The Hellgate Static
June 2023

Hellgate Amateur Radio Club
P.O. Box 3811, Missoula, MT 59806-3811
Web: www.w7px.org

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Officers:

President: NZ7S
Vice-President: K7MTD
Treasurer: W7XT
Secretary: K7MSO

Standing Committees:

Emergency Coordinator: trustee@w7px.org
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Webmaster: webmaster@w7px.org
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Static Editor: editor@w7px.org

Repeater Committee:

K7MTD (Chair)
K0SN Dec 2021 for (22/23)
K7QA Dec 2022 for (23/24)
N7PAS Dec 2022 for (23 - 1Yr)
KG7WYQ Dec 2022 for (23/24)

TAC – Board + K0SN and N7PAS
C&BL – Board + N7PAS and W7RPG

HF Committee hfc@w7px.org

President: NZ7S
Members: K0SN, K7QA, W7XT.

Coming Events

Jun	02	Fox Hunt 7:00 PM
Jun	12	Testing, Meeting
Jun	18	Fathers Day
Jun	24-25	Field Day
Jul	07	Fox Hunt 7:00 PM
Jul	04	Indpendence Day Special event station at Fort
Jul	10	Testing, Meeting
Jul	15-16	Glacier Waterton Hamfest

HARC June Meeting

Program: POTA – SOTA
Equipment setup show and tell.
Antenna setup in parking lot.

We are having in-person monthly meetings and live in person online testing. The testing and meeting are on the 2nd Monday of each Month

Meetings will be held at The Church of Jesus Christ of Latter Day Saints, 3026 South Avenue West, across the street from Big Sky High School. Use the North entrance as all others will be locked.

Testing will begin promptly at 5:30PM, and end at 6:30PM.

Meeting area will be set up between 6:30-7:00PM and meeting will begin at 7:00PM (Program & Business).

Published: 1 Jun 2023 @7:30 AM by N7PAS

May Meeting Testing Results

Congratulations to:

1. Patrick Akkerman passed his Technician and General. His new call sign is KK7MOO
2. Patrick Caylor KK7AIT passed his General. He has successfully upgraded
3. Gary Yost III passed his Technician. His new call sign is KK7MPC
4. Kaleb Gibson passed his Technician. His new call sign is KK7MTY

HARC Meeting 8 May 2023 Minutes

1. **Attendance**: Paul Shuey N7PAS, David Herzberg K7MTD, Mike Leary K7MSO, Joe Geldrich AG7FH, Niles Leuthold KK7JYA, David Kelley K7DDK, Patrick Akkerman, Gary Duncan KG7WYQ, Dale Baldwin W7RPG, Bill Reese KJ7PCR, Tom Hellem K0SN, Tom McGinley K7QA, Dick Walton W7XT, Aaron Nelson N7BIO, Gary Yost III, Eric Sedgwick NZ7S

2. **Approve last meeting minutes**
1st Mike K7MSO 2nd Bill KJ7PCR Motion passed

3. **Treasurer's report**
a. Almost no transactions in the past month.
b. Overall finances very good.
Motion to approve - 1st Dale W7RPG, 2nd Tom K7QA, Motion passed

4. **Repeater Advisory Committee** Nothing to report.

5. **HF Committee Report**
a. W1AW VOTA.
b. If you want to participate email KJ9C@arrl.net.

6. **Discussion List**
a. Field Day June 24 - 25, Where TBD, Bill Reese KJ7PCR will Coordinate.

7. **Net Control Operators**

07 Jun	N7PAS	05 Jul	N7PAS
14 Jun	N7JGS	12 Jul	_____
21 Jun	W7XT	19 Jul	_____
28 Jun	_____	26 Jul	_____

Minutes by K7MSO

Program: Eric NZ7S and Paul N7PAS showed all of the hardware that is required to work for a successful presentation.

Note Please Send Information for Static to editor@w7px.org in LibreOffice or Microsoft Office formats only. Thank You

HARC INVENTORY -- FOR SALE

Line	ITEM	MAKE	MODEL	CONDITION	VALUE	STORED	REMARKS
1	Computer	Dell	Latitude	Fair	100	N7GE	
2	Pow Supply 220-225mhz	Mirage	C106G	Good	25	N7GE	
3	Radio-Hand Held 2 met.	Realistic	HTX 202	Good	50	N7GE	
4	Radio--2 meter	Yaesu	FT-2500M	Fair	$100	N7GE	
5	Portable Repeater		TM-241X2	?		N7GE	
6	Triband Beam	Hy-Gain		Few Missing parts	200	K0SN	
7	Tuner	Signal Corps	BC939B	Parts only	25	K0SN	parts only, no cabinet
8	Speaker + Power Supply	Drake	MS-4 + AC4	Not tested	75	K7QA	needs upgrade
9	Reflected Pwr Mtr	Heathkit	HM-15	Works		K7QA	
10	Mobile Tuning Mtr	Heathkit	PM-2	Untested		K7QA	
11	Trap Vertical	Hygain	14AVQ	Clean, untested	150	K7QA	
12	Transceiver-2 mtr	Kenwood	TR-7400A	Works	70	K7QA	
13	2 Mtr HH Transceiver	Realistic	HTX-202	Error Code	25	K7QA	
14	Speaker w/volume control	Yaesu		Untested	50	K7QA	
15	1993 ARRL Handbook			like new	free	K7QA	
16	Handbooks	ARRL	1950-1980	OK	Free	KGVO	
17	Vintage Mic	Astatic	JT-30	worn, untested	50	KGVO	Ebay sales $50-300
18	13.8V, 12A power supply	Astron	RS12A	works	30	KGVO	
19	C&R checker	CDE		untested	30	KGVO	
21	Rotor	CDE?		untested	50	KGVO	w/ control head
22	Transceiver	Collins	RT-91ARC-2	untested	100	KGVO	Aircraft Military
23	Transverter Interface	Down E. Micro		untested	offer	KGVO	
24	Low pass Filter	Drake	TV-3300	untested	20	KGVO	
25	Receiver	Hallicrafters	SX-100	fair	150	KGVO	
26	Receiver	Hallicrafters	SX28	very good	900	K0SN	
27	Receiver	Hallicrafters	SX-62B	untested, rough	75	KGVO	no cabinet top
28	Vintage Speaker	Hallicrafters	PM 23	Nice, untested	150	KGVO	
29	Vintage Speaker	Hammarlund	S-100	Nice, untested	60	KGVO	
30	AC Power Supply	Heath Kit	HP-23-A	works		KGVO	for the HW-101
31	SSB Transceiver	Heath Kit	HW-101	needs repair		KGVO	Ebay $90-300
32	HF Xcvr + Power Supply	Heathkit		untested	150	KGVO	
33	Oscilloscope	Heathkit	IO-4105	untested	30	KGVO	
34	Power/SWR Meter	Heathkit	HM15	untested		KGVO	
35	Vertical antenna		Dipole 80	?		NOAA	
36	Receiver	Heathkit	HR-10	untested, rough	offer	KGVO	Ebay sales $100-300
37	SSB Adapter	Heathkit		untested	40	KGVO	
38	Transceiver	Heathkit	SB102	good	250	KGVO	W/ matching spkr. & p.s.
39	Test Oscillator	HP	650A	untested	offer	KGVO	
40	Rotor Control	Hygain	DCU-1	untested	200	KGVO	
41	VHF Mobile Transceiver	Icom	IC-25A	fair, untested	30	KGVO	
42	Transceiver	Kenwood	TS-450S	Excellent	400	KGVO	
43	2M FM Transceiver	Kenwood	TR7400A	no output	10	KGVO	
44	HF Transceiver +Man	Kenwood	TS-520	non-working	100	KGVO	
45	Transceiver	Kenwood	TS-940	Needs Repair	250	KGVO	No output on CW, others
46	Transmitter	Meissner	9-1160 (tube)	good		KGVO	was in use
47	Voice Keyer	MFJ	MFJ-432	untested	30	KGVO	
48	Fwd/Refl. pwr meter	Midland	23-126	untested	10	KGVO	
49	2 mtr, 30 Watt amp	Mirage	B23	untested	25	KGVO	
50	20-40M QRP Transceiver	Oak Hills	QRP Classic	untested	30	KGVO	
51	13.8V, 10A P.S.	Pyramid	PS15-KX	Nice, untested	30	KGVO	
52	2 mtr mobile Xcvr	Radio Shack	HTX-242	untested	40	KGVO	
53	25A switching P.S.	Radio Shack		untested	40	KGVO	

54	Field str/SWR meter	Radio Shack		untested	10	KGVO	
55	VHF/UHF/FM amp	Radio Shack		untested	20	KGVO	
56	Gen. Coverage Rvr.	Realistic	DX302	untested	125	KGVO	Ebay sales $80-350
57	12V DC p.s.	Samlex		untested	25	KGVO	
58	Receiver	Signal Corps	R-392/URR	fair	300	KGVO	Stromberg Carlson
59	VTVM	Simpson	311	untested	25	KGVO	
60	Oscilloscope	Telequipment		untested	20	KGVO	
61	Var. power resistors	Tru-ohm, etc		untested	10	KGVO	box of ~20
62	Scanner	Uniden	BC9000	untested	50	KGVO	
63	BUG KEY	unknown		fair		KGVO	
64	12V DC Backup Power	West Mtn	PG40S	good, untested	25	KGVO	
65	Radio-Sound card interface	West Mtn	Riblaster Plus			KGVO	
66	HF Transceiver	Yaesu	FT-840	fair, works	300	KGVO	
67	Speaker	Yaesu	SP-8	Good, untested	125	KGVO	
68	VHF FM Transceiver	Yaesu	FT720RU	untested	25	KGVO	
69	VHF Transceiver	Yaesu	1500M	untested	75	KGVO	
70	Many electronic parts for amps, tuners, other projects, too numerous to list.				offer	KGVO	some free, door prizes
71	Misc. panel mount meters			untested,	40	KGVO	2 boxes full
72	Patch cords w/ RCA male			good	10	KGVO	box of ~20
73	Peter Dahl 10 HY @ 1 A		new	new		KGVO	
74	Peter Dahl 40 HY @ .6 A		new	new		KGVO	
75	Peter Dahl 9 HY @ 1.5A		NEW	NEW	200	KGVO	66 pounds - pick up only
76	Peter Dahl Swgng Choke		new	new		KGVO	
77	Antenna Tuner	Icom	AH-4			NZ7S	
78	Voice Synthesizer	Icom	UT-102			NZ7S	
79	Transceivers, qty.2	Kenwood	220-225 mhz.	?		NZ7S	
80	Antenna Tuner + man	MFJ	MFJ-934			NZ7S	
81	RTTY CW	MFJ		?		NZ7S	
82	Wattmeter/SWR	Coax. Dynam.	81021	com	200	KGVO	

Contact K0SN or W7XT for further information

Contact HFC@w7px.org for further information (note this is not yet set up)

Electronics 101.4: Diodes

Electricity's one-way street

Dave Astels

daveastels.com

Dave's career started in the 8-bit days, with the Z80 and 6502, and he's been working with computers ever since. Check him out at **daveastels.com** and **learn.adafruit.com**

So far we've looked at resistors, capacitors, and inductors. These all work in a pretty straightforward way. With this part of the series, we're going to venture into something quite different: semiconductors. We'll start with the simplest: the diode.

Diodes are physically simple, yet electrically very interesting. Resistors, capacitors, and inductors are what we call linear components. A resistor is the classic example: double the voltage across it and the current through it doubles.

A diode is a non-linear component; the first we've had a close look at (the LED is, in fact, a diode, and we used one in issue 9). It's also the first semiconductor we've had a close look at.

A diode is polarised. If you recall, resistors are not polarised; it doesn't matter which way you connect them. We found that some capacitors are polarised, and some aren't; it depends on how they are constructed. Diodes are always polarised. You may have noticed that LEDs only work one way around. That's because they're diodes.

First, how is it non-linear? Have a look at **Figure 1**. It shows the current vs. voltage for a resistor. You can see that when the voltage is doubled in either direction, the corresponding current doubles. Now look at **Figure 2**. It's the same current vs. voltage curve for a diode. It should be clear that it's not linear. In fact it's a very different behaviour.

Between the two knees of the curve (at Vbd and Vd) practically no current flows through the diode.

YOU'LL NEED

- **Solderless breadboard**
- **Two different voltage power supplies** (e.g. 5 V and 3.3 V or battery holders with a different number of AAs)
- **A few 1N4001 and 1N4148 diodes**
- **Some LEDs**
- **Various resistors, from 100 Ω to 1 kΩ**
- **Jumper wires, etc.**

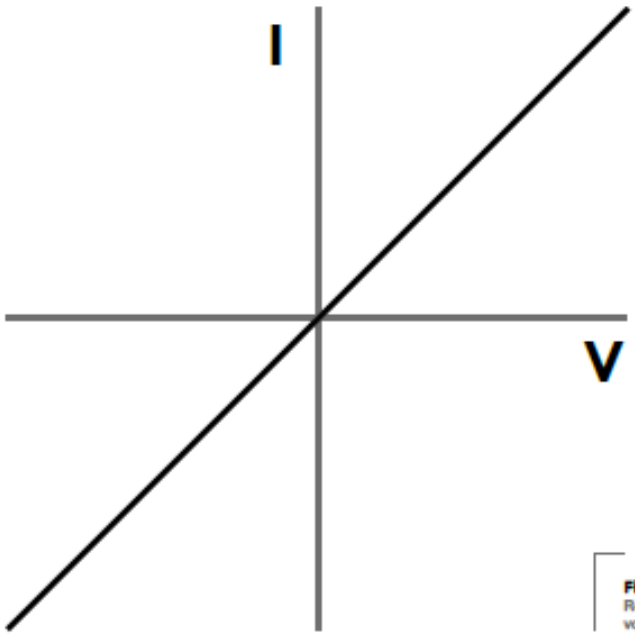
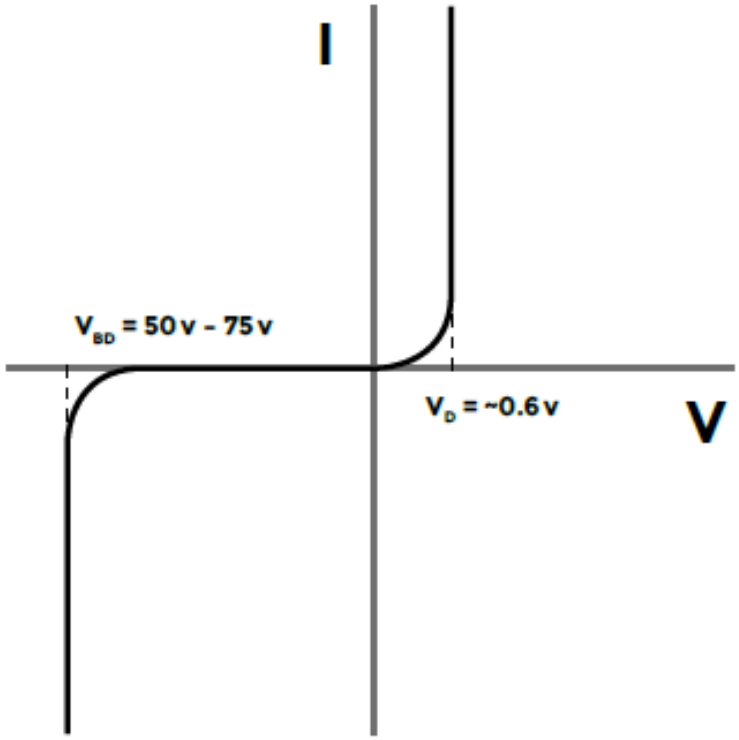


Figure 1 Resistor's linear current vs. voltage curve



Once the anode is at least Vd more than the cathode (typically around 0.6 V), current starts flowing. This is referred to as forward-biasing the diode. Notice on the graph that the current isn't really bounded: as much can flow as needed. The only limit is that the diode will eventually melt from the heat generated. In practical applications, you'll need to include some other components (such as a resistor) to limit the current and prevent the diode from melting. The other knee of the curve is when the anode becomes overwhelmingly more negative than the cathode. When the anode is more negative than the cathode, it's called reverse biasing, and when it reaches that knee (generally -50 to -75 V), the diode breaks down (hence the name of the voltage at that point: Vbd is the breakdown voltage) and current can flow in the opposite direction. This is generally considered to be not a good thing (except for a Zener diode, as we'll discuss shortly).

The result of all this is that diodes have the incredibly handy property of letting current flow in only one direction when they are forward biased.

Figure 2
Diode's nonlinear current vs. voltage curve

Credit
From Wikipedia by Hdsc CC BY-SA 4.0.v

ONE-WAY STREET

Technically, what we are discussing is silicon P-N junction diodes. **Figure 3** shows a representation of what a diode is structurally. It's simply two pieces of silicon jammed up against each other, with an external connection on opposite ends. Those connections are the anode (on the P piece) and the cathode (on the N piece). What's that P and N business?

We discussed conductors and insulators in issue 9. With diodes (and other components we'll discuss in later parts) we have something different: semiconductors. As you might expect from the name, they have a conductivity in between conductors (like metals) and insulators (like glass). Silicon is probably the best known semiconductor material, but there are others. By adding impurities to the silicon, different properties can be realised. Ignoring the chemical details, we generally have two types: N and P. The N-type has extra electrons that can wander around the crystalline structure of the silicon. These are called free electrons because they aren't locked into silicon atoms. The P-type has free holes. You can think of a hole as the absence of an electron.

The junction between the types (see **Figure 3**) creates a barrier to the electrons and holes: very few have enough energy to make the jump across. This creates what's called a depletion zone. When we forward-bias the junction, putting a positive voltage on the anode (the P-type), it causes electrons to be pulled toward the junction, and (due to the relatively negative voltage on the N-type) holes to be pulled towards the junction from the other side. The result is that the depletion zone gets narrower. When the voltage difference is big enough (that 0.6V value), the depletion zone disappears, and electrons ›

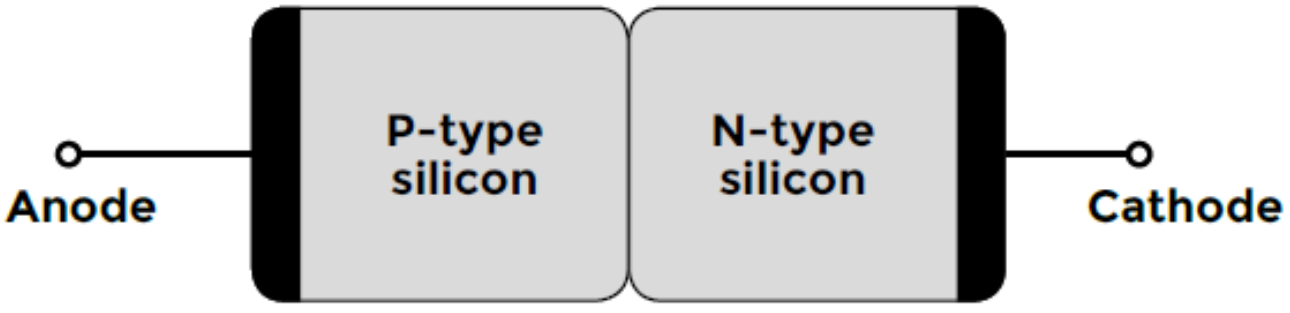


Figure 3
The structure of a PN-junction diode

Credit
Licensed under GFDL 1.2

and holes can flow freely across the junction. Reverse-biasing the junction causes the depletion zone to become wider, stopping any current flow. However, if the reverse-bias voltage is too high, the junction will heat up enough to cause what's called an avalanche effect, which causes the diode to essentially become a short circuit, allowing current to flow in the opposite direction.

> **Chances are, even if you think you've never used a diode before,** you've most likely used a light-emitting diode, aka LED

TYPE CAST

There are a few different types of diode. Here are some of the most popular:

Signal diodes

This is the basic diode that we've been discussing. It is meant for low voltage, low current use. These are typically small glass components, as shown in **Figure 4**.

Power diodes

Power diodes work identically, but are designed to handle higher currents. You'll find these used for back EMF protection (see below) and rectification in power supplies (also see below). These are larger and typically in heavy plastic or metal bodies, as shown in **Figure 5**.

Zener diodes

Zener diodes have more precise breakdown voltage. In fact, there are Zeners available with one of a large number of breakdown voltages. All diodes have approximately the same forward-biased voltage drop (~0.6V), whereas you can get a Zener that has pretty much whatever breakdown voltage you want. You can use a Zener along with a current-limiting resistor (that acts like a constant current source) to roughly regulate to its breakdown voltage. See **Figure 6**. The problem is that the precise breakdown voltage is sensitive to the current and temperature. And they tend to be noisy (i.e. the regulated voltage isn't very smooth). This noise is very random and can be used (along with an analogue to digital converter) to make a true random number generator. The exception to these downsides are Zeners with a breakdown voltage of around 6V, which are much more stable than other voltages.

Light-emitting diodes

Chances are, even if you think you've never used a diode before, you've most likely used a light-emitting diode, aka LED. This is simply a diode (hence the voltage drop across it that figures into the choice of current-limiting resistor) that emits light (visible or otherwise) when current is flowing through it. The exact impurities used to create the N and P parts of the diode determine the colour (i.e. wavelength) of the emitted light (as well as how much voltage it requires). The brightness of the LED varies based on how much current (on average) is flowing through it. I say 'on average' because using a PWM (pulse-width modulation – a way of rapidly switching a digital pin on and off) signal is the usual way to digitally control the brightness of an LED.

Photodiodes

These can be thought of as the opposite of LEDs. They are diodes that will turn on (i.e. allow current to flow through them) when bombarded with enough

Figure 4 A 1N4148 signal diode

Figure 5 A 1N4002 power diode

LED EXPERIMENTS

Hook up an LED in series with a resistor of about 300 ohms, as shown in **Figure 7**. The LED should light. Now change the value of the resistor (either by using a different value resistor or adding other resistors in series or parallel). Be careful when making the value lower. If you go too low, the current may be too much for the LED to handle: it might flash brightly and be destroyed, possibly with a SNAP! Compare the brightness of different coloured LEDs when using the same resistor values.

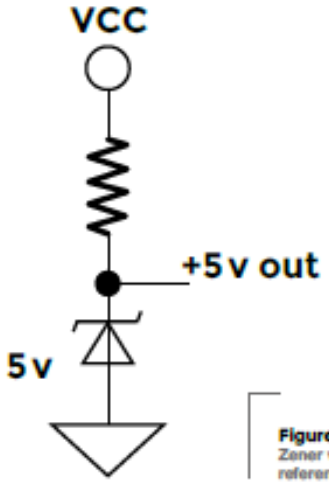


Figure 6 Zener voltage reference circuit

Figure 7 Hooking up an LED

photons. That means if they have light shining on them, they conduct. In the dark, they don't. The materials used to create the N and P type sections will determine what range of the spectrum the diode is sensitive to.

DIODES LOOSE IN THE WORLD

That's what they are, but what do these electrical one-way streets allow us to do? Here are a few of the most popular uses:

Power rectification

The electricity available at your mains outlet is AC. The details vary depending on what country you're in, but it will be AC, and it will be 120, 220, or the like, at a frequency of 50 or 60 Hz. Far from the 5V or 3.3V or even 12V DC we need to power our circuits. With an AC signal, the voltage alternates between positive and negative. In contrast, with a DC signal it's all one (usually positive). Furthermore, a DC power supply has to be stable (always the same voltage) and smooth (having minimal noise, or jitter).

There are three things that need to happen between the outlet and your circuit:

1. The voltage needs to be lowered. A power transformer (see issue 11) can be used for that.
2. AC has to be converted to DC. That can be done with diodes, as we'll see momentarily.
3. The DC voltage needs to be regulated to be a smooth, consistent value. We'll look at that in a future issue.

Power diodes can be used to convert AC to DC. There are a couple of ways to do this. **Figure 8** shows the circuit, input, and output of a half-wave rectifier – so called because only half of the AC waveform is used. The negative part is discarded (since it's blocked by the diode). This is wasteful, but more importantly, the resulting voltage is very variable. By adding more diodes (they're cheap, so why not?), we can capture that negative half of the input. **Figure 9** shows this. It's called a full-wave rectifier, also referred to as a bridge rectifier. This is standard in simple linear power supplies. While most power supplies these days are of the switching variety, if you enjoy working with retro hardware, or salvaged circuitry, you will no doubt run into linear power supplies.

Remember when we talked about capacitors in issue 10? We mentioned that they can be →

QUICK TIP

If you have an oscilloscope, you can try wiring up the circuit in **Figure 11** with different value capacitors and resistors, connecting the input to a square wave (e.g. a PWM output of a microcontroller) and observing the waveforms.

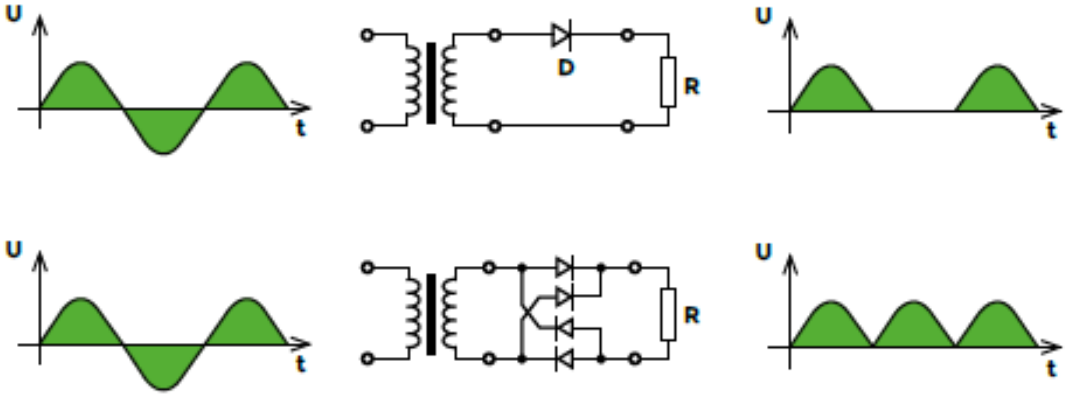


Figure 8 Half-wave rectifier

Credit
By Wikipedia user Wdwd, licensed under CC BY 3.0

Figure 9 Full-wave rectifier

Credit
By Wikipedia user Wdwd, licensed under CC BY 3.0

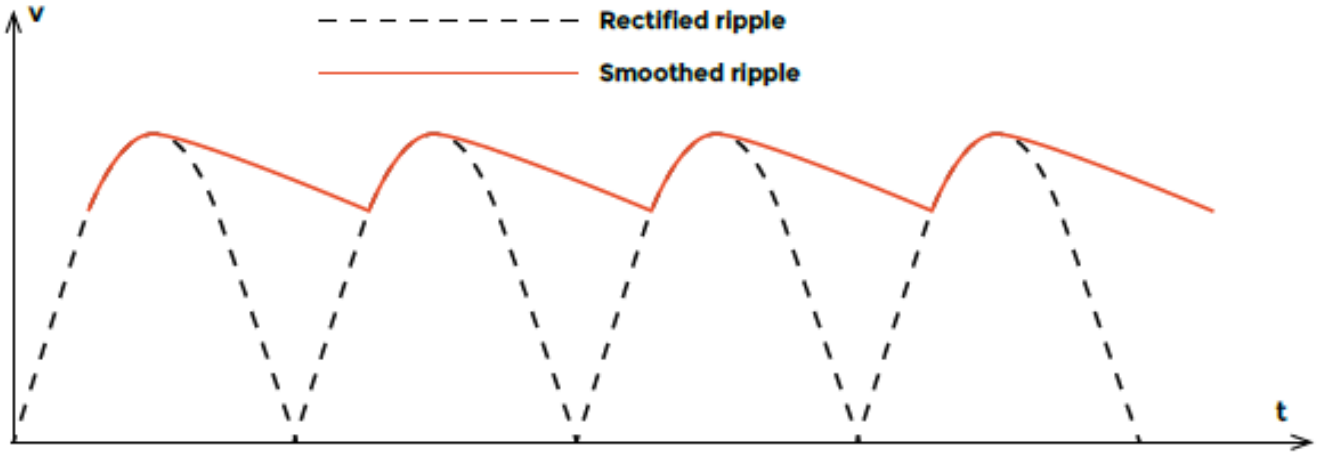


Figure 10
The effects of power-smoothing capacitors

used to smooth signals: i.e. reduce fluctuations. The fluctuations coming out of a rectifier (even a full-wave) are pretty significant. That's why big capacitors are needed. They store a lot of charge, and discharge slowly. **Figure 10** illustrates the effect of adding a large capacitor to the output of a full-wave rectifier.

Rectification is handy in lower voltage signal processing as well. Let's say you have a square-wave signal and want to pulse every time the input goes from low to high (i.e. a pulse on each rising edge). If you feed the signal into a differentiator circuit (see **Figure 11**), you will have a positive pulse on each rising edge, as well as a negative pulse on each falling edge. Remember that we said that capacitors basically block steady voltage and let changes through. This circuit takes full advantage of that property to pick out the edges of the input signal. However, those negative pulses could cause problems, so we put that through a diode, which will let just the positive pulses through.

POWER GATE EXPERIMENTS

To show this in operation, you'll need two power sources of different voltages. You can use 5 V and 3.3 V breadboard power supplies or two different batteries (with different voltages… say, a 9 V and 2–3 AAs). On your breadboard, put together a circuit similar to the one shown in **Figure 13**: you just need the two diodes with a different power source on each anode. The cathodes connect together. You can add a load resistor of 10 kΩ or so to draw some current. Connect a voltmeter to the cathodes and watch the reading as you connect and disconnect the power sources.

Back EMF protection

In issue 11, we discussed inductors, and in particular electromagnets, solenoids, and motors. Recall that we used a diode in parallel with the coil such that it is usually reverse biased. When the power to the coil is turned off, a reverse current is induced that could result in a very high voltage across it. A diode is used to drain that current off and reduce that voltage harmlessly. Otherwise the controlling circuit (typically a transistor) will quite likely be destroyed. **Figure 12** shows the typical use.

Figure 11
Rectifying a differentiated square wave to get rising edge pulses

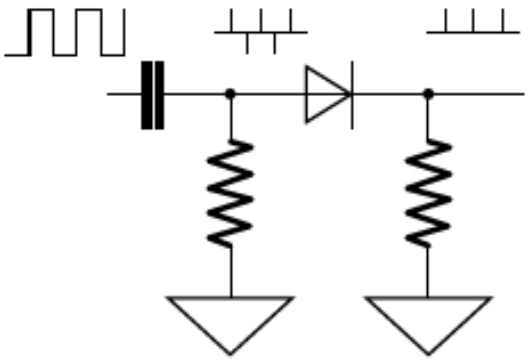
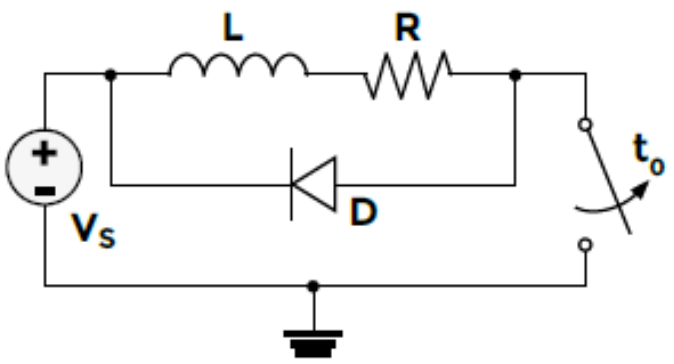


Figure 12
A diode used to protect against the current/voltage generated when the coil is switched off



When you are working with inductors, remember to either use a driver chip that includes the protective diodes (like the ULN2803), or add them yourself.

Power gates

A good example of this use is a real-time clock (RTC) circuit, like the one in **Figure 13**. When the power is on (i.e. Vin is, say, +5V), the RTC gets power from it. When the power is off and Vin is 0V, the RTC needs to be powered in order to maintain its time-keeping. This is generally done by using a small battery. Diodes can be used to automatically switch between the two power sources. The backup battery is a lower voltage than the main supply, so when the power is on, the cathode of its diode will be at a higher voltage than the anode, reverse-biasing the diode, and keeping it 'off'. When the main power is disconnected, the battery diode's cathode is no longer at that higher voltage and it becomes forward biased, allowing current to flow and power to be supplied to the RTC from the battery.

> **Diodes are the simplest semiconductor device.** Even so, they are incredibly useful

Clamps

The final use of diodes we'll look at is the voltage clamp. This is handy when you want to make sure that a signal never exceeds a certain voltage. **Figure 14** shows the most basic form of this. The diode is reverse biased and inactive as long as IN is below 5.6V (5.0V that the diode's cathode is connected to, plus the 0.6V drop across the diode, itself). As soon as IN goes above 5.6V, the diode becomes forward biased and conducts. As long as this is the case, its anode stays at 5.6V regardless of what IN attempts to do. The resistor serves to limit the current through the diode when it's conducting.

A practical use of diode clamps is on the inputs of static-sensitive integrated circuits (as part of the IC's circuit).

Diodes are the simplest semiconductor device. Even so, they are incredibly useful. The concepts behind their operation are at the foundation of modern digital electronics. In issue 13, we'll look at a slightly more complex, yet vastly more useful device: the transistor.

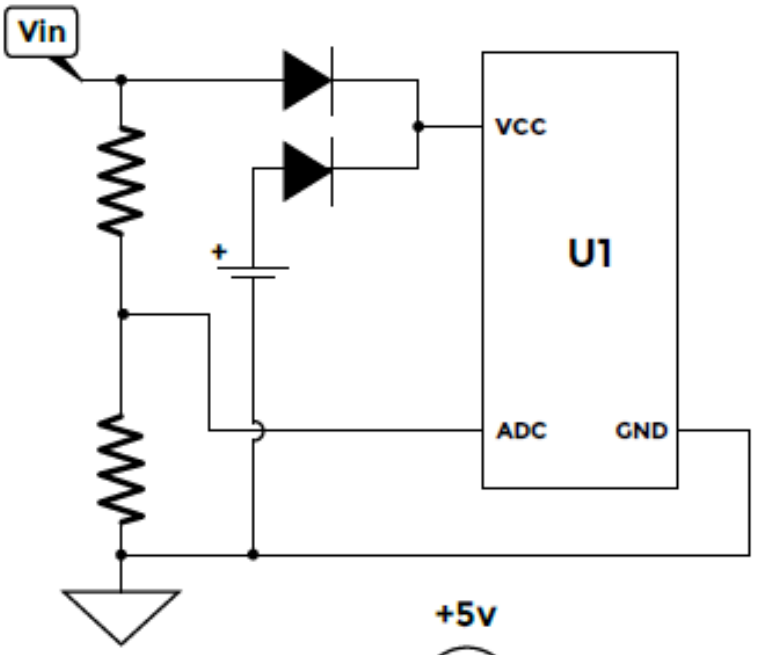


Figure 13
Simple battery backup power switching using diodes

Credit
From StackExchange, licensed by CC BY SA

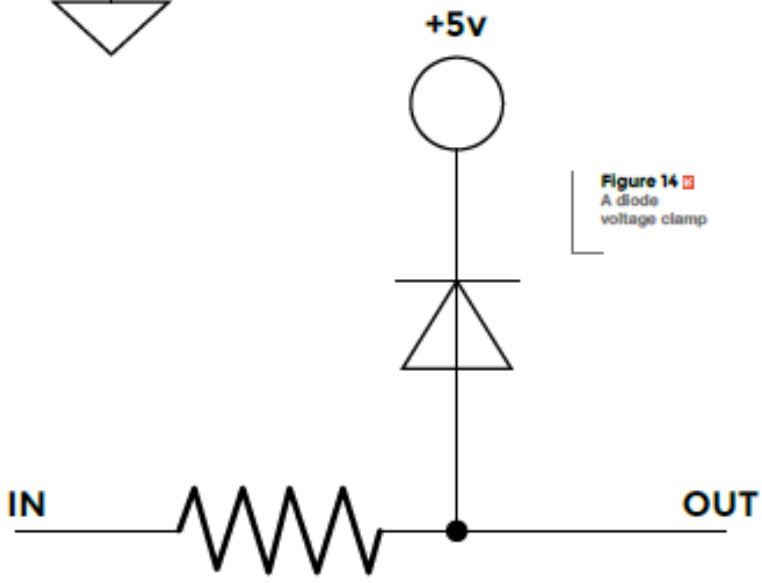


Figure 14
A diode voltage clamp

CLAMPS IN PRACTICE

Wire up the circuit in **Figure 14** using a 1kΩ resistor. With a voltmeter connected to OUT, vary the input voltage. Using 3V, 5V, or 9V will be adequate to see the operation. If you happen to have a variable supply, you should be able to see OUT stop increasing when IN reaches 5.6V.

The largest on-air amateur radio event in the world returns June 24 – 25, 2023. It will run from 1800 UTC Saturday, June 24 to 1759 UTC Sunday, June 25.

Bands and Modes: Participants may only operate on the 160-, 80-, 40-, 20-, 15-, and 10-meter HF bands, and may use all bands 50 MHz and above using phone, CW, and/or digital modes.

Setup: Class A and B stations that wish to operate for only 24 hours may begin their setup at 0000 UTC on the Friday (Thursday afternoon or evening local time) preceding the ARRL Field Day period. Cumulative setup time for those stations may not exceed a total of 24 hours. Class A and B stations that wish to operate the full 27-hour Field Day period may not begin setup until 1800 UTC on Saturday.

Reporting Your Score: All entries must be received at ARRL HQ no later than Tuesday, July 25, 2023. Participants are strongly encouraged to use the online ARRL Field Day score reporting system at **www.field-day.arrl.org**. Online entrants will receive an email confirmation that their entry was accepted, as well as 50 bonus points for submitting their score electronically.

Bob Wick, N2HM, and George Robinson, WA3LVR, operate CW late into the night as part of the Spark to Space Amateur Radio Group's 2022 ARRL Field Day operation in Chester County, Pennsylvania. [Joseph Fell, W3GMS, photo]

New Rules for 2023: There is a new 500 W peak envelope power (PEP) transmitter output category only for Class A, B, and C stations. Changes to scoring the Get on the Air (GOTA) station have also been made this year. Contacts made from the GOTA station are worth 5 points, regardless of mode, with no limit to the number of contacts that can be made. Stations can earn 100 GOTA Coach bonus points for having a coach supervise at least 10 of the contacts made and logged at the GOTA station.

Changes have been made to the Radio Amateurs of Canada (RAC) Section list. The Maritime (MAR) Section has been eliminated, making New Brunswick (NB) and Nova Scotia (NS) their own Sections. The Greater Toronto Area Section has been renamed Golden Horseshoe (GH), and the Northern Territories Section has been renamed Territories (TER). Participants should make sure their logging software has been updated to reflect these changes. For a complete list of ARRL/RAC Sections, visit **https://contests.arrl.org/contestmultipliers.php?a=wve**.

Let everyone know where you will be operating for Field Day by using the Field Day Locator at **www.arrl.org/field-day-locator**. It can also be used to find a nearby Field Day site, or an operation to join if you're traveling out of town.

Groups that actively promote their Field Day event on Facebook, Instagram, or Twitter can earn 100 bonus points. Use the hashtag **#ARRLFD** to share your plans, tips, and tricks for a successful Field Day. See the full ARRL Field Day packet for more information on all of the bonus points available.

Participants should download and review the material found in the 2023 Field Day packet available at **www.arrl.org/field-day**. Email any questions to **fdinfo@arrl.org**.

HELLGATE AMATEUR RADIO CLUB

AGENDA – 12 Jun 2023 meeting

Introductions. Please make sure you sign the attendance sheet

Last meeting minutes: Motion to approve minutes: 1St _____ 2nd _____
Discussion _____ Vote: P/F/T

Treasurer's report: Discussion _____
_____
_____
Motion to approve report: 1St _____ 2nd _____ Vote: P/F/T

Repeater Committee Report: Discussion _____
_____
Motion to approve report: 1St _____ 2nd _____ Vote: P/F/T

Events for 2023:

Jun	02	Fox Hunt 7:00 PM	Jul	07	Fox Hunt 7:00 PM
Jun	12	Testing, Meeting	Jul	04	Independence Day
Jun	14	Flag Day			W7PX Special Event at Fort
Jun	18	Fathers Day	Jul	10	Testing, Meeting
Jun	19	Juneteenth	Jul	15-16	Glacier Waterton Hamfest
Jun	24-25	Field Day			https://www.gwhamfest.org/

HARC Social Net every Saturday morning @ 9:00 AM on 147.040 Repeater – Buy/Sell - During.

HARC Discussion List

1. _Field Day - _____
2. _____
3. _____

VHF Net Control Station assignments:

Jun	7	N7PAS	Backup	Jul	5	N7PAS
Jun	14	_N7JGS	Backup	Jul	12	_____
Jun	21	_W7XT	Backup	Jul	19	_____
Jun	28	_____	Backup	Jul	26	_____
___	__	_____	Backup	___	__	_____

Reminder: Backup is always the next person in line as the net control.

Good and Welfare. _____

*** **Next Club meeting: Jul 10** *** Motion to Adjourn: 1St _____ 2nd _____ Vote: P/F/T

Program: POTA – SOTA Equipment setup show and tell. Antenna setup in parking lot.

June 2023

Sunday						
28	29	30	31	1	2	3
					Fox Hunt 7:00 PM	HARC Social Net 9:00Am on 147.040 Repeater
4	5	6	7	8	9	10
			ERC NET 7:30 On 146.900-88.5T BARC NET 8:15 On 146.720-203.5T HARC NET 9:00 On 147.040+No Tone			HARC Social Net 9:00Am on 147.040 Repeater
11	12	13	14	15	16	17
	HARC Testing 5:30 & Meeting 7:00 PM		Flag Day ERC NET 7:30 On 146.900-88.5T BARC NET 8:15 On 146.720-203.5T HARC NET 9:00 On 147.040+No Tone			HARC Social Net 9:00Am on 147.040 Repeater
18	19	20	21	22	23	24
Fathers Day	Juneteenth		ERC NET 7:30 On 146.900-88.5T BARC NET 8:15 On 146.720-203.5T HARC NET 9:00 On 147.040+No Tone		Field Day Setup	HARC Social Net 9:00Am on 147.040 Repeater Field Day Starts @ Noon
25	26	27	28	29	30	1
Field Day Ends @ Noon			ERC NET 7:30 On 146.900-88.5T BARC NET 8:15 On 146.720-203.5T HARC NET 9:00 On 147.040+No Tone			

Late Additions:

1. I saw this presentation to a western PA club and thought it was excellent. Pat N9RV
   https://www.youtube.com/watch?v=__M4LqmZ0CE&authuser=0 Note: It is 42 min 54 sec long.

2.