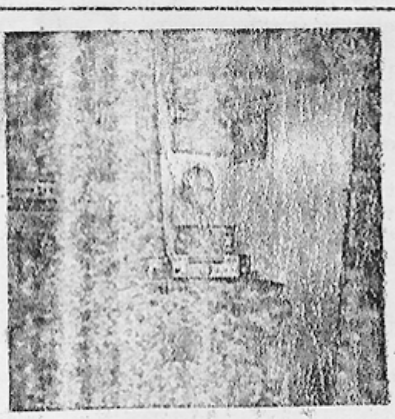
NEW. G.C. DOBBS (G8BJV) 8 RAVENSTEN COURT, CALVERTON, NOTTINGHAM. NG14 6LL.

Devoted to Low Power Radio Communication

SPRAT

NUMBER FOUR. AUTUMN 1975.



New G3RJV QTH.

Rev.G.C.Dobbs (G3RJV) 8 Redgates Court, Calverton, Nottingham. NG14 6LR.

EDITORIAL NOTES:

As you can see from the above address, I have finally moved QTH, after a few hold ups. I write this one week on in the new QTH. The rig is unpacked and 'sort-of' set up as yet without a proper antenna - but that is the next job. The QTH is in a rural setting which should be better local QRM wise, but I don't like the look of the high ridge which lies to the south.

The final production of this issue of SPRAT was rather a hurried affair. Tomorrow I go to duplicate the copies, although according to reports, the electronic scanner I use for diagrams and the front page has been rather erratic lately - so I hope the quality of the drawings will be up to standard.

On the club front, the membership has now passed the 150 mark, and I still receive letters to enquire about the club at the rate of 4 or 5 a week. Publicity of any kind has tended to bring in new members, every mention in the Short Wave Magazine, and the other monthly periodicals has been useful. Pat Hawker (G3VA) gave the club a mention in his amateur radio column in the Wireless World, which brought several enquiries, and our first members from Denmark and Italy. Person to person contact is also vital for the future growth and well being of the club. GM3MXN gave a talk about QRP to some of the locals and the club has two more members. So spread the word around - give that talk on QRP to the local club - if you want an outline and information for your talk, drop me a line.

The present size of the club, and the convenience of the annual Leicester Amateur Radio Exhibition, make a personal meeting of members a real possibility. I have only met a handful of members and would welcome a chance to meet the QRP operators I have come to know through letters and QSO's. Later in this issue, you will find my suggestion for a meeting at the Leicester Exhibition (I'm afraid I do not know the exact date - keep your eyes open in Short Wave Mag. and Rad. Comm.) I know that many members were present at the last Exhibition and such a meeting would kill several birds with one stone. We could, apart from the obvious pleasant 'ragchew', discuss the future of the club, look further into a club constitution and officers, and I could present my accounts.

On the same note, I would like to see items of a more personal nature in SPRAT. You will notice a MEET THE MEMBERS spot for the first time and a picture (if it copies OK - it's rather dark-) of the G3RJV quick set-up in the new QTH. I would be happy to receive YOUR notes for MEET THE MEMBERS, or a picture of your QTH, and any items of news about your QRP work. This will augment the technical content of SPRAT, and bring a more personal touch to the pages. We may not all be able to submit technical articles, but most of us have news or ideas worth sharing. This issue is rather short of members news items because of the very limited time available during my QSY to prepare any more typed material.

I am still glad to receive the steady flow of letters from members, after careful reading, they go into one of the files you can see in the top right of the picture, and during the last few months I have been able to build up a picture of the interests of members. In several cases I have been able to pass on questions and ideas to like minded members. Although this relies on my rather haphazard filing and memory, I hope this personal 'passing on' on information can be one of the services of the club.

Amongst the more direct services of the club, the award certificates have been printed (and look very splendid) and the 'data-sheet' service continues. All award claims, please,to Gus, G8PG, and a stamp to me for any 'data-sheets' required - these include: QST ARTICLES on HW7 Mods, Circuit and Information on the MFJ CW FILTERS, An Article by K8EEG on AUDIO FILTERS for QRP work, The SM3CFV TTX with English Translation, The QRP ARCI (American QRP group) Awards List, and I have just prepared a reprint of the SIMPLE HW7 MODS which appeared in SPRAT No.2.

The best of luck for your construction projects in the coming dark evenings, hope to see you at the Leicester Exhibition, and HPE CU QRP,

73's George G3RJV.

MEET THE MEMBER....NUMBER ONE CYRIL STAMPTON. G3ZDR.

Cyril is an ex-R.N. Spark (submarine) aged 55, now employed by the G.P.O. telephones. Sea Cadet Corp Instructor - Communications - QRP work mainly on 20m, with some on 15/40 metres - RW7 to a JOYSTICK and 1 watt FM on 2 metres. Main interest CW working, and some construction when time allows. Other interests: Royal Naval History, Reading-most subjects, Tape recording, Member of Royal Navy Amateur Radio Society

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NUMBER TWO. KAREN GARRISON. WA1THQ.

Karen, our only YL member, is used to being the only woman in a group. She majored in P Physics at college and was the only YL in most of the classes and the first YL on the campus to have a motorcycle! Now Karen, at 32, is an XYL with a 4 year old daughter. (So much for higher education ! she says) She is interested in the propagation of radio waves and is planning to set up a small telescope to observe sunspots and correlate them with the WWV propagation reports. Some of her other interests are reading about science and philosophy of science, tennis and hiking.
Karen runs the Argonaut on mainly 40 and 20m to a dipole at 7 metres, but has rather limited operating time.

WHAT ABOUT A FEW NOTES ON YOU - YOUR INTERESTS - YOUR RADIO ACTIVITY - FOR THIS NEW SECTION OF SPRAT.

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ANTENNAS AT DL7DO/P

The following is part of a letter from Ralf (DL7DO/P) to Gus (G8PG It has been slightly edited - DL7DO/P won the Winter 1975 DL AGCW QRP contest by over 10,000 points !.....

'Answering your question about the antennas I use for QRP, they are very simple. Most of my QRP DX QSO's are made with a centre fed dipole about 68 ft long, with tuned feeders. The height at the centre is about 22ft and the two ends slope down to the garden fence. It was with this antenna that I worked VO1KE on 80m using an input of one watt. This antenna is located at my portable site in the most northerly suburb of Berlin. I believe that much of my success is due to the excellent earth conductivity of this site, the water table being only about 1.5m below the surface of the soil. The contact with VO1KE was made under conditions which occur only once in a life time. His signal was 20dB over S9, and he was at the HF end of the band, just below 3600, to tune up his TX, and he heard my call. Until I got the QSL I thought it had been one of t the locals pulling my leg!
During my vacation QRPp work I have used a 5-band dipole with co-ax feed, but it is hard to erect (takes half a day hi). For 10m /P I use a home made portable full size ground plane. My best with this has been UA9 when I was running 125 mW! This was from a 600m hill during winter and it was so cold I had to keep the batteries in a belt around my waist to stop them freezing! The TX was co/pa ttx, and the RX a 3 stage transistor converter into a Jap bc rx with added BFO. I like the empty, snow covered hills in winter - no milling spectators to give good advice. Ten is almost 'dead'at themoment but when conditions improve, I will try a portable beam on 10 and 15m

It may be significant that all three memebrs who have applied for the basic Countries award so far, use simple wire antennas. You do not need a four element beam for successful QRP work.

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NOTE by G3RJV..... further to Ralf s remarks about conditions on 10m...I just wonder if the band is open more times than we believe. I have listen to the "11m band" on G3PDL's new FT301, and it's full of loud CB and pirate rubbish all working away quite happily. If 'lids' can do it on 11m, why can't we work 10m? Perhaps QRP operators ought to explore 10m a little more often..... any comments ?

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Q.R.P. WORK ON V.H.F.

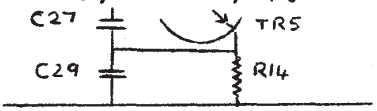
Many club members G3&4, as well as G8, are using QRP equipment on 2metres. To date I have received very little information, technical, or otherwise on QRP VHF work. I feel sure that there are members using homebuilt gear who could share their circuitry, or others who have QRP tips, news or require skeds for the VHF bands. I would welcome any items on VHF for SPRAT. Incidently I notice that 'Practical Wireless' are doing a series on 2m gear to end with a QRP FM TX in the November issue.

CORRECTIONS.....

G-QRP COUNTRIES AWARD. As a result of a typing error on my part, Gus has been waiting patiently for claims to the above award - without response ! Contacts AFTER 1st JAN. 1970....NOT 1975. So look out those QSL cards from 1970 onwards, and apply for the award.

G3IGU TRANSCEIVER. Keith has written to me to expalin an error in the VFO circuit. C28 (100pF) should not be in the circuit, but emitter/r14 junction should go DIRECT to C27/C29 junction.

CORRECTED CIRCUIT :-



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MEMBERS AD's and REQUESTS

G4DYF (Brian Castle) mentions that he has found a limited number of 10X crystals, suitable for regrinding to the amateur bands - some are actually in the bands, eg. 1802.5 There are also some crystals with B7G bases inside the 3.5 and 7 MHz bands. Members wishing to obtain crystals should write to Brian or telephone him at 0732 56708. They are priced between 50p and £1.25 according to type.

S.H.Webber, member 148, has requested details or a source of information on the STR/8C I believe that this is an ex-service receiver. Anyone know anything ?

P. Kelly. member 119, is a student who has passed both RAE and Morse Test and is amassing equipment prior to obtaining a licence. He is in need of frquency measuring equipment, and would like to obtain an old absorbtion or heterodyne wavemeter for the lowest possible price! Can anyone help ?

WA2TLQ/4, our old friend David Earl-Clark of G5BIU, is Xtal controlled on 40m, and would like skeds on 40m between 0000 and 0500 GMT with club members - he has 7037.04, 7045, 7051 and 7055 in his crystal collection, as possible frequencies.

David also offers his services to any QRP EU or DX station requiring a US QSL manager. Then he finally reminds us to keep trying 21MHz for WN contacts - novices are thrilled to work G. QRP stations, and could make future QRP full licence stations - they also QSL keenly! Davids new QTH is in last SPRAT members list updating.

G3DNF, Gordon gives a piece of cautionary advice - some members are signing G3**/QRP. This is not permissible in the UK, and not likely to endear us to the Home Office!

*****WELL DONE... to Gwyn Williams who has passed the May RAE, as an ex-service telegraphist, the morse test should be simple, so Gwyn will doubtless be a G4*** soon.

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REDUCING THE FREQUENCY OF CRYSTALS.....Notes from Allan Jones G3XJO

An additional note to G3DNF's excellent article on crystal grinding. It is often useful to be able to reduce the frequency of a xtal and I have found a way of doing this which is much better than the use of a pencil on the plate. This is to use ROTRING ink (available cheaply from most stationers, it is like Indian ink, which could perhaps also be used, but has not been tried). First a spot, as small as possible, is applied to the centre of the plate - a 0.2mm ROTRING nib or similar will make this simple. Wait for about 30 secs, and wipe the crystal face with a paper handkerchief. This will remove surplus ink and leave a very thin smear across the face of the crystal, with a more solid spot where the ink spot was applied. (For some reason this combination seems more effective than either a simple smear or dot on their own - hence the 30 sec delay) This is repeated on the other side - after the ink is dry re-assemble, and the crystal should be found to have moved some 100Hz. The procedure may be repeated as required, with further dots of ink (not on the same spot, as far as possible). Generally about 10KHz shift is possible; if it is known that a large shift is required, several dots may be applied at once. The frequency may drift a little in the first hour or so, but generally by the next day, the crystal will be steady. Finally remember that the frequency of a cystal may be pulled quite considerably by use of a 50pF trimmer in series with about 10turns of wire on a 3/8" former, in series with the cystal.

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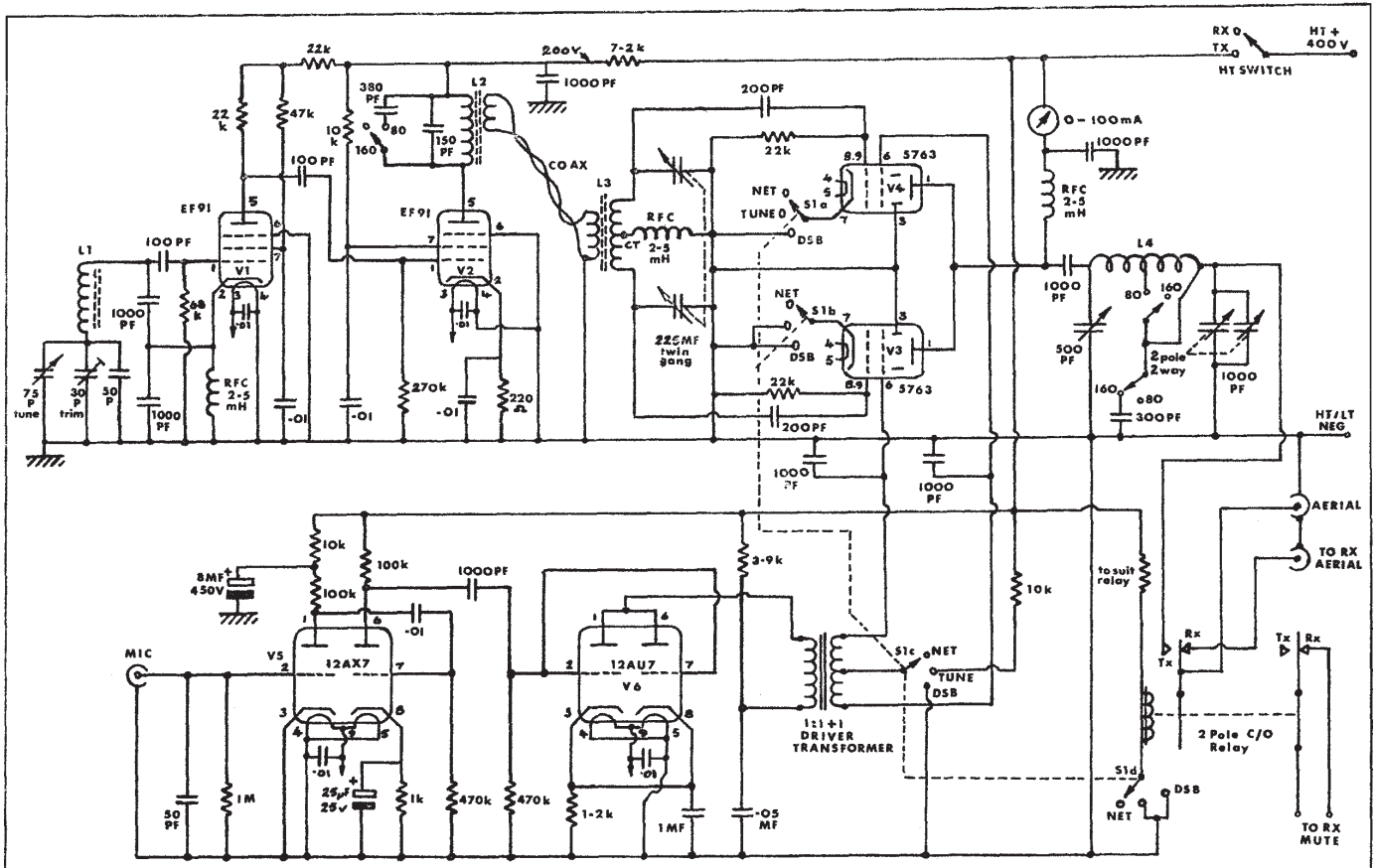
NEXT ISSUE OF SPRAT : "Cheap crystal possibilities for QRP WORK" by DJ1ZB, Ha-Jo Brandt shows how with various mixing combinations, cheap, non amateur band crystals may be used to give a variety of useful operating frequencies within the bands.

WHAT ABOUT YOUR CIRCUIT, HINT, NEWS, TECHNICAL TIP, ETC. FOR SPRAT ?



"DSB I" Double sideband transmitter. Designed by G3YUQ.

Issue A

"DSB 1" Double Sideband Transmitter" designed by G3YUQ.

The "DSB 1" is designed for QRP Double Sideband supressed carrier operation on 160 and 80 meters. The signal produced is received as SSB by modern tranceivers and selective sideband receivers. Output from the rig is about 6 watts PEP. Design and construction has been kept as simple as possible thus reducing building time and cost. Setting up is also simple, unlike SSB rigs there is no filter, no crystals and no bias supply required from the PSU. Most components are ex "junk box" type.

The circuit

The heart of any TX is the VFO, this design uses the well tried clapp oscillator. However other constructors may prefer a different design and this will be equally suitable. An alternative valve is the EF80. (B9A base). The VFO covers 1.75 to 2.0 MHZ.

Output from the VFO is via a 100pf capacitor to the Buffer/Frequency Multiplier stage. This again is a "standard" circuit. Alternative valve type is EF 80 (B9A base).

The anode of this stage is tuned by L2 to 80 meters, or 160 meters by switching in additional capacity. This stage is link coupled (via a length of Co ax cable with the screen earthed at one end). to the grid coil of the PA stage L3. This coil provides RF in Push Pull to the PA valves. It is tuned by a twin gang capacitor to 80 meters at minimum capacity and 160 meters at maximum capacity.

The anodes of the PA valves are brought together and pass via a PI tank network to the aerial. The screens of the PA valves derive there voltage from the Push Pull audio of the modulator. Peaks of audio giving about 200 volts. The screens are returned to earth via 1000pf capacitors. (Note do not increase the value of these). In the absence of audio the valves do not conduct. Speech into the mic produces a voltage varying at an audio rate on the screen grids of the PA valves and the valves conduct. Alternative PA valve are 6BW6 or EL84. The modulator is a 12 AU7 with both halves connected in parallel to provide a "Beefy" valve, the anode being fed in via the primary of a 1:1 approx. push pull drive transformer.

The speech amplifier is again a "standard" circuit using the popular 12 AX7. It is designed to be used with a high gain crystal microphone. The power supply is required to give 400 volts @ 100 ma HT and 6.3 volts for the heaters. A standard 350/0/350 transformer will be suitable and will give 400 volts when smoothed. No stabilizer has been found necessary but constructors may prefer to stabilize the VFO HT supply at 150 volts.

Function Switch S1 is a 4 pole 3 way and is used in conjunction with the HT switch.

In the NET position HT is applied to the VFO and Buffer via the HT Switch. The relay is not energised and so leaves the receiver on and the aerial to the receiver.

In the TUNE position all stages except 1 PA valve are operational when the HT is switched on. The remaining PA valve has HT applied to the screen grid and the rig is tuned in the normal way for AM rigs with a P1 tank output stage. The relay is energised and so the aerial is connected to the TX and the RX is muted.

In the DSB position, all stages are operational when the HT is switched on. The relay is energised and the aerial is connected to the TX and the RX is muted.

CONSTRUCTIONAL NOTES

Commence by building the VFO. This is built in a 3"x3"x2" deep box with all the components inside except the valve which is mounted outside on the top. The completed unit is mounted on top of the chassis with leads for HT, LT and output brought out underneath and through the main chassis. The VFO is adjusted by L1 and the trimmer to cover 1.75 to 2.0 MHZ.

The Buffer anode coil must be fitted before the VFO unit is mounted on the chassis. Keep all leads short and direct. The screening shown, isolates each stage of the transmitter from the next to minimise the risk of feedback. Screening cans are fitted to all valves except the PA stage.

HT, LT supply is via a terminal block at the rear of the TX.

A screen lead must be used for the microphone. The connection from the microphone socket to the valve pin must be short ($1\frac{1}{2}$") and screened with the screen earthed at one end.. (a piece of Co ax is O.K.). If this is not done the speech amplifier may oscillate as this is very high gain stage.

The front panel should be painted and lettered up before work commences on the main chassis. The cabinet is a wrap round type with a sloping front and a ventilation grill on top. It can be finished in "car spray". The panel can be marked up using Letraset or similar transfers.

Setting up
First the VFO is adjusted to cover 1.75 to 2.0 MHZ Listen on the main station receiver to check.
80 meters
Connect a 15 watt lamp to the aerial as a dummy load. Switch function switch S1 to TUNE, Band switches. (Buffer & PA) to 80 meters, TX load to maximum capacity. Grid tune to minimum capacity VFO at 3.8 MHZ. Switch on HT. Quickly adjust PA Tune for dip in PA current. When found open PA load slighly & redip, continue until the PA meter reads about 40 ma lamp should be glowing well by now.
Adjust the slug of the Buffer stage anode coil for max dip in the PA meter and the TX is now set up for 80 meters.
160 meters
AS above except, Band switches to 160 meters. Grid tune @ maximum, VFO @ 1.8 MHZ. Tune as before. If not possible to get a good output @ 1.8 MHZ adjust the valve of the 380pf capacitor across L2. 380pf is average but up to 500pf may be necessary. Once correct rig is set up for 160 meters. Switch to DSB on S1. PA meter will read zero but kick up to 40ma or over on peaks of speech

Operation
Net Function switch to NET. Switch on HT. Tune the VFO to zero beat with incoming signal.
Tune Switch to tune. Switch on HT. tune P1 tank to 40 ma approx. Adjust grid tune control for max dip on PA meter or max output on Field Strength meter. This will be necessary as one tunes across the band.
Transmit
Switch to DSB. Use the HT switch as a Standby/Transmit switch, i,e. switch on to transmit. PA current will read zero but kick up to over 40ma on speech peaks on the fully loaded TX.
In the QTH the G3YUQ QTH with a 90ft end fed wire with a fwe bends in a small garden. I can get around the u.k. (not V.K.) quite easily during the day and into Europe and Scandinavia very well during the evenings, even on a crowded band. I usually get good reports and most stations express surprise that I am only using 6 watts. Most stations Do not realise the rig is DSB not SSB, I have sold my "KW Vespa" which ran 220 watts, results are much the same as before Vive la QRP! I would be pleased to hear from anyone building this rig and the results they get.

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NOTE by G3RJV.....About 3 months ago, The Sort Wave Magazine received a letter from Min. Posts & Telecoms which cast doubts upon the legality of DSB as an amateur mode. This caused surprise as AM is still a legal amateur mode. Since that time, G3YUQ has been in touch with the R.S.G.B. ab. the legality of DSB on the amteur bands. It would appear that DSB is still a legal mode for the amateur, the letter to the Short Wave Mag. being the result of a misunderstanding within the HOme Office.

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G - QRP - C AWARDS.

A batch of very fine award certificates have been printed for the club awards. They are royal purple embossed with gold and will look very fine on the wall of any shack. Claims for awards should be made to G8PG, according to the conditions given in the last issue of SPRAT. May I repeat my correct to the information given for the QRP COUNTRIES AWARDS - the date for the beginning of qualifying QSO's for the basic awards is 1st Jan. 1970. (Not 1975!) SO LOOK OUT THOSE QSL's !

THE G2NJ TROPHY.

A splendid cup has been bought by Nick for this award, which we hope will become the most coveted award in the QRP world. The award will be annual, and the winner will retain a keepsake replica cup. For conditions of the award, see the awards page in the last issue of SPRAT. Copies of the awards programme are available for club members and non-members from G8PG.

CLUB MEETING

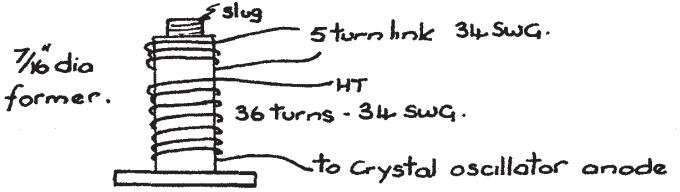
A large number of club members were able to attend the 1974 Leicester Amateur Radio Exhibition. This event appear to draw more people each year from all parts of the UK. This exhibition would provide the club with an excellent venue for a meeting of members. I suggest SATURDAY - 4pm - REFRESHMENT AREA as a meeting point. Members will probably have Callsign Badges, but a G-QRP-C badge from SPRAT could be worn.

Coils for "DSB 1"

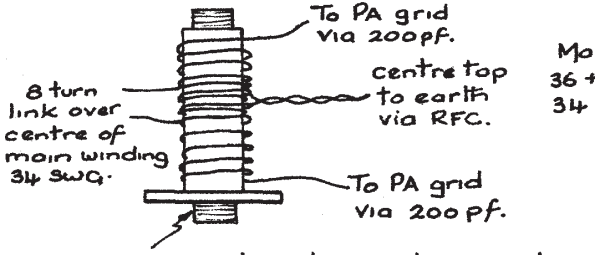
L1. VFO Coil. 96 Turns 34 SWG
½" dia former + core

Note A longer than average former is required to accomodate all the turns. (close wound 1 layer).

L2. Buffer Anode Coil.



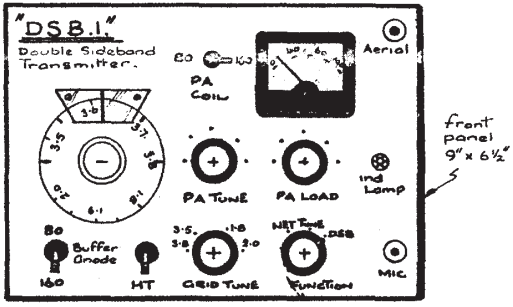
PA Grid Coil. L3.



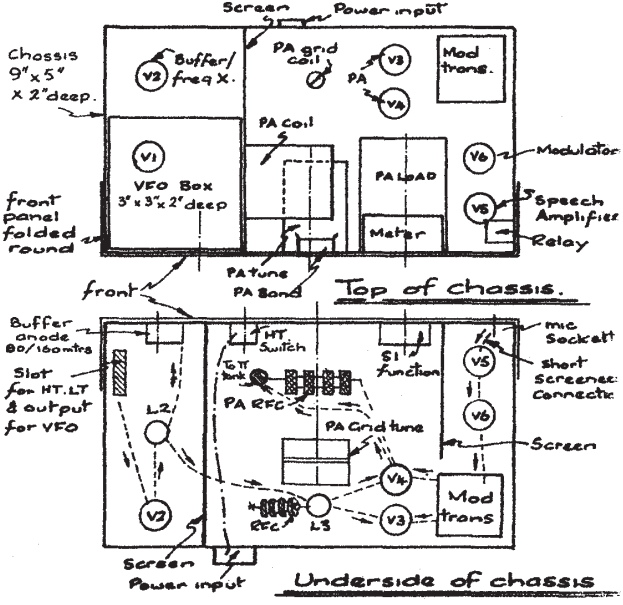
Main winding
36 + 36 turns
34 SWG.

L4 PA TT Tank Coil.

39 turns closewound of 18 SWG 1½" dia former, Tap at 19 turns for 80 meters.



Front Panel.



PROLEGOMENA TO QRP TRANSMITTERS. By C.F. Rockey, W9SCH.

A Paper prepared for the students of New Trier Township High School.

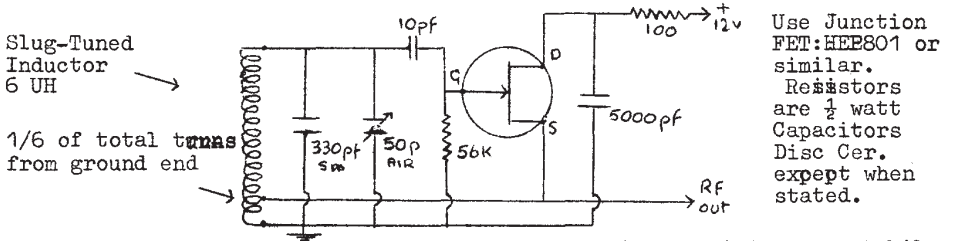
1. The VFO: Every truly effective High frequency QRP transmitter uses a VFO. While crystal control is cheaper, it so inhibits one's operating scope that it's use is not worthwhile. Therefore:

A. The essence of good VFO design is expressed in a few commonsense rules

1. Strict derating of all components, to avoid value shift with temperature change.
2. Sturdy Mechanical construction (no more need be said here)
3. Use of High Q, high C tank circuit. Wind coil with heavy gauge wire.
4. Loose coupling between the transistor and tank circuit.
5. Isolation of oscillator circuitry from the following stages. A tight shield around the oscillator is not necessary, but good decoupling of supply leads is mandatory.
6. Do NOT key the oscillator, if this can be avoided.
7. Use only air and mica (silver) capacitors in tank circuit.
8. If expedient, run the oscillator at a submultiple of the final amp. frequency. This is important at output frequencies above 4 MHz.

B. We believe that the exact circuit arrangement used is much less important than many people think. With all due respect to Messr's Vackar and Seiler, such 'trick' circuits are not necessary to achieve satisfactory amateur-level stability. Any good circuit, well set up (according to the above rules) is capable of good performance. Rather, the rule should be: "The circuit you like best will work best for you", as QST once advised.

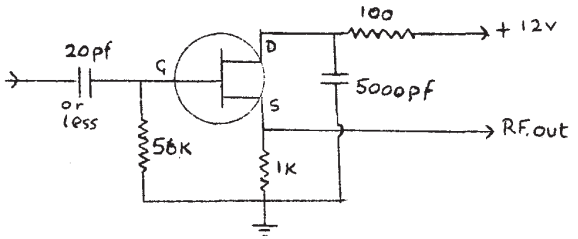
C. The circuit we like best is shown below, with values suitable for the 3.5 MHz Band



We use junction FET because we find that it provides satisfactory stability, yet not not be 'handled with kid gloves' during construction. (any thing which can be damaged by body static is too darned delicate for heavy handed klutzers like us. So, we eschew MOSFETS) "DE gustibus non disputandum est."

II. Source - Follower, Buffer Amplifier:

A good FET 'source follower' offers better isolation than one using a bipolar transistor, we believe. One of these should be used between the VFO and any following stages. It is important to keep the input coupling capacitor small to insure good isolation. The circuit is given below :



Use Junction
FET: HEP 801
or similar.

III. Frquency Multiplier ('doubler or'tripler')

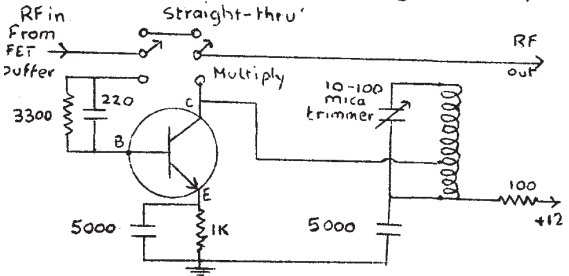
As stated,we prefer to operate the the oscillator at a submultiple of the final frequency,in the interests of stabiltity and keying properties. It is best to :

a. Do any frquency multiplying at a low signal level (power)

b. Do not attempt frequency multiplication of of more than X3 in one stage. If greater multiplication factors are required use a series of stages

We find that a good,high frequency bipolar transistor is satisfactory as a frequency multiplier. One gets more RF power from these than from a FET.

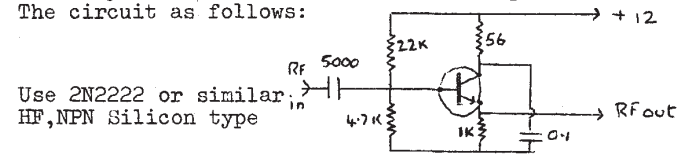
The circuit used is straightforward, as shown below:



IV. 'Power emitter - follower'

While not always strictly necessary, one or more stages of this type between the multiplying stages and the driver stage of a QRP transmitter insure adequate drive to the following stages and performs wonders in the way of isolation. Since such a stage does not consume much DC power, we heartily recommend it's use. It seldom presents any problems.

The circuit as follows:



Use 2N2222 or similar HF,NPN Silicon type

We call this a "power" emitter follower because it is capable of supplying twice as much power (RF) or more, than an FET source follower.

V. Tuned Driver Stage

This stage is so called because it supplies RF signal driving power to a more powerful class-B or class-C amplifier stage, often to the final power amplifier stage. It's performance is therefore vital if satisfactory power output and efficiency of the following stage is to be attained. Fortunely, it seldom provides a problem if a good tank circuit and short connecting leads are used. A GOOD RF,silicon NPN transistor such as the 2N2222,HEP-728,or similar is to be used in this circuit. This amplifier is always tuned to the output RF frequency, multiplying being done in earlier stages. The tank coil should be wound upon an 0.68" toroid form and tapped for the collector at about one third of the total number of turns up from the low RF potential end. The tank capacitor should eaither be of the air-spaced type (about 14MHz) or one of those mica variables originally designed for miniature BC. AM receiver use. Either work well below 14MHz.

The secondary winding of the tank coil should be adjusted empirically until a No.48 (2 volt, 60 Ma) pilot lamp is most billiantly lighted. This will then provide satisfactory impedance match into most 3 to 5 watt bipolar class-B/C amplifier stages. Seldom will more than 5 turns be needed on this winding.

Since this stage operates in approximate class-A range, and is driven from an untuned,emitter follower stage, no instability problems should normally be experienced in getting it to work well.* DIAGRAM LATER IN TEXT

VI. The Final Power Amplifier Stage.

Having completed a clean and stable VFO, the experienced amateur should have little difficulty in the other preliminary stages of a QRP transmitter. If reasonable precautions are taken as suggested, these stages are largely plain sailing. But the FINAL POWER AMPLIFIER STAGE is something else again. Indeed, few amateurs build their first few RF Power Amplifier stages without having a tale of woe to tell about them. When setting up a first (or even 2nd or 3rd) solid state transmitter, few amateurs will get by without sending a number of fancy and perhaps expensive transistors into solid state Valhalla. This also, seems to be the human condition, as theologians say. There is no doubt about it, IT IS THE DEVELOPMENT OF CLEAN RF POWER IN APPRECIABLE QUANTITIES THAT IS THE GREATEST CHALLENGE in this field for the average amateur.

This is probably not the individual amateurs fault. Unlike vacumm tubes which can be well comprehended by almost any diligent person, the transistor does it's business at the atomic level. And atomic theory is obscure, and sometimes utterly imcomparable with normal human common sense. Apart from this the main troubles are:-

1) Parasitic oscillations, sometimes at unpredictable frequency (number one transistor zapper !)
2) Over heating.
3) Poor RF power output, or collecter efficiency.
4) Interaction with oscillator stage (leading to chirp) - and 'Bum CW NOte'!
5) QUANTUM-MECHANICAL NECROMANCY. (The transistor simply turns up it's toes and dies. Not even an Atomic Physicist can tell you why!)

Let us consider each of these a bit further :-

Parasitic oscillations are perhaps the most prevelant difficulty. Although these be generated at almost any frequency, it is the L.F. ones which arise most often. These can be minimized (only a magician could prevent them) by keeping all the RF leads as short as possible, bringing all the 'grounds' of a single stage to one common point, and by using a small resistor in series with the base-right at the transistor. Often parasitics can be spotted by listening to the signal in a nearby receiver. If the signal is accompanied by a hiss that seems to 'surround' the signal...them you've got 'em brother! Some people say those little ferrite beads, strung on base or collector leads, helps with this problem. Other recommend the ritual sacrifice of a cheicken to Papa Legba...

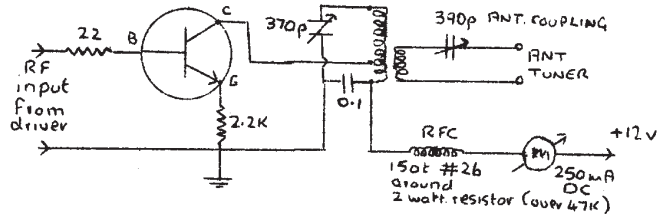
Overheating is relatively easily forstalled by using a large-enough transistor for the job at hand. It is recommended that the rated collector dissipation be at least twice the operating power DC input. With the type of transistors we have in mind here, a little heatsink - looks like a crown - will help to radiate and conduct away much of the heat.

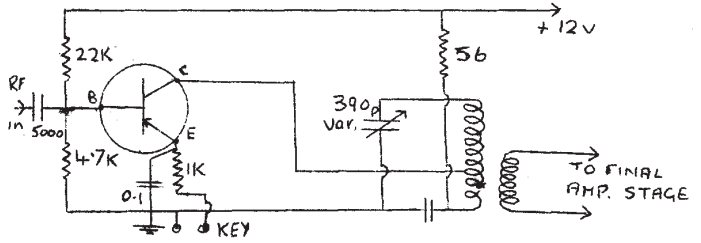
Poor RF output and efficiency are often further indications of parasitic oscillation. If not, perhaps the base driving power is insuffocient. A lossy tank circuit, or the wrong number of turns on the secondary of the coil is often the trouble Perhaps the collector tap on the tank coil is not properly placed, although this is not usually critical.

Interaction between the final amplifier and the VFO is a real stinker. We assume that your DC power supply is well regulated, or you'll be asking for trouble here. The oscillator stage should be phycically well separated from the final stage. or shielded therefrom. If you have enough stages between the oscillator and the final to insure reasonable insolation, then RF current may be sneaking via the power leads. We had this trouble once; we licked it by putting a small RF choke in the + lead of the battery, to the final amplifier. This cleaned up persistant chirp immediately.

We don't know what to say about Quantum Mechanical Necromancy, save we have inded experienced it. We lost at least one good transistor in this way. Contact your own favourite witch or astrologer...

The circuit we use with some luck is given below :-





TUNED DRIVER AMPLIFIER.

(see back)

NOTES ON POWER AMPLIFIER: A number of transistors will work well here recommened is a silicon NPN job with at least 3 watts collector dissipation, maximum collector current rating of about 2 amps or more, and emitter cutoff of at least 200 MHz. The 2N4427 is the old reliable, but are getting expensive again. The GE-18 is OK, as is the 2N3303, if you can latch onto any. Some of those 'switching transistors' for digital use might do well here. Of course, we are speaking of operation between 3.5 and 21MHz. The tank coil should be wound on an 0.68"toroid form, to resonate at almost full tank capacitance on 3.5MHz, about half capacitance at 7MHz. The output coupling coil should be wound over the 'cold' end of the tank coil and be adjusted to laod the properly-tuned amplifier to about 200 ma. with the antenna coupling capacitor at about ⅔ maximum capacitance. This is with a 50 ohm output impedence. The collector tap is made about one fifth of the way up from the 'cold' end of the tank coil. The tank and antenna loading capacitors may eaither be of the air-Dielectric or mica type, as made for AM BC receivers of the smaller type. Either type seems to work well with circuits certainly below 15MHz.

SOME HINTS WHICH MAY SAVE A TRANSISTOR: The British say: "The transistor is the fastest fuse on three legs, known to man". We agree, so to keep these expensive fuese from 'popping' :

1) Always put a safety diode between the power supply and the transmitter, in series with the + lead. It is so easy to get the power leads reversed, and without the safety diode, you will certainly 'pop' at least one transistor...maybermore
2) Always put some kind of emitter resistor in circuit whenever the common emitter mode of connection is used. In the event of excess collector current, the voltage drop across this oposes the base voltage and acts to lower the current...may save a tranistor
3) Always check a freshly built circuit with about ½ full supply voltage first; until your sure that no 'bad troubles' exist. If voltages and currents seem reasonable you can apply full power voltage with less risk of a catastrophe.
4) Make sure that there is a firm load across the output of a power amplifier at all times. This will hold down transient peakswhich may damage the transistor.

TANK COIL SUGGESTIONS FOR HIGH FREQUENCY QRP TRANSMITTERS:

We have found it most convenient to use the 0.68" OD toroid forms for our tank coils. This size seems the best compromise between cost and magnetic properties. (The smaller ones are too difficult to wind by hand, larger one not necessary) Different ferrite mixes from different sources, have slightly differing permeabilities, but not enough to invalidate our suggestions here.

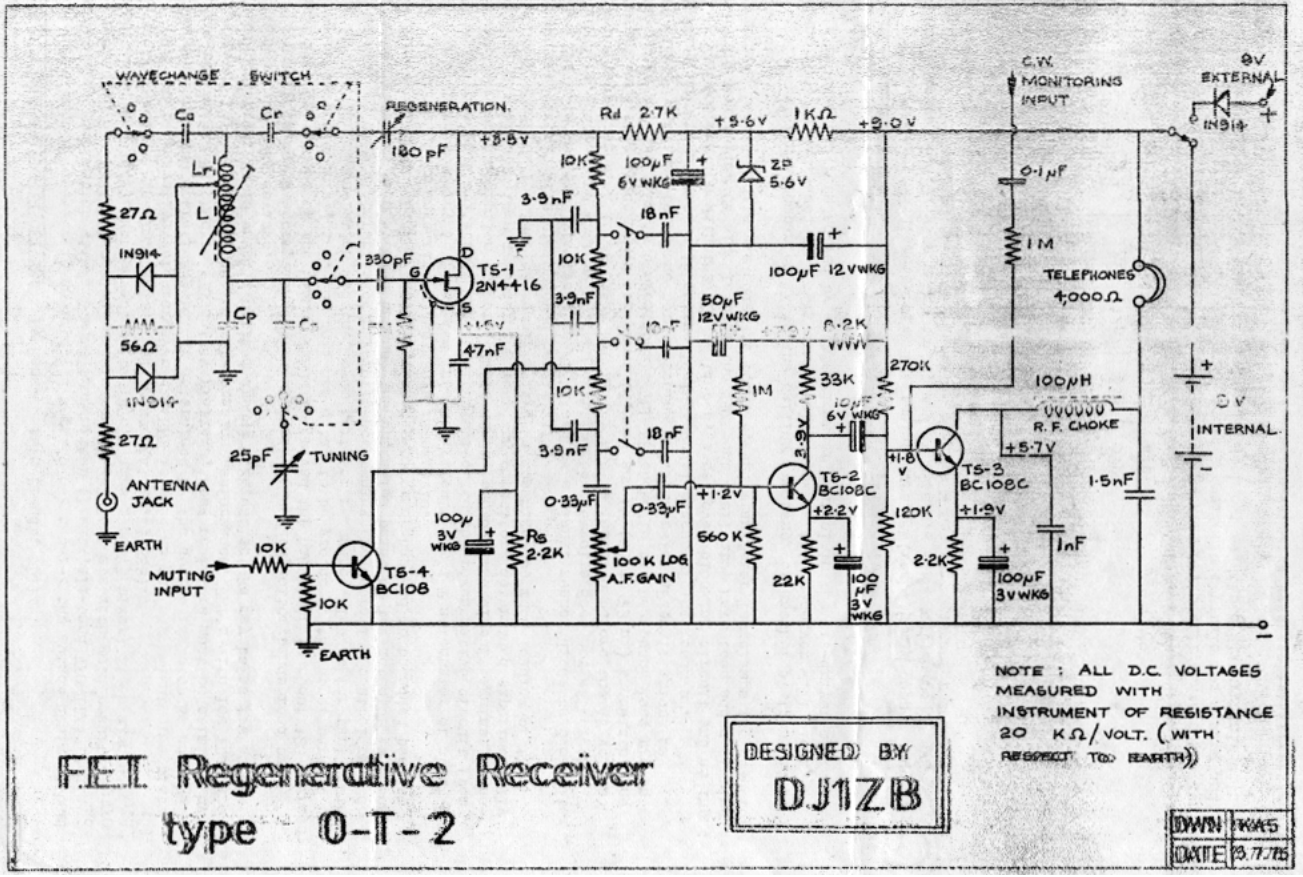
A useful empirical formala for estimating the number of turns required for resounance with the HF amateur spectrum is :

$$n = \frac{1820}{f\sqrt{c}}.$$

where n = number of turns, f = frequency in MHz, C = capacitance in pica-farads - this formula applies only to the o.68" form, of course.

Practical experience indicates the advantge of using one tank coil to cover two amateur bands - the resulting 'Q' seems adequate for amateur needs. Accordingly we have paired-off the most popular amateur bands, and suggest coil dimensions in the table below :-

MHz. BANDS:	TOTAL TURNS:	TAP FOR driver USE (From Low potential end)	TAP FOR 'P.A.' USE (from low Potent. end
3.5 - 7.0	28	9	6
7.0 - 14.0	20	6	4
14.0 - 21.0	8	4	3



F.E.T. Regenerative Receiver

type 0-T-2

F.E.T. REGENERATION RECEIVER. By Hans-JOachim Brandt. DJ1ZB.

This simple receiver is an improved version of an O-T-2 the author designed bakk in 1961. In combination with a 3 watt transmitter (3 watt,all-band VFO TTX) it has been used in all NFD's since 1969 and in the DL QRP Contests with good results. Combined with a 144/28MHz convertor (two 40673 amps & 40673 mixer) it is also used to cover the whole of the 2m. band for all modes (A1,A3,F3,SSB).

In the regeneration detector,a 2n4416 FET is used as the equivalent of a plate tube dectetor. The operating point is determined by the source resistor Rs and the drain resistance Rd. Due to FET data variations,these resistors must be otimized by experiment for best detection and regeneration performance. FET's with low IDss are to be preferred. Rs is usually optimum around 2.2K,whilest Rd may be as low as 820 ohms for high IDss devices.

Tuning is being accomplished by a 25pF air-spaced capacitor,bandspread by capacitor Cp, and Cs on the higher bands to spread the ham bands to about 120 degrees of a semi-circle drive/dial. The coil has a tap to be grounded, the upper part of Lr being used for regeneration and the lower part for resonance. The stator part of the regeneration control capacitance may influence tuning (regeneration control by a dc potentiometer has been avoided because the operating point of the detector is being shifted too). On the higher bands, series capacitor Cr has had to be added because the few turns of Lr make fine adjustments impossible.

The antenna energy is being fed into the circuit via a T attenuator of about 8 dB, Z=60 ohms (not critical), which helps to isolate the regenerative circuit from resonant antenna absorption effects. 1N914 diodes protect the circuit against trans--mitter signals. Ca is a transforming coupling capacitor, determined experimentally for each band (Ca too low:low sensistivity, Ca too high:too much loading of the resonanat circuit without improved sensitivity).

The detector supply volyage is stablised by a planar zenner diode to 5.6 volts. Therefore, decreasing battery voltage down to about 6 volts does not effect the detector operation. A three stage R/C filter has be inserted before the AF volume control and roughly designed for phone (3.9nF) and CW (15 to 22 nF) bandwidth. The two stage AF amplifier is conventional. The RF choke in the headphone lead prevents RF picked up by the telephone cord reaching Ts3. Otherwise AF oscillations may develop when regeneration is active including all stages of the receiver.

For cooperation with the TTX mentioned, a reciever blocking circuit and an input lead for monitoring CW signals from the TTX tone oscillator have been added. During transmit, 6 to 18 volts are added to point B, and transistor Ts4 clamps the detector output.

To spot the accompanied TX to the calling frequency of another station, it's power must he decreased to a very low level otherwise this receiver will block. This problem has been solved by a potentiometer control in the pre-driver of the TTX.

RESONANT CIRCUIT DATA:

Coil former 10mm diameter with VHF tuning core. Wire 0.35mm Ø cppper laquer. (Note - Neaest S.W.G. wire gauge to 0.35mmØ is 29 s.w.g - suggest 28 or 30 swg unless you can find 29 swg. For American readres - use same gauge for coils or drop a gauge .... G3RJV)

BAND.	L Turns	Lr	Cp	Cs	Ca	Cr
80m	64	5	100p	-	470p	-
40m	26	2	100p	15p	100p	82p
20m	16	2	47p	12p	39p	47p
15m	9	2	33p	12p	33p	39p
10m	8	2	15p	18p	33p	47p

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Despite w9SCH's dislike of Xtal Controlled TTX's - next SPRAT will contain another article by DJ1ZB for using a variety of cheaply available crystals for mixing and overtone operation on the amateur bands - so look out all those all crystals with "useless" frequencies.

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HAVE YOU WRITTEN YOUR ARTICLE FOR SPRAT YET - NOTES AND ROUGH SKETCHES WILL DO.

G-QRP-C ADDITIONS TO MEMBERS LIST (Aug '75)

121	G8IGZ	Dave H. RYCROFT. 10 Grove Cres. Bromyard Rd. Worcester. WR2 5HH.	VHF QRP Design and construction.
122		Hal. G. Collard (BRS 3466) 95 Hart Road, Thundersley, Benfleet. Essex	ex-G2CVA & ZE2JO CW SWL.
123	WA1THQ	Karen Garrison Box 394, Henniker, NH 03242.	QRP & Propagation - antennas Argonaut (5w) skeds with EU
124	G3HKO	Des Ward 28 Hillcrest Ave, Scarborough. Yorks.	QRP whilst caravanning.
125	DJ4HR	Willy Neirich Gellertstrasse 14, 4100 DUISBURG. w.Germany.	HW7 with 3 el. beam. 80/40 dipole.
126	GM3OXX	George Burt. 1/5 Essendean Terrace Clermistön. Edinburgh.	QRP (All Bands) Home brew, portable.
127	G3URU	Mark Edworthy. Woodlands, 29 Wade Ave. Littleover, Derby.	Homebrew copy of HW7 160/80 xtal control TX Homebrew doublesuperhet.
128	GM3KMG	Dave Plumridge 7 Waterside Gdns, Hamilton. Lanarks. ML3 7PY	Plessey ssb/cw transceiver. 80m CW/SSB operation.
129	G3RYP	Dave Craggs The Lodge, Follifoot Ridge, Follifoot RD. HARROGATE. N. Yorks.	HW7.
130	GI4CBG	Roy Smith 122 North Rd. Belfast. BT4 3DJ	RX- FR50B TX- Vanguard Ant- G5RV.
131	GW3YWE	Thomas Wilfred Jones. 'Monfa' Pengriegwen, Llanerchymedd, Anglesey	HW7.
132	GM3KNX	John McGregor 54 Albion St. Coatbridge. Lanarkshire. ML5 3SE	HW7. KW2000 (reduced input)
133	G3VA	Pat Hawker - Hon. Member - author Technical Topics (Radio Comm)	
134	G4DQA	David Macken 6 Crossways, East Boldon, Tyne and Wear. NE36 OLP	Modified HW101 (6CL6 final) 18AVT vert ant. (power input below 1 watt)
135	KL7HLC	Jim Prior c/o Dept. Of Geography. Univ. of Alaska. Fairbanks. AK 99701	HW7 and vertical Ultra-mountaineer.
136	G4BKX	John Edwin Williams 8 Lapwing Lane, Cholsey, Wallingford. Oxon. OX10 9QR	General QRP Home construction.
137	G4BJF	Brian R. Marshall. 19 Kings Ave. Loughborough. Leic. LE11 OHU	SB104 (1w) to 18AVT CW 10-80m
138	G4DPY	Peter Reginald Kitchell Gent. 22 High Beeches, Frimley, Camberley, Surrey. GU16 5UG	HW7 Portable operation.
139	G2FRZ	William N. Handley. 89 Parrenthorn Rd. Pestwich. Manchester. M25 5RL	CW operating & construction. EC10 RX. Radio Officer at sea - hopes to go QRP /MM.
140	G3RJF	Irwin Walker 28 Norrington Rd.Loose. Maidstone. Kent	QRP CW on 80/40 138ft longwire /M 5 watts on 160 - Construction

141	G4DDK	Ronald J. Pratt 79 Stanmore Rd. Stevenage. Herts	/P activity. QRP PA for TE52Q
142		James Alexander Finnegan. 65 Barrack Hill, Armagh. Co. Armagh. N. Ireland.	Original 19 set MKIII with all ancill. equipmemt. RSARS 813.
143	DK5RY	Willi Scherrer. D-726 CALW. Bozener STR. 25. W.Germany	CW operation 80-10 (5w max.) 2m (144.111) 8 w rf.
144	OZ3XH	Omar Hillers Morbaerhaven 6/54. DK-2620 Albertslund. Denmark.	HW7.
145	G3KFS	Donald V. Preston. 'Ashfield' Tanworth Lane. Beoley, Redditch. Worcs. B98 9EH	General QRP Home construction.
146		Alexander Young. 31 Lumsden Place, Stevenston, Ayrshire. KA20	QRP CW reception. AR88 & BC348 20m dipole, 15m GP. Longwire.
147	GI3XZM	Desmond H. Vance. 10 Appollo Road. Portstewart. County Londonderry.	Design & Constrcution. 9 w. 80/40, 80m dipole. RX BC348
148		S.H.Webber. 115 Armstrong St. Grimsby. Sth Humberside	Codar CR70A Joystick & ATU
149	G8IB	Douglas Woodford. 29 Norman Ave. Abingdon. OXON. OX14 2HQ	Homebrew (BFY51's etc.) RNARS, 21MHz CW
150		Bruce Spence Easterhouse, Cullivoe. Yell, Shetland.	Main RX AR88. Home construction.
151	G3TML	Tom Lloyd. (* see below) 172 Duffield Road. DERBY. DE3 1BH.	ex- 9LITL CW QRP
152	G3WOV	Gordan MacNaught. 71 Great Lines, Gillingham. Kent	QRP Construction. 2M. Trio 2200 (1w)
153	I3BOZ	Claudio Borri v.MILANO. 34142 Trieste, ITALY.	QRP CW operation. (HW7)
154	G8KEN	Kenneth Allan Crouch. 78 Millfield, Hawkinge. Folkestone. Kent.	IC210 (750mW to 10 watts) 2 metres FM CR100 for HF bands.

CHANGES OF ADDRESS : -

059 G4DEP Dave Dabinett. (New QTH)
23 Pool Court, Pickering. North Yorks. YO18 8DR.

073 G8JMO D. Robinson. (new QTH)
19 Highfield Rd. Attleborough. Nuneaton. Warks. CV11 4PW.

115 DJ1ZB Ha-Jo Brandt. (new QTH)
Lohensteinstrasse 7/b, 8000 Munich 60. W.Germany.

001 G3RJV Rev. George Dobbs (new QTH)
8 Redgates Court, Calverton. Nottingham. NG14 6LR.

* LATE CHANGE OF ADDRESS:-

151 G3TML Tom Lloyd. (New QTH)
45 Princes St. New Normanton. Derby.

(correct as for 25.8.75 - changes to G3RJV)