Tune-Up

TUNE-UP PROCEDURES

Spark Plugs

Spark plugs ignite the air and fuel mixture in the cylinder as the piston reaches the top of the compression stroke. The controlled explosion that results forces the piston down, turning the crankshaft and the rest of the drive train.

Ford recommends that spark plugs be changed ever 12,000 miles with conventional ignition systems, and every 18,000 miles with electronic ignition systems. Under severe driving conditions, those intervals should be halved. Severe driving conditions are:

1. Extended periods of idling or low speed operation, such as off-road or door-to-door delivery.
2. Driving short distances (less than 10 miles) when the average temperature is below 10° F for 60 days or more.
3. Excessive dust or blowing dirt conditions.

When you remove the spark plugs, check their condition. They are a good indicator of the condition of the engine. It is a good idea to remove the spark plugs at regular intervals, such as every 3,000 or 4,000 miles, just so you can keep an eye on the mechanical state of the engine.

A small deposit of light tan or gray material on a spark plug that has been used for any period of time is considered normal. Any other color, or abnormal amounts of deposit, indicate that there is something amiss in the engine.

The gap between the center electrode and the side or ground electrode can be expected to increase not more than 0.001 in. every 1,000 miles under normal conditions. When, and if, a plug fouls and begins to misfire, you will have to investigate, correct the cause of the fouling and either clean or replace the plug.

There are several reasons why a spark plug will foul and you can learn which reason is at fault by just looking at the plug. A few of the most common reasons for plug fouling and a description of fouled plug appearance are listed in the "Color Insert" section, which also offers solution to the fouling causes.

SPARK PLUG HEAT RANGE

Spark plug heat range is the ability of the plug to dissipate heat. The longer the insulator (or the farther it extends into the engine), the hotter the plug will operate; the shorter the insulator the cooler it will operate. A plug that absorbs little heat and remains too cool will quickly accumulate deposits of oil and

carbon since it is not hot enough to burn them off. This leads to plug fouling and consequently to misfiring. A plug that absorbs too much heat will have no deposits, but, due to the excessive heat, the electrodes will burn away quickly and in some instances, preignition may result. Preignition takes place when plug tips get so hot that they glow sufficiently to ignite the fuel/air mixture before the actual spark occurs. This early ignition will usually cause a pinging during low speeds and heavy loads.

The general rule of thumb for choosing the correct heat range when picking a spark plug is: if most of your driving is long distance, high speed travel, use a cooler plug; if most of your driving is stop and go, use a hotter plug. Original equipment plugs are compromise plugs, but most people never have occasion to change their plugs from the factory-recommended heat range.

REPLACING SPARK PLUGS

A set of spark plugs usually requires replacement before about 10,000 miles on Broncos with conventional ignition systems and after about 20,000 to 30,000 miles on Broncos with electronic ignition, depending on your style of driving. In normal operation, plug gap increases about 0.001 in. for every 1,000–2,500 miles. As the gap increases, the plug's voltage requirement also increases. It requires a greater voltage to jump the wider gap and about two to three times as much voltage to fire a plug at high speeds than at idle.

When you're removing spark plugs, you should work on one at a time. Don't start by removing the plug wires all at once, because unless you number them, they may become mixed up. Take a minute before you begin and number the wires with tape. The best location for numbering is near where the wires come out of the cap.

1. Twist the spark plug boot and remove the boot and wire from the plug. Do not pull on the wire itself as this will ruin the wire.
2. If possible, use a brush or rag to clean the area around the spark plug. Make sure that all the dirt is removed so that none will enter the cylinder after the plug is removed.
3. Remove the spark plug using the proper size socket. Turn the socket counterclockwise to remove the plug. Be sure to hold the socket straight on the plug to avoid breaking the plug, or rounding off the hex on the plug.
4. Once the plug is out, check it against the plugs shown in this section to determine engine condition. This is crucial since plug readings are vital signs of engine condition.
5. Use a round wire feeler gauge to check the plug gap. The correct size gauge should pass through the electrode gap with a slight drag. If you're in doubt, try one size smaller and one larger. The smaller gauge should go through easily while the larger one shouldn't go through at all. If the gap is incorrect, use the electrode bending tool on the end of the gauge to adjust the gap. When adjusting the gap, always bend the side electrode. The center electrode is non-adjustable.
6. Squirt a drop of penetrating oil on the threads of the new plug and install it. Don't oil the threads too heavily. Turn the plug in clockwise by hand until it is snug.
7. When the plug is finger tight, tighten it with a wrench.
8. Install the plug boot firmly over the plug. Proceed to the next plug.

CHECKING AND REPLACING SPARK PLUG CABLES

Visually inspect the spark plug cables for burns, cuts, or breaks in the insulation. Check the spark plug boots and the nipples on the distributor cap and coil. Replace any damaged wiring. If no physical damage is obvious, the wires can be checked with an ohmmeter for excessive resistance. (See the tune-up and troubleshooting section.)

When installing a new set of spark plug cables, replace the cables one at a time so there will be no mixup. Start by replacing the longest cable first. Install the boot firmly over the spark plug. Route the wire exactly the same as the original. Insert the nipple firmly into the tower on the distributor cap. Repeat the process for each cable.

Spark Plug Wires—Dura Spark System

The secondary wires used with the DURA SPARK II system are 8 mm to contain the higher output voltage. There are two types of wires used in the system and some engines will have both types. It is important to properly identify the type of wire used for each cylinder before replacements are made.

Both types are blue in color and have silicone jacketing. The insulation material underneath the jacketing may be EPDM or another silicone layer separated by glass braid. The cable incorporating EPDM is

Tune-Up Specifications

Year	Engine No. Cyl Displacement	Spark Plugs Type	Spark Plugs Gap (in.)	Distributor Point Dwell (deg)	Distributor Point Gap (in.)	Ignition Timing (deg) Manual Trans	Ignition Timing (deg) Auto Trans	Intake Valve Opens (deg)	Fuel Pump Pressure (psi)	Compression Pressure (psi)	Idle Speed Manual Trans	Idle Speed Auto ④ Trans	Clearance (in.) Intake	Clearance (in.) Exhaust
1966–67	6–170	BF82	.034	40	.025	0 ⑤	—	9	4–6	175	650	—	.018	.018
	8–289	BF42	.034	29	.017	6B	—	16	4–6	155	625	—	Hyd.	Hyd.
1968	6–170	BF82	.034	37	.027	6B	—	9	4–6	175	700	—	.018	.018
	8–289	BF42	.034	29	.017	6B	—	16	4–6	155	625	—	Hyd.	Hyd.
1969	6–170	BF82	.034	37	.027	6B	—	9	4–6	①	750	—	.018	.018
	8–302	BF42	.030	27	.021	6B	—	16	4–6	①	650	—	Hyd.	Hyd.
1970	6–170	BF82	.034	37	.027	6B	—	9	4–6	①	775	—	.018	.018
	8–302	BF42	.034	27	.021	6B	—	16	4–6	①	675	—	Hyd.	Hyd.
1971	6–170	BRF82	.034	36	.027	6B	—	9	4–6	①	775	—	.018	.018
	8–302	BRF42	.030	27	.021	6B	—	16	4–6	①	800/500 ③	—	Hyd.	Hyd.
1972	6–170	BRF82	.034	36	.027	6B	—	9	4–6	①	750	—	.018	.018
	8–302	BRF42	.034	28	.017	6B	—	16	4–6	①	800/500 ②	—	Hyd.	Hyd.
1973	6–200	BRF82	.034	37	.027	6B	6B	9	4–6	①	500	600	Hyd.	Hyd.
	8–302	BRF42	.034	27	.017	6B	6B	16 ③	4–6	①	800/500 ②	550	Hyd.	Hyd.

1974	6-200	BRF82	.034	37 .027	6B	6B	9	4-6	①	775	675	Hyd.	Hyd.
	8-302	BRF42	.044	27 .017	6B	6B	16③	4-6	①	800/500②	650/500①	Hyd.	Hyd.
1975	8-302	ARF42	.044	Electronic	④	⑤	20	5-6	①	900	650	Hyd.	Hyd.
1976	8-302	ARF42	.044	Electronic	④	⑤	20	5-6	①	750	650	Hyd.	Hyd.
1977	8-302	ARF42	.044	Electronic	④	⑤	20	5-6	①	⑥	⑤	Hyd.	Hyd.
1978	8-351M	ASF42	.042-.046	Electronic	6B	14B	—	6-8	①	650	500	Hyd.	Hyd.
	8-400	ASF42	.042-.046	Electronic	12B	12B	—	6-8	①	650	500	Hyd.	Hyd.
1979	8-351M	ASF42	.042-.046	Electronic	④	⑤	—	6-8	①	④	④	Hyd.	Hyd.
	8-400	ASF42	.042-.046	Electronic	⑤	⑤	—	6-8	①	⑥	⑤	Hyd.	Hyd.
1980-81	6-300	BSF42	.042-.046	Electronic	⑤	⑤	—	6-8	①	⑥	⑤	Hyd.	Hyd.
	8-302	ASF42	.042-.046	Electronic	⑤	⑤	—	6-8	①	⑥	⑤	Hyd.	Hyd.
	8-351W	ASF42	.042-.046	Electronic	⑥	⑤	—	6-8	①	④	④	Hyd.	Hyd.

①Lowest compression ratio should be within 75% of the highest
②Solenoid on/solenoid off
③With auto trans—20
④In drive
⑤See underhood specifications sticker
⑥Without thermactor air pump: 4B
Should the figures given on the underhood specifications sticker disagree with those given above, use the sticker figures.

used where engine temperatures are cooler and are identified with the letters "SE" with black printing. The silicone jacket silicone insulation type is used where high engine temperatures are present and is identified with the letters "SS" with white printing.

The cables are also marked with the cylinder number, model year and date of cable manufacture (quarter and year). Service replacement wires will not have cylinder numbers, or manufacture date.

NOTE: *On any vehicle equipped with a catalytic converter, never allow the engine to run for more than 30 seconds with a spark plug wire disconnected. Use an oscilloscope for testing and diagnosis. Do not puncture wires or use adapters that can cause misfiring. Unburned fuel in the cylinders will ignite in the converter as it is exhausted and damage the converter.*

REMOVAL

When removing spark plug wires, use great care. Grasp and twist the insulator back and forth on the spark plug to free the insulator. Do not pull on the wire directly as it may become separated from the connector inside the insulator.

INSTALLATION

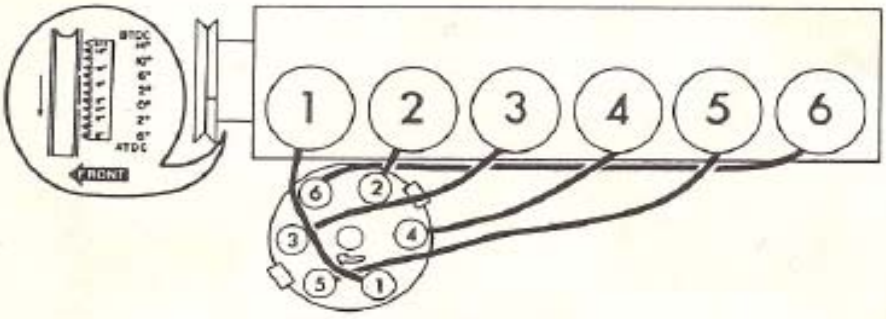
1. Install each wire in or on the proper terminal of the distributor cap. Be sure the terminal connector inside the insulator is fully seated. The No. 1 terminal is identified on the cap. On six-cylinder engines, install the wires in a clockwise direction.

On 8 cylinder engines, cylinders are numbered from front to rear; right bank 1-2-3-4, left bank 5-6-7-8. On 8-cylinder engines install the wires in a counterclockwise direction in the firing order (1-5-4-2-6-3-7-8) starting at the No. 1 terminal for 4.9L (302 CID) V-8,. On 5.8L (351 CID) V-8, and 6.6L (400 CID) V-8 the firing order is 1-3-7-2-6-5-4-8.

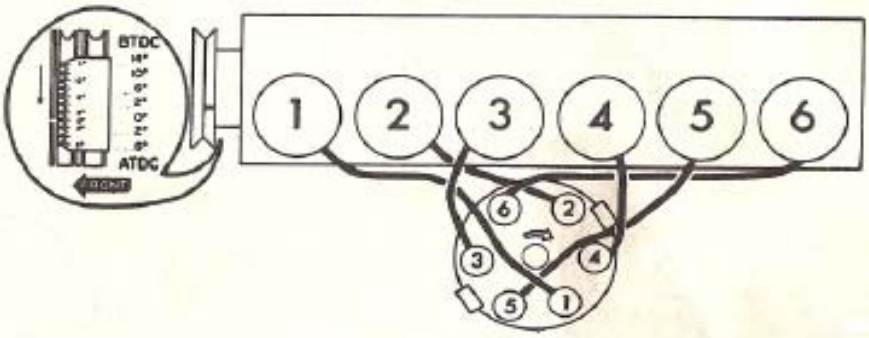
2. On 8-cylinder engines, remove the brackets from the old spark plug wire set and install them on the next new set in the same relative position. Install the wires in the brackets on the valve rocker arm covers. Connect the wires to the proper spark plugs. Install the coil high tension lead.

The wires in the left bank bracket must be positioned in the bracket in a special order to avoid cylinder cross-fire. Be sure to position the wires in the bracket in the order from front to rear.

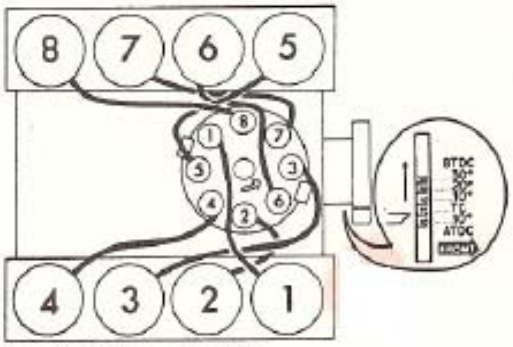
Distributor Wiring Sequences and Firing Orders



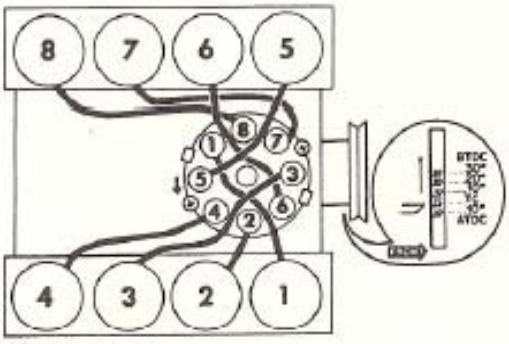
170, 200 6 cylinder 1968–74



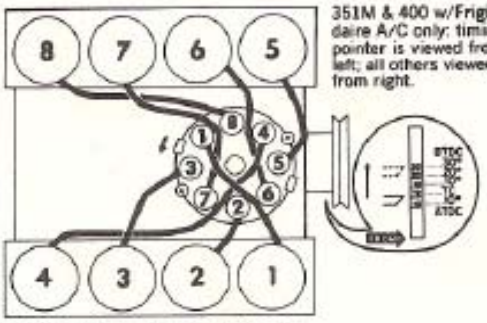
300 6-cylinder, 1980–81



289, 302 V8 through 1974



302 V8 1975–80



351M & 400 w/Frigidaire A/C only: timing pointer is viewed from left; all others viewed from right.

351W, 351M, 400 V8 1978–81

Whenever a DURA SPARK II high tension wire is removed for any reason from a spark plug, coil or distributor terminal housing, silicone grease must be applied to the boot before it is reconnected. Using a small clean tool, coat the entire interior surface of the boot with Ford silicone grease D7AZ 19A331-A or equivalent.

Breaker Points

The points function as a circuit breaker for the primary circuit of the ignition system. The ignition coil must boost the 12 volts of electrical pressure supplied by the battery to as much as 25,000 volts in order to fire the plugs. To do this, the coil depends on the points and the condenser to make a clean break in the primary circuit.

NOTE: *1975–81 models have electronic ignition. Breaker points are not used.*

The coil has both primary and secondary circuits. When the ignition is turned on, the battery supplies voltage through the coil to the points. The points are connected to ground, completing the primary circuit. As the current passes through the coil, a magnetic field is created in the iron center core of the coil. As the cam in the distributor turns, the points open and the primary circuit collapses. The magnetic field in the primary circuit of the coil cuts through the secondary circuit windings around the iron core. Because of the scientific phenomenon called "electromagnetic induction," the battery voltage is increased to a level sufficient to fire the spark plugs.

When the points open, the electrical charge in the primary circuit jumps the gap created between the two open contacts of the points. If this electrical charge were not transferred elsewhere, the metal contacts of the points would melt and the gap between the points would start to change rapidly. If this gap is not maintained, the points will not break the primary circuit. If the primary circuit is not broken, the secondary circuit will not have enough voltage to fire the spark plugs.

Condenser

The function of the condenser is to absorb excessive voltage from the points when they open and thus prevent the points from becoming pitted or burned.

NOTE: *1975–81 models have electronic ignition. A condenser is not used.*

It is interesting to note that the above cycle must be completed by the ignition system every time a spark fires. In a V8 engine, all of the spark plugs fire once for every two revolutions of the crankshaft. That means that in one revolution, four spark plugs fire. So when the engine is at an idle speed of 800 rpm, the points are opening and closing 3,200 times a minute.

There are two ways to check the breaker point gap: It can be done with a feeler gauge or a dwell meter. Either way you set the points, you are basically adjusting the amount of time that the points remain open.

The time is measured in degrees of distributor rotation. When you measure the gap between the breaker points with a feeler gauge, you are setting the maximum amount the points will open when the rubbing block on the points is on a high point of the distributor cam. When you adjust the points with a dwell meter, you are adjusting the number of degrees that the points will remain closed before they start to open as a high point of the distributor cam approaches the rubbing block of the points.

When you replace a set of points, always replace the condenser at the same time.

When you change the point gap or dwell, you will also have changed the ignition timing. So, if the point gap or dwell is changed, the ignition timing must be adjusted also.

INSPECTION OF THE POINTS

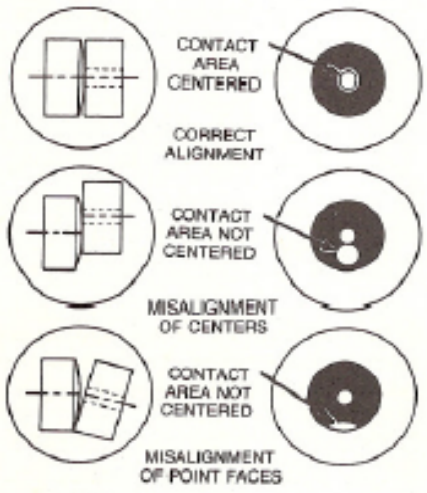
1. Disconnect the high-tension wire from the top of the distributor and the coil.
2. Remove the distributor cap by prying off the spring clips on the sides of the cap.
3. Remove the rotor from the distributor shaft by pulling it straight up. Examine the condition of the rotor. If it is cracked or the metal tip is excessively worn or burned, it should be replaced.
4. Pry open the contacts of the points with a screwdriver and check the condition of the contacts. If they are excessively worn, burned or pitted, they should be replaced.
5. If the points are in good condition, adjust them, and replace the rotor and the distributor cap. If the points need to be replaced, follow the replacement procedure given below.

REPLACEMENT OF THE BREAKER POINTS AND CONDENSER

1. Remove the coil high-tension wire from the top of the distributor cap. Remove the distributor cap from the distributor and place it out of the way. Remove the rotor from the distributor shaft.
2. Loosen the screw that holds the condenser lead to the body of the breaker points and remove the condenser lead from the points.
3. Remove the screw that holds and grounds the condenser to the distributor body. Remove the condenser from the distributor and discard it.
4. Remove the points assembly attaching screws and adjustment lockscrews. A screwdriver with a holding mechanism will come in handy here so you don't drop a screw into the distributor and have to remove the entire distributor to retrieve it.
5. Remove the points. Wipe off the cam and apply new cam lubricant. Discard the old set of points.
6. Position the new set of points with the locating peg in the hole on the breaker plate, and install the screws that hold the assembly onto the plate. Do not tighten them all the way.
7. Attach the new condenser to the plate with the ground screw.
8. Attach the condenser lead to the points at the proper place.
9. Apply a small amount of cam lubricant to the shaft where the rubbing block of the points touches.

ADJUSTMENT OF THE BREAKER POINTS WITH A FEELER GAUGE

1. If the contact points of the assembly are not parallel, bend the stationary contact so they make contact across the entire surface of the contacts. Bend only the stationary bracket part of the point assembly, not the movable contact.
2. Turn the engine until the rubbing block of the points is on one of the high points of the distributor cam. You can do this by either turning the ignition switch to the start position and releasing it quickly ("bumping" the engine) or by using a wrench on the bolt that holds the crankshaft pulley to the crankshaft. Be sure to remove the wrench before starting the engine!
3. Place the correct size feeler gauge be-



Alignment of the breaker point contacts

tween the contacts. Make sure it is parallel with the contact surfaces.

4. With your free hand, insert a screwdriver into the notch provided for adjustment or into the eccentric adjusting screw, then twist the screwdriver to either increase or decrease the gap to the proper setting.

5. Tighten the adjustment lockscrew and recheck the contact gap to make sure that it didn't change when the lockscrew was tightened.

6. Replace the rotor and distributor cap, and the high-tension wire that connects the top of the distributor and the coil. Make sure that the rotor is firmly seated all the way onto the distributor shaft and that the tab of the rotor is aligned with notch in the shaft. Align the tab in the base of the distributor cap with the notch in the distributor body. Make sure that the cap is firmly seated on the distributor and that the retainer springs are in place. Make sure that the end of the high-tension wire is firmly placed in the top of the distributor and the coil.

ADJUSTMENT OF THE BREAKER POINTS WITH A DWELL METER

1. Adjust the points with a feeler gauge as described above.

2. Connect the dwell meter to the ignition circuit according to the manufacturer's instructions. One lead of the meter is connected to a ground and the other lead is to be connected to the distributor post on the coil. An adapter is usually provided for this purpose.

3. If the dwell meter has a set line on it, adjust the meter to zero the indicator.

4. Start the engine.

NOTE: *Be careful when working on any vehicle while the engine is running. Make sure that the transmission is in Neutral and that the parking brake is applied. Keep hands, clothing, tools, and the wires of the test instruments clear of the rotating fan blades.*

5. Observe the reading on the dwell meter. If the reading is within the specified range, turn off the engine and remove the dwell meter.

6. If the reading is above the specified range, the breaker point gap is too small. If the reading is below the specified range, the gap is too large. In either case, the engine must be stopped and the gap adjusted in the manner previously covered. After making the adjustment, start the engine and check the reading on the dwell meter. When the correct reading is obtained, disconnect the dwell meter.

7. Check the adjustment of the ignition timing.

Ignition Timing

Ignition timing is the measurement, in degrees of crankshaft rotation, of the point at which the spark plugs fire in each of the cylinders. It is measured in degrees before or after Top Dead Center (TDC) of the compression stroke. Ignition timing is controlled by turning the distributor body in the engine.

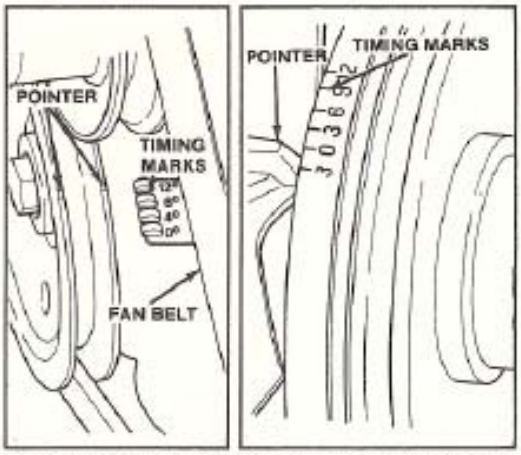
Ideally, the air/fuel mixture in the cylinder will be ignited by the spark plug just as the piston passes TDC of the compression stroke. If this happens, the piston will be beginning the power stroke just as the compressed and ignited air/fuel mixture starts to expand. The expansion of the air/fuel mixture then forces the piston down on the power stroke and turns the crankshaft.

Because it takes a fraction of a second for the spark plug to ignite the mixture in the cylinder, the spark plug must fire a little before the piston reaches TDC. Otherwise, the mixture will not be completely ignited as the piston passes TDC and the full power of the explosion will not be used by the engine.

The timing measurement is given in degrees of crankshaft rotation before the piston reaches TDC (BTDC). If the setting for the ignition timing is 5° BTDC, the spark plug must fire 5° before each piston reaches TDC. This only holds true, however, when the engine is at idle speed.

As the engine speed increases, the pistons go faster. The spark plugs have to ignite the fuel even sooner if it is to be completely ignited when the piston reaches TDC. To do this, the distributor has a means to advance the timing of the spark as the engine speed increases. This is accomplished by centrifugal weights within the distributor and a vacuum diaphragm mounted on the side of the distributor. It is necessary to disconnect the vacuum line from the diaphragm when the ignition timing is being set.

If the ignition is set too far advanced (BTDC), the ignition and expansion of the fuel in the cylinder will occur too soon and tend to force the piston down while it is still traveling up. This causes engine ping. If the ignition spark is set too far retarded after



Typical timing marks: left, block mounted; right, pulley mounted

TDC (ATDC), the piston will have already passed TDC and started on its way down when the fuel is ignited. This will cause the piston to be forced down for only a portion of its travel. This will result in poor engine performance and lack of power.

The timing is best checked with a timing light. This device is connected in series with the No. 1 spark plug. The current that fires the spark plug also causes the timing light to flash.

There is a notch on the crankshaft pulley on the 6-cylinder engines. A scale of degrees of crankshaft rotation is attached to the engine block in such a position that the notch will pass close by the scale. On the V8 engines, the scale is located on the crankshaft and a pointer is attached to the engine block so that the scale will pass close by. When the engine is running, the timing light is aimed at the mark on the crankshaft pulley and the scale.

IGNITION TIMING ADJUSTMENT

1. Locate the timing marks on the crankshaft pulley and the front of the engine.
2. Clean off the timing marks so that you can see them.
3. Mark the timing marks with a piece of chalk or with paint. Color the mark on the scale that will indicate the correct timing when it is aligned with the mark on the pulley or the pointer. It is also helpful to mark the notch in the pulley or the tip of the pointer with a small dab of color.
4. Attach a tachometer to the engine.
5. Attach a timing light according to the manufacturer's instructions.
6. Disconnect the distributor vacuum line at the distributor and plug the vacuum line. A small bolt, center punch or similar object is satisfactory for a plug.
7. Check to make sure that all of the wires clear the fan and then start the engine.
8. Adjust the idle to the correct setting.
9. Aim the timing light at the timing marks. If the marks that you put on the pulley and the engine are aligned when the light flashes, the timing is correct. Turn off the engine and remove the tachometer and the timing light. If the marks are not in alignment, proceed with the following steps.
10. Loosen the distributor lockbolt just enough so that the distributor can be turned with a little effort.
11. With the timing light aimed at the pulley and the marks on the engine, turn the distributor in the direction of rotor rotation to regard the spark, and in the opposite direction of rotor rotation to advance the spark. Align the marks on the pulley and the engine with the flashes of the timing light.
12. When the marks are aligned, tighten the distributor lockbolt and recheck the timing with the timing light to make sure that the distributor did not move when you tightened the lockbolt.
13. Turn off the engine and remove the timing light.

Valve Lash

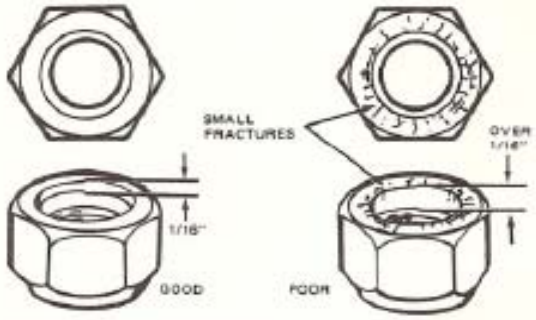
Valve adjustment determines how far the valves enter the cylinder and how long they stay open and closed.

If the valve clearance is too large, part of the lift of the camshaft will be used in removing the excessive clearance. Consequently, the valve will not be opening as far as it should. This condition has two effects: the valve train components will emit a tapping sound as they take up the excessive clearance and the engine will perform poorly because the valves don't open fully and allow the proper amount of gases to flow into and out of the engine.

If the valve clearance is too small, the intake valve and the exhaust valves will open too far and they will not fully seat on the cylinder head when they close. When a valve seats itself on the cylinder head, it does two things: it seals the combustion chamber so that none of the gases in the cylinder escape and it cools itself by transferring some of the heat it absorbs from the combustion in the

cylinder to the cylinder head and to the engine's cooling system. If the valve clearance is too small, the engine will run poorly because of the gases escaping from the combustion chamber. The valves will also become overheated and will warp, since they cannot transfer heat unless they are touching the valve seat in the cylinder head.

NOTE: *While all valve adjustments must be made as accurately as possible, it is better to have the valve adjustment slightly loose than slightly tight as a burned valve may result from overly tight adjustments.*



Checking the rocker stud nut

ADJUSTMENT

170 6 Cyl. (Solid Lifters)

1. Start the engine and let it run until it had reached operating temperature.
2. Remove the valve cover and gasket.
3. With the engine idling, adjust the valve lash using a step-type feeler gauge. This type of feeler gauge is sometimes more commonly known as a "go-no go" type feeler gauge. The proper clearance is reached when the smaller step on the gauge blade will pass through the gap while the larger step on the same blade will not pass through the gap.

Pass the proper size gauge blade between the valve stem and the rocker arm. If the clearance is correct, move on to the next valve. If the clearance is in need of adjustment, turn the adjusting screw on the opposite end of the rocker arm with a wrench until the proper clearance is reached. Turn the screw clockwise to decrease the clearance and counterclockwise to increase the clearance. Use this procedure for all of the valves.

4. After all of the valves have been adjusted, replace the valve cover gasket and cover. If the gasket is made of rubber, and is not torn, squashed or otherwise damaged it can be used again. If the gasket is cork, it is advised that the gasket be replaced.
5. Tighten the valve cover retaining bolts to 3–5 ft lbs.

302 Cu In. V8

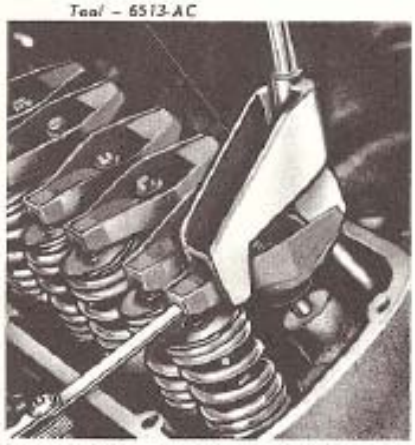
Some early models of the 302 cu in. V8 are equipped with adjustable rockers whereas the later models are equipped with positive stop type rocker mounting studs. Positive stop equipped rockers are adjusted by turning the adjusting nut down until it stops. You can identify a positive stop mounting stud by determining whether or not the shank portion of the stud that is exposed just above the cylinder head is the same diameter as the threaded portion at the top of the stud, to which the rocker arm retaining nut attaches. If the shank portion is larger than the threaded area, it is a positive stop mounting stud. Use the procedure given below for adjusting the valve lash on positive stop type mounting stud equipped vehicles.

There are two different procedures for adjusting the valves on the V8 engines. One is a preferred procedure and one is an alternate procedure. The preferred procedure is recommended, but the alternate procedure may be used.

NOTE: *These procedures are not tune-up procedures, but rebuild procedures to be performed only after valve train reassembly.*

PREFERRED PROCEDURE THROUGH 1969

1. Position the piston(s) on TDC of the compression stroke, using the timing mark on the crankshaft pulley as a reference for starting with the No. 1 cylinder. You can tell if a piston is coming up on its compression stroke by removing the spark plug of the cylinder you are working on and placing your thumb over the hole while the engine is cranked over. Air will try to force its way past your thumb when the piston comes upon the compression stroke. Make sure that the hightension coil wire leading to the distributor is removed before cranking the engine. Remove the valve covers.
2. Starting with No. 1 cylinder, and the piston in the position as mentioned above, apply pressure to slowly bleed down the valve lifter until the plunger is completely bottomed.
3. While holding the valve lifter in the fully collapsed position, check the available clearance between the rocker arm and the valve stem tip. Use a feeler gauge.



Checking valve clearance on engines with hydraulic lifters

4. If the clearance is not within the specified amount, rotate the rocker arm stud nut clockwise to decrease the clearance and counterclockwise to increase the clearance. Normally, one turn of the rocker arm stud nut will vary the clearance by 0.066 in. Check the break-away torque of each stud nut with a torque wrench, turning it counterclockwise. It should be anywhere from 4.5 to 15 ft lbs. Replace the nut and/or the stud as necessary.

5. When both valves for the No. 1 cylinder have been adjusted, proceed on to the other valves, following the firing order sequence 1–5–4–2–6–3–7–8.

6. Replace the valve covers and gaskets.

ALTERNATE PROCEDURE THROUGH 1969

Follow Step 1 of the preferred procedure given above, but instead of collapsing the lifter as in Step 2, loosen the rocker retaining nut until there is endplay present in the pushrod; then tighten the nut to remove all pushrod-to-rocker arm clearance. When the pushrod-to-rocker arm clearance has been eliminated, tighten the stud nut an additional ¾ turn to place the lifter plunger in the desired operating range.

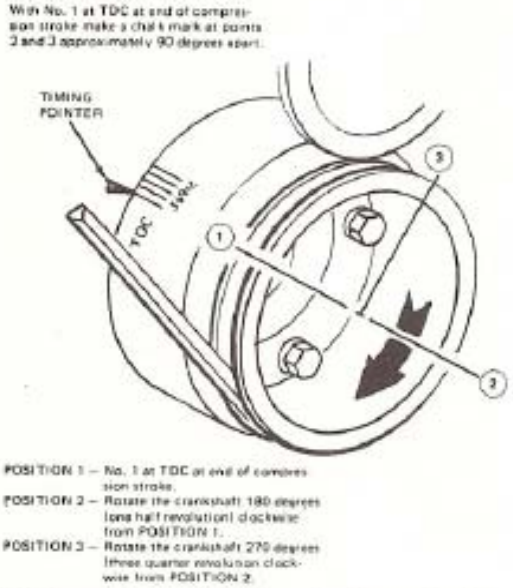
Repeat this procedure for all of the cylinders, using the firing order sequence as a guide. It takes ¼ turn of the crankshaft to bring the next piston in the firing order sequence up to TDC at the end of its compression stroke.

POSITIVE STOP TYPE MOUNTING STUD FROM 1970

1. Crank the engine until No. 1 cylinder is at TDC of the compression stroke and the timing pointer is aligned with the TDC mark on the crankshaft damper.

2. Scribe a mark on the damper at this point. This is mark A.

3. Scribe three additional marks on the damper; on at 90° from TDC (mark B), one at 180° (mark C), and the other one at 270° of rotation from TDC (¾ turn from TDC). The mark at 270° is mark D.



Position of the crankshaft for checking and adjusting valve clearance

4. With the timing pointer aligned with Mark A on the damper, tighten the following valves until the nuts contact the rocker shoulder, then torque them to 18–20 ft lbs: No. 1, intake and exhaust.

5. Rotate the crankshaft 90° to mark B and tighten the following valves: No. 5 intake and exhaust.

6. Rotate the crankshaft 90° to align mark C with the timing pointer and tighten the following valves: No. 4 intake and exhaust.

7. Rotate the crankshaft another 90° to mark D and adjust valves No. 2 intake and exhaust.

8. Continue in this manner (turning the crankshaft ¼ turn at a time) until all the valves are adjusted in the firing order; 1–5–4–2–6–3–7–8.

Engines With Hydraulic Lifters

These engines require no periodic adjustments to the valve train.

Carburetor

This section contains only tune-up adjustment procedures for the carburetors. Descriptions, adjustments and overhaul procedures for carburetors can be found in the "Fuel System" section of this book.

When the engine in your Bronco is running, the air/fuel mixture from the carburetor is being drawn into the engine by a partial vacuum created by the downward movement of the pistons on the intake stroke. The amount of air/fuel mixture that enters the engine is controlled by the throttle plate(s) in the bottom of the carburetor. When the engine is not running, the throttle plates are closed, completely blocking off the air/fuel passage(s) at the bottom of the carburetor. The throttle plates are connected by the throttle linkage to the accelerator pedal in the passenger compartment of the Bronco. When you depress the pedal, you open the throttle plates in the carburetor to admit more air/fuel mixture to the engine.

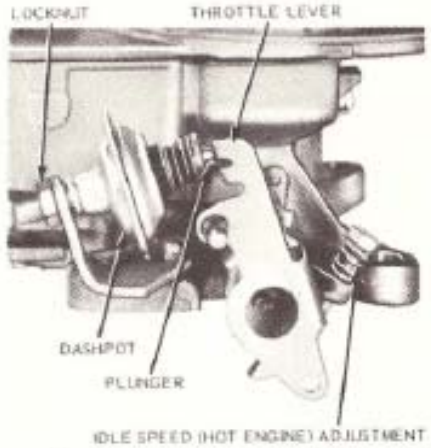
When the engine is idling, it is necessary to have the throttle plates open slightly. To prevent having to hold your foot on the pedal, an idle speed adjusting screw is located on the carburetor linkage.

The idle adjusting screw contacts a lever (throttle lever) on the outside of the carburetor. When the screw is turned, it opens or closes the throttle plates of the carburetor, raising or lowering the idle speed of the engine. This screw is called the curb idle adjusting screw.

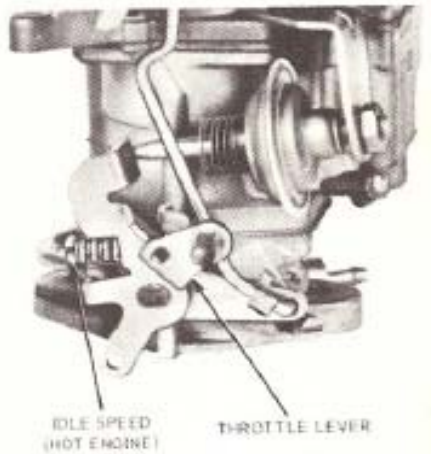
IDLE SPEED AND MIXTURE ADJUSTMENT

1966–73

1. With the engine off, turn the idle fuel mixture screw and limiter cap to the full counterclockwise position.
2. Turn the idle speed adjusting screw(s) out until the throttle plate(s) seats in the throttle bore(s).
3. Make certain that the solenoid plunger is not interfering with the throttle lever.
4. Turn the idle speed adjusting screw in until it just contacts the stop on the throttle shaft and lever assembly, then turn the screw inward 1½ turns.
4. Start the engine and warm it up.
5. Check, and if necessary, adjust the ignition timing.



Idle speed adjustment on model 2100 or 2150 2V carburetor installed on early model V8's equipped with a dashpot



Idle speed adjustment on a Carter YF 1V carburetor

6. Put the transmission in neutral (manual) or Drive (automatic). Set the parking brake. Block the wheels.
7. Check that the choke plate is in the full open position; turn the headlights on high beam.
8. Install a tachometer according to the manufacturer's instructions.
9. If possible leave the air cleaner on while making adjustments.
10. Loosen the solenoid locknut and turn the solenoid in or out to obtain the specified idle speed.
11. Disconnect the solenoid lead wire and place the automatic transmission in neutral.
12. Adjust the carburetor throttle stop screw to obtain 500 rpm.
13. Connect the lead wire and open the throttle slightly by hand.

14. Turn the mixture adjusting screw(s) inward to obtain the smoothest possible idle with the air cleaner installed.

IDLE SPEED ADJUSTMENT

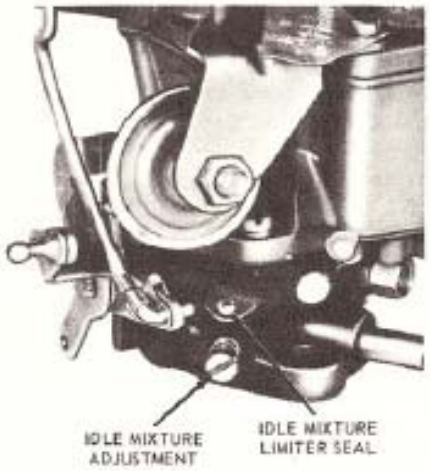
1974–76

1. Remove the air cleaner and plug the vacuum lines.
2. Set the parking brake and block the wheels.
3. Connect a tachometer according to the manufacturer's instructions.
4. Run the engine to normalize underhood temperatures.
5. Check, and if necessary, reset the ignition timing.
6. Make certain that the choke plate is fully open.
7. Place the manual transmission in neutral; the automatic in Drive. Block the wheels.
8. Turn the solenoid adjusting screw in or out to obtain the specified idle speed. The idle speed is the higher of the two rpm figures on the underhood specifications sticker.
9. Disconnect the solenoid lead wire. Place the automatic transmission in neutral.
10. Turn the solenoid-off adjusting screw to obtain the solenoid off rpm. This is the lower of the two rpm figures on the underhood specifications sticker.
11. Connect the solenoid lead wire and open the throttle slightly to allow the solenoid plunger to extend.
12. Stop the engine, replace the air cleaner and connect the vacuum lines. Check the idle speed. Readjust if necessary with the air cleaner installed.

1977–81

1. Remove the air cleaner and disconnect and plug the vacuum lines.
2. Block the wheels, apply the parking brake, turn off all accessories, start the engine and run it to normalize underhood temperatures.
3. Check that the choke plate is fully open and connect a tachometer according to the manufacturer's instructions.
4. Check the throttle stop positioner (TSP)-off speed as follows:
   a. collapse the plunger by forcing the throttle lever against it.
   b. place the transmission in neutral and check the engine speed. If necessary, adjust to specified TSP-Off speed with the throttle adjusting screw. See the underhood sticker.
5. Place the manual transmission in neutral; the automatic in Drive and make certain the TSP plunger is extended.
6. Turn the TSP until the specified idle speed is obtained.
7. Install the air cleaner and connect the vacuum lines. Check the idle speed. Adjust, if necessary, with the air cleaner on.

Mixture adjustment screws on the 2100 or 2150 carburetor with the limiter caps in place



Mixture adjustment screws on the Carter YF 1V carburetor with the limiter cap removed

IDLE MIXTURE ADJUSTMENT

1974–81

NOTE: *For this procedure, Ford recommends a propane enrichment procedure. This requires special equipment not available to the general public. In lieu of this equipment the following procedure may be followed to obtain a satisfactory idle mixture.*

1. Block the wheels, set the parking brake and run the engine to bring it to normal operating temperature.

2. Disconnect the hose between the emission canister and the air cleaner.

3. On engines equipped with the Thermactor air injection system, the routing of the vacuum lines connected to the dump valve will have to be temporarily changed. Mark them for reconnection before switching them.

4. For valves with one or two vacuum lines at the side, disconnect and plug the lines.

5. For valves with one vacuum line at the top, check the line to see if it is connected to the intake manifold or an intake manifold source such as the carburetor or distributor vacuum line. If not, remove and plug the line at the dump valve and connect a temporary length of vacuum hose from the dump valve fitting to a source of intake manifold vacuum.

6. Remove the limiter caps from the mixture screws by CAREFULLY cutting them with a sharp knife.

7. Place the transmission in neutral and run the engine at 2500 rpm for 15 seconds.

8. Place the automatic transmission in Drive; the manual in neutral.

9. Adjust the idle speed to the higher of the two figures given on the underhood sticker.

10. Turn the idle mixture screws to obtain the highest possible rpm, leaving the screws in the leanest position that will maintain this rpm.

11. Repeat steps 7 thru 10 until further adjustment of the mixture screws does not increase the rpm.

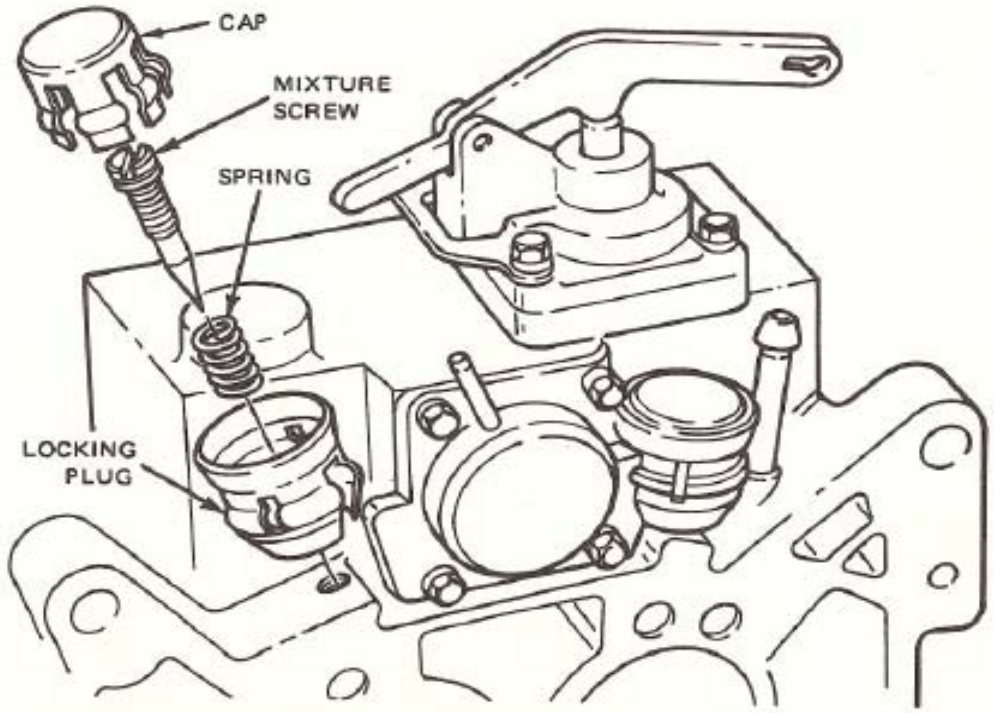
12. Turn the screws in until the lower of the two idle speed figures is reached. Turn the screws in ¼ turn increments each to insure a balance.

13. Turn the engine off and remove the tachometer. Reinstall all equipment.

NOTE: *Rough idle, that cannot be corrected by normal service procedures on 1977 and later models, may be caused by leakage between the EGR valve body and diaphragm. To determine if this is the cause,*

1. Tighten the EGR bolts to 15 ft lb. Connect a vacuum gauge to the intake manifold.

2. Lift to exert a sideways pressure on the diaphragm housing. If the idle changes or the reading on the vacuum gauge varies, replace the EGR valve.



Some 1980–81 2150 models have 2-piece metal plugs and caps in place of the plastic limiter caps on the idle mixture adjusting screws. They should be carefully removed before attempting any adjustments