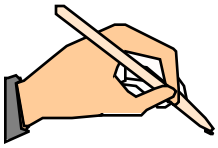
CQ Chatter

Volume B2•Issue #4 **Wood County Amateur Radio Club** **SEPTEMBER 1999**
P. O. Box 534,Bowling Green, OH 43402 **http://bravais.bgsu.edu/~boughton/wcarc.html**

A Note from the Editor

Another lazy summer is nearly over. Amateur radio is still displaying its utility in a number of natural disasters where the normal communications channels have broken down. After all, cellular phones do not work when the entire telephone system is kaput as happened in the earthquake in northern Turkey. Several American charitable organizations such as the Salvation Army made immediate use of ham radio to pass health and welfare traffic from the affected area to the outside world. The SA people also utilized amateurs to request supplies and other logistical needs as they became necessary.



The hurricane season is now upon us, and a major threat is the storm named Dennis, which has been giving the Carolinas and the Virginia coasts a good beating. Once again, reliance is placed in the amateur community to pass health and welfare traffic out of the area. If you get a chance, tune in to the Hurricane Watchers' Net on 14.325 MHz to hear what is going on. The National Hurricane Center in Miami has an amateur station on site so that they can both get and report the latest storm information. The hurricane that hit south Texas recently caused a lot of flooding. This type of disaster requires long term attention from all disaster agencies, and ham radio did a great job there.

This begs the question, what if one of these really severe disasters struck this area, with thousands of casualties? Would you know how to respond? The ARES and RACES organizations in Wood County could certainly use more volunteers who are willing to place their equipment and themselves at the disposal of the emergency authorities in case a disaster strikes. If you want to participate, contact me or Larry Reitz for information on how to become a part of them. 73 de Bob

WCARC Weekly Net:
Tuesdays at 2130
147.18 & 444.475 MHz

Club Meeting:
Monday, September 13th
Social Hour @ 1900
Fairgrounds Club Room

Special presentation on operational amplifiers by Duane, K8NEA

Here Comes the Sun!

The sunspot cycle is getting us close to peak performance on the high frequency bands. Frequent openings on 10 m and 15 m, and continuous propagation on 20 m are all the benefits of the high sunspot numbers. DX openings even on 6 m on up are commonplace. Here we see ol' sol in a more unique moment during the recent eclipse. Radio amateurs have a special interest in such events, because for the few minutes that the solar disk is obliterated, the ionosphere tends to lose density and propagation effects much as might occur after dusk or before dawn can be observed. Such things as long distance propagation on 40 m and even 80 m occur during the short period during which the ionization generating energy source is shielded.

At any rate, all the solar indices that we care about are up again this past week, with the sunspot numbers rising by 20 over the previous week. The geomagnetic A and K in-

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Big Ride Completed

The American Lung Association Big Ride Across America was completed on August 4th, in Washington, D. C., where the "Chain of Hope", a symbol of people who suffer with or have died from lung disease, was presented. The 134 riders completed a six-week long, 3,250 mile ride from Seattle, WA to Washington, D. C., to help fight lung disease. The Big Ride came through Wood County on the morning of July 22nd, traveling from the Grand Rapids area through Bowling Green, on the way to Fremont. The K8TIH repeater was used continuously by the group all morning.

Volunteer ham operators provided the vital link between support vehicles and the base camp each day. As the Ride moved from town to town, hams used local repeaters to update the location and number of Big Ride participants on the road, update checkpoint information and assist any riders needing equipment repairs or water along the route.

According to the Big Ride Communications Director, Dick Anderson, KE7A, "Ham radio continues to be the most reliable means of communication day in and day out as we move across the country. Cell phones and commercial band radios just don't work in the rural areas of the country. Riders traveled off major interstates, where cell phone coverage was spotty."■

Pagers Available

A quantity of voice pagers is available to members of RACES/ARES at a small fraction of the original cost. The estimated total cost of the pager with crystals is $35.00. This is a one-time charge and there is no monthly service fee. The pagers have been purchased and were recrystalled, so they should be available soon. If you would like to be alerted to local emergency situations quickly, a pager fills the need ideally, and is a really good deal cost-wise. One of the objectives stated by the WCARC President, Larry Reitz, is to have all Wood County RACES/ARES participants equipped with pagers so that quick call ups can be made in time of emergency. For further information, please contact Larry, WA8CWD, at (419) 837-2202. ■

WCARC
Net Control Roster

Net meets every Tuesday at 2130

Aug 31	**KB8QEW**
Sep 7	**N1RB**
Sep 14	**N8QMV**
Sep 21	**WD8ICP**
Sep 28	**KB8QEW**
Oct 5	**N1RB**
Oct 12	**N8QMV**

Brain Teasers

Answers to last week's quiz: **1-A 2-B 3-A 4-C 5-D 6-A 7D**. Now for some more:

1. What is the phase relationship between the input and output signals of an inverting op-amp circuit?
A. 180deg **B.** in phase
C. 90 deg **D.** 60 deg

2. What is the phase relationship between the input and output signals of a non-inverting op-amp circuit?
A. 180deg **B.** in phase
C. 90 deg **D.** 60 deg

3. What voltage gain can be expected from an inverting amplifier with input R = 1 kΩ and feedback R = 100 kΩ?
A. 0.01 **B.** 1
C. 10 **D.** 100

4. How does the gain of a theoretically ideal op-amp vary with frequency?
A. it increases linearly with frequency
B. it decreases linearly with frequency
C. it decreases logarithmically with increasing f
D. it does not vary with frequency

5. What are the annual dues for individual membership in the WCARC?
A. $1 **B.** $5 **C.** $10 **D.** $15 **E.** $20

September Contests

The full contest line-up for the month of September includes the following:

Aug 28-29	*1600 to 2200 UTC*	160 on up
	Hawaii QSO Party	**all modes**
Sep 4-5	*0000 to 2359 UTC*	160 to 10m
	All Asia SSB	**SSB**
Sep 4-5	*1200 to 1200 UTC*	80 to 10m
	Bulgaria DX Test	**CW**
Sep 5	*0000 to 0400 UTC*	80 to 20m
	NA Sprint	**CW**
Sep 5-6	*2300 to 0300 UTC*	160 to 6m
	MI QRP Sprint	**CW**
Sep 11-12	*0000 to 2359 UTC*	80 to 10m
	European DX	**SSB**
Sep 11-13	*1800 to 0300 UTC*	50 Mhz up
	ARRL VHF QSO Party	**all modes**
Sep 12	*0000 to 0400 UTC*	80 to 20m
	NA Sprint	**SSB**
Sep 11-12	*1500 to 1800 UTC*	80 to 10m
	Scandinavia CW	
Sep 18-20	*1400 to 0200 UTC*	80 to 10m
	YLRL Howdy Days	**all modes**
Sep 18-19	*1900 to 1900 UTC*	160m to UHF
	QCWA QSO Party	**all modes**
Sep 19	*0000 to 2359 UTC*	160 to 10m
	Atlantic QSO Party	**all modes**
Sep 19-20	*1800 to 0100 UTC*	160 to .70m
	Tennessee QSO Party	**all modes**
Sep 25-26	*1500 to 1800 UTC*	80 to 10m
	Scandinavia SSB	
Oct 2-3	*1000 to 1000 UTC*	80 to 10m
	VK/ZL/Oceania SSB	
Oct 2	*1500 to 1859 UTC*	80 to 20m
	European Autumn Sprint SSB	
Oct 2-3	*1600 to 200 UTC*	160 to 2m
	California QSO Party	**all modes**
Oct 2-3	*2000 to 2000 UTC*	160 to 10m
	Ibero-America 'test	**SSB**
Oct 3	*0700 to 1900 UTC*	15 to 10m
	RSGB 21/28 MHz SSB	

Hamfest Calendar

Sep 12 Findlay RC *8am - 3pm*
Hancock Co. Fairgrounds, Findlay, OH. Contact Bill, N8ET, (419) 423-3402.

Sep 18 L'Anse Creuse ARC *8am - 2pm*
L'Anse High School, Mt. Clemens, MI (Exit 236 off I-94). Contact Betty, N8SIH, for info at (810) 791-4484.

Sep 19 Adrian ARC *8am - ?*
Lenawee Co. Fairgrounds, Adrian, MI. Contact Brian, KG8CO, for info at (517) 265-1537.

Sep 26 Cleveland Hamfest Assn. *8am - ?*
Cuyahoga County Fairgrounds, Berea, OH. Call (800) 253-3378.

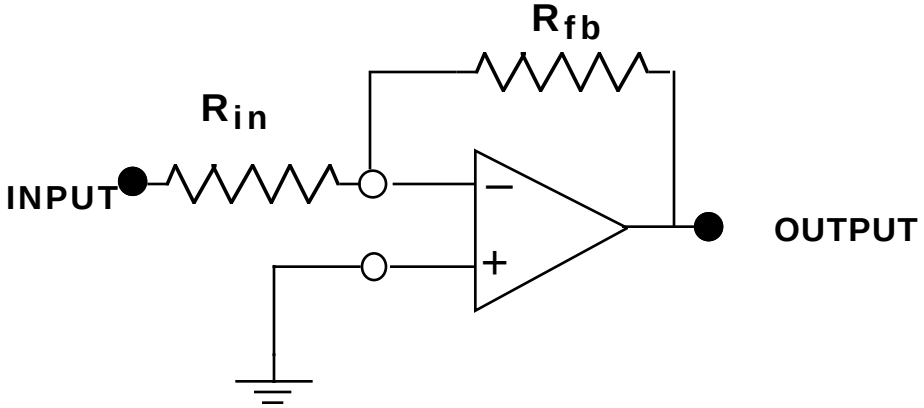
Sun - cont.--dices have been behaving themselves by staying below 10 and 5, respectively. When they kick up, there are a lot of particles like protons streaming from the sun and they tend to disrupt the ionosphere and lead to poor hf propagation. The sunspot numbers this past week were in the 120's. The last cycle's maximum was near 200, but most predictions are that the current one won't be as high. We're still on the upswing, so dust off that old hf rig and enjoy the fun while you can!. ■

HF Rig For Sale

ICOM 725 all mode rig for sale
very good condition
contact: Earl (800) 716-4599
pager: (419) 444-8686

Op-Amps - What are they and how do they work?

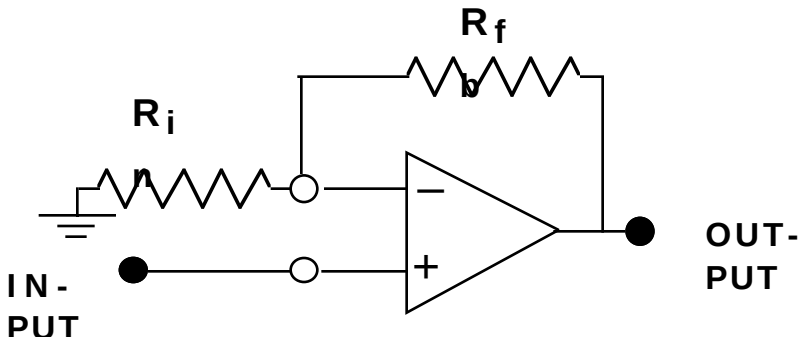
So far, we have covered some terminology connected with the op-amp. There are two basic configurations for using the op-amp to amplify while performing mathematical operations. The first is the inverting amplifier, which has the general circuit shown below:



The input voltage is applied to the *input resistance* R_{in}, which is in turn connected to the inverting input terminal of the op-amp. The all-important feedback is provided through the feedback resistor R_{fb} which connects the output terminal back to the inverting input. Two simple rules to remember when analyzing op-amps are: 1) no current flows into (or out of) the input terminals, and 2) the voltages at each input are equal. These conditions are of course approximate and hold true only when feedback is applied. The first rule tells us that both inputs in this circuit are at ground potential, or zero volts. The current that flows from the output terminal through the feedback resistor R_{fb} must also flow through the input resistor. The voltage drop across R_{fb} is v_{out} and the voltage drop across R_{in} is minus v_{in}. The gain of the amplifier is the output voltage divided by the input voltage and with this simple logic we see that the gain with the feedback loop closed only depends on the values of the two external resistors:

$$\text{Closed Loop Gain} = \frac{v_{out}}{v_{in}} = -\frac{R_{fb}}{R_{in}}$$

The minus sign tells us that there is a polarity reversal between the two voltages - for an ac signal input this corresponds to a 180 degree phase shift. For stability the gain is usually kept below about 100, a much smaller number than the *open loop*, or raw gain of the op-amp (upwards of 20,000). If the two resistors are of equal value, then the amplifier performs the function of *inversion*, or multiplication by –1, hence the name. This configuration can also be applied in digital work as the *NOT* function. The other principal configuration is the non-inverting amplifier which looks like:

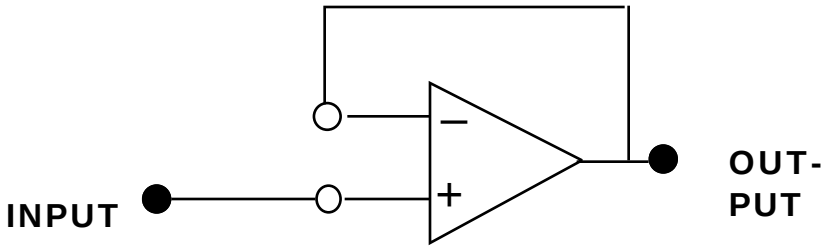


Applying the same rules to this circuit results in a gain ratio of:

$$\text{Closed Loop Gain} = \left(1 + \frac{R_{fb}}{R_{in}}\right)$$

There is no minus sign here, so the voltage is *not* inverted. It might seem like a duplication of the inverting amplifier since we can certainly achieve the same gain with both circuits just by choosing the appropriate resistance values. However, there is a major difference between the two configurations. The difference lies in the input resistance of the amplifier. The op-amp itself has a basic input resistance, that is, the resistance between the (+) and the (–) terminals - let's call it R_o - it is typically tens of Megohms. In the non-inverting set up, you can see that the input voltage source "sees" at least this much resistance to ground. In fact, the input resistance that it sees is Ro times the ratio of the open loop to the closed loop gain, a factor that can be very high

In this situation the importance of feedback cannot be over stressed. To illustrate, let's look at a circuit where the feedback is 100%. It is shown below and is called the *voltage follower*.



According to the formula above for the non-inverting amp, this circuit has a gain of one! What possible use is an amplifier that only repeats the input signal at the output? The answer lies in the input impedance, which can be on the order of 100's or 1000's of Megohms. This circuit provides a perfect *buffer* between a high impedance source like a crystal mike and a low input impedance amplifier stage. *next week - adding and subtracting* ■

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