SECTION 9

By-Pass Air (BPA) Control System

Contents

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Description and Operation

BY-PASS AIR CONTROL SYSTEM

Engine Applications

All Engines

The By-Pass Air (BPA) Control System maintains the engine idle speed quality throughout the engine's operating modes by means of the By-Pass Air Control Valve. The valve responds to engine coolant temperature only. As the engine warms up, the valve mechanically reduces the by-pass airflow from a higher cold start setting to a lower flow level at coolant temperatures of 60° Celsius (140°F) and higher, in accordance with engine demand. This action results in a smoother idle and faster engine warm-up during cold weather operation. Engine idle speed (hot engine) is adjusted at this lower flow level by means of turning the adjusting screw in the throttle body so as to admit more or less by-pass air.

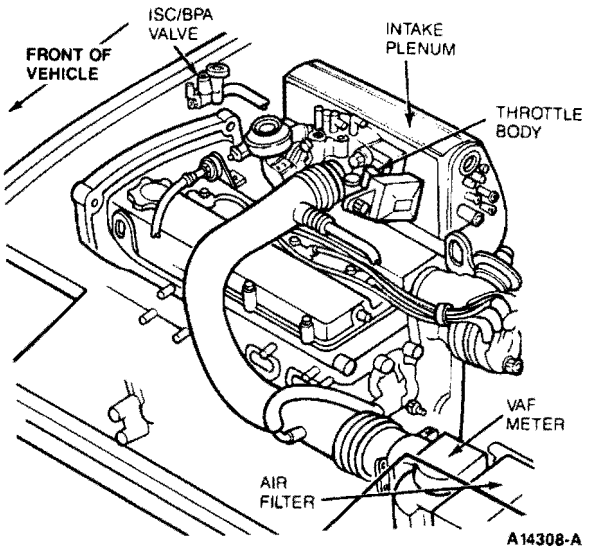
The BPA Control Valve, similar to the engine thermostat, is packaged with the Idle Speed Control (ISC) as a combination unit. The BPA valve is not serviceable and must be replaced if a mulfunction occurs.

Idle speed control other than the above manual adjustments, is controlled by the ECA, acting through the Inlet Air Control (IAC) System, described in Section 10 of this manual.

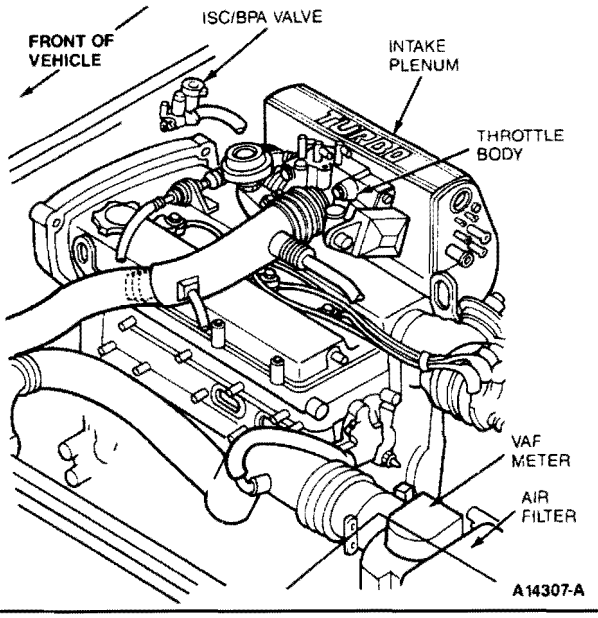
For further information regarding the makeup of this system and its relationship to other engine emission systems, refer to the appropriate Schematic Diagram, Section 4 of this manual.

Description and Operation

NON-TURBO COMPONENT LOCATIONS



TURBO COMPONENT LOCATIONS



Diagnosis and Testing

SYSTEM INSPECTION

1. Visually inspect the BPA Control Valve and related components and review the customer complaint.

   Look for:

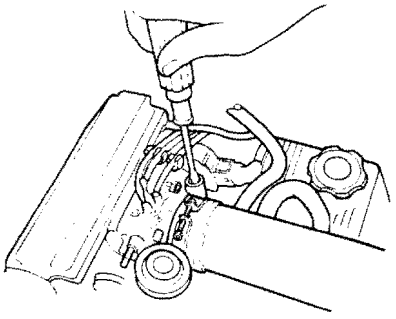
MECHANICAL
• Loose, Leaking, Pinched, Kinked or Otherwise Damaged Coolant and Air Hoses and Connections. • Excessively Low or High Idle Speed (Hot Engine) • Hard Starting (Cold Engine) • Poor Fuel Economy • Engine Coolant does not Warm-up • White Smoke from Tailpipe

2. Exercise the coolant and air hoses to determine the extent of damage or looseness.
3. If a component is suspected as the obvious cause of malfunction, correct the cause before proceeding with the next step.
4. If all visual inspection checks are OK, proceed to Pinpoint Tests.

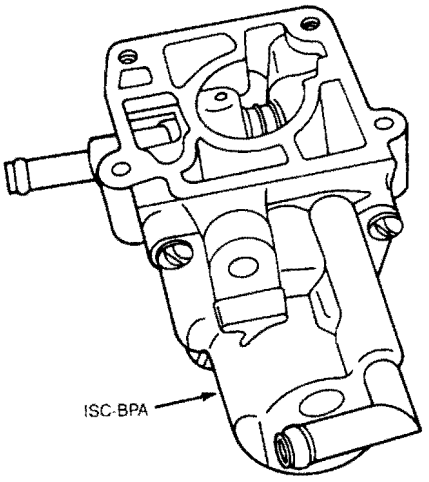
Diagnosis and Testing

All Engines

BPA

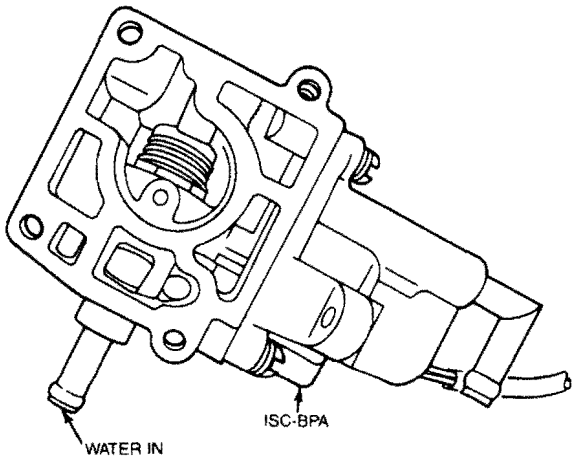
TEST STEP	RESULT ▶	ACTION TO TAKE
BPA1 BPA CONTROL VALVE — IDLE SPEED ADJUSTMENT		
• Ground the self-test Input connector (Green 1-pin). • Warm up the engine with all accessories off. Note the idle speed. • Run the engine for three minutes at 2500-3000 rpm in neutral. • Allow the engine to return to idle. Check the initial timing and adjust as necessary (Remove the blind cap from the throttle body and adjust the air adjust screw by turning it). • Turn the engine OFF and allow it to cool down. • After the engine has cooled, re-start the engine and note the idle speed. • **Does the engine still speed up during warm-up when started cold?**  A14309-A	Yes ▶ No ▶	RETURN to Diagnostic Routines, Section 2. GO to **BPA2**.

Diagnosis and Testing	All Engines	BPA

TEST STEP	RESULT ▶	ACTION TO TAKE
BPA2 BPA CONTROL VALVE COLD CHECK		
• Remove the BPA Control Valve from the vehicle. • Connect a clean test hose to the valve air port. • When the valve is cold (room temperature), blow through the valve air port. • **Does air flow easily through the valve at room temperature?**  A14310-A	Yes ▶ No ▶	GO to **BPA3**. REPLACE the BPA Control Valve.

Diagnosis and Testing	All Engines	BPA

TEST STEP	RESULT ▶	ACTION TO TAKE
BPA3 BPA CONTROL VALVE HOT CHECK		
• BPA Control Valve removed from engine. • Clean test hose attached to valve air port. • Attach a second test hose to one of the coolant hose nipples on the valve. • Circulate hot water 60° Celsius (140° F minimum) through the valve for several minutes. • With the valve warm, blow through the valve air port. • **Does resistance to air flow increase considerably with the valve warmed-up?**	Yes ▶ No ▶	RETURN to Diagnostic Routines, Section 2. REPLACE BPA Control Valve.



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Specifications/Special Service Tools

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
ECA Controlled Idle Speed: • All Accessories OFF • Cooling Fan OFF • Transaxle in NEUTRAL • Ignition Timing OK	• 800-900 RPM-All
BPA Control Valve: • Valve Open • Valve Closed	• Below 60° Celsius (140°F) • Above 60° Celsius (140°F)

SPECIAL SERVICE TOOL

ROTUNDA NUMBER	DESCRIPTION
059-00001	Tachometer

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