1975-79 DISTRIBUTORS & IGNITION SYSTEMS
Motorcraft Dura-Spark & Solid State Ignition

1978-79 American Motors (6-Cylinder & V8 Engines)
1975-79 Ford Motor Co.

DESCRIPTION

Dura-Spark I - This ignition system uses a solid state distributor, primary wiring, coil, and an electronic control module. Special 8 mm spark plug wires and wide gap spark plugs are used.

Dura-Spark II - The Dura-Spark II ignition system is basically the same as the Solid State ignition system, with 2 major differences. The ballast resistor value changed from 1.35 ohms to 1.10 ohms and the system uses the Dura-Spark I system distributor assembly (special rotor, cap, and adapter).

Some Dura-Spark II system equipped models use a dual mode timing system. The dual mode timing system uses a 3-connector electronic control module. This connector is attached to a switch. The switch is either a distributor modulator valve, used in engines with the fuel economy package, or an ignition barometric pressure switch used in engines for operation in high altitudes.

Solid State Ignition - Used in 1978-79 American Motors and 1975-76 Ford Motor Company vehicles, this system uses a solid state distributor and conventional spark plug wires and spark plugs. The ballast resistor has a value of 1.35 ohms.

OPERATION

DURA-SPARK I & II

Both Dura-Spark systems function the same way, except for the primary ignition circuit. These differences are built into the the electronic control module. On Dura-Spark I systems, the module contains a coil current regulator. This regulator will turn off current to the coil within one second after it senses that the distributor is not rotating. To turn primary circuit back on, the ignition switch must be turned to the "START" position. On the Dura-Spark II system, the igniton primary circuit is on any time the ignition switch is on.

SOLID STATE IGNITION

When ignition switch is on, primary circuit and ignition coil are energized. As distributor shaft rotates, the distributor generates a signal that causes electronic control module to break the primary current and induce a secondary voltage in coil. A timer in module turns primary circuit on again to energize coil for next spark cycle. Dwell varies with engine speed and cannot changed.

ELECTRONIC CONTROL MODULE

Each module uses 6 or 7 wires. The Blue wire, if equipped, is a fusible link that protects the electronic control module. The Red and White wires are ignition feed. The White wire is ignition primary circuit while engine is cranking, the Red wire is ignition primary circuit while engine is running. The Red wire contains the ballast resistor.

The primary current is turned on and off by the electronic control unit through the Green wire between module and coil. The Orange and Purple wires (Violet wire on AMC) transmit signals to the module from the distributor stator/magnetic pick-up coil. The Black/Green wire (Black wire on AMC) is the distributor ground circuit.

DISTRIBUTOR

The distributor contains a pick-up coil which produces a magnetic field. The armature, turning with the distributor shaft, causes the magnetic field to collapse. The module senses the make and break signal of the magnetic field and signals the ignition coil to turn on and off. The Solid State ignition system uses a conventional distributor and wires. The Dura-Spark I and II ignition systems use a modified distributor assembly (special rotor, cap, and adapter) and 8 mm secondary wires to provide better insulation for the higher secondary voltage.

IGNITION COILS

Each ignition system uses a different oil-filled ignition coil. The wire terminals are designed so that the interchange of the 2 types of coils is not possible. The "DEC" (negative) coil terminal connects with Green wire of electronic control module. The "BAT" (positive) coil terminal connects with Red wire (Yellow wire on AMC) to the electronic control module and the ignition switch, through the ballast resistor on Dura-Spark II and Solid State ignition systems.

SYSTEM PRECAUTIONS

A spark may occur if distributor is moved with ignition switch in the "ON" position. DO NOT remove secondary spark plug wires while engine is running.

Silicone dielectric compound must be applied to all insulating areas of distributor, coil, and spark plug boots. Coat distributor rotor tip with dielectric compound to a thickness of 1/32". DO NOT use silicone dielectric compound on multi-point rotor.

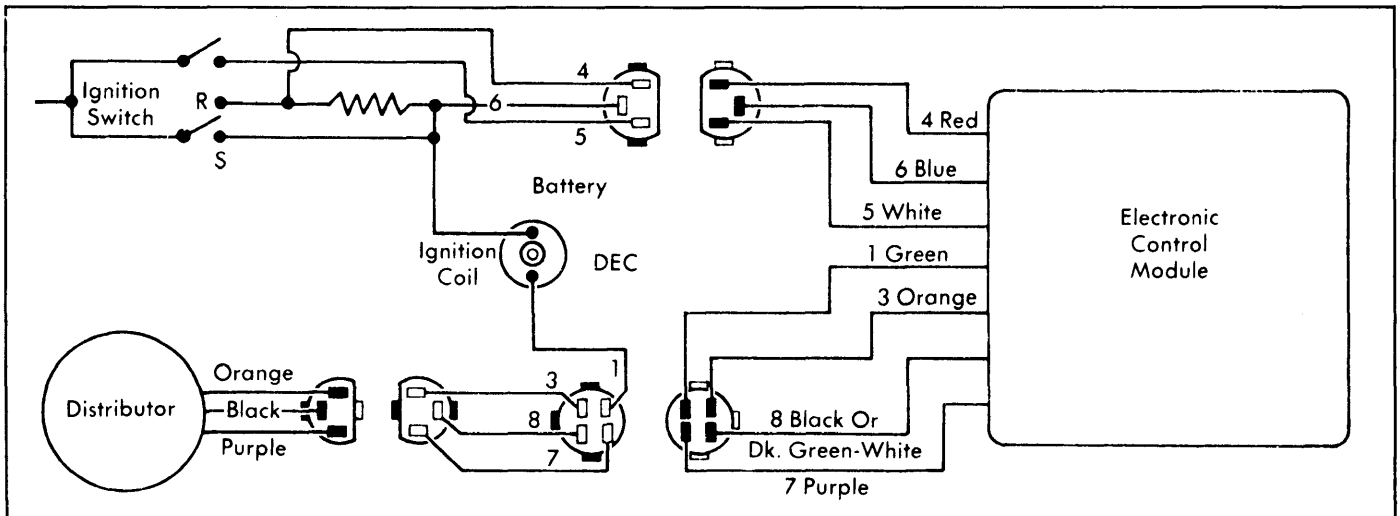

Fig. 1: 1975 Motorcraft Solid State Ignition System Wiring Diagram

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Motorcraft Dura-Spark & Solid State Ignition (Cont.)

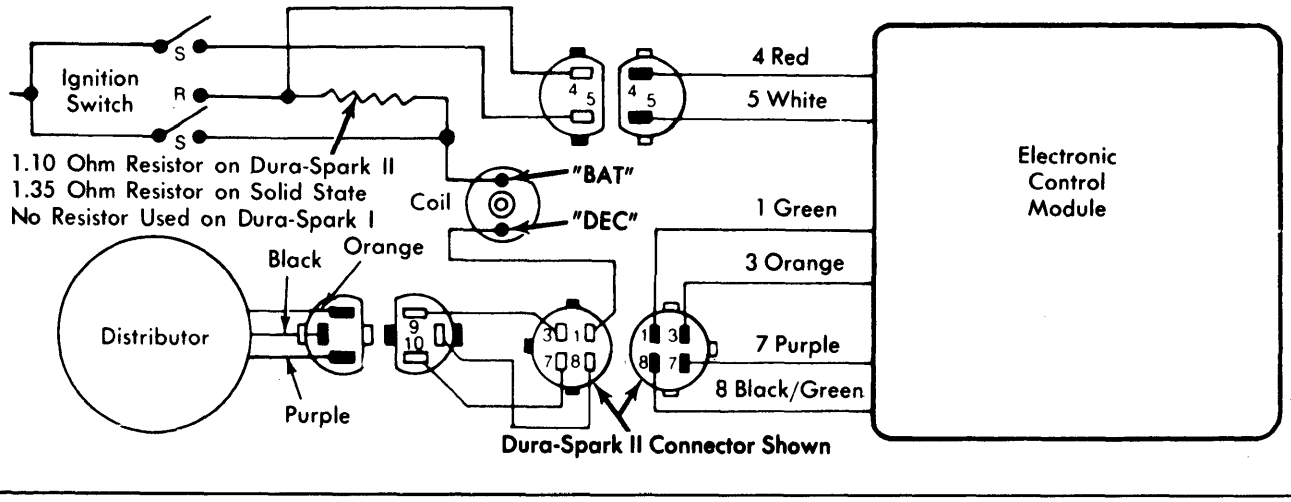

Fig. 2: 1976-79 Motorcraft Dura-Spark I & II Ignition System Wiring Diagram

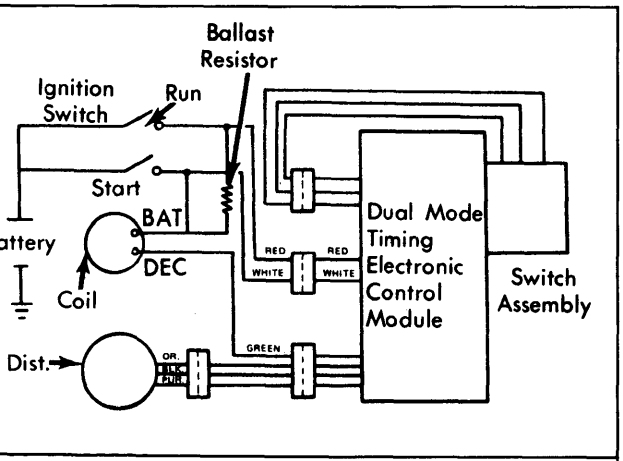

Fig. 3: 1979 Motorcraft Dual Mode Timing Dura-Spark II Ignition System Wiring Diagram

TESTING

SECONDARY IGNITION CIRCUIT

NOTE: When checking secondary voltage, do not remove the following spark plug wires while the engine is running:

- ***No. 1 or 8 on V8 engines (Dura-Spark I & II).***
- ***No. 3 or 4 on V8 engines (Solid State).***
- ***No. 3 or 5 on 6-cylinder engines.***
- ***No. 1 or 4 on V6 engines.***
- ***No. 1 or 3 on 4-cylinder engines.***

1) Perform the following test if no or very little voltage is available to the spark plugs. Connect an oscilloscope to engine. Use grounding leads and insulated pliers when called for.

2) On vehicles equipped with catalytic converter, DO NOT run engine for more than 30 seconds with spark plug wire removed.

Secondary Voltage Reserve - 1) Clamp secondary voltage pick-up over coil-to-distributor high voltage wire. Run engine at 2000 RPM and check overall operating conditions and secondary voltage reserve. Reserve voltage should be 28,000 volts minimum on Dura-Spark I and II; 20,000 volts minimum on Solid State ignition system.

2) Check resistance of coil-to-distributor high voltage wire. Resistance should be 5000 ohms per inch maximum on Dura-Spark I and II; 10,000 ohms maximum on Solid State ignition system.

Rotor-to-Cap Voltage Drop - Perform this test with engine at idle and secondary voltage pick-up connected over coil-to-distributor high voltage wire. Drop should not exceed 8000 volts. If drop is not within specifications, check cap and rotor.

Required Spark Plug Voltage - 1) Perfrom this test with engine at 2000 RPM and with secondary voltage pick-up connected over coil-to-distributor high voltage wire. Firing voltage should be relatively even and between 8000-20,000 volts.

2) If firing voltage is bad, check individual cylinder firing voltages. Each cylinder should receive a minimum of 6000 volts. Firing voltages at all cylinders should be within 50 percent of each other.

Spark Plug Wire Resistance - Check spark plug wire resistance using an ohmmeter. Resistance should not exceed 5000 ohms per inch with spark plug wire connected to the distributor cap and resistance test made through the internal distributor cap terminal.

MODULE BIAS TEST

With ignition on, measure voltage between Red wire (pin No. 4) and engine ground. *See Figs. 4 and 5.* If voltage is less than battery voltage, repair Red wire between ignition switch and control module.

BATTERY SOURCE TEST

1) Without disconnecting coil, connect voltmeter between coil "BAT" (positive) terminal and engine ground. On Solid State ignition, connect a jumper wire from negative coil terminal to ground. Turn ignition on.

2) A reading of 5.5-6.5 volts (11-14 volts on Dura-Spark I ignition system) indicates that the primary circuit from battery to coil is satisfactory. If voltage is incorrect, check primary wiring. Repair wiring as necessary.

CRANKING TEST

With engine cranking, measure voltage between White wire (pin No. 5) and engine ground. If voltage is not between 8-12 volts, repair White wire to module.

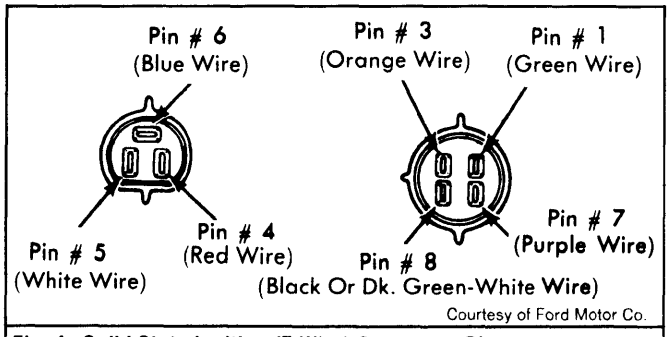

Fig. 4: Solid State Ignition (7-Wire) Connector Pins

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1975-79 DISTRIBUTORS & IGNITION SYSTEMS
Motorcraft Dura-Spark & Solid State Ignition (Cont.)

DISTRIBUTOR HARDWARE TEST

1) Disconnect distributor 2-wire or 3-wire pigtail. Set voltmeter on 2.5 volts scale and connect voltmeter between pins No. 3 and 7. *See Figs. 4 and 5.* While cranking engine, voltmeter should oscillate.
2) If voltmeter does not oscillate, remove distributor cap and check distributor assembly for damage. Iron stator must not be broken. Armature must be tight on sleeve and rotate when engine is cranking.
3) If distributor assembly is okay and voltmeter will not oscillate, replace magnetic pick-up (stator) assembly.

MAGNETIC PICK-UP TEST

1) With ignition off, check resistance between pins No. 3 and 7. *See Figs. 4 and 5.* Reading should be 400-800 ohms. Check resitance between pin No. 8 and engine ground. Reading should be zero ohms.
2) Check resistance between pin No. 3 and engine ground, and between pin No. 7 and engine ground. Both these readings should be more than 70,000 ohms. If any of these readings is incorrect, replace defective magnetic pick-up (stator) assembly.

IGNITION COIL TEST

1) With ignition off, check secondary resistance between coil "DEC" (negative) terminal and coil tower. *See Figs. 1 and 2.* Resistance should be between 7000-13,000 ohms.
2) Check primary resistance between "BAT" (positive) and "DEC" (negative) coil terminals. Resistance should be 1.13-1.23 ohms (.71-.77 ohms Dura-Spark I ignition system). If resistance is not within specifications, replace ignition coil.

STARTING CIRCUIT TEST

Connect jumper wire between pins No. 1 and 8. *See Figs. 4 and 5.* Check voltage between coil "BAT" (positive) terminal and engine ground. If reading is less than 6 volts, ignition by-pass circuit is open or grounded. Repair primary circuit as necessary.

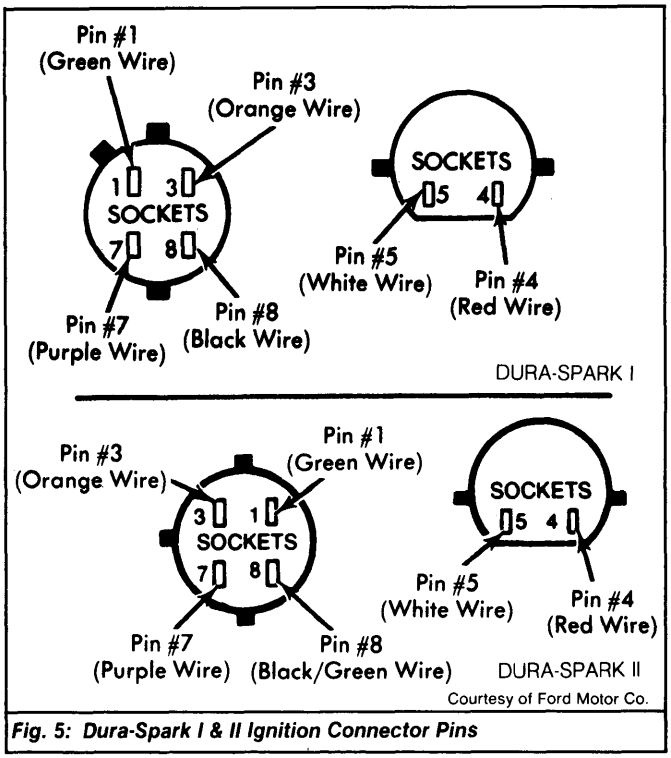
NOTE: Do not ground coil terminal for more than 30 seconds on Dura-Spark I system while performing starting circuit test.

SHORT TEST

Check resistance between pin No. 1 and engine ground. *See Figs. 4 and 5.* If reading is less than 4 ohms, check for a short to ground at coil terminals and in primary circuit wiring. Repair primary circuit as necessary.

PRIMARY RESISTANCE WIRE TEST

Dura-Spark II & Solid State Ignition - Check resistance between Red wire (pin No. 4) and coil "BAT" (positive) terminal. *See Figs. 1*



Courtesy of Ford Motor Co.

Fig. 5: Dura-Spark I & II Ignition Connector Pins

OVERHAUL

DISTRIBUTOR

Disassembly - 1) Remove distributor cap and rotor. Disconnect distributor harness plug. Using 2 screwdrivers, pry armature off of advance plate sleeve and remove roll pin.
2) Remove wire retaining clip and snap ring securing vacuum advance link to pick-up assembly. Remove pick-up assembly retaining screws and remove assembly from distributor.
3) Remove vacuum advance arm from pick-up assembly and position it against distributor housing. Remove vacuum advance diaphragm. Remove attaching screws and base plate assembly from distributor.
Reassembly - To reassemble, reverse disassembly procedure. *See Fig. 6.* Coat brass surface of rotor with silicone grease.

VOLTAGE TESTS①	SPECIFICATIONS	CORRECTIONS
With Key On Pin 4 and engine ground	Battery Voltage ±0.1 volt	Module Bias Test
Pin 1 and engine ground	Battery Voltage±0.1 volt	Battery Source Test
While Cranking Engine Pin 5 and engine ground	8 to 12 volts	Cranking Test
Jumper pin 1 to pin 8 Read voltage between coil battery terminal and ground②	More than 6 volts	Starter Current Test
Pin 7 and pin 3	1/2 volt minimum wiggle	Distributor Hardware Test

① — Make tests between Points indicated.
② — On Dura-Spark I, do not allow test to last more than 30 seconds.

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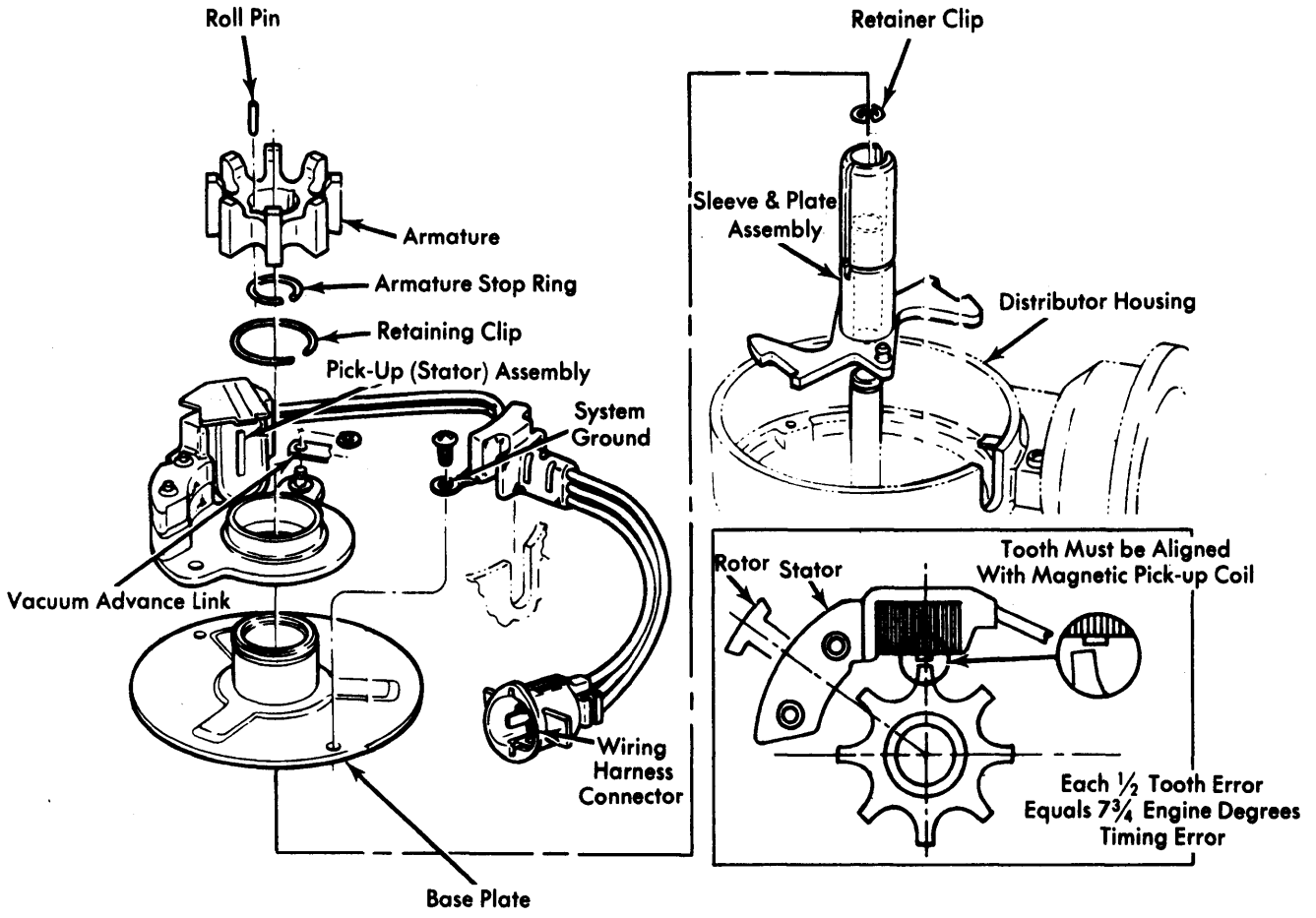

Courtesy of Ford Motor Co.

Fig. 6: Exploded View of Dura-Spark & Solid State Ignition Distributors

RESISTANCE TESTS①	SPECIFICATIONS	CORRECTIONS
With Key Off		
Pin 7 and Pin 3	400 to 800 ohms	Magnetic Pickup (Stator) Test
Pin 8 and engine ground	Zero ohms	
Pin 3 and engine ground	More than 70,000 ohms	
Pin 7 and engine ground	More than 70,000 ohms	
Pin 4 and coil tower	7,000 to 13,000 ohms	Ignition Coil Test
Pin 1 and coil battery terminal		
Dura-Spark II	1.0 to 2.0 ohms	Ignition Coil Test
Dura-Spark I	0.5 to 1.5 ohms	
Pin 1 and engine ground	More than 4.0 ohms	Short Test
Pin 4 and coil battery terminal (Dura-Spark II Only)	0.7 to 1.7 ohms	Resistance Wire Test

① — Make test between points indicated.

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