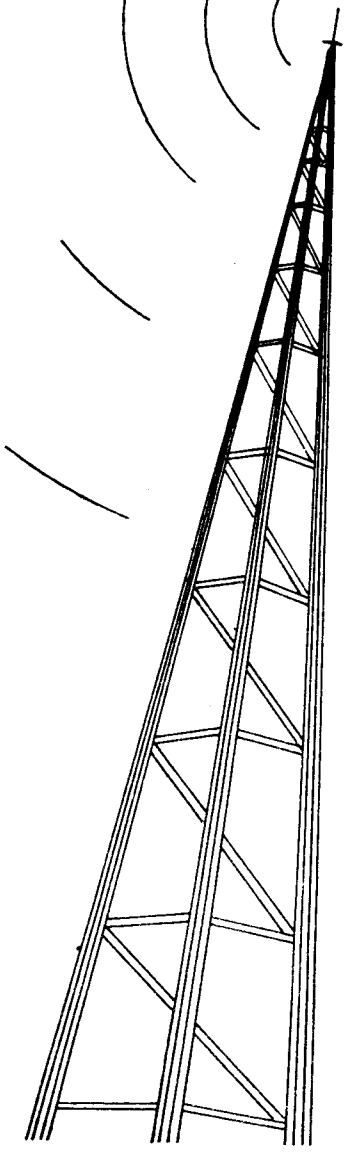
2AE.

QSX PE



Port Elizabeth Branch of the

South African Radio League

P.O.Box 462, Port Elizabeth. 6000.

National Call	145.5 Mhz
P.E. Repeater	145.05/65
Grahamstown	145.15/75
Lady's Slipper	145.10/70

ZS2PE

Bulletin: Sunday 08h40

HF: 40m – 7098 KHz

VHF: FM-145,700 MHz

Port Elizabeth Branch

›NOTICE OF MONTHLY MEETING‹

THE MONTHLY GENERAL MEETING OF THE BRANCH WILL TAKE PLACE AT THE Y.M.C.A., HAVELOCK STREET, PORT ELIZABETH ON FRIDAY 18th FEBRUARY, 1983 AT 8P.M. AS THIS IS A VERY SPECIAL MEETING, WITH A VERY SPECIAL EVENT TAKING PLACE, IT WOULD BE LOVELY TO SEE YOU ALL THERE.

****

COMMITTEE MEMBERS.

Chairman	Dick ZS2RS (322111)	Vice Chairman	Trevor ZS2AE(321746)
Secretary	Marge ZS2OB(303498)	Treasurer	Brian ZS2AB (303498)
Projects	Lionel ZS2DD (321770)	Special Events	Colin ZS2A)(312471)
			Fred ZS2EQ (0433-31419)
Awards	Attie ZR2DY (325349)	QSX PE	ZS2OB and ZS2AB.

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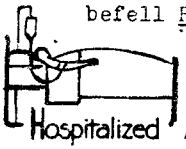
NEWS

WELCOME: To Jan Stark of Fort Beaufort and to Harry Manan and Reg Abrahams both of Port Elizabeth, who join ed the Branch during this last month. We wish them a long and happy association with the League and the Branch and good luck with the P.M.G.'s exam in November.

TECHNICAL CLASSES: Talking of exams, Brian Weller ZS2AB will be conducting the classes for the November exam specifically and these start on 24th February. If you would like any further information, please phone him on 303498.



We were shocked to hear, via Clive Fife,ZS2RT of an accident which befell Ray Connolly, ex ZS2DX, our member in Utah, U.S.A. Ray was apparently putting up some Christmas lights on their home and slipped off, impaling himself on a picket fence. We certainly hope that you will be completely well again soon Ray, and up and about.

Woody, ZS1WD was also recently in hospital and hopefully will be completely fit again very soon. Hope to hear you back on the bands in the very near future Woody.

THANKS: The thanks of the Branch are extended to Lionel, ZS2DD who took a trip up to Grahamstown to check over the repeater which had gone faulty. This apparently is only due to lack of mains to the repeater and this is going to be looked into officially. Hopefully it will be back on the air shortly. Also, thanks to Trevor ZS2AE and son Christopher who re-arranged the antenna system for the Town Repeater, and to Brian ZS2AB who did a bit of work on the Lady's Slipper Repeater and has managed to eliminate some of the desense.

BULLETIN ROSTER.

20th Feb. Colin ZS2AO
27th Feb. Fred ZS2EQ
6th March. Attie ZR2DY
13th March. Dick ZS2RS.
20th March. Trevor ZS2AE.

HINT FOR CONSTRUCTORS

Need a small screened box? Perhaps for a filter or an oscillator and none of the commercial items are suitable. Try using double-sided PCB. It is easily cut and can be soldered together. It also has the advantage that earths, screens and lead-thru capacitors can be soldered directly to it.

Ack. to Bruce ZS6XT.

LAUGH A LITTLE.

My husband is a do-it-yourself man. Everytime I ask him to do something, he says,"Do it yourself".

MINUTES OF THE GENERAL MEETING OF THE PORT ELIZABETH BRANCH OF THE S.A.R.L. HELD AT THE Y.M.C.A., HAVELOCK STREET, PORT ELIZABETH, ON FRIDAY 21st JANUARY, 1983.

PRESENT: 17 members and visitors.

APOLOGIES: ZS2RS, ZS2DK, Gordon Knapp.

In the absence of the Chairman Dick ZS2RS, the Chair was taken by Trevor ZS2AE, the Vice Chairman. Trevor welcomed all to the first meeting of the year and said he was glad to see a good turn-out. A special welcome was extended to Peet van Heerden ZS2BX from Nieu Bethesda who was on holiday in Port Elizabeth.

MINUTES: The Minutes of the general meeting held on 19th November, 1982, having been published and circulated in QSX-PE, were taken as read, proposed by Clive ZS2GQ and seconded by Trevor ZS2TJ.

ARISING: Brian ZS2AB said that he already had confirmation of 12 people who would definitely be attending the forthcoming technical classes, with a further 8 possibilities. It might be necessary to hold the classes at the Linton Grange Library Hall, as space would be at a premium at the QTH of Colin ZS2AO.
The Chairman congratulated Pete Smith on acquiring the call sign of ZR2EP and hoped that he would get his ZS call soon.

FINANCE: The Treasurer Brian, said that finances were quiet at the moment, but he had paid the repeater licences, ZS2PE licence and renewed the branch p.o. box. The A.G.M. fund stood at R800.

CORRES: (1)Council Minutes dated 23rd November, 1982.
(2)Branch Membership figures from H.Q.
(3)Letter from Pretoria Branch re 10 mHz band.
(4)Letter from PMB Branch re 1983 AGM.
(5)Branch Newsletters.

ARISING: It was felt that Council Minutes were arriving to Branches a bit late to be able to act on any matters therein, which required attention, such as nominations for vacancies on Council. Although these matters were broadcast on H.Q. bulletins, unless they were in black and white, people were inclined to overlook them.

GENERAL: Trevor ZS2AE said that the Algoa Branch were again planning to have an Amateur Radio Stand at the Agricultural Show to be held in March and had invited members of the P.E. Branch to assist with the erection and operation of the stand. All would be welcome.
Trevor also said that by now, everyone knew that the 1984 League AGM was the responsibility of the P.E. Branch and there were now only 15 months to go. Hopefully it would not be left to only 2 or 3 people and plenty of help was required. It was hoped to have organising sub-committees tied up with the Algoa Branch by February and we would then come to other members for help.
Peet van Heerden ZS2BX offered the donation of a sheep for the Branch AGM in September and this offer was gratefully accepted.
The Secretary read to the meeting the motion submitted by the Branch for the 1983 League AGM.
Clive ZS2GQ said that he would like it placed on record his appreciation for the new format of QSX-PE which was much nicer and easier to read and the printing was well done. Trevor ZS2AE also added his thanks.

GENERAL Contd.: Cyril ZS2KX and Bette ZS2LO had received a note from Audrey Burrell saying that she was improving in health and sending her best wishes and regard to the members. The best wishes of the Branch were reciprocated to Audrey.

There being no further business, the meeting was closed and tea was taken. Two films were shown, on Model Aeroplanes and the development of flying.

sgd:
T.N. Scarr ZS2AE
Acting Chairman

sgd:
M.T. Weller ZS20B
Secretary.

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MOTION SENT TO HEADQUARTERS FOR INCLUSION AT 1983 LEAGUE A.G.M.

Motion by Port Elizabeth Branch.
It is proposed that Council investigate the feasibility of publishing a technical manual for examination study purposes: this to be submitted for the approval of the Postmaster General.

Motivation.
(1) There is at present no standard manual available nationally.
(2) It is essential that this be available to all aspirant candidates especially those who live in outlying areas and cannot attend classes given by Branches.
(3) It will act as a guide to persons wishing to conduct classes.
(4) There is no single publication which covers the entire syllabus prescribed by the Postmaster General in the detail required to educate a candidate with no technical background.
(5) This Branch has a set of notes compiled by ZS2AB which could form the basis of the manual.

****

FOR SALE: FOR SALE: FOR SALE: FOR SALE: FOR SALE: FOR SALE:

(1) PYE FM 60 Base/repeater Tuned for 2m. With Handbook. R150.o.n.o.
(2) PYE Vanguard 'All tubes' Mobile. With handbook. R60.
(3) PYE New Zealand 2m Base/repeater. No Handbook. R60.
(4) PYE UHF Vanguard FM Base/repeater. With Handbook. R150.o.n.o.
(5) PYE Cambridge mobile single channel. Tuned for 2m. With Handbook. R100.
(6) Used but good QQE06/40 tubes. R10 each.
(7) Very old 1060-0-1060 volts Ca 200ma.(Primary 200-250V) Power Transformer with tappings. R16.
(8) Filter choke to match item 7. R6.

I have plenty of parts such as P.C. boards for PYE equipment with crystal filters, old tubes, etc. and am prepared to let these go for next-to-nothing if theneed can be proved.
25% to AGM Fund on all items sold. Contact Bill Browne ZS2BY.
36 Buckland Avenue, Fernglen, P.E. or phone 31-3343. (041)

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(1) 1 only Hammarlund HQ 129 receiver. Clean and working, in good condition. Spare tubes and manual. R45.
(2) 1 Johnson Viking 6 and 2m cw transmitter with VFO. R35.
Contact Dudley Forsyth, ZS2AW, 10 Cromwell St. Grahamstown. Phone 3985.

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On behalf of ZS2KU, one FT200 in good working order. R350. Can be viewed at Summit Distributors. Phone 29124. (041)

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QSL stickers and Logbooks from ZS2AB. Phone 303498.

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BEEP... ?

A HANDY ADD-ON FOR
THE SINCLAIR ZX81.

by Brian ZS2AB.

The ZX81 computer, while being an interesting and educational unit for anyone wanting to learn the basics of computing, has a number of drawbacks, due, I feel sure, to economics. Several of these have come to light since I acquired my '81 a few weeks ago, and I set about trying to eliminate a few of them.

Possibly the most frustrating thing about the unit is the non-moving keys of the keyboard.There are a number of replacement keyboards available, but these form additional expense, and the problem can be overcome with a little work. With the original keyboard, it is very difficult to be sure that a key has been properly depressed unless one looks at the screen of the VDU or TV set after each keypress, or put the ZX81 into FAST mode, when the screen will "flash" each time a key is pressed, the screen flash being easier seen out of the corner of the eye, but also becomes very annoying after a time. Better by far to use one of our other senses to establish the correct press of a key, and an audible sound does the job just fine.

The circuit given here is that of a "beeper" which will detect the press of a key, and give a short audible beep to signify that a key has made contact. There have been some other published designs for such a unit, but I could not lay hands on one, hence the development of this circuit which has proved to be quite acceptable in use. It has one shortcoming, and this could have been overcome by making the circuit a bit more involved but this was considered unnecessary. When the SHIFT key is being held down, as it frequently is whilst other keys are being pressed, 7 keys associated with the shift keys line will not beep. These are: EDIT, "", STOP, RUBOUT, ", FUNCTION and £. This is not a major problem, as, in the case of EDIT,RUBOUT and a couple of the others, you will probably look at the screen anyway to ensure that things are correct.

The reason for this condition can be found in a look at the arrangement of the keyboard as far as the processor is concerned. The board has 40 keys, arranged in a grid formation which can be considered as having 5 horizontal rows crossed by 8 vertical columns. At each point where the columns cross the rows, a key exists, which, when pressed, connects the row to the column. The processor logic periodically checks the rows and columns, and if it finds a row and column connected, knows that a key has been pressed, and can decide which key is pressed by the row and column involved. The rows are pulled to a logic-low state when scanned, and if we detect this low state by external means, we can initiate the beep. Once a key has been depressed, and is being held down, the logic state of the row and column change very rapidly as the processor goes about it business so we must arrange to detect the initial press and then ignore what follows. This is done by IC1 and IC2 whose outputs go to logic high when the key is pressed and then remain that way until the key is released. IC1 is connected only to the row which has the SHIFT key connected, and IC2 connects to the remaining four rows. This enables the beeper to virtually ignore the SHIFT key and operate on the great majority of the others on the keyboard. Transistors Q3 and Q4 merely invert the output of IC1 and IC2, and the .001uF capacitors and 10K resistors connected to the collectors of Q3 and Q4 generate a very short negative-going pulse at the instant that Q3 and Q4 conduct. These short pulses are gated together by diodes D6 and D7, so that a pulse appearing from either Q3 or Q4 will trigger IC3 into operation. IC3 also generates a pulse, the length of which is the time for which the beep will sound. The output of IC3 powers IC4 which is the beep oscillator.The length of the beep can be changed by changing the value of the 22K resistor at pin 6 of IC3, increasing the value of the

resistor will lengthen the beep sound. The frequency of the beep can also be varied by changing the value of the 10K resistor between pins 6 and 7 of IC4. Increasing the value will make the beep frequency lower. You may like to use small preset controls for these two resistors so that the beep length and frequency can be changed at will.
Space inside the ZX81 is rather limited, but with careful construction, the entire circuit can be built on a piece of Veroboard about 38mm by 50mm, and attached inside the case of the '81 with a bit of double-sided "mirror tape". The "speaker" for this unit may present a few problems as far as size is concerned. In my unit I employed a very small microphone capsule of the dynamic type used in a commercial hand-held. This was about 15 x 20 x 5 mm, and also fitted into the case with no difficulty. Some cheap taperecorder microphone capsules will work, but size may be such that mounting in the case would be awkward. The two leads to the capsule could be brought out through the case and the capsule attached outside the unit. BE WARNED: if a low impedance loudspeaker is used, the volume of the beep will be very high, and a suitable volume-control circuit would need to be added. With the high-impedance capsules, the volume is quite acceptable with the direct connection shown.
Power for the unit can be taken directly from the main PC board in the '81, preferably from the 5 volt output of the internal regulator IC. Current consumption of the beeper is only a few milliamps, and will not affect the circuit at all.
INSTALLATION: Turn the '81 over onto its face with the keyboard towards you. Gently prise off the two rubber feet nearest the front, and the one at back left side. These are held on with double-sided adhesive tape and lift away quite easily. Remove the three screws under the feet. Remove also the two screws set into the two holes towards the back right-hand side of the bottom cover and lift off the cover. The PC board is still secured by a further two screws inside which you need not remove.
The connections from the keyboard take the form of two strips of flexible PC board which plug into two sockets on the mother-board. You will find these very close to the left front edge of the PC board. One socket has 8 pins and the other 5. The 5 pin one is the one we are concerned with. The left hand pin is the line which carries the SHIFT key, and the wire from D1 on the beeper should be carefully soldered to this connection. The remaining four lines from diodes D2 to D5 can then be soldered to the remaining four socket contacts in any order. These contacts on the board are pretty close together so be careful not to cause solder bridges.
The Ground line to the beeper can be soldered to the ground connection strip which is the wide strip running close to the edge of the mother-board where the tape recorder and supply sockets are situated.
Use a test-meter to check where the 5 volt connection the regulator IC is. The regulator is bolted to the printed circuit board just on the edge where the aluminium heatsink is situated. The regulator has three terminals soldered to the board, the one nearest to the front edge of the board is the 5 volt output. Briefly power up the '81 and confirm that you have the right connection.Do not solder on the board with power on!!
HAPPY BEEPING.

One other problem springs to mind as far as the general performance of the ZX81 is concerned. The original power unit supplied puts out about 10 volts DC when running the computer. The regulator in the computer then drops this to 5 volts, and the remainder is lost as heat, and, as you will have noticed, quite a lot of heat at that. The heatsink is really rather small, and the entire PC board and all the chips and the RAM pack get pretty warm, and, after a few hours all sorts of nasties creep in like total loss of memory. The easiest way out of this one is to power the whole computer from an external supply which may or may not be regulated, as you choose, but which runs at no more than 7,5 to 8 volts on load. The overall temperature of the machine drops very markedly and it will run permanently with no heat-associated problems.

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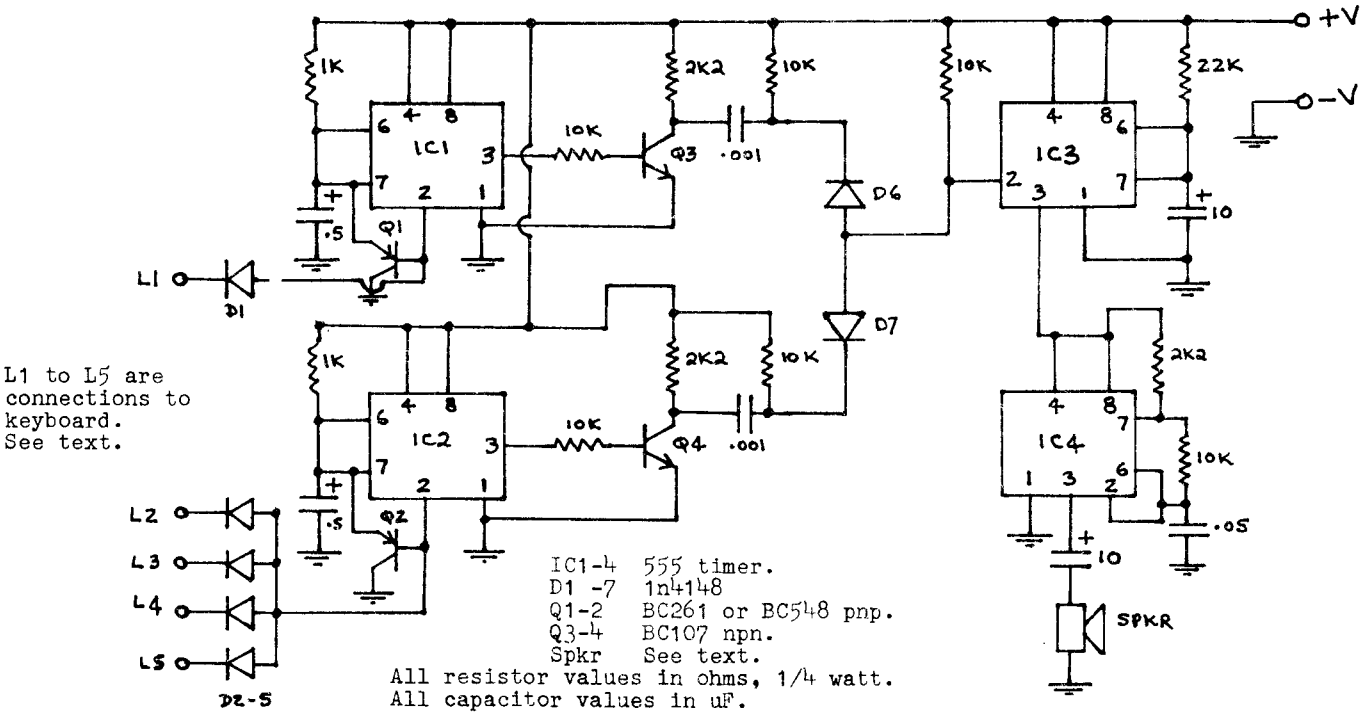


L1 to L5 are connections to keyboard. See text.

IC1-4 555 timer.
D1 -7 1n4148
Q1-2 BC261 or BC548 pnp.
Q3-4 BC107 npn.
Spkr See text.

All resistor values in ohms, 1/4 watt.
All capacitor values in uF.
Capacitors rated 10 volts or more.

SCHEMATIC DIAGRAM OF THE ZX81 KEYBOARD BEEPER.

Wheatstone

A multi-talented Victorian scientist and inventor.

One of the curious facts about the way we remember Charles Wheatstone is that the measuring system that bears his name, the Wheatstone Bridge, was not, in fact, his invention, nor did he ever lay any claim to it!

Charles Wheatsone was born in 1802 at Gloucester, and seems to have been educated at rather undistinguished schools, because we have no record of his progress in these days. There seems to have been little about his early life to connect him to electrical engineering, and the first impression he made on the world was in 1829, when he invented, of all things, the concertina, that miniature accordian which became the traditional accompaniment of singing sailors in the Victorian era. His interest was at that time intensely devoted to sound waves, and he is credited with the discovery that sound travels faster in glass or metal rods than in air.

In 1834, his research efforts were rewarded by his appointment as Professor of Experimental Philosophy at Kings College, and he continued his researches into sound. It was at this time, incidentally, that he coined a new word: "microphone" — though he didn't invent the device. His most important achievement, however, was the measurement of the speed of electric current along cables.

Not many details of the experiment survive, but from the hints that remain, we can reconstruct the method.

Two spark gaps were connected in series, one at the start of a very long length of cable, and the other at the end of the cable. The idea was that when a high voltage (he seems to have used a capacitor charged from a Wimshurst Generator) is applied to one end of the cable, sparks will be produced across both gaps — but the spark at the far end of the cable will occur slightly later than the one at the start.

A Space in Time

The time difference is not large, however. If we assume, as we know now, that the speed of the current wave in the cable is around 200 million metres per second, or 200 m per microsecond, then it takes a 200 m length of cable to cause a delay of only one microsecond. That's not a lot even by todays standards, and it was unimaginably small in those days. Wheatstone used a method which had already been used to measure the speed of light — a revolving mirror.

The mirror was small, and turned at a very high, steady, measurable speed. The light from the first spark would reflect from the mirror, and so would the light from the second spark — but in the short interval between these sparks the mirror would have turned, so that the reflected images, which would coincide if the mirror had not turned, seemed to separate. The faster the mirror was rotated, the greater was the separation. From the separation of these images, Wheatstone could work out the angle through which the mirror had turned and, knowing the rotating speed, he could also find the time it had taken to cover this angle. This was the time between the two sparks, and from this he could find the speed of the current in the cable.

The method worked (using several kilometres of cable) and Wheatstone was able to announce a value for the speed of electric current in a cable.

This work on the speed of current, however, led Wheatstone to become interested in sending signals through cables, the work which was to occupy him for the rest of his life. He was elected a Fellow of the Royal Society in 1836, at a time when he was working with William Fothergill Cooke on a telegraph system which was to be standard on railways all over the world for more than a century.

Getting the Needle

Wheatstone's aim was to produce a telegraph signalling system which could be used by relatively unskilled operators, but which could handle a lot of information. His first efforts used a 6-wire system which operated three needles (using electromagnets), but this was quickly superseded by a 6-wire, 5-needle system.

Each of the five needles was operated by an electromagnet which was connected between one of the five signal wires and the sixth (earth return) wire. Current in one direction would turn the needle clockwise, current in the opposite direction would turn the needle anticlockwise; the needles were spring-loaded to ensure that they returned to the central position when the magnets were not energised, and also that the angle of deflection was proportional to the current passing through in the electromagnet. The principle was that a digit could be selected by pointing a needle at it, and a letter could be selected by pointing two needles so that they intersected. It may look slow and clumsy, but remember that it only needed looking at to receive the message and Morse code, which in any case needs a trained operator, was still a thing of the future.

Wheatstone and Cooke's telegraph system was eagerly adopted by railways all over the world as the railway boom of the 1840-1860 period got under way and, in this country at least, the name of Wheatstone became almost synonymous with telegraphy. Wheatstone then became deeply immersed in submarine telegraphy — the use of underwater cables — and this involved the measurement of large resistance values. The solution that he adopted actually was an invention by Samual Christie to be known as the "Wheatstone Bridge".

The principle, like that of so many good inventions, was simple. If we connect two resistors in series, the voltage across one resistor depends on the ratio of its resistance to the total resistance of the pair. If we use *two* pairs of resistors, then the voltages at their junctions (**Figure 1**) are equal when the ratios of the resistances are equal. Since this equality, which determines that no current will flow between the points, is easy to detect, and can be detected using very sensitive instruments, it forms a much better system for measuring high-value resistors than the use of Ohm's law. The delightful point about the bridge system is that no *measuring* instrument is needed. All we need is a sensitive galvanometer (which need not be calibrated) to read zero when the voltages are equal, and some resistors of known value.

Hobby Electronics, January

Ian Sinclair

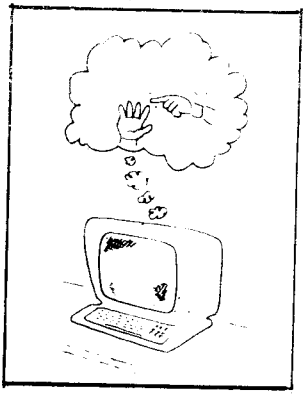
From cables to TV

Wheatstone's use of the bridge circuit was another step forward in telegraph technology and led to the first successful transatlantic cable being laid in 1866.

This was a remarkable event, not simply because it linked the telegraph systems of two major continents, but because of the other advances which it sparked off. During his work on high resistance measurements, Wheatstone had used the element selenium as a resistor material, and found that its resistance value altered according to the brightness of the light striking it. This discovery set off the research on image transmission that led to TV. In addition, the integration effect of capacitance, inductance and resistance in a long cable (**Figure 2**) led to the analysis, by Oliver Heaviside (HE September '81), of the effect of capacitance and inductance on signals and particularly on pulses, in cables — work which was later to be of inestimable value in radar engineering.

Wheatstone was knighted in 1868, a just recognition of his pioneering efforts which covered a huge range of activities not mentioned here. One of these was the stereoscope, which allowed the viewer to see three-dimensional pictures. Another was the use of electromagnets as field magnets in dynamos, a development which changed the dynamo from laboratory device to engineering plant, and led to the large-scale use of electricity (a power source regarded at the time with as much superstitious dread as nuclear power is now).

Wheatstone also amused himself with ciphers, cryptographs and his first love, music. He died in Paris in 1875, too soon to see some of the most exciting results of his work, but with the satisfaction of knowing that he had made a lasting contribution to many fields.



A QUALITY SIGNAL
– the non-electronic way –

By Leo Alexander, ZS6BEN. Reprinted from Radio ZS-July 1969 and QRX - Southern Transvaal.

Good meter and "scope" readings in your report do not necessarily mean that you are broadcasting well. It is possible to have the best TX in the world, but the OM using it is not making a good sound. Amateur Radio is not just concerned with that homebrew or commercial rig or antenna . It is a MEANS OF COMMUNICATION - it is concerned with the listener, in making communication with another honorable Ham. The Ham needs to be as good a broadcaster as he can be. Good operating includes your performance in front of the rig.

The things I notice as BAD OPERATING when sitting in front of my Rx are these: The OM who speaks too fast - like a talking teleprinter; who speaks in a single tone of voice - talking like a bad computer; who is very careless about the pronunciation of his words; who speaks so intimately to his microphone (i.e. mumbling to himself); or who shouts into it - giving distortion; or who speaks too far away from it; or who continually turns his head away from it when speaking; who (very rudely and without concern for his listener) coughs, sneezes laughs raucously or makes unnecessary noises not needed for the mode of communication; who uses bad language - which includes bad English or Afrikaans; and who allows unnecessary background noises to be heard. And, of course, that over-modulation, which comes from turning up the audio high, which makes listening unpleasant.

May I make a plea to all amateurs to attempt these simple rules - to be better broadcasters, better communicators and be able to put out better quality signals?

1. SPEAK UP - at least so that a person sitting a yard away could comfortably hear you. This makes your voice more resonant.
2. SPEAK REASONABLY SLOWLY - especially when working DX, when conditions are not good, and when the other OM cannot speak English well. On that noisy "tagtig-meter band" too. The listener might hear you more easily.
3. You should always ENUNCIATE EVERY WORD CAREFULLY. Accents do not matter. But words - every word should be most carefully pronounced, so that the listener has no difficulty in "reading" you.
4. Regarding microphones: Make sure that you have a good one that suits your voice. Address it properly. Find the correct distance from your mouth; do not scream into it; do not whisper into it. Speak up reasonably then there is no need to turn up the audio. RESPECT YOUR MICROPHONE (and so your listener) by observing good manners - no coughing, sneezing, belching, screaming, banging, etc.
5. Remember you are SPEAKING TO AN HONORABLE LISTENER. Respect him, honour him, treat him courteously. Remember your manners at all times (even when provoked) and so never loose yourtemper, or say anything unkind, uncharitable or rude.
6. Please, and again I say unto you, PLEASE, keepthose overs short. If you err in this way - buy an egg-timer and use that to time your overs. Three minutes an over should be sufficient. During nets - the briefer the over, the better. Even when there are only two in a QSO, makeit snappy with the overs - I may want to break in!! And you are expected to announce which stations are operating - frequently.
7. Let us KEEP THE HUMOUR FLOWING. Our hobby should always be enjoyable - both to ourselves and to our listeners. Humour helps us to get to know one another and to build up a relationship of friendship. Enjoy having your leg pulled. Be generous when the other

OM makes mistakes or is slow to comprehend what you consider basic operating procedure.

8. Please don't talk on a frequency when it is already being used. CHECK YO'R FREQUENCY BEFORE YOU CALL CQ. A ham who causes QRM has the worst signal and no one wants to hear him.

So, OMs and XYLs and YLs please remember the listener. He's listening to YOU in preference to the professionals. Give him his worth. Keep to the regulations, keep yourhumanity, your courtesy and respect for the listener. Let the ZS signals be known for the quality of good broadcasting.

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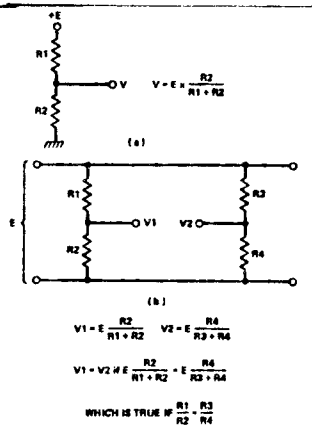


Figure 1. The 'Wheatstone Bridge'; (a) a simple potential divider; (b) Two dividers connected in a bridge formation.

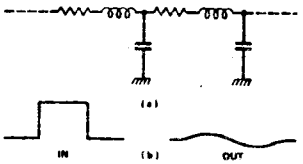
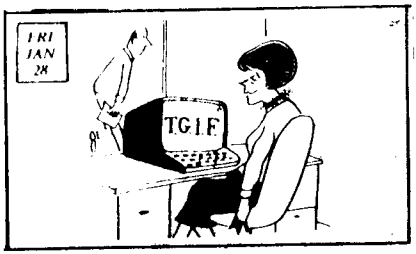


Figure 2. Cable capers; (a) a long cable can be represented as a set of inductors, capacitors and resistors; (b) their effect is to smooth out pulse waveforms, and this limits the speed of transmission of information.

Diagrams referred to in article on Charles Wheatstone.



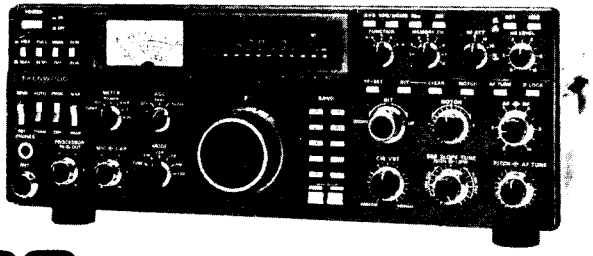
THIS IS AN AMATEUR RADIO STATION

IT IS LICENCED BY THE DEPT. OF TELECOMMUNICATIONS. I HAD TO LEARN THE MORSE CODE AND A LOT OF ELECTRONIC THEORY TO BE ABLE TO OPERATE IT LEGALLY. IN THIS STATION IT IS POSSIBLE TO TRANSMIT AND RECEIVE SIGNALS ALL OVER OUR EARTH. I CAN HANDLE EMERGENCY AND PERSONAL COMMUNICATIONS AND CREATE GOOD WILL AND DIPLOMACY. I DID A LOT TO DO A LOT, SO DON'T GIVE ME ANY STATIC ABOUT HOW MESSY THIS PLACE IS.

LAUGH A LITTLE MORE.

Dieter: "I've got a new slimming belt: It's around my refrigerator so I can't open the door.

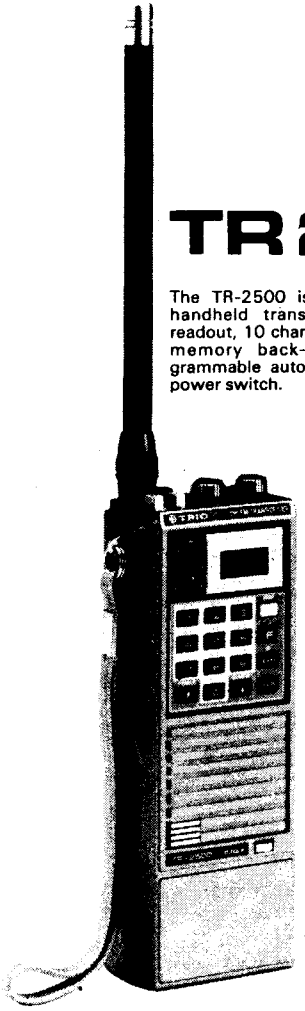
KENWOOD



Kenwood's TS-930S HF transceiver.

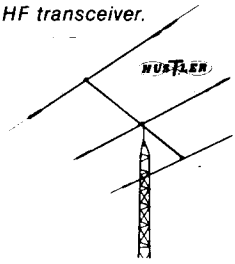
TR 2500

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan and Hi/Lo power switch.

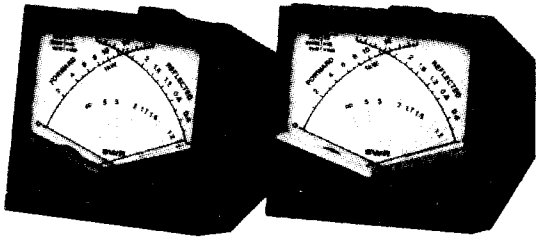


KENWOOD

hy-gain



DAIWA POWER METERS



CN540
50MHz · 150MHz

CN520
1.8MHz · 60MHz

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