BOLAND AMATEUR RADIO KLUB

Maart 2017

CQ BOLAND

VAN DIE VOORSITTER

Ek sien uit om u te sien by die ledevergadering op 25 Maart 2017 by die Stellenbosch Voortrekkers se perseel. Bly asseblief ook vir die gebruiklike 'bring en braai' na die vergadering.

Ons ledetal staan tans op 90 en BARK is nog steeds die grootste amateur radio klub in die Weskaap. Dit is belangrik om nuwe lede to werf en ek versoek dat u dit oorweeg om 'n vriend wie mag belangstel saam te bring na die vergadering. Karl ZS1KC is juis besig met die die RAE klasse ter voorbereiding vir die Mei 2017 eksamen en daar is nog tyd om by sy klas aan te sluit. Sterkte aan Karl en die kandidate.

Weereens baie dankie aan almal wie betrokke is met die onderhoud van die herhalers in die Wes-Kaap. Dit word opreg waardeer.

Andre ZS1AN is besig om te beplan vir a spesiale geleentheid te 'Doringlaagte' naby Montagu waar jy kan kamp of in 'n chalet kan oornag. Plekke is redelik beperk en indien jy belangstel om saam te gaan stel ek voor dat jy vir Andre sonder versuim kontak.

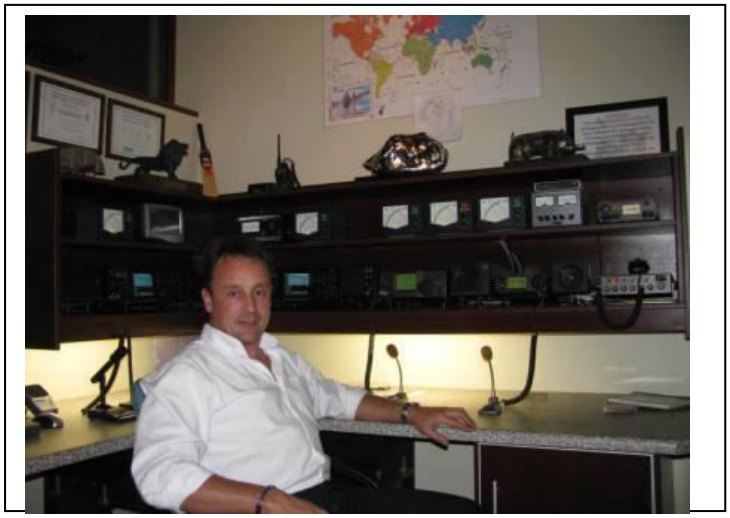
Die Samewerkings Ooreenkoms tussen 71 Sein en BARK is tans ter insae by 71 Sein vir hulle verdere kommentaar en/of finale aanvaarding.

Onthou dat u op hoogte kan bly deur BARK se Facebook blad facebook.com/bolandamateurradioklub.

Conradt ZS1ES

David de Kock, Radio Amateur, radio entoesias, restoureerder, hiedie is ‘n paar beskrywende naamwoorde wat by David pas. Hoe vêr sy passie vir hierdie stokperdjie strek kan duidelik waargeneem word in sy gesels. CQ Boland het gaan kyk.

David se belangstelling in radio kom al ‘n lang pad, maar met die wettiging van burgerband radio in die land in die 70’s het dit momentum gekry. Ook tydens sy diensplig het kontak met radios en sy liefde vir dié kommunikasie medium toegeneem.



Vandag, as volwaardige Radio Amateur, het hy nie die dae van burgerband radio vergeet nie, inteendeel hy het die herrineringe bewaar in die vorm van ‘n merkwaardige versameling.

David vertel met trots hoe hy hierdie versameling opgebou en tot die fynste besonderhede gerestoureer het. Elke radio met bykomstighede is vandag in sy oorspronklike toestand. Tot die fynste letter toe.

Geen beter beskrywing anders as sy ode **CB CITY** kan hiervoor gegee word.

CB CITY

CB City is a tribute to the Citizen Band Radio Craze that swept SA from the late 70’s. This hobby introduced many to the RF spectrum and the thrill brought by talking through space, experiencing the local chats or the benign audio from a foreign reply. Many of the CB hobbiests have moved on to Amateur Radio – an ever growing hobby world-wide with the many diverse facets it offers!

Displayed here are the popular SSB makes produced (both base and mobile) in the period 1978 – 1981. **Midland, Cobra, General Electric, President, Tedelex, Stalker, Royce, Major, Phillips, Telefunken, SBE;** also the ever popular accessories: Microphones – Leson 232 desk top, K40 Speach Processor for that extra “punch” from the mobile, the Leson fist mic, the Magic Mike – wireless! , Astatic D104 – shall we say Rolls Royce? Daiwa Echo Chamber – flatten everything and get that contact! More power needed? – Tagra Linear Amplifier (80W). Legal limit was SSB 4W AM.

Base installations saw the use of the ever popular “Shakespear Superstick / Bigstick” and the Avanti ranges where the “Avanti 100 / 101” – (the lady with the skirt), the bold would settle for a 3 – element Yagi – which was not legal!

Mobile installations came with an array of antenna’s where claims of performance were as limitless as the advertising agencies imaginations! K40 and Avanti “Moonrakers” were first choice unless you saw your way clear to install a 108” whip – still flopping around an hour after you stopped!

Also available: Power / SWR / Modulation Meters and capacitive tuners. “The Defender” did the job! Also RX amplifiers!

The lingo – BORN IN THE USA! Popular were the Q- codes and 10-codes! “Roger 10-4 !

Whether partially or comprehensively restored over a period of two years, I bring the nostalgic memories of the era! 73’s & 88’s

Radio is my Passion. David P. de Kock. May 2008

nSight-1 is ready for lift-off

nSight-1 is a CubeSat satellite that was developed by *SCS Aerospace Group* in Somerset West. The satellite is one of 45 similar CubeSats that constitute the QB50 constellation and will be launched into Earth's orbit early in 2017. The satellite was developed in less than 6 months.

QB50 is spearheaded by the Von Karman Institute for Fluid Dynamics in Belgium and is designed to perform scientific measurements in the Earth's least explored atmospheric layer, the lower thermosphere. The CubeSats forming the constellation will take simultaneous multipoint measurements over an extended period of time. Each satellite will carry one of three scientific instruments:

1. Ion-Neutral Mass Spectrometer
2. Flux-Φ-Probe Experiment (FIPEX)
3. multi-Needle Langmuir Probe (m-NLP)

A month after the launch, the instruments will be operated every second day over a period of sixty days. The measured data will be downloaded from each CubeSat and uploaded to VKI's server for processing. nSight-1 carries a FIPEX payload.

In addition to the science sensor, nSight-1 also carries SCS Space's commercially available Gecko Imager, a compact high resolution camera specially designed for CubeSat missions (which is also highly customisable for larger missions). The camera supports RGB imaging at high frame rates, includes a large integrated high speed data storage of 128 Gbit and has a ground sampling distance (GSD) of 39 meters.

An Attitude Determination and Control System (ADCS) supplied by CubeSpace is included to sense and control the orientation of the satellite, ensuring that the FIPEX is pointed in the forward travelling (ram) direction and the camera towards the earth (nadir).

The ADCS computer also performs the functions of a main On-Board Computer (OBC) such as general housekeeping on the satellite, decoding of telecommands and gathering of telemetry.

The satellite's power system relies on deployable solar panels to collect solar energy which is stored in a lithium-ion battery. An Electronic Power Supply (EPS) manages the power conditioning and distribution and the power supply components were sourced from GOMSpace.

A VHF/UHF transceiver from CPUT, coupled with a compatible antenna from ISIS, provides a radio link between the satellite and the ground station. Commands are sent from the

ground station to the satellite in the amateur radio 2-meter band and telemetry is sent back in the 70-cm band.

nSight-1 was delivered to ISIS in the Netherlands in October 2016 where it received a final checkout before it was integrated into a nanoRacks launch pod with two other CubeSats. All the pods were transported to the USA from where they will be launched on board a rocket to the International Space Station in March 2017. The satellites will remain stored and inactive on the ISS for a few weeks. In due course, the nanoRacks dispensers will be attached to the exterior of the ISS so that the CubeSats can be ejected into their own orbits.

nSight-1 joins Stellenbosch University's ZA-Aerosat as South Africa's fourth and fifth satellites and the project was supported by a number of key stakeholders, namely:

- Space Advisory Company: Development, Assembly, Integration and Test.
- Pink Matter: Funding.
- NewSpace Systems: Integration facilities.
- CubeSpace: Design, Integration and Test support.
- University of Stellenbosch, ESL: Test facilities.
- Spaceteq: Ground station software.
- CPUT: Ground station validation.
- Simera: Optical Test Facilities

For more information, please visit www.scs-space.com or email info@scs-space.com.

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AMSAT SA

SDR SIMPOSIUM

Onthou om in te skryf vir die simposium wat op 22 April 2017 by die Bellville kampus van CPUT aangebied sal word. Word deel van die toekoms vam Amateur Radio.

Vir besonderhede besoek: www.amsatsa.org.za

The Antikyhera Mechanism

1. **IT WAS FOUND IN A ROMAN-ERA SHIPWRECK AND NAMED AFTER A GREEK ISLAND.**
Located in the Aegean Sea between mainland Greece and Crete, Antikythera is an island that literally means “opposite of Kythera,” another, much larger island. The ship is assumed to be Roman and, when it sank just off the coast of the island in the middle of the 1st century BCE, carried a huge number of artifacts dating back to as early as the 4th century BCE.

2. **THE FIRST EXPLORATION OF THE WRECK KILLED ONE DIVER AND PARALYZED TWO OTHERS.**
In 1900, Greek sponge divers found the shipwreck, which was submerged nearly 150 feet, while wearing gear that was standard for the early 20th century—canvas suits and copper helmets. When the original diver surfaced with reports of artifacts, horses, and corpses, the captain assumed he had “raptures of the deep”—essentially, a drunkenness as a result of the nitrogen in the breathing mix piped into the diving helmet. Although that diver was actually fine, later exploration in the summer of 1901 caused the death of one diver and the paralysis of two more from decompression sickness or "the bends.”

3. **THREE IMPORTANT ROMANS MAY HAVE BEEN INVOLVED**.
An astrophysicist at Athens University, Xenophon Moussas, theorized in 2006 that the boat on which the mechanism was found may have been headed to Rome as part of a triumphal parade for the emperor Julius Caesar in the 1st century BCE. A related theory is that the ship was carrying booty from the Roman general Sulla’s sack of Athens in 87–86 BCE. In the same time period, the famous Roman orator Marcus Tullius Cicero mentioned a mechanical planetarium called a “sphere of Archimedes” that demonstrated how the Sun, Moon, and planets moved with respect to the Earth. More recent research, though, suggests that the ship may have been en route to Rome from Turkey. The ship’s path has been difficult to trace because the Aegean was an important and busy shipping area at this time.

4. **THE MECHANISM'S IMPORTANCE WASN'T RECOGNIZED FOR 75 YEARS**.
A reproduction of the front of the mechanism on display at the National Archaeological Museum in Athens.
The unique bronze-and-wood object was found with a shipload of marble, coins, glassware, and pottery in 1900. Since all the other artifacts were more apparently worthy of conservation, the mechanism was ignored until 1951. After an additional two decades of

study, the first publication on the Antikythera mechanism was made in 1974 by physicist and historian Derek de Solla Price. But Price's work was unfinished when he died in 1983, without having figured out how the device actually worked.

5. **JACQUES COUSTEAU AND RICHARD FEYNMAN WERE BOTH FASCINATED BY IT.**
The famous marine explorer Jacques Cousteau and his team dived the Antikythera shipwreck in 1976, shortly after Price's primary publication, finding coins from the 1st century BCE and a few smaller bronze pieces of the mechanism. A few years later, noted physicist Richard Feynman visited the National Museum in Athens. Feynman reportedly was terribly unimpressed by the museum as a whole, but wrote that the Antikythera mechanism was "so entirely different and strange that it is nearly impossible … it is some kind of machine with gear trains, very much like the inside of a modern wind-up alarm clock."

6**. IT'S BEEN CALLED THE WORLD'S FIRST COMPUTER**.
Since long before the invention of the digital computer you are undoubtedly reading this on, there have been analog computers. These types of computers range from mechanical aids like a slide rule to a device that can predict the tides. The Antikythera mechanism, which was designed to calculate dates and predict astronomical phenomena, has therefore been called the earliest analog computer.

7. **THE INVENTOR OF TRIGONOMETRY MAY HAVE ALSO CREATED THE MECHANISM**.
Hipparchus is primarily known as an ancient astronomer; he was born in what is now Turkey around 190 BCE and worked and taught primarily on the island of Rhodes. His works survive almost entirely through later Greek and Roman authors. Hipparchus was one of the first thinkers to speculate that the Earth revolved around the Sun, but he could never prove it. Hipparchus created the first trigonometric table in his attempts to solve problems related to spheres, and is therefore known as the father of trigonometry. Because of these other discoveries—and because Cicero mentions a planetary device that was constructed by Posidonius, who took over Hipparchus's school on Rhodes after his death—the Antikythera mechanism is often attributed to Hipparchus. New research, though, has shown handwriting of two different people on the mechanism, suggesting it was likely created in a workshop or family business.

8. **IT WAS SO TECHNOLOGICALLY ADVANCED, NOTHING SURPASSED IT FOR CLOSE TO 1500 YEARS**.
Consisting of at least 30 bronze gears in a wooden container that was only the size of a shoebox, the clockwork mechanism was highly advanced for its time. By turning a handcrank, the user could move forward or backward in time. The crank made the gears move and rotate a series of dials and rings on which there are inscriptions and annotations of Greek zodiac signs and Egyptian calendar days. It seems that the information to build such a mechanism was lost through time, perhaps because it was a specialty device or expensive to create. Similar astronomical clocks didn't reappear in Europe until the 14th century. Since inventions like this do not usually come from nothing, though, many

researchers think that we may yet find older precursors in an archaeological context some day.

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9**. IT WAS DESIGNED TO MONITOR CELESTIAL EVENTS, SEASONS, AND FESTIVALS**.
A 2007 reproduction of the mechanism, was modeled by science modeler Massimo Mogi Vicentini.
The mechanism tracked the lunar calendar, predicted eclipses, and charted the position and phase of the Moon. It also tracked the seasons and ancient festivals like the Olympics. The calendar is based on the time from one full moon to the next, and a special dial allowed the user to also envision the seasons, which would have been useful for agriculture. Since the ancient Babylonians figured out the cycle of eclipses, the inventor of the Antikythera mechanism included two dials that rotate to show both lunar and solar eclipses. But the most sophisticated thing the mechanism did was lunar calculations—it could figure out the Moon's period at a given time and model its elliptical orbit.

10. **IT HAS A BUILT-IN INSTRUCTION MANUAL**.
Writing on a bronze panel at the back of the mechanism suggests the inventor left either instructions for how to work it or an explanation of what the user was seeing. The inscription, which is in Koine Greek (the most common form of the ancient language), mentions the cycles, dials, and some of the functions of the mechanism. While the text doesn't specifically tell someone how to use it, and assumes some amount of prior knowledge of astronomy, it provides written-out labels for the person looking at the mechanism.

11. **NO ONE IS SURE WHO USED THE MECHANISM …**
While many of its functions have been figured out, how and where it was used are still unknown. Scholars think that it could have been employed in a temple or school, but could just as easily have been a fancy curio for a rich family. Without any other comparable artifacts or explanatory inscriptions, we don't yet know who would have used this object or to what end.

12. **…BUT THEY'RE CLOSING IN ON WHERE IT WAS MADE.**
The use of Koine in the numerous inscriptions places the creation of the mechanism in the Greek world, which was geographically large at the time. The festival dial mentions the Olympics in central Greece, the Naa in northwest Greece, and the Halieia on the island of Rhodes. The latest analysis of the inscriptions, reported this week by classicist Alexander Jones and colleagues, suggests the mechanism could keep track of at least 42 different calendar events. With those dates in mind, Jones and colleagues calculate that the creator of the mechanism was likely based at 35°N latitude. Coupled with Cicero's mention of a similar device at Posidonius's school, this means that the island of Rhodes is again the leading contender for the origin of the mechanism.

13. **THE DEVICE ALSO TOLD FORTUNES**.

Jones and colleagues' new interpretation of the mechanism is based on the extant 3400 Greek characters on the device, although thousands more characters are likely missing due to the incomplete nature of the artifact. Most notably, in their thorough linguistic analysis,

these scholars discovered that the mechanism refers to eclipses' color, size, and associated winds. The Greeks believed that characteristics of an eclipse were related to good and bad omens. Because of this belief, by building in predictive eclipse technology, the creator of the mechanism was letting the user divine the future.

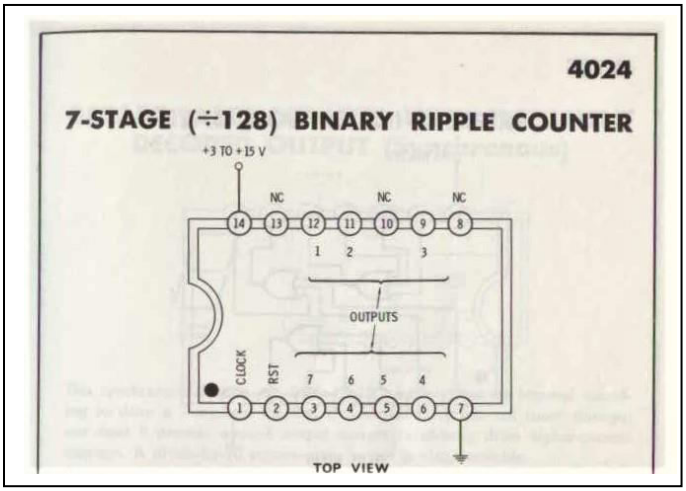
14. **PLANETARY MOTION IN THE MECHANISM WAS ACCURATE TO WITHIN ONE DEGREE IN 500 YEARS.**

The mechanism includes hands or pointers for Mercury, Venus, Mars, Jupiter, and Saturn, all of which are easily visible in the sky, as well as a rotating ball that showed the phases of the Moon. The parts that work these planetary pointers are gone, but text on the front plate of the mechanism confirms, according to Jones and his team, that the planetary motion was modeled mathematically using numerous complex gears—and that it was highly accurate.

15**. THERE MAY ACTUALLY BE TWO ANTIKYTHERA SHIPWRECKS**.

Since Cousteau explored in the mid-1970s, little work has been done at the underwater archaeological site because of the remote location and the depth of the water. In 2012, marine archaeologists from the Woods Hole Oceanographic Institute and the Hellenic Ephorate of Underwater Antiquities again dove the wreck with the latest, high-tech scuba gear. They found a massive spread of amphorae and other artifacts. This means that either the Roman ship was vastly larger than previously thought or there is a separate wreck down there. Excavations have been ongoing for several years, with new artifacts brought up constantly. Summer 2016 is poised to reveal even more about the Antikythera shipwreck. You can follow along in real time via the Woods Hole website and blog.

Circuits & Signals



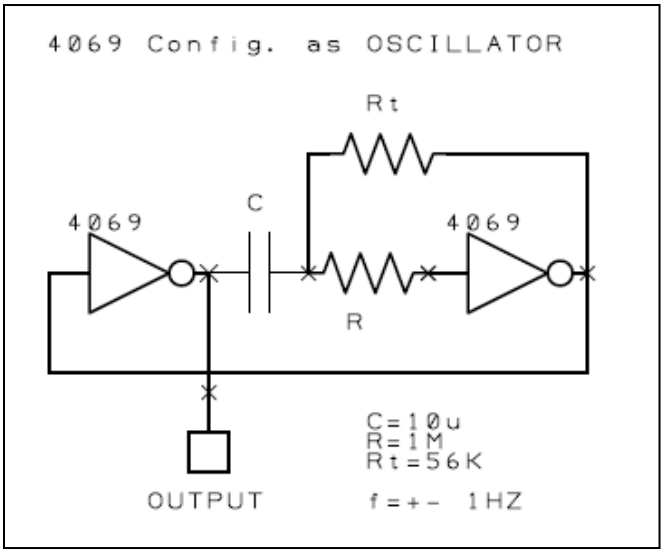
This is a binary ripple counter that counts in the up direction using positive logic.

The reset input is normally held at ground. Every time the clock changes from positive to ground, the counter advances one count. The 1 output divides the input clock by $2^1 = 2$. The 2 output divides the input clock by $2^2 = 4$, up to the 7 output which divides by $2^7 = 128$.

Making the reset input positive forces all outputs to ground and holds them there until the reset returns to ground.

The clock input must be conditioned to be noiseless and fall only once per desired count. Clock rise and fall times should be faster than 5 microseconds.

Another application circuit for the 4069 inverter



(See Novemer issue of CQ BOLAND for description of the 4069 chip)