Q S X
P E

Port Elizabeth Branch of the

South African Radio League

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

Chairman's Christmas Message

Another year has all but drawn to a close, and it has been a memorable year for the Branch, the national AGM at Easter being the highlight.
Feedback and comments indicate that we set something of a standard with our efforts over that weekend, but none of it would have been as it was were it not for the devotion of our then Chairman, Dick ZS2RS and the committee members who assisted for the two years leading up to AGM '84, as well as you, the members, who so willingly responded to the request for funds towards the project.
The other events in which the Branch participated, Hobbies Fair, JOTA, Field Day etc. all showed the same spirit of co-operation and willing assistance by members, and this has been most heartening, particularly to me, being new in the "hot-seat".
A number of our new and newly-licenced members are always very much in evidence whenever help is needed, and this is very gratifying indeed.
We remember too, at this time of year especially, those who are no longer with us, and our thoughts go out to their families.
Several of our members are at present facing the future with uncertainty as the economic situation places increasing pressure on their saltmine activities. To these families especially, and to all of you and yours, may you find strength and happiness in the Message of Christmas, and I wish you a very prosperous 1985.

Brian ZS2AB.
CHAIRMAN.

COMMITTEE

CHAIRMAN:	Brian ZS2AB (303498)	VICE CHAIRMAN:	Dick ZS2RS (322111)
SECRETARY:	Marge ZS2OB (303498)	TREASURER:	Pete ZS2PJ (301493)
MEMBERS:	Trevor ZS2AE(321746)		Gordon ZS2GK (306776)
	QSX-PE: ZS2OB and ZS2AB.		

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bulletin roster

16th December	Brian ZS2AB
23rd December	Dick ZS2RS
30th December	Marge ZS2OB
6th January	Pete ZS2PJ
13th January	Trevor ZS2AE

A merry Christmas
and a
Prosperous New Year.

THIS and THAT

CONGRATS

to Langley Lookwhy ex ZR2FC who has now passed his cw test and can be heard on all bands with his new call of ZS2LW. Also to Bevan Gwilt with the call ZS2RL. Good dx-ing.
To Percy Buckley ZS2RM who notched up 502 contacts, with 150 countries 68 zones and 316 000 points during the recent CQ WW CW contest.
To Gus ZS2MC and Shirley Winter who became grandparents to another granddaughter and to Ron ZS2MF and Dot Clarke who became grandparents to another grandson. Keeping it in the family?
To Mike Bosch ZS2FM who established a 6m meteor scatter record with ZS6OB in Thabazimbi, a distance of 1045km. Well done Mike.

SICK LIST

We are sorry to hear that Bette Goodman ZS2LO is in hospital in Cape Town for treatment and also that Jeff Bowes Taylor ZS2GJ was in hospital for several days after an operation. We hope that you will both be out and about very soon. Get well.

THANKS

Very many thanks to Julie and Trevor Scarr ZS2AE who once again opened the hospitality of their home to the Branch for the Branch Christmas Party. There was a good crowd and it was evidently enjoyed by one and all.
Thanks also the Derek and Gaynor Betts who gave us the use of their property for the children's Christmas Party which seemed to go off magically, in spite of the Secretary ending up with a red face and the Chairman being taken for one of the milk-giving bovine variety!

Rovers

Many of our members will be travelling around for their holidays. Included in these are Basil and Ros Gibson ZS2PG and Colleen and Wendy who have gone to England and Ireland. They will be in Liverpool for Christmas - a white one?
Trevor ZS2AE and Julie Scarr will be at their holiday home at Bushmans River for a while but coming back for a family Christmas Dinner.
Colin ZS2AO and Marlene ZR2ED Ashwell and family will be camping at Cape St. Francis and hope to be operating /portable from there.
Staying in their home while they are away, will be Chris ex ZS2CJ and Molly Els. Alan ZS6BTI and Naydene and Aulene Smith will be in Port Elizabeth on holiday for a few weeks.

Licences

By now, all of you should have received your renewal of licence notices which are due at the end of December. Please pay these promptly so as not to be in danger of losing your licence. Also remember, if you change your address, you must notify the P.M.G. within fourteen days.

COMPETITION

At a recent Branch meeting, the question of the Branch having QSL cards printed in bulk arose. This received favourable reaction and it was decided to hold a competition in conjunction with this, with a prize of some of the QSL cards. To be in line for this prize, all you need to do is to bring a sample of a card you think would be the most suitable to the January meeting and the best one will be chosen for printing. SO PUT ON YOUR THINKING CAPS AND LET'S SEE YOUR CARDS.

ROBIN HOOD II

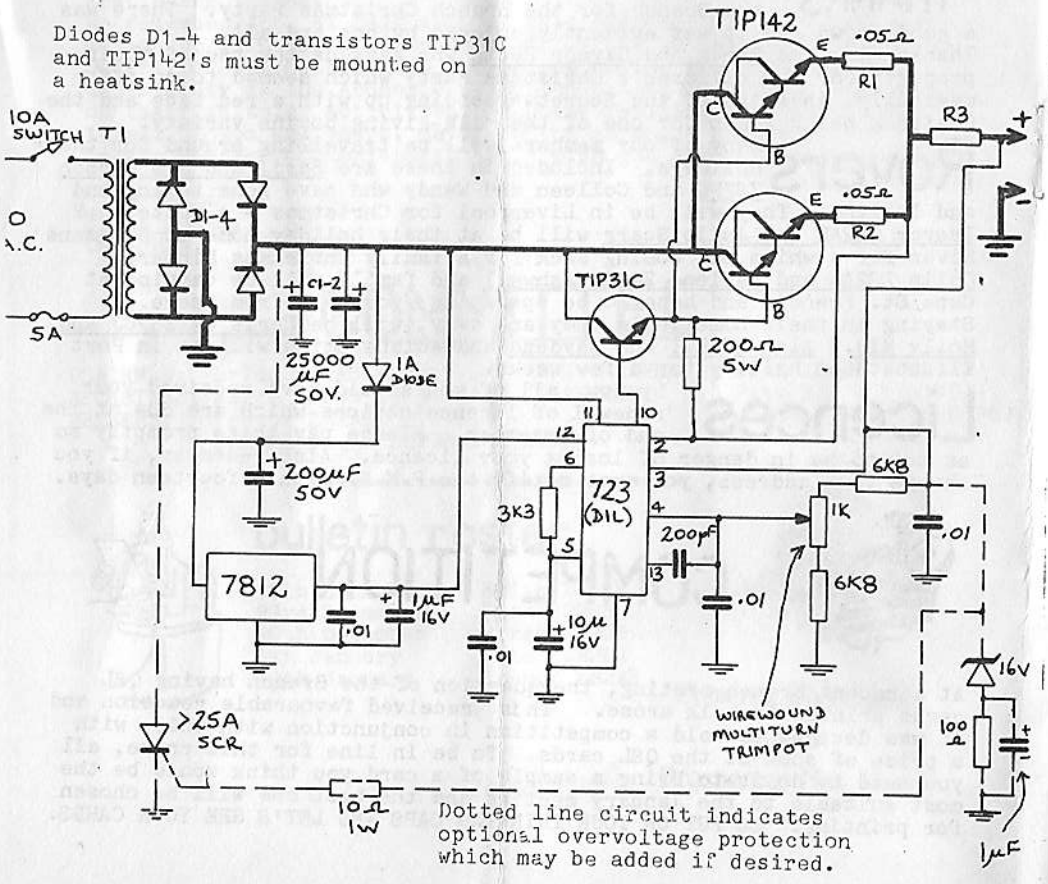
A 20 AMP 12 - 15V POWER SUPPLY (with current limiting, good regulation and low ripple).

Since the design of the "ROBIN HOOD" power supply some time ago, after appearing in QSX-PE and Radio ZS, a fair number were built throughout the country and it proved itself reliable. Now some 6 years later I have reviewed the design and incorporated a number of improvements. The output transistors, formerly 2N3055's are superceded by high efficiency Darlingtons - a bit more expensive, perhaps, but giving improved regulation and less ripple. There are newer regulators than the venerable 723 but it still remains my favourite except it is now fed from a constant voltage supply generated by the inexpensive 7812 and well worth adding. RF rejection has been improved, and ripple is very low (+/- 10mV). Regulation on the prototype was good with output droop of less than .25v from no load to 15 amps.

That's all. Good building and call if any further information is required.

73 from Peter ZS2PD.

Diodes D1-4 and transistors TIP31C and TIP142's must be mounted on a heatsink.



PARTS LISTING: (Where not shown in sketch).

T1 = Mains transformer 250v ⟶ 18-20v @ required current (10-20amps) (ex battery fast charger will work well especially if tapped)

D 1 - 4 - 50v 25 amp bridge rectifier or 4 automotive alternator diodes Note - can be mounted on same heatsink as 2 power transistors.

C1-2 = Main smoothing caps. - Connect any number in parallel to achieve at least 10 000 µfd. 25000 µfd would be better. Minimum voltage rating NOT to be less than 1,5 x transformer open circuit voltage. Suggest 50v to be safe (electrolytics 'hiss' for a few seconds before exploding violently - don't take any chances though).

T1-2 = T1P142 Power Darlington transistor - don't substitute with conventional units, these have necessary high gain and must be mounted to LARGE heatsink to dissipate at least 100 watts of heat. (Transistors available from Electronic Research Labs in Cape Town).

R1,2 = Power sharing resistors to ensure each transistor shares load. ,05Ω @ 10w each (suggest 6 off ,33Ω 5w in parallel or suitable length of heavy gauge resistance wire securely clamped at each end).

R3 = ,05Ω @ 10watt - as above for current limit of =/- 20 amps.

All ,01µfd condensors are disc ceramic for RF bypassing.

Constructional Comments.

Thick lines in diagram indicate HEAVY wiring (at least 6mm dia)

If possible connect all earthed points together and ground to chassis at one point to prevent RF pickup/instability due to ground loops.

Suggest all transistors and rectifiers be mounted to a common heat sink which in turn must then be insulated from the chassis.

Trimmer pot should vary output voltage between 12-15v. Exact range will depend on i.c. - change 6K8 resistor valves to change if necessary.

Don't skimp on the heat sinking - 2 x 200mm lengths of standard extruded aliminium heat sink painted matt black would not be too little! Or even blower cooled if current in excess of 15 amps are to be drawn for minutes at a time.

An optional output overvoltage protection is shown to protect a rig in the event of power transistor short circuit failure.

(Thanks Peter. Ed.)

Primitive Sea Scavengers

A relic of the distant past, Sharks have survived 350 million years of fierce competition for food and a space to live. Powerfully swift and ranging in size up to 16 metres, they can be terrifying and utterly unpredictable predators with an appetite for everything from plankton to people.

Sharks, together with rays & skates, are a class anatomically unique amongst all the diverse creatures that inhabit the seas. The anatomy of the Shark is a mixture of the ancient and modern. The cartilaginous sharks are both more primitive and more advanced than the bony fishes. Sharks lack bony gill covers, their gills show as a row of slits on either side of their bodies just behind their heads. Some species just have a pair of openings called the spiracles near the eyes.

The placement of fins is not as advanced as in the bony fish, but the claspers of the pelvic fins do allow the males to copulate with the females in a much more up-to-date method than the wasteful external fertilization used by bony fishes.

The shark has not developed a gas bladder therefore must keep in motion to avoid sinking. Its brain is small, but it has a huge smelling organ (the olfactory bulb) which gives it one of the keenest noses among all the fishes.

The Sharks intestines are highly efficient, compensating for its shortness by a spiral structure that gives a maximum absorptive surface. Of course, Sharks are a big and an untrustworthy family. There are many species or varieties around. From about 250 species only 12 are a true and constant menace. The emphasis is that all sharks, even if they are not man-eaters, cannot be trusted, with the exception of the Whale-shark and Basking Shark, both plankton eaters and so peaceful that even swimmers have ridden on their backs without disturbing them.

Sharks are predatory, they possess a catholic diet and ravenous appetities. Their staple diet is usually other fishes, but sometimes the larger ones eat Sea Turtles, seals and even members of their own kind.

There is not a bone in its body. The shark's skeleton is composed of cartilage, therefore this disintegrates more rapidly than bone, making it difficult to trace records. It is a poor material for fossilisation. Most shark fossils consist of teeth and spines or a few calfified vertebrae and brain cases. A well preserved fossil of the entire animal is rare. Some good fossils of the earliest sharks were found in the late Devonian shale deposits in Ohio USA, (the Devonian period spans 305 to 405 million years ago), with impressions of the skin and body, traces of muscle and kidney tissue. With a handful of fossilized teeth, today's Palaeontologists can deduce the nature of the shark to which they belonged.

This is an easy task and not as frustrating as it seems, since living types include archaic species as the Port Jackson (Heterodontus Philippi) which goes back 181 million years, the Cow Shark dating 166 million years and a Cat Shark (Galeus Melastomus) a youngster with 136 million years of history.

To summarize, from about 63 million years ago all the contemporary families of Sharks, Skates and Rays came into being, giving us a link with the distant past.

Gordon Knapp ZS2GK

(Thanks Gordon. Ed.)

Heard any of these ?

ACTIVE 10-METER BEACONS - NOVEMBER, 1984.

Frequency	Call	Location	Remarks.
28,2025	ZS5VHF	Natal, South Africa	Also on 50,005 and 144,125
,205	DLØIGI	S. Germany	Most consistent European
,210	3B8MS	Mauritius	
,212	ZD9GI	Gough Island	
,215	GB3SX	England	
,220	5B4CY	Cyprus	
,222	HG2BHA	Hungary	Last heard November 83
,227	ZL2MHF	New Zealand	Heard infrequently in 84
,230	BBC World Service (Harmonic)		Heard similar to GB3SX
,233	VP9BA	Bermuda	Good E_s Check
,237	LA5TEN	Near Oslo, Norway	
,245	A92C	Bahrain Island	Formerly A9XC
,247	ZS1CTB	S. Africa	
,250	Z21ANB	Zimbabwe	
,254	LU1UG	La Pampa, Argentine	Heard almost daily
,257	DKØTE	Germany	
,259	VK5WI	Adelaide Australia	
,261	VK2RSY	NSW, Australia	
,262	TU2ABJ	Ivory Coast	
,263	TR8DX	Libreville, Gabon	
,264	VK6RWA	Perth, Australia	Heard on short and long path
,269	ZS6PW	Pretoria, South Africa	Most consistent ZS
,270	VK4RTL	Townsville, Queensland	
,277	DFØAAB	Germany	
,273	9L1FTN	Sierra Leone	
,283	VP8ADE	British Antarctic	
,290	VS6TEN	Hong Kong	Anyone hearing this one lately?
,295	W3VD	Laurel, MD	
,298	PY2AMI	Sao Paulo, Brazil	Heard almost daily
,300	ZS1STB	South Africa	

Some frequencies are approximate. Other beacons heard occasionally in 1984: EA3VHF, EA6AU, EA7AML, DJ6VQ, LUs 2FFV, 4FM, 4HH, 8EB, OA4CK, VE2TEN, VE3TEN, YV5AYV, ZS3HL, ZS6DN. Except as noted in the tabulation, all beacons listed by frequency are believed to be operating continuously, though this is not easy to check at present muf levels.

Ed. Tilton W1HDQ. ARRL HQ.

(Thanks to Percy ZS2RM)

'n Geseënde Kersfees

en 'n

Voorspoedige Nuwe Jaar.

The Radio in Space.

The 2-meter operation by Owen Garriott W5LFL on board the space shuttle Columbia is now history. Many lucky amateurs made two-way contact with Dr. Garriott, and untold thousands listened to his signal from space. Having been in assorted hamshacks when contact was established we can attest to the joyful bedlam that followed confirmation of contact. If such scenes were common in those stations that heard their call returned from space, there must have been a lot of extremely happy hams around the world!

Early phases of the program to put an Amateur Radio transceiver aboard Columbia have been documented in QST articles. The effort to build the radio to be used on this flight was thoroughly enjoyed by all the members of the Motorola Amateur Radio Club of Fort Lauderdale who participated. Our task was to provide a handheld 2 meter radio that could be connected to the standard NASA headset, which includes earphones and a microphone. The Project Manager was Jim Worsham WA4KXY, Ron Alexander KA4ZLS served as NASA liaison for testing and qualification of the radio and battery for safety standards; Harold Sanderson WB4TTA assembled the radio, gave it a most exacting final test and co-ordinated the frequency programming with NASA and W5LFL; John Ray WB4BFS designed and assembled the interface box; Bruce Burke WB4YUC provided test equipment and fixtures and Tom McMullen W1SL provided documentation and circuit-board layout.

The portable radio used by W5LFL on the Columbia is basically a standard Motorola MX300-S series, frequency-synthesised Handie Talkie radio. These radios are used by many law-enforcement officers, public-safety agencies, fire departments and commercial interests throughout the world.

The radio is microprocessor controlled, and of modular construction. It is capable of generating up to 96 separate frequencies (48 transmit and 48 receive) by reading control information encoded in a PROM (programmable, read-only memory). Frequencies are selected by means of switches on top of the radio. A "zone" switch selects one of four "zones", or groups of frequencies, and a frequency-select switch picks one of 12 frequencies for each zone.

Each major circuit is contained in a sealed module for ruggedness and protection against most environmental problems, and these modules plug into a four-layer circuit board that is held in place by rails in the Lexan frame. Controls and battery power are connected to the main circuit board by means of "flexes" that consist of metal conductors bonded between layers of tough, flexible plastic. This type of construction allows easy troubleshooting and servicing.

The synthesizer reference frequency is provided by the 3,6 MHz crystal-controlled oscillator. Programmable frequency dividers in the controller/phase detector assembly are controlled by the microprocessor. The microprocessor obtains the transmit and receive-frequency information from the PROM.

The controller provides voltage to the VCO. In turn, it supplies an RF sample to the controller for frequency division and comparision with the product of the reference oscillator.

In the transmit mode, the VCO output is applied to a transmit PLL processor that locks the transmitter VCO to the programmed frequency. This VCO operates at the output frequency. Audio modulation is applied to the synthesizer VCO which applies it to the transmitter VCO through the phase-detector and locking circuitry. FM output from the transmitter

is amplified to a 5-W output level and filtered before being routed to the antenna relay and antenna.

During receive, synthesizer VCO output is applied to a multiplier that is part of the receiver preselector assembly, where the frequency is doubled to provide receiver injection for the first mixer. Incoming signals are amplified before being applied to the RF preselector and mixer. Mixer output is at 21,4 MHz. Filtering and two stages of IF amplification follow the mixer and the signal is then applied to a crystal discriminator. Discriminator output is routed to audio-amplifier and squelch stages. Full audio output is 500mW. Normally a built in speaker in the front of the case is used, but audio output is also available at an earphone jack on top of the radio and at an accessory connector on the side.

Audio for the interface box as used in the Columbia was taken from the accessory connector. Similarly, a built-in microphone is normally used for transmitting but the NASA headset microphone was interfaced to the radio through the accessory connector. The push-to-talk (PTT) circuit and other internal circuits are also accessed through this connector. More about this in the description of the interface box.

Radio battery power is provided by a sealed 7,5V NiCad battery. Batteries are available in various sizes: four 2000 miiliampere-hour batteries were provided to W5LFL. They proved to be quite adequate for the nine-day mission. Battery life is an important consideration, because no provisions were made to recharge them from the shuttle electrical system.

Modifications to the standard MX300-S radio were minimal: the agreed-upon frequencies were programmed into the PROM and the transmitter power output was reduced to 4 watts to prolong battery life.

Electrical and mechanical connections between the radio and the rest of the system are provided by the interface box. It matches the impedances and levels of the headset/microphone and the radio. Power for the headset microphone preamplifier comes through the interface box, and transmit and receive audio for a tape recorder are provided by the amplifier circuitry in the box. Also connections for the headset, tape recorder and radio are made through this interface. As an example of the details that had to be worked out, the drawing of the box, connectors and cabling required had to be supplied to NASA long before launch so they could provide secure storage for the equipment.

Three design constraints affected the mechanical and electrical configuration of the interface box. First the total current drain had to be less than 1 mA. This is because the supply voltage from the radio, through the accessory connector, is fed through a 1-kΩ current-limiting resistor.

Second, all materials used had to be approved by NASA. This is necessary to ensure that everything has acceptable levels of resistance to flammability, toxicity and outgassing. (Outgassing is a tendency of plastics and other materials to emit gasses when heated, cooled or subjected to oxygen-rich atmospheres). These considerations are extremely important when you cannot open the window and get some "fresh air"!

Finally the box had to be as small as possible. A bulky, hard-to-manage system is difficult to use and reduces operator efficiency.

Interface-box circuitry consists of three parts: a voltage regulator, an audio amplifier and an audio mixer. The regulator handles the supply voltage from the accessory connector on the radio, removing any voltage variations caused by the 1 kΩ current-limiting resistor in the MX300-S radio. The regulated voltage is applied to the headset microphone preamplifier and to the amplifier/mixer in the interface box. One section of the op amp serves as this voltage regulator.

To minimize current drain, the audio amplifier uses the Siliconix L144CJ micropower, programmable, operational amplifier. This device works just like any other op-amp, except that you can 'programme' its current drain. The drawback to this is that the less current you let it have, the less bandwidth it will let you have! Since all the signals through the interface box are at audio frequencies, this bandwidth limitation is not a problem. The total interface-box current drain is approximately 0,5mA.

Speaker audio from the Mx300-S accessory connector is applied directly to the earphone. Microphone audio is amplified and a proper impedance match is provided, before the signal is routed to the accessory connector. An audio mixer in the interface box combines receiver and microphone audio and routes it to a tape-recorder jack. The interface box PTT switch keys the transmitter and turns off the audio amplifier in the receive mode. This prevents background noise from being applied to the recorder through the microphone circuit while the radio is in the receive mode.

To achieve a high degree of reliability, leadless (chip) components are used. These chips are very small and have low profiles. They are soldered directly to the etched circuit board. This minimizes the number of wire leads that can fail because of vibration. The box is cast aluminium with an anodized finish. Wire insultation and other plastic parts are either Teflon or nylon; the hardware is stainless steel and the circuit board is glass-filled epoxy.

Great effort was extended to design a VOX circuit in the early prototype box. This was a difficult task because of the supply current limitation from the radio. Several versions were tried, but none had the proper amount of hysteresis (the difference between turn-on and turn-off levels) for a reliable VOX circuit. At the last minute, a decision was made to forego this convenience - a decision that later proved fortunate. After the mission, W5LFL reported that the cabin background noise was so strong that he sometimes had difficulty understanding people even when their signals were full quieting into the receiver. That amount of noise would very likely have upset even our best efforts at VOX reliability.

Although the bulk of the work on this project was done after hours and at home on weekends, there were some things that just had to be taken care of during normal business hours - phone calls to agencies involved, equipment to be obtained for the next phase and other tasks. We sincerely acknowledge the support of our supervisors and management at Motorola in Fort Luaderdale and in Schaumberg, Illinois.

Stepping back and looking at what we've learned from this project, the results are mostly positive. The circuit is really nothing out of the ordinary: an audio amplifier and a voltage regulator. Electronically, our expertise improved because we entered the new, tiny dimension of leadless components. Those things are usually placed on circuit boards by means of automatic machinery, not by shaky fingers and tweezers!

Also, working with all the great people involved in the space programme was very educational and uplifting. Working to specification and a deadline far outside what is normal in Amateur Radio provided a challenge that we're happy to have met, and would gladly do again.

Now, about that first manned mission to Mars.....

By Thomas McMullen W1SL, Jim Worsham WA4KXY and Harold Sanderson WB4TTA.

Acknowledgements to QST, August 1984 and thanks to Lionel ZS2DD.

Propagation News

Propagation forecast bulletin Nr. 48 from ARRL Headquarters.

After ten weeks at close to quiet sun levels, the solar flux started upward on November 17. From 72 it rose to 85 by the 25th and may continue upward another day or two. This rise came as geomagnetic activity was declining, making for some of the best propagation of the autumn DX season. Improvement was most marked on 21mHz. On 28MHz there was some propagation to Africa from Eastern USA and North/South conditions were good. Geomagnetic activity will be rising after about the 27th and propagation will be more variable through about Dec. 10th. The major geomagnetic disturbance of mid November will recur, probably at lower levels about December 13 to 15. It is too early to tell if the new solar activity in recent days is more than a brief event. It could signal a critical period which predicitions based on the rotational period of the sun become unreliable.

CQ DX CQ DX CQ DX

DX BULLETIN NR. 44 FROM ARRL HEADQUARTERS.

American Samoa: NH6J/NH8 made over 3000 contacts in the CQWW contest. He is now QRT. He has left a 160 meter antenna with AH8A who plans future 160 meter operation.

Fernando de Noronha: PYØFJ has been active on 7005 KHz. He is also in a net on 3787KHz ssb and works 80 meter cw. QSL to PY2AFK. PYØFK has also been active.

Crete: WØPU/SV9 is back in Crete and plans to have all his antennas up soon. He has been active on 3,5 and 7MHz. QSL via WB4TDB.

Mongolia: JTØAPE has been active on 3503KHz.

Prince Patrick Island: Look for VE8MC around 14190 KHz.

Franz Josef Land: RZ10WA has been active on 40 meter cw.

Malagasy Republic: 5R8AL still does not have permission for 80 meter operation because the band is allocated to the military. He has been on 40 meter ssb regularly at his sunrise on Saturdays.

Madeira: CT3BZ will be active. QSL to SMØGMG.

Malawi: 7Q7LW has been worked on 7007 KHz at 0400Z.

(Thanks to Percy ZS2RM for this news)

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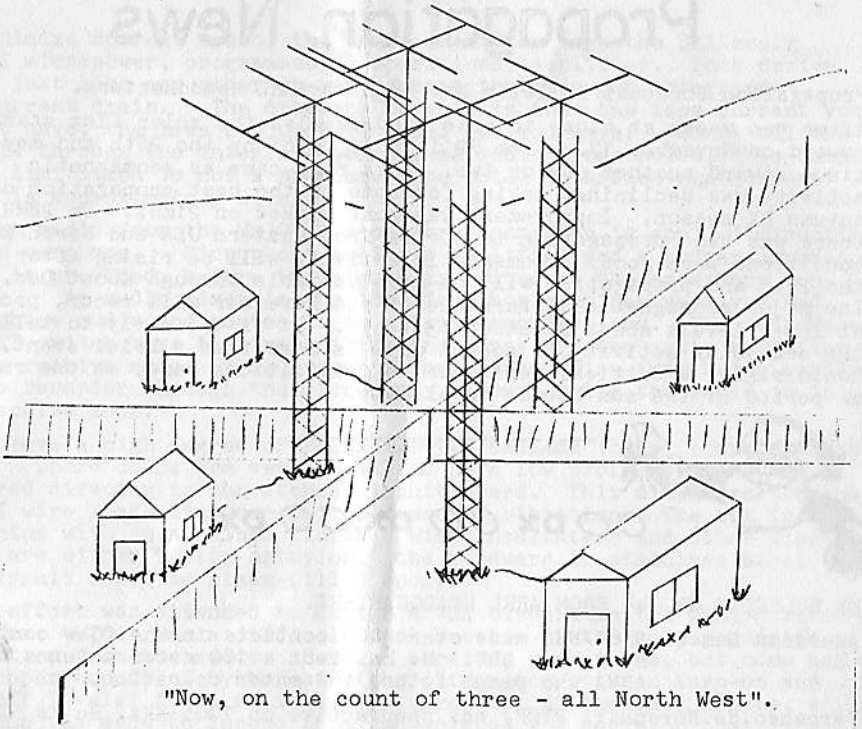
for sale

FT 101B HF Transceiver in good working order. May be tested in the shack of Andre ZS2BK. Price R350. Contact Andre on 307078 after hours.



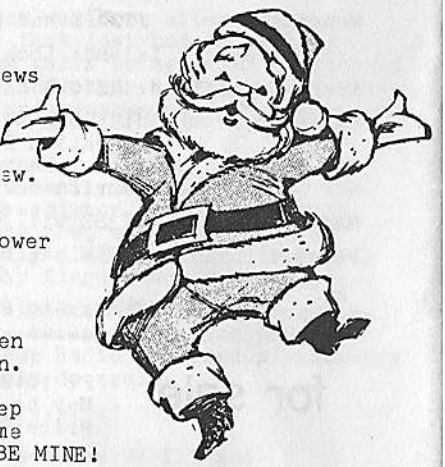
"Now, on the count of three - all North West".

THE HAM'S PRAYER.

Dear Lord, help me to design
A power supply that would be mine.
Every night that is my prayer,
Really, guys, it isn't fair.
Each time you read QSX news
Which is the voice of P.E.'s views
You'll find a circuit diagram
Thought up by another Ham.

June, July and August too
Every month there's something new.
Last month's now is superceded.
Do you really thinkit's needed?
Between us we should have the power
To light Soweto by the hour.

So each night as I go to bed
To rest my tired and weary head
I have a rap to the Ham in Heaven
That one day help to me be given.
Now as I lay me down to sleep
Circuit diagrams around me creep
You'll read of me one day in time
And the Power Supply - IT WILL BE MINE!



A Nonny Mouse.

(Acknowledgments to Shack News.)