SECTION 14

Idle Speed Control — Electronic (ISC-E) Non-EEC — 2.0L 2V

Contents

Why Are We Checking Out The ISC-E System?

The Idle Speed Control-Electronic (ISC-E) System has received a check-out before being released from the factory. Unless there has been mishandling or an accident, the chances are something else could be at fault.

Taking a few minutes at this point could save time and money later.

Be sure the owner has clearly explained the driving conditions that brought the owner in. Refer to the Diagnostic Routine Index, Section 2, for clues and corrections to the problems that may be encountered.

A fouled spark plug, disconnected vacuum hose, broken wire, a bad electrical wire crimp, wrong routing of hoses because someone else worked on the vehicle — any of these conditions can give a wrong reading on the ISC-E Quick Test. It is possible you may replace an ISC-E component and still not fix the problem.

SO STOP . . . THINK . . . AND CHECK BEFORE STARTING ON THE ISC-E SYSTEM!

ISC-E System Description

The purpose of the Idle Speed Control-Electronic (ISC-E) System used on the 2.0L Ranger is to control engine rpm **only** by means of a DC motor throttle actuator. It **does not** control any other engine function such as air/fuel ratio, spark advance, exhaust gas recirculation, etc.

NOTE: The 1988 model year 2.0L Ranger uses an Aisan model Y 2V carburetor and Aisan DC motor idle speed control unit. Refer to Section 4 for the Aisan carburetor adjustment procedure.

How To Use The Diagnostic Procedure

DESCRIPTION

NOTE: Use this procedure only when the idle speed is too high, too low or erratic.

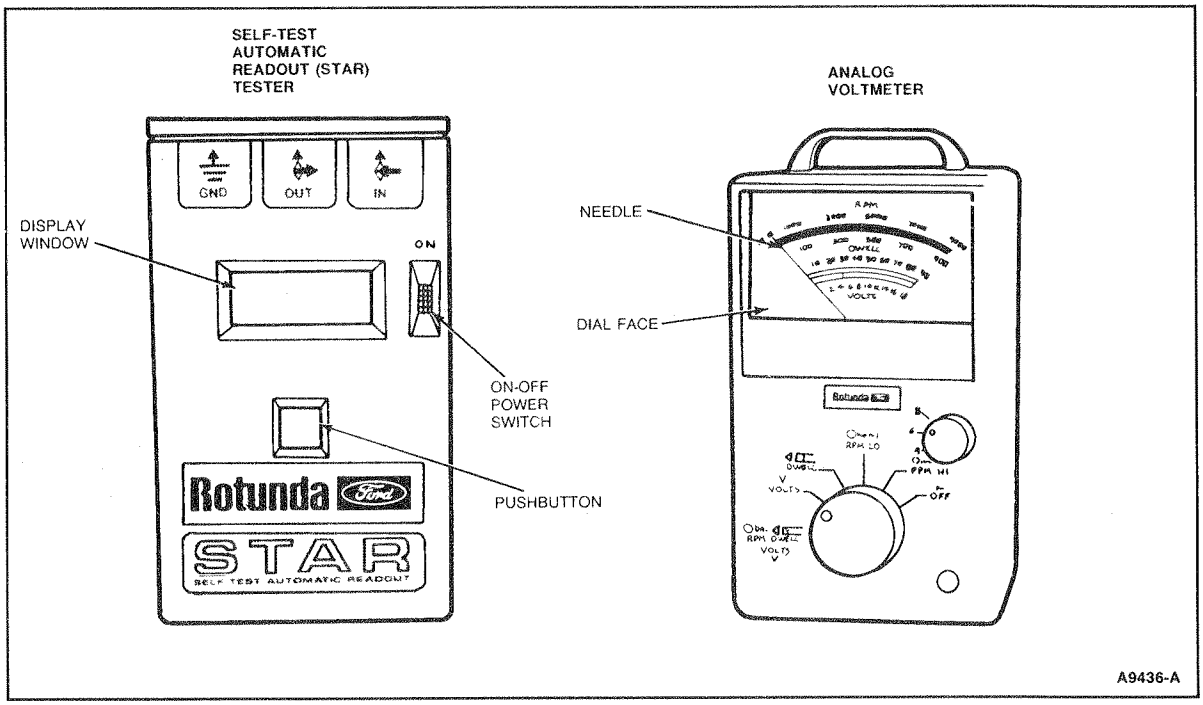
The Idle Speed Control-Electronic (ISC-E) System has the capability to diagnose a malfunction within its own system. It advises the technician where to look for ISC-E problems through the use of a Self-Test computer program built into the ISC-E module. When triggered, the Self-Test simulates a variety of engine operating conditions, so that operating conditions can be detected.

A response to the initiated Self-Test is reported to the technician as a pulsing series of voltage outputs that will appear on one of two testing devices: an Analog Voltmeter or Self-Test Automatic Readout (STAR) tester, Rotunda model 007-00017.

The series of voltage pulses are called a Service Code, representing a two-digit number. It is the two-digit Service Code that advises the technician of the nature of the ISC-E problem. Hooking up the Analog Voltmeter or STAR tester to the ISC-E System will be described and shown later.

After performing the "Self-Test", the technician must follow all diagnostic procedures in the Engine/Emissions Diagnosis Manual prior to replacing any components. This will help ensure service reliability.

NOTE: The ISC-E System uses only an Engine Running Quick Test, (No Key-On, Engine-Off Quick Test).



Quick Test Description

The Quick Test is a functional test of the Idle Speed Control-Electronic system consisting of basic Test Steps (described below). These Steps must be carefully followed in sequence, otherwise replacement of non-faulty components may result.

Test Steps

1. Visual Checks and Vehicle Preparation
   - Checks for obvious faults.
   - Properly prepares the vehicle for testing.
2. Equipment Hook-up
   - Ensures that the proper equipment for gathering test data is ready prior to testing.
3. Engine Running Self-Test.
   - It is a dynamic check with the engine in operation.

The Engine Running Self Test is intended to detect hard faults only, **not intermittent faults.**

Service Code Format

Engine Running Test

- Fast Codes
- Service Codes

WARNING: ANYONE WHO DEPARTS FROM THE INSTRUCTION PROVIDED IN THIS PUBLICATION MUST FIRST ESTABLISH THAT HE COMPROMISES NEITHER HIS PERSONAL SAFETY NOR THE VEHICLE INTEGRITY BY HIS CHOICE OF METHODS, TOOLS OR PARTS.

TEST EQUIPMENT REQUIRED FOR THE QUICK TEST:

ANALOG VOLTMETER

- Voltage Scale 0 to 20 Volts DC.

ROTUNDA SELF-TEST AUTOMATIC READOUT (STAR)

- No. 007-00017 or equivalent.
- Optional equipment used in place of Analog Voltmeter.

JUMPER WIRE

TACHOMETER

- Range of 0-3,000 rpm, Accuracy of ± 40 rpm, Resolution of 20 rpm.

Quick Test

ISC-E

1.0 VISUAL CHECK AND VEHICLE PREPARATION

Correct test results for the Quick Test are dependent on the proper operation of related, non-ISC-E components. It may be necessary to correct faults to the components before ISC-E will pass Quick Test. Refer to Diagnostic Routines, Section 2 for additional service.

Before hooking up any equipment to diagnose the ISC-E system, make the following checks:

1. Verify the condition of air cleaner and ducting.
2. Check all engine vacuum hoses for:
   - Leaks or pinched hoses.
   - Proper emission routing per Vehicle Emission Control Information (VECI) Decal.
3. Check the ISC-E system components wiring harness electrical connections for:
   - Proper connections.
   - Loose or detached connectors, wires and terminals.
   - Corrosion.
   - Proper routing of harness.

It may be necessary to disconnect the connector assembly to perform some of the inspections.

4. Perform all safety steps required to start and run operational vehicle tests.
5. Apply the emergency brake and block wheels. Place shift lever in NEUTRAL for manual transmission, etc.
6. Verify engine coolant is at the specified level.
7. Start engine and run until the upper radiator hose is hot and pressurized and the throttle is off fast idle.

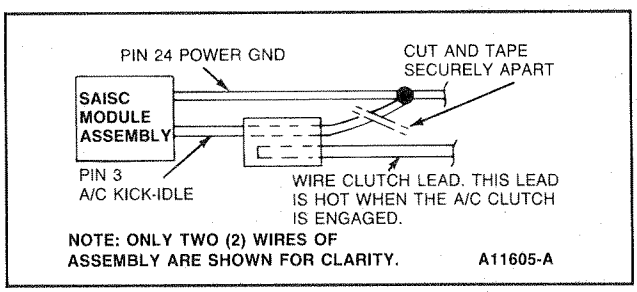
7A. **If the vehicle is a No Start, Go to Diagnostic Routines, Section 2.**

8. Turn ignition key to OFF position. Proceed to Step 2.0 of Quick Test.

NOTE: This system does not control air/fuel ratio, spark advance, exhaust gas recirculation, etc.

Air Conditioning

The 2.0L Ranger does not have factory installed air conditioning. The Stand Alone Idle Speed Control (SAISC) module does contain an A/C kick strategy. Pin 3 of the SAISC is connected to ground in the wiring harness. When installing A/C, make sure that Pin 3 is removed from ground and connected to the A/C clutch.



Quick Test

ISC-E

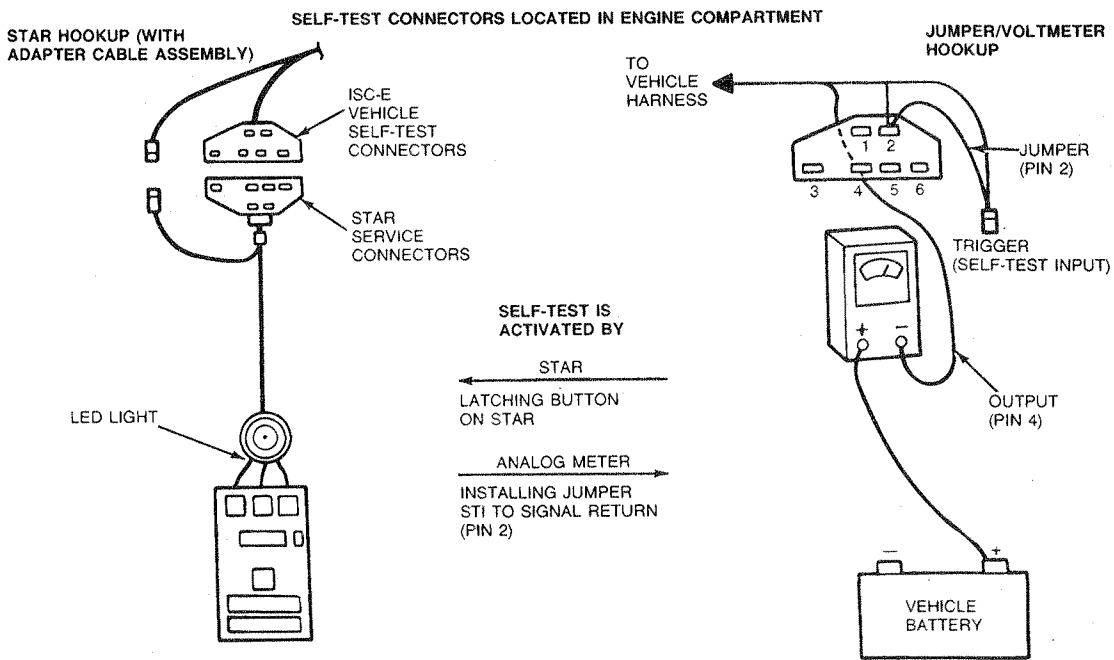
2.0 EQUIPMENT HOOKUP

Using the STAR tester:

- Turn ignition key to OFF position.
- Connect the color-coded adapter cable leads to the STAR tester.
- Connect the adapter cable's two service connectors to the vehicle's appropriate Self-Test connectors. Refer to diagram below.
- After vehicle hookup, Go to Quick Test Step 3.0.

Using analog voltmeter:

- Turn ignition key to OFF position.
- Connect a jumper wire to Pin 2, Signal Return on the Self-Test connector. When instructed to activate Self-Test, wire will also be connected to the Self-Test input connector. Refer to diagram below. DO NOT connect jumper wire to Self-Test input until directed to do so.
- Set analog VOM on a DC voltage range to read from 0 to 15 volts DC.
- Connect VOM from battery (+) to Pin 4 Self-Test Output (STO) in the Self-Test connector.
- After vehicle hookup, Go to Quick Test Step 3.0.



Quick Test

ISC-E

3.0	ENGINE RUNNING QUICK TEST

- Start and run engine to stable idle. (Upper hose hot and pressurized.)
- Carburetor should be off high cam.
- Activate self-test.
  - — STAR Tester: Latch the center button in the down position.
  - — Analog VOM: Jumper STI to SIG RTN at the Self-Test connectors.

NOTE: If Self-Test will not activate, go to Pinpoint Test Step SA35 .

Read codes.

- — The system test will be performed (8-11 seconds)
- — Engine running service codes.

- Observe and record all service codes.
- **ALWAYS BEGIN DIAGNOSTICS WITH THE FIRST CODE OUTPUTTED.**

RESULT	ACTION TO TAKE
SERVICE CODE	
11 ▶	GO TO PINPOINT TEST STEP SA1 .
58 ▶	GO TO PINPOINT TEST STEP SA10 .
68 ▶	GO TO PINPOINT TEST STEP SA15 .
12 ▶	GO TO PINPOINT TEST STEP SA25 .
13 ▶	GO TO PINPOINT TEST STEP SA30 .
NO CODES ▶	GO TO PINPOINT TEST STEP SA35 .
SELF TEST WILL NOT ACTIVATE ▶	GO TO PINPOINT TEST STEP SA35 .

Service Code Format

SERVICE CODES

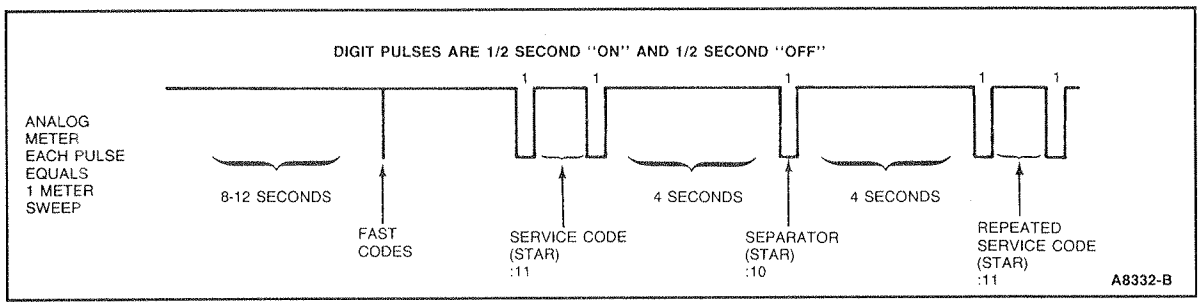
The ISC-E system communicates service information through the Self-Test service codes. These service codes are two-digit numbers representing the results of Self Test.

The service codes are transmitted on the Self-Test output (found in the Self-Test connector) in the form of timed pulses, and read by the technician on voltmeter or on the STAR tester.

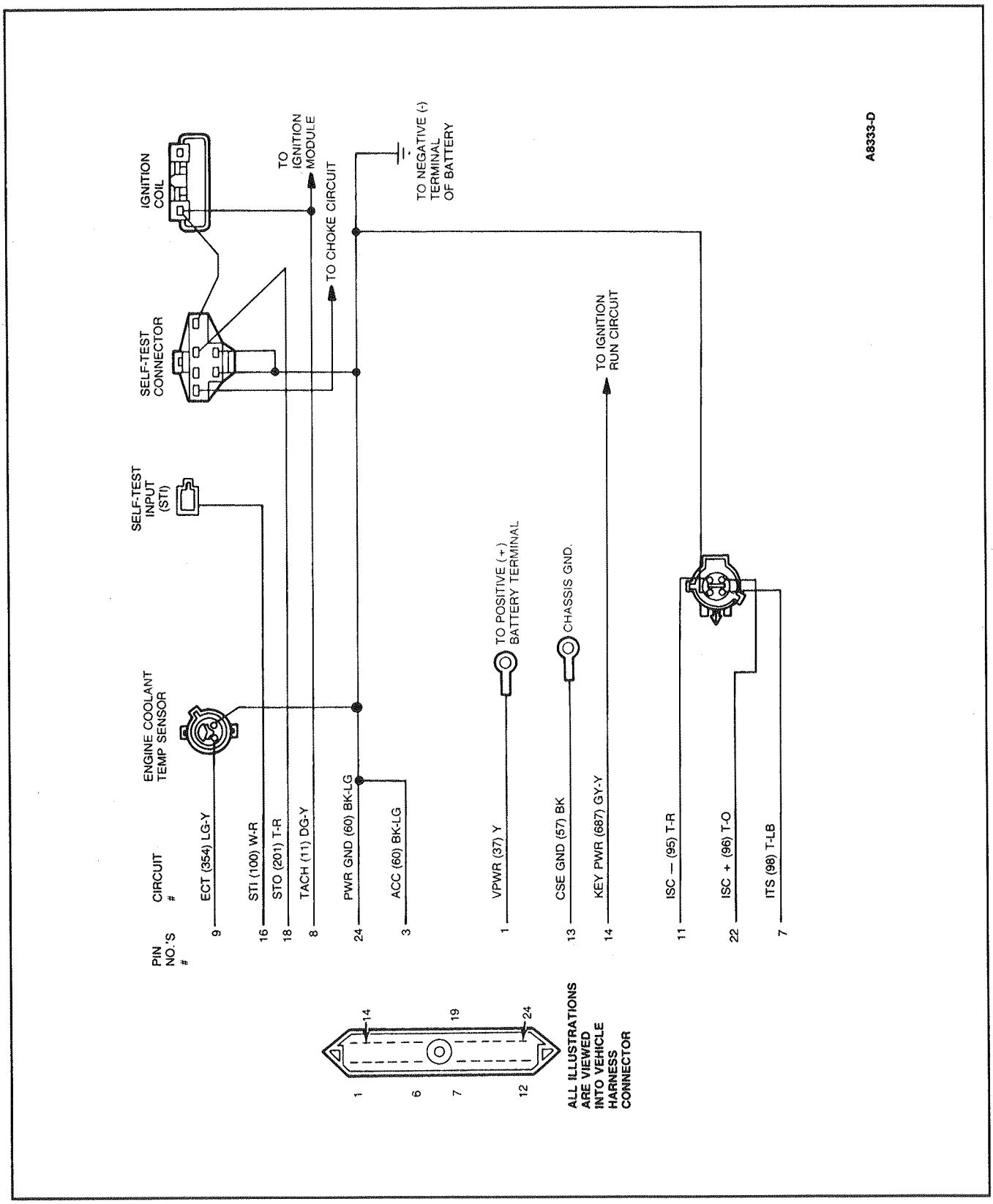
The pulse format is shown below:

- **One-half second on-time for each digit.**
- **Two seconds off-time between digits.**
- **Four seconds off-time between codes.**
- **8 to 12 seconds before fast and service codes.**

SELF-TEST OUTPUT CODE FORMAT ENGINE RUNNING



ISC-E System Electrical Schematic



Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA1 CHECK IDLE RPM • Key off. • Disconnect Self-Test jumper or unlatch Star Tester. • Connect tachometer. • Start engine. • Read engine rpm. **NOTE: Water temperature must be above 128°F during this test (upper radiator hose hot and pressurized).** • Is engine rpm between 750 and 850 rpm?	Yes ▶ No ▶	GO to **SA2**. GO to **SA3**.
SA2 CHECK "COLD ENGINE" RPM • Turn key OFF. • Tachometer connected. • Disconnect engine coolant temperature (ECT) switch. • Start engine. • Read engine rpm. • Is engine rpm between 1150 and 1250 rpm?	Yes ▶ No ▶	If symptom was lack of fast idle when engine is cold REPLACE ECT switch. (ECT always closed.) If any other symptom is present, the ISC-E system is functioning properly. RECONNECT engine coolant temperature switch. GO to Diagnostic Routines, Section 2. GO to **SA6**.
SA3 VERIFY ENGINE WAS WARM • Run engine for two minutes at 2000 rpm. • Check that upper radiator hose is hot and pressurized (water temperature above 128°F). • Rerun Pinpoint Test Step SA1. • Is rpm between 750 and 850 rpm?	Yes ▶ No ▶	ISC-E system is functioning properly. GO to Diagnostic Routines, Section 2. GO to **SA4**.
SA4 CHECK ECT SWITCH • Key off. • Disconnect harness connector from ECT switch. • DVOM on 200 ohm scale. • Measure resistance of ECT switch (switch should be closed above 128°F). • Is resistance less than 5.0 ohms?	Yes ▶ No ▶	GO to **SA5**. REPLACE ECT switch. RERUN Quick Test.

Idle Speed Control — Electronic (ISC-E)

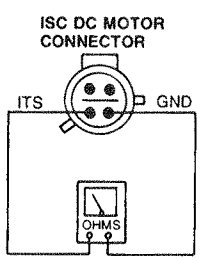
Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA5 CHECK CONTINUITY OF ECT CIRCUITS • Key off. • ECT switch disconnected. • Disconnect ISC-E processor 24 pin connector. Inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • DVOM on 200 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 9 and ECT circuit at ECT switch vehicle harness connector. (Refer to schematic). • Measure resistance between ground circuit at ECT switch vehicle harness connector and chassis ground. • Are both resistances less than 5.0 ohms?	Yes ▶ No ▶	REPLACE ISC-E processor. RECONNECT ECT switch. RERUN Quick Test. SERVICE open circuit. RECONNECT ISC-E processor and ECT switch. RERUN Quick Test.
SA6 CHECK ECT FOR SHORT TO GROUND • Key off. • Disconnect ISC-E processor 24 pin connector. Inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • Harness disconnected from ECT switch. • DVOM on 200,000 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 9 and chassis ground. • Is resistance greater than 10,000 ohms?	Yes ▶ No ▶	REPLACE ISC-E processor. RECONNECT ECT switch. RERUN Quick Test. SERVICE short to ground. RECONNECT ISC-E processor and ECT switch. RERUN Quick Test.
SA10 SERVICE CODE 58: CHECK ITS • Key off. • Disconnect harness connector from ISC DC motor. • Rerun Self-Test. • Is code 58 present? **NOTE: Ignore all other codes.**	Yes ▶ No ▶	GO to SA11. REPLACE ISC DC motor. RERUN Quick Test.

Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA11 CHECK FOR SHORT TO GROUND		
• Key off. • Harness disconnected from ISC DC motor. • Disconnect ISC-E processor 24 pin connector. Inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • DVOM on 200,000 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 7 and chassis ground. • Is resistance greater than 10,000 ohms?	Yes ▶ No ▶	REPLACE ISC-E processor. RECONNECT ISC DC motor. RERUN Quick Test. SERVICE short to ground. RECONNECT ISC-E processor and ISC DC motor. RERUN Quick Test.
SA15 SERVICE CODE 68: VERIFY ISC DC MOTOR MOVEMENT		
• While observing DC motor, rerun Self-Test. • Does ISC DC motor shaft move during Self-Test?	Yes ▶ No ▶	GO to **SA16**. GO to **SA20**.
SA16 CHECK ITS AT ISC DC MOTOR		
• Key off. • Disconnect harness connector from ISC DC motor. • DVOM on 200 ohm scale. • Connect DVOM to ISC DC motor connector as shown. • Move throttle lever so it is not contacting ISC DC motor shaft. • Is resistance less than 5.0 ohms?	Yes ▶ No ▶	GO to **SA17**. REPLACE ISC DC motor. RERUN Quick Test.



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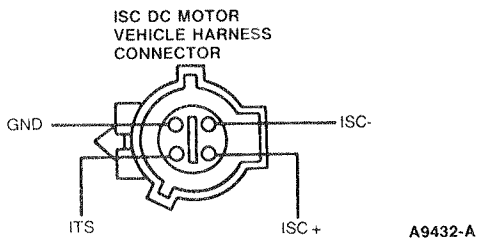
Idle Speed Control — Electronic (ISC-E)

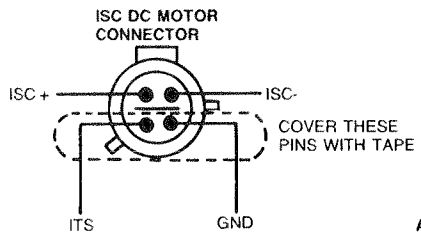
Pinpoint Test **SA**

TEST STEP	RESULT	ACTION TO TAKE
SA17 CHECK ITS AND GROUND FOR CONTINUITY		
• Key off. • Harness disconnected from ISC DC motor. • Disconnect ISC-E processor 24 pin connector. Inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • DVOM on 200 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 7 and ITS circuit at ISC DC motor vehicle harness connector. • Measure resistance between ground circuit at ISC DC motor vehicle harness connector and battery negative post. • Are both resistances less than 5.0 ohms?	Yes ▶	REPLACE ISC-E processor. RECONNECT ISC DC motor. RERUN Quick Test.
	No ▶	SERVICE open circuit. RECONNECT ISC-E processor and ISC DC motor. RERUN Quick Test.



Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA20 CHECK ISC DC MOTOR OPERATION		
CAUTION: Battery voltage must not be applied to the ITS terminals during this test. Isolate the ITS terminals with electrical tape. • Key off. • Disconnect harness connector from ISC DC motor. • Jumper battery positive post to ISC positive (+) circuit at ISC DC motor connector. Jumper battery negative post to ISC negative (−) circuit at ISC DC motor connector. Observe motor shaft movement. • Reverse polarity of ISC jumper wires and observe motor shaft opposite movement. • Does motor shaft move in both directions?  	Yes ▶ No ▶	GO to **SA21**. REPLACE ISC DC motor. RERUN Quick Test.
SA21 CHECK ISC CIRCUITS FOR CONTINUITY		
• Key off. • Harness disconnected from ISC DC motor. • Disconnect ISC-E processor 24 pin connector. Inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • DVOM on 200 ohm sacle. • Measure resistance between ISC-E processor harness connector Pin 11 and ISC - circuit at ISC DC motor vehicle harness connector. • Measure resistance between ISC-E processor harness connector Pin 22 and ISC positive (+) circuit at ISC DC motor vehicle harness connector. • Are both resistances less than 5.0 ohms?	Yes ▶ No ▶	GO to **SA22**. SERVICE open circuit. RECONNECT ISC-E processor and ISC DC motor. RERUN Quick Test.

Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA22 CHECK ISC CIRCUITS FOR SHORT TO POWER • Key on, engine off. • Harness disconnected from ISC DC motor. • ISC-E processor disconnected. • DVOM on 20 volt scale. • Measure voltage between ISC-E processor harness connector Pin 11 and chassis ground. • Measure voltage between ISC-E processor connector Pin 22 and chassis ground. • Are both voltages less than 1.0 volts?	Yes ▶ No ▶	GO to SA23. SERVICE short circuit. RECONNECT ISC-E processor and ISC DC motor. RERUN Quick Test. If ISC DC motor still does not move, REPLACE ISC-E processor.
SA23 CHECK ISC CIRCUITS FOR SHORT TO GROUND • Key off. • Harness disconnected from ISC DC motor. • ISC-E processor disconnected. • DVOM on 200,000 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 11 and chassis ground. • Measure resistance between ISC-E processor harness connector Pin 22 and chassis ground. • Are both resistances greater than 10,000 ohms?	Yes ▶ No ▶	REPLACE ISC-E processor. RERUN Quick Test. SERVICE short circuit. RECONNECT ISC-E processor and ISC DC motor. RERUN Quick Test. If ISC DC motor still does not move, REPLACE ISC-E processor.
SA25 SERVICE CODE 12: VERIFY ISC DC MOTOR MOVEMENT • While observing ISC DC motor, rerun Self-Test. • Does ISC DC motor shaft move during Self-Test?	Yes ▶ No ▶	REFER to idle set adjustment in Section 4. GO to SA20.

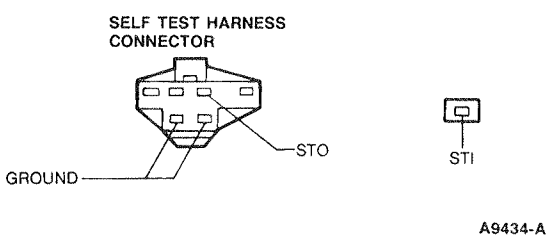
Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA30 SERVICE CODE 13: CHECK FOR SERVICE CODES 58, 68		
• Is service code 58 or service code 68 also present?	Yes, service code 58 ▶	GO to **SA10**.
	Yes, service code 68 ▶	GO to **SA15**.
	No ▶	GO to Section 4 for adjustment of the closed throttle rpm.
SA35 CHECK FOR POWER TO ISC-E PROCESSOR		
• Key off. • Disconnect ISC-E processor 24 pin connector. Inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • DVOM on 20 volt scale. • Key on, engine off. • Measure voltage between ISC-E processor harness connector Pin 1 and battery negative post. • Measure voltage between ISC-E processor harness connector Pin 14 and battery negative post. • Are both voltages greater than 10.5 volts?	Yes ▶	GO to **SA36**.
	No ▶	VERIFY battery voltage. If OK, SERVICE open circuit. RECONNECT ISC-E processor. RERUN Quick Test.
SA36 CHECK ISC-E PROCESSOR GROUND		
• Key off. • ISC-E processor disconnected. • DVOM on 200 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 24 and battery negative post. • Is resistance less than 5.0 ohms?	Yes ▶	GO to **SA37**.
	No ▶	SERVICE open circuit. RECONNECT ISC-E processor. RERUN Quick Test.

Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT ▶	ACTION TO TAKE
SA37 CHECK CONTINUITY OF TACH CIRCUIT • Key off. • ISC-E processor disconnected. • Disconnect harness connector from ignition coil. • DVOM on 200 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 8 and TACH pin at ignition coil harness connector. • Is resistance less than 5.0 ohms?	Yes ▶ No ▶	GO to **SA38**. SERVICE open circuit. RECONNECT ISC-E processor and ignition coil. RERUN Quick Test.
SA38 CHECK CONTINUITY OF STI/STO CIRCUITS • Key off. • ISC-E processor disconnected. • DVOM on 200 ohm scale. • Measure resistance between ISC-E processor harness connector Pin 16 and Self-Test Input (STI) circuit at Self-Test single pin connector. • Measure resistance between ISC-E processor harness connector Pin 18 and Self-Test Output (STO) circuit at Self-Test connector. • Are both resistances less than 5.0 ohms?  	Yes ▶ No ▶	GO to **SA39**. SERVICE open circuit. RECONNECT ISC-E processor. RERUN Quick Test.

Idle Speed Control — Electronic (ISC-E)

Pinpoint Test **SA**

TEST STEP	RESULT	ACTION TO TAKE
SA39 CHECK STI/STO FOR SHORT TO GROUND		
• Key off. • ISC-E processor disconnected. • DVOM on 200,000 ohm scale. • Measure resistance between STO circuit at Self-Test connector and battery negative post. • Measure resistance between STI circuit at Self-Test single pin connector and battery negative post. • Are both resistances greater than 10,000 ohms?	Yes ▶ No ▶	GO to **SA40**. SERVICE short circuit. RECONNECT ISC-E processor. RERUN Quick Test.
SA40 CHECK CONTINUITY OF GROUND TO SELF TEST CONNECTOR		
• Key off. • ISC-E processor disconnected. • DVOM on 200 ohm scale. • Measure resistance between Self-Test connector ground circuits and battery negative post. • Is resistance less than 5.0 ohms?	Yes ▶ No ▶	REPLACE ISC-E processor. RERUN Quick Test. SERVICE open circuits. RECONNECT ISC-E processor. RERUN Quick Test.