

Amateur

BRADIO

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On test: Yaesu FT 2700RH

JUNE 1985 £1.10

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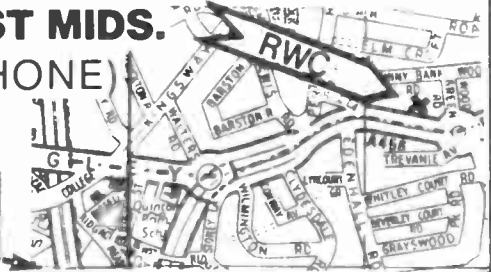


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<p>YAESU FRV 7700A RX CONVERTERS WERE £75.00 NOW £59.00</p>	<p>AKD WAVE METER A MUST FOR ALL VHF STATIONS £24.95 inc p THE BEST</p>	<p>SEND SAE OR PHONE NOW FOR CATALOGUE AND THE FAMOUS RWC COMPUTER UPDATED SECONDHAND LIST!</p>	<p>RWC'S HB9CV 2 Mtrs £6.99. 70Cms £5.99 plus 5 pck £1.00.</p>	<p>KENPRO 2 METRE HAND HELD £199.00 WITH FREE!!! 25 WATT RAYCOM AMPLIFIER</p>
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<p>YAESU FT102 AM FILTERS XF 8.2 GA £19.50</p>	<p>RF TRANSISTORS OVER 20,000W IN STOCK FOR ALL HF VHF/UHF RADIOS EG. 2SC 1947 £7.50 2SC 2290 £24.00</p>	<p>DATONG DIRECTION FINDER WAS £179.00 NOW ONLY £139.00</p>	<p>HUGE RANGE OF AZTEC ANTENNAS PHONE NOW FOR FULL LIST!!</p>	<p>YAESU FT101ZD AM UNITS ONLY £5.00 HEAVY DUTY MAGNETIC MOUNT S0239 MOUNT 3M COAX - PL259 SPECIAL PRICE £8.95</p>

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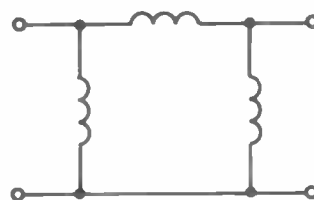
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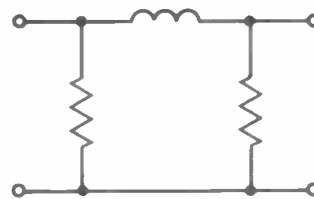
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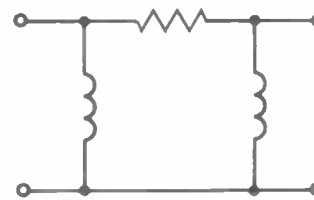
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A198	11.80	EB81	0.85	EL13	12.18	MM10	5.00	OOV3-10/14	U40	6.85	12E9	0.95	6A47	2.00	6F24	1.28	12AU7	1.85
A207	11.80	EB33	2.80	EL15	12.18	MM15	7.00	OOV3-20A	U50	3.00	12EA	1.00	6A48	2.00	6F25	1.28	12AV40T	1.00
A223	6.80	EB34	0.80	EL18E	3.50	MM17	5.50	OOV3-20B	U82	2.00	12EB	1.00	6A49	1.80	6F26	1.28	12AV41	1.00
A246	28.50	EB31	0.80	EL18E	3.50	MM16	5.50	OOV3-20C	U18	1.00	12EC	1.00	6A50	1.80	6F27	1.28	12AV42	1.00
A259	37.80	EB31	0.80	EL18E	3.50	MM18	5.50	OOV3-20D	U21	1.00	12ED	1.00	6A51	1.80	6F28	1.28	12AV43	1.00
A272	27.80	EB81	0.80	EL18E	3.50	MM19	5.50	OOV3-20E	U37	1.00	12EE	1.00	6A52	1.80	6F29	1.28	12AV44	1.00
A280	11.80	EB82	0.85	EL18E	3.50	MM20	5.50	OOV3-20F	U41	1.00	12EF	1.00	6A53	1.80	6F30	1.28	12AV45	1.00
A293	24.00	EB82	0.85	EL18E	3.50	MM21	5.50	OOV3-20G	U41	1.00	12EG	1.00	6A54	1.80	6F31	1.28	12AV46	1.00
A300	24.00	EB82	0.85	EL18E	3.50	MM22	5.50	OOV3-20H	U41	1.00	12EH	1.00	6A55	1.80	6F32	1.28	12AV47	1.00
A324	4.00	EB82	0.85	EL18E	3.50	MM23	5.50	OOV3-20I	U41	1.00	12EI	1.00	6A56	1.80	6F33	1.28	12AV48	1.00
A330	4.00	EB82	0.85	EL18E	3.50	MM24	5.50	OOV3-20J	U41	1.00	12EJ	1.00	6A57	1.80	6F34	1.28	12AV49	1.00
A342	4.00	EB82	0.85	EL18E	3.50	MM25	5.50	OOV3-20K	U41	1.00	12EK	1.00	6A58	1.80	6F35	1.28	12AV50	1.00
A350	4.00	EB82	0.85	EL18E	3.50	MM26	5.50	OOV3-20L	U41	1.00	12EL	1.00	6A59	1.80	6F36	1.28	12AV51	1.00
A360	4.00	EB82	0.85	EL18E	3.50	MM27	5.50	OOV3-20M	U41	1.00	12EM	1.00	6A60	1.80	6F37	1.28	12AV52	1.00
A370	4.00	EB82	0.85	EL18E	3.50	MM28	5.50	OOV3-20N	U41	1.00	12EN	1.00	6A61	1.80	6F38	1.28	12AV53	1.00
A380	4.00	EB82	0.85	EL18E	3.50	MM29	5.50	OOV3-20O	U41	1.00	12EO	1.00	6A62	1.80	6F39	1.28	12AV54	1.00
A390	4.00	EB82	0.85	EL18E	3.50	MM30	5.50	OOV3-20P	U41	1.00	12EP	1.00	6A63	1.80	6F40	1.28	12AV55	1.00
A400	4.00	EB82	0.85	EL18E	3.50	MM31	5.50	OOV3-20Q	U41	1.00	12EQ	1.00	6A64	1.80	6F41	1.28	12AV56	1.00
A410	4.00	EB82	0.85	EL18E	3.50	MM32	5.50	OOV3-20R	U41	1.00	12ER	1.00	6A65	1.80	6F42	1.28	12AV57	1.00
A420	4.00	EB82	0.85	EL18E	3.50	MM33	5.50	OOV3-20S	U41	1.00	12ES	1.00	6A66	1.80	6F43	1.28	12AV58	1.00
A430	4.00	EB82	0.85	EL18E	3.50	MM34	5.50	OOV3-20T	U41	1.00	12ET	1.00	6A67	1.80	6F44	1.28	12AV59	1.00
A440	4.00	EB82	0.85	EL18E	3.50	MM35	5.50	OOV3-20U	U41	1.00	12EU	1.00	6A68	1.80	6F45	1.28	12AV60	1.00
A450	4.00	EB82	0.85	EL18E	3.50	MM36	5.50	OOV3-20V	U41	1.00	12EV	1.00	6A69	1.80	6F46	1.28	12AV61	1.00
A460	4.00	EB82	0.85	EL18E	3.50	MM37	5.50	OOV3-20W	U41	1.00	12EW	1.00	6A70	1.80	6F47	1.28	12AV62	1.00
A470	4.00	EB82	0.85	EL18E	3.50	MM38	5.50	OOV3-20X	U41	1.00	12EX	1.00	6A71	1.80	6F48	1.28	12AV63	1.00
A480	4.00	EB82	0.85	EL18E	3.50	MM39	5.50	OOV3-20Y	U41	1.00	12EY	1.00	6A72	1.80	6F49	1.28	12AV64	1.00
A490	4.00	EB82	0.85	EL18E	3.50	MM40	5.50	OOV3-20Z	U41	1.00	12EZ	1.00	6A73	1.80	6F50	1.28	12AV65	1.00
A500	4.00	EB82	0.85	EL18E	3.50	MM41	5.50	OOV3-20A	U41	1.00	12EA	1.00	6A74	1.80	6F51	1.28	12AV66	1.00
A510	4.00	EB82	0.85	EL18E	3.50	MM42	5.50	OOV3-20B	U41	1.00	12EB	1.00	6A75	1.80	6F52	1.28	12AV67	1.00
A520	4.00	EB82	0.85	EL18E	3.50	MM43	5.50	OOV3-20C	U41	1.00	12EC	1.00	6A76	1.80	6F53	1.28	12AV68	1.00
A530	4.00	EB82	0.85	EL18E	3.50	MM44	5.50	OOV3-20D	U41	1.00	12ED	1.00	6A77	1.80	6F54	1.28	12AV69	1.00
A540	4.00	EB82	0.85	EL18E	3.50	MM45	5.50	OOV3-20E	U41	1.00	12EE	1.00	6A78	1.80	6F55	1.28	12AV70	1.00
A550	4.00	EB82	0.85	EL18E	3.50	MM46	5.50	OOV3-20F	U41	1.00	12EF	1.00	6A79	1.80	6F56	1.28	12AV71	1.00
A560	4.00	EB82	0.85	EL18E	3.50	MM47	5.50	OOV3-20G	U41	1.00	12EG	1.00	6A80	1.80	6F57	1.28	12AV72	1.00
A570	4.00	EB82	0.85	EL18E	3.50	MM48	5.50	OOV3-20H	U41	1.00	12EH	1.00	6A81	1.80	6F58	1.28	12AV73	1.00
A580	4.00	EB82	0.85	EL18E	3.50	MM49	5.50	OOV3-20I	U41	1.00	12EI	1.00	6A82	1.80	6F59	1.28	12AV74	1.00
A590	4.00	EB82	0.85	EL18E	3.50	MM50	5.50	OOV3-20J	U41	1.00	12EJ	1.00	6A83	1.80	6F60	1.28	12AV75	1.00
A600	4.00	EB82	0.85	EL18E	3.50	MM51	5.50	OOV3-20K	U41	1.00	12EK	1.00	6A84	1.80	6F61	1.28	12AV76	1.00
A610	4.00	EB82	0.85	EL18E	3.50	MM52	5.50	OOV3-20L	U41	1.00	12EL	1.00	6A85	1.80	6F62	1.28	12AV77	1.00
A620	4.00	EB82	0.85	EL18E	3.50	MM53	5.50	OOV3-20M	U41	1.00	12EM	1.00	6A86	1.80	6F63	1.28	12AV78	1.00
A630	4.00	EB82	0.85	EL18E	3.50	MM54	5.50	OOV3-20N	U41	1.00	12EN	1.00	6A87	1.80	6F64	1.28	12AV79	1.00
A640	4.00	EB82	0.85	EL18E	3.50	MM55	5.50	OOV3-20O	U41	1.00	12EO	1.00	6A88	1.80	6F65	1.28	12AV80	1.00
A650	4.00	EB82	0.85	EL18E	3.50	MM56	5.50	OOV3-20P	U41	1.00	12EP	1.00	6A89	1.80	6F66	1.28	12AV81	1.00
A660	4.00	EB82	0.85	EL18E	3.50	MM57	5.50	OOV3-20Q	U41	1.00	12EQ	1.00	6A90	1.80	6F67	1.28	12AV82	1.00
A670	4.00	EB82	0.85	EL18E	3.50	MM58	5.50	OOV3-20R	U41	1.00	12ER	1.00	6A91	1.80	6F68	1.28	12AV83	1.00
A680	4.00	EB82	0.85	EL18E	3.50	MM59	5.50	OOV3-20S	U41	1.00	12ES	1.00	6A92	1.80	6F69	1.28	12AV84	1.00
A690	4.00	EB82	0.85	EL18E	3.50	MM60	5.50	OOV3-20T	U41	1.00	12ET	1.00	6A93	1.80	6F70	1.28	12AV85	1.00
A700	4.00	EB82	0.85	EL18E	3.50	MM61	5.50	OOV3-20U	U41	1.00	12EU	1.00	6A94	1.80	6F71	1.28	12AV86	1.00
A710	4.00	EB82	0.85	EL18E	3.50	MM62	5.50	OOV3-20V	U41	1.00	12EV	1.00	6A95	1.80	6F72	1.28	12AV87	1.00
A720	4.00	EB82	0.85	EL18E	3.50	MM63	5.50	OOV3-20W	U41	1.00	12EW	1.00	6A96	1.80	6F73	1.28	12AV88	1.00
A730	4.00	EB82	0.85	EL18E	3.50	MM64	5.50	OOV3-20X	U41	1.00	12EX	1.00	6A97	1.80	6F74	1.28	12AV89	1.00
A740	4.00	EB82	0.85	EL18E	3.50	MM65	5.50	OOV3-20Y	U41	1.00	12EY	1.00	6A98	1.80	6F75	1.28	12AV90	1.00
A750	4.00	EB82	0.85	EL18E	3.50	MM66	5.50	OOV3-20Z	U41	1.00	12EZ	1.00	6A99	1.80	6F76	1.28	12AV91	1.00
A760	4.00	EB82	0.85	EL18E	3.50	MM67	5.50	OOV3-20A	U41	1.00	12EA	1.00	6A00	1.80	6F77	1.28	12AV92	1.00
A770	4.00	EB82	0.85	EL18E	3.50	MM68	5.50	OOV3-20B	U41	1.00	12EB	1.00	6A01	1.80	6F78	1.28	12AV93	1.00
A780	4.00	EB82	0.85	EL18E	3.50	MM69	5.50	OOV3-20C	U41	1.00	12EC	1.00	6A02	1.80	6F79	1.28	12AV94	1.00
A790	4.00	EB82	0.85	EL18E	3.50	MM70	5.50	OOV3-20D	U41	1.00	12ED	1.00	6A03	1.80	6F80	1.28	12AV95	1.00
A800	4.00	EB82	0.85	EL18E	3.50	MM71	5.50	OOV3-20E	U41	1.00	12EE	1.00	6A04	1.80	6F81	1.28	12AV96	1.00
A810	4.00	EB82	0.85	EL18E	3.50	MM72	5.50	OOV3-20F	U41	1.00	12EF	1.00	6A05	1.80	6F82	1.28	12AV97	1.00
A820	4.00	EB82	0.85	EL18E	3.50	MM73	5.50	OOV3-20G	U41	1.00	12EG	1.00	6A06	1.80	6F83	1.28	12AV98	1.00
A830	4.00	EB82	0.85	EL18E	3.50	MM74	5.50	OOV3-20H	U41	1.00	12EH	1.00	6A07	1.80	6F84	1.28	12AV99	1.00
A840	4.00	EB82	0.85	EL18E	3.50	MM75	5.50	OOV3-20I	U41	1.00	12EI	1.00	6A08	1.80	6F85	1.28	12AV00	1.00
A850	4.00	EB82	0.85	EL18E	3.50	MM76	5.50	OOV3-20J	U41	1.00	12EJ	1.00	6A09	1.80	6F86	1.28	12AV01	1.00
A860	4.00	EB82	0.85	EL18E	3.50	MM77	5.50	OOV3-20K	U41	1.00	12EK	1.00	6A10	1.80	6F87	1.28	12AV02	1.00
A870	4.00	EB82	0.85	EL18E	3.50	MM78	5.50	OOV3-20L	U41	1.00	12EL	1.00	6A11	1.80	6F88	1.28	12AV03	1.00
A880	4.00	EB82	0.85	EL18E	3.50	MM79	5.50	OOV3-20M	U41	1.00	12EM	1.00	6A12	1.80	6F89	1.28	12AV04	1.00
A890	4.00	EB82	0.85	EL18E	3.50	MM80	5.50	OOV3-20N	U41	1.00	12EN	1.00	6A13	1.80</				

L·E·T·T·E·R·S

SIC

Reading the article *Justice/injustice* in the February issue of *Amateur Radio*, I thought that it was two pages wasted that could have been put to more use on actual amateur (*sic*) radio. It appears too one-sided as the police officers had no chance to put their views across, as this being a 'police matter' they are not permitted to do so. As for the RSGB, when they were in receipt of the information I should think they had 'second thoughts' about it and referred it to WP Basket.

However, as police transmissions were being interfered with on 24/1/80, it could have been construed that 'police officers were being obstructed in the course of their duty'. This gives them power of arrest of the offending person operating the transmitter. That person and equipment would be dealt with under that act and not the one relating to the amateur licence, as it would be the greater offence. The police officer involved would have had to examine the equipment to ascertain whether an offence had been committed or not and would not be inspecting the equipment with reference to the act concerning amateur licences.

G3XSE complained of being late for work after a 15 minute examination of his equipment. I wonder whether he was helpful to the police officer at the time? Had he insisted that a 'duly authorised person' was in attendance to ascertain whether his transmitter was at fault he could have been much later for work. To contact such a person and the travelling time involved to get to the scene with instruments could have taken an hour or more. There are not as many of them as there are police officers to uphold the law.

G3XSE goes on to say that he noticed that the lock of his vehicle no longer worked and presumed that the police had forced the vehicle door. Why would they force his door when they already had the vehicle keys in their possession?

I have written this letter as I have been asked my opinion on this matter by local radio amateurs, as they are aware that I am a retired police officer. In fact I served 30 years in the Police Force, the last ten of which I was communications officer in the Hertfordshire (*sic*) constabulary.

I would like to point out that some radio equipment is advertised as capable of working out of band, ie 144-146 capable of 146-148MHz, which could bring it into frequencies used by the Home Office. If one was stopped and transmission in the latter frequencies could be demonstrated at the time, how would one explain it away?

As to the relationship between police officers and radio amateurs, there are many police radio amateur clubs, and many more police officers who are amateurs. Norfolk police encourage amateur co-operation and to my knowledge exercise emergency communications in this part of the country that are second to none.

R J Rogers G3LIA, Norfolk

NON EVENT

Did I go on the wrong day? Or maybe I'd walked into the wrong hall and was now in the Good Wine Exhibition (I wish I had been). All I can say is that as a citizen of Birmingham I feel very sorry for those dedicated amateurs who travelled from as far away as Edinburgh, Essex, Isle of Man and Canada!

I was not the only amateur to walk into that exhibition having paid a £2.50 entrance fee to walk out again having seen all the stalls and not found what I went for. It was not as though it was anything slightly unusual that I was looking for, just some 4000 series CMOS chips. Out of the twenty-five that I was looking for I only found one. Maybe we have moved into a new technological age where ICs are old-fashioned?

There could of course be another reason. It may be very nice for the RSGB to obtain the NEC for the exhibition but if they can't put up a display to match it then perhaps they

had better not bother. An opportunity like this has great potential but at the moment it just gives more and more reasons to run the RSGB down (and I am a member). Perhaps a marquee in Cannon Hill Park would be a better alternative?

It was not only the visitors who were complaining about the exhibition; some of the exhibitors declared that they most definitely would not be returning next year. I'm sure that there must have been somebody who enjoyed the rally - perhaps the woman selling tea and coffee? I wouldn't be surprised if she sold more than the exhibitors.

In addition I think some of the visitors had walked into the wrong hall. One little gem heard near the demonstration CW station was: 'Can you turn that off, it's starting to annoy some people?'

I realised that there were some people who weren't interested in construction and so only bought 'black boxes', but I didn't realise until then that some people left them in the boxes!

I'll be interested to see what happens there next year, but there again I won't be there so perhaps somebody could let me know. I will be too absorbed in my hobby of amateur radio.
Dave Rickwood G6UDM, Birmingham

BRAINGLESS

Last Sunday I was tuning around 2m SSB and on 144,480, as usual, there were two 'amateurs' who shouldn't have been there. Yes, they were amateurs; they had licences and call signs, but obviously not brains.

There they were, nattering to each other across London. So what's wrong? 144,480MHz is the SSB and CW only section of the band - but these two were using FM.

One of the stations had a signal 18KHz wide; equivalent to 5 or 6 SSB signals! Both of these amateurs have held a licence for several years, but obviously not a band-plan.

Such selfishness is completely beyond my understanding - and to cap it all the signal wasn't just an FM signal 18KHz wide in the

SSB sub-section, it also radiated equally in all directions!

I only ever operate 2m SSB but I wouldn't even dream of putting my nervous, neat, efficient, band-saving SSB signal in the FM section of the band, or one of their repeater inputs or outputs, or one of their S-channels. . . Mind you, with a channel spacing of 25KHz you could not only get eight of my SSB signals in there, but they probably wouldn't even notice me!

I have one request for these people: either play the game and abide by the band-plan or (if your only interest is chatting to your mate up the road) get yourself a CB rig.

It only leaves me now to thank you for a great mag.
David Goode G1MGV, Essex

RIDICULOUS

In reply to N Bristow's letter, *Class B 10m FM*, in the April issue - yes, of course 10m should be opened-up to class B licence holders, if only to get the band used. However, I feel that it should be all modes and all of the band as it is absolutely ridiculous for this large allocation of air space to be left virtually unused.

Even during good propagation periods the band is grossly under-used, and due to the present poor conditions you are lucky to hear anything from one day to the next in many areas.

This band is also the place for use by any proposed novice licence.

May I also take this opportunity to fire a shot at all the G3s, G4s and G8s etc who think the current RAE is too simple. It's an old saying that talk is cheaper than action - and I wonder how many of them would volunteer to take the exam again!

When I was studying to take the exam my course tutor said, 'I'm glad it's you and not me' - an honest man.

By the way, I passed my RAE with relative ease, although I still enjoy tackling test papers.

Mind you, in my time I have been a pirate, an illegal CBER and a marine operator over the course of 30 years.
J Halsey G1JBX, York



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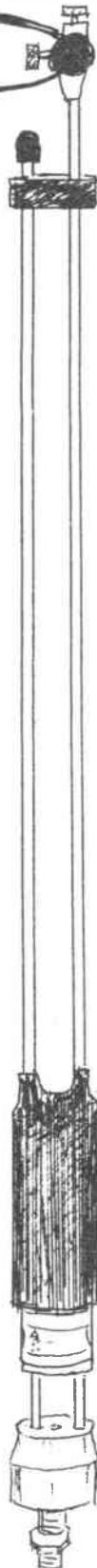
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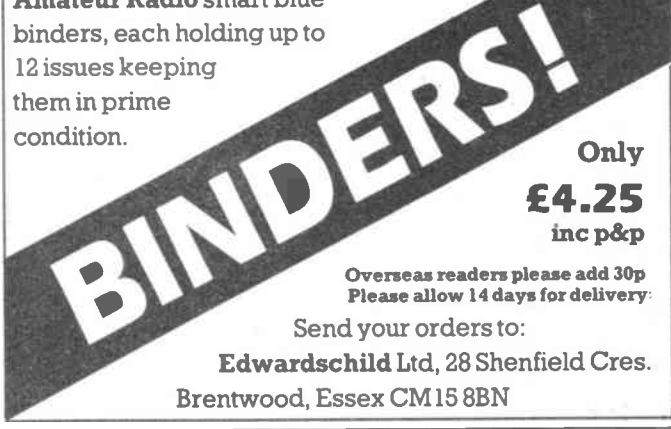
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★ ★ ★

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SLOW-SCAN TRANSMISSIONS

It is planned that slow-scan television pictures will be transmitted from shuttle flight 51-F, which is expected to be launched in July, and the equipment chosen for these transmissions is the Robot 1200C high definition colour converter.

The 12000C colour system using time multiplex component colour, is black and white compatible so the transmissions will be receivable on standard slow-scan equipment.

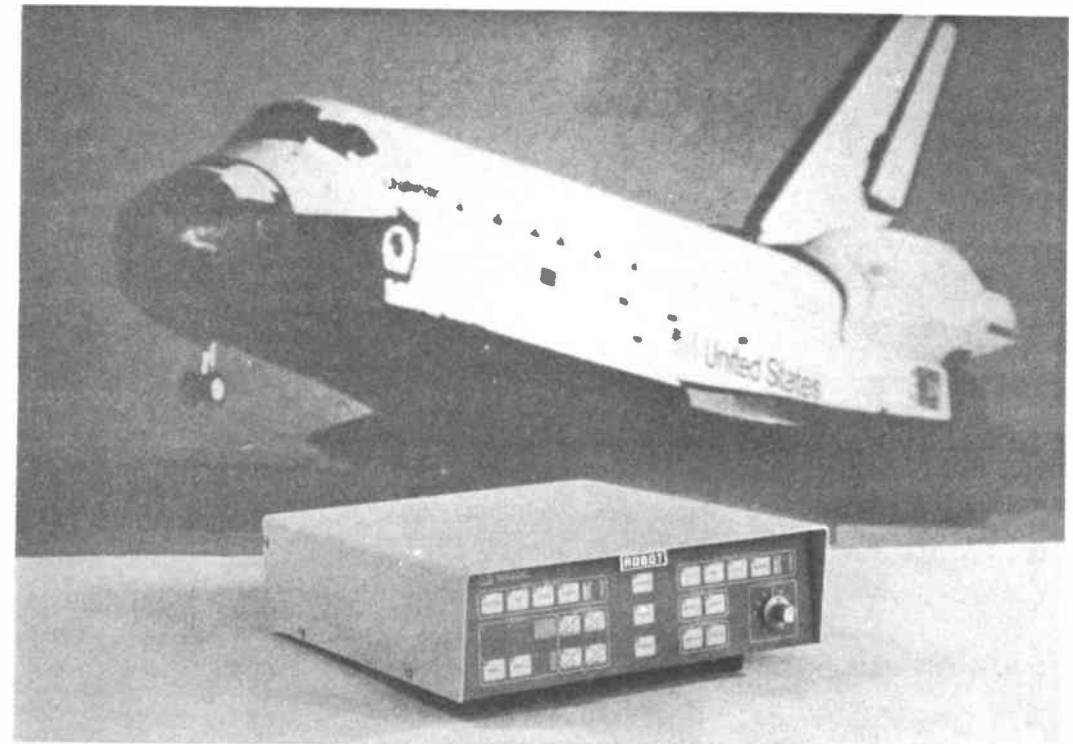
Further information is available from: Robot (UK) Ltd, Building 33, East Midlands Airport, Castle Donnington, Derby DE7 2SA.

LIFE AFTER TAU

With the sudden demise of TAU Systems Ltd we are pleased to announce the formation of ATUs UK of Cap Co Electronics Ltd formed by Tony Johnston (G40GP) and his delightful XYL, Helen. Tony, as you know, was the founder of TAU Systems, the inventor of the open wire clip-on feeder spacer and the designer of the SPC3000 ATU.

Cap Co Electronics Ltd is now going to be producing the whole range of ATUs and associated components. Their latest design, the SPC300, is ideally suited for low power operation up to 300 watts PEP. It is the same design as its bigger brother, the SPC3000, it even uses the same coil size, but the much smaller capacitors and main-frame means that the unit now only measures 9 inches wide, 3 inches high and 9 inches deep; incredible for a unit which will tune 1 to 30MHz with *no gaps*.

They also have some new electro-mechanically remote tuned ATUs, designated LCA5000 and LCA500. These



Robot 1200C (not to scale)

units will be available as soon as possible and it is expected that a great deal of interest will come from commercial sources and the more serious amateur who wishes to tune the aerial at the aerial and not in the shack.

A new price structure on the whole range is now applicable and will be easily affordable by all radio amateurs, SWLs or serious DXers. For example the SPC3000 module will now be sensibly priced at around £99.00 and the new SPC300 module at about £75.00; a unique price for such a superb piece of engineering.

The whole range can be seen at most radio rallies around the country this year and all enquiries by individuals may be made by phoning Tony or Helen.

Further information available from: ATUs UK of Cap Co Electronics Ltd, 63 Hallcroft,

Birch Green, Skelmersdale, Lancs WN8 6QB. Tel: (0695) 27948.

RADIO BOOKS

Interbooks is a new company formed by Interproduct Limited to deal solely with the importation and marketing of books for the amateur radio operator and short wave listener, and to supply them to the trade.

The company has the sole importation rights for Michiel Schaay's books which include 'Shortwave Facsimile Frequency Guide', 'Maritime Radio Handbook' and 'Embassy Radio Communications Workbook'.

New titles are being added all the time and their new free catalogue is now available on request.

Interbooks, Stanley, Perth PH1 4QQ. Tel: Stanley (073882) 575.

OBITUARY

It is with the utmost regret that we have to inform you of the death of Mr D F Jones GW3SSY.

Dave died on Wednesday 13 March 1985, aged 45 years. He was secretary of the Abergavenny and Nevill Hall Amateur Radio Club.

Dave was first licensed on 2 January 1964 as G3SSY and joined the RSGB on 5 November 1966. He was also a member of the G-QRP Club, the RAIBC, the International Short Wave League, the Sutton and Cheam Radio Society and the American Radio Relay League Inc.

Dave also ran instruction classes for the RAE and consistently achieved a high level of passes. It is probably this particular activity for which he will be most remembered.

Our condolences to Sue, his children and his family.

1985 RSGB NATIONAL CONVENTION

This year's RSGB National Convention was held on 13-14 April at the National Exhibition Centre in Birmingham. The facilities offered at the NEC, coupled with the hard work of the RSGB Exhibition Committee in ironing out some of last year's problems, resulted in a generally successful weekend for all concerned.

The number of people attending the show over the two days reached a record 11,000, this figure being almost seven percent up on last year.

There also appeared to be more seating and space between the trade stands than last year, although it

must be said that – perhaps inevitably – there was still considerable congestion as the numerous 'punters' elbowed their way towards the bargains.

Indeed, the traders seem very pleased with the level of interest in their products, with many reporting a substantial increase on last year's sales.

Lowe Electronics sold out of the Trio TH41E 70cm handheld, but continued to take several additional orders for this recently introduced 'tiny-talkie'.

The full range of amateur radio hardware was available, and between the main stallholders and the table traders

there was certainly something of interest for all, no matter where their particular interest might lie.

Another trader who was kept very active at the show was R Withers Communications, who did particularly well with many recently introduced products. The new ARM Multi P6 mobile antenna sold extremely well, and the 10m modification board, first detailed in the March 1985 edition of *Radio and Electronics World*, sold out completely.

Overall perhaps there did not seem to be as many new products on show, or as many genuine 'once-in-a-lifetime special prices' on offer, but throughout the hall, particularly amongst the table traders, there were many bargains to be had and rarities to be snapped up.

The lecture programme was a full one, and as usual they

were very well attended. The subjects covered ranged from LF to VHF, from SWLing to moonbounce, and from low cost QRP to the latest developments in Packet Radio. It would appear that there was a talk, lecture, forum or workshop for almost everyone, no matter how much (or how little) experience they might have.

So once again, the annual 'bash at Birmingham' has justified its position as one of the highlights of the amateur radio social (and business) calendar. It is true that it faces more and more competition as the standard of other local and regional rallies and exhibitions seems to get better every year, but credit is still due to the RSGB for producing a thoroughly enjoyable and smooth running event within the stark and somewhat inhospitable confines of the NEC.



A happy man with a bargain and sore feet



Chinese Microwave



Lots and lots and lots of people

STRAIGHT & LEVEL

TEMP CONTROLLED IRON

Greenwood Electronics has added an advanced new electronically controlled soldering iron, the 'Oryx Platinum 45', to its comprehensive range of soldering equipment.

Designed for use in the most demanding of production environments, the new iron incorporates a unique thick film cermet element and an ultra stable platinum resistance temperature sensor, together with miniaturised electronic control circuitry. The control circuit is built into the handle of the iron.

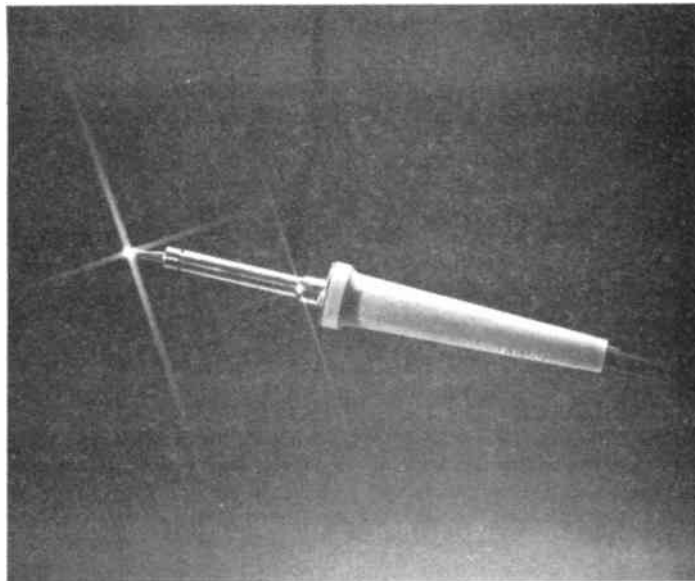
The Platinum 45 is available in 24V, 115V and 240V versions. Its tip temperature is

controllable to within $\pm 2^{\circ}\text{C}$ over the range 260°C to 420°C and nominal temperature is easily adjustable by the user.

The electronic control circuitry features zero point switching to ensure spike-free switching of the heating element and temperature overshoot is avoided by means of a special proportional control circuit.

The element is a high reliability cermet type rated at 45 watts and the iron is ergonomically designed and balanced for optimum operator comfort.

Further information is available from *Greenwood Electronics, Portman Road, Reading, Berks RG3 1NE. Tel: (0734) 595844.*



ROGUE IRON

Heron Electronics Limited, which imports the extensive range of personal stereo, portable audio and in-car entertainment products from Crown of Japan, wishes to advise the public that neither Crown of Japan, nor Heron Electronics, has any connection whatsoever with the Taiwan manufactured automatic steam iron which carries a 'Crown' brand name and is currently under investigation, having been described as 'lethal' by the British Standards Institute.

'British Standards Institute officials have described the rogue iron as lethal', explained Ron Sulkin, managing director, who is furious that the high manufacturing standards of the products made by Crown of Japan may be implicated in this revelation and is currently taking legal advice.

'We intend to work closely with consumer organisations and other interested bodies to eliminate the import of these dangerous products, which can not only injure consumers but harm the reputation of our entire industry', said Sulkin.

Heron Electronics Limited, 1st Floor, Lawford House, 429 Harrow Road, London W10 4RE. Tel: 01-968 4488.

GREAT WESTERN STEAM

The Vale of the White Horse Amateur Radio Society will be operating its special event station, GB4GWR, again this year to mark the 150th anniversary of the Great

Western Railway.

The station will be active from 18 May to 2 June during the Great Western Steam 150 event at Didcot Railway Centre in South Oxfordshire. Minimum operating times will be 11am to 5pm daily on both HF and VHF. Special QSL cards will be sent via the bureau for all contacts.

For 30 minutes each day part of the station will become 'steam mobile' and operate from the footplate of one of the working locomotives. This will be on 2m FM (probably S22) using low power. QSL cards for these contacts will be signed by the driver and foreman. At other times talk-in will be available on S22.

A fact sheet containing up to the minute details of GB4GWR, a Great Western 150 award and Didcot Railway Centre can be obtained by sending an SAE to: *John O'Hagen G4PFY, 32 Icknield Close, Didcot, Oxon OX11 7AU.*

If you would like to help operate GB4GWR then please ring John on Didcot 812565.

MICROPATCH

ICS Electronics Ltd of Arundel, West Sussex have now upgraded their popular Micropatch combined terminal unit and software package for the CBM-64 and VIC-20 computers to incorporate AmTOR as standard.

For owners of these popular home computers, this represents the cheapest and most reliable way to get on the air

with send / receive capability in all of the new data transmission modes: Amtor, RTTY, CW and ASCII.

The only additional items required to get on the air are a transceiver and a 12 volt power supply.

Both software and hardware are fully integrated into one package which plugs into the expansion port of the computer. The high quality terminal unit circuitry pro-

vides separate mark/space channel filtering together with a tuning indicator. Phase locked loop demodulation is not used.

The software is triple split screen, exceptionally user friendly, operates with tape, disc and printer.

The unit costs £191.35 including VAT and P & P.

ICS Electronics Ltd, PO Box 2, Arundel, West Sussex BN18 0NX.

AERIAL TRAPS

New from the G2DYM stable, makers of the well-known anti-TVI trap dipoles, is a full range of aerial traps for 10, 15, 20, 40 and 80 metres.

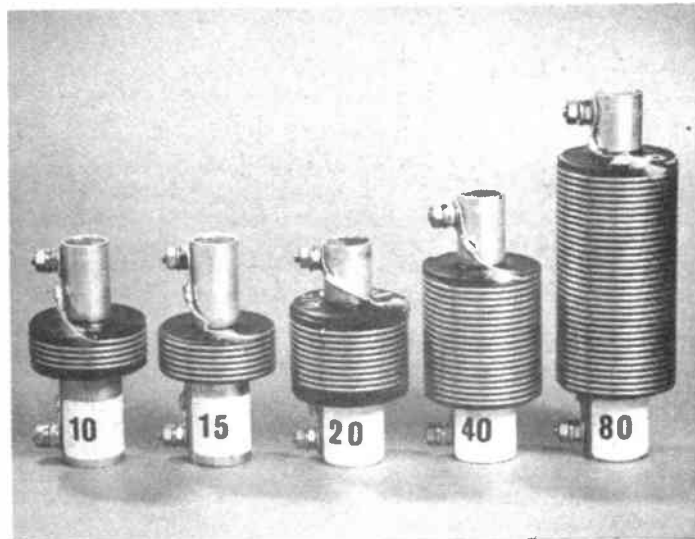
Available in pairs for trap dipoles or singly for trap unipoles, the capacity is obtained by very accurately setting the aluminium tubes concentrically in epoxy resin cement. The formers are later

cast and machine threaded and the coils are wound with 1.5mm lacquered copper wire.

10, 15 and 20 metre traps are available at a price of £9 each, 40 metre traps cost £10 each and 80 metre traps are £12.50 each, all plus £1.00 P+P.

Special frequencies can be made to order.

G2DYM, Uplowman, Tiverton, Devon EX16 7PH.



CLUB NEWS

Golden Jubilee Award

To celebrate its Golden Jubilee in 1985 the Ipswich Radio Club, in association with the Ipswich Borough Council and Arrow Electronics, will present a special award certificate signed by the President of the club and the Mayor of Ipswich for contacts made during 1985 with Ipswich Club members and stations in the County of Suffolk.

The rules are:

1. Only contacts made during 1985 will count for the award which will be presented for 50 points, 25 of which must be for Suffolk and Ipswich Radio Club contacts. Contact with a G station will count as 1 point, with a Suffolk station 2 points and with an Ipswich Radio Club member 3 points. Each contact with the

club station (G4IRC, G1IRC, or GB2IRC) will count as 5 points. Several special event stations using these call signs will be on the air during 1985. Details will appear in the radio press.

2. Contact may be on any amateur band by any mode of transmission. The same station may count for contacts on more than one band, but only once on each band irrespective of mode.

Terrestrial repeater contacts will not count for the award. If applicants so wish, certificates will be endorsed for a single band and/or a single mode.

3. Contacts on bands above 1296MHz will count as double.

4. Applications for the award, enclosing a list of contacts confirmed by a club chairman or secretary or by a representative of a national



society (QSL cards are *not* required and should *not* be sent with the application) should be forwarded with six IRCs (or £1/\$2) to Alan Owen G4HMF, 102 Constable Road, Ipswich IP4 2XA, before the 31

March, 1986.

SWLs may also apply for the award by supplying a similar list of QSOs heard between the appropriate G stations and others in their own country.

GB2CV

The 6th Citroen World Meeting is being held at the Cheltenham Race Course, Prestbury Park, Gloucestershire during the period Saturday 27 July until Wednesday 31 July 1985.

This year it is the turn of the UK to stage this international event and the '2CV GB' club was asked to organise it on behalf of Citroen Cars (UK), naturally leading to the choice of GB2CV as the special event callsign.

Three local clubs, Gloucester ARS, Cheltenham ARA and Smiths Industries RS will jointly handle the arrangements for this special event station.

Conditions permitting, all HF, 2 metre and 70 centimetre bands will be activated. It is hoped to include RTTY, SSTV and ATV operations.

Special attractive QSL cards are being provided by Citroen.

For further information please contact: Roger G8UJG, tel: (0242 67) 2175.

The Datatalk Register

With the ever increasing interest in amateur data communications, particularly in RTTY, AMTOR and Packet Radio, it has become evident that there is a real need for speakers to give talks at radio clubs on these topics.

The BARTG has now set up the Datatalk Register, which contains details of speakers, their specialist topics, and

the geographical areas they are able to cover.

Speakers wishing to be included on the register should write to Ian at the address below.

For a copy of the register, club secretaries are invited to write (enclosing an sae please) to: Ian Wade G3NRW, 7 Daubeney Close, Harlington, Dunstable, Beds LU5 6NF.

Tyne-Wear Repeater Group

Both of the Tyne-Wear Group's repeaters, GB3TW (channel R5, QTHL Z012J) and GB3NT (channel RB0, QTHL Z003A) are now operational.

GB3TW has had a complete rebuild by G4DWM (RF section) and G8YWK (logic system), and has given excellent service over the past year, suffering only two minor component failures in that time.

GB3NT is also completely new, employing the same logic design as its VHF brother, and since its commissioning in October of last year it has proved itself to be reliable. The group is awaiting approval for the resiting of this repeater, the proposed site being considerably better in terms of coverage than the present location.

All amateur repeaters are paid for by the members of the various repeater groups as there is no outside funding - the RSGB, contrary to popular myth, provides no financial assistance. If you

want the repeaters to continue to operate please join a group to help support them.

Anyone wishing to join this group should send the subscription (£2 minimum) together with an sae to the secretary: D S Williams G6FGP, Braeheds, Chopwell, Newcastle-upon-Tyne NE17 7JD.

Copies of the group's newsletter are also available from the secretary in return for an sae.

Heineken to refresh 2m

Heineken lager has stepped in to help a local radio group set a world record by refreshing the parts no-one else can reach on the 2 metre VHF band.

The top selling lager is to sponsor the West Kent Amateur Radio Society's attempt to make the first ever direct transatlantic QSO on the 2 metre band.

The group will be travelling to western Ireland in August to set up a temporary station 1500 feet up a Galway mountainside. They will transmit entirely over sea to the east coast of America and Canada, using high power to four stacked and bayed long Yagi antennae.

Schedules have already been arranged with several groups across the Atlantic. Transmission will be round the clock from 19-30 August. Modes of operation will be CW, Amtor and SSB. HF talkback will be set up to

assist the attempt.

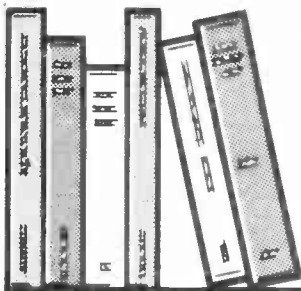
For further information please contact: Roger Hodson, Bryant Jackson, Haygarth House, 28-31 High Street, London SW19 5BY. Tel: 01-947 6339.

Jersey Island Award

An invitation is extended to all licensed radio amateurs and short wave listeners to participate in obtaining 'The Worked All Jersey Island Award' in either the VHF/UHF or HF categories. The island of Jersey is divided into twelve parishes, all of which currently count for the Worked All Britain Award, and the objective to win the WAJIA is to establish a full contact with a licensed GJ callsign from each parish under specified rules and conditions.

The award will take the form of a parchment certificate, suitable for framing, and will depict the outline of the Island of Jersey, showing each parish and the Heraldic Arms of the Bailiwick. Where possible the certificate will be signed personally by the operator of the GJ stations worked. Gold or Silver seals will be attached for the appropriate single mode endorsements.

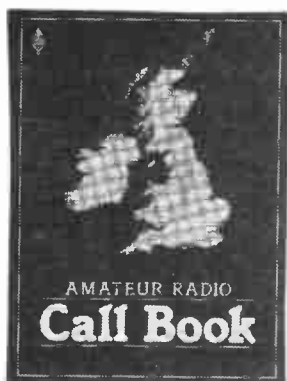
A rule sheet and details of how to claim the award are available from: Ken Kirk-Bayley GJ6OZB, Public Relations Committee member, Jersey Amateur Radio Society, PO Box 338, Jersey.



RSGB BOOKS

AMATEUR RADIO CALL BOOK

1985 EDITION



The latest version of this best-seller from the RSGB. An up-to-date and comprehensive guide to all UK and Eire call signs – and all in one book. There are more than 53,000 call signs listed in this expanded edition, and more efficient production techniques have allowed us to keep the cover price to a very acceptable level. The Call Book includes lists of RSGB affiliated societies, groups, and special call signs, plus the latest RSGB repeaters list. Most addresses given are the locations of the stations, thereby giving the VHF/UHF enthusiast an easy reference for beam directions. The Call Book first appeared at the NEC Exhibition, and is now readily available and is priced at £6.92 inc.

COMING SOON! Amateur Radio Software

Written especially for the RSGB, this extremely useful new book will have immediate appeal to all amateurs who want to make use of their home computers. There are many programs, listings and full instructions on how to make the best of both worlds.

Author Dr John Morris CM4ANB says there is hardly an activity in amateur radio where a computer cannot be used. Many subjects covered include vhf contests, scoring, component values, propagation predictions, where to point your antenna for moonbounce or satellite working, cw, and much more besides! How to write your own programs, and use the software to its best advantage is what this book is all about.

OTHER RSGB PUBLICATIONS

NEW! Amateur radio operating manual.....	£6.15
NEW! Radio data reference book.....	£7.00
Radio Amateurs' Examination Manual.....	£3.84
1985 World Radio TV Handbook.....	£19.81
VHF/UHF Manual.....	£10.58
A Guide to Amateur Radio.....	£3.91
Morse Code for Radio Amateurs.....	£1.64
How to pass the RAE.....	£3.42
Test Equipment for the Radio Amateur.....	£6.41

The RSGB is the national society representing all UK radio amateurs. Membership is open to all interested in the hobby, including listeners. The Society publishes a range of books, log books and maps for the radio amateur. A large selection of other radio and electronics books are also stocked, a full list is available on request. Contact the membership services section for more information about amateur radio, the RSGB and its publications. All publications sold by the RSGB are available at discounted prices to members.



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MM 100G As MM 100 except inputs are for 2 guitar + microphone £10.95 + V.A.T.

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AR/8/84



DX DIARY

News for HF operators compiled by Don Field G3XTT

In DX terms April opened with a bang and closed with a whimper. What is more, at the time of writing there is very little to look forward to during May and June. Time, perhaps, to get outside and repair and renovate the aerial system after the ravages of the winter snow and spring gales.

First of all, though, what was the bang? In late March (in time for the WPX SSB Contest) DJ6SI and DJ5RT appeared on the air from Uganda as 5X5BD and 5X5WR. They were relatively easy to work on 15, 20 and 40 metres, and even put in an appearance on the 30 metre band. What is more, it looks likely that this operation will be valid for DXCC purposes. QSL to their home calls.

Another good one was the operation from Christmas Island by VK9XB and VK9XG. These two put an excellent signal into Europe on 15, 20, 40 and 80 metres, and were heard (but not worked) in the UK on Top Band. QSL to their home calls, VK6IR and VK6DU respectively.

Navassa and Clipperton

Readers of this column will have followed the build-up to the Navassa Island expedition which appeared belatedly on the bands using the callsign FO0XX. The group had intended to operate from Revilla Gigedo (XF4) en route to Clipperton, but bad weather prevented a landing. The bad weather continued and, for a day or two, it looked as though they may even fail to land on Clipperton Island.

Eventually they did, and

were able to put several stations on the air.

What was particularly galling to European amateurs however was the way in which they always seemed intent on working the USA when the bands were open to Europe. A particular example was that on at least two mornings they had an excellent signal on 80 metre SSB, but only bothered to work a handful of European stations.

Only the SWLs came away satisfied. At the end of the day however most European amateurs who needed this one were able to manage a contact on 20 and/or 40.

The Navassa Island expedition, which was operational at about the same time as Clipperton, had also run into delay. In their case it was due to a damaged propeller on the boat which was taking them to the island. Once on the air the expedition seemed to get off to a slow start, but eventually amassed a very respectable number of contacts.

UK stations were able to work them on 15, 20, 30, 40, 80 and 160 metres. The official QSL route is to 6Y5NR, although GW3YDX has the logs for 6Y5FS/KP1 and is prepared to QSL Neville's contacts on receipt of an SAE.

Burundi

Later in April Ghis, ON5NT, showed us how an expedition should be run when he operated as 9U5JB from Burundi. Ghis is 9U5JB's QSL manager and went out as a guest operator. In this sense he had a head start over some expeditions in that Bull, 9U5JB, already had a good

station with an extensive aerial farm. Nevertheless, it reflects great credit on Ghis that he always seemed to be audible in Europe working the pile-ups on both CW and SSB. He made a particular effort on 80 and 40, and many UK stations were delighted to get a new one on these bands.

Bull is with the US diplomatic service, and Ghis conducted a similar guest operation during one of Bull's previous assignments in Benin when he held the call TYA11.

St Brandon and Revilla Gigedo

Now we come to the whimper. A group of Mexican amateurs put on a three-day operation from Revilla Gigedo towards the end of April but did not, as far as I am aware, work a single British station. Indeed, I know of only two contacts which they made with Europe as a whole.

Previous operations from the island by Mexican groups seem to have been characterised by a preponderance of Spanish language contacts with Latin American stations, and this recent operation seems to have been no exception.

For those who still need this one we can only keep our fingers crossed for a more serious DXpedition in a few years time when the sunspots start to return.

Another failure, albeit for a different reason, was a proposed operation from St Brandon (3B7) by SM0AGD and LA7XB. These two experienced operators got as far as Mauritius and appeared on

the bands.

However, they were unable to obtain permission to operate from any of the outlying islands. It appears that the authorities in Mauritius may be tightening up on the issuing of licences to foreigners because many foreign administrations fail to offer a reciprocal arrangement to Mauritian amateurs who wish to operate abroad.

Whatever the reason, it must be particularly frustrating to these two would-be DXpeditioners to travel several thousand miles only to be thwarted at the last hurdle.

Having read these various sagas, and if you have followed other expeditions over the years, you may sometimes wonder where the money comes from to finance DX operations from distant and exotic corners of the earth. In some cases the amateurs concerned are travelling on business and squeeze in some radio operation when time permits. In some cases wealthy amateurs finance their expedition activities from their own pockets. Others are less fortunate and, while prepared to make sacrifices of both time and money to put a 'rare country' on the air, cannot find the whole amount themselves. This is where DX foundations may be able to help.

DX foundations

One of the most well-known is the Northern California DX Foundation (NCDXF) which was founded in 1972 by K6KQN to assist radio and scientific events with funds and equipment and is sup-

ported by membership benefitting from those events. The Foundation received a substantial initial donation from W6BH and also draws income from its worldwide membership. According to their winter 1984 newsletter, there are 36 members in the UK out of a total membership of almost 3000.

The Foundation assists DXpeditions in various ways. It may help with the cost of transportation where no public transport is available (eg the last leg of the journey to a remote island), it may help with the cost of QSL cards, or it may help to provide equipment and ship this to operators in remote locations. In addition it maintains the world-wide chain of beacons on 14100KHz which I discussed in last month's column.

INDEXA

The International DX Association (INDEXA) was formed about 18 months ago to promote international goodwill through amateur radio by providing a worldwide network of private radio stations to assist hospitals, medical teams and the Red Cross, as well as other similar organisations.

Towards these ends INDEXA is prepared to help with equipment, QSL cards, training etc, in a similar way to NCDXF, but tends not to support expeditions to remote islands. Rather, it is more interested in encouraging amateur radio in third-world countries in such a way that amateur radio is seen in a favourable light by the authorities. The directors of INDEXA read like a 'Who's Who' of some of the world's best known and respected DXers.

HIDXA

The Heard Island DX Association (HIDXA) was founded by Jim Smith, VK9NS/P29JS, after the Heard Island DXpedition in 1983. The association was formed to provide an alternative to the US based foundations and includes some well-known DXers in its ranks. To date however it has received only limited support so that its activities have had to be kept to a very modest scale. Perhaps the strongest motivation behind the formation of HIDXA was the infamous race to Heard Island.

IDXF

This brings us to the International DX Foundation, based mainly in the eastern and mid-western states of the USA. The IDXF established great credibility in 1981 and 1982 by sponsoring and organising major, and immensely successful, DXpeditions to Desecheo and Navassa Islands in the Caribbean. These brought increased status and hence increased income to the IDXF, who then mounted an expedition to St Peter and Paul Rocks in the South Atlantic.

This expedition, unfortunately, ran into a host of problems. Many of these seemed to result from the fact that the group had worked on the underlying assumption that it would be just like going to another Caribbean Island. In practice they found the St Peter and Paul Rocks to be considerably less hospitable, which led to a number of logistical problems. There were also complaints about some of the operating practices adopted by the group. In consequence they came away looking for a major opportunity to restore their credibility with the DX fraternity.

Heard Island seemed to present such an opportunity and, as far as one can tell, most of the remaining resources of the IDXF were sunk into the trip despite the fact that Jim Smith was planning quite independently to operate from the island at the same time. Although the IDXF group reached, and operated from, Heard Island, little seems to have been heard of the IDXF since that time.

YASME

At rather the other end of the scale is the YASME Foundation, named after the boat used by Danny Weil, one of the earliest DXpedition operators and a founder of the Foundation.

YASME runs on—limited funds and tends to confine itself to low-key activities such as providing QSL support for expeditions (such as the recent effort from Clipperton Island). In particular, YASME has always handled the QSLs for Lloyd and Iris Colvin, who I have mentioned on several occasions in this column. In fact, the YASME Foundation has handled more than a quarter of a million

QSL cards for these two operators alone.

There may be other DX Foundations which I have not covered above. Even so, I hope I have been able to give you a flavour of what these organisations are and what they can achieve. Their activities are, of course, equally as relevant to the SWL as they are to the licensed amateur. You will have noticed that none of them are based in the UK, or indeed in Europe. It must come as no surprise that most of the money which flows into our hobby comes from the USA, but I sometimes feel it is a pity that there is no obvious means by which UK DXers can support one of their brethren who is off on an expedition.

Such help might be in the loan of equipment, the printing of QSLs, or something equally simple, but might make all the difference to whether a DXpedition is able to take place or not.

Sometimes one of the UK amateur radio dealers will provide some sort of sponsorship when British amateurs are involved in an expedition of either the HF or VHF variety, but this sort of direct commercial involvement is not always either available or desirable.

HF mobile

On a somewhat more light hearted note, while writing the above I found myself looking back over recent issues of the NCDXF newsletter. In one of them appears an item about some Californian amateurs who operated mobile with two 1KW stations in a truck.

The main antenna was — wait for it — a 2 element triband and yagi, about 10 feet above the roof of the truck and power was from two generators secured to the truck's tailgate. It could only happen in California . . .

Contests

June gets off to a good start with the RSGB's National Field Day during the first weekend of the month. If you are taking part, I hope the weather is kind. The All Asia SSB contest is scheduled for the 15-16 June, to be followed a week later by the RSGB's Summer 1.8MHz Contest. Finally, can I give you advance warning of the IARU Radiosport Contest on 13-14

July which is always a popular event with SSB, CW and mixed-mode sections. This last one is administered on the IARU's behalf by the ARRL (the US equivalent to our RSGB).

CW at Birmingham

One of the popular features of the HF stand at the recent NEC exhibition was the Morse tape. Such tapes are a feature of several of the US conventions and simulate a CW pile-up in which 100 call signs are heard over a five-minute period. Each call sign is sent at least twice, but often there are several calls being sent simultaneously. The idea is to see how many call signs you can correctly identify.

G3KDB achieved the highest score, copying 57 calls out of the 100. It was interesting to note that a number of well-known CW operators were struggling while other less well-known amateurs put in some very creditable performances indeed.

A similar tape will be run at the HF Convention in September, so why not start getting some practice in by dusting off the Morse key and using it on the air? Otherwise these Class B licensees, armed with their letters of variation might just start putting some of us to shame.

Books

When the bands are quiet and there is little or no DX around, an enjoyable alternative is to read about DXing. Unfortunately there are very few books on the subject.

One possibility is *The Complete DXer* by W9KNI which is, I believe, available from the RSGB and other UK suppliers.

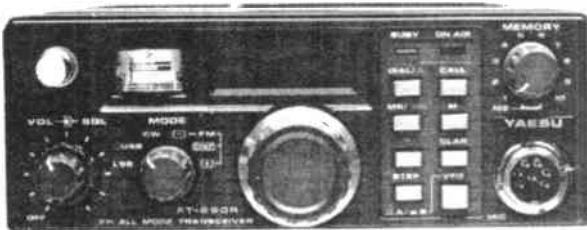
W9KNI deals almost exclusively with CW DXing but has an enjoyable narrative style and many of his hints and tips are equally applicable to the SSB DXer.

As a general guide to operating, the RSGB's *Amateur Radio Operating Manual* is, in my opinion, second to none. I would be interested to hear from readers about any other publications which they consider to be of particular interest to HF enthusiasts.

As usual, address all correspondence to me at: 105 Shiplake Bottom, Peppard Common, Henley RG9 5HJ.

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NATIONAL FIELD DAYS *are fun !*

Have you ever been impressed with the skill and operating technique of a contest operator? Have you ever marvelled at the contest operator who returns home after a weekend contest as fresh as a daisy? No, of course you haven't. Still, I thought that it was time someone took the lid off the contest scene. Here, for your edification, is a complete contest survival kit. The advice is the product of years of research, and a mis-spent youth.

So where does the young tyro make a start in contest operating? Well, things usually start at the local club (if you can find one). The typical amateur radio club scene is as follows: it will meet in the back room of a pub which doesn't do too much mid-week business. You know the sort of place I mean; where they have bouncers on the door just to throw people *in*. Two guides stand at the door armed with machettes and Davy lamps. The machettes to cut their way through the dense tobacco fog, and the lamps to show you the way in. (Owning a pub, rule 1: never let the customer see what he is drinking).

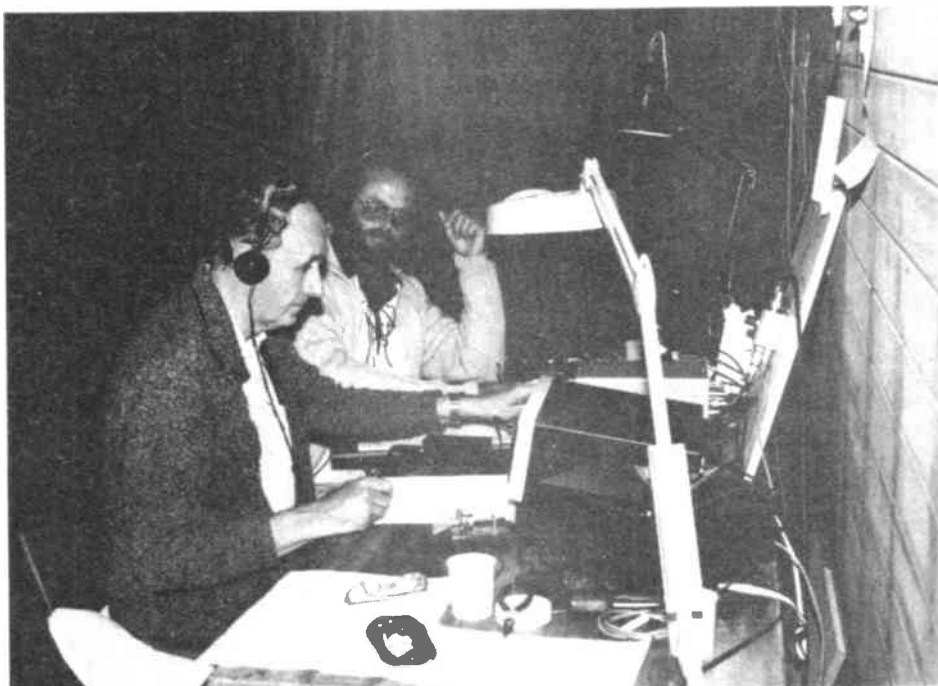
Dante's QTH

Picture the scene. You pause in the doorway, squinting around the room (because of the tobacco fumes). On one side of the room are the younger members of the club, all talking animatedly, arms flailing like junior Magnus Pikes on amphetamines. On the other side are the older members, pipes in full flow, occasionally stabbing the air with the stem of a pipe for added emphasis and nodding sagely between jabs.

As you enter the room conversation dies away. You walk self-consciously to the bar and ask for a pint of bitter in a surprised voice (surprised because you thought that your voice had broken years ago). The barmaid rolls her eyes at you. You pick them up, dust them and roll them back. Ha ha ha. Sorry about that but I've been trying to fit in that line for yonks. Meanwhile, back in the club. Most young people frequently mistake age for wisdom, so you sit next to some old geezer who then spends the rest of the evening telling you how marvellous things were in the good old days, when men were men and you had the total freedom to work on one band CW only, two hours a week to no more than four (named) stations. Yes, things were certainly better then, weren't they?

As you fall into an alcohol and nicotine induced stupor, someone suddenly says, 'I see that NFD is coming up soon'. Now, as a newcomer to the contest scene, you may well wonder why half of the room has burst into tears and the other half are off running to the bar/toilet/back door, and old Albert, who stopped running anywhere hundreds of years ago, suddenly starts tapping his hearing aid. This is the beginning of the end for the new contest operator if he is not aware of what is likely to happen next. The reason that everybody has QSY'd is because they all

... or so says
Kevin Fox G4MDQ,
who is, after all,
something of a lunatic.



You probably won't recognise these two from the front cover

know what is coming next. And sure enough, the next statement is, 'Could do with some help'.

Whatever you do, *do not* volunteer. Whatever you do now will directly influence the whole course of the rest of your life. But if you haven't read this contest survival kit it will already be too late. You will have volunteered yourself, and are consequently doomed to a lifetime of 'helping' at a contest station.

OK, it is understood that despite common sense and rational behaviour, you still want to go contest operating, so what will you need? Well let's just discuss one contest, NFD. What you need for that will do for all contests with minor adjustments.

But before we get down to details, what do you think that NFD stands for? I will give you a clue and tell you that it is held in June. No idea? Contrary to what you may have heard, NFD stands for National Fools Day. Or, if you are an old hand at contests you may know it better by its mnemonic: Normally Frozen and Drenched.

Keep that in mind and never forget that you have to be back at work on the Monday, fresh and raring to go, so it's not much good coming back from a weekend contest dirty, tired and hungry. These are my recommended weekend requirements. The more inventive of you will doubtless be able to add to the list; and don't worry about weight; someone else will be humping it for you.

Supplies

You will need: blankets, woolly underwear, padded headphones, a special tent, tranquillisers, mountains of food (more about that later), toilet tissue (again, more later), and a silly hat. This list may surprise you. No mention of radio equipment? Allow me to explain. You will need the blankets and the woolly underwear because NFD is held in June and, as everyone knows, summer is suspended during the course of NFD. The padded headphones are to keep your ears warm during the night. The special tent is needed because you will have to make strategic curves in it when

NATIONAL FIELD DAYS ARE FUN!

you erect it, to avoid those brown pancakes the younger members of the team delight in using as Frisbees.

Never, never take your own transmitting gear to a contest station. Being new, you won't know the terrible shelacking that contest equipment is subject to, from pats of congratulation to thumps, bangs and kicks of frustration and being stamped on whilst working some choice DX. Oh no, someone has to take their equipment, just make certain it's not *you*.

Food is the one area where most newcomers make their biggest mistake. As everyone else will not be bringing any, guess who will be feeding them all weekend? Obviously, you cannot hoard away mountains of food from starving hams, I mean it wouldn't be cricket would it? So what you do is this. Make up a packet of sandwiches as follows: three kipper and custard, and one ham sandwich. Half eat the ham sandwich, then say in a loud voice, so that everyone can hear you, 'Lovely, kipper and custard sandwiches, my favourite'. I guarantee that the rest of your food will be as safe as houses all weekend. This little ruse has only backfired on me once, and it happened like this.

About a fortnight after a contest, I popped around to one of the team's house for a natter. I sat talking to him and his wife, and eventually she asked me if I wanted to stop for tea. By the way, this never fails; hang around for long enough and they feel obliged to invite you for tea. Of course I reluctantly agreed to stop. After much hustle and bustle in the galley, his wife appeared with a plate of sandwiches. Yep, you're right. Bloody kipper and custard. 'Well,' said my ex-friend, 'you did say they were your favourite'. They both sat there with that look on their faces, the one you save for the village drunk when he sits next to you on the bus. With a supreme effort I ate the last sandwich, made my excuses and left, the journey home being punctuated with frequent technical yawns.

Lubrication

So much for food, what about drink? Of course, if you are going to be doing a lot of talking (and you will be), it stands to reason that your throat will get dry. Dry throats need lubrication. Tea and coffee are OK but their effects are neither long lasting nor cumulative. The best treatment for dry throats is a drop (or two) of 'falling over water'. I can say this after years of careful and meticulous research. I finally discovered the best type of falling over water is brandy.

It's no good turning up at a contest station clutching a bottle of three star brandy, because everyone else is just as aware as you are that brandy is the bee's knees for dry throats. No, what we are talking about here is camouflage. Whatever you do, do not disguise it in an empty liniment bottle. I did that once and some bright spark sprained his ankle tripping over a tent peg. I wept buckets as they rubbed my brandy all over his rotten ankle. Twenty minutes later, the

whole contest team was limping about, and my liniment bottle of brandy was empty. I never did discover whether my brandy was the cause.

Two-ply or not two-ply

You will need toilet tissue because in the words of Arthur Daley, 'It's a right little earner'. Within six hours of the contest station being set up, there will not be a dock leaf over an inch long for a radius of thirty miles. About five pence per sheet is right, but if you are a bit skint stick some paraffin into the beans and up the price to ten pence per sheet.

By the way, you will need a silly hat because everybody wears a silly hat on a contest station.

If you have a company car and company petrol you must keep this a secret. It's not only that you will be feeding the generator all weekend. No, the real problem is that seeing as it's your car it's up to you to get the petrol out of your car and into the generator. Consider the problems involved; take the case of Bill.

Bill, rather foolishly, always filled his company's car with company petrol before a contest and everyone knew this. Consequently, nobody ever brought any petrol for the generator. During the night the call would go round for more petrol, and Bill would volunteer his, never being one to stint where company petrol is concerned. Armed with a short length of rubber tubing, he stuffed one end into his petrol tank and began to make funny noises at the other end.

Go number 1: Bill turns green, spits out a mouthful of petrol onto the ground and gets a rollicking from the station manager for wasting petrol. The station manager tells Bill to spit it into the spare petrol can in future. 'If he's going to do it that way, at least get someone with a bigger mouth,' observes the station

comic. Go number 2: Bill sucks, turns green then red. Finally, to avoid another rollicking he swallows the petrol. Go number 3. Go number 4. . . Go number 37. Bill is now singing old Beatles' songs and wondering which of the three tubes is coming out of the five cars which he now sees, and which he should put into the seven mouths he feels sure he now has! Finally, Bill gets the petrol flowing into the spare can. The story would have had a happy ending, if only Bill didn't smoke.

By the way, make sure that your spare petrol can is a can and not an empty one gallon polythene bottle. I have lost count of the number of times our generator has been filled with cooking oil, vinegar and salad cream. However, it brings a whole new meaning to scrambled eggs!

Who does what?

The station manager will be making a list of who will operate and who will log and check log. Normal procedure is for all the club regulars to operate and all the newcomers to log etc. To avoid this, plead dyslexia. Tell them about the last time you check-logged a contest station. You remember? When the station made six hundred contacts, and at the end of the contest they found that they had actually only worked three stations two hundred times each! The next argument will be over operating times. The absolute worst times to operate are 0100 to 0600 hours and during the last three hours of a contest.

Avoid the 0100 to 0600 hours shift because there's never much around at this time during a VHF contest, and there's too damn much around during an HF contest. You will be so tired inventing excuses to avoid doing any work, you will be fagged out anyway. Tell the rest of the group about this rare tropical disease you have. The treatment for which

Spacious free car-parking at the NFD! Note the herbivorous onlookers standing aloof on dry ground



NATIONAL FIELD DAYS ARE FUN!

requires you to be horizontal with your eyes closed and practising deep breathing between the hours of 0100 to 0600 every night.

Avoid the last three hours of the contest because you will be making your getaway during this time. After arriving late (because you had to take the twins to trombone practice) and carefully avoiding all the work all weekend, it's pointless to spoil everything by stopping until the end to help clear away. Getaways deserve a whole article by themselves, but I will restrict myself to just a few hints and tips.

I should really be asking Cyril to write this part for you. I have seen all sorts of getaways in my contest life, but Cyril was the grand master of them all. Picture the scene: Sunday afternoon, the contest site looks like the aftermath of a nuclear test zone. Hams are falling about like tranquillised zombies. Suddenly, a car comes hurtling into the contest site, pulls up with a scream of brakes and a young man dashes from the car. He goes directly to old Cyril and says, 'Are you old Cyril... Dad?'

'Yes, son,' says Cyril, a man of few words. Young man-in-a-hurry continues in the same breathless urgency.

'Can you come home quick? A UFO has landed in the back garden and burst a water main, and it's flooded the whole house.'



'Not another UFO,' says old Cyril with asperity.

We are all so concerned at Cyril's misfortune, we pack his stuff into his car for him. We give him what petrol we have left, so he can save time by not stopping on the way back (so he tells us). We provide him with food and drink for the journey. Yes, as I said, Cyril was a master.

Obviously, it takes a master to get away with this; better to restrict yourself to things like, 'Gosh, is that the date? It's my wife's/mother's/son's birthday. Just got time to nip for a present'. If you are more adventurous you may try the old hospital dodge. Tell them you are going into hospital to have your wallet opened.

Finally, the actual operating itself. You either love contests, or you hate them.

Consequently, not a few of the people you will contact will be anti-contest. They will moan about your monster signal stopping them from working anything on all bands from Top to ten gigs. Never admit that you are wrong. Tell them that you used to have a receiver like that but you had yours repaired. Here are a few examples of the situations you are likely to meet on the air during a contest.

Comment: 'Do you know your signal is two megs wide?' Reply: 'No, but you whistle a few bars and we will all join in the chorus'.

Comment: 'Your signal has a loud buzzing noise on it'. Reply: 'Sorry about that OM, that's just the logger having a shave'. You get the picture?

There seems to be a popular misconception amongst contest operators that the faster you speak the more points you will score. The best way to talk is to disguise your voice as much as possible. Remember, it's not *your* callsign that's being used, so the only way people can get their revenge is to remember your voice. Unless you are a real masochist, never let them use your callsign. Remember, all the complaints will come direct to you.

So there you have it, the complete contest survival kit. Remember the first rule of a competent, caring and conscientious contest operator: *if in doubt blame someone else!*

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Silver	10	15	30	600 Km
Gold	15	25	45	900 Km
1296MHz				
Bronze	3	10	10	300 Km
Silver	6	15	20	500 Km
Gold	9	20	30	700 Km

The opening date is 1 January 1985 and further details are available in *On the Beam* (page 44)

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ANGUS MCKENZIE TESTS

Eighteen months ago I reviewed the Trio TW4000A dual-band FM mobile rig in *Amateur Radio*, and at the time I gave it a very warm recommendation. The Yaesu FT2700RH has now arrived and is very clearly highly competitive with the Trio rig, having almost identical facilities, but with a few major differences.

I prefer to write a review bearing competition in mind, and as will be seen later, a choice between the two rigs is not straightforward as they both have pros and cons.

The Yaesu FT2700RH is primarily intended for mobile use and it comes complete with a mobile mount and has a captive 13 volts dc lead with bullet connectors around 20cm from the back panel, the remainder of the lead being very long and supplied with inline fuses on both positive and negative leads.

The antenna interconnections are on sockets mounted on the ends of short coax leads coming out of the rear panel. Each of these again is around 20cm long, and whilst the 2m lead is fitted with an SO239, the 70cm one has an N-socket. This all makes for very easy installation and removal of the rig from the mobile mount. The rig is extremely small considering that it has a capability of operation of either band with a maximum power output specification of 25 watts.

Lightweight

The dimensions are 150mm wide, 50mm high and 168mm deep, the weight being around 1.5Kg. A bail stand can be clipped onto two screw-on protrusions either side of the front, and this allows the front of the rig to be raised well above table level when it is being used as a home station.

The loudspeaker is mounted underneath and so the sound bounces off the table and then forwards. One of the main differences between the rigs is that the Yaesu allows one to transmit on one band whilst simultaneously receiving on the other. This duplex mode is most effective when two stations are using it simultaneously, although one of the stations will have to either wear headphones, or use an extension speaker which is well separated from the microphone.

Full coverage

The frequency coverage is 144-146MHz and 430-440MHz, each band when selected having the usual facility of \pm the appropriate repeater shift, 600KHz for 144MHz and 1.6MHz for 430MHz bands. The simplex/repeater switch has three click positions – easier to use (but slightly stiff and small) than on the Trio which has a cyclic change button.

A button gives a true reverse repeater function when pushed which locks the rig in this mode until pushed again. Push-buttons select several important func-

tions. Channel spacing can be set at 12.5 or 25KHz steps, these operating either from a step tuning knob on the front panel, or from up and down buttons on the microphone. The microphone also includes a normal PTT lever, and a speech enable button.

An optional extra is the voice frequency-readout board which can either give a readout when the frequency is changed by any means, or it can be commanded by pushing the button on the mic. A small switch underneath the front of the rig determines whether the speech readout is automatic or manual.

Other push-buttons on the front panel select display dim, high or low power output (nominally 25 or 3W), two-tone squelch functions which operate an optional FTS-8 tone squelch unit, memory write, priority enable, and up/down MHz buttons (these also control memory stepping when that mode is selected).

Two rocker type buttons, which can be pressed at either end to give two separate functions, control the choice of VFO A or B, VFO or memory operation, manual 1750Hz toneburst (tone is enabled for as long as the button is pushed together with Tx) and immediate access to a calling frequency. The 144MHz calling channel can be set as required by the user but a second call

channel on 433.4MHz is preset by Yaesu and we could find no way of changing it.

Two more single buttons select programmable memory scan (this can define the limits of scanning between memories 9 and 0) and duplex mode enable. In the duplex mode you set the required Rx and Tx frequencies on VFO A and B. You then select the duplex mode and you will receive on the selected VFO and transmit on the other one. Whilst you are transmitting, the tuning controls will vary the Tx frequency, but if you relax the PTT you can then alter the Rx frequency.

Priority

The priority channel facility allows you to keep a watch every six seconds on the selected memory channel when you are using the VFO mode. This is an extremely useful function as you can select the priority frequency by going round the memories.

There are ten memories into which you can write frequency and repeater shift or separate Tx frequency.

If repeater or Tx separate is entered, the repeater switches will then not operate. According to the instructions, you cannot enter the repeater switch status into memory unfortunately (but see later), and I consider this rather poor ergonomics.



YAESU FT2700RH 2m/70cm DUAL-BAND FM MOBILE TRANSCEIVER

G3OSS TESTS

Additional switches underneath the front of the rig select auto toneburst, but unfortunately this then becomes active on simplex and repeater shift which is quite annoying. Other switches select delay on/off when a station is found in a scan, and memory back-up on or off.

Speech defect

The accessory speech module, type FVS1, produces rather poor quality artificial speech, and several of the spoken words are totally wrong. 'VFO B' comes out as 'VFO V', and the decimal point word sounds rather like 'woink'. As normally supplied the reading speed is far too slow, which will almost drive you mad, but you have the option, if you cannot stand Japanese English, of having the readout in pure Japanese!

Although it is possible to change the board connections for a speed-up, the instructions are extremely vague about this. The board is also slightly fiddly to install. The readout also tells you if you have selected memory, giving the channel number and frequency. Entering a complete repeater into memory by the book method is rather laborious, and once a Tx frequency has been memorised, the position of the repeater switch will not affect the shift.

Alternative method

However, we experimented with entering a repeater shift by a non-recommended method which is far simpler. All you have to do, having selected the memory channel, is to return to VFO, select the repeater channel, then select repeater shift, press write whilst on Rx, then press PTT and write again, after which you will find that you have stored the repeater shift into memory. So what is wrong with the instructions?

I used this rig for several weeks before writing the review. There was a complication in that all the measurements were done on a sample kindly loaned by SMC which excluded the speech readout. After all the lab tests, when using the rig on air, the 144MHz PA went wrong, although the 430MHz one continued to function. The rig was sent back to SMC for them to rectify the fault, which turned out to be a poor internal connection.

In the meantime, Amcomm in Harrow kindly loaned me a second sample together with a speech board, and this sample was faultless. It is of course the luck of the draw and no retailer can ever guarantee that some silly fault will not suddenly rear its ugly head.

I am a little concerned that the FT2700RH gets very hot indeed, and this concerns not only the heatsink on the back but also the buttons on the front which get quite hot after a while, partly from the display lamps but also from the accumulated heat developed internally. I wonder if Yaesu have perhaps made the rig a little too small as the inclusion of a fan would have helped matters a lot.

The frequency display is a large LCD panel which also indicates many status functions. It is quite bright but a little

smaller than the Trio display, and the latter was slightly preferred by my colleagues.

On the front panel the usual Yaesu 8-pin mic socket is mounted, whilst the only additional facility on the rear panel is a 3.5mm jack socket for interconnecting an external speaker. Note that the TW4000A has a control socket on the rear which can be easily modified to give an external relay changeover, and Lowe Electronics can supply the appropriate components, whereas the Yaesu would have to be used with RF sensing accessories.

Subjective tests

There seemed to be quite a lot of gain in the mic amp and full deviation of average speech was reached when my colleague or I talked quite a few inches back from the mic. The mic quality was slightly coloured and perhaps very slightly thin.

Consonant sounds seemed to be slightly compressed particularly through repeaters, whereas the Trio rig seemed more intelligible through a repeater. Perhaps excessive HF output from the electret mic pushed the limiter too far.

Quality was thought good on simplex, both on Tx and Rx. The auto toneburst on/off switch under the front was particularly awkward to use and would have been better on the front panel.

We found one very irritating ergono-

mics problem with the MHz buttons. For example, if you were on 145.775MHz and wished to QSY down 1MHz and you accidentally pressed MHz up instead of down, or you were below 145MHz and pressed down instead of up, you would suddenly find yourself at the edge of the band, having lost the KHz setting. It is so easy to push the double-ended rocker switch the wrong way, and you could have a dreadful problem if you did not take a mental note of your original frequency. The Trio TW-4000A MHz buttons retain the KHz setting.

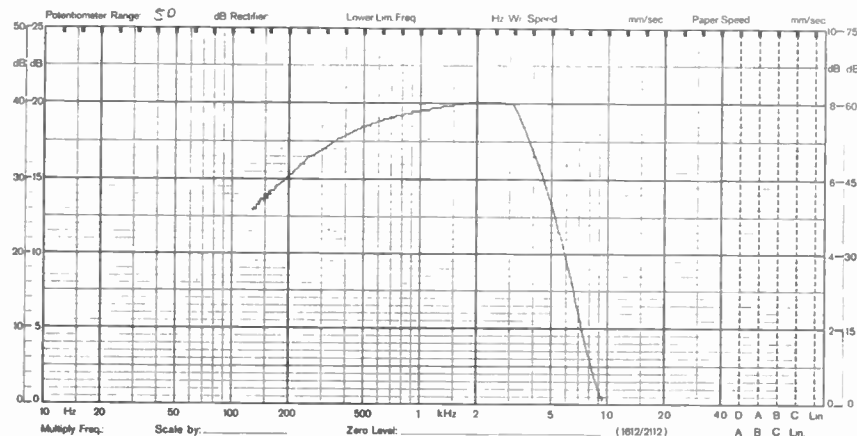
In general use the 12.5KHz selectivity was clearly not good enough and a rig advertised as having this spacing should have a narrower Rx filter. These criticisms though are just little niggles about a rig which is basically very sound and gave me a lot of pleasure to operate.

The receiver seemed very sensitive and absolutely no blocking problems were noted. I used the duplex mode very successfully, but of course one has to avoid harmonics, ie if you transmit on 145.4MHz then you will have to avoid receiving on 436.2MHz, possibly even plus or minus a channel.

Laboratory tests

The RF sensitivity on both bands measured very well, 2m being slightly better than 70cm. The RFIM performance on the 2m section measured superbly well with an input intercept point at

FT2700RH Tx response (750 μ S de-emphasis). Below limiting



FT2700RH Tx response (750 μ S de-emphasis). Into limiting



G3OSS TESTS

+2dBm, as good as I have ever measured on an unmodified Japanese black box. On 70cm though the intercept point was rather poor at -19.5dBm, although this parameter is nowhere near so important on UHF as band occupancy is so much lower.

25KHz selectivity measurements were excellent, but I was very disappointed with the 12.5KHz selectivity which is important on 2m. The IF filter width should clearly be narrower. The S-meter gave a useful range of 19dB between S1 and 9, but the bargraph indications only showed odd numbered S-points, although even S-units were displayed but not numbered.

Limiting

FM limiting was reached on the weakest possible signal, so all readable signals should reproduce at similar audio levels dependent only on their deviation.

The discriminator and audio distortion measurements were very good and nearly twice as much power was available into 4 ohms as into 8 ohms, which could be very useful if you wanted to connect two 8 ohm speakers in parallel in a mobile installation.

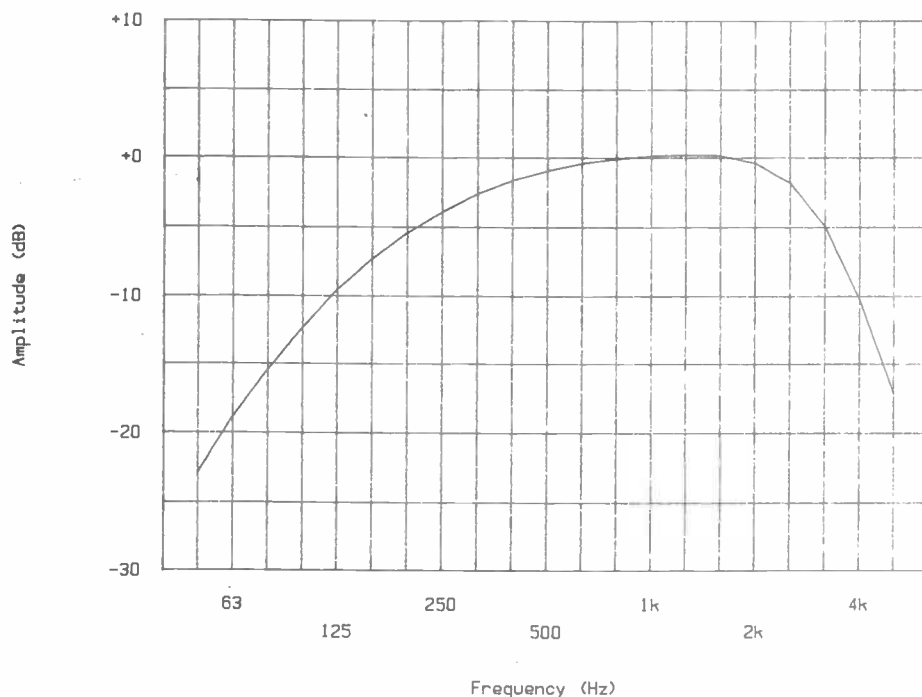
So often I have felt that 2 watts or so is insufficient in a car and it has to be admitted that most mobile enthusiasts run their audio output stages into clipping most of the time when they are driving through traffic which I tend to find slightly oppressive. A 4 ohm loudspeaker, if you can find a sensitive one, will give a marked increase in audio power before distortion becomes apparent when used with this rig, but many other rigs give only marginally more power into the lower impedance because of audio current limiting.

The audio frequency response, measured with 750µS pre-emphasis, was just about ideal, showing a useful LF cut below 250Hz and steep HF cut above 3KHz, the response being very even at voice frequencies. The audio quality was considered excellent and the internal speaker of acceptable quality, being reasonably efficient. The use of an external speaker, however, which should be forward facing, is recommended as it will improve the clarity of consonant reproduction.

Capture ratio

Capture ratio measured well, showing that the rig will discriminate a stronger signal well against a weaker one in the background. Distortion at very low levels was quite low, for at the 12dB sinad point the quieting measurement was just 14dB. The frequency accuracy was excellent on both bands on Rx and no significant improvement could be made in sensitivity by slightly offsetting the signal generator frequency.

The power measurements on transmit showed that slightly more than the specified power was produced across the 2m band, whilst 29 watts was given on 70cm. We noted just under 10dB power



FT2700RH FM received audio response (750µS pre-emphasis)

YAESU FT2700RH LABORATORY RESULTS

Receiver tests on 2m

Sensitivity
Level required to give 12dB sinad, 1KHz mod, 3KHz deviation
144.025MHz -124.5dBm
144.950MHz -124.3dBm
145.975MHz -124.3dBm

Selectivity
On channel 1KHz mod, off channel 3KHz mod, both 3KHz deviation
±25KHz 77/77dB
±12.5KHz 9.5/8.5dB

Quieting at 12dB sinad point 14.0dB

S-meter
Levels required to give the following S-meter readings
S1 -117dBm
S3 -107dBm
S5 -104dBm
S7 -101dBm
S9 -96dBm
Last LED -94dBm

Total harmonic distortion at 125mW into 8 ohms, 1KHz mod
3KHz deviation 1.7%
1KHz deviation 1.4%

Maximum audio output power for 10% THD: NB 5KHz deviation
8 ohms 2.3W
4 ohms 4.2W

Capture ratio 3.8dB

Calculated intercept point
Carriers +50/+100KHz -4.6dBm
Carriers +100/+200KHz +2.4dBm

Receiver tests on 70cm

Sensitivity
Level required to give 12dB sinad product
432.025MHz -123.0dBm
433.400MHz -123.5dBm
435.975MHz -123.5dBm
439.975MHz -124dBm

Calculated intercept point
Carriers +50/+100KHz -19.5dBm
Carriers +100/+200KHz -19.5dBm

Transmitter tests

	2m	70cm
Power output		
High	25.6W	29.4W
Low	2.4W	2.95W
Tx accuracy	+50Hz	+570Hz
Repeater accuracy	within 10Hz	within 10Hz
Repeater tone	within 1Hz	within 1Hz
Repeater tone deviation	3.8KHz	3.6KHz
Maximum speech deviation		both bands 5.7KHz
Normal speech deviation		both bands 5KHz
Harmonics and sprogs		all below -65dB on both bands

reduction on the low power positions. On 2m the frequency accuracy was incredibly good, but a 570Hz error was noted on 70cm.

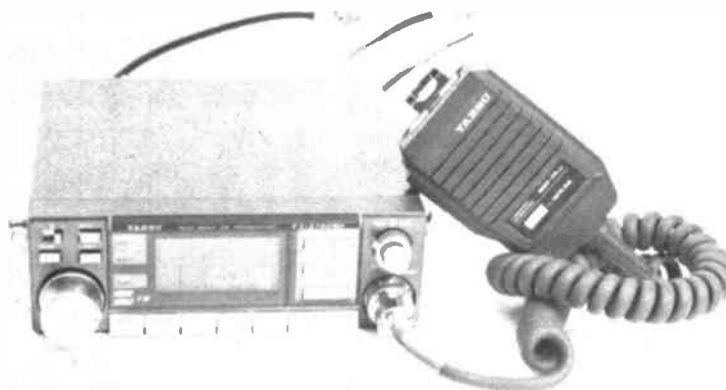
The repeater shifts were correct to within 10Hz, whilst the toneburst frequency was within 1Hz. We checked the average peak deviation of normal speech fairly close to the mic and obtained around 5KHz, although 5.7KHz could be produced by intense provocation, which frightened the cat.

The transmitted audio response seemed just about ideal for a mobile, 500Hz to 3KHz being virtually flat, and a steep LF cut was noted, although HF cut was not quite steep enough above 3KHz. The response into limiting was just about ideal. No harmonics or spurious problems were noted on the spectrum analyser above the noise floor of -65dB.

There is a safety power shut-down mode which cuts power down to around 3 watts if the PA gets excessively hot. This means that you will gently fade away, especially on the duplex mode if you go rabbiting on too long! We did not notice any drift problem on either band.

Summing up

I am most impressed with this excellent new rig from Yaesu, which includes some interesting innovations. Its very small size, with high output potential on both bands, is an asset but you will have



to allow for plenty of ventilation around the back in a mobile installation.

Most of the ergonomics are very well designed but I have to admit that I prefer to operate the Trio alternative, which has particularly fine ergonomics with far more facilities provided on the microphone. The Trio rig is larger and it does not get quite so hot; its speech is far superior and it offers immediate access to two of the memories. It is more awkward to install in the car though, as the antenna sockets are mounted on the rear panel. The one disadvantage with

the Trio is that it excludes 12.5KHz channelling on the 2m band.

Taking all into consideration, and the fact that both rigs are now around the same price, the choice is obviously going to be highly personal. I suggest that you plough all the way through both reviews before coming to your decision.

A fascinating and most important new rig then from Yaesu. Thanks to both SMC and Amcomm for loaning review samples, and to my colleague Jonathan G1LMS for all his help in the subjective and objective tests.

YAESU FT270RH HIGH POWER 2m FM MOBILE TRANSCEIVER

There have been comparatively few high power FM mobiles available up until fairly recently, and this rig is specified as giving 45W FM when supplied with 13.8 volts dc. It covers the band 144-146MHz, and includes minus and plus repeater shifts. Ten memories are incorporated together with two VFOs. The tuning knob rotates in click steps which can be set to be 12.5 or 25KHz spacings.

The microphone has up and down buttons which either step frequency channels or can put the rig into the scanning mode when held down. In the memory mode they can switch memory channels. Normal PTT is included, together with a speech readout enable button if the optional FVS1 speech board is fitted. The rig is very small, measuring 140mm wide by 40mm high and 162mm deep, the weight being 1.2Kg.

It is supplied with a removable bail stand which can raise the front about an inch to allow the audio to be heard from the speaker which is mounted underneath. The speaker is very small unfortunately, and thus produces a very thin sound quality, although it is very clear.

Controls

Front panel controls include switches for high/low power, simplex/repeater minus or plus shift, a reverse repeater function which locks on and off, step size, tone and tone set, both of which operate with the optional tone squelch board, priority enable, which allows monitoring once in every six seconds of the pre-selected memory channel when



G3OSS TESTS

the set is in the VFO mode, memory write and recall, and VFO A or B selection.

A rocker switch selects MHz up or down but there is a snag with this, for if you push it the wrong way the frequency is changed to either 144.0 or 146.0, and you immediately lose the KHz setting. This is rather infuriating if you absent-mindedly push it the wrong way. The MHz button also selects up or down memory channels.

A program memory scan button enables a scanning mode between the frequencies stored in memories 9 and 0. A T call button switches the rig to Tx and applies a continuous 1750Hz tone.

Awkward

Underneath the front panel are four extremely small slide switches which are awkward to use. These select auto toneburst on or off (unfortunately when switched on the burst occurs on simplex as well), scan delay when a station is found, memory back-up off/on, and speech readout in automatic or manual mode. When the latter is switched to auto, the readout is given when the frequency is changed as well as when the readout button is pushed on the mic, which does get rather tiresome after a while!

The speech board is the same as is used in the FT2700, and the speech quality is fairly dreadful (see FT2700 review). The frequency is displayed digitally on a small LCD together with status indications. It is quite easy to see at a moderate distance, and over quite a wide viewing angle.

A standard Yaesu 8-pin mic socket is mounted on the front panel. You can store transmit frequency in memory for repeater use, in which case the simplex/repeater switch will not function.

The dc input lead is captive and fitted with bullet connectors around 20cm from



the back panel. The remainder of the lead incorporates fuses in both positive and negative wires, this lead being nearly 3m long, almost long enough for a bus! A 3.5mm jack socket is provided for plugging in an external speaker, and a heatsink almost completely covers the back, in which there is a fan which comes on when the rig attains rather a high temperature, normally after three minutes or so. This fan is rather noisy, the sound it produces being that of a hissy whirr. When you go back to Rx the fan continues to blow until the temperature is reduced fairly considerably.

The antenna socket, an SO239 is fitted on a 20cm long captive co-ax lead fitting into the rear panel. Thus the rig is very easy to install and remove in a mobile

installation, a mobile mount being supplied together with the mic and bail stand when you buy the rig.

It is a pity that the push-buttons are not back illuminated, although fortunately the tuning knob escutcheon is.

Subjective comments

The fact that this rig is both very sensitive and can give a very high output power will make it an ideal one for mobile operators who have a healthy battery, for it takes around 8.5A when on Tx. Many repeaters are somewhat deaf, but this rig should allow you to get into such repeaters once you can hear them on the output. You will have an extra chance of getting a contact, especially with other stations who may be running linears.

The reproduced audio quality from the internal speaker was very limited in LF and even MF reproduction, although high frequencies were very clear. I found it a little tiring to listen to, but when I connected an external speaker the quality was far better – indeed excellent, but if anything, possibly too bassy, so you cannot win!

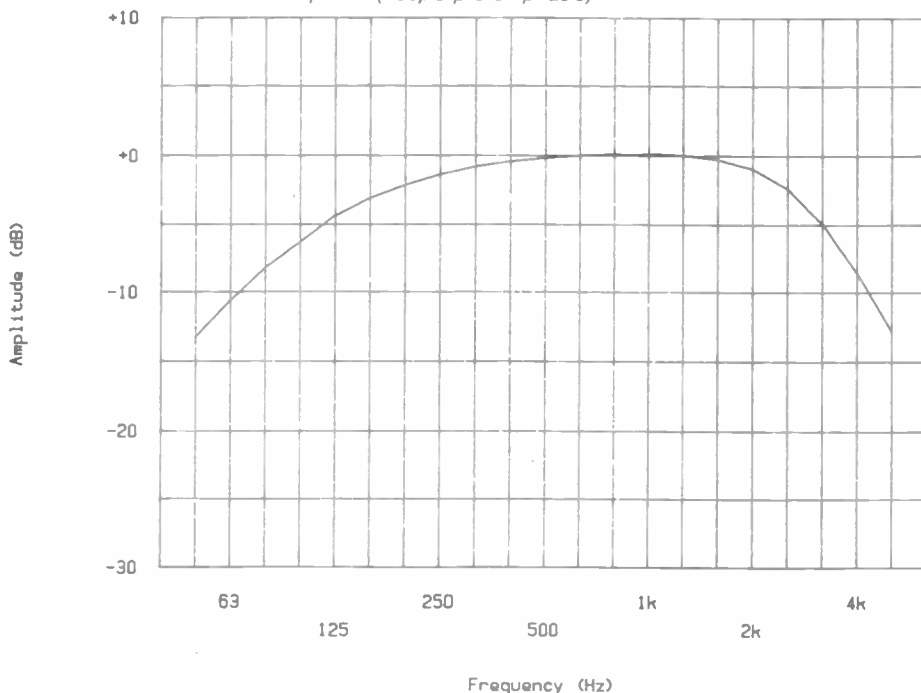
Tx quality

The transmitted quality was very good, although deviation was set a little too high.

I felt that the layout of controls was a little confusing and cramped, although this is the result of miniaturisation and the inclusion of two buttons for tone squelch operation with an optional board that is not likely to be used in the UK.

Occasionally when I turned the tuning knob it lost a channel, but this is fairly common with this type of control. All the facilities worked well and allow great flexibility in operation, but I cannot help wondering if many potential users would not prefer much simpler facilities at a lower price but with the same high power potential.

FT270RH FM received audio response (750 μ S pre-emphasis)



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Although this rig is provided with 12.5KHz frequency stepping, the appalling adjacent channel selectivity will not allow a user to receive a fairly weak signal spaced only 12.5KHz away from a much stronger one, and quite clearly Yaesu should have installed a narrower IF filter. I feel this is an important point if the rig is going to be used around the London area, for example, in which 12.5KHz channelling is frequently used, especially below 144.875MHz.

When I used the rig on a very gainy vertically polarised antenna, there was absolutely no trace of any RF intermodulation distortion, and this is a highly significant improvement over earlier Yaesu rigs which nearly went crazy when one passed high power transmitters etc. What a difference between this rig and the FT227R, a well tried old war-horse.

Laboratory tests

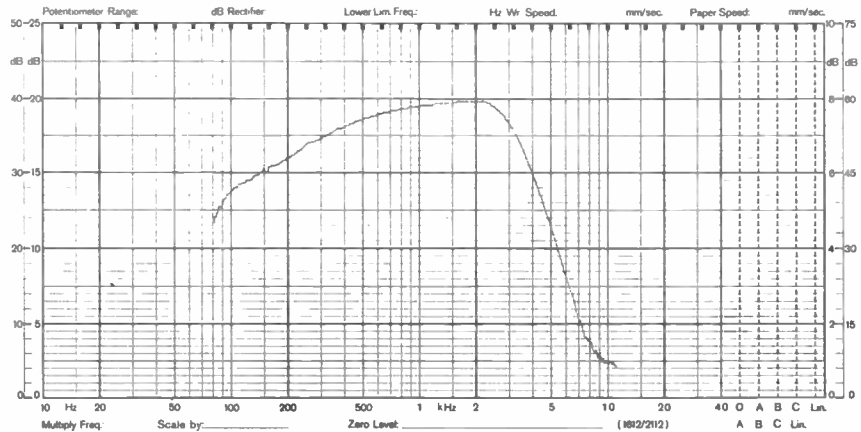
The RF sensitivity was extremely good, and as good as one needs for FM mobile. The RFIM measurements were all superb, and the input intercept point measures astonishingly well. 12.5KHz selectivity was extremely poor although it was excellent at rejecting 25KHz spaced stations, even if they were very strong. The S-meter, a series of seven lemons and three cherries, was very poor, showing only 12.5dB difference between one lemon and a fireworks display!

FM limiting was reached at an extremely low level input, which is fine, and very low level signals reproduced with low distortion as well as high level ones, rather inferring that the filter was too wide. The quieting performance closely followed that of the sinad measurement, again showing the same thing. Audio distortion was minimal, but the available power output is barely adequate for a mobile and there was not quite enough power increase into 4 ohms.

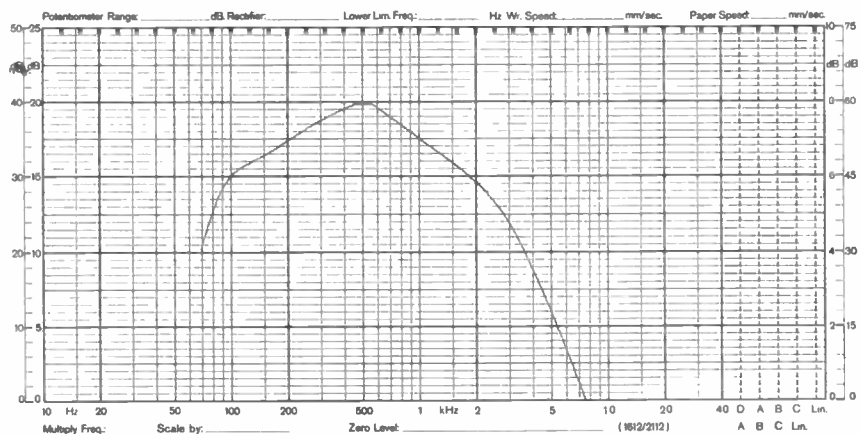
The received frequency response on the external speaker jack showed insufficient bass cut, which was not steep enough, the same slight criticism also applying to the high frequency end above 3KHz. Received frequency accuracy was excellent, and there was no apparent sensitivity improvement if we offset the signal generator frequency either way.

The maximum transmitted power was very marginally below the specified level, but I do not want to split hairs here. When low power was selected power output was reduced to just below 5 watts. Maximum FM deviation on normal speech peaks was slightly high, but when subjected to extreme provocation it actually went somewhat higher on a transient, but this test almost frightened my domestic pets! I have now recovered from a sore throat.

We checked for harmonic and spurious outputs, but noted none of these above the noise floor of my spectrum analyser. Frequency accuracy was excellent, and one cannot possibly grumble about just a



FT270RH Tx response (750µs de-emphasis). Below limiting



FT270RH Tx response (750µs de-emphasis). Into limiting

YAESU FT270RH LABORATORY RESULTS

Receiver tests

Sensitivity
Level required to give 12dB sinad, 1KHz mod, 3KHz deviation
144.025MHz -124.5dBm
144.960MHz -124.5dBm
145.975MHz -124.0dBm

Selectivity
On channel 1KHz mod, off channel 3KHz mod, both 3KHz deviation
± 25KHz 68/68dB
± 12.5KHz 6/6dB

Quieting at 12dB sinad point 12.6dB

S-meter

Level required to give following S-meter readings
S1 -110dBm
S3 -105dBm
S5 -102dBm
S7 -100dBm
S9 -97.5dBm
Last LCD -96dBm

Total harmonic distortion at 125mW into 8 ohms, 1KHz mod
3KHz deviation 1.2%
1KHz deviation 1.0%

Maximum audio output power for 10% THD
8 ohms 2.2W
4 ohms 3.6W

Capture ratio 3.8dB

Calculated intercept point
Carriers +50/+100KHz 0.0dBm
Carriers +100/+200KHz -1.3dBm

Transmitter tests

Power output high/low 44.3W/4.7W

Transmitted frequency accuracy 30Hz high

Repeater shift accuracy within 10Hz

Toneburst frequency accuracy within 1Hz

Toneburst deviation 4.7KHz

Speech deviations normal/provoked 5.777.1KHz

Harmonics and sprogs all below -65dB ref full output

Size (W) 140mm x (H) 40mm x (D) 162mm

Weight Approx 1.2Kg

G3OSS TESTS

30Hz error. The repeater shift accuracy was within 10Hz and the 1750Hz tone was within 1Hz, its deviation being only slightly on the high side. The S-meter also gives an output power indication, red for high power and around three lemons for low power! During the tests the cooling fan came on after about three minutes of operation, and this became rather irritating.

Conclusion

I feel that this is quite a useful rig, although its price is rather high. The RH version is at present priced at £399 including VAT, but there is also the R version which costs £50 less and which gives 25 watts out, so £50 seems rather a lot for an extra 2.5dB, and if you are lucky, an extra lemon at the other end.

I have to be critical about the overwide IF filter but there is nothing else to moan about, and I would not be surprised if this becomes quite a popular rig which can



be warmly recommended in more senses than one! Just the rig to warm up your feet in the winter if your car is not already too hot with an overactive heater!

Many thanks to SMC for loaning the review sample, and to my colleague Jonathan (G1LMS) for helping me with all the measurements.

Some months ago I strongly recommended two muTek 2m pre-amps as the best on the market, and at the same time I gave a reasonably favourable review to the Microwave Modules product. muTek recently introduced the SLNA144S which now becomes my top recommendation for lower priced pre-amps, as it far outclasses the Microwave Modules one in most areas.

The muTek product is housed in a diecast box which is very well finished and supplied with BNC input and output sockets. It has three solder terminals for ± 13 volts dc and a press to talk line, whilst on the side of the box is a switch to select immediate or delayed relay switching back to Rx from Tx.

An RF sensing circuit is included, and up to 100 watts can be passed through the unit on Tx without any harm occurring. It will transfer to Tx at an input level of around 100mW which is sensitive enough for most applications. The input noise figure is around 1dB, thus slightly better than that of the Microwave Modules model, and the gain peaks at around 15dB across the 2m band.

The gain plot shows gain in dBs versus frequency, and this plot clearly shows that the bandwidth is far narrower than that of almost all other pre-amps except for the other muTek models. The gain is in fact 20dB down from maximum at just under 14MHz bandwidth, thus showing excellent rejection of out of band signals as compared with most of its competition.

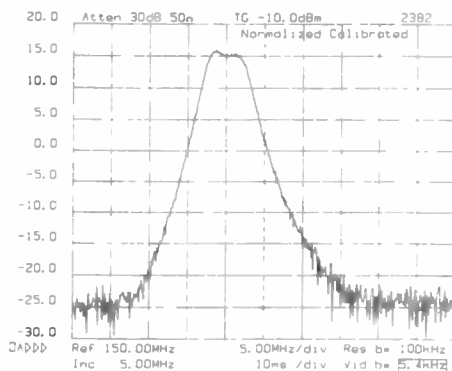
This performance is remarkable, for the unit costs just under £40, which is only a little more than the Microwave Modules unit. The only parameter that is marginally worse but still excellent is the input RF intercept point of -3 dBm. muTek informed me that they are in the course of redesigning this model to improve this, and it should end up by being better by around 3dB.

The new version, which should be on sale in the summer, will also have a

muTek SLNA144S

2m Rx

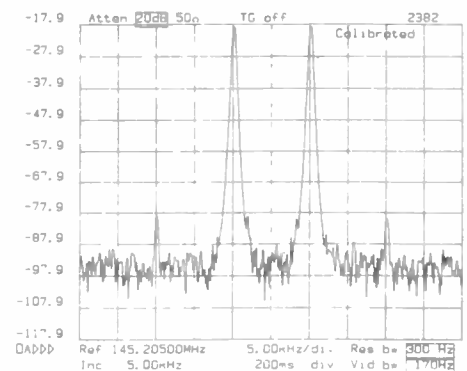
PRE-AMP



Received gain plot of the SLNA144S

variable gain preset. The PTT facility, which is fitted to all units, will be a great asset to those using CW and SSB, and you would probably be able to use this model at the masthead if you applied suitable gasket sealant in between the lid and case and around the sockets etc. You would probably have to remove the switch for this application and jumper the appropriate internal connections.

The hold time is indeed almost instantaneous, or around 1 second. Note the RFIM plot which shows the products developed from two input carriers at -33 dBm, the point at which the third



Two tone plot, carriers spaced 10KHz

order products are 60dB lower.

muTek also offers a 50MHz model with very similar specifications (£44.90) and a 70MHz version is available to special order at £39.90, again having a very narrow bandwidth.

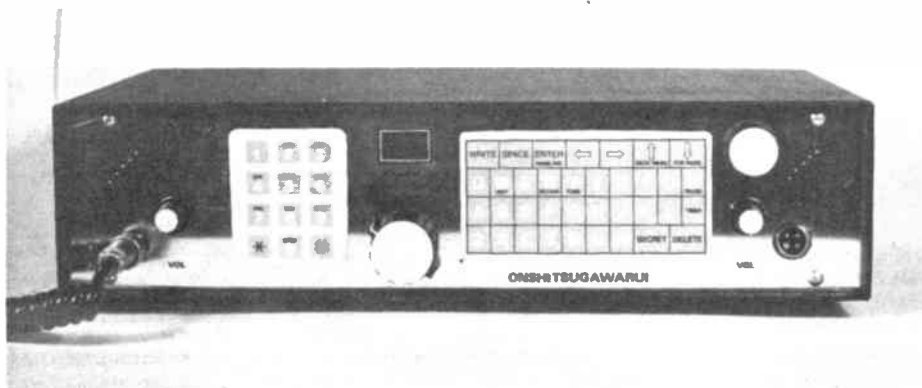
Conclusions

I have no hesitation in recommending the muTek SLNA144S 2m pre-amp for all normal uses, and it is excellent value for money. Its most important feature is the narrow bandwidth, but all its facilities will be useful, allowing it to be very flexible.

ONSHITSUGAWARUI

MULTIMODE DUAL BAND

HANDITALKIE



Every now and then a reviewer is confronted with a rig that is highly innovative and this new one has some incredible facilities which I have never seen on a rig before. It covers both 2m and 70cm, having two dual band whips on the top which interconnect with dezifix B miniature coaxial connectors, well known to Rohde and Schwarz fans.

Although the rig transmits from 144 to 146MHz and 430 to 440MHz, it can receive from 50MHz to 500MHz in 1, 7.5 or 15KHz steps. FM, AM, USB, LSB, and CW are incorporated, and the rig even has the facility for transmitting on the opposite side band to that received, thus assisting higher band occupancy. This allows a listener, by tuning dead centre, to hear two transmissions at once.

One incredible facility, introduced after much thought, is the provision for spread spectrum transmissions on up to ten frequencies at once, thus providing a far greater possibility of getting a reply to a CQ call. The rig searches all the chosen Tx frequencies in the split second before Tx, and cuts out from Tx any frequencies that it sees occupied. After a spread spectrum CQ call, it scans extremely rapidly for the first transmission which comes up after a delay of 25mS. A small press button (CS, meaning continue search) can be depressed if it has landed on the wrong station.

The rig has got two separate mic sockets (12-pin DIN) each of which provide remote operation of most of the internal functions, the matrix of 24 push buttons on the rig being duplicated on the microphone. The twin mic provision is fascinating for it allows two amateurs to use the rig at once, either one on each band, with independent Tx and Rx, or both simultaneously on the same band on different frequencies.

An interesting point is that when the frequencies selected for the two operators are the same, USB is always selected on mic A whilst LSB is on mic B.

There is, of course, a problem if one amateur wants to transmit whilst the other is receiving on the same band, but this is overcome by either operator, as appropriate, pressing his or her QRX button, thus putting out a digitised speech, saying 'QRX please,' once every five seconds. This can be rather irritating to those on the other end, but I suppose they will soon get used to it as this rig will obviously become very popular.

Frequencies, mode, and repeater shift can be entered either on the rig itself or on the microphones, but I did find the up and down steps very inconvenient and the rig has clearly been designed for the US market with its nominal 15KHz steps. In order to achieve 25KHz channelling, you either have to accept a 2.5KHz error (stepping up three 7.5KHz channels is, of course, 2.5KHz out), or pushing the 1KHz steps to get to the next channel.

Slow step

Unfortunately, the step button was rather slow for it takes one second to shift one step and clearly the designer has got his idea for this by noting that many FM tuners in the latest music centres have the same irritating stepping feature. This therefore means that it takes 25 seconds to go up one of our channels, which is tiresome.

The rig has 57 memories, and each memory can, under ideal conditions, hold frequency, mode, repeater shift and toneburst on/off. Unfortunately, the manufacturers have had a problem with their software since memory 1, the priority channel, has to have repeater shift inserted for this to be provided on all the other odd memories, whilst the even ones do not take repeater shift at all. Programming the memories can be tedious as it is necessary to press ten buttons to store a frequency. This is all the more irritating as the memory can only hold frequencies for about 2.5 hours after which it needs reprogramming.

One memory, called zero zero, when accessed provides Tx on all repeater channels at once, but again the logic seems faulty for the toneburst comes on for three seconds in this function and cannot be stopped. I suppose this facility could be called a panic one but, of course, the power has to be split over many channels thus reducing the chances of getting into any one repeater.

The synthesiser employs a multi-stage microwave type vibrator in a three dimensional palladium ULSI to create the spread spectrum, and this modulates gate three of the tri-gate GaAsFET PA. The exact operation of the synthesiser device is secret, and the entire section of circuit is encapsulated and designed to destroy itself if any attempt is made to open it up.

One useful function is the power boost button which increases the output power from 3W to 30W for up to 10 seconds to assist one to be heard in an emergency. This, of course, drains a lot of power out of the batteries which are of a novel new design employing rare earth elements, including ytterbium and europium, the latter being in its bromide form which is highly magnetic. Again, this is a secret and I am unable to find out any details. However, this highly magnetic battery will actually give four hours transmitting time at one charge.

Burst charges

Unfortunately, the nominal charging time is 72 hours, although a burst charger costing 60 kilo yen is available as an extra (BUST 14A), which will charge the rig in 10 hours. The battery is built-in and can only be changed by the importers, but there is an accessory power socket requiring 32V dc. An external battery pack can be supplied for emergency use, but to keep the price down, it uses conventional lead acid batteries, although it is rather large: 1mFlg (milli furlong) cubed.

The two receivers are each supplied with sub-miniature 5-band graphic equalisers, but these require the tip of a ball-point pen for one to set the required Rx response.

Two built-in speakers are mounted on the left and right side cheeks respectively, each system employing a 5K micron tweeter and 20K micron woofer, using mercury doped molybdenum corrugated cones. I was most surprised to see that the audio output stage actually includes an electronic crossover with separate outputs for each tweeter and woofer to improve efficiency.

One novel feature is the provision of RF feedback from the antenna output socket back to the mic input stage. This is intended to improve the linearity of the audio, but unfortunately, if you get closer than 3mFlg from the dual band whip the feedback seems to change phase and become effective positive feedback. This severely affects the sound quality, so that you have to shout louder to be understood. Therefore it is advisable to

G3OSS TESTS

hold the rig well away from the body when you use the power burst mode which increases power to 30W for 10 seconds.

The built-in speech synthesiser as well as giving the QRX signal, can automatically give both the frequency readout and signal strength indication at the beginning of each transmitted over, which can be a great help to the station at the other end. Unfortunately, this is buried when toneburst is selected but, if you remember, you can always press the speech repeat button at the end of the toneburst. At the end of each over there is a pause of two seconds whilst the speech synthesiser gives out your call-sign automatically, but unfortunately this facility cannot be turned off.

Miniature fan

One or two further technical details may be of interest – the PA has a miniature fan behind it which gives a loud rushing noise when the power burst facility is used. This does assist the PA to keep cool but you have to be careful to avoid blocking up the air intake holes which are just behind the PTT button on the rig.

I am not sure whether the triplex facility was an accident or not, but two of us found that it was possible to transmit separately on one band whilst receiving on the other. This could be very useful for Raynet purposes and there appeared to be almost no blocking problem provided that one kept off harmonics from 2m to 70cm.

The unusual PA stage can also be used to drive a loudhailer accessory and up to two of these can be utilised at once, deriving their outputs from each separate microphone input circuit. This facility cannot be used at the same time as transmitting though, which could be a problem when using the rig at church fetes.

Laboratory tests

We were surprised to see that the input sensitivity was phenomenally good, the rig needing only +1.5dBf (femto watts) at the input to achieve 1.2 Bel sinad on FM, whilst SSB was just a few Bels more sensitive. The RFIM performance was quite incredible, input signals as strong as 0.1 μ HP being required to cause intermodulation. The RF intercept point measured at around 10 μ HP.

I have been asked by the Editor to use the latest British standard units, but I find this very confusing. You should be able to translate back to the old ones as 1 μ HP (micro horsepower) is just under 7500ergs. Please note that 1 Bel is of course 10 decibels, the latter now being discouraged for future use.

Selectivity on SSB was excellent, the shape factor being 0.9, although its bandwidth of 0.001MHz is on the narrow side for European speech, the passband being centred at around 1.5KHz off the carrier frequency. FM selectivity was poor, but AM, using the SSB filter was most effective. The S-meter, unconven-

tionally, is calibrated in pico HP units. Fullscale deflection is 10mHP, which is just about right for reading your own transmitted power, the scaling being exponential so that the first indication represents a just receivable signal.

Synthesiser

Audio distortion was difficult to measure because of breakthrough from the synthesiser, which added a hash to the audio, but gave a distortion reading of 10% at all levels. However, putting in a cone filter to notch out, each notch being \pm 500Hz at 3dB points, gave a distortion reading of 0.01% explaining the potentially good quality in the absence of signal. Maximum audio output was 100 million ergs per second or 1/75HP. This is stepped up by 1 Bel for a maximum of five seconds when the rig is used as a megaphone driver.

The transmitter gave the same RF output power on both bands as was available from the receiver audio stage, since the final device was the same. I confirm that in the spread spectrum mode 10 carriers were indeed transmitted but levels were a little unstable, particularly when both microphones were used simultaneously. On SSB, again when two separate transmissions were being sent, mic 1 transmission seemed to have priority, mic 2 output only seeming to achieve peak power when no modulation was present on mic 1, the actual powers going up and down like a yo-yo.

It is thus rather awkward if one amateur is talking much more loudly than the other, and this would make the rig difficult to use under DX conditions. In the AM mode it is possible for the two mics to transmit the two AM sidebands simultaneously, thus allowing one station to hear both transmissions at the same time on an AM receiver.

Subjective trials

Myles Capstick G4RCE and I had immense fun trying out this rig, but my

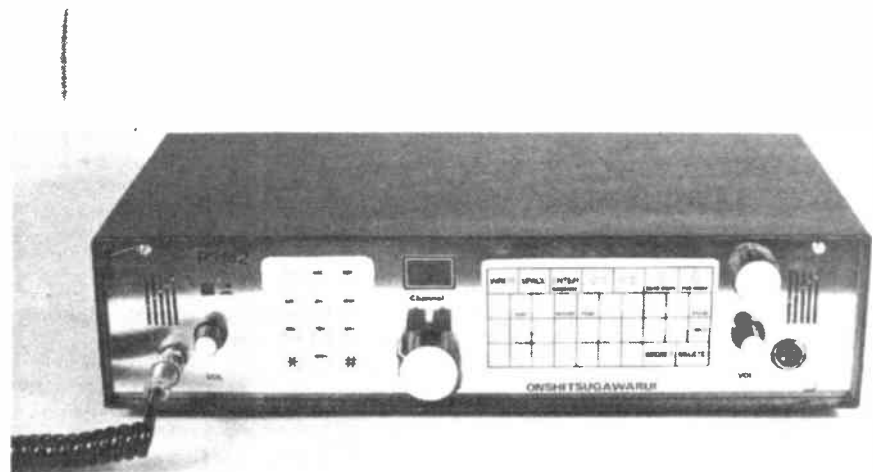
overs always seemed to be longer than his so he had to mumble away to keep his contacts interested while I continued rabbiting. When we jointly went to receive, most of his contacts seemed to return it back to him sooner than mine, so he was continually having to use the auto QRX facility which resulted in him losing many QSOs because of inexperienced operators at the other end losing patience whilst they were waiting for us to commence transmitting at the same time.

This was really rather embarrassing, so in the end Myles agreed to go up to 70cm whilst I was on 2m. He found it was quite useful to access several repeaters at once, but it was very awkward when at one time stations came back on three repeaters, and the rig did not seem to know which one to go back to. Thus Myles seemed to be working three stations at once whilst I was on 2m. We tried sideband, and got into awful trouble with the RF feedback problem, so I had to agree to shout into the rig around 1mFig away whilst he was talking into his microphone at about 5 μ Fig.

Quite a few stations erroneously informed us that we were spreading very badly on SSB, and it was only after we explained the spread spectrum mode that they realised we were in fact transmitting signals every 1KHz up the band over a bandwidth of 100KHz. This proved particularly useful in contest operation for we had so many contacts that hardly anybody else could manage any!

Easy to carry

I found the weight (5000 carats) a little on the high side (but this did help the horsepower), however the rig is easy to carry around as two carrying straps and castors are provided. It is a fascinating concept to have two bands on the same transportable rig and I am pleased to see a fairly lightweight whip antenna acting as a double collinear array which provides far more gain than usual, although



G3OSS TESTS

the height (3m) will mean that the rig is awkward to use inside buildings.

Transmitted quality could be very good, but several stations commented that at times readability was extremely poor, the howling tone being almost as loud as the voice, revealing the RF feedback problem on SSB. However, FM quality was said to be up to BBC standard, ie flat from 500Hz to 2KHz. The slow charging rate from the battery charger supplied was a constant irritation but the external accessory battery pack did work well although it was extremely heavy, again two carrying handles and castors being provided.

We found that the fluorescent tip at the top of the whip was very useful when we were lost in the country, for it glowed a brilliant purple/blue, especially in the power boost mode when we were in the dark. When out on the moors, this allowed other amateurs and sheep to find us more readily, enabling them to assist us in finding the way out when we were lost.

The five band graphic gave a great deal of response variation, but it did seem an unnecessary gimmick, for surely three bands would have been sufficient! It was, however, more useful when receiving BBC radio 3 on 91.3MHz, although quality suffered slightly because of the 20KHz bandwidth of the IF filter.

It would have been useful if the

designer had put in feedback from the discriminator to the local oscillator to reduce wideband FM to a narrower bandwidth which would work through the filter, and they hope to introduce this facility in their next model, which is rumoured to include 23cm as well as 27MHz CB.

The importers, Thanlow, south of Eastleigh, near Birmingham, informed me that Onshitsugawarui's factory is in a new coral reef complex around 1000 furlongs east of Tokyo, and a ferry service operates once a week to this strange community.

Interesting uses

The rig was originally designed for use by the Japanese military for satellite communications, and the amateur radio version is, of course, a spin-off from this. It clearly has some interesting military uses, and I understand that frequency hopping versions are available instead of the spread spectrum mode. This could be particularly useful for those who do not want any QSOs at all, other than with other amateurs who also do not want the DTI to monitor their transmissions.

Special chips can be purchased in pairs with synchronised hopping characteristics, and the internal programming details are only held, on behalf of the manufacturers, by a Swiss bank to improve security. The price of 0.5M yen

clearly makes this a rather extravagant rig, and the UK price is increasing at the present time by around 1% per day because of currency problems.

The equipment is sold with a 1000 day guarantee which can be extended by an extra payment of 100,000 yen for an additional 5000 days. Unfortunately, neither the synthesiser nor the internal battery pack is guaranteed for more than 100 days, and at the moment spares are not available but have been promised by January 1986, just in time to allow QSOs via Halley's Comet.

Even so, I strongly recommend this rig for those who want a lot of fun, and it is hoped that it will not be subject to a DTI ban. Unfortunately, sales of the rig have already been banned by the FCC in the 'States, and in most central African countries, but so far only France has banned it in Europe.

Space precludes me from giving extensive details of one useful optional extra, an automatic speech translator from English into Japanese, for use with the satellite mode. An automatic translator from Japanese to English is at the moment under development, it is hoped it will be available in 1986. Each translator costs an additional 0.2M yen and are on 1000 days delivery, which, unfortunately, is just after the guarantee runs out.

The rig became available in this country on the first day of April.

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There are other companies who will sell you a preamplifier for the amateur vhf bands, but, most of the products (even when they use modern devices) derive from the same tired old concepts which haven't really altered in twenty years!

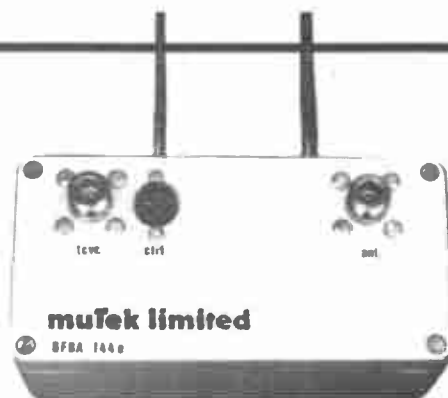
At muTek we've developed one of the world's most advanced ranges of preamplifiers. This isn't advertising b.....t!! Instead of simply taking the easy way out, and ripping-off traditional amateur designs, we chose to apply our considerable 'high-tech' rf design abilities (which we sell separately through our associated consultancy company) to the design of preamplifiers. This has resulted in amplifiers such as the GFBA 144e ('the bees' knees' according to G3OSS in Amateur Radio, October 1984) with its unique use of non-dissipative negative feedback around a real GaAsfet, and the SBLA 144e, which employs a unique balanced mosfet circuit.

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The excellence of our preamplifier range has also been noted by professional users. We're regularly asked to supply variants of the range for applications such as radio astronomy, satellite tracking, and other scientific applications.

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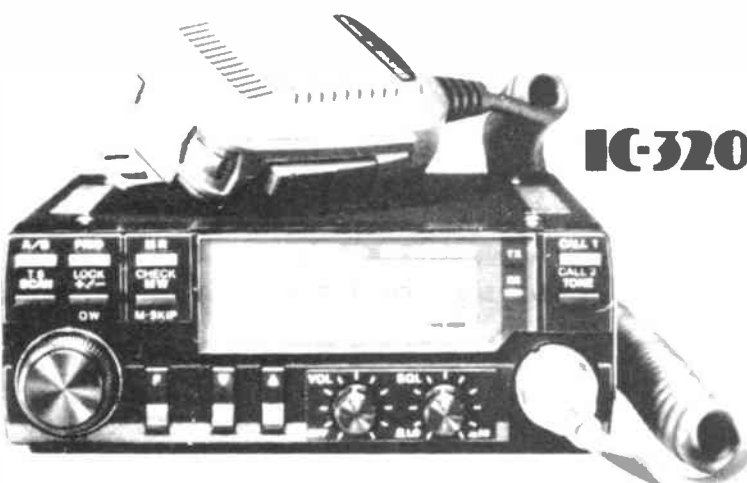
ICOM

GREAT SETS...

Remember where you saw it first- the compact IC-735 HF Transceiver.

Here are just a few details to whet your appetite. The IC-735 is shown here with the SM8 desk microphone and PS-55 power supply.

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The IC 3200E employs a function key for low priority operations to simplify the front panel LCD display is easy to read in bright places, showing frequency, VFO A/B, memory channel, duplex mode and S/R meter information.

Other features include a 10 channel memory, able to store operating frequencies, Simplex or Duplex. A memory lock out function allows the memory scan to skip programmed channels when not required. The IC 3200E has a built in duplexer and can operate on one antenna for both VHF and UHF. Options include IC PS-45 DC power supply, HS-15 mobile mic, SM-6 and SM-8 desk mics, SP-10 external speaker and UT-23 speech synthesizer. A great future is predicted for the IC 3200E.

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Amcomm, London (S. Harrow). 01-422 9585
Arrow Electronics Ltd., Chelmsford Essex. 0245-381673 26
Beamnte, Cardiff. 0222-486884
Booth Holding (Bath) Ltd., Bristol. 02217 2402
Bredhurst Electronics Ltd. W. Sussex. 0444-400786
Dressler (UK) Ltd., London (S. Harrow). 01-558 0854
D.W. Electronics, Widnes Cheshire. 051-420 2559
Hobbytronics, Knutsford Cheshire. 0565-4040 (Until 10pm daily).
Photo Acoustics Ltd., Buckinghamshire. 0908-610625
Radcomm Electronics, Co. Cork, Ireland. 010.35.321 6.32725
Radio Shack Ltd., London NW6. 01-624 7174
Scotcomms, Edinburgh. 031-657 2430
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland. 0662 2043
Reg Ward & Co. Ltd., S.W. England. 0297-34915
Waters & Stanton Electronics, Hockley Essex. 0702 206835

Listed here are authorised dealers who can demonstrate ICOM equipment all year round. This list covers most areas of the U.K., but if you have difficulty finding a dealer near you, contact Thanet Electronics and we will be able to help you.

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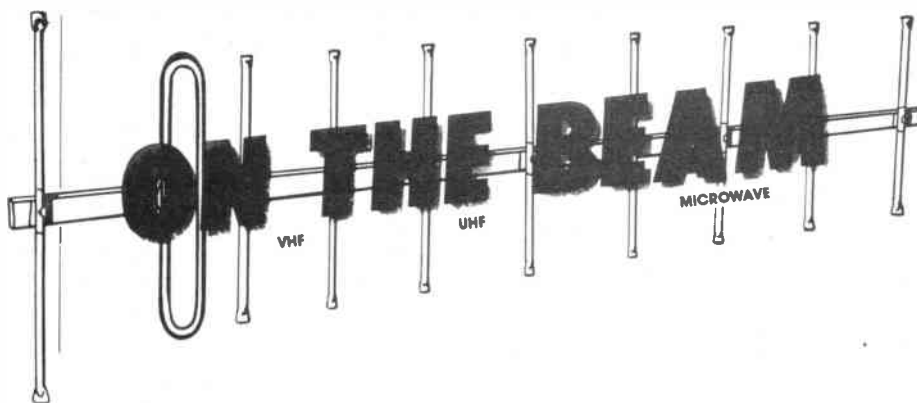
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News and comment from Glen Ross G8MWR

Four metres

We do not often get any information about the activity on four metres and this tends to give the impression that there isn't any. A letter from G4VOZ helps to put the record straight with some very interesting points being raised. The first point is that Tuesday evenings are now the accepted activity period with most activity being between 1830 and 2130.

John points out that there is a lot of ex-commercial equipment around, from Pye and similar makers) that can be bought for a few pounds at junk sales and bring and buy stalls at the rallies, and that because they are virtually on the amateur band the amount of re-tweaking required is very little.

Propagation on this band supports all the usual modes and because of the low VHF frequency things like sporadic-E are much more common than on two metres for instance. John comments on the frequency with which eastern European broadcasting stations are heard via this mode at times in the year when one would not expect this type of propagation on the higher bands. There is also some interest in QRP operating which should gladden the heart of the *reverend gentleman*, with perhaps the best results being obtained by G4CMZ who has managed to raise 40 counties whilst only running 600 milliwatts.

Aerials for the band tend to be a bit on the large side if you go in for a beam, but John comments on the number of people who are using no more than a rotary dipole with the added advantage (?) that this lets you work in two directions at once (well at least you don't miss stations off the back of the beam!).

Ideal mode

Apparently most people ignore the band plan as far as CW operating is concerned and the usual thing is to use 70.2MHz for all modes. There is a fair amount of activity on FM especially in the Nottingham and Derby areas and it would seem that this would be the ideal mode to make a start on. Given the previous remarks on the availability of surplus it would seem, with the exception of

10GHz, that this must be about the cheapest band to get started on.

Some of the stations who are known to be active include G4SEU at Nuneaton; G4WND, Tamworth; G4ISM, Towcester; G4OIG, Northampton; G8VN, Derby; G4OHJ, Redditch; G4UKM, High Wycombe and GW4BHK, Gwent. That gives you a few to make a start with but obviously there must be many more or G4CMZ could not have run up a forty county score. It seems that this is a band that deserves a lot more use than it is currently getting. How about a late new year resolution to give it a try?

In orbit

The latest edition of the UoSat Bulletin gives some interesting information on the new RS-9 and RS-10 units, both of which are currently undergoing extensive testing at Kaluga before being launched. RS-10 will have an uplink between 145.96 and 146MHz with the downlink between 29.46 and 29.50MHz. Two beacons will be carried, that on 29.457 running 250 milliwatts and the other on 29.503 which will produce one watt. Another transponder using Mode K will use 21.26 to 21.30 as uplink and 29.46-29.50MHz for the downlink. To further delight or confuse you, there may also be a third transponder on board which will use the Mode K 21MHz uplink but with a downlink between 145.960 to 146MHz. This one will also have a beacon on 145.957MHz.

Confusion reigns

This whole thing of up and downlink frequencies is really getting out of hand, with some units having up links where others have downlinks, some reversing the procedure and others seeming to have the possibility of talking to themselves. You could try working someone who you are hearing on the 'downlink' from a satellite only to find that he is actually on the 'uplink' to another unit. There is also the possibility of getting into one unit and coming down from another one at some totally unsuspected frequency.

Here someone in his turn calls you and

is amazed because he does not get a reply, the reason being that because of the variety of frequencies involved he may not be able to get back to you through the satellite you are using, rather than the one he thinks you are using! This may read like a load of rubbish but this simply indicates the possible confusion that can occur. Someone, somewhere should not only have specified amateur satellite sub-bands but should also have come up with up and downlink bands. A subject like this is too big to be handled on a parochial basis and unless something is done soon, chaos will reign supreme.

Come here, there's more

Just when you thought we were out in the clear information comes of what the new Phase 3 satellite may carry. Have you got your database ready? It's the only way you are going to keep up with this stuff.

The news is that this unit may carry no less than four transponders, the first one being a Mode B unit similar to the existing one (up on 70, down on 2) but with the downlink offset from the current Oscar-10 so as to 'avoid confusion!' The second unit may combine uplinks on 2 metres and 24cms and have a bandwidth of around 800Hz, and to distinguish it from the rest this would be known as Mode JL. The third proposal comes from a West German group and is for a Mode L transponder dedicated to Packet Radio using 2400bps on the uplink with the downlink using 400bps both on FSK. We now come to the fourth unit and this one sounds quite simple by comparison with the others. It is for a 70cm up - 13cms (not 23cms) down unit with the ability to handle a single FM channel. The proposed bandwidth being around 20KHz.

Some changes have been made to the attitude of Oscar-10 and the results on the downlink have been significantly improved, signals seeming to be anything up to 10 or 12dB better than in the past. There has also been some changes in the orbit and the perigee now occurs in the northern hemisphere.

Due to this the maximum elevation has decreased making it a rather easier proposition for the person who cannot elevate the beam. Even so, the maximum elevation can still be around 40 degrees and if you want to make some serious use of the unit, and now that the signal strength has improved this is worth considering, then some form of elevation control should be installed.

Newsletters

At the recent VHF convention and around the clubs there has been a lot of talk about the *RSGB VHF Newsletter*. The main bone of contention seems to be not whether it is a worthwhile venture, Dave Butler is certainly doing a good job, but as to whether members should have to pay for something that ought to be available to them in *Radcom*. The official answer is that the two do not conflict, that the newsletter also contains circuit diagrams and the news in the letter arrives too late for inclusion in *Radcom*.

ON THE BEAM

Now these ideas need a little consideration. Firstly, surely it is not the function of a newsletter to contain technical information which should be included in *Radcom* for the benefit of all members, possibly in the 'Technical Topics' column. Secondly, the RSGB has a Sunday morning news service which could, and should, be used to carry information of expeditions and so forth that are taking place in the following week or two.

This news would be even more up to date than the newsletter and available to all. It would seem reasonable to assume that most special activities are planned many weeks in advance, and if that is the case then there is no reason why they should not be included in the usual news features in *Radcom*.

No one doubts the usefulness of the newsletter, but the information would be of use to more people if it were in the right place. It is only fair to say that these remarks apply, by and large, to all the other newsletters that are produced under various guises.

Sporadics

By the time you read this the sporadic-E season should be well under way. The time is ripe to give a little guidance to newcomers to the mode. Please remember that this mode is 'sporadic', and because of this distant stations may only

be available for a very short space of time. You will bring the wrath of the multitude down on your head if you insist on spelling out your name, the QTH and your 'working conditions'. The trick is to get in fast, pass the minimum amount of information clearly, so as to avoid repeats, and leave the frequency as rapidly as possible so that the maximum number of operators have the opportunity to get that new country into the logbook.

Contrary to widely held belief, sporadic-E operating does not depend on having vast amounts of power available. Patience and being in the right place at the right time are far more important, and if you get there before the pile up you're in.

B Morse

What happened to it? The RSGB have issued around 6000 permits and there are less than 30,000 class B licensees of whom about half are active. This means that of the active ones, possibly one in three has a permit. Last month I said that if we did not indulge in some self-policing the result would be chaos. Perhaps it is different where you live but from the reports received so far the amount of activity does not seem to be very great.

What there is seems to be taking place on the FM simplex channels rather than

in the all-mode section, which is rather a pity.

We know that if you only have an FM rig then the keyed audio oscillator is probably your only answer, but with the vast quantities of multi-modes on the band then true CW in the all-mode section would make a lot more sense. There are even people using FM carriers in the CW end of the band and that really is not on.

Espana QRV

Whilst you are looking for that sporadic-E keep an ear open for some activity from Spain. Several stations have written to say that the following are likely to be active: EB4IM (ZA), EA7CHH and ED7GEL (YY), EA7APD and EA7BVD (XY), EA4CVS (XZ) plus EB5EHX and EA5EMM from ZZ square.

From Malta comes news that the 'Falcon' contest takes place again this year. Usually the winner gets a free holiday in Malta, so this one could be well worth winning.

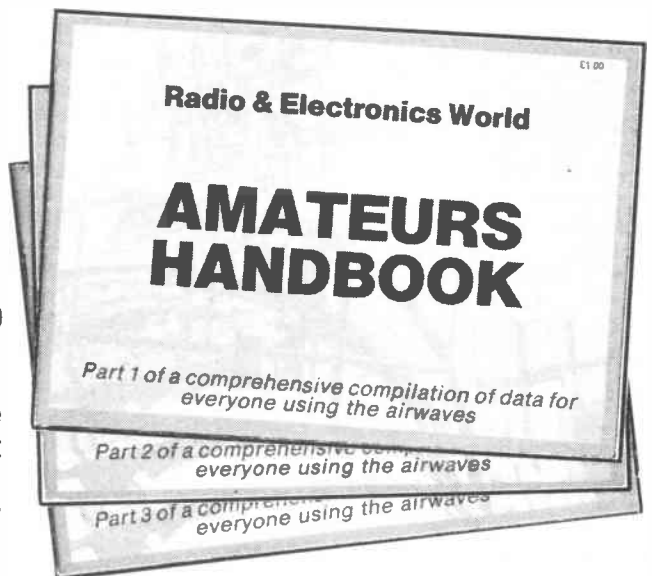
Close down

That's it for this month. Thank you for your letters and comments; these are always welcome and should be sent to me at: 81 Ringwood Highway, Coventry CV2 2GT. As a new toy you can also send your information via Prestel on 203616941.

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SHORT WAVE LISTENER

TREVOR MORGAN GW40XB

February was a bit of a hectic month here. Mostly domestic and jobwise, but the mailbag was also quite heavy so my typing finger worked overtime!

First, from D Pye in the London area came a plea for help on aerials. He is one of the listeners with the problem of living in a maisonette or flat with no space for aerial farming.

Many ideas are tried by such listeners, amongst which is the use of fine wire obtained from old transformers or magnets. This can be fed around the picture rail, or even hidden behind wall-boards and if fed through an antenna tuning unit (ATU) can be loaded to operate very successfully on all bands with some quite surprising results.

Another method is to use one of the telescopic aerials available at rallies or the local radio shop. A small bracket is made so the aerial can be mounted on the balcony or a windowsill. Quite long telescopic aerials can be found, especially if ex-government ones can be tracked down. Some were available from army tanks and were over twenty feet long when extended!

Cheap beam

Want a cheap beam? The use of telescopic aerials placed a few feet apart will give you a very effective and cheap method of directing your aerial and is worth a try if space is a problem.

The other problem is of earthing the receiver. Unfortunately, some of the newer buildings have PVC water piping which is not conducive to good earthing. If you are up on the fifth floor, a run of wire down the outside wall would act more like an aerial than an earth and would probably pick up plenty of static and other QRM.

Years ago, a company made an indoor aerial called the 'Joystick' and some fantastic claims were made for this aerial. How true they were one can only surmise but this firm also made an 'artificial

earth' system which consisted of a long length of multistrand wire and a tapped coil in a box with a switch to select the best tapping. The wire was laid out on the floor of the room under the carpet and the output from the coil fed to the earth connection of the receiver. You then tuned for least noise using the tapping selector. Crude, but it worked. I've still got one lying around the snack somewhere.

Fishing rod

Those of you living in multi-story blocks can use the 'fishing rod vertical' which was an aerial that gave DX to many a Londoner some years ago. A flexible wire was wound onto a fishing reel (the old cheap centre pin type) with a few feet left hanging out at the core. The reel was attached to a fishing rod which was then put out of the window. Using an old plumb bob as a weight, the wire was lowered down to just out of reach of the local wags and the other end coupled up to the receiver. The blokes living in the skyscraper blocks had over a hundred feet of vertical suspended 12 feet from the outside wall of the flats!

With short wave listening improvisation is the name of the game and you can try anything that will bring in a signal, but you do need a reasonable antenna tuner.

A letter from Ian Thomson in East Sussex, a listener for over 30 years, reminded me of the old game of tuning up the old iron bedsprings for an aerial. In these days of interior sprung mattresses, some of the fun of radio is lost... but I must admit I sleep better!

Ian's fun came from tracking local shipping by listening to their transmissions and plotting their positions on a map... no doubt laid out on the aforementioned bedsprings! Nowadays Ian has slightly better equipment than his old crystal set with an FRG7700 and its complementary accessories and an SR9 and AMR217B backing him up

on 2 metres and marine bands. A home-brew dipole replaced the bedsprings... just as well as he now has a rotator which could present humorous comment otherwise!

A class B licensee with his listening helping towards the class A, Graham Rigg up in Tyne & Wear (what's the betting he goes for GORIG?) also uses the 7700 in its continental guise feeding an endfed wire or inverted L to choice against an earth system of 500 yards of buried wire (what, no ground rods?). Joking aside, Graham has a lot of fun chasing the DX on broadcast as well as the amateur bands.

Basil Woodcock writes from Leeds with comments on my remarks about the 'second class citizen' syndrome. Yes, Basil, there seem to be a lot of collectors of stamps, IRCs, etc and I have very often waited in vain for a QSL card after a 'please QSL direct' request and even follow up letters brought no response. This non-return of QSLs is not confined to listeners however and even licensed operators have difficulties on this score. Funny thing is that the return rate on CW is almost 100%.

J J Sales from Lancaster is using his listening to good effect and recently passed the RAE and the Morse test. Congratulations. J J uses the SRX30 and an endfed wire in a quad loop configuration. With only an 18ft square garden, this was the best way to get the wire in and it has proved its worth.

A letter on ISWL headed stationary comes from Mike Harvey in Devon. In answer to your question, yes, Mike, I will be covering some construction in a small way as effects the short wave listener. In fact next month we will have an antenna tuning unit for you to have a go at. Mike is using the Trio R1000 and an active antenna and is enjoying getting into the thick of things.

Which nicely brings us to the *Amateur Radio Prefix Awards*.

Once again we have to

congratulate Don Robertson from Caithness for a super entry for the Silver award for 500 prefixes worked. Well done Don! Some nice catches in the list including T12, VE7, VQ9, 4J5 and 8Q7.

Ian Thompson from Rye submits his Bronze claim with over 70% on 80 metres! The list includes some choice bits like XO1, 4K1, 3C1, HH7, S79, TN8 and TL8.

Graham Rigg keeps his listening active with his Bronze claim offering A71, 8R1, 3X4, D44 and A22 for nice catches. JAs and South Americans abound in his lists.

SE Liddicoat in St Austell submits his Bronze list including nice ones from CX7, S79, 3C1, 5H3 and 9Y4.

Tez Watson of RAF Bruggen spends some of his off duty hours working the receiver to come up with his offering for the Bronze award. Tez offers CU1, J28, HN4, A92 and a good mixed grill to get the 250 prefixes. He is now G1FRG and DA4FH but due to lack of equipment is temporarily off air so is keeping his BRS53635/DL in the frame.

Mike Harvey of Kingsbridge, Devon, comes up with a nice selection including DU1, YD5, 5T5, 5N8, and a mixed bag for his Bronze. A couple of queries are raised with O6 (Peru?) and PAD3 (Dutch special?) but it still leaves Mike with plenty to spare.

JJ Sales submits his Bronze claim with some nice catches in VP2, CN2, 5B4, 4N4, HH7. JJ is putting his newly found CW expertise to good use for a mixed list.

Queries

I'm still getting a few queries about the alternative based stations and repeat that DL4ANB/EA4 counts as EA4. However, what you'd make of FG/WORLX/FS is anyone's guess!

The bands have been as bad as anyone would expect at a time of low sunspot activity and in the latter part of winter. A bit of lifesaving on the part of the Soviet stations offering some special event call signs

to work made up a few for the lists.

Eighty metres came up trumps for many listeners while fifteen and ten were in the doldrums, although when fifteen did rise there were some good catches to be had. Forty was as noisy as ever and the intrusion of broadcast stations into this very narrow band was the usual problem.

It's only a matter of how deep the trough is going to go before we reach the absolute rock bottom in sunspot activity. However, the seasonal changes should help a bit and twenty is already coming to life earlier in the mornings and staying around a bit longer.

Broadcast listening

It has been suggested by quite a few readers that we devote a small section of the column to broadcast listening as this is part and parcel of the short wave listeners' hobby. Well, if we have enough response, we'll open up a 'Broadcast Corner' within the column... if the Editor is the nice man we all think he is!

By the time you read this, the first list of the 'Information Exchange' will be out and issued to those readers who have sent in details. For new readers of *Amateur Radio*, the idea is to create a pool of listeners who are willing to help others with the same type of equipment by the exchange of ideas and information. The list is growing and the more on the list the better. The addresses of the participants are not included for security reasons and all mail is sent to me for distribution.

If you want to join the group, please send your details and a list of your receiver, antennae, accessories, etc, to me and you will be issued a number. Letters will be sent to me as, for instance, John 0456. This way I won't have to open the letters, just re-direct them to John at his address. Send your details to me at 1 Jersey Street, Hafod, Swansea SA1 2HF.

An interesting question was asked by Mike Harvey: 'what is a preselector?' Well, Mike, some receivers have a pre-

selector built in (SRX30, SSR1, ICF6700W for instance) but there are some that do not have this facility. At one time, the manufacturers made a preselector as an accessory and the Codar PR40 is still sought after by listeners.

Some receivers, especially older ones, are prone to second channel interference on the higher frequencies. If the receiver has an intermediate frequency of, say, 470KHz, the oscillator is working at a frequency 470KHz higher than that of the wanted transmission, and signals at an equal spacing higher up, ie 940KHz, can beat with the receiver oscillator to produce a signal which enters the 470KHz amplifier and interferes with the wanted signal.

Although there is usually sufficient selectivity on the lower bands (eighty and forty) to avoid the problem on the higher bands the receiver is unable to cope with the problem, resulting in whistles and interference.

This interference can be dealt with by raising the intermediate frequency or by

increasing the second channel rejection ahead of the mixer stage. Changing the intermediate frequency would be difficult to say the least but the preselector results in a substantial increase in second channel rejection.

Some of the best results are obtained with receivers having no tuned RF stage and using a 455KHz intermediate frequency. These receivers suffer often from second channel interference from broadcast stations on the nineteen metre band intruding on the twenty metre amateur band.

Another month

So, there we are for another month. I daresay some of you are heading for your annual adventures abroad. If so, and you want to take your portable with you, please check with the necessary authorities in case there are regulations to be observed. If you do have problems the publishers may have a bit of a job delivering your magazine to your new QTH in Northern Siberia!

C M HOWES

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This design was originally conceived to meet the needs of the newcomer to the hobby. It enables a simple, single band receiver, of surprisingly good performance, to be built by a novice at a sensible price. The kit was reviewed in the May 84 issue of Shortwave Magazine by G3RJV and over the last few months since our CTX90 transmitter has been available, more and more experienced amateurs have been building these receivers as part of a simple low cost QRP setup. It took careful design to produce a simple receiver that would work this well. Compare the DcRx with that expensive black box that sits in your shack. Not quite as good of course, but I bet you can still hear most of the stations you can receive on the other radio.
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73 from Dave, G4KQH Technical Manager.



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37

World Radio History

THE 11m CB TO 10m AMATEUR BAND CONVERSION GUIDE

FINAL PART

A look at how FM modulation can be added to an American AM rig

ROGER ALBAN GW3SPA

BSc. C ENG, MIEE

FM modulator

FM modulation may be added to an American AM rig by firstly adding an additional capacitance diode to the VCO and driving it with a suitable FM modulator constructed on a separate PCB. The modulator consists of three items. Firstly a mic amplifier/limiter followed by a diode switching network to ensure that the VCO is not modulated during receive. This is followed by an active low pass filter to remove the unwanted products of using a limiter. The circuit uses a dual 747 operational amplifier, IC1a.

Figure 1 acts as the mic limiter with the output being fed to a 5Kohm potentiometer which presets the deviation level. The diode switch, D1, prevents audio reaching the capacitance diode during receive.

Diode switching

To understand how diode switching works, one has to consider, for example,

the circuit in Figure 2a. When the diode D1 is not conducting, 9.9V will appear across the 47Kohm resistor. For the diode to conduct voltage +V must exceed 9.9 volts as can be seen from the equivalent circuit shown in Figure 2b.

This method of audio switching is compact and is most useful for providing a relay where there is a lack of space, such as inside a CB rig.

After limiting the audio is passed through IC1b, which is an active low pass filter designed to remove the unwanted products of limiting.

The FM modulation board can be inserted into an AM rig, such as the circuit diagram shown in Figure 8 (March issue), by disconnecting the microphone lead from point 2 on the main PCB and reconnecting it to the input of the modulation board. The capacitance diode, together with the 30pF dc blocking/coupling capacitor, should be connected across the tuned circuit of the VCO.

Care must be taken to ensure that the audio amplifier IC is not left unloaded during transmit as there is a possibility that the audio amplifier IC could be damaged if this is done. If you do not intend to keep the AM facility of the set D207 may be removed. The RF power amplifier should be permanently connected to point 17 on the PCB, the positive supply rail of the set.

Bill Sparks G8FRX (1) suggested that it was not necessary to remove the modulation transformer T201, but to change C225 from 47µF to 200µF and to bridge between C223 and C225. The author has decided to retain the AM facility and has included a switch that has been added to the front panel to switch between the modes of AM and FM using diode switching as described.

FM demodulation

To convert the receiver from AM to FM is quite a straightforward job involving the construction of another small PCB.

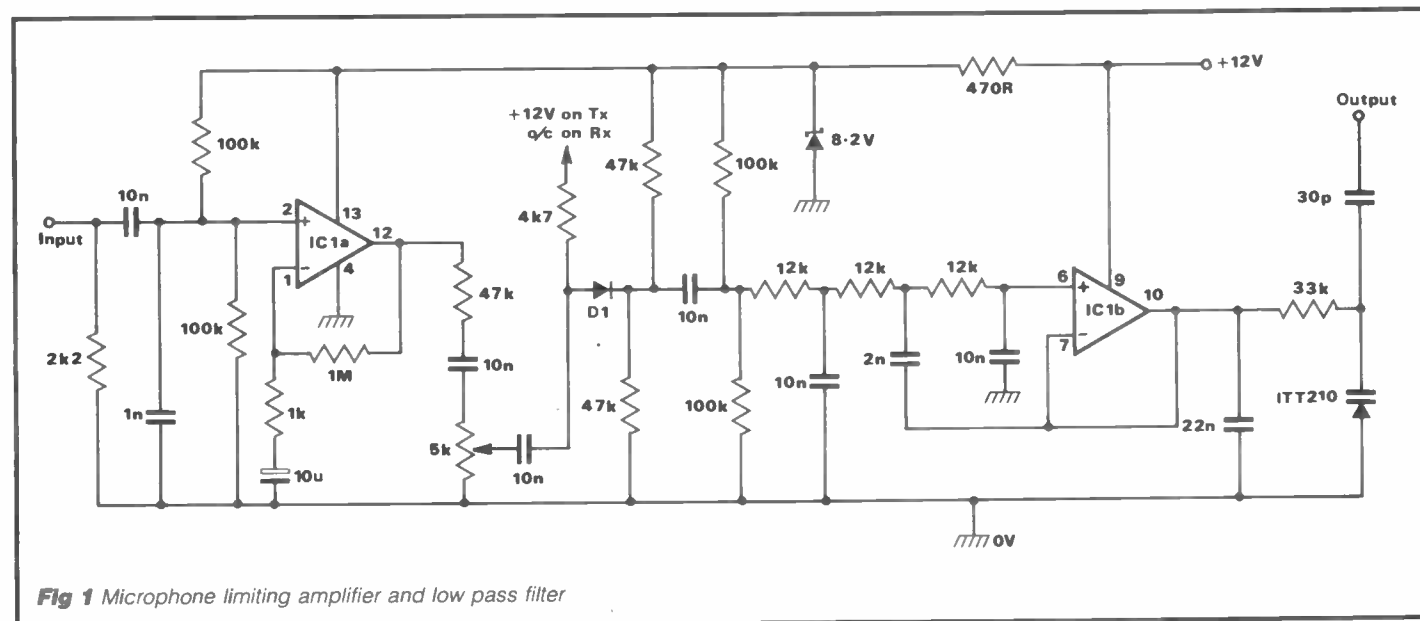


Fig 1 Microphone limiting amplifier and low pass filter

CB CONVERSIONS

There are two popular ways of achieving the demodulation of FM, the first of which is to use a ratio detector circuit and the second is to use an integrated circuit as a quadrature detector.

Figure 3 shows the diagram of the ratio detector circuit. Again, if the AM facility of the set is to be abandoned then L107 can be removed and replaced with the ratio detector. The advantage of using the ratio detector is that it has a particular application where the signal level is rapidly fluctuating, such as in mobile communications.

If you decide to retain the AM facility then a small coupling capacitor can be connected between the base of Tr104, Figure 8 (March issue), and the base of the ratio detector transistor. The author found a 10pF capacitor satisfactory and used a 2N918 transistor as a substitute for the 2SC373 used in the rig. The resulting audio from point A can again be diode switched or connected to point 24 on the PCB if the AM detector is to be abandoned.

The ratio detecting transformer used by the author is a Toko type WRHC1A516/7, obtained from Cirkit Holdings plc (2). The original squelch circuit of the set performed reasonably well and the ratio detector proved a simple way of converting the rig for AM use.

Motorola MC3357

Another method tried by the author was to use the popular Motorola MC3357 integrated circuit which comprises a mixer, limiter amplifier demodulator and squelch trigger circuit. Figure 4 shows the circuit that was used in conjunction with the diagram shown in Figure 8 (March issue).

The Motorola MC3357 is a low power FM IF circuit designed primarily for use in communication scanning receivers. The mixer-oscillator circuit combination converts the input frequency of 10.7MHz down to 455KHz, where after external bandpass filtering most of the amplification is done.

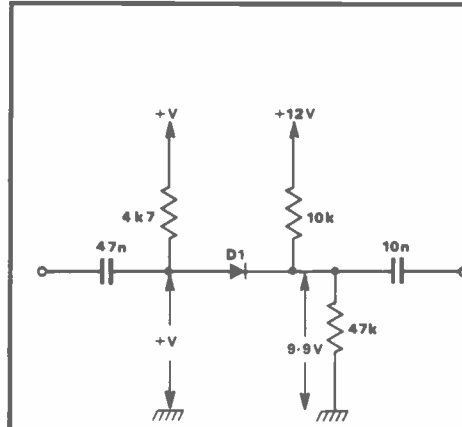


Fig 2a Typical diode switching circuit

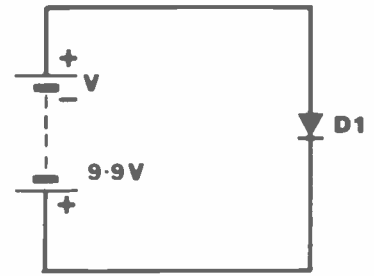


Fig 2b Equivalent circuit

The 10.7MHz input is derived from the secondary side of the 10.7MHz ceramic filter CF1. This is taken to the MC3357 IC via miniature circuit cable to reduce the likelihood of unwanted interference. The oscillator input of 10.24MHz is taken from the secondary of L204 and the integrated circuit mixer is a double balanced type to reduce spurious responses. The input impedance at pin 16 on the MC3357 is set by a 3Kohm internal biasing resistor and has low capacitance allowing the circuit to be preceded by a crystal filter.

The collector output at pin 3 must be dc connected to the positive supply. The 455KHz bandpass ceramic filter used is a Toko type CM2455A which has a minimum 6dB bandwidth of 4KHz centred at 455KHz. This ceramic filter was also obtained from Cirkit Holdings plc.

From the ceramic filter the signal is fed to the input of a five-stage limiter at pin 5. The output of the limiter at pin 7 drives a multiplier, both directly internally and externally through a quadrature coil to detect the FM. The output at pin 7 is also used to supply dc feedback to pin 5. The other side of the first limiter stage is

decoupled at pin 6. The recovered audio is partially filtered then buffered, giving an impedance of around 400ohms at pin 9.

The audio from pin 9 is given some de-emphasis and can be taken to point 24 on the PCB of the set if the AM facility is not to be used, or can be diode-switched via the volume control. Pins 10 to 14 on the MC3357 IC are intended to provide a squelch control, although the author used the existing squelch circuit in the set.

Receiver performance

The UK CB specification paid little attention to laying down standards for receiver performance, which does a disservice to the British consumer. Those of you who have already converted a UK CB to operate on 10 metres will already know that the performance of the receiver leaves a lot to be desired. The majority of UK rigs suffer from the effects of breakthrough and lack of channel selectivity (better known to the CB world as bleed-over).

A significant improvement can be achieved by replacing the 10.7MHz

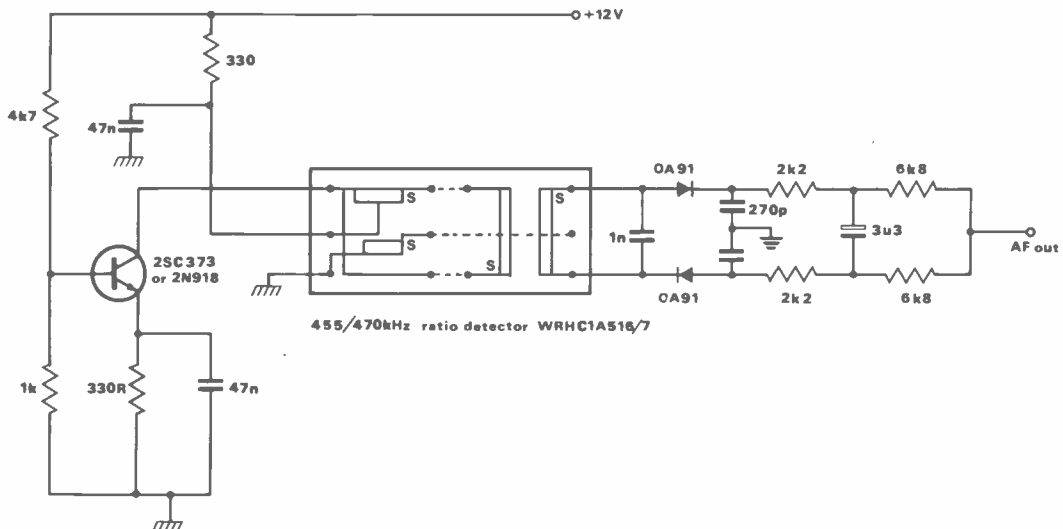
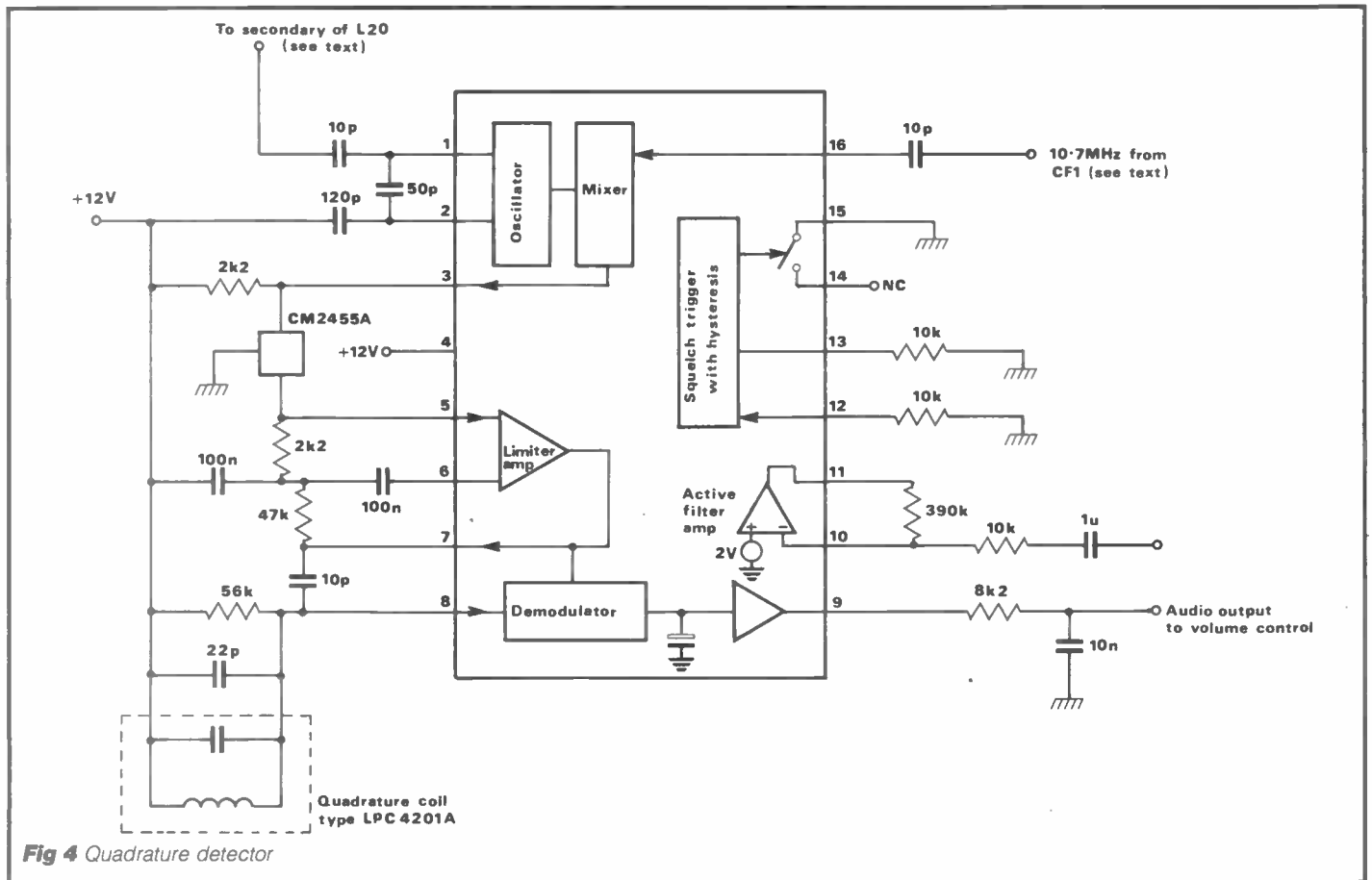


Fig 3 An FM ratio detector

CB CONVERSIONS



ceramic filter CF1 with a 2 pole crystal filter. Ideally an 8 pole crystal filter will give a bandwidth of 8KHz at 6dB but unfortunately has a price tag of around £15; the current going price of a new UK CB rig! A narrow filter at this place in the circuit removes some of the signals which cause severe blocking and inter-modulation problems in the MC3375 mixer.

The first mixer in some UK CB rigs is a rather crude mixer with the two mixing frequencies being introduced onto the base of the mixing transistor. *Figure 5a*, taken from the LCL Economy UK CB rig, is an example. If the MPS9626 is exchanged for a 35K45 as shown in *Figure 5b* it should further improve the selectivity of the set.

The reader may be tempted to convert a UK CB set to 10m rather than mess about adding the FM modulator and demodulator board to the American CB rig. I think that the end result will be a set infinitely superior to the majority of the so-called FM sets on the market today.

For those of you who have a class A licence, and who are now contemplating using 10m FM, I can assure you that it is a good band to use locally and for working DX when the sun spot activity is high.

The lack of use of the 10m band by amateurs during this current period of low sun spot activity is placing the future use of this band in danger. It is up to local clubs to promote its use by arranging for talk-in stations to operate on this band and to arrange DF hunts etc, on 10m.

It was estimated that at the beginning

of legalisation of CB in this country there were tens of thousands of illegal American CB sets in circulation.

A large number of these sets are now on open display for sale in secondhand shops and should be purchased for a few shekels.

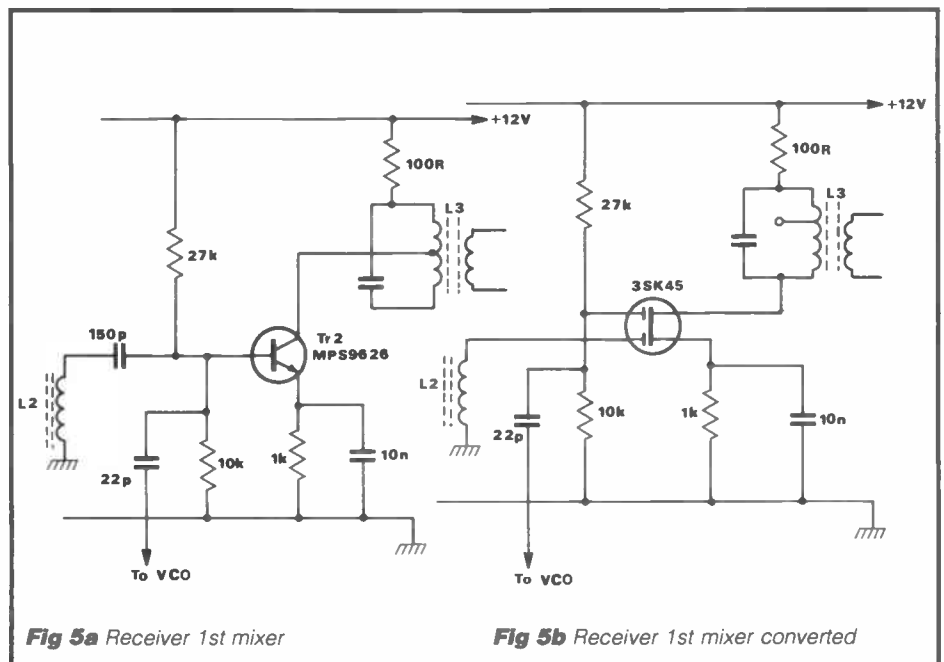
The price of the UK CB set has dropped in price from around £70 down to about £15 in the course of three years and this must represent an extremely cheap way of obtaining a transceiver which will

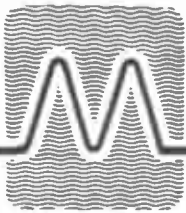
operate on 10m.

In concluding this series I hope that you have pleasure and many hours of enjoyment using your converted rig on 10m.

References

- 1 *Eleven to Ten* by Bill Sparks G8FRX, *Ham Radio Today*, June 1983.
- 2 *Circuit Holdings plc*, Park Lane, Broxbourne, Hertfordshire EN10 7NQ. Tel: (0992) 444111.





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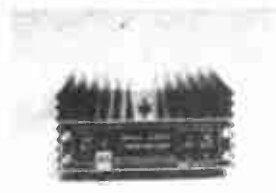
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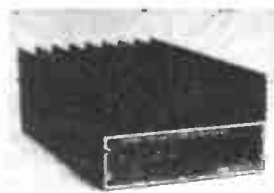
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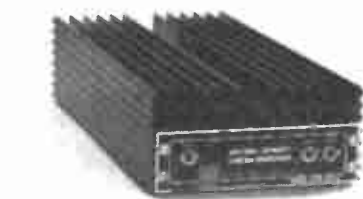


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BACK TO BASICS

Bill Mantovani G4ZVB
casts his eye over the
wires and comes up
with some

PRACTICAL ANTENNAE

Last month's antenna theory should now give you some idea of how we can make practical antennae and how to match them to the transmitter. The topic of antennae is a very challenging one for the radio amateur because it is by no means true that only the best antennae work the best DX. A good aerial with a high gain, such as a multi-element beam, that can be rotated to the desired direction, will certainly make it easier for you to hear the DX and to get through the pile-up of stations chasing some rare DX. However, it does not follow that without such an antenna you will never work the DX.

A well-designed antenna system, properly matched, high in the air and well clear of surrounding objects is something that all amateurs would like to have, yet how often is this possible? The truth is that for many amateurs, who do not live at the top of a hill and in the middle of a field, it becomes a case of making do with the chimney and a nearby tree or fence for stringing up the antenna.

Invariably, for the 'longer' bands of 40, 80 and 160m, the antenna ends up being bent in a number of places to get it to fit into the available space. As for getting it well up into the air, that's another problem in itself. Objects near to the antenna, such as your own house or the tree you are using to support the aerial, its height above the ground and even the aforementioned bends will all have some effect on it.

The impedance at the point where the transmission line or feeder is to be connected and the performance of the antenna will both be affected.

The challenge

It is because of the above problems, and many more, that the antenna presents such a challenge in our hobby. Some of course do not see it like that but simply go out and buy an antenna that has been recommended to them, put it up on the roof or on a mast at the bottom of the garden and away they go. They may not be interested in whether their antenna is working properly, they have obtained it to allow them to pursue their hobby as they wish and the fact that it does not bring in that much DX doesn't worry them at all. On the other hand, there can be little that is more satisfying than working all around the world on a piece of wire that was made, erected and matched by yourself.

Remembering what was said on propagation, it follows that when propagation conditions are extremely good even the simplest of aeri-als will bring in some good DX. The old saying though that if you can't hear them you can't work them holds very true and it is possible to get some idea of how well an antenna is performing by the reports you are given and by how well everyone else

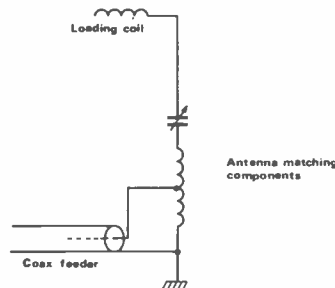


Fig 1 Marconi-type antenna for use at LF frequencies

on the band is managing to work the more distant stations.

It is probably true to say that few amateurs are ever truly satisfied with their antennae as they strive to put out a better signal, which is why you will come across so many different types of aeri-als in the textbooks. By the way, in case it is confusing you, the terms antenna and aerial both mean the same thing.

For the RAE we only need to cover the more common types of antenna, some of which you will already be familiar with if you are a regular reader of this magazine. Trevor Morgan GW4OXB has covered a number of the popular types of antenna over the months in his *Short Wave Listener* feature and all of these can be used for transmitting as well as receiving (yes, even the indoor ones), provided of course that they are correctly matched. For a bit of extra studying, look through your back issues at the various articles on antennae and in particular at Bill Sparks' excellent series on *Aerials and Propagation*.

Practical antennae

Right, let's begin our study of practical antennae with the simple *dipole*. The dipole is an antenna that is cut to be half a wavelength long at the desired operating frequency. Thus, a 20m dipole (for the 14MHz band) has a length of approximately 10m or 33ft; easy isn't it? If you make a note of the various amateur band wavelengths and halve them then you have the approximate dipole lengths for these bands. Dipole length often forms the basis for a typical RAE question.

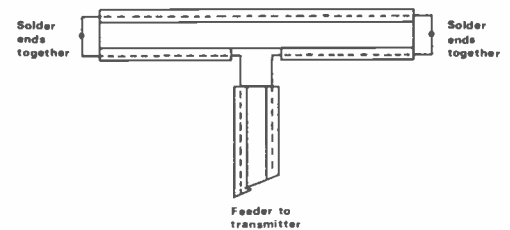


Fig 2 Construction of a folded dipole from 300ohm feeder

A diagram of the half-wave dipole was given last month and *Table 7.1* in the *RAE Manual* gives the approximate half-wave dipole lengths for the different bands.

Why choose an antenna that is half a wavelength long? In last month's introduction to antennae we saw that the ratio of voltage and current varies along the length of an antenna so that impedance at any point along this wire may be high or low depending on that ratio. As the output of a transmitter is generally of low impedance (50 to 70 ohm), it would be very convenient if we could find a low impedance point along our antenna wire where we could directly connect the transmitter output (using low impedance feeder of course) and so minimise any matching problems.

A full-wave antenna has a very high impedance at its centre point (though there are other points along the wire where the impedance is fairly low and may present a satisfactory match). The centre point of a half-wave piece of wire is ideal though because the impedance here is approximately 70 ohm (resistive). This means that we can take a simple dipole, connect it using, say, easily available 70 ohm co-ax cable to the output of a transmitter and achieve a satisfactory impedance match.

The above is only true however when the antenna is used at the frequency for which it is cut. A 20m dipole would no longer be a half-wave long if you were to try to use it on the 15m band and the impedance at the centre point would now be very much higher than our desired 70 ohm. Also, it would not be

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resistive making matching a little less simple. Thus, if a dipole cut for one particular band is used at a different frequency, a mismatch condition will exist at the feed point and maximum power can no longer be delivered by the transmitter.

The only exception to this is the 40m dipole, whose third harmonic falls within the 15m band. In this case, the impedance at the centre point would be about 90 ohm, presenting a reasonable match with the 70 ohm co-ax. Other than this, a dipole is judged to be a single-band antenna, although it is quite acceptable to connect more than one dipole to the same feeder and so achieve a very simple means of multi-band operation.

The dipole is a commonly used antenna capable of giving quite acceptable performance even when erected in the confined space of a loft. It is however a balanced antenna, and feeding it with coaxial cable, which is unbalanced, is not strictly correct. Co-ax cable may be convenient, especially as the output of most transmitters is also unbalanced, so a simple solution is to use a balance-to-unbalance transformer or a *balun* at the feed point. This usually consists of very closely coupled windings around a ferrite core.

Another method is to substitute the co-ax for 75 ohm twin-feeder and use an ATU at the transmitter end to perform the unbalanced-to-balanced transformation as well as matching the antenna at the band edges.

Being cut for a specific frequency, usually to the centre of the band in question for both CW and SSB work, the antenna will no longer be the correct length for a perfect match as you tune to the ends of the band. The SWR will have risen and some means of re-matching the system is desired. Some antennae have a broader bandwidth than others, but unless you aim to confine your activities to within a few KHz of a certain frequency, the use of an ATU is probably desirable.

Going back briefly to the balun, whilst many amateurs do in fact use their antenna systems quite happily without employing baluns, it is good practice never to connect an unbalanced circuit directly to a balanced circuit as it avoids the possible generation of TVI due to this unbalanced situation.

Trap dipole

A variant of the simple dipole is the *trap dipole*, also known as the W3DZZ antenna after its originator. This consists of a similar configuration to the ordinary dipole, with two wires of specific length going out from a central feed point. The difference is that in each leg, a *trap* or parallel tuned circuit is inserted which effectively isolates the wire at the far end of the trap at a certain frequency, thus electrically shortening the antenna.

The trap dipole is a multi-band antenna and this is how it works. The inner section of the antenna is basically a 40m (7MHz) half-wave dipole. To its ends are

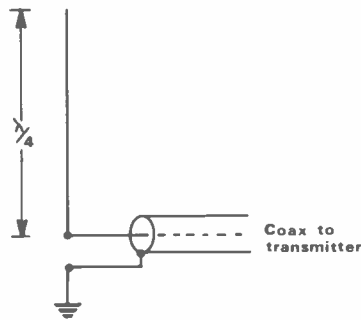


Fig 3 Quarter-wave vertical antenna

connected a trap which is resonant at 7.1MHz, plus a further length of wire to bring the whole electrical length of the antenna to that of an 80m (3.5MHz) half-wave dipole. When the antenna is operated at 40m, the traps isolate the outer wires allowing it to function as a half-wave dipole, but when used at 80m the traps no longer isolate the outer sections but electrically lengthen the antenna to an 80m half-wave dipole.

When the antenna is operated at frequencies above the resonant frequency of the traps the ends are again not isolated and the traps introduce some extra series capacitance into the system that allows the antenna to be operated at odd harmonics of its fundamental. Thus for the 20, 15 and 10m bands the trap dipole will function as a $3\lambda/2$, $5\lambda/2$ and $7\lambda/2$ antenna respectively.

The feed point impedance in all the above cases is sufficiently low to allow a satisfactory match into 75 ohm feeder for each band, but the use of an ATU is always advised to achieve a 'perfect' match. The antenna itself is a very popular one for general multi-band performance and the traps can be either bought or home-made.

Top Band too!

It can even be pressed into service on Top Band (160m) if desired by joining the feeders together at the transmitter end and operating the trap dipole against ground or a suitable counterpoise wire. In this case the configuration is known as a top-loaded *Marconi-type antenna* where, because of the large amount of space required by a resonant antenna for the lower frequency bands (ie 160m), a shorter length can be used and tuned against earth with additional loading provided at the top if the length is very short (less than $\lambda/4$). The Marconi-type antenna for use at LF frequencies is shown in *Figure 1*.

If a simple dipole is merely folded back on itself and the ends joined together so that the only break is at the feed point, the impedance at this point increases by a factor of four to about 300 ohm. The *folded dipole* as it is known is thus a suitable antenna for feeding with 300 ohm twin-feeder and can in fact be made entirely out of this feeder as shown in *Figure 2*.

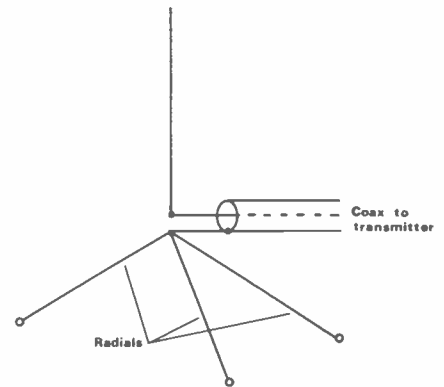


Fig 4 Ground-plane antenna using radials

Vertical antennae

A vertical antenna has a lower angle of radiation than a horizontal one and can be conveniently erected using just one single support. Disadvantages of the vertical antenna are that it has less gain than a comparable half-wave dipole and it is often difficult to achieve a good earth or *ground plane* around the base of the antenna, especially when it is mounted high in the air. Radiation is also omnidirectional.

The simplest form of vertical antenna is the quarter-wave vertical shown in *Figure 3*. This is just like a dipole turned on its end, with one of the legs removed and replaced by the ground. The impedance at what was the centre point but is now the bottom is still low (30-40 ohm), so it can be fed with 50 ohm feeder.

Unless the soil around the base of the antenna has good conductivity, earthing can present a problem, though a number of copper rods driven into the ground close to the base of the antenna and connected together will sometimes work. Another solution to the earthing problem is to create an artificial ground plane under the vertical antenna by burying wires or sheets of copper just below the surface. Alternatively, if the antenna is mounted on top of a mast, a ground plane can be created under it by using the mast's own guy wires, suitably insulated at the appropriate points, as in *Figure 4*.

Just like the trap dipole, a vertical antenna can be fitted with traps to make it multi-band, but you should bear in mind that as you go up in frequency the radiating section of a trap vertical comes closer to the base as the outer sections are isolated. Therefore, this type of antenna really needs to be placed well clear of the ground if satisfactory performance is expected.

End-fed antennae

It is quite possible to lay out a single length of wire, strung from the highest point possible and take it straight to the transmitter through some form of ATU (*Figure 5*). Whilst the wire can be a random length, optimum results are obtained if resonant lengths are used.

A length of 132ft is particularly ideal as a multi-band, end-fed antenna as it can be used from 40m through to 10m. One

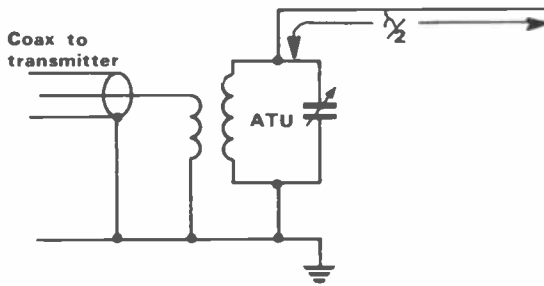


Fig 5 The end-fed antenna

problem with this type of antenna though is that it is prone to generating TVI, which the ATU can help to reduce or even eliminate altogether, particularly if care is exercised over the layout of the antenna and the way it is run into the shack.

Beam antennae

The performance of an antenna can be greatly improved by the addition of extra elements either side of the dipole. This configuration is known as a *Yagi antenna* and one of the more popular types is the *three-element beam*, as shown in *Figure 6*. This consists of a director in front and a reflector behind the radiating element, which serves to improve the directivity of the antenna (as shown in *Figure 3c* last month) and endows it with a higher gain over the simple dipole.

The addition of these extra elements serves to reduce the centre feed point impedance to about 20 ohm, so some form of matching is needed in order to feed it with 50 or 70 ohm feeder. This is achieved by the use of an impedance matching device, such as an appropriate transformer or even a simple *quarter-wave stub*. Alternatively, folding the radiator will raise the impedance by about four times, as already discussed, to approximately 80 ohm.

Traps can also be used on these beam antennae so that they can be operated on 20, 15 or 10m. The physical size of the elements limits the lowest frequency of a practical beam to 14MHz but it is not unknown for amateurs with a lot of space to be able to accommodate beams for frequencies as low as 3.5MHz, strung out between supporting masts or whatever. The smaller beams are the more common though and are usually mounted at the top of a tower with some means of rotating the beam towards the desired direction. More than just one single director may be used and the Yagi antenna is a very popular one for the VHF and UHF bands. It is possible to achieve quite high gain by *stacking* a number of Yagis in parallel.

The cubical quad

As its name suggests, the *cubical quad* (or simply *quad*) antenna is basically a square loop of wire, with each side approximately $\lambda/4$ in length (*Figure 7a*). It is one of the most popular of the loop

antennae and can be mounted horizontally as shown, with the feed point half-way along the base wire, or turned through ninety degrees so that a corner is uppermost, in which case it is fed at the bottom corner (*Figure 7b*).

The performance is the same for both types of loop and the feed point impedance is suitable for connecting to 75 ohm feeder.

Like the dipole, parasitic elements can be added to the quad to turn it into a beam antenna, the more common configuration being the inclusion of just the reflector element to form the *two-element quad*.

A multi-band quad can be constructed by assembling the loops for the various bands on the same mounting (but not in the same vertical plane!). In this case 50 ohm feeder would be used as the presence of the various elements serves to reduce the feed point impedance, as is the case with the Yagi. The quad is adjusted for optimum performance by the use of tuning stubs on the reflectors, or more simply by making the reflector about 3 per cent greater than the radiator element.

A quad antenna can be quite easily made for the higher bands of 20, 15 and 10m by using bamboo spreaders (suitably insulated as wet bamboo is a very bad insulator) and quite thin wire. The two element quad has a better gain than the three element Yagi and also a better *front-to-back ratio*, which together with the smaller turning radius compared to

Fig 7a The loop or quad antenna

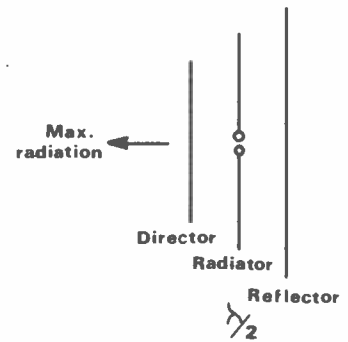
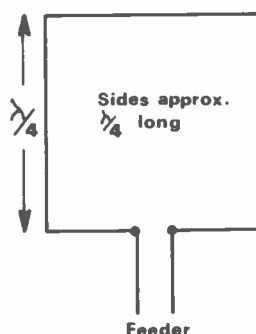


Fig 6 The three-element beam (Yagi)

the equivalent beam antenna makes the quad very popular with amateurs. The four element quad gives excellent gain and, like the Yagi, quad antenna can be stacked or used at VHF.

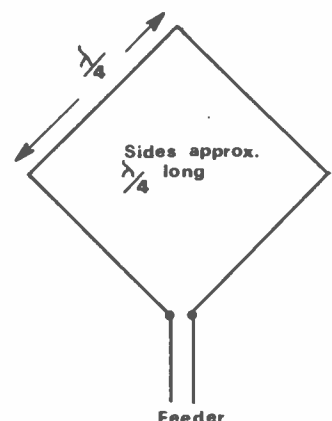
To finish with antennae, just a quick word about *loading*. Because of the lengths required, antennae for the bands above 20m can usually be easily accommodated, but longer antennae, such as for 40, 80m and, in particular, 160m, may present you with a bit of a problem. If the full length of wire cannot be laid out in the space available it is quite in order to make the antenna shorter and compensate for the reduction in length by the inclusion in the antenna of a small amount of inductance, as discussed for the Marconi-type antenna earlier.

The traps in the trap dipole do this as well, which is why the overall length of the antenna is a little shorter than that of a straightforward 80m dipole. Antennae for mobile use usually incorporate a loading coil to keep their overall length to within reasonable limits and the loading coil can be placed at the base, top or centre of the antenna.

Transmitter interference

This is one of the most important sections in the RAE syllabus, occupying as it does the first one hour paper, along with licensing conditions. We have already covered a number of the likely causes of transmitter interference over the past few months, so it suffices to give

Fig 7b A variation of the quad



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just a brief resume now of these points. Do however read Chapter 8 in the *RAE Manual* carefully; it is quite self-explanatory if you do.

Transmitter interference can be divided into two sections: interference to a neighbour's domestic equipment (such as TV, radio or hi-fi) and interference to other amateurs or users of the frequency spectrum. Looking at the former very briefly, the interference can be due to the transmitter being at fault, being operated incorrectly, the receiving equipment responding to the amateur's transmission when it shouldn't be, or something close to the transmitting station is causing interference to be radiated when the transmitter is operated.

The latter could be caused by a rusty pipe or guttering close to the transmitting antenna and is generally referred to as the 'rusty bolt effect'. Whilst this type of interference is not strictly within the syllabus, the amateur has to know how the interference is being generated before he can deal with it. The more common type of interference is the generation of unwanted signals by the transmitter, or a signal which occupies too wide a bandwidth.

A summary of the possible causes of interference from the transmitter follows.

Frequency Instability

There are two common types of problems associated with frequency instability: drift and chirp.

Drift can be caused by variations in the voltage supply to the oscillator, components in the oscillator changing appreciably in value as the transmitter warms up or mechanical vibration or movement of the transmitter chassis affecting the oscillator and its components. To minimise drift the oscillator circuit should be constructed using components which are not greatly temperature sensitive, it should be supplied from a stabilised dc source and the whole construction of the transmitter and oscillator should be mechanically stable.

Chirp is just what it says, the signal sounds very chirpy because either the power supply voltage is varying every time the key is pressed, causing the oscillator to shift frequency slightly, some of the output from the transmitter is feeding back into the oscillator to again cause a frequency shift, or the oscillator's stability is being affected by the load being placed on its output.

This can happen when keying the stage immediately after the oscillator, so it is advisable to use a *buffer stage* between the two to keep load variations to a minimum. A stabilised dc supply and proper screening of the oscillator help to overcome the first two problems.

Limiting the bandwidth

It is advisable not to make excessive use of the space available in the amateur bands by limiting the bandwidth of the transmission. This can be done without

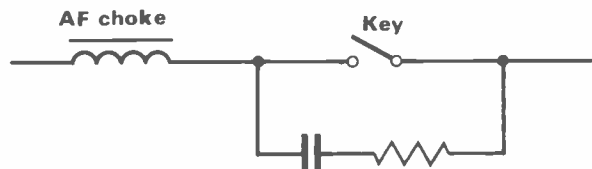


Fig 8 A typical key-click filter

severely affecting the information to be conveyed as follows.

CW: the sharp rise and fall of current when a continuous carrier wave is broken up into the dots and dashes of the Morse code can lead to the radiation of a type of interference known as *key clicks*; so called because it is audible as clicks on receivers tuned close to the carrier frequency.

This interference can be received quite a distance away from the transmitter and is a result of the energy in the broken CW waveform generating high frequency sidebands. This energy (and thus the sidebands) is suppressed by slowing down the sharp rise and fall of the CW waveform by means of a *key-click filter* circuit.

A typical key-click filter is shown in *Figure 8* and comprises an AF choke to slow down the rise of current when the key is closed, and a capacitor to slow the fall of current when the key is opened. It is necessary to fit a resistor in series with the capacitor to prevent the otherwise rapid discharge of the capacitor just as the key is being closed causing sparking at the contacts. It is preferable to perform keying at a low power point in a circuit as it makes the suppression of key clicks easier.

Speech – all the different modes of speech transmission may occupy too wide a bandwidth, resulting in *splatter* across adjacent transmissions unless precautions are taken.

For communication purposes we do not need to transmit frequencies above about 3KHz, so the audio stages of the transmitter must be *low-pass*, cutting off audio frequencies above 2.5 or 3KHz. The transmission bandwidth of an AM signal is thus about 5KHz and 2.5 to 3KHz for an SSB signal.

Over-modulation also causes interference, as we discussed earlier in the series, so the modulation level should be kept as close as possible to 100 per cent in an AM transmitter. For SSB, overdriving the linear power amplifier stage results in the generation of new, unwanted signals both inside the transmission bandwidth and outside, creating both *splatter* and distortion.

For the correct generation of a narrow-band FM transmission it is important that both the audio bandwidth and amplitude be restricted to a low level to avoid the sidebands which FM produces from being at too high a level. The modulation process generates sidebands well outside the transmission frequency, the levels of which depend greatly on the level of the modulation signal. Whilst these sideband levels are quite small, an

FM transmission should be kept well away from the edges of the amateur bands to prevent radiation outside of the band.

That is as far as we will take transmitter interference this month. In the July issue we will discuss how to prevent unwanted transmitter outputs such as spurious oscillations and harmonics. When planning the *Back to Basics* feature it had been my intention to try and cover one topic per month, but this has not been entirely possible as I felt that some points needed greater explanation than they receive in the *RAE Manual*.

I have based this on questions that often crop up from both newcomers to amateur radio and from amateurs who have already passed the RAE, so I hope to have cleared up some points for you as you go into the RAE exam.

And hope you did well . . .

By the time you read this month's issue, some of you will have just sat the May exam. With any luck you will be feeling quite confident of having passed, but if not don't despair – start studying (with *Amateur Radio* magazine of course) for another try in December.

When you do get through, you will realise how worthwhile it all was. Incidentally, the dates of forthcoming RAE examinations for 1985 are: 14 August, 16 October and 4 December. The 1986 dates are: 15 January, 19 March, 14 May, 9 July and 13 August.

Demand for sitting the RAE seems to be quite high, which is a very good sign indeed. Don't forget, you must apply well in advance to sit the exam. Your local college will be able to help you.

For those who missed the start of the *Back to Basics* series, here again is a list of useful addresses:

Radio Society of Great Britain, Cranborne Road, Potters Bar, Herts EN6 3JN. The City & Guilds of London Institute, Electrical & Telecommunications Branch, 76 Portland Place, London W1N 4AA – for RAE syllabus and sample papers.

Radio Amateur Licensing Unit, Post Office Headquarters, Chetwynd House, Chesterfield, Derbyshire S49 1PF – for the free publication *How to become a radio amateur*.

As well as concluding transmitter interference next month we shall also start looking at the chapter on measurements.

Acknowledgements and references

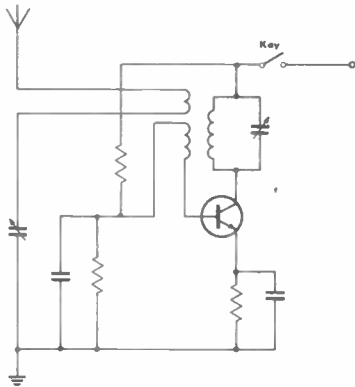
City and Guilds of London Institute. *Radio Amateurs' Examination Manual* – G L Benbow, G3HB (RSGB).

QUESTIONS & ANSWERS

RAE PRACTICE DEvised BY R.E.G. PETRI G8CCJ

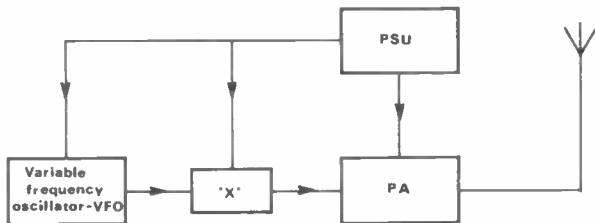
1. Figure 1 shows the circuit diagram of a transmitter in its simplest form. What is the most likely effect of connecting or changing the antenna length?
- The carrier frequency will shift, or be pulled
 - There will be a surge on the power supply
 - A hum will occur on the transmission
 - The transmitter will fail prematurely

Fig 1

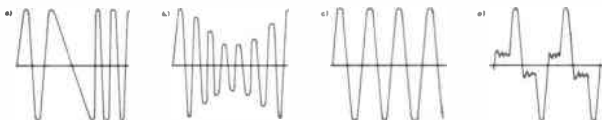


2. Referring to Figure 2. In order to increase the output power of the simple transmitter a power amplifier stage is added, but this is likely to pull the oscillator stage when tuned. Box X will reduce oscillator pulling. What is box X?
- Intermediate frequency amplifier
 - Image channel amplifier
 - Control amplifier
 - Buffer amplifier

Fig 2

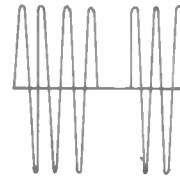


3. Which of the output waveforms shown below represents the output of the transmitter shown in Figure 2?



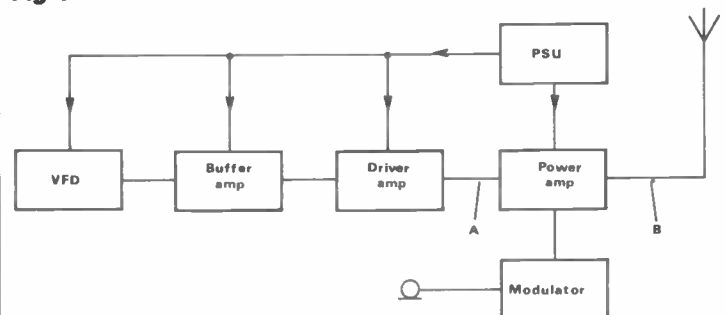
4. A carrier wave will not convey intelligence unless:
- it is modulated by some means or other
 - high gain components are used in the transmitter
 - the oscillator gain is reduced below that necessary for oscillation
 - the transmitter bears the label CB27/81
5. Figure 3 shows the output signal of a typical:
- high gain buffer amplifier
 - frequency modulated transmitter
 - on-off keyed CW transmitter
 - variable frequency oscillator (VFO)

Fig 3



6. Which stage of the transmitter shown in Figure 2 determines the carrier frequency stability?
- The power supply unit (PSU)
 - The buffer amplifier
 - The variable frequency oscillator (VFO)
 - The power amplifier stage
7. What is one disadvantage of on-off keying the power supply to a CW transmitter?
- It produces very soft output pulses
 - It causes less splatter interference
 - More charging current flows in the antenna
 - Sparking at the key contacts can cause local interference
8. What is the main disadvantage of keying the oscillator stage?
- Only a low current is keyed
 - This method is only suitable for the HF band
 - The PA stage will not deliver its full power
 - Poor frequency stability which might also cause a chirp at the receiver
9. Referring to Figure 4, which stage is likely to draw the most current from the power supply?
- The VFO
 - The buffer amplifier
 - The power amplifier
 - The driver amplifier
10. Referring to Figure 4, the block diagram shown is that of a typical:
- amplitude modulated transmitter
 - frequency modulated transmitter
 - continuous wave (CW) telegraphy transmitter
 - single sideband (SSB) transmitter

Fig 4



11. When discussing amplitude modulated transmitters, the terms 'high level' and 'low level' modulation are used. At which stage would the transmitter shown in Figure 4 be modulated for high level modulation?
- The power amplifier (PA) stage
 - The buffer amplifier stage
 - The driver stage
 - The oscillator

QUESTIONS & ANSWERS

12. If 'low level' modulation were to be employed which stage of the transmitter shown in *Figure 4* would be modulated?
- The PA stage, as shown
 - The driver stage
 - The VFO
 - The low voltage rail of the power supply

13. The modulator of an amplitude modulated transmitter is basically:
- an audio power amplifier
 - a radio frequency power amplifier
 - an intermediate frequency amplifier
 - an image frequency amplifier

14. When the transmitter shown in *Figure 4* is amplitude modulated, the output signal contains:
- a carrier wave and two sidebands
 - a carrier wave and one sideband
 - a carrier wave with no sidebands
 - two sidebands only

15. Referring to *Figure 4*, which of the waveforms shown below would be observed on an oscilloscope connected to point A, when a 1KHz audio tone is applied to the modulator?

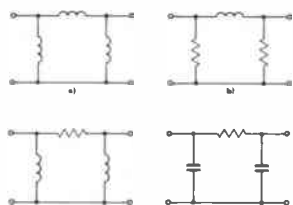


16. Referring to *Figure 4* and the waveform diagrams shown above. What signal would be observed on an oscilloscope connected at point B when a 1KHz tone is applied to the modulator?

17. The upper sideband (USB) of a double sideband transmission is referred to as the erect sideband. What is the lower sideband?
- The baseband
 - The base sideband
 - The inverted sideband
 - The introverted sideband

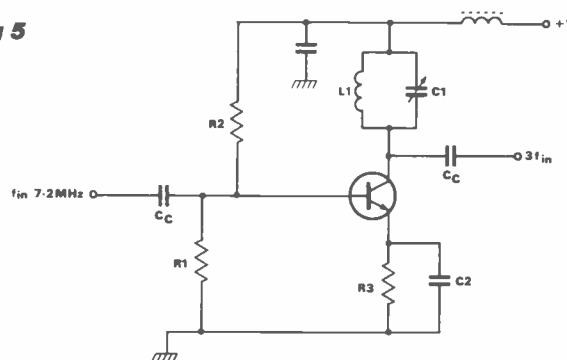
18. The bandwidth of an amplitude modulated transmission is dependent upon the highest modulating frequency. What is the typical range of audio speech frequencies suitable for amateur transmissions?
- 10-100Hz
 - 30-300Hz
 - 300-3000Hz
 - 3000-30KHz

19. To restrict the bandwidth of a transmitter to that necessary for the transmission of intelligible speech only, an audio low pass filter (LPF) is fitted in the modulator or microphone circuit. Which one of the filter circuits shown below is suitable?



20. *Figure 5* shows the circuit of a typical frequency multiplier stage. The stage is intended to provide a times three (x3) multiplication. From the information given on the diagram, calculate the frequency at which the tuned circuit needs to be resonant.
- 3.6MHz
 - 7.2MHz
 - 14.4MHz
 - 21.6MHz

Fig 5



21. Referring to *Figure 5*, how can the tuned circuit L1, C1 of a practical frequency multiplier stage be prevented from radiating radio frequency energy to other parts of the circuit?

- By reducing the number of turns on the inductor L1
- By reducing the value of the capacitor C1
- By enclosing the tuned circuit in a screening can and decoupling the power supply
- By short circuiting the emitter resistor R3

22. A transmitter's variable frequency oscillator (VFO) is tuned to a frequency of 1.8MHz and is multiplied by three stages of frequency multiplication, x2, x2 and x3. What is the output frequency of the last multiplier?

- 3.6MHz
- 7.2MHz
- 14.4MHz
- 21.6MHz

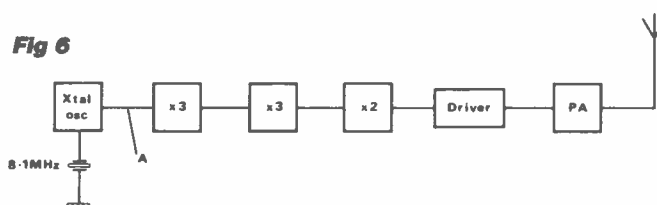
23. The block diagram shown in *Figure 6* is that of a basic frequency modulated VHF transmitter. To which stage will modulation normally be applied?

- The crystal (xtal) oscillator
- The second multiplier stage
- The driver stage
- The power amplifier stage

24. Referring to *Figure 6*, the crystal oscillator is running at 8.1MHz. What is the output frequency of the transmitter when the multiplier stages are correctly tuned?

- 64.8MHz
- 72.9MHz
- 145.8MHz
- 181.0MHz

Fig 6

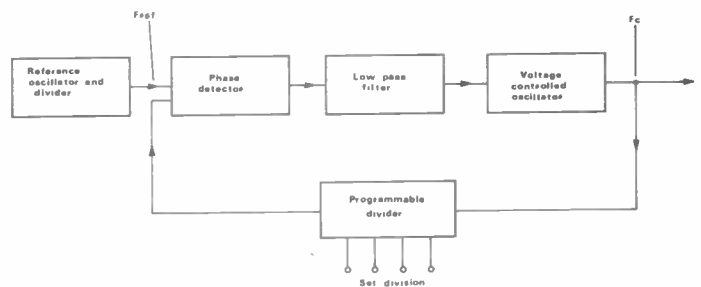


QUESTIONS & ANSWERS

25. Your transmitter has the same line up and crystal frequency as that shown in *Figure 6*, but whilst tuning you mistuned the last x2 multiplier stage and it only gave a x1 multiplication. What was the output frequency of the multiplier chain?
- 48.6MHz
 - 56.7MHz
 - 72.9MHz
 - 145.8MHz
26. The carrier frequency deviation of a frequency modulated transmitter is:
- proportional to the driver supply voltage
 - inversely proportional to the antenna impedance
 - proportional to the instantaneous amplitude of the modulating signal
 - proportional to the modulating frequency
27. Referring to *Figure 6*, the transmitter is designed to have a maximum frequency deviation of $\pm 5\text{KHz}$ measured at its output. What is the deviation measured at the input to the multiplier chain A?
- $\pm 5.000\text{KHz}$
 - $\pm 2.500\text{KHz}$
 - $\pm 0.555\text{KHz}$
 - $\pm 0.277\text{KHz}$
28. Referring to *Figure 6*, all stages that follow the oscillator:
- can be operated in class C
 - can be overdriven with no adverse effect
 - must be operated with very low supply voltages to avoid distortion
 - must operate with maximum positive feedback
29. The advantage of operating an amplifier in class C is that:
- maximum efficiency is obtained
 - minimum efficiency is obtained
 - the transistors run cold
 - minimum distortion occurs
30. *Figure 7* shows the frequency spectrum diagram representative of a DSB A3E transmission. Which components have to be removed to make the diagram represent an SSB J3E transmission?
- Both upper and lower sidebands
 - Carrier wave only
 - Lower sideband
 - Carrier and either upper or lower sideband

33. Of the three classes of bias, A, B and C, class A is the most linear:
- but the least efficient
 - and also the most efficient
 - and is always biased beyond the collector current cut-off point
 - and is always biased at the collector current cut-off point
34. Frequency synthesisers, as shown in *Figure 8* are becoming one of the most popular forms of carrier frequency generation. The reference frequency, F_{ref} usually determines the:
- channel spacing, or carrier frequency step size
 - received image channel interference
 - level of harmonic distortion
 - feedback level of the PA stage

Fig 8



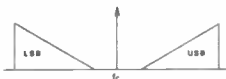
35. The synthesiser output frequency F_C is changed by:
- adjusting the PA stage for maximum input current
 - adjusting the PA stage for minimum input current
 - altering the logic levels on the programmable divider
 - by a process of digital to analogue conversion between the VCO output and the PA stage

And now . . . the moment of truth. Just turn the magazine upside down to see how many you got right.

ANSWERS

1 - a; 2 - d; 3 - c; 4 - a; 5 - c; 6 - c; 7 - d; 8 - d; 9 - c; 10 - a; 11 - a; 12 - b; 13 - a; 14 - a; 15 - c; 16 - b; 17 - c; 18 - c; 19 - d; 20 - d; 21 - c; 22 - d; 23 - a; 24 - c; 25 - c; 26 - c; 27 - d; 28 - a; 29 - a; 30 - d; 31 - c; 32 - d.

Fig 7



31. One advantage of using single sideband is that:
- it uses more of the available frequency spectrum
 - it gives hi-fi reproduction
 - it occupies only half the frequency spectrum of a DSB transmission
 - it is better for amateur sub-aqua operation
32. A transmitter is operating J3E SSB suppressed carrier. Under conditions of no modulation the power supply current is 0.5A at 12V. What is the RF output power?
- 60 watts
 - 6 watts
 - 0.6 watts
 - Zero

That only leaves us to
plug the book!

For more question and answer practice Ray Petri's book 'The Radio Amateurs' Q & A reference manual' is available from:
W P Publications,
11 Wayville Road,
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The book contains 20 sections of multiple choice questions and answers which follows the RAE syllabus in roughly the same order that any recognised RAE course would progress, making it an ideal source of course homework.

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Next month G3OSS reviews the Trio TS940 HF transceiver

■ BEGINNERS' WORKSHOP

Rev George Dobbs G3RJV examines circuit board techniques and demonstrates their use in a mini amp construction project

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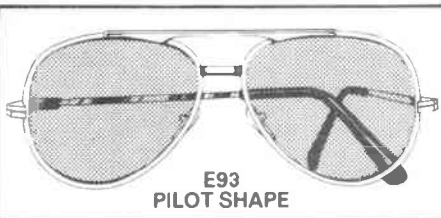
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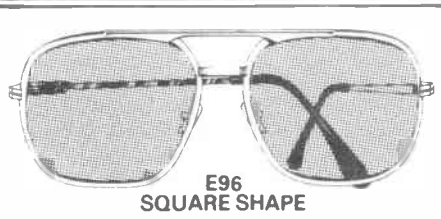
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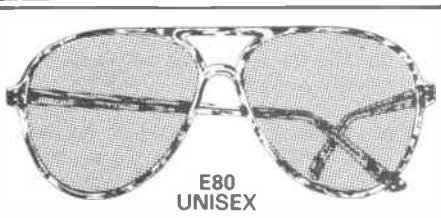
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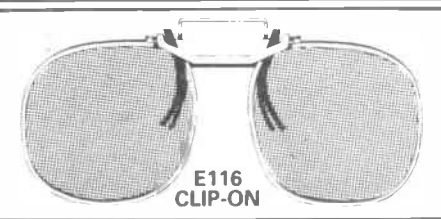
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0685

Last month I finished off this column by offering to advise where I could on secondhand equipment. As a result a reader has written asking me to identify a receiver. His problem is that it has a few valves missing and he wishes to repair it so he needs to know what the receiver is, then get the handbook and identify the missing valves. He has sent me a photograph, which is unfortunately in colour and a bit out of focus so it cannot be reprinted here, but it has caused endless arguments amongst local amateurs as to what it is.

I thus appeal to our vast army of learned readers for help. Can anyone identify a Marconi produced receiver with external power supply, which uses miniature valves (ie not octals), looks like a CR100, except for a meter on the front panel, and covers 1 to 32MHz in four bands? It has provision for crystal control or external oscillator as well as the internal oscillator, and has switched passbands of 1, 3, 8 and 13KHz.

Judging by the superb condition of the receiver, I can understand the reader's desire to get it going, so please, if you recognise the above beast, write to me (c/o Amateur Radio) and help make another reader a happy man.

Tadpoles

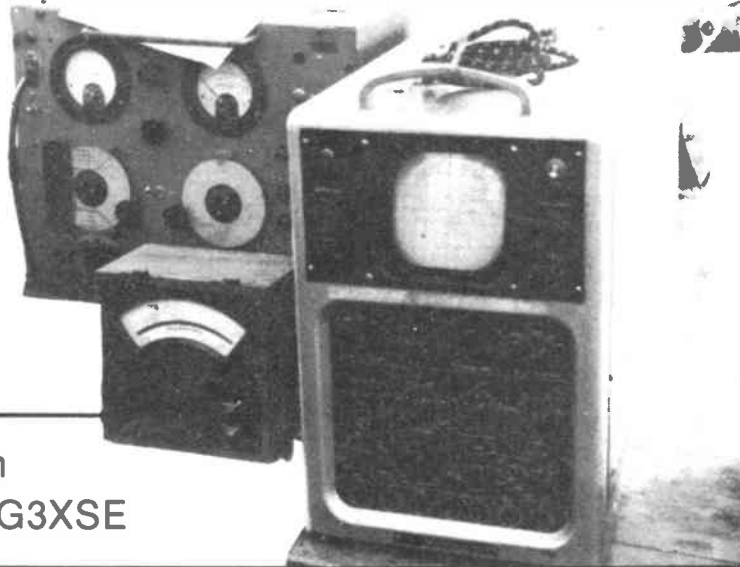
No, not the sort that turn into frogs, but high band FM hand-portables. Vast quantities of these seem to be coming on to the secondhand market at very reasonable prices. At a surplus auction recently your scribe saw 500 go for £5,000 and this is probably the reason for them appearing on the amateur market at £20 to £45 each. A lot of amateurs appear shy of buying them since they are an unknown quantity, but they really are an excellent buy.

The rigs will cover approximately 125 to 180MHz so one that has, say, 171MHz marked on it will work on 2 metres. This wide operating frequency range is unusual and may well be the reason for them not being too popular; people think they will not go onto 2 and thus don't buy them. I have set up dozens for local amateurs and each one has given a healthy 3 watts out and a useful 20dB quieting for about 0.25µV.

Frequency control is obtained by crystals, one receive and one transmit for each channel. The transmitter works best with a X12 crystal, ie 12MHz for two, but the receiver seems quite unconcerned and I have set them up for people who have bought f-10.7 divide three, f+10.7 divide three, f-10.7 divide nine and f+10.7 divide nine. I would, however, suggest that you use the same multiplication for all the channels.

Setting them up is fairly easy. A little study of the board layout should soon reveal the signal paths and the receive side should present little problem. The transmit side sets up fairly quickly too, but it is often not realised how interdependent all the variable capacitors are, so once you have got it working retweak the capacitors all the way through a couple of times, looking for maximum power out consistent with minimal power drain.

SECONDHAND EQUIPMENT GUIDE



by Hugh
Allison G3XSE

Most of the rigs I have come across have come from the surplus source with Ni-cads fitted. Since the rig uses standard pencil-type batteries the odd duff cell can be cheaply replaced. Very few so far have actually required surgery to get going and those that do have been easy to work on, being very reminiscent of early two metre handhelds.

I feel that these rigs could become the standard cheap handheld for two, rather like the old Pye Pocketphone has on seventy.

Eddystone EC10

Several readers have recently written in asking about this set, which was one of the earliest all transistor short wave receivers available. It covers from about 550KHz to 30MHz and is an extremely good looking set. It may be battery or mains powered. The set itself runs on a nominal 12 volts and this can come from a car battery or from internal 8 x U2 cells. On the highest range, around the ten metre area, the receiver has a marked tendency to drift with varying supply voltages, so use a reasonable power source.

Performance of this receiver will not exactly set the world alight, but your scribe was once part of an NFD (National Field Day) team that came sixteenth overall using one when the main receiver blew up right at the start of the contest. So they do work, although sensitivity plummets above about 16MHz. Some variants have an audio filter in them which is fairly good on CW.

Talking of variants, a word of warning. There are an awful lot of EC10 lookalikes about, all of which were made by Eddystone. Some only go to about 20MHz and are the so-called 'Marine' version,

and some cover about the same and 88-105MHz but have no BFO (beat frequency oscillator) or filter for CW reception, so if you want one for general amateur use make sure it is an EC10 and not an EB10, EB35 or some such.

Although constructed like the proverbial brick-built little room and suffering few mechanical failures, there is the well-known AF117 problem on these otherwise reliable receivers. Although I have mentioned this several times in these columns I still get letters about it, so briefly the problem is that the hermetic seal on the early transistors was less than perfect and allows moisture and other contaminant's into the transistor case. This causes a growth which eventually shorts out one of the transistor electrodes to earth (usually the collector). The receiver normally becomes exceedingly dead when this happens, but fortunately a quick snip of all the 'screen' leads of the RF transistors will cure the problem.

For your information the transistor lead-outs are emitter, base, screen and collector, there being a large gap between screen and collector.

The other problem with these receivers is noisy resistors. The best way of finding these is to turn down the audio gain control. If the noise decreases the noisy resistor is in the RF/IF stages, but if it doesn't, it is in the audio stages. A walk round the appropriate area with a scope probe will normally pin-point the offending component. Alternatively a good dose of freezer on the resistors whilst the receiver is on will often do the trick—the noise will noticeably decrease when the appropriate resistor is frozen.

Price is almost invariably determined by condition. £30 is about the minimum,

SECONDHAND

and expect a well-used example in rough condition. £50 should get you a good one with mains and battery packs.

IC31/32P

I recently received a letter from an amateur saying that a relative abroad had offered him an Icom IC31. After scouring through back issues of various magazines he had found an IC32 mentioned in an advert and assumed that there had been a mistake in his relative's letter. After much correspondence he had written to me (his relative being a non-amateur) to try and sort out what it was.

More knowledgeable readers may

know that the IC32 was a very neat 70cm FM crystal controlled mobile rig. Although its sensitivity can now be beaten, and given the limitations of crystal control, these rigs are nevertheless rightly sought after as mobile repeater nattering boxes, normally changing hands around the £80 to £100 mark.

So what is the IC31? It is a base station version of the above. Although containing a mains power supply and a few gimmicks, such as variable power out on transmit and a front panel mounted mic gain control (in my book as useful as a chocolate soldering iron), the rig uses many of the modules of the IC32 and

performs about the same. It is much bigger than its mobile brother, but can be run on 12 volts if required.

Although not officially imported into this country I have seen the occasional one offered for sale (normally fetching about £100). If offered one I would suggest that you check carefully the channels fitted, as the rig may well contain European repeater crystals. These are not the same as ours and fitting it out with UK repeater channels would be an expensive pastime. Since the correspondent only had to pay carriage I advised him that he was definitely on to a good thing!

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■ Public address loudspeakers (three) for sale in wood acoustic enclosures 60in x 15in x 8in on stands, each with six Goodman 74/49 transformers and loudspeakers. £75 each. Tel: Portsmouth 263197 evenings.

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■ Hallicrafter SX28 receiver. Original unmodified condition £50. AVO signal generator, AM/FM 450KHz to 230MHz, excellent condition £40. Wanted, all types of valved receivers, age and condition not important, urgently require microwave parts especially for 10 and 14GHz. Glen Ross. Tel: (0203) 616941 (Coventry).

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■ Ham international Concorde 3, latest model, this mobile rig has everything, 2 months old, £190 ono. Golden Eagle 26-30MHz mobile linear amplifier, input 4-12W, output 150-250W, 2 months old - hardly used, £80 ono. Tel: Tim, Hull 802531, evenings only please.

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■ Exchange or sell reception set R107 ZA 3050 serial number 8406. Ideal 80 metre reception set would like Nato 2000 or very similar. Tom Howard, Brynhadford, Llanerchymedd, Gwynedd, Anglesey, North Wales. Tel: Llanerchymedd 782.

■ VHF, UHF, FDK 750E and 430 expander 2m and 70cms mobile multimode FM SSB CW 1W & 10W, dual VFOs, repeater shifts, auto toneburst. Boxed, as new with handbook and mobile mount. Sold complete with diplexer and dual band mobile antenna £350. J Taylor G1EJE. Tel: Burntwood (05436) 72275.

■ QTH with 60ft versatower. Bungalow with third bedroom as shack. Long garden OK for ½ wave top band. Double garage and 8ft x 24in heated greenhouse. QTHr OK. G4DYP. Tel: Burntwood (05436) 6139. Price £51,500, freehold. Chasetown, Staffs.

■ FDK 750E 2 metre multi-mode. £250 or will swap for FRG7700 or a good general coverage Rx. Ask for Rick. Tel: (0302) 26080.

■ Radio-Electronics (American) March, April, May, June, July, November, December, 1983. Electronics and Wireless World January, April, July, August, September, October, November, 1983. Radio and Electronics World October 1982 to April 1985, excluding January February 1983. Ham Radio Today February, March, June, July, August, 1983, August 1984, April 1985. Television April, 1983 to April 1985 excluding May 1983. Offers per publication, not issue please. W M, PO Box 17, 23 Brentford, Middlesex TW8 9NF.

■ Cabin cruiser less outboard for sale, or exchange 2m SSB transcvr, or 70cms transcvr. Boat has good grp hull, wood deck house need painting. Intruder alarm systems, assembled, tested, to clear £30 each unit or £25 each for six. P G Robins, G8BSK, 290 Priory Road, St Denys, Southampton SO2 1LS.

■ One Trio JR310 receiver, good condition, £90.00 gets the 14, 7 and 3.5MHz bands. One SWL Lar omni-match ATU £30.00 and one Codar mains PR30 preselector good for 'dead' receivers ie receivers for less receiving, £10.00. Also one Revcone Discone £12.00. Tel: Wood, Clochen 378.

■ G3WW seeks offers on aerial installation 56ft Western 3HD tower, 205BA hy-gain beam, Moseley 10/15 and 2x16 tonnes, Emoto heavy duty rotator, separate co-ax & Emoto 70ft feedlines to shack. Two 240 ac motors gearboxed raise/tilt tower. Also 56ft x 4in dia. All mast in two sections guyed 2 x 3. Tel: (0354) 740255 QTHr.

■ JVC PC-5L portable stereo hi-fi system. Includes radio-cassette, amplifier, tuner, cassette deck and speakers, can all be separated. 25 watts. Photo and aux terminals, twin telescopic antennae. FM MW LW SW, detailed manual included, cost £300, exchange for good hand-held scanner with airbands, ham and marine bands. Cannot deliver. Mr Scrase, 2 Queen's Rise, Ringwood, Deal, Kent CT14 8HJ. Tel: Deal 368284.

FREE CLASSIFIED ADS

■ 2 metre FM Trio TR2300 with nicads, charger, mains power supply boxed £100. Eddystone RX770R, 19-165MHz good condition £100. Tower 3 section 65ft lattice hd £300. Contact Peter Eston Grange. Tel: (0642) 567249 10am-5pm, pref buyer collects.

■ Icom ICR70 Rx, as new, only 5 months old £400. Also FRT7700 ATU £25. Scarab RTTY unit (MPTU1) including BBC Micro software £45. All 3 units still with boxes. Buyer to collect please. Tel: (0494) 40001 (evenings only).

■ Dragon G4BMK RTTY transceiver, software with full instructions, only £6. Also 23 other Dragon games in good condition, all at less than half price. Good titles. Also 1 broken Dragon 32 for £20. Tel: Paul (0698) 285586 after 4.30pm.

■ 600 valves, octal American, UX types, brits, 5 and 7 pin bases, pre-war and post war types. Sae for lists please. Have BL348M int pwr pack, mains. £50 or offers. AE Jeffrey, 42 Dennis Rd, Padstow, Cornwall PL28 8DF.

■ RTTY free Creed 86R page printer plus tape punch in beautiful condition if you buy my American terminal unit (receive only). Full shift ranges, built in 2in monitor 'scope etc with circuit and loop supply unit. Yours for £45. Buyer collects. Also T20 ARC5, USA made 90 watt aircraft transmitter covers 80mtr band, great performer, yours for £25. Also RCA Nuvisors, new, plus bases £2 each. Nev Kirk G3JDK, 54 Allendale Ave, Rotherham, Yorks S65 3BY. Tel: Wickersley 541606.

■ IBM golf ball electric typewriter, as new, list price £840 with spare data golf balls and full box of 12 everlasting ribbons. Will exchange for HF transceiver bands 1.8 to 30MHz inspection welcomed. 2nd hand Tx/Rx no obstacle, good working Tx/Rx is all that is required. R Haines, 24 Loyd Street, First Lane, Anlaby, North Humberside HU10 6UG. Tel: (0482) 658716.

■ Realistic DX160 general coverage receiver, fitted connection for digital unit, £40. Onyce FC155 SWR/power/FS meter with digital frequency readout, £25. Mizuho KX2 antenna tuning unit £15. All in good condition with manuals and boxes. C Head, 34 Lyte Lane, West Charleton, Kingsbridge. Tel: (054 853) 500.

■ Trio JR310 amateur receiver vgc £60. Would swap for Lowe SRX30 etc. I want general coverage Rx solid state. Prefer buyer to collect. Stan, 9 Park Square East, Jaywick, Clacton, Essex CO15 2NL.

■ Swan 100MX, 80-10, SSB/CW transceiver. Drae 24amp PSU, transmatch with Ezitune, junkers key, SWR bridge, wavemeter, dummy load, etc. Icom IC202, Packer W'meter, dummy load all in new to excellent condition, £375 ono. Will swap for a quality camera, scanning Rx or WHY. Tel: (0872) 70701 evenings.

■ 'Panda Cub' Tx for buying or copy. Your price. Dennis GW2BLW, No9 Lon Cymru, Llandudno, Gwynedd LL30 1SJ.

■ FT726R 2m, 70cm, sat, duplex, brand new, just two weeks old, unusual reason for selling it. Will consider part exchange for lap computer like NEC PC8201 plus cash or ring with a firm offer. Buyer to collect or arrange collection. Peter, tel: Witnesham 526, between 8am and 9pm.

■ Cobra 148GTL, 360 channel, 27MHz, AM, FM, SSB, CW, as new, still boxed £100 ono. Avanti Spitfire 27MHz, 3 element beam, never used £25. Tel: (0246) 410409 between 9am-4.30pm Mon-Fri.

■ Wartime Admiralty radio working but needs some attention £60. Tel: (0622) 861998 evenings.

■ AR88D new genuine S-meter £10. R444 VHF AM/FM S-meter etc, £45. Tuning units 36MHz to 12GHz, £35 ea. Also R5032A VHF Rx 100MHz to 156MHz. National HRO receiver, spare new HRO, 697 power unit, various laboratory test instruments. Bob Wright, 249 Sandy Lane, Hindley, Wigan WN2 4ER. Tel: (0942) 55948.

■ 80m QRP transceiver, VFO. Also 20m QRP transceiver, VXO. Both CW. Homebrewed to good standard. £35 each. J Jocys, 28 Vaudrey Drive, Timperley, Altrincham, Cheshire WA15 6HQ. Tel: (061) 969 0619.

■ Robot 400 SSTV scan converter fitted professionally with interface, three memory boards, enabling frame, sequential colour as well as B/W transmit and receive, details for 4x3 aspect ratio and line sequential mods - not yet fitted, £450 ono. Also Robot 800 computer communication board,

self contained RTTY 45 to 100 bauds, ASC11 110 bauds, morse 0-99wpm, send and receive, also SSTV character generation, £250 ono. R I Clews G3CDK, 153 Boundary Rd, Wallington, Surrey SM6 0TE. Tel: 01-647 1866.

■ 100 watt audio amp including transformer £35. 3A 12V Farnell PSU £15. Radcoms, Practical Wireless, component data books etc, inquire for details. Transformers 100V, 6.3V, 170V-200V etc, 240V-115V, 12V, plus large heat sinks. Various meters, boxes, also 50 x 35 x 20cm metal box £8, and 45 x 19 x 30cm £5, plus others. FM broadcast tuner head £3. Valves - inquire for details. Buyer collects. Simon, 8 Ripon Row, Halton Lodge, Runcorn, Cheshire WA7 5YT. Tel: (85) 77075.

■ Exchange photocopier complete with 64 rolls of paper, loads of ink and toner, with two machines for spares. Electronic organ Bompemti old type. Would consider anything to do with amateur radio or WHY. Tel: John (0705) 261399.

■ SB102 Tx/Rx P/S + spkr + mike, perfect clean working order £200 ono. AR88LF clean, undamaged, f/panel working £55. 24V-28V dc 10amp Gresham P/S, £15 as new. D C Brightman, 34 Caedonian Road, New Bradwell, Milton Keynes, Bucks. Tel: Milton Keynes 314095.

■ Amateur Radio and Ham Radio Today. Every copy since day one, mint. Offers or swap for any ham gear WHY? Need 2m multi-mode. Cash adj. D M Seager, GW2BLW, 9 Loa Cymru, Llandudno, Gwynedd LL30 1SJ.

■ 65ft three section lattice tower HD £300. Tel: (0642) 456327 weekdays 10-5pm.

■ Yaesu FT290R in excellent cond. C/W hand mic, nicads, charger, auto power lead, £180 ono. Also J-Beam C5 2m antenna + 10m of UR67 co-ax, £20. Tel: Stone (Staffs) (0785) 816055.

■ Yaesu FT102 HF Tx/Rx. Micro Modules transverter 2 metres, mint condition in original boxes. Fifty hours use since new 12 months ago. AM/FM board fitted, £650 ono. Can deliver 100 mile radius. Tel: (0946) 65475.

■ Cobra 148GTL, 27MHz transceiver AM/FM USB LSB CW. Hardly used, still boxed. £100 ono. Plus Avanti Spitfire 27MHz, 3 element beam, never used, £25 ono. Will swap for any two metre equipment. Mr C Sawyer, 6 Purbeck Court, Sheffield. Tel: (0246) 410409 between 9-5.00.

■ FRG7 MK1, immaculate, no mods, manual, ATU, digital clock, also 3 books, 1100 Q&A for RAE, amateur radio, Morse code. Buyer to collect, £160 cash ono. Tel: (0422) 53979.

■ Tower 30ft heavy duty telescope with winch, ready for pick up near Bath, £190, as new. 30 watt linear MML144/30 1W or 3 watts in with pre-amp £40. Advanced Morse trainer MMS2 talk back group length one five fifty, words per minute 6 to 32 words numbers etc, £100. Tel: (0761) 415746.

■ Reace UH-74 detachable head, 50MHz, 144MHz, 430MHz, VSWR and 10 watt max power meter, cost £29 only £15 ono. Also Heil EQ300 microphone equalizer, boost your audio, wired to suit Yaesu 8 pin. Cost £65 only £30 ono. Both as new, both surplus, both £40. Tel: 01-247 6097 day only.

■ Signal generator VHF and UHF FM/AM GWO only £70.00 by Marconi. Pye pocket phones PF1 Tx and Rx complete with batts only £25.00. Pye PF70 three channel UHF portable with batt only £55.00. Pye PF6 vehicle adapter £25.00. Pye PF1 Rx, batts 9 volt, yellow ni-cads, five for £2.00. Assorted HC6U xtals 50p per bag. Write J Hamilton, 25 Thornham Close, Armthorpe, Doncaster, S Yorks.

■ R600 comm receiver, ten months old, mint condition, hardly used, £230. AR22 pocket PLL Rm receiver, complete with charger and rubber duck antenna, 18 months old, £50. T M Clayton, 10 St Nicholas's, Bracon Ash, Norwich, Norfolk, NR14 8HG. Tel: Mulbarton 78120.

■ Nato 2000 usual frequencies, £120. FT707 in good condition, PSU, ATU, £475. Tel: (0283) 221870.

■ Metal fayre 16 ele cross yagi 70cms brand new £40 ono. 13cms, 2C39/7289 PA cavity all brass (per G3VVB) £50 (beautifully made). BBC B DFS ROM £10. BASIC I ROM £5. Teac 55E 200K s/sided 40/80 track disk drive (cased etc) £135 ono. Paul Chamberlain, 9 Goffs Close, Crawley, West Sussex RH11 8QB. Tel: (0293) 515201.

■ Tandy CB handheld rig with extension pre-amp mike cost £127, my price £65. Amstrad 901 legal FM CB £15. CB SWR meter and extension speaker £5.

Both power supply brems new £10. 27MHz CB pre-amp 15dB gain £10. 44MHz crystals for two metres £1.50 each. Wanted: 934MHz CB rig, SWR meter, aerial, two metre hand held G146A AOR-22 FT-202 AR-240 or similar. Tel: 01-946 2967.

■ Hewlett Packard 140A scope with 1400A diff amp and 1422 timebase plugins £150 ono. Would consider p/x for smaller D/B scope. Metrosound ST20 stereo amp £20 ono. ICE 680R multimeter £20 ono. Tel: (031333) 2610 after 6pm.

■ Datong ASP processor £60. Yaesu SSB filter to suit 101, 901, 902, type XF8-9HS £10. QRO valve QV08/100 offers, base ant: 10-80m complete all co-ax etc £40. Crystals to suit Yaesu rigs for 11m £6. 3 band Rx with built in recorder £15. Any 70cms Txcvr? Have lots for px or swap, gen cov Rx VLF to 32MHz, govt spec, offers or swap. Martyn Bolt, 112 Leeds Road, Mirfield, West Yorks WF14 0JE. Tel: (0924) 495916.

■ Kenwood Trio TW4000A 25 watts on 144/6 and 430/40H FM mobile, 12 months old. Only used at base on LP. Excellent dual band rig. Now gone multi-mode, so surplus to requirements. Save over £100 on today's price. £425 complete in original packing. G2ATK, 8 Holloway Drive, Pershore, Worcs. Tel: Pershore 553735.

■ KW2000A transceiver complete with matching power unit and manual, good condition £100. To inspect and collect tel: (0532) 674766.

■ Microwave Modules 432MHz, 10W in 50W out linear, £90. Part built LMW 23cm transverter £40 ono. CX5200 coaxial relay, £18 ono. All carriage extra. Andrew G6HEL. Tel: Milborne St Andrew 301.

■ SWL station all equipment in mint condition and boxed. Comprises R2000 HF recvr £395. VHF converter £110. CWR610E RTTY decoder £160. 9in video monitor £70. KX3 ATU £40. SP230 speaker with audio filters £40. Plus HF5 vertical £50. VHF discone £20. Recvr is fitted with NB 500Hz CW filter. An ideal all mode SWL station. Only reason for sale, don't have time. Tel: (0436) 71262.

■ Complete two metre station. Trio 9000 multi-mode, scanning mike, mobile mount, matching BO9, SP-120, PS-20. Mobile whip, gutter clip and cable. Base 3 x 1/2 colinear. Rotator with control box and cable. 8 ele yagi. Good condition, seen working, £475 no offers. Reason for sale, going all HF. GOAMH. Tel: (0323) 898515.

WANTED

■ Can anyone provide young amateur with details or circuit diagram of micro/minature, single channel, radio control transmitter 27MHz band. Limited range 200 metres only. Push button operation on/off. Power from miniature battery. As alternative, anyone wishing to provide same made up. Cash paid. John Day, 417 Alcester Road South, Kings Heath, Birmingham B14 6ES.

■ Pye PF1 Tx/Rx Xtal for RB14. Also PF1 Tx/Rx, nicads wanted, good price paid for PF1s in vgc. Also required: PF1 Tx/Rx Xtal for RB6 or RB10. Steve Balon G1HAW, 18 Knowsley Street, Leigh, Lancs WN7 4ER. Tel: Leigh 675445 after 7pm.

■ Short wave Rx in gwo. FRG7 Trio 600 or WHY? Swap for 26in Ferguson Colorstar transistor TV, sliding doors, legs, gwo. Codar PR30 RF preselector, as new. Swap 2 metre ATU LARSEM or sim, or 2 metre base ant. Mr Aldridge. Tel: 01-200 3825.

■ Bug keys for use by dedicated CW operator and collector. Any semi-automatic keys by McElroy, Vibroplex etc. Any age, any condition. Top price paid for pre-war bugs. Philips PM3200 scope service manual or copy. G3TSS. Tel: (043) 471 3125.

■ Cabinet for RA17L receiver. Also RA121 SSB adaptor with CRT tuning indicator. Also interested in any other Racal equipment plus literature on Racal products. Mr Greetham, 10 Hillman House, Smithford Way, Coventry Tel: (0203) 26252.

■ Exchange 8HP Mariner standard shaft outboard with remote control box. Only 10 hours use. Require good quality general coverage communications receiver or 2m transceiver. Cash adjustment if required. Chris Cole. Tel: Beaconsfield 77401 evenings.

■ Instruction or operator's handbook or manual for a Griffin & George double beam oscilloscope, valve model. Or, if possible, the address of the manufacturer. All costs incurred I will reimburse. Tel: (0254) 74241.

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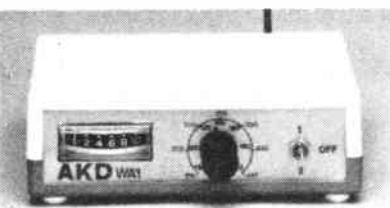
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Postcode.....

Signature.....

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Amateur RADIO

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		1 issue	3 issues	6 issues	12 issues
61 x 90	1/8 page	£66.00	£62.00	£59.00	£53.00
128 x 90 or 61 x 186	1/4 page	£115.00	£110.00	£105.00	£92.00
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263 x 394	double page	£830.00	£780.00	£740.00	£660.00

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Aug 85	27 Jun 85	3 Jul 85	5 Jul 85	25 Jul 85
Sep 85	25 Jul 85	31 Jul 85	2 Aug 85	22 Aug 85
Oct 85	29 Aug 85	4 Sept 85	6 Sept 85	26 Sept 85

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AC176K	0.30	BC125	0.12	BC328	0.14	BD434	0.68	BF258	0.30	BSX59	0.82	BY210/1600	0.30	R2008B	1.60
AC187	0.42	BC140	0.28	BC337	0.12	BD436	0.68	BF259	0.32	BSX76	0.29	BY223	1.20	R2010B	1.82
AC187K	0.48	BC141	0.42	BC338	0.12	BD437	0.78	BF262	0.30	BT100/300	1.18	BY227	0.26	SMG1.5	0.40
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AC190	0.40	BC147	0.08	BC441	0.32	BD507	0.48	BF271	0.26	BT102/300	1.38	BYX10	0.24	TIC44	0.40
AD142	1.10	Aor B	0.10	BC451	0.32	BD508	0.53	BF273	0.18	BT102/500	1.68	BYX36/150	0.22	TIC45	0.48
AD143	1.10	BC148	0.08	BC467	0.12	BD509	0.54	BF274	0.32	BT106	1.50	BYX36/600	0.28	TIC46	0.48
AD149	0.98	Aor B	0.10	BC548	0.12	BD510	0.48	BF323	0.92	BT108	1.30	BYX49/300	0.47	TIC47	0.70
AD161	0.42	BC149	0.08	BC549	0.12	BD517	0.58	BF336	0.26	BT109	1.18	BYX49/300	0.72	TIC108A	0.40
AD162	0.42	BC157	0.10	BC550	0.18	BD520	0.66	BF337	0.26	BT116	1.25	BYX55/350	0.26	TIP30A	0.48
AD161/162	0.88	BC158	0.10	BC550C	0.18	BD599	1.28	BF338	0.26	BT119	1.25	BYX55/600	0.33	TIP31C	0.54
AF108	0.48	BC159	0.10	BC551	0.18	BD617	0.58	BF355	0.42	BT120	3.60	BYX55/600	0.33	TIP31C	0.54
AF114	2.10	BC160	0.30	BC558	0.12	BDX18	2.38	BF363	0.82	BT121	3.02	BYZ12	0.42	TIP32A	0.80
AF115	2.10	BC161	0.30	BC534	0.27	BDX32	2.10	BF367	0.26	BT138/600	1.30	C1062	0.80	TIP33A	0.83
AF116	2.10	BC168B	0.12	BCY70	0.18	BF115	0.32	BF371	0.27	BT151/560R	0.90	E1222	0.40	TIP34A	0.72
AF117	2.10	BC169C	0.10	BCY71	0.17	BF117	0.54	BF402	0.38	BT151/300R	1.15	E5024	0.30	TIP41C	0.68
AF118	0.88	BC170	0.14	BCY72	0.18	BF119	0.82	BF450	0.38	BT151/400R	2.80	GE782	0.48	TIP42A	0.82
AF121	0.82	BC170B	0.12	BCZ10	1.68	BF120	0.38	BF457	0.33	BU100A	2.30	IT744	0.04	TIP47	0.80
AF124	0.48	BC171	0.10	BCZ11	1.48	BF123	0.40	BF458	0.38	BU104	2.50	IT720	0.04	TIP110	0.88
AF125	0.48	BC182	0.10	BCZ12	1.48	BF127	0.42	BF459	0.38	BU105	1.20	ME2002	0.18	TIP110	0.88
AF126	0.48	Aor B	0.08	BC130Y	0.68	BF127	0.38	BF459	0.38	BU105	1.20	ME2002	0.18	TIP110	0.88
AF127	0.48	BC172	0.08	BD131	0.34	BF152	0.18	BF490	0.22	BU108	1.80	MEU21	0.60	TIS43	0.32
AF139	0.68	Aor B	0.12	BD132	0.34	BF154	0.23	BF491	0.22	BU124	1.78	MJ400	1.28	TIS88	0.40
AF178	0.68	BC177	0.20	BD131/132	0.92	BF157	0.40	BF511	0.30	BU126	1.28	MJ2955	1.08	TIS90	0.28
AF239	0.68	BC178A	0.22	BD135	0.32	BF158	0.40	BF515	0.32	BU133	1.90	MJ3000	1.98	TIS91	0.28
AF279S	0.78	BC182	0.08	BD136	0.38	BF159	0.24	BF519	0.28	BU134	1.38	MJE240	0.80	ZTX108	0.12
AL100	2.80	Aor C or D	0.08	BD137	0.38	BF160	0.24	BF519	0.28	BU134	1.38	MJE240	0.80	ZTX108	0.12
AL102	0.80	BC183	0.08	BD138	0.38	BF167	0.30	BF590	1.72	BU206	1.70	MJE3070	0.80	ZTX108	0.12
AL113	2.30	Aor C or D	0.08	BD139	0.38	BF173	0.28	BF741	0.38	BU208	1.58	MJE520	0.48	IN4001	0.05
ASV80	1.70	BC183	0.08	BD140	0.38	BF177	0.42	BF743	0.38	BU208A	1.63	MJE2955	0.98	IN4003	0.05
AU110	1.40	Aor C or D	0.10	BD144	1.60	BF178	0.30	BFW10	0.78	BU208/02	2.05	MJE3055	0.70	IN4004	0.06
AU102	4.32	BC183L	0.08	BD145	1.82	BF179	0.32	BFW44	0.76	BU326S	1.78	MPSL01	0.28	IN4006	0.07
BA102	0.34	Aor C or D	0.12	BD150A	0.51	BF180	0.38	BFK29	0.28	BU407	1.85	MRF475	2.50	IN4007	0.07
BA110	0.87	BC184L	0.10	BD159	0.65	BF181	0.38	BFK30	0.30	BU470D	1.88	MRF479	3.80	IN4148	0.08
BA121	0.40	Aor C or D	0.10	BD160	1.85	BF182	0.32	BFK90	3.58	BU470D	1.88	MRF479	3.80	IN4148	0.08
BA129	0.38	BC187	0.18	BD185	0.45	BF183	0.32	BFK84	0.24	BU470D	1.88	MRF479	3.80	IN4148	0.08
BA148	0.16	BC208	0.18	BD175	0.60	BF184	0.32	BFK85	0.26	BU470D	1.88	MRF479	3.80	IN4148	0.08
BA154	0.08	BC212	0.08	BD182	1.00	BF185	0.32	BFK86	0.26	BU470D	1.88	MRF479	3.80	IN4148	0.08
BA155	0.10	Aor C or D	0.10	BD183	1.10	BF194	0.08	BFK87	0.26	BU470D	1.88	MRF479	3.80	IN4148	0.08
BA156	0.08	BC212L	0.08	BD184	1.20	BF195	0.10	BFK89	0.68	BY118	1.10	AO202	0.08	IS920	0.08
BA157	0.38	Aor C or D	0.10	BD201	0.72	BF196	0.10	BFY50	0.21	BFY52	0.12	AO202	0.08	IS920	0.08
BA164	0.14	BC213	0.08	BD202	0.87	BF197	0.10	BFY51	0.21	BY127	0.10	OC28	1.70	2N2904	0.28
BA194B	0.82	Aor B	0.10	BD204	0.80	BF198	0.14	BFY52	0.21	BY127	0.10	OC28	1.70	2N2904	0.28
BB105B	0.48	BC213L	0.08	BD222	0.80	BF199	0.18	BFY57	0.40	BY133	0.16	OC28	1.70	2N2906	0.24
BB105G	0.48	Aor B	0.10	BD225	0.68	BF200	0.28	BFY90	0.80	BY135	0.28	OC29	2.47	2N2926G	0.10
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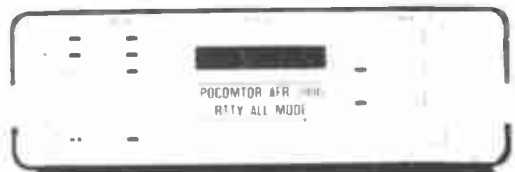


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