Identifying Vintage Triodes

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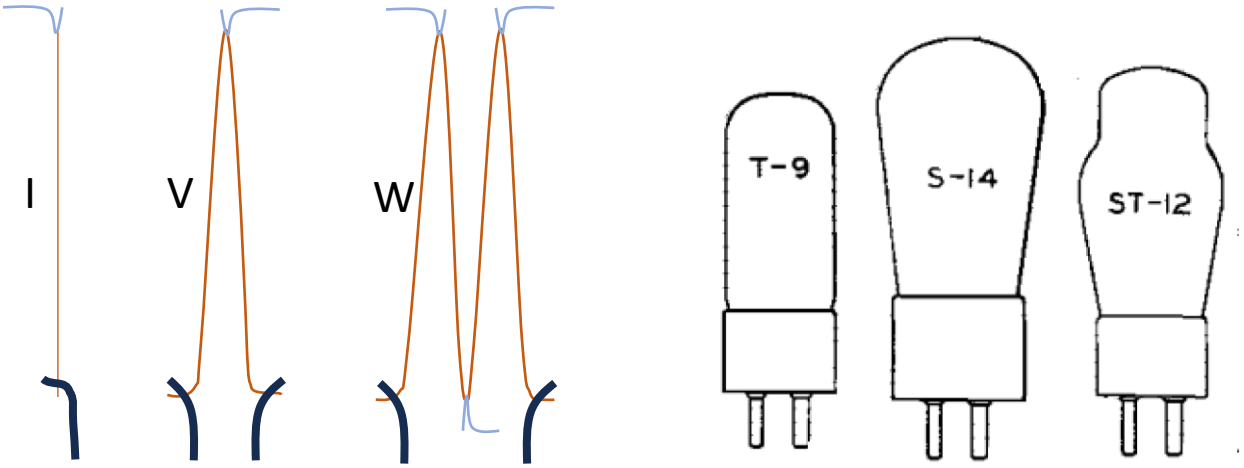
I recently received some 4-pin triodes for the OVRC tube stock. Several of the tubes had faded or invisible numbers, and it is often impossible to tell them apart visually. Indeed, according to Tyne, a 26 is the same as an 01A, just with a different filament. There are a number of tricks (breathing on the tube, rubbing it in your hair to impart some grease, using UV light) that can be used to reveal the number printed on the tube. But if that fails, I hate to discard these increasingly rare tubes. I have discovered that measuring the filament resistance is a good clue for differentiating between these tubes. Much thanks to Paul Guibord who lent me some tubes to complete my table.

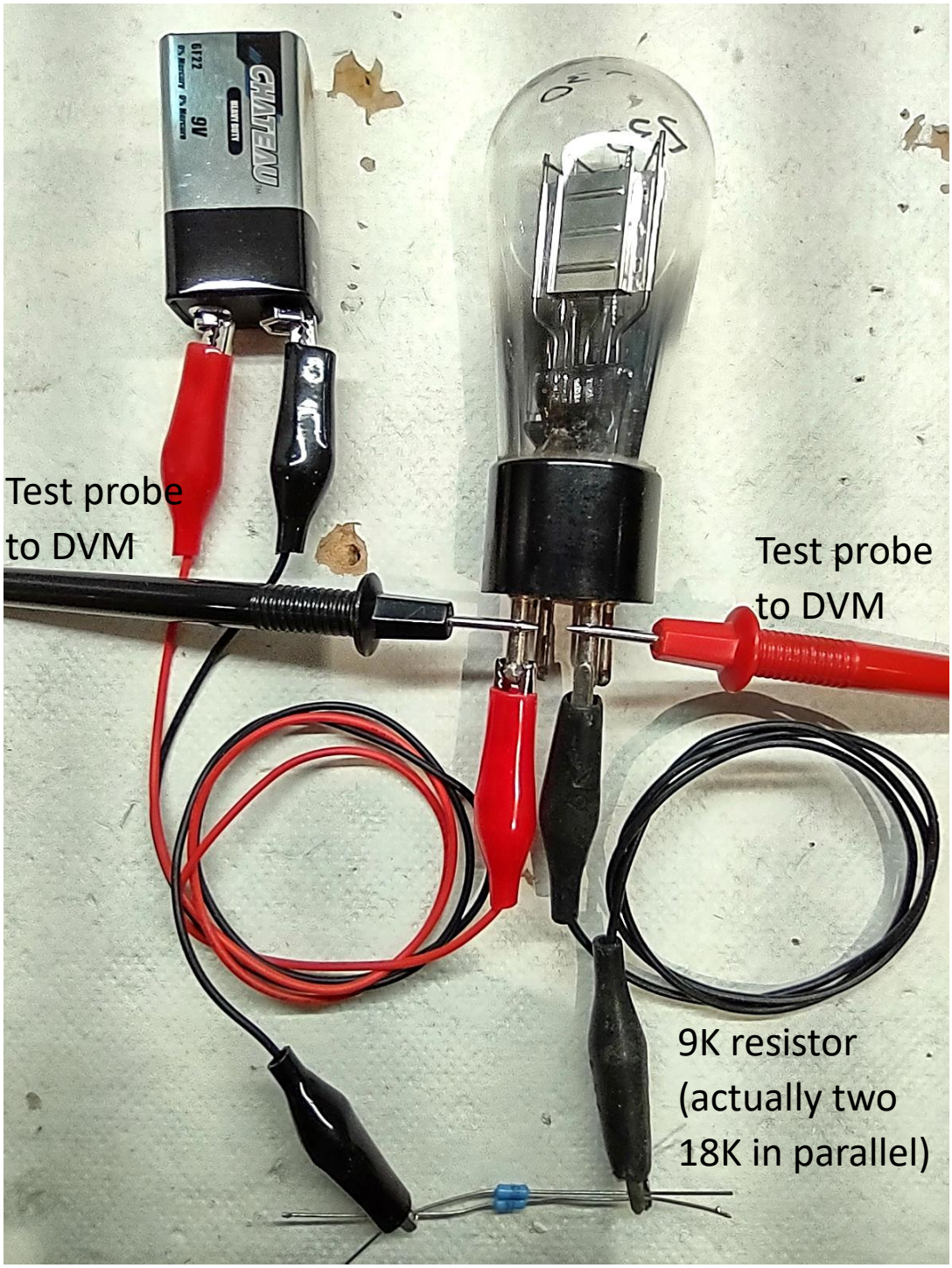
I am restricting this article to common 1920's and early '30's vintage 4-pin "directly heated" triodes with the common base consisting of 2 large pins and 2 small pins. Other triodes in that vintage (WD-11, 215, etc) can easily be identified by their distinctive size and base. The table lists tubes (with variations in the tube number that may indicate the shape of the tube) along with the cold filament resistance, and the filament shape. When possible, measured data is based on several tubes of different makes. If visible, the filament shape gives another clue to the identity of the tube. The smallest of these tubes have just one straight filament ("I"). Many have a "V" shaped filament supported with one hanger. The larger ones have a "W" shaped filament supported with 3 hangers, and still larger tubes may have an array of filaments.



Cold resistance is always lower than hot resistance. As long as current is limited (as it is in a typical DVM), cold resistance is a safe measurement to make. Measuring hot resistance is dangerous if you do not know what voltage to apply to the tube filament to make it hot!

Measuring a resistance of a few ohms accurately can be challenging, because the cable resistance and contact resistance between your ohmmeter probe and the (often oxidized) tube pin may be several ohms. I employ a "Kelvin" 4-probe measurement technique that mostly eliminates the effect of contact resistance. https://en.wikipedia.org/wiki/Four-terminal_sensing . One pair of clips injects a constant current into the filament pins (as long as there is enough voltage, contact resistance will not alter the current). Another pair of clips or probes measures the voltage on the filament pins (a good voltmeter takes very little current so contact resistance has little effect). A convenient source of approximately

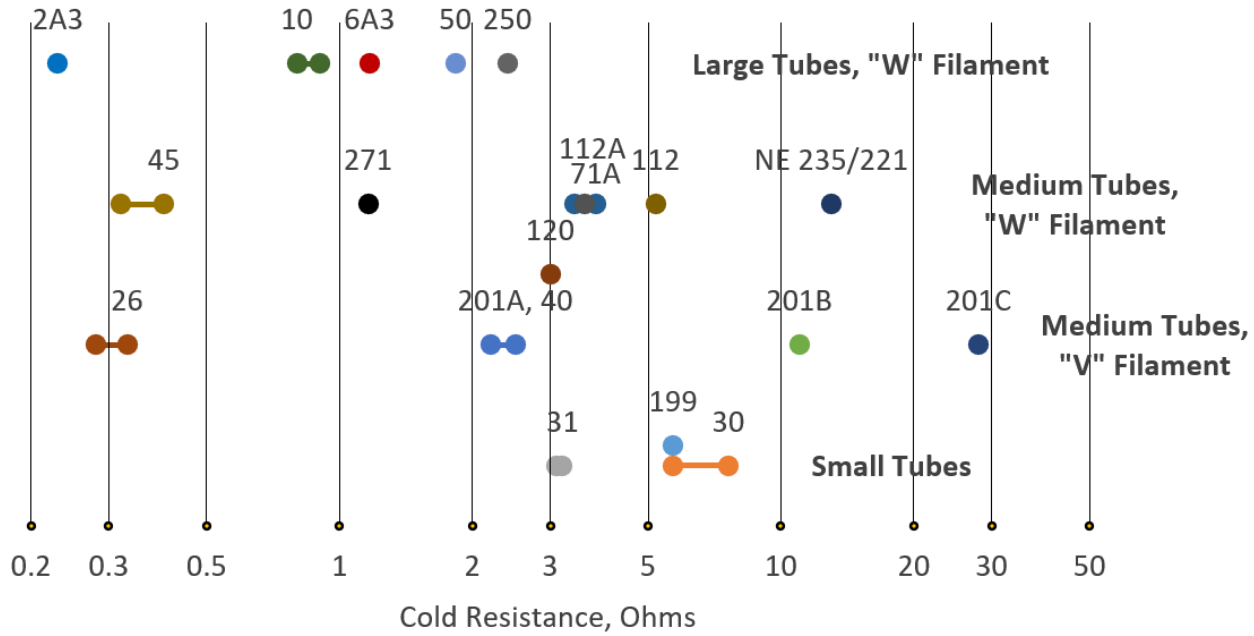
constant current is a 9V battery with a 9k series resistance, yielding about 1mA. As long as contact resistance I much less than 9k, contact resistance will have little effect. With this current, a 1ohm resistance causes a 1mV drop, which can be read with a good DVM. 1mA is safe for any tube filament. It is very important that 2 *independent* connections are made to each pin; if you attempt to use one connection (or connect those 2 connections together) the magic of the Kelvin measurement is lost.



The chart below shows my measured results. Please keep in mind that this is not a precise list; some brands of tubes may have significantly different filament resistances than those shown in the chart. And, in many cases I had limited data available. I was amazed at how consistent that 201A's were, and how much spread there was on the 30's. I am not sure of the 120's filament construction as I was unable to see inside the tube.

Tube Number						**Fil.**				
T	**S**	**ST**	**AKA**	**Filament Ratings**		**Constr.**	**Cold Resistance**			**Notes**
UV199				3V	0.06A	I	5.7 ohms			Tubular, pins are "nubs"
UX199			99, X99, 199	3V	0.06A	I	5.7 ohms			Tubular, standard 4-pin base.
	UX200		300	5V	1.0A	V	?			
	UX201		301	5V	1.0A	V	?			
	UX200A	00A	200A, 300A	5V	0.25A	V	2.2-2.5 ohm			
	UX201A	01A	210A, 301A	5V	0.25A	V	2.2-2.5 ohm			
	201B	01B		5V	0.125A	V	11 ohm	limited data		
	201C	01C		5V	0.06A	V	28 ohm	limited data		
230	230 or 30	30		2V	0.06A	V	5.7-7.6 ohm			
231	231 or 31	31		2V	0.13A	V	3.1-3.2 ohm			
	226	26	UX226	1.5V	1.05A	V	0.28-0.33 ohm			
	240	40		5V	0.25A	V	2.3-2.4 ohm			Like a 201A but high mu
	UX112			5V	0.5A	W	5.2 ohm			Yup, really! See text.
	UX112A			5V	0.25A	W	3.6 ohm			
	271			5V	0.5A	W	1.16 ohm			
	271A	71A		5V	0.25A	W	3.4-3.8			
	245	45		2.5V	1.5A	W	0.32-0.4 ohm			
	210	10		7.5V	1.25A	W	0.8-0.9 ohm			
	250			7.5V	1.25A	W	2.4 ohm	limited data		
		50		7.5V	1.25A	W	1.83 ohm	limited data		
		2A3		2.5V	2.5A	W	0.23 ohm	limited data		Construction varies. 1- or 2 plate
		6A3		6.3V	1A	W	1.17 ohm	limited data		Construction varies. 1- or 2 plate
120				3.3V	0.132A		3 ohms	limited data		
	DX-235 (Northern Elec)			5V	0.25A	W	13 ohm	limited data		Number molded on bottom of ba
	DX-221 (Northern Elec)			5V	0.25A	W	13 ohm	limited data		Number molded on bottom of ba

The chart data is all well and good, but displaying it graphically makes it easier to interpret. Just find the tube's resistance on the X- axis and then narrow the tube selection by considering the 4 categories.



I was curious about the 112 and 112A, because the 112 has more cold resistance than the 112A, yet when hot takes more current than the 112A, so I plotted resistance vs. voltage for the 112s, the 171's and a plain old 201A. All curves show a pronounced change in resistance except the 112 which is noticeably more constant. I have no explanation, but I suspect that it has to do with the composition of the material in the filament. I did not plot the DX-221 and DX-235, but they would have a similar flat profile to the 112.