

# TRANNNY TERMS

## from A to (almost) Z

*We have all learned different lingo or ways to express things within our industry. Sometimes you only have to travel as far as the next bay to find a different way to describe a transmission symptom or problem. Throughout our catalog and product announcements we describe many transmission complaints or transmission functions, relying heavily on the lingo as we know it. If you have ever wondered what we mean, here's our best attempt at an explanation.*

**1-2 bang** See bang shift

**annular groove(s)** Passages in a valve body introduce fluid under pressure from one side of the valve only, as opposed to filling a cavity surrounding a valve. This pressure has a tendency to push the valve against the bore on the opposite side of the fluid entry (side loading). Annular grooves are channels that run around the circumference of the spool. This allows fluid to surround the spool, helping to center it in the bore as well as providing lubrication, which reduces wear and the potential for the valve to stick.

**balance or balance oil** The circuit reacting on a regulating valve that opposes the spring pressure. This balance oil is actually the regulated output of the valve, returned through an orifice to help stabilize the valve action. The spring tries to move the valve to allow more pressure. The regulated pressure builds up (pushing on the balance spool), causing the valve to move until the force "balances" the spring force, establishing a regulated pressure. If you leak at the balance end, the force on the valve is reduced. It will take more pressure on the valve to balance the spring force, so the resulting regulated pressure is too high.

**bang shift (or engagement)** Refers to a harsh, abrupt shift and/or engagement into forward or reverse. This condition can be caused and aggravated by high line pressure, improper friction material, fluid, clutch or band clearance and lack of accumulator control. This can be an upshift or downshift and may only occur at certain throttle positions. May also be called a clunk or bumpy shift.

**base line** Refers to the minimum pressure reading obtained from the transmission line pressure tap. This is oil pressure regulated by the main pressure regulator valve and may also be affected by the volume of fluid supplied by the pump. Base line is the result of the balance oil force opposing only the regulator spring force, with no influence or additional force from boost oil.

**bias valve** A bias valve functions to influence the motion or fluid signal available to or established by another valve.

**bind-up, or binds during shift** Also referred to as excessive clutch overlap or tie-up. Can be caused by a one-way holding element installed backward or not allowed to freewheel. Also caused by incorrect timing of apply vs. release of clutch or band. The unit is forced to drive the transmission at two different ratios at one time. They fight each other and

you can feel the momentary bind-up of the fight until the release is complete. See flare, slide and normal shift.

**binding in Park** This refers to the manual linkage being torque loaded from either the vehicle weight transferred onto the park pawl or the input clutch is turning the driveline. For example: input RPM transferred to the geartrain can be created by lack of clearance at input/ forward clutch, hydraulic cross leaks into that circuit or manual valve adjustment.

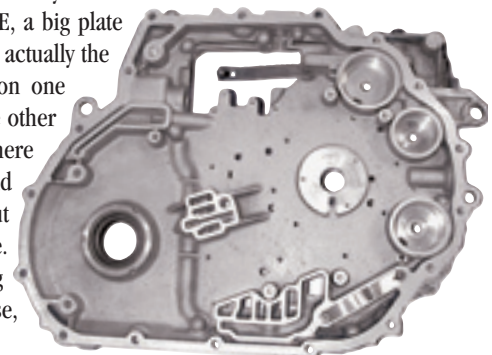
**boost or boost pressure** Boost is a hydraulic force added to the spring force of a regulating valve. This boost will not allow the regulator valve to exhaust until the control (output pressure) becomes higher, referred to as line rise. When boost oil is added to the spring, the balance/control oil will increase as well. Line rise via the boost valve is required to maintain clutch clamping pressure as input torque increases for higher loads. Situations include reverse, an upshift, forced downshift or any increased engine load. Some boost valves include a "cutback" area in the valve. This works to assist balance oil or reduce spring force and line pressure.

**boost ratio** Many boost valves function by introducing fluid to a cavity between two spools. The resulting force toward one direction is created by the valve reaction area difference between the two spools. Increasing the difference or the ratio between the two spool areas increases the boost force that will be created by the valve as a result of common pressure input.

**bump** See end bump

**chain cover or case** See channel plate

**channel plate/transfer plate** Is a "transfer plate" the same as the channel plate? More or less. The function is the same. Anything that has the channels (fluid passages) cast into it could be called a channel plate. The exact term chosen usually comes from the manufacturer. In some GM units, such as a 4T60-E, a big plate that bolts to the main case and is actually the cover for the chain and gears on one side also has the channels on the other side. The VB and plates mount there and a pan covers all. They could (and do) call it a chain cover but they mostly call it a channel plate. On a CD4E, rather than casting the channels directly into the case,



Ford set up a less elaborate flat section with a variety of ports. They then use a stiff plate with mating holes to line up with the ports on one side which are open to traditional channels on the other side. The separator plates and VB are bolted up to this plate which "transfers" fluid from the case to the VB. When you start a disassembly of the CD4E, you pull the pan and remove the correct bolts and the entire VB assembly (several sections and the transfer plate) come off together.

**chuggle** Chuggle is that back-and-forth, engine on-and-off feeling as it resists being pulled down to a stall. In an automatic with a lockup torque converter, the TCC piston is the direct connection between the input/turbine shaft and the crankshaft by way of the converter cover and flex plate. If the piston remains applied through hydraulic force or mechanical failure, the wheels are still connected to the crankshaft on coastdown. Chuggle in an automatic is similar to what is first noticed in a manual transmission when the clutch is not disengaged while coasting to a stop.

**coastdown or coastdown clunk** Coastdown is off throttle, allowing the vehicle to slow down on its own. At some point the vehicle would be expected to downshift, hopefully with minimal pressure (no TV boost) to engage the shift smoothly. A common problem is a noticeably harsh downshift while coasting, felt as the transmission firmly "clunks" down into a lower gear.

**converter shudder** A hard, violent shaking felt throughout the vehicle caused by the converter lockup piston alternately and abruptly grabbing or holding, matching input and output speeds, then releasing, allowing slip. See TCC cycling and falling out of lockup.

**crowding** As in crowding, the throttle or crowding the converter. Converter "crowding" means that you are starting to drag the lockup piston against the cover when you should be in full release. We often use the word "crowding" for a situation where you don't give something quite enough to do its job and something you do makes the situation even worse. Example: Driving uphill when the engine is beginning to labor. Instead of stepping on the gas hard enough to provide needed power or, better yet, causing a downshift, push down very lightly and the engine laboring gets worse. We call that "crowding" the throttle. In converter crowding, the leakage causes insufficient release pressure, then at low rpm flow drops off, pressure gets lower and the converter "crowding" puts the engine under even more strain. If pressure goes low enough, converter drag is so bad it can stall the engine at idle.

**cutback** See boost

**CVI** Clutch Volume Index is a computer calculation based on the time required to complete a shift. The computer compares input and output speed readings and monitors time required to complete a ratio change and expresses the time it takes to fill the clutch as a clutch volume index. While the clutch volume does not appreciably change over the parts life, increase in the CVI indicates slower fill and shift completion due to leaks, slippage or mechanical malfunction.

**detent downshift** See kickdown

**drainback or draindown** During normal operation, the transmission's internal components, the torque converter and the cooler system are fully charged (filled) with fluid. When the unit is shut down, gravity takes over and fluid tends to drain down into the sump. Excessive clearances or unrestricted passages created between line and lube increase the amount of drainback, leaving the components filled with air rather than fluid. This then causes a delay in any action when the unit is restarted until the air is purged and components recharged with fluid. The negatives of drainback are the delayed engagements and bushing wear caused by running with reduced lubrication until the system charges.

**ECCC, EC3 or EC Cubed** Electronically Controlled Capacity Clutch

**EMCC** Electronically Modulated Converter Clutch

**end bump** A bump or a noticeably harsh apply at the completion of a shift. Pressure control or an accumulator should cushion the fill rate of a clutch or component. Proper accumulator function would have the accumulator bottoming out at the time the shift is completed. If the accumulator bottoms too soon, uncushioned apply completes the clutch fill abruptly and a bump is felt.



**EPC** Electronic Pressure Control

**failsafe** Transmission Control Modules are programmed to monitor a variety of inputs received from the transmission and from other vehicle computers. Under certain circumstances where errors are found, the computer goes into a failsafe strategy. This mode of operation is designed to help prevent further damage if possible and allows the unit to be driven in at least one forward gear and reverse. The name derives from having seen a Failure and the strategy to provide some Safe operation. Also referred to as Limp In, Limp Mode or FMEM

**failsafe high line** Part of the failsafe strategy in many units is to have the controller command maximum line pressure to prevent component slippage and further damage. See failsafe.

**falling out of lockup** Usually caused by problems within the converter apply valve circuit, falling out of lockup is not a low pressure issue allowing slippage, but a full release of the converter's lockup piston. RPM observation and feel of falling out of lockup would be the same as if the converter clutch was unlocking normally as designed. See converter shudder and TCC cycling.

**flare or flare shift** A holding/driving element has released before an engagement of the oncoming element holds properly. Basically, one component releases before the other applies so the transmission is not driving at a fixed ratio (neutrals), momentarily. The result is a noticeable flare in engine RPM. See bind-up and normal shift.

**flare/bump** Engine rpm flare + bump when it finally engages. See flare and end bump.

**flow vs. pressure** See pressure vs. flow

**forced kickdown** See kickdown.

**high line** High line pressure. Although still regulated, it is more than desired. See runaway high line.

**kickdown** Part of the automatic transmission design is for the unit to automatically downshift under certain load and throttle position conditions. The response to moving your foot and having the unit downshift is the basis for the term "kickdown." Although the unit should downshift on its own under the right circumstances, drivers will often make a deliberate step down on the throttle, which is intended to result in a downshift, referred to as "forced kickdown."

**limp in or limp mode** See failsafe.

**line or line pressure** The regulated pressure created by the pump and the pressure regulator valve that is the primary force used to control or accomplish all the work in an automatic transmission.

**line rise** See boost.

**line to lube** The circuit where regulated line is tied into the converter/lube circuit. This can be on done by OE or aftermarket in various locations. An open hole created to supply lube will allow the converter to drain back after shutdown. See drainback.

**low line** Line pressure lower than normal or below the spring regulation point of the regulator valve. Can be caused by a weak spring, worn valve bore, downstream leakage or low source pressure to the valve.

**lube** Short for lubrication or for lube circuit. Line pressure oil flows around doing work within the unit and a certain amount of that flow is offed off to provide lubrication to key areas.

**lube regulated valve** In an effort to overcome converter charge and lube issues under low flow conditions, Sonnax lube regulated valves are designed to provide additional "lube" flow, similar to the practice of drilling line to lube. These valves are designed to overcome the negative aspects of line-to-lube drilling in that they do not negatively affect flow and pressure when additional flow is not needed and they do not allow drainback. See line to lube.

**manual gear selection** In most modern units with overdrive you can usually only select OD, D or L as forward choices. Manually placing the lever in L (called manual low) most often will allow a start out in 1st and shift to 2nd, possibly to 3rd in some 5- and 6-speed transmissions. Although you are in the same ratio, using the same clutches in 1st, or in 2nd, or in 3rd gears when shifting up through gears after selecting OD as you would in D(3), or making the same 1-2 upshift from manual low as you would from D, there are different hydraulics in play, usually to create some operating benefit such as engine braking. The reason we may mention things like "in manual low" or "in D(3)" is that it becomes important to note that certain problems may appear in one manually selected range but not in another. This often helps in diagnosing the area causing the problem. If you know what different circuitry is being applied, you know where to look for a problem.



**minimum line** See base line.

**MTV** Modulated Throttle Valve. In earlier units, a TV or kickdown cable was attached to the throttle so stepping on the gas mechanically moved a throttle valve or plunger in the transmission to allow shifts to be tailored to how far the throttle was open. Some units used a vacuum source and modulator to control MTV. In more current electronic units, there is no cable but the computer knows throttle position and commands



**normal shift or properly timed shift** During a normal shift, one clutch or band has to release while a different clutch or band applies, changing the ratio between transmission input and output speeds. The key is that the apply and release have to be timed properly. Two common problems result if they are not timed correctly. If both are applied you bind up, if momentarily neither are applied, the engine RPM flares.

**pilot pressure** JATCO terminology for circuit similar to solenoid regulator or actuator feed circuit.

**pressure testing options** The gear selected, the temperature of the fluid, the idle speed or the throttle position (if not at idle), will all have an effect on the anticipated pressures.

- 1. Park (high idle):** Just what it sounds like - not in gear, engine idles higher, pump flow and pressures may be up compared to other idle readings.
- 2. Drive (idle cool):** Lower engine speed than Park so flow and pressures down somewhat. Fluid still cool (thicker), so pressure higher than idle hot.
- 3. Drive (idle hot):** Thinner fluid and lower RPM cause this to be the lowest of all pressure readings you should see.
- 4. D (WOT Stall) -- WOT -- Wide Open Throttle:** Stall - maximum RPM the engine will reach in gear with the transmission prevented from moving the car (standing on the brakes). The high RPM and the EPC responding to heavy throttle will result in the maximum pressures.

Think of Drive Idle Hot and Drive WOT Stall as the minimum and maximum readings you would see in Drive. The highest pressure you will see ever is Reverse Stall due to the combination of boost signal created by maximum TV influence and reverse boost influence.

**pressure vs. flow** Pressure is a force applied uniformly over a surface measured or expressed as a force per unit of area. The most common measure used for transmission discussion is psi, pounds per square inch or KPA/ kilopascals. Pressure represents the potential strength or capability of the force that can be utilized to do some form of work. Flow is the expression of the volume of fluid than can be moved or provided over a given period of time. Commonly, gallons, quarts or liters per minute or second are used in transmission discussion. Flow represents the volume output capacity of a pump or the volume capacity that can move through a passage or restriction.

**PWM** Pulse Width Modulated. An electronic means of solenoid control using a fixed time cycle or frequency of paired on and off signals and a fixed voltage apply rate. While the full time used to complete an on and off cycle remains constant, the control or modulation is established by varying the comparative length of the on time vs. the off time within the cycle.

The "duty cycle" is described in terms of the percentage of on time used during the complete on/off cycle time frame.

**quart in 20 seconds** Prior to having an accurate method of measuring flow through a transmission's cooler, the standard rule was to pull a cooler return hose, run the vehicle and capture the fluid that flowed out during a measured time. If you could verify the flow of at least a quart over 20 seconds, you had acceptable flow. On a Sonnaflow, this would equate to .8 GPM.

**reaction area** In the context of hydraulic valves, it is common to introduce oil under pressure to a cavity between two spools. Pressure will be applied equally to the surface area of each spool face. If the spool areas are different, the valve will push in the direction of the greatest area. The reaction area is the difference in the area of the two spools in question. The force with which the valve will push is the reaction area times the pressure applied.

**regulated air (sometimes referred to as "low" air pressure)** Common transmission test and diagnosis methods involve using compressed air for testing. These tests are directed to be performed using regulated air pressure. Different tests require different pressures but "regulated air" is always lower than "shop air". Testing with shop air can be messy, dangerous and difficult to control.

**runaway high line** Uncontrolled, unregulated line pressure that will go as high as the pump capacity can take it. That could be 500-700 psi or even more, in cases where the target might have been 100 or even 200. Things tend to break when line pressure "runs away."

**run-out** Roundness and concentricity of an object can be measured by rotating it around its axis. Run-out is the variation of the location of points around the circumference as the object is rotated. A perfectly round object rotated exactly around its centerline would have zero run-out. An out-of-round object or an object whose centerline is not the center it is being rotated around, will give a range of measurements. The difference between the high and low measurements that would be taken off a rotating object is the TIR or Total Indicated Run-out.

**scarf cut (seals)** Most non-metallic sealing rings are not a continuous circle but are cut and formed into a circle with the two ends touching each other. If you cut them square, you get a butt cut. This tends to either leave a gap between the ends if overall length is shorter than circumference or the seal bulges out of groove if overall length is longer. Scarf-cut seals have ends cut at an angle, allowing one end to lie next to or over another (picture a scarf joint used in woodworking). This allows a little leeway for length vs. circumference as the ends don't butt and bulge nor leave a gap but slide over one another instead.

**shuttle shift** Shuttling back and forth between two gears. An upshift is completed, then the unit downshifts back, then upshifts again and may continue to go back and forth.

**side loading** See annular grooves.

**slide/bump** Shift is soft, engagement is delayed or "slides" in with a noticeably firm finish or "bump" on the end. See slide shift and end bump.

**slide shift** A slide shift is a shift that takes excessively long to complete. You can often count off some time from when the shift begins to when you feel it finally engage. See flare.

**Sonnaflow**® A measuring device designed and calibrated to give an accurate measurement of ATF flow rates in gallons per minute. The tool not only gives a more accurate reading than the old quart-in-20-second rule but can be done under actual driving conditions as opposed to at idle in the shop.



Additional test techniques allow the tool to be used to verify hydraulic activity or response by recording the changes in flow that occur during valve action, clutch fill or pump activity.

**stacked upshift** After an upshift is completed, the unit then quickly upshifts to the next gear and possibly more after that. These upshifts occur in rapid succession, before the vehicle has picked up enough speed to justify the upshift.

**stall or stall speed** The maximum RPM the engine will reach in gear with the transmission prevented from moving the car. Impeller, stator and turbine design determine a converter's ability to hold (low stall) or slip (high stall) when put under input torque load, but prevented from output rotation.

**TCC** Torque Converter Clutch

**TCC cycling** A cycling of the apply pressure on the converter's lock-up piston causing a cycling slip rate (comparison of the input and output speeds through the converter). Cycling can often be seen on the vehicle's tachometer or on a scan tool and can sometimes be felt by the operator and may often be described as a surging feeling while trying to drive at a steady cruise. See converter shudder and falling out of lockup.

**tie-up** See bind-up

**TIR or T.I.R.** Total Indicated Run-out. See run-out.

**transfer plate** See channel plate

**TV or TV pressure** Throttle Valve. In earlier units, a TV or kick-down cable was attached to the throttle so stepping on the gas mechanically moved a throttle valve or plunger in the transmission. Throttle valve pressure could be used to influence when an upshift or downshift occurred and also used to influence line pressure by means of a boost valve. In more current electronic units, there is no cable but the computer monitors throttle position and controls hydraulics to exert a controlled or "modulated TV oil" for the same purposes.

**WAT** See Wet Air Test

**Wet Air Test** A Wet Air Test is a captive air test, meaning a circuit is sealed off to block any designed path of escape. Remaining paths of escape would be the result of wear or excessive clearance between parts. The test utilizes ATF to provide a visual method of spotting leakage and regulated air pressure introduced into the circuit, in an attempt to force a leak. 20

to 30 psi provides a good, controllable force for testing most valves and bores. Additional pressure is needed to seat sealing rings or to test circuits that involve activating or moving larger, heavier components.

**WOT** wide open throttle