

# Q S X P E

## **ZS2PE**

### FREQUENCIES:

Bulletin	3640 Khz
	7098 Khz

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



*Port Elizabeth Branch of the  
South African Radio League*

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

8 APR 1982

PORT ELIZABETH BRANCH.

NOTICE OF MEETING.

THE NEXT MONTHLY MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE WILL BE HELD AT THE Y.M.C.A., HAVELOCK STREET ON FRIDAY 16th APRIL 1982, at 8 p.m.

x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x

AS YOU WILL HAVE DISCOVERED AT THE LAST MEETING, OUR GUEST SPEAKER, Mr. Garner, WAS UNABLE TO ATTEND.... HE WILL BE GIVING US A TALK AT THIS MONTH'S MEETING. PLEASE MAKE AN EFFORT TO ATTEND.

x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x

OUR CHAIRMAN WILL BE GIVING US A REPORT ON THE OUTCOME OF THE LEAGUE A.G.M. AT THE MONTHLY MEETING.

x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x

PERSONAL NEWS SNIPPETS FOR THE MONTH.

WEDDING BELLS: The bells will be ringing for two of our friends this month. OM Sel ZS6AXO (ex ZS2SS) and his fiancée Rietjie will be married on the 10th of April in Graaff Reinet, and Bill ZS1J will also trot up the aisle shortly. To you all, our heartiest congratulations and best wishes for the future.

NEW MEMBER: We welcome to the Branch OM Pete Smith, who is attending our technical classes, but will not be writing the exam until November as he will be out of town on the day of the May exam. Welcome Pete, and may your membership be long and fruitful.

NEW CALLSIGNS: This has been quite a month for callsign changes, the following having changed status:

OM Sam Hewitt (ex GI4MDO) whose ZS call we still do not know, and who has acquired a Kenwood TS-130 and will soon be on the air.

OM Athol Bruyns ex ZR2CN who is now ZS2CM and

OM Viv Moore ex ZR2CI who is now ZS2VM.

Congrats to you all, and gud DX.

FAREWELL: We are sorry to hear that we will be losing yet another local member in the person of Peter ZS2PS and family, who are moving to Durban at the end of this month. Peter has been offered a promotion with his saltmine. Peter, we wish you and Irene and the kids good luck and much happiness in the new job and new QTH. Peter will be staying on the Branch mailing list as a social member and will check in on our Sunday net.

BIRTHDAYS: Quite a month for birthdays too. We wish all those celebrating this month many happy returns. We have on record Mike ZS2MJ on the 5th, Peter ZS2PS on the 8th, Peter ZS2PD on the 13th, Gerrit van Wyk on the 14th, Allan ZS2AJ on the 17th, Wilf ZS2GR on the 18th, Dan van Gas on the 18th, Sam Hewitt on the 20th, and Trevor ZS2AE also on the 20th.

EASTER GREETINGS: We wish all our members a very happy Easter, and extend Passover greetings to all our Jewish members.

x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x

BULLETIN ROSTER.

April 18 Fred ZS2EQ (0422) 31419

April 25 Dick ZS2RS 322111

May 2 Brian ZS2AB } 30-3498

May 9 Marge ZS2OB }

PLEASE, PLEASE, PLEASE let the bulletin reader have ANY items of interest, even if you don't think they are important. Someone else might find them so. Thanks in anticipation.

x-x-x-x-x-x-x-x-x-x-x-x-x-x-x-x



MINUTES OF THE GENERAL MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE, HELD AT THE Y.M.C.A., HAVELOCK STREET, PORT ELIZABETH ON FRIDAY 19th MARCH, 1982.

PRESENT: 15 members and visitors.

APOLOGIES: ZS2AB, ZS2KX, ZS2LO, Langley Lookwhy and GI4MDO.

The Chairman extended a welcome to all present and especially to Attie Barnard ZR2DY and to Pete Smith who had recently become a member of the Branch and wished him a long and fruitful association with the Branch and the League.

MINUTES: The Minutes of the meeting held 19th February, 1982, having been published in QSX-PE and circulated, were taken as read, proposed by ZS2PS and seconded by ZS2MC.

ARISING: The Chairman said that the cards for the Ciskei operation had been received and were at the printers for over-printing and an evening or two would be required to get these filled in and sent out.

FINANCE: The Treasurer had nothing to report other than he had paid the cheque for the Grahamstown bus trip.

CORRES: 2 letter from Algoa Branch, which were read out.  
Copy of letter to Chloride thanking for the donation of a battery for Ladies Slipper repeater.  
Letter from Johannesburg Branch.  
Headquarters: Financial Statement  
Council Minutes.

ARISING: The Chairman said that thanks were due to Fred ZS2EQ for his help in obtaining the donation of the battery.

GENERAL: The Chairman expressed his regret at not being able to attend the gathering in Grahamstown but said that, from all accounts, it had been an enjoyable and successful outing.  
Congratulations were extended to Athol ZR2CN who had passed his cw test and now had the call of ZS2CM.  
Sam Hewitt ex GI4DMO had also received his ZS2 call.  
Members were reminded of the communications for the Veteran Car Club Rally at the beginning of May.  
The Chairman said that he was sorry to hear that Peter ZS2PS was leaving Port Elizabeth at the end of April, but wished him and his family success with his promotion to Durban and trusted that they would settle down soon. Peter said that he had enjoyed being a member of the Branch and would continue as a social member and would join in on the net on Sundays.  
The Chairman thanked Brian and Marge ZS2AB/OB for the issue of QSX-PE.  
Dick then told the members briefly of his trip to the operational area.

There being no further business, the meeting was closed and tea was taken. Thereafter, 2 films were shown.

sgd:  
R.W. Schönborn ZS2RS  
Chairman

sgd:  
M.T. Weller ZS2OB  
Secretary

# TWO-METER ANTENNAS - FACTS AND FABLES - the truth about omnidirectional antennas on two. Continued.

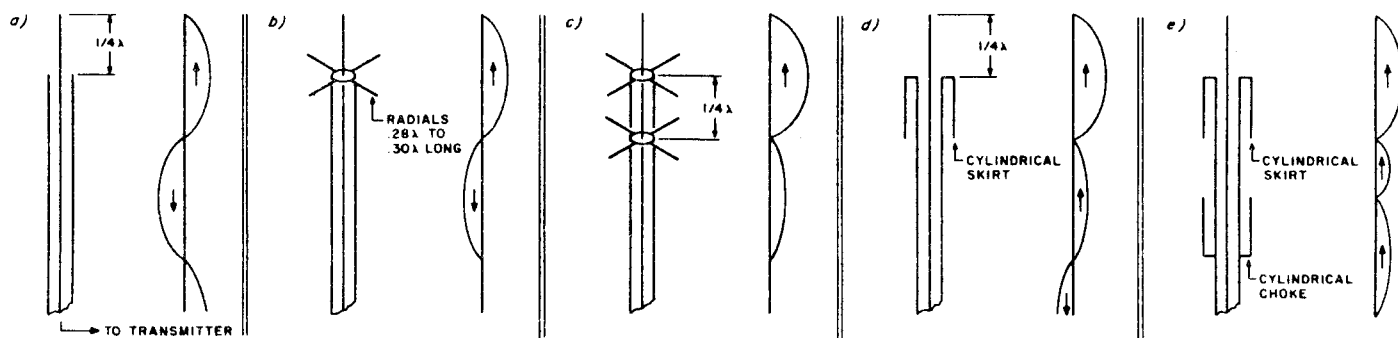


Fig. 7. Configurations and current distributions for several different vertical antennas. (a) Without ground plane. Outer conductor of coax provides radiating return path for rf. (b) With  $1/4\lambda$  ground plane. Note current  $1/4\lambda$  below ground plane is mostly in image. (c) With two ground planes, one  $1/4\lambda$  below the other, providing excellent isolation of feedline radiation. (d) Coaxial  $1/2\lambda$  dipole. (e) Coaxial  $1/2\lambda$  dipole with choke to isolate the antenna from the mast.

Now, one can also erect a vertical dipole and consider the  $0^\circ$ - $180^\circ$  line as the horizon and reconsider the patterns in Fig. 4. It should be clear that the  $1-1/4\lambda$  dipole puts more energy on the horizon than the other length vertical dipoles. Maximum lobes on the horizon are generally assumed to be the most desirable for both DX and VHF communications. The  $1-1/4\lambda$  dipole has a typical measured gain of 3 dB over a  $1/2\lambda$  dipole.

Now let's look at the classical description of a monopole or single-element vertical. A single vertical radiator must have a path through which the antenna return currents can flow, so a monopole is usually described with respect to an infinite, perfectly-conductive sheet or ground plane. See Fig. 5, top left. The ground plane carries the other half of the antenna current and mirrors the monopole (Fig. 5, top right), creating a virtual dipole across the ground plane. The radiation pattern is precisely one half of the pattern of the dipole whose

leg length is the same as the length of the monopole as in Fig. 5, center. Thus, the  $1/4\lambda$  monopole has the upper (or lower)  $1/2$  of the radiation pattern of a  $1/2\lambda$  dipole.

All this is well and good, but how many infinite, perfectly-conductive sheets are there and what happens if the sheet is not infinite or not perfectly conducting? There have been no reports, to my knowledge, of the discovery of an infinite, perfectly-conductive sheet, so let's examine what happens if the ground plane is merely some finite, physically-realizable size. Interestingly, the size of the conductive sheet has little effect on the impedance of the antenna but has a significant effect on the radiation pattern. As the size of the ground plane gets smaller, the mirror for the monopole gets "cloudy" and the reflection of the image diminishes. The result is a higher angle of maximum radiation than that supplied by an infinite ground plane as shown in Fig. 6 for a  $1/4\lambda$  monopole over a  $6\lambda$ -diameter conductive sheet.

This provides the first

clue to the poor performance of the  $5/8\lambda$  antenna over a  $1/4\lambda$  set of radials. It also raises some questions concerning the use of an auto body as the ground plane for any antenna on bands below 1296 MHz. In fact, the pattern and gain for any auto antenna needing a ground plane is very unpredictable—you get what you get! There are auto antennas which do not use the auto body as a ground plane which do provide predictable radiation patterns and gains for VHF use. On the other hand, a ground-mounted antenna over a large number of buried radials is indeed a reasonable approximation to an ideal monopole over an infinite ground plane, but ground losses can reduce the performance over that of a dipole if the ground is lossy and/or there is an insufficient number of radials.

AM broadcast stations use ground-mounted vertical antennas very effectively with ground systems of at least 120 wires at least  $1/4\lambda$  long buried radially from the base of the antenna and connected to the shield of the coaxial feedline at the base of the monopole. The larger the number and the longer the length of the radials, the lower the ground system resistance and hence the lower the ground losses. The resistance of a good ground system is

about 2 Ohms which, for an antenna whose radiation resistance is about 40 Ohms, is not an insignificant loss. So, if your trap vertical sitting in your back yard isn't getting out as well as you would like, try adding more and/or longer radials where the trade-off is usually for more rather than longer. Better yet, put it on the roof as high as possible to reduce ground losses and do better on the high frequencies as well.

For VHF, say 2 meters, we all know that the height of the antenna is very important (although it has been my experience that on all bands above 160 meters the height of the antenna is more important than any other single parameter) so we prefer to mount our antennas on tops of buildings, towers, poles, trees, etc., to get them as high as we can. One could mount a vertical radiating element on the end of the feedline as in Fig. 7 and depend on the mounting structure and feedline for the ground return. This kind of an antenna will work, but its performance is unpredictable since it depends on the lengths and positions of both the feedline and mounting structure for the radiation pattern it provides. This is because the feedline and mounting structure carry the radiating ground-return currents.

A typical current distribution on the outside of the

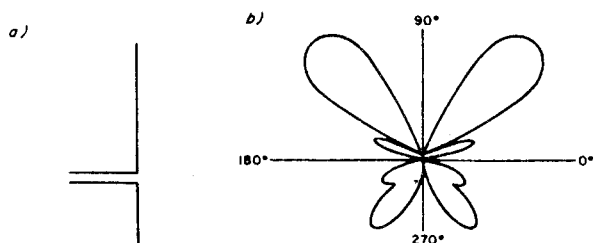


Fig. 8. Asymmetrical dipole and typical radiation pattern.

coax feedline is also shown in Fig. 7. Note that the phase of the current on the outside of the coax reverses at  $1/4\lambda$  below the top element. This will tend to cancel the effect of the top half wave of the antenna and distort the pattern from that of either the ideal vertical or a dipole in free space. The conductive sheet or mirror can be simulated by wires extending horizontally from the base.

The concept of a mirror formed by wires can be understood easily by first considering a vertical  $1/4\lambda$  element with a single  $1/4\lambda$  radial. This forms a bent dipole, a rotated inverted vee, with both horizontal and vertical polarization. If we distribute three or more radials symmetrically about the base of the vertical element, the horizontal components of the radiation from the ground plane will cancel leaving only the vertical component of the radiation. The ground plane performs two key functions. It forms a mirror for the vertical radiating element and provides some isolation of the outside of the feedline from the radiating currents.

Typically, four radial wires slightly greater than  $1/4\lambda$  long form the ground plane, as in Fig. 7(b). Also, the radials are often bent down to pull the radiation pattern more towards the horizon, as in Fig. 1. This also raises the impedance a bit closer to 50 Ohms. A properly adjusted vertical ground-plane antenna looks very much like a  $1/2\lambda$  dipole with respect to its radiation pattern and gain—approximately 0.1 dB less. A further refinement of the ground-plane antenna, shown in Fig. 7(c), places an additional ground plane  $1/4\lambda$  below the first one to act as a choke, which improves the radiation pattern by further reducing the current on the outside of the feedline. A

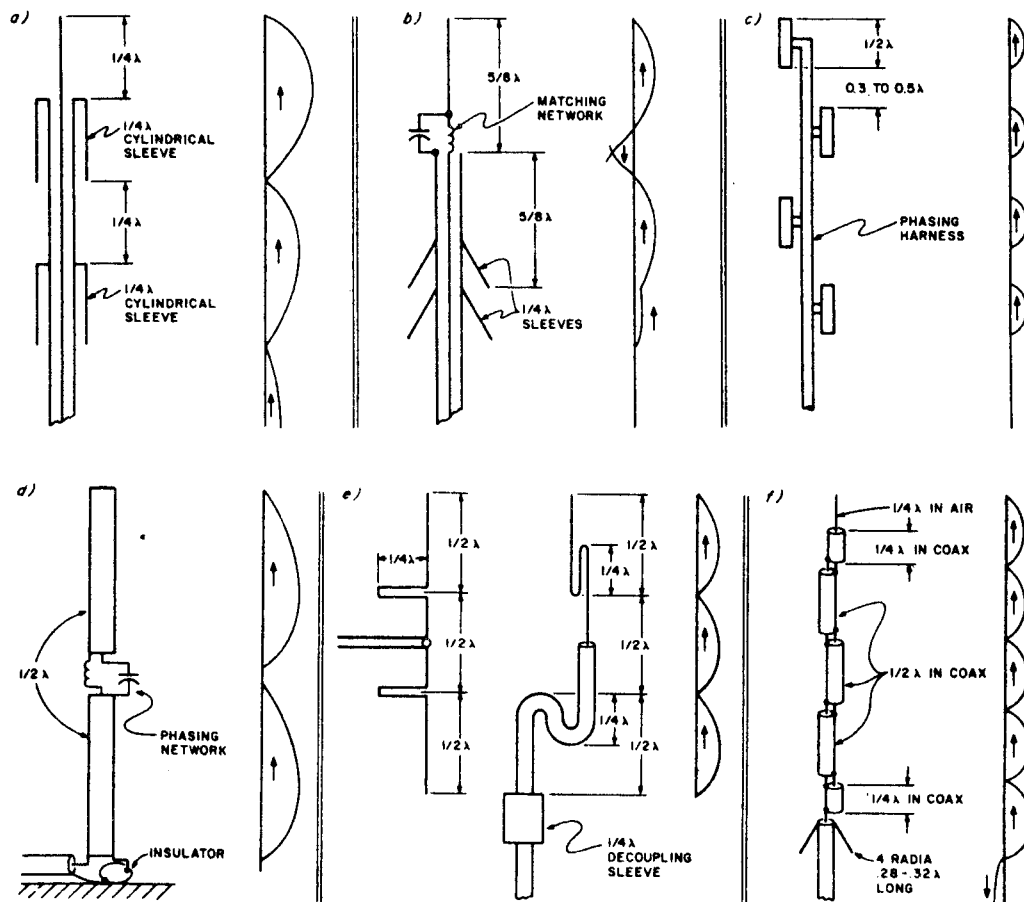


Fig. 9. Several omnidirectional vertical gain antennas and their current distributions. Arrows show phase of current; antennas with the most current in phase have the highest gain. (a) Skirted, to phase feedline currents to form a collinear antenna—1-2 dBD. (b) Isopole, using sleeves to phase feedline currents to form  $1-1/4\lambda$  dipole and to isolate it from the mast and feedline—3 dBD. (c) Four collinear folded  $1/2\lambda$  dipoles fed with a phasing harness. Four elements provide 6 dBD omnidirectionally and 9 dBD unidirectionally. (d) Ground-mounted collinear. The  $1/2\lambda$  sections are insulated from both ground and each other. An LC network provides the phase shift needed to get currents in phase in the two sections—2 dBD. (e) Franklin antenna—dipole and coaxial versions. The  $1/2\lambda$  stubs provide the phasing for current in adjacent sections. Three sections above—3 dBD. (f) Coaxial collinear uses sections of coax arranged so that the radiation from the outside of the coax is properly phased. Gain is proportional to the number of  $1/2\lambda$  sections. Eight  $1/2\lambda$  sections—6 dBD.

similar result can be obtained by using  $1/4\lambda$  sleeves instead of a ground plane, as shown in Figs. 7(d) and 7(e) to create a coaxial or sleeve antenna.

The outside of the sleeve acts as a conductor for the return signal while the inside is a shorted  $1/4\lambda$  transmission line with a high impedance at the open end. The current distribution for both the ground-plane and sleeve antennas is identical to that for the vertical dipole. If one mounts a longer vertical element such as a  $5/8\lambda$  on the  $1/4\lambda$  ground plane or  $1/4\lambda$  sleeve, then we have an asymmetrical

dipole equivalent which has a pattern with multiple high-angle major lobes as shown in Fig. 8. This antenna does not work well to the horizon and we have the truth—the end of our fable. Then how do we get the 3-dB theoretical gain from a  $5/8\lambda$  antenna? We probably do get it but in a direction above the horizon which doesn't do much good. Then how do we get the signal where it does do some good?

First, we know that we get 3-dB gain over a  $1/2\lambda$  dipole with a  $1-1/4\lambda$  dipole, so a vertical dipole which is  $1-1/4\lambda$  long will do it in a di-

rection which gets out where we want it. An equivalent can also be obtained by using an appropriate ground plane which properly mirrors the radiator. For example, ground-mounting a  $5/8\lambda$  element over ground with high conductivity as well as a good ground radial system is one way. A ground plane with  $5/8\lambda$  radials will also provide the 3-dB gain. Another approach, taken by AEA with their Isopole™, uses a  $1-1/4\lambda$  sleeve dipole with a second isolation sleeve, as illustrated in Fig. 9(b).

To be continued

COMMUNICATIONS MICROPHONES

With acknowledgements to "Shack News", Highveld Branch Dec.1981

In some respects, this mike acts as a dynamic loudspeaker in reverse, operating on the principle that when a moving wire cuts a magnetic field, electrical energy is produced. A light-weight coil of wire is attached to the diaphragm and a magnet is placed so that the coil is within its energy field. Sound waves striking the diaphragm make the wire coil vibrate in the magnetic field, resulting in an electrical output that exactly corresponds with the sound waves.

Dynamic mikes are the workhorses of the entire field. Their audio quality is good, though outputs are lower than any type previously described. Output impedance is low, running from about 30-ohms up to several hundred ohms, though some types produce high-impedance outputs, having a very small transformer installed within the microphone case.

The controlled-reluctance microphone, originally developed for the military to combine the desirable characteristics of ceramic and dynamic mikes, is a close cousin.

In it, the coil is stationary and an armature in a magnetic field is moved within the coil by the action of the diaphragm. The wire coil can be wound to match almost any impedance, from high to low.

A CONSIDERATION. What are the considerations involved in selecting a microphone? Range and uniformity of frequency response, design-for-application (FM vs. SSB), output impedance, output level (preamplified vs. non-preamplified), ruggedness of element and case, type of stand, push-to-talk (PTT) or grip-to-talk features, pattern, RF and audio shielding and wiring configuration are a few features to look at.

KEEP IT FLAT. Audio response should be uniform throughout the desired band, with no bumps anywhere in the range. Nevertheless, a slight rising characteristic, as in the crystal mike, is often preferred to produce crisp, interference-piercing quality.

As for range, many manufacturers have taken an approach in which microphone response spans from 300 to 5000 Hz. Mikes designed for FM tend slightly to the higher frequency response, SSB mikes toward the lower. The human voice ranges from 300 to 3000 Hz. Very wide range, hi-fi studio mikes are undesirable and may introduce extraneous high-frequency noise into the transmitter's audio circuitry.

Microphone impedance matching is extremely important. For best results, the impedance of the mike should be the same or fairly close to that of the circuit it feeds, up to about 3 : 1 or 4 : 1 is acceptable. Beyond these limits, frequency response curves become distorted and mike output suffers.

Most dynamic microphones are low impedance devices in the range 150-600 ohms, so you're usually safe in using them with solid state transceivers. Always look for minimum and recommended load impedances in mike's advertising brochure or spec sheet. And look at the range of minimum and maximum mike impedances your rig will accept, often listed in the set's specs.

If you can't avoid a mismatch, feeding a low-impedance mike into a high-impedance circuit is better than going the other direction. Or buy a dual-impedance mike that will match both high and low impedance

EINSTEIN'S THEOREM OF RELATIVITY.

The Radio Amateur sends his signals over the air at the speed of light and should therefore, have a slight knowledge of Einstein's Theorem of Relativity which, in mathematical terms, states as follows:

$$e = mc^2$$

Let us see how it affects the YL or XYL who wants to become a radio Ham, especially after Womens' Lib (ad lib or deduct lib is not taken into account, because this dissertation is strictly Non-musical)

In the above equation

e stands for EVE, the root of all kind (man and/or woman)

m stands for MALE and

c stands for CHAUVINIST FIG.

The small '2' means that the symbol appearing immediately before the '2' is multiplied by itself (which, fortunately does not mean biologically, a-sexual reproduction) but the 'pig' therefore becomes pigpig. Because a pigpig is non-existent, we will use a synonym in the word 'pork'. Pigpig therefore becomes 'pigpork' or 'porkpig'

For the purpose of this doctoral thesis, it can be assumed that 'porkpig' or 'pigpork' is a phonetic corruption of 'ping-pong', or the sound which originates in a Chinese gong when the latter (the gong - not the Chinese) is struck by a small celluloid ball ricocheting off a wooden surface after being in turn struck by a man-made bat (which does not fly-by-night).

Let us now return to the original equation, which therefore means

+Eve equals the male chauvinist ping-pong:

This clearly cannot be true, although the logical deduction above had definitely proved it to be true.

Further proof lies in the fact that the female of our species is ill-(not sick but -logical) in most of her words and/or deeds, and the extremely logical explanation and deduction of the equation

$$e = mc^2$$

as shown at + above, is not true which is, femininatively speaking, logical; which is true and therefore illogical.

Q.E.D.

If you understand this, you may go to VHF - if you don't, I will be on the pop-orchestra tonight at the usual fourth dimension for further consternation. (Apologies to Einstein, YLs and XYLs).

Acknowledgments to QRX (Southern Transvaal) ZS6AQZ.

+++++

NEW TERMS: The following will help you to understand the ads in the Ham mags.

NEW Different colour from previous design.

ALL NEW Parts not interchangeable with previous design.

EXCLUSIVE Imported product.

UNMATCHED Almost as good as the opposition's.

DESIGN SIMPLICITY. Manufacturers costs cut to the bone.

FOOLPROOF ADJUSTMENT No provision for adjustment.

ADVANCED DESIGN Ad writer doesn't understand it.

FIELD TESTED Manufacturer lacked test equipment

DIRECT SALES ONLY Manufacturer had argument with distributor

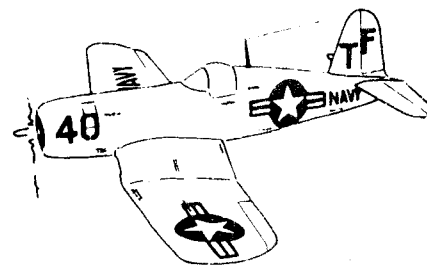
RUGGED Too heavy to lift

LIGHTWEIGHT Lighter than rugged.

YEARS OF DEVELOPMENT Finally got one that worked

PERFORMANCE PROVEN Will operate through the warranty period.

# DON'T FLY AROUND WITH FLY BY NIGHT OPERATIONS.



## You Want

- Fast Service
- Fair Prices



CN-630

### SWR & Power Meter Model CN-630

Simultaneous direct reading SWR,  
Forward Power and Reflected Power.  
Frequency Range: 140—450 MHz  
SWR Detection Sensitivity: 5 Watts min.  
Power: 2 Ranges (Forward, 20/200 Watts)  
(Reflected, 4/40 Watts)  
Tolerance:  $\pm 10\%$  full scale  
Input/output Impedance: 50 Ohms  
Connectors: SO-239  
Dimensions: 180 x 85 x 120 mm;  
7.12 x 3.37 x 4.75 in.



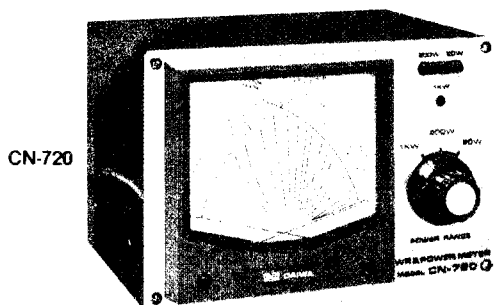
**KENWOOD  
TS-130S**



**KENWOOD  
TR-2400**



**KENWOOD  
R-1000**



CN-720

## SAVE MONEY



CN-620

### SWR & Power Meters Models CN-720 and CN-620

Simultaneous direct reading SWR,  
Forward Power and Reflected Power.  
Frequency Range: 1.8—150 MHz  
SWR Detection Sensitivity: 5 Watts min.  
Power: 3 Ranges (Forward, 20/200/1000 Watts)  
(Reflected, 4/40/200 Watts)  
Tolerance:  $\pm 10\%$  full scale  
Input/output Impedance: 50 Ohms  
Connectors: SO-239  
Dimensions: 180 x 120 x 130 mm;  
7 x 4.75 x 5 in.  
165 x 75 x 97 mm;  
6.5 x 3 x 4 in.

# SUMMIT DISTRIBUTORS

PROP. R.W. SCHONBORN

25/27 Reed Street  
PORT ELIZABETH  
P.O. Box 500  
6000

Telephone 54 4545  
Telegraphic Address: "SUMMIT"