

# 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.**

JUN 1982

## PORT ELIZABETH BRANCH OF THE SOUTH

### SECTION OF THE LEAGUE

THE NEXT GENERAL MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE WILL BE HELD AT 8 PM. ON MONDAY, 11 JUNE, 1981, AT 100, CLEVELAND STREET, PORT ELIZABETH ON FRIDAY 18th JUNE at 8 PM. THERE ARE A NUMBER OF IMPORTANT SUBJECTS TO BE DISCUSSED AND ONE LIMITED COOLING FROM GEOFF ZS2GJ WILL BE OFFERED FOR SALE. SO PLEASE MAKE AN EFFORT TO ATTEND. WE'D LOVE TO SEE YOU THERE.

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## NEWS

It seems as though quite a few of our members have itchy feet at the moment, though mainly for business reasons. Trevor ZS2TJ will be off on a trip to a number of countries in Europe including Austria, France etc. Peter ZS2PD was in the U.K. recently for two weeks and will be doing a business course at Staffordshire University for two months before returning to the U.K. for a while. Brian ZS2TY and Sheila ZS2BF will be pulling down anchor soon before their move to ZS6 where they will be staying for a while while Brian takes a post-graduate course on a bursary in the U.S.A. Gary ZS2MA, who seems to have a real case of wanderlust, has now returned to Graham, G.B.S. And has at least one dipole up. Cyril ZS2ZL and Betty ZS2MA have moved back to Park Drive and we hope they have settled in. We would like to wish all the travellers Bon Voyage, safe travelling and hope to see them back soon.

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CONGRATULATIONS to Mr. & Mrs. Graham ZS2MA on becoming proud first-time grandparents recently.

WELCOME to Brian ZS2TY who joined a member of the Branch recently and we wish him a long and happy association with the Branch and League. Also good luck with the experiments.

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TWO BIRTHDAYS: The birthdays of the late Mr. Colin ZS2AO are continuing every year. The 10th of the 14th of Colin ZS2AO 5 Hammar's 10th birthday. Colin died again. It was the last time now before the end of the world.

BRANCH TROPHIES: The trophies of the A.R.L. in September, the three trophies of the Branch will be presented. These are the VHF; ZS2AF, ZS2AF and ZS2AF. Full details were published in the September 1981, if you have mislaid your copy, you can obtain it at 303-08.

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HAPPY BIRTHDAYS to the following on their birthdays in June:

1st	Geoff ZS2GJ	7th	Edgar Lane
4th	Cyril ZS2ZL	8th	Isak ZS2LD and Gus ZS2MC
5th	June ZS2JJ	10th	Fred ZS2EQ
		26th	Bette ZS2LO

HAPPY ANNIVERSARY to

8th Neil and Heather ZS2AL; 10th Alan and Naydene (ZS6BTI)

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### In Future News

*It has been said that there is some co-operation between wild creatures. The wolf and the sheep usually work in the same neighbourhood.*

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MINUTES OF THE GENERAL MONTHLY MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE, HELD AT THE Y.M.C.A. ON FRIDAY 21st MAY, 1982.

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PRESENT: 17 members and visitors.

APOLOGIES: ZR2DY, ZS2KX, ZS2LO, ZS2TJ, and Bill Hodges.

The Chairman welcomed all to the meeting and extended a special welcome to Marlene, ZR2ED, Viv ZS2VM and Chris ZS2S.

MINUTES: The Minutes of the meeting held 16th April, 1982, having been published in QSX-PE and circulated, were taken as read, and proposed by Fred ZS2EQ and seconded by Trevor ZS2AE.

ARISING: The Chairman stated that the IRC's advertised previously had been sold.  
The Veteran Car Rally had gone off very well and the organisers were very gratified with regard to the communications. Thanks were extended to Colin ZS2AO and Athol ZS2CM who, together with the Chairman, had provided the communications link.

FINANCE: It was reported that the dollars received for the S42 operation had been sold and would be used to defray expenses on the postage of the cards.

CORRES: The following correspondence was tabled:  
Letter from Algoa Branch re 1984 A.G.M.  
Letter from H.Q. re Insurance Policy.  
Letter from H.Q. re increase in subs.  
Financial Statement from H.Q.  
Branch Newsletters.

GENERAL: The Chairman said that, after tea, those who had ordered tape-recorders would be able to collect them.  
The Chairman said that nominations for a Regional Co-ordinator for Hamnet in the Eastern Cape were to be called for. It was the responsibility of the Branch to nominate someone who was actively involved and interested. Cliff Wickham ZS2AP had made himself available for this and he was considered suitable proposed by Colin ZS2AO and seconded by Frank ZS2CY. The Sec- was asked to write to the Acting Regional Co-ordinator and advise him of the Branch's decision.  
Discussion then took place on the League A.G.M. to be held in Port Elizabeth in 1984. The Chairman said that, although it was 2 years ahead, it was a big project and warranted forward planning. A letter had been sent to the Algoa Branch inviting them to assist with hosting the meeting and thereafter the Chairmen of both branches had had a meeting. A reply to our letter had been received from the Algoa Branch stating that the A.G.M. should be hosted jointly in order to make it successful and that costs should be jointly shared. An A.G.M. committee with an equal number of members from each Branch would be constituted with the Chairman coming from the P.E. Branch and having the deciding vote. There was much discussion from the floor after it had been stated that our original invitation to 'assist' was turned down and that it been suggested as '50/50' or nothing. It was considered that this would lead to much inter-branch rivalry and undo the general good relationships that now existed. The original letter had invited Algoa Branch to 'assist' and now various conditions were being stipulated, if they decided to assist.

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Various fund-raising ideas were discussed, and one which had been raised, was the voluntary donation of 50c per month per member, this being payable as either one lump sum of R12 or in two payments of R6. Geoff ZS2GJ had promised the donation of three cases of canned foods to be sold, and Dick had a number of tape recorders which were for sale. Several cash donations were also received. It was envisaged that a sum of R2500 would be needed, and the Branch would try to avoid a repetition of the last A.G.M. which had been exorbitantly expensive. After all, as a host, one would not expect the guests to pay for their tea and cake. It was decided, therefore, to write to the Algoa Branch asking for their decision on our original letter and members would be informed as soon as possible.

The Chairman said that the Town Repeater was now back in operation but we were not responsible for the QRM. Thanks were expressed to all those who had helped with the erection of the antenna and especially to Brian ZS2AB who had been burning the midnight oil to get the unit in order. Coverage was very good and the repeater was getting out very well.

The Chairman informed members that a film from the S.A.P. originally from the F.B.I. on safety in the times we live in would be shown at the July meeting, and as it was of general interest, it would be a good idea to bring wives along.

There being no further business, the meeting was closed.

sgd:  
R.W. Schönborn ZS2RS  
Chairman

sgd:  
M.T. Weller ZS2OB  
Secretary.

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BULLETIN ROSTER.

April	Yarge ZS2ID 303498
May	Frank ZS2CY 311259
June	Colin ZS2AG 312471
July	Fred ZS2EJ (0428) 31419

I know it seems a forlorn hope, but I'm sure that some of the members must have some news that the bulletin reader can use and it does make their task some much easier if we can hear about it, so please let them know, preferably by the Saturday evening when most bulletins are prepared! After all, the bulletin is for the members, by the members and about the members!

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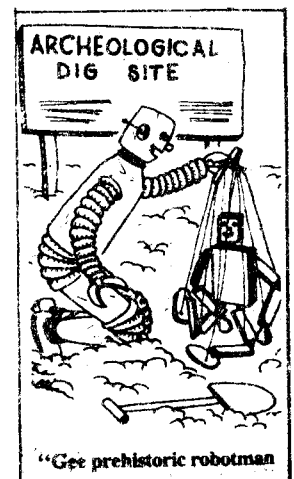
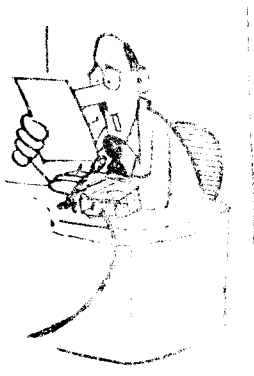
Also in lighter vein.

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

You can tell how healthy a man is by what he takes two at a time - stairs or pills.

A man was tuning in on the radio when he got a sudden twinge of pain in his back.

"I believe I'm getting lumbago!" he exclaimed.  
"What's the use", answered his wife. "You won't understand a word they say!"



# technical

## SIMPLE POWER SUPPLIES AND APPLICATIONS OF THREE-TERMINAL REGU- LATORS.

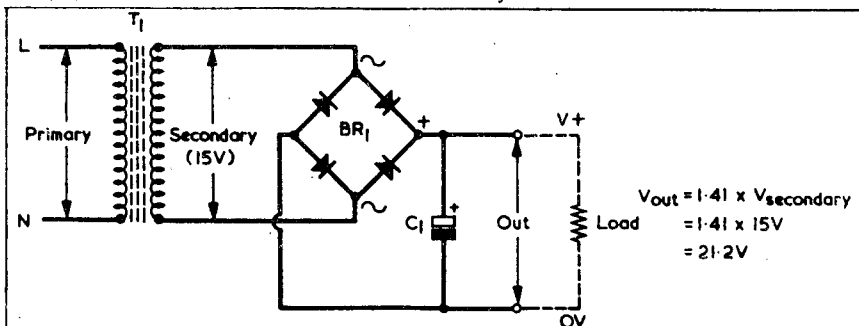
Part One of a Two-part article.

With acknowledgements to Radio and Electronics World.

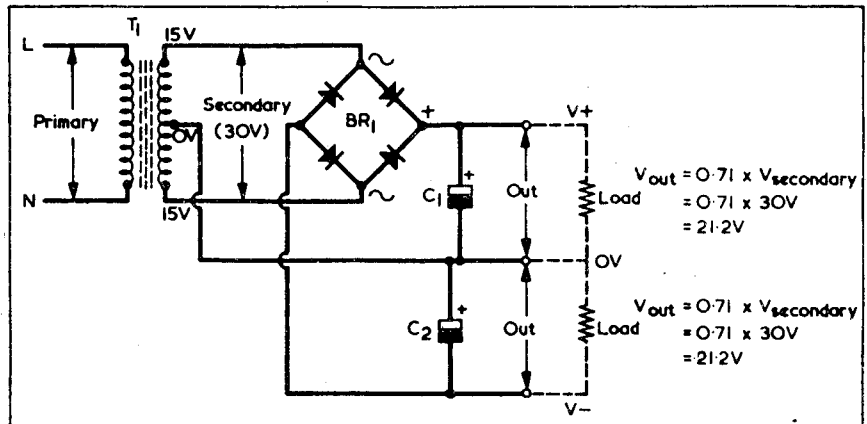
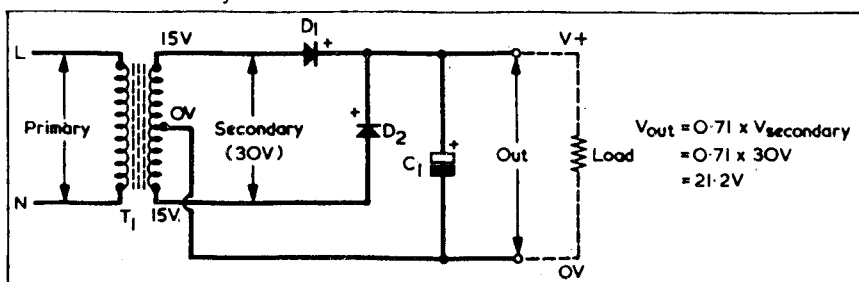
Two of the most common tasks facing the electronics engineer are those of designing basic power supply circuits to enable pieces of equipment to operate from AC power lines, and designing voltage regulator circuits to enable specific circuits to operate from well-defined DC supply voltages over wide ranges of load current variations.

Both of these design tasks are reasonably simple. Basic power supply circuits consist of little more than a transformer-rectifier-filter combination, so all the designer has to do is select the circuit values using a few very simple rules, to suit his own particular design requirements.

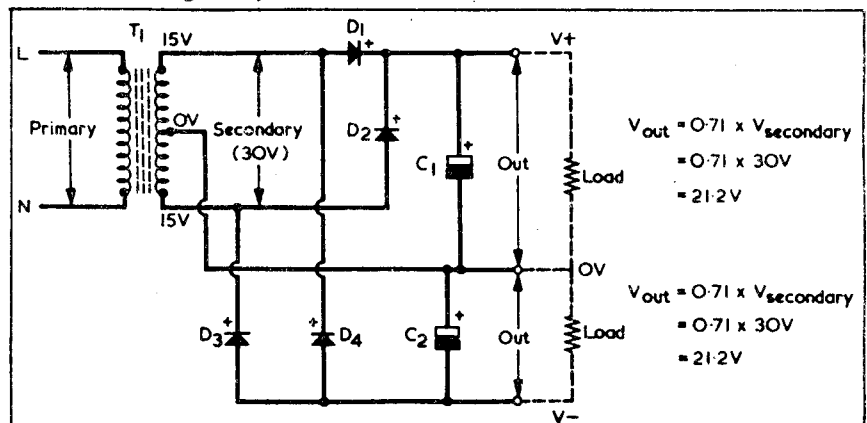
Voltage regulator circuits may vary from simple Zener networks, designed to provide load currents up to only a few mA, to fixed-voltage high-current units for powering logic boards, etc., or to variable-voltage high-current units designed to act as general-purpose pieces of test gear. We'll look at practical versions of all these examples in the next few pages.



▼ Figure 2: Basic single-ended power supply using a centre-tapped transformer and two rectifiers.



▲ Figure 3: Basic split or dual power supply using a centre-tapped transformer and bridge rectifier.



▲ Figure 4: Basic split or dual power supply using a centre-tapped transformer and individual rectifiers.

▼ Figure 1: Basic single-ended power supply using a single-ended transformer and bridge rectifier.

### Power Supply Circuits

Basic power supply circuits are used to enable pieces of equipment to safely operate from the AC power lines (rather than from batteries) and are simply designed to convert the AC power line voltage into an electrically isolated DC voltage with the value required by the actual circuitry of the equipment.

The basic power supply circuitry consists of a little more than a transformer-rectifier-filter combination. The transformer is used to convert the AC line voltage into an electrically isolated and more useful AC value, and the rectifier/filter combination is used to convert the new AC voltage into a smooth DC value.

Figure 1 to 4 show the four most useful transformer-rectifier-filter combinations that you will ever need. The Figure 1 circuit provides a single-ended DC supply from a single-ended transformer and bridge rectifier combination, and gives a virtually identical performance to the centre-tapped transformer circuit of Figure 2. The Figure 3 and 4 circuits both provide 'split' or 'dual' DC supplies and again give virtually identical performances. The rules for designing these circuits are very simple, as you'll see in a moment.

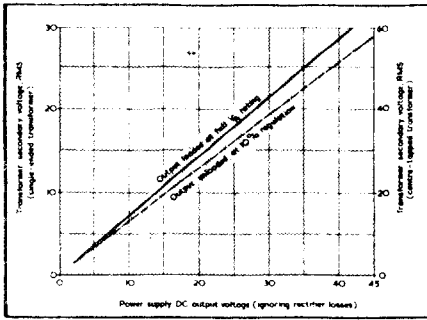


Figure 5: Transformer Selection Chart.

### Transformer-rectifier selection

The three most important parameters of a transformer are its secondary voltage, its power rating, and its regulation factor. The secondary voltage is always quoted in RMS terms at full rated power load, and the power load is quoted in terms of VA or watts. Thus, a 15V 20VA transformer will provide a secondary voltage of 15V RMS when its output is loaded by 20 watts. When the load is removed (reduced to zero) the secondary voltage will rise by an amount specified by the **Regulation Factor**. Thus, the output of a 15 volts transformer with a 10% regulation factor (a typical value) will rise to 16.5 volts when the output is unloaded.

Now, the most important point to notice here is that the RMS output voltage of the transformer secondary is **not** the same as the DC output voltage of the complete power supply. In fact, the DC output voltage of a full-wave rectified circuit is 1.41 times the RMS transformer voltage (ignoring rectifier losses) that is feeding the rectifier, as shown in the graph of Figure 5. Note here that this voltage is equal to 1.41 times the voltage of a single-ended transformer, or 0.71 times that of a centre-tapped transformer. Thus, our single-ended 15V RMS transformer with 10% regulation will in fact provide an output of about 21 volts at full rated load (just under 1 amp at 20VA rating) and 23.1 volts at zero load.

When rectifier losses are taken into account, the output voltages will be slightly lower than shown in the graph. In the 'two rectifier' circuits of Figures 2 and 4, the losses amount to about 600mV, while in the 'bridge' circuits of Figures 1 and 3 the losses amount to about 1.2 volts. The rectifiers should, for maximum safety, have current ratings at least equal to the DC output currents.

Thus, the procedure for selecting a transformer for a particular problem is very simple. First, decide on the DC output voltage and current that is required:

The product of these two values (allowing for slight rectifier losses) determines the minimum VA rating of the transformer. Next, consult the graph of Figure 5 to find the transformer secondary RMS voltage that corresponds to the required DC voltage. Simple?

To use the Transformer Selection Chart decide on the required loaded DC output voltage (say 22 volts) then read across to find the corresponding transformer secondary voltage (15V single-ended or 30V centre-tapped).

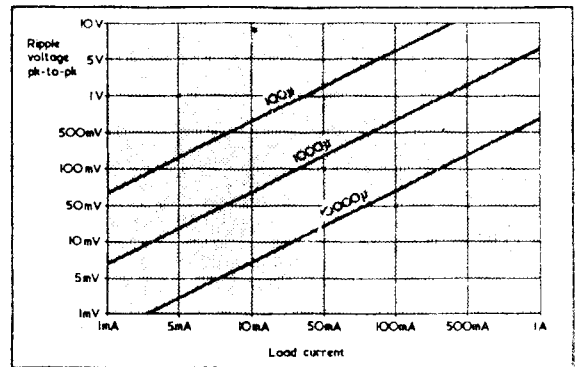


Figure 6: Filter Capacitor Selection Chart, relating capacitor size to ripple voltage and load current in a full-wave rectified 50-60Hz powered circuit.

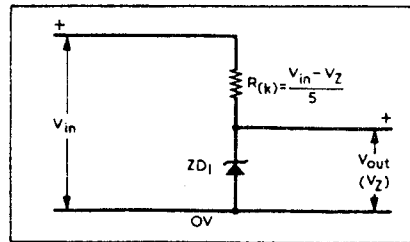


Figure 7: This basic Zener 'reference' circuit is biased at about 5mA.

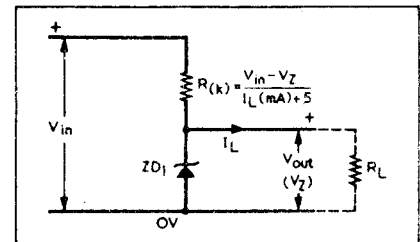


Figure 8: This basic Zener 'regulator' circuit can supply load currents of a few tens of mA.

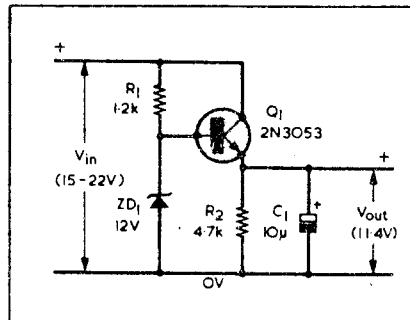


Figure 9: This series-pass Zener-based regulator circuit gives an output of 11.4 volts and can supply load currents up to about 100mA.

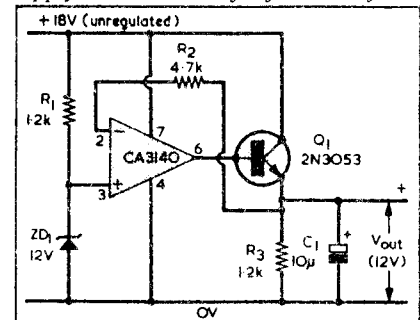


Figure 10: This op-amp based regulator gives an output of 12 volts at load currents up to 100mA and gives excellent regulation.

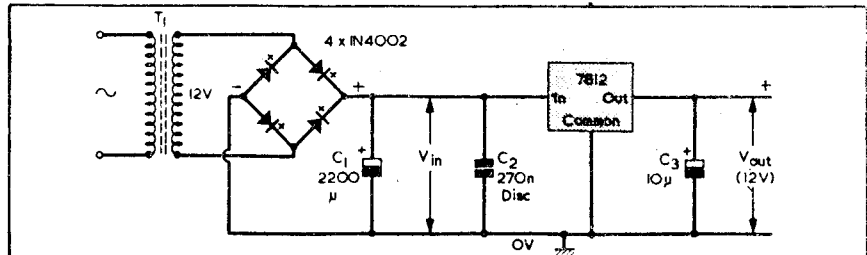


Figure 11: Connections for using a 3-terminal positive regulator, in this case a 12 volt 1 amp '78' type.

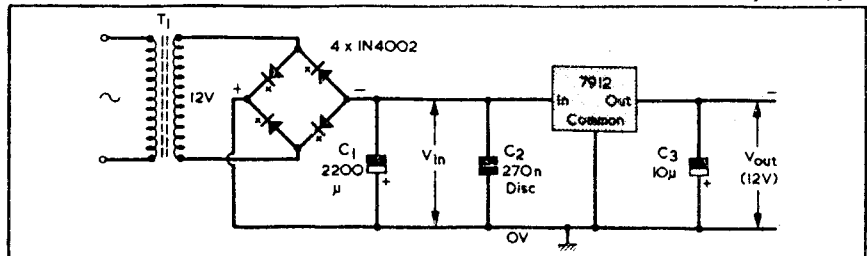


Figure 12: Connections for using a 3-terminal negative regulator, in this case a 12 volts 1 amp '79' type.

TO BE CONTINUED.

FROM THE DEPARTMENT OF USELESS INFORMATION.  
MICROWAVE OVENS.

One of the first magnetrons built by Randall and Boot oscillated to produce radio waves of 9,9cm wavelength. This was exactly what radar engineers had been praying for; a generator of high power, short wavelength signals that could be beamed up into the sky to reflect off relatively small moving targets, such as aircraft and so give an accurate position. And that was how high resolution radar, which helped win the war and enables aircraft to fly blind today, was born.

Even by the time the war was over, another interesting use of the magnetron had been discovered. As early as 1947 some hotels were experimenting with massive magnetrons to cook food and dry milk. This is possible because the microwave signals generated by the magnetron are soaked up by such organic materials and converted into heat. One suggestion is that the microwave energy causes the molecules of the food to vibrate very rapidly and generate heat by mutual friction, rather as our hands get hot when we rub them together. A lump of meat will cook very rapidly when bathed in microwave energy.

Sadly it does not matter whether the meat is alive or dead. Recently a lady tried to dry her poodle after a shampoo by putting into the microwave oven. The poor dog died almost immediately, literally cooked alive. Remember the material gets hot while everything else including the oven walls stay cold. Also the material gets hot internally and cooks from the inside.

All microwave ovens operate on the fixed frequency of 2450 mHz because this way they cause no interference to radar systems which operate on other microwavelengths.

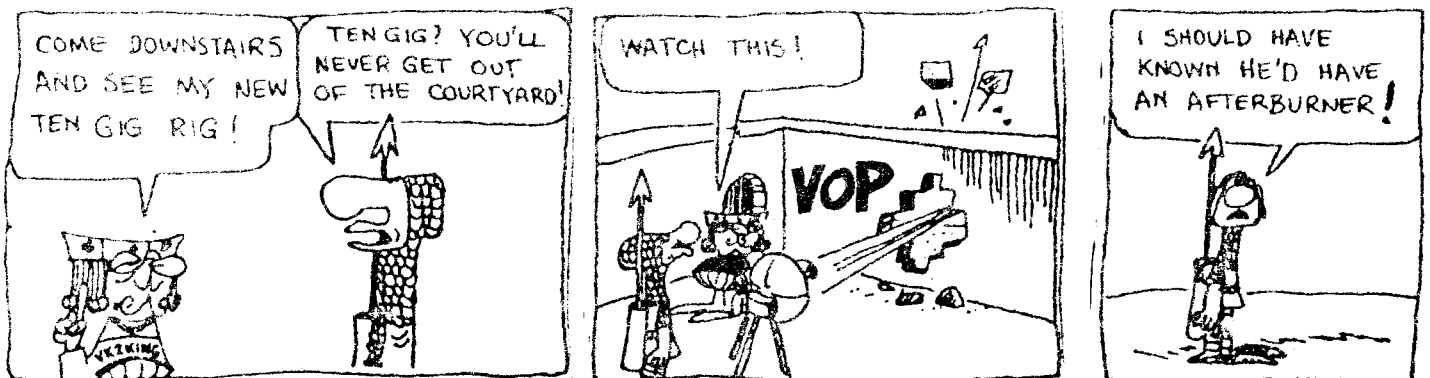
It is likely that microwave cooking will become more and more popular as the price of electricity increases, because with all the heat generated inside the food there is very high overall efficiency of energy. An oven which draws 1200 watts from the mains will beam 600 watts of micro energy into the food and fully cook a 2 kg leg of mutton in 24 minutes.

Some points worth bearing in mind. Not all foods cook well and taste good with microwave cooking. Also beware of putting the smallest metal into the microwave oven. Eddy currents will be generated that cause dramatic and potentially very expensive arcing.

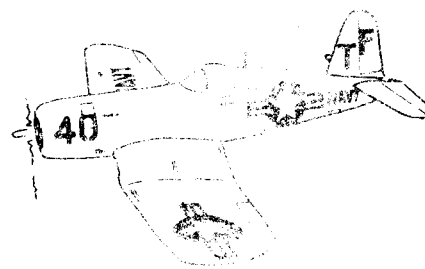
Last but not the least, users should bear in mind at all times the very real danger of exposing any part of the human body to microwaves. Thus never, but never, override the safety locks which are designed to prevent the magnetron from working when the oven door is opened. It is not just a case of burning your hands, there is growing evidence that cataract eye damage can be caused from microwaves leaking out of a faulty oven.

(Acknowledgements and thanks to S.Tvl. Branch Newsletter.)

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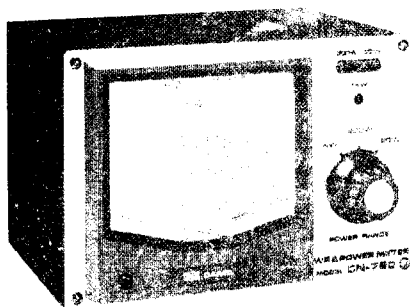


CN-630

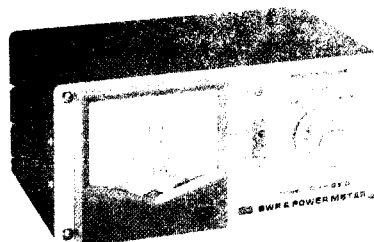
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CN-720



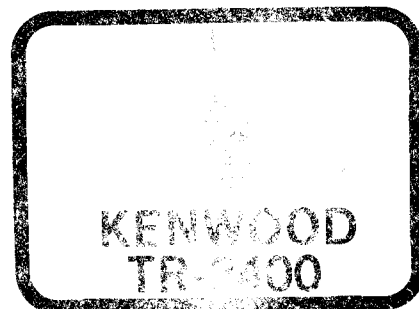
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