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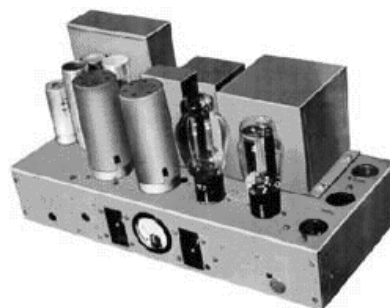
DIY HiFi Supply Ladyday Signature 300B SET 9 The Ladyday and Billie shootout!

Review By Clive Meakins
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How can technology dating back to the first third of the 1900's be of any more than purely historical interest to those wanting genuine high fidelity sound? For tubes in general there are all sorts of potential explanations; simple circuits with low component counts, high power supply voltages with superb overload margins, pleasant distortion characteristics, best performance at typical listening levels etc. I'm not going to enter into a debate about why some of us are smitten with tubes, clearly though they are an old technology in a world that is advancing technology at an ever increasing rate. Nostalgia plays its part, output tubes that masquerade as overgrown light bulbs offer a certain fascination. Tube power amplifiers can be broken down into three distinct families, Single-Ended (SE), Pull-Pull (PP) and Output Transformerless (OTL). The purest and simplest designs type are Single-Ended (SE), typically these are based around Triode tubes. With just a single output tube such amplifiers are low-powered and usually produce around 4 to 9 watts. The most ubiquitous tube is without doubt the 300B. The design that was the forerunner of the tube SE amplifiers that we use today is the Western Electric 91-A.



Think of the days when Prohibition was curtailing enjoyment and the Great Depression had only just peaked, what a combination! In the mid-1930's Western Electric were furnishing movie theatres with the latest electronics, the 91-A was one of the amplifiers leased to theatre owners. This 300B SE amplifier was specified with a frequency response of 50Hz to 8kHz and whacked out a whole 8 watts. You can be sure that very sensitive speakers were used to give a theatre-filling sound. These amplifiers were either thrown out with the trash or those that were saved, have been snapped up by collectors, sometimes for very high prices. Seeing the frequency response specifications, I would expect the sound of a 91-A to be in line with the stereotype of a tube amplifier, warm and easy on the ear.



The original Western Electric 91-A

This historically important amplifier design has been brought fully up-to-date to take its place in modern hi-fi systems, making no excuses for itself. The updated 91-A as offered by DIY HiFi Supply promises high performance and nostalgia combined. An additional attraction to some is that the tube complement includes a Pentode driver, for some a Pentode driver feeding a Triode power valve is the perfect combination.

First of all, a few words about DIY HiFi Supply. Brian Cherry is Canadian from Toronto and he set up DIY HiFi Supply 6 years ago. DIY HiFi Supply is based in Hong Kong, thereby giving easy access to far eastern parts for their kits. I've been dealing with Brian since 2001 when I built what was then called the Billie 300B amplifier. This amplifier design has since morphed into the Ladyday. Developments have come about due to a combination of fresh ideas, parts availability, movements in market requirements and material costs. The Ladyday is a monoblock 300B SET that can be purchased configured with an 6SL7 driver in Basic and Premium forms and as the Premium 91 version reviewed here. The 91 uses the original 310A Pentode driver.

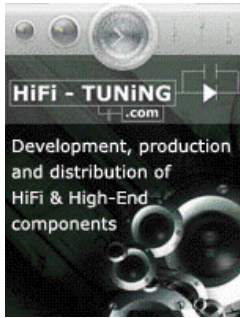


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Since I built the Ladyday 91 Brian has further developed most of his range, including the 91. There is now the LD One, this is a \$1090 300B monoblock kit using a 6SL7 triode driver and "respectable" parts, then there is LD Two (\$1490), again with a 6SL7 driver but now with Constant Current Source (CCS) and significantly higher specification parts. Finally there is the LD Three, this is the famous 91 circuit with the classic 310A pentode driver.

The chassis has changed since I built my kits. This was prompted by raw material costs increasing; Brian found the difference in cost between a steel chassis and a more sophisticated non-magnetic chassis had narrowed so new Ladydays now come with non-magnetic chassis and copper ground plane. The new chassis has moved up in the attractiveness stakes too.



Current Production Ladyday

The narrowing costs between standard and higher specification transformer cores prompted a move from the toroidal power transformer to an EI transformer with an H14 core. The Ladyday output transformers have also been upgraded to higher quality grain-oriented laminations and a larger core with perfect lay winding (i.e. very neat with each winding touching its adjacent winding).

These changes, along with some tweaking of the power supply, are how the Ladyday has developed. The power supply changes aside, the circuit for the 91 is unchanged so my review of the steel chassis version remains valid. As you can see the layout of the Ladyday being reviewed is just the same as the latest version.



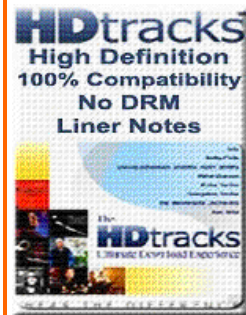
Ladyday 91 As Reviewed

The Ladyday is shipped with all the iron bolted in place with the B+ and AC heater wiring already done for you. As the circuit for the non-91 versions are very low on component count they are really quite easy to complete. I wouldn't suggest that a Ladyday be the first electronic construction project anyone undertakes but given due respect for the lethal voltages involved then I'd say that not a lot of experience is required. The 91 circuit is more complex with additional scope for error, bear this in mind if you are not too experienced in building tube amplifiers.

The 91 For Modern Times

The Ladyday 91 is the result of collaboration between DIY HiFi Supply and Thorsten Loesch. The original circuit, often replicated by DIY'ers, has been modified to give a flat frequency response 20Hz to 20kHz to within 1dB. There are a couple of changes that are very obvious. The power supply in the original 91 -A used the loudspeaker field coil as a choke so of course we need a dedicated choke. The 91-A used two 310A tube stages to give sensitivity of a millivolt or two. The first 310A stage is simply removed; the sensitivity of the remaining 310A feeding the 300B is around 1.2V for full output.

Next up there are some detail circuit modifications. There is that eight-letter word that is an anathema to SET users, *feedback!* Whew, I've said it and you are now expecting a compromised sound, probably a poor soundstage. The feedback is described by Brian as a very tiny amount of local positive feedback. To save you reading ahead I can assure you that I have detected absolutely no negative effects from the use of this tiny amount of feedback. So why risk the wrath of the SET crowd? Without it the amplifier would be rolling off from 10kHz and be 3dB down at 20kHz, with this positive feedback the 91 is now around 0dB to 1dB down at 20kHz, in other words within normally accepted limits. Enough said, just don't worry about it! Ok?



Another improvement is the use of the "WE connection," this is a capacitor connected across the 300B cathode to B+ in a specific ratio with the cathode bypass capacitor. This feature reduces power supply noise reaching the signal circuit. It was used on various Western Electric amplifiers so its inclusion is justifiable on historic terms as well as for performance reasons.

Authenticity is further achieved by the use of the 274B rectifier, this comes from Valve Art and except for its socket it is identical to the original WE 274A. You could source original WE versions of these rectifiers but you'll need a bank loan to buy them so new production Valve Art seems like a good alternative.

The 91 is one of DIY HiFi Supply's Premium range, this means there is no skimping on component specifications. Looking at DIY HiFi Supply kits it is clear that component specifications are high across the whole range but the Premium kits use some of the very best. What Brian has done is to make smart choices that obviate the need some of the craziest-priced boutique parts. At the same time he has taken great care to use the best combination of silver wire, capacitors and resistors to voice the 91 the way he wanted it to sound. DIY HiFi Supply has their own branded Obbligato film capacitors made specifically for them. They are said to be particularly tightly wound and void-free, plus they are priced very reasonably. Another, even more interesting component, again specially made for DIY HiFi Supply, is their 0.1 μF Silver Mica capacitor. Silver Mica capacitors normally come in much smaller values than this, which means they cannot normally be considered for interstage coupling duties. Where Silver Mica can be used for coupling capacitors they are giants in performance terms. They perform up with some of the very best and hugely expensive capacitors. At \$28 each these DIY HiFi Supply specials are a steal, the only downside is that they don't come in larger values, as it happens 0.1 μF is fine for the "modern times" 91.

Other components in the 91 are Tantalum resistors, Black Gate as well as oil power supply capacitors and there is also solid silver wire. All signal and tube sockets are high quality; indeed the tube sockets are Teflon nowadays. You get the picture, no skimping.

The instructions for the Ladyday kits involve stage-by-stage colour wiring diagrams with words to describe what you need to do at each stage. Aside from the small printed circuit board for the power supply, all other connections are point-to-point. The way I worked when building these amplifiers was to cross-reference the color wiring diagram with the circuit diagram, I also drew the connections as I made them on the circuit diagram. If there was anything that didn't stack up between the two sets of diagrams then either I'd made a mistake or misunderstood something. Taking a lot of care at this stage will reap rewards later. The 91 is a more complex circuit than the typical SET, the extra wiring could make debugging problems a hassle. Better to take time upfront and have the amplifiers work first time. I am relieved to say mine did.

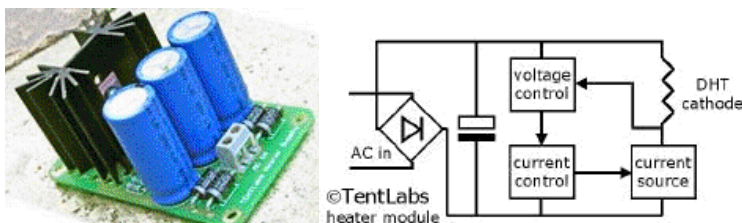
The only comment I have to add to the instructions is that where capacitors need to be attached to the chassis I used silicone adhesive. You can easily buy tubes of this adhesive from electronics stores; UK builders can source some from Maplin, part number RE81W. Silicone adhesive is great and it has plenty of stickability yet is removable.

Tent Labs Heater Supply

The way you heat a Directly Heated Triode (DHT) has a significant effect on its sound. The topic of tube heating can provoke debates of religious proportions. The main options are AC or DC. AC is more traditional, you can't really avoid a certain level of hum and the more sensitive your loudspeakers are, the more hum you will hear. Some prefer the sound of AC, personally I feel it colours the sound around the mains frequency and its first harmonic. Some have experimented with very high frequency AC, this does seem interesting. When implementing DC there are various options:

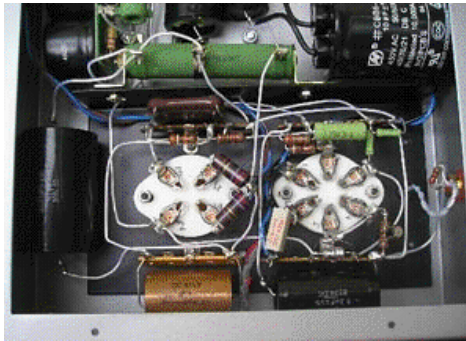
- Diode bridge with single capacitor
- Schottky diodes with a capacitor – resistor – capacitor
- Diodes with a common mode choke to cancel noise
- Diodes plus voltage regulator
- Diodes plus current regulator

Ladydays come with a diode bridge and capacitor. The level of noise across the loudspeaker outputs is very low. I found it was around 0.6mV. I wanted to try the Tent Labs heaters, which DIY HiFi Supply sell for \$145 for a pair of modules.

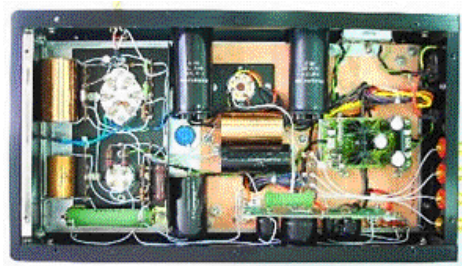
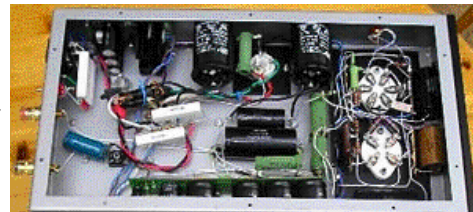


These are voltage *and* current regulated, exhibiting high output impedance. Guido Tent has developed these modules and you can find more information at [Tent Labs](https://www.tentlabs.com). By reducing heater noise the intent of the Tent heater module is to improve soundstage and resolution whilst making the sound smoother. You need to set the heater voltage for the 300B via a preset potentiometer. Once the heater voltage is set there is no need to reset it when

Almost Ready To Power Up



As you can see, my wiring could be neater, perfectly straight lines of solid silver wire would be more pleasing to the eye. I will try to do better next time. I say this every time! Before we get the 91 up and running I ought to address a couple of items, i.e. what comes before and after the amplifiers.



Inside the LD 91 and wearing its new chassis

Preamplifier

Do you need an active preamplifier or in other words do you require a gain-stage before the 91? This will be highly dependant on your situation. I am a huge fan of transformer volume controls, I use an S&B TX102 based pre, I manage without gain with the 100db sensitivity Prometheus loudspeakers, reviewed August 2006. My room is 18ft x 15ft with a lowish ceiling. I also find that I have just enough overall system gain when using 90dB loudspeakers.

Loudspeakers

If you are to exploit any SET amplifier fully it is vital that you use loudspeakers that synergize with the amplifier. This is more to do with how easy the loudspeakers are to drive than sensitivity. Of course high sensitivity is useful as there is not much power on tap and you really want to be listening to the first watt the amplifier produces, not the last watt. For ease of drive you need loudspeakers that have quite a flat impedance curve and as simple a crossover as possible, if you have one at all. Yes, you can get very pleasant sounds from loudspeakers that are not an ideal match but you will likely be sacrificing some of the SET magic.

The Big Turn-On

As the driver tube is a pentode you need to short the inputs when testing the amplifier, if you fail to do this it could oscillate. You are also advised to use a large wattage 8Ω resistor, an old loudspeaker would do but if there is a problem the loudspeaker will act as a one-time fuse. I took a very cautious approach when powering-up for the first time, I used a variac, checking the voltages as I wound up towards full mains voltage. I found the voltage on the 310A anode went very high so I chickened out. This is in fact is normal behavior, the voltage settles down again very quickly.

I should mention that if you roll 310A tubes, trying maybe Western Electric, Sylvania or National you may need to change the value of the 310A cathode resistor to get the anode voltage back to specification. Somewhere

between 1k2 and 1k8 is typically what is needed but of course the supplied resistor should be fine for the tube that comes with the kit.

Oh yes, one more potential adjustment; if you want to slightly tune the quantity of treble for your system and ears you may. You can alter the feedback capacitor value to achieve this but, check with Brian first.

I have a ritual of running brand new amplifiers into a dummy load, then an old car loudspeaker for a few minutes and then around 30 minutes into some otherwise unused old bookshelf speakers. If I am happy that all is well only then do I connect up the amplifiers to my treasured main loudspeakers. Usually with such a new amplifier I am greeted with a course sound that takes a couple of hours to bleed away. Around 100 hours are normally required before meaningful conclusions can be reached about sound quality and characteristics.

Pure Nostalgia Or High Fidelity?

If the Ladyday version of the classic Western Electric 91 circuit sounds over-mellow and stereotypically vintage then this build would have been a futile exercise. The Ladyday 91 exudes a character of all of its own and fortunately it is one that is absolutely high fidelity. What struck me immediately was that there was no coarseness in the sound of the 91s, even before they'd had their burn-in period. Part of this smoothness is attributable to the Tent Labs heater supply, comparing the standard supply to the Tent Labs one shows a higher degree of smoothness, not that the sound with the standard heaters exhibits anything to complain about! Hum levels are vanishingly low, with my 100db loudspeakers I can just hear a trace hum up to around 8cm from the main driver, any further away than this then noise is totally inaudible. Given the sensitivity of the loudspeakers this is a very fine result.

The general impression of the 91 is that they have a cohesive sound that doesn't particularly highlight individual details, even though all the micro-details are present. What does come across is music as an integrated whole. These amplifiers focus on *presence*, the music they portray is so solidly placed in front of you. Vocals or a maybe a saxophone playing mid-stage has such gravitas and presence that the illusion of a band in the room is stronger than I normally experience.

Most of my listening was with TJ Mesh Premium Mesh Plate 300Bs. I used several other types too, including Western Electric. Frankly, I have 8 different 300B makes to chose from and they all have their own attributes, which were quite obvious with the 91s. They all sounded good in their own way.

Out of curiosity I tried my Mullard GZ34 rectifiers in place of the VA274B, I was convinced the GZ34s would improve the sound. They did add further weight to the sound but somehow it was also thicker and not quite as delicate. The GZ34s drop about 17V less than the 274B so maybe the operating points are shifted slightly, this could influence the sound but I would not expect by much. The 300B plate dissipation is in the region of 28W so the 300Bs are running at around the mid point of their operating envelope. Life expectancy should be good, especially with the slow startup of the 274B. In the 91 a VA274B beats a Mullard GZ34. This is quite a surprise.

To get a better handle on the sound of the 91 I found it useful to compare them to the original Billies. You can be assured that the sound of the Billies is very similar to the triode driven Ladyday amplifiers. Brian confirms this is the case. In fact my Billies are closest in specification to the Ladyday Two version. For those that followed the different versions of Billie, mine are; Mu-stage 6SL7 driver into an S&B gridchoke and Jupiter Beeswax coupling capacitor, they have the WE connection, just as the 91s do.

Comparing the 6SL7 triode driven Billies to the 310A pentode driven 91s shows that buyers have a definite decision to come to. Both deliver extremely good sounds, irrespective of their relatively low cost. They do present music quite differently; I am now left with the task of trying to describe these differences so that you can decide which version works for you.

91 Versus The Billie

There were clear differences when comparing a number of LPs and CDs via the two sets of monoblocks. With Maria Muldaur / Richland Woman *Woman Blues* I found the 91s sounded richer and there was more presence in the room. I could hear plucked strings wobble and vibrate with a deep natural acoustic. Also, the 91s somehow tie together all the details and present a piece of music a whole. Billie sounded tremendous too, its qualities were more about being drawn into the detail of the music. Billie seems to work harder at push the music at you with greater energy whereas the 91s are more composed. Both presentations of music are entirely valid and which is better for you has to be your choice, I cannot decide for you.

Listening to Dire Straits *Private Investigations* on the Billies highlighted the some of the extended high frequencies more than the 91s did. It is not a frequency response difference, it is the extra forcefulness that Billie delivers. The reverse side of this coin is that the 91s were sweeter and again showed great presence. The picture was much the same for Tracy Chapman's first album and Mary Chapin Carpenter. Moving genre, Mozart's Clarinet Concerto K622 was incredibly palpable but the characteristics of the two amplifier designs were plain to hear. Listening to Stan Getz, Coltrane and Brubeck served only to confirm my thoughts.

The triode driven Billies are analogous to the currently available Ladyday Two. This triode driven version of the Ladyday offers an overtly exciting view of music, one that could be described as "on the edge of your seat." The pentode driven 91s sound more composed, but don't read this as meaning boringly relaxed. The 91s deliver a powerful presence in the room, somehow there is deeper meaning to their music. They are slightly smoother and more refined but do not let me lead you to surmise that the Billies/Ladyday Two are in anyway coarse or grainy, that is not the case at all.

So what about the aspects of bass, mid-range and treble quality? You'll know by now that treble is smooth, in fact sweet. Mid-range is clearly totally excellent and there is no hint of unnatural sibilance. As the Prometheus loudspeakers do bass from 100Hz down via solid-state amplification, I checked the bass by connecting up the 91s to some Visaton Topaz loudspeakers, these are very insensitive at just 80dB but they are a very easy load. I had no qualms about bass quality. Of course, as with any SET, bass will fall apart quite quickly with the wrong loudspeakers such as those with a deep impedance dip in the bass region.

Assessing the 91 for bass, mid and treble in isolation would be totally missing the point about what these amplifiers do. SETs in general major on atmosphere and a feeling of being *there*. The 91s are seriously good at this. What they do so well is to entwine the listener emotionally with music. It is all very well being nostalgic about the roots of the 91 but over time nostalgia fades and there is a realization that Western Electric had something special here. A little judicious updating has brought the 91 into the 21st century.










You've probably picked up that I prefer the 91, this is true but take away the 91 and I can very easily live with and enjoy the Billies/Ladyday Two. We're taking about a difference in presentation rather than one design sounding better than the other. I have my preference but I greatly admire both. If you are looking to purchase one of the Ladyday kits then you need to consider which presentation style *you* prefer and what works in the context of your system.

My Ratings

I have decided to rate these amplifiers within their own class, in other words other 300B SETs. It would be pointless to compare any SET to a totally different topology. The philosophy, objectives and design parameters behind a sophisticated powerhouse solid-state amplifier are hugely different to those of a SET, as are the expectations of their listening fans. Even within tube amplifier fans there are those who prefer push-pull over SET. For those within the SET brigade there are deep individual preferences for different tubes: 45, 2A3, 300B, PX25, 211, 845 and so on. 300B based amplifiers offer the easiest access to and greatest choice within the SET topology.

I have purposely left some scope for improvement in the ratings. I'm sure the latest non-magnetic chassis delivers a sonic uplift. The latest output transformer is more exotic too and this should be beneficial too. You can find horrendously expensive output transformers that sound wonderful but if you do this expect the value for money rating to plummet. The 91 strikes an excellent balance.

If you are entranced by the 300B SET sound and like the direction the 91s take then rest assured that these amplifiers are amongst the very best.

Tonality	
Sub-bass (10Hz - 60Hz)	
Mid-bass (80Hz - 200Hz)	
Midrange (200Hz - 3,000Hz)	
High-frequencies (3,000Hz on up)	
Attack	
Decay	
Inner Resolution	
Soundscape width front	
Soundscape width rear	
Soundscape depth behind speakers	
Soundscape extension into the room	
Imaging	
Fit and Finish	
Self Noise	
Value for the Money	

Specifications

Type: DIY single-ended 300B tube monoblock amplifier

Power Output: 8 watts per unit

Standard Tubes: two 300B, two 6N9PJ (6SL7), 5Z3PAx2 or 274b / 310A

Frequency Response: 12Hz to 47KHz (-3dB @ 5 watts)
20Hz to 20kHz -0.5dB)

THD: <1% (5 watts @ 1KHz)

Signal To Noise: 90dB or better

Input Sensitivity: 1.2 Volts

Input Impedance: 100kOhms

Output Impedance: 4, 8, 16 Ohms

Dimensions: 412 x 230 x 75/210 (DxWxH in mm)

Weight: 16Kg per chassis

Price: \$1090 for basic kit, various options at additional charge

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