

PSRU Installation Guide

Congratulations!

You have purchased what I believe to be the best belt drive available. In the following pages you will find a step by step guide to help you properly install your new Northwest Aero Products PSRU on your engine. It is my hope that it will be a relatively easy and painless process. Please read the instructions completely before you begin. If you get stuck along the way, don't hesitate to call, write, e-mail, or fax me to get assistance. The numbers can be found on the front cover, as well as on your invoice and/or packing slip.

I would like to take a moment to remind you that even though I personally believe that this unit is of the highest quality and has been manufactured using only the finest materials, it is up to you to take responsibility for it's suitability in your application. Northwest Aero Products, or me personally, will not be liable for any damages resulting from the use of, or any other association with, this piece of equipment. Only you, the owner/operator/installer, can decide if it is up to the task that you are employing it to do. Be forewarned that normal operation of this PSRU can result in a dangerous situation, which may lead to injury or even death. No attempt has been made to certify the operational safety of this device. **PLEASE BE CAREFUL!**

Be advised that this document is being constantly updated to serve you better, and every effort has been made to try and provide you with the most complete and accurate information and instructions. If you find errors in the instructions, or things that you feel have been left out or could be made more clear, please bring them to my attention so I can fix it.

Thanks, and Happy Flying!



John Lindgren
Northwest Aero Products

• **Step 1:**

Unpack and inventory everything. Some of the hardware will vary slightly from one engine application to the next.

Qty	Description
1	Redrive assembly consisting of the following: Rear main plate Front main plate with adjustment block attached 2 Side channels Top channel Nose housing assembly with large sprocket attached, 1 AN840-6D hose fitting installed, 1 AN932-3D plug installed, and 1 vent tube assembly installed. 1 lower bearing housing with bearing and seal installed, 4 AN6-6A bolts with washers, 1 AN842-6D hose fitting.
1	Belt
1	Starter hook doubler and starter hardware (Ford Only)
1	Rear bellhousing spacer plate (Chev only)
1	Lower bearing journal with bearing race installed
1	49 tooth drive sprocket
1	Drive sprocket spacer (this is the center part of the flywheel on some applications)
2	Engine side mount assemblies (not included on some applications)
1	Aluminum Flywheel (not included on some applications)
8	1/4-28 x 3/4 countersunk socket head screws
6	Socket head cap screws for crankshaft (size varies with engine application)
1	Oil transfer hose with 4 stainless steel hose clamps
6	Bellhousing bolts (size and number varies with engine application)
8	Engine mount rubber bushings
8	Engine mount large washers

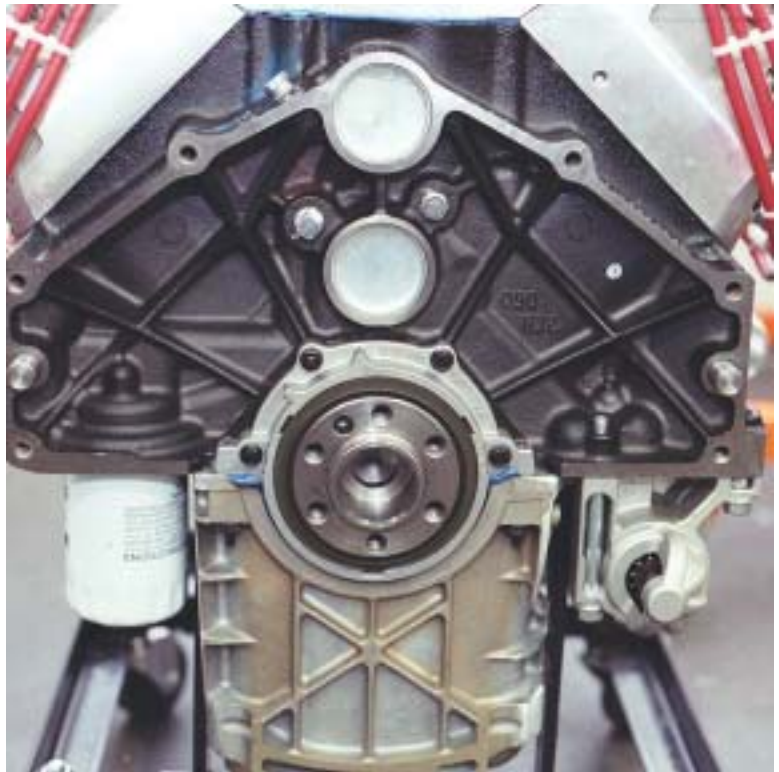
If there is anything missing, please call immediately to get it straightened out.

Note:

Throughout the PSRU, there are places where bolts thread into aluminum. In all of these cases, self locking thread inserts are used that meet MIL-I-8846 and MIL-N-25027 for thread locking. When installing bolts into these holes, it is normal to feel resistance to turning, similar to the self locking AN nuts that are used throughout the drive. Loctite is not necessary on these fasteners, and will in fact cause you grief if you use it. Loctite, or drill and wire if you prefer, is required on all fasteners that do not otherwise have a locking mechanism.

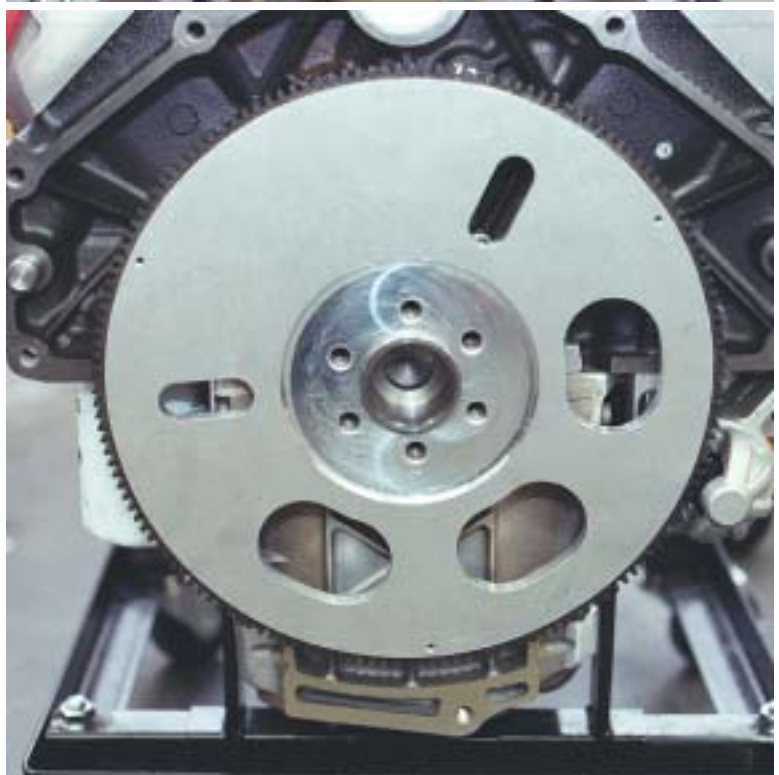
• **Step 2:**

Before you assemble anything, please use a bottoming tap to clean out the threads of the crankshaft and bell housing bolt holes on the engine. This is especially important on the V6 Ford which uses the ultra fine pitch on the crankshaft bolts. Also, everything needs to be totally clean for the crankshaft sprocket assembly to sit flat and spin true.



• **Step 3:**

Assemble the flywheel onto the crankshaft.



- **Step 4:**
Assemble the sprocket spacer onto the crankshaft.



- **Step 5:**
Assemble drive sprocket onto the crankshaft using the 6 bolts provided. Progressively torque **3/8 and 10mm bolts to 45 foot pounds. 7/16 and 11mm bolts to 65 foot pounds.**



- **Step 6:**

Install the front bearing journal onto the drive sprocket using the 8 bolts supplied. Torque to **160 inch pounds**.

- **Step 7:**

Using a dial indicator, rotate the crankshaft and check for runout at the bearing race installed on the front journal. This is best accomplished when the engine is being assembled and the crankshaft is the only thing installed in the engine. Main bearing clearances in the engine will cause the dial indicator to wander while you are rotating the crankshaft. You should be able to get repeatable readings by rotating a 1/6 turn or so at a time, and then letting go to get the reading. Make sure you are getting repeatable readings.

We are looking for **.003 TIR or better** here. If it is farther out than that, front roller bearing life will be reduced.

Things that can cause this to be farther out include:

Bent crankshaft flange.

Cumulative machining tolerances.

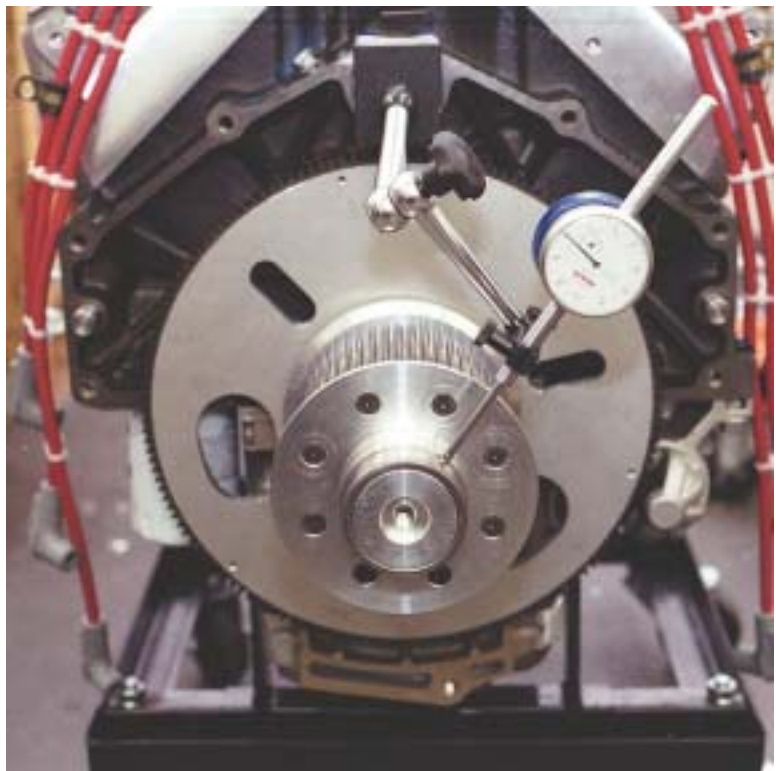
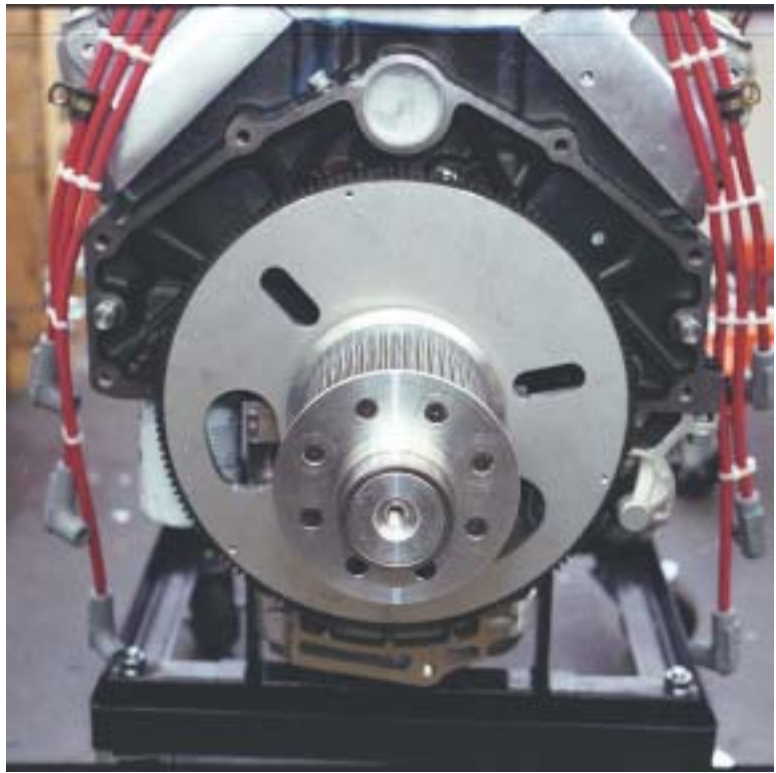
Improper installation or torquing of crankshaft bolts.

Excessive main bearing or thrust bearing clearances throwing off your reading.

To correct excessive run out you might want to try marking the

sprocket to identify the high or low indicator reading, and then file and/or block sanding the back side of it to bring it in to line. You may want to remove the pulley assembly and check the crank flange itself. If it is way out, you might want to have it ground to bring it within tolerance.

When you are done with all that, remove the front journal from the lower sprocket. Remove the crankshaft bolts, and then reinstall using Loctite (the red or blue stuff). Optionally, you may drill the heads of the bolts and safety wire. Do whatever you are comfortable with. Torque the bolts to the same values mentioned above. Reinstall the front journal and torque those bolts.



- **Step 8:**

Place the redrive assembly on it's 'back' and remove the 8 finger tight bolts that hold the **front plate** onto the side and top channels.

- **Step 9:**

Lift off the front plate assembly, taking care not to bang the large sprocket underneath into the side or top channels.

- **Step 10:**

Using a suitable torque wrench, torque all of the 3/8 bolts that hold the **back plate** to the side and top channels, as well as the starter hook doubler bolts (Ford only) to **30 foot pounds**. These bolts are only snugged up at the factory, and must be torqued correctly by you.

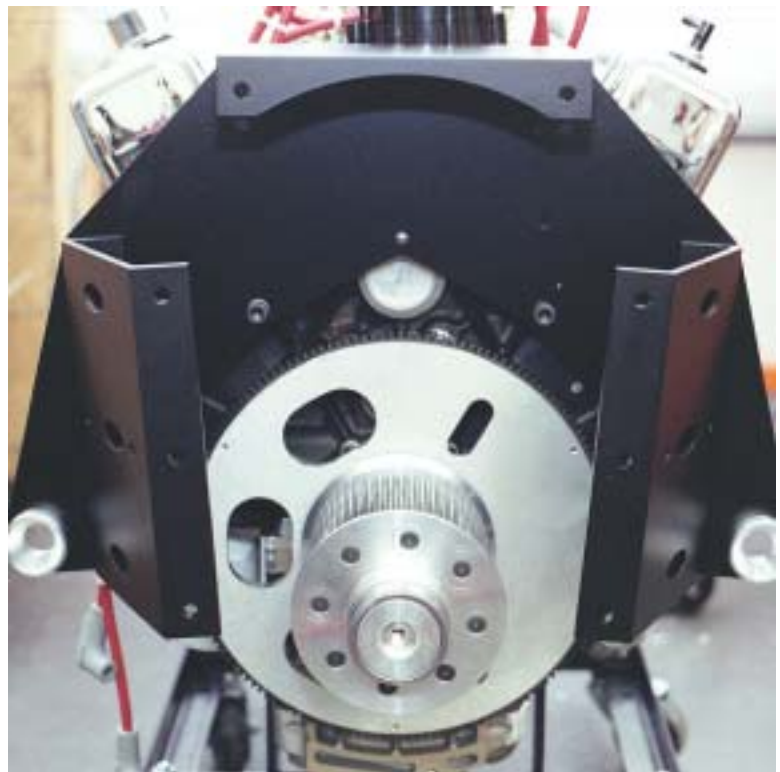
- **Step 11:**

Install the back plate assembly onto the engine using the supplied bellhousing bolts and washers.

Torque to **45 foot pounds**. Use Loctite, or drill and safety wire.

Note:

On engines that use the bellhousing spacer plate, you must install the spacer plate first. Longer dowel pins are included where needed. If you have an engine that uses the spacer plate (mostly Chev) remove the stock dowel pins, install the new ones provided, followed by the spacer plate, and then the back plate assembly. **ON FORD ENGINES YOU MUST USE THE FACTORY SHIM PLATE (approx. .060 thick) BETWEEN THE ENGINE AND THE PSRU BACK PLATE.**



- **Step 12:**

Loosen the 6 bolts, that hold the nose housing assembly onto the front plate, 1-2 turns, **do not remove them**. Pivot the whole nose housing so that it is in it's most downward position. This equates to the most belt slack for installing the front plate onto the drive. Snug up a couple of the bolts to keep the nose housing from flopping around in the next step.

- **Step 13:**

Remove the 4 bolts that hold the lower bearing housing on, and set the lower housing aside for later installation.

- **Step 14:**

Making sure that you have the drive belt in place first (it's usually easiest to put the belt around the top pulley first, then get it around the lower pulley when you put the front plate assembly into place), install the front plate assembly onto the side channels using the bolts you took out earlier. It's usually easiest to get one of the top channel bolts in first to hold the front plate on there while you get the rest of them in. Don't tighten any of them until you get them all in there. After they are all in, torque all of them to **30 foot pounds**. Be sure to use the aluminum AN washers provided.

Note:

This step can be tough if the engine is up high, like if it is already on the aircraft. It's much easier to have a helper get that first bolt in while you, or you and another helper for that matter, hold the front plate in place.

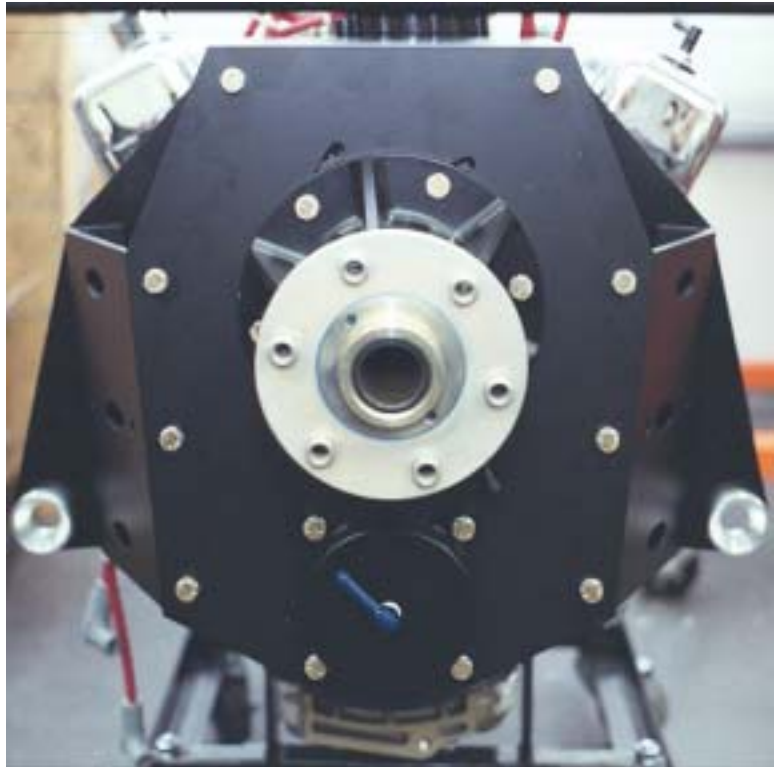
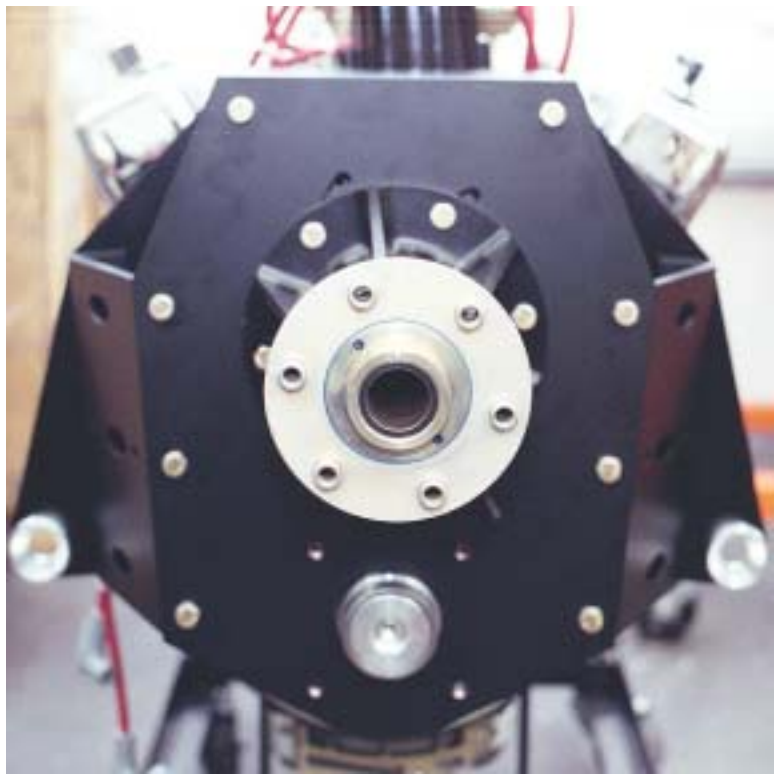
This step is a likely place for an accident. I know this from personal experience. Get help to lift and hold the front plate assembly in place!

- **Step 15:**

Locate the lower bearing housing, and smear some oil or red grease on the seal that's installed in it. Install the lower bearing housing onto the front plate using the 4 bolts and washers provided. Torque bolts to **30 foot pounds**.

Note:

When installing the lower bearing housing, you should be able to feel the seal engage over the journal **just** before it seats down onto the front plate. Due to variables that we can't control completely, it's possible that there isn't enough journal protruding through the front plate to fully engage the seal. If this is the case, simply call me and let me know about it, and I will send you a different front journal. This doesn't happen very often, but occasionally it does. Also, you may have to twist the housing back and forth and in and out a little as you engage the seal to prevent the outer seal lip from getting folded inward as it goes over the journal.



- **Step 16:**

Tighten the metal vent tube assembly where it attaches to the AN fitting in the top side of the nose housing.

- **Step 17:**

Cut the clear tubing provided to the desired length, be sure to take into account the extra length needed when the nose housing is adjusted upward to tension the belt. Install one end onto the lower housing fitting and the other end onto the lower fitting on the nose housing. Clamp using the stainless steel clamps provided. Use 2 clamps per fitting. You may want to snug up the belt tension to get a better idea of where everything is going to end up, before cutting the tubing to length.

- **Step 18:**

Remove the plug on the side of the nose housing. Fill the unit with 80W-90 Gear Oil, like what you would use in a car's rear axle housing. Make sure that the oil runs down inside the clear tube and fills the lower housing. You can attach a hose to the vent tube, put your thumb over the filler hole, and blow to force it down there. Fill the main housing up until it is level with the side filler hole. DO NOT OVERFILL!!! Install the plug with some TFE paste or teflon tape. Be sure to check oil level periodically. It shouldn't change.

- **Step 19:**

In this step we adjust the belt tension. You have to have the propeller on there to do this. So from here on out, we are assuming that the engine is probably in the aircraft, with the propeller installed according to your propeller manufacturer's instructions.

Loosen any of the 6 nose housing bolts that might be tight, just enough to adjust the nose housing. Turn the adjusting screw clockwise until belt tension is such that you get $\frac{1}{2}$ to $\frac{3}{4}$ inch of play out at the tip of the propeller blades. Torque the nose housing bolts to **30 foot pounds**. Rotate the engine a few times and recheck the amount of play at the tips. Readjust as necessary.

Caution:

Be very careful when turning over the engine. Treat it as if it will start when you do it.

Note:

Belt tension will need to be checked often during the first few hours of operation. It's easy to add "wiggling of the prop" to the preflight checklist. Some initial readjustment may be necessary. Usually, after the first 50 hours or so of use, belt length and adjustment will stabilize. The belts we use are Kevlar reinforced and don't usually change much after the initial break-in period.

Step 20:

Test run the drive for a while on the ground. Make sure there are no unusual sounds or vibrations. Get the feel of what normal is for your installation. Check for leaks or anything else abnormal. Visually inspect everything.

REALLY IMPORTANT!

Provide a source of airflow to the belt and the rest of the drive when cowled in! On some installations, this is sort of automatic, but not on all. Pusher aircraft pay particular attention to this. Check belt tension in your preflight. Periodically check the belt itself for visual signs of wear. Periodically check oil level, and look for signs of leaks. If everything is correct, there shouldn't be any signs of wear on the belt or the sprockets.

Periodic Maintenance:

Oil will darken in color with use. This is normal. Most likely you will want to change it once a year or every 100 hours. Under extreme conditions it may need changed more often than that. Use your own judgment. While there is no real "drain plug", there are ways to quickly drain the oil. I prefer to relieve the belt tension a bit and then just remove the 4 lower housing bolts and pull the housing off enough for the oil to drain out. Put the housing back on and re-tension the belt.

Belts should be replaced, no matter how good they look, at 500 hour intervals. This represents 10 years of flying on the average. If your belt shows wear before that, change it. They will typically still look like new even at 500 hours.

Don't be shy!

If you have any questions at all, please don't hesitate to call. I will be happy to help you get the most out of your PSRU installation.

When you're all done, it might look something like this:

