

TRISCO

DIESEL TIMING ADVANCE TESTER (only for 24V engine)

INTRODUCTION

This Diesel Timing Light TA-2200D works only on 24 Volt engine vehicles.

One complete unit includes following parts.



Figure 1

1. Timing Light
2. Adjustable Nuts: to adjust the tightness of the Piezo Clamp onto the injector pipe
3. Piezo Clamp: The Piezo Clamp equipped with a sensing element enables to detect the fuel pressure pulse in the injector fuel pipe while fuel is injected into the cylinder and the Piezo Clamp is clamped on the #1 Injector fuel pipe.
4. Main cable:
 - Battery Lead (red & black clips): to supply the Timing Light power from the vehicle battery
 - Sensor Lead (yellow & black clips): to connector Piezo sensor with the timing light

DIESEL TIMING LIGHT

WARNING:

While working around injectors, make certain you should pay extreme attention. When the fuel is injected into the cylinder, the pressure required is enough to inject the fuel under the skin and into the blood stream. At that time if the fuel is injected onto people, this could result in serious injury.

Principle of the Diesel Timing Light:

This Diesel Timing Advance Tester is used with an aluminum piezoelectric device and a built-in convert circuit via pressure pulses detected and converted into electrical signals to trigger this tester. While the aluminum piezo clamp detects a pressure pulse in the diesel fuel injector pipe, will emit an electrical signal into the tester, then thru its convert circuit to trigger this tester. A technician can use this helpful tool to read a diesel engine's timing and do any necessary adjustment.

For checking:

1. Injection pump timing under operating conditions without removing any components
2. Injection pump advance
3. Fuel pressure problems on distributor-type pumps

Specifications:

- Input power: 20V-30V DC
- Trigger Point: 15% of the highest pressure in the Injector pipe.
- Size of the Diesel Piezo Clamp: fits for 6mm-10mm (1/4"~3/8") of injector pipes.
- Maximum 2,000 RPM

Overview of the 4-Stroke Diesel Combustion Cycle

Intake: On early engines, during the intake stroke, the piston travels downward, drawing fuel/air mixture into cylinder. On modern engines, it incorporates an extra cam/lifter arrangement as seen on the exhaust valve which is held shut by a spring. During intake stroke, vehicle's fuel fills up the combustion chamber.

Compression: While the piston rises and passes TDC, cylinder pressure increases and temperature increases up to 500-800°C. The self-ignition temperature of diesel fuel is approx 400°C. Flywheel momentum drives the piston upward, compressing the fuel/air mixture. This is to prepare it for ignition.

Power: After fuel injects into the cylinder, an explosion occurs because of the combination of heat and atomized diesel fuel. This causes the piston to be forced downward which produces torque and the horsepower required from a typical diesel engine.

Exhaust: At the bottom of the power stroke, the exhaust valve is opened by the cam/lifter mechanism. The upward stroke of the piston drives the exhausted fuel out of the cylinder.

Why Diesel Combustion Timing is important?

Timing is critical to the optimal operation of the diesel engine. The fuel is required to be delivered only after temperature has reached over the self-ignition temperature. The gas expansion should begin only after the piston has passed TDC. If timing is set incorrectly, the engine will not perform efficiently.

Problems could occur if timing is set incorrectly.

- Difficult starting hot or cold
- Engine will not rev or is slow to rev up
- Hesitation/stalling/will not rev in very cold conditions
- Shaky idle
- Excessive fuel consumption
- Black exhaust smoke
- Gray/white exhaust smoke
- Misfiring
- Abnormal knocking from engine
- Engine overheating
- Insufficient power

Operating Procedures

1. Locate engine timing mark (see figure 2) and use a rag to clean all grease and dirt from the mark and the pointer. It may help to use chalk or white paint on the marks to make them more easily seen.
2. Check manufacturers specifications for correct timing for engine being serviced.
3. Start and run engine until normal operating temperature is reached. Approximately 15 minutes then stop engine.
4. If specifications require the vacuum hose from the fast idle actuator, disconnect and plug the vacuum hose . A golf tee or small pencil may be used to seal the hose.
5. Keep the vehicle engine off. Locate the #1 Injector fuel pipe. If the #1 Injector fuel pipe is not accessible, its companion injector's fuel pipe can be used for testing.
6. Clamp the Piezo Clamp on a straight section of #1 Injector fuel pipe (see figure 2) as close to the pump as possible (there is less noise on the pump side to interference with the pulse), and away from engine for not acquiring incorrect signal. Piezo Clamp and fuel pipe should be clean and dry. Make sure the fuel pipe is straight and is in contact with the Piezo Clamp but **do not overtighten**. Overtightening may cause damage on sensor element.
7. Connect Sensor Lead clips YELLOW to one Adjustable Nut and BLACK to #1 Injector fuel pipe. (See Figure 2)

Warning: Black Sensor clip DOES NOT touch Glow Plug Plate; it may cause circuit shorten, or even worse to damage a complete circuit and disable engine operation and the connected timing tester.

8. Connect the Power Lead clips RED to positive and BLACK to negative of the vehicle battery. Then connect the Main cable with Timing Light. (See Figure 2)
9. Start engine and operate an normal idle speed. Aim the timing light to timing mark as Figure 2.
10. Trigger the timing light and observe the reading from timing mark.
11. Compare reading obtained in above step with manufacturers specifications. If timing is not as specified readjust as described in the following procedure. Stop engine.

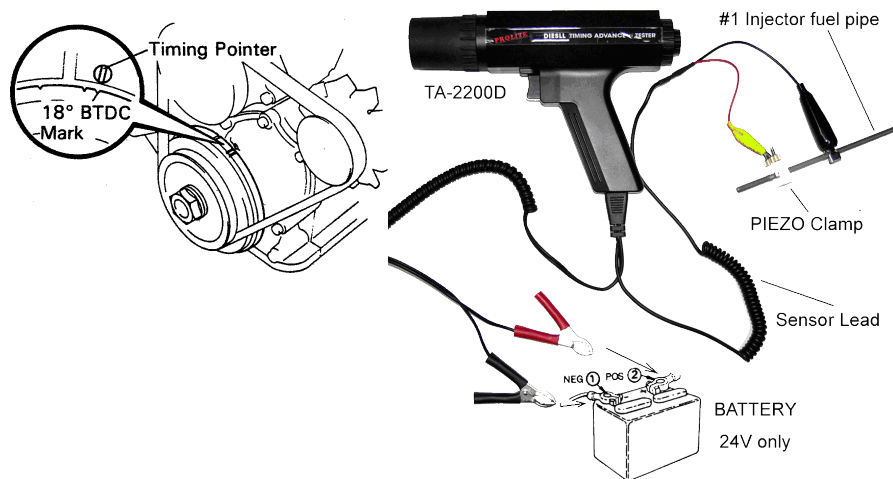


Figure 2

TO USE AN ADVANCE TIMING LIGHT CHECKING THE “IDLE TIMING”

1. Set the knob at “0” position as figure 3.
2. Follows the Operating Procedures on page 3.

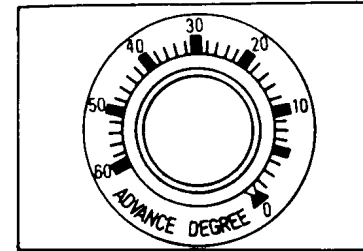


Figure 3

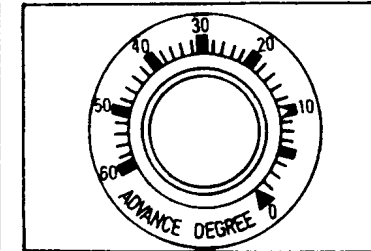


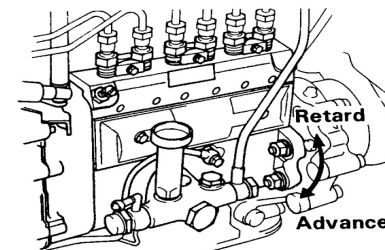
Figure 4

CHECKING THE “CENTRIFUGAL ADVANCE” AND “VACUUM ADVANCE”

1. Follows the steps 1 to 10 in Operating Procedures on page 3, except increase the engine speed to 2000 rpm.
2. Trigger the timing light and rotate the knob clockwise slowly and stop until the timing mark moves to “T.D.C.” or “0” position.
3. Observe the reading from advance scale as shown on Figure 4.
4. Compare the reading with manufacturer's specifications.

ADJUSTING TIMING TO SPECIFICATION

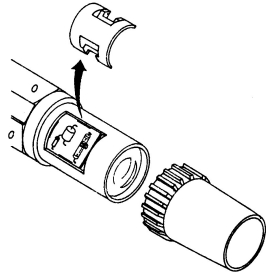
Refer to the manufacturer's diesel engine maintenance and repair manual. If adjustments is necessary, the engine must be stopped, slacken the injector pipe unions, the pump oil feed pipe and the pump fastenings. Turn the pump as necessary and repeat the check.



XENON LAMP REPLACEMENT

If procedures outlined in above do not correct the failure, probable cause is a defective Xenon lamp.

The lamp may have a black spot around the anode, this normal. However, if the lamp of completely black it has of life and should be replaced.



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is perfectly reached its end

TIP: The best way to connect the clamp is to tighten the clamp wheel until the contact is made with the injector pipe, then turn the wheel 1/4 of a revolution more.

The injector pipe is used as a ground connection for the PIEZO clamp. The injector pipe must be clean to insure a good electrical contact, and if necessary can use an abrasive paper on the pipe.

Make certain the clamp DOES NOT touch any other part of the engine except the injector pipe. Otherwise, the sensing element may send false signals due to the engine's vibration.

NOTE: If the voltage is too low, this hints there is leakage through the respective leads or connections. This is frequently happened by heating of connecting terminals, switches or parts of the leads.

NOTE: When the voltage drops greater than what specified in your owner's manual, strongly recommend to ask a professional technician to check this again.

SAFETY PRECAUTIONS

To prevent accidents that could possibly result in serious injury and/or damage to vehicles and/or test equipment, carefully observe all safety rules and test procedures when working on vehicles



Do not wear loose clothing or jewelry while working on engine. Loose clothing can get caught in fan, pulleys, belts, etc. Jewelry can conduct current and can cause severe burns if comes in contact between power source and ground.



Before working on a vehicle, set the brakes and block the wheels. Beware of automatic parking brake releases.



When the engine is running, it produces carbon monoxide, a toxic and poisonous gas. Always operate the vehicle in a well ventilated area. Do not breathe exhaust gases – they are hazardous that can lead to death.



Fuel and battery vapors are highly flammable.
DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.



When engine is running, many parts (such as pulleys, coolant fan, belts, etc) turn at high speed. To avoid serious injury, always be alert and keep a safe distance from these parts.



Engine parts become very hot when engine is running. To prevent severe burns, avoid contact with hot engine parts.



Never lay tools on vehicle battery. You may short the terminals together causing harm to yourself, the tools or the battery.

LIMITED WARRANTY

This limited warranty covers defects in materials and workmanship for a period of twelve (12) months from the date the product is initially purchased, including only those defects that arises as a result of normal use and does not cover those that arises as a result of unauthorized modifications and repair, improper operation (i.e. overtighten on Piezo Clamp) or misuse, accident or neglect such as dropping the unit onto hard surfaces, contact with water, rain or extreme humidity or extreme heat, Leads that have broken, physical damage to the product surface including scratches, cracks or other externally exposed parts.

TA-2200D

244.499 (A)