

# **Gunson's Timestrobe RPM Inductive XENON TIMING LIGHT**

**With electronic RPM indicator and  
clip on ignition pickup.**

**Part No. 4132**

**Suitable for any petrol engine vehicle**

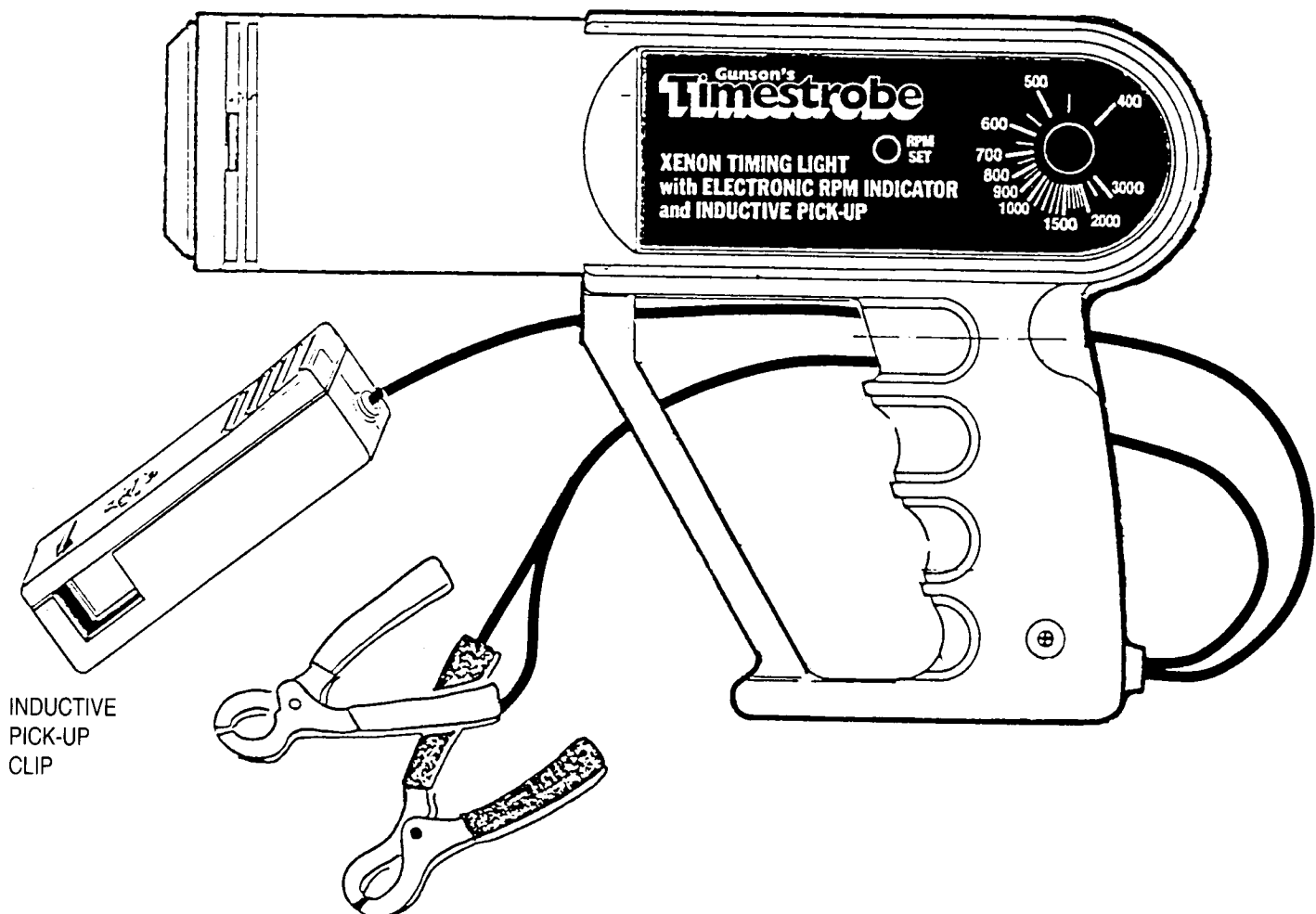
- with any type of ignition system including electronic types where applicable, (some ignition systems with ECU are not externally adjustable see also section 4.).
- indicates ignition timing and allows adjustment to manufacturers specified advance setting and RPM.
- RPM scale suits engines with any number of cylinders.
- inductive pickup clips on the ignition H.T. lead.
- works off vehicle's own 12V battery

# 1. PRINCIPLE OF OPERATION

With the timing light power leads connected and the inductive pickup clipped externally to a spark plug, a flash of light is produced each time that particular spark plug fires.

These flashes of light are directed at the ignition timing marks (which are located either on the fan belt pulley or the engine flywheel) and effectively "freeze" the motion of the rotating parts. This enables the ignition timing of the engine to be measured and checked against the car's technical service data.

The ignition timing can then be adjusted as required. Adjusting the timing is a simple operation as described below or as given in the car's workshop manual or handbook. The electronic RPM indicator allows accurate setting of engine speed to ensure precision ignition timing to manufacturers recommendations. Some vehicles may be fitted with an Electronic Control Unit (ECU) which not only controls the advance curve at various engine RPM, but also fixes the basic setting. On these systems inspection of the timing and ignition advance may be possible and setting options may be available for alternative fuel octane ratings but conventional adjustment may not be possible.



# 2. IMPORTANCE OF IGNITION TIMING

It is essential to the correct operation of the car that the ignition timing is correct as recommended by the car manufacturer. The requirement for accurate engine speed setting is particularly important if timing is carried out at above idle speed when the advance mechanisms are in operation.

Incorrect ignition timing is a very common cause of many engine symptoms, as follows:- POOR FUEL ECONOMY - LOW ENGINE POWER - DIFFICULT ENGINE STARTING - ENGINE OVERHEATING (ignition too retarded) - BACKFIRES (ignition too advanced) - ENGINE "PINKING" (ignition too advanced) - ENGINE "RUNNING-ON".

### 3. USE OF UNLEADED PETROL

Converting an early model of engine to run on UNLEADED PETROL entails RETARDING the ignition timing to a new setting recommended by the vehicle manufacturer. Care must be taken in making this conversion as not all cars can be converted without the danger of damage to the engine parts, particularly exhaust valves and their seats.

If in doubt about the ignition setting for your car, or whether your car can be converted to unleaded petrol, consult a manual for the model concerned or a manufacturers agent. There are numerous variations with engine type and year of manufacture.

### 4. TIMESTROBE RPM INDUCTIVE

Timestrobe RPM has a unique "logic" RPM indicator which allows accurate engine speed setting prior to timing measurement and adjustments. This is advisable on most engines and essential on some, particularly when basic settings are made at higher than idle speed. Engine RPM measurement also allows the ignition advance curve to be checked to specification.

Timestrobe RPM uses a xenon flash tube which produces extremely short pulses of brilliant white light. This timing light can be readily used in daylight conditions, unlike neon timing lights which are much dimmer. The use of quick drying white paint (such as typist's correction fluid) may however be found beneficial if the moving mark is not distinct or there are several close marks for alternative settings. The very short flashes of light of a xenon timing light also eliminate the blurring of the image that is obtained when using a neon timing light, this is especially important when settings are at engine speeds above idle.

A timing disc for fitting to, or as an aid to marking, the engine fanbelt pulley is enclosed. Timestrobe RPM is powered by the car battery.

### 5. INSTRUCTIONS FOR USE

**PLEASE READ THESE INSTRUCTIONS FULLY BEFORE PRODUCT USE, PARTICULARLY THE INFORMATION IN THE PRECAUTIONS / WARNING SECTIONS.**

#### 1. PREPARATION FOR SETTING INITIAL TIMING

i. Before commencing the job, check the details of the required timing data in the car's workshop manual. Ignition timing is usually specified as so-many crankshaft degrees BTDC which means "Before Top Dead Centre" (ie before the piston reaches the very top of the cylinder). Initial timing is generally specified at idle rpm which will be given. It is extremely unusual for vacuum advance to be in operation at idle speed so this pipe may remain connected for setting initial timing unless clearly stated otherwise, (the vacuum advance pipe is a small pipe that leads from the carburettor to the distributor)

ii. With the engine switched off, make any preliminary adjustments, if any, as required in the workshop manual, and slacken the distributor bolt sufficiently to enable the distributor to be turned by hand. (Do not loosen completely as some resistance to turning is required in order to maintain a "set" position).

iii. Slide open the inductive pickup clip and attach to the spark plug lead for number one cylinder. Observe the marking which indicates the direction of attachment i.e. in which direction along the spark plug is located. The inductive clip should always be handled with care and be closed carefully around the lead as the ferrite material from which the sensor is constructed is more fragile than glass. Also connect the red and black clips of Timestrobe RPM to the positive and negative terminals of the car battery (red to positive). The circuit is continuously powered when connected to the battery as this model does not have an on/off trigger switch.

## **2. SETTING ENGINE SPEED**

- i. Start the engine and check the engine speed as follows.
- ii. Turn the adjustment for RPM setting to a high RPM
- iii. SLOWLY reduce the setting and observe how the LED indicator light gradually increases in intensity as the correct speed is approached.
- iv. Continue with slight adjustments until the LED indicator is just extinguished and read the RPM on the scale.
- v. Adjust the engine speed using the idle speed screw (i.e. throttle stop screw or idle by pass screw if the throttle stop is locked) and re-check as above until the correct speed is achieved. See also SECTION 6 (If no data is available set to a typical RPM i.e. 850 RPM for a 4 cylinder car engine).

## **3. SETTING INITIAL TIMING**

- i. Direct the timing light towards the timing marks. (A timing disc is enclosed for attaching to, or assisting with marking the fanbelt pulley in case suitable marks have not been provided by the manufacturer). The movement of marks on the moving part (ie the fan belt pulley or engine flywheel) will now appear to be "frozen". Observe the alignment of the stationary and moving marks.
- ii. Rotate the distributor body to advance or retard the ignition timing as required until the timing marks are aligned correctly. Keep hands away from the area where HT leads are attached as the insulation may be imperfect and extremely high voltages are present
- iii. Check that engine speed is still as required. This can vary if ignition timing has been corrected, adjust and recheck timing marks as required.
- iv. Carefully clamp the distributor and re-check the timing to confirm that it has not been disturbed. (If tightening the clamp entails using tools near rotating parts stop the engine first then restart to check).
- v. Switch off the engine, disconnect the timing light or continue as below if required.

## **4. SIMPLE TESTING OF ADVANCE MECHANISMS**

Engines normally have vacuum and centrifugal mechanisms to automatically increase ignition advance with manifold vacuum and engine rpm. Alternatively this process is controlled by an ECU. By speeding up the engine and observing the timing marks it is possible to carry out simple tests to confirm that the vacuum and centrifugal advance are working or the ECU is performing an ignition advance function depending on manifold pressure (from MAP sensor) and RPM signals (If no mark exists a white paint spot should be applied to the crankshaft pulley in a position which is visible with the engine running. Accurate positioning ref to TDC is not required to visually check advance with increasing RPM).

- i. To check the centrifugal advance mechanism, disconnect the vacuum advance pipe, and increase the engine speed. The timing marks should be seen to move to a more advanced setting (ie move in the opposite direction to pulley rotation).
- ii. To check the vacuum advance mechanism, reconnect the vacuum advance pipe and repeat the above procedure. A greater increase in advance should be seen.
- iii. To check an ECU advance function observe a pulley mark, first at slow and then increased speed. Advance (movement opposite the direction of rotation) will occur in all cases except if the ECU is in "vehicle limp home mode" due to a serious malfunction of ECU or sensor.

## **5. DETAILED TESTING OF ADVANCE MECHANISMS**

Car manufacturers often specify the ignition timing advance at various engine RPM in order to fully check the correct operation of automatic advance mechanisms, and also to check electronic Engine Management Systems.

- i. Fit the enclosed timing disc to the flywheel pulley or mark the pulley (see the instructions on the timing disc).
- ii. Carefully follow the car manufacturer's instructions regarding the connection or disconnection of the vacuum advance pipe, and any other instructions.
- iii. Set the engine RPM at the various speeds as required, and measure the degrees of ignition timing at each engine speed, using the timing disc. Compare the results with those specified in the workshop manual.

## **6. USE OF THE RPM INDICATOR.**

IF MISFIRES OCCUR IN THE TIMING LIGHT FLASHES, CHECKING ENGINE SPEED WILL BE MORE DIFFICULT. (If necessary check condition of ignition parts and spark plugs as a faulty ignition may well be indicated. If difficulty is still encountered increase no 1 spark plug gap temporarily.)

IF EXTRA TIMING LIGHT FLASHES OCCUR, CHECKING ENGINE SPEED WILL BE MORE DIFFICULT (If necessary check distributor cap for damp or tracking and separate HT leads which are bunched together.)

SECTION 2 describes how to check engine speed by variation of the RPM indicator scale, FROM HIGH TOWARDS LOW.

HOWEVER to set the engine for example to 900 RPM it is convenient to set 900 RPM on the Timestrobe scale and adjust the ENGINE SPEED to achieve the required indication. IMPORTANT: if using this method it is essential to start at an engine speed BELOW 900 RPM and gradually increase speed with the idle speed screw while observing the increase in LED intensity. When the LED is extinguished completely the required setting has been achieved. THE CORRECT SETTING IS AT THE EXACT POINT WHEN THE LED CHANGES FROM FULL INTENSITY TO TOTALLY EXTINGUISHED.

These methods ensure there is no misinterpretation of the indicator which also gives an abrupt intensity change at TWICE the indicated RPM (thus the RPM indicator can actually be used up to 6000 RPM). On engines with a wasted spark (spark on compression and exhaust stroke) or on 2 stroke engines the RPM indicator will operate at the actual engine speed but the led will not extinguish fully.

If the above principles are followed it should only take a few seconds to establish a setting but do remember that engine speeds will fluctuate by approx 50 RPM at idle. This may be observed every few seconds as the LED goes off with increase in speed and comes on at full intensity with decreased speed at the correct RPM setting.

## **7. FURTHER NOTES**

- i. The use of quick drying white paint (such as typist's correction fluid) may be found beneficial in highlighting the timing marks.
- ii In order to achieve a steady speed the engine should be at normal operating temperature.
- iii The inductive HT connector contains a delicate ferrite material. Take care when handling and do not allow it to snap shut. Replacement parts and product service are available see warranty and refer to Customer Services Leaflet.

## **8. FAULTS**

- i. If this timing light fails to operate correctly, switch off the engine and check that the leads are making good connection.
- ii If the engine will not start and there is no timing flash check that there is no HT leakage to earth and there is a good spark at the number one plug (Lay a plug on the engine with number one HT lead connected to it while an assistant operates the starter).
- iii If the engine is running and there is no flash or intermittent flashes check that the inductive pickup arrow points along the HT lead towards the spark plug and that spark energy is not being reduced by an ignition system fault.

## **6. PRECAUTIONS**

Using this timing light necessarily involves working under the bonnet while the engine is running. This is a potentially hazardous situation, and the user should take every precaution to avoid any possibility of injury. The following guidance should always be followed:

- Never wear loose clothing, particularly ties, long sleeves etc that can catch in moving engine parts, and always tie-up or cover long hair.
- Ensure that the car is on firm level ground, and is out of gear and the handbrake firmly applied at all times.
- If for any reason the car is jacked up or the wheels removed, always ensure that the car is well supported, and never rely on a car jack alone, always use ramps or axle stands. Be wary of axle stands and jacks sinking into soft ground, and remember that asphalt surfaces may appear firm, but may give way under the concentrated load of a jack or axle stand.
- Do as much of the work as possible with the engine not running.
- Always route cables well away from hot or moving parts, (particularly the exhaust pipe and cooling fan) and check that cables are in a safe position before starting the engine.
- Always guard against getting the timing light or fingers too close to moving, hot or electrical parts. Be especially wary of the fan, fanbelt, fanbelt pulley, exhaust manifold, exhaust pipe, and HT parts of the ignition system. Remember that thermostatically controlled fans may suddenly start with no warning.
- Take care to avoid placing metal tools where they may cause an electrical short, such as near the car battery.

- Take care not to place tools etc where they may be dislodged by engine vibration.
- Treat High Tension components with respect, remembering that electrical shocks can cause involuntary movement which may result in secondary injury. Remember that sparks can jump quite a distance. Also remember that severe unexpected HT shocks can be received from old, worn, damaged or wet components (eg HT leads, coil, distributor).
- Keep all sensitive electronic equipment away from HT voltages, and do not make any electrical connection to HT voltages except as expressly advised by the makers of the electronic equipment.
- Remember that Low Tension Voltage, present on the LT terminal of the ignition coil and at the contact breakers, can also give a slight electrical shock.
- Store this timing light in a dry place and do not use it if allowed to become wet.
- Take care not to inhale exhaust gas. Never run the engine inside a garage or in a confined space. When running the engine, always ensure that there is adequate circulation of fresh air. Ensure that there are no leaks in the exhaust system near where you are working.
- Keep children and pets away from the car while work is being carried out.

## **7. GENERAL WARNING**

This equipment has been designed to operate in the harsh environment close to spark ignition engines but the user should be aware of the following:

1. Spark ignition engines and related electronics can emit high levels of interference which could effect test and maintenance equipment together with other electrical items such as radio or television receivers, computers etc.
2. Any interference emitted from the engine area could be increased by:
  - (a) Opening the engine cover.
  - (b) Making an electrical connections to the vehicle wiring loom or the vehicle battery.
  - (c) Any faulty components particularly if those associated with the ignition system.
3. If this equipment has any display which behaves in an erratic nature the user is advised to refer to the advice given in the detailed instructions to minimise the possibility of interference. In cases of difficulty the user is advised to check for the following.
  - 1) A faulty vehicle battery or poor connections to it.
  - 2) Poor ground connection to engine or other electrical equipment
  - 3) Faulty ignition components particularly rotor arms, ignition coils or HT leads with an internal break or with a resistance outside vehicle manufacturers limits.

The user is therefore advised, due to the potential emitting of interference, that vehicle maintenance and testing should be undertaken with due care and not in an area close to sensitive electronic equipment.

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### **WARRANTY**

*This warranty is in addition to the statutory rights of the purchaser.*

*Gunson have made every effort to ensure that this product is of the highest quality and value to the customer. However, Gunson can accept no responsibility for consequential damage howsoever caused arising from the use of this product.*

*All technical enquiries regarding this product should be accompanied by a stamped self-addressed envelope. Telephone enquiries can be made on the Gunson Helpline 0181-592 1967. Please note that Gunson can not provide technical information or advice or service data on particular motor cars.*

*If this product should require service or repair, it should be returned to Gunson Ltd (Service Dept), Coppen Road, Dagenham, Essex RM8 1NU.*

*Please include details of the fault, and if possible a daytime telephone number.*

*Postage may be refunded (UK only) and repairs will be completed free of charge for manufacturing defects within one year of purchase.*

*Defects due to other than manufacturing faults may be charged for.*

*When sending goods for service or repair, please give full details of faults requiring attention.*

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