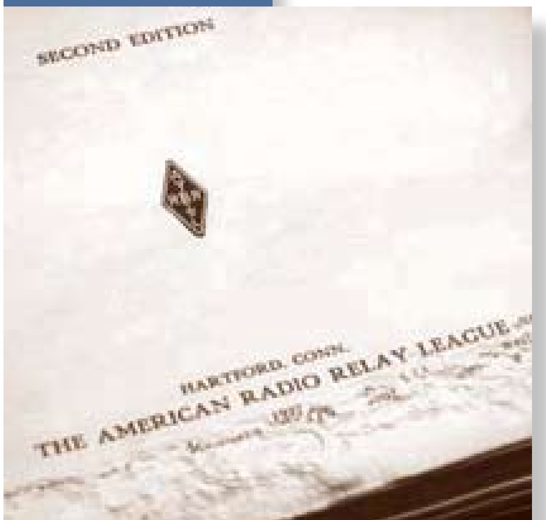
K9YA Telegraph

Robert F. Heytow Memorial Radio Club Volume 4, Issue 11, November 2007



Philip Cala-Lazar, K9PL
Editor

Mike Dinelli, N9BOR
Layout

Dick Sylvan, W9CBT
Staff Cartoonist

QSSS

Dit and Darr

Philip Cala-Lazar, K9PL

The intrepid amateur radio editor faces many challenges, not the least of which is scouring Midwestern cellars to score old mouse nibbled and odiferous publications. Midst many a sneeze and watery eyes there arises the curious, the bizarre and the downright interesting—all punctuated with, "I did not know that!"

A Bit of History

From its start, the land telegraph service employed a number of codes and abbreviations to speed, simplify and assist communications. In 1909, around the time wireless telegraphy became practical, the British government created and circulated a "list of abbreviations . . . prepared for the use of British ships and coast stations licensed by the Postmaster-General." The 31 Q codes included in that list, based on proposals made at the 1906 Berlin International Conference, were a *lingua franca* facilitating communications between maritime operators representing many nations and languages.

> *"…mouse nibbled and odiferous…"*

In 1913, forty-five Q codes appeared in the *List of Abbreviations to be used in Radio Communications, included in the Service Regulations affixed to the Third International Radiotelegraph Convention* formulated in London.

Correspondingly, the United States Department of Commerce Bureau of Navigation Radio Service issued *Regulations Governing Radio Operators and the Use of Radio Apparatus on Ships and on Land* on 27 July 1914.

From Article XXII of the Regulations: *Abbreviations. For the purpose of giving or requesting information concerning the radio service, stations shall make use of the signals contained in the list appended to the present Regulations.*

As formulated, the Q code dealt primarily with maritime message traffic. It was soon adopted, modified and enriched by amateur, military and commercial radio services to serve their specialized needs. From 31 codes in the *Handbook for Wireless Telegraph Operators Working Installations licensed by His Majesty's Postmaster-General Revised Edition*, October 1909; to 45 in the 1914 U.S Regulations; 65 in the 1927 ARRL Handbook; falling to 37 in the 1961 Handbook; rising to 45 in the 1998 Handbook; and, currently, slipping to 38 on the ARRL Web site list: clearly, Q-signals still lead a dynamic existence. Note: These numbers do not include the many "QN" prefixed net Q-signals.

Q-Signals Bygone

Meant to speed and clarify communications, Q-signals have continually evolved. Here are some

Continued - QSSS on Page 7

Inside This Issue…

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

High-Voltage Capacitor-Input Filter

Component Calculations

Hal Mandel, W4HBM

Hal Mandel, W4HBM

Have you ever built a power supply for a radio or other gimcrack around the shack? Ever put together a linear amplifier from milk crates full of stuff?

The first phase in such a project is trying to figure out how to power it up. Easy, when it's a nine-volt battery or such, but when things get into high voltages like on anodes, grids and screens of expensive tubes it's easy to make mistakes that might result in a hum on a carrier at best, or a burned-out radio at worst.

Besides the problem encountered in choosing the right transformer for the job, the hurdle of changing A.C. to D.C., filtering it, and, perhaps, regulating it, comes up.

In designing and building a tube amplifier to get my RTTY signal some oomph on the low bands, I started at the very bottom and worked my way through, spending money left and right, incurring the wrath of *She-Who-Must-Be-Obeyed* when being discovered with a shack full of junk that wasn't there a month ago.

"…she can smell when you're lying."

"What's that thing?"

Uh, oh.

"I traded some old stuff for it."

"What old stuff?"

Here we go…

"You know, old radio stuff." *Bad move, Hal. She can read your mind and she can smell when you're lying.*

"Don't give me that. You used that line last year when you bought that other thing, the one with the lights that you never use. Where'd you get the money for this?"

"From old stuff."

Now you've done it, Hal. You should'a never answered that.

So, after an obligatory apology session and a full accounting with examination of the checkbook, etc., things are back on track.

"Don't let me find out you've been wasting money on this junk, you hear me?"

"Yes, ma'am."

Consider yourself lucky, big guy.

This time.

So, back to the real story…

The amplifier needs to have just over four thousand volts at two amperes for the plates on the tubes. Coming up with a transformer wasn't too painful, but when I started looking into the filter caps situation I ran across the ARRL Handbook's chapter on power supplies, with their admonishment about ripple.

Doing some math and looking at prices of capacitors led me to figure out how to achieve good regulation without going overboard.

Here's the story:

The 2006 edition of the Radio Amateur's Handbook, power supply chapter, pages 17-1 and 17-2, state that the anode circuit of a linear amplifier will not tolerate greater than a 3% ripple in the supply voltage. This is because the full wave rectifier circuit is not conducting for part of the A.C. cycle, and the current supplied to the amplifier circuit must be derived from the filter capacitor's ability to store energy.

Ripple voltage on a full wave bridge rectifier circuit, as a *percentage* of that circuit is calculated with the formula:

Robert F. Heytow Memorial Radio Club

www.k9ya.org

telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

K9YA Telegraph

$\%\text{Ripple V-RMS} = \frac{E_1}{E_2}$

Where E_1 = RMS Ripple Voltage & E_2 = Steady D.C.

The actual ripple voltage is derived from the formula:

C (E) = I (t)

Where **C** is the filter capacitor in **uF**
E is the Ripple Voltage, (**PEAK–TO–PEAK**)
I is the full expected amperage of the supply in **mA**
t is the 60 Hz rectifier non-conduct time (**7.5 mSec**)

Using simple algebra, this becomes:

$$E = \frac{I\,(t)}{C}$$

Remember,

$V_{RMS} = 0.7071\ V_P \quad V_{RMS} = 0.3535\ V_{P\text{-}P}$

$V_{P\text{-}P} = 2.828\ V_{RMS}$

The amplifier being designed uses a set of triode power amplifier tubes that will consume 1.5 amperes, (**1,500 mA**) at rated anode current, maximum.

The anode transformer being designed and wound will deliver **2,000 v.a.c.** on the secondary winding at **1,500 mA**, Constant Commercial Service.

A full wave bridge rectifier circuit will develop **1.414** times the output voltage of the transformer, which in this case will be **2,828 VDC.** The filter capacitor will have **0.9** times the output of the rectifier as its **Steady D.C. Voltage (2,545 VDC).**

Using these values in the above formulae, and starting with a requirement of **3%** maximum ripple, the optimum filter capacitor value may be determined:

$\%\text{RIPPLE (MAX)} = E_1 / E_2$
and
$E_{RIPPLE\,(P-P)} = I{*}t / C$

So, for **1,500 mA** and **2,425. 20 VDC,**
(1500) * (7.5) = 11,250.
$11250 / 35 = 321.4285\ V_{P\text{-}P}$ **(@ 35uF)**

$321.4285_{\ Vp\text{-}p} * 0.3535 = 113.624\ V_{rms}$

$113.624\ V_{RIP,\,rms}$ **DIVBY** $2545.20\ V_{S.D.C.} * (100) = 4.4624\ \%_{RIPPLE}$

The following chart displays the effect of various capacitors on this circuit:

Capacitance	$E_{ripple\ (RMS)}$	Ripple
35uF	113.624v_{rms}	4.46400%
5ØuF	79.5375v_{rms}	3.12500%
6ØuF	66.28125v_{rms}	2.60400%
7ØuF	56.81250v_{rms}	2.23210%
8ØuF	49.71093v_{rms}	1.95310%
85uF	46.78676v_{rms}	1.83820%
9ØuF	44.1875Øv_{rms}	1.73600%
95uF	41.861842v_{rms}	1.64470%
1ØØuF	39.76875Øv_{rms}	1.56250%
1Ø5uF	37.875000v_{rms}	1.48810%
11ØuF	36.15341v_{rms}	1.42050%
115uF	34.581522v_{rms}	1.35870%
12ØuF	33.140625v_{rms}	1.30210%
125uF	31.81500v_{rms}	1.2500%
13ØuF	30.591346v_{rms}	1.20190%
14ØuF	28.40625v_{rms}	1.11610%
15ØuF	26.51250v_{rms}	1.04170%
16ØuF	24.855469v_{rms}	0.976600%
17ØuF	23.393382v_{rms}	0.919100%
18ØuF	22.093750v_{rms}	0.868100%

Note: This value is calculated using a 2.0 KV transformer secondary.

(2.0KV * 1.414 * 0.9 = 2545.2 VDC)

Examining showcase amplifier designs in the Handbook, the power supply ripple percentages were calculated using the part numbers of the anode transformers and their listed voltage specifications. Several designs employed series computer-type dry electrolytic filter capacitors and one design used a Peter W. Dahl type 53uFd @ 5KV oil-filled type.

On the amplifier employing the 53uF oil-filled capacitor the 3945.06 VDC supply rated at 1.5 amperes yielded a ripple voltage percentage of 1.902%.

The question arises in the above oil-filled capacitor design of the maximum voltage rating of the capacitor.

At 3,945 volts, the diode stack should be calculated so that PIV = $2.8E_{RMS}$ and the capacitor should be a minimum of 2.828 sec E_{RMS}.

In the case above, the 3,945 D.C. Volts corresponds to roughly 3099.95 transformer secondary volts and at 2.828 should be 8,767 PWVDC, minimum, or 9KV.

CONTINUED - HIGH VOLTAGE ON PAGE 8

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

Pikes Peak Pre-Field Day Operation

Exclusive to the K9YA Telegraph

Paul Signorelli, WØRW/PM

The author at Pikes Peak

It was a clear warm day when we left the flat lands. Mark, KIØPF, and I had planned this Pikes Peak operation to start just before Field Day started so we could work stations without QRM. We also did not want to get hit by any afternoon lightning/precipitation static or pass out from altitude sickness. It was +50f when we arrived on top of Pikes Peak at an altitude of 14,110 feet. There were piles of snow and snowdrifts in the rocks.

The A index was 17 and flux was 65, so this was not a good propagation day. Mark was going to work SSB with his PRC1099 and I was using my PRC319 on 14.060 CW. I managed to work 30 stations from coast to coast. Some of the contacts with Oklahoma and Kansas might have been line of sight.

My CW sometimes gets a little choppy when I am walking over rocks, etc. I use a highly modified single lever Whiterook bug and I hold the base in my left hand and key with my right hand. The PRC319 is a fixed frequency radio so I appreciated all the guys who were monitoring for me. Once I get the radio on my back I can't change the frequency.

I know the following guys were laying for me because I recognize their call signs as QRP'ers: WA9TZE, Jim; W3FF, Budd; WØAV, George; KØFRP, Al; N5GW, Gene; N4DD, Dennis; WA8REI, Ken; K3JA, Flav; and WS4S, Conard.

I use a 10-foot whip antenna attached to the radio and a quarter-wave coax shorted stub for a counterpoise, the shorted stub protects the antenna tuner from P-Static. I was also using a 4AH NiCad battery pack, I didn't want to bring my Sony Li-Ion battery packs because the cells have a pressure fuse in them and I have popped the fuses at high altitudes before.

I hiked up the Peak many years ago but this time after a few hours on top and with my 25-pound backpack I started to get light-headed. I tried to breath faster, but could not remember to do it. I was walking around and down over the edge to block out the RFI from Mark who was operating SSB with his backpack radio up 300 kHz on the other side of the Peak. Near the end of the operation I missed a few calls in my log and got a few changeovers confused; that was the effect of high altitude dizziness.

We met several hams there who somehow recognized us as amateur radio operators. One Pikes Peak ranger was an old ham friend of mine and he really gave us a great welcome. He worked for Hughes in California and actually worked on the PRC74 in the 60s.

After we left the Peak we stopped at Glen Cove at 12,000 feet for the hot brake check. There we saw three snowboarders coming down the 1,000-foot snow filled crevasses. This is a really beautiful alpine area where there are no mosquitoes and no snakes! I was fully recovered from my altitude sickness even though we were still at 12,000 feet. Next time I go to the Peak I am going to have to bring some O_2 along.

If you want to find out more information about these PRC radios get a copy of Mark's book, *Mil Spec Radio Gear* from CQ Communications Inc. ■

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

Global Warming Down Under

One Really HOT Radio Location

Rod Newkirk, VA3ZBB/W9BRD

Too long ago in McHenry County, Illinois, near the Wisconsin border, grandpa tried his hand at farming. Jobs were drying up in the city, especially for carpenters. Sugar beets and buckwheat were the new big things. Then the Great Depression deepened rapidly. We retreated back to Chicago when the bank seized the farm. The bank, along with others, went belly-up with too many empty farms. Dominoes. But financial worries were for grownups.

As a kid of eight or nine I wasn't much concerned with economic woes. For me rural life was a lark. I was more interested in one peculiar aspect of that rundown spread on Bunker Hill Road off Route 123. It was burning, No, not sporadic brush fires or haystacks. Soil in the area was powdery combustible peat. Some fenced-off acres on the east forty smoldered constantly, probably ignited years before by lightning.

We shivered for two winters in a drafty farmhouse while wasted free heat steamed up through the snow less than a mile away. That subterranean hot spot must be cooler by now but it still glows in my memory. Years later I became W9BRD in the city with a more worldly perspective. Around 1960, researching potential prose material, I ran across another torrid chunk of geography. New Zealand Amateur Radio Transmitters Society journal *Break-In* described one member's unusual encounter with unexpected earthly BTUs.

The enterprising ZL had decided to enhance his station's ground system by sinking a deeper copper pipe. That turned out to be a stiff challenge because rock strata underlay an otherwise normal terrain. He finally found a spot not too far from the shack where his conductor could be pounded down. The strenuous project went well. After splicing on an extension or two, the lad must have devised the best AC/DQ/RF grounding in his entire ham community.

After a day of rest, the industrious chap returned to his task. Banging away at length from the rungs of a wobbly ladder is more than child's play. Now to complete the job by strapping on a solid connection. Ouch! He found his ground stake too physically hot to touch, and — OUCH! — getting hotter all the time. Subsequent issues of *Break-In* published various contributed suggestions to explain the sizzling phenomenon. Some were wildly imaginative. Great fun. Calmer consensus eventually settled on conductive geothermal manifestation.

Hah — very fancy hypothesis. But my grandpa had the simple answer 75 years ago. He told me the pesky peat fire on our east forty would burn right down through to the other side. ■

Ham Quips

DICK SYLVAN, W9CBT

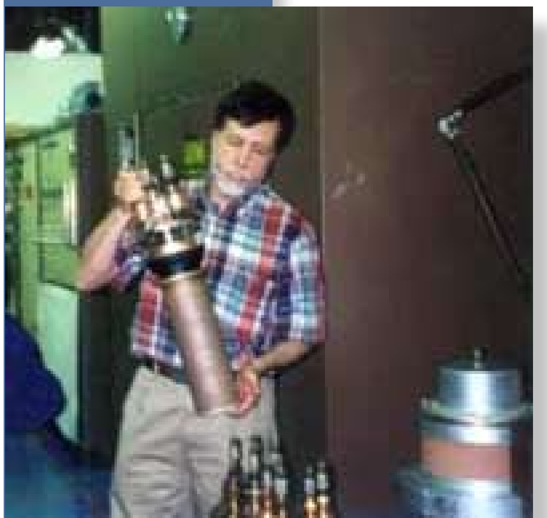
CLYDE NEVER FULLY GRASPED THE CONCEPT OF HOW TO ROTATE A BEAM

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

The "Good Old Days"

Small Gear, Big Joys

Duke Wahl, WA9WJB



Duke, WA9WJB, Demonstrating High-Tech Gear at Fermi Lab

Every now and then I look back to the "good old days" before the high-tech revolution, a time when ham radio life was exciting and fascinating.

Antenna towers could mostly be erected with impunity, shortwave activity was robust with plenty of interesting things to listen to and you could still work on your equipment with the basic electronic tools: meter, scope, soldering iron and schematic.

The Gee Whiz Factor

Advances in our hobby were quickly realized by commercial sectors and now things are quite different; enter the *High-Tech* era. The greatest, most successful single effort of the high-tech revolution has been miniaturization. Miniaturization put high-tech toys in consumers' hands and made possible the greatest obvious change in the radio landscape—the cell phone. Dick Tracy had a wrist radio, and now, 45 years later, we do too, including a little TV screen and picture capabilities—even music. Dick Tracy never heard of a computer, but he could have used one. Every time I see a flip phone I think—Captain Kirk.

Miniaturization made smaller, faster, cheaper computers a reality. Laptops, Palm Pilots, and similar devices make storing and data processing easier and faster. Smaller computers have made for more sophisticated satellites to launch into orbit. GPS, satellite radio, TV relays, all made possible by miniaturization. Miniature computer guidance systems for rockets and missiles can put electronic payloads in precise orbit or explosives within feet of a designated target.

But, in a strange way, miniaturization has also shrunk our status in the world community. Who needs ham ops when we have cell and satellite phones? Who needs Morse code when we can dump tons of digital data in a few seconds? Who needs shortwave broadcasters when we have the Internet and noise-free satellite links? Who needs a monster stereo system and CD/record collection when it all fits in our pocketable iPod? Who needs radio technicians when this stuff is cheaper and easier to throw away than fix?

Not in My Backyard

Miniaturization has changed the way society sees us. Our antenna towers are *unsightly*, so laws are passed and covenants enforced to prevent *us* from destroying *their* view of the world.

> *"Get on the radio and ham it up…"*

The shortwave bands have almost nothing left to listen to; broadcasters, ship-to-shore radio (including CW traffic), military and government communications—even the spy numbers stations are all but gone. When was the last time you pried the top off your rig to replace the finals? You would be lucky to see much without a magnifying glass. Used a scope or multimeter lately?

Simple Joys

But, all the fantastic advancements in technology cannot beat the "good old days." With screwdriver and soldering iron always at the ready in case of problems. When static and QSB made for the most interesting and challenging times when operating. The simplest rig and antenna systems offered the best radio entertainment ever. There is no need for our hobby to shrink from view, unless you let it.

Get on the radio and ham it up today. ■

Robert F. Heytow Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

Continued - QSSS from Page 1

that have experienced drastic changes in meaning and others that strongly reflect their time on the air. ([A.R.] is used in the 1927 Handbook to cite signals specific to amateur radio.)

1927 QRAR: My call-book address is correct; 1940, Not listed; 1961 Not listed; Current, Not listed.

1927 QRC: My true bearing is . . . .; 1940, The accounts for my station are settled by the …….. company (or by the Government Administration of ……….).; 1961, Not listed; Current, Not listed.

1927 QRHH: Adjust to receive on …….. meters.; 1940, Not listed; 1961, Not listed; Current, Not listed.

1927 QRL: I am receiving badly. Please send …-. 20 times for adjustment.; 1940, I am busy (or I am busy with ……….). Please do not interfere.; 1961, I am busy (or I am busy with .... Please do not interfere.; Current, I am busy.

1927 QRLL: Permission to test granted.; 1940, Not listed; 1961, Not listed; Current, Not listed.

1927 QRZ: Your signals are weak.; 1940, You are being called by ……..; 1961, You are being called by ……….. (on ……….. kc.); Current, You are being called.

1927 QRH: My wavelength is ………….. meters.; 1940, Your frequency (wave-length) varies.; 1961, Your frequency varies; Current, Your frequency varies.

1927 QSA: Your signals are strong; 1940, The strength of your signals is …….. (1 to 5).; 1961, The strength of your signals is …….. (1. Scarcely perceptible; 2. weak; 3. Fairly good; 4. Good; 5. Very good); Current, The strength of your signals is ……...

1927 QSB: Your tone is bad (A.R.) Your tone is . . . . ; 1940, The strength of your signal varies; 1961, Your signals are fading; Current, Your signals are fading.

1927 QSC: Your spacing is bad (A.R.) Your Morse is bad; 1940, Not listed; 1961, Not listed; Current, Not listed.

1927 QSD: My time is . . . .; 1940, Your keying is incorrect; your signals are bad; 1961, Your keying is defective; Current, Your keying is defective.

1927 QSK: The last radiogram is canceled; 1940, Continue with the transmission of all your traffic, I will interrupt you if necessary.; 1961, Not listed; Current, I can hear you between my signals.

1927 QSS: Your signals are fading; 1940, Not listed; 1961, Not listed; Current, Not listed.

1927 QSSS: Your signals are swinging; 1940, Not listed; 1961, Not listed; Current, Not listed.

1927 QSYI: I shall shift my transmitting wave-length to ……….. meters.; 1940, Not listed; 1961, Not listed; Current, Not listed.

1927 QSYU: Please shift your transmitting wave to ……….. meters.; 1940, Not listed; 1961, Not listed; Current, Not listed.

One more thing. You know dot and dash and you know dit and dah, how about *dit* and *darr*? The 1927 Handbook offers dit and darr as Continental Code "phonetic" sounds—the sound of King Spark?

Sourced from Handbooks available in personal collection, including:

The Radio Amateur's Handbook, *A Manual of Amateur Short-Wave Radiotelegraphic Communication*, The American Radio Relay League, Hartford, Conn., 1927. $1.00

The radio amateur's handbook, *THE STANDARD MANUAL OF AMATEUR RADIO COMMUNICATIONS*, The American Radio Relay League, Inc., West Hartford, Connecticut, 1940. $1.00

The radio amateur's handbook, *THE STANDARD MANUAL OF AMATEUR RADIO COMMUNICATION*, The American Radio Relay League, Inc., West Hartford, Connecticut, 1961. $3.50

LINK: ARRL Web site for list of current Q-signals

QN Signals?

The QN signals for amateur net operation were introduced in the late 1930s by W1UE to lighten the burdens of net control operators.

Louise Ramsey Moreau, W3WRE/WB6BBO, in *The Radio Amateur's OPERATING MANUAL*, The American Radio Relay League, Newington, Connecticut, 1966. ■

Robert F. Heytow Memorial Radio Club

www.k9ya.org

telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.

Your Turn...

Like what you're reading in this month's *K9YA Telegraph*? If so, you're in good company, as amateur radio operators in more than 100 countries agree with you. Know what else? Hams just like you write the *K9YA Telegraph*. Hams participating in the enthralling lifestyle that is the amateur radio experience.

These operators want to read your story. Evidenced by your feedback and our expanding worldwide subscriber base we know we've hit on a winning formula: YOU + *K9YA Telegraph* = A Great Read. But without your side of the equation, it just doesn't add up.

Not sure of your writing skills? No problem, the *Telegraph's* staff will edit your manuscript. The important thing is to share your story. Remember: "A good story is a terrible thing to go untold."

http://www.k9ya.org/write_for_us.htm

K9YA Fall Pizza Bash

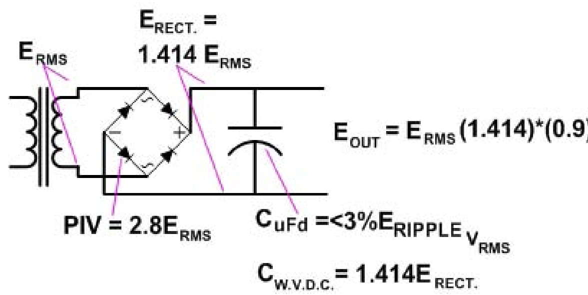
Key, Bug and Paddle—Show 'n Tell

Brown Bros., Mecograph, El-Key, Begali, Black Bouncer, Omnigraph, J-36, Bunnell...

CONTINUED - HIGH VOLTAGE FROM PAGE 3

In the case of energy-storage capacitors put into power supply filter service the voltage rating needs to be adjusted to allow the capacitors to cool sufficiently. A 40% derating is often applied

So with a 2,545 VDC supply, the capacitor voltage rating should be the diode output of 2828 VDC times 1.414, or 4.0KV. Using 6KV energy storage type oil-filled units allows a 3,600 volt maximum application at a 40% derating.



Since many of these units are in the 53uFd variety, paralleling two 53uFd energy storage capacitors with 6KV ratings and 3.6KV working voltage tolerances will yield 106uFd total. This then yields 2.948% ripple voltage percentage. ■

Thanks Stan...

The Robert F. Heytow Memorial Radio Club, publisher of the *K9YA Telegraph*, is now the proud owner of a Yaesu FT-101EE transceiver with all the trimmings. Stan Nudelman, WD9AAO, recently bestowed the rig, FL-2100B amplifier, a YC-601 digital display unit and matching speaker upon us. Stan, our thanks to you and please listen for us during on-air club events.

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Copyright © 2007 Robert F. Heytow Memorial Radio Club. All rights reserved.