APRIL 1980

THE PROPAGATOR

MONTHLY NEWSLETTER OF THE ILLAWARRA AMATEUR RADIO SOCIETY

P.O. BOX 1838 WOLLONGONG N.S.W. 2500

PRESIDENT
Keith Curle, VK2OB
24 Beach Drive
Woonona 2517

SECRETARY
John Doherty, VK2NHA
7 Risley Road
Figtree 2525

EDITOR
Brian Wade, VK2AXI
72 Murray Road
Corrimal 2518

MONTHLY MEETING - Second Monday of each month, 7.30 p.m., at the Congregational Hall, Coombe Street, Wollongong.

CLUB STATION - VK2AMW

CLUB REPEATERS - VK2RAW, Channel 5, 2 metres
VK2RUW, Channel 1, 70 centimetres.

MONTHLY BROADCAST - 7.15 p.m. on the Sunday preceding the meeting night.
Broadcast frequencies are:
Repeater Channel 5 (or simplex channel 40)
UHF repeater Channel 1
28.460 MHz USB.

CLUB NETS - 6 metres 8.30 a.m. Sundays - 52.525 MHz FM
10 metres 8.00 p.m. Sundays - 28.460 MHz USB

This month's meeting == Monday 14th April

The meeting will feature a trade display by Dick Smith's Wollongong Store.

Thanks to Peter Harding of Dick Smith's Wollongong store for a donation of three 27 MHz Handheld Tranceivers and two books - Orr's book on Wire Aerials and Dick Smith's book on Amateur Radio.

THE ANNUAL GENERAL MEETING held on 10th March 1980 attracted a good attendanc of about 60, in spite of the petrol strike. District Radio Inspector John Milton spoke about WARC 79, giving some interesting insights into the pressures on spectrum space brought about by national interests, multiplicity of services, and changing technology.

Office bearers elected at the meeting for 1980 are:

President -	Keith Curle, VK2OB
Vice President -	Denis McKay, VK2VDM/YPI
Secretary -	John Doherty, VK2NHA
Treasurer -	Geoff Cuthbert, VK2ZHU
Committee Members	Gio Donk, VK2VPD
	Ron Dorin, VK2VOE
	Les Kirchmajer VK2ALK
	Dave Meyers
	Ian Squires, VK2DKS
	Brian Wade, VK2AXI
	Keiran Kennedy, VK2DAN

NEW CALLSIGNS:

Congratulations to all those who have recently gained callsigns, or who have upgraded. Some new calls are Ian VK2DKS; Mike VK2VXS; Morry VK2VVN; Rex VK2VVI; Harry VK2VVZ; Ian VK2VXN; John VK2VWT; Grant VK2VUM.

NEXT MONTH'S MEETING (12th May):

It is hoped to run a 10 metre pedestrian sniffer hunt at this meeting, so brush the dust off the 10 metre portable equipment. A design for a simple 10 metre (or 2 metre) sniffer is presented in this issue of the "Propagator".

AMATEUR RADIO CLASSES:

The classes at Wollongong Technical College are off to another good start this year, with 40 enrolments in the Novice Class and 20 in the Full Class. Denis McKay VK2VDM is running the Novice group, and Keith Curle VK2OB the full group. Classes run on Friday night from 6 to 9 p.m., and anyone interested in joining should contact Denis or Keith.

NAME TAGS:

With the increase in membership, and all the new callsigns, name-tags at meetings are needed more than ever. (How many times have you sat next to someone you know well by voice and callsign, but can't recognise on sight?) It is intended to have a boxful of nametags at each future meeting - pick out your tag when you arrive, and return it when you leave.

I.A.R.S. SUBSCRIPTIONS FOR 1980:

Subscriptions are now due, so if you haven't already paid, please fill in the form below and post it with $5, or bring it to the next meeting.

SUBSCRIPTION TO THE ILLAWARRA AMATEUR RADIO CLUB

Attached is $5.00 in payment for membership for the period April 1980 to March 1981.

NAME: .....

ADDRESS: .....

.....

CALL SIGN IF ANY: .....

WIA MEMBER: .....

WANT QSL CARDS AT MEETING: .....

Please send to: The Honorary Treasurer,
Illawarra Amateur Radio Club,
PO Box 1838,
WOLLONGONG NSW 2500

SILENT KEY

It is with great regret that the death of Kazimierz Skulimowski, VK2NUP, is recorded.

Kaz joined the technical college novice class in 1977. In 1978, at age 70, he obtained his amateur licence, culminating an interest in radio which extended back to his experiments with crystal sets during his early years in Poland. His other great interest was his violin repair business, which was growing so rapidly that he had to defer plans to study for his full licence.

His determination and quiet cheerfulness will be missed by all those who knew him.

- Brian VK2AXI

MID SOUTH COAST RADIO CLUB MEETING -

The next meeting of the Mid South Coast Radio Club is on Saturday 19th April, on the property of Frank VK2HQ at Milton, starting at 10 a.m. Ask for directions on Repeater Channel 2. Barbecue facilities, tea and coffee are provided, but bring your own food. The annual general meeting will start at 2 p.m.

BITS AND PIECES...

The road accident rate has increased around Woonona recently, since motorists have been staring at president Keith's full size four element 20 metre quad instead of watching the road!

Rick VK2DAP has a homebrew HF vertical with plenty of radials already set up at his new QTH.

Hank VK2BHL, Les VK2ALK and his XYL Lyndell carried off some of the prizes at the Liverpool Field Day - well done.

Gio VK2VPD is getting a radio club started at Warilla High School, and John Thurstun is continuing the successful Bulli High radio club.

The Committee is hoping to establish a RFI/TVI group which can pool the experiences, knowledge, and resources of club members in order to provide practical assistance to local amateurs with RFI/TVI problems.

W.I.A. INFORMATION:

See Geoff Cuthbert, VK2ZHU for information, membership forms, etc.

I.A.R.S. STORE:

The store operates on meeting nights - plenty of good buys, especially with some of Geoffs recent "specials" - get most of your sniffer bits at the next meeting!

WANTED - WANTED - WANTED -

Articles, circuits, anything - are wanted for the "Propagator".

Remember also that "For Sale" and "Wanted" advertisements in the "Propagator" are a free service for members.

Have your articles, adverts, etc. ready for the editor at the next meeting... please?

YOUR FACE IS PERFECT FOR TELEVISION, DEAR - 625 LINES!

SATELLITE TV...

Several U.S. electronics companies are already selling earth stations, for private use, for reception of TV programs from the U.S. domestic relay satellites. Prices range from $15,000 for a 3-metre dish completely installed, to $4,000 for a do-it-yourself package. Nippon Electric says it could offer half-metre home stations for $300 to $500.

..."Radio-Electronics", December 1979.

Moonbounce Report - April 1980.

More discussion with University re move of the dish.

An interesting transistor (free sample) arrived in the mail recently, The enclosed Spec. sheet indicates transistor noise figures like 2.0db. at 4000MHz and 3.3db. at 8000MHz. A circuit diagram and construction info. was provided for a 432MHz preamp. with a measured noise figure of 0.6db. Construction of preamp. is now under way.

Radiotelescope Project.

Radiometer receiver postdetection circuit is now giving pretty pictures on the CRO, tests and adjustments continue.

Some MRF904 transistors , as mentioned in last month's Propagator, are now on order for the 30MHz wideband IF preamplifier.

The receiver is now to operate at an input frequency of 1290 to 1300MHz. The RF preamp.(approx. 2.8db noise figure) and converter to 25-30MHz are operational. A 23cm disc feed system for parabolic reflector is now operational. A small dish for initial experiments at the home QTH, is now available . Antenna gain should be about 22db.

Microwave News.

More 3cm tests will be arranged with VK2YCN after his return from trip to England, later this month.

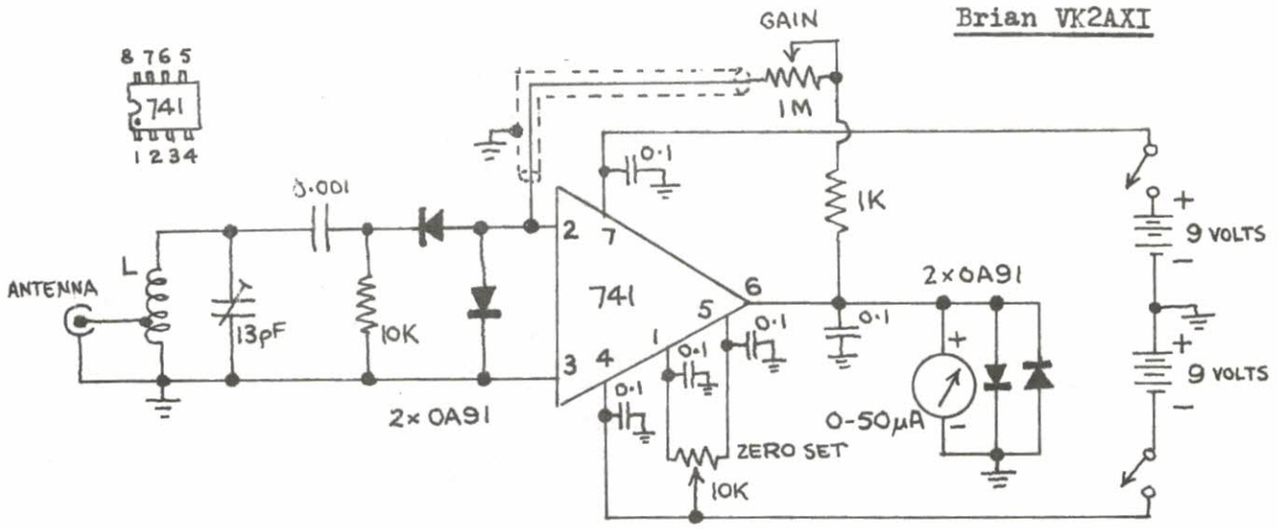
Lyle VK2ALU.

Who is the TV technician who rents TVs out in the Northern Suburbs and complains that amateur aerials in the district are causing his sets to misbehave ?? Thanks a lot, we can do with assistance!! However I would suggest that you rent sets that are not so susceptible to RFI.

- Northern Suburbs Pyeater.

SIMPLE SNIFFER FOR 2 OR 10 METRES

Brian VK2AXI



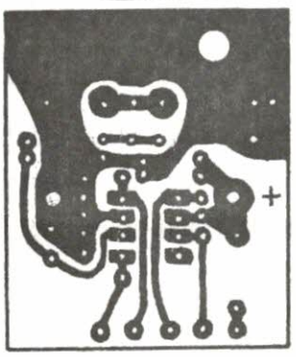
Coil L: For 2 metres - 5 turns, 22 SWG, 5/16 inch diameter and 1/2 inch long, tapped at two turns from the earthy end.

For 10 metres - 35 turns, 32 SWG, close wound on a 5 mm coil former with a ferrite slug, and tapped at 7 turns from the earthy end.

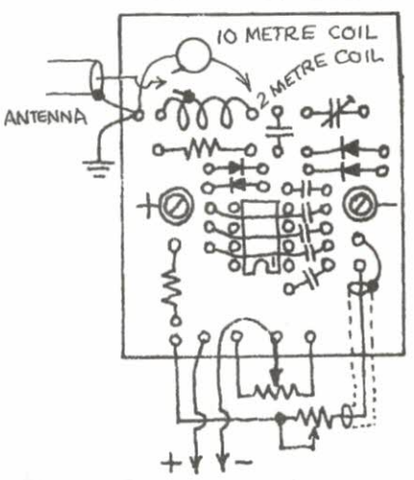
Parts: The only expensive item is the 0-50 microamp meter. If you already own a multimeter with a 50 microamp scale, the circuit can be made up to plug into the meter.

Construction: The printed circuit pattern shown can be mounted directly on the back of a normal 5 cm square meter. The lead from pin 2 of the I.C. to the 1M potentiometer should be shielded to prevent feedback. To keep leads short and layout simple, the 0.1 uF bypass capacitors at pins 1, 4, 5, 6 and 7 are mounted <u>over</u> the I.C. Generally keep all leads as short as possible.

There is space on the board to mount both the 2 metre and 10 metre coils; bandchanging can be done by either resoldering connections, or using a switch with <u>very short</u> leads.



10M & 2M SNIFFER
P.C. BOARD
COPPER PATTERN



LAYOUT FROM ABOVE

Adjustments: With the 1M and 10K pots centred, switch on. Adjust the 10K pot to produce a zero reading on the meter. At high gains, the zero reading drifts with temperature.

Using the signal from a nearby 2 or 10 metre transmitter, adjust the 13 pF trimmer (and the slug in the coil for 10 metres) to obtain maximum meter deflection.

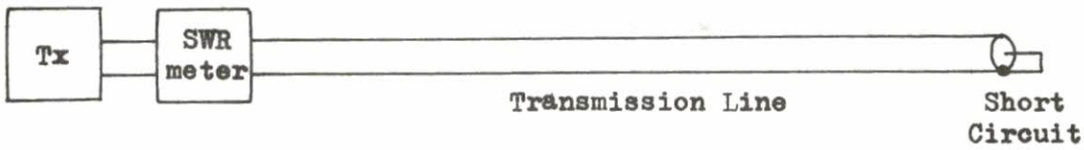
The amplifier gain is controlled by the 1M pot, with maximum gain being obtained with maximum resistance. The diodes across the meter prevent it being "slammed" too hard. The sniffer should typically detect a 2 watt transmitter at about 200 feet.

MEASURING LOSSES IN TRANSMISSION LINES

Bruce Carroll, VK2DEQ, from "Tuned-In", the newsletter of the Orange and District Amateur Radio Society.

A simple method is described which allows one to measure the loss in a transmission line at any frequency of interest. This is useful when data is not available or when the cable has been in service for some time and the data sheets may not be reliable.

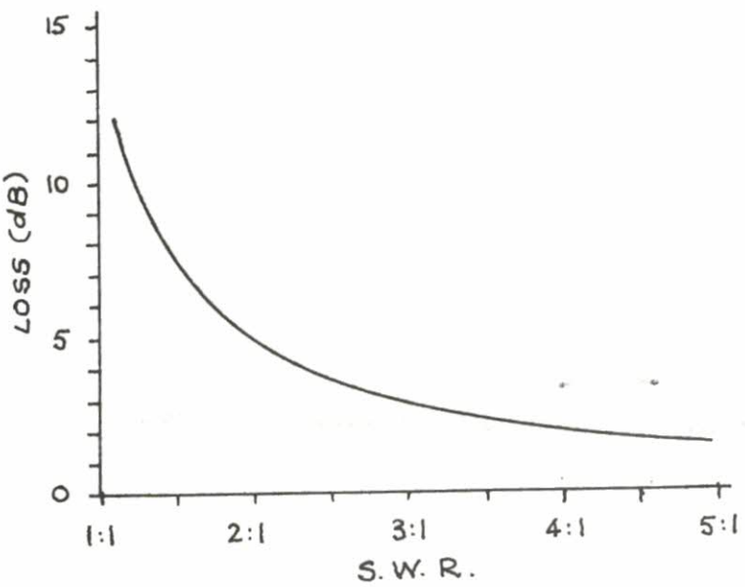
The losses can be measured by using an SWR meter in the line near the transmitter and connecting a short circuit at the other end of the line. For a lossless line all the incident power would be reflected by the short circuit and the SWR would be infinite. However, for a practical line (with some losses) the incident power decreases as the wave travels along the line towards the short circuit and the reflected power further decreases as the wave travels back to the transmitter.



The loss in the line (in dB) is given by -

$$\text{LOSS (dB)} = 10 \log \frac{(\text{SWR} + 1)}{(\text{SWR} - 1)}$$

To conserve the battery in your calculator, the graph below can be used to find the loss for various measured values of SWR, as also can the table.



SWR	LOSS (dB)
1:1	∞
1.5:1	7.0
2:1	4.8
2.5:1	3.7
3:1	3.0
3.5:1	2.6
4:1	2.2
4.5:1	2.0
5:1	1.8

Do not despair if you find that a length of cable from the junk box has a high loss. Such lengths of cable make good "dummy loads", especially at VHF and UHF where non-inductive loads are difficult to find and even short lengths of cable may have large losses. Consider, for example, a length of 50 ohm coax with a loss of 10 dB. If this was terminated with a 2 watt carbon resistor, it would make an ideal load good for more than 20 watts.

WANTED TO BUY: Electronic morse keyer and paddle.
Contact John Thurstun, VK2DET, Phone 833509.

MACELEC PTY. LIMITED

99 Kenny Street (P.O. Box 1375)
Wollongong. 2500. Phone : (042) 29 1455

PROFESSIONAL & INDUSTRIAL ELECTRONICS

AMATEUR RADIO PRICE LIST

KENWOOD

TS120S	80-10 Metre Transceiver 100 watt	$725.00
TS120V	As above 10 watt	$550.00
PS20	Power Supply For 120V	$ 85.00
PS30	Power Supply For 120S 20amp	$205.00
R1000	General Coverage Digital Receiver	$498.00
SP100	Speaker For R1000	$ 44.00
AT200	Antenna Tuner - SWR - Pwr Meter	$160.00
SP520	Extension Speaker	$ 33.00
MA5	80-10 Metre Mobile Helical System	$ 99.00
HS5	Deluxe Headphones	$ 33.00
MC35S	50K Noise Cancelling Microphone	$ 26.00
MC501C	Economy Base Microphone 50K	$ 29.00
HC10	Digital-Programmable World Ham Clock	$ 95.00
TR2400	Digital L.C.D. 2 Metre Transceiver Hand Held	$342.00

ICOM

DAIWA

LEADER

LEADER	Model LPM880 R.F. Power Meter-Dummy Load 1.8 - 500 MHZ 120 watt	$139.00
LEADER	T.R. Dip Meter 1.5 - 250 MHZ	$ 89.00
DAIWA	Automatic Antenna Tuner	$269.00
DAIWA	DR7500R Rotator with World Map Centred On Australia	$189.00

We Also Stock A Wide Range Of
Professional Test Equipment, And
Amateur Products Not Listed Here.

Power A-Plenty

—for Pennies!

BY JAMES F. VAN DETTA,* WA2FQZ

IN READING through the current ham literature (as those writer fellows always seem to say), one quickly perceives an anguished air of doom over the seemingly unbearable paradox of an increasing number of hams and a decreasing spectrum of reliable radio frequencies due to the declining sunspot cycle. In response to the forlorn crepe-hangers, one may aptly quote the old Greek philosopher who wisely observed: "In times of adversity, the woodpecker gets results because he uses his head!" So, hams should *think!* And try to contribute more to ham radio than key clicks, QRM, and splatter! After a great deal of diligent effort and personal sacrifice, I believe I have come up with a refreshingly new device that will prove revolutionary to ham radio. But you be the judge. . . .

In thinking about the problem of crowded bands, I began, logically, by trying to think of a practical solution. While mulling over possible remedies, I happened to recall a fascinating article that I had read some time ago, by the eminent Japanese physicist Dr. Aisu Kuriimu (whose father-in-law, by the way, is the famous Japanese scientist who invented and gave his name to a widely used type of single-channel TV antenna). The fact that Dr. Kuriimu's article was written in the Japanese language probably accounts for his work being unfamiliar to the general public in this country.

Amazing Research on Boulter's Principle

Writing in the journal of the Izo-Chunko University at Tokyo, Dr. Kuriimu presented the results of his painstaking research on the application of Boulter's principle to electromagnetic radiation phenomena.[1] Even though his research dealt mainly with wavelengths on the order of .000001 microns, there are extremely important implications for hams. In case you have forgotten your high school physics, look at Fig. 1, which presents a simple graphic illustration of Boulter's Principle.

Simply stated, Boulter's Principle holds that a compression or squeezing effect takes place when a radio-frequency signal moves from a larger to a smaller conductor. Naturally, this compression increases the pressure under which the electron drift flows. Electromotive pressure is more commonly called "voltage," and when you increase the voltage, other factors being constant, you increase the power. The experimental work done by Dr. Kuriimu seems to indicate that the voltage increase is logarithmic. That is, the voltage does not increase just a few times, but rather exhibits the fantastic increase of 4164×10^{10} times (i.e., $4164 \times 10{,}000{,}000{,}000$)!

"If only a sample 'accelerator' could be found to harness this logarithmic increase for ham use!" I mused, after reading Dr. Kuriimu's article.

As I took out my slide rule and my trusty old copy of *Philosophiae Naturalis Principia Mathematica*,[2] I vowed that the accelerator I would try to devise for ham use must meet certain criteria:

1) It must be very simple and foolproof to construct.
2) It must be very inexpensive.
3) It must be very effective.

With these goals in mind, I set to work.

Working in a new area with unknown parameters can be a frustrating and discouraging experience. At times, success seemed very imminent, only to be snatched away when some new and unpredictably variable factor reared its ugly head. But after all the designing, all the computing, all the construction, all the experimenting, all the synthesizing, and all the testing were finished, the joy of complete success was well worth the trials and tribulations.

A Magic Formula is Revealed

My work revealed that if you add a certain critical size and length of wire on the antenna side of your antenna tuner or transmitter, the extra wire will function perfectly as a signal "accelerator." You get a tremendous increase in e.r.p. (effective radiated power) for only a few pennies' worth of wire! The formula for finding the extra length of wire to be added is

$$L(\text{ft.}) = [(P+S) - (VC-S)] \times \frac{1}{28} - 1$$

where L = length in feet of extra wire to be added
P = power of transmitter in watts
V = voltage used to obtain P
C = current in amperes used to obtain P
S = size of wire — must be *at least* 4 sizes larger and *not more than* 64 sizes larger than the transmission line.

As with all great discoveries, this formula seems so simple and obvious — after someone discovers it! The computations in the formula are quite easy. P is the highest power, in watts, that your transmitter operates. To put down the voltage (V) and the current (C) to show how you got this power may seem unnecessary, but remember that 1000 watts might be 2000 volts at 500 ma., or 4000 volts at 250 ma. Notice that the size of the wire added must be between 4 and 64 sizes larger than the transmission line conductors if best results are to be secured. Fig. 2 shows typical installations for both coaxial and Twin-Lead lines.

When you figure the length from the formula, the answer you get should be between .41 and .64 feet. If the answer you get is *not* in this range, you may be sure you have made an error somewhere in your computations. Go back and refigure the formula (or, better yet, have someone refigure it for you). If you do not figure the formula correctly, all of your effort will have been for nothing.

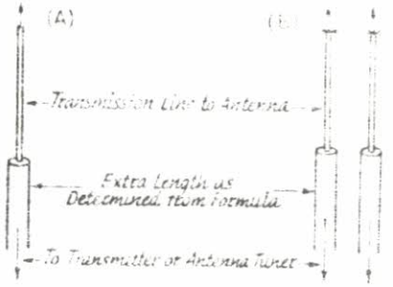


Fig. 2—Typical installations for coaxial and Twin-Lead transmission lines.

No Worries

Since the current does not increase, you need not worry about your present transmission line going up in a puff of smoke after you have installed your new accelerator. The s.w.r. on the line will not change and your transmitter will tune up the same as before. Incidentally, you need not worry about the FCC, because their regulations limit only the plate input power of the transmitter's final stage. Your input is as legal as ever; you are simply (and legally) increasing your *output*.

In Conclusion

You will probably be hearing quite a bit in the future about this new device. Therefore, as adapted for ham use, I have called this process "Logarithmic Increase of Radiated Power by Acceleration," which gives us the pleasant acronym (from the underlined initials) of LIRPA. Since this is the first model for ham use, let's refer to it (like they do those earth satellites) as LIRPA I.

Let me say that I am mighty proud to have been able to contribute another first for ham radio. I am very happy to be a part, however small, of the great ham tradition of fellowship and fun.

The very best of luck to you on this fine LIRPA I! QST

– 1st April, 1980

[1] Kuriimu, "Parametric Considerations in Designing Logarithmic Intensification Accelerators," *I.C.U. Journal*, January 1964. (Available only in the Japanese language edition.)

[2] This fine book contains a large section on acceleration and forces. Every ham should read it! Most libraries have the English language edition as well as the Latin edition.

* P.O. Box 357, Schoharie, New York.

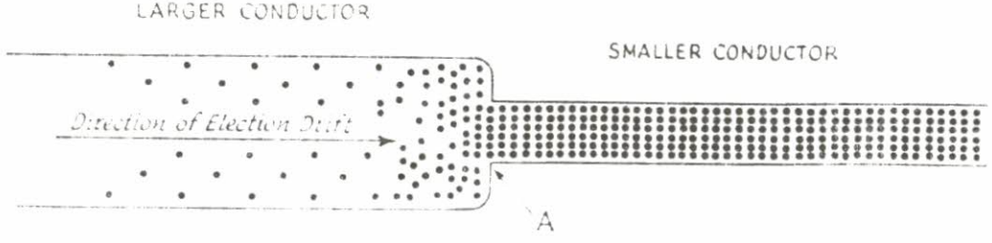


Fig. 1 — Boulter's Principle as applied to electromagnetic radiation phenomena by Dr. Kuriimu. Dots represent electrons. The heavier dot density at "A" shows the compression that takes place as the electron drift is squeezed into a smaller conductor, producing increased electromotive pressure.

ANNOUNCING A NEW COMMUNICATIONS COMPUTER!

TONO

THETA 7000E

NEW IMPROVED MODEL FEATURING STACKS OF EXTRA TRICKS!

The new Theta 7000E has all the features of the popular 0-7000, plus a lot more! Now every Amateur can enjoy the visual display of CW, RTTY, and ASC11 in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching receiver-sent or from recorded cassettes.

SOME OF THE OUTSTANDING FEATURES:

COMMUNICATIONS COMPUTER THETA 0-7000

Due to the most up-to-date computer technology, just one piece of equipment can now handle both transmitting and receiving in CW, RTTY and ASC11.

VHF and Composite video output provided:
Both home TV set and video monitor outputs are provided for display purposes.

Printer interface.
Centronics. Compatible interface enables easy connection of a low-cost dot printer for hard copies.

Wide range of transmitting and receiving speeds.
10 communication speeds for transmitting (with automatic CW speed adjustment on receive) and 8 communication speeds for transmitting and receiving in RTTY and ASC11. The multiple speed feature makes the Theta-7000E ideal for Amateur, business and commercial use.

Built-in demodulator for high performance.
Three-step shift (either 170Hz, 425Hz, 850Hz) can be obtained in High Tone and Low Tone by the switch. Manual adjustment is available by FINE TUNING control.

Crystal controlled modulator.
A transceiver without AFSK function can transmit in RTTY mode by utilising the high stability crystal-controlled modulator controlled by the computer.

Convenient ASC11 key arrangement.
The keyboard layout is the same as a regular typewriter and automatic insertion of LTR/FIG code makes operation a breeze.

Large capacity display memory.
The two-page display memory contains 32 characters x 16 lines per page. Page selection is operated via the keyboard.

Split-screen.
With a keyboard command, the same page can be divided in two; the upper half for transmit and the lower half for receive. Sentences can be edited whilst receiving.

Automatic Transmit/Receive switch.
The transmit/receive switch is controlled by the microprocessor. (Manual operation is also available). Built-in remote control key function controls the transmit/receive switch of the transceiver.

Anti-noise circuit.
A new anti-noise circuit prevents garbled messages when there is no signal.

Battery backed-up memory
Data in the battery backed-up memory is retained when the external power source is removed. The Theta-7000E has provision for 64 characters x 7 channels in the non-volatile memory. Data in this memory can be repeated 1-9 times from a keyboard instruction. Every channel can read out continuously. The channel number in use is displayed on the screen.

SEND function
The SEND function sends the whole data displayed on the screen, including the stored data in channels, with an instruction from the keyboard. The message can be stopped and easily restarted.

Buffer memory.
A 53-character-buffer-memory is displayed on the 17th and 18th. lines on the screen. The characters move to the left erasing one by one as soon as they are transmitted. Data in the channels can be displayed in the buffer.

Rub out function.
Mistakes can be erased whilst the information is still in the buffer memory. If the mistake has already been sent correcting code will be transmitted.

Simultaneous access of the memory.
Whilst receiving, it is possible to write into the channel memory and the buffer memory from the keyboard. When sending from the channel memory or the screen it is possible to write into the buffer memory.

Pre-loading function.
The buffer memory can momentarily store data and release it on an instruction from the keyboard.

Channel No., Page No., and Case No.
Channel No., Page No., and Case (FIG/LTR) in RTTY are displayed in the 17th line of the screen.

CR (Carriage return)/LF (line feed) cancel function.
When receiving CR or LF, they are replaced by = (equal) and (underline) respectively for effective use of the screen.

Cursor control function.
Full cursor control (up/down — left/right) is available from the keyboard.

WORD MODE operation.
Characters can be transmitted by word groupings.

Automatic CR/LF
While sending, CR/LF are automatically inserted once every 72 (60 or 80) characters.

Echo function.
With a keyboard instruction, received data can be read and sent out at the same time. A cassette tape can be used as the source data.

WORD-WRAP-AROUND function.
In receive mode word-wrap-around prevents the last word of line from splitting in two.

Transmit/receive in ASSC11 mode in RTTY.
On instruction from the keyboard, the same AFSK signals as used in RTTY are transmitted in ASC11 mode.

CW Identification function.
Keyboard controlled CW identification is available if required.

MARK-AND-BREAK (SPACE-AND-BREAK) system.
Either mark or space tone can be used to copy RTTY.

Monitor circuit.
A built-in monitor circuit with an automatic transmit/receive switch enables checking of the transmitting and receiving state. In receive mode it is possible to check the output of the mark filter, the space filter and AGC amplifier prior to the filters.

CW practice function.
The Theta-7000E reads data from the key and displays the characters on the screen.

Variable CW weights.
For CW transmission, weights (ratio of dot to dash) can be changed within the limits of 1:3-1:6.

Cross-pattern checking output terminal.
Provision has been made for attachment of an oscilloscope to aid tuning. This supplements the tuning LED and audio monitor provided in the system.

Log-computer output provided.
The Theta-7000E has an output terminal for connection to a log-keeping computer.

Test message function.
"RY" and "QBF" test messages can be repeated with this function.

VICOM Back-up
Supported by VICOM 90 day warranty and technical service.

Distributed by:

VICOM

Available from VICOM dealers throughout Australia

MACELEC PTY. LTD.

Professional & Industrial Electronics

THE PROPAGATOR

Newsletter of the Illawarra
Amateur Radio Society

Registered for posting as a publication
CATEGORY B.

I.A.R.S
POSTAGE PAID
WOLLONGONG
N.S.W.
AUSTRALIA
2500

Mr R. Mc KNIGHT
14 IAN BRUCE CRES
BALGOWNIE
2519

I.A.R.S.,
P.O. Box 1838,
WOLLONGONG. N.S.W. 2500.