The PROPAGATOR

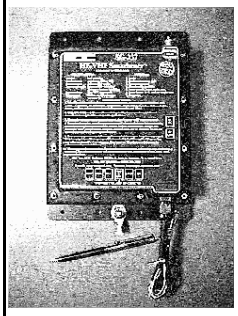
October, 2000

The Monthly Newsletter of **S**outh **O**range **A**mateur **R**adio **A**ssociation

Gordon West on Tuners — Free Giveaway

SOARA's October 16 meeting will feature a very popular speaker. Gordon West, WB6NOA, will present an exciting program on *Hidden Antennas Using the SGC Automatic Tuner*. We will see the automatic tuner in action, and no doubt the highlight of the evening will be this brand new SGC Model 237 automatic tuner being given away to one lucky ticket holder at this meeting.

Gordon West will address what it takes to get a good signal out of an attic, and he will show you how easy it is to obtain the tuner's necessary ground by picking up chicken wire that probably runs from ground level to your attic hidden antenna installation. "Gordo" has worked over 75 countries and most states in the country on multiple bands using the SGC Model 2020 QRP high-frequency transceiver, into the SGC 237 automatic antenna tuner. See both the SGC 2020 and the automatic tuner in action on October 16, and maybe walk away with the 237 after the meeting is finished.



New Members

A hearty welcome to SOARA's newest members:

Kevin Scord KD6EJY

Mitchell Knight KB6IIG

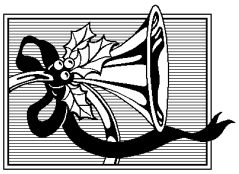
November Auction

Twice each year, in May and in November, SOARA holds an auction. Here is a chance to turn some of that unused equipment into cash, or to pick up some new equipment. With the changes in the license requirements quite a few SOARA members have upgraded. What a wonderful excuse to acquire more gear!!

Dig out those old rigs, tuners, antennas, etc. that you have in storage and bring them to the auction. Old equipment has a charm (and educational value) that new expensive rigs can't match. Mark your calendar for Monday, November 20, and come join the fun.

December Party

It may seem to be pretty far in the future, but SOARA's annual Holiday Party will be here in just a few weeks. The date is set: Sunday, December 3. The location is still uncertain. For the past several years the event was held at the Sizzler on the Lake in Mission Viejo. That location is no longer available, and a search is now underway to find a new suuitable location.

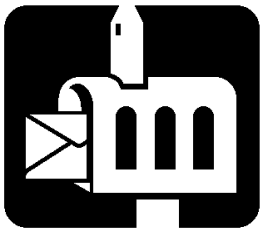


Mike Mullard, SOARA's Activities Committee chair needs people willing to take on some of the responsibilities for making the arrangements and plans. At the present he needs volunteers with some orgznizational skills to assume some leadership roles. If you can help please let Mike know. He can be reached via e-mail at:

kf6hvo@soara.org

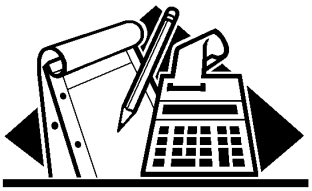
October is Membership Renewal Time.

By now you should have received your dues renewal statement for year 2000/2001. If you joined within the last 12 months you may be surprised to receive the notice so soon. However, you will notice that your dues are just the amount to bring your membership into line with the October date. This is done in order to process all of the renewals at one time.



Your dues support all of the club activities. Three major events for all club members are Field Day, the picnic in August, and the December holiday party. Repeater site rent, equipment maintenance and upgrades, as well as utilities represent ongoing expences.

All members pay the basic annual membership dues. Those members wishing to take advantage of the advanced capabilities of the clubs repeaters pay an additional annual fee for this Advanced Access.



Please fill out the information on your dues notice (and the survey form), write a check for the appropriate amount and return them this month. They can be returned by mail or you can pay electronically (using a credit card) by visiting SOARA's web site. Simply click on the paypal icon and follow the instructions. If you are already registered with paypal you can simply e-mail your payment to:

payment@soara.org

The Way I See It:

Understanding Radio Theory Without

Designing a simple power supply.

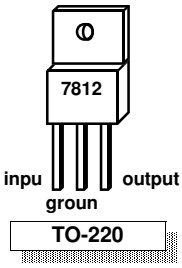
Hams often find that they need a power supply for some small piece of equipment. Power supplies need not be complex, nor difficult to construct. You may not want to actually design one, but the process is straight forward and easy to understand. (I will have to resort to some math, but I will explain each step — it will be pretty painless.)

Any design project starts with a clear statement of what the device is required to do. Let's assume that you have a piece of equipment which requires 12 volt power at about 500 mA (half an ampere). If our primary power is a 12 volt storage battery, our job is done — but lets assume we wish to run this from the 115 volt AC power line (ordinary "house current"). We will further assume that the equipment we are going to power requires a well regulated voltage supply, i.e., one whose voltage does not vary.

At this point it helps to already know that there are available integrated circuits (ICs) which will perform the regulation function nicely. If we don't know, we ask someone with some experience, search the internet, etc. But in the end we discover the 78xx series of three terminal positive voltage regulators. The "xx" in the part number indicates two digits which tell us the regulated output voltage of the part. (There is a similar series —79xx — of negative voltage regulators.) We will want to use a 7812. Several companies make these devices. They are even available at Radio Shack.

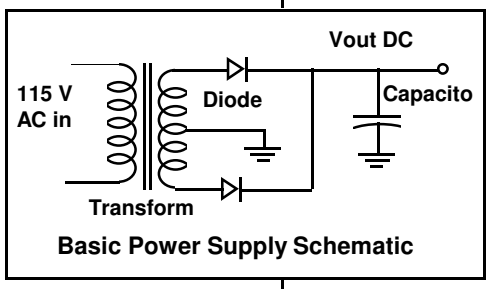
All that we need to know about these parts is contained on a "Data Sheet" which is available from the manufacturer. Data sheets are readily obtained in pdf format via the internet. Important information on the data sheet includes the function of the pins, the required operating voltage — minimums and maximums — as well as the maximum current the device will handle, and thermal considerations.

78xx parts come in a variety of packages, but the most popular, and the one that Radio Shack sells is the TO-220 package. Three leads extend from one end of the package and a large metal tab extends from the other end. Picture the part laying on a surface with the tab flat on the surface and the leads facing you. The center lead, and the metal tab, are ground connections. Since this is to be a positive voltage supply, we consider the negative "return" side to be ground. The lead to your left is the input lead and the one to your right is the output lead. (Note that the 79xx negative voltage regulators have a different pin connection.)



Our 7812 data sheet tells us that we need at least 2 volts more than the output voltage applied to the input pin. It can work with an input voltage up to 35 volts. So we need an unregulated supply of 14 to 35 volts.

How do we pick this voltage? One consideration is the Power dissipated in the regulator. This is closely related to the efficiency of our overall power supply. The output of the regulator IC will be 12 volts, the difference between this 12 volts and the input voltage will have a power loss associated with it. The regulator must dissipate this power as heat. A heat sink must be provided to handle this power. For a small supply like this we would like to bolt the regulator's tab (there is a hole in it for that purpose) to the aluminum chassis that we use to house the supply.



Basic Power Supply Schematic

We can dissipate a few watts, but we don't want to throw away too much power as heat. At a half ampere of current we will dissipate one watt (as heat) for every two volts of excess input supply voltage. We surely don't want a 35 volt supply. But what voltage do we want? Since we want to build this supply with real parts we need to first see what power transformers are available. The Radio Shack catalog shows only a few choices (other suppliers might have hundreds of choices). Secondary voltages of 12.6 VCT, 18VCT, and 25.2VCT are available. These numbers indicate the RMS voltage, center tapped. The circuit diagram shows a center tapped transformer. During each cycle of the line voltage the two ends of the transformer will (alternately) swing positive (relative to the grounded center tap).

The diodes will pass current when the anode end (the triangle symbol, the bar indicates the cathode) is positive. This current will charge the capacitor to approximately the peak voltage from the transformer. This peak is equal to 1.4 times the RMS voltage. Half of the secondary voltage is developed across each half of the secondary winding.

Let's consider the 18 volt transformer. Each half of the secondary develops 9 volts RMS or 12.6 volts peak. Clearly this is not enough to run our regulator. The 25.2 volt transformer will develop 12.6 X 1.4 = 17.6 volts peak. Actually we loose some voltage in the diodes (about 0.6 V) and some voltage in the resistance of the transformer windings. So even at full load current we should have about 16 volts developed at the capacitor. Our regulator should be quite happy, even if there is a sag in the line voltage.

If we want the capability of a full ampere output current from our supply, then we will have to select the transformer with a higher current rating. The Radio Shack transformer has a 2 A rating, it should run pretty cool in this application.

The capacitor will have both a capacitance rating and a voltage rating. Selecting the voltage rating is simple, it must be a higher voltage than the capacitor will "see". A look at the catalog shows choices of 16 V (— too low) and 25 V. The latter will do fine.

The purpose of the capacitor is to supply current to the load (through the regulator) when the transformer voltage is not at its peak value. When you apply a voltage across a capacitor, charge will flow into the capacitor (current is the flow of charge). The charge will remain (and thus the voltage will remain) after the capacitor is disconnected. The diodes in our power supply circuit "disconnect" the power transformer when the transformer voltage is

Continued on page 3.

Year 2000	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
General Meeting 7:00 PM	24	28 PSK31	20 T-hunt	17	15 Auction	19	17	21	18 Hosp.	16 Gordo	20 Auction	No meeting
VEC Testing 5:30 PM	24	28	20	17	15	26	17	21	18	16	20	
Propagator Deadline	8	12	4	1	4/29	3	1	5	2	9/30	4	2
Board Meeting	31	3/6	27	24	22	26	24	28	25	23	27	
Spring Auction					15							
ARRL Field Day						24 - 25						
SOARA picnic								5				
Fall Auction											20	
SOARA Holiday Party												3

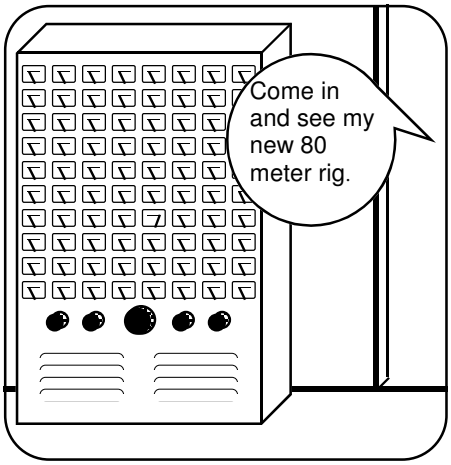
Power Supply, continued from page 2

not higher than the capacitor voltage.

The load is still connected and draws current from the capacitor. The rate at which the capacitor looses charge is equal to the current draw. If we are supplying one ampere to the load, then we are removing charge from the capacitor at the rate of one coulomb per second (an ampere *is* a coulomb per second). A one farad capacitor will hold one coulomb of charge with a voltage of one volt across the terminals. (One farad is BIG.) As we draw charge out of the capacitor the voltage across it will drop. The amount of drop will depend on the capacitance (the larger the capacitance, the smaller the drop); on the current; and on the duration of the current draw. The transformer recharges the capacitor 120 times per second (twice per cycle of the 60 Hz line frequency).

Lets pick a maximum droop of 0.4 volts (0.4 volts peak to peak ripple before the regulator). The question, then is what value of capacitor will give us a 0,4 volt droop in 1/120 second with a current drain of 1 ampere. A 1 farad capacitor would show only a 1/120 volt drop in that time. We can write 0.4 V as 4/10, or (4 X 12)/(10 X 12), 0r (48/120) V. We need only 1/48 farad capacitor. Lets change that to the more familiar microfarads (farads/1,000,000). Writing 1/48 as a decimal we obtain 0.021. That is 21,000 millionths. A standard value for electrolytic capacitors is 22,000 µF. Radio Shack doesn't carry capacitors this large so we have to get it elsewhere.

Only the diodes remain to be specified. They have to have a reverse breakdown voltage of greater than twice the DC voltage and the current rating must be high enough to handle the current we will use. We could get by with 50 V, 1 ampere devices, but there is little cost increase in going to higher ratings. Add a power line switch and a fuse and the electrical design is complete. Designing electronics isn't such black magic after all.



Y2K plus one

Plans for next years club activities are under way now. Classes for new licenses and for upgrading will be offered. There is now only one code test — the 5 WPM test. There are only three written tests. Simplification of the licensing process is welcome, but the range and depth of material to be mastered has not changed. Mastery of the rules, operating practice and radio theory is still a formidable task for many. If you would like to see a class please let Heiko, AD6IO, know what your interests are.

The **PROPAGATOR**

South Orange Amateur Radio Association
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Mission Viejo, CA 92690

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Meeting: Monday 10/16/00 at 7:00 PM
Gordon West, WB6NOA

☞ **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 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 on Tuesdays at 8:00 PM following the Laguna and M.V. emergency nets.

40 meter HF net (7.262 MHz +/- for QRM), Sunday 7:30 AM

PSK-31 net: 28.120 USB 1 KHz meets Fridays at 6:00 PM.

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