EPARA BEACON

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N3IS

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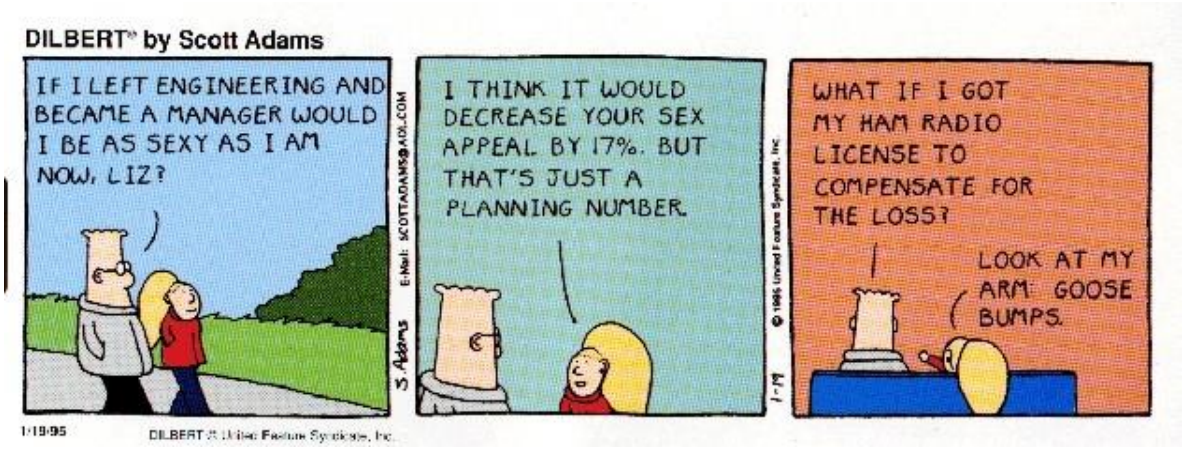
Vol. 3, Number 9 **The Official Newsletter of The Eastern Pennsylvania Amateur Radio Association** September 2019

August was a great month for EPARA, the Carbon County Fair and West End Fair went extremely well. I want to thank all of you who worked very hard at Carbon County to earn the donation that will fund many EPARA events and projects. I also want to thank all who helped man our booth at the West End Fair promoting amateur radio. We should have a filled Tech class in September due to those efforts. EPARA also received a generous donation of radio gear; we now have two full VHF/UHF go kits with hand held and 50watt mobile radios, and one kit even has solar charging capabilities with a 100-watt portable solar panel! We also now have two DMR radios and a DMR ID for the N3IS call. A full listing of the equipment received will be read at the next meeting. The person who made the donation wishes to remain anonymous, but you know who you are and the entire club thanks you.

So as fall approaches things slow a bit, but there is still much on the agenda. As many of you know we are now incorporated as nonprofit in the state of Pennsylvania. The application was accepted and we received our articles of incorporation a couple of weeks ago. The next step is to become a 501c3. As you read this, we are getting the forms together to file for this. September also brings N3SEI Elmer weekend. We will be holding a foxhunt on Saturday the 28th and continue our satellite contacts throughout the weekend. Elmer weekend will be held up on Camel-back Mountain in Big Pocono State Park. Our technician license class starts on September 11th and will run 10 weeks. If you would like to help teach, contact me or Donald WK2RP and we will get you involved in training some new hams.

Our next meeting is on Thursday September 12th and we will be voting on the 2020 budget as well as a proposed due increase that is long overdue. We will also be discussing the idea of an EPARA Ham Fest for next year. We used to hold one and I think it's time to start doing one again. That's it for now, I hope to see you at the next meeting.

73, Chris AJ3C



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WELCOME TO THE EPARA BEACON !

The EPARA Beacon is published monthly and is the official (and only) newsletter of the Eastern Pennsylvania Amateur Radio Association. The club meets on the second Thursday of every month, at the Monroe County 911 Emergency Control Center. The business meeting starts at 7:30 P.M. and visitors ARE ALWAYS welcome to attend!

To join our mailing list or to submit articles for consideration, send an email to: EPARAnewsletter@ptd.net

EPARA NETS:

MONROE COUNTY ARES/RACES – Sunday's 8:30 PM, 146.865 MHz, PL 100.0 Hz
SPARK Information/Swap Net – Tuesday's 8:30 PM, 147.045 MHz, PL 131.8 Hz
EPARA TECH NET – Friday's 8:30 PM, 147.045 MHz, PL 131.8 Hz

Next Meeting: September 12th

Monroe County Public Safety Center, 100 Gypsum Rd Stroudsburg, PA 18360

For More Information Contact:
Eastern Pennsylvania Amateur Radio Association
Postal Address: PO Box 521 Sciota, PA 18354

Send Email to N3IS@qsl.net with Questions, Suggestions or Comments

YOUR MEMBERSHIP MATTERS

Dues are due January 1st
Yearly membership - $15/yr, Spouse - $5/yr
Full time student - $5/yr
Senior (over 62 yrs old) - $5/yr
Lifetime membership - $150

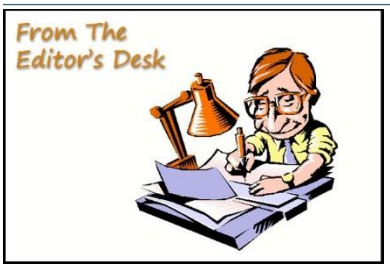
VE testing should resume in September after our commitments to the county fairs are behind us. Enjoy your summer!

What's INSIDE this ISSUE

Officers and Committees

President:	**Chris Saunders AJ3C**
Vice President	**Bill Carpenter AB3ME**
Secretary	**Naomi Lopes KC3GVO**
Treasurer	**Scott Phelan KC3IAO**
Member at Large	**Donald Darcy Jr WK2RP**

ARES EC, Charlie KB3JUF
Field Day Coordinator, Chris AJ3C
Quartermaster, Ron N3GGT
Membership Coordinator, Franklin W3OKW
Newsletter Editor, Eric N3SWR
Photographer, Eric N3SWR
Public Information, Don WK3RP
Social Media, Chris AJ3C & Eric N3SWR
Special Event Coordinator, TBD
Technical Program Coordinator, Bill AB3ME
Lead VE, Donald WK2RP
Webmaster, Franklin W3OKW



Greetings to all!

Well the Carbon County and West End Fairs are finally behind us. I would like to thank all those that came out to help the club earn our operating capital for the next fiscal year. We will be going through a change of sorts as EPARA grows and transforms into a legitimate non-profit organization. That will bring challenges of a different sort as well as rewards we could not have easily won in our prior charter. I myself continue to capture and print what I feel is the spirit of EPARA over the months that I've been brining you this newsletter, and I can see that we are indeed growing in a positive direction. I have a good feeling we will be actively seeking sponsorship from local businesses and individuals to help our group continue to grow.

Okay – off the soapbox for now. Summer is winding down and Autumn is right around the corner. I'm done parking cars! Yay! 🙂 Time to think about the cooler nights ahead, the bands opening up, propagation going long and building a few radio related projects for once – I've been away from the "bench" for too long and the soldering iron needs another road test – roll eyes…. Something about the fun of building and repairing things, I guess. So hopefully I can write up another "From The Workbench" article soon. Until then…… 73

Eric, N3SWR

Articles and submissions that would be of interest to radio amateurs are most welcome. Cutoff date for submissions is the 25th of every month to allow for editing. Copyrights are the property of their respective owners and their use is strictly non-profit/educational and intended to foster the spirit of amateur radio. For any concerns, please email me at: Editor, eparanewsletter@ptd.net

Anyone looking to take an exam is encouraged to contact Donald WK2RP to preregister at least one (1) week in advance of the test date. If you have any questions or to register, Donald can be reached via email wk2rp@aol.com and/or phone 914-424-6924. Sessions are the second Friday of the month at 7 PM. The following are this month's and next month's testing dates:

September 13th	**October 11th**

VE exam sessions are held at the Monroe County 911 Emergency Control Center located at 100 Gypsum Rd, Stroudsburg, PA 18360
http://www.monroeco911.com/

From route 33/209, take the Snydersville exit to Manor Dr west. Proceed past the Harley Davidson dealership on your right to Mid Easton Belmont Pike. Turn right and immediately right again onto Gypsum Rd. Follow this to the end and park in the visitor's section.

Amateur Radio Emergency Service

In the United States and Canada, the **Amateur Radio Emergency Service** (**ARES**) is a corps of trained amateur radio operator volunteers organized to assist in public service and emergency communications. It is organized and sponsored by the American Radio Relay League and the Radio Amateurs of Canada.

Radio Amateur Civil Emergency Service

The Radio Amateur Civil Emergency Service (RACES) is a standby radio service provided for in Part 97.407 of the Federal Communications Commission rules and regulations governing amateur radio in the United States. Founded in 1952.

For those that are interested in becoming involved in ARES or RACES or simply have questions feel free to contact Charlie Borger KB3JUF: kb3juf@gmail.com , that's why he's here 🙂

Ham Radio Classes Forming Now!

Eastern Pennsylvania Amateur Radio Association will be holding a 10 week course where you can learn everything you need to earn your Technician (entry level) FCC **Amateur Radio License**.

The Technician license is your gateway to the world-wide excitement of Amateur Radio …

… and now you do NOT need to learn Morse code!

Classes begin on September 11th at 7pm
at Monroe County Safety Center
100 Gypsum Road, Stroudsburg, PA 18360

Registration is required.

To join, contact:
Donald Darcy WK2RP
914-424-6924 or wk2rp@aol.com

ARRL The national association for AMATEUR RADIO

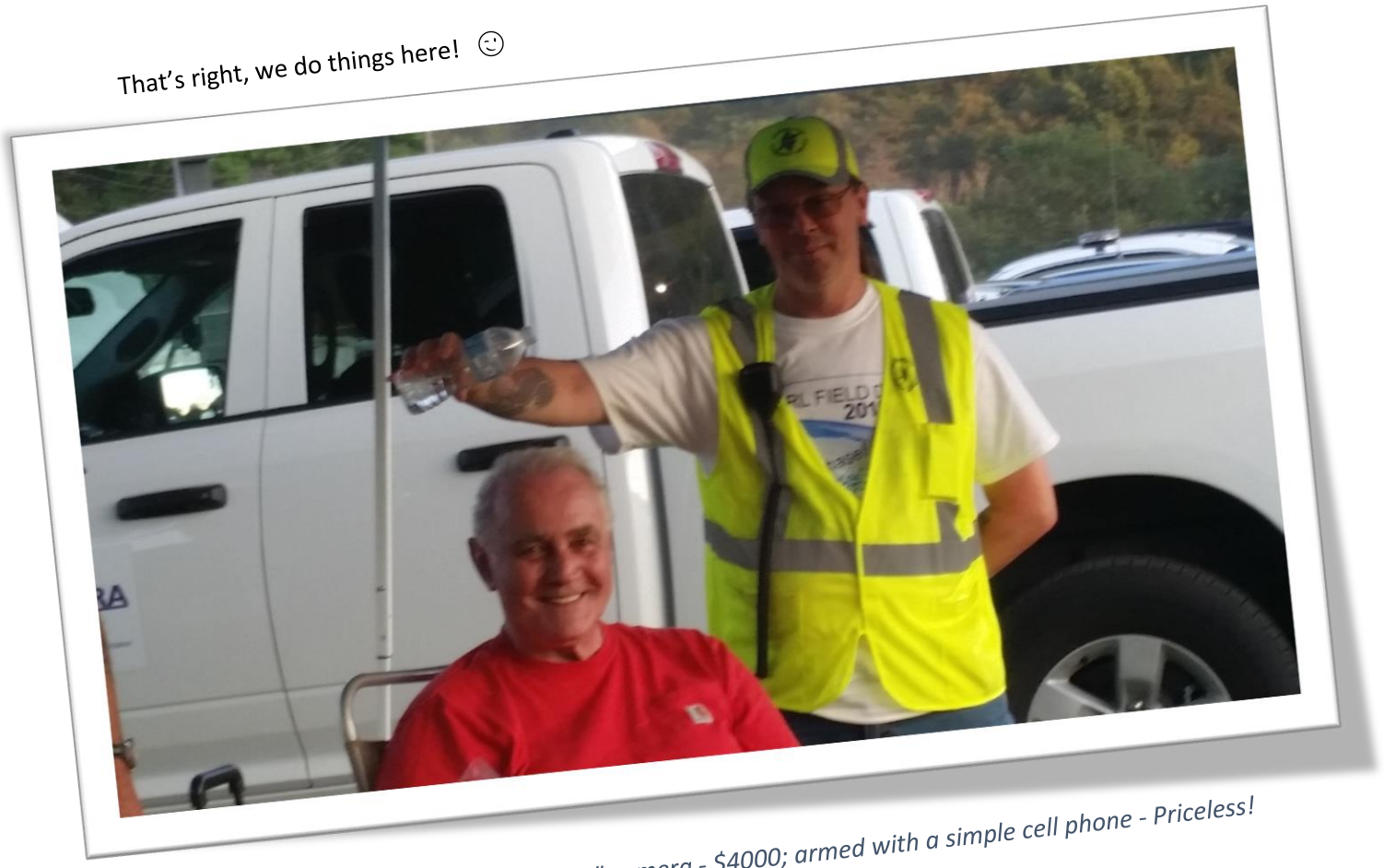
Announcements and Upcoming Events

- Elmer Weekend – September 28th – 20th Fox hunt and satellite communications!
- Readers Fire Department - October 6th
- SET scheduled for Nov.2nd - PLEASE offer your time if you can for a few hours
- The Christmas Santa Net - Something to keep in mind for the holidays
- Winter Field Day – January 24th, 25th, 26th

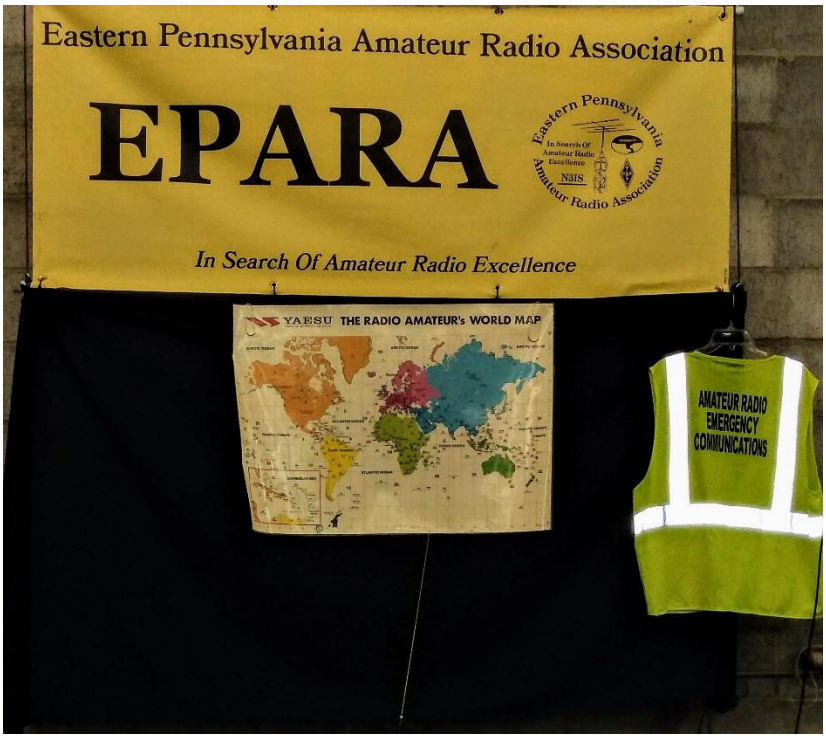
The Carbon County Fair has once again offered EPARA this year the opportunity to earn our operating funds for the year. Many of our dedicated members did their best to contribute their time and efforts to make this happen. The dust and the rain did not stop them and we all managed to park a few thousand cars over the entire week. Below are a few of the moments I was able to capture!

Mother nature even put on a show for us!

That's right, we do things here! ☺



Hourly rate to park cars - $3.25; typical "Pro" camera - $4000; armed with a simple cell phone - Priceless!



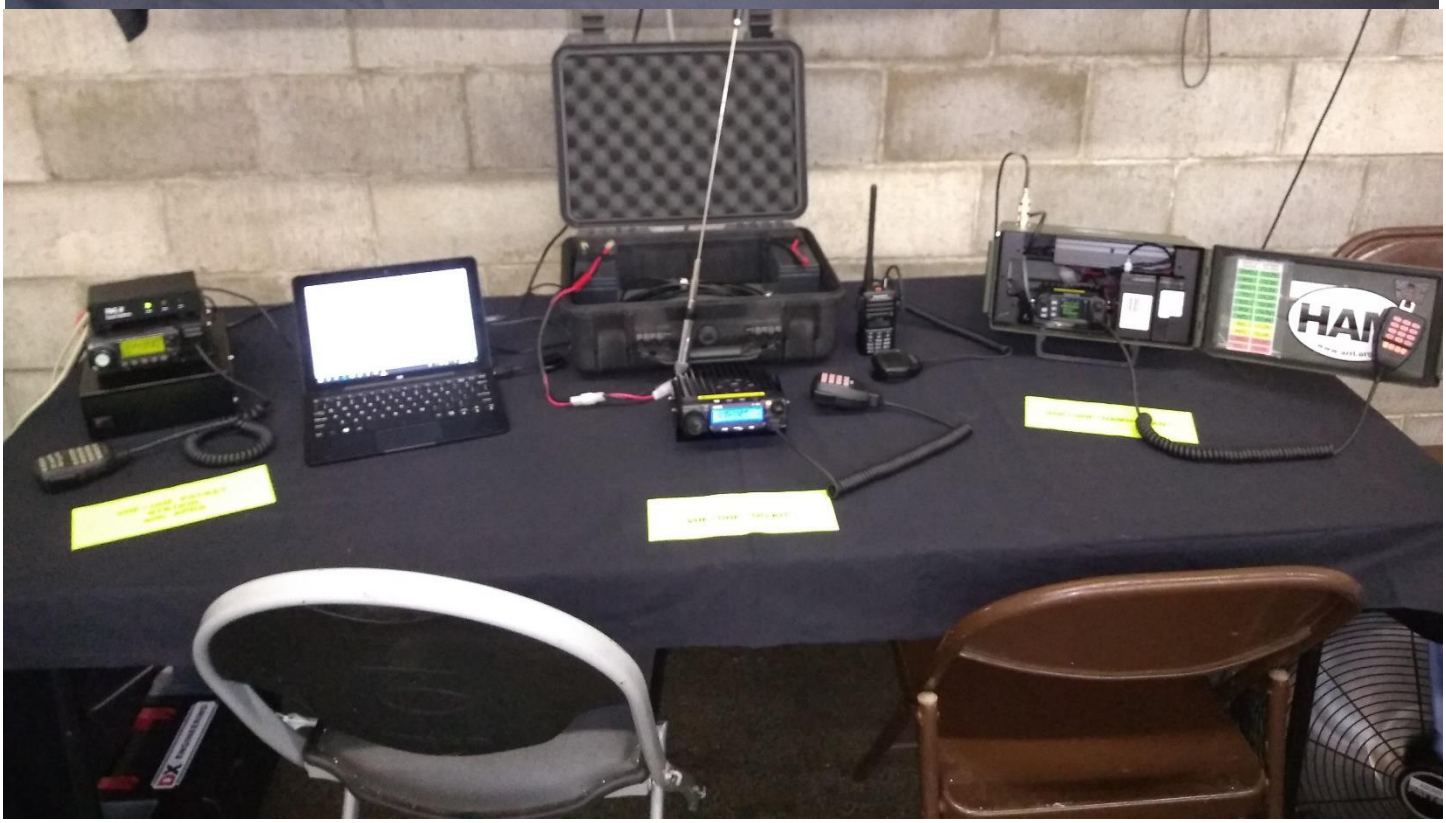
EPARA meets the public at the West End Fair!


AREDN
WEST END FAIR
1920
GILBERT, PA
Tickets & Deals
Directions
Sign In
Search Website
SEARCH
GET UPDATES
ABOUT
EVENTS
MEDIA
SPONSOR/HELP
EXHIBITORS
August 18 - 24, 2019
98 DAYS DAYS TILL THE FAIR!
Rain / Windy 50°
ALL
FAIRGROUNDS EVENTS
THE WEST END FAIR
4X4 Truck Pull (Lucas Oil Pro Pulling)
& 10.500 466 Hot Farm East Coast PPL
MORE >
MORE EXCITING EVENTS
MORE
Chris Ruble
Back again, singing current country hits and original material.
QUICK VOTE
Where do you get most of your info about the fair?
newspaper 4.8%
website 35.1%
full brochure 55.6%
single panel brochure 4.5%
SPONSORS
AREDN
HAM RADIO 21st CENTURY SPORT
Amateur Radio... Emergency Radio
Ham Radio
AMATEUR RADIO
EVENT COMMUNICATIONS
EVENT VEHICLE
HAM RADIO IS... THE GAME
HAM RADIO IS... READY
HAM RADIO IS... DISCOVERY
HAM RADIO IS... ADVENTURE
HAM RADIO IS... OUT OF THIS WORLD
HAM RADIO IS... FRIENDSHIP
Wireless Enjoyment with Amateur Radio


Ham Radio Classes
Forming Now!
Classes begin on September 11th at 7pm
at Monroe County Safety Center
100 Gypsum Road, Stroudsburg, PA 18360
ARRL


LEON CLAPPER
570-629-283
ARRL
AMATEUR RADIO


Amateur Radio
What is Ham Radio?
We Do That!
Amateur Radio
Ham Radio
DX Magic of Amateur Radio
"Hello"...
22 THINGS YOU CAN DO WITH AMATEUR RADIO!
ARRL
What is Ham Radio?
ARRL
DMR


HAM

Knowledge Test

Knowledge Test

Which type of detector is used for demodulating SSB signals?
A. Discriminator
B. Phase detector
C. Product detector
D. Phase comparator

Last month's answer was, B.
Strong adjacent signals will desensitize your receiver. Desensitization of a radio receiver is the result of the non-linearities in the receiver mixer and results in generation of spurious IF in the presence of a strong interfering signal. The resulting product will suppress all other signals reducing the effective gain of the receiver.

2019 SEPTEMBER MONDAY

CALENDAR YEAR CALENDAR MONTH FIRST DAY OF WEEK

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
26	27	28	29	30	31	01
02	03	04	05	06	07	08
09	10	11	12 EPARA Meeting Monroe County Training Center 7:30pm	13 VE session at the Monroe County Control Center 7pm	14	15
16	17	18	19	20	21	22
23	24	25	26 ARES/RACES Meeting Monroe County Training Center 7:30pm	27	28 Elmer Weekend - Big Pocono State Park - Foxhunt and more!	29
30	01	02	03	04	05	06


73
SEPTEMBER 1967
60¢
AMATEUR RADIO
Machines that Read! Talk! Smell! See! Hear!
RADIO-TV EXPERIMENTER
WHITE'S RADIO LOG
AM-FM-TV STATIONS NEW EXPANDED WORLD-WIDE SHORT-WAVE LISTINGS!
AUGUST-SEPTEMBER 75c
PUBLISHED BI-MONTHLY
ALL ABOUT SIDEBAND CB
DX CENTRAL'S NEW BROADCAST BAND BOOSTER! (See Page 75)
44 WAYS TO USE YOUR TAPE RECORDER!
HAM BAND RECEIVER ROUNDUP!
COMPLETE PLANS FOR:
Remote Telephone Alarm!
CB Handset for Your Car!
Touch Switch for Lights!
Lunchbox AM Portable!
Rewinding Time
An exciting hobby.... for everyone
everyday electronics
SEPT.72
15p
INFRA-RED BURGLAR ALARM
CAPACITANCE METER
MW/LW RADIO TUNER
Radio-Electronics
NEW WAYS TO USE YOUR SCOPE
75c SEPT. 1975
Radio-Electronics
THE MAGAZINE FOR NEW IDEAS IN ELECTRONICS
BUILD THIS ELECTRONIC DOORBELL
Plays The Tune Of Your Choice
MODERN TURNTABLE DRIVES
More Elaborate Than You Think
NEW MATV SYSTEMS
And How To Install Them
MANUAL CURSOR-ADD-ON
For TV Typewriter II
R-E's LAB TEST HI-FI REPORTS
Cartridge
Jack Darr's Service Clinic

Bruce Draper, AA5B, aa5b.corral@gmail.com

Contest Corral — September 2019

Check for updates and a downloadable PDF version online at **www.arrl.org/contests**.
Refer to the contest websites for full rules, scoring information, operating periods or time limits, and log submission information.

Start - Finish Date-Time		Date-Time		Bands	Contest Name	Mode	Exchange	Sponsor's Website
1	1800	2	0300	1.8-UHF	Tennessee QSO Party	CW Ph Dig	RS(T), county or SPC	tnqp.org/rules
2	2300	3	0300	1.8-50	MI QRP Labor Day CW Sprint	CW	RST, SPC, mbr or power	www.miqrp.net/contest
3	0100	3	0300	3.5-28	ARS Spartan Sprint	CW	RST, SPC, power	arsqrp.blogspot.com
4	2000	4	2100	3.5	UKEICC 80-Meter Contest	Ph	4-char grid square	www.ukeicc.com
5	1700	5	2100	28	NRAU 10-Meter Activity Contest	CW Ph Dig	RS(T), 6-char grid square	nrau.net/activity-contests
5	1900	5	2100	1.8-50	SKCC Sprint Europe	CW	RST, SPC, name, mbr or power	www.skccgroup.com
7	0000	7	2359	3.5-28	Russian RTTY WW Contest	Dig	RST, 2-letter oblast or CQ zone	www.qrz.ru/contest/detail/93
7	0000	8	2359	3.5-28	All Asian DX Contest, Phone	Ph	RS, 2-digit age	www.jarl.org/English
7	0600	7	0800	7,14	Wake-Up! QRP Sprint	CW	RST, serial, suffix of previous QSO	qrp.ru/contest/wakeup
7	1200	8	2359	1.8-50	SKCC Weekend Sprintathon	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
7	1300	8	0100	1.8-UHF	Nebraska QSO Party	CW Ph	County or SPC (FT8: grid square)	qcwa.org/2019-ne-qso-party-rules.pdf
7	1300	8	1259	1.8-28	IARU Region 1 Field Day, SSB	Ph	RST, serial	darc.de/der-club/referate/conteste/iaru-region-1-fieldday/en
7	1300	8	1300	3.5-28	RSGB SSB Field Day	Ph	RS, serial	www.rsgbcc.org/hf
7	1400	7	2200	3.5-28	Ohio State Parks on the Air	Ph	OH park abbreviation or "OH" or SPC	ospota.org
7	1600	7	1900	3.5	AGCW Straight Key Party	CW	RST, serial, class, name, age	www.agcw.org/index.php/en
7	2000	8	2000	3.5	PODXS 070 Club Jay Hudak Memorial 80-Meter Sprint	Dig	RST, SPC	www.podxs070.com
8	0000	8	0400	3.5-14	North American Sprint, CW	CW	Other station's call, your call, serial, name, SPC	ncjweb.com
8	1000	8	1400	144	WAB 144 MHz QRO Phone	Ph	RS, serial, WAB square or country	wab.intermip.net
9	0000	9	0200	1.8-28	4 States QRP Group Second Sunday Sprint	CW Ph	RS(T), SPC, mbr or power	www.4sqrp.com
9	1900	9	2030	3.5	RSGB 80-Meter Autumn Series, SSB	Ph	Other station's call, your call, serial, name	www.rsgbcc.org/hf
14	0000	14	2359	1.8-VHF	FOC QSO Party	CW	RST, name, mbr (if any)	g4foc.org/qsoparty
14	0000	15	2359	3.5-28	WAE DX Contest, SSB	Ph	RS, serial	darc.de/der-club/referate/referat-conteste/worked-all-europe-dx-contest/en
14	1000	15	1000	1.8-28	SARL Field Day Contest	CW Ph Dig	RS(T), # of transmitter, category, province or "DX"	www.sarl.org.za
14	1400	15	2000	All	Texas QSO Party	CW Ph Dig	RS(T), county or SPC	www.txqp.net
14	1500	15	0300	3.5-28	Alabama QSO Party	CW Ph	RS(T), county or SPC	www.alabamaqsoparty.org
14	1500	15	0959	3.5-28	Russian Cup Digital Contest	Dig	Serial, 4-char grid square	qrz.ru/contest/detail/86.html
14	1800	16	0259	50 and up	ARRL September VHF Contest	CW Ph Dig	4-char grid square	www.arrl.org/september-vhf
15	0000	15	0400	3.5-14	North American Sprint, RTTY	Dig	Other station's call, your call, serial, name, SPC	ncjweb.com
15	1300	18	0700	1.8-144	Classic Exchange, CW	CW	Name, RST, SPC, rcvr/xmtr model	www.classicexchange.org
15	1700	15	2059	3.5-28	BARTG Sprint 75	Dig	Serial	bartg.org.uk
16	0100	16	0300	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or power	qrpcontest.com/pigrun
18	1900	18	2030	3.5	RSGB 80-Meter Autumn Series, CW	CW	Other station's call, your call, serial, name	www.rsgbcc.org/hf
19	0030	19	0230	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or power	naqcc.info
20	2100	20	2359	3.5	AGB NEMIGA Contest	CW Ph Dig	RST, serial, mbr (if any)	www.ev5agb.com
21	0000	22	2359	2.3 GHz and Up	ARRL EME Contest	CW Ph Dig	Signal report	www.arrl.org/eme-contest
21	0000	22	2359	All	Collegiate QSO Party	CW Ph Dig	School name, school mascot, operating class	collegiateqsoparty.com
21	0600	22	2359	10 GHz to light	ARRL 10 GHz and Up Contest	CW Ph Dig	6-char Maidenhead locator	www.arrl.org/10-ghz-up
21	1000	22	1000	50 ,70, 144, 432, 1296	SARL VHF/UHF Digital Contest	Dig	RST, 6-char grid locator	www.sarl.org.za
21	1200	22	1200	3.5-28	Scandinavian Activity Contest, CW	CW	RST, serial	www.sactest.net
21	1200	22	1200	1.8-28	All Africa International DX Contest	CW Ph Dig	RS(T), serial	www.sarl.org.za
21	1400	21	1800	144, 432	AGCW VHF/UHF Contest	CW	RST, serial, power class, 6-char grid	www.agcw.org/index.php/en
21	1400	22	0200	All	Iowa QSO Party	CW Ph Dig	RS(T), county or SPC	www.w0yl.com/IAQP
21	1500	21	2100	1.8-28	QRP Afield	CW Ph Dig	RS(T), SPC, mbr or power	www.newenglandqrp.org
21	1600	22	0359	3.5-28	New Jersey QSO Party	CW Ph Dig	RS(T), county or SPC	www.k2td-bcrc.org/njqp
21	1600	22	2200	All	New Hampshire QSO Party	CW Ph Dig	RS(T), county or SPC	www.w1wqm.org/nhqso
21	1600	22	2359	1.8-144	Washington State Salmon Run	CW Ph Dig	RS(T), county or SPC	www.wwdxc.org/salmonrun
21	1800	21	1959	1.8-50	Feld Hell Sprint	Dig	RST, mbr, SPC, grid	sites.google.com/site/feldhellclub
22	1300	25	0700	1.8-144	Classic Exchange, Phone	Ph	Name, RS, SPC, rcvr/xmtr model	www.classicexchange.org
23	1900	23	2300	144	144 MHz Fall Sprint	CW Ph Dig	4-char grid square	svhfs.org
25	0000	25	0200	1.8-28	SKCC Sprint	CW	RST, SPC, name, mbr or power	www.skccgroup.com
25	2000	25	2100	3.5	UKEICC 80-Meter Contest	CW	4-char grid square	www.ukeicc.com
26	1900	26	2030	3.5	RSGB 80-Meter Autumn Series, Data	Dig	Other station's call, your call, serial, name	www.rsgbcc.org/hf
28	0000	29	2359	3.5-28	CQ Worldwide DX Contest, RTTY	Dig	RST, CQ zone, SP (if US/VE)	www.cqwwrtty.com
28	1200	29	1200	1.8-28	Maine QSO Party	CW Ph	RS(T), county or SPC	ws1sm.com/MEQP.html
30	1300	1	0400	1.8-28	QCX Challenge	CW	RST, name, SPC, rig	qrp-labs.com/party.html

All dates refer to UTC and may be different from calendar dates in North America. Contests are not conducted on the 60-, 30-, 17-, or 12 meter bands. Mbr = Membership number. Serial = Sequential number of the contact. SPC = State, Province, DXCC Entity. XE = Mexican state. Listings in blue indicate contests sponsored by ARRL or *NCJ*. The latest time to make a valid contest QSO is the minute listed in the "Finish Time" column. *Data for Contest Corral is maintained on the WA7BNM Contest Calendar at* **www.contestcalendar.com** *and is extracted for publication in QST 2 months prior to the month of the contest. ARRL gratefully acknowledges the support of Bruce Horn, WA7BNM, in providing this service.*

Foxhole Radios

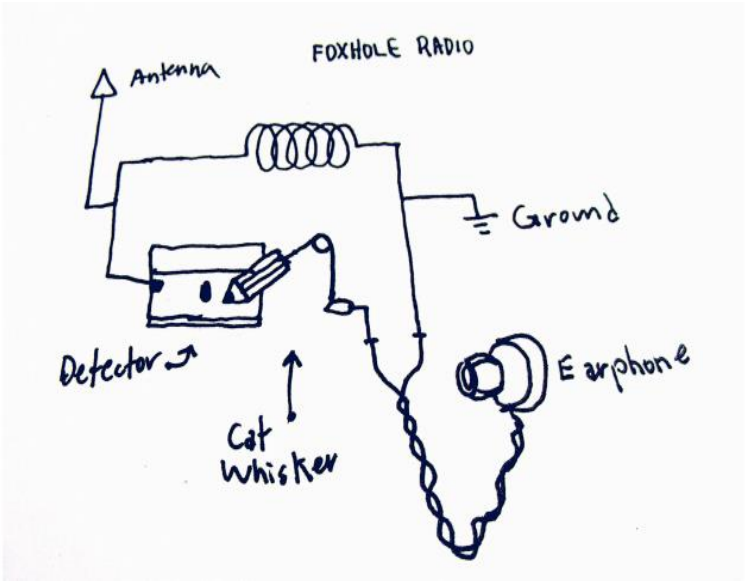
In World War II, electronically-inclined GIs would often build their own crystal radios from whatever materials they could scrounge up. These were called *foxhole radios*.

Wire for making antennas and coils wasn't too hard to come by, and super-sensitive headphones weren't hard to scrounge. But crystals for making the detector part of the circuit were another story. So, the GIs came up with a cleverly improvised solution: They used razor blades, pencil lead, and safety pins.

T

o build the detector for a foxhole radio, the razor blade must be made of blue steel. Most modern blades aren't, but you can fix that by placing the blade in a metal vice and blasting it with a propane torch until it glows red hot. Let it cool before you handle it!

Note that it also doesn't hurt if the razor blade is a bit rusty; the oxide in the rust actually helps. To build the detector, first glue the razor blade to a piece of wood. Sharpen the pencil, then cut it short (1/2" is long enough). Bend open the safety pin to about 90° and jam the pointed end of the pin into the lead at the end of the pencil that you cut off.



Then nail or screw the flat end of the safety pin to the board, positioned so that the tip of the pencil sits on the razor blade.

Connect one wire to the razor blade and the other to the safety pin and wire it into your circuit right where the germanium diode would go. Then, hook your radio up to the antenna and ground, put the earphone in your ear, and drag the pencil tip around to different parts of the razor blade until you hear a signal.

This type of detector is very finicky, so you might have to try different angles and positions, and you might have to try different razor blades or pencils. But once you get it to work, you'll be delighted that you were able to make a radio out of an old razor blade, a safety pin, and a pencil.

Making it work

– The first time I tried this, it didn't work. It was frustrating, but I just went through my materials, blued the razor blade and it worked. The second time I tried to get it to work, I couldn't get a station, I just got buzz. I played with everything and finally figured out that the ground connection wasn't very good. When I fixed that, I was able to hear sports talk radio! One of the interesting things is that it works better or worse depending on where you put the pencil lead on the razor blade. If it doesn't work the first time, don't give up!

What is FT 8 and why has it become so popular among HAMs?

By Alex Verdes KD2FTA – for EPARA

FT8 is an FSK digital mode being used today by thousands of HAMs around the globe. It has been wildly accepted everywhere throughout the HAM community due to the nature of FT8's ability to get through even the harshest of poor propagation conditions.

FT8 "Franke-Taylor design, 8-FSK modulation" was designed for propagation situations like multi hop E layer skip where most signals will be weak, band fading frequently happens, openings are short lived, and you need the fast completion of a reliable confirmable QSOs. FT8 runs on a program developed by Joe Taylor (K1JT) called WSJT-X (**W**eak **S**ignal **J**oe **T**aylor – E**x**perimental).

WSJT is useful for passing short messages via non-traditional radio communications methods, such as moonbounce and meteor scatter, and other low signal-to-noise ratio paths. It is also useful for extremely long-distance contacts using very low power transmissions. Since 2005, the software has been released as open source software under the GNU General Public License. This licensing change required substantial rewrites and took several months to complete.

Here are some of the technical specifications Joe Taylor (K1JT)* and Steve Franke (K9AN) designed into the FT8 protocol. Joe wrote the WSJT-X Software which runs FT8 on your computer:

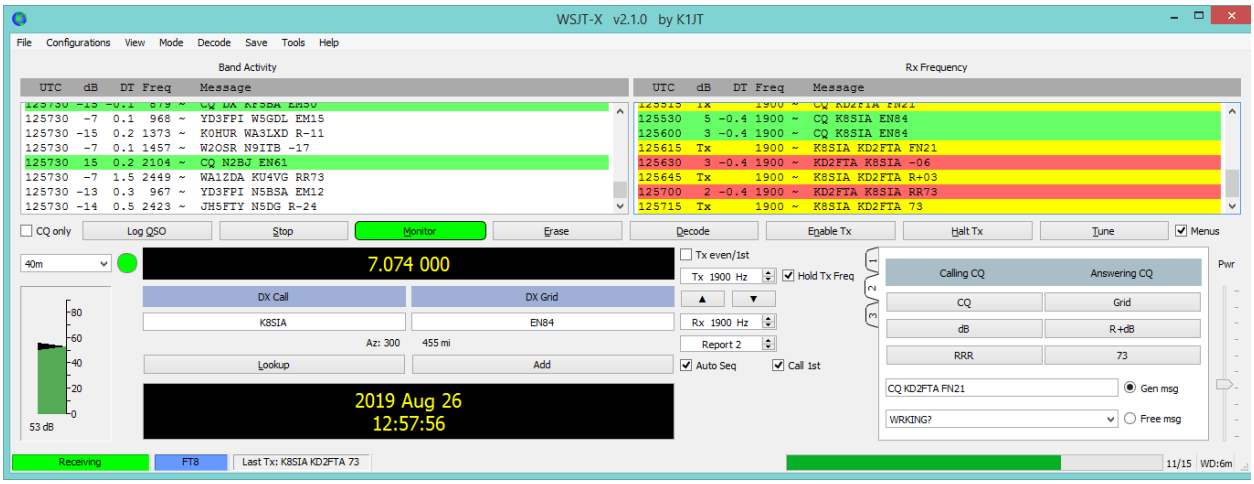
– Transmit /Receive sequence length: 15 secs
– Message length: 75 bits + 12-bit CRC
– FEC code: LDPC(174,87)
– Modulation: 8-FSK, keying rate = tone spacing = 5.86 Hz
– Waveform: Continuous phase, constant envelope
– Occupied bandwidth: 47 Hz
– Synchronization: three 7×7 Costas arrays (start, middle, end of Tx)
*– Transmission duration: 79*2048/12000 = 13.48 s*
– Decoding threshold: -20 dB (perhaps -24 dB with AP decoding, TBD)
– Operational behavior: similar to HF usage of JT9, JT65
– Multi-decoder: finds and decodes all FT8 signals in pass band
– Auto-sequencing after manual start of QSO

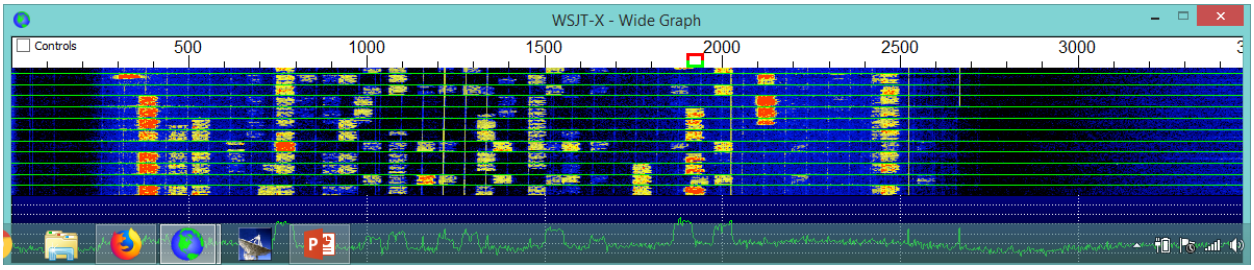
*From Wikipedia: "Joe Taylor is well known in the field of amateur radio weak signal communication and has been assigned the call sign K1JT by the Federal Communications Commission (FCC)". Joe developed JT65!

Ok so why has FT8 been so widely accepted by HAMs!?! Because with ridiculously low power <25 watts, you can make worldwide contacts on just about all the bands available to a General licensed HAM. The software does about 70-80 % of the work for you, but gives you sufficient flexibility to move through contacts quickly. I typically run between 10 to 30 watts and can make several DX contacts!

When noise levels on the band are high (>S9) FT8 still punches through, and many QSOs can, and do often occur not only on the same frequency but within a few hundred cycles of each other! Perhaps the biggest reason there has been wide acceptance of FT8 is that low power reliable and accurate information is passed, unlike other digital modes like PSK31. All messages are passed at 15 second intervals with the software controlling your transceiver. Unlike PSK31 where two HAMs can carry on a short QSO in a digital setting, FT8 can be quite impersonal. Once you make a contact, you exchange signal reports, and say 73. Perhaps that's the one thing voice, CW, and slower digital modes can't replace, and that's the ability to take the time to learn a little about the person you're having that QSO with.

WSJT Software Screen Shot below:





The reason I use FT8 is because with the minimum sun spot cycle we're in, I can still make contacts with stations in Australia, Europe, and South America. Still working on Asia however, and that could be due to my antenna orientation. With solar min still in effect, I expect FT8 and its newest brother FT4 will continue to be popular modes to operate DX contacts for more years to come.

I hope this short article perked your interest in digital HF modes like FT8, and I wish to thank Ron, N3GGT for turning me on to this mode. I'll be listening and scanning for your call signs and hope to catch you on the FT8 waterfall.

73!

KD2FTA

Newcomers and Elmers Net: Antenna Myths and Misunderstandings Robert Gulley AK3Q

One of the things I have tried to do along the way in this hobby is to keep myself grounded (no pun intended!) in reality when it comes to antennas. I read a lot, and I do mean *a lot* of sources for antenna ideas and suggestions, particularly as they might have application to my situation. I do confess to occasionally reading about antennas I could only dream of having, but most often I stick with antennas I might realistically be able to use at my location. Along the way I have read some rather exaggerated claims concerning the capabilities of various antennas, and I have learned to approach anecdotal experiences with a bit of healthy skepticism.

Here are a few myths and misunderstandings which float around clubs, nets and message boards from time to time.

Myth #1: Small antennas can perform as well as or better than large antennas.
I learned a very hard lesson back in my photography days when 35mm cameras were all the rage. When buying my first serious camera I read all the reviews of various manufacturers concerning the quality of their lenses and of the 35mm films available. I bought into the lie which said even though the film size was significantly smaller than the 2-1/4 films of days gone by, the quality of the films and lenses were so good one really could not tell a difference between them. Wrong! I wasted a lot of time trying to make tack-sharp 8x10's and 11x14's from slides and negatives incapable of being enlarged that much without some fuzziness.

The same holds true for antennas. A full wavelength quad loop antenna or ½ wave dipole is going to out-perform a ¼ wave or smaller antenna virtually every time. There are always those rare exceptions, but generally speaking when it comes to antennas, bigger really is better. This is not to say smaller antennas do not have their place. Just as a 35mm camera can be used where a medium format camera might be too big, small antennas may be required due to space constraints or other limitations. Compromise size only when necessary for physical, financial, or other considerations.

Myth #2: Higher power means stronger signals and therefore greater reach
While it is true a properly matched antenna system will reach further with more power (watts), merely increasing the power will not help a system which is designed poorly. I had an old Kenwood 3530A radio which outputs about 25 watts. On good days I could talk on simplex frequencies (meaning radio to radio without a repeater) with my friend Mike, and we hear each other pretty well. We both use 220 J-poles, and the height above ground for both antennas is about 25 feet. Another friend (Ben) who lived quite close to Mike joined in sometimes, and they could hear each other easily. Unfortunately, I could barely hear Ben on the best of days and he could rarely hear me. What to do?

Well, being the kind of guy who looks for any excuse to get a better radio, I was tempted to buy something new. A better solution is replacing the lossy coax with more efficient coax. This not only allowed more of my signal to be transmitted, but I have improved
reception as well. Based on my calculations of feedline loss, the new coax is about 6-8dB better, far out performing the increase of 25 to 50 watts on the transmitter. Always strive to make the antenna system the best it can be and *then* try increasing the power to extend the signal (I added a 50 watt radio later after the coax was better). This will ensure the increased power makes it into the ether as opposed to being dissipated as heat along the feedline. Remember, you have to hear 'em before you can work 'em! This is why some old-timers recommend for every dollar spent on a radio, spend two dollars on the antenna system. While this ratio may seem a bit high given the price of today's radios, at least the principle behind it is sound. A good antenna *system* is an absolute must. This brings up a related myth . . .

Myth #3: Coax is coax—the feedline really isn't all that important
Not all coax is created equal, particularly when working above HF frequencies. I have discussed ladder-line and coaxial properties in the past, so I won't repeat them here. Just remember the feedline is a vital part of any antenna system. When transmitting above HF frequencies, use RG-213 or better; anything less loses too much power. While there is a significant difference in the price per foot between RG-58 and RG-213 or LMR-400, the higher performance more than makes up for the difference in cost. The best radio in the world cannot overcome a lossy feedline. Don't skimp on the coax!

Myth #4: Vertical antennas radiate poorly in every direction

Vertical antennas take a lot of criticism partly, I believe, because they are more unpredictable than dipoles. There are several reasons for this. First, they are more susceptible to ground noise than other types of antennas. This means the signal noise level (or clutter) will often be higher, making weak signals harder to hear and moderate signals less intelligible.

A second unpredictable aspect of verticals is the ground response. Verticals are generally designed as a ¼ wave antenna which use a system of radials to duplicate the effects of a standard dipole. The number of radials needed for an effective ground often raises passionate debates among hams, and the truth is, no one answer works for every situation. Earlier I mentioned half the fun of playing with radios and antennas is experimentation. Well, vertical antennas offer a wide range of opportunity for playing the "what if" game. Try different combinations of radial lengths, construction material, and base height combinations to see what happens.

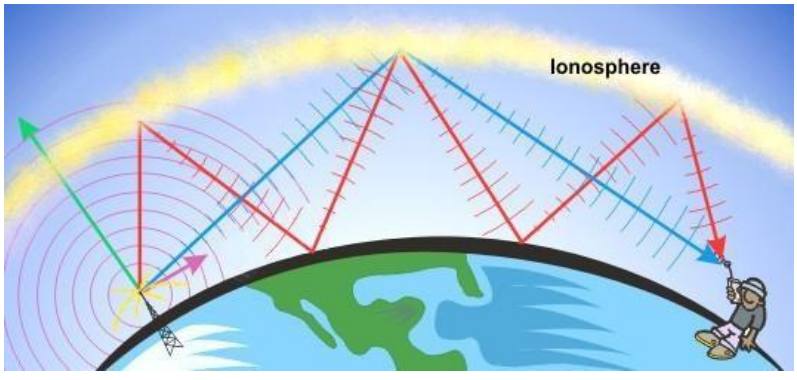
This brings up an important point. For the true hobbyist antennas are always a work in progress. Of course, not everyone wants to play with antennas or change their setups on a regular basis. I sometimes hear folks say things like "I've been using this same antenna for 15 years or more." While there is nothing wrong with using the same antenna for many years, even the best of antennas require "tune-ups" and replacement parts, just like an automobile or an old washer and dryer. Problems can slip in and degrade performance over time, so yearly checks would not be unwarranted.

One other thought as to why multi-band verticals get criticized is because people often expect more performance out of them than they can reasonable give. (Of course,
advertiser's hype has nothing to do with this . . . no, not at all!) Some multi-band verticals are rated to go from 70cm all the way to 80-meters. Can these antennas actually work across such a wide range of frequencies? Technically yes they can, but with some severe limitations. The most common limitation is having a narrow bandwidth on the 80-meter band, but some antennas have less than desirable bandwidth on 40-meters as well.

Limitations are a part of every antenna system, so it is important to know those limitations and to decide which features are most important for a given station. Splitting the workload between two or more antennas whenever possible will usually produce better results than a "one size fits all" approach.

On the positive side, vertical antennas have at least two very important "pluses" over wire antennas. First, they work well in small places. There are some situations in which nothing else will do, and a good quality vertical will reach all over the world while taking up very little real estate. If placed in more rural areas the increase of ground noise mentioned above will be significantly less, and signal reception will be very good.

A second plus, and one which is often overlooked, is the relatively low takeoff angle of a properly grounded vertical. Since HF radio waves naturally bounce off the ionosphere, lower takeoff angles mean the signal will travel farther before being refracted back to earth (see illustration below). The greater (or higher) the takeoff angle, the more quickly the signal is bent back to earth. (This holds true up to a point—for those interested, a curious anomaly to this behavior is known as the *Pedersen Wave*, where high angle signals travel along the ionosphere for a time and then get refracted to earth). A low takeoff angle will improve DX reception and transmission, and under some conditions



verticals can out-perform horizontal dipoles.

Blue line represents a *Low Takeoff Angle* and Red line represents a *High Takeoff Angle* Less skips will usually produce a better distant signal

Myth #5: A resonant antenna will always put out the best signal
Resonance refers to the relationship between the radio and the transmission line and/or between the antenna and the transmission line. A system is said to be resonant when input impedance matches output impedance. Modern receivers are designed to output full power when the transmitter circuitry senses a near resonant condition, typically around 50 ohms. Resonance merely allows a transmitter to do its job at full strength. Good SWR readings alone do not indicate an efficient antenna. By way of illustration, when 100 watts is sent into a dummy load (a device which can safely receive a transmitter's output without causing damage to the radio) an SWR meter will show a perfect reading of 1:1, even though the signal goes nowhere. Low feedline loss is a far better indicator of antenna efficiency than a low SWR reading, as was pointed out in Myth #3. The best scenario is to have a resonant system with a low-loss feedline and a usable SWR.

Misunderstandings: Sometimes A Little Knowledge Can Be A Dangerous Thing! Call me weird, but I like being reminded from time to time of my limitations both in knowledge and in experience. As much as I like teaching others, I love to learn new things even more, so I am always on the lookout for people with helpful knowledge and experience in whatever area I take interest. Amateur Radio in particular is filled with people who are not only willing, but happy to share their experiences and I continue to learn from a lot of great people.

Unfortunately, there are always those people in any hobby who have just enough knowledge to make them dangerous. They are usually the naysayers in life, more concerned about telling people what they can't do rather than what they can. These people often use sweeping generalizations to make their point, and their experiences are almost always anecdotal. After a while people like this are easy to spot, but for beginners receiving bad advice can rob them of some great learning experiences. I will share a few examples of things I have heard along the way which proved to be misguided or just plain wrong.

Misguided Advice #1: Tuners are of the Devil
Okay, I have never really heard someone actually say tuners are from the devil, but I think the thought may be lurking behind some people's hatred of them. Beginners are often told they need to build antennas which do not require a tuner if they are truly serious about getting on the air. For some the use of tuners is equated with either laziness or ineptitude, or both. Using a tuner is somehow cheating, something no self-respecting ham would do. These are also the people who talk about how tough it was in the old days as they walked to school uphill (both ways!) in the snow, with no shoes, and ate nothing but dirt everyday (and liked it!). Well, maybe I am exaggerating just a bit all in good fun, but the fact remains some people are dead-set against tuners for any reason.

Tuners function as a matching network, adjusting the antenna's input impedance to match the transmitter's output impedance. When the SWR is greater than 2:1 most modern rigs will sense this and cut back power or shut down altogether. Unless multiple antennas are used which have been cut to specific frequencies, a tuner is most likely going to be required to work multiple bands on one antenna.

Tuners can be used as a crutch to be sure, but they can also teach beginners some valuable lessons about real-world operating conditions as they make their first contacts. During our current minimal sunspot activity, the best all-around band to be on night or day is the 40-meter band. This band offers the best compromise of activity and distance throughout a good portion of the year, but it is also a band which displays a wide range of SWR movement from one end to the other. A tuner makes the whole band easier to use, especially if both CW and Phone are of interest. The same holds true for the 80-meter and 160-meter bands, only on these bands wide coverage requires a tuner.

On the receive end, tuners will not greatly enhance signal reception except under some conditions where interference from adjacent stations may be an issue. The problem is while the signal may sound louder when run through a tuner, so will the ambient noise unless conditions are particularly "quiet," free from the usual effects of

ground noise.

Misguided Advice #2: Multi-band Wire Antennas Are All But Useless
This is a variant of the multi-band vertical myth listed above, but it is one I almost bought into when I first started out. I spent much more time trying to figure out what I was going to do for an antenna given my small yard than I did which radio to buy. One group of people argued against antennas like the G5RV, while another argued against the multi- band verticals. Others insisted single-band antennas were the only way to go. The fact is either type of multi-band antenna could work, as could a number of mono-band options. Each style of antenna presents its own set of limitations, and each its own strengths. The most important thing is to get something in the air and start having some fun. This is a hobby after all, not the lunar landing!

Misguided Advice #3: All Antenna Rules Must Be Followed Perfectly
While no one really says these exact words, one could easily draw this conclusion as a beginner just entering the hobby. Rarely does someone say "Go ahead and give it a try; see what happens!" There are often many reasons given why something won't work, and one is left with the impression getting a signal out is a rigorous process. It doesn't have to be, or I would have never made my first contacts. I am not going to suggest to anyone they use the fence around their yard as their first antenna, but if someone came to me and said "What would happen if . . . ," I hope my response would be "let's try it!"

Misguided Advice #4: The Only Worthwhile Antenna Is the One You Build Yourself Often this advice comes from a sincere desire for a beginner to enjoy the thrill of making contacts on something they built with their own hands. I will admit this can bring a real sense of accomplishment. Unfortunately, sometimes this advice reveals a bit of snobbery toward anything not "homebrewed" as somehow less pure or less worthy of respect.

Given sufficient interest in the hobby I believe almost everyone will try their hand at making an antenna at some point just for the experience. One does not have to build an antenna to be a "real" Ham, however. Building antennas is just one aspect of the hobby like any other, no better no worse.
Commercial antennas offer the real advantage of having the bulk of the "trial and error" part already done. If assembled properly sometimes very little adjustment will be
required to tweak the antenna for best results. Conversely, without some real guidance homebrew antennas can lead to a lot of frustration when things don't go as planned!

Cost, complexity and experience will be the deciding factors when choosing between commercial and homemade antennas. Both have their place, and most people enjoy a combination of the two as I do. With more experience comes the desire to build more complex antennas, but I do not hesitate to buy a commercial product when so required. For me, it's all about the signal!

Some Closing Words Of Advice
One of the hardest things to accept as a newcomer to the radio hobby is just how unpredictable it all is on a day-to-day basis. While science is at the heart of the hobby, no one can take into account all of the possible variations and challenges each new situation presents. Even though we try to eliminate as much of the guesswork as possible, we are in the end at the mercy of things beyond our control. Changing weather, solar conditions, natural and man-made interference all combine to make listening and talking to someone else a daily, sometimes hourly challenge. To me this is not a negative thing, but rather part of the hobby's appeal. Digging out a signal during difficult conditions makes success all the more enjoyable. Logging a shortwave station, I've not heard before or finding an open window to an unexpected part of the world is a thrill for me. Learning to expect the unexpected keeps the hobby fun!

There is an old saying, "chance favors the prepared mind," and nowhere is this truer than when working with radio signals. Never stop learning and always be willing to try something new. The next great radio adventure is awaiting just around the next corner!

ANTENNA ARCHIVES #13

BUILD A BASIC BEVERAGE ANTENNA

By **Steve Whitt**

A Beverage antenna is probably one of the simplest and cheapest antennas one can build but it does have one-draw back in that you need a lot of space or a very long thin garden. Ideally the wire-needs to be at least half a wavelength long and for MW that means> 100 metres (ideally you need 200-500 metres). It is undoubtedly the best antenna around for use (for reception only) at frequencies below approx. 5MHz, so a scaled down version will still work fine on the 60m and 90m tropical bands if you don't have enough space for MW.

It's nice to live in the countryside where there is more space but even in town the Beverage need not be ruled out if you apply your imagination. For example, if there is a long fence at the bottom of your garden that separates two rows of back-to-back houses and gardens you can run an unobtrusive wire along it. Obviously you have little say in which direction the aerial points but if you are lucky it may point somewhere interesting. Your neighbors need not know about the wire since it can be almost invisible!

Basically the Beverage is a travelling wave antenna made of a length of wire a small height (relative to the wavelength of interest) above earth. It can be terminated for unidirectional reception or left unterminated for bi-directional reception. The schematic of a terminated example is shown in Fig 1:

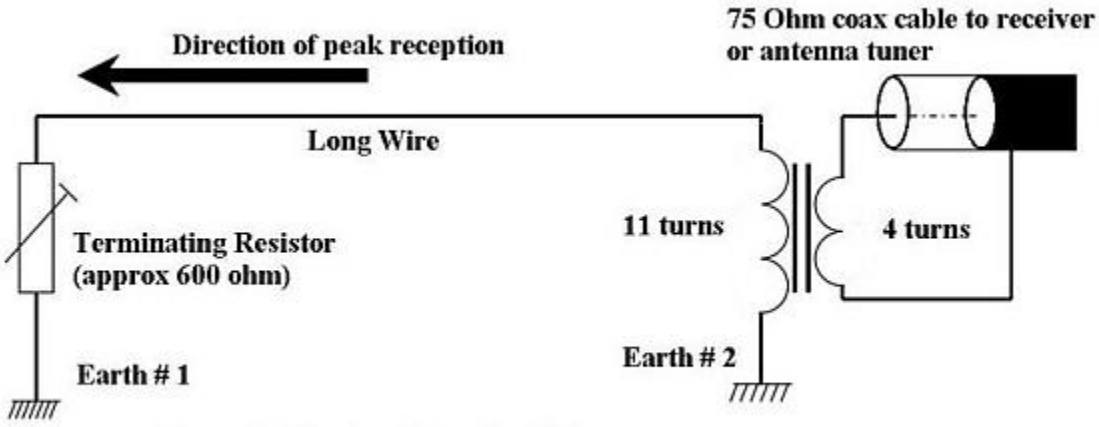


Figure 1: *A basic uni-directional Beverage antenna*

The components are all pretty basic, cheap, non-critical and easy to obtain as discussed below:

Wire and supports: Insulated 7 strand tinned copper wire (or similar) is fine and cheap with a 500metre roll of 7/0.2mm wire available from STC Electronic supplies for under ?12. Anything heavier is likely to sag, and lighter may break in the wind. The wire is best supported on bamboo gardening canes with a slit or split, made with a penknife or small hacksaw, in the top end to trap the wire. Canes can be between 1.5m and 2m long and one is needed every 8-10 metres along the wire. Take care to place the canes in a straight line as you insert them into the ground. Canes don't last forever as they can rot in the ground (it might be worthwhile dipping the canes in varnish to protect one end) but they cost between 10-20 pence and are quite flexible to the wind. Alternative supports can be plastic support stakes used by farmers for temporary electric fences or anything non-metal that comes to hand. Indeed no support

is needed at all if the wire can be unobtrusively slung along a hedgerow or run along a fence. Beverages will even work with an insulated wire just laid directly on the ground BOG - Beverage On the Ground

Terminating Resistor: This resistor can be a fixed value component of around 500-600 Ohms for simplicity. Or you can use a variable resistor which is carefully adjusted to an optimum value that minimizes unwanted reception of signals off the back of the aerial. In both cases the resistor must be kept dry in its outdoor environment which is not always an easy task. The task of optimizing the termination can be a bit time consuming and for a basic antenna needs two people linked by VHF radio or CB. One person adjusts the resistor whilst the other monitors the receiver. This activity needs to be done on stable ground wave signals since ionosphere fading makes the job nearly impossible. The best time of day is around solar noon but during short winter days late morning is good for westerly pointing aerials and early afternoon is good for easterly pointing antennas.

Earths: Good earths are essential at each end of the long wire and ideally the last bamboo stake, onto which the terminating resistor has been taped, has to be within a metre of the earth. This is to minimize the length of wire that is not part of the actual long wire. Earths can take many forms but I favor 22 mm diameter copper pipe in metre lengths pushed or hammered into wet soil (e.g. floor of a ditch or a stream). To join wires to a pipe like this is difficult. It is best to use very heavy duty copper wire (even thick braiding) clamped very tightly to the cleaned copper pipe using two Jubilee clips (i.e. metal hose clamps). Instead of Jubilee clips you can use purpose designed clamps for domestic mains electrical earths. This heavy duty wire forms the short link from earth to terminating resistor.

Transformer: This is not essential since it is quite possible to connect the long wire straight to your receiver, especially if it has a medium impedance input socket and the aerial wire makes a fairly straight run into the house to your radio. For the first few DX-peditions to Sheigra the antenna wire was connected directly to the receiver and often to several receivers in parallel. However, the transformer is useful if your radio has a low impedance input (often marked Low-Z, 75 ohm or 50 ohm) to avoid loss of signal strength, and it serves an additional purpose in that it helps discharge static build up on the long wire which could damage a sensitive receiver. Many designs for transformers have been published but my tried and tested low loss design uses a Siemens ferrite ring core (Type B6429QK618X830) obtained from Electrovalue (Phone 0784-433603 for catalogue and telephone credit card orders; Electrovalue stock number 2901448K @59pence) wound with the same type of multi-strand wire was used for my aerial. The primary should have 11 turns and, with a separate piece of wire, add four turns for the secondary or receiver side. These turns' ratios are suitable for a 75 Ohm receiver input impedance, but the primary can be increased to 14 turns if a 50 Ohm receiver input is in use.

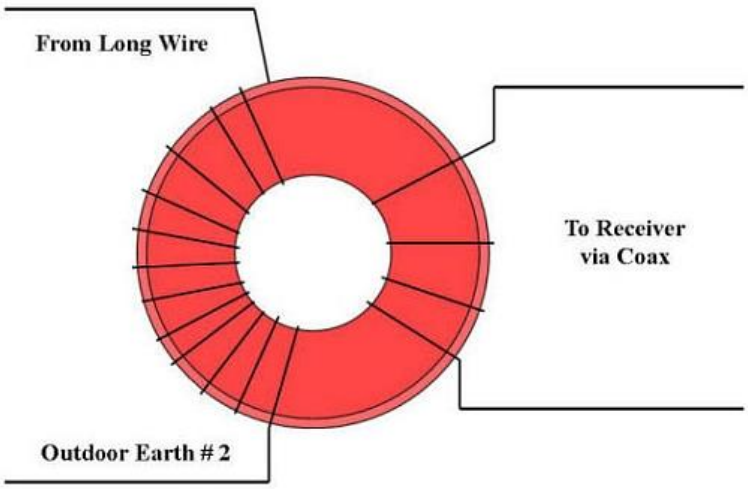


Fig 2: *Transformer Winding Detail (12:4 turns shown)*

The transformer allows the addition of a length of coaxial cable to the receiver which does not (should not!) form part of the receiving antenna. This allows the long wire to keep a straight line and avoids kinks or bends at the house end as you try to bring the wire into

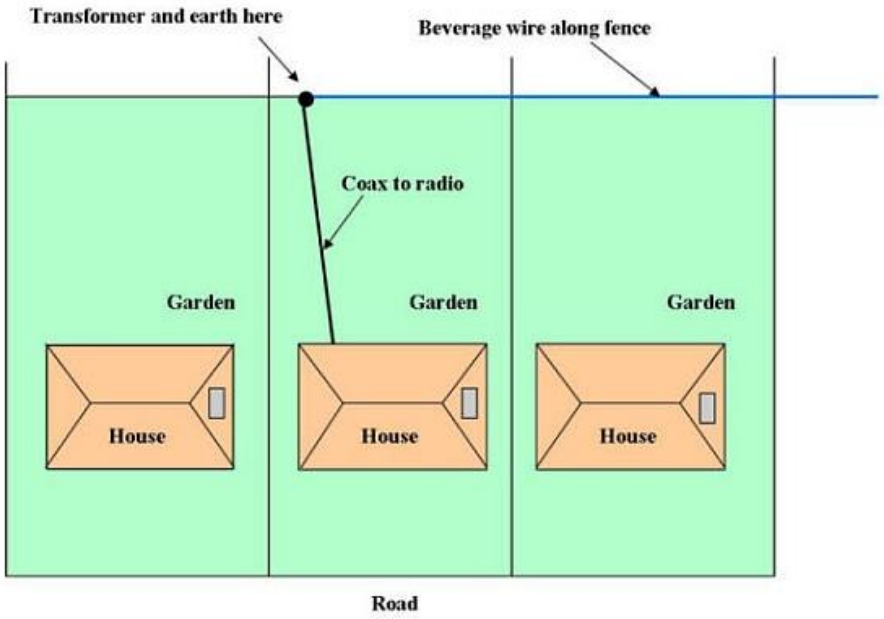


Figure 3: *Example of Urban Beverage Installation; Plan View*

the listening post. Ideally the coax run should be short (< 20m) to minimize extraneous pick up on it that could disturb the directional pattern of the main Beverage. In the earlier example of an urban Beverage, the use of a dog-leg to reach your listening post is undesirable, so if you build an antenna along a fence it is best to put a transformer at the end of the wire on the fence and then run coax cable hack to the house. (Fig 3)

Technical Tip 1:-How to measure earth resistance

Once you've erected your Beverage antenna there is one measurement that is worth doing on fairly regular basis. Since the antenna is outdoors and exposed to the elements it could suffer damage to the wire (e.g. a break due to fatigue damage) or damage to the termination resistor and its connections (e.g. corrosion) or damage to the earth (e.g. corrosion and high earth resistance). A simple continuity test using a pocket multi meter will quickly give a GO/NO-GO indication of antenna health and save you having to walk the line for a visual inspection. Apply your multimeter, set to measure resistance or continuity, to the receive end of the long wire as shown in Fig 4. If you cannot detect continuity, or resistance indicates an open circuit, you have a problem that needs investigation. Actually measuring the DC resistance of the antenna this way is usually difficult and you most likely will find that you can get two different readings according to tile polarity of the connections to your meter (just swap the two meter leads to see this effect). This is caused by corrosion of the earth stakes in the ground acting like a low power voltaic cell or battery. However you can exploit this phenomenon to more accurately measure your earth resistance. Still applying the meter in the same way, switch it to read voltage on a 0-2V scale; this is measuring the potential of the "battery". Record this figure and let’s refer to it as "V". Now switch your meter to read current on a 0-2mA scale and record this short-circuit current figure "I".

Now Ohm's law tells us that the ratio of V/I gives us the total resistance of the antenna system "R". However "R" is the sum of the terminating resistor, the two earth resistance and the resistance of the wire itself. The latter is generally negligible unless the wire has

been seriously damaged but not yet broken. Since we know the terminating resistance, subtracting this figure from "R" leaves us with the total earth resistance; the lower this is the better. Regular measurement of the earth resistance will indicate if a problem develops with the antenna.

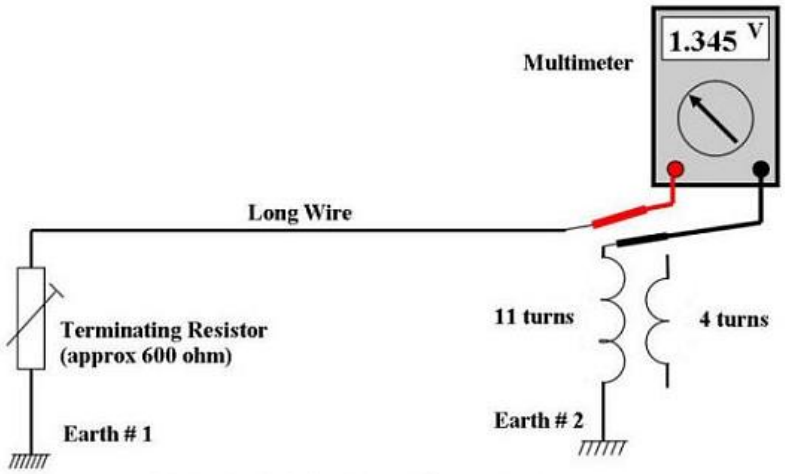


Figure 4: *Earth Resistance Measurement*

As a practical example let's look at the figures from my Beverage; I recorded "V" as 0.56V and "I" as 0.85mA. Thus V/1 =659 Ohms and since I knew that my terminating resistor was exactly 500 Ohms and the wire resistance was about 30 Ohms this gives a total resistance of 129 Ohms for two earths (ie about 65 Ohms per earth), which is not a bad figure for my simple arrangement of copper pipes.
Another reason for knowing the earth resistance is that it allows you to monitor seasonal change as the ground dries out in summer. Since the termination resistor is usually adjusted to minimize reception from the "back" or unwanted direction of the antenna, a significant change in earth resistance could influence its behavior and could make readjustment of the termination resistor necessary.

Technical TIp 2: - How to avoid signal pick up on coax lead-in.

The length of the coax cable from the transformer to the receiver should be kept short to avoid it acting as an antenna in its own right. Sometimes there is no choice but to use a considerable length of coax and even good coax cable will pick up signals primarily on the outside of the screen. This can still be a problem since these signals may degrade the directional pattern of the main Beverage.
The way to eliminate pickup on the coax is to effectively break its length up with "braid breakers" that will attenuate any signal currents on the outside of the screen of coax but leave the desired signals inside the coax unaffected. There are two practical ways of building a braid breaker. One uses a ferrite tube designed specially designed for this purpose. This tube is slid over the coax cable and one placed every 5 metres or so and then taped in place. If you do locate such a source of tubes take care with them as they are both rare and fragile! Alternatively the coax cable can be wound several times through large a high-permeability ferrite ring of the sort recommended for interference suppression. Examples include Amidon or Micro metals toroids with a -26 or -40 suffix (eg T68-40).
There are several more sophisticated versions of Beverages but the basic version is so simple and cheap to build and tolerant of design variations that I'd recommend one to anyone with the available space. Browse through any DXpedition report to see what is heard using Beverage antennas (and a good location of course).
There are many more articles like this one on the Medium Wave Circle Re-print CD, which is available from the Medium Wave Store.

Credits: http://www.mwcircle.org/mw_loop_beverage.htm

So you want to learn Morse Code

By David G. Finley, N1IRZ

Amateur license restructuring is here. You no longer need to pass a 13- or 20-word-per-minute (wpm) test to gain full operating privileges. Passing a 5-wpm test gets you everything. However, there are good reasons why you should do more than that. Having a level of Morse proficiency that is of real use on the air, meaning that you can copy at 12-13 wpm or more, will add immeasurably to your enjoyment of Amateur Radio.

Such rewarding HF activities as DXing, contesting and QRP operating still rely heavily on CW. Thousands of hams enjoy CW for its own appeal as a relaxing mode different from most other means of communication. And even on VHF and higher frequencies, you'll find that exciting activities such as Moon bounce and weak-signal work still require Morse skills for full participation.

The pressure to reduce the code-speed requirements came from the widespread perception that getting to 13 or 20 wpm is a nearly insurmountable barrier. **That perception is wrong.** For little more investment of time than it takes to pass the 5-wpm test, you can gain real, higher-speed code proficiency that will enhance your enjoyment of the hobby.

Most of what you've been told about learning Morse Code is wrong — dead wrong. Amateur radio operators traditionally have used the slowest, most frustrating, most painful and least effective techniques possible for gaining code proficiency.

You can gain real code proficiency. You can do it in a reasonable amount of time and with a minimum of frustration and pain. In order to do so, you must approach code training from a different perspective and use different techniques from those common among amateurs for the past half century.

It will require work (just as it does to get to 5 wpm). You will have to commit yourself to at least one 15-30 minute training session every day until you reach your goal. You may succeed in a month or in several months; individuals differ greatly. Without this commitment, however, you may as well not bother.

So what's new here? By using a code training method devised by the German psychologist Ludwig Koch some 60 years ago, you will progress as quickly as you possibly can, with ample reinforcement and little frustration. By understanding this method and how it builds your code proficiency, you will know why you have to spend time practicing and you'll be able to make a reasonable prediction of how long the total effort will require.

We're going to start on your road to success by throwing some time-honored ham-radio traditions onto the trash heap where they belong. These are:

- **Slow (5 wpm) code** — It ought to be illegal to teach anyone code at 5 wpm. Every minute spent toying with 5 wpm code is irrevocably wasted. In addition, as we'll see later, starting with slow code is a virtually-guaranteed path to frustration and quitting. Morse at 5 wpm and Morse at 15 or 20 wpm are completely different critters, and you don't want to waste time on the wrong one.
- **Charts, mnemonics, musical cues and other "memory aids"** — These things make you think about what you're doing while trying to copy code. That is deadly to proficient copying.
- **Code tapes** — In very short order, and unconsciously, you'll memorize the tape. This will lull you into false confidence in your ability. That false confidence will be quickly shattered when you hear transmitted text that you haven't memorized.
- **Copying QSOs off the air** — You don't know the speed of code you find on the bands, and much code on the air is pretty badly sent. All this makes it useless for training purposes. Formal code-practice sessions, such as those on W1AW, are OK, however.

Now that you know what you're **not** going to do, let's start examining just how you can best gain code proficiency.

The Mechanics: Just what is code training, anyhow?

Go to the shack of a veteran CW operator, or visit the CW station at a club Field Day operation. Watch people copy and send code at 30 to 35 wpm. You'll notice they're pretty relaxed about it; they're not sweating each character as it comes out of the speaker and they're not racking their brains to "figure out" what's being sent. Code has become second nature to them.

That's the key to code proficiency. Copying code must be a thought-free process. When you hear a character, you should know, without thinking, what it is. It should be a **reflex**. In fact, copying above about 10 wpm can only be done by reflex. Above that speed, thought processes are too slow to succeed.

That's why slow code is a deadly trap, and why traditional amateur methods of code training are so painful and frustrating. Most hams are told to memorize all the characters, then start building their speed. When you do it this way, you build a "lookup table" in your brain, comparing each character you hear with those in the lookup table until you find a match. This process shuts down from overload at about 10 wpm. That's why people experience a "plateau" at 10 wpm, and don't see any progress for weeks or months.

Those who finally get over that "hump" and progress beyond 10 wpm do so because, through constant practice, they have begun to copy code by reflex instead of by thought. They are the lucky ones; this 10 wpm barrier is where many folks give up out of frustration.

Code training, then, should completely bypass the lookup-table phase and begin by building copying proficiency as a reflex. This was recognized in the 1930s by the German psychologist Ludwig Koch, who devised the most efficient method known for Morse training. It's his method, and how you can use it, that we're going to examine in detail.

Morse Training by the Koch Method

Koch's method is a simple, direct way of building reflexes. However, it requires either a computer and Morse software or a personal trainer. That's why it was overlooked for so many years. Now that computers are commonplace, it should become the standard Morse training method. Here's how it works:

You start out by setting up your computer (or a microprocessor-based code tutor machine) to send you Morse characters at 20 wpm and at an overall sending speed of at least 15 wpm. You then get out your paper and pencil and have the machine start sending — but only two characters. That's right, for your first sessions, you'll only have two choices. Copy on paper for five minutes, then stop the machine and compare what you copied with what the machine sent. Count characters and calculate your percentage of correct copy.

If your score is 90 percent or better — congratulations! You just learned your first two characters, and, importantly, you learned them at full speed. You'll never have to learn them over again. If you didn't make 90 percent, practice some more. As soon as you can copy the first two characters with 90 percent accuracy, add a third character to your practice. Your accuracy will drop as you work on assimilating the new character, but it will rise again to 90 percent or better. Then you add the fourth character, and so on.

This method does not allow you to build that lookup table in your brain. To copy at full speed, you **must** build the reflexes in order to achieve 90 percent accuracy. And that's what you're spending your time doing — building reflexes. Think of it as a parallel to perfecting a tennis swing or mastering a gymnastic routine; you're practicing until you get it right. The Koch method of building code proficiency character-by-character is similar to standard methods of teaching touch typing, another skill that must be reflexive.

This is a very individual method of training — you progress at your own best speed, and spend only the time required to gain each new character. This means that you will waste no time in reaching your goal.

How much time is required? That will depend on the individual. Koch himself, with hand-picked students, got a group to master 12 wpm code in a mere 13.5 hours. You probably won't match that, but that's much faster than any other method in the psychological literature. You can get an idea of how long it's going to take after you've mastered a few characters. Keep track of your training sessions (some software will do this for you) and calculate your hours-per-

character rate (or characters-per-hour if you're really fast!). That, multiplied by the 43 characters in the amateur Morse test, will give a rough idea of how long it's going to take.

While the Koch method is the fastest method of Morse training, speed alone is not its principal advantage. Its principal advantage, and a major difference from other methods, is that it provides you with constant positive reinforcement. This begins with your realization, after mastering the first two characters, that you **can** copy code at 15 or 20 wpm, because you just did it. After that, each new character mastered is further proof of your progress. Contrast that to slowly trying to build speed up from 4 or 5 wpm, then hitting the plateau at 10 wpm and seeing no progress for a long time. With the Koch method, frustration is at a minimum.

Constant testing is necessary to ensure that you maximize the effectiveness of the Koch method. You must copy on paper, so you can grade yourself. Remember, if you score 90 percent accuracy or better, add another character. If you score any less than that, try again. By constantly testing yourself on continuous copying of at least five minutes, you know exactly how you're doing and exactly when you should add another character. This results in the fastest progress possible.

Naturally, with the Koch method, you'll be copying random groups of characters, rather than words, until you've mastered the entire character set. If your software allows, make these groups of random length, rather than a constant stream of five-character groups. This will ease the transition from random groups to actual words. Yes, there is a difference in the rhythm and "feel" of words and random groups. Once you've become accustomed to copying words, you should start copying sample QSOs, which are the format of the amateur tests. Pay special attention to call signs, locations, and numerals; these are the types of things that can form questions on the test.

As you proceed toward your goal, remember that some days are just going to be better than others and some characters will take longer to assimilate than others. You know, however, that you can reach your goal because you've already mastered some characters and proven that copying at full speed is something you can do. Keep in mind that what you're doing is building reflexes, and that takes time. The amount of time you require has nothing to do with your intelligence; it's just how long it takes for characters to "sink in" and become part of your reflexes.

So there it is — your path to real, useful Morse Code proficiency. After you've used this method, and start enjoying the wonderful world of HF radio, try a few CW QSOs. With Morse code developed as a reflex, you may just find that you really enjoy using it on the air. After all, you've gained proficiency without the frustrating ordeal that most hams have endured for decades. See you on the HF bands!

Questions? They're probably answered in ***Morse Code: Breaking the Barrier,*** the author's complete book on code training and CW operating, published by MFJ Enterprises, Inc. It's available now for $19.95 plus shipping. Call (800) 647-1800 and ask for stock number MFJ-3400.

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A Personal Note

These ideas may sound very bold and unconventional, but I know they work, because they worked for me.

I fell in love with radio in grade school, but was kept off the air for 30 years because I found traditional code training just too frustrating. During those decades, I tried several times to learn Morse, but every time gave up in frustration and disgust — my progress was just too slow.

In 1991, I became one of the first 500 people to enter ham radio by way of the no-code Technician license. After becoming bored with repeaters and HTs, I decided to make one last attempt to master the code. Fortunately, I stumbled on information about Koch's method, and found that it was the only thing that would work for me. In 1993, after diligent work at my computer, I took my first code test and passed the 20 wpm exam on the first try.

I became very curious about why Koch's method had worked for me when all else had failed. That sent me to libraries to read the now-aging psychological literature about Morse training. I soon realized that the Koch method achieves its speed through directness; if you want to copy reflexively at 15 or 20 wpm, then just start building those reflexes from the start. I also realized that it provides much more positive feedback than any other method, so you can keep your motivation and a "can-do" attitude throughout your training.

This was knowledge I wanted to share with others, so I began giving lectures to amateur groups on the topic. I quickly found that, after my lectures, "old-timers" would come up and tell me that my ideas on the need for reflexes were absolutely right. Many said that the Koch method sounded similar to the intense code training they had received in military schools.

Probably the only reason Koch's method didn't become standard back in 1936 when he first published it was that the average individual had no way of implementing it. The personal computer has changed that, and the time has come for the Koch method to replace all others. I hope that the speed and positive-reinforcement aspects of the Koch method can cut down the code barrier to a much less formidable size.

Prior to the FCC's restructuring of amateur licensing, the percentage of U.S. hams who had passed at least a 13-wpm code test had long since become a minority and was dropping steadily. This "code barrier" was causing an unhealthy stagnation in the amateur ranks. Many readers of *Morse Code: Breaking the Barrier* wrote to tell me how the Koch Method had helped them overcome many years of frustration and upgrade their licenses. It was gratifying to hear of these success stories. Now, people can use the Koch Method, not because they have to pass a test, but because they want to increase their amateur-radio pleasure.

I cannot overemphasize my dislike — even hatred — for 5 wpm code. As I've outlined above, it is highly counterproductive to gaining proficiency at higher speeds. In order to go from 5 to 13 wpm, you have to start over again, even though you may not realize that while you're doing it. The worst aspect is that many people pass a 5-wpm test, then never go beyond that. Why waste your time learning a skill (slow code) that has no relevance to real (13+ wpm) code proficiency and is of almost no use on the air?

Finally, as I was using the Koch method and building my code skills, I intended to forget the code as soon as I passed the test. My 30 years of frustration had built up a bitterness about CW. However, about two weeks after getting my first HF rig on the air, I looked at my straight key and decided to try a CW QSO "just so I can say I did it." Guess what? I enjoyed it. My second CW QSO was with a DX station, and I was hooked. With the encouragement of a CW Elmer, I continued to enjoy the bottom parts of the bands, and now my microphone isn't even plugged into the rig!

If the Koch method could overcome three decades of bitterness and turn me into an enthusiastic CW operator, I think it's certainly worth a try on your part. Have a go at it. Maybe I'll find you on the CW bands and we can have a rag chew.

Best of luck, and 73.

Dave Finley, N1IRZ

https://aa9pw.com/morsecode/so-you-want-to-learn-morse-code/

Station Ground

Damage-prone installations almost always include one or more of the following mistakes:

Cable wiring that mixes or combines various independent systems at sensitive equipment without a common entrance panel

Cables and wiring that routes above ground, especially several feet above ground

An entrance or equipment ground that is not bonded to the mains ground

An equipment ground without an entrance panel, or that is not bonded to the entrance panel

Rumor has station equipment or desk grounds improving reception and transmission, and reducing TVI or RFI. Some even think filters divert harmonics to ground, where the ground absorbs unwanted signals. Like many things heard, there is an element of true results behind scientific folklore.

In early radio installations, single-wire feeders were common. Even after WWII, when coaxial cable became common, very few systems used baluns. As a result, early installations frequently had very high levels of RF on station wiring and equipment cabinets.

Early equipment did not have a safety ground. USA house wiring was absent the round ground pin, having only a hot and neutral in 110 circuits, and a neutral and two hot leads in 220 applications. Many pieces of gear, since there wasn't a safety ground connection on plugs and cord, depended on a ground rod for safety. Manuals admonished users to "always attach an earth ground" to a ground terminal on equipment.

Eventually line voltage increased, as did safety. Line voltage increased to a nominal 117/234 volt with an isolated safety ground (grounded only at the fuse box). Eventually, voltage became 120/240 with typical voltages reaching 125/250 during times of light load. We now have 120/240 in the USA, not 110 or 220 volts. Most equipment is now double insulated, or has a three wire cord with safety ground.

What a Station or Desk Ground Can and Cannot Do

Effects on Signal Reception or Transmission

Even modern RF systems might have installation or design defects. These defects can cause excessive RF current to flow on wires and cables entering the house. Currents like this are called ***common mode currents***, because the current flows without a close-by countering current. For example, a perfectly functioning transmission line has exactly equal and opposite direction currents one each close spaced conductor. This cancels distant radiation, and confines current to the inside of the transmission line. If an antenna or tower system has common-mode current problems, caused by a faulty design or installation, a ground can help reduce common mode noise reaching the antenna. This is really from an antenna flaw, and not from the "reflection of signals".

In a case with unwanted common mode currents, a station or equipment ground can also decrease TVI or RFI. The ground might do this by giving unwanted current someplace harmless to flow, keeping RF out of power lines, CATV lines, and telephone lines.

A station ground can also keep RF currents out of lossy media, by providing a low resistance path, if unwanted antenna currents are appearing on station equipment or cables.

Vertically polarized signals propagate along the earth with much less attenuation than horizontally polarized signals. A ground screen, counterpoise, or ground radial system below an antenna can reduce local noise sensitivity by reducing the antenna's response to local noise. This would apply only to a horizontally polarized

antenna, because earth losses allow increased levels of polarization tilt. Lossy ground can increase vertical polarization response of horizontally polarized antennas. Ground rods have no effect on this, any improvement requires something that actually covers the lossy earth under the horizontally polarized antenna.

A station ground might.....

Mask antenna installation or feed line problems

Allow use of single wire feeders brought into the station, like a long wire or Windom antenna

Improve lightning safety and reduce electrical shock hazard

A ***station*** ground will ***NOT***.....

Help reception or transmission, or RFI or TVI, in a properly working station with properly functioning transmission lines

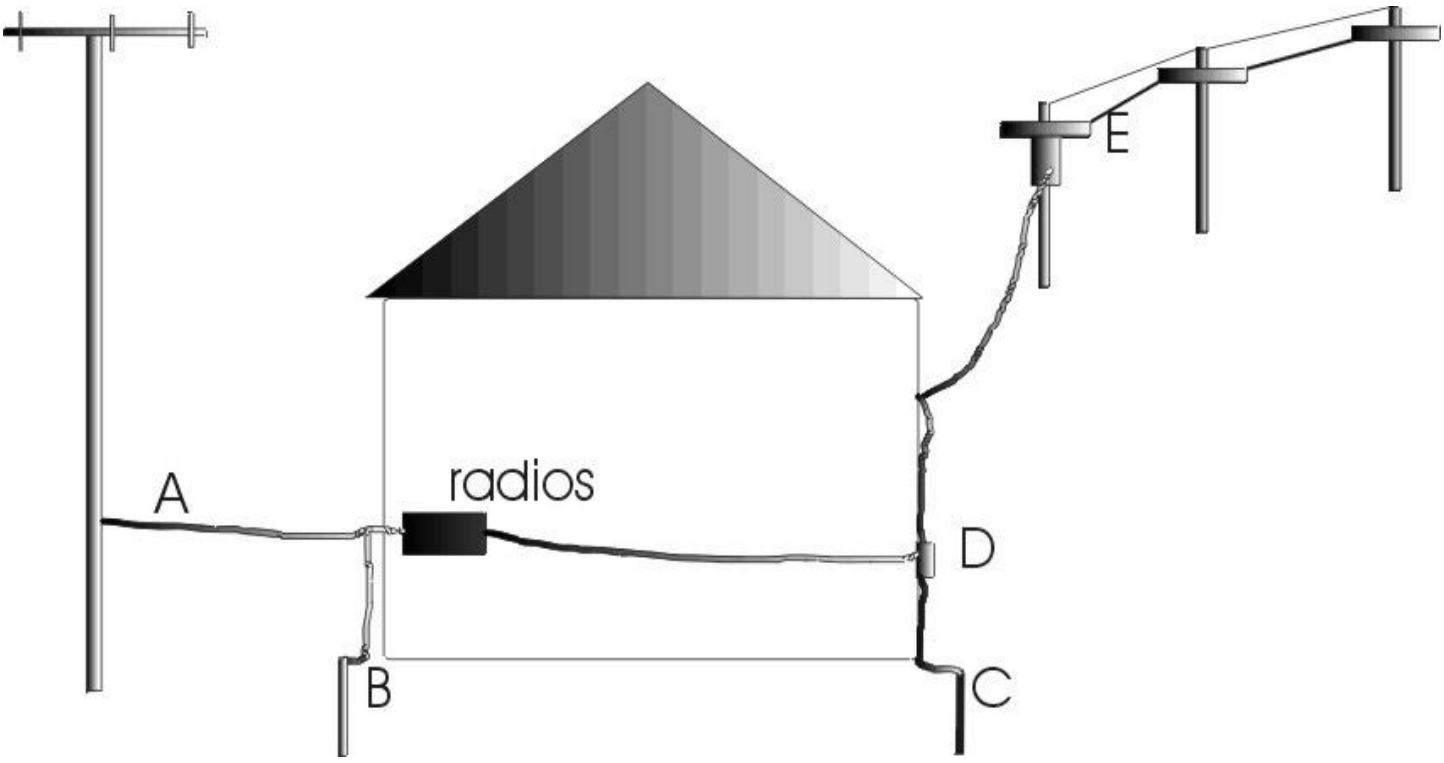
A ground will not reduce the chances of or number of lightning strikes

This is a typical amateur installation:

Unless we have a tower that is tall compared to surrounding structures, or unless we are fortunate enough to have underground utilities, lightning most often strikes utility lines. Even when heights of utility lines and towers are comparable, utility lines offer a much wider-area target, so they get hit much more often.

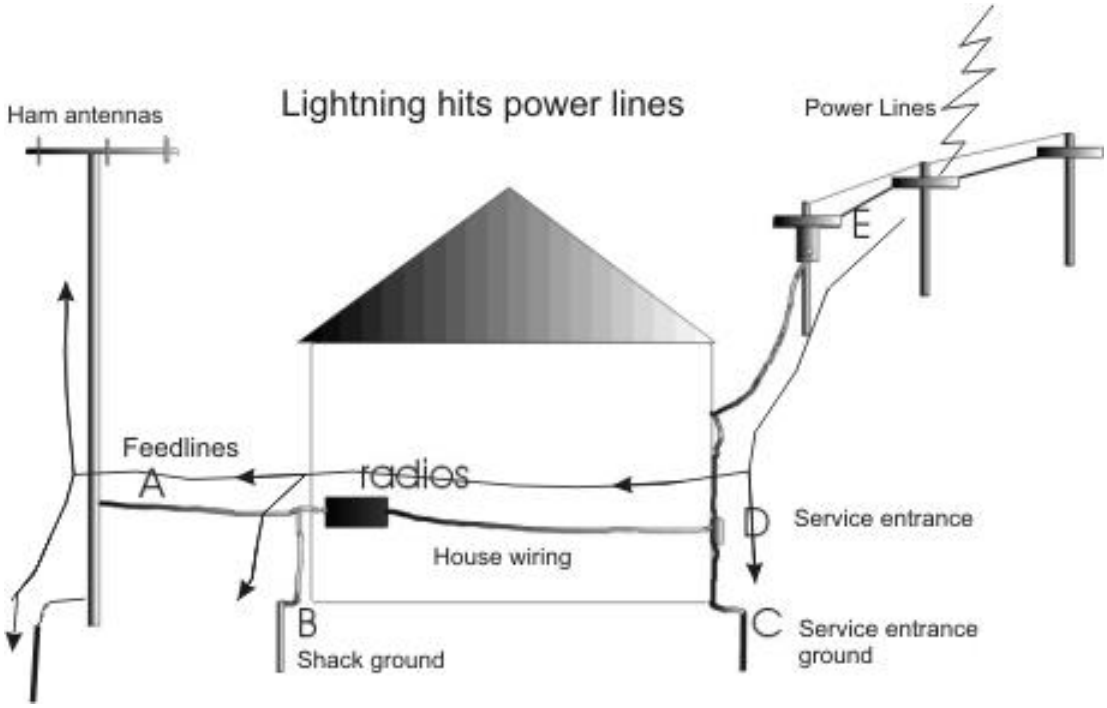
Many amateur radio installations have an independent radio-room ground rod installed just outside the radio room. Station ground rods that are not bonded to the power mains ground outside the house can, and often do, ***increase*** chances of equipment damage. We should never use an independent ground rod or rods just outside the station as a station safety ground.

In this poor but common layout:

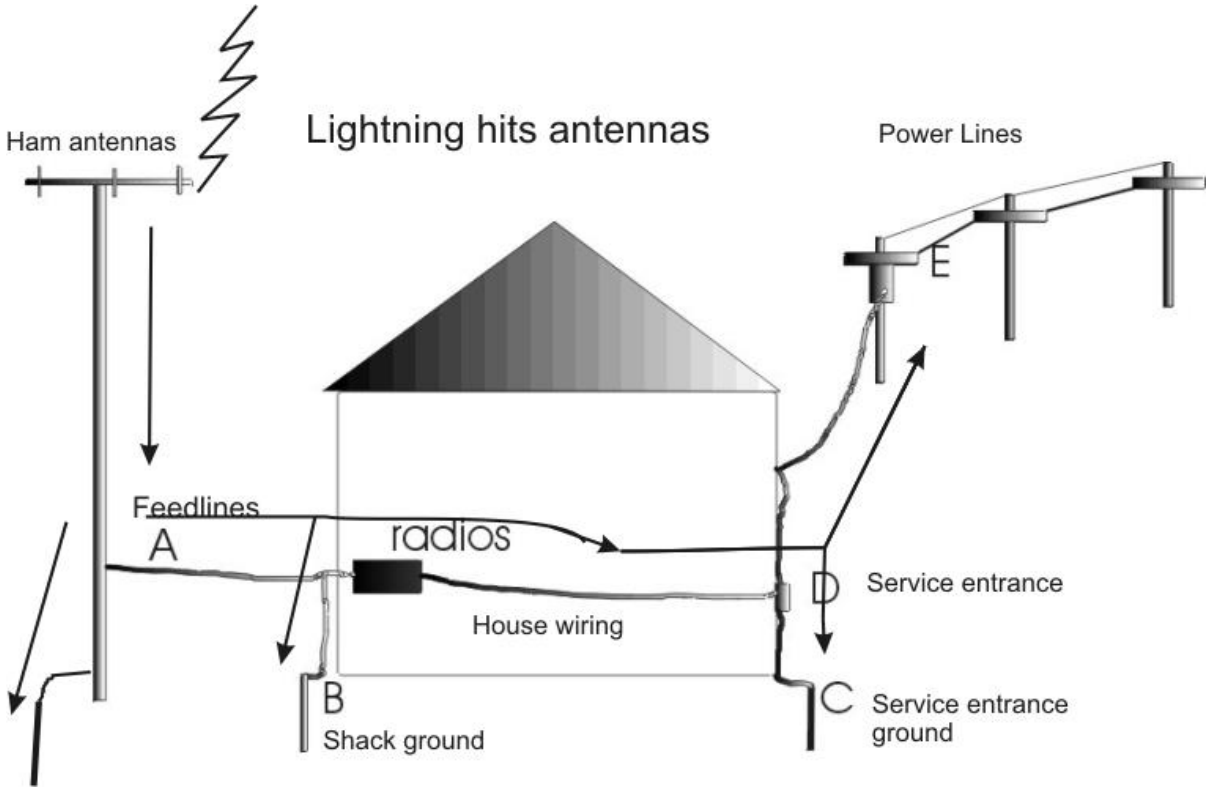


Lightning surges flow from E into the service drop and house entrance (D). A very small portion of surge is diverted into the fairly high resistance entrance ground rod (C). The station ground and "electrical mass" of the tower and amateur antennas look like a much better ground than a typical small ground rod at the service entrance. The largest portion of surge flows through house wiring to station equipment, and eventually out to the low impedance antenna system (A) and station ground (B).

With common lightning hits on power lines and power line surges, good grounds installed at A and B actually *increase* current flowing through house wiring and radio equipment when the power line gets struck, or if the power line has a ground fault!



One path for lightning, common with above ground utilities and modest antenna heights, is from power lines to the house and tower grounds. It can also loop from mains through telephone and cable equipment, or the cable and telephone can also share bringing lightning energy into the house.



Another path for lightning, common with taller towers or underground utilities, is from the tower through equipment to power mains, telephone, and/or CATV lines. Water and gas lines can be included in the path.

Some of us disconnect our antennas, and consider everything in the shack safe. If A is disconnected and B (the station ground rod) remains connected, the radio is still in the lightning path from D to B. Disconnecting the antenna doesn't do much, unless the tower or antenna takes a direct hit or has induced charges from a nearby strike. ***Disconnecting the antenna is better than nothing, but not by very much. The only way to eliminate more common lightning paths is to disconnect every path through equipment.*** Unplugging the radio equipment from the power line while disconnecting antennas helps, but there is still significant risk of lighting flowing though equipment on other paths from D or C to A, or from D or C to B unless all external connections are removed from station equipment.

The best solution is to bond point C to point B with a much lower impedance path than any other path. B and C should always be bonded together. This is even spelled out in the National Electrical Code. The National Electrical code says," **Common grounding is important** to ensure an electrically **continuous and uninterrupted path** to properly dissipate lightning's harmful electricity. **Failure to make all of the *required ground system interconnections* is a common trouble spot cited in lightning protection system inspections.**"

Also, the desk equipment should be properly connected in the ham shack. Proper radio room cable and power entrance RF grounding also works well for lightning protection! Power lines feeding shack equipment should be grounded to the same entrance point as the antennas. You can see pictures of how I do this at the end of this article.

Proper building and tower grounds, and proper wiring methods, provide virtually all equipment lightning protection. The building entrance ground ***must be tied to the power mains ground.*** Any additional work, such as improving grounds or adding lightning suppressors, will not mean anything if entrance and mains bonding is incorrect (or does not exist)!

Second floor grounds offer a unique (but similar) problem to installations in existing houses where the ham shack and all cables, power wiring, and grounds cannot be at one single entrance point.

Isolated Ground Leads and Grounds (Avoiding Ground Loops)

Never isolate RF cables on desk equipment with feed line isolators. Our equipment is designed to operate with the equipment tied together with low impedance cable shields. The last thing we ever want are multiple cabinets with differing RF potential on the operating desk. Feed line isolators at a minimum belong outside, at the cable entrance. Better yet, they belong at or near the antenna, or the antenna system needs corrected.

The only cables required to have ground isolation are audio cables that connect between equipment with different chassis potentials, even when the voltage potentials are relatively small. This is because shields are not several skin depths thick at audio frequencies. Unless a shield is many skin depths thick, common mode current, magnetic fields, or electric fields, will easily move to the cable inside.

While newer equipment is 12-volt operated, or has three-wire grounded plugs, older gear often has internal HV supplies and two wire plugs. This equipment must be grounded to a good earth path for safety, otherwise the case of the equipment could rise to more than the highest voltage. For example a blocking capacitor failure in an old radio, with some antenna configurations, could elevate the s chassis to full high voltage. A line bypass capacitor could fail resulting in 120 VAC on the chassis, or a power transformer could short from primary to a grounded secondary winding, adding the secondary voltage to the power line voltage and applying it to the chassis by pushing against the power line. Older equipment also often has power line voltage, sometimes un-fused, on external relay lines.

While more modern gear is generally safe, it is best to always bond all gear to a common heavy buss on the operating desk. This buss should be reliably bonded to a good earth path.

Any claim you should run isolated grounds to the earth from each piece of gear is not only false, it is also dangerous. Such a silly wiring scheme actually encourages ground loops, as well as decreasing electrical safety for the operator.

Some amateur gear is not grounded through a three wire plug. This equipment requires an external safety ground connection to the chassis. This means some stations actually require a station ground buss. This additional ground at the desk will never hurt, and it will never bring lightning in if properly done. It will only make things better, although it often is not necessary.

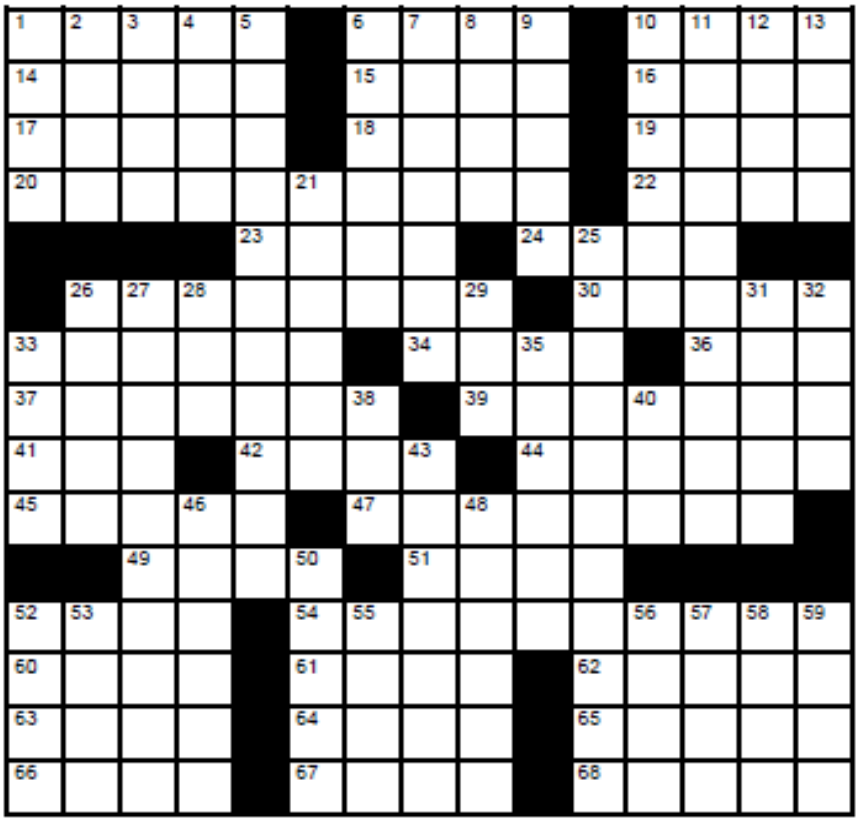
More modern stations sometimes do not require this ground because all of the gear has three wire plugs or is 12 volt operated. If a station buss is required, place it at the desk. Every piece of gear should connect directly to that buss as a common point. That common point should run to the station entrance panel on one large flashing, braid, or large conductor wire. The station entrance panel ground must ground all cable grounds as they enter, including power mains and telco grounds. Everything has to be at the same potential entering the room.

Do *NOT* run a separate wire from each piece of gear to the ground rod to avoid "ground loops". Do not use separate ground rods to avoid ground loops. Doing either *creates* undesired ground loops! This is true at your operating desk, at the entrance, or at the tower. Do NOT use isolators on coaxial lines at the operating position. That is not the place for them, it creates a harmful situation!

Credits: https://www.w8ji.com/station_ground.htm

by Chris Codella, W2PA 8/14/2008

Alphas and IOTAs



Across

1. Swiped
6. GM OM
10. Tuvalu IOTA
14. KH6 IOTA
15. If's partner (to a programmer)
16. Get one's ducks in ___
17. __nito
18. Stage part
19. Poor QTH, say
20. Foot covered?
22. Means justifiers
23. Amplifier knob
24. Softrocks, e.g.
26. Murphy, e.g.?
30. OA denizens, once
33. Mother ___
34. W4 Beach
36. Xmtr pwr plus all following dBs
37. 3B6 IOTA
39. 6Y IOTA
41. Where you might get a 5-down - or maybe five, 5-down's down
42. November honorees
44. Multiple Elvises?
45. F capital bisector
47. Carefully did 23-across, with the big knob probably.
49. CW
51. Hero
52. They're turned on by a positive base
54. Two cartons of ice cream?
60. Kind of IC
61. Word often found in IOTA names
62. Possible Northern UK prefix
63. IRE descendent, in 1963
64. Zig or zag
65. Where the HV goes
66. Western DL river
67. Blunders
68. Church assembly

Down

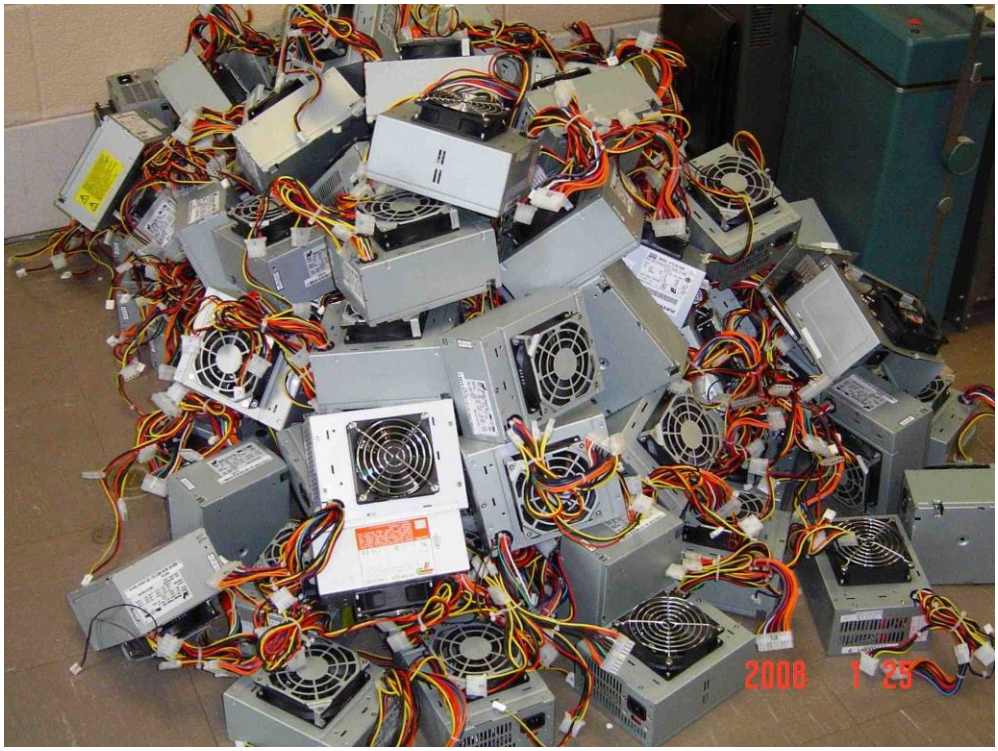
1. Narrow opening
2. Trig function
3. How many times a grid can be grossly overdriven
4. XW land
5. Brewski, to a ham?
6. Pacific
7. Zoomed in
8. LA city
9. The 18 and 21 MHz bands?
10. See 41-across
11. What a K2 can do
12. Harry Chapin's callsign?
13. Is in the red
21. Power problem
25. Result of key down amplifier, possibly
26. Smooth transition
27. Borders both VU and A4
28. RTTY char
29. G rule in VU
31. (The amp.) made an untoward noise
32. Hot Springs and others
33. Manipulates a key
35. Small pet
38. Opposite of amp.
40. Worked ___ Continents
43. Drinker
46. More meddlesome
48. Types of gears
50. North Cook IOTA prefix
52. Cloud burner sig.
53. "Guilty," e.g.
55. ___-friendly
56. Easter flower
57. Possibly needed to purchase an IC-7800
58. Not taken in by
59. The last one for DXCC #1, say

Answer Key – page 36

Tech Corner

Desktop Power Supply from a PC

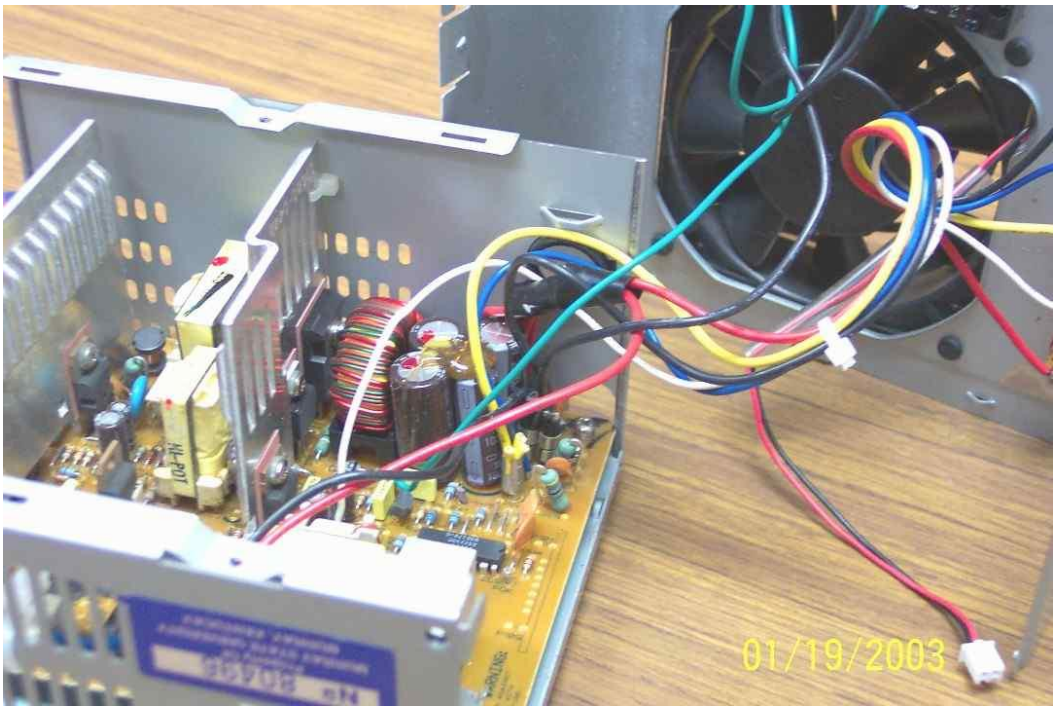
Credits: http://web2.murraystate.edu/andy.batts/ps/powersupply.htm



Do you have an interest in converting one of these..
into one of these!

A completed 145-watt ATX power supply with switch, binding posts, labels and feet. Notice the zip ties in the ventilation slots that hold the load resistor.

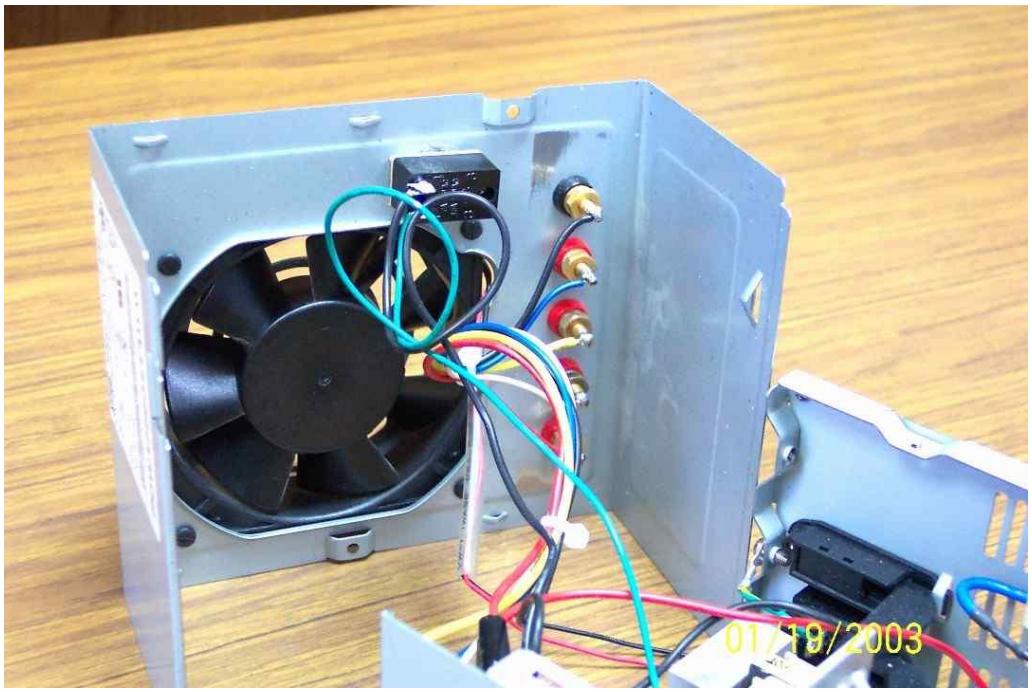
If you find building your own desktop power supply from a recycled PSU and a few parts from the local electronics store appealing, then grab some tools, pour yourself a cup of coffee (or personal preference) and let's get started. The LED (light emitting diode) was also salvaged from an old PC. If you want to add a power on indicator, LED's add a nice touch and can easily be wired into the +5v rail. I do strongly encourage you to read



the contents of this site and associated links before beginning your conversion -- there are a number of hints included in the associated pages.

This ATX PS board has leads for +5 (RED), -5 (WHITE), +12 (YELLOW), -12 (BLUE) volts, Ground (BLACK) and switch (GREEN). Be warned that some DELL power supplies manufactured between 1996 and 2000 do not follow the industry standard pinout and color codes. The fan has also been unplugged for better viewing. Since this PS was converted for use in the logic and robotics labs, the selected voltages were tapped. Other users may want combinations of +3.3 V (ORANGE), +5 V and/or +12 V if they are converting one of the newer supplies. For R/C applications, the 5-volt output can also serve as a desktop source to drive receivers and servos. If used as a power source for the micro and sub-micro servos, you must be careful not to drive the servo to either endpoint to avoid stripping the smaller gears in these units. Most standard servos have sufficiently robust gear trains and will simply stall if pushed to the mechanical stops.

Measured voltages on this particular PS (1996 P5-100 MHz Gateway) were about 5.15 and 11.75 volts. The remaining leads have been clipped off at the circuit board.

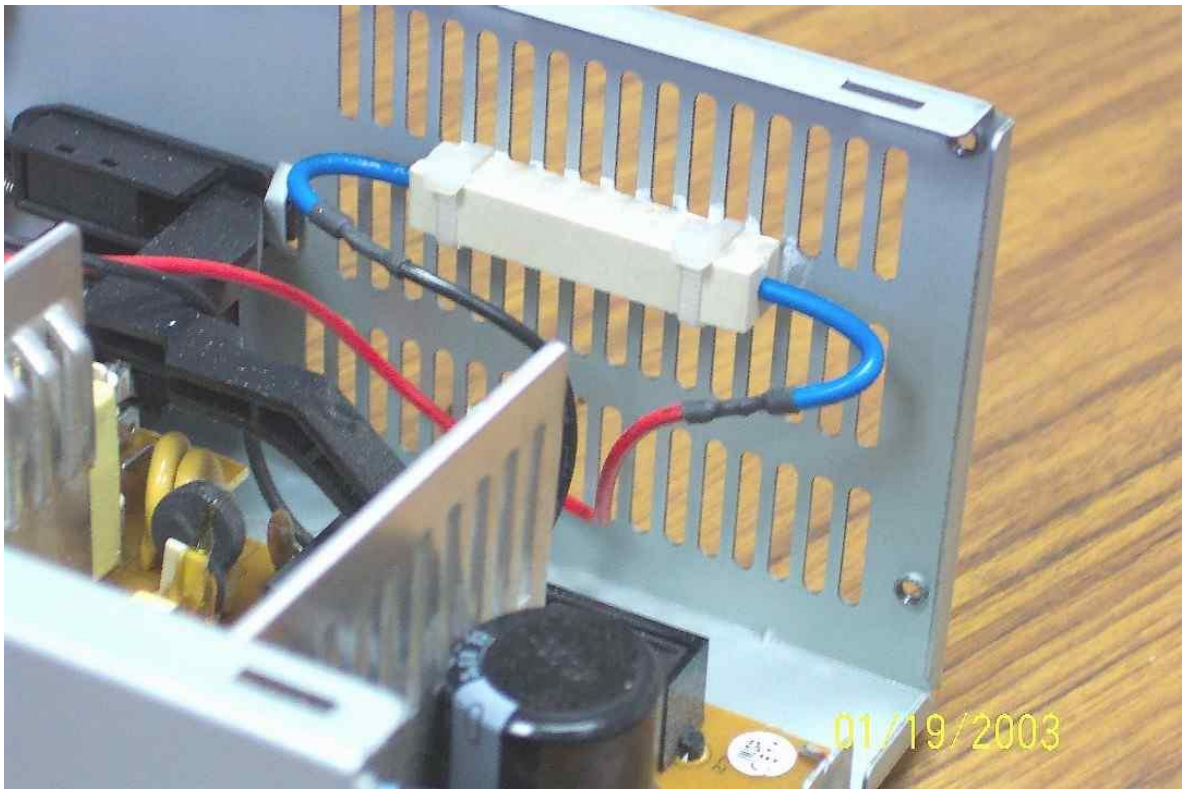


View of the case top with fan, binding posts and switch. The switch (SPST) and binding posts are available at Radio Shack or other electronics suppliers.

Power supplies in today's computers are known as SWITCHMODE or Switching Mode power supplies and require a load to continue to operate after being switched on (the term switching mode actually applies to the technique of A/C to D/C conversion and not to the power up action). This load is provided by a 10 watt, 10 ohm wire wound load resistor (sandbar - about $0.80 at Radio Shack) across the +5 volt supply. While many of the newer power supplies will latch on without a preload, you will find that adding the resistor will (1) increase the measured voltage on the 12 volt rail slightly and (2) help stabilize the voltage level in this rail by minimizing voltage drop when the power supply is loaded with a charger. Some inexpensive power supplies may fail if forced on without a load although the Design Guide states that the supplies should not be damaged if run without a sufficient load. The sandbar resistor has been zip tied to the case with a small amount of heat sink compound applied to the flattest side of the resistor. I will also take a file and remove any stamping flash that may remain

around the ventilation slots. Without cooling, the resistor will get very hot and may fail prematurely; with this arrangement, the resistor will remain barely warm to the touch.

Be warned that many of the heat sink greases can be quite toxic and any excess should be cleaned up and disposed of properly. Also be sure to thoroughly clean your hands and tools after use. While most heatsink compounds are rated to 160 to 170 C, some may dry out over time and their effectiveness will diminish -- a periodic check for good contact between the case and resistor is a recommended practice.



Additional comments

Disclaimer: The information presented should not be considered a "HOWTO" article, but merely a documentation of my conversion process. Modern PC Power Supplies can produce high output current levels that may cause internal overheating in the PS or damage to devices connected to them. Any individual attempting their own conversion is cautioned to carefully research their PS specifications and to be mindful of the associated voltages and power. DO NOT work on your opened power supply with it plugged in!!!!

The PS in the picture is a 145 watt ATX salvaged from a 1996 P5-100 MHz Gateway -- I salvage all usable parts from the older PC's before dumping them. This one is set up for a logic lab, hence the +5, -5, +12, -12 volt taps. We also use the +5 to drive servos in the robotics lab. This supply does not have a 3.3 V source, but the newer supplies do. INTEL has continued to modify the ATX specifications to include additional power connectors to support the increased power requirements of the newer motherboards. **Before** any modification is attempted, you should be sure of the type of power supply you are working with and the output currents being produced at each voltage level. Higher wattage supplies can generate fairly hefty levels of current and may overheat or damage devices attached to them. See the Table of Representative Current Levels for other power supplies.

Wiring coming off an industry standard circuit board will be:

ORANGE	+3.3 V
YELLOW	+12 V
BLUE	-12 V
RED	+5 V
WHITE	-5 V (May not be present on recently manufactured supplies)
BLACK	GND
GREEN	POWER-ON (Active high -- must be shorted to ground to force power up)
GRAY	POWER-OK What is this??
PURPLE	+5 V STANDBY
BROWN	+3.3 V REMOTE SENSING Design Guide Update

*** Note that the 1996-2000 Dell's did not completely follow this color coding -- check your voltage levels with a meter before wiring ***

The yellow, red and black wires will likely be grouped together with a clip. Some of the PS's will have a detachable plug for the fan and some will have the fan permanently attached to the circuit board. If the fan is attached, I usually clip the wires then re-solder and cover with heat shrink tubing -- this gives more working room while modifying the PS and allows me to lube the fan.

If you are going to use only the +12v and +5v, you may clip the other wires at the circuit board level or leave the unused wires about an inch long, gather common colors together, slip a piece of heat shrink tubing over the bundle and shrink -- it is an easy way to corral and insulate loose ends.

For the +5 / +12 volt PS, you will need the following combinations:

GREEN / BLACK	Power on Switch (Use a SPST switch; a momentary switch will not work)
RED / BLACK	Pre-Load Resistor (See text for recommended values and a possible substitution)
YELLOW / BLACK	+12 volt source
RED / BLACK	+5 volt source
ORANGE / BROWN	See the Design Guide Update

I use a single common post (GND -- black) for all voltage sources. Our loads are light and we don't require separate grounds for each.

Leave 3 black wires -- switch, load resistor and common (GND) binding post

Leave 2 red wires -- 5 volt binding post and load resistor

Leave 1 yellow wire -- 12 volt binding post

Leave the green wire -- power on switch

If sense wires are present, refer to the Design Guide Update

If you expect to place high current demands on your power supply, it may be prudent to run two wires to each binding post -- while it is very unlikely that the 18 AWG wire will overheat, there have been some instances of melted wires and connectors occurring on high demand motherboards.

Cut everything else off even with the board or bundle together as noted above. I usually cut the power harnesses so I can keep as much together as possible. The wires remaining in the power supply should be left long and cut to length as needed. If you leave them too long, they will get in the way when boxing it up, especially if the fan is internal rather than external. Be sure that they stay out of the way of the fan blades.

Wire in your power switch between the green (PS_ON) rail and any DC ground (black). The switch (single pole, single throw) and binding posts can be found at local electronics supply houses or online. If your power supply has a master switch, usually located near the AC plug, you may simply solder the green PS_ON directly to DC ground and use the master switch to power up. This works just as well and will save you the expense of a switch and time needed to install it.

Install the 10 ohm 10 watt pre-load resistor between DC ground and the +5V rail (red). Don't forget to heatsink this resistor.

Attach your other rails, DC ground, +12v, and +5v if used, to the appropriate binding posts. These posts **must not be grounded** to the power supply case, so be sure to check for any continuity between the case and post before trying to power up the supply.

If you want to add a power on indicator light, now's the time to do it. LEDs are quite inexpensive, have incredibly long lifetimes if run at 20 ma or less, produce essentially no heat and can be wired to the +5v rail. However, LEDs are current driven devices and will require a dropping resistor to ensure that it does not burn out immediately. A 1/4 watt carbon film resistor rated at 180 to 220 ohms wired between either of the leads and the PSU will work nicely. LEDs, being a diode, are also polarized and must be wired with the positive lead (anode) attached to +5v rail and the negative lead (cathode) attached to DC ground. LEDs have a flat molded into one side of the base --- this flat will be on the same side as the cathode. If your LED is new and has not had the leads shortened, the longest leg will be the positive lead or anode, but locating the flat is the safest means of determining polarity. Although commercial mounting clips are available, a 3/16" ID rubber grommet works out just as well. Drill your case to accept the grommet, pop it into place and push the LED in until the base bottoms out against the grommet. It will protrude about 1/8" for good visibility. I prefer diffuse lens to clear since they show up better when viewed from the side, but either lens style will add a little DIY pizzazz.

When reassembling the case, be sure to reattach the fan -- some supplies will not function without the fan attached - in any event, you need the cooling. This PS in the pictures has the fan mounted on rubber shock mounts and is extremely quiet. I will also disassemble the fan and lube the bearings while I have the PS open. Since these are salvaged, the fans have been in use for some time and normally the bearings are dry -- I use a high grade sewing machine oil from SINGER. Any light oil will work, just don't use WD40 –

As an aside, you can get 7 volts from the +5 V and +12 V outputs -- the +5 V is considered the negative (GND) and +12 the positive -- some geeks will use this combination to run their fans at a lower speed to reduce noise.

If you have any questions, comments or corrections, feel free to mail me.

I've followed all the instructions, but the output voltage on the +12 V side is still low -- what can I do?? Many of the R/C folks are converting power supplies for the purpose of driving field chargers and are finding that voltage levels below 12 volts are sometimes insufficient to power their chargers.

Read these **TIPS** for some options that may help increase this voltage level, provide a little theory, identify the connector pinouts found on most PC supplies and give a few troubleshooting hints.

Is there any way I can get more amperage out of my converted PSU?

Updated: March 13, 2009

Improvements in battery technology, brushless motors and more robust speed controllers have allowed "electrics" to expand into model sizes that were once the province of nitro and gas engines only. Obviously, as the motors became more powerful, the batteries required to drive these motors also increased in capacity, measured by the amperage they are able to supply to the flight system. To realize a reasonable charge time, modern battery chargers must be able to deliver more current to these batteries than ever before. In the electronics environment, as in all other closed systems, there ain't no free lunch. Consequently, the chargers also need a higher amperage power source than previously required. Converted PC power supplies may be stretched to the limit by these demands for more current. Is there anything that can be done to squeeze more amps from one of these PSU's?

There may be a possible fix to this problem, but your PSU must be one of the newer ATX12V models for you to be able to apply the modification. Visit **this page** to see if a solution is available for your conversion.

Resistor Substitute

A viable alternative to using a power resistor is to substitute an 1157 automotive signal lamp in its place. This is a dual filament lamp and its load, with both filaments powered, is usually sufficient to maintain latch on and to raise the voltage on the 12v rail to an appropriate level for most needs. Your options are to solder a 5v line (red) to both positive pins on the lamp and ground the base to DC ground or to pick up a twist-lock socket when you buy the lamp. The advantage of using a socket is the ease of replacement should the lamp fail. If you don't feel comfortable with your soldering skills, it is also a little easier to work with the wiring on the socket rather than the pins on the lamp. Just remember that the socket housing is the ground and the two wires in the base are to be attached to the 5v rail. More importantly, you must be very careful that neither the bulb base nor socket housing touch any of the internal components in the power supply. These lamps may be purchased at any automotive supply store and most Walmart’s.

I prefer the use of resistors since the final converted product is wholly self-contained and I have more control over the applied load, but the use of a lamp does simplify finding and installing components. It also makes a very obvious power on indicator!

I usually deal with on-line suppliers such as Jameco, Digikey, Mouser, etc. because we are buying in larger quantities and Radio Shack is too expensive for large numbers of items. However, you should be able to convert your PC supply for $5.00 or $6.00 dollars -- less if you have a junk box of parts. I suppose you could add an LED indicator with a 220 ohm dropping resistor to the 5v rail to show the PS is turned on, but the fan is a pretty good hint. We have had supplies running 24/7 for months without problems -- just electricity consumption.

The PS has some fairly hefty electrolytic capacitors and can still give a bit of a shock immediately after being unplugged -- let it sit a couple of minutes before poking around inside. Obviously, you can get whacked if you are inside the case with it still plugged in -- probably won't kill you, but you WILL turn it loose (never mind how I discovered this bit of information).

That Other Coax – Heliax

Using Andrew FSJ1-50A 1/4" Superflex Heliax with PL-259 Connectors

This project began as an effort to make new jumpers for an older Phelps Dodge duplexer. All six of the original jumpers were each 8-3/4" long (but don't take that as gospel, measure yours and use that measurement). Following are the details of how the PL-259 connector is installed on the Superflex. Each photo is a thumbnail and will enlarge to a full size photo. Click on the "Back" button of your browser to return here.

1

This photo shows a single 9" length of FSJ1-50A 1/4" Superflex Heliax with one connector installed. The following steps will install a matching connector on the other end.

2

Use Teflon silver plated PL-259 connectors for ease of soldering and because nickel plated connectors have been proven to cause problems at VHF and UHF. In this example, the jumper needed to be 8-3/4" long. I cut a piece of cable 9" long by simply cutting with a pair of lineman's pliers.

3

Prepare the end of the cable by measuring the distance from the end of the cable to the end of a UG-176/U which is normally used when installing a PL-259 on RG-59 sized cable.

4

I used a sharp Leatherman knife blade to score the jacket around and then a tapered cut all the way to the end so the jacket could be peeled off.

5

Be sure to put the outer shell of the PL-259 on the cable NOW to avoid forgetting it later.

6

Use pliers to mash the end of the cable back to round so you can push the UG-176/U over the end and against the jacket of the Superflex. With the UG-176/U in place, score the spiral groove of the superflex between the UG-176/U and the end of the cable with a sharp knife.

7

Use diagonal cutters to grab the end of the spiral and begin peeling it back around the dielectric until you reach the UG-176/U.

8

Cut the excess copper spiral off and flatten the end of the copper against the end of the UG-176/U. Cut the foam dielectric back from the end of the cable to within about 1/8" of the UG-176/U.

9

Using a hot soldering iron, solder the copper spiral to the end of the UG-176/U. Also place a few solder points around the end of the UG-176/U to provide an easy way to solder through the connector body to. Cool the UG-176/U with a damp sponge.

10

Screw the UG-176/U into the connector body and tighten with pliers. Solder the end of the UG-176/U to the connector body in one spot to prevent any possibility of it turning. Cut the 1/8" remaining center conductor off even with the end of the connector center pin.

11

Solder the center pin. Solder through two opposing holes in the connector body to insure a positive electrical connection between the UG-176/U and the connector body. Be careful in this step to get a good solder joint but not to overheat the connector. After each soldering operation, cool the connector against a damp sponge.

12

Screw the outer shell onto the connector body. Measure your jumper to insure you have the correct length.
You're done!

Back to the top of the page
Up one level
Back to Home

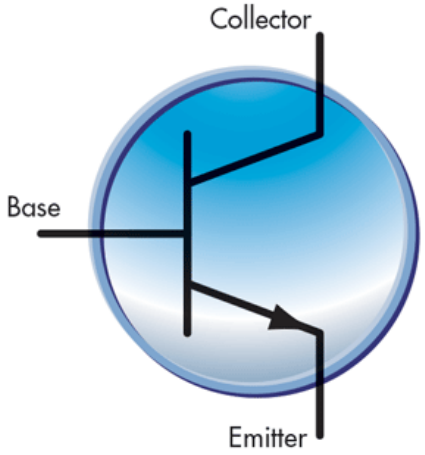
Mike WA6ILQ of Repeater-Builder edited some text, simplified the original HTML, and added a credit line to Tony.
Originally posted 01-Sept-2007.
Last revised 16-Dec-2018

Credits: http://w4zt.com

What's the Difference between PNP and NPN?

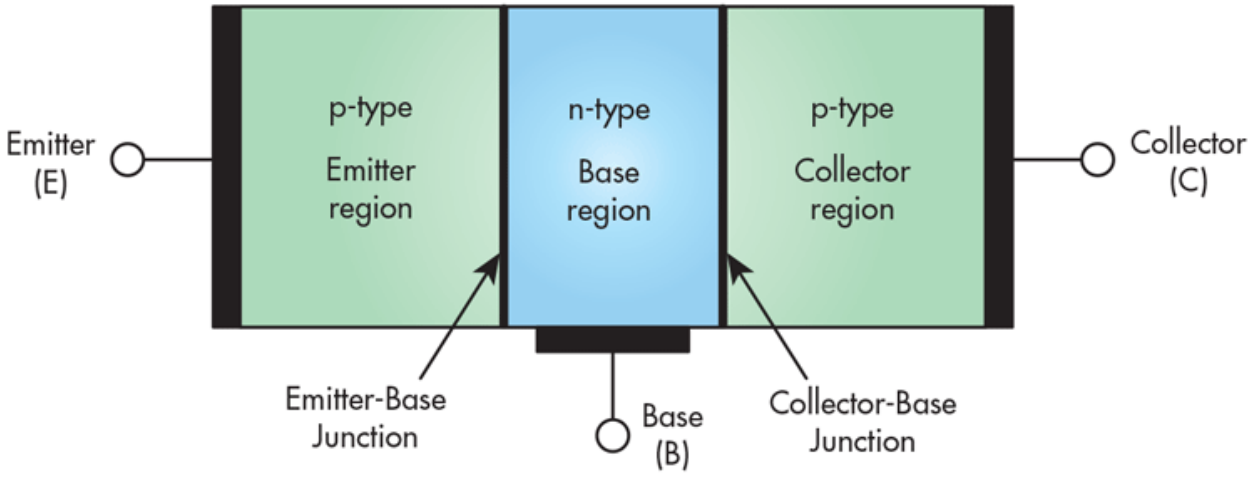
Millions of transistors are found in integrated circuits across every electronic device. Here, we focus specifically on bipolar junction transistors.

There are two main types of transistor: bipolar junction transistors (BJTs) and field effect transistors (FETs). BJTs are made of doped materials and can be configured as NPN and PNP. A transistor is an active device with three terminals, and these three terminals are known as the Emitter (E), the Base (B), and the Collector (C) (*Fig. 1*). The Base is responsible for controlling the transistor while the Collector is the positive lead, and Emitter is the negative lead.

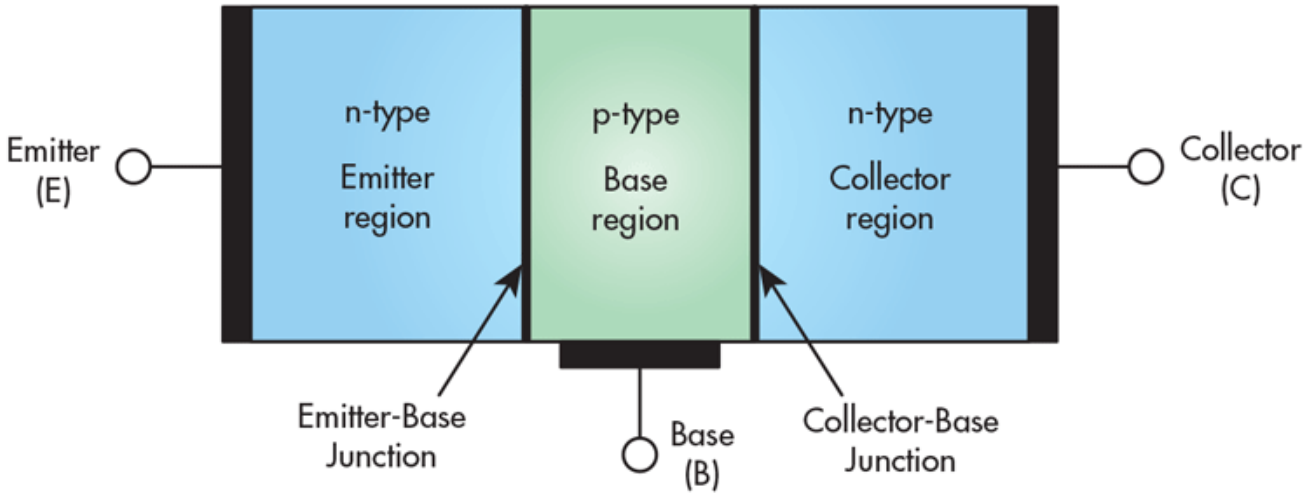


1. *The transistor symbol indicates the three terminals. (Courtesy of Quora)*

The semiconductor physics of BJTs will not be discussed here, but it is worth mentioning that a BJT is fabricated with three separately doped regions with two junctions. The PNP transistor has one N region between two P regions (*Fig. 2*) while the NPN transistor has one P region between two N regions (*Fig. 3*). The junctions between N and P regions are similar to the junctions in diodes and they can be forward-biased or reverse-biased as well. BJTs can operate in different modes depending on the junction bias:



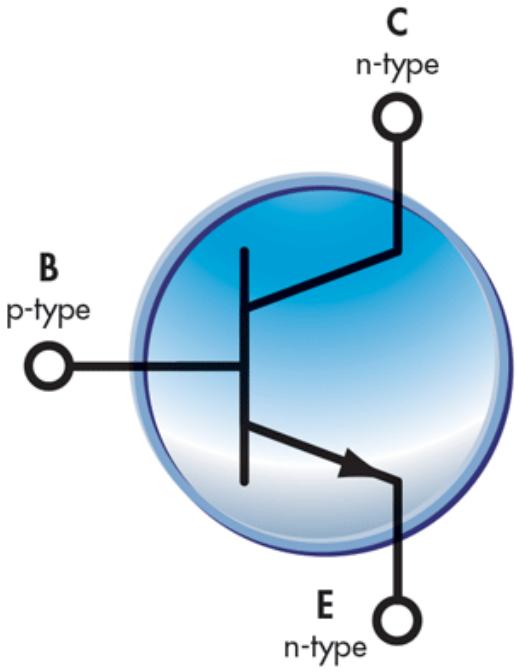
2. A PNP transistor has a layer of N-doped semiconductor between two layers of P-doped material (Courtesy of Wikibooks)



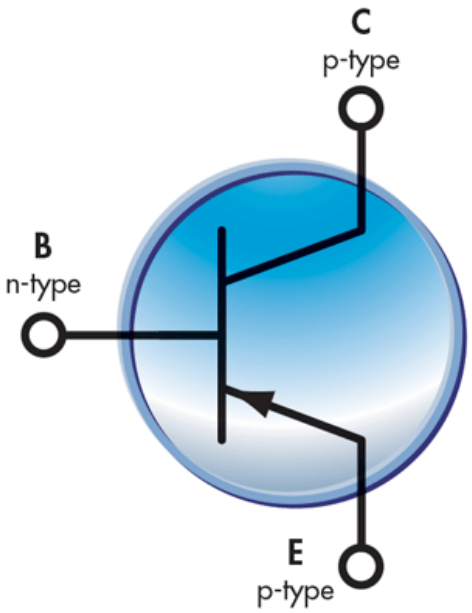
3. An NPN transistor has a layer of P-doped semiconductor between two N-doped layers (Courtesy of Wikibooks)

- Cutoff: BJT operates in this zone in switching operations. In cutoff, the transistor is inactive.
- Active: BJT operates in this zone for amplifier circuits because the transistor can act as a fairly linear amplifier.
- Saturation: BJT operates in this zone in switching operations. The transistor appears as a near short circuit between the collector and emitter terminals.
- Reverse Active: Like active mode, the current is proportional to the base current, but flows in reverse. This mode is rarely used.

In an NPN transistor, a positive voltage is given to the collector terminal to produce a current flow from the collector to the emitter. In a PNP transistor, a positive voltage is given to the emitter terminal to produce current flow from the emitter to collector. In an NPN transistor, the current flows from the collector (C) to the Emitter (E) (*Fig. 4*). In a PNP transistor, however, the current flows from the emitter to the collector (*Fig. 5*).



4. The arrow shows the direction of the current and how it is always on the emitter.



5. The NPN transistor always has an arrow pointing out.

It is clear that the current directions and voltage polarities in PNPs and NPNs are always opposite to each other. NPN transistors require a power supply with positive polarity with respect to common terminals, but PNP transistors require a negative power supply.

PNPs and NPNs work pretty much alike, but their modes are different because of the current polarities. For example, to put an NPN into saturation mode, VB should be higher than VC and VE. Here is a summary of the operation modes depending on their voltages:

TABLE 1: SUMMARY OF THE OPERATION MODES DEPENDING ON VOLTAGES

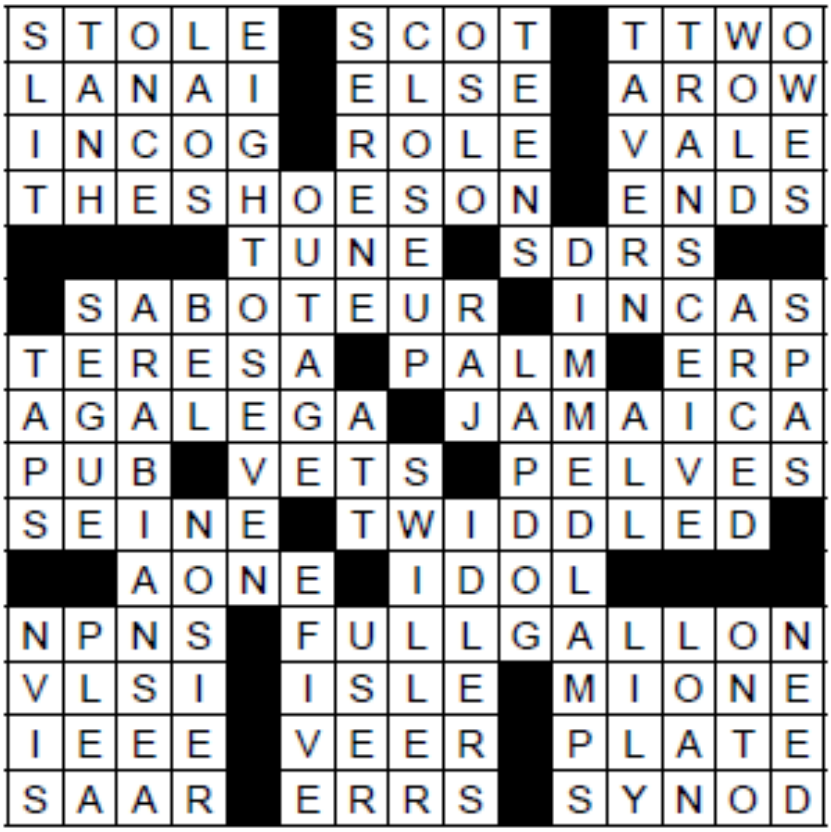
Voltage Relations	NPN	PNP
$V_E < V_B < V_C$	Active	Reverse
$V_E < V_B > V_C$	Saturation	Cutoff
$V_E > V_B < V_C$	Cutoff	Saturation
$V_E > V_B > V_C$	Reverse	Active

Here is a list of some classic general-purpose BJTs:

TABLE 2: CLASSIC GENERAL-PURPOSE BJTs	
Part	**Type**
2N2222	NPN
2N2907	PNP
2N3904	NPN
2N3906	PNP

The basic principle of any BJT is to control the current of a third terminal with the voltage between the other two terminals. The principle of operation of NPNs and PNPs is exactly the same. The only difference is in their biasing and the polarity of the power supply for each type.

Credits: https://www.electronicdesign.com/power/what-s-difference-between-pnp-and-npn



AMATEUR RADIO ANTENNA LENGTH CHART

	FREQUENCY (Mhz)	1/4λ (Feet)	1/2λ (Feet)	1λ (Feet)	1/2λ Inv Vee 90° (Feet)
160 METERS	1.800	130' 0"	260' 0"	558' 4"	257' 5"
	1.850	126' 6"	253' 0"	543' 3"	250' 5"
	1.900	123' 2"	246' 4"	528' 11"	243' 10"
	2.000	117' 0"	234' 0"	502' 6"	231' 8"
80 METERS	3.500	66' 10"	133' 9"	287' 2"	132' 5"
	3.750	62' 5"	124' 10"	268' 0"	123' 7"
	3.900	60' 0"	120' 0"	257' 8"	118' 10"
	4.000	58' 6"	117' 0"	251' 3"	115' 10"
40 METERS	7.000	33' 5"	66' 10"	143' 7"	66' 2"
	7.150	32' 9"	65' 5"	140' 7"	64' 10"
	7.300	32' 1"	64' 1"	137' 8"	63' 6"
30 METERS	10.100	23' 2"	46' 4"	99' 6"	45' 10"
	10.150	23' 1"	46' 1"	99' 0"	45' 8"
20 METERS	14.000	16' 9"	33' 5"	71' 9"	33' 1"
	14.150	16' 6"	33' 1"	71' 0"	32' 9"
	14.300	16' 4"	32' 9"	70' 3"	32' 5"
	14.350	16' 4"	32' 7"	70' 0"	32' 3"
17 METERS	18.068	12' 11"	25' 11"	55' 7"	25' 8"
	18.168	12' 11"	25' 9"	55' 4"	25' 6"
15 METERS	21.000	11' 2"	22' 3"	47' 10"	22' 1"
	21.200	11' 0"	22' 1"	47' 5"	21' 10"
	21.450	10' 11"	21' 10"	46' 10"	21' 7"
12 METERS	24.890	9' 5"	18' 10"	40' 5"	18' 7"
	24.990	9' 4"	18' 9"	40' 3"	18' 6"
10 METERS	28.000	8' 4"	16' 9"	35' 11"	16' 7"
	28.500	8' 3"	16' 5"	35' 3"	16' 3'
	29.700	7' 11"	15' 9"	33' 10"	15' 7"
6 METERS	50.000	4' 8"	9' 4"	20' 1'	9' 3"
	54.000	4' 4"	8' 8"	18' 7"	8' 7"
2 METERS	144.000	1' 8"	3' 3"	7' 0"	3' 3"
	148.000	1' 7"	3' 2"	6' 9"	3' 2"

Antenna length calculations are based on the following formulas:
1/2 wave dipole (feet) = 468/frequency in Mhz
Full wave loop (feet) = 1005/frequency in Mhz
Inverted Vee with 90 degree included angle is 49% the length of 1/2 wave dipole

Note:
Cut wire slightly longer to allow for connecting insulators and pruning.
Height above ground, nearby wires, trees, etc. will change tuning slightly.

MILLENNIA ARTS

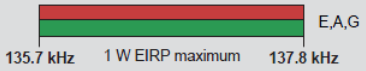
US Amateur Radio Bands

US AMATEUR POWER LIMITS — FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

ARRL The national association for AMATEUR RADIO®

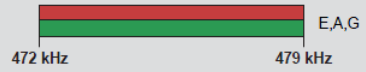
Amateurs wishing to operate on either 2,200 or 630 meters must first register with the Utilities Technology Council online at **https://utc.org/plc-database-amateur-notification-process/.** You need only register once for each band.

2,200 Meters (135 kHz)



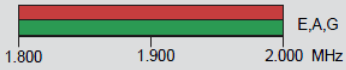
630 Meters (472 kHz)

5 W EIRP maximum, except in Alaska within 496 miles of Russia where the power limit is 1 W EIRP.

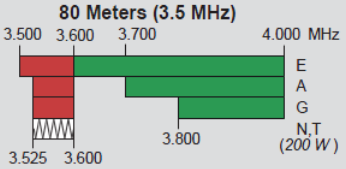


160 Meters (1.8 MHz)

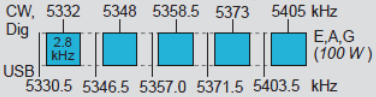
Avoid interference to radiolocation operations from 1.900 to 2.000 MHz



80 Meters (3.5 MHz)

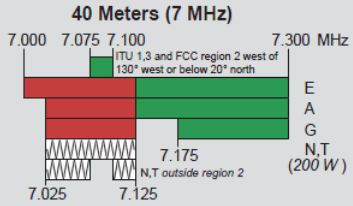


60 Meters (5.3 MHz)



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated power (ERP) of 100 W PEP relative to a half-wave dipole. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)

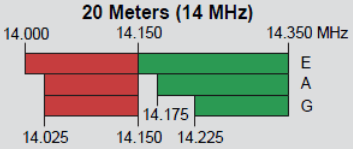


See Sections 97.305(c), 97.307(f)(11) and 97.301(e).These exemptions do not apply to stations in the continental US.

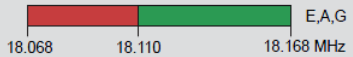
30 Meters (10.1 MHz)

Avoid interference to fixed services outside the US.

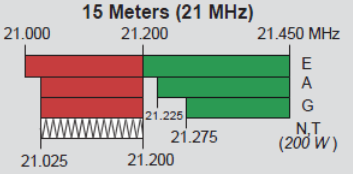
20 Meters (14 MHz)



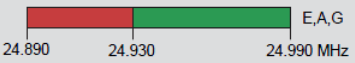
17 Meters (18 MHz)



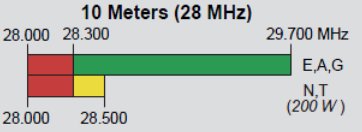
15 Meters (21 MHz)



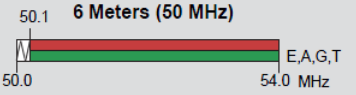
12 Meters (24 MHz)



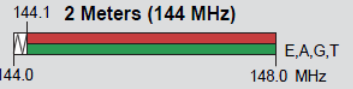
10 Meters (28 MHz)



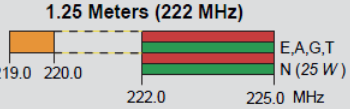
6 Meters (50 MHz)



2 Meters (144 MHz)



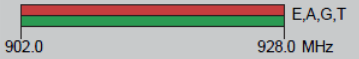
1.25 Meters (222 MHz)



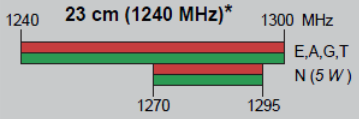
*Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.

70 cm (420 MHz)*

33 cm (902 MHz)*



23 cm (1240 MHz)*



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz ‡	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

‡ No pulse emissions

KEY

Note:
CW operation is permitted throughout all amateur bands.
MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.
Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW *only*
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems *only*

E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See *ARRLWeb at www.arrl.org* for detailed band plans.

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MORSE CODE CHART

LETTERS

A	•–	N	–•
B	–•••	O	–––
C	–•–•	P	•––•
D	–••	Q	––•–
E	•	R	•–•
F	••–•	S	•••
G	––•	T	–
H	••••	U	••–
I	••	V	•••–
J	•–––	W	•––
K	–•–	X	–••–
L	•–••	Y	–•––
M	––	Z	––••

NUMBERS

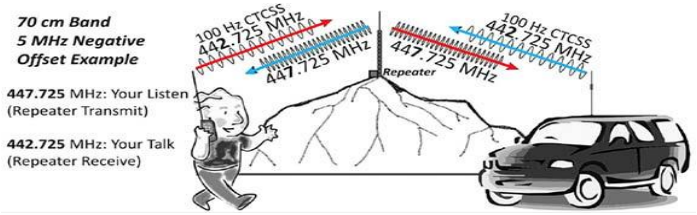
0	–––––
1	•––––
2	••–––
3	•••––
4	••••–
5	•••••
6	–••••
7	––•••
8	–––••
9	––––•

PUNCTUATION

Full Stop [.]	•–•–•–
Comma [,]	––••––
Colon [:]	–––•••
Question Mark [?]	••––••
Apostrophe [']	•––––•
Hyphen or Dash [-]	–••••–
Fraction Bar [/]	–••–•
Parenthesis Open [(]	–•––•
Parenthesis Close [)]	–•––•–
Quotation Marks ["]	•–••–•
Plus Sign [+]	•–•–•
At sign [@]	•––•–•
Equal Sign [=]	–•••–

Local Repeater/Frequency Info

Courtesy of Chris N3XCK



(1.25m band frequencies are marked in GREEN)

Output Frequency / Memory Label / TX PL Tone / Call Sign / (NOTES) / Location

---- *Monroe county PA area* ----
147.045 / EPARA-V / 131.8 / WA3MDP / (linked to N3TXG, Bangor / EchoLink) / Bangor, PA
447.225 / EPARA-U / 131.8 / N3TXG / (linked to WA3MDP, Bangor) / Bangor, PA
146.865 / SKYWARN / 100.0 / WX3OES / (Monroe County OEM) / Snydersville, PA
145.230 / W3WAN / 77.0 / W3WAN / (linked to the Wide Area Network Repeater System / AllStar) / Tannersville, PA
445.375 / POHOBO / 91.5 / K4MTP / (linked to the K4MTP Six Meter System) / Pohopoco Mountain, PA
448.375 / WOODALE / 91.5 / N3JNZ / (Limited range, 10 mile radius) / Wooddale, PA
446.575 / PMPLE-N / 151.4 / KG3I / (On Pimple Hill, linked to KA3NRJ, Allentown) / Long Pond, PA (Near the Pocono Raceway)
224.340 / LPOND21 / 131.8 / KB3WW / () / Long Pond, PA
224.920 / LPOND22 / 127.3 / K4MTP / () / Long Pond, PA
446.225 / ROSSTWP / 131.8 / N3TXG / (MAY BE DOWN, have not been able to reach it) / Ross Township, PA
449.875 / WINDGAP / 131.8 / KC2IRV / (AllStar) / Wind Gap, PA
---- *New Jersey* ----
448.175 / HOPATCG / 141.3 / N2OZO / () / Hopatcong Borough, NJ
224.280 / HOPAT2 / 88.5 / N2QJN / () / Hopatcong, NJ
147.300 / NEWTONV / 151.4 / W2LV / (linked to both 1.25m and 70cm W2LV) / Newton, NJ
443.000 / NEWTONU / 103.5 / W2LV / (linked to both 2 meter and 1.25m W2LV) / Newton, NJ
147.210 / NEWTON / 151.4 / W2LV / () / Newton, NJ
224.500 / NEWTON2 / 141.3 / W2LV / (linked to both 2 meter and 70cm W2LV) / Newton, NJ (Kittatiny Mountain)
448.075 / HACKETT / 141.3 / WW2BSA / () / Hackettstown, NJ (Strand Theater/Hackettstown Center for the Arts)
146.925 / VERNON / 141.3 / W2VER / () / Vernon, NJ
146.820 / WASHTON / 110.9 / W2SJT / (EchoLink) / Washington, NJ (Montana Mountain)
146.985 / ROXBURY / 131.8 / K2GG / (EchoLink) / Roxbury, NJ (Mooney Mountain Meadows)
147.375 / CHERRY / 151.4 / WB2NQV / () / Cherryville, NJ
223.780 / WARREN2 / 110.9 / WC2EM / () / Washington, NJ
223.860 / BDLAKE2 / 136.5 / W2RM / () / Budd Lake, NJ
224.720 / MTARL2 / 141.3 / WB2SLJ / () / Mount Arlington, NJ
---- *New York state* ----
449.125 / PJARVIS / 114.8 / N2ACF / (Linked to the N2ACF System) / Port Jarvis, NY
145.350 / SHOLANY / 114.8 / K3TSA / (this is the remote receiver located in Port Jervis, NY for K3TSA) / Schahola, PA
446.125 / GLNSPEY / 114.8 / N2ACF / (Linked to the N2ACF System) / Glen Spey, NY
224.540 / MIDTOWN / 156.7 / WR2MSN / () / Middletown, NY
449.875 / WRTSBRO / 114.8 / N2ACF / (Linked to the N2ACF System) / Wurtsboro, NY
449.225 / NYC / 82.5 / KQ2H / (Linked to the KQ2H System) / Manhattan, NY (Empire State Building) ***See Note #1***
---- *Pike, Lackawanna, and Luzerne counties, PA* ----
145.330 / DINGMAN / 141.3 / AA2HA / (MAY BE DOWN, have not been able to reach it) / Dingman's Ferry
146.715 / SHOHOLA / 82.5 / K3TSA / () / Shohola Falls, PA
145.350 / SHOLAPA / 100.0 / K3TSA / () / Schahola, PA
146.940 / SCRANTN / 127.3 / K3CSG / () / Scranton, PA
224.560 / SCRANT2 / 136.5 / KC3MN / (Linked to 448.825 N3EVW, Scranton) / Scranton & Dunmore, PA
145.450 / WILKESB / 82.5 / K3YTL / () / Wilkes-Barre, PA (Bunker Hill)
224.420 / WILKES2 / 94.8 / N3DAP / () / Wilkes-Barre, PA (Penobscot Knob)
146.805 / HUNLOCK / 88.5 / N3CSE / () / Hunlock Creek, PA
224.600 / HAZLE2 / 77.0 / W3RC / () / Hazleton, PA
441.900 / HAZLETN / 114.8 / W3RC / (EchoLink AllStar) / Hazleton, PA
---- *Lehigh Valley PA area* ----
145.270 / EASTON / 151.4 / W3IFI / (EchoLink) / Easton, PA (Braden Airport)
224.740 / EASTON2 / 100.0 / KB3AJF / () / Easton, PA
146.700 / NZRTH-V / 151.4 / W3OK / (Linked to 444.900 W3OK) / Nazareth, PA
444.900 / NZRTH-U / 151.4 / W3OK / (Linked to 146.700 W3OK) / Nazareth, PA
444.100 / PMPLE-S / 151.4 / KA3NRJ / (Linked to KG3I, Long Pond-EchoLink AllStar) / Allentown, PA (South Mountain)
146.655 / MGNHILL / 136.5 / N3LWY / () / Lehigh Valley-Easton, PA (Morgan Hill)
146.940 / LEHIGHM / 79.7 / W3OI / () / Allentown, PA (Lehigh Mountain)
224.080 / ALLEN21 / 203.5 / KA3NRJ / (Linked to 444.100 KA3NRJ, Allentown) / Allentown, PA
224.400 / ALLEN22 / 127.3 / K4MTP / () / Allentown, PA (South Mountain)
443.350 / ALNTOWN / 100.0 / N3XG / (Linked to W3EPE, Palmerton-EchoLink) / Allentown, PA (Scholl Woodlands Preserve)
---- *Carbon county, PA* ----
147.255 / JIMTHRP / 162.2 / W3HA / (EchoLink) / Jim Thorpe, PA
449.375 / PALMRTN / 100.0 / W3EPE / (Linked to N3XG, Allentown) / Palmerton, PA (Blue Mountain)
---- *Simplex* ----
146.520 / V-CALL / 100.0 / (2 meter simplex calling frequency) / ---

VHF SIMPLEX FREQUENCIES
446.000 / U-CALL / 100.0 / (70cm simplex calling frequency) / ---
UHF SIMPLEX FREQUENCIES
223.500 / 2-CALL / 100.0 / (1.25 meter simplex calling frequency) / ---
---- *Government (RECEIVE ONLY!)* ----
460.500 / PDSOUTH / Monroe County POLICE SOUTH (Stroud Area Regional Police, ESU Police)
453.750 / MC FIRE / Monroe County Fire and Ambulance Dispatch, ***See Note #2***
460.300 / BUSHKIL / Monroe County FIRE NORTHEAST (Bushkill & Marshalls Creek Fire Departments)
453.625 / BFD OPS / Bushkill Fire Department-Tactical
460.625 / STROUD / Monroe County FIRE EAST (Stroudsburg & East Stroudsburg Fire Departments)
453.5375 / FIRETAC / Monroe County Fire-Tactical
155.400 / EMS A6 / Monroe County EMS Channel A6 (Main channel)
460.400 / PTWP PD / Monroe County POLICE NORTH (Pocono Township PD)
460.150 / PMRP / Monroe County Pocono Mountain Regional Police
460.425 / COUNTYP / Monroe County Police "Countywide" (mostly Sheriff's Office)
460.275 / PD TAC / Monroe County Police-Tactical
453.450 / EMSCOMM / Monroe County EMS Command (used only during mass events)
452.200 / S SCRTY / Stroudsburg School District Security
155.775 / PIKE SD / Pike County Sheriff's Department
155.625 / PIKE PD / Pike County Police "Countywide"
159.210 / EPRPD / Eastern Pike Regional Police Department
154.445 / PIKE FD / Pike County Fire Dispatch, ***See Note #3***
155.265 / PIKEEMS / Pike County Ambulance Dispatch, ***See Note #3***
---- *Multi-Use Radio Service* ----
151.820 / MURS 1
151.880 / MURS 2
151.940 / MURS 3
151.625 / REDDOT / Red Dot •
151.955 / PURPLE / Purple Dot •
154.570 / BLUEDOT / Blue Dot •
154.600 / GREENDO / Green Dot •
---- *Family Radio Service* ----
462.5625 / FRS 1
462.5875 / FRS 2
462.6125 / FRS 3
462.6375 / FRS 4
462.6625 / FRS 5
462.6875 / FRS 6
462.7125 / FRS 7
467.5625 / FRS 8
467.5875 / FRS 9
467.6125 / FRS 10
467.6375 / FRS 11
467.6625 / FRS 12
467.6875 / FRS 13
467.7125 / FRS 14
---- *General Mobile Radio Service* ---- ***See Note #4***
462.550 / GMRS 1
462.575 / GMRS 2
462.600 / GMRS 3
462.625 / GMRS 4
462.650 / GMRS 5
462.675 / GMRS 6
462.700 / GMRS 7
462.725 / GMRS 8
---- *NOAA Weather (RECEIVE ONLY!)* ----
162.400 / WX 01
162.425 / WX 02
162.450 / WX 03
162.475 / WX 04
162.500 / WX 05
162.525 / WX 06
162.550 / WX 07

Note #1: The repeater offset and PL tones in the Chirp programming file is set so that it actually transmits to a linked repeater in Wurtsboro NY.
Note #2: Also includes Lehman Township, Pike County (i.e. Bushkill).
Note #3: Does not include Lehman Township, Pike County (i.e. Bushkill) which is covered by the Monroe County Control Center.
Note #4: Currently set to RECEIVE ONLY in the Chirp programming file as I do not have a GMRS license. To use GMRS frequencies, you need a seperate GMRS license from the FCC. Your Amateur Radio license does not authorize you for GMRS usage.

Forecast of Solar and Geomagnetic Activity

Weekly Highlights and Forecasts

Highlights of Solar and Geomagnetic Activity
19 - 25 August 2019

Solar activity was very low. The visible disk was spotless with no Earth-directed CMEs observed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at moderate levels throughout the forecast period.

Geomagnetic field activity was at quiet levels under nominal solar wind conditions throughout the forecast period.

Forecast of Solar and Geomagnetic Activity
26 August - 21 September 2019

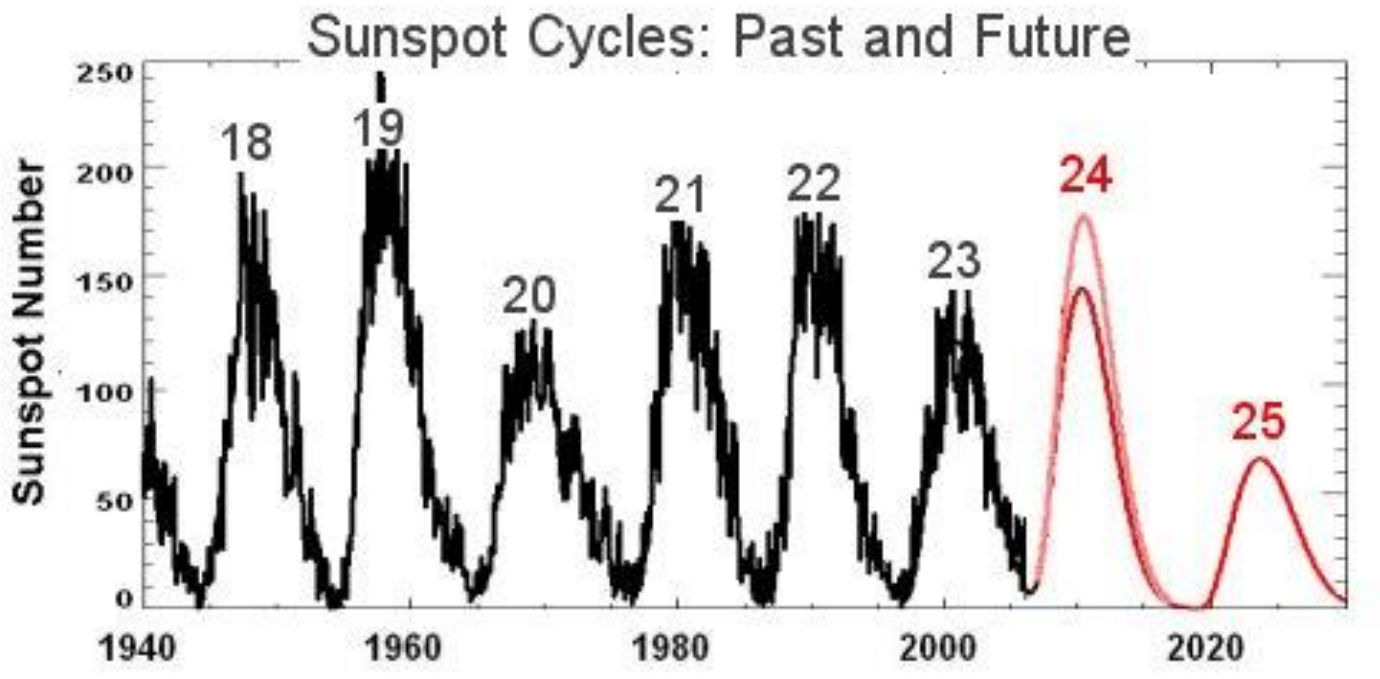
Solar activity is expected to remain very low throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 02-13 Sep due to recurrent CH HSS influence. Moderate levels are expected throughout the remainder of the period.

Geomagnetic field activity is likely to reach G2 (Moderate)geomagnetic storm levels on 01 Sep, active levels on 26-27 Aug, 02 Sep, with unsettled levels on 28 Aug, 03, 06-07 Sep due to recurrent CH HSS effects.

Long Range Solar Forecast



National Traffic System & Classroom Training Updates

By Donald Darcy WK2RP

It's hard to believe but summer is almost over. The Technician class begins on Wednesday September 11 and there is still room. Anyone interested should contact me. VE testing returns to the second Friday of each month. However, next year VE sessions will be the on same night as the club meeting starting at 6 pm. This change was made to make things easier for all and allow test takers to remain for the club meeting. If anyone is interested in learning a particular aspect of ham radio please talk to Chris or Donald, if there is enough interest, we can try to arrange a class.