

V-Twin Mfg.

VT Part No. 32-8075 CRANE HI-INTENSITY IGNITION SYSTEM DUAL FIRE, 8-1000

VT Part No. 32-8076 CRANE HI-INTENSITY IGNITION SYSTEM SINGLE FIRE, 8-2000

This is a custom application and rider safety depends on proper installation. This product should only be installed by a knowledgeable and trained motorcycle technician. V-Twin Mfg. accepts no responsibility for improper installation.

CAUTION: READ INSTRUCTIONS CAREFULLY BEFORE STARTING INSTALLATION

INTRODUCTION

Crane HI-1 and HI-2 ignition systems are intended for use with Harley-Davidson® motorcycles. The HI-1 and HI-2 replace the original equipment (OE) electronic ignition system on 1978 and later models as well as the points and mechanical advance on early models.

WARNING: 1996 and later models have a vehicle tilt sensor that shuts off the ignition if the motorcycle rolls on its side. This feature is disabled when the new Crane ignition is installed.

The Crane units utilize a Hall effect sensor system. Precisely located magnets molded into the trigger rotor deliver accurate timing and optimum dwell. Hall effect triggering is unaffected by dirt, oil, or other contaminants that may get into the ignition housing.

NOTE: HI-1 and HI-2 ignitions are for off road racing and early OE points applications only.

HI-1 AND HI-2 TRIGGER ROTOR AND IGNITION IDENTIFICATION

HI-1 and HI-2 trigger rotors and ignitions appear similar but are not interchangeable. HI-1 units have a cable with red and black wires. HI-2 units have a cable with red, black, and white wires. Refer to Figure 1 for trigger rotor identification. The system will not work if the rotor and ignition are mismatched.

ADDITIONAL REQUIRED PARTS

1980 and later motorcycles originally equipped with electronic ignition will require addition of a mechanical advance mechanism such as Harley-Davidson® P/N 32517-70. This part is not included with the Crane installation kit and can be purchased from your local dealer.

Installation of the HI-2 single-fire ignition on motorcycles equipped with an electronic tach requires Crane tach adapter P/N 8-2050. The tach will read half engine RPM without the tach adapter. This part is not included with the HI-2 installation kit and can be purchased from your local dealer.

COIL AND SPARK PLUG CABLE CONSIDERATIONS

We recommend replacing the OE coil. Coils used with the HI-1 or HI-2 must have at least 2 ohms primary resistance. Coils with 4 ohms or higher may be used, but may not produce optimum output. We recommend the following coils:

HI-1 Ignition. Use the Crane 8-3006 coil. This coil will fit in the stock mounting location on most H-D® motorcycles.

HI-2 Ignition. Use the Crane 8-3001 coil. This is a "Siamese" coil with two independent sections and will fit in the stock mounting location on most H-D® motorcycles. You can also use two dual spark tower coils and ground one of the towers on each coil to the engine case or frame. You will have to fabricate a bracket to mount the second coil.

Crane Cams FireWire spiral core wires are recommended for maximum performance. Do not use non-suppression solid core spark plug wires; they may cause interference with your electronic ignition system and/or accessories.

Figure 1. HI-1 and HI-2 Rotor Identification

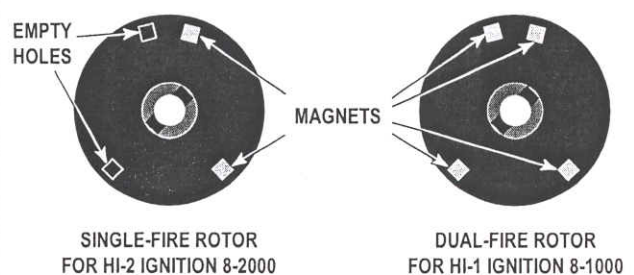
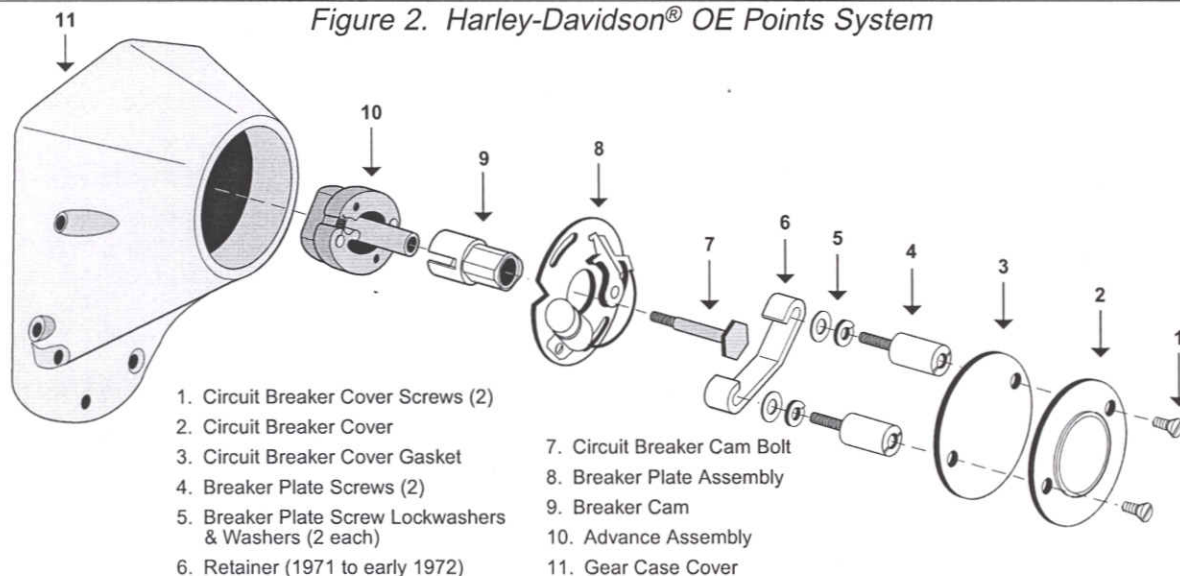


Figure 2. Harley-Davidson® OE Points System



REMOVAL OF POINTS IGNITION - 1970 TO 1977 MODELS

1. Turn ignition switch off and disconnect battery ground cable. Disconnect wire going from breaker points to Coil negative terminal.
2. Refer to Figure 2. Remove ignition cover plate, gasket, and hardware (items 1-3). Save these items for later re-use.
3. Note orientation of breaker plate. There is a V notch in the breaker plate used for alignment. When you install the Crane ignition, 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 (items 4-5). Remove the breaker plate assembly.
4. Remove the bolt (7) that holds the advance assembly to the engine. Remove the points cam (9) only. Make sure the advance assembly (10) remains fully seated on the shaft.

REMOVAL OF OE ELECTRONIC IGNITION SYSTEM - 1978 AND 1979 MODELS

1. Turn ignition switch off and disconnect battery ground cable.
2. Refer to Figure 3. Disconnect wires going from ignition module (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 Crane ignition, 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 (items 4,5). Remove the sensor, shield, timer plate, trigger rotor (items 6-11). Make sure the advance assembly (12) remains fully seated on the shaft.

REMOVAL OF OE ELECTRONIC IGNITION SYSTEM - 1980 AND LATER MODELS

1. Turn ignition switch off and disconnect battery ground cable.
2. Refer to Figure 4. Remove OE ignition module and wire harness (items 1-4). You will disconnect two wires at the coil (15), a wire going to the VOES (Vacuum Operated Electrical Switch) (18), a black ground wire at the ignition module, and the 3 pin plug (20) that connects to the sensor plate (11). 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 Crane unit, 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 (11).

6. Remove hex head bolt (12) and the trigger rotor (13). Install a new mechanical advance mechanism (H-D® P/N 32517-70). Make sure the indexing pin on the bottom of the advance mechanism links up with the slot on the end of the cam as shown in Figure 5.

CRANE IGNITION INSTALLATION

1. Refer to Figure 6. Confirm that the advance assembly (6) is seated squarely on the end of the camshaft and that the drive pin is properly engaged. Install the Crane ignition (5). Thread the cable through the hole in the housing as you install the unit. Locate the unit so that the holes for the standoff screws (1) fall in the middle of the adjustment slots. Align the Crane ignition V notch same as the OE ignition.

2. Install the two standoff screws (1) just snug enough so the plate assembly can be rotated to set timing. For 1980 and later use the supplied washers (one on each standoff screw).

3. Make sure that the advance mechanism (6) is straight on the shaft. Mount the trigger rotor (4) to the advance mechanism. The rotor is fully seated when the top of the rotor is located just below the end of the advance mechanism shaft. Install the supplied rotor hold-down screw just snug to test for proper clearance.

4. An air gap of 0.010"-0.030" between the trigger rotor and the ignition plate is required for proper operation. To check the air gap, rotate the trigger rotor counterclockwise while applying light inward pressure to insure the advance mechanism is working freely. When released, the trigger rotor should snap back to its original position. If the trigger rotor rubs or drags on the ignition plate, the air gap is insufficient. If no rubbing occurs, use a feeler gauge to measure the gap at three points around the rotor. Keep the gauge away from the

Figure 3. Harley-Davidson® 1978-79 OE Electronic System

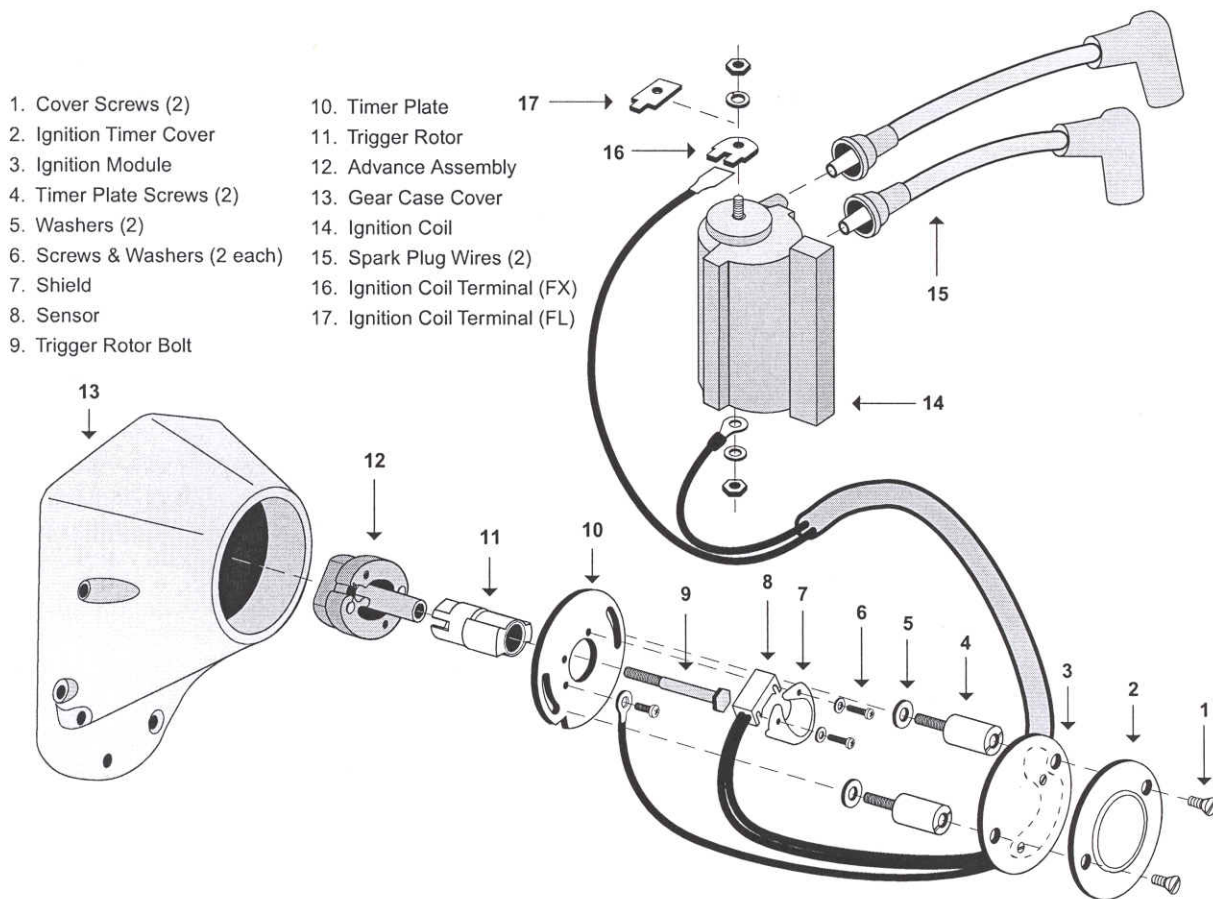
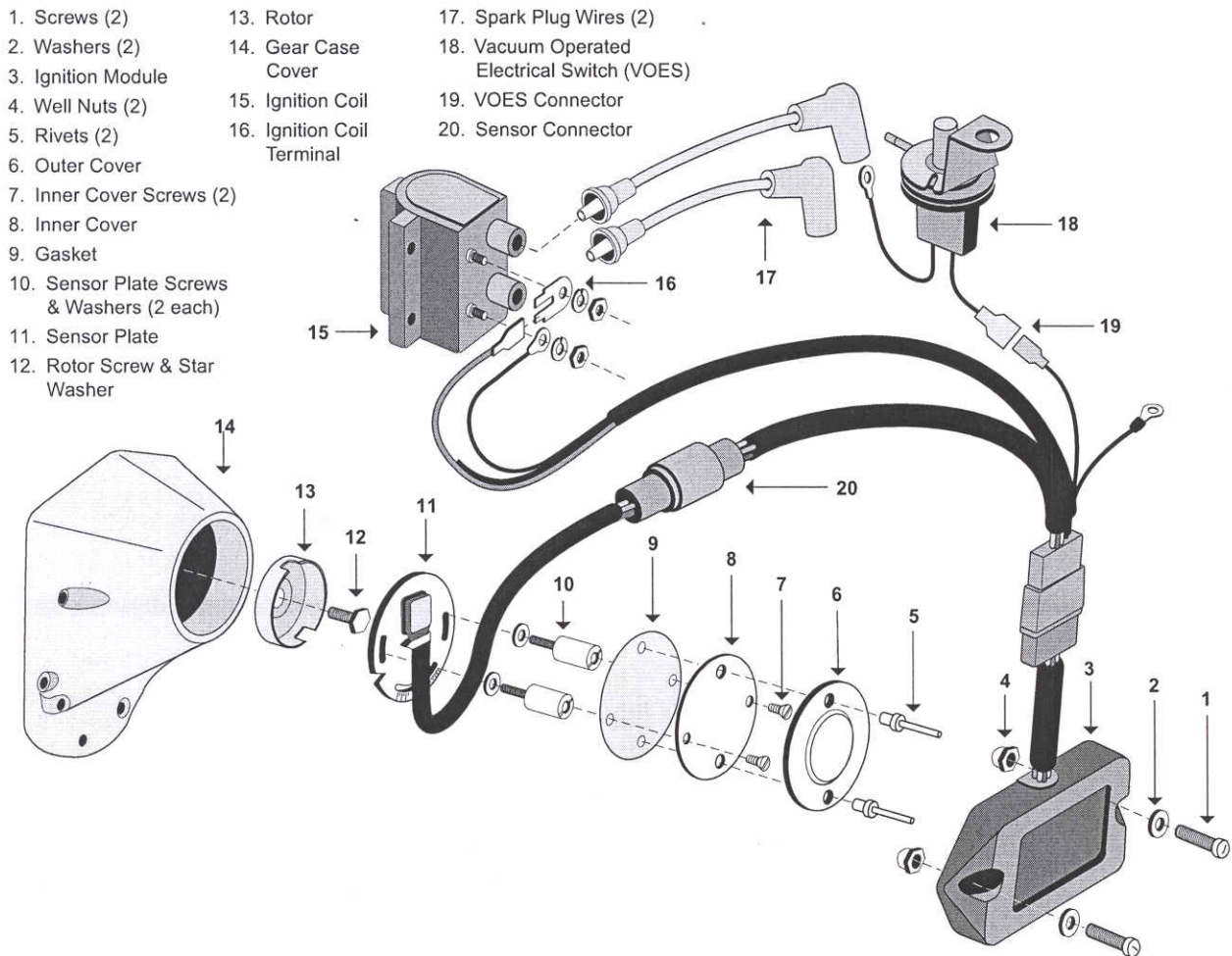


Figure 4. Harley-Davidson® 1980 and Later OE Electronic System



powerful magnets in the rotor as they may produce enough drag to simulate a normal reading. If the air gap is 0.010"-0.030" and no end play of the trigger rotor is noted, use Loctite or equivalent and tighten the rotor hold-down screw to 25 in-lb.

Insufficient Air Gap (Trigger Rotor Rubs on Ignition Plate)

If the trigger rotor rubs on the ignition plate, improper operation and possible failure will occur. Check the mounting of all components to make sure that no misalignment is present. If the trigger rotor still rubs, install the supplied advance assembly shim as shown in Figure 7. This 0.030" shim must be installed between the end of the cam and the advance mechanism. This moves the advance mechanism and trigger rotor out. Proper alignment between the advance mechanism and the end of the cam is vital. Make sure the advance mechanism sits "square" on the cam before tightening the trigger rotor retaining screw. If the air gap is now 0.010"-0.030" and no end play of the trigger rotor is noted, use Loctite or equivalent and tighten the screw to 25 in-lb.

Figure 5. Advance Mechanism Alignment

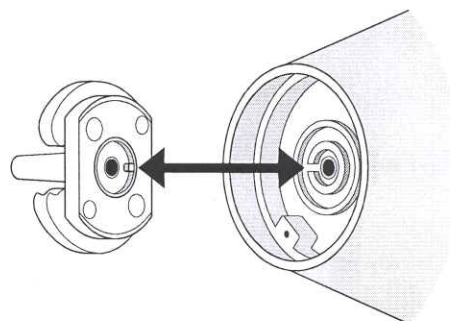


Figure 6. Crane Ignition System Installation

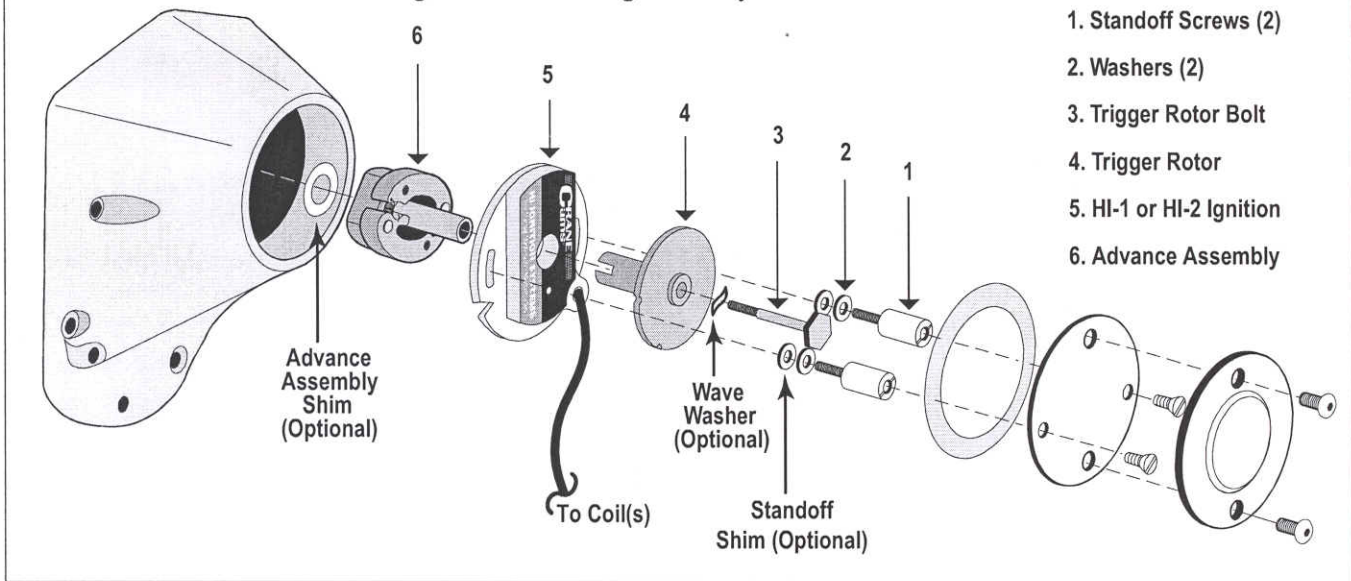
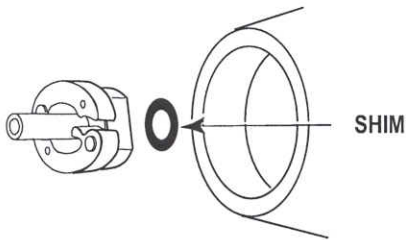


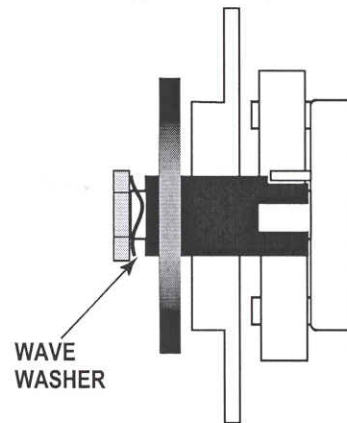
Figure 7. Shimming the Advance Assembly



Checking Trigger Rotor End Play on Advance Assembly

After the trigger rotor hold-down screw has been tightened snug, check to see if you can slide the rotor in and out on the advance assembly shaft. If the end play exceeds 0.010", the wave washer should be installed as shown in Figure 9. Apply Loctite and then tighten the rotor hold-down screw to 25 in-lb.

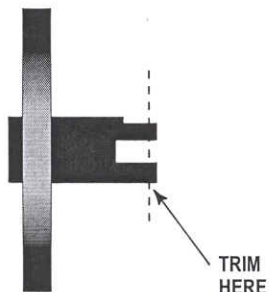
Fig 9. Reducing End Play with Wave Washer



Excessive Air Gap (Above 0.030")

If an air gap of more than 0.030" is present and there is no end play in the trigger rotor, it must be brought closer to the ignition plate. Trim the slotted end of the rotor shaft as shown in Figure 8. Use coarse sandpaper or a sanding disk. Make sure the trimmed end remains square with the rotor disk. If you must trim more than 0.050" away, some other problem exists and should be resolved before further trimming. After trimming, the wave washer may be required to reduce trigger rotor end play.

Figure 8. Trimming the Trigger Rotor



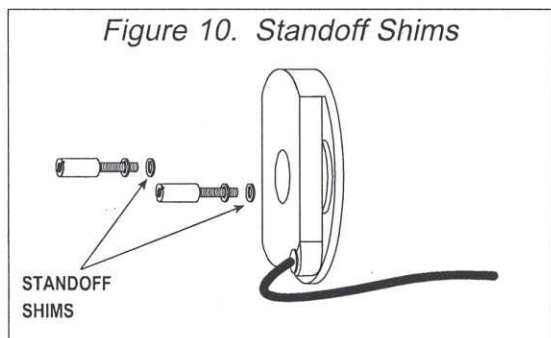
Camshaft End Play

The trimming procedure and wave washer can help to obtain the proper 0.010"-0.030" air gap between the rotor and ignition unit. However, you will not be able maintaining this gap if the camshaft has excessive end play. Since the advance assembly and rotor are mounted to the camshaft and the ignition is mounted to the case, the air gap changes as the cam "walks." Consult the factory service manual or your dealer for the proper cam end

play specs for your motorcycle and methods to control it. Unfortunately, this problem may not become apparent until after the engine is run.

CHECKING TIMING COVER CLEARANCE

Refer to Figure 6. Place a small straightedge across the ends of the standoff screws (1). Make sure the head of the center bolt is lower than the ends of the standoffs. If the head of bolt hits the straightedge, standoff shims must be installed as shown in Figure 10 in order to achieve the necessary clearance. 1980 and later models will typically require one shim on each standoff screw.



CRANE IGNITION HOOKUP

CAUTION: *Incorrect connections can damage the Crane ignition.*

Crimp terminals and hardware are supplied for your convenience. Use the ring terminals for coil hookup. Tape up any unused wires.

1. Pull the cable from the Crane ignition plate through the hole in the housing. On some early models it may be necessary to enlarge the exit hole. Make sure that the cable does not interfere with the trigger rotor. Route the cable along frame members up to the coil. Make sure the cable will not be chafed or burned by exhaust heat.

NOTE: *Most motorcycle coils do not have terminals marked. Most single-fire coils use the center terminal for +12V and the outer two terminals for front and rear cylinder Coil -. For dual-fire coils use either terminal for Coil + (positive) and the other one for Coil - (negative).*

2. 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.
3. The Crane ignition is grounded to the timing housing by the standoff screws. Make sure that the contact areas are clean and free of corrosion.

HI-1 COIL HOOKUP

1. Refer to Figure 11. Connect the HI-1 red wire and switched +12 volt wire to Coil positive.
2. Connect the HI-1 black wire to the Coil negative terminal.
3. Reconnect battery ground cable. Verify proper ground connections to the frame and engine.

HI-2 COIL HOOKUP

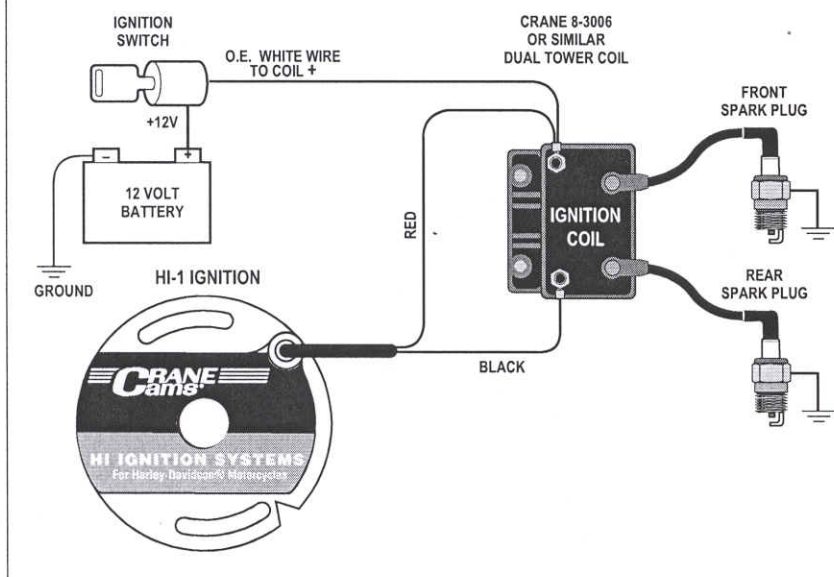
1. Refer to Figure 12. Connect the HI-2 red wire and switched +12 volt wire to Coil positive.
2. Connect the HI-2 black wire to the coil negative terminal for the front cylinder.
3. Connect the HI-2 white wire to the coil negative terminal for the rear cylinder.
4. Reconnect battery ground cable. Verify proper ground connections to the frame and engine.

TIMING MARKS

The TDC and advance timing marks are located on the flywheel and can be observed via an inspection hole (refer to service manual for details). Refer to Figure 13 for typical timing marks. Early Style includes most 1980 and earlier models. Late Style includes most 1981-95 models. If the service 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 13 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. In most cases an additional mark will remain at 35° BTDC (see Figure 13). Use this mark to set the timing with a timing light.*

Figure 11. HI-1 Dual Fire Ignition Hookup

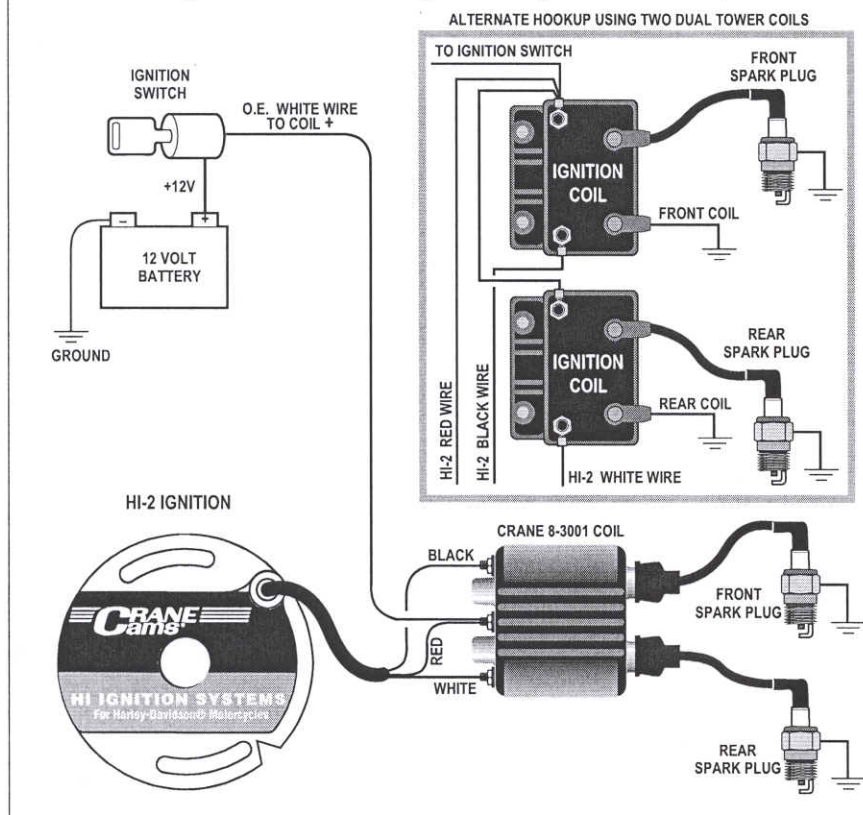


2. Hold the trigger rotor fully counter-clockwise against the advance springs. Rotate the ignition plate until the raised edge of the plate and the static timing notches on the edge of the timing rotor are aligned (see Figure 14). This will allow you to start the motorcycle and set timing with a timing light. Make sure the standoff screws are snug, but not fully tight in order to allow adjustment for timing.

SETTING TIMING USING A TIMING LIGHT

Connect a timing light to the front cylinder. Run the engine at 2,000 RPM. Adjust ignition plate position until advance timing mark is centered in the observation hole. Tighten the standoffs and verify that timing has not shifted.

Figure 12. HI-2 Single Fire Ignition Hookup



COVER PLATE ASSEMBLY

In most cases you can re-use the OE hardware. For models with a riveted outer cover, you can use 10-32 x 3/8 self-threading screws (not supplied) in place of the rivets.

TROUBLESHOOTING

Did the engine run properly before installation of the Crane ignition? If not, remove the Crane unit, reinstall the OE ignition or another known good unit and then find and correct the original problem. Did the Crane unit 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:

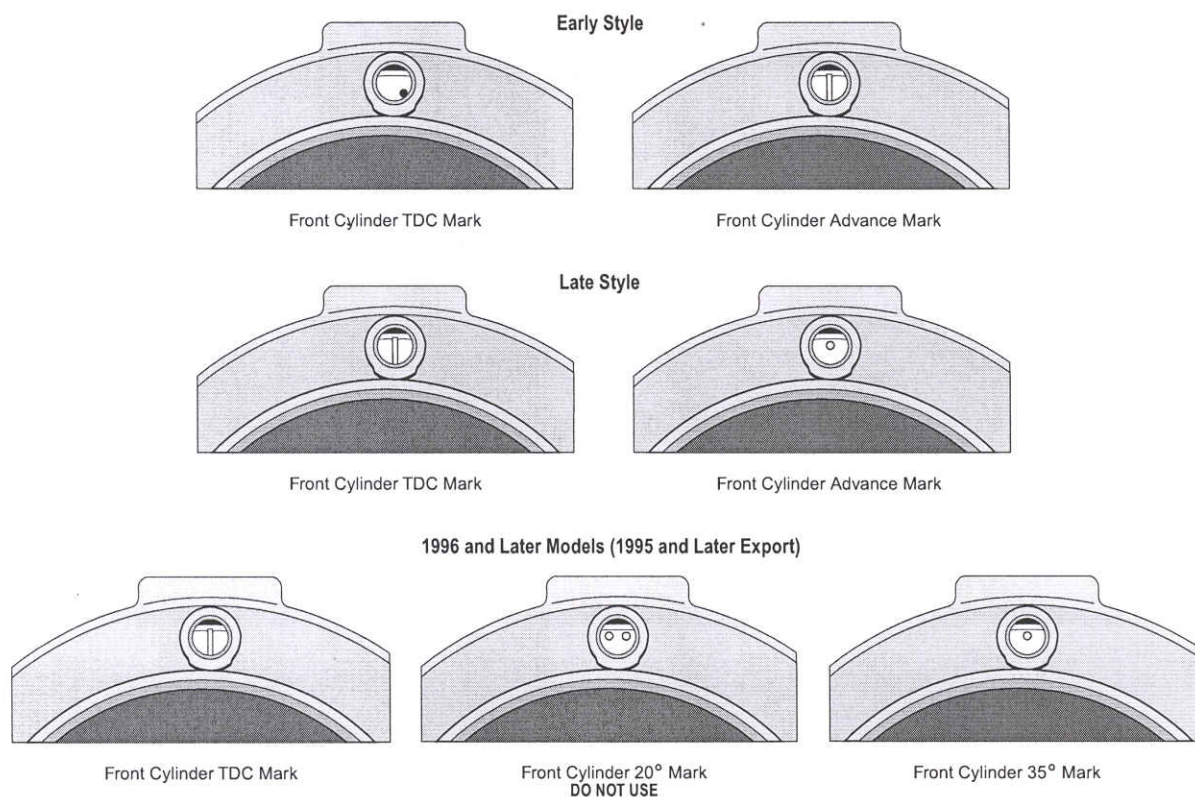
ENGINE WILL NOT START

Check for low voltage from a faulty or marginal charging system and battery.

INITIAL STATIC TIMING PROCEDURE

1. Remove spark plugs. With the transmission in gear, rock the motorcycle until the advance timing mark is in the center of the hole and the front cylinder is on compression (refer to Figure 13).

Figure 13. Top Dead Center (TDC) and Front Cylinder Advance Marks for Various Models



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.

TACH INOPERATIVE

HI-1 applications. Make sure that the tach wire is connected to COIL- (HI-1 black wire).

HI-2 applications. You must install Crane tach adapter P/N 8-2050. The tach will read half engine RPM without the tach adapter. This part is not included with the HI-2 installation kit and can be purchased from your local dealer.

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 Crane ignition. Carburetor problems, fouled spark plugs, coil failure, and loose wire harness connections are the most common culprits. Verify that spiral core or suppression type spark plug wires and resistor spark plugs are being used.

Figure 14. Static Timing Alignment at TDC

