DRIVEABILITY—IDLE AIR CONTROL (IAC) VALVE DIAGNOSTIC SERVICE TIPS	Article No. 03-3-5

FORD: 2000-2003 TAURUS
2002 THUNDERBIRD
2000-2003 EXPLORER, RANGER
2001-2003 EXPLORER SPORT TRAC, EXPLORER SPORT

LINCOLN: 2000-2002 LS

MERCURY: 2000-2003 SABLE, MOUNTAINEER

ISSUE

Some vehicles, may exhibit drivability conditions. These may include:

- No start
- Difficult to start
- Stall
- Low idle
- Rough idle
- High idle
- Hesitation/surge while accelerating or at steady speed

These conditions may be intermittent with no Diagnostic Trouble Codes (DTC) and no Malfunction Indicator Lamp (MIL). In some cases DTC and MIL may be evident.

ACTION

Trouble cannot be identified with 95% of returned Idle Air Control (IAC) valves. The following procedure is supplemental information to normal diagnostics to facilitate accurate identification of malfunctioning valves. These symptoms would include engine stall, hard start, crank/no start, idling problems, and Idle Speed Control System related DTC's.

If the service writer uses the attached worksheet (Figure 2) for all drivability concerns including stalls it will assist the technician making a correct repair the first time.

Perform normal diagnostics.

SERVICE INFORMATION

NOTE

IT MAY NOT BE POSSIBLE TO DUPLICATE THE CUSTOMER CONCERN. ALTHOUGH THE CONDITION MAY NOT BE DUPLICATED, IT IS RECOMMENDED THAT ANY EVALUATION OF THE IAC VALVE BE DONE IN ACCORDANCE WITH THE FOLLOWING SERVICE PROCEDURE.

IAC DIAGNOSTIC SERVICE TIPS - GENERAL

Never clean an IAC valve. Carburetor cleaners and other cleaning agents may temporarily repair the drivability concern, but the long-term functionality of the valve is compromised.

For all drivability concerns, make certain the service writer obtains as much information as possible from the customer as to the conditions causing drivability concern. Attached is a drivability concern check off sheet (Figure 2) that if used, can help reduce the time required to diagnose a vehicle.

NOTE

IF THE ENGINE STALLED WHILE THE VEHICLE WAS IN GEAR AND MOVING THE POSSIBILITY OF THE IAC VALVE CAUSING THIS IS UNLIKELY UNLESS IT OCCURRED ON DECELERATION.

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

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Use the following Supplemental information for 3.0L 4V Duratec Engines, in the Taurus/Sable, and Lincoln LS.

1. Use the following conditions for the test described below:
   - Transmission in park
   - Engine temperature should be at least 190° F (88° C)
   - All accessories should be off steering wheel in the center position
   - EGVR and EVAPDUTY CYCLE at zero, if the vehicle has an EGR system
   - Short and long term fuel trims less than 15%
   - At stabilized engine speed (RPM) and temperature (hot idle) per the Powertrain Control Emission Diagnostics (PC/ED) manual, verify the IAC duty cycle is within reference values called out in the following chart in this TSB.

NOTE
IT IS USUAL TO SEE THE IAC DUTY CYCLE VARY BY 1% TO 2% OVER SEVERAL MINUTES.

If the Duty Cycle is out of specification, proceed with the following steps:

1. Ensure that there is no purge flow.
2. Verify PCM harness integrity by performing a wiggle test on the harness while the engine is running and observe the IAC duty cycle and engine performance. Should abnormalities be observed, repair the harness as required.
3. For an IAC duty cycle high concern, unplug and plug in the IAC power connector several times. If the duty cycle remains high, replace IAC valve.
4. For an IAC duty cycle low concern, there may be an intake air leak. See the below IAC diagnostic service tip for DTC 1506 and other high idle concerns.

Use the following Supplemental information for the 3.9L Lincoln LS and Thunderbird.

1. Use the following conditions for the test described below:
   - Transmission in park
   - Engine idle at approximately 650 RPM
   - Engine temperature should be at least 190° F (88° C)
   - All accessories and the engine cooling fan should be off
   - Steering wheel in the center position
   - EGRVR and EVAPDUTY CYCLE are zero
   - Short and long term fuel trims less than 15%

NOTE
IT IS USUAL TO SEE THE IAC DUTY CYCLE VARY BY 1% TO 2% OVER SEVERAL MINUTES.

NOTE
IT IS EXTREMELY IMPORTANT TO CHECK THE IAC DUTY CYCLE WHEN THE RPM IS AT 650 RPM. EVEN 700 RPM IS TOO HIGH FOR CHECKING the IAC VALVE DUTY CYCLE UNDER THESE CONDITIONS. IF THE RPM IS OVER 650 RPM, MOMENTARILY OPENING AND CLOSING THE THROTTLE AND A SHORT EQUILIBRATION TIME WILL LOWER THE RPM.

At stabilized engine speed and temperature, verify that the IAC duty cycle is between 27-36% with no purge flow (EVAPV duty cycle is 0%).

If the Duty Cycle is out of specification, proceed with the following steps:

1. Ensure there is no purge flow.
2. Verify PCM harness integrity by performing a wiggle test on the harness while the engine is running and observe the IAC duty cycle and engine performance. Should abnormalities be observed, repair the harness as required.
3. For an IAC duty cycle high concern, unplug and plug in the IAC power connector several times. If the duty cycle remains high, replace IAC valve.
4. For an IAC duty cycle low concern, there may be an intake air leak. See the below IAC diagnostic service tip for DTC 1506 and other high idle concerns.

NOTE
IF THE ORIGINAL IAC VALVE WAS WITHIN DUTY CYCLE SPECIFICATION OR THE DUTY CYCLE REMAINS OUT OF SPECIFICATIONS AFTER IAC VALVE REPLACEMENT FURTHER DIAGNOSTICS ARE REQUIRED TO ADDRESS THE CUSTOMER CONCERN.

Use the following Supplemental information for 4.0L SOHC Engines in the Ranger, Explorer, Mountaineer, Explorer Sport and Explorer Sport Trac.

If no DTC's present check the following items in this order before examining the IAC valve:

- BARO Hz reading - Refer to Barometric Pressure Chart listed in this TSB
- Battery and fuse box power lead
- Ground wire attachments
- Wiring (wiggle test)
- PCM voltage
- Vacuum leaks

Examine IAC valve under these conditions:

- PCM updated to the latest available calibration
- Transmission in park
- Warm stabilized vehicle with engine temperature at least 190° F (88° C)
- All accessories and cooling fan should be off
- Steering wheel in the center position
- EGVR and EVAPDC at zero, if the vehicle has an EGR system
- Short and long term fuel trims (less than 15)

Perform the following steps in order:

1. Using either NGS or WDS bring up the following PIDS: IACTRIM, IACKAM2, IACKAM3.
2. Allow vehicle to idle until the IACTRIM PID is 0.

NOTE
IACTRIM ALWAYS TRIES TO GO TO 0. WHEN MOVING TOWARDS 0, THE IACKAM2 PID SHOULD BE CHANGING. IF IACKAM3 IS CHANGING, THEN THE AIR CONDITIONING SHOULD BE TURNED OFF.

3. If IACKAM2 is between -0.35 and +0.35 with IACTRIM=0, then the valve is operating properly at idle. The remainder of this TSB will help diagnose true root cause.
4. If IACKAM2 is not between -0.35 and +0.35, it is highly likely that the engine idle system (to include the throttle body and air intake system) is not operating properly.

NOTE
FOR ALL VEHICLES PLEASE RECORD THE OBSERVED IAC DUTY CYCLE AND ENGINE RPM IN THE WARRANTY CLAIMS COMMENTS FOR THIS DIAGNOSTIC.

IAC Diagnostic Service Tips - DTC 1506 (IAC Over Speed Error) and other High Idle Concerns:

- There are two primary causes of high idle:

1. Damaged IAC valves and
2. Vacuum leaks

- IAC valves can be damaged from engine induction backfires. Many times the customer may not notice the induction backfire but will notice the high idle afterwards. Indications of valve damage can be a shiny, almost polished appearance in the interior of the valve and a dislocated pintle. An IAC valve damaged by backfire should be replaced. Refer to Figure 1.
- Inspect PCV system for leaks especially looking for cracks along any rubber elbow joints; also verify that the correct PCV valve is installed.
- Inspect for vacuum hoses loose or disconnected from intended ports and connections. Induction backfire can loosen or disconnect vacuum hoses.
- Two indicators can help you identify if a vacuum leak is present, even if the engine RPM appear normal in the service bay. If the duty cycle is below specification that is indicative that the engine is receiving too much air (from a vacuum leak) and the PCM is ordering the valve to close up to restrict flow. Another indication is fuel trim. Record the long term and short term fuel trim PIDS (LONGFT1, LONGFT2, SHORTFT1, etc.), if short term fuel trims are high (above specification) this is a possible indication of a vacuum leak, making the engine run lean, and the PCM is attempting to compensate.

IAC Diagnostic Service Tips - DTC 1507 (IAC Under Speed Error) and Other Low Idle Concerns:

- An under speed error may not necessarily be a fault with the IAC valve. A large friction load on the engine or obstruction in the air intake system could also reduce the engine RPMs.
- There are four possible sources of friction load that can contribute to under speed error or low idle concerns.

1. Power Steering Load
2. Air Conditioning Load
3. Electrical Load
4. Automatic Transmission Torque Converter Load

IAC Diagnostic Service Tips - Rough Idle Concerns:

- Rough idle concerns are often a result of a lean running condition
- Another possible cause is contamination build up on the MAF sensor

IAC Diagnostic Service Tips - Engine Hard Start/Engine Crank-No Start

- While performing diagnostics, the technician should ensure that the fuel system is working correctly for all engines with hard start/crank no-start complaints.
- When diagnosing a mechanical return less fuel system, the following correction to the PC/ED pinpoint HC (4) diagnostic procedure should be used when performing the KEOE fuel pressure test:
- Perform the KOEO fuel pressure test as specific in the PC/ED manual.
- The fuel pressure should drop off no more than 10 psi from maximum pressure (no lower than 55 psi for a 65 psi max system or no lower than 45 psi for a 55 psi max system) within 5 minutes of the start of the test.
- The fuel pressure should drop off to no less than 30 psi within 30 minutes of the start of the test.
- For greatest accuracy, the service technician should read the fuel pressure as soon as possible after pump shut off, no more than 5 minutes after the start of the test.

NOTE

RETURNABLE AND ELECTRONIC RETURN LESS SYSTEMS SHOULD ALSO BE DIAGNOSED USING THE PROCEDURES LISTED FOR THEM IN PINPOINT TEST HC.

IAC Diagnostic Service Tips - High Idle RPM at Start Up:

- Most engines will have a temporary high idle at engine start up to allow for catalyst light off. If DTC 1506 is not present, this indicates that there is no fault present with the IAC.
- A vehicle with very low odometer miles, may exhibit a higher than normal temporary startup fast idle (1600-2500 RPM that decreases slowly). No repairs should be attempted because this is a normal temporary PCM calibration strategy to prevent spark plug fouling during plant/transportation operation. The calibration will permanently revert to its normal strategy after the PCM has seen its first 4 miles of continuous drive cycle. A brand new vehicle may accumulate some mileage without turning this strategy off if the drive cycle has been below 4 miles at a time.

IAC Diagnostic Service Tips - IAC Valve Noise Issues

For IAC valve noise concerns check for obstructed or potentially damaged IAC valve from backfire.

NOTE

ON SOME NEWER MODEL YEAR VEHICLES THE REACTION SPEED OF THE IAC VALVE IS FAST ENOUGH THAT IT MIGHT MAKE A "POPPING" SOUND AS IT REACTS TO A LARGE IDLE LOAD. THIS IS A NORMAL CHARACTERISTIC AND NO ATTEMPTS SHOULD BE MADE IN AN EFFORT TO MODIFY THE PERFORMANCE OF THE IAC VALVE. IF POSSIBLE, COMPARE AGAINST A LIKE VEHICLE.

2000 MODEL YEAR - IAC DUTY CYCLE AND ENGINE RPM				
Vehicle Line	Engine Size	IAC Duty Cycle	Engine DSDRPM	Engine RPM
Lincoln LS (A/T)	3.0L	27-47%	725	695-755
Lincoln LS (M/T)	3.0L	20-40%	850	820-880
Lincoln LS (A/T)	3.9L	27-36%	650	628-668
Taurus	3.0L 4V	16-50%	704	674-734
Sable	3.0L 4V	16-50%	704	674-734

2001 MODEL YEAR - IAC DUTY CYCLE AND ENGINE RPM				
Vehicle Line	Engine Size	IAC Duty Cycle	Engine DSDRPM	Engine RPM
Lincoln LS (A/T)	3.0L	27-47%	725	695-755
Lincoln LS (M/T)	3.0L	20-40%	850	820-880
Lincoln LS (A/T)	3.9L	27-36%	650	628-668
Taurus	3.0L 4V	24-52%	704	674-734
Sable	3.0L 4V	24-52%	704	674-734

2002 MODEL YEAR - IAC DUTY CYCLE AND ENGINE RPM				
Vehicle Line	Engine Size	IAC Duty Cycle	Engine DSDRPM	Engine RPM
Lincoln LS (A/T)	3.0L	30-50%	725	695-755
Lincoln LS (M/T)	3.0L	31-51%	850	820-880
Lincoln LS (A/T)	3.9L	27-36%	650	628-668
Thunderbird (A/T)	3.9L	27-36%	650	628-668
Taurus	3.0L 4V	24-52%	656	626-686
Sable	3.0L 4V	24-52%	656	626-686

2003 MODEL YEAR - IAC DUTY CYCLE AND ENGINE RPM				
Vehicle Line	Engine Size	IAC Duty Cycle	Engine DSDRPM	Engine RPM
Taurus	3.0L 4V	24-52%	656	626-686
Sable	3.0L 4V	24-52%	656	626-686

NOTE

REMEMBER THAT MOST WEATHER SERVICES REPORT A LOCAL BAROMETRIC PRESSURE THAT HAS BEEN CORRECTED TO SEA LEVEL. THE BARO PID, ON THE OTHER HAND, REPORTS THE ACTUAL BAROMETRIC PRESSURE FOR THE ALTITUDE THE VEHICLE IS BEING OPERATED IN. LOCAL WEATHER CONDITIONS (HIGH AND LOW PRESSURE AREAS) WILL CHANGE THE LOCAL BAROMETRIC PRESSURE BY SEVERAL INCHES OF MERCURY (±3 Hz, ±1 in. Hg.).

NOTE

BARO IS UPDATED ONLY WHEN THE VEHICLE IS AT HIGH THROTTLE OPENINGS. THEREFORE, A VEHICLE, WHICH IS DRIVEN DOWN FROM A HIGHER ALTITUDE MAY NOT HAVE HAD AN OPPORTUNITY TO UPDATE THE BARO VALUE IN KAM. IF YOU ARE NOT CONFIDENT THAT BARO HAS BEEN UPDATED, PERFORM THREE OR FOUR HEAVY, SUSTAINED ACCELERATIONS AT GREATER THAN HALF-THROTTLE TO ALLOW BARO TO UPDATE.

BAROMETRIC PRESSURE REFERENCE			
Barometric Pressure (in. Hg.)	Barometric Pressure (kPa)	BARO/MAP PID (Hz)	Altitude above sea level (ft)
3.5	11.8	89.3	
5	16.9	92.8	
10	33.8	104.6	
15	50.7	117.0	14,000
20	67.5	129.6	10,000
21	70.9	132.5	9,000
22	74.3	135.4	8,000
23	77.7	138.3	7,000
24	81.1	141.1	6,000
25	84.4	144.0	5,000
26	87.8	146.9	4,000
27	91.2	149.8	3,000
28	94.6	152.8	2,000
29	97.9	155.8	1,000
30	101.3	158.9	0 (sea level)
31	104.7	162.0	
31.875	107.7	164.7	

OTHER APPLICABLE ARTICLES: NONE
WARRANTY STATUS: INFORMATION ONLY
OASIS CODES: 602300, 603300, 607000, 607400, 607700, 608000, 608400, 611000, 618400, 619400, 698298

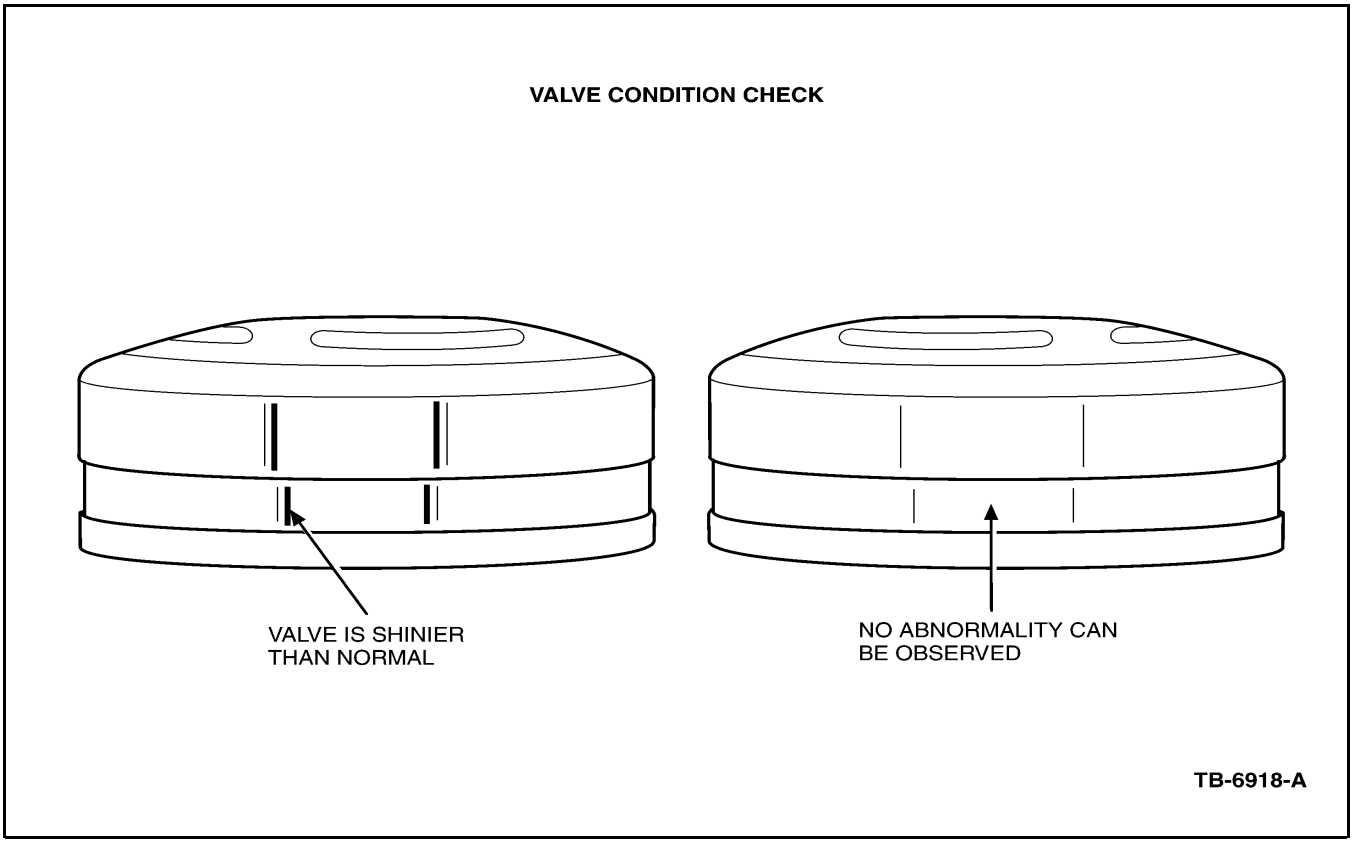


Figure 1 - Article 03-3-5

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Ford Motor Company Driveability Concern Check Sheet

Dealer Code: _____ Dealer Name: _____

Dealer Phone: _____ Contact Name: _____

Vehicle Information	
Model Year:	Vehicle Line:
Market Derived:	Warranty Start Date:
Body/Cab Type:	Production Date:
Version/Series:	VIN:

In the customer's words what happened.
Has the vehicle been repaired for a driveability issue before?

_____
_____
_____
_____
_____
_____
_____
_____

Mileage at last concern:_____miles **Mileage Now:**_____miles

Frequency of Occurrence _____Constantly _____Times Per Week ____Once ____Other (specify above)

Previously Repaired?	☐ Yes	☐ No	
Ambient Temperature	☐ Hot	☐ Warm	☐ Cold approx. temp. =_____F
Weather Conditions	☐ Dry	☐ Wet	☐ Other (specify above)
Driving Conditions	☐ Stop-Go	☐ Highway	☐ Other (specify above)
Vehicle Speed	☐ 0-10 mph	☐ 10-20 mph	☐ Other (specify above)
Transmission Gear	Circle: **P R N D 4 3 2**		
Fuel Level in Tank	☐ Full	☐ 3/4	☐ 1/2 ☐ 1/4 ☐ Very Low
Restarting	☐ Restarts only with ignition key ☐ Restarts itself immediately		☐ Will not restart ☐ Restarts after long crank
Engine Stalls Information	☐ At steady throttle ☐ Shifting into drive ☐ Loses power then quits ☐ When maneuvering at low speed		☐ Turning left/right ☐ When accelerating ☐ Slowing down ☐ After starting

Has the vehicle had any non-approved devices installed? (i.e. Alarm, Tracker, Radio, Telephone etc.)
☐ No ☐ Yes, Specify _____
_____
_____
_____

TB-6997-A

Figure 2 - Article 03-3-5