The Hellgate Static

October 2023

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

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Coming Events:

Oct	07-8	ARRL Simulated Emergency Test
Oct	09	Columbus Day(Indigenous People Day)
Oct	09	Testing, Meeting
Oct	14	Dirt Derby Fun Run
Oct	31	Halloween
Nov	05	Daylight Savings Time Ends
Nov	07	Election Day
Nov	11	Veterans Day

Constitution & By-Laws (See Sep Static) – Voting will take place by ballot/proxy at the 9 October Meeting.

Officers:

President: NZ7S
Vice-President: K7MTD
Treasurer: W7XT
Secretary: secretary@k7px.org

Positions:

Emergency Coordinator: trustee@w7px.org
QSLs, Awards: trustee@w7px.org
Webmaster: webmaster@w7px.org
Asst Webmaster: editor@w7px.org
License Exam Contact VE:
harc.ve.testing@gmail.com
Static Editor: editor@w7px.org

Repeater Operations:

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)

C&BL – Board + N7PAS and W7RPG

Buy-Sell Operations hfc@w7px.org
Members: W7XT, K0SN, K7QA.

HARC October Meeting Program:

A representative of Missoula Rural /Fire District will be giving a program on Automatic External Defibrillators (AED). These devices are now located in many public places and be used in heart attack scenarios. The program will include when they may be needed, locating, recognition, and the basic usage of them. I would encourage spouses and/or significant others to also attend. We will have the program before the business meeting. K7MTD.

We are having in-person monthly meetings and live in person electronic 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 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: 30 Sep 2023 @5:30 PM by N7PAS

11 Sep 2023 Exam Testing Results

Congratulations to:

1. Graeme Brown of Polson who passed his Extra exam. His call sign is KK7NOL.
2. Nick Salzberg of Missoula who passed his Technician exam. His new call sign is KK7OKH.

11 Sep 2023 HARC Meeting Minutes

1. **Attendance**: Paul Shuey N7PAS Dale Baldwin W7RPG Aaron Nelson N7BIO
   Mike Leary K7MSO David Herzberg K7MTD Eric Sedgwick NZ7S Tom McGinley K7QA
   Joe Geldrick AG7FH
   Free 1 Yr: Niles Leothold KK7JYA
   Visitors: Maurive Austin N7NHS Nick Salzberg ------- Andy Tomascak AG7SW
   NOTE: 9 Members present. Thank you to all that attended.
2. **Last meeting minutes, Sep:** Motion to approve minutes: 1St K7QA_ 2nd N7BIO
   Discussion _None_____ Vote: Passed
3. **Treasurer's report:** Motion to approve report: 1St N7BIO_ 2nd N7PAS
   Discussion _Money moved to E.J._____ Vote: Passed
4. **Repeater Committee:** Motion to approve report: 1St N7PAS_ 2nd N7BIO
   Discussion - 3 went to 146.90 site last labor day. Replaced link UHF amp. Link from Superior to Missoula OK. Link from Missoula to Superior – still down. Suspect problem on 146.96 side.
   - 147.04 receive side has some crackling, Receiver appears to be diminished._ Vote: Passed
5. **HF Committee Report**: None
6. **Discussion List**
   a. Thompson Peak – Superior Ranger district clearance needed.
   b. Last Saturday's Fox Hunt 9 Sep 23 - Local morning training event skipped due to very low attendance. Afternoon we created teams and conducted city wide hunt, split the pot.
   c. Motion to research new fox transmitter with 3 options by N7BIO, assigned to N7BIO.
   d. Saturday morning net going well with new net ops.
   e. Programs for future meetings - Oct AED use, Nov CAP demo of Fox equipment
   f. N7PAS will have a meeting with USFS Superior Ranger District regarding 146.90 repeater.
7. **Net Control Operators**

Sep	06	N7PAS	Oct	04	N7PAS
Sep	13	N7JGS	Oct	11	W7RPG
Sep	20	K7MSO	Oct	18	K7MSO
Sep	27	NZ7S	Oct	25	K7MSO
___	__	_____	___	__	_____

8. Good & Welfare: GMRS and GPS radio usage mentioned.
   Meeting adjourned. Minutes by K7MSO

Program: AED show and discussion by a member of the Missoula Fire Department on 9 Oct.
See page 1.

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)

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.Frank Bretz, K7EBE (SK) 9/29/2023, 11:42 AM

.Just heard from his son Dave, that Frank Bretz K7EBE passed last night. Frank was 97 yrs of age, He was very active for many years and had served as HARC Vice President and President during the 1960s.

Terry Cook

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Electronics 101.8: Amplifiers

Making signals stronger/louder

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**

An amplifier makes a signal 'bigger' in some way: bigger current, bigger voltage, or bigger power (which is voltage × current). We've seen transistors being used to amplify current when we first looked at transistors in HackSpace issue 13. We used a low current signal from a microcontroller (a milliamp or so) to control 1 amp for an LED strip.

An audio amplifier often amplifies voltage: turning a small signal into one large enough for further processing. The final stage of an audio amplifier will also amplify current for the purpose of moving a speaker to produce the required volume of sound. If you are familiar with audio amplifiers, you'll recall that they are generally rated in terms of power. From a few watts for a pair of powered speakers for your computer, to a 700 watt home theatre system, to a multi-1000 watt concert system; the principle is the same, just the voltages and currents vary. With higher power comes larger transistors to handle it. Depending on the efficiency of the design, those transistors can get quite hot. This is why you often see heatsinks on the back of amplifiers.

An electric guitar amplifier is a great example of a multi-stage audio amplifier. The signal coming from the guitar is very small, produced by the strings vibrating in a magnetic field and inducting a tiny current in the coils wound around the magnets (these are the 'pickups'). This signal has to be amplified before the signal is strong enough to drive a speaker, let alone a stadium sound system. There's usually a 'pre-amp' that amplifies the signal enough to feed into further stages. Between the pre-amp and the power amp (whose output drives the speaker), you will often find various effects units that modify the signal in different ways.

QUICK TIP

By cascading PNP and NPN transistors, we can cancel the base-emitter offset.

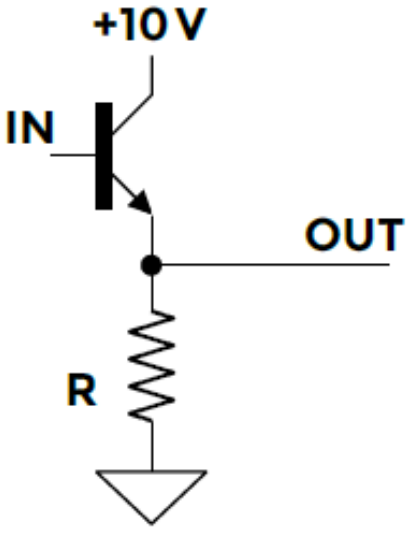


Figure 1 Simple emitter follower circuit

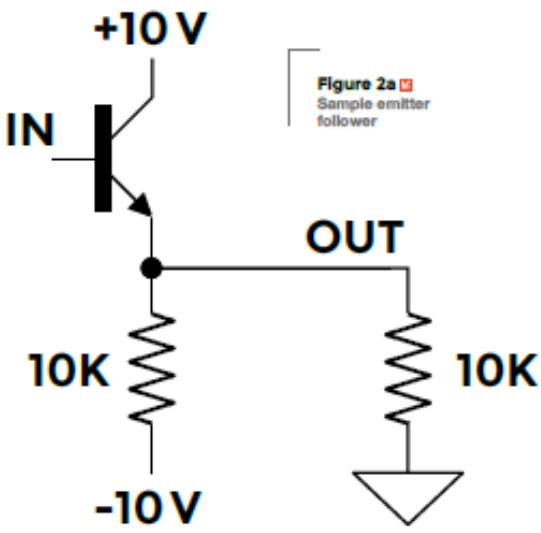


Figure 2a Sample emitter follower

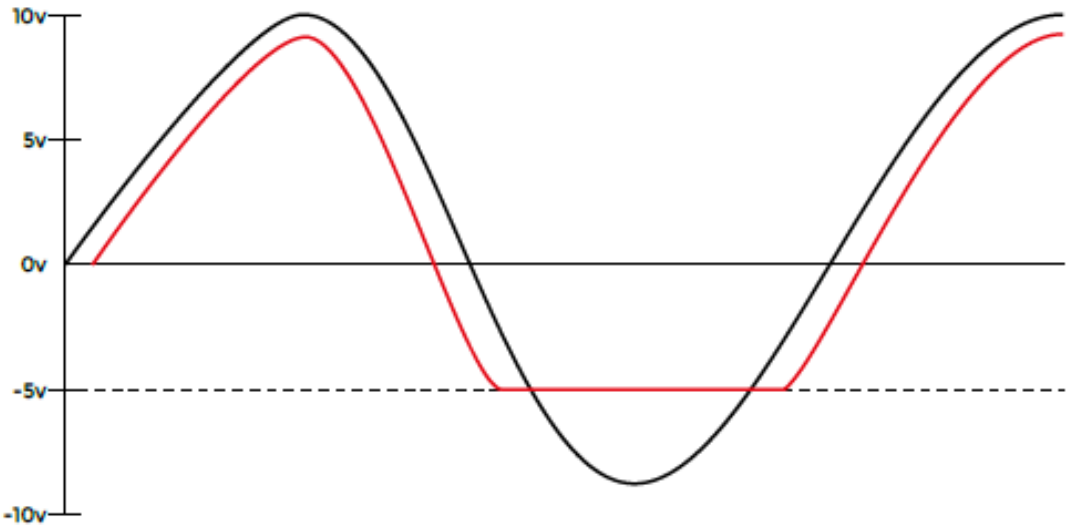


Figure 2b Input and clipped output of a naive emitter follower

The key point to remember is that amplifiers turn small signals into bigger ones.

THE EMITTER FOLLOWER

This circuit is a current amplifier. The output signal is actually lower in voltage than the input by 0.6V (due to the base-emitter junction). However, the current available by way of the collector-emitter path through the transistor can be much larger. In our discussion of transistors, we saw that this is often around 100×. **Figure 1** shows a simple emitter follower circuit. Since this uses an NPN transistor, current only flows in one direction, which can cause some problems. Consider the circuit in **Figure 2a**. It assumes an effective load of 10kΩ, which is matched by the emitter resistor. These two form a voltage divider between -10V and 0V when the transistor is turned off. This means that the output can't go below -5V. That, in turn, means that the transistor will turn off when the input (at the base) is -4.4V. Since an emitter follower has a gain of about 1, the output vs. input voltages (given a nice sine wave as input) is shown in **Figure 2b**. This clipping is far from ideal, and means that a simple emitter follower can be problematic.

> **An audio amplifier often amplifies voltage:** turning a small signal into one large enough for further processing

AC-COUPLING

In audio circuits, we typically want to deal with an AC signal. Recall that a capacitor will pass a varying signal while blocking any steady voltage in it. Essentially it's a high-pass filter: the component of the signal that doesn't change (i.e. has a frequency of 0) is filtered out. **Figure 3** shows an emitter follower with its input and output AC-coupled.

While we want to be working with this AC signal, it presents a wrinkle: we need an amplifier that uses both positive and negative voltages. A single supply amplifier will only work with the positive half of the signal. See **Figure 4** (overleaf).

If we use a dual supply emitter follower as discussed earlier (shown in **Figure 2a**), this will work with the condition that the signal stays near 0V so as to avoid the clipping shown in **Figure 2b**.

BIASING

An alternative to using a dual supply is to bias the transistor so that with the input at 0V, the output sits at half of Vcc. **Figure 3** illustrates this. Resistors R1 and R2 form a voltage divider that biases the transistor appropriately. Because the output varies around half Vcc, the →

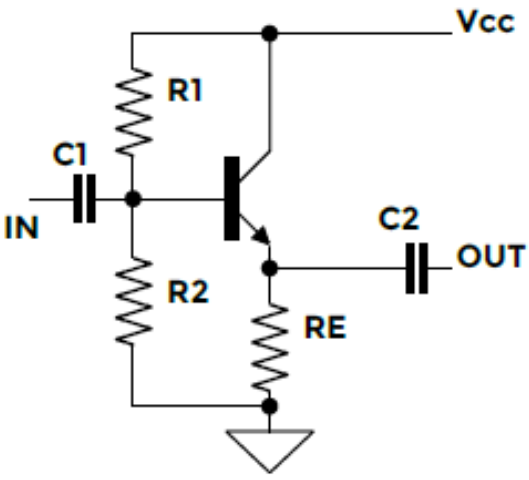


Figure 3 AC-coupled emitter follower

YOU'LL NEED

- **Solderless breadboard**
- **2N3904 and 2N3906 transistors**
- **Assorted resistors, as shown in the circuits you want to build**
- **Assorted capacitors, as shown in the circuits you want to build**
- **8Ω speaker**
- **Signal source** (frequency generator or sound source)
- **Matched NPN/PNP power transistors** (e.g. TIP31C/TIP32C)
- **2 × 1N4001 diodes**
- **Power supply, dual voltage required for some circuits**

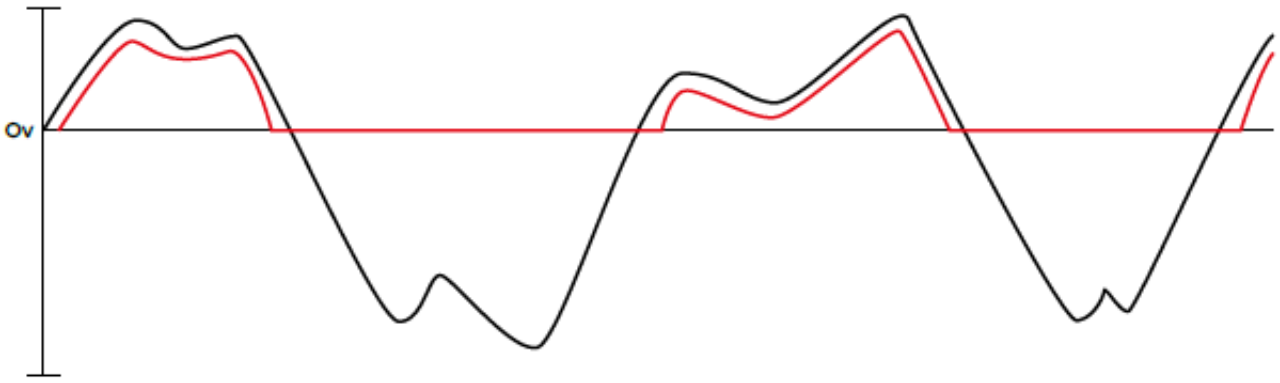


Figure 4
The result of a positive only amplifier

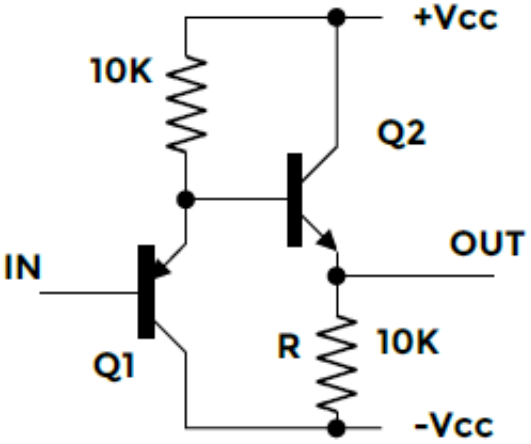


Figure 5
Vbe cancelling emitter follower

output has to be AC-coupled as well to remove the DC bias and pass the AC signal through.

AVOIDING THE VBE OFFSET

Recall that the output from a simple emitter follower is 0.6V less that its input due to the voltage drop across the base-emitter junction. We can adjust for that by using a couple more parts. Essentially we use the opposite voltage drop of a PNP transistor to cancel the drop in the NPN transistor. **Figure 5** shows the updated circuit. The emitter of Q1 is 0.6V higher than its base (higher since it's a PNP transistor). That feeds the base of Q2. Since it's an NPN transistor, its emitter is 0.6V below its base. So the output signal (at Q2's emitter) is approximately the same as the input signal at the base of Q1. As before, this only works if the input is kept near 0V so that the output doesn't clip.

COMMON EMITTER AMPLIFIER

Consider the circuit in **Figure 6**. The voltage at the collector is below Vcc by the voltage across Rc, which is IcRc, so Vc = Vcc – IcRc. The voltage at the base determines the current through the base-emitter, which determines the current through the collector-emitter. Since Vcc and Rc are fixed, if the base-emitter changes then so does the collector-emitter current and so does Vc: a small change in Vb causes a change in Ibe, which causes a larger change in Ic and thus a larger change in Vc. Note that increasing Ic causes a larger voltage drop across Rc which lowers Vc: i.e. changing Vb causes a corresponding (but amplified) decrease in Vc. Because of this we consider the gain of this amplifier to be negative.

Let's expand on the circuit in **Figure 6.** A concrete common emitter amplifier circuit is shown in **Figure 7**. R1 and R2 form a voltage divider that sets the voltage at the transistor's base. The stated values of R1 and R2 mean that 20V / 120kΩ = ~1.6 mA are flowing through them, resulting in a voltage of ~1.6V (~1.6 mA × 10kΩ) at the transistor's base. This is an

QUICK TIP

To amplify an AC-coupled signal, you can use a power source with both positive and negative Vcc.

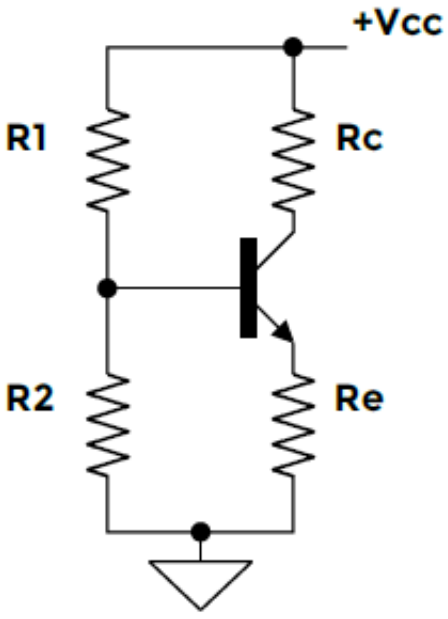


Figure 6
Current source driving a resistor (Rc) as a load

NPN transistor, so the voltage at the emitter will be 1V due to the base-emitter drop. That means there is 1V / 1kΩ = 1mA flowing through the emitter. That also means that there is roughly 1mA flowing through the collector. 1mA flowing through the 10kΩ Rc results in 10V across Rc. That means that Vc is the 20V Vcc less the voltage across Rc: 20V – 10V = 10V. That's the steady/rest state, with no input signal effecting Vb.

Notice the capacitor (C) that is used to AC-couple the input signal? We do this to block any DC bias on the signal so that it won't affect the biasing of the transistor, but will let the actual signal though. We want the signal to affect the biasing so that the transistor will amplify it. How is the value of C chosen? Why 0.1µF? C forms a high-pass filter with R1 and R2, so a value is selected that lets the frequencies we want through. Remember that the goal is to filter out any DC bias in the input, so we want the filter cutoff to be quite low. The values given in the circuit give a cutoff frequency of approximately 17Hz: $f = 1/(2\pi C(R1 \| R2)) = 1/(2\pi \times .000001 \times 9167) = 17.36$.

Now, because the transistor is biased to have the output sitting at 10V with no signal, variations in the base voltage/current caused by a signal coming

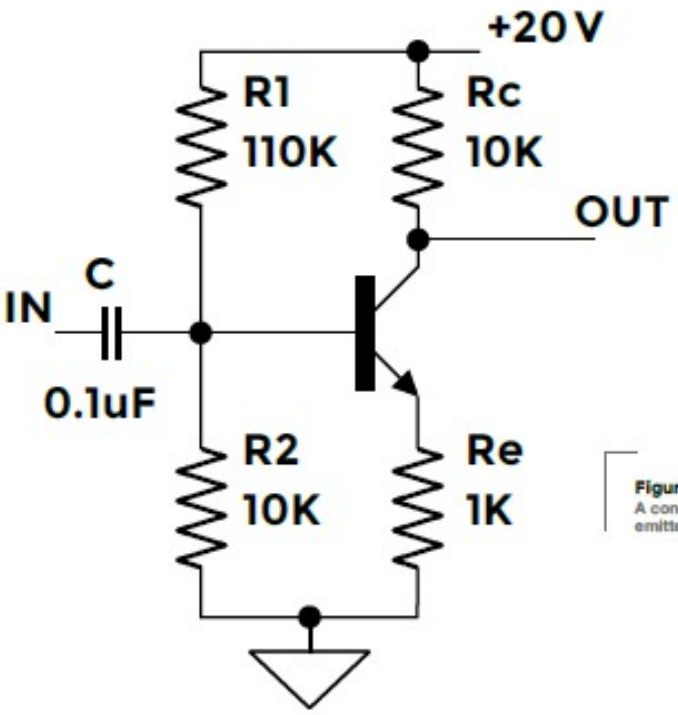


Figure 7 A concrete common emitter circuit

> **The goal is to filter out any DC bias in the input,** so we want the filter cutoff to be quite low

through the capacitor will change the collector voltage in a corresponding way, but in the opposite direction. Since the output will vary from 10V, we will likely want another coupling capacitor on the output to remove that 10V component.

DIFFERENTIAL AMPLIFIERS

There are cases where we send signals on a pair of wires. High-speed digital and RF signals are commonly transferred this way. An example is an Ethernet cable for a local area network. The two wires are quite often twisted together; you might have heard the term 'twisted pair' – this is what it means. **Figure 8** shows the wires inside an unshielded twisted pair UTP cable, typically used for Ethernet.

Why pairs, and why twisted together? Think about Ethernet cables: 3, 5, 8 metres long →

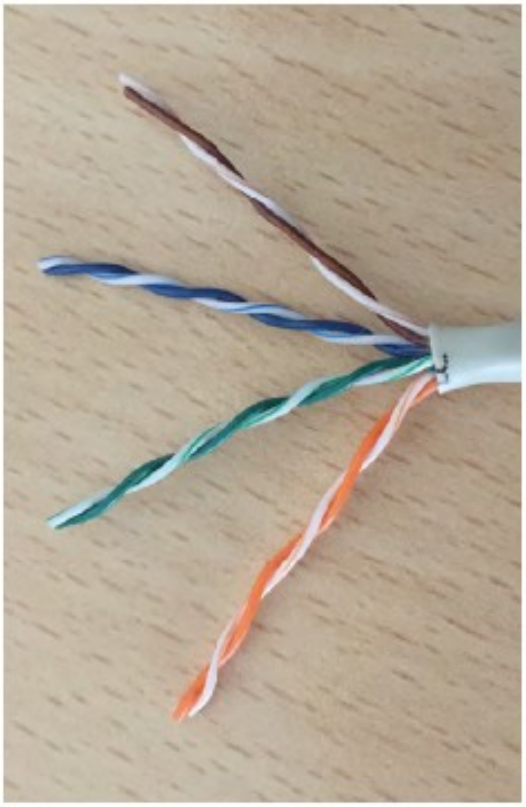


Figure 8 An unshielded twisted pair UTP cable

QUICK TIP

Using a voltage divider to set the base voltage is referred to as biasing the transistor.

COMPARATORS

Because its output reflects the difference between its inputs, a differential amplifier can be used to compare two voltages. Using its output to control a switch transistor results in a binary indication of the relative values of its inputs. A suggested exercise for you is to take the general differential amplifier and do this.

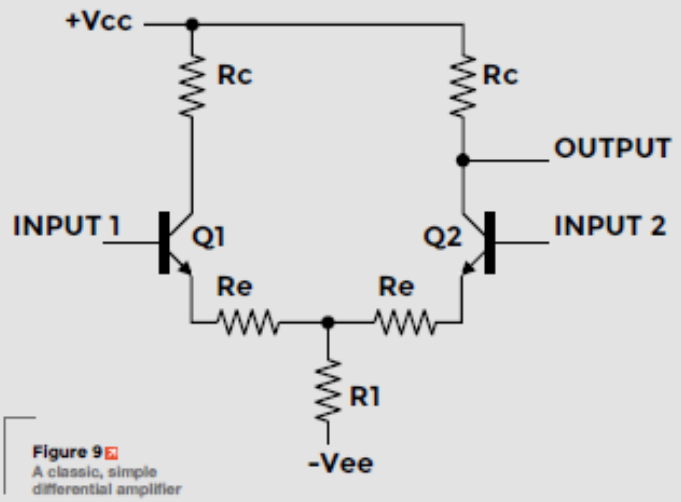


Figure 9
A classic, simple differential amplifier

cables are not unusual. The signals travelling along them are very high frequency, and not very strong. Why does this matter? Well, they are often used in noisy environments; noisy in the RF sense, not the sound sense. Remember our discussion of inductors? A varying electrical/magnetic field (which is what RF signals are) induces current in a conductor (which is what the wires in a cable are). This effect is the key to how antennas work. Unfortunately, a long cable is a very effective antenna. That means it can pick up any RF signals that are around. This presents a problem, since they can corrupt the signals travelling through the cable. This is where the twisted pair comes in. The same RF interference will be picked up by both wires. By twisting the pair of wires together, we can ensure that they both pick up the same interference. So, now we have a signal transmitted by a pair of wires; the signal of interest will be the difference between the two wires. For example, one could be a signal, and the other could be ground. Any RF interference will be picked up by both wires, so the original signal will still be the difference between them, even though the actual signal might not be recognisable due to the interference.

That's where the differential amplifier comes into play. Unlike previous amplifiers we've looked at, a differential amplifier takes two signals and amplifies the 'difference' between them. If we run the wires from a twisted pair into a differential amplifier, the output is a copy of the original signal, with anything in common (the interference) removed. **Figure 9** shows a classic, simple differential amplifier. In this circuit, the output is taken from one collector and this is the most common configuration. It takes the difference between the inputs and amplifies it, making it available at the output.

QUICK TIP

A differential amplifier and twisted pair cables help deal with RF noise picked up by cables.

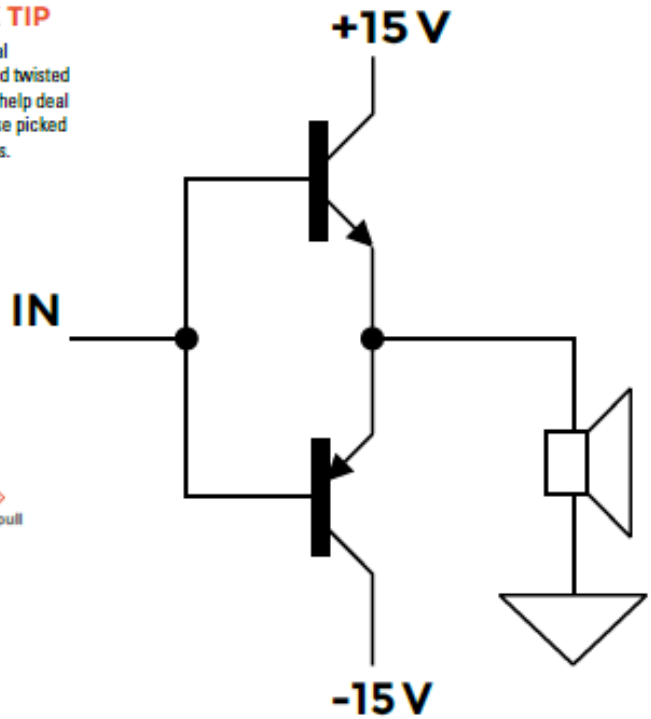


Figure 10
Basic push-pull amplifier

> **By twisting the pair of wires together, we can ensure that** they both pick up the same interference

PUSH-PULL AMPLIFIERS

As we saw, some amplifiers aren't voltage amplifiers, but instead are current amplifiers. This is especially the case in power amps that drive speakers. Speakers work (as discussed in HackSpace #11) to make sound by moving a coil in a magnetic field. The coil moves

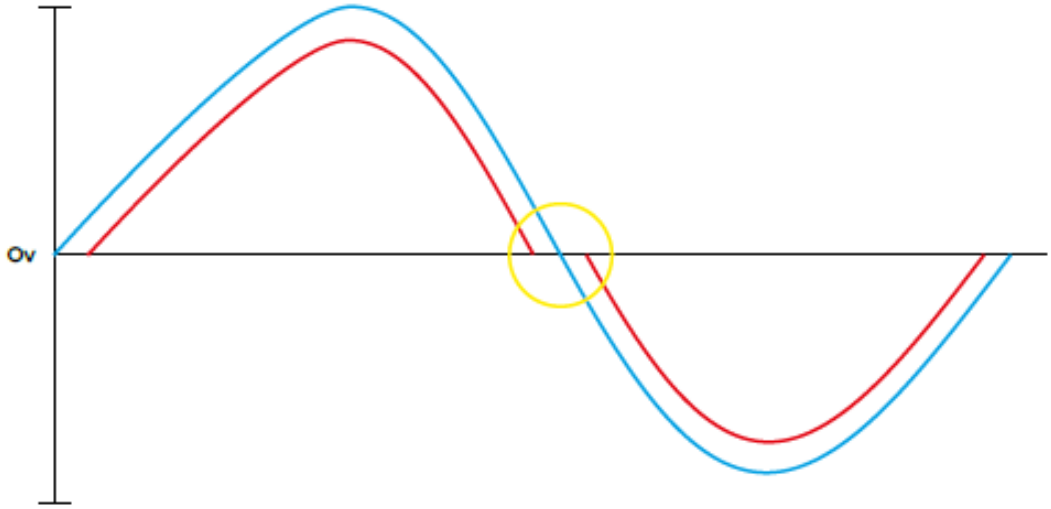


Figure 11 Input vs. output in a naive push-pull amplifier circuit

by controlling the current flowing through it. A big speaker needs a lot of current. So, amplifying the current of a signal is needed. We've seen above that a simple emitter follower needs to be biased so that the output varies around half Vcc. That means that the transistor is always conducting some amount, with a sizable current flowing through it. What happens when a lot of current flows through a transistor? It heats up. That heat is generated by power that could be used more productively. Also, heating up electronics generally causes problems, which means big heatsinks and/or fans to get rid of that waste heat.

Ideally we want transistors to conduct current only as it is required. A push-pull power amplifier circuit is a common approach to addressing this. **Figure 10** shows the basic circuit.

There's a problem, though. Remember that in the emitter follower, the output was offset by 0.6V (the drop across the base-emitter junction) from the input. The same thing happens here, but due to there being separate transistors of opposite type to handle each side of zero (an NPN for the positive part and a PNP for the negative), those base-emitter junction offsets don't line up at 0V. We get something that looks like the plot in **Figure 11**. This is because the emitter is 0.6V lower than the base in an NPN transistor, but 0.6V higher in a PNP. This is referred to as 'crossover distortion' and is generally not wanted.

This can be fixed by using a resistor and diode to bias each transistor, as shown in **Figure 12,** to keep them just at the edge of conduction. Using a diode (i.e. a P-N junction) to bias compensates for the base-emitter voltage drop of the transistor. This means that as the input signal leaves 0V, the appropriate transistor can immediately start conducting. That distortion at crossing 0V is gone.

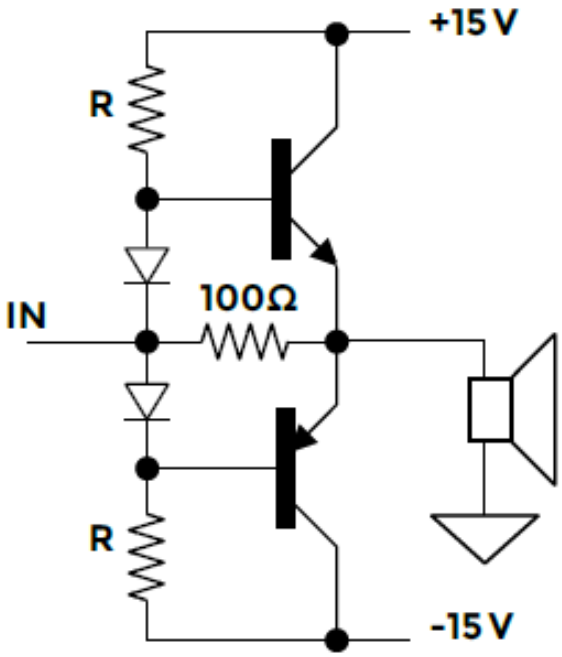


Figure 12 Diode-biased push-pull amplifier

QUICK TIP

Push-pull power amplifiers avoid wasting power as heat.

IN CONCLUSION

Amplifiers take signals and make them bigger, stronger, and more powerful. This can be by increasing voltage, current, or both. We have looked at several types of amplifiers: emitter follower, common emitter, differential, and push-pull.

As always, this is only a brief introduction. If you want more information, or more detailed theory, have a look at *The Art of Electronics* by Horowitz and Hill.

Next time, we'll move away from transistors, and will take our first look at integrated circuits. □

2023 Simulated Emergency Test

Emergency preparedness takes the spotlight on October 7 – 8.

Steve Ewald, WV1X

The ARRL Simulated Emergency Test (SET) is on the horizon, and you'll want to be ready at the individual operator and station levels and within your amateur radio community and ARRL Section. This year's national emergency exercise will occur on October 7 – 8. It will test your skills and the preparedness of many organizations that are called into action when actual emergency situations arise, and it presents an opportunity to develop new skills.

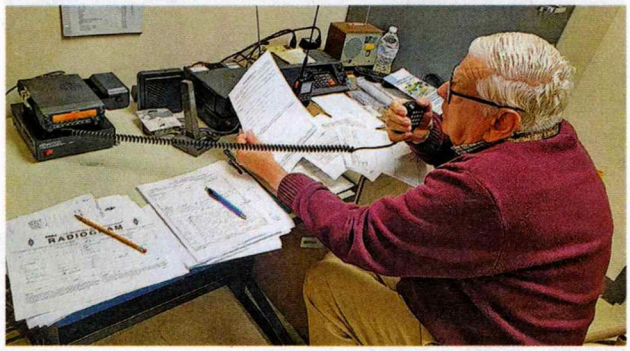
ARRL Field Organization leaders, such as Section Managers, Section Emergency Coordinators, Section Traffic Managers, District Emergency Coordinators, Emergency Coordinators, Net Managers, and their assistants are among the many amateur radio operators who are developing plans and scenarios for this year's SET.

Working Together

This annual nationwide exercise is a prominent time to work with partner organizations and served agencies to learn what their needs may be before an emergency occurs. An important goal of the SET is getting to know how to work with these organizations at the local, Section, and state levels for effective emergency and public services.

For decades, ARRL has established national working relationships with organizations and agencies like the Federal Emergency Management Agency (FEMA), the American Red Cross, The Salvation Army, the National Weather Service, the National Communications System, the Association of Public-Safety Communications Officials-International (APCO-International), Citizen Corps, National Voluntary Organizations Active in Disaster (NVOAD), REACT International, Inc., the Society of Broadcast Engineers (SBE), and the Boy Scouts of America. More details on these organizations and how they work with ARRL and amateur radio operators can be found at **www.arrl.org/served-agencies-and-partners**.

The SET invites all amateur radio operators to become better aware of emergency preparedness and the training that is available. The Amateur Radio Emergency Service® (ARES®), the Radio Amateur Civil Emergency Service (RACES), the National Traffic System, SKYWARN®, the Community Emergency Response Team (CERT), The Salvation Army Team Emergency Radio Network (SATERN), other auxiliary communications groups, and public service-oriented radio amateurs are encouraged to participate.



Paul Harig, KC3QIU, operated from the New Cumberland Township Office during the South Mountain Radio Amateurs SET in the Eastern Pennsylvania Section. [Paul Harig, KC3QIU, photo]

Get Involved

To find out how to get involved in this year's SET, contact your local ARRL Emergency Coordinator or Net Manager. Check on upcoming planned activities through local, state, or Section-wide nets. Contact your local club or clubs in other areas to find out who the Emergency Coordinator is, where the nearest ARES group meets, and which area it serves. In addition, refer to the ARRL Section web pages at **www.arrl.org/groups/sections**.

ARRL Field Organization leaders may conduct their local or Section-wide SET at a time other than the weekend of October 7 – 8 to avoid schedule conflicts and allow maximum participation. Exercises should be held no later than the end of the fall season or the calendar year.

Additional background information regarding the annual SET can be found in the article, "Simulated Emergency Test 2022 Results," in the July 2023 issue of *QST*. Guidelines and specific SET reporting forms for ARRL Section and Field Organization leaders and reporting participants can be found at **www.arrl.org/public-service-field-services-forms**. If you are an Emergency Coordinator, Net Manager, or Section leader in charge of reporting this year's SET activity on behalf of your group, please fill out the online reporting forms.

Great Montana ShakeOu

Statewide Earthquake Dri

Preparedness Organizations

At 10:21 a.m. on October 21, 2021, thousands of people will “Drop, Cover, and Hold On” in The Great Montana ShakeOut, the state's largest earthquake drill ever! All preparedness organizations are encouraged to participate in the drill (or plan a more extensive exercise) and to inform the public about the drill.

Major earthquakes may happen anywhere you live, work, or travel. The ShakeOut is our chance to practice how to protect ourselves, and for everyone to become prepared. The goal is to prevent a major earthquake from becoming a catastrophe for you, your organization, and your community.

Why is a “Drop, Cover, and Hold On” drill important? To respond quickly you must practice often. You may only have seconds to protect yourself in an earthquake before strong shaking knocks you down, or something falls on you.

Millions of people worldwide have participated in Great ShakeOut Earthquake Drills since 2008. The Great Montana ShakeOut is held in the month of October each year.

Everyone can participate! Individuals, families, businesses, schools, colleges, government agencies and organizations are all invited to register.

Register today at **ShakeOut.org/monta**

HOW TO PARTICIPATE

Here are a few suggestions for how all preparedness organizations can do to participate in the ShakeOut. More instructions and resources can be found at ShakeOut.org/montana/howtoparticipate.

Plan Your Drill:
- Register at ShakeOut.org/montana/register to be counted as participating, get email updates, and more.
- Download a Drill Broadcast recording from ShakeOut.org/montana/drill/broadcast.
- Have a “Drop, Cover, and Hold On” drill at 10:21 a.m. on October 21. You can also practice other aspects of your emergency plan.
- Partner with and assist other organizations in their drills.
- Discuss what you learned and make improvements.

Get Prepared for Earthquakes:
- Secure building contents with seismic restraints.
- Encourage employees to prepare at home.
- Be sure you have fresh, accessible supplies in place to support your own personnel.
- Recommend CERT training for all personnel.

Share the ShakeOut:
- Outreach to everyone in the community and encourage them to register, prepare and drill.
- Add a link to ShakeOut.org/montana from your web site.
- Find posters, flyers, and other promotional materials at ShakeOut.org/montana/resources.
- Share photos and stories of your drill at ShakeOut.org/montana/share.

As a registered ShakeOut Participant you will:

- Learn what you can do to get prepared
- Be counted in the largest earthquake drill ever
- Receive ShakeOut news and other earthquake informa
- Set an example that motivates others to participate

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HELLGATE AMATEUR RADIO CLUB

AGENDA – 9 Oct 2023 meeting

Meeting called to order at 7:__ PM
Introductions. Please make sure you signed the attendance sheet **Quorum Y/N ____**

Last meeting minutes, Sep: Motion to approve minutes: 1St _____2nd _____
Discussion _____ Vote: P/F/T

Treasurer's report: Motion to approve minutes: 1St _____2nd _____
Discussion _____
_____ Vote: P/F/T

Repeater Committee Report: Motion to approve minutes: 1St _____2nd _____
Discussion _____
_____ Vote: P/F/T

Voting on C&BL by ballet Ballots passed out, Counted + Proxy Vote - Passed/Failed

Events for 2023:

Oct 7-8	ARRL Simulated Emergency Test
Oct 9	Columbus Day(Indigenous People Day)
Oct 9	Testing 5:30pm and Meeting 7:00pm
Oct 14	Dirt Derby Fun Run
Oct 31	Halloween

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

HARC Discussion List

1. _____

2. _____

VHF Net Control Station assignments:

Oct	04	N7PAS	Nov	01	N7PAS
Oct	11	W7RPG	Nov	08	_____
Oct	18	K7MSO	Nov	15	_____
Oct	25	K7MSO	Nov	22	_____
___	__	_____	Nov	29	_____

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

Good and Welfare.

_____

***** Next Club meeting: Nov 13 *****
Is there any other business ? _____
Since there are no other items of business this meeting is Adjourned at _:__ PM.

Program: Automated External Defibrillator
Show and discussion by a member of the Missoula Fire Department.

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October 2023

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4 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	5	6	7 HARC Social Net 9:00Am on 147.040 Repeater ARRL Simulated Emergency Test
8 ARRL Simulated Emergency Test	9 Columbus Day (Indigenous People Day) HARC Testing 5:30 & Meeting 7:00 PM	10	11 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	12	13	14 HARC Social Net 9:00Am on 147.040 Repeater Dirt Derby Fun Run
15	16	17	18 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	19	20	21 HARC Social Net 9:00Am on 147.040 Repeater
22	23	24	25 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	26	27	28 HARC Social Net 9:00Am on 147.040 Repeater
29	30	31 Halloween	1	2	3	4