

BSR Magic Box

Digital ignition control for 4, 6, or 8 cylinder engines

Features

Digital Advance

The main feature of the Magic Box is the digital advance that replaces conventional weights and springs. The distributor is locked out and the advance curve is administered electronically. Not only is the electronic advance more accurate than a mechanical setup it is much easier to adjust. Unlike other programmable ignitions the Magic Box doesn't require you to fill out long complicated charts and maps. You only input three points and the Magic Box automatically fills in the rest. Adjusting one point has no effect on the others so changes can be made quickly and easily. That means you can adjust the initial advance without having to readjust the total.

Hand-Held Programmer

The Magic Box is adjusted with an easy to use hand-held programmer. No need for a bulky laptop, easy to lose pills, or hard to reach dip switches. All adjustments can be made from the comfort of the drivers seat, even while driving. The hand-held programmer has a backlit LCD screen that tells you in plain English what you are adjusting.

Dual Calibrations

The Magic Box has two separate calibration files, one for the street and one for the strip. You can setup a mild advance curve for lugging it around town then switch over to a more aggressive strip calibration in a matter of seconds.

Auto Start Retard

When the motor is turning less than 400 rpm the ignition fires at base timing. This allows the motor to crank easily even when running a high initial advance.

Rev Limiters

There are 5 built-in rev limiters. Four are turned on with an external switch or signal. The fifth one is a max rev limiter that is on all the time. All rev limiters are adjusted in 50 rpm increments using the hand-held programmer.

RPM Switches

The 4 RPM switches can be used to turn on a shift light, nitrous solenoids, or even turn off an electric fan at high speeds. The #4 RPM switch is a “window” switch, you can set both the ON and OFF RPM. This is particularly suited to nitrous where you can turn it on when a set RPM is reached and have it shut off before the rev limiter kicks in, in case you miss a shift or break something. Each RPM switch is adjusted with the hand-held programmer in 50 rpm increments.

Retard Controls

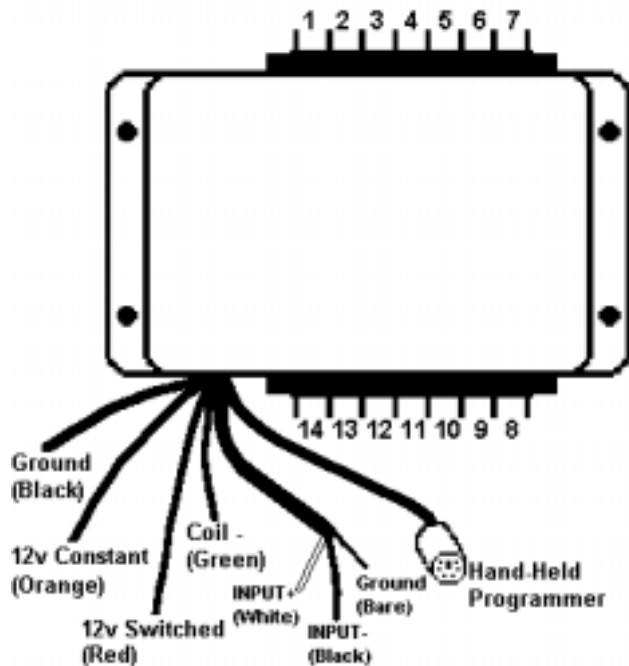
There are 4 stages of retard that are activated with an external switch or signal. Each is adjusted in 1° increments with the hand-held programmer.

High Speed Retard

There is also a built in retard that is activated by engine rpm. A high speed retard can gain you a higher trap speed and prevent high speed detonation.

Installation

- Mount the box inside the passenger compartment to avoid moisture and extreme temperatures.
- Mounting it in an enclosed area like the glove box is not recommended.
- Do not use solid core plug wires with this ignition.
- Disconnect the battery before doing any work.



- [1] NC
- [2] Retard 1 +
- [3] Retard 2 +
- [4] Retard 3 -
- [5] Retard 4 -
- [6] RPM Switch 1
- [7] RPM Switch 2
- [8] RPM Switch 3
- [9] RPM Switch 4
- [10] Rev Limit 1 +
- [11] Rev Limit 2 +
- [12] Rev Limit 3 -
- [13] Rev Limit 4 -
- [14] Tach

Power

The orange wire should receive power at all times to retain memory when the key is off. Connect the red wire to a switched power source that receives power when the ignition switch is in both the ON and START position. Connect the big black wire to chassis ground.

Distributor

The pair of shielded wires are the input wires. White is INPUT+ and black is INPUT-. The Magic Box can be triggered by just about any distributor or crank trigger using breaker points, magnetic pickup, or Hall-effect sensor. Since the advance is administered electronically you must lock out the advance mechanism when using a distributor with a mechanical advance.

Breaker Points

To trigger the Magic Box with breaker points hook both the INPUT+ and INPUT- wires to the points. If the engine doesn't run or runs erratically you may need to hook the bare ground wire to the distributor housing.

Magnetic Pickup

Magnetic pickups are all hooked up the same whether you are using a magnetic pickup distributor or a crank sensor. The negative lead of the sensor is hooked to the INPUT- wire and the positive lead to the INPUT+ wire. If they are reversed the timing will be off and you won't get a stable signal. On Ford, MSD, and some other distributors with magnetic pickups the orange wire is positive and the violet wire is negative. For Chrysler distributors orange is positive and black is negative. For a GM HEI white is positive and green is negative. If you don't know which is which you can check it with a timing light. Roll the motor over until it is at 10° before top dead center. Rotate the distributor until the armature vane is lined up with the center pole of the magnetic pickup. Set both the Base Timing and Initial Advance on the hand-held programmer to 10°. Fire up the motor and check the timing with the timing light, it should be pretty close to 10°. If its not then reverse the pickup leads and check it again.

Hall-effect Sensor

The signal wire of Hall-effect sensors are hooked to the INPUT+. The Magic Box fires on the rising edge of the signal.

Coil

The green wire goes to the coil negative (-) lead. The positive (+) coil lead should receive 12 volts when the ignition key is in both the ON and START position.

Ignition Module

You can also use the Magic Box as a timing computer and drive the coil with a separate ignition module. Any ignition module with a breaker point input can be triggered by the Magic Box. Simply hook the green wire to the input of the ignition module.

Hand-Held Programmer

The hand-held programmer plugs into the round six pin connector. The hand-held programmer can be plugged in or removed at any time, even when the motor is running.

Retard Controls

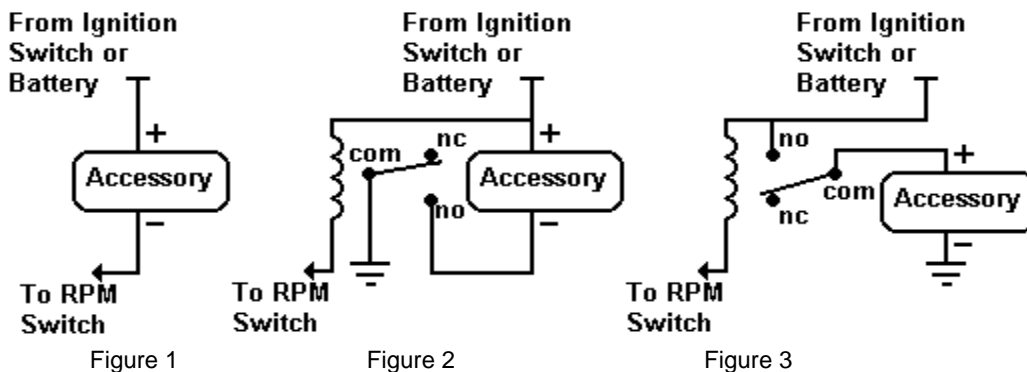
Retards 1 and 2 are turned on by applying a positive voltage to screw terminals 2 and 3 respectively. This power can come from a switch or from another accessory like a nitrous solenoid. Retards 3 and 4 are turned on by grounding screw terminals 4 and 5.

Rev Limiters

The rev limiters are actuated the same way as the retards. Applying power to screw terminals 10 and 11 will turn on rev limiters 1 and 2, and grounding screw terminals 12 and 13 will turn on rev limiters 3 and 4 respectively.

RPM Switches

The RPM switches provide a ground. When hooking an accessory (e.g. shift light, nitrous solenoid) to one of the RPM switches hook the negative (-) lead to the box and hook the positive (+) lead to a positive voltage supply (Figure 1). Each RPM switch can handle up to 3 amps. When driving a load greater than 3 amps you must use a relay (Figure 2). If the ground path of an accessory can not be isolated a relay can be used to switch a positive voltage (Figure 3).



Tach

It is not necessary to hook the tachometer to the tach pin. However when it is hooked to the coil it will read low when the rev limiter kicks in. A tach adapter may be required when running a tachometer off of the Tach pin. The Tach output is similar to that of an MSD box so an MSD tach adapter (#8920) can be used.

Base Timing

Even though the timing is adjusted electronically you still need to set the base timing mechanically with a timing light. You can set the base timing to whatever you want but it is generally set around 0 - 10°. There are a few things to consider when setting base timing. The base timing can not be set below 0°. The ignition will not fire below base timing. When starting the motor it will fire at base timing, if the base timing is too high the motor will not turn over easily. To set the base timing you need to eliminate the electronic advance. With the hand-held programmer turn the Initial Advance all the way down so it is the same as the Base Timing setting and set the Initial Advance RPM higher than your idle speed. With a timing light set the base timing where you want it. This is the only time you will need a timing light or tools. Once the base timing is set all adjustments are made with the hand-held programmer.

Final Setup

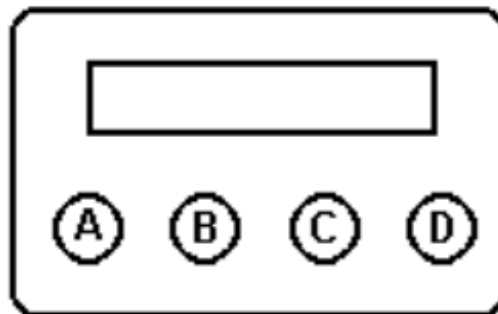
After hooking up the Magic Box you should plug in the hand-held programmer and turn on the ignition key, don't start the motor yet. The screen should light up and it should say "Initial Adv 12". Flip through the menu and make sure there are no abstract values. The following section explains how to use the hand-held programmer and what the default values should be. Go into the aux. menu, if any abstract values were present select the Reset option to load in the default values. Next set the Base Timing and Cylinders to match your engine. Your Magic Box is now ready to run.

Operation

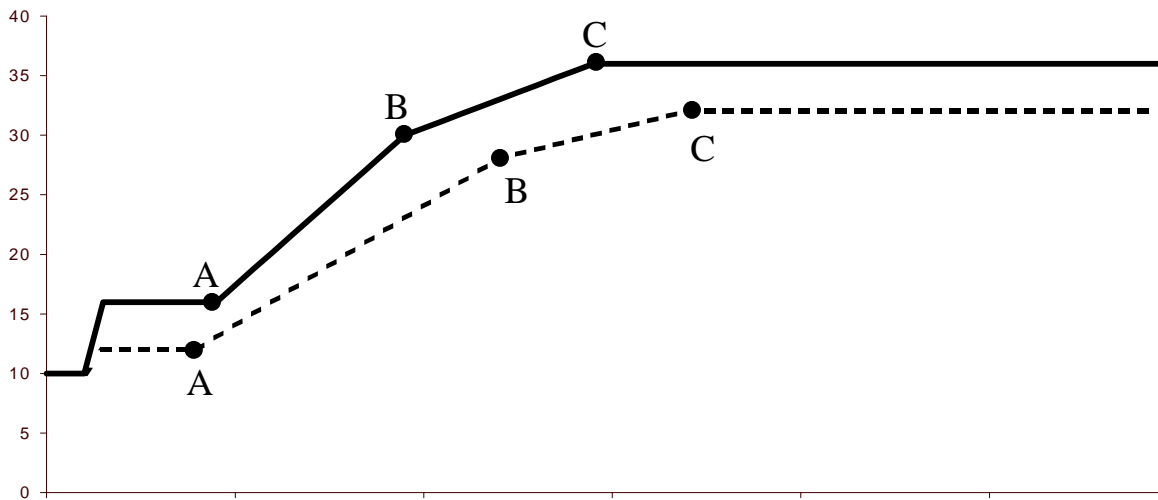
General Operation

When the hand-held programmer is plugged into Magic Box it will turn on when the ignition key is turned on. The screen will light up and it will say 'Initial Adv'. This is the main menu. You scroll through the menu with the A and B buttons. The B button scrolls forward and the A button goes back. There are 22 items on the main menu;

Initial Adv
Init Adv RPM
Mid Advance
Mid Adv RPM
Max Advance
Max Adv RPM
Rev Limit 1
Rev Limit 2
Rev Limit 3
Rev Limit 4
Max Rev
RPM Switch 1
RPM Switch 2
RPM Switch 3
Switch 4 On
Switch 4 Off
Retard 1
Retard 2
Retard 3
Retard 4
Hi Speed Ret
HS Ret RPM



When you get to the end of the menu it will start over from the beginning. Buttons C and D adjust the values. Button C decreases the value and Button D increases the value. All changes are made immediately, what you see on the screen is what the Magic Box is running at. All adjustments can be made with the engine stopped or running.



The advance curve is set with three plot points; initial advance (A), mid advance (B), and max advance (C). Above is pictured the two default curves. The dotted line is the default street curve and the solid line is the default strip curve. Any time the computer is disconnected from the battery it will revert back to the default settings.

Initial Adv and Init Adv RPM

The **Initial Advance** and **Initial Advance RPM** settings determine the initial advance point. The **Initial Advance** can be set from base timing to 50°. The default settings are 12° street and 16° strip. When the engine reaches the **Initial Advance RPM** the Magic Box starts advancing the timing. The **Initial Advance RPM** should be set just above the idle speed. The defaults are 900 street, 1000 strip.

Mid Advance and Mid Adv RPM

The **Mid Advance** and **Mid Advance RPM** settings determine the mid advance point. The mid advance point allow you to “curve” the advance rate. Without the mid advance point the advance would come in at a constant rate between initial and max advance. Most engines respond better to a curve that come in quickly off initial but tapers off as you approach total advance. If you want a constant advance rate (straight line) then make the **Mid Advance** the same as the **Max Advance** and the **Mid Advance RPM** the same as the **Max Advance RPM**. The **Mid Advance** can be set from base timing to 50°. The default settings are 28°

street and 30° strip. The **Mid Advance RPM** can be set between the **Initial Advance RPM** and the **Max Advance RPM**. The default settings are 2500 street and 2000 strip.

Max Advance and Max Adv RPM

The **Max Advance** and **Max Advance RPM** settings determine the max advance point. The **Max Advance** can be set from base timing to 50°. The default settings are 32° street and 36° strip. The **Max Advance RPM** can be set between **Mid Advance RPM** and 9000. The default settings are 3500 street and 3000 strip.

Rev Limit 1 - 4

When a Rev Limiter is activated the ignition will be cut back when the set rpm is reached. Cylinders are dropped sequentially to prevent back fire or engine damage. The Rev Limiters can be set from 400 to 9000. Any unused Rev Limiter should be set at 9000. The default setting for all four Rev Limiters is 9000.

Max Rev

The Max Rev limiter is always active. Set it above your shift points but low enough that it will cut the ignition before blowing the motor in case you miss a shift. The Max Rev limiter can be set from 400 to 9000. The default for both the street and strip Max Rev limiters is 6000.

RPM Switch 1 - 4

An RPM Switch will be activated when the set rpm is reached. You can also specify an off time for the #4 RPM switch. This can be used to shut off a nitrous system in case of a missed shift or broken drive train. The RPM switches can be set between 400 and 9000. The default setting for all RPM Switches is 9000.

Retard 1 - 4

When a Retard is activated the ignition will be retarded the set amount. The Retards can be set from 0° to 50° however they will stop retarding once they hit base timing. Remember the ignition can not fire below base timing. Any unused Retards should be set to 0°. The default for all Retards is 0°.

Hi Speed Ret and HS Ret RPM

The High Speed Retard is activated when the engine reaches the High Speed Retard RPM. The High Speed Retard can be set from 0° to 50° but like the other Retards it won't retard below base timing. The default setting is 0°. The High Speed Retard RPM can be set from 400 to 9000. The default setting is 5000.

Auxiliary Menu

The auxiliary menu is accessed by holding down both buttons A and B for three seconds. There are seven items on the aux. menu; Main Menu, Base Timing, Fine Tune, Cylinders, Reset, Street, and Strip. Button B scrolls forward through the list and A goes back. To select an item press button D.

Main Menu

Selecting Main Menu will take you back to the main menu without making any changes.

Base Timing

The Base Timing setting on the hand-held programmer only tells the Magic Box where the base timing is set. The base timing is set mechanically and can not be adjusted electronically. If you set the base timing to 10° with the timing light then set the Base Timing on the hand held programmer to 10° so the Magic Box knows where to start advancing. The default setting is 10°.

Fine Tune

The fine tune feature allows you to compensate for any delay of the ignition module and coil. If you watch the timing with a timing light you may notice it retard slightly as RPM increases. If so then increase the Fine Tune value until the timing is accurate throughout the RPM range. The Fine Tune can be set from 0 to 255. The default is zero.

Cylinders

The Cylinders value simply tells the Magic Box how many cylinders your engine has. It can be set to 4, 6, or 8. Default value is 8.

Reset

Selecting Reset will reset all values, both street and strip, back to default values.

Street

Selecting Street will switch the Magic Box over to street calibration and load all street values into the main menu.

Strip

Selecting Strip will switch the Magic Box over to strip calibration and load all strip values into the main menu.