

e-mail: sales@precisionfabricationplus.com

'73-'86 K Series & '87-'91 V Series

Squaremax Engine Mounting Kit

Revision 01 (10/24/20)

Squaremax Engine Mount Kit

- (1) *D/S Upper Engine Mount Plate*
- (1) *P/S Upper Engine Mount Plate*
- (1) *D/S Upper Engine Mount Bracket*
- (1) *P/S Upper Engine Mount Bracket*
- (1) *D/S Lower Engine Mount*
- (1) *P/S Lower Engine Mount*
- (4) *Polyurethane Bushings*
- (2) *Bushing Sleeves*

- (9) *M10x1.5x25mm Flat Head Cap Screws*
- (1) *M10x1.5x20mm Flange Head Bolts*
- (5) *M10x1.5x25mm Flange Head Bolts*
- (6) *M10x1.5x35mm Flange Head Bolts*
- (6) *M10x1.5mm Flange Head Lock Nuts*
- (2) *M14x2.0x130mm Hex Head Bolts*
- (2) *M14 SAE Washers*
- (2) *M14x2.0 Flange Head Lock Nuts*

Squaremax Engine Xmember Kit

- (1) *D/S Engine Xmember Bracket*
- (1) *P/S Engine Xmember Bracket*
- (1) *Engine Center Xmember*
- (1) *D/S Engine Xmember Support Bracket*
- (1) *P/S Engine Xmember Support Bracket*

- (26) *M10x1.5x35mm Flanged Hex Bolts*
- (2) *M10x1.5x45mm Flanged Hex Bolts*
- (28) *M10x1.5 Flanged Hex Lock Nuts*

Tools Required

1. *5/8" Box end wrench / 5/8" Socket*
2. *11/16" Box end wrench / 11/16" Socket*
3. *15mm Box end wrench / 15mm Socket*
4. *3/8" Cordless Impact Wrench*
5. *1/2" Torque Wrench*
6. *Rubber Mallet*
7. *Ball Peen Hammer*
8. *Center Punch*
9. *1/4" Drift Punch*
10. *4" - 4 1/2" Grinder with 60 grit flap disc*
11. *Dual Action Sander*
12. *Protractor with Precision Scale*
13. *(2) 5/8"-11 x 3' Threaded rod, USS washers & nuts (optional)*

Additional Tools Required for Steps 9: 1-3

1. *(2) 1/2"x 2"x 12" Steel flat bar*
2. *(2) 6"-8" Drop Forged "C" Clamps*
3. *Acetylene Torch with Rosebud*
4. *Welding Gloves*
5. *18" (minimum) Crescent Wrench*
6. *2"x 3"x .1875"x 3'-4' Steel tubing*

Notice

First of all, we would like to take a moment and thank you for your recent purchase and support! Thanks to you kind folks we have been successful following our dreams of creating this amazing Squaremax Powertrain Conversion System.

We cannot legally provide you with information regarding emission requirements. Please remember to check your local state and county emission laws before performing this engine conversion.

If you are utilizing the '06-'07 (LBZ), '08-'10 (LMM), or the '11-'16 (LML) Duramax Diesel engine you will have to purchase and install a 3" Y-Bridge kit (we highly recommend the SDP Performance Billet Y-Bridge), full EGR delete kit, '01 (LB7)-'05 (LLY) oil filler tube on the engine in order to gain the necessary clearance for the hood to close. If you are following your local state and county emission control laws then you will need to retain the OEM plastic intake horn, EGR system and the cold side intercooler plenum. When doing this you will need to either modify the stock hood, install a body lift or install a steel / fiberglass cowl induction hood to allow the hood to close.

Chassis Preparation

1. *Remove OEM rubber engine mounts and discard.*



2. *Remove the (4) four 7/16"-14x1" Flanged Hex Bolts that fasten the OEM engine crossmember to the OEM lower engine mounting brackets and discard.*
3. *Remove the OEM lower engine mounting brackets from the chassis and save for later installation. Note the position and mark with a silver Sharpie (D/S, driver side & P/S, passenger side).*
4. *Remove rivet heads on OEM engine cross member. The quickest and most efficient way to do this is from the underside. Using a 60 grit flap disc on an angle grinder, grind the head completely away until you lightly scuff the surface of the frame (see photo below).*

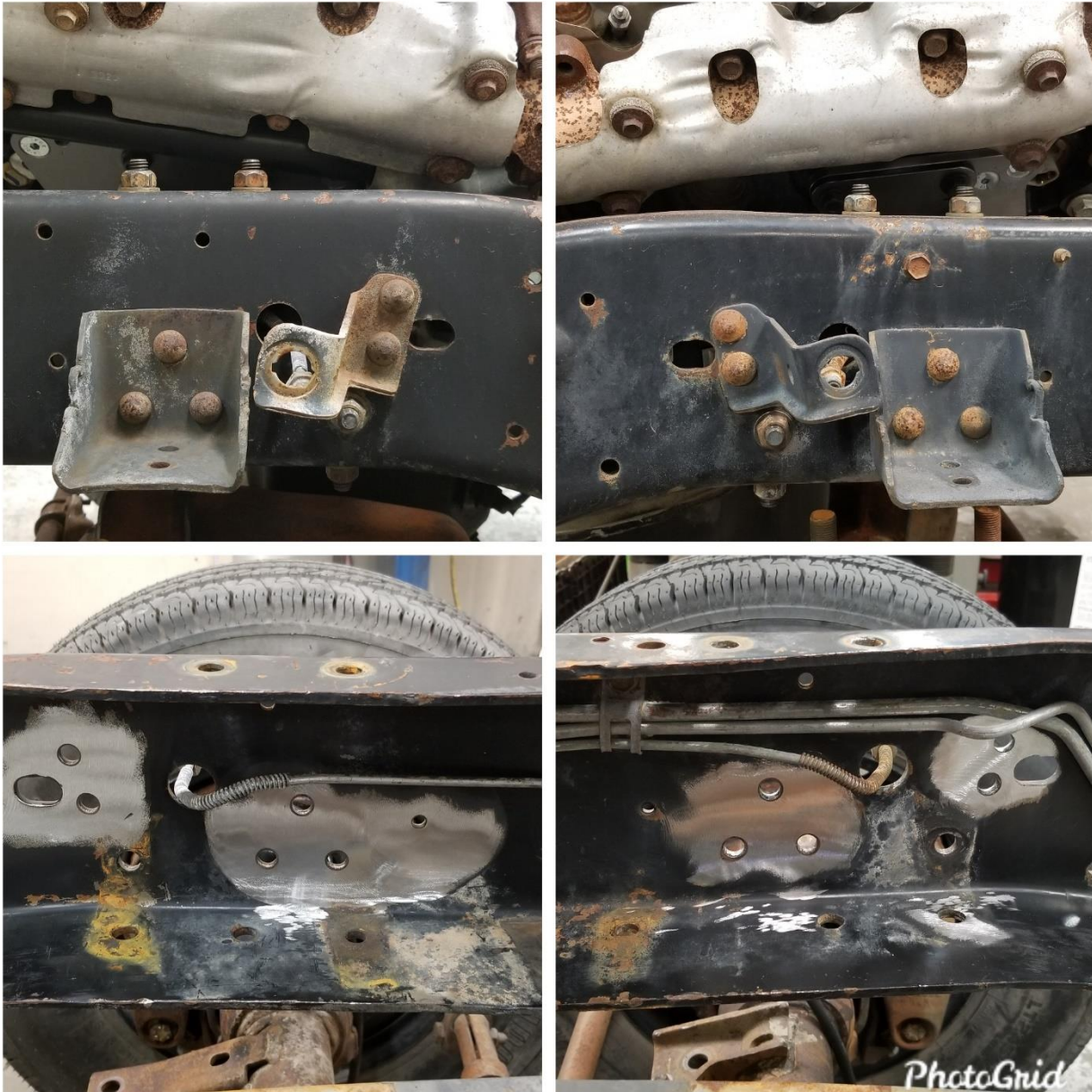


5. *Using a 1/4" steel punch and a ball peen hammer, drive the rivets out of the holes.*
6. *Remove the OEM engine crossmember and set aside. We highly recommend saving the crossmember for future OE restorations. You may notice the frame rails move slightly when removing the OEM engine crossmember; this is nothing to worry about. The new Squaremax Engine Xmember will place the frame rails back where they need to be.*



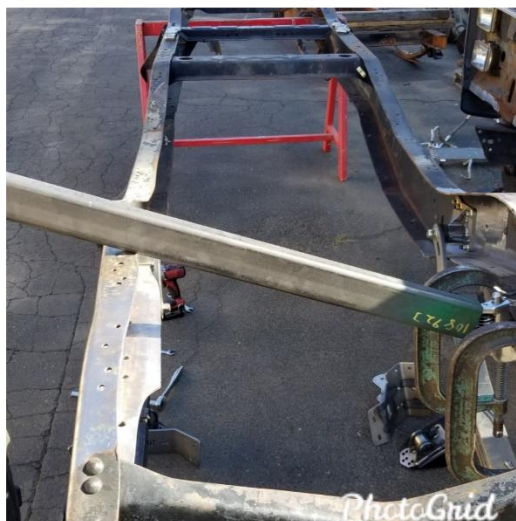
7. *Remove the OEM upper bump stop brackets. The quickest and most efficient way to do this is from the inside of the frame rails. Using a 60 grit flap disc on an angle grinder, grind the head completely away until you lightly scuff the surface of the frame. Once you remove the OEM upper bump stop brackets, you will most likely have to carefully clamp them in a vice to finish removing the remainder of the rivets from the bracket. The quickest and most efficient way to do is grind the stem of the rivet until you lightly scuff the surface of the bracket. Then you'll easily be able to drive the rivet out of the bracket without causing any damage to the bracket. This process applies to ALL rivets that are required for removal.*
8. *On '81-'91 model years you will need to temporarily remove the brake line brackets. The quickest and most efficient way to do this is from the inside of the frame rails.*

Using a 60 grit flap disc on an angle grinder, grind the head completely away until you lightly scuff the surface of the frame.



- 9. Using the Protractor measure the angle of both lower flanges in several locations. This angle is taken within 5" fore and aft of the upper bump stop bracket mounting location. The lower flanges should be EXACTLY 87 DEGREES. If your lower flanges measure 87 degrees please skip this step and proceed to step #10. IF THE LOWER FLANGES ARE EVEN A DEGREE OFF YOU MUST MANIPULATE THE FLANGE UNTIL IT MEASURES 87 DEGREES. THE FOLLOWING PROCESS WORKS WELL IF NEED TO MANIPULATE THE FLANGE OR FLANGES:**

1. Using (2) two pieces $\frac{1}{2}$ " minimum thickness flat bar 2" wide by 12" long. Clamp them to the lower flange (one on the top side of the flange and one on the bottom side of the flange) using (2) two 6"-8" Drop Forged "C" clamps.
2. Heat the lower bend radius until it's showing a slight orange tinge using an Acetylene Torch and a Rosebud.
3. **YOU MUST WORK QUICK ON THIS STEP AND MAY NEED AN EXTRA PAIR OF HANDS. BE EXTREMELY CAREFUL NOT TO BURN YOURSELF!** Once thoroughly heated, shut off torch and set aside quickly. Using the large Crescent wrench and cheater bar (2"x 3" rectangular tubing works well) bend flange to achieve the 87 degree angle by checking with the Protractor and Precision Scale. You may have to repeat this step a few times until you get it right. Try to do this in the LEAST amount of steps possible to alleviate putting too much stress into the frame rails.



Squaremax Engine Xmember Installation

- 10. At this time, you may choose whether or not you would like to re-install the upper bump stop brackets. If you are running a minimal 4"-6" lift, we highly recommend re-installing them. On '81-'91 model years you will need to re-install the brake line brackets as well. Loosely install the D/S Squaremax Engine Xmember Bracket using (9) M10x1.5x35mm Flanged Hex Bolts and (9) M10x1.5 Flange Hex Lock Nuts. DO NOT TIGHTEN AT THIS TIME!*
- 11. Loosely install the P/S Squaremax Engine Xmember Bracket using (9) M10x1.5x35mm Flanged Hex Bolts and (9) M10x1.5 Flanged Hex Lock Nuts. DO NOT TIGHTEN AT THIS TIME!*
- 12. Loosely re-install the D/S OEM lower engine mounting bracket using the OEM hardware on the top flange only. There are only (2) two 7/16"-14 x 1" Flanged Hex Bolts, (2) two 7/16" Washers & (2) two 7/16" Hex Lock Nuts. DO NOT TIGHTEN AT THIS TIME!*
- 13. Loosely re-install the P/S OEM lower engine mounting bracket using the OEM hardware on the top flange only. There are only (2) two 7/16"-14 x 1" Flanged Hex Bolts, (2) two 7/16" Washers & (2) two 7/16" Hex Lock Nuts. DO NOT TIGHTEN AT THIS TIME!*
- 14. Loosely install the D/S & P/S Engine Xmember Support Brackets to the OEM lower engine mounting brackets using the provided (4) four M10 x 1.5 x 35mm Flanged Hex Bolts and (4) four M10 x 1.5mm Hex Flanged Hex Lock Nuts.*
- 15. Loosely install the Squaremax Engine Center Xmember using the provided (2) two M10x1.5x35mm Flanged Hex Bolts. These are installed in the forward holes and attach the D/S & P/S Engine Xmember Brackets to the Engine Center Xmember. As stated in step #6, you may have to manipulate the frame rails inward to align the hole pattern and install the Squaremax Engine Center Xmember. This rarely happens but if the frame rails need to be narrowed use two pieces of 5/8" threaded rod about 3' long. There are two slots in the frame rails. Slip the threaded rod through the slots and install heavy USS washers and nuts on the outside of the frame rails. Tighten slowly and evenly until the hole patterns align. In most applications the outer most holes only exist. Please note that the rear most holes coincide with the D/S & P/S angle brackets*

that were loosely installed in step #8. Fasten using the provided (4) four M10x1.5x 35mm Flange Head bolts and (4) M10 x 1.5mm Flange Hex Lock Nuts.



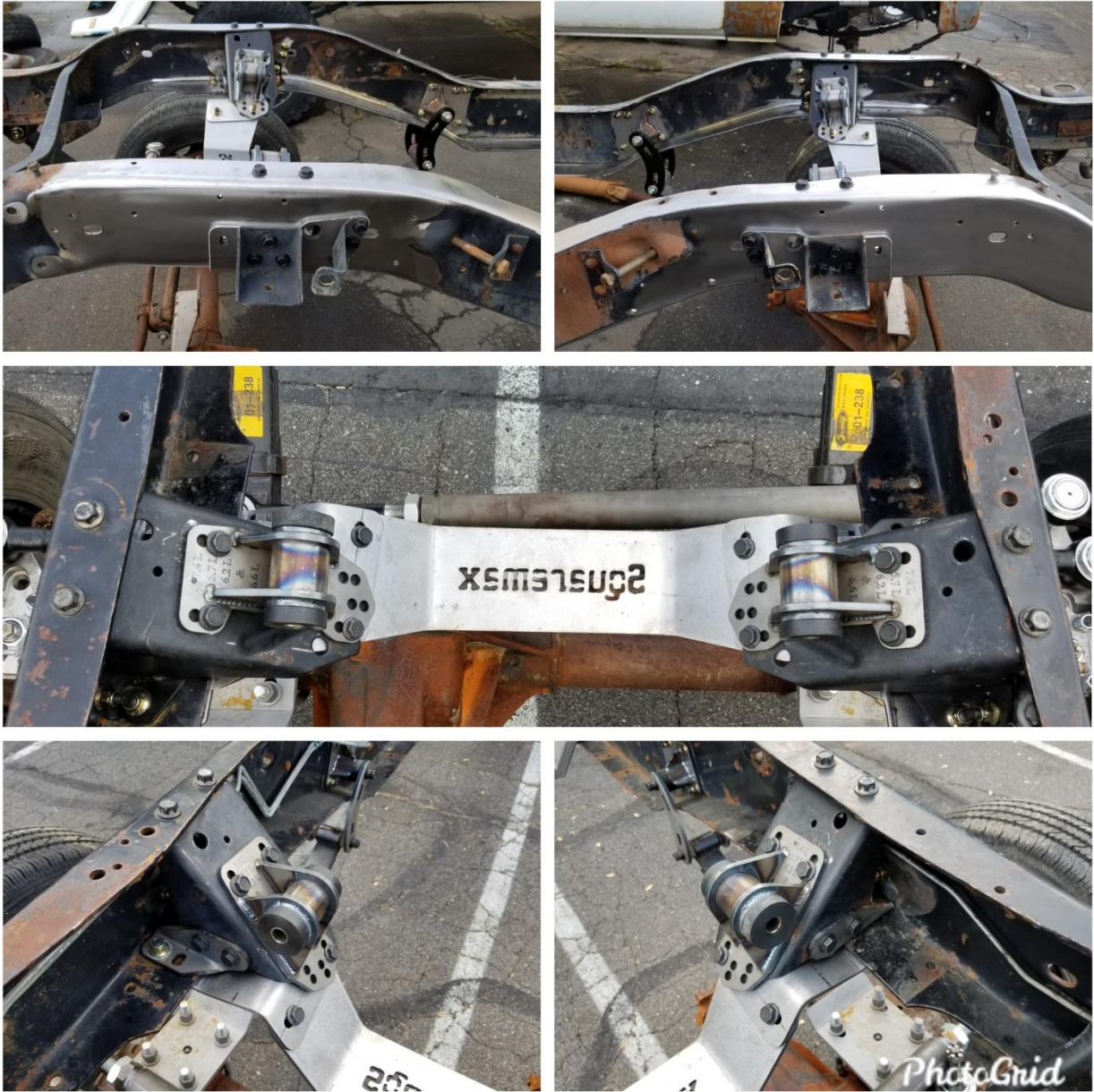
Squaremax Engine Mount Installation

16. This step will take a bit of critical thinking so please pay attention! Take a tape measure and measure the distance from the lower edge of the OEM lower engine mounting bracket to the centerline of the upper engine mounting slots (see photo below). The slots are horizontal or parallel to vehicle centerline. If you measure a distance of 6.125" you will be installing the Squaremax Lower Engine Mounts using the upper most hole pattern. If you measure a distance of 5.625" you will be installing the Squaremax Lower Engine Mounts using the lower most hole pattern.



- 17. Loosely install the two upper bolts in the D/S Squaremax Lower Engine Mount by using the provided (2) two M10x1.5x35mm Flanged Hex Bolts and (2) two M10x1.5 Flanged Hex Lock Nuts (the third bolt will be installed in a later step).*
- 18. Loosely install the remaining (2) two M10x1.5x45mm Flanged Hex Bolts through the lower mounting holes in the Squaremax Lower Engine Mounts. These are installed in the rear facing holes of the Squaremax Engine Center Xmember from the bottom up with the nuts on the top side surface of the Squaremax Lower Engine Mount. This leaves a nice clean finished appearance when completed. The bolts fasten the bottom*

bolt of the Squaremax Lower Engine Mount through the D/S & P/S Engine Xmember Brackets and lastly the Engine Center Xmember. These bolts are very crucial and help tie all of the bracketry together (see photo collage below).



Engine Preparation

- 1. In this step you must decide what engine position you will be utilizing. Position #1 will place the engine in the OEM position and will allow earlier transmissions and transfer cases to be used. Please note this will complicate your installation process and require*

several modifications on your behalf. Position #1 is *ONLY* intended for use with a Turbo-Hydromatic 400 Transmission in the stock mounting location. If you decide to utilize this engine mounting position you will need our D/S Allison 1000 Series Transmission Dipstick assembly. It is available for purchase in our online store. Position #2 moves the engine forward to help clearance issues with the Allison input speed sensor and larger diameter down pipes for high performance applications. Once decided, prepare the D/S & P/S upper engine mount plates by applying Anti-Seize to the countersinks in the plates, (this will allow disassembly in the future and prevent the socket drive from stripping due to excessive force during the removal process). The D/S upper engine mount plate will use (5) five M10 x 1.5 x 25mm Flat Head Cap Screws in the #1 position and (4) four M10 x 1.5 x 25mm Flat Head Cap Screws in the #2 position. The P/S upper engine mount plate will use (4) four M10 x 1.5 x 25mm Flat Head Cap Screws in positions #1 & #2. Desired position will dictate the placement of the floating cap screw. Install the D/S & P/S upper engine mount plates using the provided (9) nine M10 x 1.5 x 25mm Flat Head Cap Screws. Torque using the provided Torque-Tension chart to determine proper bolt torque.

2. Please note the D/S Upper Engine Mount Bracket has a horizontal slot to allow slight variances during the final installation process. Install D/S Upper Engine Mount Bracket to Engine Mount Plate and fasten using the provided (3) M10 x 1.5 x 25mm Flange Hex Bolts. Torque using the provided Torque-Tension chart to determine proper bolt torque.



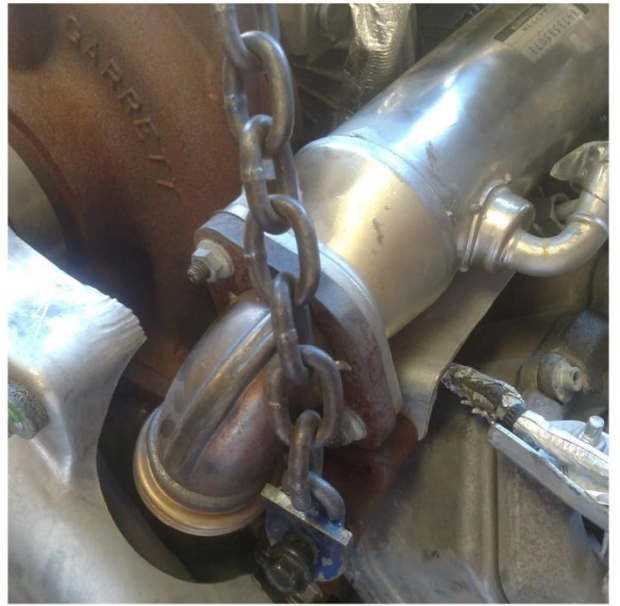
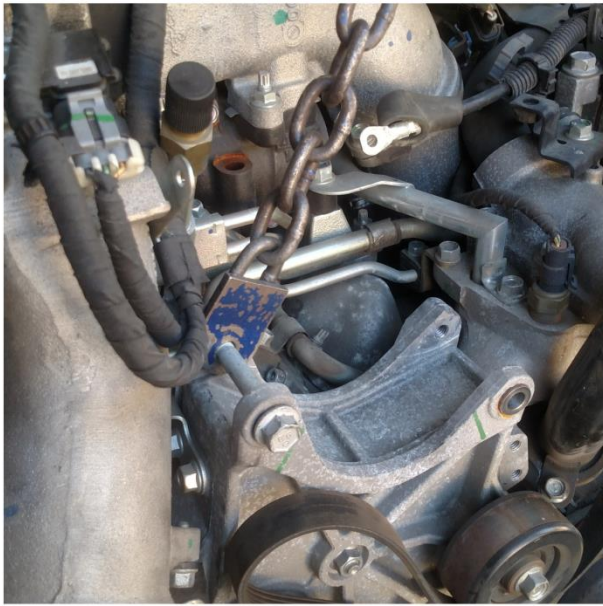
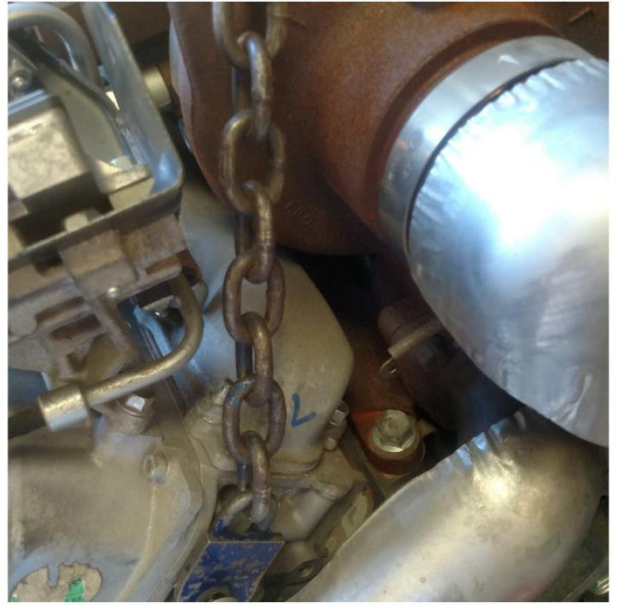
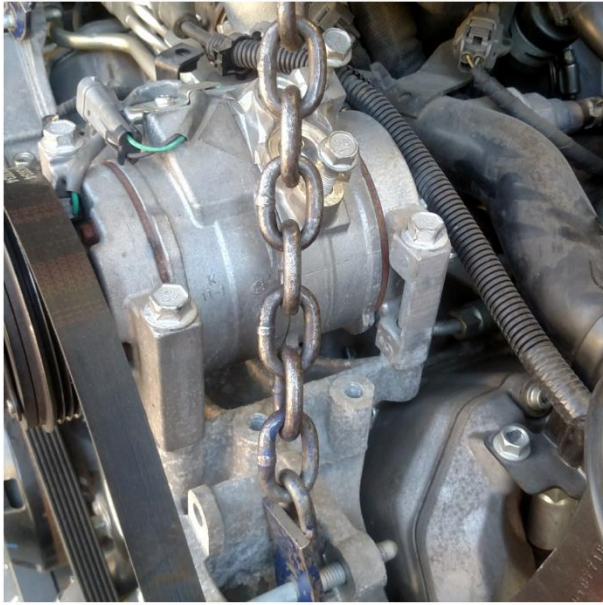
3. Please note the P/S Upper Engine Mount Bracket has a through hole. Install P/S Upper Engine Mount Bracket to Engine Mount Plate and fasten using the provided (1) one M10 x 1.5 x 20mm Flange Hex Bolt and (2) two M10 x 1.5 x 25mm Flange Hex Bolts. Install the (1) one M10 x 1.5 x 20mm Flange Hex Bolt in the forward most hole. **THIS PLACEMENT IS CRITICAL! If a 25mm long bolt is threaded into this hole it will come in contact and pinch the dipstick tube closed.** Use caution and make sure the 20mm bolt is properly placed. Torque using the provided Torque-Tension chart to determine proper

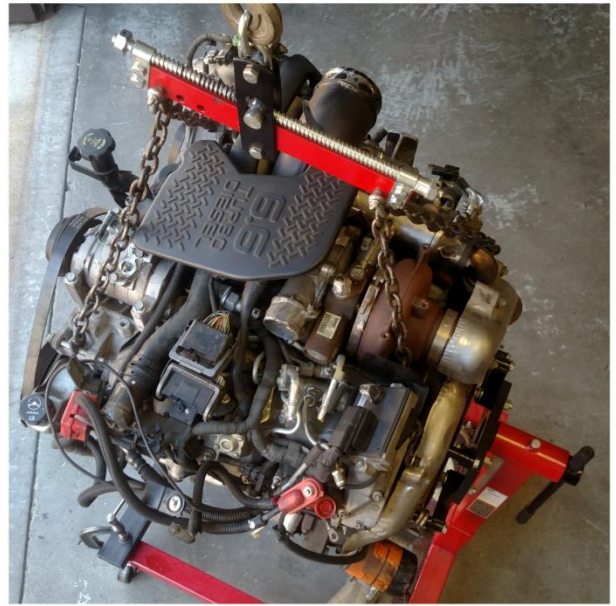
bolt torque.



Engine Installation

- 1. The fastest and most efficient way to install the engine is by using a 3/4 Ton (minimum rated) Adjustable Engine Sling. On the front side of the engine remove belt and alternator. Attach one leg of the chain through the furthest alternator mounting point to the passenger side and secure using the OEM Flanged Headed Bolt. Attach the opposite side of the chain to the optional second alternator mounting point and secure using the other OEM Flanged Hex Bolt. On the rear side of the engine carefully route the chains and attach them to the cylinder head accessory bolt holes. There are two attachment points that work well and safely support the engine during the lifting process. **DO NOT TRY TO CUT CORNERS ON THIS STEP! If this step is not followed properly serious injury and or death may occur if the engine falls on you.***





2. *Attach the Adjustable Engine Sling to a heavy duty chain swivel link and attach to cherry picker or forklift. Lift engine and adjust Engine Sling to tilt the front of the engine upward. Carefully lower engine into chassis and pay attention to the downpipe clearance and oil filter housing! Once the engine is nestled in its new home adjust the Engine Sling to align the upper engine mount brackets with the lower engine mount brackets and install the (2) two M14 x 2.0 x 130mm Hex Bolts and fasten with the (2) two M14 x 2.0 Flange Hex Nuts. Torque using the provided Torque-Tension chart to determine proper bolt torque.*
3. *Continue to support MOST of the weight of the engine with the lifting device. Now you may begin to hand tighten all of the M10 hardware as well as the OEM 7/16"-14x1"*

hardware. Once tightened use the provided Torque-Tension chart to determine proper bolt torque.

- 4. After ALL hardware has been properly torqued you may lower the weight of the engine onto the Engine Mounting System. If you look closely while you are lowering the weight down, you SHOULDN'T NOTICE any deflection of the frame rails. If you do, then you should raise the engine to take the weight off the Engine Mounting System and double check ALL hardware to ensure you didn't miss anything.*

Additional Information

- 5. Now that your Duramax Diesel Engine has a new home you will notice there is some extra M10 hardware. There is one (1) vertical slot close to the forward edge on the D/S & P/S Engine Mounting Brackets (see photo below). If you look closely the chassis has a 5/16"-18 tapped hole in that position. Our slot is a clearance hole for a brake line mounting bracket and allows the threads of the bolt to pass through. The choice is yours if you would like to drill out the 5/16"-18 threads to a .40625" diameter through hole and add (1) M10x1.5x35mm Flange Hex Bolt and (1) one M10x1.5 Flange Hex Lock Nut for extra strength or leave it alone.*
- 6. Now look on the bottom flanges of the D/S & P/S Squaremax Engine Xmember Brackets. You will notice two slots and only one of them has a M10x1.5x35mm Flanged Hex Bolt installed. If you are working on a '77-'86 K30 or '87-'90 V3500 chassis you will need to center punch and drill the additional hole to .40625" diameter. If you have a '91 V3500 chassis the additional hole will be there and you may have already installed the additional M10 hardware in step #'s 10 & 11. If you are working on a '73-'86 K10/20 or '87-'91 V10/20 chassis, you will notice the lower flange of the frame rails are too narrow and there wouldn't be enough material to drill an additional hole. If you have the ability to acquire and cut a piece of Hot Rolled Steel flat bar and bevel the welded edge for additional weld penetration you could you could weld on the piece to widen the lower flange of the frame rail. Once completed you will need to grind the weld down flush using your Corded or Cordless Grinder and 60 grit Flap Disc. Hot Rolled Steel is used in this instance because it can be formed without cracking. Please note that the steel MUST BE the same thickness as your chassis. Once completed you may proceed by center punching and drilling the additional through hole to .40625" Install the remaining (1)*

one M10x1.5x35mm Flanged Hex Bolt and torque using the provided Torque-Tension chart to determine proper bolt torque.



Troubleshooting

Our Squaremax engine conversion could possibly have only two variables that would affect the distance between the lower side of the transmission tunnel and the input speed sensor on the driver side bellhousing on the Allison transmission:

The first factor would be engine position. Placing the engine in the #2 position will move the entire powertrain forward almost 2". By doing this the input speed sensor moves along with it and creates even more clearance between the lower side of the transmission tunnel and the input speed sensor.

The second factor is deteriorating rubber on the cab mounts. If the rubber is cracked and squished on the cab mounts this will allow the body to sit lower than it should. Replacing the cab mounts will help resolve this problem and also keep body lines straight.

The attached photographs are of our '86 Chevrolet Silverado K30 Crew Cab Long Bed Dual Rear Wheel truck. It has a '03 LB7 with an Allison transmission and a Circular Pattern GM NP205 transfer case. The transmission tunnel has NOT been modified in any way and there's plenty of clearance between the lower side of the transmission tunnel and the input speed sensor. If your clearances do not look like the photos shown below then please review the two possible scenarios mentioned above.

