40p

The SHORT WAVE Magazine

VOL. XXXVII AUGUST 1979 NUMBER 6

THE FABULOUS ICOM IC-701!

Don't be frightened by Solid State PAs! They are ROBUST *and* GUARANTEED.

Designed for the connoisseur, the ICOM IC-701 HF transceiver brings the latest digital technology to Amateur Radio. Study a few more of the vast list of features offered with the IC-701 . . .

TWO VFO's BUILT-IN
The second VFO, which is an optional tack-on with most other transceivers, is an integral feature in every IC-701. Now you can work those Yanks on 40 and 80 metres!

OPTICALLY COUPLED VFO
A VFO with no variable capacitors ! Made under arrangement with Collins Radio, the IC-701 maximises digital readout with positively no time lag or backlash in display stability, even when using 100Hz steps. The IC-701's free wheeling dial is instantly co-ordinated with the high speed, computer controlled six digit readout using an optical chopper. There is absolutely NO mechanical connection between the smooth bearing mounted flywheel knob and the two dual-tracking VFOs.

COMPUTER COMPATIBLE INTERFACE
External microprocessor control from a PIA interface is possible via the 24-pin accessory socket on the rear panel of the IC-701. The IC-701 can even be interconnected with the companion 2 metre IC-211 to track frequencies for Oscar work.

REMOTE CONTROL FACILITY
The IC-701 can be remotely controlled via the new optional RM-3 computerised remote controller. This unit includes scan, duplex, memory and tone functions plus a touch-tone pad with digital readout. You can select frequencies and automatically change bands with this CPU controlled accessory.

CONTINUOUS OPERATION
The IC-701 features continuous operation with a full 200w. pep or 200w. CW input on all bands and all modes. No need to worry about timing key-down operations as the IC-701 is designed to handle the maximum power continuously ! If the heat sink starts to warm-up a built-in fan automatically switches on. If a temperature danger point should ever be reached the fan doubles its speed and the digital display flashes to tell you to quit transmitting !

NO TUNING NECESSARY
Just select the required band and frequency and start transmitting

ALL SOLID STATE
While the others are still fooling around with valves, ICOM have produced a solid-state HF transceiver including protected transistors in the final.

CROSS MODULATION MINIMISED
Cross modulation—a fact of life with some rigs—is minimised with the double balanced Schottky diode mixer used for both transmit and receive.

SMALL ENOUGH FOR MOBILE
The IC-701 is extremely compact with dimensions 111 by 241 by 311mm. (HWL) and weighs only 7·3kg. No more need to struggle with heavy rigs impossible to mount under-dash!

FULL METERING
The front panel meter includes swr, power, ALC, compression and collector voltage/current measurement.

DESKTOP MICROPHONE AS STANDARD
A high-quality condenser electret desk microphone is included as standard equipment with your new ICOM IC-701.

VARIABLE POWER OUTPUT
In CW and RTTY modes power output can be continuously varied from zero to maximum 200 watts input. SSB output can easily be adjusted for novice use.

IDEAL FOR THE CW AND RTTY BUFF
The IC-701 includes narrow CW filter as standard plus semi-break-in and sidetone facilities. The IC-701 has switching to select either narrow or wide RTTY shift rates.

THANET TECHNICAL BACK-UP
Your new IC-701 from THANET comes complete with the THANET one year warranty plus technical and spares support THANET staff have been factory briefed on the service and alignment procedures, and that includes all SEMICONDUCTORS.

PLUS—

- ★ **Separate front-end RF stages using dual gate MOSFETs for each band, providing optimum performance.**
- ★ **Diode matrix to define band edge parameters.**
- ★ **Operation on all bands 1·8 thru 30 MHz includes WWV**
- ★ **Modes include USB, LSB, CW, CW-N (narrow), RTTY.**
- ★ **Unique ICOM bandpass tuning.**
- ★ **VOX, Semibreak in CW, RIT, AGC, effective noise blanker.**
- ★ **Built-in speech processor using advanced circuitry.**
- ★ **All filters built-in.**
- ★ **Automatic front panel light dimming to suit ambient light conditions.**
- ★ **Separate VCOs for each band to reduce spurious and birdies.**
- ★ **Receive triple conversion.**
- ★ **Built-in DC power supply, external AC PSU with speaker.**
- ★ **Full line of matching accessories to come.**
- ★ **Internal speaker.**

COMPARE THE IC-701 WITH THE OTHERS! —and see what extras you DON'T have to buy.

Complete with AC PSU as shown £899 inc. VAT IC-701 alone £800 inc. VAT.

THE ULTIMATE! IC-701 state of the art

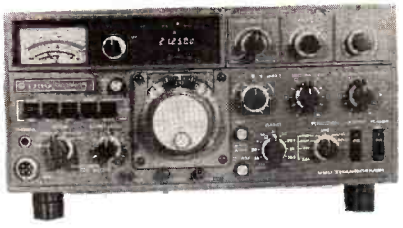
THANET ELECTRONICS for ICOM®

WATERS & STANTON ELECTRONICS

TRIO IN THE SOUTH EAST!

APPROVED TRIO DEALER

It's now our pleasure to announce that we have been appointed official Trio stockists for the South East. We shall be carrying the full range of their products, including the new TS180S solid state HF rig and TS770 VHF/UHF transceiver. Yes, 1979/1980 promises to be an exciting year for Trio and Waters & Stanton. This month we will be moving into our large, purpose-built premises a couple of hundred yards away in Main Road, Hockley. But don't worry, all our mail will be re-directed automatically — in fact, our mail order customers won't notice we've moved (apart from an even faster service!). Callers will see our new super store (we hope) as they enter Hockley! No parking problems, two miles from Southend-on-Sea and a shop full of Trio — can you resist the invitation to visit us?



TRIO TS820S £832 inc VAT SAE for brochure

The Trio TS820S must be the HF operator's dream come true. Many superlatives have been used to describe it and all are justly deserved. It's the transceiver that you'll hear from about every corner of the World with its distinctive, clean, crisp audio. A most effective RF processor ensures a remarkable improvement in readability under QRM conditions without any degradation of quality and RF negative feedback produces just about the cleanest signal you'll find anywhere. 160-10 metres, 200 watts PEP input and 0.2uv for 10db S-N all add up to an enviable package. Add to this the digital readout display and unique selectivity obtained by "bandpass tuning" of the IF section produces a transceiver that is today's DX operator's No. 1 choice. For further information or credit terms, just drop us an SAE. Less digital readout **£710** inc VAT.

NEW TS 180S ex stock TS770 September

TRIO TS520S £542 inc VAT SAE for brochure

The TS520 is now the most widely sold HF rig in the World. Just listen for a while on the HF bands and you'll realise just how many TS520's there are about. Full 6 band coverage of 160-10 metres with 200 watts PEP input and built-in speech compressor will get your signal around the World with ease. And, of course, the TS520 gives you a remarkable receiver performance to match.
With the TS520 you are buying the best engineered HF rig in its price bracket — and that's our own opinion having tried them all! Ask any owner of a TS520 what he thinks of it — he'll tell you his only regret is all the QSO's he lost by not changing to Trio before! If you have a limited budget yet want performance and a rig that will hold its price, then the TS520 is your choice.

TRIO TR2300 £199 inc VAT SAE for brochure

The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a mobile transceiver. In many ways it's the ideal "starter rig" in amateur radio. Full band coverage from 144-146mHz in 80 x 25kHz channels plus 600kHz repeater shift and 1750Hz automatic tone-burst complete its versatility.
The dial is directly calibrated in frequency and has illumination for night use. The transmitter is exceptionally clean with an output power in excess of 1 watt. Receiver sensitivity is every bit as good as the best mobile rigs and either internal batteries or an external DC source may be used. Fits easily into a suit case or on the corner of a desk and makes a really compact mobile rig. Price includes carrying case, shoulder strap, battery charger, external DC cord and, of course, the Waters & Stanton 12 month warranty. An absolute bargain — we even sell them to our staff!

TRIO TR7500 £239.95 inc VAT SAE for brochure

The TR7500 2 metre FM transceiver combines simplicity of operation with advanced design. Full coverage of 144-146mHz in 80 x 25kHz channels means no more crystals to buy. Dial indication meets the modern operator's requirements — if you want S20 you simply dial "20". For R6 you simply dial "6" — if you're one of those operators who finds channel numbers easier to use than frequency readout, than we can recommend this as a "best buy". Reverse repeater operation is, of course, a single switch action — as it should be. The package comes complete with microphone, mounting bracket and DC leads.
Performance is equal to the best in a remarkably small package — 15-18 watts transmitter output and better than 0.2uv sensitivity matched with the unparalleled Trio quality and attention to detail makes the TR7500 hard to beat.

ROTATORS

AR30	£47·16
AR40	£54·73
CD44	£109·25
AR22	£49·46
KR400	£98·13
DR7500	£108·10

CABLE

UR43	21p metre
UR67	65p
300 ohm Ribbon	11p metre
75 ohm low loss	20p

SRX–30
Solid state Receiver 550 kHz–30 MHz £175·00

TEK
5D Multi Band Trapped Dipole 80–40–20–15–10 metres. 50 ohm feed. 23 metres in length. This is complete, not a kit. High quality Traps and wire. 2kW PEP rating PRICE (inc. VAT) £50·00

Accessories

2 way Antenna Switch 50 ohm-200 watt	£5.25
3 way Antenna switch SWL push button type	£4.60
3 way Antenna Switch 2 kW PEP 0-500 MHz	£9.50
4 way Antenna Switch 50 ohm 200 watt PEP	£10.50
6 way Antenna Switch 2 kW PEP 0-30 MHz	£17.50
Single Meter SWR Wall type	£10.87
Single Meter SWR Desk type	£11.00
Twin Meter SWR Desk type	£13.55
Hansen FS-301 Through Line Watt-meter	£40.10
DL20 20 watt 50 ohm Dummy Load	£6.30
DL50 50 watt 50 ohm Dummy Load	£7.50
DL120 100 watt 50 ohm Dummy Load	£12.50
DL-1000 1 kW Dummy Load 50 ohm	£31.00
Morse Keys Lightweight	£3.25
Nye King Morse Keys	£10.15
HyMound HK708	£10.50
Katsumi EK150 Electronic Keyer	£79.00
Katsumi MK1024 Electronic Keyer, with memory	£135.00
DX-008 Programmable Frequency Counter	£116.25
Antenna Gutter Mounts	£3.55
HP3A High Pass Filter	£3.25
Twin Keying Paddle. Chrome plated with heavy base. Precision Unit	£26.50

Full Range of Microwave Modules Converters, Transverters, Linears, etc.

Hy Gain

12AVQ 3 band Vertical	£43.12
14AVT/WB 4 band Vertical	£60.37
18AVT WB 5 band Vertical	£87.40

ASP and Diawa 144MHz anfd 70 cms Antennas in stock.

Mini Products

C4X 3 band Vertical	£48.00
HQ1 Mini Beam	£96.00

ARAC 102 receiver, 28–30 MHz. 144–146 MHz. AM–SSB–FM–CW **Price £105·00**

S.T.E. Prices include VAT and postage

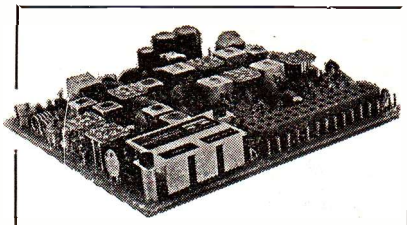
Arac 170 10m. and 70 cm. Receiver	£129·00
AA1 Audio Module for AR10	£4·10
AD4 FM Discriminator	£5·00
AL8 Linear Amplifier	£27·60
AG10 Tone Generator	£4·50
ATAL 2m. AM-FM Tx	£129·00

G-WHIP

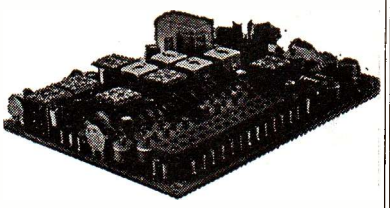
Tribander Helical 10–15–20m.	£23·00
LF Coils for Tribander	£6·55
LF Telescopic Whip Section	£2·99
Basemount standard type	£4·20
Multimobile 78, 10–15–20m.	£26·45
MM Coils	£6·55
MM Telescopic whip section	£2·59
Flexiwhip basic 10 metre section	£16·10
Basemount standard	£4·20
Ball type Basemount	£5·75
Coils for Flexiwhip	£6·55
Base thread adaptor USA/G Whip	68p
Extendarod 40"	£10·93

Drake

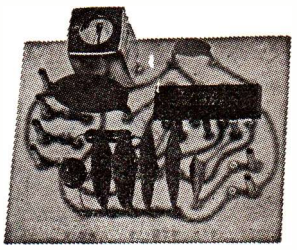
SSR-1 Solid State General Coverage Receiver	£179.00
TV3300 Low Pass Filter	£18.40
TR7 Transceiver and AC psu	£1021.00
MN7 ATU/RF Wattmeter	£126.50
R4C Amateur Band Receiver	£506.00



AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50–75 ohm. AM-FM modes. Sensitivity 0·2uV AF output 3 watts. 12v. DC operation. **Price £50.00**



AT23. 12 Channel FM Transmitter. 3 watts. 144–146 MHz. Frequency deviation 3–10 kHz adjustable. 12v. DC operated AF input sensitivity 2mV adjustable to 50 mV. **Price £50·00**



455 kHz FM Discriminator Amplifier. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 200-300mV frequency deviation + or — 3 kHz. Price £5.00

TECHNICAL ASSOCIATES

Rx Band Pass Filter. 9 I.C's. 1 watt output* 8 switched positions of filters* High pass 2·5 kHz–2–00 kHz–1·5 kHz–200 Hz–110 Hz–80 Hz* Ideal for increased selectivity with FRG7, SXR30, ETC ... **Price £30·45**

Printed Circuit Module. Including rotary switch ... ... **Price £17·65**

RX Peak and Notch Filter. Goes between RX and speaker* All I.C's* By-pass switch* Notch width control for optimum width of notch ... ... **Price £30·45**

Printed Circuit Module. Including all pots and switch ... ... **Price £17·65**

Pre-Selector. Coverage 1·6 MHz to 31 MHz* Three switched bands* Type 1 with antenna changeover relay for Transceiver op **Price £30·45**

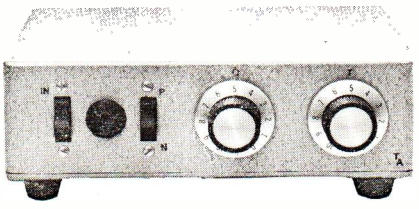
Type 2 for SWL without relay **Price £27·25**

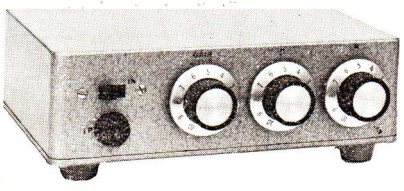
Crystal Calibrator. Seven ranges down to 1 kHz. Selected from front panel. Complete with antenna. ... ... **Price £22·80**

VHF Tunable Pre-amp ... Price £23·00

Some Models in New Type Cabinets

These prices include VAT and postage.





Solid State Stabilised Power Supplies
Maximum ratings quoted. Prices include postage.

Model 122 12·6V 2·5A	£15.55
Model 125 10-15V 2·5A Meter	£28.00
Model 153S 4-20V 3 amp Dual Meter	£29.35
Model 156S 4-15V 5 amp Twin Meter	£35.00
Model 1210S 4-20V 10 amp Twin Meter	£85.00
Model 1210S 4-20V 10 amp Twin Meter	£85.00
Model 1210SV 4-20V 10 amp Digital Readout	£110.00
Model 153SV 4-20V 3 amp Digital Readout	£38.00
Model 1220/1 13·5V 20 amp	£90.00
Model 1220/2 13·5V 12 amp	£80.00

Mod. 1210 S

STEPHENS-JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCS. WN7 3EA

See us on Stand 30 at the Leicester Exhibition 8—9—10th Nov. telephone **0942 - 676790**

ADVERTISERS' INDEX

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CONTENTS

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AUTHORS' MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap 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 for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

E & O. E. VAT Reg. No. 239 4864 25

FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

COURSES FOR THE R.A.E., 1979-80

Belfast: College of Technology (GI2BX), College Square East, Belfast, commencing Sept. 18, Tuesdays 5.30-8 p.m. (Theory and Practical), Thursdays 6-8 p.m. (Morse), enrolment early Sept. Further details from lecturer, J. E. Wilson, at the above address.

Birkenhead: North Wirral College of Technology, Borough Road, Birkenhead, starting Sept. 13, enrolments Sept. 3-5, Full details from the course tutor D. E. Owen, G4GGB, at the Dept. of Electrical Engineering.

Borehamwood: Borehamwood College of F.E., Elstree Way, Borehamwood, commencing Sept. 26, enrolment 7-8.30 p.m. Sept. 10-11, Wednesdays 7-9 p.m. Lecturer, G. L. Benbow, G3HB.

Burgess Hill: Marle Place A.E. Centre, Leylands Road, Burgess Hill, West Sussex, commencing Sept. 18, Tuesdays 7.30-9.30 p.m., tutor R. Canning, G6YJ. Full details from the Centre, ring Burgess Hill 6355.

Cheshunt: Organised by Cheshunt and District R.C. through East Herts. College of F.E., Turnford, starting September, all enquiries to J. Sleight, G30JI, QTHR (tel: Ware 4316).

Crawley: Ifield Evening Centre, Sarah Robinson School, Ifield, Crawley, W. Sussex, Thursdays 7-9 p.m., starting Sept. 27. Further details from course tutor, R. Scrivens, G3LNM, Crawley 22540. Enrolment Sept. 10-11.

Doncaster: Doncaster Metropolitan Institute of Higher Education, Waterdale, Doncaster, Wednesdays 7.30-9 p.m., enrolment week beginning Sept. 17.

Dudley: Dudley Technical College, Dudley, Tuesdays at 6.30 p.m., enrolment Sept. 4-7. Course lecturer, J. Raby, G8RF.

Hemel Hempstead: Dacorum College, Marlowes, Hemel Hempstead, Wednesdays at 6 p.m., starting Sept. 26, enrolment Sept. 10. Further details from course organiser, C. Burke, G3VOZ (tel: Hemel Hempstead 833300).

Leamington: Mid-Warks. College of F.E., Warwick New Road, Leamington Spa, Thursday evenings commencing Sept. 20, enrolment Sept. 6-7.

London: De Beauviour ILEA School, Mon., Tues., Wed. and Thursdays 7.30-9.30 p.m. (inc. Morse), starting Sept. 17, enrolment commences Sept. 10. Full details from Senior Tutor, F. Barns, G3AGP (QTHR).

London (Chingford): Friday Hill House, Simmons Lane, London E.4, Thursdays at 7.15 p.m., commencement (and enrolment) Sept. 20, fees £10 (under 18, £5). Further details from A. Foss, G8EAY, 01-500 6034.

London (Harrow): Hatch End High School, Harrow, Wednesdays 7-10 p.m., starting Oct. 3, enrolment at Nower Hill High School (Sept. 15, 10 a.m.-3 p.m., Sept. 18, 7-9 p.m.). Tutor D. T. Busby, G4HFL.

London (Paddington): Amberley Adult Institute: Amberley Road, Paddington, Mons. and Thurs. 7-9 p.m., starting Sept. 17, enrolment Sept. 6-7 and Sept. 10-12. Tutor D. T. Busby, G4HFL.

Manchester (Openshaw): Openshaw Technical College, course includes Morse, enrolment Sept. 10-12. Tutor A. B. Langfield, G3IOA.

Manchester (Stretford): North Trafford College of F.E., Talbot Road, Stretford, Thursdays 6.30-9 p.m. (Theory), Mondays 6.30-9 p.m. (Morse), enrolment Sept. 10-12, 6-8 p.m. Lecturer, J. T. Beaumont, G3NGD.

Manchester (Swinton): Moorside School, East Lancashire Road, Thursdays at 7.30 p.m., starting Sept. 13. Details from P. Whatmough, G4HYE (G8BFP), 061-794 3706.

Melton Mowbray: Melton Mowbray College of F.E., Wilton Road, Melton Mowbray, Leics., Tuesdays 7-9 p.m., starting Sept. 18, enrolment early Sept. Full details from lecturer, K. Melton, G3WKM (QTHR), tel: Melton Mowbray 68810.

Northampton: Duston Adult Centre, Duston Upper School, Northampton, Tuesdays 7-9 p.m., starting Sept. 25, fee £11, enrolment Sept. 5/6/10 evenings. Instructor D. F. Watton, G4AYZ, QTHR.

Princes Risborough: Adult Education Centre, County Secondary School, Merton Road, Princes Risborough, Mondays 7.15-9.15 p.m., starting Sept. 24, enrolment Sept. 10-11, 7.15-9.15 p.m., fee £10. Lecturer, M. Lilley, G3INN.

Slough: Langley College of F.E., Station Road, Langley, Slough, Mondays 5.30-7 p.m. (Techniques), Mondays 7-8.30 p.m. (Morse), Thursdays 7-9 p.m. (Theory), enrolment Sept. 11-12, 12.30-8 p.m. Further details from lecturer, E. C. Palmer, G3FVC.

Stockton-on-Tees: Stockton and Billingham Technical College, Oxbridge Avenue, Stockton, Mondays at 6.30 p.m. (Theory), Thursdays at 7 p.m. (Morse), starting Sept. 17. Full details from J. A. Ross, G3WWG.

Walsall: Broadway North Centre, Walsall, enrolment Sept. 17-18, 6.30-8.30 p.m. For further information contact F. Fear, Aldridge 52706 (evenings).

Welwyn Garden City: Dept. of Engineering, De Havilland College, The Campus, W.G.C. (course takes place at Applecroft School, W.G.C.), lecturer H. Cox. For all enquiries ring W. G. C. 26318 ext. 40.

VHF BANDS

NORMAN FITCH, G3FPK

Next Stop Baghdad?

BY the time this appears, there will be few VHF enthusiasts who will not have heard of the record-breaking *Sporadic E* QSO between CT1WW and OD5MR which was concluded at 1643 GMT on June 28. The distance was, as near as makes no odds, *four thousand kilometres*, a convincing world record, surely? This poses the question of just how far it is possible to work on VHF *via* the E-layer; after all, it would have been only another 850 kms. to Baghdad!

Awards News

John Hunter, G3IMV, (Bucks.) QTH Squares Century Club member no. 3, has submitted a further 25 confirmations to bring his total of primary QTH squares to 125 and hence, his first sticker. Reflecting his enthusiasm for meteor scatter, 8 of the cards were for that mode, all on CW. six were tropo. QSO's, two *via Ar*, the remaining 9 being *E's* contacts. The rules for the QTHCC award, and an application form, may be obtained by sending a stamped, addressed envelope to the address at the end of this feature.

The rules for the VHFCC awards for the 4m., 2m. and 70 cm. bands are frequently mentioned in these pages, but, for the benefit of new readers, here they are again. All QSO's must be made from the same QTH and must be direct; no repeater or satellite QSO's count, but *E-M-E-* ones do. Any mixture of modes and propagation is acceptable; *e.g.* CW, SS/TV, SSB, *E's*, MS, etc. The awards are for one band only; *i.e.* all 2m. or all 4m. or all 70 cm. There is no application form; just send a list of at least 100 QSL's in your possession, accompanied by a declaration that all the QSO's were made from the same QTH and that all were direct. Six cards will be chosen at random from this list and applicants will be required to send these for scrutiny. If all are acceptable, a certificate will be issued. When sending in the lists, please send a resumé of your amateur radio activity and history, together with details of present station and any details for future operation.

Contests

The results of the April 29, 4m. Open contest are to hand. In the Single Operator section, the winner was G3UUT/P with 575 points from 53 QSP's. G3UKV's 43 contacts worth 297 pts. earned second place and G3XBY was third with 264 pts. from 44 exchanges. In the Multi-Operator part, GM3WOJ/P were clear winners with 628 pts. from 49 QSO's, followed by G3PFM/P, whose 53 contacts were worth 385 pts. In 3rd. spot were the G3JEQ/P team with 267 pts. from 57 QSO's. *Coming attractions:*— August 19 is the date for the 70 MHz. event from 0900-1700 GMT, and it is a two section event—Single Op. and Multi-Op. with no separate fixed or portable parts. The weekend of Sept. 1/2 sees the first leg of the IARU Region 1 Contest devoted to VHF, which means 2m. The usual 1600 GMT start for this 24 hour event, with one-point-per-kilometre for the scoring. This contest coincides with the U.K. 144 MHz. Open and *s.w.l.* event which requires the radial ring scoring system. The final UHF/SHF part of the IARU event is scheduled for the weekend of Oct. 6/7 and covers all bands from 432 MHz up. It coincides with our own 432/1296/2304 MHz contest.

The AGCW-DL VHF CW Contest will take place on Sept. 22 from 1900 to 2300 GMT on 2m. As before, there are three classes determined by the output power of the Tx. Class A is less than 3½ watts, Class B less than 25 watts and Class C over 25 watts. Exchanges should consist of report/serial number/class/QTH locators; *e.g.* 569040/C/ZL60j, etc. The scoring system is a little complex and any reader wanting the complete rules is requested to send an *s.a.e.* to your scribe. (*QTHR*).

RTTY addicts are invited to participate in the 11th BARTG VHF/UHF Contest, a two session affair starting at 1800 GMT on Sept. 8 and lasting 5 hours. The final 5-hour stint at 0700 GMT on Sept. 16. The event is for 144 and 432 MHz but neither cross-band nor repeater or satellite contacts will count. The scoring is a little different from previous years and full rules can be obtained by sending an *s.a.e.* to Chris Plummer, G8APB, at 148 Porter Road, Brighton Hill, Basingstoke, Hants., RG22 4JT.

Beacon News

As this is being edited, the 2m. Lerwick beacon, GB3LER, on 144·965 MHz is QRT following the failure of the drive to the PA stage. The 2m. Angus beacon, GB3ANG, on 144·975 MHz is not being copied in London so that too is presumably still QRT.

In a letter dated June 7. Serge Canivenc, F8SH, wrote;—"It is quite a possibility for FX3THF (144·905) to be again on the air pretty soon, thanks to F1DIU from Nantes who will supply us with an 8-watt *Motorola* transmitter 'cleaner' I think than our present exciter. This will be used first as the beacon itself and we shall then transmit with a lower power than usual." Later on, it is proposed to increase the power output to 60-100 watts for future TEP tests. Serge mentions that the present single 9-ele. aerial will be replaced by two 9-ele. *Tonnas* which F9FT will supply.

The 4m. Gibraltar beacon, ZB2VHF, on 70·26 MHz is QRV again between 1800 and 2400 GMT, soon to be on 24 hours-a-day, During any breaks in transmission, keeper Jimmy Bruzon, ZB2BL, will be listening for calls and use the Tx for replying. This ruse was used on June 28, during the big *E's* opening, when GI3ZTL was worked.

Repeater Notes

VHF relay GB3MN (Stockport) on R2 became fully operational on June 30. It is micro-processor controlled and the talk-time is 90 secs. Tony Oakley, G4HYD, told your scribe that the 2m. Hull repeater on R2 has been QRV from its new site since June 16. Its callsign is GB3HS. The Nottinghamshire Repeater Group issues irregular Newsletters the second of which describes its UHF relay at Mapperley on RB6 as, "A repeater to set your watch by." It is claimed that the first dash in the callsign on the hour is as accurate as the Greenwich Time Signal. The group plans to replace the existing

460 MHz dipole stacks with bespoke ones for 433-434 MHz as soon as enough funds are available. Details of this group from G4AFJ at 21 Greenwood Avenue, Nottingham, NG3 7FX.

Trans-Equatorial Propagation

F8SH, in his letter of June 7, mentioned that the 2m. beacon ZE2JV was received in the Netherlands on Feb. 12 in CL53h between 1645 and 1723 GMT. On April 4, DC3MF near Munich copied it from 1823-1945 with signals 25 dB. above the noise. It was also heard in PA between 1745 and 1932 up to 43 dB. above the noise and in Austria at 21 dB. The QRB from Salisbury, Rhodesia to CL53h is about 8,100 kms. On this basis, it would not be surprising if ZE2JV is heard in Southeast England during the autumnal equinox. The QRG is 144·160 MHz. and it would seem that the period 1630-2000 GMT is the one to monitor. *Doppler* shift can be expected, so do not use too narrow a filter.

The Satellite Scene

Those readers seeking the latest up-dates on AMSAT satellites and related matters should note that the 80m. net on the *first* Sunday in each month is devoted to such information. G3RWL in North London is net control and the QRG is nominally 3780 kHz.

Oscar 7 is being commanded into Mode "A" whenever possible. The batteries have "had it" but the transponders work well enough when the spacecraft is in sunlight and working off the solar panels. As power is limited, when the transponders are working there will be no telemetry and *vice versa*. AMSAT-UK still needs meaningful TLM for *0-7* and this should be sent to G3YJO at the University of Surrey, Guildford.

Oscar 8 continues to function very satisfactorily but its orbit has been affected by recent solar events. AMSAT has given the following data for orbit number 6630 on June 24, based upon a visual sighting; Equatorial crossing time 0001.12s. UT at 45°W. *Apogee* 941.9 km; *perigee* 907.8 km. Inclination 98.921° and period 103.2258 *plus/minus* 0·00005 minutes. Increment 25·807° west per successive orbit. Using this data, orbit number 7412 on August 19 should cross the Equator at 0123·47s at 66·1° some 8m.21s. earlier and 2·7° further east than predicted in the UOS-AMSAT calendar. At the time of editing, *0-8* is on Modes "A" and "J" simultaneously on Tuesdays and Fridays, Mode "A" on Mondays, which are QRP days, and Thursdays, and Mode "J" at weekends with Wednesdays reserved for prior-booking special experiments through ARRL.

THREE BAND ANNUAL VHF TABLE
January to December 1979

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL Points
G3SPJ	30	3	47	6	25	2	113
GD2HDZ	22	4	40	12	25	3	106
G3FIJ	17	2	50	11	14	2	96
G3CO	19	2	42	10	17	4	94
G8LHT	—	—	62	14	15	2	93
G3KPU	—	—	54	6	28	4	92
G3FPK	—	—	68	19	—	—	87
G4ERG	—	—	63	23	—	—	86
G4DEZ	—	—	61	23	—	—	84
G8KAX	—	—	38	7	28	7	80
G8ITS	—	—	40	6	25	4	75
GI8EWM	—	—	51	6	12	5	74
G2AXI	13	1	35	6	13	2	70
GM4CXP	6	2	37	12	1	1	59
G4GHA	—	—	34	13	—	—	47
G4GXT	—	—	38	7	—	—	45
G4HAO	—	—	36	6	—	—	42
G4FKI	3	1	6	1	2	1	14

Sporadic E

Following the reports in the last issue covering the *E's* event of June 2, *s.w.l.* Mike Allmark in Leeds says he is, ". . now convinced that YU2CUT heard on June 2 is a phoney." There is some joker in the locality who comes on during *E's* happenings, using such calls as, SV1DH, F5UF, SU2DX, 4X4HF, SU1ADV/1, EA1CR and SVØDA. John Lovell, G8JHL, in Manchester, has heard this character too and reckons he must have a good station to straddle the Pennines so well as he does. The give-away is that the cove does not seem to know his QTH locator. He gave KF66e for YU2CUT, but that is in the YU1 area in the autonomous region of Vojvodina. Mike reports he was at it again on June 19.

During the June 21 event, Bill Bilcliffe, G6NB, (Bucks.) was called by 5B4WR but could not complete the QSO due to unmannerly, continental QRM. He is almost certain he heard an Egyptian station, too. The QRB from G6NB to 5B4WR is about 3,270 kms. This was around 0900 GMT and it only lasted a few minutes. It will be interesting to ascertain if any other readers caught this one. G6NB is a very experienced operator but admits to being somewhat sceptical.

The best *E's* opening to date was the one on June 28 which started about 1330 GMT and went on till almost 2000 in fits and starts. From reports so far received from different countries, it is obvious that there was widespread ionization over much of the European continent, dense enough to sustain propagation on 2m. Some very long distances were worked and this raises the question, "Is there such a thing as double-hop *E's*?" The majority of *E's* contacts on 2m. are over distances between 1,100 and 1,900 kms. so it is tempting to conclude that contacts between stations 3-4,000 kms. apart must be double-hop. However, it is difficult to believe that ground reflexions from a heavily forested area, for example, would be possible.

The path between CT1WW and

OD5MR is such that, if it *was* a double-hop affair, the reflexion would have been off the sea, which sounds reasonable. It seems that current ideas are that these long-distance signal paths are possible due to the wave travelling perhaps a couple of thousand kilometres *within* the E-layer before being reflected down; ducting, in effect, with which we are familiar on tropo. To help solve the mystery, as many reports as possible are needed. F8SH asks we should send him reports not only of 2m. reception *via E's*, but of Band 2 FM, the VOR beacons in the 108-118 MHz section, the aeronautical communication band, 118-136 MHz, and possibly Band 3 TV.

As to reports from readers, John Hunter, G3IMV, (Bucks.) heard it all happening when he switched on at 1620. In his first session, he worked IT9TDN (HY68b), YU2RQG (HE) and YU2CKL (HD) and was called by YT9MI. A "CQ" call at 1730 brought a reply from LZ1ZB (LC) who was a huge signal, briefly. At 1925, John heard YU2RIO (JF34) at 599 and was called by YU2KDE (JF23). Then OE6FGG (HH) was worked and YU1's BBO and NOU called, the event fizzling out about 1945. From Dorset, John Cleaton, G4GHA, mentions three phases in the first of which he contacted 9H1BT (HV03f), IT9IJJ (sure it wasn't *XJJ*, OM?) IT9TAI (GY67f), IT9IKG, IT9LYF, IT9ZWV (GY67) and IW9ACT. In the second phase, John worked IC8EGO and in the final session, YU2BKL. All those with 14 watts to a 6-ele. *Quad* at 27ft.

Darrell Mawhinney, GI8JPG, from Co. Antrim, is a new contributor and worked a goodly assortment of DX between 1440 and 1607. From WO40d, he contacted DB2GB, HB7AJF, 13's LDS, LCZ, TJR and VFJ, IW3QEF, YT9MI, and YU's 2CGC, 2RQG, 2RSK and 3TDW. Darrell's QSO with IT9TDN at a QRB of 2420 kms. could be a GI-to-IT9 first, he suggests.

From Jersey, Geoff Brown, GJ41CD, was in on the act from the start at 1335 until 1845. His tally included 30 IT9's, in GX, GY, HX and HY squares; 5 9H1's; 35 YU's in IF, JC, JD, JE, JF, KD, KE, KF, etc.; a couple of LZ's in LD and LC; and HG8 in KG claimed as a Jersey "first," another GJ "first" with FØHI/FC who is GU3KFT on holiday in Corsica in EB square, plus lots of mainland Italians.

For your scribe, the event brought a new country in ISØPDQ, and a new square (EZ66a) and IT9VHS in GX03j was another new square. At least three other ISØ's were QRV; *viz;* BCO, ISJ and PUD, all in EZ. A Sicilian YL operator, IW9AKI, was very loud but only spoke Italian and insisted on spelling out her QTH—Castelvetrano—phonetically to all contacts!

Elsewhere, SM3AKW (IW) worked FØHI/FC, some Berliners worked into Israel and F1CRP heard a Canadian in Egypt. Mike Gaskin,

QTH LOCATOR SQUARE TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3JXN	34	70	93	197
G3COJ	24	66	84	174
G8LEF	22	61	101	184
G8GML	11	63	106	180
GD2HDZ	11	34	67	112
G8EOP	8	36	38	82
G8IFT	7	18	49	74
G4DKX	5	30	68	103
G3SPJ	5	21	63	89
G3OHC	4	33	101	138
G8LHT	3	34	82	119
G4AEZ	3	28	61	92
G3BW	3	25	91	119
G2AXI	2	52	91	145
G8BKR	1	30	108	139
G4ERX	1	29	67	97
GJ3RAX	1	24	67	92
G2POI	—	—	266	266
I4EAT	—	25	217	242
G8HVY	—	71	119	190
DK3UZ	—	—	182	182
G3IMV	—	—	180	180
G3SEK	—	—	179	179
G3CHN	—	—	174	174
G4CMV	—	30	140	170
GJ4ICD	—	35	125	160
GM4CXP	—	25	134	159
G3FPK	—	—	157	157
G4DEZ	—	—	156	156
G4BWG	—	29	118	147
9H1CD	—	13	127	140
9H1BT	—	—	138	138
G3XCS	—	21	111	132
G8HHI	—	30	101	131
G8ATK	—	38	88	126
G4HYD	—	40	83	123
GM4COK	—	9	106	115
G4ERG	—	—	115	115
G4FCD	—	22	89	111
G3VYF	—	—	111	111
GJ8KNV	—	26	83	109
G3KPU	—	21	84	105
G4FBK	—	5	92	97
GM8NCM	—	12	84	96
G4AWU	—	—	94	94
G4IGO	—	—	93	93
G3FIJ	—	27	65	92
G8KAX	—	29	59	88
G8GII	—	22	63	85
G8KGF	—	5	80	85
G6UW	—	—	85	85
G4GEE	—	27	56	83
9H1C	—	—	83	83
G8KPL	—	7	74	81
G8JAG	—	7	73	80
G8JHX	—	—	80	80
GI8EWM	—	18	61	79
G8JJR	—	—	79	79
G8LGL	—	1	74	75
G8KSP	—	2	72	74
G8ITS	—	16	56	72
G4GET	—	—	70	70
G8LFJ	—	—	69	69
GD3YEO	—	8	59	67
G8KUC	—	7	60	67
G8KLN	—	1	62	63
G4CIK	—	—	62	62
G4GCQ	—	—	61	61
G8JEF	—	—	58	58
G8MFJ	—	9	48	57
GW4FJK	—	—	57	57
G4GHA	—	—	53	53
G4GSA	—	1	48	49
G4GXT	—	—	43	43
G4EYL	—	—	41	41
G8JGK	—	—	41	41
G8PRG	—	—	15	15

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 23 cm.

G8KYC, (Croydon) has built a simple panoramic display for his Rx and watched the MOF rise at the rate of 1 MHz per *second* in the June 28 event, He monitors the VHF spectrum and records 14 E's openings in June. At 1920 on the 11th, he heard Arabic voices on 145·9 MHz and is puzzled as to their origin.

There is talk that EA8JJ in the Canary Islands was heard or worked from the British Isles, plus lots of other similar rumours of super-DX worked. There is little doubt that this was a most extensive event. It deserves the widest possible chronicling so that the researchers, like F8SH, will be able to build up an overall picture of E-layer propagation on the VHF's over a large area of Europe and beyond. Your conductor will gladly pass on all such reports.

Iain Simpson, GM8BVD, (Fife) has filled in some details of his 2,840 km. QSO on June 2 with SV1DH. His transceiver is a modified *Trio* TS-700 with the original 20 kHz roofing filter replaced by a 7·5 kHz 8-pole crystal filter on SSB/CW modes. An *SD-306* pre-amplifier stage has been added. The 16-ele. *Tonna* aerial at 13m. *a.g.l.* is 3m. above immediate obstructions and fed with less than 10m. of *UR-67* coax. It is driven by an analogue rotation system with separate sync. position indicator accurate to better than 0·1°.

GJ41CD has been making the most of this season's *E's* happenings and had notched up 14 new squares this year *before* the June 28 session. Mike Allmark wrote before "the big one" but mentions having heard F1JG (CD24g) at 1604 on June 2, with a 5 min. opening on the 20th at 1155 which produced IW5AVM and a couple of IWØ's, but no QRA's. On June 7 and 16 he copied Icelandic TV signals on Band 1 *via Auroral E.*

Kevin Jackson, (Leeds) reports reception of TV from Gwelo in Rhodesia on May 29 on 48·25 MHz with signal strengths up to S8 and suggests this was *E's* enhanced TEP. On June 11, there was an *E's* opening to YU when he got a snow-free picture from the Pelister Tx (KB76d), a 10 kW station on Ch. E4 (62·25 MHz). On the 19th, an Italian pirate TV station in Udine (GG77) was copied, while on the 22nd, a 100 watt OE Tx at Birkfeld (HH59) was identified. Other interesting squares seen in June included WW70B in Spain, HB35e in Norway and EB14 in Corsica.

The Rest

John Lemay, G8KAX, (Essex) enters our tables for the first time. His gear comprises a *Sommerkamp* FT-250 transceiver driving a home-built transverter for 2m. and a *Microwave Modules* job for 70 cm. On 2m, the aerial is an 8-ele. *Yaga*, while on 70 cm. a 20-ele. one is used. John is seeking 70 cm. skeds with Cornwall, and any Welsh counties during the autumn.

Jon Stow, G8LFJ, is another new Essex correspondent who enters our popular squares table for 2m. only at present, but with possible 70 cm. activity from the autumn. Planning application for a 40 ft. tower for supporting one or two 16-ele. aerials is under way. Jon caught the nice tropo. conditions on June 18-20 and worked EA1CR (XD32d) late on the 19th and again early the following morning. French stations in AH and ZE were worked, plus OZ5TE/A (FP) and OZ1BRJ (EQ) on the 19th. He heard a number of SM's in GP and GQ squares. Jon complains bitterly about a weekly FM net of East London stations on 144·90 MHz from 2200 on Saturdays, sometimes lasting for three hours. Suggestions that they choose some other frequency, ". . . did not appear to make any impression," he writes. It seems another case of because *they* cannot hear any beacons on their inefficient aerials, then they assume nobody else can! Other groups have been persuaded to quit this part of the band so we can only hope this group will respond to polite requests to move.

Another new Scottish correspondent is Richard Thomson, GM8ODL, from Dundee, who also enjoyed the June 2 event. He worked an assortment of DL, ON and PA's in CL, CM, DL and DM squares from 2350 until 0330 the following morning. Richard uses an *Icom* IC-202, home-brew amplifier and 8-ele. *Yagi* at 60 ft.

Bryn Llewellyn, G4DEZ, was due to leave his Didcot QTH on July 12, having near-filled a waste skip with unwanted junk accumulated over the last five years. The new QTH is in south east Essex. Bryn mentions an opening to SM and OZ late on June 10 but nobody was around to take advantage of it. On the 18th, Geoff Brown, GJ4ICD, worked into ZZ square on tropo. to EA5CD.

Malcolm Andrew, G8NRP, of *Randam Electronics*, was on holiday in the Dordogne region in France in mid-June and telephoned G3FPK on the 19th to say he had heard GM8FFX in Aberdeen on 2m. working well down the west coast on the 18th. Unfortunately he did not seem to be able to raise anyone back home. Your scribe found it a struggle to work OZ51Q (FP38f) on the 19th, but exchanged S8 reports with EA1CR at 2317. By contrast, G4DEZ was only copying Ruben at S2. EA1CR was still on at breakfast time and admitted to not having gone to bed at all!

On the MS scene, Mike Allmark reckons the *Arietids* shower was good on June 7-9 and he heard DC7OH (GM), DF6NA (EJ), I6WJB (HC), F1JG (CD), EA3ADW (BB), F6FHP (AE), OE3OBC (II), F6BVA (DD), IW3QBC (GG), IØSNY (GD) and others. He listened in on G3POI's sked with 4U1ITU on the 10th and received 53 bursts and 24 pings, the longest burst being 9 secs. at S8 and bringing Mike his 38th country heard. The mid-June tropo. brought in many F's in AF, ZE and ZG squares.

VHF NFD is happening as this is being compiled and your scribe has taken occasional listens on 2m. and worked a few GI and GM portables, plus some GT "Millenium" stations and EI1AA/P, The Irish Leprechaun Contest Group in Co. Wocklow. The conditions seemed fairly average. GW8BHH/P ended up with 708 QSO's, GW6UQ/P 643 and G3VCP/P 622 with perhaps 10 duplicates. The Crystal Palace Group worked in to FO and DF squares and bagged 3 LX's. Perhaps there will be more detailed reports on other bands next edition.

Sign Off

By the time this is expected to appear the September deadline will have passed, so the contributions for October should reach us by September 6 at the latest; earlier if possible due to probable postal problems. Everything to:—"VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*

DISCUSSING PHASED VERTICAL ANTENNAE

ON THE HF BANDS—A TRI-BAND SYSTEM GIVING DIRECTIVITY CONTROL BY SWITCHING—CALCULATIONS, MEASUREMENTS AND PRACTICAL APPLICATION

B. N. TAIT (G3DDN)

THERE must be many amateurs who feel that the erection of a rotary beam in their garden is rather a frightening and costly undertaking, and yet think that without it they are getting left behind in the search for DX on the HF bands. In the writer's case, having moved to a magnificent site in Cornwall right on a cliff edge overlooking the Atlantic, the problem was one of neighbours who had paid large sums of money for a property with a sea view, and who were unlikely to take kindly to a Quad or Yagi in their foreground! A ground plane had already proved most successful, but, on 20 metres in particular, European QRM can very easily blot out all but the strongest DX stations—unless one can devise an aerial system with the advantage of directional properties.

So experiments were started using a pair of ground planes, switching them in and out of phase, which is almost equivalent to rotating an antenna mechanically, and certainly a lot easier and cheaper. Initial tests were made using two home-made 10-metre ground planes spaced 16 feet apart. Fed "in phase," they produce a directional figure-of-eight pattern broadside to the place of the verticals; fed 180° "out of phase" a similar pattern is produced in the opposite directions, *i.e.*, "endfire," as it is called. The actual theoretical forward gain is not more than 4 dB over a single vertical, but the side attenuation can be as much as 30 dB, which compares very favourably with any rotary beam. The method of phase switching is shown in Fig. 1.

Having proved the effectiveness of a "vertical beam," the writer embarked on a somewhat more ambitious scheme—a three-band vertical beam system, using two commercially built ground planes incorporating traps for Ten, Fifteen and Twenty metres. It was decided to settle on a spacing of 16 feet, as half-wave spacing is most suitable for 10 metres, and the advantage of quarter-wave spacing (as it is on 20 metres) is the fact that by feeding the verticals 90° out of phase—instead of 180°—a cardiod pattern is produced with a side attenuation of 20 dB and a rear attenuation of 30 dB—most useful for overcoming the QRM on Twenty. Then, by inserting a quarter-wave delay line in either feedline the cardiod pattern can be switched in either direction.

The switching does become a little complicated with all the necessary quarter and half wavelengths of coax required for each band, but nevertheless the whole system is very much simpler than the mechanical rotation of a fairly large beam! The three-band switching is shown in Fig. 2. At Fig. 3 is the front panel layout, showing markings for each band.

Measuring the Coax

The formula for calculating an electrical quarter wavelength of coax is:

$$\frac{246 \text{ feet} + \text{velocity factor}}{\text{frequency (MHz)}}$$

The velocity factor of normal coax is somewhere between 0·5 and 0·8, but if it is not known for certain (normally obtainable from the manufacturer) it is advisable to calculate this first, otherwise a considerable number of short lengths of coax are going to finish up in the dustbin.

This is the suggested way of going about the calculation: Cut off exactly 14 feet of 52-ohm coax. Connect one end to a single-turn loop of wire and leave the other end open circuit. Couple the loop loosely to the coil of a GDO and find a dip on the meter at a frequency somewhere below 14 MHz. Check this frequency very accurately with the aid of a general coverage receiver. It is now possible to calculate the velocity of this coax by writing the previous formula as:

$$\text{Velocity factor} = \frac{14 \text{ feet} + \text{frequency (MHz)}}{246}$$

Repeat the process with the 75-ohm coax.

Both these lengths of coax can be used in the circuit, so in order to get them to resonate in the centre of the 20-metre band, they should be trimmed at not more than an *inch* at a time, checking progress with the GDO.

All the required lengths of coax can now be cut using the original formula for calculating the approximate length, adding on several inches before the initial cut, and then trimming and checking with the GDO after each cut. Note that on ten metres *half an inch* is critical.

A half-wavelength of coax is naturally exactly double the length of a quarter-wave, but note that to measure this with the GDO the far end of the coax must be short circuited.

Construction

The whole unit can be built into a metal box 15in. x 9in. x 7in. No chassis is required, as the switches are mounted on the front panel, the sockets on the back, and the coax is coiled up and tucked inside the box.

First make the connections from one tag to another on Sw2 and Sw3 as shown on the circuit diagram, keeping

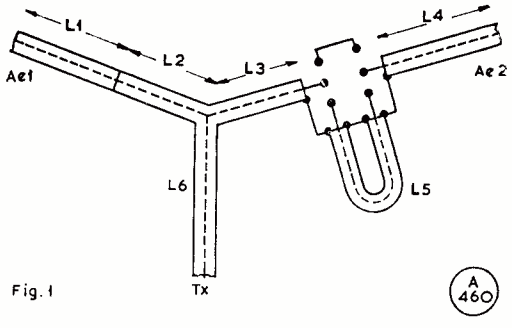

Fig. 1. With spacing for the Verticals at half-wavelength, dimensions for L1, L4, should be any equal length of 52-ohm coax; L2, L3, quarter-wave of 75-ohm coax; L5, half-wavelength of 52-ohm coax; L6, any length of 52-ohm coax.

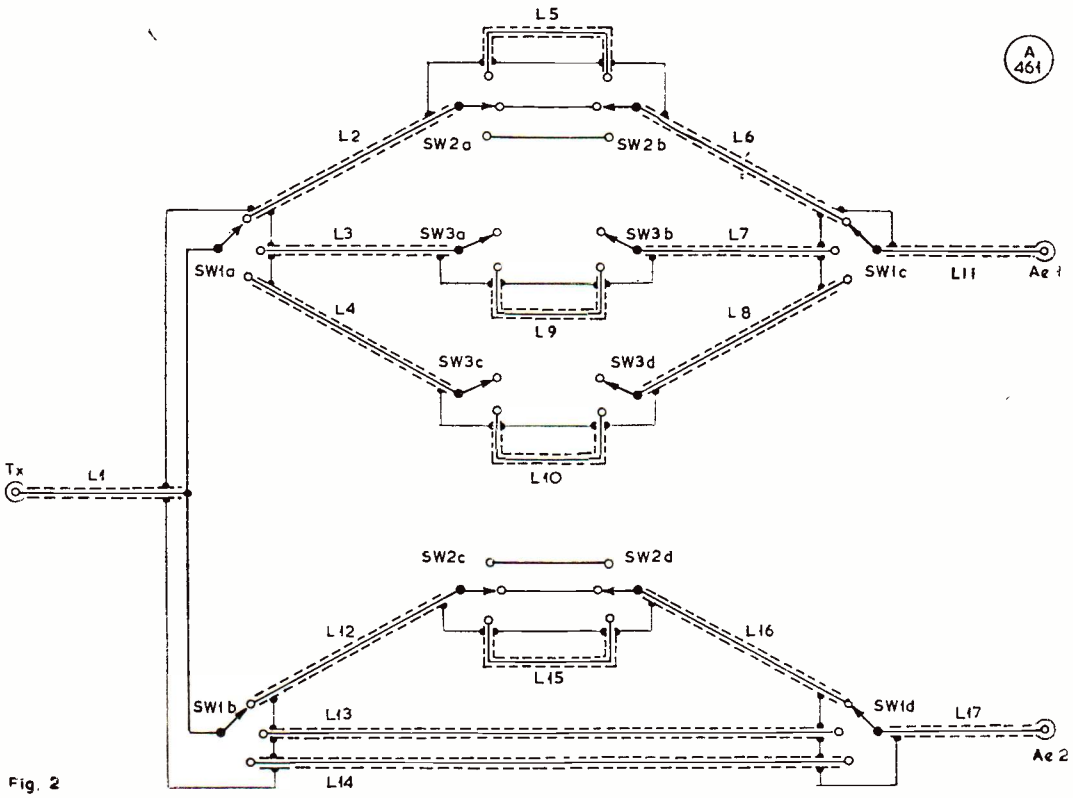

Fig: 2. Lengths for Phasing Units: L1, any convenient length of 52-ohm coax. L2, L12, quarter-wave 20m. 75-ohm coax. L3, L13, quarter-wave 15m. 75-ohm coax. L4. L14, quarter-wave 10m. 75-ohm coax. L5, L15, quarter-wave 20m. 52-ohm coax. L6, L7 and L8, L16, 52-ohm coax, kept as short as possible (see text). L9, half wave 15m. 52-ohm coax. L10, half wave 10m. 52-ohm coax. L11, L17, any equal length of 52-ohm. Sw1, 4-pole, 3-way. Sw2, 4-pole, 3-way. Sw3, 4-pole, 2-way. (These switches should all be high-quality ceramic.) The feeder lines to the two vertical aerials Ae.1 and Ae.2 must be of identical electrical length.

the wires as short as possible, then mount the switches on the front panel. Using three or four standoffs construct a common earthing line around the switches, made of 12 or 14g. wire. The braiding at the ends of all the lengths of coax which are connected to the switches should be soldered securely to this wire. The input and output sockets should now be mounted on the back of the box.

Next, solder all the measured lengths of coax to the switches and also the 52-ohm coax from Sw1C and Sw1D to the two output sockets. Now make the connection from the input socket also with 52-ohm coax, but at the switch end connect to Sw1A only.

Alignment

Connect a GDO to the input socket of the unit by taking a single loop of wire loosely coupled to the coil, and switch Sw1 to 20 metres and Sw2 to "in phase." With nothing plugged in to either output socket, check for reaonance, *i.e.*, dip the meter, at some frequency below 14 MHz. (You are now measuring L1+L2+L6+L11.) Check this frequency accurately, and now disconnect the input coax (L1) from Sw1A and connect to Sw1B. The resonant frequency of this section should be identical with that of the first section, if the two antennae are to be exactly in phase. If this is not the case they can be balanced by shortening or lengthening L6 or L16, whichever is more convenient. Repeat this check until the resonant frequencies of both sections are identical.

Now, with Sw1 switched to 15 metres carry out the same check for "in phase" on this band. Should adjust-

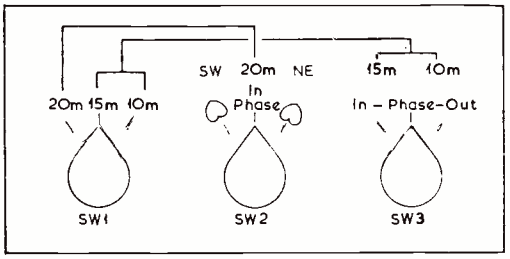

Fig. 3. Control Panel Layout

ment be necessary the cable to be trimmed is L7. If it is not possible to balance them it may be necessary to add a short length of 52-ohm coax between the end of L13 and the connection to Sw1d.

Repeat the same procedure for 10 metres, adjusting the length of L8, or adding a short length of 52-ohm coax between the end of L14 and Sw1D.

It is not so important to check the "out of phase" or cardiod positions; if these are not exactly 180° or 90° it simply means that the directional pattern of the two verticals will be slightly moved to one side or the other—however, with patience it is possible to get these to perfect accuracy by the method previously described, but noting the frequency difference between the "in phase" and "out of phase," and adjusting the appropriate switch connections accordingly.

Results

The foregoing may seem somewhat complicated, but the fact is that no antenna system will work at maximum attainable efficiency unless quite a lot of time is spent on detailed measurements and adjustments. If the system is correctly adjusted and the two ground planes are reasonably in the clear, the lobe patterns and extremely low-angle radiation prove most effective for DX workings. The writer's system is laid out to give the two cardiod patterns on 20 metres towards VK and ZL for the long and short paths. Signal reports have been most gratifying, and the ability to cut down (and even eliminate) QRM at the turn of a switch certainly makes the effort seem well worth while.

SWITCHED SELECTIVITY FILTER FOR THE FRG-7 USING TOKO MFL455 AND MFH41T FILTERS

PLUS ADDITIONAL IF AMPLIFIER STAGE

R. F. MILLINGTON

THE circuit devised, and described in the July 1978 issue of *Short Wave Magazine*, by R. Barker was just the circuit I was looking for to get the best out of my FRG-7, but no way could I afford—or indeed would the XYL authorise—the £50 outlay for the Collins filter. Not having much experience in working out component values for changes in impedances etc., I nevertheless decided to take a chance and send for the Toko SSB filter, mentioned by Mr. Barker, and have a go. Also, unwilling to apply a hot iron to a PCB in a confined space for any length of time, I decided not to remove the original filter but to bypass it, and use the Toko MFH41T mechanical filter, with a quoted passband of 4 KHz.

The circuit, Fig. 1, is the same as that given by Mr. Barker, except for the components forming the input and output impedances. R1 and R2 give the required input impedance for the SSB filter, 5K, and R11 in conjunction with the impedance of Q405 provide about 1K. R4,R5, R12,C5 and C8 provide the required impedances for the AM filter.

Originally the filter board was made and tried out, with the hoped for improvement in selectivity—though with the reduction in signal as Mr. Barker described; whether or not the losses were worse with the Toko filter I do not know, but although readable with the phones on, loudspeaker volume was very poor, even with the volume control fully on.

I found a circuit (Fig. 2) for a crystal-filter/IF amp, and adapted the IF amp circuit. Although not AGC controlled it works extremely well for the small number of components involved, and for the extra cost it is well worth while; Fig. 4 shows layout. The input impedance of the IF amp, although more than that required by the filter, did not seem to detract from the efficiency of the filter, so R11 and R12 were left in circuit and not changed.

It was thought advantageous to have the filters switchable independently of the 'Mode' control, and the spare contacts on the 'Lights On/Off' switch was used, so as not to drill into the metal work. It was wired so that the AM filter was in circuit with the lights on. There is one problem with this method of switching when the two filters used are on different frequencies: with the BFO correctly tuned to give 1.5 KHz output with the SSB filter in circuit (*i.e.* with an IF of 453.5 KHz) and BFO for USB on 452 KHz, and the AM filter on 455 KHz switched in, the resultant output will be 3 KHz. It is of course the same on LSB, except that the resultant AM filter output is now zero beat. When reading Morse this can be an advantage; but whether CW or SSB, if tuned-in correctly using the AM filter, then no retuning is necessary when switching to the SSB filter.

T1 and T2 are part of the MFL455 filter, and come with a small printed circuit board. This was used and mounted on the *Veroboard*, Fig. 3, using stiff pieces of wire (resistor lead off-cuts). T3 comes with the MFH41T filter

Table of Values

Fig. 1

R1, R4 = 3K
R2, R5 = 2K
R3, R10 = 2.2K
R6, R8 = 47K
R7, R9, R11 = 680R, 0.5w.
R12 = 470R
C1, C3, C4,
C6, C7, C9,
C10, C12,
C13, C14 = 0.1 μF
C2, C11 = 4.7 pF s/m
C5 = 500 pF, s/m
C8 = 200 pF s/m
L1 to L8 = Type 8RB 10mH fixed

F1 = MFL455 mech. filter, supplied with matching transformers T1 and T2.
F2 = MFH41T mech. filter, supplied with matching transformer T3.
D1 to D6 = 1N4148
TR1, TR2 = BC109
Note: Components L1 to L8, F1 and F2 are available from *Ambit International.*

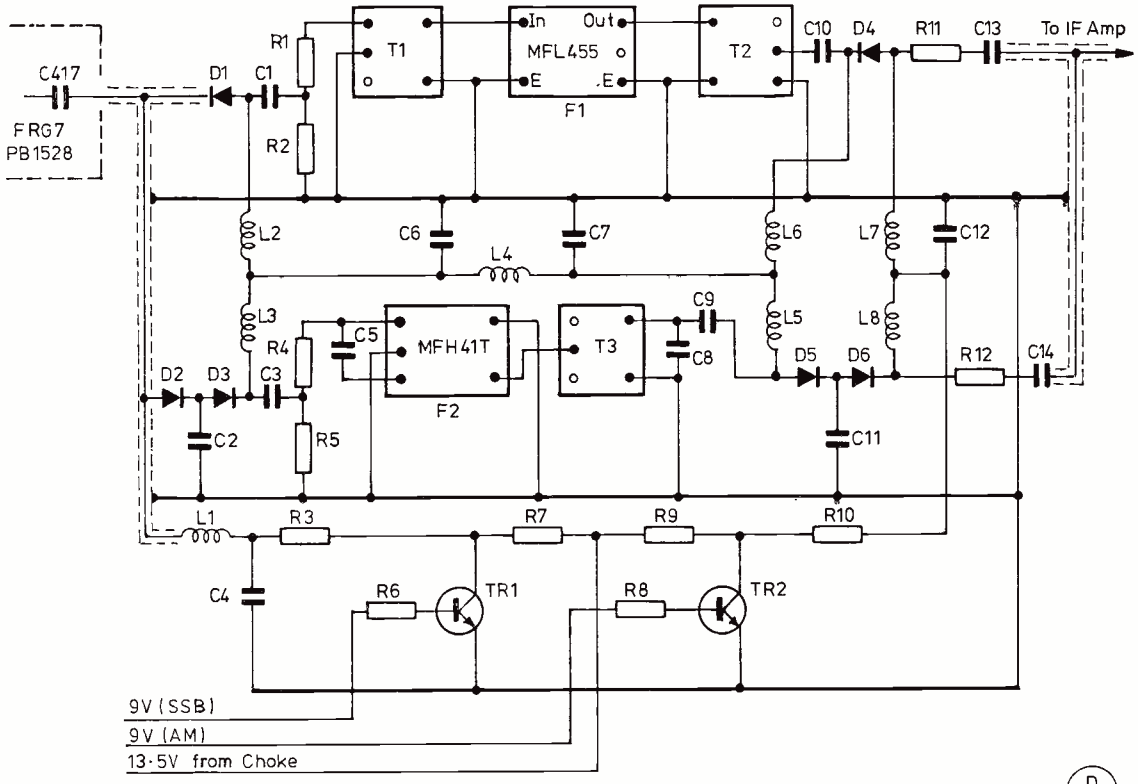

Fig. 1 SWITCHED SELECTIVITY FILTER

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but with no PCB, so care has to be taken in enlarging the *Veroboard* holes and fitting the pins in without force. If making up the filter *and* the IF amp, then use a piece of board approximately 7" long and 3" high; only 26 holes on this side were used as the remainder were used for mounting the board. A bracket was constructed with

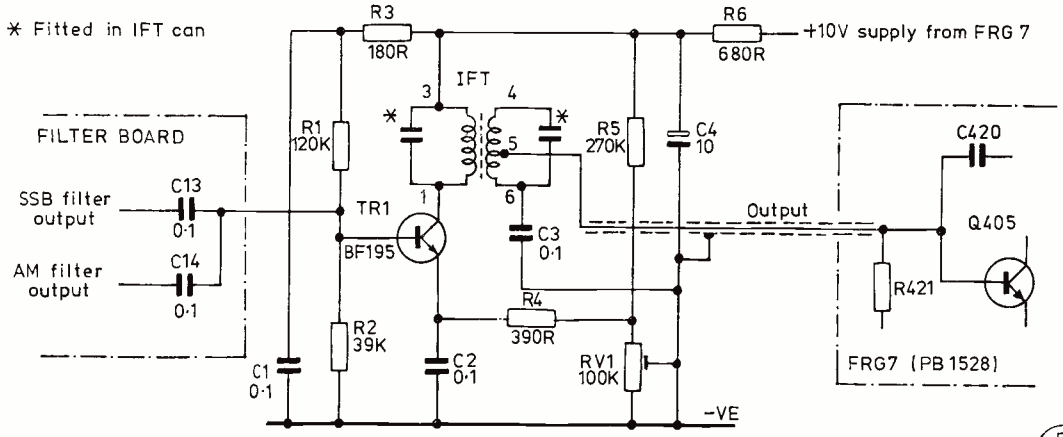

Fig. 2 ADDITIONAL IF AMPLIFIER

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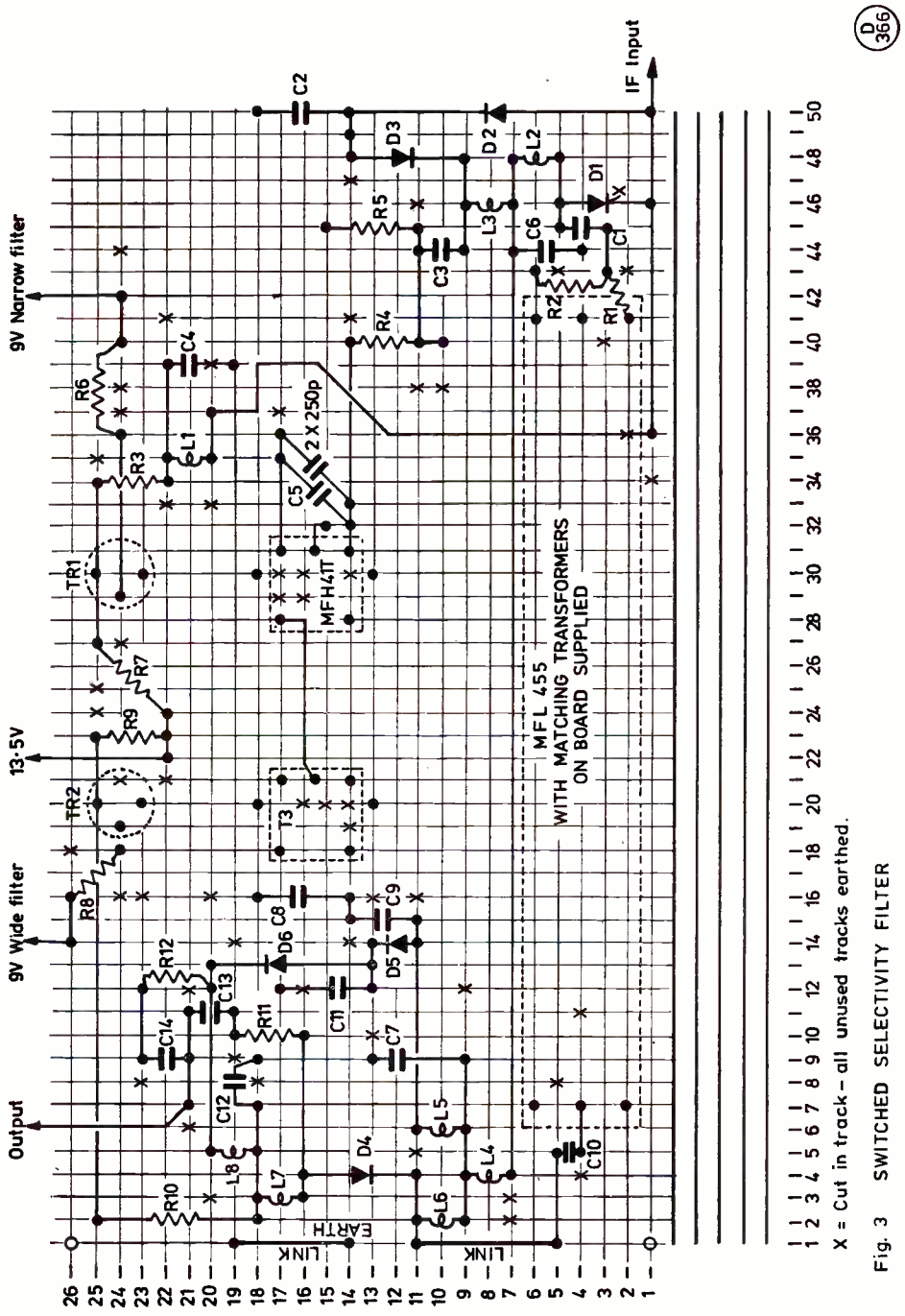
The IFT used (a Denco IFT18/465) was recovered from the junk-box and is in no way critical: the circuit should work with any coupling coil as long as it can be turned to the IF frequency. Indeed a low-value resistor can be tuned to the IF frequency. Indeed a low-value resistor can be substituted for the IFT, and the output taken via a 0.1 μF capacitor from the collector's junction. C1, C2 and C3 are ceramic at 30v. working; C4 is electrolytic at 25v. All resistors are ¼ watt.



X = Cut in track – all unused tracks earthed.

Fig. 3 SWITCHED SELECTIVITY FILTER

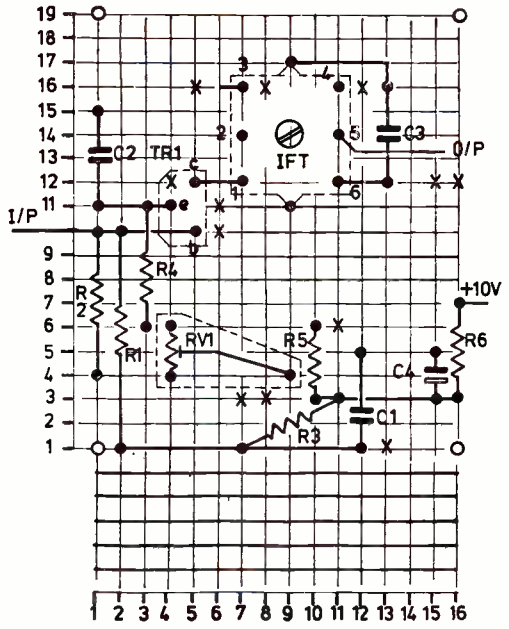


Fig. 4 ADDITIONAL IF AMPLIFIER

with two feet bent at right-angles with centre holes, made so that the feet fitted over the fixing holes of the IF/AF PCB of the FRG-7, and so that it went between the inner end of the battery pack and that PCB. The *Veroboard* is then bolted to the bracket so that the SSB filter just clears the AF output IC and heat sink on this PCB. In this position the battery pack can still be used and no alteration has been made to the original set. No instability was noted either.

In order to keep the original filter in its place, the end of C417 at its junction with the filter was lifted (Fig. 5) and the inner of screened lead soldered directly to it, and the lead taken to the input of the switched filter. There is a small length of track leading from the output of the original filter to the junction of Q405, R421, and C420: this is cut with a sharp knife, making sure there is no bridge. The output from either the filter or the additional IF amp is taken to the R421/C420 junction *via* another length of screened lead. Should it be needed to return the set to its original condition, it is an easy matter to unsolder the screened leads, solder a bit of wire across the cut track, and reseat the end of C417.

As in the original circuit, the switching transistors get their voltage from the output side of the smoothing choke. Identify the pole of the 'Mode' switch which carried the 9v. BFO supply, and solder a length of wire from that point to the centre of the three connections on the unused side of the 'Lights' switch. Then connect a wire from the base of each switching transistor, as in the original circuit, one each to the remaining unused connections. The IF amp supply was taken from the set's 10v. stabilised supply—a convenient point being the input to the 'Lights' switch, as then all three wires can be bound together to make things tidy.

Setting Up

Follow the procedure described in Mr. Barker's article to receive, in effect, the receiver's 1 MHz oscillator. Adjust RV1 for maximum gain, then screw in the core on the output side of the *Denco* IFT until the signal is heard. Repeat the same procedure with the other core, adjusting the IF gain control, RV1, for best volume. Once this stage is aligned, adopt the procedure as detailed by Mr. Barker, remembering that in addition the cores of the filter's matching transformers will also need peaking up.

The IF gain control RV1 is adjusted to give enough amplification without overloading the receiver's IF strip and cause distortion, or gain which cannot be turned down by way of either the AF volume control or the *Ae* attenuator. Indeed, if the control was brought to the front panel it would be a useful asset, but I concentrated on being able to return the FGR-7 to its original state.

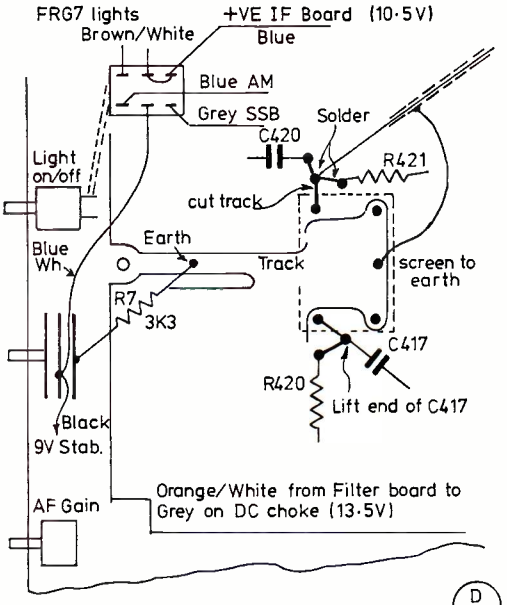


Fig. 5 UNDERSIDE OF IF-AF BOARD PB 1528

In conclusion, the circuit works very well, and the frustration factor of listening on 80 metres in the evenings has been greatly reduced, and the expense—in total not more than £20—has been well rewarded with far more enjoyable short wave listening.

My thanks to Mr. Barker for going to the trouble of publishing his circuit.

Reference:

"General Coverage Receiver", by F.G. Rayer, G30GR, *Practical Wireless* March 1976 (for additional IF stage and crystal filter).

SLOW-SCAN TELEVISION, PART II

J. BROWN, G3LPB

Now we have described the Monitor, we hope you built one and got it going. If you did, you will doubtless be ready to start into sending pictures as well as receiving them; if you didn't, well, just resurrect it from the loft (or wherever you put the projects that fall by the wayside) and *get* it going, as it isn't all that hard.

Most people start by using a Monitor and getting someone who has a camera or flying-spot scanner to make a suitable tape; when it comes to your turn to transmit you have just to press the start button, and as the reels rotate so the transmitter is modulated with picture. This may become a bore after a while, but you should go through this phase if only because it is one way of gaining your own "test tape" with which you can check your station.

There are two methods of generating pictures: a camera or a flying-spot scanner. The camera is to be dealt with later: suffice it to say here that the choice is between vidicon and plumbicon tubes and we have opted for the former in *Part III*.

By implication then, we are going to describe a flying-spot scanner. This will enable us to transmit our own pictures, captions, and so on, by way of drawings or photographs.

We have to find a photo-multiplier or two, we have to have a CRT, and we have to find the mechanical arrangements to give an acceptable picture. Oh, and the electronics!

There are two basic methods used, which we may classify as the see-through method and the reflected

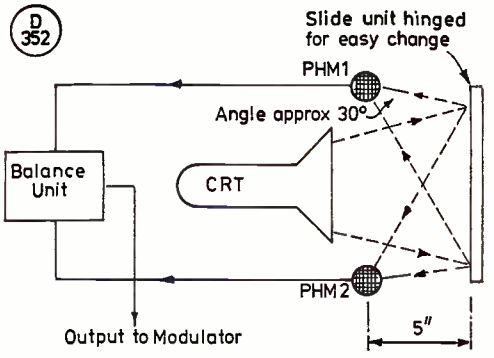


Fig.1 USING TWO PHOTOMULTIPLIERS

Sensitivity is adjusted mechanically, and by the balanec unit.

method, *see* Figs. 1 and 2. Fig. 1 shows the CRT on which we have a scanning raster which provides the light; the spot as it travels "looks at" the picture, and the reflected ray travels to the two photo-multipliers. In order to get a useful picture you have to have mechanical adjustment horizontally, radially and vertically for both photo-multipliers independently, and a balance unit to combine the two multiplier signals at a level which allows for variation in the two multipliers. (There is a variation on this theme which uses a lens and focussing arrangement to ensure the spot only looks at one "bit" of picture at a time—*Ed.*)

Having looked at the hard way, turn to Fig. 2, which is so much easier and gives as good or better results. Here we have a raster on a CRT as before, but now we have a transparency in front of the tube, and a single photo-multiplier. The multiplier can only see the quantity of light allowed through by the bit of the transparency

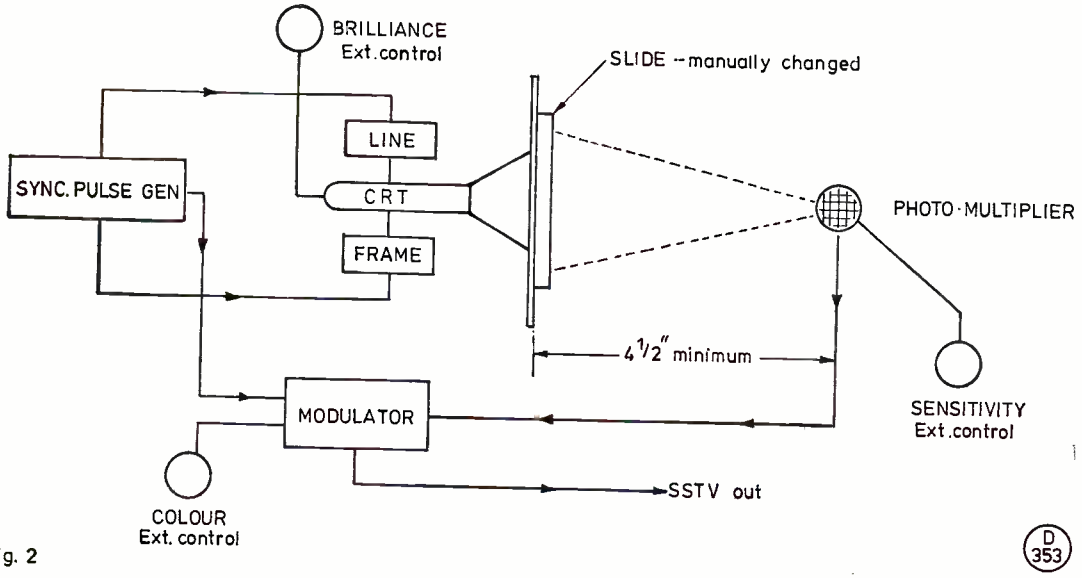


Fig. 2

Single photomultiplier system.

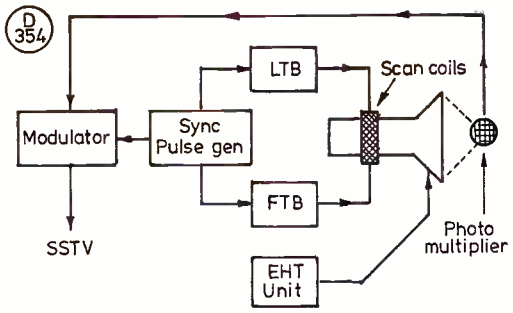


Fig.3 FLYING SPOT SCANNER BLOCK DIAGRAM

being scanned. It may look to you that this method has limitations by the mere fact of the use of transparencies but, for example, with the presence of a phase-reversing stage at the flip of a switch between multiplier output and modulator input, you can use a photo-negative, and use black letters to give white ones on the RF output.

We will try the method of Fig. 2 as being simpler and easier to set up. We need a source of synchronised light to scan the picture, which the block diagram shows to be the CRT: in other words we need a raster. Thus we need frame scan and line scan for the CRT, the photo-multiplier to turn light into electrical voltage, all of which have to be co-ordinated by suitable pulses—these are locked to the mains 50 Hz and produced in a unit called a Sync Pulse Generator; the electrics are shown in Fig. 4. C1 and C2 are given nominal values; these will work OK but later you may wish to get the timing closer and may then select their values. The spare gates on IC1 are deliberately un-used so that if we require other units in the station we can derive pulses from these spare gates to hold all in sync with each other. The BD131 is a simple PSU stabilising arrangement, the 5.6 volt zener allowing for the 0·6 volt drop across the BD131. For outputs we have line sync pulses, frame sync pulses, and combined sync pulses.

Now to the Modulator—*see* Fig. 5. Here we meet the VCO (voltage-controlled oscillator), mentioned in *Part I*, in the flesh; and lo!—it is nothing more than a common-or-garden multi-vibrator. However, we need to set it up, for which we need either a counter or a source of audio which we can define pretty closely. (One use for a 'scope, a bit of mains, and the Lissajous patterns!). Apply mains power with no other inputs initially, and put a speaker on one of the output transformer secondaries, and set all pots to centre. Ground Tr2 base, and adjust the two "white" pots equally and in the same direction for a clean 2300 Hz signal; if an oscilloscope is available we can check that both halves of the 2300 Hz are good and clean, as well as on frequency.

Unground Tr2, earth Tr4. Now adjust the "sync" pot in the emitter for 1200 Hz; release Tr4, ground Tr3, and adjust "black" pot in Tr3 emitter for 1500 Hz. Go

Tables of Values

Fig. 4.

R1 = 8·2K
R2 = 10K
R3 = 8·2K
R4 = 3·3K
R5 = 1K
R6 = 390 ohm
R7 = 390 ohm
R8 = 1K, 1w.
C1 = 25-47 μF
C2 = 16-25 μF
C3 = 1 μF, polycarbonate
C4 = 10μF, 10v.
C5, C6, C7,
C8, C9, C11 = 0·1 μF
C10 = 10 μF, 25v.
TR1, TR2 = BC113
TR3 = BD131
IC1, IC5, IC6 = 7400
IC2, IC3 = 7493
IC4 = 7490
ZD1 = 5·6v., 400 mW.

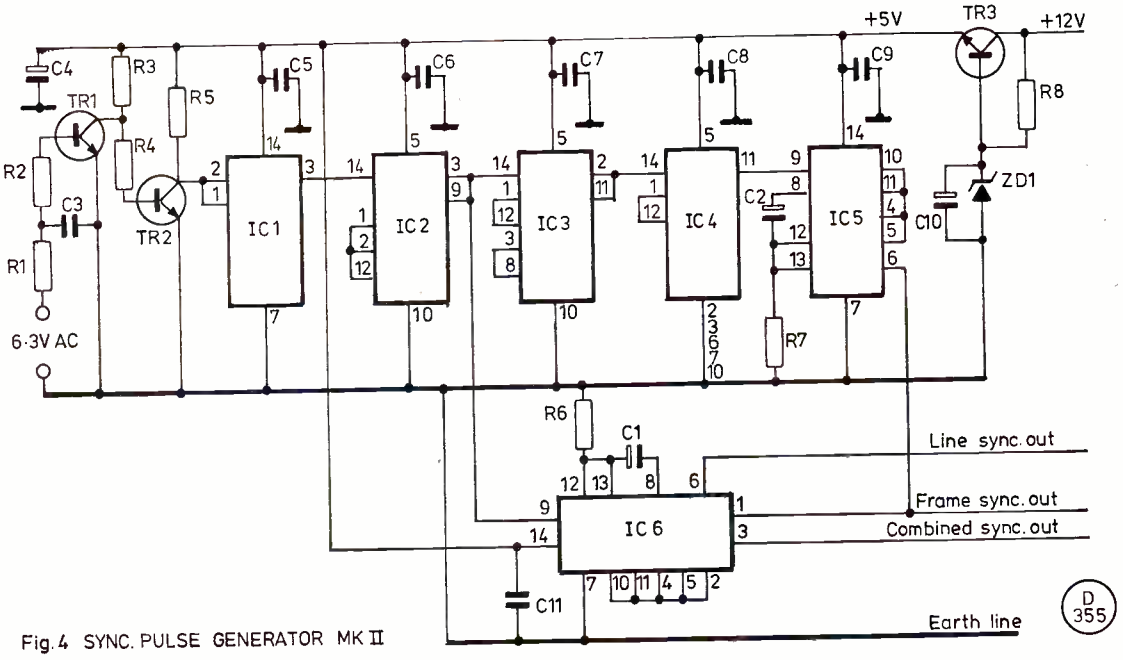


Fig. 4 SYNC. PULSE GENERATOR MK II

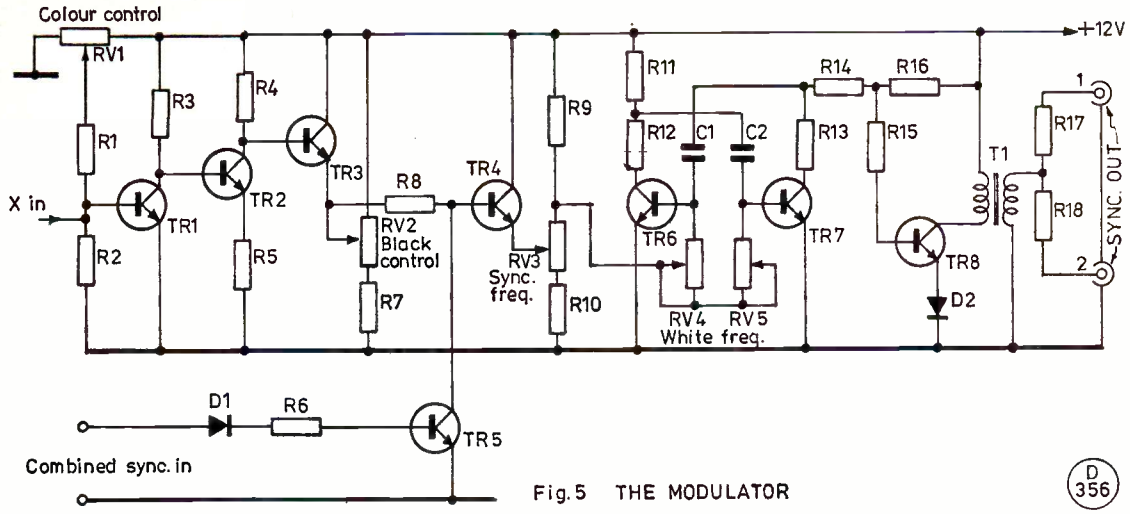


Fig. 5 THE MODULATOR

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through them more than once, remembering that they may be a little interdependent. Release Tr3 from earth.

Now remove the external inputs and inject "combined sync" from the sync pulse generator; we should now hear *sync-driven* audio tone in the speaker (if you've remembered to put the 50 Hz input into the Sync Pulse Generator!).

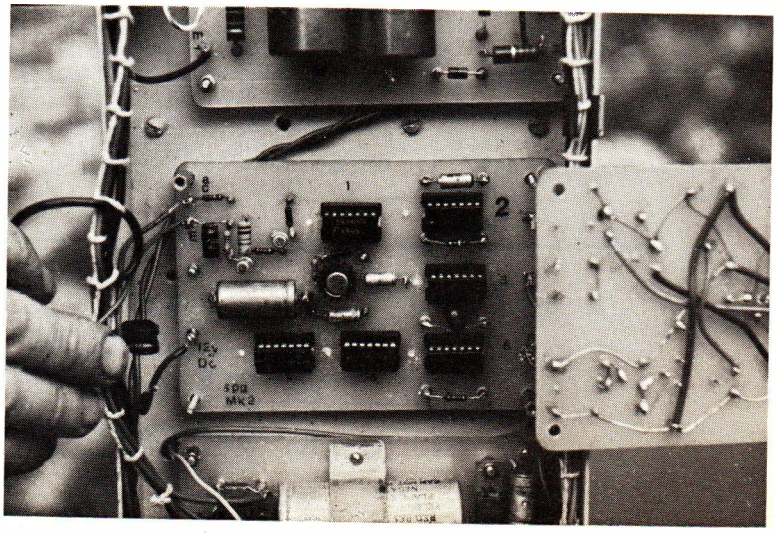
Timebases

See Figs. 6 and 7. These boards are similar to the ones in the Monitor. If one is only going to use the board in a Scanner, we could remove the unijunction, VR1, the 1K resistor and the 220 ohm one. Thus we would be feeding into Tr2 through the 2·2K resistor. In Monitor use, one sets the VR1 to the unijunction circuit to give more than 120 lines, and so let the input from the SPG to Tr2 stop the game after 120 lines exactly; thus the monitor is using a free-running timebase which locks as soon as it sees a sync pulse. P2 sets the amplitude (width) of the sweep, and P3 is a shift control. The wirewound pot in series with the scan coil is partly to allow the output transistors to "see" a more civilised impedance, but it may also be used as an external width control; the output transistors can be BD131/132, or BD139/140, or the

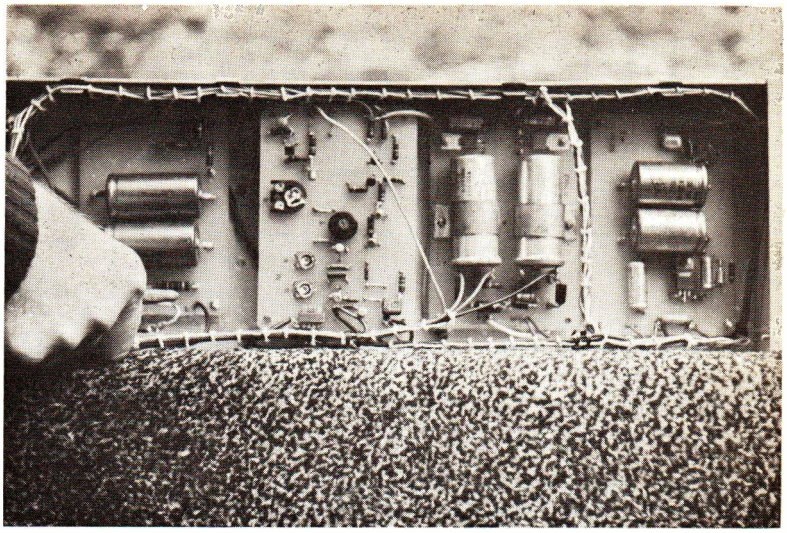
Table of Values

Fig. 5

R1 = 8M	R16 = 390K
R2 = 2·2M	R17, R18 = 100 ohm
R3 = 500K	C1, C2 = 0·001 μF
R4 = 4·7K	TR1, TR2,
R5 = 1·2K	TR3, TR4 = BC109
R6 = 82K	TR6, TR7 = BC107
R7 = 1K	RV1 = 47K (colour control)
R8 = 8·2K	
R9 = 4·7K	RV2 = 10K (black control)
R10 = 2·2K	
R11, R12, R13 = 2·7K	RV3 = 2K (sync. freq.)
R14 = 1·5K	RV4, RV5 = 100K (white freq.)
R15 = 680 ohm	D1, D2 = IN4148



The completed SPG board; *see* **also Fig. 4.**



An underside view: the four sections are, right to left, EHT multiplier, 12v. positive and negative power supplies, modulator, and other power unit.

MJE340 series, depending on who you are friendly with!

The frame timebase board is the same for all practical purposes with slight changes of values to cope with the different speed. Again it is suitable for a monitor, and again the unijunction and its associated components may be discarded. (While it is true they *may* be omitted if so desired, one feels their presence in working order will be found to be of considerable use when things go wrong, and interchangeability of PCBs as between Monitor and FSS is a great aid to fault-finding—*Ed.*) Tantalum is even more important for the electrolytics here: P2 is Height, P3 is Vertical Shift, and the wirewound pot in series with the scan coils becomes an external Height control. At each stage, the semiconductor devices are similar in both boards.

E.H.T.

See Fig. 9. A 5FP7 CRT is used, and the EHT for the tube is obtained from an old TV EHT transformer. As one dismantles, care should be taken to note what-goes-where, particularly if there is an air-gap in the ferrite. We want to save the *over-wind* which is usually the biggest, and usually the outer. Now we require two windings with which to provoke the brute into ringing. So, first to go on is a winding of 30 turns of 28 gauge enamelled wire, with start and finish marked. Douse with *Durofix* to stick all in place, then add a layer of PVC sheet (*Melinex* or *Kapton* is even better than PVC). Allow to

Table of Values

Fig. 6

R1 = 1K	C1 = 0·47 μF
R2 = 220 ohm	C2 = 0·33 μF
R3 = 2·2K	C3, C4 = 0·1 μF
R4 = 750K	C5 = 0·01 μF
R5 = 3·3K	C6, C7 = 1 μF, 40v.
R6, R8 = 10K	TR1 = 2N2646
R7 = 22K	TR2 = BC109
R9 = 100 ohm	TR3 = 2N3819
R10 = 100K	TR4, TR5 = *see text*
R11 = 22K, 1w.	RV2, RV3 = 10K
R12, R13 = 5 ohm	RV4 = 20 ohm, w/w
	IC1 = 741

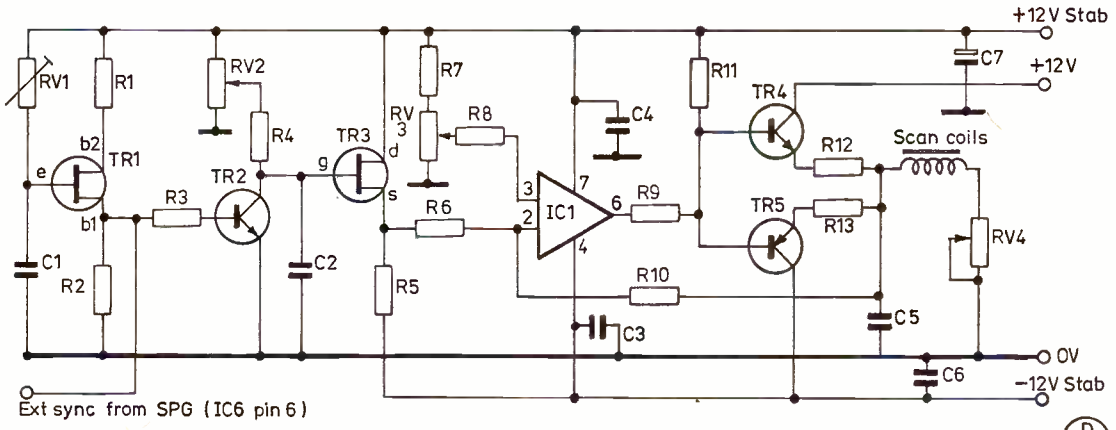


Fig. 6 LINE TIMEBASE

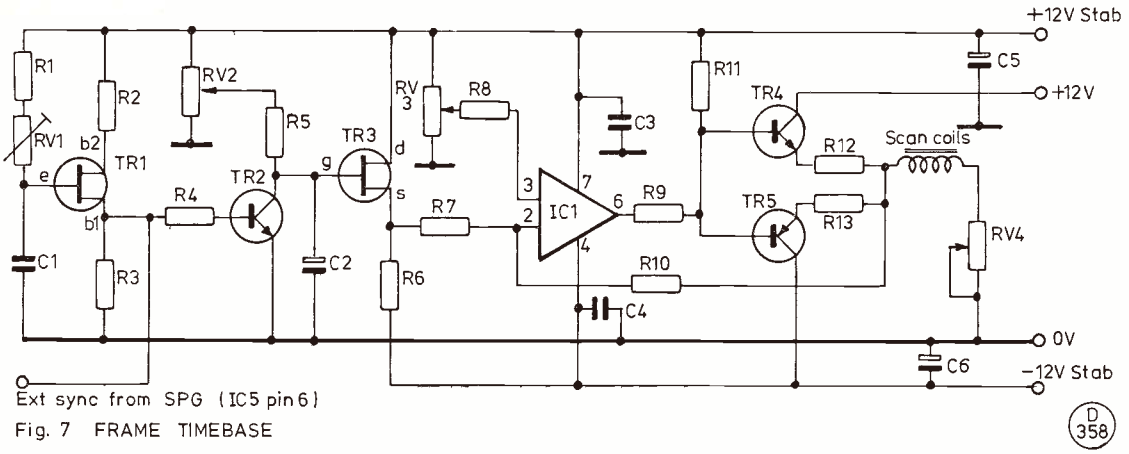


Fig. 7 FRAME TIMEBASE

dry, and follow with 8 or 9 turns of 28 guage, marking start and finish as before, dope and cover with PVC as before. The third winding is 200 turns of 30 gauge to produce the 250 volts for the CRT electrodes. Now put everything back together, and make sure the overwind is well insulated. Connect in accordance with the circuit, while monitoring current and looking for around 1·1 amp. typically and the sound of the ringing just audible. If no whistle and around 3 amps. or so, switch off quick! In the latter case, one of the windings on the switching transistor side needs reversing of its connections (when another try will almost certainly demonstrate that you *didn't* mark the starts and finishes adequately!). The EHT is derived by way of the tripler, built up from scrap triplers or quintuplers from old TV sets; build them up with capacitors from the same source, and between fibre boards. You can't be too careful here; for example a sharp point on an otherwise inoffensive soldered joint has been known to provoke a most annoying corona discharge. Mount the whole assembly at least 1 inch clear of any earthed metal parts. The typical result is some 5·1 kV for an input current of around an amp;

Table of Values

Fig. 7

R1 = 180K	C1 = 100 μF
R2 = 1K	C2 = 2·2 μF
R3 = 220 ohm	C3, C4 = 0·1 μF
R4 = 2·2K	C5, C6 = 1 μF, 40v.
R5 = 20M (2 X 10M)	TR1 = 2N2646
R6 = 3·3K	TR2 = BC109
R7 = 10K	TR3 = 2N3819
R8 = 20K	TR4, TR5 = *see text*
R9 = 100 ohm	RV1 = 250K
R11 = 22K, 1w.	RV2, RV3 = 10K
R12, R13 = 5 ohm	RV4 = 20 ohm, w/w

several have been made this way, and one was happy to draw a mere 600 mA—never since have we been so lucky!

Photo-Multiplier

Consider Fig. 8. This shows the supplies for a single photo-multiplier; it calls for 600-800 volts to the 931A by way of a voltage-doubling power supply; a look at the PSU circuit (Fig. 10) will indicate that the photo-multiplier transformer is fed from around 12 volts 50 Hz, which in its turn is derived from the mains transformer in

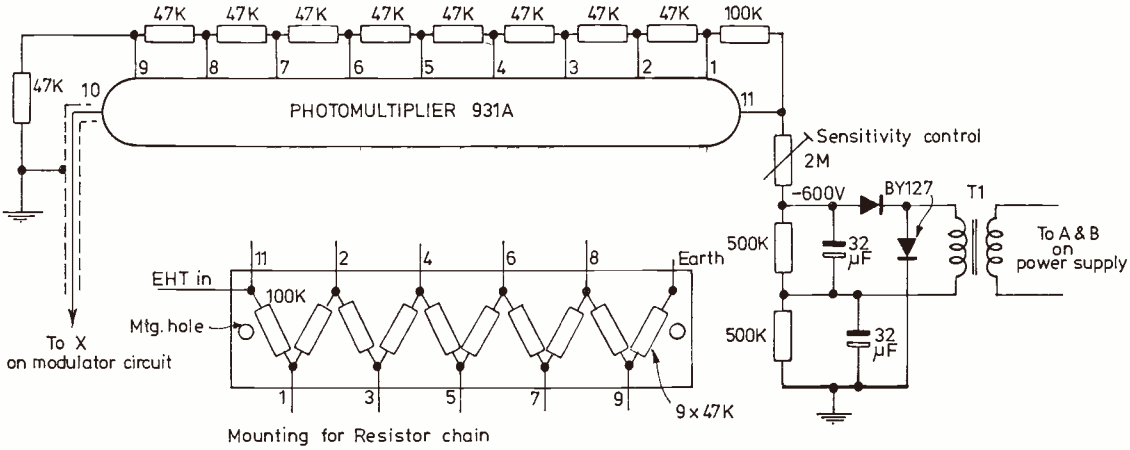


Fig. 8 MULTIPLIER SYSTEM

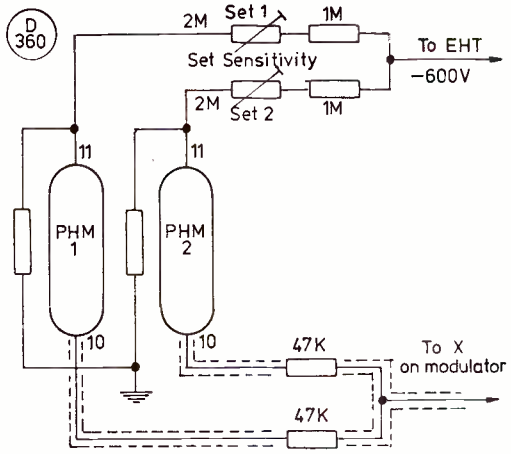


Fig. 8a MODIFIED MULTIPLIER SYSTEM USING 931A's

" . . . when you get this picture, don't take it too literally OM — I'm just off to a fancy dress ball . . . "

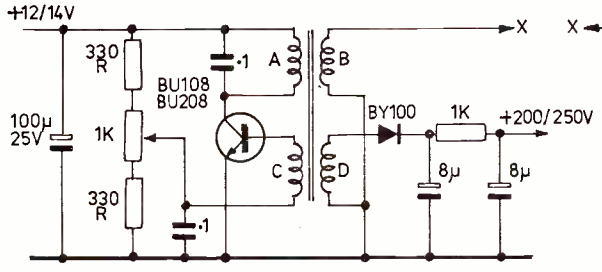
the PSU proper. This is quite intentional, as these high voltages can bite, and putting your finger on them won't make the power-station notice even though you fry. *BE WARNED!*

The scrap view shows how the 47K resistors can be mounted on a bit of fibre board with pins. If you have only the copper-clad stuff, you'll be able to see how well it sticks while you're getting it off! If you want to play with the two-multiplier system, then Fig. 8a shows the slight differences required; in essence the light from the CRT is reflected from the object and this reflected light is collected by the two 931A photo-multipliers. A shiny surface is the thing to avoid with this sort of set-up, and it will probably be found helpful to use an optical focussing system to get a decent scan. The two multipliers are treated as individuals and the voltages balanced for equal sensitivity; output from pin 10 of each multiplier is 'commoned' after passing through the 47K resistors and taken to 'X' on the multiplier. In addition to the equalising electrically, one may expect a great deal of juggling with the mechanical arrangements for a satisfactory result, both horizontally and vertically.

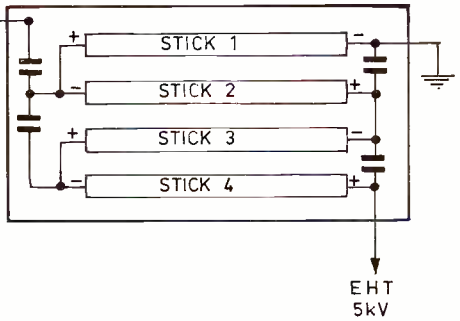
Power Supply

Transformers 1, 2, and 4 are all ex-frame transformers from the VC-series TV chassis marketed by KB, RGD, and a few other firms; however any transformers which can dish out 14 volts AC at about 1 amp will do fine. T3 is a transformer having two 6·3 volt windings.

Look at Fig. 10: We get plus-12 volts DC from T1, and minus-12 from T2, so note which way round the diode goes! In each of these R1 can be around 1000 ohms, C1 at 500 μF, C2 at 1000 μF, with C3 around 0·1 μF in parallel. Some less-experienced constructors may wonder at the sanity of putting this tiny capacitance across



(a) Circuit of EHT Unit



(b) Circuit of EHT rectifier system

D 361

Fig. 9 EHT ARRANGEMENT

This complete unit should be mounted away from any 'earthy' part of the case by at least an inch; these high voltages are dangerous and must be treated with respect, and covered-in where possible. Stick rectifiers are from old EHT tray triplers, and capacitors from old EHT trays.

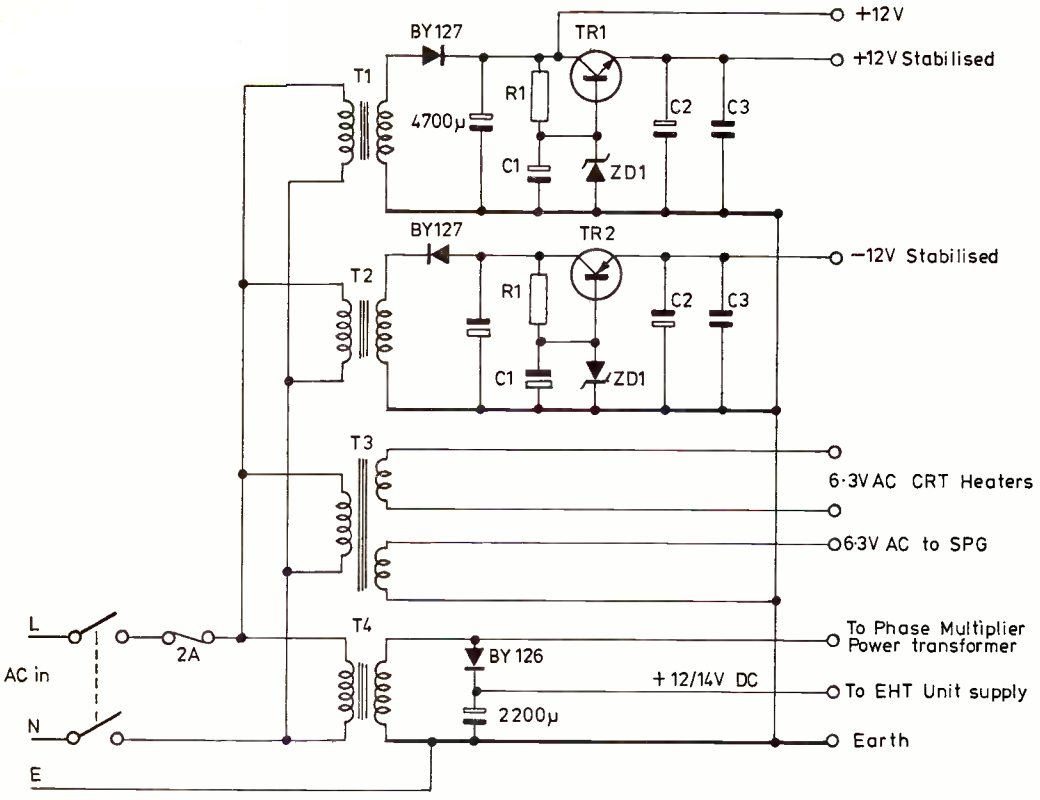


Fig. 10 POWER UNIT

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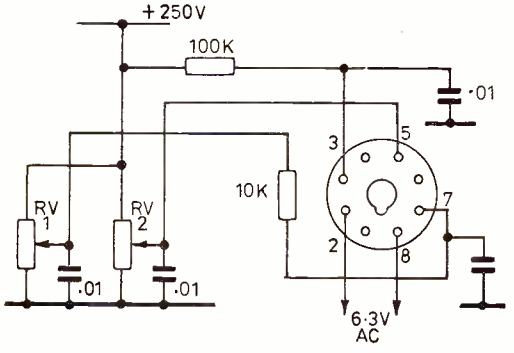
1000 µF—the reasoning is that the high capacity component will cease to "look like" a capacitor as the frequency looking at it rises; at this frequency the smaller component is still behaving as a capacitor and takes over the work. Tr1 will clearly be a 2N3055, and Tr2 must be a *pnp* of equivalent beef, preferably a silicon; but OC28/OC36 will serve at a pinch. The zener diode may be 13 volts, but it may also be found that a little juggling by selection required if the *pnp* Tr2 has to be germanium. Adequate heatsinking goes without saying. For the rectifiers, BY127's can be used on the 12-volt lines from T1 and T2. Next we turn to T4, and here we see A and B give us 12-14 volts AC, which is fed to the transformer of the photo-multiplier in Fig. 8, and by way of the half-wave rectifier and smoothing capacitor we obtain the 12-14 volts of DC which appears in Fig. 9 and is chopped and



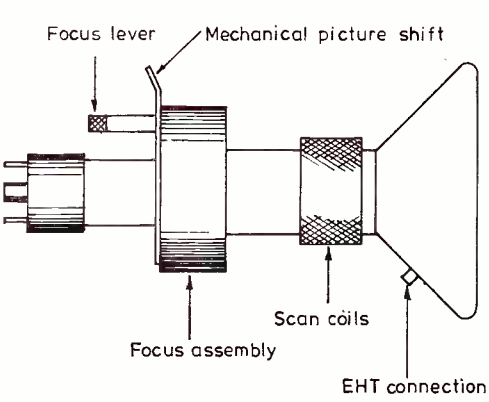
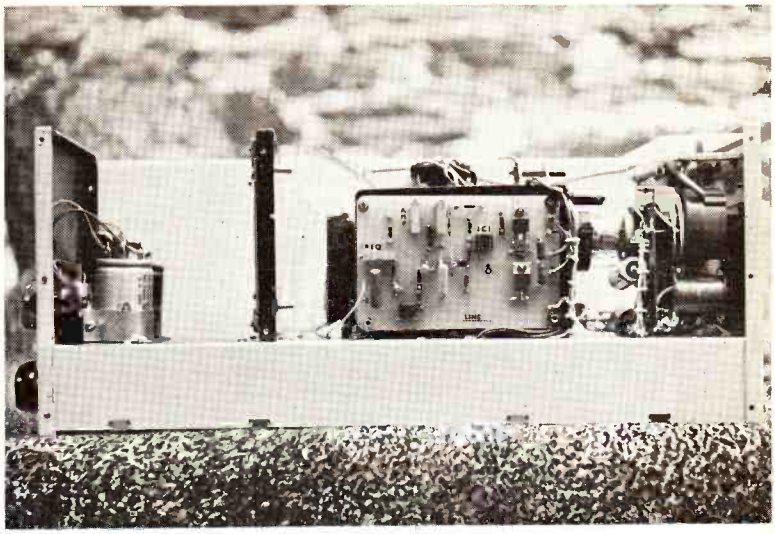
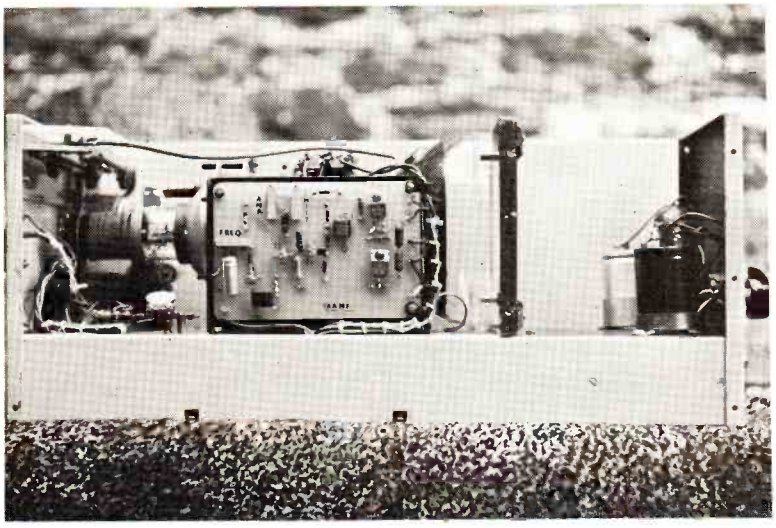


Fig. 11 CRT GENERAL LAYOUT

D 363



Line timebase PCB.



Frame timebase PCB.

used to generate the EHT for the CRT. This business of transforming down first and then up again causes the EHT supply to be poorly regulated, both at CRT and multiplier—but this is a safety measure as already indicated. Should the CRT EHT not be satisfactorily stable, a bleed string of resistors making up 200 megohms from the 5 kV to ground may help—the values selected so that no individual resistor has more than the rated voltage across the ends (usually 250 or 500 volts).

We are now left with T3. One winding on this supplies the CRT heater, and the other goes to the sync-pulse generator, where it serves both as the master timing voltage and provides 5 volts DC for the IC's. Incidentally, this may be a good time to warn that if the 5-volt supply goes up in value beyond an *absolute maximum* of 5·25 volts, you may as well start replacing the beetles. So—don't let the volts rise! The 0·1 μF capacitors across each IC in the SPG is further decoupling yet, partly as such and partly to prevent any fast spikes of high volts as the various IC's do their thing.

The CRT

This is Fig. 11. P1 is the front-panel brilliance control, while P2 is the internal one which is set for low illumination when the P1 setting is almost off; thus P1 is effective over most of its range.

Photographs

These will serve to show how the various bits go together, and will give some idea of the shape of things to come from your workshop.

to be continued

KEY BITS AND PIECES

IDEAS FOR TWO LOW-POWER CW TRANSMITTERS COSTING ALMOST NOTHING TO BUILD

SIMPLE CW rigs capable of being run from shoestring power supplies are frequently fascinating to construct and operate, and because they cost so little to put together are often attractive propositions to both old old hands and newcomers alike. From the newcomers viewpoint in particular, getting 'airborne' *via* commercially produced gear requires a sudden cash demand unlikely to be met by a 'piggy bank' source! It can then be distinctly advantageous to get one's feet wet gently, and by taking one, or maybe two, old-fashioned valves—and valves still refuse to 'die' in amateur spheres—and linking them together appropriately a lot of on-the-air fun can be had for next to nothing. And it is really quite surprising just how much of the world can be worked with just a few watts of CW into a decent aerial.

Low power 'Top Band and 80' rigs have always been popular, and nowadays it seems that QRP working on other bands, too, is on the increase.

Circuitry of a couple of low power transmitters now follows.

Transmitter No. 1

A recently built hybrid CW rig for the 7 MHz band is shown in Fig. 1, final output being derived from a VXO source. The VXO allows a frequency swing of some 4 kHz, thus a few crystals of differing frequency in the 7 MHz CW band patch afford a fair final coverage and yet the rig remains 'rock bound'. The VXO was described in *Short Wave Magazine* earlier (March 1979, p. 38) with constructional details but here only the circuit is reproduced attached to the valved section it drives.

The few milliamps of current at 12v. DC required by the VXO is obtained by rectifying the 6.3v. AC heater supply and doubling it—BY100 rectifiers being used for D1 and D2 merely because they were to hand. Resistor R15 provides a discharge path for the circuit when S1C is at the 'Receive' position.

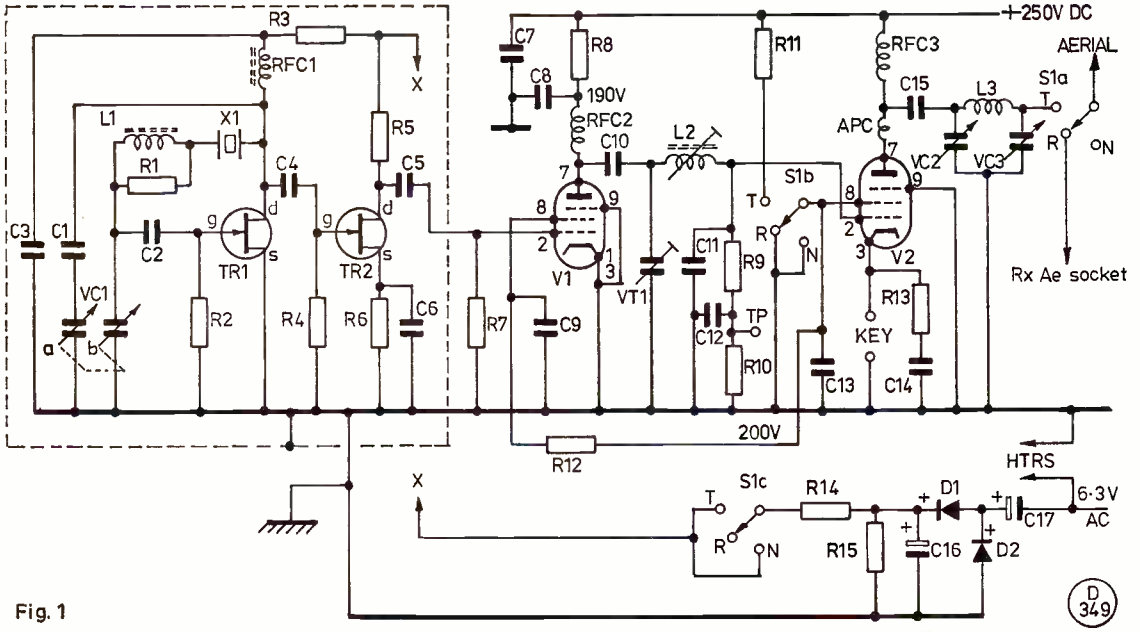
In the valved section, V1 amplifies the 7 MHz input and it reaches V2 grid through a pi-network pre-tuned partly by the core of L2 and partly by VT1; it is hardly worth while making VT1 a panel control in a single band affair. Keying is in the PA cathode satisfactorily.

Table of Values

Fig. 1

R1 = 27K
R2 = 100K
R3, R6 = 270R
R4 = 330K
R5 = 4K7
R7 = 56K
R8 = 6K8
R9 = 22K
R10, R13 = 1K
R11 = 4K7, 2w.
R14 = 2K7
R15 = 2K2
C1, C2, C11 = 100pF
C3, C6 = 0·02 μF
C4, C10 = 150pF
C5, C15 = 1000pF
C7, C8, C9, C12, C14 = 0·01 μF
C16 = 1000 μF, 25v.
C17 = 500 μF, 25v.
VT1 = 140pF
VC2 = 150pF
VC3 = 2 × 400pF nom., var.
RFC1, RFC2 = 1mH miniature choke
RFC3 = 2·5mH Tx type
TR1, TR2 = 2N3819
D1, D2 = BY100
V1 = EF184
V2 = 6BW6
S1 = 3-pole, 3-way rotary switch
VC1 = 2 × 200pF nom. var. (or *see* "Some Extra Bits and Pieces", *S.W.M.* March 1979, p. 38).

L1 = 40 turns fine enam. wire, close-wound on 0·3in. dia. dust cored former.
L2 = 30 turns enam. wire on 0·3in. dia. dust cored former.
L3 = 22 turns 26 *s.w.g.* PVC-covered wire on 1in. dia. air cored former.
APC = 5 turns 26 *s.w.g.* enam. wire on 100-ohm 5-watt resistor.
X1 = HC6U-type crystal, in 7 MHz amateur-band CW patch.



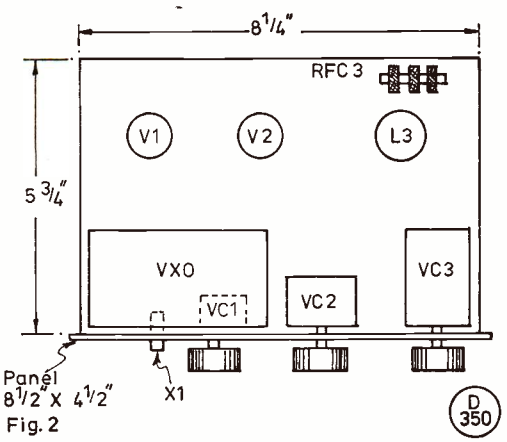


Fig. 2

Panel meters are by no means inexpensive nowadays: therefore when tuning-up, the station test meter (set to read 0-100 mA) can be made use of by plugging it into the key socket; alternatively the station reflectometer or wavemeter can be used to supply visual indication. The test point TP can also provide a ready indication that L2 is tuned 'on the nose'.

Function switching is simple using a small rotary switch, but since it is not advisable to apply highish DC potentials to such switches the anode feeds can be left 'hot' and the rig 'killed' at 'Receive' by grounding both valve screens. Some adjustment to the two screen resistors might be necessary in other constructions to give correct DC potentials at these electrodes.

Valve types other than those specified can be tried if to hand, and types EF183 and 6CH6 can be directly substituted for V1 and V2 respectively without base changes; output overall might be slightly less however.

Constructional Points

Because the coils are home-made a reasonably accurately calibrated dip-oscillator is an indispensable item—and no self-respecting home-brew station should be without one. Initially too many turns should be wound on and a couple removed at a time until resonance is indicated. Coils should of course be loosely hooked into the construction and valves plugged in otherwise misleading results are possible; some 'cut and try' is inevitable usually.

The VXO should be contained in a metal box bolted to the front panel but allowing the tip of the crystal to project through sufficiently for it to be changed from time to time. A reduction epicyclic drive attached to the VXO tune shaft is also desirable. The VXO tune knob need not be calibrated if the receiver scale can be read in small divisions as is possible in the better type of amateur bands communications receiver. Type HC6-U crystals should be found 'moveable' over some 4 kHz—say 7017-7021 and so on—thus the user soon discovers just how much receiver scale he has available for any

Table of Values

Fig. 3

R1	= 15R	C8	= 2000pF
R2	= 33K	VC1	= 150pF variable
R3	= 3K3	VC2	= 2 × 400pF nom. var.
R4, R5	= 10K	VT1	= 100pF trimmer
R6	= 22K	RFC1	= 2·5mH choke
R7	= 1K	RFC2	= 2·5mH choke, Tx type
R8	= 2K2	V1	= ECL83
C1, C3, C9	= 0·01 μF	X1	= *see text.* (For Top Band or 80m.)
C2	= 100pF	S1	= 3-pole, 3-way rotary switch
C4	= 20pF	APC	= 6 turns 26 *s.w.g.* enam. wire on 1w. resistor
C5	= 220pF		
C6	= 1000pF		
C7	= 5000pF		

L1 = *For 160m.*: 80 turns fine enam. wire scramble-wound on 0·3in. dia. dust-cored former.
For 80m.: 50 turns ditto, but close-wound.
L2 = *For 160m.*: 65 turns 26 *s.w.g.* enam. wire close-wound on 1in. dia. air-cored former.
For 80m.: 35 turns ditto.

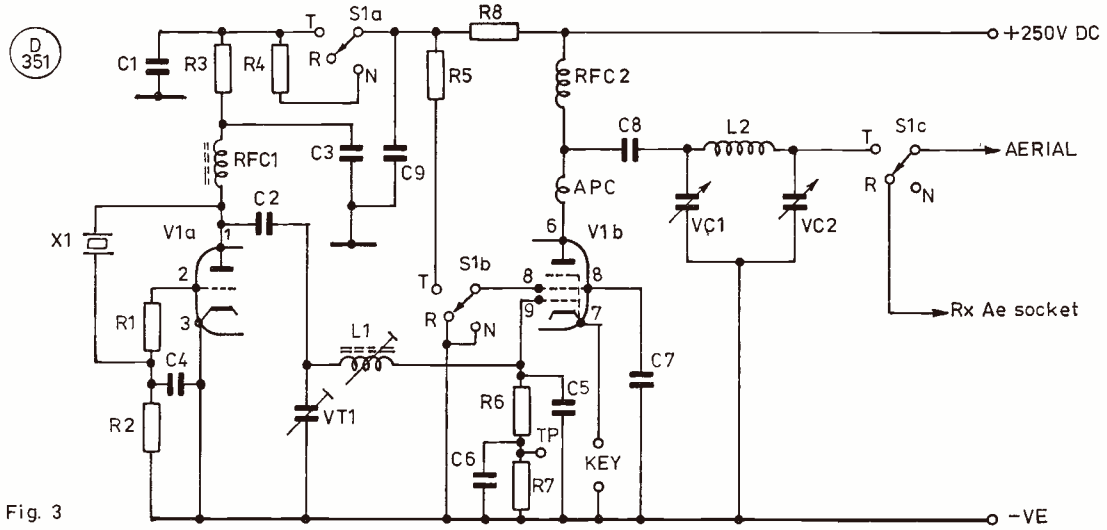


Fig. 3

particular crystal and whether a station calling CQ is within his tuning range, transmitter-wise, or not.

Coil L2 and VT1 are best placed sub-chassis with L3 on the upper surface. A suitable layout is shown in Fig. 2.

Testing

The VXO output is checked first, and with no HT applied to the valved section (if S1 is moved to 'Net') the oscillator note should be heard plainly *via* the associated receiver. Thereafter it is merely a case of tuning-up into a dummy load in the usual way and peaking L2. If the station test meter is plugged into the key socket and tuned for dip, some 40-50 mA can be expected from a rail voltage of 250v. DC for maximum output loading.

Transmitter No. 2

The circuit of an even simpler low power transmitter is shown in Fig. 3, and this can be effective on either Top Band or 80 metres; it could probably be made to go on other bands, too.

The active elements boil down to no more than a single valve and a crystal thus making the whole thing virtually pocket size. Crystal control does savour of yesteryear but is still useful on Top Band, in particular so that other services are not interfered with. Overall the physical size is mainly governed by the dimensions of the variable capacitors and for single-banding it might be possible to dispense with VC2 by using a fixed value item of suitable capacitance. The purpose of R4 is to prevent the voltage at the anode of V1A from going over-high when S1 is at the 'Net' position; actually a 'Net' facility is not really necessary and simpler function switching could be used.

Construction of the little transmitter is simplicity itself and provided the oscillator 'fires' readily little can go wrong. As in the other transmitter no panel meter need be used.

Power supplies

A simple power supply utilising an old receiver type mains transformer capable of supplying 250v. DC at 60-80 mA and 6.3v. AC at 1A in conjunction with either a type 6X5 or similar rectifier valve, and a couple of electrolytics, is quite adequate and as many suitable circuits have been described before there seems no need to repeat such information here.

ALTERNATIVE AERIAL-RAISING TECHNOLOGY

OR HOW TO PUT ONE UP WITHOUT MASTS OR CLIMBING TREES

Pretty well every amateur who has ever operated on the LF Bands, or out/P, has at some time taken a moment to curse his aerial arrangements—at least as to the erection thereof.

There seem to be, in general, two main problems; firstly you have to *throw* something up and over, and then you must *recover* whatever it is you've thrown if it fails for any reason to come down of its own accord. Gravity alone is not enough. Neither is it enough for the nautically-minded among us to make a 'Monkey's Fist' on to the end of a length of line. A line over a tree and a line thrown to a dockyard matey are not quite in the same category.

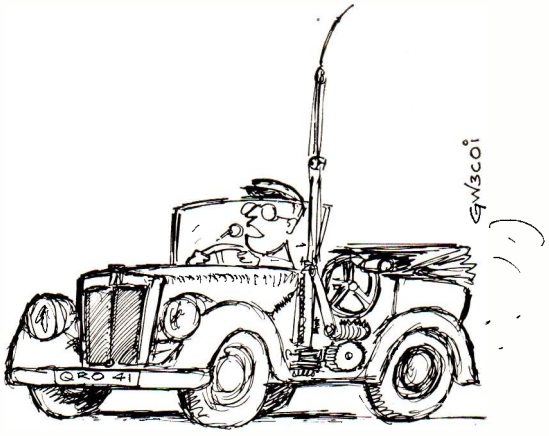
If one stays with the throw-it-over technique and restricts one's activities to trees well away from windows, a useful method is to go to a fishing-tackle shop and buy one of those nice tear-drop shaped lumps of lead with a loop moulded in to which a thin nylon monofilament can be attached. Provided you can persuade the monofilament to stay tied to the weight, you have a good combination, mainly because on the one hand one has a slippery line and on the other the tear-drop shape makes it most likely that when the weight falls square on to a branch on its way down, a bit of jiggling from the ground should be enough to make it roll over to one side or the other and so continue its way back to master. We hope.

Another possible technique used to be called the "five-bob rocket" ploy. Heaven knows what a suitable rocket would cost now! With this method, again one uses monofilament, attached to the stick of the rocket, and the rocket launcher (a bottle, what else?) is aimed in the desired direction with some care before the blue touch-paper is lit and things start to happen. Since it is normal to need a couple of sighters, this is a pricey way to obtain a higher aerial.

Bows and Arrows: here we have a method which should be available to most amateurs, and which can be very effective if, as the writer does, you can call on an Olympic-standard archer and his tools to tackle the task. Don't, unless you already play archery yourself, try doing this without lots of practice well away from humans. Arrows can break your string and carry a long way, and still do a lot of damage at the end. Crossbows would appear to have something to offer in this context but the writer hasn't found a volunteer cross-bowman. Most were, it seems, demolished at Agincourt.

Still trying to get this bit of nylon monofilament up, one's next move is to radio-controlled models. Here one either needs a five-channel radio-control system, using four to control the aeroplane and one to give a *positive* drop of the line, which in its turn should be weighted so the flight of its fall can be noted. If the plane only needs two or three channels and you've got a four-channel R/C, fine, and you can use the spare channel to detach the line. Don't rely on gravity or drag or whatever to achieve the freedom to release, or you will inevitably have the doubtful pleasure of seeing your prized model aeroplane dive at full chat straight into the ground, scattering bits of radio gear and balsa all over the scenery; and when you wipe away the tears, you'll probably find the string broke

during the dive and you haven't even the consolation of getting the aerial up. No, the procedure must be amended to allow for all the factors. Take your aircraft off, or better handlaunch it, and make it spiral-climb straight up over your head until it is at least twice and preferably three times higher than your tree. Now you need help with a pair of binoculars unless you reckon to look through a telescope on a tripod and still control your model(!): your helper will direct you to fly the aircraft over the desired tree, and just *before* the line touches the tree he will call to you to release the line, which with its weight will plummet to earth, the while you fly your aeroplane back to you and bring it in to land all safely. We hope.



" . . . . QRX while I resonate the antenna . . . ."

Still with the models, one can use a helicopter now that such can be made to be radio-controlled. Once again though there is a snag; in this case the clear one that flying a model 'copter isn't the same as flying the old trainer mentioned in the last paragraph (what—you were going to do it with a model Spitfire? Optimist!) but a whole new dimension to flying. The darned thing has to be flown all the time, and it *won't* be as forgiving as a high-wing trainer type. On the other hand, if you can fly a chopper model, with the right sort of confidence, it is quite remarkable how well the system works.

No? Still not up? Try the fishing-rod again, with the monofilament and tear-drop, and with a bit of practice you'll be able to exceed handsomely the height you can obtain by simply throwing. If you are interested in throwing a line over the ridge of your house, we do strongly recommend you replace the tear-drop by something less glass-breaking, such as a sorbo ball with the line threaded through it. Make sure the wind direction is right—there is nothing more annoying than having the ball go nicely up and clear of the ridge, only to be blown back again, drop and—Murphy again!—bounce down the roof to the guttering and straight down the downspout. (This does, of course, clear any spiders out quite effectively). If the ball does go over as required you will realise why the weight has to be non glass-breaking; just as soon as the trailing line touches the roof, it will check the ball and the elasticity in the monofilament will swing the weight nicely round in an arc—and as sure as you're reading this, the end of the arc will be a window. Hope won't resolve *this* one!

Just one final point. Don't let the family pooch or next-door cat get into the act; apart from the risk of doing them a mischief, there is also the risk that they may be able to do *you* a dis-service by such innocent things as standing on the invisible monofilament as you reach lift-off. Shut them up and/or kick 'em out, as may be appropriate.

Finally, you've got your monofilament up where you want it. Don't hang an insulator on it and haul the aerial up, but use it to haul over a second, stronger, line. There is no need whatever for these great hefty lines so often seen, but a braided terylene of quite small dimensions will have a breaking strain more than enough for you; indeed in boats the stuff tends to be selected too thick purely on the basis that thin stuff cuts the hands when used as sheets. If you insist on *thick* rope, use the terylene braid to haul up the Big One.

And, of course, don't forget that trees tend to move in the wind; this can be allowed for to some degree if the line is not to be broken on the first windy day. Perhaps the best way is to use the line to hold up a pulley-block through which you have threaded a line before hauling aloft, One end of the latter is tied to the aerial, and the other to a bucket filled with some stones to give a reasonable weight to hold the span up without too much sag; a hole in the bottom will ensure that water escapes before it can gather enough weight to break the aerial or line. The terylene line holding the pulley-block can now be hauled aloft and tied off to a lower part of the tree, preferably out of the sight of the local youngsters. You hope.

The result of all your efforts? With luck, the best aerial you've ever had. But, if it leads you to the doctor claiming a bad back strain, we accept no blame: we will however pray for you.

September issue will appear on Friday, September 7th.

CLUBS ROUNDUP

BY *'Club Secretary'*

CLUBS again, and we must remind all scribes that not only will they be dropped in the absence of reports, but also that we can't give them any publicity on anything in the nature of history (unless it is of very general interest) except for the odd item which may be seen by us as a way of attracting more members to the club.

New Club

A long-felt need is filled by this one; **British Young Ladies Amateur Radio Association,** or BYLARA for short. They propose to have meetings over the air, Monday evenings on 3·605 MHz, and personal gatherings at 2 p.m. at every rally where they are in attendance, in the 'tea place'. These will be the ones for the informal natter, but at Drayton Manor 1980, the 2 p.m. main tea-room session will be the AGM. One other "official" get-together will be at 2 p.m. in the tea room of the Leicester exhibition, on the Saturday. What more can we do but wish them every success? Only to pass on the request that anyone reading this who knows of YL or XYL types, should tell them about the club and put them in touch with the Hon. Sec.; and of course to ask all letters to be fitted up with an *s.a.e.* "CDXN" will no doubt be noting the frequency, but here we can note that the girls will throw open) the meeting to any OM callers after thirty minutes. Let us hope that they can get some of the G8 YLs into the group too, as we half suspect that, if not actually a majority, they are a pretty large minority!

Deletions

As we have previously indicated, as long as we are to run a system which reduces the postage and work-load at the Club end, then we must have our regular updates. We mentioned it last time, and now we have acted—albeit we have not done so in any case where on past experience we would have expected a letter, which might have been delayed in the post. However, if you aren't mentioned, then write in with the dates, the Hq address, the name and address (telephone number and STD code if there is one) of the Hon. Sec., and so forth. *Don't* fizz and pop because we dropped you—one of the clubs we would have thought to be an absolute "cert" after some 25 years knowledge writes in to indicate a search for Hq is in progress, and the old one demolished! We don't feel it appropriate or proper to send a potential new member to look at the work of a demolition company; which is why we delete an entry if we don't get an update every few months.

The Mail

As usual, our first port of call is **Acton, Brentford & Chiswick;** August 21 at 66 High Road, with G4GD opening the discussions on the UK proposals for WARC '79.

Addiscombe are primarily a contest group, but they still have a regular natter on Tuesday evenings at the Spread Eagle, Portland Road, S. Norwood. The start is set for around 9.15.

The current **AMSAT** *Newsletter* is as interesting as ever, containing as it does an article discussing the Russian RS satellites and some data on the next phase of *Oscars*. If you have any interest in satellite working you should be a member. Details from the Hon. Sec.—*see* Panel.

A.R.M.S. is the one for the /M enthusiasts, whether they are on two-metres FM or 14 MHz DX. Details from the Hon. Sec.—*see* Panel.

Ashford in Kent have Hq at the top of Hart Hill, near Charing, where they can be found on any Tuesday evening.

B.A.R.T.G. looks after the interests of the radio-teleprinter mode chaps, by way of a newsletter, helping hand where needed, supplies of specialised bits and pieces, paper rolls and suchlike, not to mention the convention and other similar activities. Details from the Hon. Sec. at the address in the Panel.

Deadlines for "Clubs" for the next three months—

(*September issue—July 27th*)
October issue—August 31st
November issue—September 28th
December issue—October 26th
Please be sure to note these dates!

B.A.T.C. comes next, and for a quarter-century or so has been the pivot around which all the amateur TV activity rotates: B/W or colour, fast-scan or slow, it all comes alike. Your scribe can recall the *Newsletter* in its very earliest days, when everything was done by way of valves (hot-cathode FETs to you, Buster!) and mere ownership of a transistor was a marvel. Indeed, one recalls in those distant days an article by G3HMO on *making* transistors at home from broken-up ex-WD diodes.

Bishops Stortford are to be found at the British Legion Club in Bishops Stortford on the third Monday in each month. The venue is at the top of Windhill, just before the roundabout.

It is some measure of the man when we say that as far as we know, **Bournemouth** do not yet have a new Hon. Sec. to replace the late G4EMN. However, they are at the Dolphin Hotel, Holdenhurst Road, Bournemouth on the first and third Fridays of each month. For more details, either just turn up at a meeting, or get in touch with D. Wade, 70 Creekmoor, Poole.

Almost into East Anglia now, for a mention of the **Braintree** gang; they are in Room 3 of Braintree Community Centre, adjacent to the Bus Park in Victoria Road.

Although they are to be found on any Tuesday, the second one of each month is the main meeting for **Bury,** on which evening they have a speaker or films, or whatever. On the remaining Tuesday evenings they have time for projects, natter-and-noggin sessions, Morse practice, etc.

Find the Old Bakery, Chester Walk, at the rear of the Public Library, if you are after the **Cheltenham** group. It looks to be the first Thursday and the third Friday in each month, but it is suggested that a check with the Hon. Sec. be made.

Chichester are booked into Room 34A in the Lancastrian Wing of Chichester High School for Boys, Basin

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3. (*01-992 3778.*)
ADDISCOMBE: P. J. Hart, G3SJX, 42 Gravel Hill, Croydon, Surrey CR0 5BD. (*01-656 9054.*)
AMSAT-UK: R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.
A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
ASHFORD: J. A. Clarke, G3TIS, Yeomans Cottage, The Street, Brook, Ashford, Kent. (*Wye 812888.*)
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EXETER: A. W. Bawden, 232 Exwick Road, Exeter EX4 2BA.
FULFORD: G. W. Kelly, G5KC, 10 Deepdale, York YO2 2SA.
G-QRP CLUB: Rev. G. C. Dobbs, G3RJV, "Willowdene," Central Avenue, Stapleford, Nottingham. (*Sandiacre 394790.*)
GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey.
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IRTS (Region 1): J. Ryan, EI6DG, 23 Dollymount Grove, Clontarf, Dublin 3.
LINCOLN: B. Bennett, G3EAM, 142 West Parade, Lincoln. (*0522 23958.*)
MAIDENHEAD: J. Patrick, G3TWG, Bedford Lodge, Camdon Place, Bourne End, Bucks. (*Bourne End (06285) 25275.*)
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PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough.
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REIGATE: F. H. Mundy, G3XSZ, Westview, rear of Manor Farm, off Reigate Road, Hookwood, Surrey. (*Horley 73878.*)
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SOUTHGATE: J. Fitch, G8EWG, 16 Kent Drive, Cockfosters, EN4 0AP. (*01-440 7353.*)
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TYNESIDE: H. P. Cranage, G8OFA, 69 Rectory Lane, Blaydon-on-Tyne NE21 6PJ.
VERULAM: A. Clarke, G8MAE, 24 Kiln Ground, Hemel Hempstead, Herts. (*Hemel Hempstead (0442) 64751.*)
WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent. (*0732 56708.*)
WORCESTER: M. Tittensor, G4EKG, 16 Durcott Road, Evesham. (*Evesham (0386) 41105.*)
YEOVIL: D. L. McLean, 9 Cedar Grove, Yeovil, Somerset.
YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Road, where they foregather on the first Tuesday and the third Thursday of each month.

The area around High Wycombe is served by a group called **Chiltern.** Nominally we understand they are in the Canteen of John Hawkins Ltd in Victoria Street which is off the A40 Oxford Road. However, it is suggested you contact the Hon. Sec. to confirm this.

In terms of attendance rates, with little chance of bringing in outside speakers, not to mention the geographical spread, one marvels that there could possibly be such consistent success. We are referring, of course, to **Cornish,** who have their meetings on the first Thursday of each month, at the SWEB Clubroom, Pool, Camborne, starting at 7.30. We recall a visit we made: arriving a little late we found it difficult to squeeze into the room, let alone find a chair!

Crawley are one of the groups who owe us an update; but we know they are based on Trinity Church, Ifield, on the second and fourth Wednesdays—but check with the Hon. Sec. about the second date first.

Another of the forward-looking groups is at **Cray Valley,** where they have a place at Christchurch Centre, High Street, Eltham, on the first and third Thursdays. One is set aside for a talk, and the other for a ragchew session, but this is flexible.

One of the few groups to have a Saturday evening is **Crystal Palace;** third Saturday in each month at Emmanuel Church Hall, Barry Road, London SE23. It is understood that the August meeting is set aside for G3OOU to take up Aerials as his theme, followed by G3IIR on Aerial Accessories. Reading the *Newsletter* we were amused to learn of the method of curing their generator problems; ours too! On a totally different tack, they have quite a lot of new members, and the committee are thinking hard about the ways and means of getting them 'genned-up' by a suitable mix of lectures.

Every Wednesday evening at 119 Green Lane, you can find the **Derby** types foregathered, to see what goodies the committee have laid on in the way of entertainment or activity. We might also note in passing that another YL has become a member, and received memberships number 878!

There is another group in Derby, this one being based on **Nunsfield House** Community Association, Boulton Lane, Alvaston Park; they are in residence every Friday evening.

Back into the London area for a while now. **Ealing** have Tuesdays at the Northfields Community Centre, Northfields Road, London W13.

At **Edgware** the second and fourth Thursdays are the ones to ring in red on the calendar each month. The venue is Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.

Down West again, to **Exeter** where the Hon. Sec. puts us in our place—the Hq address is St. Davids Hill, in the Community Centre, on the second Monday every month.

It is a long time since we last heard from **Fulford.** However they are still about and can be found every Tuesday evening at 31 George Street, York.

We mustn't forget the **G-QRP** club, or we'll be shot at dawn by the Editor! This club is devoted to the arts and crafts of low-power amateur radio; thus it covers a lot of things, for the operating-only types right through to the majority who spend lots of time dreaming up and building their own QRP transmitters, receivers, aerial tuners and so on. Details from the Hon. Sec.—*see* Panel.

Now **Guildford,** who are in their Diamond Jubilee year and still enjoying it all. For August, they have a local insurance broker coming along to talk to them about his work, followed by G4CWP on "Aerial Masts and the Authorities", all on August 10. On 24th, G3LTP will be coming along to talk about Tropospheric Propagation.

At **Harrow** the venue is the Arts Centre, High Road, Harrow Weald, where from 8 p.m. till 10 p.m. they have a shack, bar facilities, good car parking and a good programme. What more can one ask?

Next we turn to **Hereford** where the routine is to get together on the first and third Fridays of each month; and there is almost always something set up in the way of a programme. On a slightly different tack, the idea of having a coffee evening for the YLs/XYLs while the gang are yakking about wireless sounds like a useful sort of idea.

Over the seas and on *past* Skye brings us to the Emerald Isle, and **IRTS Region 1.** For anyone living in Eire, this is the one to make the first contact with, as they will amost certainly know if there is a local group near you; and of course you could do a lot worse than join anyway! Details from the Hon. Sec.—*see* Panel.

The newly-reformed **Lincoln** group are based on the City Engineers Club, Waterside South, Lincoln, and on the look-out for new members for the second and fourth Wednesdays of each month.

We now come to **Maidenhead,** where they have Hq at the Red Cross Hall, The Crescent, Maidenhead, on the first Thursday and the third *Tuesday* of each month; our current data closes with July-end, but indicates they have had plenty of talks, films, and whatever to keep the interest going.

Northern Heights *Newsletter* is a bit hard going at times—though it obviously appeals to the members—but this time they have hit the jackpot with a discussion of such ICs as the 'maybe' gate, the 'won't' gate and the J(UN)K flip-flop—this last changes state only when the coffee-machine starts giving change! We could add another, obtained very simply by subjecting a DVM chip to a pulse of some 5 kV; we have all the pieces in a little box, ready for interment! Alternate Tuesdays at the British Sub-Aqua Club, Mountain, Queensbury, Bradford.

A shot of the Swindon 160m. Mobile Group, taken at Barbury Castle fort. Left to right: Ford Escort (G3OUC/M), G4EQP, G4CYE, G4FTK, G8VP, G3SNV, G4FSU, G8OQY, G4GDR, G3JNQ, G4AXU and G3OUC (kneeling).

Peterborough Radio & Electronics Society live in the Scout Hut, Occupation Road, where they will be on August 17, topic to be arranged at the time of writing.

R.A.I.B.C. have changed the word denoted by the 'B' from 'Belfast' to 'Blind', thus clearly indicating the value of the club to both the invalid and the blind members. We who are fit could help in many ways: by being a supporter, more actively maybe as a representative, or by setting-up some fund-raising activities. Not to mention roping in anyone who could be a full member; details from the Hon. Sec. at the address in the Panel.

Now to the **R.N.A.R.S.** for serving and ex-members of the Royal Navy, and Merchant Navy. The current *Newsletter* discusses MARS in some detail, and also has a piece on WARC '79. Details from the Hon. Sec.—*see* Panel.

At **Reigate** the Hq is in the Constitutional Centre, Warwick Road, Redhill, on the third Tuesday of each month. More details from the Hon. Sec.—*see* Panel.

A letter from G3XCS puts us right about the goings-on at **Saltash,** and gives us the new Hon. Sec.'s name and address for the Panel. They foregather at the Toc H Hall, which lies at the junction of Warraton Road, and Oaklands Drive.

There is a change of venue for the August meeting at **Southgate**—they normally foregather at the Scout Hut in Wilson Street, Winchmore Hill on the second Thursday in each month, but for this once they will be at another place which has still to be settled at the time of writing; thus we have to ask you to contact the Hon. Sec. at the address in the Panel.

On to **Solihull,** where the Hq is at the Manor House in the High Street on the third Tuesday.

There is quite a complicated programme of events at **South Birmingham,** all at Hampstead House, Fairfax Road, West Heath. There is a formal affair on the first Wednesday of every month; the club shack is open for HF operation every Thursday, and ever Friday evening there is an "open" evening, by which we understand a natter session.

Now to **Stevenage,** where they have had a superb programme during the first half of the year which finishes on August 2, at the British Aerospace (*ex*-Hawker Siddeley, *ex*-de Havilland) works. For more

information, or details of getting to the venue, a call to the Hon. Sec. is in order—*see* Panel.

We have two copies of the **Surrey** newsletter to hand, which makes it lucky that we looked at the most recent and spotted a late change of programme. The Hq is at *T.S. Terra Nova*, 34 The Waldrons, South Croydon, on the first and third Wednesdays: thus on August 1 we see a talk with slides to be given by G3OFJ on his visit to Egypt; August 15 will be informal.

Now to **Sutton & Cheam** where there seems to be a certain amount of doubt about the venue for this month; building alterations *always* overshoot the target date for completion! Thus, we suggest you get in touch with the Hon. Sec. at the address in the Panel for the latest situation.

Our letter from **Torbay** simply notes a change of Hon. Sec. without mentioning details of the goings-on. We do know the Hq address as Bath Lane (rear of 94 Belgrave Road), Torquay. For the rest, contact the Hon. Sec. at the address in the Panel.

Thames Valley are to be found in Giggs Hill Green Library in Thames Ditton, on the first Tuesday of each month.

Up north now, to **Tyneside,** where the Hq is at Vine Street Community Association, Wallsend; since this was a first letter after an AGM the programme dates are pretty open save that they will be on every Monday evening.

Yet another group with Hq problems is **Verulam,** as their old home is now rubble—but there are three places being actively investigated and by the time this comes to be read, the Hon. Sec. will be able to tell you where to go. This refers to the formals of course; the summer informals at the *Mosquito* Museum, Salisbury Hall, London Colney on the second Thursday in each month are not affected. Incidentally, Salisbury Hall was owned, before the *Mosquito* exercise, by Sir Nigel Gresley of steam locomotive fame.

The last of the season's **West Kent** evenings will have been fun—a challenge to produce the loudest possible noise from a single US size Leclanche cell, measured in dBA at a point one metre in front of the device; an additional rule was that the cell must be at a temperature of 60°C, or less, at the start of noise and that the noise must be sustained for at least ten seconds! Now the Hq has closed down for the summer recess, they will carry on with gatherings on the alternate Tuesday evenings at the Drill Hall in Victoria Road, Tunbridge Wells.

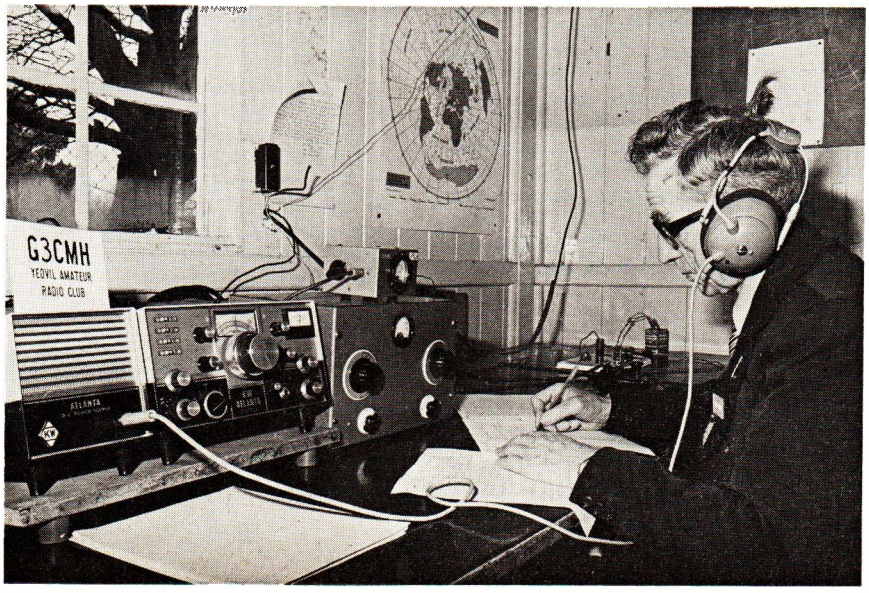
Next stop is at **Worcester** where the venue is the Old Pheasant, New Street, Worcester, and it looks to be the first Monday evening in the month.

The **Yeovil** chaps will be putting out their strong right arms in August, with three special-event stations; GB2FAA at *R.N.A.S. Yeovilton* on August 3 and 4; this one is with and for the Royal Navy Group. GB2MSS is on Saturday August 18, at the Mid Somerset Show, Shepton Mallet, and finally their own G3CMH call, at Dillington House Fete, Ilminster, Somerset on Monday August 27, not to mention the every-Thursday sessions in Hut 101 at Houndstone Camp.

Lastly, to **York,** who are based on the United Services Club, 61 Micklegate York, every Friday evening *except the third one* in each month, at 7.30. They almost always have something going on, even though it may be fixed up at the last minute and so not noted in this column.

Finale

That's it for another Roundup; send in your up-dates this time, please, addressed as ever to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.



B. J. Clark, G3BEC, operating the Yeovil Amateur Radio Club's QRP Tx (to the right of the main station). Club call is G3CMH.

THE TRAP ANTENNA

T. L. SADLER, G3VMC

The following article describes the operation and construction of tubular traps for use in dipoles, beams or verticals on 10, 15 and 20 metre bands. Although some lathe work is involved the author feels that most amateurs can, with a little searching, find someone to do the relatively simple turning operations. It may be possible to interest a local college or school in exchange for some mutually agreed item (*e.g.* a technical manual). The author was fortunate in involving Mr. D. Beales whose expertise as a model engineering enthusiast proved invaluable when exploring the most effective and simplest methods of construction. The outcome being a very strong, stable unit comparing favourably with its commercial counterpart.

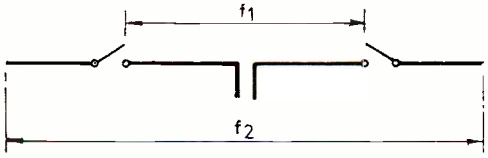


Fig. 1 D 230

Trap Operation

Fig. 1 shows a dipole which will resonate on one of two frequencies f_1 or f_2 depending on the condition of the switches. When open, the dipole resonates at f_1 and on f_2 when closed. For a variety of reasons actual switches as shown would be most impractical from both an operational and engineering standpoint. Secondly if the lower frequency (f_2) was 14 MHz then this length would be around 33 feet and somewhat large for rotation at many QTH's. So instead of switches a device is needed which offers a high resistance at f_1 and a very low resistance at f_2. This will for all practical purposes act like a switch and be self selecting. The simplest solution is to use a parallel tuned LC circuit which when resonant at f_1 would offer a very high impedence to signals at that frequency and appear similar to an open circuit. On the other hand signals at other frequencies, in this case f_2, pass through the circuit with little attenuation. However, although the

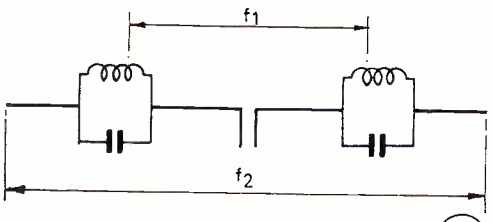


Fig. 2 D 231

circuit is non resonant at f_2, the coils used in the traps become part of the next element and consequently load it, thereby reducing the length of f_2; see *Fig. 2*.

Consider now the diagram for a three band dipole, *Fig. 3*; note that loading coils are now in operation for both bands f_2 and f_3, *i.e.* 4 coils in f_3 and 2 in f_2, thereby shortening the overall length even further. So a 10, 15 and 20m. trap antenna is smaller than a 15 and 20m. band version which must be a bonus at most QTH's.

Trap Design

When using wire antennae it is common to use traps consisting of a coil in parallel with an actual capacitor. In the case of self-supporting tubular elements a more substantial unit must be utilised. The coil still exists as such but the capacitance required is obtained from that existing between the element and the protective cover. *Fig. 4* shows this more clearly.

It can be seen that the insulating bush acts as the dielectric of the parallel capacitor, and as this is not air, then careful choice of the material is essential. The dielectric constant of materials such as nylon and PVC varies widely with manufacture, so, using that odd bit of plastic tubing you may have in the garage is a recipe for disaster. The author settled on polythene which has proved most satisfactory in practice and reasonably easy to work, though polystyrene would probably work equally well, both materials having a relative permittivity of around 2·3.

The capacitance required can be estimated by knowing
a) The spacing between the tubes.
b) The dielectric constant of the separating medium.
c) The area of the smaller tube.

A worked example will probably make this clearer, *see Fig. 5*. In this example it can be seen that two "capacitors" exist here, both in parallel *i.e.* one formed with an air dielectric and the other with a solid dielectric, both being 1 inch in length.

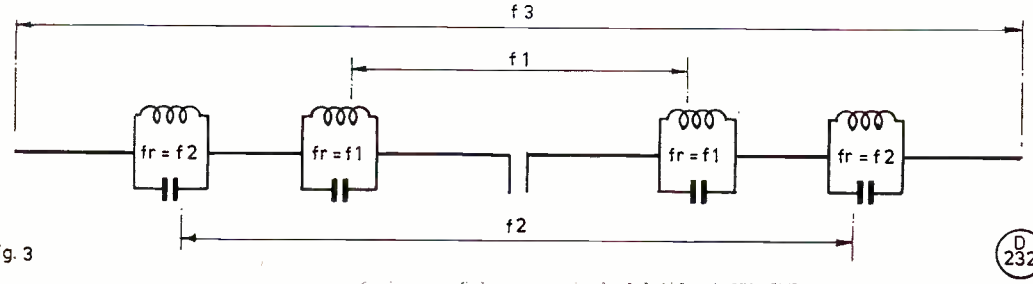


Fig. 3 D 232

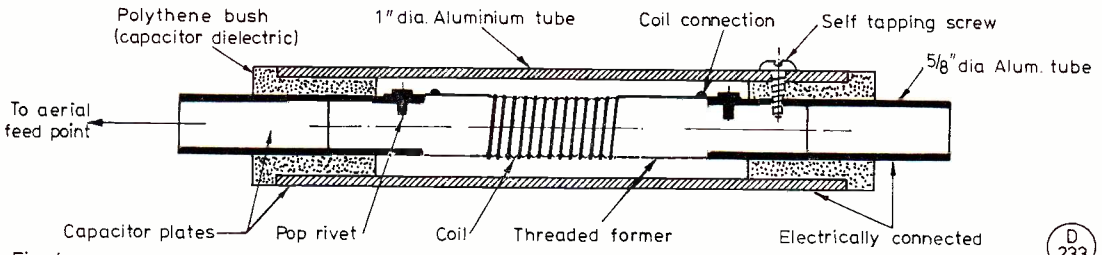


Fig. 4

Cap. 1 (Air).
Area of smallest plate (A) =
$\pi \times$ dia. $\times$ length $= \pi \times 0{\cdot}625 \times 1 = 1{\cdot}963$ sq ins.
Spacing between plates (d) = 0·125 ins.
Dielectric constant (K) = 1.

$$CpF = \frac{0{\cdot}2235 \times K \times A}{d}$$

$$= \frac{0{\cdot}2235 \times 1 \times 1{\cdot}963}{0{\cdot}125} \times 3{\cdot}5\ pF$$

Cap 2 (Polythene).
K = 2·3

$$CpF = \frac{0{\cdot}2235 \times 2{\cdot}3 \times 1{\cdot}963}{0{\cdot}125} = 8\ pF.$$

Total $C = C_A + Cp = 11{\cdot}5$ pF.

Now consider the coil connecting the two elements. The following formula will prove reasonably accurate for single layer coils:

$$L\mu H = \frac{(N \times r)^2}{9r + 10L}$$

where N = No. of turns
r = radius of coil (mean)
L = length of winding

E.g. Coil = 22 turns at 16 t.p.i., and mean diameter = 0·625. Then:

$$L = \frac{(22 \times 0{\cdot}313)^2}{(9 \times 0{\cdot}313) + (10 \times 1{\cdot}37)} = 2{\cdot}87\ \mu H$$

Now to find the resonant frequency of such a unit:—

$$f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{2{\cdot}87 \times 10^{-6} \times 11{\cdot}5 \times 10^{-12}}}$$

$$= 27{\cdot}7\ MHz$$

If the "air" capacitor is reduced to zero by sliding the bush and cover, then the effective C would be 8 pF. The resonant frequency would then be found to be 33·2 MHz, showing that a resonant point in the 10 metre band is tunable by sliding the bush and cover relative to the coil assembly.

Construction

Let us consider the difficult parts first, namely the insulator and bushes. As stated earlier a lathe is essential for the construction of these items. The insulator/coil former needs threading so as to facilitate ease of coil winding and to ensure stability. Do not try to wind the coil without threading the former, it will never be stable enough, especially during the tuning procedure.

Firstly turn down either end of the rod leaving the centre section at the length stated in Table 1. Making sure the inside edge of the §-inch tubing is de-fashed, skim the rod until a "wine cork" fit is obtained. (The author originally worked out the coil for a 15 turns per inch pitch, but it was subsequently changed to 16 t.p.i. as apparently most small lathes can accommodate this

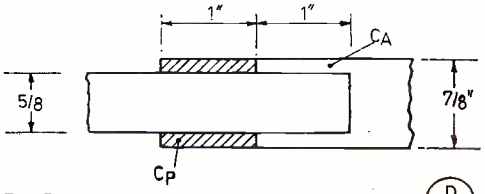


Fig. 5

more easily). The coil spacing will of course affect both the inductance and its power rating, so stick to the details given here. At this point it may be of help to the lathe operator to mention that a centre-steady is needed as plastics tend to bend away from the cutting tool. The thread needs to be a 'V' cut to a depth of about 1mm.

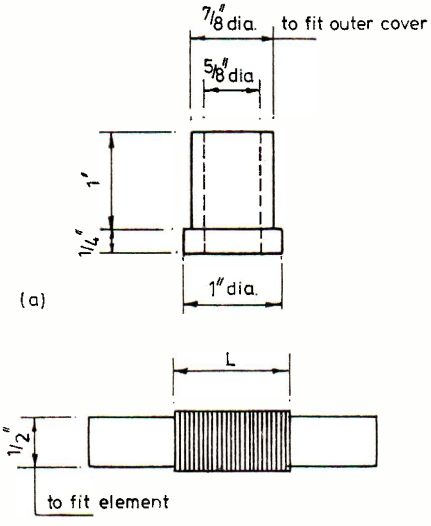


Fig. 6

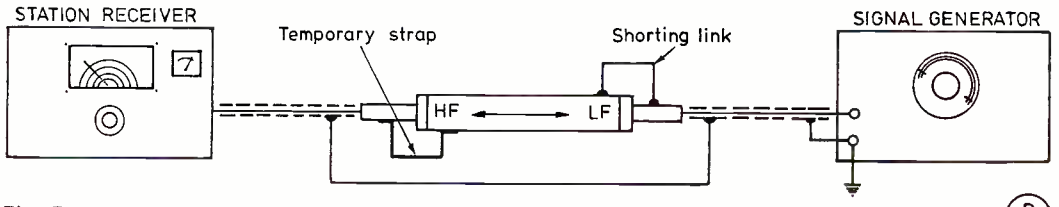


Fig. 7

Now the bushes: Turn the bushes to the dimensions shown in Fig. 6 and again skim to fit inside the 1-inch tubing. Don't make it too tight a fit. Now, and not before turning, drill out the centre with a $\frac{1}{4}$-inch drill and then follow through with a $\frac{5}{8}$-inch drill. The shoulders on the bushes are necessary to stop them sliding into the cover when tuning.

Now fit the coil former into the two $\frac{5}{8}$-inch tubes. If you have made them too sloppy a fit then use plumbers $\frac{1}{2}$-inch PTFE jointing tape until a firm fit is obtained. Adhesives are unnecessary.

Place the unit in a vice and drill a $\frac{1}{8}$-inch hole through the aluminium tubes and into the insulator at a point $\frac{1}{4}$-inch from the end of the tube; a depth of $\frac{3}{8}$-inch will suffice. Countersink the hole. Pop rivet a solder tag into the hole ensuring that the tag faces the coil thread. With a soldering iron melt some of the plastic under the tag so as to form a hollow. The copper wire may now be soldered to one end and the required number of turns applied (some form of clamp or vice is useful to grip the coil while cutting and soldering the far end). Wind the coil tightly and neatly into its grooves. When complete, lightly file the rivet head and peen the connections with a hammer to obtain the minimum of protrusion over the nominal tube diameter while retaining a sound connection. If the wire approaches the tag from underneath then the joint may be lightly peened into the previously made hollow. It is important to follow the above carefully so as to avoid the possibility of arcing in the unit.

All that remains now is to fit the outer cover and bushes. Using a length of $\frac{3}{4}$-inch steel tube slipped over each end of the trap, the unit is hammered tightly together. If it is a very tight fit then don't worry about having to hit hard as practical experience has proved these traps to be extremely strong.

Tuning

You will need your steel tubes and hammer again to shift the outer tube and bushes over the coil unit. Place one end of the trap on a soft wood block, slip the steel tube over the other end and—hit it!

You now need a stable signal generator, preferably with a controllable output, and a receiver with a S-meter.

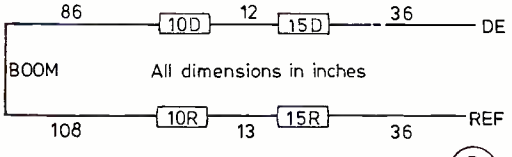


Fig. 8

Connect them, together with the trap as shown in Fig. 7.

With the shorting link in place set the signal generator so as to give a S9 S-meter reading. (Don't at this stage blast the rig with a massive signal as this will mask any measurements). Now remove the shorting link and a drop in S-meter reading should be seen, noting the amount. Change the frequency to another point in the chosen band and again measure the amount of attenuation, remembering to reset the S.G. level with the "capacitor" shorted. If, for instance it is found that the attenuation improves as the frequency is decreased then the trap's resonant frequency needs increasing, i.e. the capacitance requires decreasing. Using the slide hammer, move the cover and bushes so as to place the capacitor bush nearer the coil thus reducing the air spaced section. Repeat the process until you have maximum attenuation in the desired part of the band; you may then like to check the attenuation across the band. Most S-meters cannot be relied upon to give very accurate measurements of attenuation but the author found (using two receivers of known performance) that attenuation well in excess of 45dB was easily obtained, falling by some 10dB towards band edges.

When you are satisfied that you have got it right remove the temporary strap and, referring to Fig. 4, drill a suitable tapping hole through cover, bush and element. Drill a clearance hole through the outer cover only and then tightly screw in the self tapper. Re-check the tuning. Apply some *Copydex* to the screw head if you are not using a stainless screw. When dry, bind with a band of self amalgamating tape, or snap over a finger from a surgical glove.

That's it, the trap is now complete and ready for use.

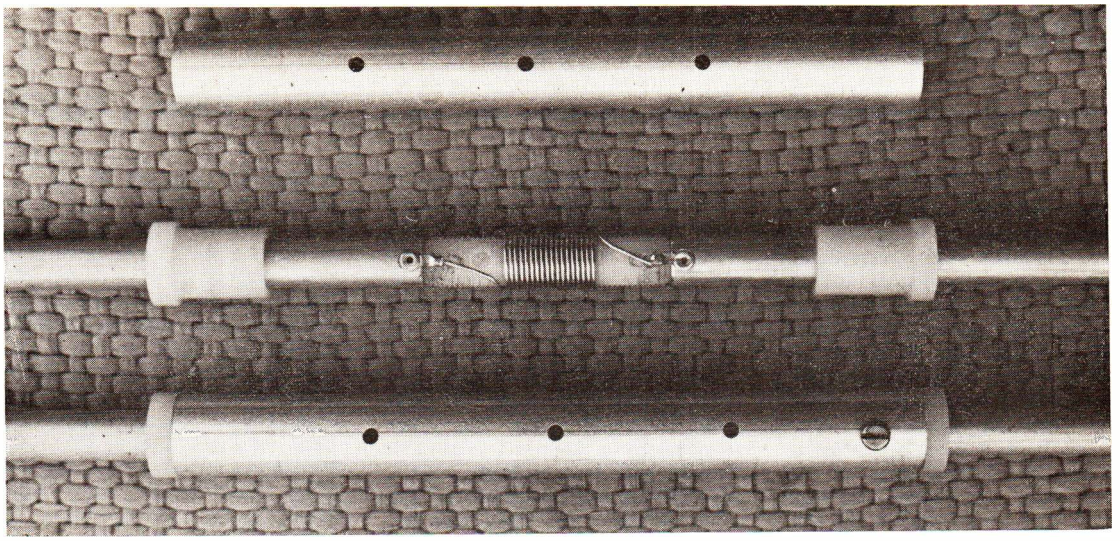
The Antenna

How you use the traps is of course dependent on the antenna configuration, therefore specific dimensions of elements will not be given.

Normal antenna tuning practise should be used using a GDO and SWR bridge. The traps may be used in rotary dipoles or beams and, of course, verticals.

	DRIVEN ELEMENT		REFLECTOR	
	15M	10M	15M	10M
TURNS	38	22	41	26
FREQ.	21·2	29	20	27·5
INSULATOR L	3·5"	2·5"	3·5"	2·5"

TABLE 1



Showing a trap in the final stages of assembly together with a finished and tuned unit (note the self-tapper).

Note that Table 1 gives details of the reflector traps if you decide to use them in a two-element beam. A similar reduction in the number of coil turns will allow you to resonate director traps.

Fig. 8 gives some very approximate dimensions which should give a good starting point for adjustment.

A word of warning: aluminium tubing available today does not quite telescope and needs filing down a couple of thou. or so which does tend to be a little frustrating, but it can and has been done. Filed or sanded aluminium cold welds with the slightest pressure so be extremely careful when attempting to file and fit, or what appeared to slide together easily will be impossible to separate.

Let us consider the adjustment of a 3-band dipole for 10, 15 and 20 metres.

Using $\frac{3}{4}$-inch tubing, form the dipole section for 10 metres making the elements slightly on the long side; fit a 10 metre trap on each element. Using a GDO resonate the dipole by trimming back each leg, fine adjustment being achieved by telescoping the trap within the element. This completed, extend the next sections and fit the 15 metre traps. Again using the GDO resonate the dipole in the 15 metre band by adjusting the section between the traps. Do not alter the 10 metre section.

Re-check the 10 metre resonance which should not have changed appreciably, if at all.

Finally extend $\frac{1}{2}$-inch tubing from 15 metre traps until 20 metre resonance is obtained. Again re-check all three frequencies.

The SWR will be dependent on how good the match is to the feed line and also on the height above ground. Feeding methods are dealt with in considerable detail in the usual amateur radio manuals to which the reader is referred in cases of difficulty.

A few final notes which the author considers important.

(a) Always place the capacitor end of the trap towards the feed point of the antenna.

(b) The traps are suitable for what is termed "junior" antennae so pushing the legal limit through them may be unwise, however the traps have been used with an output power of 250w, p.e.p. with no problems.

(c) When resonating the antenna remember to have the trap(s) in place.

(d) Cost? Well this depends largely on how accomplished you are in the gentle art of persuasion and scrounging, but the cost per trap should average out at about £2.

(e) If you already own a commercial 'junior' antenna which utilises separate traps for each band, and has a damaged trap, then with a little ingenuity in fitting, the author feels that a homebrew trap may be substituted. They are a little heavier but you won't bend one of these very easily.

(f) When the trap is sealed there is a possibility of the formation of condensation, particularly in cold weather, so three 3/16th inch holes are drilled over the centre 4 inches of the outer cover to balance the humidity; obviously when used in a dipole make sure the holes face down. In the case of vertical antennae, then either forget the holes or fit suitable plastic covers to prevent rain access. Remember to de-fash the holes on the inside of the tube or they could short to the coil.

Materials (per trap)

(a) One 1 inch o.d. 16 gauge aluminium tube, 8 inches long.

(b) Two $\frac{5}{8}$-inch o.d. 16 gauge aluminium tubes, 8 inches long approx.

(c) 1 inch dia. polythene rod, 3 inches long approx.

(d) *Polypenco* rod, $\frac{5}{8}$in. dia. 6 inches long.

(e) 18 *swg* enamelled copper wire, 6 feet long approx.

(f) Two 4 B.A. solder tags, 2 pop rivets, 1 self tapping screw.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

The Bands

June weather must of need produce June-type conditions: in between the signals the crack of lightning static, and all too often the dismal noise of rain static. And, when the rain static has gone away and the sky is clear blue, one looks out of the shack window to the tiresome realisation that the mower needs to be mobilised *again*! Roll on winter—the worst that can happen there is a possible hour or two shifting snow off the drive. And of course, between summer and winter there is the DX season.

Talking of DX seasons, there does seem to be a mighty lot of operators hatching plans for expeditions to rare and semi-rare DX spots; some of them are single-handers trotting round lots of DX'y spots, while others are all-out team jobs where the signal will be on the air 24 hours a day from two or three stations. Among the places mentioned have been Yemen, Mount Athos, and the 8Z4 Neutral Zone. The last-mentioned has already seen a 24 hour effort by 9K2DR, and 3B6/3B9 has also been activated by a group servicing the weather stations on Agalega, St. Brandon and Rodriguez. These last three also are prominent in plans being drawn up by N2KK and K5CO for a three-month jaunt during which they will individually look at some spots, and combine forces at others, in the Indian Ocean and Africa. For a bit of light relief, W8TQE will be operating from Hell from 1600 August 25 for 24 hours. (Hell, be it noted, is not in the Underworld but in Michigan!). QSLs to Adrian A.R.C., Box 111, Adrian, Michigan 49221.

The XF4MDX operation from Revill Gigedo has been drawing good business, and so also did KH6LW at Kure. Wake Island should be showing about the time this piece is being put together, and Niue, Tonga, Manihiki are in the pipeline. It seems that if you can think of a rare one, someone, somewhere, is hatching a plot to activate it. Even to ZA—which will put the noses of all the Phoney Phreds claiming residence in Albania somewhat out of joint! However, we'll believe in a ZA signal when we have worked it *and* got our sticky paws on the QSL card! If in the process, we accidentally work a phoney ZA or two, so be it.

Eighty

G2NJ mentions a long CW QSO with G5NX/M while the latter travelled from Southwell, Notts., to Peakirk near Peterborough; G5NX both driving and keying the rig. On other occasions they have been out together, when G5NX/M has been VHF and G2NJ/M on the HF bands. G6ZG was worked a couple of times in Norfolk, once near Bacton and again when he was on the side of the River Ant (well known to Broads' lovers). G2CAS/P was also noted, from the Bridlington area. Nick also mentions helping a local radio amateur carry a No. 19 set back to his car after it failed to make the reserve of 50p at an auction. G4FIM up in Leeds uses one to turn out a rock-steady CW signal of 15 watts or so.

Snippets

Ladies First! The YLs of this country have now organised themselves, into the British YL Amateur Radio Association. They will be having a weekly eighty-metre gathering, Monday evenings at 7.15 clock, the frequency being 3·605 MHz, ± QRM. The net control will vary, but it is intended that after some 30 minutes the net will be thrown open and the OMs may call in. They also intend a quarterly newsletter edited by G4GAJ, G4IAQ (who used to contribute to "*SWL*" before she gained her licence) is Treasurer, and G4EZI is the one to contact for more details. Doubtless all the OMs will show the proper gallantry while the girls are having their weekly natter and avoid QRM. Incidentally, if you want to make your DX-chasing a bit tougher, try doing it the G4EZI way—she has worked YLs in 170 countries now!

Guildford & District club is celebrating its Diamond Jubilee, and doing so partly by way of an Award. You have to work at least five members of the club between March 1 and August 31, which leaves you a few days to do it before closing date. The five contacts must be spread over at least two bands, and be from at least 50 kM away unless the QSO in question was on 23cm, in which case there are no distance restrictions. Look for them, around 2000z every evening, on or near 1835, 1935, 3535, 3735, 7035, 7055, 14035, 14235, 21035, 21235, 28035, 28535 (the Monday-evening club net frequency), and 145525 KHz. Send log data to G3KMO, QTHR. To find if any of the gang are lurking in wait to give you a QSO, call "CQ Guildford Diamond Jubilee award" on Phone, or CQ for GJA on CW.

'CDXN' deadlines for the next three months—

September issue—August 2nd
October issue—September 6th
November issue—October 4tn
December issue—November 1st

Please be sure to note these dates.

Years ago, there was a trio of reporters to this piece who were christened the "Pirates of Penzance", and after a long lapse one of them again writes in—G4BKI, who is now at Warwick University. Since 1976 he has spent extended periods of time in VP9, where he signed G4BKI/VP9; now he has VP9KF. Hopefully, a degree in electronics will soon be his, and then the activity will show a rise. When operating from G4BKI/VP9, Paul gave at various times his brother, G4AMJ, or G4EWU as QSL addresses, as well as his own UK address, all as per *G Callbook*. However G4EWU has moved, so the best route is probably to send them to Radio Society of Bermuda, Box 275, Hamilton, Bermuda, where his father, G3DLH/VP9GG will attend to them; certainly so for any VP9KF contacts.

Looking at the contests now, we note the European DX contest CW on August 11-12, with the Phone leg

on September 8-9. Only 36 of the 48 hours may be used, the 12 hours rest being taken in not more than three periods. Score QSO points by swapping RS(T) and serial number, starting from 001. Europeans score one point per QSO times a multiplier of ARRL Countries List and call areas of JA, VK, PY, W/K/N, VE/VO, ZL, ZS, UA9, UA0. In addition, the multiplier is times-four on Eighty, times-three on Forty, and times-two on 14/21/28 MHz. Non-Europeans may take advantage of the "QTC" feature by which they can repeat back to a European station a list of Europeans already worked. You can QTC up to ten times to the same station for QTC points, but only the first of the contacts with that station will be counted for QSO credit. The form of the QTC should be Time (GMT) call, and QSO number (e.g. 1300G3KFE123 would mean you had worked G3KFE at 1300z and given him QSO number 123 in your log). A QSO made can only be the subject of a QTC report once, which says you've got to work a lot of EUs to make it worth while to QTC. CW logs must be mailed by September 15, Phone by October 15, to DARC Contest Committee, D-895 Kaufbeuren, P.O. Box 262, West Germany.

G3WZD, 7 Stockwell Court, Gower Road, Haywards Heath, West Sussex, writes to say that from around mid-September he will be resident in Singapore. Should anyone wish a sked, CW or SSB, they could write to the above address to arrive before the end of August.

RTTY

This mode seems to be on the increase, and certainly the writer has received more inputs of this order in the last month than ever before. First, we have to mention the SARTG Contest: in the 1978 results we note G3UUP in fifth place in the multi-op category, and G8CDW fourth among the SWLs. Congratulations to both. As for the 1979 effort there are three periods over the same weekend, namely 0001 to 0800 August 18, 1600-2359 on the same day, 0800-1600 August 19, all times GMT. Operate 80-10 metres, as single operator, multi-op single transmitter, or SWL, exchanging RST and QSO number. Score five points for each station in your home country, 10 if it is another country in the same continent, and other continents 15 points. Multiplier is based on ARRL countries list, but includes each district in W/K, VE/VO, and VK. Final score is sum of QSO points times multiplier. It seems that the same station may be worked once on each band for QSO points and for multiplier credits. Logs to be received by October 10th, 1979, to contain band, date, time GMT, call-sign, exchanges sent and received, points and multipliers claimed—all on a separate sheet for each band. A summary sheet with the station vital statistics and classification entered, plus operators if one is in the multi-op class, should be posted to: SARTG Contest & Award Manager, OZ2CJ, C. J. Jensen, Meisnersgrade 5, 8900 Randers, Denmark.

The report of the BARTG 1979 Contest in March is to hand, and it is noticeable that even with modern RTTY gear, Forty metres doesn't get as much use as it deserves. Of course the HF bands were lively (albeit some Ws indicated they found Ten a bit flat), and Eighty was turned to for the sake of the extra multipliers to be found. As usual, the hard one was South America, where few stations made more than a couple of dozen contacts, and only PY2CYK sent in a log. Africa was well represented, as was Asia, while the VKs were fewer; ZL2BR was a welcome newcomer. This time some 67 of the entrants managed to work all six continents, and in all there were some 56 countries operating, not counting the various call areas. There were some 138 single-op entries, 23 multis, and 14 SWLs; F9XY was top single-op station with G3RED leading the Gs home, I5MYL top multi, with G3ZRS third in the category, while SWLs Musson and Niendorf provided the UK representation in the SWL category.

Still with RTTY, we repeat the schedules for the GB2ATG on Sundays: on 3590 and 14460 kHz, both ±QRM, the word goes out at 1100, 1130 on both bands, 1800 on Eighty only, and 1230 on VHF for GI only. 14090 kHz is used at 0730 for long-path to VK/ZL, 1530 beamed east across Europe to the Far East, and at 1900 beamed *NW* for North America. All transmissions on 170 Hz shift, 45 bauds. The VHF transmissions are made twice, once using FSK and then again with AFSK.

Before going on to the matter of the rest of the piece, let us offer you an interest variation of the great Murphy's Law; this one is Ginsberg's Theorem, and it says 1. That you can't win; 2. That you can't break even; and 3. That you can't even quit the game. However, Freeman's commentary on this says that every major philosophy of life which seems meaningful is based on the *opposite* of one of the three parts of the Theorem: thus 1. Capitalism is based on the assumption that you *can* win; 2. Socialism is based on the assumption that you *can* break even; 3. Mysticism is based on the assumption that you *can* get out of the game. Baffling, isn't it!

Twenty

Here we must offer the joker in the pack, worked by GW3GWA (Wrexham) as 5X5IA/A, giving name as "Idi" and QSL *via* Box 1, Entebbe; CW and only southern hemisphere signals audible on the band at the time. However, to make up for that one, GW3GWA is up to 93 confirmed for his CW DXCC, and has also received all the cards for a WAS. In terms of QSOs, there were, apart from the W-VE-EU stuff, LU, VU, ZL, VK, KH6, HI8, FP8, KL7, XE, UØ from the North Pole Expedition, VP2VJ, and ZK1BD.

We have already mentioned the G2NJ/G5NX/M saga: two stations in one car. While G2NJ was in the back seat at the key, an OK with whom he was in QSO asked for a word with G5NX, who promptly stopped the car and took the key. We suspect that surprised the OK somewhat!

Twenty for G2HKU (Sheppey) was tackled in three different directions: CW QRP with the HW-8 managed EA8MA, UK5OBP, UK5SAU, VE2DXU, UT5QG, UH8DC, OK2YN, UC2WP, and UI8LAG. Full-bore CW operation made with YVØAA, K6SV, UK9SAY, VE6ABC, DK5AD/AC3, and VK7CM. SSB managed to work out to ZL1AA, ZL1VN, ZL3SE, ZL3RS, ZL1QQ, and C5ACQ.

Two letters from G3NOF, both of which indicate that conditions have been very good. In the mornings there have been openings to W6, W7, VE7 as early as 0600, to be an overture to the first act when the VK/ZL

stations (and sometimes the Pacific) appear around 0730. Not a great deal of real DX in the daytime, but conditions improving again in the evenings. SSB QSOs were made to FO8DH, FO8DT, FO8FC, K7ICW (Nevada), KØCL (Colorado), K8-VIO/KH4, KH6FKG, KL7H, UØCR heading for the Pole, PZ1DR, VKs, VK2AGT (Lord Howe), VR6-HI, W5IXQ (New Mexico), WA7-COQ (Utah), ZF1GC, ZK1DN and ZLs. By the time of the other letter, DA1WA/HBØ, HKOBKX, K7IW, KL7CD, KL7CHT, OE6XG/A, P2-9JS, TG4NX, TG9GI, TI2LL, VKs (including VK4AJW/M/VK5), VP8-RY, VR6TC, WA7WSE (Arizona), WB7VIY, XE1MR, XE1UF, YS9-RVE, ZLs, 5T5CJ, and 5W1BU had also been worked.

21 MHz

Here we must let G2BJY (Walsall) go in first; his home-brew rig and brace of 807s managed to work to EUs assorted, HZ1HZ, *lots* of JAs, OH2BOZ/OHØ, UA9, UAØ, UF6-VAB, UK5DAT, UK8ACC, UK8-FAA, UK8IAA, UL7GCE, UM8-MAQ; the previous letter indicated again the pattern of JAs in plenty and Asian Russian signals, but in addition PYs, SV8JE, UOCR and 7X7AN, not to mention a couple of /MMs showing that the aerial was getting out to other parts of the world at the appropriate times.

G2ADZ (Chessington) did have a spell when nowt was doing on Ten, for long enough to make him crank the bandswitch, the result being just one QSO, on CW with VK1PG.

G2NJ/M, out with G5NX, mentions that his last QSO, just as the car turned into the home straight, was with VE1BBH.

While G2HKU stuck all the time to CW, he divided it between QRP and the HW-8, and full-bore; the latter gave W6BS, G3LGP/WØ, J2ØBS, PT2ERA, JK1IWB, W4DIV, and 5H3VT; the HW-8 worked out to DK5AD/N3, K1RM, K3EST, OD5LX, ED8TY, PY1BOA, N3-ATG, and UV9AX.

G3NOF (Yeovil) notes the summer conditions have often left 21 MHz open to somewhere for 24 hours a day, with some Sporadic-E propagation in between the good stuff. The first letter mentions just one QSO, this on SSB to W7QK in Oregon. The second letter indicates full summer conditions, heavy fading, Ws coming in around 1100 and staying there till 0600, the short gap being filled by VK/ZL. SSB QSOs were made with K7HRW, K7RI, KH6JEB, KP4CKY, J7DAY, JA3-GSM, JA3MCS, JA6OKB, JR6HI, TI4HWF, VE1AST/1 (Sable Is.), VP8SD, VQ9KK, W7DND, W7-BKR (Wyoming), WD5AJE/SU, XT2AV, ZL2AZV, 9J2BO, 9Q5MA.

Ten Metres

G2BJY wangled his rig onto this band as well as the normal 21 MHz, and as a result keyed with C6TOQ, who gave the name Lu and QTH Lisbon to raise an eyebrow, DL2HE/W5, EA8TY, PYØMAG, PY1MGH, PT2XX, SV0AA/5 (Rhodes), K5VT/SV5, UK7BAL, UK9ADV (YL Irina), many UA9s, and YT2D for a new prefix.

G3OUC wrote on a different subject altogether, of which more elsewhere, but on the back of his letter he did indicate that on 28·82 MHz he had worked RA9FIA, and RA4PGC, both around the 0830 mark on successive mornings.

G2ADZ has been busy elsewhere and so his radio has had to take a back seat for much of the time. However, he still managed to generate a report of considerable interests. Firstly, beaconry, and here it was GB3SX, DLØIGI, 5B4CY, EA2BH, and A9XC pretty consistently; erratically ZS6DN, and W1AW with slow CW. Nothing noted of ZE2JV for some time. Stations worked were all on CW, as: ZP5NW, ZP6AQ, 5H3VT, PYØMAG, PYØAPS, HI8-LC, CP5EZ, ZL3GQ over the S. Pole, ZL2GH ditto, ZL1NG *not* over the Pole for a change, K5VT/SV5 in Rhodes, YV5GHL, VQ9MR, VP2-VEZ, YN1U, 6W8AA, OE6XG/A, VU2LHO, VU2SV, YVØAA (just about everybody seems to have made it to Aves!), CX2AQ, HK3QO, HK7UL, TI2LA, OX3MD, VK1PG, 9V1TL, VK6NDJ, VK4NJQ, AX6-NCD, VP2SAH, 9K2DR, VR6HI (the Pitcairn expedition), 9Y4VU, VE8AW, VP2MBJ, KL7MF, and assortment of small fry from UAO, LU/PY, JA and so forth. Gotaways included VK1FT, VP2SZ, VQ9TC, VP1MT, VR3AH on QRP, and PZ1AP who didn't seem to be replying.

Ten CW was an unusual variation for G2HKU, who used it for QSOs with LU9CV, RA4AKC, UF6VAI, and UAØBCI.

In G3NOF's first letter we note SSB QSOs with CE3RC, CE6EZ, CX7BN, G4HHL/MM in the S. Atlantic, HL9TT, HMØU, JA7GB, P29JS, UM8MAQ, VK4NJC, VK4-NOF, VK4NQL, VK8NDX, VS5-OO, VU2EA, WA7GPZ (Idaho), WB7UFO (Idaho), YBØADW, YBJ ØWR, 5NØNAS, and 9M2FR. The second letter came at a time when summer conditions were in full swing, with the propagation tending to be more *N-S*, few Ws and those around 1800z.

Top Band

It's been a long time since we heard of anything much doing on this band, other than the winter DX-chasing. Now we have a letter from G3OUC (Newbury) who is one of a group of Top Band /M enthusiasts who have arranged a string of meets. It is just too late for the one at Avebury, but in August they intend to have one on Monday 27th at Crofton Beam Engine near Great Bedwyn which lies just off the A338 near Burbage, and is on the Kennet & Avon Canal. Later there's September 23, when there will be a meeting in Savernake Forest, with a barbecue for you to deal with your own bangers. Talk-in will be by G3WEF/G4DGR. In general, a sked will be held at 1015 local time to confirm last details, such as the weather(!) and talk-in will start around 1430, the favoured frequency being 1·920 MHz. Suffice it to say we wish this initiative every success and we ourselves hope to get to at least one of these events.

HF Convention

The RSGB HF Committee have organised an HF Convention to be held on September 15th, at the Pavilion Suite Complex, Warwickshire County Cricket Ground, Edgbaston, Birmingham. It promises to be an interesting and informative occasion, and applications for tickets should be sent to G4CNY, QTHR.

Finis

Which is the end of the tale once again. The dates for your material are all as shown in the 'box', and the address is "CDXN," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Till next time, *au 'voir.*

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READERS

Wanted: Marconi 'Atlanta' receiver, 15 kHz to 30 MHz in 10 ranges, input 240v., case slightly scratched, in good working order, no mods., £100 or near offer.—Quinton, 38 Weyland Road, Witnesham, Ipswich, Suffolk.

Wanted: HRO receiver in good working order. Details and price please.—Edwards, Dany Graig House, 44 Cornwall Road, Williamstown, Penygraig, Rhondda, Glam.

Sale: Drake SPR-4 communications receiver, with 6 extra crystals, manual, little used, as new, £250.—Ring George, Plymouth 812031.

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Selling: Lowe SRX-30, five months old, £140. Buyer collects.—Ring Lane, 01-778 9118.

For sale: Nascom computer in nice cabinet, with heavy duty fan-cooled protected PSU, cuts interface, B-bug, cassette and all data books, £250. Type 8K dynamic ram (4027), £40. Storno Viscount, UHF, £20. 100 double-balanced MC1496L mixers, £50.—Bonner, G3TGF, QTHR. (Tel: Orpington 26802).

Sale: Transformers: 6·5v. at 25 amps., £5. 6·5-0-6·5v. at 15 amps., £4.—Ring Cavender, 0632-743546 after 5 p.m.

Selling: FT-7, 2 months old, original packing (gone homebrew), £260.—Ring Johnson, G4DHF, Bourne (Lincs.) 3108, 6-7 p.m.

For sale: Eddystone 840C, £50. Quad FM1 tuner, recent makers' overhaul, with PSU, £20. Heathkit S99 stereo amp., £20. Avo Model 7, £15. Garrard 4HF(H) deck, with spare head shell and 2 magnetic cartridges, £15. All excellent. Buyers collect, no cheques please.—Perkins, 22 Callis Court Road, Broadstairs, Kent. (Tel: 0843-62947).

Sale: Pair of Eimac 3-500Z's, unused and boxed, £60.—Ring Surman, 0403-722909.

Sale: Drake TR4-C, with AC/PSU, matching MS-4 speaker, RV4-C remote VFO and 7075 mic., mint, £475 the lot. KW-1000 linear, £125. KW-107 ATU, £50.—Cox, G3RYV, QTHR. (Tel: 0628-22551).

For sale: IC-215 with R3-R9, S20-S23, 145·8 MHz, auto tone burst, and all accessories, 12 months old, very good condition, boxed; commercial (Coutant) 1 amp. PSU; 5-ele Yagi. The lot, £155. Will deliver up to 50 miles.—Stephen, G8MYX, QTHR. (Tel: 0993-841305).

For sale: Collins 75S-3C receiver ('round dot'), £600.—Ring West, Upper Warlingham 3522.

Sale: Realistic DX-160, as new, under warranty, £65. Buyer collects.—Ring Weale, Bookham 56741.

Selling: Collins TCS transmitter, £50. FM tuner unit, £10. Racal/BCC Type 715 VHF receiver, £25. Marine band crystals: 9·13125, 9·12500, 9·31250, 9·30625, 9·30937 MHz, £2 each. Type VCR-139A 3-in. CRT, £5. Bench oscilloscope, £60. Transistor/diode tester, £25. Type 51 waveform generator, £10. UHF radio/transmitter tester, £10. Carriage extra, s.a.e. with enquiries.—Hayward, Sunnyfields, Lighthouse Road, St. Margaret's Bay, Dover, Kent.

Selling: FL-200B Tx, SSB/CW/AM, £70. Eddystone EC-10, £60. Exchange for good CW Tx considered.—Farley, Badgers, The Dean, Alresford, Hants. SO24 9BH. (Tel: Alresford 3816, evenings only).

Wanted: Will swop large Cossor valved oscilloscope (or cash) for any of the following ex-military radio equipment: Wireless Set 62, Wireless Set 19, Wireless Set 38, R.209 receiver, Wireless Set 22, or any other equipment of this type.—Ring Dudley, Letchworth 5301 after 6 p.m.

For sale: AR88D in nice condition, surplus to requirements. Offers around £60 please.—Hurst, 31 Avondale Road, Fleet (5831), Hants.

Sale: Yaesu FR-DX400 2m. and 4m. converters, £120. Microwave Modules 432/144R transverter. 432 MHz 19-ele tonna, £14. National RS-772 stereo tape recorder, 2 or 4 track, 3-speed, plus hours of pre-recorded tapes, £100 or near offer.—Spencer, G3ILO, 49 Rosebery Road, Dursley, Glos. GL11 4PT.

Selling: Eddystone 770R, 19-165 MHz, £110. Burndept BE-201 Tx/Rx, 4-channel xtal VHF, 100-156 MHz, with original 12v. PSU and cables, £22. R.1974 VHF Rx (similar to R.1392), xtal 100-156 MHz, with mains PSU, £20.—Ring Allinson, Aspatria 20243.

Selling: KW-202, excellent condition, with speaker and manual, £180.—Adelman, 40 Formosa Street, London W.9. (Tel: 01-286 3172).

Sale: FRG-7, mint condition, with phones and original packing, £120.—Davies, 37 Nicholls Avenue, Porthcawl, Glam.

For sale: Three new (3 weeks) TR-2300 2-metre synthesiser portables, complete with batteries and guarantee, £175 each inc. VAT.—Ring Winder, 0903-814645.

Selling: Drake TR-7 transceiver with DR-7 GC/digital board and extra 1·8 kHz filter; AUX-7 range prog. board; PS-7 PSU; RV-7 remote VFO; MN-2700 high-power matching network; MS-7 speaker; 7077 desk mic.; DL-1000 dummy load with fan; Datong ASP RF speech processor. All only a few months old, as brand new and boxed, genuine reason for sale. Offers?—Ring Hufton, 0602-54047.

Sale: Grundig 2001 'Satellit' 21-band receiver, with BFO unit, in perfect condition (today's price £282), £150.—Ring Turner, Newtown (0686) 27108, Powys.

Selling: FT-202R, hand-held, 2 months old, 5 channels, with charger and nicads (save nearly £30 on new price), £100.—Ring Trevett, G4GKX, 0202-696929 (Dorset).

Wanted: Good general coverage receiver for new SWL.—Ring Oxby, 0532-675489 (Leeds).

For sale: AR88D Rx, with spares and manual, £55. PR-40 preselector, £6. Sentinel 2m. pre-amp., £8. Sentinel 2m. converter, £5. Or £70 the lot. Buyers collect.—Ring Swan, Redhill 63017 evenings/weekends.

Sale: Sony CRF-230 'World Zone' receiver, battery/mains, FM/SW/LW/MW, 23 bands, 48 transistors, 34 diodes, excellent condition, £250.—Ring Lilley, Medway 251853, Kent.

For sale: ST-5B RTTY T/U; HAL RVD-1005 visual display unit. Both mint. Or would exchange for FRG-7000. W-H-Y ?—Ring Akines, 0472-71211.

Selling: Western Electronics Alu-mast, 30-ft. aluminium lattice tower, complete with base, rotor plate and top plate; Hy-Gain TH-2 Mk.III beam; BN-86 balun; CD-44 rotator and cable. Only a few months old, all as new and boxed. Offers?—Ring Hufton, 0602-54047.

Selling: Drake MN-4 ATU/SWR/wattmeter, 200 watts continuous, with manual, £80 plus carriage.—Addie, G8LT, Spring Hill, Wappenham, Towcester, Northants.

Sell or exchange: KW-201 with spare set of valves, good condition, £100 or near offer. Or **exchange** for linear amp., 3-30 MHz.—Jones, 113 Springwell Road, Heston, Middx.

Sale: FDK Multi-U11, 70cm. FM transceiver, 9 channel, fitted, 1w/12w. RF output, hi/low dev., 4-ch. auto-scan, auto tone burst, 28 channel capability, mobile/base rigs mint condition, £240 or near offer.—Ring Le Masurier, G8NRZ, Walton-on-Thames 44356, 9 a.m. to 5 p.m. only.

Selling: Versatower W.60, with heavy-duty head, rotator, 14-ele Parabeam, 88-ele 70cm. Yagi, and two 100-ft. lengths of UR67, £285. **Yaesu** YO-100 monitor 'scope, £95. **Standard** C.828 low-band mobile transceiver, fitted 9 channels, £95. **Standard** C.146A 2m. hand-held transceiver, with helical antenna and nicads, £95. New **JVL** 6dB 2m. co-linear antenna, £25. New **Fritzell** FB53 Jumbo 5-ele beam, 10/15/20m., 2 kW power handling, £148. **Radiometer** AM/FM signal generator, with matching modulation meter, 0·3-240 MHz, £220. **Kyokuto** 400-channel 2m. 12w. mobile transceiver, with xtal toneburst and digital readout, £165.—Ring Lee, G4HYQ, 01-904 2104.

September issue: Due to appear September 7th. Single copies at 50p post paid will be sent by first-class mail for orders received by Wednesday, September 5th, as available. —Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sale: KT-230 communications receiver, 0·55-30 MHz, bandspread 10-80m., with handbook and 8 spare valves, £25. Morse key, £2. VFO unit, 9v., 160m., £4. Carriage extra.—Livermore, Village Farm Cottage, Market Western, Diss, Norfolk.

For sale: Stolle 2010 rotator with RZ-100 bearing and 100yd. 5-core cable, all brand new, £42 or offer.—Snowden, Manor Farm, Amotherby, Malton, Yorks.

Selling: Eddystone 840C communications receiver ,480 kHz to 30 MHz, newly valved, £55.—Ring Schneider, 01-953 2306 evenings.

For sale: Versatower P.40, good condition, £180.—Chalkley, G4BXR, QTHR. (Tel: 0908-566266).

Sale: Yaesu FR-DX400 Rx, 9 bands, 160-10m., plus 2m. and 6m., 7 filters inc. FM etc., excellent condition, with handbook, £145. IC-20 2m. mobile transceiver, 10w., 9 pairs of crystals (ideal first 2m. rig), £75.—Ring Rice, G3XYT, 021-354 1566.

Sale: Yaesu FRG-7, new, in makers' carton, £170.—Condon, 33 Kimbolton Green, Borehamwood, Herts.

Selling: Pye PCR-2 communication receiver, with BFO/speaker, LW/MW/SW(6-22 MHz), PSU, £30. Carriage extra, s.a.e. with enquiries.—Hayward, Sunnyfields, Lighthouse Road, St. Margaret's Bay, Dover, Kent.

Sale: Trio 9R-59DS general coverage receiver (on which 100 countries heard), with speakers, £55.—Ring Winpenny, Redruth (0209) 215568.

Selling: FRG-7, fine tune, mint condition (reason for sale, gone FT-101), £160.—Ring Leather, Yateley 878010.

Sale: KW-2000B with power supply, good condition, £195.—Ring Bruder, 0926-35311.

For sale: R.C.A. 88 with manual; Creed 7B teleprinter; Ex-Naval AN/SGC-1A (MSA) radio-teletype terminal; Visual indicator for ATM teletype unit ('scope); B.62 and B.40 Rx's; Marconi 'Oceanspan' transmitter. Offers?—Ring Watson, 0272-38822 after 6 p.m. (weekdays only).

Sale: G.E.C./Marconi R.411R, transistor circuiting, coverage 15 kHz-31 MHz in 31 bands, digital display, fully synthesised, notch filter, noise limiter etc. (list price £1500), £400 or near offer. Carriage and packing extra.—Clapham, Lloyd Court, High Street, Deal (65021), Kent.

Selling: Surplus to requirements: Collins 75A-4 amateur bands receiver with three mechanical filters, and Yaesu FL-2100B linear amplifier. Both absolutely mint condition. Phone for details, sane offers only please.—Ring Miller, GM4AGS, 0382-543113.

Offering: "Short Wave Magazine", bound in book form, April 1938 to Sept. 1939; RSGB "Bulletin", June 1947 to June 1954, complete. Offers?—Brundret, 49 Lon Conwy, Benllech, Gwynedd.

Offering: K.W. Vanguard 50w. CW/AM Tx, with instructions and circuit diagram. Offers? Buyer collects.—Ring Tebay, 01-229 5630 after 8 p.m.

Wanted: Manual for B.40 (or photostat), good price paid.—Ring Hastings (Sussex) 440340, reverse charges.

Wanted: HF transceivers and/or separates; also VHF transceivers.—Ring Hall, Bolton 592929 after 6 p.m.

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