PART 2B — Ignition System — Distributorless

WARNING

- High tension voltage produced by a distributorless ignition system is higher than for a conventional ignition system.
- When carrying out service operations on an engine equipped with distributorless ignition, it is important to be aware of the above point as well as all the usual safety measures to prevent the possibility of electric shocks.

DESCRIPTION

The purpose of an engine's ignition system is to ignite the fuel/air mixture at the correct time and sequence based upon the input it receives.

The Distributorless Ignition System (DIS) used on the VSG 411/413 engines is a state-of-the-art ignition system. The brain of this system is the Universal Electronic Spark Control (UESC) module. This module normally receives four inputs:

- Crankshaft position
- Crankshaft speed
- Engine temperature
- Engine vacuum (load)

From these inputs, the UESC computes spark strategy (spark advance) to obtain optimum engine performance for correct input conditions.

OPERATION

With this system, the electronic control module monitors the engine load, speed, and operating temperature and decides what degree of spark advance is correct for all of the operating conditions. This system maximizes the benefits of the high compression swirl design. Because timing is set for life inherently in the design of the engine, and there are no moving parts in the ignition system itself, no maintenance is required except for periodic spark-plug checks. The system provides for fixed spark advance at start-up, for cold weather starting, fixed advance for service checking, and for "average value" default settings in case of component failure. Particular attention has been given to spark optimization for excellent fuel economy in the warm-up mode, which is coupled with improved warm-up and a new carburetor.

The spark plugs are paired so that one plug fires during the compression stroke and its companion plug fires during the exhaust stroke. The next time that coil is fired, the plug that was on exhaust will be on compression, and the one that was on compression will be on exhaust. The spark in the exhaust cylinder is wasted but little of the coil energy is lost.

The spark strategy is based on sensors and manifold vacuum input to the UESC module, which include the following **inputs:**

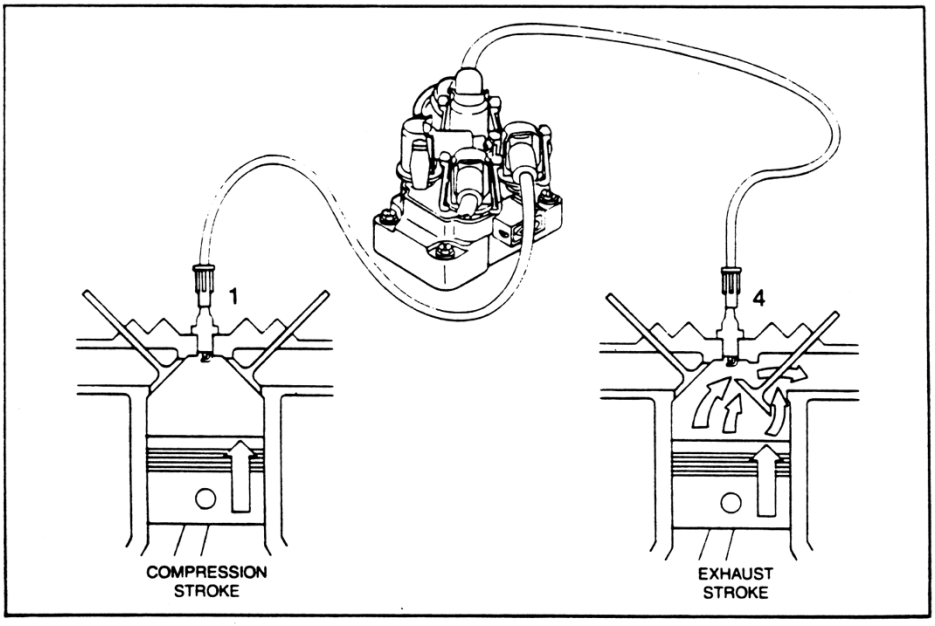


FIG. 1 Spark Plugs Fire in Pairs

1. Engine Speed and C/S Position

The crankshaft position and speed information comes to the UESC from the Variable Reluctance Sensor (VRS). The VRS is triggered by teeth cast into the engine side of the flywheel. The 36-1 teeth, spaced 10° apart, indicate to the UESC the crankshaft speed. The missing tooth indicates crankshaft position.

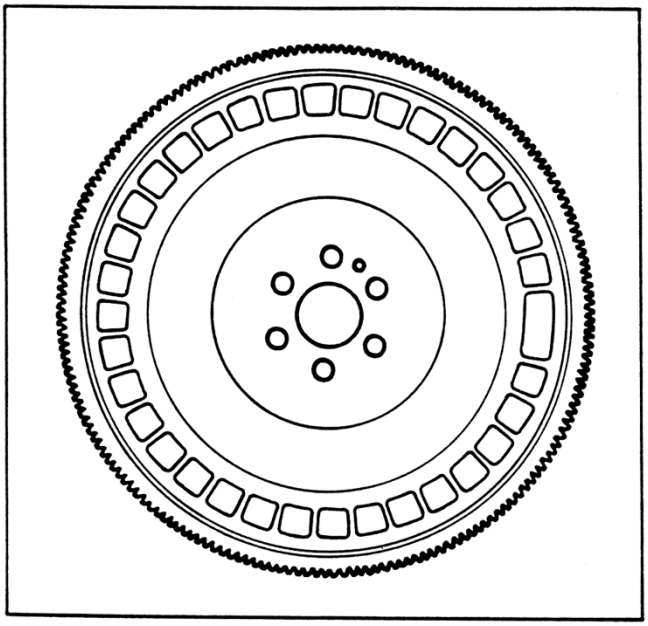


FIG. 2 Toothed Flywheel

2. Engine Load

The engine load information is processed into the UESC's electronics by a pressure transducer located within the UESC. A vacuum line connects the transducer to the engine intake manifold. The engine vacuum is proportional to it's load.

3. Engine Temperature

The Engine Coolant Temperature Sensor (ECTS) sends engine temperature information to the UESC. The ECTS is located in the intake manifold water jacket.

4. Fuel Octane Level Adjustment

Another input to the UESC (which is not usually used in the U.S.) retards the spark.

The UESC module **outputs** are:

IGNITION COIL DRIVER

The UESC switches two ignition coils on and off at the correct times to give the desired spark advance.

SENSOR FAIL-SAFE

If the UESC identifies a failure of any of its inputs, other than the engine speed/position sensor, it will substitute a fixed value for that input until such time that the fault on the input is rectified. A failed sensor is defined as the instantaneous reading of a sensor being made that is either above or below the maximum or minimum reading as defined by the system constants below:

Engine Coolant Temperature	minimum -39°C	(-38°F)
	maximum 112 °C	(232°F)
Manifold Absolute Pressure	minimum 21 KPA	(6.22" Hg)
	maximum 101 KPA	(29.91" Hg)

Ignition timing is adjusted constantly by the UESC module. Many factors, including all the sensors affect the final ignition setting.

CRANKING MODE

Cranking mode is the area of engine operating speed within which the ignition timing is at a static position. The static spark advance is fixed at 10 degrees BTDC up to 250 RPM.

RUN MODE

In this mode the RPM is above 250 and the spark advance is calculated in three main sections which are added together. The UESC sections are: Base Spark Advance (BSA) plus Spark Advance Offset Temperature (SAOT) plus Spark Advance Offset Detonation ECT (SAODE).

The final spark advance is then corrected, for propagation delays and finally the spark advance is limited by the system ranges and the spark slew rate limited.

The Base Spark Advance (BSA) is calculated by the UESC module looking at speed and load inputs.

The Spark Advance Offset Temperature (SAOT) will change ignition timing from the function of Engine Coolant Temperature (ECT). This allows the spark advance to be altered during cold engine conditions to improve starting and operation.

Spark Advance Offset Detonation ECT (SAODE) the ignition timing is offset as a function of Engine Coolant Temperature (ECT). This allows the spark advance to be reduced during hot engine conditions to avoid detonation and allow base spark advance to be calibrated near to the best performance curve.

TRANSIENT MODE

This function is to provide detonation protection when the engine load is increased rapidly by fast opening of the throttle plate. Rapid increases in engine load are determined by large changes in consecutive Manifold Absolute Pressure (MAP) values to the UESC module.

OVERSPEED MODE

If the instantaneous engine speed is greater than the maximum speed threshold, then the spark events are terminated until the instantaneous engine speed falls below 6375 RPM. During this time all other UESC calculations are performed as normal.

SERVICE ADJUSTMENTS AND CHECKS

1. Each 400 hours of engine operation remove the spark plugs and clean & adjust the electrode.
2. Clean and visually check spark plug high tension leads and check for secure fit, replace if necessary.
3. To retard the spark advance if the engine is operated on lower than specified fuel octane it may be necessary to retard the timing. 87 octane or higher fuel does not require any adjustment.
4. To retard the spark advance, cut the wire loop in the harness that connects to pins number 6 and 7. For assistance, or further information, consult Ford Power Products Engineering.

An Grounded	Pin Above Ground	Retarded °
7	6	1-2
6	7	2-4
6&7		6-8

The UESC module must be mounted above the intake manifold vacuum fitting to prevent fuel from entering the UESC module chamber.

The connecting rubber hose must be compatable with gasoline and be as short as possible. It is recommended that a fuel vapor trap be used in line in the connecting hose.

REMOVAL AND INSTALLATION

IGNITION COIL

Removal

1. Disconnect battery ground lead.
2. Disconnect ignition coil multiplug.

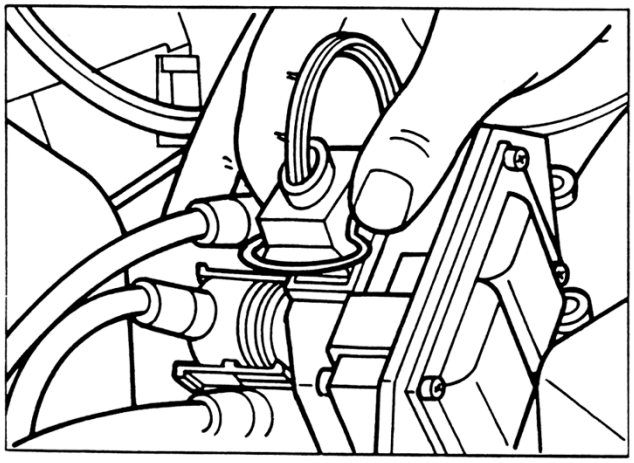


FIG. 3 Removing Ignition Coil Multiplug

3. Compress 2 lugs and disconnect HT leads at coil.

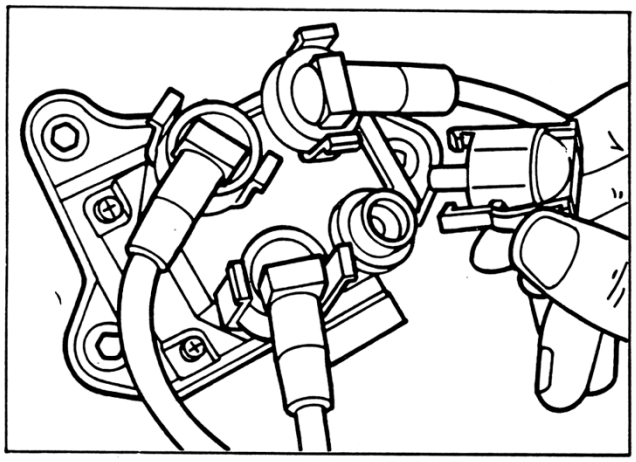


FIG. 4 Disconnecting HT Leads

4. Remove three screws and detach coil assembly.

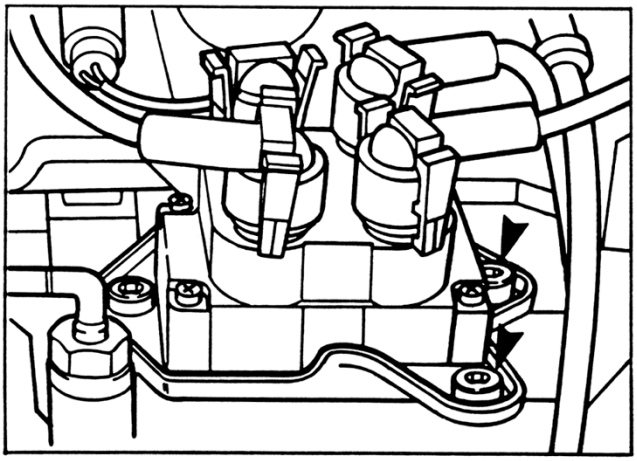


FIG. 5 Ignition Coil Retaining Screws

Installation

1. Position coil assembly, secure with three screws.
2. Connect HT leads at coil, ensuring that locking tabs snap into position.

NOTE: HT connections at coil are marked 1 to 4. It is important that each HT lead is connected in correct sequence.

3. Connect ignition coil multiplug.
4. Connect battery ground lead. Start engine and check coil operation.

ENGINE SPEED SENSOR

Removal

1. Disconnect battery ground cable.
2. Disconnect multiplug from sensor. Remove engine speed sensor, (one screw).

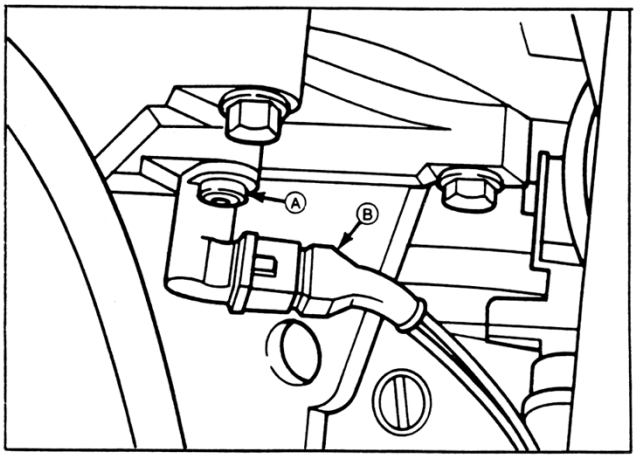


FIG. 6 Engine Speed Sensor
A — Retaining Bolt
B — Multiplug

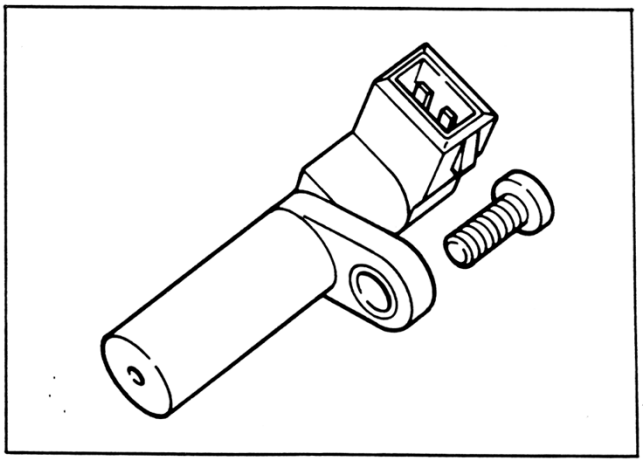


FIG. 7 Engine Speed Sensor (Removed)

Installation

1. Fit engine speed sensor and secure with screw.
2. Refit sensor multiplug.
3. Connect battery ground cable.

ENGINE COOLANT TEMPERATURE SENSOR

Removal

1. Disconnect battery and release cooling system pressure.

WARNING: When releasing system pressure, cover cap with a thick cloth to prevent coolant scalding.

2. Place a clean drain tray below engine under radiator drain plug and remove drain plug. To assist draining remove radiator cap.
3. Remove temperature sensor multiplug, located below the intake manifold. To remove multiplug, pull on multiplug, do not pull on wiring.
4. Unscrew sensor from intake manifold

Installation

1. Install sensor into inlet manifold, do not overtighten sensor. Connect multiplug, ensuring that locking tabs snap into position.
2. Replace radiator drain plug and refill system with correct solution. Remove rubber blanking cap on water outlet. When coolant is evident, refit blanking cap. Fill container to "maximum" mark allowing time for air in system to bubble through. Install radiator cap.
3. Connect battery and start engine. Allow engine to warm to normal operating temperature. Check, and if necessary, add coolant.

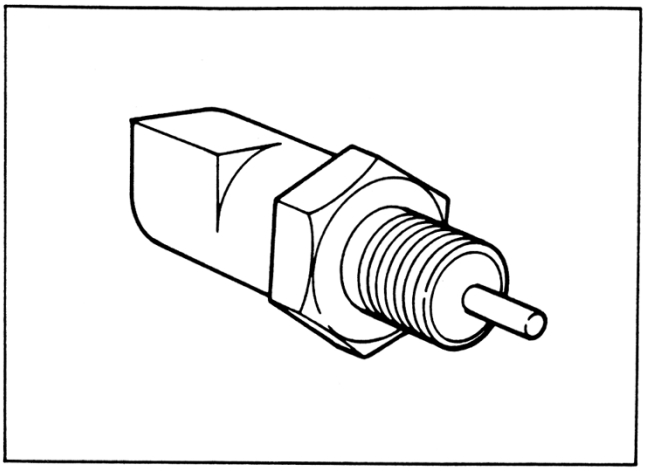


FIG. 8 Temperature Sensor

DIAGNOSING AND TESTING DIS

DIS DIAGNOSIS EQUIPMENT

To accurately diagnose DIS, certain diagnostic equipment and tools are required. In addition, the suggested diagnostic equipment may make the job easier and more convenient.

Prior to diagnosing DIS, obtain the following test equipment or equivalent.

- DIS diagnostic harness PPO111429 or equivalent
- SPARK TESTER, NEON BULB TYPE (CHAMPION CT-436 OR EQUIVALENT)

There is no need to disconnect a plug wire; just place this spark tester on a spark plug wire to determine if spark is being provided to the plug. This is especially useful for those hard to reach plug wires.

- SPARK TESTER, GAP TYPE (SPECIAL SERVICE TOOL D81P-6666-A OR EQUIVALENT)

Connect this gap type spark tester between any spark plug wire and engine ground to instantly determine if spark is being provided to the plug. A spark plug with a broken side electrode is not sufficient to check for spark and may lead to incorrect results.

- VOLT-OHMMETER (ROTUNDA 014-00575 OR EQUIVALENT)

A volt-ohmmeter is essential for gathering system operating data during diagnosis, testing, and engine servicing procedures. This digital volt-ohmmeter (DVOM) can also be used for general purpose electrical troubleshooting on conventional starting and charging systems.

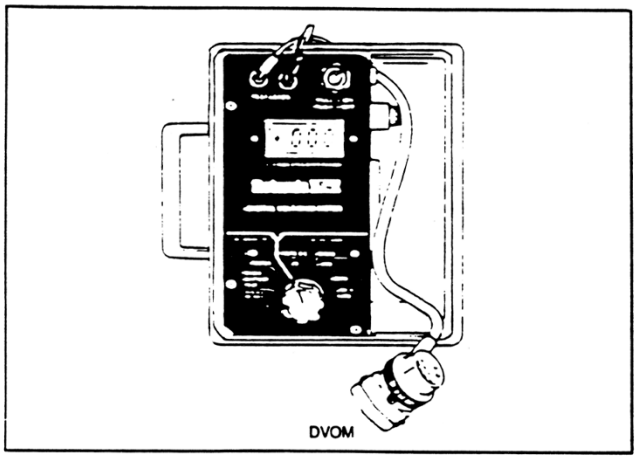


FIG. 10 Volt-Ohmmeter

- 12-14 VOLT TEST LAMP

TIMING LIGHT (ROTUNDA 059-00006 OR EQUIVALENT)

This timing light uses an inductive pickup for convenience and safety on 12 volt systems. This timing light includes a tachometer which reads from zero to 3000 RPM (Figure 11).

Identify the engine harness Ford part number and use the following electrical harness part number sketch that corresponds to the engine harness part number being checked.

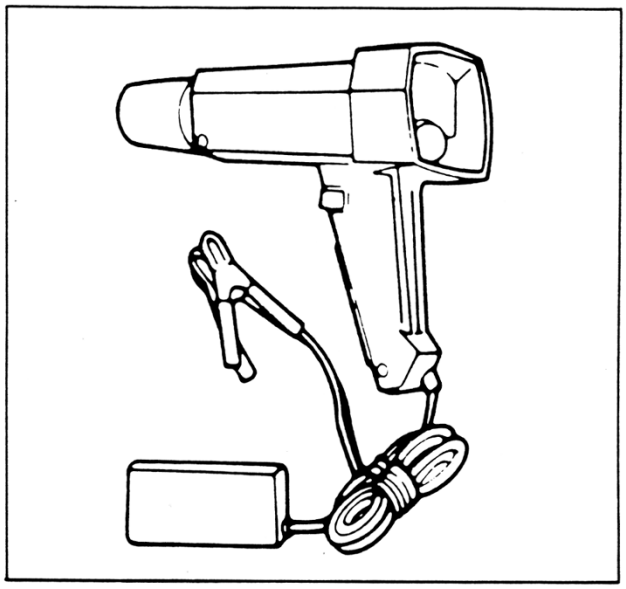


FIG. 11 Timing Light

DIS DIAGNOSING

If the DIS Engine Harness checks are not to the chart specifications (page 2B-06), complete the following:

- Remove the wire harness connector to the UESC
- Remove each sensor or component from the harness
- Using a high impedance digital volt-ohmmeter (DVOM) check each wire for continuity or resistance (ref. 2B-08 through 2B-15) for wire numbers & colors for the harness being used.
- If the wire harness has open circuits or resistance higher than specifications repair or replace the harness.
- If the wire harness checks are to specifications — reconnect each sensor and component and complete another DIS Engine Harness check (ref. page 2B-06 and 2B-08)
- If the same sensor or component circuit does not test to specifications — replace that sensor or coil.
- If the engine will not start and/or run install a new module and make a normal start.

The first check will test the engine harness, connectors and sensors for both continuity & resistance.

1. Remove the 12 pin UESC harness plug from the UESC module. Pins 1 and 5 are not used, therefore, do not have female connectors in the 12 pin harness connector plug.
2. Check the following circuits with the volt-ohmmeter (with the sensors connected) per the following chart on page 2B-06, with reference to pages; 2B-08 through 2B-15.

DIS ENGINE HARNESS CHECKS (UESC HARNESS CONNECTOR REMOVED ALL SENSORS CONNECTED TO HARNESS)

Test No.	Engine Harness (12A200) Part Number	Harness Connector PIN Nos.	DVOM Set Selection	Reading Ohms/VDC	Codes	Description of Circuit, Wires Checked & Circuit Function
1	E8JL-AC, AD	2 to 3	Ω	200-600		Engine RPM & Crank Position, Wires 264, 265 & V.R. Sensor
2	E9JL-CA	Same as Test 1				
3	E9JL-CB, CC	Same as Test 1				
4	E8JL-AC, AD	4 to 10	Ω	105,000④	①③	Eng. Coolant Temp. Sensor, Wires 354, 354A and 359.
5	E9JL-CA	Same as Test 4				
6	E9JL-CB, CC	4 to 10		95,000④	①②	Eng. Coolant Temp. Sensor, Wires 354 & 359.
7	E8JL-AC, AD	6 to 7	Ω	Continuity 0.00 Resis.		Eng. Spark Adv. Circuit, Wires 6 & 6 No Grounds Equals S/A Set for 87 Oct.
8	E9JL-CA	Same as Test 7				
9	E9JL-CB, CC	Same as Test 7				
10	E8JL-AC*	8 to 9	20 VDC	12 VDC		With the Ignition Switch "ON" — Wires Checked 21A, 16M & 57.
11	E9JL-CA	Same as Test 10				*AD & CC-Ign. Switch "ON", Wires Checked 16I, 16C, 16M & 57 — 12 VDC Inidcated
12	E9JL-CB*	Same as Test 10				
13	E8JL-AC, AD	11 to 12	Ω	0.5-1.0		Wires 850 or 850A, 852 or 852A & Coil Circuit Has Cointinuity.
14	E9JL-CA	Same as Test 13				
15	E9JL-CB, CC	Same as Test 13				
16	E8JL-AC	Coil Sec. 1-4**	Ω	14000 ± .05		**Remove the 4 Spark Plug Wires and Measure the Sec. Resistance.
17	E9JL-CA	Same as Test 16				
18	E9JL-CB	Same as Test 16				
19	E8JL-AC	Coil Sec. 2-3	Same as Test 16			
20	E9JL-CA	Same as Test 16				
21	E9JL-CB	Same as Test 16				

H.T. spark plug wire resistance 9,000 to 16,000 ohms — (maximum 30,000 per wire)

CODES — TEMPERATURE SENSOR CHARACTERISTICS CHART (TSCC)

① Column A converts the sensor only resistance to a temperature reading (page 2B-07)
Column B converts the sensor and harness resistance to a temperature (page 2B-07)

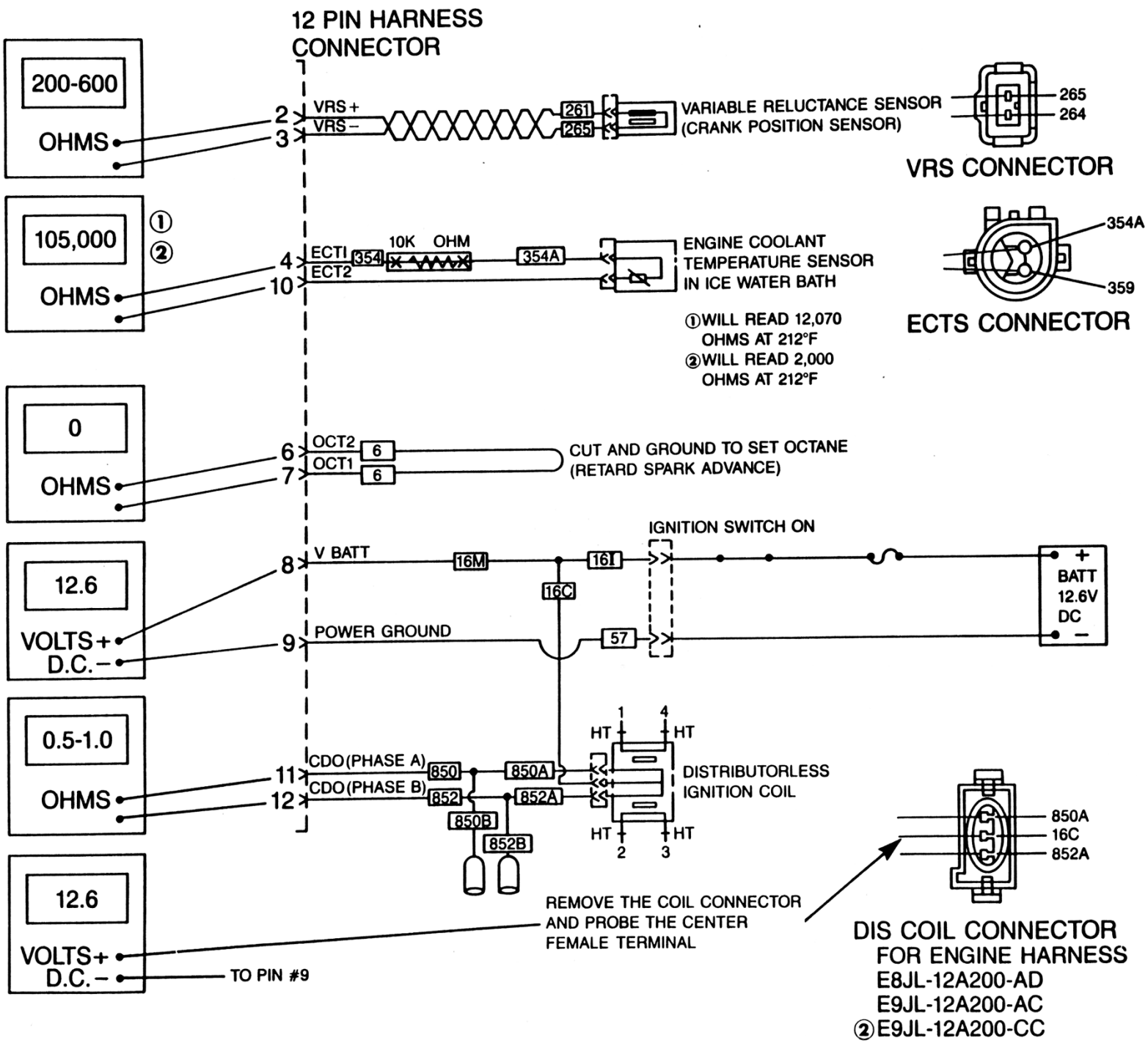
② Use column A when the sensor is connected to the harness (page 2B-07)

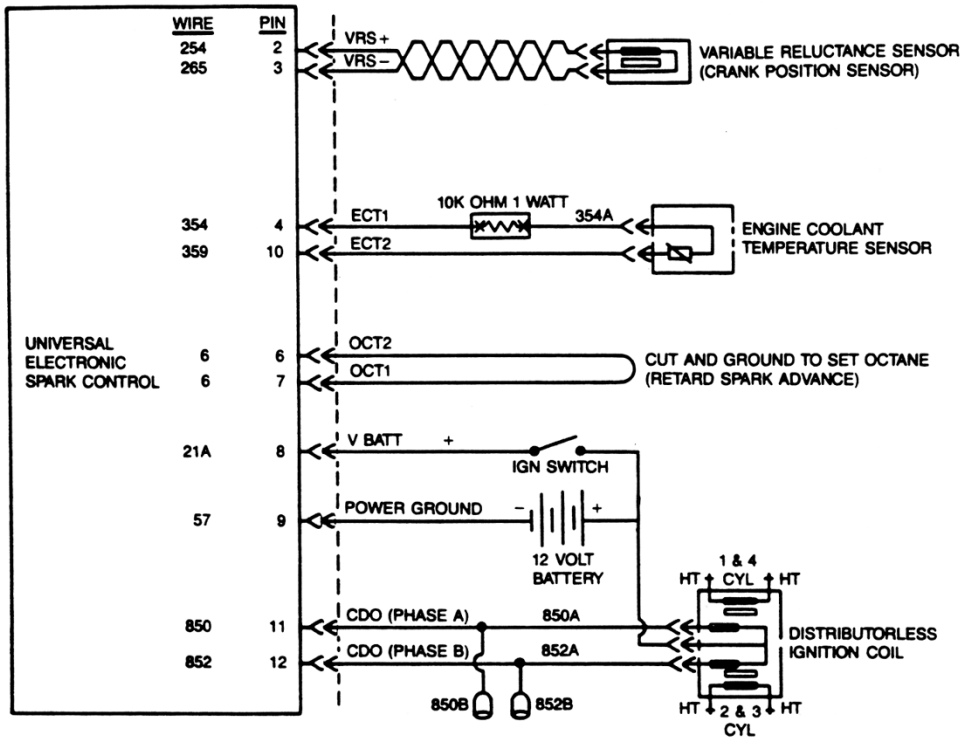
③ Use column B when the sensor is connected to the harness (page 2B-07)

④ E.C.T.S. brass only in 32°F ice water

ENGINE COOLANT SENSOR CHARACTERISTICS

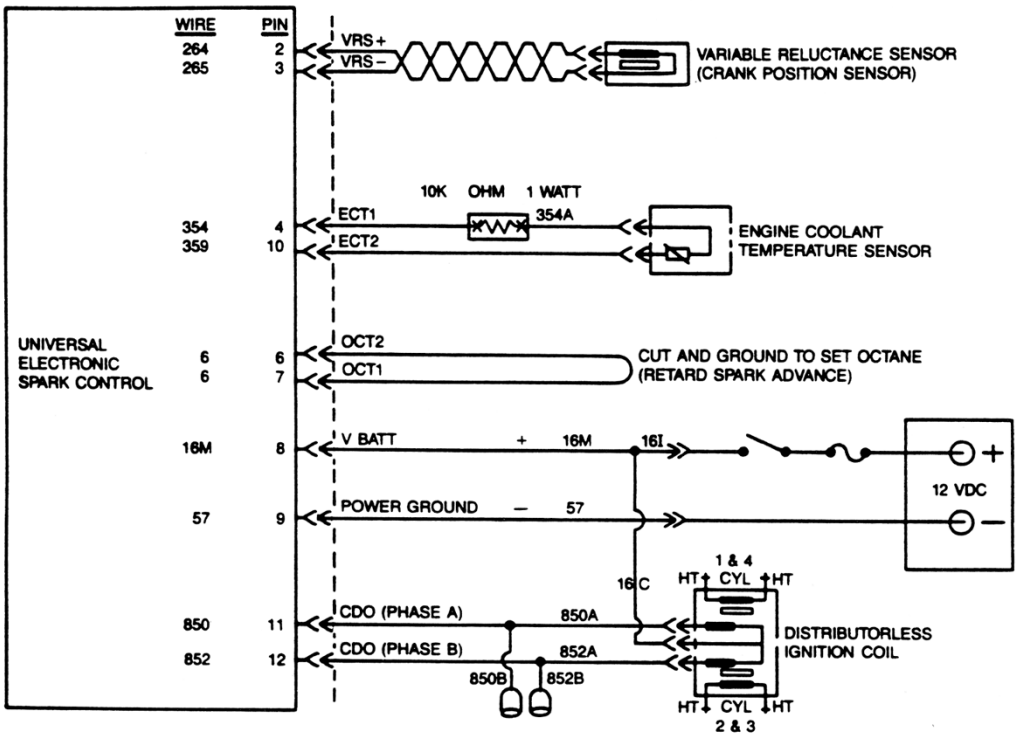
Temperature		Column A Sensor (Ohms) ± .02%	Column B Sensor & Harness (Ohms) ± .03%
°C	°F		
−30	−22	481,000	491,000
−20	4	271,200	281,200
−10	14	158,000	168,000
0	32	95,000	105,000
10	50	58,750	68,750
20	68	37,300	47,300
30	86	24,270	34,270
40	104	16,150	26,150
50	122	10,970	20,970
60	140	7,600	17,600
70	158	5,360	15,360
80	176	3,840	13,840
90	194	2,800	12,800
100	212	2,070	12,070
110	230	1,550	11,550
120	248	1,180	11,180
130	266	903	10,903
140	284	701	10,701
150	302	550	10,550


12 PIN HARNESS CONNECTOR
200-600
OHMS
2
3
VRS +
VRS –
261
265
VARIABLE RELUCTANCE SENSOR (CRANK POSITION SENSOR)
265
264
VRS CONNECTOR
105,000
OHMS
①
②
4
10
ECT1
ECT2
354
10K OHM
354A
ENGINE COOLANT TEMPERATURE SENSOR IN ICE WATER BATH
354A
359
ECTS CONNECTOR
①WILL READ 12,070 OHMS AT 212°F
②WILL READ 2,000 OHMS AT 212°F
0
OHMS
6
7
OCT2
OCT1
6
6
CUT AND GROUND TO SET OCTANE (RETARD SPARK ADVANCE)
IGNITION SWITCH ON
12.6
VOLTS+
D.C.–
8
9
V BATT
16M
16I
16C
POWER GROUND
57
+
BATT
12.6V
DC
–
0.5-1.0
OHMS
11
12
CDO(PHASE A)
CDO(PHASE B)
850
852
850A
852A
850B
852B
1
4
HT
HT
HT
HT
2
3
DISTRIBUTORLESS IGNITION COIL
12.6
VOLTS+
D.C.–
TO PIN #9
REMOVE THE COIL CONNECTOR AND PROBE THE CENTER FEMALE TERMINAL
850A
16C
852A
DIS COIL CONNECTOR
FOR ENGINE HARNESS
E8JL-12A200-AD
E9JL-12A200-AC
②E9JL-12A200-CC



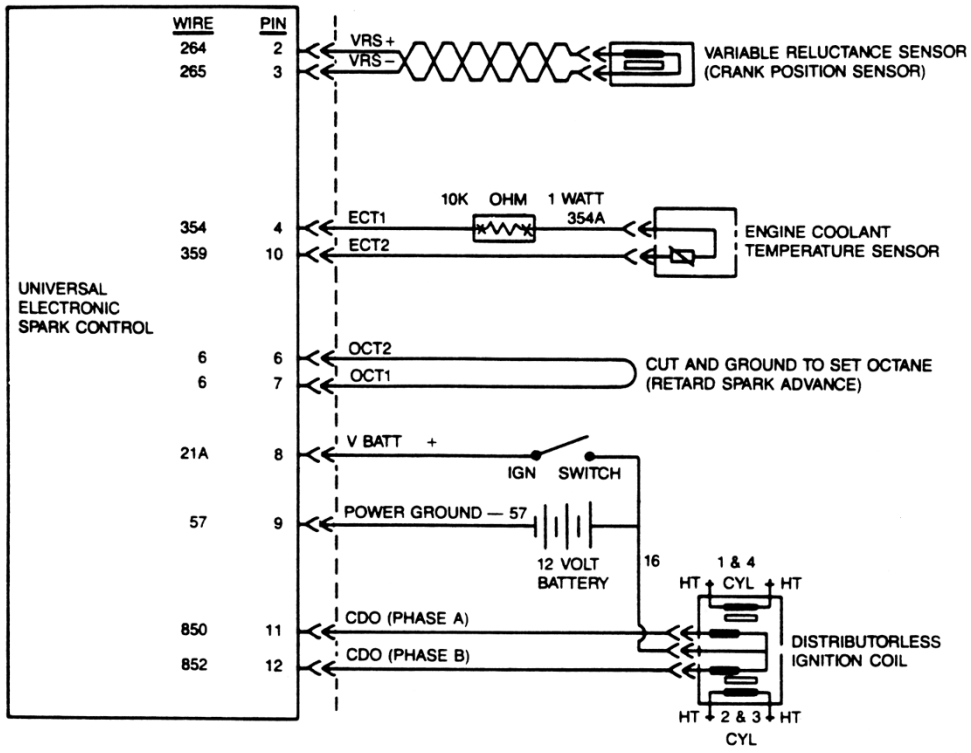
VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E8JL-12A200-AC)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	21A	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	YELLOW		
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO SPLICE	18	YELLOW	BLACK	
12	852	UESC TO SPLICE	18	YELLOW	WHITE	
—	16	DIS COIL TO BAT POWER (NOT SWITCHED)	18	RED	GREEN	
—	354A	RESISTOR TO ECTS	18	BROWN	WHITE	
—	850A	SPLICE TO DIS COIL 1	18	YELLOW	BLACK	
—	850B	SPLICE TO ELECTRONIC GOVERNOR OR TACHOMETER	18	YELLOW	BLACK	
—	852A	SPLICE TO DIS COIL 2	18	YELLOW	WHITE	
—	852B	SPLICE TO ELECTRONIC GOVERNOR OR TACHOMETER	18	YELLOW	WHITE	



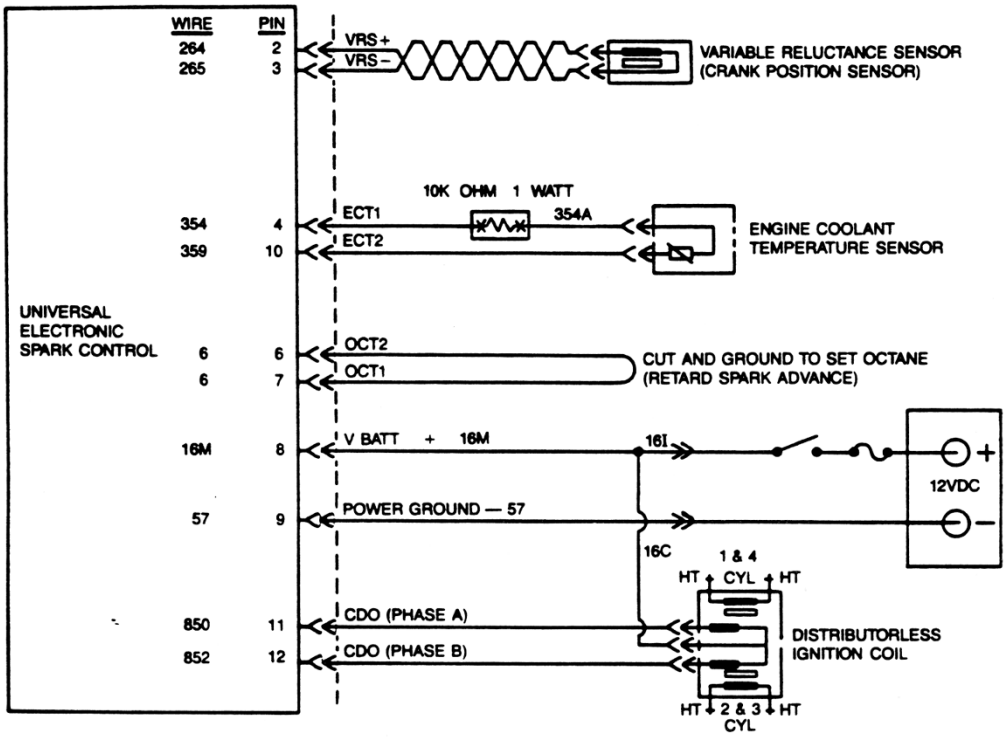
VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E9JL-12A200-CC)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	16M	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	RED	GREEN	
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16C	DIS COIL TO BAT POWER (SWITCHED)	18	RED	GREEN	
—	16I	IGNITION SWITCH TO SPLICE	18	RED	GREEN	



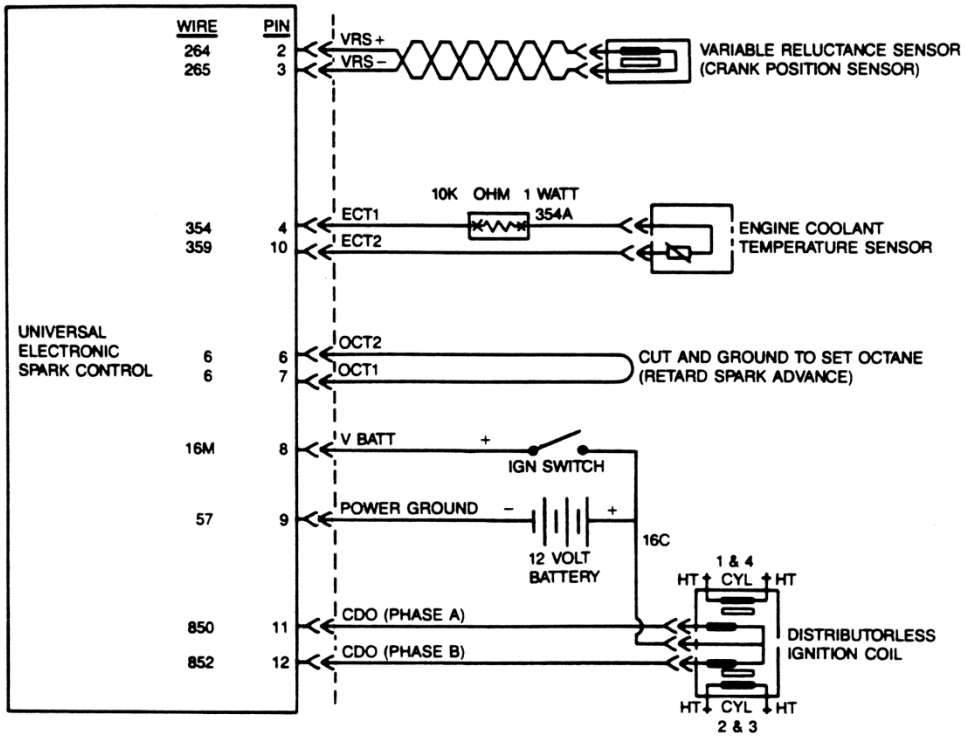
VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E9JL-12A200-AB)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS −	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	21A	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	YELLOW		
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16	DIS COIL TO BAT POWER (NOT SWITCHED)	18	RED	GREEN	
—	354A	RESISTOR TO ECTS	18	BROWN	WHITE	



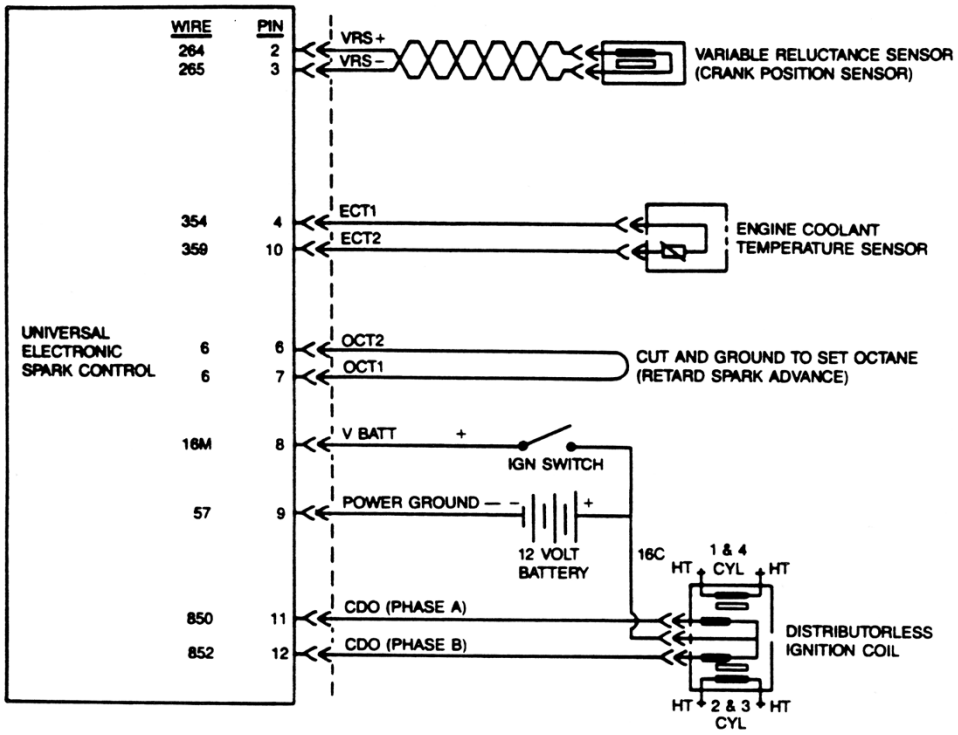
VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E9JL-12A200-AC)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	16M	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	RED	GREEN	
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16C	DIS COIL TO BAT POWER (SWITCHED)	18	RED	GREEN	
—	354A	RESISTOR TO ECTS	18	BROWN	WHITE	
—	16I	IGNITION SWITCH TO SPLICE	18	RED	GREEN	



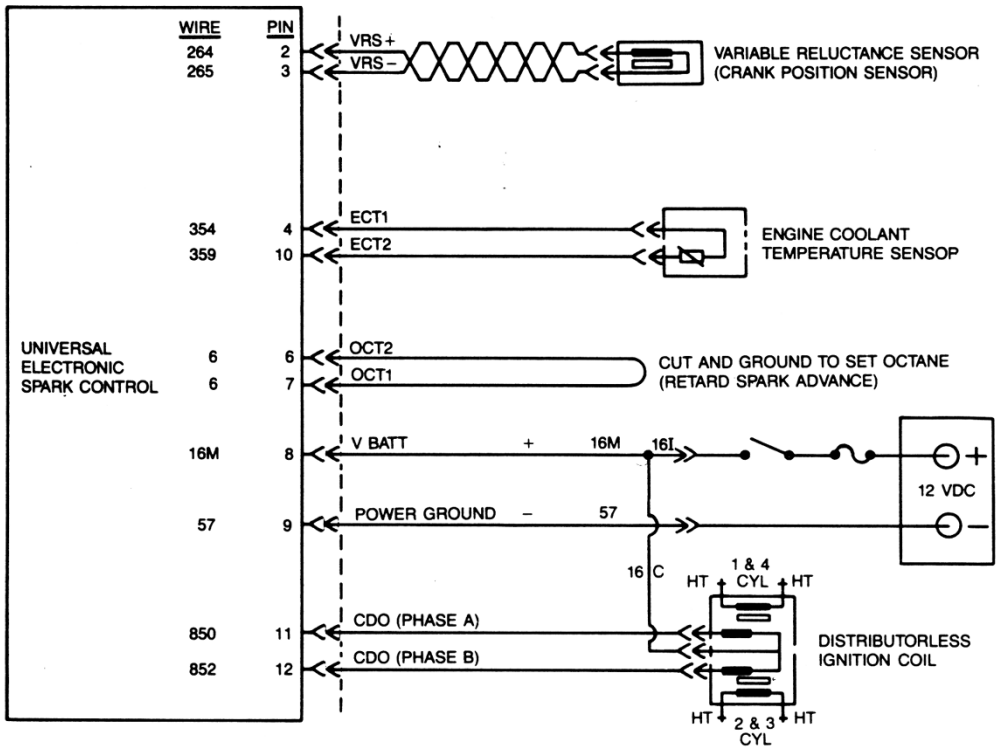
VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E9JL-12A200-CA)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	16M	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	YELLOW		
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16C	DIS COIL TO BAT POWER (NOT SWITCHED)	18	RED	GREEN	
—	354A	RESISTOR TO ECTS	18	BROWN	WHITE	



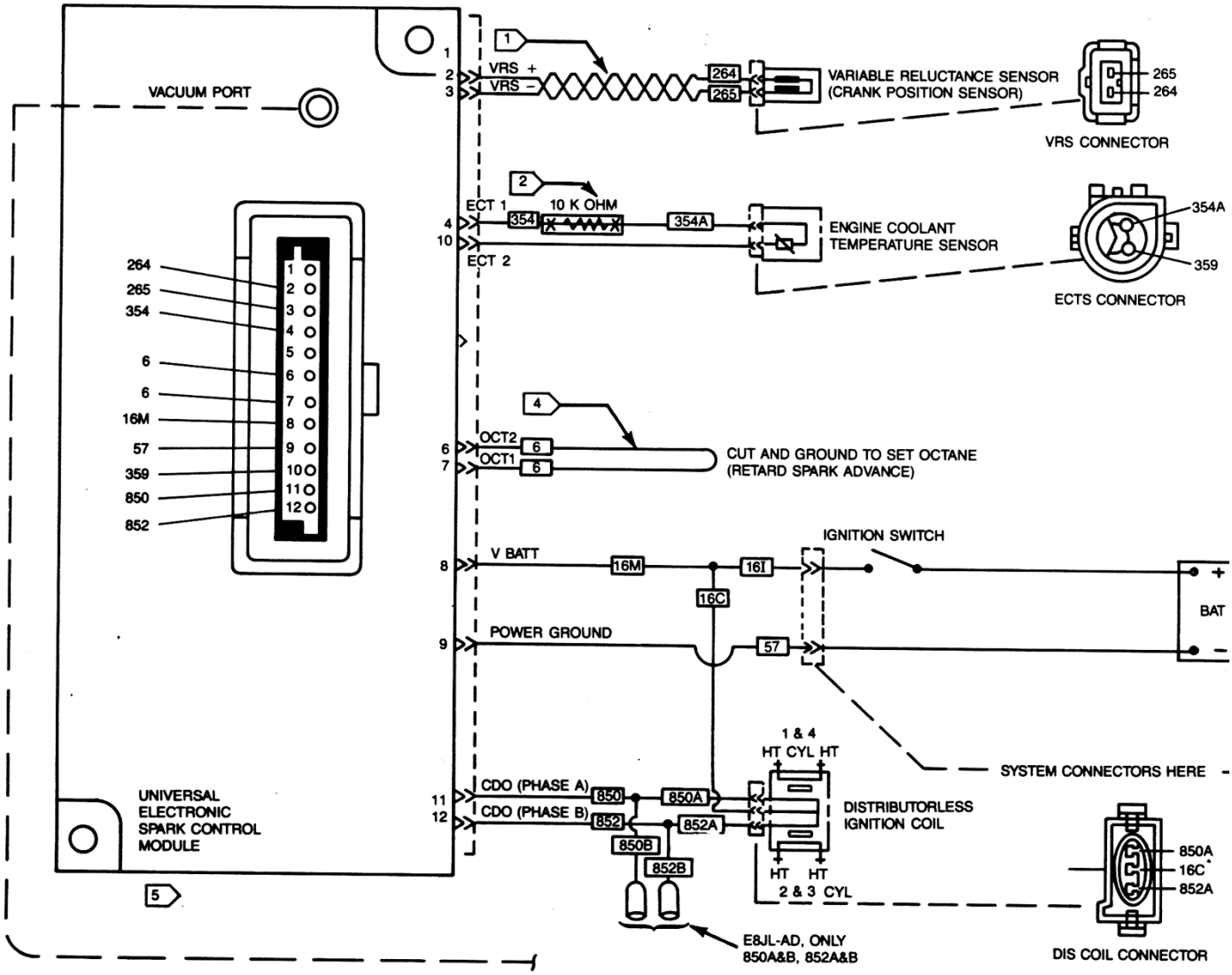
VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E9JL-12A200-CB)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	16M	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	YELLOW		
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16C	DIS COIL TO BAT POWER (NOT SWITCHED)	18	RED	GREEN	



VSG DISTRIBUTORLESS IGNITION SYSTEM (DIS) WIRING DIAGRAM REFERENCE (E9JL-12A200-CC)

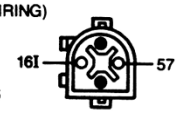
UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO RESISTOR	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	16M	UESC TO IGN ON IGN SWITCH (SWITCHED)	18	RED	GREEN	
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16C	DIS COIL TO BAT POWER (SWITCHED)	18	RED	GREEN	
—	16I	IGNITION SWITCH TO SPLICE	18	RED	GREEN	



HARNESS CONNECTOR (ON FORD WIRING)

E4DB-14A624-CA 1 EA SHELL
D8EB-14A468-AA 1 EA WEDGE
E7EB-14461-HB 2 EA TERMINAL
ALT D6TE-14461-AB

SYSTEM CONNECTOR (ON CUSTOMER'S WIRING)



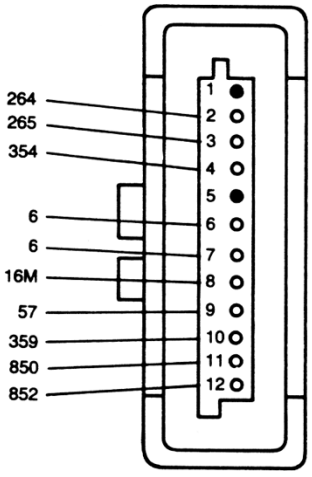
MATING PARTS

E7TB-14A464-GA SHELL
D8EB-14A468-BA WEDGE
E7EB-14486-SA TERMINAL (FOR 18 GAGE W
ALT EOV8-14488-DA
E8EB-14488-BA TERMINAL (FOR 14 OR 16 GAGE V

SYSTEM CONNECTORS USED BY PPO

3 (OTHER SUBMERSIBLE QUALITY CONNECTORS MAY BE USED AT USERS OPTION)

UESC PIN	NO	CIRCUIT DESCRIPTION	GA	BASIC COLOR	STRIPE COLOR	SPEC
1		BLANK (NO WIRE)				
2	264	UESC TO VRS +	18	WHITE		
3	265	UESC TO VRS –	18	GREEN		
4	354	UESC TO ECTS	18	BROWN	WHITE	
5		BLANK (NO WIRE)				
6	6	UESC SPARK RETARD OS2	18	BROWN		
7	6	UESC SPARK RETARD OS1	18	BROWN		
8	16M	UESC PIN 8 TO SPLICE	18	RED	GREEN	
9	57	UESC TO BAT GROUND	18	BLACK		
10	359	UESC TO ECTS GROUND	18	GREEN	WHITE	
11	850	UESC TO DIS COIL 1	18	YELLOW	BLACK	
12	852	UESC TO DIS COIL 2	18	YELLOW	WHITE	
—	16C	DIS COIL TO SPLICE	18	RED	GREEN	
—	354A	RESISTOR TO ECTS	18	BROWN	WHITE	
—	16I	IGN SWITCH TO SPLICE	18	RED	GREEN	
—	852B	SPLICE TO ELECTRONIC GOVERNOR — TACHOMETER	18	YELLOW	WHITE	
—	852A	SPLICE TO DIS COIL 2	18	YELLOW	WHITE	
—	850B	SPLICE TO ELECTRONIC GOVERNOR — TACHOMETER	18	YELLOW	BLACK	
—	850A	SPLICE TO DIS COIL 1	18	YELLOW	BLACK	



12 PIN HARNESS CONNECTOR TO UESC MODULE

Connector Information
For E8JL-12A200-AD
E9JL-12A200-AC
E9JL-12A200-CC

1 The following pair of wires 264 and 265 are to be uniformly twisted at no less than 20 twist/meter

2 Resistor shown is application sensitive and is not used in a few special applications consult Ford PPO applications engineering. (Not used in harness #E9JL-CC) 10/23/89

3 For engine users desiring to fabricate their own wiring assemblies. The four proprietary connectors needed may be obtained from Ford PPO or from the parts manufacturers.

4 Note the wire loop from UESC pin 6 to pin 7. If the engine is operative with low octane fuel it may be necessary to retards the spark. This may be done by cutting open the loop and grounding the wire which goes to pin 6 or 7 or both.

To retard 1-2° ground wire to pin 7
To retard 2-4° ground wire to pin 6
To retard 6-8° ground wire to pin 6 & 7

5 The UESC module must be mounted somewhat above the level of the intake manifold. This is so that fuel or condensed fuel vapor cannot drain (thru the vacuum line) into the module during operation or storage. (Reference service adjustments portion of page 2B-02.)

Male connector symbols: ⊗, →, ⊠
Female connector symbols: ○, ←, □