Clallam County Amateur Radio Club W7FEL
Serving Port Angeles, Sequim, and Surrounding Areas

CLALLAM COUNTY AMATEUR RADIO CLUB

QTC

AUGUST 09

**DRT's Shack**

It's that time again folks, when we go to Victoria for the annual picnic with our Canadian friends. Never having gone over with the Club, I'm excited knowing I'll be meeting many who I've heard over the air, but not met face to face. From what everyone has been saying, they know how to throw a shindig, make everyone feel comfortable, and have some good stories to share making for some good belly laughs.
They serve up some good vittles too, so bring a huge appetite. We can't offend them by not eating it all, right? hi hi. Just be ready for one heck of a day. They'll take care good care of each of us, making us feel just like the family we are! Ham family.

We'll be leaving on the first ferry out, on the Coho, and if I had gotten the correct pamphlet, I could give you the exact time, but I believe it's at 8:20. Boarding starts approximately at 7:45, give or take a few, so give yourselves time to park, get to the terminal, and wait. We all know how that works. Hurry up just to wait! Such fun.
Oh, and wish for sun. Nothing like having a picnic in the rain, but I'm sure they've planned for that as well.

Parking...at the end of Railroad Ave., before going around the corner where the buses sit, {if they still do}, there's that dirt parking lot we'll have access to, which I believe is $5.00 dollars for the day. Don't quote me on that, as I've never used it, but do plan on at least that just to keep from receiving a ticket. Bring an umbrella just in case, your photo ID, Pass Port, or enhanced drivers license. I'm bringing a copy of my Ham license, and if we all do so, maybe we can make it through customs faster, since we'll be in a nice sized group, breezing right through..let's hope so. Add your Ham license to your list of what to bring, especially if bringing your HT. That's up to you if you want to bring it. I'm going for the fun, friends and food, so bringing yours is optional. It may be a fun way to stay in touch on the ferry or at the picnic. I'm just not sure how customs is working this at this time.
We'll work out all the kinks at the meeting this coming Wednesday, OMC, Linkletter Hall, so please try to come if you're going to the picnic.

We have 28 Club members going, so thanks to all who are joining in. It's going to be a great day, one I hope you're looking forward to as much as I am. Until then, see you on the 12Th. Bring your ideas, comments, stories of past picnics, and lets build on them so we can make it just as fun next year when we host them coming to our great town!!.
73 to all,
Nita~ KE7DRT
CCARC President

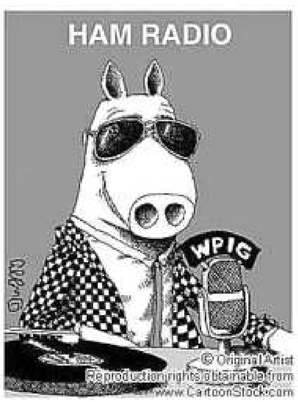
## Get Your License Here!

The CCARC Amateur Radio License Classes will be

0845-1700 Saturday September 19th & 26th Review on October 3d. Exam Session at 1300.

If you know of anyone who would be interested in a Technician or General Class license please have them call Chuck, N7BV 360-452-4672 or Tom, KE7XX 360-452-8228.

Thanks, Chuck, VE-L




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!

## CCARC QTC Newsletter

Just a little back round on how the QTC works.

We use ccarcqtc@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 ccarcqtc. 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-serf font (Arial which is easer 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**
**Aug 12th**

**Chuck Jones Information form the Spokane DX Convention**
**Propagation Info from Carl Luetzelschwab Cycle 24 talk**

## 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.

# Ten Meter Opportunities

To All Interested 10 Meter Operators:

I am beginning the process to create a Ten-Ten International Net Chapter here on the Olympic Peninsula.

For those of you not familar with the 10-10 International organization, please go to http://www.ten-ten.org.

To form a new chapter, we need a minimum of seven local members in good standing (dues paid).

If you are interested, or if you need more information about 10-10, I can be reached at:
k7ina@aol.com
24-7 Cell 360-477-8869

73, Russ, K7INA
10-10 # 21455

10 Meter group.
Interested in starting a 10 meter net 2 nights a week. As a group, we could work towards collectively getting the needed 10 contacts to become a 10-10 Chapter. Also have tech support for any questions as we work as a group, to get comfortable on the HF bands. 10M is a great band to start on in the sunspot minimum, with some Sporadic-E openings as well. What better way to get comfortable on HF for those big openings at the Sunspot Maximum. Would like to get together on the air 2 nights a week, Monday and Friday, around 7PM local time on 28.420 MHz.
If interested in joining, or if you have more questions, please contact W7DTG, either on the air or by email at:
foureyes779@gmail.com
Or, at home at:
360-928-0127

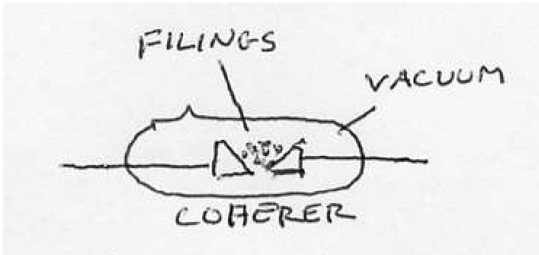
## Home Study Course in Radio Theory

Who collects old radio documents?
I have about 50 small pamphlets from National Radio Institute.
These are Home Study Courses in Radio theory
Copyrighted in 1929-1930
I hate to throw them out. Who wants them?

--
Frank Doherty KJ7SK

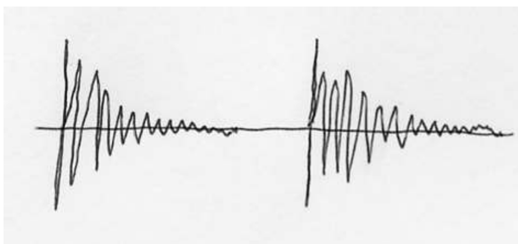
## Electronic Fundamentals, Part-1 (*Analog Circuits*)
### Unit-17 Detectors

The first practical use of radio communication was for ships at sea to communicate with each other and to shore stations. The equipment was cumbersome and dangerous, necessitating high voltage spark discharges into a tuned circuit to provide broad-band RF oscillations. No voice communication was possible so crude means of detection were employed. The first method of detection used was the **Coherer**.



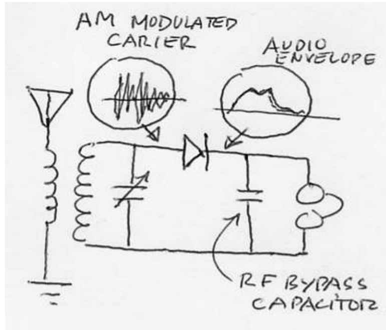

**(Fig 17-1)**

It consisted of a metal filings resting between wedge-shaped electrodes in a vacuum tube. The filings would bunch together, changing resistance in the presence of a signal. A variable current produced by the change in resistance was used to operate a mechanical relay for reception of Morse code signals. The waveform for these early transmissions was a damped **Continuous Wave (CW)** signal. It occupied a broad spectrum of RF and looked something like this -- not as clean as modern CW waveforms but essentially the same.



**(Fig 17-2)**

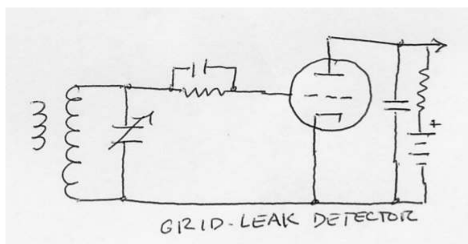
The advent of **Amplitude modulated, (AM),** voice communication necessitated another type of detection -- some way to strip the low frequency audio **envelope** from the high frequency RF carrier The answer was the galena crystal, a semiconductor. Maybe you're old enough to remember building a "crystal set" from plans in *Boy's Life* magazine and spending hours hunting with a "cat's whisker" for a sensitive spot on the surface of the crystal to bring in a radio station. The principal wasn't all that different from a modern diode detector, except they've taken all the fun out of it by making the diode consistent and reliable. In essence, we've come full circle to the rectifier from unit 10, except we're using the diode to rectify extremely small currents. The basic circuit for a diode detector looks something like this.




**(Fig- 17 3)**

RF signals from the antenna are inductively coupled to a tuning circuit. You'll recognize it as the tank circuit I introduced earlier. The variable capacitor tunes the resonant frequency of the tank circuit to select a particular signal. A diode rectifies the signal, exactly as it rectifies AC in a power supply, and passes it on to the headphones. A small bypass capacitor shunts the RF carrier to ground, leaving only the audio envelope to be heard. Early vacuum tube detectors were direct applications of the rectifying diode or a variation of it, using a negatively biased vacuum tube grid to provide conduction only in the positive direction

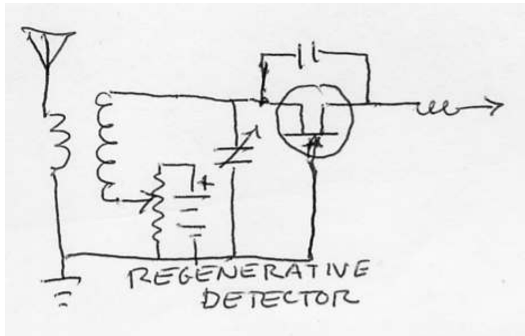
Soon, it was realized that the triode vacuum tube could not only rectify a signal, it could amplify it. The result was the **grid leak detector**.




**(Fig 17-4)**

In this circuit, a very large value resistor -- a million ohms or more -- is placed in series with the input to the grid. As the tube begins to conduct, the grid draws current from the electron stream, causing a voltage drop across the resistor and forcing the grid to become slightly negative, biasing the tube into the cutoff region. The action is not perfect but the result is a detector that is quite sensitive -- enough to rectify very weak signals. The important thing is, the main current flow through the tube is from cathode to plate, so, in addition to detecting a signal, the tube amplifies it. Grid leak detection was very common in World War II military equipment, so, if you find yourself in possession of some of this equipment, you'll likely find yourself working with grid leak detectors.

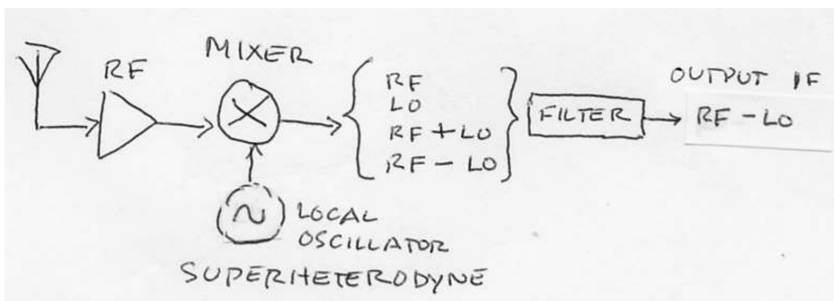
An early innovation was the **regenerative detector.** In this circuit, some of the detected output is fed back, *in phase* to the input, forcing the tube toward oscillation. A regenerative receiver is touchy to operate. The trick is to feed back just enough signal to reinforce itself short of full oscillation. The advantages tend to outweigh the disadvantages however, as it is capable of producing a signal gain of several thousand, enabling it to detect extremely weak signals. The regenerative detector has been updated to solid state and is available in a number of low priced HF kit receivers. As such, it is a worthwhile project for the beginning HF enthusiast or first time kit builder. Here's a typical example using a Field Effect Transistor (**FET**).




**(Fig 17-5)**

The output of the detector is fed back to the input through a small capacitor. Since there is a 90° phase lag introduced by the capacitor, the detector is stable and won't naturally tend to oscillate. Regeneration is controlled by the voltage applied to the FET drain. An RF choke in series with the output blocks the RF carrier and allows only the audio signal to pass. A word of caution. If the receiver is tuned too far into regeneration, it becomes a powerful oscillator, in fact a transmitter! Introduction of a broad-band RF stage ahead of the detector will act as a buffer to help reduce the possibility of broadcasting illegal transmissions.

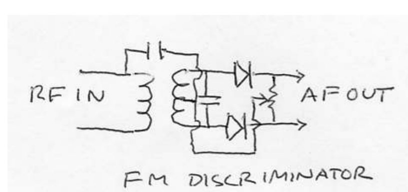
A better approach, and one that is now almost universally employed is the **Superheterodyne or product detector**. It works like this:




**(Fig 17-6)**

If two signals of different frequencies are combined, they will beat together and produce two new signals equal to the sum and difference between them. The **Beat frequency** is produced by a **local oscillator.** Suppose the input is tuned to 1600 kHz and the local oscillator is producing an output of 1850 kHz. The two will combine in the detector to produce four distinct signals at the output. Two of them will be the original 1600 kHz signal, and the 1850 kHz output from the local oscillator. The other two signals will be the sum of the two, or **1850+1600=3450 kHz** and the difference between them, **1850- 1600=250 kHz.** We'll choose the 250 KHz signal and filter out all the rest. The 250 kHz resultant is called the **I**ntermediate **F**requency (**IF**). The IF frequency is used in all subsequent stages in the receiver until it reaches the detector stage. There are good reasons to do this and I'll explain them in the next unit on the AM receiver.

So far, we've only discussed Amplitude modulated signals. If the receiver is going to demodulate **F**requency **M**odulated **(FM),** signals, a different method of detection is required. FM detection is accomplished with a **Discriminator**




**(Fig 17-7)**

In the discriminator circuit, the signal is inductively coupled from the primary to the secondary windings of a transformer, but it is also fed 90° out o f phase, by a capacitor, to the center tap of the secondary winding. As the carrier frequency changes with modulation, the signal in half the secondary winding leads in phase, while the signal in the other half lags by the same amount. The result, rectified by the two diodes, is a signal that varies in amplitude in proportion to the frequency variation of the input.

In this unit, I described some basic methods of detection for CW, AM and FN signals. In the next unit, we'll use the building blocks we've already seen to assemble a simple AM radio receiver.

**Terms to remember**

| | |
|---|---|
| **AM** | **Amplitude modulation** |
| **Beat frequency** | **Frequency produced by a local oscillator** |
| **BFO** | **Beat frequency oscillator (Local oscillator)** |
| **Carrier** | **Radio Frequency oscillation** |
| **CW** | **Continuous wave (unmodulated carrier)** |
| **Discriminator** | **FM detector** |
| **Envelope** | **Change in carrier amplitude by audio modulation** |
| **Fm** | **Frequency Modulation** |
| **Local oscillator** | **On-board oscillator as an integral part of a receiver** |
| **Modulation** | **Low frequency information impressed on A high frequency carrier** |
| **Product detector** | **Detector using the sum or difference of two signals to reveal a modulation envelope** |

Paul Honore' W6IAM
(rev-2 July '09)

## Electronic Fundamentals, Part 2 (*Digital Circuits*)

### Unit-6 (A/D and D/A Conversion)

Most variables in the world are analog.  That is, they are continuous, with no gaps or steps in their structure.  Temperature, for instance, rises and falls smoothly instead of increasing and decreasing in steps. The same can be said of wind speed or rainfall.  All of these phenomenon can be represented graphically and displayed in terms of increasing or decreasing voltage and current. The trick is to plot those same voltage or current readings using binary numbers.

The first step is to determine how detailed we want the measurements to be.  Remember, from Unit-1, that binary numbers can only be generated in whole increments.  Of course the increments can be very close together but there is a limit to how fast we can sample points on the curve and how many computations our measuring equipment is capable of before becoming overloaded .  These limits are called **sampling rate** and **memory.**  Let's assume you want to measure temperature and you want to encode the result in digital format.  You might begin with a grid like this, where the X-axis represents time and the Y-axis represents temperature.

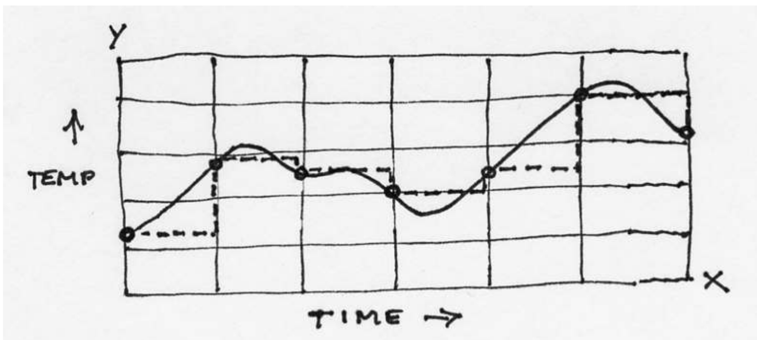



**Fig 6-1**

The vertical (Y) scale might represent temperature in 10 degree increments and the horizontal scale might represent days of the week.  If we take a "snapshot" of the temperature at, say, 12 Noon each day, the dots represent sample points along the temperature curve.  The dashed line, therefore, will represent the temperature we'll see until the next sample is taken,  As you can see, the steps are pretty large and the plot won't be very accurate.  If we take a temperature sample every two hours, we'll get a much closer representation of the real situation. We'll still have steps along the curve but they will be much smaller and closer together.

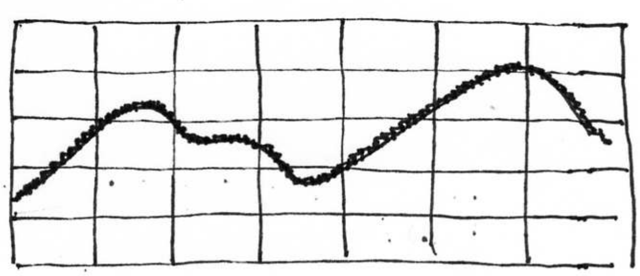


**Fig 6-2**

While the first plot might be good enough to gage an overall trend, the second, more detailed plot would be more useful but it would require 12 times as much memory,  And so it is with Analog to digital (**A/D)** conversion.  The closer together the waveform samples the better the representation of the curve. Right? Half right! We can have as high a sampling rate as we like but what about the vertical (Y) scale on the graph? If each line on the vertical scale represents a binary number equal to 10 degrees F, we could only get a temperature sample accurate to the nearest 10 degree mark. We'd have to assign a binary number to each degree of temperature to make the measurement meaningful. That means an A/D converter capable of generating 9 times more binary numbers. We've increased our computation requirements by a factor of 11X9 or 99 Times! Everything in A/D conversion is a compromise. As the saying goes: "Garbage in - garbage out"

A basic Analog to Digital **(A/D)** converter can be made from a string of OP- AMPs used as comparators.

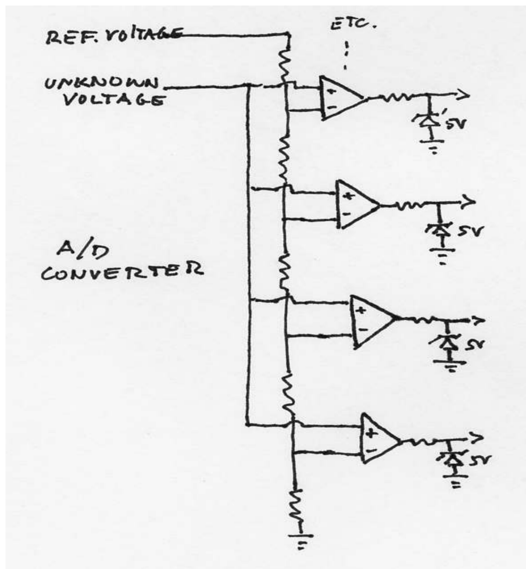



**Fig 6-3**

As many OP-AMPs as needed are spaced along a voltage divider network and a known reference voltage applied to the network, Let's say the network is adjusted to provide a voltage drop of 1V across each resistor. The Comparator nearest ground will see a reference voltage of 1V The next Comparator will see a reference of 2V, and the next will see 3V, etc. Now, we apply an unknown voltage to the remaining inputs. At any voltage less than 1V, all the comparators will be OFF. There will be no output at any of them. Now let's increase the applied voltage. At exactly 1V, the first OP AMP will switch ON and will output a signal. At 2V, the second OP-AMP will switch ON, and the third will switch at 3V, etc. The purpose of the zenar diodes at the comparator outputs is to ensure a standard 5V logic output from each comparator, regardless of input. All we have to do is route the output of each comparator to a chip that will generate a unique binary number that represents the value of the applied voltage. In this example, we can only measure to the nearest Volt. Everything in between will be lost. To get more detailed information, we'll need a great number of OP-AMPs as comparators This is not as difficult as it might seem. Manufacturers have come up with chips containing hundreds of comparators, and also chips to generate binary numbers, making the construction of such a converter practical.

There are a number of ways to reverse the process, **(D/A conversion**), but one of the most common uses a single OP-AMP and an "R - 2R" ladder network to which 5V logic signals in input binary code are applied.

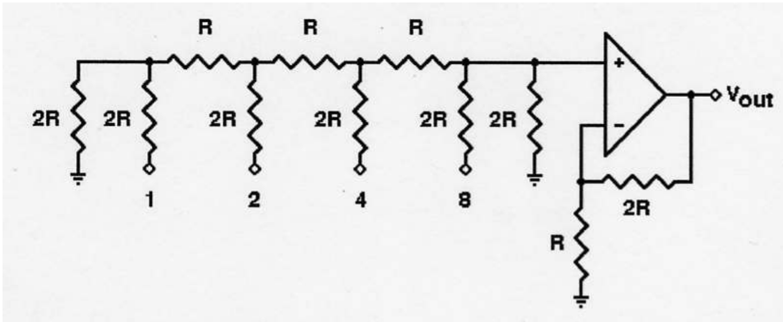



**Fig 6-4**

The ladder network is designed so that current from any input will divide in such a way as to produce even voltage steps with 4-bit binary numbers from “0“ to “15“. The ladder can be extended to accommodate any code length. e.g. 8 bit, 16 bit, 32 bit, etc.

Not too many years ago, radios were tuned using variable capacitors. No more. Today’s communication receivers and transceivers use optical shaft encoders to do the job. The benefits are obvious -- no mechanical wear and its associated RF noise and, using software, the tuning rate can be adapted to sweep as large or small a segment of the spectrum as desired. Of course, this type of coding is not restricted to radios,. Shaft encoders are used in robotics and machine tool operation, too. In fact, any time you want to convert degrees of rotation to digital numbers for automatic computation or control.

Here’s how it works. Let’s assume we want to know the position of a shaft within the nearest 90 degrees. We can fit the shaft with a disk that has a pattern of opaque and transparent segments, and we can place a Light Emitting Diode **(LED)** on one side of the disk and a photo-sensitive transistor on the other. This way, we can switch the transistor ON whenever it sees the light source and OFF when the light path is interrupted.

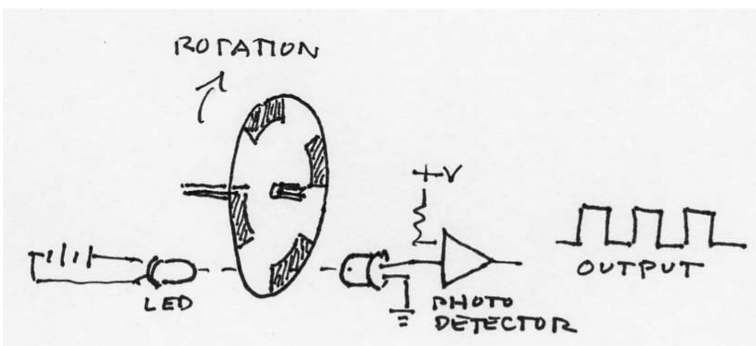



Fig 6-5

As the shaft rotates, the photo detector will produce an output of alternate “1”s and “0” s. If the output is fed to a counter, we can determine the number of shaft rotations to the nearest 45 degrees for out 8-segment pattern. With more segments, we can increase the resolution but, remember, with this technique, we can never get infinite resolution. The readout will always be in discrete steps, no matter how small.

This is all well and good, but how can we know whether the shaft is turning clockwise or counter-clockwise? By adding a second identical pattern to the disk but, 90 degrees out of phase with the first. And a second set of LEDs and photo-sensitive transistors.

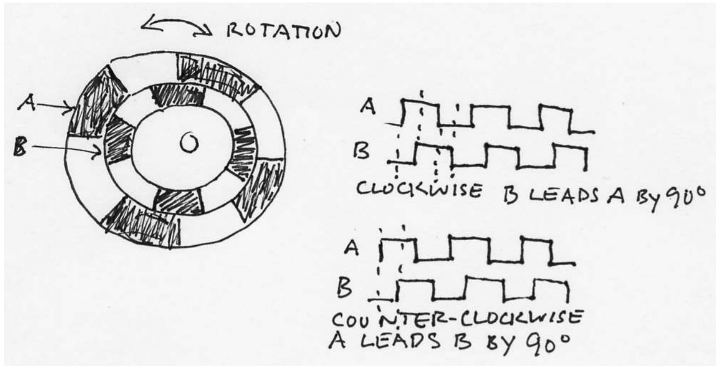



**Fig 6-6**

Now we get outputs “A” and “B” whose phase relationship is dependent on the direction of shaft rotation.

In this unit, we’ve seen how analog signals can be converted to digital format and back again. In the next unit, we’ll examine memory.

**Terms to remember**

**A/D** **Analog to Digital conversion**

**D/A** **Digital to Analog conversion**

**Paul Honore’ W6IAM**

**(Rev-1 July ‘09)**

## FROM OUR TREASURER:

First Federal Savings & Loan of Port Angeles Balance:
$ 7,048.48
Outstanding Cheques: - 0.00
**Current Checkbook Balance: $ 7,048.48**

## New CCARC Club Members

We welcome new club members Kevin A. Shorthimer, KZ7CIA who joined 8/05/09 and Gladdis K. Dawn, K7PIP who joined on 8/06/09.

**BIRTHDAYS:**

Birthdays for Aug, and the first week of Sep:

| | | |
|---|---|---|
| Fontaine Jr. (Ralph) | AF7DX | Aug-04 |
| Fisk, Albert | KD7TFK | Aug-12 |
| Judd, Nola E. | KC7ZNW | Aug-12 |
| Hicks, Casey | KJ7XE | Aug-14 |
| Franklin, Michael I. | KE7SLI | Aug-19 |
| Hoffeld, Donald | WA6JTW | Aug-24 |
| Stroeher, Charles | WA7EBH | Aug-26 |
| Uhden, Roger | K7RGR | Aug-26 |
| Peterson, Richard | KE7Z | Aug-27 |
| Diemer, Alicia L. | KE7TTY | Aug-28 |
| Scairpon, Rik | WX7RIK | Aug-28 |
| Cowen, Stan | KI6HCW | Sep-06 |

YL Birthdays

| | |
|---|---|
| Baguley, Mrs. (Michael, KE7RFP) | Aug-06 |
| Abbott, Wendy (Dan, N7DWA) | Aug-22 |
| Tilton, JoAnn (Dennis, AD7TV) | Aug-27 |

**Happy Birthday!**

## FOR SALE OR TRADE

~ ~ ~ ~ ~ ~ ~ ~

**FOR SALE:** KENWOOD TS-850S HF Transceiver; WITH BUILT IN AT-850 ANTENNA TUNER 2 THRU 150 OHMS; KENWOOD PS-50 Power Supply, Included:- Instruction Guide - MIC, Condition: Very good condition. ALL FOR $750.00 Contact Ernie W7EWG 808-6668

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**For Sale:** Staco Variable Autotransformer Transformer Model 3PN1010 Input : 120 V, 10 A Output : 0-120/140 V Contact wx7rik@pobox.com or 360-460-2472

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***Your Ad Could Go Here***

## COMING EVENTS

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## NEXT YL LUNCHEON

Tarcisios
609 W. Washington

Time: 11:45 a.m.

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

## 2009 YL Luncheons:

March - Gordy's Pasta and Pizza - 1123 E. 1st - Port Angeles
April - Oak Table - 292 W. Bell - Sequim
May - Downriggers - 115 E. Railroad Ave. - Port Angeles
June - Mariner - 707 E. Washington - Sequim
July - Joshuas - 113 DelGuzzi Dr. - 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 - Paradise - 703 S. Sequim Ave. - Sequim

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

## CLUB OFFICERS For 2009

***President:*** Nita Lyman KE7DRT 360-457-5022 Nita_lyman@yahoo.com
***Vice President:*** Dennis Tilton AC7TV 360-452-1217 3tiltons@wavecable.com
***Secretary:*** Lee Diemer KE7TTY 360-683-5102 pathfindernorth@aol.com
***Treasurer:*** David McCoy KE7JEJ 360-457-8550 mccoy.d.r@olypen.com
***Board Member* (Chairman):** Bill Carter W7WEC 360-6814375 w7wec@arrl.net
***Board Member*:** Johan Van Nimwegen KO6I 360-681-7300 jvn@olypen.com
***Board Member**:* Al Dawson W7YLV 360-457-0752 adawson@tfon.com