



The PROPAGATOR

September, 2001

The Monthly Newsletter of South Orange Amateur Radio Association

Orange County RACES Program

The focus of the September meeting will be emergency communications. Two speakers from Orange County RACES will be at the meeting to present information on the function and activities of Orange County RACES and on their application of some of the newer technologies.

Joe Selikov, KB6EID, will speak on O. C. RACES, and Ralph Sbragia, KD6FYT, will speak on PSK31. O.C. RACES has been active in disaster preparations at the county level and also in providing guidance to city Emergency Radio groups.

This presentation comes at an opportune time. With the end of summer and summer vacations, most of us are getting back into a regular schedule. Both SOARA and the local cities emergency groups are looking at becoming more organized. In fact SOARA and the local emergency groups have been holding discussions on the allocation and use of resources in the case of a disaster.

Ray Hutchinson, AE6H, as SOARA's Communications Director is charged with maintaining liaison with the local emergency and public service groups. With the help of Keith Soesbe, KG6CGT,

New Members

A hearty welcome to SOARA's newest members:

Samuel L. Jones	WA3EGI
Sam Banis	KA6RUV
Michael J. Byrne	KG6HBZ

Share the Magic

A few months ago Malcolm, KO6SY, and Keith, KG6CGT, conducted a survey at a general meeting of SOARA which showed that the majority of members present had been "bitten by the radio bug" at a young age. Many may have waited until much older (much, much older!) but the interest was kindled at a young age.

If we expect to have future generations of Hams enjoying this hobby then it would be wise for us to expose young people to the magic of radio. At last month's meeting we heard from Art, W6XD, that the ARRL was busy developing a program to reach children in the schools. Part of the motivation (and support from the electronics industry) is the need for RF engineers. With the current push to make every thing "wireless" there is a growing need for RF engineers.

SOARA is seeking effective ways to reach more young people. Ideas and members who are interested in working on this are needed. If you have ideas, experience, or enthusiasm to contribute, please contact a board member and get involved.

discussions have been under way to increase the cooperation and communications among the groups.

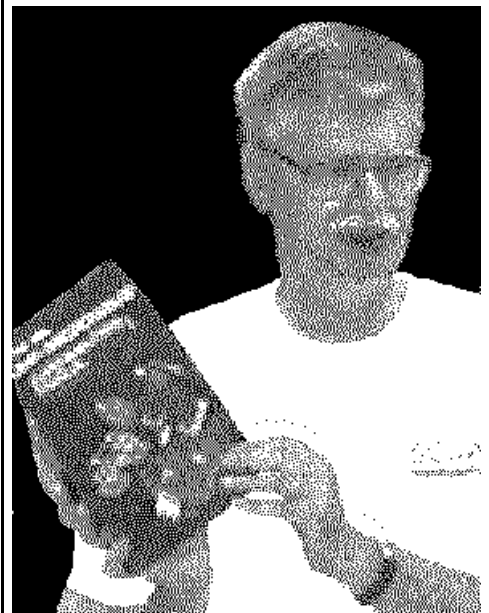
SOARA derives many benefits from the local cities and a part of our support of the cities is by means of supporting their local emergency groups. SOARA makes its repeaters available for use during drills and simulated emergencies as well as during disasters. SOARA also sponsors presentations on emergency communications such as this month's program.

Keith and Ray have worked out with the local emergency groups MOUs (memorandum of understanding) which add some

Continued on page 3

ARRL Insight

Art Goddard, W6XD, the current Vice Director of the Southwestern Division of the ARRL, visited SOARA on August 20. His presentation at our regular monthly meeting covered the more important items that the ARRL sees as high priorities in the coming months



. He also announced that Fried Heyn, W6WZO, has decided to not run for re-election as Director. Usually the position of Director is sought by the Vice Director upon the retirement of a director, and Art is running unopposed for the position. Since he is the only candidate he will take office on January 1 of next year. His ten years experience as Vice Director and his long association with amateur radio will serve him well in his new position.

The open position of Vice Director is being sought by two candidates:

Tuck Miller, NZ6T, and
Ned Sterns, AA7A.



The Way I See It: Understanding Radio Theory Without Math.

Diodes — Part Two

Lets quickly review the diode structure from last month's column. A block of semiconductor material (usually Silicon) is "doped" with the proper impurities so that on one side of a junction the conduction is by means of negative carriers (electrons) and on the other side conduction is by positive carriers (holes). We call this a p - n junction diode. Wires are properly attached to each side of this diode structure.

A positive voltage applied to the n-type (negative carriers) end, with the negative voltage applied to the p-type end, will result in no current flow. The n carriers will be attracted by the positive voltage and will move away from the junction. Similarly the p carriers will be pulled by the negative voltage away from the junction on the other side. The region about the junction from which the carriers have been removed is called a depletion region. There is no source of carriers to sustain a current flow.

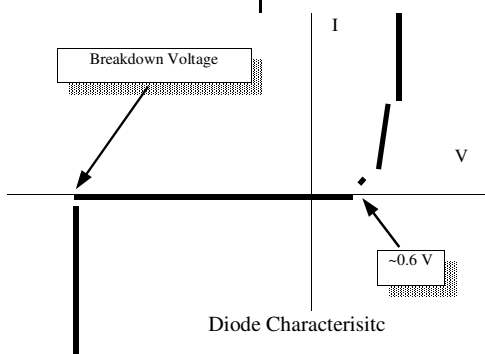
If we apply voltage across the diode in the other direction, then carriers on both sides of the junction will be forced toward the junction. As the positive and negative carriers cross the junction they combine and annihilate each other. A constant current can flow through the diode for this polarity of the voltage. This is called the forward direction, and the direction for no current flow is called the reverse direction.

There is a small voltage drop in the forward direction — a voltage drop that is not very dependent on the magnitude of the current flow. For a silicon diode this drop across the junction is about 0.6 volts.

Power rectifiers and small signal diodes take advantage of this characteristic to change AC power (or signals) to DC pulses which are smoothed or filtered in order to obtain DC power (or an audio signal).

If we apply enough voltage in the reverse direction we will get a current flow. The value of this reverse breakdown voltage depends on the concentration of the impurities that were used to dope the semiconductor (and make it p-type or n-type). The length of the depletion layer for a given voltage depends on the concentration of impurities. For lightly doped material the length is fairly long, and the applied (reverse) voltage is dropped over a reasonable distance resulting in a high breakdown voltage. You need this for a high voltage power rectifier.

There is one type of diode in which we want a low breakdown voltage. A voltage regulator diode, or Zener diode, relies on the reverse breakdown for its operation. We can obtain the desired breakdown voltage by varying the doping.



If we make the diode so that light can reach the junction area we can use it as a light detector. Silicon is sensitive to visible and infrared light. The light knocks electrons out of their fixed locations causing a hole - electron pair. The two (opposite polarity) carriers separate and drift in opposite directions across a reverse biased junction. While no current flows in the dark, there will be a current flow in the presence of light. A solar cell is just a special form of a diode in which the carriers are separated by the 0.6 volt junction voltage of the diode. The voltage output per cell is about 0.6 volts even with fairly low light levels. The amount of current available is a function of the amount of light falling on the junction.

You are all familiar with the LED or Light Emitting Diode. It is made from a more complex material than simple silicon. The forward drop is about 3 times that for silicon. Solid state lasers are diodes similar to LEDs.

The simple silicon diode has another characteristic that can be exploited in our

circuits. A variable capacitor is basically a pair of conductive plates separated by an insulating region. Changing the spacing varies the capacitance. A reverse biased diode acts like a capacitor. The conducting regions on each side are separated by the depletion region. By changing the DC (reverse) bias on the diode, we vary the length of the depletion region and thus the capacitance. The tuning capacitors of yesterday have almost completely given way to "varactor" diodes in radios today.

A schematic of a modern communications rig would show a large number of diodes. Many of them are used as switches. When you switch between filters in your HF radio, there are no relays or mechanical switches doing the work. The DC bias on diodes is switched to change from conducting to blocking. With a forward DC current flowing through a diode we can easily add to it an AC (RF) component. When the diode is reverse biased, the AC component is also stopped.

We could use this scheme even at high power levels, but for it to work without distorting our RF signal, we must always have a forward current flow in the on state. We must have a DC current greater than the peak negative swing of the RF current. That may represent a very large DC power for the sake of switching the RF.

A type of diode called a PIN diode will handle RF switching without the large currents. This diode has the normal n-type and p-type regions but they are separated by an undoped region. It is called "intrinsic" (undoped) material. We have, in effect, a very long depletion region, and the result is that the current flow through that region represents a large stored charge. With only a small DC bias current to put the PIN diode in the forward (on) state, we can handle a large RF signal because the reverse current is taken from the stored junction charge.

The Gunn diode used at microwave frequencies has no junction. It is a slab of material with the characteristic that increasing the applied voltage may reduce the current flow. It is like a car with an automatic transmission that shifts down when you press on the gas. You slow down rather than speeding up (for a time). This behavior is called negative resistance. The negative resistance of the Gunn diode cancels the resistance of a tuned cavity, and you have a very simple oscillator.



Year 2001	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
General Meeting 7:00 PM	22	26	19	16	21 Auction	18	16	20	17	15	19 Auction	No meeting
VEC Testing 5:30 PM	22	—	19	—	21	23	16	—	10	—	19	—
Propagator Deadline	6	10	3	1	5	2	1	4	1	9/29	3	2
Board Meeting	29	3/5	26	23	TBA	25	23	27	24	22	26	
Spring Auction					21							
ARRL Field Day						23 - 24						
SOARA picnic								4				
Fall Auction											19	
SOARA Holiday Party												2

RACES *cont.*

formality to these mutually beneficial relationships.

Amateur Radio's unique ability to provide communications, when the regular channels are not available in emergencies has always been a key component of our hobby. Every ham should give serious consideration to how he or she can best be prepared to help in a disaster. For many this will mean belonging and training with one of the local city groups. The Radio Officers / Team Leaders for the local Emergency Communications Groups are listed below along with phone numbers where they can be reached for information about joining their teams.

Laguna Beach: LBACT - RACES
John Kountz, KE6GFF, (949) 494-8783

Laguna Niguel: LNACS - RACES
Al Way, KC6LNP, (949) 461-0684

Mission Viejo: MVEARC - RACES
Charley Speelman, WA6RUZ, 770-2658

Rancho Santa Margarita: SMART- ARES
Bill Westfall, KD6NJP, (949) 858-4542

All other :contact Ray Hutchinson, AE6H,
(949) 496-8020 or e-mail at
ae6h@soara.org

T-Hunt Opportunity

Craig Regional Park, between Fullerton and Brea, will be the site of southern California's next international-style on-foot radio foxhunt on September 22. This event is sponsored by Fullerton Radio Club and is free and open to everyone who wants to see and try the sport. A ham radio license and knowledge of radio equipment is not required.

At least three participants in this summer's USA ARDF Championships in Albuquerque are expected to attend. They include Sergei Zarubin of Ukraine, who won gold on 80m and silver on 2m in the M21 (prime) division, and Jay Thompson W6JAY of Santa Ana, gold medalist in the M19 (youth) division on both bands. Take advantage of this opportunity to get some pointers from the experts.

Bring any 2-meter RDF "sniffing" gear you have. If you don't have any, just bring your HT or scanner, if you have one. A limited number of RDF sets will be available for loan. Also be sure to bring anything you'll need while going after those radio foxes, such as munchies, bottled water and sunscreen. Course maps will be available, so bring your own compass, protractor and pencil. Make sure all batteries are fresh.

In addition to the two-meter band, international ARDF championships also include an 80-meter band event. At least

one optional 80m transmitter (3542 KHz) will be on the air for you to try. Be sure to bring your 80m gear if you have it.

Practice and beginner 2-meter transmitters will go on the air around 11:30 AM, and the main 5-fox hunt will begin at 12:30 PM. There are picnic tables nearby so you can bring your lunch.

Craig Regional Park is bounded on the west by State College Boulevard, on the north by Imperial Highway, on the east by the 57 freeway, and on the south by Bastanchury Road. From 57 freeway, take the Imperial Highway exit, go west to State College (first light), turn left (south) and look for the park on your left (east). Vehicular entrance and parking within Craig Park costs \$4.00. You can park just outside along the street for free. The starting area will be at the north end of the park, not far from the vehicle entrance from State College Boulevard. (See maps at www.homingin.com) Look for a sign near the entrance and an orange and white orienteering flag at the starting point.

Talk-in is on K6QEHR, 146.97(-) PL 136.5. If you can't bring up the repeater, use 146.97 MHz simplex.

Joe Moell K0OV
USA ARDF Coordinator
www.homingin.com

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**Meeting: Monday, 9/17/01 at 7:00 PM.
Program: O C R A C E S**

☛ **SOARA** meets at the Mission Viejo Community Center, 26932 Veterans Way, Mission Viejo, the third Monday of every month at 7:00 PM. Changes to the meeting time or place are announced in this newsletter and on the two-meter repeater.

☛ **License Exams:** Amateur License Exams are given prior to most SOARA meetings. Exams are from 5:30 to 7:30 PM. You must make an appointment at least a week in advance. Call Lou Parker, KA6BJO, at 951-0336. (No calls after 9:00 PM please.)

☛ **Contacting SOARA:** Questions about SOARA? Send e-mail to: info@soara.org, or leave a message at 949-249-1373.

☛ **Web Site:** SOARA maintains a web site with current club information. The URL is: <http://www.soara.org>.

☛ **Repeaters:** The SOARA 2-meter and 70 cm repeaters are open to all licensed hams.

SOARA 2m — 147.645 - (110.9)

SOARA 2m — 145.240 - (110.9)

SOARA 440 — 445.660 - (110.9)

The SOARA 220 and HROC 440 repeaters are shared by members of both clubs. Each machine is subject to the operating rules of its respective club. Call KG6GI for details.

SOARA 220 — 224.100 - (110.9)

SOARA 220 — 224.640 - (123.0)

HROC 440 — 447.180 - (131.8)

☛ **Nets:** SOARA 2 m repeater open net is held Tuesday 8:00 PM
40 meter HF net (7.263 MHz +/- for QRM), Sunday 7:30 AM
PSK-31 net: 28.120 USB 1 KHz meets Fridays at 6:00 PM.

SOARA OFFICERS

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kb6fyg@soara.org