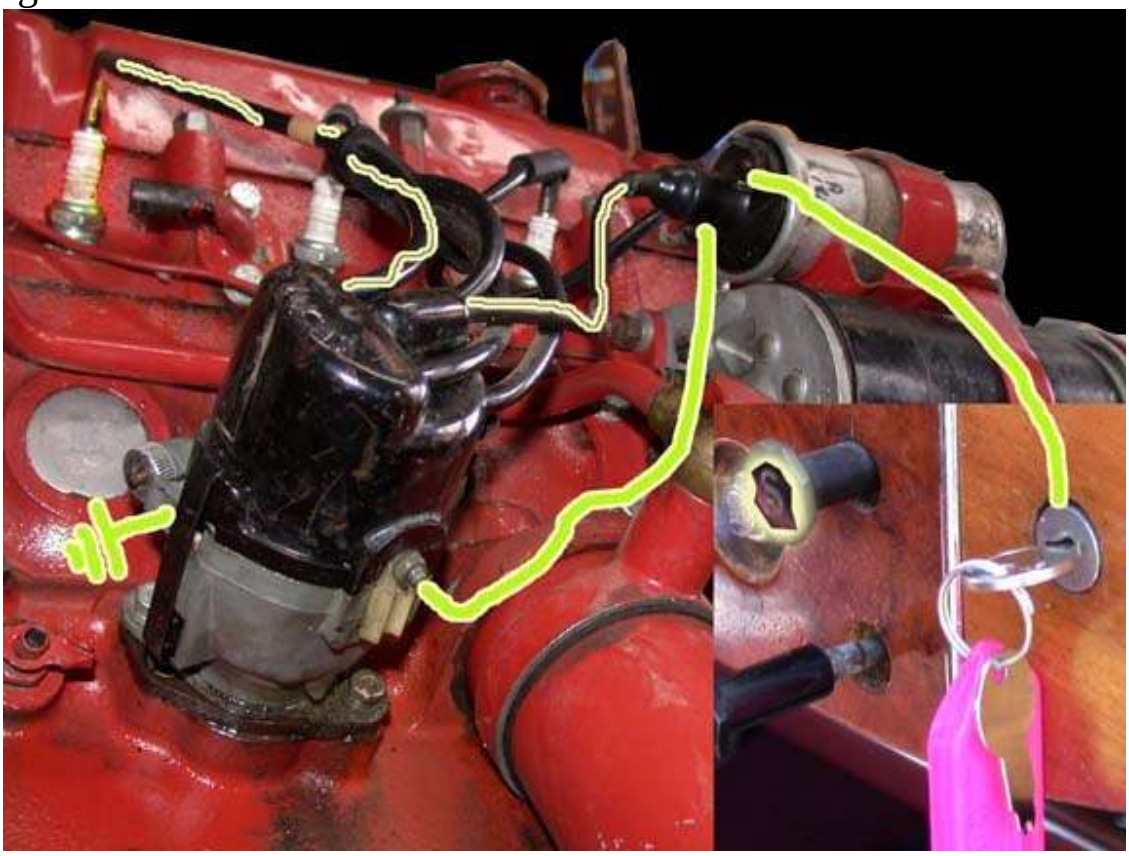
Ignition as a Pointless Exercise



Picture 1. Lucas DM2 Ignition system – ignition switch on.

Comment

In a collection of secondhand ‘spare’ ignition coils that look the same, any will do? ***Further down ‘The Quest’ indicates where this article will lead you! Alternatively a quick overview can be gained by reading the conclusion and viewing the images.***

Lesson in hindsight

Having installed a reconditioned engine into the engine bay, last action was to select a distributor coil [see selection process above] and clamp it in place on the generator. Engine was then fired up and timed as per specification without any problem. Some weeks later the engine started to miss at cruising speed, progressively becoming more frequent and increasingly obvious in some rev ranges.

Diagnosis No.1 Seemed like fuel problems to me [hindsight comes later]. Changed fuel filters ‘still missing’, next checked fuel flow and changed fuel pump ‘condition worsening’.

Diagnosis No2. Well perhaps the ignition system? Timing still ok but the coil should not be too hot to touch!

The Fault. Wrong ignition coil fitted. It was actually a modern coil in the older style casing. Problem was its lower primary coil resistance was generating many times the normal current, resulting in chronic burning of points and 'possibly dangerous' overheating of coil. QED {Quite Easily Deceived}

Lesson. Gain more knowledge on ignition systems and their electrical specifications. Also heed warped wisdom at end of conclusion.

THE QUEST

To:

Revise basic knowledge of 1950's MG ZA/ZB ignition system
Appreciate evolution of ignition systems in the 1950's to 1980's period.
List relevant component specifications for selected ignition systems.
State some options in converting to pointless electronic ignitions.
Comment on options.

1950's to 1980's EVOLUTION OF IGNITION SYSTEMS

[a] DM2 Distributor in Standard Lucas Ignition System **{Pic1 & Fig 1}**

Battery supplied via ignition switch to coil and distributor in series.
Benefits. Reliable, simple, easy to fix and great for originality
Limitations. Needs servicing regularly. Points and cam follower continuously wear. Rev limitations (for some people).
NB. *Basic circuit operation of circuit [Fig1] is given on last pages as attachment1*.

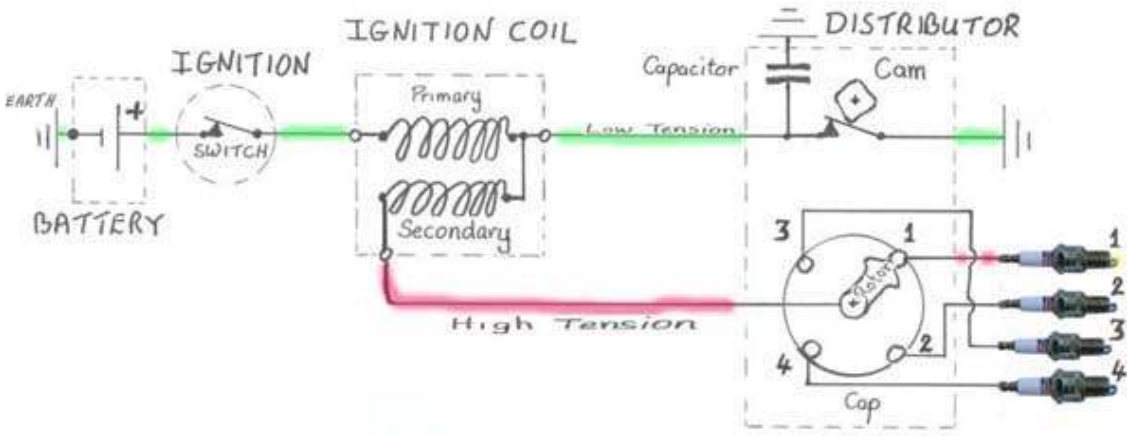


Figure1. Standard 1950's ignition circuit [converted to negative chassis earth]

[b] Ballast with Standard Ignition System

Next evolutionary step was to add a ballast (load) resistor to the standard ignition system. Ignition key now has two active states. First, at start-up [cranking] the ballast has no function and the ignition coil receives all the available battery voltage. Once the engine starts, ignition switch reverts to run mode, the battery voltage returns to the normal higher

voltage but the ballast is now switched in to take that excess voltage from the coil. Coil is now not compromised and works at its design voltage for both cranking and run states.
Limitations. If the ballast ignition system utilizes a mechanical distributor it will have the same limitations as the 1950's Lucas DM2 distributor.
Coils should not be swapped between standard and ballast ignition systems.

[c] After Market Point Conversion Kits

These kits usually employ a photoelectric cell and shaft mounted interrupter disc supported 'typically' by an externally mounted electronic module.

Some Brands are: Pertronix Ignitor {LU142 for negative ground}; Lumination; and Crane Cams {fireball XR700, kit 700-0231{check polarity}}

Benefits. Overcomes DM2 distributor's points limitations; Usually available for negative or positive earth systems; and original parts can potentially be reinstated if kit fails. Pertronix kit is contained within the distributor so is great for originality.

Limitations. Can be expensive [Lumination has a great name but seemed expensive]; Must be able to work in Counter Clock Wise 'CCW' direction; Externally mounted electronic module can be hidden, but is a nuisance and nonstandard.

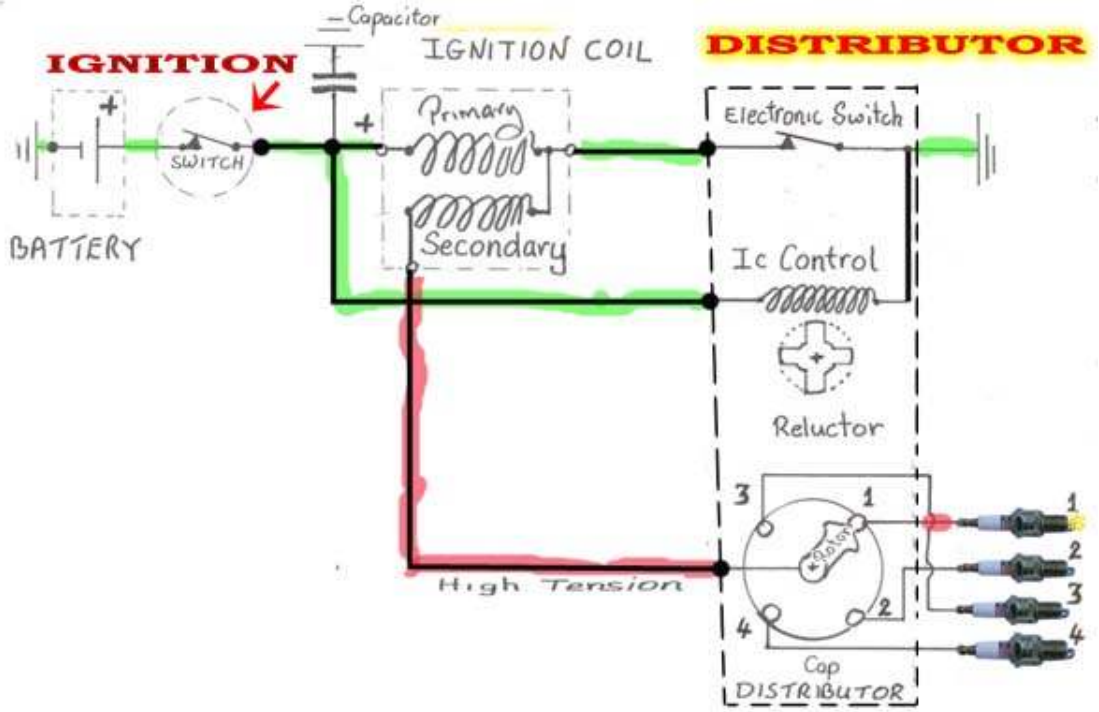


Fig2. Electronic Ignition and its Pointless Distributor

[d] Solid State [Electronic] Distributor {Fig. 2}

Most Auto Manufacturers have gone to the magnetic pickup variety in supplanting the distributor points. This is where a small magnetic field is affected by a rotating toothed 'reluctor' to initiate timing to the electronics. One such car is the Nissan 'Datsun'

Bluebird Series 2 [commencing June1983]; it has a distributor and ignition coil {no ballast resistor} that can after modification be transplanted onto the B series engine.

Picture 2. Modified distributor installed.

Modifications to suit B Series engine {Picture 3 and Reference List}
[1] New IC (Integrated Circuit module- BIM024) that is suitable for the B series engine. Timing for the MG is suggested as 10 DBTDC
[2] Distributor drive shaft: modified in length, machined to take DM2's clamping bracket and DM2's drive dog.
[2] New high-tension leads

Benefits
[1] Noticeable power improvement
[2] Vanquishes DM2's limitations
[3] Electronics all contained in Distributor
[4] New Bosch IC Module 'BIM024' is common, robust and inexpensive
[5] More efficient operation (assume better for environment)
[6] Easily fits into MG ZA/ZB engine bay.
[7] Automatic vacuum control and centrifugal mechanism similar to DM2 distributor

Limitations
[1] Not cheap as there are combined costs of 2nd hand Distributor, its Coil, and modification.
[2] It's subtle to the non-expert 'well a bit pregnant looking' but not original.

Picture 3. Comparison: DM2, Modified & Unmodified Electronic Bosch Dizzy

1950's MG ZA/ZB

Distributor	MG Timing	Points	Rotation	Lucas Coil
Lucas DM2 [Standard - Mechanical]	8 DBTDC	0.35-0.40mm	CCW	Primary=3.5 ohm Secondary=7 K ohm

*__Early 1980's Nissan {Datsun} BlueBird Series 1__

Distributor	Timing	Points	Rotation	Lucas Coil
Bosch 9230062451 [Ballast - Mechanical]	10 DBTDC	0.45-0.63mm	CCW	Primary=1.5 ohm *Ballast=1.8 ohm Secondary=5 - 7Kohm

#__Mid 1980's Nissan {Datsun} BlueBird Series 2__

Distributor	MG Timing	Points	Rotation	Bosch Coil
Bosch 9230064519 [Pointless - Electronic]	10 DBTDC	#Magnetic	CCW	Primary=0.55 ohm Secondary=5 - 7Kohm Bosch 9220 061 458

TABLE 1. ***Specifications. Note value of coil's resistance 'ohms'.***
[Above indicates the evolution from standard to ballast, and then pointless form.]

CONVERSION {Bosch **9230 064 519** Electronic Distributor and its Coil **9220 061 458}**

{a} In General [Picture 2]
Follow the guidance as given in the Nissan (Datsun) service manual.
Below items are highlights [***do consult your Auto Electrician first***].

{b} The Bosch Distributor [Picture 4 & ZA/ZB service manual]
Conversion to negative earth is a must for ZA/ZB compatibility with the Nissan distributor. ZB wiring loom uses a white wire [9] in delivering power from ignition switch to positive of new coil. While, 'white wire with black trace' [16] is now redundant. Redundancy is due to the Nissan's green and pink wires 'linking Nissan Distributor and Coil' being retained}.

Picture 4. Modified Bosch 9230 064 519 Electronic Distributor

{c} Installation [Picture 5 & Table 1]
Initial installation is with rotor pointing at No1 position in Distributor cap, plus:

- -Use only an inductive type timing light. *Recommend **10** DBTDC*
- -Placement and lay of high-tension leads is important
- -Don't disconnect battery with engine running.
- -IC will be damaged if incorrect voltages are connected
- -Capacitor clamped to coil must be retained and installed to prevent irregularities in distributor's operation

{d} Safety {Nissan Bluebird Model 910 Series 2 service manual**}**

Safety it's important; electronic ignition generate higher voltages:

Never hold high-tension leads. Ground with a securely fixed spark plug.
Don't open circuit high-tension leads as it's dangerous to people & circuitry.
Dangerous voltage exists at the primary and secondary terminals of coil.
Boiling of coils cooling oil will occur if battery is connected across terminals.
Coils 'blow off' slot should be directed at inner guard panel.

Picture 5. Location and Orientation in Engine Bay

SIMPLE TEST TOOL

A 12Volt [Say 6 Watt] globe with longish soldered colour coded leads and insulated alligator clips is very good for faultfinding. Takes little space, being great where earth or battery is lost. (Tried to take a picture but its camera shy and doesn't like daylight)

CONCLUSION

The ignition system has evolved to meet ever-increasing emission control demands and the desire to retrofit superseded high maintenance mechanical systems with aftermarket electronic upgrades. Although the humble auto - transformer '<u>coil</u>' is basically unaltered its detailed electrical specification is now more <u>distributor specific</u>!! Check if uncertain!!

Point conversion kits allow enthusiasts to have the benefits of electronic points along with retained originality. The Pertronix Ignitor kit is a nice option as it's advertised to fit totally within the distributor housing. Enthusiasts can choose from a number of point conversion kits.

Modifying a Nissan [electronic Bosch 9230064519] distributor to work in the B series engine would seem to better suit either, a competition driver or someone looking to gain more power and efficiency at the expense of originality. It's a personal choice to whom you give your cash!

Warped Wisdom – *remember what the old python said to the young python.*
"Always match your coils to the task"

Reference List.

MG ZA/ ZB service manual
Nissan Bluebird Model 910 Series 2 service manual
Mitchell's Electronic Ignition. - Trouble shooting Guide by Fisher Books
Ignition Modification. - Performance Ignition Services, Melbourne; Australia
Pertronix Ignitor {Lucas} –Http:www.vintageperformance.com/retrorockets/carapps.Htm

Attachment 1- **Basic Operation of the 1950's Lucas Ignition system {Fig 1 and Pictures 1,6 & 7}**

Ignition switch is closed allowing current to flow into the coils primary winding and to earth via the, DM2's, distributor points. Pushing the starter button cranks the engine and rotates the distributor shaft; in turn opening the points and breaking the current flow in the primary winding, that now collapses its magnetic field in such a way as to induce a very high voltage across the coils secondary winding.

Picture 6. Lucas DM2 Distributor Cap cut-a-way

This newly generated high tension is directed by the distributor timing, ignition leads and rotor to fire the correct cylinder spark plug. Continuing rotation of engine again closes

Attachment 1 Continued
the distributor contacts {points} and allows the process to repeat the cycle for the next spark plug in the 1,3,4 & 2 firing order. By design the DM2 rotor always spins in a counter clock-wise {CCW} direction. Note direction arrow on rotor shown in Picture 7. Additionally the capacitor has an important role in extending the life of the distributors points. Its function is to minimizing arcing associated with the points opening and closing.

Picture 7. Lucas DM2 Uncovered

Importantly the timing of the ignition needs to be, set at a point, within an operating range that will cope with the dynamics of the engine. A setting of 8 DBTDC is the reference that the inbuilt automatic advance works to. Both vacuum [Hg] and centrifugal [Mechanical] feedback are used in controlling when best to open the points.
Details of timing are provided in the MG service manual.

END

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