Here are some of the tricks to get a smoother OD sound from a 70's era D-ODS clone amp. These amps used Fender values for the preamp plate and cathode resistors (i.e. 100k and 1k5). Raising these values to those used in the 90's era Skyliner amps helps a lot, although you might get even better results by experimenting with variations, like 2k7 or 2k2 instead of 3k3 for the cathode resistor, and 120k, 150k, 180k or 220k for the plate resistors. You might also try determining the bias current for each preamp stage by measuring the voltage drop across the plate resistor and dividing it by the value of the resistor; many people like the sound and response of a tube stage biased at roughly 0.75mA.

The earlier amps used 5uF cathode resistor bypass caps instead of the typical 25uF caps used in many Fender designs. By using the smaller caps, there is less of a chance of getting the dreaded "farty" bass response. A further improvement can be achieved by adding a small 1.0uF poly cap in parallel with the 5uF electrolytic cap (or use a 4uF e-cap if you can get them). Using 5uF Ck caps for all four preamp stages can make the sound a bit bass heavy, so it is suggested that you replace one of the 5uF caps with a 1uF poly cap to keep the bass response under control. You can try using the 1uF poly cap by itself on the second Clean stage or the second OD stage.

Changing the coupling caps after the various stages can also fine-tune the sound to your tastes. Using a 0.047uF coupling cap instead of 0.01uF after CL2 will improve the bass response of both the Clean and the OD channels. Using a 0.005uF coupling cap after OD2 seems to improve the blues tones from the amp, while the 0.01uF cap is good for a thicker rock sound. There are many possibilities for the coupling cap after OD1 as seen in different D-ODS amps and clones. The 0.01uF value used in the 70's design could be increased to 0.022uF for a fuller OD signal, although the Skyliner amps decrease the value to 0.0022uF.

The tone stack has gone through some changes between the 70's design and the 90's Skyliners. Increasing the 100k slope resistor to 150k seems to make the tone stack work more effectively, and you can also try replacing the audio taper 250k treble pot with a linear taper 250k treble pot. The 0.01uF Middle cap is replaced with a 0.05uF cap in the Skyliner, which improves the midrange response. The 100k linear taper Middle control was replaced with a 250k audio taper pot in the Skyliners, which allows for more mids at the higher settings. (An added benefit is that 250k audio pots are readily available with DPDT push-pull switches which can be used to toggle in some of the added features mentioned below.) Increasing the 250k audio taper Bass control to a 500k audio taper pot is recommended, along with replacing the 1k8 resistor to ground from the ccw terminal with a 10k resistor. The later designs also add a cap between the two outer terminals on the 500kA bass pot; 0.001uF seems to work quite well. All of these changes seem to improve the sound of the amp and the response of the tone stack. I have gotten good results using Sprague Type 418P Orange Drop caps; other people have used the Type 715P caps (which are polypropylene rather than polyester).

Many of the preamp switching options from the later amps can be added to your 70's ODS clone. A midrange boost can be added by selecting between two values for the treble capacitance. While most midboost schemes add a second cap in parallel with the treble cap to increase its effective value, a different trick is used in the later D-ODS amps. Two caps are wired in series, with the second one optionally bypassed with a switch. With the switch open the two capacitances are summed together using the same basic formula as two resistors wired in parallel (i.e., CTOTAL = C1*C2/C1+C2). So with a .0022uF cap followed by a 390pF cap, the net capacitance in the unboosted mode is approximately 330pF; with the switch closed, the full value of the first cap becomes the boosted value. While the later D-ODS amps use a .0022uF cap followed by a 390pF cap, many people think that the midboost is too extreme, in which case you might want to try two 500pF caps wired in series or a 500pF cap followed by a 1000pF cap. With the first alternative, the unboosted value would be 250pF and the boosted value would be 500pF (for a more subtle tonal shift effective for both Clean and OD modes). With the second alternative, the unboosted value would be 333pF, closer to the stock value used in many of the D-ODS amps. As for the composition of the treble caps, ceramic seems to work better than

dipped silver mica for those values of 1000pF or less; if you use the 0.0022uF treble cap, you should use poly rather than ceramic.

The footswitchable preamp boost used in the later amps is an effective addition to the 70's design. This preamp boost is achieved by essentially bypassing the tone stack; the connection from the CCW treble pot terminal to the bass pot is interrupted to remove the bass and middle pots from the signal going to the first volume control. Unlike a full bypass switch, some of the signal is bled to ground through the bass and mid caps, which IMHO makes the boosted sound much more usable. For details on wiring this up check out some of the newer schematics and drawings. It should also be noted that the Rock/Jazz switch on the 70's designs are still being used in the newer amps and is very effective for both the Clean and the OD modes; in the Jazz mode the bass and mid frequencies are cut a bit, for a sound more like the jazzy C&W guitarists than the traditional jazz guitarists like Wes Montgomery or Kenny Burrell. For a more traditional jazz sound, the Deep switch used only in the 70's amps will cut the high frequencies a bit, along with a very noticeable reduction in overall signal level. If you have a spare switch available, you might try hooking up the Deep switch to see if you like the effect. While the stock 70's design shows a 500pF Bright cap across the ungrounded terminals of the initial volume control, many people think that value is way too high and you might try something like 220pF or 270pF.

There are two revisions to the 70's design that will brighten up the sound a bit. The 220k series resistor after the initial volume control and going to the grid of CL2 can be bypassed with a 390pF cap as it is in the Skyliner design to give more definition to the Clean and OD sounds. Another revision involves the local feedback loop at CL2 consisting of a 22M resistor and a 0.05uF cap in the stock 70's design. The 22M resistor can be replaced with a 32M or 44M resistance to keep the sound from becoming muddy and overcompressed. (Add a 10M resistor in series with the 22M to get 32M; add two 22M resistors in series to get 44M.) I suggest wiring the cap to the CL2 plate to keep the high voltages from the resistors (which are generally available only as 1/4 watters these days). In the Skyliner design the local feedback loop has been eliminated, possibly to maximize the signal level from the two Clean stages.

Much has been hypothesized about adding tone shaping components to the basic 70's design to smooth out the sound. However, in adding a cap to ground to bleed off some of the high frequency content, the sound can become compressed and muddy. So it is suggested that you keep the tone shaping components as simple as possible.

The 500pF caps from the plates to the cathodes of the two OD stages in the 70's design are there to eliminate oscillations and to mellow out the sound a bit. You can try smaller caps like 350pF or 250pF to give the OD sound a little more presense. Since some of the oscillations can be higher than the audio frequencies you may need a scope to confirm that they are in fact not there.

The final suggestion for shaping the tone sounds too simple to have much of an effect but it may in fact be the "internal high-frequency taper control" mentioned in some of the literature. After the coupling caps for OD1 and OD2, try wiring in a 500k trim pot as a variable resistor ahead of the 100k ratio and level pots. The 70's drawing shows a 100k series resistor here; replace that resistor with the trim pot. There is no series resistor shown after the OD2 coupling cap so insert the 500k trimmer in the circuit ahead of the 100k OD level control.

The series resistance after the OD2 coupling cap has a very drastic effect on the overall sound of the OD section. With no resistance at all, the OD section can sound very harsh and brittle. Adding in a 150k resistance for a 0.01uF coupling cap, or a 330k resistance for a 0.005uF coupling cap seems to work really well in shaving off some of the high frequencies while leaving plenty of definition in the sound. But with the 500k trim pot in there (at least temporarily) you can determine the "sweet spot" for your own amp. Once you find the value you prefer you can hard wire in a fixed resistor (or combination of resistors) for that particular resistance.

The series resistance after the OD1 coupling cap has a more subtle effect on the sound of the OD section, and when I dialed it in for the "sweet spot" it worked out to around 105k (very close to the 100k resistor used in both the 70's and 90's designs). However, you are encouraged to try the 500k trim pot here since your own amp may be tuned a bit differently. I noticed that as I set the trimmer to 91k and 82k the sound was a bit brighter, and would improve the blues tones. In seeking an "ultra-smooth" sound, I ended up setting the trimmer to roughly 220k.

You may further experiment with small caps in parallel with these trim pots, possibly wired in series with a small trimmer, but I was very impressed with the effect of just the variable resistor. Many people have suggested adding a cap to ground through a variable resistor to remove some of the high frequency content at the end of the OD section, but that arrangement tends to make the sound a bit overcompressed and removes much of the definition of the sound along with the harsher high frequencies.

It should be mentioned that the choice of preamp and output tubes will effect the tone. FWIW many of the fine tuning tweaks mentioned here were based around amps using a pair of EI 12AX7's for the preamp tubes. These tubes were also marketed by Groove Tubes as their 7025; I am not sure if any of these tubes have been exported from Yugoslavia since the NATO bombings so the stocks may be dwindling. I have also tried the Sovtek 12AX7LPS tubes which sound pretty good but I still prefer the EI's in my D-ODS clone. When trying out different tubes in the preamp, you may need to adjust the OD input trim pot to match the gain and other characteristic of the tubes. (BTW many people will set the 100k OD input trim pot to somewhere between 40k and 60k to ground.) As for the output tubes, I've gotten good results with the Svetlana 6L6's in most of my amps including my D-ODS clone. I figure that you once you have a good sound from the preamp that you can use the Presence control to fine-tune the sound for your choice of output tubes and speakers.

The following chart shows different values for the plate and cathode resistors, coupling caps and tone stack components used in various D-ODS amps and clones:

Appendix A

An overview of different component values used in various D-ODS amps and clones.
( ) = 70's [junk these values for a smoother sound]

CL1 Rp: (100k) 220k
Rk: (1k5) 3k3
Ck: 5uF

CL2 Rp: (100k) 150k
Rk: (1k5) 2k2 3k3
Ck: 5uF 1uF

OD1 Rp: (100k) 180k 220k
Rk: (1k5) 2k7 3k3
Ck: 5uF

OD2 Rp: (100k) 150k 180k
Rk: (1k5) 1k8 2k2
Ck: 5uF 1uF

Tone Stack:
Treble cap: 250pF 330pF 500pF
Treble cap [midboost]: 500pF .0022uF
Treble pot: 250kA 250kB

Middle cap: 0.01uF 0.05uF
Middle pot: 100kB 250kA

Bass cap: 0.1uF
Bass pot: (250kA) 500kA
Resistor to ground: (1k8) 9k8 10k
Cap across pot: (none) 0.001uF

Slope resistor: (100k) 150k

Coupling caps:
CL2: (0.01uF) 0.047uF
OD1: 0.002uF 0.01uF 0.02uF
OD2: 0.005uF 0.01uF