APRIL 1989 £1.30

ISSN 0141-0857

Practical Wireless

The Radio Magazine

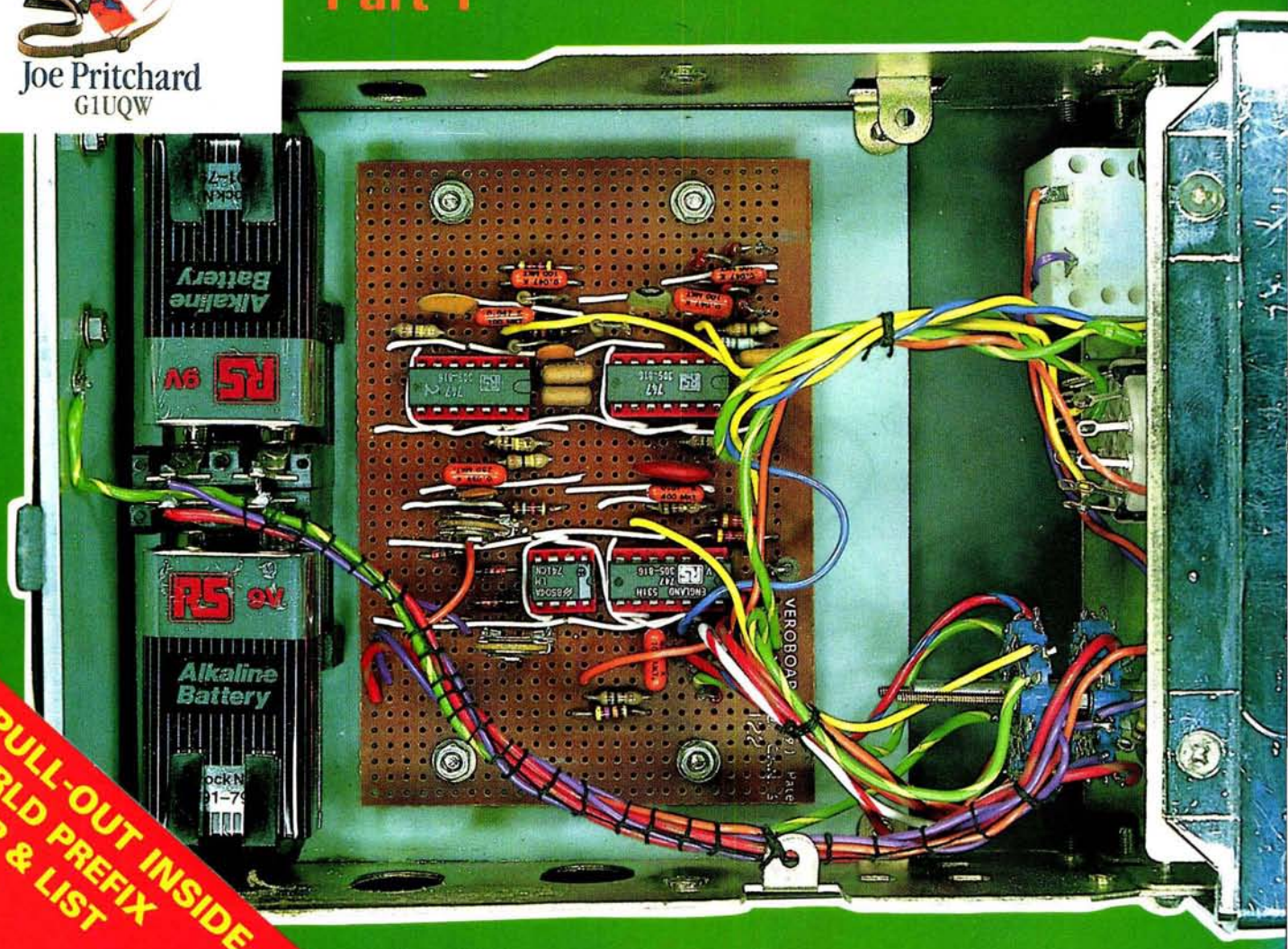
NEWNES
Short Wave Listening
HANDBOOK

Joe Pritchard
G1UQW

Pre-Publication Offer To PW Readers - Save £1 (p&p free)

Modifying The Realistic DX-100 Receiver

Transmitter 2-Tone Testing Part 1



FREE PULL-OUT INSIDE WORLD PREFIX MAP & LIST

HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

Of course, you've probably noticed a similarity to its predecessor, the FT-757GX. That's purely intentional. And now its performance is even better.

With new features like memory storage of operating mode. Slow/fast tuning selection. Automatic step-change according to mode. IF notch-filter. 10 memories. And VFO to VFO scan.

Plus you get an iambic electronic keyer. Woodpecker noise blanker. 600-Hz CW filter. AM and FM modes. AF speech processor. And 25-kHz marker generator. All at no extra cost.

Three microprocessors. Dual VFOs. Single-button VFO/memory swap. Receive coverage from 500 kHz to 30 MHz. Transmit coverage from 10 to 160 metres, including WARC bands. All-mode coverage (LSB, USB, CW, AM and FM). 100-watt RF output.

QSK operation. Massive heatsink and duct-flow cooling system for continuous RTTY operation for up to 30 minutes.

Computer Aided Transceiver (CAT) System for computer control via optional interface.

Of course, the FT-757GX/II offers the kind of options you'd expect from Yaesu, too. Including standard and heavy-duty power supplies, automatic antenna tuner, hand and desk microphones.

So no matter where you work the DX, take along Yaesu's FT-757GX/II. The full-featured HF rig you'll have a real field day with.

YAESU

UK Sole Distributor *South Midlands Communications Ltd S.M. House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY Tel (0703) 255111*

Prices and specifications subject to change without notice.

Practical Wireless
The Radio Magazine

APRIL 1989 (ON SALE 9 MARCH 1989) VOL. 65 NO. 4 ISSUE 985

THIS MONTH

Regular Features

NEXT MONTH

PW REVIEW of the Kenwood TS-790

Wireless Goes to War—The First Time!

Experimental HF Loopstick Antenna

Valved Comms Receivers Collins 75A-2

and All the usual features

Don't miss it—place your order with your newsagent now!

On sale April 13

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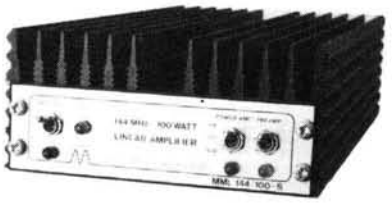
Microwave Modules

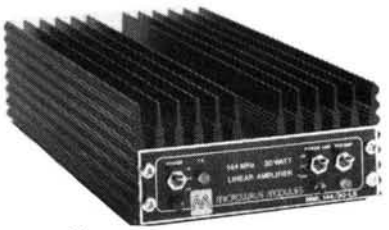
MML 144/100-S £149 (C)

★ 100 Watts output power.
★ Suitable for 10 or 25 Watt transceivers.
★ Linear all-mode operation.
★ Straight through operation when turned off.
★ Ultra-low noise receive preamplifier — front panel selectable.
★ Equipped with RF vox and manual override.
★ Led status lights for power, transmit and preamp on.



MML 144/30-LS £105 (B)

★ 30 Watts output power.
★ Suitable for 1 or 3 Watt transceivers.
★ Linear all-mode operation.
★ Straight through operation when turned off.
★ Ultra-low noise receive preamplifier — front panel selectable.
★ Equipped with RF vox and manual override.
★ Led status lights for power, transmit and preamp on.



MMT 50/28-S £295 (B)

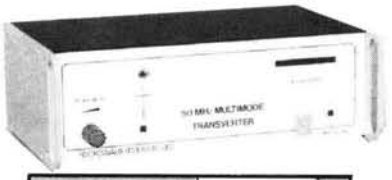
★ 20 Watts output power.
★ Input frequency range 28-30MHz.
★ Output frequency range 50-54MHz.
★ Input level range 0.1-750 milliwatts.
★ Modes:- SSB, FM, CW, FSK or AM.
★ 18.5 DB conversion gain.
★ Exceptional large signal receiver performance.
★ RF vox operator adjustable from 20 milliseconds to 1.5 seconds.

MMT 70/144 £149 (B)

★ 10 Watts TX output.
★ Output frequency range 70-72MHz.
★ Input frequency range 144-146MHz.
★ Input power range 10-500 milliwatts.
★ Low noise receive converter.
★ RF vox provides automatic changeover.
★ Input modes:- SSB, FM, AM or CW.

MMT 50/144 £295 (B)

★ 20 Watts output power.
★ Input frequency range 144-148MHz.
★ Output frequency range 50-54MHz.
★ Input level range 150 milliwatts-15 watts.
★ Modes:- SSB, FM, CW, FSK or AM.
★ 10 dB conversion gain.
★ Exceptional large signal receiver performance.
★ RF vox operator adjustable from 20 milliseconds to 1.5 seconds.



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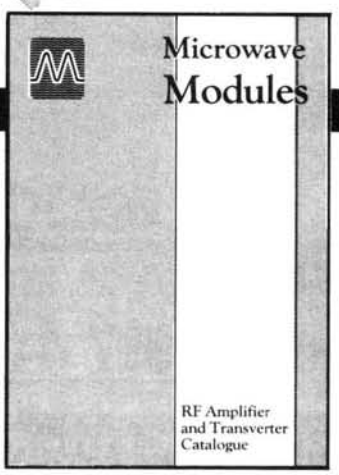

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Brenda G4VXL

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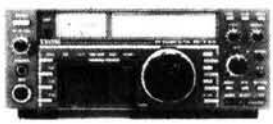

Icom have now introduced the new IC725 as an economy version. Available from stock at only £749.00

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Since the autumn of '88 with the increase in solar activity there have been openings to ZS, ZD, VE, W, HC, 5NO, LU, FY7, VP2, KP4, T1 and the prefix list is likely to increase daily. Now's the time to equip yourself for the sunspot peak. SMC can supply the transceivers, modules, antennas and amplifiers etc., that will enable you to maximise your ERP (within licence conditions) no matter what your antenna restriction or feed line loss happens to be. We have equipment available from **Yaesu, Create, Tokyo Hypower, Jaybeam, Icom, BNOS, and Microwave Modules.**

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FT767GX (module optional)	£1559.00
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FL6020 10W PA for FT690R2	£109.00
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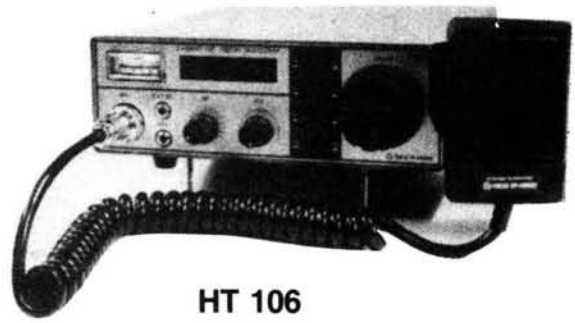
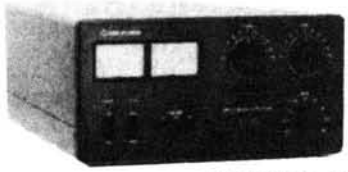
IC505 6M 3/10W	£529.00
IC575 10M/6M Base 10W	£1042.00
IC575H 10M/6M Base 100W	£1199.00



HT 106



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LPM50-10-100 10W to 100W preamp	£235.00

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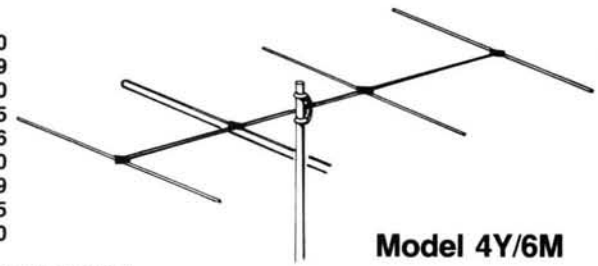
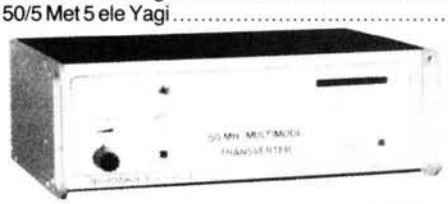


Model 4Y/6M



MMT 50/144

TRANSVERTERS

MMT50/144 6M 20W 2M IF	£289.80
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ATTENTION FT726 OWNERS

If you are missing out on the 6M information net on 28.885MHz then we have the answer. Yaesu manufactured an HF option for the FT726R that enabled operation on 10M, 17M and 15M. SMC have managed to obtain the last few of the units from Yaesu and at a very attractive price. Just what you need to keep in touch with the latest news and for crossband full duplex* operation 6M-10M. Don't you be the one to miss those exotic crossband QSQ's. Supplies of the HF module are limited, order now to avoid disappointment.

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*with SAT unit fitted.

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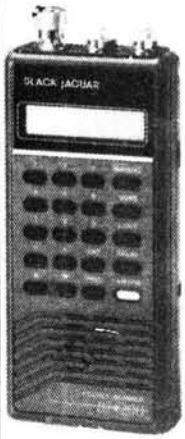

BLACK JAGUAR MkIII

The new Mark III is probably our most popular handhold scanner with 16 channels of memory and a sensitive receiver. Selectable AM or FM reception and the facility to power the set from the mains or car using one of the many accessories now available.
Frequencies: 28-30 MHz, 50-88 MHz, 115-178 MHz, 200-280 MHz, 360-520 MHz.

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(suitable for all models. BJ200, Challenger etc.)

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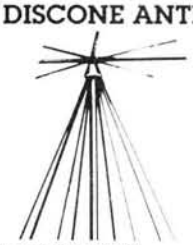
DISCONE ANTENNAS - *New British Made Antennas*



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10 off 10uf 50v	at	35p
10 off 22uf 10v	at	35p
10 off 22uf 35v	at	35p
10 off 47uf 35v	at	40p
5 off 47uf 250v	at	60p
10 off 47uf 25v	at	35p
10 off 100uf 60v	at	45p
10 off 100uf 10v	at	40p
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+5V @ 4A, +12V @ 1A, −5V @ 500mA, −12V @ 500mA ..... £17.50 + £2.60 p+p

Printed circuit permanent magnet motor/generator with toothed belt reduction drive. Input/output 2V to 30V up to 10 Amps ..... £14.00 + £3.50 p+p.

THE WIZARDS COMPUTER DESK—Save over £150.00 on this NEW desk! L102cm × W74cm × H74cm with keyboard recess and cableing trunking. To good to miss at £50.00 + £16.00 P&P

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CL33	4.00	EM87	2.50	PL802	6.00	6AL5	1.50	6L6G	7.50
DY86/7	1.50	EN91	6.50	PY33	2.50	6AM6	6.02	6L6GC	7.50
DY802	1.50	EY51	2.75	PY81	1.50	6AN5	4.75	6L7	2.50
E88CC	10.33	EY86	1.75	PY82	1.50	6AN8A	3.50	6LQ6	7.50
E180F	12.05	EY88	1.75	PY83	1.25	6AQ5	3.25	6Q7	3.75
E810F	35.48	EY500A	3.00	PY88	2.00	6AR5	25.00	6RHH8/6KN8	
EABC80	1.25	EZ80	1.50	PY500A	4.00	6AS6	8.66		10.00
EB91	1.50	EZ81	1.50	PY800	1.50	6AS7G	8.75	6SA7	3.00
EBF80	1.50	GY501	300	PY801	1.50	6AT6	1.25	6SC7	2.75
EBF89	1.50	GZ32	4.00	QQV02-6	38.00	6AU5GT	5.00	6SG7M	2.50
EC91	8.00	GZ33	4.75	QQV03-10	26.25	6AU6	2.50	6SJ7	3.25
ECC33	4.50	GZ34	5.00	QQV03-20A		6AW8A	3.75	6SK7	3.50
ECC35	4.50	GZ37	4.75		48.38	6B7	3.25	6SL7GT	3.00
ECC81	1.75	KT61	5.00	QQV06-40A		6B8	3.25	6SN7GT	3.00
ECC82	1.75	KT66	15.00		46.00	6BA6	1.50	6SS7	2.75
ECC83	1.75	KT77 Gold Lion		QV03-12	6.80	6BA7	5.00	6U8A	2.25
ECC85	1.75		12.00	R18	3.00	6BE6	1.50	6V6GT	4.25
ECC88	3.50	KT88	15.00	R19	9.24	6BH6	2.50	6X4	3.00
ECC91	8.93	N78	15.00	SP41	6.00	6BJ6	2.25	6X5GT	1.75
ECF80	1.50	OA2	3.25	SP61	4.00	6BN6	2.00	12AX7	1.75
ECH35	3.00	OB2	4.35	U19	13.75	6BQ7A	3.50	12BA6	2.50
ECH42	3.50	OC3	2.50	U25	2.50	6BR7	6.00	12BE6	2.50
ECH81	3.00	OD3	2.50	U26	2.50	6BR8A	3.50	12BY7A	3.00
ECL80	1.50	PC86	2.50	U37	12.00	6BS7	6.00	12E1	20.00
ECL82	1.50	PC88	2.50	UABC80	1.25	6BW6	6.00	12HG7	4.50
ECL83	3.00	PC92	1.75	UBF89	1.50	6BW7	1.50	30FL1/2	1.38
ECL86	1.75	PC97	1.75	UCH42	2.50	6BZ6	2.75	30P4	2.50
EF37A	5.00	PC900	1.75	UCH81	2.50	6C4	1.25	30P19	2.50
EF39	2.75	PCF80	2.00	UCL82	1.75	6C6	3.50	30PL13	1.80
EF41	3.50	PCF82	1.50	UCL83	2.75	6CB6A	2.50	30PL14	1.80
EF42	4.50	PCF86	2.50	UF89	2.00	6CD6GA	5.00	572B	65.00
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EF54	5.00	PCF802	2.50	UL84	1.75	6CH6	13.00	807	3.75
EF55	3.50	PCF805	1.70	UY41	4.00	6CW4	8.00	811A	18.33
EF80	1.75	PCF808	1.70	UY85	2.25	6D6	3.50	812A	52.50
EF86	5.00	PCH200	3.00	VR105/30	2.50	6DQ5	7.50	813	65.00
EF91	2.95	PCL82	2.00	VR150/30	2.50	6DQ6B	4.75	866A	35.00
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EL32	2.50	PCL805	2.50	4CX250B	58.00	6H6	3.00	5814A	4.00
EL33	5.00	PD500	6.00	5R4GY	5.50	6HS6	3.77	5842	12.00
EL34	6.00	PFL200	2.50	5U4G	3.00	6J5	4.50	6080	14.00
EL36	2.50	PL36	2.50	5V4G	2.50	6J6	8.93	6146A	12.00
ELL80	25.00	PL81	1.75	5Y3GT	2.50	6J7	4.75	6146B	12.00
EL81	5.25	PL82	1.50	5Z3	4.00	6JB6A	7.50	6550	12.50
EL84	2.25	PL83	2.50	5Z4GT	2.50	6JE6C	7.50	6883B	12.50
EL86	2.75	PL84	2.00	6/30L2	1.75	6JS6C	9.00	6973	7.50
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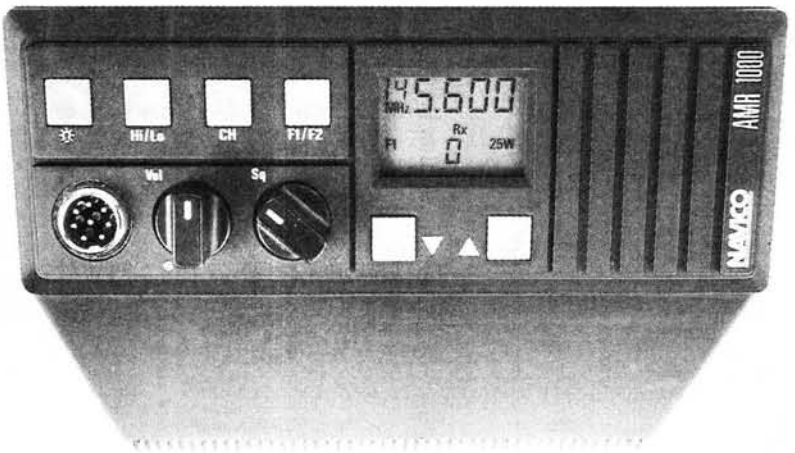

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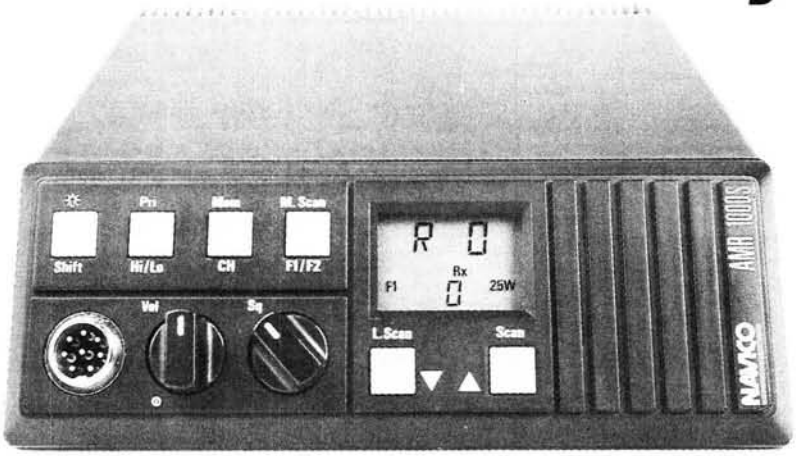
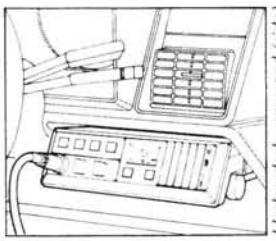
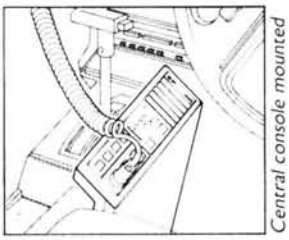
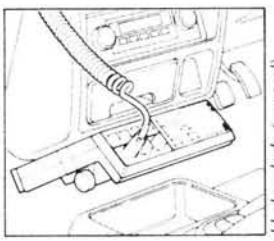
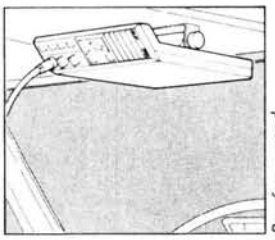



Under dash mounted (side)


Central console mounted


Under dash (central)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Application

A funny lot are radio amateurs, and none more funny than the frustrated individuals who prattle on about the Morse test. A more resentful lot of faint hearts I have not come across, for invariably they all seem to have an urgent desire to get on the h.f. bands, yet seem incapable of applying themselves to achieving that goal by surmounting the difficulties of the Morse test.

As amateur radio operators we should know, and be accomplished in, the modes which are avaialble to us on our bands. All this business of saying Morse is old hat, and looking for an easy way in, is rubbish. Let us be honest, the QSO that really gives satisfaction is the low-power DX one, and there is no better way of achieving this than by using the old up-and-down Morse key, without electronic assistance.

Though I had an intermittent interest in radio since 1975, it was only after having been retired for four years that my s.w.l. interest was rekindled, and 12 months after that I resolved to obtain my licence. This took 18 months of slogging away night after night, first to try to understand the complexities of electronic circuitry, then with an electronic tutor and later a computer program to master Morse code. I failed my first Morse test, nerves I suppose, but passed with ease on the second attempt. My 12 months on the h.f. bands subsequently have been well worth the effort.

So come on you faint hearts; stop seeking the easy way and get stuck in and stop moaning. If an OM like me can do it, so can you!

G. Bradley G0IQQ
Cleckheaton.

I Like It!

I have read with interest most of the correspondence which has taken place over several years in your excellent magazine and others, including *Radio Communication*.

I have yet to read a letter on this much debated topic which grasps the main point of the whole argument, either for c.w. or against. This is that: (a) Amateur radio is a **hobby** which caters for a wider variety of subjugate interests than does any other hobby. (b) There are many amateur radio operators who **enjoy** using Morse!

Speaking personally, I spent several years as a Class B licensee, during which time I employed (for myself and others) all the rationale on Morse, i.e. outmoded, not interested, too lazy, beneath my dignity, too difficult, too easy, the product of authoritarianism (?), etc.

Then about twelve years ago, in a fit of pique I thought "I will show 'em". And "show 'em" I did. I set to and learned the dreaded code, passed the test and then (pause for fanfare) decided that I like c.w. A whole new spectrum of communication, previously obscured, was suddenly mine.

Add to all this the inescapable fact that equipment for c.w. will always be easier to design and build than for any other mode, and the argument for Morse requires no further reinforcement. Come on in, the DX is lovely!

Ivor Wilkinson GW4RJA
Cwmbran, Gwent.

Lost to the Hobby

Ever since repeaters were invented they have been subject to a certain amount of abuse. This ranges from the inconsiderate fixed stations, who use them for hour upon hour to the exclusion of mobile stations, through the music merchants, to the foul-mouthed who pollute certain urban repeaters.

A friend of mine, who has been a s.w.l. for some years, recently asked me to lend him some gear for 2m to supplement his h.f. receiver. As well as himself, Peter's five children are quite keen on listening on h.f. During the summer, they invited to stay with them a Finnish girl whose father happens to be licensed. The idea of being able to keep in touch via amateur radio was thus quite appealing to them—ideal candidates for novice licences, one might think.

So I rigged up a dipole and a v.h.f. converter for him. After a few weeks he experienced his first "lift". The initial delight in being able to hear some new, distant repeaters soon turned to dismay at the things he heard. Obscene language, sexist and racist remarks, jamming and top of the pops. I have tried to convince Peter that the offensive things he heard are **very** unrepresentative of

PW COMMENT

International Concern

IN THE JANUARY 1989 ISSUE OF *QST*, journal of the American Radio Relay League, the Editorial and two pages of members' letters are devoted to the thorny question of the continued requirement for Morse operating skills as part of amateur radio.

The letters are in response to one in an earlier issue which had written Morse code off as obsolete. Interestingly, the average age of the 13 letter-writers was 38—about ten years younger than the average American amateur, yet every one of them was in favour of keeping Morse.

The Editorial, written by W4RA and K1ZZ, ARRL's President and Executive Vice-President respectively, comments on the decision last November by the International Maritime Organisation to bring its long-awaited Global Maritime Distress and Safety System on line during the next decade. By 1999, ships worldwide will be equipped to permit any member of the crew to send a distress signal at the press of a button. Ship owners are expected to use this development to phase out their shipboard Morse radio operators, and to rely on satellites and maritime telex to keep in touch with their vessels.

On this side of the Atlantic, Portishead Radio, the British Telecom International station which provides the UK's long-range radio service for shipping, has seen major changes over the past twenty years or so. Up to the beginning of the 1970s, all communications there were by Morse code, apart from those with a handful of high-traffic ships with automatic telegraphy equipment. Now, telephone and telex are the norm, and manual Morse traffic is falling in volume, used only by ships whose trading pattern necessitates very little communication with their owners and agents, and by ships of the developing countries which simply cannot afford the capital investment for automatic systems. Portishead Radio expects to go on communicating by Morse with those who require it for as long as the amount of business warrants running the service.

So, though Morse may have lost its pre-eminent position in commercial systems where there are large volumes of information to exchange, internationally it is by no means dead. The correspondents in *QST* point out that training in the use of Morse continues in the US Navy, Air Force and Marine Corps, and that the Soviet Navy still makes heavy use of c.w.

Learning and using Morse is a challenge; it exercises the mind and promotes bodily co-ordination, but most of all, IT'S FUN!

Geoff Arnold

amateur radio but to no avail. What is worse is that Peter is considering selling his h.f. receiver and taking up some other hobby. He has already banned his kids from listening because he fears for what they might hear. An over-reaction, perhaps, but quite understandable in the circumstances.

So what, you may say, but this selfish behaviour by the few has meant the loss of six potential amateurs. The RSGB want to encourage more youngsters into the hobby and seem to be taking some positive steps to do this. The hobby can ill afford to miss opportunities to recruit new devotees.

This incident set me thinking about the degree of spectrum abuse, particularly on 2m. For many years the GB3SL repeater in South London has been a veritable cesspool of the worst kind of abuse. More recently the GB3BM repeater has been the subject of long-term abuse by people playing records and suchlike. Another repeater subject to systematic abuse is GB3NA. In this case many of those who use foul language are quite blatant about the fact that they are licensed and even give their callsigns.

Over the years the standard line seems to be: "Ignore them and they will go away". Well, this policy has been seen to fail miserably. Contrast this with the situation in the USA where the amateur population have tracked down many culprits and handed the details to the FCC (USA equivalent of the DTI) for enforcement and prosecution. In the USA licences are quickly revoked and large fines imposed when abuses occur.

I would like to know why this does not happen in this country. Why do the authorities and repeater groups adopt an ostrich-like posture to this abuse? Numerous complaints have been made to the RSGB Amateur Radio Observation Service, the DTI, the RIS and the RSGB Repeater Management Group over a long period of time with little or no effective action being taken as a result.

If **you** are unhappy about this state of affairs, why not write to the Secretary of the RSGB or to the DTI, expressing a wish for effective action to be taken **now** rather than next week or next year. Even better, write to your MP who is in a position to put pressure on the DTI officials to carry out their responsibilities. The problem can be dealt with provided the powers-that-be are put under sufficient pressure. Do it today: don't wait for someone else to do it!

P. L. Crosland G6JNS, Worcester.

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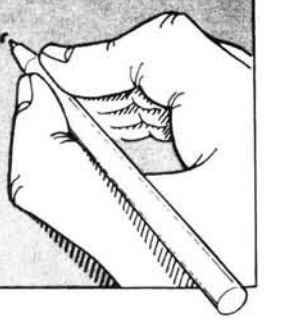


What's Your Line?

I hope discussions about Morse will go on, as in *PW* Feb. 1989, along with its use by those radio amateurs who like value for money. The simplest effective apparatus and a few watts can lead to a clear contact with the other side of the world, a process more complicated and expensive when the carrier is speech-modulated.

Was there not a time when acquiring an amateur transmitting licence depended upon persuading a government department that the applicant intended to pursue a useful line of research in wireless? Might this not have to come in again for true amateurs.

Gordon Lines G1TMA Reigate.

Babblers?

In response to John Hillerby's letter in *PW* Feb. 1989, I doubt if most of the non-c.w. or Class B amateurs are "up-market CB babblers".

I use PR27, CB27/81 and CB934/81, mostly 934, for a chat with users with like interests, none of whom, in my opinion, are up-market or down-market CB babblers.

I have never found teaching c.w. "heart-breaking" but rather rewarding, especially when you are presented with a sheet of "joined-up writing". However, it takes all sorts, and I am sure there is room for all modes. I am equally sure that the Tom referred to is due for a thrill when he reads John at 20 w.p.m., and jolly good luck to both of them.

A note of caution? — it is dangerous to generalise, c.w. is not music to all ears as a shout from the kitchen or lounge often reminds me.

E. Swan Eastbourne.

Chicken Wire

Reading about the "Chicken-wire Discone" (*PW* Feb. 1989) brought back happy memories of yesteryear. I had completed building the £9 *PW* TV receiver made from surplus radar equipment when an article appeared on building a TV antenna using chicken-wire netting. This was hung from the rafters by string. After setting up the TV, I was rewarded for quite some time with a good picture from Sutton Coldfield, some 70 miles away.

After a few months I was dismayed to receive a weak picture gently rolling from top to bottom of the screen. I checked the TV receiver and could find no fault, but on clambering into the loft I found that the string holding up my antenna had broken, and the netting was rolled into its original shape on the floor of the loft.

I am sure that many building the discone will have a lot of fun and also pretty good results, but make sure that the discone is held securely in place.

Vic Westmoreland G3HKQ Retford, Notts.

USB?

Perhaps it is time to use upper sideband on all amateur bands. The use of l.s.b. on 1.8MHz (160m) and 3.5MHz (80m) continues from the early days of s.s.b. radio, when a technical simplification made this popular. Modern transceivers are now more complicated and expensive by having to offer l.s.b. as well as u.s.b. However, the main advantage of using u.s.b. on 80m and 160m would come from being able to operate closer in frequency to other u.s.b. services without interference, and more room on 80m can't be bad!

M. Mann G4FFO Cambridge.

Modern Times

I have to admit that I sometimes wonder at the nature of the society in which we live today. Much comment heard whilst going about one's daily routine is based on complaint. Either that or upon the fact that the other guy seems to be having an easier time of things than is fair.

Fair to whom? To those, perhaps, who are not prepared to put so much effort into making a success of what they choose to do. To those who expect too much from the state, the boss, the wife, the kids, the hobby? To those, in fact, who seem to believe that all things are theirs by right, simply because they want them. What a pity that this attitude has wormed its way into what is possibly the finest hobby in the world—amateur radio!

In all the letters columns of all the publications available to the radio enthusiast, one sees repeated complaint about the fact that one class of licence cannot be achieved without a Morse pass. "Morse is antiquated", "Morse is unnecessary", etc. Morse is, in fact, simply another means of communication; a language that one has to learn in order to communicate with other users of that language.

There are those who claim not to be able to learn Morse, but who travel to sunny lands each year for holidays and manage to learn enough Spanish, French, Greek, or whatever, to get by. Six months of effort may have been devoted to learning sufficient Italian to enable the individual to ask a waiter for fish and chips, but suggest that he learn Morse to communicate with almost any country in the world and the target of your suggestion will fly into a rage and storm about the current government, the DTI, the RSGB, and his last quarter's gas bill. All because the word "Morse" has been uttered.

I would, perhaps, agree that the commercial use of c.w. may no longer make too much sense, given the developments that have been made over the last thirty years or so. However, my impression was that the purpose of the hobby of amateur radio was not to ape the activities of the commercial radio operator, but rather to provide an opportunity for self-training and the development of one's ability in a companionable hobby.

Those who have sufficient ability and commitment to succeed in the RAE could surely find the same—barring certain physical difficulties—in order to pass the dreaded Morse test. If, on the other hand they are unable to do so, then why can they simply not accept the rules of the game? After all, they did know the rules when they started to play; now they seem to want to move the goalposts before half-time.

Do stop whingeing about these matters in the letters columns. Get on with gaining pleasure from whatever class of licence may be available under the rules.

Just to clear up one small matter; I passed neither the Morse tests nor the RAE first time. I had to go back again, but it made it all the more satisfying when success was finally achieved.

Name and address supplied.

OUR SERVICES

QUERIES

We will always try to help readers having difficulties with a *Practical Wireless* project, but please observe the following simple rules:

1. We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2. We cannot deal with technical queries over the telephone.
3. All letters asking for advice **must** be accompanied by a stamped, self-addressed envelope (or envelope plus International Reply Coupons for overseas readers).
4. Write to the **Editor, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** giving a clear description of your problem.
5. Only one project per letter, please.

BACK NUMBERS AND BINDERS

Limited stocks of many issues of *PW* for the past 18 years (plus a few from earlier years) are available at £1.40 each, including post and packing to addresses at home and overseas (by surface mail).

Binders, each taking one volume of *PW* are available Price £3.50 plus £1 post and packing for one binder, £2 post and packing for two or more, UK or overseas. Prices include VAT where appropriate.

CONSTRUCTION RATING

Each constructional project is given a rating, to guide readers as to its complexity:

Beginner
A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.

Intermediate
A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.

Advanced
A project likely to appeal to an experienced constructor, and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on his own.

COMPONENTS, KITS AND PCBS

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. **Kits** for our more recent projects are available from **CPL Electronics,** and from **FJP Kits** (see advertisements).The **printed circuit boards** are available from our **PCB SERVICE** (see page 40 of this issue).

CLUB NEWS

If you want news of radio club activities, please send a stamped, self-addressed envelope to **Club News, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** stating the county or counties you're interested in.

ORDERING

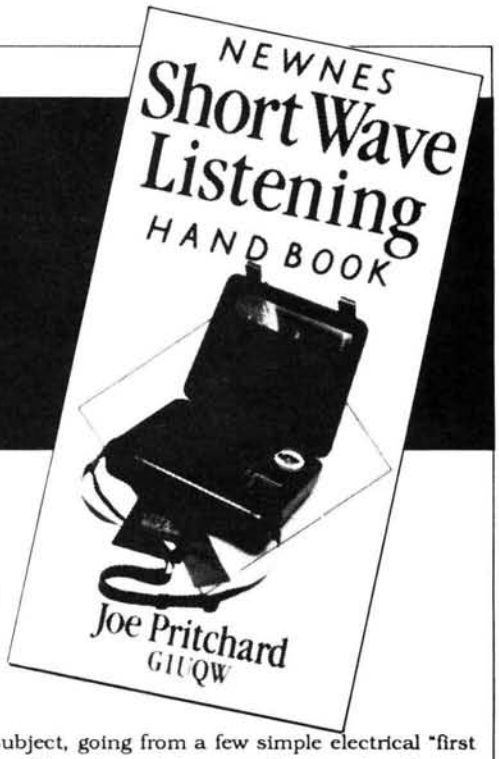
Orders for p.c.b.s, back numbers and binders, *PW* computer program cassettes and items from our Book Service, should be sent to **PW Publishing Ltd., FREEPOST, Post Sales Department, Enefco House, The Quay, Poole, Dorset BH15 1PP,** with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders **must** be drawn on a London Clearing Bank.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Poole (0202) 678558. An answering machine will accept your order out of office hours.

SUBSCRIPTIONS

Subscriptions are available at £15.50 per annum to UK addresses, £18 to Europe, and £19 elsewhere (by Accelerated Surface Post). For further details, see the announcement on page 41 of this issue.

Special Offer



To *PW* readers - a special pre-publication offer on a new book by Joe Pritchard G1UQW.

Save £1.00 off the published price of £12.95

The *Newnes Shortwave Listening Handbook* first covers the "science" side of the subject, going from a few simple electrical "first principles", through a brief treatment of radio transmission methods to simple receivers. The emphasis is on practical receiver designs and how to build and modify them, with several circuits in the book, from the crystal set to converters, regenerative receivers, direct conversion and simple superheterodyne sets. Various "peripherals", such as antenna tuners, filters, preselectors, noise limiters and c.w. and RTTY terminal units are also covered.

The second half of the book covers the "listening" side: the use of sets, what can be heard, the various bands, propagation, identification of stations, sources of information, QSLing of stations and listening to amateurs. Some computer techniques, such as computer Morse decoding and radioteletype decoding are also covered, along with computerised record keeping and other applications of the computer in the shack. Interference sources and cures are investigated.

Newnes Shortwave Listening Handbook is for all existing and potential short wave listeners who want a technical guide covering construction and for the listener who wants to explore the bands between 0 and 30MHz.

Joe Pritchard G1UQW, is the author of six computing books, numerous articles in the computing and electronics press and has been a radio amateur for more than ten years.

The *Newnes Shortwave Listening Handbook* (ISBN 0 434 91550 5) is in paperback, comprising 288 pages 216 x 138mm with 80 illustrations, and will be published by Heinemann Newnes. The special pre-publication offer price to *PW* readers is £11.95 including post and packing. (Books are zero-rated for VAT).

HOW TO ORDER

Complete both coupons in ink, giving your name and address clearly in block capitals. Coupon (2) will be used as the address label to despatch your book to you.

Send the coupons with your cheque to: *Practical Wireless*, Book Offer (Apr), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP. If you wish to pay by credit card (Access, Mastercard, Eurocard or Visa only), please fill in your card details and sign the coupon where indicated.

Available to readers of *PW* in England, Scotland, Wales, N. Ireland, the Channel Islands and the Isle of Man. Orders are normally despatched within 28 days, but please allow time for carriage. **The closing date for this offer is 14 April 1989**

(1)

To: PRACTICAL WIRELESS, Book Offer (Apr), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP

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PW Publishing Ltd., Poole, Dorset (Reg. No. 1980539, England)

SHORT WAVE LISTENING BOOK OFFER APRIL 89

Radio Pirates

There will be no let-up in the Government's crackdown on pirate radio stations following a record year of raids against illegal broadcasters, Industry Minister Robert Atkins has said.

The Department's Radio Investigation Service (RIS) made nearly 450 raids last year. More than 100 people were prosecuted—a rise of over 50 per cent on 1987, the minister announced that the Government is to seek more powers to prosecute people who advertise on or support the pirate stations.

The interference from uncontrolled radio broadcasts can threaten vital communications for emergency services like fire and police; important radio links for businesses and legitimate radio and TV services.

"The RIS are not killjoys," said Mr Atkins. "I must warn pirates that there will be no let-up. The RIS will continue to keep up the pressure to make certain that interference is removed."

He outlined powers which the Government will be seeking, which would make it an offence: to supply goods and services for the operation of an unlicensed station; to advertise on an unlicensed station, or to solicit others to do so and to engage in the operation of an unlicensed station.

The proposals would need legislation to put them into effect.

"The Government is using the carrot as well as the stick. There are positive incentives for those interested in community-based local radio to stay within the law, with 20 licences for community stations available to the most suitable applicants this year.

"But the rub for the pirates is that anyone with a conviction for a piracy committed from 1 January 1989 onwards will be barred for five years from applying for a community radio licence. So there is even less reason to risk fines of up to £2000 and 3 months in jail by staying on the wrong side of the law."

HMS Warrior

The Fareham & District ARC will be operating a Special Event Station with the callsign **GB4HMS** on board HMS *Warrior* during the spring and summer this year.

The station will be active most weekends on v.h.f. and h.f. with the emphasis on 'phone operation.

HMS *Warrior 1860* is a 3-masted, square rigged sailing ship also fitted with a twin cylinder steam engine. Launched in December 1860, at a time when war with France seemed inevitable, HMS *Warrior* was Britain's first iron-clad warship and the fastest, largest and best armed warship in the world at that time.

After an 8-year restoration scheme, costing over £7 million, HMS *Warrior* is on display in Portsmouth Dockyard.

The group running the special event station would like to thank both Portsmouth City Council and SMC Ltd., for their help in getting the station on the air.

You can get more information about the station from:
Rodney Smith G0ERS,
59 High Street,
Southwick,
Fareham,
Hants PO17 6EF.

Frequency Allocation Chart

The radio frequency bands allocated to commercial and industrial uses in the UK can be seen at a glance on a colour coded bar chart prepared by the DTI's Radiocommunications Division.

Frequencies from 1kHz up to 60GHz are covered by the chart which is divided into primary and secondary uses.

The main uses shown are broadcasting, fixed services, mobile, amateur, meteorological, radio location, navigation, astronomy, space and the various maritime, aeronautical and satellite bands.

The chart is available from your local HMSO, priced £2.50, the ISBN number is 0 11 514637 7.

Weather Station

ICS have announced a new low cost microprocessor controlled weather system from Magnaphase Industries Inc., Seattle, USA.

ICS say that this battery powered unit is cheaper than any other similar system and brings local weather monitoring of wind speed and direction, temperature and precipitation within the range of many boat owners and amateur radio enthusiasts. It can be installed on a boat, in the home, the office—in fact almost anywhere.

Also available from ICS is the matching PCW system for the IBM PC. This enables long term monitoring and analysis of wind speed and direction, temperature, precipitation and air pressure. Support software operates in background mode and the price for this is £299.95.

The other prices are: £129.95 for the micro weather station with anemometer, £39.96 for the rain collector, £7.75 for the desk stand, £2.95 for the mounting template, £9.95 for the 40 foot extension cable and £3.95 for the 12 volt d.c. lighter power cable. These prices don't include P&P, contact ICS for details.
ICS Electronics Ltd.,
PO Box 2,
Arundel,
West Sussex BN18 0NX.
Tel: 02436 5655.

Special Event Stations

Following the success of the world wide event last year, International Marconi Day will be held from 0001 to 2359 on April 22. Keep a look out for the following stations:

K1VV/IMD*: From the Cape Cod area where the first Europe to USA contact was made.

VE1IMD*: From Nova Scotia at the Marconi site where later this year the new Marconi Museum will be opened.

VO1IMD*: From St. Johns, Newfoundland, where the first transatlantic contact was made.

Catalogues

Kanga Products' latest catalogue contains a few changes since the last edition. You can now buy either the p.c.b., instructions and components OR the p.c.b. and instructions only (at a reduced cost). They have some new kits too, a transmitter to match the dual band receiver, a Morse code practice oscillator and a simple transmit/receive control board.

If you would like to receive a copy of the catalogue, send an s.a.e. to:
Kanga Products,
3 Limes Road,
Folkestone,
Kent CT19 4AU.

ITW Switches has just produced a new short-form catalogue which provides a brief overview of some of the most popular switch products in the company's range. Full colour photographs illustrate the various switch types and they're accompanied by a brief description of their salient features in English, French, German, Italian and Spanish.

For a free copy of ITW's short-form catalogue, send to:
ITW Switches,
Norway Road,
Portsmouth,
Hants PO3 5HT.

The Vintage Wireless Company Ltd has sent us their Antique Wireless Newsheet No. 130. This is issued every month and 12 issues will cost you £4 in the UK (overseas including Eire £5). The newsheet contained all kinds of things as well as the list of their standard stock items such as subscribers' adverts, news snippets, forthcoming events and special offers. For more details, contact:
The Vintage Wireless Company Ltd.,
Tudor House,
Cossham Street,
Mangotsfield,
Bristol BS16 3EN.
Tel: 0272 565472.

Electromail's November '88 to February '89 catalogue has recently arrived. If you are into home construction this is the catalogue to have. Make sure, however, that your bookshelves are reinforced as this book is heavy—the numbered pages stop at 1137, while the index sections and the pages provided for notes are thicker than many other catalogues! It gives extremely detailed technical data on of each item and as such provides you with a very useful reference work.

This catalogue gives you access, on a strictly cash or credit card number with order basis, to the enormous range of components stocked by RS Components at competitive prices, with no minimum order charge and even discounts for larger volumes. Your own copy will set you back £4.95 plus £2.00 P&P direct from:
Electromail, PO Box 33,
Birchington Road,
Corby,
Northants NN17 9EL.
Tel: 0536 204555.

Harris Electronics (London) Ltd have a wide range of panel meters both analogue and digital in their catalogue. To help you select a suitable model they have provided full-size front views, together with mounting details of each analogue meter in their range. For digital panel meters the information is given in tabular form.
Harris Electronics (London) Ltd.,
Unit 3,
GEC Estate,
East Lane,
Wembley,
Middx HA9 7PJ.
Tel: 01-908 3355.

Technicad, who represent Emmerich of West Germany, have just published a short form catalogue which outlines the design and performance features of the standard 1.2V NiCad cell and the unique double and triple cells of 2.4 and 3.6V. Included are details of their extensive range of high-capacity button cells, memory buffer batteries and batteries with standard solder tags, single as well as double p.c.b. pins. For further details contact:
Technicad Ltd., Unit 4C,
Sunrise Business Park,
Blandford,
Dorset DT11 8ST.
Tel: 0258 59581.

New 430MHz Repeater

A new 430MHz repeater, GB3EH, commenced operation on Wednesday January 18 from a site at Edge Hill, about 10km north-west of Banbury. The channel used is RB8 and coverage is provided for the Banbury and Stratford-upon-Avon area.

It is expected that a good stretch of the forthcoming M40 Oxford to Birmingham motorway will also be covered by this unit.

The repeater uses a Pye 412 base station, two Pye AE450 cavities in notch mode and a pair of end-fed dipoles custom built by Radio Structures of Northampton. The logic was built by G8PYT and provides a signalling frequency of 875Hz (one octave below toneburst) with callsign interval and timeout set as 256 seconds. A reply pip is sent after an input transmission of 4 seconds or more.

Reports and contributions would be welcomed by G40HB or G8CQH, QTHR.

Aircastle Products

We have been asked to point out to readers who have had trouble contacting Aircastle Products during their recent change of premises that their new telephone number is 0202 632040.

EI2IMD*: From near the location where the first Irish experiments took place.
IY4FGM*: From the official Marconi Club Station in Italy.
GB0IMD*: From the area on the Isle of Wight where many experimental transmissions were made by Marconi and his colleagues.
GB4IMD*: The Cornwall Radio Amateurs Club station operating from the original Marconi Site at Poldhu Cove on the Lizard Peninsula in Cornwall. There is an award available linked with the stations marked *.
GB2STB**: This station will be operational from March 25 to 27 at the New Lanark World Heritage Site, a Cotton Mill and village.
GB2DWR**: This station will be on the Distillers Whisky Route on April 29/30 from the Blair Athol Distillery, Pitlochry, Perthshire.
GB2RB**: Celebrating Robert Burns, this station will be on the air during May 27/28 from Burns House Museum, Mauchline, Ayrshire.
GB2RBC**: Located at Royal Balmoral Castle, Crathie, Aberdeenshire on June 24/25.

There are two awards available for working those stations denoted by ** and other Scottish Special Event Stations for which the dates will be announced when we know them.
GB2NTS, GB2NTU, GB2NTW and GB2NTE: On July 29/30 four stations will be on the air from different National Trust properties, one each in Scotland, Ulster, England and Wales. Hopefully Ireland will make up a fifth country (EI). If you live overseas and can contact two of these stations, or if you live in the UK/Ireland and contact three stations there is a Commemoration Certificate available. Overseas the cost is $1 or equivalent return postage by Air Mail, UK/Ireland it requires a 19p s.a.e. You need to send QSL cards or log extracts to:
Scottish Tourist Board (Radio Amateur) Expedition Group, PO Box 59, Hamilton, Scotland ML3 6QB.

GB2WW & GB4BOB

During 1989, the Bedford & District Amateur Radio Club plan to commemorate the outbreak of the Second World War by operating several Special Event Stations using the callsigns GB2WW and GB4BOB.

The locations will include a number of former RAF and USAAF stations in and around the Bedford area which were in use during the hostilities.

Further details can be obtained from the Special Events Manager:
Ray G0EYM,
30 Cotswold Close,
Putnoe,
Bedford MK41 9LR.
Tel: 0234 244506.

Awards

The Scottish Tourist Board (Amateur Radio) Expedition Group are fielding two awards this year. The first is the Thistle Award which can be obtained for working four of their special event stations this year. The second is the Supreme Tartan Banner Award which means you need to work all six of their stations. Short wave listeners can also apply for the certificates on a heard basis.

Details of the stations known about at the moment can be seen under the heading "Special Event Stations" elsewhere on these pages.

The Thistle Award costs £1 including postage and claims should be sent to:
Robbie GM4UQG,
PO Box 59,
Hamilton,
Scotland ML3 6QB.

The Marconi Award requires you to work six of the seven special stations on during International Marconi Day (again details of the stations are elsewhere in these pages). QSL cards can be exchanged with any of the stations, either via the bureau, or if preferred directly (with stamps or cash to cover postage please).

All official award claims must be made via ***CRAC, PO Box 100, Truro, Cornwall TR1 1RX***. They must be accompanied by either $5 (US), £2 (UK) or 10 IRCs. The official award is for full two-way working only, but in addition this year, they are offering an extra award for short wave listeners. Again applications need to be via CRAC. Claimants will have to record at least six of the Marconi Day stations plus the stations being worked together with the times heard (UTC). The s.w.l. award will cost $3, £1.50 or 6 IRCs.

Operation this year will be voice only and preferred frequency segments will be: 3.77-3.78, 7.07-7.08, 14.26-14.28, 21.36-21.38, 28.36-28.38, 28.76-28.78, 29.36 (f.m.) and 50.26-50.28MHz.

Soldering Iron

Greenwood Electronics have introduced a new version of their electronically-controlled Oryx Platinum 45 mains iron.

Whilst still offering such features as spike-free switching and proportional control electronics, a redesign now relocates the warmer parts of the control circuit to the base of the safety handle. Not only does this eliminate heat from the handle, it also reduces the weight of the iron and enables the platinum sensor to concentrate on measuring the heating element without having to compensate for other hot spots. This leads to far greater accuracy of temperature control—now within just 2 per cent.

A solid state electronic control system has been designed for severe production conditions where stability, reliability and mechanical strength are prime requirements.

The 45W iron is available in 24, 115 and 220-240V versions and is now supplied with a safety stand at no extra cost.
Greenwood Electronics,
Portman Road,
Reading,
Berkshire RG3 1NE.
Tel: 0734 595843.

Can You Help?

Philip Taylor is looking for a good working example of a Brimar or STC "tunograph" tuning indicator. This is to complete a working display of all the different types of electron ray tuning indicators, or magic eyes, as they were called. The "tunograph" was marketed in the very late 1930s and from an STC manual, appears to be a very simple form of c.r.t. with one set of deflector plates and a small metal screen built into a valve size bulb. The filament has a rating of 0.9V at 0.5A. If you can help, contact:
Philip Taylor, 14 Willow Walk, Canewdon, Rochford, Essex SS4 3QH.

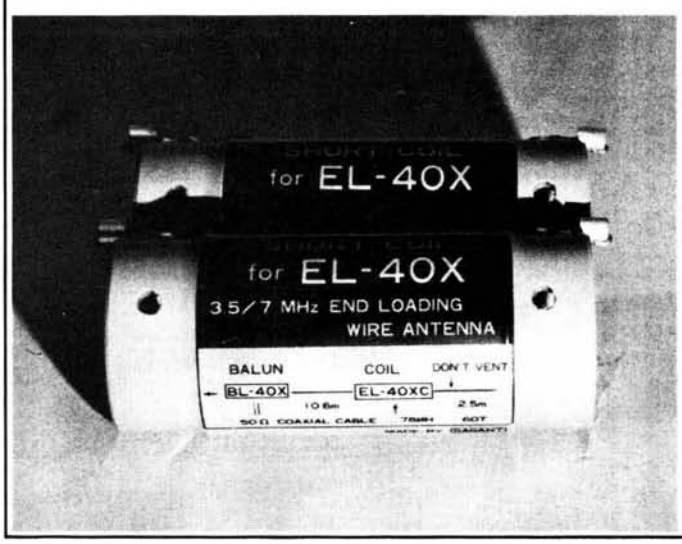
David Brown is searching for data on the 7360 balanced modulator tube. If you know anything that will help, write to: ***David Brown, 1 Ady Street, Hunters Hill, London.***

Mr Kilpatrick would like to beg or borrow a copy of *Introducing RTTY* and is willing to do so on a deposit. If you can help, contact:
Mr. G. W. Kilpatrick, 63 Love Lane, Whitby, N. Yorks YO21 3LQ.

Traps for 3.5 and 7MHz

With the growing improvement in h.f. band conditions, many operators are trying their hand on the short wave bands for the very first time. One of the problems with today's small garden is that of fitting an antenna for 3.5 and 7MHz into the available space. One answer is to use a loaded dipole and, if choke traps are used, it is possible to construct a loaded two-band dipole.

Waters & Stanton are now marketing a pair of traps that will do that. Using the instructions provided a two-band dipole can be constructed that measures approximately 24.5m long and covers 3.5 and 7MHz. If the ends of the antenna are dropped down vertically, it is possible to reduce the horizontal run to something of the order of 18m.



For those who are using a half-size G5RV antenna, the same traps can also be used to add 3.5MHz to this antenna, whilst only increasing the length by a metre or so.

The traps are sold as pairs complete with instructions and are rated to at least 500W. Those wishing to use them to add 3.5MHz to half size G5RV antenna should request the appropriate additional instructions when ordering. The traps cost £16.95 plus £1.50 P&P from:
Water & Stanton Electronics,
Warren House,
18/20 Main Road,
Hockley,
Essex SS5 4QS.
Tel: 0702 206835.

Special Offer

The portable HP4951A protocol analyser is on special offer from the used equipment specialist firm of Carston Electronics Ltd. They can supply the instrument fully tested, calibrated and guaranteed.

Among the facilities are bit error rate testing, non-volatile memory to hold data and menu set-up and remote data transfer capability. Data codes includes ASCII, EBCDIC, Baudot, six bit transcode, IPARS and EBCD.

The analyser has a 32KByte RAM for data and menu storage and a 256KByte tape drive for off-line storage.

Carston Electronics say they now operate a fast, comprehensive second-user equipment and computer peripherals service based on a computerised source/buyer database to respond rapidly to its customers' requirements.

Carston Electronics Ltd., 2–6 Queens Road, Teddington, Middlesex TW11 0LR. Tel: 01-943 4477.

Stolen!

On the evening of January 7, a Yaesu FT-290R (serial no. 3E270750) with leather case and mic was stolen from a car in the Scunthorpe area. Any information would be appreciated. Telephone either the Scunthorpe Police on 0724 282888 or your local police.

Hand-held Multimeter

The 6022A is a hand-held digital multimeter available from Global Specialties.

The instrument features a $3\frac{1}{2}$-digit liquid crystal display and has six functions—d.c. volts, a.c. volts, direct current, alternating current, ohms, h_{fe} and diode test.

Ranges for the multimeter are 200mV to 1000V d.c., 200mV to 750V a.c., 200µA to 20A d.c. and a.c., 20Ω to 20MΩ and finally *pnp/npn* transistor testing, measuring h_{fe} from 0 to 100 at an I_b of 10µA.

The 6022A is powered by a 9V alkaline battery providing in excess of 150 hours continuous use. The meter is supplied with test leads and a carrying case is available as an option. The 6022A costs £39.95 from:

Global Specialties, 2-10 St. John's Street, Bedford MK42 0DH. Tel: 0234 217856.

Rally Calendar

March 12:** The Trafford Rally, now also being called The Great Northern Rally, organised by The Trafford Amateur Radio Club, is moving to a new venue—G-MEX, the new Greater Manchester Exhibition & Event Centre. All the usual attractions will be there including a free draw, Bring & Buy, licensed bar, hot & cold meals, lots of room on one floor and plenty of parking. Talk-in on S22. All enquiries on. ***Tel: 061-748 9804 or 061-881 3739.

March 19: Wythall Radio Club will be holding their 4th Annual Radio Rally at Wythall Park, Silver Street, Wythall, Worcs. This is on the A345 south of Birmingham. Doors open at 11.30am. There will be three large halls, the usual trade stands, a flea market, a large Bring & Buy, snacks available and a bar. Talk in on S22 with more free parking this year. Admission is 50p with more details from: ***Chris G0EYO on 021-430 7267.***

March 26: The Cunningham & District ARC are starting a new rally at the Magnum Leisure Centre in Irvine to combat the shortage of rallies for Scottish amateurs. Doors open at 10.30am. More details from: ***Bob Low on 0563 35738.***

April 30: The British Amateur Television Club will be holding their 1989 rally in new and larger premises. This year they'll be using the Founders Suite at the Coventry Crest Hotel. This is located on the A46, about 450m south of junction 2 of the M6. There will be the usual wide range of trade stands and demonstrations covering all aspects of both amateur and satellite TV equipment. The hotel training centre has been made available for technical lectures which are to be given in the afternoon. There is ample parking and the rally opens at 10am. Admission is free to BATC members who bring their ticket from *CQTV* and 50p to non-members.

May 7: The Southend & District Mobile Rally will be held at Roach Way Youth Centre, Rochford, Essex. Doors open at 10am. More details from: ***Ted G4TUO. Tel: 0702 202129.***

May 21: The "Hobbies Fair" is the first event in the Science Museum's Wroughton 1989 season. As well as radio this event covers a wide range of interesting hobbies and also offers the rare opportunity to see some of the Science Museum's stock of aircraft and other transport items which are stored in the hangars. Wroughton Airfield is south of Swindon, Wiltshire and easily reached by road.

May 28: The 13th Annual East Suffolk Wireless Revival will take place at the usual venue of the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich. That's between Bucklesham Road and Felixstowe Road (now the A1156) and adjacent to the Suffolk Showground. There will be the usual traders, an RSGB book stand, and antenna testing range, Bring & Buy, car boot sale, transceiver clinic, etc., plus non-radio stands, a children's play area and a model flying display. Doors open at 10am. Further information from: ***Colin Ranson G8LBS, 100 Stone Lodge Lane West, Ipswich IP2 9HR. Tel: 0473 464047.***

***June 11:** The Royal Naval Amateur Radio Society's Annual rally is scheduled to be held at HMS Mercury again this year. More details nearer the date.

June 25:** The 32nd Longleat Amateur Radio Rally will be held as usual in the grounds of Longleat House, Warminster, Wiltshire. This rally is always popular as it offers something for the whole family. More details from: ***Shaun O'Sullivan G8VPG, 15 Witney Close, Saltford, Bristol BS18 3DX.

July 9: The 1989 Droitwich Strawberry Rally will take place at the High School, Droitwich. There will be trade stands, a Bring & Buy, family entertainment and strawberry fields (weather permitting). There is both free entrance and car parking. ***Derek Batchelor G4RBD. Tel: Worcester 641733.***

July 15:** The Cornish Radio Amateur Club rally will be held at Richard Lander School, Truro. There will be the usual trade stands, a Bring & Buy, computer displays/demos and refreshments. There is plenty of free parking as well as attractions for all the family. More details from: ***Rolf Little. Tel: 0872 72552.

August 13:** Hamfest '89 will be held at the Flight Refuelling Sports Ground, Wimborne, Dorset. Gates open at 10am and there's free car parking as well as overnight camping facilities. The day will feature radio and electronics trade stands, field displays and a craft and gift fair. More details from: ***Rob G6DUN. Tel: 0202 479038.

*Practical Wireless & Short Wave Magazine in attendance.

If you are organising a rally and would like it mentioned in *Practical Wireless*, then drop us a line, preferably as soon as you have fixed the date but no later than 6 weeks in advance (marking your envelope Rally Calendar) and we'll do the rest. Please make sure that you include all the details including such essential information as the venue, starting time, special features and a contact for further information.

Modifying the Realistic DX100 Communications Receiver

A few years ago, the DX100 was the lowest priced communications receiver in the Tandy range. Nowadays, they change hands at rallies at around £30. In this article, Alan Mills G1CAQ describes the modifications he made to improve the performance of one he obtained in just this way.

At first, it seemed a good buy, but as anyone who has ever owned a DX100 will tell you, it has a few shortcomings.

One is that the selectivity on crowded bands is abysmal to say the least! Another is that for some reason best known to the manufacturers, the b.f.o. cannot be switched on when either the long wave or medium wave band is selected. So, with these factors in mind, I decided to try to improve things.

The first problem was to obtain the circuit diagram. I approached my local Tandy store, where I was told that data was kept on file for only five years after a line was discontinued. After two false starts, I eventually was sold a photocopy of the circuit diagram for £2.00 plus VAT. I arrived home and began to study the circuit eagerly.

Just as I suspected, between the first and second i.f. amplifiers sat an i.f. filter providing the selectivity (Fig. 1). I had reason to believe that this filter could be the main cause of the poor selectivity, so I set about looking for a replacement. Looking in the Cirkit catalogue, I was pleased to discover that they stock Toko mechanical i.f. filters in bandwidths of 4, 6, 8 and 10kHz. I decided that I needed very good selectivity and duly ordered the filter with the 4kHz bandwidth (Toko No. CFM2455A, Cirkit Stock No. 19-45530), which arrived a couple of days later.

In the meantime, I had been looking at the possibility of getting the b.f.o. to work on l.w. and m.w. Scrutinising the circuit diagram again, I found that on these bands, the power for the b.f.o. was switched off (Fig. 2). I decided I would add the two missing links, so ensuring b.f.o. operation on all five bands.

Theory into Practice

Having decided what I wanted to do, I began to dismantle the receiver. I removed all the retaining screws from the back plate and eased it out. I disconnected the external s.w. antenna and then tried to puzzle out how to remove the printed circuit board. After about an hour's probing I found I had to remove all the remaining screws dotted about the receiver—three black ones on the top and five silver ones on the bottom. After that the whole of the front of the receiver slid forward, bringing the circuit board with it.

The next step was to locate the i.f. filter, which is a red component, mounted in the middle of the board on the same side as the S-meter (Fig. 3). It can be simply removed and replaced by the new filter.

Getting the b.f.o. to work on the l.w. and m.w. bands can be achieved by adding just one wire link across two of the switch terminals on the circuit board (Fig. 4).

All that remains is to reassemble the set and switch on. My first test was on the 7MHz band, where the high-powered broadcast stations tend to swamp the amateur stations. I was delighted to hear an amateur transmitting within a few kilohertz of a rather powerful commercial station with no problems in separating them. A final check on l.w. and m.w. bands showed the b.f.o. to be doing all I wanted it to.

So with a good antenna tuning unit connected, I found I had quite a reasonable communications receiver. ***PW***

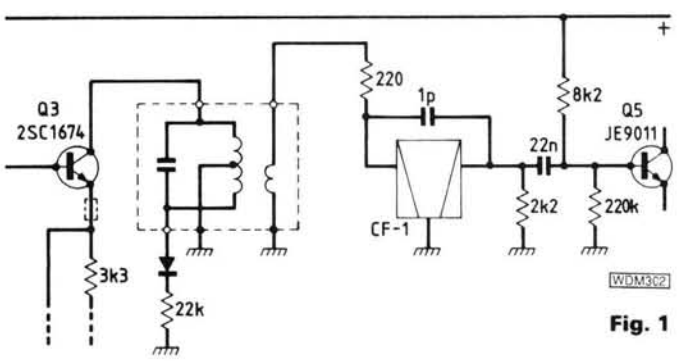


Fig. 1

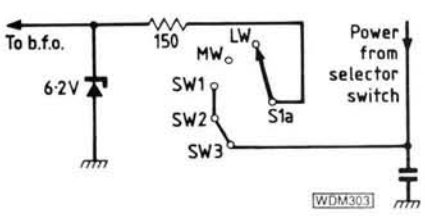


Fig. 2

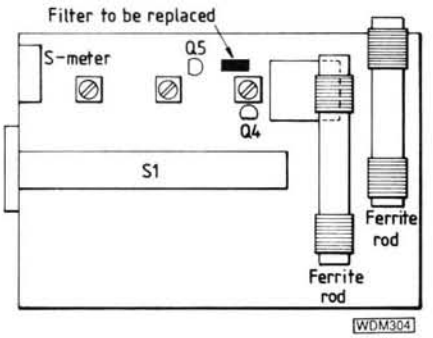


Fig. 3

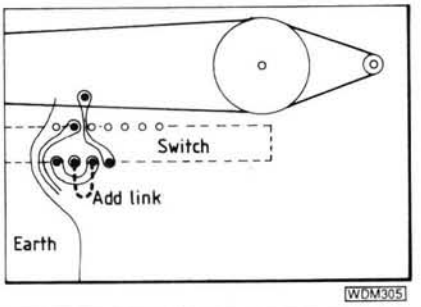
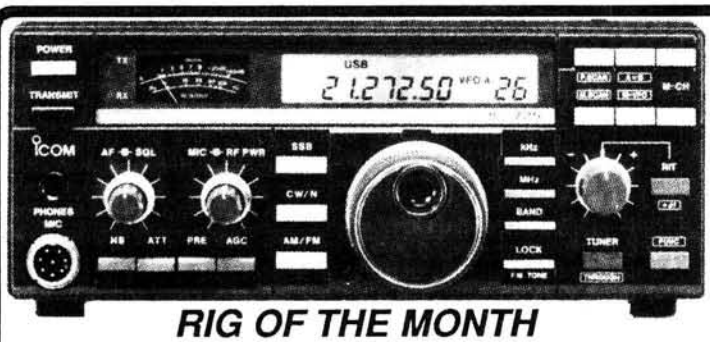


Fig. 4



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A Two-tone Oscillator

Test Equipment–Backbone of Amateur Radio

How often have you listened to the amateur bands to hear a station causing unintelligible splatter interference over many kilohertz either side of the transmitted signal. The cause is often a linear amplifier which is improperly adjusted or being over-driven. It is probable that the station is completely unaware of the interference being caused. Operating on the crowded amateur bands requires the use of a transmitter which produces as little distortion as the state of the art reasonably permits. The reduction of adjacent channel interference is ultimately of benefit to us all. In this short series of articles, Roger Alban GW3SPA looks at the causes of the interference and what can be done to resolve this problem.

The power amplifier required for a single-sideband (s.s.b.) transmitter must be linear. In other words, the signal at the output must be an exact replica of the signal at the input. This implies that the power gain of the amplifier must be constant regardless of the signal level. Any deviation from this ideal is a result of non-linearity within the amplifier creating a distortion of the output signal, resulting in unwanted signal products appearing at the output of the amplifier.

The excellence of an s.s.b. signal is judged by the lack of sideband splatter on either side of the wanted signal. An s.s.b. signal should be just as wide as the voice passband of the transmitter —approximately 3kHz. If the output signal from the power amplifier is a replica of the input signal, there will be no distortion products. However, valves and in particular transistors are not perfect, and the best of power amplifiers will exhibit some small non-linearity.

Testing

There are three commonly used methods for testing a power amplifier, either internal or external, associated with an s.s.b. transmitter. These include the wattmeter, oscilloscope and spectrum analyser techniques. In each case an audio frequency two-tone test signal is fed into the microphone input to simulate a speech signal. The s.s.b. transmitter will convert this into a radio frequency two-tone signal through its modulation process.

The results of the measurements will provide the peak envelope power (p.e.p) and intermodulation distortion product (i.m.d., also sometimes referred to as intermodulation products or i.p.s) of the amplifier. Depending upon the technique used, other features of the amplifier operation can be observed, such as hum problems and transmitter carrier balance.

Each measuring technique has both advantages and disadvantages. The suitability of a particular method will depend upon the desired application. The wattmeter method is the simplest test, but the one that provides the least amount of information. A spectrum analyser is capable of giving the most information, but it is the most costly method and is outside the financial grasp of many amateurs. The third and most practical method is to examine the output waveform of the amplifier with the aid of an oscilloscope, whilst applying a two-tone signal to the input. The shape of the waveform will reveal how linear the amplifier really is for different input levels.

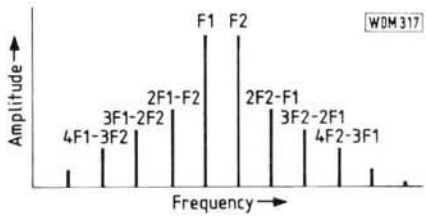


Fig. 1.1: Output frequency spectrum

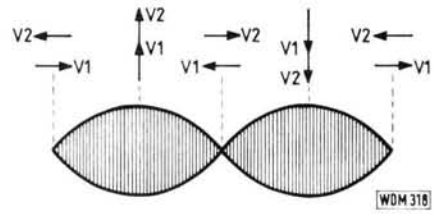


Fig. 1.2: Voltage waveform at the output of an amplifier resulting from a two-tone test signal

Two-tone Tests

If two radio frequencies of equal amplitude are applied to the power amplifier, the output signal may be examined for spurious products. These intermodulation products of the r.f. amplifier, which are the cause of sideband splatter, are shown in Fig. 1.1 on an expanded frequency scale. In the example, the two frequencies of the two-tone test are identified as F_1, and F_2. If the power amplifier is perfect these will be the only two frequencies which will appear in the output.

In practice, the power amplifier is not perfect, and there will be additional combinations of sum and difference frequencies generated by the non-linear characteristics of the amplifier. These odd-order products fall within the passband of the amplifier and will appear at the output along with the wanted signal. The inside pair of intermodulation products are called third-order, a mathematical term stemming from the fact that they are produced by a mixing of 2× one frequency and 1× the other frequency, and 2+1 = 3. The next pair are fifth-order, being due to 3× one frequency and 2× the other, with 3+2 = 5, and the next pair are seventh-order, being due to 4× one frequency and 3× the other, and so on.

It will be observed that the third-order products are the largest, and it is the amplitude of these, relative to that of the wanted signals, that determines the excellence of the amplified signal.

Using the Oscilloscope

The shape of the output waveform from the amplifier under test can be examined by taking a small sample of the output waveform and displaying the envelope shape on an oscilloscope cathode ray tube (c.r.t.). The generation of the two-tone waveform can be shown using vectors representing the magnitude and phase of the two r.f. frequencies as shown in Fig. 1.2. When the two vectors are opposite in phase, the resulting voltage of the waveform will be zero. When the two vectors are in phase, the voltage of the waveform will be at a maximum. The resulting voltage waveform which appears at the output of the amplifier under test will be roughly sinewave in shape and will have a repetition frequency equal to the difference between the two tones. If there are no appreciable non-linearities in the amplifier under test, the resulting envelope waveform will approach a perfect sinewave pattern. As a comparison, a spectrum analyser display for the same power amplifier is shown in Fig. 1.3. In this example, spurious products can be seen which are approximately 30dB below the amplitude of each of the test tones. A rejection of 35dB is quite acceptable

for interference-free operation within the crowded amateur bands.

If the amplifier under test is made to become non-linear, the spurious products produced by the amplifier will increase and the resulting output waveform will depart from a true sinewave. The sort of distortion you are likely to see when the amplifier bias is set so that the power amplifier is running with zero quiescent current is displayed in Fig. 1.4. The spectrum analyser shows the intermodulation distortion product has become worse, with the spurious products less than 20dB below the amplitude of each of the two tones. This type of amplifier distortion is called "crossover" distortion, because it occurs around the zero "Y" axis. The two-tone envelope clearly shows this form of amplifier problem. Increasing the quiescent current of the power amplifier will reduce the effect of crossover distortion.

A common cause of an increased intermodulation distortion product is amplifier overload. In Fig. 1.5, the two-tone envelope is distorted by flattening out of peaks of the sinewave. The display on the spectrum analyser shows the unwanted spurious products have now spread out in frequency, causing splatter interference for any station operating on either side of this signal. This is the most common and serious form of distortion, but it can be quite easily overcome by either reducing the carrier level, or on sideband the audio level. The relationship between the level at which the distortion begins for the two-tone test signal and for an actual voice signal can again be determined by measuring the maximum amplitude of the two-tone envelope. When the microphone is reconnected the voice peaks must be kept below the measured maximum amplitude of the two-tone envelope. This type of distortion is called "flat topping", for obvious reasons. The intermodulation distortion product level will rise rapidly when flat topping occurs. The third-order product levels will increase by 30dB for every 10dB increase in power output, and the fifth-order product will increase by 50dB for the same increase in output power.

The two-tone test using an ordinary oscilloscope to display the resulting envelope shows quite clearly if the amplifier is linear, and also shows quite clearly the type of distortion, if any, present. The greatest value of the two-tone test is to indicate, by the resulting shape of the envelope, the type of distortion present. Knowing the cause of a problem makes it much easier to resolve it.

Ideal Requirements

When setting about the design of a piece of test equipment, all the important features required in the unit need to be taken into account. In the case of a two-tone audio frequency generator, these are as follows.

First, the oscillator must generate two non-harmonically related audio signals of equal amplitude. Secondly, the unit needs to be portable and contain its own power supply. Thirdly, it was intended to use the unit also to generate separately two fixed-frequency, low-level audio tones for general testing. It was also important to keep the construction costs low.

The author had available a scrap CB transceiver that had been purchased at a local rally for the spare parts, and it was his intention to use the case to house the two-tone oscillator. The design of the circuitry was also influenced by the values of the components removed from the rig.

From earlier discussion, the repetition frequency of the amplifier output envelope will equal the difference between the frequencies of the two audio tones. The author decided to generate tones at 700Hz and 1900Hz, both well inside the normal audio passband of any s.s.b. transmitter, their difference being 1200Hz which can be quite easily observed on an oscilloscope. It is essential for the two tones to be free of any distortion, and therefore a filter will be required following each audio oscillator. The amplitude of the two tones should be equal, so there is a need to introduce some form of gain control before mixing the two tones together. To carry out the flat-topping test, there is a requirement to vary together equally the level of the two tones. The author decided to incorporate both a step attenuator and a variable gain control. The scrap CB rig contained a flat panel meter, and it was decided to retain this to indicate the audio output level.

The block diagram of the instrument is shown in Fig. 1.6. Each of the two tones is generated by a separate Wien-bridge oscillator which can be switched independently on and off. This will produce two independent tones or a combined tone for the two-tone test. The oscillators are fed into two *CR* active low-pass filters. A balance control has been added following the 700Hz active low-pass filter to ensure that the two tones are at the same level entering the audio mixer.

The audio mixer has a gain control which can be adjusted from the front panel. The output from the audio mixer is fed to a meter amplifier and to a step attenuator. The front panel meter will indicate the level of signal leaving the audio mixer. The attenuator can be adjusted in steps of 10dB, so it will be quite easy to determine the actual output level from the meter indication. A buffer amplifier which has unity gain and 600Ω output impedance is sandwiched between the step attenuator and the output terminals.

An important factor in keeping the cost down is to minimise the number of components required by using well-known operational amplifiers throughout the design. One of the most readily available and cheap operational amplifiers around today is the 741, consequently most component traders at radio rallies will have them. The author managed to obtain several of the 747 which is the dual version of the 741 in a 14-pin dual-in-line package.

The second part of this article will feature the circuit and full constructional details of the two-tone oscillator, together with an analysis of the design procedures for the Wien-bridge oscillators and the active low-pass filters.

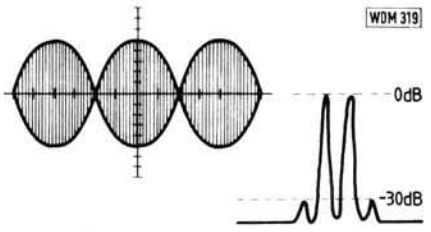


Fig. 1.3: Voltage waveform and corresponding spectrum analysis from an amplifier with an acceptable output

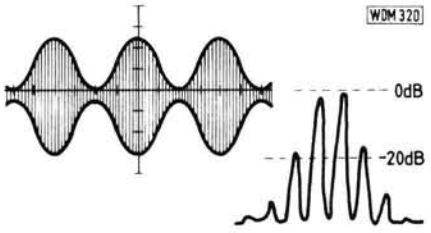


Fig. 1.4: Voltage waveform and corresponding spectrum analysis from the output of an amplifier with bias problems

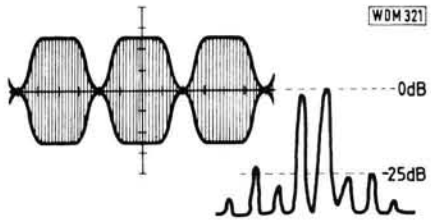


Fig. 1.5: Voltage waveform showing classic "flat topping" and corresponding spectrum analysis of an amplifier which is being overloaded

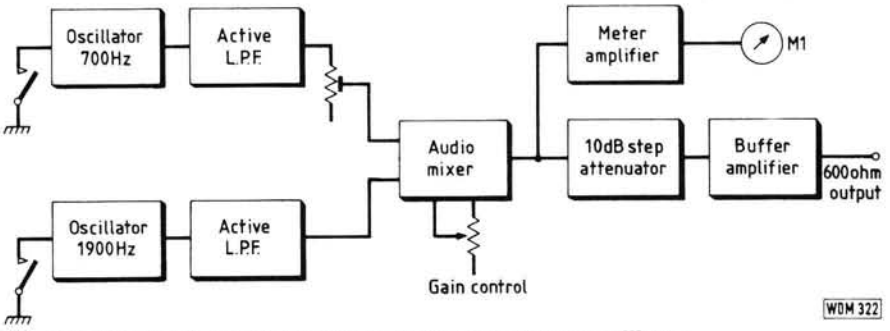


Fig. 1.6: Block schematic diagram of the two-tone oscillator

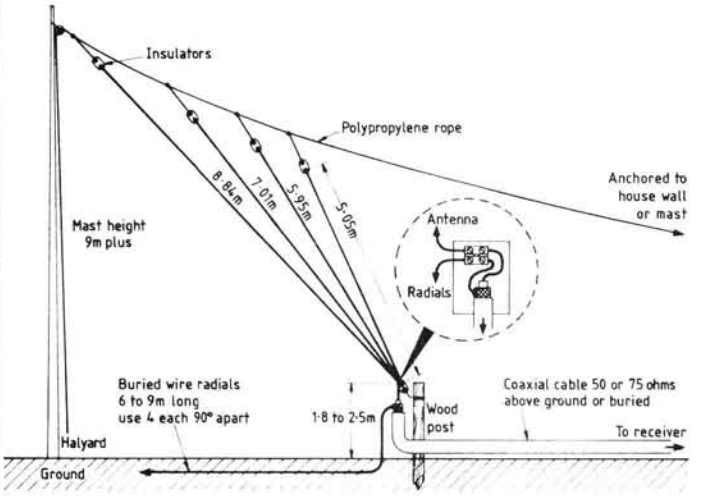
Antenna Clinic

Session 4

In the course of a year, antenna specialist F. C. Judd G2BCX receives many queries from radio enthusiasts, both about his own designs and about antennas in general. These come not only from various parts of the British Isles, but also from as far afield as Australia, New Zealand, Indonesia, Sri Lanka and several European countries.

Often, several people will ask a very similar question, highlighting a point that may be widely misunderstood. This series aims to explain some of these.

Q "My main interest is receiving aircraft s.s.b. signals between 8 and 13MHz. Please advise if I should use a long wire or a dipole to cover this bandwidth. I have enough space for an antenna 100m long."



A Whilst it would not be too difficult to tune a long wire over a frequency span of 5MHz or so, or set up a multi-element dipole to cover a similar bandwidth, these antennas are "directive". However, in view of this reader's interest it would seem that "omni-directional" reception is required, in which case a vertical antenna to operate over the required bandwidth could be a better proposition.

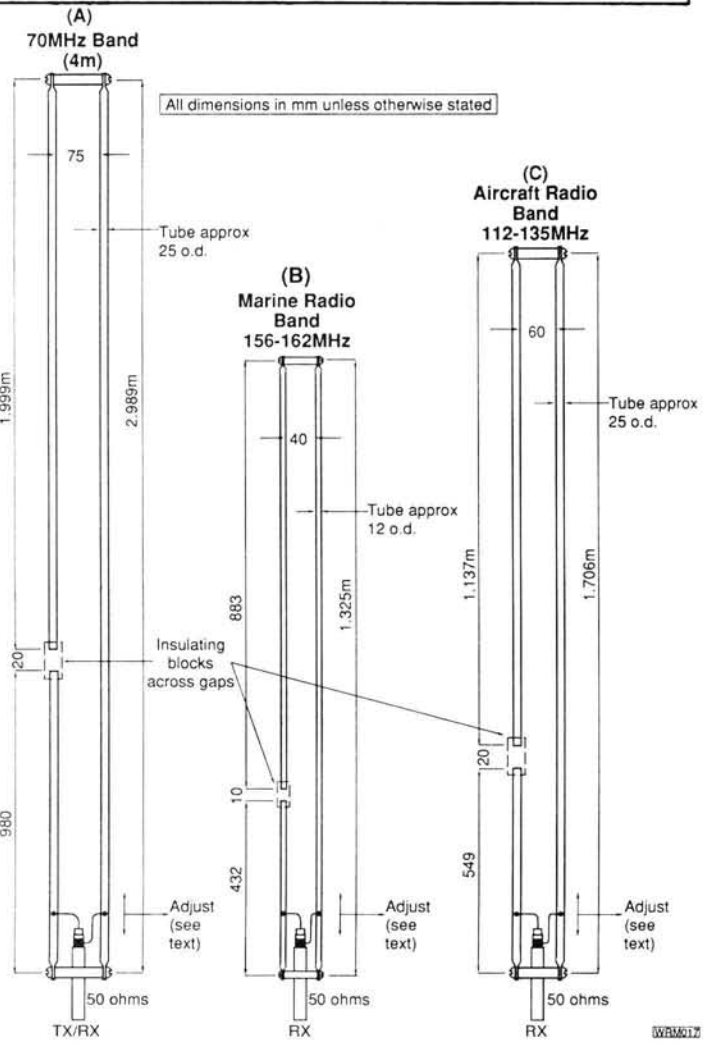
This can be accomplished by using four vertical quarter-wave wires arranged as shown in the drawing, each wire being resonant at a frequency higher than the lowest required (steps of 2MHz). With four wires, a bandwidth in the region of 6MHz can be obtained, i.e., the operational band coverage will be about 8 to 14MHz. This arrangement can be extended to cover a greater frequency range.

Q "I would like to make a 'Slim Jim' for the (X)MHz band. Can you give me the appropriate dimensions. Do *all* dimensions, and not just the element lengths, have to be scaled up (or down) for another frequency band?"

A This antenna was originally designed for 144MHz operation, but suitably re-dimensioned will operate quite well on the 70MHz (4m) amateur band, the 156MHz marine radio band, and others not too greatly different in frequency. Constructing antennas for frequencies other than the original design frequency was dealt with in *Practical Wireless* July and August 1987. Construction details and dimensions for a 430MHz (70cm) "Slim Jim" were published in *PW* March 1983 and also in the *PW* publication *Wires & Waves*.

The element lengths must of course comply with the new frequency and if this is **lower** than 145MHz the diameter of the aluminium tube used for them should be increased to provide greater strength to the final assembly. This will also help to maintain low v.s.w.r. over the width of the new frequency band.

Recommended dimensions for a "Slim Jim" for the 70MHz amateur band are given in drawing "A", those for the marine radio band (nominal 156 to 162MHz) in drawing "B", and for the aircraft radio band (nominal 112 to 135MHz) in drawing "C". All dimensions are based on the band centre frequency. The coaxial cable feed points for the 70MHz version are adjusted for minimum v.s.w.r. at band centre. For the marine and aircraft radio bands, adjust for maximum strength of a received signal at approximately band centre. The cable feed points and the exposed end of the cable must be enclosed in a watertight pvc box. If water gets into coaxial cable it will be ruined for all time. ***PW***



NOTE — Whilst F. C. Judd is always willing to answer letters from readers about problems with antennas generally, he cannot deal with queries relating to the performance of commercially made products, which should be addressed to the manufacturer or dealer concerned.

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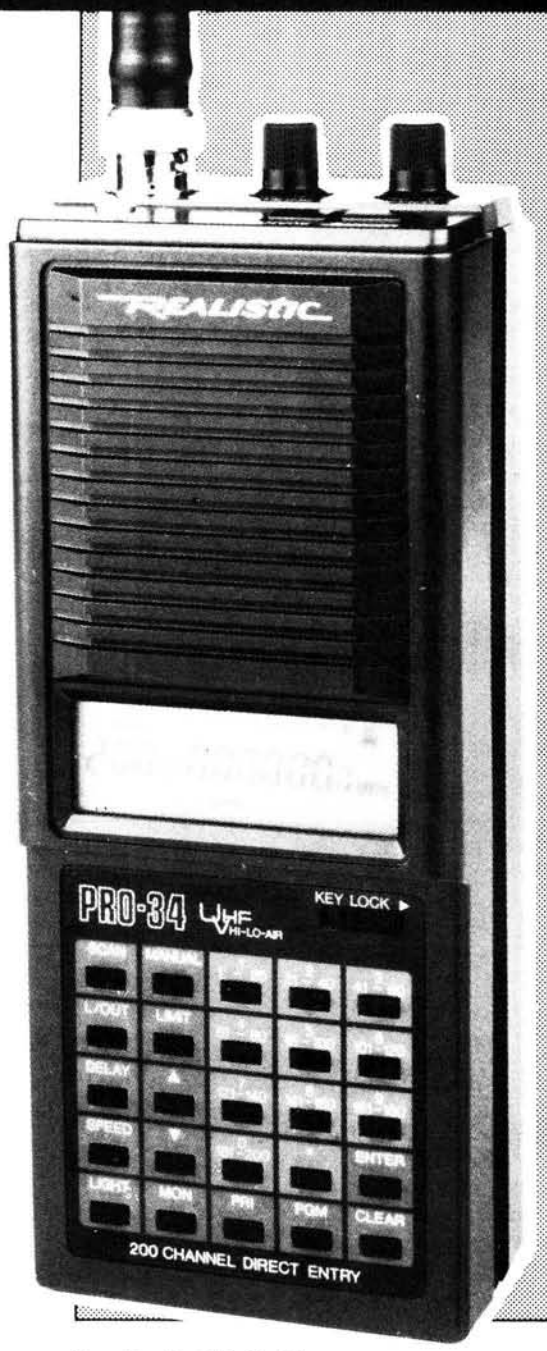

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Packet Radio Update

In Part 1, Roger J. Cooke G3LDI finished with a mention of TheNet, so in Part 2 he continues with more about that software node package developed by the Nordlink packet group.

Several nodes have already changed to TheNet software, including GB3NP. In view of all the comments regarding piracy of NetRom I have used a totally unbiased report and comparison from Ronald McCallister N7FYA in this article. After reading this, I feel sure the final decision as to which to use is fairly obvious.

NetRom Versus TheNet

"When TheNet first appeared, I was concerned that my investment in NetRom from Software 2000 was in danger. I was also curious about TheNet because research into new products is my livelihood. I read all the comments from those at Software 2000 about piracy. I do NOT believe in stealing any program. I think that software programmers should be able to make a living because I am one. I realise that this report will make a lot of individuals mad at me but I am in the consulting business and my opinions are as objective and accurate as I am able to make them. Please feel free to make comments back to me at N7HFZ BBS here in Washington or mail to AI Research Inc., PO Box 97044, Tacoma, WA 98497, USA.

This report is broken into two major sections: 1—comparison of code and my opinion of the comparison; 2—personal observations concerning NetRom and TheNet. 1: I called Ron WA8DED at Software 2000 to get permission to disassemble NetRom (N7FYA-8) for the purpose of comparing the disassembled code to the disassembled code of TheNet. I was given verbal permission to do so provided I destroyed all papers upon completion. I have done so. I disassembled the NetRom and TheNet using SLR Z80DIS. I found that the two products are about 85 per cent identical. Since both products were compiled by two versions of one compiler and used the same libraries, I expected 60 to 65 per cent of the code would be the same. This is normal in programming. When I talked to Ron at Software 2000, he said that there were assembly code sections that had been hand massaged to improve performance but he failed to tell me which section. In assembly code on the Z80 there are only a few ways to do certain items efficiently. This means that any two GOOD programmers working on different programs in Z80 code are likely to code in a similar if not exact fashion. The names in the procedures will be different in the source code but will look the same in the object code. In "C" there are many ways to code anything BUT to be efficient in the Z80 environment, you must optimise to the hilt. That means if you are trying to do a connect sequence in a TAPR type TNC2 and want to stay compatible with the rest of the amateur community, you must follow a specific set of rules. These rules will make 80 per cent of connect sequence code identical. As Ron Raikes said, 'the code in the two ROMs are very much alike. As to being identical . . . NO WAY!'

Fig. 2.1: Leo Labutin UA3CR seated at the computer, whilst G3LDI and his son look on

TheNet has some distinct differences that make it the better of the two node controllers. 1: It can operate in a full duplex mode whereas NetRom cannot. 2: TheNet is considerably faster in its response to changing network conditions. This alone tells me that the code is better optimised. 3: There are numerous features in TheNet that the NetRom is incapable of doing because of the Cell Encryption code. 4: It also will not crash. I have tried to crash it and NetRom for 15 days. TheNet has better error handlers than the NetRom. I cannot give any more specifics than this because I would be giving away the code from NetRom.

2: As a software programmer, I can see the need to make money and to provide a good income for my family. As an end user however, I cannot but wonder why I need to pay a company $100 for a pair of EPROMs with a program. The EPROMs in single quantity cost $7 each. Then you add programming time. And finally you add the cost of the software and manual. Now it sounds fair. Let's go buy the original NetRoms for a hilltop. The two nodes just cost us $100 with only one manual. Version 1.0. Ahhhh. Version 1.2 just becomes available and it fixes a few of the bugs in Version 1.0. What? You mean I have to send my two original EPROMs back to be reprogrammed and it costs me $35 for each. That's $70. It is now 5 months later and a new version is out. Version 1.3. Here we are again sending $35 per EPROM to have the bugs removed. Now we have decided to change the SSID on the node for compatibility. That is another $35 per EPROM. I have now spent $310 for just the EPROMs and STILL there are bugs in the programming. I also only have one manual. I charge $35 an hour in my job. How much is Software 2000 paying their people to reprogram one EPROM? If you look at the big companies like Microsoft, Micropro and Borland and you find that they send you updates of their software with brand new rewritten LARGE and multiple manuals for $25–35. What does Software 2000 offer that makes that

big difference? Also, these other big companies offer a free upgrade if they fix bugs within a short period of time, usually three months. Does Software 2000?

This is not the end of my opinions but I will stop. My personal opinions are separate from my findings of the investigation into the code of NetRom and TheNet. I would like to see the original code of NetRom and compare it to TheNet source code I recently received. Without the NetRom original code to compare, I must say that I prefer TheNet in performance. Last but most important! I say thanks to Software 2000 for their contributions to amateur radio packet but I would caution them from alienating those that give them their sales."

UA3CR—New BBS Active

On August 3 this year, I was very pleased to play host to Leo UA3CR for a day, he had expressed an interest in packet some months previous and I had already had a QSO with him and his son, Evgeni RA4APR. Leo was now keen on getting a BBS operational. He was very interested in lots of the bulletins and text-files I had on the BBS at G3LDI and my printer worked overtime for a few hours! Leo is now active with a BBS on 14.099MHz and he is intending to come up to 14.105MHz later. He also calls in to my BBS on 21.107MHz so hopefully we may be setting up a forward file between us.

Leo was heavily involved in the ski-trek expedition as was his son. The photograph in Fig. 2.1 shows Leo (sitting) with me and my son Robert beside him.

Leo mentioned that he is also trying to get a v.h.f. network set up in the Moscow area, so the interest is growing rapidly over there and no doubt other countries in the USSR will soon be active. As I said, you will find him on 14.099MHz, or if you would like to send him any mail, it can come to my BBS for passing on.

In the past year, there has been a large increase in the numbers of amateurs coming onto packet. So, to assist newcomers here's a resumé of how to use the "local" BBS for maximum efficiency. The NTS (National Trunking System) has been set up to enable packet operators to pass bulletins, private mail and files (with a maximum of 12K preferred) all over the UK and beyond. The area in which you live will probably have a packet repeater and one or more local BBS to which you can connect either direct or via the repeater.

Most repeaters are now TheNet or NetRom nodes, making it very easy. BBS systems should be replicas of each other, depending on the editing of the system operator (sysop) so there should be no need to use the nodes to connect to another BBS kilometres away. This will clog the system and make life difficult for both the other end-users and the BBSs forwarding to each other.

The old adage of getting the antenna as high as possible also has to be re-thought when on v.h.f. packet. You only need just enough r.f. to get to your local node or BBS and **no more.** Indeed it would probably be better to use lower power and a fixed beam onto the node or BBS so that nothing else is heard and you are heard by nobody else. This will help to improve the

```
     PACKET REFERENCE CARD
     =====================
       GENERAL COMMANDS
       ----------------
CONNECTING:
 C GB7LDI
 or C GB3NP (wait for connect msg)
    then C GB7LDI

Enter your NAME:
 N Roger

HELP:
 ?          = displays detailed
              help for commands
 ?Y         = displays help for
              BINARY transfers
 ?L         = displays help for
              LIST command
 or any other command letter!

LIST mail:
 L<CR>      = List all new mail
 LM         = List your mail
 LN         = List only NEW mail
              for your call
 LL 10      = List last 10 only
 L< G9ZZZ   = List only mail
              from G9ZZZ
 L> G9ZZZ   = List only mail to
              G9ZZZ
 L@ GB7LDI  = List mail sent
              'care of PBBS'
 L 900      = List mail from
              highest no. to 900
 L 10 20    = List open mail
              from msg. 20 to 10
 LB 10 20   = List bulletins
              from no. 20 to 10

READ mail:
 R 123      = Read msg. no.123
 R 123 456 789
            = Read msg.'s no.
              123 456 789
              (up to 6 no.'s)
 RM         = Read all messages
              addressed to you
 RN         = Read all NEW mail
              for your call

NB: use 'V' instead of 'R' to
    display all routing info.

SEND mail:
 S GB7LDI   = Send an OPEN
              message
 SP GB7LDI  = Send PRIVATE
              message
 S G3LDI @ GB7LDI
 SP G3LDI @ GB7LDI
            = Send OPEN or
              PRIVATE mail to
              G3LDI at his
              local PBBS GB7LDI
 SB ALL $   = Send general
              bulletin to ALL
 SB ALL @ GB7LDI $
            = Send general
              bulletin to ALL
              at another BBS
              or BBS-group

 NB: see BBS GROUPS on other
     side.

KILL mail:
 K  123     = Kill your own
              msg. no. 123
 K 123 456 789
            = Kill your own
              msg.'s no.
              123 456 789
              (up to 6 no.'s)
 KM         = Kill all messages
              addressed to you

        FILE COMMANDS
        -------------
WHAT files:
 W          = List all files you
              can download using
              the 'D' command
 WN         = List new files
 W DIRNAME    and
 WN DIRNAME = List files or new
              files in DIRNAME
              directory
```

```
DOWNLOAD files:
 D file.nam = Download file
              'file.nam'
              (e.g.: D USER.DOC)
USER.DOC)
 D file.nam 10
            = Download first 10
              lines of file.nam
 D file.nam -20
            = skip first 20
              lines of file.nam
              and read remainder
 D file.nam 5 15
            = Download lines 5
              to 15 of file.nam
 D directory\file.nam
            = Download file.nam
              located in a
              'directory'
UPLOAD files:
 U MYTEXT.TXT
            = Upload MYTEXT.TXT
              into file area of
              PBBS (file MUST
              end in CTRL/Z)
YAPP (binary) files:
 You MUST use YAPP conventions!
 YH         = Display help file
 YW         = List all binary
              files on PBBS
 YN         = List all NEW
              binary files
 YU file.nam
            = Binary upload
 YD file.nam
            = Binary download

        OTHER COMMANDS
        --------------
 A          = Press A<cr> to
              abort a long
              listing
 B          = BYE, to logout
              of the PBBS (DRT)
 H          = Display HELP text
 I          = Show system info.
 JK         = Show connected
              stations
 JA         = Show activity on
              channel
 T          = Talk to SYSOP
              (only if
              available)

 X          = Toggle short and
              long menu

 V          = Show VERSION,
              lowest and highes
              message no.

        PBBS GROUPS
        -----------
BULLETINS ONLY:
 @WWW       = Whole Wide World
 @GB        = Great Britain
 @SYSOPS    = Sysops info
 NB:
 @ and specific BBS will forwar
 to that BBS only.
```

Fig. 2.2: Commands common to the WA7MBL and W0RLI BBS software

overall efficiency of the whole system.

A list of commands that are common to both the WA7MBL and W0RLI BBS software are shown in Fig. 2.2. These two systems seem to be the most popular in use at the present time, although Graham G8UFQ has produced a very good system which is also compatible and looks like catching on. It is being tested in the Norwich area at the moment with Dirk G1TLH. There has already been an update in the software so the bugs are being sorted!

Whilst on the subject of commands for the BBS it would be nice to see the less common commands being used to help both the end-user and the sysop. One of the most annoying errors is the omission of the @ field when replying to mail. This makes it incumbent on the sysop to quit the program and try to find the home BBS of the addressee. It would also help if ALL mail to individuals was marked SP instead of just S. Private mail is always killed after forwarding and it is not listed when another users lists the mail. Please remember to kill your mail after reading it.

Directories on the disk sometimes present a problem for the newcomers—I well remember having the same problem myself! When a W command is issued you could see something like this:

DXINFO (DIR) PROPAGATION (DIR) BBSLISTS (DIR) OSCAR (DIR)

This means that DXINFO is a directory and in order to see what files are available in that directory just type W DXINFO and a CR. This will display all the file names. Then, to download a file, it is necessary to type D DXINFO/CONTEST.INF assuming that's the name of the file you want. In other words, the path to the files must be shown. I personally like to keep the active messages very low on the BBS and I put the interesting information into directories on the disk, this keeps the listening to a low level and also speeds up the BBS operation.

In Part 3 we'll look at The Eastnet project as well as some of the other new projects there are about.

Theory

Simplified Filter Design Routine

Producing efficient allstop filters having wide bandwidth, low v.s.w.r. and the ability to work between unequal impedances is among the most complex tasks facing a radio designer. This simple computer program devised by Ben Sullivan attempts to solve the problem.

Passive filters using lumped reactive elements are widely used for applications involving frequencies beyond the a.f. range, up to about 1GHz (1000MHz) or so. Lowpass, all-pole designs are well documented and the corresponding highpass filter can be derived from a lowpass prototype by changing the signs of the reactances—inductors become capacitors and *vice versa*. The derivation of the narrow bandpass design from a lowpass prototype is also well known. A further standard transformation converts from bandpass to the bandstop form.

Filtering a complex signal, e.g. premodulation filtering a pulse train to limit the occupied bandwidth, can result in unacceptable waveform distortion, due to group delay variations. In this case a phase equaliser or allpass filter is often required and although the design procedure is more complex, being a non-minimum phase network, it is standard and well documented.

A useful and versatile filter, the allstop design, is currently little used, possibly because there is no simple design route via a transformation from the allpass case. However this should not be allowed to deter one from using it, since in all cases where a high attenuation, maintained over a wide bandwidth, is required, the allstop design is clearly indicated. The program presented here simplifies the design of allstop filters. It handles the general case where ZA, the characteristic impedance from which the filter is driven, differs from ZB, the filter design load impedance. The program generates the required values of shunt resistors at input and output ports and also identifies the attenuation of the corresponding zero-order allpass design. The latter can be quite low, especially for ZA/ZB ratios near unity, clearly indicating the superiority of the allstop design where high attenuation over a wide bandwidth is required.

An allstop filter with ZA=50Ω, ZB=75Ω was designed using the program here presented and constructed in a die-cast box. The attenuation was in excess of 90dB from 10Hz to 144MHz, falling to 70dB at 512MHz, although at that frequency the input and output v.s.w.r.s had risen to 3.142:1 and 2.718:1 respectively. The mechanical design was revised using stripline launcher sockets and chip resistors, with improved interstage screening. The attenuation was then found to be in excess of 90dB up to 980MHz (when measured using coaxial test leads of solid outer construction), whilst the input and output v.s.w.r.s were improved to 1.414:1 and 1.524:1 respectively.

In summary, the main advantages of allstop filters are:

(a) Very wideband performance.
(b) Ratio ZA/ZB is unconstrained, unlike published designs for impedance transforming lowpass filters: e.g. a 0.18dB passband ripple Chebyshev design filter has a fixed ZA/ZB ratio of 1:0.667 (Ref. 1).
(c) No close tolerance components required (except RA and RB which should be 5% or preferably 2%).
(d) No setting-up required.
(e) No reactive components required.

PW

Ref. 1: *Simplified Modern Filter Design*, P. R. Geffe, Iliffe, 1964.

```
10 REM: BASIC ALLSTOP FILTER DESIGN
20 PRINT: PRINT "ALLSTOP FILTER DESIGN": PRINT
30 PRINT: INPUT"ENTER INPUT IMPEDANCE ZA"; ZA: PRINT
40 GOTO 7000
50 RA=(ZA*ZA)↑0.5
60 PRINT: INPUT"ENTER OUTPUT IMPEDANCE ZB"; ZB: PRINT
70 GOTO 7030
80 RB=(ZB*ZB)↑0.5: K=RA/RB
90 L=10LOG(4/(K+2+1/K))
100 PRINT"EQUIV. ALLPASS FILTER LOSS=", L, "dB": PRINT
110 PRINT"ALLSTOP FILTER INPUT RESISTOR=", RA, "OHMS": PRINT
120 PRINT"ALLSTOP FILTER OUTPUT RESISTOR=", RB, "OHMS": PRINT
130 END
7000 A$=CHR$(84)+CHR$(72)+CHR$(65)+CHR$(78)+CHR$(75)+CHR$(83)
7010 IF ZA =0 THEN PRINT"NOGO": BEEP: PRINT: GOTO 30
7020 PRINT A$: GOTO 50
7030 IF ZB =0 THEN PRINT"NOGO": BEEP: PRINT: GOTO 60
7040 PRINT A$: GOTO 80
```

The BASIC filter design program ▶

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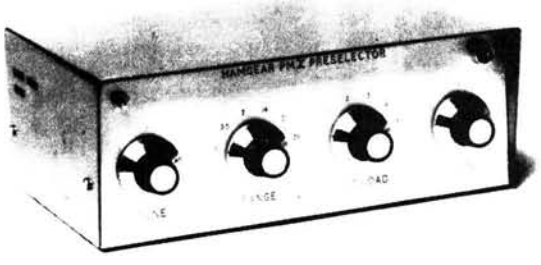

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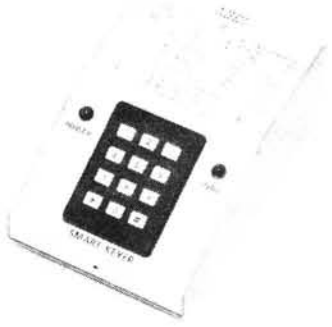

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Reading & Understanding Circuit Diagrams

(with a bit of theory thrown in)

This month, in Part 13 of his series R. F. Fautley G3ASG describes an amplitude modulator and talks about single sideband

The c.w. transmitter can be used for speech communication with very little in the way of modification by adding a modulator. This mode of telephony operation is called a.m., or amplitude modulation. Although not often encountered these days, having been superseded in the main by the single sideband mode, it was very popular until some twenty-five years ago.

If we look back at the r.f. power amplifier in Fig. 11.1, what do you think would happen if the h.t. voltage (500V in our example) were to be reduced to some lower value, say 100V? The most logical answer is that the r.f. power output would drop because both the anode and screen voltages would fall. In particular, the screen voltage drop would have a large effect in reducing the anode current. In that case would the r.f. output power be increased if the h.t. voltage were to be raised? The answer is "yes," provided that sufficient r.f. grid voltage was available to swing the anode current to its maximum. So varying the h.t. voltage supply to the stage would be one way of varying the output. Suppose the variation were to be made quite rapidly, say a thousand times a second, what would happen then? Well, if demodulated on an a.m. receiver, the sound in the headphones or speaker would be a tone of 1000Hz. Its purity would depend on how the original "up and down" of transmitter h.t. supply was made. If it was varied sinusoidally with time, the received tone would be a pure 1000Hz note. So this is modulation! Add a means of varying the h.t. in sympathy with microphone signals and we can transmit speech!

How can we do this? Well, **power** is needed, audio frequency power, in other words an a.f. power amplifier. This audio amplifier is called the "modulator". Look at Fig. 13.1. The most important component is T2, the "modulation transformer". Its function is to superimpose a.f. signals (which are amplified microphone signals) on to the r.f. power amplifier's h.t. supply. As you can see, the h.t. supply to the anode and screen grid of V1 is via the secondary winding of T2.

Speaking into the microphone produces amplified speech signals at T2 secondary which add to or subtract from the h.t. voltage, thus "modulating" the r.f. amplifer supply. It's as simple as that!

If c.w. mode is required, T2 secondary winding is shorted out by switch S1 to prevent the inductance of the transformer winding affecting the shape of the radiated Morse elements. It could have an effect because the anode current produced when the Morse key is depressed would have to flow through the transformer winding, which has quite a high value of inductance.

Why should this have any effect? When a voltage is applied across an inductor, current starts to flow through it (Morse key "down"). As the current increases a magnetic field is produced which itself results in a further voltage which has the opposite potential to the original applied voltage. This opposing voltage, often referred to as the "back e.m.f.", causes the current to rise much more slowly, so taking some time before it reaches maximum. Similarly, a falling current (key "up") would take time before reaching zero. This phenomenon, it might be thought, is just what was wanted to shape the Morse elements to prevent key clicks. However, there are two drawbacks, one is that it would be the **value of the inductance** (which is not so easy to control as a resistor-capacitor combination like that in Fig. 10.3) which would set the time constant; and the second, which is much more important, is that collapsing current through the secondary winding (at the instant when the Morse key is released—key "up") would result in quite high voltage spikes at the transformer windings which could damage the component and also possibly cause local radiated interference.

The modulator stage itself consists of two triode valves, V2 and V3, connected in push-pull. The a.f. transformer, T1, provides push-pull drive to the two modulator valves from a driver stage, which would include a microphone amplifier. The latter will be looked at later when dealing with s.s.b. transmitters. Capacitors C1 and C4–8 are (as you know by now) just for r.f. or a.f. decoupling.

Now for just a little bit more theory. Correct turns ratio for the modulation transformer T2 is most important to ensure that as near to 100 per cent modulation as possible is obtained on speech peaks without distortion. So,

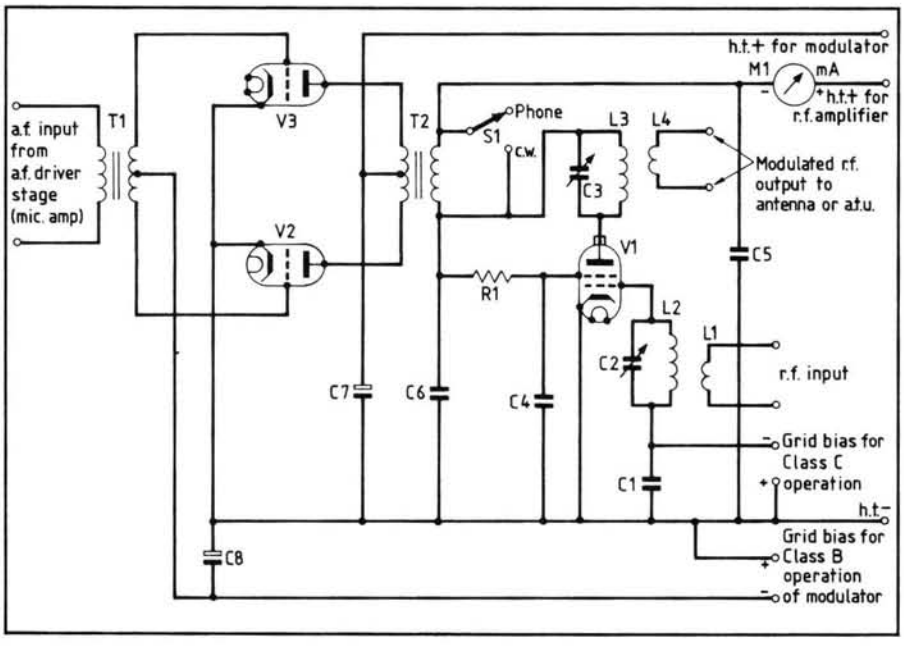


Fig. 13.1

here we go with something about a.f. transformers. They consist of two or more windings wound around a core of interleaved metal laminations. In an **ideal** transformer only the **ratios** between the number of turns on each winding is important. For our purposes we will consider a simple transformer having two windings. These two windings are usually referred to as "primary" and "secondary", as shown in Fig. 13.2. Conventionally, the larger of the windings on an a.f. output transformer is called the primary, although in mains transformers used in power supplies, the primary is the one to which the mains supply is connected.

Back to our a.f. transformer. If a load such as a loudspeaker is required to be operated by a valve amplifier, it can be considered for our purpose to be equivalent to a resistor of say about 8Ω connected to the smaller or secondary winding. This is because the load resistance required by the valve to develop its output power is in the order of several thousands of ohms and our problem is to make the 8Ω loudspeaker look, to the valve, as though it was a very much higher value. This is where the turns ratio comes in, for one effect of the transformer is to "transform" the value of a load connected across one winding to quite a different value at the other. The mechanism by which this happens is theoretically complicated and just not necessary here, so we'll concentrate on **what** happens rather than **how** it happens.

In Fig. 13.2, the resistor R_L represents the loudspeaker load of 8Ω and R_{ref} (shown dotted because it is not a physical component) represents the transformed (or reflected) value of R_L as it appears to the valve at the transformer primary. If we were able to measure the value of the resistance appearing across the primary it would have the value R_{ref}, and if R_L were to be disconnected the value of R_{ref} would rise (theoretically because we are still dealing with an **ideal** transformer) to infinity.

How are these values, R_L and R_{ref} related? It's quite simple, in fact, for the **turns ratio** is the key to the answer.

$R_{ref} = N^2 \times R_L$ where R_{ref} is the resistance appearing across the primary, R_L is the resistance connected across the secondary and N = turns ratio (number of primary turns/number of secondary turns).

As the value of R_L is known (8Ω) and the value of the optimum anode resistance required by the valve can be found in the valve manufacturer's information, our unknown to determine is the turns ratio N which will transform the 8Ω load to a reflected load equal to the valve's optimum load resistance. By re-arranging the formula we get:

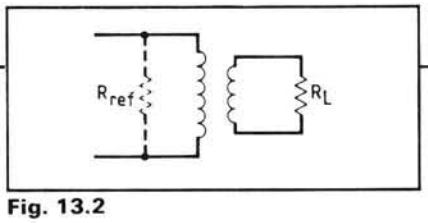


Fig. 13.2

$$N^2 = \frac{R_{ref}}{R_L} \quad \text{and} \quad N = \sqrt{\frac{R_{ref}}{R_L}}$$

In our valve amplifier example R_{ref} would be the manufacturer's optimum load for the valve, say 8000Ω, and the loudspeaker R_L = 8Ω.

So the transformer turns ratio required would be:

$$N = \sqrt{\frac{8000}{8}} = \sqrt{1000} = 31.62$$

Let's get back to the amplitude modulated Class C amplifier. For the modulation transformer T2 in Fig. 13.1, we want to know the values of R_L and the required R_{ref}. If the manufacturer's literature gives the optimum anode-to-anode load for the two modulator valves in Class B push-pull as 11kΩ, then this is our value for R_{ref} across the **whole** of the primary winding (ignore the centre-tap for these calculations).

What about the value for R_L? This is not as easy as the loudspeaker example where the value for the component is known. In the modulated amplifier of Fig. 13.1, T2 secondary winding is connected to the anode circuit of the r.f. amplifier valve V1. So how do we find the value of R_L? What we need to know are just two things.

1: The value of the h.t. voltage supply to V1
2: The value of V1 anode current indicated by meter M1 when the r.f. amplifier is correctly tuned and matched.

The mysterious R_L value is simply the resistance value equal to the h.t. load of the r.f. amplifier applied to the transmitter power supply.

Assume the h.t. voltage is 1000V and the anode-plus-screen current measured on M1, when the amplifier is correctly tuned and matched, is 150mA. Then the equivalent resistance load will be (by Ohm's Law):

$$R_{eq} = \frac{V_{h.t.}}{I_{A+SG}} = \frac{1000}{150 \times 10^{-3}}$$

$$= \frac{1000 \times 10^3}{150} = \frac{10^6}{150} = 6666.7\Omega$$

So $R_L = R_{eq} = 6666.7\Omega$
Now for the turns ratio:

$$N = \sqrt{\frac{R_{ref}}{R_L}} = \sqrt{\frac{11000}{6666.7}}$$

$$= \sqrt{1.65} = 1.285$$

So T2 must have a turns ratio of 1.285 with the primary having a centre tap.

That's enough about a.m., now for something a bit more complicated —single sideband transmission.

Single Sideband

To be more explicit—single sideband suppressed carrier (s.s.b.s.c.) communication (suppressed carrier because ideally the carrier power is zero) has a considerable advantage, in fact 9dB, over a.m. How can this be justified—and what's a dB anyway?

A dB, or more fully a **decibel,** is a bit of a paradox really, for it's a **ratio** which has a unit! Let's see how this happens by using an example.

If an amplifier has an output **power** of 10W for an input **power** of 0.1W, then it has a **power gain** of:

$$G_P = \frac{P_{out}}{P_{in}} = \frac{10}{0.1} = 100 \text{ (note, no unit)}$$

where G_P is power gain

P_{out} is output power in watts and
P_{in} is input power in watts.

The word "power" has been emphasised because, regardless of what some people say, the decibel is **only** concerned with **ratios of power.**

It is really based on degrees of loudness as assessed by the human ear. Most people find that the loudness of a signal **sounds** about **twice** as loud when the level of the signal is actually raised by about **ten times.** Mathematically this means that the ear has a logarithmic function, which is the reason for using the decibel which is also logarithmic

$$N_{dB} = 10 \times \log_{10} (P2/P1)$$

where N is the number of dB

P2 is the higher **power** level and
P1 is the lower **power** level.

In our example where the power gain $G_P = 100$, it is the same as:

$$N = 10 \times \log_{10} (100) = 10 \times 2 = 20\text{dB}$$

To familiarise yourself, try calculating dB gains for various power gains such as 2, 4, 10 and 40, etc.

The opposite to an amplifier is, of course, an attenuator and the loss it would introduce could be considered as a **negative** gain.

Suppose we have a resistive attenuator where the input power is 5W and the output power is 1W. Then:

$$N = 10 \times \log_{10} (P_{out}/P_{in}) = 10 \times \log_{10} (1/5)$$

$$= 10 \times \log_{10} (0.2)$$

$$= 10 \times (-0.699) = -6.99 \approx -7\text{dB}$$

The attenuator has introduced a power **gain** of −7dB which is the same as saying that it has a **loss** of 7dB.

Voltage or current ratio **may** also be expressed in dB, but even then what is actually being done is still to compare **power** ratios. To express a voltage ratio in dB it is **essential** that the resistance values across which the two voltages are measured are **exactly the same.**

For example, if a microphone ampli-

fier has an input resistance of 50kΩ and an output load also of 50kΩ, then for an input voltage of 100mV and an output voltage of 1V, the gain may be expressed as:

$N = 20 \times \log_{10} (V_{out}/V_{in})$ **note that the constant is now 20 and not 10**

$= 20 \times \log_{10} (1/10^{-3})$

(because $1mV = 10^{-3}V$)

$= 20 \times \log_{10} (10^3)$

$20 \times 3 = 60dB$

Getting back to s.s.b., the theoretical gain over an a.m. system of 9dB comprises two parts, one in reception and one in transmission.

Reception: The bandwidth required for receiving s.s.b. speech is only 3kHz compared with 6kHz for a.m. (needing different filters, of course). Now the amount of received random noise in a system is determined by the bandwidth of the system, therefore if s.s.b. needs only half the bandwidth then it also halves the noise level.

$$N = 10 \times \log_{10} \frac{\text{s.s.b. RX noise power}}{\text{a.m. RX noise power}}$$

$$= 10 \times \log_{10} \frac{\text{Pnoise in 3kHz band}}{\text{Pnoise in 6kHz band}}$$

$= 10 \times \log_{10} (1/2)$ that's if s.s.b. noise is 1 unit of power then a.m. noise will be 2 units

$= 10 \times \log_{10} (0.5)$

$\approx 10 (-0.3) = -3dB$

So s.s.b. provides **3dB less noise** when receiving the same information (e.g. speech), this is equivalent to a gain of 3dB over a.m.

Transmission: The transmitted a.m. signal consists of 50 per cent carrier power, 25 per cent speech power (modulation) in the lower sideband and 25 per cent speech power in the upper sideband.

An s.s.b. signal has only one sideband, which has 100 per cent or all of the transmitted power, since only **one** sideband is actually necessary to communicate the intelligence, the gain of transmitted s.s.b. over a.m. can be considered as the ratio of the powers in one sideband containing the intelligence. This is:

$$N = 10 \times \log_{10} \frac{\text{s.s.b. speech power}}{\text{a.m. speech power}}$$

$$= 10 \times \log_{10} \frac{100\%}{25\%}$$

$= 10 \times \log_{10} (100/25)$

$= 10 \times \log_{10} (4)$

$= 10 \times 0.6021 \approx 6dB$

giving s.s.b. transmission a gain of 6dB over a.m. Adding the two gains together gives us 9dB.

This means that given equal **peak envelope power** (the power developed at the peak of modulation) for two transmitters, one a.m. and one s.s.b., the received signal using currently designed a.m. and s.s.b. receivers will have a signal-to-noise ratio improvement of 9dB in favour of the s.s.b. system.

Peak envelope power (or p.e.p) is another phrase to master. An a.m. transmitter 100 per cent modulated by a single sinewave develops its p.e.p. at the peak of the modulating sinewave. Numerically the p.e.p. at 100 per cent modulation is equal to four times the power of the unmodulated carrier. Unmodulated carrier power is the same as the "key down" c.w. output. The peak envelope power developed by an s.s.b. transmitter, for the same single sinewave modulating signal is equal to **all** the power transmitted.

Next month we'll start to look at the methods of generating s.s.b. signals and at an s.s.b. transmitter.

SWAP SPOT

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G-zero? In fact, have you got anything to trade radio-wise?

If so, why not advertise it FREE here. Send details, including what equipment you're looking for, to "SWAP SPOT", *Practical Wireless*, Enefco House, The Quay, Poole, Dorset BH15 1PP, for inclusion in the first available issues of the magazine.

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing below, it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

The appropriate licence must be held by anyone installing or operating a radio transmitter.

Have modern SLR camera and ancillary equipment all in excellent condition. Would exchange for modern amateur radio equipment in similar condition or w.h.y? Value between £350 to £400. Prefer arranged meeting. Kevin. Tel: Stoke-on-Trent 0782 314383 evenings. *F211*

Have Rohde and Schwarz Type SDR u.h.f. signal generator covers 300 to 1000MHz in 8 ranges, output 1μV to 4V. Would exchange for 200MHz counter or w.h.y? Jim. Tel: Woking 0486 262671. *F232*

Have Sony ICF-2001D short wave and airband receiver. Would exchange for realistic (Tandy) scanning receiver PRO-2004. Wally. Tel: Brighton 0273 603108 evenings and weekends. *F235*

Have Edison Gem cylinder phonograph complete with twelve 2 inch cylinders and aluminium horn. Would exchange for amateur radio gear or w.h.y? G3IJL. Tel: 01-749 1454. *F255*

Have FT-75B c.w./s.s.b. crystal controlled h.f. transceiver plus matching p.s.u. and speaker unit, also have R107 valved receiver and new valves. Would exchange for heavy duty rotator, 144MHz s.s.b. rig or transverter to suit Icom 720A. Tel: 0978 755822. *F227*

Have FRG-7 receiver with 3 digit frequency counter. Would exchange for scanner or RTTY/c.w. decoder. T. Jenkins. Tel: 01-983 1730. *F254*

Have Icom R-7000 with remote control. Would exchange for Kenwood R-5000 with v.h.f. converter. Ron. Tel: 0975 532608 evenings. *F261*

Have Racal RA17L receiver in good clean condition and fully operational. Complete with manual and 5 spare valves. Would exchange for 144MHz rig or electronic organ. Jim. Tel: 0763 87378. *F272*

Have Seikosha GP50A computer printer. Would exchange for 10 element crossed Yagi for 144MHz or w.h.y? Peter. Tel: Sunbury-on-Thames 0932-787628. *F283*

Have Trio TS-510 h.f. transceiver and PS-510 power supply/speaker. Would exchange for TS-700 or TS-700G. Would consider non-working unit as item is destined to be converted to 70MHz. Ken Greenough. G8BEQ, 2 Bexley Close, The Heath, Glossop, Derbyshire SK13 9BG. Tel: 04574 5468. *F273*

Have Trio TS-700G 144MHz multimode and Drake TR-4CW h.f. rig. Would exchange for best offered solid state h.f. transceiver. Drake needs overhaul otherwise OK, in daily use on 3.5MHz. J.C. Peerless. Tel: 01-958 6887. *F314*

Have 35 foot, 3 section lattice tower with braked winch. Would exchange for 50MHz rig or transverter. Dave. G1NYN. Tel: 0924-405274 after 4pm. *F324*

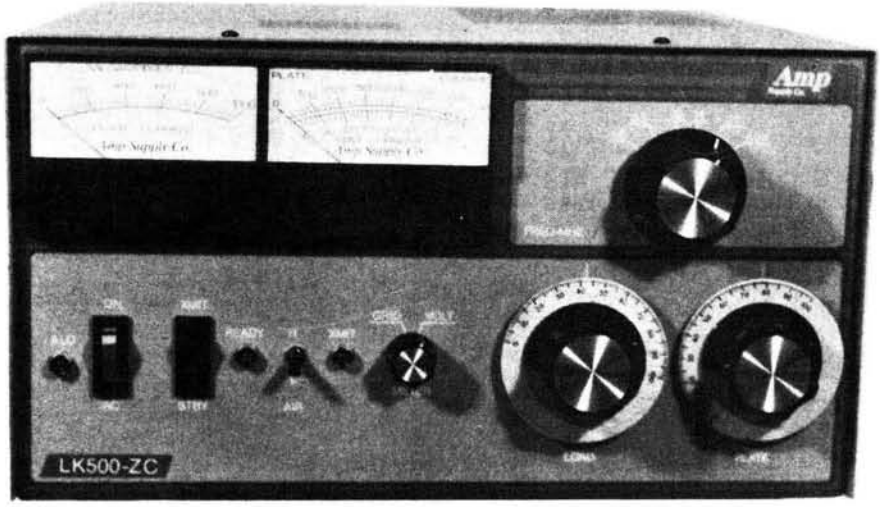
Have Yaesu FT-208R hand held plus NC-8 p.s.u./charger, PA-3 car adaptor, YM-24A speaker/mic and Heatherlite mobile boom mic. All in excellent condition and worth approximately £250. Would exchange for FT-290R in same condition. Ian. G0KRL. Tel: Suffolk 0359 70527 after 6pm. *F325*

Have Microwave Modules 2001 RTTY to TV converter, also Nevada home base collinear plus mobile magmounted antennas. Also RX4 software with cassette port for Spectrum +2 computer. Would exchange for spare receiver with l.s.b./u.s.b. and b.f.o. for same or w.h.y.? Bill Batley, West Yorkshire. Tel: 0924 471226. *F351*

Have 12 ft dia. aluminium dish with 0.25 f/d, believed 18GHz accuracy. Worth £100 scrap, swopper collects. Would exchange for large gun mount, Hymac digger platform or motorised searchlight turntable or w.h.y? System needed to mount and drive 4m dish. Grayham. G3VMO. QTHR. *F355*

PW REVIEW

The Amp Supply Co LK500-ZC HF Linear



Once in a while it's nice to hear something about how the "other guy" lives. This month, Ken Michaelson G3RDG gives us his impressions of a linear amplifier from the USA which can run up to 1.5kW r.f. output.

This linear amplifier is a new American import from a company well known for its range of high quality units; the example reviewed is no exception. The initial impression is one of solid workmanship, and further investigation bears this out.

One glance through the specification table will be enough to tell you that this is some amplifier! As far as connecting up was concerned, I had to run a heavy duty extension mains cable from another socket to feed it as the various outlets round my bench would certainly not have supplied the 12.5 amps required. The unit was supplied set up for 234V a.c., so there was no need to alter any tappings on the mains transformer.

The two Eimac 3-500Z valves were not installed but came in separate boxes. Removing the top cover of the unit revealed the top cap connectors hanging loose with their anti-parasitic chokes, the ends being attached to flat aluminium plates having holes in the centre to fit over the valve top caps. Handling them very carefully, I inserted the valves into the holders and, adjusting the aluminium plates just mentioned, dropped them onto the anode connection on the top of each valve, locking them into position by means of a screw in the side of each plate. The cover was replaced before there was any thought of switching on, as the voltages used are lethal—over 3kV for the anodes of the valves. There were numerous warnings in the owner's manual pointing this out; a very good thing.

The front panel carries two large clear meters, one indicating plate (anode) current and the other either plate voltage or grid current, as selected by a rotary switch. I thought it a pity that the scales of these meters were not back-lit. The 6-position bandswitch is marked 1.8, 3.5, 7.0, 14, 21 and AUX. The use of AUX rather than 28 is because US manufacturers are not allowed to include this range on linear amplifiers except for sale to genuine licensed amateurs. The ceramic bandswitch was made by Centralab and has a solid "beefy" feel about it when operated. The contacts are silver plated to achieve the highest efficiency.

The lower half of the front panel carries the red l.e.d. ALO (automatic lock-out, of which more later) indicator, together with green READY and red XMIT lights. Two rocker switches control mains on/off and STBY/XMIT switching, the mains switch being an illuminated type. The unit is equipped with a two-speed fan, controlled by a front panel toggle switch. Ventilating grilles in the top and right-hand side of the case allow for the movement of air. Completing the front panel controls are the PLATE (anode) and LOAD capacitors, both fitted with slow motion drives and dial skirts graduated 0-100 over a 180° swing.

Although the outside appearance of the LK500-ZC is nothing to write home about, looking, in my opinion, like a very well-made home-brew unit, the interior makes up for that. At first sight I stood back and admired—the very best quality components must have been used in its manufacture. From the size of the r.f. choke to the silver plated tank coils, from the computer grade electrolytics to the wide-spaced load and plate capacitors and Jennings vacuum changeover relay, everything is of solid dependable quality. The unit uses an h.t. transformer of 1.2A ICAS (intermittent commercial and amateur service) rating and a separate filament transformer.

The rear panel carries SO239 sockets for RF IN and RF OUT, and three phono sockets marked RLY, KEY IN and KEY OUT, a toggle switch which can be set to QSK or VOX, and two 15A a.c. line fuses.

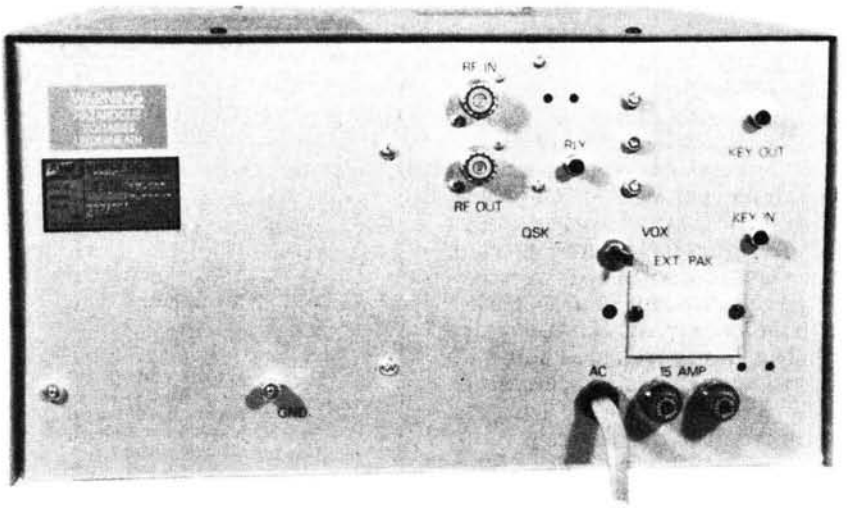
Connecting Up

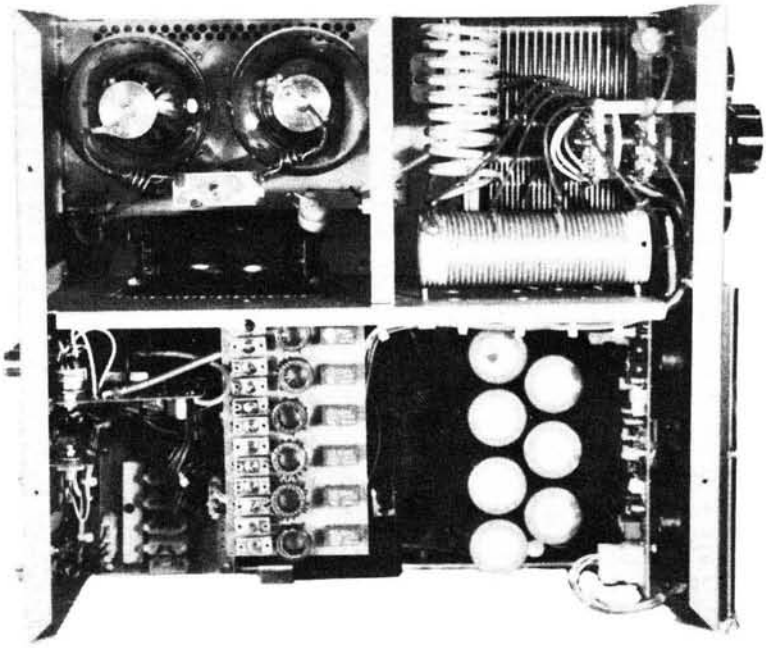
Having plugged in the mains supply and made sure the XMIT/STBY switch was at standby, I switched on. The plate voltage meter immediately indicated just over 3.1kV and the valve filaments lit up. The next step was to connect my own rig, an Icom IC-751. This has a phono socket on the rear panel marked T/R CONTROL TERMINAL, and a connection from this to the KEY IN phono socket on the LK500-ZC was the means of switching the linear on and off in parallel with the operation of the p.t.t. switch on my rig or any other method of changing from receive to transmit. There is no means of extracting an a.l.c. (automatic level control) voltage from the linear to input into an exciter. The final connections were coaxial cables from the output of my rig to the RF IN socket on the linear and from its RF OUT to the input socket of my KW109 Supermatch antenna tuning unit.

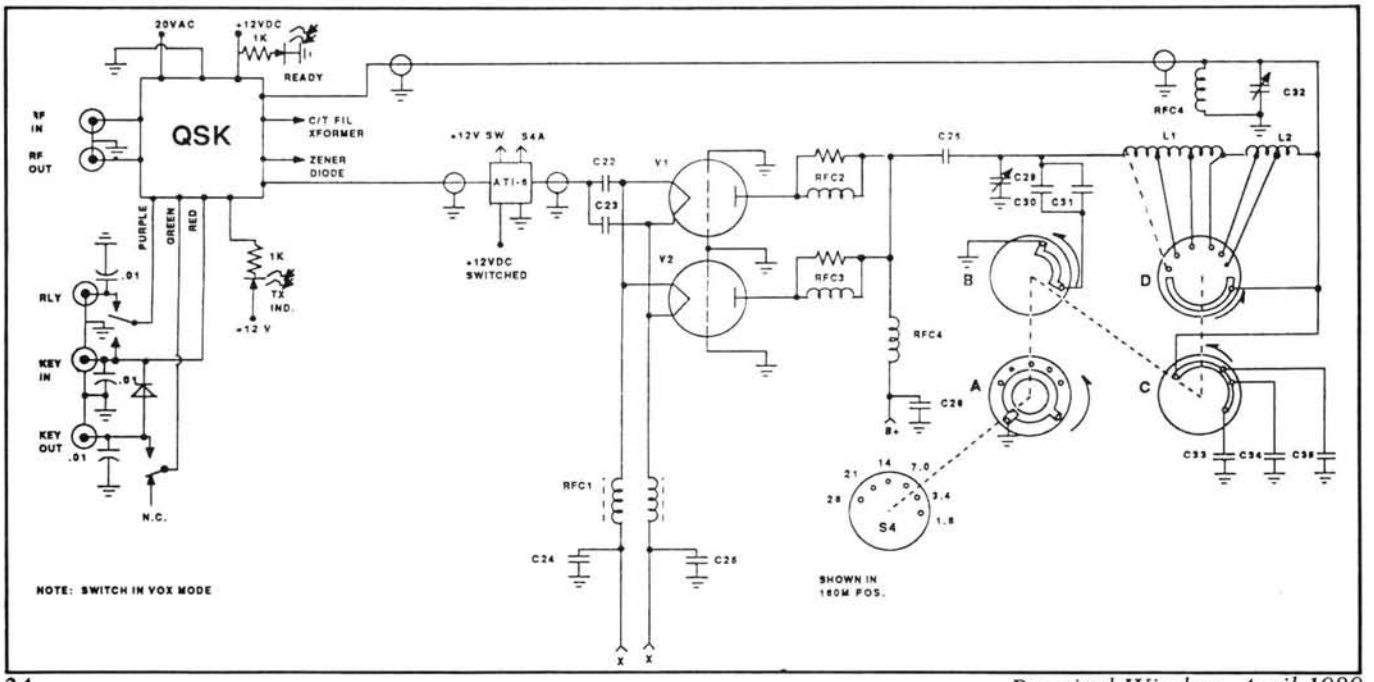
Since the IC-751 has broadband output tuning and the LK500-ZC presents an assured 50Ω load at its input there was no need to tune the rig. So I tuned the KW109 with the minimum output from the exciter first on 80m to get a 1:1 v.s.w.r. on my very peculiar 80m dipole. Each LK500-ZC comes with individual calibration details giving the LOAD and PLATE capacitor settings on each of the six bands. The review unit was tested by one Bill Edwards K4BWC as recently as 8 September 1988 according to the date on the sheet.

I set the dials to the readings given on the sheet, switched the linear to XMIT and the KW109 to read power, then set the exciter to RTTY and moved the transmit/receive switch on the exciter to transmit. For an input of about 10W from the exciter, I got just over 100W out from the linear, then I increased the drive until the legal limit was reached. The LK500-ZC will give an r.f. output of 1kW for RTTY and SSTV but, obviously, it was impossible to try this on the air legally in the UK. My dummy load would take 1kW for a maximum of 5 seconds, which was hardly a test, but the unit gave this output without any trouble.

As I had tuned the KW109 to a 1:1 v.s.w.r. on 80m, it was only necessary to tune the LOAD and PLATE capacitor of the linear to maximum output for a given drive, as instructed in the owner's manual in its very smart ring-binder. The manual was spoilt to some







extent by the fact that it covered all the LK-400/500 series of linears, and had to be read very carefully.

Naturally, at the power limit in this country, the unit was running cool and could take the necessary input from the exciter for ever. The first mode tried on the air on 80m was AMTOR, using f.s.k. so audio was not applied to the signal. The relays in the linear operated fast enough to give several pleasant contacts with no comment from the far end about any difficulty in reception. Further up the band, I had a number of s.s.b. contacts, with a good percentage of them commenting on the crispness of the signal when I told them I was trying out a new linear. A drive from the exciter of 15 to 20 watts gave an output of about 400W p.e.p. or 150W for RTTY.

I could not use the unit on Top Band for obvious reasons, though inflicting 1kW on my dummy load for the allowable 5 seconds showed everything worked as it should do. The other bands were used, operating on s.s.b., RTTY and c.w. in the designated band-segments, and there was no doubt about the increase in signal power. As an example, calling CQ on 'phone on 14MHz resulted in an almost immediate reply from VE3DFD, with whom I had a good half-hour QSO. A number of contacts were made on RTTY around 14.090MHz, and on 'phone and c.w. on 21 and 28MHz. On c.w., full break-in may be used by moving the rear-panel switch on the linear to QSK.

Changing from band to band was never any trouble, although the figures given on the test sheet did not always agree with my tuning positions. Provided the exciter was tuned first for a 1:1 v.s.w.r. reading on the antenna for the band in use, everything worked smoothly.

★ MAKER'S SPECIFICATIONS

Frequency range:	1.8–2.2MHz (160m) 3.5–4.5MHz (80m) 7.0–7.5MHz (40m) 14.0–14.9MHz (20m) 21.0–21.5MHz (15m) 28.0–29.7MHz (10m)
Type of emission:	s.s.b., c.w., a.m., RTTY, SSTV
Drive power:	100W nominal for 1.5kW s.s.b. p.e.p. output 125W nominal for 1.5kW c.w. output
RF output:	s.s.b. 1.5kW p.e.p. continuous c.w. 1.2kW average continuous RTTY, SSTV 1kW av., 1.5kW p.e.p.
Anode voltage:	3.2kV d.c. no-load
Harmonic suppression:	50dB minimum
Intermodulation distortion:	–33dB minimum
Valve complement:	Two Eimac 3-500Z triodes
Circuit type:	Class AB_2 grounded grid
Duty cycle:	Amateur continuous duty in all modes at specified output
Output circuit:	Pi-network with silver-plated tubing h.f. coil
Power requirements:	230V a.c. at 12.5A, 115V a.c. at 25A
Dimensions:	203Hx356Wx406D mm including knobs
Weight:	26.76kg (59lb)

I should mention that on occasions when using s.s.b. with the amplifier on 14 and 21MHz, I was told by my XYL that my voice could be heard through the hi-fi loudspeakers in the sitting room, even though the hi-fi was not switched on! Obviously care would have to be taken in the case of a permanent installation.

Any grouses? None really, apart from the lack of meter-scale illumination already mentioned, and, as a purely personal opinion, the strange mixture of switch types used on the front panel; two rockers of different sizes and a toggle switch. This makes the panel seem unbalanced, and I would have thought the designers could have obtained three switches of the same type and size. Apart from this, I have nothing but praise for this beautifully engineered instrument. The ALO (automatic lock out) circuit stops amplifier operation if it senses improper tuning or over-current in the valves.

I understand that there is available what the manufacturers call a "plug and play" harness, suitable for connecting the linear to most well-known exciters, so there would be no need to make up your own leads.

My conclusions were that anyone wanting to get his or her signal through the QRM could do no better than consider the LK500-ZC as an addition to their set-up, giving them a voice which could be heard anywhere. The cost of the LK500-ZC is £1499.00 including VAT. Thanks are due to **Amcomm of London, 373 Uxbridge Road, London W3 9RH, telephone 01-992 5765** for the loan of the review amplifier. ***PW***

All About Lamps

Part 2

In Part 1 of this article, J. D. Harris looked at the technology and characteristics of tungsten filament lamps, including tungsten halogen types. This month, he moves on to talk about neon lamps, and describes some unusual uses for them, rounding off with a few words about electroluminescent panels.

The neon lamp has been available for many years and the phenomenon of gas discharge in an electric field was well documented before 1900. Modern manufacturing techniques have enabled high volume production to be achieved with output rates of up to 3000 lamps per hour being possible.

A glass bulb containing the two electrodes is evacuated and the inert neon gas is introduced prior to final sealing (Fig. 2.1). They may be fitted with a base, typically m.b.c. or m.e.s., or may be used in capless form. Many different types of construction exist but the operating mode of all neon lamps of this type is the same. The voltage/current curve in Fig. 2.2 shows that little or no current flows until the striking voltage is reached (point A). The current then increases to a value A1 which is largely controlled by the external impedance of the circuit. The striking voltage is typically 45–65V a.c. for standard brightness types, and 70–100V a.c. for high brightness types.

The operation of a neon glow lamp is relatively simple but does take us into the area of electron physics. When the applied voltage is greater than the striking voltage all the electrons emitted from the cathode (negative electrode) are accelerated by the electric field towards the anode. These electrons collide with the atoms of the neon gas and two possibilities occur.

The electrons moving from cathode to anode can collide with an atom of gas and elevate one of the valence electrons to a higher energy state. The electron will then return to a lower energy level and a photon of light will be emitted. The wavelength (hence colour) of the light will be dependent on the type of gas used.

Remember that we are considering millions of such collisions. If we were considering a high vacuum (non-gas-filled tube), typical figures are that only one electron in 60 000 experiences a collision, therefore their motion is virtually unaffected by any gas molecules present. However, when neon or some other suitable gas is introduced, one electron in six will experience a collision, resulting in the characteristic glow of the neon lamp.

Another effect that occurs is that atoms of the gas have an electron removed, causing the atom to become positively charged. This is attracted to the cathode in the form of positive ion. The collision with the cathode causes material to be removed, a phenomenon known as "sputtering". The special emissive coating on the electrodes is thus removed over a period of time, causing the base material to be exposed and increasing the striking voltage of the lamp. When a lamp is operated from a.c. each electrode is alternately positive and negative. However when operated from d.c. one electrode is always the cathode hence shortening the effective life of the lamp. Apart from causing an increase in the striking voltage, the emissive material removed from the cathode will be deposited on the glass resulting in a decrease of light output over the life of the lamp. For maximum life of a neon indicator, the end of the lamp should be used to provide the light source rather than the side, as maximum sputtering and hence darkening of the tube is found to occur on the side of the lamp.

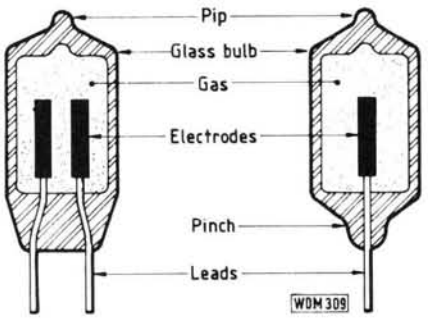


Fig. 2.1: Construction of a typical small neon lamp

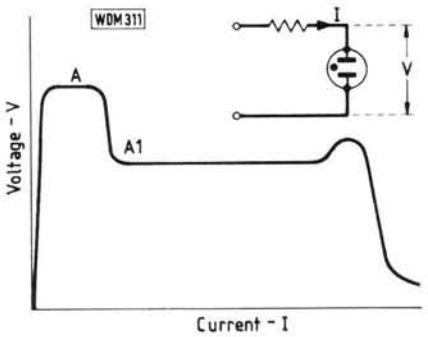


Fig. 2.2: Voltage/current curve of a typical neon lamp

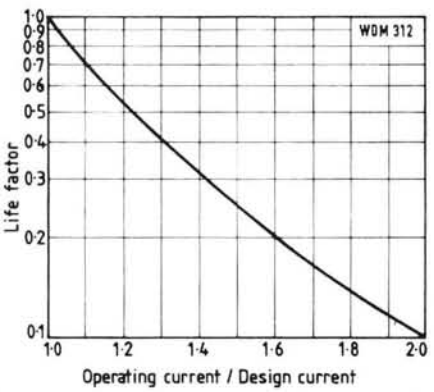


Fig. 2.3: Life/current curve of small neon lamps

Lamp Life

The useable life of a neon lamp is typically from 5000–20 000 hours or more, depending on the type of lamp used and the operating current specified. The relationship between operating current and life is a 3.3 power law i.e.:

$L2 = L1 (I1/I2)3.3$
or $L2 = L1 (R2/R1)3.3$
Where L1 = specified life expectancy
I1 = specified operating current
R1 = specified series R
L2 = New life with current I2 or series resistor R2

For example a typical neon lamp requires a series resistor of 180kΩ at 240V a.c. for a 5000 hour life. In general an increase of the value of the series resistor, whilst increasing life, will cause erratic striking.

To provide a higher light output but with shorter life, reduction of the series resistor should be treated with caution as Fig. 2.3 shows:
Reducing value of series resistor from 180kΩ to 100kΩ with nominal lamp life of 5000 hours:

$5000(100\,000/180\,000)3.3 \simeq 900$hrs.

As the increase in light ouptut is not very significant it is generally worthwhile to adhere to the specified values where possible.

"Green" neon lamps are available, although this is of course a misnomer. The inside of the lamp is coated with a fluorescent material that will glow green when the lamp is ionised.

Cold-cathode Tubes

Another widely used form of two-electrode neon tube is known as a cold-cathode tube. These are manufactured to much tighter tolerances than neons intended purely for use as indicators, and the light output from cold-cathode tubes is usually of secondary importance. Many of this type of tube have a

radio-active tracer introduced to ensure that the tube will strike when used in situations of total darkness within equipment. Nevertheless home constructors will find acceptable performance can be obtained from standard neon lamps and a number of useful circuits are shown in Figs. 2.4–2.6. Some cold-cathode tubes have a third electrode known as the trigger electrode which enables even more accurate striking parameters to be realised.

A neon lamp can also be used as a crude but effective indicator of the presence of r.f., provided it is placed near the area of maximum r.f. voltage, e.g. the ends of dipoles, mobile whips, p.a. coils, etc. In many cases this is certainly a better indication of r.f. than a light emitting diode or similar device, which will only show that voltage has been applied to the p.a. or similar stage.

In the past cold-cathode tubes have been widely used as surge arrestors and in similar applications. Older readers may recall the American BC series of receivers where neons were used to protect the input of the receiver and also to provide a form of crude audio limiting on the output. Another wide use has been as a surge arrestor to protect BT-maintained telephone equipment or wires. In modern equipment using semiconductors the ionisation time is usually too long to offer protection and many solid-state surge suppression devices are now on the market.

It is wise to remember to operate neon indicators via the correct value of series resistor. Failure to do this can result in catastrophic failure. The circuit current is then limited only by the external impedance. The neon current rapidly increases, causing a rapid increase in temperature. An arc will form, the pressure in the lamp will also increase and the lamp can explode.

As neon lamps can be operated directly from the mains supply (via the correct value of series resistor), they can be used without transformers, etc., for decorative displays for use in low ambient lighting conditions.

When using neon lamps as indicators in equipment operated on 240V

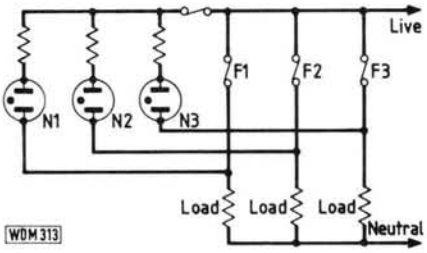


Fig. 2.4: A blown-fuse indicator; when a fuse blows, its associated neon indicator will light. This circuit can be used with any number of fuses and neons

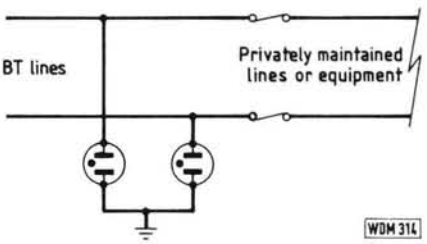


Fig. 2.5: Neon lamps used as surge arrestors to protect telephone lines

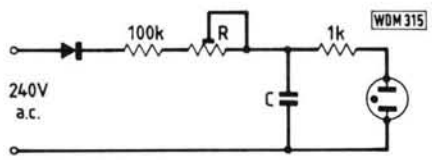


Fig. 2.6: A neon lamp flasher. The required flash rate is achieved by adjusting R between 100kΩ and 1MΩ, and C between 0.5μF and 2μF

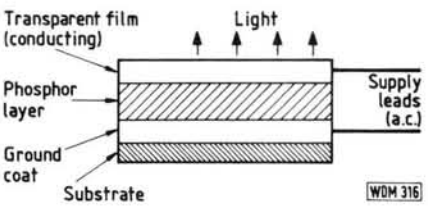


Fig. 2.7: Typical construction of an electroluminescent panel. The panel thickness is approximately 5mm

a.c. supplies, long leads associated with any indicators may have sufficient induced voltage to cause the neon to strike. This can usually be cured by placing a resistor in parallel with the neon lamp as close to the lamp as possible.

Due to their manner of operation, neon lamps are effective noise generators and care should be taken if they are used in circuits such as high-gain audio amplifiers. The noise may well peak at a particular frequency determined by the inherent inductance and capacitance of the leads. This problem can be overcome by suitable decoupling or by rearranging the leads.

Electroluminescence

Another interesting method of producing light for use as indicators or panel and instrument illumination is the electroluminescent (EL) panel. Although relatively inefficient, producing typically 0.5–1 lumen per watt, EL light sources find many applications. The original research was carried out in 1939 but the intervening war and lack of suitable materials delayed any commercial exploitation until the late 1950s.

The construction of the EL panel is a sandwich consisting of a thin transparent conducting film, a suitable phosphor layer and a conducting electrode. Various forms of construction exist, a typical one being shown in Fig. 2.7. The phosphor is subjected to an electric field and the change in energy levels produces light output. The colour of the emitted light depends upon the phosphor used, the most common colours being green and blue. By using "Day-Glo" and similar types of organic fluorescent paints, other colours including red and yellow are produced.

As this form of electroluminescent panel is produced as a flat package, it is useful as an area light source for use in instruments and meters. Because the flat panels can be drilled and shaped as required they find many uses in avionics and military applications.

Commercial applications of EL include children's night-lights, luminous switch surrounds, radio dials, etc. Some liquid crystal displays offer EL as an optional extra for viewing the display in the dark or in low ambient lighting conditions. ***PW***

Kitchen Konstruktion

In this, the last in this occasional series, Richard Q Marris G2BZQ covers one of the most important aspects of starting home construction, the development of a junk box.

Things have changed considerably in the 33 years since the displayed Walter Ashe advertisement appeared in an ARRL publication. It's typical of that era when radio and electronic components were available from a profusion of mail order and retail outlets. Some of the UK companies trading during this period became quite famous, or infamous as the case may be. Every other shop in Lisle Street, London WC2 was a treasure house loaded with radio goodies. This was also the era when suppliers would fall over backwards to send you their latest catalogue/list, post haste and all at one postal rate!

Salvage

The home radio constructor, experimenter or radio amateur needs to have access to components. If his activities include radio equipment restoration then the components will need to be of an old pattern. Old-fashioned radio components are becoming increasingly difficult to come by and when they are available they're generally overpriced, particularly when you see that some parts on offer are ex-equipment. High prices combined with heavy postal charges and the dreaded VAT make a nonsense of ordering such devices, especially when the equipment to be restored might have only cost a few pence at the local car boot sale.

The answer to this thorny problem is salvage. Some items of electronic and electrical equipment are only any good for stripping down. Take for instance your average valved radio, thousands were produced after the last war. Few of these sets have any historical or technical value, but when stripped down they can produce some very useful items for the junk box. Just one item, such as a two or three-ganged variable capacitor will literally pay for your initial outlay to buy the set. Other items such as loudspeakers, dial drive assemblies, mains and output transformers, valves and their holders, capacitors and resistors are all an added bonus.

Places to Look

The days of the junk shop are past in many towns, with high rates forcing them out of business. Taking their place are charity shops, flea markets, jumble sales and car boot sales. Many of the above sources often sell second-hand technical books as well as magazines and this is what originally drew the author to such places. A little while ago, a dirty, scruffy-looking old broadcast radio was bought from such a place for just £1. When later examined, it was found to be an 8-valve 1950's job and quite a nice set for its time. The innards of the set were in remarkably good condition. This was obviously a set worth renovating, and after some good oldfashioned elbow grease and bit of repair, including a replacement for the missing mains-lead, the beast sprang into life. The set is now an imposing piece of equipment and quite an efficient receiver.

With acknowledgements to ARRL

The sense of achievement gained from such an exercise is quite remarkable and just goes to show that not every piece of gear picked up cheap should be stripped down.

Strip Down

Now assuming a piece of old gear has been "picked up" at low cost for salvage, the first step is to carefully remove the chassis from the wooden case and extract all the valves from the chassis. This is done by grasping the valve base, if it has one, never by the envelope, as this may be loose and the valve will be destroyed; more of this later. After the valves have been removed, a vacuum cleaner fitted with an upholstery nozzle should be used, along with a small soft paintbrush to clean away the years of accumulated dust from the chassis.

If the valves are of interest then they should be gently wiped clean. Once the valve type number has been established make a note of it on a small sticky label, which should be attached to the valve base. Next, using a multimeter check each valve for heater continuity. The pin configuration of each type will be different, so you will need to look this information up in a suitable reference book[1]. As mentioned earlier the valve envelope often comes loose from the valve base. This can be cured by applying a thin fillet of Araldite between the base and envelope, using a matchstick or similar. Only use the normal setting Araldite, as the "Quick-Set" type puts too much stress on the glass envelope and may crack it. When the adhesive has been applied stand the valve upright in a cool place for 24 hours before putting the valve into store.

The next major item to be removed is the loudspeaker along with any nuts, bolts, washers and wood-screws from the wooden case. Once this has been achieved we can turn our full attention to all the chassis-mounted components. Large items such as i.f., a.f. output and mains transformers should be carefully unsoldered, unbolted and cleaned. Before storing these components check and note any impedance, voltage or current markings as well any other useful information. This information can then be written on a small luggage tag and attached to the item, making for easy future reference.

Capacitors

The older ganged capacitors found in valved broadcast receivers are usually of sturdy quality construction. However, over the years they seem to take on a rather tatty look as they act like a magnet to household dust, some of which resists nearly all attempts to be removed. Having said that, methylated spirit does seem to work. Use a small paint brush to apply the meths to the main structure of the capacitor. Once this is free of dust and dirt, take a suitable thickness piece of plain card and run it, in turn, between the stator and rotor vanes of the capacitor. This action should leave the capacitor free from dirt, unfortunately it will have also removed all the bearing lubrication. However, several spots of light oil into each ball race should overcome this problem. Finally put the capacitor in a polythene bag before storage, this will keep it from attracting any more dust.

▶ 44

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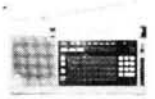

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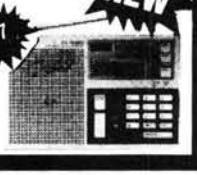

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E992a

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R.A.

IH002

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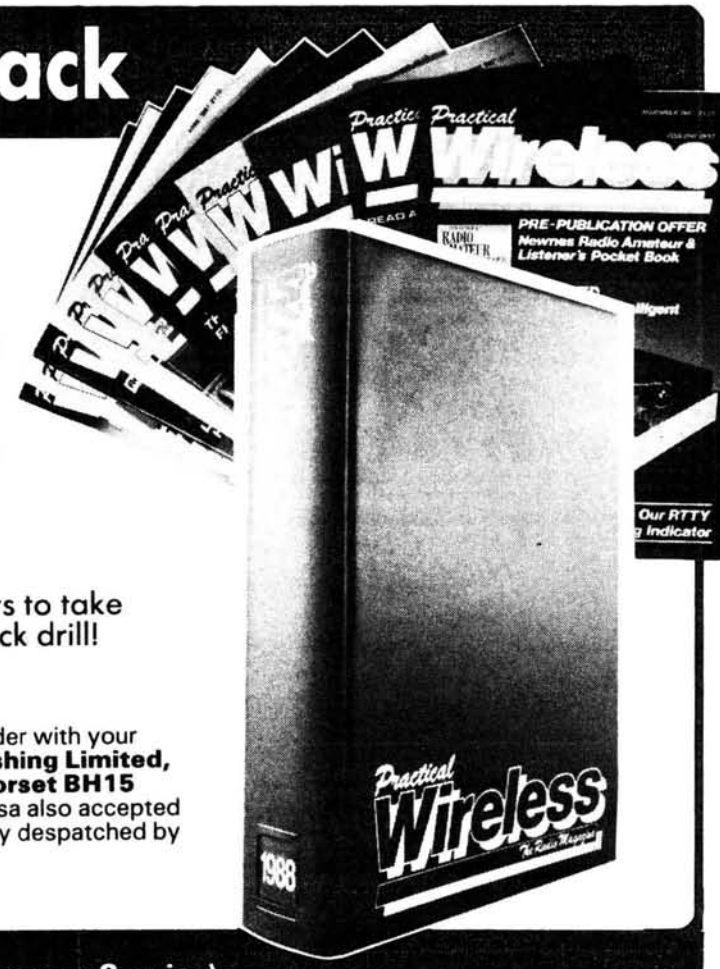

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De-soldering

Large numbers of resistors and capacitors can be gained from one chassis. The snag is that these components, unlike those mounted on a p.c.b., have their legs bent round the tag they are soldered to. This means that each joint will need to be de-soldered using either braid or a solder sucker. After most of the solder has been removed, each component lead will need to be mechanically unwound from the tag to which it was soldered. The upshot of this operation is that each component is subjected to prolonged high temperature, which may be damaging. In order to stop this, a heat shunt should be applied between the component and the iron. A small pair of long-nosed pliers make an excellent heat shunt. These can be clamped into place while you're de-soldering the component by wrapping a strong rubber band over the handle of the pliers.

Before committing these salvaged components to the junk box, test the resistors with a multimeter to see that their value has not altered, as old resistors tend to go high in value, while capacitors tend to go resistive or short circuit.

Transistor Radios

The author's experience with modern portable transistorised receivers is that very few components can be salvaged from them. Larger items such as loudspeakers, audio and mains transformers and possibly variable tuning capacitors are the limit of what can easily be saved. This is a good point to remember; some equipment may be old and large but in general it is much easier to service. As equipment becomes smaller and smaller, so it becomes harder for the average amateur to attempt his own equipment servicing and repair. This is where well designed home or kit built equipment scores, it's generally a lot easier to repair than commercially built gear.

Home Built Enjoyment

If you're going to enjoy the hobby and not eventually look upon it as a continuous drain on your financial resources, then the only approach is to build your own equipment. Remember, kits are a good place to start in this area of the hobby. You obviously can't compete with commercial equipment when it comes to bells and whistles, but then just look how often you actually need these extra facilities; it's surprisingly low. Who knows, if your home-built equipment works well, you could write up the design and get it published within the pages of this very magazine, and be payed for it, too! ***PW***

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Wireless in 1928

In Part 2, John D. Heys G3BDQ concludes his look back at this important year.

On 4 October 1927, the delegates from seventy-four nations began their deliberations at the International Telegraphic Conference that was being held in Washington DC. This was the first conference to follow the one held in London in 1912, and the agreements reached had important and wide-ranging effects on the world of wireless. These new decisions changed many of the rules and conditions pertaining to the holding of amateur licences and the regulations were due to take effect towards the end of 1928.

Many amateurs were, as they thought, dragged unwillingly into a new era of stable transmitters, closely defined frequency bands, effective frequency measurements and the new list of "Q" codes and callsign prefixes.

1928 was perhaps the final year to see the operation of the older transmitting techniques and it saw the gradual introduction of crystal controlled oscillators, tighter licence conditions and the opening up of the ten metre DX band.

The New Licence

The British Post Office issue Memorandum No. K 702 on 5 September 1928 which defined the new condition to apply to holders of the quaintly named "Experimental Licences" for the use of sending and receiving apparatus. These new licences were to be issued between October and December and under no circumstances could licences in the old form be allowed to continue after 1 January 1929. Sending was limited to the following frequencies: 1.74–1.97MHz, 7.05–7.25MHz and 14.06–14.34MHz and if a special application was made operation might also be allowed on one or both of the frequency bands 28.1–29.0MHz and 56.15–59.85MHz.

In future, transmissions were to be limited to pure c.w. and telephony. No spark or unrectified a.c. was allowed and special reasons were to be given if i.c.w. or Tonic Train transmissions were contemplated. Every station was to possess a piezo-electric crystal to enable the measurement of transmission frequency and every effort must be made to ensure frequency stability with as little possible harmonic and other unwanted radiation.

Messages to stations in this country or abroad who were co-operating in the experiments were allowed. This was significant; for up to that time it was outside British licence regulations to contact foreign stations. Our amateurs, however, had long disregarded this condition which had been formulated when long distance contacts between amateurs were thought to be impossible. For the first time the index letter "G" ("GI" for Northern Ireland) was to be always prefixed to the call of the station. This was good news for G6MN and other printers of QSL cards!

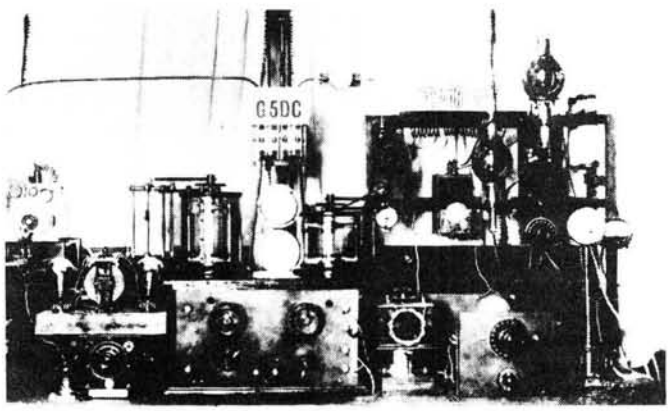
The use of the general call "CQ" was expressly forbidden, but the general call "test" was allowed. This odd regulation persisted right up to the big QRT in 1939. Power was normally to remain at 10 watts input and higher powers were only to be allowed in exceptional circumstances.

The most upsetting feature of the proposed new licence was the ultra-cautious attitude of the Post Office regarding band edge tolerances. They lopped 25kHz from each band edge to ensure that everyone kept within the bands. The RSGB protested vigorously but the Post Office were adamant and remained unbending.

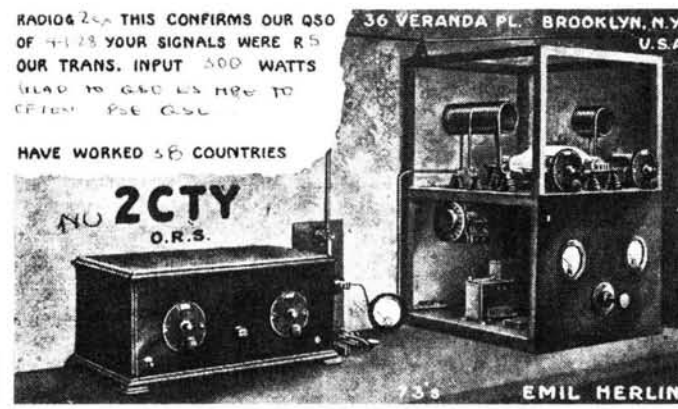
Transmitters in 1928

Most British and foreign amateurs were still using self-excited oscillators as transmitters during 1928. These were normally single or two-valve circuits arranged as Hartley, Colpitts or t.p.t.g. (tuned-plate, tuned-grid) oscillators. Just a handful of stations had m.o.p.a. (master oscillator-power amplifier) arrangements which could reduce the frequency shift brought about by antenna movements, keying, etc. The transmitting valves most commonly in use here were the LS5 and the DE5. Both were power valves for driving the new moving coil loudspeakers, the Marconi LS5 had an amplification factor of 5 and an impedance of 600Ω. It needed 5.25 volts on its filament at 0.8A and 400 volts h.t. The LS5 was ideal for a station operating within the 10 watt input limitation and cost 25 shillings.

Many amateurs found difficulty in achieving the high voltage (smoothed d.c.) for the transmitter valve anodes. A lot of them lived where there was still no mains supply and they were forced into using batteries or hand generators. Some agile or acrobatic types actually managed to turn the handle of the wretched generator and operate the Morse key at the same time! The d.c. mains could be ideal for voltages around 200 but useless for anything higher unless a motor generator could be obtained, these noisy devices were often suspended in cradles with strong rubber thongs. The more fortunate individuals with an a.c. mains supply could, of course, get any voltage they needed from transformers, but then there remained the problems of rectification and smoothing. Some just applied the rectified d.c. to their transmitters and others put raw a.c. on the anodes! The c.w. notes from the r.a.c. stations were excruciating and almost T1! Keying was a problem for the high powered stations. Many achieved this by keying the primary of the h.t. transformer.



The equipment of G5DC showing a high-power oscillator to the right



A neat station at NU2CTY in New York. The transmitter is again obviously a t.p.t.g. single valve oscillator

Crystal Control

Not more than about 15 per cent of British amateurs were using crystal control during 1928. This deduction was made from the close examination of many QSL cards for that year and it shows clearly that 1928 was perhaps the last year when uncontrolled transmitters were predominant. Quartz crystals were (and remain) relatively expensive and the 20 or 30 shillings needed for the purchase of a "rock" must have seemed quite exorbitant 61 years ago. This led the impecunious and more adventurous types to the premises of long established opticians! Here were often boxes full of old quartz lenses of types no longer used in 1928. Opticians could wear out complete sets of tools for lens grinding if they worked on quartz for a few weeks so they were quite willing to let radio amateurs buy them for a nominal sum.

Many of these old lenses could be induced to oscillate; and if the experimenter was lucky one might be found which had a natural frequency within or harmonically related to an amateur band. The author has two such lenses which can still be made to oscillate in a home-made holder. If over excited the crystals shoot out sideways from the holder!

There were at least two suppliers of quartz crystals in 1928. Messrs. Quartz Oscillators Ltd., of 1 Lechmere Road, NW2 advertised in many languages on the back of the G5FS QSL card, and the Oscillating Xtal Company in Cambridge had a price list of their products on the reverse of the QSL cards used by G5YK. This company supplied crystals ground to a tolerance of ±2.5kHz between 600 and 5000kHz. Standard crystals cost £1 and heavy duty types were 30 shillings.

In a t.p.t.g. circuit, the frequency is determined by either the anode or the grid tuned circuit. The circuit having the best *Q* will decide upon the output frequency and if a quartz crystal is substituted (or put in parallel with) the grid circuit, the crystal will determine output frequency regardless of the adjustments or loading of the anode circuit. If high power operation was contemplated, there was a danger that the high r.f. currents through the crystal would heat and fracture it, but this snag was neatly overcome by Cecil Goyder G2SZ. Goyder was the first British amateur to contact New Zealand in 1924 and he devised his "Goyder Lock" circuit. A low power crystal oscillator was loosely coupled to the grid circuit of a high power t.p.t.g. oscillator and the crystal oscillator then "took over" the frequency control of the big valve.

Receivers and Antennas

In the UK, amateurs used simple two valve 0-V-1 receivers. Such sets were, of course, low-noise devices especially when operated from batteries, but their selectivity left much to be desired. Hand capacity effects and the smoothness of their reaction controls became all important design considerations. The detector circuits were usually of the Reinartz or Schnell types which had been developed in the USA during 1923.

By 1928 antenna theory and practice had advanced beyond the use of simple top loaded Marconi systems with counterpoises and most stations were using Hertz antennas cut to a resonant length. These were normally half wave (a full wave on 45 metres was too long for the conditions of the licence!) and were either end or "Zepp" fed. At that time there was no low impedance feeder or coaxial cable available, but the single wire feeder system known as the Windom tap had been introduced from the United States where it was becoming very popular. The Windom is still used all over the world and is an effective radiator.

Ten Metres

The Licensing Authorities thought that the ten and five metre bands were too high in frequency for more than very short distance working and gladly allowed their use by amateurs. As usual the pundits were proved wrong! It was difficult to get many valves to oscillate at 28MHz and this held back operation on that band. A few determined amateurs persisted and they were rewarded by the making of historic record DX contacts.

The Frenchman Pierre Auschitsky EF8CT made the first ever contact on ten metres between Europe and North America on 1 January 1928. He used a twin valve t.p.t.g. oscillator (attributed to Professor Mesny) with 1200 volts on the anodes at 125mA (150 watts input) and his receiver was a simple 0-V-1 mounted on an old gramophone disc to provide good insulation!

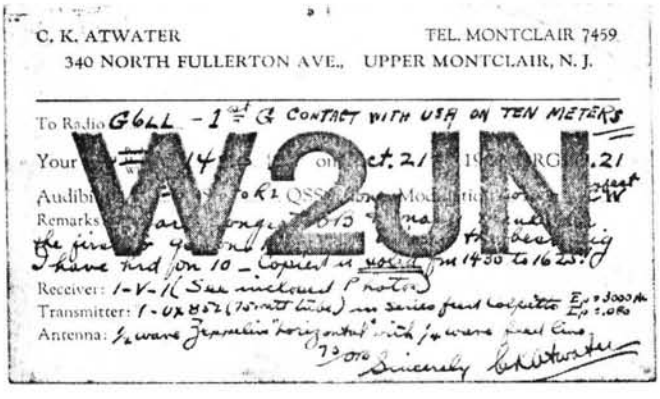
The antenna, then known as a "levy" consisted of two 5 metre long wires end to end centre fed with open wire twin line. We would know call this a full wave centre fed doublet. His wire ran from north to south and it gave him S5 to S6 reports from the station in New Jersey, NU2JN. The contact was on c.w. 'Phone was tried but NU2JN did not hear the French station. A listener report on the telephony was, however, received from another American station. The historic contact lasted from 1415 to 1645GMT.

Later in the year, Jimmy Matthews G6LL who was the leading worker on ten metres in this country also contacted W2JN (USA stations began to use the W prefix in 1928) on October 21. This was the first USA/G contact on the band. Matthews had a home-built sophisticated transmitter with crystal control on 80 metres followed by a chain of doublers and a final p.a. running at 50 watts. His receiver was also the ubiquitous 0-V-1 and the antenna a half wave vertical, Zepp fed.

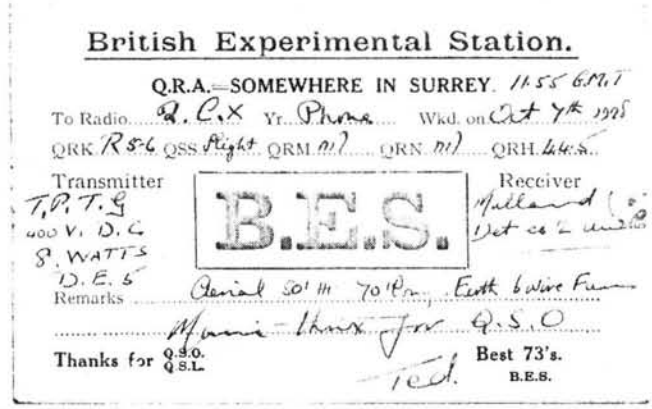
Fun and Games

The May 30 issue of *Wireless World* carried a small paragraph which discussed the work of the Post Office Detector Van and it went on, "Good missionary work regarding oscillation detector interference has been put in by the Post Office but these vans have spent most of their time tracking illicit transmitters".

Piracy was indeed not unknown then, and the author's predilection for collecting ancient and interesting QSL


C. K. ATWATER
340 NORTH FULLERTON AVE., UPPER MONTCLAIR, N. J.
TEL. MONTCLAIR 7459
To Radio G6LL - 1st 2 CONTACT WITH USA ON TEN METERS
W2JN
Receiver: 1-V-1 (See enclosed Photo)
Transmitter: 1-UX852 (75 watt tube) in series feed
Antenna: ½ wave Zeppelin horizontal with ½ wave feed line
73's Sincerely

The historic QSL card from W2JN to G6LL to confirm the first 10m contact between the UK and the USA


British Experimental Station.
Q.R.A.—SOMEWHERE IN SURREY.
To Radio G2.CX Yr. Phone Wkd. on Oct 7th 1928
QRK R5-6 QSS Right QRM nil QRN nil QRH Lots
Transmitter T.P.T.G. 400 V. D.C. S. WATTS D.E.5
B.E.S.
Receiver Mullard (?) Det & 2 L.F.
Remarks Aerial 50' H. 70' Run. Earth & Wire Fence
Thanks for Q.S.O. Q.S.L.
Best 73's. B.E.S.

A QSL card used by E. J. Laker before he was licensed as G6LK

cards has brought to light one or two shady secrets from 1928. The late Austin Forsyth G6FO, founder and Editor of *Short Wave Magazine* from 1936 to his death, was a youngster living in Newport in 1928. He was a keen s.w.l. with the BRS number 80. I have a QSL card that he sent to G2CX reporting on that station's signals which is dated 16 October 1928. Also before me is a QSL card bearing the call letters "SMD" from a motor cruiser *Leonie* lying in Newport River which confirmed contact with G5UF on October 13 of the same year. It is an obvious "under cover" card with a London Mono-mark address and has been written by the same hand as the card from BRS 80. His receiver was a 0-V-1 Reinartz and the transmitter was a Hartley running 8 watts to an LS5 valve. The second card also is marked "QSL No. 80"!

Another well-known amateur was E.J. (Ted) Laker of Cranleigh in Surrey who also chanced his arm and defied the PO regulations in 1928 before he received his transmitting licence. His "under cover" call was "BES" (for British Experimental Station) and the QRA is shown on his QSL as "somewhere in Surrey", the QSO was with G2CX on 7 October 1928 and his TX was a t.p.t.g. at 8 watts to a DE5 valve. The card is signed on the back E. J. Laker and the signature is identical with those on his later QSL cards when he was G6LK.

One wonders how G2CX felt when a postcard was delivered to his London house on 11 June 1928 which read:

"Dear Sir, Would it be possible for you to broadcast something more interesting than, 'Hello—Hello—Hello—2WR' on Sunday mornings as you interfere greatly with the musical programme from Hilversum? Yours truly J. A. Bayley."

Most readers will know that Les Moxon G6XN is perhaps one of our leading amateur authorities on antenna design and construction, his book on the subject will remain a standard work for some time. In June 1928 the almost juvenile Les Moxon who had been recently licensed contacted G5UF. In those days our antenna wizard was using a 5 metre indoor wire for reception and a 16 metre inverted L only 2 metres up for transmission. His transmitter ran 8 to 9 watts with half wave rectified but unsmoothed h.t. and it had a.c. on the filament. He had already worked 12 countries with from 2 to 3 watts input!

There is necessarily much more to tell about the happenings during 1928, that vintage year, but it is to be hoped that this brief dip into the history of that year will prove as interesting to the reader as the original research did to its compiler. **PW**

Feature

Practically Yours

By Glen Ross G8MWR

Imagine that you have just managed to blow a semiconductor device in your latest constructional project. You look in your spares box and find that although you have many transistors, obtained at various junk sales, you don't seem to have a direct replacement. Something in the spares box might do the job, but you are going to have to go through the data books to make sure. Is there some way in which you can narrow the field of search down? There is little point in looking up a device that turns out to be a thyristor if you want an audio driver.

The Code

All semiconductors carry a coded type number which may or may not be of help to you. The least useful is the American system. The coding consists of the number and letter 2N followed by a serial number, so that we get such things as 2N3055. Apart from telling you that this is a semiconductor device with two junctions, which you already knew, there is little or no information to be gained from the number.

Old English

The early transistors made by such companies as Mullard carried coding that does at least give some help. The code consisted of a figure followed by a letter and a two digit number, such as an OC35. This system was based on an already existing valve coding system, the first digit showed the filament voltage, in case of a transistor this is obviously zero and is depicted as the letter "O". The second digit showed the element configuration, C indicating a triode or three element construction, referring to the Emitter, Base, Collector sections of the device. The final figure was an in-house issue number. The code letters which you may find are: A indicating a diode or rectifier, AP meaning a photo diode, AZ used for voltage regulators (Zener diodes), C for a normal transistor and CP for a photo transistor.

JA Coding

The Japanese decided to put more information on the device. They carried this to such an extent that they ran out of space on the top of the transistor and promptly truncated the coding. A full coding might appear as 2SC1234B. In this the first digit shows the type of semiconductor, the second indicates that it is a semiconductor, while the third symbol shows the type of use the device is intended for. The group of figures is simply the device registration number (all Japanese devices are registered with an organisation known as JIS). The final letter shows a revision of the original design; the further you go through the alphabet the more revisions there have been. Table 1 shows the coding used.

Table 1

First digit
0 = Photo transistor
1 = Diode
2 = Transistor
3 = Field effect transistor

Second symbol
Always S.

Third digit
A = High frequency *pnp*
B = Low frequency *pnp*
C = High frequency *npn*
D = Low frequency *npn*
F = Thyristor *p*-gate
G = Thyristor *n*-gate
J = Field effect transistor *p*-channel
K = Field effect transistor *n*-channel

European Code

The system which is used by nearly all European manufacturers is known as the Pro Electron code. This carries much more information about the device than any of the other systems. Next month we shall look at this coding in some depth. **PW**

On The Air
On The HF Bands

Reports to Paul Essery GW3KFE
287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1AR

Conditions

As always, up and down. What we need at this stage of the sunspot cycle is not more sunspots but rather the quiet geomagnetic conditions and absence of solar disturbance which enable us to make the best of what is there. To be fair we have certainly had some of those sort of conditions and most readers will have taken advantage of them. On balance, one could say the band has been better than one could have expected throughout the period.

DXCC News

Rather as expected, Rotuma has been accepted for DXCC credit. However, rather than start with the recent 3D2XX operation, they have made it a country retrospectively to 1945, despite the fact that an earlier application back in 1982 was turned down . . . Whatever the logic here, and it escapes me, there is a secondary problem for the older DXers. If you previously submitted a card emanating from Rotuma for Fiji credit, then you'll have to also send a second Fiji card to maintain the credit. Don't submit before June 1.

M-V Island cards should not have been submitted before March 1. The operation, as previously stated, was a "new one" in terms of DXCC credit.

Still with DXCC, we hear that the 5UV386 is now accepted, but on the other hand there seems to be a mighty query hanging over the TU4BR/5U7 activity . . . seems like the TU authorities say the licence had lapsed a while back and the 5U authorities had not given an authority to operate! So . . . if that were true, how did the presented documentation validate the case to DXCC?

On the other hand DXCC has decided against reinstating Okino Torishima.

Before you read this, I hear there will have been another Laccadives operation —virtually all of March, using VU7APR and VU7NR, with it is believed, possible side trips to other islands.

Revilla Gigedo XF4 activity is slated for May-time according to *DXNS*, which also notes that there is another rumour going the rounds that suggests April, and a Clipperton Is. follow-up by the same group.

As for the Mellish/Willis operation, they made some 25 000 contacts from Mellish, despite strong winds knocking down antennas; on the other hand the Willis activity wasn't quite so successful, as conditions were not helpful.

Thailand: according to *DX News Sheet*, K3ZO, Fred Laun in a letter to G3NLY, indicated that some 9513 Thais had taken and passed their radio amateur examination last July! Alas, there is no indication when they will appear on the bands.

Marion Island next; this one will be on the air again from mid-April; ZS6PT is one of the meteorological team there from then and will be applying for ZS8MI; we gather his tour lasts 14 months. The last operation was from ZS2MI back in 1979. No amateur DXpedition as such will be permitted, since South Africa observes the UN treaty which restricts landings on Marion to scientific studies only. For regular updates, listen to the South African *Amateur Spectrum* programme, Saturdays 1445Z on 21.590 for Europe, 25.790 for USA, 11.925MHz for Africa; on 1845Z Europe 15.345MHz and 17.795MHz. Sundays 0245Z are for the USA on 9615, 9580 and 11.760MHz.

Late word indicates, says *The DX Bulletin* that the Russian DXpedition to Vietnam may be operational at the end of February and through most of March, with the call likely to be 3W0A; on the other hand, I know of no confirmatory word from RL8PYL or other team members.

Letters

Yes, I do get 'em, though to be sure I can always use more! **PA3EUS/G0FGB** wrote to ask for the address of the "Navy Special" antenna manufacturers, and let it be known in passing that he is often out and about throughout Europe and even occasionally the UK. At home Godfrey has a terraced house, with a garden of 6 metres wide and 12 metres long; neighbours complain if his antenna oversails their house, since the birds perch on it and leave droppings on the garden next door; verticals are out thanks to the QRM from various computers and so a half-sized G5RV just sneaks its nose over the roof at about 12 metres; fine for working Europe but not much DX!

ZD8BOB writes from Ascension Is where he will be for some three years. In the first month of operation, from December 8, some 1800 contacts were made, mainly 21MHz c.w., though some s.s.b. is worked as a sort of relaxation! Bob says his mail address is PO Box 2, Ascension Island, South Atlantic Ocean, and he will handle requests for QSLs as expeditiously as possible. Clearly, if he carries on at the present rate, the cost of mailing return QSLs will be quite alarming, and so help with the cost of return QSLs would be appreciated.

Last time we mentioned the GB75DH station. Since then, a nice letter has come in enclosing a picture of the view to seaward (northwards) from the rear of the GB75DH, apparently some 900-plus contacts were made in all continents, mostly on 14MHz with a wire antenna (the beam was delayed and couldn't be put up in time). With much evidence of Auroral effects, conditions must have sounded rather different to the noise we southerners hear. In conclusion, since the call was "one-off" they couldn't set up the QSL printing until the station closed down on New Year's Eve; but printing is in hand, and everyone will receive their QSL in due course; the club lads who helped with the station in so many ways, are involved in this activity too. It sounds to have been a super effort all round.

Now we must go overseas, to Malaysia in fact, where **9M2ZZ** sends the greetings of the locals there to all our readers. Kevin says they have h.f. band activity aplenty from 9M2 Peninsular Malaysia, 9M6 Sabah, and 9M8 Sarawak. Power limits are the same as UK levels, so some "pinning-back of ears" is called for by DXers who assume every rare one has a brace of kilowatts at command! Propagation to Europe at the time of writing is good on 10-15-20 from around 0500Z to 1200, with 7MHz "giving" in the same direction from 1300Z to around 2000. The Malaysian QSL Bureau address, for the record is PO Box 10777, 50724 Kuala Lumpur, Malaysia.

Top Band

Here we start with a note from the GB75DH team up there in Dunnet Head; the club lads found the exercise to be fun and there are thoughts of a Top Band activity from there with suitable antennas, and maybe GM3JDR at the key. That sounds interesting indeed.

G2HKU (Sheppey) says he has been shifting the gear into a different room, so most of the time has been taken up with the installation of the gear, and wiring runs, plus the inevitable checks for TVI and so on. Nonetheless, on Top Band ON7BW was raised with s.s.b. plus OK1KQJ using the key.

The only other report for this band concerns my activity; this has come to a grinding halt thanks to an antenna breakage. However, thoughts are being applied, now we are brought to the crunch, towards a significant improvement . . . a little difficult with such a small garden! Seriously, though, while it might be difficult, the challenge of doing it is half the fun; watch this space!

According to *DXNS*, around January 1 conditions were pretty good; it seems GW3YDX was on the band from 0400-0700Z and worked 80 Americans, including some 28 W6/W7.

The 3.5MHz Band

The DX is there on 3.5MHz (80m), but under the man-made QRM!

GM3JDR (Wick) stuck to c.w. and raised JA0DXG, JA0CWZ, JR1EGJ, JA1HQT, JA1CGM, JA7HMZ, JA8DMB, JA7FS, JA2AAQ, JH7LWK, UA0FDX, FM5BH, TA2AO, EA8AB, 8P9HT, VP2MW, UA1POL/UA9K, KX6DC for a new one on the band, plus VEs, all JA and UA areas, operating between 0800 and 0915Z.

G0HGA (Stevenage) is now using a Century 21, although she is still QRP; a maximum of 20 watts, more often only 15 watts before a warble sets in to make the note somewhat distinctive. On 3.5MHz, Angie has a low quarter-wave wire which one would expect would ask for lots of wire in the ground to give of its best. However, there were shoals of Gs, LA3X, SM6EAN, HB9AZB, SP1MM, LA5VGA, SP0RT, LY2ZG, YT2ZR, IK2HLB who was QRP, OK1FGF, SP6EVX, SP3CCT, OK2PAY, OK1FFL, RB5IFM, N1EA/MM who was in PA, SP6BW, YL2BZ, LA2YE, RA1AOM and UA1CGS not to mention GI, GW, ON, DL/DJ, Ys, and a couple of old friends in G3LIK and G3SVK.

The 7MHz Band

Love it or leave it seems to be the feeling; lots of people quietly fishing for DX and keeping quiet about it, while another lot avoid it like the plague! Certainly, it

does require a certain extra degree of application, particularly if you like s.s.b.

G2HKU used c.w. from home to raise K3IPK, K2SWZ and KP4L, while from Rochdale he managed a two-watt QSO with ON4AHQ.

Another c.w. addict is GM3JDR, he worked UA0ICX, 9Y4SB, UA0FDX, KL7CYL, ZS3Z, JH1DTC, RA9AAV, JA5AVI, JR1SSH, JR4CSH, ZC4JL, UA0ABB, KH6AK, KL7KJ, UW0FB, ZL7TZ, ZD8IAN, ZL3ABV, 7X4AN, JH7BRG, 8P6AU, ZL1ST, JH7RWY, P4OV, YC6JRV, G4LJF/V2A, K7ZH, WB7A, LY2ZZ, RA0ZX, VP5U, KO7N, VK3EGN, KP2A, 8P9HT, EL7U, 3W8CW, UW0AJ, JA3BCK, JE1TSD, JI1FXS, JA4AO, JR1CWY, F2JD/J7, UJ8AQ, YB0DPO, FR/DL4BBO, CO1RH, YV4AU, VE7AGC, CX4CQ, TA1AW, ZF2FK, OD5OB, VK8AV, RH8AX, TA1AZ, 3DA0/ZS6BCR, PY1BYK, VP2VI and HK1IU.

G0HGA used her low power and end-fed semi-sloper to work all round Europe on c.w.; of the more distant ones she notes EA1ETF, UB5MDP, I2CZQ, OK2PDL, IK6BAK, HB9FAB, SM5GU, SP3CUQ, SM5FPZ, EA2NF, UC2OR, OE5GM, N1EA/MM in PA-land, YL2VZ and UB4MZA; plus of course the usual crop of smaller fry, including a QSO with GB2SM at the Science Museum.

WARC Bands

Here the main item of news is probably that the full release of the 18 and 24MHz bands is expected to be completed on 1 July 1989, following completion of the transfer process; this should result in the removal of existing limitations and the introduction of normal h.f. power limits on these bands.

G2HKU seems to have indulged in quite a bit of 24MHz operation; OA4ZV, EA8AB, W5LYM, OK1AEX/5N0, N6QR, W8VSK/M, NA7R, K3QAP, WA4SNI, W1PXA, N9FC, KC3M, K4BAI, N5IR and ZS1VP were all swallowed into the log.

No one else even mentions these bands, alas.

However, reading *DX News Sheet*, I notice that GW3AHN has 176 countries worked, 120 confirmed on 24MHz; and 128/101 on 18MHz. Who is going to overtake THAT?

The 14MHz Band

Let G2HKU open the batting here; on s.s.b. there were the regular contacts with ZL3FV, and from Rochdale a two-watt c.w. QSO with DL1DQ and LY2ZA.

Low-power c.w. from G0GHA made the grade with DL6ZBA, OK2KLI, LA1IE, DJ1JE, DL1NAZ, DK8NB, EA2BEF, G3PDL, DK6OK, DL8YDS, DF2SL/YL, UC7A and DJ4SI.

Finally, the list from Dale, **GM4ELV** (Glasgow) who uses 5 watts of QRP; I believe his list refers to 14MHz (20m), but for once GM4ELV doesn't specify which band or mode he operated on. QSOs were made at 5 watts input with 6Y5NO, N200HOE, 9Q5NW, YI0BIF, 9K2DR, 9N1RN, SZS2COT, W200EXU, ZS1LI, ZS6AKW, VK3DPS who was also QRP, 3W8DX, YI1BGD, 8P9EM, ZS6BRZ, 1Z9A, HH7PV, DU1KT, 4X4OT, SN7LUB, 6W2EX, WP4AZS, WP4BDI, EW2AB-(=UC2), SV7CO, A22RA, LY2ZZ, VS6CT and 7X2SX.

Incidentally, the 9K2DR, name of Mahmoud cannot be confirmed by G4BWP; the latter only has logs up to 14 January 1982 from Bob Roberts who then held the call but is now a Silent Key. Does anyone have the current QSL route for this one, or any other information?

The 21MHz Band

First, another new reporter, **G0IFI**, of Bridgwater. Perry has been hard at work restoring a cheaply acquired Swan 260 rig, which for the expenditure of a few man-hours, resistors and things has been restored to full output power and receiver sensitivity. After a first fling with an inverted-vee on 14MHz, Perry built a vertical for 21MHz (15m) and hasn't looked back—he's hooked on the band! First, it was s.s.b. which raised KA2QWZ, K7PSQ, WK0S, VE3OCP, WA3ZRO, W1SBM, W1EMH, VE3CRG, NE9O, JH3KEA, JR3BOT and stacks of EUs. Then there came the thought "Why not c.w."—although, to be sure G0IFI had never before been taken with the mode. Be that as it may, he was surprised at the pleasure to be obtained in working, among others, KB2ELY, VE3IJP, UC3CF, UV3QGS, KA1QPJ, UB5EPQ and PY7MY. Naturally the receiving speed is coming up all the time and, after Perry had thought of the Morse as an obstacle, he's now finding it the very reverse. One could wish a few others were able to be as open-minded about Morse and so able to partake of the pleasure they are missing. On a different tack, Perry wonders about FY5BO on December 17, 14.120. Probably French Guiana.

It was 21MHz c.w. for GM3JDR; Don worked P4OV, PJ1B, 6Y5JH, CW8B, HD8EX, VK, W, VE and JAs this way.

With just her low power rig, Angie G0HGA managed c.w. two-ways with UZ4FWO, HA5XQ, LY2ZZ, HA5KF, SM4GL and LA3EDA.

There was just one contact on 21MHz c.w. that G2HKU felt worth a mention, namely that with VE3PHU.

The 28MHz Band

This band has been very active, for those who can be operational at the times when it opens up; there are the usual v.h.f.-propagation openings just as in the sunspot minimum years of course, but often signals of this nature will be drowned out under shoals of DX. In addition the band seems to retain that odd knack it has of producing a DX reply to a CQ put forth on an apparently dead band—an effect I can recall from forty years back.

G2HKU is not often to be heard, but he did make one call on the band, to K4EF.

Now a first report from **Peter Martin G4SDK/M** who has been having fun operating on 28MHz (10m) s.s.b. from the car, using a FT-77 and a Navy Special antenna. In the first eighteen days of 1989, Peter worked HK0HEU, VP2EY, CP6RP, FY4FC, VU2DVP, A45GY, HC1ATG, 8P9EM, CE2BMU, OD5YL, XE1JEO, 6Y5EW, 8P9AF, HZ1AB, VE7AGC, VP8ML, HI3JH, VP2M/WQ6Y, ZF2NB/ZF8 and KC4GLT/HH5, while the gotaways included VP8BUO, 9K2KW, TF3CW and SU1ER. Peter also uses c.w. while mobile, but on 28MHz at least he finds that few DX stations seem to be on to be worked; over the same 18 days, only LU1AO was raised on c.w. A welcome first report for which thanks; Peter is based at Rubery, Birmingham.

G0HGA has twenty watts or less of c.w. available, and that was enough to raise K2OZ, K2SPO and an assortment of the more distant EU stations.

Turning northwards we come to GM3JDR, who used c.w. to hook ZY5EG, LU7D, UZ0AWB, VP2MW, P4OV, EL7U, CW5A, PJ2X, PY8CC, LT8WW, ZY3TD, HC2G, SU1ER, 6V6A, FY5FE, KP2A, 8P9HT, HD8EX, J52US, VP2M/ND3A, Ws and JAs; as for sideband, it got across to TG9GI, KP4FBW, NQ6X/SV5, TA2AT, G4LJF/VP2A, FS/HB9CQK, V44KI, HK0HEU, XE2RB, CE2BMU, VKs, Ws and VEs.

Oddments

G3VTT, previously the ECM for G-QRP Club with regard to EUCW matters, has been rather busy of late, and so the job has passed on to G0HGA. G-QRP Club members and anyone indeed who has a query involving the EUCW group, please ask G0HGA in future, either by letter or on the bands.

We hear a hint that a new Ten-Tec rig is soon to appear, called the Omni-5; similar in appearance to Ten-Tec Paragon, but amateur bands only. It apparently contains four 6.3MHz i.f. filter positions as well as 1.8kHz, 500Hz and 180Hz filters in the 9MHz i.f. Sounds a likely sort of tool!

News on the VE1AL and CY9DXX QSLs. Alan Leith has written to *DX News Sheet* saying that "the QSLs will be answered when I have the time to answer them" going on to say of QSLs received via the Bureau system, "responding to them is far down my list of priorities"—but (and this is the final insult) he says he expects to have cleared them by the end of 1991! My personal reaction is that if that is his attitude—he's had his bit of fun, now pull up the ladder, Jack, then one hopes the VE authorities will take his licence away . . . amateur radio can live without that approach.

In November 1976, G3LQP sent off a QSL for an HL9VB contact enclosing an s.a.e. Recently, the envelope came back, containing an HL9VB card and a note from WB5UOI the QSL Manager saying "Sorry for the delay Roger"!

On the subject of QSLs from Cuba, CO7KR said that UB5ILA was only a valid route for several Cuban stations for USSR; but nonetheless, it has been noted that when several QSLs to the specified Cuban station fail to elicit a reply, one to UB5ILA has produced the goods forthwith. Black mark to the COs, and ten out of ten to UB5ILA.

To end up with, some QSL addresses which may help those athirst for wallpaper. 8P9EM cards go to G3VBL; HK0HEU to HK0FBF; VP2EY to HB9SL; CP6RP to Box 393 Santa Cruz, Bolivia; FY4FC to Box 6005, Cayenne, French Guiana 97306; A45GY to K2RU; HC1ATG to Box 8512 Quito, Ecuador, enclosing $1 US; CE2BMU to Box 3016 Valparaiso, Chile.

GW3AX—Vale

Stan Thomas GW3AX has died; in *DXNS* G3UML wrote an obituary tribute and I would like to quote Laurie's last paragraph: "I like to think that Stan almost invented the concept of helping others to work DX. To me, over a twenty year friendship, GW3AX was the epitome of what amateur radio should be about." Thanks, G3UML—you expressed it perfectly.

Finale

That's it for another month. Please let us have your letters, news, views, DX worked or escaped, by the deadline quoted.

Reg Ward & Co. Ltd.

1 Western Parade, West Street, Axminster, Devon, EX13 5NY.
Telephone: Axminster (0297) 34918

Yaesu

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FEX767(6)	6m Module (767)	169.00	(3.00)
SP767	Speaker	69.95	(2.50)
FT290	Mkll New Super 290	429.00	(—)
FT690	Mkll 6m M/Mode 2·5W	399.00	(2.00)
YHA15	2m Helical	7.50	(2.00)
YHA44D	70cm 1/2wave	12.50	(2.00)
YM49	Speaker Mike	23.00	(2.00)
MMB15	Mobile Bracket	14.55	(2.00)
FT23R	2m Mini H/H	209.00	(3.00)
FT73R	70cm Mini H/H	229.00	(3.00)
FNB9	Nicad Battery Pack (23/73)	34.50	(2.00)
FNB10	Nicad Battery Pack (23/73)	34.50	(2.00)
FNB11	Nicad Battery Pack (23/73)	67.85	(2.00)
NC18C	Charger (23/73)	17.71	(2.00)
SMC28	Charger (23/73) 13A Plug	17.71	(2.00)
NC28	Charger (23/73)	17.71	(2.00)
NC29	Base Charger (23/73)	69.00	(3.00)
PA6	Car Adap/Charger (23/73)	24.15	(2.00)
MH12A2B	Speaker Mic	31.05	(2.00)
MH18A2B	Speaker Mic Miniature (23/73/727)	31.05	(2.00)
FT727R	2m/70cm H/H	425.00	(3.00)
FNB3	Spare Battery Pack	41.00	(2.00)
FNB4	Spare Battery Pack	46.00	(2.00)
FNB5	Empty Cell Case	10.00	(2.00)
FRG9600M	60-950MHz Scanning RX	509.00	(—)
PA4C	Power Supply for 9600	29.00	(2.00)
MMB10	Mobile Bracket	10.00	(2.00)
NC9C	Charger	11.50	(2.00)
PA3	Car Adaptor/Charger	21.85	(2.00)
YM24A	Speaker Mike	31.05	(2.00)
FRG8800	HF Receiver	649.00	(—)
FRV8800	Converter 118-175 for above	100.00	(2.50)
FRT7700	RX ATU	59.00	(2.50)
MH1B8	Hand 600 8pin mic	21.00	(2.00)
MD1B8	Desk 600 8pin mic	79.00	(2.00)
MF1A3B	Boom mobile mic	25.00	(2.00)
YH77	Lightweight phones	19.99	(2.00)
YH55	Padded phones	19.99	(2.00)
YH1	Lweight Mobile H/set-Boom mic	28.75	(2.00)
SB1	PTT Switch Box 208/708	22.00	(2.00)
SB2	PTT Switch Box 290/790	22.00	(2.00)
SB10	PTT Switch Box 270/2700	22.00	(2.00)
FT736 **NEW**	2/70cm 25W Base Stn.	1,359.00	(—)
FT747GX	160-10 All mode TX Gen. Cov.	659.00	(—)
FT2311R	23cm FM Transceiver	475.00	(—)
FT211RH	2m 45W FM Mobile	309.00	(—)
FT212RH	New 2m 45W FM Mobile	349.00	(—)

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PS55	Ext PSU (735)	185.00	(3.00)
IC505	50MHz multi-mode portable	499.00	(—)
IC290D	2m 25W M/Mode	542.00	(—)
IC28E	25W FM	359.00	(—)
IC28H	2m 45W FM	399.00	(3.00)
IC Micro	2E New Mini H/H	239.00	(3.00)
IC2E	2m The Original H/H	225.00	(3.00)
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IC490	70cm 10W M/Mode	617.00	(—)
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BP4	Empty Battery Case (2/4E/02/04E)	9.20	(2.00)
BP5	Battery Pack 10.8V	60.95	(2.50)
BP7	Battery Pack 13.2V (02/04E only)	74.75	(2.50)
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FA2	2m Helical BNC	9.20	(2.00)
FA3	70cm Flexible 1/4 wave Antenna (BNC)	9.20	(2.00)
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HS10	Head set Boom Mike	20.70	(2.00)
HS10SA	Vox Unit HS10 (02/04E only)	25.30	(2.00)
HS10SB	PTT SW Box HS10	20.70	(2.00)
LC1	Leatherette Case 2E/4E + BP5	6.90	(2.00)
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LC11	Leatherette Case 02E/04E + BP3	9.20	(2.00)
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SS1	Shoulder Strap	10.35	(2.00)
SM6	600ohm 8P Base Mic	46.00	(2.50)
SM8	1.3kμ/600μ 8P Base Mic	46.00	(2.50)
SM10	Comp/Graphic Mike	116.00	(3.00)

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AT940	Auto/ATU	244.88	(3.00)
SP940	Ext Speaker	87.55	(3.00)
TS140	HF 9 Band Gen. Cov. TX/RX	862.00	(—)
TS440	9 Band TX General Cov RX	1138.81	(—)
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PS50	H/Duty PSU	222.49	(3.00)
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TH41	70cm Mini H/H	218.00	(3.00)
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VC10	118-174MHz Converter (R2000)	161.94	(2.50)
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VC20	118-174MHz Converter (R5000)	167.21	(2.50)
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DC21	DC Power Supply TH21/41	25.00	(3.00)
EB2	Ext. Battery Case TH21/41	6.77	(2.00)
HMC1	Headset with Vox TH21/41	32.91	(2.00)
PB21	Nicad Pack TH21/41	24.36	(2.00)
BC6	Desk Charger TH21/41	99.00	(2.50)
SC8	Soft Case TH21/41	11.86	(2.00)
SMC30	Speaker/Mic TH21/4/2600	28.31	(2.00)
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MC43	8P Fist Mic	22.22	(2.00)
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HS5	Deluxe H/phones	37.54	(2.50)
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ASP	As above with 8 pin conn.	89.70	(2.50)
D75	Manual RF speech clipper	56.35	(2.50)
D70	Morse Tutor	56.35	(2.50)
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HK704	Straight key (adjustable tension)	26.35	(2.00)
HK705	Straight key (adjustable tension)	22.49	(2.00)
HK706	Straight key (adjustable tension)	21.80	(2.00)
HK707	Straight key (adjustable tension)	20.15	(2.00)
HK802	Straight key (Deluxe-Brass)	109.00	(3.50)
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MK703	Squeeze key	34.50	(2.00)
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MK706	Squeeze key	30.48	(2.00)

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HANSEN

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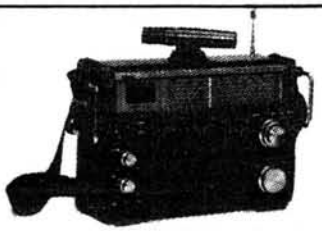

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1989 got off to a good start with a period of useful tropospheric propagation to see the old year out and the new year in, followed by the Quadrantids meteor shower. Auroras have been frequent in more northerly latitudes with a few good ones in the south, too. The 50MHz band has produced some excellent F-layer openings and winter Sporadic-E has been observed.

Awards News

Congratulations to **Süli (Szigy) Iulius YO2IS** (KF17e), member number 69 of the 144MHz QTH Squares Century Club who was awarded his 325 sticker on January 26. He submitted 41 new confirmations to bring his total to 349. 24 QSOs were via Es, 12 by meteor scatter and five on tropo. Some of the best DX via Es were SM2LTA (JY), OH1AYQ (LW), UA3MAG (TR), ZB2IQ (XW), EA1OD (XD) and GW4VEQ (XN). On m.s. Szigy lists PA3BZL (BN), SK3SN/3 (HV), KC3RE/TA (NY) a real rarity, and UV1AS (PT).

Beacon Information

Geoffery Holland G3GHS has sent news about the Cornish beacons. The two new ones for 50.0425 and 1296.86MHz are ready but await a mast on which to erect the antennas. This is down to British Gas and a meeting with the new site manager was pending but had not been arranged by Jan 20.

G3GHS is relinquishing the job of beacon keeper, the new keeper being Maurice Richards G3WKF who will deal with queries. The Mid-Cornwall Beacon and Repeater Group is also responsible for GB3HB and GB3NC and would welcome donations for the upkeep and running costs of their beacons and repeaters. The group's treasurer is Ted Warne G3YJX.

From *QSB* The Newsletter for Four Metres, I read that GB3CTC on 70.030MHz will be changing its callsign to GB3MCB (Mid-Cornwall Beacon) and that G8ROU is testing a 25W beacon TX he has built to be installed at a site in the north of Scotland.

Scandinavian VHF Meeting

In the February issue I mentioned that this year it is the turn of the Danes to host the Annual Scandinavian VHF/UHF/SHF Meeting. I have now received a preliminary leaflet from **Soeren Pederson OZ1FTU** confirming the dates; June 9, 10 and 11, "... somewhere in the lake district of Silkeborg."

Lectures are planned on e.m.c., microwave antennas, computer simulation of 144MHz Yagi antenna gain and "... hopefully many more interesting topics." Facilities are planned for measurements of antenna gain — 430MHz and above — preamplifier gain and noise figure and general TX and RX measurements.

Joint organisers are the Horsens division of the Danish national society, EDR, and the DAVUS Group. A provisional programme and final invitations will be sent out in March, meanwhile OZ1FTU would like to hear from anyone who would like to give a lecture. His QTH is Krumstien 10 A, DK-2730 Herlev, Denmark.

50MHz annual table
Final placings at 31 December 1988

Station	Counties	Countries	Total
GM0EWX	71	21	92
G1SWH	59	20	79
G6NB	47	19	66
G0IMG	49	17	66
G4XEN	50	16	66
GW6VZW	50	16	66
G1KDF	48	17	65
G6HKM	47	15	62
GM0HBK	48	13	61
G1TCH	31	19	50
G4DEZ	33	16	49
G1LSB	37	12	49
G4SEU	35	13	48
GJ6TMM	30	16	46
G1IMM	35	11	46
G4VOZ	28	14	42
GW4HBK	22	18	40
G8XTJ	34	5	39
G1SMD	21	17	38
GI4QWA	19	18	37
G6MXL	27	10	37
G8PYP	22	9	31
G6MGL	19	10	29
G8LHT	19	8	27
GM1SZF	18	8	26
G4YCD	12	9	21
G1DOX	16	2	18
G3EKP	12	3	15
G4WHZ	6	4	10
GM1ZVJ	4	3	7
G2DHV	5	1	6

70MHz annual table
Final placings at 31 December 1988

Station	Counties	Countries	Total
G4SEU	67	9	76
G3NAQ	60	8	68
G4VOZ	60	8	68
G4WND	60	7	67
GW4HBK	53	7	60
G0EHV	50	7	57
G4XEN	39	5	44
G0IMG	36	6	42
G8LHT	33	5	38
G4ARI	33	4	37
G1EZF	30	5	35
G8PNN	21	3	24
G2DHV	22	2	24
G6MXL	19	4	23
G1DOX	19	2	21
G3EKP	16	4	20
G4AGQ	15	2	17
G8PYP	2	1	3

1296MHz annual table
Final placings at 31 December 1988

Station	Counties	Countries	Total
G6HKM	31	15	46
G1KDF	38	7	45
G4DEZ	34	10	44
G6MXL	9	3	12
G8LHT	6	2	8
G4WHZ	6	2	8
G6MGL	4	2	6
G1DOX	2	1	3

DXpedition News

Mike Ray G4XBF (SRY) has sent a brief report about a short period of activity from XK square in the December Geminids shower. The other members of the team were Alan McMillan G4SSO and Paul Pas-

144MHz annual table
Final placings at 31 December 1988

Station	Counties	Countries	Total
G1KDF	93	22	115
G1SWH	95	20	115
G4YCD	84	30	114
G1EZF	76	33	109
G4XEN	73	35	108
G4ZEC	78	29	107
ON1CAK	72	34	106
G6HKM	78	28	106
G3FPK	80	22	102
GW4FRX	71	30	101
G7ANV	75	26	101
ON1CDQ	66	34	100
G8LHT	68	32	100
G1LSB	71	25	96
GM0EWX	72	24	96
G0EHV	68	23	91
GW6VZW	70	17	87
GM0HBK	57	22	79
G1CEI	63	14	77
GI4OWA	58	16	74
G4ARI	60	13	73
G8XTJ	58	14	72
G1TCH	53	17	70
G6NB	54	15	69
G8PYP	51	17	68
G1IMM	56	12	68
GJ6TMM	44	21	65
G0IMG	50	12	62
G6MXL	43	18	61
G6MGL	49	10	59
G4SEU	48	11	59
GM1SZF	37	19	56
G4WHZ	33	19	52
GU4HUY	35	16	51
G4DEZ	30	16	46
G4AGQ	38	8	46
G1SMD	25	18	43
GM0JOL	32	11	43
G0HDZ	33	7	40
G4ZVS	34	5	39
G2DHV	32	6	38
G0HGA	31	6	37
G1DOX	22	5	27
GM1ZVJ	16	8	24
G3EKP	7	4	11

430MHz annual table
Final placings at 31 December 1988

Station	Counties	Countries	Total
G1KDF	67	14	81
G6HKM	54	19	73
G4XEN	55	15	70
G8LHT	48	17	65
G1SWH	55	9	64
G4VOZ	35	8	43
ON1CAK	23	15	38
G1IMM	31	7	38
G4DEZ	27	6	33
G4SEU	29	4	33
ON1CDQ	16	15	31
G0IMG	26	5	31
G6MXL	20	9	29
GJ6TMM	10	11	21
G4AGQ	12	4	16
GM0EWX	10	3	13
G8PYP	11	2	13
G6NB	7	5	12
GM0HBK	8	3	11
G2DHV	8	2	10
G1DOX	5	2	7
G1TCH	6	1	7
GW4HBK	4	2	6
G3EKP	5	1	6
GM1SZF	—	1	1

quet G4RRA. Operation was from the home of Mike Atkinson G8ZVM and his wife Sheila, using the callsign G4XBF/A.

The station was QRV from 0000 on Dec 10 through 0700 on the 12th during which time 15 out of 24 skeds were completed with DL3RBH, EA3AQJ, EA3BTZ, HG7KPL, LA9BM (EU), OE3JPC (II), OK1OA, SM5BEI (JU), SM5MIX, SM7FWZ, Y27BL, YU3MC, YU3ZW and YU7AU (KE). All those were via m.s. but one with DF8LC (FN) was on tropo, and all stations needed the square.

The equipment comprised a Yaesu FT-225RD, an amplifier using two 4CX250Bs and two 19-ele home-made Yagis. There were many reflections but all were very short. In 72 hours of operation they each had only about ten hours' sleep and would like to record their gratitude to Mike and Sheila for putting up with them.

During a recent QSO **Dave Johnson G4DHF** (LCN) gave a few details of the trip by the Five Bells Contest Group to the north of Scotland at the end of 1988. They operated as GB4XS from Betty Hill (HLD) in Sutherland from Boxing Day. They caught the tropo opening on Jan 1/2, best DX being AJ square. In an Aurora on Jan 5, Dave used the call GM4DHF/P and made over 60 QSOs, mostly with D and PA stations. At the very end of this event he was called by RO9GMS with 52A reports but the station faded out. He is quite sure he got the call right but it does not ring any bells. I am sure there is no such prefix as RO9; very puzzling.

This year the Square Bashers DXpedition Group plans to operate from Porto Santo, a small island to the north of Madeira CT3, probably IM13 square. The proposed period is May 31 for a fortnight. **Colin Mister G0DAZ** (HWR) is one of "... a crew of about ten ardent Bashers" planning to make the trip. More details later.

Contest News

The results of the Barking Radio and Electronics Society's contest on Aug 14 last have finally reached me. Although many stations were active there were only four entries listed in each section. The low power part was won by G1PJM/P (SXW) with 3552 points from 89 QSOs. G4DFI (LDN) was runner up with 1875/58. The high power section winner was G8JAY/P (GLR) with 7379 points from 149 contacts, runner up being G4XBF (SRY) with 5031/117.

Now for forthcoming attractions taken from the RSGB's list. The final two legs of the 70MHz Cumulatives are on March 12 and 26, 1000 to 1200 on the 12th and 0900-1100 on the 26th, both UTC. There are two section, F being for Single-op fixed stations and O for all others. QTH information exchange is required. Entries go to G4FRE at 15 Ferry Lane, Cavendish Park, Felixstowe, Suffolk IP11 8UR.

March 12, 1300-1700 sees the Derby and District ARS 144MHz contest, details of which you can find on page 60 in the February issue. The 50MHz Fixed Station event is on April 9, 0900-1500, another two section F and O affair but with county and country multipliers. Radial ring scoring up to 650km thereafter all contacts are worth the same 25 points. Entries to G4NBS at 10 Quince Road, The Limes, Hardwick, Cambridge CB3 7XJ.

Mark down April 9 as the first leg of the 10GHz Cumulatives; full details awaited. Further afield, a reminder that the first Tuesday each month is when you can participate in the Scandinavian 144MHz Activity contest, 1800-2200UTC. The first Thursday sees a similar 430MHz event while the first Monday is devoted to the microwave bands.

John Fitzgerald G8XTJ (BKS) has advised that the 144MHz WAB contest date has been altered to June 25, 0900-1600UTC to avoid the RSGB 50MHz event on the 18th. The QRP events are on July 9 with the 144MHz leg 0900-1300 and the 430MHz one 1400-1800. The contest manager is Ian Webb G6TNW who is QTHR.

Annual v.h.f./u.h.f. table
Final placings at 31 December 1988

Station	50MHz Counties	50MHz Countries	70MHz Counties	70MHz Countries	144MHz Counties	144MHz Countries	430MHz Counties	430MHz Countries	1296MHz Counties	1296MHz Countries	Total Points
G1KDF	48	17	—	—	93	22	67	14	38	7	306
G4XEN	50	16	39	5	73	35	55	15	—	—	288
G6HKM	47	15	—	—	78	28	54	19	31	15	287
G1SWH	59	20	—	—	95	20	55	9	—	—	258
G8LHT	19	8	33	5	68	32	48	17	6	2	238
G1LSB	37	12	—	—	71	25	55	19	—	—	219
G4SEU	35	13	67	9	48	11	29	4	—	—	216
G0IMG	49	17	36	6	50	12	26	5	—	—	201
GM0EWX	71	21	—	—	72	24	10	3	—	—	201
G6MXL	27	10	19	4	43	18	20	9	9	3	162
G4DEZ	33	16	—	—	30	16	27	6	34	10	162
G4VOZ	28	14	60	8	—	—	35	8	—	—	153
GW6VZW	50	16	—	—	70	17	—	—	—	—	153
G1IMM	35	11	—	—	56	12	31	7	—	—	152
GM0HBK	48	13	—	—	57	22	8	3	—	—	151
G0EHV	—	—	50	7	68	23	—	—	—	—	148
G6NB	47	19	—	—	54	15	7	5	—	—	147
ON1CAK	—	—	—	—	72	34	23	15	—	—	144
G1EZF	—	—	30	5	76	33	—	—	—	—	144
G4YCD	12	9	—	—	84	30	—	—	—	—	135
GJ6TMM	30	16	—	—	44	21	10	11	—	—	132
ON1CDQ	—	—	—	—	66	34	16	15	—	—	131
G1TCH	31	19	—	—	53	17	6	1	—	—	127
G8PYP	22	9	2	1	51	17	11	2	—	—	115
GI4OWA	19	18	—	—	58	16	—	—	—	—	111
G8XTJ	34	5	—	—	58	14	—	—	—	—	111
G4ARI	—	—	33	4	60	13	—	—	—	—	110
G4ZEC	—	—	—	—	78	29	—	—	—	—	107
GW4HBK	22	18	53	7	—	—	4	2	—	—	106
G3FPK	—	—	—	—	80	22	—	—	—	—	102
GW4FRX	—	—	—	—	71	30	—	—	—	—	101
G7ANV	—	—	—	—	75	26	—	—	—	—	101
G6MGL	19	10	—	—	49	10	—	—	4	2	94
GM1SZF	18	8	—	—	37	19	—	1	—	—	84
G1SMD	21	17	—	—	25	18	—	—	—	—	81
G4AGQ	—	—	15	2	38	8	12	4	—	—	79
G2DHV	5	1	22	2	32	6	8	2	—	—	78
G1CEI	—	—	—	—	63	14	—	—	—	—	77
G1DOX	16	2	19	2	22	5	5	2	2	1	76
G4WHZ	6	4	—	—	33	19	—	—	6	2	70
G3NAQ	—	—	60	8	—	—	—	—	—	—	68
G4WND	—	—	60	7	—	—	—	—	—	—	67
G3EKP	12	3	16	4	7	4	5	1	—	—	52
GU4HUY	—	—	—	—	35	16	—	—	—	—	51
GM0JOL	—	—	—	—	32	11	—	—	—	—	43
G0HDZ	—	—	—	—	33	7	—	—	—	—	40
G4ZVS	—	—	—	—	34	5	—	—	—	—	39
G0HGA	—	—	—	—	31	6	—	—	—	—	37
GM1ZVJ	4	3	—	—	16	8	—	—	—	—	31
G8PNN	—	—	21	3	—	—	—	—	—	—	24

Shetland Islands Activity

Steve Bryan G1SGB (YSS) has sent comprehensive details of his team's next trip to the Shetland Isles. They plan to depart from Aberdeen at 1800 on May 26 to arrive in Lerwick at 0800. On the way they have permission to operate —/MM on 144MHz and possibly 50 and 70MHz. Then they take another ferry from Vidlin to base camp on the Out Skerries.

Operation is promised on all bands from 430MHz to 1.8MHz from as many islands as possible. A helicopter from the Sullum Voe oil terminal may be available for island hopping. The return trip from Lerwick at 1200 on June 9 will provide further opportunities for —/MM operation, including "wet" square ZS.

Colin Roberts GM0AVR has bought the Coastguard lookout hut on Housay Island (NGR HU682713), the largest island in the Out Skerries group. He is equipping the hut at his own expense so that it can be used as a base for amateur radio operation and the G1SGB group, of which Colin is a member, will be using this facility. For full details about the hut send an s.a.e. to Colin at 4 Ladieside, Brae, Shetland Islands. His telephone number is Brae (080 622) 406.

The 50MHz Band

From some of your letters it is quite obvious that those who are adhering to the e.r.p. limits permitted in the British licence are becoming increasingly frustrated by those who are blatantly ignoring them. During good DX openings they rarely get a

chance to be heard beneath those who appear to be running considerable power. One regular contributor likened it to the 1.8MHz situation, suggesting that people either stick to 10W and work little or nothing or " . . . take the easy alternatives." Another is so disgusted that he wrote to ask that his entries in the tables be deleted. Fortunately I persuaded him not to take this course.

All this leaves a nasty taste in my mouth as it means I am inadvertently reporting the successes of those who have been cheating. Yet if some operators are running much higher power than that permitted but do not appear to be causing any problems for other services, then why not scrap these power restrictions?

During a recent QSO with **Marc De Munck ON5FF** he mentioned that he expected that Belgian amateurs would get a 50MHz allocation within the next couple of years. At present there is a TV station in Antwerp on Ch. E2 (48.25MHz vision, 53.75MHz sound) and one in Liège on E3 (55.25/60.75MHz).

Several readers have suggested that with frequent transatlantic openings, the band is little different from 28MHz. Your letters indicate DX openings via F-layer, Ar and Es on virtually every day from Dec 20 through Jan 23. Therefore I will give the broad outline of what has been heard and worked.

On Dec 20 the band was open to W8, W9, VE1 and OH. On the 21st to W1-5, W8, VE1 with HC5K heard. 22nd, KP2, VE1, W5 and P43. 23d, W1, W2, W5 and W8 with HC1BI heard. **Ken Osborne G4IGO** (SOM) heard Far East signals on Ch. E2 from Sabah (9M6). 24th, F-layer TV on Ch. R1, W1, W3, W4, W9, VO1, VE2, J52US, HC1BI and the FY7 beacon copied.

More F-layer R1 TV on Christmas Day, FY7VHF was S9++ at G4IGO from 1149-1232; HC1BI, HC5K, KP2A, KP4EIT, PZ1AP and TI2HL. Dec 26, W1, VE1 and HC1BI. On the 27th G4IGO identified TV carriers from the Far East on E3, probably 9M2, 9M6 and HS, 0858-0926. This means the m.u.f. was around 58MHz. 5B4CY beacon heard 0918-0927, F-layer R1 TV, W1, W3, W4, W5 and W8, ZD8VHF beacon heard 1633-1640.

Dec 28, W1-5, VE1-3. Dec 30 J52US keyer heard 1535-1602. 31st, FY7VHF copied around noon. Jan 3, OH stations in KP10. 5th, OHs and CT0WW beacon via Es, later GB4XS, GM4DHF/P and GM3WOJ via Ar. Jan 6, VE1. More Es on the 10th to 9H1BT, plus VE1, also VE1 on the 11th. 12th, GI8YDZ via Ar and HP3XUA heard from Panama.

Jan 13, VE1 and W2 worked from Jersey. 14th, W8 and W9. An Ar on the 15th with GM8MBP (GRN). From GJ, G3GJQ/5NO S9 at 0930. 17/18th VE1. 19th W1-3. 20th, Ar QSOs with HLD, GRN, SCD regions in Scotland and with NLD in England. 22nd, W1-4, W8 and VE1 and on the 23rd an extensive opening to North, Central and South America which will have to be chronicled next month.

Geoff Brown GJ4ICD is claiming the first GJ/FY7 QSO with FY7AU (GJ35) at 1225, and the first GJ/HH contact with HH7PV (FK28) at 1326 on Jan 19. The HH only worked one other British Isles station, GJ0JSY. In a big opening on Jan 22 Geoff worked 139 stations in 41 squares in North America between 1600 and 1710. His best DX north was FN86, west EM79 and south FM16. Most signals were extremely strong and the band was full of stations from 50.05 to 50.300MHz.

Annual c.w. ladder

Station	Band (MHz)				Points
	50	70	144	430	
G4ZEC	—	—	785	—	785
G4NZU	7	17	291	—	315
G4XEN	42	26	221	11	300
G4OUT	—	16	278	—	294
G4AGQ	—	39	170	12	221
G0HGA	—	—	221	—	221
G0HLT	14	—	195	—	209
PA3FAQ	—	—	199	—	199
G4WHZ	21	—	157	—	178
G4VOZ	31	102	—	23	156
G0DJA	12	—	107	—	119
G0HEE	—	—	111	—	111
G6DIF	13	—	94	2	109
G4ARI	—	29	80	—	109
G2DHV	10	37	45	4	96
G4ZVS	—	—	80	—	80
G3FPK	—	—	70	—	70
GU4HUY	—	—	59	—	59
GW4HBK	21	33	—	—	54
G0GKN	—	—	52	—	52
G1SMD	21	—	15	—	36
G1DOX	3	5	—	—	8

Number of different stations worked throughout 1988.

In addition to those already mentioned the above information was compiled from letters from the following readers: **Bob Nixon G1KDF** (LNH), **John Palfrey G4XEN** (NHM), **John Lemay G4ZTR** (ESX), **Vic Van Den Bergh G6DIF** (LDN), **Ela Martyr G6HKM** (ESX), **Bill Biltcliffe G6NB** (OFE), **John Pilags G8HHI** (HPH), **Colin Redwood G6MXL** (DOR), **Ian Harwood G8LHT** (YSS), **Steve Damon G8PYP** (DOR), **Colin Robertson GM0HBK** (HLD), new contributor **Alan Harper GM1SZF** (HLD), and **Paul Baker GW6VZW** (GWT).

Welcome to two more new contributors. First **Dave Brown GD4XTT**, the Chairman of the Isle of Man ARS, and newly QRV on the band with 0.4W and a home-made 2-ele Yagi. The first three days' operation brought a QSO with G4AHN (SRY). A small amplifier is envisaged and he should do well from his cliff top site 213m a.s.l. He suggests that fellow Manx amateurs GD3FOC, GD3TNS and GD4HOX are disappointed that few mainland stations seem to beam towards them.

Second **David Wright GW1MVL** (CWD) who is trying hard to get going on the band. He is using a Hy Gain transceiver, converted to 28MHz, and Spectum transverter with a 4-ele Jaybeam Yagi in the attic but it was all rather unstable when he wrote. I think the Hy Gain product must be a Citizens Band job.

The 70MHz Band

Ian Cornes G4OUT (SFD) only started on the band last December and, on c.w. in January he contacted G3UEY on the 2nd and G4APA and G4XEN on the 5th. **Dave Lewis GW4HBK** (GWT) got off to a good start thanks to an Aurora on Jan 11. His contacts began at 1837 and were with G4WND, G4SEU, G6DER, EI9FK, G4APA, GM3WOJ (IO77), GI4ONL (LDR) and finally G8XVJ at 2015. The event faded at 2040. QTE was 355° with nothing heard to the east. Beacon EI4RF was a good signal throughout but GB3CTC was weak. A second phase was heard from 2337 to midnight with EI4RF, but no amateur stations heard. The GI was an all-time new country.

John Jennings G4VOZ (LEC) reckons that activity slumped during the Oct-Dec period. In November, 40 CQ calls went unanswered. But since Christmas the band has come alive with lots of activity. Between Jan 1 and 19 he lists G4IOQ (SPE), G4APL (SRY), G3SDL (KNT) and G1DOX (AVN) on s.s.b., G8YLB (WMD) and G4PWD (SFD) on f.m.

The main event was the Ar on the 11th which yielded GM3WOJ, GI4ONL and EI9FK. John mentions the growing tendency among A licensees to use s.s.b. during Auroras which tends to slow down a QSO unless signals are very good. He monitored several contacts where incorrect details were confirmed, so suggests that c.w. be the preferred mode. He says that EI4RF is the best Ar indicator on 70MHz, much better than GB3ANG. The main event was detected from about 1800 to 2030 but EI4RF kept coming through spasmodically, tone A till 2230.

The January issue of *QSB* includes an Activity Table for 70MHz. Other interesting items are a brief report on the Jan 11 Ar, details of the Out Skerries expedition, news that Mike Webb GD6ICR is QRV from Peel, conversion of a 144MHz Europa transverter to 70MHz and Part 2 of the 4CX250B amplifier project. For subscription details send an s.a.e. to G4WND at Rivendell, Kiln Way, Polesworth, Tamworth B78 1JF.

The 144MHz Band

G0DAZ has been working a few of the "bigger" stations off the moon recently, successes being SM2CEW, VE7BQH, W7IUV, N5BLZ, W5UN, KI3W, W4ZD, OK1MS, PA0NIE, KF0M and KB8CRQ. He uses four 14-ele Yagis. **Dave Thickett G0FEH** (WKS) has recently moved from Chesterfield to Leamington Spa and asks if he will have to start collecting squares from scratch. As the distance exceeds 50km, the answer is "yes," OM. On Dec 31 he worked EA1BCB (IN63) and Fs in southern France.

Ian Rose G0HDZ (ESX) has been off the band for a long while but is now QRV again.

Peter Hirons G1CEI (HPH) found conditions to the north good on Jan 2 and worked GM1EHK (FFE) and GM7BUD (TYS). He complains of f.m. QSOs in the beacon band, 144.85-144.99MHz. One station on 144.875MHz said he was taking part in a TV contest and was using the frequency as an alternative to 144.700MHz.

G1KDF mention strong signals from EA1 on Dec 31 and Jan 1 and wonders why we never hear any CT stations in these lifts. Bob worked EA1s BCB, DOD (IN73) and TA (IN53), OE2CAL (JN67), HB9QQ (JN47) and several Fs. **Pat Billingham G4AGQ** (SRY) heard the HB9HB beacon on Jan 1 but no Swiss stations.

G4IGO would like to thank those readers who sent reports on the Es events on 31 July 1988, but was somewhat disappointed that "well known" operators did not respond. G4OUT found tropo conditions good to Germany on Jan 19 and worked DJ4GJ and DL0UD on c.w. Ian was very sorry the RSGB dropped the February c.w. contest.

During the Jan 11 Ar, **Nick Peckett G4KUX** (DHM) worked an SM2 in KZ (KP05) square which is most unusual. Not only was the actual distance large but the latitude difference of over 10° was a bit over his boundary fence.

Dave Dibley G4RGK (BKS) is finding it

difficult to work new squares now with 280 in the log. Therefore any new ones via m.s. mode are long distance attempts such as SM2CEW (LZ) finally worked after nearly five years of trying. He has heard signals from UV1AS (PT) but the sked was incomplete. The Ar on Jan 5 produced GB4XS and GM4DHF/P for a new square, and another on the 11th brought UR1RWX (MT), LA3NGA (ET), SM6CMU (FR) and assorted GMs.

G4XEN completed with UR1RWX on Jan 3 at what John concluded must have been the peak of the Quadrantids shower, but he did not mention the time. He detected an Aurora at 1604 on Jan 5 and worked a few GMs including GB4XS and GM4DHF/P. He records other Ar events on the 11th and 15th. The 15th also brought excellent tropo propagation from 2100 and D, Y, OK and SP stations were worked including OK2KZR/P (JN89) the following morning.

Roger Colwell G4ZEC (BKS) had 972 c.w. QSOs in 1988 and sent a detailed analysis of them by country and prefix. By far the most numerous, in almost equal numbers, were G0s and G4s while the overseas league table shows D, F, PA, and ON in descending order. He proposes to give the c.w. ladder a miss this year, but reserves the right to change his mind!

G6HKM worked OE2KMM (GH) at 1528 on Dec 31 and was delighted when the good tropo conditions continued into the New Year. Ela worked into EA, EI, F, ON and PA and in a brief tropo opening to the northwest on Jan 2 she contacted GM0EWX and GM0HBK on Skye. In the German contest on the 7th she made 13 QSOs as far as the E line of squares. On the 15th, two Berlin stations were worked and Y46PH (JO51). In the early hours of the 16th her CQ call was answered by OK1IAS (JO60) and on the 18th, HB9SLU (DG) was netted. Many DLs were worked from 1344 on the 19th, plus OE9NHI (JN47), OE5PAM (JN78), LX1SI (JN39), HB9SJE/P (JN36), HB9DFP (JN37) and Y27DO (JO62). In an Ar on the 20th Ela worked into ATM, CTR, DHM, HLD, LDR and OZ1JVX (JO46). Not a bad start for 1989.

G6MXL worked into EA1 on Jan 1 as did G8HHI who reckons that a lot of the DX QSOs were "going overhead." John says the GWs were having a field day. On the 2nd he worked FC1EAN (AG) and heard GMs in the Ar on the 20th.

For G8LHT, EA1BCB on Dec 31 was the first new square since last September and Ian also worked Fs in IN94 and JN29 with EA1DOD the next day. The Ar on Jan 11 brought GM0HUO (IO86). In the Jan 15 late evening tropo he worked DL7AKA, DC7KM, Y23KO and Y28FO, all in Berlin, SP3RBF (JO71), OK1USZ (JO70) and a PA. He remarks on the deep QSB and that signals did not beam up in the right direction. Did other readers notice this phenomenon?

G8PYP rightly points out that for south coast stations, Auroral events are usually weak and rare so hopes those further north will give them a chance to work the GMs, etc. He appreciated GI1JUS calling for G stations between working the DX on Jan 11. On tropo, Steve lists Ds worked on Dec 22 and Jan 15/16.

Erik Gedvilas G8XVJ (CHS) mentions the widespread nature of the Dec 31 tropo. Within 15 minutes he worked four HB9s and EA1s in XD and VD squares. The Ar on Jan 5 brought two each OZs and SMs and an LA.

GD4XTT and GD0ELY are active every week, not just in lifts. Dave and Joyce use 2.5W from a Yaesu FT-290R and a 10-ele Jaybeam Yagi and use c.w. a lot. In a telephone call **Keith Boleat GJ6TMM** reported tropo QSOs with OK1s FFD/P, BL/P, DDO and VRY, plus OK2MMW (JN89, a new square), but I forgot to write down the date.

John Eden GM0EXN ran a special event station GB75DH from his QTH in December and was QRV in the Christmas Day Aurora, thanks to a tip off from GM4ILS. Between 1730 and 1830 25 station were worked in D, G, GM, PA, with OZ1IPU (JO57) and SM7NJH (JO66) for good measure.

GM0HBK worked D, EI, G, OZ and PA in an Ar on Dec 24 including DK3LL (FO) and OZ1LO (FP), two new squares. A weak Ar on the 31st brought GB4XS and GM4DHF/P. Colin worked southern Gs and FA1NRM (AJ) by tropo on Jan 2. He thought the Quadrantids shower very poor with only DG6LS (FO) worked on the 4th, 0000 to 0055. A good Ar on the 5th brought D, EI, G, GM, ON and OZ QSOs. On the 11th, D, F, G, GI, GM, GW, ON, OZ and PAs were worked including OZ8TU (GP) and F6DWG (BJ). Other Ar events were recorded on the 13th-17th, the 17th bringing a c.w. contact with LA5SAA/P (JO39). On the 20th SK7JD (IR) on c.w. was new and yet more Ar propagation was noted on the 21st and 22nd.

John Lincoln GM0JOL (HLD) caught the Christmas Day Ar, best DX being DL9LBH (JO44). The Jan 11 event was in two phases. The period 1900-1930 brought D, G, GM and PA contacts, the 2330-on session EI, G, ON and PA QSOs.

GM1SZF's station comprises a Yaesu FT-726R, Microwave Modules 100W amplifier and a 14-ele MET Yagi at 6.1m a.g.l. The Christmas Day Ar brought contacts with SM7LXV (GP), DF8LC (FN), LA3EDA (FU) as well as EI, G, GM, GW, ON, OZ and PA QSOs. The next day was a weaker affair with best DX DL5BAC (EN) at 1455. On the 11th from 1727 SM7SCJ (GP), Y22UC (GN), Y23KO and Y23BD (GM), Y22ME (HM), SM7FMX (GP) plus D, G. LA, ON, OZ and PA. Next the 16th with EI3GE (WN) plus G, GI, LA and SM QSOs. The 17th LA and SM in GT and GR squares plus D, G, OZ and PA and lastly, on the 20th Y21NB (FM), Y23KO and Y26HO (GM), SM7FMX and G0JXY in AN, another new square.

John Hilton GM1ZVJ (LTH) uses just 2.5W and a 10-ele Yagi yet manages to make Ar QSOs. On Jan 5 he found G8ECI (AN) and heard many G, OZ and SM stations. The extensive Ar on the 11th produced QSOs with G8XVJ, G1SWH (MCH) and GI1JUS (ATM).

GW1MVL uses an FDK-750E running 10W to an 8-ele Apollo Yagi at 9m a.g.l. David lists some respectable DX worked in F, ON and PA on Dec 30/31, Jan 3 and 8. He worked his first stations via Ar on the 11th, GM0HBK and GM0EWX(IO67). For WAB fans he is in SJ24 and will take skeds any time.

John Nelson GW4FRX (PWS), with the help of Andy Steven GM4IPK who paid a brief visit, has completed the fine tuning of the matching of his new four 18-ele Cushcraft 4218XL Yagis. The s.w.r. is 1.08:1 and the pattern exceptionally clean after making sure the power was being shared equally by all four antennas. In the Jan 20 Ar he detected two distinct scatter regions, one at 070-080° where he heard an SP4, the other at 010°. The band was full of stations at 1840 but at 1935 someone switched the Aurora off.

GW6VZW got off to a flying start this year with 33 countries in the log by Jan 20. These include GU2FRO (SRK) and GU3EJL (ALD). Paul would like QSL information for HG7JAS, HG2NP and DL8HCZ. If anyone can help, he is QTHR or telephone Cwmbran 60921.

The 430MHz Band

The good news is that from now on Syledis QRM should be less. This follows the Ministry of Defence ruling that the system should not be used within 100km of the UK coastline. The main frequency will now be 438MHz except for a sector between North Foreland (KNT) and Beachy Head (SXE) where 432MHz will still be used for a while.

G1KDF worked OE2CAL and HB9ASB (DG) on Dec 31, his first Austrian and Swiss QSOs in 1988. Bob also contacted F6HPP/P (BJ). In the Jan 16 tropo, G4XEN heard OK2KZR/P but John could not make a QSO. G6DIF asks, "Does the world know 70cm exists?" I think we all realise that outside of lifts, it can be a bit of a desert in spite of activity nights.

John Tye G4BYV (NOR) takes up DA4RG's comments about the apparent lack of u.h.f activity on the continent. He says this is because they will not move off the .200 calling frequency so do not hear us calling CQ. In the Cumulatives he reports that one G was on .200 all evening. He has been on the band for 20 years and seems a bit exasperated with the "planners" who have fiddled around with calling frequencies over the years. (Why do they never consult the regular users, I wonder.)

On Jan 2 G6HKM had a pleasant QSO with G1GEY (TWR), usually only worked with difficulty in contests. In the wee hours of the 16th, Ela worked Y26CI (JO50) and DD8AK (JO52) and in the afternoon of the 19th DG8EAJ (JO31) and Y21NB (JO53). G6MXL found HB9AGE (JN37) on Jan 1, also worked by G8HHI the next day plus HB9MIN/P (DH).

Although tropo conditions on 144MHz were good on Jan 15/16, G8LHT's CQ calls on 432MHz went unheeded. GJ6TMM worked DK3FB, DJ6XV, DC1EX, DG6EAE and DG8EAJ, all in DL square and DC5NA and DD5TD/A in EJ. When he wrote on Jan 22, GM0HBK's beam was down but prior to that, Colin had worked a couple of GMs.

GW1MVL uses his FDK-750E with Expander-430 running 10W. His antennas are an 88-ele Multibeam or a three times five-eighths wavelength collinear mounted on a bin lid. With the latter he has worked a DL in JO30 getting an S8 report. Both antennas are in the attic, the beam fixed pointing SE.

The Microwave Bands

G0DAZ is now QRV on 1.3GHz using four 21-ele Yagis buried among the 144 and 432MHz arrays. Colin has 27 squares so far. G1KDF tried with F6KPP/P on 1.3GHz on Dec 31 but was not heard in BJ square.

G6HKM worked G4BYV on Jan 2, a good start since Ela never worked Norfolk at all last year. In the afternoon of the 19th the DL beacon was up to S9 and QSOs with DG8EAJ and DL5EAG followed. The next day G1RER (LDN) was worked.

G4BYV had a 30 minute QSO on Dec 21 with DC0DA on 1.3GHz, almost a year since he first worked him on 5.6GHz. On Dec 29 John worked DF6WE and DJ6UT (DL), and F8ZW (DI) all on 1.3GHz. Apart from that he said there was not much microwaves news.

Final Miscellany

I have copied my Amstrad PCW software for several readers and have recently added PCWINDEX, a database program useful for record keeping. A little error has come to light in the ELSAT program. Line 3570 should end with GOTO 160 and not 170, or the predictions may not be correct for your QTH; sorry. Please note the programs are written for the 8256/8512 computers and I cannot guarantee they will run on other Amstrad machines, as they are.

G4ZTR thinks that some QSLs for GB4XN contacts in 1986 and 1987 sent via the bureau may have gone astray. Anyone needing a card should send an s.a.e. to John at 64 Parsons Heath, Colchester, Essex CO4 3HY.

Finally, the 1989 tables will start next issue so make sure you send your latest claims to the specified address by the deadline date.

The next three deadlines are Mar 29, Apr 26 and May 31

RTTY

Reports to Mike Richards G4WNC
200 Christchurch Road, Ringwood, Hants BH24 3AS

Esmond Aguilar F6GOV/G4KBJ has written from Mouvaux in France reporting his experiences with FAX reception. Although retired now, Esmond has spent many years in the commercial FAX business and would now like to try his hand at amateur FAX transmission and reception. The equipment in use at present is a Kenwood TS-940S transceiver and a FAX-1 decoder from ICS Electronics. The only problem is that the FAX-1 is a receive only device and Esmond would like to transmit. His question therefore is quite simple—where do I start if I want to use a computer for FAX transmission?

Unfortunately there are not very many FAX transceive programs around. Probably the most recent to enter the market is the AMIGA FAX from ICS Electronics which seems to produce very good results for a modest outlay (that is if you already own a Commodore Amiga computer!).

One of the main problems with computer generated FAX is that of obtaining your image in the first place. With a conventional electromechanical FAX machine all you had to do was fit the sheet of paper with the image to the drum and start the machine. With computer FAX you can only send images that are stored in the computer's memory. Because of this limitation most computer FAX users create images for transmission using graphics programs which can store the resultant picture either in memory or on disk for transmission later. The snag here is that the process of creating the image can be quite long winded and time consuming, also you are stumped if, for example, you want to send a photo of the shack.

On the bright side, there is a way to overcome this problem by using a device called a digitiser. This normally comprises a software package and interface which, when combined with a video camera, allows visual images to be stored on disk.

The digitiser works by taking the analogue output of the video camera and processing it using an analogue to digital converter which gives a digital signal that can be handled by the computer and stored on disk.

Although computer FAX may appear to be rather appealing, the old electromechanical machines generally give a far superior image and offer ease of use. There is always a snag, and in the case of the older mechanical machines it's the smell which can be rather unpleasant especially if your shack is in the house!

Another possibility for FAX transmission is to use one of the multi-mode terminal units that have this feature included, e.g. PK-232. The same problems exist with these as with the computer FAX described earlier but you do have the advantage of being able to receive many other modes.

For more information on this particular facility I would recommend that you contact the dealer who supplied your unit as the software tends to be frequently updated.

More news on the FAX front from **R. Selmes** of Bexhill-on-Sea who is a keen FAX listener. For reception he is currently using a Realistic HF DX 302 receiver but is hoping to upgrade to a Lowe HF-125 in the near future. The FAX decoding is performed using a Spectrum computer running the G4IDE FAX program and an Alphacom thermal printer.

This type of station is ideal for anyone new to this mode as it represents a very economical starting point and with careful use can produce some very reasonable results. Good pictures were received between 14.1MHz and 14.117MHz which is the most popular h.f. FAX frequency. By the way, the antennas used are an external inverted V and a multi-band dipole mounted in the loft.

Finally, if you know of any useful FAX transceive programs or indeed have any information which would help amateurs get started in this fasacinating mode, then please drop me a line.

ARRL Contest Report

John Barber has sent in his usual comprehensive report on this contest. Conditions were apparently terrible except for 28MHz which was doing quite well on the Sunday after 14MHz and 21MHz had died! John operated the contest with **G4TSW Tiverton South West Radio Society** from a portable site. The antennas used were a 7MHz $\frac{1}{4}$ wave vertical, which was also pressed into service on 21MHz and 28MHz, 14MHz $\frac{1}{4}$ wave vertical and an inverted V for 3.5MHz. The transceiver was John's normal home-brew, running 100 watts out. The final prefix list for the contest was quite impressive with 32 states and 36 countries including 22 states on 28MHz! Two interesting stations that were noted but not actually worked were 9Q5BG (Zaire) and KP2N (Virgin Is.).

On the home front, John has finally ditched his Amstrad PCW computer in favour of a 1512 IBM PC compatible. John also managed to work a new country, which is quite a feat when you have already worked as many as he has! The elusive call was 7P8DR (Lesotho) and if anyone else managed a contact, the QSL address is PO Box 521, Maseru, Lesotho. My thanks to John for this report which made the deadline by the skin of its teeth!

Packet Activity

I have received a very interesting report from **Peter Strauss ZS6ET** regarding packet activity in South Africa. Apparently, as in the UK, the level of activity has increased dramatically over the past two years from some 40 or 50 operators to the present level of 250 plus. To put this in perspective, there are approximately 5000 licences issued in South Africa with about 2500 being members of the South African Radio League.

The first packet activity was on the 144MHz band and in the absence of dedicated digi-peaters the voice repeaters were used during quiet periods. The main centres of activity are Johannesburg, Pretoria, Durban and Pietermaritzburg. There are currently some twelve digipeaters working in these areas on the 144MHz band.

The frequencies used for BBS access are 144.65 and 144.675MHz, with all major towns being connected by an h.f. forwarding system on 14MHz.

Fig. 1: FAX picture received by Esmond Aguilar

Linking the ZS network with the ASIA network is achieved using regular forwarding by YB5QZ and ZS1RO. The link to the UK is via the DCE (University of Surrey Digital Communications Experiment), the UoSAT 11 UK ground station being GB3UP. In South Africa, data forwarded from GB3UP via UoSat 11 is off-loaded by the ground control station ZS6IT and then forwarded to the AMSAT BBS ZS6SAT. UK operators can send messages as MAIL to specific destination callsigns, e.g., SP ZS6ET @ ZS6SAT and mark the header "pse forward via DCE". Alternatively, you could send a message to all ZS amateurs using the normal convention "SB ALL @ ZS $".

Links to Germany via DB0AHA are normally routed via the Netherlands and then up-loaded via the DCE.

Peter also reports that the use of h.f. to v.h.f. gateways has increased dramatically with most of them linking between 14MHz and 144MHz. One exception is the recent addition of a gateway between 10.147MHz and 144MHz. There are also plans in hand to introduce a link between South Africa and South America.

In addition to all this, regular activity is to be found on 7MHz, 28MHz, and 50MHz.

My thanks to Peter for a most interesting report and if any readers are able to send me general reports on national packet networks I would be delighted to hear from you.

New Packet Guide

Still on the subject of packet I have just received news of a new guide to packet operation. This A4 size book titled *Your Gateway to a Basic Understanding of AX25 Packet Radio* (Phew!) has been written and published by the South Hams Radio Group. The book is aimed at the beginner who perhaps has a computer, but has not yet bought a TNC.

The book has sections covering—TNC selection, computers, software, radio link, understanding AX25, getting started, BBS and networks. There are also appendices covering the common BBS command set, hardware connections, various networks and some useful addresses.

The book costs £3.50 and is available from **Vince Bobin G1FBH**(1). In case you are wondering where the profits are going, they will be used to fund the operation of SDN2 (G1FBH-2) and the establishment of GB7KB-7, 1, 4 and 6.

Equipment

Technical Software have sent me a press release covering the latest addition to their range of decoding packages, the RX-8. This multi-mode receive only package looks pretty impressive and covers the following modes: FAX: Most speeds and IOCs.
Packet: v.h.f. 1200 baud and h.f. 300 baud.
SSTV: Mono and colour display with many useful controls.
RTTY: 45-300 baud including both high and low tones.
Morse: Auto-tracking from 4 to 250 w.p.m.
AMTOR: ARQ and FEC with fast synchronisation.
UoSat: 1200 baud UoSat1 and 2 transmissions.
ASCII: All standard baud rates.

Although this company has become well known for its software interface programs like the RX-4, this latest version uses a dedicated hardware interface. The interface sits between the computer and the receiver and features 4-pole filtering when receiving narrow shift modes.

The RX-8 has been designed to run on a BBC B computer with software in a 16K ROM. The package costs £259.00, though existing users of the RX-4 and TIFI interface can obtain some discount. Further details can be obtained from Technical Software(2).

Whilst talking about Technical Software, several readers have been having problems demodulating AMTOR using the RX-4 programs. I have contacted Richard Wilmot of Technical Software and apparently the trick is to keep the audio level down to a minimum. All new versions of the program will be supplied with revised instructions pointing out this fact.

Regular readers will recall that I recently mentioned a program which allowed complete control of a Yaesu FRG-8800 receiver using an IBM PC computer. Well, I have just received a letter from **Barry Dale**(3) who also produces a computer control program for this receiver but in this case using a BBC Master computer.

One very interesting feature of this program is that you can still gain access to an external decoder for data reception. Another interesting point is that the reception log is actually a quite sophisticated database and can be displayed in any order you specify. For example you could list the log in date order or alternatively in frequency order.

For further details contact Barry directly with a s.a.e. or send two 5.25in disks formatted for 80T ADFS with £12 for your copy of the program.

Contests

A busy month for contests this month with two from BARTG.

The first contest is the BARTG Spring HF RTTY Contest which runs from 0200UTC Saturday March 18 until 0200UTC on Monday March 20. Although the total contest period is 48 hours no more than 30 operating hours are permitted. The breaks can be taken at any time but each one must be more than 3 hours long.

The bands are the 3.5, 7, 14, 21 and 28MHz amateur bands. A station may only be contacted once per band. The ARRL DX countries list will be used plus each W/K, VE/VO and VK call area counting as separate countries.

Messages must consist of Time in UTC as a four figure group, RST and message number. You score 2 points for all two-way RTTY contacts inside your own country; outside your own country it's 10 points, there's 200 points for each country worked including your own (and that's on each band).

You work the score out by taking your two-way contacts points multiplied by the total number of countries then add that to the total country points multiplied by 200 multiplied by the number of continents worked (max 6). If that sounds complicated you can always send an s.a.e. to BARTG for the rules.

The logs must be in the usual format and be received by May 27. Send to Peter Adams G6LZB, 464 Whippendell Road, Watford, Herts WD1 7PT.

The second is the Spring VHF/UHF RTTY Contest which will be held between 1800UTC on Saturday April 15 and 1200UTC on Sunday April 16. All stations will be required to take and declare a 4 hour break during the contest period.
Bands: 144MHz, 432MHz and 1296MHz.
Operators: Licensed amateurs within zones 14 and 15 who are permitted to use RTTY. Contest logs from short wave listeners will also be very welcome.
Messages:
Time: Start time of contact in UTC using full four digit group passed in both directions.
RST: Normal three figure group.
Number: A three figure number starting at 001 and incrementing for each contact.
Locator: Maidenhead system preferred but may be given as town or bearing and distance from a town.
Logs: Logs for each band on separate A4 sheets preferably BARTG accompanied by a cover sheet giving correspondence address, site and equipment details.
Scoring: For 144 & 430MHz 0-50km = 1 point and 2 points for each subsequent 50km. 1296MHz contacts score 1 point per kilometre.
Awards: Single operator, Multi operator and s.w.l.
All logs must be postmarked no later than Saturday May 27 to qualify. Send to: BARTG Contest Manager, Mr. J. Alderman, 38 Greenacres, Shoreham-by-Sea, Sussex BN43 5WY.
(1) Vince Bobin, 13 Homelands Place, Kingsbridge, South Devon TQ7 1QU.
(2) Technical Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF.
(3) Barry Dale, Cimbri Glimpse, Powfoot, By Annan, Dumfriesshire DG12 5PS.

The next three deadlines are Mar 29, Apr 26 and May 31

Amateur Satellites

Reports to Pat Gowen G3IOR
17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD.

Keplerian Elements

The set of Keplerian elements for all the major satellites of general interest again come from **Birger Lindholm** of Dalsbruck, Finland. They will be the last set for 1988 and should work well into the New Year. The next set in two months' time will be for 1989 and if your program does not have automatic annual sidereal time correction "built in" it may be necessary for you to put the new correction into the right line(s) of your listing.

Most of the latter day programs based on the original W3IWI "basic orbits" and those written by GM4IHJ will run without amendment year after year, but some programs have sidereal times for a limited number of years, whilst some others will function for the current year only. This limitation will become very apparent when

you attempt tracking in the following year, or put in the sets based on 1989 derived elements, as grave timing and tracking errors will be displayed.

Although it is often possible to bluff your computer into correct function, by say calling the 1 January, December 32, or the 1st day of the 13th month, etc., eventually it becomes a headache, especially with leap years around. Far better to update your program and find the line that relates to the current sidereal time, which for 1988 will say something like LET G = .27469296 or IF Y(n) = 88 (or 1988) LET (or THEN LET) G = .27469296 or similar. Change the year to '89 and the number to .27676777 and your tracking will work well again.

If you use the "AMS81" program from AMSAT, you will by now be out of data and it will be necessary to update the array. **Courtney Duncan N5BF** and **Ralph Wallio W0RPK** advise the following routine. After loading the program, break in with the space key, and then type in DIM G(21) and ENTER. You can now assign each value of the G array, which commences with 1979. Confirm this by typing PRINT G(1) which should show .27518504. To maintain the array format it will avoid problems if you put in the G sidereal values for past and future years, which will let you carry on tracking for the next ten years. Type in: LET G(1)=.27518504 and ENTER (This for 1979), LET G(2)=.27452194 ENTER and so on increasing the G number by one each time and giving the value, so that G(3)=.27659675 and so on. The next value is .27593365, then .27527055, .27460745, .27668226, .27601916, .27535606, .27469296, .27676777 (this year, G(11), .27610467, .27544157, .27477847, .27685328, .27619018, .27552708, .27486399, .27693880, .27627570, finishing up with that for the year 1999, LET G(21)=.27561260.

The listing of Keplerian elements given will need the latest updates for both MIR, which has just used the old Progress for propulsion into a higher orbit, and for OSCAR-9 which is now being severely affected by the escalating average drag factor. Here as a "stop press" are the latest Laser Radar set to hand, which are working well in early February:

Satellite:	MIR	OSCAR-9
Epoch Year:	89	89
Epoch Day:	23.76807044	15.41913433
Inclination:	51.6217	97.5857
Right Ascension:	13.2748	61.3120
Eccentricity:	0.0016375	0.0001495
Arg. of Perigee:	106.6311	339.7929
Mean Anomaly:	253.7443	20.338
Mean Motion:	15.73667622	15.41588884
Decay:	6.7323E-4	5.53583E-4
Epoch Rev./Orbit:	16858	40532

With these lower orbiters, it may be necessary to manipulate the drag factor in order to update the set to equate to found AOS, TCA and LOS times until the next set is available to ensure accurate continuity.

The Keplerian element sets that have up to now been provided on a daily basis by the ARRL bulletin will terminate soon, as it is felt that other sources are sufficient. These include the numerous national and international AMSAT nets, the packet radio sources, the AMSAT bulletin board service of WD0GML on USA area code 314,4473003, the request available AMSAT-UK booklet, this column, the RS data on the RS-10/11 satellites and the space information nets on the satellites themselves. If you are dependent upon ARRL as a source, please write to Don Champer K8OCL, at 7800 Hartwell Street, Deerborn, Michigan 48126, USA, who will arrange revision of the source closure.

OSCAR-9

Not only are the 21.0018 and 14.0013MHz h.f. beacons now complementing the 145.825MHz beacon, but suddenly the 29.510MHz beacon has arrived on the scene too! It sounds like the other h.f. beacons, sending a long carrier to enable Doppler shift measurement and detection of multi-path propagational anomalies, followed by the first ten channels of telemetry, ending with the call "AMSAT" all at some 8 w.p.m. Morse code keyed carrier. The new arrival is quite strong, some 8–10dB over noise and can be heard well at sub-horizon times, going very tone "A" auroral when close to the magnetic pole.

Why this should have suddenly come about is not clear. Whilst a faint possibility of the source now being below the main F2 attenuating layer has permitted audibility, or whether the "stuck" gravity gradient boom used as an antenna has released, or whether it was a self healing electronic, mechanical or software command error that did not permit earlier tests to be heard is unknown. Careful listening amid the enormous din on and around 7.002MHz may well reveal the presence of this beacon also. Whilst your columnist has heard what might be a weak slightly shifting carrier and slow Morse sending numbers in moments of temporary respite of terrestrial QRM on high elevation passes, the call "AMSAT" has yet to be fully identified.

Perhaps following a Dellinger fade out, this removing all ionospheric propagated signals and cancelling the otherwise free electron dense highly attenuating direct path (which is to be expected frequently in March and early April this high solar flux year) it may be clearly heard. Reports on all signals, with particular reference to trans-equatorial, auroral, non-great circle and sub-horizon hearings would be welcomed by the University of Surrey. Sadly, as one may note by the increasing mean motion and drag factor, UoSAT-1 is now coming down much faster as the sunspot number increases atmospheric heating and expansion. Guesses at the time of its final demise vary, with some sources saying at least two more years and others saying as early as October this year. G3IOR, aided more by a crystal ball than by his computer, and considering the NASA data from the solar mesosphere explorer satellite, is plumping for 23 November 1989 at 1830UTC. If any readers would like to have a go at guesstimating the time of re-entry (to the nearest minute) a prize in the form of a superb brand new 308-page hardback book by Wernher von Braun, Frederick Ordway and Dave Dooling entitled *Space Travel — A History* (with many superb colour pictures) will be sent to the winner, whose entry must be in by 31 August 1989. While you are writing, please send us your news and views for this column.

OSCAR-10

This never-say-die transponder has never been so good as the past month, especially just after perigee. It has been transponding even 10 watt to 10-element Yagi signals to give an excellent downlink for twenty-four hours per day, and thus providing lots of really solid good DX QSOs all round the world. **Keith Dunn G1NDK**, of Staplehurst in Kent expresses his admiration for the satellite, which he prefers to OSCAR-13. "I have been having many perfect QSOs with many stations but, surprisingly, I find the numbers of users very low. They all seem to be competing with each other on A-O-13. Thankfully, most of the 'alligators' have migrated there also!"

OSCAR-10 has been heard at good readability even using G3IOR/M with a half-wave whip! It has been out of eclipse, and at a good sun-angle, but sadly not for much longer, as **Ian Ashley ZL1AOX** reports that a new eclipse period will commence on February 15. It will prove to be necessary to maintain the battery charge in eclipse conditions by restricting the Mode B transponder operating time, the changing mean anomaly times for which will be supplied on the various AMSAT nets. Even at other times, the

Fig. 1

Fig. 2

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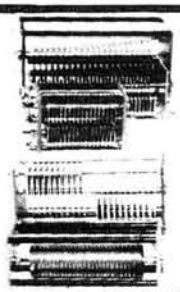

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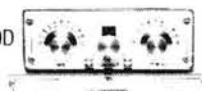

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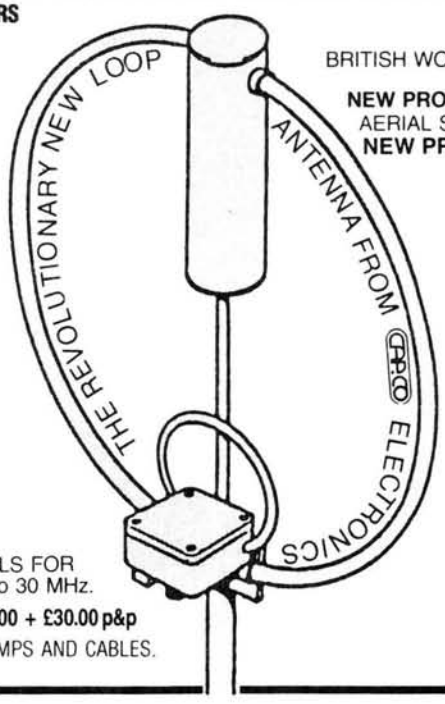

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battery will not be fully charged, so it is again requested that all users minimise their uplink power to that bare minimum needed for QSOs, and not to transmit to the satellite at all if any f.m. is heard on the 145.810MHz beacon.

FUJI-OSCAR-12

Due to escalating battery storage and decaying solar-cell problems, the periods of activity are protracted and are usually now followed by a further re-charge session. The long-term schedule is still unknown, but a good hint is given by the latest schedule given at the time of writing this column, but some of which will be dated by the time it is read, which goes:

February 11 0624UTC to February 12 0733UTC; Mode JA

February 15 0449UTC to February 16 0553UTC; Mode JA

February 18 0409UTC to February 19 0558UTC; Mode JA

February 25 0154UTC to February 26 0506UTC; Mode JD

February 28 0724UTC to March 01 0630UTC; Mode JD

Following this, it is highly probable that the transponders will be turned off to permit a further 11 day battery re-charge session before a next similar schedule.

This satellite has had rather a chequered history. It was almost six months before its JD digital mode was activated and a further four months before the 8J1JAS mailbox was put into operation. Despite its large memory, it was found that only fifty files could be placed into the memory until the first one was discarded. Users found that the data flow transmitted by the beacon was often held up, when a connect or disconnect was executed immediately, but it often took several minutes before the prompt "JAS" was indicated showing readiness for command input.

Heinz Hildebrand DL1CF, is an all-round satellite enthusiast. His photograph is shown in Fig. 1, a group of DX satellite users taken at the AMSAT-UK colloquium at the University of Surrey in July last year. Shown from left to right Michael Meerhan G0/PA3BHF; Colin Richards 9M2CR; your author G3IOR; Heinz DL1CF and Nico PA0DLO. Heinz also specialises in the digital mode of communications on FO-12 and has some useful information to input on overcoming some of the JD mode difficulties experienced. He points out that many stations using a TNC version 1.1.4 of the TAPR software were experiencing considerable problems and that only after switching to the WA8DED software was there a significant improvement. In the meantime, some of the FO-12 uploaded software was also improved, with new commands and by raising the memory capacity up to 200 files. He also believes that some software errors may have been corrected over the same time period.

During the problematic time Heinz took part in many discussions as to the potential cause of the difficulties and performed some research himself after noting that some terrestrial packet signals were not totally correct, some observed as having differing deviation of the two tones. A check of his own signals showed that the higher frequency tone generated a significantly higher deviation than the lower frequency tone. The pre-emphasis of the modulation amplifier of the transmitter was proved to be the cause, as virtually all operators were feeding the TNC's signals into the microphone input, giving different deviations of the individual tones, depending upon the particular equipment in use.

Satellite Name	OSCAR 9	OSCAR 10	OSCAR 11	OSCAR 12
International Designation	81-100B	83-058B	84-021B	86-061B
Calatogue Object Number	12888	14129	14781	16909
Element Set Number	386	371	377	123
Epoch Year	1988	1988	1988	1988
Epoch Day.Decimal Day	362.26039431	354.41262227	361.23588414	347.77684405
Inclination	97.5906	26.8622	98.0282	50.0134
Right Asc. of Ascending Node	41.4282	289.3545	58.9442	151.3381
Eccentricity	0.0003219	0.6046459	0.0013479	0.0011202
Argument of Perigee	44.1511	2.1727	141.7740	229.0490
Mean Anomaly	315.9922	359.5722	218.4416	130.9375
Mean Motion (Orbits per Day)	15.40145445	2.05881205	14.62716293	12.44396973
Decay or Drag Factor	3.5082E-04	-3.6E-07	2.158E-05	-2.5E-07
Revolution or Orbit Number	40237	4151	25725	10619
Nodal Period (in minutes)	93.558174	699.1815	98.505789	115.652956
Longitude Increment deg.West	23.386147	175.3513	24.627313	29.239286
Beacon Frequency(s) in MHz	21.002/ 145.825/ 435.025/ 2401.0 MHz	145.810 MHz 145.987 MHz	145.826/ 435.025/ 2401.5 MHz	435.797/ 435.913 MHz
Reference Equator Crossing	01 Jan 1989	30 Dec 1988	01 Jan 1989	30 Dec 1988
Orbit Number	40310	4173	25810	10834
Time UTC (HHMM.MM)	0003.98 Utc	0220.62 Utc	0112.60 Utc	0104.04 Utc
Longitude Degrees West	55.27 Deg	206.26 Deg	54.22 Deg	16.46 Deg

Satellite Name	OSCAR 13	R S 10/11	SALJUT 7	MIR
International Designation	88-051B	87-054A	82-033A	86-017A
Calatogue Object Number	19216	18129	13138	16609
Element Set Number	23	618	375	617
Epoch Year	1988	1988	1988	1988
Epoch Day.Decimal Day	345.71673632	362.93785475	363.00469821	363.35881741
Inclination	57.4058	82.9258	51.6109	51.6215
Right Asc. of Ascending Node	228.3882	4.6482	71.9601	149.7265
Eccentricity	0.6620691	0.0012233	0.0000742	0.0019625
Argument of Perigee	195.2309	160.4359	97.2977	217.9962
Mean Anomaly	126.3564	199.7266	262.7544	141.8254
Mean Motion (Orbits per Day)	2.09698504	13.71925425	15.35802984	15.76458728
Decay or Drag Factor	7.0E-08	2.92E-06	2.9658E-04	3.8179E-04
Revolution or Orbit Number	376	7591	38183	16441
Nodal Period (in minutes)	686.6514	105.020924	93.700549	91.282015
Longitude Increment deg.West	172.1939	26.381005	23.805117	23.209951
Beacon Frequency(s) in MHz	145.812/ 435.651 MHz	29.357/.403, 145.857/.903, 29.407/.453, 145.907/.953 MHz	19.953 MHz	143.625=voice 166.125=data (AM)
Reference Equator Crossing	16 Dec 1988	31 Dec 1988	02 Jan 1989	31 Dec 1988
Orbit Number	388	7633	38260	16483
Time UTC (HHMM.MM)	1030.57 Utc	0001.39 Utc	0021.02 Utc	0030.32 Utc
Longitude Degrees West	15.27 Deg	97.60 Deg	59.24 Deg	331.25 Deg

Satellite Name	NOAA 9	NOAA 10	NOAA 11	METEOR 2-15
International Designation	84-123A	86-073A	88-089A	87-001A
Calatogue Object Number	15427	16969	19531	17290
Element Set Number	311	174	30	207
Epoch Year	1988	1988	1988	1988
Epoch Day.Decimal Day	358.95485427	361.94143986	359.60547806	359.30694998
Inclination	99.1244	98.6596	98.9199	82.4699
Right Asc. of Ascending Node	336.6674	29.5865	298.6616	294.0360
Eccentricity	0.0016566	0.0014443	0.0012640	0.0014557
Argument of Perigee	85.3005	33.0946	9.6433	35.8263
Mean Anomaly	275.0057	327.1134	350.4983	324.3866
Mean Motion (Orbits per Day)	14.11736596	14.22726000	14.10721588	13.83635640
Decay or Drag Factor	6.18E-06	5.98E-06	6.07E-06	2.74E-06
Revolution or Orbit Number	20772	11944	1285	9943
Nodal Period (in minutes)	102.058333	101.271395	102.132065	104.132118
Longitude Increment deg.West	25.512356	25.318015	25.532510	26.162303
Beacon Frequency(s) in MHz	137.620=APT 137.770=DSB	137.500=APT 136.770=DSB	136.995=APT	137.850=APT
Reference Equator Crossing	01 Jan 1989	30 Dec 1988	30 Dec 1988	30 Dec 1988
Orbit Number	20886	11988	1362	10022
Time UTC (HHMM.MM)	0049.60 Utc	0051.60 Utc	0136.03 Utc	0028.43 Utc
Longitude Degrees West	128.17 Deg	78.96 Deg	178.64 Deg	176.32

Satellite Name	METEOR 2-16	METEOR 2-17	METEOR 3-02	COSMOS 1766
International Designation	87-068A	88-005A	88-064A	86-055A
Calatogue Object Number	18312	18820	19336	16881
Element Set Number	209	72	97	473
Epoch Year	1988	1988	1988	1988
Epoch Day.Decimal Day	361.91873676	355.18743177	362.05485448	2.91188984
Inclination	82.5590	82.5440	82.5470	82.5229
Right Asc. of Ascending Node	356.0300	62.8011	297.4434	190.6154
Eccentricity	0.0008735	0.0018056	0.0014900	0.0022412
Argument of Perigee	326.5235	55.0150	253.2639	279.7576
Mean Anomaly	33.5587	305.2701	106.6816	80.1257
Mean Motion (Orbits per Day)	13.83386684	13.84068942	13.16848207	14.74184930
Decay or Drag Factor	-2.06E-06	3.28E-06	3.91E-06	1.373E-05
Revolution or Orbit Number	6869	4492	2025	13093
Nodal Period (in minutes)	104.150972	104.099649	109.409641	97.740900
Longitude Increment deg.West	26.166333	26.153620	27.471041	24.564795
Beacon Frequency(s) in MHz	137.400=APT	137.300=APT	137.850=APT	137.400=APT
Reference Equator Crossing	30 Dec 1988	28 Dec 1988	30 Dec 1988	06 Jan 1989
Orbit Number	6912	4601	2064	13139
Time UTC (HHMM.MM)	0041.47 Utc	0136.73 Utc	0025.97 Utc	0049.19 Utc
Longitude Degrees West	115.48 Deg	64.39 Deg	169.81 Deg	290.15 Deg

After his findings were verified and reports of successful modifications came from G3RUH and ON6UG, Heinz decided to modify his equipment as follows:

1. The output signal from the TNC-1 was removed from the microphone input of his TS-711E and put into the data input of the multiple accessory jack ACC-2 on the rear panel. Following this, it was found necessary to increase the output level from the TNC-1 so that it was possible to give a deviation of 3–4kHz from the transmitter output.

2. G3RUH's modem was modified by replacing the 270kΩ R3 with a 10kΩ resistor, changing the 1.8kΩ potentiometer R5 to a 20kΩ potentiometer and replacing the 10nF C9 with a foil capacitor of value 1μF.

The output signal was now routed from

the wiper of the 20kΩ potentiometer to the f.m. modulator of the TS-711E via the data input jack ACC-2 on the rear panel. The deviation of the transmitter was set to 3.5kHz by adjusting the 20kΩ potentiometer and immediately came Heinz's big break through in digital satellite communications!

"Occasionally there are still link-resets when the orientation of FO-12 is so unfavourable that its quarter wave stub receive antenna is shadowed from the ground station by the satellite structure," writes Heinz. "This undesirable phenomenon occasionally can be very noticeable on mode JA (the analogue mode) and strong QSB results, giving serious signal degradation, with power increases of up to 10dB giving no improvement."

Since performing the modifications, Heinz has been having a ball with his satellite packet radio communications, having used some 90 orbits in the past year, inputting nearly 450 different files into the 8J1JAS mailbox. He finds that the main activity comes from some 25 mode JD active stations in Europe, with files also from JA1–JA0 inclusive, LU1 and 8, AL7 and KL7, VK zones 2, 3, 5, 7 and 8, VS6, W1 to 0 inclusive, ZL1 and 2 and from ZS6.

Heinz would like to see a number of improvements made on the forthcoming JAS-1B system, which is now scheduled to be launched with the MOS satellite in July this year. He hopes that a better receiving antenna will be designed and used, so that the satellite itself does not obstruct the uplink path. He points out that a power budget which permits the mailbox to remain open in JD mode every orbit is needed and that it is hoped that the future Fuji should be so designed as to retain its memory contents when it switches from digital to analogue communications mode.

"If no significant improvements result in the new JAS-1B in comparison to its predecessor, the stations currently active in mode JD will transfer their activities to the upcoming PACKSAT micro-satellites," states Heinz. "Since we anticipate additional digital amateur satellites in the future, this mode of operation will continue to gain importance."

In next month's column, we shall be giving out a lot more new information that has arrived from DB2OS and N5BF on the new micro-sats, including the PACKSAT details.

RS-10/11

Since the beginning of the year, RS-10 has been the activated satellite, with its transponder on all the time. It is providing many opportunities of pre- and post-horizon, often being heard well whilst over Indonesia, Japan and China in the mornings and coming up whilst over southern Africa in the evening passes. Comparison with the RS-11 transponder seems to show that the sensitivity and downlink power of the RS-10 transponder is slightly down, and that the a.l.c. time constant is slightly greater. It is very marginal, difficult to measure, and the findings may be more to the variations of path attenuation than to any significant differences.

RS3A operator **Andy Mirinov**, who regularly works many stations through the transponders, sent in the photograph that is our Fig. 2, showing him at the controls.

Considerable problems are evidenced on RS-10 resulting from the enormous improvement in terrestrial 29MHz propagation. The very added ionisation providing m.u.f. elevation that gives such good world-wide paths between earth users is that which brings about severe attenuation of the 29MHz downlink and extinction of the telemetry beacon, the ROBOT and the transponded signals. Just as the word was got around to keep the section 29.400 to 29.450MHz clear of the strong and wide f.m. use, the passband changed to that of RS-10, 50kHz lower in frequency.

Readers are asked to request 10m f.m. users to not now use the section from 29.350 to 29.400 inclusive, that is Channels 5 to 10 on CB conversions, even when the satellite is not on a pass over their area, as signals from many thousands of kilometres away are destroying the weaker satellite contact possibilities.

OSCAR-13

Considerable improvement has resulted with the positional changing of this newest satellite. It is becoming apparent that the beamwidth is less than that of OSCAR-10 and hence the spin modulation and signal strength is markedly impaired when the pointing angle to earth is not optimised. The best time for satellite employment has been just prior to the time when it switches to mode JL, when the antennas are looking at earth. Until March 13, the schedule is:

Mode B from mean anomaly 03 to mean anomaly 100.

Mode JL from mean anomaly 100 to mean anomaly 150.

Mode B from mean anomaly 150 to mean anomaly 240.

Transponders off between mean anomalies 240 and 03.

At this time, no mode S time is given, but this will come about again just as soon as the pointing is ideal again. The schedule is likely to change again soon, to adjust for re-orientation and changing sun-angles.

For those who use SQUINT or similar computer programs so as to determine optimum use times from the A.LONG and A.LAT of OSCAR-13, the numbers determined for January 30 were 178.7 long and −0.9 lat. On February 6 it was 178.8 long and −1.7 lat. The rate of change was A.LON 0.016 degrees per day, and A.LAT −0.1 degrees per day. This will change when the satellite is turned by its magnotorquers. ZRO tests.

In memory of Kaz Deskur K2ZRO, AMSAT are conducting a series of tests permitting participants to find and demonstrate their satellite receiving capability. A c.w. signal in steps of reducing uplink power will be sent to the OSCAR-13 satellite, to provide a step reduction of downlink on a selected frequency of 145.840MHz.

The copy, together with the station's details, etc., plus a s.a.s.e. with two IRCs should be sent to Andy McCallister WA5ZIB, 14714 Knightsway, Houston, Texas 77083, USA, who will send a handsome certificate stating the level of achievement. In the ZRO test conducted from 1600 on January 14, stations were able to copy the content when the uplink was less than 4 watts e.r.p., i.e. the level that would be given by using a 5 watt hand-held transmitter with a 170mm long quarter wavelength whip antenna!

If you should still speak to them, it is asked that you advise some of the "alligator" OSCAR-13 users of the test, as it may bring home to them that using over 1kW e.i.r.p. is quite unnecessary. Above all, ask them to listen rather than transmit during the test, otherwise the test will be rendered useless by the escalation of a.l.c. attenuation that they normally create by their excesses, destroying any logically powered uplink signal transponding capability.

It is hoped to commence such tests on L mode soon, and any stations who are willing to conduct these are asked to contact Andy WA5ZIB, to offer their services.

Semi-Major Axis

A number of readers run satellite tracking computer programs that ask for an input of the SMA of the particular satellite. Whilst this is unnecessary for programs that use the mean motion and can in any case be calculated from this mean motion as shown earlier in this column, here are those requested for the current amateur satellites, taken at the end of 1988:

OSCAR-9 (UoSAT-1): 6823.8201
OSCAR-10: 26101.0302
OSCAR-11 (UoSAT-2): 7062.55839
OSCAR-12: 7866.160079
RS-10/11: 7370.80826.

Be warned that OSCAR-9 is dropping fast and needs very regular updates!

MIR

Activity from MIR has been at a very low ebb, with only the resident medical doctor Valery Polyakov U3MIR having been heard twice in mid-January over the USA and once whilst over Europe at 1847UTC on January 23, by OK3AU. It is hoped that the new ten watt transceiver may have gone aboard with the supply launch from the latest Progress and that a new surge of activity from the new cosmonauts would have been brought about.

The next three deadlines are Mar 29, Apr 26 and May 31

Propagation

Reports to Ron Ham
Faraday, Greyfriars, Storrington, West Sussex R20 4HE

In the February issue I referred to the diary entries of the late Nell Corry G2YL which proved that Dennis Heightman G6DH and a number of other radio enthusiasts heard solar radio noise (hissing) in the h.f. bands, between 1935 and 41. Nell's diaries are full of contemporary information including the occurrence of aurora, blackouts, echoing on signals, extraordinary DX and any available details about solar eruptions.

I found further evidence of all this in *Cosmic Notes*, compiled by the Propagation Section of the RSGB's Radio Experimental Section, published in the July 1936 issue of the Society's journal *The T. & R. Bulletin*. This piece, covering the period March 14 to June 3, is a good example because it lists such items as "fade-outs"

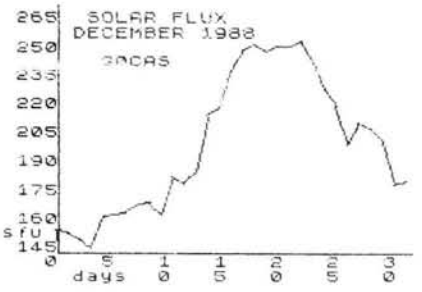


Fig. 1

logged by G2NJ, G2XG and the magazine *Wireless World*, "hissing" heard by BRS25, G2YL, G5OJ and G6DH; solar activity, described as "Bright eruption on the Sun" by *Wireless World*; "Very vigorous eruptive prominences on the sun" (May 6), "Prominence near CM on sun" (May 25) and "Prominence of May 25 dying out" (May 26) observed by a Mr. A.M. Newbegin.

From my research into the "hissing" phenomenon back in 1972 I believe that this is Mr. Algernon Montagu Newbegin FRAS, an active astronomer, whose home and observatory in Sussex was called Starween. I was reminded of this after visiting a Chichester Book Fair recently where I found a third edition (1887) of an astronomical classic entitled *The Story of the Heavens*, by Sir R.S. Ball, with the fly-leaf bearing a large pencilled signature, G.J. Newbegin. 1888.

However, amateur work continued until the outbreak of war and the July 1939 issue of *The T. & R. Bulletin* carried a chart entitled, "The Hissing Phenomenon And Bright Chromospheric Eruptions On The Sun Recorded During 1938", showing that solar radio noise was heard by BRS25 and BRS1173 on July 10; BRS3003—September 21, October 17 and December 7; BRS3179—March 21 and October 14; G2YL—January 3 and July 12 and 31; G6DH—January 16 and 17, March 21, April 7 and 15, July 26, 29 and 31, August 1, September 19, October 14 and November 11 and 12; G2XC—April 15 and 24 and July 10; G6YL—April 25, July 31 and September 21; GM6JJ—July 10 and VU2AN—July 31 and November 6.

Although the "hiss" was mainly observed at 28MHz, G8MH heard it on 14MHz on April 24, G2XC said it was loud from 7 to 28MHz on July 10 and 2BIL and G6YL recognised it on 56MHz on the 31st. In that year, eruptions on the sun's surface were seen on January 16 and 17, April 7, 15, 24 and 25, July 10, 29, 30 and 31, September 19, October 14 and 17 and November 11 and 12. Now let's take a look at the happenings in December 1988 and January '89.

Solar

"For the first 13 days of December, the solar flux climbed from 155 s.f.u. on the 1st to 186 on the 13th. On the 14th, the solar flux leapt to 215 and continued to rise to a monthly high and also a high for Cycle 22 of 255 on the 22nd before falling back to 182 on the 31st," wrote **Neil Clarke G0CAS** (Ferrybridge). He pointed out that the solar flux remained above 200 units for 16 consecutive days. The daily variations can be seen on Neil's computer print-out, Fig. 1. From his observatory in Edinburgh, **Ron Livesey** located around eight active areas on the sun on December 5, 11, 24 and 26 and 10 on days 19, 21 and 22.

While looking for TVDX in Band I (48-68MHz) on the 23rd, **John Woodcock** (Basingstoke) heard what sounded like north-American RT traffic. However, the following morning he listened to Radio Australia's propagation forecast and learnt about the high level of solar activity.

Patrick Moore (Selsey) sent his drawings of the giant sunspot group which he observed, with difficulty through a gap in the cloud at 1505 on January 12, Fig. 2 and in its full glory at 1125 on the 14th, Fig. 3.

Although the sun was low in the sky and made observation difficult for **Ted Waring** in Bristol, he managed to count 25 sunspots on January 4 and 21 on the 22nd.

At 1048 and 1110 on January 22, **Dave Coggins** recorded bursts of radio noise from the sun, at 143MHz, with his experimental radio telescope using a 5-element

WRM033

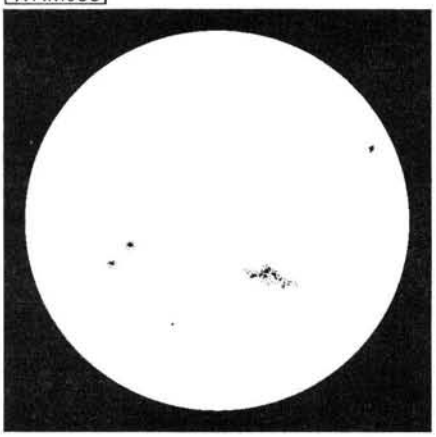


Fig. 2

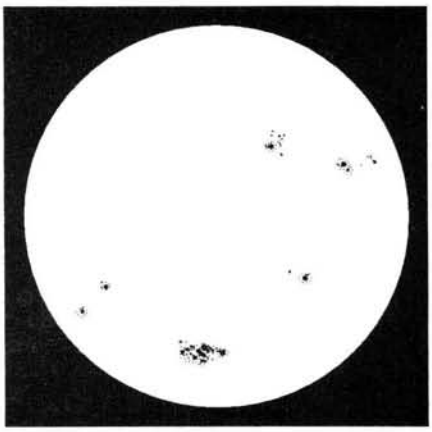


Fig. 3

December 88 January 89

Beacon	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
AX2RSY	X	X	X	X	X			from now on see VK2RSY																					
OF0AAB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OL01GI	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EA2HB		X	X	X	X		X										X	X		X	X	X							
EA6AU	X											X	X	X	X	X	X	X	X	X	X								
EA6RCM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
EA7RCC								X	X	X	X	X	X				X	X	X	X	X								
IY4M	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
KB2BBW																											X	X	X
KB4VPI	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
KC4QPC							X																						
KD4EC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
KE2DJ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
KF4MS	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
KJ4X							X		X	X		X	X	X	X	X	X	X	X										
LA5TEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
LU1UG			X		X							X		X			X	X			X							
N4LMZ		X	X	X	X		X	X	X				X						X					X	X	X	X		X
OK0EG	X	X			X	X	X				X		X			X	X					X	X						
OH2TEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PT2AAC									X		X	X																	
PY2AMI	X	X	X	X	X	X	X	X	X	X	X	X			X	X				X	X	X	X	X	X	X	X	X	X
VE1MUF		X	X					X	X	X	X	X	X	X		X	X	X	X	X		X	X		X			X	X
VE2HOT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VE3TEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VE6YF										X		X			X	X		X		X									
VK2RSY							X	X	X	X	X	X	X	X			X		X				X		X	X	X	X	
VK5WI	X			X				X	X	X	X					X													
VK6RWA	X									X																			
VP8BA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VS6TEN							X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		
WA4DJS		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
WB4JHS						X	X	X	X	X			X	X															
WB9FVR	X						X	X		X		X		X		X		X				X					X		
WC8E	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WJ7X																X													
W3VD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W3SV							X	X	X	X	X	X	X																
W7JPI												X				X													
W9UXO		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZD8HF		X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZL2MHF		X	X	X	X																								
ZS1LA	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
ZS5VHF	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZS6PW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZZ1ANB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5B4CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5Z4EER													X																
9L1FN						X																							

Fig. 4

Yagi, 144MHz converter, Yaesu FRG-7700 communications receiver, home-brew d.c. amplifier and a pen recorder.

Cmdr Henry Hatfield (Sevenoaks) using his spectrohelioscope, located three sunspot groups, 22 filaments and eight quiescent prominences on the sun's disc at 1402 on January 2; 2g, 19f, 6qps and a region near the east limb almost flaring on the 6th; 4g, 20f and 12qps on the 10th; 5g on the 11th; three flares in one group on the 13th; 4g, 25f, 11qps, three small flares and a very bright patch on the 14th; 3g—one with two spots and a very large "fuzzy" patch, 22f and 8qps on the 18th; 3g, 24f and 5qps on the 19th and 2g, 16f and 12qps on the 21st. Unfortunately, cloud cover hampered his observations on days 4, 11 and 13, however, he recorded individual bursts of solar radio noise, at 136MHz, on December 20 and 21 and January 2, 4, 5, 7, 12, 17 and 19 and periods of continuous noise on December 21 and 28 and January 4, 9, 10, 13, 16 and 17. Henry described the burst at 1220 on December 20 and at 1500 on January 9 as "very powerful" and "very violent" respectively. The former sent his recording pen against the upper stops. At present he is experimenting with a second radio telescope to observe the sun at 1298MHz.

Magnetic

Neil Clarke reports that the Ap index for December was generally unsettled with a quiet period from the 5th to 9th. The most unsettled day was the 17th when the index was up to 33.

The magnetometer used by **Karl Lewis** in Saltash, recorded "magnetically stormy" conditions after 1900 on the 17th, 2200 to 0015 on the 18th/19th, minor storm from 0800 to 1900 on the 25th and 2300 on the 26th and up to 1200 on the 27th.

Ron Livesey's "jam-jar" magnetometer measured disturbed conditions on days 15, 16, 17 and 25 and to a lesser degree on the 5th and 31st.

Aurora

Ron Livesey is the auroral co-ordinator for the British Astronomical Association and received reports of auroral "glow" from observers in northern Scotland overnight on December 11/12 and 15/16, "active aurora" seen from northern Scotland and Helsinki on 16/17 and 25/26 and "quiet arc" from Oulu, Finland, as the year changed. Auroral reflected radio signals were reported by **Doug Smillie** (Wishaw) during the early evenings of days 14, 15, 16 and 19.

Dave Coggins received tone-A signals from stations in Scotland on 50MHz and Ireland, Norway and Scotland on 28MHz around 1945 on January 11. He also heard such signals from the 50MHz beacons in Anglesey (GB3SIX), Inverness (GB3RMK) and Potters Bar (GB3NHQ) and reports that the aurora manifested again around 2330.

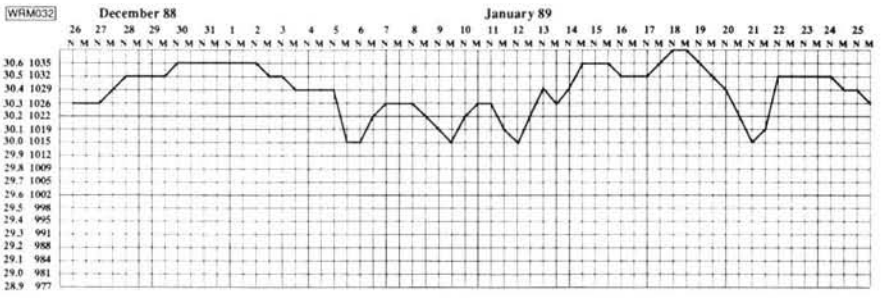


Fig. 5

The 28MHz Band

Dave Coggins heard a 28MHz QSO, via meteor scatter, between Tony Usher G4HZW (Knutsford) and SM6EHY during the Quadrantids meteor shower on January 3rd. Dave has also been listening, at midday, to the BBC on 25.750MHz and Radio France on 25.820MHz and noted their signals were echoing on most days between January 1 and 22.

While listening around 28MHz, **John Levesley G0HJL** (Bransgore) heard stations from Africa, Europe, the Middle East, Scandinavia and the USSR on December 26, South America on January 2, Europe, the Middle and Far East on the 15th, Europe and South America on the 21st and the USSR on the 23rd.

During his routine beacon checks on January 1, **Mark Appleby** (Scarborough) also logged a couple of stations from Ecuador and several from Turkey and the USA.

Propagation Beacons

First of all my thanks to Mark Appleby, **Chris van den Berg** (The Hague), Dave Coggins, **John Coulter** (Winchester), **Vaclav Dosoudil OK2PXJ** (Kvasice), Henry Hatfield, **Don Hodgkinson G0EZL** (Hanworth), **Ken Lander G3LCX** (Harlow), John Levesley, **Greg Lovelock G3III** (Shipston-on-Stour), **Ted Owen** (Maldon), **Fred Pallant G3RNM** (Storrington), Ted Waring and **Ern Warwick** (Plymouth), for their extensive 28MHz beacon logs which enabled me to compile our monthly chart, Fig. 4 and show the value of their combined efforts.

Among the new beacons heard by Don Hodgkinson this time are EA6AU (28.230MHz) La Palma, EA7RCC (28.283MHz), KB2BBW (28.281MHz) New Jersey, N4LMZ (28.232MHz) Alabama, W3SV (28.250MHz) Pennsylvania and WB9FVR (28.259MHz) in Florida. He also reports that the Australian beacon AX2RSY has reverted to its original call-sign VK2RSY and he heard VS6TEN after a long absence on January 2 and 5Z4ERR (28.246MHz) on the 7th.

"VS6TEN back on the air, giving 'DE VS6TEN' on 28.290MHz," wrote Vaclav Dosoudil and says that EA7RCC is operated by Radio Club of Cordoba and puts in a strong signal to Vaclav. His report has been verified by their QSL card.

Mark Appleby had a wonderful day on January 6 when he logged 30 beacon signals plus a couple that he could not resolve, Ted Waring heard "TEST VE3LOE" on January 8. In addition to his good haul of 28MHz beacons, John Coulter logged KB2BBW on 28.281MHz at 1413 on January 22 and 23.

Information about beacons in the other amateur bands is equally important as far as propagation studies are concerned and during this period Ern Warwick copied signals from IK6BAK (24.915MHz), CT3B, JA2IGY, OH2B, ZS6DN/B, 4U1UN/B and 4X6TU/B (14.100MHz) and DK0WCY (10.144MHz). Greg Lovelock received IK6BAK (24.915MHz) at 599 on January 11 and John Coulter logged PY2AMI during the early evenings on 24.900MHz.

Tropospheric

The slightly rounded atmospheric pressure readings in Fig. 5, were taken at noon and midnight from the barograph at my home in Sussex. Although the pressure remained high throughout the period the tropo openings were few and short lived. However, during the new year opening, **Kevin Phillips** (Bexhill, Sussex) logged BBC and ILR stations in Band II and identified 144MHz repeaters from the Midlands and Wales and I found a number of continental stations between 87 and 108MHz on January 24.

In Maldon, Ted Owen's barometer was also generally high with an average reading of 1029mb (30.4in) between December 26 and January 23. His instrument peaked at 1041mb (30.75in) on January 1 and 2 and his lowest was 1012mb (29.9in) on the 12th.

934MHz

"The old year went out and the new year came in with high pressures of 1037/1039mb (around 30.6in) providing favourable working conditions, passing NE to SW across the country, but of short duration," wrote **Terry Wyatt UK-848** from Walton on Thames. During the period Terry contacted stations ranging from the Isle of Wight at 110km to Bedfordshire and Cambridgeshire at 100 and 120km respectively. He also heard stations in Surrey working into Guernsey (225km), Leicester (120km) and Northants (110km).

John Levesley UK-627 received signals, from Guernsey on December 29 and January 7. During the opening on January 1, he heard stations on high ground in north Dorset working into the Midlands, and QSOs between stations in Bournemouth, Essex and London.

The next three deadlines are Mar 29, Apr 26 and May 31

Broadcast Round-up

Peter Shore

Despite the advent of the new generation of DBS television channels, short wave radio remains a newsworthy medium. Much has been happening in and around the bands in the past few weeks, and there is more to come in the months ahead.

Now that jamming has stopped on the frequencies of Radio Free Europe and Radio Liberty, the station is toying with the idea of reducing the number of channels it uses to send its programmes into the Eastern Bloc countries. At the present time, several frequencies in almost all of the bands are used—try tuning around and you will find Russian, Czech, Ukrainian, Romanian and all of the other RFE/Liberty language programmes booming out. It will clearly be of benefit to listeners and broadcasters if this rather uneconomic way of sending signals across the kilometres can be changed. One wonders what will become of the new VoA/RFE/Liberty transmitter site in Israel—is it really needed, or will it simply be an expensive white elephant?

However, jamming by Bulgaria of Bulgarian language transmissions from Radio Beijing, Voice of Greece, Radio Tirana, Vatican Radio and RAI in Italy continues.

Comments from Soviet officials have suggested that transmitters used for jamming, located mainly in city centres, are to be dismantled or turned into local radio transmitters. Since the jammers were often situated in areas of high population, the radiation produced was often well above the permitted levels.

On January 26, BBC World Service in Russian carried a live phone-in programme with Paul McCartney, who answered questions from all over the Soviet Union through an interpreter. Some of his music was played, including the track "Back in the USSR". It is interesting to see how much things have changed with glasnost and perestroika: during the National Union of Journalists' one day strike at the BBC a few years ago (over the "Real Lives" affair), all regular programming on every service was suspended. The Soviets, who at the time jammed BBC Russian, thought they would save some money by leaving the jamming transmitters switched off on that day. Music was played instead across all BBC channels—but when "Back in the USSR" was played, the Soviet jammers were immediately switched back on . . !

News from down under concerning Radio New Zealand. Both domestic and overseas broadcasting is about to change when on April 1 Radio New Zealand will become a limited company, with each of the 36 RNZ station managers around the country responsible for making their regional stations profitable. The country's radio and TV licence fee, currently around NZ$45, will finance the Broadcasting Commission which will allocate money to the NZ Special Broadcasting Service, which is to take over from the National Network, and a small portion of the licence fee, together with a Grant-in-Aid from the Foreign Office, will keep Radio New Zealand's external service on the air. More than NZ$3million is to be spent on upgrading the short wave service, including the introduction of a new 100kW transmitter to take over from the two ageing 7.5kW senders currently in use at Titahi Bay. The new transmitter will be near Taupo, beamed to the South Pacific, but if good frequencies are used, there will be benefits to listeners in Europe and North America. It is thought that Radio New Zealand will be asked to put together the programmes for the new external service which will no longer simply consist of a relay of the domestic service.

Nearer to home, in Scandinavia, there is more news of a possible link between Radio Norway International and Danmarks Radio. We reported some months ago in this column that plans were afoot to make more efficient use of the transmitters of Radio Norway which are presently used for a maximum of 45 minutes in each hour, possibly by changing to a half-hour programme format, and that Danmarks Radio, whose external service is similar in essence to that of New Zealand, would hire transmitter time from Norway. However, negotiations have yet to be completed and the talked about start date of May this year could be postponed. The Danish government will pay for the transmitter hire, and probably the programmes, too, although Danmarks Radio will continue to make the programmes in its national headquarters in Copenhagen. Co-operation may not be limited to Norway as Danmarks Radio would like to introduce foreign-language services, and is talking with Radio Sweden.

On January 17 broadcasts from Spain for abroad changed their names: in Spanish, the station identifies as Radio Nacional de Espana-Radio Exterior, and in French as Radio Nationale d'Espagne-Radio Exterieure whilst the new English name is Spanish National Radio's International Service. There is no immediately apparent reason for the changes.

Europe

All times UTC (=GMT).

The Cyprus Broadcasting Corporation's broadcasts to the UK are now heard on Friday, Saturday, Sunday on 9.580, 7.18 and 6.03MHz at 2215 until 2245.

The Voice of Greece has a new English language service to Australia at 0800–0850 on 17.55MHz.

Italy broadcasts in English to Europe as per:

0425–0440 on 7.275, 6.165

1935–1955 on 9.575, 7.290, 7.275.

RAI also uses the Radio Luxembourg medium wave transmitter on 1.440MHz for an Italian broadcast at 1830–1845.

Radio Netherlands English language schedule has undergone one or two minor alterations recently, and is now:

0730–0825 on 9.715 & 9.63MHz (to New Zealand via Bonaire)

0830–0925 on 21.485 & 17.575MHz (S.E. Asia via Madagascar)

1030–1125 on 9.505 & 6.02MHz (Australia/Caribbean via Bonaire)

1130–1225 on 17.605, 9.715 & 5.955MHz (to Europe)

1130–1225 on 21.615, 21.48 & 17.575MHz (to Mid East/Asia)

1430–1525 on 17.605, 17.575, 15.15, 13.77 & 5.955MHz

1630–1725 on 15.56 & 6.02MHz (to Africa via Madagascar)

1830–1925 on 21.685, 17.605, 15.175 & 6.02MHz (Bonaire/Madagascar)

1830–1925 on 6.02MHz (via Flevo to Europe)

2030–2125 on 15.56, 11.74, 9.54 & 9.895MHz (Flevo & Madagascar)

Programmes coming in the next few weeks:

Wednesdays—from March 1, a repeat of last year's series *More than Tulips* looking at the Dutch provinces including Limburg, Overijssel, Zeeland and Gelderland.

Thursdays—Media Network on March 9 looks at local radio in West Germany; news from everywhere on March 16, and on March 23 presenter Jonathan Marks will visit the Bonaire relay in the Netherlands Antilles, and MN will stay in the Caribbean on March 30 looking at the influence of video in the Caribbean, and whether it is still an important area for international broadcasting.

Saturdays *Over to You*—call in your comments on 010 31 35 218700 (note the change in this telephone number!)

Radio Norway is expanding its use of the 11 metre band from March 5 when its European day-time schedule will be:

0500 on 15.165 & 15.175MHz

0600 on 25.73, 15.165, 9.59 & 5.98MHz

0700 on 21.73, 17.78, 15.165 & 9.59MHz

1000 on 25.73, 21.705 & 15.235MHz

1100 on 25.73, 21.705 & 15.18MHz

1200 on 25.73, 21.705, 15,325 & 15.165MHz

1300 on 21.705, 9.59 & 6.035MHz

1400 on 25.73, 21.705 & 15.19MHz

1500 on 25.73, 21.705 & 17.84MHz

1600 on 25.73, 21.705 & 15.265MHz

1700 on 21.705, 15.22 & 9.655MHz

1800 on 25.73, 21.705, 15.22 & 9.655MHz

1900 on 21.705, 15.22 & 9.59MHz

2000 on 17.78 & 15.31MHz

Radio Vilnius in Lithuania, part of the USSR, has started an experimental media or DX programme, broadcast fortnightly in the English service which is heard daily on 6.10MHz at 2230 until 2300. A medium wave transmitter on 666kHz also carries this service.

The new Radio Moscow World Service in Russian, which has taken over from the composite service for listeners abroad, known as the Fifth Programme, has its own programmes at:

0300–0500 on 13.615, 12.020, 7.38 & 6.89MHz u.s.b.

1000–1200 on 12.07, 12.02 & 1.386MHz

1800–1900 on 12.07, 10.67 u.s.b., 7.30 & 6.89MHz u.s.b.

2100–2200 on 15.455, 13.645, 7.14 & 6.02MHz

The frequencies shown are only a small selection of those available at those times. At other times, Radio Moscow World Service in Russian carries Radiostantsiya Rodina, *For Those at Sea*, or a selection of news broadcasts and other programmes from the Moscow First Programme. Short wave usage for the Mayak (Lighthouse) Second Programme has decreased as frequencies have been switched to this new Russian-language overseas service.

News from home—BBC World Service is rumoured to be considering dropping the long established frequency of 18.08MHz in the summer, something which has come about as a result of the deliberations at WARC-HFBC back in 1979.

Africa

Africa No. One in Gabon is now using 17.63MHz for its daytime transmissions, only weakly audible here in the UK. This frequency is used until 1600 when 15.20 is engaged with 4.83 in parallel from 1700.

Radio RSA in English at 1500 now uses 25.79, 21.59 and 21.535MHz.

Middle East

Programmes in English from Radio Jordan:

0630–1415 on 11.955MHz
1400–2200 on 9.56MHz

in Arabic

0330 on 11.81, 9.54 & 9.53MHz
1530 on 11.81 & 9.53MHz

English from the Voice of the Islamic Republic of Iran are heard:

1130–1225 on 11.79, 9.685, 9.52 & 7.23MHz
1930–2030 on 9.022 & 6.02MHz

Baghdad in English:

2100–2300 on 9.70MHz (to Europe)
0100–0300 on 9.515MHz (to the Americas)
0230–0430 on 7.28MHz (to India and Pakistan)

Asia and the Pacific

Radio Afghanistan's External Service in English uses 17.72 and 15.435MHz at 0900–1030, both relayed from sites in the USSR. This station's continued use, again through Soviet transmitters, of 6.02MHz during the evening period for European listeners continues to cause problems for Radio Netherlands which transmits in English at 1830 on this frequency.

Radio Australia can be heard clearly in the early evening on 15.14MHz at around 1600–1730, a time when 7.205 and 6.035MHz can suffer from heavy interference.

All India Radio has brought in a new English language news transmission at 1430–1435 on 9.95 and 7.412MHz.

The Overseas Service of the Voice of the People of Kampuchea broadcasts in English at 0000–0015 and 1200–1215, reported on 11.94 and 9.695MHz.

Radio Veritas Asia in the Philippines is to inaugurate a new 250kW transmitter in March which should improve audibility in Europe.

Whilst conditions have been good recently for long path reception from the west, Papua New Guinea has been noted (a 2kW transmitter) at 0800 on 4.89MHz, and New Caledonia's relay of RFO has been heard weakly on 7.17MHz at around 1000. For night-birds, Radio Madagasikira has been heard around 0300 on 4.958MHz.

Radio Ulan Bator beams in English and French to Europe at 1940 until 2010 on 11.87 and 9.645MHz. The Far Eastern service at 1200 has also been noted in Europe on 12.015, announcing 9.615MHz which is unheard here.

Any reports for Broadcast Round-up should be sent to the PW offices

The Americas

RAE, Buenos Aires has retimed its English services to an announced 1630 on 15.345 (unheard at the time of writing) and 2100, also on the same frequency, which has been noted here.

HCJB in Quito, Ecuador, is using 11.835 between 0700 and 0830. Other frequencies used at this time include 6.205, 9.61 and 9.745MHz.

New North American station KJES is testing with a 5kW transmitter combined with a high-gain antenna between 2300 and 1515 on one of the following frequencies: 17.84, 15.14, 11.73, 9.665, 6.095 or 6.07MHz. The station is located in New Mexico, and the address is:

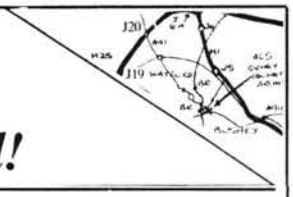
3720 Greenwich Drive, Vado, New Mexico 88072

The Christian Science Monitor is testing its two new 500kW transmitters at Cyprus Creek in South Carolina. The provisional schedule, for broadcasts beamed to Canada, is:

0000–1000 on 7.315MHz
1000–1400 on 6.15MHz
1400–1600 on 11.58MHz
2000–2200 on 15.225MHz
2200–2400 on 15.205MHz

American station WHRI puts in a good signal in the UK at 0700 on 6.10MHz, continuing after 0800 on 7.355MHz. Its programme from Radio Libertas in Serbo-Croat continues to be heard at 1600 on 21.48 and 15.105MHz.

Packet Radio – Now in Watford!



Andrews Computer Services are pleased to announce the opening of their Retail Shop in Watford. We have a live demonstration Packet Station available to you, so that you can compare our range of products or discover what Packet Radio is all about. The shop is open Monday to Saturday 9:00am to 5:30pm and is within easy reach of M1 and M25 motorways (see map) and BR rail links.

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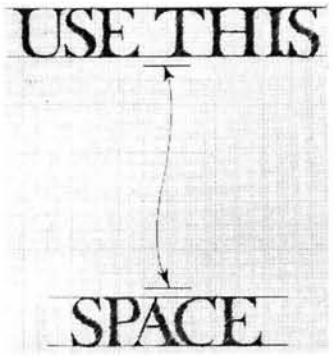

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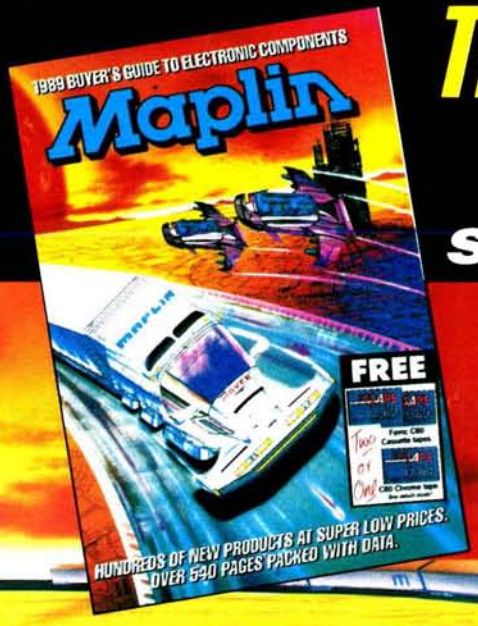

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