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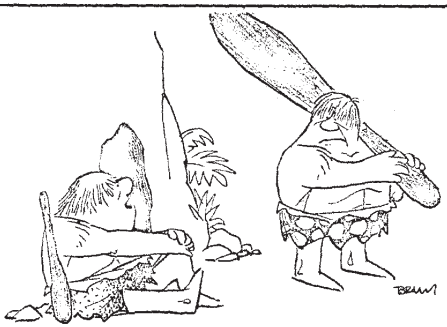
Devoted to Low Power Radio Communication

SPRAT

NUMBER SIX. SPRING 1976.



" NOTHING LIKE A BIG BANG TO MAKE UP FOR LACK OF SKILL, IS THERE ? "

****

CHAIRMAN.
Dr. Gordon Bennett (G3DNF)
52 Whinmoor Crescent,
LEEDS. LS14 1EW.

CONTEST AND TEST MANAGER.
Mr. Angus D. Taylor (G8PG/GW8PG)
37 Pickerill Rpad, Greasby,
WIRRAL. Mersyside. L49 3ND.

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Tel. (060 744) 3920.

EDITORIAL NOTES:

During the last three months a lot of things have been happening in the QRP world. The membership of the club is now over the 200 mark with several possible members in the pipeline, including a couple of VKs. Another DL contest has come and gone - alas no results as yet. Sadly the American QRP magazine MILLIWATT has ceased publication, which probably leaves the SPRAT as the only solely QRP magazine in publication - according to W9SCH, Britian has now become the centre of world QRP activity. Last week Gordon, our Chairman, was in Nottingham and he called to see me at the QTH and we had a very pleasant chat on QRP and the club. The first winner of the G2NJ TROPHY is G3NEO (details in this issue) Phil's entry and the entries of the other applicants show what can be done with QRP with patience and effort.

During this time I have been in touch by both QSO's and mail with many members. As usual I am always glad to receive club mail and answer questions, put members of like interests in touch with each other and issue datasheets. The only slight problem is the club's postage bill, so if you write and do not require a reply, it would be helpful if you state this in the letter.

Thinking of money, most of the members who's subs were due have sent me the renewal money for their membership, but I still have a number of outstanding subs in the first batch of renewals. As I said last time, I have split the membership into groups spaced by the issues of SPRAT and will ask for subs from members whose fees are due between each issue. SEE BELOW.

Would you please note that the GPO have changed my phone number, the new one is given above. It was pleasant to prepare this issue of SPRAT because of the wealth of material sent to me by members. In fact, I have had to hold some of the items over for the next issue. This does not mean that I do not want any more material. I am always glad to receive material for publication in SPRAT, and it will all be published as space is available. So I would like to see those ideas and circuits which so many members have - if you don't think of yourself as a writer, short notes will do.

Most of the members I have been in touch with have complained about the state of the bands recently. Nevertheless I hope that we make a good showing in the two QRP contests that are coming up. (see below) Best wishes for the warmer weather to come, and don't be hit by too much gardening QRM !

73's George G3RJV.

R.S.G.B. 3.5/7 MHz LOW POWER CONTEST. 1976. R.S.G.B. Contest Rules.
0900gmt to 1600gmt on Sunday April 11th.
SEE MARCH 1976 RADIO COMMUNICATION.

Max.Input	1w.	2w.	5w.
Points	100	50	20

DL AGCW QRP CONTEST SUMMER . 1976. July 2-3 1500gmt to 1500gmt
Select 5 bands from 1.8 to 28 MHz. 15 hrs operation, 9 hrs pause in 2 parts max.
SEE CONTEST RULES FOR HANDICAPS ETC.

G-QRP-C ACTIVITY DAY.
Many members have express ed interest in a club QRP activity day. I have discussed this with Gordon and hope to announce a day in the Autumn in the next issue of SPRAT.

PLEASE mention the club in Q.S.O's and in your local club
MEMBERSHIP details from G3RJV.

SUBSCRIPTIONS - RENEWAL. MEMBERS UP TO NO. 120 are requested to renew their subscription BEFORE THE NEXT ISSUE OF SPRAT (July 1976) The fee is now £1.50 Cheques to G.C.DOBBS, re QRP CLUB. ask for receipt if required.

QUALIFYING FOR THE G-QRP-COUNTRIES AWARD - PROGRESS REPORT. BY G8PG.

Having now reached the magic figure of 50 confirmed the writer has been able to check the accuracy of the lists given in his previous article (SPRAT Summer 1975) It is encouraging to see that all the countries from which cards have been received appear in the lists given in that article, which proves that they do provide a useful basis for the award hunter. The lists prove equally interesting (and encouraging) when the prospect of working the next 25 new countries is considered. With 50 confirm-ed one would expect to find that working new countries in Europe was virtually impossible, but examination of the lists shows that this is not so. No less than 12 countries in the 'Europe - More difficult' list have still to be worked, so nearly half the next 25 countries could be worked over a path not exceeding 1100 miles. In the 'DX - More Difficult' list there are 10 countries still outstanding, all of which are known to be workable from the UK with 5W e.g. during the last few months G3DNF has worked PY, despite it being a sunspot minimum period. With the wanted more difficult DX reduced to this fairly small number of countries it is now possible to investigate the best bands and time of year for working the various areas, and also to erect simple aerials which will fire in the required direction. In this respect it is worth noting that all the present holders of the G-QRP-C Countries Award have achieved their results with simple aerials between 20 and 30 ft high, so quads and big yagis are not required when trying for this sward. Apart from the sense of achievement which each individual feels on qualifying, each award serves as tangible proof of what can be achieved using QRP. Have you applied for yours yet? You only need 25 countries for the basic certificate.

QRP COUNTRIES AWARD :

Basic Award ; 25 countries	no.1	G8PG/GW8PG
	no.2	DL7DO/p
	no.3	G3DNF
	no.4	G4AYS
	no.5	DJ1ZB
First endorsement: 50 countries	no.1	G8PG/GW8PG

WORKED G QRP AWARD

No claims yet. In answer to queries, yes, both members must be using 5 watts or under for a contact to count. This is not an easy award to qualify for, but additional 80m activity by members would help very much. Under present sunspot conditions 80 is our best band for inter QRP contacts and there is always activity around 3535 to 3540 kHz, 1400 - 1500 on Sunday. HPE CU THERE.

QRP CONTACT LINK.

Following his article in this issue of SPRAT, G3ANQ wrote to me about the importance of continued personal contact between club members in order that the ideals of the 'WYNDHAM PROJECT' can be pressed into service. He suggests more use of the INTERNATIONAL QRP FREQUENCIES to further this contact. Gus has mentioned the use of 80m above, may I remind members of the other frequencies.

80m	3540	40m	7040
20m	14065	15m	21040
10m	28040	All	± 5 kHz

There is no accepted 160m frequency, so what about 1850 (± 5kHz)
In addition to the 80m Sunday contacts mentioned by Gus, members could also look for each other on the 160m and probably the 40m QRP frequencies.

********** THE G2NJ TROPHY ********** 1976 **********

It is with great pleasure that we announce G3NEO as the winner for 1976. Phil offers 364 QRP contacts for 1975 on CW, FM and SSB on all bands 160m to 23cm, and includes QRP QSO's with VE, OK and DL via OSCAR - WELL DONE PHIL !

Also well done to G4AYS who can second, and to G5BIU who takes third place. I hope to be able to present the cup to Phil at his home QRH sometime near Easter. On behalf of the club, I would also like to thank Nick, G2NJ, for the splendid cup.

ROCK BOUND? if you work Xtal controlled, please send the frequencies for publication in the next SPRAT, so that we know who anddwhere to look.

"Only mustard isn't a bird" Alice remarked. "Right as usual." said the Duchess;
"What a clear way you have of putting things!"

THE GREAT D.S.B. MYSTERY goes on - after the discussions in previous issues following the publication of G3YUQ's D.S.B.1. it emerged that the Home Office does allow the use of D.S.B. on the amateur bands. The problem remained of what designation to use for this mode in the log book. G4DOU wrote to ask the Home Office - I enlcose some of the text of the reply, which is interesting if not entirely clear.....

"....permission is hereby given for the use of double sideband, suppressed carrier and the symbol for such emission can be regarded as A3. We do occasionally give authority to suitable applications, but we do not want this to be known generally as we do not actually favour the use of this mode of operation due to technical difficulties which cannot be resolved at present."

One wonders if individual applications are required to use D.S.B. and actually what constitutes a "suitable application".

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From Brice Fleckenstein, WB9LGZ, who did very well in the last DL QRP Contest, with a single band (7 MHz only) entry.....

MY DL-ADCW QRP CONTEST SETUP.....Brice Fleckenstein, WB9LGZ.

My setup for this contest was orginally planned for the ARRL FieldDay Contest the weekend before. I live in a trailer (mobile home) court owned by my parents. At the back of the court we have a playground, approximatly 150ft wide by 200ft long,, about half the length of one side we have the equipment. Opposite,across the field, there is a baseball goal.

My antenna was about 15ft off the ground,and had an apex angle of about 70 deg One end was secured to the trunk of a large tree near the middle of the side of the field by the playground equipment. The wire then ran to a support made of 2 10ft lengths of 2x2 clamped together and driven into the ground. The other element ran from this support to another length of 2x2, clamped to the baseball goal. Each element was about 110ft long, with another 20ft of each feeding to my equipment.

I used a Heath HW7 for the transmitter. The receiver was the detector of the HW7 feeding an outboard homebuilt active filter and audio amplifier. This gave better than twice the sensitivity, and over 10 times the selectivity, of the standard HW7.

For power,I used the battery from the family garden tractor,running the engine once in a while to keep iy charged. At night I used a pair of no.57 bulbs to light the operating position, set up inside an ex-scout Explorer type tent.

This setup was good for top honours in the contest,operated only on 40 metres, with 2 watts input. It was also good for top class 1 band battery, and overall 1 band third honours in the Field Day contest.(with 2800 points-1 band winner=3226) My next contest will be the ARRL Sweepstake, using a dipole with the same rig.

****

THE G3YUQ D.S.B.1. .....Notes,from G3YUQ. The G3YUQ TRANSISTOR 1....Notes from G8PG

From G3YUQ- CORRECTION to circuit diagram - the legends 160 - 80 on the buffer anode coil and switch should be reversed, ie. to include the 300pF on the 160 position.

From Gus, G8PG - This is an excellent little circuit but it does require one small modification. In its presnt form, if the aerial and earth connections are accidently crossed, or if it used with an ATU where there is a DC path to earth,there will be a direct short across the batteries. The TRANSISTOR 1. circuit should therefore be modified by wiring a .01 mfd fixed capacitor between the aerial connection on the pcb and the aerial terminal.

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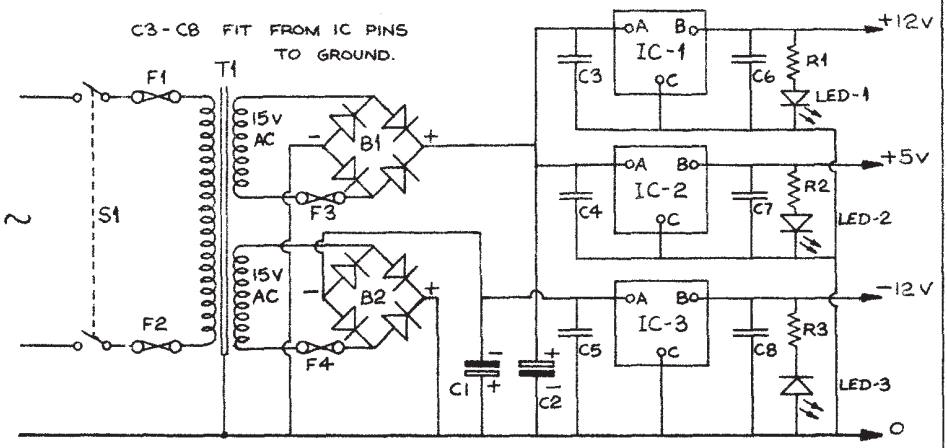
DATA SHEETS.....

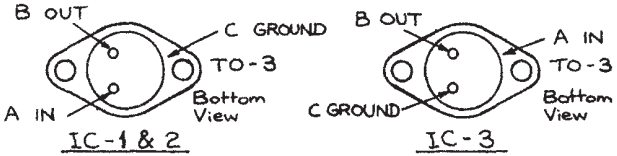
Thanks to the stirling efforts of Gwyn Williams, the following are available for a stamp from G3RJV :-

THE G3IGU 80m TRANSCEIVER - complete circuit and details.
THE G3YUQ TRANSISTOR 1. - simple xtal controlled TTX.
THE G8EPE 2 METRE A.M. 3 WATT TRANSMITTER - from the last SPRAT.
THE SIDEBAND MINITUNER- A miniature Direct Conversion RX for 80&40 (Ham Radio)
MINIATURE SOLID STATE V.F.O. - Stable Vackar VFO on 1½" pcb (Ham Radio)
SOLID STATE DRIVER AND FINAL - Interesting Broadband circuit (Ham Radio)
QRP ARTICLE ON ACTIVE FILTERS - by K8EEG
THE MFJ ACTIVE FILTER - Full makers details with circuit.
Plus the two RST HW7 modification articles.



POWER PACK FOR Q.R.P WORK

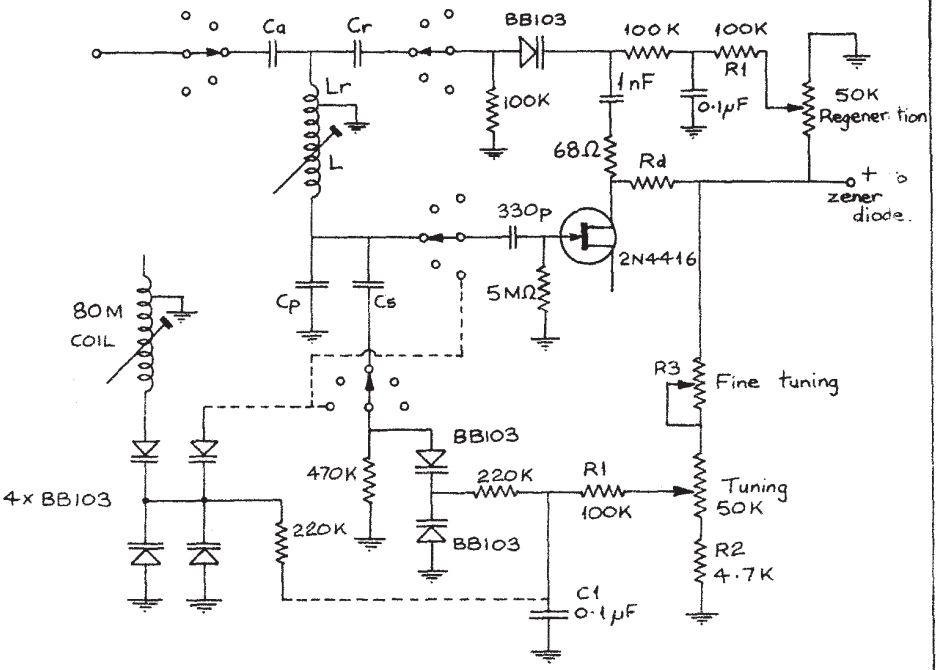
by George Burt GM30XX



Parts List :

T1 Low Voltage Transformer. 50 VA. 240 P. 0-15v 0-15v Sec.
B1 & B2 2 amp Bridge Rectifiers 100 PIV
C1 & C2 5,000 uF 50v Working (low as 30v will do)
C3, C4, C5, .22 uF 50v Working (Tant if possible)
C6, C7, C8, .47 uF 50v Working (Tant if possible)
R1 & R3 390 Ohms 1 Watt (Adjust value or
R2 100 Ohms (to suit LEDS of other types
LED 1 Colour RED (
LED2 Colour ORANGE(Panel mounting Type (Po 225 mW)
LED 3 Colour BLUE (
IC1 LM340 - 12v (
IC2 LM340 - 05v (National Semiconductor
IC3 LM340 - 12v (
S1 Miniature DPST Toggle switch
F 1 to 4 Panel Fuse Holders

N.B. Heat Sinks are required for IC 1,2 & 3.
Use of the IC's can give differing combinations of supply rails
ie. For two pos. rails, reverse ground connections to B2 & C2 and fit
+ Stab. IC.



Varactor Tuning of DJ1ZB's F.E.T. 0-T-2

This varactor tuning and regeneration control circuit had been proposed t F5IM who wanted to build the O-T-2 published in SPRAT Autumn 1975. It ma be of general interest, because F5IM reported about it's performance with great enthusiasm. However, resonant circuit data (L, Lr, Ca, Cr. Cs) must be redesigned by the user for the desired range.

The RC combinations R1/C1 eliminate wiper noise of the potentiometer . If their time constant should be improper for personal "tuning feeling" it m be varied. Resistor R2 is to limit the minimum varactor voltage to about .5v in this case (temperature sensitivity of varactors is highest at low bias voltage). Potentiometer R3 may be inserted for fine tuning (SSB). In the author's test circuit VHF oscillations were noticed and eliminated by the 68 ohms series resistor in the regeneration path.

One BB103 is used for regeneration control and two BB103's in anti-se ies for tuning. The latter may be replaced by one BB104 or BB204. This arran ment is sufficient to tune the bands 40 mtr to 10 mtr. For 80 mtr however, a hi gh inductivity coil with low Qp (Cs shorted out) is necessary to cover the wh le band. As this may be critical, several diodes in parallel may be used additionally for the 80 mtr coil, as proposed in the circuit.

Ha-Jo Brandt. DJ1ZB.

NOTE..... The following article is submitted by 'Ted' G3ANQ, who, as many members will know, is not only an amateur CW operator of many years, but has also taught morse to amateur and professional operators for over 30 years. Ted has half a century of CW operating experience to call upon and is deeply concerned about the diminishing activity of CW on the LF bands. He points out that it IS POSSIBLE to work 100% QSO's THROUGH QRM if the operators have the correct equipment and understanding. He would like to see QRP CW opearators making a fuller use of the LF bands - fighting the QRM rather than giving up on a noisey band. Ted would like club members to accept the challenge he offers and suggests that we work under the title THE WYNDHAM PROJECT, after the late Wyndham John of the club, who before his untimely death was receiving CW tution from Ted.

THE CHALLENGE OF OUR TIME.

(QRP versus QRO, QBO, SSB and RTTY.)

by

C. Edington Sutton. G3ANQ.

(By permission of Austin Forsyth (G6FO) Editor of the 'Short Wave Magazine')

Twenty-five years ago the S.W.M. published two articles "Beating the QRM." and "Modern Low Power Operating." which described a unique QRP sked worked by Jim Newth,G3EJN,and G3ANQ. Nobody believed it. Last year,G3RJV gave QRP men a united voice. Here by G6FO's courtesy, are the facts, now grimly relevent. Judge for yourselves and say what you think.

This was a completely unbroken sked on 3540 KHz, of two hours, three to four nights a week, over two months in the Spring of 1951, through apalling QRM from QRO CW, "other services", and the LF end of duplex QRO a.m. Phone. EJN, in Bristol ran 2 to 4 watts, VFO/PA, to 132ft, 66ft & 15ft end feds, plus a 12ft rod, with a BC348 Rx. ANQ, on the roof of Magnet House, Kingsway, London, ran 2½ watts, VFO/PA, to a 130ft high coax fed dipole, with a BRT 400 Rx. This has a 500 Hz bandpass non-ringing crystal filter which could be sharpened symmetrically, plus a 1 KHz audio filter.

In London, noise and QRM were enormous, often 90 dB above 1 microvolt on the S meter. We hoped that if EJN could get through all this it might prove something. It did, for he suceeded beyond all expectation, though at first we had a desperate struggle to avoid being overwhelmed. Discovering by sheer good luck, that we could actually survive the interference, this spurred us on to increasing audacity and we began to take on overcomers regardless. No loner did we QSY away from QRM; we stayed put and fought back, working right through the heart of a.m. Phone and holding our ground between 100 watt C.W. on either side.

In doing so, we tried and discarded every known dodge and Q signal, devising others, by which alone we manahed to survive; a new technique of short overs, "dodging the blot-out","beat note change", and "knifing through". Simplicity and and rapidity are the essence of this "lifeline" working, which depends upon perfect understanding between the two operators, a mutual determination not to be put off by any kind of interference, close appreciation of Rx selectivity and RST, precise adjustment of Tx frequency and rock steady transmitter note.

Short overs and instant "come back" wre essential; anything could happen the next minute, for the quiet channel invited endless interference, sometimes blotting out signals entirely. Dodging this "blot out" is a most exhilarating sport with a good partner. As no signal exists to measure and give warning of this deadly menace we appropriated the aircraft signal QBO, using it like QSB, eg. "QBO 7/3" to report the fall in signal strength, or, briefly, "7/3" to save seconds.

Surprisingly, all the affected operator often required was a "beat note change" by his colleague of a few hundred Hz, and for this he signaled "up" or "dwn". For greater shift the figure of KHz was added, eg. "1 up","2 dwn", which put the QBO down the skirt of the Xtal bandpass, and EJN was frequently worked between two such stations, with careful sharpening of the Xtal filter, plus audio filter if necessary.

A.M. Phone called for "knifing through"; simple but effective. ANQ first zero beat the carrier and sharpened the Xtal filter, steering EJN by "B.N.C." across the Xtal bandpass into the first "wuff" of the modulation. Then in came the audio filter and a touch on the BFO brought him piping through. Offsetting slightly is better;

dead zero produces a kind of clapper affect, very noticeable on chirping C.W.

First and foremost, the sked established the principle that "QRP no longer goes ROUND, it goes THROUGH". Faced by the incredible, there is nearly always a way, for the penetration of a QRP signal is almost unbelievable. Despite this "Lifeline" working - ie reser ve power - is indispensable. EJN got through on everything, even the 12ft rod, but many times only the 132ft saved the QSO by countering QBO and filter insertion loss of 4 or 5 S points. The RST needs constant watching when you work through and between stations 50 times your power. So much for technique. Immense progress has been made since then and wonderful work is being done by individuals. The men, the spirit and the means are there in plenty. Now to the point.

The London dipole forecast with uncanny accuracy the grim challenge of today, the steady encroachment of "other services" with QRO C.W. SSB and RTTY especially on 160 and 80. Amateurs have always retreated before interference, and small blame to them; but now we have reached the'point of no return'. We can only share these bands on the professional basis of minimum power for effective contact, which EJN demonstrated so brilliantly 25 years ago. It is a job that only QRP men can-do; a ringing call to them throughout our hobby to man the key and save the lower half of our H.F. bands before it is too late.

We do not need to be supermen; anyone can try his hand, and welcome; technical men to design, constructors to build, and operators to do the job. In this club alone there are many, not all expert, who yearn to take the key and "do something for Amateur Radio". They feel and even say,"QRP is like the old pioneering". It certainly is, perhaps, the last of it's kind that may be done on F.F., for time is fast running out on us. We need determined men to do for C.W.,by much simpler and less expensive means, what has been done by SSB for Phone, and we want everyone we can get in the next three years.

Above all we need a united mind and a common method. Writing daily, swapping notes and ideas, EJN and ANQ built up more than a perfect understanding; it was a real unity of mind across space. G3RJV has done Amateur Radio a priceless service; by bringing together QRP men he has established the means by which this wonderful unity could become world wide.

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NOTE....G3ANQ would like to hear from any QRP operators who are moved by the above article to take part in "THE WYNDHAM PROJECT". He has prepared a memorandum setting out how it should be tackled technically and operationally. Ted would welcome any letters from interested QRP operators - to: C.Edington Sutton (G3ANQ) 3 Parkwood Road, Woodside, Wimbledon. SW19 7AQ.

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THE WIRELESS PRESERVATION SOCIETY:

G2NJ, who is vice Chairman of the Wireless Preservation Society, wonders if any member of the club has in his attic a Scanning Disc as constructed by radio enthusiasts in the mid thirties for the reception of Television. If so, G2NJ and G3KPO (Hon sec. and Curator of the Society) would be very grateful if they would donate it to the National Wireless Museum now situated in Arreton Manor, Arreton, Nr. Newport, Isle of Wight. Arreton Manor is the home of Count and Countess Slade de Pomeroy and already houses a superb collection of dolls, dolls houses and toys, as well as a collection of domestic and agricultural by-gones. The National Wireless Museum will be open to visitors from Spring 1976 and the Society would be pleased to receive additional items of vintage character. All communications should be sent to G3KPO, Douglas Byrne, Alveston Manor, Luccombe Road, Shanklin, I.O.W. G2NJ adds that another member of the club, namely G4OO (Denis Hoult) is Chairman of the Society.

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FOR SALE.....AVO VALVE VOLTMETER, WITH RF PROBE AND LEADS, £4 plus carriage. contact G4DEP. address as members list

WANTED..... 2 or 3 element beam for 14 MHz and means of support - All reasonable offers considered. contact G3LGX (QTHR)

WANTED..... An old BATTERY ELIMINATOR to supply 120 to 150 volts DC and 2volts DC Please state cost, including postage to GI2DZG.

OPENING THE BLACK BOX
or
TAKING THE MYSTERY OUT OF AERIAL COUPLERS
(particularly for SWL's)

by G8PG

One "Black box" which seems to give many beginners and R.A.E. students a great number of headaches, is the one which appears between the output socket of the transmitter and the aerial. This is hardly to be wondered at when one finds that four such "black boxes", each of them containing an identical circuit, might be variously called an "aerial tuning unit" (ATU), and "aerial coupler", an aerial matching unit", or a "transmatch".

The first three titles are used on both sides of the Atlantic and the fourth is rapidly becoming popular in the U.S.A. It is most unfortunate that we have this multiplicity of names for the same thing; but, once we realise that this is so, one major source of confusion is immediately removed. If we can then learn what these "black boxes" are for, and the typical circuits which we use in them, life becomes easy. Irrespective of what title the designer or text book author may use, once we know the typical circuits we can recognise the unit for what it is and deduce how it works.

THE USES OF THE "BLACK BOX"

In the case of aerials which are resonant by virtue of their length, such as the half wave and centre fed dipole, the "black box" performs the following functions:-

i) when used with a transmitter it provides matching between the output impedance of the transmitter and the input impedance of the aerial; and also - most important - it provides a tuned circuit which discriminates against spuriouse radiation of frequencies other than the fundamental frequency of the transmitter.

ii) when used with a receiver, it matches the impedance of the aerial circuit to that of the receiver input circuit; and, also, "front end" selectivity, thus helping to reduce the effects of image interference.

iii) when used with random length aerials the "black box" will perform the functions decribed above but, in addition, on both send and receive, it will perform the vitally important function of tuning the aerial to resonance at the frequency which it is desired to use.

From the foregoing, we can see why our "black box" is so important. In view of the strict rules against radiating spurious emissions contained in the amateur transmitting licence, use of the "black box" - which from now on we will call an aerial coupler - is essential whenever a transmitter is operated. Though not mandatory on reception, there are very few receivers which will not give an improved performance if we match them accurately to the aerial, and give them a little more "front end" selectivity. So in this respect, the aerial coupler is of just as much use to the serious short wave listener as it is to the transmitting amateur.

COUPLING TO DIPOLE AERIALS

Before talking about the aerial, let us for a moment consider the output stage of the transmitter. The output power is generated at the anode of the p.a. valve, or the collector of the p.a. transistor, and the impedance at this point will probably be between 1500 and 4000 ohms (valve) and 5 - 150 ohms (transistor); depending upon the input

power, type of device used, etc. In a typical transmitter, the r.f. output could be developed across a parallel tuned circuit which is tuned to resonance at the transmitting frequency. Such a circuit is represented by C1 and L1 in Figure 1 (a). When we wish to connect the tranmitter to the aerial coupler, we invariably do so via a length of co-axial cable. This provides an efficient, well-screened connection. The co-axial cable used will normally have an impedance of 75 or 50 ohms. We are therfore faced with the problem of matching a high impedance output circuit to a low impedance input circuit (valve), or an impedance that can be higher or lower (transistor).

Anyone who has built a receiver, or a.f. amplifier using valves, will already have met this problem. The need is to match the high impedance of the output valve to the low impedance of the loudspeaker speech coil. The answer to it is to use a matching transformer, having a high impedance primary circuit and a low impedance secondary. We can use exactly the same principle in our valve transmitter.

In Figure 1 (a) C1-L1 provide the high impedance primary circuit, and L2 provides the low impedance secondary circuit. In practice, C1 and L1 would be of the values which give resonance at the output frequency, with a good L-to-C ratio. L2 would typically be between about 8 turns for 1.8 Mhz operation and 2 turns for 28 Mhz operation when using valves in the p.a. When transistors are used, try about one third the number of turns used in L1, and wind them over the centre of L1. L2 is usually wound over the earthy end of L1 for valve use. A little experimenting with the number of turns and the coupling should allow a good match to be achieved. This is indicated by the transmitter loading fully when the aerial coupler is tuned to resonance.

Figure 1 (b) shows one form of aerial coupler which can be connected to the other end of the co-axial cable from the transmitter. In this circuit, C2 and L3 represent a parallel tuned circuit which is resonated at the transmitter frequency. The values of these components will be similar to those used for C1 and L1 in Figure 1 (a). The co-axial cable from the transmitter is matched into this circuit by using L3 as an auto-transformer; the braid of the co-axial cable being connected to the earthed end of L3 and the inner conductor being tapped up the coil a turn at a time until the correct matching point is obtained. This is indicated by full loading of the transmitter and/or minimum reading on a standing wave ratio meter inserted in the co-axial cable.

Assuming that a centre fed half wave dipole is in use, its low impedance feeder is matched to the high impedance of C2-L3 by means of the low impedance winding L4. If a balanced feeder is used (and this is preferable to unbalanced co-ax. in any area where TVI is likely), L4 should be wound over the centre of L3. The number of turns will be similar to those mentioned forL2, and once again a little experimenting with the number of turns and the physical relationship of L4 to L3 will probably be necessary to get the best loading. If an unbalanced co-axial feeder us used, L4 should be wound over the earthy end of L3 and its lower end should be earthed. The sheath of the co-axial cable is connected to earth and the inner conductor is connected to the free end of L4.

When setting-up the coupler, C1 and C2 are both tuned to resonance with the aerial connected and the loading of the transmitter at resonance is noted. If the transmitter does not load fully, first adjust tap X (Figure 1 (b)) to give maximum loading, checking after each adjustment that tap X is still in the optimum position. If the

transmitter is still not fully loaded increase or decrease as appropriate the number of turns on L4 until full loading is obtained. After every adjustment C1 and C2 should be adjusted to resonance.

This coupler, and indeed any aerial coupler, should be built in a metal box to provide good screening. The box should be earthed.

When using this coupler for receiving only, the co-axial cable from tap X should be connected to the dipole input teminals on the receiver if such are provided, otherwise between the aerial and earth terminals. The receiver should be tuned to a steady signal on the desired band and C2 tuned to resonance as indicated by maximum signal strength, C2 being re-peaked after each adjustment of the tap. If signals are still weak even after this adjustment, the number of turns on L4 should be varied until the maximum signal strength point is found.

COUPLING TO END-FED AERIALS

So far we have covered the method of coupling to a half wave dipole, using low impedance feeders which is of course, a single band aerial. For multiband operation using a single aerial we can either use a trap dipole or an end fed aerial. The former can be used with the aerial coupler that we have just discussed, but the latter will require some modifications to the coupler circuit. With the end fed aerial we bring one end of the aerial itself down to the aerial coupler and feed the aerial from this end.

Under these conditions the feed point impedance of the aerial will be anything from a few ohms to several thousand ohms. It will also be possible to use the aerial on several bands instead of only one. For instance, if we use a length of wire cut to resonate as a half wave at 7 Mhz, it will be almost right in length to use as a full wave on 14 Mhz, as three half waves on 21 Mhz, and as two waves on 28 Mhz. The wire can also be used as a quarter wave on 3.5 Mhz. This arrangement is very flexible, though it does have certain disadvantages. These are:-

a) a greater likelihood of TVI owing to the unbalanced nature of the aerial system; (not likely with QRP);

b) a different horizontal radiation pattern on each band (see any text book on aerials);

c) as the lead-in will almost certainly have to be bent on its way down to the transmitter there will be some distortion of the horizontal pattern;

d) and some losses may occur due to the wire passing close to walls, gutters, etc.

Despite these disadvantages, this type of aerial can give good results and it is quite widely used. It can be matched to the transmitter by modifying the coupler shown in Figure 1 (b) to the circuit shown in Figure 2. In this circuit r.f. energy from the co-axial lead to the transmitter appears across low impedance link winding L5, from whence it is coupled to L6. The taps on L6 are the equivalent to those on a multi-ratio output transformer. Taps near the earthy end of the coil provide matching to low impedances, those near the centre to medium impedances, and those near the top to high impedances. It is thus possible to use the coupler to match into a wide range of end fed aerials.

The methods of setting up the coupler is as follows:-

1) Resonate the transmitter output circuit and, with the tap on L6 set to the mid position on the coil, tune C3 to resonance. Note the loading on the transmitter.

2) Repeat the process with the aerial moved one tap up the coil and one tap down the coil and see which of these positions gives increased loading.

3) Once this is known, move the aerial in this direction a tap at a time until the point is found at which the transmitter will load fully.

4) After each adjustment the transmitter must be re-resonated, also C3. If it is impossible to fully load the transmitter even on the tap which gives highest loading, the number of turns on L5 and its coupling to L6 should be varied until full loading can be obtained.

The tap positions will vary from band to band. Taking the 7 Mhz mentioned previously as an example, when used as a quarter wave on 3.5 Mhz it will present a low impedance, and would thus be tapped well down the coil. On 7 Mhz it will be at maximum impedance, and so will be tapped well up the coil. On the higher frequencies the impedance will be fairly high, but lower than on the fundamental frequency, so an intermediate tapping point is likely to give best results.

Adjustment of this coupler when feeding a receiver is similar to the transmitter method, except that instead of adjusting for maximum loading, the object is to obtain the best signal strength. If the receiver is an old one that tends to suffer from image interference someimprovement will be obtained by experimenting with L5. If this coil is kept small and the coupling to L6 is loose, signals will be weaker but image interference will also be considerably reduced, so time spent in finding a good compromise between signal strength and selectivity is likely to produce improved results. Similar adjustments can, of course be made to L4 in Figure 1 (b) if selectivity is a problem.

It is worth noting that the coupling circuit shown in Figure 2 can be used equally well with random length aerials, including those considerably less than a quarter wavelength long. Such aerials will be less efficient than the half or full wave type, but space limitations often make it essential to use them on the lower frequency amateur bands. It is also possible to use a dipole aerial for bands other than that for which it is designed; by connecting together the two conductors in the feeder, and loading up the feeder plus the top, as a random length aerial. Once again this can be fed via the coupler shown in Figure 2. When using this method try and provide the best possible earth system.

USING THE COUPLER WITH A PI TANK OUTPUT CIRCUIT

Many transmitters use the pi tank output circuit shown in Figure 3 instead of the parallel tuned circuit shown in Figure 1 (a). This circuit, when properly designed and matched, functions as a low-pass filter, giving good attenuation of the harmonics above the fundamental frequency. In most designs of amateur transmitter in current use it is designed for an output impedance of either 75 or 50 ohms; and, as it is an unbalanced circuit, can be fed directly into a 75 ohm feeder serving a dipole. While this is true in theory, it is a most dangerous thing to do in practice for two reasons. Firstly, even though

the circuit gives good harmonic suppression at v.h.f., this is unlikely to be enough to prevent TVI in a built-up area. Secondly, and even more important, a low-pass filter gives no attenuation whatsoever to frequencies below the transmitter output frequency. Think for a moment of a transmitter using a v.f.o. on 1.8 Mhz followed by a frequency doubler and a power amplifier working on 3.5 Mhz. Most of the p.a. output will be the 3.5 Mhz component, but there will be some of the original 1.8 Mhz component from the v.f.o. present. If the transmitter is operating on 3510 Khz this spurious emission will be on 1755 Khz which is outside the amateur bands. Let it be sufficient for the writer to say that he has heard amateur stations up to 800 miles away around this frequency, and has been able to find their fundamental transmissions in the 3.5 Mhz band. The lesson is clear - always use an aerial coupler with a transmitter which has a pi tank outpu circuit.

Both the coupler shown in Figure 1 (b) and that shown in Figure 2 are suitable for use with a pi tank output circuit. The setting-up method is as follows:-

a) First, fully load the transmitter into a non-inductive load resistor having a value equal to the output impedance of the pi tank circuit. Once this has been done, connect the coupler to the transmitter.

b) Using the method already described, adjust the coupler until the transmitter is showing the same loading as it did into the dummy load.

DURING THIS PROCESS DO NOT TOUCH THE TRANSMITTER P.A. TUNING CONTROLS

In other words, having correctly set up our pi section filter into a dummy load equal to its own output impedance, we then adjust the aerial coupler until the load represented by the aerial looks exactly the same as this.

AERIALS TO COUPLE TO

The transmitting amateur should already have his own ideas on this subject, and it would be presumptious to advise him. For the SWL, a good arrangement is two end fed horizontal (except possibly for the down lead) aerials at right angles to each other, plus a vertical. The average plot of land on which a house is built is rectangular, so one horizontal should be made as long as possible, and the other should be across the shorter length of the plot. The vertical can be a whip mounted on a bracket on the side of the house, with its downlead brought to the shack window and stood off from the house by two feet at least. Each aerial should have its own coupler and a switch should be provided so that any one of the three can be switched through to the receiver. It is thus possible to instantaneously compare the signal on all three and select the best one for the prevailing conditions.

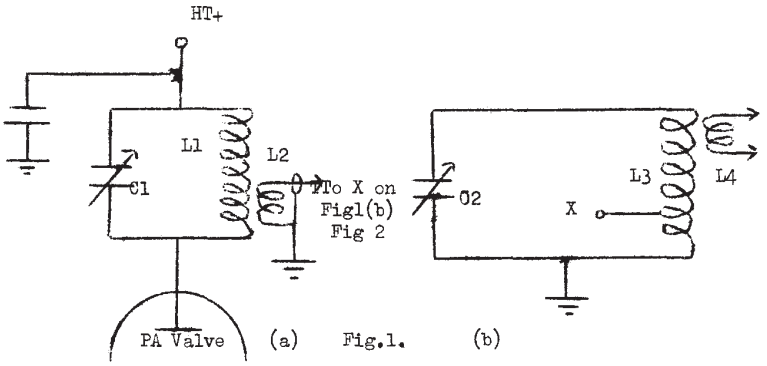


Fig.1.

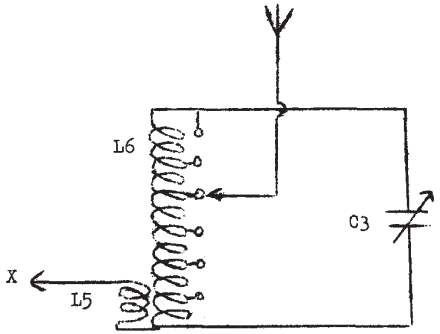


Fig.2.

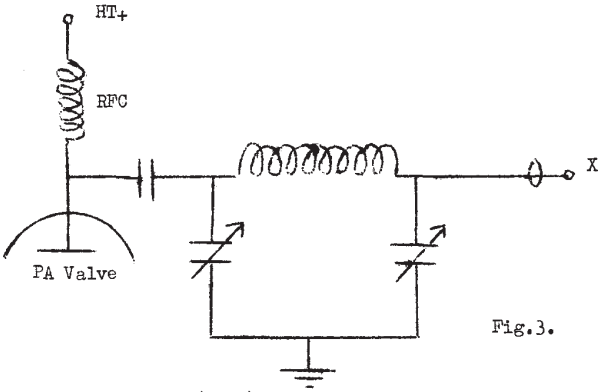


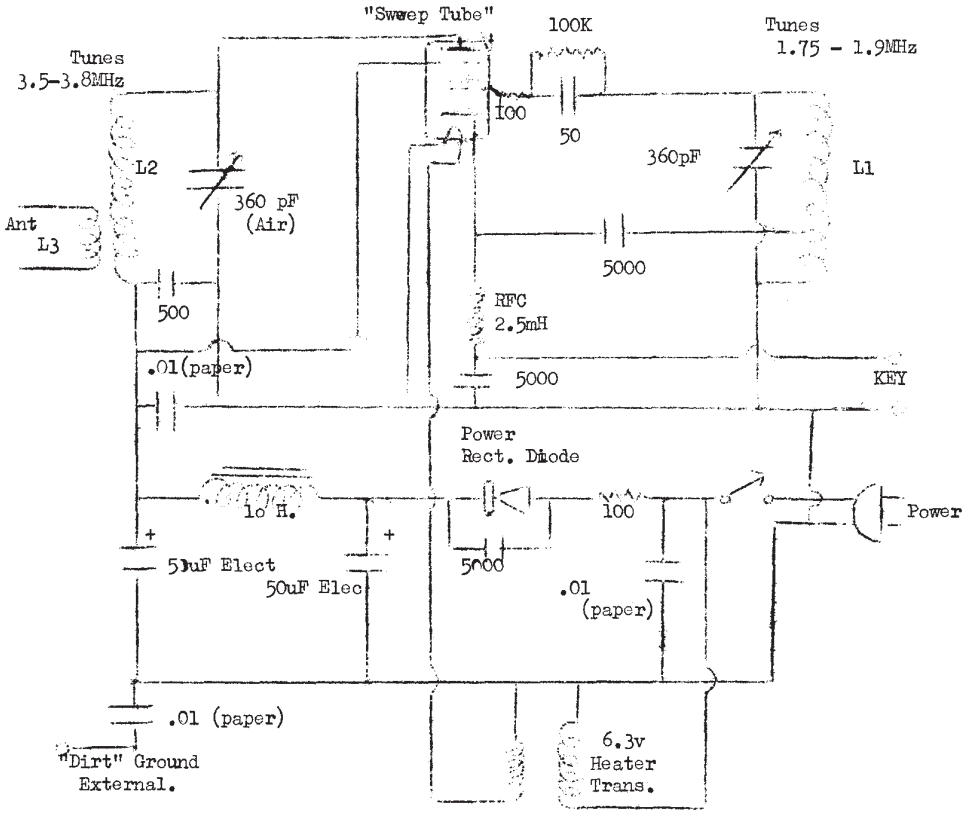
Fig.3.

(Submitted By A.D.Taylor (G8PG) in response to request by member 089 F.C.Stevens.)

DATA SHEETS - The club still run this service - A stamp with request to G3RJV.
MFJ FILTERS-GEN SHEET. QRP ARCI AWARDS LIST.
K8EEG ARTICLE ON ACTIVE FILTERS. THE G3IGU 80m TRANSCEIVER.
IMPROVING SHORT LF BAND AERIALS (G8PG) QST HW-7 MODIFICATION ARTICLES.
SOLID STATE DRIVER & FINAL 40/80(Ham Radio) SIDEBAND MINITUNER+DC RX (Ham Radio)
MINIATURE SOLID STATE V.F.O. (Ham Radio) THE TRANSISTOR 1. (G3YUQ - SPRAT)
I have also got a number of copies of an excellent article by DJ1ZB.
TRANSISTOR PA DESIGN-THE SAFE WAY. (Considered too long and specialised for SPRAT)

"ROARIN - MICK" - 80m MOUSE THAT ROARS By C.F.Rockey W9SCH.

For those who have loads of "tube stuff" in the junk box.....



This job should be especially effective in the UK and EU with 220 line voltage Even works well using 6CU6 "Sweep Tube" with 120v line (4-6 watts) Any Audio or TV-Sweep Beam Tetrode can be used, none of part, except tuned circuit are critical. Since 'electron-coupling' is used with 2nd harmonic:good isolation antenna and Freq. detirmining circuit is obtained.The note is clear and chirp free.
Li and L2 are wound on plastic drinking cups (Woolworths etc) 2" open end dia. L1 consists of 25t No.18 wire ( ) tapped 6t from ground end. L2 is 12 turns No. 18 "Bell Wire" closewound, with L3 2t of the same on the ground end of L2. (This matches my system best-you may need to adjust).Both of the tuned circuits should be High C, and thus High Q. For the tuning capacitors I use the little Japanese made single gang BC (Air) tuning capacitors, readily available in the US (also in UK! G3RJV) or any old air space capacitors of about 350pF Max. If the note is rough try some additional bypassing across the power leads.It will be probably RF interaction rather than poor filtering. Also make sure one side of the heater is connected to the RF ground.

With these precautions the signalwill be "clean and modern" in sound. We make no boast for this rig except that it performs as a GOOD QRP transmitter should. Used with a good antenna, 500 mile QSO's are routine, during the cold months 1500 mile contacts are not unusual. ..... What more do you want ?

J. BIRKETT

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****

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RCA FETS 40600 @ 50p 40601 @ 50p 40603 @ 50p 40673 @ 57p

MULLARD VHF FETS BFW10 @ 27p BFW11 @ 30p, ZTX300 @ 10p ZTX500 @ 10p

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179 G4CZX.	Ian G. Godden. St Michaels Vicarage, Birbeck Rd. Kent House,Beckenham. Kent.	Home const. Simple equipment.
180	George W. Grieveson. 6 Spinney Bank,Kings Sutton, Banbury, Oxon. OX17 3RL.	Heath S.W. Rx 2m converter Home Const.
181 G3YGI	Laurence "Max" Miller "Hillcroft" Springfield, Daybrook, Gloucester. GL17 9BW.	QRP work in retirement.
183 G4CQK	Albert George Allnutt. 18 Crofton Ave,Walton on Thames, Surrey. KT12 3DB.	CW operation. QRP Constr.
184 G3PLB	Ronald William Howe. 18 Vance Hill Drive, Basildon, Essex. SS16 4DD.	160m/2m QRP 160m (4 watts) 2m (500mW)
185 G4ETJ	Reginald Ferris Lyddon. 24 Winbury Court,Hightown Rd. Maidenhead. Berks. SL6 [illegible] 1PP.	QRP CW all bands Home Const.
186 G3KDL	Leslie D.E.Light. 22 Chippenham Ave, Wembley, Middlesex. HA9 6NQ	General QRP, AT5 HROt, 2m/P RAFARS, ISWL, RAIBC.
187 G4ATN	Frank Clinton Tregurtha. 79 Holcombe Close, Bathampton, Avon. [illegible] BA2 6UP.	General QRP.
188 GM3XNE	Art.F.Smyth. 4 Afton Place, Ardrossan. Ayrshire. KA22 1JD	TenTec PM2 2m CW (10watts) 2m FM/SSB (5w)
189 G3OKY	Denis A.G.Vincent. 93 Maple Rd. Penge. LONDON. SE20 8LN.	General QRP /P work
190 GM4EWM	Edward William McLean. 62 Nederdale, Lerwick. Shetland. ZE1 0SB.	General QRP Home Const. CW (ex RAF op.)
191 G5FF	Arthur Blackman. [illegible] 3Pendoch Rd. Winterbourne. Glos,	General QRP. Active HF & 2m.
192 G4CEJ	Ray Moore. 17 Scmme Ave, Flookburgh, Grange-over-Sands, Cumbria.	QRP Const. CW & DSB at VHF
193 Charles	W. Remington. "Rosebank" Devizes Rd. Corsham, Wiltshire. SN14 9EB.	General QRP. HRO Rx, RAE. BRS35232
194 GI3NZZ	Robin Copeland. 39 Cromlech Park, Kilkeel, Co.Down. N.Ireland. BT34 4AY	HW7 Homebrew QRP
195 WB8PJR	Peter Sils. 13529 Harold Ave, Cleveland. Ohio. 44135. U.S.A.	QRP DX QRP DXCC.
196 GW8WJ	J. Phil Evans. 2 Ffordd Ty Newydd, Prestatyn. Clwyd. LL19 8PB	Hon. Member. Hon Sec. of TOPS. 10 w Max, on HF bands.
197 OZ8SO	Jens O Sørensen. Gudrunsvej 22-1 8220-Brabrand. DENMARK.	Rx Geloso G4/214 Double dipole 7/14m 3.5 to 14m 5w TTX.

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198 William F. Kitching. S.W.L.
1 Greenacres, Ketley Bank, I.S.W.L.
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199 G4EEZ Jeffery John Pascoe. QRP /P and fixed on CW & SSB
19 Kiln Orchard, Newton Abbot, Home Const.
South Devon. TQ12 1PJ

200 G2CKM Miles Salmon. /P QRP operation.
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NEW CALLS:

Our best wishes to two new calls within the club:-

086 Col. James Munn. Now - G4ESF.
142 James Alexander Finnegan. Now - GI8KYB.

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052 35 Larkin Ave, Cherry Willingham, Lincoln. LN3 4AZ. (G4BXL)
(Please note proper call given above - at present in the Far East)

032 G3MDQ 15 Pilkington Ave, Sutton Coldfield, West Midlands.

CORRECTIONS:

046 G3ZOF not G3ZCF.

062 Correct Address: 65 The Breaches, Easton in Gordano, Avon Bs20 0LY.
035 Correct Address: 14 Hillview ROAD, Minehead, Somerset. TA24 8EG.

****

******MEET THE MEMBER*******MEET THE MEMBER

JENS O SØRENSEN. OZ8SO.
Jens is a radio operator at a naval radio station, aged 21, whose main interest is radio and other electronics. Jens uses a Geloso G4/214 receiver and a double dipole for 7/14 MHz. He has a 5 watt TTX on 3.5 to 14 MHz with a BD135 P.A.

CLAUDIO BORRI. I3BOZ.
Claudio is a 41 year old engineer in a Pharmaceutical Factory (US Lic.) He has held a licence since 1970 but the radio interest goes back to 1950. He runs a QRP Tx with 5 watts (Xtal and 6AW8 valve) on 7 and 14 MHz. At VHF Claudio runs 1watt FM with a Bantek rig. The receivers are a CR300, HF solid state Super from P.W. and the DJ1ZB OT2 from SPRAT. Antennas are 7-14-21 dipole and 12AVQ vertical.

ALAN T. SHREWSBURY. G3KAN.
Alan was licenced in 1954 at the age of 17. His first interest in amateur radio came through joining the ATC which had a radio room with a licenced amateur as operator. This licenced amateur introduced Alan to the local club and after a year he took the RAE. At that time Alan had to spend his first year on CW only, but this has led to his present interest in CW - he spends about 90% of his time on CW and 10% on 2m FM. His main bands are 160 and 80 with a 2 watt valve transmitter for these bands. He also runs a TTX with a BFY51 on 80m (about 500mW), and a National NC109 receiver. Alan hopes to improve his aerials, at present he only has 85' end fed against a counterpoise. He would also like to spend some time on 2m CW and plans to rebuild his complete station and make it all solid state.

****

FORTH COMING ARTICLES IN SPRAT (space allowing) INCLUDE:-
TWO METRE RECEIVER TO MATCH TO G8EPE TTX.
A COMPLETE AMATEUR STATION WITH ONE TUBE - another interesting item by W9SCH.
BROADBAND AMPLIFIER AND DRIVING ARRANGEMENT by DJ1ZB
THE GI3WUO 4 METRE TRANSCEIVER.
MAKE YOUR PM3A INTO A PM3X. by G8PG.
SIMPLE A.T.U. FOR RANDOM WIRES by DJ1ZB.
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At the moment SPRAT is doing quite well for articles, but we can't have too much material, and it will all appear in time - SO what about the circuit of that project you have built ?