

Transmission Report

Volume 2, No. 1

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Controlling Line Pressure with Sonnax Line Pressure Booster Kits

Many aftermarket “kits” for raising pressure can lock you into an unpleasant situation: too much pressure at idle and not enough at maximum pressures. There is a better way, because there’s a *smarter* way to get the results you want without the drawbacks: Sonnax line pressure booster kits.

Rather than simply raising line pressure, Sonnax booster kits control the rate of line pressure increase to give you all the benefits of increased line pressure without the objectionable low-speed harshness. Our kits make it easy to improve and control line pressure with simple, low-cost parts which do not require machining. Why settle for other aftermarket “kits,” where old-school technology can’t match the benefits of Sonnax *smart* technology? With our booster kits you get all the benefits of increased line pressure exactly when you need it, a much better solution than a blanket pressure increase from baseline pressure on up.

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“Great product!”

Kit 4T65E-LB1

Dan Tucker • Tucker Transmissions

Customized Powerglide Performance

- Premium, Ultra Premium and Extreme gears
- 1:69 or 1:80 ratio sets
- Assemblies with standard (long) or short 4340 steel output shaft
- Clutch drum flange with 12-tooth profile like OE or a 24-tooth profile that fits Sonnax’s exclusive 10-clutch drum



New & Improved! Powerglide® Gear Sets & Assemblies

As a leading Powerglide aftermarket parts manufacturer, Sonnax has been trusted for many years to provide the very best in performance and quality. This year the Sonnax product line is expanding with enhanced gear sets and complete planetary assemblies for all levels of performance and budgets. Whether you’re looking for specific components, a custom combination, complete gear set or planetary assembly, Sonnax delivers.

Sonnax premium gear sets are made from top-quality SAE9310 steel. All gears are manufactured to meet AGMA class 8-9 specifications for the most accurate gear geometry available. The materials and processes used are only part of what makes Sonnax gears trusted by some of the top builders in the country. These builders also know the benefits of quality control, which Sonnax executes with some of the finest equipment available including an in-house CMM machine and roundness checker.

Introducing Sonnax Advanced Process Gears

For 2011, Sonnax is enhancing existing premium gear sets to achieve greater durability and higher levels of performance than ever before. To do this, Sonnax has added three more processes to the premium gear set: cryogenic tempering, shot peening and super-finishing.

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Sonnax Line Pressure Booster Kits

Part No.	Unit
Hydraulic Booster Kits	
4R100-LB1	E40D, 4R100
4L60E-LB1	4L60-E, 4L65-E, 4L70-E*
4L60E-LB2	4L60-E, 4L65-E, 4L70-E**
700R4-LB1	4L60 (700-R4), 200-4R
400-LB1	400
4L80E-LB1	4L80-E, 4L85-E
4T65E-LB1	4T65-E
350-LB1	350
4R70W-LB1	AODE, 4R70W, 4R75W
Electronic Booster Kits	
44957-LB1	68RFE
44957-LB2	45/545RFE

*Early-style pump **Late-style pump

"Really works good."

Kit 4T65E-LB1
Gary Carne • Colman Taylor

"This is a good product."

Kit 4L80E-LB1
Mark Parkland • Parkland Transmissions

Get all the benefits of increased line pressure, exactly when you need it!

Sonnax line pressure booster kits include large ratio boost valves and stronger pressure regulator springs designed to work together.

When driving a vehicle with a Sonnax booster kit, you get normal engagements, crisp, light throttle shifts and smooth coast downshifts. When pushed harder or driven aggressively, the pressure increases progressively to give you faster, firmer shifts and increased torque capacity.

The Sonnax booster kit product line covers a wide range of transmissions. Two 4L60-E unit family kits are available to replace either the early- (long) or late- (short) style boost sleeves. 4L60 or 200-4R transmissions can be upgraded with a common kit. There's even a way to increase and control throttle related forward boost in the AODE/4R70/75W, where the original boost valve was for reverse only – just another *smarter* approach from Sonnax.

Line Pressure Booster Kit Q&A

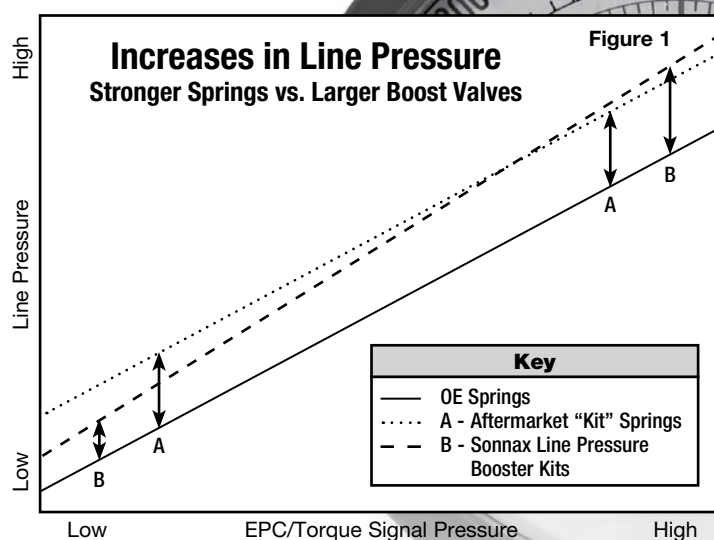
Q. For higher pressure, why not just put in a stronger pressure regulator spring?

A. Stronger springs have a *linear* effect on pressure, giving you the same amount of pressure increase at the low and high ends of the pressure range (A in Figure 1).

A significant pressure increase that will tighten-up shifts under heavy load can be too much of an increase when shifting into reverse in the garage or causes clunks when coasting to a stop. This also puts extra load on the pump at idle that can result in the TCC clutch dragging on due to reduced cooler flow. The lesson here is a stronger pressure regulator spring will raise line pressure, but there is a limit to how much you can get away with before troubles surface.

Larger boost valves, on the other hand, have a *progressive* effect on pressure, changing the rate of pressure increase. With a larger boost valve it is possible to have a very small pressure

increase at the low end of pressures, and a far greater pressure increase at the high end of the pressure range (B in Figure 1). This is an ideal combination: smooth engagements, lower load on the pump at idle, but a greater increase in pressure as the transmission is worked harder.



Q. What is different about the boost valves in Sonnax line pressure booster kits?

A. Sonnax increased EPC/TV reaction area by roughly 10% over the original boost valve. For some applications where high reverse pressure is a problem, we have “tuned out” most of the reverse pressure increase. Most of the boost sleeves have O-rings to prevent TV/EPC oil from blowing past the outside of the sleeve or cross leaks. O-rings help avoid lower overall pressure, pressure instability and pump issues.

Q. What are the improvements in the Sonnax PR springs?

A. Our booster kit springs are typically about 10% stronger than OE springs and are meant to replace weak, sagging original springs with just a slight increase in base pressure. They have been carefully calibrated to work with our larger boost valves.

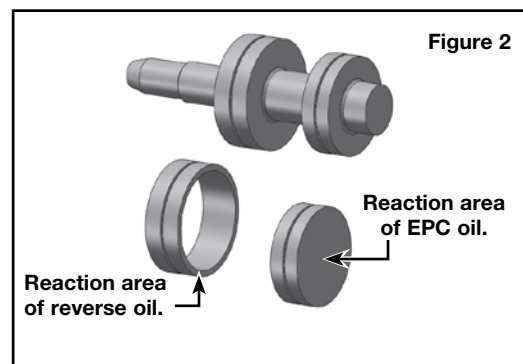
Q. When does more pressure become too much pressure?

A. There are three general areas related to excessive line pressure:

1) Overworking the pump at low RPM. Sonnax large-boost valve and spring combinations work so well because there is only a small pressure increase at idle, with the biggest pressure increase coming under load when pump speeds are higher.

2) Harsh shifts. High pressure at light throttle causes annoying harsh shifts or clunks when coming to a stop. A harsh shift when going slow isn't helping anything. With a larger ratio boost valve the pressure increase is very low on deceleration and low-speed shifts, yet the pressure will progressively climb as the transmission is pushed harder.

3) Broken parts. The most common causes for this are “runaway” high line pressure caused by a worn boost valve or worn pressure regulator valve bore. Always check the pressure regulator bore for wear with a wet air test, vacuum test or close visual inspection to make sure pressures stay consistent and within allowable limits.



Q. How does a boost valve work?

A. Pressure regulator spring force establishes base line pressure. In typical applications, oil pressure from the EPC solenoid, vacuum modulator or TV valve is directed to the end of the boost valve (Figure 2). As this oil pressure increases, so does the force assisting the pressure regulator spring and line pressure increases. If the reaction area of the boost valve is made larger, a given amount of oil pressure on the larger valve results in more force created to assist the pressure regulator spring (Figure 2), resulting in higher line pressure..

Many boost valves have an additional reaction area where reverse oil reacts to increase pressure in reverse (Figure 2). With our Sonnax boost valves we carefully balance these two reaction areas to get the right combination of pressures.

Sonnax booster kits walk the fine line between “not enough” and “too much” pressure.

Electronic Line Pressure Booster Kits

Q. How do you increase line pressure in Chrysler's RFE applications?

A. Chrysler 45RFE, 545RFE and 68RFE units are unique because they have a true closed-loop pressure control system where the computer reads line pressure at all times using a full range pressure sensor. Traditional methods of raising line pressure by installing a stiffer pressure regulator spring or making changes to the pressure regulator valve are ineffective because the computer will lower output until the pressure sensor reading matches the computer's target pressure.

Sonnax electronic line pressure booster kits modify the sensor signal which causes the computer to create a pressure increase. The booster kits **44957-LB1** (10-15 psi increase) and **44957-LB2** (15-30 psi increase) are installed between the pressure sensor and vehicle harness using OE-style sealed connectors and do not require any modification or changes to the transmission. Simply unplug the vehicle harness and reconnect with one of these kits in line.

10 *NEW* Valve Kits

1 Part No. **25741-29K**

Lockup Clutch Control Valve Kit

Helps cure:

- RPM surge on coast or light acceleration
- Harsh downshifts
- Overheated fluid

Note: Requires tool kit **F-25741-TL29** & the **VB-FIX** reaming fixture.



2 Part No. **25741-01K**

Oversized Pressure Regulator Valve & End Plug Kit

Helps cure:

- Excess pressure in reverse
- Fluid & converter lining overheat
- Bushing failure

Note: Requires tool kit **F-25741-TL** & the **VB-FIX** reaming fixture.



3 Part No. **25741-11K**

Secondary Regulator Valve Kit

Helps cure:

- Overheating fluid, bushing & converter
- Harsh reverse engagement
- TCC slippage/surge

Note: Requires tool kit **F-25741-TL11** & the **VB-FIX** reaming fixture.



4 Part No. **25741-18K**

Solenoid Modulator Valve Kit

Fits 2 Locations

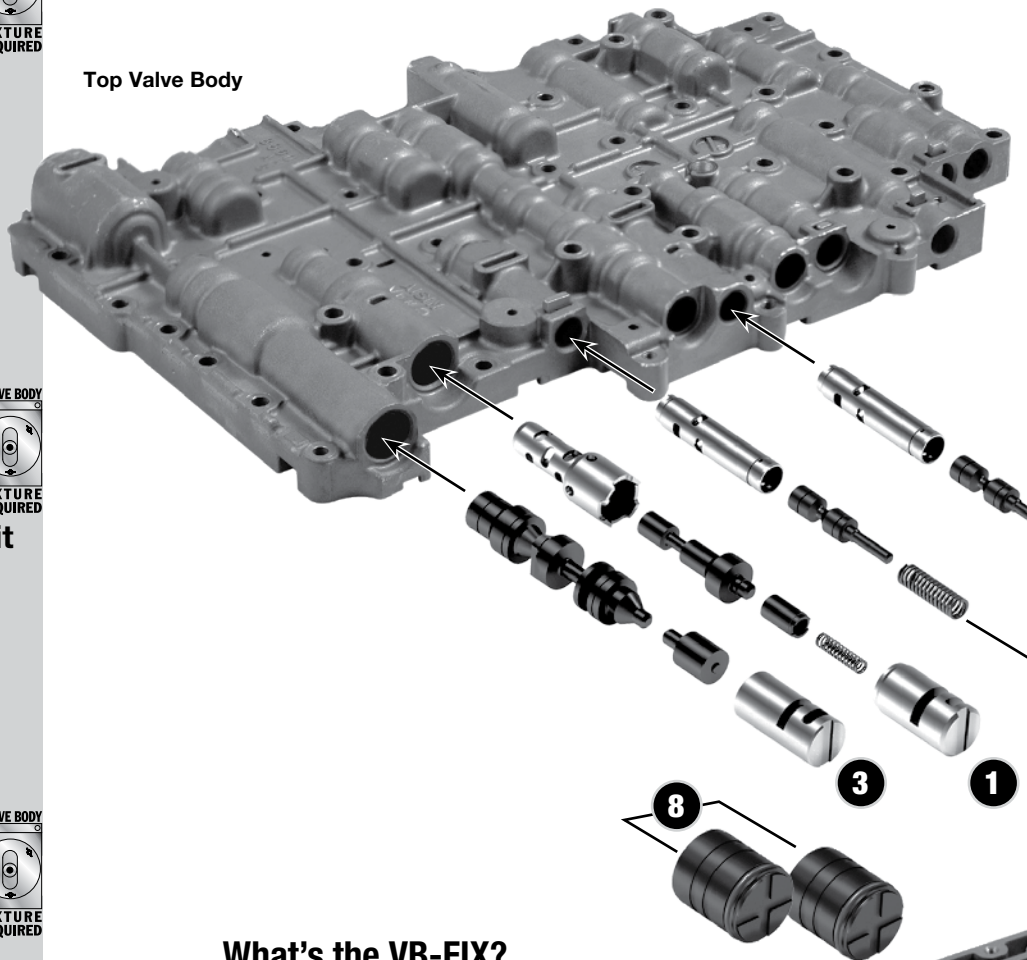
Helps cure:

- Linear solenoid and/or gear ratio codes
- Slippage or shock on kickdown
- Slippage in steady driving 4, 5 or 6th gear

Note: Requires tool kit **F-25741-TL18** & the **VB-FIX** reaming fixture.



Top Valve Body



What's the VB-FIX?

In certain applications there is no way to pilot a reamer to repair a worn valve body, forcing rebuilders to purchase new ones.

The patented Sonnax VB-FIX™ is a self-aligning fixture that provides an external rigid pilot bore for the reamer and guide pin, allowing the fixture to be used on multiple valve bodies and valve bores.

Special tool kits designed to service a specific bore are used with the VB-FIX. Sonnax part numbers for these kits begin with an "F-" to distinguish them from stand-alone Sonnax tools.

Part No. **VB-FIX** Patent No. 7,220,085

- Base Plate
- Clamp Mounting Plate
- Clamp Plate
- Outer Races (2)
- Inner Race
- Studs, Washers & Wing Nuts (3 each)
- Socket Cap Screws (4)



The VB-FIX provides reliable results and the potential for reaming. Detailed reaming instructions are available online.

for Aisin AW TR-60SN

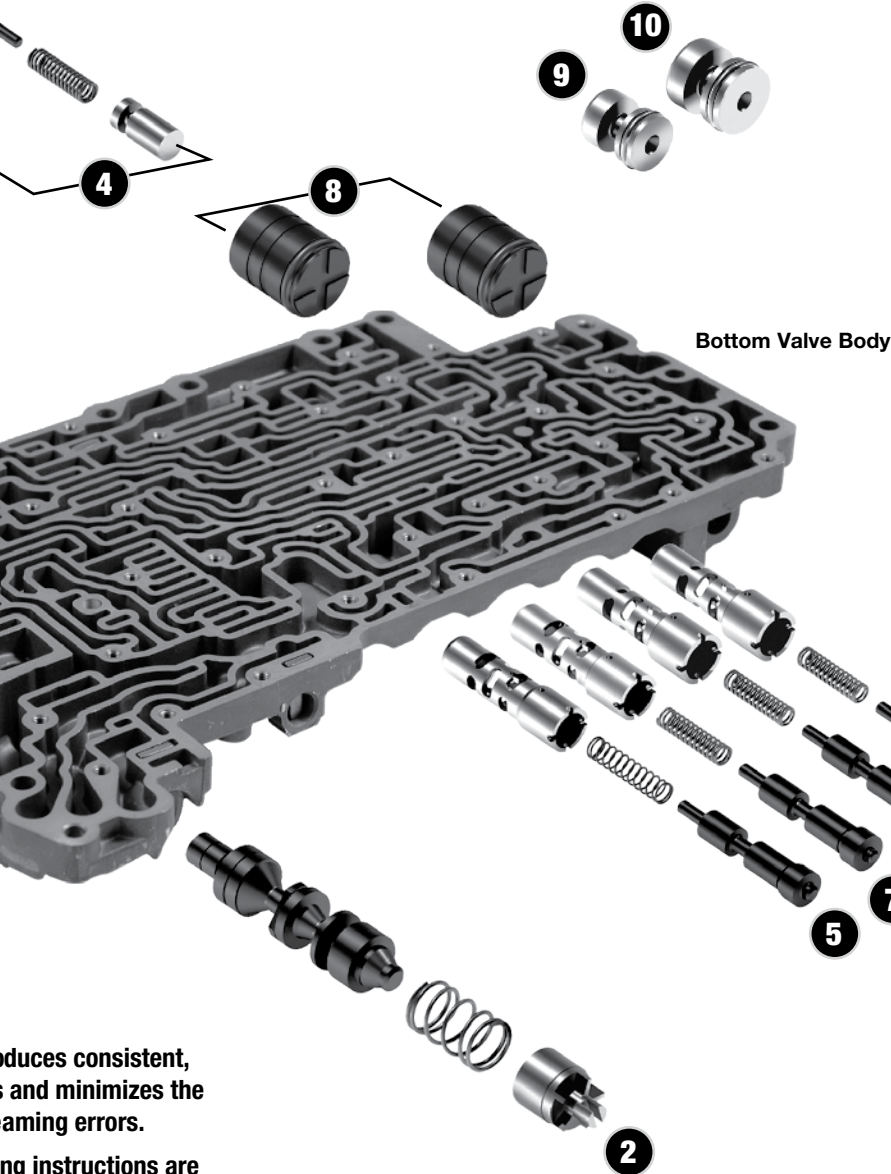
The valve kits shown here also fit VW/Audi 09D.

MORE Sonnax Valve Body Solutions

You asked for them and we developed them!

- Aisin AW TF-60SN, TF-80SC, TF-81SC
- Aisin AW 55-50SN
- ZF6HP19/26/32
- Jatco/Nissan CVT

View these and more Sonnax valve body layouts and parts at www.sonnax.com.



duces consistent,
s and minimizes the
aming errors.
ng instructions are
e at www.sonnax.com.

5 Part No. **25741-25K**



K1 Clutch Control Valve Kit

Helps cure:

- Flare upshifts or downshift bind-ups
- Excess clutch overlap & distress
- Pressure control “out of range” codes

Note: Requires tool kit **F-25741-TL25** & the **VB-FIX** reaming fixture.

6 Part No. **25741-05K**



K2 Clutch/B1 Brake Control Valve Kit

Fits 2 Locations

Helps cure:

- Flare upshifts or downshift bind-ups
- Excess clutch overlap & distress
- Pressure control “out of range” codes

Note: Requires tool kit **F-25741-TL5** & the **VB-FIX** reaming fixture.

7 Part No. **25741-08K**



K3 Clutch Control Valve Kit

Helps cure:

- Flare upshifts or downshift bind-ups
- Excess clutch overlap & distress
- Pressure control “out of range” codes

Note: Requires tool kit **F-25741-TL8** & the **VB-FIX** reaming fixture.

8 Part No. **15741-14K** Fits 4 Locations

Accumulator Piston Kit

Helps cure:

- Delayed engagements
- Slipping in forward gears
- Burnt clutches

9 Part No. **15741-35K** 5 Small, 9mm

10 Part No. **15741-36K** 5 Large, 11mm

O-Ringed End Plug Kit

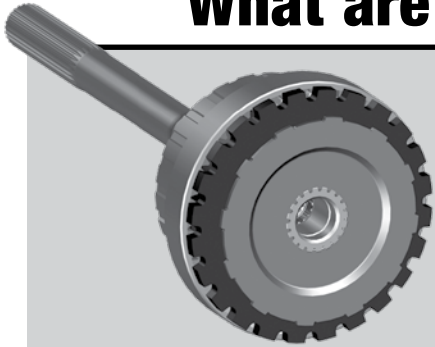
Helps cure:

- Shift complaints associated with circuit pressure loss

Note: Each kit comes with seven O-rings and fits multiple locations.

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What are Sonnax Advanced Process Gears?



Process 1

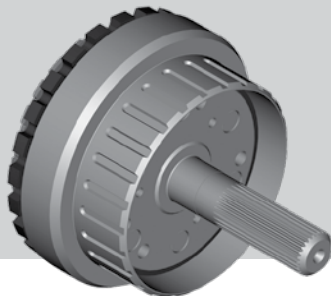
Cryogenic tempering for an even denser, more uniform gear with a tough and wear-resistant structure.

Process 2

Shot peening for increased gear resistance to fatigue failure, cracking or galling.

Process 3

A super-finish to reduce friction, vibration, noise and wear on the gear, potentially tripling the life of the part.



Advanced Process gears undergo a three-step process that takes aftermarket performance gear manufacturing to a whole new level:

Cryogenic tempering is an extension or continuation of the tempering process down to ultra-low temperatures (-350°F). This continues the conversion of nearly all retained austenite to more wear-resistant martensite and forms finer carbides for a denser, more uniform, tough and wear-resistant structure as well as an improved ability to resist pitting in high stress gear applications. This alone is an additional 40-hour process.

Shot peening is a cold working process that induces compressive stresses at the surfaces of the gear. Compressive stresses are beneficial in increasing resistance to fatigue failure or cracking and galling.

The super-finishing process is not a coating but a two-step surface treatment that reduces friction and greatly improves wear resistance. The process effectively burnishes the surface, reducing friction, vibration, noise and increasing service life of gear sets.

The U.S. Government has demonstrated a 3X mean life improvement with this process, and it is used in nearly all high-end professional racing circuits. You can feel the frictional benefits by just rolling two gears together in your hands without any lubrication. This set not only will last longer, but with the reduction in friction, will increase power to the rear wheels.

Each Sonnax gear set or assembly includes a flanged sun gear and a ring gear.

Unlike some competing products, the flange is machined from billet, not a stamped piece. The flange is broached and the sun gear is matched for a precise press fit that does not require welding as do other competing products.



NEW for 2011 – More Gear Set & Assembly Choices Than Ever!

Sonnax has been one of the leaders in Powerglide gear offerings for years.

With all that is new, we can offer you product at levels and combinations found nowhere else. Sonnax is a leader in the transmission industry, providing you with the parts which put you ahead of the competition!

Extreme

Gear Sets & Complete Planetary Assemblies

Advanced Process sun gears and pinion gears are the exclusive components of Sonnax Extreme gear sets and assemblies. They are made to the same exacting standards used on Formula 1™, NASCAR® and other high-end professional racing circuits.

Ultra Premium

Gear Sets & Complete Planetary Assemblies

Experienced racers know that sun gears typically show wear and pitting well before pinion gears. Sonnax Ultra Premium gear sets and assemblies combine Premium pinion gears with Extreme Advanced Process sun gears, greatly improving the life of the gear set at a lower cost than Extreme products.

Premium

Complete Planetary Assemblies

Each complete planetary is fully assembled in our Vermont manufacturing facility. They are available with your choice of gear set options, shaft length and flange tooth count.

Two-Year Warranty

Starting in 2011, any Sonnax gear set purchased as an individual set or in a planetary assembly will have a two-year warranty.

Planetary Assembly					Set & Assembly Parts*				
	Type	Gear Set Part No.	Long Shaft Part No.	Short Shaft Part No.	Long Pinions	Short Pinions	Front Sun Gear	Rear Sun Gear	
1.80 Ratio									
Flange Tooth Count	12	Premium	180S-K	28180G-01	28180G-01S	PRE	PRE	PRE	PRE
		Ultra Premium	180S2-K	28180G-02	28180G-02S	PRE	PRE	ADV	ADV
		Extreme	180S3-K	28180G-03	28180G-03S	ADV	ADV	ADV	ADV
	24	Premium	180S-24K	28180G-04	28180G-04S	PRE	PRE	PRE	PRE
		Ultra Premium	180S2-24K	28180G-05	28180G-05S	PRE	PRE	ADV	ADV
		Extreme	180S3-24K	28180G-06	28180G-06S	ADV	ADV	ADV	ADV
1.69 Ratio									
Flange Tooth Count	12	Premium	169S-K	28169G-01	28169G-01S	PRE	PRE	PRE	PRE
		Ultra Premium	169S2-K	28169G-02	28169G-02S	PRE	PRE	ADV	ADV
		Extreme	169S3-K	28169G-03	28169G-03S	ADV	ADV	ADV	ADV
	24	Premium	169S-24K	28169G-04	28169G-04S	PRE	PRE	PRE	PRE
		Ultra Premium	169S2-24K	28169G-05	28169G-05S	PRE	PRE	ADV	ADV
		Extreme	169S3-24K	28169G-06	28169G-06S	ADV	ADV	ADV	ADV

PRE = Premium
ADV = Advanced Process

*Each gear set and assembly includes the parts listed here as well as a premium ring gear.