1. Turn ignition switch off and disconnect battery ground cable.
2. Refer to Figure 1. Remove ignition cover plate, gasket, and hardware (items 1-3). Save these items for later re-use.
3. Note location of breaker plate. There is a V notch in the breaker plate used for alignment. When you install the HI-4N, align the V notch in the same location. This should set the timing close enough to start the engine. Remove and save the two standoffs and washers (items 4-5). Remove the breaker plate assembly, wiring, cam, and advance assembly (items 6–10).

REMOVAL OF OE ELECTRONIC IGNITION SYSTEM—1978 AND 1979 MODELS
1. Turn ignition switch off and disconnect battery ground cable.
2. Refer to Figure 2. Disconnect wires going from ignition module (item 3) to coil (14).
3. Remove ignition cover plate and hardware (items 1 and 2). Save these items for later re-use. Remove ignition module (3).
4. Note location of timer plate (10). There is a V notch in the timer plate used for alignment. When you install the HI-4N, align the V notch in the same location. This should set the timing close enough to start the engine. Remove and save the two standoffs and washers (items 4-5). Remove the sensor, shield, timer plate, trigger rotor, and advance assembly (items 6-12).

REMOVAL OF OE ELECTRONIC IGNITION SYSTEM—1980 AND LATER MODELS
1. Turn ignition switch off and disconnect battery ground cable.
2. Refer to Figure 3. Remove OE ignition module and wire harness (items 1-4). You will disconnect two wires at the coil, wire going to the VOES (Vacuum Operated Electrical Switch), ground wire at the module, and the 3 pin plug (20) that connects to the sensor plate. Refer to shop manual for locations.
3. Remove ignition cover plates and gasket (items 5-9). This will require drilling out two rivets. The rivets will later be replaced with two supplied self threading screws.
4. In order to remove the sensor plate cable, the cable plug (20) must be removed first. Use needle nose pliers to pull the terminals out of the plug. Then pull the cable through the exit hole at the bottom of the timing cover.
5. Note location of sensor plate (11). There is a V notch in the sensor plate used for alignment. When you install the HI-4N, you should align the V notch in the same location. This should set the timing close enough to start the engine. Remove and save the two standoffs and washers (10). Remove the sensor plate (item 11).
HI-4N INSTALLATION
Refer to Figure 4. The HI-4N requires OE timing rotor P/N 32402-83, or Crane Cams Part Number 8-1150. Check your rotor (9) for correct part number. For models prior to 1980, use the supplied 10-32 x 3/4" bolt and washer to mount the rotor.

1. Install HI-4N system in place of OE breaker or sensor plate. Rotate the HI-4N about 90 degrees to give better access to the cable exit hole in the gear case cover. On some early models it may be necessary to enlarge this hole. Install the HI-4N first, then push the cable through the hole. Align the V notch on the HI-4N same as the OE plate you removed. Use the OE standoffs to secure the HI-4N. You must use lock washers under the standoffs for proper clearance between the HI-4N and cover plate. Do not fully tighten the standoffs until the timing has been set.

2. Route the HI-4N harness along the frame rails to the coil. Make sure that harness will not be chafed or burned by exhaust heat. Secure harness with tie wraps. Do not install timing cover.

HI-4N HOOKUP
Crimp terminals and hardware are supplied for your convenience. Use the ring terminals for coil hookup. Use male-female quick disconnects for connections to the tach and vacuum switch (VOES). Tape up unused wires.

NOTE: Damage will result if the brown tach wire comes in contact with +12V.

1. Identify switched +12 volt wire and tach wire (if equipped) going to the coil. Refer to your service manual, or reconnect the battery and use a test light or voltmeter. The switched +12 volt wire will be hot when the ignition key is turned on.

2. Refer to Figure 5, 6, or 11 depending on your application. Connect the HI-4N white wire and switched +12 volt wire to Coil + (positive).

3. Connect the HI-4N pink wire to the Coil – terminal on the coil for the front cylinder.

4. Connect the HI-4N blue wire to the Coil – terminal on the coil for the rear cylinder.

5. Connect the HI-4N violet wire to the vacuum switch (Figure 3, item 18), if used.

6. Connect the HI-4N brown wire to the tach wire, if equipped with a tachometer. Tape up if unused.

7. The HI-4N is grounded via the timing housing; a separate ground connection is not required.

8. Reconnect battery ground cable. Verify proper ground connections to the frame and engine.
Figure 3. Harley-Davidson® 1980 and Later OE Electronic System

1. Screws (2)  
2. Washers (2)  
3. Ignition Module  
4. Well Nuts (2)  
5. Rivets (2)  
6. Outer Cover  
7. Inner Cover Screws (2)  
8. Inner Cover  
9. Gasket  
10. Sensor Plate Screws & Washers (2 each)  
11. Sensor Plate  
12. Rotor Screw & Star Washer

13. Rotor  
14. Gear Case Cover  
15. Ignition Coil  
16. Ignition Coil Terminal  
17. Spark Plug Wires (2)  
18. Vacuum Operated Electrical Switch (VOES)  
19. VOES Connector  
20. Sensor Connector

Figure 4. HI-4N Ignition System Installation

1. Buttonhead Screws (2)  
2. Outer Cover  
3. Inner Cover Screws (2)  
4. Inner Cover  
5. Gasket  
6. Sensor Plate Screws & Washers (2 each)  
7. HI-4N Unit  
8. Rotor Unit  
9. Rotor  
10. Gear Case Cover

Use Supplied Gasket
NOTE: Most motorcycle coils do not have terminals marked. Most singlefire coils use the center terminal for +12V and the outer two terminals for front and rear cylinder Coil–. For dualfire coils use either terminal for Coil+ and the other one for Coil–.

VOES HOOKUP
The OE vacuum switch (VOES) is normally an open circuit. Above 3-5 inch-Hg vacuum, the VOES closes and grounds the vacuum input on the OE module. This increases the total advance generated by the OE ignition module. Vacuum advance improves part throttle driveability and fuel economy. Connect the VOES to the HI-4N violet wire as shown in Figures 5, 6, and 11.

NOTE: 1996 and later models use a 2 wire connector between the VOES and the OE harness. Connect one wire from the VOES switch to frame ground and connect the other wire to the VOES input (violet wire) on the HI-4N.

MODELS WITHOUT OE VACUUM SWITCH (VOES)
This includes most models prior to 1985. Fuel economy and driveability will be improved if you install a VOES and connect it to the HI-4N violet wire as shown in Figures 5, 6, and 11. We recommend you use H-D® VOES P/N 26566-91. If the VOES is not used, tape up the violet wire.

HI-4N SETUP AND OPERATION
Refer to the cover plate on the HI-4N, and the switch table on page 6. The unit has four switches that select the operating modes, advance rate, and rev limit.

The top switch sets the operating mode. Use the OEM with VOES advance curve for stock and modified engines with OE electronic or points ignition. Use the Race Only advance curve for high compression engines. Kick start mode fires the first cylinder for quick starting. Electric start mode delays firing for 2 revolutions of the crankshaft for smoother starts and less strain on the starter.

The advance curve is adjustable over a limited range via the advance rate switch (SPK ADV). Advance curves are given in
The RPM limit switches (RPM LIMIT) are adjustable from 1,500 to 9,900 PRM. Use a safe RPM for your engine. Do not set RPM limit below 1500.

The HI-4 timing LED should light up when the ignition key is turned on. The timing LED will go off when the crankshaft is rotated past TDC. During cranking, the LED will blink.

Figures 7 and 8. Each set of advance curves includes minimum and maximum curves. The actual advance curve will be between the minimum and the maximum curves depending on the advance switch setting.

If you have a passenger or are using low octane gasoline, minimum advance will reduce spark knock. Maximum advance will give higher performance, but may require the use of high octane gasoline.
### MODE SWITCH SETTINGS

<table>
<thead>
<tr>
<th>Mode</th>
<th>Switch Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Single Fire, Single Spark, Race Curve, Electric Start</td>
</tr>
<tr>
<td>1</td>
<td>Single Fire, Single Spark, OE Curve, Electric Start</td>
</tr>
<tr>
<td>2</td>
<td>Single Fire, Multi Spark, Race Curve, Electric Start</td>
</tr>
<tr>
<td>3</td>
<td>Single Fire, Multi Spark, OE Curve, Electric Start</td>
</tr>
<tr>
<td>4</td>
<td>Dual Fire, Single Spark, Race Curve, Electric Start</td>
</tr>
<tr>
<td>5</td>
<td>Dual Fire, Single Spark, OE Curve, Electric Start</td>
</tr>
<tr>
<td>6</td>
<td>Dual Fire, Multi Spark, Race Curve, Electric Start</td>
</tr>
<tr>
<td>7</td>
<td>Dual Fire, Multi Spark, OE Curve, Electric Start</td>
</tr>
<tr>
<td>8</td>
<td>Single Fire, Single Spark, OE Curve, Kick Start</td>
</tr>
<tr>
<td>9</td>
<td>Dual Fire, Single Spark, OE Curve, Kick Start</td>
</tr>
</tbody>
</table>

### TIMING MARKS

The TDC and advance timing marks are located on the flywheel and can be observed via an inspection hole (refer to shop manual for details). Refer to Figure 9 for typical timing marks. Early Style includes most 1980 and earlier models. Late Style includes most 1981-95 models. If the shop manual is not available, remove spark plugs, turn engine until front piston is at TDC on compression stroke and identify TDC mark on the flywheel. Refer to Figure 9 and find the diagram with a matching TDC mark. Use the corresponding advance mark shown in the diagram.

**NOTE:** 1996 and later models (1995 and later for export models) have a timing mark at 20° BTDC for setting the timing with the OE ignition module. Do not use this mark for setting the timing on the HI-4N. In most cases an additional mark will remain at 35° BTDC (see Figure 9). Use this mark to set the timing with a timing light as described below.

### INITIAL STATIC TIMING PROCEDURE

In most cases, aligning the V notch on the HI-4N plate to the same location as the OE plate will set the timing close enough to start the engine. If the engine will not start or runs very rough, you can use the following static timing procedure.

#### Figure 7. OEM (with VOES) Advance Curves Based on TDC Initial Timing

![OEM (with VOES) Advance Curves Based on TDC Initial Timing](image)

#### Figure 8. Race Advance Curves Based on TDC Initial Timing

![Race Advance Curves Based on TDC Initial Timing](image)
Run the engine at 2,500 RPM. Adjust HI-4N position until TDC timing mark is centered in the observation hole. You will now have the amount of advance you dialed into the timing light. Tighten the standoffs and verify that timing has not shifted. Most dial-back timing lights will be compatible with single fire systems.

**ADVANCE CURVE SETUP**
After you have set the timing as explained above, set the HI-4N advance switch to desired position. If you run 93 octane gasoline, you can set the switch to position 9 for maximum advance and performance without spark knock. High compression engines may require less advance. You should use the Race Only advance curve for high compression engines.
COVER PLATE ASSEMBLY
You can re-use the OE hardware, and the supplied Crane Cams gasket for the HI-4N. For models with a riveted outer cover, use the supplied self-threading screws in place of the rivets.

TROUBLESHOOTING
Did the engine run properly before installation of the HI-4N? If not, remove the HI-4N, reinstall the OE ignition or another known good unit and then find and correct the original problem. Did the HI-4N function correctly before the problem occurred? If the answer is yes, did you change anything that may have affected it? Try going back to the last setup that worked OK to help isolate the problem.

If the engine will not start, or runs rough or intermittently, use the following checklist steps:

ENGINE WILL NOT START

1. Check that timing LED lights up and stays on when ignition key is first turned on. If not, check for +12 volts on white wire from HI-4N.
2. Check that timing LED blinks while engine is cranked.
3. If the timing LED blinks, but engine will not start, recheck all wire harness connections or replace coil(s).
4. Check for low voltage from a faulty or marginal charging system and battery.
5. If all of the above conditions have been checked, contact tech-support for assistance.

CHECKING FOR SPARK
To crank the engine and check for spark, use a KD Tools test plug or H-D® tool HD-26792. These test plugs come with an alligator clip that must be attached to frame or engine ground. Use a length of spark plug wire to connect the test plug to the coil.

WARNING: Never crank the engine with any spark plug wire disconnected.

MISFIRE OR INTERMITTENT OPERATION
Field experience has shown that popping back through the carburetor, misfiring, and intermittent failure (especially after the engine gets hot) are usually not caused by electrical problems within the HI-4N. Carburetor problems, fouled spark plugs, coil failure, and loose wire harness connections are the most common culprits. Also, verify that spiral core or suppression type spark plug wires and resistor spark plugs are being used.

TACH INOPERATIVE
If the tach is inoperative after installation of the HI-4N, you may require a tach adapter. The HI-4N tach output is compatible with ground sensing tachs which includes most OE and aftermarket tachs. Some tachs require a high voltage trigger pulse. In this case, install Crane Cams tach adapter P/N 8-2050. Note that the tach will read correctly at the rev limit only if it is connected to the brown wire from the HI-4N. Damage to the HI-4N circuitry may have occurred if 12 volts was applied to the brown tach wire at any time.