January 2016
Volume 70, Issue 1

# The Cat's Whisker!

## The Wanganui Amateur Radio Society Inc., Branch 48 NZART

www.zl2ja.org.nz

### Club Officials 2015-2016

| Position | Name | Callsign |
|---|---|---|
| Patron: | Strath Davis | ZL2AAJ |
| President: | Jason Wallace | ZL2FT |
| Vice President: | Jeff Howe | ZL2THO |
| Secretary/Treasurer: | John Love | ZL2JEL |
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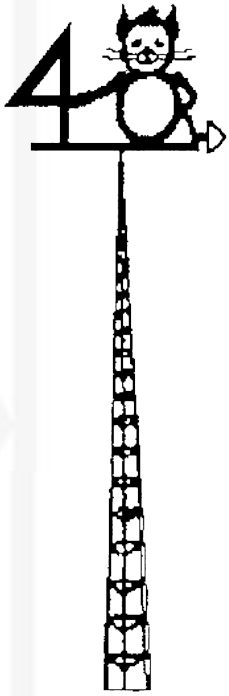
| **Committee:** | Stephen Swartz | ZL2SWZ |
| | Ivan Horn | ZL2ATU |
| | John Love | ZL2JEL |
| | Paul Greenwood | ZL2GRE |
| **Publicity Officer** | **Jason Wallace** | **ZL2FT** |
| Net Controller, 690: | Ivan Horn | ZL2ATU |
| Financial Checker: | Leo Boyle | ZL2BGE |
| Equipment Officer | John Love | ZL2JEL |
| Awards Custodian: | Ivan Horn | ZL2ATU |
| Webpage/Newsletter Editor: | Colin Wilson | ZL2WM |
| Branch e-Mail Address | branch48@zl2ja.org.nz | |



## The Next General Monthly Meeting will be held:

**Monday 1st February, 2016**

**(There is NO meeting in January)**

**at the Hunters and Stalkers Hall, Peat St.**

**At 7:30pm**

**Business: SPECIAL GENERAL MEETING.**

**All Very Welcome!**

**Don't Forget to Bring Along Your Outgoing QSL Cards to the Meeting Too!**

*"Just the Cat's Whiskers"*

## SPECIAL GENERAL MEETING

Good evening all, I hope you have all had a lovely well earn break over the Christmas, New Year holiday period.

I have just returned from having a "Special Committee Meeting" and would now like to advise all members that at our 1st meeting of the year which is on the 1st February 2016 that the Committee has requested that we hold a "SPECIAL GENERAL MEETING" following our normal branch meeting. This special meeting is to do with the changing of some of the rules governing Branch 48 by the Incorporated Society Act.

I would like to request that all members to attend this meeting, and if you would kindly send to my Email address of zl2jel@xtra.co.nz indicating your acknowledgement of this email and your intention to attend this important meeting would be much appreciated.

Regards John Love

ZL2JEL

Branch 48

Secretary/ Treasurer

ZL2JA

## From the Editor

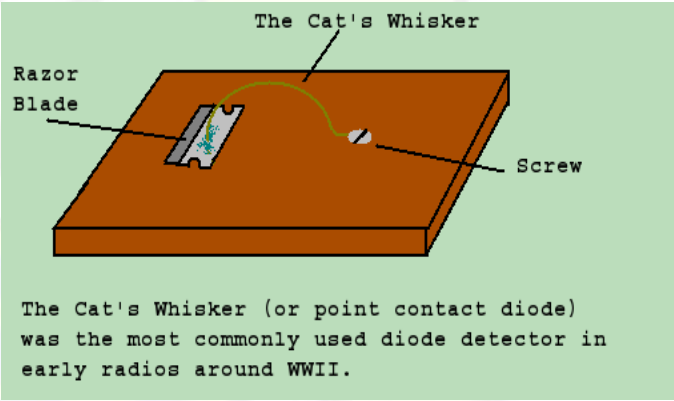
Hello Everyone,

Happy New Year to all.

Well it's February already...

Sorry about the lateness of this newsletter, has been a busy start to the year for me, and time has flown past...

Colin




The Cat's Whisker (or point contact diode) was the most commonly used diode detector in early radios around WWII.

# Through the Grapevine

## Kapiti Museum, Waikanae

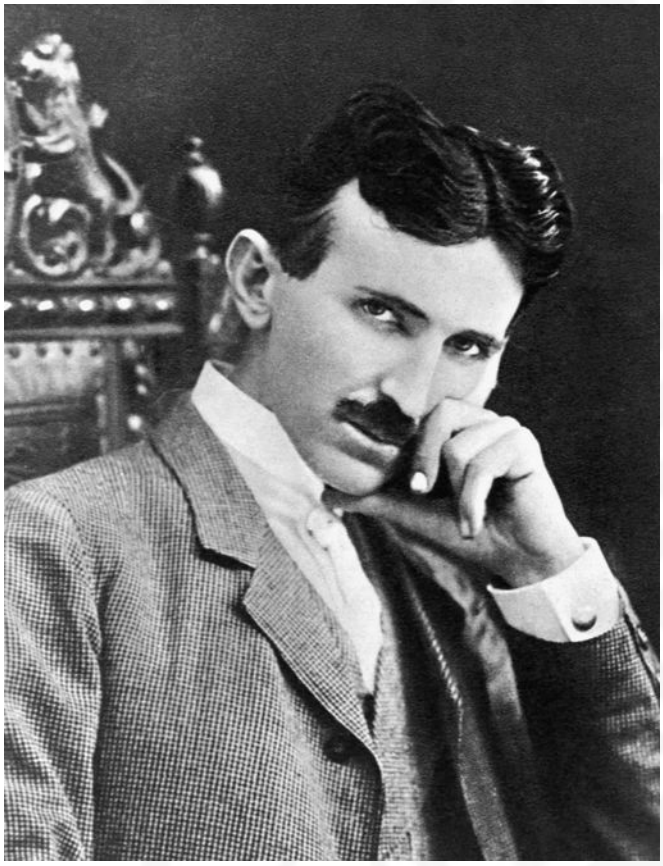
# Dead Electrical Dudes No. 2

By Philip Neidlinger (KA4KOE)

**This Month's Stiff: Nikola Tesla**

**Entered Mortal Coil: 10 July 1856**

**Assumed Room Temperature: 7 January 1943**



*Sparky in a Contemplative Pose...*

I present to you this month's Dead Electrical Dude No. 2, Mr. Nikola Tesla (i.e. “Sparky”, since he had an affinity for large electrical discharges) Mr. Tesla invented many of the electrical devices and systems in widespread use today. It is interesting to note that the man started out his professional career as an electrical engineer with Budapest's version of Ma Bell. Tesla's contraptions and wild ideas resulted in some amazing toys being thrust upon mankind. Note the following highly abbreviated list of just a small sampling of his innovation:

Alternating polyphase current distribution: Tesla's AC system won out over Thomas Edison's DC system. In retaliation against his former employee, Edison staged public demonstrations of the lethality of alternating current by electrocuting dogs. If Edison's DC system had won out, we'd in all likelihood still be in the dark...literally. Imagine huge storage batteries surrounded by fences every few city blocks. Tesla joined forces with Westinghouse and the rest is, as they say, history.

Induction motor: This item is considered to be one of the greatest inventions of all time.

Fluorescent light: Fluorescent lighting is now considered the standard for energy efficient illumination, relegating incandescent sources to secondary status.

Tesla coil: versions of this device are used in your television set's high voltage deflection coils. These coils are responsible for moving that little electron beam around ever so FAST. Really large Tesla coils can generate impressive artificial lightning bolts. Cool stuff.

Tesla held patents for elementary radio apparatus, in particular, the use of tuned circuits. Marconi built the first viable radio system using technology described by Tesla.

In all, Tesla held 700 U.S. patents for his devices. Note, however, that the inventor did have a weird side. Some of Tesla's quirks included the following-

Tesla claimed to have received signals from another planet using one of the devices in his laboratory.

Sparky never married. How many homely geeks do you know who fit this picture?

Tesla also claimed to have invented a “death ray” that could destroy 10,000 enemy aircraft from a distance of 250 miles. We may never know the veracity of this claim, since all of Tesla's papers were confiscated by the Feds at

the time of his death during World War II.

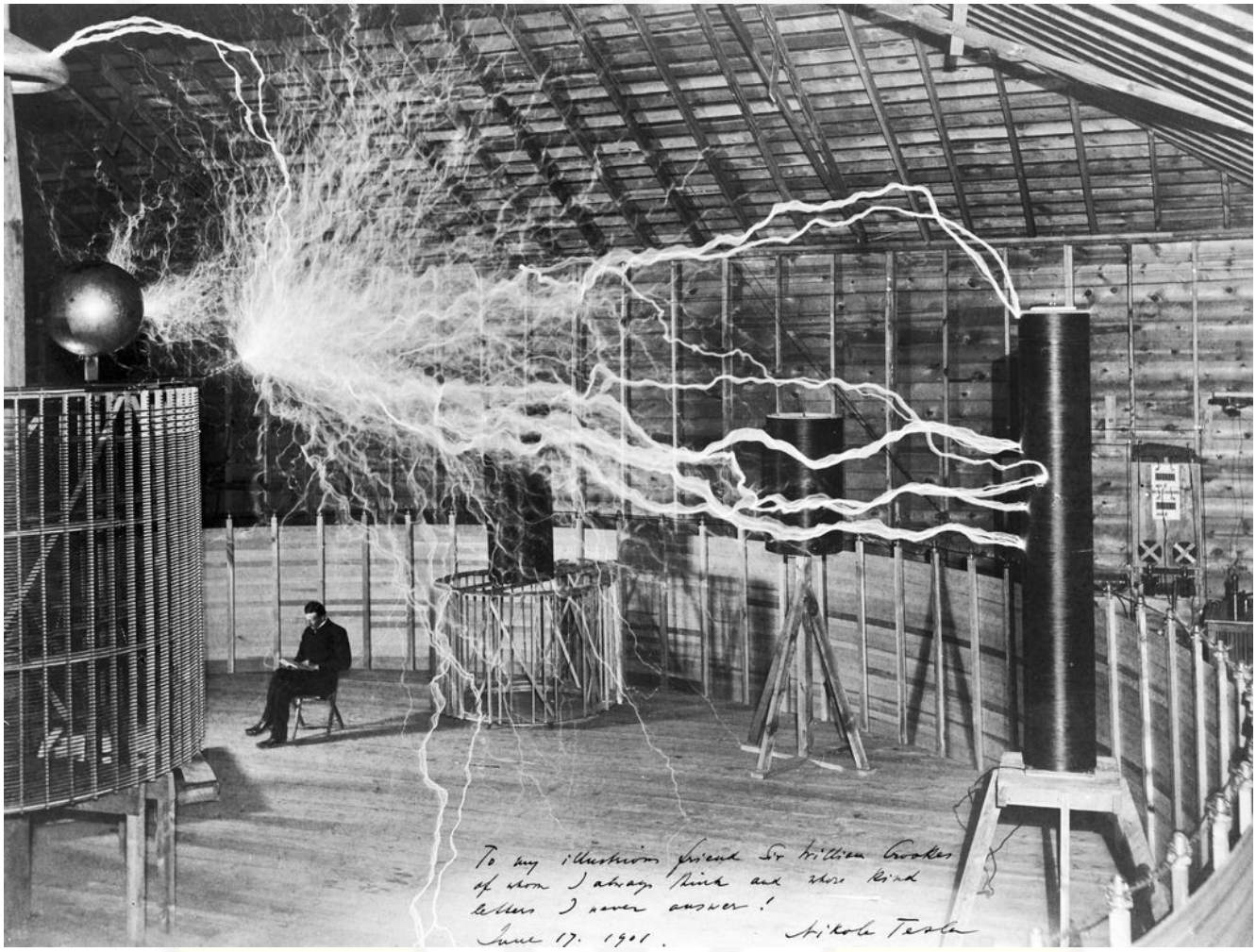
Tesla lived the last 10 years of his life in a two room suite on the 33rd floor of the Hotel New Yorker, Room 3327. Edward Armstrong, the inventor of the superheterodyne receiver and FM, said of his colleague, “The world will wait a long time for Nikola Tesla's equal in achievement and imagination.” I agree with the late Mr. Armstrong. As a final tribute to the man and his achievements, the unit of magnetic flux density, the Tesla, was named in his honor.

References:

The Nikola Tesla Memorial Website, http://www.teslasociety.com

by Philip Neidlinger, PE






*Famous photograph of Serbian-American inventor Nikola Tesla in his laboratory in Colorado Springs around 1899, supposedly sitting reading next to his giant "magnifying transmitter" high voltage generator while the machine produced huge bolts of electricity. The photo was a promotional stunt by photographer Dickenson V. Alley; a double exposure. First the machine's huge sparks were photographed in the darkened room, then the photographic plate was exposed again with the machine off and Tesla sitting in the chair. In his Colorado Springs Notes Tesla admitted that the photo is false: "Of course, the discharge was not playing when the experimenter was photographed, as might be imagined!" Tesla's biographers Carl Willis and Mark Seifer confirm this. During 1899-1900 Tesla built this laboratory and researched wireless transmission of electric power there. The Magnifying Transmitter, one of the largest Tesla coils ever built, with input power of 150 kW could produce potential of around 12 million volts at a frequency of about 150 kHz, creating 130 ft. (41 m) "lightning bolts". The arcs in the image are 22 feet long. When he first turned it on, the machine blew out the Colorado Springs power company's generator. (From wikipedia.org)*

# Taupo maritime radio ZLM HF broadcast and Local HF propagation.

## From Jeff ZL2THO

On the 690 net the other week, I mentioned how I tune into the Marine weather broadcasts to get an idea of local HF propagation.

| Local Time* | Contents of Broadcasts | Frequency (kHz) |
|---|---|---|
| 0133 | Coastal Navigational Warnings, Synopsis, Forecasts and Warnings for the New Zealand Coast and 0000 Coastal Reports | 2207, 4146, 6224 |
| 0303* | Oceanic, Navigational and Meteorological Warnings in force for Navarea XIV; Synopsis and Forecast for high seas area Southern | 6224,12356 |
| 0333* | Repeat of 0303 broadcast | 8297, 16531 |
| 0533 | Coastal Navigational Warnings, Synopsis, Forecasts and Warnings for the New Zealand Coast and 0300 Coastal Reports | 2207, 4146, 6224 |
| 0803 | 0600 Coastal reports for Shipping | 2207, 4146, 6224 |
| 0903* | Oceanic, Navigational and Meteorological Warnings in force for Navarea XIV, Synopses and Forecasts for high seas areas Subtropic, Forties and Pacific | 6224,12356 |
| 1003* | Repeat of 0903 broadcast | 8297, 16531 |
| 1203 | 0900 Coastal reports for Shipping | 2207, 4146, 6224 |
| 1333 | Coastal Navigational Warnings, Synopsis, Forecasts and Warnings for the New Zealand Coast and 1200 Coastal Reports | 2207, 4146, 6224 |
| 1503* | Oceanic, Navigational and Meteorological Warnings in force for Navarea XIV; Synopsis and Forecast for high seas area Southern | 6224,12356 |
| 1533* | Repeat of 1503 broadcast | 8297, 16531 |
| 1733 | Coastal Navigational Warnings, Synopsis, Forecasts and Warnings for the New Zealand Coast and 1500 Coastal Reports | 2207, 4146, 6224 |
| 2003 | 1800 Coastal reports for Shipping | 2207, 4146, 6224 |
| 2103* | Oceanic, Navigational and Meteorological Warnings in force for Navarea XIV, Synopses and Forecasts for high seas areas Subtropic, Forties and Pacific | 6224,12356 |
| 2203* | Repeat of 2103 broadcast | 8297, 16531 |

- *Oceanic Warnings and Forecasts broadcast one hour later when NZDT is in force (last Sunday in September to first Sunday in April).
- *Source; http://metservice.com/marine/radio/hf-broadcast-schedule*

# Accurate Transmitting Antenna Locations Using Global Positioning System (GPS) Satellites



PART 2

## INTRODUCTION

A technique for obtaining accurate locations, using low cost GPS receivers, was described in Part 1 (Q-Bit May 2015). This article provides additional information.

## HOW GPS WORKS

The design of the GPS allows up to 32 active satellites. Typically, 24 active satellites are in orbit at any one time, each one completing an orbit every 12 hours.

Each satellite carries a very accurate clock, producing a “tick” every second. The GPS receiver compares the “time of arrival” of the “ticks” from the available satellites.

The GPS receiver also downloads the orbital parameters broadcast by the satellites and calculates the satellite locations. By a process of successive approximation, using the satellite positions and the time of arrival of the ticks, the GPS receiver calculates its own location.

## THE SPEED OF RADIO WAVES

When we studied for the Amateur Exam, we were taught that radio waves travel 299.7 metres in one microsecond. So, for 1 metre GPS positional accuracy, it would appear that the time of arrival of the ticks needs to be measured to an accuracy of better than 3.3 nanoseconds.

Unfortunately, this could imply the need for a GPS receiver processor clock rate of 299.7 MHz. Also, the bit-rate of each “civilian” satellite transmission is 1.023 Mbits/sec, corresponding to a bit duration of 977.5 nanoseconds.

Clearly, current GPS receivers, such as the one pictured, claiming 3 metre accuracy at best, are unlikely to have a processor clock of, say, 100 MHz, or are measuring time of arrival to better than 10 nanoseconds.

By selectively blocking parts of the sky, as seen by the GPS receiver, and noting the effect on the individual satellite signal strength bar graphs, and changes in the claimed location accuracy, it is apparent that the receiver uses a complex averaging process. The details of this process are subject to intense competition between GPS receiver manufacturers. Some of the details are revealed in patents, while other details are closely guarded trade secrets.

A good spread of satellites across the sky usually produces the best accuracy. Overhead satellites seem to have more influence on the accuracy of the displayed altitude, while satellites lower in the sky have more influence on the location accuracy.

## ACHIEVING BETTER ACCURACY

At best, the pictured receiver claims 3 metre accuracy. It displays locations to 3 decimal places of Minutes. In New Zealand the least significant place corresponds to 1.4 metres in the East-West direction and 1.9 metres in the North-South direction.

The least significant digit varies up, or down, in an apparently random fashion. It would seem that location accuracy could be improved by longer-term averaging of the display, either manually, or automatically by accessing the GPS receiver's NMEA output interface if available. Some, more expensive, GPS receivers include a menu-selectable long-term averaging option.

Manual averaging, while measuring the location of LINZ survey marks, using the pictured GPS receiver, has typically achieved 0.3 metre location accuracy.

**UNHEALTHY SATELLITES**

A simplistic location averaging process may be disrupted for up to 12½ minutes if a satellite becomes “unhealthy”, due to the time taken to update the Almanac stored in the GPS receiver.

For example, our Colonial Knob site has many suitable locations for antennas. Each location has been surveyed to better than 1 metre accuracy, with the assistance of Ray, ZL2REES.

However, during the survey, the site appeared to suddenly move by about 5 metres, according to the GPS receiver display, without the aid of a severe earthquake.

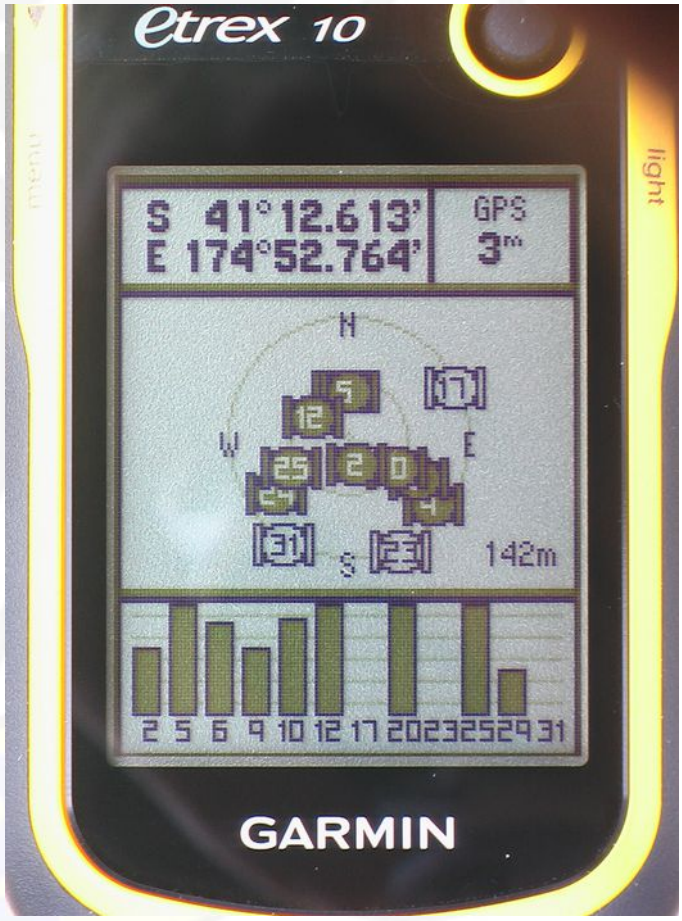
A few minutes later the site moved back to near its original position and one of the satellite bars, in the signal strength bar graph display, had changed from solid black to only a black outline, indicating that the particular satellite had been marked “unhealthy” by the GPS control station, instructing GPS receivers to ignore it's transmitted information.

The delay in the “unhealthy” notification was caused by the slow rate at which the Almanac (including the healthy/unhealthy information) is transmitted. As noted in Part 1, it takes nearly 12½ minutes to transmit the complete Almanac update cycle.

12½ minutes later, after another Almanac cycle, the black outline signal strength bar changed back to solid black. The GPS control station had fixed the satellite problem, some time during that 12½ minutes. The displayed position reverted to its original position.

A smarter GPS receiver would have noticed that it was being used for surveying (near zero horizontal velocity) and would have detected, and ignored, a significant satellite error much earlier, without waiting to be informed of the error by way of an updated Almanac.

REFERENCE
*www.linz.govt.nz*




ZL2AJ
KAPITI COAST MUSEUM
ZL6KCM
KAPITI COAST MUSEUM

# The Back Info Page

**(Links are "clickable" in the PDF version)**

## The Internet:

**The ZL2JA Webpage**:
http://zl2ja.org.nz/

**The ZL2JA Photo Gallery:**
http://zl2ja.org.nz/photos/

**Listen to the New Zealand National System (Live-ish):**
http://zl2ja.org.nz/listen/

**The Wanganui Award:**
http://zl2ja.org.nz/award/

**ZL2JA on Youtube:**
http://www.youtube.com/user/ZL2JA

**NZART (NZ's National AR Organising Body):**
http://nzart.org.nz

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## Branch Repeaters:

**"Wanganui 690"**
Output 146.900MHz, In -600kHz

**"Wanganui National System 9875"**
Output 439.875MHz, In -5MHz

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Devoted to Amateur Radio Since 1926