

## CLALLAM COUNTY AMATEUR RADIO CLUB

QTC  
MAY 10

### From the shack of AD7TV,

Nita is on a special mission that you will hear about later. She asked me to do the honors this month. So here goes.

Ham radio should not only be a fun and ever learning activity but also a service to the community! This coming June 25 thru 27 gives each of us an opportunity to achieve all of those goals during Field Day at the Clallam County Fairgrounds.

Things are moving along well. The equipment is coming together and arrangements for food and refreshment are progressing.

This year we will have two stations. One will comprise a Kenwood TS-940S feeding a G5RV antenna and the other station will be an IC-706 feeding a Z-11 Pro tuner with another G5RV and a Signalink USB digital interface with a laptop PC to do PSK31. The IC-706 was originally going to be used for the GOTA station but it has a nice built-in keyer allowing semi-break-in and is very easy to use. The TS-940S is slightly more complex, does not contain an internal keyer but is a fun rig to use once you get used to it.

Each of these stations will require at least one operator and one logger. You will have a chance to sign up for a time slot and mode(s) (SSB, CW or PSK) at our next club meeting this coming Wednesday night at the Hospital. If you sign up for CW be prepared to bring your own iambic key or bug unless you want to use a straight key. Here is a chance to try out a mode that you haven't used in a while in a non-threatening atmosphere.

This promises to be a fun activity and one where we can learn new modes and procedures and to set up and operate different pieces of equipment under emergency conditions. Please sign up and bring your friends and neighbors.

The Field Day schedule is as follows:

Friday	June 25,	11:00a.m.	Start setup at Fairgrounds
Saturday	June 26,	11:00a.m.	Start Field Day operations.
Sunday	June 27,	11:00a.m.	Complete Field Day and start clean up.

I look forward to seeing you this coming Wednesday.

73,

Dennis AD7TV  
Vice President CCARC

**Get Your License Here!**

Exams 24 Apr 2010

12 Passed Element 2 (Technician)  
 04 passed element 3 (General)  
 01 passed element 4 (Extra)

10 new Tech licenses  
 4 new Gen licenses  
 1 new Extra license

Congratulations to all!!

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 Call: Chuck, N7BV Tom, KE7XX  
 360-452-4672 360-452-8228

Thanks, Chuck, ARRL VE-L

**CCARC QTC Newsletter**

Just a little background on the QTC.

We use ccarcqtq@yahoo.com as a repository for information for the newsletter. So if you have something for the QTC, please send it to the yahoo address. Do not sent it to one of the editors as they will just have to turn around and resend it to the yahoo address.

Please make sure the article or information is complete. As we rotate editing the newsletter you cannot be sure which editor will be piecing the newsletter together.

Please remove as much formatting from within whatever program you are using (MSword, edit, clear, formatting) if you know how, before sending it to ccarcqtq. If you feel the creative urge to design a document—please open a design shop, but don't do it and then send it to us expecting to see your creative work transferred to the newsletter.

We do not edit, except to change fonts to a standard non-serif font (Arial which is easier to read than Times Roman). We will run a spell checker.

When first conceived the editors were given free license, it still is that way. It was understood they would endeavor to include everything submitted, within reason. For instance, off color jokes etc are not going to be printed.

Thanks,  
 Chuck, N7BV & Bob K6MBY



**PROGRAM  
 For May**

Field Day propagation by Scott Robinson, AG7T. A very interesting use of graphics to display propagation data of stations worked during Field Day 2008 by the Mike and Key Club of Seattle.

Have an idea for a club program? Pass them along to the members of the program committee: Bill Carter, Janet Parris, or Chuck Jones.  
 Thanks.

We need articles for the QTC newsletter. This is your newsletter.

Tell us how you became interested in Ham Radio. What did you do over the summer (just like school) huh!

The more you submit the less we have to think of.

Thanks, the staff!

**2 METER NETS**

**CCARC :**  
 Every Thursday 7:00 pm on the W7FEL Repeater.

**ARES/RACES:**  
 Every Tuesday except 1st Tuesday of the month at 7:00 pm on W7FEL Repeater.

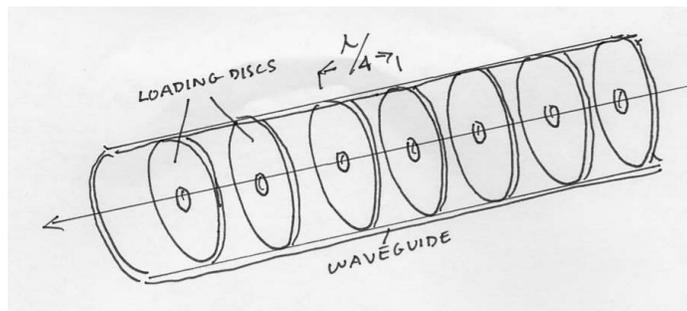
W7FEL Repeater: 146.76 MHz., offset down 600 KHz. with a tone of 100 Hz.

## The Linear Accelerator, a technician's view

### Part-2 The accelerator wave guide

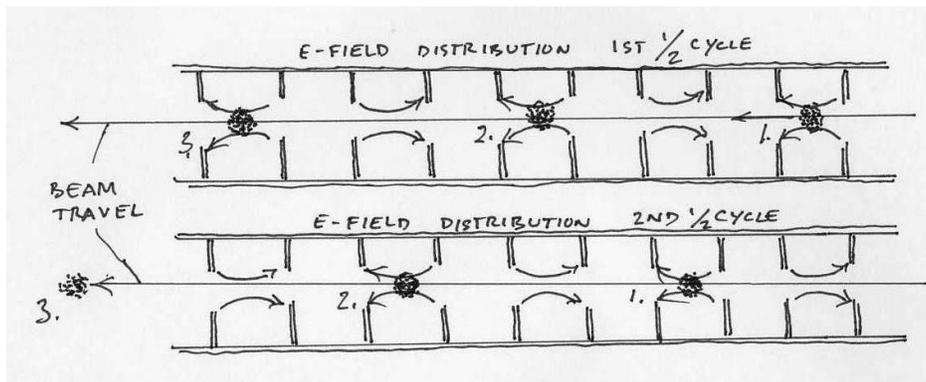
Although other methods have been used, it can be shown that the most efficient way to accelerate electrons to extremely high energy levels is by surfing them on the crest of a traveling RF wave. This was the method chosen for the Stanford Mk-III Linear accelerator. With this method, there is no theoretical limit to the amount of energy that can be produced. Machines can be built to any length, subject to practical limits of electrical breakdown and budget constraints. The 220 foot Mk-III machine was the largest of its kind in the world, and capable of producing a billion electron volts. More modern machines can produce energies in excess of a hundred billion electron volts.

The heart of the accelerator is the wave guide through which the electrons travel to their target.



(Fig 2-1)

It is a disc-loaded circular wave guide with the disks spaced to make  $\frac{1}{4}$  wave cavities at a resonant frequency of 2850 MHz (in the Microwave "S-band"). Pulsed RF is fed to the wave guide and electron bunches are injected in phase with the RF to ride the crest of the wave as it travels along the wave guide.



(Fig 2-2)

It sounds very simple and so it is in theory but the real world seldom aligns with the ideal. It was estimated that in order to produce a billion electron volt energy beam using this method, at least 1000 MegaWatts of RF would be needed. No RF source of that magnitude existed, so it was decided to inject low power RF at ten foot intervals along the length of the accelerator. I say low power in the broadest sense of the word. Each input signal was provided by a 100 MegaWatt klystron amplifier. That's still a lot of RF to inject into a copper pipe!

Let me digress for a moment to describe some of the challenges we faced in constructing the accelerator wave guide. Bear in mind that placement of the discs was critical in order to maintain correct resonance and RF phase relationship to the electron "beam".

The wave guide was made in two-foot sections (actually  $23.7569 \pm .001$ " ). Loading discs were machined from copper bar stock to a tolerance of .0001 inch in all dimensions. They were then "spaced" on a mandrel and cooled in liquid nitrogen. The circular wave guide was bored and honed from bar stock to similar tolerances and heated in an oven to expand it slightly. The mandrel was then inserted into the wave guide and the temperature allowed to stabilize, producing a tight fit between the discs and the wave guide. Prior to "shrink-fitting", the loading discs and wave guide were gold flashed to prevent oxidization of the surfaces. The end flanges of the assembled wave guide sections were then drilled and machined so that when they were bolted together the cavity formed at the joint would resonate to the correct frequency.

All of this assumes the physical dimensions of the wave guide remains constant in operation. It doesn't. In fact, during operation the 220 foot wave guide assembly "grows" several inches in length due to heating from absorbed RF energy. This is kept more or less to a constant by water cooling but the machined dimensions of the cavities at room temperature is adjusted to allow for expansion to the final resonant frequency when the structure is heated by the RF.

Last time, I included a simplified schematic of the accelerator. Here's a more detailed diagram from a 1955 technical report.

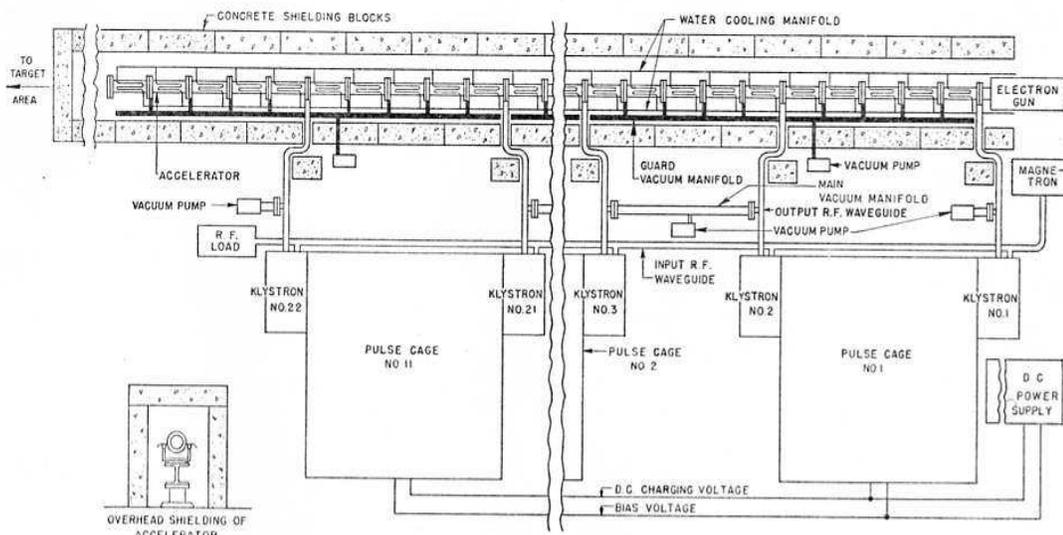
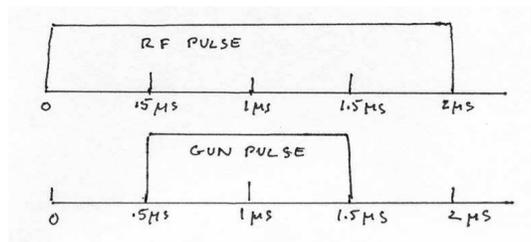


FIG. 1.4. Block diagram of Stanford Mark III Accelerator.

(Fig 2-3)

As you can see, the electron gun and accelerator wave guide are surrounded with iron-ore filled concrete radiation shielding and are supported by a number of auxiliary systems. For instance, to reduce the probability of high voltage arcing within the structure and to avoid beam scattering by collisions between electrons and stray gas molecules, the wave guide is continuously pumped to a fairly high vacuum. A combination of mu-metal shielding, degaussing cables, and powerful steering magnets are used to offset deflection of the electron beam by the earth's magnetic field. Also, the I-beam support for the accelerator wave guide is shock-isolated from the building by mounting it on concrete pillars anchored several feet below the building floor.

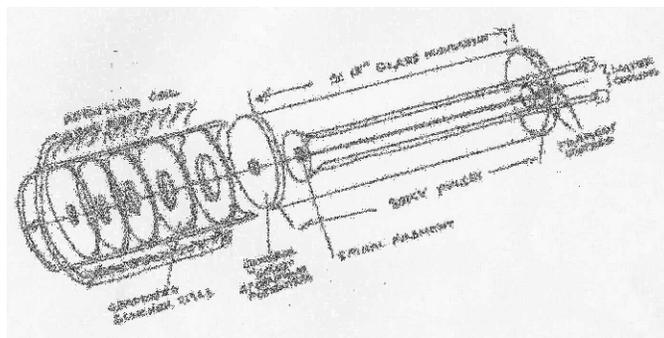
Since a lot more power can be had from a low duty cycle pulsed source than from a CW source, the electron gun, the master oscillator, and the klystron amplifiers are pulsed at a rate of 60 Hz. This allows easy synchronization of the various machine functions and a minimum of power supply filtering. It takes a couple of microseconds for the RF to "fill" a ten foot section of wave guide so every 60<sup>th</sup> of a second, the amplifiers are pulsed for 2 microseconds. The electron gun is fired a half microsecond after the amplifier pulse is initiated. This allows the RF energy to reach peak value before injecting electrons into the field.



(Fig 2-4)

The electron gun operates at a potential of 80 KV and the klystron amplifiers at 400KV. Shaping and delivering these enormous electrical pulses is a bit tricky and requires special circuit construction. I'll discuss the power supplies and pulse handling circuits later, as well as the vacuum system and the operation of the klystron amplifiers. For now, let's concentrate on the electron gun.

Several types of electron guns were tried but the most successful of them looked something like this.



(Fig 2-5)

A spiral filament was located at the business end of the gun and emitted electrons much as a standard vacuum tube diode. Voltage to power it was fed through a water cooled coaxial support structure. And the whole thing was contained in a glass insulating sleeve. One end flange was connected to the filament. The other end flange, at ground potential, acted as a control grid. 80KV.pulses were applied between the filament and grid flange, accelerating the electrons toward the grid where they would pass through a small hole in the center. The gun was mated to a short wave guide section containing loading discs that were designed to gradually modify the field intensity and RF phase in order to compact the emitted electrons into "bunches" and inject them in phase with the traveling RF wave in the main accelerator wave guide. .

Electrons leaving the filament were disbursed in a spectrum of energy levels and were therefore accelerated toward the grid at varying speeds. The impedance gradient of the buncher loading discs helped to slow down the more energetic electrons and speed up the slower ones so that, by the time they left the buncher, a large percentage of them were formed into compact bunches and locked to the traveling RF wave. Unfortunately, high energy electrons that were not locked in proper phase with the RF were scattered to produce heat and nasty kinds of radiation as they struck the grid plate and wave guide surfaces. In fact, the entire accelerator was a rich source of radiation.

So much for the Accelerator structure. In the next installment, I'll discuss the klystron amplifiers.

**Paul Honore' W6IAM**  
**Rev-2, April 2010**

## Lets play raffle. Drawing at the May 12th Meeting!!

This time the rig is a YAESU FT-990, 160m-10m, plus general coverage receive. Just look at all them buttons to push – well worth one raffle ticket alone!!



And if the Front Panel doesn't do it – check out the rear panel. Two tickets??



See ticket seller David KE7JEJ, Becky W7RJW, and Chuck N7BV. \$10.00 a ticket, 1 in 50 chance. Members only.

*Dave Tyler, N7DRT now SK, a former Club President and Trustee purchased the FT990 on January 7, 1994 from HRO in Portland, OR. In 1997 he had the radio aligned to Yaesu specifications by Richmond 2-Way Radio in Port Angeles. Dave purchased a MD-1AX8 microphone for the radio. The radio has been used by Dave and his son. It was also used during the 1995 Clallam County Fair. The radio comes with said microphone, purchase documentation, power cord, and operating manual. . After Dave's passing his wife offered the radio to the club for its use. The writer checked out the operation of the radio into dummy load and found it to be sound, but he did not test it on the air. The radio is in very good cosmetic shape. While this radio is a bit dated as it does not have DSP circuitry, it meets most of the requirements of an Amateur Radio Operator.*

*Roger Uhden, K7RGR*

A special thanks goes out to the CCARC from the Elwha Tribe CERT and Ham Radio operators for all the help and patience you have shown to our fledgling organization and radio operators.

In particular we owe a huge debt of gratitude to Tom and Shirley Newcomb for months and months of training and encouragement enabling all of us to receive our Tech and then our General licenses. Tom and Shirley helped us in two major exercises and continue to held with tech support and radio programming. We love them both.

Other individuals critical to our operations have been Chuck Jones and Al Dawson who got our initial setup at our EOC going and provided much valuable information and Paul Honorae who brims with knowledge and provided the necessary expertise that allowed us to operate in the March 24th 2010 exercise.

Very simply, we could not have advanced as we have nor been able to operate during the exercises without the support of the CCARC.

You have been instrumental in making us all much safer in the event of a disaster.

Thank you,

Phil Slimko, KE7KWB  
Lower Elwha Klallam Tribe, Emergency Management

**COMING EVENTS**

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4-6 Jun 2010

Northwestern Division Convention (SeaPac)

Oregon Tualatin Valley ARC

See: <http://www.seapac.org>

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ARRL Field Day 1800Z, Jun 26 to 2100Z, Jun 27

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07/10/2010

Pacific Northwest Indoor/Outdoor Ham Radio Tailgate

Swapmeet

Location: Chehalis, WA

Sponsor: Chehalis Valley Amateur Radio Society

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Hamfest

08/14/2010 | [The Radio Club of Tacoma](#)

Location: Spanaway, WA

Type: ARRL Hamfest

Sponsor: The Radio Club of Tacoma

**CLALLAM COUNTY AMATEUR RADIO CLUB  
Minutes of the General Meeting 14 April 2010**

The meeting was called to order at 1900 by the Club Vice President Dennis Tilton, AD7TV. Forty two people attended the meeting. We'll just report the number of people because the Board voted that a sign in sheet wasn't needed.

Nita started the business meeting by talking about some New Ham's and club members name plates. The minutes of the previous meeting were approved as printed in last months QTC. Nita read a letter from the SwiftSure Race organization in Canada. They were thanking the Club for the use of the Repeater and asking for the use of it again this year. A motion was made and received unanimous approval to let them use it this year. The Race is the weekend of 29-30 May. All Hams are asked to keep the repeater as free as possible during that weekend.

There was some equipment announced for sale. See the QTC for any that were not sold at the meeting.

The evening's presentation.

Subject: The just released Apple iPad. Rik, WX7RIK showed a video with the unit's capabilities. This included all of the various programs that are included with the purchase and three that cost ten dollars each. Those three can compete with the Microsoft software products of Word, Excel, and Powerpoint. Ham radio programs are also available. These include BeaconAid, Ham Bands, HF Beacons, Morse Key, Morse Test, and Text2Morse. Most of the Ham programs are free or cost a dollar to two dollars. Rik had a live demonstration of his unit using an overhead projector.

Break:

After the break Dennis called the business meeting back to order.

Chuck Stroeher, WA7EBH, and Karen Jones conducted an audit of the club's finances. They found no significant errors or problems. They do have a couple of minor suggestions to improve the speed of the audit for next time.

The meeting was adjourned at 2035.

Bill Carter, Secretary, CCARC

## **Ellis Peak Status**

The negotiations with Century are still moving along. The insurance issues have been worked out. Century **will not**, however, authorize CCARC, or any of its members, to work on the tower or a ladder while putting up the coax and/or antennas. At this point in time I need some assistance finding a certified climber with \$1 million of Workers Comp insurance. If someone has some time to make a number of phone calls it would be a big help. Also I need someone to work on finding a frequency for the Ellis repeater. I will provide a list of possible frequencies but need someone to coordinate with the other users on the frequency and do some testing from Ellis. Please contact me direct at [k6mby@olympen.com](mailto:k6mby@olympen.com).

## **CCARC Committees**

**Activities Chair:** Callie Kroll N7YMU

**Public Relations Chair:** Becky Winters W7RJW

**Publications (Newsletter):** Bob Sampson, K6MBY, Chuck Jones N7BV

**Membership Chair:** Valerie Hannon KF7VAL

**Health and Welfare Co-Chairs:** Chuck Jones N7BV, Rich Golding N7NCN

**Technical Co-Chairs:** Bob Sampson, K6MBY, Steve Debiddle, W6MPD

**Field Day Co-Chairs:** Dennis Tilton AC7TV, Al Fisk KD7TFK, George Hutchinson W7TTY

**Net Coordinator:** Becky Winters W7RJW

**Education and Training:** Chuck Jones N7BV

**Web Site Administrator:** Rik Scairpon WX7RIK

**Program Co-Chairs:** Janet Parris WA7JEP, Bill Carter W7WEC, Chuck Jones N7BV

**FROM OUR TREASURER:**

As of April 30th, 2010:

|                                                       |                    |
|-------------------------------------------------------|--------------------|
| First Federal Savings & Loan of Port Angeles Balance: | \$ 9,125.77        |
| Outstanding Cheques:                                  | - 255.00           |
| <b>Checkbook Balance:</b>                             | <b>\$ 8,870.77</b> |

*David R. McCoy,*

**KE7JEJ** - - . -... .- - . .- -

**CC-ARC Treasurer**

**We welcome new members:**

Paula S. Johnson, KF7JQQ and her husband Craig!

Mary Hadley, N7WVT

Charles Brown, WA4DFT

Al Johnson, KF7JQP

**FOR SALE OR TRADE**

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**For Sale**

- VHF 2M Radio, Kenwood 2550A with mike and no tone module. \$60 This is a Silent Key sale. A portion of the sales benefits the Club.

Contact Bill Carter, 360-681-4375

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**Wanted people to go in on buying a Vector Network Analyzer. Contact: Chuck N7BV or Bob K6MBY.**

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**Birthdays for May, 2010 and the first week of June, 2010:**

|                        |        |        |
|------------------------|--------|--------|
| Ray, Jody              | KE7LKA | May-07 |
| Carter Jr., William E. | W7WEC  | May-14 |
| Popowski, Al           | W7ALP  | May-19 |
| Dundas II, John A.     | W6SU   | May-21 |
| Stearns, Bob           | KI7ZC  | May-28 |
| Baker-Wilson, Jan      | N7JAN  | Jun-02 |
| Greene, Norman B.      | KF7BCR | Jun-03 |
| Golding, Rich          | N7NCN  | Jun-05 |

**YL's Birthdays for the same period:**

|                                   |        |
|-----------------------------------|--------|
| Moore, Barbara (John, K7NIA)      | May-17 |
| Jones, Karen (Chuck, N7BV)        | Jun-05 |
| Dundas II, Joanne S. (John, W6SU) | Jun-06 |

**Happy Birthday!**

**Your Ad Could Have Gone Here**

**NEXT YL LUNCHEON****May 14****Downriggers, PA****Time: 11:30 a.m.**

**Find us on the web at  
www.olyham.com  
Check it out. Lots of  
information about ham radio  
in Clallam County!**

**2010 - CCARC Ladies Luncheon Schedule****June** - Mariner - 707 E. Washington - Sequim**July** - Toga's - 122 W. Lauridsen Blvd. - Port Angeles**August** - Tarcisios - 609 W. Washington - Sequim**September** - Sergios - 205 E. 8th - Port Angeles**October** - Fortune Star -145 E. Washington - Sequim**November** - Chestnut Cottage -

929 E. Front - Port Angeles

**December** - Cedars at Dungeness -

1965 Woodcock Rd. - Sequim

| Description                                        | Time/Date                       | Location                                                          | Contact                           |
|----------------------------------------------------|---------------------------------|-------------------------------------------------------------------|-----------------------------------|
| Clallam County ARES/RACES meeting                  | 7 pm, first Tue of every month  | Clallam County Courthouse EOC,<br>223 E. 4 <sup>th</sup> St., PA  | Dan Abbott N7DWA<br>360-582-3824  |
| Clallam County Amateur Radio Club general meeting  | 7 pm, second Wed of every month | Olympic Hospital<br>Linkletter Room, PA                           | Tom Newcomb KE7XX<br>360-452-8228 |
| Clallam County Amateur Radio Club social breakfast | 8 am, first Sat of every month  | Joshua's Restaurant<br>Hwy. 101 & Del Guzzi Dr.                   | Tom Newcomb KE7XX<br>360-452-8228 |
| Clallam Country Amateur Radio Club YL social lunch | 11:45 am 2d Fri of every month  | Rotates - announced on Thursday<br>night Net (See QTC Newsletter) |                                   |

**CLUB OFFICERS For 2010****President:** Nita Lyman KE7DRT 360-457-5022 Nita\_lyman@yahoo.com**Vice President:** Dennis Tilton AD7TV 360-452-1217 3tiltons@wavecable.com**Secretary:** Bill Carter W7WEC 360-6814375 w7wec@arrl.net**Treasurer:** David McCoy KE7JEJ 360-457-8550 mccoy.d.r@olyphen.com**Board Member (Chairman):** Johan Van Nimwegen KO6I 360-681-7300  
jvn@olyphen.com**Board Member:** Al Dawson W7YLV 360-457-0752 adawson@tfon.com**Board Member:** Chuck Jones N7BV 360-452-4672 n7bv@yahoo.com