

ELUMINATOR™ OPTIC 84

TACH - ADVANCE TIMING LIGHT

This Eluminator Optic xenon stroboscope features an extraordinarily brilliant flash and is built for high performance, heavy duty professional use. High efficiency power conversion lets the light run cooler for a long working life.

The bright digital display shows RPM with the flash off, and Degrees Advance while flashing. Timing Advance Control Buttons are conveniently located on the handle, allowing easy, one-handed operation. A 2/4 stroke switch scales readings for double-ended coil or distributor ignitions.

Hookup is simple with the Inductive Spark Pickup. Dependable spark sensing is assured by electronics engineered for the broadest range of ignition types. The inductive pickup is plug-in replaceable for easy service.

The light is constructed of rugged, impact-resistant materials. It has a comfortable handle grip and a narrow barrel, which makes it easy to project light between engine belts and brackets. Quality engineered and made in the USA.

OPERATING SPECIFICATIONS

ADVANCE	0 to 90 degrees, 4 Stroke	
	0 to 45 degrees, 2 Stroke	
TACHOMETER	500 to 9,990 RPM	
POWER	10 to 16 Volts DC	12 volt battery
TEMPERATURE:		
Operating	0° to 122° F	-18° to 50° C
Storage	-40° to 180° F	-40° to 80° C
LEADS	5 feet	1.5 m
WEIGHT	1.5 pounds	650 gm
SIZE	12 inches tip to tip, 2.8 wide	30 x 7 cm

OPERATOR'S MANUAL

HOOKUP AND SETTINGS

POWER LEADS

The RED clip connects to the POS terminal on a 12 volt battery. The BLACK clip connects to the NEG battery terminal. The power should be at least 10 volts, and not over 16 volts, to assure reliable operation. Current draw is 0.2 amp without the flash, and about 0.5 amp while flashing at 1800 RPM. Strobe flash intensity is regulated and is not affected by voltage. The light will not be harmed if the leads are connected incorrectly.

DIGITAL LED DISPLAY

Shows tachometer readings to 9990 in 10 RPM steps or advance readings to 90 degrees in 4 stroke or 45 degrees in 2 stroke, by 1 degree steps.

LIGHT SWITCH

The left switch selects RPM or Degrees Advance readout and applies power to the flashtube when degrees are displayed. The light does not flash while RPM is read.

ENGINE SWITCH

RPM and Advance Degree readings are scaled with the switch on the right. Use "2" for 2 stroke and double-ended coil, distributorless ignitions. Use "4" for distributor ignitions. This is a 2 times multiplier because a 2 stroke engine sparks every revolution, while a 4 stroke sparks every two revolutions.



INDUCTIVE SPARK PICKUP

Latch the pickup around the reference spark plug wire (usually #1) so that spark current impulses are detected. The best pickup arrangement is next to the distributor with the label facing toward the spark plug end. This provides the cleanest signal and keeps the pickup away from the hot exhaust manifold.

Leave the Pickup Latch Open when not in use.

The magnetic cores are made of ferrite ceramic and, when kept apart, they are less likely to break if the pickup is dropped.

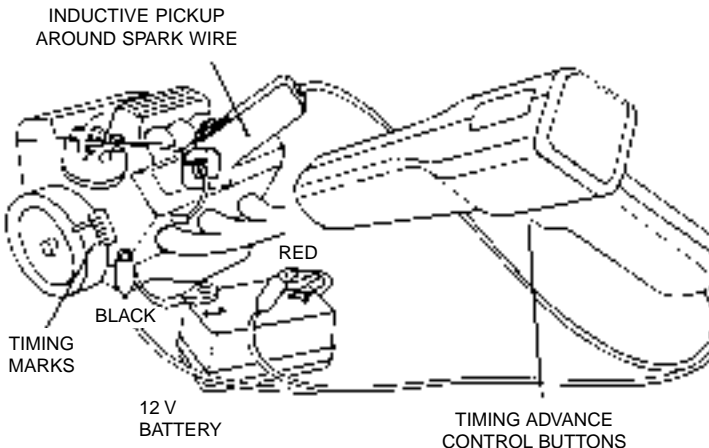
If the light will not trigger on a spark plug wire, the wire may be broken. Try another for comparison. Ignition on a no-start engine may be checked by seeing if the timing light pickup will trigger from a plug wire while cranking the engine.

Metallic ignition wires may cause electromagnetic interference with trigger signals. Putting a 10K ohm resistance wire between the engine's coil output and distributor will usually reduce the interference sufficiently.

TIMING-ADVANCE TEST PROCEDURE

This light measures advance by delaying the flash so that it appears to align the crank shaft TDC mark to its pointer, and then displaying the degrees delayed. Note that on engines with ignition contact points, dwell affects timing and must be in calibration before timing is adjusted.

1. Connect the power leads: RED - positive, BLACK - negative. Set the LIGHT switch to TACH. Set the 2/4 stroke switch. Place the Inductive Pickup around the #1 spark plug wire. Keep leads away from the fan, belts, and exhaust manifold.
2. Prepare the engine for timing tests according to the manufacturer's instructions. Specifications are often printed on the emissions control label in the engine compartment.
3. Read RPM, and set the engine speed to the test specification. Then slide the LIGHT switch toward the crank angle symbol to read degrees of advance.
4. Point the light beam at the degree marks on the engine damper wheel or flywheel, and move the apparent mark to the TDC position using the Timing Advance Control Buttons. Then read the timing advance on the display.
5. Compare the measurement with the specification. Timing adjustments are made by turning the distributor slightly or by moving the ignition timing sensor.
6. Restore all engine parts to their normal arrangement.



NOTE: Align your eye squarely with the timing marks when viewing, to avoid parallax error. The strobe light may be aimed from the side, but marks must be viewed squarely.

TYPICAL MEASUREMENTS

INITIAL TIMING

This is usually the engine timing specification. Follow the engine service manual procedure or the emission control label in the engine compartment. Not all engines can be adjusted. For engines with fixed timing, this is a diagnostic measurement.

VACUUM ADVANCE OR RETARD

Vacuum actuators connected to the distributor or intake manifold sensors have specified amounts of timing change for an amount of applied vacuum. To measure, disconnect and plug the input hoses and then couple the input to a hand pump with gauge. Run the engine at idle to see the timing change with and without applied vacuum.

CENTRIFUGAL ADVANCE

Mechanical ignition controls usually have a set of spinning weights in the distributor which advance the spark timing a certain number of degrees as RPM goes from idle to driving range. To see the centrifugal advance alone, vacuum actuators must be disabled. Besides the amount of change, it is important to see that the advance changes smoothly with slowly increasing RPM. Sticky weight pivots, rust, and bad retracting springs are the usual problems.

TOTAL ADVANCE

This is the advance at a specified RPM with the engine timing controls intact.

COIL WIRE TIMING

Use only when required by engine specifications. Be sure to set advance to zero, because the advance reading will be divided by the number of cylinders sensed by the pickup.

STOPPED MOTION VIEWING

Valve lifter motion and throttle body injector spray can be watched in stopped motion with the light. The advance control changes the viewed time in the engine cycle. Triggering can be from a spark plug wire, coil primary, or injector drive. Multiple flashes per revolution are likely with unconventional hookups. Some experimentation may be necessary to find a trigger coordinated with the action. The 2 stroke scale works best.

MEASUREMENT TECHNIQUE

This measurement technique, which is used by all makes of strobe lights, operates with the assumption that RPM is constant throughout the crankshaft revolution. In fact, the shaft slows down for each cylinder during its compression stroke and speeds up on the power stroke. This variation is not significant at RPM levels where advance is normally measured, but at idle speed there may not be enough flywheel inertia. In this case, compression slowing could make the delay noticeably longer than the average time to turn a complete crankshaft revolution, thus making the reading higher than actual. If you are concerned about this possible error, confirm advance measurements by comparing the display advance reading to the nearest engine timing scale mark with the light set to zero advance.

MAKING MEASUREMENTS

TACHOMETER READINGS

Set the LIGHT switch to TACH. RPM can be read from 500 to 9990 RPM in 10 RPM steps. In the 2 stroke setting, readings are accurate up to 5,000 RPM.



TIMING-ADVANCE CONTROL BUTTONS

Two buttons are located on the handle for easy, one-handed advance control. Pressing the upper button increases the strobe advance setting. The lower button decreases the setting. The setting changes about six degrees per second while a button is held. Pressing the buttons will change the advance setting even if RPM is displayed.

Operating Tips

The light must be connected to a running engine to display the advance setting, otherwise it shows zero. Watch the engine timing marks, rather than the display numbers, when adjusting the advance setting. The display readings lag the setting changes because the display shows what the strobe is doing, not what it was set to. If you need to preset the advance on the light, "bump" the buttons to move the setting a little at a time after you get close. When power is first connected, advance will normally be in the active range between 0 and 10 degrees.

If the light is set at zero advance, it is forced to the shortest possible delay so that high RPM timing is possible. To get back into the active adjustment range, it may be necessary to press the up button for several seconds. To minimize high RPM test time, advance can be set by quickly aligning the wheel mark with TDC at high RPM, releasing the throttle, and then reading the setting after RPM has returned to idle.

A short stabilizing period is needed for the advance electronics to readjust when RPM is changed. Readings will be accurate when the RPM is held steady. A one degree jitter suggests that the setting may be close to the higher reading. For example, a setting of 9.9 may fluctuate between 9 and 10. "Bumping" the up or down button should stabilize the reading.

TIMING LIGHT MAINTENANCE & REPAIR

When cleaning the timing light, use a cloth dampened with waterless hand cleaner. DO NOT use solvents such as acetone and benzene, which can be absorbed by and damage plastics. Promptly remove penetrating oils, gasoline, and battery acid.

For repair service, contact your tool dealer or check the other sheets for a telephone number to call. The Inductive Spark Pickup is a plug-in replaceable lead. It can be repaired or replaced if damaged. There are no user serviceable parts inside the light.

SAFETY PRECAUTIONS

- Do not look into the light beam. Internal eye burns may be the result. The pain usually starts in a day or two.
- Do not touch rotating engine parts that appear stopped or slowed under the strobe light flashes.
- Always wear an eye shield when testing vehicles. Be extra careful near batteries and moving parts.
- Battery gas is highly explosive.
 - a. If a battery explodes, flush the acid away from person's skin with generous amounts of water. Follow up with a neutralizing solution of baking soda and then more water. Medical treatment for acid burns may be necessary.

Treat clothing, vehicle parts, and equipment similarly. Any acid traces inside equipment must be removed by generous rinsing. Dry off equipment afterwards and place in a warm 50° C (120° F) oven until thoroughly dry.

- b. Never use a wrench on the ungrounded battery terminal until the grounded one has been disconnected. Contact between the vehicle body metal and the "hot" terminal can cause sparks to ignite gas or even weld tools into a battery short circuit.
 - c. Keep the space around a battery well ventilated.
 - d. Do not make sparks or allow flames near batteries.
- Before working on a vehicle, set the brakes and block the wheels. Beware of automatic parking brake releases.
- Keep your work area well ventilated and free of exhaust. Engine exhaust contains deadly poisons.
- Avoid electrical shocks caused by getting too close to live ignition wires or touching the coil TACH terminal. A person's reaction near a running engine can be more damaging than the shock.
- Keep spark producing devices at least 0.5m (18") above the floor to reduce the hazard of igniting gasoline vapor.
- Do not let test leads wind up in a fan or pulley. Route leads away.
- Remove finger rings and metal wristbands. They can short terminals and become very hot from electric current.