EnDuraLast
EDL4IGNS

Electronic Ignition System with Crank Mounted Hall Sensor Installation Guide

for use with the EDL4 Alternator

EUROMOTOELECTRICS.COM

ELEKTRONIK SACHSE MP

EDL-IGNS Parts Inventory

Item #	Qty	Description
1	1	Trigger Unit
2	1	Ignition Module
3	1	Ignition Module Plug
4	1	8” Cable Ties
5	1	Velcro Patch
6	1	Rotor Bolt & Washer
7	3	Insulated Ring Connectors
8	2	Insulated Spade Connectors
9	1	Allen Wrench
10	1	Screw Driver
11	16”	Black wire
12	16”	Brown Wire
13	16”	Red Wire
14	16”	Wheel Hub
15	1	Timing Wheel
16	1	4” Cable Ties
	1	Loctite

Your kit consists of the ignition module EDL-310 or the upgrade EDL-312 if purchased.

Notes & Disclaimers

Please understand that working on 30+ year old motorcycles may require additional work to the wiring not specifically covered in these instructions. These instructions cover the installation of the electronic ignition on BMW motorcycles model years 1970 through 1995. After 1990, BMW changed the wiring to the ignition circuits and it is not compatible with this ignition system without the addition of a relay. Otherwise damage may occur to the Ignition Module and render the emergency kill switch ineffective.

Prep the Bike

Disconnect the battery and put it on a charger so it is fully charged when the project is complete. Place bike on center stand, flip open seat, and remove tool box. Turn off both fuel petcocks and disconnect the fuel lines. Remove the tank. Remove the front engine cover and starter cover.

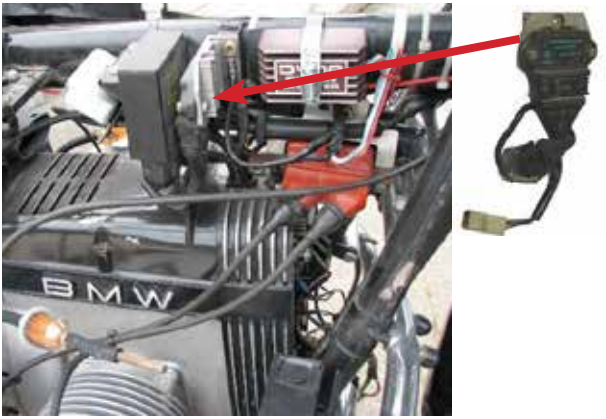
Remove Existing Ignition or Tune Up Contact Points Ignition If Applicable

The original points ignition components on 1970-1978 Airheads (advance unit, points, points plate, condenser and points compartment grommet) can be **left in place as a backup secondary ignition!** If leaving in place, disconnect the coil negative terminal and cable tie it to the new coil negative wire that will be run later in the installation. Switching this wire will change it back to the original points setup. Since they really aren't necessary, they may be removed.

If left in place, the points rubbing block, the points contact surfaces, and the mechanical advance unit would normally wear. You may care to accept this, or you can remove the mechanical advance unit, and store in a Zip-loc bag in the bikes' tool kit. Replacing the 10 mm nut and wave washer on the end of the cam nose. Don't over tighten this nut! Install it with a torque wrench to 54 inch-lbs (4.5 ft-lbs). To revert back to the stock points system, simply slide the advance unit back on the cam nose and change one wire at the ignition coil.

For 1979-1980 Airheads with points or the "bean can", You can keep it installed as a secondary ignition system. As stated earlier, it will continue to wear. Alternatively the entire bean can unit is removed by disconnecting the cable going to the condenser mounted on the "bean can" and removing the two bolts, one on each side.

For later models with electronic ignition, remove the ignition control unit, located on the right side of the frame just back from the coils.



There are two wire harness' leading to the stock ICU. The cable connected to the white three plug connector has a green and yellow wire which is a **switched power source**. Use this green and yellow wire from this connector later to trigger the relay detailed on page 17 of this guide.

Install Cover Plate (optional)

A cover plate can be ordered from Euro Moto Electrics, Part # BMW-COVER to replace the "Bean Can" on 1981-1995 models. Remove the two M5 5mm Allen bolts, pull off the bean can and fit the cover plate. Secure with the original two M5 bolts.

Remove / Disconnect Non-Stock Ignition Components Ignition (1978-80)

Remove any points amplifiers (also called "points boosters") from the system. These will normally be found zip-wrapped to the motorcycle frame under the tank. Equally, if your engine had been upgraded to an older generation electronic ignition, usually Boyer or Dyna, remove it completely. They cannot be used with the EnDuraLast Electronic Ignition. *If you are not thoroughly familiar with the history of your Airhead, you may be surprised that these were installed by a previous owner.*

Accel units were popular in the 1970s.

Dyna III is a contact points replacement, still using the original mechanical advance.

The Dynatek DBR-1 is the most commonly used points amplifier on Airheads today.

Boyer Micro Digital (Formerly MkIII)

Your new EnDuraLast Electronic ignition is superior to these older units in every way: more robust modern construction, better ignition curves, and crank-driven to avoid the vagaries of cam-driven timing.

Install The Trigger Wheel

Remove the center bolt holding the EnDuraLast rotor to the crankshaft. Often this can be removed by "jerking" the wrench without holding the motor from turning. If the bolt won't break loose, place the transmission in gear and apply the rear brake. This will keep the engine from turning.

Install the longer Center Bolt and lock washer (Part # 6) through the wheel hub (part# 14) back into the rotor and tighten with a torque wrench to 14 ft-lbs (168 inch-lbs). Do not over tighten!

Assemble the timing wheel (part #15), loosely on the on the wheel hub with the "N" and "S" stamps facing outward so it can rotate independently for now. We will secure it later once we are setting the timing.

Install The Pickup

Remove the top two stator frame bolts holding the EnDuraLast stator to the timing case. Be careful not to bump or knock the stator once it is loosened.

Slide the trigger unit (Part #1) under the heavy black alternator cable onto the stator ring frame and re-insert bolts. Reinstall stator housing bolts with a torque wrench with a 4 mm Allen bit to 3 ft-lbs (36 inch-lbs). *Do not over tighten! These are steel bolts going into an aluminum timing cover which can strip easily.*

The ignition module wire can be routed through either grommet on the timing chain cover. The rubber grommet is already molded for a second wire on 1980 and later bikes; it just needs to be carefully removed and then with a sharp knife cut open to accommodate the trigger wire. Replacement grommets are available from EME.

Install The Ignition Module

Two Ignition Module's are available with this system. Fitment is the same for either module. The only difference in installation is the optional tach or rev wire on the EDL-312 module.

EDL-310

EDL-312

Mount Ignition Module

The Ignition Module is attached to a suitable surface, which should not be in the splash-water range, with the included Velcro. This should be sufficient however large cable ties are included for additional support. The wires from the pickup should be long enough to reach almost any desired location. One recommended location on early Airheads is where the large mechanical voltage regulator has been updated to the modern solid state slim version, the top of the voltage regulator works perfectly!

Alternatively, towards the rear of the center frame is often a good location as shown on this R100RS.

NOTE: Do NOT install the ignition module inside the alternator cover. The ignition module is sensitive to extream heat and can be damaged if installed under the alternator cover. Do NOT shorten the pickup leads going to the module - Simply secure any extra wire with cable ties.

EDL-310 3 curve ignition module

Wire the ignition module as detailed below. Be sure to note the orientation of the plug and the terminals in the correct order.

1. **Ignition Coil Negative Black Wire (-)**
2. **Negative Ground Brown Wire**
3. **Brown Sending Unit Wire**
   (Trigger Ground)
4. **Yellow Sending Unit Wire**
   (0V/5V Trigger Output)
5. **White Sending Unit Wire**
   (+5V Trigger supply voltage)
6. **Power Supply Ignition Positive Red Wire (+)**
   (12V Key ON Power Supply, *Coil Positive is a good source*)

Do not shorten the pickup lead! Tin the end of the wires supplied in the kit with solder when securing into the ignition module plug. If you power the unit while wired in reverse the module will be damaged and a replacement must be purchased.

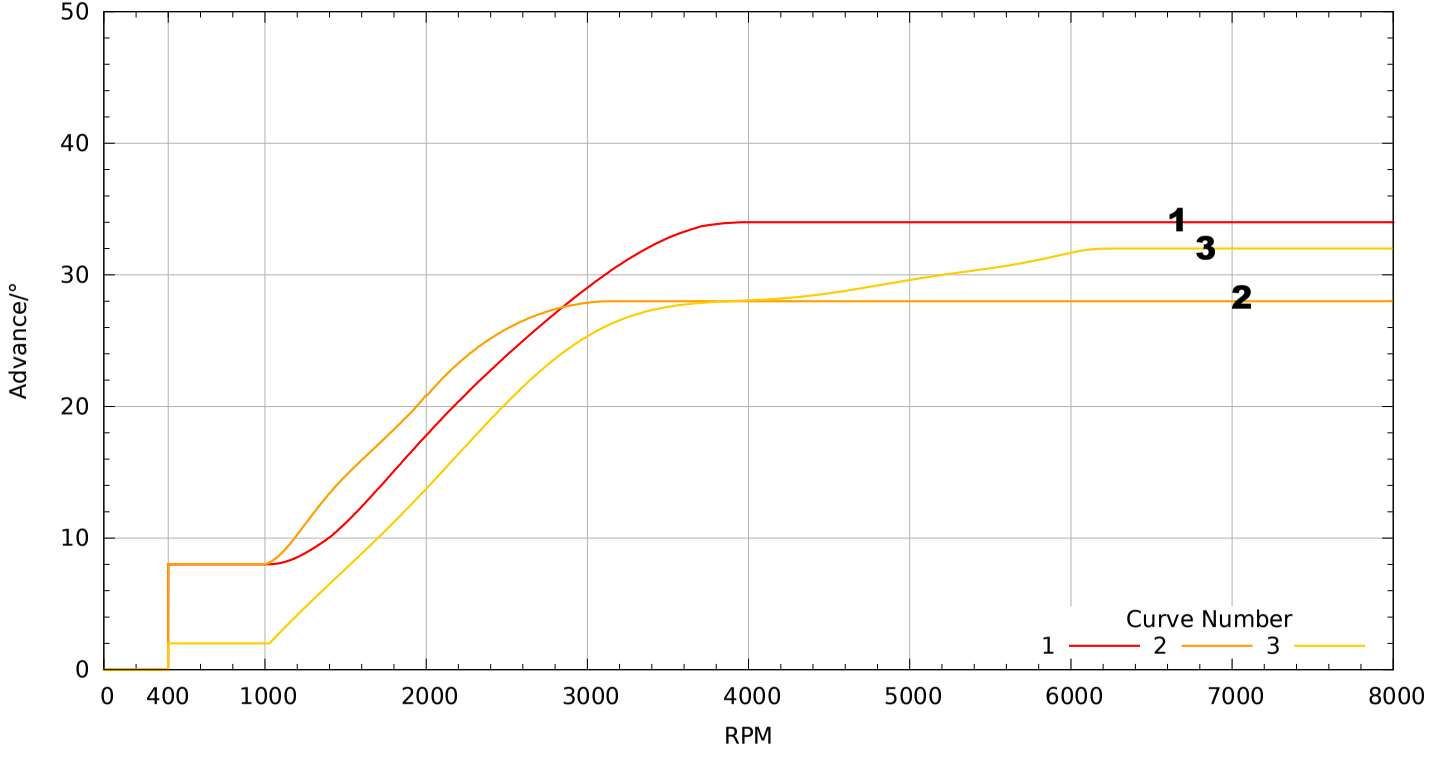
Step 11-A: Set Dip Switches

Select your advance curve. *Note the module is NOT preset.*

- **Curve 1** has a quicker advance as RPM's increases and tops at 34° advance. For **STOCK** singe plugged heads.
- **Curve 2** has a quicker advance as RPM's increases and tops at 28° advance. For modified **DUAL** plugged heads
- **Curve 3** has a slower advance as RPM's increases and tops out 32° advance. Curve #3 is in the middle and, depending on the engine and total setup, might also work for dual plugged heads.

Dip switch positions

1	**2**	
Off	Off	Module test mode
On	Off	Advance curve 1
Off	On	Advance curve 2
On	On	Advance curve 3


50
40
30
20
10
0
Advance/°
0
400
1000
2000
3000
4000
5000
6000
7000
8000
RPM
1
3
2
Curve Number
1
2
3

EDL-312 9 curve ignition module

Wire the ignition module as detailed below. Be sure to note the orientation of the plug and the terminals in the correct order.

1. **Ignition Coil Negative Black Wire (-)**
2. **Negative Ground Brown Wire**
3. **Brown Sending Unit Wire** (Trigger Ground)
4. **Yellow Sending Unit Wire** (0V/5V Trigger Output)
5. **White Sending Unit Wire** (+5V Trigger supply voltage)
6. **Output for an electronic Tach / Rev Counter**
7. **Power Supply Ignition Positive Red Wire (+)** (12V Key ON Power Supply, *Coil Positive is a good source*)

Do not shorten the pickup lead! Tin the end of the wires supplied in the kit with solder when securing into the ignition module plug. If you power the unit while wired in reverse the module will be damaged and a replacement must be purchased.

Step 11-B: Set Dip Switches

DIP Switch's and the Rotary switch are located on the end of the ignition box. Dip Switch 1 is your over speed protection. Dip Switch 2 should be set up for your tach frequency requirement for either crankshaft or camshaft frequency. The Rotary switch is used to select the desired advance curve (*See advance curve illustration to the right.*)

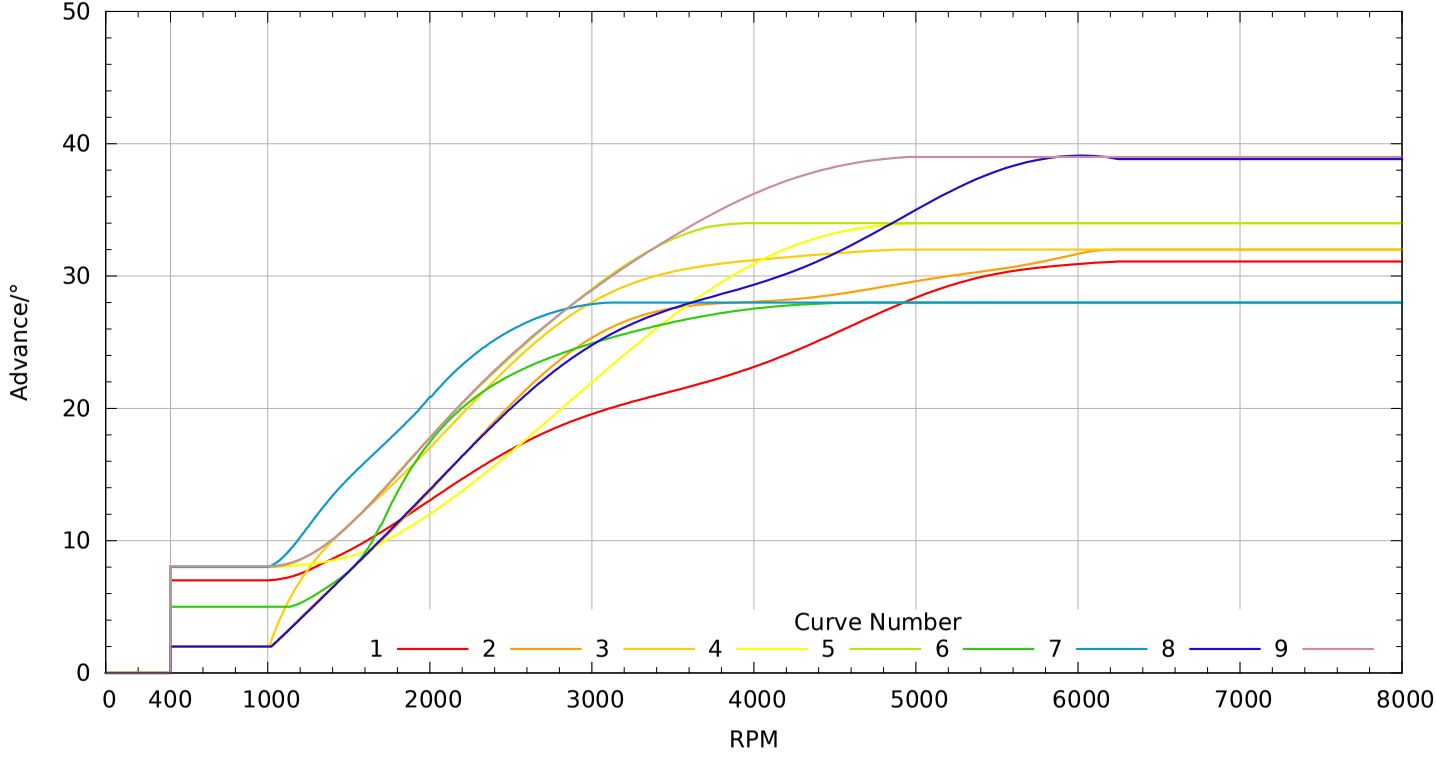
Dip switches

1 Over speed protection
- •switch down: 7900 rpm
- •switch up: 8700 rpm

2 Rev. counter output frequency
- •switch up: crankshaft
- •switch down: camshaft

Rotary switch

1-9 Advance curves 1-9
0 Module test mode


Advance/°
RPM
Curve Number
1
2
3
4
5
6
7
8
9
0
10
20
30
40
50
0
400
1000
2000
3000
4000
5000
6000
7000
8000

Fasten Wire Connectors

Using the Red, Black and Brown wires included in your kit, strip the end and apply solder to "tin" the wire ends. The wires from the pickup are pre-fitted with connectors for the Ignition Module. With the included small screwdriver, insert the correct wire in the correct slot per the diagram for your ignition module.

Compatible Coils

Examples of Compatible Coils

The Electronic ignition must see a 2.5-3.2 Ω coil configuration. You can use stock BMW ignition coils used on models using points and condensers.

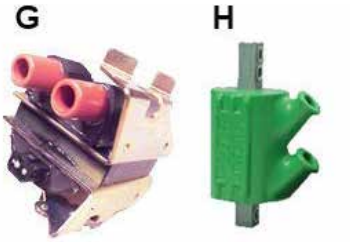
When stock Airheads and dual plugged Airheads use two coils wired in series, each of these coils needs a primary resistance of 1.25 to 1.6 Ω.

Two recommended replacement coils are;

BOSCH 6V 1.5 Ω "Super" coils.
EME Part # BO-Coil6Vx2
Or
The EnDuraLast 3 Ω coils
EME Part # EDL-Coil3.0Ω

Incompatible Coils

The EME ignition is NOT Compatible with conventional electronic ignition coils, which typically have a primary resistance of around 0.7 Ω. These coils will damage ignition module. The older black Bosch coils and the newer electronic black Bosch coils look almost the same – except the electronic ignition coils (which can't be used) have a small yellow lightning icon on them.



Examples of Incompatible Coils

The DC1-1 (green coil) is compatible with Single Plugged Engines, BUT not compatible with Dual Plugged Engines because that would bring the total resistance to 6.0 Ω.

See coil compatibility to the Right.

Single Plugged Engine using 2 Coils Wired in Series (stock configuration)

Compatible Coils

Stock BMW points & condenser coils from 1970-1980
Black coil BMW # 12 13 1 351 584 Bosch # 0 221 100 022 (/5)
Black coil BMW # 12 13 1 243 452 Bosch # 0 221 101 003 (/6,/7, early 100)
Black coil BMW #: 12 13 1 244 142 & 02-21 100 028 (R80RT,R100/T,CS,RS,RT)

C - Bosch Super "Blue" 6V single tower coil (NLA)
A - Bosch Super 6V single tower coil , Brazilian "silver"

Incompatible Coils

G - Any coil from any 1981+ BMW motorcycle,Oilheads, Airheads, K-bikes
G - Any coil from a stock BMW transistorized ignition.

Single -Plugged Engine using a Single Two Tower Aftermarket Coil & Single - Plugged Engine using 2, Single Tower Aftermarket Coils in parallel

Compatible Coils

Accel 140403S 3.0 Ω dual-tower coil
H - Dyna Dual-tower DC1-1: 3.0 Ω "Green"

Incompatible Coils

Accel 140404S 0.7 Ω dual-tower coil
Dyna Single-tower DC9-4: 0.7 Ω "blue"
Dyna Single-tower DC10-1: 5.0 Ω "black"

Dual -Plugged Engine using 2, Two Tower Aftermarket Coils in Series

Compatible Coils

D - Dyna Dual-tower DC2-1: 1.5 Ω (wired in series) "brown"

Incompatible Coils

Accel 140404S 0.7 Ω dual-tower coil
Dyna Dual-tower DC9-1: 0.7 Ω "blue"
Dyna Dual-tower DC4-1: 2.2 Ω "gray"
H - Dyna Dual-tower DC1-1 & DC6-1: 3.0 Ω "green"
Dyna Dual-tower DC7 & & DC8-1: 5.0 Ω "black"
Dyna Four-tower DC9-2: 0.7 Ω

Dual -Plugged Engine using 2, Two Tower Aftermarket Coils in Parallel

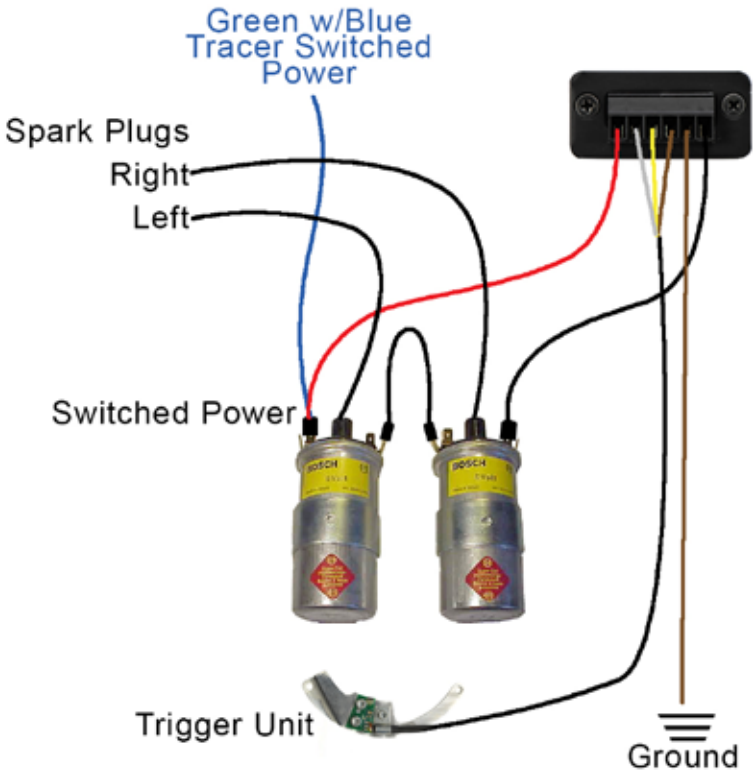
Compatible Coils None

Incompatible Coils

Accel 140403S 0.7 Ω dual-tower coil
H - Dyna Dual-tower DC1-1 & DC6-1: 3.0 Ω "green"
Dyna Dual-tower DC7 & & DC8-1: 5.0 Ω "black"

Coil Wiring on Pre 1986

These models use two identical 6V coils wired together in series with a black jumper wire between the inside terminals - these coils work great with this electronic ignition! Route the Red, Black & Brown wires from the ignition module to the coils and secure with the included cable ties for a clean installation. Ring and spade terminals are included in the kit depending on what your particular coils require.



The outside terminal of the left coil is the key ON 12 volts and has a green wire that comes from the ignition switch. Connect the RED wire from the module to this terminal to provide power to the ignition system.

The outside terminal of the right coil is the “trigger” connection via a black wire that comes from the condenser under the front engine cover. Replace the BLACK wire on the right coil going to the condenser with the black wire from the electronic Ignition box. *Models with electronic tachometers will have a second black wire connected here.* If the original contact point ignition was left in place, these two wires can be switched to revert back and forth from points ignition to upgraded ignition.

If the bike has aftermarket coils (Dyna, Accel, etc.) they will also be wired with one terminal as switched power (green wire) and the other trigger (black wire) from the condenser.

Connect the BROWN wire to either the right or left coil mounting bracket front bolt. (There may be other grounding wires there).

If the engine has been dual-plugged, dual tower coils will take the place of the BOSCH canister coils, but still wired the same, with a jumper between them and a switched power (green wire) and trigger (black wire).

Coil Wiring on 1986 to 1990

Post 1986 models had a single Dual Output Bosch 0.6 Ω coil which is **not compatible** with this ignition system. It must be replaced with any of the recommended dual tower 3 Ω coils as described earlier.

The ideal coil is the EnDuraLast dual tower 3 Ω coil. EME also offers a coil bracket to aid in mounting the replacement coil in the same location as the original coil. This coil (and Dynatek coils) do not have specified polarity. You assign one terminal as positive, and the other as negative

On the assigned positive terminal, connect the red wire from the ignition module along with the original green key ON 12v power.

There were some variations on later models where the green wire became a green/blue.

On the assigned negative terminal, connect the black wire from the ignition module. *For bikes with electronic tachometers, there is a second black wire at the trigger connection. Some wiring schemes had two green wires at the switched power connection as well.*

Connect the BROWN wire to a common chassis ground, where other brown wires from the chassis harness are grounded.

Coil Wiring on Post 1991, Kill Switch Integration

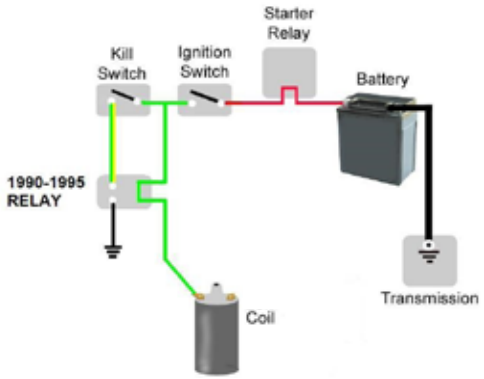
After 1990 BMW changed the wiring to the ignition circuit. The power to the Ignition Control Unit is switched separately by the Emergency Kill Switch, while the key still switchees the power to the ignition coils.

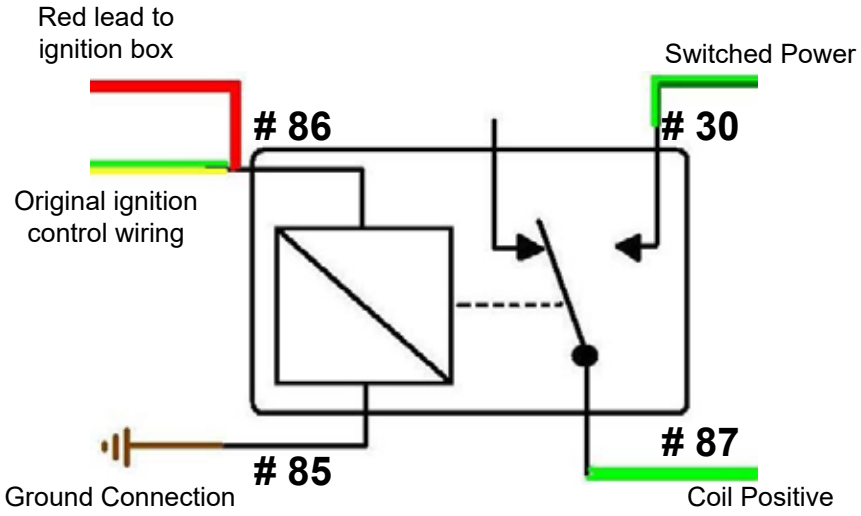
Additional wiring and a SPST 12 volt 50 amp relay is need. This can be sourced from EME or your local auto parts retailer, and is configured to retain the functional use of the Emergency Kill Switch.

- Connect relay terminal **#86** to the **green/yellow** striped wire that was connected to the original ignition control unit, and the **Red** wire from the Ignition Module
- Connect relay terminal **#85** to a good frame ground terminal.
- Connect relay terminal **#30** the original **green** “switched” wire of the ignition coil
- Connect relay terminal **#87** to the ignition **coil positive** terminal.
- Connect the **Black** wire from the ignition module to the **coil negative** terminal.

With the key switch ON and the kill switch in the ON or run position, there will now be power to the Ignition box and the relay will be energized.

By switching the kill switch OFF, the power is cut to the relay, Ignition module, and the coil.





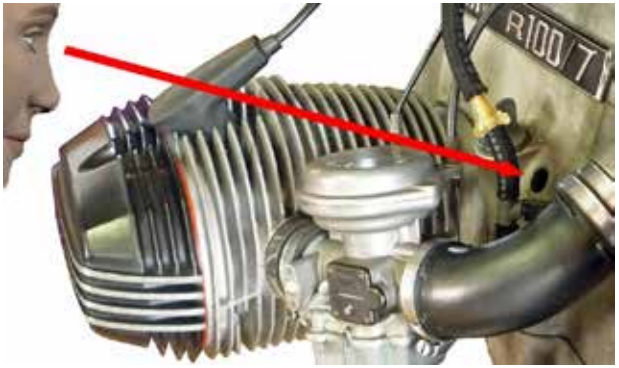
Step 16: Turn Crank to Top Dead Center (TDC)

Rotate the crankshaft so that the pistons are at top dead center (TDC), the highest point in their travel in the cylinders. Both cylinders on an Airhead have the same TDC crankshaft position.

The timing marks are stamped on the flywheel and viewed through the timing hole to the right of the dip stick.

There is a groove stamped into the left side of the timing hole. This groove, NOT the center of the hole, is used to align timing marks.

Rotate the engine by putting the transmission into 2nd gear and bumping around the rear wheel. This is preferred over using an Allen wrench in the alternator rotor bolt to turn the crankshaft as this can wallow out the Allen bolt hole. Turn the crank until the OT dot, to the left of the "OT" stamping on the flywheel, is exactly adjacent to the groove in the timing hole. (OT, in German, is Oberer Totpunkt, literally the "top dead point".) If having trouble turning the engine over, the spark plugs can be removed but this isn't usually necessary.



The apparent alignment of the flywheel timing marks with the groove on the engine can vary by several degrees by raising or lowering your head a few inches.

This is due to the viewing angle problem if your eyeball is not exactly perpendicular to the timing hole. The problem is worse on R65s which have a 20 mm smaller diameter flywheel that sits even farther from the timing window.

Airhead Timing Marks

1970 - 1990 BMW Airheads have three timing marks stamped on the flywheel:

- OT: Top Dead Center used for adjusting valves & Ignition timing.
- S: Static Ignition timing, Spaetzuendung, minimum or retarded advance. This is the timing mark to use when timing with the engine off or at idle.
- F: Fast ignition timing, Fruehzuendung (spark advanced), the maximum ignition advance. On later engines, the letter “F” was changed to a “Z”.

The horizontal line above the “S” and the dot above the “F” are the actual marks to use for timing. Some flywheels have two lines, one above and one below the timing letter. These indicate the permissible “range” of the timing, +/ 3° due to “split images”, i.e., the difference in timing between the right and left cylinders. Turning the engine over, peering into the timing window, the flywheel will appear to be moving down. From the perspective of a rider sitting on the motorcycle, the flywheel, crankshaft, rotor, camshaft and timing wheel all turn counter-clockwise.

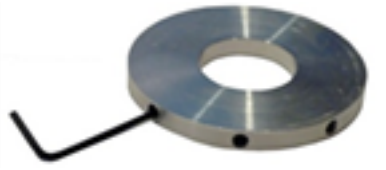
When viewing the flywheel with a stroboscopic ignition light, the “S” horizontal line should appear at idle. As the RPM is increased, the “F” dot mark will slowly move up from the bottom into the window. It will stop moving up at about 2200 – 3800 RPM, depending upon model.

Rarely there may be a flywheel installed incorrectly on the crankshaft (being some multiple of 72° off) so all timing marks are in the wrong place. Re-install the flywheel correctly by installing the flywheel on the crank at TDC (pistons fully extended) with the “OT” mark in the timing window. Flywheels that have been lightened and/or balanced may also have had the timing marks machined off the flywheel. Put them back by measuring the distances from OT to the “S” and “F” marks from the chart on the next page.

The Circumference of all 1970-1980 Airhead flywheels is the same: 736.6 mm. So 1° of crankshaft rotation corresponds to 2 mm (2.046 mm actually) on the flywheel. The only exception to this is the R65 flywheel, which is 200 mm smaller in diameter. 1° of rotation of an R65 crank corresponds to 1.5 mm on the clutch carrier (flywheel).

Set the Static Timing

If necessary, loosen the three set screws with the provided small Allen wrench (Part #4) so that the timing wheel can rotate on the hub.



Set the engine at TDC (OT on the flywheel.) Turn on the motorcycle's ignition. Rotate the timing wheel clockwise as viewed from the front of the engine. As the wheel rotates, the LED on the trigger plate will turn ON when the "S" stamped on the wheel passes the trigger. It will extinguish when the "N" on the wheel passes the trigger.

Rotate the wheel a few revolutions to see how this works. (If the LED doesn't come on, make sure the magnets located on the edge of the wheel are aligned with the pickup on the sensor.

Slowly rotate the wheel until the LED just turns OFF. Tighten the 3 set screws. This is your starting point to set the ignition timing. You can fine tune your timing by rotating the disk clockwise / counter clockwise to advance, or retard your ignition timing.

NOTE: Rotating the wheel to the right - Clockwise when viewed from the front - will advance the spark

Rotating the left -Counter Clockwise when view from the front - will retard the spark,

This moves the entire advance curve on the graph up or down when advancing or retarding the ignition timing on the crank with the trigger wheel.

Set Full Advance

The amount of ignition advance built into 1970-1980 BMW Airhead motorcycles was determined by the automatic advance unit or “ATU”. These varied during Airhead production as emission controls were introduced. The amount of advance built into the mechanical advance matched the timing marks stamped on the flywheel. For example, if an ATU had 25° degrees of advance, the distance on the flywheel between the “S” and “F” marks corresponded to 25° degrees of advance.

The 1970-1978 ATUs were primarily set up for power. The 1979-1980 canister models were retarded for emission control. While the EnDuraLast Electronic Ignition replaces the ATU, we will continue to use the “F” flywheel timing mark for identifying the fully advanced crankshaft position.

Models	Static BTDC	Advance Range	Total Advance	OT – F Distance2
Early /5	9° +/- 3°	30° +/- 2°	39° +/- 2°	79.8 mm
Late /5	9° +/- 3°	25° +/- 2°	34° +/- 2°	69.6 mm
Some /6, early /71	6° +/- 3°	25° +/- 2°	31° +/- 2°	63.4 mm
Some Late /6 and /7	6° +/- 3°	28° +/- 2°	34° +/- 2°	69.6 mm
1979 – 1980 (canister)	6° +/- 3°	26° +/- 2°	32° +/- 2°	65.5 mm
1981+ (electronic ign)	6° +/- 3°	26° +/- 2°	32° +/- 2°	65.5 mm

(1) After Jan 1, 1978, the static timing mark was retarded from 9° to 6° BTDC for better emission control. Most 1978 flywheels were mis-marked, 4 degrees retarded! A service bulletin describes how to time engine with marks at the top of viewing hole. (2) For R65s, reduce the OT – F distances by 78%.

The above chart can be used to determine the total advance in degrees that the “F” mark on the flywheel corresponds to. It will be one of 31°, 32°, 34°, or 39°. When in doubt, especially for the ambiguous 1971 and 1978 model years, measure the distance between the “OT” dot and the “F” line. Then use the last chart column to identify the total advance represented by the “F” line.

Having determined what the stock flywheel “F” line ignition timing is, should it be used “as is”? Conventional wisdom might say to rotate the timing wheel so the “F” line is adjacent the timing groove in the timing window under a strobe timing light.

This may not be optimal. Early /5s probably had too much advance; the early /6s too little. The “sweet spot” for most single-plugged engines is about 34°, or curve 1.

After a high compression Airhead has been dual-plugged the stock advanced ignition timing point must be retarded. There has been much dialog, testing, and controversy over what the ideal ignition advance curve should be. After 20 years of discussion, the Airhead community consensus is that dual-plugged engines should have idle timing near stock and fully advanced timing of 27° - 28° degrees. For 28° advance select curve 2.

Step 19: Dynamically Checked Timing

Take note how the F “dot aligns with the groove on the window, not how it aligns in the window. Your groove may be stamped higher or lower in the window!

Attach a strobe timing light to the left coil spark plug wire. Start the engine and examine the timing marks on the flywheel through the timing window. Raise the RPM until the image stops advancing (moving up) the window, around 3800 (3000 on dual-plugged) RPM. Adjustments are made with the engine off.

To set the timing to the original maximum advance value, adjust (rotate) the timing wheel on the rotor so that at 3800 RPM and above the strobe image looks like this:

To set the timing to 34° (whether or not this was the original BMW value), adjust the timing wheel on the rotor according to the flywheel type as below:

Single Plugged Ignition @ 34° Advance

31° F Mark Flywheel

32° F Mark Flywheel

34° F Mark Flywheel

39° F Mark Flywheel

Dual Plugged Ignition @ 28° Advance

31° F Mark Flywheel

32° F Mark Flywheel

34° F Mark Flywheel

39° F Mark Flywheel

Fine Tuning Ignition Timing

A particular engine's best ignition timing is dependent upon engine compression and fuel octane. The optimal ignition timing is also dependent on exhaust back pressure and whether a "hot" 336" cam replaces a stock "308" camshaft.

These installation instructions use the best timing for the 1970-1990 Airheads. The 34° advance is conservative and will work with no pinging if the correct octane gasoline is used and the combustion chamber doesn't have higher than normal compression from carbonization. On 1981 and later Airhead models, with the lower 8.2 and 8.4 compression ratios, as well as the R50/5, should use 32° for the maximum advance.

The electronic ignition may, of course, be set to any advance value by simply rotating the timing wheel on the rotor bolt. If you know what you are doing you won't need these instructions and the ignition advance can be set to any value. Too retarded timing under heavy load will result in higher exhaust valve and valve seat temperatures. Too advanced timing will result in engine pinging and possible engine damage. Pinging (also known as "detonation" and "knocking") sounds like steel balls being shook in a jar. It is very pronounced on an Airhead.

Significant deviation from the recommended 34° ignition timing value (28°for dual plugged) will eat up both performance and fuel economy.

To determine the absolute optional ignition timing for optimal horsepower on a specific engine, a dynometer is needed. This may allow a couple of degrees advance beyond 34° to be used. A poor man's alternative is to advance the timing until the engine just begins to ping and then backing off (retarding) 2 degrees. Pinging is best induced under an actual load going up a hill. Lug the engine in a high gear, at low RPM, with wide open throttle, with a warmed up engine, using the lowest octane fuel that will ever be used.

If ignition timing is advanced beyond what is recommended here to increase mileage and/or power with premium fuel, do not use lower octane fuels without returning to stock timing. The engine could be damaged by pinging for an extended period of operation.

Apply Thread Locking Compound

Now that you are comfortable that the timing is set to your satisfaction, remove one at a time each of the set screws on the trigger disk and apply a tiny drop of the included Loctite thread-lock then re-install befor going to the next set screw. There is no reason to remove these screws once the timing is set correctly except to change the engine timing chain. Not securing the set screws with a thread locker can cause one or all to back out and contact the pickup, causing damage and failure.

Install Front Cover

Do **NOT** run the motorcycle with the front engine cover installed without first verifying clearance between the ignition trigger wheel and the front engine cover.

We recommend you apply a thin layer of grease to the high point of the trigger wheel, secure the cover completely then remove and inspect for any transfer of grease, identifying contact. You may also use machinest puddy if available to you.

In the unlikely case where you experience timing wheel interference with the front cover, the inside of the cover will need to be ground down to allow the space needed for the timing wheel to spin freely. This is a relatively thick casting, yet take care not take too much away in one go and to not grid all the way through the cover. Repeat until you can verify sufficient clearance.

Install Remaining Components

Lastly reinstall the starter cover, tank, and any remaining items removed earlier to restore the bike to a safe working condition.

TROUBLESHOOTING GUIDE

Warning

Do not operate the engine with the spark plug caps disconnected from the spark plugs, not connected to anything (ungrounded), *or* connected to the spark plug but the spark plug not touching anything (ungrounded). This can damage the coils internally, fry the sensor, and damage the ignition module.

Confirm Components

Use only compatible components with this system, namely:

- **3 Ω coil configuration.**
- **5k Ω plug wire caps.**
- **NON resistor spark plugs.**

Battery Voltage

Using a digital voltmeter, the voltage reading MUST be 12.43 Volts or higher. If your battery is over 3 years old, it should be replaced.
If you battery has been discharged 3 times or more, it is sulfated and MUST be replaced! The ignition module will not operate reliably if supplied less then 12 volts

Power To The Ignition System

The ignition system and pickup are powered by the RED wire you ran to the module. Verify voltage at this red wire to ensure the system is receiving adequate voltage of 12 volts or higher. The ignition pickup is powered from the ignition module.

Power to the Pickup

On the pickup circuit board there is an LED light that will illuminate in-line with the signal that is being sent to the ignition module. If this light is turning on and off with engine rotation the pickup is fine. If not verify that the trigger wheel is in-line with the pickup sensor

Check Secondary Coil Circuit

Remove a spark plug and securely ground the plug threads to a cylinder fin. Position the plug so that it can be seen firing.

Disconnect the black trigger wire on the right coil which goes to the Ignition module. Using a 2' wire with clip leads, clip one end to this terminal. Turn on the ignition and touch the other end of the wire to a cylinder head fin.

Every time you make/break this connection, you should see the spark plug fire. This is what the points used to do: make and break a connection to ground. Repeat for the other spark plug (*or other three spark plugs for dual-plugged engines)* and verify that each spark plug "sparks". If they do, the coils, plugs, wires, and spark plug caps are okay.

Check Primary Coil Circuit

If there is no visible spark at the spark plugs, investigate the coils further. Leave the 2' wire in place (connecting the outer male terminal on the right ignition coil to ground) and connect a voltmeter positive probe to an inside spade terminal of either coil. The voltage should read about 6.5V, half the voltage of the green/blue wire. (After this test remove the wire with clip leads so we don't burn up the coils). If not, the coil is bad (bad primary circuit) or the crimp connections on the jumper wire between the coils are loose.

Check the Coils

Disconnect all the wires connected to the coils, including the high tension lead. With a multimeter on the ohms scale, measure the resistance between the two spade terminals on each coil. They should measure 2.0 - 3.5 Ω, the primary resistance of the coil. If outside this range, the coil is bad or you are using the wrong coils.

Measure the resistance from each high tension coil tower to either of the male spade connectors. This secondary resistance will be 12-17K Ω for stock Bosch coils, 11.5K Ω for Accel 140403S coils, and 14K Ω for Dyna DC2-1 coils. If any of these measurements are open circuit, short circuit, or too high resistance the coil is bad.

Check the Ignition Wires and Caps

Leaving the spark plug caps attached to their ignition wires, measure the resistance end-to-end of the wire/spark plug cap combination. It should be 5K Ω.

Replace Spark Plug(s)

A NON resistor plug must be used. Check the part number on the plug, if there is an "R" then it is a resistor plug. This system is known to work well with NGK BP6ES or the NGK equivalent in the appropriate heat range for your particular bike.

If the coils, ignition wires and caps check out okay but there still is no spark when the trigger terminal is grounded, the problem must be the plugs, replace them.

Check Timing Wheel

Remove the front engine cover exposing the trigger unit. Grasp the timing wheel to check if it is slipping on its hub. If so, the set screws have become loose. Follow the procedures for setting the electronic Ignition timing - when done, secure wheel and use a thread locker.

Ignition Module Self Test

A self diagnostic test can be run on the ignition module. To run a self test on the ignition module follow these steps:

1. Position the dip switches to test mode (OFF|OFF or DOWN | DOWN for the EDL-310 module, or for the EDL-312 module, point the rotary switch to 0.)
2. Pull one spark plug and reinsert into the plug wire, grounding the plug on the head so you can see the spark plug electrode.
3. Turn the ignition key ON - but DO NOT START the bike to supply power to the ignition system.
4. A faint rapid spark will be seen verifying they system is in good working order and the self test has passed

If the spark plugs do indeed spark, the ignition module is not the issue making the optical sensor suspect.

Pickup Test

With the front engine cover removed so you can view the pickup, turn over the engine with the starter. The LED on the trigger should turn on and off as the timing wheel passes.

- If the LED turns on and off correctly and there is still no spark, the issue is not the pickup.
- If the LED never turns off, loosen the set screws on the timing wheel and slide it in or out slightly on the hub to better align the Hall sensor with the magnets in the timing wheel. If the LED cannot be made to turn on and off the trigger unit is defective.
- If the LED never comes on, check there is at least 12 volts supplied to the red wire going to the ignition module.

IMPORTANT:

Use only compatible components with this system namely;

- **NON Resistor spark plugs.**
- **5K Ω plug wire caps.**
- **3 Ω coil configuration.**

EnDuraLast

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