

Ottawa Vintage Radio Club



Ottawa, Ontario, Canada

www.ovrc.org

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The Great OVRC Build-A-One-Tube-Radio Challenge, May 2020

In the April 2020 on-line meeting, members were challenged to build and present a one-tube radio at the May 2020 on-line meeting. After many solder connections and slide-rule corrections, with each of us working in isolation, several wonderful one-tube radios were exhibited and demonstrated. **Marek Klemes**

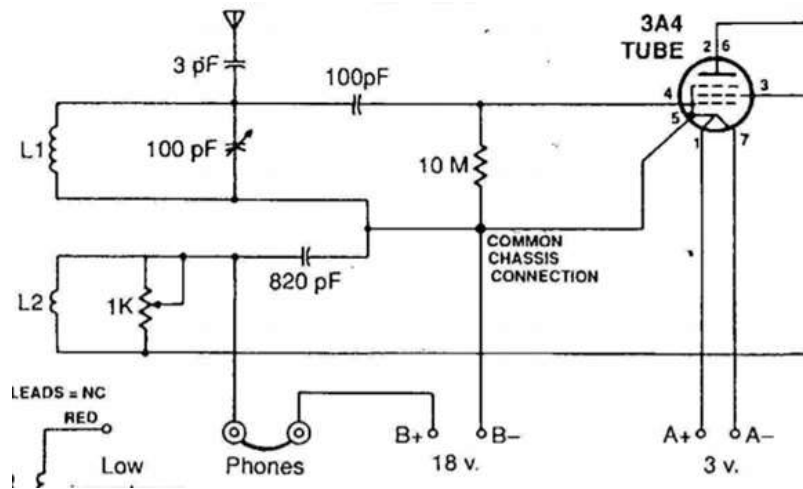
1. Therapeutic, funky one-tube radio project, Phase one

- o Although it is more funk than function, it just needs some "optimization."
- o It is also still a little touch-sensitive.
- o He built this 1-tube Short Wave radio as a therapy for his frayed nerves caused by recent "upgrades" of "smart"-phone and company computer software that have been foisted on him against his will, in the name of progress and efficiency.



Requirements

- o Will not have a USB or Ethernet port
- o Will have a real on/off switch
- o Will not be capable of self-updating
- o Will not siphon money out of my bank account
- o Will be compatible with all past and present versions of all software ever to be conceived, as it won't use any
- o Will be immune to hacking
- o Will not do what I don't tell it to do
- o Will not be touch-sensitive
- o Will have all parts visible and no invisible functions
- o Will not send information to anyone
- o Will not have non-standard pentalobe or triangular-slot screws (only Philips and Robertson ... proudly Canadian)
- o Will glow and warm my hands and soul like a real radio should.

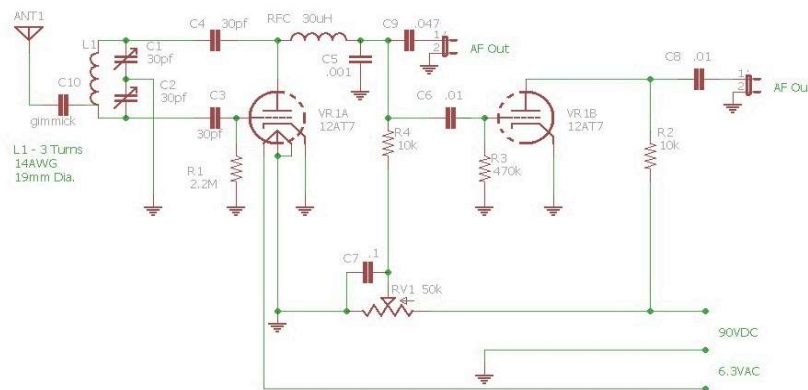


◦ Design based on Dave Ingram, K4TWJ.Sept 1995 QST

Joe Gabriele

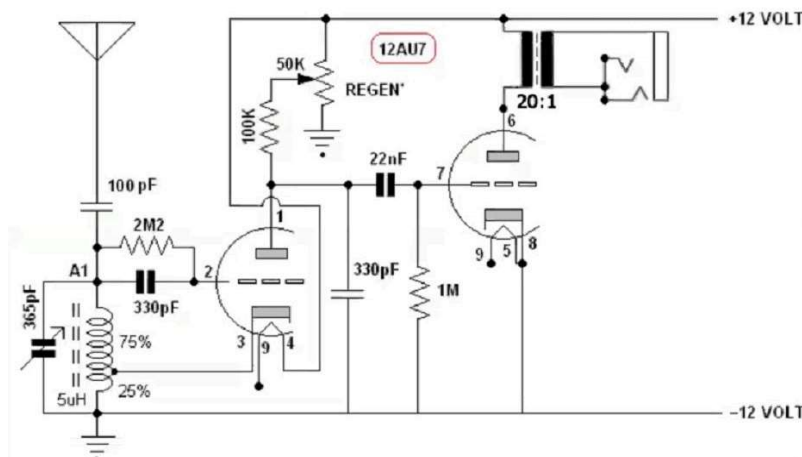
2. FM Receiver by Slope-Detection

- I based this 12AX7 regen receiver on a transistorized version I built several years ago for the 80 and 40M ham bands.
- I've always had better luck building Colpitts oscillators rather than Hartley's or Armstrong's for some reason. The schematic is attached. I show 2 audio outputs in case purists insist that it's actually a 2 tube radio. You can still get audio directly from the 1st tube although it will be at a lower volume.
- I built it on an old dot-bar generator chassis from the 60's because it already had a 100VDC power supply, filament voltage and a 9 pin tube socket. I only had to drill some holes for the tuning capacitor, regen pot, phone jack and power switch. I also added multi pin soldering posts to accommodate the components.
- I chose the FM band because it was easier to wind a VHF coil as opposed to an HF/MF coil. The coil wire is ordinary household 14AWG electrical wire. The gimmick was a small alligator clip attached to a 12 inch piece of 14AWG wire for the antenna and clipped on to the coil insulation at the bottom end of the coil. The tuning capacitor is a dual ganged 30pf capacitor salvaged from the fine tuning circuit from an old defunct radio.
- The measured plate voltage was 90VDC. I did not, however, try to run the radio on a lower voltage. I'm sure it would still work although I'm not sure just how low the voltage can go.



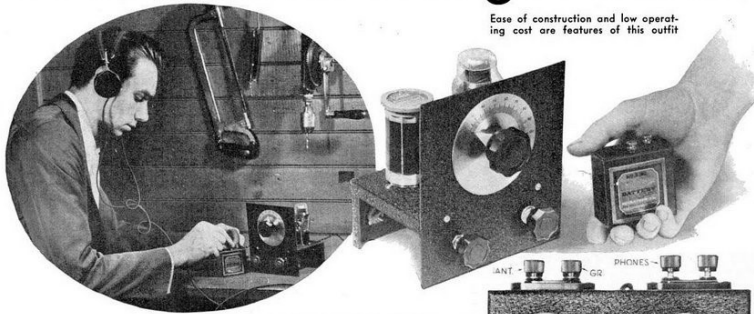
3. Jean Marcotte One-Tube Regenerative Receiver

- Runs on 12 Volts



4. Paul Guibord Simple, One-Tube, 3 Volt Regenerative Receiver
- Here is a copy of the article from which I built the 1 tube/3V radio

ONE TINY BATTERY OPERATES THIS Homemade Midget Radio

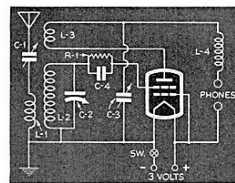


Ease of construction and low operating cost are features of this outfit

By Arthur Miller

ONE tiny battery, the size of a package of cigarettes, supplies all the power needed for this novel, homemade receiver. It makes an ideal portable outfit for campers and hikers, and for use in isolated sections where electric power is not available. All parts are standard and readily obtained, while the single, three-volt, "A" battery is inexpensive and provides excellent service.

Good earphone volume with the limited power supply is made possible by a special circuit designed by the writer and described in a previous issue (P.S.M., July '36 p. 52). As shown in the wiring diagram, the grid connections to the dual-grid, '49 tube are the opposite of those employed in the ordinary circuit. The usual method employs the grid nearest the filament as the control grid, but with the low plate voltage, available from this small battery, no regeneration would result. Therefore, the grid next to the filament is given a positive voltage, which attracts the electrons to the plate, giving the same result as a higher "B"-battery voltage.



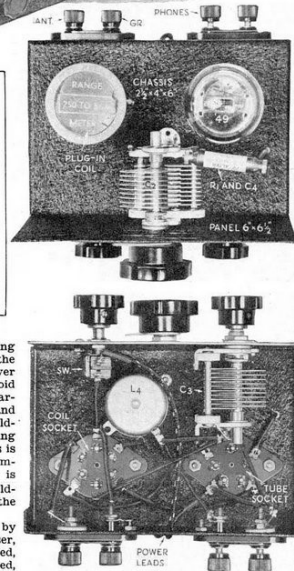
When wiring the circuit, make sure that the grids of the tube are reversed, as indicated

LIST OF PARTS

C_p —Variable condenser, antenna trimmer, .0005 mid.
 C_1 and C_2 —Variable condensers, .00014 mid.
 C_3 —Fixed grid condenser, .00015 mid.
 R_1 —Resistor, grid, 3 megohm.
 L_1 , L_2 and L_3 —Plug-in coils, six-prong, broadcast band.
 L_4 —Shielded radio-frequency choke, 10 mh.
 Miscellaneous.—Chassis, panel, sockets, tube, dial, knobs, earphones, battery, wire, nuts, screws, solder, lugs, etc.

Care must be taken in selecting the various parts needed for the set. Because of the small power supply, it is important to avoid losses, and this applies particularly to the variable condensers and the coils. Note also that a shielded radio-frequency choke having an inductance of ten millihenries is specified. This part, too, is important, for if the plate choke is of inferior quality, or is not shielded, it may be difficult to get the set to oscillate.

Regeneration is obtained by means of the variable condenser, C_3 . If, when the set is completed, no regeneration can be obtained, try reversing the connections to the tickler coil, L_4 . If this fails, unscrew the antenna-coupling condenser, C_1 . If both of these expedients fail, the trouble is probably caused by the use of an outside aerial that is too long. Disconnect the antenna from the set entirely, and substitute a ten to twenty-foot length of insulated wire, running it along the floor of the



How the parts are placed and wired. The upper photograph shows the coil, tube, and condenser

room, or concealing it around the top of the baseboard. Tune the set slowly, operating the regeneration control and tuning dial simultaneously to obtain the best quality and volume.

NOVEMBER, 1937

Popular Science Monthly

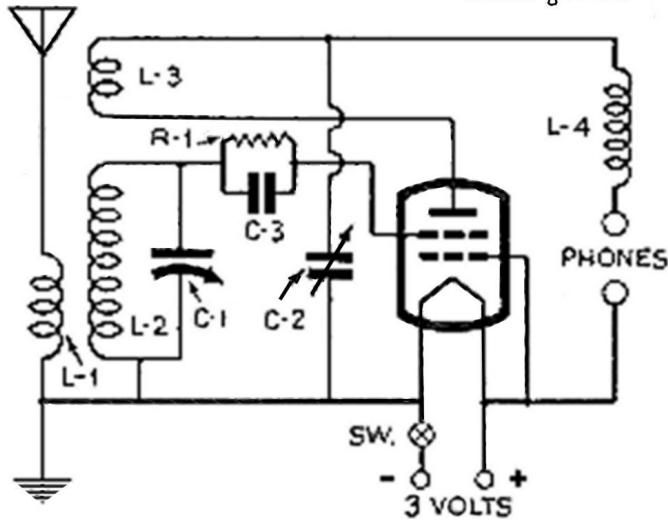
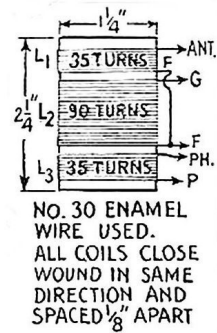
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- If anyone is interested in such "space charge" tubes, there is quite a bit of information [here](#)

Simple 3V. Regen. Receiver

Based on an article in
Popular Science Monthly
November 1937

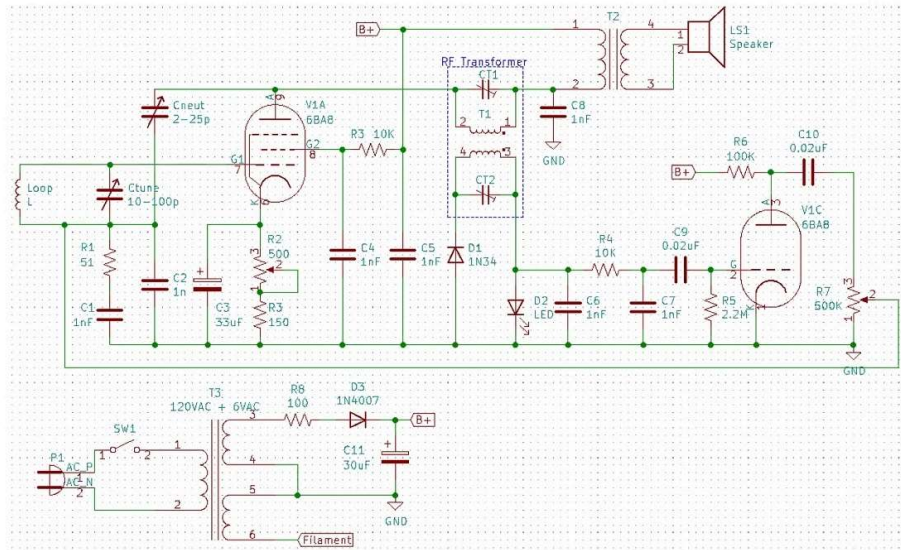
C1 350 pF
C2 350 pF
C3 250 pF
L4 16 mH
R1 3 megOhm
Tube 49



5. Gord Rabjohn 1-Tube Reflex Radio for CHU



- CHU (Time Signal) receiver. Tuned to 3.33MHz.
- CHU is located in Barrhaven.
- In Barrhaven, you can pick it up with a rusty shovel, but in Downtown Ottawa it is surprisingly weak. I have been unable to pick it up with decent volume with a crystal set.
- This radio uses the "Reflex" Architecture.
- 1-Tube Pentode + Triode + germanium diode detector.
- Pentode amplifies TWICE: a tuned RF amplifier and an audio amplifier
- Triode is an audio amplifier.

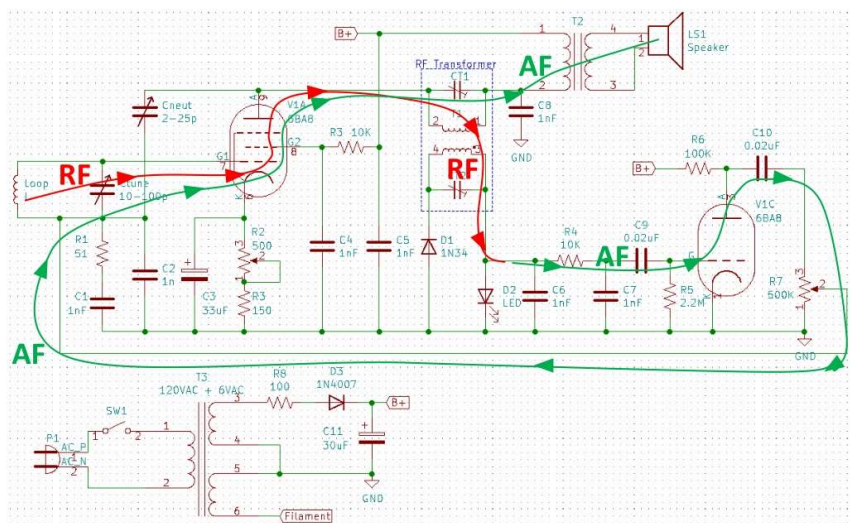


Radio Design Notes

- Was not easy! Instability (RF oscillation) was a huge problem!
- I had to learn "neutralization", Added "Cneut" to circuit.
- Neutralization is a circuit that cancels the effect of the grid-plate capacitance that causes oscillation.
- R1 C1 added to de-Q the input a bit, make the circuit easier to operate.
- Shielding around plate circuit, careful (excessive?) supply decoupling.
- Though the box is wood, there is a copper ground plane underneath.
- There is also the potential of audio oscillation, as the audio signal alters the operating condition of the RF amplifier.
- And, a microphonic tube also caused some oscillation!
- Circuit is still "touchy".

Tube Selection

- A figure of merit for the stability of a tube is g_m / C_{g-p} (see Radiotron Designer's Handbook, 4th ed, page 1065)
- I have new respect for the lowly 6AU6! I started with it. It has one of the best figures of merit for stability of any tube in its era.
- 6AU6 (4500/0.0035pF). 6BA6 is similar, but lower g_m .
- EF50 is also excellent at 6500/0.003pF.
- 6EJ7 (a modern frame-grid tube) is probably the best at 15000/0.005pF.
- All the triode+pentode tubes are worse.
- So, using a multi-section tube made stability tougher to achieve.
- I tried 6AU8, 6AW8, 6BA8, 6BH8, 6EB8 (all have same pin-out). Different tuning required. Settled on 6BA8 (9000/0.03pF, 5X worse than 6AU6). Differences between these 5 tubes were not huge.



Component Notes

- R1 C1 de-Q the input, makes tuning easier.
- LED lights if the circuit is oscillating! Also serves as a limiter.
- R2 sets pentode current. Not critical.
- T2 is a high ratio output transformer.
- T1 is a Meissner 1.6MHz IF transformer with turns removed from both windings until they resonate at 3.33MHz. (~33uH each) The coils are also moved closer to each other.

- Ctune and both RF transformer trimmers are peaked at 3.33MHz. Cneut is adjusted to stop oscillation, and is critical.

Loop Antenna



- Wound with Litz wire.
- Basically 8 turns of wire, 26 cm in diameter.
- Inductance (measured) of 27 uH.
- Though it looks like a toroid inductor, that is not the intention. The loop antenna is wrapped around a foam "core" just to keep the wires apart (reducing interwinding capacitance). Since the core is non-magnetic, the toroid formation does not affect the inductance.

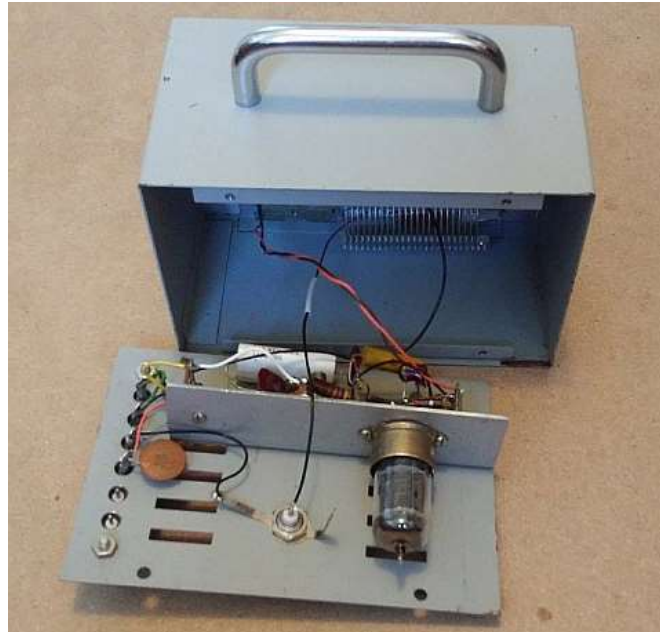
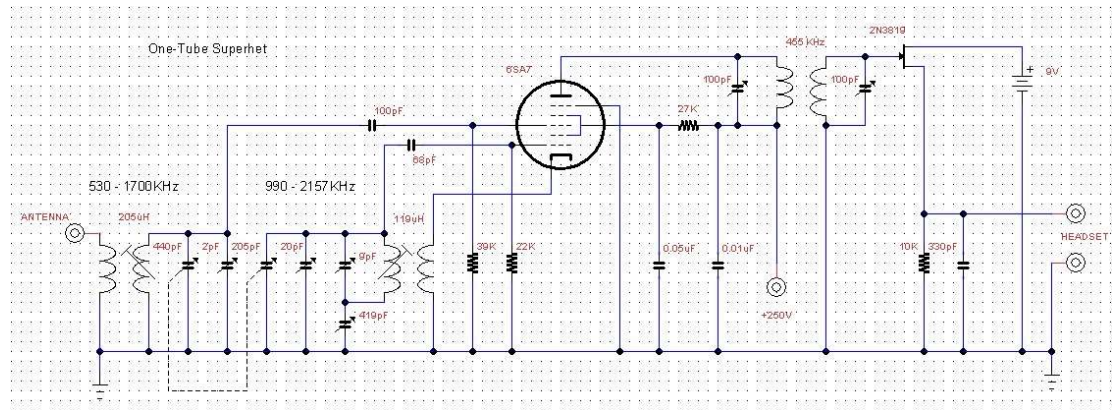
6. Greg Heppenstall

The first radio looks good, but as it was unable to drive a headset, I built and took a second radio to the party.

1. One-Tube Superhet



- Tunes 530-1700 KHz, Intermediate Frequency is 455 Khz
- Uses a 6SA7 pentagrid convertor and a N-Channel J-FET as an infinite impedance detector. Cheating? Nah, there's only one P-N junction, just like a 1N34.
- Solution of the oscillator tracking problem is great fun. I mechanized the math in the Radio Engineers Handbook, Terman, 1943, pg 649 with refinements in Electronic Designer's Handbook, Giacoletto, 1977, pg 24-74. That solution uses a number of arbitrary factors and seems to require results tweaking, so I'm studying the (different) math in the Radio Designer's Handbook, F. Langford-Smith, 4th impression, 1957, Chapter 25, pg 1002
- Other one-tube superhet designs can be found on the web, but they invariably use the famous and sensitive US Navy sound-powered headset. I don't have one of those, so I've tried to compensate with the JFET.
- Audio output level, at present, is less than that of the rusty shovel, see #3 below



- Tunes 3 to 8 MHz.
- Uses a 12AT7 dual-triode.
- First stage is the grid-leak detector, second stage drives the headset.
- Easily receives two of the three nearby CHU transmitters.
- Regeneration will make it come alive.
- Made no attempt to run it on a low B voltage. 250VDC seems adequate.

2. Barrhaven CHU Receiver

- As it contains no tubes, the rusty shovel receiver, above, was not entered into the challenge.
- The author lives in Barrhaven, only 1.2 Km from CHU. Signal strength is adequate.
- Although shovel orientation is critical, alligator clip placement is not.

7. Ted Carron

Pics and notes coming soon

8. Don Asquin

9. Pics and notes coming soon

10. Rick Patch

Mystery Tuner

- I bought this on line from a seller in the USA who didn't know anything about it. It is quite the conversation piece to have in my collection.
It appears to be a tuner coil receiver with a Cat's Whisker crystal detector which would make it late 1910's or early 1920's. The slide tuners are in tandem which I have not seen before. There are binding posts for A battery & B battery as well as phones.
- What is not usually seen in this configuration is the variable condenser (labelled Tri-State Radio, Defiance Ohio) and the RCA Radiotron UX 201-A tube amplifier. The knob labelled "increase" adjusts the tube filament voltage. These latter components could possibly have been added around 1925.
- Another mystery is the plaque labelled "LAB APP 1743". Was this an experimental lab device or, more likely, an educational device?

- Thanks for suggestions received.



11. Brian Griffon

Pics and notes coming soon

- OVRC Auction [Slideshow](#) - **May 2015** (Turn up your sound!)
- OVRC Auction [Photos](#) - November 2013

Bill Beaton recites into a SoundScriber Machine



Many members will recall Life Member Bill Beaton as having had one of the largest and most varied radio and ephemera collections in Ottawa. One of his items, a Sound-Scriber dictation machine, of 1950 vintage, was purchased from him by Lea Barker. An article on the restoration of this device is in the Spring, 2011 OVRC newsletter. Since Bill was also a collector of Robert Service books, and an expressive reciter of Service's poetry, Club President Paul Guibord and Editor Lea Barker took the opportunity on May 28, 2014 to record at Lynnwood Lodge Bill reciting the well-known "The Shooting of Dan McGrew." Because disks for the Sound-Scriber are almost unobtainable, your newsletter editor makes them from the clear plastic packaging on boxes of Christmas crackers. This material, thought to be low-density polyethylene, takes the embossing of the ultra microgrooves of the Sound-Scriber very well. Some of the quality of the original recording has unfortunately been lost in the quadruple conversion to MP3 (plastic disk to tape to computer to WMV to MP3); but it can be heard that the old recording machine still works well.

[\[Click to Listen \]](#)

OVRC Radio Plays

Performed at the meeting of 10 October 2012

[Number Please](#)

[Death Calls at Dinner](#)

[House of Purple Shadows, Part 1](#)

[House of Purple Shadows, Part 2](#)

[House of Purple Shadows, Part 3](#)

[House of Purple Shadows, Part 4](#)
[House of Purple Shadows, Part 5](#)