

TIME STEP ELECTRONICS LTD

FRG7 OWNERS ARE GOING — DIGITAL AND SIDWAYS

And you can join them by using our custom designed DFC70 digital frequency counter. The DFC70 is specifically designed for the FRG7 and gives rock steady read out on all bands with 100Hz resolution. Signal frequency is computed and displayed unambiguously on a state of art LCD display specially made for us in Japan. It is not necessary to drill any holes and only one wire has to be connected to a well marked test point in the receiver.

DFC70 Kit £19.95 Built and tested module £24.95

Will also work with the Lowe SRX30 and Drake SSR1.

With our new FM7 adaptor module, you will be able to receive sidways modulation (FM as it is otherwise known). Our superb state of art FM detector uses the very latest 3359 chip from Motorola, and has a built in IF filter and a variable squelch control for noise free monitoring. Although specially designed with the FRG7 in mind, it will happily work with other receivers or transceivers with a 455kHz IF amplifier. The FM7 will add a whole new dimension to your listening activities. You will of course be able to follow legal CB contacts but you will also hear the exciting DX being worked by amateurs on 10 metre FM. Used in conjunction with our DFC7 counter, you can accurately tune to a specific CB or amateur channel and so be sure that you will not miss whatever goes on.

Kit Price £9.95 Tested Module £14.95 P&P £1.00 (VAT inc.)

For FM reception on receivers with any IF up to 50mHz, the FM 42 is the answer to all your problems. Please state frequency required when ordering.
Kit Price £14.00 Tested Module £19.00 p&p £1.00 (VAT inc.)

TIMOTHY EDWARDS MK2 144 mHz PRE-AMP HEAR IT LIKE YOU NEVER HEARD IT BEFORE

We are proud to announce that the well known RF consultant Timothy Edwards has given us the exclusive marketing rights to his new 2 metre pre-amp. Timothy Edwards RF designs are used by British Telecom amongst others and so you can be sure that this pre-amp will perform to perfection. It employs the incomparable BF981 which has a better noise figure at 2M than the often used 3SK88. Spec. Size (tiny) 34mm x 9mm x 15mm (same as Mk1) Noise figure 1.0db Gain 26db **Kit Price £4.95** (inc VAT & P&P).

TRANSISTOR

	mHz	Power	Pin W	Volts	Price	Notes
2 N6456	30	60	1.25	13.8	£5 (inc)	Not 3SK88 but BF981 Better 2M noise figure -0.6db £1.40 (inc) ZTX 501 Gen. purpose PNP 0.5A, 20 for £1.25 (inc)

BARGAINS

NEW LCD COUNTERS

At last a new range of 5 digit LCD counters that will cover up to 200mHz and give 1KHz resolution to 39MHz. Ideal for most short wave receivers using common IFs. Similar to the FC177 but cheaper! Supply voltage 5-15V dc. Will operate on 26 different IF offsets. If this counter range won't do what you want probably nothing will. Works with all of Tony Bailey G3WPO designs, ask for conversion data.

DFC40 0-4MHz £14.95 built DFC41 0-32 MHz £18.50 kit DFC42 0-200MHz £21.95 kit

LNA144. OUR ace RF designer Timothy Edwards has done it again! In line 144MHz RF switched pre amp which needs no modification to any rig. Just put it in the co-ax feed, supply 12V and your deaf rx will have ear ache. Uses the BF981 with a total of 4 tuned circuits for the best out of band rejection. The relays are 50ohm gas filled with earthed metal cans and are good to over 800MHz. This was originally designed for 'British Telecom Satellite Division' hence the provision for gold 14GHz SMC connectors. 1dB noise figure and 18dB gain is guaranteed to improve all standard rigs on 144-146MHz. Will fit in standard diecast box (not supplied). Try one in the car under a wing mounted aerial and be surprised. LNA144 kit £14.95. Built and tested module £24.95.

TONE BURST. Probably the smallest crystal controlled unit available. 1750Hz \pm 0.1Hz. Supply 5-15V. Will fit in the tiniest of rigs or even microphones.

TBI Kit £6.50

70cm POWER AMPLIFIER At last a cheap and easy UHF power module by TRW the world leaders in RF modules. Only 150mW input for a full 15 watt output all the way from 430 to 440 MHz. Use with an attenuator for your handheld or build a simple TV Transmitter with the circuit provided.
TRW MX15 £12.75

TOP BAND CONVERTER Listen to the other local nets and DX on 160m with any 2m SSB receiver. Does not need a large aerial and will comfortably out perform most commercial receivers.

UC160 Kit £9.95 UC160 built and tested £16.50

2M MONITOR RECEIVER. A superb design featuring crystal and ceramic filters coupled with the MC3359 and BF981 results in an almost bomb proof monitor. Single channel with squelch and 500mW audio amplifier. No coils to wind and little alignment required. Uses standard crystals from 'PM Electronics'. **MON2M Kit £19.95 Built and tested module £29.95.** For professional use on 18-200mHz built and tested module **£38.50** including crystal.

WHO IS TIMOTHY EDWARDS? He's 32, licenced for 14 years, was a senior design engineer at Pye Telecomm and now works full-time for Timestep. He's also responsible at Timestep for designing the synthesizers and down converters for British Telecom used on the current ECS satellite system. He also specified and uses our new Spectrum analyser and signal generators costing over £40,000. Now you can see why our amateur modules always work properly and have full meaningful specifications.

GAS FILLED RF RELAY

New Japanese 50 ohm low loss gas filled RF relay. Only 0.3dB loss at 430 MHz with 35 watts input. Ideal for switching pre-amps and the TRW MX15. BSWR 1.5:1 at 1GHz. 12 volt coil. **DR12V £4.75**

All prices include postage and VAT. Send 35p for individual data on any of the above.

Mail order only. Please allow up to 28 days for delivery.

TIMESTEP ELECTRONICS LTD, WICKHAMBROOK, NEWMARKET, SUFFOLK.

TELEPHONE NO 0440 820040 TELEX 817015 TIMST G



SHORT WAVE MAGAZINE

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(GB3SWM)

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AUTHOR'S MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of A4 sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention — see any issue. Payment is made at a competitive rate for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

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LOWE SHOPS

Whenever you enter a LOWE ELECTRONICS' shop, be it Glasgow, Darlington, Cambridge, Cardiff, London or here at Matlock, then you can be certain that, along with a courteous welcome, you will receive straightforward advice. Advice given, not with the intention of "making" a sale, but the sort which is given freely by one radio amateur to another. Of course, if you decide to purchase then you have the knowledge that LOWE ELECTRONICS are the company that set the standard for amateur radio shops and after-sales service. The shops are open Tuesday to Friday from 9.00 to 5.30 p.m., Saturday from 9.00 to 5.00 p.m. and close for lunch each day from 12.30 till 1.30 p.m.

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 041-945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret's Road, off Queen Margaret's Drive. That's the right turn off Great Western Road at the Botanical Gardens' traffic lights. Street parking is available outside the shop and afterwards the Botanical gardens are well worth a visit.

In the North East the LOWE ELECTRONICS' shop is found in the delightful market town of Darlington (the telephone number is 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington. That is on the A167 Durham road out of town. A huge free car park across the road, a large supermarket and bistro restaurant combine to make a visit to Darlington a pleasure for the whole family.

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (the telephone number is 0223 311230). From the A45 just to the north of Cambridge turn off into the town on the A1039, past the science park and turn left at the first roundabout, signposted Chesterton. After passing a children's playground on your left turn left again (between the shops) into Green End Road. Very quickly, and without you noticing it, Green End Road becomes High Street. Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Richard GW4NAD, who hails from Penarth, the shop (the telephone number is 0222 464154) is located within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Clifton Street is easily found, being a left turn off Newport Road just before the Infirmary. Once in Clifton Street, South Wales Carpets is the modern red brick building at the end of the street on the right hand side. Enter the shop, follow the arrows past the carpets, up the stairs and the "Emporium" awaits you. Free street parking is available outside the shop.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01-429 3256). The shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings and as such being on the Metropolitan and Piccadilly lines (approximately 30 minutes from Baker Street main junction). For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hangar Lane) and the new M25 junction at Denham. Immediately behind the shop is a large car park where you can currently park for the day for 20p. There is also free street parking outside the shop.

Although not a shop there is on the South Coast a source of good advice and equipment — John G3JYG. His address is 16 Harvard Road, Ringmer, Lewes, Sussex. (telephone 0273 812071). An evening or weekend telephone call will put you in touch with John.

Finally, here in Matlock, David G4KFN is in charge. Located in an area of scenic beauty a visit to the shop can combine amateur radio with an outing for the whole family. May I suggest a meal in one of the town's inexpensive restaurants or a picnic on the hill tops followed by a spell of portable operation.

For many years.....

I have found much pleasure in slowly tuning a receiver across the short wave bands. I remember discovering that the new wireless, just purchased by my Grandfather, had on it a short wave section. So, after the family had listened to "The Archers" and set about the evening's activities, I was left with the set to myself, able to tune around and listen to the world. I am certain that the thing that fascinated me then is still the same today; the fact that transmissions from such exotic places so far away could be heard in my own surroundings. Perhaps I am a romantic at heart but to imagine the sights and sounds of the countries originating the transmissions was special. I find it difficult to describe the feeling. I have since spoken to many people who have shared the same experience, they too find it difficult to explain.

Since those days.....

things have changed and many receivers have come and gone. When compared with the large pieces of surplus equipment once used by the short wave listener in his shed at the bottom of the garden, today's equipment looks "very HI-FI". Most of the receivers carry the description "general coverage" meaning that it will tune without gaps frequencies from around 100 kHz to 30 MHz. Such wide coverage means that not only can you listen to amateurs and short wave broadcast stations worldwide, you can also hear Radios 1, 2, 3 and 4 and Laser on 588 kHz. To the short wave listener this is a great advantage over rigs which only have selected bands. It is usually the band you particularly want that the manufacturer had decided you could do without. The receivers which I now describe are all "general coverage", and I might add are each capable of giving you the satisfaction which I describe above.

the R600.....



TRIO R-600

At the start of the range is the TRIO R600 which costs £272.83 including VAT. This is the receiver for the beginner, the person of limited means or the cynic who does not really believe my enthuse. The R600 is a basic receiver covering from 150 kHz to 30 MHz and having switched upper and lower sidebands, wide and narrow am and cw. It has a 20 dB attenuator and a noise blanker fitted as standard. Operation is simple, select the mode of operation, turn the MHz dial to the correct band and, by using the VFO knob, tune to the desired frequency. The clear digital readout makes station selection simple. The TRIO R600 is an ideal receiver for shack, bedroom or lounge.

LOWE ELECTRONICS

Chesterfield Road, Matlock, Derbyshire. DE4 5LE.

Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.



the R2000.....

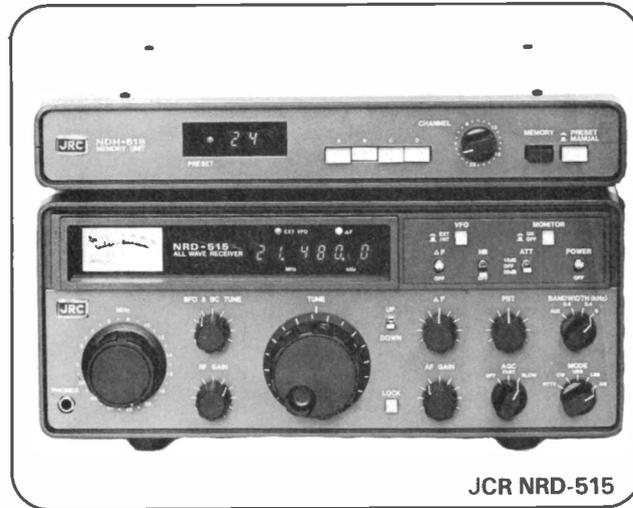
Moving upward from the R600 we find the TRIO R2000. The receiver covers frequencies from 100kHz to 30MHz and has, in addition to the facilities found on the R600, a ten channel memory to hold for quick access your favourite stations. Memory operation is versatile, each memory retaining not only the frequency but the mode of operation. Each memory can be also used as a separate VFO. In addition to AM, USB, LSB and CW the R2000 is fitted with FM which, when used



TRIO R-2000

with the VC 10 internal vhf converter, enables the amateur 2 metre band to be fully listened to. Another advantage over the R600 is that the R2000 tunes continuously up the band and not in 1 MHz sections. Three rates of tuning are provided enabling the band to be either searched diligently or quickly "scanned". With the optional VC 10 fitted the R2000 adds to its frequency range the VHF section from 118 to 174 MHz and, of course, operates on AM, FM, USB, LSB and CW. Fast or slow AGC can also be easily selected using a front panel switch. Altogether a fine receiver and ideal for today's listener. **The TRIO R2000 costs £436.75 including VAT.** The optional VC 10 costs £117.00 including VAT and is easily fitted inside the receiver.

from JRC, the NRD515.....

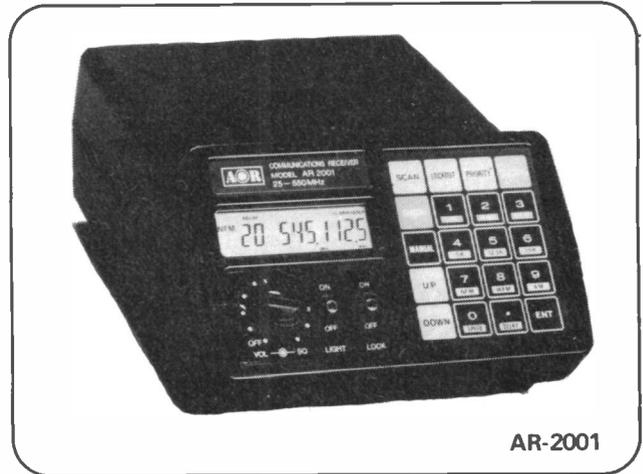


JCR NRD-515

There are amongst us a discerning few for whom only the best is good enough. For them there is only one receiver: this is the NRD515 manufactured by the JAPAN RADIO COMPANY. The receiver is built to professional standards and is designed to give its owner the ultimate in listening pleasure. Covering 100 kHz to 30MHz the NRD515 has pass band tuning, slow and fast AGC and a preselector covering the broadcast bands from 600 kHz to 1.6 MHz. Optional accessories include a 96 channel memory unit (NDH518 £264,00 inc VAT), a remote frequency controller giving keyboard frequency entry, plus an additional four memories (NCM515 £169.75 inc VAT) and a matching speaker (NVA515 £45.41 inc VAT). **The NRD515 short wave monitor receiver costs £965.00 inc VAT.**

and the AR2001....

It is rare to use a piece of equipment so refreshingly new as to be devastating. Although it has been my pleasure to use numerous receivers over the past years nothing has so captured my attention as has the AR2001 from the company AOR. Authority On Radio, AOR, sums them up exactly. In the past there have been several receivers covering parts of the HF/VHF/UHF spectrum but never before a receiver



AR-2001

tuning continuously from 25 MHz to 550 MHz. Never before a receiver having AM, narrow band FM and wide band FM. Never one that could be afforded by all enthusiastic listeners. The AR2001 is the new concept in receiver design combining user friendly controls to aid listening with a carefully designed receiver that actually works. The receiver with its continuous coverage between 25 and 550 MHz enables its owner to listen to a multitude of transmission sources. The provision of three modes, AM, narrow band FM and wide band FM are essential when one considers the variety of information that can be received. AM for the VHF/UHF airband channels, narrow band FM for amateur radio, CB and business radio and finally wide band FM for broadcast and TV sound. Digital frequency readout is combined with visual reminders of receiver state and for night time listening the panel is illuminated. Scanning, memories, memory scan, programmable band scan are all part of the receiver and to aid operating the memory not only remembers the frequency but the mode of operation. **The AR2001 receiver costs £345.00 inc. VAT.**

LOWE ELECTRONICS

Chesterfield Road, Matlock, Derbyshire. DE4 5LE.
Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.



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The TS930S latest transceiver from Trio Price: **£1195.00 inc. VAT.**



TRIO TS430's
£779.00



TW4000A
£488.00



TRIO R600 RECEIVER
£272.00



TRIO R2000 RECEIVER
£436.00
VHF CONVERTER. £117.00
 Covers 118-174MHz



TRIO TS830S
HF SSB TRANSCEIVER
£758.00

NEW TRIO MODELS

TH21E 2M FM Micro Transceiver.....	£189.00
TR2600E 2M FM Transceiver.....	£269.00
TS711E 2M Multimode Base Transceiver...	£785.00



We are proud to introduce the VHF/UHF communications receiver we have all been waiting for. A glance at the brief specification will tell you why the new AR2001 receiver is going to take the listener by storm.

- ★ Continuous coverage 25-550MHz (no gaps).
- ★ Receive modes of AM (for VHF/UHF airband), FM narrow (for amateur radio, CB, business radio) and FM wide (for broadcast and TV FM).
- ★ Digital display of frequency, mode and memory channel.
- ★ Memory channels which store frequency and mode.
- ★ Full range of scan facilities.

The performance of the AR2001 sets new standards. Gone are the complaints of "deaf" receivers. The AR2001 has typical sensitivity of 0.2 microvolts for 12dB SINAD on FM (N) across the entire 25-550MHz range.

Finally, the AR2001 is small, light weight, and powered from any 12V dc source, so it can be used at home, in the car, boat or aircraft, and whilst out portable.

Now comes complete with 12V PSU. **£345.00**



J.R.C. NRD515D

General coverage receiver 100 KHz to 30 MHz fully synthesised. Digital readout PLL synthesiser with rotary type encoder pass band tuning - modular construction. **£965.00**

NSD515 TRANSMITTER & AC PSU **£1,371.00**
 NEW 96 CHANNEL MEMORY UNIT.
 J.R.C. JST 100HF TRANSCIVER + Ac PSU **£998.00**

DATONG PRODUCTS

PCI General Coverage Converter.....	£137.42
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AD370 Active Antenna (outdoor).....	£64.40
AD270 Active Antenna (indoor).....	£47.15
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ANTENNA ROTATORS

Diawa

DR7500R.....	£153.67
DR7600X.....	£189.37
DR7600R.....	£213.41

KENPRO

KR400C.....	£118.45
KR600RC.....	£167.90
KR500Elevation Rotator.....	£115.00

Station Accessories

SP400.....	£82.00
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SP15M.....	£41.00
SP45M.....	£59.75
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TV3300 low pass filter.....	£27.60
HP41 high pass filter.....	£4.95

BELCOM

LS-202E 2m hand held DM-SSB transceiver plus accessories.....	£225.00
Belcom LS20E 2M FM hand held transceiver.....	£139.00

Microwave Modules, FDK, and other equipment also available, including I.C.S. - Diawa.

GB-100 Base Station Antenna - Self selecting 8 band vertical - 50 Ohm ground mounted 15ft vertical manufactured by G-Whip Products..... **£85.50**

ANTENNAS

Hy-Gain	
12AVQ 3Band Vertical.....	£52.90
14AVQ/WB 4Band Vertical.....	£66.70
18AVT/WB 5Band Vertical.....	£113.85
TH2MK 3 2EI Tribander Beam.....	£169.05
TH3JNR 3EI Tribander Beam.....	£202.40
TH6DX X Tribander Beam.....	£396.75
2058A 5 Element 20m Beam.....	£396.00
Explorer 14 Tribander.....	£325.00

Mini Products

HQ1 Minibeam 10-15-20m.....	£169.00
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T.E.T.

HB23SP 2EL Tribander.....	£172.50
HB23M Triband Minibeam.....	£169.50
HB33M Triband Minibeam.....	£230.00
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G4MH

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TONNA

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21 Element 432MHz Yagi.....	£29.67

Wetz Diamond Antennas

DP.CP5 Vertical.....	£133.00
DP.CP4 Vertical.....	£99.00

Hokessin

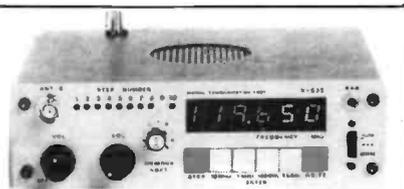
1/4 wave 2m Whip mobile.....	£2.00
5/8 wave 2m Whip mobile.....	£10.56
7/8 wave 2m Whip mobile.....	£16.00
5/8 wave Base Station antenna.....	£18.50
GPV-52m Base Station Co-Linear.....	£38.50
GPV-770cm Base Station Co-Linear.....	£31.80
GPV 720 144/432MHz dual base station.....	£33.90
Revcone Discone.....	£25.00

JAYBEAM

LW5 5EI 2m Yagi.....	£15.33
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LW16 16EI 2m Yagi.....	£37.95
PBM10 10EI Parabeam.....	£49.95
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Q4/2m 4 Element 2m Quad.....	£31.63
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Q8/2m 8 Element 2m Quad.....	£51.75
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ANT PRODUCTS

LY6 2M Yagi.....	£15.95
LY8 2M Yagi.....	£20.95



THE R532
AIRCRAFT BAND RECEIVER
£175.00 inc. VAT

SPECIFICATION.
 Frequency range: 110 to 136MHz, i.e. all NAV/COM channels.
 Number of channels: 1040 (25KHz steps).
 Sensitivity: Better than 0.75 microvolts 10dB /SN.
 Memory channels: 100 (10 banks of 10). Memories can be scanned automatically or selected manually.
 Power required: 12V dc negative earth 300mA typical. (Display can be switched off to reduce consumption when operating portable). Size: 160 x 45 x 130mm.
 Weight: approx. 1Kg. (including memory backup batteries).

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835
12 NORTH STREET, HORNCHURCH, ESSEX. Tel: (040-24) 44765

UNBEATABLE PRICE M750XX SSB-CW-FM

144 -148MHz
20 watts output. Digital display. Dual VFO. Repeater operation. Noise blanker. 70cms option. Up/Down mic. R/T.
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Absolutely complete

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TRIO

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AT930 ATU.	£150.00
SP30 Speaker.	£82.96
TS430S HF tcvr.	£778.00
PS-30 AC psu.	£119.00
SP430 Speaker.	£31.00
AT250 ATU.	£277.00
MB430 Mobile Unit.	£12.00
FM430 mod.	£36.50
TS830S HF tcvr.	£758.00
VFO230 VFO.	£258.00
AT230 ATU.	£143.00
SP230 Speaker.	£43.00
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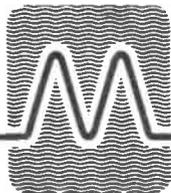
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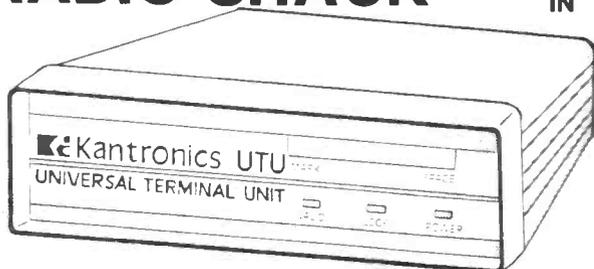
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FOR THE RADIO AMATEUR AND AMATEUR RADIO



EDITORIAL

Licensing

It seems to be somewhat absurd, when the spectrum is becoming ever more used and abused, to de-regulate any form of electronic emission without very careful consideration; yet this is something the Government apparently intends to do early next year. Among the devices specifically mentioned for de-regulation are radio aids for the elderly and disabled, garage door openers, radio microphones and anti-shoplifting tags. While one is quite able to understand the ideal behind the proposals, the result will be a craze for the inevitable flood of imported inferior-quality devices (the number of people with perfectly normal hearing for whom a radio deaf aid has great play-value is not to be counted in ones and twos). The upshot, of course, will be just yet *more* QRM to the inconvenience of *more* sections of the population. Disabled people's radio aids will be themselves disabled, garage doors will be opened all along the road each night as the yobs do their rounds, and radio microphones will proliferate everywhere to the extent that they will QRM each other out of use. As for anti-shoplifting tags, if they aren't neutralised in short order, police overtime will increase to an unprecedented level.

We must always press to maintain and extend our freedoms, but when the best is the enemy of the good for heaven's sake let us *think* before we act. History is littered with examples of the results of non-thinking among those we pay to do our thinking for us!

A day after this is written, the new 'simplified' schedule to the amateur radio licence becomes operational. It is aimed at "the needs of the user" and also "clears up misunderstanding". The schedule, far from being clearer has become a bit of a dog's breakfast; change for change's sake, in fact. As for the changes in the body of the licence, they are essentially the ones arising from some negotiation with the RSGB and represent easings or extensions of our possible activities. And the footnotes repeat — as they always have done — what should have been learnt by heart at the time of the RAE-taking.

When will we see some attempt at licence *enforcement* — rather than playing with words rendered empty by lack of enforcement?

Our apologies to readers for the delayed publication of last month's issue; this was due to a major machinery breakdown at our printers.

WORLD-WIDE COMMUNICATION

VHF BANDS

NORMAN FITCH, G3FPK

FEATURED this month are further *Sporadic E* reports, *Perseids* MS news and details of some excellent tropospheric propagation at the end of August, plus resumés of recent DX-peditions.

Award News

Two more readers have joined the 2m. QTH Squares Century Club. Certificate no. 41 was issued to Jeffrey Slater, G6FIO, from Solihull on Aug. 28. His station comprises a *Yaesu* FT-225RD with a *muTek* front end board, a 25w amplifier, the antenna being a 16-ele. *Tonna Yagi* at 35ft. The QTH is 450ft. *a.s.l.* 91 of the QSOs were on tropo, three *via Es* and six by *Ar* propagation. 22 countries were represented, best DX being 9H1BT. Jeffrey is building gear for 23cm. and 3cm. and hopes to be on 70cm. early next year. He has 12 other awards already.

Regular contributor Keith Hewitt, G6DER, from South Yorkshire received his 100th square confirmations as he was compiling his report so is member no. 42, the certificate being dated Aug. 31. His list reveals 67 tropo., 7 *Es*, 2 MS and 24 *Auroral* contacts. Some of the choicest QSLs were from LA0DT/MM (AO), F6FRE (DD), DK5HP (DO), SP6GZZ (IL), OK2KYC/P (JJ) and CT1AQS (WA).

John Bates, G6ZLW, from West Bromwich, is member no. 368 of the 2m. VHF Century Club, his certificate being issued on Aug. 17. He first took an interest in amateur radio in May 1982, spending the next year studying for the *R.A.E.* which he took in May, 1983. First licensed on Aug. 1 last year, John has been chairman of the *West Bromwich Central Radio Club* since its foundation in June, 1982. He is a member of the *West Midlands Raynet Group*. His station consists of a *Yaesu* FT290R, 30w amplifier and 12-ele. *ZL-Special* antenna. An *Adonis* compressor microphone is used.

Recent operation from the Isles of Scilly has led to queries about their county status. For the Annual Table they *do* count as a county, separate from Cornwall since our list is based on the 78 counties/regions listed in each January edition of *Radio Communication*. Some confusion has arisen as they are omitted from the list

forming the rules for an *RSGB* award. They do not constitute a country, however. Concerning countries, The Shetland Isles *do* count as both a county and country for *Magazine* purposes since countries as defined for the *Worked All Europe* award are recognised in the tables. Similarly, IT9 counts in addition to Italy, as does IS0.

Beacon Notes

The 6m. beacon at the *RSGB's* Potters Bar headquarters was officially switched on at 1400 GMT on Aug. 30 GB3NHQ is on 50.05 MHz continuously and the *e.r.p.* is about 15w from crossed dipole antennas. Reception reports have been received from the north of Scotland to the south of France.

In a CW QSO on Aug. 27 on 2m. Ray Baker, G4SFY, (Norfolk) gleaned from LA5IH details of beacon LA4VHF which Jon looks after. It operates on 144.890 MHz from CU47a running 15-20w. The antennas are two 8-ele. *Yagis* beaming due south, 10m. *a.g.l.*, the site being 30m. *a.s.l.* This information shows considerable variance from that printed in the latest *DUBUS* magazine to hand.

John Lemay, G8KAX, (Essex) heard the Swiss 70cm. beacon HB9F again around the end of July. It is on 432.984 MHz from DG40c and sends details such as the locator, power, antenna, *a.s.l.*, etc.

Contests

The *B.A.R.T.G.* has sent the results of the Spring VHF/UHF RTTY contest which brought fewer entries than the 1983 event did, in spite of there being more operators using the mode now. The fixed section on 2m. was won by G6CZV with 354 points and GU6JST was second with 305. There were 16 entries. Only eight were received in the 2m. Multi-op. part won by G4PDY/P with 428 pts. G3WOR/P was second with 335. The two 70cm. sections each attracted one entry and no entries were received for 23cm.

The Contest Manager's report mentions, "... the perennial complaint from mechanical operators about the absence of CR and LF sequence from some computer stations". And of "... long CQ calls and endless RYs which seriously waste time".

Henry Souchet, 9H1CD, has sent the results of this year's 9H Falcon Contest. It attracted 31 entries from seven countries and was won by I4BXN who accumulated 207,775 points. ISOQDV came second with 160,427 and IT9BBD third with 145,125. The only U.K. entrant was Kevin Piper, G8TGM, who came 11th with 36,649 pts. beating all 13 Dutch entrants.

From GB2RS come the results of the 70 MHz and SWL contest on June 3. The winner of the Fixed section was G4FOH with 284 pts. with G4CIZ (216) second and G4NRG (163) third. The Open part winner was GW4MGR/P (601) with G3MPN/P

(586) runner-up and G4ADV/P (504) third. The SWL section winner was BRS 52543 (229) with BRS 28198 (113) second and BRS 44984 (59) third.

The WAB VHF/UHF Contest on June 24 results show that G4AFF/P came first in the Single-op. section with 250,470 pts. followed by G6DER (179,350) and G6AJL (167,310). In the Multi-op. event, G4WET/P (481,250) was first, followed by G4SGK/P (204,530) and G4VKR (151,505). In the mobile section, G8ZRB/M (39,235) came top with G4IUF/M (37,410) next and G6OKU/M (7,930) third. The SWL winner was RS 46296 with 12,880 pts.

The next major event is the *IARU* UHF/SHF contest on Oct. 6/7, 1400-1400 and which coincides with the *RSGB* affair. All bands from 432 MHz to 24 GHz. In the *IARU* version there are points multipliers; x1 for 432 MHz, x5 for 1,296 MHz, x10 for 2,320 MHz and x20 for higher bands. In the *RSGB* event, there are no multipliers each band being scored at the usual one point per kilometre.

The first two legs of the 432 MHz *Cumulative* contest are on Oct. 9 and 25, 1930-2200 GMT and use radial ring scoring. On Oct. 17 there is the first leg of the 1,296 MHz *Cumulatives* from 1930 to 2200, the next one being on Nov. 2, 2030-2300 GMT. Radial ring scoring again and both these *Cumulatives* are for Single-op. stations.

The *B.A.R.T.G's* Autumn VHF Contest is scheduled for Oct. 13/14, from 1800-1100 GMT. Exchanges to be time of start of contact in GMT, RST, serial number and QTH locator. Radial ring scoring and entries to go to:— The Contest Manager, 464 Whippendell Road, Watford, WD1 7PT, postmarked Nov. 17 latest. (N.B. The information sheet said "Saturday 17th October", which cannot be right.)

On Oct. 28 there is the 70 MHz Fixed Contest, 1000-1500 GMT. Usual exchanges including the "3km. south of Watford", type of information. For CW addicts, the Nov. 3/4 weekend is a "must". The Marconi Memorial Contest is a 24 hour stint starting at 1400 GMT and scoring at one point per kilometre. The *RSGB* affair is from 0800-1400 on the 4th with radial ring scoring, both being 144 MHz CW events. Also on Nov. 4 is the *Cray Valley* affair on 144 MHz, 1000-1400 GMT and it is an all mode contest. Exchanges to be report and serial number and *administrative* county. This is a two section event, either up to 25w *p.e.p.* or up to legal limit. Club stations G3RCV and G8FCV are worth 10 pts; non *Cray Valley* members working CV members score three pts; members working each other score 2 pts and 1 pt. for all other contacts. Final total is points times total of counties and DXCC countries worked. Entries by Nov. 20 to G6CSY, 19 Cowden Road, Orpington, Kent BR6 0TP.

The Satellites

Dave Robinson, G4FRE, (Suffolk) is now using *Oscar 10*, mode B. On 435 MHz, he runs 7w Tx output to an 11-turn home made helical antenna. The 145 MHz Rx system utilises a 5XY Yagi with switchable polarisation, 3SK97 preamp. and *Icom IC-202*. Up to Sept. 2, 25 countries had been worked including HL1EJ, EA8AAE, LX1PB, LA6HL/TF, CT1HA, plus 17 JAs and 10 Ws. *Az-el.* control is by the renowned "armstrong method". Dave has acquired an *Icom IC-402* for uplink use.

Adrian Chamberlain, G4ROA, (Coventry) has added 4X4IX and SV1PY via *O-10*, for two new countries. Early morning operation on Aug. 16/17 brought many new Californian stations, KL7KC and VE7AIO. Adrian uses the Russian RS satellites when they are available and takes hard copy from *UOSAT-1's* bulletins. He writes that *UOSAT-2* is "... getting a bit monotonous now..." and hopes it will soon become more operational.

Colin Morris, G6ZPN, (W. Midlands) has got started on *O-10* during August. He uses a *Yaesu FT-726R* running 10w on 435 MHz, through 25m. of *Pope H-100* feeder to a single 19-ele. Yagi. On 145 MHz, he uses a 9-ele. Yagi with 25m. of RG-213 coax and home made preamp. The antennas are vertically polarised, only 8ft. a.g.l. and steered by hand. Colin has been using the *FT-726R* without full duplex facility so cannot hear his own signal. He has to rely on the receiving station having good ears.

John Fitzgerald, G8XTJ, (Bucks.) wonders about a station heard on 2m. on Aug. 20, from 1844 GMT transmitting on 144.195 MHz on SSB and FM modes, broadcasting *UOSAT* telemetry and using the callsign GB3UOS. There is no such call so this was somebody "playing the fool". The *University of Surrey E and ARS's* callsign is G8AHK, for the record.

According to the *RSGB's* Council Letter for August, Space Shuttle mission 41G, scheduled for launch on Oct. 1, will carry a "Get-Away Special" amateur radio package promoted by the *Marshall Club* in the U.S.A. Transmissions would be made on 435.033 MHz FM under the club's call WA4NZZ. Three transmission cycles of eight hours were planned, each cycle consisting of a 30 or 45 seconds transmission every four minutes in English language. The first period would be exactly 34 hours after lift-off, what is called *Mission Elapsed Time*. The next period would be at 57h. 30m. *MET*, the last at 81h. 45m. *MET*. *GB2RS* may broadcast information at 1700 local time on the usual news bulletin frequencies during this shuttle flight.

Steve Reading, G4LZD, (Devon) got his 10m. Rx going again on Aug. 17 and has been using the RS satellites to work various Europeans via *RS-7* and *RS-8*. He is receiving QSLs now. On Aug. 20, *RS-7*

ANNUAL VHF/UHF TABLE

January to December 1984

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
GW4TTU	—	—	90	36	41	10	11	4	192
G4TIF	29	3	68	18	47	11	—	—	176
G1EZF	—	—	83	26	50	10	3	1	173
G6DER	—	—	68	20	52	11	13	5	169
G8PNN	—	—	59	14	48	10	27	10	168
G4ROA	—	—	58	12	49	10	31	5	165
G3BW	39	6	58	21	22	7	16	5	153
G6XLL	—	—	72	17	51	8	—	—	148
GD2HDZ	40	5	52	7	33	5	6	3	142
G8ULU	—	—	52	18	32	13	8	7	136
G4ARI	39	4	71	18	—	—	—	—	132
G6MGL	—	—	58	18	42	12	—	—	130
G4MUT	34	3	43	16	25	5	—	—	126
G8TFI	—	—	—	—	63	18	32	12	125
G4VXE	—	—	63	12	38	6	—	—	119
GW8UCQ	—	—	55	14	37	8	—	—	114
G8KAX	—	—	45	14	26	9	12	4	110
G6ZPN	—	—	72	14	20	4	—	—	110
G6ECM	—	—	77	27	—	—	—	—	104
G4HGT	14	2	50	6	24	7	—	—	103
GW3CBY	6	3	52	14	21	5	6	3	101
G3FPK	—	—	73	22	—	—	—	—	95
G6YIN	—	—	71	16	3	1	—	—	91
G4SFY	—	—	70	21	—	—	—	—	91
G6XVV	—	—	51	13	18	6	—	—	88
G4NRG	22	4	23	18	17	3	—	—	87
G6HFF	—	—	56	7	19	5	—	—	87
G8RWG	—	—	59	20	—	—	—	—	79
G6AJE	—	—	62	16	—	—	—	—	78
G4XKR	—	—	41	7	23	4	—	—	75
G4LZD	—	—	60	15	—	—	—	—	75
GM8YPI	—	—	32	14	20	8	—	—	74
G8XTJ	—	—	58	14	—	—	—	—	72
G6NVQ	—	—	60	7	—	—	—	—	67
G8VFE	—	—	50	14	—	—	—	—	64
G4YIR	—	—	47	10	—	—	—	—	57
G6XSU	—	—	—	—	40	8	—	—	48
GW4HBK	25	4	6	3	7	2	—	—	47
G2DHV	7	1	24	3	3	1	—	—	39
G8FMK	—	—	3	1	21	2	7	2	36
GM4CXP	—	—	20	7	6	2	—	—	35
G3PBV	—	—	—	—	—	—	29	5	34
G4EZA	—	—	24	8	—	—	—	—	32
GU4HUY	—	—	26	5	—	—	—	—	31
G6CSY	—	—	8	5	7	1	4	2	27
GW3MHW	16	2	—	—	—	—	—	—	18

Three bands only count for points. Non-scoring figures in italics.

and *RS-8* were on together with signals being transponded by both at the same time.

DX-Peditions

Three very successful DX-peditions took place in August. First the *Derbyshire Hills Contest Group's* trip to the Irish Republic, reported by Martin Daft, G6ABU. The team arrived in Ardmore on Aug. 2 and set up in WL02j with a large herd of curious cows for company. The 2m. station was assembled first and, after a few problems, was fully operational at 2100 on the 3rd. The 4m. and HF stations were operational on Aug. 4, good use being made of the 20m. VHF net for arranging MS skeds. The supposed 80m. VHF net proved to be a non-event.

Highlight of the trip was a 70cm. MS test with DL7QY (FJ61e) on the 11th, from 2200. At EI2VPX/P, the station consisted of an *Icom IC-471E* with *muTek Gasfet* masthead preamp. (MGF1202); LDF2-50 feeder to four 21-ele. *Tonna Yagis* at 55ft. and a K2RIW design amplifier. CW at 400 l.p.m. was used and the resulting QSO was far from marginal, the longest burst being over ten seconds. Your scribe has heard the tapes and at the end, DL7QY's signal

was in and out of the noise much of the time, suggesting tropospheric propagation as well. After this historic sked, the *Gasfet* preamp. died but they did manage about 200 tropo. QSOs.

On 2m. about 1,700 stations were contacted including 84 on SSB MS and 32 on CW MS. On Aug. 5, from 0738-0806, there was an *Es* opening when 12 stations were worked in HB, I2, I3, IW1, F and YU, plus OK9PW (HJ). In the big opening on the 6th, only YU1UN (JD) was worked from WL02j, though, at 1240. On 4m. activity was disappointing but DK1PZ was worked via MS, crossband to 2m. in .EL59h in 38 mins. on the 6th. 12 stations were worked on 4m.

The 23cm. station was not QRV until the evening of the 8th. It comprised a *Trio TS-770*, fed with LDF4-50 feeder, *Piper* masthead *Gasfet* preamp. and four 23-ele. *Tonna Yagis* at 45ft. The transverter was a *Microwave Modules* one and the PA a single 2C39A. The preamp. never seemed to work properly so only seven stations were worked:— EI2VRT/P (VL), G4KIY (ZM40j), G3WOH (YN47f), GW8FKB (XN), G6LUZ (YM08a), G4CBW (YN79c) and G8JHL (YN). They had no time to set up the 13cm. equipment and

regular 3cm. trials with GW3PPF/P and G4DGU/P were unsuccessful. Operations ceased on Aug. 14th by which time the resident cows had begun to invade their tents. The site was about 200ft. *a.s.l.* 200 yards from the sea at Ram Head.

Paul Broadhurst, G4NFD, has sent in a report covering the *Albatross Contest Group's* trip to VL38d in the Irish Republic from Aug. 3 to 14. The QTH was the Old Head of Kinsale (Co. Cork) on a hill top 90m. *a.s.l.* at the end of a 4km. long peninsular affording sea-path take-offs from the W through NE. Initial generator troubles were eventually resolved on the 7th so some skeds on the 5th and 6th were kept using just 20w from a *Yaesu* FT-221R powered from a car battery. They also suffered tape recorder and keyer malfunctions on the 9th and 10th after which all worked well.

The 2m. station consisted of the FT-221R with 8877 PA and two 16-ele. *Tonna Yagis* for EI2VRO/P. 95 MS QSOs were completed, 9 were not and nothing was heard from 13 sked partners. Many tropo. QSOs were made in not very good conditions.

On 70cm. they used a *Yaesu* FT-101 with transverter and a pair of 4CX250B type PA, the antennas being four 21-ele. *Yagis*. 80 tropo. QSOs were made to G, GI and GW, best DX being G3LTF (AL11d). Three MS skeds with DK1PZ (EL) did not produce a result for EI2VRS/P.

On 23cm. the "prime mover" was a *Trio* TS-700G to a transverter and 2C39A PA, the antennas being four 23-ele. *Yagis*. Tropo. QSOs were made with G4CBW, G3WOH, GW8FKB, G8KBQ (YL), G4CVI (ZK), G3OSS and G4NQC (ZL) and G8JHL. The callsign was EI2VRT/P. QSL cards go to G4NFD at 92 Clevedon Road, Tickenham, Clevedon, Avon, BS21 6RE. *IRC/S.a.e.* requested. The personnel were G4NFD, G4OPC, G8KQP and G8KWX.

Richard Hope, GW8TVX, has provided details of the trip to Strathclyde Region from Aug. 6 to 14 using the callsign GB2XQ, from XQ80d. The operators were GW3NYY, G8TFI, GW4LXO, GW6EWA and GW8TVX. 1,138 QSOs were completed on four bands. 22 countries and 92 QTH squares were worked on 2m. and 85% of the MS skeds were successful. On CW, 2½ minute periods increased the "strike rate" suggesting it is time it should be generally adopted instead of the hitherto five min. period. Best MS DX was HG1W/0 at 2,000 kms. then OH7PI (1,928) and OH5LK (1,876) in LH, NW and NU respectively.

2m. tropo. conditions improved from 1400 on the 12th with ducting into OZ, then D, PA and SM6/7 areas and best DX was SM6KJZ (GR) at 998 kms. then SM6CMU (FR) at 986 kms. on SSB. No *Ar* or *Es* activity was experienced.

On 70cm. nine countries and 31 squares

were worked, best DX again being SM6KJX, then SM6HYG (FS) at 964 kms. and DK2NH (FN) at 943 kms., all on SSB. In the lift on the 12th, beacon OZ2UHF (EP) reached S9-plus. Six countries and 17 squares were worked on 23cm. and the best DX was OZ20E (EP) at 862 kms., then OZ1FEF (EQ) at 803 and PE1GHG (CL) at 724. On 13cm. a QSO with PA3DIJ (DN) at 729 kms. is claimed as a "first" GM/PA on the band; it was on Aug. 12 at 2125. Later PA0FRE and PE1GHG, both in CL, were contacted. On a lighter note, GW8TVX, using a *Trio* TR-2300 and MM transverter on a pushbike worked some eight miles, not line-of-site, running 250mw to a short length of 15A fuse wire for an antenna. Richard is claiming a "first" for this! The group thanks those many G stations who stood by while they worked the continentals. Many GMs visited the site and Gerry, GM4RKM, was particularly welcome when he provided beer for all. QSL cards have been designed and were expected to be sent out starting at the end of September.

On the subject of QSLs, Reg Woolley, GW8VHI, one of the EI2VPX team, reports that quite a few cards received after DX-peditions are incorrectly made out, such as wrong date, omission of -/P, etc. He emphasises he will not reply to any such cards.

Repeater Note

GB3SF, claimed to be the world's first pilot SBB repeater, was switched on at 1800 on Aug. 14. It is located at the *University of Sheffield* and the power to its 3dB gain colinear antenna, 120ft. *a.g.l.* is about 5w *p.e.p.* total. The input is on 145.185 MHz and the output on 145.785 Mhz. Ideally stations accessing GB3SF should transmit a pilot carrier 16dB below peak output. For example, if running 4w *p.e.p.* the carrier should be 100mw. The relay has been licensed for one year and reports should go to Dr. A. J. Whitaker, G3RKL. (*QTHR*).

Six Metres

No news up to Sept. 10 concerning the extra 60 6m. permits. The only report on

activity is from Dave Lewis, GW4HBK, (Gwent) who says he copies GB3NHQ 90% of the time. A few crossband QSOs were made with SM6PU and OZ9QV, both on 10m. on Aug. 5, and with GW4NOS on 4m. on the 18th.

Four Metres

John Wilkinson, G4HGT, (Leeds) is back ". . . after a couple of years of enforced QRT. . ." and started off on NFD with one watt to a 3-ele. *Yagi* in the loft. 14 countries and two countries so far with activity described as abysmal. GW4HBK reports that on Aug. 5 at 1630, F9HS could copy GB3ANG but not him. Dave is up to 25 counties and four countries for the year.

Two Metres

First, what should be the final *Es* report of 1984 starting with Flemming Jul-Christensen's G4MJC, (E. Sussex) notes about the Aug. 6 affair. From 1159, he worked 14 YUs in the 1, 3, 5, 6 and 7 regions, plus LZ1AB (LC) and HG8CE (KG). Other YUs and HGs were heard and possibly SV0AB or SV7AD. On Aug. 4, Ray Baker, G4SFY, (Norfolk) called CQ" on CW at 2135 and was answered by YU2EZA (IG54f) getting an RST559 report. This apparent *Es* opening was very fleeting so perhaps it was a long MS burst?

Martyn Jones, G4TIF, (Warks.) was at home on Aug. 6 and caught the Balkan *Es* event from 1231. In the following hour 14 YUs and LZ1AB were worked on SSB providing five new squares and country no. 31. G6DER (S. Yorks.) also mentions a short event on Aug. 4, but omitted to state the time, in which Keith worked YU4EDO. On Aug. 6, he found six new squares and managed 5UTs in ID, 4 in IF, 2 in IE and one each in HE, HF, JD, JE and JF.

Kevin Piper, G8TGM, (W. Sussex) was rewarded with three new countries and four more squares on Aug. 6. He began at 1232 and got 11 YUs, LZ1AB, LZ1KDP (LC), YO2FP (KF) and two HG8s in KG. He has changed his gear again and now uses an *Icom* IC-251E with *muTek* board. From GJ4ICD, news that Keith Boleat, GJ6TMM, was on in the Aug. 6 affair from 1305. He contacted YO2FP and 7 HGs in JH, JI and KG squares. No YUs were mentioned.

Andy Steven, GM4IPK, (Edinburgh) has been on leave this summer and sent a long letter covering all his various modes activities. He worked his first EAs in the June 30 event, which lasted about 1½ hours, contacting every station heard. He remarks that stations from the extreme north to the far south were coming in at the same time, but his best DX was I0SNY/EA9 (XV04e) at 2,228 kms. and 12 squares were worked.

Next, the MS scene and more readers are using this mode than ever before. Henry Souchet, 9H1CD, wrote, "I am

Station	ANNUAL CW LADDER				Points
	4m.	2m.	70cm	µWave	
G4SFY	—	365	—	—	365
GW4TTU	—	247	53	10	310
G4ARI	67	193	—	—	260
G4TVH	—	180	—	—	180
G4WHZ	—	180	—	—	180
G4NOZ	—	158	—	—	158
G4TON	—	130	2	—	132
G2DHV	19	60	1	—	80
G4VXE	—	65	11	—	76
G4WGY	—	73	—	—	73
G4UNL	—	71	—	—	71
G4LZD	—	70	—	—	70
G4EZA	—	52	—	—	52
G4SGO	—	43	1	—	44
GM4CXP	—	21	—	—	21
GU4HUY	—	13	—	—	13

No. of different stations worked since Jan. 1.

dedicating myself to MS—sked every evening.” He runs adequate power to two 19-ele. *Yagis*. There seems to be no definite conclusions about this year’s *Perseids* shower, opinions varying from disappointing to quite good. What has transpired is that reflexions were very good on Aug. 4/5, a week before the peak of the shower.

Mick Allmark, G1EZF, (Leeds) lists 31 QSOs all on the random QRGs, including LA1K (EY) on the 13th. John Hunter, G3IMV, (Bucks.) also completed with LA1K other successes being YU6BLM (JB), LA8OW (DU), OH6CY (MW) and SSB QSOs with IT9GSF (GX) and EA6QB (AY). He describes the antics on the random SSB QRGs as, “bedlam.” Pete Atkins, G4DOL, (Dorset) made his first MS QSOs on the 12th with OE3OBC (II) worked in a 9s. burst, and OK1MAC (HJ) also in one, 8s. burst. Later IW9ANO (GY) answered a “CQ” call and was worked in 12s. SSB skeds on Aug. 23/24 with Y27BL (GL) and SM1BSA (JR) were not completed, however.

Ken Osborne, G4IGO, (Somerset) lists a mixture of CW/SSB, random and sked contacts in the shower including LA1K, HG1W/0 (LH) and Y4IYL (HO). He heard little random activity on 144.400 MHz so it seems that the SSB-ers prefer the “old” QRG of 144.200. Ken reports little or nil in most of his skeds and reckons reflexions were very bad; he reports better luck in June and July. On Aug. 26, a sked with CT1WW (WB) came off, though. Using only 25w. G4LZD made a few attempts on random SSB on the 11th and was heard by IW5ACZ and IK4DCO, but not completed. As Steve wrote, “Well, I tried!”

Over the period Aug. 7-12, Jon Stow, G4MCU, (Essex) had six completed QSOs with YU2JL/2 (IC), HG8CE, SM5BEI (JU), YU3FM (HG) and Y23NL (HO) all on CW, and with HG1S (IH) on SSB. G4MJC asks if anyone is interested in trying 110 *Baud*, 170 Hz shift RTTY on MS? Roger Greengrass, G4NRG, (Essex) completed his first MS sked on Aug. 10 with I2FAK (EF). Next day brought F1JG (CD) and YU1AWW (KE) at 1,662 kms. and on the 12th OE3OKS (IH). The YU contact was over in 9 mins. after a 25s burst.

Tim Kirby’s, G4VXE, (Gloucs.) first attempts brought Y22ME (HM) and IW2BZY on the 11th, and F1JG and IW2BNA (EF) on the 12th, all SSB. He will be on CW soon. Since getting his Class A licence Ian Parker, G4YUZ, (Herts.) has been operating on CW MS mode using a morse program developed for the *B.B.C.* Model B computer by G4IJE. It enables keying speeds between 300 and 2,000 *l.p.m.* to be chosen. Ian completed with YU3ES (GF) and DL3MBG (GI) on Aug. 4, I3LGP (FF) and SM5MIX (HS) on the 5th, Y4IYL on the 9th, I1AMP (EE) and SM4IVE (HT) on the 11th, the last

QTH LOCATOR SQUARES TABLE

Station	23cm.	70cm.	2m.	Total
OZ1EKI	—	116	345	461
GJ4ICD	21	116	236	373
G3JXN	68	109	170	347
G8TFI	51	109	126	286
G4FRE	41	106	68	215
G3PBV	40	105	188	333
G8FUO	39	105	88	232
G4MAW	39	102	52	193
G3XDY	54	101	149	304
G4BVY	9	100	—	109
G3IMV	—	98	366	464
G8KBQ	22	96	188	306
G3COJ	41	95	170	306
G8ULU	35	90	125	250
G4TIF	—	86	165	251
G4NQC	60	84	195	327
G8ATK	23	82	129	234
G4MCU	18	81	198	297
G3KNV	18	79	201	298
G3UVR	17	79	196	292
G8PNN	42	77	125	246
G8HHI	20	77	135	232
G4NBS	14	77	94	185
G4MUT	—	70	108	178
G4HFO	—	69	115	184
G8FMK	35	68	80	183
G6DER	23	67	123	213
GW8UCQ	1	67	114	182
G4BWG	—	64	152	216
G4FRX	—	60	90	150
G4ROA	24	60	65	149
G8WPL	5	59	100	164
G4TJX	—	59	94	153
G8KAX	35	57	82	174
GW4FTU	10	56	185	251
G8SRL	—	53	106	159
G4RGK	5	52	154	211
G6DZH	—	52	97	149
GD2HDZ	13	50	91	154
GD2HNY	—	48	219	267
G4STO	29	48	113	190
G4COM	—	48	55	103
G8SBT	26	47	182	255
G6MGL	—	44	127	171
G4OAE	—	42	184	226
G6XSU	—	42	—	42
G4DCV	—	40	201	241
G3BW	8	37	245	290
GM8YPI	—	37	105	142
G4KUX	—	36	200	236
G1EZF	2	36	111	149
G4HMF	2	35	152	189
GW8VHI	—	34	75	109
G4NRG	—	33	112	145
EA3LL	3	32	300	335
GW3CBY	9	32	101	142
G6CMV	1	29	142	172
GM4CXP	—	27	172	199
G6XLL	—	26	30	70
G6CSY	15	25	30	70
G8VR	2	24	246	272
GM8BDX	8	24	29	61
G8ZDS	—	23	95	118
G4RSN	2	23	84	109
G6XVV	—	20	45	65
G6JNS	1	19	112	132
G4ERG	—	16	261	277
G6DDK	3	15	131	149
G4MJC	—	12	140	152
G4GHA	—	6	110	116
G4MWD	—	1	120	121
G6YIN	—	1	66	67
G3POI	—	—	425	425
G4IJE	—	—	325	325
G4DEZ	—	—	241	241
GW4EA1	—	—	214	214
G3FPK	—	—	203	203
GM4IPK	—	—	201	201
G6ECM	—	—	184	184
G3BDQ	—	—	177	177
G8LFB	—	—	175	175
G8TGM	—	—	174	174
G6HKS	—	—	169	169
G4MEJ	—	—	150	150
G4SFY	—	—	131	131
G4IGO	—	—	129	129
G4DOL	—	—	126	126
G4YUZ	—	—	117	117
G8VFW	—	—	107	107
G8RWG	—	—	103	103
G6HCV	—	—	102	102
G6NWF	—	—	86	86
G8XTJ	—	—	82	82
G6AJE	—	—	82	82
G4UYL	—	—	81	81
G4LZD	—	—	71	71

Starting date January 1, 1975. No satellite or repeater QSOs. “Band of the month”, 70cm.

was a problem. G8TGM completed five QSOs but did not think the *Perseids* were very good this year. Kevin’s successes were SM7KNK (HP) and I4BXN (FE) on the 11th and YU3C (HG), DL3MBG and OE3OKS (IH) on the 12th. On the random QRG, French stations in CF and CG were audible on tropo. which did not help. Neil Montanana, G8RWG, (Surrey) mentions LA1K (EY) on the 12th for a new square.

Geoff Brown, GJ4ICD, thought this year’s *Perseids* shower was the best for some time and is claiming 72 completed QSOs on random SSB, the early morning hours on the 12th being particularly hectic. At 0100, F1FHI called him to report that with his antenna pointing due east, he was working into Italy and Sicily. Geoff then worked two Is and an IT9 whose signals were weak and watery, by also beaming at 90°. This has the hallmark of *FAI* propagation.

GM4IPK’s August MS operations saw completed QSOs with SM6AFH/2 in IB and JC on the 2nd and 4th, OE3CEW (II) on the 1st, OH5LK (NC) and OH2AUK (LT) on the 5th, CT1WW on the 14th and F8CS (CH) on the 20th. In the *Perseids*, Andy lists Y2IPL (GL), SM2LTA (JY) and SM3COL (IW) on CW, and I2FAK, SM3GHB (HW) and OE3OBC on SSB.

And now the tropo. activity beginning with the ladies. Sue Frost, G4WGY, (London) is threatening to dig up the Crystal Palace ridge to improve her take-off. However, she is quite pleased with her August efforts on the key. Some more in the Sept. contest brought her ladder total to 73. Sue queried if contest QSOs count for the CW Ladder scores and of course they do. June Charles, G4YIR, (Essex) missed the *Es* again but did work EI2VPX/P (Waterford) and GM6JUK (Grampian) for new countries, the GM being prized as her beam will not turn due north.

Dave Sellars, G3PBV, worked several of the EI DX-Pedition stations in August including EI3VQA/P (UL) on the 19th. The operator was F6HMQ but Gildas was not heard from other locations after the 19th. EI2VPX/P was the strongest signal Dave has ever heard from EI, which is a poor direction for him. Conditions improved at the end of the month and EA1CYE (YD) was worked on the 31st. In the contest, at 0330 on the 2nd, he found the band wide open to DG square. Many Fs and HB9s were worked. HB0PMF/P, running 2w, was worked, also DK9TV/HB0/P in the Principality of Liechtenstein. G4DOL also contacted the latter station but failed to work IW2BAI (EF) due to QRM.

During the Sept. 1/2 contest G4FRE did well to the south with easterly QSOs hard to find. Dave’s best DX from Suffolk were EA3JA (BC) and F6FRE (DD). G4IGO caught EI3VQA/P (UL) on Aug. 19 and in the contest Ken lists EA1RCA/P (WD), HB9s in DG, plus the two HB0s

producing a 40s burst at S9 + 20 dB.

Richard Mason, G6HKS, (Norfolk) broke his duck with at least four QSOs on random SSB MS. These were HG1W on the 11th, and OK2KZR (IJ), IW4ARD (GE) and I4VOS (FE) on the 12th. Quick break-in procedure was used but QRM

aforementioned. G4LZD worked most of his excellent tally on just 2½w, including Irish squares UL, UM, VL, WL and WM. In the contest Steve worked another 7 squares including HB9POI/P (DG) and DK9TV/HB0 (EH) also a new country. He mentions being rather irritated when, having been using a frequency for a number of QSOs, someone else calls the station just worked, the latter staying in the frequency.

G4MCU reports nothing new in the squares quest, but lists EA2LY/P (ZD) on Sept. 1, and during the contest later on, EA3JA and the HB0s. Les Bober, G4NOZ, (Essex) added 19 more new CW stations in August making 158 different people worked this year. G4NRG worked F0GAL/P (YG) on Aug. 8 and some EI and GM expeditions too. In the opening northwards on the 25th, Roger got GM1ELP (ZR) and GM4SSA (ZU), while the contest brought EA3JA and F6ITD/P (BD).

G4SFY did not miss much in August. On the 4th, at 2314, Ray worked LA0DT/MM (AO) on SSB, while good tropo. on the 12th-14th brought OZ1JXH (ER), SM5CNQ (HS), OZ1IUK (GQ) and lots of Ds and PAs. On the 22nd, another mariner, YU3HEF/MM (BM) was contacted on SSB and on the 24th, PA3DLG/MM (BN) on FM. The "big one" was on the 25th when 18 GMs were worked including GM4SUF/P (XS), also OY9JD (WV07b) who was worked last year when -/P in WW square. Next day saw QSOs with ON6CK/LX, G6EBH/MM (AO) and LA8OJ (CS) plus lots of Ds in the E and F squares. On the 27th Ray found VK5BLM/MM on his way to Amsterdam plus LAs and OZs including LA6VBA (ES). It took half an hour's calling to raise G3OUR/P in the Scilly Isles on the 28th. In the contest, best DX was F6ITD/P and 11 countries were worked.

Paul Smith, G4TON, (Lincs.) has added many more on CW but hopes operators will remember to QSY off the calling QRG once they have made contact. His wife has now "inherited" his old G6OAA callsign. On Aug. 25/26, David Brown, G4TVM, (Northants.) worked PAs in CL and DL using 8w.

Thanks also to the following for some very interesting tropo. reports;—G6AJE, G6CSY, G6DER, G6HFF, G6MGL, G6XVV, G6ZPN, G8KAX, G8RWG, G8TGM, G8VFF, G8WPL, G8XTJ, GM4IPK, GM8BDX and GM8YPI. Finally, *Auroral* activity was reported on Aug. 1 by G1EZF, on the 14th by GM4IPK, on the 27th and 28th by GM6LXN, on Sept. 4 and 5 by your scribe and G4IGO.

Seventy Centimetres

G3PBV reports a lack of *Syledis* QRM lately so Dave managed to work EI3VPB/P (WL) for his second ever EI on

the band. On Aug. 30, he contacted G3YGF/P (WJ). G4FRE also got the latter. On Aug. 21, at 0400, Dave heard 19 beacons from FX4UHF (ZD) to OY6UHF (WW) and OK0EA (HK) to SK5UHF (IU), a remarkable feat. On Aug. 25, G4HGT, with 10w and home made 15-ele. *N.B.S. Yagi*, worked ON and D and on the 27th, GU8FBO. Mark Marment, G4MAW, (Devon) enters the lists with 102 squares worked but needs YO to fill up a hole in his map. Any offers?

G4MCU lists LA4IW (CS), LA1BM (CT) heard and LA8AK (DS) in the period Aug. 25-27 in over-sea ducting. G4ROA worked EI3VPB/P on the 12th, GB2XQ on the 10th and DF4KT (?) on the 26th. G4TIF found EI3VPB/P and EI2VRS/P, GB2XQ, G6HV (Devon) and G3YGF/P for assorted new ones, stations also worked by G4VXE. Tim got PE1HXD (DN) for his first Dutchman on the 25th. G4WGY puts out many "CQs" on CW but Sue hears nothing, so how about an effort, gents?

G6DER found conditions up from Aug. 19-26 but little activity from Yorkshire. Best QSOs were DK2PH (EL) on the 20th, SM7FMX (GP) 22nd, OZ2GG (GP) 23rd and 9 OZs from EQ on the 25th. Philip Ruder, G6MGL, (London) managed EI3VPB/P on the 6th, SM6HYG (FS) and OZ1CTC (ER) on the 10th and HB9MIN/P (DH) on Sept. 2. For his best DX G6XLL lists G3YGF/P on the 28th, DJ0PQ (DL) on the 26th and EI3VPB/P on the 5th.

Haydn Barker, G6XVV, (S. Yorks.) is now on the band with an *Icom* IC-402 and 48-ele. *Multibeam* 8m. *a.g.l.* By now he should have some antennas on a new 20m. tower. He quickly worked 18 counties and 6 countries, his second only QSO being LA1ZE (CS) on Aug. 23. G6ZPN worked his first DX outside the U.K. on the 25th, thanks to PAs in CL and CM. John Lemay, G8KAX, (Essex) wishes more 2m. operators would say if they have 70cm. too as he thinks many more 70cm. QSOs would result. He managed OZ1CTC, EI3VPB/P, G8VIB (ZP) in Northumberland and GM8YPI (YP) Borders, in August.

Don Hughes, G8WPL, (Stockport) added GM4SIV/P (XS), EI3VPB/P and EI2VRO/P (VL) for three new squares. Alex Scott, GM8BDX, (Borders) also added three more; GM4SIV/P, PE1GEX/A (BL) and LA1BM (CT). During the big lift, Aug. 24-26, Alex McCreadie, GM8YPI, (Borders) found the band almost as busy as 2m. at times. His best DX was DK8SG (EI) and OY9JD was heard on the 25/26 at RS41 only. By the 27th the band seemed dead but LA1ZE came on the Aberdeen repeater and a 36 min. 70cm. QSO followed.

Twenty-three Centimetres

Both G3PBV and GJ4ICD thought the contest on the 19th was poor. Dave's only

noteworthy QSO was G8VLL (Norfolk) while Geoff, who called "CQ" on SSB/CW for hours, only worked G3JVL (ZK). He is doing quite well on the band now he has decent power and antennas. On Aug. 25/26, G4FRE contacted G4PEC (ZP), GM3ZBE (YR), ON5NY (BK) and ON5GF (CK). G4MAW uses a solid state transverter driving a 3CX100A5 PA to 25w. An *NEC* 64535 preamp. is used, all home built and mounted in the loft under a 15-over-15 antenna and remotely controlled from the garden shack. Mark is looking for YO square on this band too.

G4MCU finds propagation over the sea quite reasonable even in low pressure conditions, something Jon has not noticed on 70cm. He worked DC9XO (EM) and DF5LQ (EO) on the 19th, PA0GHB (BL) on the 21st and G8PNN on the 25th, all new squares. G4ROA added CL sq. on the 25th thanks to PE1JSE. G6DER got G8WPL, GM8MBP and ON5NY (BK) for assorted new table points on the 23rd-26th. G8KAX mentions PAs in CL and DL on the 14th.

G8PNN sent copies of 14 pages of his station log covering the period Aug. 1 to 26, most of them devoted to 23cm. His achievements would be good by many people's 2m. standards. New squares for Gordon were ON5NY (BK) and ON5GF (CK) while Surrey and Lothian were all-time new counties. G8WPL runs 2w to a 23-ele. *Yagi* and only started on Aug. 10 but looks like he will do well with 5 squares already. GM8BDX is up to 13 sq., the latest additions being AM, BK, CK, CL and CN. The weekend Aug. 25/26 saw GB3BPO at S9 + 10 dB and PA0QHN at S8.

Thirteen Centimetres

G4FRE has a PA0HEJ *varactor* mixer and single valve PA producing 12w output. Dave's Rx uses an MGF1401 Gasfet RF amplifier and interdigital converter, the antenna being a 42-ele. *Quad Loop Yagi* at 10m. *a.g.l.* G8PNN was worked on Aug. 25 and ON5GF (CK) the next day. G8PNN is up to 6 countries and 13 sq. on the band Gordon's log showing 27 QSOs in August. SM6HYG (FS) was worked on the 11th at 1916 at S9 + 60 dB each way.

Deadlines

Once again the Editor is none too pleased at sporting an extra page and maybe there will not be quite so much to report next month. The deadline for November is Oct. 3, quite early. The next one is Nov. 7. Everything to:— "VHF Bands", *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*

“Kitchen Table Technology”

A SERIES OF OCCASIONAL ARTICLES TO PUT THE ‘AMATEUR’ BACK INTO AMATEUR RADIO

REV. G. C. DOBBS, G3RJV

No. 6: The Timestep Electronics MON-2M Two-Metre FM Monitor Receiver Kit

FOR some considerable time I have been an advocate of home-built amateur radio equipment, but sometimes the dragon wins. In my shack I have a little 2-metre FM handheld transceiver; it's not new but it is black and Japanese. Looking inside the diminutive case it is clear first of all that it would be impossible for most of us to build anything so compact, and secondly, we could not do it for the same price. And so it is with several types of equipment we use in our hobby. Particularly at VHF, and especially if they are bought secondhand, some of the far-eastern boxes offer good value for money. Sometimes applications appear in the hobby for which the full weight of oriental technical ingenuity is somewhat heavy handed. What happens if one wishes to monitor a particular VHF channel? Must a complex box of robots vomit decorated with controls and digital readout be tied up for one simple operation? One attractive way around such a problem is to have a dedicated single channel monitor receiver. The **Timestep Electronics MON-2M** 2-metre Monitor Receiver Kit designed by Timothy Edwards provides such a receiver module.

The basic receiver was designed for the range 18 to 200 MHz with high performance, although for amateur markets the 2-metre version is the one usually sold. The cost of the kit is low enough for it to be used as a single-channel monitor for a local repeater or a simplex channel, left on to monitor required calls. Most high performance receivers at VHF seem very complicated but this kit has been designed with a low component count in mind. The designer is Timothy Edwards who is well known for his amateur radio designs and articles, he seems to spend a lot of his time sitting on 45 grand's worth of test equipment! The receiver kit can also be used as the starting point for an upgradable system. **Timestep** also sell a 10-channel oscillator to match the basic board and an optional 8-pole crystal filter which simply replaces the existing filter on the board. Timothy Edwards' well known 2-metre preamplifier boards could also be used in front of the receiver board.

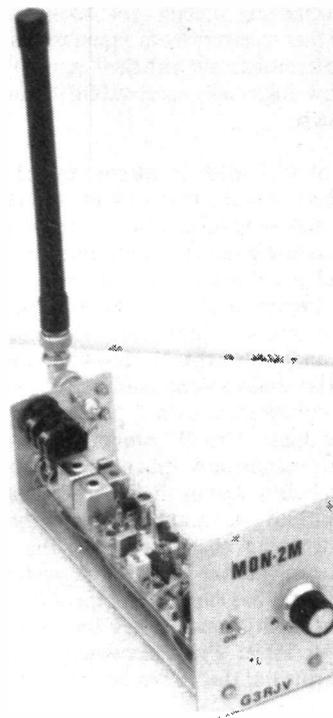
The kit is supplied with all components and double-sided printed circuit board; all of the inductors are prewound and just solder into the circuit. The first oscillator requires a crystal in the 44 MHz range for the chosen channel. These are standard items and can be ordered from *PM Electronic Services*, 2 Alexander Drive, Heswall, Wirral, Merseyside L61 6XT. Just ask for a 44 MHz receive crystal in HC25/U mountings and quote the required 2-metre channel or frequency.

The Circuit

The circuit for the MON-2M is shown in Fig. 1. Perhaps the best way to consider the circuit is to follow the words of the designer, Timothy Edwards in the notes from the kit.

Circuit Description

The first oscillator section is a standard Colpitts oscillator operating in the 44 MHz region with the collector tuned to the third harmonic. It is not necessary to use any further multipliers or amplifiers since an equivalent output in the order of 0dBm at final frequency is achieved from this oscillator. Further multipliers and amplifiers as used on other receivers will only degrade the noise performance and produce latent instability. The crystal spec. used is the standard series resonant third overtone type already used in many existing projects and *PM Electronic Services* are able to supply from stock most amateur channels. L4 is used to tune the crystal to its series resonance and will move the receiver approximately ± 5 kHz from the desired channel. It will come as a surprise and shock to most people to find the design deliberately omits the obligatory RF amplifier, since with a properly designed mixer stage input sensitivities in the order of $0.25\mu\text{V}$ for 12dB



A front view of G3RJV's Timestep MON-2M receiver.

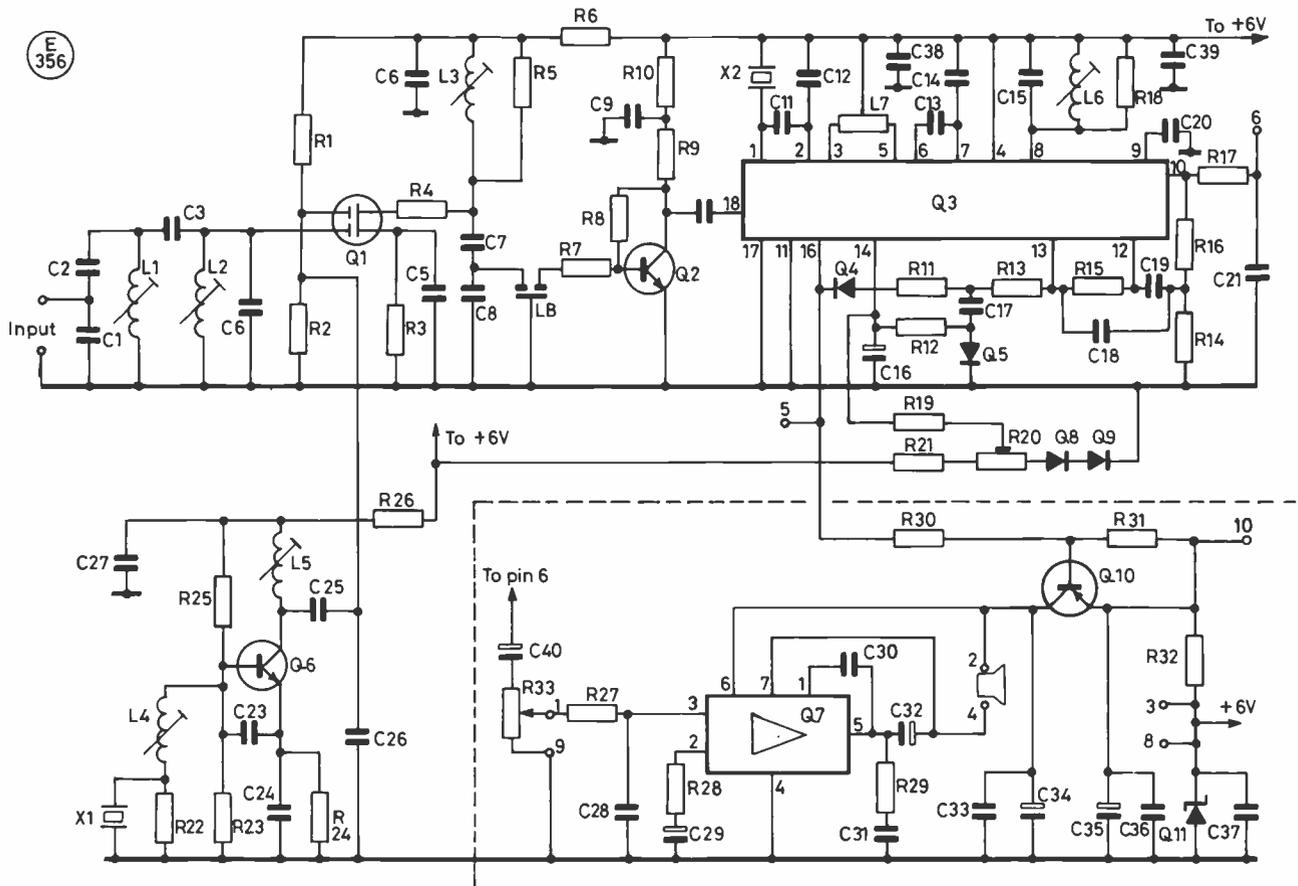


Fig. 1 CIRCUIT DIAGRAM

SINAD are achievable. It should be noted that a 2-stage band pass filter comprising L1 and L2 is provided to give a superior image rejection. Even with the attendant loss that this gives the early prototypes were achieving $0.20\mu\text{V}$ for 12dB SINAD. These figures are so good that receivers from Japan only a few years ago could not equal these results even with their excess of RF gain. The mixer FET is the now universally accepted BF 981 introduced into the U.K. by *Timstep*.

The IF output at 10.7 MHz is selected by L3 which has an internal tuning capacitor and is matched into L8 which is a 2-pole crystal filter. The matching of this filter is extremely important and the design procedure is rather complicated; however using the values specified will give the best distortion and adjacent channel performance. It is important to note that this must be a crystal filter and not a ceramic one as the ceramic filters have excessively wide stop bands and cause the IF amplifier to overload; IF amplifier overload is usually an unidentified problem with a lot of receivers and the substitution of a 2-pole crystal filter always clears these difficulties. The IF pre-amplifier Q2 has been designed to correctly match the output impedance of the filter and provide a little gain before driving the main IF section, Q3, which is the ubiquitous MC3359 (also manufactured as the ULN3859A). It is important to note that ostensibly the two ICs are interchangeable but in fact the ULN3859A version is a second generation device which has superior temperature tracking and limiting amplifier stability, and it was the designer's original investigation of this IC at *Pye Telecoms* that persuaded the manufacturers to bring out the 'A' version and hence it is used in this project.

The 10.7 MHz is mixed with the crystal oscillator comprising X2, C11 and C12 to the final IF frequency of 455 kHz; this is selected and filtered by a 4-pole ceramic filter, L7. The IF is then amplified and limited before passing to the quadrature

discriminator comprising C15, L6 and R18; L6 already has an internal capacitor but for ease of tuning C15 is added externally. The audio output is buffered internally with an emitter follower and appears on pin 10, the base of the emitter follower being decoupled to ground via C20 which not only improves sensitivity but also assures complete stability. The audio output is low-pass filtered by R17 and C21 before being passed to the volume control, R33. Standard de-emphasis is provided by R27 and C28. It is a strong feeling that monitor receivers should be able to drive relatively high quality inefficient loudspeakers — certainly for local nattering the tiny speakers used in most black boxes are not suitable. It was with this in mind that a 2-watt audio amplifier was incorporated rather than the usual 500mW amplifiers. It must be noted with this particular chip that the output to the loudspeaker is not referenced to ground and neither loudspeaker output should be connected to ground or earth otherwise damage to the IC will occur; in practice this is no problem.

The main IF amplifier, Q3, has internally a noise operated squelch system which looks at a narrow audio spectrum at approximately 9 kHz — which, of course, has no modulation as the speech band is between 300 Hz and 3 kHz. 9 kHz was chosen as it is the frequency at which the noise disappears at a very fast rate when small input signal levels are present. This noise is filtered and rectified before being passed to the input of a Schmitt trigger on pin 14 of Q3. There is also a standing DC level provided by R20 applied to this pin. By adjusting R20, signals between $0.10\mu\text{V}$ and approximately $2.0\mu\text{V}$ will open the squelch. The squelch uses a novel system which is well proven by the designer's Company and turns the supply to the audio amplifier on and off. This has the inherent advantage that with the receiver in its quiescent mode current consumption is considerably reduced. It may be thought that this system would produce clicks and bangs in the loudspeaker as the squelch opens and closes; however with the use of Q10, a 0.5 amp transistor, and the circuitry around Q8, there

Table of Values

Fig. 1

R1 = 56K	C8 = not used
R2 = 100K	C12 = 82pF
R3, R6, R10, R26 = 100R	C13, C14, C34, C36,
R4 = 47R	C37, C38, C39 = 100nF
R5 = 5K6	C15 = 22pF
R7 = 1K5	C16, C29, C35, C40 = 2 μ 2, 63V
R8, R21 = 47K	C17 = 10nF
R9 = 1K2	C18, C19, C30 = 1nF
R11 = 3K3	C20 = 150pF
R12, R16, R25, R31 = 22K	C24 = 15pF
R13 = 470R	C26 = 6p8
R14 = 820R	C28 = 4n7, K 63
R15 = 330K	C31 = 220nF
R17, R30 = 1K	C32, C33 = 220 μ F
R18 = 33K	Q1 = BF981
R19, R23 = 27K	Q2, Q6 = BF199
R20 = 47K pot.	Q3 = ULN3859A
R22 = 680R	Q4, Q5, Q8, Q9 = 1N4148
R24 = 560R	Q7 = TBA820M
R27 = 150K	Q10 = ZTX501
R28 = 33R	Q11 = 4V7, 5V1 or 5V6
R29 = 1R	L1, L2 = S18 orange
R32 = 330R	L3 = 0210
R33 = 25 or 10K pot.	L4 = 3766
C1, C11, C23 = 47pF	L5 = MC108 violet
C2 = 12pF	L6 = 0814
C3 = 1p8	L7 = LF-B12
C4 = 10pF	L8 = 10752
C5, C6, C7, C9, C10,	X1 = ($f_c - 10.7$)/3
C21, C22, C25, C27 = 4n7	X2 = 11.155 MHz

Also: PCB from *Timestep Electronics*, 2-off xtal skts., 2-off PCB pins, 2-off 10mm. cans, 1-off 7mm. can, 17-off track pins, 1-off 10-way plug, 1-off 10-way shell, 10-off 10-way pins.

Note: X1 can be obtained from *P.M. Electronic Services*, 2 Alexander Drive, Heswall, Wirral, Merseyside L61 6XT (quote 44 MHz Rx HC25/U and channel required).

are no perceptible clicks or bangs and the squelch operates in a very smooth and positive manner.

A stabilized supply is provided for all stages other than the audio amplifier from the Zener diode Q11 fed from R32; if a very low current receiver is required Q11 may be removed resulting in, typically, a reduction in quiescent current from 19 to approximately 15mA. The designer is sure that these circuit techniques will be lifted by other authors and commercial manufacturers!

Building the Kit

The text suggests that the construction of the board may take a whole weekend. That appears to be a good estimate. I built it up in three evenings and I am used to wielding a soldering iron. The kit is *not a beginner's project*. The placements and spacing on the printed circuit board are such that accurate and careful soldering with low wattage soldering iron is essential. *Timestep* maintain that most of the problems encountered with the board have been due to poor soldering from inexperienced constructors: I can quite believe that. Most of the people who have approached me over the years with problems in home construction have had soldering faults — and they can be fiendish to trace. A high density board requires a little pre-planning for the constructor, but if the components are sorted out in advance and the constructor is methodical in his progress, and the recording of that progress, most simple mistakes can be avoided. The board requires good workmanship rather than technical knowledge. The layout plan and the clear component list minimise the chances of wrong component placement. I enjoyed building the board, but I always find electronic construction therapeutic.

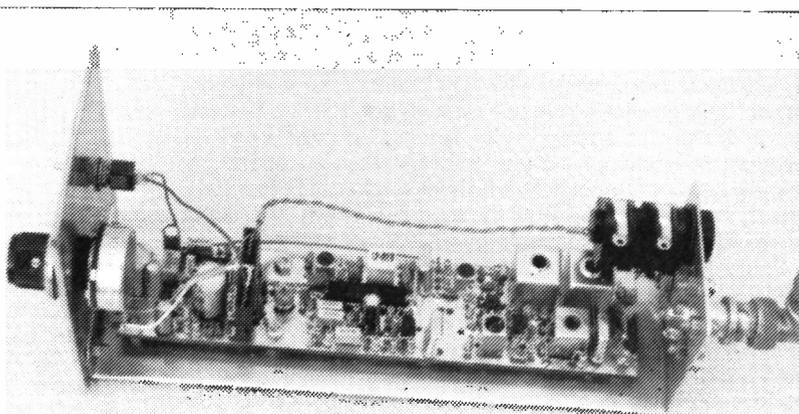
The kit has no housing for the circuit board, it would be pointless for a module with so many diverse applications. I mounted mine on a simple aluminium cradle of base, front and back panels with a view to console mounting at a later date. The module would fit into quite a small box, although one of the features of the circuit design is the good audio quality of the output so perhaps the housing would be governed by the size of the loudspeaker chosen for the receiver; mine has no integral loudspeaker but a jack socket audio output. There is only one control, for volume, as the squelch level control is a printed circuit board preset. The volume control potentiometer is provided with the kit, although some constructors might like to replace it with one which includes an on/off switch.

Alignment

The alignment can be performed without any test equipment at all although life is easier if some simple equipment is available. The text with the kit simply and carefully explains the procedure for alignment of the receiver. Apart from the input tuning coils the other inductors should require little or no adjustment. There are so many operators around on 2-metres FM these days that aligning up from an existing signal on the band should not be too difficult. As with all alignment procedures the principle is a little at a time, recalling the amount of offset made so that the original state can be restored if required.

My particular board when aligned appeared to have a sensitivity of 0.32 μ V for 12dB SINAD, the squelch opening threshold being 0.18 μ V. Nice on paper but even nicer in use! I have found the receiver very sensitive even when used with a

An internal view of the MON-2M receiver.



rubber ducky antenna on the shack bench. The manufacturers are right about the audio — it does sound good into a decent loudspeaker. The board has a squelch defeat point which can be wired to a switch or push button and that is very useful for poor or fluttery mobile signals. The module did not seem to be appreciably desensitised by another transmitter in the same shack on an adjacent channel. **Timestep** can supply a suitable 8-pole crystal filter which just slots into the existing board and this gives a very good intermodulation response. **Timestep** do offer a limited trouble-shooting service to builders of their kits but this is a home construction project and buyers should be aware of the fact that they are expected to build the equipment when they buy it.

I like the MON-2M receiver. Mine has a typical use now that Mrs. RJV is an RAE graduate: it is the dedicated monitor receiver idling away in the study awaiting for the "beam me up Scottie" signals from her handbag rig.

The MON-2M breaks new ground in design simplicity at high performance and has been adopted by *British Telecom* in one of their monitoring schemes. A nicely presented kit, satisfying to build and use, and the price is such that it enables the keen 2-metre FM user to have a dedicated monitor for his or her favourite channel or repeater.

The kit costs £19.95 and is available from **Timestep Electronics Ltd.**, Wickhambrook, Newmarket, Suffolk. (Tel: 0440-820040).

Basics for the SWL and R.A.E. Candidate, Part 17

SUGAR-COATED THEORY

Modulation

WE must now come back to this word 'modulation'. If we have a CW carrier to command, then we say that we modulate it when we alter it such that we convey information. The simplest case is just to switch on the carrier as a signal, and the next simplest is when we turn the carrier wave on and off in accordance with the Morse (or similar) code to convey a message. However, in common amateur parlance we tend to think of modulation in the slightly more restricted sense of causing our carrier to convey *speech*.

Now, there are various ways in which we can make the speech signal from the microphone alter the carrier. We can cause the carrier to move in frequency about its nominal figure — this is the FM so beloved of the VHF licensees, of the CB-ers, and of the hi-fi fans who listen to *Radio 3*. This method is the best in terms of the possible received quality, given a clear channel and an adequate received signal level. The hi-fi signal also requires a very large bandwidth, but our amateur FM signals are restricted by the terms of our licence to no more than the width of an equivalent AM signal.

Which neatly leads us into the business of AM. Here, we are going to hold our carrier signal on a constant frequency, and vary its *amplitude* in accordance with the dictates of our microphone signal. If we imagine a pure sine wave at, say, 1000 Hz (a sound not unlike that of a flute) as the signal being given off by the microphone resulting from what it 'hears', then we can imagine that the maximum amount by which the carrier can be reduced is exactly to zero, and therefore the maximum to which it can be increased is exactly to double the original carrier amplitude. If we call this '100% modulation', then it doesn't require a genius to realise that if we now increase the sound level to the mic. we will actually stop the carrier altogether each time we approach and pass 100% modulation at the negative end; and we may or may not succeed in going beyond double the carrier amplitude in the positive direction. In effect we will be cutting off carrier 1000 times a second — and the resulting 'splatter' up and down the band will make you rather unpopular with the other users of the band! See Fig. 1 for drawings of all this.

Next we must analyse the case of the perfect AM signal having 1000 Hz tone modulation at 100% modulation level. Without going into the maths of it all too much, we can say that if we look at this signal on an oscilloscope we will get a display like Fig. 2(a); and if we transfer the signal from the 'scope to a 'spectrum analyser' we will see a display like Fig. 2(b). If we imagine our

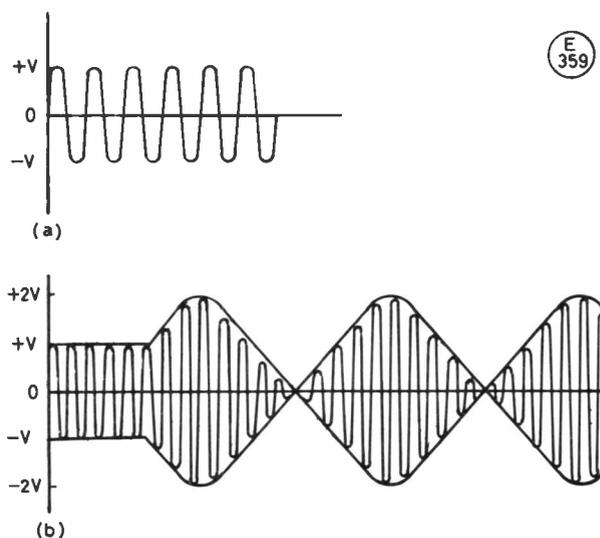


Fig. 1(a). A CW signal with no modulation. To send Morse, this 'carrier' may simply be switched on and off in accordance with the code. **Fig. 1(b).** At time 't' a modulating tone is added — say 1000 Hz — to give 100% modulation; note that now the RF signal changes at an audio rate to ± 2 volts and at the same rate to 0 volts. Note also that the line shown as the modulating AF sine waveform touches the peak level of each successive cycle of RF; at 1.8 MHz, for example, each AF cycle would contain 1800 RF cycles.

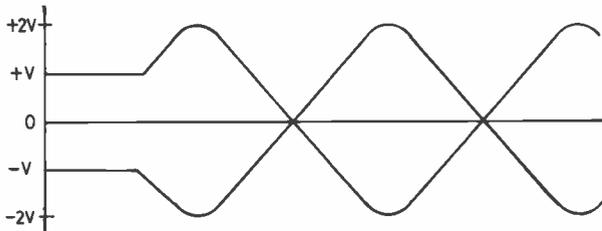


Fig. 2a 100% modulation by 1000Hz tone, on an oscilloscope.

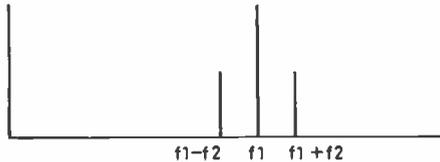


Fig. 2b. The same signal as Fig. 2a as seen on spectrum analyser.

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Fig. 2(a). The RF would be visible as a luminosity within the envelope shown; modulating frequency, 1000 Hz pure sine wave. Fig. 2(b). $f_1 - f_2$, is the lower sideband, f_1 , the carrier, and $f_1 + f_2$, the upper sideband.

signal is on 1.9 MHz, then the spectrum analyser will show us a signal at 1.9 MHz *plus* a signal at 1.899 and another at 1.901 MHz. Cut the modulation, and the 1.9 MHz signal is now all alone, and its two friends have disappeared. Put the modulation back on, and back come our little friends at 1.899 and 1.901 MHz. If you have a receiver with a CW bandwidth filter fitted, feed the modulated signal into it instead of into the analyser, and tune carefully around 1.9 MHz. Lo and behold, you find a signal at 1.899, one at 1.900 and at 1.901 MHz; and the first and last of these will disappear if you cut modulation leaving the second; and this one will in its turn disappear if you turn off the carrier.

If we analyse this situation in terms of vectors, we can see that a 100-watt output carrier, 100% modulated at 1000 Hz sinewave will have a signal at 1.901 MHz — the *upper sideband*, and another at 1.899 MHz — the *lower sideband*, which have precisely half the voltage amplitude of the carrier, and whose *phase*, relative to the carrier are each rotating at 1000 Hz, in opposite directions. Thus, once in every rotation the two sideband voltages will be in phase with the carrier, and once in every rotation they will both be in anti-phase with the carrier; therefore when all are in phase the amplitude will appear double, and in anti-phase the amplitude will be zero. In other words, the display we saw on the 'scope and on the spectrum analyser are merely different ways of displaying the same signal. Sigh of relief — both sets of test gear are telling the truth!

Now, recall Ohm's Law, and the power relationships. If you double the voltage across a given resistor, the current also doubles (from Ohm's Law), and since $E \times I = W$, the dissipation has gone up to four times. Going back to our transmitter, our 100%

modulated AM signal will therefore give out 100 watts in the absence of modulation, and under modulation will vary about this figure to a peak output of four hundred watts, and a low of zero watts output.

In practice it was a rare AM transmitter that could make 100% modulation without distortion, even among the broadcasters; and of course we would be transmitting speech, whose waveforms are vastly more complex than the single tone.

To revert to our 100-watt output rig, and 100% modulation, a little of the Ohm's Law stuff will show us that we have 100 watts in the carrier and 25 watts in each of the sidebands.

SSB Enters — Stage Left!

It wasn't long after the AM case had been analysed that it was realised that the AM signal's two sidebands contain identical intelligence, and that the function of the carrier is to provide a 'reference signal' for the receiver detector to use, to extract the wanted audio component. By 1915, indeed, Western Electric had patents on a viable single sideband (SSB) system; what was done was to filter out the carrier and one sideband, leaving only one sideband to be transmitted. Further they had realised that, for a given received signal, SSB only requires one quarter the power output capability in the transmitter. In those early years the latter was important, due to the limitations of the early transmitting valves. Today, of course, we amateurs would use the same pair of valves we would have used in our old AM rig to give us four times the talk power. Furthermore those old-timers would have had no reason to suspect the greatest gain in our bands in 1984 — the removal of all those carriers and unwanted sidebands means we can get many more signals on to a band without heterodyne QRM or mutual interference. Even when we do have some QRM from another SSB station, we have a far better chance of being able to apply our ears and brains to resolving the cacophony into 'sense plus monkey-chatter'.

The reason for this last gain is less than obvious; if two AM signals are so close they are mutually interfering, the detector will tend to demodulate everything against the strongest carrier, so if they are fading up and down first one carrier and then the other will be favoured. With SSB, we don't transmit the carrier; instead we re-insert it at the receiver (BFO or CIO) and, which is more important, we make its amplitude so large that it is the only one against which the receiver will demodulate *everything*.

The practical advantage of SSB is so obvious that from its appearance in the late forties it very quickly swept everything in the way of old-fashioned AM into the dustbins and flea-markets of the amateur radio world. For a year or two the sideband op. would get the odd puzzled comment, "Something wrong with your mod, OM", from some poor chap who either had never before met SSB, or didn't know how to resolve it on the war-surplus or home-brew receivers of the time. However, one clear explanation on how to deal with SSB was usually enough, as far as reception went. However, those who sought to explain SSB transmission and theory in the magazines all made it sound so darned complicated that it scared almost everyone off home-brew SSB transmitters. In reality, anyone who could build a decent superhet receiver could build and align an SSB transmitter.

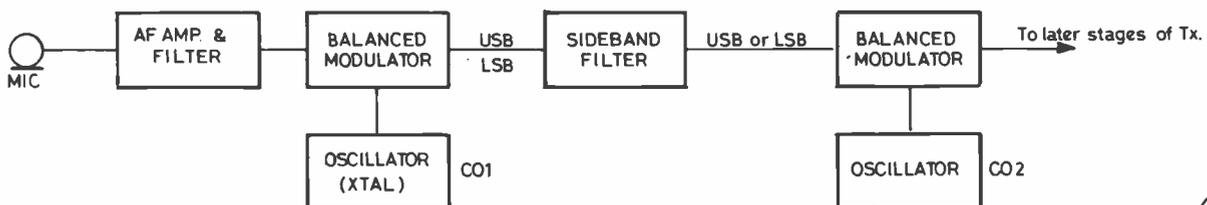


Fig. 3 A FILTER TYPE EXCITER - BLOCK DIAGRAM

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Notes: (a) 'filtering' in the AF amplifier should include low frequency roll-off and peak limiting; (b) CO1 frequency is chosen to suit sideband filter and CO2 to suit later stage of circuit design; (c) notice the resemblance to the simple superhet.

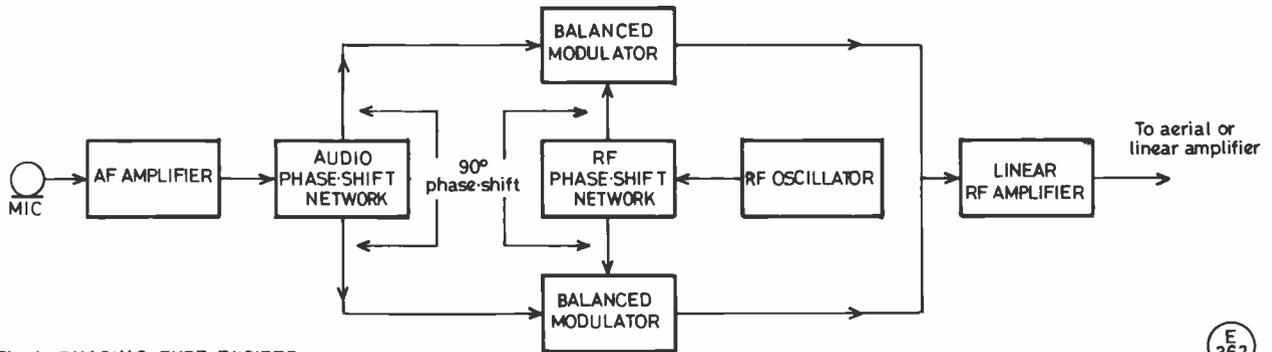


Fig.4 PHASING TYPE EXCITER

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Sideband suppression is achieved entirely through the accuracy of the phase-shift networks at RF and AF, and carrier suppression is achieved entirely by accurate balancing of the two balanced modulators. A very elegant approach.

However, for years now, almost everyone using SSB has used a *transceiver* rather than a separate transmitter and receiver — why? There are two reasons: firstly the rather obvious one that, since the sideband to be used on any given band is agreed by all, it follows that once a signal is tuned-in, the transmitter will be on the right frequency (unless one is in a DX pile-up where they are working split-frequency of course). Secondly, if the receiver requires a suitable filter for SSB selectivity, and the transmitter requires an identical one for the purpose of generating the SSB signal, one has a pointless duplication of the most expensive components. In practice, the duplication is more than just the filters, and so a transceiver costs little more than a receiver of equal calibre. To obtain the desirable split-frequency facility with a transceiver is fairly simple — small splits are accommodated by the use of incremental receiver tuning (IRT) which pulls the VFO a small amount as required by use of a varicap diode, which is enough for most purposes; wider splits can be accommodated by the use of an outboard VFO and switching, normally powered from the main rig.

Circuits

There are, in practice, three methods of generating an SSB signal. One can start with a fixed frequency and use a crystal or mechanical filter, as is done in all the current commercial rigs. If one is prepared to start at a low enough frequency — say, 50 kHz — one can indeed use a filter made from coils and capacitors, in the same way. This is what is known as the 'filter method'.

Secondly, one can use a technique of phasing — this was developed by amateurs and is a more elegant attack than the brute-force method of filtering; and one can do it either on a fixed frequency, or, with some compromise, on the final band of a single-band rig. The method involves an audio phase-shift network, and an RF phase-shift network, each having outputs at 90° apart, and a couple of balanced modulators. RF phase shifting is quite easy. The audio phase-shift is more tricky, but circuits are around. The famous "SSB Jr." circuit audio network is due to W2KUJ and first made SSB popular in U.S.A. The one by Dome, W2WAM, is considered by some to be easier to set up. A more modern approach to audio phase-shifting is that due to Gingell, extensively discussed by Martinez, G3PLX. The first two are discussed in detail in the third, fourth and fifth editions of the RSGB *Radio Communication Handbook*, (save that Dome is dropped from the fifth) while the Gingell/Martinez polyphase arrangement has been written up in *RadCom* and the RSGB *Amateur Radio Techniques* in recent editions. Phasing, especially using the G3PLX approach, is a natural for home-brew, and in the writer's opinion a good one puts out a nicer-sounding signal on the air than a filter method rig.

That leaves us with the so-called 'third method', due to Weaver. This is, in effect an amalgam of filtering and phasing, and has the minor advantage that it tends to turn its splatter on to

its own frequency rather than spreading it far and wide. (Rough justice, that!) The writer has never heard a Weaver-type rig on the air to his knowledge, nor seen an article on a practical construction using the method.

But for our purposes we are talking about the filter method. Firstly, we need a crystal or mechanical filter! The latter are made by Collins — rather expensive — and Kokusai, and they are made for frequencies up to around 500 kHz. Crystal filters are also expensive, although probably easier to obtain, but there is no reason why you shouldn't 'roll your own'. Indeed, many of the earlier SSB designs did just that, using the then easily-obtained surplus FT243 series crystals, or even the FT241 series. To go this route in 1984, one would need to have a source of lots of these 'rocks' and be prepared to accept that the exciter frequencies will be tailored to the crystal filter one can make with the crystals to hand, rather than the other way about. Some useful articles appear in the ARRL *Single Sideband for the Radio Amateur* covering this approach to filter brewing. Let us just say that a reasonable crystal filter will use at least six crystals, and a first-class HF one will probably have a dozen. The main requirements are that the pass-band across the top be around 2.7–3.1 kHz, without serious 'humps and hollers' in that area. It should have a steep-sided shape outside the pass-band, with a bandwidth of no more than 6 kHz at 60dB down. A careful examination for any

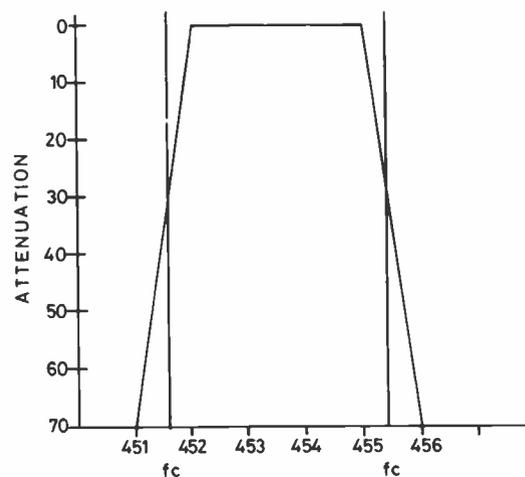


Fig.5 CRYSTAL FILTER RESPONSE

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This is a plot of a crystal filter made from FT241-series crystals; f_c shows where the crystal oscillator, CO1, of Fig. 3 would be located to give USB or LSB output. Note that the carrier crystal frequency is located such that 20dB or more of carrier suppression is given by the filter.

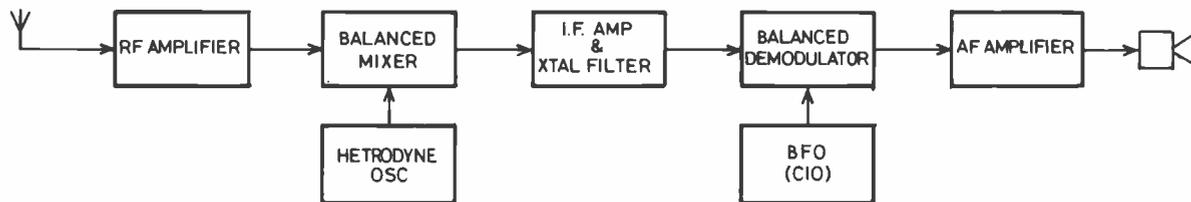


Fig. 6(a) SUPERHET RECEIVER

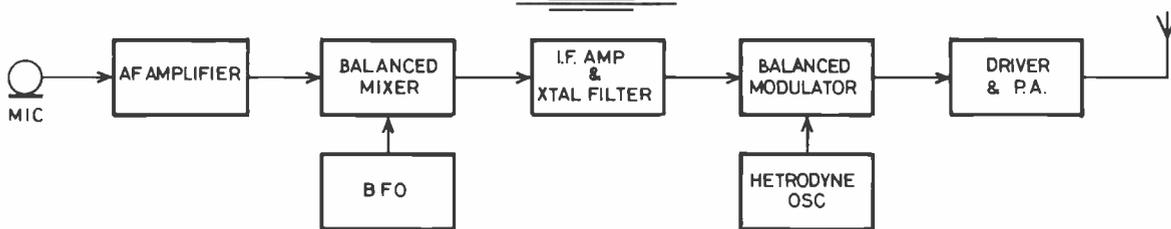


Fig. 6(b) THE SUPERHET RECEIVER OF Fig.6(a) CONVERTED INTO AN SSB TRANSMITTER

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Fig. 6(a). This is completely conventional, except that in pre-SSB days one would not have bothered to use *balanced mixer or de-modulator* circuits. **Fig. 6(b).** By using the receiver RF amplifier as a mic. amp., transposing the two oscillators, and using the AF output valve as a driver, all that is needed for an SSB rig is the QRO PA valve!

spurious responses should show none for a goodly number of kHz to either side of the pass-band, if one sets the 60dB down level as the figure. Practically, with amateur test gear, -60dB is probably as far as you can measure with any degree of ease. These figures will only be achieved when the filter is correctly terminated on both input and output ports; see Fig. 5.

If one is prepared to equate the audio output of a superhet to the PA of the SSB transmitter, a consideration of the block diagram at Fig. 6(a) and 6(b) indicates that the receiver case and the transmitter case are all but identical.

Carrier Suppression

Up to now we have made no mention of the business of getting rid of the carrier; with the filter method we implied the filter is removed by the carrier, which is at least partly true — by about 20dB in most rigs on our bands, and by rather more in some specialised equipments. However, 20dB isn't enough; and we haven't even got that with a phasing arrangement. The trick is turned by the use of a 'balanced modulator' which is another name for a balanced mixer. Recall our mixer stage. We put in F1 and F2, and we get out F1 + F2, and F1 - F2, F1, F2, and the various harmonics. The balanced mixer will show a condition of balance — like the Wheatstone Bridge, if you like — to the carrier, which will therefore not appear in the output in the ideal case. Practically, our design carries tolerances, and so carrier suppression is less than perfect; but with care and, maybe, a balance control to adjust for best results, we can obtain quite good carrier suppression.

Desiderata

This is as good a time as any to consider just what sort of suppression we are looking for. The carrier we want to be at least 30dB down, and preferably more suppression will be welcome. A practical rig will give around 40-50dB. Less than 30dB of carrier suppression will probably be noted at the receiver as a 'growl' if one is a trifle mis-tuned. Suppression of the unwanted sideband should be a minimum of 30dB, and again we would like more, if we can get it easily. A filter rig should go 60dB, and a 45dB figure indicates that there is some leakage around the filter due to less than perfect layout and screening; a phasing rig will go to 35dB with the Dome or W2KUJ arrangements, and one could expect better of a polyphase rig.

In the course of the processing of the signal, there will be some non-linearities due to the characteristics of the devices used and the degree to which they are 'thrashed' and some of these will

appear in the pass-band of the signal proper. If this happens after the SSB signal has been created — the *spurious* outputs will be radiated. Some will be, as indicated, in the pass-band proper, and will serve to degrade intelligibility. Others will appear where the unwanted sideband would have been, and be a nuisance to others; and yet more will be spread right across the band and outside it. This sort of thing cannot be reduced to zero, but it can be kept down to a reasonable level by ensuring that all mixers are given the right sort of drive levels (essentially, the 'carrier' signal needs to be ten or more times bigger than the peak level of the 'modulated' signal), and by avoiding bad practice in the output stage. Here we can make a firm statement: nothing less than at least 30dB down is tolerable. Don't forget that if you have a linear, your transmitter must do better than -30dB, to allow for some degradation in the linear. At levels from 100 watts p.e.p. output up to the legal limit, on any band, there is no alternative to valves if you are not to be anti-social! One hopes this situation will improve in the next year or so, as power FET devices that are suitable appear. Meantime, if you have a solid-state PA, *don't* over-drive it and preferably never let it go above half its nominal peak power output level.

Finally, *stability*. It is nice to know with good accuracy where you are on the band, and essential if you go near the band-edge; but this isn't so important by a long chalk as having a signal that doesn't wander up and down the band. A little can be tolerated by way of an IRT control on the receiver end, but without this, the chap at the other end retunes the drifter, resulting in the situation at the end of the over where the chap who was drifting now has to retune to find the stable chap who moved to take up the drift. The end result is the entire QSO 'walking' up or down the band as the case may be, to the annoyance of all and sundry.

What about CW transmission with an SSB rig? Some of them will achieve this by unbalancing a balanced modulator so that a suitable level of carrier leaks through — sort of accidental-done-on-purpose, if you follow. Another way is to generate an audio tone at, say 800 Hz, and use this tone, turning it on and off by means of the key, to cause bursts of CW output at 800 Hz off the nominal carrier frequency. Fine, provided the 800 Hz tone is pure; it needs to have a second and third harmonic level of at least 40dB down, or there will be little QRP brothers at 1600 and 2400 Hz away from the nominal carrier — and the level of injection of the 800 Hz tone must be of itself 'just so' or the pure sine-wave will be degraded in the audio amplifier stages leading to the first modulator. Why 800 Hz, anyway? Because most people like an 800 Hz beat note in the receiver headphones, and most AF filter designs are centred on this frequency.

to be continued

U.K. Radio Amateur Participation in the CQ Worldwide Contests

N. S. CAWTHORNE, G3TXF

ON the last full weekend of both October and November each year there takes place on the HF bands arguably the biggest and most important set of contests of the year: the CQ Worldwide SSB and the CQ Worldwide CW contests. Worldwide activity during these DX contests is always very high with large numbers of radio amateurs making a special effort to be on the air for at least some part of these contest weekends.

DX stations from many of the rarer locations are always to be found in the CQ WW contests; contest expeditions activate many countries that may normally be difficult to work. Rarer countries where the resident amateurs may usually prefer to ragchew rather than work DX-er's often come on the bands for the CQ Worldwide contests. The CQ WW contests give everybody an opportunity to work something new or interesting on the HF bands.

U.K. Participation

Worldwide participation in the CQ WW contests is very high. The organisers, CQ magazine, regularly receive over 2,000 logs for each section of the contest. For the 1982 WW contests, the total number of logs received by the organisers was 4,666. Where do these logs come from? How much do U.K. stations participate?

Analysis of CQ WW Results over 15 Years

To try and find the answers to these questions a detailed analysis has been made of U.K. participation in the CQ WW contests for the last 15 years (1968-1982), based on the published results. In order to put the U.K. participation into perspective on the international scale, a detailed analysis of the full results for the 1982 SSB and CW CQ Worldwide contests has also been made.

The full results of the CQ WW contests take about a year to be published and reach the U.K. At the time of writing the 1983 results are not yet to hand, and so the analysis of worldwide participation has been based on the 1982 CQ WW contests, held in October and November 1982.

Tables 1 and 2 show a detailed summary of the U.K. participation in the CQ WW contests over fifteen years. The Tables show the numbers of logs submitted by U.K. stations in the different categories. As listed, there are ten possible categories of entry for the WW contests: Single Operator on all bands, Single-Operator Single-Band on any one of the six bands, Multi-Operator Single-Transmitter, Multi-Operator-Multi-Transmitter and finally there is a special QRP section.

Single-Operator All-Band Entries

Of the several types of entry that can be made, the most popular is the single-operator all-band entry, where contest QSOs are made on a number of bands. The top line in the Tables show that this is usually the most popular entry for U.K. stations.

Single-Band Entries

Alternatively a single operator may decide to work the contest on just one band. CQ WW contests cover the six HF bands (the new WARC bands are not included) and therefore there are six possible "single band" categories. The Tables show the number of U.K. entries for each of the single-band categories from 1.8 MHz through to 28 MHz.

For the CQ WW SSB contests, 28 MHz appears to be the most popular band for single band entrants in the U.K. during sunspot maxima. This is understandable since 28 MHz is probably one of the most enjoyable bands to work on HF, subject to there being any good propagation. For both SSB and CW taken together, 14 MHz is the most popular single-band entry for U.K. stations. There have been a total of 122 in the last 15 years.

Table 1. CQ Worldwide SSB Logs from the U.K., 1968-82.

CQ WW SSB	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals 1968-82	Average 1968-82
<i>Single Op.</i>																	
All Bands	8	10	8	8	12	10	15	13	11	5	13	11	6	7	15	152	10.13
28 MHz	10	5	4	2	6	2	3	3	2	1	9	9	4	8	6	74	4.93
21 MHz	2	1	0	2	5	4	3	3	5	2	4	2	3	1	1	38	2.53
14 MHz	3	4	5	5	3	2	3	8	8	7	4	4	2	1	3	62	4.13
7 MHz	1	2	1	1	0	0	2	1	1	2	1	1	0	2	0	15	1.00
3.8 MHz	4	2	1	3	1	2	1	1	4	1	1	0	2	1	2	26	1.73
1.8 MHz	0	1	1	3	1	2	2	3	3	2	4	3	0	0	1	26	1.73
Multi-Single	7	11	8	8	14	13	10	12	9	6	5	6	9	4	7	129	8.60
Multi-Multi	1	0	0	1	1	0	0	0	0	0	0	0	1	0	1	5	0.33
QRP	—	—	—	—	—	—	—	—	—	—	3	1	4	2	2	12	0.80
	36	36	28	33	43	35	39	44	43	26	44	37	31	26	38	539	35.93
G	27	23	20	23	26	23	22	30	35	22	29	26	20	18	25	369	24.60
GD	1	2	0	1	1	1	0	1	1	0	0	1	2	2	1	14	0.93
GI	0	1	1	0	1	1	1	0	0	0	0	0	0	0	1	6	0.40
GJ (GC)	0	1	0	0	1	0	0	0	0	1	0	1	4	0	1	9	0.60
GM	6	5	5	8	9	7	9	7	1	0	7	7	3	4	8	86	5.73
GU (GC)	0	0	0	0	1	0	0	0	1	0	5	1	0	1	0	9	0.60
GW	2	4	2	1	4	3	7	6	5	3	3	1	2	1	2	46	3.06
	36	36	28	33	43	35	39	44	43	26	44	37	31	26	38	539	35.93

Table 2. CQ Worldwide CW Logs from the U.K., 1968-82.

CQ WW CW	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Totals 1968-82	Average 1968-82
<i>Single Op.</i>																	
All Bands	13	5	7	7	11	7	16	16	12	8	12	13	11	19	9	166	11.06
28 MHz	7	5	1	3	4	2	1	1	0	1	3	9	4	0	4	45	3.00
21 MHz	6	7	4	3	5	1	1	3	3	4	4	4	3	1	2	51	3.40
14 MHz	2	1	3	3	5	5	10	12	5	3	0	3	3	1	4	60	4.00
7 MHz	0	4	7	1	2	3	1	1	5	1	1	1	5	0	3	35	2.33
3.5 MHz	3	3	1	1	2	1	4	1	3	1	1	0	3	1	3	28	1.86
1.8 MHz	0	1	3	2	3	2	4	5	2	2	3	2	0	2	4	35	2.33
Multi-Single	5	6	2	2	4	3	6	5	5	3	1	4	3	7	5	61	4.06
Multi-Multi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
QRP	—	—	—	—	—	—	—	—	—	—	2	1	1	1	4	9	0.60
	36	32	28	22	36	24	43	44	35	23	27	37	33	32	38	490	32.66
G	30	24	22	18	22	18	32	34	28	20	20	30	29	22	27	376	25.06
GD	0	1	1	0	0	0	1	2	1	0	0	0	0	0	0	6	0.40
GI	1	0	0	0	1	1	2	1	0	0	0	0	0	0	0	6	0.40
GJ (GC)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06
GM	4	3	4	2	7	2	4	6	4	0	2	0	1	3	6	48	3.20
GU (GC)	0	0	0	0	0	0	0	0	1	1	3	3	1	2	1	12	0.80
GW	1	4	1	2	6	3	3	1	1	2	2	4	2	5	4	41	2.73
	36	32	28	22	36	24	43	44	35	23	27	37	33	32	38	490	32.66

Multi-Operator Single-Transmitter

Within the current rules for the CQ WW contests, this category of entry is slightly more than its name alone would imply. Operating in this section a "spotting station" is also allowed; *i.e.* a second station in addition to the "single transmitter". There are strict rules as to how a spotting station may operate. The purpose of the spotting station is to work multipliers on a band different to that being used by the main station, at the same time as the main station is on the air. This category of entry has always proved very popular in the CQ WW contests, because it allows a number of operators to team up and make a "multi-single" entry.

In the U.K., the average number of entrants in this category over the fifteen years observed has been 8.6 on SSB and 4.06 on CW. These two together probably represent something between 25 and 60 participating operators. Multi-single teams are usually from 2 up to about 5 operators.

Multi-Operator Multi-Transmitter

A full scale "multi-multi" entry requires at least four and more likely five or six stations that can work independently, each on different bands, throughout the contest from one location and using one callsign. The U.K. licence conditions for normal amateur stations do not permit transmissions on more than one band at a time. However, realistically there cannot be many U.K. stations with a sufficient amount of antenna space and equipment to be able to compete seriously in this category anyway! Participation in this category from the U.K. has been very low on SSB and so far has been zero on CW!

QRP Section

In 1978, the QRP section was introduced in the CQ WW contests. This has been growing in popularity over the years. QRP is defined for these contests as "less than 5 watts input". To encourage QRP participation the QRP results are listed separately from the QRO entries. The numbers of QRP entries on a worldwide basis for both the SSB and the CW WW contest together have more than tripled in the five years since the QRP section was started. In 1978, the combined QRP entry was 58, whereas by 1982 it was up to 204.

The CQ WW contests are an excellent opportunity for QRP operators to work much DX which may under more normal

operating conditions be out of their reach. The QRP operator can usually work several new countries during the Worldwide contests, not only because of the high level of activity, but also because all the QSOs are kept to an absolute minimum in length and because the DX is trying to make as many contacts as possible by working everything that he can hear. This includes QRP-er's that might otherwise be trodden to death in pile-ups and DX working out of contests!

U.K. Countries and the CQ WW Awards

CQ magazine issues awards and certificates for the CQ Worldwide series of contests on a country-by-country basis. For the purposes of the CQ WW contests, the countries list used is the ARRL DXCC countries list, plus those countries on the DARC's Worked All Europe countries list not appearing on the DXCC list. There are three such countries, and just one of them is in the U.K.: GM-Shetlands! With the normal seven DXCC countries (G, GD, GI, GJ, GM, GU, GW) that make up the U.K., Shetlands makes the eighth country within the U.K. for the purposes of the CQ WW contests.

Contest Year	SSB Logs	CW Logs	Total Logs
1968	36	36	72
1969	36	32	68
1970	28	28	56
1971	33	22	55
1972	43	36	79
1973	35	24	59
1974	39	43	82
1975	44	44	88
1976	43	35	78
1977	26	23	49
1978	44	27	71
1979	37	37	74
1980	31	33	64
1981	26	32	58
1982	38	38	76
15 years:	539	490	1,029

Table 3. U.K. logs listed in the results of the SSB and CW CQ Worldwide Contests.

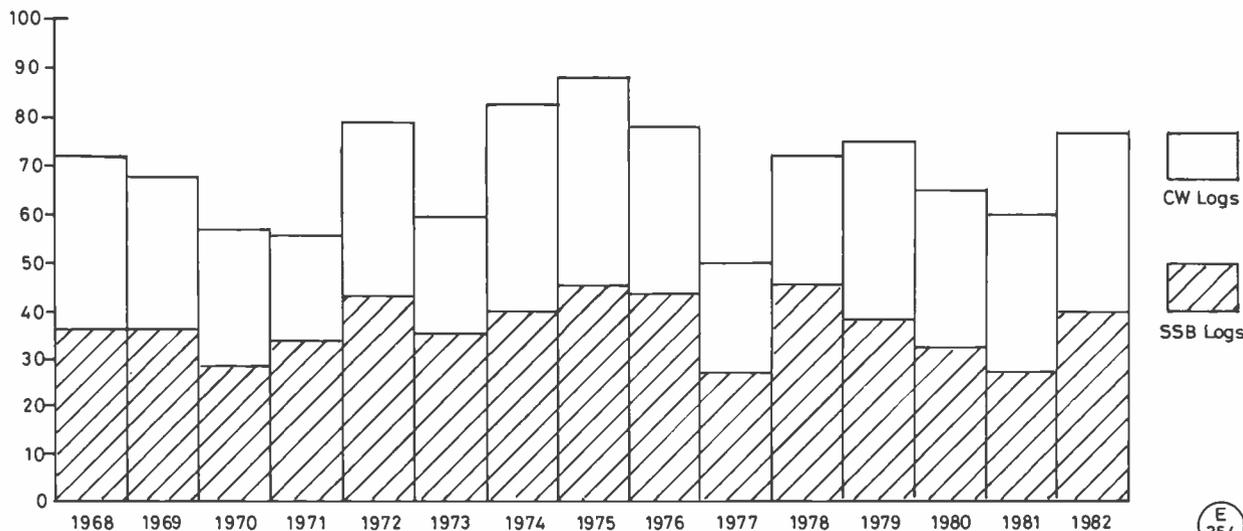


Fig. 1 Total UK entries to CQ Worldwide SSB and CW contests during the years 1968-1982

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With there being 10 possible entry categories and with the 8 CQ WW countries in the U.K., this would, in theory at least, mean that 80 certificates are available to U.K. entrants in both parts of the CQ WW contests! This is without taking into account any of the possible continental winner awards that might also be available to high scoring stations.

The Islands around the U.K.

The Isle of Man (GD), Jersey (GJ) and Guernsey (GU) are all very much sought after as multipliers in the CQ WW contests. It is interesting to note the relatively low number of entrants in the CQ WW contests from these island "countries". Many of the entries shown on the Tables from the islands are often connected with visiting "foreigners" to the islands, be they G3 type foreigners or G5 type foreigners!

U.K. Total Logs in CQ WW's

Table 3 shows for each of the fifteen years covered, the total number of U.K. logs submitted for both the SSB and the CW CQ WW contests each year. It is interesting to note that the total number of logs submitted from the U.K. for SSB (539) only slightly outnumbers those for CW (490). The U.K. entries for the different years are also shown in Fig. 1.

There is a fair degree of consistency in the number of logs submitted over the years, although the U.K. amateur radio population as a whole has probably at least doubled over the period. The average for SSB was about 36 U.K. logs and for CW about 33 logs. Looking through the results listings many call signs are found to appear on a very regular basis, almost year in and year out!

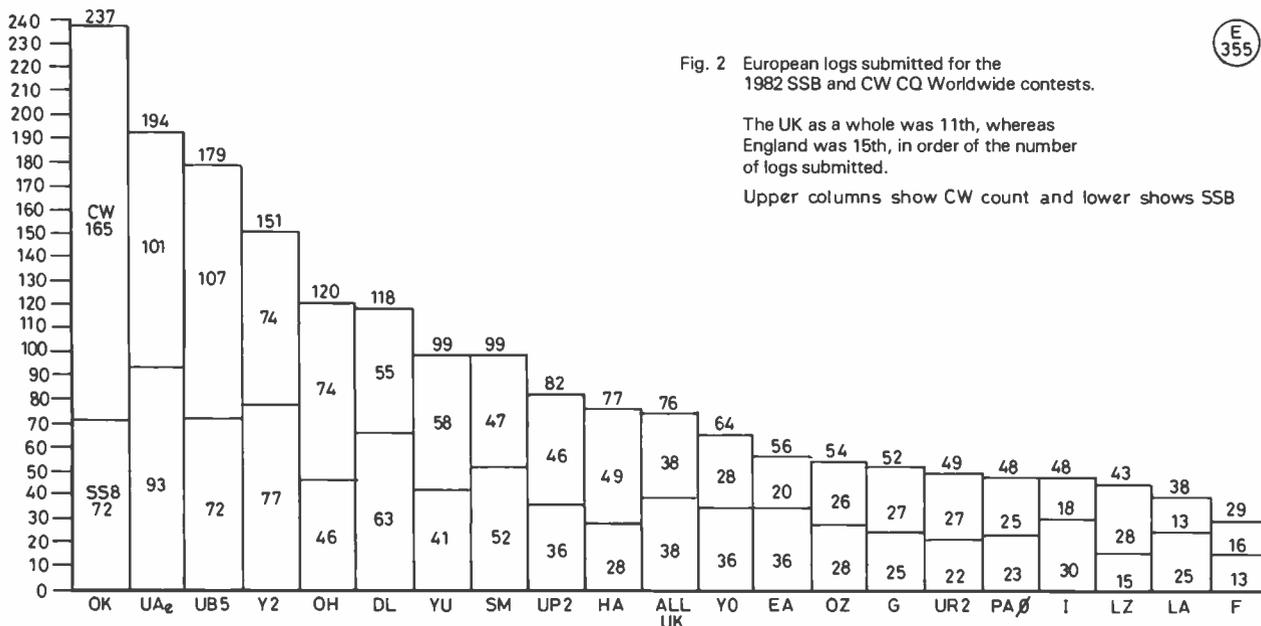


Fig. 2 European logs submitted for the 1982 SSB and CW CQ Worldwide contests.

The UK as a whole was 11th, whereas England was 15th, in order of the number of logs submitted.

Upper columns show CW count and lower shows SSB

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Worldwide Analysis

For 1982 only, a complete analysis of the worldwide entries has been made, which helps to put the U.K. figures into perspective. For the 1982 CQ WW SSB contest 2,444 entries appeared in the results, whereas on CW in the same year the total was 2,222. The corresponding U.K. entries of 38 (SSB) and 38 (CW) represent about 1.6% (SSB) and 1.7% (CW) of the totals.

On the global basis, the total number of logs shown for the five most major contributors of logs are: U.S.A., 1,495; U.S.S.R., 781; Japan, 444; Czechoslovakia, 237; and East Germany 151. The U.K. participation on a global basis is relatively a long way down the listings.

Fig. 2 gives the breakdown of the number of logs submitted by each European country for both the SSB and CW Worldwide contests in 1982. An "all U.K." position, *i.e.* including GD, GI, GJ, GM, GU and GW, is shown on the graph as well as a G only position. This shows the U.K.'s participation as a whole in relation to other European countries, as well as the participation of the English stations alone in these two contests. The number of logs submitted from all the U.K. was about one third the number submitted by the highest participating country in Europe, namely Czechoslovakia.

Fig. 2 also shows the mix of SSB and CW logs submitted by each country. For 1982, the U.K. entries were just 50% SSB and 50% CW. How that mix for U.K. stations has varied over the

years can be seen from Fig. 1. The Eastern European countries tend to have a relatively higher participation in the CW contests than in SSB contests.

This Year's CQ Worldwide Contests

The next CQ Worldwide contests will again be on the last full weekends of October and November. The dates for this year's events are October 27-28 (SSB) and November 24-25 (CW). Whatever the band conditions are like, one thing is certain: there will be plenty of stations to work! The U.K. participation in these major international operating events is relatively low when compared with many of our European neighbours. So this year, why not come into the CQ Worldwide contests for a few hours, work as much as you can and send in a log. Who knows, you might even win a certificate for your effort! The address to which logs should be sent is: CQ Magazine, 76 North Broadway, Hicksville, NY 11801, U.S.A.

Acknowledgements

The data used to prepare this article has been drawn from the results of the CQ Worldwide contests that appear in CQ magazine.



Now available from *muTek Limited* is its new TVHF-230C 9-band HF transverter, designed to operate with a 144 MHz SSB/CW or multimode transceiver and give high-performance receive and transmit facilities on all nine current HF amateur allocations with 10 watts p.e.p. output. Built to *muTek's* usual demanding specifications and high standards, the TVHF-230C cost £334.90 including VAT (plus £5.00 carriage); for detailed information contact *muTek Limited*, Bradworthy, Holsworthy, Devon EX22 7TU (tel: 0409-24543).

• • • "Practically Yours" • • •

with GLEN ROSS, G8MWR

Important note: It was pointed out in last month's issue that if any part of these designs is changed the expected performance will not be realised.

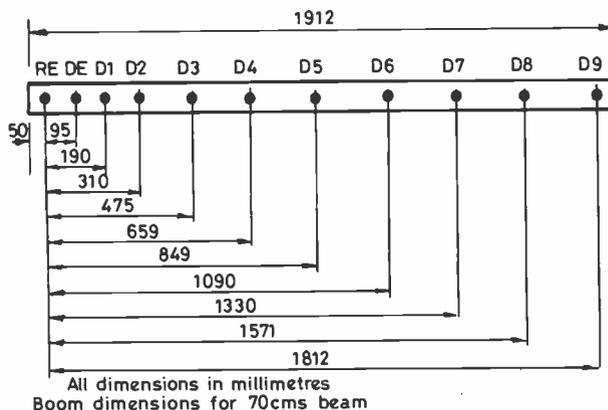
Using the Data

TWO designs will be described, a six-element beam (Fig. 1) centred on 145 MHz and an eleven-element (Fig. 2) with a centre frequency of 433 MHz. The designs use readily available materials and give gains of around 15dBd on 433 and 10dBd on 145 MHz. Provision is made for converting from balanced elements to coaxial cable feed and allowing accurate impedance matching by the use of a Gamma matching system. Due to the high gain obtainable and the matching system used, these designs have become known as the "Big G" aerials (the fact that I stand six-foot five and weigh over twenty stone is, of course, completely coincidental!)

The Materials

The booms for the aerials are 1.25 inch square "finished" timber. This is a nominal dimension and may vary slightly according to how much timber was removed during planing. Slight changes in this dimension are of no importance. The elements are made from 8mm. copper water pipe. Choose a straight piece of timber which is free of knots and drill 8mm. holes at the points shown in the diagrams. All measurements should be made from one end, as indicated, so that errors do not "build up". The timber should now be primed and finished with a good quality paint or varnish.

The elements should be cut to lengths that are about 10 to 15mm. longer than those indicated in Tables 1 and 2 and are then inserted through the boom. You may find a slight slope on the elements but this can be corrected with a gentle bend. Set the element central in the boom and then fix it firmly by driving in a woodscrew as shown in the sketch, Fig. 3. The ends of the elements are now closed by lightly hammering them over a distance of about 10mm. at each end. (This is to stop the elements



RE	DE	D1	D2	D3	D4	D5	D6	D7	D8	D9
340	320	285	282	280	277	274	270	267	265	260

Table 2. Element lengths for 70cms beam (8mm copper tube)
Fig. 2

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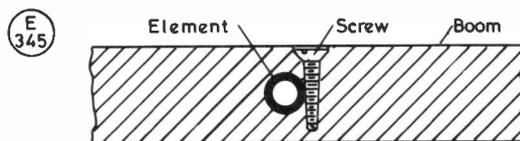
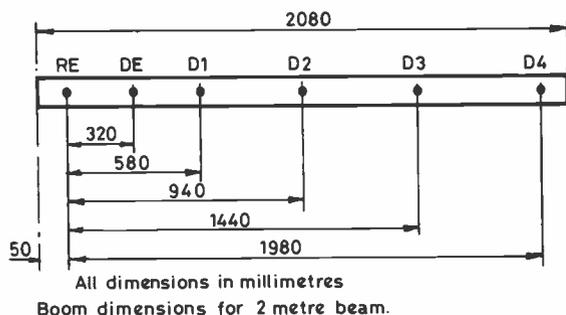


Fig. 3 Method of fixing parasitic elements



RE	DE	D1	D2	D3	D4
1010	960	935	930	925	920

Table 1: Element lengths for 2 metre beam (8mm copper tube).
Figure 1.

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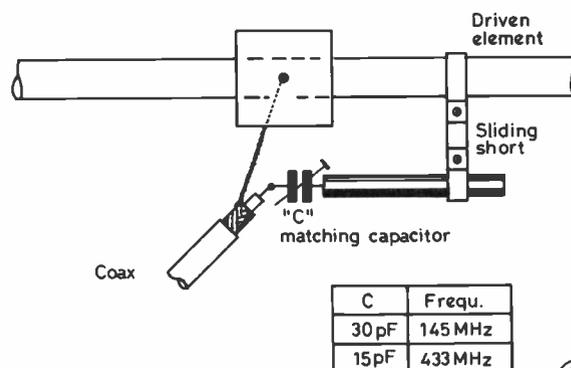
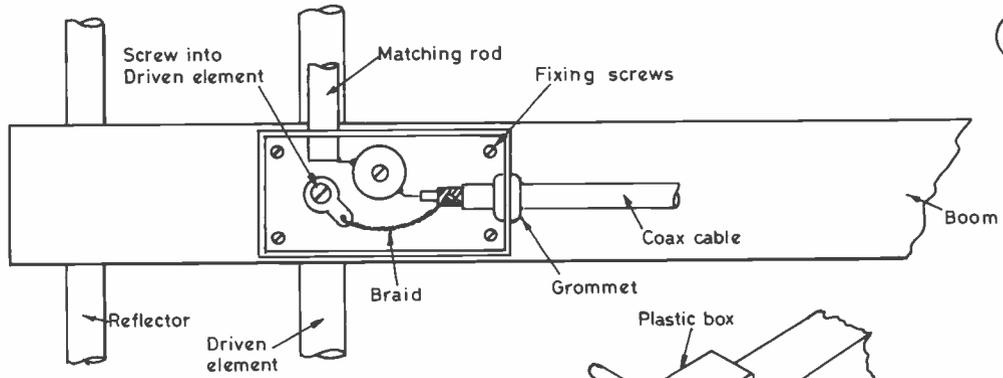


Fig. 4 Principle of "Gamma" matching.

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Matching rod before adjustment:
 145MHz 12 inches
 432MHz 5 inches

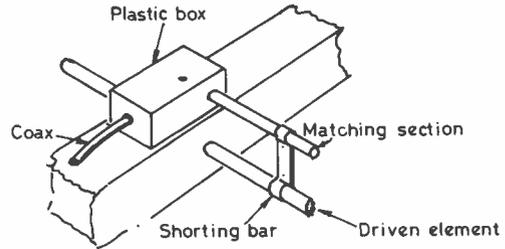


Fig. 5 DETAIL OF MATCHING SYSTEM.

“organ piping” in a high wind. Very pretty sound, but your neighbours will not want to hear it at three in the morning). The exact length of the element is then marked and cut to length.

The Gamma Match

This is best understood by reference to the drawings, see Figs. 4 and 5. The outer of the coaxial cable is connected to the centre point of the driven element and the inner is connected to a point on the driven element *via* a variable capacitor and the lower tube; this is the same system as used on the HB9CV but with variable tapping. A small plastic box is screwed to the underside of the boom to make a waterproof housing for the matching system.

Tuning-Up

There are only two points at which you can measure what is popularly known as the “SWR” of the aerial. One is at the feed point of the aerial itself and the other is at electrical half-waves along the feeder system. The second is usually more convenient.

Make up a length of UR43 cable 106” long and connect this between the aerial and your SWR bridge. Connect a suitable transmitter and set it to the centre of the frequency range in which you normally operate, say 144.300 MHz if your interest is mainly SSB. The aerial should be supported on a suitable mast and

pointed upwards at an angle of 45 degrees or so to avoid ground reflections. You should also ensure that the aerial does not look into any high buildings or other obstructions.

Apply power from the transmitter and check the SWR. By moving the shorting bar along the rods and adjusting the variable capacitor bring the SWR down to 1:1. Any of the matching bar that extends beyond the short may now be removed. The aerial may now be mounted on the mast in the normal fashion. If it is mounted close to other aerials, which may detune it, it is possible to do that final tweaking at the installed position. Do not try to adjust the SWR by cutting the length of the cable. This does *not* adjust the SWR but simply alters the feed point impedance at the bottom of the cable. This may protect your PA but it will not improve your aerial system performance!

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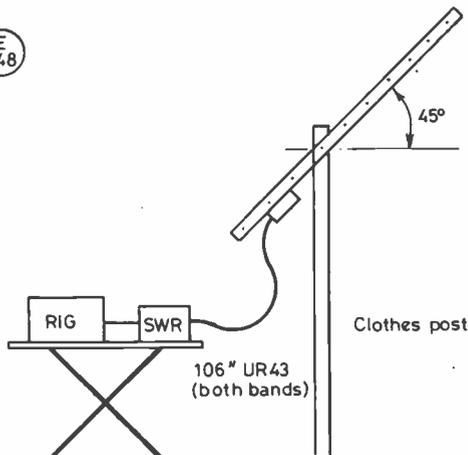
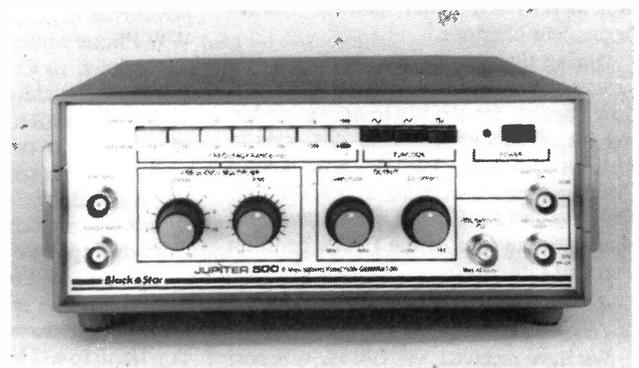


Fig. 6 Tuning the set-up



Pictured here is the new British-made Black Star Jupiter 500 function generator. This mains-operated equipment offers full programmability of both amplitude and frequency by external voltage and high output voltage of up to 30V peak-to-peak; frequency range of the Jupiter 500 is 0.1 Hz to 500 kHz in seven switched decade ranges with fine frequency control. Sine, square, triangle and TTL (30 loads) waveforms are selectable and an adjustable DC offset up to 15V can be applied to the output. Supplied with a comprehensive instruction manual, the Jupiter 500 costs £110 plus VAT in the U.K. Full information and an illustrated colour data sheet are available from Black Star Ltd., 9A Crown Street, St. Ives, Huntingdon, Cambs. PE17 4EB (Tel: 0480-62440).

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

CONDITIONS have begun their seasonal change on the bands; the first stirrings in the indicators are reported in the RSGB Sunday News-Bulletins for those who care each week to lend an ear. Indeed, one wonders if there is any real DX-er who doesn't listen to the propagation forecast.

Odds and Ends!

It is one thing to be able to guess what is happening on the bands next week, and indeed to be able to say we are on the up- or down-side of the sunspot cycle — but it is quite another one to predict when and how it will peak or bottom. This will have been brought home to anyone who listened to the RSGB News-Bulletin of August 19, in which the minimum was predicted to occur around the end of 1987 or early in 1988 — but with the reservation that some authorities are predicting a prolonged period near the minimum, lasting until 1990. The truth of the matter is really that none of us know enough about the mechanism of the sunspot cycle to make a long-term prediction, save by an extrapolation from history. The first indication that the minimum is near will be when the first sunspots are seen relating to the new cycle — these appearing at a different latitude on the sun. But *don't* try making observations of sunspots yourself, unless you can arrange to throw the sun's image onto a white card — any attempt to look directly at the sun is liable to produce permanent blindness!

During the past month, dedicated DX types on 80m. will have observed that it is now possible for the Ws to appear within our bit of the band — 3750-3800 kHz in fact; but General-class Ws now have a Phone allocation starting at 3.850 MHz. Only the best for Eighty! There have been similar expansions of the Phone band on Ten and Fifteen.

Vale

We have received, via G4ITL, a report of the death on August 5 of Dennis Heightman, G6DH. Although not too active of late years, G6DH was very much to the front in the early post-war years on 28 and 50 MHz, until the latter band was swallowed into the maw of television. G6DH was a leading light in the firm of Denco, who specialised in the manufacture of coils; and they did make at least one foray into the communications field by way of the Denco DCR-19 receiver, which was fine equipment for its

day, embodying as it did an example of advanced design in its band-changing arrangements. Indeed, one may well comment that Dennis Heightman, G6DH, put into amateur radio far more than he took out, and so he will be all the more missed.

In the letter from G3OUC, we learn of the death on August 27 of Herbert Barber Fox, G3JNQ, who was eighty-eight. Bert Fox was active on all bands HF, using CW and SSB, and he was a keen WAB operator. Bert helped G3OUC, and many others with technical problems on a variety of subjects — in fact he was a mine of information. G3OUC and G3LLK, at the family's request, put the station on the air for the last time on September 2, and then closed all down; during operation on Top Band many of his old friends paid tribute to G3JNQ, a well loved operator and friend.

DX-Peditions

What about rare countries? OH2BH, says the *DX Bulletin*, reports that he was not able to make a scheduled trip to Albania some weeks ago, but that the telegram from the authorities was longer and friendlier than in the past, so there is still hope.

Rumours of an Andamans operation continue. Hm. . . .

The crowd which activated Lord Howe Is. last year are aiming for Mellish Reef, possibly at the end of October for the CQ WW Phone contest. A rumour nails those dates down to October 25-November 6, and the QSL address as VK2WU.

K4YT, Karl Renz, has been assigned to Manila for a two year stint, and we understand he will be travelling to P29, BY, BV, YB, ZL, VK, 3D2, VS5 and VS6, with some considerable hope of operating from these places.

Another station has appeared from China, this one being BY5RA, operating from Foochow, with authorisation from Top Band to 432 MHz, CW, SSB, FM and Satellite. The QSL address is Box 730, Foochow, China.

An interesting little contradiction refers to A51PN; *TDXB* says that he has been QRT for the past three years but *DX Report* has him audible in Canada around noon and 14310 kHz; so some serious listening seems indicated!

Now to a real live DX-pedition. The Chilean Radio Club and the Chilean Navy are sponsoring CE0AA, San Felix, beginning on September 4 for around six-

eight weeks. According to CE3GN, the two operators are both new to amateur radio, and don't have very much English — and they have less experience of handling pile-ups! And, one would expect some of the biggest pile-ups ever. This has to be one of the most wanted countries ever for Europe, as well as the rest of the world, and it does seem from the first couple of days that it is all going to be a 'list' operation. At the time of writing the list seems to be being picked up on the French net around 1715z, 21170-ish, and/or 14120-ish from 1900z. The operators are claimed to be good commercial CW operators with a little CE9 time in. Let us hope that by the time you come to read this they have gained a little confidence and begun to work split-frequency.

"CDXN" deadlines for the next three months:

November issue—October 4th
December issue—November 8th
January issue—December 6th

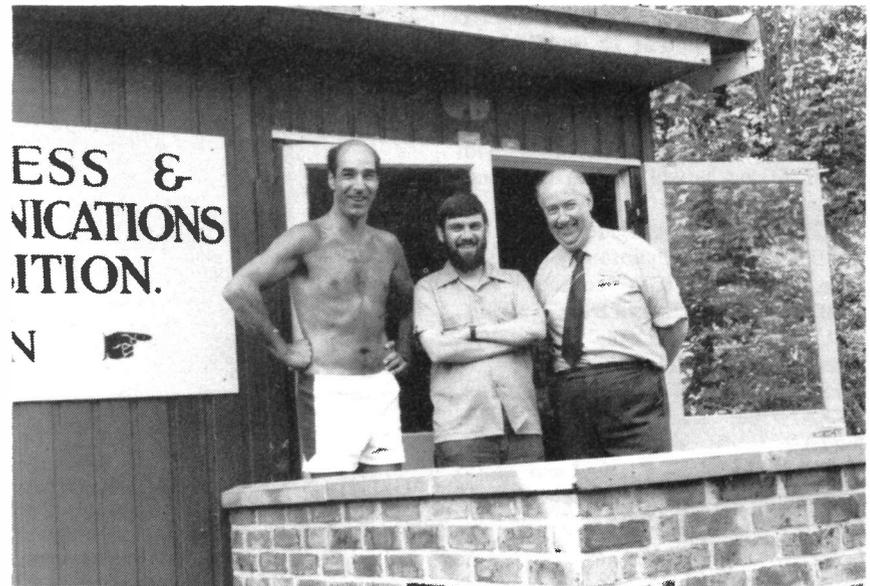
Please be sure to note these dates

Now for a British DX-pedition; this one is a group called the Rutherford-Appleton Laboratory Amateur Radio Group, and they will be active from Montserrat as VP2MF from October 20 on CW, and then on Phone of course through the CQ WW DX Phone Contest, October 27/28. There will be an emphasis on the low bands for those after 5BDXCC, and some Top Band activity. Operators are G3SJK, G3UKS, GM3YOR, G4BGH, G4JVG, G4XRI and G4XRJ. The QSLs should either go via the Bureau or direct to G3RRS, c/o Jean Mills, G4XRJ, R20, Rutherford-Appleton Laboratory ARC, Chilton, Didcot, Oxon., U.K.

Another expedition of note is the one to South Cooks by PA3BFM and PA3DHH, operating as ZK1XC and ZK1XD, with assistance from ZK1CG. It is of interest to note that ZK1CG is now in the holiday business and can arrange a complete package including accommodation and ham station. The 1983 *Call Book* shows his address as Victor Rivera, PO Box 618, Rarotonga, Cook Is., South Pacific N.Z.

Pictured on a hot summer's day in July at the Wireless and Communications section of the Chalk Pits Museum, Sussex. Left to right: Chris Page, G4BUE, well-known QRP DX-er and contributor to *Short Wave Magazine*; Rev. George Dobbs, G3RJV, hon. sec. of the G-QRP Club and regular writer for *Short Wave Magazine*; and Ron Ham, curator of the Chalk Pits Wireless and Communications Museum and well-known writer on VHF and propagation.

photo: Jo-Anna



By way of *DX Report*, we hear that 5X5GK is not licensed either as a 5X5, or indeed as a VE.... and that 5U7LD and the recent DJ5CQ/SV/A were both turned down as DXCC counters.

Top Band

Between his new job and a holiday, G4AKY (Newport, Essex) only managed to work UZ3SWG, EA3CQS/EA5, UG6GAW, a couple of OLs, and SM5AHK. However, during his holiday at Fowey with uncle G4JFU, who possesses some three acres of garden, much of the time was spent with G4JFU planning a 'good' Top Band aerial — but on the existing 200 feet, G4AKY worked W2QD, KT3M, OL0COB, and heard PY1BVY and HZ1AB, all on CW. An amusing sideline to the exercise of planning a good Top Band aerial at Fowey is that Dave says the space allows consideration of so many alternatives that a selection becomes difficult. Thus, to have the usual constraints of a postage-stamp garden and so on makes the planning exercise so much easier!

At G4OBK (Chorley), quite a bit of time was spent on the LF bands despite the static. On Top Band Phil nabbed HZ1AB after two years stalking him; HZ1AB worked around fifty EUs on the night of August 29 when static was low at that end. IS0NZA also went into the bag, not to mention G4AKY and letters to G3XAP. In the listings, G4OBK notes CW contacts with UA9CBO (twice), 4U1ITU, KH8AC/1, EA3VY, KT3M, W1RR, RV9CBT, VK6HD, CX8DT for another new one, UA3PFN, plus CY0SAB (Sable Is.) with whom the only other G to 'make it' was GI3OQR.

Some time ago the writer had some correspondence with Jim Cookson,

G4XWD, when he was still G6ETV. Jim's main interest (as his call indicates!) is in old-time radio gear, and he wonders whether there is much interest in this area; we immediately think of Ron Ham and the Museum at the Chalk Pits, Amberley, and of course the Wireless Museum of which G3KPO is curator, down on the Isle of Wight. In addition there are several private collectors known to the writer, so the interest is certainly there. G4XWD wonders if there is enough interest for some on-the-air contact between enthusiasts — sounds likely, and those interested could get in touch with G4XWD at 40 Oldnall Road, Kidderminster DY10 3HW. Incidentally, if you hear a very strong signal from G4XWD, the chances are fair that you are hearing him using a kite aerial, of the type used with the old BC-778 series rigs. And, if you want to help the cause of restoration, and you happen to have a circuit of the DST-100 receiver, please let G4XWD have a copy, or at least a sight — his copy lacks a great lump in the second mixer area.

Top Band for G2HKU (Sheppey) was very largely a matter of QRT-in-favour-of-gardening . . . so much for retirement! However, if pressed Ted will admit to having worked PA0PN on SSB, plus CW to DL1RK and SM6MCW for the latter's first CW contact.

Finally, G3BDQ (Hastings). John found the band awakening from its summer sleep, and has made changes which seem to have improved the DX potential of the aerial, and which have made it a good proposition on 3.5 and 7 MHz too! CW worked 4U1ITU, AA1K, KT3M, W2OKM, W0CD/8, ZS6BX back to a CQ at 0346z, KH8AC/1, W2LPE and W2BHM, this last contact being in full daylight at 0450z; CT4BD, EA8AAU, RV9CBT, UZ9SWY, UA9FKW,

UA9SA, LZ2CJ, 3D6AB on the morning of August 26, KA1PE, K1BUH, W1RR, WA3EUL, AA1K, KH8AC/1 again, and CP8HD heard on SSB on the impossible frequency for Gs of 1810 kHz LSB. On the weekend before he wrote John managed HZ1AB three times, with a big improvement using the new aerial, DL1GK/HB0, DF2P1/OY, UL7FEA, RL7FER, UO5GQ, and very weakly heard VK6HD on September 2 at 2215z.

Ten

Just one contact was noted on this band by G6QQ (Hoveton) in the shape of a CW one with LU8DQ; David, like all the other correspondents, reckons conditions were between lousy and awful!

Ten metres for G3OUC (Newbury) came in two varieties, namely QRP SSB with a homebrew rig, which accounted for I4KMN, OK1AJN, SM7ACB, Y2ZEK, DK8GT and others; and QRP FM with which FOIS/MM and some locals were worked.

G3NOF (Yeovil) admits to no contacts on the band, although, he says, there have been openings to Europe in the daytime and to South America in the evenings, on occasion.

For G4OBK the band held the pleasure of a new country, by way of 9J2BO, plus lots of Europeans.

The New Bands

G4OBK mentions an outing on 18 MHz, which yielded a CW contact with FOHSE.

G4KKI (Swinton) — at least that's who we *think* it is, but he didn't put his name or call on his letter! — has been operating almost exclusively QRP, on various bands. Bill mentions that he has a CC rig

on 10 MHz, and a crystal which looked to be right in the middle of the QRM at 10.112 MHz, so he took the holder apart and pencilled on it till it came down nicely to the band edge — and then broke it! So, Bill awaits delivery of a new rock, with which, he says, he will be more tender and loving!

G2HKU only seems to look at 10 MHz, but there he is usually into pay-dirt. This time he reports CW contacts with Y24DO/P, OY7ML, and DF3GX/PJ4.

It was 'new bands only' for our last reporter, G4UZN (Leeds LS17). On 10 MHz CT2FN, DF3GX/PJ4 (Bonaire), DK4AN/IS0, DL1GK/HB0, LU1DZ, NP2AB (U.S. Virgin Is.), OX3LV, VK2BKH, VK6WT, ZL3GQ and ZL3IS were all hooked, with the following on 18 MHz: DJ6OY, DL2NAI, HB9AKW, IS00MH, OY7ML and OZ5MJ. On 24 MHz, believe it or not, precisely the same stations were worked as already listed for 18 MHz. As G4UZN says, not a mis-print — and not as *easy* as it looks either!

Fifteen

G6QQ (Hoveton) seems to have spread his wings a little; all bands 3.5-28 MHz seem to have received at least a look, but for the moment we must concentrate on 21 MHz. CW dealt with JA8HGQ, JH7MSQ, 4X6KF in August, while in the European DX CW contest David went after and raised such as RF0, UL8, UA9, W1KM, ZS1CT, 3D6AK, LU8DQ, 4X6IF, 4Z4NVT, K1AR, KC1F, K1BV, K1VUT, W2YV, W3GM, K4BAI, K4LTA, W5ZR, K5KLA, PY2BW, N4NO, NP4Z, HZ1HZ, a brace of UFs and one UL. As for SSB, that was used for contacts with JY5CO, TR8DR and PY2ZJ.

G4KKI is a 100% QRP and home-brew merchant, and can use all the bands 3.5-30 MHz. On 21 MHz his QRP rig heard lots of PYS, but none were near his crystal frequency. Bill in fact uses the OXO rig, famous throughout the G-QRP Club ranks, with a 2N3866 output stage giving about 750 milliwatts or 2SC1969 PA stage to take him to three watts output. The snag, of course, is being crystal controlled, so VFO rigs for each band are in the building. G4KKI has had some shack photographs taken, and reckons to let us have sight of one — preferably in black-and-white, for best reproduction as an adornment to "CDXN"!

G3NOF found the band very poor, and indeed dead at times. Most signals have been on the north-south path, patchy during the day and not really open until as late as 1300z, starting with VU, then moving on to 9M, 9V, YB, South Africans about 1500z, and Central Africa peaking at around 1800z. In the evenings a few South Americans were heard. There were no VK/ZL signals, and from N. America only a couple of VO1s, around 2230z one evening. QSOs actually completed



Chris Rees, G3TUX, operating as G3TUX/16 at his holiday QTH near Ancona. His newly-acquired *muTek* transverter performed well, the limiting factor being the FT-290 used to drive it. On the problem of intrusion into the amateur bands, and the ineffectiveness of jamming unless the intruder is nearby, Chris says that some of the strongest CB signals on 10m. (in the middle of the Beacon Sector) copied at G3TUX/16 were East London YL's discussing the dinner menu. G3TUX welcomes the new U.K. legislation aimed at illegal operation, but feels that its effect on QRM will be minimal until other countries follow Britain's lead.

included those with A24MC, A24SC, C30LAI, FH4AA, F6GXB/TK, H5AK, I2DMK/IL7, J28DN, JY9CL, UI8ZAC, VO1BL, VO1NP, ZS1AAQ, ZS2AO, ZS2DK, ZS2OM, ZS6TB, ZS6TUK, 3D6AN, 5X5GK and 9Q5RN.

G4NOZ (Colchester) notes only the group from Malta, who are inundated whenever they venture on to the bands; Les mentions in particular 9H1HD, on August 2, handling the pack with a great good humour.

Points from the Post

W1WY sends his usual, and invaluable, *Contest Calendar* each month. October, he informs us, this year is going to be a bit of a dog's breakfast. It seems that there have been no notifications of the California, Oregon, and Maryland/DC QSO Parties, nor of the East German DX Contest.

SS/TV operators will probably already be aware of the German Amateur Radio Teleprinter Group Contest, over October 6-7, 0600z-0600z. Just why a RTTY group should run a SS/TV contest baffles us! The same weekend sees the Phone leg of the VK/ZL/Oceania contest 1000z Saturday to 1000z on Sunday. Exchange RS plus serial number from 001; and the dose repeats the following week-end for the CW buffs. Multiplier is the sum of the VK/ZL/Oceania call area, QSO points two per QSO. Final score QSO points total times the sum of the multipliers on each

band. There is also an SWL section. Awards are certificates. All entries to be received by January 31, 1985, to Jock White, ZL2GX, 152 Lytton Road, Gisborne, New Zealand. Include a summary sheet, showing the scoring, and the usual signed declaration, plus 1 IRC for a copy of the results.

October 13/14 is the weekend for the ARCI QRP Contest. Just about all active QRP-ers are members of the G-QRP Club, so all we need to say is the details are in the pages of the current issue of *Sprat*, as indeed are the DL-AGCW affair and the HA-QRP Contest.

J-O-T-A is over the weekend of October 20-21, but although W1WY's contest column has notes on the Stateside activities, we don't have anything on the U.K. end.

We mentioned the CQ WW DX Contest bash last time round, and of course we mustn't forget the ARRL QSO party over the weekends October 6-7 and October 13-14 (CW and Phone respectively) in which you aren't eligible to play unless you are an ARRL member.

And of course we mustn't forget the RSGB 21/28 MHz contest on October 14, 0700z-1900z; this is a Phone one, while on October 21 they have a 21 MHz CW contest.

We hear that the Radio Club Venezolano has made a formal announcement that only QSL cards issued by the manager, YV5HUIJ, are considered as official confirmation of contacts with

the Aves Is. DX-pedition last March. It seems some of the operators were putting out their own. Sad — we thought the contact was the thing. Sounds like someone fell out with someone else!

Finally, Verulam's club contests, on 1.8 and 144 MHz. Top Band is on November 17, 2000z-midnight zulu. The two-metre affair is 0900z-1300z on November 25. These are designed by Verulam club to be activities to involve club stations, as well as providing fun for the 'un-clubbed'. All the details on this one from G4JKS, Mrs. H. Clayton-Smith, 115 Marshalswick Lane, St. Albans (St. Albans 59318, evenings) to whom also should go the logs after the contest, postmarked no later than December 10. We commend this one to everyone as a club activity.

Forty

G4NOZ found the band rather noisy for SSB, but reports good QSOs with SMs and UBs on CW.

G4KKI attacked the problem of his aerial, and in fact got it up a further eight feet; this and the three watts output on CW was enough to practice Morse on DL3KBQ, G4FKH, GI3MBO (2-way QRP), G4CTJ (2-way QRP), EA3ALY, EA2EY, and W3GM.

The normal rig at G2HKU was used to work CW to UA9SA and UF6CR; but it was down to four watts CW QRP for the contacts with UL8LWO and UZ9FWR.

Forty for G4OBK began with a QSO with Snow, VK3MR, on 7 MHz; then PY1JF, W1, W2, W3, W8, VE1ZZ, 4U1ITU, LU8DQ, PY2BW, FG4DI for a new one, UA9s and RL0G.

As for G3BDQ, he notes that outside of Top Band, he worked CW on 7 MHz, to raise RI8BL, UI8OAA, a half-dozen UA9s, 8Q7RM for a band new one (QSL via JE3MXQ), 6W8GE, JAs, UL7CAD, UL7TCG, DF2PI/OY, F6EYS/3A and UJ8JKK.

Finally on this band we come to G6QQ; David seems to have taken a liking to Morse and to this band, on which he penetrated to KC1F, W1KM, KZ2S, K3ZO, W2YV, W3GM, K4BAI, N4ZC, VE2ACP, VY3MRN, KA1DWX, K2SX, K2NG, LU8DQ, all in the WAE contest; plus, in the All-Asia CW contest, UA9IM, UZ9YWA, UZ9CWW, UD6DC and UD6CN.

Eighty

Not a band on which we get all that many reports, but a better than usual month this time.

First off we have G4NOZ, who has put up a home-brew G5RV and tried it out on the TS-130S with some very good reports from QRP stations; noticeable QRM on SSB, but generally in the clear on CW.

G2NJ (Peterborough) notes that G5NX is back from his 26th trip to VK land, and was operating CW while /M on August 27 from Oakham for QSOs with Nick and G4OKL. QRP stations noted by G2NJ included G3SB/P at Badminton, using an HW-8 with a mobile whip, just after a QSO with GM3DJT; G3SB/P was up on a hill and in the clear all round. G4GIQ was 579 throughout a 35 minute CW QSO, testing out a pocket-size transceiver to be used with a kite aerial — his QTH being on the bank of a small river. Yet another contact with G2CNN was made while the latter was at Basingstoke, the day before G2CNN was due to return home to Norfolk.

G4KKI offers QRP contacts with G3ASM, G3JHC (QRP), G3NSA, DJ4ST and GM3MXN (QRP), all while using his three watts of output.

G2HKU offers just one QSO, made with the QRP rig with DJ0SS.

Last contributor on this band was G6QQ, who managed to push his CW signals across to UL8 and UA9.

Twenty

Which is where it all happens. G2HKU stuck to CW, and worked HK6KKK, DF3GX/PJ4 in Bonaire, and KC7UU/5N6. A 'moment' of a rather different kind occurred one morning when Ted's wife suggested he look out of the window; there was a tit, busily engaged in biting lumps off the insulation of one of the aerials, and carting it off to a nest site as construction material. Now *that* needs a law about it!

A crystal on 14.060 MHz, an OXO rig, and an SRX-30 receiver provided twenty-metre entertainment for G4KKI, mostly at three watts out; it raised N2DAN, VE3AX, W2AG, F6IPS while at only 750 milliwatts, and HB9NE. However, it is a little upsetting to hear things of interest off one's crystal frequency, so we gather that a VFO controlled rig is now in the building stage.

G4NOZ joined in the Sunday evening RNARS net (14190 kHz plus or minus QRM, 1900z), and found ZB2HT, plus a little later EA7DHK in La Linea. Others were WA2SSV, WA2VFA, both at 559 on CW, and EA6GPE; youngest of the month was 4Z4HS, operated by 14-year-old Moran, and most nostalgic FV4VAR, commemorating the landings in Southern France in W.W.II.

The band has been poor usually, but there have been some signals around. Early-morning VK/ZL have been poor, and the best time seems to be 1700z onwards, with a few good Asians on short path, and Africans around 1800. Don made Phone contacts with A4XKD, AL7BL, CY0SAB, DU1DBT, F6GXB/TK, JW5VAA, JY9CL, K2BDY/DU7, KC2PZ/VP2M, KC7UU/5N6, OX3ZM, TF5BW, UA10T (Franz Josef Land), UD6BR, U18JJ, U18ZAC, V2AZM, IZ9A, 4K0B (USSR North Pole Expedition), 4S7NS, 4U1VIC, 5N8AFE, 9J1NO, 9Q5MA and 9V1VS.

G4XWD, as we have indicated, is interested in the old-time radio gear, but at the moment he is on with a TS-520SE until he can get some vintage gear working to satisfaction, operating on 80, 20 and 15 metres. As for the DX, Jim doesn't give a list, but says his best was W7WHO in Oregon who came back to a quick CQ; they has a nice contact, and then the W disappeared in the horde all after a contact with Oregon!

Last man in is G6QQ; David stuck to CW, and worked VK3DFX, UL8, UA9, UF6, K1AR, W2YV, W3GM, KZ2S, UA0, K4LTA, KC1F, W2REH, K2NJ, W5ZR, W8UVZ, N8BJQ, W90A, plus in the All-Asian JA6YAI, JS6AAT, JE1SGH, eight UA9s, one UA0, two ULs, JA1BWA, JA9YBA and HZ1AB. Now, he says, after all the CW practice last month, he's back to the microphone!

Big Switch

We can pull it and relax till next month. We know conditions have been pretty vile, but we could do with more reports with news of what's going on in the great big world of amateur radio; send them addressed to "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL69EQ, by the dates shown in the 'box'. And, by next time we should be seeing the conditions picking up a little — fingers crossed, please!

Every Beam Has its Moment

OR, ENSURING YOUR MAST
STAYS UPRIGHT!

D. J. REYNOLDS, G3ZPF

Having made an assessment of local windspeed ("S.W.M.", June 1984) and then converted wind speed to wind force ("S.W.M.", August 1984), the next step is to use the derived forces to determine the size of mast member required to resist them.

Bending Moment Theory

It is necessary at this point to introduce the concept of a bending moment, and the stiffness of a section, although for this 'limited' application (in engineering terms) the maths will be quite straightforward. Most, if not all, readers will be familiar with the term cantilever, and this is just what a self-supporting mast (or a vertical antenna) is. The elements of a Yagi array can be considered as two cantilevers back to back.

Figs. 1(a) and 1(b) show a vertical cantilever subjected to different kinds of lateral loads. In Fig. 1(a) the load is referred to as a 'point load' which, as its name implies, has the entire load applied at a single point. Examples of a point load are the load from an aerial array atop the mast, or the pull exerted by the end of a dipole to the mast.

Fig. 1(b) shows a 'uniformly distributed load' (of UDL) applied, and the obvious example of this would be the wind pressure exerted on the side of the mast itself. Note that the wind force on the elements of the aerial are of the UDL type, but their effect on the mast is concentrated at the top, as in Fig. 1(a).

To avoid confusion, point loads are generally referred to by a capital letter, with UDLs being referred to by a lower case letter. The units of point loads are either newtons (N) or kilonewtons (kN), whilst UDLs have units of newtons per millimetre (N/mm), kilonewtons per metre (kN/m), or any other combination of force per length.

Under the action of lateral forces, the vertical (or horizontal) cantilever will bend by an amount dependent on the magnitude of the applied forces and the stiffness of the cantilever. The forces acting within the material to resist the bending action are such that the face nearest the applied load will be in tension, whilst the opposite face will be in compression. The distribution of stresses across the depth of the member subject to bending are shown in Fig. 2, but note that the tensile face being next to the loads only holds true for a cantilever, and with a beam supported at both ends the situation is normally reversed. The stresses are greatest on the faces of the member, and change sign (tension is normally regarded as +ve and *vice versa*) at the centreline. At the centreline there is theoretically no bending stress, hence the name 'neutral axis'. The neutral axis will always be on the centreline of the member for the type of members being dealt with, but there are occasions in civil engineering when the two are displaced.

A bending moment is the product of a force and a distance, with the distance from the point of action sometimes referred to as the 'lever arm' for obvious reasons. Looking at Fig. 1(a) it is easy to see that the bending moment will be zero at the top of the mast, and equal to $W \times L$ at the base of the mast. The stresses on the face of the mast are at a maximum at its base, coinciding with the point

of maximum bending moment, and their value will depend on the stiffness of the mast. The stiffer the mast for a given length and load then the lower the stresses, and *vice versa*. Obviously if the diameter of the mast is too small, the stresses induced will be greater than the material can stand, and the mast will snap.

Shear Force

As well as bending the mast, transverse loads will also tend to shear it off at the base. This may seem hard to imagine with a tall, slender mast, but imagine if the mast were only one metre high and was one metre in diameter. A hypothetical case, yes, but it will shear rather than bend. Fortunately for members of the proportions covered by this article, bending will be the limiting factor and not shear.

Here Comes the Maths . . .

To determine the safe load for any given cantilever, or the size of cantilever needed to resist given forces, there are a few simple formulae. It is not intended to derive or explain them, but simply to use them as mathematical tools, as a means to an end.

Fig. 1(a) (point load),

$$\text{Max. B/M} = W.L$$

$$\text{Shear} = W$$

Fig. 1(b) (UDL),

$$\text{Max. B/M} = \frac{w.L^2}{2}$$

$$\text{Shear} = w.L$$

For both Figs. 1(a) and 1(b),

$$M = f.Z \quad \text{where} \quad \begin{array}{l} M = \text{Bending Moment} \\ f = \text{bending stresses} \\ Z = \text{section modulus} \end{array}$$

Simple enough on the face of it, apart from the mysterious 'Z', which is a measure of the stiffness of the mast.

Although it will be obvious to many readers, to simplify the design of a mast with several loads, it is quite possible to calculate the moments and stresses caused by each load separately, and then add the results at the end. It is referred to as the "principle of superposition", and is illustrated in Fig. 3. Earlier in this piece, it was stated that both masts and Yagi elements were cantilevers, apart from the fact that the former is in the vertical plane, and the latter is horizontal. Because of the different alignments there are slight differences to the forces present at the supports of each, which have to be taken account of, and which are illustrated in Figs. 4(a) and 4(b).

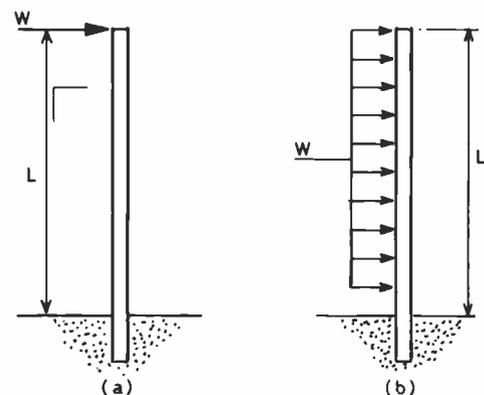


Figure 1

Fig. 1(a). A self-supporting mast with a point load 'W' at the top. Examples of this load type include the windload from aerial arrays, or the horizontal force from one end of a dipole. Fig. 1(b). A self-supporting mast with a uniformly distributed load, 'w' per metre height. This is the type of load produced by the action of wind forces on the mast.

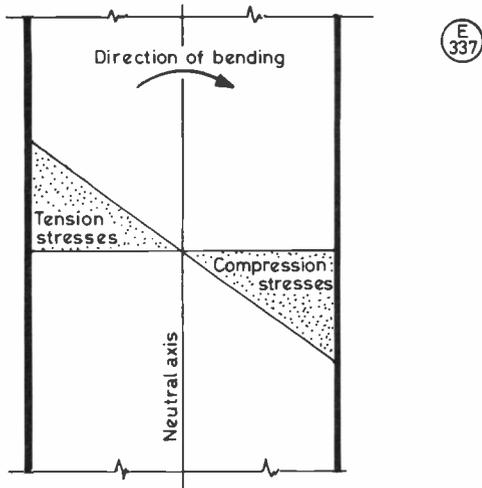


Fig.2 Distribution of stresses across a section in bending.

Section Modulus

Cantilevers can be formed from a variety of materials, such as timber, steel, or reinforced concrete. Generally only the first two materials are likely to be used by Amateurs, and for the purpose of this article only steel will be considered. Beams are manufactured in a variety of shapes, some of which are shown in Fig. 5, although the first two would only ever be used in very small size sections, because of the weight and cost implications.

The most commonly used section in amateur circles must surely be (iv), the circular hollow section (a tube) and there is a 'standard' formula for calculating the stiffness of such a shape, viz: Fig. 6. Again, no attempt will be made to derive the formula, since that would just confuse the issue, but now the only factor remaining to be found in the earlier formulae is the bending stress 'f'.

The Code of Practice

As with most things, a little knowledge can be a dangerous thing, and simply using the above formulae can get readers into very deep water if one or two conditions are not met. *BS449: Part 2:1969*, henceforth referred to as the "steelwork code", gives guidance on the use of structural steelwork, and at first sight looks horribly convoluted and difficult. As with the code of practice on wind loads, however, it is meant to cover all things for all men, and the vast majority of it is irrelevant to this application. What is required from the steelwork code is a value for the maximum

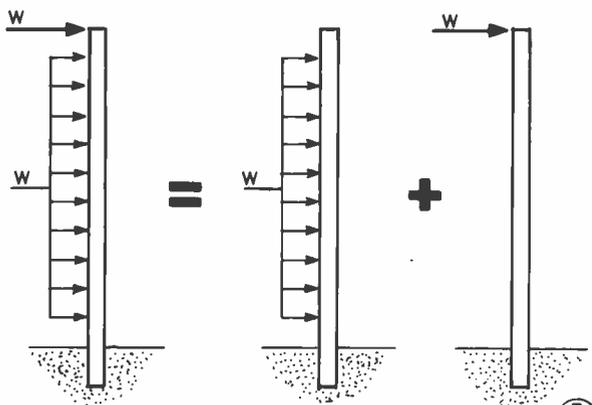


Figure 3

Combined load cases can be split into their component parts, to aid analysis, then all results are added together to give the total stresses and moments.

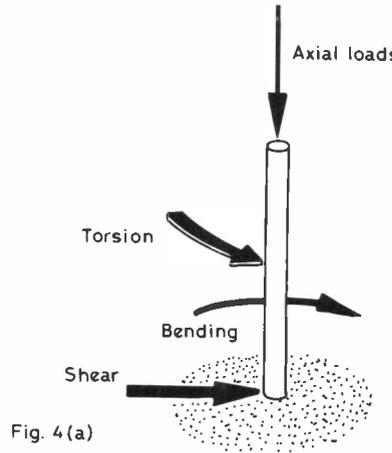


Fig. 4 (a)

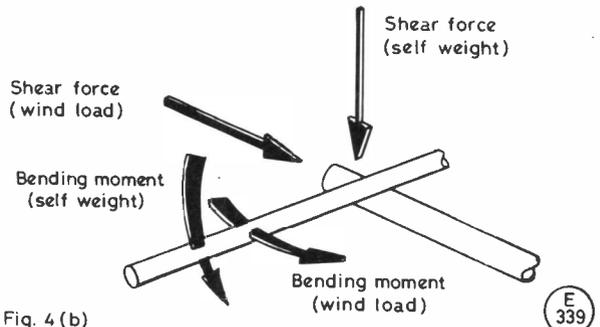


Fig. 4 (b)

Fig. 4(a). Summary of loads and moments at the base of a vertical, self-supporting mast with aerial array on top. For a free-standing vertical, torsion will be zero, and axial loads negligible on all but the largest systems. Fig. 4(b). Summary of loads and moments at the stem of a beam element; forces and moments must be added to give total effects.

value of 'f'; the bending stress. This can be found in table 3a of the steelwork code, and the table is reproduced in Fig. 7. Obviously a range of values is given for 'f', rather than a single value, with the actual value being dependent on l/r , and D/T . Notice that the top left-hand corner of the chart has the higher values, whilst the bottom right-hand corner has the lowest. The top left-hand of the chart refers to short, fat, cantilevers or beams, whilst the bottom right-hand refers to tall, slim ones. Although the table has values for 'f' up to 165 N/mm², a footnote in *BS449* adds the proviso that if the thickness of the walls of the member are 40mm or over, then the maximum stress allowable is reduced to 150 N/mm².

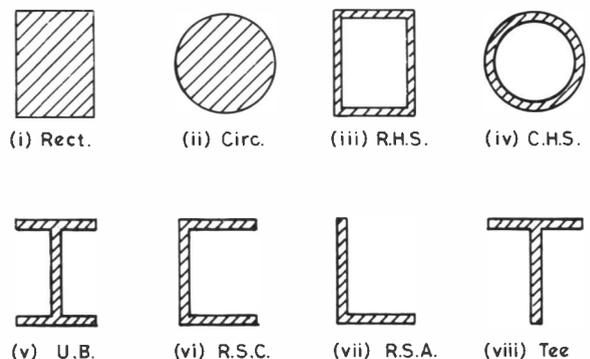
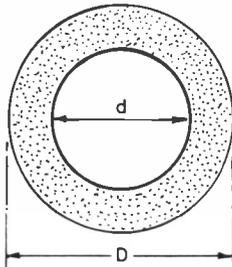


Fig. 5 Examples of some of the sections available for beams



$$Z = \frac{\pi}{32} (D^3 - d^3)$$

E 341

Fig. 6

The circular hollow section (C.H.S.) will be the section most widely used by amateurs, either for masts or beams. The formula for the Section Modulus (Z) is as shown.

Sorting out the D/T is no problem, as that is just the outside diameter divided by the wall thickness, but the ratio l/r_y needs some explanation. The 'l' is the effective length of the cantilever (as opposed to the actual length), although fortunately if the base of the cantilever is well designed, they are one in the same. Note, though, that a poor base detail which provides only a partial resistance to torsion will entail the effective length having to be taken as twice the actual length. Fig. 8 illustrates the point, and will hopefully serve to make readers aware that attention to practical detailing is just as important as the mathematical design.

The Radius of Gyration

This rather grand sounding name is given to the figure r_y shown in Fig. 7, and again it will be introduced as simply another small formula to be solved, but masochistic readers who have tired of this simplistic approach will find a full explanation in a book

Permissible stress, p_{bc} , in bending (N/mm^2) for beams of Grade 43 steel.

l/r_y	D/T							
	10	15	20	25	30	35	40	50
90	165	165	165	165	165	165	165	165
95	165	165	165	163	163	163	163	163
100	165	165	165	157	157	157	157	157
105	165	165	160	152	152	152	152	152
110	165	165	156	147	147	147	147	147
115	165	165	152	141	141	141	141	141
120	165	162	148	136	136	136	136	136
130	165	155	139	126	126	126	126	126
140	165	149	130	115	115	115	115	115
150	165	143	122	104	104	104	104	104
160	163	136	113	95	94	94	94	94
170	159	130	104	91	85	82	82	82
180	155	124	96	87	80	76	72	71
190	151	118	93	83	77	72	68	62
200	147	111	89	80	73	68	64	59
210	143	105	87	77	70	65	61	55
220	139	99	84	74	67	62	58	52
230	134	95	81	71	64	59	55	49
240	130	92	78	69	61	56	52	47
250	126	90	76	66	59	54	50	44
260	122	88	74	64	57	52	48	42
270	118	86	72	62	55	50	46	40
280	114	84	70	60	53	48	44	39
290	110	82	68	58	51	46	42	37
300	106	80	66	56	49	44	41	36

Fig. 7. Table of allowable bending stresses, reproduced from table 3a in BS449.

entitled "The Steel Designers Manual", published by Crosby Lockwood Staples, although it is a fairly large tome, weighing in at about 4lb. Be that as it may,

$$r_y = \frac{Z \cdot \frac{D}{2}}{A}$$

where Z = section modulus
D = outside diameter

$$A = \text{area of metal calculated from } A = \frac{\pi \cdot (D^2 - d^2)}{4}$$

Armed with the above, it is then possible to determine a value for p_{bc} for any particular situation. Values in the table can be interpolated if required. Providing that the actual bending stress derived from 'f' in the equation $M = f \cdot Z$ is less than the value of the permissible stress p_{bc} , then all is well, and the section is adequate for the applied loads.

Making a 'Guesstimate'

The more astute reader will probably have realised by now that part-way through the design process there is a chicken-and-egg situation. In attempting to decide upon a section size it is necessary to guesstimate a section size before proceeding to

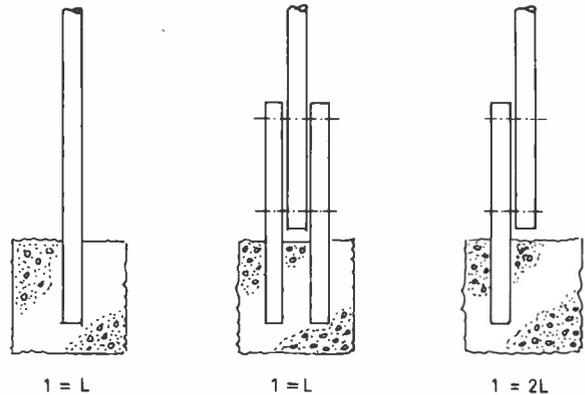


Fig. 8

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Effect of base details on effective length. For a single post base it is better to use a square hollow section with cheek plates to bolt through.

determine the actual stresses, and comparing them with the permissible ones for the section gussed at. Experience allows structural engineers to guesstimate fairly accurately the size required, but for the tyro it is possible to work out the 'minimum Z' by putting the maximum value of $165 N/mm^2$ for 'f' into the formula $M = f \cdot Z$, which can be rearranged as:-

$$\frac{M}{f_{max}} = Z_{min}$$

The section eventually needed may turn out slightly larger than that indicated by the minimum value of Z, but it does provide a starting point far closer than a blind guess would give. The aim is to end up with the actual bending stresses slightly lower than the permissible ones, for maximum economy, but as long as the actual stresses are lower than permissible, then the section will be safe.

The situation is slightly different when checking out the maximum possible loading on an existing mast, but to clarify the

process for each case, a step-by-step guide to the design process is shown in Figs. 9 and 10. The most commonly used section shape is a tube, but the most commonly used size is that of the ubiquitous "two inch" scaffold tube. For ease of reference the dimensions and section modulus of a scaffold tube are given below.

- D = 48.3mm
 - T = 4.0mm
 - d = 40.3mm
 - A = 557mm²
 - Z = 5700mm³
- The section properties of the ubiquitous "two inch" scaffold tube.*
- Self weight = 4.37 kg/m

Although the design process is stated to be for a tubular mast, the process can also be applied to trap verticals, beam elements and booms, or whatever, to determine their maximum survival velocity. Note though, that for horizontal members the bending moment due to self-weight must be allowed for (see Fig. 4(b) in the form of a (usually) small UDL).

Other Considerations

Even though the section chosen may appear adequate from the above criterion, there are still two more checks to make in some cases. These have been deliberately left out of order as readers who are checking out survival velocities for existing (or intended) verticals or beams will not need them.

In the case of the pole-plus-aerial, no account has been taken of axial loads from the weight of the aerial array, plus the self-weight of the pole itself, although they are unlikely to prove a problem on simpler setups. Even so it would be as well to check them, and for this reference has to be made to table 1 in BS449 to find the permissible compressive stress (as distinct from the permissible bending stress) which fortunately is a constant 230 N/mm².

Armed with this new piece of information it then remains to check that the following is true:—

$$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \text{less than } 1$$

- where f_c = actual compressive stress (derived from load/area)
- p_c = 230 N/mm² (the permissible compressive stress)
- f_{bc} = actual bending stress
- p_{bc} = permissible bending stress

The above formula is simply to check that the combined effects of the bending moments and axial loads do not combine to push

- (i) Calculate bending moment from point load at head of mast using $M = W.L$.
- (ii) Calculate bending moment from UDL, using $M = \frac{w.L^2}{2}$
- (iii) Add together both of the above, to give the total moment.
- (iv) Use a value of 165 N/mm² for 'f' in $M = f.Z$ to determine the minimum possible value of Z.
- (v) Choose a section size to give a Z value slightly larger than that determined from (iv).
- (vi) Calculate $1/r_y$ and D/T for the section.
- (vii) From Fig. 7 determine the permissible bending stress.
- (viii) If the actual stress is less than the permissible, then section is adequate, but if not then choose a larger one and repeat from (vi).

Fig. 9. Step-by-step procedure for sizing of mast.

- (i) Calculate $1/r_y$ and D/T for the mast section.
- (ii) From Fig. 7 determine the permissible bending stress.
- (iii) Use the permissible stress for 'f' in $M = f.Z$ to determine the total permissible moment.
- (iv) Determine the headload, and calculate the bending moment it produces (see Note A).
- (v) Subtract the headload moment from the total permissible moment, to give the maximum windspeed moment.
- (vi) Using the previous articles, backtrack to obtain the maximum safe windspeed.

Note A. Since the headload will be dependent on windspeed, it is necessary to guesstimate a reasonable figure to start with. Once the actual windspeed has been found, check that the aerial load at this speed is less than the initial estimate. If not, increase the headload and repeat from (iv).

Note B. If checking out a trap vertical, steps (iv) & (v) can be omitted.

Fig. 10. Step-by-step procedure for finding safe wind speed for an existing mast.

the stress over the top. As previously stated the ratio f_c/p_c will often turn out to be negligible, but it pays to check.

The final consideration is that of deflection. A cantilever may be strong enough to withstand the applied loads, but if it is particularly tall then the deflection under loading may be a cause of alarm to neighbours, and is unlikely to endear them to your intrusion on "their" skyline. In building construction the deflections of individual members have to be kept within defined limits, as steel tends to be happy with deflections which would easily crack plaster on walls, or brickwork cladding panels. For the case of a self-supporting pole the deflection will be more of a psychological problem than anything else, except perhaps where UHF arrays are fitted. A mast which sways excessively in high winds will not only cause the XYL some panic, but could well rock a UHF array by an angle which exceeds its vertical beam width. It would be a good idea to limit the deflection to less than 1/180 to minimise problems in either area.

Referring to Fig. 1(a) the actual deflection will be:—

$$\text{deflection} = \frac{W.L^3}{3.E.I.}$$

and for Fig. 1(b) will be:—

$$\text{deflection} = \frac{w.L^4}{8.E.I.}$$

A couple of new terms have sneaked in here; the Young's Modulus (E) and the moment of inertia (I), which have values as follows:—

$$E = 210,000 \text{ N/mm}^2$$

$$I = \frac{Z.D}{2}$$

Once the actual deflection has been calculated from the above formulae, it can be compared with the permissible value of 1/180, and if it exceeds it then it may be wise to choose a larger section. There is no need to check out all of the bending and axial stresses again, as they will obviously be lower, just put the value for Z into the above equations.

Tapers

With a cantilever the maximum bending moment is at the base of the member, but the moment decreases to zero at its tip. It is therefore possible to gradually reduce the size of the section, and save some metal, a feature which you will have noticed in trap verticals and the elements of beams. This is fine providing there are no attachments to the tip of the cantilever, such as an aerial array, which will require a reasonable size section to fix to. Even so, tall masts can be tapered slightly, which helps when fabricating from shorter lengths of beam. Sections can be obtained which are a snug fit inside the one below, and then bolted or welded together. Take care that your taper is not too steep, and check out the bending moment, etc., at each change of section.

Look at Lamp Posts

In engineering design, as mentioned before, it helps to have a good idea of what the answer should be before starting, so that any errors in calculation are then self-evident. Knowing what the answer should be is a product of experience, but readers can get an appreciation of the expected sizes from simply looking at tubular steel lamp posts. They, too, are vertical cantilevers with the possibility of torsion at the top, as the arm supporting the lamp housing is unbalanced, unless it is a twin light unit for the centre of a dual carriageway. The adventurous may care to examine the extremely tall lighting towers found in some large carparks or public places, and also take note of how far they sway in a good wind.

Stainless Steel Stresses

The stresses laid out in BS449 are for mild steel, but commercial aerials often use stainless steel. I am told that the stresses for stainless steel can be taken as 15% below the corresponding values for mild steel.

Units in Calculations

The author has tried to make the maths as simple as possible, and providing that readers work through the various steps in a logical manner then few problems will be encountered. Although the formulae are quite simple, it is *very* important to take care with the units of each parameter, otherwise surprising results may be produced. The simplest approach is to reduce everything to:—
 Nmm for bending moments (= kNm x 10⁶)
 N/mm² for stresses (both bending and compressive)
 mm³ for Z values (mm³ = cm³ x 10³)
 mm² for area (mm² = m² x 10⁶)
 mm for thickness
 mm for length
 N for point loads
 N/mm for UDLs

Readers may end up with rather large numbers of zeroes, or exponent powers, but these will (or should) mostly cancel out during the calculations.

Final Comments

In order to clarify the situation further, it is intended to produce a further article giving worked examples to follow, plus the design of a mass concrete base to support the mast, plus comments on practical construction details. It seems as well to point out at this juncture that *although every effort has been made to ensure the accuracy of information, the author can accept no liability for any consequences arising from its use.* As with previous sections, enquiries of a general nature will be dealt with on receipt of an s.a.e., the address to which to write being: 502 Lapwood Avenue, Kingswinford, West Midlands DY6 8SG.

Acknowledgement

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An Improved Tone-Burst for the FT-207

JOHN EVERINGHAM, G4TRN

FOR repeater operation the FT-207 tone circuit leaves much to be desired: having to switch the 1750 kHz access tone off while maintaining a carrier requires two hands and is very inconvenient. The circuit (see Fig. 1) is easily fitted within the rig without drilling and with a minimum of alteration to the existing circuitry.

From the start of a transmission the tone oscillator is fed through R1; this has no effect on its performance. While the tone oscillator is running C1 is charging through R2. After about 1/2-second the voltage on C1 triggers the SCR into conduction. When this happens the tone oscillator stops abruptly as its supply voltage is grounded by the SCR; in this state about 4.5 mA flows through R1.

On receive the 5 volt supply is removed and the SCR turns off. The next transmission repeats the cycle, though as C1 has to discharge through R2 during reception the next tone burst may not be so long; it is however always sufficient to access a repeater.

Having gained access the tone burst switch may be moved to 'off' at any time to avoid annoyance (and to save that extra 4.5mA battery drain on transmit).

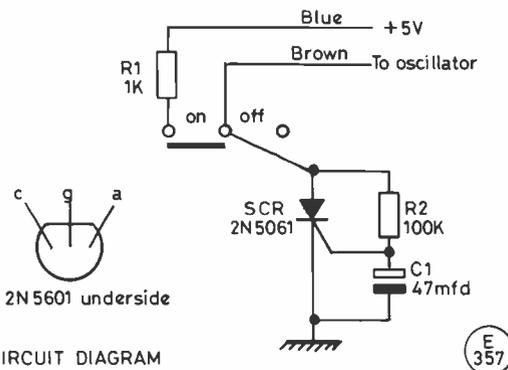


Fig.1 CIRCUIT DIAGRAM

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Construction

See Fig.2. The SCR, R2 and C1 may be 'crows nested' together and then hung between convenient points in the rig; a lump of 'Blu-tack' greatly aids the 'crows nesting'. The blue wire is removed from the tone burst switch and soldered to R1; the other end of R1 is soldered to the tone burst switch (in place of the blue wire). The ground connection is made to the key pad PCB where the negative side of the two electrolytic capacitors are connected. The anode connection is soldered to the middle tag of the tone burst switch, where the brown wire is already connected.

The connections to the switch should be dressed very close to the front panel, and as a precaution a strip of p.v.c. insulating tape should be stuck along the angle of the PLL/VCO screening box as there is very little clearance between it and the line of slide switches.

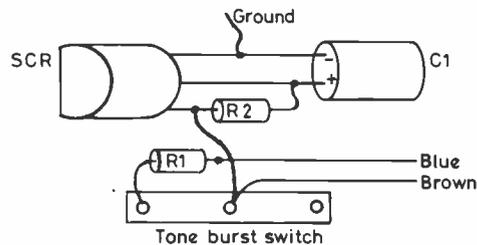


Fig. 2 CONSTRUCTION

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CLUBS ROUNDUP

By "Club Secretary"

BEFORE we start the meat course, may we just say, once again, that we must have all the required information to hand — Hon. Sec., Hq. address, meeting dates and details, and the *full name of the club*. And, of course it goes without saying that you must give details for the correct month. For example, for deadline September 28, we are receiving copy to appear in the November issue, which covers your club's November dates.

The Mail

A nice, well-nourished pile of letters, so we had better start to slim it down.

Acton, Brentford & Chiswick have a talk on 70cm. on October 16, at Chiswick Town Hall, High Road, Chiswick, given by G6BLT, and with the start time 7.30 p.m.

October 5 for **Axe Vale** is a microwave evening, at the Cavalier Hotel, West Street, Axminster.

New One

This one is called **Aycliffe & Shildon**, and they are to be found at Sunnydale Leisure Centre, Middridge Lane, Shildon, Co. Durham, every Friday evening; we note this month outings planned on October 9, election of officers the following week, J-O-T-A over October 20/21 at Kelloe, and on October 28 a Sunday junk sale and bring-and-buy at Elm Road, Working Men's Club, Shildon, with refreshments and a licence applied for. More details from the Hon. Sec. at the address in the Panel.

For details of the **Bangor** club in GI, we must refer you to the Hon. Sec. — see Panel — although we believe they gather at the Sands Hotel on the sea-front on the first Friday of the month.

Barry College of Further Education's letter doesn't mention the October activities; we gather they meet at the College Annexe, Weycock Cross, Barry, but for the rest we refer you to the Hon. Sec. — see Panel.

At **Bishops Stortford** they have the formal meeting on the third Monday in the month at the British Legion Club, near the top of Windhill; on October 15, G3MUI will be the speaker. Additionally they have an informal on the first Thursday in the month at the "Nags Head", Dunmow Road.

October 16 is the date for **Biggin Hill** at St. Marks Church Hall, Biggin Hill, for the Construction Contest.

Changes

There has been a change of Hq. for the **Braintree** crowd; they have moved to St. Peter's Church Hall, St. Peter's Close, Braintree — and they have changed their dates to the first and third Wednesday.

Another club to make a move is **Bridgend**; they are now receiving visitors in the YMCA at Bridgend. In addition they have altered their meetings to be on the first and third Friday, with the first meeting an informal and the other one the main meeting. For October, the main meeting will be the AGM.

Quite a while since we heard from the **Bristol** group; they now have a base at the YMCA, 6 Park Road, Kingswood, every Tuesday. Among the winter activities we note RAE and Morse classes, a special-event station on December 1 at Hq. with a full HF and VHF club station available. More details: contact the Man in the Panel!

Now to **B.A.R.T.G.**: this is the one for the RTTY buffs, and we must congratulate the club on its enormously successful

membership drive — we understand they are now over the top of their 2000-member target. The club caters for all those amateurs and SWLs interested in RTTY, by machine or electronically, by AMTOR or packet radio. All the details from the Hon. Sec. — see Panel.

October 20 is AGM time for **British Rail**; the club is having this event at Stanier House, which is close to New Street Station, off Stephenson Street, Birmingham, and of course all members are asked to attend. Details from the Hon. Sec. — see Panel for his details.

We now go to **Bury** where they meet every Tuesday evening at the Mosses Community Centre, the main one being on the second Tuesday of each month. Thus, October 9 is the Construction Competition.

Cambridge (Repeater Group) look after several repeaters including those at Barkway; they also have the odd meeting which is always well-attended. More details from the Hon. Sec. — see Panel.

Either September 28 or October 12 (check with the Hon. Sec. to find out which!) is the big date for the combined **Cheltenham** clubs, when Lady Fiennes will be telling them all about the transglobe expedition by her husband — this will be at Smiths Industries canteen. Normally the club meetings are at Charlton Kings Library, in the Stanton Room, and they will be there on October 19 for a natter evening.

For **Cheshunt** the club gatherings are weekly; natter evenings are on October 3, 17 and 31, while on October 10 G3TIK puts on a film show, and on 24th G6BTQ will be talking about the ins-and-outs of coaxial cable. The venue is Church Room, Church Lane, Wormley, near Cheshunt.

Deadlines for "Clubs" for the next three months—

November issue—September 28th

December issue—October 26th

January issue—November 30th

February issue—December 28th

Please be sure to note these dates!

It is the first Tuesday and the third Thursday of each month for **Chichester** at Fernleigh Centre, 40 North Street, in the Green Room. There is a mis-print (we think!) in the current newsletter, as we believe the 'October 20' date should read *October 2*. The other meeting is on October 18 and is down for a talk on AMTOR by G4CJD with a live demonstration of the method by G4EMR.

Down west now to **Cornish**, at the Church Hall, Treleigh, on the old Redruth by-pass, where we are told the October meeting is on October 11 for a talk by G3NPB on aerials. That also *seems* wrong, as we know the club computer section usually meets around that date. . . better check with the Hon. Sec. — see Panel.

Crawley is at Trinity Church Hall, Ifield, on October 24 for a talk and demonstration by *Wood and Douglas* of their range of equipment. In addition they have informal meetings at one another's homes.

We have a run-down on **Cray Valley** goings-on for almost a year ahead; October 4 is their Grand Surplus Sale, at Christchurch Centre, Eltham High Street, and on October 18 there is a natter evening at the same address.

October 20 is a junk sale for **Crystal Palace** — what is more, a junk sale in *red ink* — must have something special to dispose of. . . . The venue is All Saints Parish Room, Upper Norwood, London SE19, which is at the junction of Beulah Hill and Church Road, opposite the IBA mast.

Naturally enough, most of the events in the **Dartford Heath D/F** club programme are D/F Hunts — but before each hunt they

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- WORTHING: E. Sandaver, G4KIT, 33 North Farm Road, Lancing, Sussex BN15 9BT. (0903 766318)
- YEOVIL: E. H. Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW. (0935 75533)
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.
- 308: D. Davis, G6YQD, 13 Maple Road, Surbiton, Surrey KT6 4AA.
- 934 MHz CLUB (U.K.): Glenys Anthony, 4 Austral Way, Althorne, Essex.

have a meeting at the "Horse and Groom", Leyton Cross, Dartford, which is NGR TQ5 521726. These are from 2100 onwards, and the next one is on October 9. More details from the Hon. Sec. and what better outfit to join if you want to learn about D/F?

Allied Centre, Greenman Alley, off Tower Street, is home to the **Dudley** crew. It looks to be every Monday evening, but we do note natter sessions on October 1 and 8, plus the AGM on October 22.

October 11 is down as 'open' and to be announced on the night at **Edgware**; they are based on 145 Orange Hill Road, Burnt Oak, Edgware, on the second and fourth Thursdays.

West again now to **Exeter**, where the gang foregathers at the

Community Centre, St. Davids Hill, on October 8 for the AGM.

October 12 for **Farnborough** is a film show by G4MBZ, at the Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough.

We've not received our up-date from **Fylde**, so all we can tell you is that they meet at the Kite Club, Blackpool Airport, on the first and third Tuesday of each month; more detail from the Hon. Sec.

Between writing this and your receiving it the **Glenrothes** group will have had its AGM, at Provosts Land, Leslie, Fife. Details from the Hon. Sec. — see Panel (but before October 19 — he's off to Montserrat for the CQ WW Phone Contest!).

Members of Ballymena A.R.C. (G13FFF) pictured during their expedition in August to Rathlin Island, where they operated GB2MRI to commemorate Marconi's and Kemp's first practical Morse transmissions, to Ballycastle (just south of Rathlin Is.) in 1898. Left to right: G14NNM, G14KUM, G14XFX, G14SFZ, Angela, G14TRX, G14POV, G14VBZ, G14OUE, G14OZT, G13UHL, G14HCN, G14OGQ, G14DCC, G14VJZ, G14TOR, David, G16FTW.



Another New One!

This is at **Glossop**; they seem to have two meetings a month at least, at the "Nags Head" on Thursday evenings. October 4 is down for G3RJV to do his QRP talk, and on 25th there is a demonstration of SS/TV by G3LEE. More details from the Hon. Sec. — see Panel for his address.

Next we come to the **G-QRP Club** itself—and members should note the Hon. Sec.'s new address in the Panel. Please, if possible give him a couple of weeks relief from calls and letters while he finds the box containing the soldering-iron. That doesn't apply if you want to join, of course!

Greater Peterborough foregathers at Southfields Junior School, Stanground, on the fourth Thursday of each month in term-time. October 18 is an RSGB Video evening. They had a visit from G3RJV of the G-QRP Club back in June and are still recovering from the shock!

The **Harlow** club is based on Mark Hall Barn, First Avenue, Harlow, Essex, where they meet each week. For the latest details of the programme we refer you to the Hon. Sec. at the address in the Panel.

For **Harrow** the Hq. is Harrow Arts Centre, Harrow Weald; they are there every Friday evening, either in the Roxeth or the Belmont Room. For October we only note the informal on 5th and the Construction Contest on 12th.

Turning to **Hastings**, we find they have regular chat nights on Fridays at Ashdown Farm Community Centre, Croft Road, plus other activities at the same venue on other evenings. The main meeting is the third Wednesday of the month, at West Hill Community Centre; October 17 is a junk auction.

Now to **Havering**, which means Fairkytes Arts Centre, Billet Lane, Hornchurch, where they have an informal quarterly business meeting on October 3, and informals on 10th and 24th. The Constructors Cup is on October 17, and on October 31 the talk is "The History of Battery Power" by G3EUR.

October 13 sees the skittles match between Worcester and **Hereford** at the "Antelope" pub in Hereford; in addition there are the normal meetings on first and third Fridays at County Control, Civil Defence Hq. Gaol Street, Hereford. October 5 is a talk and demonstration on microwaves by the Microwave Society, and on 19th there is the club informal.

The **Hornsea** club meet each week at The Mill, Mill House, Atwick Road, Hornsea, on Wednesdays; the membership comes from a large catchment area extending to Hull, Bridlington, Driffield, Flamborough, as well as Hornsea.

October 10 for **Ipswich** will be a night-on-the-air; on October 31 they have a bring-and-buy sale, at Barrack Corner Church Hall. Normal meetings are on the second and last Wednesdays in the clubroom at the "Rose and Crown", at the junction of the A45 Norwich Road and Bramford Road.

If there is anything you want to know about amateur radio in EI-land then you should be in touch with the **I.R.T.S.** crowd; details from the Hon. Sec. — see Panel.

Over to the **Isle of Man**. We hear they have now completed the QSL chore from their recent DX-pedition; for the WAB fans they have a trip organised into NX square on a 'fine' weekend in October. Details from the Hon. Sec. — see Panel — on this and also the regular club meetings.

The **City Engineers Club**, Central Depot, Waterside South is home to the **Lincoln** crowd on second and fourth Wednesdays, filling the gaps with RAE and CW classes. October 10 is an evening of slides about western U.S.A. and Canada by R. Littlewood, and on October 24 they have an activity night, with a rig on the air.

It's been a while since we heard from **Loughor**; find them at the Loughor Scout Hall, which is situated off Heol Cae-ty-Newydd — visitors can look out for GW4HVJ on S20 or GB3WW on R7, from 1900 onwards for talk-in.

Turning now to **Maltby** we find them every Friday evening at the Old School Buildings, Church Lane, Maltby. We don't have the very latest details, for which we must refer to the Hon. Sec.

The **Midland** crowd are very coy about their meetings at 294A Broad Street, Birmingham, opposite the Repertory Theatre; thus we suggest you either go along — there is some activity most evenings — or contact the Hon. Sec. at the address in the Panel.

Every Wednesday evening the "Dolben Arms" in Finedon, near Wellingborough, is filled with amateur radio talk from the **Nene Valley** members who take it over. The only date we have detail on is October 3, for a talk on the Town and Country Planning Act, 1971.

On we go to **Newark** for a gathering of the local club at The Palace Theatre on the first Thursday of the month, this being in Appletongate; they also have informal gatherings at a local inn — perhaps you should be in touch with the Hon. Sec. for the latest details.

Now we turn to **R.A.I.B.C.**, the club for the invalid and blind amateur or SWL. There are three grades of membership, namely the full member, the representative and the supporter. The latter two groups are the ones that make everything happen each in their different way. If you know of a disabled amateur or SWL, you should point them at RAIBC; and if you can help you should, whether actively, or by persuading your club to make a donation, or doing so yourself. More details from the Hon. Sec. — see Panel.

October 16 for **Reigate** is a talk by G3JKV on aurora, at the Constitutional and Conservative Centre, Warwick Road, Redhill.

All those who served in, or are currently serving in the Royal or Merchant Navy, should consider membership of the **Royal Navy** group. Details from the Hon. Sec.

On to **South Bristol** now, and here we find them at Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol; October 3 is down for a talk on "Submarine Mobile" by G3OUK, and on 10th G8XIH introduces the club winter project. October 17 is computer activity night, and on 24th they will be discussing next

year's calendar of events. The month is rounded off by a bring-and-buy night. Looking forward a bit, on November 7 they have a talk on G.W.R. steam engines by Ron Gardner.

Now we head for **Southdown**, and the Chaseley Home for Disabled Ex-Servicemen, South Cliff, Eastbourne. October 1 is set aside for *Wood and Douglas* to talk about the history of their kits, while in November they have G2LL on OSCAR-10. As we have a separate note about a new club room, at Hailsham Leisure Centre, with, it seems meetings each week, perhaps a call to the Hon. Sec. would sort it all out!

It is the second Thursday of each month for **Southgate** at their Hq. at St. Thomas' Church Hall, Prince George Avenue, Oakwood, London N14. However, we don't have the details on the programme for which we refer you to the Hon. Sec. — see Panel.

We now go to **Stockton** where they meet every Wednesday at the Billingham Community Centre between 7.30 and 10 p.m. More details from the Hon. Sec. — see Panel for his particulars.

The **Surrey** club foregathers at *TS Terra Nova*, 34 The Waldrons, South Croydon, on the first and third Mondays. On November 1 they have a talk about the Planetarium, by G3WPB.

Not so far away is **Sutton & Cheam**, where they gather at Downs Tennis Club on the third Friday of each month for the main meeting, and on the first Monday of each month for an informal. October 1, then, is an informal, and on October 5 they visit the Vintage Wireless Museum at 23 Rosendale Road, West Dulwich. On October 19 they have a talk on Fast Scan TV by G8MNY.

Turning now to **Torbay** we find they have a place at Bath Lane, rear of 94 Belgrave Road, where they gather informally every Friday evening, and on the last Saturday of each month for the main meeting. Details of what's on from the Hon. Sec.

October 1 at **Todmorden** is down for a sight of the "Secret Listeners" video; venue Queens Hotel in Todmorden.

The first and third Tuesday are the evenings for the **Vale of White Horse** crowd; we don't have the latest programme data for which we have to refer you to the Hon. Sec. — see Panel. Venue is the Landsdown Club, Milton Trading Estate, Didcot.

We head now for **Verulam**, where they are based on the R.A.F. Association Hq., New Kent Road, off Marlborough Road in St. Albans, on the second and fourth Tuesday of each month. The first meeting is informal, and the second one the main meeting; October 23 sees a talk by G8MQT on Larkspur ex-military equipment.

WACRAL is the name of the group of practicing Christian radio amateurs and SWLs who have grouped into their own club; details from the Hon. Sec.

October 8 is the date for the talk by G3NRW to the **Welland Valley** group, and his subject is to be AMTOR; Hq. is Welland Park College, Market Harborough. The club would be pleased to have visitors or new members, who should contact the Hon. Sec. — see Panel.

West Kent now meets every Friday evening in the Adult Centre Annexe in Quarry Road, Tunbridge Wells. The informals are on October 12 and 26; the October 5 date is taken up with films, and on 19th October the talk "Touchdown" is by Dave Thorpe of BT and Brian French of BCal.

Up to **Westmorland** now, which means the "Strickland Arms, Sizergh, near Kendal, on the second Tuesday of the month. October 9 is down to G3UEC, for a photographic audio-visual evening.

Now we go to **Wirral** who will be meeting from now on on the first and third Wednesday of each month at the Parish Hall, Heswall, Wirral.

We have run out of programme for the **Worcester** group; but we can say they meet twice each month, sometimes in the "Old Pheasant", sometimes the Oddfellows Club, both in New Street, Worcester. For the rest we refer you to the Hon. Sec. — see Panel for his details.

It's the "Old Ship Inn", in the Market Place for the **Workshop** members; October 11 is a demo by *Lowe Electronics*, and on 18th

they have the AGM. Then on October 25, G3FDW will give a talk entitled "Do vertical antennas radiate equally badly in all directions?"

A move of Hq. is noted by the **Worthing** crowd, they having shifted into more roomy premises at Lancing Parish Hall, South Street, Lancing, where they are to be found every Wednesday evening.

Every Thursday evening the **Yeovil** club get together at the Recreation Centre, Chilton Grove, Yeovil. October 4 is a night for you to "Bring your Gadget", and on 18th there is the G3GC talk on computers; October 25 is a natter night.

At **York** the group of friends forming the local club all head for the United Services Club, 61 Micklegate, York, each Friday, when they are pleased to see visitors and potential new members.

Now **308** — and here we have to say that they are very coy indeed about giving us all the latest gen on their club — so all we can say is that they are in the Surbiton area and refer you to the Hon. Sec. — see Panel — for the rest. However, we do know they are having a junk sale on October 9, at St. Mark's Church Hall, Churchill Road, Surbiton — this is not their usual venue so they must be hoping for bumper turn-out!

CB

We don't normally get much correspondence from the CB fraternity, but we have a copy of the beautifully printed magazine of the 934 MHz Club UK. As its name implies, it is devoted to the interests of the UHF CB activity, and is very keen on setting and maintaining *standards of operating*. We have read this from cover to cover and think it is a worthy group to support; we suspect they may be showing some of our VHF fraternity the proper way to operate their rigs! More details from the Hon. Sec. at the address in the Panel.

Finale

All completed again; the deadline dates are as shown in the Panel, and are for the arrival of your letters complete with all the needful information, addressed as always to your "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. 73 and 88!

R.A.E. Course

Fareham: Fareham Adult Education Centre, Wickham Road, Fareham, Fridays 7-9 p.m., commencing November 2. Full details from the Centre (0329-280709) or course tutor G3CCB (0329-288139).



"... sorry to hold it so long, OM..."

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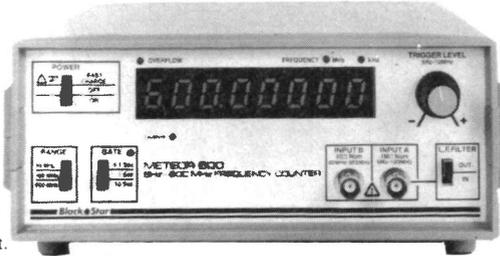
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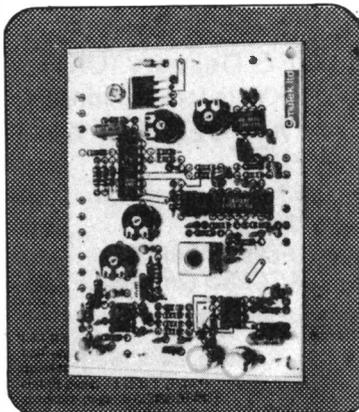
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