

**MATCO
TOOLS**



MTL300

**Timing
Light**

**OWNER'S
MANUAL**



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SAFETY FIRST!

This manual describes common test procedures used by experienced service technicians. Many test procedures require precautions to avoid accidents that can result in personal injury, and/or damage to your vehicle or test equipment. Always read your vehicle's service manual and follow its safety precautions before and during any test or service procedure. **ALWAYS** observe the following general safety precautions:



When an engine is running, it produces carbon monoxide, a toxic and poisonous gas. To prevent serious injury or death from carbon monoxide poisoning, operate the vehicle **ONLY** in a **well-ventilated** area.



To protect your eyes from propelled objects as well as hot or caustic liquids, **always** wear **approved** safety eye protection.



When an engine is running, many parts (such as the coolant fan, pulleys, fan belt etc.) turn at high speed. To avoid serious injury, always be aware of moving parts. Keep a safe distance from these parts as well as other potentially moving objects.



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



Before starting an engine for testing or trouble-shooting, make sure the parking brake is engaged. Put the transmission in **park** (for automatic transmission) or **neutral** (for manual transmission). Block the drive wheels with suitable blocks.



Connecting or disconnecting test equipment when the ignition is **ON** can damage test equipment and the vehicle's electronic components. Turn the ignition **OFF** before connecting the Code Reader to or disconnecting the Code Reader from the vehicle's Data Link Connector (DLC).



To prevent damage to the on-board computer when taking vehicle electrical measurements, always use a digital multimeter with at least 10 megOhms of impedance.



The vehicle's battery produces highly flammable hydrogen gas. To prevent an explosion, keep all sparks, heated items and open flames away from the battery.

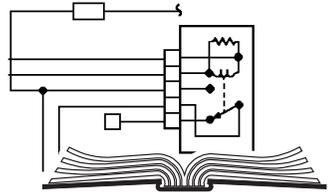


Don't wear loose clothing or jewelry when working on an engine. Loose clothing can become caught in the fan, pulleys, belts, etc. Jewelry is highly conductive, and can cause a severe burn if it makes contact between a power source and ground.

Vehicle Service Manuals

Always refer to the manufacturer's service manual for your vehicle before performing any test or repair procedures. Contact your local car dealership, auto parts store or bookstore for availability of these manuals. The following companies publish valuable repair manuals:

- **Haynes Publications**
861 Lawrence Drive
Newbury Park, California 91320
Phone: 800-442-9637
Web: www.haynes.com
- **Mitchell 1**
14145 Danielson Street
Poway, California 92064
Phone: 888-724-6742
Web: www.m1products.com
- **Motor Publications**
5600 Crooks Road, Suite 200
Troy, Michigan 48098
Phone: 800-426-6867
Web: www.motor.com



FACTORY SOURCES

Ford, GM, Chrysler, Honda, Isuzu, Hyundai and Subaru Service Manuals

- **Helm Inc.**
14310 Hamilton Avenue
Highland Park, Michigan 48203
Phone: 800-782-4356
Web: www.helminc.com

IMPORTANT!

Timing procedures vary from vehicle to vehicle. **ALWAYS** refer to the Vehicle Emission Label or service manual for the vehicle to obtain the proper timing procedures, specifications, and location of timing marks. **OBSERVE ALL SAFETY PRECAUTIONS WHENEVER WORKING ON A VEHICLE.**

ENGINE TIMING AND TUNE-UPS

Proper ignition timing is critical in order to achieve peak engine performance and to ensure maximum fuel economy. An ignition system timing check is critical during any tune-up procedure. Your Timing Light provides a simple and efficient means of checking a vehicle's timing.

You may also need tools and equipment to check engine rpm, breaker point dwell (for conventional ignition systems), or to apply vacuum to the vacuum advance diaphragm on the distributor during advance checks. Your supplier offers a wide range of tools and equipment necessary to perform these tasks.

With reference to today's "self-tuning" vehicles, the meaning of the term "tune-up" has changed significantly. A tune-up consists essentially of checking engine operation with Original Equipment Manufacturer's specifications. Adjustments are made and parts are replaced **ONLY** if engine performance is not within specifications.

ABOUT THE TIMING LIGHT

Your Timing Light is designed for use on all 12-volt negative ground vehicles equipped with conventional breaker point, and electronic ignition systems, or with DIS (distributorless ignition systems).



Some DIS systems are not adjustable. Consult the vehicle's service manual for procedures and specifications before at-tempting to time vehicles with DIS systems.

For 6-Volt Electrical Systems

- Requires a separate 12-volt automotive battery.

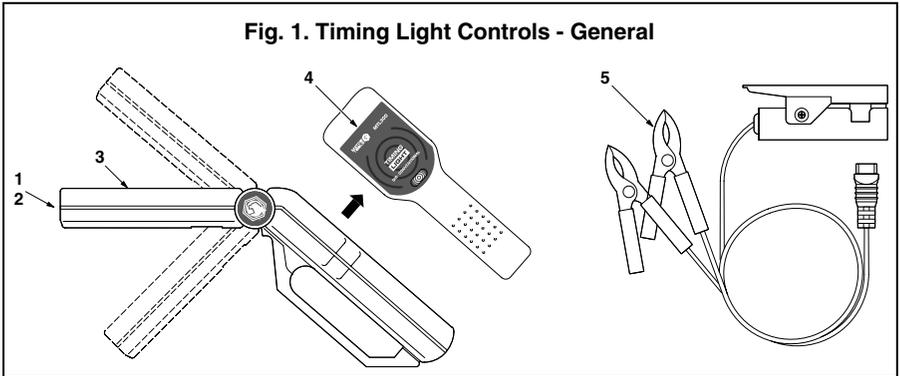
Your Timing Light may be used on vehicles with 6-volt electrical systems by using the following connection procedure:

1. Connect the **RED** battery clip to the positive (+) terminal of the 12-volt battery.
2. Connect the **BLACK** battery clip to the negative (-) terminal of the 12-volt battery.
3. Using a length of 18AWG jumper wire, ground the negative (-) terminal of the 12-volt battery to a known-good ground on the vehicle under test.
4. Perform remaining connection and test procedures as specified in the appropriate sections of this manual.

Timing Light Controls

General controls for the Timing Light are shown in Figure 1.

1. **Xenon Bulb** — Used to illuminate timing marks for checking timing.
2. **Spotlight** — Aids in aiming the Timing Light before performing a timing check.
3. **Swiveling Head** — Contains the xenon bulb. Rotates over approximately 90° to allow for easy illumination of timing marks in hard to reach locations.
4. **Control Panel** — Contains the controls necessary to operate the Timing Light.



5. Inductive Pickup Leads — Detachable leads assembly connects Timing Light to battery and ignition system:

- **Red Battery Clip** — Connects to battery positive (+) terminal.
- **Black Battery Clip** — Connects to battery negative (-) terminal or bare metal chassis ground.
- **Inductive Pickup Clip** — Clamps around No. 1 spark plug cable.

Operating controls for the Timing Light are shown in Figure 2.

1. **On/Off Switch** — Press to turn Timing Light on. Press again to turn Timing Light off.



BEFORE YOU BEGIN

Make a thorough check before starting any test procedure and fix any known mechanical problems before performing any test. Loose or damaged hoses, wiring, or electrical connectors are often responsible for poor engine performance.

Refer to the vehicle's service manual for proper connection of vacuum hoses, electrical wiring, and wiring harness connectors. Check the following areas:

- All fluid levels
- Spark plugs and spark plug wires
- Air cleaner
- Vacuum hoses
- Belts
- Electrical wiring
- Electrical connectors

ENGINE PREPARATION BEFORE TIMING

Always prepare the engine for timing before performing a timing check. Refer to the Vehicle Emission Control Label or service manual for timing procedures and specifications for the vehicle. The Vehicle Emission Control Label is located under the hood in the engine compartment. The label is typically located on the underside of the hood, on a fender well or valve cover, or near the hood latch.

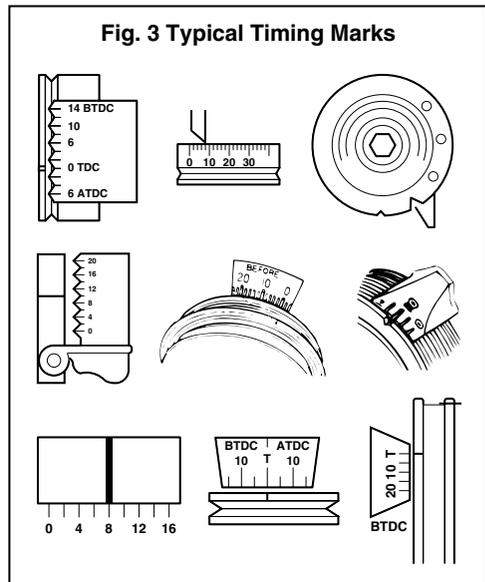
As a minimum, make the following preparations before timing:

1. Locate the timing mark and reference pointer. The timing mark and pointer are usually located on the crankshaft pulley or vibration damper (on the front of the engine) or on the flywheel (between the engine and transmission). Refer to Figure 3.

Make sure the timing mark and pointer are clean and clearly visible. Chalk the marks if necessary.

2. Make sure all spark plugs are in good condition and properly gapped.
3. Start and run the engine until it reaches its normal operating temperature. **TURN THE ENGINE OFF BEFORE CONNECTING TIMING LIGHT.**

If applicable, check and adjust dwell to manufacturer's specifications.



Using Your Timing Light

TIMING LIGHT CONNECTION

To ensure personal safety and reliable operation of the Timing Light, use the following procedure to connect the Timing Light:

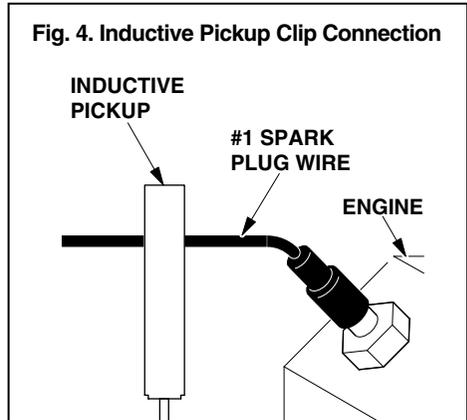


WARNING! Always keep hands, Timing Light, lead wires and clips away from moving engine parts and hot surfaces. DO NOT SMOKE.

1. Turn the ignition off. **DO NOT CONNECT THE TIMING LIGHT WITH THE ENGINE RUNNING OR WITH THE IGNITION ON.**
2. Clamp the inductive pickup clip around the No. 1 spark plug wire. See Figure 4.

DO NOT ALLOW THE INDUCTIVE PICKUP CLIP TO CONTACT THE EXHAUST MANIFOLD OR OTHER ENGINE PARTS. These parts become **EXTREMELY** hot while the engine is running, and will damage the inductive pickup clip.

3. Connect the battery clips to the vehicle's battery:
 - Connect the **RED** battery clip to positive (+) battery terminal.
 - Connect the **BLACK** battery clip to negative (-) battery terminal.
4. Connect the inductive pickup leads to the bottom of the Timing Light handle. The spotlight will turn on automatically.



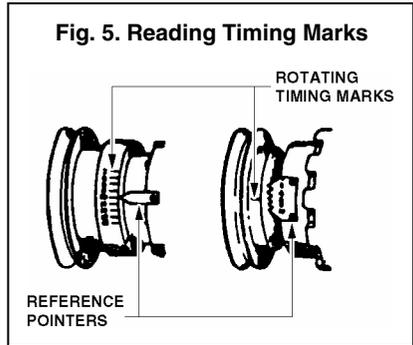
INITIAL (BASE) TIMING CHECK



Some ignition systems require that certain components be disconnected, jumped or grounded **BEFORE** ignition timing can be checked or adjusted to specifications. If these procedures are not followed, the checked or adjusted timing will not be correct. You **MUST** consult the vehicle's service manual for the proper procedures and specifications.

1. **MAKE SURE** the Timing Light is properly connected as described in TIMING LIGHT CONNECTION.
2. **MAKE SURE** the engine has been properly prepared for the timing check as described in ENGINE PREPARATION BEFORE TIMING.
3. Start and run the engine until it reaches its normal operating temperature.
4. Adjust the engine's idle speed, if necessary, to conform to manufacturer's specifications.
5. Adjust the Timing Light barrel, as needed, to adequately light the timing marks. Use the spotlight to aid in aiming the Timing Light properly.
6. Press the On/Off switch. The Timing Light will begin flashing. Note the position of the rotating timing mark in relation to the reference pointer. See Figure 5.

- Compare the readings obtained in step 6 with the manufacturer's specifications for timing. If the readings are within the specified tolerance (typically $\pm 2^\circ$), ignition timing is correct.
 - If the readings are not within the manufacturer's specifications, parts replacement or timing adjustment **MAY BE** necessary.
7. Press the On/Off switch. The Timing Light will stop flashing.
 8. Turn the ignition off and disconnect the Timing Light from the engine. **BE SURE** to reconnect any vacuum hoses, etc., which were disconnected during the timing check.



If the Timing Light fails to operate or operates erratically, refer to TROUBLESHOOTING to determine the most likely cause of the problem.

TIMING ADJUSTMENT

Refer to the vehicle's service manual for the proper procedures to adjust engine timing. **DO NOT ATTEMPT TO ADJUST ENGINE TIMING WITHOUT THE MANUFACTURER'S PROCEDURES OR SPECIFICATIONS.**

Troubleshooting

If the Timing Light fails to operate or operates erratically, make the following checks:

1. Make sure the battery clips are firmly connected to the battery terminals.
2. Make sure the battery clip polarity is correct (red battery clip is connected to the positive (+) battery terminal, black battery clip is connected to the negative (-) battery terminal).
3. Make sure the upper and lower ferrite cores of the inductive pickup clip are clean. If necessary, clean the inductive pickup clip as described in MAINTENANCE.
4. Make sure the inductive pickup clip is properly connected to the No. 1 spark plug cable.
5. Make sure the No. 1 spark plug is working properly:
 - Connect the inductive pickup clip to another spark plug cable, and press the On/Off switch.
 - If the Timing Light flashes, service the No. 1 spark plug before continuing.



Low spark plug voltage or a faulty spark plug wire may cause the Timing Light to operate erratically. Try moving the inductive pickup clip to a new location on the plug wire to improve operation.



Some ignition systems and/or specialty spark plug wires (solid core wires, racing wires, off-road wires) radiate above normal Electro-Magnetic Interference (EMI) and Radio Frequency Interference (RFI) which can cause improper operation of testing equipment. Contact the manufacturers of these parts for instructions on how to use an inductive pickup with their systems.

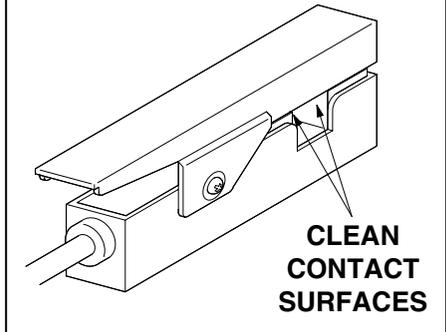
CLEANING THE INDUCTIVE PICKUP CLIP

Dirt or grease on the inside surfaces of the inductive pickup clip can result in erratic flashing or poor operation of the Timing Light. Periodically clean the contact surfaces inside the inductive pickup clip by wiping with a soft cloth. See Figure 6.

REPLACING THE INDUCTIVE PICKUP LEADS

The Timing Light is equipped with detachable leads which can be disconnected from the Timing Light for easy storage after use. If the test leads or clips become damaged, a replacement set can be obtained from your dealer or directly from the service center.

Fig. 6. Cleaning the Inductive Pickup Clip



LIMITED ONE YEAR WARRANTY

The Manufacturer warrants to the original purchaser that this unit is free of defects in materials and workmanship under normal use and maintenance for a period of one (1) year from the date of original purchase.

If the unit fails within the one (1) year period, it will be repaired or replaced, at the Manufacturer's option, at no charge, when returned prepaid to the Service Center with Proof of Purchase. The sales receipt may be used for this purpose. Installation labor is not covered under this warranty. All replacement parts, whether new or remanufactured, assume as their warranty period only the remaining time of this warranty.

This warranty does not apply to damage caused by improper use, accident, abuse, improper voltage, service, fire, flood, lightning, or other acts of God, or if the product was altered or repaired by anyone other than the Manufacturer's Service Center.

The Manufacturer, under no circumstances shall be liable for any consequential damages for breach of any written warranty of this unit. This warranty gives you specific legal rights, and you may also have rights, which vary from state to state. This manual is copyrighted with all rights reserved. No portion of this document may be copied or reproduced by any means without the express written permission of the Manufacturer. THIS WARRANTY IS NOT TRANSFERABLE. For service, send via U.P.S. (if possible) prepaid to Manufacturer. Allow 3-4 weeks for service/repair.

SERVICE PROCEDURES

If you have any questions, require technical support or information on UPDATES and OPTIONAL ACCESSORIES, please contact your local store, distributor or the Service Center.

(877) 336-2826 (33-MATCO) (6:00 AM-6:00 PM, Monday-Saturday PST)

Web: www.matcotools.com

REPLACEMENT PARTS

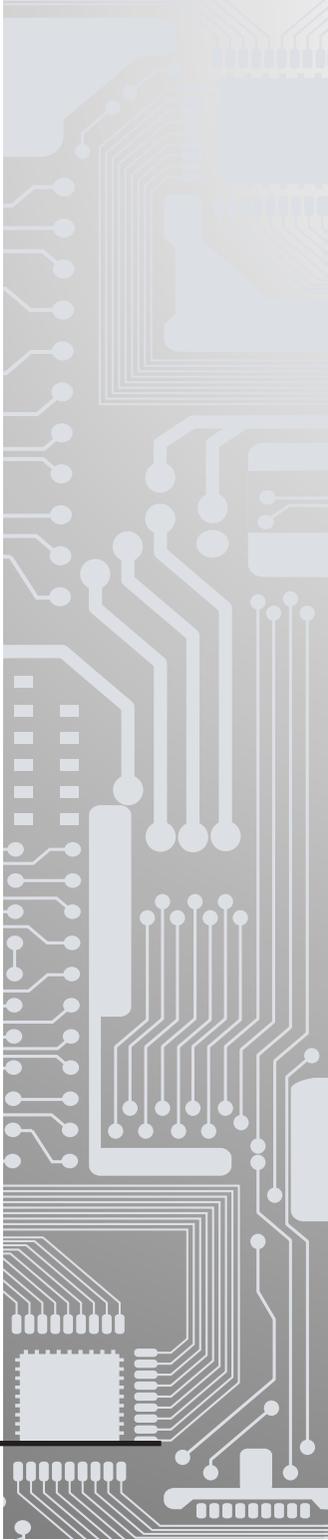
Replacement Metal Inductive Pickup PN 3595



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