MERCURY

THE JOURNAL
OF THE
ROYAL SIGNALS
AMATEUR RADIO SOCIETY

NUMBER 20 **JULY 1967**

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HEADQUARTERS STATION - BLANDFORD CAMP - GB3RCS G4RS

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EDITORIAL
CALLING CQ DOG X-RAY

An eventful quarter, leastways around the Catterick area.

In April the last screw in the last box was secured and the HQ Station, (which many of you no doubt will nostalgically associate with the old Army Hut atop the crest in VIMY LINES), left for BLANDFORD.

It is now firmly established as G4RS having taken under its wing G3VXX, the old 30th Signal Regiment Club.

Best wishes for the future.

Less happily, old G3CIO now the Catterick Garrison ARC having extricated itself from the resultant wreckage, had also to find a new home. In fact, a further two moves followed in as many months. Its present resting place is AISNE LINES (near St. Oswald's XRds to the uninitiated) A not very satisfactory solution. We hope to report a happy ending next quarter (D.V. and Higher Authority!).

The Old Comrades Weekend was a rousing success judging by the number of bouquets received. Thanks were due to 3WEO (Mike) who has now left for the Big City and 3VIS Ron who finds it easier to have a camp bed on site than to keep going home.

From the many and varied DXPEDITIONS taking place we ought to have a few bumper sessions before we meet again at the AGM.

As in 1966 it is intended to hold the Annual General Meeting on the Friday afternoon of the Annual Exhibition:

Time : 1600 hrs

Date : 29 September 1967

Location : Royal Horticultural Society,
New Hall,
Vincent Square, London S.W.1.

It is again intended that Royal Signals will be well and truly represented with a display in the capable hands of Ted (G3NJM).

Don't forget too our Canadian members CENTENNIAL Year Signals Reunion. 3C3RCS, Sept. 15, 16, 17. They'll be pleased to hear from you.

See you in September - meanwhile

73 es gud hunting

G3RUS

ACTIVITY PERIODS

On the LAST SUNDAY OF EACH MONTH from 1000-1200 and 1400-1600 UK time, approx. frequencies:-

3530, 14050 and 21050 Kc/s on CW
3700, 14120 and 21150 Kc/s on Phone (SSB or AM)

UK members are particularly asked to attempt to contact overseas members on 14 and 21 Mc/s during these periods.

Ring these dates on your calendar:-

Jul. 30 Aug. 27 Sep 15-17 Sep 24 Oct. 29

SOME THOUGHTS ON RECEIVERS

by G3EJF-(4)

One of the problems facing the newcomer to amateur radio is the choice of a receiver. Apart from the newcomer the older amateur may want a change, either due to dissatisfaction with his existing RX or just because he feels he would like a change. Of the many figures given in a complete specification of any receiver by far the most important is the price and a look through any issue of the well-known journals shows a bewildering range of types and prices. Given that the task of building a high grade communications receiver takes a lot of time and skill we are faced with the necessity of spending money. If you can afford a few hundred pounds this article is not addressed to you, but if, like the writer, you are impecunious and parsimonious (skint and stingy) and consider that fifty pounds is the absolute limit then read on.

Within this price bracket your choice is limited. Firstly there are the ex-service receivers such as the AR88 and the CR100, built like battleships they need a strong table and strong arms to move them. As general coverage jobs calibration within the amateur bands is often of the by guess or by God variety. On the HF bands bandspread is sadly lacking and one often finds them used in conjunction with crystal controlled converters on these bands. Despite these drawbacks they are still good receivers. Turning now to new equipment one immediately thinks of the range of imported receivers which seem to sell under a lot of different names but which look very much alike. The writer has tried some of these receivers and was asked to moderate his language. Further investigation shows another possibility, the Heathkit RA-1 supplied as a kit it costs £39.6s.6d. (less the discount that RSARS can get) but second-hand models are frequently advertised at around £25. Incidentally, if you are thinking of buying a second-hand equipment built from a kit try to find out who built it and what the standard of construction is like, you can be buying a lot of trouble. The writer was fortunate in buying RA-1 built by a Corporal Radio Technician who could be trusted to make a good job of it.

The RA-1 covers the amateur bands only and consequently there is no lack of bandspread. Being small and light, some 14 x 12 x7 inches and weighing 18lbs, it will be of interest to the serving member of the Society on these grounds alone. As purchased two modifications had been done on the set. The switched BFO control had been replaced by a small variable capacitor, a modification often referred to in the radio periodicals. Additionally the EZ 81 rectifier had been replaced by a pair of 1000 volt p.i.v. silicon diodes, see Figure 1, the fuse holder being fitted in place of the valveholder. This removes one source of heat, always a problem in small equipment.

After checking the alignment this receiver was in use for several months during which time two drawbacks became apparent, thermal drift and poor selectivity, The drift was of course only noticeable on CW and SSB so it was decided to check whether it was due to local oscillator or BFO instability. The latter was thought unlikely and in fact did not occur so attention was concentrated on the front-end which is made for Heathkit by Electroniques. A study of the literature showed that the variable padder capacitors used on the four HF bands (7, 14, 21 and 28) had a negative temperature coefficient. Since the drift was towards LF this implied that the overall temperature coefficient of the tuned circuits was positive. On these four bands there are two ways of adjusting the tracking at the LF end of the band, the core of the coil and the padder capacitor. It was reasoned that if the padder capacitance was increased and the core moved out of the coil to compensate for the increased capacitance we should still have reasonable tracking but with an increasing negative temperature coefficient to offset the positive temperature coefficient of the remainder of the tuned circuit.

Figure 1.

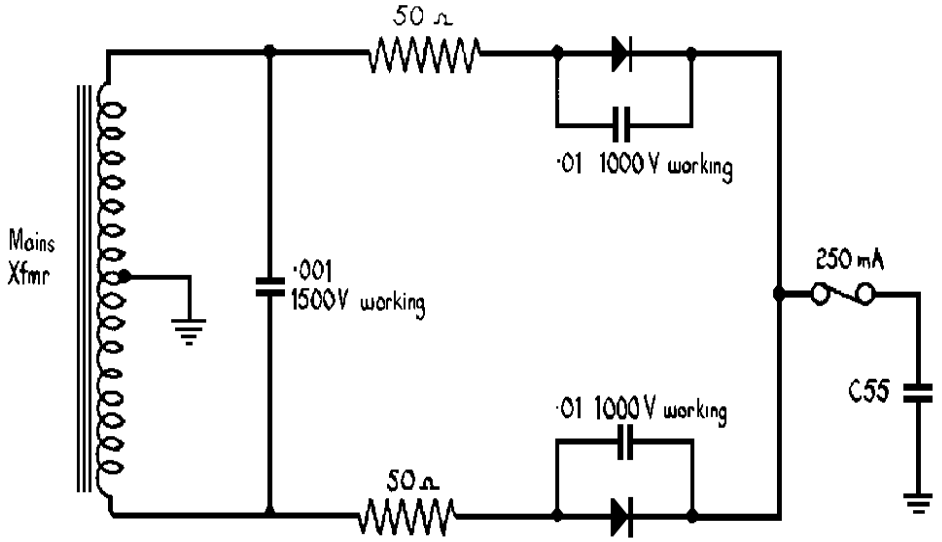
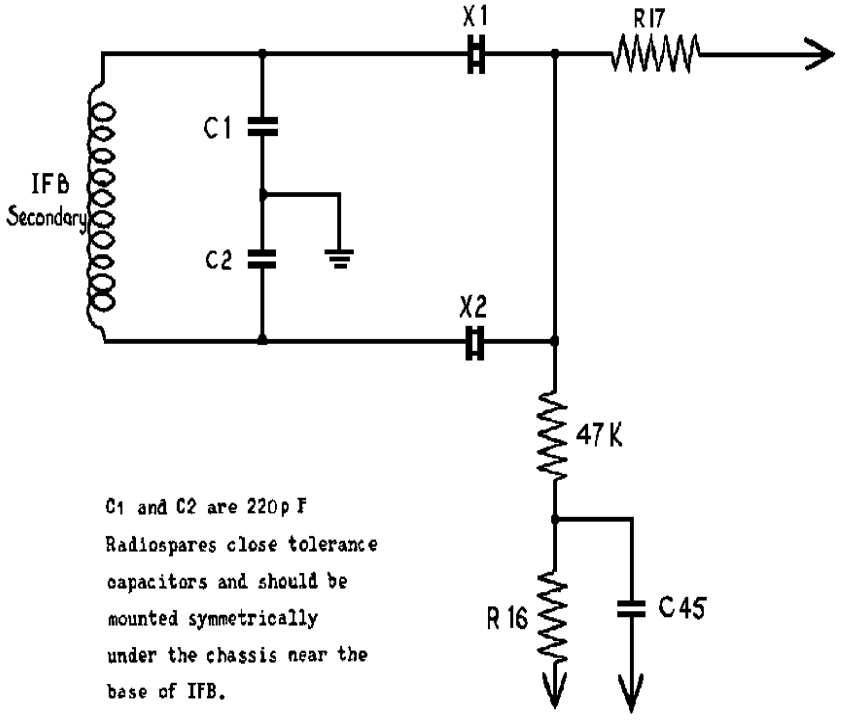


Figure 2.



C1 and C2 are 220p F
Radiospares close tolerance
capacitors and should be
mounted symmetrically
under the chassis near the
base of IFB.

The procedure used was as follows. Set the receiver dial to the LF end of the band and with the aerial disconnected adjust a signal generator or the netting signal from the transmitter until it is heard on the receiver. Move the receiver dial 10 Kc/s· HF and adjust the padder capacitor until the signal is heard. Working a few Kc/s at a time adjust the padder until the signal is heard at the highest dial reading possible, the padder is now at maximum capacitance. Now reset the dial to the original frequency and adjust the core of the coil until the signal reappears at the original dial reading. Reassemble the receiver in its case complete with base plate, allow about 15 minutes to warm up and now check the direction of the drift. If it is in the reverse direction you have too much negative temperature coefficient so the value of the padder should be reduced and the tracking restored by means of the core coil.

It was found that after this adjustment it was easy to listen to SSB stations on 21 and 28 Mc/s without the continual receiver adjustments which were previously necessary. However, the tracking was not quite as accurate as before but this is no hardship since the RA-1 is fitted with a front panel calibration Adjust control. Instead of a calibration check at say 14000 Kc/s holding for the entire band it is necessary to check at the nearest 100 Kc/s point to the frequency in use. This is of course advisable with even the best receiver.

Now to selectivity. The RA-1 has a 1·6 Mc/s I.F. for good image rejection and in order to obtain reasonable selectivity at this frequency a half lattice crystal filter is used between the mixer and first I.F. stage. The two crystals in the filter are spaced 1·7 Kc/s apart so giving a passband suitable for SSB reception. Examination of the response curve of a single half lattice filter shows fairly steep sides but a succession of small humps either side of the main passband. The result of this is that a very strong signal appears at several points on the dial. This is not strictly speaking a fault but is rather a design limitation. It is not peculiar to the writer's RA-1 as another receiver of this type which had been "factory aligned" showed the same phenomenon.

The answer to this problem is to add a further half lattice filter between the first and second I.L.F.L stages. All that is needed for this modification is a further pair of crystals which cost about £3.10s. from Heathkit, two crystal sockets, two close tolerance capacitors and a resistor. Mount the two crystal sockets side by side in the space between IF transformer "B" and V4 so that the crystals are at right angles to the front panel. It is not necessary to remove transformer "IFB", open it up and remove the 120pF capacitor from across the SECONDARY winding. When the transformer is replaced great care should be taken to avoid getting the primary and secondary readings mixed up. Having replaced the transformer and reconnected the primary, wire up as per Figure 2, numbered components being already in the receiver.

On switching on it will certainly be found necessary to adjust the cores of IFB so it may be a good idea to completely realign the receiver I.F. stages. The writer has found that there is no advantage in using a frequency modulated signal generator and an oscilloscope since the passband is so sharp that an ordinary A.M. signal generator and an output meter can do the job. The method of I.F. alignment described in the Heathkit handbook is quite satisfactory.

The improvement in selectivity obtained by this inexpensive modification is quite staggering, those annoying humps outside the main passband disappear completely.

An RA-1 modified in this way has now been in use for several months for AM, SSB, and CW reception on the amateur bands and the writer has been very impressed by its performance. On Top Band and Eighty, the bands used most, it is certainly better than the AR88D, even when the latter has been carefully brought up to specification. On the HF bands the increased bandspread of the RA-1 really comes into its own.

Occasionally one hears of people finding the RA-l unstable on Top Band, due probably to the high gain of the EF183's used as RF and first IF amplifiers. This fault was originally observed but very careful alignment of the RF stages using a properly terminated signal generator has cured it.

EPICUREAN MOMENT (G3RUS)

"MUSIC BE THE FOOD OF LOVE, PLAY ON;
GIVE ME EXCESS OF IT, THAT, SURFEITING.... "
"AN ARMY MARCHES ON ITS STOMACH"

If this be true (and I have no quarrel with either the BARD or NAPOLEON) then equally is "COPY THE FOOD OF THE EDITOR"

At the present time there is a distinct tendency to malnutrition creeping in, and Gentlemen, you are earnestly requested to put things right by sending, regularly, news of Station and Club activities. More particularly, technical articles, with not too many or too complicated diagrams.

At the moment, in common with Mother Hubbard, the cupboard is bare.

At the same time that you reach for the pen to oblige, take a deep breath and think hard on whether or not you have paid your subscriptions for 1967. Some 150 are still behind.

Sorry to sound such mournful notes, but your JOURNAL can only survive by the will of its membership. Whilst the JOURNAL is produced on a 'NO COST' basis, we do have to buy stamps and we do need something of interest to print. We've got to eat!

Looking forward to the deluge and thanking you all in advance for your response to this CRI DE COEUR.

FOR YOUR DIARY

The Annual General Meeting will be held at 1600 hrs on Fri. 29 Sept. 67 in the Lecture Room, NEW HALL, ROYAL HORTICULTURAL SOCIETY, S.W.1.

SOCIETY AWARD

It should be noted that claims for the Society award for contacts established before one or both parties were Society members cannot be accepted. SORRY!

AVAILABLE FROM HQ

Members' Notepaper This is a good quality white paper and costs 8/4d. per 100 sheets post free.

Members' QSL Cards The basic card cost 37/6d. per 500 post free. We can overprint your callsign, Name and address in black, red, blue or green for a further 15/- per 500, making a total price of 52/6d. per 500, less than a penny farthing each.

G3CIO
AMATEUR
RADIO
DISPLAY
Hic!
Hic!
Hic!
PERCY LAD!
YOU KNOW THAT'S FOR ALL THE PROGRESS
BEEN MADE IN THE ARMY,
OI STILL MAINTAINS THAT
WIRELESS SETS WERE EASIER
TO HANDLE IN OUR DAY!"

A LETTER FROM CATTERICK

Somewhere in Catterick

Dear OM,

If the GPO allowed us to use signature tunes over the air G3CIO could have been playing "Where is my Wandering Boy Tonight", since the HQ Station left for Blandford the Catterick Club has moved twice. First we went to the Hobbies Centre in Gaza lines, but the contractors wanted to knock the building about, so now we're in Aisne Lines.

We're doing our amateur radio the easy way too, no quad that needs a lot of maintenance, just a trap dipole. Certainly it's not the DX antenna that the quad is but it gets us plenty of QSO's. All the old gear has been traded in and we are equipped with the Sommerkamp transmitter and receiver, it looks very nice and works well.

Now Aisne lines is rather a long way from all the centres of activity of Old Comrades weekend and we couldn't expect the OC's to waste valuable drinking time finding us, so we set up our stall on Messines Sports Field (next to the beer tent), slung the trap dipole up and with the station augmented by G3VIS's KW2000A and 3 el beam prepared for action. No special call sign this year, GB3RCS was operating from Blandford, so we used G3CIO on one station and the operator's call from the other. Members with sharp ears were able to push their award score along as at least five different callsigns were used on 80 metres during the weekend. Can anyone rival the record of Des Barry G3ONU who has worked Catterick during the Reunion in each of the last five years, operating from three different countries and with the same operator at Catterick each time?

Conditions on the bands were atrocious but we managed to interest the visitors by working a string of W8s on 15 metres. On the L.F. bands the noise level caused all but those with tin ears to close down. One of the most satisfying aspects of amateur radio is to receive reports of appalling weather in other places while you are enjoying sunshine. During Old Comrades Weekend thunderstorms caused flooding as far apart as Lancashire and Dorset whilst all that happened at Catterick was some steady but gentle rain on the Saturday evening, and the same after everyone had left on the Sunday. To a Yorkshireman there was some wry amusement to be gained from the plaintive voice of the operator at GB3RCS complaining of the rain and static.

We were glad to see G3SZQ once again, but sorry that his usual companion G5PX was too ill to attend, get well quickly Jack. It was good to hear another member, G6VQ, back on the air after his recent illness. Bill Windle G8VG made this his first Reunion and brought his Class I Award plaque to display on the wall of the station. One of Bill's reasons for coming was to see the faces that go with the voices from G3CIO, it reminds me of the young daughter of another G8 who said "Mummy, who are these men with funny heads who come to see Daddy"?

This operator would make only one criticism of the arrangements, the beer tent, although next door, was closed most of the time and although we had brought a tool kit we hadn't brought any beer - bad logistics!!

If you are coming up this way at any time we'll be pleased to see you at the Club, Tuesday and Thursday evenings as before.

73

Jimmy

CONFESSIONS OF AN AMATEUR RADIO ADDICT
by G3NWQ (282)
Part 2: 'Straight ahead for the Salt Mines'

Soon after obtaining a DL2 licence I met a local German amateur, named Willi, whose main interest was in mobile operation. He was a very good skier and be taught me some of the rudiments of the sport. One Saturday Willi and I and two friends from my unit drove to the Harz Mountains in Willi's car for a weekend's ski-ing.

On the Sunday evening we left the ski-slopes to motor back to Bunde, some 150 miles away. Before starting the journey we called at a restaurant for a meal. One glass led to another and it was late in the evening when we left the restaurant, to find a heavy snowfall adding to the several inches already underfoot. Fortified within, we set off. Progress was slow, the mountain road, difficult in daylight, was now extremely dicey.

After driving for about an hour Willi said he thought we were lost. Recourse to a road map told us nothing and all we could see from the car was that we were on a very narrow road - and that it was still snowing. Studying the map, I asked Willi to explain the thick blue line running roughly North and South, very near to where I estimated our position to be. Willi said that it marked the frontier with East Germany. With visions of having to spend the next 15 years in the salt mines I suggested that we proceed West without delay, before the guard dogs and the gentlemen with the burp-guns arrived on the scene. To be caught in a prohibited area with an illegal transmitter (all transmitters are illegal to frontier guards), did not appeal to me.

After some discussion we decided to turn around. 30 seconds later the car was well embedded in a snow-filled ditch. Fortunately the antenna mounting and the base-loaded whip were in the clear, although the angle at which the car was reclining in the ditch gave the antenna a decidedly horizontal tilt. Having failed to move the car by brute force, Willi decided that it was time for MAYDAY action. He called CQ on 80m phone and soon raised a DL1 in Hannover. Meanwhile the other two members of the party had trudged off into the night to search for landmark. They returned about 45 minutes later, with the news that they had found a signpost about half a mile back down the road. Aware of our position at last (it was about 6 miles from the frontier), Willi passed the information to the DL1, with whom be was still in QSO, and he obligingly relayed it to the police in Goslar by land-line.

An hour or so later a diesel recovery truck hove into view, and soon afterwards we were back on the road, following the recovery vehicle back to civilisation - and away from the salt mines.

We got back to camp at 7 o'clock on Monday morning. "You don't look very bright," my O.C. said to me after parade. "You ought to cut out these late nights." "Yes, Sir," I said, "I will."

MEMBER AND CLUB ACTIVITIES

3C3RCS Is the special call sign of the Royal Canadian Signals (VE3RCS) for their CENTENNIAL YEAR Signals REUNION for all those who served with the ROYAL CANADIAN CORPS OF SIGNALS.

The Stn offers a special welcome for a QSO with all RSARS Members. Make a special note.

Date 15-16-17 Sep 67.
Times 161600 to 162200 ZULU Times.
Freq. 3550-3800 Kc/s
7150 Kc/s approx.
14140 Kc/s approx.
21150 Kc/s approx.
Mode AM - CW - SSB
Call 3C3RCS.

The 10m band may also be used. Rally round chaps, there's plenty of room on your shack wall for a 3C3 card.

DL5XE(268) Announces a DXPEDITION to ANDORRA Routing via LIPPSTADT - KASSEL - FRANKFURT - KARLSRUHE - STRASBOURG - BASLE - GENEVA - LYON - MILLAU - CARCASSONE - ANDORRA LA VELLA. Dave infos that the Stn will be manned by DL5XE - DL5XH - DL5YG and could possible include that erstwhile fly by night MAURICE (G3NWQ) (who is determined to get SOMEWHERE).

Date 31 Aug. -13 Sep
Freq. 14-21 mc/s day
7-3·5 mc/s and 14 mc/s night
Call NYA but could be any of the three DL5 stns mentioned plus /PX

9M2SR(AFF23) GHURKA SIGNALS licence now held by Jack Cooper (9M2XX - VS5JC) reports QRT pending aerial repairs due to burst water main under the beam which 'lowered the boom' in no uncertain manner by crashing on the roof of the Mess Toilets (unoccupied at the time!!). Jack is now the Regional rep for WEST MALAYSIA so we hope to hear of renewed activity around that zone.

Gi3PUE(AFF7) Belfast report the acquisition of a HYGAIN TRIBANDER and a 42 ft tower. BILL DOUGLAS and his boys have Club evenings weekly on Tues. since the new TA/VR reshuffle has virtually done away with week night training.

G3UDU (378) infos that he will be Stn Opr to the ROYAL SOCIETY EXPEDITION to ALDABRA VQ7 - land through Sep 67 - Mar 68.

Call VQ7?
Freq. 7040/14080 SSB/AM/CW
14210/14240 AM only
Times 2100 to 0400 GMT

He will be open for Skeds wef 14 Sep. Hopes to have a 600 ft vertical (you HEARD) on 80/160 held up by MET balloons!

GD3RWF operated by members G3RWF(293) and G3RFI (133) Messrs HENWOOD and SCOTTORN are going to the Isle of Man again this year (Sept.).

Any RSARS members wishing to join this DXPEDITION should write to

2Lt N. HENWOOD,
Nottingham University OTC (TA)
TA Centre
Broadgate
BEESTON, Notts.

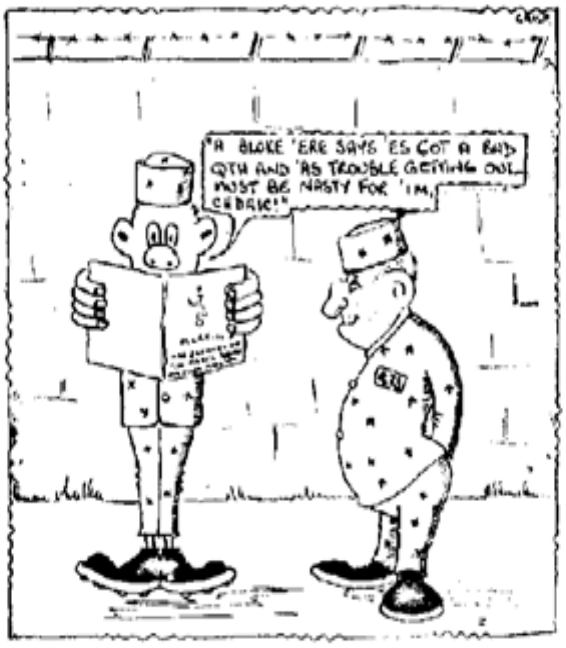
This is the third successive year and past experience indicate some terrific pile ups. About ten days.

G3NWQ (282) regrets his trip to VS5 is off despite high level support. The round trip would have taken months instead of weeks judging by aircraft non-available details in Far East. (Bit of a comedown Maurice, to settle for a DL5 instead - bad luck!)

G5PM (AFF12) is going portable 3 to 10 August and will visit many counties, (including RUTLAND). Using AM/CW on 80 metres and top band. After dark CW on top band.

G3PFC (21) is emigrating to VE - land as VE3GDO. Flying over the POLE direct to VANCOUVER, ARTHUR is buying a car there and mounting his mobile gear (AT5 v RX + 3F1F WHIP) then working mobile as VE3GDO/mobile VE7,6,5,4,3 etc.

New QTH ARTHUR RAWLINGS, 85 BRANSTONE ROAD, TORONTO 10, ONTARIO, CANADA, AND THE VERY BEST OF BRITISH LUCK TO YOU ARTHUR



G8VG(340) - A Thumbnail Sketch

Bill entered the Royal Navy during World War I, at the ripe old age of 15 years and 3 months. He chose to take up radio and was initiated into the world of spark transmitters and Perikon detectors. His papers show that he was a better operator than a technician, his technical grading being 98%! Rotary gaps followed fixed gaps and the Poulsen arc became a real transmitter, and one to be proud to operate.

To see the glass tank of methylated spirit which slowly drip-fed into the arc chamber would bring bewilderment to youngsters of the present day who see the complete transmitter in a small box, just about ‘a yard foot and a thick wide.'

The Service receivers were also a sight to behold. No valves, other than perikon, a choice of detector: bornite/zincite or carborundum and steel, and 21 switches and handles to be adjusted to tune to a particular wavelength; 180 metres to 28000 metres.

He joined the GPO In 1924, operating a sounder on duplex and simplex landline circuits, handling telegram and press traffic. During this period he got the title of 'the mad sailor'. Teleprinters came along and thus a source of extremely good operators was closed.

Bill became licensed as G8VG in 1937. Due to heavy QRM from DLs in both London and Plymouth during World War II he lost many of his personal records. At this time his experience was being utilised to the full in a special communications unit. He was demobbed in 1946 with rank of Captain.

Since getting back on the air after the war he has kept a card-index filing system, which shows that nearly 30,000 contacts have taken place. The record is comprehensive and includes the details of each contact, taken from the station log, together with personal details of the operator at the other end, a description of his rig and a note of confirmation sent and received. An additional record shows the countries worked on each band. 160 to 10 metres, the mode - CW or SSB - and whether the contact has been confirmed. The present score is 212 worked, 195 confirmed, DX is worked as it comes, but pile-ups are avoided.

Now aged 65, Bill will celebrate 50 years of brass-pounding in August 1961 (all on a 'straight' key !). He retired in 1962 and found a new interest in seeking certificates and awards. To date he has 65 certificates, a silver cup, two bronze medallions and an engraved plaque from the Royal Signals Amateur Radio Society - the first of its kind.

He has been a member of the First Class Operators Club since its inception in 1937. He was FOC President 1960-1962 and has been chairman of committee since 1951. He won the FOC Marathon Cup in 1949-1950 and again in 1951-1952.A chap of firm convictions, he likes:

1. To hear good operating, particularly when a 'straight' key is used.
2. To work anyone as in 1. whether at 10 wpm or 40 wpm.
3. To hear good manners being displayed on the bands.

and he dislikes:

1. People who use phone in the CW portion of the band.
2. Operators who seldom use their call signs (usually on phone).
3. Those who insist on sending the morse symbol 'KN'. (Bill says that whoever dug this one up can surely not aware that in the days when all operators were gentlemen (!) the symbols now corrupted to 'KN' were in fact sent as 'TP', meaning 'Transmit, please.').

Thus, Bill Windle: from Boy Telegraphist Royal Navy to Captain Royal Signals; from spark transmitter to SSB transceiver. 50 years in the communications business and enjoying it as much as ever. Always ready to place his vast experience at the disposal of younger operators, he is a connoisseur of radio operating and a great character: G8VG.

Fig 1 Horizontal polar diagram, elementary aerial.

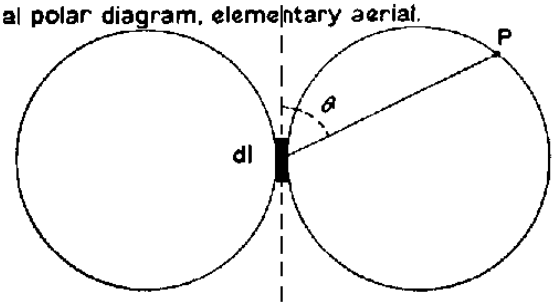


Fig 2 Horizontal polar diagram, half wave aerial.

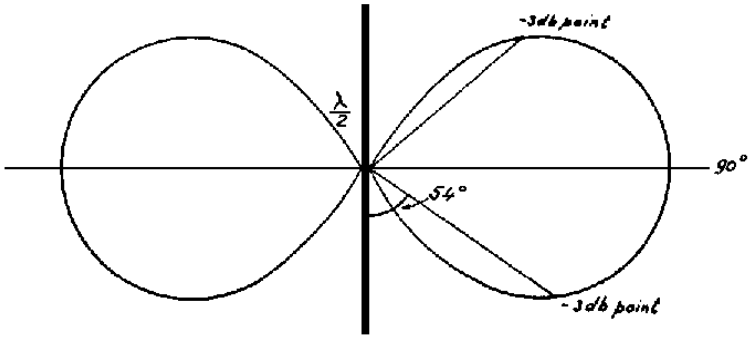
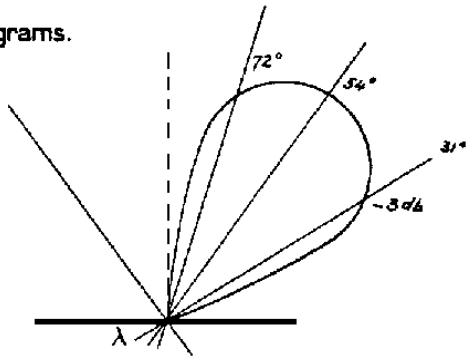
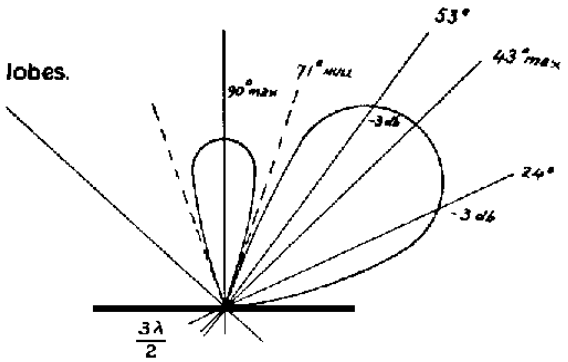


Fig 3 Horizontal polar diagrams.

a) Full wave aerial, has four lobes.



b) $\frac{3\lambda}{2}$ aerial has six lobes.



"HOTTING UP THE EITHER"

However big a furnace and boiler you may have in the basement of your house, you will be none the warmer unless you have an efficient radiator system. Similarly however high-powered and sophisticated your transmitter you will not get anywhere unless there is attached thereto an efficient radiating system commonly called an aerial. There are two requirements of an aerial. It must radiate as large a proportion of the power generated by the transmitter as possible. It must radiate this power in the desired direction.

An imaginary point source in free space is the only thing that will radiate equally in all directions. All practical aerials will have some directional properties. In order to choose the type of aerial most suitable for ones requirements it is necessary to have a general understanding of the properties.

A short element of wire of length (dl) carrying a uniform current will have a polar diagram such that the field strength, H, at a given distance is proportional to Sin.θ where θ is the angle from the line of the element. (Fig 1) This again cannot be achieved in practice. The shortest length of wire that can be energised and caused to radiate, whether it be stretched out in one length, partly "hidden" in a tuned circuit or partly existing as a mirror image in the earth is a half wavelength. The two lobes of the polar diagram are rather sharper than in the case of the Imaginary element and the half power, 3db. points are at an angle of 54º from the line of the aerial. Fig 2. The polar diagrams of other resonant lengths of wire are shown in Fig 3 a, b and c. In free space the full polar diagram is obtained by rotating the figures shown in Fig 1, 2 and 3 about the axis of the aerial. As it will be some time before there will be manned "Ham" stations in space (Pace Oscar) these diagrams represent the horizontal polar diagrams where the aerial is suspended parallel to the earth's surface. The vertical polar diagram depends on the height of the aerial above ground.

In the case of a half wave dipole a quarter wave above ground the maximum radiation is vertically upwards. The radiation vertically downwards from the aerial suffers 180 phase change on reflection at the earth's surface and returns to reinforce the direct upward radiation from the aerial as at figure 4(a). At figures 4(b), (c) and (d) are shown the vertical polar diagrams for other heights above the ground. At $\lambda/_2$ above ground there are two major lobes at an angle of 30º to the horizontal. At ¾ λ above ground there are three lobes, two at an angle of 20º to the horizontal and one vertically upwards. At a full wavelength above ground there are four lobes, two at 15º and two at 50º to the horizontal.

For short distance communication, beyond the ground wave range, where reflection from the ionosphere is employed high angle radiation it necessary. For long distance communication the lowest possible angle of radiation is required so that the minimum number of reflections between ionosphere and earth are required. For the former a horizontal wire must be suspended $\lambda/_4$ above earth. For the latter $\lambda/_2$ or higher above earth.

For low angle radiation for ground waves or long distance sky wave communication a vertical aerial may also be employed. The vertical polar diagrams and radiation resistances - Z - at base are shown in diagrams 5a to d for vertical aerials of different lengths. The best low angle radiation is given by an aerial ⅝ λ high. Above this height undue cancellation takes place and the amount of energy radiated falls off.

Having decided on the angle of radiation required we must now decide whether we require directivity in the horizontal planes. This is most desirable if it can be arranged because not only does it mean that reduced power will be radiated and less interference caused in unwanted directions but, more important, there will be an increase of power radiated in the required direction. The amateur usually wants the best of both worlds. He wants his increase in power but at the same

Fig 3 (c) A two wavelength aerial has eight lobes, two in each quadrant.

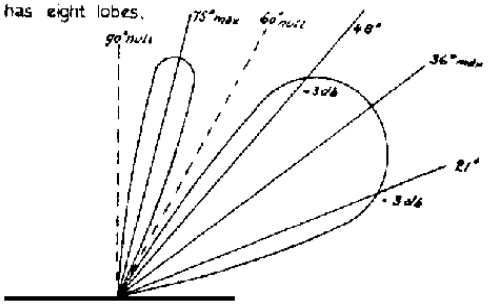


Fig 4 VERTICAL POLAR DIAGRAMS OF HORIZONTAL AERIALS.

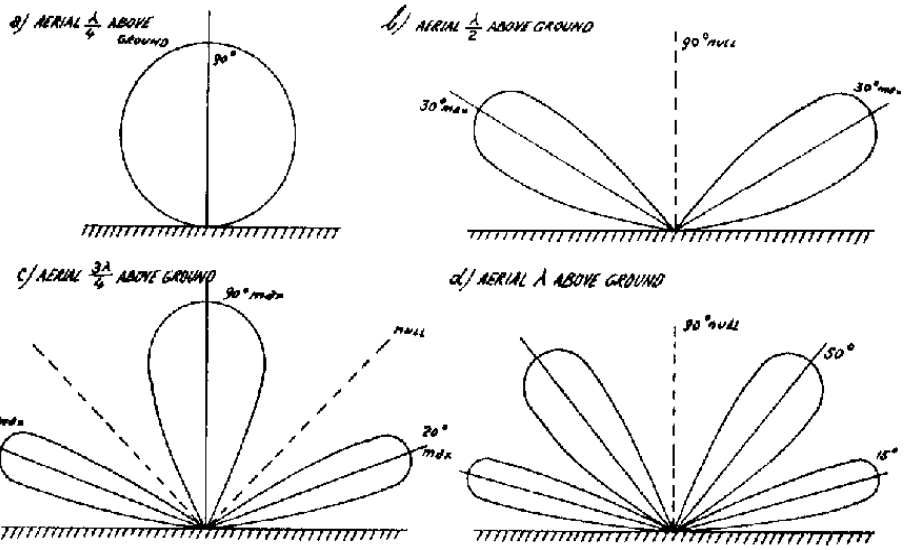


Fig 5 VERTICAL POLAR DIAGRAMS OF VERTICAL AERIALS.

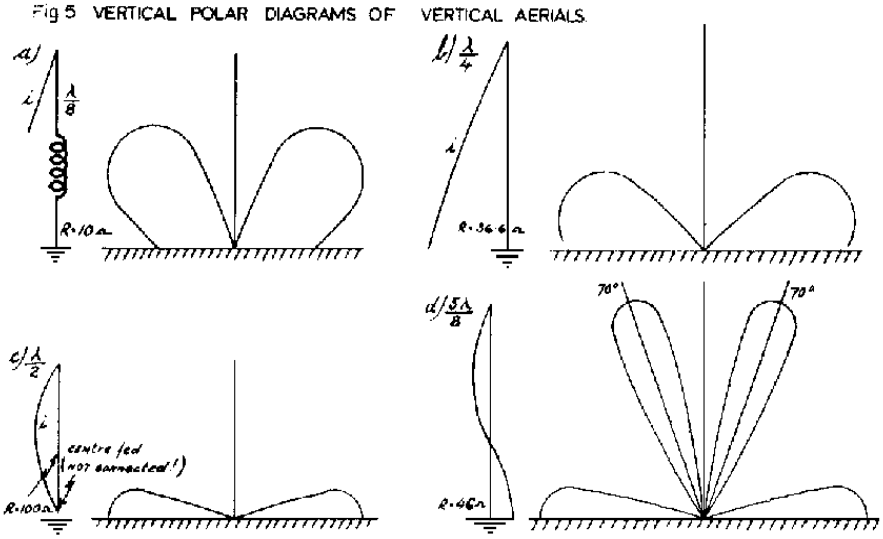
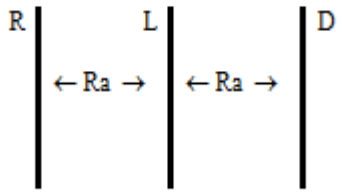
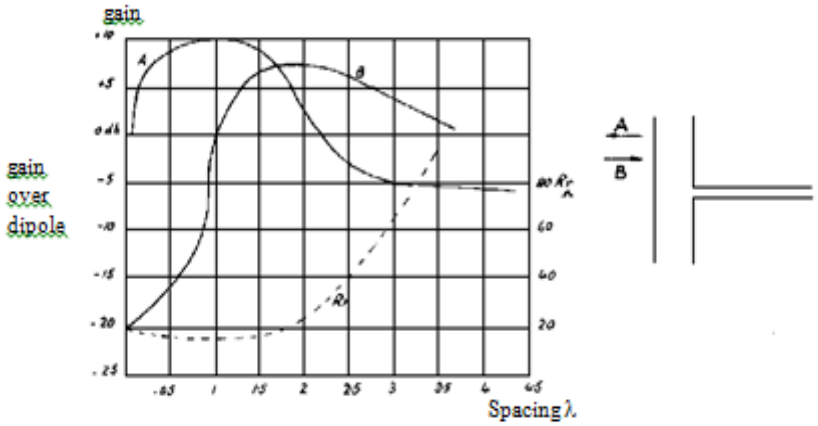


Fig 6(a) Design figures for two and three element Yagi arrays



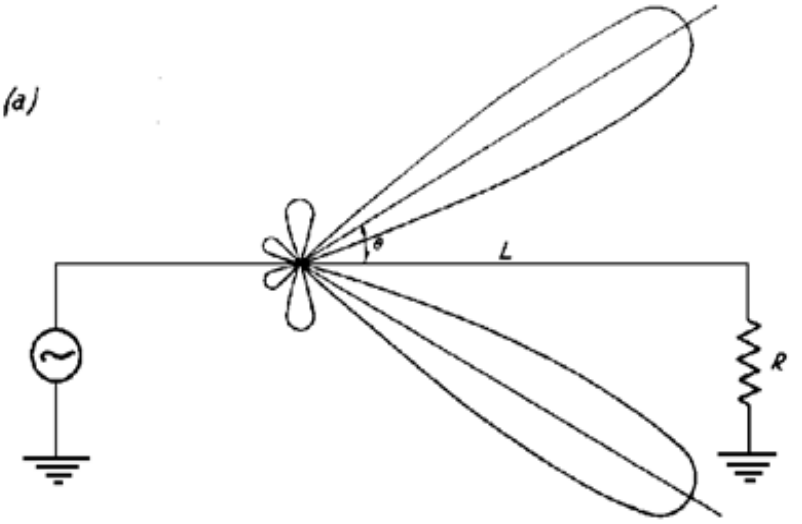
Length of R	Ra	Length of L	Rd	Length of D	Gain	Front to back Ratio
480 ft f mc/s	246 f	468 f	246 f	430 f	(wide spaced) 3db	9 db
492 f	98 f	478 f	98 f	458 f	(·1λ spacing) 10db	30 db
–	–	468 f	138 or 98 f f	450 f	+2 db +6 db	
492 f	145 f	468 f	–	–	+4 db	13 db
468 f	197 f	468 f	–	–	RESONANT REFLECTOR +6 db	
5786 ins f	1430 ins f	5546 ins f	1752 ins f	5332 ins f	Yagi with 3 DIRECTORS gain + 10 db	Beam width 30° Frequency tolerance 0.5 to 1%

b)



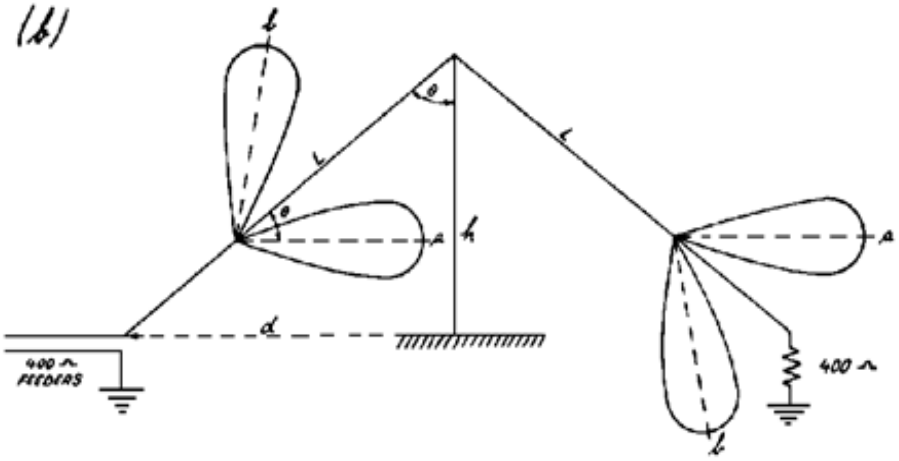
1. The reference point 0 db is the field strength from an aerial a $\frac{\lambda}{2}$ long.
2. The greatest gain in direction A is at spacing of less than 0·14 λ.
3. The greatest gain in direction B is at spacings of more than 0·14 λ.
4. The front to back ratio is the difference in db between A and B.

Fig 7 (a)



R = 400Ω
Where L = 2λ., 2ø = 72°
Where L = 3λ., 2ø = 64°

(b)



$\frac{d}{L}$ = Sin ø and $\frac{h}{L}$ = Cos ø

d = L Sin ø and h = L Cos ø

Where λ 20 metres and L = 2λ., L = 132ft and ø = 36°

∴ d = 132 Sin 36° feet h = 132 Cos 36° feet
= 132 x 0·5878 feet = 132 x 0·8090 feet
= 77ft 7 ins = 106ft 9 ins
and 2d = 155 ft 2 ins

time he wants to be able to have it in any direction he likes. This calls for a directional array that can be rotated!

There are several ways of obtaining directional effects. If an unidirectional array is satisfactory and space is no object then arrays based on the long wire give high gain and good directivity. Such an array is the Rhombic described in an earlier issue, and when space is more limited, the horizontal V and the Bruce inverted V. Other fixed high gain arrays used in point to point services based on driven resonant elements are the Sterba, Koomans and the Log Periodic. A discussion on this is beyond the scope of this short article.

The form of array which lends itself to reasonably compact construction, which is most commonly used by amateurs, is based on a driven radiator together with a resonant reflector and one or more resonant directors. This is known as the Yagi array.

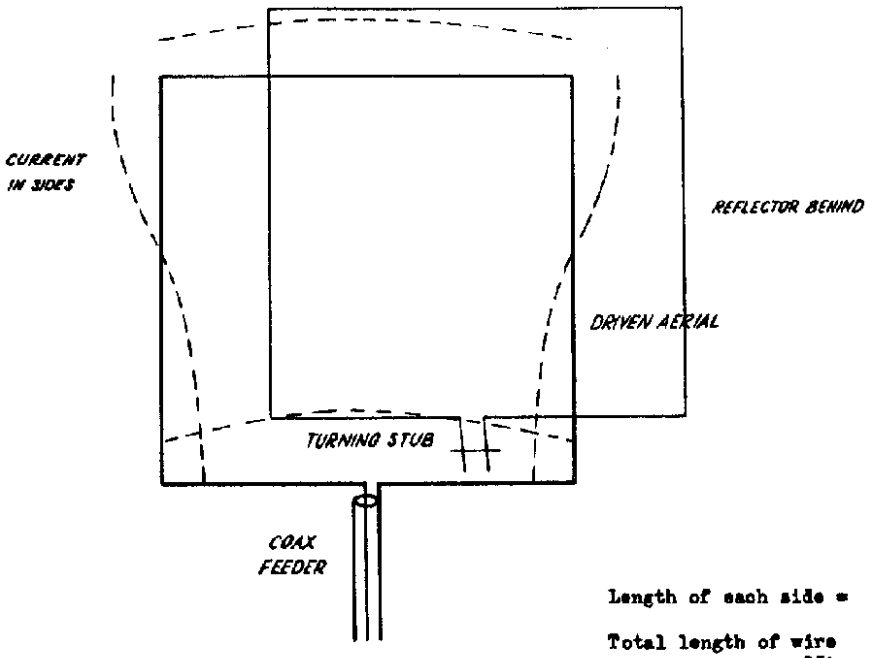
If a rod or wire resonant at or very near to the same frequency is placed near to an energised dipole, energy will be induced in it. This energy will itself be radiated from the resonant rod or wire. Such a rod will be known as a "parasitic element". The energy radiated from a parasitic element differs in phase from the energy reaching it to an extent depending on its resonant frequency. If it is exactly resonant the phase difference will be 180º. If it resonates to a lower frequency, i.e., is longer than the driven element the parasitic element will have capacitive reactance and the phase change will be less than 180º. If the parasitic element is shorter than the driven element, i.e., resonant to a higher frequency, it will have inductive reactance and the phase change will be more than 180º. If a reflector is required it is normal to make the parasitic element 10% longer than the driven element and spaced 0·2λ. from it. A director is about 10% shorter and spaced 0·1λ from the radiator. At figure 5(a) is a chart showing formulae for the lengths and spacings of radiators, reflectors and directors of two and three element Yagi arrays. At figure5 (b) is a graph showing the gain over a dipole for different spacings of director and reflector and the radiation resistance of a simple dipole in the presence of directors and reflectors at different spacings.

A development of the terminated long wire aerial, occasionally used by amateurs who are mainly interested in transmitting in one direction is the Bruce inverted V. Figure 7(a) shows the horizontal polar diagram of a terminated long wire aerial. The terminating resistor R absorbs half the power and ensures that there is no reflection at the termination and hence no standing waves. There are as a result no reverse lobes. The longer the wire the closer are the main lobes to the line of the wire. Figure 7(b) shows the development of this known as the Bruce inverted V. It will be seen that horizontal lobes reinforce while the vertical lobes partially cancel. It will be seen that a long garden (pointing in the right direction) and a tall mast are called for which limits its usefulness in the amateur field!

Another directional aerial which has gained some popularity in recent years is the "quad". This is a wavelength of wire bent into a square of side ¼λ end fed at the centre of one side with 72Ω twin or coax feeder. A single loop is bi-directional. To make it unidirectional the driven element is backed by a similar square tuned by a stub to a slightly lower frequency. The spacing is 0·15 to 0·2λ. This acts as a parasitic reflector. Figure 8 shows the arrangement. It will be seen from the current distribution that radiation from the vertical sides cancels out and adds from the horizontal sides. It is thus horizontally polarised as is a horizontal dipole or Yagi. A gain of up to 10db can be obtained.

There are many of us who because of lack of space, cash or time have to make one simple aerial do for all bands. In this case the old formulae “hang up as much as you can as high as you can” must be relied on. The vertical part of such a wire aerial will give low angle radiation for short distance ground wave and long distance ionospheric propagation. The horizontal part will give high angle radiation, on the lower frequencies, for medium distance ionospheric propagation.

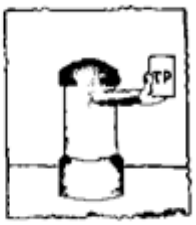
Fig 8



Length of each side = $\frac{\lambda}{4}$

Total length of wire in loop given by $\frac{251}{f\ (mc/s)}$ feet

FROM THE POSTBAG



WA6CEB(557) Welcome to our first WA member. JOHN who served with the REME from 1943 to 46 emigrated to CALIFORNIA in 1948. Always happy to work G-land, he is to be found on 21350 at 1600 hrs GMT on Saturdays and Sundays.

John works as an electronic technician at LOCKHEED AIRCRAFT and says that he will be happy to oblige any RSARS member seeking information on conditions in the States. (QTH on Amdt. list)

G4RS Has acquired an automatic transmitter with which it is hoped to commence the transmission of morse code proficiency runs in the near future.

G8VG(340) Has mooted the idea of a Social gathering possibly in the form of a RSARS dinner to he held during the forthcoming International Radio Comms. Exhibition (ROYAL HORTICULTURAL NEW HALL, WESTMINSTER, SW1 27-30 SEP 67). Bill thinks that the 'get together' could well follow the AGM to be held on 29 Sep 67.

Comments from like minded members are welcomed.

SWM Sends a reminder which reads, quote "It is requested that RSARS members note that packets of QSL cards intended for the QSL Bureau should not be sent to our LONDON OFFICE.

The correct address for SWM QSL Bureau is:

62 BELLMORE ROAD,
THORPE,
NORWICH,
NORFOLK.

Moreover it states SWM, we do not accept packets for individuals unless they are direct subscribers and known to us individually as such."

G3EJF(4). Sends the following which I am happy to print in full:-

Bridge House,
Hunton,
Bedale, Yorks.

Dear Sir,

Some time ago your journal published an appeal for Servicing Volunteers for the Talking Book Library for the blind. Blind persons rent a tape recorder machine onto which fit cassettes which contain the recorded books. Occasionally these blind people run into trouble, usually of a trivial nature

which a sighted person could fix himself, and it is here that the Servicing Volunteer can help.

This is not a large commitment for anyone to take on as even in the days of the old troublesome disc machines I rarely received one call in three months despite the fact that my area at that time covered several large towns.

Nobody expects you to drop what you are doing, you just do any job at your earliest convenience.

There is a desperate need of Servicing Volunteers in the following places: -

LONDON	DERBYSHIRE	SOMERSET
WC 1, WC 2, W 12.	Buxton	Wellington
SE 1, SE 8, SW 3, SW 11.		
HERTFORDSHIRE	DEVON	DORSET
Adforton	Teignmouth	Shaftesbury
Bullingham		
Bromyard	KENT	NOTTS
	Westgate-on-Sea	Worksop
LANCASHIRE	PEMBROKESHIRE	PERTHSHIRE
Liverpool	Milford Haven	Blairgowrie
Bury	ROXBURGH	SALOP
Litherland	Hawick	Wellington
YORKSHIRE	WESTMORLAND	SUFFOLK
Barnaby	Kendal	Leiston
		Mildenhall
		Saxmundham
		Stowmarket

Does any member of RSARS live close enough to one of these places to help?? It is such a small thing to ask of even the busiest of us that I am sure no blind reader need be in the position of having no one to turn to.

If any member of the Society feels he could help I would be pleased to answer any questions or put him in touch with the Library.

73,

Johnny Hodgkins G3EJF
(Member No.4)

G3NWQ(282) Had a letter from member G3HRU (524) and that they had last met in 1947 in PHANTOM SIGNALS. If you want to know what happened to old- - - why not write in and ask.

G6QM(510) Uses a pump handle key (and I do mean PUMP HANDLE). He borrowed it on extended loan from LES WALMSLEY back in 1937. Just how extended is extended.

G3NWQ(282) Adds a report of 285QSO/900 points taken on NFD from 40 and 80M bands.

(568) And awaiting a UK call is Staff STURGES of the ROYAL AUSTRALIAN SIGNALS now at BLANDFORD.

G3PYN(569) Peter is on the Range Control Staff at STANDFORD PRACTICAL TRG area and extends a hearty welcome to any RSARS type who finds himself in the THETFORD area (Thetford 3224).

G3VTU(469) Old HQ Stn Stalwart, Harry, is now languishing in Benghazi (suitably disguised). He bemoans (always did anyway - Ed) the difficulties connected with getting a licence in 5A-land. How's the JOYSTICK, HARRY!*?!!

G3IDG(24) Wishing to cause a riot reports QSL outstanding from 3DSS 3EKL, 3LUN 3OLE 3PGM 3RCJ 3STZ 3TNU ZC4TJ. Latest score 20/10. He further infos apropos last edit P.02 that "55" means VIEL ER FOLG (every success). Any bets?

GI3JEX(544) Infos wkd 23/16 cfm.

GI3DZG(5) Walter, the Awards Manager claims (yes., very carefully scrutinised - Ed) the ARS class II award. Heartiest congrats, Walter.

QTH AND MEMBERSHIP AMENDMENTS

	HQ STN RSARS, School of Signals, Blandford Camp, Dorset.	G4RS
529	Mr. KENT, 146 Aldershot Road, Crookham, Aldershot.	G3PMC
48	Brig. R.B. RIDLEY MARTIN, Flat 2, Wood Hall, Sunningdale, Berks.	
530	K.J. COOK, 41 Racecourse Rd, East Ayton, Scarborough, Yorks	G2KK
531	T. KENNEDY, 22-24 Main St, Spittal, Berrick-on-Tweed	G6UC
532	A.E. BOSTON, 22 Barrington Rd. Newton, Aycliffe, Durham	G3BIN
533	L. SANDERSON, 31 Tetney Lane, Holton Le Clay, Nr Grimsby	G8TN
534	H.E. SMITH, 7 Ascot Close, Borough Green, Sevenoaks, Kent.	G3POY
535	G. CHAPLIN, 68 Cowper Rd, Harpenden, Herts.	G3UTW
536	M.R.G. SIMPSON, Nottingham University OTC (TA)	G3UVM
537	M. GOLDMAN, 8 Nunroyd Rd., Leeds 17	A5110
538	L.R. SEAL, 'Elleslie', Market Lane, Greet, Nr. Winchcombe, Glos.	G2OC
539	R. CONWAY, 2 Sqn, 14 Sig Regt, Worcester Rd, Droitwich	G3INE
540	A.C. TABBERER (?) 32 Russell Rd, Liverpool 18	
541	P. FIRMIN, 42 Gregoriss Rd, Beaconsfield, Bucks	A3977
542	J.S. OWEN, 'Brunswick' Plas Rd, Llandudno, N.Wales	GW3QN
543	J. CUTTER, 124 Briercliffe, Scarborough	G3VAN
544	D. BUTLER, 21 Inverleith Drive, Sydenham, Belfast	GI3JEX
545	E.W. TAYLOR, 4 Brownsea Ave, Corfe Mullen, Dorset	G3FK
546	V. BARTLETT, 25 Partridge Rd. Roath, Cardiff	GW5BI
541	P.C. BURNS, 24th Signal Regiment, Catterick Camp, Yorks.	VS9APB
548	J.M. CLIFF, Sigs Tp, 32 Heavy Regt, BFPO 33	
549	C.W. PETTIFAR, 3 Greenway, Campton, Sheford, Beds.	G2DPQ
550	A.C. APPLEBY, 68A Sutton St, Newcastle upon Tyne 6.	G3BKK
551	N.R. PASCOE, 30 Handel Road, Keynsham, Bristol	G3IOI

552	T. BEAUMONT, Kitlands Farm House, Cold Harbour, Dorking, Surrey	G6HB
553	S. FRETWELL, 177 Piper Hill, Colburn, Catterick Camp.	
554	V.J. TOMLIN, 53 Ivy Close, Harrow, Middlesex	G3GJH
555	R.F. GAITSKELL, Green End, Dane End, Ware, Herts.	G3WCP
556	H.G. PEERS, 3 Monks Brook, Close, North Stoneham, Eastleigh, Hants.	G3BEZ
557	J.F. NEVILLE, 44 West Mendocino St, Altadena 91001, California, USA	WA6CEB
558	Major J.B. SCOTT, 40(U) Sig Regt (V) Clonaver Pk, Belfast 4	
559	Capt. TEE. RUSSELL, " " " "	
560	Lt R.D. GILPIN, " " " "	
561	Capt. W. SURGEON, " " " "	
562	Lt W.R. CLEMENTS, " " " "	
563	Sgt W. EWINGS, " " " "	
564	L/Cpl T.A. JOHNSON, " " " "	
565	L.E.R. HALL, 24 Calthorpe Rd, Walsall, Staffs.	G3IGI
418	Sgt R. VASPER, R Sigs Tp, 39 Msl Regt RA, BFPO 16	VS9ARV) VS9KRV) VS9HRV)
428	T.C. HICKS, 72 Ebony Walk, Colchester.	VS9ATH
446	Capt. M.Q.M. GREAVES, 24th Signal Regt, Catterick Camp	G3WEO
452	Cpl JARRETT, 1 Sqn, 8th Signal Regt, Catterick Camp	G3WHZ
106	Lt. R. TITTERINGTON, 8 Cleveland Rd. Bullington, Nuneaton, Warwicks.	G3ORY
92	Cpl J. BROWN-GREAVES, 1 Div HQ & Sig Regt, BFPO 32	G3NOL
505	Capt. F.A. GEORGE, 14 Swallow Gardens. Hatfield, Herts.	G5FG
251	K.G. KING, Foxwood, 129 Chatsworth Rd, Hazel Grove, Cheshire	G3RGE
141	J.J. JARVIE, Holly Towers. APT 1513, 33 Holly St, Toronto 7, Ontario	VE3ZH
421	Cpl G.W. RODGERS, 4 Royal Tank Regt, BFPO 15	
469	Sgt H. WHENMAN. 245 Sig Sqn, BFPO 55	G3VTU

SILENT KEY

G2AHL (195) J.A. ROUSE. Members will have learned from the BULL and SWM of the tragic death on 20 May of our old friend John. His connections with the world of Amateur Radio are too well known by all to require reiteration in this column. A keen member, popular with all; he was instrumental in helping RSARS along tremendously by giving us on occasion an extra share on the publicity side. The sympathy of all Society members is extended to Mrs HAZEL ROUSE and daughter SARAH.

CONGRATULATORY

F. McALLISTER (485) now proudly awaiting his call sign. After 45 years as a SWL, Frank spent a further eighteen months practising Morse. He has now passed. This endurance marathon we think will remain unchallenged for a long time to come. Well done. Frank.

ON THE AWARDS FRONT BY GI2DZG. (5)

Bill Windle, G8VG, holder of the first Class I Award, leads the scoring stakes with 109 worked and 83 confirmed, In a QSO with the writer, Bill told me that he would forward all the cards when he gets the 100 confirmed. Question is does he get another plaque? An intriguing question,

indeed! Dave Butler, GI3JEX, was kind enough to pass along for my scrutiny a photo that Bill had sent him showing the OM with the plaque very much in evidence. Very nice it looks, too! Another question worrying Ken Hooper G3UJW and others is how Bill manages to get such a high return of QSLs. The writer knows of one member to whom a SAE has been sent but has not had the courtesy to reply. Another member in QSO with the writer was kind enough to say that he did not QSL. I respect his opinion and his kindness in saying that he did not QSL; thank you G4GM. Such thoughtfulness will save members wasting cards, and maybe postage. If other members feel the same, would you please let me know. Your call will be published and your time and that of other members will be saved; thanks.

Class II Awards issued since last issue of 'Mercury' are as follows:-

9. GI2DZG
10. G3LAT
11. GI3JEX

Claims for a Class I Award.... this time from a SWL member and for a Class II.... first from overseas and being checked at the time of going to press.

SCOREBOARD:-

G3UJW	35 worked;	22	confirmed
GI2DZG	37 worked;	31	confirmed

WHAT'S YOUR SCORE? PLEASE DROP ME A POSTCARD AND LET ME, AND OTHERS KNOW

GOOD HUNTING!

RULES FOR THE ROYAL SIGNALS AMATEUR RADIO AWARD

1. The object of this award is to encourage activity amongst the transmitting and listener members of Royal Signals Amateur Radio Society.

2. The award is available to all individual members of the Society and the affiliated clubs subject to the conditions laid down in these rules.

3. The award will be made in two classes and will consist of a certificate for the Class II award and a Royal Signals plaque for the Class I award .

4. Transmitting members must furnish proof of contact and Short Wave Listener members proof of having heard, member stations as detailed below:-

   For the Class II award:

   5 member stations including the Society's HQ station G4RS/GB3RCS

   For the Class I award:

   50 member stations including the Society's HQ station G4RS/GB3RCS.

5. Members may either submit QSL cards or other written confirmation or a list certified by two licensed radio amateurs, an officer of a National radio society or an Officer of Royal Signals. Such a list must take the following form:

"This is to certify that I have examined QSL cards or other written confirmation from the stations listed below which confirm contacts made by/reports submitted by station .....

Signed .....

Appointment/Callsign .....

Signed .....

Appointment/Callsign .....

Date	Time	Freq. Band	Callsign of Member station contacted/heard

6. Member stations contacted/heard after 1 Jan 1965 will count towards this award. For the purposes of the Award the same member operating under different callsigns from different countries will count separately under each callsign. Thus G3NJM and 9M4MB although operated by the same member count as two member stations.

However, contacts made by this member under either callsign will count towards his own award.

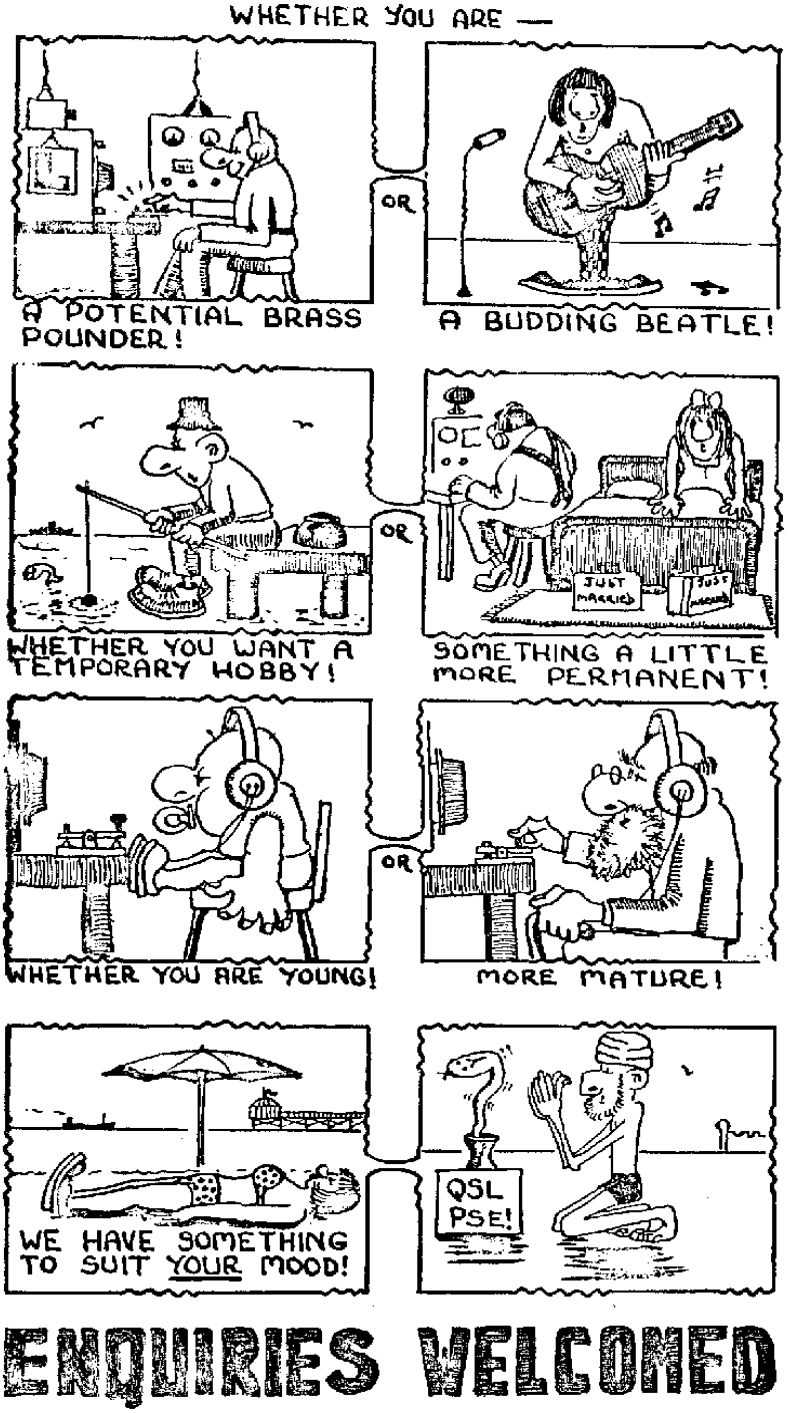
7. Claims together with the supporting evidence should be sent to:-

Mr. W. E. Caughey, Awards Manager RSARS,
Gilnahirk Park, Cherry Valley,
Belfast 5, Northern Ireland.

8. Details of awards presented will be published in MERCURY.

9. Transmitting members of the Society are asked to scrutinise all listener reports received and to assist by issuing QSL cards to listener members of the Society. Listener members are asked to ensure that their report cards are clearly marked "Member Royal Signals Amateur Radio Society".

10. In conjunction with the award Activity Periods will be detailed from time to time in MERCURY. These will state approximate spot frequencies and will last two or three hours. During these periods G3CIO will be on the air and UK members are particularly asked to use the HF bands in order to help overseas members to qualify for the award.


WHETHER YOU ARE —
OR
A POTENTIAL BRASS POUNDER!
A BUDDING BEATLE!
OR
WHETHER YOU WANT A TEMPORARY HOBBY!
JUST MARRIED
SOMETHING A LITTLE MORE PERMANENT!
OR
WHETHER YOU ARE YOUNG!
MORE MATURE!
WE HAVE SOMETHING TO SUIT YOUR MOOD!
QSL PSE!
ENQUIRIES WELCOMED

APPLICATION FOR MEMBERSHIP OF THE
ROYAL SIGNALS AMATEUR RADIO SOCIETY

I wish to apply for membership of the Royal Signals Amateur Radio Society as under: -

		Sum enclosed
ANNUAL MEMBERSHIP	(5/- per year)	_____
LIFE MEMBERSHIP	(£2/2/-)	_____
CLUB AFFILIATION	(10/- per year)	_____

Surname..... Christian Name.....

Address for correspondence .....

.....

Call ..... Signature ..... Date .....

Please return to :- Captain (QM) R. WEBB, R. Signals
30th Signal Regiment,
BLANDFORD, DORSET.

AVAILABLE FROM HQ

Members' Notepaper This is a good quality white paper and costs 8/4d. per 100 sheets post free.

Members' QSL Cards The basic card cost 37/6d. per 500 post free. We can overprint your callsign, Name and address in black, red, blue or green for a further 15/- per 500, making a total price of 52/6d. per 500, less than a penny farthing each.

ORDER FORM
(Block letters please)

Name .....Callsign .....

Address.....

.....

Please supply :-

.....sheets of Members Notepaper at 8/4d per 100

.....Basic QSL cards at 37/6 per 500

.....QSL cards overprinted in .....(State colour) at 52/6 per 500

I enclose Cheque/Postal Order for.....

Cheques and Postal Orders to be crossed and made payable to
Royal Signals Amateur Radio Society.