

QRM

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Branches of the Wireless Institute
of Australia, Tas. Division.

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As all licensees are taken into consideration in computing the final score in the R.D. contest, it is most inconsiderate of the Federal Council not to allow the use of repeaters. There are many limited licensees in isolated (VHF) areas who have very little chance of getting a reasonable score without the use of repeaters.

The W.I.A. lists repeaters as one of the benefits to members. Last year they spent quite a large amount of money on a special convention to agree on a national frequency plan. Yet when it comes to a contest, to remember the amateurs who gave their life in the fight for freedom, they become little dictators and discriminate against limited licensees and country areas.

Don't allow this to happen, protest, by writing to the Institute and A.R., by talking to your Federal Councillor and even by submitting a log of repeater contacts in this contest, accompanied by a note stating your reason for using the repeater.

John VK7JV

MEETINGS.

- | | |
|-----------|---|
| June 4th | North West Branch, Lakins Hall, Ulverstone. |
| June 14th | Northern Branch, AEB rooms, High st. |
| June 15th | Council meeting at the QTH of VK7KK, 1.30 p.m.
149 Cambridge st. Launceston. |

YRCS

- June 8th & 22nd room 38, Kings Meadows High School.

I don't want this to sound like another editorial or a soap box article but there are a few things worth saying.

There's no doubt that the branch has achieved much in the past few years- the repeater, QRM and meeting attendances would be the most notable features.

However there is one distinct lack of action, social activities. Do you think its important that the OM's and XYL's (a nasty term!) get together more often?

Do the wives feel that hubby has a hobby in which they want to - but can't get involved in?

Should the wives get together now and again to organise social events for the branch? Any bites?

Thanks to Frank and Brenda 7ZFR for the use of their QTH and their efforts in preparation for the 25th.

Thanks also to those who attended to make the evening such a success.

With a total around 50 (34 adults) it must rate as one of the best attended yet.

It was great to see North West and Southern representation. Seems there were a few worried OM's after signs of "cluckiness" in a few XYL's present, guess reminders of the sleepless nights and associated problems should've cured that.

The other major development concerns meeting activities, Wally 7ZWX has organised well and has activities planned until January!

The fare includes talks by members to assist those amongst us who are less experienced, outside visitors with both electronic and non electronic expertise, and an occasional film.

Finally, it is proposed to hold regular executive meetings on the Friday prior to branch meetings.

If you have any winges, ideas or brainwaves that's the place to air them.

Let's get everyone involved in making this branch serve you even more effectively than it does at present. Ideas please.

The June meeting will include two BP films.

Oil digger - shows the life of a rubberneck working on a oil rig in the Gippsland area, it shows both the work and play side of the job.

Soltice - is an aesthetic study of bird and animal life in the Bass Strait region.

Whilst these are non-electronic films they're well worth seeing, you dont need an activity to entice you to attend meetings, this is just an added attraction.

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John was adept as ever as auctioneer at the May meeting.

The clubhouse account was \$30.00 better off as a result of a donation of a percentage of the proceeds of 700's gear.

Seems the bottom's fallen out of the market in VK3!

Prices of equipment sold at the Geelong Hamfest were ridiculous, Base stations sold for \$5.00.

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We must be breeding literary talent in the Northern Branch!

First 7JV's QRM, next 7ZBY is Bulletin editor and now 7Down from Matric College!

All we need now is LEB to move North!

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North West notes from Max VK7MX.

May I commence my notes with a word to the ladies, bless them. The salt of the ham shack. The silent partner mostly, but now is your chance to become voluble.

I refer to the ladies page in QRM, you can write some thoughts on the subject of radio, any aspect, post them to QRM PO Box 1010 Launceston, and give someone a shock when the magazine arrives, its a great idea and we do look forward to reading some interesting notes in the months to come.

We had a very well attended meeting this month and our visitors included Brian VK4ZKF and his companion Darrel. In addition four very interested young chaps came along and we hope to see them at future meetings.

The usual business was transacted including a lengthy discussion on the possibility of originating the Sunday Broadcast from this area, more of that later.

Sid 7SF came up with some interesting goodies which disappeared in very quick time.

At the conclusion of the meeting Wayne Gibson gave a lecture on the intricacies of the electronic keyer which he designed and built for the beacon.

Wayne knew his subject alright and finished up with a very confused audience. How do those things work ? Thanks Wayne.

We are appreciating the liason with council that we now have through our councillor Graham 7ZAQ.

It is a new experience to our branch.

We are all very sorry that David 7MS has had such bad luck with his new HF rig, particularly when he received it back from the mainland with a heap of broken glass rattling inside. However David is now back on the air and we hope that it stays that way.

There appears to be trouble over the hill. A racket came on 2 metres recently consisting of squaks, whistles and a paper crackling sound and somewhere amongst it we resolved Ian 7ZIE. Whats with the new rig Ian ?

Which reminds me of some of Murphy's law which I think may be appropriate.

Probability of failure of a component, assembly or system is inversely proportional to ease of repair or replacement.

A transistor protected by a fast acting fuse will protect the fuse by blowing first.

Isn't that the truth.

See you next month

Max VK7MX

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A reminder to our associate members that the next AOLCP examinations are held on August 20th.

However your application will have to be at Radio Branch before July 8th.

If you think you haven't a chance, try it anyway you may be surprised and if you don't pass at least you'll be told how much you have learned.

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Q.R.M.

June 1974

DX notes by Den VK7DK.

Page 4

I guess it is just my luck, but the very evening I turned in my notes for the May QRM, stating that 20 metres could be forgotten as a night time DX band, that European signals were plentiful, but not strong.

SM, OH, DL, were but a few that were heard around 1200 Z and about S5.

I have had very little chance this month, to listen on the bands. For one week the gear wasn't even turned on whilst a virilient wog dealt with me.

From what I have heard I haven't missed much, going through the bands does not reveal any great DX news.

80 metres; have not had a chance to listen for DX

40 metres; the occasional openings to Europe is still there around 1230 Z, and again at 2100 Z, YU's and YO's have been noted.

20 metres; 0300/0400 Z, HC20A, YS, W4's and VQ9M (long path) 0600/0800 Z, G6PD, DJ9GD, stacks of I's, YS1AG, MID (S9), VE7's and of all things, ST2SA at S6 so dont overlook the possibility of an African QSO.

15 metres; 0130 Z, W's and JA's would you believe?

73 Den

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VHF notes by Joe VK7ZGJ.

Dporadic E activity is almost non-existent, the only two openings this month were on the 5th when Danny 7ZDA and Kevin 7ZAH worked VK4QO and again on the 6th when Danny worked VK5SU.

Brian 7RR is once again active on 53.525 as well as myself with a 50W base station.

A new station on 2 metres A.M. in Launceston is Graeme 7ZGG running 20W input to a 3/12.

2 metres has been a little better with an extremely good opening to VK3 on May 5th. when over 16 SSB stations were worked by Danny 7ZDA and John 7JV, Danny also worked 20 stations via the ch.42 and 48 repeaters.

At the same time John worked VK3ZCG and VK3BDL on 6 metres. That's about it for this month, don't forget to keep an ear open for the mid winter 6 metre DX openings, it only lasts a week or two but every VHF operator will be looking for this so there should be plenty to work.

73 Me

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Congratulations to Brenda and Frank VK7ZFR on the birth of their daughter Katie Ann.

Congratulations to Angus Robertson and Margaret Cush on their engagement.



LADIES PAGE

I thought that the ladies who belong to clubs, committees etc. may like to hear about a way of raising a little extra money. The committee of the pre-school my son attends holds monthly bingo evenings.

Eighteen people attended the last evening and just over \$20.00 was raised.

The evenings are held at the homes of members and each is asked to bring something for supper as well as a small grocery item for prizes.

This way there is no great expense on anyone and what money is made is all profit.

We encourage members to bring their friends along so we have a few different faces each evening.

For those who haven't played bingo it goes something like this, the cards are 5 cents each (so as not to make too big a hole in the house keeping) there is no limit to the number of cards a player can buy.

As the numbers are called out the player crosses them off if they appear on her card, the first player to have all the numbers crossed out, calls out Bingo! the card is then checked and if correct is the winner.

Every one who comes agrees its a good evening out for just over a dollar.

VK7ZAH's XYL Judith

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Festive Dip.

4 oz Cream Cheese, softened at room temperature.

1 Table spoon of lemon juice

1 Table spoon of finely grated onion

1/2 Tea spoon of salt

Good pinch of cayenne pepper

Milk

Beat the cream cheese until smooth, add lemon juice, onion, salt and cayenne pepper.

Blend in sufficient milk to make a dipping consistency, spoon into small bowl and chill.

Judith VK7ZAH

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A LOW NOISE PREAMPLIFIER FOR 1296 Mhz.by Daniel VK7ZDA.

A low noise transistor preamplifier for 1296 Mhz is described in this article using the Philips BFR91 NPN silicon planar epitaxial transistor used in a grounded emitter circuit with an approximate noise figure of 2.7 - 3db and approximate gain of 10-12db.

The amplifier is constructed on a piece of 1/16" thick double sided glass epoxy printed circuit board 3.5" long x 2" wide with a $\frac{1}{8}$ " wide stripline etched on one side and full copper clad on the other side.

The basic structure is a 50 ohm stripline with a transistor inserted near the input connector and DC blocking capacitors placed at the junction between coaxial connector and stripline. No input tuning is provided since best noise performance is obtained with a 50 ohm source impedance, this means that the antenna and feedline must themselves be reasonably well impedance matched at the operating frequency for optimum performance.

The output of this transistor is tuned and matched to 50 ohms by means of a sliding capacitor tuner.

In the finished design the capacitor is a tab of copper foil whose area (capacitance) and position along the output line are experimentally adjusted for maximum gain at 1296 Mhz. Under the condition of 50 ohm input and output impedance the gain will be approximately 10-12 db at midband and exhibit a -3 db bandwidth of several hundred Mhz.

Biasing: An important feature of this circuit is its stability (freedom from surplus oscillations) which is a function of the elaborate bias network shown on the schematic diagram. This network consists of a 56 ohm resistor in series with a resonant choke for midband, the choke L consists of 6 turns of 30 gauge wire air wound on a 1/16" diameter former with turn spacing of about one wire diameter, the overall length of the winding is about $\frac{1}{8}$ ".

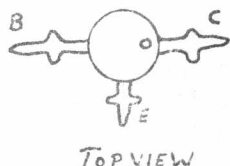
The small resistor is first soldered to the stripline (straight upward away from the strip) with leads as short as possible. The top of the resistor is now a terminal point for one end of L, the other end of L is connected to a good UHF 1000 pf bypass capacitor (low inductance).

These three components provide a good high impedance choke at midband, 1296, and a good lossy impedance out of band. At the lower frequencies in the VHF region the inductance is small and the 56 ohm resistor loads the circuit heavily preventing resonances of large enough Q to start oscillations.

At still lower frequencies an additional R.C. network is provided which essentially loads the transistor with a total of 112 ohms well into the HF region.

Below the HF region the 100pf blocking capacitors roll off the external circuit response and 5 mf capacitor prevents internal feedback. This combined action of components in the bias network discourages external and internal circuit resonances which may cause self oscillations. In addition the bias network provides collector current stabilization by means of negative feedback through the 560 ohm collector dropping resistor. When operating from 12 volts supply the minimum noise figure in this circuit occurs with a collector current of 2.5-6 ma which is adjusted by the 25K ohm bias adjust resistor.

BFR91 Data.



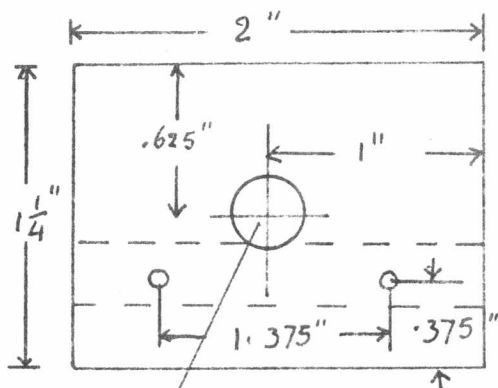
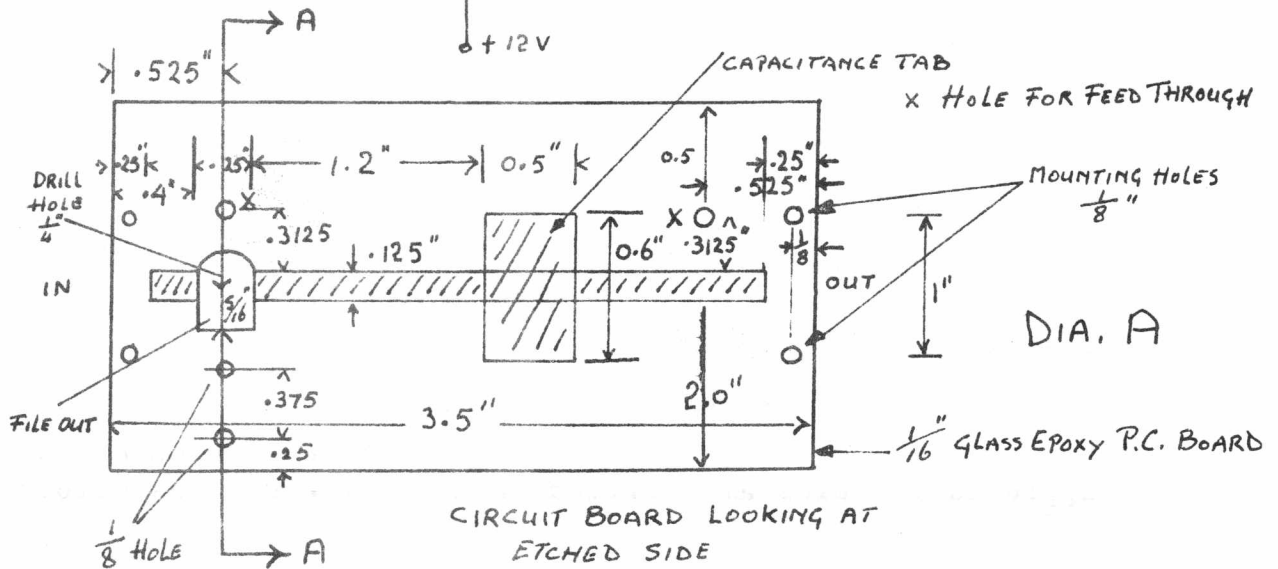
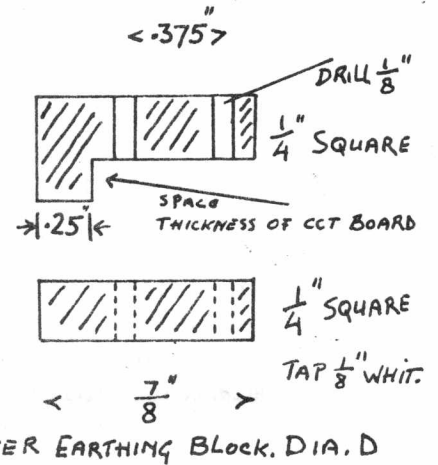
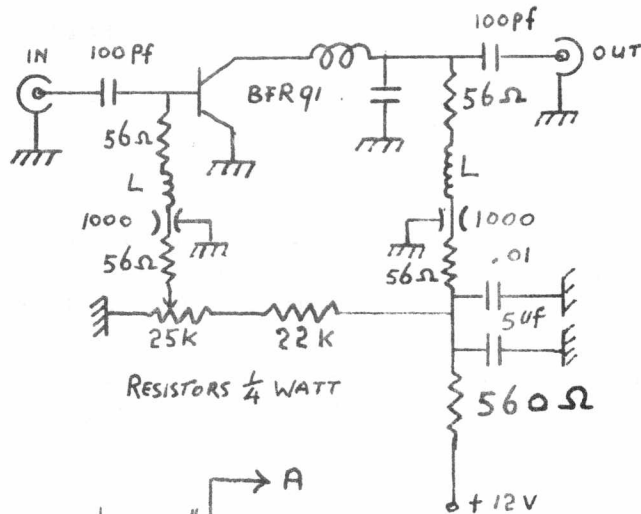
Vcbo 15V
Vceo 12V
Ic max 35 ma
Power dissipation 180 mW
FT 5000 Mhz

Construction.

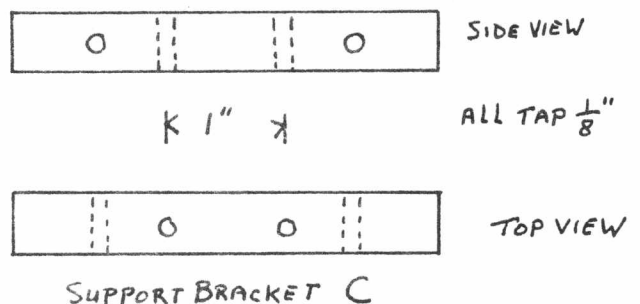
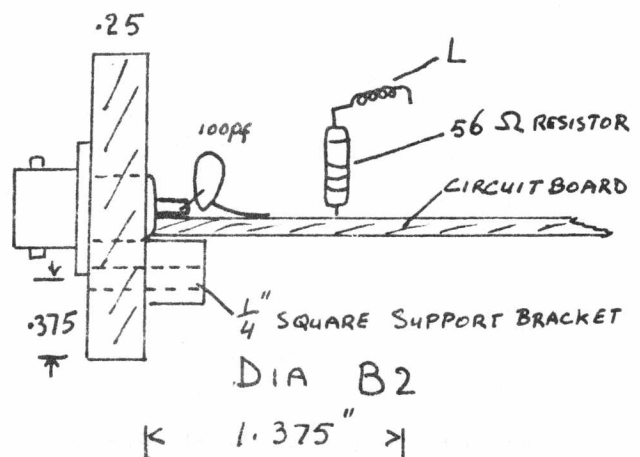
- 1) Circuit board as shown in diagram A
- 2) End plates made of $\frac{1}{4}$ " x $\frac{1}{4}$ " brass bar 2" long in which the appropriate holes are drilled to mount the BNC connectors and the support shelf for the circuit board.
Diagram B1 and B2.
- 3) Support shelf mounted to end plates by $\frac{1}{8}$ " whit. screws or sweated to it, made of $\frac{1}{4}$ " square by 2" long brass and it supports the circuit board to stop movement away from the BNC connectors, which would damage the input/output coupling capacitors. Diagram C.
- 4) Emitter earthing block, $1\frac{1}{4}$ " square by $\frac{7}{8}$ " long brass as shown in diagram D.

The overall cost of the project should be less than \$10.00 as all components are available in Australia and the construction can be carried out using the tools normally found in the Ham shack without great difficulty.

I would like to thank Ron Wilkinson VK3AKC for supplying me with information and the Crawford Hill VHF club technical report 8 from which nearly all this information comes from.



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MIXERS for VHF SSB

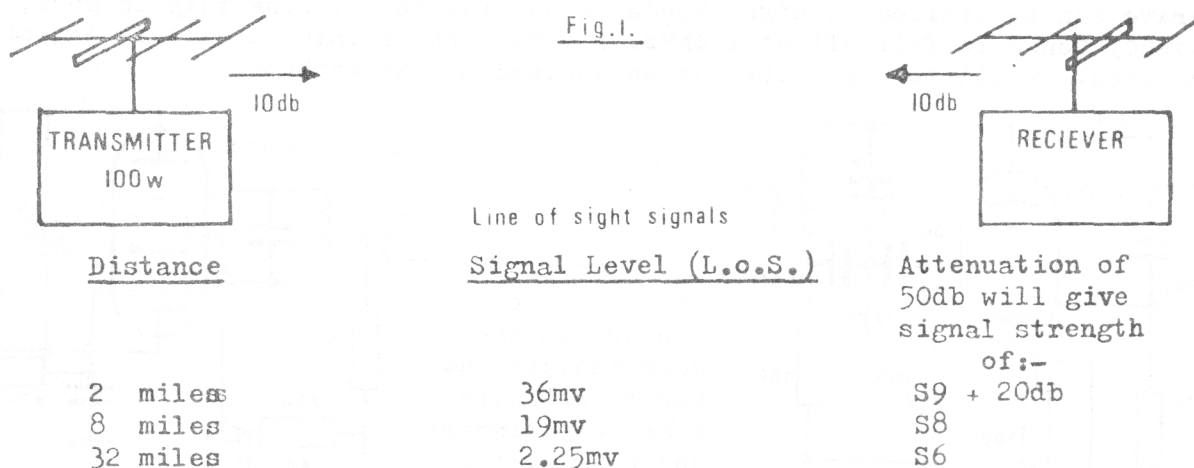
by Mike Farrell VK2AM

There has been a dramatic increase in the use of SSB on VHF in the past few years - SSB is certainly the dominant mode on six metres, and two metre SSB is increasing. The latter no doubt is partly due to Oscar 6.

VHF sideband does have its problems, principally those of spurious products appearing in-band which can be of much annoyance to ones (amateur) neighbours. Out-of-band spurii annoy the other neighbours ! If one considers the usual "commercial" specification of -60db spurious performance, and the fact that a genuine S9+40db signal report would mean that a -60db spurious is S6 at the receiver, the extent of the problem is readily appreciated. Figure 1, pinched from the RSCB VHF manual, illustrates the problem.

Obviously a case can be made for spurious reduction of 80db, or even 100db. A drive control on the transverter will enable the output power to be adjusted for reasonable copy at the receiver. A report of 60 over S9 is good for the ego but deflating when it is remembered that ones in-band crud is S9 !

The problem, of spurii, under discussion is usually produced by mixing processes in the transmitter - it is therefore essential to be sure that the SSB exciter is clean before tackling the transverter problem as higher order harmonics from the exciter can cause problems on VHF, even though the HF transceiver etc is OK on HF. The writer recently modified his 14MHz SSB exciter and found that the modifications were creating a large spurious only 40db down from the main signal. This turned out to be the 6th harmonic of the VFO mixing with the 5th harmonic of the SSB generator on 9MHz to produce a reverse tuning spot on 14MHz - one cant be too careful ! Harmonics from the SSB exciter should be considered also (28MHz x 5 comes out on 140MHz) and use of a bandpass filter is good practice.



Another problem is the spectral purity of the local oscillator chain in the transverter. Use of an oscillator and mutiplier on, say 144MHz, is not good enough -- consider figure 2.



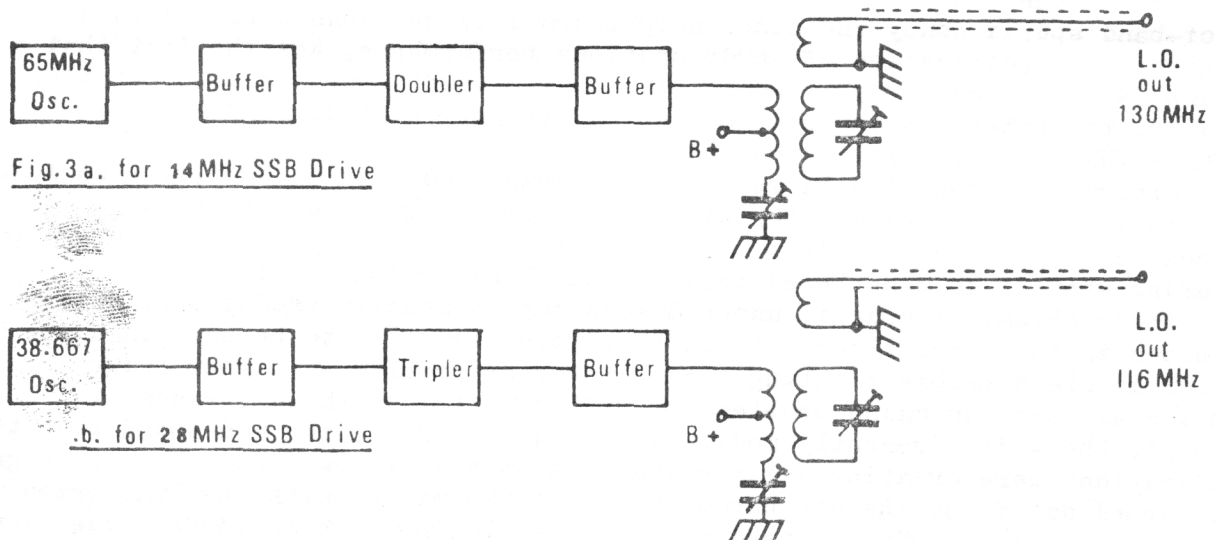
Fig.2.

$$\begin{aligned}(58 \times 2) + 28 &= 144 \\ (58 \times 3) - 28 &= 146\end{aligned}$$

$$\begin{aligned}(43.333 \times 3) + 14 &= 144 \\ (43.333 \times 4) - (14 \times 2) &= 145.333\end{aligned}$$

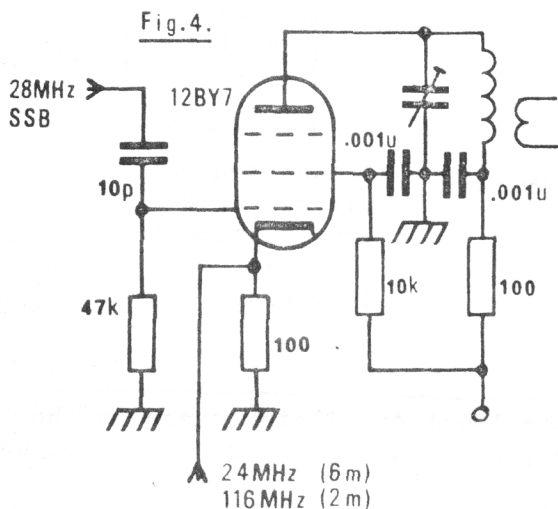
The working Q of LC circuits at VHF is not high and undesirable harmonics can cause embarrassment. The local oscillator chain should be liberally supplied with buffers and double tune circuits. Figure 3 would be the sort of thing required.

Use of a double balanced mixer in the transverter is almost mandatory, especially where the local oscillator frequency approaches the desired output frequency as in fig.3a. Where the local oscillator is far removed from the desired output frequency, a simple single-ended mixer may be used, provided

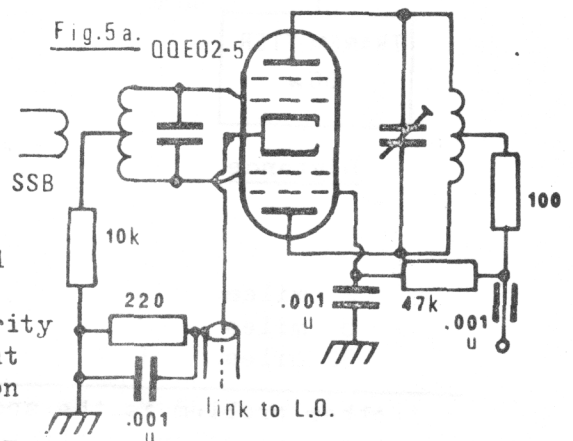


post-mixer filtering is good.

A circuit popular in the US is seen in fig.4. An advantage here is that the SSB drive can be applied at high impedance and low level. Linearity is good, but the efficiency tends to fall off at 144MHz. A variation of this circuit is injection of the local oscillator into the screen instead of the cathode.



This circuit appears in the RSGB manuals and works well with excellent linearity and output. About 1w L.O. injection is needed with somewhat less SSB drive.



Balanced Mixers

Balanced mixers are superior to fig.4. in all aspects and should be used if at all possible. The most successful version uses a QQE02/5 with the SSB drive applied in push-pull and the local oscillator applied in parallel, thus cancelling the L.O. in the plate circuit. Several variations of this arrangement are shown in fig.5.

Drive is adjusted from the SSB source and L.O. separately to produce 0.5 - 1mA grid current respectively. i.e. apply drive from one source and adjust level to achieve grid current required, then from other source. One only at a time.

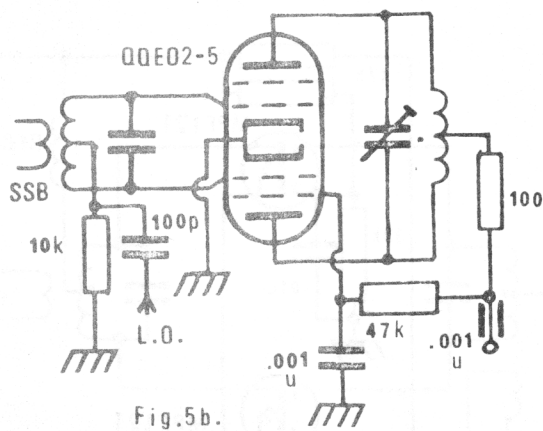


Fig. 5b.

This circuit is reputed to be less critical to adjust than 5a.

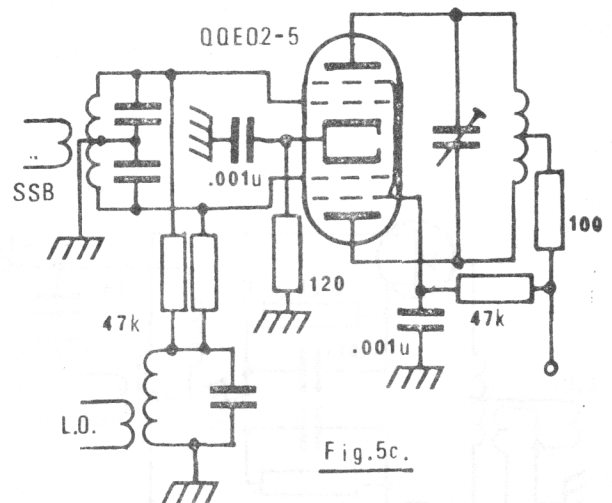


Fig. 5c.

A more complicated version of 5b with similar performance.

A QQE03/10 or 3/12 will work with the mixers in fig. 5. but output and linearity are down on the QQE02/5. A 6J6 may be used in a similar arrangement as in fig. 6.

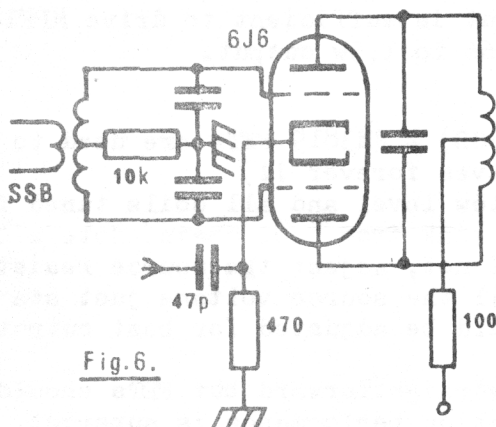


Fig. 6.

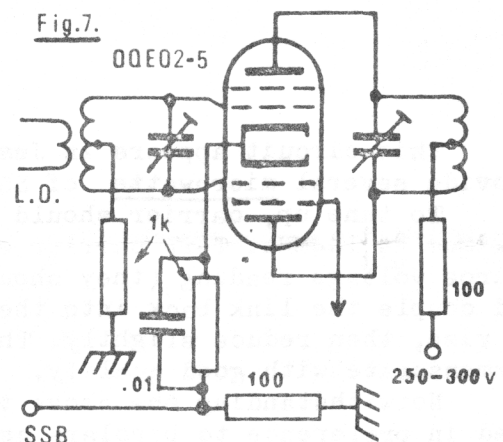
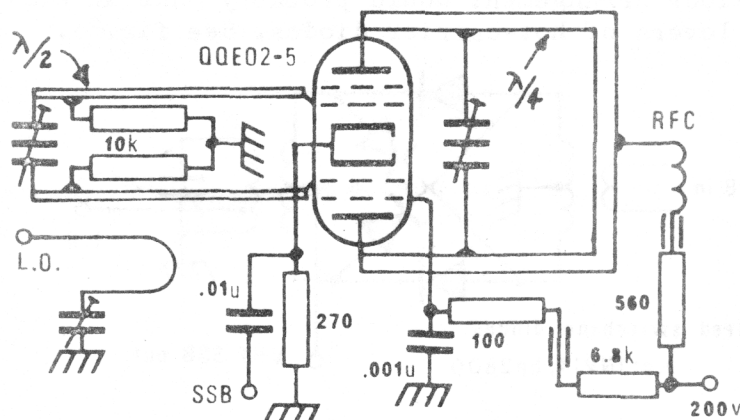


Fig. 7.

The mixer may be arranged to balance out the feedthrough of the HF SSB - this may be of benefit when using 28MHz SSB to drive a six metre transverter, but generally it is preferable to balance out the local oscillator - herewith for the record, see fig. 7. A UHF version which performs well appeared in "Ham Radio" a few years ago. This circuit (or variations) is popular on 432MHz.



Solid State Mixers

All the forgoing circuits use, of course, valves. Since it is far easier and cheaper to achieve power at VHF using valves rather than transistors one might as well use valves throughout - although this problem is decreasing rapidly. For those who subscribe to solid state for the sake of solid state, some transistors et al are described in mixer service in fig. 8.

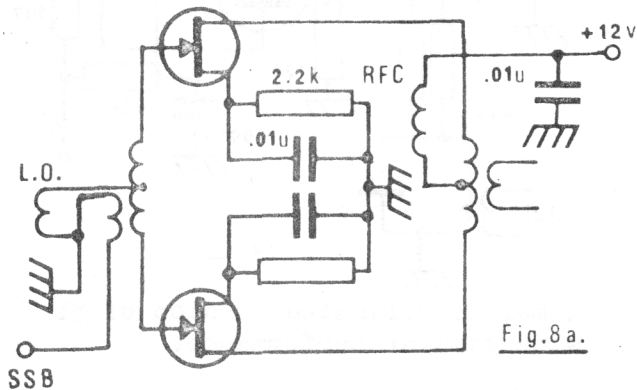


Fig. 8a.
Junction FET Mixer...with L.O. & SSB injected into gates. Can give up to 45db L.O. rejection.

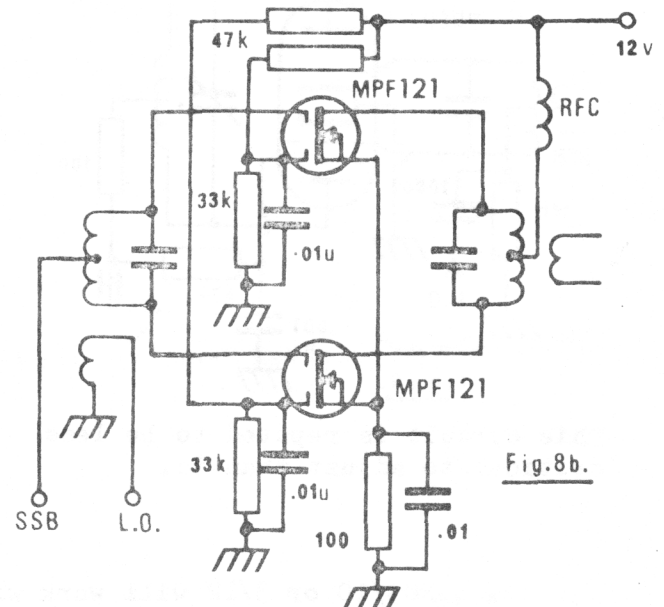


Fig. 8b.
MOSFET Mixer. N.B. the SSB drive is cancelled out, not the L.O. Output is sufficient to drive MPF121-2N3866 to 1.5w output.

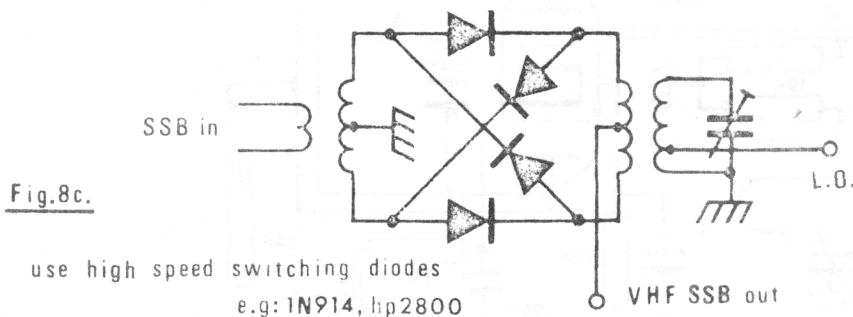
This circuit appears in Jessop's manual (RSGB) - 2N3819 FETs are used to provide several microwatts of SSB on 144MHz (valves forever !!)

To tune up, carrier should be inserted at low level and all coils tuned for maximum at 144MHz. Turn carrier off and decouple link from L.O. chain. Note either source voltage reading (they should be equal - if not, adjust the source resistors) and couple the link back into the L.O. chain until the source voltage just starts to rise, then reduce slightly. The SSB drive should be adjusted for best output commensurate with good quality.

Notwithstanding the above this circuit is straightforward but FETs should be used in preference to bipolars as the intermodulation performance is superior.

Last year VK3ZUR published a circuit in the Victorian VHFer of an all solid state SSB transmitter for 52MHz and used MPF121s in the mixer, but he did observe that single gate FETs would have worked just as well and provided easier balancing. The circuit is shown in fig. 8.b. Note that the SSB drive is balanced out, not the L.O. Output is sufficient to drive an MPF121 amp.-2N3866 driver to 1.5watts output.

The ring diode arrangement would probably make an excellent double-balanced mixer - for the lovers of hot-carrier diodes. See fig. 8c.



Summary

Well, there you have it. The golden rule with mixers is not to overdrive - spurious products increase alarmingly - the proper place to increase the VHF SSB signal level is after the mixer - a class A buffer will provide more than enough power to drive anything up to a 6/40 in ABL, so the prime requirement of the mixer is quality, not quantity.

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High fidelity audio equipment, AWA ST25 amplifier
 7.5 Watts rms per channel, fitted with quad decoder
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 Joe Gelston, 40 Lavender Gr., Summer Hill
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=====

Vinten car phone, mod. MTR13, QQE03/12 final
 fitted with MOS FET preamp and xtal switching
 for 6 channels (ref. A.R. May '74) fitted with
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Playmaster 104 stereo amplifier, tuner and
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 negotiate price \$\$\$\$\$\$
 Also some transformers and a radio dial, what offers?
 Carl Waldon, 11 Woolven st. Kings Meadows

=====

I know Col 7KW doesn't like water but to use a bank of
 Solar cells to power his receiver to listen to the
 Broadcast is carrying his dislike a bit far ?

===

DON't forget the "TOWNSVILLE PACIFIC FESTIVAL CONTEST"
 on 8th June. Rules can be found on page 25 in the May
 issue of A.R.
 Logs to be sent to; PO Box 964, Townsville, Qld 4810
 Closing date for entries , 31st July 1974

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