# WATTS

**10-2016**
**Year 86 + 10m**

Monthly Newsletter of the Pretoria Amateur Radio Club
Maandelikse Nuusbrief van die Pretoria Amateur Radio Klub



PARC, PO Box 73696, Lynnwood Ridge 0040, RSA
http://www.parc.org.za zs6pta@zs6pta.org.za


**Bulletins : 145.725 MHz on Sundays / Sondae at 08:45**
Relays: 1.840, 3.700, 7.066, 10.135, 14.235, 51.400, 438.825, 1297 MHz
Activated frequencies are announced prior to bulletins
**Swopshop : 2m and 7.066 MHz live on-air after bulletins**
Bulletin repeats on Mondays / herhalings op Maandae : 2m 19:45

## CQ HOU KOERS : 15 OKTOBER 2016

### In This Issue / In Hierdie Uitgawe



Vir meer inligting aangaande die CQ Hou Koers dag op die 15de Oktober 2016, kontak gerus vir Pierre Holtzhausen ZS6PJH by 082 575 5799 of zs6pjh@gmail.com

### Club Meetings / Klub Vergaderings

**Club Social Meeting :**

Saturday the 1st of October 2016 from 14h00 at SAM

**Committee Meeting :**

Thursday the 13th of October from 19h00 at SAM

## PARC Fleamarket : 5 November 2016 from 10h00

The next Pretoria Amateur Radio Club Fleamarket will take place on the 5th of November from 10h00 at the Pretoria Old Motor Club, Keuning Street, Silverton.

Please do contact Almero du Pisani ZS6LDP (083-938-8955) for more information, or to book a table, or if you wish to donate any old equipment to PARC.

# PARC Committee Members / Komiteelede : 2016 - 2017

| Elected Members | Name | Callsign | Email Adress | Tel No | Mobile No |
|---|---|---|---|---|---|
| **Chairman, Web co-ordination** | Graham Reid | ZS6GJR | greid@wol.co.za | 012-667-2720 | 083-701-0511 |
| **Vice Chairman, Repeater & Rallies** | Johan de Bruyn | ZS6JHB | zs6jhb@gmail.com | 012-803-9418 | 079-333-4107 |
| **Bulletins, RAE & Liason** | Etienne Naude | ZS6EFN | etienne@afrigrid.com | 012-661-6745 | 082-553-0542 |
| **Treasurer** | Andre van Tonder | ZS6BRC | andreh.vtonder@absamail.co.za | 012-361-3292 | 079-869-0753 |
| **Clubhouse Manager** | Pieter Fourie | ZS6CN | pieterzs6cn@gmail.com | 012-804-7417 | 082-573-7048 |
| **Social** | Whitey Joubert | ZS6JJJ | zs6jjj@gmail.com | 012-993-2267 | 072-120-4516 |
| **Secretary, Watts & RAE** | Louis de Wet | ZS6SK | louis.zs6sk@gmail.com | 012-349-1044 | 072-140-9893 |
| **Co-Opted Members** | **Name** | **Callsign** | **Email Adress** | **Tel No** | **Mobile No** |
| **Fleamarkets** | Alméro Dupisani | ZS6LDP | almero.dupisani@up.ac.za | 012-420-3779 | 083-938-8955 |
| **Auditor** | Tony Crowder | ZS6CRO | tcrowder@telkomsa.net | 011-672-3311 | |
| **Historian, Archives, Awards** | Tjerk Lammers | ZS6P | zs6p@iafrica.com | 012-809-0006 | 083-976-4387 |
| **Contests** | Jaco Cronje | ZR6CMG | jacocronje@yahoo.com | | 081-474-2220 |
| **Contests** | Pierre Holtzhausen | ZS6PJH | zs6pjh@telkomsa.net | 012-655-0726 | 082-575-5799 |

## Birthdays – October / Verjaarsdae – Oktober

01 Evan Seligmann ZS6ELI
02 Andre van Tonder ZS6BRC
10 Roy Alexander ZS6MI
20 Martinho Dos Santos ZS6BQP
25 Gawie Marais ZS6GJM
30 Andre Coetzee ZS6GCA
31 Pieter Myburgh ZS6PAM

### Spouse's Birthdays / Verjaardae – October / Oktober

03 Poppie, gade van Hansie Meyer ZS6AIK
12 Juanita, sw of Ryan Gibson ZS6GGR
21 Louise, gade van Alméro Du Pisani ZS6LDP

### Anniversaries / Herdenkings –October / Oktober

06 Poppie en Hansie Meyer ZS6AIK
09 Annatjie en Pieter Fourie ZS6CN
15 Annelize en de Jager Burger ZS6ZO

## Lief en Leed / Joys and Sorrows

Dis met leedwese dat ons verneem het van die afsterwe van Alf Joubert ZS6ABA, die broer van Whitey Joubert ZS6JJJ op die 12de September. Hiermee ons medelye aan sy gade Alta, familie en vriende.
Jean de Villiers ZS6ARA het onlangs 'n kornea oorplanting gehad. Hiermee ons wense vir spoedige beterskap
Kenny Martin ZS6KMM is receiving chemotherapy treatment. We wish you all the best with the treatment.
Jaco Cronje ZR6CMG and Richard Peer ZS6UK were in bed with sever flu. We wish them a speedy recovery.
Evan Seligmann has undergone and operation, and has been discharged. We wish him a speedy recovery.

**October Birthstones : Opal and Tourmaline**

**The Opal**, which has healing properties, is believed to enhance one's creativity, calming nerves and strengthening memory. **Tourmaline** is believed to have more psychological effects and helps one to retain their calm when under pressure, battle negative emotions as anger and jealousy, and promotes peace and tranquility

| Contests and Diary of Events – September 2016 / Kompetisies en Dagboek van Gebeure – September 2016 (UTC Times) | |
|---|---|
| 01 – 02 | Oceania DX Contest, Phone : 08h00 – 08h00 |
| **06** | **SARL 80m QSO Party : 17h00 – 20h00** |
| 08 – 09 | Oceania DX Contest, CW : 12h00 – 12h00 |
| **08 – 09** | **Antique Wireless Association Valve QSO Party** |
| **09** | **SARL Youth Net** |
| **15** | **CQ Hou Koers** |
| 15 – 16 | 10-10 International Fall Contest, CW : 00h01 – 23h59 |
| 15 – 16 | Worked all Germany Contest : 15h00 – 14h59 |
| **20** | **Radio Amateur Examination** |
| **21 – 23** | **Jamboree on the Air** |
| 29 - 30 | CQ Worldwide DX Contest, SSB : 00h00 – 24h00 |

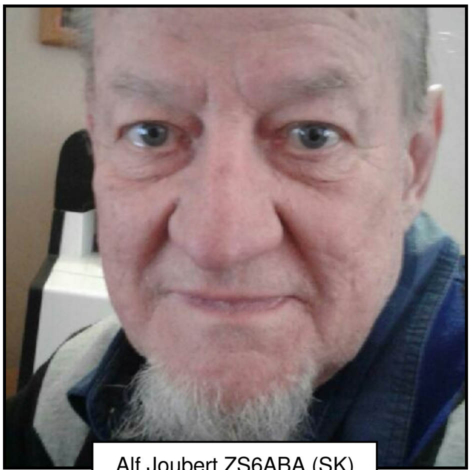
## PARC SUBS / LEDEGELD FROM / VAN 30-06-2016

| | | | |
|---|---|---|---|
| Bank | First National Bank | Ordinary Members / Gewone Lede : R150<br>Spouses / Pensioners : R50 | **Your call sign must appear as statement text!** |
| Branch Code | 25 20 45 | | |
| Account No | 546 000 426 73 | | |

**Please remit your subs in time to our Treasurer, or pay per transfer into the PARC account**
**Betaal asb. u ledegelde betyds aan ons Tesourier, of betaal per oorplasing in die PARC rekening**

**Please Note : If your Club fees are not paid up to date, birthday details cannot be displayed in Watts**

## Silent Key : Alf Joubert ZS6ABA



Alf Joubert ZS6ABA (SK)

It is with great sadness that we have learned of the passing of Alf Joubert ZS6ABA, on the 12th of September 2016. We sincerely send our condolences and best wishes to his wife, family and friends. Alf was the brother of Whitey Joubert ZS6JJJ, and has been a member of the Pretoria Amateur Radio Club for many years.

Whitey Joubert ZS6JJJ

## PROJEK LEXICON IN VOLLE GANG : Etienne Naude ZS6EFN

Projek Lexicon is nog in volle gang, met die woordelys wat aansienlik gegroei het en die inhoudsopgawe van die onderwerpe wat deel van die handleiding vorm wat ook nou gefinaliseer word. Die volgende stappe is om die eerste weergawe van die woordelys einde Oktober 2016 te finaliseer vir hersiening. Inhoud vir die handleiding moet nou bymekaar gemaak word en baie skryfwerk lê nou voor. Die projekspan gaan binnekort 'n uitnodiging aan die Radio Amateur gemeenskap rig om bydraes te skryf vir die handleiding. Ons beplan om die onderwerpe in bondels van 5 onderwerpe op 'n slag bekend te stel sodat ons die inhoud vir die verskeie onderwerpe in kleiner hoeveelhede kan bymekaar maak en om almal wat 'n bydrae wil lewer 'n geleentheid te gee om deel van die skryf van die handleiding te wees. Vir meer inligting omtrent Projek Lexicon kontak Etienne Naude, ZS6EFN by etienne@afrigrid.com

## Die skep van ‘n suksesvolle Klub

Hiermee enkele gedagtes oor hoe om ‘n Klub meer aantreklik vir lede te maak:

**Moenie net daar sit nie, doen iets! Minder interessante klubs is gevul met operateurs wat nooit aktief is nie.**

Vind redes om op die lug te wees met mede klub lede: Moenie net met mekaar gesels via die herhaler nie,beplan 'n nuwe spesiale gebeurtenis soos bv Jaco ZR6CMG se kontakte op simpleks op 145.500 en 144,300 SSB .

Velddag kompeties - reel/besoek interessante persele om kompetieses van te bedryf.

**Wanneer moontlik (of ten minste een of twee keer 'n jaar), hou 'n gesellligheid voor die vergadering.** As jou klub nie 'n baie groot begroting het, maak dit 'n bring & braai of iets dergliks . Jou lede sal mekaar beter leer ken en is n goeie geleentheid om vir potensiële nuwe lede (en nuwe Radio Amateurs ) te sê, "Hoekom kom maak jy nie n draai nie kom ontmoet ons lede en gesels saam met ons?"

**Hou die formaliteite tot 'n minimum.** Sommige klubs het Parlementêre prosedures, maar ander funksioneer die beste met vergaderings wat die "ou besigheid/nuwe besigheid" roetines volg. Bly gefokus, saaklike en lewendige - veral met betrekking tot bedryf aktiwiteite - baie meer aangenaam as om deur die gewone lys van droë verslae te ploeter.

Voorbeeld: " eerste item van besigheid: Joe wil die VHF-wedstryd vanaf XYZ berg bedryf. Daar is 'n pad wat lei tot die perseel vanwaar hy die kompetiese wil bedryf. Enigiemand anders wat belangstel? ... OK, Joe, jy het 3 mense wat graag saam met julle wil gaan ; kry hulle na die vergadering. Volgende, item.

As die klub een maal n maand vergadering en huis toe gaan en geen aktiwiteite word beplan nie is jou klub op die verkeerde pad. *(Artikel ingestuur deur Johan de Bruyn ZS6JHB)*

# Who really invented the LED? : Pete Friedrichs AC7ZL

*"...And the wizard extended his hand toward the crystal which sat upon the table before him. He imparted it with mystical energy which caused it to glow. Its rich light painted the astonished faces assembled around the table, casting deep shadows which danced on the walls behind them..."* Sounds like an outtake from a fantasy movie, or some kind of elf-on-a-magical-quest novel, right?

This is no fantasy at all. If you fabricate a crystal with the right materials, and energize it with an electric current, you can get all kinds of materials to glow, in pretty much any color you please. Sealed in a transparent plastic package with terminals through which the electric current can be applied, we now call such a device a "light emitting diode," or "LED."

I remember the first LED I saw, sometime in the early to the mid-1970s. It was tiny, about an eighth of an inch in diameter. It came with an electronic kit that a friend of mine had received for his birthday. I marveled at how such a pure red light could be generated with such little electricity and without the production of any heat. To me, it was magical. Around this time marked the first common appearance of LEDs, arranged into segments, in the displays of calculators and digital clocks. My first digital wrist watch was a black plastic Texas Instruments watch with a red LED display. You had to push a button on the side to light the display and show the time. Now that was high-tech. I couldn't have been happier if I had been given the ignition keys to an Apollo rocket.


**A range of early Texas Instruments watches**

Nowadays, LEDs are so fully ingrained in everyday life that people take them for granted. They're dirt-cheap and available in every conceivable hue, not to mention infrared and ultra-violet colors. In recent years they've graduated from simple indicators or display devices to high-power applications like automotive tail lamps, stop lights, football game score boards, and general-purpose replacements for incandescent and fluorescent bulbs in lighting fixtures.

To whom can we give credit for this modern technology? Who invented the LED and when was it invented? The answer depends upon who you ask and how one defines the term "invented." I've reached my own conclusions, which I'll share in a moment, but let's look back through time at some possible contenders for the title.

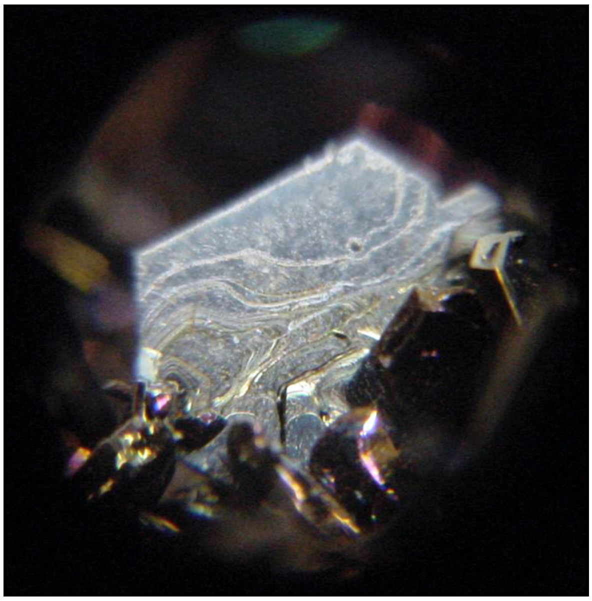
**Who Really Invented the LED?**

In 1968 Monsanto Corporation became the first company to mass produce discrete LEDs and LED numerical displays. The sheer numbers in which these devices were fabricated helped drive the cost from several hundred dollars per unit to mere pennies apiece, thereby transforming an expensive laboratory curiosity into a practical component for integration into consumer goods. This achievement was essential for getting LEDs into the hands of the general public, though I wouldn't really credit Monsanto with their invention.

Nick Holonyak, Jr., working as a consulting scientist at General Electric, proposed the use of gallium arsenide and gallium phosphide as the materials from which to fabricate an LED crystal. Despite the fact that "experts" around him dismissed his ideas as ridiculous, Holonyak forged ahead, fabricated, and then demonstrated a practical visible-light LED in 1962. Many have called Holonyak the "father" of the LED, but is such credit conclusive? Was this truly the first time that a semi-conducting diode had emitted light?

Apparently not. Ten years earlier, in 1952, Kurt Lehovec led a research team that experimented with and patented a silicon-carbide-based LED. Surely, then, he and his colleagues must have "invented" the LED. But wait, not so fast....

In the 1920's, a self-taught genius by the name of Oleg Losev applied electrical currents to chunks of carborundum. He observed luminous emissions and set out to study the phenomenon. In 1927, the Russian periodical Telegrafiya i Telefoniya bez Provodov published one of Losev's papers entitled, "Luminous Carborundum Detector and Detection with Crystals." In this paper, Losev documented light emission from carborundum (silicon carbide) detector crystals, quantified the polarity and threshold for the electric current required to stimulate the emission, and even quantified the spectral qualities of the emitted light. He correctly understood that the emitted light was "cold" in nature, resulting not from an arc or incandescence, but directly from the semi-conducting action of the crystals. In later papers, he went on to propose advanced applications for such a device, including an "optical relay" for telecommunication use.



**Carborundum (SiC) (left) and Moissanite, the rare mineral form found in nature (right)**

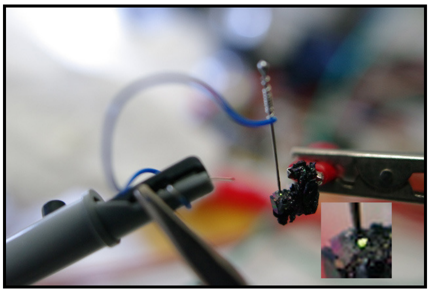
Losev's work was certainly brilliant and ground-breaking, but did he invent the LED? Was he the first person to observe an LED in operation? The ultimate answer may lie in a brief article submitted by Henry J. Round to the periodical Electrical World. Round wrote the following:

To the Editors of Electrical World:

Sirs:

*During an investigation of the unsymmetrical passage of current through a contact of carborundum and other substances a curious phenomenon was noted. On applying a potential of 10 volts between two points on a crystal of carborundum, the crystal gave out a yellowish light. Only one or two specimens could be found which gave a bright glow on such a low voltage, but with 110 volts a large number could be found to glow. In some crystals only edges gave the light and others gave instead of a yellow light green, orange, or blue. In all cases tested the glow appears to come from the negative pole, a bright blue-green spark appearing at the positive pole. In a single crystal, if contact is made near the centre with the negative pole, and the positive pole is put in contact with any other place, only one section of the crystal will glow and that same section wherever the positive pole is placed.*

*There seems to be some connection between the above effect and the EMF produced by a junction of carborundum and another conductor when heated by a direct or alternating current; but the connection may be only secondary as an obvious explanation of the EMF is a thermoelectric one. The writer would be glad of references to any published account of an investigation of this or any allied phenomenon.*



Round's letter was published in 1907, twenty years before Losev's work. I've seen no earlier documentation describing the effect, so Henry J. Round may have been the first to publish an account of light-emitting behavior in a chunk of carborundum--even if he didn't quite understand what it was that he was seeing. But does that make him the inventor of the LED?

**A replication of JH Round's LED Experiments**

Before I answer with my own opinion, let's discuss what would motivate someone like Round to apply an electric current to a carborundum crystal in the first place.

**Early Radio Detectors**

Radio receiver operation involves the process of "detection," the conversion of captured radio frequency energy into currents suitable for driving a sounding device like a set of headphones. Early 20th-century radio receivers made use of what now seems a strange and exotic array of instruments, like the Branley coherer, the Marconi magnetic detector (sometimes known as a "Maggie"), and Reginald Fessenden's electrolytic detector.

In 1874, two decades before the term "radio" was commonplace, Karl Ferdinand Braun discovered that point contacts between certain materials could exhibit semi-conducting properties. That is to say, such contacts exhibited a preference for the flow of electric current in one direction versus the other. This behavior can be exploited in simple radio circuits to strip the carrier from a received signal and recover the audio information encoded on it.

Jagadish Chandra Bose made subsequent use of this phenomenon in the construction of instruments he used to generate and study the properties of microwave radiation. This occurred in the late 1800's.

In 1906, Greenleaf Whittier Pickard developed and patented a silicon-based radio detector. The invention was based in part on Braun's work. From a modern frame of reference, we would now refer to such a device as a point-contact diode.

Pickard's detector manifested Braun's point contact as a slender but springy piece of wire, dubbed a "cat's whisker". The whisker probed the surface of a silicon crystal, forming a semi-conducting junction where the two materials met. Pickard is said to have tested some 30,000 other combinations of crystal and whisker materials. This resulted in additional useful designs like the Perikon (zincite/bornite) and pyrite detectors.

The trouble with many of these devices was their inherent fragility and instability. The electrolytic detector, for example, consisted of on open cup or capsule filled with sulfuric or nitric acid—nasty stuff, and hardly suitable for portable equipment. Cat whisker-type detectors like those based on galena or silicon worked well, but required considerable fussing to obtain proper operation, and then they could be knocked out of adjustment with little more than a hard stare. In a shipboard environment, where the floor and furniture are in constant motion, this was problematic. In addition strong signals, like those produced by a nearby transmitting antenna, could electrically damage the junction, requiring the whisker to be readjusted to a new "sensitive" spot.

**The Carborundum Detector**

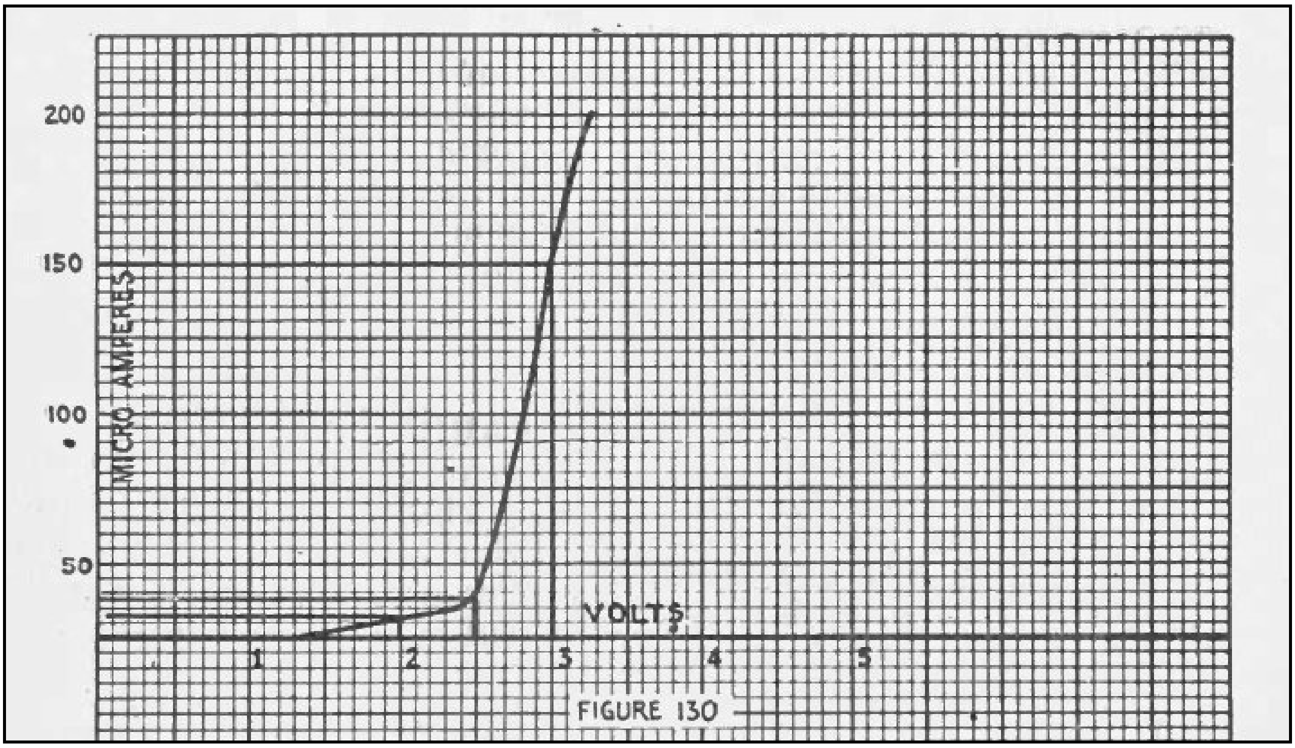
Carborundum, also known by the chemical name silicon carbide, is rare in its natural form (a mineral called moissanite). In 1884, while trying to develop a process to create synthetic diamonds in an electric furnace, chemist Edward Acheson instead discovered a cost-effective way to produce synthetic carborundum. Carborundum's extreme hardness (second only diamonds) made it an ideal industrial abrasive. Acheson was granted a patent for his process in 1893, and carborundum has been produced for commercial use ever since.

Enter now General H. H. C. Dunwoody, retired Signal Officer of the U.S. Army and employee of the Deforest Radio Telephone Company. In December of 1906, he patented a radio detector based upon carborundum. This new detector offered wireless operators some important benefits.

Carborundum was by this time a cheap and plentiful material from which to fashion a detector. It was found to perform best, not by probing with a delicate cat's whisker, but through the application of a steel contact point under comparatively high pressure. This meant that once the device was properly adjusted, it had the tendency to maintain that adjustment even in the face of mechanical shock or vibration. And, unlike many other mineral-based detectors, the carborundum detector was not damaged by exposure to the kinds of high-power signals found in shipboard or coastal stations where transmitting and receiving antennas were located in close proximity.

For the Deforest company, carborundum held an additional attraction. At that time, wireless communication technology was still in its infancy. Fierce competition provided the engine for endless litigation between companies seeking to make a name and maintain a competitive edge. Dunwoody's invention gave the Deforest company an alternative to the electrolytic detector they were using, and essentially disembowelled legal action taken against them for having employed the latter in their wireless stations without proper license.

For all its merit, there was one drawback to the use of carborundum that is perhaps best explained through analogy. If water flowing through a pipe can be thought of as representative of the flow of electricity through a wire, then a crystal detector like Pickard's or Dunwoody's can be thought of as a one-way check valve. In the case of the valve, a spring forces a poppet into a valve seat and seals it. If pressure is applied in the forward direction, the poppet is lifted off its seat and water can flow through. If the flow should reverse, the spring closes the valve again and flow is terminated.




**The forward transfer function for carborundum (From Bucher, 1920)**

It stands to reason that a certain minimum forward pressure must be applied to open the valve and keep it open. Because of the action of the spring, water pressure below this value will fail to open the valve, even though applied in the correct direction.

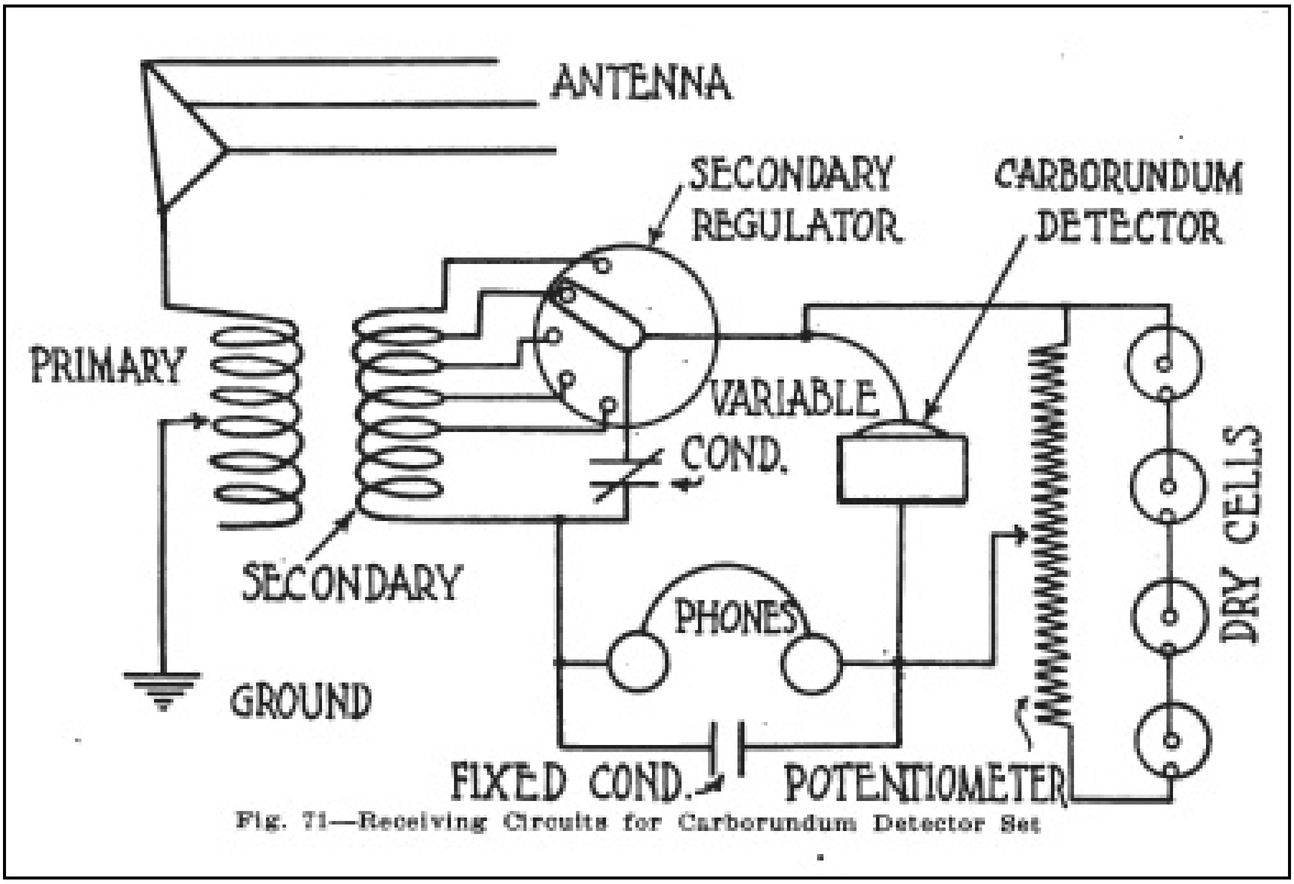
The same holds true for crystal detectors. A certain minimum pressure (voltage) must be applied to achieve meaningful flow (current). The relative stiffness of the "valve springs" in differing crystal detector chemistry accounts for the variation in observed sensitivity from one to another.

Since early radio circuitry could offer no amplification, the only way a detector would function is if the feeble signals captured on the antenna were sufficiently strong to force the detector "spring" to an open position. It follows, then, that the most sensitive (and therefore desirable) crystal materials were those that required the smallest voltages to operate.

The problem with carborundum is that it has, in valve parlance, a very stiff spring. That is to say, a comparatively high voltage must be applied in the forward direction in order to get the detector to turn on. In a crystal radio setting, this means that only the most powerful signals are capable of driving the detector, rendering a carborundum-based radio set essentially deaf to weak signals.

To combat this deficiency, an ingenious method was devised wherein a battery is used to provide a bias voltage. The bias battery wired to provide a fixed voltage (pressure) sufficient to almost—but not quite—push the detector to its on state. Any radio signal now superimposed on this bias, even an incredibly weak one, would be sufficient to drive the detector to its fully on state. The inherently insensitive carborundum detector was thereby made to function as though it were a much more sensitive crystal.

The genesis of the LED, then, was the search for an improved crystal detector for use in early radio sets. The application of a battery voltage to a carborundum crystal was part of a strategy to improve the radio sensitivity of the material. Now in the case of certain crystalline materials like carborundum, light emission is a natural consequence of electric current acting on the boundaries between crystals and between crystals and the detector probe. It can thus be argued that LEDs were not so much invented as they were discovered.




**Biasing the carborundum detector in a radio receiver (From Packer and Haugh, 1922)**

Undeniably, credit is due Henry J. Round for recognizing the novelty of crystal-generated light, to document it, and to try to quantify the electrical conditions necessary to produce the effect. However, I think it naïve to presume that he was the first to observe it.

To begin with, Round was employed by the Marconi Company at the time. He must have had colleagues and coworkers, and it is possible that one of these individuals brought the effect to Round's attention after having stumbled upon it himself.

Not only that, the art of radio has a longstanding tradition of amateur experimentation. Amateur radio operators and equipment builders, now referred to as "ham" operators, have been around for nearly as long as the science of radio communication itself. Published plans for homebuilt radio gear can be found as far back as 1901. Through the first decade of the 1900's hundreds if not thousands of amateur radio stations were set up. Undoubtedly, some of these operators had experimented with carborundum detectors at their stations. Since bias batteries were essential for effective carborundum detector operation, it is a virtual certainty that at least one of these operators would have noticed twinkles of light emanating from their detector.

**Reproducing the Past**

Academic discussions of carborundum detectors are well and good, but the big difference between legend and history is that the latter can be independently verified. The claim that a chunk of common industrial abrasive can be induced to produce cold light from an electric current is both intriguing and worthy of confirmation. That is exactly what I set out to do.

First came the matter of obtaining carborundum. In this age of the Internet, an on-line search will reveal numerous sources. Raw carborundum crystals are actually quite beautiful, and chunks of the material are sold as mineral specimens to collectors. In my case, Tucson, Arizona's annual International Gem and Mineral Show provided a grand opportunity to purchase some handsome samples of carborundum crystals for a just a few dollars. From one of these samples, I snapped off a small shard or flake, about the size of a large grain of rice.

Next, I located a spent .22 rifle cartridge. Using my soldering iron as a source of heat, I filled the brass with molten solder. This was to act as my crystal mount.

Finally, using a pair of tweezers, I picked up the carborundum shard and inserted one end of it into the pool of molten solder. I removed the heat. When the solder solidified, the crystal was permanently mounted.

To apply an electric current to the crystal, I snapped the spent cartridge into the jaws of an alligator clip test lead, which was subsequently connected to the positive terminal of a variable DC power supply. A second test lead, connected to the negative terminal of the supply, was fitted with a steel sewing needle. The point of the needle would allow me to probe the surface of the carborundum shard with some degree of precision. I adjusted the current limit on the power supply to something on the order of 50 mA.

The crystal shard was tiny and any light emitted was not likely to be dramatic, so I set up the apparatus just described on the stage of a stereo microscope. In the eyepiece of the microscope, the little flake of carborundum became a tabletop with visible fissures, seams, and stepped surface. My sewing needle probe became a baseball bat.

I set the power supply to about 12 volts, touched the crystal with the point of the needle and immediately witnessed the production of blue-yellow light. The stories were true!

Sometimes light appeared only at the point of the needle. Sometimes fissures or craters in the surface of the sample would flicker. Sometimes the boundaries between adjacent crystals would illuminate.

I also witnessed a variety of colors—yellows, blues, greens, golden hues, and red. In a room devoid of direct sunlight or overly aggressive lighting, the glowing features of the crystal were often bright enough to be visible to the naked eye.

I experimented with different voltages and with reversed polarity. Each change produced slightly different effects but nearly all produced some kind of light emission. Thirty volts was capable of producing an impressive amount of light, though it sometimes also caused local heating and destructive incandescence. Surprise: you can burn out a carborundum detector just like any other LED!

I fitted my microscope with an eyepiece-to-DSLR adapter for my camera. I was able to collect several minutes of interesting video documentation of all that I've just described. I've created a Youtube video entitled: Light Emitting Diodes... in 1907? where you can see actual footage of raw carborundum LEDs in operation.

### Conclusion

So where does this leave us? We know that carborundum was used in the construction of certain radio detectors as far back as 1906. We know that in order to render the carborundum sufficiently sensitive for radio receiver use, it was necessary to apply a bias in the form of an external battery current. We know that Round documented the emission of light from an electrically-stimulated carborundum crystal in 1907, and I was able to easily reproduce and verify the effect myself, using a random piece of carborundum crystal and a DC power supply on my bench top.

We know that originally the production of light in the carborundum detector was not an intended or engineered effect, but rather the outcome of previously unrecognized natural processes. The production of light from a semi-conducting junction was therefore discovered, as opposed to invented.

Finally, we know that during the early 1900's, there were many individuals experimenting with detector crystals and detector biasing schemes, most of whom were probably amateurs.

So if the LED wasn't invented, then who should get credit for discovering it? At the risk of sounding anti-climactic, I have to admit that we'll never know for sure. But as a licensed amateur radio operator myself, I like to believe that the first twinkle of LED light witnessed by the human eye was generated and observed by one of my brothers—some forever-to-remain-unknown ham radio operator.

#### References Materials

Bucher, Elmer E. The Wireless Experimenters Manual, copyright 1920, Wireless Press Inc., New York

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*Article submitted by Johan de Bruyn ZS6JHB for re-formatting for Watts*

## WICEN search for missing plane

*by WIA on September 26, 2016*

The search continued to solve the enduring mystery disappearance of an aircraft VH-MDX last heard from 35 years ago in the rugged Barrington Tops National Park, about 200 kms north of Sydney. It is a regular WICEN (NSW) event who with the Bushwalkers Wilderness Rescue Squad and several others look for the plane wreckage. WICEN (NSW) President Steven Heimann VK2BOS said the exercise searches for the Cessna 210 missing with five people on board in stormy night in August 1981. WICEN was involved in the original search and in the 35 years since. The pilot of VH-MDX took off from Coolangatta in Queensland for Bankstown in New South Wales. Over Barrington Tops he radioed that his aircraft was unstable, losing altitude, may have had a lightning strike and ice on the wings. Steven VK2BOS said about 50 were involved last weekend, but unable to find a trace. In many places they had to cut through thick vines while avoiding Gympie Gympie stinging trees that can result in severe pain for humans that last days or months. An ambulance stood by in case any searcher was injured in the exercise on September 16-18, but their services were not needed. Some 12 from WICEN (NSW) met the communication challenges posed by the extremely rugged terrain. Each volunteer has rain-proof communications and in contact with WICEN (NSW) at several command posts.

## How you can talk to an Astronaut from home

*by seeker.com on September 24, 2016*

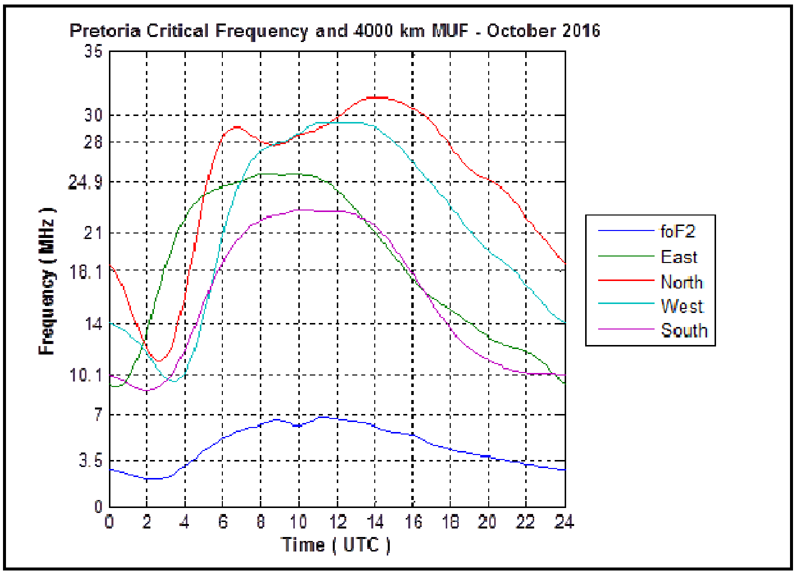
Fans of the empirically awesome Netflix series Stranger Things will recall that at one point our adolescent heroes use ham radio to communicate with their pal, who is stranded in another dimension circa 1983. We have no proof that ham radio actually reaches other dimensions, but on then again, we have no proof that it doesn't, either. And as Trace Dominguez explains in today's DNews report, it's not that crazy of an idea, because ham radio can go a long way. Ham radio is another terms for amateur radio, and works just like the broadcasts you pick up in your car stereo. The differences are that ham radio is strictly non-commercial and dedicated to specific frequencies or bands on the RF spectrum. There are nearly three million ham licenses worldwide, with major populations of licensed operators in Japan, Germany, England, Indonesia, and South Korea. According to the American Radio Relay League (ARRL), there are more than 727,000 licensed ham radio operators -- called hams -- in the United States alone.

## Why Do We still have Morse code?

*by smithsonianmag.com on September 23, 2016*

Are there any practical applications remaining for Morse code? Samuel F.B. Morse's system of dots and dashes was revolutionary in the 1840s (Morse, a portrait painter, became interested in speeding up communications after his wife died suddenly while he was away from home), but Western Union sent its last telegram in 2006. Now Morse code is used largely in airplane navigational systems for identification purposes, says Paul F. Johnston, curator of maritime history at the National Museum of American History. Amateur radio operators also use it for fun.

**I would like to die on Mars. Just not on impact.**
**Any product that needs a manual to work is broken.**
**I think that's the single best piece of advice: constantly think about how you could be doing things better and questioning yourself.**
**When something is important enough, you do it even if the odds are not in your favor.**
**Elon Musk: CEO and CTO of SpaceX ; Product architect of Tesla Motors**




## Long Term HF Propagation for October 2016

### DX Operating

The graph shows the 4000 km maximum useable frequency (MUF) to the East, North, West and South from Pretoria for the first hop using the F2 layer.

### Local Operating

The F2 critical frequency (foF2) is the maximum F-layer frequency for short range communications.

See also the Propagation tab at http://www.parc.org.za/

**Courtesy Vincent ZS6BTY**



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### Those weird chemists…