

# VHF Journal ON THE WEB



## JUNE 2001

Above: Postage stamps from Vietnam depicting fixed link microwave relay stations. *(I'm sorry, but although I think it's a really cool subject for a stamp, the post office artists in Vietnam must really be hard up for new material!)*

## Meteor Scatter Issue!

**ONE NIGHT STAND!**  
**Toronto VHF DO June 16 !**

**EXTREME MICROWAVE DX!**  
**PIONEER 10 LIVES ON!**

The VHF Journal goes **TECHNICAL**  
(in a manner of speaking)

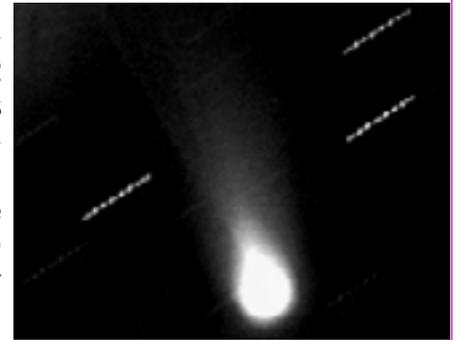
**Congrats to K2AXX, W2DYY, N2IM, N2JMH and K2DH** on their elections to the RVHFG! See the Officers and Board link on the club website for details & email.

Dues are coming up! **Remember, there are now 2 tiers of dues & 2 prices based on your preference!** If you choose web-only distribution of the Journal, pay only \$10 USD/yr. If you want your Journal mailed to you - the dues are \$15 USD/yr.

Family memberships still available! See us at the Hamfest - signups will be easier than ever!

The RVHFG is taking it to the road again. N2JMH and K2AXX are doing yet another presentation, this time for the Xerox ARC. Perhaps there's some new flame for the Rochester Cup competition? We'll have to see what we can feed to the fires!

Our Next Regular Meeting will be held on the 2nd Friday in September. However, there WILL be stuff to do this summer - you need to watch the club website for more current details as necessary. Picnic, Hamfest - we're doing it BIG!



### LINKS FOR JUNE:

**meteorite magazine (quarterly)**

<http://www.meteor.co.nz/>

**main page: Univ Western Ont, Meteor Physics**

<http://phobos.astro.uwo.ca/~pbrown/metphys.html>

<http://phobos.astro.uwo.ca/~pbrown/meteors.html>

**meteor pix**

[http://www.bbc.co.uk/skyatnight/space\\_gallery\\_comets.shtml](http://www.bbc.co.uk/skyatnight/space_gallery_comets.shtml)

### The 2001 Eastern VHF/UHF Conference

will be held on August 31, Sept 1&3. This is 1 week later than in past years. We are in the process of finalizing the speakers and proceedings. Anyone wishing to be a speaker or to present a paper either in person or for the proceedings should please contact the author. The conference will be held in the Radisson Hotel in Enfield, CT. Further info will be forthcoming and available on the NEWS Web site as it develops.

Thanks & 73 Bruce N2LIV

# VHFBILL

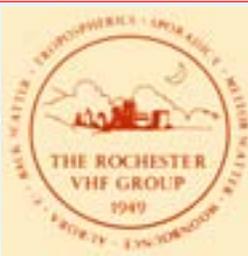
Welcome to the June 2001 WEB ONLY edition of the VHF Journal.

Yup- after extensive research, trials and tribulations, much pain, crying, screaming and gnashing of teeth, **we've gone Technical** (this new type-face you see here). Of course, **this change has more benefits than just being cool looking.** It results in smaller file sizes and faster downloads for you. It means a move to a slightly less cluttered look, faster editing for me... And lets not forget **better living through technology** (or at least that's what they used to say until everyone found out that TANG was better for cleaning your dishwasher than for drinking). We are now officially a very Technical publication.

NOW for the hard part: I NEED YOUR FEEDBACK. Any time you have difficulty with a download, contact me. I want your experience with the digital VHF Journal to be a positive one, and I will do what I can to make it so. In doing all this fancy typesetting and layout on my end, I assume everyone is pleased with the outcome unless I hear otherwise... that means each month I will push the technological envelope a little further. If you don't tell me you are having a download or printing problem, in another month I will be going farther and you will be left in the dust- not the desired result.

The JOURNAL has been readable with Adobe Acrobat 4.0 for about a year now, but time marches on. **In the next 30 days, you NEED to get ADOBE 5.0 INSTALLED.** Just click on the link in the RVHFG website that will send you to Adobe for your **FREE Acrobat 5.0 Reader download.** As I said above, we're going to continue shrinking files and pushing limits, and that means a little effort on your part. I think you will be QUITE pleased with the new reader... and the new Journals that flow from it.

...CU in June. Tom VE3IEY FN14pd



## The Rochester VHF Group

\* Club memorial call: W2UTH \*

Club website @ <http://vhfgroup.rochesterny.org>

### Officers:

**Chairman:** K2AXX Mark Hoffman (716) 243-5606 [k2axx@arrl.net](mailto:k2axx@arrl.net)  
**Vice Chairman:** W2DYY, Russ Schroder [w2dyy@rochester.rr.com](mailto:w2dyy@rochester.rr.com)  
**Secretary:** N2JMH Jim Howard (716) 637-4554 [n2jmh@arrl.net](mailto:n2jmh@arrl.net)  
**Treasurer:** N2IM Charles Barkowski, [n2im@juno.com](mailto:n2im@juno.com)  
**Director** (Even year): KB2VGH Jeff Luce (716) 424-8406 [kb2vgh@amsat.org](mailto:kb2vgh@amsat.org)  
**Director** (Odd year): K2DH Dave Hallidy (716) 728-9517 [k2dh@frontiernet.net](mailto:k2dh@frontiernet.net)  
**Past Chairman:** NS9E Tim Stoffel (775) 972-9470 [lionlamb@servtech.com](mailto:lionlamb@servtech.com)

### Appointees:

**Contest Chairman:** N2JMH Jim Howard (716) 637-4554 [n2jmh@arrl.net](mailto:n2jmh@arrl.net)  
**Awards manager:** N2JMH Jim Howard (above)  
**Club memorial Call Trustee:** N2WK Wayne King [N2WK@arrl.net](mailto:N2WK@arrl.net)  
**Banquet Chairman:** WA2ZNC Len Gessin (716) 229-5470 [wa2znc@juno.com](mailto:wa2znc@juno.com)  
**Picnic Chairman:** AA2WV Scott Ballou  
**Journal Editor:** VE3IEY Tom Richmond (613) 634-1855 [tantonn@kingston.net](mailto:tantonn@kingston.net)  
**Journal Publishing:** N2KXS & W02P (716) 582-2074 [jstonehi@frontiernet.net](mailto:jstonehi@frontiernet.net)  
**Membership Manager, Subscription Services:** N2KXS (above)  
**Internet Webmaster:** K2AXX (above)  
**Mailing list Majordomo in charge:** KB2VGH (above)  
**Advertizing:** VE3IEY (above)

Jeff, KB2VGH sez: "There is only \*one\* mailing list [you'll ever need...]"

[Rvhfg@vhfgroup.rochesterny.org](mailto:Rvhfg@vhfgroup.rochesterny.org)

It is set up to broadcast to all RVHFG members

To Subscribe: Send your address, call, e-mail address and \$15 US funds for mailed copies (or \$10 US for Web downloaded copies) to: The Rochester VHF Group, PO Box 92122, Rochester, NY, 14692. You may elect WEB or MAIL delivery for the same price. You will be notified the very day it is available for download. If you elect delivery by mail, copies are in Black and White- sorry!

**-Commentary and articles:** via e-mail to editor VE3IEY: [tantonn@kingston.net](mailto:tantonn@kingston.net). Use standard ASCII text, Corel's Word Perfect or send as regular e-mail.

**-Photos and drawings:** via e-mail, and can be sent in any format that is available (JPG, GIF and TIFF are most common). **EXCEPTION:** We don't like MS PowerPoint (\*.PPT) files!

**-Assistant Editor, Printer, Membership & Data-Magician:** Judy, N2KXS

**-Production Czar and Supreme Downloader of the Word:** Fred, W02P

**-Advertising space is now available in the Journal.** Contact the editor for One thru Twelve month rates. **Layout services are free of charge.**

**-This publication is Copyrighted by the Rochester VHF Group.** It has been created using Corel's Word Perfect 2000, Adobe Photoshop 6.0, Adobe Pagemaker 6.52, Adobe Image Ready 3.0, and Adobe Acrobat Distiller 5.0. **It is best read with Acrobat 4.0 or 5.0** Other NFP publications may excerpt articles herein provided subscription information (or [www address](http://www.vhfgroup.rochesterny.org)) to the Journal is reprinted with it.

THE VHF JOURNAL was compiled, edited, and typeset on  
Amherst Island, in Ontario, Canada (FN14pd)

It was published in Rochester, New York, USA (FN13)

The World's Image Capital

50  
144  
220  
332  
903  
1296  
2304  
3456  
5760  
10G  
24G  
75G  
light

Need a new BRICK?



(908)  
996  
3548  
-  
fax  
996  
3702

Downeast Microwave Inc.  
Everything for the  
Microwave experimenter  
<http://www.downtownmicrowave.com>

**Your Andrew Cable Connection!**

**TOM WHITTED, WA8WZG**  
PORT CLINTON, OHIO - EN810M

50 MHZ - 24GHZ

PHONE: (419) 732-2168 FAX: 732-2944  
E-MAIL: [WA8WZG@WA8WZG.COM](mailto:WA8WZG@WA8WZG.COM)



# RVHFG May Meeting Minutes

Jim Howard, N2JMH, secty

Mark, K2AXX opened the meeting at 7:35pm with short introductions and activity reports by all in attendance.

Mark, K2AXX motioned to accept the secretaries and treasurers report as printed in the April Journal, Charlie, N2IM accepted and Jeff, KB2VGH seconded.

Old Business: Howard, K2AN and Charlie, N2IM received their plaques for the January contest for placing 3<sup>rd</sup> place Single-op High power and 1<sup>st</sup> place QRP, respectively.

Elections: Mark, K2AXX opened the floor for any new nominations, with none added to the slate of current nominations it stands as, Mark K2AXX for Chairman, Russ W2DYY for Vice-Chairman, Charlie N2IM for Treasurer, Jim N2JMH for Secretary and a choice of Paul N2OPW or Dave K2DH for Director. Dave K2DH then moved to acclimate the office of Chairman, Vice-chairman, Treasurer and Secretary with Fred W2OP seconding and all voting in favor.

Ballots were passed out for the election of Director with Dave K2DH winning the election.

New Business: Dues structure for the upcoming year was discussed by Mark, K2AXX and brought to the floor for a vote on as printed in the April Journal. Accepted as printed with a unanimous vote by all in presence.

Ballots were passed out for the Gizmo award and the winner will be announced at the summer picnic, which will be held at Scott AA2WV's new QTH. Date and time will be announced in the Journal and on the web page.

Volunteers are needed to man the table at the Hamfest this year, contact Mark K2AXX for time slots still available.

Irv AF2K is looking into getting a banner made for the RVHFG, hopefully in time for the hamfest.

Paul N2OPW announced he will be in charge of the VHF operations during the Field Day operations with RDXA and could use help from anyone interested

Mark, K2AXX motioned to close the meeting at 8:45 and Dave, K2DH accepted and Len WA2ZNC seconding.

**The Kharmic Law of Return,  
or, Getting Back What You Put Out:  
If you approach a broken down piece of  
equipment with frustration and anger,  
fixing it will be all the more difficult.**

**Consider the problem with a clear head,  
a positive attitude, and plenty of time.  
As you get into it, you'll be more relaxed,  
and might even find yourself having fun.**

## Murphy's Technology Laws

#1: You can never tell which way the train went by looking at the track.

#2: Logic is a systematic method of coming to the wrong conclusion with confidence.

#3: Technology is dominated by those who manage what they do not understand.

#4: If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization.

#5: An expert is one who knows more and more about less and less until he/she knows absolutely everything about nothing.

#6: Tell a man there are 300 billion stars in the universe, and he'll believe you. Tell him a bench has wet paint on it, and he'll have to touch to be sure.

#7: All great discoveries are made by mistake.

#8: Nothing ever gets built on schedule or within budget.

#9: All's well that ends... period.

#10: A meeting is an event at which minutes are kept and hours are lost.

#11: The first myth of management is that it exists.

#12: A failure will not appear until a unit has passed final inspection.

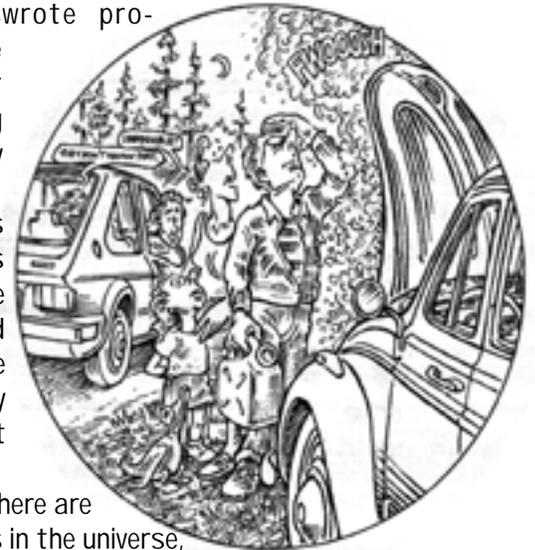
#13: New systems generate new problems.

#14: To err is human, but to really foul things up requires a computer.

#15: We don't know one-millionth of one percent about anything.

#16: Any given program, when running, is obsolete.

#17: A computer makes as many mistakes in two seconds as 20 men working 20 years make.



*"Where I live, there's a lady who  
walks everywhere on her hands.  
It's like she doesn't trust  
where her feet want to take her."*

*Tanya Donnelly*

# Meteor Scatter Special

## Comets and Meteors

excerpted from Amsat

...by GM4IHJ

Past examination of the orbit and timing of the November Leonids shower indicates that it is produced when the Earth's orbit around the Sun takes us through the debris stream cast out by Comet Temple-Tuttle. 20 years ago none of this was obvious. The connection between annual meteor showers and comet orbits was debated but not proven. But that situation changed when the IRAS Infra Red satellite began to look into space.

IRAS revealed the existence of Infra red stars, as expected. But unexpectedly, it showed what looked like long aircraft vapour trails in space. Trails where something was radiating infra red, along lines up to a million miles long. Indicating the presence of something warm enough to be clearly seen in infra red light. Trails of small particulate debris along almost straight lines going both in and out of the solar system. Specialists in orbital mechanics calculated the orbits of the track materials, and found that one of them coincided with the orbit of a small dead asteroid which had long been associated with the Geminid meteor shower of December. Connections with other "comets" or, asteroids which had once been comets were soon established.

To date the connection between a particular comet and its meteor stream, has been established for the following meteor showers :

Shower	Month	Comet
Lyrids	April	Comet 1861 I
Acquarids	May	Halley ( outgoing )
B Taurids	June	Encke
Draconids	June	Pons-Winnecke
Perseids	August	Swift-Tuttle / Kegler
Draconids	October	Giacobini-Zinner
Orionids	October	Halley ( incoming )
E Taurids	November	Encke
Leonids	November	Temple-Tuttle
Andromids	November	Biela (comet appears to have broken up)
Geminids	December	Dead Asteroid former comet ?
Ursids	December	Tuttle 1939X

We are normally only concerned with these comet debris trails

where they cross the Earth's orbit. Not all comets come in on a plane near that of the Earth's orbit. Those which do, like Comet Halley produce debris streams the Earth collides with twice a year. Many other comets come in and out round the Sun on highly inclined orbits such that the Earth only encounters them once, or in some cases does not encounter them at all. The material escaping from the comet, leaves it with only a very slight difference in velocity from that possessed by the comet itself.

None the less in the course of hundreds of years this material orbits with the comet gradually spreading all around the orbit track. This spread does not occur evenly. Some Earth encounters produce lots of meteors, whilst others do not. Other planets also encounter the debris stream from time to time, further dispersing or reducing its contents.

Having established in recent years, that most meteors are debris released by Comets, it is reasonable to ask, where Comets come from. The Dutch Astronomer Jan Oort suggested that comets were resident far out from the Sun, well beyond the planets of the solar system, Residue left over from the formation of the planets, unable to form planets, these icy bodies are contained in a spherical cloud centred on the Sun, but nearly 1 million million miles from it, ie 1/24th of the way to the next nearest star. Far from the Sun and planets the majority of these small bodies have remained undisturbed for 4.5 billion years.

Though at rare intervals, a passing star may come close enough, to send some of them far out into space to be lost from the solar system. Whilst others are slowed up by the stellar visitor's gravity and lose orbit speed, falling slowly in towards the Sun.

Recently, another Dutch astronomer ( G Kuiper) suggested that there was a closer, second comet reservoir, beyond the orbit of the planet Neptune, at a range of about 5000 million miles from the Sun. A fact confirmed in recent years, by the discovery of at least 60 small bodies, albeit big enough to be seen, in this Kuiper Belt.

When disturbed these comets fall into an elliptical orbit coming much closer to the Sun at perihelion (closest point to the Sun) but going back out to the Kuiper or Oort belt at aphelion. Un-

less, they come too close to one of the inner planet and are captured by say Uranus, which then confines them to an orbit going around the Sun at one end and Uranus at the other. As does the comet Temple-Tuttle generator of the November Leonids meteors.

When inside Jupiters orbit , the heat from the Sun , melts some of the comets icy surface , releasing some of the trapped dust and fragments, which having, almost the same velocity as the comet, stream behind it, such that in a few hundred years there is a debris trail all around the comets orbit. Some comet orbits come near to, the orbit of the Earth around the Sun , and when they do, Earth runs into the debris stream. Twice in the case of a comet like Halley . Where the Earth meets the incoming and the outgoing stream. But only once in the case of most other meteor streams which intercept Earth orbit only once. So we get two showers a year from some comets, only one from others, and no showers at all from comets, which perhaps come in at very high inclination and miss Earths orbit track entirely.



Recent studies to prove the above conjecture, have used examination of comet tracks to establish their perihelion distance from the Sun and their orbital eccentricity ( easy for short period comets coming in from Jupiters orbit but much more difficult for the orbits with very high eccentricity where the comet comes from the Oort cloud ). None the less, a detailed check of 190 of these long distance "presumed" Oort cloud wanderers has shown that their aphelion furthest from the Sun is roughly as expected ie around 1 million million miles or more

. Do we ever get comets from other star systems ? Perhaps, once every 200 years, but only single stars like the Sun can be expected to retain comets. Binary star systems probably cannot hold on to comet clouds.



See the website info on page 1 for **Meteorite** magazine.

## Meteor Scatter Bonanza ... MAYBE ????

by GM4IHJ, from the Amsat webpage

Towards the end of August 1862 , Comet Swift Tuttle was a superb magnitude 2 comet easily visible in northern skies. Several astronomers attempted to calculate its orbit , and the Italian astronomer Giovanni Schiaparelli was the first to point out that the orbit was very close to that of the famous August meteor shower - the PERSEIDS.

With the recent passage of Halleys comet and the comet trails imaged by the IRAS Infra Red Astronomy satellite. The link between comet dust trails and meteor showers is now well established. So it is reasonable to ask "When is Comet Swift Tuttle expected back , and will it like Halley and several other comets produce big meteor shower events when the comet is nearest to the Earth ?

The trouble is that some astronomers linked slight increases in the Perseids shower in the 1970's with Swift Tuttle likely return. But no comet was seen and some 1980's Perseids were very poor. But last year although Europe saw a relatively moderate Perseids shower, there was a sudden spectacular increase in the Perseids over Japan, where conditions were much more favourable than they were over Europe.

So is Swift Tuttle coming back now ? Checks with old comet records suggest that Swift Tuttle which has only been seen once , may well be Comet Kegler last seen in 1737. So several astronomers have plotted the likely return of a hypothetical Kegler Swift-Tuttle.

Officially the Perseids begin to build up on 10th August with best reception likely around noon and midnight local Sun time ( not Daylight saving ), each day to 13th August. At these times a 45 degree elevation of the shower radiant from UK should give good results . But be aware that while the Perseids radiant is above the UK horizon through out the shower 10th to 13th August. The actually number of meteors intercepted by the Earth as it passes through the Comets Dust track has two marked peaks . One due at about 2200 UTC GMT on 11th August and maybe a second peak roughly around 1000 utc on 12th August, ie both peaks at times not far from those giving the best radiant location.

Caution is however necessary . Comet Swift Tuttle has not yet been located If it is not going to appear until say December , it will not be in place to give us a good shower in August because its track will be quite some way from the Earth - making it a poor visual and a poor meteor track target.

# Good News!! Pioneer 10 lives on. EXTREME MICROWAVE DX!

**Editors note: I'm still waiting for data from NASA on approximate frequencies and calculated path loss on this project- but the signals are so weak they are using CHAOS THEORY as a means of interpreting the data. No I am NOT making this up. See The NASA Pioneer 10 website for more info.**

At GMT 17:27:30, Saturday, 4/28/01, the signal from Pioneer 10 was received at station 63 in Madrid, the first time since August 5/6 of last year. So it appears that Pioneer 10 has life, albeit in another mode - i.e., only in a two-way coherent mode. We have been listening for the Pioneer 10 signal in a one way downlink non-coherent transmission mode since last summer with no success. **We therefore conclude that in order [for Pioneer 10] to talk to us, we need to talk to it.** This means from now on, we need two-way round-trip light time (RTLTL) passes to allow the Deep Space Network (DSN) to send up a strong stable signal to lock up with a coherent downlink signal.

The status of the Geiger Tube Telescope instrument (James Van Allen, PI.) is on. Due to power considerations, this is the only instrument that has been powered on for the last 4 years. Last month, we successfully processed tracks, previously thought null. The scientific data on the 5 and 6 August 2000 passes of Pioneer 10 were analyzed by Dr. Van Allen, who reported clean data. The cosmic ray intensity was identical within statistics to that on DOY 190 (7/9/00), the date of the last maneuver. There was no indication that the Solar wind boundaries have yet to be reached.

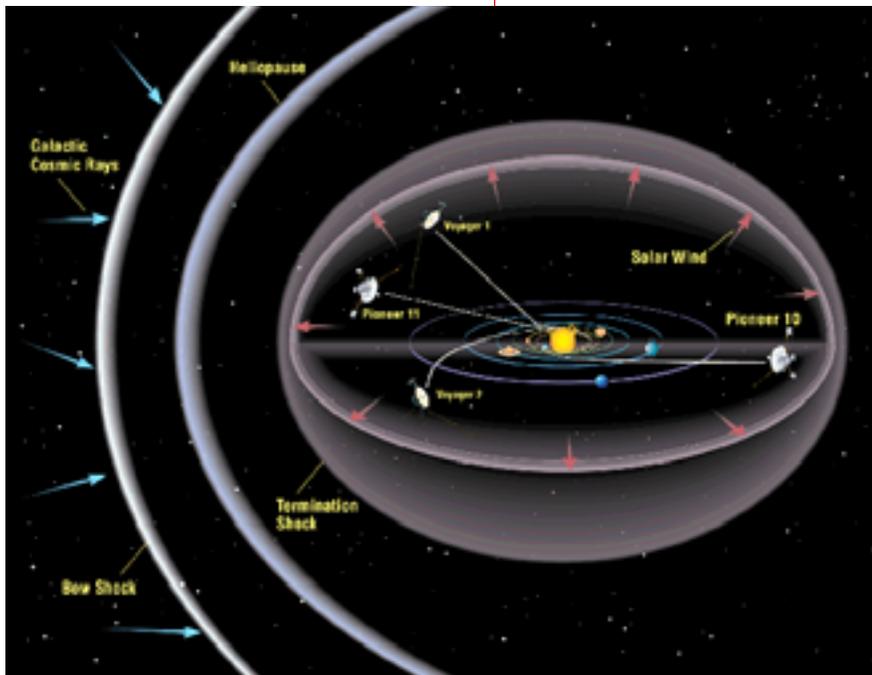
There was a successful contact of Pioneer 6 for about two hours on 8 December 2000 to commemorate its 35th anniversary. The control room at NASA Ames Research Center in Mountain View, CA, was manned by Project Manager: [Larry Lasher](#) , Flight Director: Dave Lozier, Chief Flight Controller:

Ric Campo, and Flight System Engineer; Larry Kellogg, with Network Operations Project Engineer: Ida Millner at JPL. Some 35 years from the launch date of 12/16/65, Pioneer 6 telemetry data were received expeditiously as spacecraft lockup occurred on the first attempt on Day 344 UT 0000:45 (local time 4:00:45 PM PST) at DSS-14 at Goldstone. Pioneer 6 was 83 million miles distant from Earth. The track lasted approximately 2.5 hours. **The Signal-to-Noise Ratio (SNR)=9 dB and signal strength (AGC)=-164 remain at approximately the same levels as the last previous contact on October 6, 1997** demonstrating the stability and durability of NASA's oldest extant spacecraft. Viva la Pioneer.

**Question:** How far will Pioneer travel and on what path? **Answer:** Pioneer 10 will be in galactic orbit for billions of years. It is moving in a straight line away from the Sun at a constant velocity of about 12 km/sec. Until Pioneer 10 reaches a distance of about 1.5 parsec (309,000 AUs) -about 126,000 years from now - it will be dominated by the gravitational field of the Sun. After that Pioneer 10 will be on an orbital path in the Milky Way galaxy influenced by the field of the stars that it passes.

**Question:** Why does the RTG power decrease? **Answer:** Power for the Pioneer 10 is generated by the Radioisotope Thermoelectric Generators (RTG's). Heat from the decay of the plutonium 238 isotope is converted by thermoelectric couples into electrical current. The electrical output depends on the hot junction temperature, the thermal path to the radiator fins, and the cold junction temperature. It is the degradation of the thermoelectric junction that has the major effect in decreasing the power output of the RTG. In the 27-year time scale operation of Pioneer 10, the 92 year half-life of the isotope does not appreciably affect the RTG operation. **The nuclear decay heat will keep the hot junction temperature hot for many years but unfortunately will not be able to be converted into enough electricity to power the transmitter for much longer.**

**Question:** How much has Pioneer been eroded? **Answer:** All the wear, pitting, and erosion that Pioneer 10 has sustained are probably over now. The asteroid belt and the severe conditions of Jupiter have already been experienced. Now, Pioneer is



in the vacuum of space where the average spatial density of molecules is one trillionth the density of the best vacuum we can draw on Earth. We expect Pioneer to last an indeterminate period of time, probably outlasting its home planet, the Earth. In 5 billion years, the Sun will become a red giant, expand, envelop the orbit of the Earth, and consume it. Pioneer will still be out there in interstellar space. Erosional processes in the interstellar environment are largely unknown, but are very likely less efficient than erosion within the solar system, where a characteristic erosion rate, due largely to micrometeoritic pitting, is of the order of 1 Angstrom/yr. Thus a plate etched to a depth ~ 0.01 cm should survive recognizable at least to as distance ~ 10 parsecs, and most probably to 100 parsecs. Accordingly, Pioneer 10 and any etched metal message aboard it are likely to survive for much longer periods than any of the works of Man on Earth.



**Question:** Why and how is Pioneer 10 being maneuvered? **Answer:** The Pioneer spacecraft is spin-stabilized, spinning at approximately 4.28 rpm (Revolutions Per Minute), with the spin axis running through the center of the dish antenna. **If a person were to sit in the spacecraft, looking through a hole in center of the dish antenna with a telescope, he would see the Sun traveling very slowly to the left.** The Earth's path would describe a very narrow ellipse (the orbit is seen nearly edge-on) around the Sun. In July the Earth is near the right hand edge of the ellipse, and 6 months later will be near the left hand edge of the ellipse. The angle to the spacecraft between the left edge of the ellipse and the right edge is less than 2 degrees. In order to communicate with the spacecraft, **the Earth has to be within 0.8 degrees of the boresight of the spacecraft antenna.** Since the Earth moves by almost 2 degrees, the spacecraft has to be re-aimed at the Earth about twice a year. This is done by a "CONSCAN (conical scan) precession maneuver" executed by the spacecraft.

The radio signal transmitted from an antenna on Earth is focused and reflected by the spacecraft dish antenna toward a small feed horn located on a tripod which is centered in front of the spacecraft dish antenna, and then conducted to a receiver in the spacecraft. During a CONSCAN maneuver, the feed horn is physically moved by 8 inches to one side. A ground command turns on a heater in a bellows filled with liquid Freon. The Freon boils, the bellows expands, and moves a mechanical piston and cam attached to the feed horn mounting plate against a mechanical stop. A micro switch cycles the heater power on and off to keep the feed in the offset position. With the feed in the offset position, the radio signal from the tracking station is seen by the spacecraft receiver as varying sinusoidally in amplitude (amplitude modulated). This error sig-

nal contains amplitude and phase information on the pointing angle between the spacecraft spin axis and the Earth and the direction to the Earth during the spin cycle. The minimum amplitude occurs during the spin cycle when the antenna points to the Earth, whereas the maximum occurs when the **antenna dish** points away from the Earth. The frequency of the modulation is equal to the spacecraft spin rate (4.28 rpm). The error signal is processed on board the spacecraft to calculate the timing requirements for firing the jets at the appropriate instant in the spin cycle to precess the spin axis towards the Earth.

The CONSCAN processor averages the modulation over two revolutions of the spacecraft. On the third revolution, it orders two hydrazine thrusters (mounted 180 degrees apart on the rim of the **dish antenna**) to fire a short pulse of 0.0312 seconds duration. This moves the spacecraft spin axis a tiny amount toward the minimum amplitude value, i.e., the Earth, reducing the amplitude of the modulation by a small amount. This process is repeated each three revolutions, each time reducing the pointing angle error and the modulation amplitude. When the pointing angle is within 0.3 degrees of boresight, the processor terminates the maneuver automatically. Typically, about 20 to 28 pulses are fired. A ground command then executes to turn off the power to the feed offset heater, the gaseous Freon recondenses to pull the mechanism back to the normal centered position, and the maneuver is completed.

## FOR SALE



AKA: Trader Len's Corner!

Icom IC-275H, 2 meter multimode,  
Excellent condition, 100 watts,  
voice module, \$ 900.00

Icom IC-475H, 440 multimode,  
Excellent condition, 100 watts,  
voice module, \$ 900.00

Len, WA2ZNC, wa2znc@juno.com



# 50 Years of Canadian VHF, UHF, & Microwave DX

The Toronto VHF Society ARC: VE3ONT in cooperation with Humber College, presents  
the premiere Canadian VHF, UHF, & Microwave meeting!

## ONE NIGHT ONLY!

# Saturday June 16, 2001

(1 week after VHF contest, 2 weeks after the Rochester Hamfest)

**Location:** Humber College, North Campus, 205 Humber College Blvd., Etobicoke, Ont. (IF YOU ARE FROM ROCHESTER: This is in Northwestern Toronto, so check your map) Seventh Semester Room (area K just off the Food Emporium area 29) Enter via main entrance, turn right, then left, and go down one level. Lots of parking across from the main entrance. Talk-in on 146.580MHz.

**Time:** 5:00pm- 6:00pm Happy Hour, cash bar / 6:00pm- 7:30pm Buffet Supper / 7:30pm- 8:00pm Break / Social / Setup for speakers / 8:00pm 9:30pm Tech talks (4 to 6 total) / 9:30pm 10:00pm Open session : VHF/UHF/uW  
**Costs:** \$15.00 including buffet supper ( This is aprox \$10 USD) *There is no cost for attending the tech talks only.*

**Door Prizes:** Provided by RAC, ARRL, and others

**Registration:** Before June 1, 2001 if you are planning on attending supper. (RSVP) Before June 13 if you are planning on attending the tech talks only.

**Contacts:** Bob VE3BFM@RAC.CA or (705) 435-0689 Dana VE3DSS@RAC.CA or (416) 232-2484 Peter VE3AX@icom.ca or (905) 772-8938

**Challenge:** Bring along someone younger who may be interested in VHF+ activities (This won't be too hard for some of us older hams).

**Tech Talk Speakers :** Dana Shtun, VE3DSS 30 Years of 50 MHz DX a retrospective look / Bob Morton, VE3BFM 'Phasing techniques for stacked 6 metre yagis'/ Peter Shilton, VE3AX 'Power amp construction SB220 mods for 6M / Russell Beech, VE3OIL Roving in the Great White North  
Tom Richmond, VE3IEY Editing a simple (hi-tech) VHF Newsletter.

**NOTE:** If you are interested in VHF, UHF, or Microwave communications, then you are welcome to attend the technical presentations at no cost. Please register before June 13, 2001 if you are planning on attending; seating will be limited.

**DIRECTIONS:** From Rochester, cross the border at Niagra Falls or Buffalo. Follow signs to the main superhighway, the QEW (The Queen Elizabeth Way). Don't worry- all roads over the border there lead to the QEW. Follow signs to Toronto (North). Take exit # 139, to Highway 427 North. Etobecoke is 3 or 4 exits north, near the intersection of Highway #401. Follow the Etobecoke / Humber College signs. Use the talk-in frequency , which is 146.58 FM

## *Meteor Fireball Detection by Satellite*

IR sensors aboard US DOD satellites detected the impact of a (fireball) over the Pacific Ocean on 23 April 2001 at 06:12:35 UTC. The object was observed at an altitude of 28.5 km at 29.90 North, 133.89 West. The impact was simultaneously detected by space based visible wavelength sensors operated by the US Department of Energy. The total energy was  $4.6 \times 10^{12}$  joules.

IR sensors aboard US DOD satellites also detected the impact of a (fireball) on 25 August, 2000 at 01:12:25 UTC. The object was observed at 14.45 North, 106.13 West. The impact was simultaneously detected by space based visible wavelength sensors operated by the US Department of Energy. The total energy was  $1.4 \times 10^{12}$  joules.

PLEASE NOTE THAT ALL RELEASES CAN BE FOUND AT:  
<http://phobos.astro.uwo.ca/~pbrown/usaf.html>