



Installation Instructions for STREET/RACE DISTRIBUTOR

CAUTION: READ INSTRUCTIONS CAREFULLY BEFORE STARTING INSTALLATION

INTRODUCTION

The Crane Cams street/race distributor is a high precision system intended for use on a variety of V8 engines. Modification of centrifugal and vacuum advance curves is accomplished by changing the position of rotary switches on the front of the module. These changes can easily be performed with the distributor installed in the engine and does not require removal of any distributor components.

Separate switches on the front of the distributor trigger module control centrifugal and vacuum advance independently. The module also contains a precision MAP sensor to adjust the vacuum advance.

IGNITION, COIL, AND SPARK PLUG WIRE CONSIDERATIONS

The Crane optically triggered distributor is intended to be used in conjunction with a magnetically triggered ignition such as the Crane HI-6 or HI-6R. An external ignition coil such as the Crane LX 91 or LX 92 is also required to complete the ignition system.

NOTE: The Crane Cams Street/Race Distributor requires an external magnetically triggered ignition module and coil to operate. The distributor will not directly fire an ignition coil.

All ignition timing functions are controlled by the optical pick up in the distributor. The external ignition system should not effect the ignition timing. Additional components such as timing computers or retard controllers can cause dangerous cross fire conditions.

Use only high quality, spiral core spark plug wire such as Crane Cams FireWire. **Do not use solid core spark plug wire, as this can generate electrical noise that may interfere with the CD unit or other on-board computer and radio equipment.** Do not use high resistance carbon wire, as this may burn out from the high energy levels. Optimum wire resistance is less than 800 ohms per foot.

CAUTION: Do not use solid core spark plug wires with the Street/Race Distributor.

Resistor spark plugs are required for all applications. Recommended plug gap is .045" for normally aspirated engines.

GEAR COMPATIBILITY

The distributor gear is compatible with cast iron cams, most hydraulic and solid flat tappet cams, most hydraulic roller cams, and carburized steel roller cams with iron gears. Carburized steel roller cams without iron gears require an aluminum bronze gear. Contact Crane Cams tech support at the number listed below if in doubt about the type of camshaft gear that is installed in the vehicle.

PRE-INSTALLATION CHECKS

Ensure that the engine is in sound running condition before installing any ignition system components. This will allow for accurate troubleshooting if any problems arise during distributor installation.

Replace spark plugs and wires if necessary. Resistor plugs and high quality, low resistance spark plug wire such as Crane Cams FireWire should be used to obtain maximum spark energy.

Verify that the vehicle wire is in good condition and that the engine block is well grounded to a solid chassis ground. Tube frame chassis may require additional ground straps and buss bars to provide a reliable ground.

HEI, TFI-IV, OR DURASPARK REPLACEMENT

Replacement of an O.E. inductive ignition system should be performed in stages to allow checks to be performed on each particular stage of the new ignition system installation. These types of O.E. ignition systems will require an additional ignition and coil that should be installed and tested with the original distributor. The connections to the original distributor do not need to be permanent if the Crane Cams Optical distributor will be installed immediately after the external ignition and coil are tested. Refer



530 Fentress Boulevard, Daytona Beach, FL 32114

Tech Line: (386) 258-6174 Fax: (386) 258-6167

Check our web site for updates: www.cranecams.com

to the installation instructions for the particular ignition system for wiring connections and follow the procedures below to verify proper operation of the external ignition and coil:

1. Turn ignition switch off and disconnect battery ground cable.
2. Locate a suitable mounting position for the ignition and coil that is close to the distributor, is away from heat sources, and allows for sufficient air flow around ignition components.
3. Connect the ignition and coil as shown in the ignition installation instructions. If the O.E. distributor has a points type output that directly fires the ignition coil, the ignition must be connected with the points input. This connection must be replaced with the magnetic trigger input when the Crane Optical distributor is installed.
4. Start the vehicle and verify the ignition system functions properly.

CAUTION: Disconnect switched 12 volt and battery power from the ignition during distributor installation to avoid shock hazards.

REMOVAL OF ORIGINAL DISTRIBUTOR

The engine should be at TDC of the #1 cylinder compression stroke before removing the original distributor.

1. Turn ignition switch off and disconnect battery ground cable.
2. Disconnect both ignition and battery power to the ignition. Do not have power connected to the ignition while installing the distributor.
3. Disconnect the #1 spark plug wire, and remove the #1 spark plug.
4. Mark the distributor to locate the #1 distributor cap lug and remove the cap.
5. Reconnect battery ground cable.
6. Gently bump the engine over until the rotor is approaching the mark that was just made on the distributor.
7. Rotate the harmonic balancer until the TDC mark aligns with the timing indicator.

GM DISTRIBUTOR HEIGHT CHECK

An adjustable slip collar is supplied on all GM versions to allow for variations in deck heights, head modifications, etc. Check and adjust the slip collar as follows:

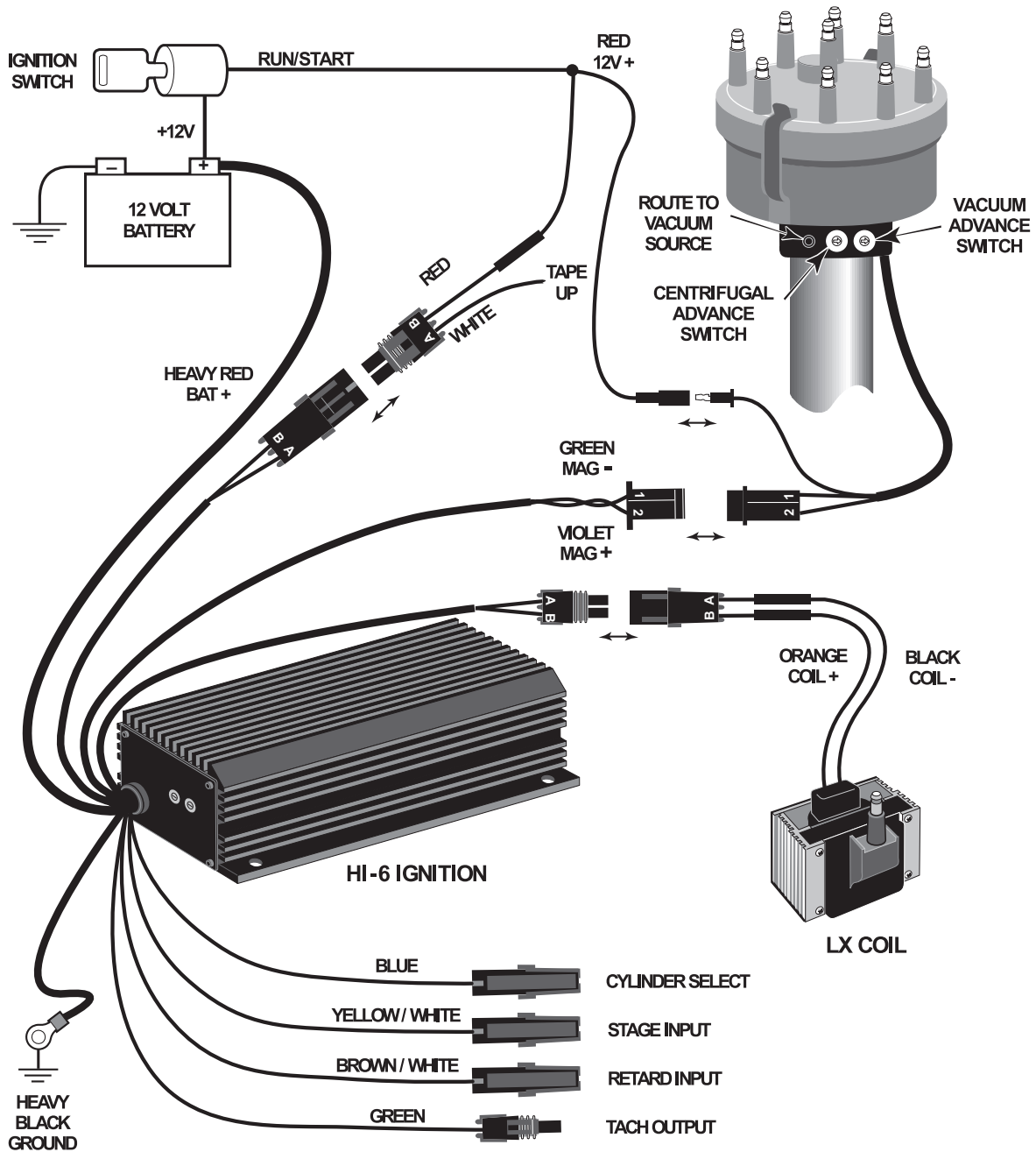
1. Remove the hold down clamp and original distributor.
2. Loosen the adjustable slip collar.
3. Install the new Crane Optical distributor without a gasket beneath the adjustable slip collar until it bottoms on the oil pump drive shaft.
4. Tighten the set screws on the slip collar and remove the distributor.
5. Tighten the cap screw on the adjustable slip collar to 50 +/- 5 lb-in. Verify that the slip collar is perpendicular to the distributor housing and tighten the two set screws to 20 +/- lb-in.
6. The distributor and cam gears must be properly aligned to prevent premature wear. Install the gasket on the distributor and apply a small amount of moly grease to the distributor gear. Crank the engine over a few rotations to distribute the grease between the distributor and cam gears. Align the distributor so that the engine is on TDC of the #1 cylinder compression stroke as outlined in the preceding section and remove the distributor. Verify that the engagement pattern on the distributor gear is in the center of the gear. If not, adjust the slip collar slightly.

DISTRIBUTOR INSTALLATION

The trigger module should be located so that the switches are easily accessible after the distributor is installed. The distributor caps have a #1 cylinder index mark that aids in routing the spark plug wires. This index mark should be used if possible. Check the area around where the distributor will be installed and ensure that the module can rotate enough to adjust the timing when installed.

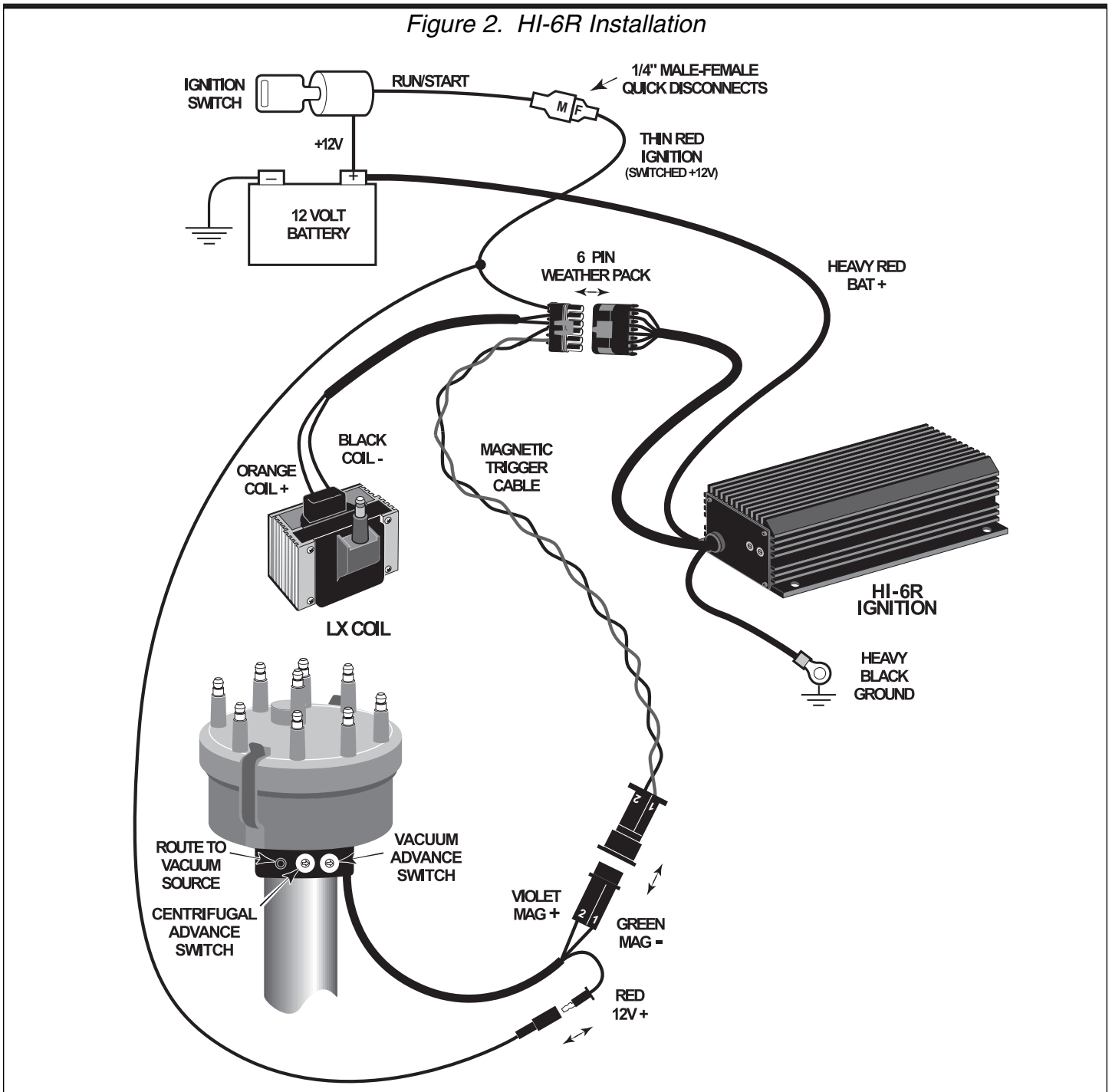
1. Install the gasket over the lower end of the distributor and slide up to the mounting flange. Apply the supplied assembly lube to the distributor gear and o-ring.
2. Gently lower the distributor into the engine until the gears mesh and the distributor is fully seated in the engine. If the distributor is fully seated, skip ahead to step 6.
3. If the distributor will not fully seat, the oil pump must be rotated slightly. Reconnect the battery ground cable but leave the ignition disconnected.
4. Hold onto the distributor cap or body. Apply a very slight downforce while an assistant gently bumps the engine over. When the distributor shaft aligns with the oil pump drive shaft the distributor will drop in place.
5. Disconnect the battery ground cable.
6. Install the distributor hold down clamp and tighten it enough to prevent the distributor from rotating.
7. Install #1 spark plug and connect the number one spark plug wire.

Figure 1. HI-6 Installation



8. Starting from the #1 spark plug wire, remove the wires from the old cap one at a time and install them on the new cap.
9. Place the cap on the distributor and verify that the rotor tip points toward the #1 cylinder cap lug. Verify that the harmonic balancer is at TDC. Install the new distributor cap and tighten the cap hold down screws.
10. Refer to the section on advance curve selection and set the centrifugal advance curve switch to the desired setting.
11. Set the vacuum advance curve switch to 0 to set the base timing. This setting eliminates any vacuum advance and allows the base timing to be set more accurately.
12. Reconnect battery and switched 12 volt supply to the ignition. Reconnect the battery ground cable.
13. The engine should now start and allow the base timing to be set correctly.

Figure 2. HI-6R Installation



VACUUM ADVANCE CURVE SELECTION

The 0 through 3 position switch on the right hand side of the module selects the vacuum advance curve. Refer to Figures 3 through 5 for the corresponding curves for these switch settings.

The vacuum port on the distributor pick up module should be connected to a timed or ported vacuum source on the carburetor that produces no vacuum at idle but will once the throttle plates are opened as the vehicle accelerates from idle. Connecting the distributor vacuum port to full manifold vacuum can cause problems such as rough idle, hesitation and stumbling off idle, and rich exhaust.

Below is a brief description on typical applications for the various centrifugal switch settings:

Note: Switched 12 volt power must be cycled before any advance switch position changes are recognized by the distributor trigger module.

- 0 **Zero Vacuum Advance:** No vacuum advance is added to the centrifugal advance regardless of engine vacuum. Should be used for applications such as circle track racing. This setting can also

Figure 3. Vacuum Advance Switch Setting 1

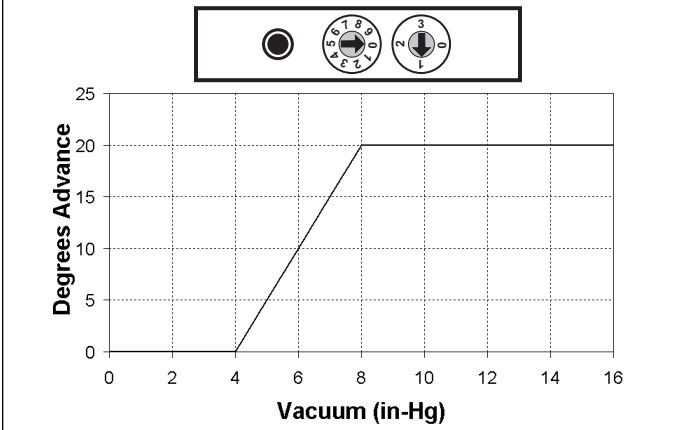


Figure 4. Vacuum Advance Switch Setting 2

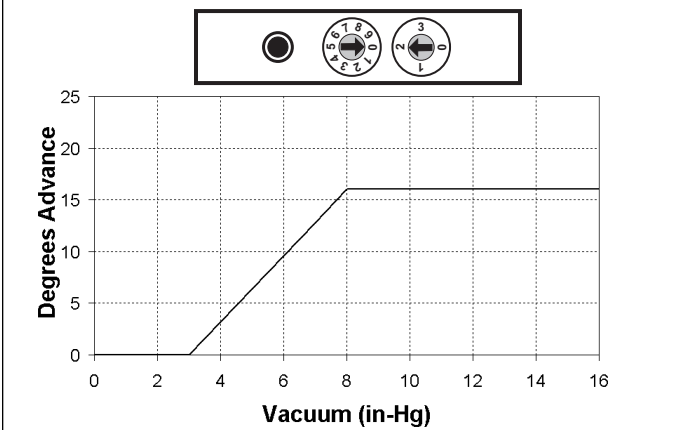
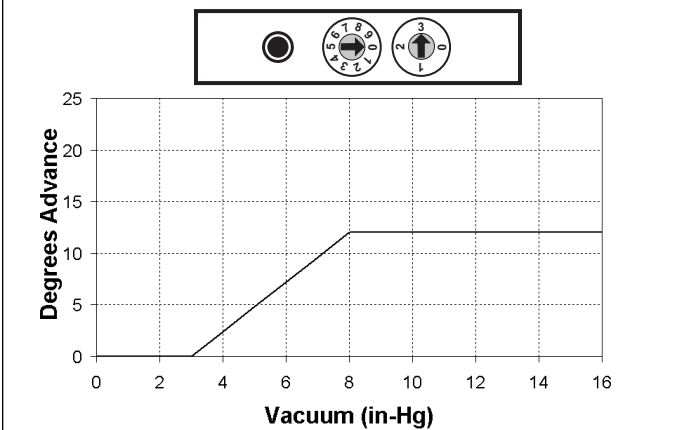


Figure 5. Vacuum Advance Switch Setting 3



be used during base timing setting to provide more stable timing measurement.

Note: Vacuum switch settings are shown with centrifugal advance switch set to 0 for convenience only. Refer to Centrifugal advance setting section for correct application settings.

- 1 High Vacuum Advance:** Additional 20 degrees advance at high vacuum. Useful for older OEM style cylinder heads with slow burn rates.
- 2 Medium Vacuum Advance:** Additional 16 degrees advance at high vacuum. Useful for cylinder heads with medium burn rates.
- 3 Low Vacuum Advance:** Additional 12 degrees advance at high vacuum. Useful for newer style cylinder heads with fast burn rates.

CENTRIFUGAL ADVANCE CURVE SELECTION

Note: Centrifugal advance switch setting 0 should not be used to set base timing unless the vehicle will always be operated with locked out advance.

The 0 through 9 position switch next to the vacuum port on the module selects the centrifugal advance curve. Refer to Figures 6 through 14 for the corresponding curves for these switch settings.

In general, faster burning combustion chambers require less total ignition timing. Below is a brief description on typical applications for the various centrifugal switch settings:

- 0 Locked out advance:** Full advance at all RPM. Should be used for applications such as race only vehicles where part throttle performance is not a concern. Timing is controlled by distributor position only regardless of RPM.
- 1 General street performance:** intermediate to moderately heavy vehicle with bolt on modifications such as performance carburetor, intake manifold, mild performance cam, or headers. (See Fig. 6.)
- 2 General street performance:** light to intermediate weight vehicle with large engine or good power to weight ratio with various bolt on modifications. (See Fig. 7.)
- 3 General street performance:** heavy vehicle with low power to weight ratio. Good for tow vehicle or RV with mild engine modifications. (See Fig. 8.)
- 4 General street performance:** vehicle with fast burn type cylinder heads. Good for tow vehicle with moderate engine modifications. (See Fig. 9.)
- 5 Super street/bracket racing:** manual transmission or automatic with high stall converter, high power to weight ratio, and extensive engine modifications. (See Fig. 10.)
- 6 Super street/bracket racing:** manual transmission or automatic with high stall converter, high

Fig. 6. Centrifugal Advance Switch Setting 1

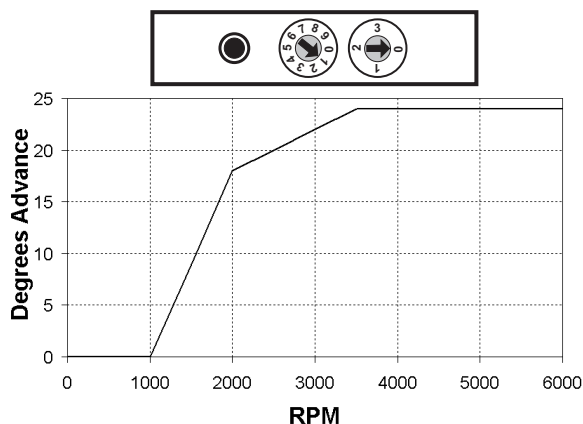


Fig. 7. Centrifugal Advance Switch Setting 2

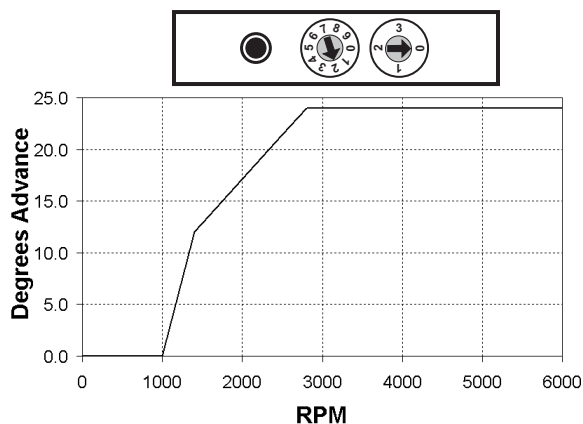


Fig. 8. Centrifugal Advance Switch Setting 3

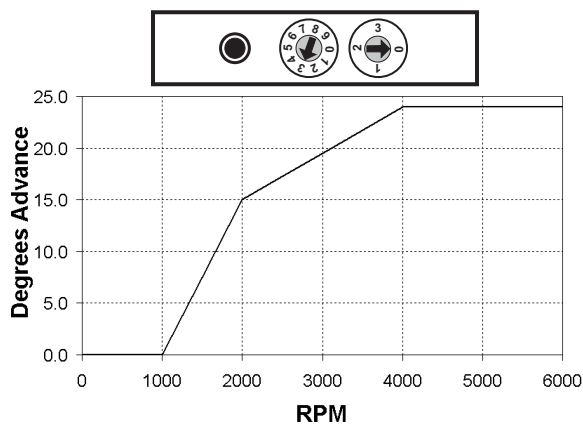


Fig. 9. Centrifugal Advance Switch Setting 4

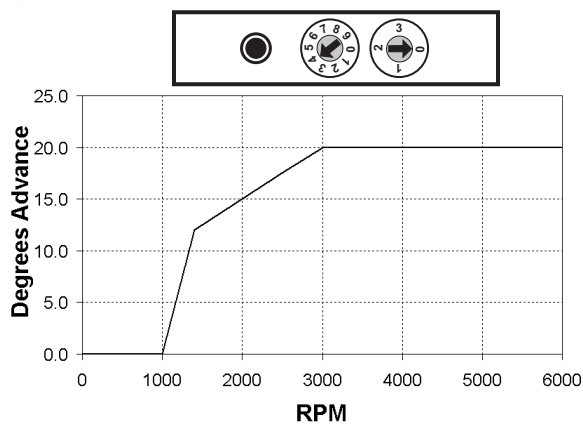


Fig. 10. Centrifugal Advance Switch Setting 5

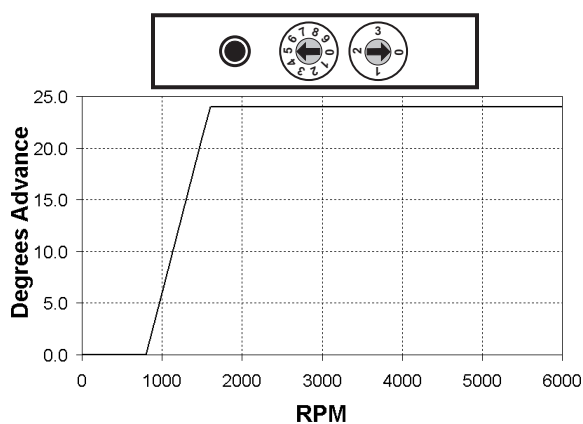
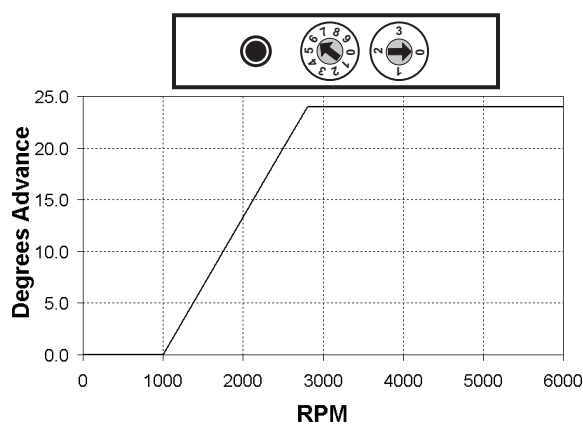


Fig. 11. Centrifugal Advance Switch Setting 6



power to weight ratio, and extensive engine modifications. (See Fig. 11.)

- 7 **Super street/road racing:** extensive engine modifications including modified OE heads. (See Fig. 12.)
- 8 **Pro street/full racing:** vehicles with high power to weight ratio, high stall converter, and extensive engine modifications such as a very aggressive cam. (See Fig. 13.)

- 9 **Heavy duty towing:** trucks, vans, motorhomes, RVs, etc. that have low power to weight ratio. (See Fig. 14.)

Note: Setting the base timing may be easier if the ignition module is operating in single spark mode. Refer to ignition module instructions for details.

Fig. 12. Centrifugal Advance Switch Setting 7

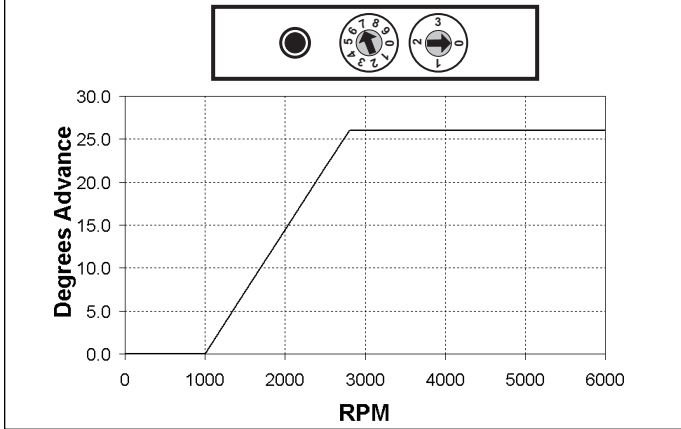


Fig. 13. Centrifugal Advance Switch Setting 8

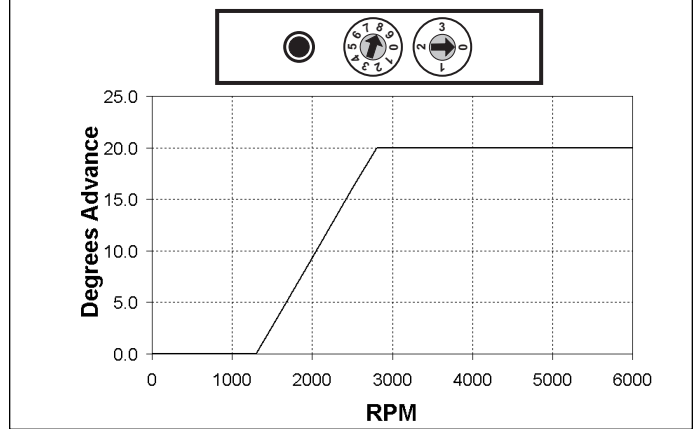
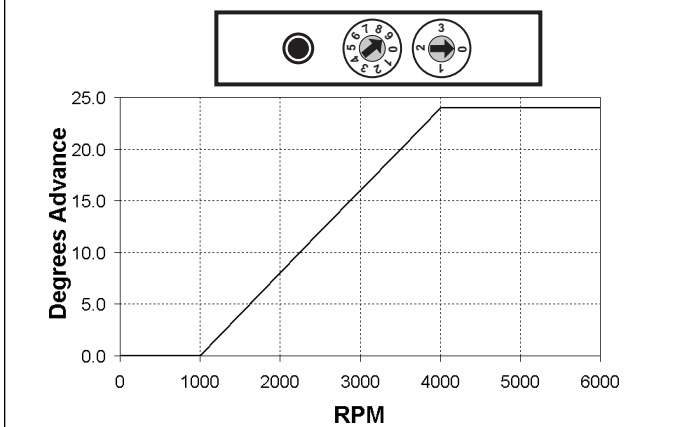


Fig. 14. Centrifugal Advance Switch Setting 9



Note: Centrifugal switch settings are shown with vacuum advance switch set to 0 for convenience only. Refer to Vacuum advance setting section for correct application settings.

After setting the base timing, tighten the distributor hold down clamp and recheck the timing. Set the vacuum advance switch to the appropriate setting.

Test drive the vehicle with these settings. Allow the engine to reach full operating temp then try a few hard acceleration runs. If detonation is detected under hard acceleration, decrease the base timing by 2 degrees or select a less aggressive centrifugal advance curve.

Check for detonation at part throttle. If none is detected, the vacuum advance switch can be set to increase the amount of vacuum. If detonation is detected with the higher vacuum advance, select a setting that gives less vacuum advance. If the vacuum advance switch is set to 3, decrease the base timing by 2 degrees and test to verify the detonation is eliminated.

CAP AND ROTOR REPLACEMENT

The distributor cap and rotor must be replaced periodically. Call the Crane Cams tech line listed at the bottom of page 1.

Care must be taken when installing the replacement rotor. Place both thumbs on the rotor opposite the rotor button spring and press rotor onto the hub with a steady force. Do not use the palm of your hand to install the rotor as this can cause the rotor to crack and produce a serious injury or damage the rotor.

Caution: Use both thumbs to press down on the rotor when installing it. Never use the palm of your hand.

SETTING BASE TIMING

Refer to Figures 6-14 for the total centrifugal advance of the selected switch position. The previous sections gives brief descriptions of applications for particular switch settings. Setting the vacuum advance switch to position 0 eliminates any vacuum advance and may help stabilize the timing at idle speed.

Note: Perform the following procedure for setting the base timing whenever the centrifugal switch setting is changed.

As an example, suppose that the centrifugal advance switch is set to position 6 and the desired total centrifugal advance with no vacuum is 36 degrees. Figure 11 shows that the maximum centrifugal advance added will be 24 degrees. Therefore, the base timing should be set as follows:

36 degrees	(Total Advance)
-24 degrees	(Max Advance)
12 degrees	(Base Timing)

TROUBLESHOOTING

Did the engine run properly before installation of the distributor? If not, was more than just the distributor installed at the time?, If so, reinstall the original distributor or another known good unit and then find and correct the original problem. Did the rest of the ignition system function properly the distributor was installed, or did the distributor 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:

Warning: High voltage is present at the coil primary and secondary terminals. Do not touch the coil while the engine is running. Do not connect any test equipment to the coil.

ENGINE WILL NOT START

All Crane ignitions feature a status LED that aids troubleshooting procedures by giving a quick visual clue about voltage levels and trigger signals. If the engine will not start follow the procedure below to determine where a possible fault in the system may occur:

1. Check that the status LED lights up when the ignition key is first turned on. If not, check for +12 volts on the thin red wire shown in Figures 1 and 2. The red wire from the distributor pick up module must also have a switched 12 volt supply.
2. Check that the status LED blinks while the engine is cranked. If not, the ignition is not receiving a trigger signal. Verify that the white points input wire to the ignition is disconnected and taped up. Verify that the distributor pick up is properly connected to the magnetic trigger input of the ignition and a switched 12 volt supply.
3. If the status LED blinks, but engine will not start, recheck all the wire harness connections. Many Crane HI-6 ignitions have a diagnostic routine that flashes trouble codes with the status LED based

upon particular fault conditions. Refer the ignition installation instructions for further details.

4. Verify that the rotor is installed and is in good condition. Ensure that the distributor cap is also in good condition.
5. Check for low voltage from a faulty or marginal charging system and battery.

Note: If the distributor is connected to an ignition module other than a Crane Cams HI-6, refer to the ignition installation instructions for details on troubleshooting.

CHECKING FOR SPARK

To crank the engine and check for spark, use a test plug commonly available at most automotive parts stores. 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.

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 ignition system. 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

The tach must be connected to the green tach wire of the HI-6 to function properly since the OE wiring from the distributor or ignition coil was removed. The HI-6 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 tach adapter P/N 6000-8920. Damage to the HI-6 circuitry may have occurred if 12 volts was applied to the tach wire at any time.

Crane Cams, Inc. Limited Warranty

Crane Cams, Incorporated warrants that all of its products are free from defects in material and workmanship. All Crane Cams performance products are subject to the conditions established in this policy.

Crane Cams, Incorporated warrants that when our products are properly installed in their correct application, they will be free from defect and will function as specified.

Due to the variety of modifications made on performance applications, Crane Cams' obligation under this warranty is limited to the repair or replacement, only of Crane products, when the consumer returns these products to: Crane Cams, Incorporated, Attention: Warranty Dept., 530 Fentress Boulevard, Daytona Beach, Florida 32114.

This Limited Warranty begins on the date of purchase and is good for a period of one year from validated date of purchase unless otherwise specified to the original purchaser.

This warranty will be void on all products that show evidence of misapplication, improper installation, abuse, lack of proper maintenance, negligence, abnormal use, or alteration from their original design.

Crane Cams, Incorporated reserves the right to make necessary changes in the products it manufactures and markets at any time to improve product performance. These changes in products will be made without obligation to change or improve products that were previously manufactured.

This warranty limits any implied warranty to one year, and no person, company or organization is authorized to assume for Crane Cams, Incorporated, any other liability in connection with the sale of Crane Cams products. Some states do not allow limitations on how long an implied warranty lasts.

This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Crane Cams, Inc., 530 Fentress Boulevard, Daytona Beach, FL 32114
386/258-6174 FAX: 386/258-6167
Made In U.S.A.