SPRAT

THE JOURNAL OF THE G-QRP CLUB

DEVOTED·TO·LOW·POWER·COMMUNICATION

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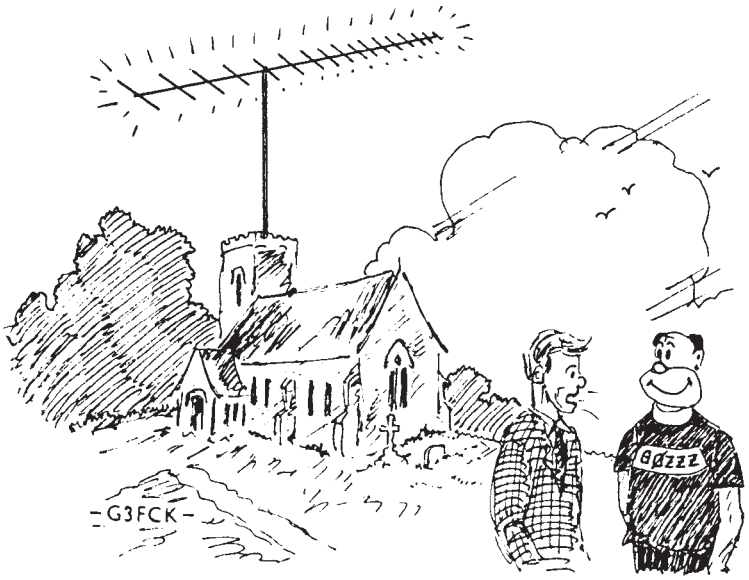

"AND HOW'S THE CHURCH RESTORATION GOING, VICAR?"

[Use an antenna from a church tower on October 19th - See p.28]

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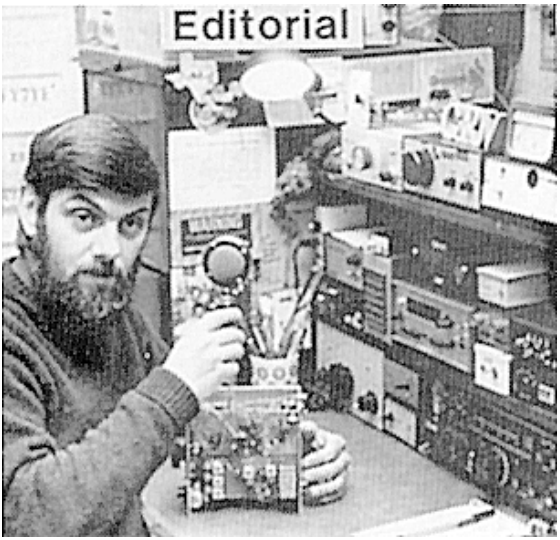

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Mistakes in SPRAT are not uncommon - such is the way of an amateur journal produced in spare time... but some mistakes are to be avoided, like getting a wife's Callsign wrong! Jo-Anna is **GOOWH** (not OHW). This issue - a guest editorial by Gus, G8PG.

73 G3RJV.

"72 ES 73 OM" Guest Editorial By Gus G8PG

It is not often that we get a new operating code in Amateur Radio, and to the best of my knowledge there has never before been one introduced specifically for QRP operators. Some months ago the U QRP Club suggested that QRP operators adopt the new code **"72"**, meaning "Wishing you Good QRP". Your club then organised a world-wide pole of QRP Clubs to see if this suggestion was acceptable, resulting in a 100% YES vote. So now we have our own code for wishing fellow QRP operators success in our unique side of amateur radio. Please start using it immediately, and draw the attention of your fellow QRP operators to its existence.

72 es 73, Gus, G8PG.

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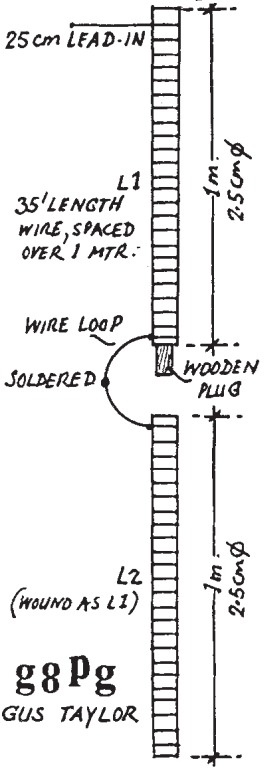
CAUTION: The antennas described were developed for QRP use (say up to 10w rf). If high power is used high rf voltages will be set up at the ends of the antennas. This requires a capacity hat (15 cm metal disc) to be fitted to the free end of the antenna, and high power transmitting variable capacitors to be used in the associated a.t.u. With QRP such precautions have not proved to be necessary.



A linear loaded antenna is one in which the antenna wire is wound as a long coil on a suitable insulated former, the turns being spaced by several wire diameters. To achieve approximate resonance, the amount of wire wound into the coil must be roughly twice the length which would be required for resonance if the wire was stretched out in a straight line. As the antennas to be described are end fed via a Z-match or other suitable atu, resonance need only be approximate, and it was decided to use slightly more than a quarter wavelength of wire at the lowest frequency to be covered. In the G8PG experimental models it was decided to operate the antennas as a quarter wave on 7 MHz, a 3/8 wave on 10.1 MHz (Marconi operation), as a full wave on 14 MHz, a 1 1/2 wave on 21 MHz, and a 2 wavelength on 28 MHz (Hertzian operation). To achieve this result the length or wire wound on was 70 feet, which proved satisfactory. Feed on all these bands was via a multi-band Z-match as described in the RSGB "Radio Communications Handbook", an earth connection being made to a central heating pipe near the first floor operating position.

For indoor use as a vertical antenna, the former selected for the antenna was a 2m length of 25mm [1 inch] diameter plastic pipe. This was cut in two at the centre, and a suitable wooden plug was glued into the end of one piece, thus allowing the two halves to be separated for storage or transit, and plugged together when required as an antenna

A 70 foot length of flexible, stranded plastic insulated wire was then measured off, and cut at its centre. Each half was then wound onto one half of the plastic pipe, using a spacing of several wire diameters. The easy way of winding on is to lay the wire on the floor in a loose coil, sit on a chair, and rotate the pipe with one hand while guiding the wire with the other. Leave about 25 cm (10ins.) wire free at the start of the winding, and secure the first turn in place with a binding of plastic tape. Put a similar binding at the far end; leave 25 cm of wire free at the far end. Repeat the process for the other half of the pipe, then solder the loose wires at the inner ends of the two halves of the antenna together. This forms a loop which allows the two pieces of pipe to the plugged together for use as an antenna, or unplugged and laid parallel for storage or transportation. See Fig.1.

The above construction method is ideal for indoor use, or for outdoor use as a permanent vertical antenna. For portable use, or if the linear loading section is to be used to improve a short horizontal antenna, an alternative method of construction offers advantages. Here, instead of a rigid former, we wind our coil on to a 2m length of 25mm diameter nylon rope, thus providing an antenna which can be coiled up for storage or for carrying in a back p0ack. The actual winding of such a linear loaded antenna is more time consuming than the method described above and the following procedure is based on some hard won experience! It assumes that one has already cut a suitable 70ft length or wire. Begin by binding the two ends of the 2m length of rope with insulating tape to prevent the strands untwisting. Then, a few cm from each end of the rope, work a 30 cm length of nylon cord through the strands, and tie the ends together to form two loops. These allow the rope to be supported during winding, and when in use as an antenna. Use the loops and suitable support points to support the rope ready for winding; ensure it is taut. Wind the wire onto a flat piece of wood in such a way that it will unwind easily. Work one end of the wire through the strands of the rope and tie a knot it , leaving about 25 cm free. Then wind on the wire by passing the wooden former around the rope. As the rope is less rigid, put a couple of turns of insulating tape around the winding after each 20 turns to maintain tension on the wire. When the far end of the winding is reached, work the free end of the wire through the rope strands and tie it into place, leaving 25 cm free.

The use of a 2m former is not mandatory. It was chosen because it is the shortest length recommended for reasonable 7 MHz operation.

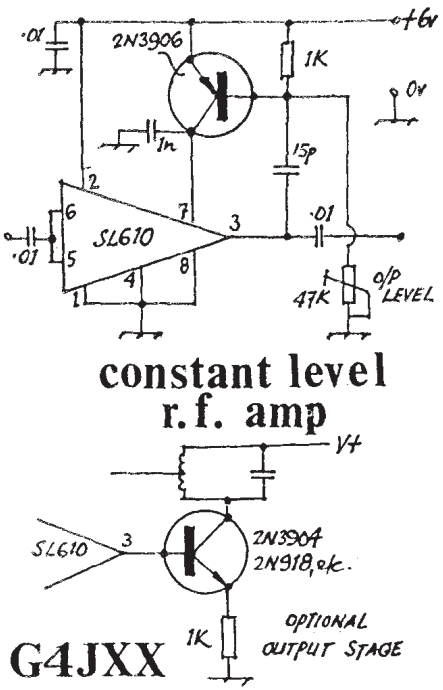
Greater lengths will provide some increase in efficiency. Lower frequencies are also of course possible. For example 140 feet of wire would, if wound on a 4m long former, provide a quarter wave at 3.5 MHz, and Hertzian operation from 7 MHz upwards. As a free standing antenna, either version described above can be used either as a vertical or as a horizontal antenna. For such use the free wire at one end is connected to a lead-in wire of suitable length, which is taken to the z-match coupler, and the free wire at the other end acts as a small capacity hat. When used as a vertical the lead-in wire should go to the top of the antenna. One of these antennas can also be used to load an existing short, wire antenna, be it either a horizontal or a vertical. For example, of only 30 ft of wire can be erected connecting one of the antennas described above to its far end will convert it into a 7 MHz half wave, and considerably increase its efficiency both on that band and on the higher frequencies. Operation on 3.5 MHz as a quarter wave Marconi will also be possible. There are also many other possible combinations of this type of loading, an very important point being that besides loading the wire, the linear loading section will also radiate with good efficiency.

When preparing this article tests were first carried out using a 2m long pipe wound version leaning against the shack wall next to the operating bench. The lead-in wire from the top of the coil was 1m long, feed was via a Z-match, and the earth connection was to the central heating system. The first surprise was 7 MHz operation as a quarter wave. Many QRP stations in the UK and Western Europe were worked, and late evening QSOs with HA, OK, UB5 etc were made. Results

on the hf bands were also good. All Europe could be worked, and dx when conditions were at all reasonable; this included VU on 28MHz. Results with an indoor antenna do depend much on local screening, but this one was surprisingly good and well worth trying.
A second set of tests were carried out with the antenna erected vertically outdoors with the top about 4.5m above ground. Feed was via the top of the antenna, using a 7m length of wire. This combination was impressive. Ragchew type QSOs with W, UA9 etc were possible on the hf bands, 10MHz was good for UK/EU and on 7MHz, two way QRP was easy and 599 reports were received from UB5 and LY2. There is no doubt that in my location at least, this a very worthwhile outdoor antenna.
Two further tips. For outdoor use weather-proof the antenna by carefully wrapping in in polythene tape. If any band gives problems with RF in the shack, increase the length of the lead-in wire by a few feet to shift the resonance.
This concludes this trilogy of articles on short multiband hf antennas. It is hoped that they will prove of use to readers and show that with ingenuity, one can put out a signal from almost any location however unpromising. (As a postscript, a 12ft long version, 18ft high, was tried. It gave UK and near EU QSOs on 3.5MHz and was excellent on the HF bands.)

CONSTANT LEVEL RF AMPLIFIER
Mike Hadley G4JXX

A useful circuit to provide a constant output from an input range of greater than 30db, without the preset the output is about 500mV RMS.
Construction is not critical but there must be an adequate groundplane as close to the IC as possible.
The optional output stage shown is recommended for driving an inductive load.
This circuit has been used to regulate the output from a multiband crystal oscillator board of the type used in the G3ROO "Kitten".



FURTHER NOTES ON VFO STABILITY

Dave Benson NN1G

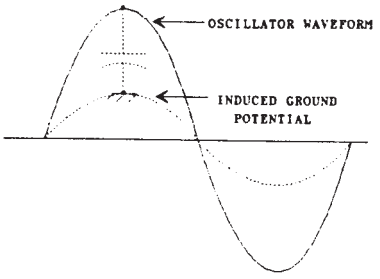
Much has been written about stabilising VFOs for QRP transmitters. Despite the best efforts of the homebuilder, however, a new rig may show signs of frequency pulling or chirp. To add to the frustration, extra buffer stages may not have helped much. These problems are all too common in cases where the VFO frequency is run "straight through" to the transmitter output.

The culprit is RF current flow across the transmitter case due to feedline inbalance and to PA stage ground return currents. Typically for the smallest QRP rigs, the VFO section is not provided with its own shield enclosure. As a result the component stray capacitances to the case are especially sensitive to potentials developed by this current. This makes these strays "look like" a new value on key-down, causing a distinct frequency shift (see figure).

The builders who have successfully used the "straight through" design have stressed the need for careful VFO compartment shielding and lead bypassing. An alternate solution to the frequency pulling problem involves moving the VFO frequency so that the transmitter isn't running straight through. The mixing (heterodyne) VFO is especially useful since it works well in QSK applications. The schematic shows such a VFO for the 40-Meter band. Even without shielding around the VFO section, I noted no frequency shift when changing from dummy load to antenna or when adjusting an antenna tuner! I also constructed a sample VFO for 28 Mhz with good results so the idea is easily extended to other bands.

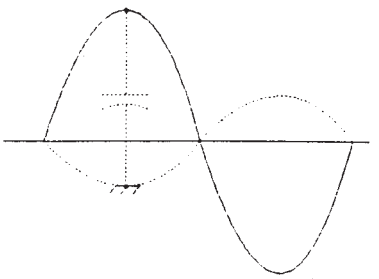
The circuit components at the base of the PNP switch provide a fast turn-on and a 10 msec turn-off delay for the mixer to assure a stable VFO output during the keydown interval. The actual waveshaping of the transmitted signal should be done in succeeding transmitter stages.

This VFO also works well as the basis for a stable DC transceiver, by configuring the mixer to run continuously and adding an RIT or XIT circuit. Whichever version you try, good luck and good QRP DXing!



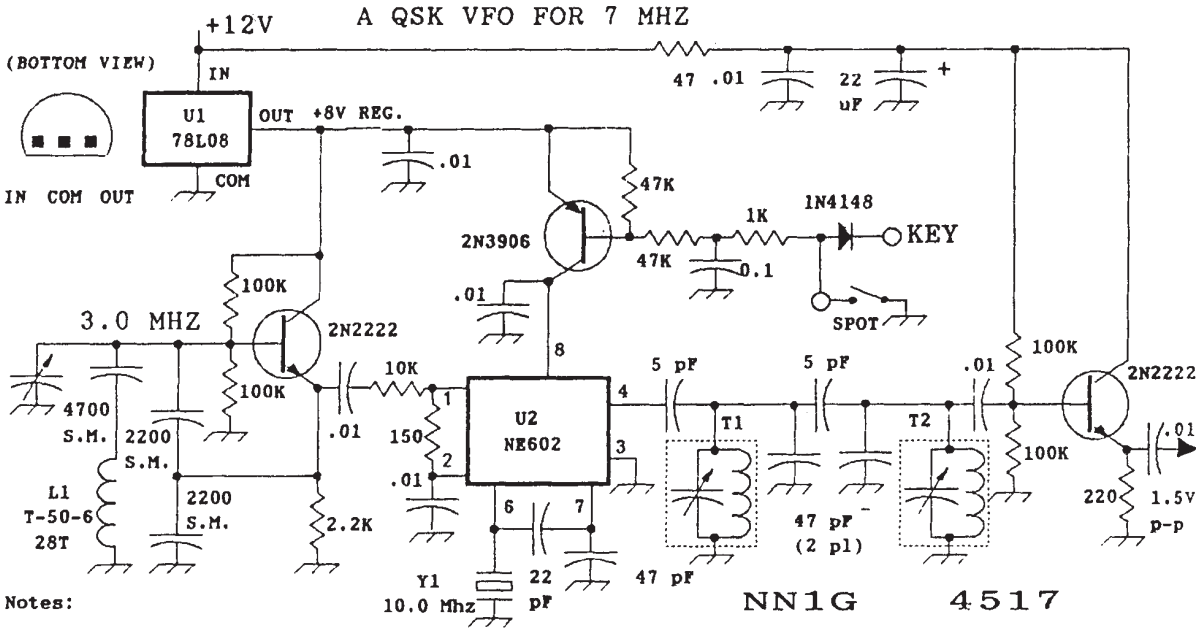
CASE 1: INDUCED POTENTIAL IN PHASE WITH OSCILLATOR

EFFECTIVE STRAY CAPACITANCE IS REDUCED.



CASE 2: INDUCED POTENTIAL OUT OF PHASE WITH OSCILLATOR

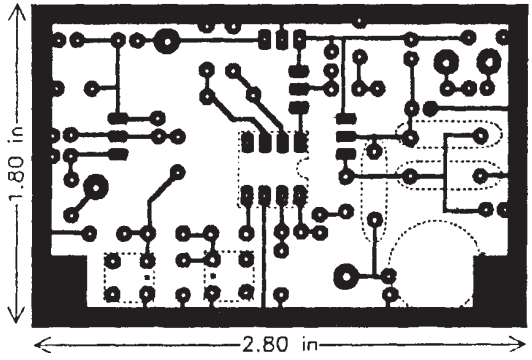
EFFECTIVE STRAY CAPACITANCE IS INCREASED.



T1,T2 are subminiature (7 mm) 10.7 Mhz IF Transformers (green core). Secondary windings are unused.

L1 turns are spread or compressed to set VFO frequency. (The frequency conversion reverses the tuning, so the adjustment is "backwards").

A 2N5179 or similiar is recommended for the output buffer if the VFO is used at 14 Mhz or above. A ferrite bead is added to the base lead if instability results.



INTRODUCTION
To give it its full name, the Frequency Analogue-Digital-Analogue-Meter, describing the changes the signal undergoes as it moves along the circuit. By chance, my elder son's name is Adam....

A different type of frequency meter from that which we're used to seeing which, though by no means as accurate as a digital frequency meter, is a useful piece of test gear at a fraction of the cost. All components bought new save the meter and box should come to about £10 or thereabouts. Maplin appears to have everything required.

Specifications are - input impedance no idea
sensitivity don't know
range 5kHz in five decade steps. The smallest fraction of FSD that can be read accurately depends on the size and quality of the movement.

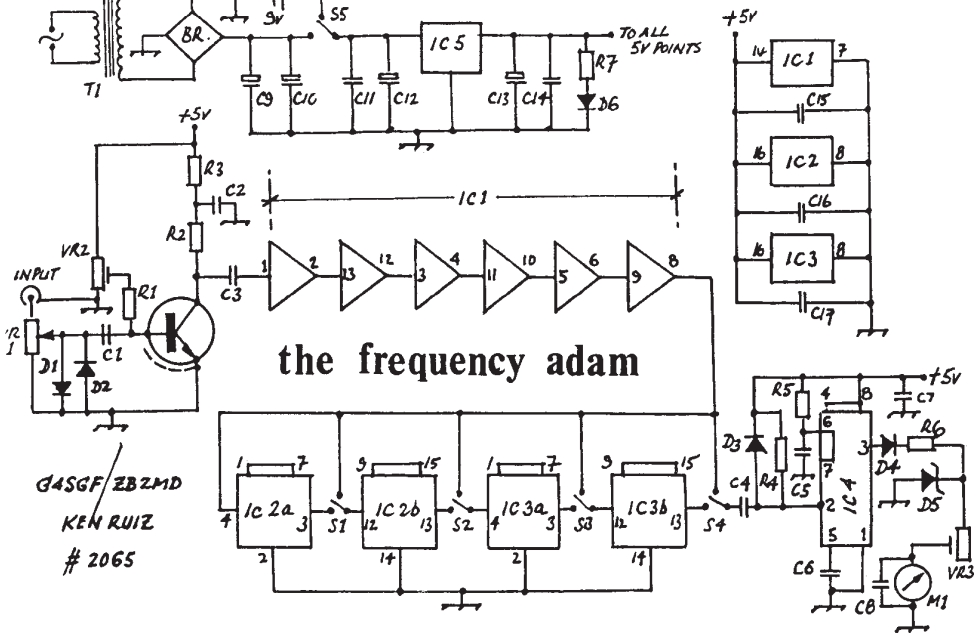
THE CIRCUIT
The circuit is perhaps best considered backwards.
IC4, a 555 timer, is in monostable mode. For every pulse presented at pin 2 a pulse appears at pin 3, the duration of which is fixed by R5 and C5 as (1.1*R5*C5) seconds. The amplitude of the pulse is the positive voltage rail, so that the mean voltage at pin 3 is proportional to the rate of pulses appearing at pin 2. IC4 is then a linear frequency-voltage converter. C4, D3 and R4 make it an edge-triggered AC-coupled device. M1 acts as a voltmeter.

ICs 2 and 3, 74HC390s, are each in effect dual 7490 types with a maximum count frequency of 60MHz. Using these instead of the more commonly seen 74LS90 increases the maximum count frequency of the instrument while keeping cost and the component number down. S1 and S4 select the number of counters in use and so the meter range. These latch switches can be replaced with a 4p5w switch if available.
IC1, a 74HCU04, is well suited to high speed analogue circuits and here is used as an a-d converter providing the counters with signals they can use. The use of six buffers is perhaps a smidge excessive, but they're all on the chip anyway.

TR1 is an untuned Rf amplifier as first seen in SPRAT 37 by G3AGX. Here it is preceded by D1 and 2 to limit the maximum signal presented to it, and VR1 an input attenuator/sensitivity control.

Construction of the prototype was a scraps of veroboard and it worked. The final version used the PCB shown, and incorporated a mains PSU. The meter was salvaged from a scrap-heap, the 'box' is in fact two boxes glued together, the bottoms having been removed. Why? They were free!

SET-UP
Setting up is simplicity itself. Tune in a station on the 7MHz band on the station receiver. Connect the station antenna to the frequency meter input and take the signal on IC1 PIN 1 to the receiver. Adjust VR2 for maximum signal (and quite a lot of noise!)>

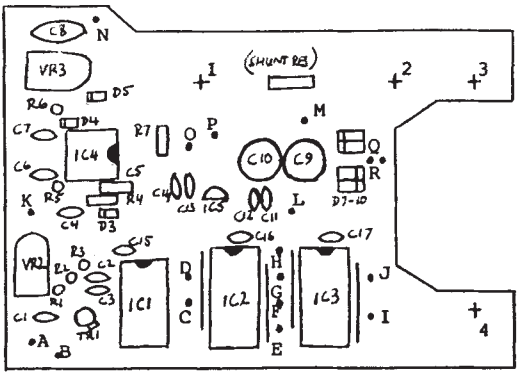


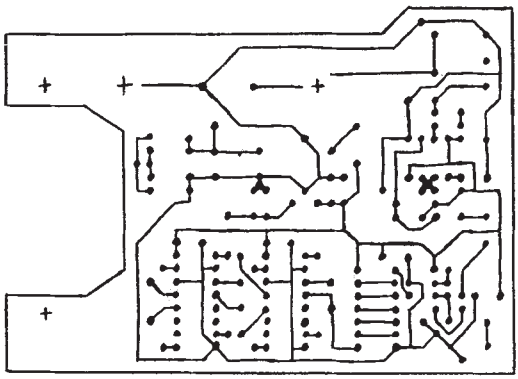
COMPONENTS FOR THE ADAM		
R1 6K8	C1,2,3,4,7,11,14	D1,2,3,4 1N4148
R2 330R	15,16,17 10n cer	D5 4v7 400mW
R3 56R	C5 820p poly	D6 LED
R4 4K7	C6 100n poly	D7,8,9,10 1N4001
R5 150K	C8 0.47u poly	TR1 BFY90
R6 1K	C9,10 100u 25v elec	IC1 74HCU04
R7 270R	C12,13 2u2 20v tant	IC2,3 74HC390
Shunt resistor		IC5 555
to give 1mA FSD		IC5 78L05
VR1 10K		
VR2 2K2 preset		
VR3 5K preset		

M1 1mA FSD
T1 0-9V 100mA TRANSFORMER
S1-4 Interlocked latchswitch, SPDT each
S5 SPDT

PCB, Veropins, Mounting Hardware, Knob, Box, Feet, Input Socket

RANGES: USING THE SWITCHES AS SHOWN
S4 ON-5KHz,S3 ON-50KHz,S2 ON-500KHz,S1 ON-5MHz, ALL OFF-50MHz





Veropin guide

A Signal in
B Signal braid
C 'On' S1-4
D 'Off' S1
E Pole S1
F Pole S2
G 'Off' S3
H 'Off' S2
I Pole S3
J 'Off' S4
K Pole S4
L Pole power selector switch
M Mains PSU option power selector
N Battery -ve
O LED (D6)
P LED
Q AC in from transformet secondary
R AC in from transformer secondary

Hole guide

1 Meter +ve
2 Meter -ve
3 Transformer mounting
4 Transformer mounting

D1 and D2 mounted on VR1 (front panel)

THE FREQUENCY ADAM : SUGGESTED LAYOUT : HALF-SIZE

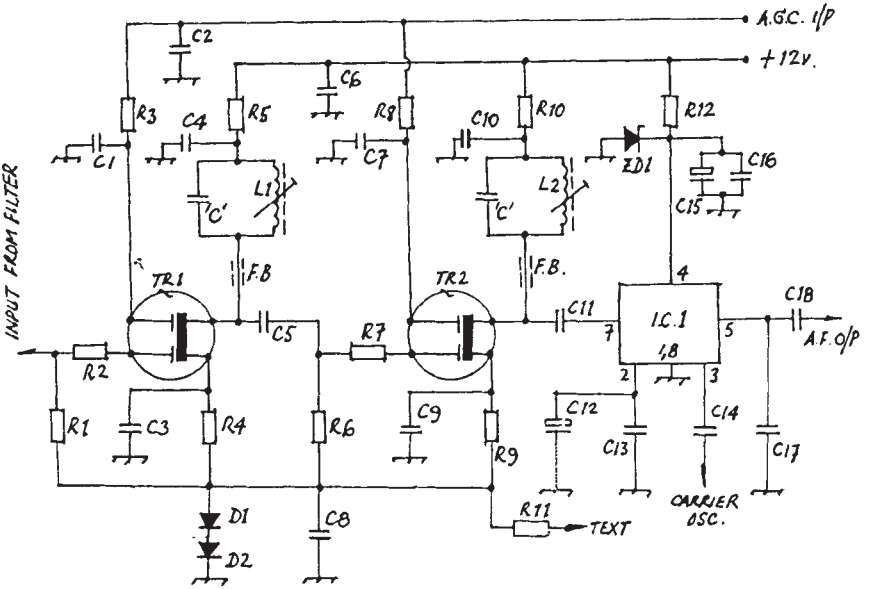
There are three methods for setting FSD. The most popular would be to take a known signal, from a crystal oscillator to the input, select an appropriate range and set VR3 for a correct meter reading. Alternatively, use a calibrated audio oscillator set to the basic 555 FSD. Apply this to the input on the appropriate range and set VR3 for FSD. The third method is to apply to pin 3 of the 555 the voltage which would appear there for FSD, and set VR3 to show this. This voltage is given by V=4.7*(1.1*R5*C5)*FSD frequency, and is 3.18V for a 5kHz FSD. A fourth method would be to calibrate it using a digital frequency meter, but if you have one of those you won't want one of these....

Maximum frequency is 10,000 times the basic 555 range, 50MHz in my case. The 74HC390 should cope with 60MHz, and might manage 70MHz or higher.

To be really cheap, forget the meter, provide a couple of terminal posts and use your multimeter instead. A digital multimeter would turn it into a digital frequency meter!
A 600MHz prescaler chip can precede the counter circuitry here to give another decade, but will cost more than all of the circuitry shown here. I spent under £4 in new components and hardware to make mine!

AN SSB AND CW IF STRIP David Limmer

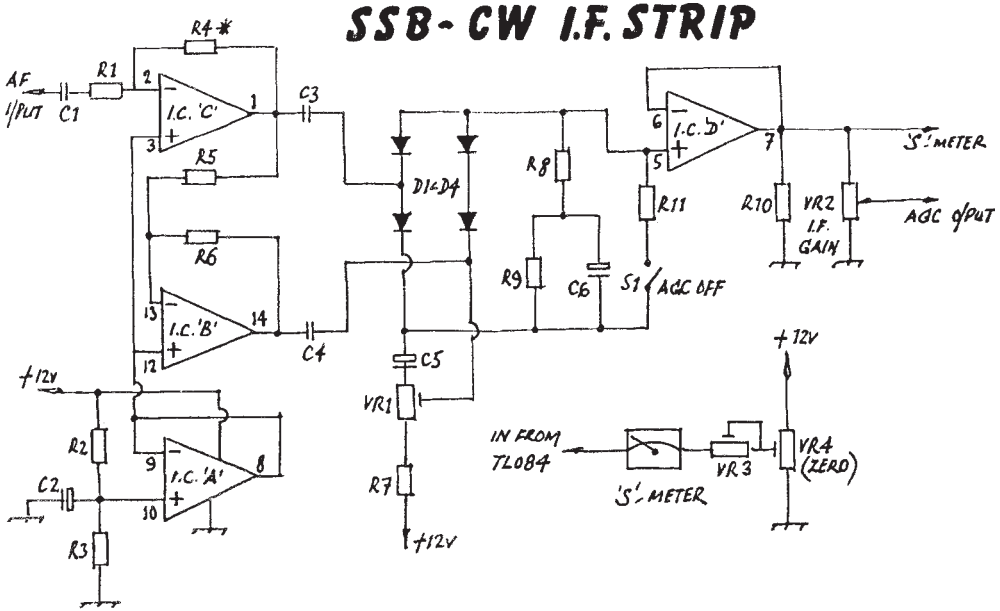
This article is prompted by reading the G3ROO article in SPRAT 62 "A Stable SSB and CW IF Strip". It struck me that I had been using something broadly similar for some time in several receivers, albeit simpler.
Audio, rather than RF AGC is used, and some effort has been made to reduce "clicking" and "pumping" found in some audio agc circuits.
I have normally built the strips around a 4.43MHz IF (with 4.43MHz crystals available at 50p each - a perfectly good filter can be built for £3!) but there is no reason why other frequencies cannot be used. It is also simple to insert an AF CW Filter in the AGC loop, which is far cheaper, although less effective, than a crystal filter. I use a version of this strip in an 80m receiver and find little to complain about in the performance. The AGC will overshoot a little, but only on ridiculously strong signals: this is easily avoided by turning down the IF gain a little.



SSB/CW IF STRIP : CIRCUIT DIAGRAM

R1 TO SUIT FILTER					
R2.5.7.10	100R	C1,3,7,9,13	10n	D1,2	
1N4148					
R3,8	100K	C2,4,6,8,10,16,17	100n		or
sim.					
R4,9	150R	C5,11	100p	IC1	
SL640					
R6	10K	C14	1n0		or
1640					
R11	4K7	C12	10u elec	ZD1	6v2
R12	330R	C15	47u elec		
		C18	220n mylar		

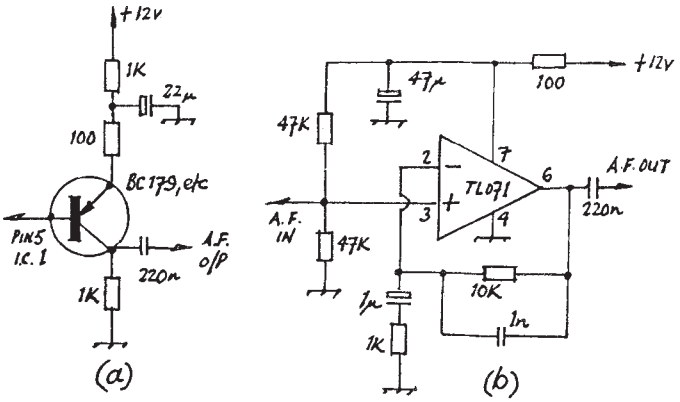
TR1,2 3N201, 40573 etc OR Birkett's Specials
L1,L2,"C" To suit IF. For 4.43MHz, Toko KANK3334R (5.4uH) with "C" of 270p. For 9 or 10.7MHz appropriate Toko IFTs or surplus FM Radio IFT.



SSB/CW IF STRIP : AGC CIRCUIT DIAGRAM			
R1,5,6,10	10K	C1,3,4	47n mylar, poly etc.
R2,3	47K	C2	10u elec or tant
R7,8	1K0	C5	47u elec or tant
VR1,VR4	4K7 preset	C6	4u7 tant
R9	1M0	IC1	TL084
R10	100R	D1-4	1N4148 etc
R4* S.O.T.(circa 470K)		VR1 should be set to give 6v at pin 7 of TL084 to feed D.G.FETs	

The IF Strip and PD should be fairly self-explanatory. The source potential is raised by D1/2 to approx. 1.4v above ground, to give greater agc range. R2,7 and the two ferrite beads are for stability and should be included.

The AGC Amplifier/Generator looks complicated, but isn't! Using a TL084 (note-do not use quad 741 types such as the LM324) quad op-amp allows the use of a full wave rectifier circuit, instead of the half wave normally used: this considerably improves the attack time. IC1 b and c act as voltage amplifier and unity gain invertor, driving the two arms of the rectifier in antiphase; IC1a is a simple voltage splitter to provide half Vcc, while IC1d is a high impedance voltage follower, which loads the rectifier and associated decay circuitry very lightly. R8 helps prevent overshoot, while R9 and C6 set the decay time. These can be adjusted to taste: R9 can even be made variable (I suggest 100K resistor in series with 1M lin. pot) to vary decay time. R10 shorts the AGC Generator to provide an off facility, which can be omitted. The S Meter can be the normal 200uA ex-tape recorder meter, as used in the prototype.

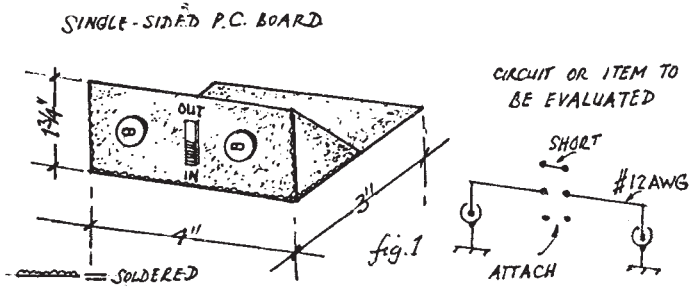


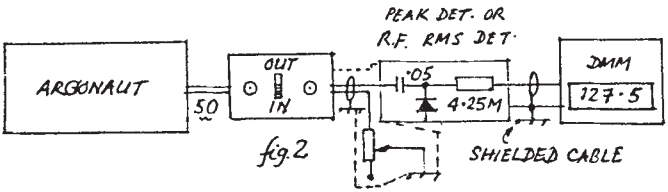
I offer two ideas here for amplifying the output of the SL640 IC to a suitable level to drive an output stage, such as the LM386

WU2J's VERSATILE TEST BOX

BYRON WEAVER WU2J

Perhaps readers would be interested in an "IN/OUT" Test Box I find very useful in evaluating filters, transformers, beads, series tuned circuits etc. Fig.1. gives my dimensions but each to his own. My typical test setup is as Fig.2.





"T" connects to In/Out Box. 50 ohm termination connects to one side of "T" and Diode Detector to the other side of "T"

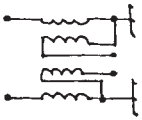
Useful formulas: $P=\frac{E^2}{R}$ For comparisons of power

Ins Loss or Gain = $dB=\frac{P\ out}{P\ in}$ 10Log 10

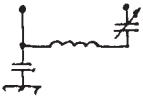
Some circuits which can be tested/ compared/ evaluated by two quick solder joints to the bottom 2 points on the slide switch :

Insertion loss/attenuation of various ferrite beads on each of the various bands (very interesting)

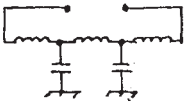
Various RFCs vs. Frequency I.L. frequency response and can compare home wound RFCs and known value inductors



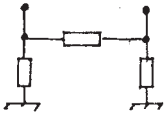
Various transformers I.L. vs. Freq. by connecting 2 back to back (ie 4:1, 1.78:1, 2.25:1 etc) made on different core materials. But, use two of the same for test (very interesting)



Resonance of series tuned circuit/filter with I.L. and filter response (attn. vs. freq.)

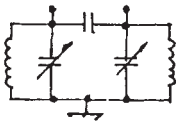


Build and evaluate your TX output filter directly on the board to know response and I.L. vs. Freq.



Measure the loss of an Attenuation Pad

Prototype bandpass tuned filters

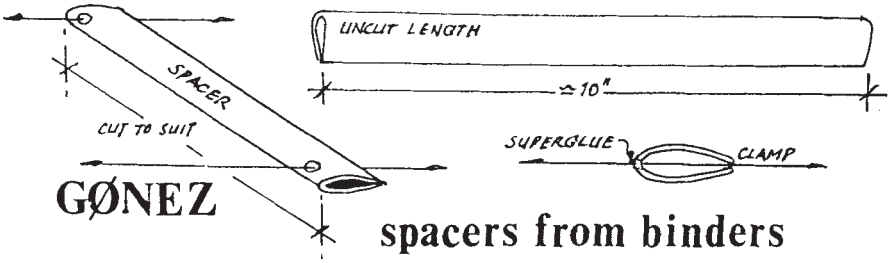


By inserting a VSWR bridge (50 ohm) between TX and Box and terminating box with 50 ohm : VSWR vs. Freq

A Radio Shack LCD Scientific Calculator (about $14) is indispensable with this box. A 10dB pad (from parallelling several 2W resistors to obatin correct values is useful in reducing Argonaut power.
Another observation is the power level at which small cores (T37 or FT37) start to fail or become lossy when wound as transformers. (4W appears a safe level for T37-6 .... if I remember correctly !)

SPACERS FROM BINDERS David Gosling G0NEZ

A4 Plastic end Binders make excellent Open Wire Feeder Spacers. The complete length (A4) is about 10 inches and can easily be cut to required size with a Stanley Knife. They are available from stationers singly or in packs. Cut the required spacing length then drill the sealed end. Slide over your feeder and the closed edges trap the wire quite securely. More effective security can be had by using a spot of superglue.



S'METER AND AGC FOR ZN416 IF STRIP

Bill Mooney. G3VZU

The ZN416 a.m. radio IC gives about 70dB of RF gain before the detector followed by 18dB of audio gain to give astounding headphone performance. The 20dB of AGC is somewhat limited but this chip does make an excellent IF strip and can be coaxed to decode SSB and CW. A ceramic or crystal filter readily gives the required bandwidth.

I needed to add AGC system and an S'meter to a top band DF receiver project which used a ZN416 if strip. Looking at extending the existing rudimentary system the data sheet indicates that there will be a voltage change on pin 2 proportional to the strength of the signal reaching the detector. Unfortunately this is the audio output from the detector and also has a residing DC bias on it. To see just what the AGC component was, I delved into the above mentioned am receiver which had the IF strip shown in the top part of fig. 1.

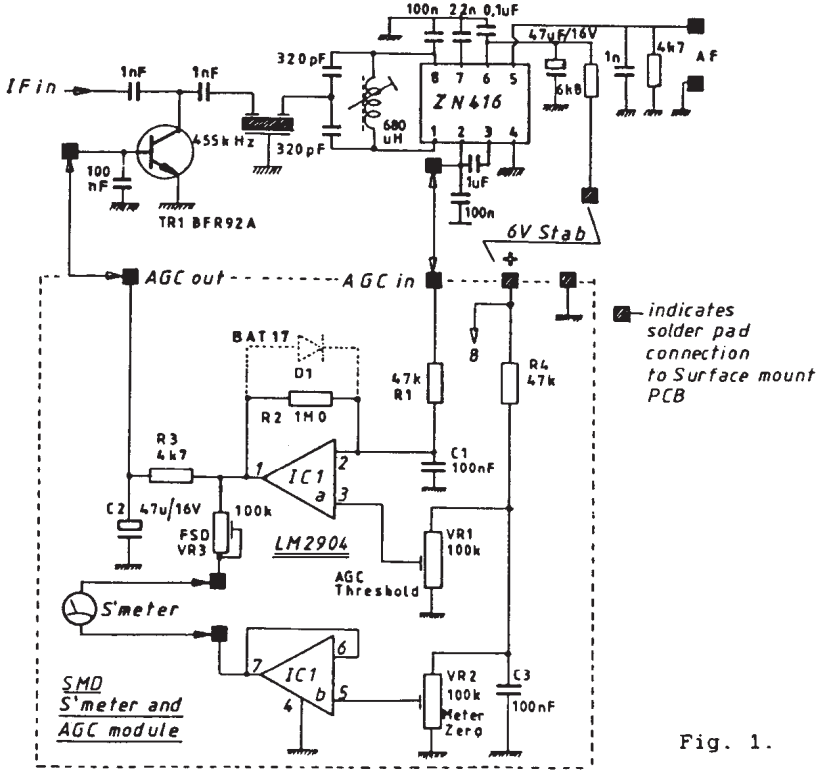
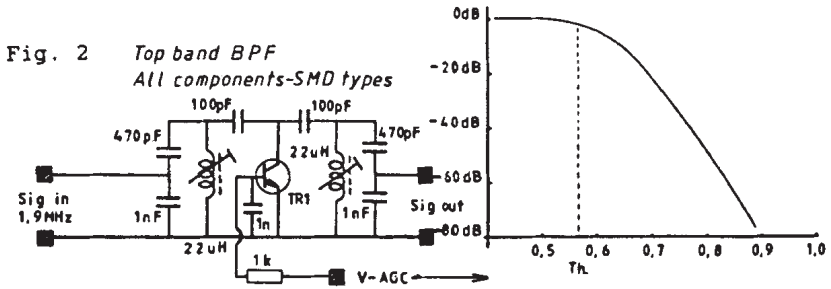


Fig. 1.

Using a high impedance meter the voltage on pin 2 was 1.202V with no signal and dropped to 0.742V (-460mV) with a huge 100mV input from a sig. gen. Tuning around Top Band produced an AGC component of about -150mV at most. So we must separate this little negative going 150mV AGC voltage from the rest of the gubbins on pin 2 and amplify it to some suitable level. An important point here is the supply to the ZN416. This must be stabilised otherwise the DC level on pin 2 will drift. An LM317 adjustable regulator is ideal as the supply can be adjusted to 1.2 to 1.6V depending on the sensitivity required from the 416. Set the LM317 to the 6V region and this will give the required 1.6V at pin 6 of the ZN416 if a 6k8 dropper resistor is used.

Before deciding on how to extract the AGC it seemed sensible to look at the control element to which this AGC might be applied. The band pass filter used in the top band receiver was used to test the efficacy of the proposed control system as shown in Fig. 2. The performance of this circuit is shown on the accompanying graph. I was delighted with the results - 80dB or so of control and practically no effect on bandwidth. The maximum current into the base of TR1 was only about 120uA. We have our control element.



CLOSING THE LOOP

To cut a long story short the proposed AGC circuit is shown the lower part of fig. 1. This module is based on the LM2904 IC and takes less than 1mA at 6V. The high value input resistor, R1, coupled with the low impedance of C1, reduces the audio component adequately. If the voltage applied to the non-inverting input of IC1a is adjusted to the DC component in the input, about 1.20V, the op-amp will only respond to the AGC component, ie. the difference between +ve and -ve inputs. This DC offset is provided by VR1. IC1a also inverts the signal so that the output on pin 1 increases with increasing signal strength. If this signal is applied to our control transistor with suitable current limiting through R3 and damping by C2 we have closed the loop. The control works well at IF as shown. With a BFR92A low capacity device for TR1 I found attenuation just beginning with 0.57V on the base. VR1 is therefore set to give 0.57V on TR1 base. You can of course set VR1 to whatever AGC "threshold" you like.

Applying signals of varying amplitude to the IF amp now results in practically constant output but with a lovely big 'S' meter signal waiting to be picked off IC1a pin1. To offset the 0.57V threshold bias on pin 1 we use IC1b as a voltage follower supplied from VR2 which in effect becomes the 'S' meter "zero". VR3 is the S' meter FSD. The easiest way to set this is to tune to the strongest local signal you can find and adjust for full scale or 40 over 9. A 1mA movement or better should be used. The ZN416 starts to produce AGC at a few hundred microvolts input signal strength. With say 20dB gain before the IF you are in the microvolts region at the aerial input and this will register on the S' meter. My receiver with a ferrite rod and FET amplifier could be set to register day-time static on the meter. A delightful consequence of the use of a transistor control element in this fashion is that the response is logarithmic, just what we need for an s' meter.
Finally, if you only want an s'meter, add a BAT17 (SOT23) schottky diode to the PCB in the position provided. This will give the required log response. With the module input connected pin 2 on the ZN416, Set VR1 to put about 0.6V on the output of IC1a and then

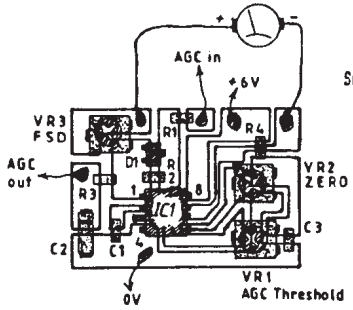
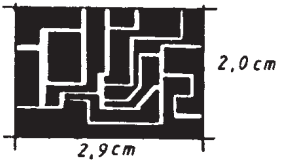


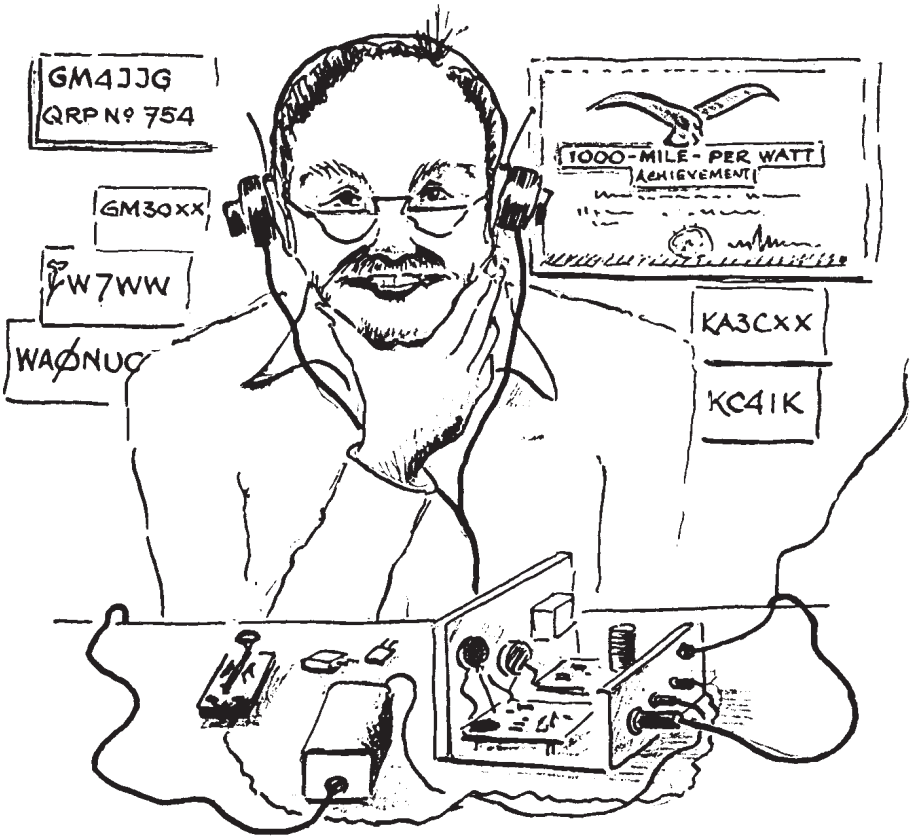
Fig. 3.

Surface Mount Construction of the S'meter module.



PCB track - actual size.

adjust VR2 to zero the meter. The pot settings do interact a little and are a bit tricky. Always keep the principle of operation in mind, make measurements know where you are, don't twiddle - there are a lot of combinations of three pots. The only disadvantage with this circuit is the temperature dependence of the DC voltage on pin 2 of the ZN416. An accessible meter zero pot wired across VR2 may be needed.



A HIGH PERFORMANCE DIRECT CONVERSION RECEIVER Matthias Volkert DF4SQ

Due to its simplicity, the direct conversion principle is very popular among QRPers. However many designs are prone to characteristic side effects, such as microphonics, hum or AM breakthrough. The causes are discussed in the well-known articles of W7EL (1), DJ1ZB (2) and in the ARRL handbook (3). As the understanding of these facts is the key to a good receiver, here is a short summary:

Microphonics is the result of the very high gain of the AF stages, which amplify the extremely small voltages generated by mechanical vibrations to a noticeable level. With superhet receivers this problem does not exist, as most of their overall gain is ahead of the demodulator.

A direct conversion receiver should therefore be built as rigid as possible, avoiding large circuit boards with poor mechanical support. A speaker should not be integrated because of acoustic feedback. Although sometimes suggested, an RF preamplifier isn't appropriate just to fight microphonics, as the susceptibility to AM breakthrough may increase.

Receiver hum is not caused by a poorly regulated power supply as one could suppose, but by radiation of VFO energy into the power supply or other nearby equipment, containing non linear elements in connection to the mains, i.e. rectifier diodes. There the VFO signal is modulated with a 50 Hz hum and this signal is received again, as VFO frequency and receiving frequency are identical. To avoid this the whole receiver should be built into an RF-tight compartment and all external leads should be carefully decoupled, so that no VFO energy can leave or enter the receiver except through the aerial socket, which cannot be decoupled of course.

VFO leakage through the aerial can be minimized by using a doubly balanced mixer, which isolates the VFO and the RF port and by feeding the aerial with coaxial cable, thus separating the source of radiation and the non linear device. An RF stage in front of the mixer would provide further isolation, but again this is not recommended in respect of AM breakthrough. Finally the rectifier of the power supply itself could be decoupled by soldering a small capacitor across each diode to suppress any RF signal.

The most annoying and persistent side effect with direct conversion receivers is AM breakthrough. This is caused again by the high gain of the AF amplifier together with non linear elements in the receiver front end or in the first AF stages and a relatively poor selectivity ahead of the demodulator (compared to the IF selectivity of a superhet). Strong AM signals from broadcast stations reaching a non linearity are demodulated and amplified to an audible level.
It is therefore mandatory to use a high quality doubly balanced mixer (i.e. a diode ring mixer), which is linear up to high signal levels and which provides a good isolation between the RF and AF port. The mixer has to be properly terminated of course for optimum performance.

It is further mandatory to avoid any non linearities ahead of the mixer. So no RF amplifier should be used, if this is not really

necessary for sensitivity reasons, and no diodes neither for T/R nor for band switching purposes. During receive the final stage of the transmitter has to be disconnected from the receiver frontend, as the PA transistor represents a non linearity too. A change over relay is the best solution for T/R switching. The AF amplifier should be shielded against the rest of the receiver and the signal should enter via a passive low pass filter, so that no RF signal can reach the first amplifier stage. Finally a certain amount of frontend selectivity is necessary to prevent the mixer from being overloaded.

All these design rules were followed with the receiver here and besides of being virtually free from side effects it offers click free muting, a side tone, AGC and a signal strength indicator. The AGC range is ca. 100dB and the sensitivity better than 1 uV for a discernible signal, which is sufficient at least for frequencies up to 20 metres.

The circuit in detail (fig 1 and 2):
The RF signal from the antenna is fed via the transmitter low pass filter, the T/R-relay and two tuned circuits (component values shown are for 20 metres) into a doubly balanced diode ring mixer. A commercial mixer such as the IE500 is worth the expenditure, as it guarantees a predictable performance.

As with W7EL, the mixer is followed by a diplexer. The high pass section consisting of C100,R100 provides a 50 ohms termination for RF. The AF-signal is fed via the low pass section LO,CO into the first amplifier stage. RO represents the amplifier's input impedance, so that the mixer is terminated properly for all frequencies. To get a good overall sensitivity, a low noise opamp is required here and the use of metal film resistors might be advantageous too.

The first amplifier is followed by a second order active low pass filter, which has a Q of 5 and by that a distinctive peak at around 750Hz. The receiver can be muted by grounding the gate of TO. The time constant of R39, C38 provides a delay of some milliseconds when switching back to receive and a smooth and click free action.

The following two amplifier stages are gain controlled by means of a Signetic NE572. This IC is intended primarily for use in noise reduction systems of hifi equipment, but due to its high dynamic range and the possibility to set attack and decay times independently it is perfectly suitable for an audio derived AGC system. The NE572 contains two similar devices, each of which can be considered as a variable resistor controllable by an AF-signal. This resistor is used in the feedback path of an inverting amplifier, and as resistance and signal amplitude at the control input are in reverse proportion, doubling the control amplitude reduces the gain of the amplifier by one half.

There is a small but important difference in the structure of both amplifier stages. With the first stage its output signal is applied to the control input. This causes an amplitude compression by 2:1. With the second stage its input signal is applied to the control input. Due to that, the output remains constant at ca. 100mV over an input range of ca. 50 dB. Both stages together provide an AGC-range of 100 dB.

The attack time of the AGC is set by C13 and C22, the decay time by C14 and C23. R14 and R16 determine the maximum gain and by this the signal level, at which the AGC begins to act. Many hours have been spent varying these parameters until the final values were found.

The first stage acts a little bit faster than the second to provide some attenuation of short noise peaks and to get a quick increase in gain after a strong signal has gone. However, as the compression rate of the first stage is only 2:1, the somewhat slower time constants of the second stage dominate, providing a smooth AGC action without breathing.

The disadvantage of an AGC system is, that the setting of the volume control doesn't correspond in any way with the signal strength.
So some sort of indicator is needed. To keep it simple, the control voltage across C14, which is a function of the signal strength is fed into IC2D and compared with the threshold set by R36 (ie. S9). The LED will flicker, if the signal is slightly higher than the threshold and will be constantly on, if it is considerably higher than that. To keep the LED off during transmit, a high level voltage may be applied to D1.

An LM386 serves as a final amplifier, which can drive a small speaker or low impedance (walkman) headphones. R33, C37 are intended to attenuate the output to a convenient level when using phones. A sidetone is generated by the remaining opamp IC2C and associated components. The sidetone volume can be set by R28. With all amplifier stages the frequency response is limited from about 300 Hz to 1500 Hz. In addition to the active filter stage there are 7 poles of low pass and 6 poles of high pass filtering.

Due to the high overall gain, some care has to be taken with the physical layout of the circuit board, especially what ground leads are concerned. To avoid oscillations, the ground of the final stage (wave symbol) with its relatively high currents should be kept separate from the ground of the low level stages (bar symbol). There should be only a single common connection (i.e. at the speaker socket).

A possible layout for the AF stages is shown in fig. 3. A piece of singly clad PCB material is used upside down. Ground connections of the low level stages are soldered directly to the copper plane. All other wiring is done on the opposite site of the board. However, relatively small components are required, so some adaption might be necessary.

(1)W7EL: An Optimized QRP-Transceiver, QST 8/80
(2)DJ1ZB: The Laim Transceiver, SPRAT No.36
(3)ARRL: The Radio Amateurs Handbook 1983, pages 8-7 to 8-10

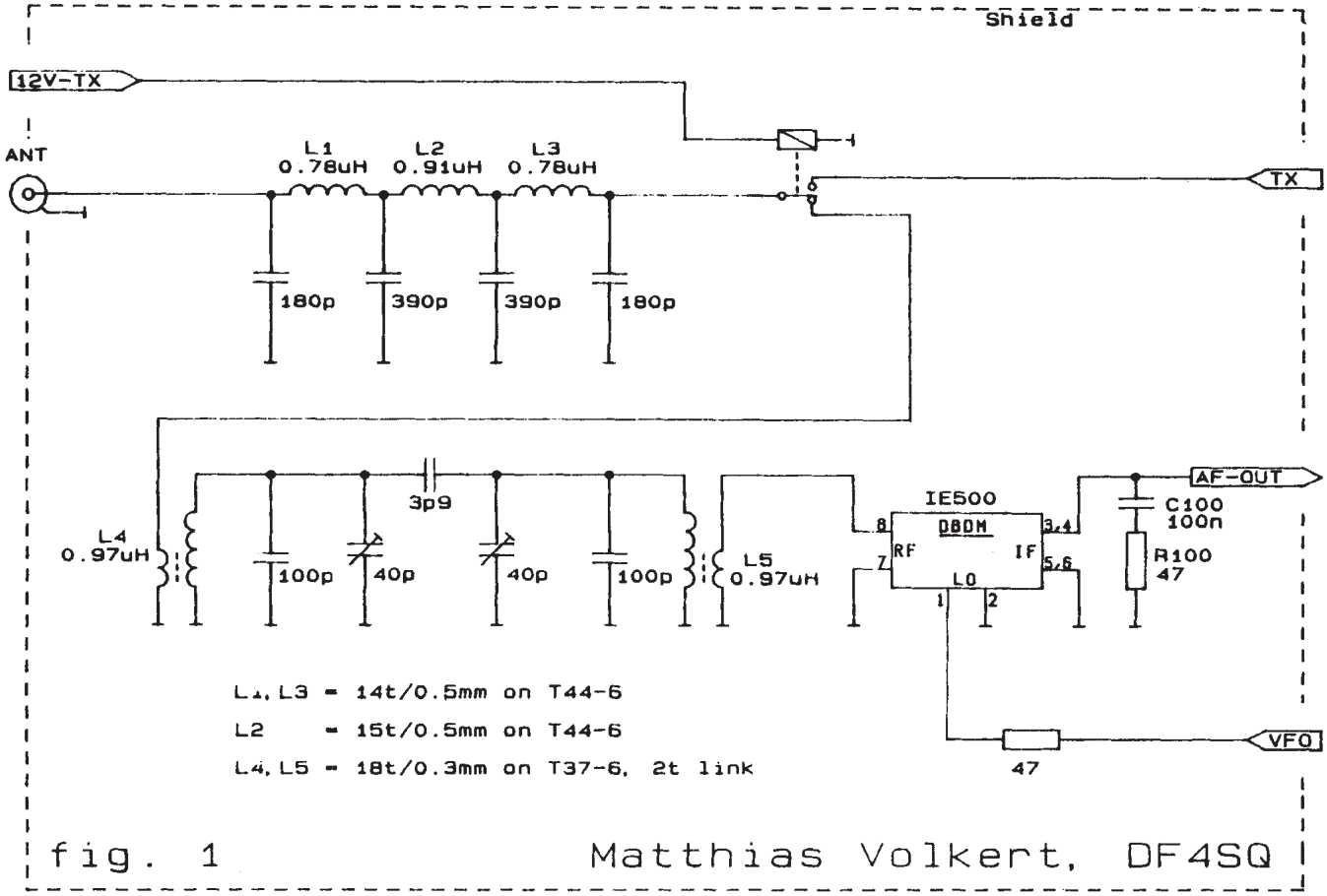


fig. 1 Matthias Volkert, DF4SQ

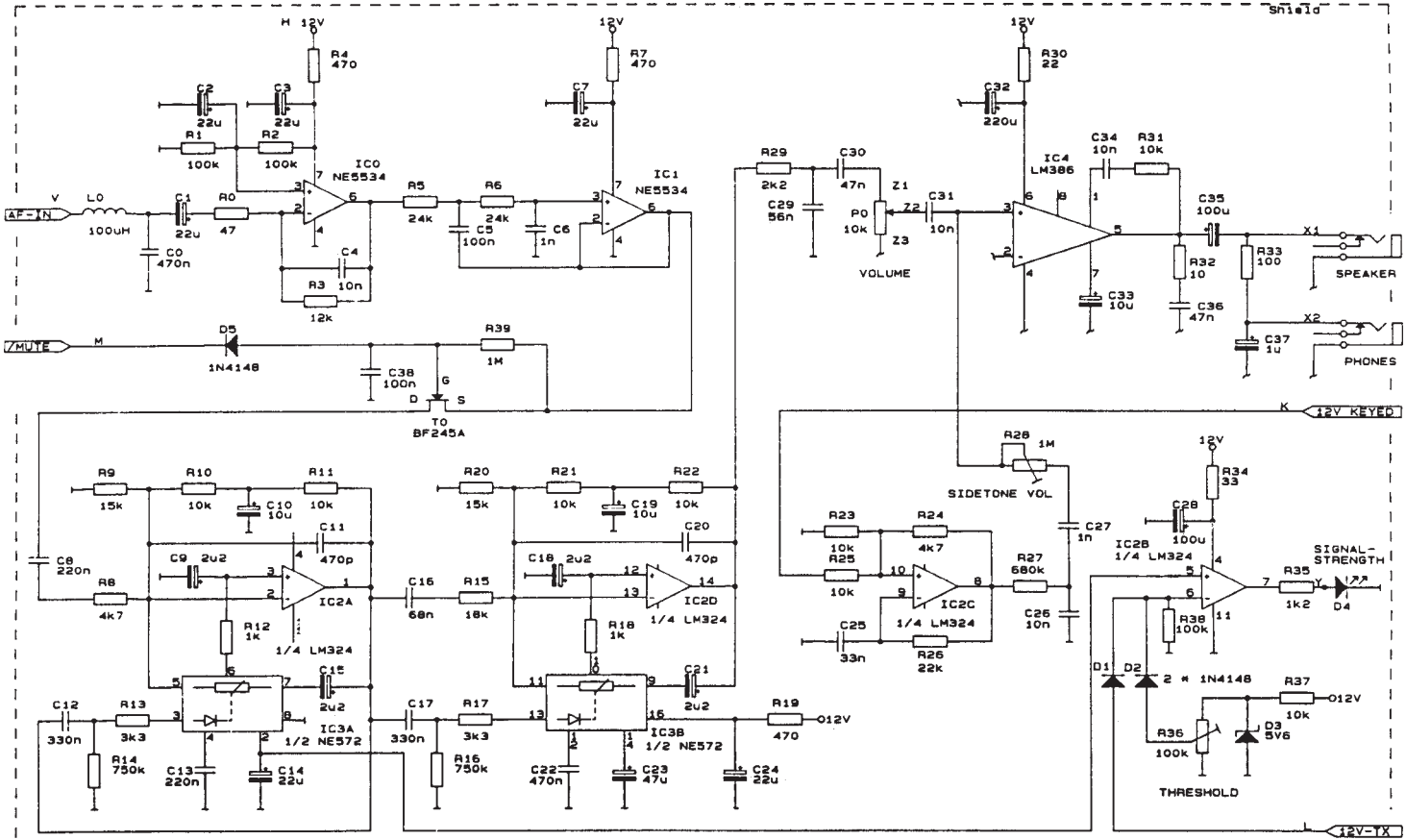
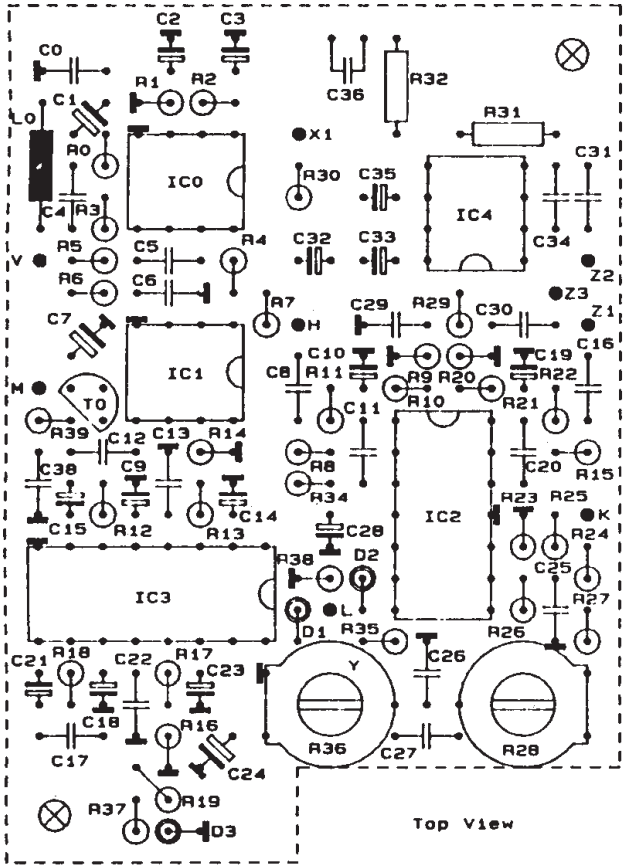


fig. 2

Matthias Volkert, DF4SQ



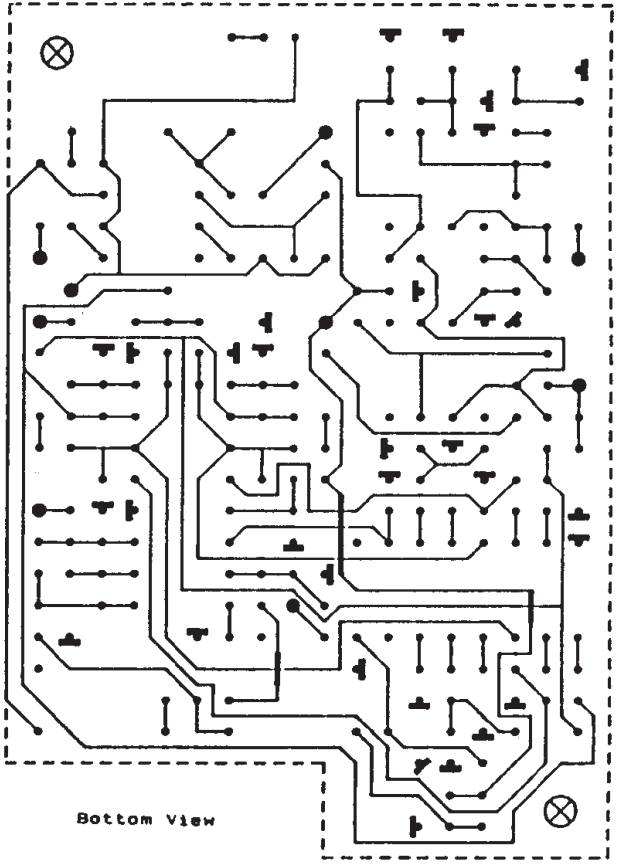


fig. 3

Matthias Volkert, DF4SQ

FULL QSK WITH THE RA17 BOB LEASK G4CEO

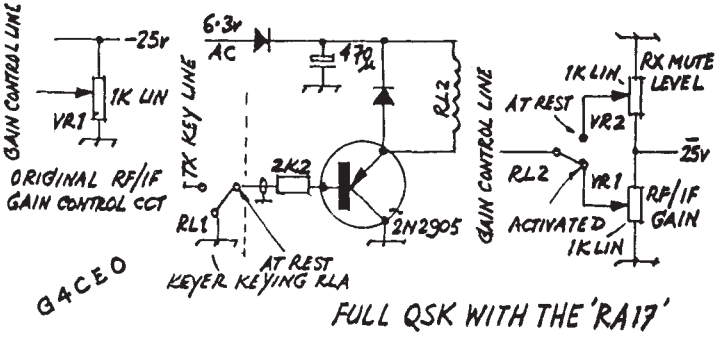
Recently I acquire something I've always wanted -well, one of them. I was given, yes given, a very nice Racal RA17 RX and it lives up to its expectations. They seem very popular these days and have found their way into many shacks. As usual with me, I wasn't content to accept Mr. Racal's design and had to have a poke around inside. I've got a thing about full QSK on all my rigs so herewith mods, extremely simple, for full QSK on the RA17. All mods can take place "above deck", so no fiddling around with designer circuitry underneath.

CIRCUIT DESCRIPTION:

RX can be operated on "manual" ie. No AGC.

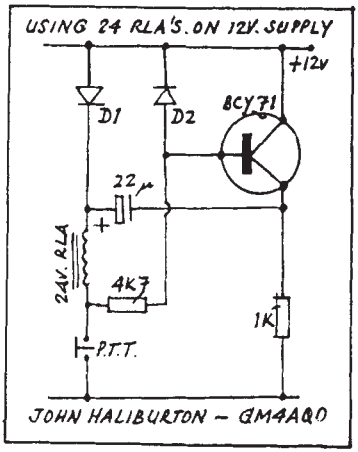
RL1, the main keyer, keying relay is shown at rest, thus TR1 base is earthed. Tr1 conducts and RL2 is held in and U11 is used as normal. As RL1 is keyed, TR1 base is no longer earthed and RL2 drops out, connecting VR2 in circuit and set to a convenient mute level. RL2 is a reed relay, and it will drop out faster than RL1 can make, so VR2 is in circuit before the TX is actually keyed so there is proper sequential keying.

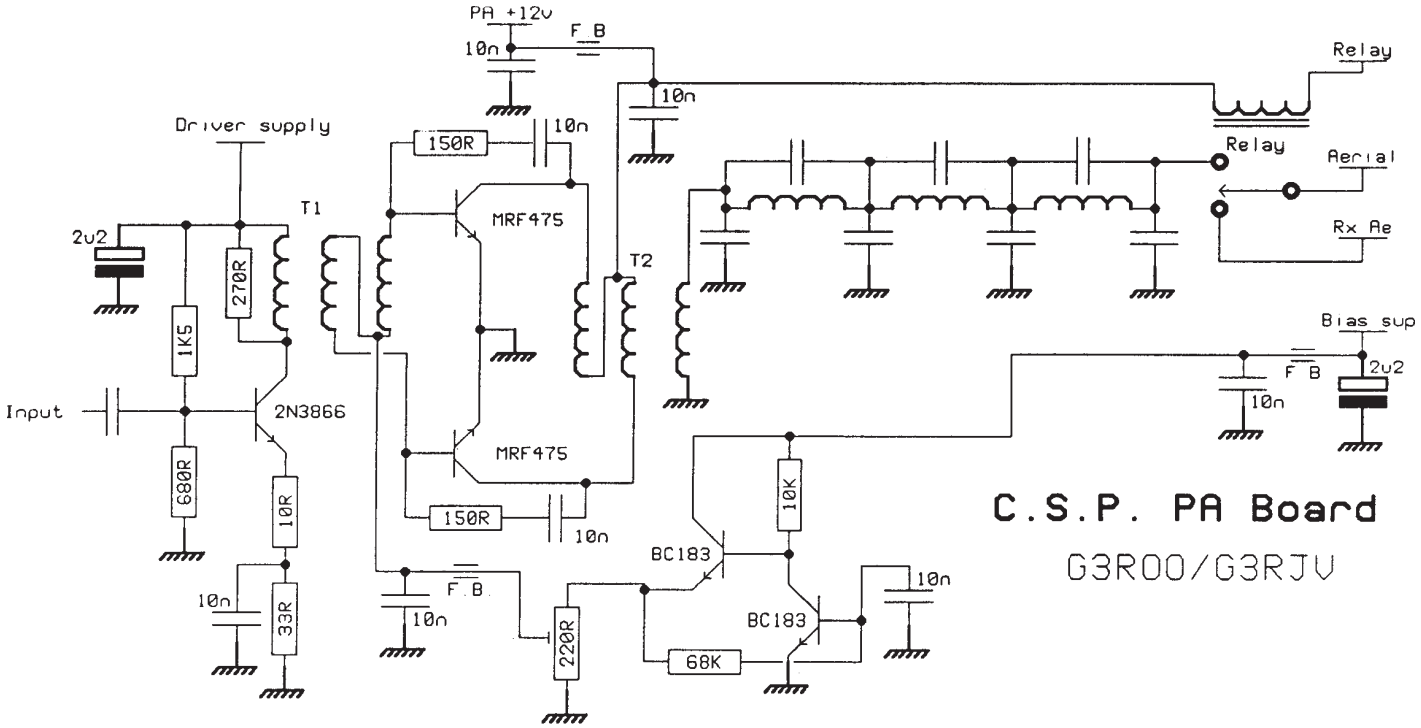
VR2 is affixed in the space of the original loudspeaker. 6.3v AC comes from dial light. The control line from TR1 to RL1 is via a phono socket fixed on the rear panel: the original 1MHz RF output. The transistor components and RL2 are mounted on a scrap of PCB fixed to the side wall of the RX.



24 VOLT RELAYS ON 12 VOLTS
John Haliburton GM4AQO

Recently I required a changeover relay for a 12 volt powered rig and the only small relays in my junk box were 24v types. Then I came across this circuit in Rad Com p.105 Feb'73. Briefly a capacitor is charged up to 12v and when the switch is operated this charge momentarily appears in series with the 12v supply which operates the relay. The 12v supply is then sufficient to hold the relay on. D1 must carry the relay current and if the transistor is a germanium type, D1 should not be a silicon type since the Miller Effect would delay recharging the capacitor. I actually used a BCY71 which works well.





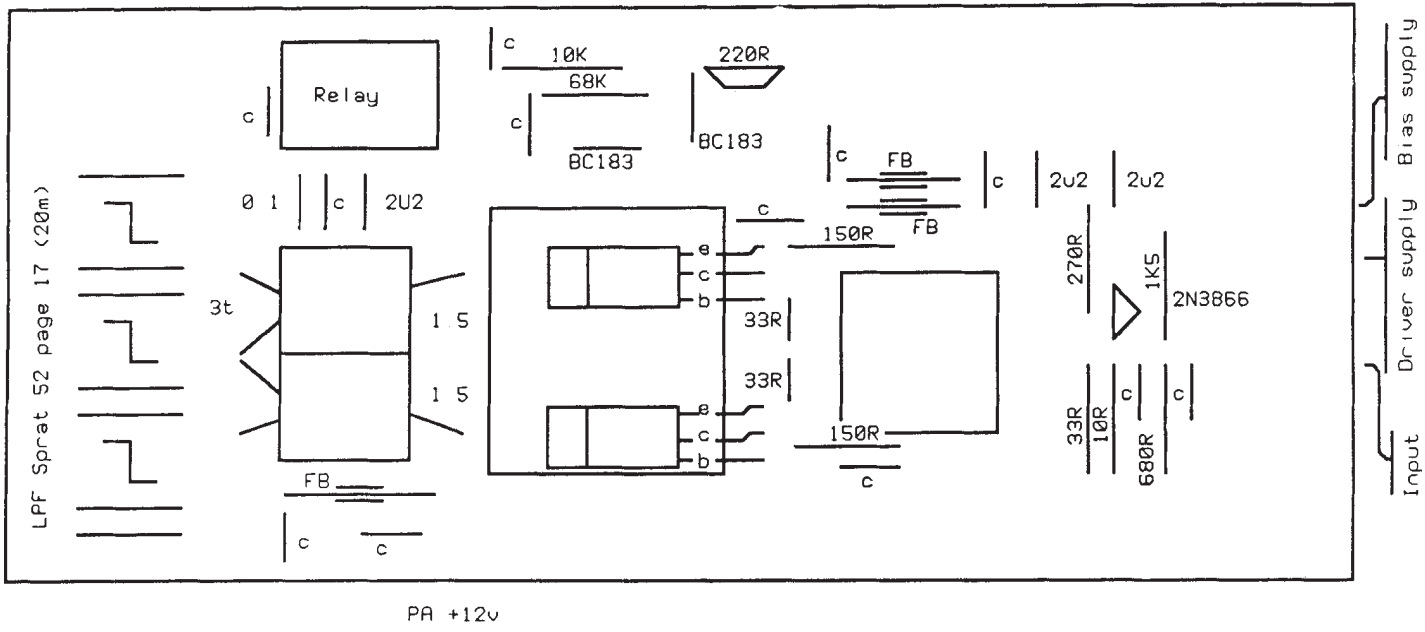
THE CSP PA BOARD
G3ROO and G3RJV

The aim was to use standard devices in the lower price range with a 12 volt supply - the conclusion was, that that is not easy.
The circuit is very standard accepting 1v RMS drive, set the PA standing current at about 30mA. Output 2-3 watts

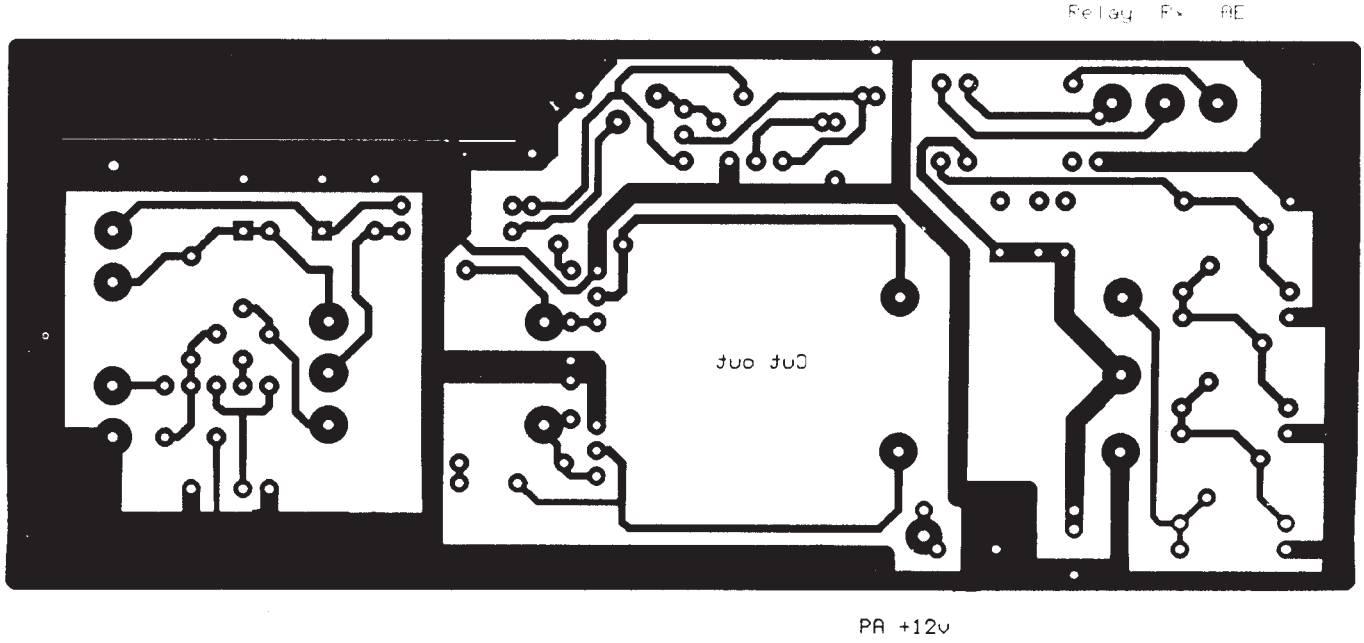
T1: 6t pri. 1.5+1.5 sec on 2 hole balun ferrite former
T2: 1.5+1.5t pri. 3t sec on 2 jumbo ferrite beads.

REQUEST: Are there any RF Design Engineers out there who can design a club linear PA (say 5 or 10w) for a 12v supply using less expensive common devices ?

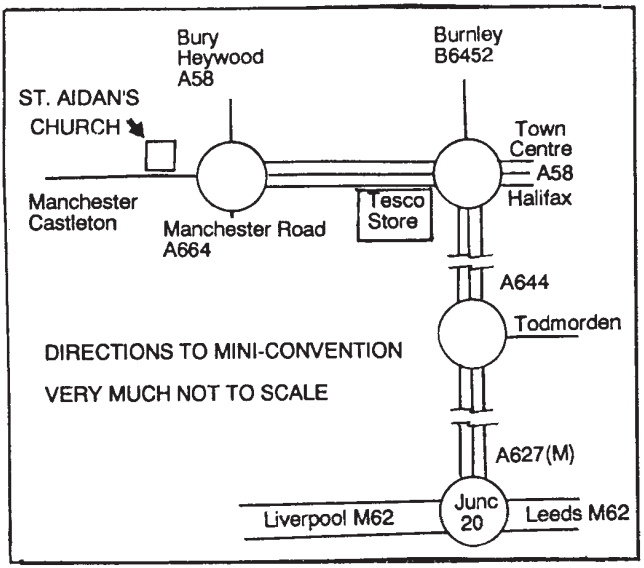
CSP PA LAYOUT : COMPONENT SIDE : DOUBLE-SIDED ALL GROUNDS MADE TO TOP



CSP TRANSCEIVER PA BOARD : PRINTED CIRCUIT BOARD : COPPER SIDE



G QRP CLUB MINI CONVENTION



THE NORTHERN GATHERING
FOR G QRP CLUB MEMBERS

ST. AIDAN'S CHURCH HALL
MANCHESTER ROAD, SUDDEN
ROCHDALE, LANCS.
SATURDAY OCTOBER 19th
10am until 5pm

Once Again to the Popular Formula
Large Social Area * Full Lecture Programme *
Bring/Buy/Swop Stall * Component & Kit Sales *
QRP Circuit Archive * Equipment Display *
Mr. Salaway's Famous Meat Pies * Food & Drink *
ADMISSION £1 : DOORS OPEN AT 10am
Talk - in Station on S22 from 9am

THE SPEAKERS THIS YEAR:
Peter Dodd, G3LDO, author of the new "Antenna Experimenters Guide" will speak on antenna matters. The book will be on sale at the convention. Peter is a very early club member.
David Stockley, GM4ZNX, with his popular AMATEUR RADIO ANY QUESTIONS in which he invites you to put ANY technical amateur radio question to him. David is an Electronic Design Engineer for Hewlett Packard.
Rob Mannion, G3XFD, Editor of the PRACTICAL WIRELESS, will talk briefly about the magazine and invite questions and suggestions on amateur radio journalism. Rob is a club member and QRP Operator.

Bring your items to sell or swop : From Equipment to just Junk

Bring your Homebuilt Equipment for display and discussion

ACCOMMODATION IN THE SAME ROAD AS THE MINI-CONVENTION
TUDOR HOUSE (B&B GUEST HOUSE) : Catherine Traynor (0706) 861103
THE MIDWAY HOTEL (0706) 32881. NORTON GRANGE HOTEL (0706) 30788

Communications Forum.

Gus Taylor G8PG, 37 Pickerill Rd. Greasby, Merseyside, L49 3ND

QRP CALENDAR 1992. OWING TO CIRCUMSTANCES BEYOND OUR CONTROL THIS IS HELD OVER UNTIL OUR NEXT ISSUE.

BEST WISHES TO TONY, G4FAI, ex-Chairman of EUCW and Associate Editor of "Morsum Magnificat" who was recently run down by a bus while crossing the road. We all wish that you will soon be fully fit Tony.

VACUUM TUBES (VALVES) HAD THE LAST LAUGH in the recent Gulf conflict according to a story in the current issue of the QRP ARCI "Quarterly". When the US Army Signal Corps set up their shiny new hf sets, all solid state of course, the static charges generated by the first sand storm blew each and every front end, leading to a desperate rush to find and ship out the old Collins tube type equipment which had served the military so well. Any Old Timer could have told them....!! Which leads on to the point that solid state front ends can also be damaged by the precipitation static generated by certain types of rain, hail, and snow storms. A good degree of protection from such damage can be obtained by connecting a 250K carbon resistor across the antenna / ground inputs, either at the antenna input socket on the rig or, if an atu is in use, across the antenna input socket on the rig or, if an atu is in use, across the antenna and ground terminals of the atu. The resistor allows the static charge to leak to ground.

DO NOT FORGET THE WINTER SPORTS 26 December - 1st January on all QRP cw frequencies, and especially the new French Day on 29th December which should let us all meet our new French members.

DATA BUFFS should note carefully the new code for data box usage published recently in Radio Communication. Failure to observe it could cost both you and the data box operator(s) your licences. And remember this applies internationally. If you input a message to an overseas data box that contravenes the regulations of that country both you and the overseas operator can be cited by his administration, and you could both end up losing your licences. This particulary true in the USA where serious violations can be a Federal offence. A misguided American amateur and no less than ten data box operators are currently facing citation over an alleged gross violation of FCC Regulations.

STILL ON THE SUBJECT OF THE FCC it is good to note that certain US stations have been reminded by them of the international requirement that only sufficient power be used to ensure satisfactory communication. These reminders are said to be "because of EMC problems". Well, for my money EMC applies just as much within an amateur band as to the TV next door, and if another amateur selfishly spoils my communication by using more power than is necessary, then he is just as guilty of bad EMC practices as if he was causing serious TVI. Once again a case for power management training in amateur radio.

THE OK QRP CLUB can now accept subscriptions paid in bank notes of the following currencies. Five pounds sterling, 10 dollars US., or 15 Dm. Otherwise 15 IRCS. No coins please.

HW9 OWNERS who wish to improve their rigs should read "Modifications and Improvements to the HW9", by S.W.McLellon, ND3P, originally published in the ARRL QEX, and re-published in the April 1991 issue of the QRP ARCI "Quarterly". Based on 18 months work by a first class engineer, this is an outstanding article. At G8PG the PA stabilisation and agc amplifier balance/decoupling modifications have already been applied and have proved very successful.

MAY IF TAKE A LITTLE SPACE to welcome our new Novice Services Manager, David, GoNEZ, and to wish him success with his new SPRAT Column. There is a little personal interest here - I played a small part in helping both David and his Father obtain their licences. Our first Novices will appear on the bands about the time that this is published. Please do everything you can to help and encourage them. Hopefully many of them will become the QRP experts of the future.

DOES ANY READER HAVE TECHNICAL DETAILS OF THE BILAL ANTENNA?
It is believed to be a 1 metre high indoor transmitting antenna, and the rumour is that an OE station running 5 watts has used one to work JAs and Ws on 7 MHz! The design is believed to originate from the USA. Any technical details to G8PG, please. At the moment we <u>think</u> it is a cunning combination of the principles of linear loading and the magnetic loop, using copper tubing throughout. These days "plumbing" is no longer confined to microwaves!

CARLOS PY7FNE is very keen to work members in Europe. 21060 or 14060 from 2000 GMT on weekdays, and 0900 - 1300 and from 1900 onwards on weekends. If hf is out he goes to 7030.

THE G2NJ TROPHY for 1991 has been awarded to our Membership Secretary, David G4HYY, for his outstanding work in managing our large and international membership roll. David puts an enormous amount of work into this area, and the Award recognises this. In making the Award the Club also wish to recognise the support given to David by Jennifer, his XYL, without which he would find his club work extremely difficult. Sincere congratulations to both.

THE 1991 SUFFOLK TROPHY goes to G3XJS, who managed a very good score despite poor conditions. Well done Peter!

OUR NEW CODE 72 FOR USE BY QRP is explained in the Editorial of this SPRAT. Please do use it when working other QRP operators.

EX9QRP/6, the U QRP Club QRP expedition to UA6 was doing a good trade on the bands during late July. Any chance of a bit of QRP from places like UL7 or UH8, Oleg?? Anyone operating from these areas and giving us regular operating times would have a ball with other QRP men. The PY7FNE operation mentioned earlier is a good example. Carlos is now working into Europe regularly because people are looking for him. Another place crying out for a well publicised QRP Expedition is Corsica TK, which is a separate DXCC country. I am surprised that none of our French members have latched on to this one. Given six months advance notice, as your communications Manager I can arrange very wide publicity for any such QRP Expedition. This will ensure 72 when you actually arrive!

DESPITE FLUCTUATING IONOSPHERIC CONDITIONS on hf, there have been some excellent Es openings on 28 and 24 MHz this summer, with most of Europe workable. It is always worth checking these bands for possible Es openings, as they often produce big signals with very little power. One also seems to meet some nice people during such openings. When the hf bands have been good they have often been very good, with excellent 18 MHz grey line evening paths to the West Indies and northern South America with a couple of watts.

SINCE LIBERALISATION CB HAS BROKEN OUT in certain ex-East Block countries such as Poland. With so many people living in high density apartment blocks in these countries it is causing some of our members considerable problems with QRP operation. "No gain without some pain" as the saying goes!

AWARD NEWS.
Congratulations to new QRP Masters Y24TG, WN2V, AND RV3GM. Well done!
Congratulations also to the following.
QRP WAC. G4JZO, G4WUS.
QRP COUNTRIES. 100 WN2V (ex-WB21PX).
WORKED G QRP C. 849 GM30XX (No stopping him!); 700 G4JFN; 460 G8PG; 420 G2DAN, 340 GOIFK; 320 ON4KAR; 220 G3FCK; 180 GOCQA; 140 G4NBI; 120 G4JZO; 100 GONEZ; 80 GOKCA, GOKART; 60 WN2V, RV3GM, GMODHD, Y24TG, G4UNL; 40 GOKZO; 20LA7FF, F6EQO, G3MJX.

TWO-WAY QRP. 20 GM4JJG, G4VPG, GMODHD, Y24TG, WN2V; 10 LA7FF, G4UNL, G4LAV.

72 ES 73 TO YOU ALL. See Editorial for the meaning of 72, and use it!

'G Filters' — A Practical Evaluation

Frank Lee, G3YCC (042)

In SPRAT 58, Roy W7EL described a computer designed front end filter circuit for 40m D/C receivers. This was as a result of BC QRM suffered by us G's, which apparently is not evident in USA. I decided to try the idea out in a 40m DC transceiver I built recently. I must admit I am not a fan of direct conversion RX's, except as fun rigs, but thought it worth a try. I built a copy of the G Filter on a scrap of PCB, using compression trimmers as the variable capacitors and incorporated this in the receiver, which uses a Schottky diode ring mixer and a VXO. A conventional 2 stage 741 AF Filter feeds into a BC109 preap and hence into an LM386 amp. As the Q of the filter is high the bandwidth is small, which is required and would therefore need carefully peaking. I hit on the idea of connecting the antenna socket of the DC RX to my main station rig. the TS130V and listening for the VXO signal coming through the mixer and G Filter, and carefully peaking this up on the TS130V S-meter. Naturally I had to have maximum attenuation employed to render the tuning accurate. Peaking was VERY sharp, but so easily done with the constant, steady VXO signal. Now for the acid test - would the DC 40m RX be any good? It was fantastic, no BC breakthrough at all and the rig works fine, even at night, which is always a good test on 40m.
Needless to say I am delighted with the results and my thanks go to Roy, W7EL for his article.

THE TYNESIDE AMATEUR RADIO CLUB RALLY is moving to a New Venue next year: Temple Park Leisure Centre in South Shields with single level 18,000 sq ft of space. The date is Saturday 7th March 1992 and further information can be had from GOBEV on 091-281-0999.

R.W.GRAPHICS are producing an AMATEUR RADIO DIARY in A5 Desk format at £4.20 (80p post) and Pocket Size £2.70 (50p post) from The Birthday Shop, Market Hill, Braintree, CM7 8HG. Tel: 0376-45058.

RECORDS UPDATE FOR THE MEMBERS HANBOOK (UPDATED to 31/7/91)

0325	SMOGHU	4119	WB6AAM	4826	GOKOK
0428	G4NFR	4145	NU4B	5215	GOGVS
0647	G2CYN	4224	G3IAG	5351	K8RL
1417	KA8NRC	4315	KI6LC	5414	KC1EZ
2742	G4OKB	4346	K6JHR	5595	KA8IPO
3281	W1DMD	4795	GOKQS	5610	IK3NAA
				5767	GONZA

Novice News

David Gosling G0NEZ, 31 Semphill, Hemel Hempstead, Herts. HP3 9PF

Are you a Novice Operator looking for a cheap, simple and effective Antenna? Great, read on! In this SPRAT, such an aerial is described, including details of a Matching Unit for Novice Multiband use.

The W3EDP, named after the American callsign owner, was developed as early as 1936 and has been used by many QRP enthusiast. It is a Marconi type, using an 84ft long wire; plus a 17ft counterpoise (sometimes called a radial). The 84ft wire can be bent into small spaces, but try to get a long clear horizontal run if possible, say about 60ft, and bend the remainder. Same with the radial; hang it from the shack window; or even lay it on the shack floor. With both wires try to avoid the nearness of large objects.

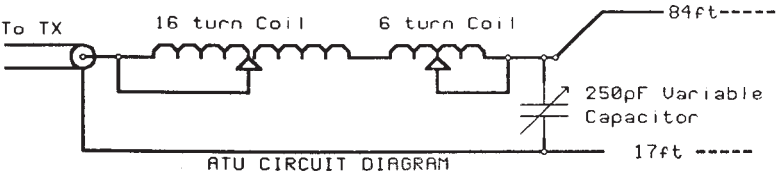
The accompanying L Match ATU (Antenna Tuning Unit) should enable you to use the antenna on all Novice Bands. It can be build from existing parts you have or from a kit. A suitable kit is sold by Lake Electronics and contains all the parts you need including case, coil, tuning capacitor etc. G3RJV reviewed the kit in Short Wave Magazine, and with permission from SWM; copies are available from me for an SASE It is quite easy to build from scratch, and as shown couples low impedance to high; I have shown variable inductance using croc clips; but a 12 way switch is better. A 250pF capacitor is shown, but you can use one section of an old 365 or 500pF capacitor from an old broadcast radio.

During late June this year; I built the ATU as shown and erected the W3EDP. Considering that conditions were far from good, I had contacts on the 80m and 15m Novice Section (3.565 - 3.585 and 21.100 - 21.150MHz) into Europe and within the UK using the novice power level of 3 watts - all on Morse Code.
I hope this short piece will encourage Novices to have a try with the W3EDP; I found it easy to put up; the ATU worked well and since my garden is rather small, I had to put two bends in the long wire and two in the radial! My big dipole was temporarily taken down during the operation with the W3EDP.

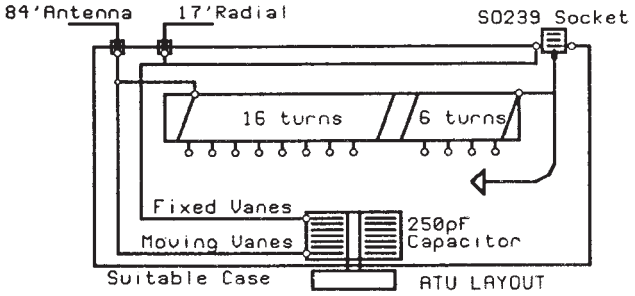
In the next SPRAT I will go into actually "doing it". In other words how to get up and running with some RF, using a Power/SWR Meter etc. If you are studying for the Novice licence we wish you good luck and hope to meet you on the air soon. If you have operating problems write with an SASE, and we'll be happy to help you out. meanwhile keep am eye on the column for more Novice News.

ATU CONSTRUCTION NOTES
2" dia plastic plumbing pipe can be used for the coil former. It shouldbe about 5" long. Wind 16 fairly close turns, then 6 wider spaced. Enamelled copper wire is best-about 18swg. Scrape the coating off every two turns and solder on a "tag take off" for croc clip, or use a 12 way switch as I did. The capacitor must be isolated from the case. Banana plugs and sockets were used for the aerial and radial connections. A slow motion drive 6:1 may be used with the capacitor. When you get the unit up and running make a note of the various settings for the bands on a piece of paper.

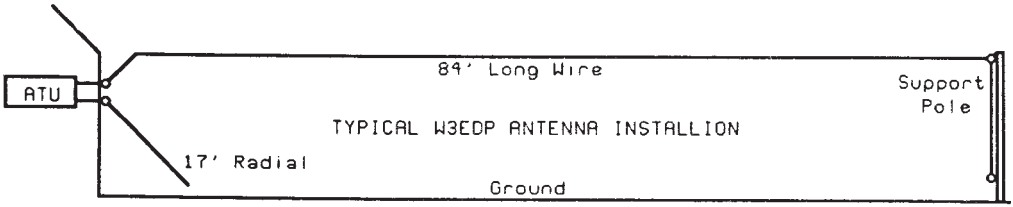
Acknowledgements and further reading for the W3EDP: Gus, G8PG; RadCom "TT" July 1990 pp30-31; Book: Practical Wire Antennas by John Heys G3BDQ pp33-34.



ATU CIRCUIT DIAGRAM



ATU LAYOUT



G3RJV COMMENT: W3EDP - an excellent Antenna - It is common to change the radial size for some bands: 6.5ft for 20m and nothing for 15/10m

NOVICE NEWS JUST IN ... From the RSGB
The results of the first ever UK Novice Exams reveal that 163 Candidates (a 87% pass rate) have now qualified as Class B Novices. It is reported that many have gone on to pass the 5wpm Morse Test. If you are a Class A or B new Novice, we send our congratulations! At the moment of writing (late July) the next Novice exams will be on 16th September. The first Novices were presented with their certificates by the RA here in the UK at a ceremony on 25 July 1991.

SOME NOVICE LICENCE HOLDERS ARE ALREADY JOINING THE CLUB
WATCH THIS SPACE FOR DETAILS AND ENCOURAGE THEM ON THE AIR
REMEMBER TO USE SLOW CW FOR THESE, AND ALL NEW OPERATORS

SSB News

Dick Pascoe, G0BPS, 3 Limes Road, Folkestone, Kent. CT19 4AU.

The party are Chris' went very well as usual, it was great to see so many familiar faces enjoying the sunshine. I have yet to find out how he manages it, but the sun always seem to shine on 'BUE especially at his summer party. The bad news it that my van, loaded for Woburn, blew out the big ends as I left Chris' - Ouch!!

Only two letters this time and one phone call, Peter PE1MHO, claims 34 QRP countries this year and all are made on 50MHz, just shows what can be done on this new band. His 54 all time score is also a very high score for a single "VHF" band.

Wyn, GW8AWT, sent a nice letter full of news, and complaints, that the grass grows faster than he can cut it, he said that he was pleased to cross over the Bristol Channel with just 2w on 2m using just a 1/4 wave on his van. He reminds us that next year is the Diamond Jubilee of the Scott Taggart ST300, he plans to build a replica using a 5m4 tetrode with the necessary "twiddledums".

10m SSB CALLING FREQUENCY IS NOW 28.360MHz

Several novices have joined the club already, and it will not have taken too long for the more astute of you to see that none of their allocated frequencies fall within the "standard" QRP centres of activity. John, G0IIA, writes with a very sensible comment. He suggests that the centre of activity for the 10m band should be moved well away from the "old" frequency of 28.885, we should move to the part of the band with Novice access. well spotted John, and yes the centre of activity for the 10m band for ssb will now be 28.360MHz.
Other frequencies for cw operating with the novices will be found elsewhere in SPRAT.
No table this time as PE1MHO was the only change - see above.
That all for now, more entries for the table please, to keep the column going we need your letters! 72 es 73 de Dick.

ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS

WANTED: TEN TEC CENTURY 22: GM3MXN QTHR or Tel. 0698-887176

WANTED: HEATH HW8 in reasonable condition. G0IFP. 051-648-2492.

WANTED: Any Information/handbook to photocopy, on the "TOP 2-7" by Minimitter. All expenses paid. G4MRH. 0273-418755.

WANTED: Copy of 2 part article HF ON THE CHEAP by G3GDU, May/June 86 of HAM RADIO TODAY. Peter Karrais, DL1GPK, Jungbuschstr.25, W-68 Mannhiem 1, Germany.

FOR SALE: 25 SPRAT mags No.s 40-67 (41,45,46 missing) G QRP Club Circuit Handbook, PW Introducing QRP, Hints and Kinks. £12 the lot inc. postage. G0EWC QTHR. 0272 776891.

THE HISTORY OF QRP by Adrian Weiss
A cery readable account by the former QRP Editor of CQ Magazine of the history of the early pioneers of QRP operation
Available at the Reduced Price of £7.50 inc. postage
Dave Aizlewood G4WZV, 36 King St. Winterton, Scunthorpe, DN15 9TP
Please make out all cheques to "G QRP CLUB" and quote your number

THE 1991 SUMMER QRP PARTY

Spot the QRPer! The party in full swing.

René, ON4KAR with his homebrew transceiver.

Bill, GØFAK pointing out a feature of the Argonaut II.

Steve, G4VRR showing ON4KAR his homebrew tcvr.

René, ON4KAR (left) and Marcus, DL8RDS settle down to check out the beer!

Mike, G3WWS with his bag of goodies from the "free-bee" box.

Robert, PA3BHK with his Argonaut II - with a mic on SSB!

MEMBER'S NEWS

Chris Page G4BUE

"Alamosa", The Paddocks, Upper Beeding, Steyning, West Sussex, BN44 3JW.
(Tel: 0903 814594. Packet: G4BUE @ GB7VRB or via the DX PacketCluster)

I must start this column by thanking everyone who came to our Summer QRP Party on 3rd August. The weather again turned out nice for us which was just well in view of the large number who came. A special thanks to our overseas members DL8RDS, ON4KAR and PA3BHK who came. PA3BHK brought his Ten-Tec Argonaut II with him which gave many visitors the opportuinity to try it out. I would be interested to hear from any other members who are using the Argonaut II or the higher powered Delta. Robert has subsequently sent over some photographs and if all goes well you should be able to see examples of his photography elsewhere in Sprat.

Secondly, can I draw your attention to the notice published elsewhere in Sprat about the RSGB's NFD and the decision of the HF Contest Committee to include a QRP section as I suggested on page 38 of the last Sprat. Could it be anything to do with the fact that the Chairman is Dave, G4BUO, who is also a member of the G-QRP-Club? Well done Dave.

G3HNP thanks all those members who replied to his plea for a "great circle program" in the last Sprat. ON4KAR managed to work his first ever ZS in July thanks to a very patient ZS6BCA. Thanks to another ZS station, G2BUV has beaten his won record for poor reports. ZS1ACJ gave Ted a 129 +QRM+QRN+QSB report! Any claims to take the record off him? Ted says he was pleased about the T9 bit! Since then he has worked 4K1A in Antarctica and Z2 receiving reasonable reports. GØNEZ worked CX5RV (G5RV at his winter QTH) recently and then PY7FNE on two-way QRP. David's antenna is an end loaded dipole from an early Sprat designed by G8PG.

GØDJA has worked a few stations on packet and cw on 2 metres. Dave says that Terry, VE3TKB is looking for QRP packet contacts with the UK and can be contacted @ VE3IUI. GØOXT uses an FT77 with reduced drive to 1 or 2 watts but his next shack job is to build a "proper" QRP rig. Paul's best DX is a W5 in Fort Worth, TX. FD1OEB says that summer is the best time to enjoy QRP. Dominique took his 500mW TX down from the shelf and worked OHØ/DJ7ST/MM who was in a rowing boat and EA6/F6GIN on holiday with a "hotel type installation". DL4DBT is active on packet in the German 70cms net.

G2BUV has just brought a Hallicrafters SX-111 valve double superhet receiver with a variable bandwidth from 5KHz to 500Hz and an effective notch filter. Ted says he can breathe as much as he likes on the 6C4 oscillator with no effect, which is more than can be said for an NE602 mixer/osc he built!

If you work G3GZT ask him about radio microphones. Reg was the inventor of the original radio microphone which was first used on 76MHz in the ice show "Aladdin" at the (very famous but now gone) Brighton Sports Stadium in September 1949.

G3DNF had a "good run" in the DL-AGCW Contest in July. Gordon would like to start island chasing under the IOTA award scheme on QRP, but says the sticking point to claiming the basic award is the obligatory QSO with Antarctica. He says he never hears Antarctica on CW and suggests a "QRP CW DXpedition to the South Pole". There have been several 4K1 stations active recently with good signals.

GØCJM has been enjoying a "rebirth" on 11 metres but says he will soon be on 40m looking for club members. Reb says he regular copies PA, DL and UA stations on 27/LO and there are great possibilities for long distance working with the right antenna.

G3TUX is one of several members who, after 28 years are considering their membership of RSGB. Chris would like to see some of their monopoly reduced by clubs like the G-QRP-Club which he says must be good for all of us. Chris's letter was typical of several received lately and I must agree that reduced monopoly means more competition which usually benefits the consumer, in this case, us!

Welcome to new member Y26SW, 14 years old. Henay has been using an HW9 since Christmas (courtesy of Santa Claus!) to monoband delta loops. He has worked lots of USA stations and ZL, ZS, 9V and 9X. Not a bad start eh? Henay suggests a regular QRP DX Net at week-ends. Any suggestions?

GØKCA has built G8PG's 6ft linear loaded vertical antenna and says it works well when erected indoors to European stations. John will now be waterproofing it to put it outside to try and work further afield.

G8QM asks if anyone has knowledge or information about reducing the power levels of the Kenwood TS140S other than by the normal power control? Vic believes it can be achieved by the application of a negative voltage to the ALC line but he has never seen any practical details about it. He refers to the report in Sprat 65 about G3RQT reducing the power of his TS140 down to 100mW by simply decreasing the power control. Vic says, "Perhaps I am old and clumsy but I find it impossible to adjust the small slider control to such fine limits." Perhaps G3RQT and any other members with ideas can drop a line to Vic.

My thanks to those of you who sent reports on the 7th QRP Convention at Yeovil in May. This was the best ever, with 226 visitors. The overall winner of the Fun-Run was G3BPM followed by G4PRL and G3LHJ third, all G-QRP-C members! The E=Ø.5m^{3}W Challenge was wone by G3PCJ with G3OXF second and Club member G3CQR third. Well done to you all. GB2LOW was busy most of the day making many CW contacts and also acting as the 2 metre talk-in station. The G-QRP-C stand was manned by G4JFN and I'm told the food was up to the usual high standard. Next years QRP Convention will be on 10th May 1992.

David, G0NEZ in his shack - using a mic?!

Congratulations to GØNEZ on being appointed our Novice Manager. David acknowledges the help he has received from club members, in particular G8PG, and would now like to help others. He invites novices to drop him a line.

Much to the surprise of some of you, I am now a VHF'er after purchasing an FT726. I have been on 6 metres for a year now and have about 50 countries worked, including WAC. I enjoyed the aurora in mid June so much that I wanted to be ready on 2 metres and 70cms for the next one. I have to admit that VHF still takes second place to HF, especially on QRP!

G4EDD has been using indoor antennas for the last three years but has still managed to work W and VE using only 100mW. John has now moved to a new house with a 60ft back garden overlooking cows in the fields, so watch out for even better things from him. PA3BHK worked LY3BI on 28MHz who was running 3w to an indoor dipole. The QSO was about 12 hours before the coup in the USSR. Robert was using his homebrew TX and an FRDX500 receiver.

G2BUV, another critic of the RSGB, says if he wins the pools he will finance a take over by the G-QRP-C! On a more serious note, Ted says he has nothing but admiration for the way the G-QRP-C is run.

Finally, if all goes to plan, look for something different from me in the QRP Winter Sports this year! You will have to work me to find out what, though!! Please keep your letters and packet messages coming and let me know how your autumn/fall goes.

73's for now, Chris

HF FIELD DAY AND QRP Part II by Chris Page G4BUE

When I wrote the article that appeared on page 38 of the last SPRAT, I never dreamt for one moment that I would be writing a favourable follow-up to it so quickly.

In the middle of August, G4BUO (Chairman of the HF Contest Committee and G-QRP-Club member), sent me a packet message telling me the question of a QRP section in HF Field Day was going to be discussed at the HF Contest Committee Meeting that Thursday. Following the meeting, Dave sent me the following packet message:-

> *"This is to let you know we have decided to add a QRP section to NFD starting next year. There will be a limit to the maximum power of the rig along the lines of that in LP-FD to encourage true QRPers and avoid people using a 100w rig getting tempted to turn the power up beyond 10w. Please spread the word in Sprat. If the section proves popular we will be looking for a trophy."*

The LP FD which Dave mentioned is the RSGB's Low Power Field Day which is held in July every year. It is a six hour event on 40 and 80 metres with 3w and a 10w output classes. Entrants are restricted to using a transmitter capable of delivering more than 15w output.

This is very good news for QRPers in the UK and Dave and his HFCC are to be thanked for their recognition of the need for a QRP class in the HF Field Day. The onus is now on us to convince the HFCC that there is sufficient interest in the new QRP class for an annual trophy to be awarded. (Perhaps the G-QRP-Club could sponsor such a trophy?)

The rules for the new QRP class will be published in Sprat in due course but make a note of the date now. Why not start lobbying your local club to enter a QRP group in addition to their normal entry. The single antenna that has to be used by entrants in the Restricted Section, which is likely to be the same antenna restriction for the QRP class, can easily be erected without a lot of complicated equipment and pairs of hands. I intend doing a solo effort on similar lines to what I did in this years Low Power Field Day. Field Day is always held on the first full week-end of June, e.g. 6th/7th June 1992.

HF Field Day is held in conjunction with clubs in Europe who also have their annual Field Day over the same week-end. This creates a lot of interest by working /P stations throughout Europe in addition to the UK. Can our European members let me know if their national societies have a QRP class in their Field Day and what the power and rules are, etc? Perhaps we may eventually be able to have a European QRP Field Day Championship held in parallel with the existing Field Day. Please get in touch with me via the methods shown in my Members' News column. See you in Field Day in 1991.

SPONSORING AN OVERSEAS MEMBER

A number of members help the club by sponsoring another member, that is they pay the subs for someone who lives in a country where free or exchangeable currency is not available. We have now used up all our sponsorship. Would you like to help in this way by donating an extra £5 to help someone join the club? Please contact G4HHY, our Membership Secretary for further details. [David Jackson G4HYY, Castle Lodge West, Halifax Road, Todmorden, Lancs, OL14 5SQ.]

G-QRP-CLUB PACKET BBS LISTING

GØBJJ	@	GB7VRB	G3CJ	@	GB7DXC	G6LBZ	@	GB7SIG
GØBPS	@	GB7SEK	G3RQT	@	GB7ESX	G6YBC	@	GB7CRG
GØBWG	@	GB7GBY	G3SMV	@	GB7FLG	DF5JL	@	DBØIZ
GØCUQ	@	GB7HSN	G3TPI	@	GB7FLG	DJ6SX	@	DBØEI
GØDCL	@	GB7ESX	G3YBK	@	GB7GLP	DK6AJ	@	DKØMAV
GØDJA	@	GB7WRG	G4BCY	@	GB7TXA	DK6SX	@	DBØIE
GØEIY	@	GB7PMB	G4BJM	@	GB7LWB	DL1BJI	@	DBØCL
GØFAK	@	GB7ZAA	G4BUE	@	GB7VRB	DL1SDZ	@	DBØAAA
GØGQF	@	GB7BST	G4BXL	@	GB7LNX	DL4DBT	@	DBØSGL
GØJED	@	GB7SYP	G4GIY	@	GB7GBY	DL5BAO	@	DBØCL
GØJHC	@	GB7BPL	G4GJA	@	GB7SEK	EA3ERT	@	EA3MM
GØJJI	@	GB7BNM	G4GHU	@	GB7GHU	EA3FNT	@	EA3CIW
GØKFO	@	GB7ZAA	G4HDP	@	GB7XAN	F1EMT	@	FF6KDC
GØKYA	@	GB7LDI	G4HYY	@	GB7CRG	FB1MQO	@	F8BK
G0KYF	@	GB7ZPU	G4MET	@	GB7TCM	FE1JBX	@	FE6BIG
GØLGJ	@	GB7TLH	G4MUY	@	GB7GBY	KA1CZF	@	N1DCS
GØLGX	@	GB7ZAA	G4NRW	@	GB7CRG	OE6WTD	@	OE6XYG
GØLKX	@	GB7HJP	G4OBF	@	GB7BSX	PA3EKK	@	PI8DAZ
GØLXC	@	GB7IMB	G4PDQ	@	GB7DXC	PA3FPJ	@	PI8DAZ
GØMPL	@	GB7VRB	G4SCT	@	GB7WNM	PE1LIF	@	PI8DAZ
GØOXT	@	GB7GLP	G4SXH	@	GB7TCM	UA9CDC	@	GB7LDI
GØNMT	@	GB7LDS	G4TLS	@	GB7ZZZ	ZL2BSJ	@	ZL2AHK
GØNZV	@	GB7CRG	G4UDT	@	GB7BST			
GMØNRT	@	GB7CQV	G4WPI	@	GB7SIG			
GWØMOH	@	GB7ABC	G4XFD	@	GB7CRG			
G1HDQ	@	GB7TXA	G4XHE	@	GB7ZZZ			
G1XEI	@	GB7WRG	G4XZD	@	GB7YHF			
GM1BEA	@	GB7CQV	GM4HQF	@	GB7CQV			
GM1OGZ	@	GB7MAC	GM4KJQ	@	GB7NOS			

There are additions since the last list. Please help me keep this list updated by sending info to G4BUE @ GB7VRB or via the UK PacketCluster system.

ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS:ADS.

FOR SALE: Unbuilt HOWES HC280 TRANSVERTER. 2M In 80M Out, All Modes, 10 Watts Output. Costs £52.50. New - will accept £30 plus postage. Len G3XXQ. Tel: (091)4782965 (work) or (091)2744416 (home : answerphone)

CRYSTALS FOR SALE: 14060, 14040, 28060 @ £1.50 each post paid. D.W. Cooper, G0KYK, Tel: 0670 712514.

FOR SALE: HEATHKIT HW7 RIT Mod and S.M. drive on pre-selector. Offers. HOWES DSB80, Fully assembled and Working, LCD Frequency readout. £40. 160M DSB, Fully Assembled phone home brew from Rad Com article. £30. Geoff Gregor, G4OWH, Tel: 0761-431198.

FOR SALE: SWAN ASTRO 102BX TRANSCEIVER, 160,80,40,20.15,10 CW/SSB at 150-200 watts. 2 VFOs, speech processor, notch filter, other features, Circuit diagrams and Handbook. Good Conx. £325 ono, Would consider a 2m or 70cm handheld in part exchange.
2 MRF RF HF Power Transistors, 200 watts, Offers? Small Tape Recorder to record that QSO! £5, Sort Wave Radio covering 20,30,40m, Ideal for SWL, £3. Motor Cycle Intercom System, Full duplex, complete with mikes and phones that fit in crash helmet, £16 ono. Tel 081-460-7325.

The AGCW cordially invites you to a

(Homebrew and Oldtime Party)

GUESTS: Operator of homebrew or more than 25 years old equipment. Homebrew or OT TX or RX may be completed by modern RX or TX.
DATE: 3rd Sunday in November (17-Nov-91, 15-Nov-92 ....)
TIME/QRG 1300-1500 utc: 7010-7040, 1500-1700: 3510-3560
MODE: CW, PA-input below 100 watts. CALL: "CQ HOT"
CLASS A: TX and RX homebrew or older than 25 years
CLASS B: TX or RX homebrew or older than 25 years
CLASS C: QRP-TX below 10w input or 5w output, homebrew or 25yrs old
CONTROL: eg. 579001/A (starting 001 on both bands)
SCORING: Class A with A, A with C, C with C = 3 points
Class B with A, B with C = 2 points
Class B with B = 1 point
LOGS: Must include a short description of homebrew or old time equipment. Send not later than Dec. 15th to Dr. H. Weber, DJ7ST, Schlesierweg 13, W-3320 SALZGITTER 1. GERMANY.

NEW! DTR7 – 40m CW TX-RX

The DTR7 is building on the success of its companion, the 80m DTR3. Featuring module construction, with no less than five PCB's, the rig incorporates all the essential features of a transceiver without indulging in expensive gimmicks.

Covering the entire 40 metre band – 7.0/7.1 MHz – the Transmitter produces a clean 2 watts of CW. It requires only about 350mA at 13.8V (key down), which, combined with its compact size and light weight makes it ideal for portable operation.

The Receiver section (Direct Conversion), can resolve signals of less than 1uV. Selectivity is around 250Hz @ 6dB.
AF output, up to 1/2 watt, is for 8 ohm 'phones or speaker.
Sidetone and RIT (plus and minus 4kHz shift!) are built in.

ALL COMPONENTS AND HARDWARE INCLUDED

£84.50 (Kit) **£135.00** (Ready-Built)

NEW! PM20 POWER METER for QRP

The PM20 is a combined 50 ohm Dummy Load and direct-reading milliwatt meter. Designed specifically for the QRP enthusiast, it accepts any frequency from 10kHz to 150MHZ. VSWR is less than 1.5:1 at 150MHz, about 1.1:1 at HF.
A dual range instrument – 20 watts or 1000 milliwatts FSD – it permits readings down to 25mW to be made easily.

ALL parts (Yes! Case AND meter!) are included.

£19.50 (Kit) **£28.75** (Ready Built)

For full details of our kits, send SAE to

LAKE ELECTRONICS
7 MIDDLETON CLOSE, NUTHALL, NOTTINGHAM NG16 1BX

OR RING ALAN, G4DVW, ON 0602 382509

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