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Units of the SCR-522 (TR5043) for experiments on 2 metres T.V. and radio telephone wavebands.
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CHASSIS
Frequency, 100-156 mcs. with 11 valves:

3/125G7's
12C8
12F6
12AH7
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Complete chassis (less xtcials) with 3/12 mcs., I.F.T.'s Relay, etc., designed for operation on predetermined xtal frequencies, but easily altered for continuous tuning. Power requirements (external) H.T. 300v D.C., 75 ma. L.T. 24v D.C. 3A. Dimensions, 15"x72"x6". Circuit supplied.


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RECEIVER and UNITS of SCR-269 RADIO COMPASS
by BENDIX AVIATION CORP.
Comprising:—BC-433-G, 15-valve s.hets. revr. Covers med. and long wave, 172-1,500 mcs., in 3 switched bands, power input 115; 400 c/s (if converted to 200/250v 50c,s, power requirements would be 300-350 150 ma.; 6-3v 3A, 5v 2A.). In metal case, 8½"x2½"x12".
Plus, BC-434-A Control Box, with "5" Meter, etc., in metal case 7½"x4"x7½".
Plus, 2 Flexible Tuning Drives, MC214.
Clydesdale's £6/6/- Carriage price only per set
Set of "Radio Compass" (SCR-269-G) Circuits available at 2/6 per set. Post paid.

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E.952. Input 6v. Variable output, 200-240v 40-50 ma. Controlled by 4-position output switch. Complete with 6p UX synchronous vibrator, 024 rectifier, in metal case, 4¾"x4"x6".
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"SIROCCO" BLOWER, WITH SHUNT MOTOR
27v D.C. 1-5A. 1/50 h.p., 3,000 r.p.m. continuous running, multi-bladed fan, outlet dia. 2½". Size overall 7½"x5"x6", mint, size 7½"x5"x4½" on rack 16"x12" with fixing screws, aluminium construction.
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200 ohms. Wound on circular porcelain former, 2½" dia. x 12", with spindle.
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R1481 Frequency 65-86 mcs.
A 10-valve, 4/VR53 (EF39), 2/VR65 (SP61), VR54 (EF34), VR57 (EK32), VR66 (P61), plus stabilizer VS70 (74/75) superhet, with "5" meter, screened R.F. section, B.F.O., etc., etc. Enclosed chassis, 19½"x10½"x11", finish dark grey. Circuit supplied, all units tested and guaranteed working before despatch. New, unused.
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For the R1481 or R1132
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SPECIAL OFFER—Receiver and Power Unit
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Power requirements (external) H.T. 115v for 100-124 mcs., 220v for 172-1,500 mcs., 300v for 300-350 mcs.

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- 50 Kc/s - 150 Kc/s
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- 500 Kc/s - 1.5 Mc/s
- 1.5 Mc/s - 5.5 Mc/s
- 5.5 Mc/s - 20 Mc/s
- 20 Mc/s - 80 Mc/s

Note these Attractive Features:

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Battery Model available having same general specification and covering 50 Kc/s - 70 Mc/s, powered by easily obtainable batteries.

Sole Proprietors and Manufacturers:

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Fully descriptive pamphlet available on application.
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“Ask the man who owns one.”

We supply all requirements.

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Output: 250.0/250v, 60 ma., 5v 2 amp., 6-3v 3 amp. 
Output: 350.0/350v, 100 ma., 5v 2 amp., 6-3v 4 amp.

**THESE TRANSFORMERS ARE DEFINITELY THE BEST VALUE OFFERED IN THE HOME TRADE**

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
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<tr>
<td>6H6 3 for 4/-</td>
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<td>65H7 3 for 5/-</td>
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<td>7193 3 for 5/-</td>
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<td>6AC7 3 for 10/6</td>
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**L.F. CHokes**

- 6H6 60 m/a open type: 3/- each
- 4/6H 250 m/a, Fully Shrouded: 5/- each
- 3/4H, 150 m/a, Fully Shrouded: 3/- each
- 15H. 100 m/a, Fully shrouded U.S.A.: 7/- each

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Dial marked 0-100 engraved black on white with transparent pointer. Dial marked 0-100 engraved black and vernier reduction 100 to 1 ratio. Complete with spindle. Brand new in cartons with wooden former. Worth 25/-. only 4/- each. !

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- 6v, made by Masteradio. Output 200v at 60 mA. Fully smoothed and filtered (2,000 mfd). Non-synchronous vibrator, uses OZ4 rectifier. In handsome grey metal case, 9½x5½x6". 20/- only. Brand new.

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With lead and two-pin midget plug. Type T530 complete with Nickband and Brand New. Price 3 for 2/6.

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Made by S. G. Brown. 4,000 ohms per pair. Brand new, 2½ pair. Headphones moving coil with handset included 47 ohms each part, 6½ pair, U.S.A. Type H.S.-23, with leather headbands and rubber earpads, 2,000 ohms resistance, 6½/- per pair.

**VALVES**

- 807, 6Y6, 6V6, 5U4G, 77, 78, 6K8, 17A, 7½/- each. VR150, R3, 6X5, 6X7, 6N7, 6Q6, 6/½ each. 6SL7, 6AG5, 617, 6K7, 3QS, 5Z4, 5/½ each. 955, 6G6, 12SG7, 12SH7, 12A6, 7IA, 9006, 4/½ each. 12J5, VR54, VR65, VR66, 3/½ each.

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To clear space in our warehouse prior to rebuilding, we are offering the remainder of our stock of these well-known receivers at clearance price. Freq. range. 65-86 Mc/s, 6" S.M. Dial, 10 6-3v Valves, 3 VR65s, 4 VR53, I VR66, 1 VR54, 1 VR57, 1 VR67. I.F. Freq. 12 Mc/s, B.F.O. These receivers are 19" rack mounting, brand new in transit cases, with circuit diagram. £4/10/, carriage paid.

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6-valve straight receiver with 3 R.F. stages, using plug-in coil packs, H.R.O. type. Valves : 3 78's, 2 77's, 1 1642. Black crackle case, 15"x8"x8". Provision for remote or local control. Dial cal. 0-100. Supplied new, complete with valves and 4 coil packs covering : Q, 524-844; E, 1285-2155; G, 2960-4620; H, 3865-6265; M, 5075-7280. £3/2/6, carriage paid.

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V.F.O. by Wilcox Gay. Type M1. 19467A. Uses 807 electron-coupled osc., very stable, well screened. Employed in 2 circuits : (a) Using cath, grid, screen, tuning 1-2 Mc/s in 6 bands. (b) Plate circuit as multiplier; tuning 2-10 Mc/s in 3 bands. Incorporates grid choke, grid leak, grid current meter (0-10mA) for intermediate amplifier. Supplied brand new in original carons, with installation accessories and instruction book. £5, carriage paid.

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Power units used with 115/55. Input 200/250v 50 c/s. Outputs 220v 110mA D.C., 6-3v 13 Amp. D.C. Metal rectifiers used in both cases. In perforated metal cases. 19x15x12", £2/10/, carriage paid.

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15H, 200mA 150Ω, size 6"x5"x2 1/2"... 7/6 6H, 200mA, 100Ω ... ... 6/9
20H, 300mA, 150Ω, Weight 13 lb., size 7x5"x5" 20/9 5H, 200mA, 90Ω ... ... 7/6
20H, 40mA, 220Ω ... ... ... ... 3/11 5H, 200mA, 140Ω ... ... 5/9

ELECTROLYTICS

8mF 170v, 1/3 : 8mF 350v, 2/6 : 8mF 500v, 2/3 : 8-8+8 450v, 4/- : 16mF 350v, 2/6 : 16mF 500v, 2 1/2 : 16-16mF 350v, 3/6 : 16-16mF 500v, 4/- : 16-16mF 450v, 5/- : 32mF 450v, large can, 2 1/2 : 32mF 500v, large can, 3/- : card, 3/- : wire ended, 3/6 : 100mF 3v, 3d : 100mF 6v, 6d : 100mF bolt fixing, 25v, 1/6 : 25/25v, 1 1/2 : 25/50v, 1/6 : 50/50v, 1/6 : Special line : 24mF 350v, card, 1 1/2 : 32mF 450v, can, 2 3/4 : 8-8+8 350v, can, 2 1/2 : 100+100 350v, can, 3/-.

LOUDSPEAKERS, P.M.

5", less trans., 9/6, 9", with trans., 11/6; 6", less trans., 11/6; 10", with trans., 21/6. All brand new boxed, with all speck coils. Post extra.

MARKER BEACON RECEIVERS B.C.357

2-valve receiver (12C8, 12CQ7), freq. approx. 70-90 Mc/s, pre-set toned, on chassis 5x3x1 1/2", with 1mA relay, 9/6.

R.F. UNITS

Type 24, with valves, used, good condition ... ... 8/6 plus 1/6 post
Type 25, with valves, used, good condition ... ... 10/6 plus 1/6 post

MODULATOR AND MIXER UNITS W4332/A

Ex-Admiralty Units with 7 valves, 1-SUM, 1-VR54, 2-6J5, 2-P61, 1-VR65. On chassis 10x3 1/4". Also 5H 200mA choke, large mains trans. (500 c/s), pots, res., cond., etc., in metal case with louvres, 10x3 1/4"x4 1/4", 21/- carr. paid.

10-VALVE RECEIVERS R28/ARC5

Covers 100-150 Mc/s. Supplied New with valves (including 4-717A's), 42/6.

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Input 24v D.C. Output 230v A.C. 50 c/s. Rating 75 watts. In metal case, 19x12"x11", with 2 1/2-0-250v meter on output. Auto trans., sluldlock fuses, output control switch to raise or lower volts. £3/10/, carriage paid.

W2702. 6v D.C. input, 190 80mA output, smoothed. D.C. In metal case 14x9 1/2x4 1/2" with on/off switch, 16/6 carr. paid.

Type 104. 12v D.C. input, outputs 250v 6-5mA, 6-5v 2-5A. D.C.P.M. Rotary on chassis with cover, size 8 7/8x4 1/2x6 3/4", 6/11 post paid.

Type 87, input 24v. Outputs as Type 104, 5/11 post paid.

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2P 3W 1 Bank ... ... ... 2/- 3P 3W 2 Bank ... ... ... 3/-

VIBRATOR PACKS

Input, 12v. Output, 250v 65mA, with 12v vibrator and QZ4 rectifier. Mounted on chassis 5 1/2"x3 1/2x1", with 8 ft, screened cable, on output. Brand New, boxed, 17/6.

Vibrator Power Units Type 173. Input 24v D.C. Output 120v. Stabilised by S.130. With 12v vib. and metal rect., in metal case, 6 1/2"x10 1/2x3", 11/6, post paid.

S.M. DIALS, as used on R.F.26, etc., lesser Curser, 3/11.
**Benson’s Better Bargains**

**TRANSFORMERS.** RCA. Fully shrouded. Input 190/250v, 50c. Output 400-350-0-350-400 ma, 6-3v 6a, 5v 3a, 37/6.


**VIBRATOR PACK.** DC 6v to 190v 80ma and 6v, 22/6. SCSR22 Rx, 11 valves, 32/6. BC453/4/5 scrap chassis, underdeck fairly complete, 6/-. Set 3 coils, 3/6, set 3 IFs 8/-. (45/5 ONLY), SCSR274:— 3-sang Variables or single Tx type, 3/6; Replacement TX Ceramic coils, 1/3; Potted Condensers, 1/3 (state types), BC456: Mod. Trans., 6/6, 800, 3/6; Chokes, 2/3.

**DINGHY TX HAND GENERATORS.** Input DC 300v and 6v or Input 6v, output 300v (also convert to AC/DC motor) 15/-; VCR97 new, catted. 35/-. Base, 3/6. OIL-FILLED CONDENSERS, 1-2, 5K 3/6, 1-600v 9d., 5, 800v 1/6 (all tub. bakelite). Metal 1 mfd 1-5K 1/6, 4mfd 1K 4/6, 12mfd 750v 8/6.


**METAL RECTIFIERS** 600v 30ma, 230v 80ma, HW, each 5/-; 280v 100ma CT, 6/6; F.W. 230v 3a 7/6; 48v 2K 5/-. 8v 3a 15/6, 12v 2a 22/6, 12v 1/4 8/-; CHOKES 300 ohms 400 ma 4/-, 100 ohms 200 ma 7/6.

**POTENTIOMETERS.** Ceramic 200 ohms 3a 6/1, 1k 1a 5/6, w/w 20k 4w 3/3, 4k 1/9; Carbon 4m 100k 50k 1/3. VITREOUS RESISTORS 35K 35w, 100K 35w, 25K 15w, 400 ohms 20w, each 1/3.

**BULGIN.** Twin fuseholders 1/3; Ruby Indicators 1/3; Toggles SP 1/9; Mains (chassis), plug and socket, 2-pin 5a 1/6, 5-pin Ceramic v-hldr. 6d.

**VAR. CONDENSERS.** Spindled, ceramic miniatures, 100pF 2/-; 75pf d.E. 1/6; 75pf twin 2/6; 50pf 3-sang 3/6; 160 pf 3-sang 5/-. EDDYSTONE 60pf, linear 2/-. SPINDE COUPLERS std 4 in. Md., Epicyclic drives SM, 1/3. AXLEYS, 2/6 each. Many types available. CABLE: Coax. 80 or 55 ohms 1 in. 9d. yd. Screened 6-core with two inside pairs screened 9d. yd. Screened Twin, heavy 9d. yd. PYE PLUGS (2) on 1/3 coax. 1/6. ROD AERIALS 4ft. or 10ft. sectional, each 8/6. Holders to suit, ceramic 1/3.

**CREED Keying relays, high-speed, 5 ma 12/6. METERS MC 0/50ma b/-, 0/23a 1/6; 0/1a 5/-; 0/3a 7/6. MICRO SWITCHES 1/9.**


**Resistors, new, 52 values, 50 assid. 5/6.**

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for BC221 frequency meter or similar application. Input 0-110-200/250v 50 c/s. Output 150v 5-40 ma. Regulation 5/30 ma 2v—5/40 ma 4v. Type P22/A fits the battery compartment of the BC221 and is manufactured by us using new high grade components on stove enamelled aluminium chassis.

Size 8" × 6½" × 4".

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- 350-350v 100mA, L.T.'s as (c) ... ... 22/-
- 250-0-250v 50mA, 0-4-5v 2A ... ... 16/6
- 300-0-300v 60mA, 0-4-5v 2A ... ... 16/6
- 250-0-250v 80mA, L.T.'s as (c) ... ... 19/-
- 300-300v 100mA, L.T.'s as (c) ... ... 22/-
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**HUNTS E.H.T. CONDENSERS.** New, recent manufacture, 1 to 25,000 volts, 1/4 to full plate.

- EX-GOVT. NEW E.H.T. CONDENSERS, all hermetically sealed, 1 mfd. 25 kv, 2 1/2; 1 mfd. 35 kv, 3 1/2; 2 mfd. 35 kv, 5 1/2; 5 mfd. 25 kv, 10 1/2.
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They consist of an amplifier/recorder/playback/erase unit, with a detachable recording head, and are ruggedly constructed from first quality components to give long, trouble-free use.

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Illustration shows:

- 65 watt oval tapered bit.
- 65 watt round pencil bit.
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THE SHORT WAVE LISTENER ASSOCIATED WITH THIS MAGAZINE IS SPECIALLY FOR THE RECEIVING ENTHUSIAST
NEW CATALOGUE NOW READY—POSTAGE 3D.
Editorial

Evolution

We would draw the attention of all readers to the remarkable results now being obtained by the leading British VHF operators on our two-metre band—and, to a lesser degree but with the same promise, on 70 cm. In 1939—when those of us who were on Five certainly thought we knew something about VHF operation—the possibility of such results would have been considered fanciful and remote. Even two years ago it was quite seriously suggested by some that VHF interest and activity would be killed stone-dead if we lost Five, because Two held no such promise for GDX working. For, as we all know, it is by two-way communication in the DX sense (whether the Antipodes on 14 mc or 250-mile contacts on 145 mc) that Amateur Radio lives.

The new distance records now being painstakingly established on the most difficult communication band open to us are at once a great tribute to the enthusiasm and technical ability of the operators concerned and, what is perhaps more important, a happy augury for the future well-being of Amateur Radio itself.

There can be few thoughtful amateurs who do not foresee that there may come a time when Amateur Radio finds itself with 28 mc as the lowest frequency band upon which operation is permitted. It is for this reason, apart from the practical interest and scientific value of successful VHF working, that the present results on Two are so important.

Fortunately, the accepted valve techniques can be applied right up to 1,000 mc—this means that we can expect some equally encouraging amateur results on 420 mc, the seventy-centimetre band, when it receives the full attention of all our more advanced VHF workers. Always, the object must be to solve the problem of point-to-point communication on these frequencies—that is, working from the home location rather than having to go portable on high ground in order to make distant contacts.
It is fairly generally accepted that for the utmost on Ten, a transmitter, receiver and aerial system designed specially for that band should be used—even if it does involve a separate installation. In terms of frequency, the change from Twenty to Ten is greater than the change from Twenty to the Top Band! The receiver is usually the main problem, so that our contributor’s ideas will be of great interest to those who are striving for the best possible results on 28 mc. He describes in detail the design, construction and setting up of a double superhet, built mainly from surplus material, which should out-perform any commercial receiver designed for general coverage.—Ed.

Double Superhet for Ten
Converter Design with Adapted 1196 Unit, forming a Sensitive, Low-Cost Receiver

PART I

By A. B. WRIGHT (G6FW)

MOST amateurs find that the average communications receiver, while giving an excellent account of itself on the lower frequencies, falls off rather badly when used on the 10-metre band.

The reason is, of course, that it is difficult to design a receiver which will cover with equal efficiency the whole range of amateur frequencies from 1-8 to 30 megacycles. While circuits and components which give excellent performance on the bands from 20 metres upwards will still give reception on the higher frequency bands, the performance of the receiver usually falls a good deal short of that of a set designed solely for optimum results on Ten. On the higher frequencies the losses introduced by such components as valve-holders, coil formers and variable condensers can be considerable if they are not specially designed for high frequency operation.

The choice of suitable valves having reasonably low inter-electrode capacity and low noise factor is also a matter of considerable importance if maximum efficiency is to be obtained at 28 mc. While some apparent increase of sensitivity is usually noticeable when valves such as the EF50 or 6AC7 are substituted for the usual 6SK7 found in the HF stages of the cheaper type of communications receiver, it is also found that, unless these stages are completely redesigned, other troubles such as instability, cross-modulation and an increase in second channel interference manifest themselves.

Only too often one hears the proud owner of a commercial receiver demonstrating the S9 reception of some DX signal, when in point of fact 6 or 7 S-points consist largely of receiver noise!

Signal to Noise Ratio

To obtain maximum performance on the ten-metre band many amateurs add a one- or two-stage preselector ahead of their existing communications receiver. This procedure does, of course, bring up signal strength considerably if the pre-selector is well designed, but it may also bring up the noise level to an extent dependent upon circuit design and the valves used in the preselector.

Thus, while the QRK of those elusive, weak DX signals is increased according to the S-meter, only too often the accompanying background noises are brought up also, and on a weak signal it is the accompanying noise which will make all the difference between an R5 and an R3 signal.

It follows, therefore, that the first requirement of an efficient receiver for Ten is a high signal-to-noise ratio. This statement necessarily applies also to reception on other bands, but the average communications receiver usually fulfils these requirements on the lower frequency bands without alteration or adaptation.

There is also the question of second-channel image interference, which becomes increasingly troublesome on a normal communications receiver having an IF in the region of 460 kc as the frequency is raised.

In a well-designed receiver images usually only cause trouble on the 20- and 10-metre bands. A preselector ahead of the main receiver helps considerably, but on 10 metres these advantages are often off-set by an increase in noise.

Converters

The best solution to the problem of images
Table of Values

Circuit of G6FW's Double-Super for Ten

- \( C_1, C_6 = 15 \mu\text{F variable (see text)} \)
- \( C_2, C_7 = 25 \mu\text{F air trimmers} \)
- \( C_3, C_4, C_5, C_9, C_{13} = 0.005 \mu\text{F mica} \)
- \( C_8 = 15 \mu\text{F ceramic} \)
- \( C_{10} = 25 \mu\text{F ceramic} \)
- \( C_{11} = 35 \mu\text{F variable (see text)} \)
- \( C_{12}, C_{14} = 100 \mu\text{F air trimmers} \)
- \( C_{15} = 300 \mu\text{F mica} \)
- \( C_{16}, C_{20} = 3-30 \mu\text{F mica trimmers} \)
- \( C_{17}, C_{21}, C_{22}, C_{25}, C_{26} = 0.1 \mu\text{F paper} \)
- \( C_{18}, C_{34} = 0.1 \mu\text{F paper} \)
- \( C_{19} = 100 \mu\text{F mica} \)
- \( C_{23} = 0.002 \mu\text{F mica} \)
- \( C_{24}, C_{27}, C_{31}, C_{32} = \text{IFT trimmers, part of } 1196 \)
- \( C_{33} = 200 \mu\text{F mica} \)
- \( C_{37}, C_{40} = 10 \mu\text{F electrolytic, 25v wkg.} \)
- \( C_{38} = 180 \mu\text{F mica} \)
- \( R_1 = 500 \text{ ohms} \)
- \( R_2 = 68,000 \text{ ohms} \)
- \( R_3, R_{16} = 300 \text{ ohms} \)
- \( R_4, R_9, R_{10}, R_{17}, R_{22} = 22,000 \text{ ohms, 1 watt} \)
- \( R_5 = 47,000 \text{ ohms} \)
- \( R_6 = 500 \text{ ohms} \)
- \( R_7 = 33,000 \text{ ohms, 2 watts} \)
- \( R_8, R_{25}, R_{26}, R_{30} = 1 \text{ megohm} \)
- \( R_{11} = 400 \text{ ohms} \)
- \( R_{12}, R_{13} = 50,000 \text{ ohms} \)
- \( R_{14}, R_{18} = 2,000 \text{ ohms (in IFT cans)} \)
- \( R_{15} = 2 \text{ megohms} \)
- \( R_{19} = 2,000 \text{ ohm wirewound potentiometer} \)
- \( R_{20} = 2,500 \text{ ohms, 2 watts} \)
- \( R_{21} = 2,000 \text{ ohms, 5 watts} \)
- \( R_{23}, R_{24} = 470,000 \text{ ohms} \)
- \( R_{27} = 5 \text{ megohm potentiometer} \)
- \( R_{28} = 200,000 \text{ ohms} \)
- \( R_{29} = 1,200 \text{ ohms} \)
- \( R_{31} = 5 \text{ megohms} \)
- \( R_{32} = 300 \text{ ohms, 1 watt} \)
- \( \text{IFT 1, 2} = 465 \text{ kc IF transformers (part of 1196)} \)
- \( \text{RFC} = 2.5 \text{ mH HF Choke} \)
- \( M = 0-500 \text{ Micro-ammeter, for S-meter} \)
- \( V_1 = 6AG5 \)
- \( V_2 = 6J6 \)
- \( V_3 = EK32 (VR57) \)
- \( V_4 = EF36 (VR56) \)
- \( V_5 = 6H6 \)
- \( V_6 = EBC33 (VR55) \)
- \( V_7 = 6V6 \)

Coil Table

- \( L_1 = 7 \text{ turns thin flexible over cold end of } L_2 \)
- \( L_2 = 15 \text{ turns No. } 12g. \frac{1}{4} \text{ in. diameter, spaced } 2 \text{ in.} \)
- \( L_3 = \text{As } L_2 \)
- \( L_4 = 7 \text{ turns No. } 14 \text{ on } \frac{1}{2} \text{ in. diameter former, spaced } 1 \text{ in.} \)
- \( L_5 = 3 \text{ turns thin flexible, spaced } \frac{1}{2} \text{ in. from cold end of } L_4 \)
- \( L_6 = 100 \text{ turns No. } 30g. \text{ enalemed, closewound on } 1 \text{ in. former} \)
- \( L_7 = \text{See text—10 turns if } L_8 \text{ is low impedance, 70 turns if high, wound over cold end of } L_6 \)
- \( L_8, L_{10} = \text{Wearite P coils or similar, to tune to } 1,500 \text{ kc} \)
- \( L_9, L_11 = \text{Wearite P coils or similar, to tune to } 1,500 \text{ kc} \)

Circuit of the receiver designed by G6FW. It consists essentially of a ten-metre converter feeding into an adapted TR.1196 receiver.
is, of course, to run a converter ahead of the receiver, using a first IF frequency sufficiently high to prevent their appearance. This procedure effectively does away with images, and, as most of the inherent noise in a receiver emanates from its first stage, we can, by suitable choice of valves and circuit, design a "front end" which will raise our signal-to-noise ratio as well.

The first consideration then will be the choice of a suitable valve for the HF stage which is to precede the first mixer stage. We need here a valve which will give us the highest amplification and which generates the least noise.

After much perusal of current literature the writer came to the conclusion that one of the miniature valves, a 6AK5 or 6AG5, would fit the bill admirably, and experiments with these valves certainly justified the choice.

Apart from the valve itself, a certain amount of unwanted noise can result from the use of components not designed to operate at high frequencies, and wherever possible the use of ceramic valve holders, condensers and high-grade resistors is recommended.

The aerial coupling circuit should also receive close consideration, and in order to present the largest possible signal to the input grid the tuned input circuit must be of high Q and high impedance, and be correctly coupled to the aerial. With this end in view, it was found advantageous to use air-spaced coils of heavy gauge wire, and to experiment with the number of turns on the aerial coupling coil.

The First Mixer Stage

With the question of signal-to-noise ratio still in mind, it is as well also to give some consideration to the choice of mixer and oscillator valves.

A number of converters have been built by the writer using conventional mixer valves such as the 6L7, 6K8 and 6SA7 with a triodes such as the 6J5 or 6C5 as oscillator, but despite much juggling with the applied voltages and circuit constants nothing in the way of any outstanding converter resulted, and the feeling was always there that something a little better was required.

Having a number of war-surplus 6J6's about, and bearing in mind the fact that, from the point of view of inherent noise, a triode amplifier usually results in much quieter operation, it was decided to give the triode mixer a trial.

One triode section of the 6J6 was used as a mixer, the other as oscillator, dependance being placed upon inter-electrode and stray circuit capacities for oscillator voltage injection.

Results far exceeded expectations, and it was decided forthwith to build up a special receiver for use on ten metres only, which would incorporate the 6J6 mixer/oscillator and 6AG5 amplifier combination.

A Ten-Metre Double Superhet

The resulting double conversion superhet described here has proved extremely efficient in operation, and its sensitivity and signal-to-noise ratio exceed that of all commercial communications receivers which the writer has handled on the 28 mc band.

The receiver, as the photographs show, actually consists of the 6AG5/6J6 converter fed into a modified 1196 receiver. During recent months, this last piece of equipment has been advertised in the Short Wave Magazine by many firms at almost give-away prices.

The complete circuit of the double superhet is given in Fig. 1, together with values. It consists of one stage of tuned RF amplification using the 6AG5. Alternatively, a 6AK5 could be tried in this position with little or no change in performance, although it should be borne in mind that the maximum plate voltage for the 6AK5 is only 180, while that for the 6AG5 is 250 volts.

The HF stage is run at maximum gain at all times, there being no HF gain control, thus enabling the strongest possible signal to be passed on to the mixer grid. No blocking or overloading effect has been noticed even on the strongest signals, and omission of an HF gain control has the slight added advantage that one may zero the S-meter with the assurance that it will stay put for some considerable time.

The aerial coil L1 should be coupled quite tightly to L2, and it may prove advantageous to experiment with the number of turns on L1, as there is a definite optimum for the coupling which results in maximum signal and minimum noise. At the same time it will be found that the degree of coupling has a pronounced effect upon the tracking of the HF stage tuning condenser—if the coupling is not tight enough difficulty will be found in obtaining a setting of the HF trimmer condenser C2 to hold over the entire tuning range. More will be said on this point at a later stage.

Double Triode Mixer

The mixer is, of course, the 6J6, one half of the valve being used as oscillator and the other as mixer. The number of turns specified for L5 should be adhered to, as also should the voltage applied to the oscillator plate via R7 if smooth oscillation is to be obtained.

No provision has been made for external injection of the oscillator voltage into the mixer section of the valve, as the coupling provided by the valve inter-electrode capacities and the wiring seems to do the job quite efficiently.
Various methods of coupling the output of the 6J6 mixer into the second mixer grid were tried out. The circuit shown gave maximum gain, and peaked up much more sharply than when the conventional tuned circuit was placed in the 6J6 anode. L6 is tuned by the condensers C14 and C15 to the first IF of 1,500 kc. The size of L7 depends upon the impedance of L8, which in the original set is part of a Wearite "P" Type coil which has a primary of fairly high impedance.

Second IF Channel

The 1196 comprises the second IF channel of the receiver, converted as a straight superhet, the input of which is fixed-tuned to the first IF of 1,500 kc. An EK32 (VR57) is used as second frequency changer, as in the original circuit, and a pair of Wearite coils are substituted in the mixer and oscillator tuned circuits. (Circuit round V3).

A single stage of 460 kc amplification follows, using either the original IF valve, an EF39 (VR53), in this position, or alternatively an EF36 (VR56). The second detector is an EBC33 (VR55), as used in the original set, but re-wired in the more usual manner to serve as a diode detector, AVC rectifier and first AF stage, the latter being resistance-capacity coupled to a 6V6 output stage. (V6, V7).

Noise Limiter

On the ten-metre band some form of noise limiter was considered essential, and the circuit incorporated in this receiver is of the series type, being automatic in action, so that it is equally effective on weak as well as strong signals. There is very little loss in audio gain when the limiter is in action and no distortion is at all evident on speech, so that no provision is made for switching the noise limiter in and out, as this extra control was felt to be unnecessary. (Circuit round V5).

The loud popping noise produced by a passing car is reduced to a slight buzz, and in a noisy location the limiter will make all the difference in the readability of weak signals. For optimum results the values of resistance and condenser shown in the circuit diagram should be closely followed.

This particular circuit is the most effective the writer has yet encountered, and signals which have been unreadable on a comparison communications receiver owing to ignition QRN have been read with ease on this receiver.

S-Meter

An 0-500 micro-ammeter is used as an S-meter in a bridge type circuit, in the anode circuit of the IF amplifier. The values of resistor shown will be correct for an EF36, but if the EF39 is used as an IF amplifier the 82,000 ohm resistor may need replacing by one of a different value. The use of an EF36 results, however, in a more linear scale on the
Beam Design and Adjustment

Back-to-Front Ratio vs. Forward Gain

By W. A. SPARKS (G3DGJ) and S. S. LEIGH (G2FCV)

ROTARY parasitic arrays have come into common use in the post-war era and are now accepted as standard equipment for DX work on the higher frequency bands. These arrays have many advantages since they offer considerable gain in the forward direction over the usual standard of reference, the half-wave dipole, together with comparative ease of rotation in a relatively confined space. Beams of many types are in operation at amateur stations throughout the world, but in the following notes certain peculiar aspects of the Yagi array will be examined. The Yagi array is probably the most popular type in regular use at present, although the Quad is achieving certain popularity in the U.S.A. and may eventually supersede the Yagi.

The Yagi array may be tuned for one of two particular conditions; that is, either for maximum forward gain or for maximum back-to-front ratio. Actual operation in either of these modes will show very little difference, except in isolated instances, since tropospheric variations will prevent any slight difference from showing itself with any degree of reliability in the observation. The only major noticeable difference would be if a British station wished to work Africa and India regularly and then the additional discrimination offered by tuning for maximum back-to-

front ratio would assist in rejecting American signals. However, as the 10-metre band is in effect split into two phone areas, 28-1-28-5 mc and non-U.S.A. and 28-5-30 mc for the W’s, such discrimination is not usually required. A more important consideration is the effective forward radiation angle and it is hoped to give information on the point which may clear the air a little on this important characteristic.

Angle of Radiation

It is generally accepted that a low angle of radiation is a necessity when working DX stations and a greater concentration of power in the lower of the two lobes characteristic of the Yagi array (in the forward direction) is also a feature which is often sought after. But the most effective angle is not constant since the height of the reflecting layer is subject to considerable daily and seasonal variation. It can be shown that the required angle of radiation for single hops over a given path is variable and is related to seasonal and hourly changes. In considering a desired path and taking F2 layer reflection only (independent of frequency) experiments have shown that over a path of 3,000 miles the layer height varied sufficiently to alter the required angle between the limits of 9 and 12 deg. during spring and between 10 and 17 deg. during summer. However, the above are average figures and taking as an illustration one particular day (March 20, 1949), on 10 metres during that afternoon signals from the W6 and W7 call areas were at a maximum, and
S9 signals from these areas were very common. The East Coast W's did not appear at anything like their usual strength. Consequently, one could assume that the layer height was sufficient to produce single or possibly double-hop signals over the great circle path, whereas the other signals from the East Coast were not radiated with sufficient power at the required angle of radiation.

**Lobe Analysis**

Recent experiments by Ohio State University have shown that on the two possible modes of operation—with the beam one wavelength in height and over a theoretically perfect ground—by tuning for best back-to-front ratio an angle of maximum forward radiation of 13 deg. is obtained with a relative power figure of 37 in the lower lobe (see Fig. 1), and a radiation angle of 44 deg. and respective power figure of 33 in the upper lobe. Comparative figures for a beam tuned for maximum forward gain are 17 deg. and power figure of 40 for the lower lobe and 46 deg. and power figure of 35 in the upper lobe. These figures are shown graphically in Fig. 1.

Fig. 2 shows the distribution of power over the lobes at varying vertical angles from the horizontal axis of the aerial. Apparently, tuning for maximum forward gain offers the advantage of increased power, but the effective power gain over tuning for maximum back-to-front ratio is only in the region of 3 dB, hardly one-half S-point. The benefits of tuning for maximum back-to-front ratio are to be observed in the lower angle of radiation, with consequent improvement in the DX performance. But this mode suffers from the disadvantage of lower efficiency since more power is spent in cloud warming with the upper lobe.

Adding a further director to the three-element beam at the same spacing tends to increase the available forward gain since the ratio of power distribution tends to improve in favour of the lower lobe. The effective forward angle is also reduced but the bandwidth of the beam is curtailed and VFO operation is more confined.

The Ohio State University experiments also show that it is possible to tune a beam to give a discrimination of 30 dB whilst a beam tuned for maximum forward gain can still have a rejection figure of 20 dB and an improved forward performance for general DX working.

**Beam Elevation**

The height of an array has considerable effect on its performance and in this case it is not a matter of "the higher the better." Experiments have shown that an optimum height is in the region of 0-8 to 1-25 wavelength or above 1-8 wavelengths. Ground effects are such as to upset the pattern of radiation in the vertical plane when outside.
The figures were curves optimum is 18, representing an impedance step-up of 18 times over a plain dipole in the same position.

Ferrel (CQ, April 1948) published a set of curves which illustrated the effective angle of radiation over a path of about 1,500 miles. The figures were taken over a yearly period and useful angles for 10 and 20 metres were estimated from published information on F2 layer heights. It is shown that angles greater than 17 deg. were optimum for only 1 per cent. of the observations, angles greater than 10 deg. for 50 per cent. and angles greater than 8 deg. for 80 per cent. of the time. This would appear to indicate that a beam having an angle of radiation (maximum) of about 12-13 deg. would be satisfactory for general use since the shape of the pattern gives considerable radiation down to about 7° and up to 15 deg. This is suggested where a tiltable array would not be feasible.

The writer would suggest that a three-element array tuned for maximum back-to-front ratio with a height of 1-0 wavelength would be the most satisfactory for general amateur operation, although the purpose of these notes is to present a new approach to beam design in general.

**Practical Tests**

In accordance with the foregoing considerations, a beam was constructed to the following dimensions:

- **Driven Element**: 16:22 ft.
- **Reflector**: 17:42 ft.
- **Director**: 15:63 ft.
- **Spacing**: 3:42 ft.

These dimensions are approximately correct for 28·2 mc. The height of the beam was varied and checks taken on performance. The results so far obtained are not conclusive but tend to confirm that the foregoing arguments are correct.

Fig. 3 shows certain data which may be of value. Table I shows the various design data to be used in constructing beams (3-element).

Fig. 3 shows the design details in graphical form for folded dipole radiators using 12 SWG wire and 1-in. dural or copper tubing.

### TABLE I

**DESIGN OF TEN-METRE BEAMS**

<table>
<thead>
<tr>
<th>Aerial Type</th>
<th>Driven Element</th>
<th>Reflector Length</th>
<th>First Director</th>
<th>Second Director</th>
<th>Third Director</th>
<th>Spacing</th>
<th>Approx. Gain dB</th>
<th>Approx. Rad. Res. ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 EL. (REF)</td>
<td>462/F</td>
<td>480/F</td>
<td>Maximum Forward Gain</td>
<td>Maximum Back-to-Front</td>
<td>0·15</td>
<td>5·3</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>2 EL. (REF)</td>
<td>462/F</td>
<td>495/F</td>
<td>Maximum Forward Gain</td>
<td>Maximum Back-to-Front</td>
<td>0·15</td>
<td>4·3</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>2 EL. (DIR)</td>
<td>462/F</td>
<td>—</td>
<td>462/F</td>
<td>Maximum Gain</td>
<td>0·1</td>
<td>5·5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2 EL. (DIR)</td>
<td>462/F</td>
<td>—</td>
<td>445/F</td>
<td>Max. Back-to-Front</td>
<td>0·1</td>
<td>4·6</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>3 ELEMENT</td>
<td>462/F</td>
<td>495/F</td>
<td>444/F</td>
<td>—</td>
<td>0·15</td>
<td>7·0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3 ELEMENT</td>
<td>462/F</td>
<td>495/F</td>
<td>450/F</td>
<td>—</td>
<td>0·2</td>
<td>9·0</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>3 ELEMENT</td>
<td>462/F</td>
<td>495/F</td>
<td>450/F</td>
<td>—</td>
<td>0·25</td>
<td>9·0</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>4 ELEMENT</td>
<td>462/F</td>
<td>490/F</td>
<td>442/F</td>
<td>438/F</td>
<td>0·2</td>
<td>10·0</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>5 ELEMENT</td>
<td>462/F</td>
<td>490/F</td>
<td>442/F</td>
<td>438/F</td>
<td>0·2</td>
<td>11·0</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Practical SSB Driver

Further Design Details

PART II

By H. C. WOODHEAD (G2NX)

It will be clear from the preceding article that it is quite a practicable proposition to construct a drive unit to produce a single-sideband suppressed carrier signal, suitable for operation in the amateur bands, by using a balanced modulator to remove the carrier and a filter of the crystal gate type to remove the unwanted sideband.

A transmission of this kind will show all the advantages of SSBSC such as the 6 dB gain over DSB, since only a quarter of the power necessary on DSB is required to convey the same audio level in using SSBSC. This factor of an apparent increase in power of four times is certainly well worth while, especially since it brings with it decreased liability to BCI and means that the 150 watts permitted input can be used more effectively with less likelihood of interference with BCL than before, quite apart from the improvement due to the reduction in width of channel required.

There is plenty of latitude in the manner of construction to permit the individual to suit his own particular methods. Some may prefer to purchase a meat tray from the local chain store, turn it upside down and mount the components on the surface so presented, leaving the space underneath for wiring and tag-boards. Others may run to sheets of polished aluminium, steel frames and such, and make a very nice thing that can be regarded almost as an ornament for the living-room. Others again (like the author) may prefer to take some choice piece of ex-Service equipment, acquired at a knock-down price from the advertisement pages of the Short Wave Magazine, and convert it into something more useful. For this latter group there is plenty of scope and a unit should be selected, for preference, which has a number of IF cans containing single or double tuned circuits which can be reworked to suit requirements. The most difficult part of the construction and final adjustment is involved in obtaining the correct type of filter response, and here a cathode-ray wobbulator would be a distinct advantage. However, the would-be constructor need not be discouraged by the lack of this accessory since the author has so far managed without it.

It is also essential to have accurate control of the frequency of the carrier oscillator so that it can be placed exactly half-way up the steep side of the filter response. This is accomplished by using a crystal of the same nominal frequency as those used in the filter, and trimming it with a series or shunt condenser, with or without added inductance, to the exact frequency to suit the filter. 

General Schematic

The general layout of the units is shown in Fig. 10 and the mode of operation is as follows: The audio, from which all frequencies below 200 cycles and all above 3,000 cycles have been removed, is applied to the balanced modulator. The output, consisting of the sidebands only, is applied to the crystal gate filter where one sideband is suppressed leaving the other one with a nominal frequency of 5-65555 mc, since this is the frequency of the crystal chosen.

By closing S1 the full carrier may be restored to the transmission for calling purposes. This will be necessary initially, for the average amateur will not be able to receive SSBSC signals without first being told how to adjust his receiver.

The SSB signal is passed to FC1, where it is mixed with the output of Osc. 2, which is variable between 1-8 and 2-2 mc. The resulting difference frequency provides a signal directly in the 80-metre band, which can be adjusted by varying Osc. 2.

For operation on 20 metres, the sum frequency from FC1 between 7-45 and 7-85 mc is selected, and the output of a suitable crystal oscillator Osc. 3 is added in FC2 to produce any frequency required in the 20-metre band. For 10-metre operation, the third harmonic of a 7 mc crystal in Osc. 4 is added to this same sideband to give any frequency in the 10-metre band.

The number of components may at first sight appear somewhat formidable, but it has been necessary in Fig. 10 to show a number of them as separate entities the more clearly to indicate their particular functions. In practice, many of them are combined in one component and the whole unit has only eight valves; though there are three output positions, only one of them is in use at any given time. When operated on 80 metres, only five valves are used.

The unit selected as most suitable for
Table of Values

Fig. 10. Block Schematic of SSB Drive Unit. Key to Diagram.

Filt. 1 = Audio Filters. Z = 1,000 ohms
HP cut-off = 200 cycles
LP cut-off = 3,000 cycles

Filt. 2 = Two section, crystal gate type filter with steep side to cut off unwanted sideband. Frequency 5-655 mc

Filt. 3 = Tuned circuits of FC1 anode and Output Amplifier grid. Tuning variable to cover 3.5 to 3.8 mc

Filt. 4 = Tuned circuits of FC1 anode and FC2 grid. Pass band 7.45 to 7.85 mc

Filt. 5 = Tuned circuits of FC2 anode and Output Amplifier grid. Tuned to pass 14 to 14.4 mc

Filt. 6 = Tuned circuits of FC3 anode and Output Amplifier grid. Tuned to pass 28 to 30 mc

Bal. Mod. = Balanced Modulator. 6SN7.
Input: Audio, 300 to 3,000 cycles
Output: Balanced and tuned to 5-655 mc

Osc. 1 = Crystal in EF50 circuit. Frequency = 5-655 mc (nominal)

Osc. 2 = Stable VFO. Range 1.8 to 2.2 mc. Valve 6SH7.

Osc. 3 = Crystal in EF50 circuit. Frequency 6.55 mc

Osc. 4 = Crystal in EF50 circuit. Frequency between 6.85 and 7.38 mc

FC 1 = Frequency changer, EF50
Input: 5-655 mc (Osc. 1) and 1.8-2.2 mc (Osc. 2)
Output: 3.5-3.8 mc or 7.45-7.85 mc, according to S2

FC 2 = Frequency changer, EF50
Input: SSB between 7.45 and 7.85 mc
Osc. 3 at 6.55 mc
Output: SSB between 14 and 14.4 mc

FC 3 = Frequency changer, EF50
Input: SSB between 7.45 and 7.85 mc
Carrier from HG between 20.55 and 22.15 mc
Output: SSB between 28 and 30 mc

HG = Harmonic Generator
Input between 6.85 and 7.38 mc from Osc. 4
Output between 20.55 and 22.15 mc to FC 3

Attr. = Attenuator for adjustment of reinserted carrier

Out. Amp. = Output Amplifier 6AG7, 1 watt output

Fig. 11. Inductance wound on ex-Service type formers: A, close wound; B, turns spaced to maintain coil length 1.5 centimetres.

Fig. 12. Inductance on ex-Service type formers.
adaptation was the R3170 radar receiver. All parts were first removed to the store cupboard for future stock and a start made with the SSB filter using the formers out of the original set for winding the inductances and the original screening boxes for shielding the circuits.

Small Inductances

These coil formers are frequently to be found in ex-Service equipment and are readily adaptable for tuned circuits in the range 5 mc to 100 mc, though they are also used for much lower frequencies in the R1155 and the CNY-1 receivers. Two curves are shown in Figs. 11 and 12 which enable one to wind a given inductance on these formers suitable for use in the above range. The figures given are for an empty former. A dust-core slug will increase the inductance to about double, while a brass slug will reduce it to approximately half. These formers have been used for practically all the tuned circuits in the unit except the anode circuits of the output stages. They will usually be found to be covered in wax, which should be removed together with the old winding, and the former cleaned in petrol or carbon tetrachloride. The new winding, when complete, should be painted over with a solution of polystyrene in carbon tetrachloride to hold it in place.

Balanced Modulator

The original modulator used was of the ring type, as shown in Fig. 13, using 1N22 type crystal valves. It was subsequently replaced by a 6SN7 in the more conventional type of balanced modulator circuit in order to obtain more input to FC1. There are some advantages in using crystal valves in a ring
modulator at this point, but if further gain is required this is the most suitable place to add it since no additional tuned circuits are needed.

The high-pass filter was constructed from the parts of the 95-cycle filter from an BC733A Glide Path Receiver. These filters consist of two transformers and one choke, on identical cores, and three condensers. The circuit is given in Fig. 14, with values as measured. With the existing mica gap in the core, the values of 1.5 and 1.33 H, required in Fig. 15, are given in 1,600 turns of 36 SWG and 1,500 turns of 36 SWG respectively. The cut-off for the values given in the filter is 200 cycles and its impedance is 1,000 ohms, to suit the input transformer to the modulator and the output impedance of the preceding LF circuits.

The circuit for the low-pass section of Filt. 1 with a cut-off at 3,000 cycles is shown in Fig. 16.

Table of Values

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Audio Input Transformer. Step-up 5 : 1</td>
</tr>
<tr>
<td>T2</td>
<td>Pri: 35 turns 28 SWG C/T Sec: 12 turns 28 SWG C/T and 1 turn 18 SWG RAF former, adjustable dust core</td>
</tr>
<tr>
<td>T3</td>
<td>Pri: 12 turns 28 SWG C/T Sec: 35 turns 28 SWG and 5 turns 36 SWG RAF former, adjustable dust core</td>
</tr>
<tr>
<td>R1</td>
<td>12,000 ohms</td>
</tr>
<tr>
<td>R2</td>
<td>12,000 ohms</td>
</tr>
<tr>
<td>R3</td>
<td>10,000 ohms</td>
</tr>
<tr>
<td>R4</td>
<td>1,500 ohms</td>
</tr>
<tr>
<td>C1, C2, C7</td>
<td>1,000 µF mica</td>
</tr>
<tr>
<td>C3, C4</td>
<td>50 µF mica</td>
</tr>
<tr>
<td>C5</td>
<td>0.1 µF mica</td>
</tr>
<tr>
<td>C6</td>
<td>100 µF variable ceramic</td>
</tr>
<tr>
<td>C8, C9, C10</td>
<td>60 µF variable air-trimmer</td>
</tr>
<tr>
<td>C11</td>
<td>100 µF variable ceramic</td>
</tr>
<tr>
<td>Ch</td>
<td>Twin Choke of 160 turns of 46 SWG on 1 in. dia. paxolin tube</td>
</tr>
<tr>
<td>V1</td>
<td>6SN7</td>
</tr>
<tr>
<td>V2</td>
<td>EF50</td>
</tr>
</tbody>
</table>

The circuit of the balanced modulator is given in Fig. 17. The audio is applied to the grids of V1 in push-pull through Ch., while the carrier is applied in parallel through the two condensers C3 and C4. The primary winding of T2 is tuned to the carrier frequency and the carrier is balanced out by adjustment of the slug core in T2 to the central position. It is possible that an improved balance may be obtained by adding a measure of resistance balance to the circuit, though it has not so far been found necessary.

The single turn on T2 leading to a coaxial socket marked "Test" will be found extremely useful for injecting the output from a signal generator into the filter during the line-up operations.

Two crystals are used in the filter, to give a total attenuation of some 40 dB to the unwanted sideband, and they have each in a nominal frequency of 5.65555 mc and were used in the aforementioned BC-733A unit. The carrier is reinserted, when required, by a relay S1 of Fig. 10, operated from the front of the panel, which supplies some of the output from Osc. 1 direct to T3 in the output from the filter.

Frequency Changers and Oscillators

FC1 is an EF50 with the signal applied to its control grid by T3 and the output from Osc. 2 applied to its suppressor grid. Oscillator 2, which is variable from 1.8 to 2.2 mc, needs careful construction since any frequency fluctuations in the output from the whole unit are more likely to come from this than any other source, all other oscillators being stable crystals. The circuit chosen was the usual ECO, coupled down the tuning inductance as shown in Fig. 18, and a double winding to prevent the heater-cathode capacity from being a part of the tuned circuit. No special claims are made for this circuit, but it is at least as
stable as the temperature characteristics of its reactance components. Adherents of the Clapp and Franklin will no doubt substitute their own favourite circuits. In the present case the range 1.8 to 2.2 mc was chosen to be as low as possible and to produce frequencies in the 80-metre band directly by selecting the lower sideband from FC1, or the difference frequency between Osc. 1 and Osc. 2. Only one drawback to this choice has been discovered up to date in that when using higher frequencies in the 80-metre band, the second harmonic of Osc. 2 is very close to the wanted signal and may be difficult to separate from it in Filt. 3. The two are identical for a radiated frequency of 3.77 mc when the frequency of Osc. 2 will be 1.885 mc giving a second harmonic of 3.77 mc. For this reason it is not very satisfactory for working between 3.6 and 3.8 mc, and it would, as it happens, have been better to have chosen a higher frequency for the crystal filter. For example, if the filter frequency were 5-8 mc, the range of Osc. 2 would be 2 to 2.4 mc, bringing its second harmonic clear of the working band.

Filt. 3 consists of two separate tuned circuits, one in the anode of FC1 and the other in the grid circuit of the 80-metre output amplifier, with link coupling between them. The output amplifier is a 6AG7 with a tuned circuit in its anode stepping down to 75 ohms co-axial and giving an output of 1 watt of SSB power for 100 mW of audio input to the unit.

(Part III of this article will follow)
Case Against the NBFM Mode

Some Critical Comments, and an Analysis

By P. F. CUNDY, A.M.I.E.E. (G2MQ)

The use of narrow-band frequency or phase-modulated telephony is a post-war innovation which has achieved considerable popularity. For reasons to be discussed later, the author is of the opinion that such popularity is undeserved and that NBFM is basically unsuited to amateur requirements. That the possibilities of this method should be explored by amateurs is fully agreed, but the writer's submission is that since it has been given a fair trial and has been found less satisfactory than amplitude modulation, its further use should be discouraged.

Characteristics of Frequency Modulation

The main attraction of NBFM is the use of very low modulating power at an early stage in the transmitter, with high-efficiency Class-C multiplier and power-amplifier stages subsequent to the modulation. It is necessary to consider the actual side-band power rather than carrier power in assessing the value of the signal as a means of conveying intelligence by telephony, and it is on this feature that true narrow-band FM is so unsatisfactory. It is directly tied up with the band-width, since side-band power can be increased only by increasing the deviation. If the highest audio frequency used for speech transmission is 3 kc, then a deviation of 1.5 kc corresponds to a modulation index of 0.5, and a deviation of 3.0 kc corresponds to a modulation index of 1.0. These cases are examined and the results are shown in the Table appearing herewith; the abbreviation AF stands for the modulating audio frequency, and CF for the unmodulated carrier frequency.

The FM transmission does offer the possibility of using an amplitude limiter in the receiver which can prevent amplitude-modulated interference from reaching the demodulator. The limiter certainly reduces the background noise on strong signals, but on weak signals the advantage is not very apparent. It seems that an AM signal, received on an AM receiver with a post-detector noise limiter, is always as easy to read and very often much easier.

There is considerably less broadcast and television interference of the break-through type caused by FM transmission than by AM; since these receivers are usually fitted with detectors that respond to amplitude variations only, an interfering signal of constant amplitude will cause no audible output. Heterodyne or second-channel types of interference may not, however, be appreciably reduced by the use of FM. It is always possible to eliminate interference caused by AM signals even if it does turn out to be a long and tedious job; it is quite possible to visualise the case where the station is located in a heavily populated area such that elimination of all cases of AM interference would take an unreasonably long time. In such instances great relief may sometimes be obtained by use of NBFM and is, in the author's view, the only case where its employment is justified.

Comparison with AM

Assume a NBFM transmitter is contemplated, using the maximum allowable input of 150 watts and that the 150 watts smoothed output from the power pack is a limiting factor. Then comparisons may fairly be made with various types of AM transmissions; these are shown in lines 3 and 4 of the table. For this, the grid modulated power amplifier is assumed to have an efficiency of 37.5 per cent., the plate modulated power amplifier 75 per cent. and the modulators 50 per cent.

It will be noted that the grid-modulated stage requires a larger power amplifier valve than the FM transmitter, but the modulators are comparable. The plate-modulated stage requires a smaller power amplifier, but two additional modulator valves and a modulation transformer. Both AM arrangements are superior to the NBFM transmitter in respect of side-band power at comparable bandwidths. The FM signal shows higher side-band power at larger deviations, but the increase is then more difficult to utilise; full benefit from increased side-band power can only be realised when it is fed into a discriminator designed specifically for that deviation. The total band-width is excessive and could not be employed in practice without causing considerable interference to other users of the band in question.

Line 5 of the table is included so that comparison between AM and FM can be made on the basis of the legal maximum input to the power amplifier.
Observations
The author's observations have generally been in accordance with that which would have been expected from the foregoing analysis, but some additional points, based wholly on experience, are worthy of note. Selective fading causes a much greater loss of intelligibility on FM transmissions than on AM signals and the FM transmission is much more difficult to follow through heavy interference, particularly if fading is present.
It is admitted that these opinions have been formed largely from listening to NBFM transmissions on an AM receiver, but actually, for very narrow band transmissions, the detuned AM receiver is a more sensitive converter than the conventional discriminator. The reason for this is that the slope (volts per cycle) on the edge of the pass band of a conventional IF amplifier is higher than can be achieved with a discriminator. This arises from the fact that in the IF amplifier all the tuned circuits are playing a part in the frequency-to-amplitude conversion, while in the limiter-discriminator arrangement, only one pair of circuits is engaged in this task. The detuned AM receiver will not of course handle wide-band frequency modulation, but this should in any case never be employed on any amateur band.
Some operators, acutely aware of the troubles that arise from excessive deviation, employ automatic volume compression, speech-clipping or deviation limitation to control the band width. Such signals, although they may only have 16 per cent. side-band power, are 16 per cent. nearly all the time because of the compression. It is quite possible for this to be easier to read than an AM signal which achieves 50 per cent. peak side power on odd occasions only. Comparisons should therefore be made only when the AM signal is similarly restricted by speech clipping or volume compression.

Conclusion
It is hoped that the side-band spread and power analysis given in the table will be a clear indication of the responsibilities one incurs in regard to restriction of deviation when the decision is made to adopt frequency modulation. Responsibility also rests with the AM user, since over-modulation can be as troublesome as excessive deviation. But when both systems are correctly restricted and operated the increased side-band power achieved with AM makes the use of NBFM a very poor second choice. In turn, AM, when compared to single-side band suppressed carrier telephony, is equally unsatisfactory!
CALLS HEARD, WORKED & QSL'd

By L. H. THOMAS, M.B.E. (G6QB)

All bands except 28 mc have shown a marked improvement on last month's conditions, and those of the DX fraternity who still find time to take a look round occasionally have been well rewarded.

But this month we must give pride of place to the 3·5 mc news—not in any sense because we happen to figure in it ourselves in a quiet way, but because it is the hottest news as such. To the intense surprise of those who thought 80-metre DX a winter phenomenon, all sorts of things started breaking through in June and July.

To cut a long story short, G3EIZ (Liverpool) was the first G station to work LU3EL, which he did four times with his 25 watts, starting on June 19 (3508 kc, 2320 GMT). Later he also worked LU7AZ. DL1FF apparently started this off by persuading the LU's to come up from 14 mc.

DL1FF was also heard late in June working our old friend VK5KO, and intensive listening revealed the said '5KO after a few days. At any rate on July 7 he worked G6QB (Bexhill) and heard G5DQ.

Then, on July 9, G6QB worked Z55YF, giving him his first (and, at the time of writing, his only) G contact. Z55YF also had previously been heard working DL1FF, and in his letter which has just arrived, confirming these contacts, Z55YF adds that he has been hearing G8AX at RST 579 and has getting 589 reports from VK5KO.

On July 10 VK5KO worked G6QB again with 569 signals both ways.

Yes, all these are genuine this time; we have got the trick of coping with the pirate situation now!

Future Plans

Z55YF (who, by the way, also worked EI9J for his first EI contact) now says that he is going to QRX every Wednesday evening from 2030 to 2200 GMT on 3520 kc. So look for him at that time, and let us have no unseemly brawling!

VK5KO is on regularly and at present peaks at about 2200 GMT. Others on the way are CE4AD, LU4BA, LU6BM, LU8EN, CX1FB and (hold it!) JA3AA.

So far the only stations known to have worked the LU's are G3EIZ and G3DKZ, EI9J, SM3ATL and FA8BG—apart from DL1FF, who seems to have worked everything that has appeared so far. LU3EL uses 350 watts and LU7AZ a kilowatt.

ZS6AM, ZS6HO and ZS1M are also appearing on the band—although we haven't heard them yet. The latter proposes to come on 3500-25 kc at three minutes past the hour!

Representing Asia, HZ1VP (G2AVP away from home) has been operating with a T.1154 on 3650 kc in the early mornings, but we haven't yet heard him, although we did work him on 14 mc to confirm the times and frequencies.

G8VB (London, W.5) still holds his parties with the VO's on 3755 kc phone, and tells us that VO2CO is now in Bermuda and hopes to be coming up with a VP9 call soon. CR4AA is also expected to arrive on 3755 kc. F9QU is operating 3·5 mc 'phone in Martinique, of all places, and is of course swamped by the W kilowatts. PY4ZI runs a net on 3755/3800 kc, and KP4ES another on 3925 kc.

Well, so much for the 80-metre news up to date, but there may well be a flash or two before we finish talking!

Competitive Stuff

We were sorry to receive a letter from ON4JW (Brussels) asking us to remove him from the DX tables. He, of course, was at the head of the Zones Worked table, and also in the lead for 14 mc scores in the Four Band DX. Jules hastens to add that this has nothing to do with his recent marriage; his wife, who has always spurred him on, is very disappointed at his enforced inactivity for a while. His trouble is his new job, which doesn't leave him enough time or energy for DX-chasing.

As luck would have it, G4CP (Dudley) would have passed ON4JW this month, for the addition of five new ones, all on 14 mc, give him the colossal 14 mc score of 191, which is also his total. So, for the present, G4CP is king of the Zones Worked list, with G2FSR (Chingford) a close second and sundry Old CROcks panting behind.

The Four Band Table is set out in 7 mc
order, which gives pride of place to G6BS (Cambridge) with G5GK (Burnley) second. These scores are getting perilously near the century on 7 mc, and we foresee a terrific race between these two when the real DX becomes plentiful again.

**DX of the Month**

Several regular correspondents report working FP8AB (St. Pierre-et-Miquelon) during the past few weeks, but the W6 crowd, who generally have pretty good noses for this sort of thing, remark that he is "about as good as the other FP's"—which means no good at all. So if no one can produce a QSL from FP8AB in less than six months, we shall have to strike him off again.

Other quite interesting pieces have been around during the month. In 25 years on the air we had never worked YN, YS or ZP, but we managed them all in four days during early July, with ZP2AC (2200), YS1RA (0820) and YNIFTB (0825). Now we are searching for HH's, HI's and VP2's—none of which have ever come our way, not even pre-war!

G3FGT (Birmingham), who recently broke into the Four-Band Table with his 133-ft. long wire, 9 ft. high, now boasts a wire twice as long and nearly three times as high. He is working out nicely and contacted HZ1KE (yes! it's Ken Ellis again) on 28 mc CW. VQ4ALF and 4KRL on 14 mc have also fallen victims to FGT's 25 watts.

G8OJ (Manchester) reports raising HP1BR, KZ5IP, CR6AN, ZD2S, VS2BX, OX3MG, CR7BN and MD7HV. He also worked the Dutch weather ship PI1LS on 14 mc 'phone. G2BJY (West Bromwich) found things rather erratic, but bagged two new ones on 28 mc (ZD1BD and 4X4ES) and two on 14 (EA6EG and EA8AL).

G3DCC (London, N.8), working with 75 watts on 14 mc 'phone, collected VS2BS, TA3BS, YS1JR, HK4DF, CE1BE, XE1A, TI2HP, YK1AC and HZ1KE. He also tells us that MP4BAC is now on his way home and won't be heard any more, although another station may be operating from there in the near future.

Further interesting comment from G3DCC (you must have noticed the ominous absence of II's lately): It appears that the silence from Italy is due to a police round-up which resulted in some 70 per cent. of the transmitters on the
FOUR BAND DX

<table>
<thead>
<tr>
<th>Station</th>
<th>Countries Worked</th>
<th>Power</th>
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<tbody>
<tr>
<td>G6BS</td>
<td>93 28 4 154 168 168 150</td>
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<tr>
<td>G5GK</td>
<td>88 11 29 123 185 150</td>
<td></td>
</tr>
<tr>
<td>G5FA</td>
<td>83 17 55 118 134 35/150</td>
<td></td>
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<tr>
<td>G6Q8</td>
<td>67 34 115 165 186 150</td>
<td></td>
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<tr>
<td>G3ATU</td>
<td>60 26 81 158 166 10/150</td>
<td></td>
</tr>
<tr>
<td>G8H8</td>
<td>57 14 30 179 186 7/150</td>
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<tr>
<td>G2AVP</td>
<td>55 28 32 156 163 25/120</td>
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<tr>
<td>G2VD</td>
<td>50 26 84 159 164 150</td>
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<tr>
<td>G5VC</td>
<td>50 1 12 115 116 45</td>
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<td>G4C8</td>
<td>45 3 64 191 191 150</td>
<td></td>
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<tr>
<td>G3AKU</td>
<td>45 29 21 130 138 30/70</td>
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<tr>
<td>G8VB</td>
<td>44 50 59 119 140 120</td>
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<tr>
<td>G3CBN</td>
<td>44 13 26 107 118 50/150</td>
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<tr>
<td>ZB1AR</td>
<td>38 29 40 87 100 25</td>
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<tr>
<td>G3DO</td>
<td>37 21 97 147 177 150</td>
<td></td>
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<tr>
<td>G3ABG/A</td>
<td>36 21 3 76 79 45</td>
<td></td>
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<tr>
<td>G6BB</td>
<td>35 19 28 99 114 10/70</td>
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<tr>
<td>G8IP</td>
<td>34 13 62 111 127 3/150</td>
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<tr>
<td>G2HKU</td>
<td>32 1 7 83 91 4/25</td>
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<tr>
<td>G3BDQ</td>
<td>26 18 9 107 109 25/150</td>
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<td>G3FNJ</td>
<td>26 19 42 100 113 150</td>
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<tr>
<td>G4OK</td>
<td>26 19 3 93 97 150</td>
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<tr>
<td>G8KU</td>
<td>24 9 47 117 127 120</td>
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<tr>
<td>G2YS</td>
<td>23 21 25 110 121 150</td>
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<tr>
<td>G3E1Z</td>
<td>23 33 15 37 52 25</td>
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<tr>
<td>G3F8T</td>
<td>21 19 11 45 54 25</td>
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<tr>
<td>G2DHV</td>
<td>20 18 4 78 81 25/60</td>
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<tr>
<td>GW3CBY</td>
<td>20 13 4 37 48 15/30</td>
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<tr>
<td>G8Q8</td>
<td>18 12 70 107 129 150 Phone</td>
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<tr>
<td>G3ACC</td>
<td>13 20 5 101 110 150</td>
<td></td>
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<tr>
<td>G2HIF</td>
<td>9 6 44 42 71 150 Phone</td>
<td></td>
</tr>
<tr>
<td>G6CB</td>
<td>5 1 81 21 89 20/150 Ph.</td>
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</tbody>
</table>

issued calls are now (for the time being) off the air. This news was passed to G3DCC by MF2AC, who is practically on the spot and should know the answers!

Some 7 mc Items

G3AGQ (Benson) is hurt by the lack of attention given to “good old Forty.” He was on the band during seven mornings recently and raised UQ2AL, XE1SA, ZL4HI, ZL4GH and a bundle of W’s. PY2AFS and CM7RA were also on. The W2’s and 3’s, says AGQ, “come back delightfully when called.”

G4NZ (Harrow), who used to be G5TD many years ago, has moved to 7 mc, where he has worked loads of W’s, plus VE and PY2RT. He remarks that 7 mc DX is quite possible with QRP even at this time of the year—if you don’t mind getting on between 0400 and 0530!

14 mc Again

G5DZ (Croydon) suggests that conditions have been quite abnormal for the West Coast of America and Canada, compared with the pre-war years. He has worked W6 and W7 or VE7 at practically all times between 0450 and 2145, and says that he never remembers even having heard them during the midday or afternoon periods at this time of year before.

“BZ has been finding DX conditions extremely good and has raised 110 countries this year.

G2DHV (London, S.E.13) has been on the band at all sorts of times and has cleaned up on HS1SS, UIJAF, CT3AB, EA8MC, FQ3AT, K6H9 and many others. G2FSR (Chingford) has had bad luck during the month and says that a list of Calls Heard would be far more impressive than a statement of DX worked. Fancy hearing, calling and missing T8BR, KB6AJ, ZM6AL and FK8AC—all in one morning! FSR says the only way to work the rare Pacific Islands nowadays is to “ride on the back of a W6.” Then, to add to his chagrin, a local friend of his, not very keen on DX, told him he had worked “another VS9”—which turned out to be VS9BU in the Maldives Islands! This seems the right time to turn it up and go for a holiday, which is precisely what FSR has done.

TVI and BCI have restricted activity at G8PL (London, N.W.3), but he has managed to raise FP8AB, VP1AA, HP1BR, EA6EG, COZBM and some 11’s—all on his indoor aerial. PL wants a W3 in Delaware for his WAS, and, finding them extremely rare, asked a W3 in Pennsylvania about it—only to find that he, too, wanted Delaware for his WAS. . . . A recent surprise was the receipt of a card from UP2KBB, with a letter, by direct air mail. Quite a new experience, that.

Talking of QSL’s, G81H (London, W.5) tells
us that he now has them from VP8AI, 8AK, 8AD and 8AP—lucky fellow!

G5GK (Burnley) seems to have been very active on 14 mc, and turns in AC4RF, ZP2AC, UA0KGA, EA8AL (all CW) and a long list of 'phone QSO's including KP6AA, EL3A, ZD4, HP, HI, M1B and other useful customers. G3ATU (Sunderland) describes conditions as "unhot," but collected MS4UU for one new country. He adds that this station has two operators, one of whom makes the call sound like "74 UV"—so don't be fooled. And he also worked a station signing "3V8AG," who told him that 3V was the new prefix for Tunisia—but there are still some FT4's working.

Last month G6BB (Streatham) asked how to raise EL3A. Apparently this came to EL3A's notice, for, after coming back to G5HB (Swindon) on the first call, he told him that he is packing up and leaving for Paris, and that he will keep a sharp look-out for G6BB when he gets there!

G2FFO (Burnley) was told by a W4 that he had recently worked GR2...MM (he forgot the full call) who gave his QTH as 185 miles from Midway Island. Had anyone else heard this curious call? Who, or what, is he?

G2AVC (Hanworth), referring to G3ATU's plaint about not raising AR8AB, writes to say that the latter came back to a lone CQ on 28 mc recently—and the said CQ was G2AVC's first 28 mc transmission for six months.

G3AKU (St. Ives) managed to polish off AC4RF and now joins the select band of "40's" in the Zones Worked Table. He is awaiting confirmation from AC4RF and VK1VU for his WAZ, and adds that 116 of his 138 countries are confirmed. AKU says that our recent tirades on 7 mc might well be extended to 3-5, where he listened one night to a "multi-way" in which all the stations kept trying to keep the channel clear and telling everyone who came near it what so-and-so's they were, but at the end of three hours no one seemed to have said anything interesting or done anything useful. Perhaps they are still at it.

**Behaviour Again**

This brings us to a few more cases reported on the 3-5 mc band. G3BFC (Ferndown), who, by the way, will soon be MT2BFC, asks whether nothing can be done to stop "Those dreadful people who chip into QSO's with rude things to say." He says it's awful to hear this sort of thing after nine months of ten-metre phone. Funnily enough, by the same post came a letter from an SWL in Aberystwyth, expressing admiration at the self-control of G3BFC, G4JG and a GI station, whose three-way was being deliberately bust up by someone playing gramophone records and then pausing to listen. He hopes that the gentlemanly attitude of the stations concerned has shamed the offender into a state of mind in which he will not repeat his "disgusting performance." Ah, well—as we said before, there's another one born every minute.

**Have You WAWCL?**

G2EC (London, W.1) prescribes yet another exercise for jaded DX-chasers. Describing it as "slightly useless but very fascinating," he outlines the scheme for "Working All W Call Letters." Quite simple—you try to work a W1A, W1B, W1C and so on right through to W0Z. Some areas have no calls beginning with X, and you're up against it when you look for Y's in the 1st, 3rd, 5th and 7th districts, but the possible total is about 252. G2EC wants 30 more to complete, and it would be interesting to see how others have fared. Highly recommended for those who can't find any new countries, and those who like to mix a certain number of QSO's with their DX-snaring tactics.

**Overseas News**

ZD4AB (Koforidua, Gold Coast) writes to say that he still holds his G licence as G2TH
(London, S.W.18), and as he is returning to the U.K. for a few month's leave he might even get his old rig on the air for a while.

G2AVP (Mildenhall) is in HZ and MD5 and may possibly be heard with the T2-T4 note associated with an 1154 in the wilds!

ZD4AM (Tafo) is still hearing quite a number of G's on 7 mc, and logged 2DN/P, 5VQ/P, 5Y/Y/P and 6NU/P on NFD. New ones for him recently on 14 mc have been HP1BR, UL7AB, VS6AC and XZ2FK. The latter, by the way, is G2FK in Burma.

Dave Mitchell of ZL1MP is proceeding apace with his shack and house, and when he gets his super-aerial system up he should produce a noteworthy signal over here. He encloses a most interesting story about a pirate in New Zealand. This station, operated by a youth of 17, for some days caused total disruption of all services using the Paraparaumu airfield. He lived half a mile from the control tower, and operated a ZCI transceiver both on the control frequencies and on the amateur bands. He even issued instructions to aircraft about to land!

In the end it was an amateur who helped to catch the fellow, by keeping him talking while the Post and Telegraph Department closed the net round the suspected area. When the radio inspectors and police finally entered a garage adjacent to a house they found the culprit actually in QSO with ZL2IN, using "efficiently-installed equipment."

Quite a thrilling chase preceded the actual location of the offender, which was made more difficult by the fact that his transmissions were spasmodic and of very short duration.

OQ5CF (Nzvi, Belgian Congo) sends a short description of his outfit—with an 813 in the PA run at 180 watts—and remarks that he always QSL’s 100 per cent; to date he has worked 153 different G stations, who have between them only managed to produce 49 cards. This seems hardly good enough, so if you owe him one, get it off your conscience!

An old friend, who used to be a regular correspondent to the Magazine in pre-war days, is now 4X4CJ in Tel-Aviv. He writes feelingly on the subject of QRP, as he runs a 6F6-6V6 outfit with all of 6 watts to the PA. Between April 5 and June 28, he stacked up 45 countries, and with only a two-stage receiver at that. As Reuben remarks “QRP men can take heart” —but he would probably agree that his somewhat unusual callsign may give him an advantage!

SVOAAL (ex-G3BWX, Salonika) in an interesting letter discusses his experiences out there—again with 6 watts of QRP on 14 mc, from 210-volt DC mains with poor regulation, and a very uninspiring aerial; though three half-waves end-fed, it is low and surrounded by electrical obstacles of every conceivable description. At any rate, on this rig SVOAAL has brought in 25 countries, including JA and OQ5. This is in spite of a high local noise-level, and a BC610 200 yards away operated quite unofficially by some types who know nothing of amateur procedure; but they seem to get a huge kick out of working near-Europeans on 350 watts with a 45 w.p.m. bug scattering dots all round the band, and everything spelt out in full! The only official SVO calls are in the sequence SVOAA-AZ (British) and SVOWA-WZ (American), with a total of no more than seven genuine stations on the air. SVOAAL himself intends to QSL 100 per cent, and with that laudable object has ordered 1,000 cards from home. He is always keen to work G’s—so look out for him, and remember his 6 watts and that BC610 a few hundred feet away!

MS4UU (Mogadishu, Somalia) writes to assure us that his is a genuine civilian call in ex-Italian Somaliland, now known as Somalia, that he was on 14084 kc CW from June 20 to July 5, and that with 25 watts to a very surplus 807 he has been knocking off the DX in no ordinary fashion. MS4UU is M13UU when in Eritrea, and will be back in Somalia as MS4UU about the time this appears. He also remarks that all QSL cards due from him have

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<th>ZONES WORKED LISTING</th>
<th>POST WAR</th>
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<tr>
<td><strong>Phone and CW</strong></td>
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<tr>
<td>G4CP</td>
<td>40</td>
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<tr>
<td>G2FSR</td>
<td>40</td>
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<td>G6QB</td>
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<td>G2IH</td>
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<td>GM6IZ</td>
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<td>G5WC</td>
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<td>ZB1AR</td>
<td>36</td>
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</tbody>
</table>

| **Phone and CW**     |         |
| G2YS   | 35 | 116 |
| G3CVG | 34 | 111 |
| G3ACC | 34 | 109 |
| G2FYT | 33 | 100 |
| G4OK  | 32 | 97 |
| ZD4AM | 32 | 92 |
| G2DTH | 31 | 81 |
| G2SO  | 30 | 82 |

**Phone only**

G2ZZ | 39 | 160
G2XK | 38 | 126
G3DO | 37 | 142
G0QX | 35 | 129
G2ALN| 35 | 120
G6CB | 32 | 89
been posted—but that to send them airmail (as some G's have asked) costs 1s. each!

On the matter of totals of VK's worked by G's, VK3NC (Casterton, Victoria)—yet another QRP station doing it all with 6 watts to a 6V6—writes on the subject of G's worked by VK's. His own log shows no less than 316 separate G calls QSO'd, all post-war on 14 mc; and to these can be added 31 EI, GD, GC, GI, GM and GW stations, with 263 Continental Europeans; he only needs five more cards for DXCC. VK3NC remarks that his 20-metre diamond is very sharply directional. This mighty aerial, aimed on London on the South American path, has 3 wavelengths in each leg and is built on the side of a hill, with 200-ft. feeders. VK3NC adds that he “lifts his battered old hat and bares his poor old bald head” to the /P.G's recently who were putting excellent signals into VK on a very poor band with only 5 watts input.

Another Contest

The first DX Contest organised by Indian amateurs will come up in September next. Run on the familiar lines, with exchanges of RST plus serial number, this will take place on the 14 and 28 mc bands only, with India, Burma, Ceylon and Pakistan counting as “locals” and the rest of the world (but only between Long. 10 deg. E. and 180 deg. E.) as “DX.” So the whole of America, as well as Great Britain and some of the Western European countries, are excluded.

One of the unusual features is the statement (in Rule 14) that “Proofs of all contacts are required.” DX stations will be asked to send their cards direct to Box 6666, Bombay, where they will be checked by the A.R.C.I. before being forwarded to the stations concerned. (Perhaps this gives a clue to the exclusion of America and the U.K.?)

In case it still interests you, the duration is from 1130 GMT on September 17 until 1830 GMT on September 18, and again a week later. Phone and CW all mixed up, and “mixed” contacts permitted. At any rate we in G are allowed to listen!

Top Band Stuff

So many readers have suggested that they would like to see a “Top Band Counties Worked” ladder that we have just had to give way! So, you users of 1.7 mc, start from the date on which you read this (we will call the deadline August 1) and log your contacts. Then send in your claims for (a) Counties and (b) Countries worked on the band. We are not publishing a list of counties; suffice it to mention that Monmouth (whether signing
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<th>DX QTH's</th>
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<td>CE5AW</td>
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<td>CR4AC</td>
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<td>EA6EG</td>
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<td>KH6VX/KB6</td>
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<td>MI3UU</td>
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<td>PK6XZ</td>
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<td>SV0AL</td>
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<td>VK2ACC</td>
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<td>VK4SI/VR1</td>
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<td>VQ3SS</td>
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<td>W6AZA/KW6</td>
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<td>YS1RA</td>
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<td>ZB1AJX</td>
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<td>ZP2AC</td>
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G or GW) will count as an English county, and that Yorkshire counts as one county and not as three Ridings. The Channel Islands each count as one county (also collectively as a country); likewise the Isle of Man. The Isle of Wight can count as a county. Counties of Northern Ireland, Wales and Scotland are duly added on—but not those of Eire. EI, of course, counts as a separate country.

So, without getting too involved, start pegging your claims for Counties and Countries worked on Top Band. If, one year from now, there is any discussion about the winner of this Marathon, we shall simply put both feet down and demand QSL cards, so you'd better see about those, too. Don't rely on the Call Book too much for QTH's—ask the other chap at the time. Duration, August 1, 1949, to July 31, 1950. Power, 10 watts! Let's have your first claims next month.

Stop Press

G3FEH (Morden) reports that FZ2NU is a station aboard ship in the Port of Dakar, works on 7086 kc with 200 watts, and would like G contacts.

Two nice new phoneys recently heard mid-July: HS5C (14050, T7) and VR5Z (14020, T6). A better one (we hope)—W6ATB/KC6 (14100, T9), who has all the appearance of being genuine.

The world's worst QTH to send, when you're a weak signal, must be that of OX3WC, who lives at KangerdIugssuk! From G3CYX via G2MI we get it that HB9HK will be one of his Liechtenstein trips during the period August 13-15, and will be operating on 14 mc as HB1HK—so he will no doubt stir up a little excitement . . . GM6IZ (Aberdeen) turns in a short report which shows that he has worked 98C in 37Z in 89 days—not too bad for an OT who has little time for radio these days; the list includes quite a number of fruity ones, too.

And that just about runs us dry, so we must get back to the shack and see where Arabackle has swished that VFO to. Closing time for next month's issue is first post on August 15. Please keep the news separate from the DX claims—and, if you're Top-Band-minded, don't forget to count up some counties and countries before then. In twelve days you should work, roughly, 20 and 4 (or are we optimistic?).

Until next month, then, Good Hunting. 73 and BCNU.

**THE ARRL FIELD DAY**

Peter Lovelock (ex-G2AIS, and now of New York) writes that he joined the Westchester Amateur Radio Association for the recent ARRL Field Day. The camp was on a Connecticut hillside and the experience was "very similar to the British equivalent," with the same after effects as 48 hours of/P working in this country. One difference, however, is that the W's can use the full gallon on their Field Day events. Though we have heard it said . . . enough!

**CARDS IN THE BOX**

If your call appears below, please send a large stamped addressed envelope, with name and callsign, to BCM/QSL, London, W.C.1, when card(s) held for you will be forwarded. If you want your address to appear in "New QTH's," please mention that at the same time; it will ensure eventual publication in the *Radio Amateur Call Book*.

G2AIU, 2CNU, 3BJH, 3CLT, 3CRS, 3DPA, 3DSP, 3EDK, 3EEQ, 3EVO, 3EYX, 3EXK, 3FIC, 3FJT, 3FRA, 3FXL, 3OD, 5CH, 5PI, 6SP, 6XH, G13FJX, GM3BZI, 3DBX, GW3EPF, 3WI.
Joe's YL Takes Up Amateur Radio

By MURIEL COOKSON

I AM a YL. Nothing unusual in that you may say, but to me it has been a revelation. Before I knew Joe, I'd never even heard of Amateur Radio so, when he first mentioned his hobby, I just said "Oh yes," very politely—then dismissed it from my mind. To me it was just a craze that didn't affect me in the slightest.

I soon learnt, however, that I just couldn't take that attitude. As we got to know each other better, this radio business cropped up more and more, till finally it became to me a rival which would have to be considered.

Then I visited his shack and at once it was obvious that this was no mere flash-in-the-pan hobby, but a serious business. I tried hard to take an interest in it but as he was only on CW at that time I found it very hard going.

Awakening

At the beginning of this year, he came on "phone and when that great event occurred my interest was slowly awakened—unintentionally, I must admit—but as I visited the shack three evenings a week, I just had to listen to his QSO's.

I would sit there for hours knitting furiously (and often with furious thoughts) whilst Joe talked away in some practically foreign language. A lot of his contacts were with locals, so I soon got to know their callsigns and names and when they knew I was there they would say something to me. For a long time I was "mike shy" and wouldn't even say goodnight, but now I welcome the chance to say a few words. If I don't get it I cough loudly, rattle cups and anything else to attract attention till I hear a voice saying, "By the way, Joe, is there anyone in the shack with you?", and there is my cue.

I have progressed even more rapidly of late, and in consequence my knitting is suffering rather badly. I now do QSL cards, or hunt manfully through the log when Joe is on the air and can't recall someone's name or QTH. I have also helped with tests, and after the latest one I got some rather flattering reports on my microphone personality!

Solo Turn

My biggest thrill was last week when I had a QSO all on my own, more out of bravado than anything. I called CQ and to my utter amazement an Italian came back. For a few moments I was panic-stricken, my mind went a complete blank and all I could do was sit there and gaze at the rig in terror. However, with a few gentle proddings from Joe I managed to pull myself together and carried on fairly well. No doubt all my feverish whispers aside were heard but I don't suppose the Italian minded that.

After that experience it is going to be harder than ever to keep me off the air—the best thing for me to do now is to teach Joe to knit.

Judging from what I have heard, very few XYL's take an interest in Amateur Radio, which I think is a big mistake. Before anything is hurled at me, let me hasten to explain that I fully realise an ex-XYL hasn't the free time I have, with a house and family to look after; their day doesn't start at 9 a.m. and finish at 5 p.m. like mine does at the moment.

I still think, though, that some wives could co-operate a little more; many a time I have heard an amateur remark that his wife won't come near the shack, and he really has sounded disappointed.

Anyway, here is one YL who is Amateur Radio conscious, and who knows but one of these days I might go in for a licence of my own. No, I don't regret my interest in it; I no longer feel neglected when I'm in the shack and as for Joe—well he thinks it marvellous, which more than repays me for any mental effort I have had to make.

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FOR THE SWL

Our companion Short Wave Listener is still the only radio periodical in the world devoted entirely to the interests of SWL's; as such, it enjoys wide support and finds its way to every part of the globe. The Short Wave Listener is essentially practical in its approach to the subject, and covers all aspects of SWL activity; the regular features are "Have You Heard?" (Amateur Band Commentary), Calls Heard, "Pse QSL," "The VHF End" (for SWL's working on the VHF bands) and "DX Broadcast" (a long monthly article on the reception of short wave broadcasting stations). Additionally, each issue carries technical articles on the receiving side of short wave radio. The Short Wave Listener costs 16s., post free, for a year of twelve issues (cover price 1s. 3d.) and is published on the third Thursday of each month from the same address as the Short Wave Magazine—49 Victoria Street, London, S.W.1.
Ideas for the TU7B

By N. P. SPOONER (G2NS)

Most amateurs will know how best to adapt to their own particular requirements certain of the GEC transmitter tuning units used by the U.S. Army Signal Corps. Unless duplicating the original QST VFO conversion circuit or that of the Transitron described by G5RZ in the June 1948 issue of the Short Wave Magazine, as few alterations as possible will probably be made in order to preserve the temperature compensators housed inside the ceramic coil-formers.

The units most likely to come the way of amateurs are the TU5B, TU6B and the TU8B—tuning respectively 1500-3000 kc, 3000-4500 kc, and 6200-7700 kc.

The TU7B is, however, a different proposition from the amateur point of view as it covers from 4500 to 6200 kc. Should one be acquired for breaking-up, several useful items will be found with it, including a cabinet, chassis, six-position switch, high voltage tuning and fixed condensers, slow-motion dials and RF chokes. Acetone or amyl acetate (from the chemist) will loosen any fixing dope and the special grub-screws can be shifted with an Allan key (usually costing about twopence at a large ironmonger’s, or one might be borrowed from the nearest AR88 owner who should have a key of this size in the receiver trimming-tool kit).

The old panel will serve as a template and one good use at least for the despised TU7B is shown by the photograph—it makes an excellent housing for the EF50 TRF Receiver described by G5UM in the August and December 1946, and July 1947, issues of the Magazine.

Noise Limiter Circuit

Suggested by E. J. WILLIAMS (G2AKY)

Doubtless there are many amateurs who have at some time or other tried these several noise limiter circuits there are “on the market.” The writer was no exception and after many experiments finally adopted the one described here, this giving the best results for simplicity of circuit design.

Referring to the circuit, it will be seen that one half of the double-diode (which may be an EB34, 6H6, EB91 or similar type of valve) is used as a detector in the conventional manner, the diode load being made up from two ½-megohm resistors in series; the audio component is taken from the junction of these two resistors.

Action of the Circuit

When the noise limiter is switched in circuit the signal reaches the audio stage through the second diode section which is connected in opposition to the first diode, as far as polarity is concerned. Under these conditions, the second diode will pass signals so long as its cathode is maintained at a greater potential than its plate.

If it is assumed that the full voltage developed across the load at one instant be
When tried, the circuit was found to behave excellently even with an electric vacuum cleaner running a few feet away from the receiver aerial.

**XTAL XCHANGE**

This is a free service for readers, but is for exchanges of crystals only—buy-or-sell notices can not be accepted for this space. With the exception of 100-1,000 kc bars, the fundamental frequency of any crystal offered must be within one of the amateur communication bands, or suitable for harmonic operation at VHF; 100-1,000 kc bars should be of certified accuracy, and in the case of other crystals it should be stated whether calibration certificates accompany them. Notices, headed “Xtal Exchange—Free Insertion” should be set out on a separate slip in the form shown below, and all negotiations conducted direct.

G2DUD, 8 Hall Grove, Cheadle, Cheshire.
Has Bliley 7028 kc crystal in American Eidson holder, 3-in. pin spacing. Wants 1820-1860 kc crystal, holdered, 3-in. mounting.

G2HII, 73 Elvaston Road, Nottingham.
Has QCC Type PS 1888 kc crystal, certificated. Wants similar crystal 3550-3650 kc.

G3CED, 17 Ethel Road, Broadstairs, Kent.
Has several “dead” 7000 kc crystals. Wants frequencies at CW end 3-5 and 14 mc bands.

G3DJD, 2 Canfield Road, Brighton 7, Sussex.
Has RCA 160 kc bar in American 3-pinn holder, with base. Wants 250 or 500 kc bar, mounted.

G3DDL, Upways, Viewlands Rise, Chervin End, Menston-in-Wharfedale, Yorks.
Has QCC Type PS 7060 and 7063 kc crystals, certificated, also 100/1000 kc bar in 3-pin holder. Wants certificated crystals in 1-7 mc band.

G3DNX, 15 Roosevelt Road, Long Handborough, Oxon.
Has ex-Service 3500 kc crystal, 3-in. pin spacing. Wants frequency 7010-7045 kc, either 3-in. or 2-in. mounting.

G3DSA, 2 Nunmill Street, York.
Has QCC Type PS 7124 kc crystal. Wants frequency 1800-1900 kc.

G6FB, 311 South Lane, New Malden, Surrey.
Has 100 kc and 5001 kc ex-A.M. crystals, 3-in. pin spacing. Wants frequencies 3500-3595 kc.

SWL, 19 Darnley Avenue, Wakefield, Yorks.
Has 465 and 500 kc crystals, 3-in. pin spacing, also 8000 kc octal based. Wants frequencies for CW end 3-5 mc band, or in 1-7 mc band.

**Mention the Magazine when writing to Advertisers**
Triode Converter for Two

Design using 6J6’s, with Performance limited only by Aerial Noise

By W. J. CRAWLEY (G2IQ)

In an article describing a method of measuring signal-to-noise ratio in VHF receivers (“Comparing Receiver Performance,” Short Wave Magazine, June 1949), the author referred to an all-triode converter with the extremely low noise factor of 4 dB. The following is a description of this converter, the performance of which may justly be claimed as being well in the forefront at the present stage of VHF technique.

Simplicity and Stability of the Push-pull Converter

For purposes of comparison about half a dozen different versions of this receiver have now been constructed, and without exception every one worked first time without the slightest sign of trouble. Indeed, despite the rather complicated appearance of its circuitry, this converter is simpler to construct and to get working than any other type. Its perfect balance makes it inherently stable; the only possibly tricky adjustment is that of neutralising the RF stage, but if the instructions are carefully followed, this will present no difficulty. Compared with receivers using a pentode RF stage such as the 6AK5, this converter is as docile as a lamb, gives slightly higher gain, and much better signal-to-noise ratio!

Some Advantages of the Push-pull Triode

The main advantage of the triode over the pentode in VHF RF amplifiers is that it has no screen. The noise energy in pentodes is higher than in triodes of similar characteristics because of the added noise caused by the screen current. A pentode is usually between three to five times as noisy as a triode producing equivalent amplification. For example, the Equivalent Noise Resistance of a 6AK5 is approximately 1,500 ohms, whereas that of the 6J6 is only about 400 ohms. However, in single-ended circuits, full advantage of the triode superiority cannot usually be taken. In the push-pull mode, however, the triode demonstrates its superiority because of the following factors: The push-pull connection halves the input capacity (it becomes here only 1 μµF), making it possible to use a comparatively large inductance in the grid circuit, a step-up aerial transformer and a truly balanced input circuit. In addition, the

Table of Values

Circuit of the G2IQ 145 mc Converter using 6J6’s

| C1 | 8 x 8 μµF “Butterfly” |
| C4 | 15 x 15 μµF “Butterfly” |
| C2, C3 | 1.5 μµF trimmers (see text) |
| C5, C8, C15 | 500 μµF mica |
| C6, C7 | 30 μµF Ceramicon |
| C9, C10 | See text |
| C11 | 0.1 μµF mica |
| C12 | 50 μµF mica |
| C13, C14 | 10 μµF Ceramicon |
| C16 | 5 x 1.5 μµF split-stator |
| C17 | 30 μµF trimmer (Philips) |
| R1 | 56 ohms 1/2 watt |
| R2, R7, R10 | 2,000 ohms 1/2 watt |
| R3, R5 | 100,000 ohms 1/4 watt |
| R4 | 470 ohms 1/4 watt |
| R6 | 56 ohms 1/2 watt |
| R8, R9 | 15,000 ohms 1/2 watt |
| All RFC | 20 in. of 26 SWG enamelled on 1/2-watt resistor or 3/16 in former |
| L2, L3 | 6 turns 1 in. diam. centre tap |
| L4 | 7 mc IF coil |
| L5 | 4 turns 1 in. C.T. |

Top side of the converter built up on the locally fabricated chassis, using surplus parts. The oscillator coil and tuning condenser are right in the foreground.

The author has already made a number of very useful contributions to these pages. Since the receiver is still one of the main considerations at every VHF station, we are glad to present here details of his latest converter for the 145 mc band—and the quest for better converters must go on unceasingly. This one is giving exceptional results and can be recommended as an extremely effective practical design.—Ed.
The circuit complete of G2IQ's two-metre converter, using 6J6's and with a neutralised RF section. It is a low-noise, high-gain job, easy to build, and should give exceptional results on Two. The by-pass condenser C in the sketch inset can be 500 µF.

Input resistance is doubled so that the damping of the grid coil is halved with consequent improvement in the gain. In point of fact, the input resistance of a properly neutralised 6J6 is better than 10,000 ohms at 145 mc, whereas that of the 6AK5 is as low as 3,000 ohms. One further big advantage of the push-pull 6J6 is that this valve has only one cathode, common to both triodes. In the push-pull Class-A mode no RF current flows in the cathode lead; in other words, the cathode is cold to RF and consequently the evil effects of cathode lead inductance are eliminated.

When added together the foregoing advan-

Underneath the converter constructed from surplus components. The grid coil is across the butterfly condenser, and the screen divides the grid and plate sections of the push-pull RF stage. The mixer injection condensers are the two parallel wires in the centre (white sleeving).
tages make a properly designed push-pull 6J6 RF amplifier approximately 5 to 6 dB better than a well-designed 6AK5 stage on the score of signal-to-noise alone. This may not look much on paper, but consider to what lengths we are willing to go to get another 6 dB gain from our beam arials! Moreover, the gain we are getting from the 6J6 is better than that we could get by increasing the beam gain by 6 dB because it represents pure signal gain without any additional noise. Increasing the beam gain also increases the noise component to some extent!

Further Design Considerations

Having decided on the balanced RF amplifier stage it is as well to carry the symmetry throughout the converter and use a balanced mixer and balanced oscillator. A push-pull mixer has the disadvantage of requiring balanced output, and as the single-ended output coil was easier to construct a push-push mixer was decided upon with plates strapped. A crystal controlled oscillator was regarded as an unnecessary complication as stability at 144 mc is easily attainable with self-excited oscillators when carefully designed. Balanced injection to each side of the mixer is essential, and for this reason the oscillatory circuit shown was chosen. With stabilised power supply this oscillator has no tendency to drift after the initial warming up period and gives a pure DC tone, a most desirable but not often encountered characteristic of oscillators at VHF.

Construction of Two Units

The photographs illustrate two versions of the same circuit. One is the logical development of a study of the circuit diagram and the components are spaced across the chassis in “chronological order,” starting with the RF grid circuit and ending with the oscillator plate tank. This type of construction has the necessary symmetry and is, perhaps, easier than the second type. Both converters, however, have identical noise factors. The first was constructed almost entirely of surplus components on a home-made chassis the second (also photographed) uses well-known types of components, and a commercially made cabinet and chassis. In order to get everything into the commercial chassis it was necessary to use a different layout, but the balance has not been impaired.

The input circuit in both converters uses a pre-set butterfly type condenser. The input circuit is sufficiently broad-band to allow the grid condenser to be tuned to the middle of the band and left there. The neutralising condensers lie on each side of the tuning condenser, making the grid leads as short as possible. The neutralising condensers are midget 30 µF air-spaced trimmers with all the plates removed except one rotor and one stator. Neutralising is fairly tricky and experiment with various types of neutralising condensers led to the adoption of these as the best for this application. It should be remembered that everything connected with the tuned circuits should be of as small dimensions as possible so as to reduce inductance external to the tuned circuit and capacity to earth. These tiny condensers, when modified as suggested, provide the required capacity variation (2 to 3 µF) with least circuit losses.

The grid leads to the tuning condenser are crossed over at the valve socket so that the plate neutralising leads may come straight across to the neutralising condensers. A metal shield screens the input and output circuits with a cut-out for the valve socket. Keep all leads as short as possible; cup type mica by-pass condensers are an advantage in keeping down lead inductance. The cathode resistor is not by-passed for the reasons enumerated above. The grid coil is mounted direct on to the tuning condenser.

All earth returns are taken to a tag secured to the chassis by the valve socket bolt. The plate tank is similar to that of the grid, with HT fed to the centre tap of the coil through an RF choke. Condensers from each side of the coil feed to each mixer grid, which has no tuned circuit. The mixer grid resistors are raised about 3-in. from their respective socket pins to allow injection to be obtained by home made condensers. These consist of parallel insulated wires from each oscillator grid pin brought to each mixer grid pin and looped once around the ½-in. of resistor lead. The mixer does not appear to be unduly critical as to oscillator power, and varying amounts of injection have been tried with little or no variation in the noise factor.

There is no need to stress that the oscillator depends for its stability on the mechanical strength of its parts. Short, rigid leads are particularly vital here. The coil should be wound with not less than 18 SWG wire, and its centre should receive added support by a short rigid wire from the centre tap to the by-pass condenser. The tuning condenser requires a rigid supporting bracket and should be connected to the slow-motion drive by a flexible coupling. Use a concentric condenser for trimming the oscillator as this type may be rigidly supported in the wiring. If desired, the VR105/30 stabiliser may be mounted on the same chassis with no ill effects.

Putting the Converter into Operation

There should be no difficulty in getting the converter working satisfactorily in a short time. The first step is to peak up the IF coil, and this may be done by turning up the main
receiver gain and trimming the IF coil for maximum hiss at the frequency chosen. The next step is to trim the oscillator coil to approximately 138 mc—that is, 145 less the intermediate frequency. With the HT to the RF valve temporarily disconnected, rock the RF plate tuning condenser. Two positions of increased hiss in the receiver output will be noticed corresponding to frequencies of 131 mc and 145 mc. The latter is the correct one, that is the one using less capacity. Now apply HT to the RF valve and in all probability (unless you have been very lucky) the receiver will become distinctly unstable! With the neutralising trimmers at maximum, reduce the capacity of each uniformly, a little at a time, until tuning the grid coil into resonance does not produce self-oscillation in the RF stage. When the receiver is properly neutralised tuning the grid coil should produce a slight increase in hiss at resonance but the tuning should not be sharp, neither should the increase in hiss be pronounced. Pronounced hiss and sharp tuning denote that the receiver is working on the threshold of instability, and whilst the gain will be higher the signal-to-noise ratio will suffer. If this condition exists it is as well to experiment with the neutralising condensers until the RF stage becomes more docile. When properly adjusted, the stage should remain stable even with the aerial disconnected.

The Input Load
The converter works better with a balanced aerial system with an impedance of between 300 and 600 ohms. The use of coaxial cable with one side of the aerial coupling coil earthed upsets the balance somewhat. Many VHF workers are coming to the conclusion that symmetrical feeders are to be preferred to coaxial (asymmetrical) lines, but for those who
are using the latter the following suggestion may be of help: it is not always recognised that when the aerial is used for reception its function is reversed and the receiver becomes the load and the aerial the generator. Therefore matching the aerial to the receiver must be done at the receiver end. In this case the 70-ohm coaxial line may be matched to the 300-ohm input of the converter by means of a quarter-wave matching transformer of 150 ohms impedance, and the need to earth one side of the input coil is obviated. This transformer may take the form of two lengths of 70-ohm coax 13 in. long (i.e. 20 in. times the velocity factor) with the outer braid connected together at each end and the inner conductors connected to the aerial feeder and receiver input. Alternatively, two lengths of 300-ohm twinlead, each 16 in. long, may be used in parallel to effect the desired balance. Attention to small points like this are well worth while and will help achieve the near-perfect reception of which this type of converter is capable.

Do not be disappointed, during the first few hours' work with this receiver, at its apparent lack of liveliness. Its abnormal quietness is not due to insensitivity, as it will soon demonstrate when a signal appears on the band.

On the tidy theme, this is looking underneath the converter as constructed on an Eddystone chassis. The RF grid section is almost completely screened from the rest of the set. The mounting of the neutralising condensers is clearly visible.

PULSE TRANSMISSION

In the American radio periodicals, they are beginning to talk about pulse transmission as a possible method of communication on amateur frequencies—it is a large subject, involving new techniques, and offers a wide field for experiment, particularly as a pulse transmission can also be modulated. At the moment, no form of pulse transmission is permitted on any amateur band in this country.
THE month has seen many very fine contacts made on the two-metre band, and space is far from sufficient to list them all. Study of the calls worked and heard in the Activity Report herewith will give an idea of what has been achieved. At the time of writing the GDX record still stands at the figure of 296 miles set by G3BLP and GM3OL on June 20, but some very serious assaults have been made on it. G5BY and G5GX had a 294-mile contact, while both G5BY and G6WT are gunning for GM. Across the waters of the North Sea, the Newcastle group have worked PA0AD at 350 miles, while reports have come in of the reception of DL’s in several East Coast areas—the distances involved are approaching 500 miles. DL1CK in Frankfurt was S7-8 at G3COJ in Hull on the evening of June 26, and this fine piece of reception has been indirectly confirmed by a report from PA0LU, who was hearing both DL1CK and G3COJ’s abortive calls to him.

Further to the DX in this category, G2OV/G3EBW (Hurst Green, Sussex) report the reception of DL4XS on 145 mc, MCW R5, S6, calling another DL4 on July 17. So there is good evidence of the possibility of some very useful and interesting European DX on Two. What a band!

70 cm. News

It is with considerable mortification and some trepidation that your conductor has to confess that much of the Seventy Centimetre news following should actually have appeared in the last issue—it was an error of omission for which due apologies are offered.

The latest achievement on Seventy-cems is a contact over a distance of about 47 miles between G3BEX/P at Devil’s Dyke and G3AHB/A on the roof of the E.M.I. building at Hayes, Middlesex. Signals were R5, S9 at Hayes, and R5, S6 at the Sussex end. The Tx at G3BEX is a pair of 8012’s as SEO, with MCW provided by a single 6L6, while the Rx is a R1359. Beams are 24-element for Tx and 16 for Rx, of which we hope to show some photographs next month. At G3AHB the Tx is an 8012 with MCW at 450 c.p.s., and the aerial is eight half-waves stacked, with reflectors; the Rx is from the APS13 transceiver.

Correspondence shows that there is some controversy arising between various 70 cm. groups as to the use of SEO’s on that band. One point is quite certain, namely, that SEO’s cannot be received on converters feeding into receivers such as the HR9. These are early days to form a final opinion, but there are many who feel that if consistent DX results comparable with those obtained on Two are to be obtained at 70 cm., then CW technique and narrow-band receivers will be essential—and that implies frequency stabilisation. There would appear to be no reason at all why tropospheric propagation should not be equally good on 70 cm. as on two metres. Rather, the limiting factors appear to be getting sufficient RF into the Tx aerial, and receiver sensitivity. So while not wishing in any way to minimise the excellent work being done by many of the present 70 cm. pioneers, one suggests a different technique must be sought for if the band is ever to be put to any better use than portable operation from hill tops and contact over line-of-sight paths. After all, we already know that such working is possible with quite elementary apparatus.

In the Midlands, G3APY (Kirkby-in-Ashfield) and G3ENS and G3KK (Loughborough) are active. The first-named has a 32-element broadside array and a RF105 tripler followed by a similar PA; the Rx at G3APY is a modified P58 with a 464A as RF and 1N23 mixer, with which a noise factor of only 5-5 dB at 435 mc is achieved. G6TF (Sheffield) has an ASB24 which he thinks might be persuaded to work on 70 cm.; he would be glad to hear from anyone who has tried...
modifying this particular type of receiver.

G2HKU (Sheerness) is using a corner reflector with a folded dipole made of \frac{1}{2}-in. copper tube fed with 300 ohm line. A new transmitter is under construction using a CV63 parallel-line oscillator, while the single 9002 Rx is being rebuilt. At Romford G2BVN has push-pull 6J6's as a transmitter and a converted ASB8 on the receiving side, with a 16-element vertically polarised aerial in course of construction. G5BY (Boft Tail) is prepared to arrange 420 mc schedules with anyone, and points out that some good circuits across the water to Cornwall are obvious from his QTH—so perhaps someone will go /P on his holiday in the South-West!

G3BKQ (Leicester) has both Tx and Rx ready for 420 mc, but so far only altimeters have been heard. G4LU (Oswestry) is now CC on 432-6 mc, using an 832 tripler; power output is about 3 watts into a 12-element beam. The receiver is a modified ASB8, and he also has heard altimeters and cars. G3AHX, also in Oswestry, should be active soon. G4LU is beaming on Birmingham every evening from 2100 to 2110 with MCW, and listening on the band for the following ten minutes.

Some special 420 mc activity is scheduled for the week-end August 20-21, and three stations of the South London VHF Group will be operating portable, as follows: G2FKZ/P, 3 miles west of Wantage, 700-ft. a.s.l.; G3CU/P, One Tree Hill, Honor Oak; G3FZL/P, near Hastings, 500-ft. a.s.l. An attempt will be made to work F8OL across the Channel, who is co-operating. We shall, of course, be very interested to have news (and photographs) of the results of this effort, for reporting in the next issue.

The Zone Plan

The Two Metre Frequency Plan, as amended in the Short Wave Magazine, June, 1949, page 293, was fully discussed at the Nottingham meeting of the Fiveband Club, and it was unanimously agreed that it was a Good Idea. One or two slight modifications were suggested, and all present agreed to support the Plan if it was introduced. With this encouragement (and also the support promised by the great majority of correspondents in their letters), it has been decided to advise all two-metre operators to adopt the scheme with effect from October 1. There is, of course, no compulsion whatever about this, but it is hoped that all those who have promised support will operate according to the new Plan from the date given and endeavour to persuade others to do the same. There may be a little confusion just at first, and even after the Plan is in operation, a certain number of stations may not have moved. But if you really do believe in the scheme, please do not wait to see what others will do but be ready with your crystal on October 1.

In brief the plan is as follows. The country is divided into nine geographical zones (see accompanying map). The Zones A and B of the original scheme have been combined as there was little activity in Zone A. To each area a section of the band has been allocated.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Frequency</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; B</td>
<td>144-0 to 144-2 mc</td>
<td>All Scotland.</td>
</tr>
<tr>
<td>C</td>
<td>144-2 to 144-4 mc</td>
<td>All England from Lancs. and Yorks. northward.</td>
</tr>
<tr>
<td>D</td>
<td>145-8 to 146 mc</td>
<td>All Ireland.</td>
</tr>
<tr>
<td>E</td>
<td>144-4 to 144-65 mc</td>
<td>Cheshire, Derby, Notts, Lines, Rutland, Leics, Warwick and Staffs.</td>
</tr>
<tr>
<td>F</td>
<td>145-65 to 145-8 mc</td>
<td>Flint, Denbigh, Shrops, Worcs, Hereford, Monmouth and westwards.</td>
</tr>
<tr>
<td>G</td>
<td>144-65 to 144-85 mc</td>
<td>Northants, Bucks, Herts, Beds, Hants, Cambs, Norfolk, Suffolk.</td>
</tr>
<tr>
<td>H</td>
<td>145-25 to 145-5 mc</td>
<td>Dorset, Wilts, Glos, Oxon, Berks and Hants.</td>
</tr>
<tr>
<td>I</td>
<td>145-5 to 145-65 mc</td>
<td>Cornwall, Devon and Somerset</td>
</tr>
</tbody>
</table>

As a result of a proposal made at the Nottingham meeting it was agreed that local contacts could be carried out at the extreme HF and LF ends of the band, i.e., in the first
G5RP himself banging it out when /P near Wantage, Berks, on July 3. Tx in the foreground.

50 kc at either end (144·0 to 144·05 and 145·95 to 146·0). Stations in GM and GI desiring DX contacts are therefore advised to select their frequencies outside these portions of their zone allocations. This proposal was made with a view to lessening local interference in congested areas, but it is not intended that all local contacts should be made on those frequencies.

Method of Calling
To indicate what part of the band is to be searched after a CQ call, the calling station should follow the CQ by the letter Z and the zone letter, e.g., “CQ ZG” would indicate Zone G stations were desired and searching would be from 144·65 to 144·85 mc. The letter Z is included to avoid any possible misunderstanding of “CQ G” or “CQ F” in Continental circles! To call two zones, include both letters in the call in the same order in which it is proposed to search the bands.

Crystal Exchanges
Arrangements are being made to effect the necessary crystal exchanges, and all who want to change crystals should notify G2XC of the frequency and type of crystal desired and give full details of the crystal offered in exchange. Do not send the crystal itself to either the

Short Wave Magazine or G2XC! Exchanges will be arranged as promptly as possible. Information may be sent as soon as you like, but the actual exchange need not be made until sometime in September, at a date to be mutually arranged between the parties concerned. However, October 1 is target date for the new zones, so the aim must be to have everyone fixed up by that day.

At the Nottingham meeting the following promised full support for the scheme : G2FHU, 2IQ, 2KK, 2MA, 2RI, 2XC, 2XS, 3ABA, 3ALD, 3ALY, 3APY, 3BLP, 3BUR, 3CUJ, 3CZV, 3DBH, 3DCV, 3ENS, 3ENY, 3DRG,

Two-Metre DX Working

<table>
<thead>
<tr>
<th>Worked</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 350 miles</td>
<td>G2IQ, G3CYY, G4LX, G5BY</td>
</tr>
<tr>
<td>300 to 350 miles</td>
<td>G2ADZ, G2BMZ, G2MA, G3DMU, G4LU, G6WT</td>
</tr>
<tr>
<td>250 to 300 miles</td>
<td>G2HDY, G2KG, G2NH, G2XC, G3BLP, G3COI, G3CJU, G3EHY, G5GX</td>
</tr>
<tr>
<td>200 to 250 miles</td>
<td>G2CJW, G2OL, G3ABA, G1AGA, G3DAH, G4AP, G5BM, G5MA, G5MQ, G5NF, G5RP, G5TZ, G6DH, G6PG, G6ZQ</td>
</tr>
</tbody>
</table>
3MY, 3WW, 5GX, 5JU, 5PP, 5RW, 6CW, 6FO, 6HY, 6MN, 6OS, 6VX, 8DD, 8J1, 8UZ.
In addition, the following are only a few amongst those who have given written
promises of support: G2NH, 20I, 3BW, 3CYY, 3DAH, 3DMU, 3EJL, 3VM, 3WS, 3YH, 4LX, 5MR, 8AO, 8LY, 8WV. During the past two months many other indications of approval have been received, and only five letters of dissent. So it is now up to everyone who has promised support to make the scheme work. G2XC will be back on 145-29 on October 1.

Contests

Contest plans were also fully discussed at the Nottingham meeting, and as a result separate two-metre and 70-cm. events are being arranged. The former will be in November, the exact dates to be announced later.

The 70-cm. Contest will be on two weekends, September 10-11 and October 8-9, the period being from mid-day Saturday to midnight Sunday in each case. Either portable or fixed QTH operation will be permitted, and contacts may be prearranged or made after initial contact on another band, and half-points will be allowed for cross-band operation—420 mc to any other band, and either way. Points will be scored at one per mile, that is, 25 miles make 25 points.

Although this first 420 mc Contest is on a points scoring basis, it is hoped that all competitors will appreciate that the idea behind the event is to encourage 70 cm. activity and it is therefore urged that everyone with 70 cm. equipment, either Tx or Rx, be active on those weekends, whatever may be their chances of winning the Contest.

Results of the first week-end should be sent in to us by September 16 so that a brief report can be given in the October Short Wave Magazine, and the final score for the two weekends combined by October 14. Details of equipment and operating sites should also be included.

Beams

Aerials for Two have occupied a prominent place in the correspondence this month. Stacked arrays seem to be gaining favour everywhere. G2KG (Chelmsford) says, “If the average ham would discard his Yagi (unless stacks of 3 or 4), also throw away his low-loss coaxial, there would be plenty of DX about.”

G5GX (Leven) similarly comments, “One can tell a station using a stacked array by its consistency and its strength.” G2KG has a fixed array with a theoretical gain of 17 dB trained on PA, and a similar one, rotary and 70 ft. up, with which he has been putting S9 signals all over the country. An array of stacked rhombics aimed north has also been tried. Regarding coaxial cable, one length of 60 ft. was found to have 6 dB attenuation at 145 mc, with a SWR of only 1:6.
Others with multi-element arrays either up or under construction include G3BKQ (Leicester) 24, G3COJ (Hull) 16, G3DMU (Scunthorpe) 16, G5BY (Bolt Tail) 24, G5RP (Abingdon) 16, G6WT (Torquay) 24.

Station News

G2IQ (Sheffield) is considering making a stacked array from ½-in. dural wire, which is sufficiently rigid to allow 40-in. being supported at one end only. G3COJ (Hull) has worked PA9AD and G5BY at excellent DX distances. He points out that it was on the first day of the recent air exercises he heard DL1CK, but he does not consider Window had anything to do with it. G3CUI is another to work G5BY from Hull and also to get across to PA. He comments on the strong and consistent signal he receives from G2CPL (Lowestoft) over a mainly water path.

G2O1 (Eccles) logged 79 stations during the recent field day, and complains of QRM in the Manchester area from 'phone stations that spread. He recently received a QSL from F9MZ for a 2-metre QSO which he knows nothing about; he thinks the Frenchman may have made an error with the callsign, so if it belongs to someone else please send your claim to G2O1. The date was July 3. G8FI (Darwen) is active nightly from 1900 BST.

Further north the Newcastle group have worked PA9AD, but are finding some of these "one-way paths." On June 26 both G3CYY and G4LX heard a station in Flensburg, either DA or DL1KN. G8AO has heard G5BY, and worked G3APY; he asks for a few more beams to be fired at the North-East. He hears plenty of stations calling GM3OL.

Our congratulations must go to G334W, who, in one of the loneliest VHF spots in the country (Whitehaven), has achieved associate membership (100 stations worked) of the VHF Century Club. It is also a pleasure to record that by the next post a bundle of 100 cards arrived from GM3OL (Dumfries) to make him the first GM to become VHF CC. This is no mean achievement on the part of both operators concerned, and shows what can be done even from a difficult or DX location. During the past month they have both worked G12FHN, and both have now reached the Counties Worked list. The Rx at G3BW is a CC converter with two 6AK5 RF stages; a six-element c.s. beam and a SCR522 with a 829 PA complete the equipment. GM3OL says that July 3 was easily the best VHF day he has experienced.

G12FHN, who has had contacts with G, G1, GM and GW, is blazing new paths across the Irish Sea and is active most evenings between 1800 and 1900 and again 2300 to 2359 BST. He has a converter with 6J6 RF and mixer stages and 6C4 cathode follower output; the oscillator is 955. The VFO for the transmitter is a LM10 frequency meter which he claims to be as good as a crystal. The aerial system is two stacked three-element wide-spaced beams; usual frequency 145-2 mc.

On the Field Day G4LU (Oswestry) found the hardest job was to contact the GW portables! He has recently moved his indoor beam to give better signals to the south. G3ABA (Coventry) is one of those to work GM3OL and he has also heard PA9AD; he asks where are the Middlesex and Sussex stations? G3BKQ (Leicester) reports that
two-metre activity report

To maintain the usefulness of this section, please set out your list on a separate sheet and exactly as shown below. That is, with call signs in numerical and alphabetical sequence, arranged horizontally, repeating the numeral but not the prefix, and divided into "worked" and "heard" listings. And please print all calls clearly!

G3BKQ, Leicester.

**WORKED:** G2AJ, 2ATK/P, 2AVQ, 2BUJ, 2BVW, 2HCN, 2IQ, 2MH, 2RI, 2XC, 3ABA, 3BLP, 3CGQ, 3DEP, 3EYH, 3ENS/A, 4AU, 4CL, 4RK, 5BY, 5GU, 5JU, 5LJ, 5SW, 5TP, 6FB, 6SM, 8SM, 87L, 6XY, 6YQ, 8KL/P, 8MS, 89Y, GW2ADZ. (June 14–July 12.)

G3GCO, Luton, Beds.

**WORKED:** G2FTD, 2I0, 2KG, 2PU, 3BW, 3CJY, 3FD, 3MY/P, 3PB, 3RP, 4CI, 4LP, 4MY/P, 5GU, 5JU, 5JU, 5PB, 5RW, 5TP, 5WP, 6FB, 6FB, 6SM, 6SM, 6XY, 6YQ, 6ZQ, GWADZ. (June 23–July 7.)

G3GHD, GW4O/P.

**HEARD:** G2ATK/P, 2BUJ, 3BND/P, 3CDX, 3DMU, 3ENS/P, 6SM, 6GMJAYR. (June 7–July 11.)

G6WT, Torquay, Devon.

**WORKED:** G2AOQ, 2CPL, 2KG, 2NH, 2NM, 2RI, 2XC, 3ABA, 3AGA, 3AVF, 3AVF/P, 3BKO, 3BLP, 3EXR, 3CMU, 3DAD, 3DEP, 3EYH, 3JFL, 3JFU, 3LJ, 3N1, 4AP, 4CI, 4DC, 4GR, 40Z, 4OL, 5MA, 5PB, 5RP, 5TP, 6FB, 6FB, 6SM, 6XY, 6YQ, 8AJ, 8BD, 8SM, 8TS/P, 89Y, GW2ADZ, 55A.

**HEARD:** G2ATK/P, 2FZ/P, 2IQ, 3APY, 3CC/L, 3PZ, 3WP, 4R, 4SM, 5JU, 6UZ, 6WT, 73L, 73R, 73T, 8SM, 8TS/P, 89Y, GW2ADZ, 55A.

G6DT, Hornchurch, Hants.

**WORKED:** G2JJU, 2KG, 3ABA, 3AGA, 3AVF, 3EYH, 3TN, 4CI, 4GR, 5UP, 6CI, 6WT.

**HEARD:** G2AN, 2IQ, 2MY, 2NH, 3AK, 3BY, 3CK, 4DC, GWADZ, 55A, PA0PDN. (June 16–July 12.)

G3CJD, Newcastle-upon-Tyne, Staffs.

**WORKED:** G2ACJ, 2ATK/P, 2AVQ, 2IQ, 2XS, 3ABA, 3APY, 3BBA, 3BLP, 3BND/P, 3BW, 3EHY, 3CMU, 3DA, 3DJQ, 3DMU, 3ENS/A, 4AU, 4CL, 4RK, 5BY, 5GX, 5LJ, 5SW, 6DP, 6L, 6OS, 6VC, 8KL, 89Y, GWADZ, 40S/P. (June 23–July 7.)

G3VM, Norwich, Norfolk.

**WORKED:** G2AJ, 2CMK, 2CPL, 2FJD, 2IQ, 2KG, 2NH, 2XC, 2XS, 2HK, 3ACY, 3CJY, 3FD, 3MY/P, 3PB, 3RP, 4CI, 4LP, 4MY/P, 5GU, 5JU, 5JU, 5PB, 5RW, 5SM, 6FB, 6FB, 6SM, 6XY, 6YQ, 6ZQ, 8KL/P, 8MS, 89Y, GW4O/P, PA0PDN, 6ZQ. (June 19–July 9.)

G5BY, Bolt Head, Devon.

**WORKED:** G2ATK/P, 2IQ, 2MA, 2PU, 2TP, 3BAG, 3BBA, 3BKO, 3BY, 3CHY, 3CMT, 3CJO, 3CJY, 3DA, 3DMU, 3ENS, 3EYH, 3M/L, 4DC, 4LU, 4PZ, 5BH, 5SM, 5X1, 6FB, 6LYQ, 82Y, 8SM, 89Q, 89Y, 8SM, 89UZ, GW2ADZ, 55A.

**HEARD:** G2AJ, 2AVQ, 2BUJ, 2KG, 2NH, 2PN, 2PU, 2WJ, 3ABE, 3XCP, 3CEP, 3RI, 4CI, 5GR, 5MA, 5PB, 5BP, 6CI, 6WZ, 6XY, 8B, 8BD, 8SM, 8TS/P, 89Y, GW2ADZ, 55A.

G50A, Exeter, Devon.

**WORKED:** G2BMZ, 3AVF, 3AGA, 3CMU, 5BY, 5MA, 6WT, GWADZ.

**HEARD:** G68M, GW5BM/P.

G2CPL, Lowestoft, Suffolk, NGR 62910836.

**WORKED:** G2AJ, 2EJD/A, 2FJD/A, 2HK, 4DRG, 4SM, 5LJ, 5UP, 6CI, 6WT, 73L, 73R, 73T, 8SM, 8TS/P, 89Y, GW2ADZ, 40S/P, PA0PDN, PA0PDN.

**HEARD:** G2AJ, 2CPL, 2MV, 2PU, 3BUJ, 3CJY, 3FD, 3MY/P, 3PB, 3RP, 4CI, 4DC, 4LU, 4MY/P, 5BH, 5SM, 5X1, 6FB, 6LYQ, 82Y, 8SM, 89UZ, GW2ADZ, 40S/P, PA0PDN, PA0PDN.

G3DAH, Berne Boot, Kent.

**WORKED:** G2EJD/A, 2FMF, 2IO, 2KG, 2NH, 2UJ, 3ABA, 3BKO, 3BY, 3CHY, 3TMU, 3JU, 3LJ, 3MY/P, 3PB, 3RP, 4CI, 4DC, 4LU, 4MY/P, 5BH, 5SM, 5X1, 6FB, 6LYQ, 82Y, 8SM, 89UZ, GW2ADZ, 40S/P, PA0PDN, PA0PDN.

**HEARD:** G2AI, 2CPL, 2MV, 2Pu, 3BUJ, 3CJY, 3FD, 3MY/P, 3PB, 3RP, 4CI, 4DC, 4LU, 4MY/P, 5BH, 5SM, 5X1, 6FB, 6LYQ, 82Y, 8SM, 89UZ, GW2ADZ, 40S/P, PA0PDN, PA0PDN.

G12FHN, Belfast, Co. Antrim.

**WORKED:** G2OL, 3BW, 3DA, G2HML, 3FKO, GM3BDA, 3OL, 3SO, GW2ADZ.

**HEARD:** G5CP, 5LJ, GW4O/P. (June 21–July 13.)

... signals which are S6-7 on his 24-element beam are only just audible on the five-element job. In Newcastle, Staffs, G3CXD finds G3BLP the most consistent DX signal. G3CXD is using a modified BC625 with 18 watts, and the Rx is P/P 616 RF, 616 mixer and 6J6 P/P oscillator.

On the eastern side, G3DMU (Scunthorpe) is running a 6J6-plus-CV53 GG stage in front of a BC639. He recently observed one station to send 74 CQ's with the call made twice only. This may be an extreme case, but there are far too many long calls with no signing. Time after time calls are being lost through just that cause. Sign frequently both when calling CQ or when calling another station. It beats the QSB and the car QRM.

G3VM (Norwich) has been putting out a good signal from Norfolk and has worked PA8LU for what he thinks must be the first PA/G contact between F.O.C. members. He runs a daily schedule with G2CPL and would like to arrange a regular contact with a station in the Hull area. G2CPL (Lowestoft) has
maintained his daily contacts with G2NH, and has worked G6WT over a 263-mile path for an excellent GDX QSO.

Good news for the county hunters is that G5RL and G3AKU in St. Ives, Hunts, hope to be active soon. They ought to be popular! Now what about Rutland?

G8WV (Hanslope) finds Cambridge a difficult place to work, in spite of its proximity. In the same county of Bucks, G6JK (High Wycombe) has been active after some initial bad luck with 832's. He has a very fine converter consisting of two 6J6 GG RF stages, 6AK5 triode mixer and 6C4 cathode follower output. G6FO (Buckingham) also threatens preparations for two metre activity!

G2CIW (Romford) has started up at his new QTH, but the beam is at present only 13 ft. high. G3DAH (Herne Bay) congratulates the /P operators on the recent field-day on their generally high standard of operating. He is running a regular schedule with G3CC (Hull) to compare day and night conditions. Another to have started operations at his new QTH is G5MR (Hythe), who has had several contacts, including G8OL.

G3BLP (Selsdon) logged GM3OL almost every night for over a week, after his record contact with him on June 20; he has also heard G3BW at good strength. G2NH (New

Malden) says he feels it is going to be hard work raising the counties totals much further as several of the Surrey group have almost exhausted the list of possibles. Also, he has worked numerous ON and PA stations during the month, and found PAØPN the outstanding signal from that direction. His schedules with G3EHY and G2CPL continue with uninterrupted success. G4CI (New Malden) has an 832 in the Tx, while the converter uses 6J6 and 6AK5 RF stages and a 6J6 mixer/osc.

G8VR (Upper Abbey Wood) is one of the newcomers to the band in the London area. He has operated /P and hopes to be on 145 mc from his home QTH very soon; a 6J6 converter is under way. G2HDY (Romford) has been getting excellent results to the North, but is screened to the South; he has managed to hear G8AO and has worked PAØJD. G2ANT (Godalming) has made a welcome appearance on the band, using 18 watts to an 832. G6VC (Northfleet) is getting some of the DX but is experiencing trouble in working it; he suspects his beam. G4AU (Grove Park, S.E.12) is using 6J6 RF and another as mixer/osc. into an AR88 on 7 mc, with a four-element w.s. beam.

At Horndean, G6DT badly screened to the North by the South Downs, has been very successful to the South-West and West, and should soon be appearing in the Counties Table. In the Bournemouth area activity is on the increase, with G2NS, G3CFR, G5PB, G5SP and G8AJ all on regularly, and just over
the border in Dorset G3ABH has been doing well with his corner reflector.

G5BM (Cheltenham) has raised GM3OL no less than 14 times out of a possible maximum of 20 on their schedule, and on July 11 worked the GM for 35 minutes on 'phone. G5BM fails to hear any signals from the E.N.E. and asks stations in that direction to look for him from 2200 to 2230. The Cheltenham and District Radio Society helped G5BM to go /P on July 3 on Clyro Hill in Radnor 1,241 ft. a.s.L. G8QX has been having some success from Malvern. When he worked GW5BM/P he had to point his beam S.S.E., whereas it should have been due West. He thinks this due to reflection from the Cotswolds. A hint from G8QX—come on when there is a nice red sunset! J—means there should be some good strong ducts forming.

G5RP (Abingdon) is expecting to get up a 16-element job soon, to replace the four element. He built a new 2-metre portable T/A with an 832 final, while his Rx is 616 RF, 616 mixer, 9002 osc., 9002 cathode follower into an HRO. G3EHY (Banwell) has at last worked the elusive Hampshire, G6DT being able to break the spell for him one lunch hour. Several contacts G3EHY-GM3OL have been made. Regular schedules from G3EHY are: 1300 G2NH; 1755 GW2ADZ; 2130 G2NH (if conditions poor); 2200 GM3OL. All these times are GMT. He thinks conditions on Two have proved more consistent than on Five. On the other hand, G5BY (Bolt Tail) has pointed out that, as far as he is concerned, two metres is following five metres very closely, and it is undoubtedly true that over land the DX records on Two are almost identical with Five.

Others reporting active in Devon include G5QA and G6WT. The former has worked G5MA in spite of a poor location, while G6WT has been getting excellent results with his 24-element array, including a 263-mile contact with G2CPL in Lowestoft. G2AAN (Bushey Heath) has been obtaining some encouraging results on a BC639 using only a 15-ft. wire as aerial. He says it is much superior to the SCR522 Rx. G3CCP (Shirvenham) is on 144-72 mc with an indoor three-element beam; some DX, including G2O1 (Manchester), has been worked.

An interesting letter from PA6LU confirms the excellent conditions existing between G and PA in June. He bemoans the scarcity and price of 6J6’s in PA, and says most of them are using 9003, 6AK5, EF54, 955 and 954. Best results were achieved by those using the 6J6’s, for example, PA6PN, PA6D and PA6UN. PA6D is running 80 watts and a 12-element beam, while PA6UN has 100 watts with a similar array.

The Fiveband Club

Space will not permit a detailed report on the excellent VHF meeting at Nottingham on July 9, arranged by G3APY but it must be recorded that like its predecessors at London and Oxford, it was very well attended and an undoubted success. The Zone Plan and Contests were discussed at length, and a number of items of VHF equipment were on view and very thoroughly examined. The Club membership continues to grow and it is hoped to complete the distribution of the Frequency Lists to all members very soon.

In Conclusion

Once again your conductor must express his thanks for your support, as shown by the large number of letters and reports to hand this month. This is in itself ample evidence of the increasing interest in VHF wave all over the country.

Some of the lists of Calls Heard received this time have not actually reached the Activity List due to space considerations, but as far as possible the usual lists have been included.

Do not let the omission of your list this time cause you to hesitate to send one next month. It is suggested, however, that local calls (except where the call is a new one on the band) should be omitted. The latest date for next month's reports is August 17, and the address is E. J. Williams, G2XC, Short Wave Magazine, 49 Victoria Street, S.W.1. We shall be with you again on September 7.

N.P.L. APPOINTMENT

The Department of Scientific and Industrial Research announces that Professor E. C. Bullard, M.A., Ph.D., F.R.S., Professor of Physics in the University of Toronto, is to be the new Director of our National Physical Laboratory, from January next. The N.P.L. is of course closely concerned with radio research, and over the years has made a very large contribution to progress in this field. Professor Ballard, who is 41, was educated and trained in England, and is himself a well-known geophysicist.

GIFT SUBSCRIPTIONS

If you have a transmitting friend overseas to whom you would like to make a useful present, why not buy him a year's subscription of the Short Wave Magazine? It costs but 20s. and would be a constant reminder of your thoughtfulness. And if you have an SWL contact in distant parts, he would be sure to appreciate the regular appearance of the Short Wave Listener (16s., post free). Write the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.
Food for VHF Thinking
Analysing Results and Improving Performance

By M. D. MASON (G6VX)

The following experiences may be of some assistance to those who are not entirely happy with their VHF aerial installations.

Ever since the 2-metre band came into use, the main aerial at this station has been a wide-spaced four-element beam, mounted at least 50 ft. up and fed by a 150-ft. length of BAn cable.

This beam was built on the same lines as the previous 5-metre effort, which under all possible conditions held its own very well.

When the 2-metre band was performing so nicely last November, it was felt that a four-element array should be adequate for obtaining the maximum results from the new band. This deduction was based on results obtained at that time.

However, constant evidence of stations being active on Two, but never a sound of them, meant one of two things. Either through lack of experience it was difficult to assess conditions exactly, or the equipment angle needed much more study. The only way to tackle the former is by constant operation on the two-metre band, year in and year out, at the same time reviewing results obtained under all operating conditions. Thus, one will get the true "feel" of the band, as was more or less the case on 58 mc, and thereby judge whether or not the stations should be coming through. Then it might be possible by careful study of weather forecasts and a survey of past results to predict what might be expected from time to time. Since this aspect of the subject will obviously take time, the immediate alternative is to study the problem of equipment very carefully.

Constant Improvement

It is fatal to become satisfied with the gear, since new ideas are always turning up for improving the art, especially aerials and receivers. Realising that most of us hooked up what we could to have a crack at Two, installations in many cases were pretty ribby. If conditions had not been as good as providentially they were last November one feels that a number of operators would have been very disappointed in our newly-released band.

In this article, one of our foremost VHF workers shows how progress on Two can only be maintained by constant attention to the equipment, particularly the aerial installation. From his own very recent experience in overcoming a particular problem, he is able to give some practical advice and show results which prove his points. Everyone active on the VHF's will find this article of the greatest value and interest.—Ed.

Many contacts would never have been made and possibly interest would have died early and there would not have been the same activity as there is at the present time.

One point that is of no little concern is this: How many of us, after having a taste of those remarkable November conditions, take it for granted that that is how the two-metre band is going to perform—therefore, why worry much if the band sounds dead most of the time? All that seems necessary is to sit back and wait until next November, or hope for foggy conditions once again.

All this is another way of saying that perhaps

General impression of G5RP/P on July 3. The beam consists of two sets of two half-waves in phase.
we got off to rather too good a start. If the going had been harder a lot more effort would have been put into getting better equipment in hand at the beginning. Certainly, a few stations would have reported long-distance contacts and that would have been enough to keep the keener two-metre operators at it until they too could be in at the kill. This last point is proved by the good contacts made under really shocking conditions compared with last November. The most striking feature of these regular contacts is the fact that they are between stations who are using better-than-average aerials, although the locations would not normally be classed as good VHF sites.

Location Factors
This raises the question of what is a good or bad VHF QTH? When things are going badly, then it is that the QTH takes the can back for practically everything. The location, every hill you can lay your eyes on, the nearest gasometers and even the most distant buildings that happen to be in line of sight come in for criticism. There is no doubt about it that these factors do influence results, but do not necessarily condemn a QTH for Two. The point is that if we have another “last November” most of these obstructions are forgotten in the rush to rake in that S7 GM!

To anyone who complains about his poor location the advice is that the receiver is as good as the one being used by the operator who is working the DX. Be certain, too, that the aerial is tuned up and really performing. The way to make sure of these two points is to take your converter along to the station getting the results and do a live comparison. Several well-known VHF men are always doing this. Often as not, it is just to see what the other fellow uses and make sure he has not something unique tucked away and is pulling a fast one. Nothing like it for progress!

About the aerial; make a Chinese copy of a beam you know works well. When both these points have been settled and tests with a DX station have been made in conjunction with your successful neighbour, you are now in a good position truly to assess your QTH. If you show an improvement over somebody who is already doing well and appears to have a better location, the whole field is wide open for even greater improvements and original experiments. However, should your equipment check and exhaustive tests show no promise then truly your operating results on Two will be limited either to super conditions of local QSO’s.

G2NH/G6VX Comparative Tests
To illustrate this point, a concrete case may be of interest. About Easter G2NH (New Malden, Surrey) was running successful schedules with G3EHY (Banwell, Somerset) and G2CPL (Lowestoft). Both stations are close on 100 miles away and in opposite directions. I looked for these stations very carefully and I mean by that the amount of searching required was held to within plus or minus 5 kc. Occasionally a squeak or maybe a callsign was identified, but that would be all at a time when G2NH would be handing out R5 S5 reports. This was a very interesting situation to me and there should be an explanation somewhere. Checking up on the G2NH hide-out, a double 4-element beam came to light, 4-above-4 with half-wave spacing. Now this did not worry me unduly as it would only account for about 3 db or half an S-point. But there were 4-5 S points losing themselves somewhere between Malden and Hayes—15 miles apart. On closer examination it turned out that G2NH had raised his beam to 60 ft and at the same time had gone in for a length of really useful twin cable. The change of cable, there is no question
about it, quite definitely picked up 3-4 dB improvement for him. The additional height must also have contributed quite a lot, but difficult to access in conjunction with a brand new aerial and feeder. But a complete spring-clean had put him on the map in no mean manner, even to the extent of conducted tours to see "what was what" at 75 Woodlands Avenue!

Now this is where regular schedules are so much of a boon to the operator who wants to improve his equipment. He has a two-way circuit passing along reports. The first thing to do is to carry on experimenting until the station you think should be audible is heard at last. Now it is possible to compare your own estimate of signal strength with the reports exchanged. Estimates of signal strength are always somewhat a matter of opinion, but those who take the trouble to run regular schedules are not the kind to deceive each other, themselves or the listener.

Aerial Checks

What all this did mean was that something had to be done about hearing G2CPL at G6VX (let alone work him), so the four-element beam was taken down and re-measured for gain—in this case using about 20 ft. of feeder. The gain appeared to be satisfactory, around 8 dB when compared with a half-wave dipole. The 150 ft. of feeder was then examined and a power transfer measurement made. This was done by measuring the current through a 100-ohm non-inductive resistor at the transmitter, and then through the whole 150 ft. of cable. The measured loss was 3 dB—not too bad for this length. When the 150 ft. of cable was reconnected to the beam and a second measurement made, the difference between the first short cable and the second measurement was near enough to 6 dB. This meant that the 4-element beam 56 ft. high was better than say a very efficient but highly directional dipole. This loss was thought due to a very bad mismatch which was not very apparent by the easy method of cable feeder pruning and as far as the transmitter and converter were concerned no ill effects were noticed.

Results

The next step was to construct one 4-element section of G2NH's beam. This was easy because both had previously bought a supply of identical tubing. The G2NH beam had been carefully pruned and from all normal checks matches his feeder system very nicely. The folded element in the G6VX version was altered slightly to match a 300-ohm open feeder. The resulting beam was now erected 25 ft. high with about 30 ft. of 300-ohm line. The first beam was run up again to 56 ft. for comparison. The first comparison check on G2CPL found him on the lower beam at R3, S3 and out, but only an occasional squeak on the higher beam. At this time, G2NH was reporting G2CPL at 5-3-6. The next night G2CPL was actually worked by G3NH, asking him to listen for me. The reports both ways were 4-2-4 and out; G2NH was receiving 5-3-7. From these tests it showed that the lower beam with a more efficient feeder was a vast improvement. Still, 31 ft. odd of available height was going to waste at G6VX, but that could not be utilised without running a long feeder. It was therefore decided to look over some of the proven stacked co-linear arrays plus reflectors, which might lend themselves nicely to open-wire feeder systems.

A 16-element arrangement proved to be a fair compromise. It only occupies 10 ft. by 7 ft.
by 1 ft. 6 in. and weighs around 12 lb. complete. This beam was constructed and erected with the bottom element 20 ft. high and the top 30 ft. high. On a local test it showed a gain of 3 dB over the 4-element 25 ft. high. Testing around locally, up to 20 miles, there is very little between the two. The surprise comes on stations over 100 miles or more away. With the 16-element run up so that the top is just 60 ft., tests were made on G2CPL and G3EHY. The difference between the 4-element giving an S3 signal is a genuine S7 on the 16-element. This is apparently due to the greatly increased low angle radiation and the more efficient and larger pick-up area, plus a better feed system. The feeder, by the way, is 300 ohms 70 ft. long and matched into a 150-ohm point with Q bars. The open line was much easier to match for the smallest standing wave ratio.

The result of all this testing and reconstruction is to give me confidence that if G2CPL is to be heard at all I shall hear him. What does happen now is that I will be giving G2CPL much stronger reports at certain times than G2NH and vice versa—but this is quite a common phenomena in the South London area where DX signals definitely vary in signal strength from minute to minute in different locations. This is borne out by the gap in a QSO being filled in by someone else who has made solid copy. It is also true that one operator may be copying solid where another is suffering from QSB, but he does at least hear what is going on.

The Attic Ambler

Indoor Aerial for 7 mc

By P. F. LUCAS (G3BQJ)

Being somewhat cramped for aerial space, the writer was very interested in the article by G3PL on “Indoor Aerials,” in the April 1948 issue of the Short Wave Magazine.

With a reasonably efficient outdoor aerial for 20-metre work already available, it was decided to concentrate on a 40-metre indoor arrangement in the attic. This simply meant climbing into that realm of dust and cobwebs, armed with 66-ft. 4-in. of ordinary stranded aerial wire, a pair of side-cutters and a dozen or so egg insulators.

Having hooked the aerial up to each corner of the attic, it was found that a lot of slack still remained; this was pulled up to the apex of the roof, and in this manner the required length of wire for 7 mc operation was just accommodated, as shown in the accompanying sketch.

The writer does not pretend to know what is the radiation pattern of the “G3BQJ Attic Ambler Aerial”—though it seems to fire North, South, East and West with equal aptitude—but some field patterns are being plotted. The point is, however, that with an input of 50 watts on Forty, the following results were obtained as at November, 1948: UA1, UB5, UO5, VE1, VE2, W1, W2, and Europeans on CW; on phone, F, I and L have been worked. Reports on these contacts varied from 559 (VE and W) to R5, S8 for the European phone QSO’s. The whole G area has been covered on both CW and phone.

It is hoped that these notes will enthuse and encourage others who may feel themselves handicapped and at a disadvantage by reason of lack of aerial space; the writer will be pleased to hear from those who may try something on the lines of the Attic Ambler. In the meantime, he is designing an indoor system for 3·5 mc operation!

Footnote.—Round about 1935, very successful tests were carried out using a quarter-wave system, entirely indoors, on the 1·7 mc band.

—Ed.

DENCO DCR-19 RECEIVER

We hope to carry a full Test Report on the Denco DCR-19 in the next (September) issue of the Short Wave Magazine. A production model has been on regular test for some time now.
Here and There

Army Amateur Reserve

Tentative plans are being made under the aegis of the War Office for the eventual formation of an Amateur Reserve for the Army, limited in the first instance to operators with an amateur transmitting licence.

As it is necessary to estimate the support that can be expected, those interested are asked to send a postcard with name, address, call sign, and service rank and trade (if any), to Capt. D. W. J. Haylock, G3ADZ, 230 Devonshire Avenue, Southsea, Hants. It is emphasised that this is by way of preliminary enquiry only, and at this stage G3ADZ cannot answer queries or enter into correspondence on the project. Since he is anxious to compile a list without delay, if you are interested, please respond as soon as possible. Club secretaries are also asked to bring this scheme to the notice of their membership.

Panel Marking Transfers

We have had several enquiries as to a possible source of supply for these—the sort of transfer which will “take” well on a metal panel and is available in the range of markings suitable for Amateur Radio purposes. Any firm or individual able to meet this need is asked to get in touch with us, with a few samples, for mention in this space.

Advice for Settlers

David Mitchell, ZL1MP (ex-GW6AA), writes to say that he has had a large number of letters from amateurs in this country relative to the possibilities of settling in New Zealand. As he is to be in England on a short business visit for six weeks during the period August 27-October 14, David has informed us that while he is over here he would be very pleased to meet amateurs who want to know more about conditions and prospects in ZL—a very generous suggestion on his part. Those who wish to take advantage of his offer should write to him in the first instance c/o Short Wave Magazine.

Landline DX

Strolling casually into the offices of a daily newspaper during an exhibition just recently, G6HU found an open line to Nairobi. He sent a free message asking if there were any amateurs on duty at the other end. Two minutes later back came “Yes, Stan G. Crow VQ4SGC that’s a genuine answer.” So G6HU asked him to keep a schedule on Ten, to which VQ4SGC replied that he was not on that band yet. As G6HU remarks, “What is all this talk about DX heard and worked!”

A Mullard Name Change

The title of the old transmitting valve division of Mullard Electronic Products, Ltd., has been changed to the Communications and Industrial Valve Department. This change makes the name of the department more expressive of the scope of its activities. What used to be thought of as transmitting valves exclusively in the radio sense now have a number of applications in no way connected with wireless working.

The New Call Book*

The latest (Summer) edition of the Radio Amateur Call Book is again a very complete issue and, in the G section, includes all entries in “New QTH’s” up to and including the May, 1949, Short Wave Magazine. The G’s occupy some 45 columns in 16 pages—this compares with 43 columns of VE’s and 21 of VK’s, so that on a population basis, the proportion of licensed amateurs in Australia and Canada is much higher than it is in this country. The ratio in the States is, of course, also more favourable, with some 70,000 licensed amateurs in a population of 122 million. On this basis, the amateurs in this country would be about 20,000—so there is plenty of scope yet, though at the present rate of licensing it will take nine years to achieve that figure. Enough of statistics!

F.O.C. Election Notice

In accordance with the Rules of the Club, the following have been elected, to active membership of the F.O.C.:

- R. W. Madigan, EI9Q (Waterford);
- A. W. Jones, G3CRF (Plymouth);
- G. Houbart, ON4IE (De Panne);
- Rev. L. C. Hodge, G6LH (Boston);
- A. Campbell, G3DGQ (Leafield);
- and C. S. S. Lyon, G3EIZ (Liverpool).

To avoid delay in notifying elections, a list of new F.O.C. members will appear in this space every alternate month.

Tail Bit

G6QB will be active with QRO on 200 kc again at 5.15 p.m. on August 6, when he will be modulating rather more than 200 kW with the BBC Theatre Organ.
NEW QTH's

This space is available for the publication of the addresses of all holders of new callsigns, or changes of address of transmitters already licensed. All addresses published here are automatically included in the quarterly issue of the Call Book in preparation. QTH's are inserted as they are received, up to the limit of the space allowance. Please write clearly and address on a separate slip to QTH Section.

DL2NN  Sat. V. P. Moore, c/o Sergeants' Mess, 3rd The King's Own Hussars, B.A.O.R. 22.
GW2ADZ  Hafod, Llanymynech, Montgomeryshire, Wales.
G2AHY  J. S. Woodhouse, 326 Reading Road, Wimnash, Berks.
G2AOP  C. H. Nokes, Misida, Ripley, Surrey. (P.O. 5212.)
GW2AXT  J. K. Cousins, Melbourne House, Earl Street, Aberffrwd, Mon, S. Wales.
GW2BDF  W. E. G. Barrett, Midland Bank House, Spencers Lane, Cwmbran, Monmouthshire, S. Wales.
G2BFQ  M. E. Edwards, 20 Fernbank Avenue, Wembridge, Middlesex.
G2BFT  W. T. Bustin, 386 Aigburth Lane, Catherine De Barnes, Solihull, Birmingham.
G2BCN  D. Cameron, 94 Eaton Avenue, Bletchley Bucks.
G2CIW  J. F. Moseley, 45 Geoffrey Avenue, Harold Park, Romford, Essex.
G2DNY  C. A. Wheaton, Devon Constabulary, Milton Damerel, Holsworthy, Devon.
G12DTB  R. Graham, Fernlea, Drumalis, Lame, Co. Antrim, Northern Ireland.
G2JU  E. Pearcey, Spinfrith, Marine Drive, West Worthing, Sussex.
G3AJS  R. Deeman, 161 Sumatra Road, London, N.W.
G3AKF  B. G. Taylor, 33 Orchard Lane, Pilgrim's Hatch, Brentwood, Essex.
G3BMQ  G. Humphrey, 61 Commonside West, Mitcham, Surrey.
GM3BRY  D. Hichinson, Ambleside, Carberry, Edinburgh, Scotland.
G3BYU  G. K. Bainbridge, 8 Williams Terrace, Deventry, Northants.
GM3CJN  A. Handside, 3 Chapel Place, Selkirk, Scotland.
G3CVC  P. Bolton, 13 Midland Road, Worcester.
G3CZW  W. D. Old, 83 Trevenson Road, Carn Redruth, Cornwall.
GM3DHD/A  G. W. D. Brown, 45 George IV Bridge, Edinburgh, Scotland.
G3DITY  E. Jones, 4 Trevethen Place, Newlyn, Penzance, Cornwall.
GW3DIZ  J. Probert, 136 St. Helen's Avenue, Swansea, Glam., Wales.
G3DLS  F. J. Raymond, 56 Willes Road, Winson Green, Birmingham, 18.
G3DPO  R. L. Knight, 35 Sussex Road, South Croydon, Surrey.
G3DBX  R. Gladwell, 182 Perne Road, Cambridge.
G3DXR  Mrs. L. Y. Cutter, Spinney Cottage, Melbury Abbas, Shaftesbury, Dorset.
GM3EH  J. Mathers, 41 Reid Street, Bells Hill, Eastbourne, Sussex.
GM3EMM  H. Weir, Gaillardcoats Farm Cottages, Portobello, Scotland.
G3EMN  J. C. Watton, 20 Edencourt Road, London, S.W.16.
G3EOX  D. Holdcroft, 73 Argyle Road, Sney Green, Stoke-on-Trent, Staffs.
G3EPA  D. R. Pentelow, 65 St. John's Road, Stough, Buck.
G3EPL  J. Illingworth, Hampton Place, St. Bees, Cumberland.
G3EPX  P. L. Doherty, 31 Marlborough Avenue, Londonderry, Northern Ireland.
G3EQG  L. Ratcliffe, 70 Windsor Road, Great Harwood, Blackburn, Lancs.
G3ERY  C. Robertson, 45 Gresley Street, Middlesbrough, Kent.
G3EISN  W. C. Tatham, 7 Arthur Terrace, Netley Abbey, Southampton, Hants.
G3ETC  F. Shore, 130 Sough Road, Darwen, Lancs.
G3EUQ  D. Blake, 4 Wilton Crescent, Southampton.
G3EVM  E. A. Baie, Shenangi, Chandell Road, Tean, near Stoke on Trent, Staffs.
G3EXE  J. E. Bromley, 20 Hurst Grove, Bedford.
GD3FAC  H. Griffith, 6 Queens Road, Onchan, Isle of Man.
G3FAE  A. B. Perry, 40 Mary Road, Orrell, Liverpool, 20.
G3FAJ  R. Marshall, West Holme, Silkstone Common, Barnsley, Yorks.
G3FCA  W. T. McDonald, 139 Southchurch Road, Southend on Sea, Essex. (Tel.: 68386.)
G3FCU  J. S. Dyer, 42 Granse Road, Ilford, Essex.
G3FCY  C. S. Norman, 3 Oldstead Avenue, Ingelmire Lane, Hull, Yorks.
G3FDV  S. Ledbrooke, 5 Hoopern Terrace, Dawlish, S. Devon.
G3FDW  M. Gibbins, Longthorpe Vicarage, near Peterborough, Northants.
G3FEK  J. M. Verrall, Donnh, Liphurst, Blackwell, Worcs. (Tel.: Hillside 1578.)
G3FFU  D. A. Zealey, 44 Parry Road, London S.E.25.
G3FFZ  G. E. Stamp, 39 Norwich Road, Wheatley, Doncaster, Yorks.
G3FHV  R. K. Green (ex-Z0B), Wharley End P.O., Cranfield, Bletchley, Bucks.
G3FI  R. S. Head, 9 Dunnsford Place, Bathwick Hill, Bath, Somerset. (Tel.: Bath 46260.)
G3FLJ  H. Hall, The Ledge, Belton, Upham, Rutland.
G3FJN  J. A. Barson, 15 Church Street, Eastwood, Notts.
G3FJW  K. W. Finch, 36 Bathurst Road, Ilford, Essex.
G3FKO  A. G. Blackmore, 34 Victoria Avenue, Sydenham, Belfast, Ulster, N. Ireland.
G3FKP  F. Feli, 53 Orchard Street, Great Harwood, Blackburn, Lancs.
G3FKT  J Towneley Davies, Sandown, Kirkway, Wallasey, Cheshire. (Tel.: Wallasey 2824.)
G3FLB  G. W. Naylor (ex-D2CK), 20 Beckhampton Street, Swindon, Wilts.
G3FLD  P. F. Ross, 29 Herbert Avenue, Wellington, Shropshire.
GM3FLT  B. H. Cartwright, 52 High Street, Gatabshiel, Selkirkshire, Scotland.
G3FMA  T. A. Smith, 85 Littleton Road, Pendleton, Ashton-under-Lyne, 6 Lancs.
GM3FMX  J. C. Walker, Littleton, Maybole, Ayrshire, Scotland.
G3FMU  F. F. Wilson, Maes Knoll, Long Lane, Upton, Chester. (Tel.: Chester 3370.)
G3F Mk  R. D. Parris, 47 Allen Street, Middlesbrough, Kent.
G3FML  H. J. Finch, 46 Fore Street, Sheldon, Teignmouth, Devon.
CHANGE OF NAME

Since the main business of the well-known firm of Rediffusion, Ltd., is not (as might be supposed) wire broadcasting but the manufacture of radio communication equipment, it has been decided to change the name to Redifon, Ltd. The firm trades on a world-wide scale and also produces radio heating plant, audio frequency amplifier systems and other electronic devices. Redifon, Ltd. (VANdyke 5691/5), Broomhill Road, Wands- worth, London, S.W.18.

“RADIO AMATEURS’ PROGRAMME”

For those who may be interested, we are informed that the U.S. Department of State’s Voice of America transmitters are putting out a weekly 15-minute programme of “international interest to radio amateurs.” This takes the air from 2045 GMT on Saturdays, on the 13, 16, and 25 metre broadcast bands, with relays by the BBC in their 25 and 31 metre services. We have better bend an ear to this and see what goes on! The same programme is being projected to South America and the Far East on Sundays from 1300 GMT, with relays by Honolulu and Manila.

HF PRESELECTOR UNIT

The performance of practically all communication receivers designed for a wide frequency coverage can be improved by the use of a preselector (or additional RF amplifying unit) for the high-frequency end of the tuning range. This is especially so on the Ten, and a preselector can also be very helpful on the 14 mc band. A suitable design, easy to build and using standard parts, is described in detail in the August issue of our Short Wave Listener, of which a few copies are available at 1s. 4d., post free.

NEW OTH’S

This issue sees an assault on the accumulation of new British amateur station calls and addresses, to such effect that we can promise that all those not appearing this month but received by July 31 last will be in the September issue of the Magazine. Incidentally, we only publish an address at the direct request of the holder of the call, and all that are sent in to us appear in the Radio Amateur Call Book in due course. And for the information of those who always enquire when we print a note in these terms, we are not the publishers of the Call Book! It can be obtained as regularly advertised in these pages.
The other man's station

G3BKF

The station shown in the photograph is G3BKF—J. M. Ivison, Braunston, St. Nicholas Road, Witham, Essex—and is completely home-constructed, including the operating desk and bug-key.

Licensed in February 1947, activity commenced on the 1·7 and 3·5 mc bands, using a 1-V-1 receiver and a 10-watt 6V6-6L6 transmitter; from that modest beginning has grown the present layout.

The rack houses a 150-watt CW/Phone transmitter for the 3·5, 7, 14, 21 and 28 mc bands. The two lower panels carry the power supplies for the exciter unit and power amplifier. In the third panel is the modulator, a pair of 807's in Class-AB2 driven, through a suitable transformer, from the cathode of a triode-connected 6V6; the modulator power supply, using SR4GY's, is also in this section of the rack. Above the modulator is the band-switched exciter, which is a 6L6-807-807 arrangement, giving adequate output on all bands from 3·5-28 mc to drive the 813 PA stage in the fifth panel. A 6Y6 is used to prevent the screen voltage of the 813 soaring under no-drive conditions; fixed bias is also applied to the PA. The grid circuit of the 813 is band-switched, but plug-in tank coils are used. The top panel carries the aerial tuning unit, which is provided with variable coupling from the PA by means of a swinging-link operated from the front panel.

The receiver is a 14-valve home-constructed superhet, covering the 1·7 to 30 mc amateur bands. The salient features are switched RF coils, two RF stages, temperature-compensated oscillator, crystal filter, built-in crystal oscillator and multivibrator for calibration and frequency checking, separate AVC amplifier to give improved AVC performance and a noise limiter.

To the left of the receiver is the VFO-cum-Top Band transmitter, and to the right of the receiver is the speech-amplifier with its associated peak-clipping and low-pass filter circuits, a keying monitor and the station control...
circuits. Above the VFO is the 1-7 mc aerial tuning unit. Power supplies for the receiver and VFO are carried on a shelf under the operating desk.

The whole station is relay-controlled, and change-over from receive to transmit is automatic; immediately the key is pressed HT is applied to the transmitter, the aerial is changed over and the receiver is muted. A suitable delay circuit ensures that the return to the "receive" position does not take place between morse characters; the delay is adjustable from one-half to about five seconds.

Various aerials have been tried, but the 66 ft. centre-fed, with tuned feeders, at present in use, appears to be the best for 7 and 14 mc DX working.

All bands from 1-7 to 28 mc are used, but the main interest is working DX on 7 and 14 mc CW; 109 countries in 36 zones have been worked, with more than 50 on 7 mc and only New Mexico and North Dakota are required for WAS.

We are glad to give space to this description of a very fine station in the G3-plus-3 category; there can be no doubt that G3BKF is representative of the best in modern British Amateur Radio practice, and in particular we congratulate him on a completely home-built installation.

THE MONTH WITH THE CLUBS
FROM REPORTS

Activity reports from 33 Clubs this month indicate that enthusiasm continues and that most of the well-organised clubs are capable of catering for their members at all seasons, including holidays.

Already there are signs of preparation for the annual battle which we call "MCC," and it is to be hoped that this year's entry list will include many newcomers. Club licences have increased considerably since last year's event. The Rules for this Fourth Annual Top Band Contest will be circulated during the coming month to all Clubs on our Active Register.

Incidentally, we have received a letter from an operator who says that last year he put in an appearance on the Top Band specially to work some of the clubs and to give them their points. He worked most of them and sent QSL's to all that he worked, but he has had practically no response. This, he thinks, is "a crack showing in the goodwill of Amateur Radio." And we are rather inclined to agree.

If a club enjoys the facilities of a transmitter, it should be prepared to shoulder the responsibilities—not the least of which is keeping the upper hand of the QSL situation. Did you reply to G3DCC's card?

Next month's deadline is first post on August 15. Please address your reports to Club Secretary, Short Wave Magazine, 49 Victoria Street, London, S.W.1.

Birmingham & District Short Wave Society.—This club has now acquired permanent headquarters at the Churchill Citizens' Club, Acocks Green, Birmingham—where the garden is more than 200 ft. long! Application has been made for a licence, and work started on a transmitter for the Top Band. General meetings are held at the Colmore Inn, Church Street, Birmingham, on the second Monday of the month. Subscriptions have now been reduced from 15/- to 7/6 per annum.

Brentwood & District Amateur Radio Society.—Meetings are being held fortnightly throughout the summer, and have recently consisted mostly of discussions and junk sales. The club licence has been applied for and details of the equipment will be discussed at future meetings.

Brighton & District Radio Club.—Attendances continue to be good in spite of the many rival attractions at this time of the year. The July programme included further talks on Valves (Mr. Rawley), Transmitting Aerials (G3YY) and Frequency Checking (G3FLY). Visitors to Brighton and Hove are cordially invited to look in at the Club (Eagle Inn, 125 Gloucester Road) any Tuesday evening.

BTH Recreation Club (Rugby)—Radio and Television Section.—The Club's D/F Shield Contest was held at the end of June, and the winning party were Messrs. Prior and Bywater, using a receiver which had not been finished until two days before! Only two other parties located the transmitter before the close-down.

Carlisle Amateur Radio Society.—Meetings are held monthly during the summer, and, at present, membership belongs mostly to the transmitting fraternity, but it is desired to extend this and to
cater for receiving and junior members. Local support at present is not strong, and more members would be welcomed. Visits are being arranged to the local BBC station and to the GPO; it is also hoped to fix one to the Electricity Authority's local station.

Chester & District Amateur Radio Society.—A recent visit by 21 members to the Port of Liverpool Radar Station was highly successful, and further visits of the kind are to be organised. Lectures covering a wide variety of subjects have been well attended, and a D/F Contest is being held in August. The next regular meeting is on August 9, 7.30, at the United Services Club, Watergate Street.

Clifton Amateur Radio Society.—Despite the hot weather, meetings have been well attended. Another outdoor visit is being planned, and further gear is being built, including a superhet on the “unit” principle. Prospective members are welcome at the Clubroom, 225 New Cross Road, London, S.E., any Friday evening.

Edgware & District Radio Society.—Twelve members spent an enjoyable evening as the guests of “Grafton” at the end of June. On the 26th a 2-metre D/F Contest was held, and is believed to have been the first of its kind in the country. (No one located the transmitter!) The Club has been asked by the BBC to co-operate on listener research in connection with a series of Science Talks on Friday evenings, and a member of the BBC staff is expected to visit the Club on this matter.

Grafton Radio Society.—Attendances have continued “up to scratch” and plans are being made for a 2-metre station under the guidance of G2AAN. New members swell the ranks of the Morse classes, and a successful junk sale was also held recently (T.1154 for 7/6). The Club closes for August and re-opens with the AGM on September 12.

Radio Society of Harrow.—A steady flow of new members is a gratifying feature at Harrow; the station is being completely rebuilt and will be on the air again shortly. Morse classes and technical lessons continue every week, and a Field Day is being arranged for a date in September.

Kingston & District Amateur Radio Society.—Recent meetings have consisted of a junk sale and a rag-chew at G2BN’s QTH. Both were well attended. A Field Day for the near future is being discussed. At the August meeting (on the 3rd) there will be a demonstration of Measuring Instruments. The September meeting, on the 1st, will be at 7.45 p.m. at the Kingston Hotel.

Portsomouth & District Radio Society.—The above is the new title of the former South Hants Radio Transmitting Society. The Hon. Sec’s QTH is in the panel, and the Club has been issued with the call G3DIT.

Reading Radio Society.—At the July meeting Mr. G. T. Peck gave a talk on 160-metre portable D/F equipment and its use in Field Day competitions. He then went on to talk about Radio as used for Oil Prospecting, and showed a film loaned for the occasion by the Anglo-Iranian Oil Co., Ltd.

Rhigos & District Radio Club.—There has been a gap in the meetings on account of holidays, but they resume in the middle of August. Great interest is being shown in the forthcoming MCC and Rhigos—the winners of the 1948 MCC intend to hold their title! Active members are GW32V, STJ, 8BW and 3CDP. The Club station GW3FFE has been busy on 14 mc.

Slade Radio.—Forthcoming events include a talk on Communications Receivers (August 19), a visit to Daventry (August 21), a Junk Sale (September 2) and a D/F Test (September 4). On September 18 there is an Inter-Club D/F Competition, of which full details are available to other clubs if they will contact the Hon. Sec. (QTH in panel.)

Solihull Amateur Radio Society.—Recent events have been a talk on Measuring Instruments
G3AUT with his D/F receiver for the BTH Club's direction finding contest, when G3BXF/P was the target.

and the second D/F Contest of the season. The Club is now busy moving into new headquarters and it is hoped to have a transmitter on the air in the near future. Prospective members will be heartily welcomed at the Clubroom, c/o Tucker Switches, Ltd., Kings Road, Tyseley.

Southend & District Radio Society.—An exhibition of Amateur Radio Equipment was held in Chalkwell Park on July 9. All kinds of gear were on show and demonstrated to the public. G5QK/P was in operation throughout. The next indoor meeting is on October 7, but in the meantime several outdoor activities have been arranged, including D/F Contests and visits to places of interest.

Southport Radio Society.—Monthly meetings, consisting of lectures, discussions and Morse classes, continue to be well attended. Lectures in preparation for the next Examination will start in September. Regular meetings are held on the third Monday,

but the Clubroom is open every Monday and Wednesday.

Stourbridge & District Amateur Radio Society.—At the July meeting Mr. Hudson of the Dudley Model Aero Society gave an interesting talk on Radio Control of Model Aircraft. Various models and equipments were on show and members saw some very fine midget apparatus in action. Next meetings are on August 8 (King Edward's School) and August 26 (Corn Exchange Vaults).

Sutton & Cheam Radio Society.—Forthcoming events are: September 6, Lecture on Modulation of Class-C Amplifiers; September 20, Lecture and Demonstration on Home Constructed Television Apparatus; October 4, Open Evening for General Discussion.

Torbay Amateur Radio Society.—Well-attended meetings are held every third Saturday at the YMCA, Castle Road, 7.30 p.m. A visit was recently paid to the BBC station at Start Point, and at the June meeting some technical films were shown. Amateurs visiting Torquay are asked to make themselves known and will be heartily welcomed. See panel for Secretary's QTH.

Warrington & District Radio Society.—Meetings have reverted to the Sea Cadet Headquarters off Wilderspool Causeway, and are now held on alternate Mondays, 7.30 p.m. A visit to the local power station was paid on July 25, and it is hoped to organise one to the BBC at Moorside Edge during September. Morse classes are held on all club nights and also on Thursday evenings, and work proceeds on the Club transmitter.

West Bromwich & Handsworth Radio Society.—The above title is newly acquired, Handsworth having been "brought in." During June G6FK lectured on Time Bases, and in July Mr. Bills gave a talk on the Superhet, with a demon-
estation of his own home-built receiver. Prospective members will be heartily welcomed at the Lewisham Hotel, High Street, West Bromwich, on the last Wednesday in each month.

West Cornwall Radio Club.—From the Club journal, The Radio Link, we gather that the various groups of this widely-dispersed Club are all very active. Four members from Penzance sat for the recent R.A.E.—so Penzance hopes for four more callsigns in due course.

Wirral Amateur Radio Society.—Recent talks have included one by G2AMV (Reduction of Hum in High-Gain Amplifiers) and one by G3ERB (Modification of the Rx Type 78). Plans for the winter months include a Constructional Contest. The August meetings (YMCA, Whetstone Lane, Birkenhead) are on the 10th and 24th.

Worcester & District Amateur Radio Club.—Steady progress is being made and attendance at the weekly meetings is encouraging. Application has been made for a transmitting licence and constructional work has begun. Several of the Blind College students are leaving at the end of term and taking up training for their particular calling. The Club will miss them and wishes them every success. Visitors welcome on Thursdays, 7 p.m., in the basement, Worcester City Library.

South Manchester Radio Club.—At the AGM, in July, the committee was re-elected en bloc and thanked by the members for their efforts during the past year. The club licence is on the way and it is hoped to get a station on the air very shortly.

Radio Amateurs' Club, Walsall Technical College.—This Club meets every Wednesday at 7.30 in Room G of the Wisemore Annexe, and a Club station will be completed as soon as a private room is available. The first meeting took the form of an exhibition of gear, most of which has been given or loaned to the Club. A field day is planned for one week-end in August, and an R.A.E. Course is being arranged to commence in September.

Thames Valley Amateur Radio Transmitters' Society.—TVARTS hold their Field Day on August 28; about six club stations will be operating on the 3.5 mc band, with 5 watts 'phone or CW. The duration is from 1100 to 1900. Any other clubs or individuals keen on joining forces or organising a contest are asked to contact the Hon. Sec. immediately.

Bournemouth & District Amateur Radio Club.—The new Television Section is flourishing, and the Club's TV receiver is nearly completed. Many members are active on 2 metres, and the membership increases steadily. A recent visitor was SM5JN from Stockholm. Club night is

Some of the Bradford and District amateurs who joined the trip, organised by the Spenborough Radio Club, to the BBC transmitters at Skelton on April 3 last.

Photo G3CUM, Baildon.
Friday at 8 p.m. Visitors to Bournemouth will be heartily welcomed.

West Middlesex Amateur Radio Club.—Great activity continues and the membership is on the increase. An interesting programme has been laid on for the next three months, including "Transmitter Nights," when the Club station G3EDH will be on the air. Meetings are on the second and fourth Wednesdays at 7.30—Labour Hall, Uxbridge Road, Southall.

Derby & District Amateur Radio Society.—Fortnightly meetings continue, but this Club is searching for larger and permanent premises. At recent meetings a home-built television receiver has been demonstrated, and talks have been given on various subjects, including a demonstration of the "Commander" receiver. On August 17 there will be a talk by Mr. C. E. Woolley (Post Office Engineering Dept.) on Radio Interference.

**Names and Addresses of Club Secretaries:**

BIRMINGHAM: N. Shirley, 14 Manor Road, Stechford, Birmingham.

BOURNEMOUTH: A. E. Harvey, Hillview, Currie Road, Oakdale, Poole.

BRENTWOOD: J. F. Moseley, G3CW, 45 Geoffrey Avenue, Harold Park, Brentwood.

BRIGHTON: L. Hobden, 17 Hartington Road, Brighton.


CARLISLE: J. Ostle, G2DYV, Ousgate, Aspatria, Cumberland.

CHEADLE: H. Morris, G3ATZ, 24 Kingsley Road, Boughton Heath, Chester.

CLIFTON (S.E. LONDON): W. A. Martin, 21 Brixton Hill, S.W.2.

DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littlerover, Derby.

EDGWARE: R. H. Newland, G3WV, 3 Albany Court, Montrose Avenue, Edgware, Middx.


GRAFTON: W. A. McC. Jennings, G2AHB, Grafton LCC School, Eburne Road, London, N.7.

HARROW: S. C. J. Phillips, 146 Belmont Road, Harrow Weald.

KINGSTON: R. Babbs, 23 Grove Lane, Kingston, Surrey.

PORTSMOUTH: H. G. Martin, G3ACM, 184 Kirby Road, North End, Portsmouth.

READING: F. Hill, G2FZI, 997 Oxford Road, Reading.

RHIGOS: F. Hamer, GWRB, 7 Neath Road, Bunkalows, Aberdare, Glam.

SLADE: C. N. Smart, 110 Woolmore Road, Erdington, Birmingham, 23.

SOUTH MANCHESTER: M. J. Wilks, 77 Lowley Lane, Northenden, Manchester.

SOLIHULL: G. Haring, 121 Bradbury Road, Olton, Birmingham.

SOUTHEND: J. H. Burren, M.B.E., G3HBJ, 49 Swansea Road, Southend-on-Sea.

SOUTHPORT: F. H. F. Cawson, G2ART, 113 Waterloo Road, Southport.

STOURBRIDGE: W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.

SUTTON AND CHEAM: L. Seaton, 8 Croft Road, Sutton, Surrey.


TORBAY: K. Grimes, G3AYF, 3 Clarence Park, Tor Vale, Torquay.

WALSALL: J. F. Young, Walsall Technical College, Broughton Place, Walsall.

WARRINGTON: W. R. Murray, G3CUB, 56 Crow Wood Lane, Widnes.

WEST BROMWICH: G. Johnson, G2BJY, 20 Lynton Avenue, Halesowen Heath, West Bromwich.


WEST MIDDLESEX: H. C. Bostock, G3BWC, 1 Grange Road, Hayes.

WIRRAL: R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.

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MODULATION TRANSFORMERS

| Transformer | Power (RF) | Price (£)
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>UM1 to mod. 60w RF</td>
<td>...</td>
<td>£2/14/-</td>
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<tr>
<td>UM2 to mod. 120w RF</td>
<td>...</td>
<td>£3/12/6</td>
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<tr>
<td>UM3 to mod. 240w RF</td>
<td>...</td>
<td>£4/10/-</td>
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<tr>
<td>UM4 to mod. 500w RF</td>
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<td>£10/15/-</td>
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LABGEAR WIDE BAND COUPLERS

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<tr>
<th>Frequency</th>
<th>Price (ea.)</th>
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<tbody>
<tr>
<td>3.5, 7, 13, 21, 28 Mcs.</td>
<td>... 17/6</td>
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SIGNAL GENERATORS

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<tr>
<th>Generator</th>
<th>Frequency</th>
<th>Price (£)</th>
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<tbody>
<tr>
<td>AVO. 50 Kcs.-80 Mcs.</td>
<td>...</td>
<td>£25/-</td>
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<tr>
<td>ADVANCE, 100 Kcs.-60 Mcs.</td>
<td>...</td>
<td>£23/10/-</td>
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<tr>
<td>B.P.L. 100 Kcs.-30 Mcs.</td>
<td>...</td>
<td>£21/-</td>
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<tr>
<td>TAYLOR. 100 Kcs.-160 Mcs.</td>
<td>...</td>
<td>£17/15/-</td>
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MICROPHONES

<table>
<thead>
<tr>
<th>Microphone</th>
<th>Price (£)</th>
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<tbody>
<tr>
<td>TRIX M.C., with switch</td>
<td>... £6/15/-</td>
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<tr>
<td>MEICO M.C.</td>
<td>... £5/5/-</td>
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<tr>
<td>ROTHERMEL D.104 Crystal</td>
<td>... £5/5/-</td>
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AERIALS

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<tr>
<th>Aerial</th>
<th>Price (£)</th>
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<tr>
<td>ARNINE folded dipole, 14 Mcs. up</td>
<td>... £3/2/6</td>
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<tr>
<td>ARNINE folded dipole, 7 Mcs. up</td>
<td>... £3/12/6</td>
</tr>
<tr>
<td>G.E.C. Antiference</td>
<td>... £4/10/-</td>
</tr>
<tr>
<td>EXSTAT Antiference</td>
<td>... £4/5/3</td>
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