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HAM RADIO TODAY

DECEMBER 1991 £1.50

REVIEW

Icom IC4SRE 70cm
handheld with
built-in scanner

CAMEL TROPHY

DXing from 8R1 and PP8
Comms team run
T60m-6m DXpedition

The Early Days
of 5 and 6m –
G5KW reports



AN ARGUS SPECIALIST PUBLICATION

NOVICE • PACKET • REVIEWS • PROJECTS • SATELLITES

HRT

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Icom
IC-4SRE
Handheld
Reviewed



Project — 80m Fun Rig





CQ de G8IYA

our recent comprehensive construction feature for a Morse text generator, designed to help potential Class A Novices as well as those just wishing to increase their proficiency of the mode. Our editorial policy is that amateur radio should move with the times, and it cannot go un-noticed that to newcomers to the hobby, the 'magic' of simple- to-use Morse may be overshadowed by the 'magic' of other high- tech forms of communication. A few facts back this up, like the response to our reader's survey, like the uptake of Novice Class B licences, like the proportion of licensed amateurs in Japan. From our survey, a significant majority of unlicensed readers and licensed Class Bs believe that the current Morse test should be replaced with something different. If that could be a 'loaded' response, let's take a look at the uptake ratio of Class A to Class B Novice licences. At the time of writing, the Novice Class As were up to the 20AA series, the Novice Class Bs were up to the 21AE series. About five times as many have chosen not to go for the 5 WPM Morse test. In Japan, over 1,000,000 amateurs, the vast majority of amateurs in that country, have a no-Morse test licence. Facts, not opinions, not personal views, and don't shoot the messenger.

Maybe we should wake up to what's happening and concentrate on what *does* attract newcomers to the hobby, rather than possibly forcing our traditionally based opinions on them. Once they've come into our hobby, *then* we can show them the many and varied facets of amateur radio, some of which they may grow to use proficiently once the 'novelty' aspect wears off. Otherwise, we risk dissuading them from even thinking about joining our ranks, and we become a hobby of senior citizens. But maybe that's what amateurs want. I don't. What do you think? Write and tell us, we won't suppress your views, and if it's a constructive letter you may even win £10 for the 'Letter of the Month'!

One of the long-standing discussions in UK amateur circles, which can't be ignored, is that of the validity of the Morse test as the means for attaining a Class A licence. We also hear many discussions debating whether Morse should hold a valid place in today's amateur radio of advanced communication modes.

Why Abolish Morse?

Some amateurs believe the discussion centres on whether to abolish the use of Morse or not. Why abolish it? If some amateurs like using Morse, why make them cease? Likewise for Packet, or AMTOR, or FM, or SSB, or SSTV, or RTTY, each amateur has their preferred mode, and to many Morse is an art form, something to be enjoyed on the air. If you like Morse, use it, no-one's going to stop you, not yet at least. There are indeed some groups in the UK dedicated to the furtherance of Morse. Proficiency in the mode may even gain one membership of the FOC (First class Operators Club), and the 'Morsum Magnificat' periodical is dedicated to the mode. The 'FISTS' group are dedicated to helping amateurs on the mode, even with pre-arranged on-air skeds for a newly-licensed amateur's 'first' Morse QSO.

But there are two sides to each story. One 'extreme' of amateurs maintain that the knowledge and use of Morse is essential, stating it is used worldwide for vital communications, getting through when all else fails. This is countered by

those who state this may have been valid some time ago, but that it now holds little if any weight.

Satphones Rule OK?

So who's right? Let's take a current example, this month's front cover feature, something that's happening right now. Here, reliable communications from the middle of nowhere, with operators surrounded by man-eating animals, are absolutely vital. Their primary mode to summon help? Transportable satellite telephone communication. Their secondary mode? Speech on HF and VHF. Not a Morse key to be found, at least not in the professional communications side of things. Another example of this, even in wartime, was during the recent activities in the Gulf where many personnel relied on their suitcase-sized transportable satphone terminals. I was fortunate to have the opportunity of trying one of these recently, it took me just a few minutes to unpack and assemble, to then contact anywhere in the world. These are, of course, professional pieces of equipment, but remember that we amateurs have our own low-Earth orbiting satellites, receivable using just a handheld (even a converted ex-PMR type costing just a few pounds).

Attracting Newcomers

In HRT we're pushing for *progressive* amateur radio, including where appropriate the knowledge and proficiency of Morse. An example of this is

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LETTERS

Letter of the month

'Tone Burst — Class Wars' may reflect how some see differences between license classes, but as the only difference between Class A and B is a Morse test, I as a Class B see no reason to feel inferior to a Class A licensee who may not be any better an operator than myself. There are bound to be other Class B licensees who are far more knowledgeable than either of us!

The attitude of some class As that 'it should not be any easier' to gain access to HF is insulting and elitist. How can anyone seriously maintain that the Morse test is good to 'keep the numbers down'? Crowded bands can only be a good thing for the hobby, giving more chances of a contact and more to listen to. If anyone complains they can't get a clear frequency, I would say first come first served — if you can't join in then try another band! If numbers are to be kept down, why waste all that effort on recruitment and why bother trying to attract new Novices?

There are many advantages to CW, and I would like to get a 'G0' call before these new fangled 'M' calls are issued, but why 12 WPM if the ITU regulation doesn't specify the speed required? Many find it difficult to progress from 10 WPM to 12 WPM for example, but why not 8 WPM, which is good enough for many users. If we really have to be tested for Morse, the format of the test should be kept as it is with separate letters and numbers sections and no abbreviations. It is the Morse code

itself being tested, not the amateur application.

Why not allow Class Bs to use SSB on restricted portions of the bands? This would of course still upset the ITU, but why should the amateur have to perform CW by hand and ear? Why not give the amateur a choice of DIY Morse, or let a computerised gadget do all the hard work. The test could be either straight key or to test the ability to effectively use a machine Morse decoder/encoder which the licensee would be obliged to always have connected. There would be no practical difference between the old timers, and those new licensees who would rather have bought a gadget than learn the code. The new Class As this would produce would still be able to have rigid QSOs with non-English speaking amateurs, would still be able to receive requests to QSY from primary users, would still be able to receive Morse MayDay calls, though why that should be the responsibility of the amateur is ridiculous! Maybe not learning the code would still upset the ITU as this would be against the principle of 'self-training' in the definition of the Amateur Radio Service.

If frequencies below 30MHz 'with potential for international communication' require a knowledge of Morse code, what about CB (27MHz)? How come there is still so much illegal SSB around 27MHz anyway?! If 27MHz is the limit, then let class Bs use 28MHz! Hold on a minute, isn't 50MHz very international at times?

Finally, the RSGB considers that 70 hours of practice (boring) is required to learn the code, one can gain a Private Pilot's License in half as many hours and actually enjoy it!

Yours sincerely,
A. Venables GJ7JHF

Editorial comment;
We're glad the satirical 'Tone Burst' series is stirring discussion, that's exactly what it's meant to do! (Paul G6MEN does an excellent thought-provoking job each month with his cartoon character). Many amateurs understandably do believe there is a distinction, but don't always jump to the conclusion that Class As are considered above than Class Bs, who in turn are considered above Novices. In the July 1991 HRT I went on record (CQ de G8IYA Editorial, page 5) as stating that Novices may even know more about the practicalities of radio than we do. So there. Each has their own interests and abilities, 'old timers' have significant experience whilst newcomers often have a knowledge of modern communication techniques coupled with a fresh outlook. Let's hope amateurs of different classes will appreciate each other's talents and attributes, but in the meantime we'll still continue 'rattling the cage' to keep amateurs on their toes! As for Morse, see this month's 'CQ de G8IYA'. Some of us choose to bury our heads in the sand, at HRT we certainly don't.

Dear HRT,

After reading Martin Saunder's letter (letter of the month August 91 issue), where he states "you must weigh up the people who cannot get a licence because of Morse, and the people who cannot obtain a licence because of the above" I presume he means people who have a B licence and cannot get an A licence because of the Morse. I also presume our young friend is fond of pop music, perhaps he has a Walkman. May I suggest he takes the pop music tape out and insert a

Morse practice tape. Yes maybe music does help especially the classical type, because you have to discipline yourself when learning and playing music. I am 71 years old and revelling in the prospect of passing the Morse test to obtain my A licence, packet radio Ugh! I much prefer to talk to people and listen to their views. I suppose the Morse test will be abandoned in the near future, so Martin abandon your packet radio, at 16 your brain should be elastic enough to absorb the Morse technique, at 71 I am going leaps and bounds.

Yours sincerely,
J.H. Clifton, G7IOU

Editorial comment;
This is a constructive letter on stepping towards learning the Morse, but maybe the mandatory requirements for progressing through the hobby should instead be more up-to-date as well? How about some constructive letters from readers on the advantages of learning Morse as opposed to more modern subjects. We seem to have an underwhelming amount of these,

£10 for the Letter of the Month

Do you have something constructive to say on the state of amateur radio today? Perhaps you'd like to put your viewpoint to the readers, get some discussion going, or give an answer to one of the issues raised? We'll pay £10 for the best letter we publish each month. So write in with your views, to HRT, A.S.P., Argus House, Boundary Way, Hemel Hempstead, HP2 7ST.

"TONE" BURST'S "CLASS-WARS" Part 3

DRAWN BY THE GEMEN



and we can only print the letters our readers send. Don't shoot the publisher — these pages are for you!

Dear HRT,
I sit here disabled and sometimes wonder at this modern world we live in. I ordered an item from a well known dealer on the 23/7/91 and here we are today (15/8/91) still without the piece so urgently needed, the original being stolen.

One writes to the firm and is assured it is in the post from another branch. I telephoned twice and the second time they don't know what you're talking about, at 35-40p per minute one wants to listen to more than the chimes of the hold line! Finally we get *the man*, who admits he can only say he is sorry, but can offer no explanation for near 3 weeks delay on a simple item!

I suppose I spent £5-£6 trying to see if indeed I was ever going to receive my order. Come on amateur radio dealers, lets have a better deal, or are you immune from complaint?
Yours sincerely,
Ray Williams
P.S. A great magazine, your reviews are fair.

Editorial comment;
We could tell you much greater horror stories, e.g. of non-amateur businesses who refuse to honour their obligations like the communications dealer who we're taking to court, like the mail-order firm selling receivers who we're aiding the Trading Standards Office to take action against, like the radio organisation who we're helping to sue. This shows there's always someone worse off than you in the consumer field, but remember that dealers are only human, at least you did receive an apology.

Dear HRT,
I sometimes find it strange when some amateur radio dealers complain that sales of new equipment are slow. On the 10th July this year I sent a letter to a dealer asking for information on one

of their products, and also prices and details of other amateur radio equipment. One month later I still had heard nothing, thinking the letter must have been lost in the post I sent another, result as of today (3rd Sept) still nothing.

Around the 15th July I sent a letter to another company requesting information on their HF rigs and also a list of their second hand equipment, 3 weeks later I had heard nothing so sent off another letter requesting the same. In the middle of August I received a letter with the second hand price list but with no brochures as requested, the result is I am now going to buy from elsewhere.

73's John Hilton GM1ZVJ

Editorial comment;
Everyone's got a choice of course, and people can easily vote with their feet. But on inquiring around amateur radio dealers on our readers' behalf, it generally appears that the days of posting requested bundles of 'free' glossy leaflets at no charge are unfortunately long gone, as this practice can present an incredible overhead on many businesses. Indeed just try writing a letter to one of the many Hi-Fi or Television 'box shifter' warehouses asking them to send you their product leaflets through the post, and you're unlikely to get a high return rate either. The sad fact is that you must often go to the dealer in person, thus showing a 'commitment' indicating an interest to purchase, to pick up a stack of leaflets — which of course normally cost the dealer a considerable amount of money in the first place. Some dealers now charge for their glossy product information, typically £1-£3 reflecting the real cost to them, this sometimes being refundable if a purchase is made. Unfortunately, expecting something for nothing in all walks of life often results in disappointment.

Dear HRT,
First let me congratulate you on the

way that HRT is beginning to look, especially to Chris G4HCL with his ex-PMR projects. Having read through Chris's book *'Surplus 2-Way Radio Conversion Handbook'* I was really glad to meet him at the Elvaston Castle rally. Chris autographed my copy for me there, thanks once again for a superb book. Please do keep the ex-PMR projects coming!

I have recently acquired a frequency counter/timer, which has a number of faults on it. The instrument is a RCS 901 countertimer, 520MHz device with two inputs 0-80MHz for up to 520MHz, plus a pre-scaler switch. It can also be used as a period timer of some sort, but I don't know how to use it as a timer. Also there is a socket on the back, on test it seems to be OK, but as a frequency counter, I have tested it with a HF signal in the 80MHz I/P, it was OK on most settings but on some settings there are a few faults.

I would like to get this old piece of equipment working so if one of your regular readers has a workshop manual, and an owner/user manual, or anything to get me on the way to repairing this countertimer, I would be very grateful. I will pay for any postage and photocopying costs that may need to be met. I also need a components list, and if possible, a parts layout with voltages at whatever test points for it.

Yours Faithfully,
Ray Davidson G7FHD

Editorial Comment
If any readers can help Ray with his frequency counter/timer, we'd be pleased to forward on letters addressed to him c/o the HRT address. We've plenty more ex-PMR conversions lined up for HRT, there's several sitting here just waiting to go in, and it's good to know they're appreciated. We're delighted to be the only UK magazine to regularly feature this low-cost way of getting into amateur radio, allowing Novices for example to get onto 70cm or 6m FM for just a few pounds.

Chris Lorek tests a handheld with a difference — this one has an additional wideband receiver built in!

Icom IC-4SRE Review

OK, yet another handheld I thought. But wait, what's this extra aerial? A different type of 2m/70cm dual-bander? No — this set is totally unique, as well as a being fully-fledged 70cm transceiver it has a separate wideband receiver built in. Great for the newcomer who's already keen on listening around on a scanner - plenty of other bands to listen to when 70cm goes quiet. HRT must have a look at this I thought, and the Editorial team left the head office of Icom (UK) with a unique new review toy to play with!

in an external 13.5V DC supply into the top panel DC socket. This socket also doubles as a nicad charger connection, and as well as allowing you to charge an attached 7.2V nicad from an external 12V supply, a plug-in mains wall charger, fitted with a moulded UK 3-pin plug (not one of the common two-pin types you need a shaver adapter to use), comes with the set for UK markets. A variety of add-on power leads, nicads and chargers are of course available, including a fast-charger for when you need a battery top-up in a hurry.

Wideband Receive

Whilst the Editor was driving me back, I found the set was far, far more than just a scanner 'toy'. A thorough read through the instruction manual showed the separate receiver had many of the facilities of the main set, such as DTMF code squelch decode facilities with five code memories and even CTCSS decode with a plug-in option. With a receive coverage of 50MHz-905MHz (the actual tuning range being 25MHz-950MHz), and reception modes of AM and both narrow and wideband FM, the opportunities are many and varied. Listening into local 10m, 6m, 4m and 2m FM activity for example, or even wideband broadcast band FM stations on Band II or TV sound on UHF, as well as many other scanning uses such as aircraft, marine, and the like where this is allowed. I certainly had fun tuning around on the jour-

Controllability

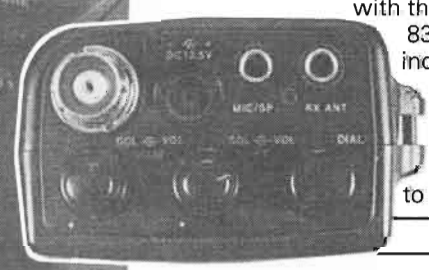
On transmit, when used with the 7.2V battery, 1.5W and 500mW transmitter power levels are given. However, no less than four power levels are provided when used with a high voltage supply, typically 5W with a selectable low power level of 3.5W, 1.5W or 500mW with an external 13.5V DC supply, to let you set the power level to your individual needs. Adjacent to the DC socket on the set top, as well as the standard BNC external 70cm aerial socket a single 3.5mm jack socket also lets you plug in an external speaker/microphone for use in a car or at home, thus adding to the set's versatility. A 2m version, the IC-2SRE, is also available, this having similar features to the 70cm model but with a 2m transceiver incorporated.

The unit, when fitted with the BP-83 battery, measures around 155mm x 55mm x 35mm and weighs around 440g. It's finished in a black metal and plastic case with grey rubberised push buttons on the front panel. Concentric volume/squelch knobs are fitted for independent control of the main receiver and the wideband receiver, a single click-step tuning knob being used for both receivers with the control of this switched from the front panel. Rather than a mechanical on/off switch, Icom have used a 'software controlled' power switch, where a press of the relevant keypad on/off button for longer than a second is required to switch the set either on or off.

As well as the aforementioned nicad and charger, the set comes with a 70cm

70cm Transceiver

We mustn't of course forget the set is, after all, a handheld transceiver, the IC-4SRE (the 'E' indicating the 'European' model) covering 430MHz-440MHz in the usual user-selected step sizes. The transmitter puts out a specified 1.5W with the supplied 7.2V BP-83 nicad fitted, this is increased with higher supply voltages such as the optional 12V BP-85 nicad, and goes up to 5W when you plug



set-top helical, a short flexible plug-in whip for the wideband receiver, a carry strap and belt clip as carrying aids, and a comprehensive 60 page instruction book with an additional small fold-out card giving operating notes. A variety of soft carrying cases (for the different



nicad sizes) and other usual accessories are of course available.

Keypad and Memories

As would be expected, the front panel keypad serves a variety of purposes such as mode select, direct frequency entry, scan initiation and the like. By the use of a small 'function' button above the side-mounted PTT, the keypad facilities are increased to allow other functions such as memory, DTMF and CTCSS, high/low TX power level programming and the like to be carried out without too many keys being needed. To save you having to remember the many keypad and operating modes, the separate handy fold-out 'memory jogger' card can be kept in your pocket — useful if you get stuck (as I often did) when out and about.

For repeater use, the normally required 1750Hz access tone can be generated by pressing the 'H Main' button, near to the PTT, whilst in transmit mode, this tone the continuing until you release the button thus making it suitable for European repeaters (which sometimes need a long tone) as well as UK repeaters.

To save frantic keypad operations in use, the set has a user-programmed

'call' channel on each receiver for quick access, together with the facility of 30 memory channels for the main transceiver plus 60 extra memories for the wideband receiver section. Each of these are capable of storing the usual facilities of frequency, CTCSS tone if fitted, repeater offset and the like. The main tuning knob may be used to switch between memory channels, and many scanning facilities are available.

Scanning and Searching

As well as the usual 'scan for activity' mode, where either or indeed both receivers may be set to search the memory channels, halting on an active channel for the period of the squelch being raised, a number of other scan and search modes are available for those of us who like to be in on the action all the time. The manual details a full scan, programmed scan, memory scan, memory skip scan and selected mode memory scan, together with scan resume modes of 'pause' (waits 2 seconds after the squelch closes before resuming) or 'timer' (waits 5 seconds on an active channel, then resumes regardless of squelch state). 'Priority Scan' where either a preprogrammed memory, or the 'call' channel, or each memory channel in sequence, are periodically checked for activity in addition to the selected VFO frequency.

Clock and Timer

The set also has a built-in 24hr clock with power-on and power-off timer functions. This could be handy if you're out and about with the set as well as possibly also using it to wake you up in the morning. Together with this, an auto power-off function, separate from the timer, may be switched in to save your nicads from going flat if you leave the set switched on overnight by mistake, this can be set to switch the set off after either 30 or 60 minutes of no switch being operated or no signal being received.

DTMF Use and CTCSS Option

DTMF Code squelch operation, for selective calling using a preprogrammed three-digit DTMF sequence, may be used with the IC-4SRE in a similar manner to the facilities offered by other recent 2m and 70cm FM transceivers. In transmit mode, the keypad becomes a normal DTMF encoder if needed for manual digit DTMF transmission, and four DTMF memories each storing up to 15 digits are available for manual use.

With many UK and overseas repeaters now using CTCSS control facilities,

e.g. for repeater access and 'preferred' timeout modes, the IC-4SRE may if required be fitted with an optional CTCSS unit. Here, as well as CTCSS encode for repeater use or whatever, CTCSS decode may also be switched in for 'private channel' monitoring on both the main transceiver and on the wideband receiver section — useful for group callouts and the like. You can even switch in a so-called 'pocket bleep' to alert you if you've been called, with the correct CTCSS tone, in your absence. A USA model, the IC-4SRA which covers 440-450MHz has the CTCSS unit fitted as standard, but no 1750Hz tone access generator.

In Use

In operation, I found the set was extremely similar, in fact almost identical, to the Icom IC-W2E dual band portable which I've recently been using (the sets even look virtually identical). I thus found operating the IC-4SRE fairly straightforward. However in an attempt to simulate 'first time' usage, I passed the transceiver to an Editorial colleague for their 'first impressions'.



Here, the many functions available did initially cause a degree of confusion, especially the DTMF selective call programming which obviously needed careful attention to the instruction book. But once mastered, operation was fairly easy by just using the memory channels on the main transceiver, and the direct-entry keypad followed by the rotary dial on the wideband receiver section. Although a single 'busy' LED is used to show a signal is being received, twin bargraph S-meter displays are used on the LCD panel, each below the relevant receive frequency, indicating which band is being received and at what relative strength.

As with the IC-W2E, I found the set fitted in my hand comfortably, but again I noted the limitation (confirmed by my other 'guinea pig' colleague) of needing two hands to operate the buttons on the set, e.g. for repeater access. I also had difficulty at night in keypad frequency entry, as the set had no backlighting of the keypad buttons — only the main LCD had a backlight fitted, so out came the torch.

I found the performance of the 70cm transceiver to be quite good, the receiver was reasonably sensitive and the tiny speaker gave surprisingly loud and readable audio. Turning this up to a very high level invariably brought in distortion, although in normal portable use this was never a problem. On transmit my modulation could only be described as excellent, indeed I found this was better than my own 70cm portable rig which gave me mixed feelings! The set is, naturally, larger than a single-band handheld due to its second receiver, which consoled me a bit.

Although I found the wideband receiver was also fairly sensitive, especially around 2m and 70cm, it was, literally, wideband, having little rejection from other close-spaced signals in the band. This caused me a few problems in some sections of the spectrum, where in scan mode the wideband receiver's squelch would often open around 50kHz or so away from a moderate strength signal. I found the constant need to then twiddle the tuning knob to bring the signal into readability rather a pain. Connecting a rooftop aerial to the wideband receiver 3.5mm aerial socket often caused it to simply give up, although to be fair I do live in a congested RF area, a few miles away from international airport, international shipping port, and with a fire station aerial tower (with its associated connected transmitters) around a mile away. In the end, I normally left the set just monitoring a given channel, ignoring the occasional squelch raises caused by other nearby transmissions.

RECEIVER;

Sensitivity;			
<i>Input level in uV pd required to give 12dB SINAD;</i>			
Main RX;			
430MHz;	0.18		
435MHz;	0.18		
440MHz;	0.19		
Wideband RX;			
<i>Freq.</i>	<i>AM</i>	<i>FM</i>	<i>WFM</i>
25MHz;	—	2.59	—
50MHz;	—	0.74	—
75MHz;	—	0.56	—
100MHz;	—	0.43	0.77
125MHz;	0.72	—	—
145MHz;	—	0.32	—
170MHz;	—	0.35	—
250MHz;	0.53	0.38	—
435MHz;	—	0.21	—
450MHz;	—	0.21	—
500MHz;	—	0.27	0.44
750MHz;	—	0.34	0.63
935MHz;	—	0.73	—
950MHz;	—	0.87	—

Squelch Sensitivity;	
(Main RX)	
<i>Threshold;</i>	0.10uV pd (3dB SINAD)
<i>Maximum;</i>	0.23uV pd (20dB SINAD)

LABORATORY RESULTS:

All measurements taken at 435MHz using fully charged BP-83 nicad unless otherwise stated.

Adjacent Channel Selectivity;		
<i>Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal;</i>		
	Main RX	Wideband RX
+12.5kHz;	35.5dB	16.0dB
-12.5kHz;	29.0dB	20.0dB
+25kHz;	68.5dB	34.5dB
-25kHz;	68.0dB	33.5dB

Blocking;		
<i>Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;</i>		
	Main RX	Wideband RX
+100kHz;	78.5dB	34.0dB
+1MHz;	79.5dB	75.0dB
+10MHz;	91.0dB	85.0dB

Intermodulation Rejection;		
<i>Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;</i>		
	Main RX	Wideband RX
25/50kHz spacing;	59.5dB	27.5dB
50/100kHz spacing;	60.0dB	28.0dB

When used portable, the supplied receiver aerial whip plugs into the 3.5mm jack socket, I sometimes felt that wasn't quite as secure as I'd like because I often inadvertently pulled the whip out when taking the set out of my inside pocket. However this I quickly got used to, and to be fair the whip does only need to be connected when the wideband receiver is actually being used.

Circuitry

For those technically-minded, the main transceiver uses the usual arrangement of a double conversion superheterodyne receiver under synthesiser control, having a first IF of 35.8MHz with monolithic dual crystal filtering and a second IF of 455kHz with a multi-pole ceramic filter fitted for adjacent channel selectivity. The transmitter uses a modulated VCO (Voltage Controlled Oscillator), which is amplified to the RF output power level of 1.5W-5W using a 'block' module as the final PA.

Due to the relatively large frequency range, the wideband receiver uses a triple conversion superheterodyne, with a high first IF of 266.7MHz to achieve better image rejection. Wideband ceramic filtering is used at the second IF of 10.7MHz and narrower ceramic filtering at the third IF of 455kHz to achieve close-in selectivity. The synthesiser apparently uses the second harmonic of the independent VCO for receive frequencies above 268.7MHz (corresponding to a VCO frequency of 534.5MHz), thus keeping the current drain down.

Laboratory Tests

In general the performance of the transceiver section was quite reasonable, an adequately sensitive receiver coupled with a good level of transmitter power across the frequency range, this being well controlled in the various low power modes. The transmit deviation was very accurately set at just below the 5kHz absolute maximum mark, with the RF carrier frequency accuracy, measured after the transmitter had been in use for one minute (hence the set had warmed up somewhat), being slightly off but within a reasonable tolerance.

The wideband receiver performance, as found on air, naturally wasn't up to the associated 70cm receiver performance in terms of strong signal handling. In fact it was significantly worse than many handheld scanners I have measured with the exception of the IC-R1 with its similar 'wide open' second IF filtering, however its rejection of well-spaced signals was quite reasonable thus giving acceptable performance in a 'quiet' band.

Maximum Audio Output;

Measured at 1kHz on the onset of clipping, single receiver;

3 ohm load;	235mW RMS
8 ohm load;	195mW RMS
15ohm load;	150mW RMS

Image Rejection;

Increase in level of signal at IF image frequency over level of on-channel signal to give identical 12dB SINAD signals;

Main RX (1st IF Image);	57.5dB
Wideband RX (1st IF Image);	36.0dB
(2nd IF Image);	46.5dB

Current Consumption;

Measured with battery economiser disabled

	Main RX Only	Main and Wideband RX
<i>Standby, economiser in use (1:4 ratio);</i>	29.5mA	60.5mA
<i>Standby, sq. closed;</i>	73.5mA	152.5mA
<i>Receive, Mid Volume;</i>	136mA	221mA
<i>Receive, Max Volume;</i>	170mA	242mA

TRANSMITTER

TX Power and Current Consumption;

Freq.	Power	7.2V Supply	13.5V Supply
430MHz	High	2.08W/1.38A	5.08W/1.67A
	Low 3	2.08W/1.38A	3.16W/1.36A
	Low 2	1.36W/975mA	1.39W/980mA
	Low 1	410mW/620mA	410mW/620mA
435MHz	High	2.04W/1.35A	5.15W/1.67A
	Low 3	2.04W/1.35A	3.21W/1.34A
	Low 2	1.38W/945mA	1.42W/960mA
	Low 1	410mW/605mA	0.41mW/605mA
440MHz	High	2.02W/1.28A	5.20W/1.65A
	Low 3	2.02W/1.28A	3.29W/1.32A
	Low 2	1.42W/950mA	1.45W/960mA
	Low 1	420mW/590mA	420mW/590mA

Conclusions

With its unique facility of having a wideband receiver 'built in', under virtually independent control from the transceiver, the IC-4SRE (and of course its 2m cousin the IC-2SRE) could fill a 'niche' in the market for users who'd like such a facility. I know full well as I've carried both my 70cm handheld and my portable scanner receiver around with me several times in the past! The built-in wideband receiver I must say I found to be rather limited in its strong-signal handling performance when used in busy areas, even on its short plug-in whip, but for users in 'quieter' RF locations this shouldn't be too much of a limitation. I'm now seriously wondering whether the similarly-featured Icom dual-band handheld, or the single-band plus receiver handheld, will be the better seller as they each have an attractive

user appeal. I'd personally be hard pushed to choose between the two!

My thanks go to Icom (UK) for the loan of the review set.

Harmonics;

<i>2nd Harmonic;</i>	-68dBc
<i>3rd Harmonic;</i>	-88dBc
<i>4th Harmonic;</i>	-79dBc

Peak Deviation;

4.97kHz

Toneburst Deviation;

3.26kHz

Frequency Accuracy;

-680Hz

Project – 80m Fun Rig

Mel Evans GM6JAG constructs a handy little 80m rig



One of the main worries about starting to build a project from a magazine article is whether or not the finished unit will work. What I'm going to do is to show you how to make an 80m transmitter that's quick and easy to build, is fun, and certainly not going to break your bank account. You don't need to be a drawing or chemistry expert to make the PCB, and you can join the club of over 200 people who have so far managed to make this little fun rig work first time, every time. Age or lack of experience are no barriers, the youngest constructor in my group was aged 11, and the oldest pair over 70, and at least 25 80m fun rig constructors admitted to never having built anything at all before.

Board Preparation

First, take a look at Fig.1, this gives you an idea of how to make the PCB, using a commonly used technique in the UK and abroad. Take a piece of double sided PCB material, and mark it out so that it is 40mm by 30mm, then cut it to size using a hacksaw. Next mark and cut a piece 20mm by 30mm, this time after cutting, mark off the top surface into six

10mm squares. Using the hacksaw held flat and parallel to the surface, gently cut along the lines to create grooves in the top copper surface, so that you end up with six separate small islands of copper. Finally, mark in with pencil from the two short sides of the 40mm by 30mm piece, and use 'super glue' to stick the smaller

piece of PCB material within these lines to produce a finished item as shown in the illustration. You will also need to make another PCB assembly for the filter unit, as shown in Fig.4, don't be tempted to dispense with this as this is essential to suppress the high level of harmonics generated by the transmitter module.

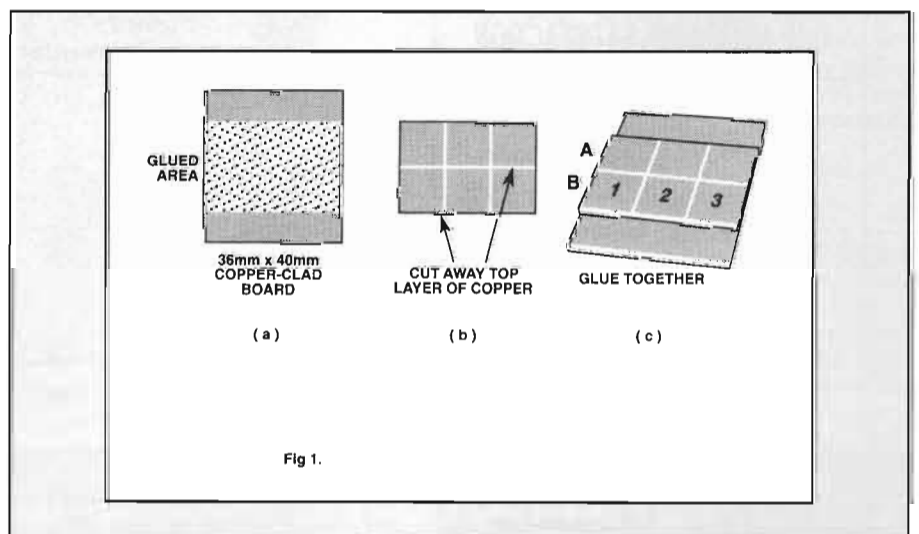


Fig 1.

Transmitter Module

Fig.2 shows the circuit we are going to use for the transmitter module. There are only seven components so the total cost, even if all the parts have to be bought, will only be about £3. Despite the simplicity, the rig will generate around 0.6W to 0.75W on 80m, the power depending upon the individual transistor used. Compare the circuit diagram with the physical layout in Fig.3, and notice the very similar placing of components. This method of construction lends itself to very quick and easy assembly, in as much as there are no mirror images used to confuse the beginner. Despite this it still following good RF practice by using a substantial ground plane area, with short connections to ground and between most component parts. Note also that some components have a lead spacing of 10mm and we have very conveniently made our squares 10mm each!

Construction

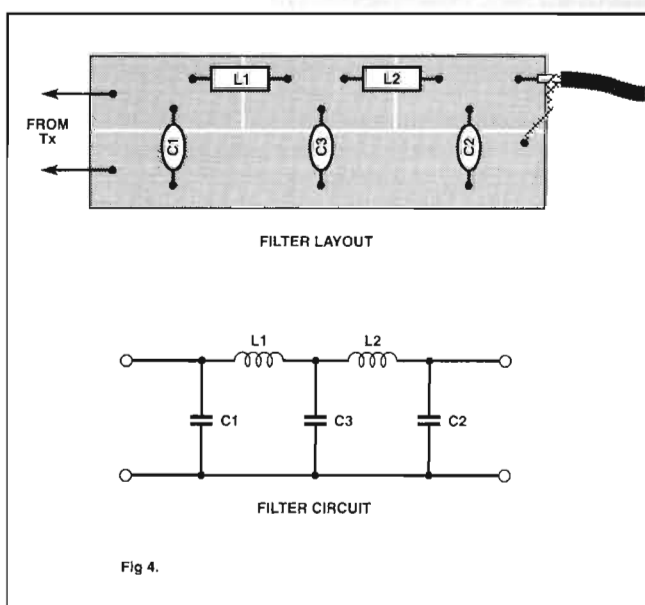
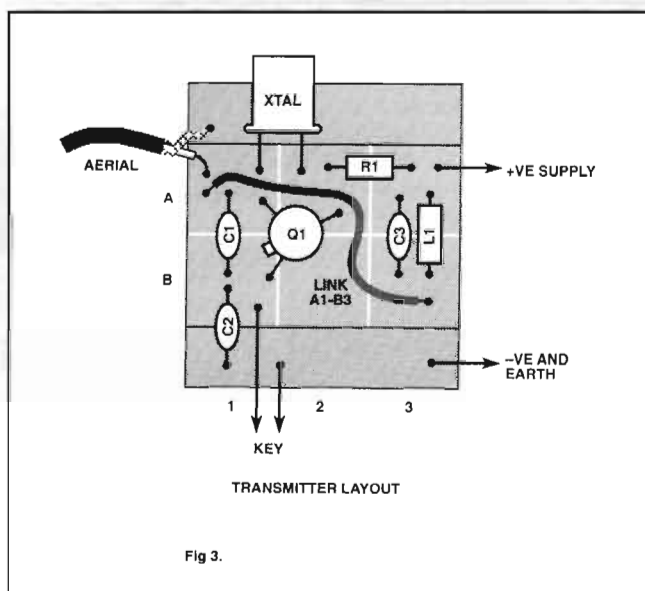
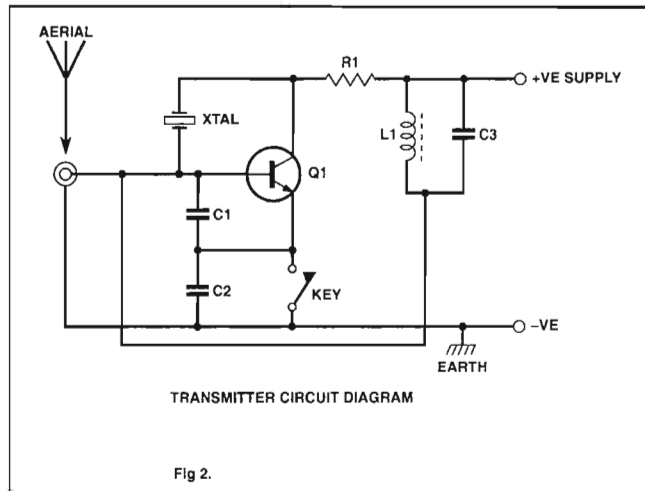
The first stage in the actual construction is to fit the single wire link that runs between squares A1 and B3 as in Fig.1c. You should try to make this as neat as you can, at the same time tucking it in tightly where the two pieces of PCB are glued together so the other parts can fit over it easily. Next fit the resistor and C3 followed by L1.

L1 is wound on a T50-2 ferrite toroid using SWG 30 enamelled wire. Remember, a wire passing through the centre of a toroid counts as one turn, this makes it easy to count the necessary 25 turns. Space them out evenly around the outside of the doughnut shape, and make sure the ends are thoroughly clean of enamel before soldering. A good tip for cleaning the enamel off, and also the legs of any other parts, is to use a small piece of folded emery cloth or even steel wool. Grip the lead to be cleaned within the emery cloth and draw the lead through, turning slightly as you do so. Two or three strokes of this should remove the stubbornest of wax or other preservative coating.

Now fit the transistor following the layout as shown, then C1, C2, and finally the crystal. Remember the layout shows the transistor looking down from the top. Out of the two hundred and more of these built, the only two which didn't work first time were built by experienced constructors who simply bashed on without reading the instructions!

Testing

The testing is equally as easy as the construction of the transmitter module, but before you test this, check that you



have mounted and soldered all components on the board correctly. Now connect around a metre of wire to square A1 to act as an aerial, and positive and negative leads to A3 and ground as shown. A key can be connected between B1 and ground, or for test purposes just a couple of wires will suffice. If you have a multimeter, then set it to a range of around 200-300mA and place this in series with the positive supply lead. Connect the unit up to a 12V supply and press the key. You should have a current reading of about 130-150mA, if not, switch off and re-check your board, especially the orientation of the transistor.

Next, tune your shack CW/SSB receiver to the frequency of the crystal. If you are using the recommended cheap colour burst crystal, this being 3.579MHz, you should hear a nice CW tone going on and off in time with your keying. Unfortunately, if you listen on 7MHz and 14MHz as well you will probably still hear the signal going on and off in time, so to use this unit on the air it is essential the filter as shown in Fig.4 is added! It is also advisable to use a screened metal case for the final unit to reduce the level of direct harmonic radiation.

Filter Assembly

This can be built onto a PCB made in the same way as for the main transmit unit, but using revised sizes to accommodate the toroid coils more easily. This filter should be cased up in the same case as the transmit unit. To tidy up the project, add a standard quarter inch jack socket to take the key, and a suitable RF aerial socket to the power output.

Conclusion

This little fun rig started life as a 'one night' club construction project, since then it has been built many times over by members of various clubs, even by those with no prior constructional experience whatsoever. Why not try it at your club? At the *Lothians Radio Society* here in Edinburgh, we have found the best way is to pair off the members so that an experienced constructor is building his own unit, at the same time helping a beginner by instruction and checking of their partner's soldering and so on.

A project such as this can be ideal for introducing home construction to newcomers and of course potential Novice licensees. It offers a good introduction to soldering, PCB making albeit without chemicals, and general RF practice, all at a basic level and the project circuitry is easily copied and understood.

Try it, you'll be surprised!



Component List

Transmitter Module;

R1	10k (0.5W)
C1	680pF
C2, C3	1000pF
L1	T50-2 ferrite core with 25 turns SWG30 enamelled wire
Q1	BFY 51

Filter Module;

C1, C2	680pF
C3	1000pF
L1, L2	T50-2 ferrite wound with 20 turns SWG24 enamelled wire

Other Items;

PCB material for PCBs
Case and RF connectors to suit
12V connectors to suit
Screws and pillars to mount PCBs.

Crystal;

Somewhere in the 80m band, a 3.57945MHz TV colour burst crystal will function satisfactorily in this circuit.

See HRT classified (back pages) and display ads for suppliers of components, PCBs, and complete kits.

SCANNERS

INTERNATIONAL

Feedback

Our recent expose of a so-called *pocket scanning receiver* advertised in the UK national press has certainly solicited some response! Here's a couple of extracts from typical letters we've received; Dear Sir,

I was interested in your article regarding the so-called Scanning Receiver worth £99 going for £19.95. I also had one of these and was charged £28.49. I sent a letter to the firm stating that the receiver I received was faulty, could I have my money back, also to complain about the overcharging by them. I received a reply about the overcharging (this saying they would do nothing about it - Ed) but no mention of a refund. I still haven't had a reply. I got in touch with the Trading Standards Office and they advised me to send a recorded letter threatening the firm involved with the small claims court. They have also ignored the recorded letter. I have also sent a letter to the newspaper advertising the product, but with no reply from

them either. I hope this is of use to others who have also been conned by this firm.
C. W. G., Gwynedd.

Dear Sir,

I noticed with interest your expose of the latest scanner con (Scanner Scandals, August 91 Scanners International). I hope you will not only involve the Trading Standards Office, but also the Office of Fair Trading. This firm wants closing down, the sooner the better. There seems to be a number of firms now engaged in these mail-order cons. They often get around the refund guarantee by simply refusing to accept any return items, including recorded delivery. The overcharge is normally about double the real value, plus false representation of goods etc. There really needs to be new legislation to deal with these disreputable firms - I hope you take them to the cleaners!

J. G., Cheltenham.

Scanners International repeatedly tried to contact the firm concerned with selling this receiver, but without success.

Last week, we received an unsolicited communication from the Tradings Standards Office covering this firm's location, with a request for help in prosecuting the company. We were, of course, pleased to oblige!

If you're looking around for a scanner receiver then simply take a look in our periodically published *Buyers Guide* in Scanners International. If you have any further questions on the suitability of a scanner to your needs, then any reputable dealer should be able to advise you. We'll carry on by continually trying to ensure we provide you, the reader, with the latest information on anything scanner-wise!

Police Listener Gets Five Years

Our thanks to the many readers who've written to us, and sent press cuttings, about the gentleman in Tyrone who was reportedly jailed for five years for collecting information on police frequencies and call signs from his scanner. From this it would appear that his written recording of the information gained, rather than simply his use of a scanner receiver, was the main issue for his jail sentence. But be warned, if you listen into *naughty* frequencies such as police transmissions, don't expect to get away with it if you're found out!

SCANNERS

INTERNATIONAL

Hard Line by Radiocommunications Agency?

A recent information sheet from the Radiocommunications Agency is entitled *Receive Only - Scanners Etc Information Sheet*. They state in this "There are many authorised users of radio, such as the police, the other emergency services, the armed forces, aeronautical and maritime interests and businesses. These need radio to enable them to carry out their activities and are protected By Law from unauthorised people listening in to their transmissions. Eaves-

dropping, or listening to messages that are not intended for you is an offence." It continues by saying that no, you cannot get authority from the Secretary of State to listen into maritime and aeronautical services, and that you can only listen into these if you get permission to do so from the person sending them.

Now airband receivers for example are openly advertised in high street shops, mail order catalogues, market stalls, as well as up-market models in specialist shops. So who's kidding who? There may certainly be a case for disallowing the reception of some transmissions, such as cordless and cellular telephone calls for example (even though people do, and will continue to, listen

into these). But we at Scanners International ask what's the harm in listening into general marine and airband transmissions?

You can get your copy of the information sheet, requesting publication RA169 (July 1991), from the Information Library, Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London. SE1 8UA. They're also the people to write to if you have any questions not answered by the sheet. We at Scanners International will be pleased to present a coordinated approach to them, either of opposition to this law or indeed your views on its correctness or enforcement - but we need your written comments to do this.

Starting Out

HF Broadcast Band Listening

Ted Walker, G0KAAQ, gives us an introduction to this fascinating side of the hobby.

Listening into the HF broadcast stations, especially with the continuing worldwide political changes, can give an exciting change from your local radio station! Many countries have international broadcast stations presenting their own country's view of the news. Many scanners, even handheld types, now cover the Short Wave bands with AM reception facilities, so why not take advantage and tune in!

Propaganda

As far as Short Wave broadcasts go, many of these can be thought of as propaganda. Some are sympathetic and relatively fair, others have an obvious axe to grind, Radio Havana, Cuba, springs to mind in the latter context as an unreformed *Big Brother!* One English broadcast from this station is 19.00-21.00 on 11.800MHz. There are plenty of other broadcasts that can be heard; some in different languages such as Spanish, French, Creole or even Esperanto, and there are English language broadcasts beamed to other parts of the world such as North America, these can often be heard in Europe with suitable propagation. It is worth noting that stations such as this, as well as many others who also broadcast to an international audience, solicit correspondence from their listeners to ensure that the message is getting out. Last year I had a charming picture of the bearded dictator.

Fraternal Greetings, Comrade

English transmissions from Radio Moscow are so plentiful as to render it pointless recording anything like a comprehensive schedule, but some frequencies worth trying include 7.315MHz, 11.630MHz, 11.890MHz and 15.185MHz. A likely way of finding it however is to just tune between the boundaries of one or two broadcasting bands, see the accompanying table. Simi-

lar comments may be made about the BBC World Service, which I patriotically recommend as the best news service available. Suggested frequencies for this station, besides the 648kHz medium wave transmissions which may be heard in some areas, are 6.195MHz, 7.325MHz, 9.410MHz, 9.760MHz and 12.095MHz.

Alternative Points of View

Other *Western* stations are also worth listening into. *Voice of America's* broadcasts are less extensive to Europe. It can reportedly be heard 04.00-05.00 on 5.995MHz, 6.140MHz, 7.170MHz, and 9.715MHz, and between 22.00 and 23.00 on 9.582MHz, 11.805MHz, 15.345MHz, 15.370MHz and 17.610MHz. Radio Beijing, China, represents a somewhat unusual point of view. It can be found on 9.440MHz, 11.500MHz, and 15.110MHz between 20.00-22.00, however it does not represent a total monopoly of Chinese propaganda, with BBC sponsored *Voice of Free China* competing and challenging new ventures such as *Radio Democracy* coming on stream. Clandestine broadcasts tend to appear and disappear, particularly during abnormal times, as demonstrated by *Mother of Battles Radio*. For this reason, and because schedules tend to be changed frequently, it is useful to tune around the bands quite often, especially when political events are unfolding (i.e. the recent USSR coup). It is also interesting to experience the evangelism of the religious broadcasters. One such station, Christian Science World Service, beams to Europe at 07.00-08.00 on 9.455MHz, 11.705MHz, and 15.225MHz.

Enthusiast Information

Some stations make a conscious effort to look after short wave listener enthusiasts. Radio Netherlands, for example, broadcasts a most informative feature on short wave during its Thursday English transmissions, for example on 21.685MHz between 18.30 and 19.25 (fea-

ture begins following the news etc.). The Austrian *Shortwave Panorama* is also back on the air, and can be heard on Sundays at 11.30 and 14.30 on 6.155MHz and 13.730MHz. Most stations will happily provide frequency information or a QSL card, they give their address out, but always keep a pen and paper handy to not down information you hear on the air. There are three primary sources of further information if you're interested in this aspect of the scanning hobby. Firstly the expensive but invaluable *World Radio and TV Handbook*, next *on air* sources such as the various short wave programmes and the schedules given out on air by these, and the international periodicals which keep try to keep abreast of changes (see the comprehensive Short Wave broadcast lists given periodically in *Scanners International* - e.g. April 91 and January 91 - Ed). In the meantime, try tapping in a few of the above frequencies in your scanner - you could become *hooked!*

International Short Wave Frequency Bands

120m	2.300-2.495MHz	(Tropical Band)
90m	3.200-3.400MHz	(Tropical Band)
75m	3.900-3.950MHz	(Used in Asia)
75m	3.950-4.000MHz	(Used in Europe, Africa and Asia)
60m	4.750-5.060MHz	(Tropical Band)
49m	5.950-6.200MHz	Used worldwide
41m	7.100-7.300MHz	Not used in western hemisphere
31m	9.500-9.775MHz	Used worldwide
31m	9.775-9.900MHz	Used as unofficial band extension
25m	11.650-11.700MHz	Used as unofficial band extension
25m	11.700-11.975MHz	Used worldwide
25m	11.975-12.050MHz	Used as unofficial band extension
22m	13.600-13.800MHz	Used as unofficial band extension
19m	15.100-15.450MHz	Used worldwide
19m	15.450-15.600MHz	Used as unofficial band extension
16m	17.550-17.700MHz	Used as unofficial band extension
16m	17.700-17.900MHz	Used worldwide
13m	21.450-21.750MHz	Used worldwide
13m	21.750-21.850MHz	Used as unofficial band extension
11m	25.600-26.100MHz	Used worldwide

Notes

Tropical bands, where marked, are used for broadcasting in designated tropical areas.

An increasing number of broadcasting stations make use of *unofficial* bands as detailed, as extension or additions to internationally agreed short wave broadcasting bands, some stations also use frequencies other than those shown.

QRP CORNER

*Dick Pascoe G0BPS
with some QRP gatherings*

Over the year, there are many QRP gatherings that vary very much according to the season and the location. Perhaps one of the best in the south is the QRP gathering in Somerset. This is the annual Yeovil QRP convention hosted by the Yeovil Club, and held in May of each year. It isn't just a gathering for enthusiasts, but a convention with good speakers, it's also good for those interested in a bargain or two. Various traders turn up to show their wares, mostly those interested in the QRP market, but others attend also.

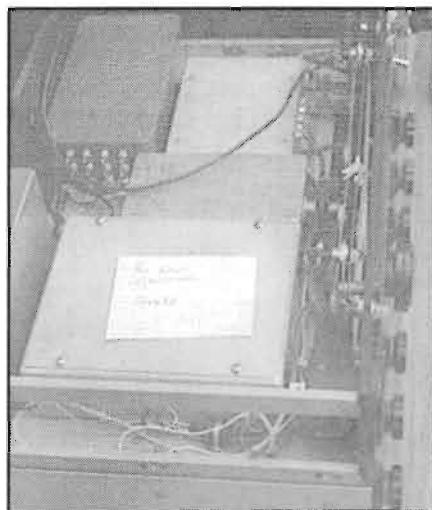
Later in the year, usually early in August, Chris G4BUE and his wife Pam host the Southern QRP gathering at their home near Brighton. This is not a place to buy and sell, but a place to exchange ideas, show off your latest radio project, and to generally enjoy the (inevitably) good weather and good food supplied by Pam and friends. The overseas visitors were down a bit this year as the normal invasion by the Dutch did not occur, however Robert PA3BHK and Rene ON4KAR appeared from the continent.

Robert amazed us all by appearing with his arms full of a strange radio! It turned out to be one of the new Argonaut II transceivers from Ten Tec, rumoured to be priced at about £1300 in the UK (no prices available at time of writing). Having tried one of these radios out at the Dayton Hamvention QRP hospitality suite, I was very keen to see how it performed.

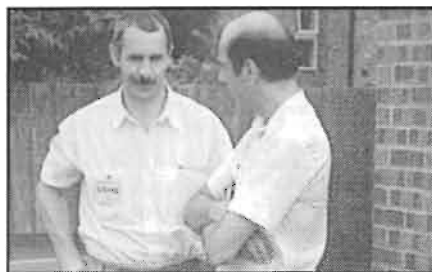
It became obvious that the unfortunate radio we had tried at Dayton was faulty, as Robert's was generally heralded to be 'very nice'. Sad to almost hear the almost silent 'but' after the comment, as a price in excess of £1000 will put off a lot of prospective buyers.

Surprisingly there was little homebrew gear on display at Chris's this year. A 'Sudden' receiver proudly displayed by Gerald G3MCK did not take the proud glint out of the eye of Vince G4VRR who showed off his almost complete all band, all mode transceiver based on G3ROO's 'Kitten' transceiver. The carefully mounted Edison dial gave a wonderful feel to this radio. This set was beautifully built, partly from kits and partly from commercial boards, but the whole assembly was put together with significant loving care and thought.

QRP beside the seaside is another time to sit and 'chew the cud' whilst enjoying the company of other QRPers. This event is held at Lowestoft in a small church hall kindly lent by the vicar (also licensed!). I understand the date of this



Vince G4VRR's homebrew TX.



Chris G4BUE (host), tells Frank G3JKS about the latest DX worked.

event is to be changed, watch this column for details.

As you sit and read this I hope you will have not missed the biggest, and some may consider it the best QRP gathering of the year. St Aiden's church is the workplace of one of the most well known amateurs in the QRP field. What many amateurs may not know is that behind this very successful vicar is the 'little woman'. I use the term very carefully, as Jo-Anna is perhaps small in stature but very big in heart. She has also recently gained her 'A' licence and like many has asked that other amateurs give them a chance when operating on CW. She says "Please QRS, otherwise I suffer from the erratic CW syndrome", I sympathise with Jo as I still use erratic CW!

Watch Your Speed

Jo's comments remind me also of an observation from Roy Clayton, the RSGB's senior Morse examiner who remarked that many successful Morse examinees are happy to pass the

12WPM test but find it very difficult to get up to the more usual 20WPM (or more) found on the bands. Perhaps the Morse Tape suppliers could look at this hole in the market.

It all comes down to operating procedures, how many times have you heard someone calling CQ at 12-14WPM and answered them at 20+. Courtesy *demands* that you answer a CQ call at the speed of the caller, *not* at your favourite operating speed! Not doing this is much the same as answering in a foreign language, very little will be understood by the recipient. This will become even more important as our Novices come on to the HF bands, remember many of them will only be able to read CW at 5, yes *five* words per minute. Sending 12s at them will just be a waste of time.

Winter Sports

The time for the annual winter sports is fast approaching, so dust off the gear and get it fired up ready for Boxing Day.

The G-QRP club Winter Sports run from Boxing day through to New Year's Day. It is *not* a contest, just a gathering of like-minded individuals for a specific period. However the best log gets a prize, send your entry to Gus, G8PG. Sunday 29th December has been designated Anglo-French day, so look out for all those French members of the club.

Finally, 72 to all

After a suggestion from our Russian cousins it was agreed by most of the international QRP clubs to accept the abbreviation '72' to mean 'wishing you good QRP' as this is one down from the more normal '73' it fits beautifully. I expect to hear you all now signing 72 es 73 whilst mentally thanking our anonymous Russian friend.

That's it for this month, news and views to me either via HRT editorial, on packet at GB3SEK or at 3 Limes Road, Folkestone. 72 es 73.

Hilary G4JKS being comforted by G-QRP treasurer Peter G3PDL after being told her subs were due, Gerald G3MCK looks on.



The Early Days of 5 and 6 metres

On January 28th 1983, after a long and frustrating campaign by the late Roy Stevens G2BVN and other dedicated members of the RSGB, the DTI granted temporary conditional experimental permits to 40 (later increased to 100) UK operators to use frequencies between 50-54MHz on a non-interference basis. With the exception of a few permits issued during the IGY (1957), there had been no legal operation in the UK since the 58.5-60MHz range was withdrawn in 1948 for Band I TV. The previous history of 5/6m operation was only remembered by the few who had been active or interested during sunspot cycles 18-21. We are therefore indebted to the various radio publications of that period, such as the RSGB T&R Bulletin, and their dedicated contributors for recording the activities, equipment used, and what little was known then of propagation conditions in that part of the spectrum.

In addition to my own contributions as G5KW in the thirties, and MD5KW during cycle 18 (1946) from the Suez Canal zone, I have had valued support from many national and international operators who took part in the early days. Ron Ham BRS15744, who is still very active, gave a comprehensive record of the early days in a feature entitled 'The Five Metre Story', but as he said then "there are many parts of this story still to be told, apologies to the many 5m enthusiasts whose names were not used in the article". I also apologise to those who have not been mentioned or their activities recorded. Hopefully one day a book will be published with space to include all the work of the early pioneers.

First VHF allocation to the amateur service, by Brian Bower G3COJ

Probably the first VHF allocation to the amateur service was 60-75MHz given in the USA in 1924. Following the First World War, from the administration conference in Washington in 1927, came a worldwide allocation of 50-60MHz. In the USA this replaced 60-75MHz, and some interesting work was done on this band in the 1930s.

G5BY was heard in the USA on 27 Dec 1936, as was GM6RG on 18 Feb 1938. At the Cairo WARC in 1939, the band was reduced to 58.5-60MHz to make way for Band I TV. However before this change could be implemented, World War Two

Ken Ellis G5KW/MD5KW describes pioneering work in the early days of 5m and 6m

started and amateur operation ceased in most of Europe. After the war, amateur operation in the UK was resumed in the band 58.5-60MHz.

In 1947 the next WARC took place in Atlantic City, New Jersey. This was disastrous for European amateurs, with no allocation between 29.7MHz and 144MHz. For the rest of the world, the results were much happier with 50-54MHz being allocated in all the remaining continents, notably all of South America, North America, Southern Africa, Australia, New Zealand, Pacific territories and Japan. The 58.5-60MHz band was withdrawn in UK in 1949, American 50MHz stations began to be heard in the UK during autumn 1946 and crossband contacts were however made with UK stations operating on 28MHz.

Thanks to the Post Office, who were responsible for the amateur service at that time, special permits were issued to a few stations and the first transatlantic VHF contacts took place in late 1946. These were by reflection from the F layer, the sunspot maximum being in 1947.

The Trail Blazers, G2FA, Folkestone, Kent

Folkestone radio amateurs established the first 56MHz link between England and the continent in March 1936. This was arranged through correspondence between the group's Chairman G2IC and F8WY. On March 29 the operators at G2FA heard F8NW in QSO with F8AA. They gave him a call and to their great joy he came back to them, giving them QSA5, R7. Later they made contact with F8WY, F8ZF and F8AA.

The apparatus used at G2FA was a long-lines oscillator with a pair of Tung-sram 15/400 valves in push-pull and an input of 8W at 250V. Due to lack of support the club ceased its activities and the G2FA call was not renewed. G5KW, who was a member of the club in the thirties and had spent many weekends operating portable at the old G2FA site, came to Folkestone in 1988 to retire and get the old club re-formed. After a long and frustrating confrontation with the DTI, they

agreed to re-issue the call G2FA to G5KW on behalf of Folkestone radio amateurs. Ken Ellis G5KW was elected 'Life President' of the club. Tim Vickery G2VI, the only other surviving member from the early thirties as far as is known, was elected 'Life Honorary Vice President'. The club meets regularly on the last Thursday each month at the RAOB Social Centre, St Michael's Street, Folkestone.

5m DX during 1939 — G6XM, Farnborough, Hants.

Bill James G6XM needs no introduction to VHF/UHF operators, having been active on all bands since the early thirties. He is still operating mainly on UHF and microwave using home brew equipment, but can heard most mornings on the 6m net on 3.718MHz around 08.30 local time. He has kindly loaned me the historic photos and records of the early field days in which he took an active part. Several of the VHF pioneers will be recognised, regrettably most are now 'silent keys'. His log includes a list of 41 stations heard and worked on 56MHz between June 14 and July 12 1939. Included in this list are three Italian stations I1FA, I1SS, and I1BE, also one French station, F8AA in Boulogne. Of the remainder G2BI in Colne Wilts, and G6CW in Notts, share honours as DX signals.

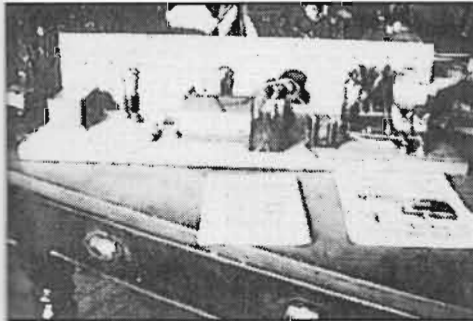
G6XM was active during the 56MHz field day in 1939 and made contact with eleven different stations, five of which

5m TX and modulator, left to right G2YD, G2MR, G2nH and G6XM



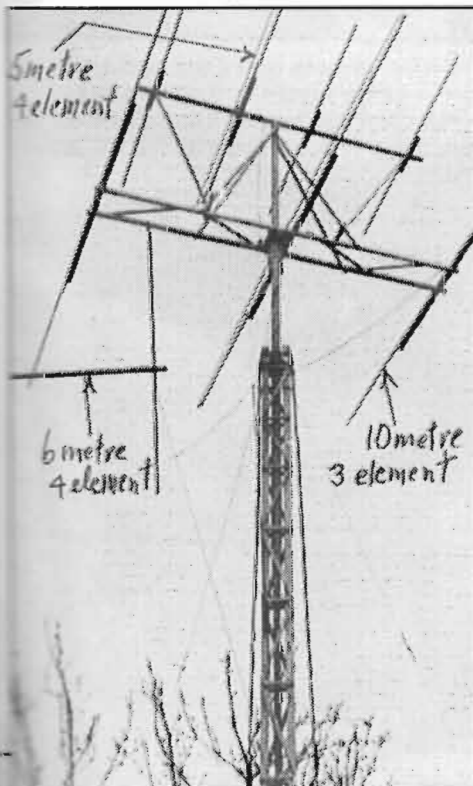


5m TX and modulator, left to right G5BY, G2YD, G6XM, G2NH and G2MR



2BRP 0-V-2 'straight' RX 1930

Mast aerial supports all wood 1947



were portable. An interesting point is that all signals were received on a two valve detector-audio straight. Using a close-spaced rotary beam consisting of a director, radiator and reflector, he operated a portable station from near Elstree during the 56MHz field day, and with 10W input contacted G5TX in the Isle of Wight (83 miles). The station was also heard by G6CW in Notts at 100 miles.

In addition to G6XM's reports, June/July of 1939 produced other DX. G2MC, in the August 1939 issue of Wireless World, stated; "During the early part of June, when the five metre band was 'open' for DX while harmonics of commercial stations IBE, IRJ and IRX were



G2NH at the mike, G2YD resting!

received at great strength, no amateur station could be heard on the five metre amateur band. Despite this, G5MP later received a card from an Italian amateur reporting his signals at strength S9. Two other stations G6DH and G5MQ were also heard on the same occasion by the same Italian amateur. These signals were audible for only short periods and the early afternoon seems to be the best time. G5MP reports reception at 3pm GMT, whilst it will be recalled that it was at about the same time that G6YL in Northumberland reported Italian stations on June 25th last year. Italian stations have been heard and contacted as late as 8-9pm GMT. G6YL is only 38 miles from the Scottish border and informs us that the distance to I1IRA is about 1060 miles. Another long-distance station heard in this country on 5m recently is CS3VA in Lisbon, reception being reported via G6YL by both G5AX and

G5CM at 1170 and 960 miles respectively. No time is stated but the date was July 19th. CS3VA was again heard on July 24th calling G6YL audible until 6pm, G6DH reports hearing this station at exceptional strength".

Five Metres in the air from 'The Bright Sparks of Wireless' by George Jessop G6JP

At the beginning of the thirties, there were a number of stations active on the 5m band, and it was becoming clear that propagation characteristics in this part of the spectrum were somewhat different from those of the short wave bands, being quasi-optical under normal conditions. It occurred to George Jessop G6JP, and Douglas Walters G5CV, that there might be a case for demonstrating the value of this wavelength for airborne operation as an alternative to the longer wavelengths currently being used by the services. It was fortunate that G6JP had access to a factory roof 80ft above the ground for the aerial, although this would involve a feeder length of 175ft. An open wire arrangement of 26swg wire with quarter inch wooden dowel spreaders which had been previously boiled in paraffin wax. We did not know how much power was radiated, but since the transmitter was operated from a 120V battery, it could only have been in the order of milliwatts. Indeed, in the course of initial tests between Hammersmith and Bedford Park in Chiswick, about a mile and a half away, satisfactory contact was maintained with a HT of only 9V from a grid bias battery! At that time G5CV was Radio Correspondent of the Daily Herald, he managed to persuade them to sponsor the initial experiment which was for G5CV to fly from Heston Aerodrome in an easterly direction over Essex and the north sea. Results of the first test



G6XM 1932 10V 20m TX/RX

were encouraging, but two way contact could not take place because G6JP's receiver had been taken in the aircraft as a spare in case of failure. Sunday May 21st the next experiment involved two de Havilland Dragon Moth aircraft, the hire costs were shared by the Daily Herald and Popular Wireless Magazine, G6JP was in the aircraft hired by the latter. The airborne aerials consisted of simple dipoles made from standard lighting flex. We thank the RSGB for permission to include a report, from 'The Bright Sparks of Wireless' by George Jessop G6JP, an account of the historic tests during May — June 1933.

"G5CV/G6JP airborne on 5m May — June 1933. On Sunday May 21st 1933 Douglas Walters took off in a Puss Moth aircraft with two completely shielded 3 valve receivers on board, one was his own and the other belonged to George Jessop G6JP. Immediately the plane left the ground, Doug was getting a tremendous signal from G6JP and very soon, altitude now 3000ft, a colossal carrier was heard from G6QB operating from the north tower of Crystal Palace. As the plane flew over London, about a dozen signals were heard on 56MHz including G5MG, G6CJ, G6UH and G6VA. When flying 60 miles north-east of London Doug and his colleagues in the plane heard G6QB at terrific strength and later, at 8000ft, they heard both sides of a QSO between G6CJ and G6QB. Owing to shortage of fuel the plane turned back towards London, when at 10,000ft and 130 miles out they were still getting a strong signal from G6QB at Crystal Palace".

Following the great success of the Crystal Palace tests it was decided to attempt further experiments with aircraft. On June 18th 1933, two De Havilland Dragon Moth aeroplanes were fitted with transmitters and receivers for 56MHz. One aircraft was again chartered by the Daily Herald and the other by Popular Wireless. Douglas Walter's gear was installed in the Herald's plane and George Jessop fitted his sets into the other plane. The Dragon Moth was chosen because of its large cabin, which normally held six passengers. Several seats were removed to make room for the radio equipment and the associated power supply. Ordinary 2V valves were used as oscillators (Osram P2s) and modulators (Osram PT2s in parallel). The power supply consisted of 200V from Helleson super capacity batteries, specially supplied for the occasion. The aerials were half-wave and slung inside the cabin, a power of about 5W was used. The receivers were conventional 3 valve super-regens as used before.

When both planes were airborne, two-way radio communication was established between them. Owing to

thick mist and heavy rain, the two planes lost sight of each other, but met again over Harrow. At this time Doug could hear George Jessop working duplex phone with G2JV of Harrow, and shortly after Doug did the same. Later they worked G6YK and G6NF with absolute ease, and when both planes landed at Romford Aerodrome, they talked about the running commentary given by G5CV as he was landing.

After spending an afternoon on Dunstable Downs watching the London Gliding Club's flying activities, Doug Walters decided that radio could really assist gliding. Pilots attempting long distance flights could obtain the latest information from ground stations, instructors could correct faults and give advice to their pupils. Once again here was an opportunity to prove again the efficiency of 56MHz for reliable local communication.

One fine Sunday in 1934, 'the old firm' of Walters and Jessop arrived on Dunstable Downs with a car load of 56MHz apparatus, including a midget 5m receiver specially made by George. It had three valves housed in an aluminium case and measured 6x5x2.5 inches. A 60V HT battery and a small unspillable accumulator were contained in a small suitcase which was placed in a recess behind the seat of the glider. The aerial was a 3ft length of wire inside the suitcase! While the glider was being towed up the hill, Doug tested out his transmitter, which was totally enclosed in an aluminium cabinet and mounted immediately below the feeder of their wire dipole, which was suspended between two six foot rods supported at each end by the car. When the glider was airborne Doug told the pilot that he was

the first person to 'listen in' while gliding, and then asked him to 'bank to the left', which he did, as if to salute the expertise of G5CV and G6JP!

To be continued; Ken will conclude his feature in a forthcoming issue of HRT.



Douglas Walters G5CV operating the 5m receiver in the aircraft chartered by the Daily Herald (Photo by kind permission of the RSGB)

Douglas Walters G5CV (left), George Jessop G6JP (right), install radio equipment into the De Havilland Dragon-Moth aircraft (Photo by kind permission of the RSGB)



From My

Geoff Arnold G3GSR details that simple but important item, the filament bulb

Notebook

In these days of light-emitting diodes, liquid crystals, plasma displays, and so on, traditional filament type indicator lamps tend to get looked upon as somewhat old-fashioned. Despite the move to solid-state indicators, which it must be admitted have many advantages in terms of reduced size, heat dissipation and power consumption, there are still places where the extra illumination which a lamp will give is essential. Also let's face it, there are an awful lot of lamps still in use in existing equipment, and likely to be so for some time to come. It's worth knowing something about them, especially when you're faced with a dud lamp and need to identify a catalogue description to be able to order a replacement.

In the space available here, I can do no more than outline the basic types and explain some of the terms and abbreviations you may encounter. What I have done though, is to extend somewhat outside the strict radio and electronics field, partly because it is difficult to know where to draw the dividing line.

Lamp Caps

Over the years, there have been many specialised lamp caps (and the associated lamp-holders or sockets) developed, and there has been a steady trend towards making them smaller and smaller, ending up with a range of so-called 'capless' lamps, which simply have a couple of connecting wires coming through the glass envelope. The most traditional lamp caps are the screw cap and the bayonet cap.

Screw Cap

The screw cap is based on the design adopted by Thomas Edison for the lamps used in his electric lighting system, and that fact has been commemorated ever since by the use of the name *Edison Screw* (abbreviated *ES*).

The original Edison Screw cap was 27mm in overall diameter, I've never been able to discover why that should be so, and is also referred to as an E27 cap — *E* for Edison Screw and *27* for 27mm diameter. The same screw form is used

for several other sizes of cap too. One is larger, the 'Goliath Edison Screw' (abbreviated *GES*) which you're not likely to find in radio or electronic equipment as it's 40mm in diameter! This E40 cap is used on the sort of lamp you'll find in large floodlights.

There are four Edison Screw-form caps smaller than E27, and these are listed in Table 1. The *MES* size is the traditional 'torch bulb' size, but just because of that fact, don't run away with the idea that *MES* torch bulbs and radio panel lamps are completely interchangeable. More of that later.

All Edison Screw-form caps have one connection to the threaded shell, and the other to the single contact on the end of the cap. Where they are used on mains or other circuits where the voltage is sufficient to cause electric shock, the 'live' side of the circuit should be connected to the centre contact, and the 'neutral' or earthy side connected to the threaded shell, as it is quite possible to touch the shell whilst fitting or removing the lamp.

Bayonet Cap

The Bayonet cap is named after the catch used to secure a bayonet to a rifle — push in against spring pressure, turn slightly and release pressure to allow two (sometimes three) pins to engage in shaped slots. The bayonet cap is preferred over the screw cap where there is severe vibration, as a screw-cap bulb may loosen and fall out of the holder. Bayonet caps can come in one of two forms — with a single contact on the end and the other connection via the cap shell, like the screw caps, or with two contacts on the end, in which case the cap shell is electrically isolated (with one important exception — the twin-filament combined 'stop and tail' lamps used in cars).

There are three sizes of bayonet cap. The largest, used for most mains lamps in the UK, is known as *Bayonet Cap* (abbreviated *BC*). It's 22mm in overall diameter, and is also known as a B22d — 'B' for bayonet, 22 for 22mm diameter and 'd' for double contact (two contacts on the end and an isolated cap shell).

There is no single contact version of this size.

As shown in Table 2, the next size down, *Small Bayonet Cap*, comes in both single and double contact versions, but also with a variation of those two types, identified by the letter 'A', meaning auto (short for automobile). In the days before pre-focused sealed beam units, car headlamps (and sidelamps) used silvered parabolic metal reflectors, and were manually focused by sliding the lamp in and out in its holder to achieve the desired beam shape. The pins on the lamp cap had to be no longer than the metal of the lamp holder was thick, so that they did not foul the focusing sleeve. They were therefore cut shorter than on a standard B14 cap, and designated BA14.

Smaller bayonet sizes are BA9s and BA7s (the last one has 'pins' which are simply dimples pressed into the side of the cap, rather than conventional pins). Cap sizes E14 down to E5 and B14d down to BA9s have been used in radio and electronic equipment for both filament and neon lamps.

Other Types

Here's some other lamp-cap types you should know about. Firstly the *Flange base*; leaving aside the one used in modern torches, these come in two sizes, the Miniature or S6 and the Sub-miniature or S3 (sometimes called SX6 and SX3 respectively). These have been widely used in panel lighting systems. Next the *Midget groove base*; the S5, used in illuminated push-button switches, etc. In each case, the figure tells you the diameter of the cap in millimetres. There's also a lamp designed for use in telephone switchboards, where large numbers of indicators had to be packed into a small panel area, and now used also in illuminated switches, etc. It is called a *Slide type*, and it does just what its name implies, sliding in from the front of the holder, with a plastic wedge-shaped base to force the holder contacts apart, and connections made by contact-plates on the side of the lamp. It comes in 5.5mm and 7mm diameter versions.

Moving on to capless lamps, there are three possible types. First, as mentioned before, the wire-ended version, in which the connections are simply fine flexible wires which must be soldered to tags or pins provided in the equipment. Second, the Wedge base, in which the glass base of the lamp has been shaped to fit into a holder and the connecting wires are formed and folded back on either side of the wedge. Finally, the bi-pin lamp, in which two stiff pins carrying the connections have been moulded into the glass base at a spacing of 2.5mm, this type also fits into a holder. Incidentally, very much larger lamps on a 'bi-pin' base are used in studio and stage lighting systems. They can run to several kilowatts in power, where the heat would

simply be too great to be withstood by any conventional lamp holder.

Bulb Size

Although the cap shape and size would seem to be a logical way of specifying a lamp — after all, if the cap and holder don't fit together, what's the point of having the glass bulb the right shape and size — there *is* another system. Here the radio and electronic indicator and panel lamps are described by their bulb shape and diameter.

In this, lamps with tubular (straight-sided) glass bulbs are given size numbers beginning with 'T', whilst those with globular (round) glass bulbs have numbers beginning with 'G'. The figures

following the letter give the approximate overall diameter of the glass in eighths of an inch. For example, an MES or MBC lamp with a 10mm diameter tubular bulb is called a T3-1/4. An MES or MBC lamp with an 11mm round glass bulb is called a G3-1/2.

This is a system which seems to have originated in the USA many years ago. There it was used also for valves or tubes, so that the little, straight-sided GT octal series was said to have a 'T9' bulb, as a result of it being 1-1/8 inches (nine-eighths) in diameter. It is now gaining universal acceptance in specifying lamps.

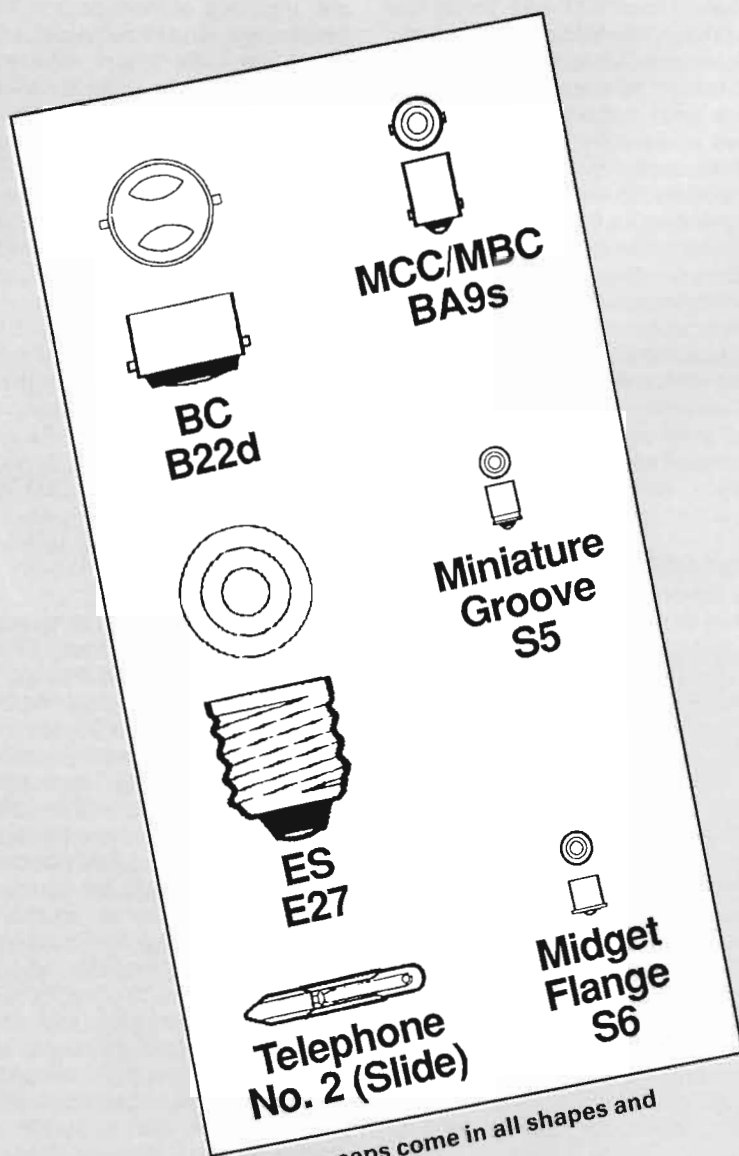
Inside Information

I shall now move on to look at some of the internal features of lamps. I mentioned earlier that torch-bulbs and radio panel bulbs, though they might look the same and have the same basic rating, are not identical, and may not give acceptable results if you swap them over. The main reason is that they are designed to perform different jobs.

From a torch-bulb, we want the maximum brightness possible for a given rate of power consumed from the battery, and since it will generally be used only for brief periods at a time, long life is of less importance. But for a radio panel lamp, we are not concerned with high brightness, nor about power consumption, at least where a mains-powered set is concerned, but we do want long life. All too often, getting to the panel lamps to replace them is a major engineering job, and where the man in the street is concerned, it means paying a repair-man to do it.

The two lamps are therefore designed and made to meet those requirements. If you replace your burnt-out torch bulb with a radio panel lamp, you could find that it gives a feeble orange glow, even though both may say 3.5V 0.3A on the cap and you've put a fresh set of batteries in the torch. The torch-bulb has a smaller, more lightweight filament, which will get much hotter (and brighter) than the one in the panel lamp, despite the fact that both of them are dissipating about one watt of power.

A torch-bulb fitted in your radio, on the other hand, is likely to be unduly bright and to have a very short life. Another reason for not putting a torch-bulb in a radio receiver is the possibility that electrical noise may be generated at the cold-welded junctions between the filament and its supports. For use in high-sensitivity radio receivers, lamps are available with 'noise-free' (NF) filaments, in which a different (and more expensive) manufacturing method is used.



Lamp caps come in all shapes and sizes

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Avid readers of reference books will probably have come across tables of panel lamp characteristics and type numbers used in the USA, which also mention a system of recognising lamps by the colour of the little glass bead which holds the filament supports. Unfortunately, lamp manufacturers in

the UK do not use this system, and in fact successive batches of the same lamp delivered from the same manufacturer may well have different colour beads.

A Few Abbreviations

To round off with, here's a few abbreviations which you may come

across in connection with lamps of one type or another. First, *LCL*, which stands for *Light Centre Length*. This describes how far the centre of the filament is from some datum point on the lamp cap. Just where that datum point is, differs from one lamp cap to another, and you would need to refer to a lamp catalogue for further information. The LCL is most important in lamps used for stage lighting equipment, slide and cine projectors etc., but it can also be vital in some types of holders used in radio and electronic equipment, where the lamp is sideways-on to a small viewing window, or end-on to a lens.

Next, *GLS* (not to be confused with *GES*), which stands for *General Lighting Service*, meaning the sort of common-or-garden lamps used in domestic fittings. Where lamps are likely to be subjected to lots of vibration, as in inspection lamp fittings or on board a ship, *Rough Service (RS)* grade lamps should be used. These have extra filament supports compared with *GLS* lamps, and can withstand a lot more knocking about.

There are many more types of lamps and related abbreviations used in display lighting and so on, but I don't want to stray too far away from radio and electronic equipment into other fields, so I think that's about it for this month.

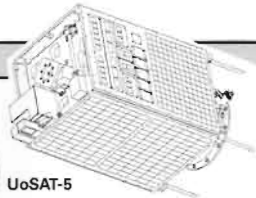
Table 1 — Edison Screw Form Caps

Name	Abbreviated	Diameter
Goliath Edison Screw	GES (E40)	40mm
Edison Screw	ES (E27)	27mm
Small Edison Screw	SES (E14)	14mm
Candelabra Edison Screw	CES (E12)	12mm
Miniature Edison Screw	MES (E10)	10mm
Lilliput Edison Screw	LES (E5)	5mm

Table 2 — Bayonet Form Caps

Name	Abbreviated	Diameter
Bayonet Cap	BC (B22d)	22mm
Small Bayonet Cap:		
with double contacts	SBC (B14d)	14mm
double contact (auto)	SBC (BA14d)	14mm
with single contact	SCC (B14s)	14mm
single contact (auto)	SCC (BA14s)	14mm
Miniature bayonet cap		
single contact (auto)	MBC or MCC (BA9s)	9mm
Sub-miniature bayonet cap		
single contact (auto)	— (BA7s)	7mm

Satellite Rendezvous



Richard G3RWL of AMSAT-UK reports on the events of this year's Satellite Colloquium

About 150 people were present from at least 21 countries at this year's AMSAT-UK colloquium. The main new topics were about future satellites, but the 42 different presentations also gave much more information, reports, knowledge and wisdom to all present. Typical subjects were: WARC-92 Preparations and CCIR participation; Selecting orbits for radio amateur missions; Telemetry — past, present and future; VITA operations using UoSAT-3; A Low cost receiver for UO-11 and DOVE; Digital satellites and equipment required to use them; Amsat-Oscar-13 management, past & future; Portable aerial systems for use with UOSAT-3 and Pacsat; and the UO-22 CCD camera.

Here's a few items of news from the event;

Phase-3D Information from DJ4ZC/Amsat-DL

The European Space Agency have confirmed a launch slot on the second ARIANE-5 flight timed for October 1995, the primary payload is the 'Cluster' spacecraft. Phase 3D will look like a doughnut, of non-uniform thickness, 3.2m in diameter and about 0.65m tall, weighing 400-500 kg. Two deployable 'wings' carry extra solar panels, and the power budget is about 200W. The inside of the 'hole' will be a launch adaptor to carry the 2.5 tonne weight of the main payload. Because a 3m spacecraft is too big for doors, elevators, etc., P3D will probably be made in separate pieces and the blocks finally assembled at the launch site.

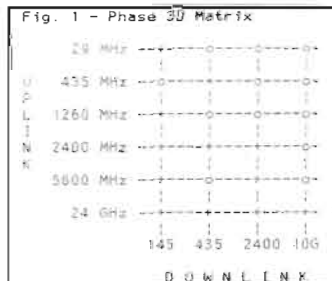
Launched into a standard geostationary transfer orbit, the aim is for the first motor firing to occur at perigee and raise apogee to about 50,000km. Subsequent firing(s) will be made at apogee to raise the perigee and make a plane change to 60 to 63 degrees inclination. The energy required for this is actually less than that needed for AO-13.

The (current) intention is to fine-tune the orbital period to exactly 16 hours, in order to give regular and repeatable access times with consecutive apogees occurring, and repeating, over Europe, USA, and the Far East. The target times for access are local-time-

synchronous at 05.00-08.00 and 18.00-24.00.

The spacecraft will carry gain-agile aerials, possibly 13dB at 70cm and 20dB at 24cm, for narrower beamwidth at apogee and then widening out at lower altitudes. The digital communications links will be similar to the existing RUDAK experiments, however the analogue links will be equipped with the LEILA concept to kill 'alligators'. Here an excessively strong uplink signal will first be overlaid with a tone, and then, if you don't decrease your power, it will be notched out. LEILA can handle several signals simultaneously.

The concept of a transponder 'mode' may be abandoned. Instead P3D could have communications links connected at baseband like a matrix as shown in Fig. 1.



A camera experiment, *SCOPE*, is likely from Japan. This will have at least two lenses (24 and 90 degree fields) and will return colour images of the Earth. If possible there will be a third lens to return sky, planet and star images, the resolution of all of these is expected to be about 750 x 580 pixels.

Another possible experiment comes from Amsat South Africa. This will provide educational broadcasts of up to 15 minutes of digitised speech on 29MHz using *CAM*, Compatible Amplitude Modulation (SSB + carrier). These transmissions are expected to occur at perigee and are targeted at schools and other educational establishments.

Finally, the doughnut has a hole in the middle. Can we mount something inside this area? It is possible that this void may have an extra Amsat-DL payload, a spacecraft to send to **Mars**. The possibility of accurate arrival is low but, in the interim, much experience would be gained in interplanetary communica-

tions. One-way propagation delays of 5 to 15 minutes would be experienced and links would probably be on 2400 MHz. Software writers — we need a tracking program for interplanetary objects — please.

ARSENE info from F6BVP

The final orbit of this is still expected to be equatorial with an apogee of 36,000km and perigee of 20,000km, and a period of seventeen and a half hours. The ARSENE launch is expected in June/July 1992, the Telecom 2B main payload has been moved to a different flight and the present main payload is not known.

A solid fuel rocket motor will be used to raise the satellite's perigee after launch into Geostationary Transfer Orbit. Fortunately, last year's requirement for deployable solar panels has now gone thanks to the use of GaAs solar panels from Italy which will provide 50 to 60W of power. This spin-stabilised satellite will be earth-pointing using nitrogen gas for attitude control, the lifetime expected is of the order of three to five years. The six-sided body is 900mm in diameter, 880mm high with a weight of about 140Kg before kick motor firing. Upon ejection, the satellite will spin up to 60 RPM before the kick motor is fired in the first few days of orbit, then it will spin down to about 1 RPM.

The communications payload will have a 70cm uplink and will use 145MHz and 2445MHz for downlinks; the two modes, B and S, will *not* operate simultaneously. Mode B operation will be a 1200bps digipeater with uplinks at 435.0625/0.0875/1125 MHz and a single downlink at 145.975MHz (with expected doppler shift of about 100 Hz). Bell 202 packet tones are specified rather than FO-20 style, and there won't be a mailbox due to insufficient memory capacity. Mode S will be a linear transponder, with an uplink passband of 435.050 to 435.125MHz and downlink 2446.470 to 2446.540MHz.

Microsats

In six years time there should be enough microsats in orbit to spend all of ones waking (and sleeping) hours chasing different birds across the sky. The following details are, unfortunately, brief depending on how much information was given; hopefully they will give you an impression of the work that is evolving in this field. The main motivations for all of these are so that the different national institutions can attract young people, develop the necessary skills and introduce the technology into their country's future. All the flights are polar orbiters on Ariane and most missions

are planned to use commercial as well as amateur frequencies, depending on payload requirements.

First an *Italian satellite* (the name currently unknown). This will fly in 1992 if it's ready, otherwise 1994, carrying packet at 9600 to 32k bps. TSFR proposals are welcome, and it will carry equipment to investigate the solar calcium line.

SUNSAT — South Africa; Flying with the 1994 Helios mission, carrying a payload of store-and-forward communications, position location, and imaging (over the RSA). A 2m/70cm packet BBS (FSK and AFSK) will be on board, also broad bandwidth L-band equipment. This one will use momentum wheel stabilisation.

TECHSAT — Israel; This country's aim is to produce a new satellite every two to three years. The present project is for a 3-axis stabilised satellite carrying digital and imaging equipment; position reporting by GPS; ion and particle counting; MM (?) wave propagation and ozone observations; it will be using heat pipes for thermal stabilisation. The BBS will have two transmitters on 70cm, five receivers on 2m and five receivers on 1260 MHz. The modulation types will be at least 1200bps AFSK on 2m, 1200bps (Fuji) on 70/23cm, and 9600bps (UO14/22) on 24cm, the transmitter power is expected to be in the 3W to 5W range.

KITSAT — Korea; Planned for 1992, it will be UoSAT size with an orbit of 66 degrees at 1380km. It will assist emergency communications to the Korean Antarctic base plus CCD, DSP, and DCE (Mode B) systems on board.

ESPY — United Kingdom; Not a Microsat — more a nano-sat, proposed by the UK Science in Education group. It will be the size of a large coffee jar, weighing two to three kg this proposed satellite will be TX only and will run from dry cells for one to two months. Providing simple 'space science' from orbit, this one will carry an electrometer experiment. The downlink will be synthesised speech, possibly on/off with a five second cycle, and it's hoped to be manually launched from Mir.

In all, this was four days of satellite utopia, many other subjects were of course covered and you'll find a selec-

tion of the papers presented in the published proceedings, available from AMSAT-UK. If you didn't make it this year, then please note next year's dates in your diary; 30th July until 2nd August 1992.

WD3Q DX-peditions

If you worked Eric via Oscar 13 on his recent trip to Djibouti and Sierra Leone, send your QSL to 338 14th Street N.E. Washington DC 20002, USA. He may also be active on his forthcoming trips to Mali, Niger and Senegal, so keep your ears open. As many HRT readers know, Eric is active with VITA, Volunteers In Technical Assistance, which takes him around the world.

Oscar 10

Recently, a number of users have reported that when the Mode B transponder is operational the signals are quite good. However, if the transponder loading increases above a certain level (due either to the number of users or a number of users using high power on the uplink) the signals start FMing.

Unfortunately the transponder has also been switching off from time to time, probably due to the bus voltage dropping extremely low. This would typically occur after heavy use, during low solar illumination, or after a period of solar eclipse. To return to Mode B transponder operation generally requires one of the Command Stations to send a successful *RESET* command, but sometimes (rarely) it will reset itself to Mode B when it receives sufficient bus voltage to start operation.

Using extrapolation from the last known attitude (Dec 86) the estimated attitude on July 27, 1991 was BLON 337, BLAT 11 which equated to a solar illumination of 90%. The solar illumination is not expected to drop below 50% until early Sept 91 with a minimum around the end of September. The solar illumination should return to greater than 50% at the end of October 91, i.e about now as you read this.

AO-10 started being affected by eclipses on 21-July-91 lasting only 3 minutes between MA 241 and 242, peak-

ing on 18 Aug lasting 36 minutes between MA 238 and 251, and ending 22-Oct-91 lasting only 5 minutes between MA 253 and 254.

Therefore, if you find AO-10's Mode B transponder ON when it is in view of your location, please use it unless you hear either the beacon or transponder signals FMing.

Mir News

The Soviet Union has announced a change in mission/crew plans for the rest of this year. As many amateurs are aware, the current crew consists of Anatoli Artsebarski and Sergei Krikalev (U5MIR). Sergei has been active on the amateur bands and was supposed to return in October. However, recent reports said that the Soyuz TM14 mission has been cancelled, and the crew for Soyuz TM13 has been changed. The result is that Sergei *will not* be coming home in October. Instead, he will be joined by his old mission commander, Alexander Volkov (U4MIR) and Sergei will be staying on for another 6 months for a total time in orbit of approximately one year.

Short Bursts

The 19kg French radio-astronomy satellite SARA launched with UO-22 has been heard with strong signals on 145.955 MHz. It transmits AFSK data at 300 baud, being the digitised noise from Jupiter received on some HF channels.

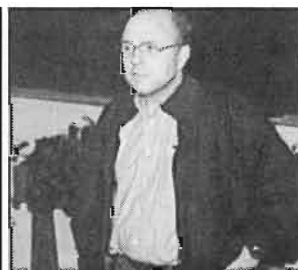
AMSAT-UK News

As well as the ARRL PacSat/MicroSat telemetry handbook and software, AMSAT-UK also have the Amsat-NA book about decoding telemetry and the papers from the ARRL 9th telecomputing conference, together with the latest ARRL antenna compendium, more copies of the Davidoff book, and the ARRL WxSat handbook — contact G3AAJ for details.

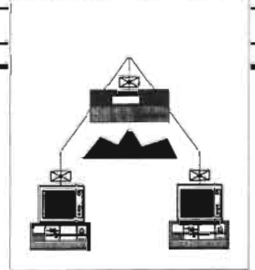
For further information about Amsat-UK contact: AMSAT-UK, c/o Ron Broadbent, G3AAJ, 94 Herongate Rd, London, E12 5EQ. A large SAE gets you membership info.

Lepters

SAT:	OSCAR 10	UoSAT 2	AO-13	UO-14	FO-20	AO21/RM1	UO-22	RS-10/11
EPOC:	91227.94157318	91229.06079883	91221.43736133	91226.75095752	91219.37029763	91232.89341419	91225.66928674	91232.80913611
INCL:	25.8013	97.8955	56.8086	98.6663	99.0332	82.9439	98.5412	82.9272
RAAN:	130.2052	271.6648	78.9241	305.8603	191.8269	185.8539	299.2509	11.0950
ECCN:	0.6051278	0.0011928	0.7220054	0.0011875	0.0540566	0.0036828	0.0008049	0.0012513
ARGP:	267.6183	341.9733	261.6296	357.9153	185.4362	79.1136	138.1901	13.6950
RA:	26.4937	18.1047	18.2775	2.1971	174.0698	281.4161	221.9901	346.4555
RM:	2.05879900	14.67226276	2.09695412	14.29209860	12.83184864	13.74399914	14.36112338	13.72205029
DECY:	6.8E-07	1.363E-05	2.14E-06	4.35E-06	1.1E-07	7.1E-07	4.63E-06	8.3E-07
REVN:	3347	39837	2417	8135	7012	2791	396	20845
SAT:	PACSAT	DO-17	WO-18	LO-19	SAT:	RS 12/13	Mir	
EPOC:	91227.97269668	91228.22923679	91227.14767975	91227.11892876	91232.50936275	91232.65329669	91232.71815296	
INCL:	98.6696	98.6694	98.6696	98.6694	82.9211	51.6050	98.5432	
RAAN:	307.4495	307.7614	306.7369	306.7758	56.4210	323.2047	306.2116	
ECCN:	0.0012034	0.0012081	0.0012580	0.0012990	0.0030755	0.0001141	0.0006276	
ARGP:	358.7844	358.2730	1.2030	0.8018	99.0723	287.0552	120.8417	
RA:	1.3289	1.8408	358.9179	359.3182	261.3915	73.0365	239.3390	
RM:	14.29292299	14.29383865	14.29419669	14.29497356	13.73916327	15.61246882	14.35679774	
DECY:	3.59E-06	3.95E-06	3.66E-06	3.68E-06	8.9E-07	4.5043E-04	2.145E-05	
REVN:	8153	8157	8142	8142	2697	31522	497	



Karl DJ4ZC of AMSAT-DL described an amateur Mars orbiting transponder



Packet Radio

—Roundup—



G4HCL looks forward to the AREMIR packet experiment

ation) will be have just become operational on board the Mir space station. The mission, tentatively scheduled to commence in October, is part of a sixteen experiment package called AUSTROMIR '91.

The AREMIR equipment will use a modified Alinco DJ120E transceiver running 3W on 2m, together with a laptop computer communicating with the TNC. The continuous packet bulletins will be 36 characters long interleaved with a 6 second tone for doppler measurements. The exact operation frequency hasn't been decided as I write this, but it's likely to be within the 145.800- 146.000MHz satellite sub-band. The AREMIR equipment is scheduled to have been sent up on an earlier Progress re-supply ship, and Sergi U5MIR may have set up the equipment first in readiness for the Austrian cosmonaut.

By the time you're reading this, the UK 'Sysops 12' packet networking conference, open to all amateurs, will have just taken place, let's hope plenty of sensible decisions were made for the controlled future of packet. I know plenty of amateurs are working away on improvements to the network, both on the software side (e.g. new Node and BBS systems) and on the hardware side (e.g. suitable equipment for backbone links).

High Speed Links

As many amateurs will know, one of the largest technical problems on packet is that of congestion — the popularity of the mode being its own worst enemy! Throughout the country, amateurs are working on networking protocols and high-speed 'backbone' links to take the inter-node (and thus inter-BBS) traffic off user-access frequencies such as those on 2m and 70cm. One such project is 64kbaud data on full duplex wideband 23cm channels. Mike G8TIC has been testing this using modified G3RUH modems and ex-PMR Pye L300 base stations for the RF side, and has managed very good results. Yours truly has been working with Mike (we have long chats on the phone!) to get together a similar link system, but using alternative commonly available RF modules. Mike plans to organise a multi-node north/south backbone link along the western side of the UK, and I plan to set up a multi-node link around the central southern part of the UK — hopefully the two will link in time.

Austrian Packet from Space

Regular HRT readers will know that around this time, if all goes to plan, the AREMIR (Austrian amateur Radio Experiment aboard MIR) experiment including DATAMIR (i.e. data communi-

Packet Group of the Month — DANPAC

DANPAC is the Derbyshire and Nottinghamshire Packet Support Group, who look after the interests of packet users in that area. As well as keeping in touch through bulletins on packet, they have regular meetings at a variety of venues in the area. Together with helping the network in that area, membership of the group gets you a very well produced periodic newsletter (the last one I had containing no less than 64 A5 pages!) full of general information as well as specific items relating to the nodes and BBSs run by the group. Their members even go out and demonstrate packet radio to possible 'converts', as the accompanying picture which I took at the recent Lowe Electronics open day shows. Their Secretary/Treasurer is Denis G0KIU, and you can contact him for membership details on 0623 659514 or of course on packet.

New Software — NOSview

From the keyboard of Ian G3NRW comes NOSview, an on-line documentation package for the KA9Q Network Operating System (NOS). Ian tells us this

package contains probably the only complete reference work describing all the commands to be found on major NOS releases, and is supplied on a 1.2Mb 5.25in disk with over 80 separate description files, one for each NOS command. When used with a file-viewing TSR (Terminate and Stay Resident) program such as 'Clockwork View' which is public domain, you can 'hot key' to a menu to list the files in a particular directory, then instantly pick the file of interest to you, Clockwork View is even supplied on disk with NOSview. Ian tells us that, by now, NOSview should be available on the major telephone bulletin boards around the world, and suggests looking for a file name of the form *NOSVWnnn.ZIP*. Alternatively, if you send Ian a formatted 1.2Mb 5.25in disk, in a disk mailer with a self-addressed return label with return postage (either UK stamps or sufficient IRCs), he'll be pleased to send you a copy. Remember to add a note with your disk saying you want NOSview, and ensure it's a 1.2Mb disk formatted under DOS or PC-DOS as Ian can't handle other formats. There's no charge for NOSview, it comes free with Ian's compliments and he asks that no money, cheques, POs etc. be enclosed, although he adds that exceptions *maybe* made for gold bullion! Send your disk to Mr. Ian Wade G3NRW, 7 Daubeney Close, Harlington, Dunstable, Bedfordshire. LU5 6NF. United Kingdom. Thanks for your thoughtful service Ian.

CTRL-Z, End of Message

That's it for another month. Although I'm writing this before the Sysops 12 conference and the HF Convention DX PacketCluster Forum, I thank the amateurs who said 'hello' to me there and I look forward to exchanging call-signs on the keyboard and VDU. If any packet groups would like a mention in this column, all information, newsletters etc. are greatly appreciated, sent to my direct address of PO Box 73, Eastleigh, Hants. SO5 5WG. Packet messages, as always, are guaranteed an (almost!) instant reply — let's hear what you've been up to in your area. Until next month, 73 de G4HCL @ GB7XJZ.



A live DANPAC packet demonstration

VHF/UHF Message



Eric F1JKK/TL8MB/TT8AQ and J28BR, well known for his 50MHz DXpeditions, on his visit to GJ4ICD during August 1991.

Geoff Brown GJ4ICD, takes a look at the December Geminids

The December Geminids Meteor shower next month usually provides some very intense spectacular results. According to the 'Dubus' handbook the maximum occurs between December 13th/14th, although in my experience December 12th has always been the best.

This shower is one of the major showers of the year and always seems to attract the Meteor Scatter (MS) fiend. More and more amateurs are becoming interested in MS as they find this is a very lucrative way to increase their country/square scores on 50MHz/144MHz.

Some tests have been conducted on 432MHz on MS, but very few results have been achieved, as the higher in frequency you go the less reflections there seems to be. On 50MHz for instance with full legal power, it should be possible to work the '1000 km' distance without any

problems. On 144MHz a little more ERP is needed to achieve the same results, this ERP is achieved by using the same power output level and increasing the aerial gain by many dB. However, with the new licence conditions now on 144MHz (400W of CW now) utilising this along with a single yagi should provide spectacular results. Have a go at it, but please read G4IJE's previous article (August 91 HRT) on how to operate MS using the correct sequence. Remember, if you make any skeds on the VHF net (14.345MHz) to let the *eastern* station call for the *first* period. This is standard procedure and must be adhered to as not to cause QRM to your fellow amateurs.

Many amateurs have been surprised at the results which can be achieved with such low power levels and, added to which, much of the operation tends to be after TV hours which limits any TVI or BCI.

Higher power permits are available to amateurs for conducting propagation tests in a wide range of fields including 432MHz. These are available, subject to the usual vetting procedures, by writing to the RSGB VHF committee who act on behalf of the Radiocommunications Agency (a division of the DTI). Good luck,

and please let me know your results for publication.

Propagation Reports

Derek G17CNO writes in with details of his 50MHz activity. Derek's equipment is a Trio TR-7010 driving a homebrew transverter, which produces a maximum of 200mW output to a homebrew 3 element yagi. To say he only has 200mW, the DX that has been worked is unbelievable, in fact, Derek has worked stations that I have never heard on the band. This just shows the difference in locations which propagation sometimes affects.

From County Antrim, Derek has worked a total of 21 countries and 132 squares, his best DX was 6W1QC in Senegal at a distance of 5,500km (yes with 200mW). VE1YX has also been worked this year using the same power level, and Derek received a 5/7 report! Other notable QSOs were with 3X1SG (JK51), VE3KKL (FN25), SM3GHW (JP73-rare), YU3ZM, YU3AN, LA1K (JP53), many DLs, PAs, OZs, SMs, LAs, and a nice catch in late June was CU3/K6EDX in the Azores. The list of stations is endless, and he must be congratulated on his patience and perseverance with 200mW.

The Joint ES0/SM DXpedition

Yes, you may well ask where this call came from, in fact it threw yours truly for a while. ES, and not to be confused with Sporadic E, was an old Estonian callsign, however this callsign was something very special.

The joint DXpedition between Estonian and Swedish amateurs travelled to Saarema Island (KO08XL) in the Baltic Sea, just off the coast of Estonia (UR2). The main intention of the operation was for the Perseid meteor shower from August 8th to the 18th, and to operate on 144MHz and 432MHz. However, it seems that at the last minute a permit to operate on 50.110MHz was granted. This became very interesting to many amateurs chasing DXCC, as Estonia and its islands count for this award.

Within the first few days of operation on 50MHz, contacts were made with UK stations in the Midlands area via ES. Richard G4AHN was the first station in the south of England to also make the grade. I decided to take a few days off work after a tip-off from G6HCV, luckily it paid off and this added DXCC country number 109 to my list. Mind you, I did sit by the radio for six long hours listening to

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the many meteor bursts from them! Other stations known to have worked them during the second large opening on August 11th include G3WOS, G4CCZ, G3HBR, G3JVL, GJ0JSY, PA0HIP, and I am sure many more. Openings continued throughout the week of August 10th-17th and many UK stations added a new country on 50MHz to the score. Did anyone work them on 144 or 432? Their QSL info is direct to SM0KAK, Platavagen 18, S-19150 Sollentuna, Sweden.

Ela G6HKM sent in a very detailed report of 50MHz activity from Chelmsford, on August 10th Ela heard ZS9A, on the 11th LA, LX, OY/G4ODA, and ES0SM for a new country and square. On the 24th lots of ES to YU, 9H5, and although losing EI5FK via ES, Ela did manage to work EI7GL for an all-time new one!

G8PYP (I090) in Dorset reports QSOs during August with YT3YL (JN65), ES0SM (KO08) on the 16th and Italians on the 20th.

TEP conditions continued to improve on 50MHz during the month with reports of ZS6, FR5, A22, V51, 9Q5 and many more stations across the equator. To my knowledge over ten stations, mainly in the south east, have now completed DXCC on 50MHz, something that took 34 years for K8WKZ who has just claimed the Six Metre Group's DXCC plaque number 2.

144MHz reports

The Perseids meteor shower peaked around the 12th-13th August but reports suggest, once again that this year was not very good. G8PYP reported hearing on random MS (144.200MHz) YU2PT, I4RSP, IN3DOV, HA4XT and I8KPV on the 12th, but many skeds were incomplete. On the 13th at last some Sporadic E to YU7BW, YU1EV, OE3OBC, YU7EW, YO2AVM, and YU7AS. Steve also reports tropo QSOs on the 29th with OZ and SM.

Ela G6HKM, nearly missed the ES opening on the 13th, however thanks to a phone call from G3YDY, she managed YT5G (KN11), YU7AU (KN04), YU2YF (JN85) and a new square, YU2SB (JN95), YU2CCY (JN85), and YU1EV (KN04). Ela also reports better tropo conditions during August with the HB9 beacon in on the 14th, but was unable to attract any QSOs.

432MHz openings

Continuing with Ela's reports, things were quiet on 70cm during August, however contacts were made with PAs and ONs plus a few DLs on the 25th.

Steve Damon G8PYP also found things quiet during the month but he did manage to work F6APE (IN97), PA0GHB (JO11), F6CGJ (IN78), and FC1DLJ (JO10).

23cm

G6HKM reports working Rob G1GHA, and trying a QSY from 432MHz with ON5UI but with no QSO resulting. Has 23cm really died, or is it just very selective openings around the country which are not being reported?

QSL List

Here's this month's QSL selection; **CU3/K6EDX**; P.O. Box 330, Mangonui, New Zealand.

9J2HN; JH8BKL, K. Kawase, 8 Shinkai, Teshio, Hokkaido 098-33, Japan.

TA/G3SDL; D. Court, Egebakken 18, DK-3520 Farum, Denmark.

5B4ZL; J. Carp, ENG 280 SU. BFPO 57, London.

Late news

FR5DN on Reunion Island in the Indian Ocean is reported to be active on 144MHz EME. Skeds can be arranged via the VHF net on 14.345MHz.

That's it for this month, please let me have your reports, especially from GM, on any of the VHF/UHF bands. My daytime telephone number is 0534 77067, or after 17.30 local on 0860 740727, or write to; Geoff Brown, TV shop, Belmont Rd, St. Helier, Jersey, JE2 4SA Channel Islands.

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G4RAS

G8UUS

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