

V-Twin MFG.

VT No. 32-9500 V-TECH 1 IGNITION KIT, SINGLE FIRE FITS EV SHOVEL, XL THRU 1997 VT No. 32-9503 V-TECH 1 IGNITION KIT, SINGLE FIRE FITS EV, SHOVEL, XL, WITH COIL AND WIRES

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

The Volt Tech Ignition system is intended for use with H-D motorcycles. The Volt Tech replaces the original equipment (OEM) electronic ignition system on 1978 and later models as well as the points and mechanical advance on early models. Each cylinder is fired independently and only on the compression stroke. Single fire operation increases engine power at high RPM, improves starting, and helps reduce backfiring at low RPM. The Volt Tech features an adjustable advance and rev limiter. A timing LED indicates static timing (top dead center) and gives diagnostic information. Two starting modes are provided: electric start and kick start. A tach output gives accurate tach readings even at the rev limit.

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 HI-4 ignition is installed.

ADDITIONAL REQUIRED PARTS

FX series BT and XL series models prior to 1984, FL series BT models prior to 1985, and all models with OE points will require OE timing rotor VT No. 32-9087. This part is not included with the Volt Tech installation kit.

COIL AND SPARK PLUG CABLE CONSIDERATIONS

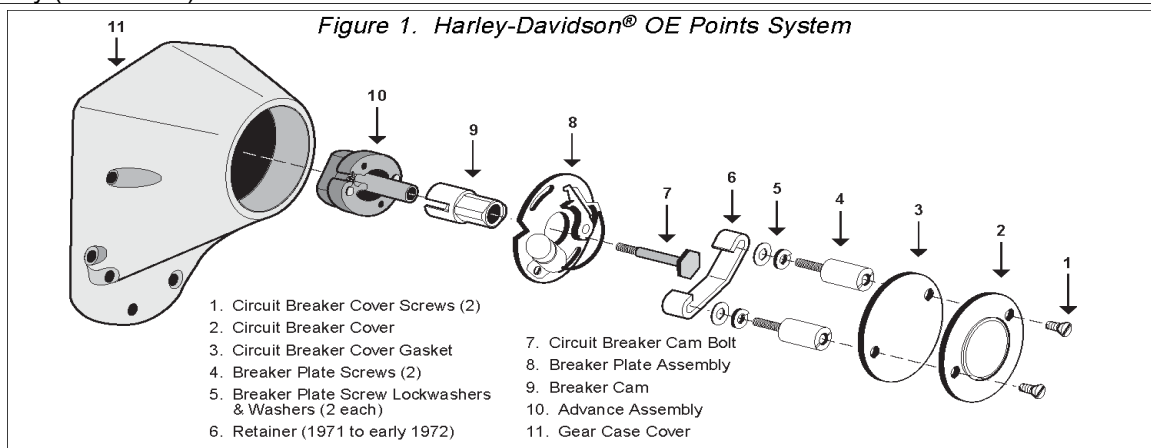
We recommend replacing the OEM coil. Coils used with the Volt Tech must have at least 2 ohms primary resistance. Coils with 4 ohms or higher may be used, but may not produce optimum output. We recommend the following coils for single and dual-plug applications.

Volt Tech Ignition With Single Plug Heads. Use VT No. 32-2013 coil. This is a "Siamese" coil with two independent sections and will fit in the stock mounting location on most HD 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.

Volt Tech Ignition With Dual Plug Heads. Use two VT No. 32-7789 coils. You will have to fabricate a bracket to mount the second coil. Do not use solid copper spark plug cables; they may cause interference with your ignition system and accessories.

REMOVAL OF POINTS IGNITION - EARLY MODELS PRIOR TO 1978

1. Turn ignition switch off and disconnect battery ground cable. Disconnect wire going from breaker points to Coil – (negative) terminal.
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 Volt Tech, 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 Volt Tech, 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 OEM ELECTRONIC IGNITION SYSTEM - 1980 AND LATER MODELS

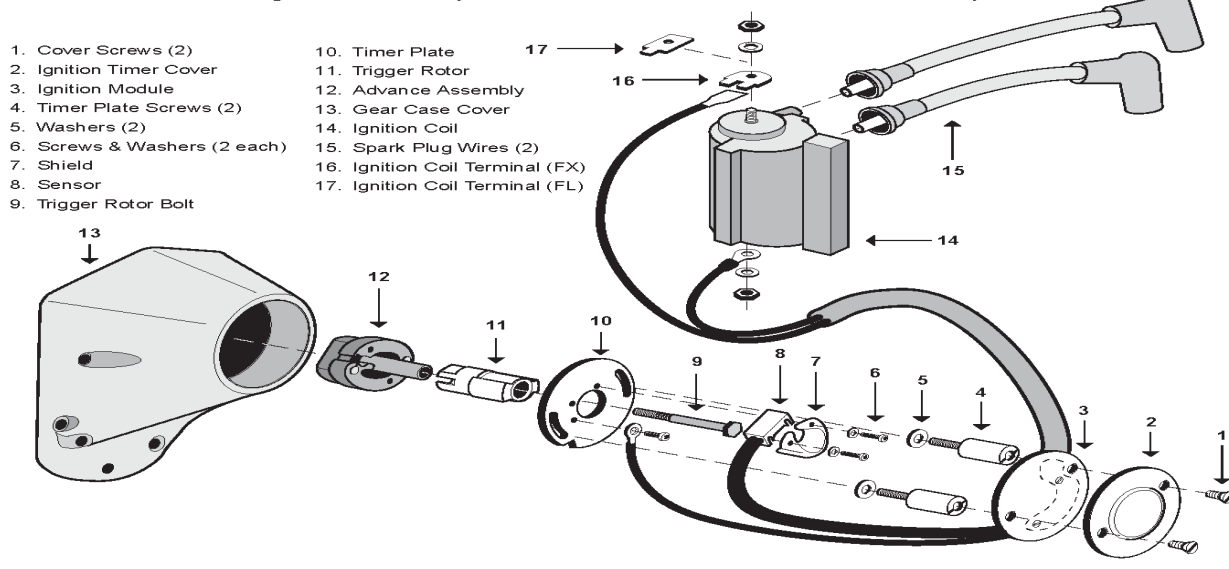
1. Turn ignition switch off and disconnect battery ground cable.
2. Refer to Figure 3. Remove OEM ignition module and wire harness (items 1-4). You will disconnect two wires at the coil, wire going to the VOES (Vacuum Operated Electrical Switch), ground wire at the module, and the 3 pin plug (20) that 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.
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 Volt Tech 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).

Volt Tech Installation

Refer to Figure 4. The Volt Tech requires OEM timing rotor. 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 Volt Tech system in place of OEM breaker or sensor plate. Rotate the Volt Tech 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 Volt Tech first, then push the cable through the hole. Align the V notch on the Volt Tech same as the OEM plate you removed. Use the OEM standoffs to secure the Volt Tech. You must use lock washers under the standoffs for proper clearance between the Volt Tech and cover plate. Do not fully tighten the standoffs until the timing has been set.
2. Route the Volt Tech 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.

Figure 2. Harley-Davidson® 1978-79 OE Electronic System



Volt Tech Hookup

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 or 6, depending on your application. Connect the Volt Tech red wire and switched +12 volt wire to Coil + (positive).
3. Connect the Volt Tech black wire to the Coil - terminal on the coil for the front cylinder.

4. Connect the Volt Tech white wire to the Coil – terminal on the coil for the rear cylinder.
5. Connect the Volt Tech green wire to the vacuum switch (Figure 3, item 18), if used.

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+ and the other one for Coil–.

6. Connect the Volt Tech brown wire to the tach wire, if equipped with a tachometer. Tape up if unused.
7. The Volt Tech 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.

VOES HOOKUP

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

Figure 3. Harley-Davidson® 1980 and Later OE Electronic System

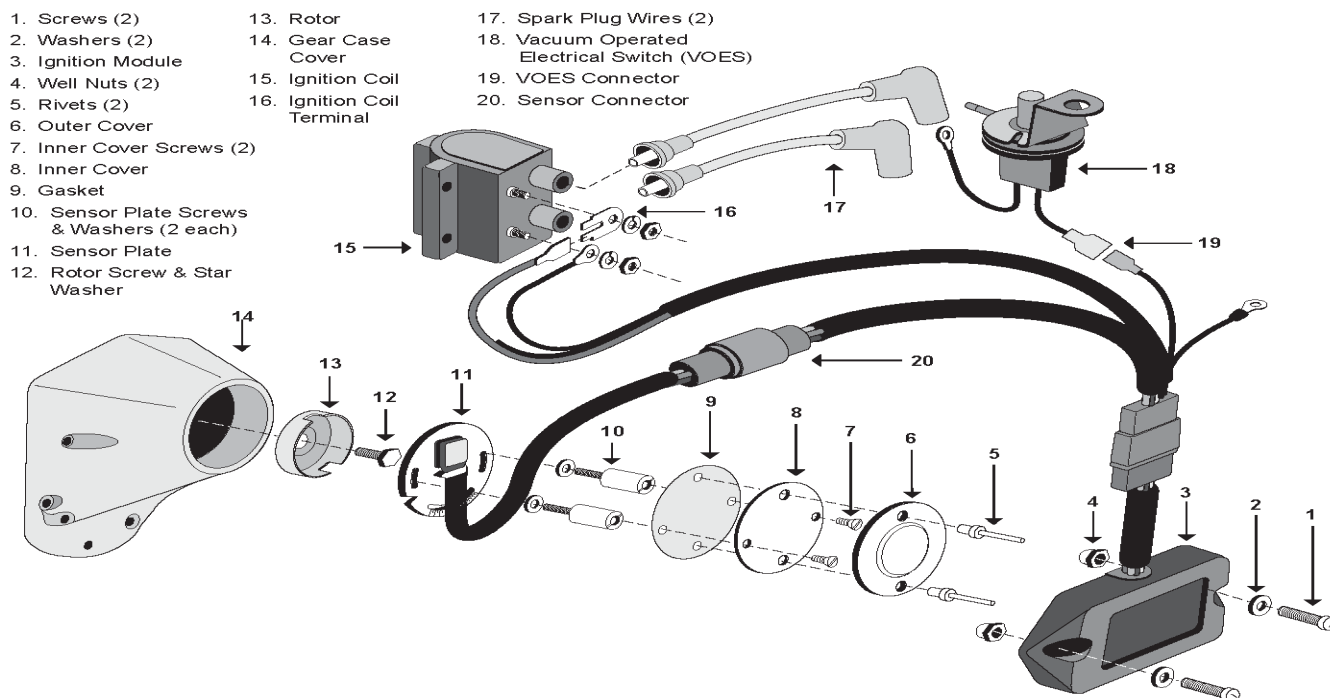
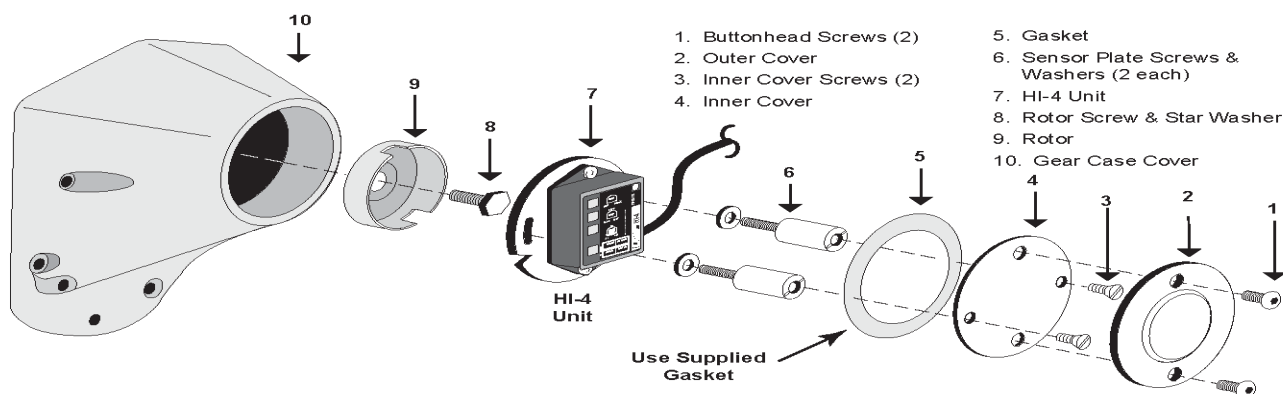


Figure 4. HI-4 Ignition System Installation



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 (green wire) on the Volt Tech.

NOTE: Each trimpot can be adjusted over a range of just under one turn. At the ends of the adjustment range, mechanical stops prevent further rotation of the trimpot. Do not attempt to turn the trimpots past their limits.

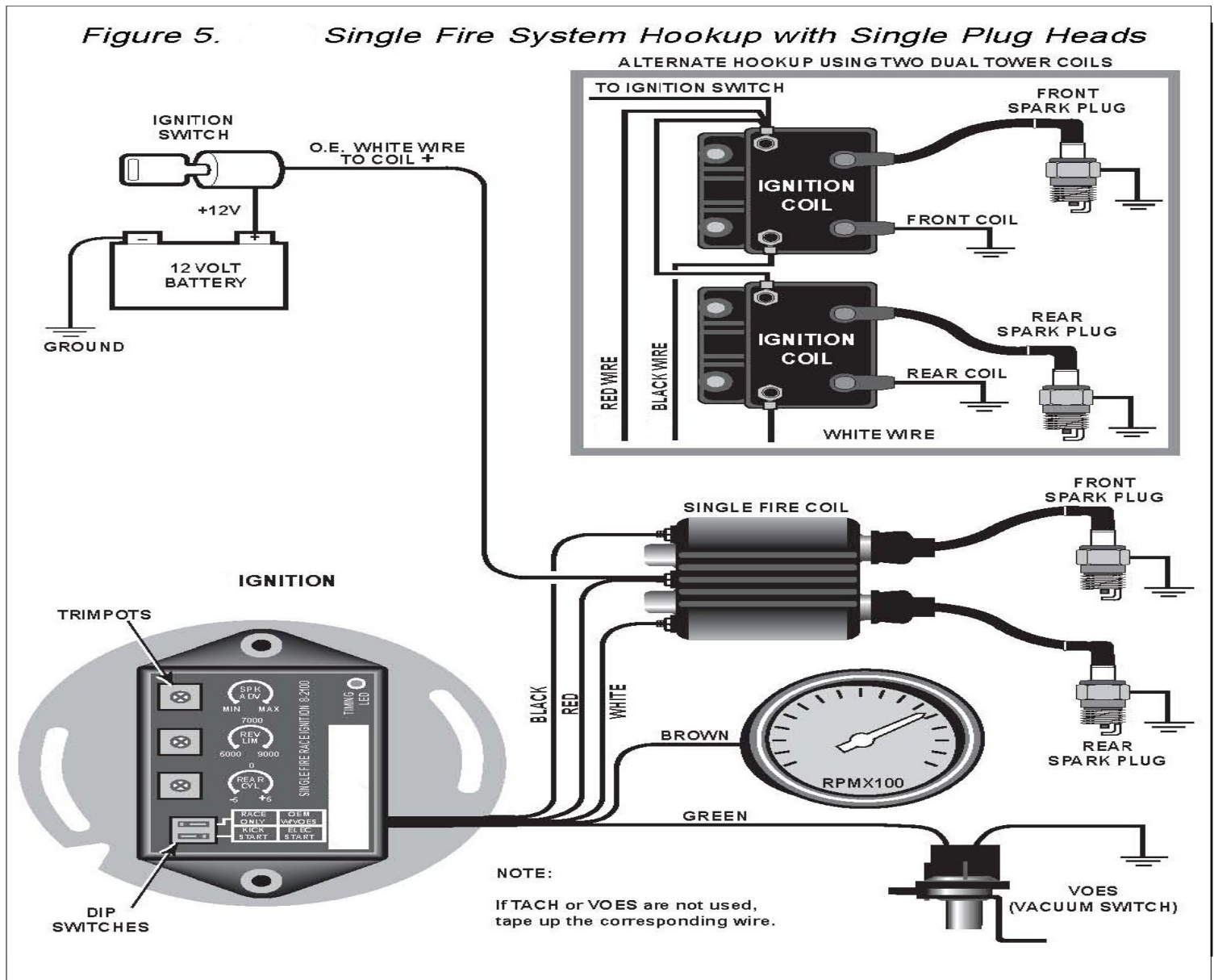
MODELS WITHOUT OE VACUUM SWITCH (VOES)

This includes most models prior to 1985. Fuel economy and driveability will be improved if you install a VOES and connect it to the Volt Tech green wire as shown in Figures 5 and 6. We recommend you use VT No. 32-9083. If the VOES is not used, tape up the green wire.

VOLT TECH SETUP AND OPERATION

Refer to the label on the volt Tech. The unit has two DIP switches that select the advance curve and starting mode. The top switch sets the advance curve. Use the OEM with VOES advance curve for stock and modified engines with OEM electronic or points ignition. Use the Race Only advance curve for high compression engines. The bottom switch sets the starting mode. Kick start mode fires the first cylinder for quick starting. Electric start mode delays firing for 2-3 revolutions of the crankshaft for smoother starts and less strain on the starter. Trimpots on the Volt Tech allow adjustment of advance and RPM limit settings. Use the supplied screwdriver to adjust the trimpots. The trimpot setting is indicated by a slot that has two small dots on each side. The advance curve is adjustable over a limited range via the advance trimpot (SPARK ADV). Advance curves are given in Figures 7 and 8. Each set of advance curves includes minimum and maximum curves. The actual advance curve will be between the minimum and maximum curves depending on advance trimpot 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. An additional trimpot (REAR CYL) is provided for rear cylinder timing offset over a ± 5 degree range. This feature allows slight offset of rear cylinder timing for critical race applications. Normally, the rear cylinder offset trimpot should be set to zero (midrange). The RPM limit trimpot (REV LIM) is adjustable from 5,000 to 9,000 RPM. Use a safe RPM limit for your engine.

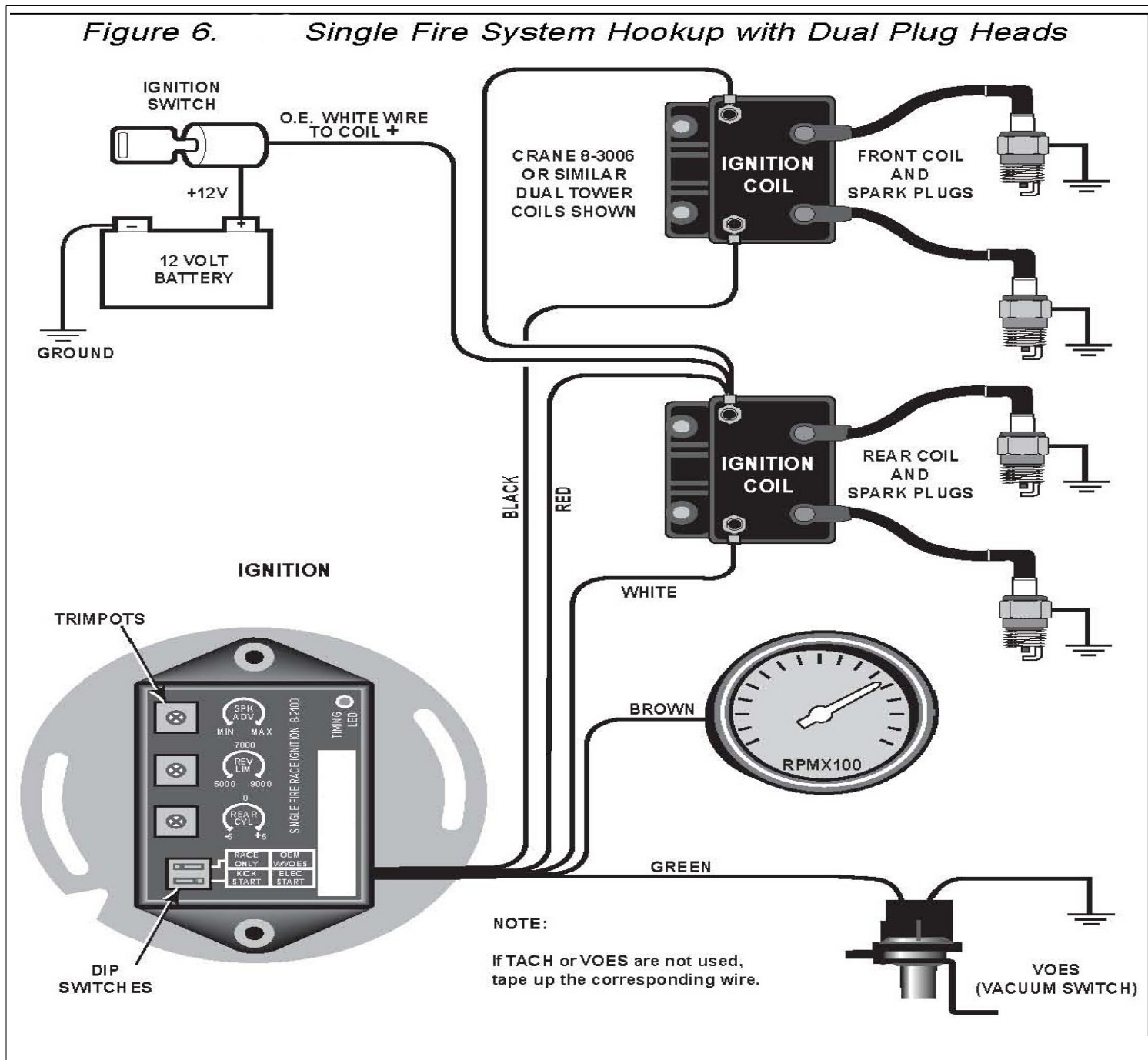
The Volt Tech timing LED should light up when the ignition key is turned on. The timing LED will go off when the crankshaft is rotated past TDC. During cranking, the LED will blink.



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 Volt Tech. 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

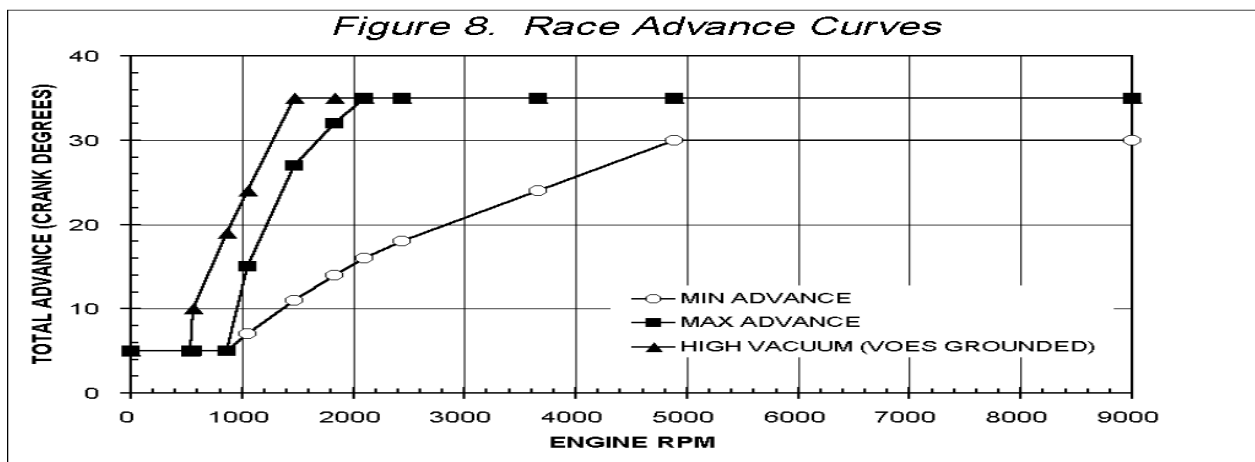
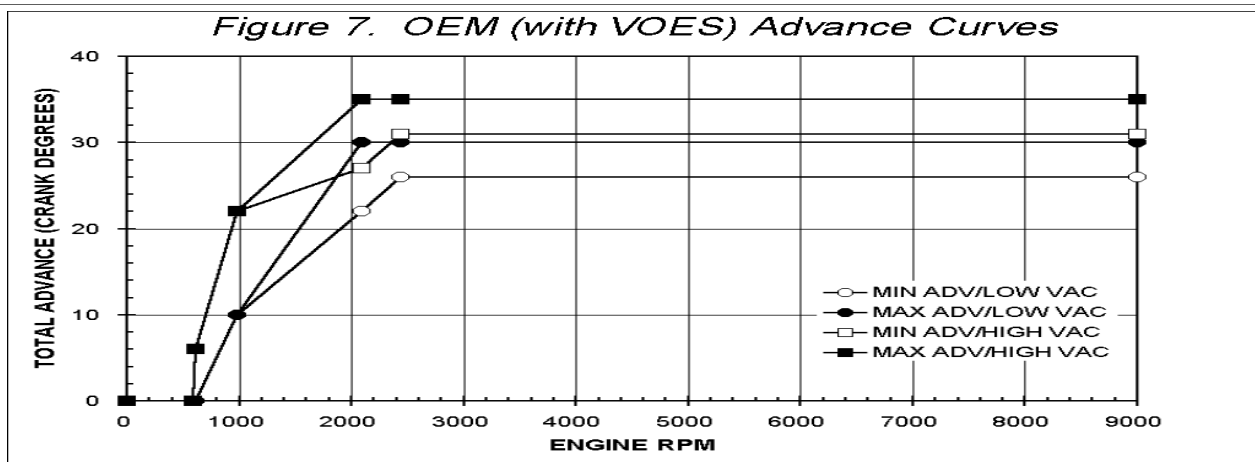
In most cases, aligning the V notch on the Volt Tech plate to the same location as the OE plate will set the timing close enough to start the engine. If the engine will not start or runs very rough, you can use the following static timing procedure. Remove spark plugs and turn engine until TDC mark appears in observation hole. Ground spark plugs with an alligator clip so you will not shock yourself. Turn on ignition. Loosen the standoffs holding Volt Tech and rotate unit clockwise until timing LED goes out. The point at which LED goes off is TDC. Timing is now set approximately at TDC. Turn off ignition and reinstall spark plugs. Once the engine has been started, you must set the timing with a timing light.

SETTING ADVANCE TIMING USING STANDARD TIMING LIGHT

This timing procedure requires that a VOES switch be connected to the Volt Tech. For racing and early points applications without a VOES switch, you must ground the VOES input (Volt Tech green wire) while setting the timing. Connect a timing light to the front cylinder. Set the Volt Tech advance trimpot to midrange. Run the engine at 2,400 to 2,500 RPM. Adjust Volt Tech position until advance timing mark is centered in the observation hole. Tighten the standoffs and verify that timing has not shifted.

SETTING PRECISE ADVANCE TIMING FOR RACING USING DIAL BACK TIMING LIGHT

Determine the advance you want at 2,500 RPM. Use a dial back timing light. Set the amount of advance you want, say 35 degrees, on the dial-back timing light. Connect the dial-back timing light to the front cylinder. If the VOES is used, disconnect the VOES input (Volt Tech green wire) while setting the timing with this procedure. Set the Volt Tech advance trimpot full clockwise for maximum advance. Run the engine at 2,500 RPM. Adjust Volt Tech 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 Volt Tech advance trimpot to desired position. If you run 93 octane gasoline, you can usually leave the trimpot full clockwise 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.

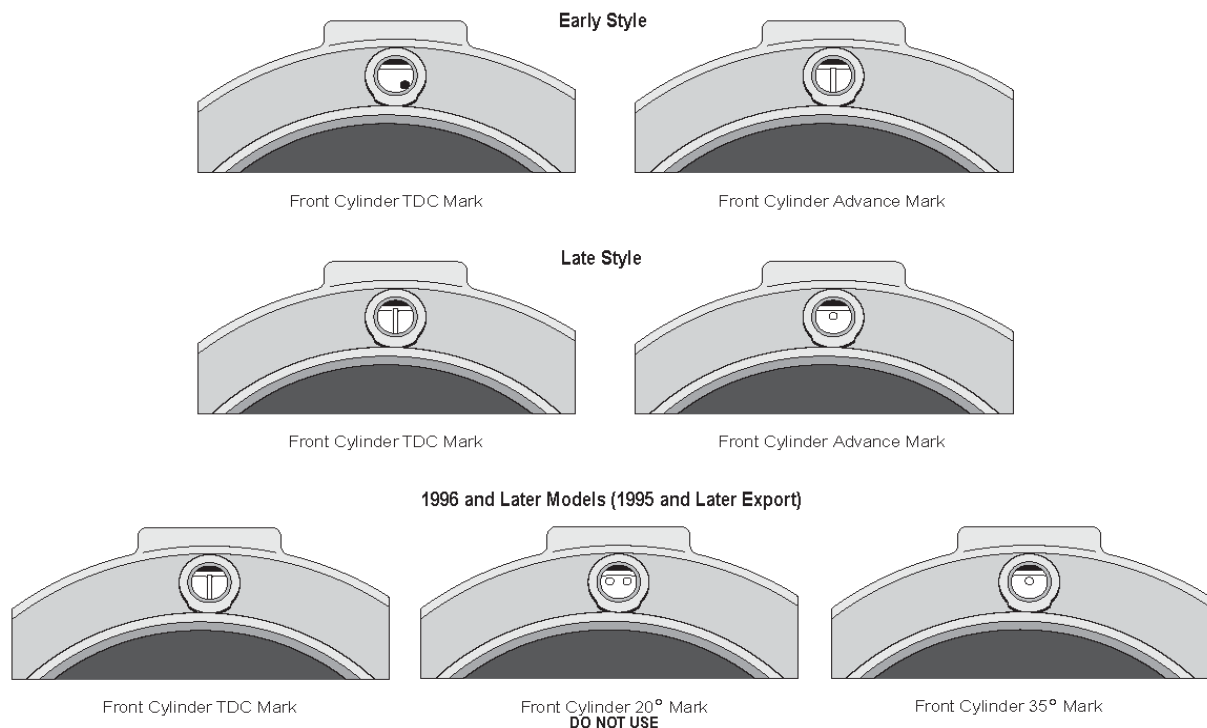
COVER PLATE ASSEMBLY

You can re-use the OEM hardware, except use the supplied gasket to provide proper clearance for the Volt Tech. 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 Volt Tech? If not, remove the Volt Tech, reinstall the OEM ignition or another known good unit and then find and correct the original problem. Did the Volt Tech 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.

Figure 9. Top Dead Center (TDC) and Front Cylinder Advance Marks for Various Models



ENGINE WILL NOT START

1. Check that timing LED lights up when ignition key is first turned on. If not, check for +12 volts on red wire from Volt Tech.
2. Check that timing LED blinks while engine is cranked. If not, Volt Tech may be defective.
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.

WARNING: Never crank the engine with any spark plug wire disconnected. **NOTE:** The battery ground on most HD is connected to the frame behind the seat. In order to provide a dedicated ground for the high starter current, another cable should be installed from the point on the frame that the battery is already grounded to the starter mounting flange. This cable should be the same diameter as the battery ground cable presently on the bike, and will help prevent damage to your electronic components.

CHECKING FOR SPARK

To crank the engine and check for spark, use a test plug. 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 Volt Tech. 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.

TACH INOPERATIVE

If the tach is inoperative after installation of the Volt Tech, you may require a tach adapter. The Volt Tech tach output is compatible with ground sensing tachs which includes most OEM and aftermarket tachs. Some tachs require a high voltage trigger pulse. In this case, install VT No.32-7799 tach adapter.

Note: The tach will read correctly at the rev limit only if it is connected to the brown wire from the Volt Tech. Damage to the Volt Tech circuitry may have occurred if 12 volts was applied to the brown tach wire at any time.