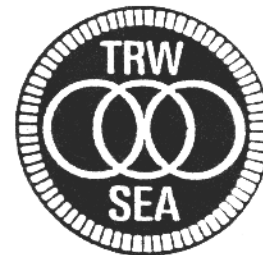




CROSSTALK



A Publication of the TRW Amateur Radio Club

APRIL 1995 CALENDAR

Every Monday: DCS Net on 145.32 Repeater at 7:30 PM

Every Wednesday: Emergency Communications Team Net on 145.32 Repeater at Noon

Every Thursday: Club Net on 145.32 Repeater at 7 PM, Club news, etc.

Every Friday: Club Breakfast in Bldg S cafeteria, 7-8 AM

Apr 4: Executive Board Meeting, E2/1200, 5:15 PM - Note New Start Time

Apr 11: Emergency Communications Team Meeting, R3/1413, Noon

Apr 11: Club Meeting, 5:30 PM at Petrelli's

Apr 21: Technical Chairman's Meeting, Bldg S Shack, Noon

Apr 28-30: Dayton HamVention

Apr 29: Swap Meet, Parking lot, NW corner of Aviation & Marine, 7-11:30 AM, T-HUNT at Noon

EDITORS NOTES: The deadline for *CROSSTALK* submissions is the executive board meeting on the first Tuesday of each month. If you have something and will be later than that please call and I will try to accommodate you.

CLUB NEWS: A work party was held on Sunday, February 26 and three new antennas were installed on the Bldg S roof, two tri-band verticals for 2 m, 70 cm and 23 cm and a 6 m/ 10 m vertical. The HF vertical was moved to make room for the OSCAR antennas. The HF rig is operational but you must use the internal tuner on the TS-940 since an elevated vertical has an impedance of 16 to 20 ohms (2.5 to 3:1 VSWR). The 6/10 m antenna needs to be tuned and the triplexer for the tri-bander has a VSWR problem at the time of this writing. Hopefully these will be fixed by the time you read this. Call Chris Wachs, WA2KDL for the latest status on the shack. Remember the club has a second shack in Bldg R3.

New BBS Phone Number: 310-768-3399, effective 4/1/95

CLUB NEWS (cont'd): Effective April 1 we have a new SYSOP, Ron Hoffman and a new BBS phone number, 310-768-3399. Many thanks go to our retiring SYSOP, Dave Hassall for all his hard work on the BBS over the past few years. I hope Dave and his wife enjoy their retirement in New Mexico and hope to hear him on during the VHF/UHF contests, QRP of course.

Bob Briggs and Young Ryu are coordinating the OSCAR antenna installation. Brian DeAro is taking the lead on the tower installation on Bldg S. These folks will need assistance to accomplish their tasks so if you would like to help please give them a call. No special skills are needed and you might learn something.

Field Day planning meetings will start in April. Call John Shepherd if you are interested in helping.

Bryan, KN6OW is thinking about holding a General Class license course. Give him a call if you are interested.

Frank Cartier has revised the club constitution to reflect the latest SEA guidelines. The executive board will vote on it at the April EBM and the regular membership will vote on it at the May club meeting. If you want a copy to review please call Frank.

More shack news: The 9600 Baud packet station is up and running on 450. Several club members are regularly using the HF rig. Several other members have been working to get the rest of the shack up and running.

The club is getting a new Emergency Communications Van. This one will be larger than our present one and we need lots of help to fix it up. If you would like to help on this fun project please call Ray Enriquez.

MEMBERSHIP: As usual many TRW employee members haven't renewed their memberships yet. Please renew ASAP so Nina can straighten out our mailing list which has grown too large again. If you don't you will stop receiving *CROSSTALK* in the next few months.

Newcomers Guide: Getting Started on HF

by Bill Shanney, KJ6GR

I've been asked several questions recently regarding basic equipment for HF. I'll present my opinions in this article but also encourage all newcomers to get several viewpoints before making your final decisions. many factors enter into this process:

- How much money do you want to spend?
- How much room do you have for antennas? This is influenced by CC&Rs and your spouse's feelings.
- What are your operating interests?

The last question may be difficult for a newcomer to answer. If you think some activity sounds interesting, find a friend who is active in that area and have him show you the ropes and perhaps operate his equipment. The club shacks have equipment that can be used to try most common operating modes and bands, if you need assistance contact one of the club officers and we will try to help you.

The first thing to buy is a transceiver. ICOM, Kenwood, Ten Tec, and Yaesu all offer a range of products to satisfy the needs of basic operating through demanding contesting and DXing. A new entry level rig will cost \$900 - \$1500. Some personal recommendations are the Kenwood TS-50, Yaesu FT-840 and Yaesu FT-900¹. These are all small rigs with enough features to handle most operating conditions. If you plan on operating CW you should get a 500 Hz CW filter (\$100 - \$150) and you will need a keyer and paddle (\$100 - \$200) (the FT-900 has a built in keyer). You will also need a 12 volt, 20 amp power supply. I don't recommend buying the matching supply since you are paying for appearance, an Astron unit is less than \$100.

You can save some money buying used gear. Most hams take good care of their equipment, beware if it looks beat up and always verify that it works before you buy. An IC-735, TS-440, or FT-757 should cost \$700 - \$800 depending on age and options. Make sure that it includes a 500 Hz filter if you want to work CW, getting a filter for out of production gear may be difficult. I recently bought a Ten Tec Corsair II used and reconditioned from the factory for \$875 + \$75 for the CW filter. This is a ham band only rig but is big on CW performance (SSB too).

Some of you may be suffering from sticker shock at this type of investment, please read on. I'm a big QRP fan. QRP operation is less than 5 watts on CW and 10 watts SSB. Other club members who enjoy low power operation include Brian KN6OW and Max, NU6U. Most QRPers build their own gear, there are many easy to build kits available for less than \$200. I'd be happy to help anyone in the club align their rig once assembled. There is something very special about using a rig you built that I can't describe in words. My recommendation is to start with a 40 meter transceiver. If you join the Northern California QRP Club (\$5 per year) you get their excellent newsletter and can purchase a NorCal 40A transceiver kit for about \$100. This is a good kit for a beginner to start with. I've listed other sources of QRP rigs at the end of the article, write for catalogs and price lists.

The QRP Plus transceiver is a multi-band full featured transceiver available from Index Labs for around \$600. It has a full 5 watt output on CW or SSB and many nice features. MFJ single band QRP rigs are available at most ham stores and sell for less than \$180. Ten Tec sells an interesting transceiver called the Scout. The Scout has an output of 5-50 watts and bands are switched via plug in modules. This rig costs \$550 with one band module and \$29 for each additional band. These are all low cost ways to become active on the HF bands. Don't expect the same level of performance from these simple rigs but do expect to have a lot of fun.

¹ Throughout this article I'll refer only to equipment I'm familiar with. I'm sure there are other fine products out there so ask other experienced hams for their recommendations too.

Antennas are relatively inexpensive. I'm not talking about quads or yagis on a tower, just simple wire antennas. Buy a wide range antenna tuner, a unit that will handle 300 watts cost less than \$150. These tuners will allow you to match random length wires and dipoles on multiple ham bands. The tuners built in to many modern rigs do not have the range required to match many multiband antennas. The MFJ-949E and Vectronics VC-300DLP are examples of tuners in this class. You can also build your own using parts found at the swap meet.

Wire antennas can be home built ("home brewed") or purchased. Lew McCoy, WIICP suggests a dipole of any convenient length fed with inexpensive 450 ohm ladder line. For good performance this wire needs to be at least one quarter wave long on the lowest frequency of operation (that's ~70 feet for 80 meters). The popular G5RV is 102' long and centerfed with ladder line. Some versions transition to coax after a 34 foot length of 300 Ω line but I prefer to feed it using 85 feet of 300 or 450 ohm ladder line for multiband use. The G5RV is available commercially from many sources.

The Windom is an offset fed dipole 132 feet long that operates on most bands using a tuner. Antennas West and Radio Works sell well made versions of this good performer as well as other wire designs. W9INN sells dipoles using a combination of inductive loading and parallel wires to achieve multiband operation. He has versions to fit most restricted space installations. Check the ham magazines for information from these sources.

Horizontal HF antennas perform better when they are higher in the air. Radio Shack sells 35' push up masts that work great for wire antenna supports, so do trees. At heights less than $\lambda/8$ ground loss becomes considerable. If at all possible put your antenna up $\lambda/4$ or higher on the lowest band of operation. If you can't do this, no problem, you can still have fun with QSOs less than 1,000 miles or so. 70% of my QSOs are within this range. To increase your range a vertical cold be used². Cushcraft (R7), GAP and Butternut make excellent products. Please stay away from power lines for safety sake.

Many years ago W3EDP popularized an 85 foot end fed long wire antenna. Installed as an inverted vee or inverted L with the top up about 35' it is a good performer on the lower bands. You must have a good ground at your tuner to use this type antenna. I recently had good luck with a 67 foot horizontal wire fed 17 feet from one end. This antenna matches easily on 40, 30, and 20 meters when fed with 68 feet of 450 ohm ladder line. It can also be used on 80 meters with a wide range tuner. I used it as a an inverted vee with an apex at 40 feet.

The ARRL Antenna Book, Lew McCoy on Antennas, the Bill Orr, Stu Cowan series and many other antenna books have many ideas for wire antennas. One of my personal favorites is HF Antennas for All Locations by Les Moxon, G6XN. This book is full of interesting antenna designs for limited space applications.

The 80 through 20 meter bands are where most of the HF action will be for the next few years (i.e. during the minimum of the sunspot cycle). Casual operating on these bands is a lot of fun. Coast-to-coast contacts can be made almost any night on 40 meters. It is relatively inexpensive to get started (less than most computers) and equipment is easy to operate. Put up a simple wire antenna and give HF a try.

² I'm partial to horizontal antennas on the lower bands since most man made noise is vertically polarized. Local noise pickup by verticals is 6-10 dB higher in this area.

ORP Kit Suppliers

Small Wonder Labs
(NE QRP Club Kits)
80 East Robbins Ave.
Newington, CT 06111

S & S Engineering
14102 Brown Road
Smithsburg, MD 21783

MXM Industries
Rt. 1, Box 156C
Smithville, TX 78957

Lectrokit
401 W. Bogart Rd.
Sandusky, OH 44870

A & A Engineering
(see them at our swap meet)
2521 W. La Palma, Unit K
Anaheim, CA 92801

Oak Hills Research
20879 Madison St.
Big Rapids, MI 49307

Dan's Small Parts
1935 So. 3rd West No. 1
Missoula, MT 59801

Kanga US
Bill Kelsey N8ET
3521 Spring Lake Dr.
Findlay, OH 45840

Townsend Electronics
Box 415
133 N. 1st St.
Pierceton, IN 46562

624 Kits
171 Springlake Dr.
Spartanburg, SC 29302

Tejas RF Technology
17 Briar Hollow, Suite 101
Houston, TX 77027

Assembled ORP Rig Suppliers

Index Laboratories
19913 48th St.
Long branch, WA 98351

Ten Tec
1185 Dolly Parton Pkwy
Sevierville, TN 37862

MFJ Enterprises
P.O. Box 494
Mississippi State, MS 39762

ORP Clubs

Northern California QRP Club
(over 1000 members)
Jim Cates, WA6GER
3241 East wood Rd.
Sacramento, CA 95821

QRP Amateur Radio Club International
Michael Bryce WB8VGE
2225 Mayflower NW
Massillon, OH 44647

For Sale: Ten Tec Argonaut II QRP rig. Excellent condition. \$900/1300 obo.
Call Bill, KJ6GR 310-542-9899 evenings.

Solar Power for the Ham Shack

by Bill Shanney, KJ6GR

I have been thinking about a solar charged backup battery power system for my shack for a long time. The bad rains we had in early January caused a 5 hour power outage at our house in Torrance, that got me started looking for sources of information on how to size and set up such a system including some reserve power for household use. The earthquake in Kobe, Japan just one year after the Northridge quake increased my sense of urgency. I had a "deep cycle" marine battery for backup power but this is not adequate to run the ham gear, power some lights and maybe the TV for news reports in a more serious emergency.

I'm a QRP enthusiast and many low power operators use battery power. An excellent introduction to solar power appears in the book *Low Power Communications, Volume 2* edited by Richard Arland, K7YHA (Tiare Publications, 1994). Chapter Eight is written by Michael Bryce, WB8VGE who is very knowledgeable in the area of solar power. He presents a good summary on sizing a battery and charging system as well as some good advice on component selection. To give you readers an idea how it works I'll summarize my system.

First I looked at the power consumption in my shack for both nominal operation and worst case operation in an emergency. I then added a few necessities like lights, TV and a radio to keep the family happy and informed in case of bad weather or an earthquake. A summary of these power requirements are shown in Table 1.

Table 1: KJ6GR Power Requirements

Item	Avg Current or Power*	On Time (hrs/day)		Battery Drain (Amp-hours)	
		Nominal	Worst Case	Nominal	Worst Case
HF Transceiver	6A (Note 1)	3	3	18	18
2M Transceiver	1.5A (Note 2)	3	12	4.5	18
Lights/Accessories	2A	3	5	6	10
House Lights	100W (Note 3)	-	5	-	56
TV (19" Color)	70W	-	5	-	39
Radio	10W	-	5	-	11
Daily Current Drain				28.5 A-H	152 A-H (Note 4)

*110 Volt AC Power, converted to 12 Volt battery amp-hours assuming an inverter with 75% efficiency (Amp hours = AC Power ÷ .75 ÷ 12V x On Time)

Notes:

- 1 - HF 100W transceiver using 1 amp receive, 20 amps transmit, 25% transmit duty cycle.
- 2 - 2M 50W transceiver using 0.5 amp receive, 10 amps transmit, 10% transmit duty cycle.
- 3 - Four 23 watt fluorescent lights, each puts out the same amount of light as a 90 watt incandescent bulb.
- 4 - Significantly less power should actually be required, using 50 watts on HF, 10 watts on 2 meters and only 2 lights on continuously reduces the worst case daily current drain to less than 110 amp-hours nominal.

I chose to purchase golf cart batteries which are rated at 6 volts and 220 amp-hours. Two in series provide the required 12 volts, two more in parallel double the current capacity to 440 amp-hours. This will supply 3 days of power at my worst case load and 4 days at a nominal load (see Note 4). Some additional power will be provided by the solar charging system.

I installed two solar panels capable of producing 4.4 amps each. The worst case equivalent hours of sunlight on a horizontal panel in the Los Angeles area is 4.7 hours per day which yields a total of 41 amp-hours/day. This extends the worst case load time to 4 days and the nominal load time to over 5 days which is a reasonable amount of time to recover from an emergency (see Note 5). This amount of charging capacity is adequate for my normal daily needs, I can use an AC charger to recover after an emergency. By elevating the panels so they face the Sun considerably more power is available in the worst case winter months (see one of the books listed below for details).

There are several books that will help you get started in solar/battery power:

- *Solar Living Sourcebook*, edited by John Schaeffer
- *The New Solar Electric Home*, by Joel Davidson
- *The Solar Electric House*, by Steven Strong

I have only located three sources for solar panels and regulators:

- Antennas West, Box 50062, 1500 North 150 West, Provo, UT 84605-0062. (801) 375-8425
- Sunlight Energy Systems, 2225 Mayflower N.W., Massillon, OH 44647. (216) 832-3114.
- Solar Electric Inc. 4901 Morena Blvd. #305, San Diego, CA 92117. (619)581-0051. They sell batteries too.

Batteries may found at discount stores, Sears and I've been told House of Batteries in Huntington Beach. I found the best prices at Solar Electric and they had everything under one roof. I would write for catalogs from as many places as you can because they all contain useful information and so you may find the best product for your needs.

Installing a solar system is easy. The solar panels can be mounted on your roof or on the ground if you have a large yard. Lead acid batteries should always be kept outdoors, I have mine in an aluminum tool shed on the side of my house. The charge regulator should be mounted near the batteries. I chose a 30 amp regulator to permit future growth. Since voltage drop at high currents can be considerable, you must use heavy wire (like #2 or #4) between the batteries and the load, check a wire table and compute the voltage drop for your peak load. Keep the drop less than 0.25 volts.

A series of articles appeared in *QST* in March, April and May 1990 entitled "Practical Battery-Back-Up Power for Amateur Radio Stations" by George Thurston, W4MLE. Batteries, charging and maintenance are covered in this informative series. George used discarded batteries from a telephone switching system which are not "deep cycle" types but is interesting in its own right for continuous duty applications.

I use my battery system almost exclusively in my shack. The FT-1000 which only runs on AC power hardly gets used. The solar panels keep the batteries at full charge, even on a cloudy day. I've replaced most of the house lights with fluorescent bulbs which require only 25% of the power for the same light output. I'm very satisfied with the outcome of this project. I hope some of you will become motivated to consider battery power as a good thing to do for the environment and/or emergency preparedness.

Notes:

5 - This would drain the batteries completely which is never a good idea. Even deep cycle designs should not be discharged more than 80% of rated capacity. I'm planning on adding two more batteries to be on the safe side.



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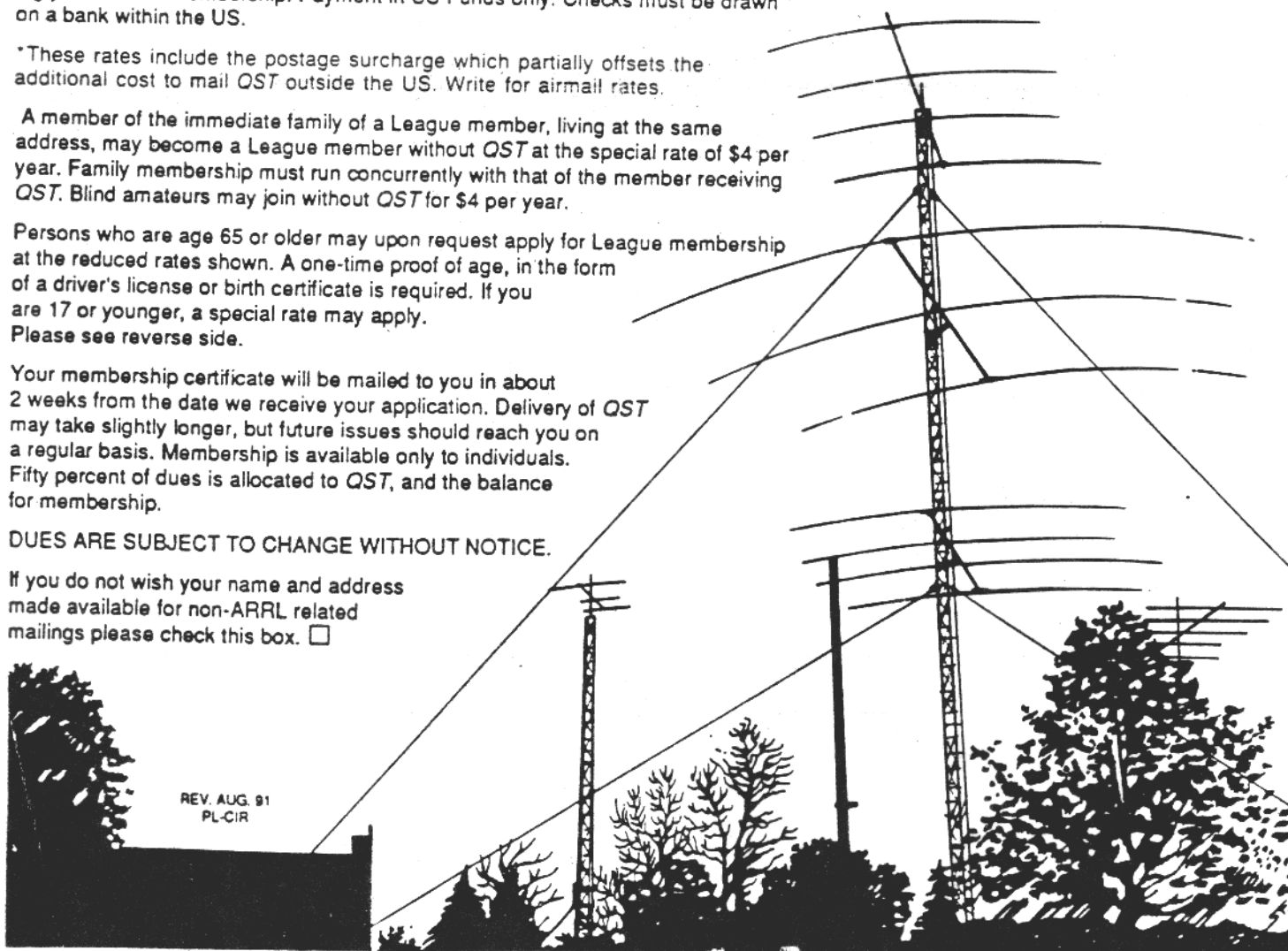
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