SPRAT

THE JOURNAL OF THE G-QRP CLUB

DEVOTED·TO·LOW·POWER·COMMUNICATION

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THE NEW ARGONAUT II MODEL 535
PHOTOGRAPHED IN DAYTON BY G3RJV

AF PREAMP AND PASSIVE FILTER - 28MHz TRANSMITTER - SMD KEYER

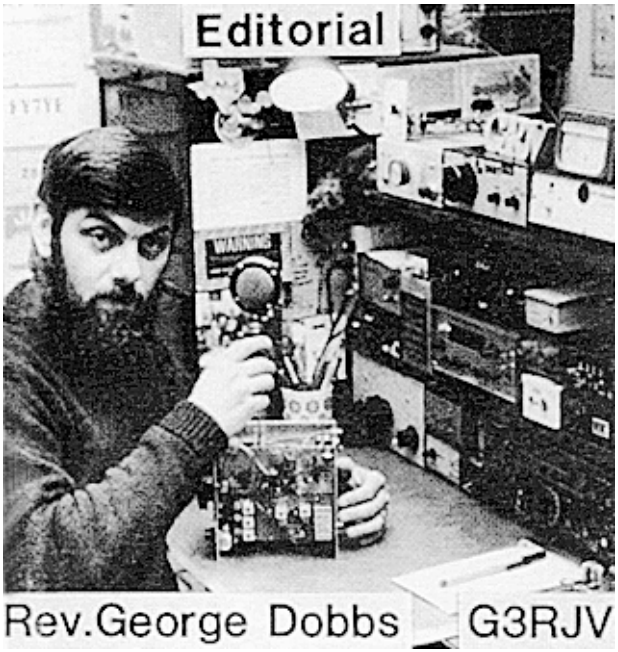
ONE TOROID FILTER - DISCO DISPLAY - VARICAP VFO - SURFACE MOUNTING

VFO SOURCE FOLLOWER - SUITCASE LOOP - HUFF AND PUFF REVISITED

QSK FOR CTX80 - DUO LED SWR INDICATOR - QUALITY AUDIO AMPLIFICATION

AGCW CONTEST - COMMUNICATIONS FORUM - SSB, VHF and MEMBERS NEWS

JOURNAL OF THE G QRP CLUB



St. Aidan's Vicarage,
498 Manchester Rd
ROCHDALE,
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OL11 3HE.
Rochdale [0706] 31812

Dear Member,

Since the last issue of SPRAT, I have had an exceptionally busy time meeting members and attending events. I managed to take two weeks off and fit in the RSGB National Convention at Birmingham and the following week the Dayton Hamvention. We ran club stands at both events. Ian, G3ROO, Dick, G0BPS, and I represented the club at Dayton, this time not sponsored by the club, although the club paid the stand hire. We were able to renew our valuable link with the QRP ARCI and planned even closer co-operation with them in the future. The week after my return to Dayton I was visited by ZL1ABS, followed by VE7HR. As I write this, Glen Reid, K5HGB, and his family are visiting us for a few days and PE1MHO is expected to call.

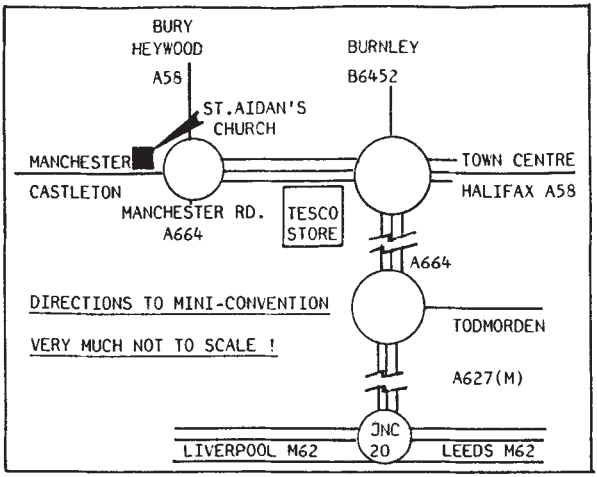
The good news from Dayton is that the current President of the QRP ARCI, Paula Franke, WB9TBU, and Luke Dodds, W5HKU, plan to be at the Mini-Convention in Rochdale in October. I also hear that will be at least two Dutch members, a German member and perhaps Klaus, Y24TG, an East German member. [how the world has changed!] It would appear that the Mini-Convention will be an international event. Thank goodness we have six bedrooms and a caravan!

You will notice - I hope - an improvement in the type quality of SPRAT in this issue. This is the first issue completely printed on a laser printer. I have used a basic typeface (Courier) for this issue but may try other typefaces in future issues. The face is 10 pitch which should also allow for a clearer text when reduced to SPRAT page size.

Enjoy the summer, 73 fer nw. George G3RJV

REMINDER : ANNUAL SUBSCRIPTIONS ARE STILL £5.00 [US$10 : CHECKS $12]

G QRP CLUB MINI-CONVENTION



THE NORTHERN GATHERING
FOR G QRP CLUB MEMBERS

ST. AIDAN'S CHURCH HALL
MANCHESTER ROAD
ROCHDALE LANCS

SATURDAY OCTOBER 20th

10am to 5pm

Large Social Area * Full Lecture Programme

Equipment Display * Food and Drinks

Bring/Buy/Swop Stall * Component/Kit Stalls

Test Bench * QRP Circuit Archive

HF QRP Station * S22 Talkin

Admission £1 : You can book in advance to G3RJV or just arrive
Bring your items to sell or swop : From equipment to just junk
Bring your Homebuilt Equipment for display with prizes awarded

QRP BESIDE THE SEASIDE

SATURDAY SEPTEMBER 22nd
The Garnham Centre, United Reform Church, Back Chapel Lane
Gorleston, Great Yarmouth
Talk in from 1315 hrs on S22 (G3OEP)
Prize for longest traveller and best home brewed gear
Big display of Home Brewed QRP Gear : Light Refreshments
1400 - 1730hrs (clocktime) : Admission Free
For further details contact G3OEP

AVAILABLE AGAIN : AT NEW LOWER PRICE
A fortunate buy by G3RJV at Dayton, enables us to offer more stocks of the 6 pole 9MHz SSB Filter and USB/LSB Crystals.

SPECIFICATIONS

Bandwidth at 6.0dB points	**2.2KHz nomimal**
Centre Frequency	**9.000Mhz**
Shape Factor 6.0 - 60dB	**<1.60 to 1**
In/Output Impedance	**500 ohms**

AVAILABLE FROM G3RJV AT £12.00 each (50p postage) Cheques"G QRP Club"
LSB/USB Matching Crystals (HC18U) at £3.00 the PAIR

AUDIO PREAMP AND PASSIVE FILTER FOR NE602 MIXER

STEF NIEWIADOMSKI

I was interested to see the Sudden article in SPRAT 58, using the NE602 IC. It is certainly a versatile chip, making design and construction of DC and superhet receivers very straightforward. After seeing the article, I decided to design a 40m DC receiver, based on the NE602/LM386 combination. I managed to get hold of the Mullard data on the NE602 and I noticed that the output from the chip appears in antiphase on pins 4 and 5, whereas most published applications use only one of these outputs. Since I wanted to incorporate an audio pre-amp and passive audio filter, I thought I would make use of both outputs.

My final circuit is shown in the attached diagram. The 1000pF capacitors on the NE602 outputs prevent some of the RF products produced by the mixer from reaching the op-amp. Both inputs of the op-amp are used, driven in antiphase by the NE602 outputs. If required, the gain of the op-amp can be varied by changing the 100k feedback resistor.

The audio filter is designed for 1.5k ohm drive and terminating impedances. Because the op-amp has a low output resistance, the drive impedance for the filter is provided by a series 1.5k resistor. If the extra gain provided by the op-amp is not needed, the filter can be driven directly from pin 4 or 5 of the NE602 without the need for any resistor.

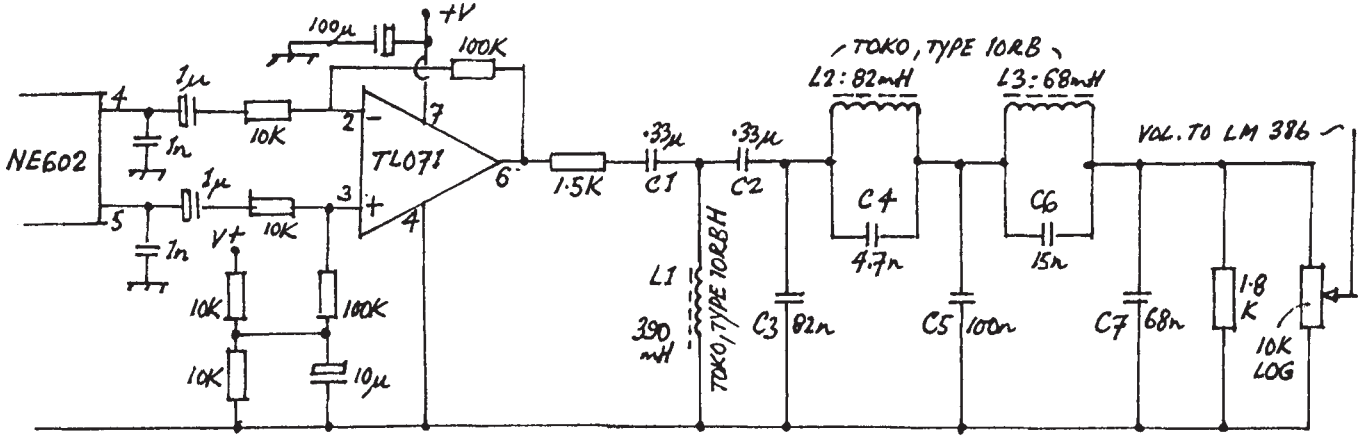
The filter is a third-order 300Hz Butterworth highpass section cascaded with a fifth-order 3kHz 1dB passband ripple elliptic lowpass section, giving excellent out-of-passband rejection. The highpass section gives 47 dB of attenuation at 50Hz, eliminating mains hum problems often asssociated with DC receivers. The lowpass section reaches an attenuation of more than 60dB at 1.66 times its cutoff frequency. An overall 6:60dB shape factor of about 1.84, comparable with a good quality crystal filter, is achieved. Note that all the components are E12 standard values.

Termination is provided for the filter by the parallel combination of the 1.8k resistor and 10k volume pot.

I know the reaction of many amateurs to the sight of inductors in audio filters! Do not despair, however, because the inductors used here are off-the-shelf ready-wound miniature components made by Toko. They are types 10RB and 10RBH, available from Bonex and Cirkit. Their small size (10.5mm diameter and 14mm high, about the same as a low voltage 100uF electrolytic) and low weight makes them ideal for use in compact portable equipment. For the capacitors in audio filters, I always use the polyester layer type: again they are small and available from several sources (Electrovalue, Maplin, Cirkit etc). It has been shown (references 1,2,3) that the performance of such filters is not significantly degraded by the comparatively low Q of the inductors and rounding the values of the components in them.

Filter impedances other than 1.5kohm can be accommodated by scaling the filter component values. It is best to use exact values when scaling to another impedance, to prevent 2 sets of rounding errors.

SHORT LOADED DIPOLE PROGRAM (SEE SPRAT 60) NOW CONVERTED FOR BBC B
A conversion of the original programme by Ron, G3DSV, and his son G6CQB, for the BBC "B" with the wire gauges in swg is available as a listing from G3RJV for a self-addressed and stamped envelope.



AUDIO PREAMP AND PASSIVE FILTER FOR NE602 MIXER

STEF NIEWIADOMSKI

For this filter the exact values are:

	rounded value	exact value
C1,2	0.39uF	0.354uF
C3	82nF	77.5nF
C4	4.7nF	5.35nF
C5	100nF	98.23nF
C6	15nF	14.5nF
C7	68nF	69.85nF
L1	390mH	398mH
L2	82mH	75.7mH
L3	68mH	64.8mH

If the new filter impedance is R ohms, then the new capacitors have the value:

$$Cnew = \frac{Cold \times 1500}{R}$$

Similarly, the new inductors are found by:

$$Lnew = \frac{Lold \times R}{1500}$$

Hence, doubling the filter impedance results in half the original values for the capacitors and double the original values for the inductors. When the impedance scaling operation has been carried out, the values are then rounded to the nearest E12 preferred value.

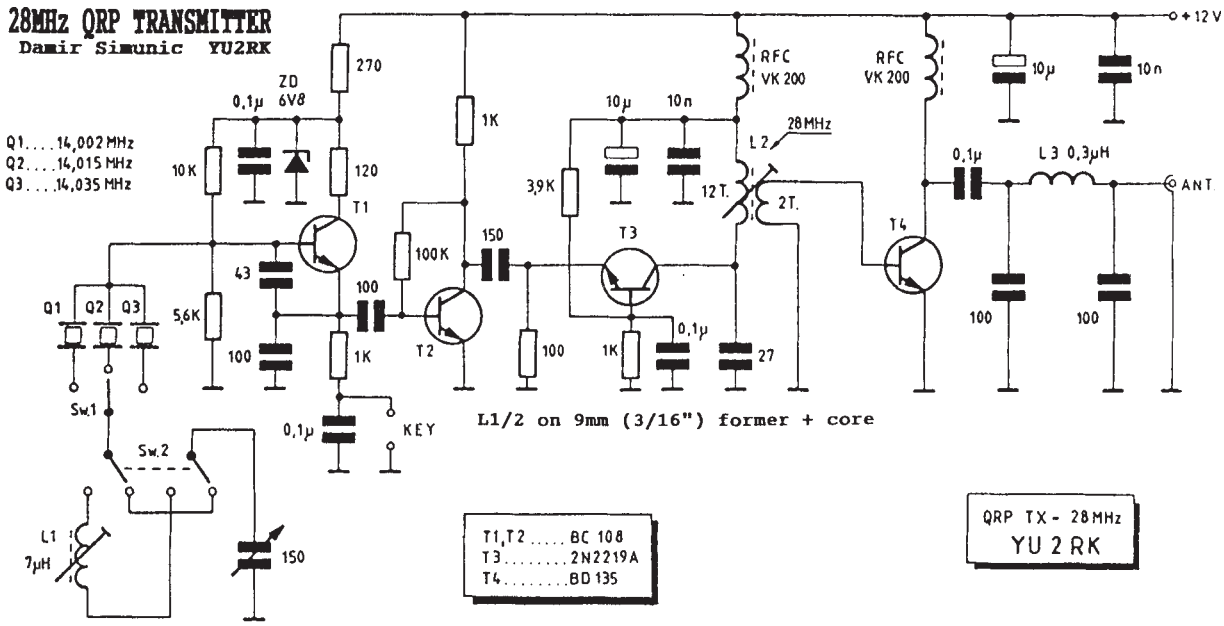
I feel that it is important to use a low noise op-amp in the pre-amp, and in fact in any audio amplifier in the signal path. it is pointless dragging in low level RF signals and filtering out the surrounding interference just to add noise unnecessarily close to the speaker output. So please don't use that 741 you have lying around, go for something like a TL071 which is designed for low noise applications and costs very little. Using a LM386 as the power amp, rather than the good old LM380, also produces noise. It would be interesting to hear about members attempts to reduce noise in audio stages.

Incidentally, this pre-amp and filter arrangement can also be used with the LM1496 type mixer. This also has two outputs, which should be connected to the op-amp in the same way as pins 4 and 5 of the NE602.

Reference 1: Elliptic lowpass audio filter design using miniature preferred value components. S. Niewiadomski. Radio Communication, October 1984.

Reference 2: Passive audio filter design. S. Niewiadomski. Ham Radio Magazine (US) September, October 1985, January 1986.

Reference 3: Filter Handbook: a practical design guide.
S. Niewiadomski. Heinemann Newnes, 1989.



Recently I have completed my first circuit for 28Mhz and offer it to SPRAT readers. As you can see it is not complicated. I decided to construct something for 28MHz when I received three interesting 14MHz crystals from a friend. Using ideas from several radio magazines, my final circuit is as shown.

With the available crystals and by switching L and C in a VXO, 80KHz of the band (28.000-28.080) can be covered.

T1 is the oscillator, T2 a buffer, T3 a doubler and T2 a PA. L1/2 are wound on 9mm formers (3/8") and L3 is airwound. The output power is about 1 watt. Using this Tx and the Trio TS510 as a receiver, I have already made QSOs with 16 countries.

L1 - 30 turns 28swg, L2 - prim: 12 turns 28swg, sec: 2 turns over primary winding. L3 - (air) 11 turns 22swg, length 10mm, dia 6mm.

AN SMD IAMBIC KEYER SYSTEM (PART 2)

The Iambic Keyer Board
Bill Mooney G3VZU

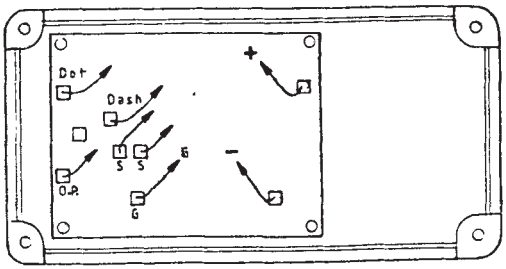
The keyer follows the circuit offered by G4ZQK in a previous SPRAT and will give full IAMBIC operation with positive keying output from an open collector. This is easily modified for negative keying. The unit is very small and along with the touch paddle unit can be incorporated into every rig you build. CMOS operation ensures very low current in the microamps range. In the circuit positive pull up resistors are included so that grounding the inputs will produce the required dots or dashes. It will work with all mechanical IAMBIC keyers but works very well with the capacitive touch paddle described in the last issue of SPRAT.

SETTING UP AND TESTING

Arrange to monitor the output from TR2. Its collector needs a load connection to +ve. The control input to the sidetone oscillator on the paddle PCB would provide such by way of R9. A small bulb or LED with 1k resistor would also suffice.

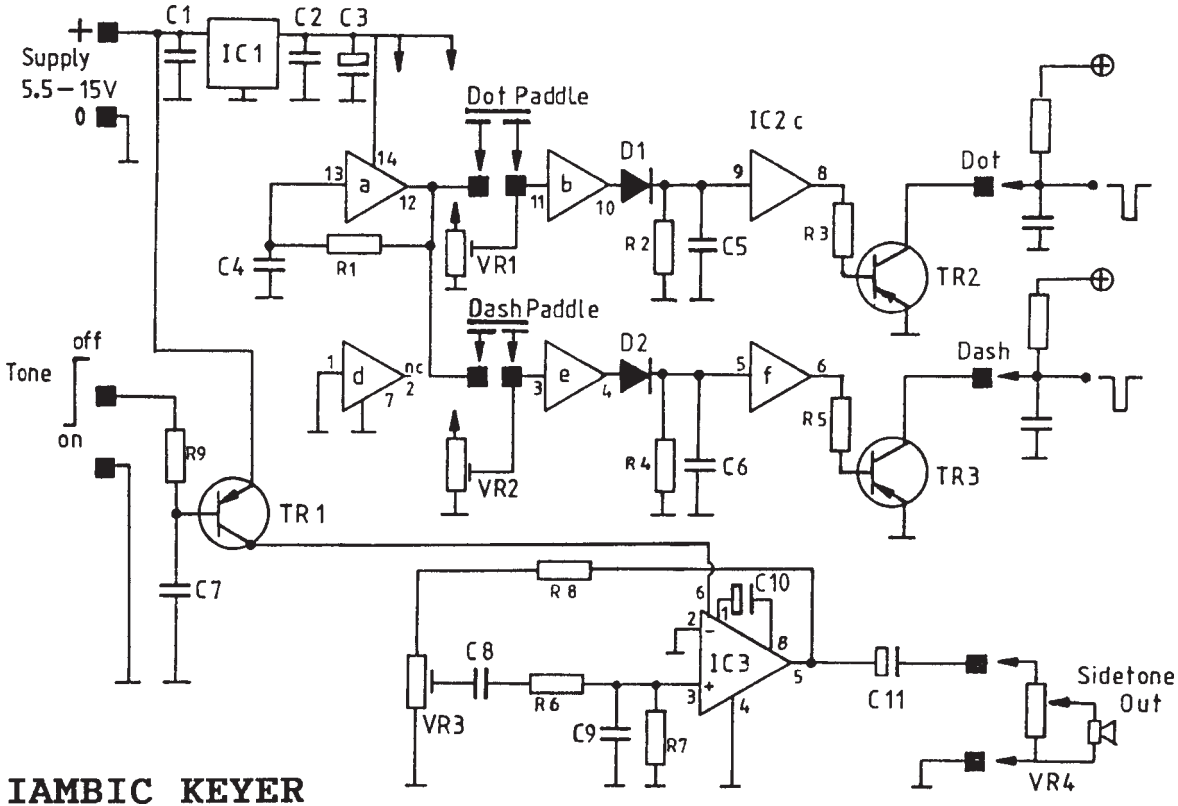
IAMBIC KEYER COMPONENT LIST

Resistors			
R1, R2, R3	100k	size	1206 chip resistor
R4	10k		1206 chip resistor
R5	4k7		1206 chip resistor
Rx	zero ohm jumper		1206
Rxx	zero ohm jumper		1206
Capacitors			
C1, C2,	1nF	size	1206 multilayer COC Diel
C3	100nF		1206 multilayer X7R Diel
Diodes			
D1	1N4148	in	SOT23 package
Transistors			
TR1	BCW32		SOT23 NPN
TR2	BCX54		SOT23 NPN
Integrated Circuits			
IC1, IC3	4011		SO8 SMD
IC2, IC5	4027		SO8 SMD
IC4	4001		SO8 SMD

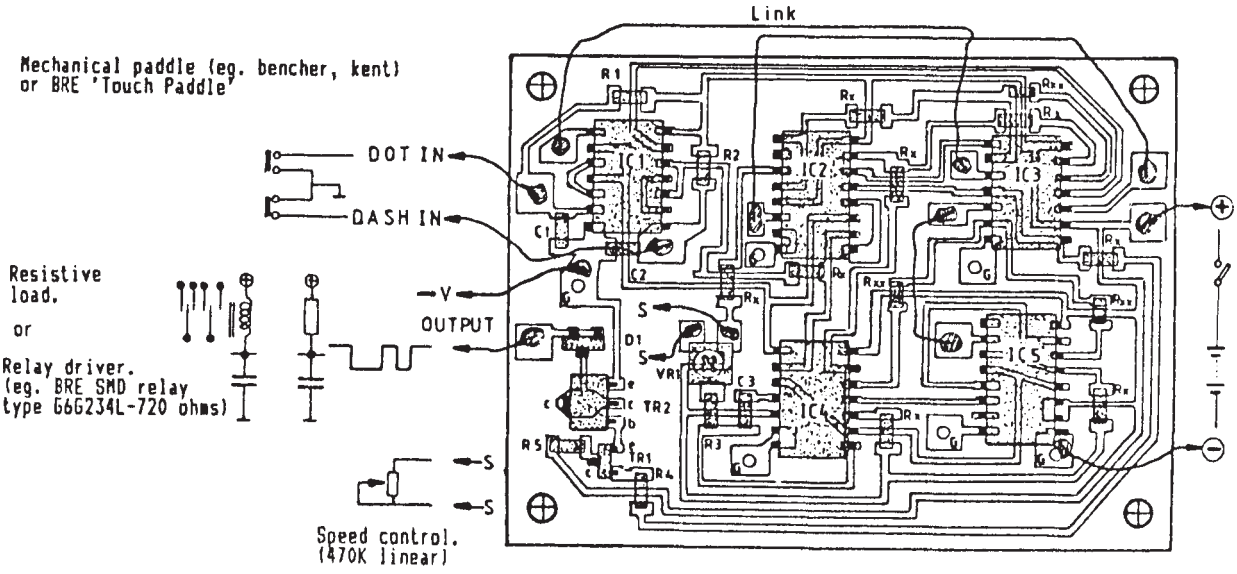


PCB MOUNTED IN LID OF BOX
See The Layout in SPRAT 62

FULL KIT OF PARTS FROM BLUE ROSE ELECTRONICS : SEE ADVERT



IAMBIC KEYER



Rx = 1206 0 ohm jumper, Rxx = 0805 0 ohm jumper.

G = Through-PCB pins, connection to rear ground plane.
(eg. Maplin FL82D)

SMD IAMBIC KEYER : PCB LAYOUT

SIMPLE ONE-TOROID AF FILTER

JOHN T COLLINS KN1H

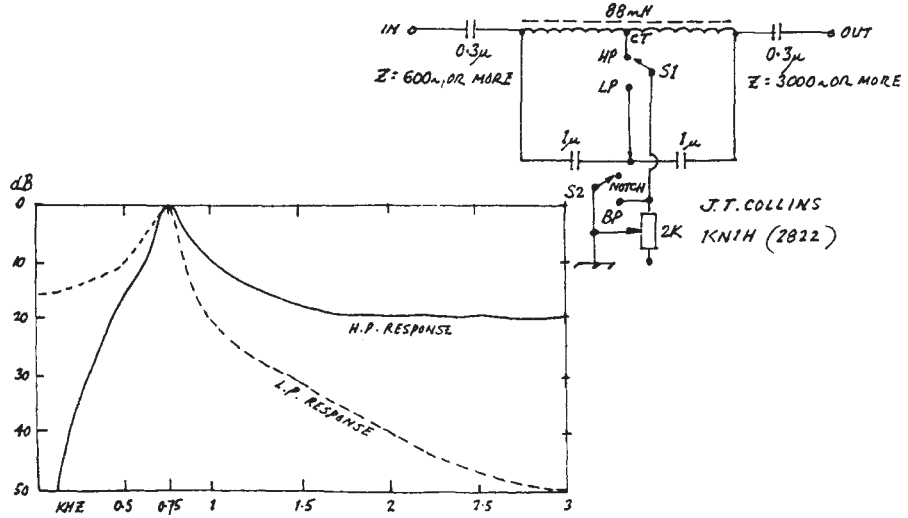
This simple AF Filter was built to go between a NE602 Product Detector (1500 Ohms) and a fed-back pair audio amplifier (3000 Ohms). It doesn't come close to matching either of these impedances, but rather makes use of the characteristic that a filter passband will 'hump up' when it is badly misterminated. (See figs. 2 and 3).

The filter is made of on 88MH toroid, two 1uF capacitors (actually a .68 and a .3 in parallel), a couple of miniature toggle switches and a 2k preset pot. In the LP mode, the junction of the two capacitors is connected to ground making the familiar pi network. In the HP mode, the center-tap of the toroid is grounded, effectively inverting the pi network and also the filter response. When the 2K preset is switched in, the circuit becomes a bridge-T network providing a 40db notch centered on 750 Hz and less than 50 Hz wide at the -6db points. The preset is adjusted for the deepest notch possible and then it should require no further adjustment.

The HP response is useful for copying SSB and also for cutting down Low Frequency QRM. For CW, the LP filter works quite well. The Notch mode is especially useful for close-by QRM; just tune the offending station into the notch and he's gone, while signals as close as 50hz away will be unaffected. It makes little difference whether switch S1 is in the LP or HP position when the Notch is selected, but further low-pass filtering in the amplifier is recommended as all frequencies except 750Hz pass unattenuated in this mode.

Input and Output coupling capacitors are shown as .3uF, but these are not critical. Smaller values will roll off the lower frequencies more, higher values will not. If you have no need for DC isolation, they can be left out.

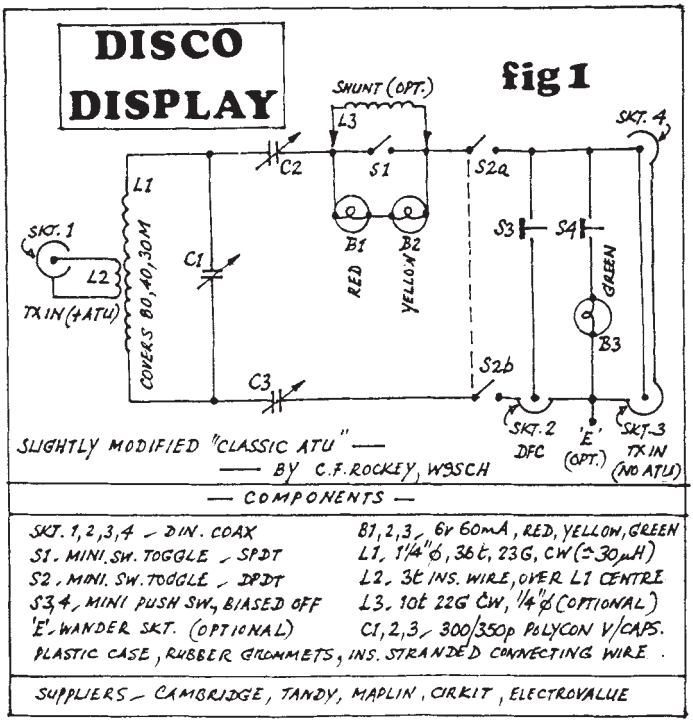
Some observations before you warm up the soldering iron: the responses shown in figs. 2 and 3 were obtained with a 3K Ohm termination - the response around 750 Hz gets sharper as the termination impedance is increased. Also, the peak response can be lowered in frequency by increasing the capacitor values - this will also sharpen the response in the peak. E.G. a 500 Hz filter is much narrower than a 750 Hz one.

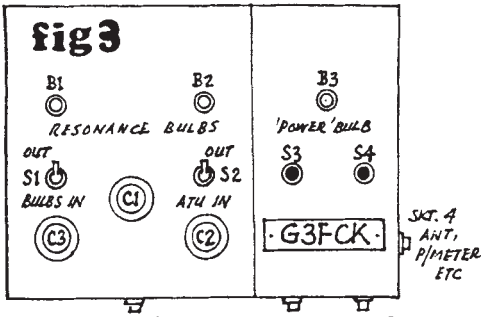


THE DISCO DISPLAY

A.W.McNeil G3FCK

This unit, besides providing a semi-spectacular disco type lights display for the benefit of non-technical visitors to the shack, has the advantage of confirming resonance, relative power and frequency when testing home-brew QRP Transmitters.
The "Classic Antenna Tuner" by W9SCH, featured in SPRAT 59 is used, and is reproduced here, with minor modifications.
A DFC facility switch is included for those with insensitive counters, allowing semi-permanent connection to antenna distribution, switched in or out at will.
No DFC? Resonance and power indication should suffice. If you do possess one, it allows easy checks of VXO/VFO ranges and saves plugging in, and out, the DFC coax lead.
An additional bulb (B2) is included purely for the purposes of symetrical panel layout and can be omitted is desired.
Careful adjustment of the 3 ATU capacitors is necessary, so tuning is sometimes very critical. This is when visual indication, via resonance bulbs can aid accurate ATU adjustment.
The "power" bulb gives visual indication that the TX is supplying a reasonable modicam of its output to the antenna socket! Only one 6v. 60mA bulb is used here, as existing equipment is limited to 1 watt Max. output. With powers of 3 to 5 watts, more bulbs could be connected. Mini bulbs are available in packets of three (one each of red, green and yellow) for 99p, and provide a beautiful display!
With the addition of the "PSU ON" lamp, TX keying LED and this box of tricks, you can have Christmas in the shack, all the year round!





SKT. 3 ALSO USED AS TEST POINT FOR CHECKING RANGES OF VXO'S, VFO'S, IN ADDITION TO TX QRG CHECKS.

UNUSED POLES OF S2 COULD BE USED TO INCLUDE INTEGRAL (MINI) POWER OUTPUT METER IN UNIT.

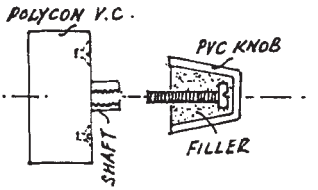
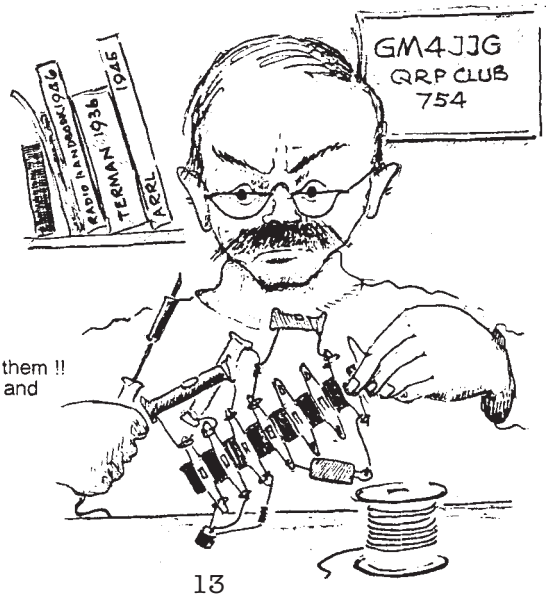


fig 2

SCREW BOLT INTO SHANK TO DETERMINE PROJECTION REQUIRED. UNSCREW BOLT, CENTRE IN KNOB, PACK WITH 'ARALDITE.' WHEN HARDENED, CLAMP SHAFT WITH LONG-NOSE PLIERS, AND SCREW KNOB TIGHTLY INTO SHAFT, QUICKLY, USING SUPERGLUE APPLIED TO PROJECTION OF BOLT, AND BASE OF KNOB.



Can't See ?? We'll show them !!
(with apologies to G8PG and Members Handbook)

40m VARICAP DIODE VFO

BILL BINGHAM G4WUS

This VFO is basically three bits of tried and trusted circuits assembled together.
The oscillator circuit came from Solid State Design for the Radio Amateur. The buffer amp and regulator circuit is from the Kanga gang, the varicap tuning idea came from the RC14 by S Price GW4BWE.
This circuit was up and running for less than the cost of a good quality tuning capacitor and reduction drive unit. The cost be reduced further by using two variable resistors in tandem (LIKE THE RC14) in place of the 10 turn VR1. The output is about 4v P/P.
I have this VFO in my home brew 40M TX and its stability is very respectable. I would be interested to hear your views on the above.

SEMICONDUCTORS

TR1, TR2	J310
TR3, TR4	BC183
D1	BB204B
D2,4,5	IN4148
D3	BB109
REG1	78LO5
REG2	7808 OPTIONAL

RESISTORS

100 OHMS	R3.4.9
330 OHMS	R5
1K OHMS	R8
4.7K OHMS	R6 adjust for o/p
10K HOMS	R10
100K OHMS	R1,2,7,11,12,13,14
VR1	2K OHMS 10 TURN
VR2,3	2.2K OHMS Preset
VR4	220 OHMS Preset
VR5	47K OHMS Preset

CAPACITORS

Polystyrene/Silver mica

10pF	C19
33pF	C6
100pF	C12
220pF	C4,5 (see table)

CERAMIC

.0047uF	C9
.01uF	C7,8,13,14,15,16,17, and 18
.047uF	C20
.1uF	C10,11,(C21,22 optional)

C1,2,3 see table

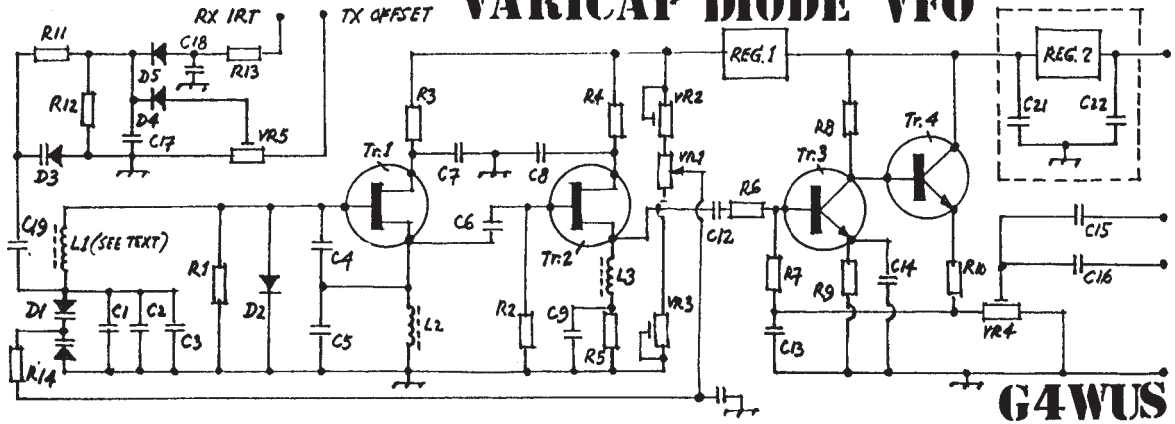
INDUCTORS

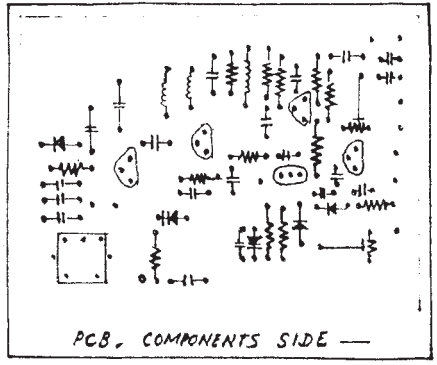
L1 see table
100uH L2,3
DOUBLE SIDED PCB
100mm x 60mm

Band	C1/C2/C3	C4,5	L1
160	200oF	1000pF	Toko 3333
80	75pF	1000pF	Toko 3333
40	100pF	560pF	Toko KXNK 4173 AO
30	80pF	560pF	Toko 3335

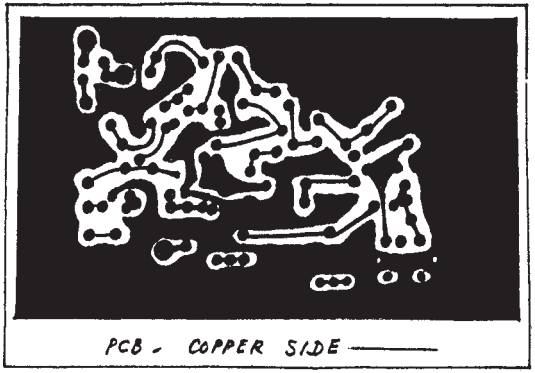
CT = 40% C1, 40% C2, 20% C3 (Silver mica, polystyrene, NPO CERAMIC)

VARICAP DIODE VFO





PCB - COMPONENTS SIDE



PCB - COPPER SIDE

SURFACE MOUNT TECHNOLOGY : HAM STYLE

DAVE PLUMRIDGE G3KMG

This subject is currently hitting the amateur radio press, but it's not something new - some constructors have been using the technique for years, long before the specialist components became readily available. The others have been bogged down by the Printed Circuit Board Syndrome. In this affliction, the constructor believes that all circuits must, by divine order, be build on a processed piece of capper clad insulation board. He laboriously etches connections with the use of dubious chemicals and carefully drills small holes to allow mounting and soldering of the components to the resultant copper connecting strips. he knows this method to be the only true and proper one because he observes that commercial equipment is built this way!

But we are radio AMATEURS, so why ape the commercial producers? PCB's are fine for mass production, but for one off home brew efforts why waste time designing and producing a PCB? And what happens when you want to modify that circuit to add on some new and better ideas...?

There has never been a time when components were more divers, cheaper and easier to obtain. Look at the success of the G-QRP Club, where many members get great fun and satisfaction in "rolling their own". Why not break that appliance operator syndrome and enhance your enjoyment by building even that small add-on or QRP tx? But don't get caught in the PCB trap - build it the easy way.

Surface Mount Technology - "Ham Style" - offers a quick, easy and effective method of constructiion. There is no better example than that given by the K2BLA Low Cost Spectrum Analyser described by Pat Hawker in "Technical Topics". Here several constructors had trouble - they had gone to the bother of making a PCB whereas K2BLA had used "Surface Mount Technology".

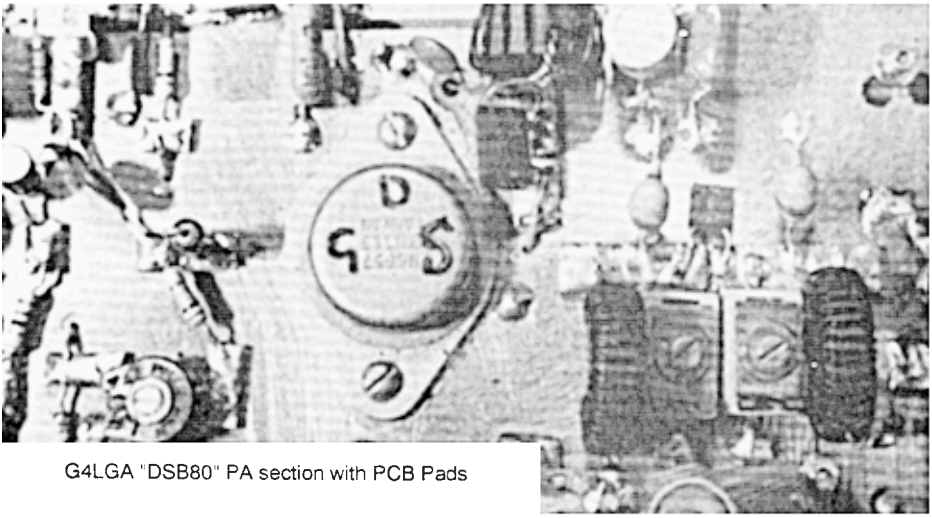
What then is this system which allows simple circuit production and gives better performance than a PCB? The Americans call it "Ugly Construction" - or for more complicated circuits - "Dead Bug Construction". You simply take your piece of copper-clad board and mount and connect your components as you go along. Earthed components have the appropriate leg soldered to the board with their free end(s) up in the air as anchors for other components. IC's are turned on their backs, earthy pins soldered down with the other pins used as miniature tag strips to allow connection into the circuit. Where "lands" are necessary, these can be cut from double sided board (fibreglass for easy cutting) and soldered down like chip C's, or just stuck with glues. Alternatively, isolated areas can be produced on the board by removing the copper with "hobby tools". G3RJV himself uses these methods for prototyping and one-off jobs where he finds a use for the numerous resistors in the megohm range you find in "bargain packs" soldering one end to the ground place and using the other end as a support.

You can get some ideas from the photos - but the technique is so versatile its really up to you and your ingenuity!

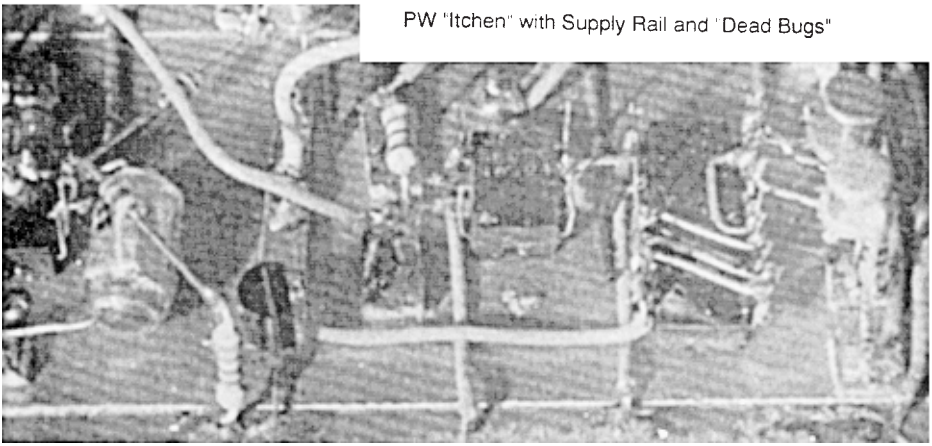
The soldering requires a steady hand, good reading glasses for the old timers and a fine point soldering iron with thin solder and wire. Given a bit of practice a good and not necessarily "ugly" job will result. The earth place given by the continuous copper sheet is of course ideal for RF circuits and is the reason why the "Low Cost Spectrum Analyser" worked so well for its originator - and why the "PCB Merchants" had trouble.

Circuits can usually be built by simply following the circuit diagram from left to right. If you don't place the components too close together the circuit modification or development is easy. If space is at a premium, then tried and trusted circuits can be put together in an amazingly small space. If you're not building mobile gear for your GTi then there's not much point in making gear so it can withstand enormous "g" forces. What's wrong with using sticky pads or blue tack to fix your boards in the box or cabinet? Copper clad fibreglass board is a marvellous material for the home constructor. It is easily cut with tin snips, solders beautifully, and can make surprisingly strong and RF-tight boxes and even small cabinets.

Surely as long as the equipment is functional and aesthetically acceptable to YOUR eye, then that's what matters! Let's take from the commercial boys what is appropriate, but please, never forget, it is AMATEUR radio.



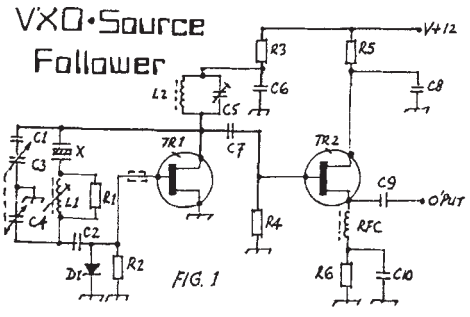
G4LGA "DSB80" PA section with PCB Pads



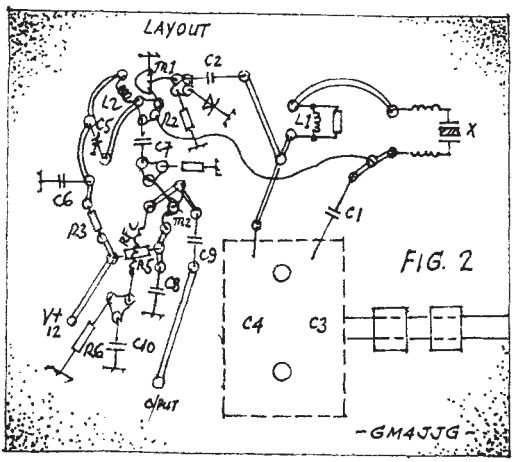
PW "Itchen" with Supply Rail and "Dead Bugs"

A CHEAP VFO SOURCE FOLLOWER

Ronnie Marshall GM4JJG



Let me make two things clear at once. There is nothing original about this circuit which is lifted from "Solid State Design" - I never had an original idea in my life....and I have no interest in J. Birkett's, save finding him a useful source of components.
From Birkett, I got a series of old 10XAJ xtals, mainly of the demountable type. These go from 7040 to 7020 in steps of 5kHz. This circuit will pull each of them down in frequency by 7kHz without trouble, more can be had with adjustment of L1, but 7kHz with each crystal enables almost complete coverage of the CW section of the band.
L1 is a ready wound pie coil on a 3/16" former, and was also obtained from Birkett. I soldered a 100pF capacitor across it and stripped off turns, until it resonated at the correct frequency on a GDO (about 4.00MHz with the core withdrawn, and about 3MHz with the core full in. L2 is wound to resonate in the 7.00MHz band with the trimmer at half value.
The VXO works very well, loading the output with an RF test probe, produces no variation in the beat note of a nearby receiver. It keys without chirp or frequency flutter and by adjustment of C5, the output can be made fairly level over the pulling range of 7kHz. Finally, sitting on top of a broadcast RX it produces no nasty outputs on AM or VHF. It should form the ideal basis for a handy transceiver on 7MHz or any harmonically related band.



LOW PASS FILTER : SPRAT 62

I have had an enquiry about wire gauges for the inductors in the Low Pass Filter article. This is not critical, an appropriate gauge to enable the winding to occupy about two thirds of the core is required.

SUITCASE MAGNETIC LOOP FOR 40 - 20m

DAVE ALLARDYCE DJ0PJ

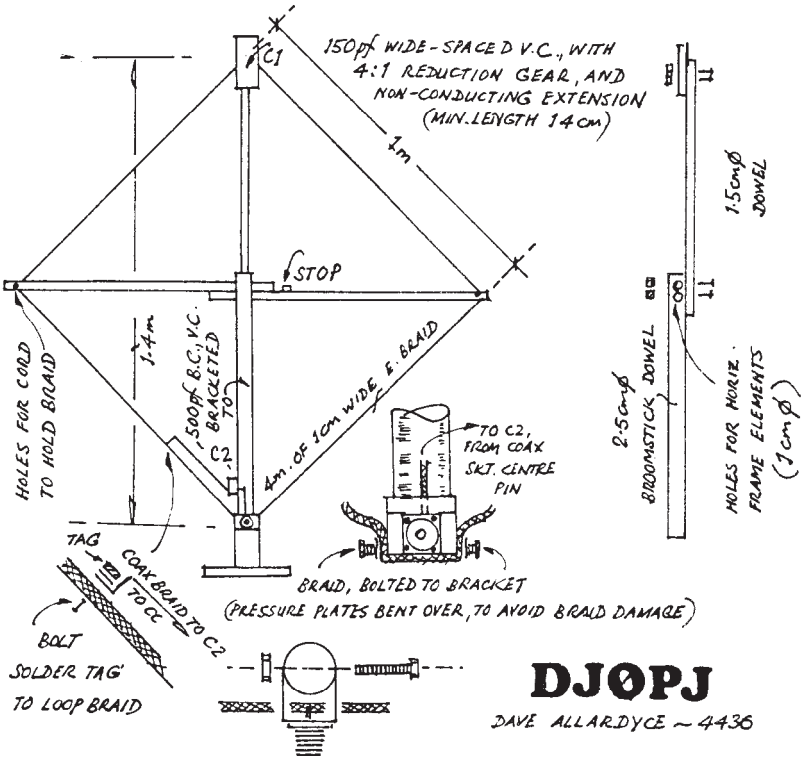
After many disappointing attempts to find an ideal hotel ant. (2m high loaded whips, loaded dipoles stuck on window frames etc) I decided to experiment witha magnetic loop and built the version shown in the diagram.

Some of the good reports recently received are as follows:

Stn	Band	Pwr out (mine)	RST
GM30XX	40	5W	589
G4WWN	30	4/20W	559/579
IZ3ARI	20	5W	579

Reports received vary a lot and aren't always as good by any means, but as a means of getting out from some "impossible" QTH's quite adequate. (With the horizontal elemnts dismantled it fits into the wardrobe for storage.) The loop was standing on the floor next to my operating position and is fed through a gamma-match system which jo8ns the loop about 50 cms from the coax socket.

The frame/base assembly dismantles easily, the loop (socket) can be rolled up and doesn't take up much room in my suitcase but care must be taken not to damage the braid.



THE HUFF AND PUFF RE-VISITED

STEF NIEWIADOMSKI

In the early 70's (July 73, October 73, August 74) Pat Hawker's Technical Topics in RadComm carried on exchange of information on the so-called "Huff and Puff" stabiliser. This was a method of achieving crystal-like stability from a VFO without the potential drawbacks and complexity of frequency synthesisers. Although my records of what has been published since then are far from complete, the subject seemed to disappear from the amateur press fairly quickly and no recent reference to it can be found. In this article I will try to resurrect the subject in the light of the developmentsin IC technology which have taken place in the intervening years, which have made the implementation of the stabiliser much simpler that it was when it first appeared. Hopefully this will encourage G-QRP club members who have tried VFO control of their transmitters but have found that drift is a problem to have a go again.

THE CIRCUIT

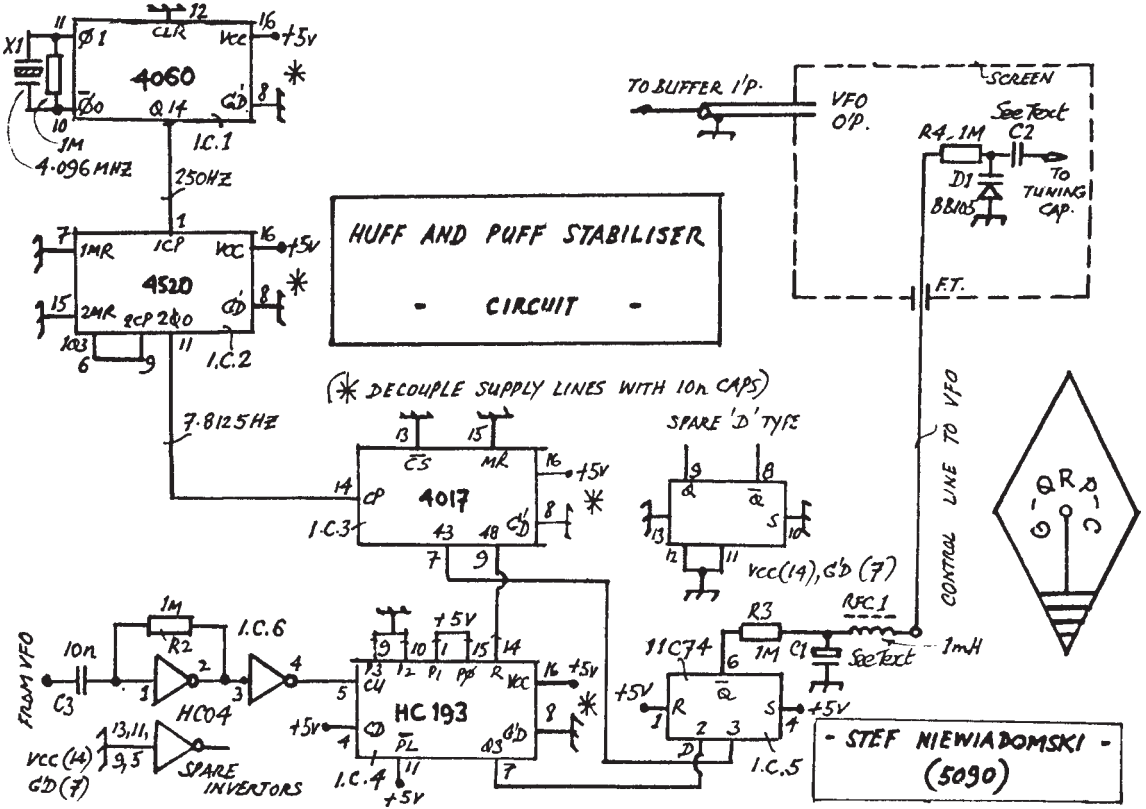
Figure 1 shows my implementation of the stabiliser. ICI (a 4060B) contains a crystal oscillator and 14 stage divider, which saves a considerable number of IC devices compared5ed to the TTL-implemented 1970's design. With a 4.096MHz crystal, 250Hz is obtained at the Q14 output of ICI and this feeds IC2, a further counter (4520B) which divides down to 7.8125Hz. This 7.8125Hz signal clocks IC3 (a 4017B) which divides by 10 and produces 1-out-of-10 decoded outputs. Because of the divide-by-10 action of IC3, its outputs change with a frequency of 0.78125Hz. These are used to control the counting of the VFO frequency and strobing of the result of the frequency measurement. Note that the frequency values given in this and subsequent paragraphs assume an exact 4.096MHz frequency source. As will be seen later the exact frequency of the source is not important, only that it is stable.

The crystal frequency and exact implementation of the divider chain are not critical. What you want to aim for is a final frequency of about 10Hz clocking IC3. For example, a 4.433MHz crystal could be used with the divider chain as it stands, or starting from a low cost 32.768kHz crystal, the divider chain could be much simpler. It is in this divider chain area that the biggest improvement over the 1970's circuit can be made. The use of high divider ratio chips and CMOS technology reduces the chip count and power consumption considerably.

Figure 2 shows the counting and strobing sequence. While the Y8 returns to a logic 0, ic4 starts counting the VFO frequency and continues until it is reset again when Y8 goes back to a logic 1. The Y3 output of IC3 strobes the Q3 output of IC4 into d-type IC5 after a measurement time of 512mS. This process is repeated continuously every 1.28secs (frequency of 0.78125Hz). Again, the use of a 4017B for IC3 gives benefits over the 1970's arrangement of monostables to derive the control sequence. The monostable method required more packages, consumed more power and gave less confidence that the timing of the sequence was correct than the all-digital method used here.

Note that this strobing into IC5 is done "on the fly". That is, the clock input to IC4 is not gated and therefore its outputs are not stable before its Q3 output is stored in IC5. Purists will note that this will give occasional set-up or hold errors on the D-type data input, but these will not affect the overall performance of the system because of the large amount of damping in the system. The elimination of the NAND gate, or similar, which would have been necessary if the clock was gated, saves an IC package which is a valuable saving in a compact system.

The output of IC5 holds the result of whether the Q3 output of IC4 was a logic 0 or 1 at the end of the measurement period. if it was a logic 0, the QBAR output of IC5 will become a logic 1 and C1 start to charge through R3. Conversely, if it was a logic 1, then C1


HUFF AND PUFF STABILISER
- CIRCUIT -
(* DECOUPLE SUPPLY LINES WITH 10n CAPS)
4060
I.C.1
4·096 MHZ
250HZ
4520
I.C.2
7·8125HZ
4017
I.C.3
SPARE 'D' TYPE
Vcc(14), G'D (7)
TO BUFFER I/P.
VFO O/P.
SCREEN
See Text
R4 1M
C2
D1
BB105
TO TUNING CAP.
F.T.
CONTROL LINE TO VFO
QRP-C
R3
RFC 1
1mH
11C74
C1
See Text
I.C.5
FROM VFO
C3
10n
R2
1M
I.C.6
HC04
SPARE INVERTORS
HC 193
I.C.4
- STEF NIEWIADOMSKI -
(5090)

starts to discharge through R3. C1 must be a low-leakage type so that it doesn't slowly discharge itself thereby changing the VFO frequency, and requiring the stabiliser to compensate for this additional source of drift. I had some 330uF tantalums of which I used 3 in parallel, but cheap 100uF low-leakage electrolytics are available from Cirkit which look ideal for parallelling up to give the 1000uF needed.

CONNECTING TO THE VFO

The stabiliser is suitable for matching to almost any VFO, whether for a transmitter, receiver or transceiver. I connected the Huff and Puff to a VFO running at 5.0-5.5MHz based on the versatile NE602 device. RFC1 and R4 isolate the VFO and the stabiliser from each other and permit only the DC voltage from the stabiliser to reach the VFO. The smoothed control voltage varies the capacitance of D1, which in the prototype was a BB105. This varying capacitance is loosely coupled across the VFO tuning capacitor via C2, which in the prototype had a value of 1.88p.

IC6 acts as an input buffer and amplifier, converting the VFO sine wave input to a CMOS compatible waveform. IC6 AND ic4 are the only speed critical devices, since they have to run at the VFO frequency. This is why HC devices have been used in these positions.

HOW DOES IT STABILISE?

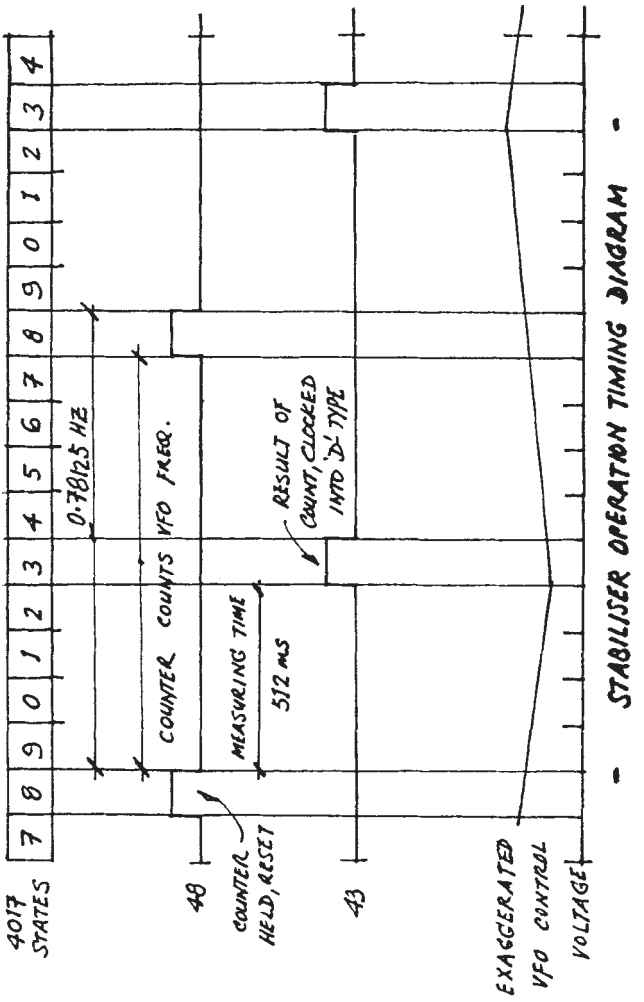
The question is: how does this charging and discharging of C1 stabilise a VFO whose frequency wants to wander around? Well, let's way that if at the end of a measurement period, the Q3 output of IC4 is at logic 0 and therefore the QBAR output of IC5 becomes a logic 1. We can regard this condition as existing when the VFO is too low in frequency. The logic 1 on QBAR causes the voltage across C1 to start o rise, causing the capacitance of the varicap diode D1 to fall. Because less capacitance is now included in the VFO tuned circuit, its frequency rises. Eventually its frequency will rise sufficiently that a measurement period results in the Q3 output of IC4 becoming a logic 0, and the voltage across C1 falling, thereby raising the capacitance of D1 and lowering the VFO frequency. This cyclic process is repeated continuously, the VFO frequency slowly oscillating about some centre point.

Note that it makes no difference what the actual VFO frequency is. The effect of the Huff and Puff is to lock at any frequency which gives a logic 0/logic 1 cross-over point at the Q3 output of IC4. The locking frequencies are determined by the frequency measurement time. With the scheme shown here, the measurement time is 4 cycles of 7.8125Hz, that is 512mS. The least significant bit of the counter IC3 therefore represents 1.95Hz of any input frequency, and its Q3 output represent 8 x 1.95=15.625Hz. Locking points are therefore twice this frequency apart, that is about 31.25Hz. This separation has been confirmed by measurement.

Interestingly, it does not matter whether R3 is connected to the QBAR (PIN 6) or the Q (PIN 5) outputs of IC5. The stabilising action is similar with the same separation between locking points, but the locking points are shifted by 15.625Hz.

As in any feedback control system, the way the Huff and Puff circuit performs depends just as much on the characteristics of the rest of the system (in this case the VFO) as on its own behaviour. The system can exhibit instability, where the VFO frequency moves up and down violently because it is being overcontrolled or it can drift around, much as it did before stabilisation was applied because the stabiliser is not applying sufficient or rapid enough compensation.

The critical components which determine how the VFO and Huff and Puff interact are C1 (1000uF is a good starting value), D1 and C2. Don't use the type of varicap diode designed for medium wave tuners, because their pF/volt characteristic is much too coarse for this application. VHF tuning or AFC diodes are ideal, such as the BB105, BB109 or BB204. With a VFO which has a reasonable initial performance,



NOW AVAILABLE: PRINTED CIRCUIT BOARDS FOR SEQUENCE 70MHz FM TRX at £15 from John Beech, G8SEQ, 124 Belgrave Rd. Wyken, Coventry. CV2 5BH (see SPRAT 60 - 61)

C2 should be very small, so that the Huff and Puff is applying only very slight changes to the tuning capacitance.

CONSTRUCTION

Layout of the circuit is not critical and veroboard will give a quick, cheap working circuit. The more enthusiastic may produce a PCB (not available from the author). Beware if you modify the circuit to suit the chips you have to hand. Make sure you breadboard thecircuit first before committing to a PCB. Apart from C1, the circuit looks ideal for a SMD version

THE CIRCUIT IN ACTION

You might find that when first switched on, your VFO drifts too much for the stabiliser to correct, but when the initial drift settles down, the Huff and Puff is able to "get a grip" and hold it stable from then onwards. With a VFO ;with reasonable initial stability, the Huff and Puff should lock very quickly. If the controlling voltage is monitored (use a high impedance voltmeter), it will be seen to move up and down very slightly as it compensates for attempted shifts in frequency by the VFO. The VFO is tuned as normal, but when the tuning knob is released, the Huff and Puff will pull the VFO frequency to the nearest locking point and hold it there. What you want of course is that this locking point it not too far away from where you tuned initially. For SSB, it probably needs to be not much more than 30Hz away.

The VFO used can have RIT fitted, the stabiliser will make almost no difference to its operation. If fact the user doesn't really notice the action of the Huff and Puff, except of course the vast improvement in VFO stability!

MODIFICATIONS

Apart from the modifications to C1, D1 and C2 which might be needed to match the stabiliser to your VFO, there are numerous modifications to the digital partof the circuit which you might try to make use of the IC's in your junk box. As far as the crystal and the dividerchain are concerned, all that is needed is a stable clock of about 10Hz to drive IC3. This could be achieved, for example, with a 1MHz crystal and a divide-by-100,000 circuit using 3 cascaded 451B's. The frequency counter device, IC4 can be any binary counter with a RESET (asynchronous) input and capable of working at the VFO frequency, for example the HC4520, HC161, HC162 or HC163. The D-type could be a 4013B, but note that the unused SET and RESET inputs must then be tied low and not high as for the 74HC74.

COMPONENTS LIST

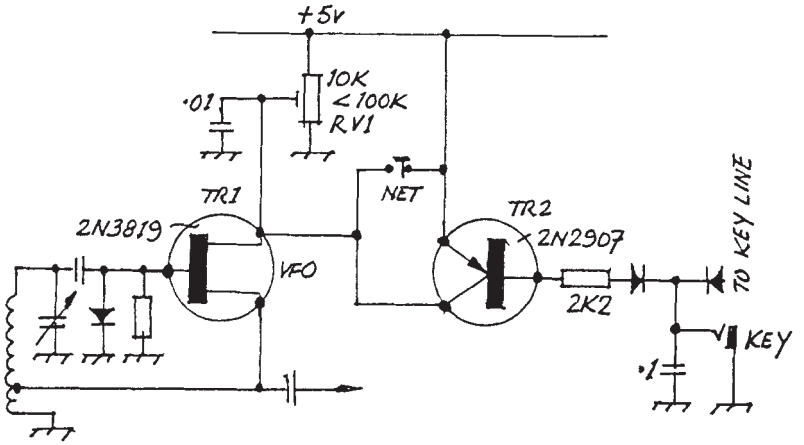
R1,2,3,4, 1Meg
X1 4.096MHz crystal (see text)
C1 1000uF (made up from tantalums or low-leakage electrolytics)
C2 1.8pF ceramic place (see text)
C3 10nF (not critical)
Decoupling capacitors 10nF or similar
RFC1 1mH RF choke
D1 BB105 varicap diode

IC1 4060B
IC2 4520B
IC3 4017B
IC4 74HC193
IC5 74HC74
IC6 74HCO4
Any manufacturers versions of these devices can be used.
For example, the 4060B can be CD4060B, HCF4060B or 74HC4060

QSK FOR THE HOWES CTX80

Bill Leask G4CEO

This is the circuit I use to allow me to "park" the VFO on my CTX80 to allow full QSK.
Simply adjust RV1 until oscillation just fails. In doing this the VFO frequency will move about 800Hz, and is an audible tone if monitoring the VFO in the station receiver. Don't fret!
Pressing the net switch allows the VFO to operate and be brought onto the required frequency without keying the TX.
Pressing the key uses TR2 as a switch to apply 5v to the VFO to operate it and key the TX. I have had no reports of chirp in over two years of using this VFO keying.
I mentioned above how when adjusting RV1, the VFO frequency moves, but the is NO difference in VFO frequency when the FET is on "standby" and when the full voltage is applied and it is oscillating. I use 5v because it is a low enough voltage for the VFO FET and easily obtainable from a 7805 regulator from the normal 12v line.



Members Ads

FOR SALE: RadComs from 1969-88 £15 the lot, buyer collects.
WY250 Matching PSU for WY2521 T.M.S. Tester Unit Oscillator MkII, very good condition £20. Phone Jason G7BSK (0427)811051.

FOR SALE: Kent Key on Plinth £20, 80m Unichip RX/TX in Box £20
Telephone Mr. E. Cassell, 061-301-3750

FOR SALE: Argosy II Transceiver with 270Hz CW Filter and attenuator, Circuit Breaker. £500 ovno + carriage, Frank, G3YCC (0482) 650410.

WANTED: SPRATs 20 - 25 for cash. Les Marshall, G3IGN, 11 Coopers Court, Charlton Kings, Cheltenham, GL53 8AY.

WANTED: Crystal for HRO : 456KHz either original or small modern encapsulation. Also any HRO Coil Packs. G4JBL 0273-452617.

HELP WANTED FOR SIGHTLESS RADIO AMATEUR: The instructor of a class for sightless radio amateurs requires details, a manual or a kit or completed WPO Talking Digital Frequency Meter. Please contact: Bill Fuller, 431 West St. Ontario, N3R 3V9, Canada.

A BATTERY AND SWR INDICATOR WITH A DUO-LED

MATTHIAS VOLKERT DF4SQ

In order to monitor and to tune the aerial when operating portable, I wanted to build some sort of SWR indicator into my little rig. Although there was enough space inside the rig for the pickup circuit, I didn't find a suitable place on the front panel for a meter and a potentiometer. So I began to experiment with a Duo-LED as a substitute and came out with the circuit shown.
A Duo-LED consists of a green and a red LED integrated into a single case and as the LEDs are close together, the two colours mix almost perfectly. This property is used in the SWR Indicator to provide a change of colour from red via yellow to green while the ATU is tuned, whereas the intensity of the light represents the applied power.

For simplicity I used the pickup circuit of G4ZNQ (described in SPRAT No. 61), which needs only few components and no adjustments at all. The choice of the cores seems to be not very critical with this application, as no absolute readings are required. Of course any other form of an SWR bridge could be used instead.

The forward and reflected voltages are amplified by the first two opamps of an LM2902 (OR LM324) package. The gain is set by Rf and Rr. The remaining two devices form a voltage controlled current source for each LED. The current through the red LED is directly proportional to the reflected voltage. The current through the green LED is a function of forward voltage minus reflected voltage (see equations at the bottom of the circuit diagram). As the total current through both LEDs is determined only by the forward voltage, brightness and colour are independent functions of applied power and SWR.

By means of S1 the red LED can be turned off to check whether a perfect match is already reached.

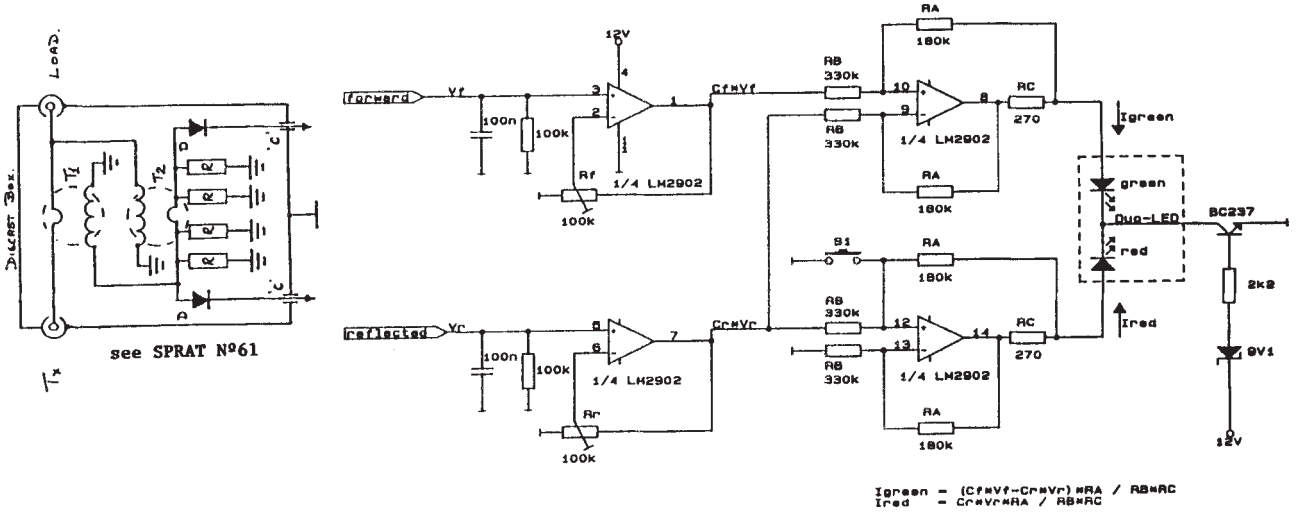
The LEDs are connected to ground via a transistor. Due to the zener diode the LEDs are switched off when the supply voltage falls below about 10 Volts thus providing additionally a simple way to monitor the battery.

For alignment apply as much power into a 50 Ohms resistor (SWR=1) as you want for maximum brightness and adjust Rf for 10 Volts at the amplifier output pin 1. This is equivalent to a current of 20mA through the green LED. Then change the load into a 150 Ohms resistor (SWR=3) and adjust Rr for 10 Volts at Pin 7, so that the whole current will flow through the red LED. This upper limit may of course also be set to another SWR value if preferred.

THE NEW ARGONAUT II MODEL 535

The new Argonaut II (model 535) was on display at Dayton for the first time in its final form. The front panel has been reworked and RIT and a Notch Filter have been added. The new Argonaut still includes the first application of the new continuously variable bandwidth, 8 pole crystal ladder filter. The transmitter power (LSB,USB,CW,FM) is continuously variable from 0.5 to 5 watts output on 160m to 10m with receiver coverage from 100KHz to 30Mhz.

Following Dayton, Ten Tec were to conduct a "pre-production in-service evaluation". Production would then begin with an expected release of not later than "this summer".
The price is not finally fixed but is expected to be a little in excess of $1,000 in the USA. G3RJV has the pre-production Specification Leaflet and will send a copy for interested members who send an SASE marked "Argonaut".



Battery & SWR Indicator with Duo-LED - Matthias Volkert, DF4SQ

A QUALITY AUDIO AMPLIFIER FOR RECEIVERS

GM4ZNX AND G3ROO

Oh, how we neglect the audio stages in all our receivers! Personally I think the worst possible output stage is the LM380 used in the way that we see it most of the time. On one ship I served on this device was used in the talkback on each of the base units, for no reason these would suddenly distort the audio. It was found that the device was oscillating at 18 MHz at certain input levels. A Zobel network and supply decoupling cleared the problem but how often do we see similar precautions in amateur circuits? RARELY!

Intermodulation and distortion are big problems in most simple AF stages especially when overdriven. Unless the audio stages are designed with adequate reserves these problems can be worse than that due to the rest of the receiver! Another problem is recovery time after the stage has been saturated by a pulse, such as a static crash. A badly designed amplifier can easily take these short transient effects and stretch them into long 'hang-ups'. It has been found that the audio stages can make the difference between a receiver that is good to listen to and one that is painful to use. This circuit has been designed to meet these tough requirements and David notes that four of these would make the ideal "in car" system (but use 2,200uF instead of 1,00uF capacitors to improve LF response even further).

We were hoping to include the an audio filtering board into this Sprat, but due to a complete change of direction on this design we have decided to hold fire. Now looking at switched capacitive filters with auto tuning! Will try and get that covered as a separate article in a future Sprat to save delaying completion of this transceiver.

SPECIFICATION

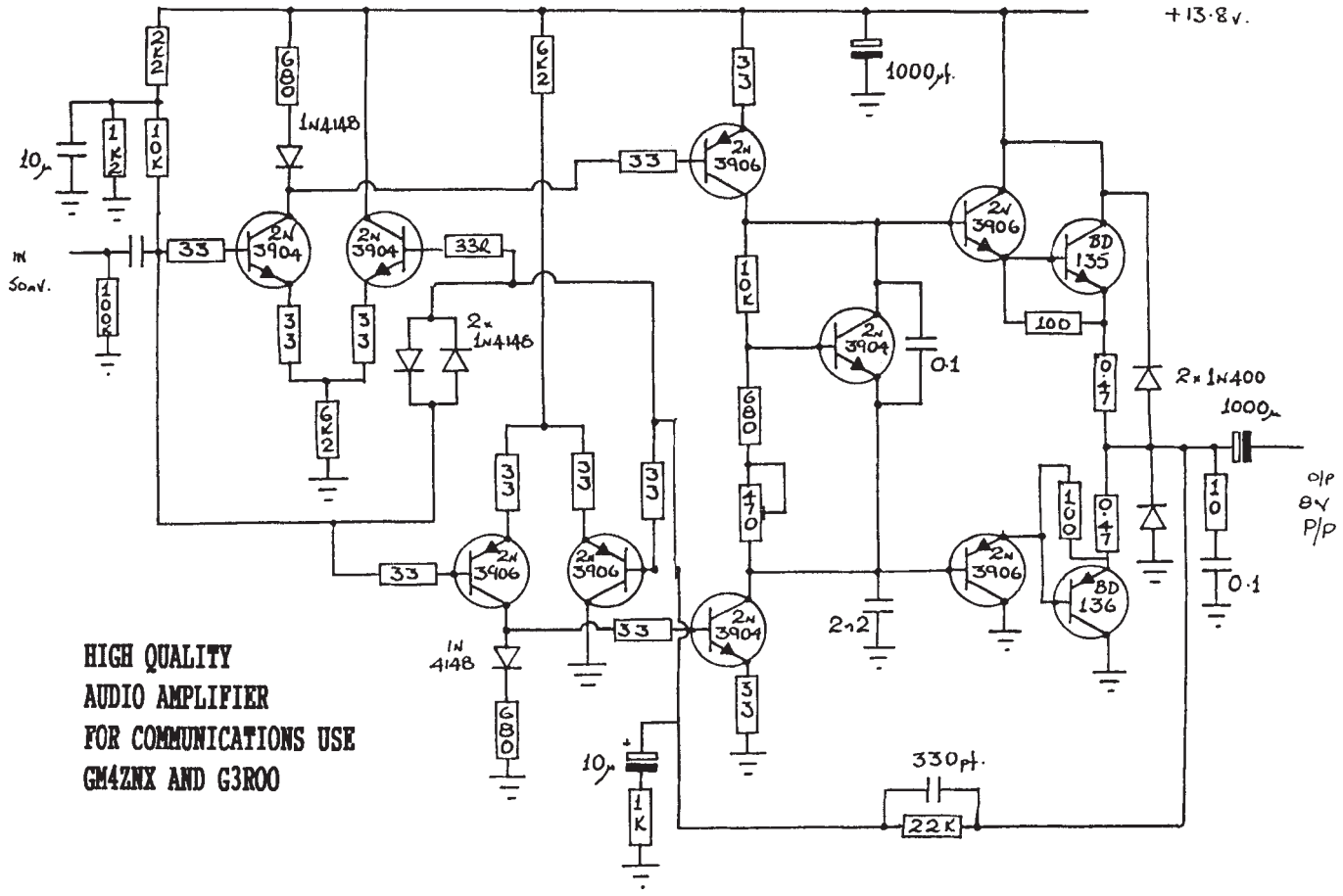
Input sensitivity	50mV RMS for onset flat topping
Output	3 Watts into 4 ohms
Freq. response	3dB at 100Hz and 38KHz
Distortion	not yet measured but low!
PCB	82 x 90mm
Supply	13.8 volts
Quiescent I	80m/a

Circuit description

The circuit of any amplifier designed in the last 25 years almost always follows the scheme devised by Tobey and Dinsdale, input amplifier - wide swing voltage amplifier - emitter followers. This circuit is more elaborate than usual, here's why.

The heart of the circuit is the wide swing voltage amplifier Q5 and Q6. Simple circuits use a single ended one, some have bootstrapped collector load transistors or a constant current collector load to improve the performance. A double ended stage is actually neater and simpler than elaborate single ended stages and has the advantage that if driven into clipping it recuperates as soon as the overdrive ends. A bootstrap system can 'hang-up' for appreciable time.

Q5 needs drive at voltages near to the +ve rail from the input stage where Q6 needs drive near to ground. This is difficult to achieve with a single input stage, so this design sports two input stages effectively running in parallel, one PNP and one NPN differential pair. The differential input stages are very well behaved and clip symetrically without long term hang-ups. CR2 and CR3 protect the input stages, remember that most silicon transistors can be destroyed by greater than 5 volts revers base-emitter voltage. CR1 and CR4 compensate the base emitter bias of Q5 and Q6 quiescent current. R6,8,9,12 control the input stage gain and improve balance between the



HIGH QUALITY AUDIO AMPLIFIER FOR COMMUNICATIONS USE

GM4ZNX AND G3ROO

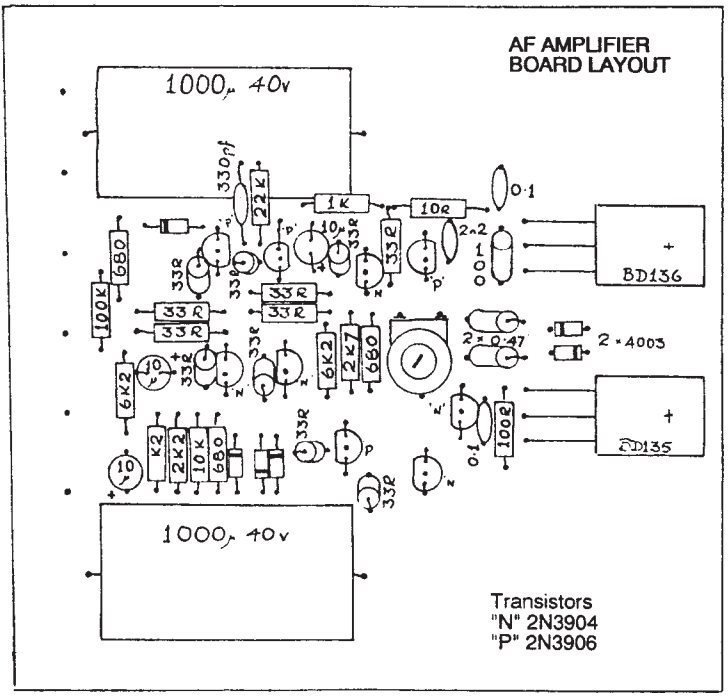
two stages. R14 and R18 similarily control Q5 and Q6.

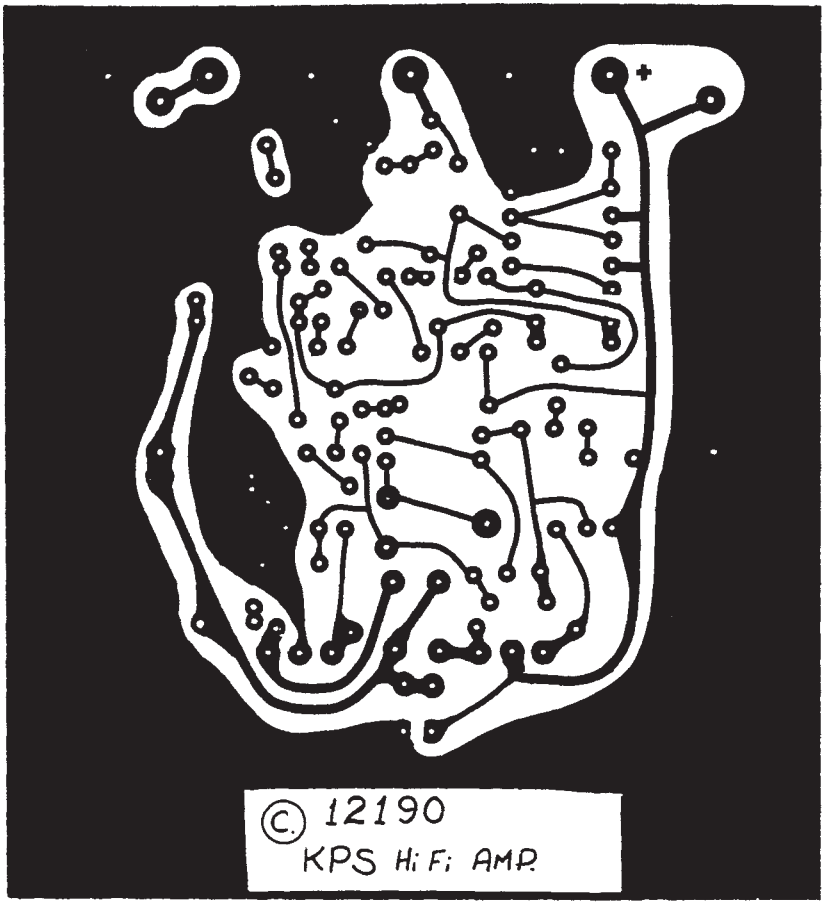
Note that the output quiescent current pot R17, if the slider goes open circuit Q7 turns hard on setting zero current in the output emitter followers. Some designers have it that an open pot turns Q7 off turning both output transistors full on! Hopefully a fuse goes first. R20 and R21 provide a discharge path for stored base charge in Q10 and Q11 and also increase the currents in Q8 and Q9 to a level where they have decent gain and speed.

CR5 and CR6 are important to catch any transients entering via the output ports. EG inductive transients from a bad connection to the speaker or static discharge from the operator. R13 and R19 set the voltage gain at 24 and C5 and C6 control theloop response of the whole system and keep it stable. Even audio transistors these days can exhibit spurious oscillation in the RF region consequently good RF practice is necessary to prevent this. Base damping resistors are liberally used, do not use wirewound, they must be non inductive!!

Use good grounding, that may sound daft to go to such trouble at AF but in reality it avoids the trouble if the stages 'hooting' at RF. Good RF practice also helps the stages to work well in the presence of RF.

Not included in the circuit board layout is audio output current limiting but the circuit given here can easily be constructed on the underside of the board if considered necessary.





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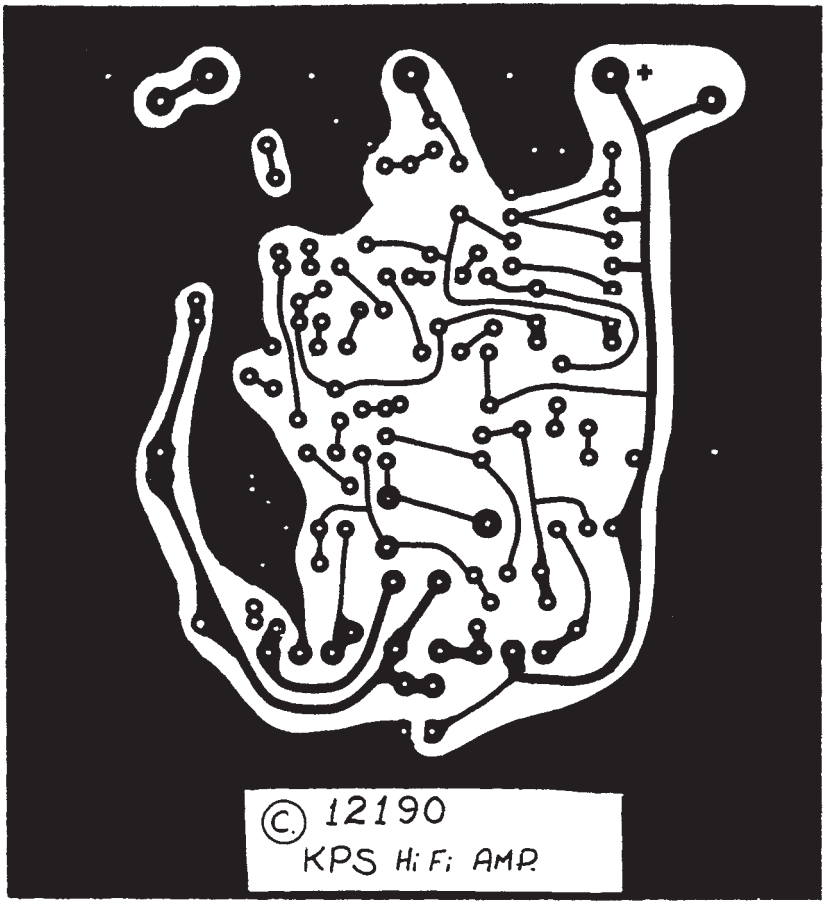

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PCB : COPPER SIDE

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PRINTED CIRCUIT BOARD FOR IF STRIP [Last Issue] £12.00
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tricky on 21/28 MHz (try a quarter wave counterpoise), but he reports a 14 MHz DXCC score of 103 countries during 1989 which cannot bad! Of course there is nothing sacred about the shape of these loops, although on oblong versions the length:width ratio should not be below 4:1. The idea is to get out as much wire as possible, even if the shape is a bit irregular. Many other members are using such loops, and all seem very happy with them. If you do have any problems with rf in the shack on a particular band, just hook on a quarter wave length of wire as a counterpoise. Try it at both the atu ground terminal and the rig ground terminal. One or other should get rid of the rf.

AWARD NEWS
Congratulations to Bob G4JFN, on Silver Tern Award No.5.
Also congratulations to the following QRP WAC; RV3GM
QRP COUNTRIES; 250 AA2U (terrific!); 200, G4JFN (well done!); 125; G3DNF, GMUYE; 75 GMXQJ; 50 G4XVE; 25 OH6MEC, UB5JFA, GOFYP, RV3GM, PE1HMO (all vhf!!).
WORKED G QRP CLUB; 680 G4JFN (great work!); 540 G3XJS; 340 G3MBN; 260 G3DNF; 240 OK1CZ; 220 GOIFK; 200 G4CFS; 140 G3FCK, GM4UYE, GOCQA; 80 G£ROO; 60 G4CZL; 40 GM4EWM, GOKCA; 20 G4ECI, RV3GM.
TWO-WAY QRP; 50 G3XJS (a well done!); 40 OK1CZ, GM4UYE; 30; G2DAN, GI4DQO; 20; G4WAS, G4AWT, GMXQJ, RV3GM; 10; GOKCA, PE1HMO (all vhf!)

CONGRATULATIONS TO OUR CZECH FRIENDS who have now been able to upgrade the OK QRP Group to the OK QRP Club, with membership open to overseas amateurs. Hopefully, more details in our next issue. The OK leading stations in the January OK/G QRP weekend were OK3CUG, G3VTT, and G3DNF. The G entry was undoutbedly hit by the big storm which blew down many antennas and cut mains power supplies. The Czechs fielded 19 QRP stations, which is excellent. OK1DEC received as special milliwatting award (15 G contacts with 700 mW) and OK1DVX a novice award. See you again next year!

PROJECT FREQUENCY BAND CONTINUES (see Technical Topics, Radcom. april 1990). An excellent new design for a 550 Hz filter has bee produced by Ed, W3NQN, and a prototype is to be sent to the UK for testing by the project team. The GWODYT idea of using a small af amplifier between an outboard LC filter and the phones has been under test a G8PG. It has proved to be an outstanding success, and is thoroughly recommended. Used with a W3NQN 500 Hz filter it shows just how good the latter is at removing QRM and general background noise. A further advantage is that the receiver af gain can be kept at low level thus eliminating any af overload problems.
THAT IS ALL FOR THIS MONTH. Many thanks for your letters which help to keep this feature going.

Members Ads

FOR SALE: WPO DSB80 Transceiver, Built as CW only, needs a few components to add DSB, Tested but not cased. £28.
YAESU 10 Watt PA BOard for FT757GX. This rig is available in Japan in a QRP version as FT757SX. I had a board specially imported, simply removed 100w PA board and fan and plug in 10w PA for QRP! £30.
Full spec. FT757GX (100w) also available at £590. FC700 ATU £70.
Malcolm, GW4FMD, 03483 - 641.

WANTED by newcomer to the hobby, back numbers of radio and radio-type mags and secondhand basic books on broadcast DXing/RAE/Amateur Radio. Local or localish pref. Further afield may be practical. Please write to Ed Kangai, Brook House, Turners Hill Road, East Grinstead, West Sussex. All Letters answered.

SUMMER QRP CONTEST 21/22 JULY 1990 (DL-AGCW)

This contest is the next in a well-established series of QRP contests organised by the DL-AGCW, at six-monthly intervals. These events attract wide support and are highly regarded. Predictably most of the entries are from European stations but although UK entrants get high placings there are so few of them that the Contest Manager DJ7ST (Hal) has recently made a plea for greater participation by the "Motherland of QRP. Now that's a compliment not to be ignored - so let's be having you!
Here are the full details (with some explanatory notes in brackets):-
"QRP Winter and Summer Contests, organised by DL- AGCW, are held each year in the third complete weekend in January and July, Saturday 1500 UT to Sunday 1500 UT>

CLASS A : Below 3.5w input or 2w output, single op.
CLASS B : Below 10w input or 5w output, single op.
CLASS C : Below 10w input or 5w output, multi op.
CLASS D : QRO stations, over 10w input or 5w output. to contact only QRP stations
CLASS E : SWL

(Measure output or input as appropriate - you do not have to observe both limits simultaneously)
Bands : 160, 80, 40, 20, 15, 10m; 2 way CW.
Only Class C stations may operate for the full 24 hours. All other classes must take a break of 9 hours (or 2 breaks totalling 9 hours, giving a maximum operating time of 15 hours). Call CQ QRP Test.
Exchange RST, QSO serial number and power eg 579 001/5 (If using crystal control, the power suffix has "x" added, eg /5x). QRO stations give eg 339002/QRO.
Operation on each band must be in one class only and may be VFO or crystal control, but not both. (VXO counts as VFO!). If crystal controlled, not more than three spot frequencies may be used per band. Stations may ve contacted once only per band.
(For QRP operation all contacts count, so you do not have to restrict your efforts to looking only for QRP/QRP contacts. However you must give your serial number and power, even if working DX OR STATIONS NOT IN THE CONTEST).
POINTS:- FOR qso with own country 1 point
For QSO with own continent 2 points
For QSO with DX (other continents) 3 points
(Countries are as in the latest DXCC list, but call areas in JA, PY, VE, VK, W and ZS count as individual "Countries")
Multipliers:- For each country.....1
For each DX QSO.....1
(This means that your first QSO with a DX country gets 2 multipliers, and then another multiplier for each successive contact with the same country).
Results per band - points x multipliers.
Total result = sum of band results.
Double the results for crystal controlled stations.

Certificates are awarded for the first 3 places in each class and band. (There will also be a G-QRP plaque for the highest placed member!)
Closing date for entries is 6 weeks after the contest. Special log sheets available from the Contest Manager (DJ7ST) for 2 IRCs. Enclose 1 IRC with your entry if you wish to receive the results.
The contest Manager's address is
Dr H Weber DJ7ST
DL AGCW Contest Manager
Schlesierweg 13
Federal Republic of Germany

It is really not as complicated as it looks! There's a lot of fun to be had in winkling out the QRP and DX. Scanning the bands intensively can result in many "new countries" falling into your grasp. The choice of bands used is yours, but sticking to one band will often pay dividends. The problem is to decide" which band". Careful monitoring during the days preceding the contest will give some indication, but remember that Lady Luck has the last work on propagation!
Complications can also arise when there are other contests running on the same weekend. This can be turned to advantage, despite the fearsome QRM.
As Gus (G8PG) has recently commented in "Sprat", contest operation tests your skills and equipment. A good aerial is a help, but don't despair if you do not have a high gain rotary beam. A "backyard" fixed wire aerial is used to good effect by both G8PG and G3DNF in these contest.
Let's make it a team effort in future!
GORDON G3DNF

ANNUAL TABLES (CLAIMS FROM 4/90)

C/S	CW	SSB	SPRAT
1990 COUNTRIES WORKED, H.F.			
G4MET	0	27	64
G4EZA	25	0	63
G0KZO	20	0	64
G0DJA	15	0	64
G4YIR	13	1	62
ALL TIME COUNTRIES			
VHF			
AA2U	12	28	62
G0DJA	4	0	64
PE1MHO	1	32	61
H.F.			
AA2U	225	226	62
G4EZA	25	0	63
G0KZO	14	0	62
G4YIR	13	1	62

SSB NEWS

Ian Keyser G3ROO
Rosemount, Church Whitfield,
Dover, Kent. (0304) 821588

Dave, G0DJA has entered the tables having borrowed a TS520 and using is wound down to 3 WATTS. On 2 metres he has an FT290. Special congrats are to his wife on giving dave another QRP/QRM rig, a baby boy on the 26th April. Dave will soon be heard on 50 MHz, QRM permitting of course!

Errol, G4MET has been active on 10M and has added UA9, FR and ZS to his list making a total of 27 countries in just over a month!

A short note from Eva G0KZO increasing her all time countries score to 20, she raises the point if I require lists of callsigns with claims. This is not important, but if you do it gives me some idea what I have missed on the air!

I have had a letter from Roberto I4NRR and several others regarding the tranceiver project and the availability of kits. These will be available as kits or 'baord and instructions' and an eye should be kept on Kanga Products to keep abreast of availability.

That's all for now folks

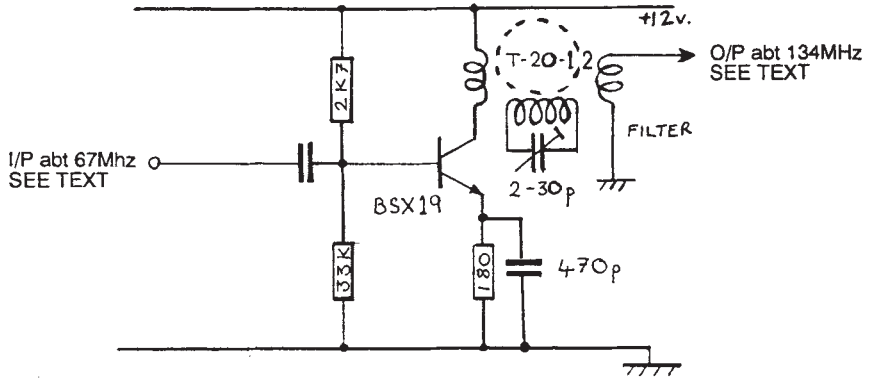
Ian
"ROO

VHF NEWS

John Beech, G8SEQ, 124 Belgrave Rd. Wyken, Coventry, CV2 5BH.

THE SEQUENCE 70MHz TRANSCEIVER ON 2M OR 6M

The circuit converts the Sequence 70MHz of SPRAT 60 and 61 to 145Mhz. The output of the 1st local oscillator is fed to the doubler, which has a band pass filter tuned to about 134MHz, the optimum tuning is found by experiment. the output level from this doubler is slightly higher than the xtal oscillator output (at 70MHz) to compensate for the reduced gain of the TX PA at 144MHz. the receiver input and transmitter output filters need to be altered as follows:



NOTE: The TX & RX filters are indentical to the above circuit for 2m;
For 50MHz use T-37-6 core with 2t; 10t; 2t and 2-70pf trimmer

The 50Mhz circuit does not require the doubler, only a crystal change (50.xxx + 10.7 ie 1st LO operates ABOVE signal frequency, the inverse of normal VHF practice). The only other changes are to the in/output filters as indicated on the diagram.

It should be noted that the design is for 50MHz or 70MHz or 144MHz; it is not intended for multiband operation as there is no provision for switching the rf circuits satisfactorily. The rig should prove ideal as a low cost transceiver for a packet radio set-up or a general purpose local chat box.
The next stage of development is to have the frequency control from the keyboard of my packet set-up, as the diode switching used in the 1st LO circuit lends itself to remote manual or computer controlled switching.

FORMULA FOR CALCULATING XTAL FREQUENCY:

$$\frac{(2m\ Freq - 10.7)}{2}$$

Worked examples:

$$\frac{144.0 - 10.7}{2} = \frac{133.3}{2} = 66.65$$

$$\frac{146.0 - 10.7}{2} = \frac{135.3}{2} = 67.65$$

$$\frac{144.650 - 10.7}{2} = \frac{133.95}{2} = 66.875$$

NEWS

There has been even less VHF news from you the members than usual. Dave, GODJA wrote asking where all the activity on 2m has gone - no members heard for ages.

So in a bid to liven things up (no its not another contest) I have designated the week following Midsummers Eve as "VHF Summer QSO Party" so please please extracts from your log to me and/or Gus, G8PG, however meagre and I'll dream up an award for the most interesting log received. we will have a listeners section too for the increasing number of unlicensed members.

ANY BAND, 50, 70, 144, 432 MHz, ANY MODE.

Midsummers Eve is June 2st : this and every year.

NOTE: But as you will not have read this until the scheduled event is over FOR THIS YEAR ONLY it will take place for one week starting on SUNDAY JULY 22nd.

NORWICH QRP CONVENTION 1990

At the first Norwich QRP Convention held on May 19th, 35 licenced amateurs and 15 non-licenced attended, the furthest coming from Essex. The event proved so successful that it will be repeated next year with more publicity. Thanks go to Jim Bacon, G3YLA, and David Buddery, G3OEP, for talks. The Norwich QRP Group meets on the 3rd Thursday of each month. Details from John, G7EZL on Norwich 424864.

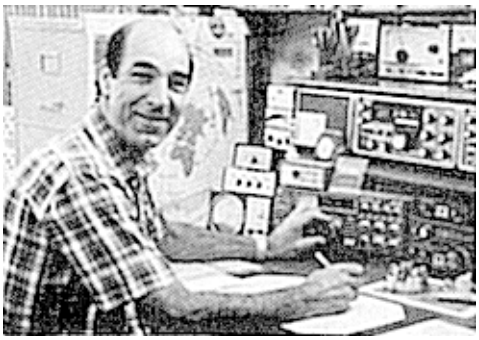
VERY LOW POWER SKEDS REQUEST

Jos Koekkoek PA3FDW has been conducting experiments with milliwatt power on the 6,10,12,17 Metre Bands. He would welcome skeds on any of these bands during weekends and evenings. His idea is to begin the QSOs with 20mW and decrease power during the tests. Jos may be contacted at PO BOX 2040, KERKRADE, 6460 CA, HOLLAND. His telephone numbers are 045-455664 (weekends), 055-551262/336637 (evenings).

HAVE YOU WORKED FY QRP ?

Member Dave Allardyce, DJ0PJ, is working as FY/DJ0PJ at Kouvou, 2100gmt most evenings until mid July on 14061 with 5 watts and looking for members.

MEMBER'S NEWS



Chris Page G4BUE

"Alamosa", The Paddocks, Upper Beeding, Steyning, West Sussex, BN44 3JW

By the time you read this the CQ WW WPX Contest over the last week-end of May will be over. If you worked GB0QRP then you had a QSO with your columnist. This was a special call that I obtained to use during the period leading up to World QRP Day on 17th June to help publicise the QRP cause. I'm hoping the solar flux is high and the K index low for the WPX Contest, otherwise it is going to be difficult to obtain a good score with 5 watts. If you took part in the contest with QRP, let me know how you got on. I wasn't able to get to the Yeovil QRP Convention as a local amateur and good friend, (who is not a QRPer), got married that day! Can someone send me a report about the Convention for the next SPRAT please.

PA3BHK is recovering after an accident with his bicycle. Robert hopes to get better quickly as he wants to visit the UK at the end of July and visit my QTH for the Summer QRP Party. See elsewhere in SPRAT for details of the Party if you are planning to be in Sussex at the end of July and want to meet other members and QRPers. Robert has been QRV on 28060 with his homebrew 3w rig but has been disappointed by the lack of answers to his CQ calls. His best DX so far is JA. G4INM recently worked ZL on 10MHz with his 80 meter dipole and ATU. AA2U was chuffed to crack the huge 20 meter pile up for 3Y5X with just 600mW. SM0GKF is one of the few members who only use SSB. Rune recently worked ZK1XL and VK0AE with his 509 Argonaut. He was issued with an SSB QRP WAZ certificate in 1984.

G0NEZ has been using his new call to work members, but like your scribe David also uses higher power when conditions demand it. Do you need to work Alaska on two-way QRP? If so keep an ear for KL7DG who uses an Argonaut 509 to a G5RV. John's other interest is running and estimates that since 1966 he has run over 21K miles! Any challengers? W9IWI recently acquired a 505 Argonaut after several disappointing stabs at homebrewing. John says the DC receiver is the worst thing that has happened to ham radio since the invention of the TV! He says the welcome mat is out for any of the QRP gang passing through the Chicago area. KA1CZF is back on the air after a four year absence. Tom has a new QTH and is erecting a beam.

RV3GM has been using 2 watts from a homebrew transceiver since 1988 on 15 and 20 meters. Oleg has worked 35 DXCC and 22 on two-way QRP and enjoys working members. He is also a member of the U.QRP Club. G0DRT has recently renovated an old Collins TCS12 WW2 transmitter and is now using it for QRP with good results. Peter is now renovating an old T1154 and offers members the chance to hear these rigs on the air by telephoning him for a sked, (0795-86722). AA2U went on a DXpedition to Israel in April with his 509 Argonaut and 20 meter dipole. From an 18th floor hotel balcony in Tel Aviv Randy hung it as a vertical with the top sloping back to the wall of the hotel. He worked two-way QRP with many Eu countries including club members G3NIJ, GM4XQJ, OK1CZ and SM1CNS. He also worked UI8VB who was running 5w. Randy says he may go back this summer in which case he will be QRV from 17z onwards.

I saw the new Argonaut II at Dayton. It's called the 535 and the Ten-Tec boys told me that many of the features on it are the direct result of feedback from the QRP "Gurus" worldwide. The price isn't fixed yet but will be around $1300. I can't help wondering if they may have tried to incorporate too much feedback and the price come out too high. We shall see. If any member buys one can they please write a review type arti-

cle about it for SPRAT. I'm sorry I missed some of the QRP gang at Dayton. I looked by the ARCI stand a couple of times but didn't see any familiar faces there and I wasn't able to get to the hospitality suite. I shall be there again next year with G3VTT.

G0KCA has built the Kanga Stockton Wattmeter with the 22K resistors for the 5w range, and is very pleased with it. His first milliwatting experience was with 500mW to a DJ. John mentions a TVI problem since the house next door installed a satellite dish and he is waiting for the DTI to sort it out. Wish you luck with that one John!

Talking of milliwatting your help is requested by W8UR (Box 343, Mackinaw City, MI, 49701, USA). Dennis operates a beacon on 28215 at 500mW which has been in non stop operation since February 1989 and he wants SWL reports of it. His friend, N8KHE (Box 367 in Mackinaw City) runs another beacon on 28246 with only 50mW and also wants SWL reports.

G3XJS is building the G3TSO transceiver and not the G3OGR as reported in the last SPRAT. Peter christened it by working VP2 through a pile-up, although the rig is not yet finished! He supports G3ROO's idea for a natter night on 160 meters and suggest 1940KHz at 2130 local time on Monday evenings. Peter also mentions the home-brewer's net on 3733KHz most days at 1700 local time.

W0RSP hopes to return to South Dakota by August and be back on the air. Ade has been doing research down in Florida and sends his best wishes to all the UK QRP gang. Ian Wye hopes to receive his call sign soon. He is in BFPO 40 and has bought a filter PCB from BARTG which turned out to be the "Son of SuperScaf", the terrific audio filter that I reviewed in PW a while ago.

G3OEP will be running another "QRP Beside the Seaside" at 2pm on 22nd September at The Garnham Centre of the United Reform Church in Gorleston, near Great Yarmouth. It is situated at the junction of Back Chapel Lane and Garnham Road and has good car parking facilities. Refreshments will be available.

Several of you responded to my note in the last SPRAT about Packet. I am QRV @ GB7VRB and on the DX Cluster @ G4LJF-4 and news for this column can be passed to me via those BBS's. Once sufficient members are on Packet I will circulate regular QRP News Bulletins. The list of members I am aware of so far is:-

G1HDQ	@	GB7TXA	G4BUE	@	GB7VRB
G0BPS	@	GB7SEK	G4GJA	@	GB7SEK
GM1OQZ	@	GB7MAC	G4GHU	@	GB7GHU
G4GIY	@	GB7GBY	G4SCT	@	GB7WNM
G0DCL	@	GB7ESX	GM1BEA	@	GB7CQV
KA1CZF	@	N1DCS			

G4SCT uses QRP on packet and would like two-way QRP QSOs with members on that mode. G1HDQ runs 5w from an FT470 handheld into a vertical dipole in the loft. Kevin also recommends the TRF design in Technical Topics (Rad Com 1987) mentioned by GM3MVN in the last SPRAT. He is currently building a 20 meter version based on a modifed G3TDZ White Rose converter PCB. Kevin asks if a anyone knows of a cheap source for HC6/U crystals on or around 14060. G4GIY has recently built a DTR3 kit with which he is QRV on 80 meters with 1.5w. All the news in this paragraph was passed to me via packet.

Whilst in the USA I did a lot of operating from N4AR's QTH near Lexington, Kentucky as G4BUE/W4. One afternoon I was working a reasonable European pile-up on 15 meters, no doubt caused by the six over six yagis I was using!, when I heard G4LQF calling me. Norman was running 5w and his QRP was competing very well with the big guns. Wel done Norman. Back home, I recently worked CO2DC in Havana on 40 meters at 0650z one morning. Jesus was using 5w to a long wire but unfortunately I wasn't QRP too!

At this time of the year my thoughts always turn to antennas . As every QRP DXer knows the antenna is the secret of success. With more time on my hands this year due to finishing my exams, I have several projects in mind, including a 6m antenna to try out the two rigs I bought at Dayton. What projects are you planning? Please write and tell me about them as I want to share antenna ideas in this column and help other members work more DX.

That clears the files (and the packet mailbox). I hope to see many of you at "Alamosa" at the end of July. Let me know how your summer goes, by 17th August please.

73, Chris

THE 1990 SUMMER QRP PARTY

Once again Pam and Chris will be holding their Summer QRP Party at their QTH in West Sussex on Saturday 28th July 1989. The format will be the same as in the previous five years in that it will start at 2pm and finish when the last guests have left! Everyone interested in QRP an/or HF dxing is invited to attend, but you're asked to let Pam and Chris know beforehand, (0903 814594, by mail or via packet to G4BUE @ GB7VRB or the DX Packet Cluster)).

Items of homebrew gear, anything you want to sell or swap plus a contribution in the form of food or drink will all be very welcome! If you live some distance away and want to attend, then get in touch with Chris as some sleeping acommodation is available for those wishing to stay over to the Sunday. Be quick though as the PA contingent have already booked some of the available space!

LACK TEST EQUIPMENT : WANT HELP ?

Many constructors within the club may lack the range of test equipment required to troubleshoot or get a project going.

One of our members, Ian Butterworth (4303), has a good range of such equipment and the expertise required to use it. Ian is willing to undertake work on members projects with the following conditions:

a) Members are responsible for the carriage to and from Ian.
b) Members are also responsible for packaging damage and loss.
c) The service is on an informal basis, hence time and scope of work depend upon what is possible.

If you would like further details contact Ian at:
IAN BUTTERWORTH, 21 GREENSIDE COURT, MONTON, ECCLES, MANCHESTER

TOROIDS IN THE UK : TMP ELECTRONICS CHANGE NAME AND ADDRESS
TMP Electronics, a common source of toroids for members in the UK have changed name and address. Howarth, GW3TMP, informs me that the company now trades in toroids as
FERROMAGNETICS, P.O. BOX 577, MOLD, CLWYD, NORTH WALES, CH7 1AH.
A catalogue and informative data list is available for 50p

SPECIAL SPRAT OFFER

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BAND	QRP CALLING CHANNEL	OTHER FREQUENCIES			MODE	PRICE
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20m	14060	14030	14040	14050	"	3.50
17m	-	18080	18090		"	3.50
15m	21060				3rd Overtone	3.50
	21060				Fundamental	4.00
12m	-	24910			"	4.00
10m	28060				3rd Overtone	3.50
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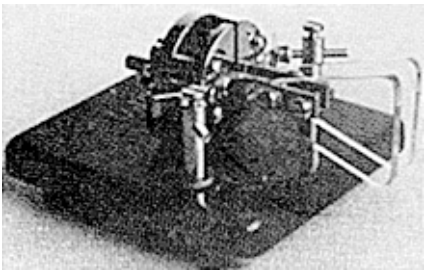
SAE please for lists of stock crystals and TTL oscillators for microprocessors, radio crystals, plus Crystal, Monolithic and Ceramic Filters on 455 kHz, 9.0, 10.7 and 21.4 MHz etc.
VAT and UK postage included. Overseas members please add £1.00 per order.

73 G3EDW

Merriott Somerset TA16 5NS England Telephone: (0460) 73718



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£2 Discount on all keys to members: Quote Number

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Single Band Kits for	3.5, 7, 10MHz	£40 each inc post
	14, 18, 21, 28, 50MHz	£55 each inc post
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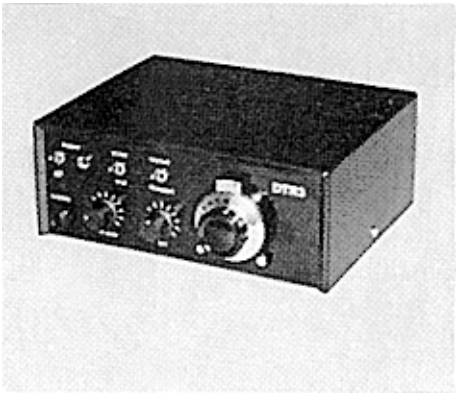
(PCBs and construction notes only for above at £10 inc post)
White Rose 50 to 28MHz Transverter Kits £25 (PCB only £5)
Overseas members add £5 for postage. Cheques "John Beech"
JOHN BEECH, G8SEQ, 124 BELGRAVE RD. WYKEN, COVENTRY, CV2 5BH

QRP KITS – QRP PRICES!



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Sensitive and selective,
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TU2(Mk2) ATU with SWR Meter £45.00

Both ATU's are suitable
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DTR3 80m CW TX/RX
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READY BUILT £126.50

LAKE ELECTRONICS specialise in supplying FULLY COMPLETE kits for the licensed Amateur and SWL. "COMPLETE" means just that – everything you need – right down to the last nut, bolt, washer and bit of wire!

The DTR3 80m Transceiver, for example, comes not only with case and knobs but, of course, all the other essentials – a stable VFO which includes a good quality variable capacitor and slow-motion drive, RIT (plus and minus frequency shift!), sidetone, RX attenuator, 250Hz Audio Filter and ready-printed Facias for that "Professional" finish.

With a LAKE ELECTRONICS kit, there is no more wondering how to link up a motley collection of various PCB's – or, for that matter, how to fit them into a box which, you've now discovered, isn't quite suitable – or "making do" with ex junk-box bits that don't quite fit, either physically or electrically . . . . .

As you would expect, a complete set of good quality, brand new, components together with comprehensive instructions to guide you every step of the way, results in a kit which is not only a pleasure to build and use but ensures a finished job you can be proud to show your friends.

For full details of our kits, send SAE to

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NOTTINGHAM, NG16 1BX
or, ring Alan, G4DJW, (0602) 382509

Access

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AS WE HAVE JUST CELEBRATED OUR 3rd BIRTHDAY !!

NEW KITS FOR YOUR DELIGHT

A LOW PASS FILTER.. Designed by David GM4ZNQ for the Club. It is a 7th order elliptical filter with a ripple co-efficient of 5% (so now you know!) Ideal to follow the ONER too. Just state the band (not WARC) required. Just £ 2:50

The DIRECTIONAL WATTMETER, another from that HF expert David Stockton. See SPRAT 61 for full details. George commented "our tests..suggest that it could be better than the Bird" (wattmeter). The kit comprises just the 'head' within an alloy box, two 50uA meters are required and the case to house it all! Meters are available at £6:95 each. The kit is only £13:95

		PCB	KIT	
KP850A	'ONER' TRx (all 5 kits)	(£11:00)	£26:50	
KP350RD	DUAL BAND RECEIVER	(SPECIAL OFFER)	£29:95	
KP360T	DUAL BAND TRANSMITTER	(SPECIAL OFFER)	£25:95	
KP310RG	G3RJV'S 'SUDDEN' DC RX	(£ 5.00)	£13.95	
KP870C	TX/RX BOARD (Mark 3)	(£ 7:00)	£13:45	
KP880C	SIMPLE TX/RX CONTROL KIT	(£ 5:00)	£ 9:00	
KP820V	VFO KIT	(£ 5:00)	£11:45	
KP570TT	TWO TONE OSCILLATOR	(SPECIAL OFFER)	£10:95	
KP160/7	FT707 160M CONVERSION KIT	(£12:00)	£26:95	
KP160/77	FT77 160M CONVERSION KIT	(£12:00)	£26:95	
KP750	THE P.S.U. KIT	(£ 7:00)	£13:45	
KP850X	CRYSTAL OSCILLATOR (Mk 2)	(£ 7:00)	£13:95	
KP860X	DUAL BAND CRYSTAL MIXER	(£ 5:00)	£16.95	
KP730CT	MORSE OSCILLATOR KIT	(£ 6:50)	£11:45	
KP580K	IAMBIC KEYER	(£ 7:00)	£15:00	
KP950LCK	SINGLE BAND TR/X	(SPECIAL OFFER)	£40:00	
Please add post & packing			£ 1 : 00	

SEND SAE NOW FOR FULL CATALOGUE
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