BOLAND AMATEUR RADIO KLUB

Desember 2018

CQ BOLAND

VAN DIE VOORSITTER

Ons laaste ledevergadering van die jaar vind plaas op 8 Desember 2018 by die Voortrekkerterrein te Wellington. Die vergadering word oudergewoonte gevolg deur ‘n bring en braai en ek sien uit om u by die geleentheid te sien.

Baie dankie aan almal wie hierdie jaar betrokke was by BARK se bedrywighede. ‘n Spesiale word van dank aan die skrywers en lesers van bulletins asook diegene wie getrou luister en inroep. Dankie ook aan Deon, ZR1DE, vir die opstel van CQ Boland. Ek dink almal sal saamstem dat die uitgawes baie interesant is en natuurlik ook ‘n groot dankie aan almal wie bydraes gelewer het.

Ons ledetal staan tans op 87 en ek doen ‘n beroep op u om nuwe lede, veral jonger lede, vir die klub en natuurlik ook vir amateurradio te werf.

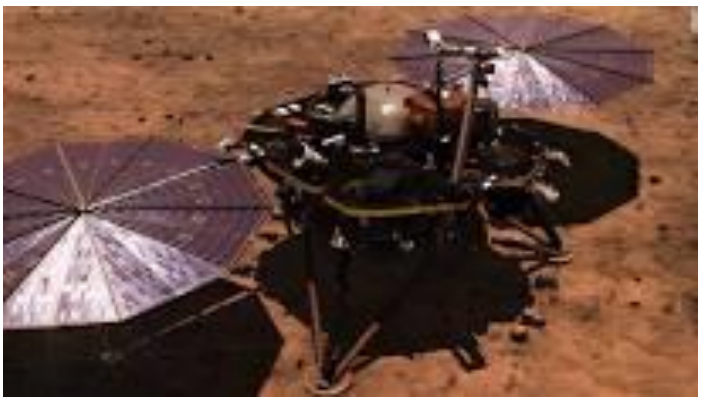
Onthou dat u op hoogte kan bly deur BARK se Facebook blad facebook.com/bolandamateurradioklub.

‘n Geseënde Kersfees en ‘n voorspoedige Nuwejaar aan u en u gesin.

Conradt

ZS1ES

NASA celebrates another milestone in space exploration after successfully landing an unmanned spacecraft on Mars



The InSight Lander

US space explorers successfully landed a craft on Mars on Monday, (November 26, 2018) and it has already started sending images back to Earth.

Audiences from around the world watched in nervous anticipation as the National Aeronautics and Space Administration (NASA) delivered the spacecraft, InSight lander, to the surface of Mars.

NASA said it had taken nearly seven months for the spacecraft to complete the 458-million-kilometer journey.

According to a CBS News report ahead of the launch, NASA's principal investigator Bruce Banerdt said: "The goal of InSight is nothing less than to better understand the birth of the Earth, the birth of the planet we live on, and we're going to do that by going to Mars."

And that they certainly did.

Barnedt said that the team behind the project now faces a new challenge. "We have to do a survey of the area in front of our spacecraft, make sure we don't put the instruments down on a rock or in a hole or something like that."

The unmanned spacecraft is remotely operated by a team based in NASA's Jet Population Laboratory in Pasadena, California.

When InSight touched down on the red planet, there was just as much excitement on social media as there was in NASA's Pasadena lab.

Source: NASA

Terrestrial Amateur Radio Repeaters

Quo Vadis?

Deon Coetzee ZR1DE

Prologue

In this article we take a look at the present status of terrestrial amateur radio repeaters.

Over the years developments in technology has resulted in repeaters becoming more sophisticated such as the employment of digital technology.

However, the basic system of receivers and transmitters operating from difficult accessible remote positions, and subjected to harsh conditions, has remained basically unchanged.

The access to suitable and available sites with a stable power source are becoming rare, and commercial operators tend to become more reluctant to make such services available on their sites at a reasonable cost to the amateur radio community.

Servicing the installations are exclusively performed by radio amateurs on a voluntary basis. With amateur radio becoming very much a purely operational hobby, the technical side have largely outgrown the capabilities of the vast majority of hobbyists in this field. Finding willing and able amateurs to perform upkeep has become virtually an impossible challenge.

This of course poses the question of the title of this article: Terrestrial Amateur Radio Repeaters " Where are you marching to"

Introduction

An **amateur radio repeater** is an electronic device that receives a weak or low-level amateur radio signal and retransmits it at a higher level or higher power, so that the signal can cover longer distances without degradation. Many repeaters are located on hilltops or on tall

buildings as the higher location increases their coverage area, sometimes referred to as the radio horizon or "footprint".

Amateur radio repeaters may use commercially packaged repeater systems that have been adjusted to operate within amateur radio frequency bands, but more often amateur repeaters are assembled from receivers, transmitters, controllers, power supplies, antennas, and other components, from various sources.
In some areas multiple repeaters are linked together to form a wide-coverage network.

Frequencies

Repeaters are found mainly in the VHF six meters (50—54 MHz), two meter (144—148 MHz), 1.25-meter band (220—224 MHz) and the UHF 70 centimeter (420—450 MHz) bands, but can be used on almost any frequency pair above 28 MHz. Recently, 33 centimeters (902—928 MHz) and 23 centimeters (1,240—1,300 MHz) are also being used for repeaters

Repeater frequency sets are known as "repeater pairs", and in the ham radio community most follow *ad hoc* standards for the difference between the two frequencies, commonly called the *offset.*

In the days of crystal-controlled radios, these pairs were identified by the last portion of the transmit *(Input)* frequency followed by the last portion of the receive *(Output)* frequency that the ham would put into the radio. Thus "three-four nine-four" (34/94) meant that hams would transmit on 146.34 MHz and listen on 146.94 MHz (while the repeater would do the opposite, listening on 146.34 and transmitting on 146.94). In areas with many repeaters, "reverse splits" were common (i.e., 94/34), to prevent interference between systems.

Since the late 1970s, the use of synthesized, microprocessor-controlled radios, and widespread adoption of standard frequency splits have changed the way repeater pairs are described. In 1980, a ham might have been told that a repeater was on "22/82"—today they will most often be told "682 down". The 6 refers to the last digit of 146 MHz, so that the display will read "146.82" (the output frequency), and the radio is set to transmit "down" 600 kHz on 146.22 MHz. Another way of describing a repeater frequency pair is to give the repeater's output frequency, along with the direction of offset ("+" or "plus" for an input frequency above the output frequency, "−" or "minus" for a lower frequency) with the assumption that the repeater uses the standard offset for the band in question. For instance, a 2-meter repeater might be described as "147.34 with a plus offset", meaning that the repeater transmits on 147.34 MHz and receives on 147.94 MHz, 600 kHz above the output frequency.

Services

Services provided by a repeater may include an autopatch connection to a POTS/PSTN telephone line to allow users to make telephone calls from their keypad-equipped radios. These advanced services may be limited to members of the group or club that maintains the repeater. Many amateur radio repeaters typically have a tone access control (CTCSS, CG or PL tone) implemented to prevent them from being keyed-up (operated) accidentally by interference from other radio signals

In many communities, a repeater has become a major on-the-air gathering spot for the local amateur radio community, especially during "drive time" (the morning or afternoon commuting time). In the evenings local public service nets may be heard on these systems and many repeaters are used by weather spotters. In an emergency or a disaster a repeater can sometimes help to provide needed communications between areas that could not otherwise communicate. Until cellular telephones became popular, it was common for community repeaters to have "drive time" monitoring stations so that mobile amateurs could call in traffic accidents via the repeater to the monitoring station who could relay it to the local police agencies via telephone. Systems with autopatches frequently had (and still have) most of the public safety agencies numbers programmed as speed-dial numbers.

Repeater Coordination

Amateur Radio Repeater Coordinators or coordination groups are all volunteers and have no legal authority to assume jurisdictional or regional control in any area. The purpose of coordinating a repeater or frequency is to reduce harmful interference to other fixed operations. Coordinating a repeater or frequency with other fixed operations demonstrates good engineering and amateur practice.

Repeater Equipment

The most basic repeater consists of an FM receiver on one frequency and an FM transmitter on another frequency usually in the same radio band, connected together so that when the receiver picks up a signal, the transmitter is keyed and rebroadcasts whatever is heard.

In order to run the repeater a repeater controller is necessary. A repeater controller can be a hardware solution or even be implemented in software.

Repeaters typically have a timer to cut off retransmission of a signal that goes too long.

Conventional Repeaters

Conventional repeaters, also known as in-band or same-band repeaters, retransmit signals within the same frequency band, and they only repeat signals using a particular modulation scheme, predominately FM

Standard repeaters require either the use of two antennas (one each for transmitter and receiver) or a duplexer to isolate the transmit and receive signals over a single antenna. The duplexer is a device which prevents the repeater's high-power transmitter (on the output frequency) from drowning out the users' signal on the repeater receiver (on the input frequency). A *diplexer* allows two transmitters on different frequencies to use one antenna, and is common in installations where one repeater on 2 m and a second on 440 MHz share one feedline up the tower and one antenna. Most repeaters are remotely controlled through the use of audio tones on a control channel.

Cross-Band Repeater

A cross-band repeater (also sometimes called a replexer), is a repeater that retransmits a specific mode on a frequency in one band to a specific mode on a frequency in a different band. This technique allows for a smaller and less complex repeater system. Repeating signals across widely separated frequency bands allows for simple filters to be used to allow one antenna to be used for both transmit and receive at the same time. This avoids the use of complex duplexers to achieve the required rejection for same band repeating.

Amateur Television Repeaters

Amateur television (ATV) repeaters are used by amateur radio operators to transmit full motion video. The bands used by ATV repeaters vary by country,

There are also digital amateur TV repeaters that retransmit digital video signals. Frequently DVB-S modulation is used for digital ATV, due to narrow bandwidth needs and high loss tolerances. These DATV repeaters are more prevalent in Europe currently, partially because of the availability of DVB-S equipment.

SSTV Repeater

An SSTV repeater is an amateur radio repeater station that relays slow-scan television signals. A typical SSTV repeater is equipped with a HF or VHF transceiver and a computer with a sound card, which serves as a demodulator/modulator of SSTV signals.

SSTV repeaters are used by amateur radio operators for exchanging pictures. If two stations cannot copy each other, they can still communicate through a repeater.

One type of SSTV repeater is activated by a station sending it a 1750 Hz tone. The repeater sends K in morse code to confirm its activation, after which the station must start sending a picture within about 10 seconds. After reception, the received image is transmitted on the repeater's operation frequency. Another type is activated by the SSTV vertical synchronization signal (VIS code). Depending on the software it uses (MMSSTV, JVComm32, MSCAN, for example), an SSTV repeater typically operates in common SSTV modes.

Store-and-Forward Systems

Another class of repeaters do not simultaneously retransmit a signal, on a different frequency, as they receive it. Instead, they operate in a store-and-forward manner, by receiving and then retransmitting on the same frequency after a short delay.A type of system known as a *simplex repeater* uses a single transceiver and a short-duration voice recorder, which records whatever the receiver picks up for a set length of time (usually 30 seconds or less), then plays back the recording over the transmitter on the same frequency. A common name is a "parrot" repeater.

Digipeater

Another form of repeater used in amateur packet radio, a form of digital computer-to-computer communications, is dubbed "digipeater" (for *DIGItal rePEATER).* A digipeater are often used for activities and modes such as packet radio, Automatic Packet Reporting System, and D-STAR's digital data mode. Also commercial digital modes such as DMR, P25 and NXDN. Some modes are full duplex and internet linked.

Linked Repeater Systems

Repeaters may be linked together in order to form what is known as a *linked repeater system* or *linked repeater network*. In such a system, when one repeater is keyed-up by receiving a signal, all the other repeaters in the network are also activated and will transmit the same signal. The connections between the repeaters are made via radio (usually on a different frequency from the published transmitting frequency) for maximum reliability. Some networks have a feature to allow the user being able to turn additional repeaters and links on or off on the network. This feature is typically done with DTMF tones to control the network infrastructure. Such a system allows coverage over a wide area, enabling communication between amateurs often several hundred km apart.

Voting Systems

In order to get better receive coverage over a wide area, a similar linked setup can also be done with what is known as a *voted receiver system*. In a voted receiver, there are several satellite receivers set up to receive on the same frequency (the one that the users transmit on). All of the satellite receivers are linked to a voting selector panel that switches from receiver to receiver based on the best quieting (strongest) signal, and the output of the selector will actually trigger the central repeater transmitter. A properly adjusted voting system can switch many times a second and can actually "assemble" a multi-syllable word using a different satellite receiver for each syllable. Such a system can be used to widen coverage to low power mobile radios or handheld radios that otherwise would not be able to key up the central location, but can receive the signal from the central location without an issue. Voting systems require no knowledge or effort on the part of the user - the system just seems to have better-than-average handheld coverage.

Internet Linking

Repeaters may also be connected to over the Internet using voice over IP (VoIP) techniques. VoIP links are a convenient way to connecting distant repeaters that would otherwise be unreachable by VHF/UHF radio propagation. Popular VoIP amateur radio network protocols include D-STAR, Echolink, IRLP, WIRES and eQSO. Digital Mobile Radio (DMR), D-STAR, Fusion, P25 and NXDN all have a codec in the user radio and along with the encoded audio, also send and receive user number and destination information so one can talk to another specific user or a Talk Group. Two such worldwide networks are DMR-MARC and Brandmeister.

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Ean Retief ZS1PR deel met ons van sy observasies aan die Weskus as ‘n voorsmakie van ‘n beloofde artikel.

Dankie Ean, by voorbaat.

Soos baie van ons lede weet, dek die Piketberg 145,625 MHz herhaler ‘n wye gebied, maar as mens Noordwaarts met die N7 oor die Piekenierskloofpas ry dan is dit die einde van die dekking.

OK Ean ZS1PR was van 11 tot 13 November in die Citrusdal omgewing. Tot sy verbasing het hy gevind dat hy die herhaler S5 in Citrusdal dorp kon kry en solank hy nie verskuil is agter ‘n gebou nie, hy die herhaler kan trek. Sodra hy weer Suidwaarts met die Olifantsrivier ry (dus nog agter die berg) dan verbeter die sein byna onmiddellik na S9. Hulle het by “Tree tops” so 28 km Suid van die dorp (verder Suid as “The Baths”) oorgebly en daar was die sein tussen die bome S9+40 op sy mobiel met ‘n vyf-

agste antenne en hy kon lekker met heelwat OK gesels, want die 70 cm skakel van die Piketberg 625 na die Hawequas 650 werk nou weer baie goed.

Hierdie observasie van Ean was net na die suksesvolle werking van ZS1 stasies met ZD7. Wat Ean ook opgemerk het was dar die eerste dag 'n "baan" van hoë Cirrus wolke hoog reg bo-oor hulle gegaan het. Die 12de was bewolk en die 13e sonnig. Hy wonder egter of hy deel was van die "geut" wat langs die Weskus na St Helena plaasgevind het, want eerstens was die sein baie sterk en stabiel vir die hele drie dae, dus waarskynlik nie agv atmosferiese effekte nie. Verder is die Piketberg baie hoog bo die omliggende omgewing en nie 'n goeie kandidaat vir sulke lang afstand voortplanting nie, soos die ZS3 stasies al agter gekom het.

Die berg tussen "Tree tops" en Piketberg is redelik laag met 'n lang gelyk bo-kant, so dit kon "meslem refraksie" wees wat Ean ervaar het, maar hoekom is die herhaler dan nou so 'sterk' meer Noordwaarts tot by Citrusdal waar die bergtoppe hoër en meer ongelyk is?

Ean gaan nou weer oor so twee weke Noord en sal weer kyk wat aangaan by Citrusdal en dan soos hy verder Noord ry kyk wat gebeur. Hy versoek enigiemand anders wat ook in die geweste rondry om vir ons terugvoering te gee sodat ons 'n idee kan vorm wat aangaan en die resultate in die volgende CQ Boland publiseer.

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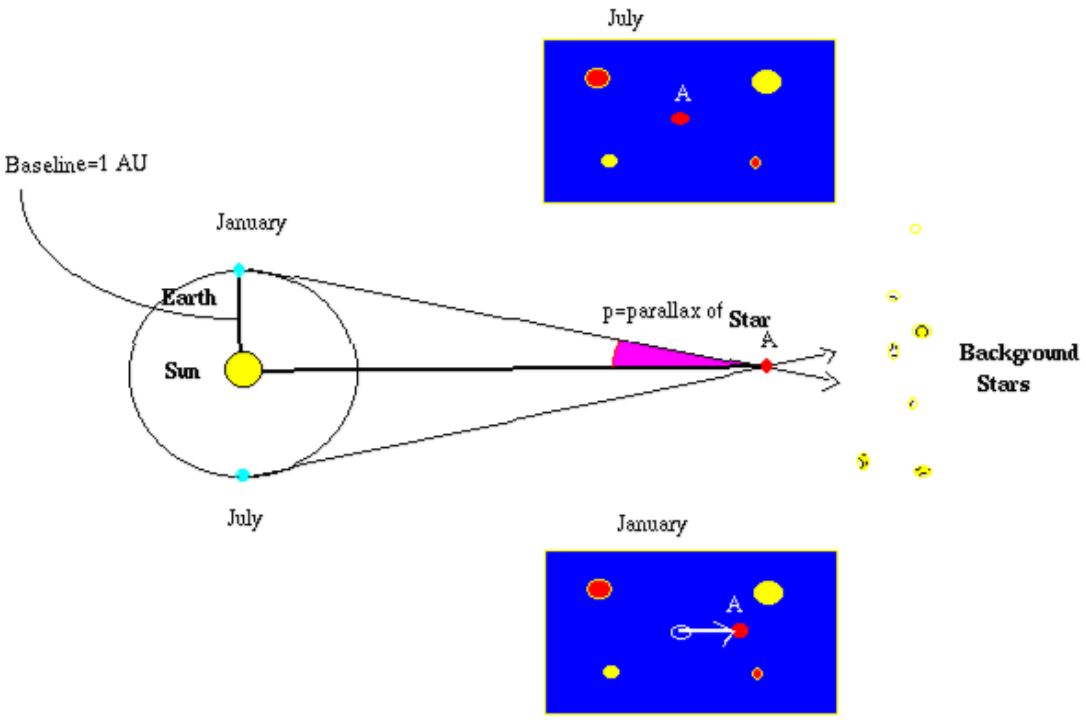
The BMW 501 launched in 1951 and was the first BMW to be manufactured in Bavaria

Photo: Franschoek Motor Museum.

The Parallax Method for measuring Distances to Celestial Bodies

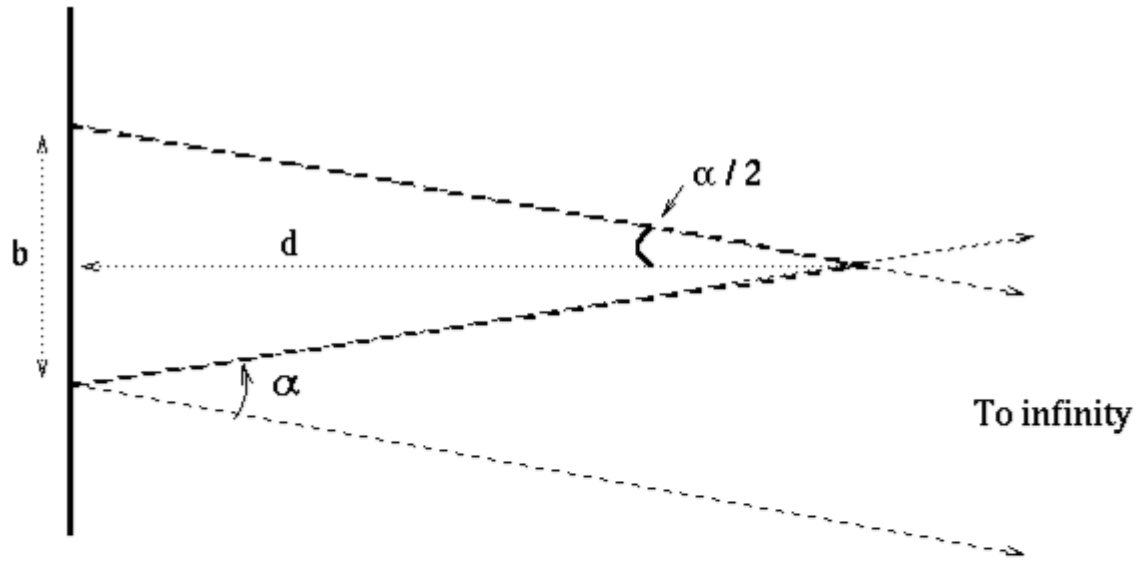
Astronomers derive distances to the nearest stars (closer than about 100 light-years) by a method called stellar parallax. This method that relies on no assumptions other than the geometry of the Earth's orbit around the Sun. You are probably familiar with the phenomenon known as parallax. Try this. Hold out your thumb at arm's length, close one of your eyes, and examine the relative position of your thumb against other distant (background) objects, such as a window, wall, or tree. Now look at your thumb with your other eye. What do you notice? Move your thumb closer to your face and repeat the experiment. What was different this time? This is a demonstration of the parallax effect: the apparent shift in position of a relatively nearby object against more distant ones when viewed from different vantage points.

Now consider that the Earth moves in its orbit around the Sun, allowing us to look at nearby stars from slightly different locations - just like your two eyes are at slightly different locations. This is shown in the image below.



From the image above, you can see that by knowing the size of Earth's orbit and measuring the angles of the light from the star at two points in the orbit, the distance to the star can be derived. The farther the star is, the smaller the angles. For stars more than about 100 light-years from Earth, we cannot measure any shift and the method fails.

The mathematical formula of a parallax distance is:



b: baseline
d: distance to object
α: measured parallax angle

$$d = \frac{(1/2\ b)}{tangent\ (a/2)}$$

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