Retrofitting the Fender 'Custom Vibrolux Reverb' into a hiss free classic.

MODS by Mark Moyer (original notes in GREEN)
Additional notes by Jason McLaren

The general intent of these MODs are to remove the inherent hiss. This can be accomplished by reverting this amplifier back to the '63 Vibroverb specification to the degree that this is practical. These MODs will turn this from a dust collecting dud, into an heirloom.

Prerequisites:

Copy of the Fender schematic and layout sheets.

Document conventions

Standard electronic and schematic notations are used throughout.
Abbreviations:
V# (example: V1) refers to a vacuum tube (valve) as specified on the schematic.
P# (example: P6) refers to a pin on the noted component.
V#-P# (example: V1-P1) refers to specific pin on a specific valve.

Special Notes:

HIGH VOLTAGE! Discharge the caps!

When working with the PCB, the traces are particularly thin and fragile on the this model. Use extreme caution when handling, desoldering, soldering, installing and removing components, or otherwise disturbing it.

Where directed to place components into empty locations, the solder pads will need to be desoldered first as the factory has soldered them closed. Do not attempt to insert components into the empty board holes without desoldering, you may knock the pads off the traces.

When sourcing parts, note that the PCB holes and layout spaces are quite small and intended for modern sized components. Allen Bradley vintage style Carbon composite resistors will not fit in the stock ¼ watt holes, nor will orange drop type Sprague capacitors. The combination of their size and gauge of the legs are prohibitive. I do not recommend enlarging the holes, as stated above the traces are very thin and I feel this would cause more trouble than it is worth.

The Differences:

1. Reverb is present in the 'Verb only on the bright channel. It is on both channels in the Vibrolux. This is accomplished by connecting pin 6 of V1b to pin 6 of V2B and eliminating R35, and R11, V1B's plate load resistor (220k in the 'Verb), and using the R22/R23 combination as a common plate load resistor for both V1B and V2B. On the 'verb, R22 and R23 are 22k and 82k, respectively. On the 'Lux, R23 is dropped to 47k. The Lux has a significant amount of hiss and more pre-amp gain with lower headroom due to this circuit change.
2. The 'Lux has a 500pf-coupling cap from the 12AX7 of the Reverb return to the pot. The Verb uses a .0033uf.
3. The 'Lux has no negative feedback. The 'Verb has a NFB loop. Negative feedback loops tend to negate hiss and other unwanted noise.
4. R37, the lower cathode resistor in the PI, is 6.8k in the 'verb and 39k in the 'Lux.
5. The 'Verb has a 100pF shunting cap, C20, across the PI plates. This is absent on the Vibrolux.
6. The 'Llux has 3kV spike protection diodes on the OT.
7. The 'Verb has very cheap sounding Oxford 10K5 reissue speakers. The 'Lux has the decent-sounding Eminence alnico's.
8. The Original Vibroverb runs a 12AX7 with a 1k 1w-cathode resistor as its Reverb driver. The Lux and Verb run a 12AT7 with 2.2k 1w.
9. The Verb's ground reference resistors; R62 and R63 are 47 ohms. The Lux uses 100 ohm

I started by labeling and disconnecting all the wires that go to the front panel PCB modules. I then removed these modules to get them out of the way. I left the pilot light in place, and added a spare switchcraft jack into the 1st left end hole to hold the faceplate on. I then covered the faceplate with blue masking tape to avoid scratching it.

I labeled and disconnected all the spade connectors from the board. This left the board still connected to the valve side, but free enough to rotate it up to a perpendicular position and allow access to the trace side. On my model (mfg date of 2011), all of the valve wires had been hot glued to the PCB on the top side. So I was confident that this would minimize stress to the PCB traces and solder joints. The hookup wire is very thin in this amp, so there is little resistance to repositioning it once all the spade connectors have been unplugged.

The Changes

MOD 1: Eliminate Reverb on Normal Channel.

WHY:
The 'Lux has Reverb on both channels. In theory, this is a good idea but the negatives outweigh the positives. Adding Reverb to both channels of the 'Lux causes a significant amount of hiss. Going to a common plate load resistor and lowering R23 from 82k to 47k makes the pre-amp run hotter, which to my ear makes for less headroom. I also suspect some cross talk is going on. Further, the Reverb on the Bright channel improves by converting the Lux pre-amp back to the Verb. If you like Big Clean Reverb laden tone with no hiss you must convert the Lux pre-amp back to the Verb.

HOW:
To convert the 'Lux pre-amp back to the 'Verb unsolder the blue wire from pin 6 of V2 and solder it to the unused hole marked 6 on the circuit board where the rest of V1's connections are made. The blue wire connects pin 6 of V1 to pin 6 of V2. Leave one end connected to pin 6 of V1. Replace R23 with an 82k. Place a 220k resistor in both of the empty spots pre-marked R35 and R11.

- Locate the wire that runs from V1-P6 to V2-P6 (**LIGHT BLUE**)
- unsolder the one end of the **LIGHT BLUE** wire from V2-P6.
- Move this end to the unused hole on the PCB (marked '**6**' on schematic) that has the V1 connections on it.
- Remove R23 and replace with 82K Ω
- Locate empty PCB locations marked R11 and R35 and install a 220K resistor in each.

PARTS:

QTY	Value	Type	Note	X
1	82K Ω	Resistor	R23 **1-Watt**	
1	220K Ω	Resistor	R11 **½-Watt**	
1	220K Ω	Resistor	R35 ¼-Watt	

MOD 2: Fuller Reverb

WHY:

The Reverb on the Lux is much more filtered out then the Verb due to the coupling cap in the recovery stage. C16 on the Verb is a .0033. On the Lux it is 500pf. This is a significant difference. I highly recommend replacing C16 on the Lux with a .0033 Silver Mica cap. This makes the Reverb come alive on the otherwise Reverb challenged Lux.

HOW:
Locate and replace C16 with a .0033uF value capacitor.

PARTS:

QTY	Value	Type	Note	X
1	.0033uF	Capacitor	C16 Silver Mica	

MOD 3: Shunting cap

WHY:
The Verb has a 100pf-shunting cap across the plates of the 12AX7 Phase Inverter. It is C20. I recommend placing this 100pf cap in the Lux as it is inaudible and greatly reduces the parasitics that are inherent with a printed circuit board.

HOW:
Locate empty C20 on PCB and install 100pF capacitor.
PARTS:

QTY	Value	Type	Note	X
1	100pF	Capacitor	C20	

MOD 4. Add Negative Feedback Loop (NFB):

WHY:
To further reduce the hiss found on the Lux and increase your headroom you must add a NFB loop to the 'Lux.

HOW:
Solder a 10k resistor in the empty space marked R41. Then run a wire from the speaker jack (positive, or tip, terminal) to the unused connection point "2" above the right-hand corner of C37 and next to a green wire. ONE MORE THING! There needs to be a 470-ohm resistor between this point and ground! It's R42 on the Vibroverb PCB. My 1995 Blonde had a jumper wire acting as R42. One Other Phase Inverter Change: Replace R37 with a 6.8k resistor. This goes hand in hand with the NFB loop change.

- Locate empty PCB location marked R41 and install a 10K resistor.
- Install a wire between the positive tip terminal connection of the speaker jack to unused connection point marked '2' located near the positive end of C37 and a **green** wire.
- Install a 470Ω resistor at R42.
- Replace R37 with 6.8K Ω resistor.

PARTS:

QTY	Value	Type	Note	X

1	10K Ω	Resistor	R41 ¼-Watt	
1	?? inches	Hook-up wire		
1	470 Ω	Resistor	R42 ¼-Watt	
1	6.8K Ω	Resistor	R37 **1-Watt**	

MOD 5: Remove Surge Protection Diodes

WHY:
While theoretically surge protection diodes are a good idea. However, they tend to cause the amp to blow fuses when switching out of standby. Further, they seem to drain off some of the high frequencies. I am talking about the diodes from pin 3 to ground on the 6L6GCs. None of the older Fenders had them and most of these amps are still going strong 30 or more years later. I recommend removing these Diodes.

HOW:
Remove diodes CR6 and CR7. These are mounted directly on the power tube sockets. They Bridge Pin 3 to ground (Pins 2/7) on V7 and V8. Simply snip them out.

PARTS:
None.

MOD 6: Ground Reference Resistors

WHY:
Replace R62 and R63 with a pair of 47 ohm resistors. I used 1-watt metal oxide. This may seem an insignificant change but it removes the last little bit of hum and hiss from the amp.

HOW:
- Locate and replace R62 & R63 with 47Ω resistors.

PARTS:

QTY	Value	Type	Note	X
2	47Ω	Resistor	R62, R63. 1 Watt Metal Film	

The Options

OPTION 1: Install an adjustable Bias

WHY:
Optimize your prefered power tubes rather than relying on the stock fixed bias.

HOW:
Use a 10k linear pot. Mount the pot through the bottom of the chassis below and to the pilot-light side of the tremolo pots. Remove R59. Solder two lengths of wire to the PCB where the resistor was. Connect one of the wires to the middle and one end tab of the pot. Solder a resistor to the remaining tab and connect the other end of it to the other wire. For values, I recommend starting with a 10k. What you've just done is replaced the 18k bias set resistor with a 10k resistor in series with a 10k pot. Where before you had a fixed 18k, you now have 10k-20k range. Button things back up and check your idle current. You will want to see anywhere from 30-40mA per tube. If you can't get the idle current high enough (which is likely if

you use NOS American tubes or the Tesla 6L6GC), replace the 10k resistor you just added with a 5k. If you use Svetlana tubes the 10k works fine. Philips 6L6WGBs may require the 5k. The Tesla 6L6GCs will definitely require the 5k. I have tried the Svets, Phillips and Teslas in my amp. The Svets have nice mid range. A good sounding all around tube. The Phillips are clean and bold at low volume and break up nice. A good blues tube. The Tesla's remind me of 7581As. They are big, full and clean. They seem to add wattage to this amp with lots of big clean headroom. They are also tough as nails and can be run hard. The Svetlana are my choice for this amp. I run them @ 36ma per tube.

R59 is located on one of the front panel modules, the one with the vibrato controls.

Mark's notes recommend placing the bias pot in the traditional location. This is also nearest to the R59 resistor that is removed and the hookup wire locations to be used. It will require drilling the hole in the chassis. At that point I would think removing the PCB entirely from the chassis would be in order. I chose a different, less invasive, approach.

Locate the stock chassis hole on the power transformer side, on the back near the fuse holder-power plug. It is punched in the chassis, but not through the back plate. I believe this punch out originally held a ground lift switch on earlier models. Mark the place on the back plate by tracing around the chassis hole.

Remove the one black screw and the switch/jack the nuts holding the back plate on. with the plate off the chassis I used a straight edge to line up my marks with the existing holes and center punched my starting point. Then drilled the hole to fit my bias pot, reassembled and installed the bias pot. The pot legs pointing to one side.

I had a 5 point terminal strip handy so I loosened one of the power transformer nuts closest to the bias pot and installed the strip. I bent over the the terminal lug that was grounded so I didn't accidentally use it. On the strip I installed the 10K resistor across two lugs I then completed the modification per Mark's instructions. From each lug of the resistor I ran a length of hookup wire one to the pot the other to one of holes of R59. I ran another length of hookup wire from the other R59 hole directly to the pot.

You may have to ream the mounting hole of the terminal strip slightly to fit the transformer bolt.

PARTS:

QTY	Value	Type	Note	X
1	10K Ω	Pot - Linear	10% <Bias> Fender PN: 0017502000	
1	10K Ω or 5K Ω	Resistor		
1	?? inches	Hook-up wire		
1	terminal strip	3 lug minimum	optional mount for the inline resistor.	

2. The Original Vibroverb, not the re-issue, ran a 12AX7 as its Reverb driver. Replace R26 with a 1k -1w resistor and install a 12AX7. The 12AX7 will increase the dwell of the Reverb and is a much more common tube if you want to experiment. Be sure to use a 1-watt resistor here! You may find that this gives you too much Reverb. **Jason's <different Jason> concept... some instead of a 1K resistor, perhaps a 820Ω resistor in series with a 2K trim pot (total range of 820Ω - 2.8KΩ) to set the dwell? the original value is a 2.2K

3. Reverb Switching: These amps always have some Reverb, even when it's turned down to "1" and foot switched out. All Fender Reverb amps do this to some degree, but on these it can really be annoying, especially when cranked.
The solution is to rearrange the foot switch setup to the original Fender style. On the 'verb/Lux, the foot switch grounds the signal from the Reverb recovery circuit at R65. This should kill the signal, but for some

reason it does not. On the original Reverb amps, the foot switch grounded the Reverb signal at the grid of the recovery tube. It's simple to put this back in order.
First, trace the gray wire attached to the foot switch jack back to the PCB. Either unsolder it at the PCB or just snip it off flush. Then solder it to pin two of V4. Viola!

4. The stock Reverb cables are crap. Replace them with some nice heavy-duty video quality cables. I disconnected the originals from the board and soldered the new cables right to the board. This improves the signal quality and reduces interference making for better quieter Reverb.

5. As in all Fender Reverb amps the 12AT7 Reverb driver takes a beating. A good fresh RCA or Mullard will last the longest and sound the best. I tried the Phillips 12AT7 and I was disappointed with its short life and shallow tone.

6. As you may have noticed, I am a Reverb junkie. I like the smoothness of the three spring Reverb pan in this amp. The number is 9AB3C1B.

7. There is a 47pf cap across the volume pot of the Bright channel. This is what makes the Bright channel Bright. This is the same set up as the Deluxe Reverb. I feel that the amp is too bright with this cap. If you share my opinion simply remove C11. It is on the Bright channel daughter board. For what it is worth, I remove the 47pf cap from the Deluxe Reverb as well.

8. The stock blue Alnico speakers are decent but there are better. After much research I decided to buy and install a pair of the Weber C10Qs. This final change was the icing on the cake! They transformed my already fine sounding amp into a truly professional sounding workhorse.

The Conclusions:
The Fender Vibroverb, in my opinion, is the best sounding amp that has come out of the Fender factory in years. I am very big on REVERB and the Vibroverb, when properly set up, has the finest Reverb of all!
Converting a Lux into a Verb is fairly simple and will take you about an hour if you know what you are doing.
My goal in converting my 1995 Blonde Lux into a '63 Vibroverb was to get rid of the hiss. I also had a parasitic on certain notes. Further, the Vibrato would make an audible pop when I switched it on and off. I liked the basic tone of the Lux but I could not live with the noises and shallow Reverb. Converting my amp made it virtually silent. The basic tone is about the same but the Reverb is much bigger and fuller. I do not miss the Reverb on both channels. I do not miss the pops, crackles and mostly I do not miss the Hisssssssssssssssssssss. Mark

MOD PARTS:

QTY	Value	Type	Note	X
1	82K Ω	Resistor	R23	
1	220K Ω	Resistor	R35 ¼ Watt	
1	220K Ω	Resistor	R11 ½ watt	
1	.0033uF	Capacitor	Silver Mica	
1	10K Ω	Resistor	R41	
1	?? inches	Hook-up wire		

1	470 Ω	Resistor	R42	
1	6.8K Ω	Resistor	R37	
1	100pF	Capacitor	C20	
2	47 Ω	Resistor	R62, R63 1 Watt, Metal Film	

Filter Caps:

QTY	Value	Type	Note	X
5	22uF 500v	Capacitor	C31-C35 (Electrolytic - Axial)	

Potentiometers:

These are the pots used in a blackface, in case you really want to get after it:

QTY	Value	Type	Note
2	250K	Pot - Audio	10% <Bass>
2	250K w/50K Tap	Pot - Audio	20% <Treble>
2	1M	Pot	20% <Volume>
1	100K	Pot - Linear	Reverb
1	250K	Pot - Linear	Vibrato - Intensity
1	1M	Pot - Reverse Audio	Vibrato - Speed
1	10K	Pot - Linear	Bias **-** Option 1
2*1	250K w/70K Tap	Pot - Audio	20% <Middle>

*1 optional modification (not documented here) to add middle tone controls