

April 2003

Volume 3, Issue 9

ANODE

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Editor's Comments

April Issue

What with Witchcraft and hard drives not failing, its been a noisy month. The main article below was featured in April's 1970 Wireless World and is a classic of all the April articles.

Radio Honours: World Amateur Radio Day

Amateur Radio Supporting Education' is theme for World Amateur Radio Day. Its coming up real

soon. RSGB newsreader Jeremy Boot, G4NJH, is here with the details:

The theme of this year's IARU World Amateur Radio Day is to be 'Amateur Radio supporting technology education in the classroom'.

World Amateur Radio Day is marked on the 18th of April each year to commemorate the anniversary of the founding of the International Amateur Radio Union on that date in 1925.

Ole Garpestad, LA2RR, the Chairman of IARU Region 1 writes: "There is no doubt that the future of amateur radio belongs to those that are now in the classroom. In keeping with this theme, I would like to encourage every society in the Region to let our young people know that amateur radio is a unique hobby - simultaneously sport, scientific study, personal pleasure and collective activity. And

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Dynamic Range Vs Ambient Noise

A practical solution involving metal-cone loudspeakers and high-power amplifiers
by George Izzard O'Veering

The essential requirements for a high quality sound reproduction system are adequate power and adequate bandwidth. Since loudspeakers are inefficient, and the attainment of wide bandwidth systems is generally incompatible with high efficiency, the achievement of the desired acoustic spectrum

from the subsonic to the ultrasonic makes heavy demands on amplifier output.

Moreover, it will be apparent on reflection that many of the musical and other instruments, the acoustic output of which it is desired to reproduce, are themselves both powerful and developed to a high degree of acoustic efficiency. It is clearly laughable to suppose that the majestic splendour of a full orchestral fortissimo or the lung

power of a Wagnerian tenor in full cry can be represented adequately on an acoustic budget of a few hundred milliwatts. Inconvenient though it may be, there can be no doubt that to recreate the true dynamic range of much recorded sound over the required sonic spectrum makes demands on the output power of the audio amplifier/reproducer system which are well beyond the capabilities of most, if not all, of the equip-

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Special points of interest:

- Contact details on back page

Editors Comments

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that radio amateurs today are voluntary and selfless researchers in the technological field of amateur radio, an important resource to every country, and something to be proud of."

"But the 18th of April is not only a day to think about our future, it is our day, a day for celebration. All of us, societies and individuals, can celebrate in our various ways - organizing presentations, club meetings, parties, honouring senior radio amateurs who go back to the early years of IARU, or just putting our equipment on the air and making just a single QSO on this day, so realizing how

large our ham community is."

Jeremy Boot, G4NJH

Again, the date for this years World Amateur Radio Day is Friday, April 18th. (GB2RS)

Radio That Can Make You Sick

And finally this week, it appears that some hams may be facing a new health threat ... especially if they eat while operating the radio. Roving correspondent Pierre Pullinmyleg is back from his self imposed exile and filed this report on Tuesday, April 1st:

For decades, wives of radio amateurs have said that ham radio makes them sick to their stomachs. Now, it seems that ham radio may actually DO that.

The French Office of Oohs and Lalas, or FOOL, has been studying reports of amateurs falling ill after eating while operating during certain band openings on 6 and 10 meters. Officials at FOOL have determined that the problem occurs only during periods of sporadic-E propagation and believe that the radio waves carry with them into the shack of ham some of the ionisation from the E-layer of the ionosphere.

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A Story About 'Magic'

Some years ago, I (GLS) was snooping around in the cabinets that housed the MIT AI Lab's PDP-10, and noticed a little switch glued to the frame of one cabinet. It was obviously a homebrew job, added by one of the lab's hardware hackers (no one knows who).

You don't touch an unknown switch on a computer without knowing what it does, because you might crash the computer. The switch was labelled in a most unhelpful way. It had two positions, and scrawled in pencil on the metal switch body were the words 'magic' and 'more magic'. The switch was in the 'more magic' position.

I called another hacker over to look at it. He had never seen the switch before either. Closer examination revealed that the switch had only one wire running to it! The other end of the wire did disappear into the maze of wires inside the computer, but it's a basic fact of electricity that a switch can't do anything unless there are two wires connected to it. This switch had a wire connected on one side and no wire on its other side.

It was clear that this switch was someone's idea of a silly joke. Convinced by our reasoning that the switch was inoperative, we flipped it. The computer instantly crashed.

Imagine our utter astonishment. We wrote it off as coincidence, but nevertheless restored the switch to the 'more magic' position before reviving the computer.

A year later, I told this story to yet another hacker, David Moon as I recall. He clearly doubted my sanity, or suspected me of a supernatural belief in the power of this switch, or perhaps thought I was fooling him with a bogus saga. To prove it to him, I showed him the very switch, still glued to the cabinet frame with only one wire connected to it, still in the 'more magic' position. We scrutinized the

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Dynamic Range Vs Ambient Noise

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ment at present on the market.

Calculation of required power

The quietest sound which can be heard in a given environment depends entirely upon the background noise level of that environment. Unfortunately, most people live in close proximity to traffic, neighbours with television sets, dogs, and noisy children, and these things, together with the normal background sounds of the home, combine to give an ambient noise level of about 50dB. The minimum sound level which can be distinguished

clearly above this background level is therefore 53dB. The dynamic range of orchestral music can be as much as 70dB, therefore in order to be able to hear the pianissimo as well as the fortissimo passages, a peak level of 123dB is required.

The acoustic power in watts required to produce a sound intensity level of 53dB is about 6uW for an average-size living room. Since a 10-dB increase in power output requires a tenfold increase in power, the 123dB peak-power level will therefore require a maximum acoustic output of some 50W. If the loudspeaker efficiency is 5% (and this is

significantly better than is obtained from most commercially available loudspeaker systems) a peak-power output of 1000W per stereo channel is obviously required if the total dynamic range of a symphony orchestra is to be heard in comfort.

It was clear from discussions both with manufacturers and distributors that no serious attempt had been made to meet the requirement for drive units capable of handling as little as 250W. Initial trials made with some of the more likely units, were generally unsatisfactory. In particular there was a tendency for the cone and speech coil to become detached, and

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A Story About 'Magic'

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switch and its lone connection, and found that the other end of the wire, though connected to the computer wiring, was connected to a ground pin. That clearly made the switch doubly useless: not only was it electrically non-operative, but it was connected to a place that couldn't affect anything anyway. So we flipped the switch.

The computer promptly crashed.

This time we ran for Richard Greenblatt, a long-time MIT hacker, who was close at hand. He had never noticed the switch before, either. He inspected it, concluded it was

useless, got some diagonal cutters and {dike}d it out. We then revived the computer and it has run fine ever since.

We still don't know how the switch crashed the machine. There is a theory that some circuit near the ground pin was marginal, and flipping the switch changed the electrical capacitance enough to upset the circuit as millionth-of-a-second pulses went through it. But we'll never know for sure; all we can really say is that the switch was {magic}.

I still have that switch in my basement. Maybe I'm silly, but I usually keep it set on

'more magic'.

1994: Another explanation of this story has since been offered. Note that the switch body was metal. Suppose that the non-connected side of the switch was connected to the switch body (usually the body is connected to a separate earth lug, but there are exceptions). The body is connected to the computer case, which is, presumably, grounded. Now the circuit ground within the machine isn't necessarily at the same potential as the case ground, so flipping the switch connected the circuit ground to the case ground, causing a voltage drop/jump which reset the

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for fraying of the surround. In addition, the failure was often made more serious by partial combustion of the inflammable materials within or in proximity to the speech-coil assembly.

When more substantial reproducer units had been evolved, this only brought to fight the flimsy nature of the housings which had been supplied, and considerable annoyance was caused by a minor injury sustained when one of the cabinets burst during an orchestral transient and the room was filled with flying splinters. At this stage it was accepted that the cabinets used would require to be of comparable strength to the reproducers, and the assistance of the specialist who constructed the metal cone loud-speaker assemblies was sought to manufacture four sheet-steel column-loaded units, of a suitable type to take the 23in X 14in elliptical wide-band speakers. These are situated at the four corners of the listening room and the opposite units are connected in parallel but in antiphase. This has the effect of increasing the apparent dimensions of the listening room, in addition to reducing the I^2R losses in the speaker wires.

Each unit is rated at 500W, with a nominal 20 Ohm impedance. The required output from the amplifier is therefore 10A at 100V r.m.s. (282 volts pk-pk) per channel.

Power amplifier design

The use of a solid-state, transformerless, amplifier to provide an output of 1 kW into a 10 Ohm load imposes certain limitations on the designer. In particular, the normal complementary or quasi-complementary output stage configurations are no longer practicable since the only useful and relatively cheap high-voltage transistors which are available are all of the n-p-n construction.

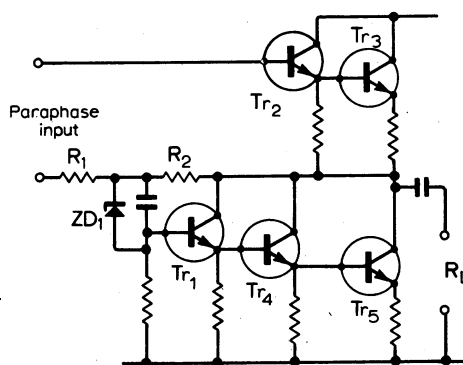


Fig. 1. Symmetrical output stage using only n-p-n transistors.

The basic output stage configuration employed, to provide a fully symmetrical push-pull class B output stage using only n-p-n transistors, is shown in Fig. 1. As shown, this would be satisfactory for power outputs up to about 50W.

In this circuit arrangement, Tr2 / Tr3 and Tr4 / Tr5 are Darlington pairs with TR2 and TR4 being normal small-power driver transistors. TR1 in combination with R1 and R2, provides the necessary signal level and amplitude transfor-

mation for the lower half of the output stage, and ZD1, effectively stabilizes the voltage level at the power output point. This is chosen so that the largest symmetrical voltage swing is obtainable. The symmetry of this stage is maintained up to a frequency determined by the resistance of R1 and R2 and the input shunt capacitance of Tr1. This will normally be well above the audible spectrum.

The final circuit employed is shown in Fig. 2. Although for simplicity only four parallel-connected output transistors are shown in each half of the output stage, this is only adequate for intermittent use at 11W output. In practice six parallel connected transistors are required in each half of the output stage.

The paraphase input is obtained from two medium-power high-voltage transistors, TR3 and TR4, the h.t. supply for which is obtained from a separately smoothed 400-V line, because bootstrapping is not practicable with this type of driver stage.

The input is derived from a long-tailed pair of p-n-p transistors, of a type chosen for high voltage linearity, and freedom from avalanche or collector leakage (Early effect) distortion. Although 50V is applied to the end of the 'tail', the maximum collector emitter voltage is limited to

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about 52V, because the base of Tr2 is returned to the 50V tap on the zener diode chain. A variable resistor is included in the 'tail' to set the current through TR1 and TR2. This controls the current through TR3 and TR4, and, since the output d.c. level is determined by ZD1, thereby controls the quiescent current of the output stage. This should be set to about 200mA. Because of the absence of coupling or bootstrapping capacitors the gain of the circuit from the base of Tr, to the output of the power transistors is constant from the h.f. roll-off point down to d.c. The U. roll-off point is therefore determined solely by the 2 uF input capacitor and the output

time constant.

The input impedance is 2k Ohm in series with 2 uF. The h.f. roll-off point and the phase stability margin is determined by C1, (the input-lag capacitor) C2 and R3 and C3 and R5. The loop gain is determined by resistors R1 and R2 and is approximately 100. The full output is given by an input of 1V r.m.s., which can be obtained from any suitable high-quality pre-amplifier capable of operating into a 2k Ohm load.

Constructional details

The construction of the power amplifier unit follows conventional lines, and no unusual

precautions are required apart from the need for generous heat sinks. Very satisfactory results were given in the prototype by the use of a pair of old cast-iron radiators, such as can be found second-hand for a few pounds in a builder's yard, to which the transistors can be individually attached by small bridges made from a suitably substantial gauge of copper sheet. The bottom and sides of an old copper preserving pan would be ideal. Care should, of course, be taken in drilling the attachment holes to make sure that the radiator shell is still capable of retaining water without leakage.

If such radiators cannot be

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Editor's Comments

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If food is present at the amateur's operating position, then the ions apparently interact with bacteria present in the food to cause food poisoning. The scientists have determined that this is a type of E-Coli contamination which they have named Sporadic-E-Coli, both because it occurs only sporadically and because it appears to be caused by sporadic-E radio signals. They recommend using audio filtration in order to "cleanse" the signals before they reach the speaker, which appears to be the major medium of transmission.

Reporting from the E-layer, this is Pierre Pullinmyleg for Newsline.

Pierre says that another option, of course, is to eat in the shack only during periods of F-layer propagation -- and then -- to only munch on chocolate F2 layer cake. (A Pierre Pullinmyleg Annual April 1st Exclusive Report)

and from South Africa.....

Ananova: Witchcraft blamed after dog 'gave birth to kittens'

A dog is reported to have

given birth to three kittens in South Africa where locals believe witchcraft is to blame.

The dog, Vodi, was found nursing the kittens at Winterveld, near Pretoria, and residents believe she gave birth to them.

Elijah Mhlanga, Vodi's owner, said her behaviour changed after she disappeared a while ago.

"I was worried when she disappeared. When she came back last Sunday, she was different. She hid from us and

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A Story About 'Magic'

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machine. This was probably discovered by someone who found out the hard way that there was a potential difference between the two, and who then wired in the switch as a joke.

extracted from the Jargon file.

.... And in case you didn't know about the Jargon file.....

The Jargon File, a comprehensive compendium of hacker slang illuminating many aspects of hackish tradition, folklore, and humour.

This document (the Jargon File) is in the public domain, to be freely used, shared, and modi-

fied. There are (by intention) no legal restraints on what you can do with it, but there are traditions about its proper use to which many hackers are quite strongly attached. Please extend the courtesy of proper citation when you quote the File, ideally with a version number, as it will change and grow over time. (Examples of appropriate citation form: "Jargon File 4.0.0" or "The online hacker Jargon File, version 4.0.0, 24 JUL 1996".)

The Jargon File is a common heritage of the hacker culture. Over the years a number of individuals have volunteered considerable time to maintaining the File and

been recognized by the net at large as editors of it. Editorial responsibilities include: to collate contributions and suggestions from others; to seek out corroborating information; to cross-reference related entries; to keep the file in a consistent format; and to announce and distribute updated versions periodically.

Editor's Comments

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stopped barking. She also refused to eat," he told the Daily Sun.

"On Monday my grandchildren called me and said Vodi had given birth to kittens. I did not believe them. I thought the puppies just looked like kittens to them."

Mr Mhlanga decided to go and see for himself and was shocked to find Vodi nursing three kittens which she tried to hide under her belly when people came to look.

Animal welfare officer Meshack Matlou said he had never seen anything like it: "We will do

some tests and the results will tell us what happened," he said.

Story filed: 10:13 Tuesday 1st April 2003

Introducing the new Bio-Optic Organised Knowledge device, trade-named: BOOK.

BOOK is a revolutionary breakthrough in technology: no wires, no electric circuits, no batteries, nothing to be connected or switched on. It's so easy to use, even a child can operate it. Compact and portable, it can be used anywhere - even sitting in an armchair by the fire - yet it is powerful

enough to hold as much information as a CD-ROM disc.

Here's how it works:

BOOK is constructed of sequentially numbered sheets of paper (recyclable), each capable of holding thousands of bits of information. The pages are locked together with a custom-fit device called a binder which keeps the sheets in their correct sequence.

Opaque Paper Technology (OPT) allows manufacturers to use both sides of the sheet, doubling the information density and cutting costs.

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Dynamic Range Vs Ambient Noise

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found, a copper hot water storage cylinder would serve admirably, but it would probably be more difficult to introduce such an item inconspicuously into the listening room. The siting of the output transistors should combine shortness of signal leads with the required thermal separation of the power transistors one from another. It should also be borne in mind that the circulating currents at full power are of the order of 30A. The leads to the loudspeaker terminal bosses for which old car battery connectors are suggested to the collector and emitter rails of the output transistors, and to the h.t. and earthy ends of the

h.t. decoupling capacitor block must be substantial. A in 3/8 in x 1/4 in bore copper pipe is preferable, but as an alternative, lengths of 12 s.w.g. copper wire may be plaited together.

After assembly, it is recommended that the amplifier units be bench tested on a dummy load before attachment to the speaker units, since quite trifling faults can lead to a surprising amount of energy being released. For example, in preliminary listening trials with the prototype, an intermittent o/c in the earth braiding on an input to the pre-amp, led to the necessity for the listening room ceiling to be substantially re-

stored and replastered.

Listening arrangements

Although the results obtained with good quality gramophone recordings have been most astonishing, and have brought home to the author in the most vivid way the qualities of stamina and emotional detachment required of an instrumental player situated, as the fortunate listener, in the midst of a large orchestra, it is clear that there are a large number of residual problems the life-like reproduction of disc recordings, of which the major one is the avoidance of acoustic feed-

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Editor's Comments

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Experts are divided on the prospects for further increases in information density; for now, BOOKS with more information simply use more pages. Each sheet is scanned optically, registering information directly into your brain. A flick of the finger takes you to the next sheet.

BOOK never crashes or requires rebooting, though, like other devices, it can become damaged if coffee is spilled on it and it becomes unusable if dropped too many times on a hard surface. The "browse" feature allows you to move instantly to any sheet, and move

forward or backward as you wish. Many come with an "index" feature, which pinpoints the exact location of any selected information for instant retrieval.

An optional "Bookmark" accessory allows you to open BOOK to the exact place you left it in a previous session - even if the BOOK has been closed. Bookmarks fit universal design standards; thus, a single Bookmark can be used in BOOKs by various manufacturers. Conversely, numerous BOOK markers can be used in a single BOOK if the user wants to store numerous views at once. The number is limited only by the number of

pages in the BOOK.

You can also make personal notes next to BOOK text entries with optional programming tools, Portable Erasable Nib Cryptic Intercommunication Language Styli (PENCILS). Portable, durable, and affordable, BOOK is being hailed as a precursor of a new entertainment wave. BOOK's appeal seems so certain that thousands of content creators have committed to the platform and investors are reportedly flocking to invest. Look for a flood of new titles soon.

Dynamic Range Vs Ambient Noise

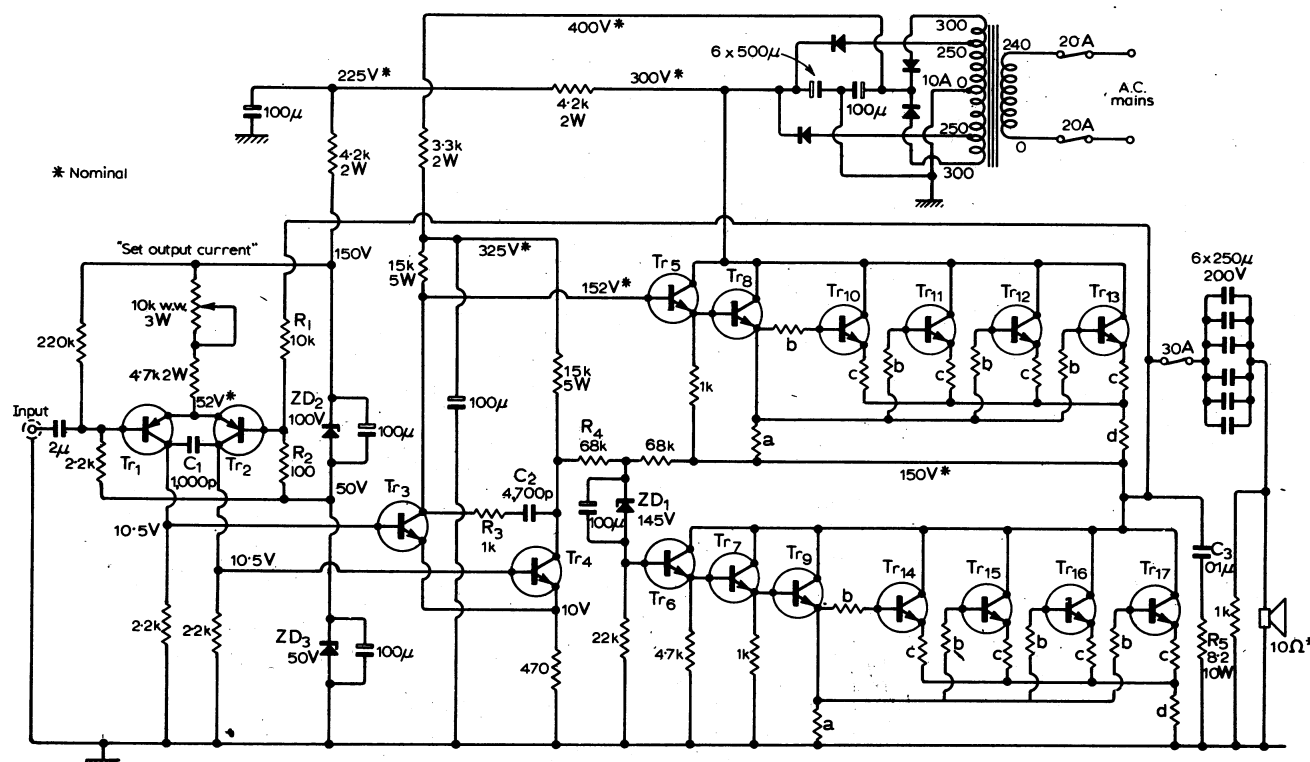


Fig. 2. Expanded version of Fig. 1 employing a Darlington triple as the output device. Tr_1, Tr_2 —R.C.A. 38496; Tr_3 to Tr_7 —MJE340; Tr_8 to Tr_{17} —MJ413. Lettered resistor values: $a=22\Omega$, 2W; $b=10\Omega$, 2W; $c=0.5\Omega$, 5W; and $d=0.1\Omega$, 5W.

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back. As with many other of these problems, it is suspected that the manufacturers of the equipment have not really got down to serious thought on this matter, and the solution which the author feels most people must adopt, that of housing the record player unit in some detached building, such as a small garden shed, is inconvenient and prevents the listener from hearing the beginning of the recorded piece. Moreover, if in one's hurry to return to the audition room, the pickup cartridge is let fall too rapidly upon the record, extensive damage can be caused to windows and other glazing.

Summing up

The performance of the equipment as installed is entirely satisfactory, and a wide variety of sound sources have been explored during the assessment of the scope of this system, and many sounds have been recaptured with a degree of realism not previously encountered. However, the development of this apparatus has not been without difficulty, scepticism and expense, and it has been suspected at times that unnecessary difficulties have been placed in the author's way. For these reasons, it is thought unlikely to appeal to those for whom high-fidelity reproduction is merely a passing interest. On the other hand,

it has proved possible to purchase several of the adjoining properties at a very advantageous price, and this has undoubtedly offset a large part of the constructional costs.

From
Wireless World, April 1970

The West Rand Amateur Radio Club

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Roodepoort

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Phone: +27 11 726 6892

Email: john.brock@pixie.co.za

Bulletins (Sundays at ...)

11h15 Start call in of stations

11h30 Main bulletin start

Frequencies

145,625 MHz (West Rand Repeater)

10,135 MHz (HF Relay)

Radio Amateurs do it with more frequency!

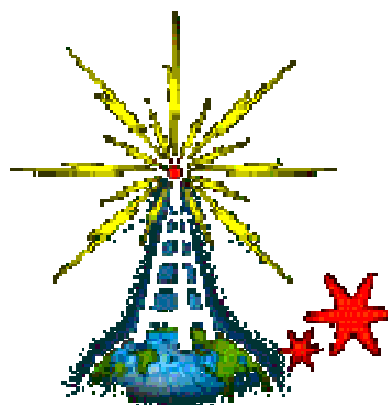
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West Rand members input - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

In November 2001, we published an Anode Compendium on CD. It has the issues from July 2000 until November this year. This included IE5.5 and the new Adobe reader. It is soon to be updated, check with the vice-chairman for details.



We need your input! Email us articles, comments and suggestions please.
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