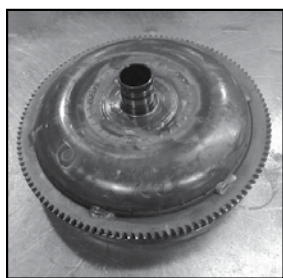


## Transmission Report

Volume 2, No. 3

October 2011

### Overheated Honda Converters/740 Codes



Overheated Honda converters have become a living nightmare for many transmission and torque converter shops, one that has lingered way too long because of the many misconceptions and missteps during the problem-solving process. The blame game has gone back and forth, but the torque converter rebuilders have been receiving most of the criticism.

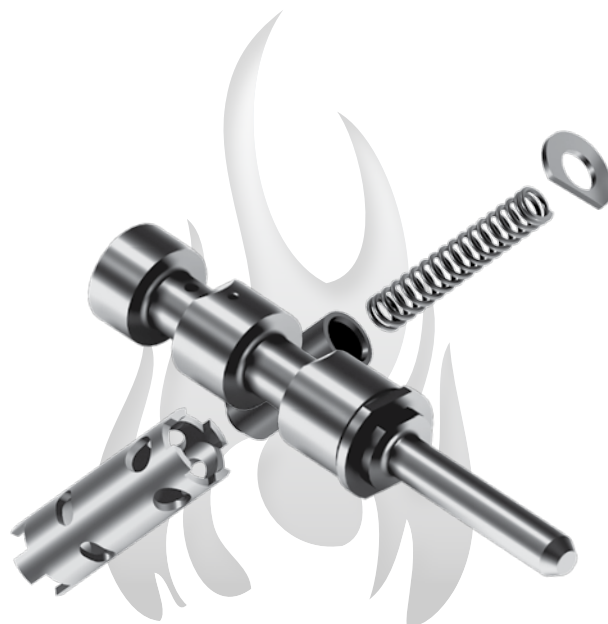
The overheated converters have been pushing the frustration levels of many transmission rebuilders to an all-time high. Shopping around for a different torque converter rebuilder was common during this period. At one point, ATRA Technical Advisor Mike Souza said that many of his tech calls would start with the question, “Is there anyone out there that can build a good Honda converter?”

The reality is that if the proper converter friction material for the clutch apply strategy was being used (such as BorgWarner HTS for models with a modulated TCC), the clutch release clearance was adjusted properly (.035" is correct for most models) and the TCC circuit seals were doing their job, there was not much more that the torque converter rebuilder could do. The painful truth is that the torque converter rebuilder could supply a great converter and still have an overheating issue. The fact that at least half of the overheated Honda converters in any given core pile are OE converters is further proof that the problem was not being caused by rebuilt converters.

The appearance of the converters after a failure, and the fact that most failures ended with a P0740 code, led to the misconception that the failures were caused by heat. Consequently, a lot of time was wasted focusing on the inside of the converter instead of working to increase the volume of oil flowing through the converter.

#### Why was the converter overheating?

Many transmission shops helped to find the root cause of the overheating issue, but ATEX Transmissions in Port Richey, Fla., stands out for their effort. The shop manager, Sean St. John, logged hundreds of road test miles with vehicles equipped with flow monitoring devices to record cooler flow and strategically placed pyrometers to record temperatures. Sean was the first person to recognize that after warm up, when the vehicle would come



**SEE PAGES 2 & 5 for the hot new Sonnax fixes for overheating Honda converters!**

to a stop, the cooler flow would drop to zero. The flow would resume when the idle was raised above 1200 RPM. Most importantly, he noticed that the temperature of the oil exiting the converter would increase dramatically when the cooler flow dropped to a certain level. Sean’s observations led to the conclusion that the heat in the converter was caused by the clutch dragging on the cover during periods of low TCC charge (release) oil flow and not as a result of slipping during TCC apply, as previously thought. But why was the low flow happening?

This became easier to understand when a pressure gauge was added and transmission line pressure was monitored at the same time as cooler flow. If the line pressure dropped at the same time as the cooler flow was decreasing, you would be looking for conditions such as low fluid level, severely worn valve bores or possibly a severely worn pump. But, since the line pressure remained high when the flow rate decreased, an out-of-position PR valve was more likely the cause of poor cooler flow.

*continued on page 2...*

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Typically, the PR spring and any available boost pressures push the PR valve in one direction and balance pressure opposes or pushes from the opposite direction until the valve reaches its regulating position. When the PR valve approaches its regulating position, charge oil (TCC release oil) begins to flow and continues to flow as long as the valve remains in the regulating position (**Figure 2**).

In many systems, a modest base line pressure is established by the PR springs, with higher pressures coming as a result of some demand-related boost system. As you can see in **Figure 2**, Honda does not use a conventional line pressure boost system. In the Honda system, more substantial PR springs and a stator load-related boost system establish a much higher base line pressure from the outset with modest boost increase at max pressure.

## Why was the cooler flow low?

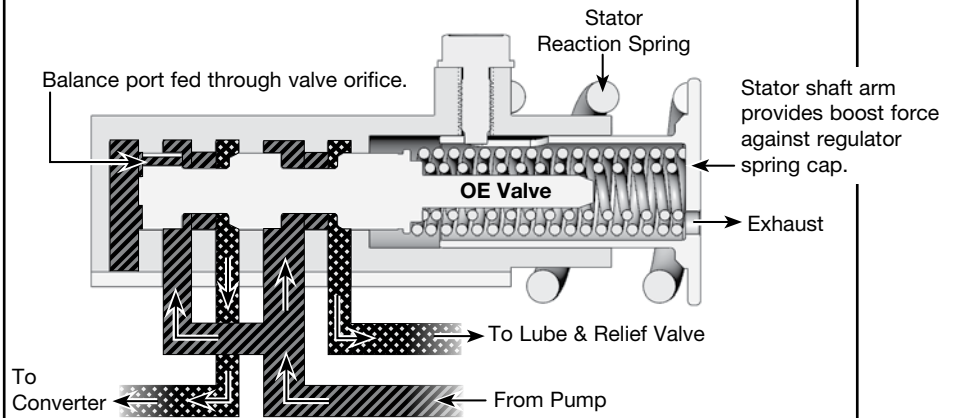
Under low pump output conditions, balance line pressure cannot overcome the stout PR spring and boost force. This causes the PR valve to move out of its regulating position (also referred to as a PR valve being “out of balance”). Under this condition, although line pressure is available (as noted by Sean), the valve has stroked over and shut off flow to the converter charge/cooler circuit. The result: TCC dragging on the cover, little or no cooler flow to control that heat, and all those cooked converters in your core pile (**Figure 3**).

## Why was the pump output low?

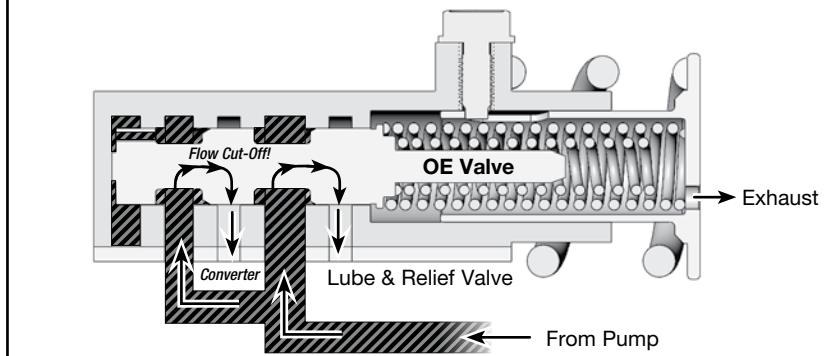
There are several factors which contribute to or hasten the occurrence the low output/out-of-balance condition:

**1. Low pump capacity:** A key factor is the low capacity of the Honda pump. Because the pump is designed around fuel efficiency concerns and limited space restraints, it has very little reserve capacity. The higher the operational demands on the pump, the more likely it is that you will experience an overheated converter. The vehicles with the larger diameter converters, larger

**Figure 2 Honda PR Valve in Normal Condition**  
Under normal conditions, the OE valve is in regulating position and the flow goes to the lube/relief valve and converter.



**Figure 3 Honda PR Valve in Low Flow Condition**  
Under low flow conditions, the OE valve becomes out of position, shutting off the converter and lube circuits. This leads to converter overheating.



clutch drum capacities and more gears will be more likely to have converter overheating. Low pump capacity also makes wear an important factor. Pump wear, valve bore wear and end plug wear caused by high mileage will increase the likelihood of a converter overheating. Because of the delicate balance of the Honda PR valve, very little wear is necessary to upset this balance.

**2. Added demands on the vehicle:** The chance of converter overheating also is present when there are added demands on the vehicle. Towing a trailer, overloading the vehicle or climbing over a mountain all will put added force on the stator in the converter and affect the balance of the PR valve.

**3. Oil viscosity:** The viscosity of the oil also can be an issue. Since the viscosity of the oil is related to its temperature, the higher the ambient temperature, the higher the likelihood of an overheated converter. High-quality synthetic oil may be helpful, but since the Honda 1-2 shift feel relies so heavily on OE Honda fluid, it is less of an option.

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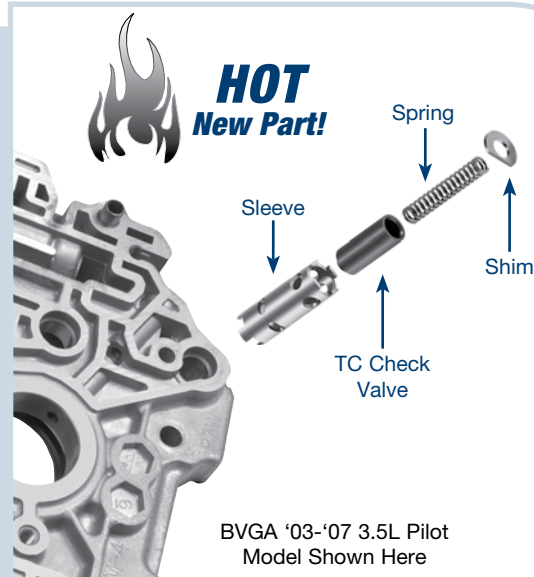
**Honda 4/5 Speed****TC Check Valve Kit****Part No. 98892-06K****Kit includes:**

- TC Check Valve
- Sleeve
- Shim
- Spring

- Sleeve offers more valve support than OE bore, which reduces wear and stops the valve from sticking
- The valve sleeve is highly wear-resistant to increase life
- Direct drop in replacement; no special tools required
- Salvages new OE valve bodies machined with an edge remaining at the relief ports

An overheating torque converter is a common problem in Honda vehicles equipped with a four- or five-speed automatic transmission. This condition can be caused by a worn or stuck TC check valve, which reduces the pressure in the torque converter and leads to excess heat buildup.

Replacing the OE TC check valve with the direct replacement Sonnax TC check valve kit **98892-06K** will restore the torque converter pressure and prevent valve sticking. Some new OE castings have been discovered to be machined with an edge remaining at the relief ports. This also can be used to salvage those castings.



**NOTE:** This kit fits several Honda 4/5 speed models. However, model to model the appearance of valve bodies and the location of the TC check valve bore may vary.

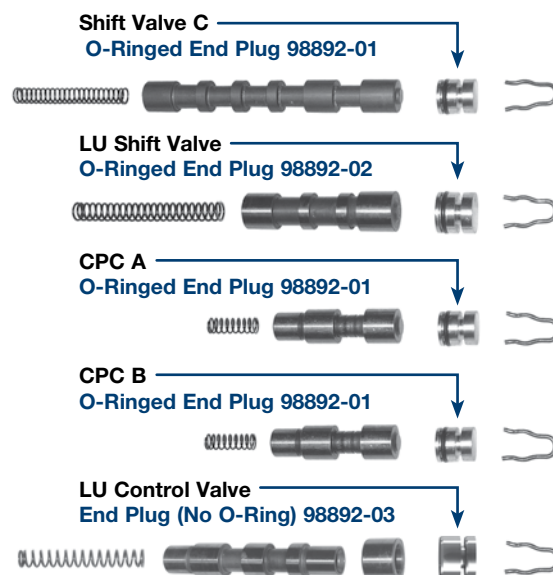
See the **98892-06K** Application Chart online at [www.sonnax.com](http://www.sonnax.com) for a detailed guide.

**Honda 4/5 Speed****O-Ringed End Plug Kit****Part No. 98892-01K****Kit includes:**

- |                        |           |
|------------------------|-----------|
| • End Plugs (3)        | 12mm      |
| • End Plug             | 14mm      |
| • End Plug (No O-Ring) | 15mm      |
| • Small O-Rings (5)    | (2 extra) |
| • Large O-Rings (2)    | (1 extra) |
- Prevents loss of CPC and other critical oil pressures
  - Drop-in installation requires no machining or special tools
  - All end plugs and O-ring replacement kits also sold separately
  - Can be used in other locations as needed

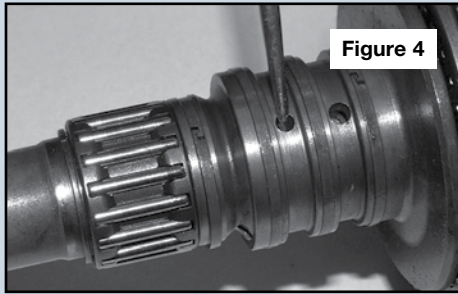
Valve bore plugs on Honda/Acura valve bodies wear and allow critical CPC and solenoid feed oil to leak to exhaust, leading to low CPC pressures and soft or inconsistent shifts.

Sonnax O-ringed end plug kit **98892-01K** replaces the worn OE end plugs and restores critical circuit pressures at the CPC A and B valves, shift valve C and LU shift valve. The kit also includes a 15mm interference fit end plug **98892-03** that does not use an O-ring. It will fit either the lock-up control or shift valve D bores. In addition to these commonly worn locations, the end plugs **98892-01** (12mm) and **98892-02** (14mm) can be used in other valve bores as needed.

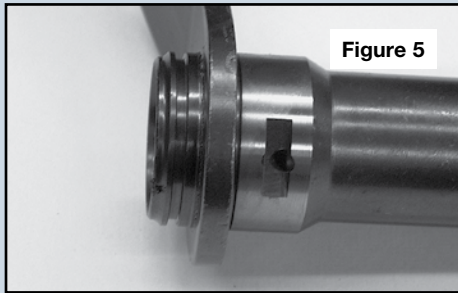


**NOTE:** This kit is for units with dual linear solenoids. Some BMXA units have been found with plugs which have smaller diameter clip-grooves and narrower retainers as shown below. The Sonnax plugs will not work in these applications.

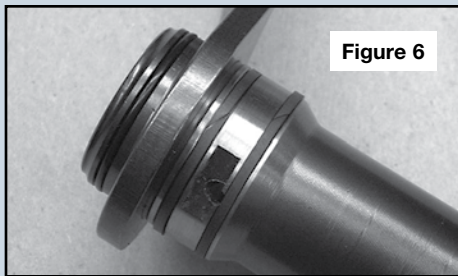
## Areas for Potential Leaks



Primary Charge Circuit



Parallel Circuit without Positive Seal



Parallel Circuit with Positive Seal

## Addressing the Low Flow/Out-of-Balance Issue

Since there is little or no flow of converter charge oil to keep the TCC piston from dragging on the cover when the PR valve is out of balance, you will need to create an alternate or secondary path for oil flow. For an effective repair, you should consider an aftermarket PR valve with a built-in, metered, line-to-lube circuit. This allows flow to the converter and cooler when out of balance, but does not affect flow when in the regulating position. In addition, a check valve prevents converter drain back when the engine is shut off. Remember that the root cause of the converter overheating is low pump capacity and you do not want to make this issue worse by creating a drain back condition. Starting a Honda and have it starve for oil because of drain back will only create more pump wear and lead to lower pump output, which only makes the root cause of the problem worse. **Figure 7** shows the Sonnax lube regulated pressure regulator valve **98892-04K** for Honda 4/5-speed units (see page 5), maintaining flow during the out of position situation.

For further reading, reference the “Anatomy of a Transmission” article in the Sonnax Transmission Technical Library at [www.sonnax.com](http://www.sonnax.com) or the “Ford Bypass Converter Clutch Circuits” article on pages 98-99 of the Sonnax Transmission Specialties Catalog Volume 5 and in the Sonnax online tech library at [www.sonnax.com](http://www.sonnax.com).

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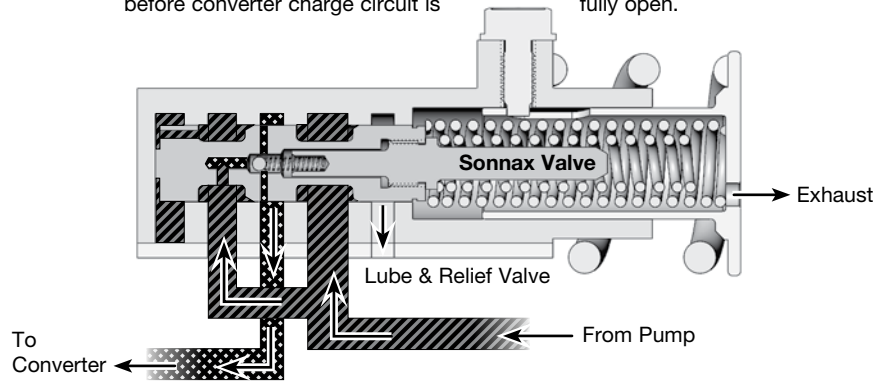
## Why doesn't the engine stall?

One question that always comes up is, “With the PR valve out of balance, why doesn't the engine stall when the flow of charge oil is so low and the clutch is dragging?” This is an excellent question and the answer involves the type of hydraulic lockup circuit that the Honda uses. The two-path lockup circuits on the E4OD and rear-wheel drive 3-speed Chrysler transmissions have both had engine stall issues caused by flow issues. If Honda had a two-path lockup circuit, it also would probably have an engine stall issue. The lockup circuit found on Honda transmission is a three-path circuit that uses a bypass valve like some front-wheel drive Ford transmissions. The three-path lockup circuit is not as susceptible to engine stall as the two-path circuits because there are two check valves which can be forced open before full lockup is achieved.

One downside to the three-path lockup circuit is that there are more areas for potential leaks. The Honda primary charge oil circuit enters the input/turbine shaft between the second and third sealing ring and exits at the end of the shaft between the cover and TCC clutch (**Figure 4**). This circuit is generally fairly tight. The parallel circuit, on the other hand, does not have a positive seal where the stator support passes through the valve body (**Figure 5**). This parallel circuit is prone to leak and does have some effect on flow. Not all shops will be able to address this leak, but the overheated converter issue can be resolved without fixing this leak. If you are able to address this leak (**Figure 6**), you will add about .2 of a gallon to your cooler flow.

**Figure 7** Sonnax Lube Regulated PR Valve, Corrected Low Flow Condition

The Sonnax lube regulated PR valve **98892-04K** corrects the low flow condition by allowing the internal relief valve to provide flow to converter before converter charge circuit is fully open.



## Honda 4/5 Speed Lube Regulated PR Valve

**Part No. 98892-04K** Patent Pending

- Maintains adequate converter charge and cooler flow at low rpm
- Checkball inside valve prevents converter drain back when vehicle is shut off
- Direct drop-in replacement part with no special tools required

Honda/Acura models equipped with a four- or five-speed automatic transmission may overheat the converter. Eventually the slip rate cannot be controlled due to lining failure, resulting in code P0740.

To prevent this problem, Sonnax now offers a drop-in lube regulated pressure regulator valve **98892-04K**. This valve allows more flow to the converter and cooler circuits (see **Figure 7** on page 4), increasing converter charge during low pump output conditions, and includes an internal checkball to prevent converter drain back when the vehicle is off.

The same valve design will assist converter charge and TCC apply pressure during low-output/high-load demand situations. Make sure to inspect and replace lockup control valve end-plugs to help ensure maximum TCC apply pressure (refer to **98892-01K** end plug information at [www.sonnax.com](http://www.sonnax.com)).



MAXA '98-'02  
Regulator Valve  
Body Shown

**NOTE:** This kit fits all 4/5 speed Honda/Acuras except: A6VA, AOYA, BOYA, MPOA, MPJA, APXA, MPXA, MP1A, PX4B, MPRA, RO, MPZA, M5HA, M1WA, M5DA, MPWA, MPYA.

Model to model, the appearance of valve bodies and the location of the pressure regulator valve bore may vary.

## New! Vacuum Test Stand Kit

**Part No. VACTEST-01K**

A worn valve or valve body bore can lead to incorrect hydraulic pressure in the transmission, which causes poor performance or failure. Sonnax now offers a vacuum test stand kit that allows rebuilders to accurately check for wear in critical valve body areas and verify the effectiveness of repairs.

### Why vacuum test?

**Economical** A vacuum testing station has a low initial cost to set up and requires minimal maintenance.

**Quick & Easy** Vacuum testing is easy to learn. It doesn't take long to become skilled at rapidly testing multiple areas.

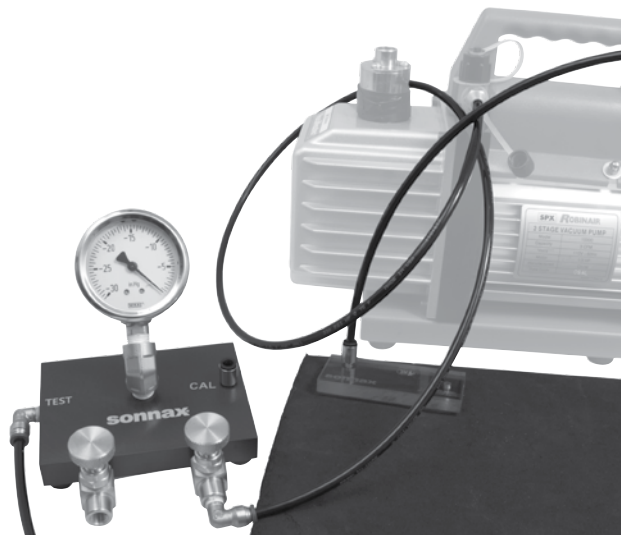
**Quantitative** Vacuum testing returns a specific value (inches of mercury) which, with experience, allows rebuilders to establish pass/fail standards for proper valve body function.

**Repeatable** Test results are accurate and repeatable when routine calibration and basic test procedures are performed.

### Kit includes:

- Vacuum Test Stand
- Wet Air Test Plate
- Rubber Mat
- Push-to-Connect Fitting
- Nylon Tubing

**NOTE:** A vacuum pump is not included in this kit. Sonnax recommends the Robinair® 3cfm vacuum pump when vacuum testing valve bodies.



Learn more about vacuum testing in the Sonnax online tech library at [www.sonnax.com](http://www.sonnax.com).

## Four Levels of Handy Sonnax Kits to Fit Any Job



### Line Pressure Booster Kits

The Smarter Way to Raise Line Pressure

- Affordable, drop-in kit with no special tools required
- Increases torque capacity
- Improves shift feel without the harshness



**New!**

### Zip Kits

Your One-Stop Box for Correcting Common Shift Problems

- Installs quickly and easily without any special tools
- Stops leaks so valve body works the way it's supposed to
- In-depth tech booklet for installation plus diagnostics and repair



### Sure Cure® Kits

Big Fixes for Big Problems You Don't Want Back

- Restores OE shift quality
- Repairs biggest trouble areas to reduce comebacks
- Step-by-step instructions for complete valve/pump body restoration



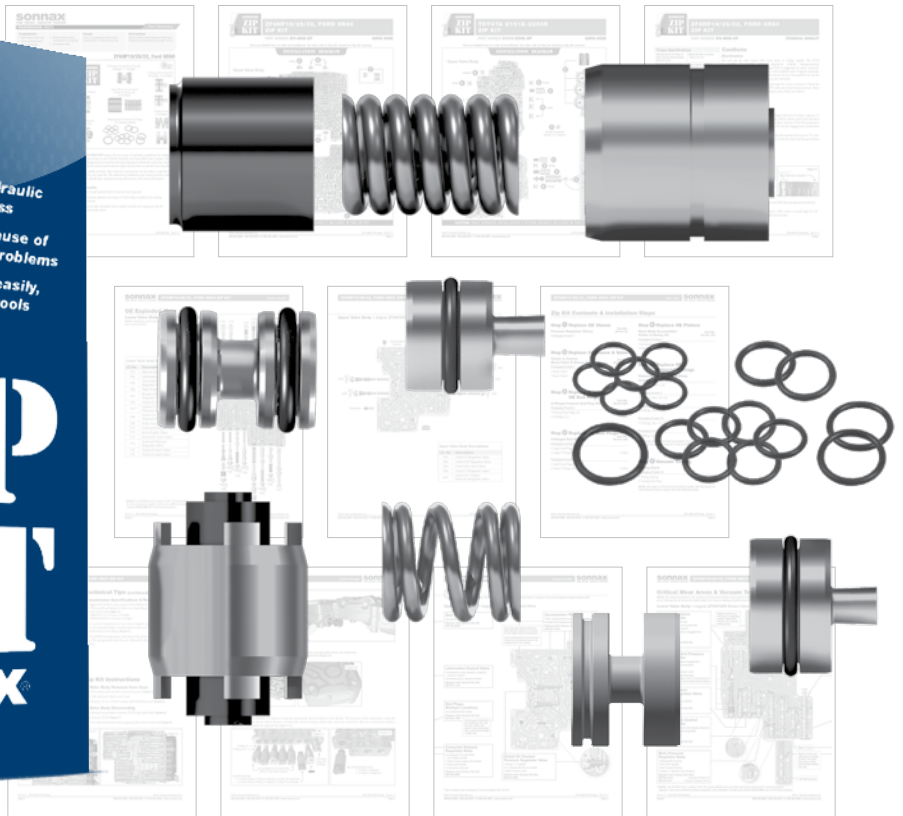
### Performance Pack

The Best Parts for Performance & HD Recalibration

- Best of both worlds: great drivability and performance
- Highest quality performance upgrades
- Great shifts which firm up the harder the transmission is worked
- Consistent results, no guessing on calibration



Kit ZF6-6R60-ZIP shown here.



## Introducing **Sonnax ZIP KITS** *Your One-Stop Box for Correcting Common Shift Problems*

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scan code with your smartphone

### Simple & Effective Drop-In Repairs

- Simple to install with NO special tools required
- Does not permanently modify the valve body core

### Comprehensive Fix for Shift Problems

- Tackles critical hydraulic pressure loss caused by worn components
- Extends the life of high-mileage units

### Detailed Tech Booklet

- In-depth tech guide explains diagnostics and installation steps
- Identifies more Sonnax fixes for other worn areas in the valve body causing transmission problems



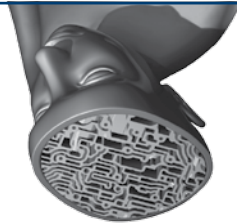
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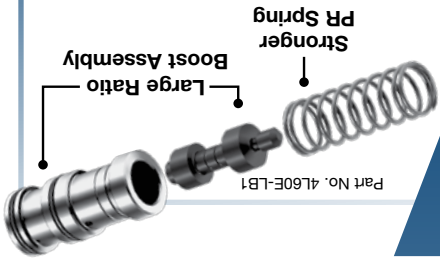
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| 4L80-E, 4L85-E | 4L60 (700-R4), 200-4R  |            |

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