1) It's best to use the stock T-140 caps because the replacements listed for the X by NGK are way shorter as shown here: www.maxim-x.com/pix/plugcaps/cap-x_vs_ngk_xd05fp.jpg



2) And even if you did decide to use new caps from NGK, the XD05FPs which are listed in all their reference catalogs are not really appropriate for several reasons... not the least of which is that because of their height, the caps can only be installed in two ways - with the head pointing left or right - neither of which allow for good wire routing. So for that reason, SD05FPs are a better choice. They're still short but they're straight as shown here: www.maxim-x.com/pix/plugcaps/sm-sparkplugcap-assembled-x+ngk_sd05fp.jpg That allows the wires to go off in any direction from the caps.



- 3) Some catalogs show that the X uses XD05F caps but the trailing "P" is pretty critical it refers to a special waterproof shell that's a must for the X and it's igntion issues.
- 4) But as I said, the stock T-140 spark plug caps are best: www.maxim-x.com/pix/plugcaps/sm-00-sparkplugcap-horizontal.jpg They extend over the cam cover and can be rotated any direction. The plug caps can also be disassembled (so can the NGK XD05FPs but not the SD05FPs) and that's why we can use them again.



- 5) The first thing you need to ask yourself is whether you will be installing resistor plugs like the Iridium DR8EIX or non-resistor plugs like the stock 1985 D8EA plugs. If you use nonresistor plugs, the caps must have 5k-ohm resistance. But if you use resistor plugs, the caps can be converted to zero resistance - that's what I've done on my X (Iridium plugs and 0 K-ohm T-140 caps).
- 6) If you go with Iridium plugs like I did, then you can discard the resistor core inside the stock cap and replace it with and equal length of solid metal instead. <u>www.maxim-x.com/pix/plugcaps/sm-cap_core-marked3.jpg</u>



- Of course, there are several choices of metal for that job. I found appropriately sized rods of steel, aluminum and brass. Although I figured aluminum would be best from a conductivity standpoint, the adjacent metals would be dissimilar and would inevitably create corrosion so I decided against aluminum. I also decided against steel because it would rust all on its own. I thought the best choice would be brass because brass doesn't rust and because at least one adjacent piece was brass as well so the effect of dissimilar metals would be minimal. So that's what I used 3/16" (or 5/32") brass rod instead of the stock resistor core. The end result was, however, not perfectly 0 resistance I ended up with 0.4 ohm across each cap but that was damn near close enough to zero and gave me the maximum benefit to keep spark power high.
- 7) So once you've decided which caps to use, which plugs to use and what to use for the core, then comes the disassembly. If you take a look inside the plug end of the cap, you'll see that the plug connector has notches which would have been for a slot screwdriver if there wasn't

a hole in the middle: www.maxim-x.com/pix/plugcaps/13-sparkplugcap-assembled-plugend.jpg



But a slot screwdriver is still what you'll use. Trust me - find one that fits perfectly. It'll make removal of the spark plug connector much easier and you'll damage the slots less. Here's what I used:

www.maxim-x.com/pix/plugcaps/14-slotscrewdriver-front.jpg

www.maxim-x.com/pix/plugcaps/15-slotscrewdriver-side.jpg

Be careful - it's spring loaded and pops apart.



8) When you pull the cap apart it'll look like this: <u>www.maxim-x.com/pix/plugcaps/1-maximx_plugcap_and_parts.jpg</u>



Up close, the internal parts look like this: <u>www.maxim-x.com/pix/plugcaps/2-maximx_plugcap_innerparts.jpg</u>



Notice that there are small pieces that can go flying. You should have a tray or something to work on so the round parts don't roll away.

9) When you have it apart to that extent, you'll still need to disassemble the spark plug connector itself. You'll need to remove the two clips which hold the threaded top of the spark plug in the connector because those clips might be badly rusted and adding lots of resistance. Be careful not to break or bend the clips. I removed them with the tip of a knife as shown here: www.maxim-x.com/pix/plugcaps/4-maximx_plugcap_plugconnecter_frictionclips.jpg



- 10) Of course, when it's all apart, it's cleanin' time. I used a small wire wheel in a cordless drill to polish all the internal parts back to a nice brassy shine - including the clips for the plug connector. You don't have to worry about cleaning the resistor core because you'll be replacing it with a solid brass rod.
- 11) But just for fun, measure the resistance of the core to see how high it is. The very interesting thing about the resistor cores is that any amount of cleaning causes the resistance to increase. It has something to do with the construction. I believe the resistor is just a fine wire down the core and to provide a contact surface on either end there seems to be a film of brass. Cleaning seems to obliterate the contact film leaving only a pinpoint in the centre where to make contact with the fine wire core. In any case, the resistor would likely not be reusable even if you wanted to keep a 5 k-ohm resistance in the cap. So in that case, if you do want the cap resistance, what you can do is buy an NGK XD05FP cap and take it apart the same way. Then extract the resistor core from the new cap. It's the Cadillac of cores in comparison: www.maxim-x.com/pix/plugcaps/resistorcores-x+ngk.jpg



Notice the NGK resistor is longer though. That's OK. It will work, it just requires a lot more force on the spring when reassembling.

12) So when all is clean and you have your new core, whether the NGK 5-kohm core or the brass rod, you might be tempted to reassemble but you can't. If you try to put things back together now, you'll end up with a heinous amount of resistance, no matter how well you cleaned. Why? It's all about the topmost connection inside the cap. The spring makes contact there and even if you had tried in some way to clean it, it's almost impossible to reach and it has an odd shape. You might envision the uppermost inner contact surface to be flat but it's not. The surface has a centering post for the spring which I've shown in this drawing: www.maxim-x.com/pix/plugcaps/uppermost contact point.jpg



That shape makes cleaning around the post very tricky. I tried all kinds of things and failed miserably until I had an epiphany - I used the spring itself to clean the surface it would make contact with. First I took a piece of left over rod from when I cut the new cores. I squared off the tip of the rod as shown in these pictures:

www.maxim-x.com/pix/plugcaps/sm-springdriverrod.jpg



www.maxim-x.com/pix/plugcaps/sm-springdriverrod-close.jpg



The square tip was just big enough to fit inside the coils of the spring and the tapered square shape was so the rod would grip the spring when I pushed against it rather than having the rod spin inside the spring. Anyway, after grinding the driver rod, I pumped some abrasive hand cleaner into the cap then put the rod in a cordless drill, dropped the spring into the cap and started spinning the spring using the driver rod:

www.maxim-x.com/pix/plugcaps/sm-sparkplugcap-addingabrasive.jpg



www.maxim-x.com/pix/plugcaps/sm-sparkplugcap-sandinguppercontactwithbrakeline.jpg



13) It takes some time and effort to clean that uppermost inner contact surface but when you're done, abrasion between the two parts assures a shiny, rust-free surface, right where the spring would be making contact when you reassemble: <u>www.maxim-x.com/pix/plugcaps/sm-sparkplugcap-shinytopcontact-marked.jpg</u>



14) Now it's time to reassemble but before that happens, you still have to put the clips back on the plug connector. That can be surprisingly difficult. I tinkered with those damn clips for a fair amount of time without luck until I had another epiphany. To get the clips on without bending or breaking them, insert an appropriately sized Torx bit into the centre of the connector where the spark plug would go:

www.maxim-x.com/pix/plugcaps/sm-torx_bit_helps_install_clips-out.jpg



www.maxim-x.com/pix/plugcaps/sm-torx_bit_helps_install_clips-in.jpg



With the Torx bit filling the opening in the connector, the clips go back on surprisingly easily.

15) Ok, NOW it's time to put the caps back together so you might want to refresh your memory about their sequence:



Remember, if you restored the cap to 5 K-ohm resistance using a resistor core that was extracted from an NGK cap, then it will be mighty difficult to screw the works back together. It's difficult but not impossible. However, be careful not to bugger the threads in the cap. Don't push the connector into place then turn it only enough to catch the threads before letting go - you'll tear the threads out. You need to keep lots of pressure on the connector as you continue

www.maxim-x.com/pix/plugcaps/sparkplugcapassembly-exploded.jpg

to thread it into place for at least a full revolution, if not two. The more threads you catch before you let off on the pressure, the less likely it is that you'll tear out the threads in the Bakelite spark plug cap (which are pretty brittle to begin with). This, of course, isn't as much of a problem if you're converting to zero resistance with a brass rod core which can be cut to the proper length to match the original resistor core.

- 16) The length and shape of the brass rod core can be critical. Although a longer piece creates more pressure and better contacts throughout the cap, the longer the brass rod, the more likely that the contact point between spring and rod will buckle, causing the two parts to end up in contact with the cap body. So try to keep the length of the brass rod similar to the length of the stock resistor core. Just as important is the shape of the ends of the brass rod. It's important to keep the plug connector end as flat and as orthogonal as possible to help maintain alignment of the parts.
- 17) You can also add some dielectric at various points of contact before you reassemble I'd highly recommend it. That should help slow down corrosion over time.
- 18) The tiny contact disc is optional if installing a brass rod rather than a resistor core. That disc is arched and I believe that may have been deliberate in order to achieve a centre-point contact on the adjacent resistor core. That's only speculation on my part. In any case, the contact disc isn't necessary when using a brass rod core.
- 19) It also helps to bevel the edges of the spring end of the brass rod just to help keep it centred on the spring rather than slipping to the side and contacting the cap housing.
- 20) When everything is reassembled, you should measure the resistance across the rebuilt cap: <u>www.maxim-x.com/pix/plugcaps/sm2-multimetertest-assembledcap.jpg</u>



If your aim was to restore the original resistance then you should get a reading of exactly 5 K-ohm (or very very close). This, of course, would be best with non-resistor plugs. If, however, your aim was to convert to zero resistance, then that's what you should see... or at least very close. If you did things just like I did, then you should see a resistance of 0.4 ohm (rather than 5000 ohm) and that, of course, would be perfect for use with resistor plugs like the '86 stock DR8ES-L plugs or the DR8EIX iridium replacements.

There will be those people who tell you it doesn't matter to use resistor plugs and resistor caps in combination but that's only in a perfect world where both are still pristine. There have been guys

who were able to start and run their XJs with their old plugs and then couldn't start the bike after installing Iridium plugs. That's because the old plugs were non-resistor types but the Iridium plugs were resistor plugs & ended up pushing the resistance over the top - just high enough to prevent ignition. That's not expected but it happens all the time where coils and plug caps have corroded connections... but not quite corroded enough to prevent ignition. Then the added resistance of the new plugs puts the resistance over the top.

In any case, the bigger the spark, the better the X will perform and anything you can do to increase the spark will help its 11.2:1 engine. The best combination is:

- Dyna DC1-1 coils (30K-volts as compared to 8K-10K-volts for the stock coils)
- Iridium DR8EIX plugs (don't even dream of using DR7EIX or anything else). The plug temp of the DR8EIX plugs is just right and so are the outer electrodes which improve spark quenching. And the Iridium material requires only 80% of the power to fire as compared to standard materials
- solid copper core wires with soldered ends
- stock T-140 caps converted to zero resistance with brass cores
- If you install Dyna coils, you can overgap the Iridium plugs by 50% or more. I ran mine at 0.036" for the first year and increased the gap to 0,040" after that. The Dyna coil voltage and low rpm response is so excellent that the 0.040" is no problem at all. And the Iridium centre electrode is so incredibly hard that it won't deteriorate due to the larger gap and resulting larger spark. In fact the SparkPlugs.com web site has test results that say the Iridium electrodes wear less than half as much as platinum electrodes under the same conditions. Iridium is so crazy hard that they're considered lifetime plugs. They're not expected to see appreciable deterioration until well after 200,000 miles. (http://www.sparkplugs.com/pdfs/iri.pdf Check out the last paragraph on the left side on Pg11).