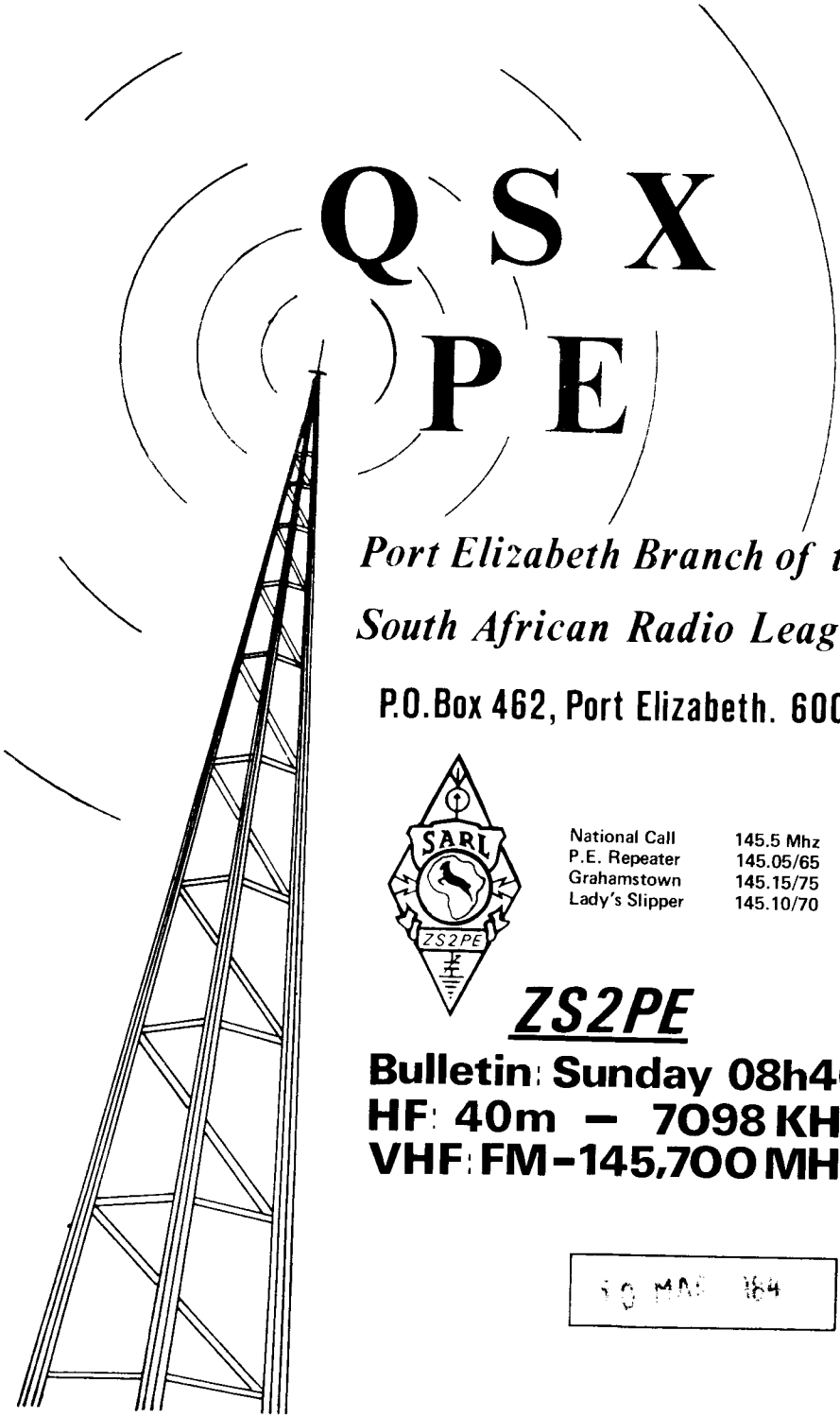


# Q S X

# P E

*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 PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE WILL TAKE PLACE AT THE SUNRIDGE PARK SCOUT HALL, BROADWAY AVENUE, SUNRIDGE PARK ON FRIDAY 16th MARCH, 1984. AT 8P.M.

**********

# Committee

| | | | |
|---|---|---|---|
| CHAIRMAN: | Dick ZS2RS (322111) | VICE CHAIRMAN: | Trevor ZS2AE(321746) |
| SECRETARY: | Marge ZS20B (303498) | TREASURER: | Brian ZS2AB (303498) |
| PROJECTS: | Lionel ZS2DD (321770) | SPECIAL EVENTS: | Colin ZS2AO (312471) |
| P.R.O.: | Pete ZS2PJ (301493) | AWARDS: | Attie ZR2DY |

QSX-PE - ZS20B and ZS2AB.

**********

# NEWS

**Welcome!** We would like to welcome the following who have recently become members of the Branch and hope their association with us is a long and happy one: Lerryck Anderson, Lynda and Dave Chidell, Ray Jackson, Dave Harvey, Ronald Herman, Robert Barnes, Cheryl Perelson, and Micheal Raff.

**********

# AGM'84

Please don't forget to let Marge know if you will be attending any of the functions during the weekend of the A.G.M. Phone 303498. The functions are as follows:

Friday 20th Finger Supper, 6.30p.m. Drill Hall, Central. Free of charge but entry by ticket only. Let us know soon.

Saturday 8a.m. A.G.M. at Edward Hotel. Seating fairly limited. Lunch R9.50 and Dinner/Cabaret R10.50, both per person. These are optional, but again please let us know.

Sunday 10a.m. Seminar on VHF propagation by Mike Bosch ZS2FM. Edward Hotel, free of charge.

The Branch has a number of Parker pens engraved with the League Badge and A.G.M. '84 as a memento of the occasion and these may be obtained from Dick ZS2RS for R2.50 each. Phone 544545 business hours.

**********

# bulletin roster

| | |
|---|---|
| March 18th | Trevor ZS2AE |
| March 25th | Marge ZS20B |
| April 1st | Brian ZS2AB |
| April 8th | Lionel ZS2DD |

**********

**for sale** K.W. Atlanta SSB/CW transceiver (80 - 10m). Needs overhauling. As is. R200. Telephone Rudy van der Elst ZS2EE at Port Alfred 0464-42219.

MINUTES OF THE GENERAL MEETING OF THE PORT ELIZABETH BRANCH OF THE SOUTH AFRICAN RADIO LEAGUE HELD AT THE SCOUT HALL, BROADWAY AVENUE SUNRIDGE PARK, PORT ELIZABETH ON FRIDAY 17th FEBRUARY, 1984.

PRESENT: 26 members and visitors.

APOLOGIES: ZS2AV, ZS2TJ, ZS2DY, ZR2EY, and Lynn Crothall, and ZS2FR.

The Chairman welcomed all to the meeting, especially the Ladies, and a special welcome to Jim Levay ZS2QK, Percy Buckley ZS2RY and Paul Pretorius ZS2PR.

MINUTES: The Minutes of the general meeting held 20th January, 1984 having been published and circulated in ZSX-PE were taken as read, proposed by Hugh ZS2RS and seconded by Gus ZS2MC.

ARISING: It was reported that the orders for the car badges had been sent off.

FINANCE: Brian ZS2AB reported that 16 new members were enrolled in the Branch. The A.G.M. fund stood at approx R2600.

ARISING: The Chairman said that he would like to extend thanks to Brian for his Technical classes from which the new members had come. There were presently 20 people attending the classes.

CORRES: Letter from Y.M.C.A. re Hobbies Fair to be held 9-14 July
A meeting for pre-arrangements to be held Thursday 23rd Feb at 5.30p.m.
Letter from Johannesburg Branch re Amateur of the Year Award.
Letter from National Organiser of J.O.T.A.
Several Newsletters.

GENERAL: The meeting then considered the motions for submission to the A.G.M. The results of discussion were as follows:

MOtions 1, 2, 3, 4, 5, Agreed.
6 - Not in favour. 7 and 8 - Agreed.
Propose Read No. 14 at this stage.
Motions 9, 10, 11, 12 to be read together. Propose accept P.E. Branch motion.
Motions 13 and 14 - Agreed.
Motions 15 and 24 to be read together. - Agreed.
Motion 16 - leave for later discussion.
17 and 18 - Agreed. 19 Delegate's discretion.
20 - not in favour. 21. Agreed - could be at Branch level if necessary. 22, 23 - agreed. 25 This should be left to individual branches to increase membership.
26 Agreed. 27, 28, 29, 30, 31, 32. Not in favour.
It had been stated that Radio ZS would be self-sufficient within 6 months. Copies need not be sent to second members of the same family at the same QTH. Members with degrees had worked hard for these and were entitled to use their qualifications. 33. Delegate's discretion - is it workable? 34 and 35 not in favour.

The Chairman reminded members that the finger supper on the Friday evening of the A.G.M. was free to all members and wives or partners, but entrance would be by ticket only and the Secretary must be informed well in advance so that catering may be arranged.
He thanked members for their patience with the discussion on the motions.

There being no further business the meeting was closed.

sgd:
R. V. Schönborn ZS2RS
Chairman

sgd:
M.T. Keller ZS2OS
Secretary.

# Construction Project

## NOTES ON 12V 1.5A POWER SUPPLY USING LM317 REGULATOR

by Gordon Harris ZS2GH.

A power supply with a well-regulated 12 volt 1.5 amp output capability was required and the LM317T 3-terminal regulator was selected for use as it would provide the required current without the use of external pass transistors and was the cheapest variable voltage regulator in its class which could be readily obtained locally.

### LM317 DATA

The LM317T comes in a plastic TO-220 package and its connections are shown in Fig. 1. The LM317K which comes in a standard TO-3 metal package (see Fig. 2) has a thermal resistance (junction to case) of only half that of the T version but as it is almost 3 times as expensive and as the T version could, in this case, handle the required current with ease, the LM317K was not considered.

Fig. 1

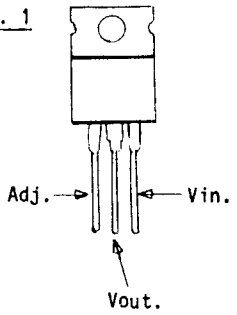
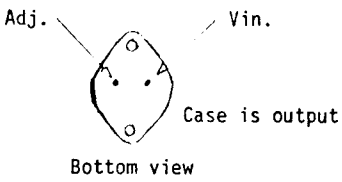
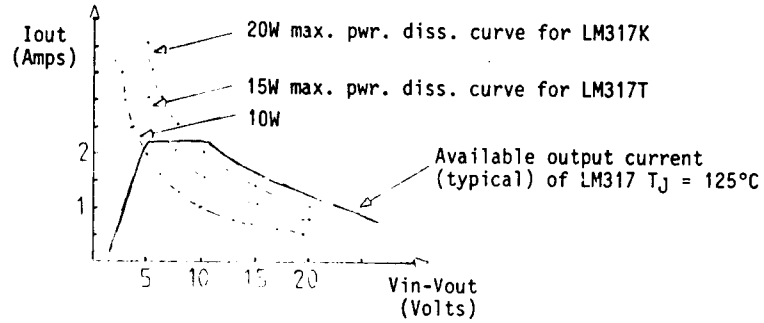



Fig. 2



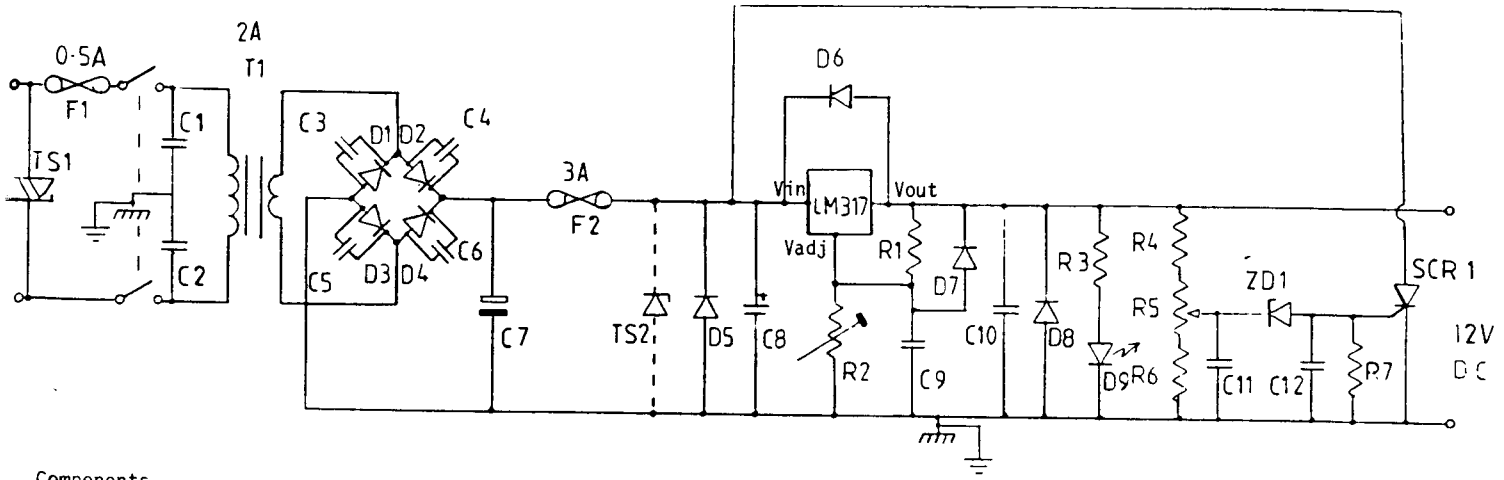

The LM317 is capable of supplying more than 1.5A over a 1.2V to 37V range, provided that the heatsink employed is adequate to maintain the regulator junction temperature below 125°C. A useful graph showing the relationship between typical available output current and voltage drop across the regulator is shown in Fig. 3.

Fig. 3




Overload protection is in the form of internal current limiting at about 2A, thermal overload protection which will reduce the output voltage, and therefore current, if the maximum operating temperature of the chip is exceeded and safe area protection which ensures that in the event of an internal fault occurring the regulator will destroy itself without damaging the load.

FIG. 4 - 12V 1.5A PSU USING LM317




Components

TS1 = GE-MOV Varistor type V250LA4

TS2 = GE-MOV Varistor type V33ZA5 OR 24V zener diode (only required if unreg. supply feeds inductive load)

D1-D4 = 3A 200V PIV rectifier diodes

D5-D8 = Switching diode, eg. 1N5401 100V 200A surge

D9 = LED

ZD1 = 10V zener diode

F1 = 0.5A fast-blow fuse

F2 = 3A

C1-6 = 0.01μF disc ceramic

C7 = 4700μF 40V electrolytic

C8, C10 = 2μF 35V solid tantalum OR 25μF 40V electrolytic OR 0.22μF disc ceramic

C9 = 10μF solid tantalum

C11 = 0.5μF polycarbonate, etc.

C12 = 0.01μF disc ceramic

T1 = 220V : 15V 2A transformer

R1 = 220 ohm

R2 = 2.5 kOhm trimpot OR 1.2 kOhm fixed + kOhm trimpot

R3 = 820 ohm

R4 = 100 ohm

R5 = 500 ohm

R6 = 3.3 kOhm

R7 = 1 kOhm

SCR1 = 6A or larger s.c.r.

## CIRCUIT DESCRIPTION

The circuit diagram of the power supply is shown in Fig. 4. As the diagram shows, precautions have been taken to ensure that under no circumstances will the load be subjected to an over-voltage condition, that both the regulator and load are protected from mains-borne transients and r.f. interference and that the regulator is protected against certain type of abnormal load conditions.

Transient suppressor TS1 prevents voltages exceeding 500 volts peak from being applied across the transformer primary winding. Voltages of this magnitude are common on the mains supply due to surges produced by lightning strikes, distribution system faults and switching of inductive loads.

Fuse F1. The lowest value of fuse which would reliably fail to be blown when the p.s.u. was switched on while supplying maximum load current was selected.

Capacitors C1 and C2 are 0.01 $\mu$F disc ceramic types and are intended to suppress, at an early stage, any r.f. interference present on the mains supply.

Transformer. A transformer had to be selected which would supply the current at which the LM317 'limits' while still providing, after rectification and filtering, a d.c. voltage input to the regulator slightly exceeding the required output voltage plus the 3 volts minimum difference required between the input and output voltages to ensure that the regulator operates correctly. A 2 amp transformer having a nominal secondary voltage of 15 volts for a primary input of 220 volts was chosen.

| AC Mains Input Voltage | Transformer Output Voltage | D.C. Input to Regulator | Voltage at psu output terminals | Load Current |
|---|---|---|---|---|
| 231 volts a.c. | 15.40 volts a.c. | 19.90 volts d.c. | 12.01 volts d.c. | 10 mA |
| 231 volts a.c. | 14.95 volts a.c. | 17.78 volts d.c. | 12.02 volts d.c. | 0.5 A |
| 231 volts a.c. | 14.77 volts a.c. | 17.14 volts d.c. | 12.02 volts d.c. | 1 A |
| 231 volts a.c. | 14.55 volts a.c. | 16.54 volts d.c. | 12.03 volts d.c. | 1.5 A |

Diode Bridge. Diodes D1 to D4 are 3 amp, 200 volt P.I.V. Across each diode is a 0.01 $\mu$F disc ceramic capacitor to suppress any interference which is produced by the switching action of the diodes.

Fuse F2. This fuse was incorporated before rather than after the regulator in order not to add unnecessary series resistance after the LM317 as this would degrade voltage regulation. Its main purpose is to provide a means of cutting off power quickly in the event of the crowbar over-voltage protection circuit operating.

Diode D5 and all the other diodes (D6, D7 and D8) which have been added to protect the regulator should be fast-acting. Ordinary rectifier diodes are inadequate because they look like an open circuit in the forward direction until minority carriers are injected into the intrinsic base region of the PIN structure. They should be capable of handling large current surges without excessive voltage drop but do not have to be power diodes. D5 is required if, as in this case, inductive loads such as relay coils are to be fed from the unregulated supply. Such a load can reverse the input voltage to the regulator on switch-off. Furthermore, when the input power is switched off, a heavy load operating from the unregulated supply could cause the input voltage to drop faster than the output voltage, causing a voltage reversal across the regulator, particularly if the output of the regulator is lightly loaded. Thus the need for both D5 and D6. Further protection against voltage transients due to an inductive load on the unregulated supply would be afforded by either a substantial 24 volt zener diode or varistor such as the General Electric V33 ZA5.

Diode D7 prevents capacitor C6 from discharging through the internal low current paths of the regulator.

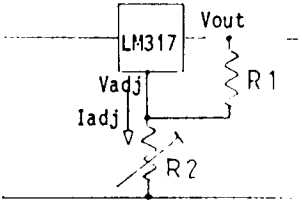
Diode D8 was included to protect the regulator in case it is used to drive an inductive load which could reverse the output voltage polarity.

Capacitor C7 was required to limit the maximum ripple voltage to approximately 3 volts peak to peak.

Supply bypass capacitors C8 and C10 could each be 0.22 $\mu$F or larger disc ceramic, 2 $\mu$F solid tantalum or 25 $\mu$F aluminium electrolytic, the different values being due to the higher effective series resistances of tantalum and electrolytic types. Points to note are that some disc ceramic capacitors tend to have a high impedance at frequencies near 500 kHz and that tantalum capacitors, if used, should have a conservative voltage rating and the maximum ripple (if known!) allowed by the manufacturer should be observed. When subjected to voltage spikes near the peak of the ripple they can 'sputter', short-circuiting momentarily, blowing out a poorly protected regulator. C8, C9 and C10 should all be located as closely as possible to the regulator terminals.

Bias resistors R1 and R2. The regulator develops a nominal 1.25V reference voltage between the output and adjustment terminals. Thus a constant current must flow through the output set resistor R2, giving an output voltage:

$$V_{out} = V_{ref} \left(1 + \frac{R2}{R1}\right) + I_{adj}. R2 \quad (1)$$




Rearranging (1), $R2 = \frac{R1 (V_{out} - V_{ref})}{V_{ref.} + I_{adj.} R1}$

If program resistor R1 = 220 ohms, $I_{adj.} = 10^{-4}$A and Vref = 1.25V

$$R2 = \frac{220 (V_{out} - 1.25)}{1.272} \simeq (V_{out} - 1.25) \times 173 \text{ ohms}$$

The 100 $\mu$A maximum current from the adjustment terminal represents an error, the effects of which can be minimised by operating with a minimum load current of approximately 5 mA. The use of an l.e.d. as an indicator lamp at the regulator output provides the required minimum load at all times. The current-set resistor R1 should be mounted close to the regulator output terminal and a single-point grounding system for all components should preferably be used, keeping all lead impedances as low as possible. Such precuations will help to improve voltage regulation. If proper care with construction is not taken, ground loop errors and lead resistance drops can easily become greater than regulator errors.

Capacitor C6 improves rejection of any 100 Hz ripple present at the input of the regulator. Without this capacitor, rejection is of the order of 65 dB. With a 10 $\mu$F solid tantalum capacitor it increases to 80 dB. Larger capacitance values show little improvement in rejection.

## THE OVER-VOLTAGE PROTECTION CIRCUIT

This was included to provide protection to the load in the event of D6 becoming short-circuit or some other unforseen fault occurring. This crow-bar circuit employs a 6 amp s.c.r. which fires, blowing the fuse F2, in the event of an over-voltage condition. The pre-set resistor R5 is set such that the s.c.r. will not be triggered under normal operating conditions. Capacitors C11 and C12 are included to prevent the s.c.r. from being triggered by voltage transients. An alternative overvoltage protection circuit using an MC 3423 IC is described in ref. (4).

## HEATSINK

The heatsink should be sufficient to allow the junction temperature ($T_J$) of the LM317 to be kept at least 25°C below its maximum permissible operating temperature ($T_J$ max = 125°C) at the maximum expected ambient temperature ($T_A$) for the maximum power that has to be dissipated under normal operating conditions, if maximum reliability is required.

A 100 mm length of Algoa Engineering's standard heatsink material is reputed to have a thermal resistance of about 2.1°C/W. To calculate how much power could be dissipated by the chip mounted on the heatsink mentioned, while allowing a maximum $T_J$ of 100°C, one can use the following formula:

$$\text{Watts} = \frac{\text{(1) max. chip junction temp. °C - 25°C - (2) max. ambient temp. °C}}{\text{(3) thermal resistance junction to case + (4) thermal resistance case to heatsink + (5) thermal resistance heatsink to air.}}$$

(1) for LM317 is 125°C.
(2) say 35°C if enclosure is well-ventilated.
(3) for LM317T is 4°C/W (for LM317K 2.3°C/W)
(4) using mica insulator and silicon grease is approx. 1 for a TO-220 pack.
(5) for heatsink mentioned, assume 2.1°C

Max. power which can be dissipated under conditions specified $= \frac{125 - 25 - 35}{4 + 1 + 2.1} = \frac{65}{7.1} = 9.1$ watts

Expected operating conditions:

Vin at max. load = 16.54 volts d.c.
Vout = 12 volts d.c.
Imax. = 1.5 amps

Thus max. required dissipation in chip (under normal conditions) is (Vin - Vout) x Imax. ≏ 4.5 x 1.5 ≏ 6.75 watts.
The heatsink mentioned would therefore be adequate, providing that it is mounted with its fins vertical in free air.

The information in the table below is useful when making such calculations.

| Approx. thermal resistance, case to heatsink, θcs in °C/W | | | |
|---|---|---|---|
| Package | Direct contact | Contact with silicon grease | Contact with silicon grease and mica washer |
| TO-3 | 0.5 - 0.7 | 0.3 - 0.5 | 0.4 - 0.6 |
| TO-220 | 1.0 - 1.3 | 0.6 - 0.8 | 0.8 - 1.1 |

References: (1) National Semiconductor publications.

(2) "A note on overvoltage protection" by G4HSS in Radio Communication - March 1982.

(3) "13.8V power units - an amateur's approach" by G3ISD in Radion Communication - July 1983.

(4) "Overvoltage protection for 13.8V power supplies" by VK5IK in QST - Oct. 1983

# INVESTIGATING THE 50 AND 144 MHZ VHF PATHS TO JOHANNESBURG.

by Mike Bosch ZS2FM.

During the peak of the sunspot cycle, cross-country contacts have been possible on six metres viz Sporadic E propagation or backscatter emanating from the $F_2$ layer. Of course, $F_2$ propagation is responsible for world-wide DX operation and ZS amateurs have already QSO-ed all six continents including the most distant Hawaii. $F_2$ DX contacts are fascinating but a great deal easier than trying to work cross-country on the other modes of propagation during the "quiet years of the sun". These modes have very high transmission path losses which require far more efficient equipment and is therefore, believe it or not, a far greater challenge! This also applies to two metres.

There are four modes of propagation which are effective for country-wide communication on 50 and 144 MHZ, namesly Troposheric Scatter, Temperature Inversion - Tropo, Metero reflection and Sporadic E. The first three modes are present throughout the year, while the latter manifests itself mainly during the summer months.

Way back in 1966 Lionel ZS2DD used to listen to an AM carrier on 50 MHZ, transmitted by Mike Rowland ZS6AFG of Springs, and he could hear it intermittently on meteor reflection. These meteor pings were the first ever to be received by a ZS2 amateur. Later Lionel also monitored the meteor as well as some tropo signals from the ZS6VHF beacon.

However it was only in March 1982 that two-way contact was established on meteor reflection by ZS6AXO Sel and ZS2FM Mike. During their meteor sked on 50 MHZ a remarkable thing happened when these two stations discovered the first ever tropospheric scatter signals between Johannesburg and Port Elizabeth. Later the existence of these unusual signals was confirmed by ZS2DD. The tropospheric scatter path loss is extremely high resulting in very weak signals but consistent over long distances. ZS2FM conducted a further series of tests with ZS6LN of Pietersburg to prove once again the existence of this mode of propagation over the 1200 kilometre path and possibly it could extend even further.

Tests were also conducted on two metres between ZS2FM and ZS6LN with ZS6AVL and his moonbounce antenna but the results were negative thus far except for some meteor signals. It is interesting to note that simultaneous tests on 50 and 144 MHZ yielded very strong meteor signals of long duration on six metres but only short and weaker pings on two metres.

When temperature inversions took place then S8-9 signals have been recorded in Port Elizabeth emanating from ZS6LN and ZS6AXO. ZS2FM too has been copied in Johannesburg by ZS6AXO and ZS6NS at about S8. Such tropo openings should also produce strong signals on two metres throughout South Africa. Strong signals have been picked up too from ZS6AJU(FM), ZS6CAU (FM), ZS6PKS (SSB), ZS6TUK (SSB) etc.

Sporadic E appears mainly in the summer months and peaks around noon and again during the later afternoon and early evening. This mode can produce remarkably strong signals on both 50 and 144 MHZ. Many years ago the late Frank Burrell ZS2CY worked ZS3G of Tsumeb during an ionospheric type of opening, with only an 807 tupe in the final of his six metre rig and a 66 foot windom antenna.

To summarise it would appear that we could enjoy a 24 hour communication with Division 6 stations on 50MHZ tropospheric scatter, providing we can improve the efficiency of our equipment including the antenna gain at both ends of this VHF path. This is a tremendous challenge and one which we could conquer and the reward will be reliable two-way contacts on both FM and SSB.

Finally, it may be of some interest to our VHF members to know that the writer transmits a regular VHF bulletin at the end of the Algoa branch weekly news bulletin on Sunday evenings after 19h30 SAST on the two metre repeater channel of 145,775 MHZ. This bulletin is relayed on 51,2 MHZ with horizontal polarization for our long distance listeners and on 52,6 MHZ vertical polarization for local listeners. The writer invited VHF members of both branches to participate and to contribute any VHF news items which they may come across. See you on 50 MHZ or higher.

**********

# Hamnet News

Do you listen to the Hamnet bulletins? If not, then please try it. By listening regularly, it eventually becomes a habit, and by doing this one can learn a surprising amount over a long period. There are also interesting nets afterwards. You do not need to stay on for long if you do not wish to. On eighty metres we have stations reporting in from all over the country and we even recently had a maritime mobile station. At the November 1983 SATEPSA meeting, a vote of appreciation to Hamnet members was passed for their contribution to Civil Defence. You may be surprised to learn that even the fun activities that we participate in have served a very useful purpose.
Finally I would like to record my congratulations on a job very well done by the Hamnet members in Natal and elsewhere, during the recent cyclone disaster. Well done chaps. 73, Al ZS2U.

(From QUA - Algoa Branch Newsletter).

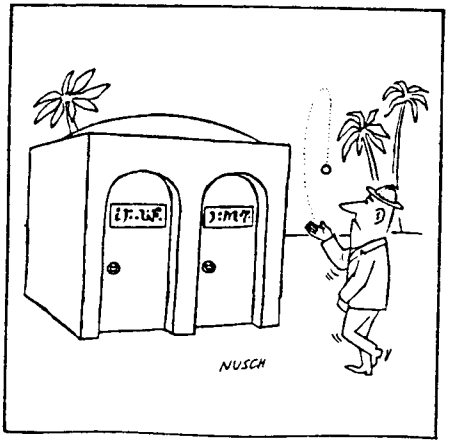
**********

ODE TO THE ACTIVE MEMBER.

Are you an active member
The kind that would be missed?
Or are you just contented
That your name is on the list?
Do you attend the meetings
And mingle with the flock
Or do you stay and home the while
And criticise and knock?
And do you take an active part
To help the work along,
Or are you satisfied to be
The kind that 'just belong'?
Do you ever pay a visit
To a member who is sick
Or leave the work to just a few
And talk about the 'clique'?
There's quite a programme scheduled
That I'm sure you've heard about
And we'll appreciate it if you, too
Will come and help us out.
So come to meetings often
And help with hand and heart.
Don't be 'just another member'
But take an active part.
So think this over, member
You know the right from wrong.
Are you an ACTIVE MEMBER
Or do you JUST BELONG?

"That dame is some kind of a nut! She said I should take my QRM and put a lot of DX between here and my next QSO!"

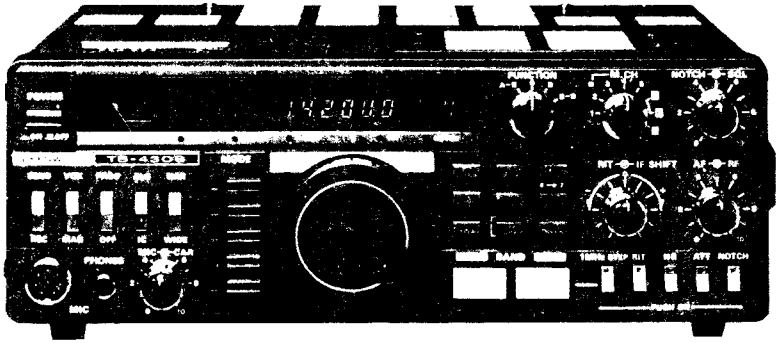
# HI !




# KENWOOD TS-430S

## HF TRANSCEIVER

# The D'XERS Choice



# IT'S GOT IT ALL

* BASE OR MOBILE APPLICATION
* SSB-AM-CW-FM-GENERAL COVERAGE

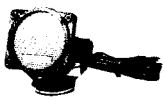
- 160-10 Metre operation, including new bands.
- General coverage receiver 150kHz-30MHz.
- Dual VFO's - built in.
- 8 Memory channels.
- Memory scanning.
- Lithium battery memory back-up
- Programmable band scan.
- I.F. Shift
- Notch filter.
- Speech processor.
- All mode squelch circuit.
- Noise blanker
- R.F. Attenuator.
- Vox circuit.

**OPTIONAL ACCESSORIES**

**PS-430**
DC Power Supply

**SP-430**
External Speaker

**SP-40**
Mobile Speaker



**AT-130**
Antenna Tuner

* PLUS A HOST OF OTHER GREAT FEATURES.

## P.E. CAR RADIO & COMMUNICATIONS

INCORPORATING

## SUMMIT DISTRIBUTORS

662 MAIN STREET
P.O. BOX 500
PORT ELIZABETH 6000

PHONE:
54-4545
54-7223

MasterCard VISA

**SEE DICK ZS2RS**

**USE YOUR CREDIT CARD**

KENWOOD

JLE1