sonnax®

TRANSMISSION PARTS

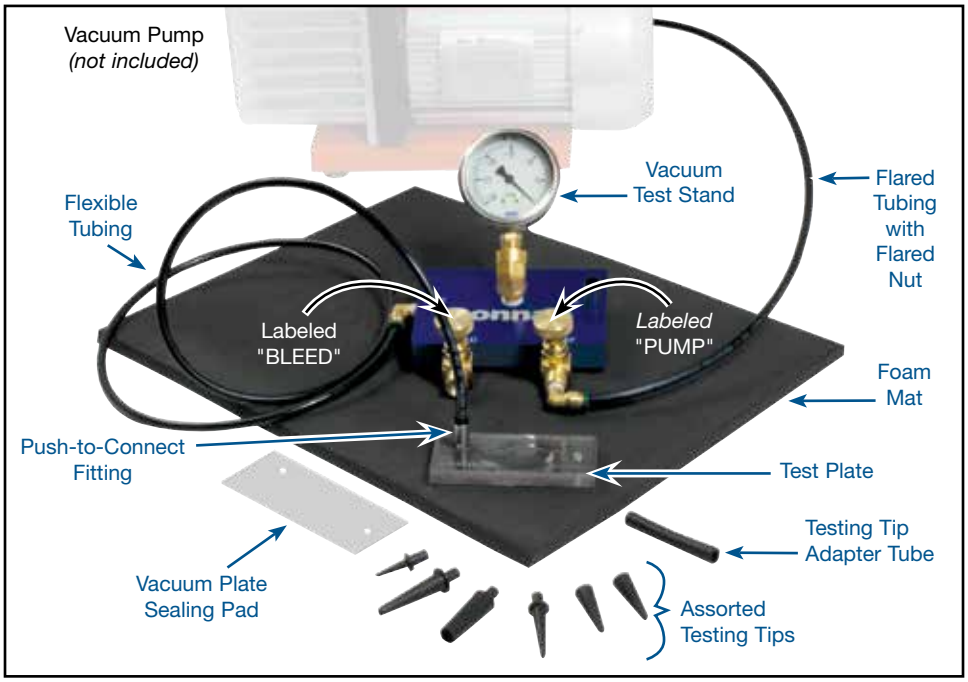
Instructions

Vacuum Test Stand Kit

Part No. VACTEST-01K

- Vacuum Test Stand
- Test Plate
- Vacuum Plate Sealing Pad
- Foam Mat
- Push-to-Connect Fitting
- Assorted Testing Tips (6)
- Testing Tip Adapter Tube
- Flexible Tubing
- Flared Tubing with Flared Nut

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



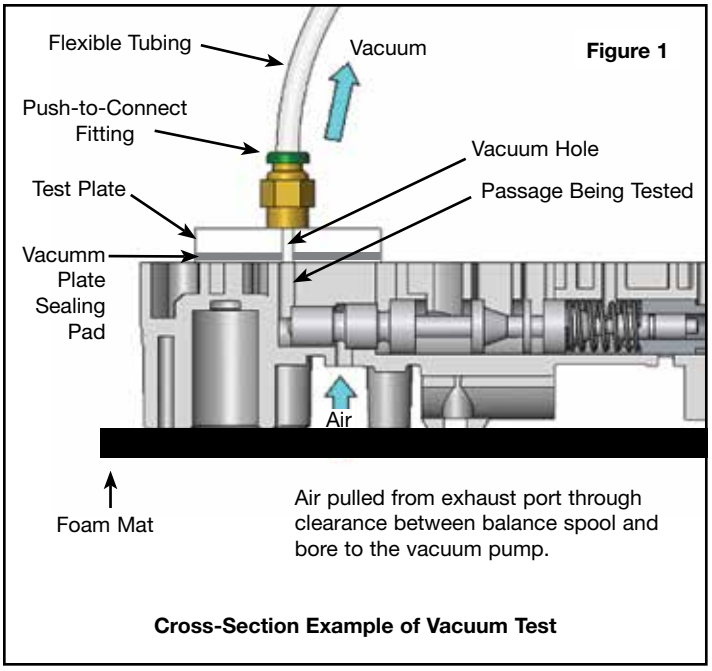


Figure 1

Cross-Section Example of Vacuum Test

How Vacuum Testing Works

Valve and bore wear occurs when valves repeatedly stroke in a pump or valve body casting. This wear will eventually increase clearance beyond what is necessary to maintain a proper hydraulic seal, making it impossible for the valve to function properly.

Crossleaks and pressure loss due to wear ultimately result in durability and drivability complaints. Even in late-model units, wear will eventually exceed computer adaptive capabilities. Testing with vacuum allows the degree of bore wear to be accurately measured with repeatable numerical results.

Vacuum testing involves isolating or sealing a circuit containing one or two valve spools and then pulling air between the spool(s) and bore (**Figure 1**). This airflow is measured with the vacuum gauge, and is proportional to the amount of clearance/wear between the spool(s) and bore. The higher the vacuum reading, the less airflow that occurs, meaning less clearance/wear between the bore and valve.

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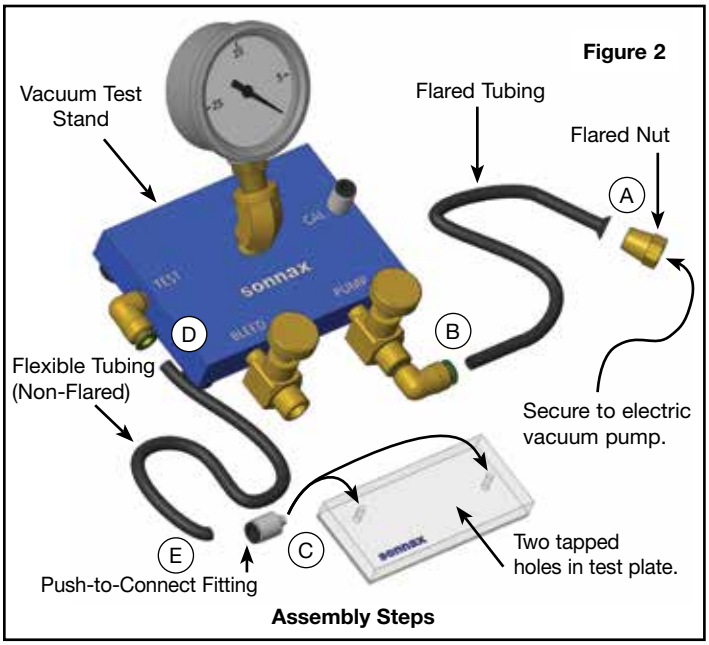
NOTES:

- The Sonnax vacuum test stand is designed to work with a vacuum pump, which is not included in this kit. Sonnax recommends a 3cfm vacuum pump when testing valve bodies.
- The Sonnax vacuum plate sealing pad will help provide a better seal and more accurate results. Alternatively, TransJel™ can be used between the valve body port and the test plate to provide a better seal. TransJel™ is not included in this kit.
- The valve body must be clean and dry to ensure a proper vacuum reading.



1. Assembly as shown in Figure 2

a. Slide the flared nut up to the flared end of flared tubing. Secure to an electric vacuum pump.

b. Push the other end of flared tubing into test stand fitting labeled "PUMP."

c. Screw push-to-connect fitting into either of two tapped holes on the test plate.

d. Push one end of non-flared flexible tubing into test stand fitting labeled "TEST."

e. After calibration, push the other end of the non-flared flexible tubing into the test plate push-to-connect fitting.

In some cases where the test plate cannot be used, Sonnax has included an assortment of testing tips and a 3" adapter tube. When needed, insert one end of the 3" adapter tube onto the flexible tubing and the other end onto the correct test tip.

2. Calibration as shown in Figure 3

NOTE: To ensure consistent and repeatable results, the test stand should be calibrated before each use.

a. Assemble test stand as shown, ensuring non-flared flexible tubing from the "TEST" fitting goes to the "CAL" fitting.

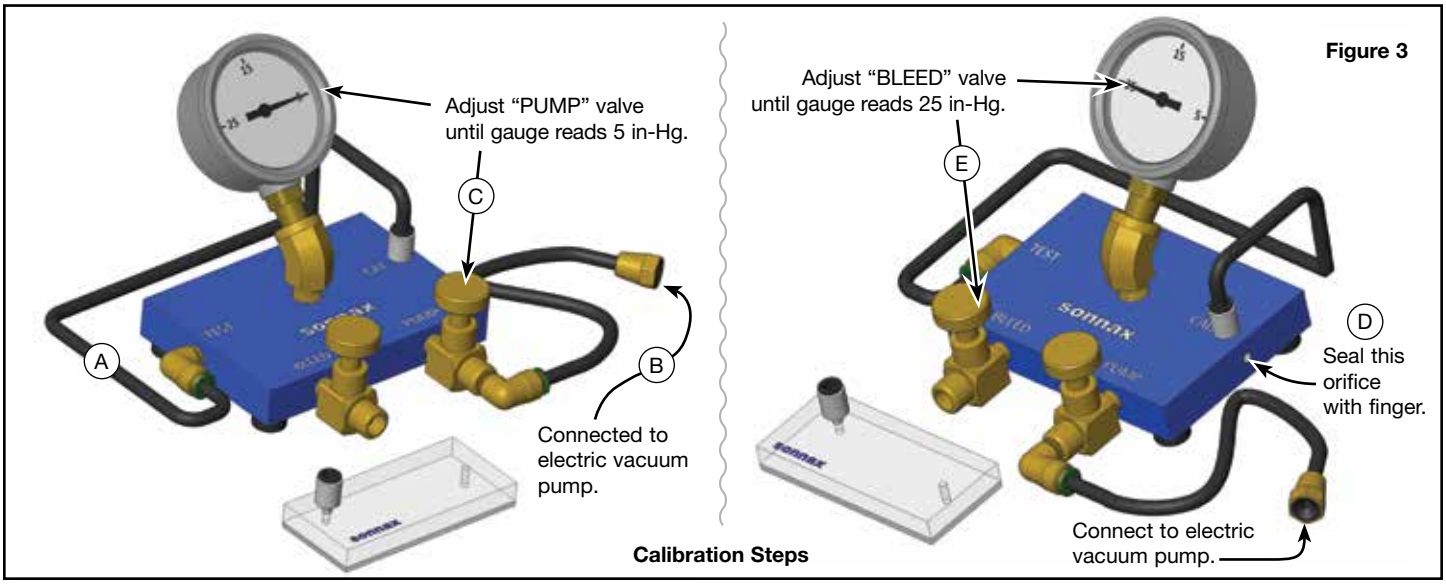
b. Turn the electric vacuum pump on.

c. Adjust the "PUMP" valve until the gauge reads 5 in-Hg.

d. Seal the calibration orifice on the side of the plate with finger.

e. Adjust the "BLEED" valve until the gauge reads 25 in-Hg.

f. Repeat steps c, d and e until the readings are consistantly 5 in-Hg and 25 in-Hg.



The test stand is now calibrated for repeatable results. Disconnect the non-flared flexible tube from the "CAL" fitting and insert it into the test plate push-to-connect fitting.

NOTE: Shops located at higher elevations may not be able to obtain a 25 in-Hg vacuum reading. At these elevations a lower maximum value may be substituted as your standard, and pass/fail standards will need to be slightly lower as well.

3. Vacuum Testing

With the vacuum test stand calibrated, testing can be performed.

a. Place the clean valve body on the foam mat and locate the passage being tested.

b. Align the Sonnax vacuum plate sealing pad with the bottom of the Sonnax test plate, making sure that the holes line up. This will help seal the test plate to the valve body. Alternatively, a small amount of TransJel™ (not included) can be applied to the worm tracks surrounding the test passage.

NOTE: The sealing pad should be rinsed in water to remove surface dust and debris. If contamination eventually renders pad unusable, discard and replace with new pad.

c. Turn on the vacuum pump, place the test plate over the test passage and apply light pressure. Make sure to seal the entire test port with the test plate. Do not seal neighboring ports, especially those which may be providing the air flow across the valve spool, or false high vacuum readings will result. Also, be sure the vacuum hole in the test plate is not being blocked during testing (**Figure 4**).

d. With the test plate in place and the vacuum pump running, a vacuum reading will be displayed on the gauge.

NOTE: To test valve bodies with passages which penetrate through the casting, the valve body can be pushed against the airtight closed cell foam mat.

For more information on vacuum testing, visit the Sonnax online Transmission Technical Library and sort articles by the subject "Vacuum Testing."

Where should I test?

Vacuum testing should be performed on a clean, dry valve body. You may use either of the following approaches, depending on your situation:

Targeted Testing

If you have a specific complaint and there are valves you know are directly related to certain codes or drivability complaints, you may choose to start there. For example, a 4L60-E with an 1870 code should have the TCC regulator valve bore vacuum checked for leakage.

General Testing

If you do not know where to start, or if you want to evaluate the valve body or pump body more completely, begin by checking different circuits based on their level of valve activity:

- **Active valves -** The valves doing the most cycling in the bore are most likely to wear first. Boost valves should always be checked because EPC or throttle pressure changes keep these valves constantly moving in their sleeves.
- **Modulated valves -** Valves reacted on by low-resistance, modulated solenoids tend to wear quickly.
- **Regulating valves -** These valves are controlling pressures to a set parameter, and wear will make the pressure out-of-spec and possibly set a code. Regulating valves also typically

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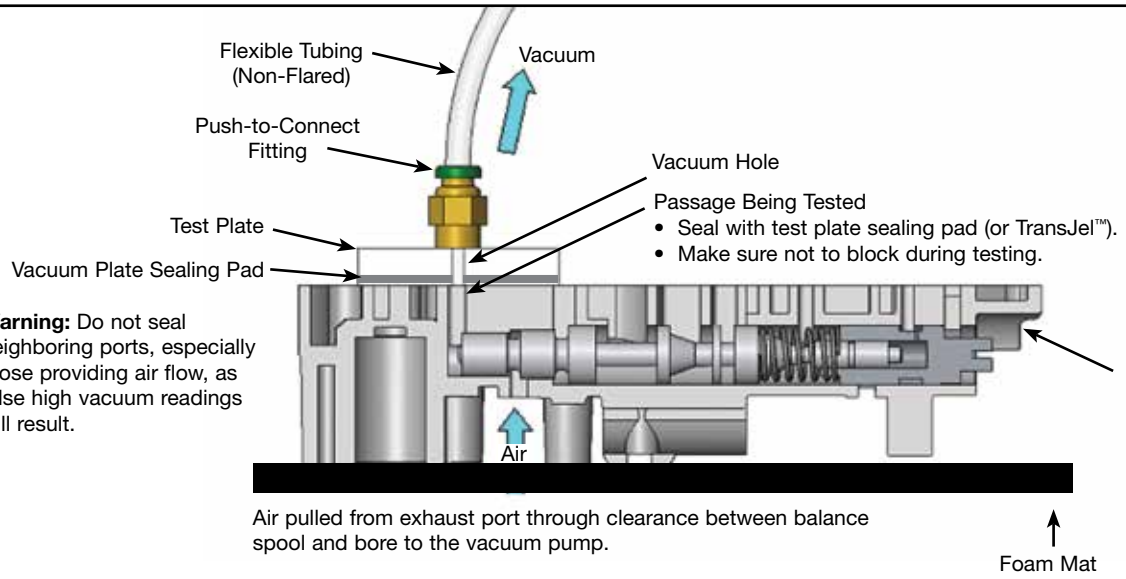

Figure 4

Vacuum Testing

General Testing (continued)

- operate in a relatively narrow section of the bore, creating wear at the very location where sealing is the most critical. Examples would be main pressure regulators, secondary regulator valves and solenoid regulator valves.
- **On/Off valve -** Examples include shift valves and manual valves which don't move as frequently or don't oscillate in narrow, linear sections of the bore.

The circuit or port being tested must be captive or sealable. Balance ports are great locations to perform vacuum tests for this reason. The Sonnax foam mat in this kit can be used to help seal off circuits which are open to the opposite side of the casting. The Sonnax test plate makes a great tool for sealing off circuits for testing. When sealing a circuit/port for testing, make sure you do not seal off the neighboring port that would supply the air source needed for leak detection, because a false high vacuum reading can result.

When using a test plate, we recommend that you apply a small amount of TransJel™ around the worm tracks of the circuit/port being tested. This provides a much better seal with the test plate, particularly if there are any knicks on the valve body surface. Checking some locations might require getting creative with test plates. Adapters can be made by drilling through a small rubber ball, disassembling solenoids and using the snout end with O-rings, or by cutting a sheet of Plexiglas® to size and using push-to-connect fittings.

Valves which tend to operate in a narrow, somewhat-consistent location develop wear and are more accurately tested in their operating position. Small checkballs, washers or retainers can be used to position a valve into operating position prior to vacuum testing.

Keeping an oil circuit handy will help lead you to the key ports for vacuum testing. For units you frequently see in your shop, you should develop vacuum test sheets. Show the entire valve body along with the valve locations and ports which should be vacuum tested. Complaints associated with a low vacuum reading at designated ports also can be added as a quick and easy method for evaluating a valve body.

What should my vacuum test results be?

While a properly calibrated and maintained test stand will give consistent vacuum reading results for a specific circuit and amount of wear, evaluating those results requires establishing your own pass/fail criteria. Variables which influence vacuum readings are the number of spools tested in a captive circuit, spool diameter size and contact length of the spool within the bore.

Test results may vary, especially in areas at high elevation (*see note on top of page 3*). Pass/Fail standards are specific to your setup and process, but they also must be based on your experience, quality sensitivity, warranty concerns and cost/pricing structure. Sonnax recommends that you keep a record of vacuum results for each valve body at each tested circuit/port location. This lets you compare results over time to help determine for your shop what an acceptable vacuum reading is for each circuit/port location.