

FEEDBACK

OCTOBER 2015

SEPTEMBER FOXHUNT RESULTS

The church needed its meeting room on September 11, so **Don Warkentien, W0DEW** and **Tom Wheeler, N0GSG** put together a fox hunt. As should be expected from the wildest of foxes, hunters were in for something new.

Instead of a single "fox," the worked together to provide a nearly continuous signal for the hunters to track by alternating transmissions from each of their vehicles. Both Don and Tom were at the same location, a parking lot at the corner of Lamar and 91st street, and used digital mobile radio (DMR) units on a VHF simplex frequency to coordinate their activities. Tom and Don reported that this worked out very well.

Ted Knapp, N0TEK coordinated the activities at the start point (75th and Conser) and logged each team's information while maintaining contact with the two Fox stations.

Keith McKinney, KE0AEP, Rod Rodriguez, K6TBJ and **Bill Brinker, WA0CBW** took advantage of the invitaiton to contact the Foxes on 10 meter single sideband.

Once the hunters reached the site they learned that a second transmitter attached to Pluto, a "lost dog," needed to be located. The second transmitter was a very low power (1 mW) unit transmitting a continuous carrier and tone on a frequency different than the Fox. This proved challenging since the 25 watt Fox transmissions tended to cause receivers to overload--which, in spite of Tom's insistance--no one believed was an unintentional effect.

Tom recorded the time teams needed, first to reach the site and then to find "Pluto".

1. **Herb Fiddick, NZ0F** and **John Morse, N0EI**: Arrival at site 20 minutes after start of hunt, and 6 minutes elapsed after arrival to find Pluto. Herb used an inexpensive two-antenna time-delay-of-arrival unit that produced a tone when the fox's signal was not broadside to the pair.

2. **Charlie Van Way, N0CVW, Chip AC0YF** and **Deb KD0RYE Buckner**: Arrival at 40 minutes, and 7 minutes to locate Pluto. Charlie brought a Heathkit attenuator. The team was handicapped by Chip's fascination with all the switches his repeated "what happens if you ... oops".

3. **Dennis Nealey, KE0DRJ** and **Royce Parman, KA0YQD**: Arrival at 73 minutes, and 10 minutes to locate Pluto.

4. **Jay Greenough, WJ0X** and **Steve French, KE0FDQ**: Arrived at Pizza Shoppe instead of Fox site, reportedly to investigate a rumor of circular transmitters!

The hunt was followed by a "debriefing session" at the Pizza Shoppe where many tall tales were exchanged.

OCTOBER MEETINGS

Oct 9 – Vintage Night - Bring a vintage radio or other item. We will have display tables set up.

October 23 – HF Shootout

The Johnson County Radio Amateurs Club normally meets on the 2nd and 4th Fridays of each month at 7:30 PM at the Overland Park Christian Church (north entrance), 7600 West 75th Street (75th and Conser), west of the Fire Station.

Much of the membership travels to the Pizza Shoppe at 8915 Santa Fe Drive for pizza buffet and an informal continuation/criticism/clarification of the topics raised at the meeting ... or anything else.

Leave the church, turn right (west) on 75th. Turn left (south) on Antioch. Turn right (west) on Santa Fe. Pizza Shoppe is just past the Sonic on your left.

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-> FEEDBACK <-

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Johnson County Radio Amateur Club, Inc.*

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* * *

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How Come I've Never Heard of This?

The Rotary Club met too early in the morning. I put my coffee on a nearly empty table and asked the woman across the table if she had done anything fun this week. She said something and, of course, asked me the same question.

Deb and I spent an afternoon learning to be volunteer tour guides at a museum in Olathe. During the thirties, a guy named Marshall Ensor set up a radio station in his house. He and his sister broadcast lessons to teach radio operation to listeners around the country. Time and Newsweek wrote him up when the president of CBS came to Kansas City to present him an award to recognize the work he had done preparing amateur radio operators who saved lives during natural disasters.

At this point, other people at the table are leaning our way, eavesdropping on the conversation.

At the outset of World War 2, they were credited with training thousands of radio operators who were available for the war effort. When he was initially passed over for military service, he started sending out resumes. Someone with the Navy said "we can use this guy". They assigned him to the team that developed radiolocation techniques for enemy submarines. After the war, his home was placed on the National Register of Historic Places

"Who is this guy?," interrupted a newcomer. "And", the first woman asked, "How come I've never heard of this?"



Well, it's an Olathe City Park. The city promotes it as an old dairy farm where you can go learn about what it was like to be a pioneer in old Johnson County.

"That's just wrong", she said.

* * *

And you know what? She's absolutely right. Ensor is--or ought to be--OUR museum.

-- Chip ACØYF and Deb KDØRYE Buckner

PRESIDENT'S CORNER

I hope you had the opportunity to volunteer for at least one public service event this spring and summer. Supporting a public service event is an excellent way of meeting fellow Amateurs and learning how to use your equipment.



October brings the Ensor auction. This year because of the of the five October weekends, we will have both of our meetings at the Church (October 9 and 23). The

Auction will be Saturday October 31. The Eve of all Hollows (better know as Halloween). There will be a campfire Friday evening and overnight camping. Spread the word.

Please support the auction, search through your ham shack for that item needing a new and caring home. We will be more than happy to assist your sale and at the same time help support the Club and Ensor. Auction items can be consigned or donated. Let us know if you have items that need to be picked up if you will not be attending.

Skywarn Recognition Day is co-sponsored by the National Weather Service and American Radio Relay League. This year the event will run from December 4 at 6 pm to Saturday December 5 at 6 PM CST. This event celebrates the important contributions volunteer SKYWARN radio operators make to the National Weather Service core mission. If you would like to help with this event, please contact me. The Regional Headquarters is located near the airport, Interstate 29, exit 10. We will need volunteers operators starting at 6 pm Friday through Saturday 6pm.

-- Bill Gery -- WA2FNK

Johnson County Radio Amateurs Club - July 24, 2015 Meeting Minutes

Meeting Date: Friday September 25, 2015. The meeting Started at 7:30PM.

Attendance: Self introduction with name and call sign. 35 signed the check in sheet. This was followed by the Pledge of Allegiance.

The Minutes from the August 28, 2015 and September 11, 2015 meeting were accepted with 1 opposed vote.

The Treasurer's report, as follows, was read and accepted unanimously.

Cash on Hand	\$ 217.96
Checking Account	\$ 640.01
Savings Account	\$ 7,473.26
Total	\$ 8,331.23
Repeater Operating Reserve	\$ 935.87
Memorial Fund	\$ 310.00
Active Members	137

Old Business:

- Repeater Update – There appears to be a lot noise at the 145.29 Repeater site. The Repeater equipment was checked out and it was determined that the noise was not coming from the Repeater equipment. Work will continue to identify the source of the noise. A new Fusion Repeater is on order and it will replace the current but older 146.91 Fusion Repeater. “Van” Van Daveer K0HCV has covered the cost of the new Repeater however if anyone would like to share in the cost please see Van. As an FYI, the older Fusion Repeater can be repaired for \$300 and would become a very nice back-up Repeater.
- Official Club Name Badges – Orders will be placed through Cal, KC0CL. Cost is \$9 each.
- Ensor Auction – The dates for the Ensor Auction and activities is Friday and Saturday October 30 and 31. Please start collection items for this year's auction.
- WW1USA – Upcoming Event which will be organized by the Club is December 12-13.

New Business:

- The Kick-Off Meeting for the Charter Members of the Mo-Kan Regional Council of Amateur Radio Organizations will be a week from this Saturday at 10:00 AM CDT, September 26, 2015. The purpose of this meeting to get together the Leaders of all the area Clubs in order to exchange ideas and coordinate events.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 5 participated on September 24.
- 440 Wheat Shocker net – 17 check-ins on September 23 and 16 check-ins on September 16.
- 2m Wheat Shocker net – 17 check-ins on September 24 and 16 check-ins on September 17.
- HF Activity – The Island of Niue on CW. John Raydo K0IZ averaged 100 contacts/hour during the Colorado QSO Party.

Announcements:

- Welcome to all the 1st time visitors.
- HF Mobile Shootout October 23. Lon Martin, K0WJ will be organizing this event. More details to come.
- Skywarn Recognition Day is December 4 -5. The event starts at 7:00 pm on the 4th and ends at 7:00 pm on the 5th. See Bill Gery, KA2FNK for information.
- Watch Larry's List for upcoming events.

Business meeting adjourned at 8:12 PM

Program: The Program for this meeting was a presentation on Fldigi and Flmsg by Bill Gery KA2FNK.

Hambone and the Screams of Terror

“Tell me again, Unck, why we are hacking our way through this foggy jungle in Shawnee Mission Park in the middle of the night?” asked Hambone as he waved off yet another mosquito attack. “I’m missing a great Halloween party, you know.”

“According to my dad, who got the story from his dad, who got it from his dad, our ancestors lived in a farm somewhere around here. This was all rural land in 1925. Theirs was the only house around.

“It’s not real clear who all lived in the house, but for sure it was at least a mother and father along with their 16 year-old son and his 19 year-old sister. Sort of like you and Dude.”

“What were their names?” asked Hambone, trying to take an interest in this strange, but boring project.

“I’m not sure about the girl’s last name, she just showed up one day and the family took her in, but her first name was Elizabeth. They called her Lizzy for short. The boy was Hamilton Burguer.”

“I’m glad you want to visit the remains of Hamilton’s and Elizabeth’s old homestead, but why tonight and why am I dragging this old coaster wagon with an ancient radio with us? And where’s Dude, shouldn’t he be helping?” asked Hambone tripping, over another fallen tree.

“All in due time, my boy,” continued Elmer as he held up his rusty red Dietz kerosene lantern to get a better view of the dark and foggy terrain. “The story ran in the Kansas City Star as a simple murder, but there was much left unsaid.

Oh, look, this might be the remains of a wall or something. Yes, it is! There’s part of a fireplace and chimney. We must be getting close!”

“Great, sighed Hambone, brushing away yet another mosquito attack. Close to what?”

“The abandoned graveyard behind the house, what else?” blurted Elmer.

“Get me out of here right now,” demanded Hambone. “I hate graveyards, I’m going home.”

“No you’re not! You’re staying to help me with this experiment.”

“What experiment?”

“Let me finish the story.

The parents had to go into Kansas City for a few days so, they left Hamilton and Elizabeth to look after the house and farm.

It was October 31, 1925, 90 years ago tonight when Lizzy apparently killed her brother by biting him in the neck and sucking out all of his blood. The parents discovered the body when they returned some days later. The boy’s body parts were scattered around the great room. The family’s new radio was playing, but Lizzy was nowhere to be found.”

“How do they know Lizzy killed him? Couldn’t the parents have done it?”

“According to the Star, the parents had a solid alibi. Investigators found Lizzy’s bloody fingerprints on the radio and the door knob, but nowhere else. She was very neat. Clean up was easy. A search for



Lizzy failed to find her and the case eventually died of old age. The parents changed their name and moved away. Case closed.”

“I take it, you don’t consider the case closed,” asked Hambone.

I don’t know about the case,” continued Elmer. “But there is one interesting aspect that we are investigating tonight – the radio. In fact, that old Crosley regenerative receiver you have in your wagon is the radio from that bloody room.”

“Eew, I’m not touching that thing,” shouted Hambone.

“Don’t be a pantywaist, most of the blood’s been cleaned off for 90 years,” chided Elmer.

“Legend has it that Lizzy turned the radio on to drown out her brother’s screams, even though there was no one around to hear them. But the scene was so horrific and her evil so great that the boy’s screams became trapped in the space inside the radio’s tubes, forever.”

“I don’t know if I believe that,” said Hambone.

“Remember, radio was brand new and mysterious back then. Couple that with the fact that regenerative radios scream if the regeneration control is turned up too high, and you have the making of a legend. By the way, this radio does have a very odd tone.”

“I’m guessing there’s a little more to it than that,” said Hambone, now taking a big interest in the story. “Or we wouldn’t be out here with that radio.”

see HAMBONE on page 5

<p>from <i>HAMBONE</i> on page 4</p> <p>“You’re right. The legend says that Lizzy was actually a vampire who lived in this cemetery. After feasting on the boy, she returned here where she has resided ever since. But once a year, on the night of the murder, the boy’s screams can call her forth.</p> <p>We are going to test that by hooking up the radio and making it scream. If the legend’s true, Lizzy should appear.”</p> <p>“I’m, I’m not sure I want to do this,” stammered Hambone. But he was too late. Elmer had already turned on the radio and was adjusting the tickler coil and regeneration control. A shrill screech, that had been silent for 90 years, pierced the air.</p> <p>The ground fog began to swirl. Sounds of scraping and dirt moving became louder and a low rumble filled the air.</p>	<p>“Unck, where are you? Unck?” shouted Hambone. But his uncle did not answer.</p> <p>The screeching grew louder as Hambone scrambled to turn off the radio, but without the lantern, he could only grope in the blackness. Finally, frightened, he started to run back along the trail. But something grabbed his ankle and pulled him into a pile of decaying leaves. As he struggled to get up, a cold sticky, hand covered his face and forced him to the ground. To his horror, the hand was attached to a black, hissing bat that was wrapping him in its wings and pinning him to the ground.</p> <p>Lightning flashed and the earth quaked as Hambone said, “Dammit!” as a warm wetness spread across the front of his pants.</p> <p>Then, all noises stopped, lights came on and cheers of ‘happy Halloween’ filled the park. The big</p>	<p>bat, which was actually Dude in a batman mask and cape, helped his brother up and offered him a pair of dry pants.</p> <p>A bonfire crackled to life and the rumbling noise turned to rock music and everyone was having a good time.</p> <p>“You said you wanted to go to the Halloween Party, so here it is,” said Dude.</p> <p>Later, as Hambone, Dude and Uncle Elmer were walking home, Hambone said, “Unck, it seems to me the parents’ side of the story, especially the part about Elizabeth being a vampire and living in the graveyard, doesn’t sound right. Does anyone know where they moved to or what happened to them? ”</p> <p>“Oh yes, the parents moved to the house that you live in now, but later all three disappeared.”</p>
<p>from <i>POWER</i> on page 9</p> <p>This inductor in fact works perfectly in the circuit of Figure 4, providing about 74% efficiency at a load current of 100 mA on the 9 volt output.</p> <p><i>Conclusion</i></p> <p>Many hams fear switch mode power supplies, and perhaps with good</p>	<p>reason. There is a lot of mystery surrounding them, and yes, a lot of math if one cares to drill down deeply. But modern ICs are available to take away most of the drudgery of designing these circuits, and the only really critical choice is the inductor, which will make or break the circuit's performance. It's easy to verify inductor performance, and</p>	<p>thus guarantee success of any given design.</p> <p>So my little scope is now somewhat portable. It will run seven hours on the USB power stick of Figure 1--not bad at all. All it needs now is a case to make it a complete package. Don't fear switching supplies. They're easier than they look!</p>
<div></div> <p><i>Your editor takes notes as, before the hunt, eventual winner Herb Fiddick, NZØF explains his time delay of arrival device.</i></p>	<div></div> <p><i>Pluto, wearing a 1 mW transmitter, peeks out of his bag and through the leaves at the fox hunters.</i></p>	

Powering Widgets with USB Sources

Switching Power Supplies and Components - Tom Wheeler, NØGSG

In the last installment we examined the JYE Tech DSO-138 oscilloscope kit (<http://www.jyetechnology.com>), an inexpensive little oscilloscope (\$35) that you can build yourself. But this kit comes with a minor drawback: It requires

9 V DC at 100 mA to operate. To make this device truly portable means we need a decent power source. Nine-volt batteries are a consideration, but they don't last very long at moderate current drains, and end up in a landfill rather quickly. Twelve-volt batteries can be conditioned down to 9 volts with a linear regulator, but that's bulky and not very efficient.

But every ham likely has several very handy, rechargeable power sources hanging around the house, in the form of USB 5-volt power "sticks," as shown above in Fig. 1.

USB power sources have several advantages:

- They can be readily charged with standard AC adaptors, and often with the 12 volt supplies in automobiles.
- They are dense power sources, as they're usually equipped with lithium-ion cells. As a bonus, they also contain the circuitry to provide for safe charge and discharge.
- They're relatively inexpensive, widely available, and pretty universal (plug-n-play).



The disadvantages of the devices are few:

- They only produce 5 volts.
- The output must be conditioned to get lower or higher output voltages.
- The current they can provide is limited, often less than an amp.

In order to get higher output voltages, some sort of switching power supply is needed. Most hams cringe at the thought of the "black art" inside a switcher, but actually they're pretty straightforward to design and build,

especially given today's dedicated ICs. Let's first take a look at how a switcher works.

Switching Supply Modes

Switching power supplies can be made to operate in several modes;

the two primary modes are *boost* and *buck*. A boost-type supply adds a series-aiding voltage to the provided DC input (think of putting flashlight batteries together in series, one after another with all the batteries facing the same direction, thus increasing the output voltage). A buck-type supply adds a series-opposing voltage (think of adding one or more extra flashlight batteries in series, but backward, reducing the overall output voltage).

These "boost" and "buck" voltages can be obtained by using either capacitors or inductors as storage tanks. The circuits we'll explore here use inductance to store the boost energy, as that's the most common method and can be very efficient.

Figure 2 shows the basic operation of a "boost" supply.

In Figure 2, a transistor (Q1) is made to act as a rapidly alternating

see POWER on page 7

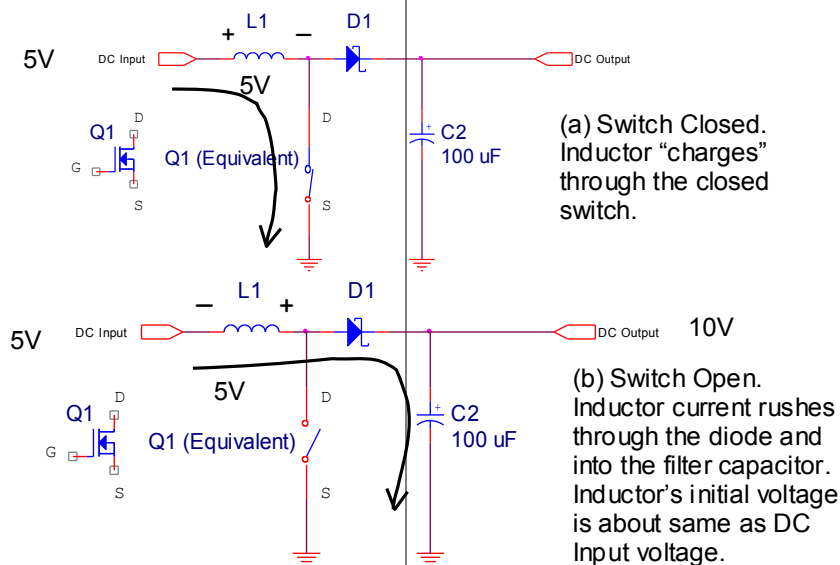


Figure 2: Boost-Mode Switching Supply

from **POWER** on page 6

on-off switch. When Q1 is "on," it's a closed switch (Figure 2a) and the inductor L1 charges up from the power supply. When inductors "charge" they are storing energy in a magnetic field. The more energy absorbed by the inductor, the stronger its magnetic field becomes.

Note that there's a limit to how long the inductor can charge, so we can't leave the switch on too long. The inductor will draw more and more current the longer it's connected to the input voltage. Eventually it will draw a very large current that's limited only by the resistance of the wiring in the circuit and the current limit of the power supply. That will be followed by a mushroom cloud of magic smoke!

Before that maximum current is reached, the switch is opened (Q1 is turned off). Inductors cannot change their current instantaneously, so the current now flows in the same direction through L1, through the diode D1, and into capacitor C2. The inductor voltage flips polarity in Figure 2b, causing it to add to the battery voltage, thus "boosting" the output voltage above the original input value.

Because of the rapid on-off switching, D1 *must* be a fast diode. Schottky rectifiers are typically used in switching power supplies for this very reason. Note the "funny" symbol for the Schottky rectifier; the cathode is a bar with two "squiggles."

You might guess that this switching must be fairly precisely controlled, and you're right; typically we use an oscillator circuit with a variable "on" percentage time (or duty cycle) to control how hard L1 is charged, and thus regulate the output voltage. Figure 3 shows such

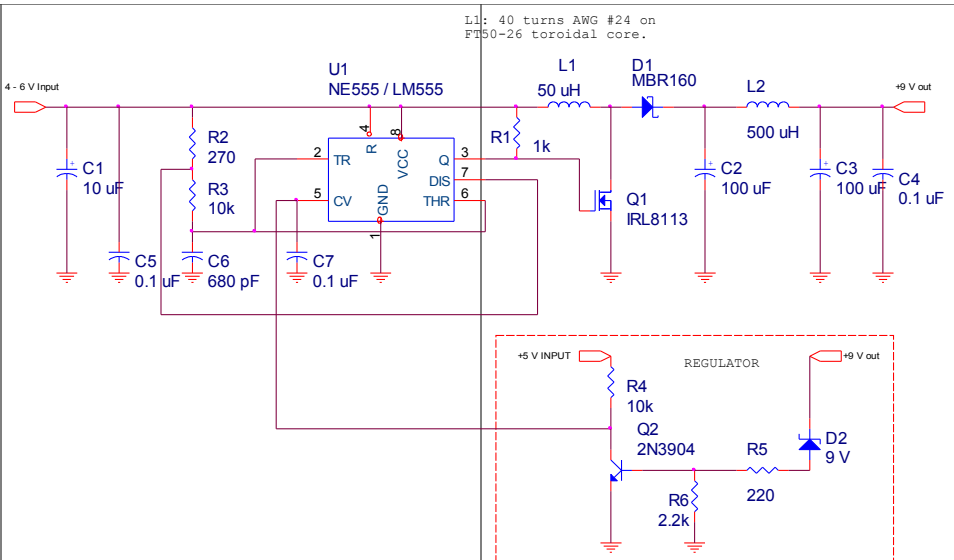


Figure 3: Using a 555 Timer to Control a Boost Regulator

a circuit crafted around the omnipresent LM555 timer IC.

In Figure 3, the LM555 is wired as an oscillator to switch Q1 on and off about 80,000 times a second. The "on/off" signal comes from U1 pin 3 and drives the gate of Q1. R1 is a pull-up resistor to improve the drive to Q1 (ensure that it turns on as hard as possible to minimize switching losses). L1 is the boost coil, and D1 rectifies the output voltage as it charges C2. D1 also prevents C2 from discharging to ground when Q1 turns on during the next charge cycle! L2, C3, and C4 are additional filtering to clean up the DC output.

A boost regulator can produce many times the input voltage, so feedback control is needed to regulate the output. Zener diode D2 conducts when the output voltage rises to more than 9V, and this turns on Q2 at a value of about 9.5 volts by driving Q2's base slightly positive. When Q2 turns on, it pulls down on pin 5 of U1, which reduces the duty cycle of U1's output, which in turn gives L1 less time to charge during each on-off cycle. Thus, the output voltage stabilizes around 9.5 volts DC. In the absence of Q2 conduction, R4 pulls upward on pin 5 to

increase the duty cycle above 50%.

The operation of the feedback circuit is very much like the cruise control on a car. Q2 will conduct just the right amount to keep the output voltage at 9.5 volts. To change the output voltage setting, we simply change D2 to a different zener voltage.

The Figure 3 circuit can provide more than 10 watts of power to a load with very good efficiency (more than 80%), but it's not a very good production circuit. There are too many parts, and regulation isn't that tight (the gain of Q2 is limited).

The Easy Way

Figure 4 shows a better way; it uses the same components, but swaps in a dedicated switch mode power supply (SMPS) chip, the TI MC33063A, for the LM555. The MC33063A is a "universal" SMPS controller IC containing a built-in switch rated at 1.5 A (notice that we eliminated Q1, the power MOSFET), and voltage regulator (Q2 and the zener diode circuit are now history).

The circuit of Figure 4 is simplicity itself; C7 sets the switching

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from **POWER** on page 7

frequency to about 80 kHz, as before; R1 sets the current limit at 800 mA to protect the IC in case of a short circuit; and R2 limits the drive current to the IC's internal switching transistor.

The inductor L1 is still needed, as is diode D1. Resistors R4 and R3 set the output voltage; the reader is directed to the online data sheet for the MC33063A for design details. The circuit of Figure 4 can easily supply 200 mA at 9 volts to a load, which is more than twice the amount needed to run the little oscilloscope kit.

Choosing Good Inductors

The most critical component in a switching power supply is the inductor. The inductor must store the energy from the input source and dump this energy back out once every cycle.

Unlike most applications, switching supplies are very demanding on inductors. They place high currents through the parts - - which can cause the inductor to change its value, or even worse, cease being an inductor! This can spell certain failure or even destruction of the power supply circuitry, so it's a good idea to be able to test and evaluate inductors if you're contemplating building switching supplies. The circuit of Figure 5 can be used to do just that.

In Figure 5, a square wave from a signal generator is amplified in both current and voltage. With the fixture shown, a voltage of 70 volts peak-to-peak at 14 amps peak-to-peak (7 amps peak) can be passed into L1, the DUT (device under test).

The amplifier I use is a homebrew unit built for hi-fi use from a

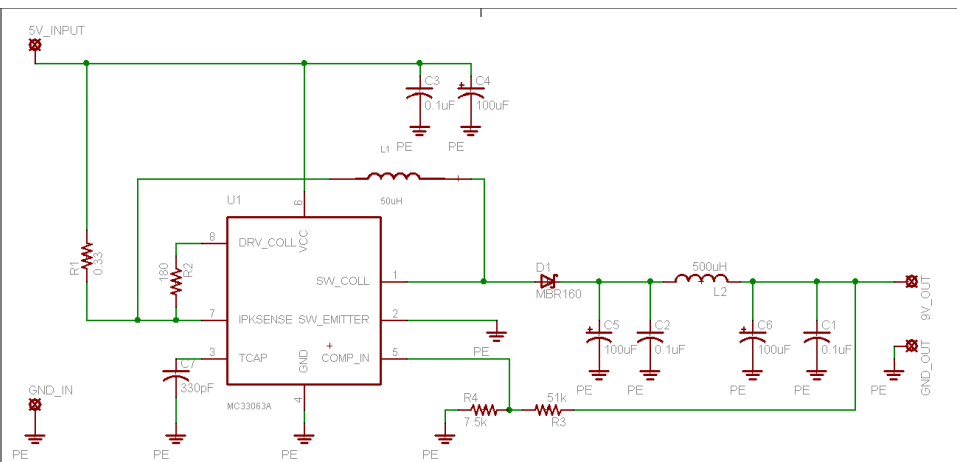


Figure 4: Doing it the Easy Way: Use a Specialized IC!

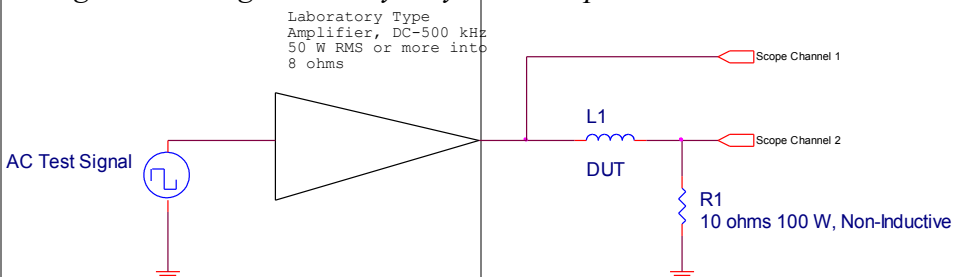


Figure 5: A Simple Test Circuit for Inductors

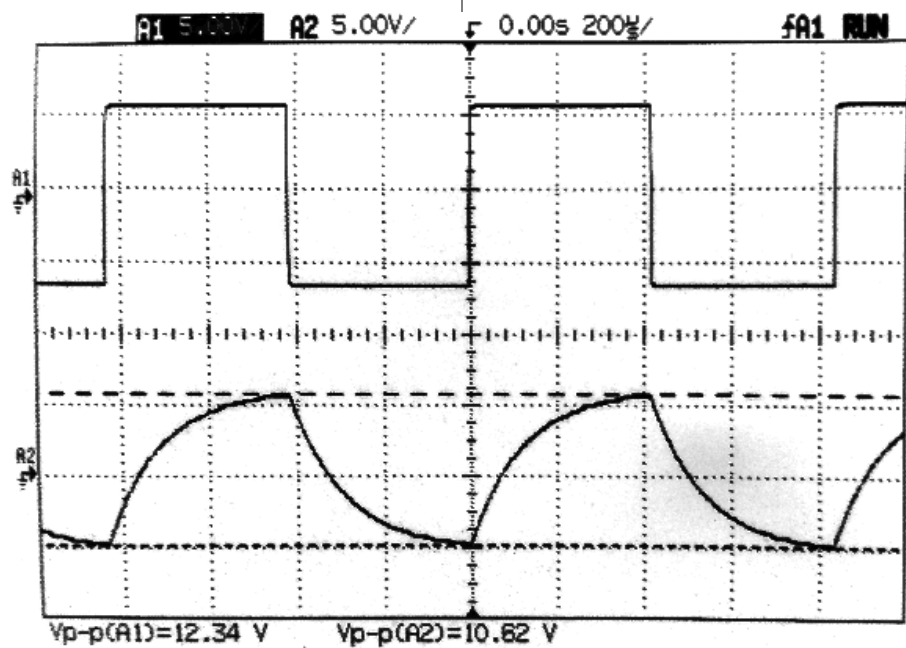


Figure 6: A Good Inductor

National LM3876TF power amplifier IC. It's a superb amplifier with very low distortion, flat frequency response extending to nearly DC, and a power bandwidth extending to over 100 kHz.

Plus, it's very well protected against lab mishaps! If you'd like to build

an amp like this, see <http://n0gsg.no-ip.org/devry/projects/100wattamp.pdf>.

The input voltage to the circuit reads on scope channel 1, and the circuit current, converted to a voltage by resistor R1, directly

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reads the inductor's response. Since R1 is 10 ohms, the inductor current can easily be read by dividing the channel 2 voltage by 10.

The frequency of the AC test signal is adjusted to show about 5 L/R time constants (depends on the nominal value of L, the inductor being tested).

The readout of a "good" inductor (a 1 mH Bournes part rated at 10 amps) is shown in Figure 6 (on the previous page).

In the figure, you can see that the channel 2 wave shape remains a clean exponential. It rises and falls smoothly, with no bumps or breaks. It's being driven with about 1.06 amps peak-to-peak (0.503 peak). This inductor performed equally well when the voltage was cranked to 70 volts peak to peak (3.5 amps peak), the limit of the test rig.

Not all inductors are created equal! Figure 7 shows the result of trying to fabricate the 50 μ H inductor on a T37-43 toroidal (donut) core. (The "T37-43" designation means the core is 0.37" in diameter, and uses ferrite material number 43).

Note how the inductor is hardly storing any energy at all - - even with a low applied voltage and current, the unit gives up almost immediately. Instead of a smooth current waveform, we get a sudden spike of current - - which means the inductor's magnetic core has saturated, and it can store no more additional energy.

In a switching supply, this behavior will cause the switching transistor to draw a very heavy current, as it's now driving a short circuit load. Not healthy for the transistor (more magic smoke), and of course the supply won't be putting out much power.

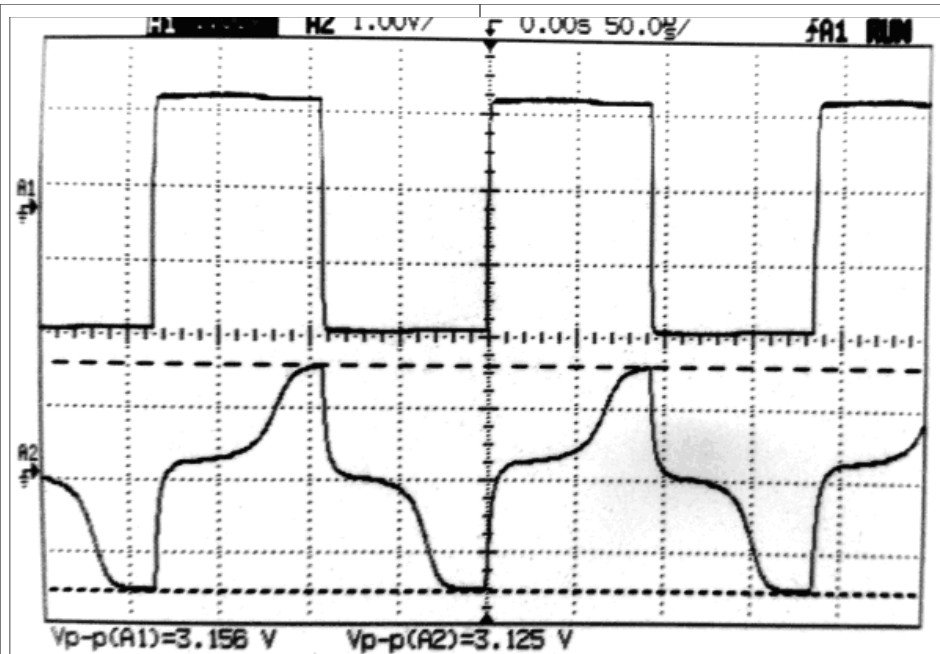


Figure 7: A Crappy Inductor

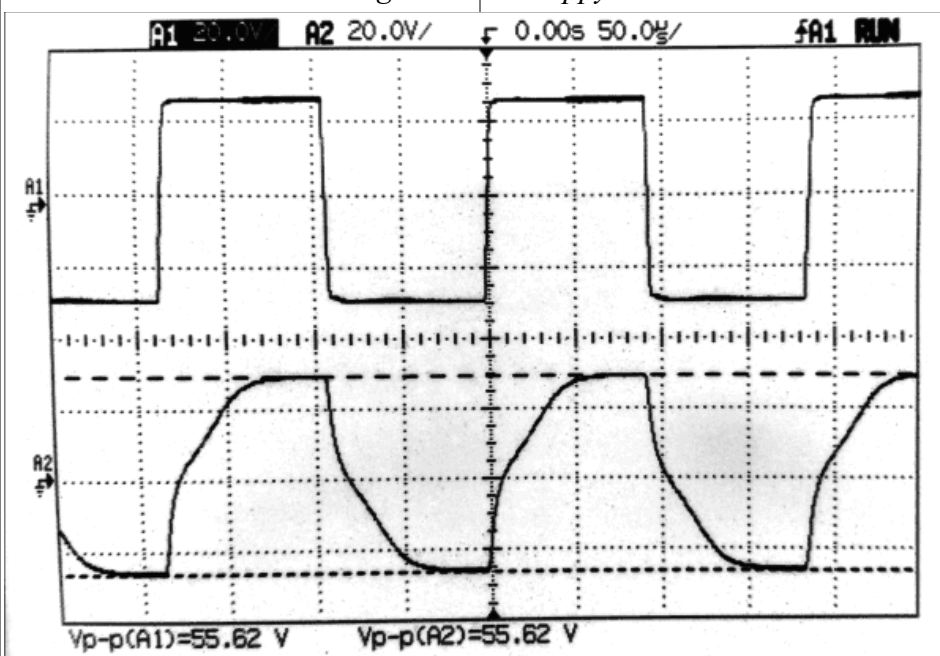


Figure 8: Test of a 50uH Inductor, 40 Turns on T50-26 Core

Finally, I found some "unknown" cores that I'd picked up at a hamfest a few years back. (It seems that someone is always offering bins of unknown toroid cores at hamfests!) They were yellow and white (cores are color coded), indicating that they were Amidon material 26. A look at the Amidon web site showed that this material was made for low-Q RF chokes below 1 MHz. Worth a try! Figure 8 shows one of these under test.

If you've been following allow, you will immediately note the crinkled shape of the bottom waveform, which represents inductor current. The inductor is being over-driven. But it's handling about 2.75 amps peak (55.62V / (2 * 10 ohms)), which is far more than the little scope power supply circuit needs (about 0.5 amps).

see **POWER** on page 5

JCRAC ENSOR Auction

Campfire & Cookout

18995 W 183rd St Olathe

Friday – Oct 30th

5:00 PM - 9:00 PM Campfire Cookout – Bring your own chair, food, and drink – no alcoholic beverages.

6:00 PM Grill ready to Cook

9:00 PM Clean up and douse the fire

Saturday – Oct 31st

9:00 AM - 1:00 PM Breakfast & Lunch from the Canteen

9:00 AM - 11:00AM Bidder Registration. Item Donation and Consignment Check-in

11:00 AM - 2:00 PM Auction

2:00 PM ALL items removed



Fri & Sat
Oct 30/31

