



DISTRIBUTORLESS IGNITION SYSTEM Installation and Adjustment Instructions

1.0 INTRODUCTION:

Congratulations on your purchase of a Holley® Distributorless Ignition System! Holley® cannot and will not be responsible for any alleged or actual engine or other damage, or other conditions resulting from misapplication of the products described herein. However, it is our intent to provide the best possible products for our customer; products that perform properly and satisfy your expectations. Should you need information or parts assistance, please contact our Technical Service Department at 1-270-781-9741, Monday through Friday, 8 a.m. to 5:00 p.m. Central Time; please have the part number of the product you purchased when you call.

Holley® DIS can be retrofitted onto any engine. It is a waste-spark type system which means that one twin-tower coil feeds two cylinders that fire 360 degrees apart. These coils provide a high level of spark energy to feed high powered nitrous and forced induction engines. A cam sync is not required when using a Holley® 60-2 crank pickup wheel, although one is required for sequential fuel control.

WARNING! These instructions must be read and fully understood before beginning installation. Failure to follow these instructions may result in poor performance, vehicle damage, personal injury or death. If these instructions are not fully understood, installation should not be attempted.

2.0 APPLICATIONS:

PART NUMBER	APPLICATION
556-100	4 Cylinder DIS System (includes sensor, coils, harnesses) Trigger wheel/sensor mount must be purchased separately
556-105	6 Cylinder DIS System (includes sensor, coils, harnesses) Trigger wheel/sensor mount must be purchased separately
556-101	8 Cylinder DIS System (includes sensor, coils, harnesses) Trigger wheel/sensor mount must be purchased separately

Additional Parts:

556-102 – Universal SB Chevy Crank Sensor Mounting Kit (includes 8.5" trigger wheel and all brackets)

556-103 – Universal BB Chevy Crank Sensor Mounting Kit (includes 8.5" trigger wheel and all brackets)

556-104 – Single Coil

556-106 – 5" 60-2 Trigger wheel (machined only with 1" diameter center hole, must be machined for specific application)

556-107 – 6" 60-2 Trigger wheel (machined only with 1" diameter center hole, must be machined for specific application)

556-108 – 7 ¾" 60-2 Trigger wheel (machined only with 1" diameter center hole, must be machined for specific application)

556-109 – 8 ½" 60-2 Trigger wheel (machined only with 1" diameter center hole, must be machined for specific application)

NOTE: Mounting the 60-2 crank trigger wheel will space the lower pulley out 1/8". This requires that all other pulleys be moved out 1/8" as well for proper alignment. A spacer for the water pump is included in SBC and BBC kits. Other items will need to be moved out 1/8"

NOTE: Installation on a SBC/BBC likely requires the removal of some material off of the lower crankshaft pulley. This does NOT require precision machining, but does require at a minimum the use of a metal grinder.

NOTE: Depending on where the coils are mounted, this kit may require different length spark plug wire than was originally used with a distributor.

3.0 PARTS IDENTIFICATION:

Photographs shown are of a Small Block Chevrolet Kit. Your kit may vary.



Crank Trigger Wheel



Block Bracket



Block Bracket Mounting Hardware and Spacers



Sensor Mounting Bracket



Sensor Mounting Bracket Hardware



Centering Adapter



Crank Sensor



Crank Sensor Hardware

4.0 MATERIALS REQUIRED FOR INSTALLATION:

- Standard Socket Set with Driver
- Allen Wrench Set
- Timing Light
- Feeler Gauge Set
- Various Wiring Crimpers and Pliers

NOTE: The following instructions are for the installation of Holley® PN's 556-102 and 556-103. These are complete sensor mounting kits designed for Small Block and Big Block Chevrolet applications. If you have a different application, you must create your own crank sensor mounting hardware, as well as machine a Holley® supplied crank trigger wheel to fit your engine. This likely requires machining equipment such as a mill and possibly a lathe. Some guidelines for the design of this hardware are in section 9.0 below.

5.0 INSTALLATION OF 60-2 CRANK TRIGGER WHEEL:

The "60-2" alludes to the fact that crank trigger wheel has 58 teeth with "2 missing". This is also known as a "58x" wheel.

1. Rotate the engine to #1 TDC.
2. Remove any pulleys that are mounted to the harmonic balancer.
3. Check the surface to which the crank trigger wheel will be mounted to ensure that it is smooth and free of any excess dirt or oil. Clean the surface of the balancer, if necessary.
4. There is an aluminum centering adapter included with the SBC/BBC mounting kits (shown in the parts identification above). It locates in the harmonic balancer. Install it, then slide the crank trigger wheel over it.
5. Determine which side of the engine the sensor will be mounted on. The sensor bracket can be flipped to use on either side of a SBC or BBC engine. With the engine at TDC on #1 cylinder, the sensor will be positioned such that it is lined up with the 10th tooth "after the missing teeth" on the crank trigger wheel (the 10th tooth is the tooth after the gap in the direction that the engine rotates). If this is off, it can be adjusted within the software, but this is the intended location. Install the crank trigger wheel and align the bolt holes on it such that the sensor will be near this position.

Most all engines rotate clockwise, except for Honda engines which rotate counter-clockwise. If you are confused about which tooth this means, put the trigger wheel on the engine and rotate just the trigger wheel (leave the engine at TDC on #1) in the direction the engine rotates. Rotate it until the missing teeth/gap line up to where the sensor will be mounted, then continue turning it and count 10 teeth. Take a marker and mark this tooth. It will be the tooth you need to align with the sensor.

6. Install some bolts to hold the trigger wheel in position on the engine for the time being.

6.0 INSTALLATION OF ENGINE BLOCK BRACKET:

1. Install the block bracket using the two 1-3/4" long counter-sunk socket head cap screws and 1/2" spacers. The spacers should put the pickup at the correct location. If it does not, washers of the proper size and thickness must be purchased to shim the bracket as needed. That alignment will be checked in Section 7.0, step 3 below.

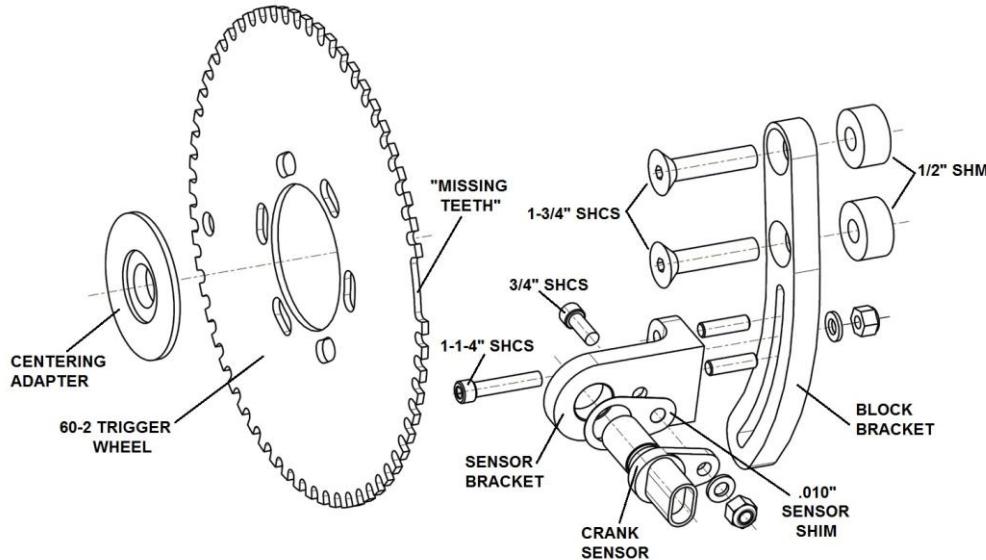


Figure 1

7.0 INSTALLATION OF ADJUSTABLE SENSOR AND SENSOR BRACKET:

1. The crank sensor must have the proper air gap (.015" - .030"). Less than .015" is fine, but make sure run-out does not allow the sensor to contact the trigger wheel. It may be necessary to add sensor shims (included in the kit) to set the proper air gap.
2. Using the 3/4" long socket head cap screw, washer and locknut, install the crank sensor to the sensor bracket using one .010" shim. Note the proper orientation of the sensor and sensor bracket in **Figure 1**.
3. Using the 1-1/4" long socket head cap screw, washer and lock-nut, install the sensor and bracket assembly to the block bracket as shown in **Figure 1**. The dowel pins will help align the sensor bracket. It is possible that the sensor will interfere with the trigger wheel. If it does, add more .010" shims as needed to obtain a .015"-.030" air gap.

Also verify that the sensor is centered longitudinally on the wheel. If it is off more than .050" or so, the block bracket must be re-shimmed appropriately.

When doing final installation, make sure that the sensor is aligned to the 10th tooth after the air gap, with the engine at TDC on #1. Tighten the sensor and mounting bracket hardware when complete.

8.0 PULLEY INSTALLATION:

1. Reinstall the lower crank pulley. The lower pulley will likely require a small amount of material to be removed off of its "centering lip". This can be done on a lathe or it can be done with a typical 4" disk grinder. This lip can not be more than .075". **See Figure 2.**
2. Bolt up the lower pulley. Torque to the proper specifications. The use of Loctite or lock-washers on the 3 pulley bolts is recommended. Make sure the trigger wheel is still in the intended alignment position with the crank sensor.



Figure 2

9.0 INSTALLATIONS REQUIRING CUSTOM BRACKETS

The following are key items when making custom brackets to mount the crank sensor and trigger wheels:

- Make sure the crank sensor is rigidly supported. The bracket should not flex. Also make sure the “round head” of the sensor is contained within the bracket. It should fit snuggly in the mount.
- Make sure the trigger wheel is concentric as mounted. Run-out will cause the wheel to contact and damage the sensor, or force the need to run excessive air gap.

10.0 WIRING

10.1 Cam Signal/Sync

Note that a cam signal/sync is NOT required to properly run this DIS ignition system (since it is a waste fire design). It only needs to know when cylinder #1 is approaching. This is accomplished by the “missing teeth” in the 60-2 crank trigger wheel. A cam sync signal is only required to run sequentially fired fuel injection.

10.2 Cam and Crank Signal Type

Note that the “canned” Holley® DIS ignition type selections (see section 10.5 below) use a “Falling Edge” Hall Effect crank and cam sensor signal. This is important to know if the hall effect cam sensor design is a “180/180 degree” style of trigger. “180/180 degree” means that rising and falling edge signals occur 180 degrees opposite of each other. If using a cam sync signal, make sure you set it up so that it is triggering on the FALLING edge of the sensor. When using a 60-2 crank sensor wheel, this falling edge cam sync signal trigger MUST occur:

- Before cylinder #1 is at TDC on the COMPRESSION STROKE, make sure that it is not occurring on the exhaust stroke.
- It also MUST occur at least 8 teeth (approximately 50 degrees) before the “missing teeth” are read by the crank position sensor. If the crank sensor is set up in step 7 above such that the 10th tooth after the missing teeth is at TDC, position the cam sensor such that it is between 110 -250 degrees before TDC on cylinder #1. This will create a proper position.

The figures below (**Figures 3, 4, 5, & 6**) show how to wire the coils for 4, 6, and 8 cylinder applications. An example is given for standard firing order Small and Big Block Chevy engines, as well.

Holley® PN's 556-100, 101, and 105 come with the following wiring harnesses:

- **Main Power Cable** – The main power is a fused 14 ga. cable that should go directly to battery power. It then splices into the individual coil harnesses.
- **Cam/Crank Sensor Harness** – The cam/crank sensor harness is a fully terminated ignition adapter that connects directly to the Holley® crank sensor supplied in the kit. It also includes a terminated cam sync connector. This connector plugs into the GM sync pulse distributor used on certain 1990's big block vehicles, AC Delco PN 213-350. This distributor was reproduced and is sold by EFI Connection (www.eficonnection.com) for a very reasonable price. This distributor, which can be used on Small or Big Block Chevy standard deck height engines, serves the purpose as an oil pump drive and cam sync signal. It is very low profile. If a different cam sync input is used, the proper connector must be installed on this harness.
- **Coil A, B, C, & D Harnesses** – There are 4 harness “pigtails” for each coil. Each has a different wire color for each individual coil trigger. The rest of the wires are tied together as shown in the diagram. The following overviews each coil pin:
 - A – Chassis ground. Tie these together. If connecting all together into another wire, make sure this wire is at least a 14 gauge wire.
 - B – Trigger Ground. These wires need to be connected and run back to the ECU to pin B14. They can be tied together near the coils or back at the ECU. It is a low current line.
 - C – Coil Trigger. This is the individual trigger from the ECU to each coil. Wire per the “ECU to Coil Wiring” instructions below.
 - D – 12v Battery. Constant 12v power supplied from the battery. Tie together and use the supplied fused, 14ga wire to run to battery power.

NOTE: Keep this wiring separated from the spark plug ignition wires. Do not run these wires through or in parallel with the spark plug wires.

Coil and Plug Wiring

It is imperative that the wiring of the coils and spark plug wiring is done correctly. If it is not, a cylinder will fire at the incorrect time and it likely that the starter, flex plate, and possibly other components will be damaged!

ECU to Coil Wiring

Use Figures 3 through 6 below as a worksheet to fill out the proper wiring for the coils and ECU. Perform the following steps on this worksheet:

- 1) Enter the engine firing order as indicated in the yellow boxes at the top. This will be used as a “cross reference” chart.
- 2) In all the yellow boxes through the diagram, enter the corresponding engine cylinder for each letter based on the cross reference chart.
- 3) Using the “ECU Pinout” diagram, enter the proper ECU pin in the orange boxes based on the cylinder number entered for each.
- 4) You can now wire based on this chart. Insert the ECU coil trigger pins into the proper locations on the P1B ECU Connector.

CAUTION: If the coils are not wired in the correct sequence, if spark plugs are not routed to the correct coils, OR if the firing order is not entered into the software correctly, the wrong cylinder WILL be fired. This will likely damage the starter, flex plate or worse. Before starting an engine, it is highly advised to disconnect the fuel injectors and put a timing light on each plug wire to ensure it is firing at the correct crank angle. Double-check your wiring!

HOLLEY DISTRIBUTORLESS IGNITION WIRING - 8 CYLINDER

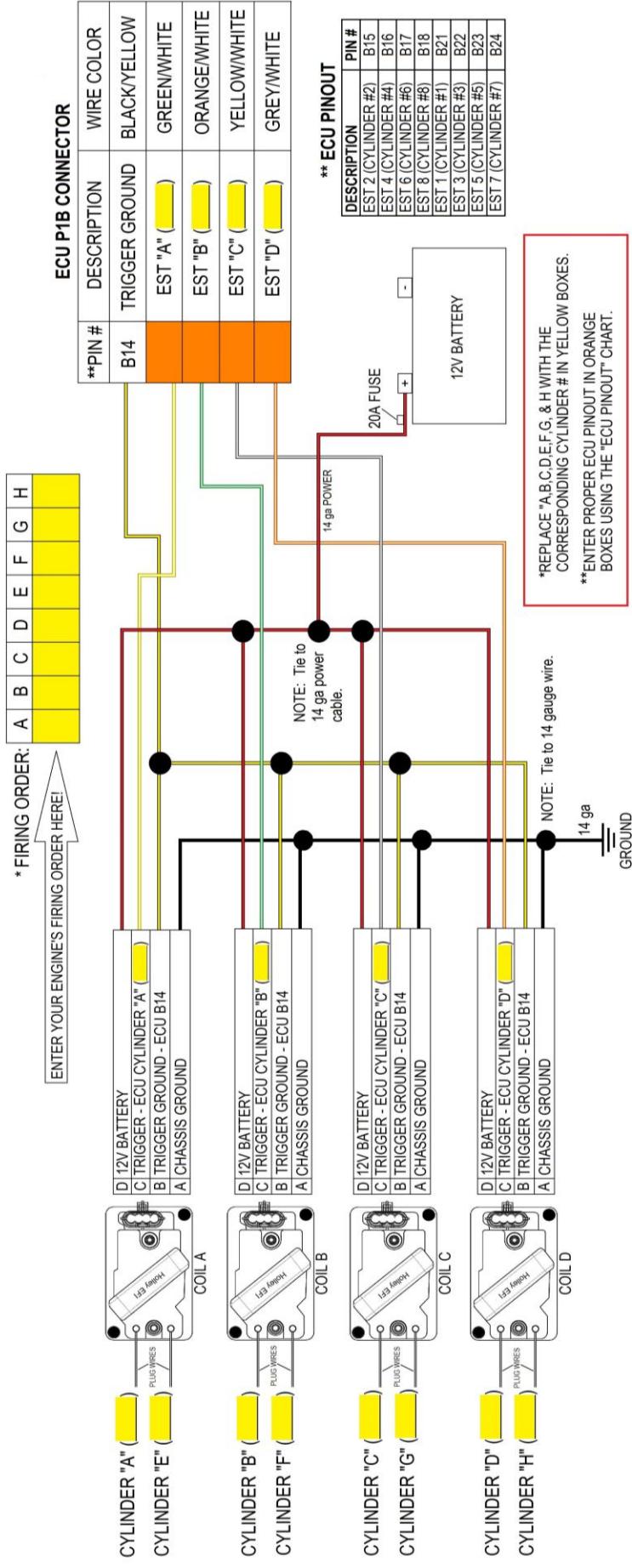


Figure 3

HOLLEY DISTRIBUTORLESS IGNITION WIRING - 8 CYLINDER

EXAMPLE: SMALL/BIG BLOCK CHEVY WITH STANDARD FIRING ORDER

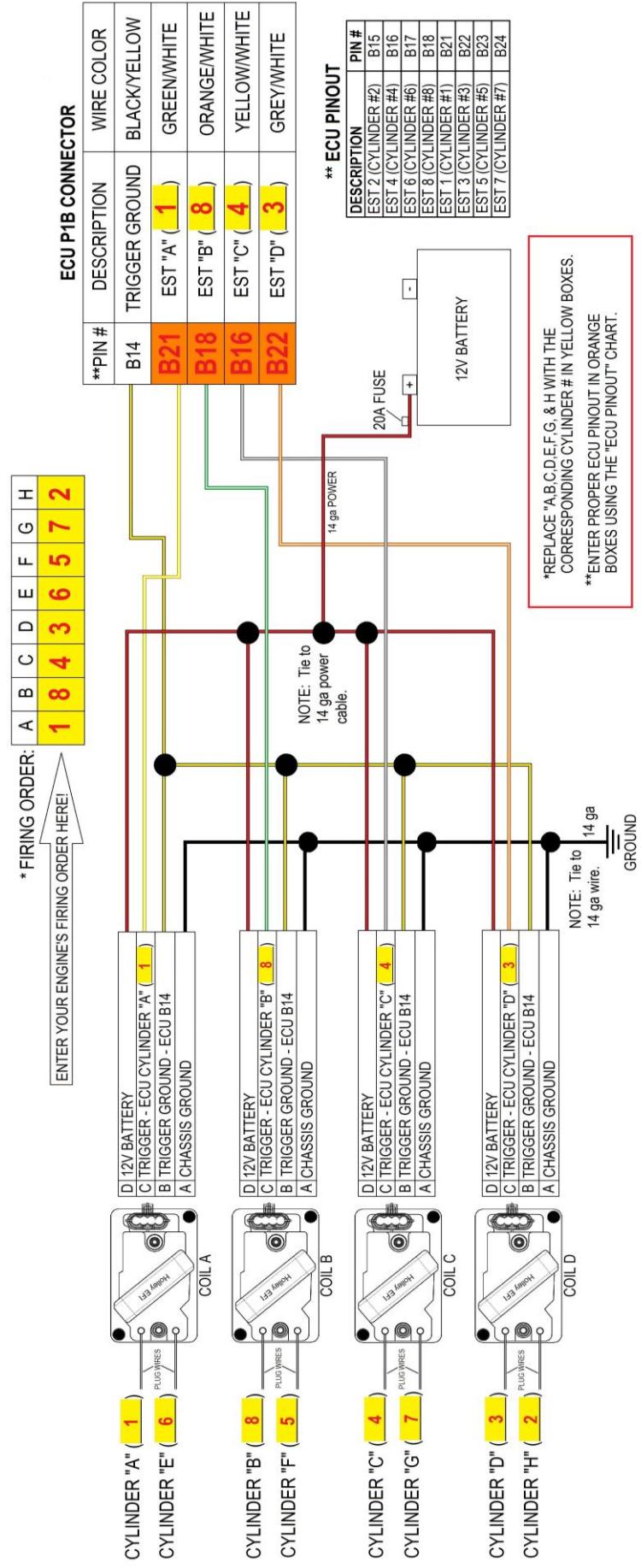


Figure 4

HOLLEY DISTRIBUTORLESS IGNITION WIRING - 6 CYLINDER

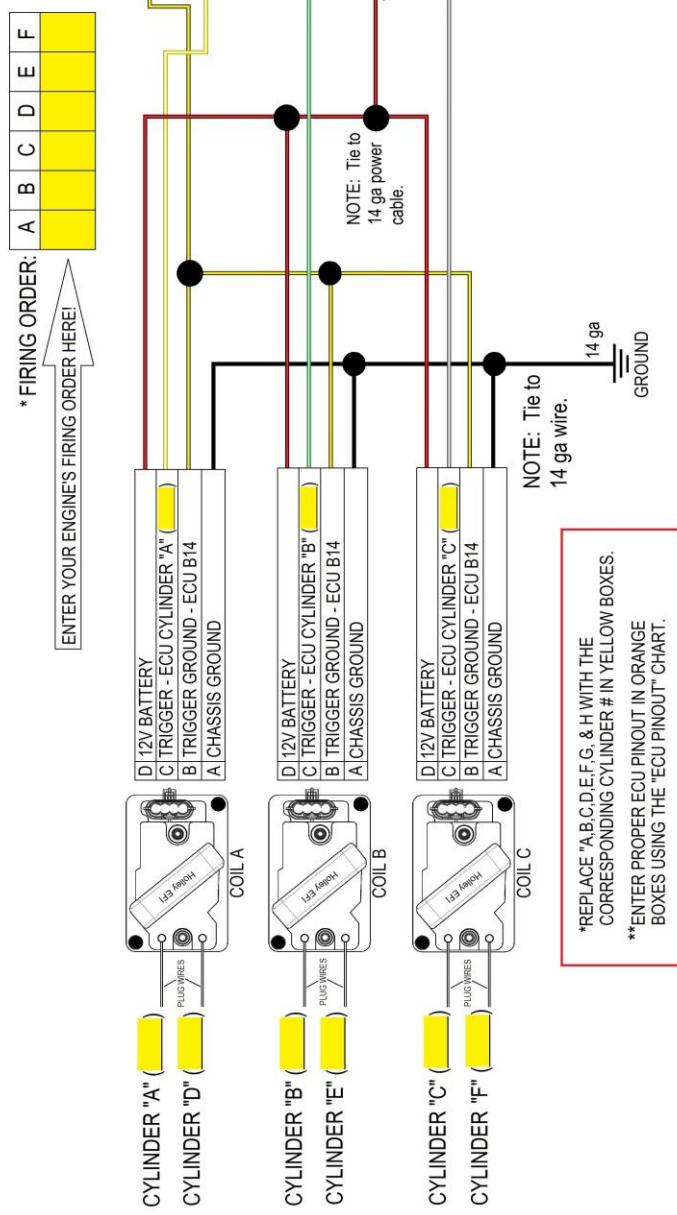


Figure 5

HOLLEY DISTRIBUTORLESS IGNITION WIRING - 4 CYLINDER

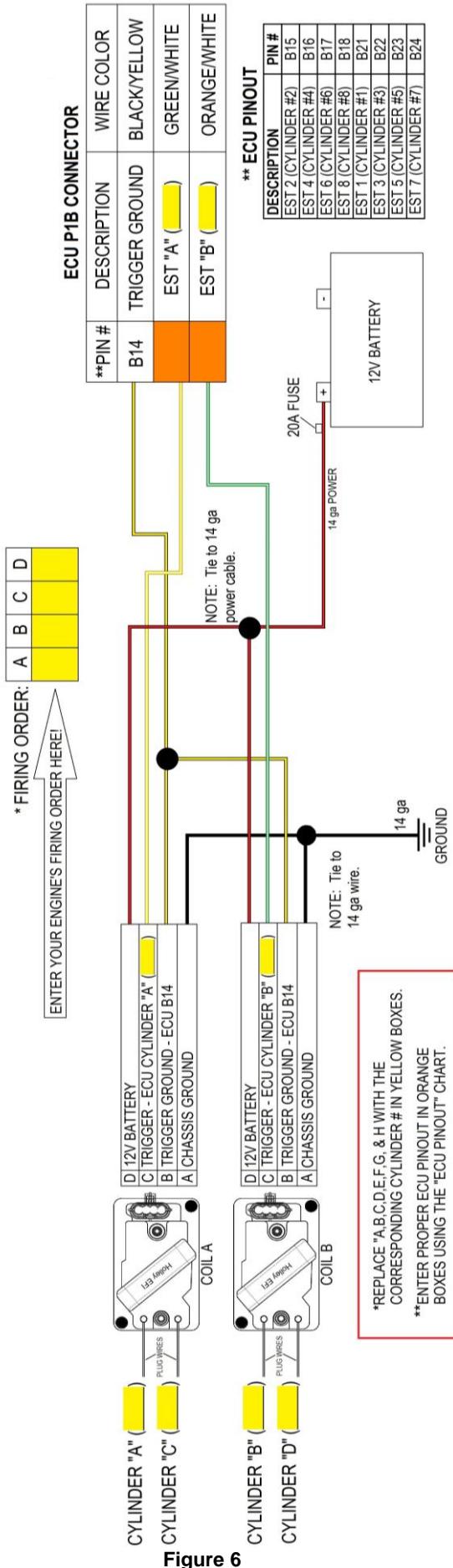


Figure 6

10.3 Crank/Cam Sensor Harness Installation

The following diagram shows the crank/cam pickup harness that is included with the DIS kits. The 10 pin metripak connector plugs directly into the main harness “ignition connector”. The crank sensor plug connects directly to the Holley® crank sensor. The cam sensor, as mentioned above is for a GM cam sync distributor. If you are using a different cam sensor, you must install the proper connector on it. Use the diagram below (**Figure 7**) for proper wiring of the cam sensor.

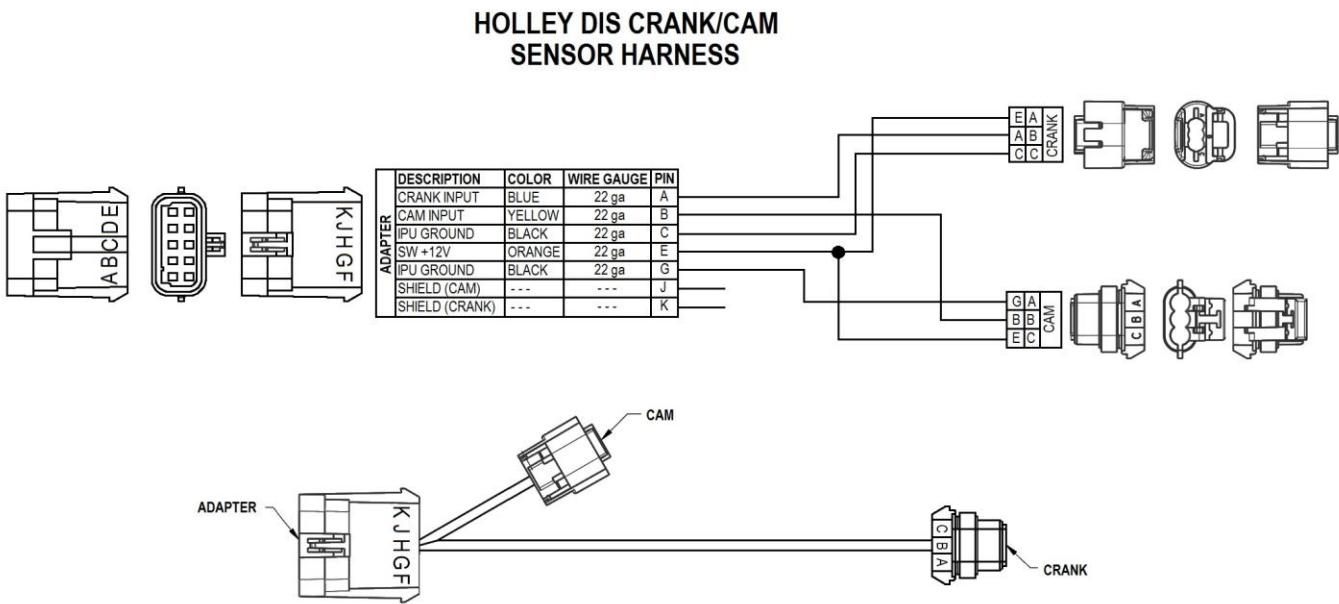


Figure 7

10.4 Magnetic Cam Pickup

If you are using a magnetic cam sync input, reconfigure the harness per the diagram below. Make sure you use the shielded/ground cable supplied with the harness or it is likely that EMI will disturb the camshaft signal.

MAGNETIC CAM SYNC WIRING

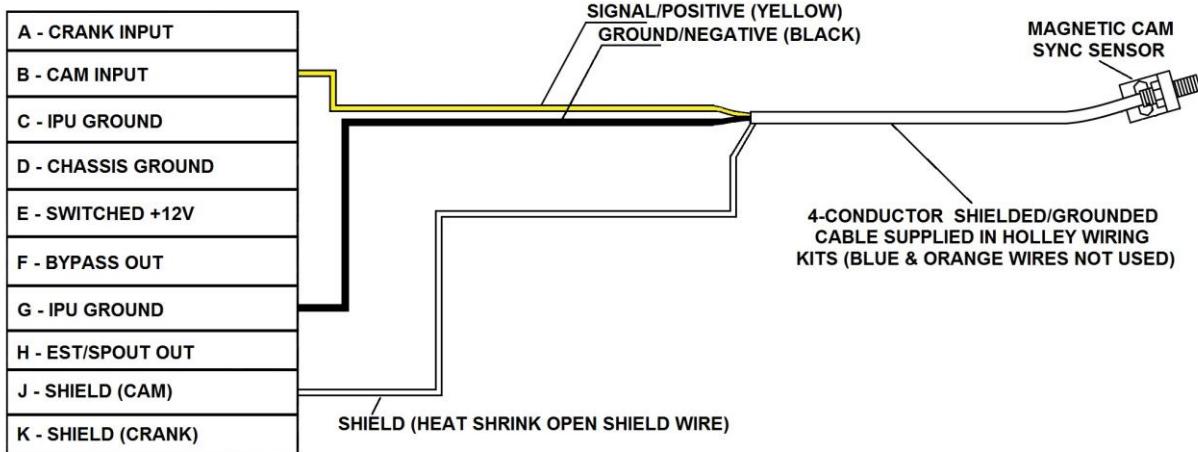


Figure 8

NOTE: The shield wire (bare wire) **MUST** always be grounded at the ECU. If you use the supplied harnesses without modification, this will automatically be the case. If you modify the harnesses at all, and do not know what it means to “ground the shield wire at the ECU”, call Holley® tech service for clarification. Not doing so **WILL** result in noise entering the crank and cam inputs, causing potential severe problems.

10.5 Software Setup

The following must be properly set up in the software to run a Holley® DIS system.

NOTE: The coil in this package requires a different dwell time than early Holley® DIS coils for optimal coil output. Newer coils are rev C or higher and have the recommended dwell setting printed on the label located on the base, typically 2.4 milliseconds. Older coils do not list their revision and do not have a recommended dwell setting printed on the label. They should be set to a dwell time of 1.8 msec. Maximum dwell time on this later coil should never exceed 3.0 milliseconds (3.0 msec is only recommended if needed on very high cylinder pressure applications) or coil damage will occur.

If using these coils, it is advised NOT to use the canned ignition types "Holley DIS, 60-2 Wheel, HE Cam Sync" or "Holley DIS, 60-2 Wheel, No Cam Sync". The Ignition Type should be set to "Custom" so that the dwell is not defaulted to 1.8 msec, and the following setup used (which is the same as the canned settings other than the dwell):

Crank Sensor

Type – 60-2

Sensor Type – Digital Falling

Inductive Delay – Start at 1 and modify as needed. Note that 1 was the value in the canned settings, and increasing this can increase high RPM timing by 1-2 degrees from previous values.

Timing Offset – 0 (modify to sync timing if needed)

TDC Tooth Number – 11

Cam Sensor (if used)

Type – Single Pulse

Sensor Type – Digital Falling (if using a hall effect sensor)

Output Setup

Type – DIS Waste Fire

Dwell Time – 2.4 msec

If you are using a different crank or cam signal, select them appropriately.

In the Ignition Parameters area, make sure you properly enter the FIRING ORDER for the engine.

10.6 Initial Startup

WARNING! Do not attempt to change the position of the pickup to adjust the ignition timing while the engine is running. Always shut the engine off while making any adjustments to the location of the pickup. Failure to shut the engine off during adjustment may result in vehicle damage, serious injury, or death.

1. Once everything is installed properly, it is HIGHLY recommended to check the timing of the first 4 cylinders in the firing order, to make sure they are wired properly. If they are not and the engine fires, the starter and flexplate can be severely damaged or worse. To do this, perform the following:
 - 1) Disconnect the fuel injector connector harness (so no fuel is injected).
 - 2) Set the cranking timing parameter to 0 (zero) in the Ignition Parameters.
 - 3) Connect a timing light to cylinder #1 (first cylinder of the firing order). **NOTE:** Do not use the "dial back" function on a timing light with a waste-fire ignition system, it will give you an incorrect reading. Use a degreed balancer.
 - 4) Crank the engine, the timing should read "0". If it varies by less than 20 degrees, you can adjust the "Timing Offset" parameter in the Ignition Type setting. If it is more than 20, you need to move the crank sensor or trigger wheel position. Move the sensor itself counter-clockwise if you need to advance the timing. Move it clockwise to retard the timing. In extreme case the wheel can be moved to a different slot position.
 - 5) Once Cylinder #1 reads 0 degrees when cranking, put the timing light on the next cylinder in the firing order. Crank the engine. It should read 90 degrees after Cylinder #1. This position would be "270 degrees" on a fully degreed balancer.
 - 6) Put the timing light on the 3rd cylinder in the firing order, it should read "180 degrees" on a fully degreed balancer.
 - 7) Put the timing light on the 4th cylinder in the firing order, it should read "90 degrees" on a fully degreed balancer.
 - 8) You can check the remaining four cylinders, but as long as you paired them correctly on the coils, they should be correct and fire in the same sequence the first four cylinders fired.

2. If everything checks ok in number, re-connect the fuel injectors, set the cranking timing back to the desired setting (15 typically) and start the engine. It should start and run. Check the timing at idle and 3000 RPM or so. It should match the commanded timing. If it is off (shouldn't be off more than a few degrees), adjust the timing offset value to fully sync.
3. Installation and setup should be complete.

NOTE: Use of Individual Cylinder Timing when using Holley® DIS: At the present time, the Individual Cylinder Timing function, when used with waste fire ignition systems, such as the Holley® DIS, does not have full individual tuning capabilities. A timing retard is "shared" between both cylinders attached to a coil. For example, if cylinders 1 and 6 are attached to a coil, and a timing retard of 2 degrees is commanded for cylinder #1, cylinder #6 will have a 2 degree retard as well. The retard value for the cylinder with the most amount of retard requested, will be used for both.

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