OUR 26TH YEAR!

EPARA BEACON

VOL. 6, NUMBER 4 THE OFFICIAL NEWSLETTER OF THE EASTERN PENNSYLVANIA AMATEUR RADIO ASSOCIATION APRIL 2022

NEXT CLUB MEETING: APRIL 14TH

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

Welcome to the EPARA Beacon! This newsletter is published monthly and is the official newsletter of the Eastern Pennsylvania Amateur Radio Association. EPARA has served the amateur radio community in the Pocono Mountains for over 25 years. We have been an ARRL affiliated club since 1995. We offer opportunities for learning and the advancement of skills in the radio art for hams and non-hams alike. EPARA supports Monroe County ARES/RACES in their mission of providing emergency communications for served agencies in Monroe County. Feel free to join us at one of our meetings or operating events during the year. 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. Anyone interested is invited to participate in our meetings and activities.

ZOOM Meeting Info: Meetings begin at 7:30PM!
https://us02web.zoom.us/j/85463346031?pwd=bU1KcVZoaVZiVEUvdjRsUXlNNHZkZz09
Meeting ID: 854 6334 6031 Password: 244632

From The President

The election results are in, I want to congratulate and thank Kevin W3KCF, Scott KC3IAO, and Eric N3SWR for remaining on as EPARA officers for another two-year term. Your work is genuinely appreciated by the membership as well as me. Bill AB3ME has decided to not run for a third term as Vice President, I want to thank him for all the challenging work he has done over the past four years. His contributions to turning EPARA around has been tremendous! We could not of met our goals as a club and organization without his efforts! Filling the vacancy is our new Vice President Bob W3BMM, I am extremely excited to work with Bob moving forward. We have lofty goals for this two-year term, and I know Bob will be a perfect fit and great contributor! Congratulations and thank you to Bob W3BMM our new Vice President.

So, April will bring the start of warmer weather and it's time to get going on some projects. We will be scheduling the antenna repair at the 911 Center during the next meeting, I want to get this done by the end of April so be ready to help. ARES is also moving forward with the installation of an HF station at the Red Cross chapter house, so there is another spring project. The second M2 antenna is in for the EME project so Bob W3BMM and Alex KD2FTA will be working on our EME antenna array. I'm confident we will be successful in making several moon bounce contacts with this setup. We are also working on the grant process to get a new EMCOMM trailer. Lastly, tech classes began on March 16th, we have around a dozen students, and so far, they are doing quite well. Our VE sessions continue to be well attended bringing new people into the hobby of amateur radio. So, there is lots of stuff going on with EPARA.

That's it for now. Our next meeting is on April 14th, and I hope to see you all then.
73, Chris AJ3C

CONTACT INFORMATION

President Chris Saunders AJ3C: aj3c@gmx.com	Vice President Bill Carpenter AB3ME: bill47@ptd.net
Secretary Kevin Forest W3KCF: w3kcf@outlook.com	Treasurer Scott Phelan KC3IAO: kc3iao@hobbyguild.com
Member at Large Eric Weis N3SWR: n3swr@ptd.net	ARES EC Charles Borger KB3JUF KB3JUF@gmail.com

Postal Address:	Web Site:	Send dues to:	Newsletter submissions to:
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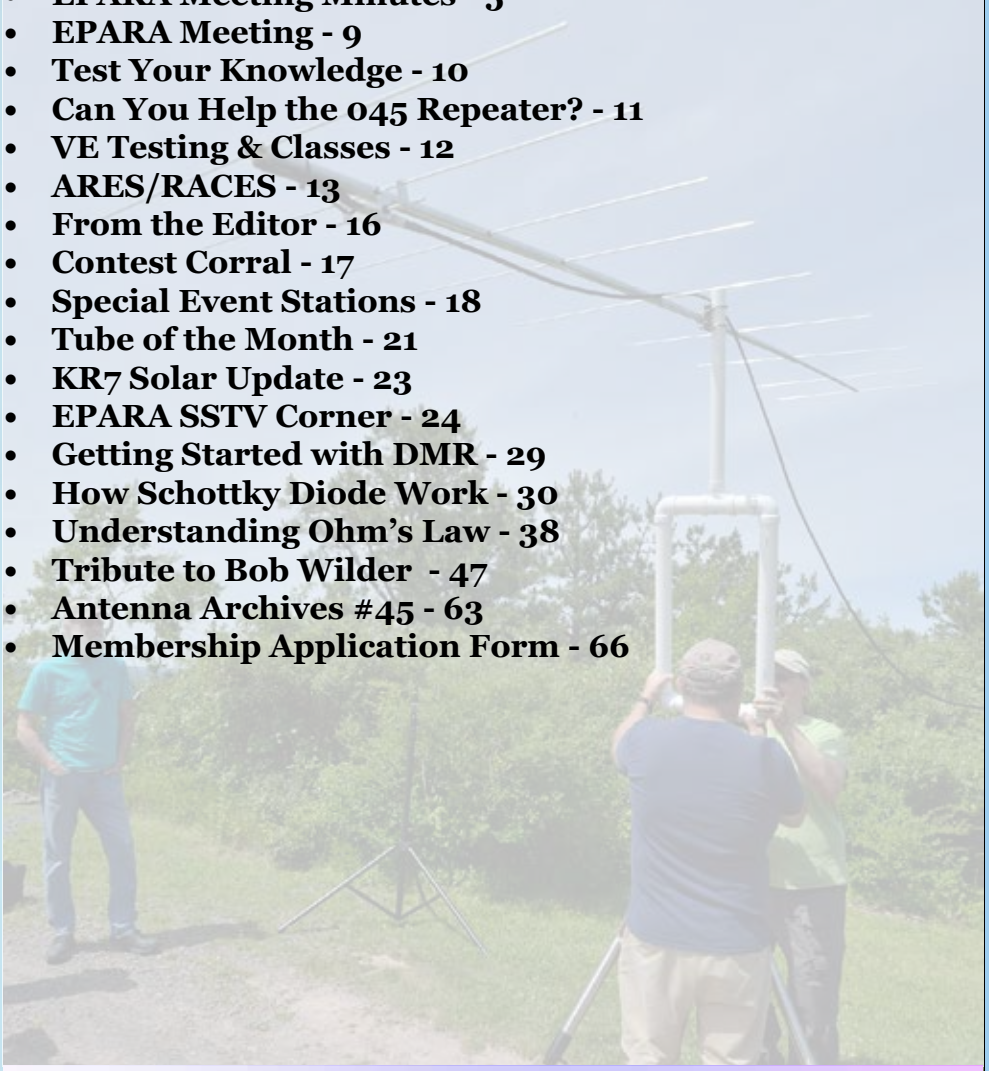
PO Box 521	Email:	PO Box 521	EPARAnewsletter@ptd.net
Sciota, PA 18354	N3IS@qsl.net	Sciota, PA 18354	

What's INSIDE this ISSUE



EPARA Net list

Monroe county ARES-RACES – Sunday's 8:30 PM, 146.865 MHz, PL -100 Hz

The Monday Night Pimple Hill repeater 8:30 PM (Repeater freq = 447.275 with a - 5MHz offset) DMR TECH Net on TG314273* Time Slot 2

SPARK Information/Swap Net – Tuesday's 8:30 PM, 147.045 MHz, PL 131.8 Hz

The Wednesday Night EPARA Hot Spot DMR Rag Chew net at 8:30 PM, TG 3149822* Time Slot 2 (N3IS Talk Group)

EPARA Tech Net – Friday's 8:30 PM, 147.045 MHz, PL +131.8 Hz

*TG = Talk Group

Announcements
AND UPCOMING EVENTS

EPARA Club Dues
Club dues were due January 1st and are temporarily extended due to COVID reasons. For those that missed the chance to stay current, there are two (2) methods available to pay to help make this easy for all. Contact Scott KC3IAO via his email: KC3IAO@hobbyguild.com and you can send him a check or pay via PayPal.

VE Sessions
VE sessions have returned. Please contact Chris AJ3C for dates and info should you require a test session.

Amateur radio Classes
Technician classes are scheduled to begin in March, and General classes in Early summer.

Hamfest!
The date for next years hamfest has been decided and it's to be on Sunday, September 18th, 2022.

EPARA Patches: Club patches are in! For those that ordered them please step forward to collect them. We also have extra just in case …

Rule #1 of Amateur Radio, it is a hobby, unless you figured out a way to fashion a living out of it.
Rule #2 of Amateur Radio, life is not a hobby and typically carries heavy responsibilities of everything that is not a hobby.
Rule #3 of Amateur Radio, never give up a LIFE event for a Ham event. You may make some great memories at the Ham event, but the guilt you may carry missing a LIFE event can be a terribly heavy millstone.
Rule #4 of Amateur Radio, as technology moves forward, so does Ham Radio - do what makes you happiest, experiment with other elements of Ham Radio as LIFE allows.
Rule #5 of Amateur Radio, it is only Ham Radio, when confused always refer to Rule #1 through #4.

EPARA GENERAL MEMBERSHIP MEETING AGENDA

EPARA General Membership Meeting Agenda
March *10th* 2022

General Membership Meeting 7:32Pm

Open meeting:

Meeting called to order at 7:32 pm on March 10th 2022 by Chris AJ3C

Declaration of Quorum.
Total members attending: 21 Members at 911 Center: 16 - Zoom members present: 5 - Visitors present: 3

Pledge of Allegiance / Moment of silence:

Membership Meeting - Minutes February 10th, 2022
Secretary - Kevin W3KCF:

Meeting minutes for February 10th, 2022 were posted on the EPARA website. Chris – AJ3C asked members if they had seen and read the minutes from our previous meeting. He then asked if there were any questions or objections to the minutes as they were presented. With no objections, Chris asked for a motion to accept the minutes as presented:

Motion to accept minutes as presented: By Eric – N3SWR 2nd by Bob – W3BMM Motion Passed

Treasurers report:

Treasures report read by Scott, KC3IAO

Bank Account Statement Opening Balance (2/28/22 statement.): $4264.83
Expenses: None.

Income: $50.00 Dues; KD2FTD (20), KC3OLB (15), KC3SCI (15). $0.16 in bank interest.
Closing Balance: $4313.99

Our PayPal Account:
February 28, 2022: Statement opening balance of $194.10
Expenses: None

Income (PayPal):

$145.00 Dues; WK2RP (20), KD3CEU (20), KC3SRB (20), W3KCF (15), N3SWR (20), W3INK(10) | W3BMM (20), KC3BPZ (20).
$5.00 Donation.

Fees: $5.05

Closing balance of $339.05

Motion to accept reports by Bill – AB3ME 2nd by ED – KC3OLB Motion Passed

Correspondence:

Received confirmation letter granting approval to use the state Park for our events. Chris stated, we now have to send them a letter showing we have liability insurance ($1,000,000) to cover the club.

New Opportunities for the Technician (See page 4)

EPARA GENERAL MEMBERSHIP MEETING AGENDA

Reports of officers and committee's:

Bill AB3ME – Program Committee:

Bill stated he had nothing new, but he was looking for presentation material available on the net that would be useful to the club. He also asked again for members to step up and provide some sort of presentation.

Chris (AJ3C) mentioned he was doing a presentation after the meeting tonight on contesting. He hopes to spark interest in this area to get folks to engage more with their radios.

Charlie KB3JUF – ARES/RACES:

Charlie reiterated that all involved in ARES need to be motivated. Make sure you attend our meetings on the 4th Friday of the month and keep your Task Books up to date. Complete any and all training required and stay enthused. Charlie also stated, please check in on the Sunday Night ARES Net.

Ruth Ann, W9FBO – PIO:

Ruth Ann said she is putting information out for events the club has planned for the year. She also mentioned that many places are now charging to advertise. She is not discouraged and is working to find alternative means to get the information out.

Chris AJ3C -- Instruction and Training:

Our Tech class is scheduled to begin on March 16th, class is listed on the ARRL website. Chris said there are currently 11 folks signed up and hopes they will all continue to the end.

In June, Chris mentioned we would be starting a General Class. Start date has not been finalized yet.

Chris AJ3C – Website:

Nothing to Report

Bob W3BMM – Social Media:

Bob said that he and his wife are actively involved in managing our social media accounts. Facebook is up today and adding to it daily. Bob asked for feedback and suggestions on what information to add to the account.

Al, KB3OVB: Membership:

Current membership is 69. Our 2022 Dues are due and payment can be made by check or PayPal. Any member who does not pay their dues by March 31st will be removed from the membership rolls.

Eastern Pennsylvania Amateur Radio Association
P.O. Box 521, Sciota, Pa 18354

KC3IAO@hobbyguild.com

New Opportunities for the Technician (See page 4)

EPARA GENERAL MEMBERSHIP MEETING AGENDA

Eric N3SWR – Newsletter:

Eric said there was nothing new and asked if anyone had articles, they'd like to share, please send them to him at eparanewsletter@ptd.net.

Sat-Com / EME Group:

The second M2 2M9SSB antenna has been ordered, and we are anxiously awaiting shipment. Alex said we are working on ways to mount the two antenna and doesn't think there will be any problems. He also said once the antenna project is complete, he will reach out to those participating and start getting schedules out. John donated a tri-pod to mount the antenna. Many thanks, it was much appreciated by the club.

Old business:

2020 / 2021 audit:

The 2020 budget audit will be conducted along with the 2021 audit in January 2022. Audit team will consist of Edward KC3OLB, Eric N3SWR, and Bill AB3ME Scott is in the process of preparing the material and will be available soon.

OCF Dipole Repair

Replacement or the antenna rope for the OCF Dipole was postponed due to inclement weather. We need to reschedule this tonight. Chris hopes this completed in April.

Any other old business:

None

New business:

Officer Nominations and Elections:

Nominations for President, Vice President, Secretary, Treasurer, and the Board Member at Large are now open.

We will now call for additional nominations and hold elections.

Nominations are:

Scott KC3AIO – Treasurer,
Kevin W3KCF – Secretary,
Eric N3SWR – Board Member at Large,
Chris AJ3C – President,
Bob-W3BMM - Vice-President (Bob accepted the nomination)

Elections will be conducted in accordance with EPARA Bylaws and constitution.

Election Results: All members present and on Zoom. Vote for board members was unanimous

President, Chris – AJ3C
Vice President, Bob – W3BMM
Treasurer, Scott – KC3AIO
Secretary, Kevin – W3KCF
Board Member at Large, Eric – N3SWR

New Opportunities for the Technician (See page 4)

EPARA GENERAL MEMBERSHIP MEETING AGENDA

Any Other New Business

Alex would like to form an exploratory committee to look into utilizing YouTube, Rumble or other platforms to expand the capabilities of the club.

Members volunteering to be part of the committee:

Bob W3BMM
Eric – N3SWR
Alex – KD2FTA
Ruth Ann – W9FBO

Votes / New members:

None

Announcements:

Bill informed the club members there were multiple antennas and Motorola speakers outside the classroom door, free for the taking after the meeting.

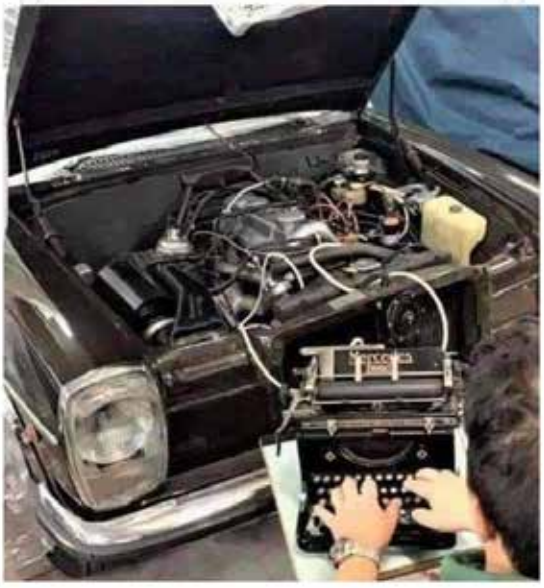
Any Additional Announcements

Adjournment…

Meeting was adjourned at 2035 Motion to close by Charlie – KB3JUF 2nd by Brett – NV3I Motion Passed

Secretary
Kevin Forrest
W3KCF

When the young mechanics ask you how you did tuning before laptops, show them this!



New Opportunities for the Technician (See page 4)

EPARA MEETING

TEST YOUR KNOWLEDGE!

What do the letters I and Q in I/Q Modulation represent?

A. Inactive and Quiescent
B. Instantaneous and Quasi-stable
C. Instantaneous and Quenched
D. In-phase and Quadrature

Last month's answer was, C. Install parasitic suppressors and/or neutralize the stage. A parasitic suppressor adds resistance to a circuit path in an amplifier or oscillator. It also alters the resonant frequency where the suppressor is inserted. Both of these effects reduce or prevent unwanted oscillations.

DMR
DIGITAL MOBILE RADIO

The EPARA HOT SPOT Wednesday night DMR rag chew is here!

Wednesday evenings at 8:30 PM local, 0:30 UTC!

Tune your DMR radios to Talk Group 3149822 TS2 to join the

N3IS EPARA Hot Spot rag chew DMR net.

Listen to the Tech Net Friday nights on the 147.045 repeater to learn more about joining this net and for upcoming ZOOM meetings announcements to learn more about programing your radios and hot spots!

To: All EPARA Members and Users of the WA3MDP Repeater System

Re: The 147.045 Repeater Malicious Interference

Over the past few years the 147.045 repeater here in Monroe County has been plagued with an increasing amount of deliberate and malicious interference. While some of this interference has been directed at some specific operators the end results has been a wide area large foot print repeater that get little to no use except for a few regularly scheduled nets.

This is not a problem that is special to just the 147.045 system. Nationwide FM repeaters (and HF bands for the matter) are also being interfered with deliberately and the FCC lacks the manpower and ability to search out the people causing the issues.

The ARRL in conjunction with the FCC reorganized the Volunteer Monitor program a while back to assist in tracking down QRM on all of the amateur bands. While some progress has been made there obviously is a lot more to be done.

A small dedicated group has been tracking the QRM locally by various means for over a year. While some of the sources have been narrowed down it is now time to get the rest of the local ham community involved.

What we are asking people to do is when you listen to the 147.045 repeater also listen to the "input" frequency which is 147.645 (no tone is required). If you should hear any of the malicious and deliberate QRM occurring, do the following:

1) DO NOT ENGAGE IN A CONVERSATION WITH THESE INDIVIDUALS.

2) If you hear farting, cat calls, high pitch cartoon voices, music, etc write down the DATE, TIME, YOUR LOCATION and APPROX STRENGTH OF THE QRM STATION. If you have a beam antenna and can provide a heading that would be great too!

3) Send your listening report to the email address LIDSonzero45@gmail.com.

ALL information will be kept confidential and with this added information we hope to narrow down the locations that have already been identified.

In closing let me assure you that the people looking for the sources of the interference are doing so with the blessing of the repeater owners. It is our desire to see the 147.045 repeater system return to the quality repeater that it used to be many years ago.

Thank you in advance for your cooperation.

VE Testing & Classes

Anyone looking to take an exam is encouraged to contact Chris AJ3C to preregister at least one (1) week in advance of the test date. If you have any questions or to register, Chris can be reached via email AJ3C@GMX.COM. VE sessions are being held the 4th Friday of each month at 6pm at the Monroe County 911 training center. Seating is limited for the time being so we can follow the health guidelines set forth by the county and state.

VE sessions are back - contact Chris AJ3C for further information!

AMATEUR RADIO CLASSES

ARES/RACES meetings are now being held on the fourth Friday of each month at 7PM. The meetings are once again being held at the 911 call center. These meetings will serve as training sessions covering several aspects of amateur radio emergency communications. We will start with traffic handling and the use of Radiograms and the ICS 213 general message form. Future sessions will cover the use of several ICS forms and the setup and use of digital communication modes including Winlink, Packet Radio, APRS, and the FLDIGI software program. Meeting are open to all, you do not need to be an ARES/RACES team member to attend.

Want to Put Your Ham Radio Skills to Good Use? Get Involved in

EmComm!

One of the missions of the Amateur Radio Service is for amateur radio operators to provide public service and emergency communications (EmComm) when needed. We act as a voluntary noncommercial communication service and pitch in to help our communities and first responders.

So, what organizations are out there for community-minded amateur radio operators and what can we do to help?

Join In

One good entry point into public service and emergency communications is to join SkyWarn, a volunteer program run by the National Weather Service (NWS) with more than 290,000 trained severe weather spotters. These volunteers help keep their local communities safe by providing timely and accurate reports of severe weather to the NWS.

Not all of these weather spotters are amateur radio operators, but many are. Amateur radio communications can report severe weather in real time. When severe weather is imminent, SkyWarn spotters are deployed to the areas where severe weather is expected. A net is activated on a local repeater and SkyWarn spotters who are Hams check into that net. The net control advises the spotters when they might expect to see severe weather, and the spotters report conditions such as horizontal winds, large hail, rotating clouds, and even tornadoes.

To become a SkyWarn spotter, you must attend a class that teaches you the basics of severe weather, how to identify potentially severe weather features, and how to report them. The classes are free and typically last about two hours. Check your local NWS website for class schedules.

ARES/RACES/CERT

Another way Hams can become involved in public service and emergency communication is to join an ARES or RACES group. Technically, these are two separate services—the Amateur Radio Emergency Service (ARES) is run by the ARRL, while the Radio Amateur Civil Emergency Service (RACES) is a function of the Federal Emergency Management Agency (FEMA). Amateur radio operators who typically take part in one also take part in the other.

To participate in RACES, you'll need to take some self-study FEMA courses in emergency preparedness and emergency-response protocols. Classes may or may not be required to participate in ARES. These requirements are set by each individual ARES group. To get involved with either ARES or RACES, ask your local club members when they meet. You can also contact the Section Manager or Emergency Coordinator for your ARRL section. To contact them, click here and find the section that you live in.

Amateur radio operators belonging to ARES (and its predecessor, the Amateur Radio Emergency Corps) have responded to local and regional disasters since the 1930s, including the 9/11 attacks, and Hurricane Katrina and Hurricane Michael, among others.

The Community Emergency Response Team (CERT) program trains volunteers—both Hams and non-hams—how to be prepared for disasters that may impact their area. They provide basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a nationwide approach to volunteer training and organization that first responders can rely on during disaster situations, allowing them to focus on more complex tasks.

What Gear Do You Need?

For most local needs, a 5-watt VHF/UHF handheld transceiver is sufficient for utilizing local repeaters to relay messages and report on conditions as they exist. Replacing the radio's stock antenna with a higher gain antenna or connecting it to a magnetic mount on a vehicle will increase range significantly.

Even better is a VHF/UHF mobile radio installed in your vehicle with 25 or more watts output and a good mobile antenna. In the event the repeater loses power, you can talk over a considerably larger area in simplex mode with the extra power and a good mobile antenna.

If you work with an ARES or RACES group, you may be asked to act as a county control station. In this capacity, you'd need both HF and VHF transceivers in a fixed location, such as your house, with a good antenna system and emergency power capabilities like a generator or batteries. This allows you to make contacts within your state and throughout the U.S.

Helping Hams

Ham radio can play a key role in emergency situations. Here are a few examples:

- Ham radio connected firefighters and police departments, Red Cross workers, and other emergency personnel during the 2003 blackout that affected the northeast United States.
- In 2017, fifty amateur radio operators were dispatched to Puerto Rico to provide communications services in the wake of Hurricane Maria.
- Amateur radio operators provided communications in the aftermath of the Boston Marathon bombing when cellphone systems became overloaded.

- During Hurricane Katrina, more than one thousand ARES volunteers assisted in the aftermath and provided communications for the American Red Cross.
- During the devastating Oklahoma tornado outbreak that began in May 1999, amateur radio operators—giving timely ground-truth reports of severe weather—played a critical role in the warning and decision-making processes at the NWS Weather Forecast Office in Norman, Oklahoma.
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Credit: https://www.onallbands.com/want-to-put-your-ham-radio-skills-to-good-use-get-involved-in-emcomm/

From the Editor

Eric, N3SWR

Well so much for Spring around the corner. Who ordered this weather? Old man winter seems like sticking around for a while yet and I'm getting a bit unraveled. I placed a quick ad/reference to the MB Glick surplus outfit right on the front cover so if anyone is looking for a place to snoop around for your hobby needs, give it a try as they may help you a bunch. I'll also post a quick ad right below this to another spot that I wandered around in last year and their selection was outstanding too. There's a huge amount of material to pick from and it changes often I'm sure. The best part is you're allowed to pick through anything they have and buy it at a very reasonable cost. Lastly I included an article about Bob Widler - an engineer that was a prankster and pushed the limits of thinking back when voltage regulators and op-amps were being designed and combined into a single chip. You should enjoy that. That's it for now :) Till next month, 73
Eric N3SWR

"Basic research is what I am doing when I don't know what I am doing."
- Wernher von Braun.

Topics of Interest

Have an idea you would like to share with your fellow hams? Interested in one of the new exotic digital modes and would like to get others interested in it too? Found a blog somewhere that you think others would find interesting? Members are encouraged to submit items of interest for publication. Submitted articles (are suggested) to be no more than a page or two in length and may be edited for content and grammar. The EPARA officers and newsletter editor reserve the right to determine which items will be included in The Beacon. The deadline for publication is the 15th of the month. The publication date will be at the end of each month. 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.

If you've taken pictures at an event and would like to submit them for possible inclusion in the newsletter, forward them to the newsletter editor. Please send action shots, if possible. Faces are often preferable over the backs of heads. Many hams may be way too overweight, so please consider using a wide-angled lens.

Disclaimer

The Beacon is not representative of the views or opinions of the whole organization, and such views and opinions expressed herein are of the individual author(s).

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

Contest Corral

April 2022

Check for updates and a downloadable PDF version online at **www.arrl.org/contest-calendar**.
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
2	0800	2	2000	1.8-28	RSGB FT4 International Activity Day	Dig	Signal report, 4-char grid square	www.rsgbcc.org/hf/
2	1000	3	0400	14	PODXS 070 Club PSK 31 Flavors	Dig	SPC, mbr or name	www.podxs070.com
2	1200	3	1200	3.5-28	EA RTTY Contest	Dig	RSQ, EA province or serial	concursos.ure.es/en
2	1400	3	0200	1.8-144	Louisiana QSO Party	CW Ph Dig	RS(T), LA Parish or SPC	laqp.louisianacontestclub.org
2	1400	3	0200	1.8-144	Mississippi QSO Party	CW Ph Dig	RS(T), MS county or SPC	arrl.org/sections/view/mississippi
2	1400	3	2000	1.8-UHF	Missouri QSO Party	CW Ph Dig	RS(T), MO county or SPC	www.w0ma.org/index.php
2	1400	3	2200	3.5-28	Florida State Parks on the Air	CW Ph Dig	Park ID or SPC	flspota.org/rules
2	1500	3	1500	1.8-28	SP DX Contest	CW Ph	RS(T), SP province or serial	spdxcontest.pzk.org.pl/2021
5	0100	5	0300	3.5-28	ARS Spartan Sprint	CW	RST, SPC, power	arsqrp.blogspot.com
6	1200	6	1300	1.8-28	A1Club AWT	CW	RST, name	a1club.org/contest/awt
6	2000	6	2100	3.5	UKEICC 80-Meter Contest	Ph	6-char grid square	www.ukeicc.com/80m-rules.php
7	0000	8	0300	7	Walk for the Bacon QRP Contest	CW	RST, SPC, name, mbr or power	qrpcontest.com/pigwalk40
7	2000	7	2200	1.8-50	SKCC Sprint Europe	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
9	0000	9	0600	1.8-28	QRP ARCI Spring QSO Party	CW	RST, SPC, mbr or power	qrparci.org
9	0700	10	1300	1.8-28	JIDX CW Contest	CW	RST, JA prefecture or CQ zone	www.jidx.org/jidxrule-e.html
9	1200	10	1100	3.5-28	DIG QSO Party, CW	CW	RST, mbr (if any)	diplom-interessen-gruppe.info
9	1200	10	1200	1.8-28	OK/OM DX Contest, SSB	Ph	RS, OK/OM county code or serial	okomdx.crk.cz
9	1200	10	1200	3.5-28	FTn DX Contest	Dig	4-char grid square	europeanft8club.wordpress.com
9	1200	10	1800	3.5-28	IG-RY World Wide RTTY Contest	Dig	RST, 4-digit year first licensed	www.ig-ry.de/ig-ry-ww-contest
9	1200	10	2359	1.8-50	SKCC Weekend Sprintathon	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
9	1300	10	2200	1.8-UHF	Nebraska QSO Party	CW Ph	NE county or SPC (FT8: grid)	nebraskaqsoparty.com
9	1400	10	0200	1.8-144	New Mexico QSO Party	CW Ph Dig	Name, NM county or SPC	www.newmexicoqsoparty.org
9	1400	10	2000	All	Texas State Parks on the Air	CW Ph Dig	RS(T), park ID or SPC	www.tspota.org
9	1800	10	1800	1.8-144	North Dakota QSO Party	CW Ph	RS(T), ND county or SPC	www.ndarrlsection.com
9	1800	10	2359	1.8-50	Georgia QSO Party	CW Ph	RS(T), GA county or SPC	gaqsoparty.com
9	2100	10	2100	1.8-28	Yuri Gagarin International DX Contest	CW	RST, ITU zone	gc.qst.ru/en/section/32
10	0700	10	1900	3.5-14	International Vintage Contest HF	CW Ph	RS(T), 6-char grid square	arirmini.jimdofree.com
10	1000	10	2100	3.5-14	WAB 3.5/7/14 MHz Data Modes	Dig	RS, serial, WAB square or country	wab.intermip.net/Contests.php
10	1800	10	2359	3.5-28	ARRL Rookie Roundup, SSB	Ph	Name, year first licensed, state/province/XE area/DX	www.arrl.org/rookie-roundup
10	1900	10	2030	3.5	RSGB RoLo SSB	Ph	RS, previous 6-char grid received	www.rsgbcc.org/hf
11	0000	11	0200	1.8-28	4 States QRP Group Second Sunday	CW Ph	RS(T), SPC, mbr or power	www.4sqrp.com
11	1900	11	2030	3.5-14	RSGB FT4 Contest	Dig	4-char grid square	www.rsgbcc.org/hf
11	1900	11	2300	144	144 MHz Spring Sprint	CW Ph Dig	4-char grid square	sites.google.com/site/springvhfupsprints
13	0030	13	0230	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or power	naqcc.info
15	2100	16	2100	1.8-28	Holyland DX Contest	CW Ph Dig	RS(T), 4X area or serial	iarc.org/iarc/#HolylandContest
16	0500	16	0859	3.5, 7	ES Open HF Championship	CW Ph	RS(T), serial	www.erau.ee
16	0600	17	0559	3.5-28	Worked All Provinces of China	CW Ph	RS(T), BY province or serial	www.mulandxc.com
16	0700	17	0659	3.5-28	YU DX Contest	CW Ph	RS(T), YU/YT county or serial	www.yudx.yu1srs.org.rs
16	0900	17	2359	3.5-28	CQMM DX Contest	CW	RST, continent abbreviation	www.cqmmdx.com/rules
16	1600	17	0400	3.5-28	Michigan QSO Party	CW Ph	Serial, MI county or SPC	www.miqp.org/Rules.htm
16	1700	17	1200	3.5-28	EA-QRP CW Contest	CW	RST, category, "M" if member	www.eaqrp.com
16	1800	16	2159	1.8-50	Feld Hell Sprint	Dig	RST, mbr (if any), SPC, grid	sites.google.com/site/feldhellclub
16	1800	17	1800	1.8-144	Ontario QSO Party	CW Ph	RS(T), ON county or SPC	va3cco.com/oqp/rules.htm
17	0700	17	1900	1.8-28	Dutch PACCdigi Contest	Dig	RST, PA province or serial	www.veron.nl
17	1200	17	2000	1.8-144	Quebec QSO Party	CW Ph	RS(T), QC zone or SPC	wp1.quebecqsoparty.org
17	2300	18	0100	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or power	qrpcontest.com/pigrun
18	1500	18	1730	3.5,7	DARC Easter Contest	CW Ph	RS(T), DOK or serial	darc.de/der-club/referate/conteste
19	1900	19	2300	222	222 MHz Spring Sprint	CW Ph Dig	4-char grid square	sites.google.com/site/springvhfupsprints
21	0000	22	0300	14	Walk for the Bacon QRP Contest	CW	RST, SPC, name, mbr or power	qrpcontest.com/pigwalk20
23	0001	24	2359	28	10-10 International Spring Contest, Digital	Dig	Name, mbr or "0," SPC	www.ten-ten.org
23	0800	23	1800	3.5-21	QRP to the Field	CW Ph	RST, SPC, name/SOTA	www.zianet.com/qrp
23	1200	24	1200	3.5-28	SP DX RTTY Contest	Dig	RST, SP province or serial	www.pkrvg.org
23	1300	24	1259	1.8-28	Helvetia Contest	CW Ph Dig	RS(T), HB canton or serial	www.uska.ch/contest
24	0000	24	0400	3.5-14	North American SSB Sprint	Ph	Other's call, your call, serial, name, SPC	ssbsprint.com/rules
24	1700	24	2059	3.5-28	BARTG Sprint 75	Dig	Serial	bartg.org.uk
27	0000	27	0200	1.8-50	SKCC Sprint	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
27	1900	27	2300	432	432 MHz Spring Sprint	CW Ph Dig	4-char grid square	sites.google.com/site/springvhfupsprints
27	2000	27	2100	3.5	UKEICC 80-Meter Contest	CW	6-char grid square	ukeicc.com/80m-rules.php
30	0600	1	2359	2.3 GHz +	SBMS 2.3 GHz and Up Contest	CW Ph Dig	6-char grid square	n6nb.com/sbmsrules.htm
30	1200	1	1159	1.8-28	Russian WW MultiMode Contest	CW Ph Dig	RST(Q), UA oblast or serial	www.rdrclub.ru
30	1200	1	1200	3.5-28	UK/EI DX Contest, CW	CW	RST, serial, UK/EI district code, serial	ukeicc.com/dx-contest-rules.php
30	1600	1	2159	7-28	Florida QSO Party	CW Ph	RS(T), FL county or SPC	floridaqsoparty.org/rules

There are a number of weekly contests not included in the table above. For more info, visit: **www.qrpfoxhunt.org**, **www.ncccsprint.com**, and **www.cwops.org**.
All dates and times 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.*

Amateur Radio Special Event Stations!

04/01/2022 | Autism Awareness Month

Apr 1-Apr 15, 0000Z-2359Z, WA3MD , Pasadena, MD. WA3MD . 3.573 7.074 14.074 21.074. QSL. Frank Mathias, 1849 Choptank Rd, Pasadena, MD 21122.

04/05/2022 | Sun-N-Fun Aerospace Expo Special Event Station

Apr 5-Apr 10, 0800Z-1700Z, W4S, Lakeland, FL. Lakeland Amateur Radio Club (LARC). 2, 20, and 40 meters; other bands and modes possible.. QSL. LARC, P.O. Box 90853, Lakeland, FL 33804. www.lakelandarc.org

04/09/2022 | Texas State Parks on the Air

Apr 9-Apr 10, 1400Z-0200Z, K5LRK, The Colony, TX. Lake Area Amateur Radio Klub. 80M-3.825MHz, 40M-7.225MHz, 20M-14.225MHz; CW bottom of band +40 kHz; phone general segment and 28.350; VHF 50.200 and 144.200 15M-21.325MHz,. QSL. Ken Rainey, AC5EZ, 529 Kenilworth Ave., Oak Point, TX 75068. The Lake Area Amateur Radio Club (K5LRK) is organizing the Texas State Parks on the Air event this year. The event will take place on April 9 and 10, 2022 (4/9 1400 to 4/10 0200, and 4/10 1400 to 2000. The event website is tspota.org. On the website can be found the rules and list of Texas State Parks designators. We hope your club will participate in this event this year by trying to make contact with Texas HAMs activating a state park in Texas. Questions can be directed to info@k5lrk.com https://www.tspota.org

04/09/2022 | USS Midway Museum Ship special Event: Doolittle Raid

Apr 9, 1600Z-2300Z, NI6IW, San Diego, CA. USS Midway (CV-41) Museum Ship. 14.320 7.250 14.070 (PSK31) DSTAR (Papa Sys Rept). QSL. USS Midway Museum Ship COMEDTRA, 910 N Harbor Drive, San Diego, CA 92101. www.qrz.com/db/ni6iw

04/10/2022 | Spaceport America Open House New Mexico

Apr 10, 1700Z-2100Z, NM5HD, Rio Rancho, NM. High Desert Amateur Radio Club of New Mexico Inc. 14.235 14.265 7.185 146.460. Certificate. David Ham, 5052 Mira Vista Dr NE, Rio Rancho, NM 87144. nm5hd.org

04/14/2022 | Loretta Lynn 90th Birthday

Apr 14, 0000Z-2359Z, K4L, Paintsville, KY. Amateur Radio Community Service. 7.235. QSL. Amateur Radio Community Service K4L Special Event., P.O. Box 75, Paintsville, KY 41240. A special event station honoring Ms Lynn from her Birthplace and Childhood home in Butcher Holler at Van Lear Kentucky. Ms. Lynn during her career received many awards including Grammys. She is noted for her famous song of "Coal Miner's Daughter." The special event station will be operating on other hf bands on LSB, USB,CW, and digital modes. Also operating on 2 and 6 meter simplex. In addition to the previous modes the group will be on the KY4ARC 147.225 repeater with a positive offset and a pl of 127.3. n4kju@yahoo.com

04/14/2022 | Maritime Radio Day 2022

Apr 14-Apr 15, 1200Z-2200Z, various, Various, OT. Maritime Radio Day. CW only; 160 80 40 20 15 10 meters, plus WARC. Certificate & QSL. see website, for QSL, information, OT. Various call signs will be used from various worldwide locations. This is an operating event. See website for rules. maritimeradio.pro/maritimeradioday

04/15/2022 | 80th Anniversary of the Doolittle Raid

Apr 15-Apr 18, 1400Z-2359Z, N4D, Mesa, AZ. Superstition Amateur Radio Club, Inc.. 3.893 7.225 14.330 21.337. QSL. SES N4D, c/o Superstition ARC, P.O. Box 21522, Mesa, AZ 85277-1522. Please include SASE for QSL card. https://www.superstitionarc.org

04/16/2022 | 160th Anniversary of the Great Locomotive Chase

Apr 16, 1400Z-1800Z, W4ABZ, Ringgold, GA. Ringgold Amateur Radio Club. 7.265 14.265. QSL.

Amateur Radio Special Event Stations!

Jim Skeen, 224 Smith Liner Rd., Chickamauga, GA 30707. Send SASE for QSL card.

04/16/2022 | Whiskey 4 Moonshine

Apr 16-Apr 30, 0000Z-2359Z, W4M, Boones Mill, VA. AA4SS. 7.215 14.250 18.135 50.125. QSL. Timothy Boyd, AA4SS, 2201 Green Level Rd, Boones Mill, VA 24065. W4M ("Whiskey 4 MOONSHINE") will operate from April 15 through April 30 2022 on ALL HF bands (depending upon volunteers preferences and equipment) using phone, digital, and cw modes. Operations will take place in Franklin and surrounding counties https://whiskey4moonshine.wordpress.com

04/18/2022 | 80th Anniversary Doolittle Raid on Tokyo

Apr 18, 1400Z-2359Z, NA1KW, Doolittle, MO. North American Kilowatt Club. 7.178 14.228; 20 and 40 meters SSB. Certificate & QSL. Charles Doolittle, N1SPX, 2600 Davis St., Hannibal, MO 63401. https://www.na1kw.com

04/18/2022 | World Amateur Radio Day

Apr 18-Apr 19, 1700Z-0030Z, W0W, Las Vegas, NV. NARRI *World* EchoLink Conference VoIP. 146.520 441.500. Certificate. Thomas Harrington , 636 West 24th Street , Ogden, UT 84401. Look for W0W on www.qrz.com to Obtain a QSL card and for information. Pleas vist WWW.WRN-WFN.COM for information and WWW.NARIVOIP.COM for information on the Echolink System Echolink Conference *World* on cellphone app and PC or #479886 IRLP 9251 OR Alstarlink via WV8CW #43609 www.wrn-wfn.com

04/18/2022 | World Amateur Radio Day

Apr 18-Apr 19, 1500Z-0030Z, W7W, Ogden, UT. Narrivoip.com/WRN-WFN.COM . 28.400 14.074 7.074 3.920. QSL. THOMAS, HARRINGTON , 636 W 24th street , Ogden, UT 84401. WORLD AMATEUR RADIO DAY on HF voice Mix mode of Voice and FT-8 will be logging via n1mm and looking forward to connecting with many Hams Around the world. www.wrn-wfn.com

04/18/2022 | World Amateur Radio Day

Apr 18, 1400Z-2000Z, W2NPT, Fair Lawn, NJ. Fair Lawn Amateur Radio Club. 14.250 7.250 14.035 7.035. QSL. Fair Lawn Amateur Radio Club, 10-10 20th Street, Fair Lawn, NJ 07410. FairLawnARC.org

04/18/2022 | World Amateur Radio Day 2022

Apr 18-Apr 19, 1300Z-0500Z, W2W, Rochester, NY. ROC-HAM. ROC-HAM/EchoLiink 531091; ALLSTAR 2585,47620,47918; other EchoLink conferences will be connected for this. QSL. John Derycke, W2JLD, 85 Amherst St. Apt. 2, Rochester, NY 14607. 7th annual VoIP Event/Largest VoIP special event www.roc-ham.net/ward-2022

04/19/2022 | Baker to Vegas LAPD Challenge Race

Apr 19-Apr 20, 0000Z-2359Z, K6V, Baker, CA. West Valley Amateur Radio Club. 147.465 223.440 445.510. Certificate. West Valley ARC, 5403 N. Annie Ct., Litchfield Park, AZ 85340. bakervegas.net

04/21/2022 | San Jacinto Day

Apr 21-Apr 24, 1200Z-2359Z, K5T, Nacogdoches, TX. Nacogdoches Amateur Radio Club. 3.75 7.230 14.275 21.240. QSL. Nacogdoches ARC, 167 CR 2093, Nacogdoches, TX 75965. All contacts confirmed via LOTW. Special QSL card available for SASE. w5nac.com

04/22/2022 | 58th Annual West Point Scout Camporee

Apr 22-Apr 25, 0000Z-2359Z, W2P, West Point, NY. Ten Mile River Scout Museum ARC. 18.158 14.258 7.258 3.858. QSL. James Gallo, 149 Marine Avenue, 6F, Brooklyn, NY 11209. After two years lost to Covid we are exited to work the West Point MA Annual Scout Camporee again and hope to have more Scouts then ever in 2022.

04/23/2022 | 50th Anniversary of Apollo 16

Apr 23-Apr 27, 1400Z-2359Z, W5RRR,NN4SA,+, Various. NASA On the Air (NOTA). 14.045 14.271.

Amateur Radio Special Event Stations!

QSL. see each club QRZ page, na, na. NASA On The Air (NOTA) is back for 2022. We'll be operating from various NASA centers in commemoration of Apollo 16's 50th Anniversary, and later other milestones throughout the year. Info/updates as well as tracking and scoring will be available at nasaontheair.wordpress.com. Individual clubs will provide QSL information at their QRZ.com pages. nasaontheair.wordpress.com

04/23/2022 | Remembering the 80th Anniversary of the Doolittle Raid

Apr 23, 1500Z-1900Z, NE1PL, Fall River, MA. USNR. 14.259; 40 meters. QSL. Rick Emord, KB1TEE, 135 Wareham St., Middleboro, MA 02344. We will be on 20 and 40 meters and other bands as equipment and people allow, phone, and digital. www.ne1pl.org

04/23/2022 | WHOA weekend Scouts BSA

Apr 23, 1400Z-2000Z, W1M, Russell, MA. Western Mass Council--Scouts BSA. 7.190 10.115 14.060 14.290. QSL. Tom Barker, WA1HRH, 329 Faraway Road, Whitefield, NH 03598. Monthly seasonal outdoor activities for scouts and the general public including "ham radio in the woods". Paper logging. Qsl via SASE and eqsl.

04/29/2022 | Handiham 55th Anniversary Special Event

Apr 29-May 1, 1900Z-1900Z, W0ZSW, Minneapolis, MN. Handiham Radio Club. 14,265.000 7,040.000. QSL. Handiham Program, 3915 Golden Valley Road, Mail Route 78446, Minneapolis, MN 55422. On Saturday, April 30th, the Handiham Program will celebrate its 55th anniversary of helping people with disabilities get involved in the amateur radio hobby. This is a pretty special accomplishment for any organization! Listen out for CQ Handiham 55 on phone and CW! handiham.net

04/30/2022 | Amargosa Days

Apr 30, 1700Z-2359Z, NV7AV, Amargosa Valley, NV. Amargosa Amateur Radio Club. 7.250 14.280 18.150. QSL. AARC, P.O. Box 101, Amargosa Valley, NV 89020. www.amargosa-hams.org

04/30/2022 | Hams for PanCAN

Apr 30-May 1, 1400Z-2020Z, N3P, New Kensington, PA. WQ3Q. 3.960. 7.172. Certificate & QSL. Richard Ryba /PanCAN, 2777 Leechburg Rd., New Kensington, PA 15068. This special event station is set up to raise awareness and support for pancreatic cancer research and resources for patients through PanCAN Purple Stride Day. in Pittsburgh. https://secure.pancan.org/site/TR/PurpleStride/PurpleStride?px=3163046&pg=personal&fr_id=2357 rybar1949@gmail.com

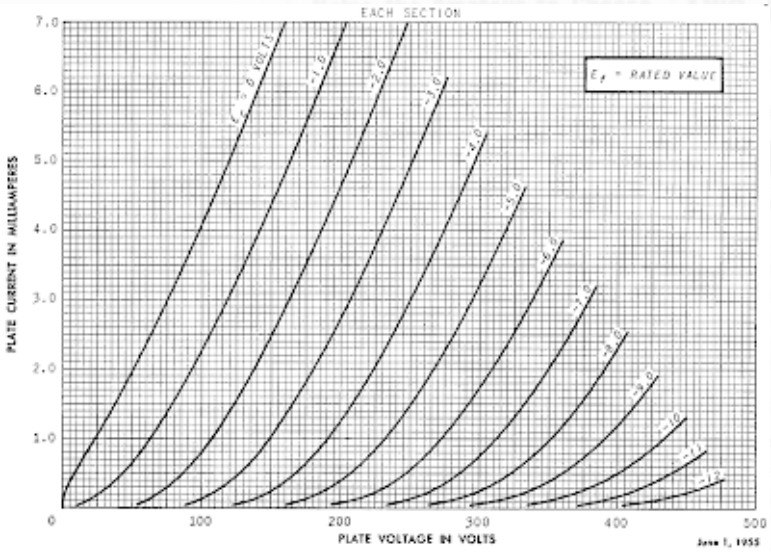
04/30/2022 | UGA Sanford Stadium Special Event

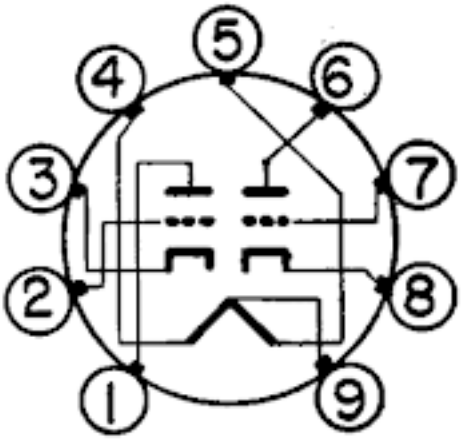
Apr 30-May 1, 1700Z-1700Z, N1D, Athens, GA. Athens Radio Club. 3.930 MHz 7.230 MHz 14.330 MHz 28.430 MHz. QSL. Athens Radio Club, P.O. Box 782, Athens, GA 30603-0782. Athens Radio Club is hosting a special event station from Sanford Stadium April 30 - May1, 2022 from 1700 to 1700. If you're a Bulldog fan, or if you're not, give us a call! athensradioclub.org

12AY7 - Miniature Medium-mu Twin Triode

As mentioned above the 12AY7 was specifically developed for low noise performance in applications working at low levels, which makes it an interesting candidate for the first stage in phono or microphone preamplifiers. The General Electric data sheet lists an operating point specifically for such low level applications. The tube has a 9 pin noval base. As the prefix '12' indicates the heater voltage is 12.6V and only needs 150mA. The heater has a center tap which is connected to pin 9. This enables parallel connection of the heater halves which results in a 6.3V/300mA heater. The 12AY7 has an amplification factor of 44 which comes with a plate resistance of 25kOhm.

Here the plate curve diagram from the data sheet:





12AY7

TWIN TRIODE

FOR LOW-LEVEL AMPLIFIER APPLICATIONS

DESCRIPTION AND RATING

The 12AY7 is a miniature medium-mu twin triode designed primarily for use in low-level stages of high-gain audio-frequency amplifiers. The tube is specially designed to exhibit low noise and low microphonic output. In addition, hiss and hum output voltages are controlled to limits consistent with the requirements of low-level amplifier applications.

GENERAL

ELECTRICAL

Cathode—Coated Unipotential	Series	Parallel
Heater Voltage, AC or DC	12.6	6.3 Volts
Heater Current	0.15	0.3 Amperes
Direct Interelectrode Capacitances*		
Grid to Plate: (g to p), Each Section		1.3 pf
Input: g to (h+k), Each Section		1.3 pf
Output: p to (h+k), Each Section		0.6 pf

MECHANICAL

Mounting Position—Any
Envelope—T-6½, Glass
Base—E9-1, Small Button 9-Pin

MAXIMUM RATINGS

DESIGN-CENTER VALUES, Each Section

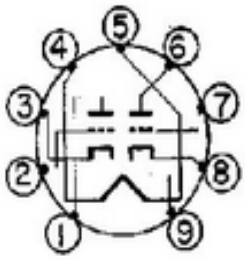
Plate Voltage	300	Volts
Plate Dissipation	1.5	Watts
DC Cathode Current	10	Milliamperes
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode	90	Volts
Heater Negative with Respect to Cathode	90	Volts

Design-Center ratings are limiting values of operating and environmental conditions applicable to a bogey electron tube of a specified type as defined by its published data and should not be exceeded under normal conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube in average applications, making allowance for normal changes in operating conditions due to rated supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially no design-center value for the intended service is exceeded with a bogey tube under normal operating conditions at the stated normal supply voltage.

BASING DIAGRAM

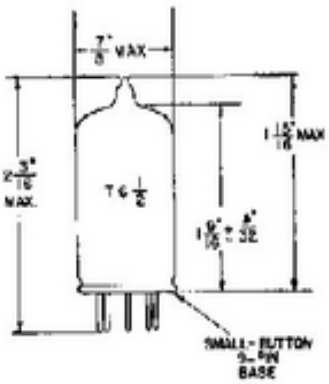


EIA 9A

TERMINAL CONNECTIONS

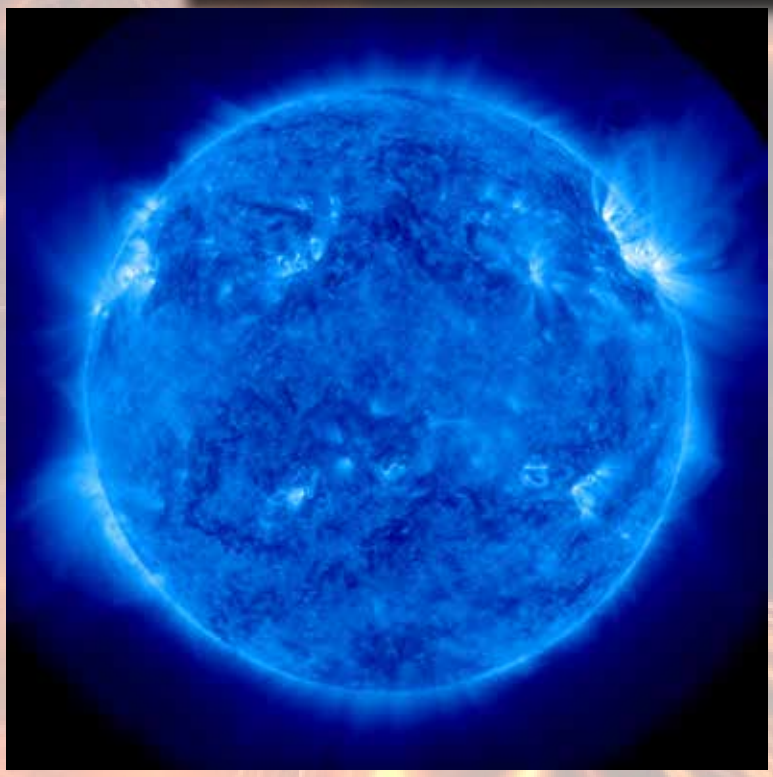
Pin 1—Plate (Section 2)
Pin 2—Grid (Section 2)
Pin 3—Cathode (Section 2)
Pin 4—Heater
Pin 5—Heater
Pin 6—Plate (Section 1)
Pin 7—Grid (Section 1)
Pin 8—Cathode (Section 1)
Pin 9—Heater Center Tap

PHYSICAL DIMENSIONS



EIA 6-2

K7RA Solar Update



Tad Cook, K7RA, of Seattle, Washington, reports: We saw plenty of sunspot activity this week, along with numerous solar flares. A confounding indicator was a higher average solar flux but lower average sunspot numbers. We expect to see these parameters track together, but that isn't always the case.

The average daily sunspot number went from 87.4 last week to 74.6 in the latest reporting period, March 10 – 16.

The average daily solar flux increased from 115.5 to 119.

A new sunspot group appeared on March 12, another on March 13, and two more on March 14. The total sunspot area (expressed in millionths of the solar disc) declined throughout the week, starting at 1,170 on March 10, then 1,080, 1,040, 940, 670, 490, and 290. So, the decline continued even through days that revealed new sunspots.

March 13 had the greatest geomagnetic disturbance, with the middle latitude A index at 30, the planetary A index at 40, and Alaska's college A index at 65. The A index is calculated from the K index, updated every 3 hours. In Alaska, the K was 0 in the first three readings, at 0000, 0300, and 0600 UTC, before jumping dramatically to 5, 7, 7, and 5 for the rest of the day. The K index is logarithmic, and 7 is a very big number, indicating a geomagnetic storm.

The solar flux prediction peaks at 125 on April 6 – 8, but starting today, the predicted flux is 108 on March 18 – 19; 95 on March 20 – 26; 100 on March 27 – 28; 110 on March 29 – 30; 115 on March 31; then 120, 115, and 120 on April 1 – 3; 115 on April 4 – 5; 125 on April 6 – 8; 120 on April 9 – 11; 115 on April 12 – 14; 110 on April 15 – 17; 100 on April 18; then 95 on April 19 – 22, and 100 on April 23 – 24.

Predicted planetary A index is 10 on March 18 – 19; then 15, 12, and 8 on March 20 – 22; 5 on March 23 – 25; 10 and 8 on March 26 – 27; 5 on March 28 – 30; 10, 25, 15, and 8 on March 31 – April 3; 5 on April 4 – 15; 12 on April 16 – 17; 8 on April 18; then 5 on April 19 – 21, and 10 and 8 on April 22 – 23.

The vernal equinox will occur at 1533 UTC on Sunday, March 20 — a good sign for HF propagation as we move from winter to spring conditions in the Northern Hemisphere.

30 Days of ISS passes for SATComm

Satellite passes / Orbitron 3.71 / www.stoff.pl

Location : Oak Ridge NJ (74.5009¢X W, 41.0297¢X N)
Time zone : UTC
Search period : 03/25/2022 22:41:37 - 25 days
04/19/2022 22:41:37
Conditions : Maximum sun elevation = None
Minimum sat elevation = 30 deg
Illumination NOT required

Time	Satellite	Azm	Elv	Mag	Range	S.Azm	S.Elv
03/26/2022 03:42:28	ISS	304.6	30.1	ecl	781	331.7	-43.0
03/26/2022 03:44:00	ISS	215.8	86.7	ecl	425	332.1	-43.1
03/26/2022 03:45:31	ISS	129.2	30.3	ecl	775	332.6	-43.3
03/26/2022 20:26:00	ISS	158.3	30.0	0.7	775	243.6	30.4
03/26/2022 20:26:35	ISS	135.7	32.3	0.5	736	243.7	30.4
03/26/2022 20:27:09	ISS	113.9	30.0	0.6	776	243.8	30.3
03/26/2022 22:02:39	ISS	306.6	30.0	0.3	779	261.8	13.1
03/26/2022 22:03:20	ISS	333.2	33.3	0.1	724	261.9	13.0
03/26/2022 22:04:01	ISS	359.7	30.0	0.2	780	262.0	12.9
03/27/2022 02:54:37	ISS	326.7	30.0	ecl	783	317.8	-37.5
03/27/2022 02:56:01	ISS	32.2	56.1	ecl	505	318.2	-37.6
03/27/2022 02:57:25	ISS	98.2	30.1	ecl	780	318.6	-37.8
03/27/2022 21:13:58	ISS	269.0	30.2	0.6	773	253.5	22.3
03/27/2022 21:15:16	ISS	328.0	50.4	-0.3	538	253.7	22.0
03/27/2022 21:16:35	ISS	28.0	30.2	0.3	776	254.0	21.8
03/28/2022 02:07:05	ISS	352.5	30.1	ecl	781	306.3	-30.5
03/28/2022 02:07:58	ISS	27.8	36.1	ecl	684	306.5	-30.7
03/28/2022 02:08:52	ISS	63.6	30.0	ecl	782	306.7	-30.8
03/28/2022 20:25:45	ISS	237.6	30.2	0.9	771	244.2	31.0
03/28/2022 20:27:16	ISS	328.2	84.0	-0.6	424	244.6	30.7
03/28/2022 20:28:47	ISS	50.6	30.1	0.6	778	244.9	30.4
03/29/2022 02:55:28	ISS	280.5	30.2	ecl	779	318.7	-37.0
03/29/2022 02:56:47	ISS	221.0	50.8	ecl	536	319.1	-37.1
03/29/2022 02:58:06	ISS	161.1	30.2	ecl	776	319.5	-37.3

03/29/2022 19:37:56	ISS	204.1	30.2	1.2	770	233.5	38.9
03/29/2022 19:39:18	ISS	139.1	55.3	0.1	505	233.8	38.7
03/29/2022 19:40:40	ISS	75.4	30.1	0.8	776	234.2	38.5
03/30/2022 02:07:18	ISS	306.1	30.3	ecl	776	307.0	-30.0
03/30/2022 02:08:49	ISS	266.2	89.6	ecl	424	307.4	-30.3
03/30/2022 02:10:21	ISS	127.0	30.1	ecl	778	307.7	-30.5
03/30/2022 20:27:22	ISS	303.7	30.1	0.8	775	245.3	31.2
03/30/2022 20:28:06	ISS	332.5	34.1	0.6	709	245.5	31.0
03/30/2022 20:28:51	ISS	2.0	30.1	0.7	777	245.7	30.9
03/31/2022 01:19:25	ISS	328.5	30.2	-0.3	779	297.1	-22.1
03/31/2022 01:20:47	ISS	32.0	54.1	ecl	516	297.4	-22.4
03/31/2022 01:22:09	ISS	95.8	30.2	ecl	777	297.7	-22.6
03/31/2022 19:38:40	ISS	266.6	30.2	1.2	773	234.4	39.3
03/31/2022 19:40:00	ISS	328.2	52.1	0.2	525	234.8	39.1
03/31/2022 19:41:20	ISS	29.7	30.2	0.8	774	235.1	38.9
04/01/2022 00:31:51	ISS	354.9	30.0	-0.2	781	288.5	-13.7
04/01/2022 00:32:41	ISS	27.8	35.1	-0.5	697	288.7	-13.8
04/01/2022 00:33:30	ISS	60.1	30.1	-0.3	779	288.8	-14.0
04/01/2022 18:50:25	ISS	235.2	30.0	1.6	774	221.2	46.3
04/01/2022 18:51:56	ISS	319.0	87.3	0.0	421	221.7	46.2
04/01/2022 18:53:27	ISS	52.3	30.3	1.1	772	222.1	46.0
04/02/2022 01:20:06	ISS	282.7	30.2	-0.3	778	298.0	-21.8
04/02/2022 01:21:27	ISS	220.5	53.2	ecl	520	298.2	-22.0
04/02/2022 01:22:48	ISS	158.1	30.1	ecl	777	298.5	-22.2
04/02/2022 18:02:35	ISS	201.4	30.0	1.9	772	205.0	51.6
04/02/2022 18:03:55	ISS	139.9	52.7	0.8	519	205.5	51.5
04/02/2022 18:05:15	ISS	77.9	30.3	1.4	771	206.0	51.4
04/03/2022 00:31:54	ISS	307.9	30.1	-0.2	779	289.2	-13.2
04/03/2022 00:33:26	ISS	41.1	86.9	-1.6	424	289.5	-13.5
04/03/2022 00:34:57	ISS	124.5	30.2	-0.4	776	289.7	-13.8
04/03/2022 18:51:51	ISS	300.0	30.1	1.4	775	222.4	46.8
04/03/2022 18:52:40	ISS	332.5	35.0	1.0	694	222.6	46.6
04/03/2022 18:53:29	ISS	4.9	30.1	1.2	776	222.9	46.5
04/03/2022 23:44:00	ISS	330.5	30.3	-0.1	776	281.3	-4.3
04/03/2022 23:45:20	ISS	31.7	52.0	-1.0	528	281.5	-4.6
04/03/2022 23:46:41	ISS	93.4	30.0	-0.2	780	281.7	-4.8

04/04/2022 18:03:09 ISS	264.0	30.1	1.8	772	205.8	52.2
04/04/2022 18:04:31 ISS	328.3	54.2	0.7	511	206.3	52.1
04/04/2022 18:05:52 ISS	31.5	30.3	1.3	772	206.8	52.0
04/04/2022 22:56:26 ISS	358.3	30.1	0.1	779	273.8	4.9
04/04/2022 22:57:10 ISS	27.0	34.0	-0.2	713	273.9	4.8
04/04/2022 22:57:55 ISS	56.4	30.1	0.0	780	274.0	4.6
04/05/2022 17:14:53 ISS	232.6	30.0	2.0	772	186.2	55.1
04/05/2022 17:16:24 ISS	143.7	89.1	0.5	420	186.8	55.1
04/05/2022 17:17:55 ISS	54.2	30.1	1.6	773	187.5	55.0
04/05/2022 23:44:31 ISS	285.1	30.1	0.0	777	282.0	-4.0
04/05/2022 23:45:54 ISS	220.1	55.9	-1.0	504	282.3	-4.3
04/05/2022 23:47:17 ISS	155.0	30.1	-0.2	777	282.5	-4.5
04/06/2022 16:27:03 ISS	197.9	30.2	2.1	768	165.5	54.8
04/06/2022 16:28:20 ISS	139.4	50.0	1.2	536	166.1	54.9
04/06/2022 16:29:38 ISS	80.3	30.1	1.8	772	166.6	54.9
04/06/2022 22:56:18 ISS	309.9	30.2	0.2	777	274.4	5.3
04/06/2022 22:57:49 ISS	34.1	83.2	-1.3	426	274.7	5.0
04/06/2022 22:59:20 ISS	121.8	30.2	-0.1	774	274.9	4.8
04/07/2022 17:16:08 ISS	296.6	30.2	1.7	771	187.1	55.8
04/07/2022 17:17:01 ISS	332.4	36.2	1.3	676	187.5	55.8
04/07/2022 17:17:54 ISS	7.8	30.0	1.5	776	187.9	55.8
04/07/2022 22:08:22 ISS	332.5	30.2	0.3	776	266.9	14.4
04/07/2022 22:09:40 ISS	31.3	49.8	-0.6	542	267.1	14.2
04/07/2022 22:10:58 ISS	90.2	30.2	0.1	774	267.3	14.0
04/08/2022 16:27:25 ISS	261.1	30.0	1.8	773	165.7	55.6
04/08/2022 16:28:48 ISS	326.9	56.6	0.8	496	166.3	55.7
04/08/2022 16:30:12 ISS	33.7	30.0	1.6	775	166.9	55.7
04/08/2022 21:20:48 ISS	1.8	30.0	0.5	780	259.0	23.5
04/08/2022 21:21:27 ISS	26.9	32.8	0.3	729	259.1	23.4
04/08/2022 21:22:05 ISS	51.4	30.1	0.4	778	259.3	23.3
04/08/2022 22:57:34 ISS	248.3	30.1	0.2	776	275.3	5.5
04/08/2022 22:58:12 ISS	223.7	32.9	0.0	727	275.4	5.3
04/08/2022 22:58:50 ISS	199.1	30.1	0.1	775	275.5	5.2
04/09/2022 15:39:09 ISS	229.6	30.3	1.6	766	146.2	52.2
04/09/2022 15:40:39 ISS	141.6	85.1	0.4	421	146.8	52.4
04/09/2022 15:42:10 ISS	56.3	30.0	1.6	774	147.3	52.5

04/09/2022 22:08:43 ISS	287.7	30.0	0.4	778	267.6	14.8
04/09/2022 22:10:08 ISS	219.7	59.0	-0.7	487	267.9	14.5
04/09/2022 22:11:32 ISS	151.9	30.3	0.2	772	268.1	14.2
04/10/2022 14:51:18 ISS	194.1	30.1	1.4	768	130.3	46.5
04/10/2022 14:52:32 ISS	139.1	47.2	0.8	556	130.7	46.7
04/10/2022 14:53:47 ISS	83.3	30.1	1.5	771	131.0	46.9
04/10/2022 21:20:29 ISS	312.0	30.2	0.6	776	259.7	24.0
04/10/2022 21:22:00 ISS	36.9	79.2	-0.8	429	259.9	23.7
04/10/2022 21:23:30 ISS	118.8	30.2	0.4	773	260.2	23.4
04/11/2022 15:40:11 ISS	292.5	30.1	1.4	772	146.3	53.1
04/11/2022 15:41:08 ISS	331.4	37.5	1.1	657	146.6	53.2
04/11/2022 15:42:05 ISS	10.4	30.2	1.5	772	147.0	53.3
04/11/2022 20:32:31 ISS	334.7	30.1	0.8	777	250.9	32.9
04/11/2022 20:33:47 ISS	30.9	47.5	0.0	558	251.1	32.7
04/11/2022 20:35:03 ISS	87.2	30.1	0.6	776	251.4	32.4
04/12/2022 14:51:29 ISS	258.2	30.2	1.2	768	129.9	47.2
04/12/2022 14:52:53 ISS	326.8	59.5	0.3	481	130.3	47.4
04/12/2022 14:54:18 ISS	35.8	30.1	1.4	773	130.7	47.6
04/12/2022 19:45:00 ISS	7.0	30.0	1.0	778	240.7	41.3
04/12/2022 19:45:30 ISS	26.1	31.7	0.9	748	240.8	41.2
04/12/2022 19:46:00 ISS	45.3	30.1	0.9	777	240.9	41.1
04/12/2022 21:21:29 ISS	254.7	30.0	0.7	776	260.5	24.2
04/12/2022 21:22:16 ISS	223.7	34.7	0.4	697	260.7	24.0
04/12/2022 21:23:04 ISS	192.0	30.0	0.6	775	260.8	23.9
04/13/2022 14:03:11 ISS	226.4	30.1	1.0	768	116.9	39.9
04/13/2022 14:04:41 ISS	141.5	80.6	-0.2	424	117.3	40.2
04/13/2022 14:06:11 ISS	58.7	30.1	1.2	771	117.6	40.5
04/13/2022 20:32:43 ISS	290.3	30.2	1.0	773	251.7	33.3
04/13/2022 20:34:09 ISS	219.4	62.7	-0.2	470	251.9	33.0
04/13/2022 20:35:35 ISS	148.3	30.2	0.7	772	252.2	32.7
04/14/2022 13:15:21 ISS	189.7	30.2	0.8	766	106.4	31.9
04/14/2022 13:16:31 ISS	138.7	44.4	0.2	579	106.6	32.1
04/14/2022 13:17:42 ISS	87.0	30.2	1.0	769	106.9	32.3
04/14/2022 19:44:27 ISS	314.3	30.1	1.2	776	241.3	41.8
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04/14/2022 19:47:27 ISS	115.6	30.2	1.0	773	242.0	41.3

04/15/2022 14:04:02 ISS	288.8	30.2	0.9	769	116.6	40.7
04/15/2022 14:05:03 ISS	331.2	39.1	0.5	637	116.8	40.9
04/15/2022 14:06:04 ISS	13.5	30.1	1.0	771	117.1	41.0
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04/15/2022 18:57:41 ISS	30.4	45.2	0.7	576	228.8	49.3
04/15/2022 18:58:54 ISS	83.6	30.1	1.3	775	229.2	49.1
04/16/2022 13:15:19 ISS	254.8	30.1	0.6	769	105.9	32.4
04/16/2022 13:16:45 ISS	326.6	62.9	-0.4	467	106.1	32.7
04/16/2022 13:18:11 ISS	38.2	30.1	0.9	771	106.4	32.9
04/16/2022 19:45:13 ISS	260.1	30.0	1.4	774	242.2	42.1
04/16/2022 19:46:08 ISS	223.0	36.8	1.0	667	242.5	42.0
04/16/2022 19:47:03 ISS	185.8	30.1	1.3	773	242.7	41.8
04/17/2022 12:27:01 ISS	222.8	30.2	0.4	766	96.7	23.8
04/17/2022 12:28:30 ISS	141.4	75.9	-0.7	430	97.0	24.1
04/17/2022 12:29:59 ISS	61.4	30.2	0.6	768	97.2	24.3
04/17/2022 18:56:29 ISS	293.2	30.0	1.6	776	229.2	49.9
04/17/2022 18:57:57 ISS	219.0	66.9	0.4	455	229.7	49.7
04/17/2022 18:59:24 ISS	144.6	30.3	1.5	769	230.1	49.5
04/18/2022 11:39:12 ISS	184.7	30.2	0.2	766	88.5	15.1
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04/18/2022 11:41:24 ISS	90.8	30.0	0.4	771	88.8	15.5
04/18/2022 18:08:13 ISS	316.9	30.2	1.8	772	212.5	56.2
04/18/2022 18:09:42 ISS	35.4	70.7	0.6	444	213.1	56.0
04/18/2022 18:11:10 ISS	112.1	30.3	1.8	769	213.6	55.9
04/19/2022 12:27:39 ISS	284.3	30.1	0.4	770	96.3	24.4
04/19/2022 12:28:44 ISS	330.2	40.9	0.0	615	96.5	24.6
04/19/2022 12:29:50 ISS	16.8	30.1	0.6	772	96.7	24.8
04/19/2022 17:20:13 ISS	340.5	30.2	1.8	772	191.3	59.9
04/19/2022 17:21:22 ISS	30.0	43.0	1.3	597	191.9	59.8
04/19/2022 17:22:31 ISS	79.5	30.2	1.9	772	192.5	59.8

Getting Started With DMR

Curious about DMR (Digital Mobile Radio) but don't want to spend money on a radio and hot spot or fiddle with frustrating code plugs? Here are two ways you can experience DMR for free.

The first way you can get exposure to DMR listen only communications is by using your computer or smart phone to visit the web site hosted by Brandmeister. Brandmeister is the organization that runs computers that make digital communication possible. There are other DMR networks but Brandmeister is by far the largest and supports talk groups all around the World. Point your web browser to http://hose.brandmeister.network. Once there, you will see boxes that represent talk groups that have been active. Clicking or tapping on one will start the player and you can listen to the traffic. You can get a list of all the major talk groups Brandmeister hosts at https://brandmeister.network/?page=talkgroups. You can also "tune" to any you find interesting by selecting it.

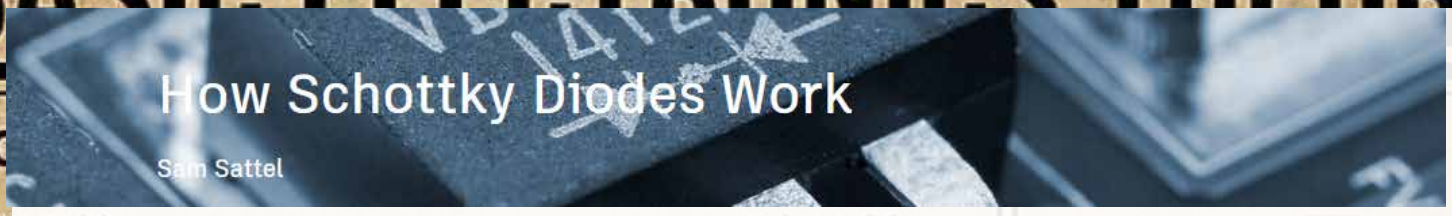
The second way to get active on DMR (transmit and receive) requires you to register for a DMR user ID. You must have a technician license or higher. There are many explanations available on the internet (including YouTube) but here is one that might explain it best:
https://www.bridgecomsystems.com/blogs/bridgecom-tx-rx-blog/how-to-get-your-dmr-id

Once you have your DMR ID and callsign, you need to register with Brandmeister at: http://brandmeister.network/?page=register. You need to specify a password that will be used when you connect to Brandmeister for the purpose of transmitting. Your DMR ID, call sign, and password assure that there isn't the anonymous noise that sometimes crowds analog RF based communications.

Once all that is done, there is an app for Android called DroidStar. It is available from the Google Play Store. The app serves as a transceiver using your phone's data connection (cellular or WiFi). The app requires some setup (Settings tab) for call sign, DMR ID, and password. The rest of the settings seem to work with their default values. On the Main tab you need to tell it which Brandmeister server you want to use. I use the BM_3102_United_States from the drop-down list.

Next you choose the talk group you want to communicate on. There is a box labeled TGID where you enter the talk group number. The N3IS (EPARA) talk group is 3149822. Tap Connect on your screen and you should be ready to go. Tap the TX bar at the bottom of the screen and you'll be transmitting. Tap again to stop.

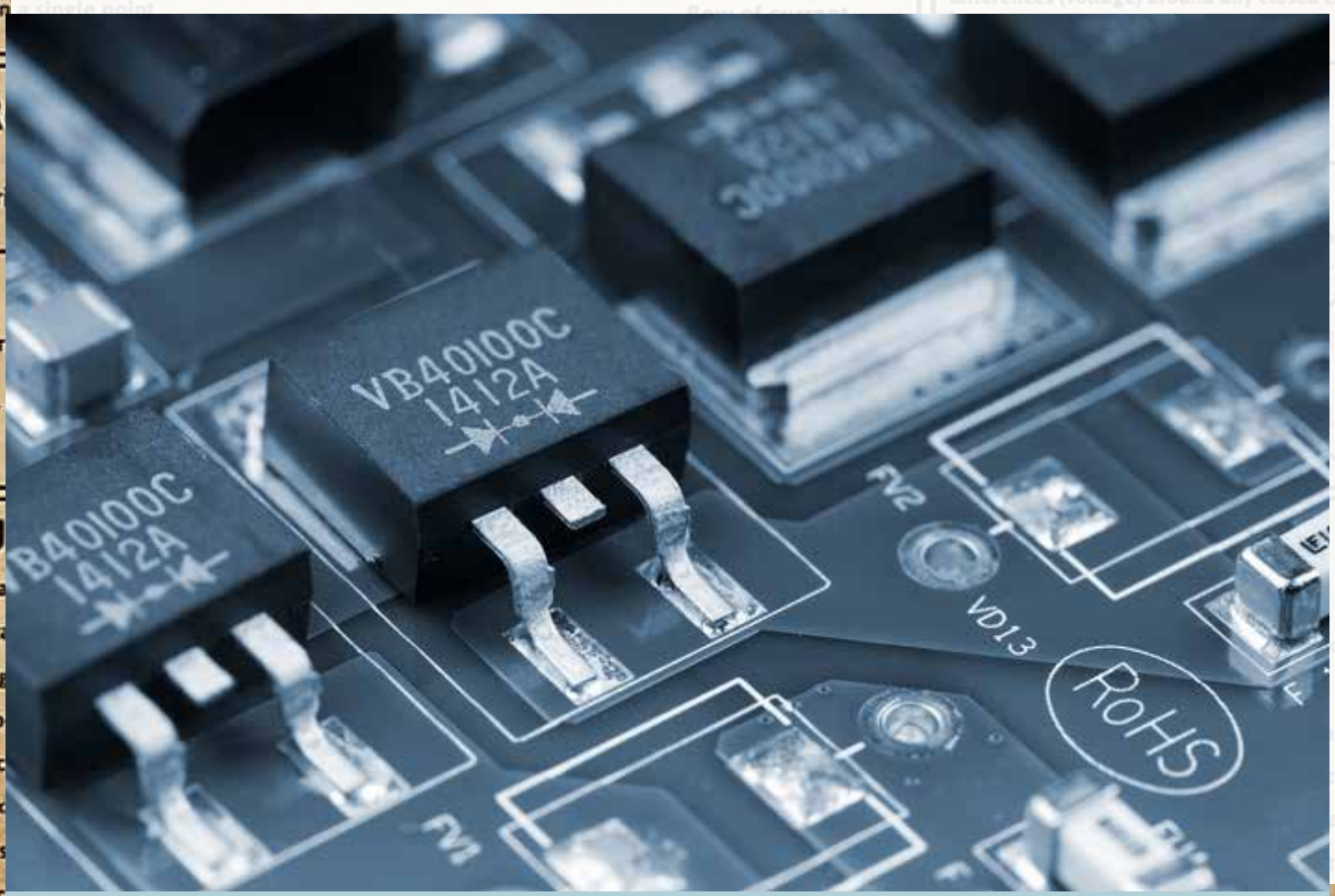
de Roy Preuninger W0ROY 73!



Everything You Need to Know About Schottky Diodes

Like other diodes, the Schottky diode controls the direction of current flow in a circuit. These devices act like one-way streets in the world of electronics, letting current pass only from anode to cathode. However, unlike standard diodes, the Schottky diode is known for its low forward voltage and fast switching ability. This makes them an ideal choice for radio frequency applications and any device with low voltage requirements. There are a variety of uses for the schottky diode, including:

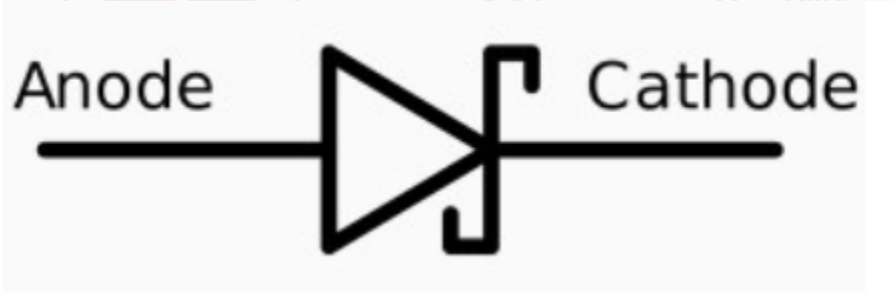
- Power Rectification. Schottky diodes can be used in high power applications thanks to its low forward voltage drop. These diodes will waste less power and might reduce the size of your heatsink.
- Multiple Power Supplies. Schottky diodes can also help to keep power separated in a dual-power supply setup, like with a mains supply and battery.
- Solar Cells. Schottky diodes can help to maximize solar cell efficiency with their low forward voltage drop. They also help protect the cell from reverse charges.

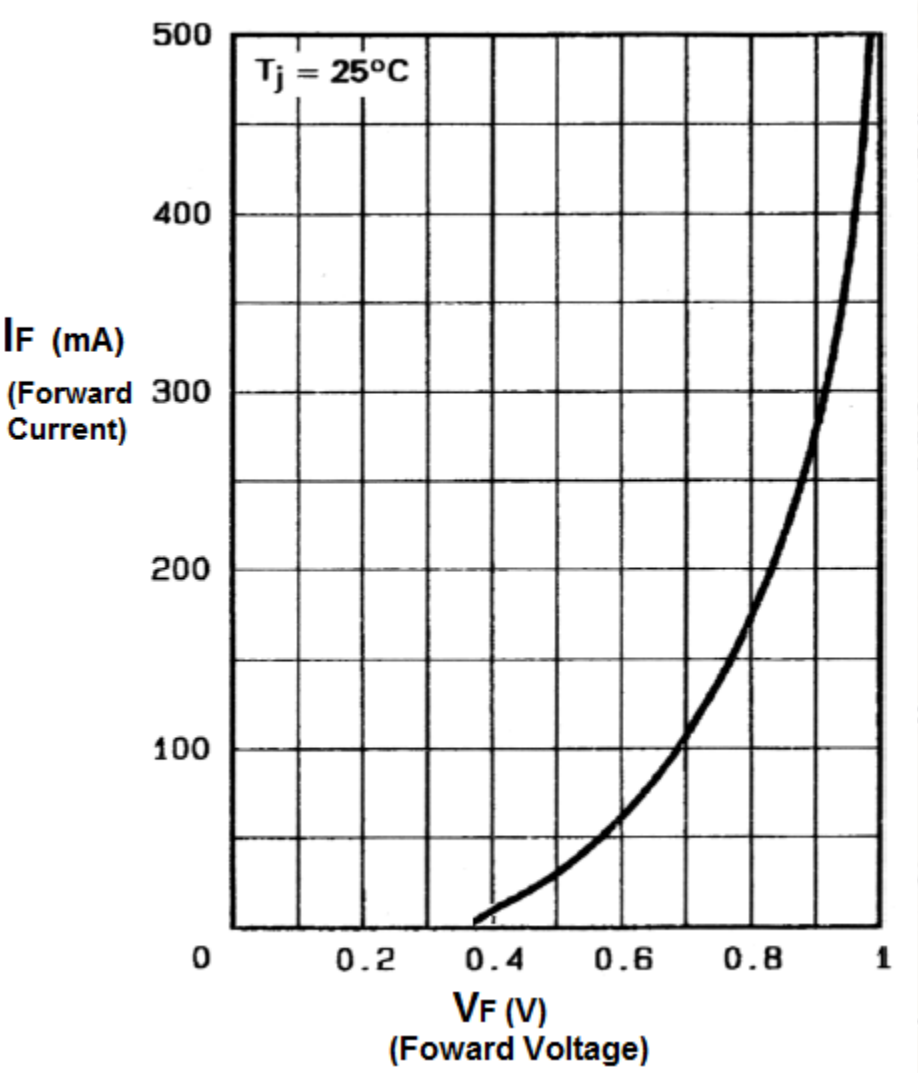


Clamping. Schottky diodes can also be used as a clamp within a transistor circuit, such as in the 74LS or 74S logic circuits.

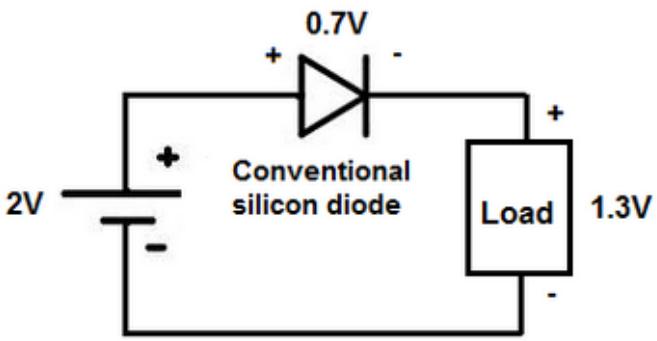
Schottky Diode Advantages & Disadvantages

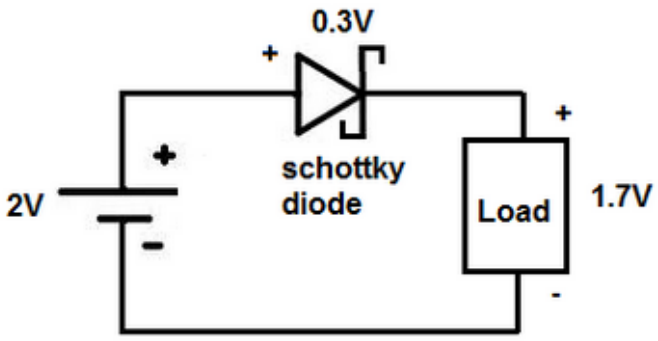
One of the primary advantages of using a Schottky diode over a regular diode is their low forward voltage drop. This allows a Schottky diode to consume less voltage than a standard diode, using only 0.3-0.4V across its junctions. In the graph below you can see that a forward voltage drop of about 0.3V begins to increase current significantly in a Schottky diode. This current increase would not take effect until about 0.6V for a standard diode.





In the images below we have two circuits to illustrate the benefits of a lower forward voltage drop. The circuit on the left contains a conventional diode, the one on the right a Schottky diode. Both are powered with a 2V DC source.





The conventional diode consumes 0.7V, leaving only 1.3V to power the load. With its lower forward voltage drop, the Schottky diode consumes only 0.3V, leaving 1.7V to power the load. If our load required 1.5V then only the Schottky diode would be up for the job.

Other advantages for using a Schottky diode over a regular diode include:

- Faster recovery time. The small amount of charge stored within a Schottky diode makes it ideal for high speed switching applications.
- Less noise. The Schottky diode will produce less unwanted noise than your typical p-n junction diode.
- Better performance. The Schottky diode will consume less power and can easily meet low-voltage application requirements.

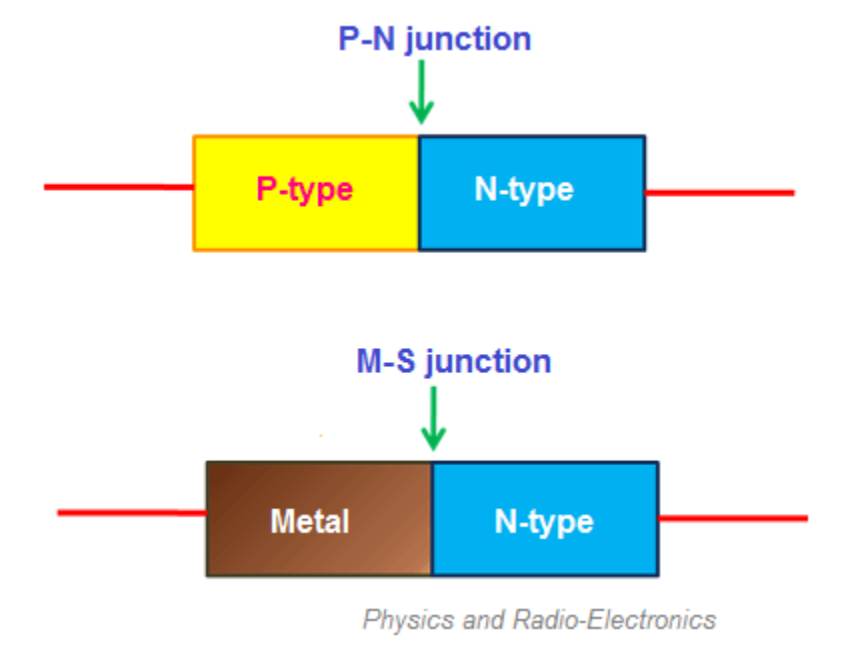
There are some disadvantages to keep in mind about Schottky diodes. A reverse-biased Schottky diode will experience a higher level of reverse current than a traditional diode. This will lead to more leaked current when connected in reverse.

Schottky diodes also have a lower maximum reverse voltage than standard diodes, usually 50V or less. Once this value is exceeded then the Schottky diode will break down and start to conduct a large amount of current in reverse. However, even before reaching this reverse value the Schottky diode will still leak a small amount of current like any other diode.

How a Schottky Diode Works

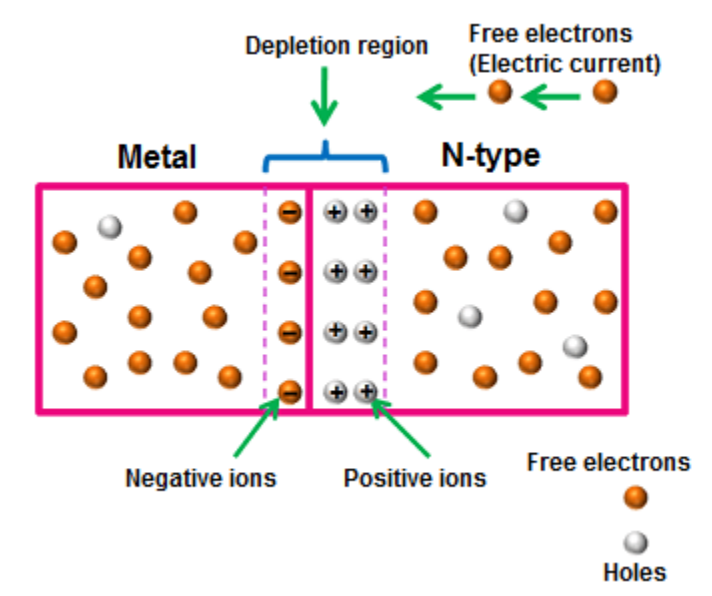
A typical diode combines p-type and n-type semiconductors to form a p-n junction. In a Schottky diode metal replaces the p-type semiconductor. This metal can range from platinum to tungsten, molybdenum, gold, etc.

When metal is combined with an n-type semiconductor an m-s junction is formed. This junction is referred to as a Schottky Barrier. The behavior of the Schottky Barrier will differ depending on whether the diode is in an unbiased, forward-biased, or reverse-biased state.



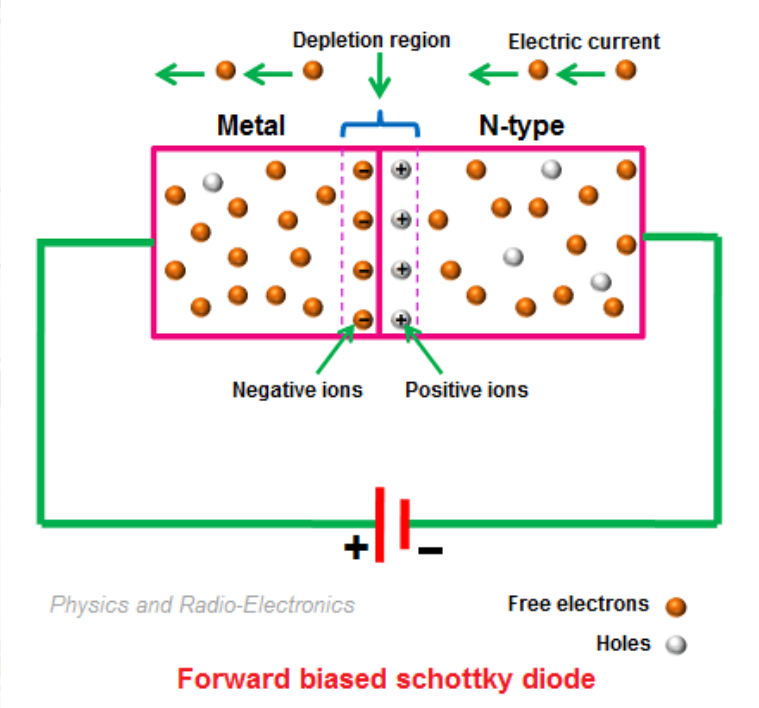
Unbiased State

In an unbiased state, free electrons will move from the n-type semiconductor to the metal in order to establish balance. This flow of electrons created the Schottky Barrier where negative and positive ions meet. Free electrons will need a greater supplied energy than their built-in voltage to overcome this barrier.



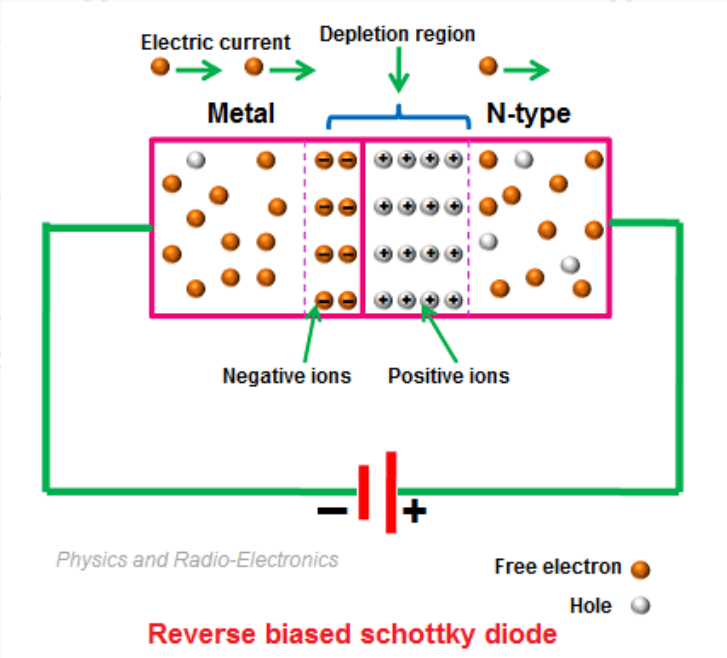
Forward-Biased State

Connecting the positive terminal of a battery to the metal and negative terminal to the n-type semiconductor will create a forward-biased state. In this state, electrons can cross the junction from n-type to metal if the applied voltage is greater than 0.2 volts. This results in a flow of current that's typical for most diodes.



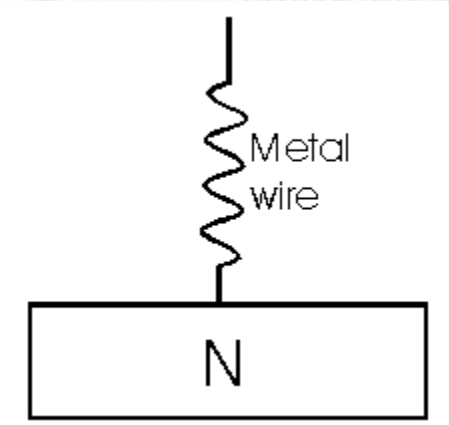
Reverse-Biased State

Connecting the negative terminal of a battery to the metal and positive terminal to the n-type semiconductor will create a reverse-biased state. This state expands the Schottky Barrier and prevents the flow of electric current. However, if the reverse bias voltage continues to increase this can eventually break down the barrier. Doing so will allow current to flow in the reverse direction and may damage the component.

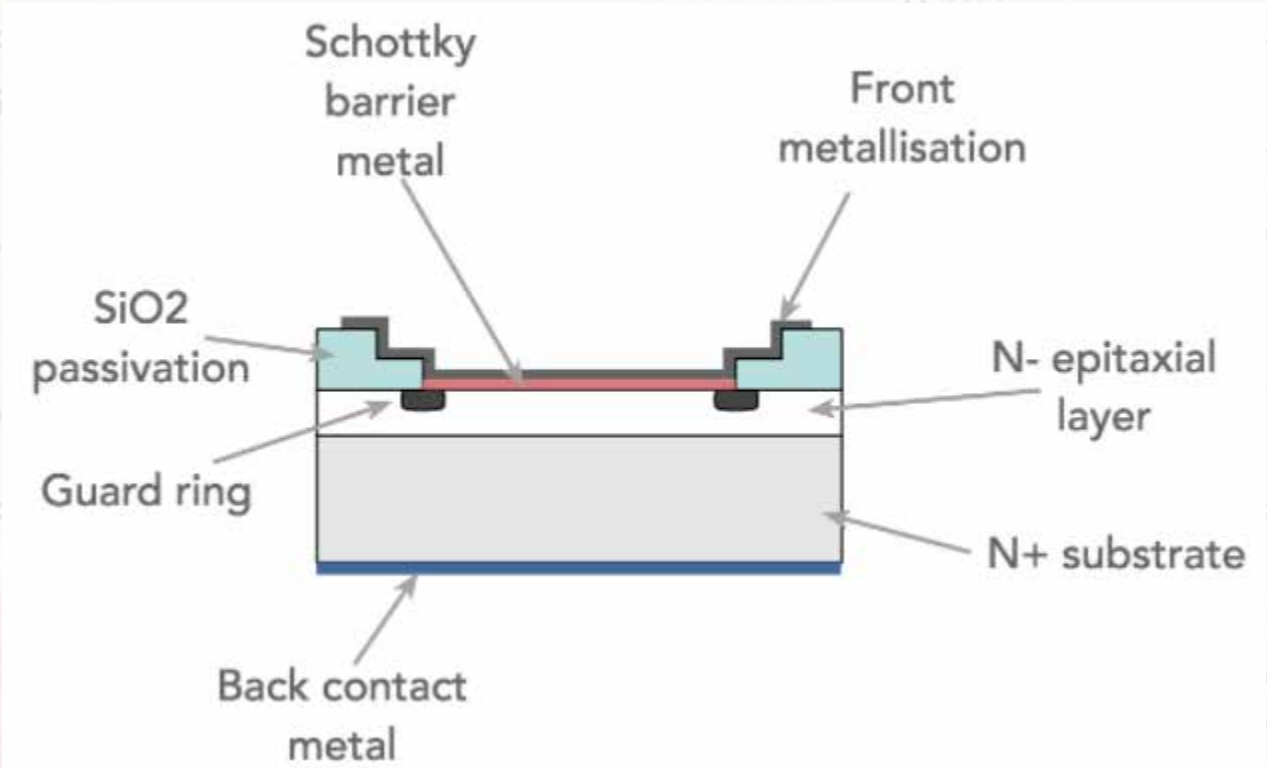


Schottky Diode Manufacturing & Parameters

There are a variety of methods to manufacture a Schottky diode. The simplest is to connect a metal wire against a semiconductor surface, called Point Contact. Some Schottky diodes are still manufactured using this method, but it is not known for its reliability.



The most popular technique is using a vacuum to deposit metal onto the semiconductor surface. This method presents an issue of the metal edges breaking down due to the effects of electric fields around the semiconductor plate. To remedy this, manufacturers will protect the semiconductor plate with an oxide guard ring. Adding this guard ring helps to improve the reverse breakdown threshold and prevents the junction from being physically destroyed.



Schottky Diode Parameters

Below you'll find a list of parameters to consider when choosing a Schottky diode for your next electronics project:

Parameter	Description
Forward Voltage Drop	Any part specification will provide the forward voltage drop for a given current. The typical turn-on voltage for most Schottky diodes is around 0.2V.
Reverse Leakage Current	Increasing the temperature within a Schottky diode will significantly increase the reverse leakage current. This parameter is important to consider for preserving the integrity of your device.
Reverse Recovery Time	This parameter describes how much charge flows during the transition from an on to off state. This is usually measured in nano or picoseconds.
Reverse Breakdown	Look for parameters titled Peak Reverse Voltage, or Maximum Blocking DC Voltage to understand when your diode will allow current to flow in reverse.
Capacitance	The junction area within a Schottky diode has a small and capacitance is typically measured in picofarads. Capacitance will be defined at a given voltage in a spec sheet and is important for RF applications.
Working Temperature	A typical Schottky diode needs to maintain a junction temperature between 125 to 175° Celsius. Keep this value in mind when working on heat distribution for your device.

Schottky Diode Examples

It helps to see how these parameters are typically listed on a manufacturer's website or datasheet. Here are two examples:

The 1N5711 Schottky diode is an ultra-fast switching diode with high reverse breakdown, low forward voltage drop, and a guard ring for junction protection.

Parameter	Value	Unit	Details
Max DC Blocking Voltage, Vr	70	V	
Max forward continuous current, Ifm	15	mA	
Reverse breakdown voltage, V(BR)R	70	V	@ reverse current of 10µA
Reverse leakage current, IR	200	µA	At VR=50V
Forward voltage drop, VF	0.41 1.00	V	at IF = 1.0 mA IF=15mA
Junction capacitance, Cj	2.0	pF	VR = 0V, f=1MHz
Reverse recovery time, trr	1	nS	

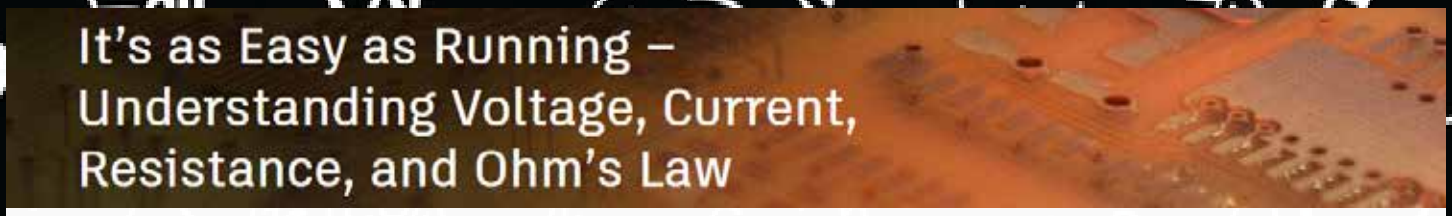
The 1N5828 Schottky diode is a stud-type diode used for power rectification applications.

Parameter	Value	Unit	Details
Maximum recurrent peak reverse voltage	40	V	
Maxim DC blocking voltage	40	V	
Average forward current, IF (AV)	15	A	T = 100°C
Peak forward surge current, IFSM	500	A	
Maximum instantaneous forward voltage, VF	0.5	V	At IFM = 15A and Tj = 25°C
Maximum instantaneous reverse current at rated blocking voltage, IR	10 250	mA	Tj= 25°C Tj = 125°C

Control the Flow

Planning to work on an RF or power application that requires low-voltage operation? Schottky diodes are the way to go! These diodes are well known for their low forward voltage drop and quick switching speeds. Whether they're used in solar cells or power rectification, you can't beat the low 0.3V voltage drop and added efficiency.

Credit: https://www.autodesk.com/products/eagle/blog/schottky-diodes/



It's as Easy as Running – Understanding Voltage, Current, Resistance, and Ohm's Law

Welcome back, young electronics master. In our previous blog, we learned about the humble circuit, and it's place in our world of electronics. But to grasp the true essence of electricity, one must understand how to manipulate and measure voltage, current, and resistance. That's where this blog comes in. We've climbed the highest peaks to find the right analogy to explain the nature of how electricity works in a circuit. And rather than go with yet another water analogy, we thought we'd get a little more personal, with our bodies in motion.

Voltage – It's All About Potential

Imagine waking up in the morning. You're laying in bed, wanting just a few more hours of sleep, but knowing that it's time for that dreaded morning run. You know it's good for you, and you'll feel great once you get moving, but every morning you have to make a choice. You can either stay in bed and sleep a little bit longer or get up and start moving your body.

This is the essence of voltage; it's all about the difference of potential. We all have potential, and when it comes to running, the potential in question is making a choice of whether to run or sleep. If you don't decide to run this morning, then your potential will sit dormant, but if you do, then that potential will explode outward, propelling you to run for miles and energizing the rest of your day.

Voltage in Electricity

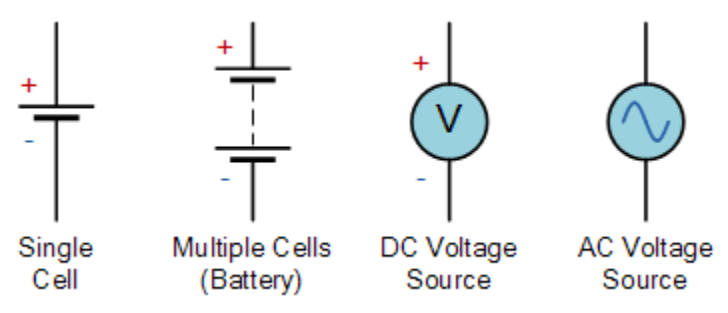
Like having the potential to move or not, voltage is stored electrical energy with the potential for movement. It's this voltage force that motivates electrons to flow in a circuit and keeps them running hour after hour.

Voltage is all around just waiting for us to tap into its potential. Look at every unused wall outlet in your house – There is voltage buzzing in those sockets ready to do work for you. But like making a choice to run, you have a choice of whether to tap into that source of voltage in your outlet. If left alone, then the voltage remains where it is, never realizing its full potential.

In an electrical circuit, voltage is measured by finding at what's called the potential difference between two points with a multimeter. Take a 9-volt battery, for example, if you measure the positive and negative ends, you'll get a potential difference of 9 volts (or close to it). The positive end measures at 9V, and the negative end measures at 0V. Minus the two numbers, and you get your potential difference.

You can use a multimeter to quickly measure the voltage or potential difference in a battery.

Voltage comes in two different forms, being DC (Direct Current) voltage, which provides a steady stream of negative electricity, or AC (Alternating Current) voltage, which switches from negative to positive continuously. Here are the symbols that you'll want to be on the lookout for on a schematic for DC voltage, AC voltage, and battery:



Here's some of the voltage symbols to look out for in your next schematic – batteries, DC, and AC.

The Father of Voltage – Alessandro Volta

The man to first discover voltage was Italian Physicist Alessandro Volta. He also uncovered a ton of other cool things, including:

- Discovering that if you mix methane with air that you can create an electrical spark, which marked the beginning of the now-famous combustion engine.
- Discovering that electrical potential stored in a capacitor is proportional to its electrical charge.

Volta was also credited with creating the first electric battery, called the Voltaic Pile, which allowed scientists of the time to create a steady flow of electrons.

Fig. 2.

An example of a Voltaic Pile first created by Volta, enabling scientists to create a steady flow of electrons. Volta wasn't without his quirks, though. Until he was four years old, he didn't speak a word, and his parents feared that he was either mentally challenged. Good thing they were wrong!

Current – Going with the Flow

Going back to our running analogy, imagine that you've made the choice to take that morning run. You have your shoes and running shorts on and walk out your door to hit the trail. At this point, you've got some movement going as you start your run, a flow.

Here's current in motion in our bodies, who knew that electricity could be so personal?

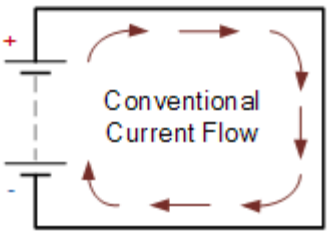
Maybe an hour into your run and you start to hit your stride, ready to run for miles. As you run, your smartwatch measures exactly how far you went and how fast you traveled. This process of running and measuring the process is what Current is all about.

Current in Electricity

Like taking steps to complete your morning run, current is the constant movement, or flow, of electricity in a circuit. The electric current flowing through your circuit is always measured in Amperes or Amps. But what keeps this current moving?

It's the voltage that we talked about earlier. Just like you need to tell yourself to keep running once you get tired, voltage is the motivating force behind current that keeps it moving. There are two schools of thought for how current flows in a circuit; Conventional Flow or Electron Flow, let's look at both:

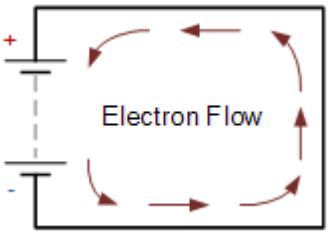
Conventional Flow – Conventional Flow was first, in a period of scientific discovery when people didn't understand electrons and how they flowed in a circuit. Under this model, it was assumed that electricity flows from positive to negative.



Conventional Flow with electricity flowing from the positive to the negative side of a battery.

You'll still see this mentality being used in schematics today, and though it isn't entirely accurate, it is a bit easier to understand than Electron Flow. After all, if we go back to our running analogy, you start with a positive source of energy, and you run until you're out of energy. It's positive to negative relationship like many things in life.

Electron Flow – Electron Flow was the follow up to Conventional Flow. This model accurately portrays electrons as flowing in the opposite direction, from negative to positive. Because electrons are negative by their very nature, they will always flow out of the negative and endlessly try to find their way to the positive, low voltage side of a power source.



And the more current electron flow, with electrons flowing as they do in reality, from negative to positive.

Does it matter which way you display current flowing in a circuit? Not really. You'll likely see it presented both ways when looking at a variety of schematics. Take a look at the diodes or transistors in the next schematic you examine; they'll all be pointing in the direction of Conventional Flow.

The Man Behind Current – Andre-Marie Ampere

Ampere was a French Physicist and Mathematician, and also one of the founders of the science of classical electromagnetism. You can thank Ampere for some pretty great stuff, including:

- His major discovery of demonstrating that wire carrying an electric current can either attract or repel another wire that also has a current flowing through it, without the use of physical magnets.
- He was also the first to bring out the idea of the existence of a particle that we all widely recognize as the electron.
- He also organized chemical elements by their properties in a periodic table a half century before today's modern periodic table came into existence.

An interesting bit about Ampere's education – He didn't have any formal studies! Instead, his father let him do as he pleased, learning anything. While this might bring out laziness and excessive video game playing in the rest of us, Ampere discovered a natural love for knowledge, devouring as many books as he could from the family library and even memorizing pages from the encyclopedia.

Resistance – It's a Material World

Our final concept – Resistance. Imagine yourself back out on the running trail, on what kind of surface are you running? If you're lucky, then you might be cruising on a soft grass or dirt path. Or maybe you prefer the firmness of the street or sidewalk. But what if it starts pouring outside? Then you might be stuck slogging through some thick mud

Regardless of what kind of path you're running on, your feet are encountering some resistance as you continue to move forward. Naturally, not every path of resistance is created equal. Running through mud puts way more resistance on your ability to run when compared to running on a dirt path or street. This is what resistance is all about, the tug and pull of the material world.

Resistance in Electricity

Whatever kind of material that electricity moves through, it's going to encounter some friction that resists its motion. To put it simply, resistance slows down a current. While there are specific components in an electric circuit like a resistor whose sole job is resisting electricity, any physical material will provide some resistance.

You'll find resistance being measured in Ohms Ω, and it has a direct relationship to current and voltage. Here's a simple example – The more resistance you have, the less current that can flow through a circuit. It's just like running, the thicker the mud, the slower you're going to run. The opposite works as well, if you crank up the voltage to get your current moving faster than your resistance will have less of an effect on your circuit.

The Master of Resistance – Georg Simon Ohm

Mr. Ohm was a German Physicist and Mathematician, and it was during his days as a school teacher when he began his research using the new electric battery invented by Volta. With his own equipment, Ohm was able to discover that there is a direct relationship between the voltage applied to a conductor (like a copper wire) and its resulting electric current. This came to be known as the now famous Ohm's Law that we all rely on today.

It's interesting to note that Ohm presented his findings in his first book – The Galvanic Circuit Investigated Mathematically, but the college that he worked for at the time didn't care for it. So what did Ohm do? He resigned, and got a new job at the Polytechnic School of Nurnberg. It was here that his work thankfully got the attention it deserved.

Putting it All Together with Ohm's Law

Alright, it's now time to put all of our concepts together. Here's what we have to work with:

- Voltage (V) – Which is stored electricity that has the potential for movement. When this potential is activated, then voltage acts as a sort of pressure, pushing current along a circuit.
- Current (I) – Which is the flow of electricity in a circuit. This can be measured directly in Amperes, and there are two schools of thought for how current flows – Conventional Flow and Electron Flow.
- Resistance (R) – Which is the resistance that electricity encounters simply by flowing through some physical material. This is measured in Ohms.

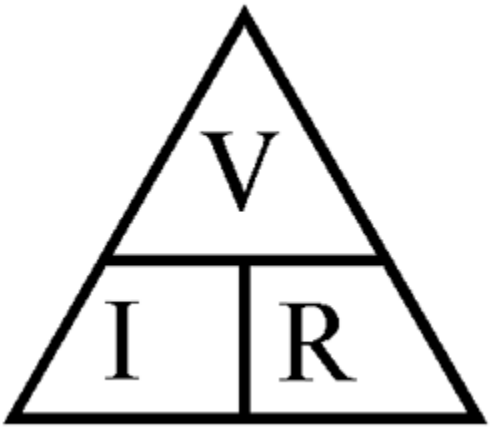
By putting all of this together, we arrive at Ohm's Law:

$V=IR$

In this equation, V = Voltage, I = Current, and R = Resistance. The flexibility of Ohm's Law is impressive and can be used to find any of these three values when only two of them are known. Let's go through an example to see how it works.

Using Ohm's Triangle

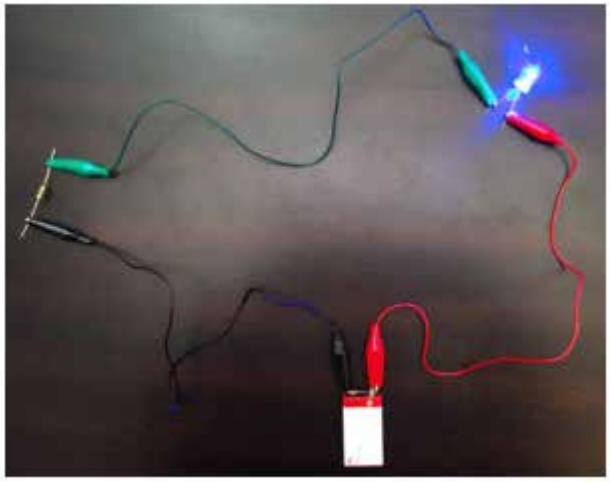
Check out Ohm's Triangle below. It provides an easy, visual representation of how you can manipulate Ohm's Law to get the answers you need. To use it, all you need to do is cover up the letter of the value that you need to figure out, and the remaining letters show you how to get there.



Ohm's Triangle, your handy tool to find exactly what variation of Ohm's Law needs to be used.

Take a look at the circuit below. We have a 9V battery connected to a LED and a resistor. The only problem is that we need to figure out what is the value of the resistor.

Our practice circuit to get a taste of Ohm's Law. We can use the known Amps and Volts to get our Resistor value.



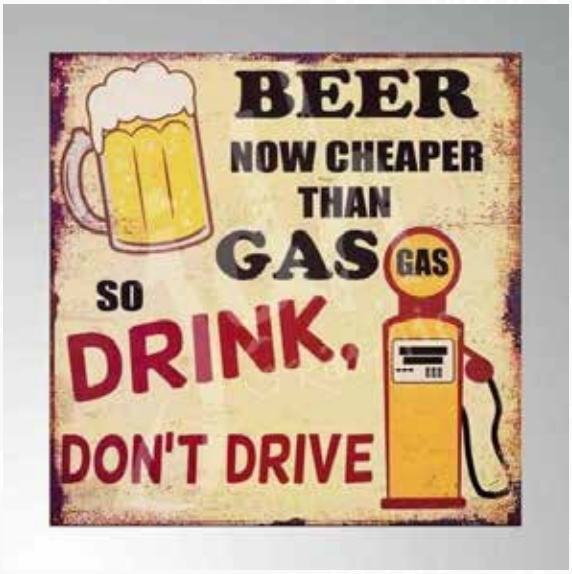
To do this, let's look at our Ohm's Triangle. By covering up the R, we can see that we have V over I, or V divided by I. So by dividing these two numbers, we'll get the value of our resistor. Let's plug these numbers into this equation: R = V/I.

- Let's start with the most obvious, our battery voltage is 9 volts.
- Looking at the datasheet for our LED, we can see a suggested max current of 16mA (milliamps), which converts to 0.016 amps.
- Plugging these two numbers into our equation gets us R = 9V/0.016A, which equals 473.68. This means we need a 473 Ohms resistor for our LED to turn on!

Resistance is Futile

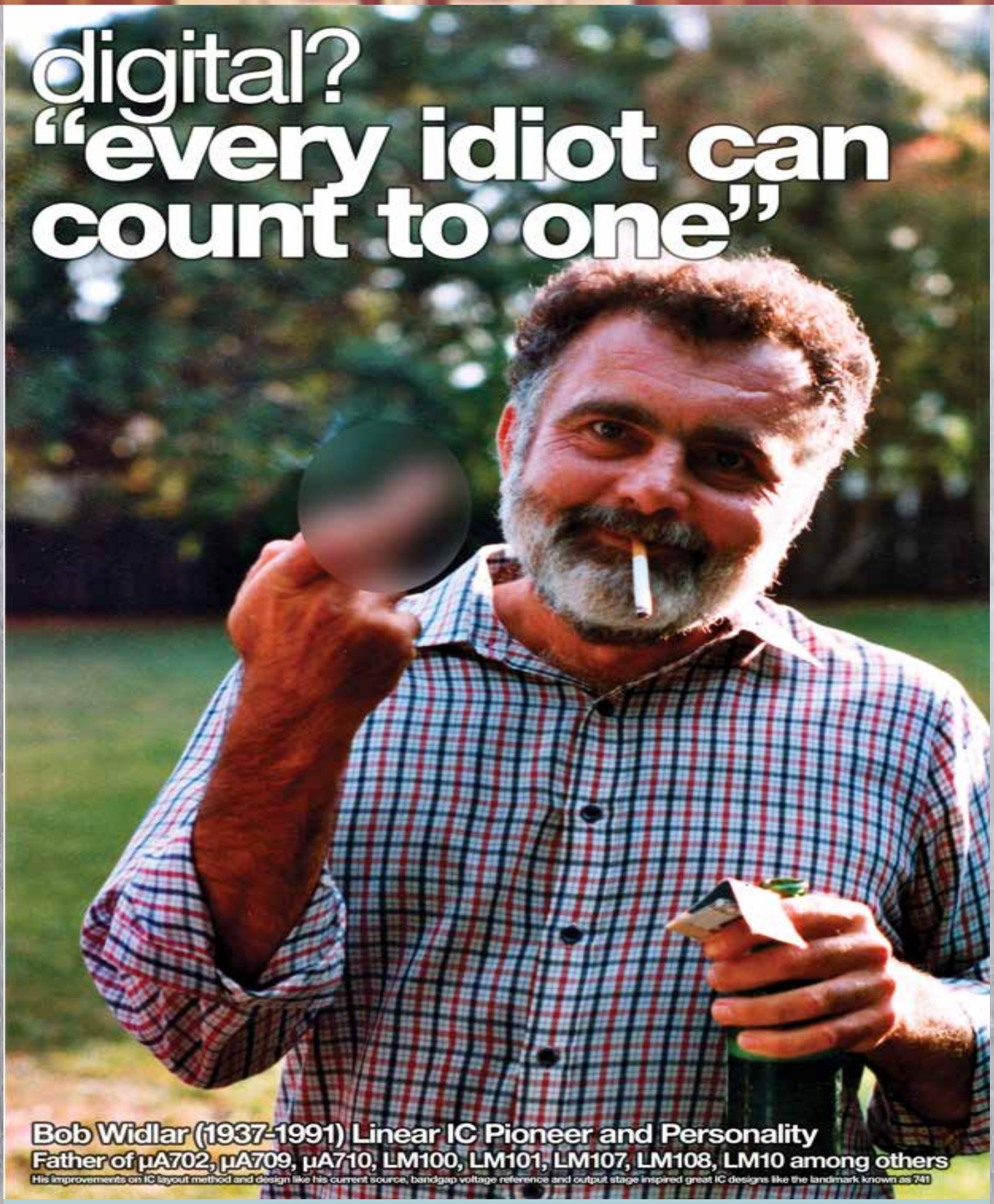
Understanding how voltage, current and resistance all work together wasn't all that hard, now was it? The next time you go for a morning run, we hope you'll have a new perspective on electricity. Feel your feet flying across the pavement or dirt, and remember that's resistance. And when you check to see how far you ran, then you're observing current in motion! And that force that got you out of bed and kept you running? Voltage.

Credit: https://www.autodesk.com/products/eagle/blog/easy-running-understanding-voltage-current-resistance-ohms-law/



Bob Widlar – The Life of an Engineering Legend

Sam Sattel



Rebel with a Cause: Bob Widlar – Engineer, Artist, Prankster, and Legend

Bob Widlar wasn't just a good hardware engineer; he was a legendary one. Even today, he's considered one of the most famous hardware engineers to ever live. Not just for his genius designs, but for his rebellious and entrepreneurial personality that seemed to exist in a universe of its own. For over a decade, Bob ruled the world of Analog IC design with famous designs like uA702, the first linear IC operational amplifier. Or LM109, the first high-power voltage regulator. We're not just here to rattle off all of Bob's landmark achievements though. We think Widlar would appreciate a more well-rounded look at his life. From integrated circuits to sheep and more, this is the story of Bob Widlar as we know it.

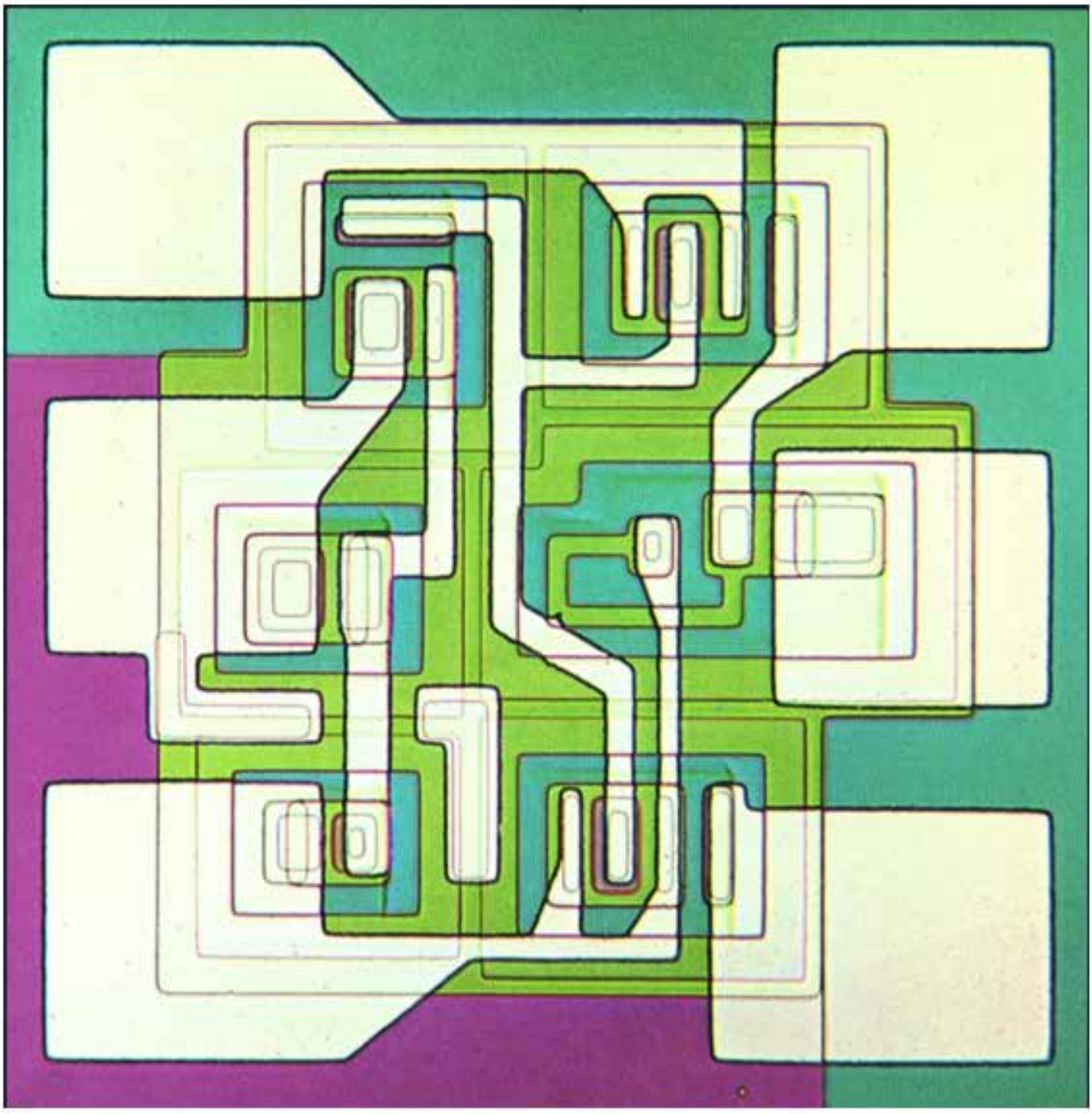
Bob Wasn't Just an Engineer

Bo Lojek, the author of *History of Semiconductor Engineering*, described Bob as, "more artist than engineer…in the environment where Human Relations Departments define what engineers can and cannot comment about, it is very unlikely that we will see his kind again."

"more artist than engineer…in the environment where Human Relations Departments define what engineers can and cannot comment about, it is very unlikely that we will see his kind again."

This is Bob. Bob wasn't a fan of digital electronics. (Image source)

Bob is the kind of engineer that I always pictured in my head, wild-eyed in both mind and actions, but a true genius at heart. No, he didn't sport a Gandalf-like beard from the likes of Bob Pease, but Bob's circuits seemed to manifest from some other dimension of reality and spontaneous creativity.



Bob designed circuits that bordered on art. (Image source)

The artistic and bohemian side of Bob's personality fit in with the times. In the late 1960s and 70s, the semiconductor industry was like a scene from a Wild West movie. Bars were packed day and night, circuit innovations were pouring out like a beautiful waterfall, and in the center of all that change and chaos was Bob.

By all means, Bob enjoyed his alcohol. There are stories floating around of Bob refusing to give a speech until he was provided his allotment of scotch or wine. But compared to the wild times of the day, the Bob we envision now might not have been all that crazy when you look at the environment he worked in.

Bob always enjoyed a good drink, whatever might be in that "Coke." (Image source)

As the *History of Semiconductor Engineering* describes, "Bob was a fiercely independent individual, very happy to be by himself, and he did everything in a stunning way, which was absolutely natural to him, but completely weird to so-called 'normal people'."

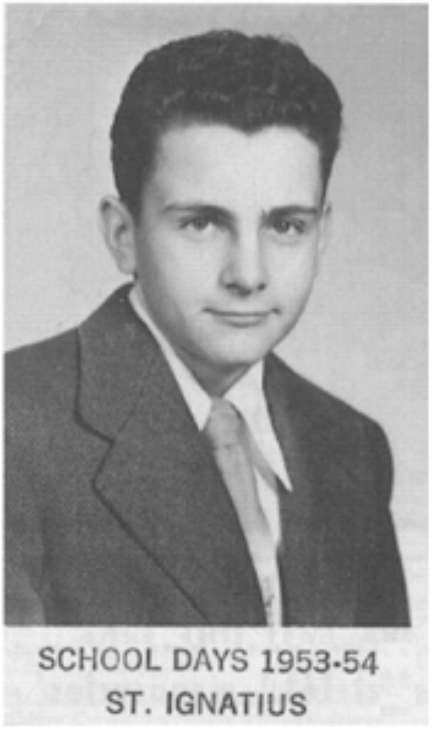
In short, Bob didn't really give a damn about what others thought about him. I suppose when you're the one shaping an entire industry, that mentality is just a given.

Bob's Passion for Electronics Started Early

It's challenging to dig up any personal details from Bob's early life, and he was reported to rarely speak of his early years. What we do know just scratches the surface, but shows that electronics played a huge role in Bob's early life.

Robert Widlar was born on November 30, 1937, in Cleveland to mother Mary Vithous and father Walter J. Widlar. His father was a self-taught radio engineer who worked at a local radio station. He would leave behind a legacy of designing ultra-high frequency transmitters.

Since his birth, electronics were all around Bob, and so he followed what his environment presented to him and pursued a passion for engineering. At the age of 15, Bob was featured in a local newspaper as an electronics designer who repaired radio and TV sets. Bob also reportedly enjoyed playing radio pranks on the Cleveland police, but details of those pranks are scarce.



Robert J. Widlar at age 16

Bob again at the age of 16 without the Widlar Salute. (Image source)

Bob's budding passion for electronics fully matured when he joined the United States Air Force in 1958. Here Bob was responsible for instructing his fellow servicemen in electronic equipment. This was also the time when he wrote his first book, *Introduction to Semiconductor Devices*

What's interesting to note is that some sources say Bob's "liberal mind" wasn't a good match for the military environment. However, one of his yearly Air Force performance reviews tells a different story. Of first interest is a review of Bob's strengths, where his superiors explicitly noted his superior electronics and communication skills:

"A/2C Widlar is perhaps the outstanding electronics technician assigned to Course ABR33130. His background in the field of electronics as a civilian and his present endeavors in off duty educational pursuits serve to put him "head and shoulders" above the average technicians. He demonstrates a willingness to assist his fellow instructors, who looks to him for guidance on complex electronics problems. Airman Widlar is not satisfied with mediocrity in his efforts and constantly strives for perfection. He has an above average ability to use clear concise words to express himself."

We then get to the recommended areas of improvement for Airman Widlar. This part starts to draw connections to his later charged personality and depicts a man simply growing into his own skin and maturing:

"Airman Widlar, in the past, has tended to dramatize his frustrations at inefficiencies that exist, to a point that he creates an impression of immaturity. He has improved greatly in this area, toning down his approach to problems, and has evidenced a willingness to accept that which he cannot control. No further recurrence of this comment are anticipated."

For reasons largely unknown, Bob chose to end his Air Force service in 1961. From there, we find Bob joining the Ball Brothers Research Corporation in Boulder, Colorado where he developed analog and digital equipment

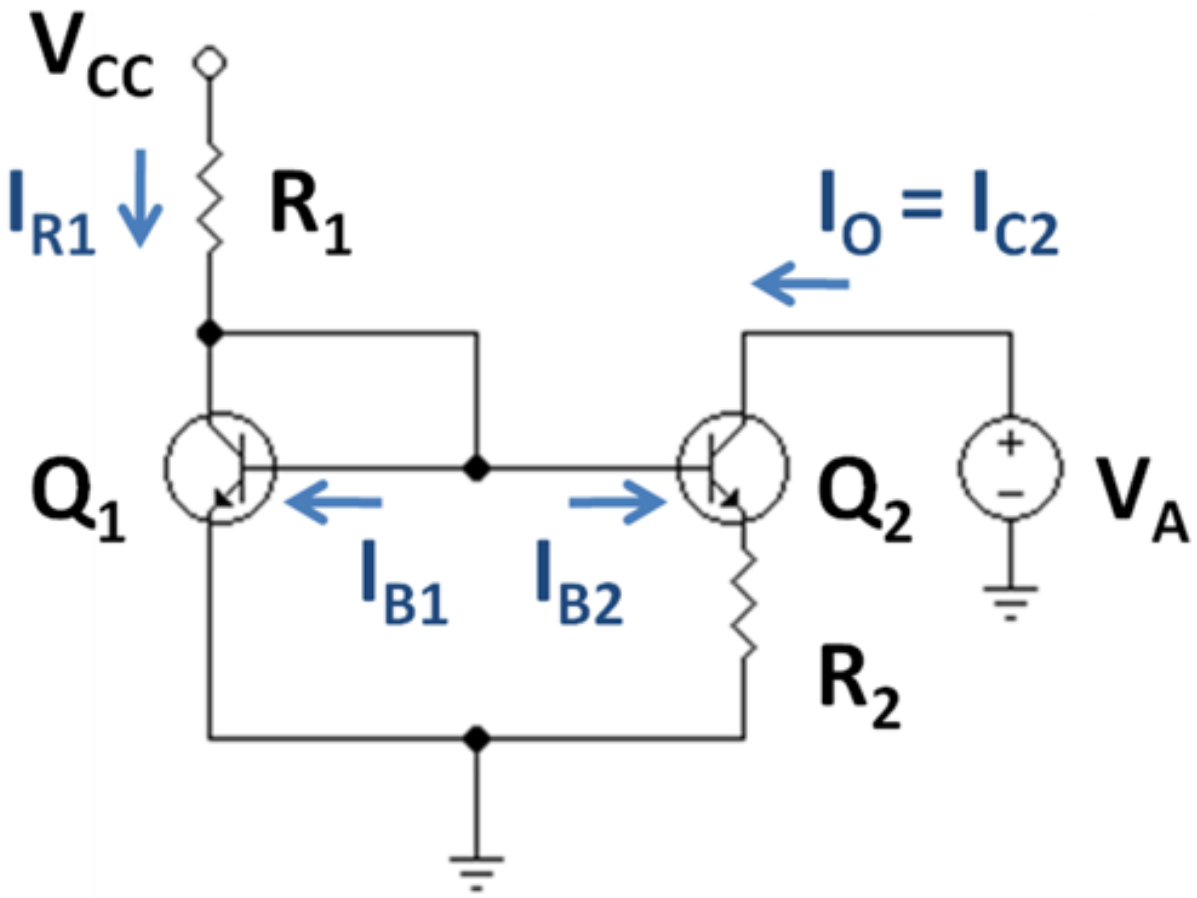
for NASA. It was also during this time that Bob completed his studies at the University of Colorado, graduating with a Bachelor's degree in Electrical Engineering in 1963.

Bob Shapes an Industry Around His Designs

It's in the 1960s and 1970s where Bob's genius and renown come into full swing. We won't bother rattling off all of Bob's great achievements, as other articles have already done that justice. However, we will mention a couple that deserves to be mentioned over and over again:

1964

Bob catapults the semiconductor industry into a $10 billion success thanks to his LM101 operational amplifier design. During this time Bob also created the building blocks for linear IC design documented in what is now the Widlar current source, Widlar bandgap voltage reference, and the Widlar output stage. Without these contributions, our progress in IC development would not be where it is today.



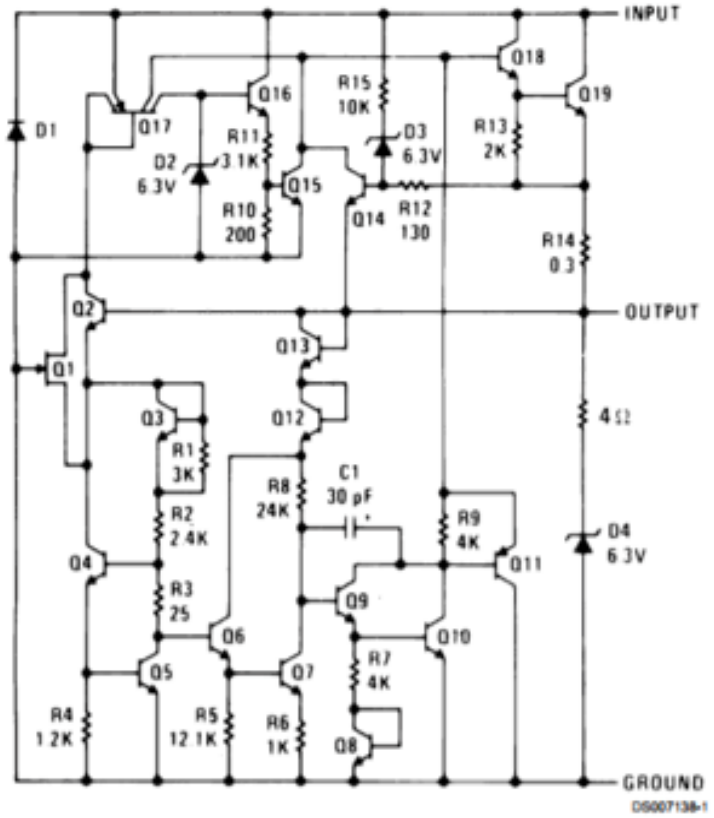
A version of the Widlar current source with bipolar transistors. (Image source

1967

Bob releases his design for the industry's first high-power voltage regulator, the LM109, with a twist. During this period there was a debate about whether it was even possible to build a high-power regulator on one chip. To settle the matter, Bob wrote a letter to several magazines which stated that it was simply impossible to produce this design, with plenty of facts and figures to justify killing the effort.

Bob was already an engineering legend by this time, so his letter held weight, and the issue seemed to be settled. However, cut to two months later and Bob introduces his design for the LM109, with all of the features he said was impossible in his letter. Widlar pulled a fast one on the industry and profited greatly. Classic Bob.

Schematic Diagram

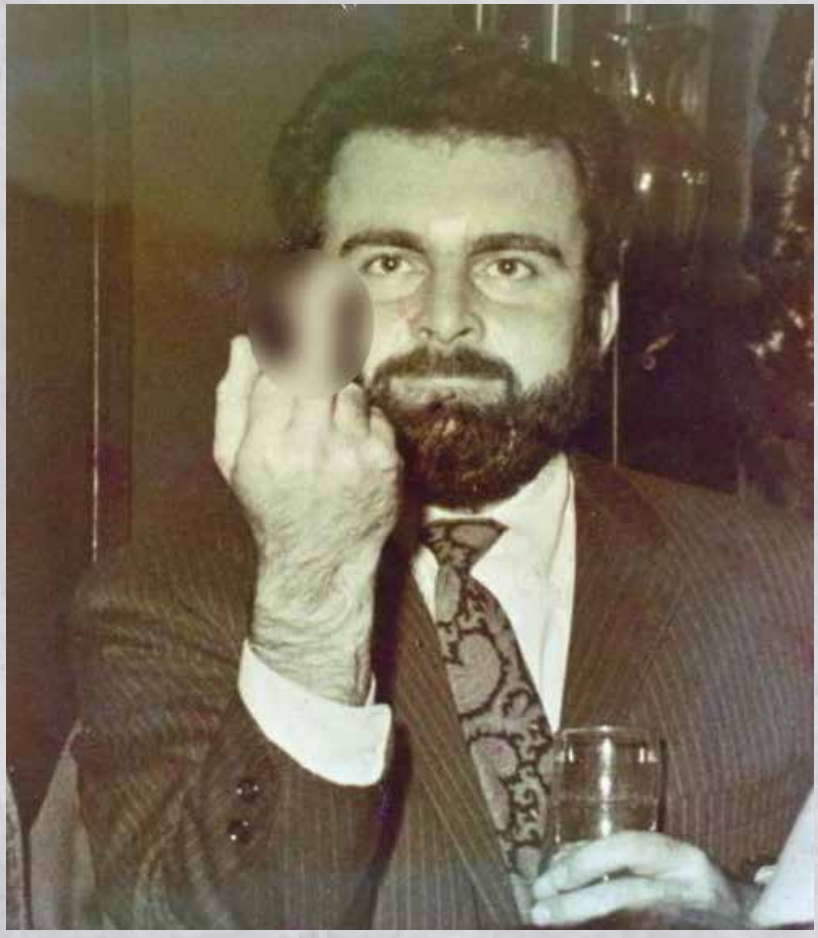


The LM109 is still alive and well in today's linear regulators. (Image source)

It was during Bob's employment at Fairchild Semiconductor that he released several other landmark designs. We have uA709, a high-performance op-amp, which improved on the original design of uA702 and became a flagship product of Fairchild for years. During this time Bob also released his design for the first integrated voltage regulator, uA723.

Bob Shapes an Industry Around His Personality

Bob wasn't just a genius designer; he also embodied a personality that gave a characteristic Widlar Salute to the rest of the semiconductor industry.

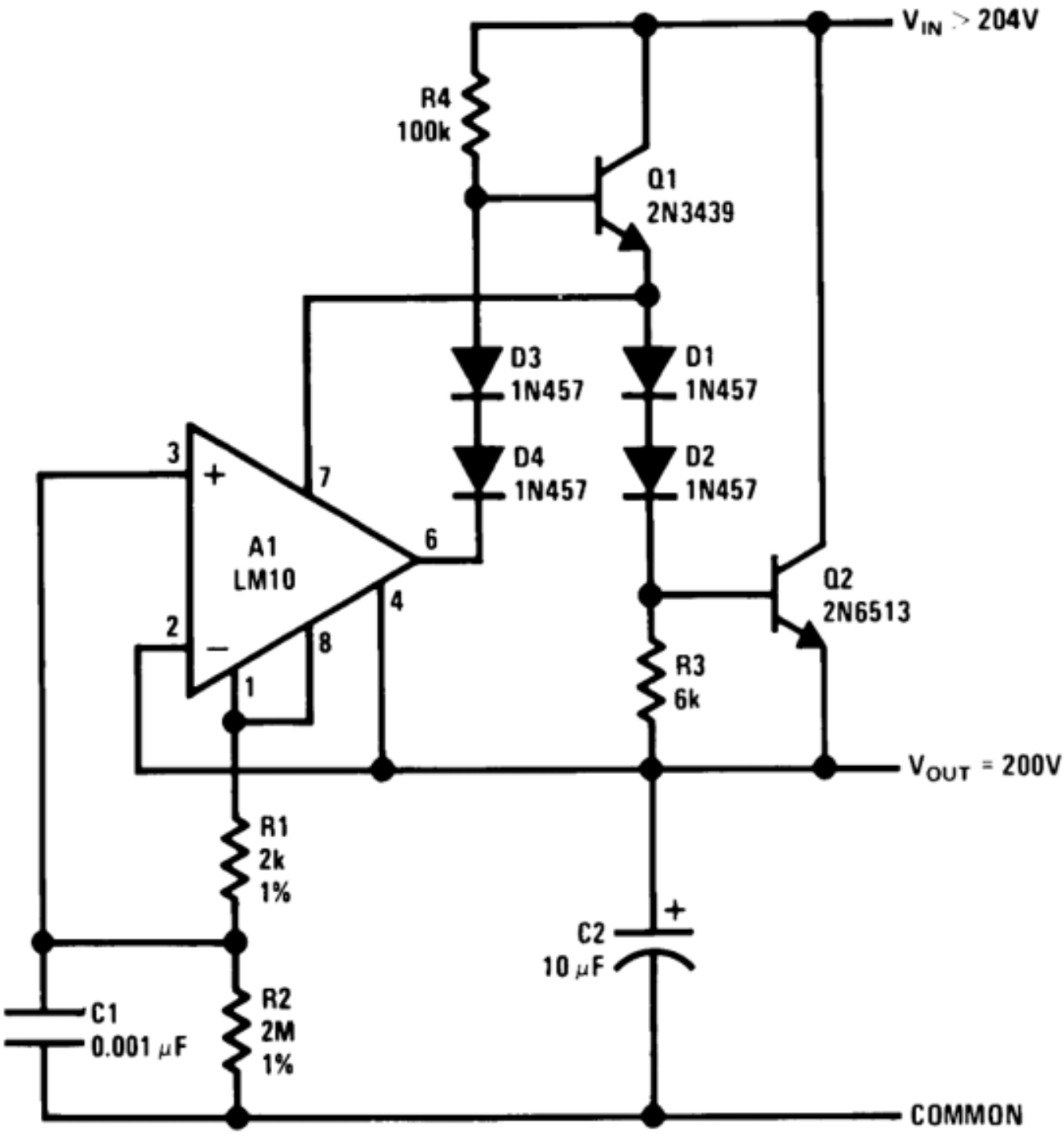


The infamous Widlar Salute. (Image source)
Bob's wild personality came during a time in Silicon Valley where counter-culture was all the rage, and Widlar just happened to be in the right place at the right time with his rebellious, entrepreneurial spirit.

An ad published by National Semiconductor in the 70s with Bob's name written all over it.
When you strip away the attitude, you get a Widlar that cared deeply about the designs he created. At National Semiconductor Bob worked directly with his customers and even wrote his own app notes and data sheets. According to Bob, if you weren't "designing for minimum phone calls," then you were doing something wrong. Bob's unique designs and 'no-bull' attitude propelled him through a lightning-like career of success and fortune. He entered Fairchild in the 60s claiming that analog was nonsense, only to leave the company years down the road positioning Fairchild as a leader in linear integrated circuits. Bob later moved on to Molectro, owned by National Semiconductor, where he transformed the parent company into an analog design giant.

Here's Bob at National Semiconductor in 1967. (Image source)

At the age of 33, Bob ended his career, cashing out his stock options from National Semiconductor to retire in Mexico. Bob's creative brilliance soon remerged when he became a contractor for National Semiconductor in the 1980s. It was in the following years where he designed a number of advanced linear integrated circuits, including the first ultra-low voltage operational amplifier, LM10.

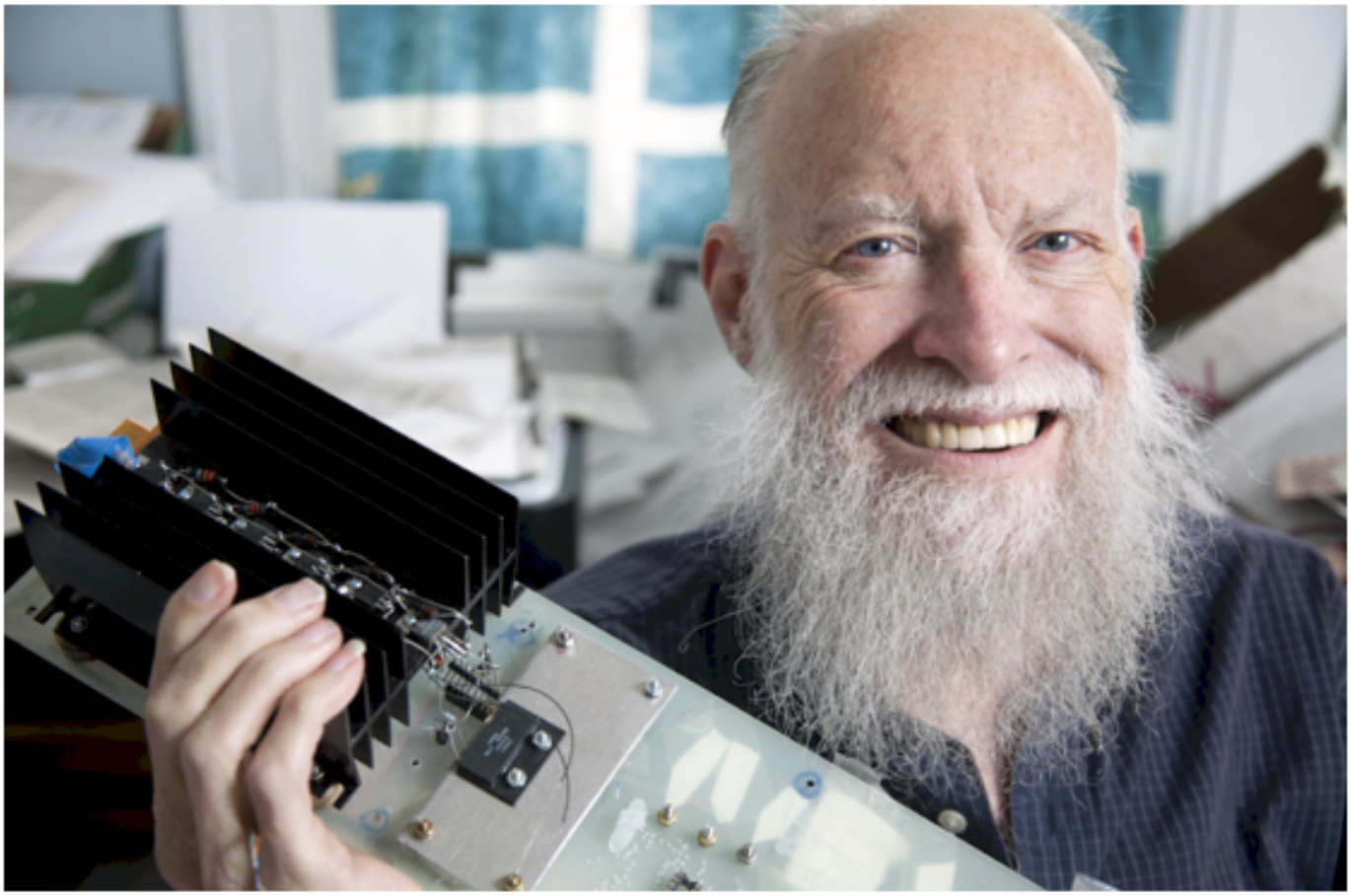


LM10, the first ultra-low *voltage* op amp. *(Image source)*

Bob's Love for Pranks and Antics

While Bob was known as a genius engineer and entrepreneurial rebel, no story is complete without recounting a few of Bob's legendary pranks. Throughout his years of engineering, Bob lived as a free-thinking prankster that was a nightmare for HR departments.

Bob's feverish personality and humor inspired other analog engineers like Bob Pease and Jim Williams to keep his spirit alive even after his passing. Below you'll find three of our most favorite pranks, and antics carried out during Bob's career, but these are by no means exhaustive. Enjoy them in writing, because you'll never see this kind of stuff pulled in today's sterile corporate environments.



Bob Pease kept Widlar's spirit alive until his passing in 2011. (Image source)

The Hassler Circuit

Widlar was a soft-spoken man and didn't care for loud noises in his office. His solution? The Hassler Circuit. When someone came into Bob's office to hassle him and started talking loudly, the device would detect the audio, convert it into a high frequency, and playback the converted sound.

A modern rendition of the Hassler Circuit. (Image source)

For the visitor, the louder they talked, the louder the whining pitch from the Hassler Circuit would get. Visitors would notice this strange ringing, stop talking, and suddenly the sound disappeared. Lesson learned.

Borrowing Sheep for Lawn Trimming

In the 1980s National Semiconductor announced that it was trimming down on lawn maintenance to save money. Bob's response? He bought (some stories say he borrowed) a sheep, packed it into the back of his Mercedes-Benz convertible, and brought it to the front lawn of National's office. Instant grass cutting. Twenty minutes later a news report from San Jose Mercury News strolls by to take pictures of the event, and the story makes headlines. It also pissed off Bob's employer in the process.

There's Bob and his sheep, note the Mercedes parked on the lawn. (Image source)

Widlarizing Faulty Components

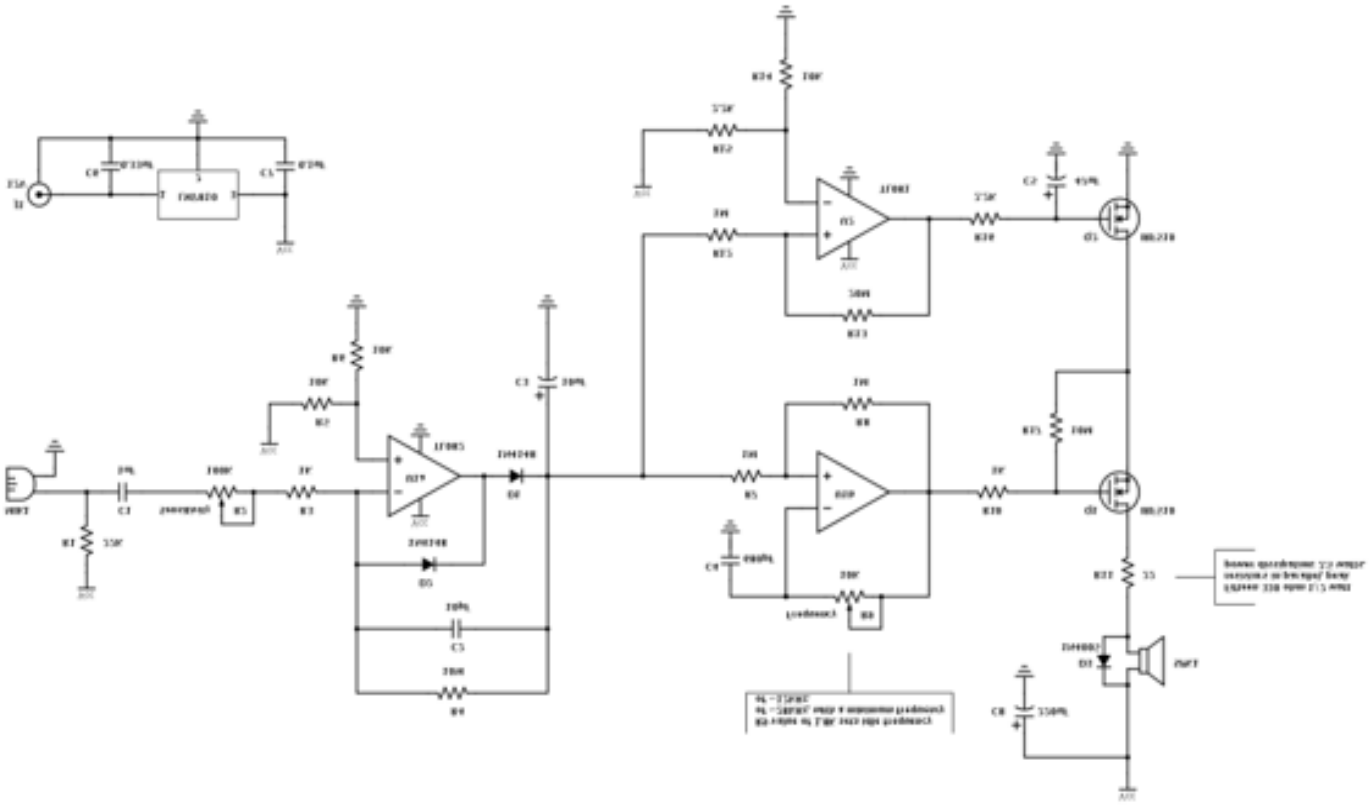
Bob might have been a soft-spoken man, but he wasn't opposed to making noise when frustration warranted it. There were times when Bob would waste an entire day on a circuit that didn't work because of a faulty component. To make sure this component never terrorized another circuit, Bob would take the part over to an anvil in the office and beat it senseless with a hammer until it resembled dust. Widlarizing bad parts became a legend.

"How do you Widlarize something? You take it over to the anvil part of the vice and you beat on it with a hammer, until it is all crunched down to tiny little pieces, so small that you don't even have to sweep it off the floor. It sure makes you feel better. And you know that that component will never vex you again." ~ Bob Pease (Image source)

Keeping Bob's Legacy Alive

Bob Widlar left us early at the age of 53 when he died of a heart attack while jogging in Puerto Vallarta. During his later years, Bob was into fitness as he curbed his alcohol habit. Some say that Bob died drunk, while others closest to the situation say otherwise, which might have amazed some of his colleagues.

To keep Bob's legacy alive, we found a modern version of the Hassler Circuit created by Craig and Analog Zoo. Bob's original schematic was never published for the Hassler, so Craig took it upon himself to recreate it:



The Hassler Schematic, recreated by Analog Zoo.

You can read all about the detail of the Hassler schematic and see the finished circuit in action at Analog Zoo blog.

A Living Legacy

The passing of Bob Widlar left behind not only a transformed semiconductor industry but also a way of engineering that just isn't the same today. We often spend our years in EE education learning about Faraday, Ohm, and Ampère, but never really connect with the more recent engineering personalities of our times like Widlar. Bob shows off a truly unique side of engineering that borders on art, and if there's one thing he was known for, it was that he never designed an obvious circuit.

More importantly, though, Bob's personality triggers a sort of reminisce about the days of free expression and personality in our workplace. In an age where everything has gone digital and the world functions on 1s and 0s, it might just be that we need more personalities like Bob Widlar to inject life into our modern engineering cultures.

Credit: https://www.autodesk.com/products/eagle/blog/bob-widlar-life-engineering-legend/

MARCH 1976
$1.50

73 AMATEUR RADIO ANTENNA ARCHIVES #45

A TILT AND LAY MOUNT FOR A TRAILER HITCH

As a member of our local ARES group I am aware of the need to have gear that can enable simplex operation if the normal repeater link is down or in use by another group. One of the ways to do that without having to call out "the big guns" like the ARES trailer with its portable tower, is to have a way of elevating an antenna connected to the mobile rig in your car or truck. Such a device would have to be easily and conveniently stored in the vehicle and also be easy to set up and use. Here is my take on the problem and the solution I devised (with a lot of help from various sites on the Internet and some of my past projects)

Since my current vehicle now has a trailer hitch receiver and ball mount I wanted to make use of that capability some way. A tour through the Google Universe gained me several ideas which demanded further study. One in particular "4x4 Ham - 2" Hitch Mount for Antenna Mast"

I used the Adjustable Ball Mount from his project, I even got it on sale at Harbor Freight for $25. For the tilt mechanism I went back to an article of mine that actually wound up in the pages of QST, and also in these pages. There I had used a tilt-over trailer tongue jack which I had stripped of all of its jacking parts and added a screw in safety pin so that the tilt mechanism cannot accidentally be activated. I had given the tilt mount to my son last year and since I am currently visiting him and his family, I played "Indian giver" and asked for it back. I removed the tilt mechanism from the "Big Foot" under tire base and with a pair of new rectangular U-bolts instead for the curved ones I had used for the metal pipe of the "Big Foot" base, the tilt assembly was quickly attached to the L-shaped 2" square base of the adjustable ball mount. The adjusting part that would hold the actual "ball" and the pins that hold it in place have been donated to my son's ever growing pile of trailer parts.

I also took back the telescopic mast that was the passive part of the tilt system. I removed the bottom tube which decreased the height of the mast to around 22 feet with a 12 inch overlap at each joint in the telescopic mast. A dual band (VHF/UHF) antenna was recovered and mated to the mast along with one eye-bolt that will allow the raising of an NVIS dipole antenna for HF. The NVIS antenna can be adjusted from ground level to the top of the mast allowing plenty of adjustment for the best results. When telescoped into its storage mode the mast is only about 4'6" long so it stores easily. The tilt mount uses the same retaining pin as a regular ball mount and also stores easily inside the car. My experience indicates that set-up time from parking the van to operating on the much taller antenna for VHF/UHF is about 15 minutes. That is 15 minutes for a 73 year old curmudgeon like me. A younger ham could probably do it in 5 minutes if he or she had everything ready.

In order to easily connect the antenna(s) on the mast with the radio in the vehicle I ran 3-foot coax jumpers from the radio (a IC-706MkIIG) to two coax switches mounted at the back of the center console. These switches are accessible from the driver's seat but are more easily operated from the area behind the front seats. The normal mobile antennas are connected to one side of the switches and the coax runs to the elevated antennas are connected to the other side. Once the antennas are connected it is a simple matter to flip two coax switches and begin operations with a 22 foot tall "mobile" antenna.

One can easily see other options for this tilt up system. It could be attached to the bumper of a travel trailer or to the tongue of the trailer. A tilt and lay system might be the perfect answer for a ham in an antenna prohibited development. Raise it up after dark and take it down before dawn and no one need be the wiser.

The purpose for this project was to create an easily erected mast that would be attached to the vehicle and not need guy ropes except in the case of high winds. The elevation of the antenna from the nominal 4 or 5 feet on the roof of the average car to the 22 feet of the mast will make a huge difference in the range of your signal. There is one important cautionary rule. DO NOT ATTEMPT TO DRIVE THE VEHICLE WITH THE MAST RAISED.!!! I GUARANTEE BAD THINGS WILL HAPPEN.

This shows the left side of the tilt mount. It attaches to the vehicle via the 2" hitch receiver at the back of the van. This view also shows the safety lock which is the white tubular handle which is turned by hand to insert the threaded portion into the base to prevent accidental unlatching of the tilt mechanism.

The right side view displays the spring loaded lock that when pulled allows the mount to pivot. Normally this would be in 90 degree increments but if one does hold the pin out it is possible to rotate the mount 360 degrees.

A close-up of the safety lock on the left side of the tilt system. If this is properly engaged with the back plate then even if an errant rope or coax will not be able to unlock the tilt mechanism even if the spring loaded pin is pulled.

This is probably not the best photo of the system due to the shade of the trees all around the vehicle, but the important item is still clearly visible. Specifically a 22 foot mast attached to the trailer hitch of my van.

Credit: http://www.n1gy.com/a-tilt-mount-for-a-trailer-hitch.html

MEMBERSHIP APPLICATION

E P A R A

Eastern Pennsylvania Amateur Radio Association
Address: PO Box 521, Sciota, PA 18354
Email: N3IS@qsl.net
Website: www.qsl.net/n3is

Date: _____

Name: _____ **Callsign** _____

License: Novice Technician General Advanced Extra

Address: _____

City: _____ **State:** _____ **Zip:** _____

Home Phone: _____

Cell Phone: _____

Email: _____

* **Note:** We do not publicize your phone or email information.

ARRL Member: _____ **Skywarn Spotter:** _____ **ARES/RACES Member:** _____ **VE:** _____

Interests:
DX _____ Contest _____ CW _____ QRP _____ Digital Modes_____ Antique Radio Equipment _____
Building Antennas _____ Electronic Repairs _____ Elmering _____ Kit Building _____ EmComm: ____

Others: _____

How did you get interested in Ham Radio?

_____

Please list any relevant qualifications or assets you have or are willing to share/contribute to the club.

Use reverse side if needed:

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Sponsored or Reviewed by: _____ **Callsign:** _____

Membership Rates,

Membership: **$20.00** per year Spouse: **$10.00** per year
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