

THE WIRELESS INSTITUTE — OF AUSTRALIA —

TASMANIAN DIVISION

BOX 851J, G.P.O., HOBART

JANUARY 1964

MONTHLY BULLETIN

PRICE 6d

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GENERAL MEETING.

The next monthly meeting of the Division will be held in the Club Room, 147 Liverpool Street, Hobart, on WEDNESDAY 8th January 1964, at 2000 hours

PLEASE NOTE THE CHANGE OF DATE.

Activities for the evening have not yet been finalised but come along just the same - we will have something organised before then.

NORTHERN ZONE

The next meeting will be held on FRIDAY, 10th January 1964 at 2000 hours, at 102 Charles Street, Launceston. Understand that one item is finalisation of arrangements for the Zone Station VK7NZ to take part in the National Field Day in February.

NORTH WESTERN ZONE.

The next meeting of this Zone will be held in Lakins Hall, Ulverstone, on TUESDAY, 7th January 1964, at 2000 hours.

COUNCIL MEETING

The usual Council Meeting for January will be held in the Club Room on MONDAY, 20th January, at 1930 hours.

I. T. U. FUND.

We acknowledge with thanks donations from VK7RY, VK7GB, VK7QM and from the North Western Zone a combined contribution from VK7DA, VK7XL, VK7LR, VK7ZAH, VK7ZAA, VK7BL, VK7MX and G. Howard. Total in hand is now:

Northern Zone	£3
North Western Zone	9
Rest	38- 4- 5d
	<u>£50- 4- 5d</u>

STRAYS.

Congratulations to Mike Jenner VK7ZAV and Anne Landers who have recently announced their engagement.

And congratulations also to Harry Harjano on passing his AOCP and to Crosby Russell-Green and Daniel Ford who have their LAOCP.

And to VK7AI, VK7DK, VK7SM and Associate Greg Johnston, award winners in the R. D. Contest.

TECHNICAL by VK7ZAI
QUARTZ CRYSTALS.

Quartz crystals are widely used in modern telecommunications practice as frequency stabilising elements and as resonant elements in filter circuits. They are relatively simple and robust in construction and extremely stable in their properties. Quartz itself is chemically inert, has extremely low electrical and mechanical losses, and because of its piezo-electric properties is readily applied in high frequency electrical circuits as the equivalent of a stable, high Q, tuned circuit, having a stability and Q factor much higher than could be achieved by conventional means.

Quartz SiO_2 , the most widely occurring crystalline form of silica, crystallizes in the trigonal class, and well formed crystals have a striking symmetry, the form of the crystal being a hexagonal prism terminated by hexagonal pyramids.

Quartz occurs in the two forms known as left-hand and right-hand. The two kinds have identical properties and physical constants, except that each is the mirror image of the other.

Quartz has four axes of crystalline symmetry, the Z of principal axis around which it exhibits trigonal symmetry, and three X axes, equally spaced at 120 degrees to each in a plane perpendicular to the Z axis. Each X axis is an axis of diad or twofold symmetry, and all three are, of course, identical and indistinguishable from each other. As in all crystalline materials, the mechanical, electrical and optical properties vary with direction, the variations being in accordance with the symmetry. There are therefore small but significant changes in the elastic constants and in the thermal-expansion coefficient, with change in the direction of measurement. These variations have important practical significance in that they permit crystal plates to be cut having low or zero coefficient of frequency.

Since there is hardly any time lag between the application of the voltage and the change in dimensions, it follows that the dimensions of a quartz plate will vary cyclically in step with an applied AC. Suppose that a LF voltage is applied to a quartz plate and that the frequency is slowly increased. If we were to measure the current flowing into the plate a curve such as Fig.1 would result.

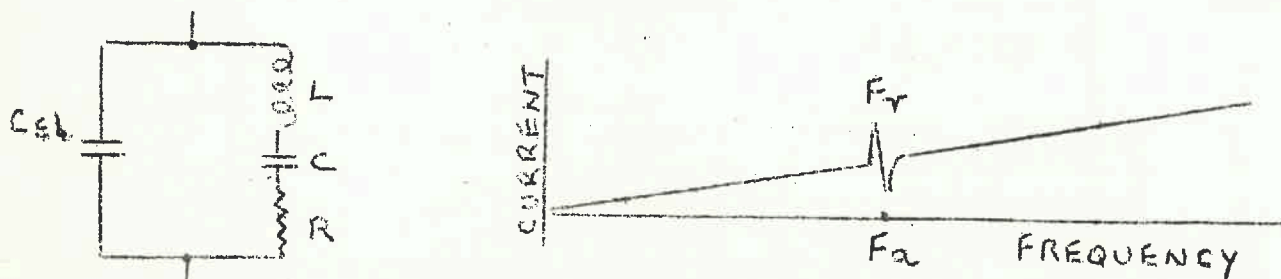


Fig.1. Equivalent Circuit of a Quartz Xtal.

A small current would flow initially and would increase proportionally to the frequency in a similar manner to the current into a small capacitance. As we approach closely to the frequency F_r the current rises sharply, reaching a maximum at F_r , and falls sharply to a minimum at a slightly higher frequency, F_a . With further increase in frequency, it then increases slowly, resuming its linear rate of increase with frequency. The frequency corresponding to maximum current is the resonant frequency F_r and that at the minimum current is known as the anti-resonant frequency F_a . The sharp dip at the anti-resonant frequency F_a , is the result of the series arm exhibiting inductive reactance at frequencies above the resonant frequency. At the frequency F_a , the value of this inductive reactance is equal in magnitude to the capacitive reactance of the direct capacitance between the electrode represented in Fig. 1 by the capacitor C_{el} .

The frequency at which a plate or bar resonates depends on the mode of vibration employed and the plate dimensions. For most purposes fundamental modes are employed, but for special requirements - especially for the highest frequencies - overtone modes have been used, otherwise the plates would be too thin or too small to permit manufacture.

In practice any quartz bar or plate has an infinite variety of modes in which it can resonate and its behaviour can be extremely complex. Fortunately many of the modes can be inhibited by the choice of the electrode system and the manner of mounting, or by suitable choice of the plate dimensions.

TECHNICAL (Continued)

As the quartz plate has two frequencies of zero reactance associated with each mode of vibration, the seriesresonant frequency and the parallel or anti-resonant frequency, oscillator circuits can be broadly divided into two classes according to which resonance is used. The anto-resonant circuits we have all used, the MILLER-PIERCE, and the straight PIERCE circuit. In both cases the operation of the circuit depends on the stray inter-electrode capacitance of the electron tube. The COLPITTS and the COLPITTS-derived circuit are also anti-resonant circuits and are especially useful at the higher frequencies. Whilst crystals used at the parallel resonance give results which are adequate for most purposes, it has been shown that the frequency of oscillation is dependent directly on the circuit capacitance. These capacitances may not be very stable in themselves, and therefore these circuits do not provide the highest degree of frequency stability which the crystals themselves can provide.

When the crystal is operated at its series resonance it exhibits a relatively low impedance and the effect of the capacitance between its terminals is negligible, except at the VHF. With suitable circuit arrangements it can therefore provide a stability of frequency at least one order better than that when operated in the parallel mode. The most widely known circuit for series mode operation is the MEACHAM BRIDGE circuit, but, perhaps the most used in Amateur Radio equipment is the BULTER, the ROBERT DOLLAR and the SQUIER. Page 160 of the latest edition of the R. S. G. B. Handbook, Table 1, has some useful dope to enable you to select the correct cut of crystal

R. D. CONTEST.

It was pleasing to see that this year's Contest was won by Queensland Division for the first time, and to that Division we extend our congratulations. As far as this Division was concerned the percentage participation was very poor compared with other years, and were it not for the efforts of members of the two Zones, our score would have looked sick indeed.

VK7WI BROADCASTS.

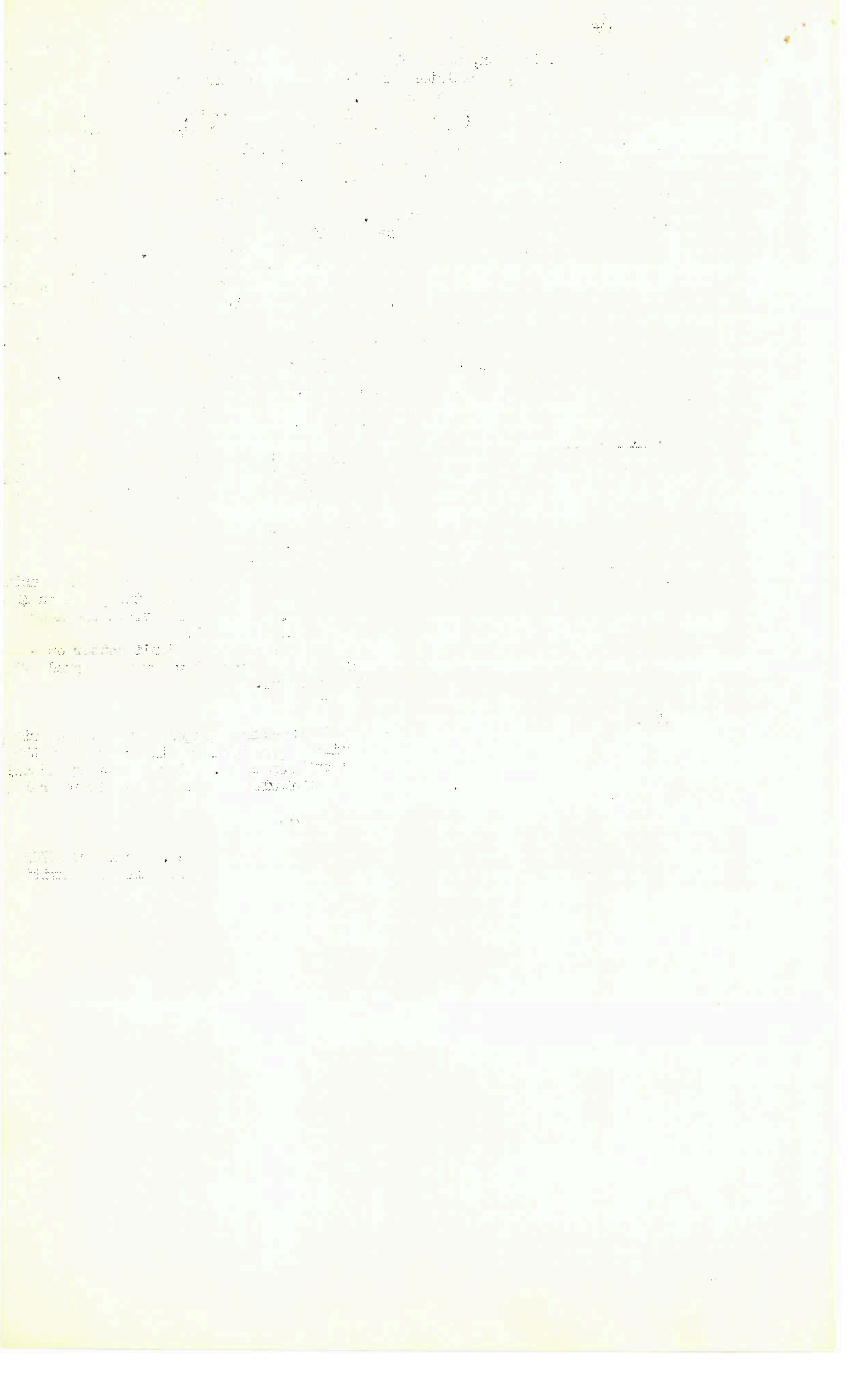
It has been decided that for a trial period the call backs from country stations will be taken first on 80 metres as has been the practice, and on 40 local stations will be given first preference. This will obviate the long delay for locals waiting for the country calls to finish.

While on the subject - keep your calls short and don't natter on - there are probably others waiting. If you want a rag chew arrange a sked after the Broadcast Officer has finished his round up.

DISPOSALS.

We have acquired a large quantity of various gauges of new copper wire, but the problem arises where are we going to get small spools from to put the smaller gauges on, as it is nearly all on large reels. Anyone got any ideas? Most is enamelled covered. The thicker stuff will be machine wound into rolls. Full details later.

Chas. Harrison VK7CH
for Bulletin Committee



At last the awaited 6 mx DX is with us. During the past few days, beginning on around the 11th Nov. openings have been heard by 7ZAI. Most of the signals were not very strong, but on 21/11 VK4s & VK2s were worked by ZAQ and ZAO. Sigs were heard again on 22nd but no contact was made. On 23rd the band again came good, with 4s and 2s. VK5s have been heard also, but none worked to date that I know of.

The Ham Fest was a success again this year. In the fox hunt held on the Sunday, Geof, 7ZAS with ZAI and EB in the wagon with him, came in first, followed by 7DH with 7MY 3rd. Also with Allan were Barney, ZAK, Dave, ZAY and Danny, ZDM. This fine crew found the fox without hearing it until arriving at the site. It appears that Barney has won so many fox hunts that he no longer needs a receiver to find the hidden trx.

Stations active on 144 at the Ham Fest were... 7RL, 7DK, 7ZAY/ZDM, 7KC, 7ZTC, 7ZAI, 7ZAT, 7ZAP, 7ZAS and 7ZAV. Several others had receiving equipment for this band. 7ZAH and 7RL operated portable from Mt. Barrow, and were worked by most camping at Campbell Town and also by those remaining in Hobart.

On 1st January '64, the 420 mcs band becomes available for use to amateurs, and should get its first real try-out in the Athol Johnston Memorial Contest at the end of Feb. The scoring for this band has been decided on to help as an incentive to get on the air. It appears as tho we will retain the 50--54 mcs band until the end of the Ross Hull contest. However, further notification will no doubt be given when a final date has been decided on.

Looking forward to some good DX in the Ross Hull Contest, and hope that all those who are able, will take part in same, and forward a log!

Rules for the Athol Johnston Memorial Contest will be forwarded to the North and North West Zones for approval in the near future, and the final set of regs. will be published in the January Bulletin.

NORTH WEST ZONE.

After being heard on the coast VK5ZHL now listens for VK7s every evening at 2000 hrs EAST. He is situated at Mt. Gambier and runs 90 watts to a QQEO6/40.

Bob 7ZAA, and Kevin, 7ZAH are having regular QSOs with good sigs both ways and both have worked to Mt. Barrow and Launceston. Terry, 7TT, has been listening in while tuning up his 522 receiver.

Den, 7DK, has been heard along the coast with his MCW signal but suffered bad QSB.

There should be quite a few stations taking part in the ZL Field Day on Dec. 8th, conditions permitting. 7ZAA is hoping to take his station up onto Round Hill near Burnie. Several associate members will have receivers operating on Table Cape near Wynyard. Both locations are over 500 feet above sea level and offer good outlooks to the east.

On 20/11/63 Den, 7DK, and Len, 7BQ worked some VK3s on 144. Signals were around 5/8 and stations heard included VK3s... ZNC, ZDE ZNB and BW. There were several others, but too weak to read. 7ZBR was heard by 3ZNC but contact could not be maintained.

73s to all for the coming Festive Season and good DX in the New Year,
W. Nickols.

I see we are nearly out of room, so I will take this opportunity of wishing you all, all the best for Christmas and the New Year. Remember the ITU fund and make it a New Years resolution to do something about it.

73s, see you next year,

Michael L. Jenner, VK7ZAV.

