SECTION 4

Carburetors, Fuel Charging Assemblies, Throttle Bodies and Injectors

Contents

CFI, EFI & Carburetor System Troubleshooting

Driveability Symptom Menu

Pre-checks

- Inspect the fuel lines and fuel tank for deformaties, leaks and kinks.
- Inspect the vacuum lines for leaks — disconnected, kinks, or broken plastic connector.
- Inspect the cooling system to be sure it is filled and leakage.
- Inspect the cooling hoses to be sure they are not collapsed, kinked, or leaking.
- Inspect ignition system for crossfire, spark plug wires — coil wire off or loose.
- Inspect ignition system for breakage or other damage.
- Verify ignition timing.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• No Start — Cold	• Carburetor	• No fuel in carburetor bowl.	• Check fuel bowl sight glass. Check by actuating accelerator pump. If no fuel discharge is seen, check fuel delivery system. Refer to Group 24 or Section 11.
		• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service, or replace as required.
		• Venturi valve sticking open, **7200 only.**	• Clean and service as required.
		• Clogged air bleeds or idle passages.	• Clean with solvent and compressed air.
	• CFI-EFI	• Inoperative ISC motor.	• Go to EEC-IV Diagnostics.
		• TP sensor stuck at WOT	• Crank engine with TP sensor disconnected.
		• Plugged or inoperative injector.	• CFI only — Check for fuel injector discharge at the injector. Clean injector. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only. Go to EEC-IV Diagnostics.
			Return to Routine 201, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Hard Start — Cold	• Carburetor	• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service or replace as required.
		• Incorrect choke thermostat adjustment, lean or rich.	• Adjust choke. If tamperproof, check for correct assembly.
		• Venturi valve sticking open, **7200 only.**	• Clean and service as required.
		• Hot idle compensator stuck open.	• Service as required. Refer to Section 3.
		• Restricted choke vacuum air passages.	• Remove carburetor and clean passages. Blow out with compressed air.
		• Accelerator pump not functioning, check visually for fuel discharge.	• Visually check for fuel discharge and service as required.
		• Leaking intake manifold or carburetor gaskets.	• Replace leaking gaskets.
		• Feedback motor inoperative, **7200 only.**	• Clean and service as required. Refer to Section 3.
		• Faulty TCP Valve. Temperature Compensated (accelerator) Pump.	• Check function and service as required. Refer to Section 3.
	• CFI-EFI	• ISC inoperative.	• Go to EEC-IV Diagnostics.
		• Plugged or inoperative injector.	• CFI only — Check injector for fuel discharge. Clean injectors. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only. Go to EEC-IV Diagnostics.
			Return to Routine 203, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Rough Idle — Cold, Emission Test Failure	• Carburetor	• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service, or replace as required. Check choke pull down adjustment. Check voltage to choke cap.
		• Improper curb idle adjustment.	• Perform curb idle adjustments.
		• ISC motor inoperative.	• Check ISC motor. Refer to Section 14 (Aisan Carburetor)
		• Improper fast idle adjustments.	• Perform fast idle adjustments.
		• Venturi valve sticking open, **7200 only.**	• Clean and service as required.
		• Venturi valve diaphragm leaking, **7200 only.**	• Check and service as required.
		• Feedback motor inoperative, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Hot idle compensator (HIC) stuck open, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Metering rod bent, **7200 only.**	• Check and service as required. Refer to Group 24.
		• Air cleaner duct vacuum motor damaged open to cold air source always.	• Service or replace as required. Refer to Section 3.
		• Improper idle mixture.	• Perform propane check, adjust if out of specification.
	• CFI-EFI	• Injector plugged, leaking or inoperative.	• CFI only — Check operation of injector. Clean injectors. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only. Refer to Section 11.
		• Injector O-ring seal leaking.	• Perform injector/regulator leakage check.
			Return to Routine 204, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Stall, Stumble, Hesitation — Cold	• Carburetor	• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service or replace as required. Check choke pulldown. Check voltage to choke cap.
		• Accelerator pump not functioning, check visually for fuel discharge.	• Visually check for fuel discharge and service as required.
		• Low fuel pump delivery.	• Test fuel pump, service or replace as required. Refer to Group 24 or Section 11.
		• Feedback motor malfunction, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Clogged fuel filter.	• Clean or replace as required. Find cause.
		• Power valve stuck closed.	• Replace power valve.
		• Improper or obstructed main jets.	• Check, clean, or replace as required. For 7200, replace carburetor.
		• Air cleaner duct vacuum motor damaged open to cold air source.	• Service or replace as required. Refer to Section 3.
		• Venturi Valve Diaphragm failure, **7200 only.**	• Replace diaphragm.
		• Faulty Temperature Compensated Pump (TCP) valve.	• Check function and service as required. Refer to Section 3.
	• CFI-EFI	• TP sensor failure.	• Go to EEC-IV Diagnostics.
		• Plugged fuel injectors.	• Clean injectors. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only.
			Return to Routine 202 or 207, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• No Start — Hot	• Carburetor	• No fuel in carburetor bowl.	• Check by actuating accelerator pump. If no fuel discharge is seen, check fuel delivery system. Refer to Group 24 or Section 11.
		• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service, or replace as required.
		• Venturi valve sticking, **7200 only.**	• Clean and service as required.
		• Flooding or loading.	• Check float level, adjust as required.
	• CFI-EFI	• Inoperative ISC motor.	• Go to EEC-IV Diagnostics.
		• TP sensor stuck at WOT.	• Go to EEC-IV Diagnostics.
		• Injector inoperative.	• CFI only — Check for fuel discharge while cranking engine. Test fuel injectors. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only.
			Return to Routine 201, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Hard Start, Hot	• Carburetor	• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service, or replace as required.
		• Incorrect choke, thermostat adjustment, lean or rich.	• Adjust thermostat housing and choke cap. If tamperproof, check for correct assembly.
		• Venturi valve sticking open, **7200 only.**	• Clean and service as required.
		• Bowl vents plugged.	• Check internal vent for adjustment and external vent for kinked hose.
		• Feedback motor inoperative, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Flooding or loading.	• Check float level, service as required.
		• Restricted choke vacuum or hot air passages.	• Remove carburetor and clean choke passages and blow out with air.
		• Leaking intake manifold or carburetor gaskets.	• Replace leaking gaskets.
		• ISC motor inoperative.	• Check ISC motor. Refer to Section 14 (Aisan Carburetor).
	• CFI-EFI	• Excessive fuel pressure.	• Clean and service — — Fuel return line. — Fuel pressure regulator.
		• Contaminated fuel pressure regulator valve and seat.	• Clean and service fuel pressure regulator. • Check fuel pressure bleed down after engine has been turned off.
		• Injector leaking or inoperative.	• CFI only — Check operation of injector. Test injectors. Clean if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only.
		• Injector O-ring seal leaking.	• Perform injector leakage test.
		• ISC inoperative.	• Go to EEC-IV Diagnostics.
			Return to Routine 203, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Rough Idle — Hot Emission Test Failure	• Carburetor	• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service, or replace as required.
		• Venturi valve sticking, **7200 only.**	• Clean and service as required.
		• Improper idle adjustments.	• Perform all idle adjustments.
		• Throttle plates sticking.	• Check and service as required.
		• Choke pulldown diaphragm not functioning.	• Check and service as required.
		• Venturi valve diaphragm leaking, **7200 only.**	• Check and service as required.
		• Hot idle compensator stuck closed or open.	• Service or replace as required. Refer to Section 3.
		• Improper idle mixture.	• Perform propane check, adjust if out of specification.
		• Clogged air bleeds or air passages.	• Clean with solvent and compressed air.
		• Improper fuel level.	• Adjust float level.
		• Feedback motor, **7200 only.**	• Check for smooth operation. Refer to Section 3.
		• Temperature Compensated Accelerator Pump Diaphragm not functioning.	• Check function and service as required. Refer to Section 3.
		• ISC motor inoperative.	• Check ISC motor. Refer to Section 14 (Aisan Carburetor).
	• CFI-EFI	• Injector plugged, leaking or inoperative.	• CFI only — Check operation of injector. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only. Refer to Section 11.
		• Injector O-ring seal leaking.	• Perform injector leakage test.
			Return to Routine 204, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Stall, Stumble, Hesitation — Hot	• Carburetor	• Cold enrichment or choke system not functioning.	• Check linkage for proper operation and adjustment; clean, service, or replace as required.
		• Inoperative accelerator pump.	• Visually check for pump shot or fuel siphoning. Service as required. Refer to Section 3.
		• Low fuel pump volume.	• Test pump; fuel delivery system. Refer to Group 24 or Section 11.
		• Feedback motor malfunctioning, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Bowl vents plugged.	• Check internal vent adjustments, external for kinked hoses.
		• Clogged fuel filter.	• Check and replace as required. Check cause.
		• Power valve stuck closed.	• Replace valve.
		• Improper or obstructed main jets.	• Check, clean or replace as required. **For 7200, replace carburetor.**
		• Venturi Valve Diaphragm failure, **7200 only.**	• Replace diaphragm.
		• Temperature Compensated Accelerator Pump Malfunction.	• Check function and service as required. Refer to Section 3.
		• Carburetor Feedback System Malfunction.	• Refer to appropriate MCU or EEC Diagnostic procedure.
	• CFI-EFI	• TP Sensor Malfunction.	• Go to to EEC-IV Diagnostics.
		• Plugged fuel injector.	• Clean injectors. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only.
			Return to Routine 202 or 207, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Low Idle Speed, Stalls on Decel or Quick Stop	• Carburetor	• Idle speed adjustment.	• Check and adjust as required.
		• Throttle positioner not functioning.	• Check and service as required.
		• Venturi valve sticking, **7200 only.**	• Check and service as required.
		• Feedback motor malfunctioning, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Clogged air bleeds or idle passages.	• Remove and clean with solvent and compressed air.
		• Venturi Valve diaphragm leaks, **7200 only.**	• Replace diaphragm.
		• Leaking intake manifold or carburetor gaskets.	• Replace leaking gaskets.
		• Dashpot failure.	• Replace dashpot.
		• ISC motor inoperative.	• Check ISC motor. Refer to Section 14 (Aisan Carburetor).
	• CFI-EFI	• ISC inoperative.	• Go to EEC-IV Diagnostics.
		• TP Sensor malfunction.	• Go to adjustment procedure.
		• Base idle adjustment.	• Go to adjustment procedure.
			Return to Routine 206, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Lack of Power	• Carburetor	• Sticking venturi valve or leaking diaphragm, **7200 only.**	• Check, clean and service as required.
		• Venturi valve limiter out of adjustment, **7200 only.**	• Adjust as required.
		• Accelerator pump not functioning or improper adjustment. Check visually for fuel discharge.	• Check and service as required.
		• Control vacuum regulator off specification (high), **7200 only.**	• Check and adjust as required.
		• Plugged pump discharge nozzle.	• Clean nozzle with compressed air.
		• Leaking fuel at pump discharge nozzle screw gasket.	• Replace gasket.
		• Improper float setting.	• Adjust float level.
		• Main metering system plugged, contaminated fuel.	• Clean fuel system as required.
		• Venturi Valve Diaphragm failure, **7200 only.**	• Replace diaphragm.
		• Feedback motor, **7200 only.**	• Check for smooth operation. Refer to Section 3.
		• Fuel filter or fuel delivery lines restricted.	• Check fuel delivery. Refer to Group 24 or Section 11.
		• Temperature Compensated Accelerator Pump Malfunction.	• Check function and service as required. Refer to Section 3.
		• Carburetor feedback system malfunction.	• Refer to appropriate MCU or EEC Diagnostic procedure.
		• Secondary throttle plates stuck closed.	• Check and service as required. Refer to Group 24.
	• CFI-EFI	• Damaged fuel pressure regulator.	• Refer to Section 11 or Group 24.
		• TP sensor malfunction	• Go to EEC-IV Diagnostics.
		• Plugged fuel injectors.	• Clean injectors. Test if necessary. Use Rotunda injector Tester/Cleaner 113-00001 or equivalent, EFI only.
			Return to Routine 209, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Poor Mileage	• Carburetor	• Feedback motor malfunction, **7200 only.**	• Check and service as required. Refer to Section 3.
		• Carburetor feedback system malfunction.	• Refer to appropriate MCU or EEC Diagnostic Procedure.
		• Cold enrichment, or choke system malfunctioning.	• Check choke system function and adjustment.
		• Purge vent control valve malfunctioning.	• Check evaporative control valve and evaporative system. Refer to Section 7.
	• CFI-EFI	• Injector O-ring seal leaking	• Perform injector leakage test.
			Return to Routines 213, 219, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Reduced Top Speed/Power	• Carburetor	• Venturi valve sticking, **7200 only.**	• Check, clean and service as required.
		• Incorrect venturi WOT opening, **7200 only.**	• Adjust as required.
		• Binding throttle linkage.	• Clean and service as required.
		• Venturi valve diaphragm leaking, **7200 only.**	• Check and service as required.
		• Low fuel pump volume.	• Test fuel delivery system. Refer to Group 24, or Section 11.
		• Metering rods bent, **7200 only.**	• Service as required.
		• Incorrect float drop.	• Adjust as required.
		• Clogged fuel filter.	• Replace as required. Check cause.
		• Power valve stuck closed.	• Replace power valve.
		• Improper or obstructed main jets.	• Clean or replace as required. **For 7200, replace carburetor.**
		• Inoperative secondary system on two-staged carburetors.	• Check shaft and plate alignment, binding linkage, service as required.
		• Feedback motor inoperative.	• Check for smooth operation. Refer to Section 3.
		• Carburetor feedback system malfunction.	• Refer to appropriate MCU or EEC Diagnostic procedure.
	• CFI-EFI	• Plugged injectors.	• CFI only — Check for fuel injector discharge at injector. Clean injector. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only.
		• Damaged fuel pressure regulator.	• Refer to Group 24 or Section 11.
		• TP Sensor malfunction.	• Go to EEC-IV Diagnostics.
			Return to Routine 209, Section 2.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Surge at Cruise	• Carburetor	• Restricted fuel delivery or fuel filter.	• Replace filter. Refer to Section 11.
		• Improper fuel level.	• Adjust float level and drop, check float hinge pin for binding; service and adjust as required.
		• Low fuel pump volume or pressure.	• Test fuel delivery system. Refer to Group 24 or Section 11.
		• Contaminated fuel.	• Drain fuel, clean as required.
		• Damaged metering rods, **7200 only.**	• Replace.
		• Feedback motor inoperative.	• Check for smooth operation. Refer to Section 3.
		• Blocked air bleeds.	• Clean and service as required.
		• Fuel leaks around carburetor.	• Service as required.
	• CFI-EFI	• Plugged or leaking fuel injectors.	• CFI only — Check injector operation. Clean injector. Test if necessary. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only.
		• Damaged fuel pressure regulator.	• Go to Section 11 or Group 24.
			Return to Routine 210, Section 2.

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• Flooding, Black Exhaust Smoke, Gas Smell	• Carburetor	• Float problem.	• Service as required.
		• Damaged fuel inlet or sticking needle.	• Service as required.
		• Excessive fuel pressure.	• Check fuel pressure. • Service fuel return line
	• CFI-EFI	• Excessive fuel pressure.	• Service fuel pressure regulator. • Service fuel return line.
		• Injector stuck open, or O-ring seal leaking.	• Check injector operation. Use Rotunda Injector Tester/Cleaner 113-00001 or equivalent, EFI only. • Perform leakage check.

CFI, EFI & Carburetor System Troubleshooting

SYMPTOM	SYSTEM	POSSIBLE SOURCE	ACTION
• High Idle Speed Engine Diesels or Idles too Fast	• Carburetor	• Not coming off fast idle cam.	• Check linkage for proper operation and adjustment; clean, service, or replace as required.
	• Carburetor CFI-EFI	• Incorrect idle base adjustment.	• Perform all idle adjustments. Go to adjustment procedures.
		• Vacuum leaks.	• Check all vacuum lines and connections.
		• ISC motor inoperative.	• Check ISC motor. Refer to Section 14 (Aisan Carburetor).
		• Sticking throttle plate or linkage.	• Visual check for proper operation.
			Return to Routine 211, Section 2.

Idle Speed Adjustment

Preliminary Note:

The curb idle and fast idle speeds are controlled by the EEC-IV processor and the idle speed control device.

Vehicle Prechecks:

1. Verify:
   - The cooling system is filled.
   - The throttle plate and throttle bore are clean.
   - Throttle is not sticking or binding.
   - The throttle lever is resting on the throttle stop screw (EFI only).
   - There are no vacuum leaks.
   - Heater and accessories off.
   - Engine at operating temperature.
2. Do:
   - Place transmission in PARK or NEUTRAL.
   - Apply the parking brakes (automatic brake release disconnected where applicable).
   - Block the wheels.
   - Check curb idle rpm, automatic transmission in DRIVE, manual transmission in NEUTRAL.

   NOTE: If electric cooling fan comes on, wait until it turns off.
3. If a rough idle problem exists, perform EEC-IV diagnostics and resolve any vehicle malfunctions that are indicated by service output code. (Ignore this step if you were sent here from a Pinpoint Test in Section 19).
4. **EFI only** except 7.5L engine check EEC controlled curb idle rpm, if it is not to specification, shut engine off. Disconnect the negative (–) terminal of the battery for three minutes minimum then reconnect it. Let engine idle for five minutes with automatic transmission in DRIVE.
5. Check EEC controlled curb idle rpm, if it is not to specification SHUT ENGINE OFF and go to the appropriate adjustment procedure for base idle rpm. Follow the procedure from top of the page in sequence to the bottom of the page.

Idle Speed Adjustment

CFI ENGINES

1. Engine off, remove air cleaner. Connect jumper wire between self-test input (STI) and signal return pin on the self test connector (Figure 1).
2. Turn ignition key on but do not start engine. ISC plunger will retract within 10-15 seconds. If ISC plunger does not retract, perform EEC-IV diagnostics.
3. Disconnect Vehicle Harness from the ISC motor. Turn ignition key off and remove jumper wire.
4. Start engine, check idle rpm. If it is not:

   1.9L: 600 + 50 rpm continue with Step 9.

   2.5L: ATX 50 rpm less than specified on Decal continue with Steps 5, 6, 7 and 8.

   2.5L: MTX 100 rpm less than specified on Decal continue with Steps 5, 6, 7 and 8.
5. Turn ignition key off. Remove CFI assembly from vehicle.
6. Remove the plug that covers the throttle stop adjusting screw (Figure 3).
7. Remove the old throttle stop adjusting screw and install a new screw.
8. Install the CFI assembly. Start engine and let it stabilize.
9. Adjust throttle stop adjusting screw (Figure 2 or 3). Refer to Step 4 for idle rpm.
10. Shut engine off and reconnect vehicle harness to the ISC motor. Reinstall air cleaner.

Idle Speed Setting Procedures

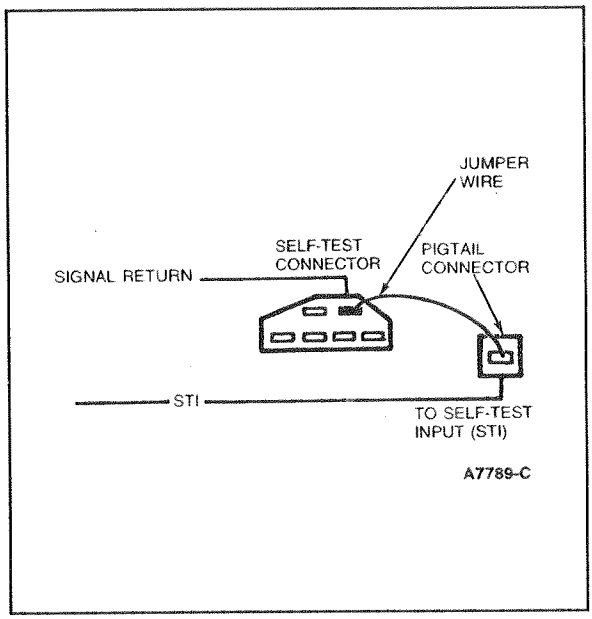


Figure 1 1.9L CFI and 2.5L CFI HSC

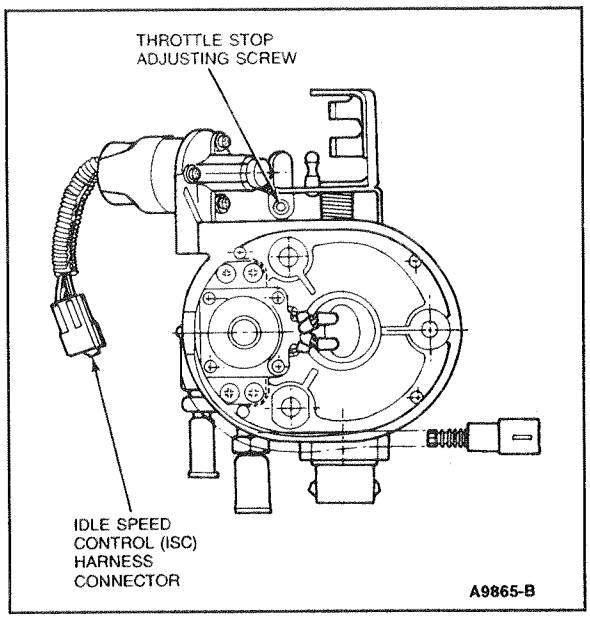


Figure 2 1.9L CFI

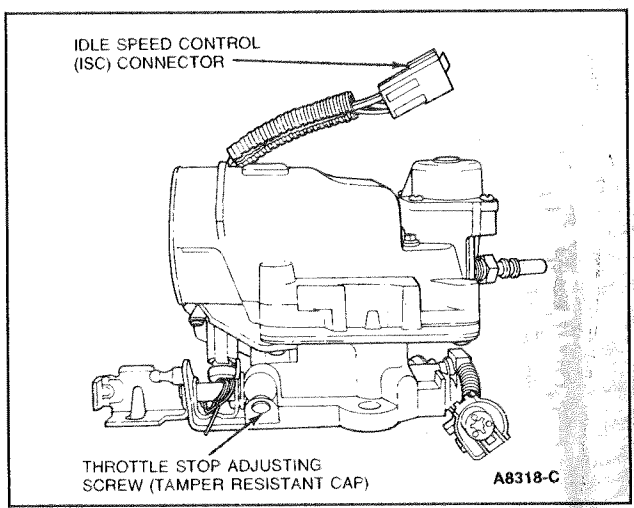


Figure 3 2.5L CFI HSC

Idle Speed Adjustment Procedures

ADJUSTMENT PROCEDURE FOR PASSENGER CAR	1.9L EFI	2.3L EFI HSC	2.3L EFI OHC	2.3L EFI TURBO	3.0L EFI	3.8L EFI RWD	3.8L EFI AXOD	5.0L SEFI
REFER TO FIGURE:	1	2	3	3	4	5	5	6
1. Unplug spout line and verify that ignition timing is Base + 2 degrees BTDC.		X			X			
2. Remove PCV hose at the PCV valve and install .200 inch diameter orfice (Tool T86P-9600-A) or equivalent.		X			X			
3. Disconnect Idle Speed Control-Air Bypass Solenoid.	X	X	X	X	X			
4. Start engine and run at: rpm/sec.	2000/60	2500/30	1500/20	2000/120		2500/30	2500/30	1800/30
5. Place automatic transmission in DRIVE, manual transmission in NEUTRAL.		X			X	X	X	X
6. Check/adjust idle rpm: • Turn the throttle plate stop screw to:	950 ± 50	1, 2	525 ± 25	750 ± 50	760 ± 20			
• Back out the throttle stop screw to --- ± --- rpm then back out an additional 1/2 turn **NOTE: Adjustment must be completed within --- seconds, see note below. Shut engine off and repeat Steps 4, 5, 6.**	120					550 ± 20	3, 4	5, 6, 7
7. Shut engine off and disconnect battery for 3 minutes minimum.					X			
8. Engine off reconnect spout line.		X			X			
9. Remove orfice from PCV hose and reconnect to PCV valve.		X			X			
10. Engine off reconnect idle speed control-air bypass solenoid verify the throttle is not stuck in the bore and linkage not preventing throttle from closing.	X	X	X	X	X			
11. Repeat Step 4, 5 and check curb idle speed.	X	X	X	X	X			
12. On Automatic Overdrive Transmission (AOD) applications check TV pressure adjustment.					X			

NOTE: For Step 6: After the time frame idle speed may change due to strategy parameter.

1 1025 ± 50 rpm 2.3L HSC ATX
2 1550 ± 50 rpm 2.3L HSC MTX
3 700 ± 20 rpm 3.8L AXOD calibration 8-16C & 8-16Q
4 640 ± 20 rpm 3.8L AXOD calibration 8-16D & 8-16R
5 575 ± 20 rpm 5.0L A/T Base Engine
6 625 ± 20 rpm 5.0L A/T HI-Output Engine
7 700 ± 20 rpm 5.0L M/T HI-Output Engine

Idle Speed Adjustment Procedures

ADJUSTMENT PROCEDURE FOR TRUCK	2.3L EFI OHC	2.9L EFI	3.0L EFI	4.9L EFI	5.0L EFI	5.8L EFI	7.5L EFI
REFER TO FIGURE —	7	8	4	9	9	9	10
1. Disconnect idle speed control-air bypass solenoid.	X	X	X				X
2. Place transmission in NEUTRAL or PARK, run engine at: rpm/sec	2500/30	2500/30	2500/30	1800/30	1800/30	1800/60	2500/30
3. Let engine idle if it stalls turn throttle stop screw one turn clockwise and repeat Steps 2 and 3.			X			X	
4. Place automatic transmission in DRIVE, manual transmission in NEUTRAL.	Neutral	X	X	X	X	X	Neutral
5. Check/adjust idle rpm: • Turn the throttle plate stop screw to - - - + - - - rpm	625 ± 25	700	A 625 ± 25 M 725 ± 25			A 625 ± 25 M 650 ± 25	650
• Back out the throttle plate stop screw until - - - + - - - rpm then back out an additional 1/2 turn **NOTE: Adjustment must be completed within - - - seconds, see note below; shut engine off and repeat Steps 2, 3, 4, and 5.**				A 610 ± 40 M 710 ± 40 40	A 625 ± 25 M 700 ± 25 40	40	30
6. Shut engine off and repeat Steps 2, 3, 4 and 5.			X				
7. Shut engine off and disconnect battery for 3 minutes minimum.		X	X	X			
8. Engine off reconnect idle speed control-air bypass solenoid, verify the throttle is not stuck in the bore and linkage not preventing throttle from closing.	X	X	X	X			X
10. Repeat Steps 2, 3, let engine idle for 2 minutes then repeat Steps 2, 3 again let engine idle for 1 minute and check curb idle rpm	X	X	A 700 ± 50 M 800 ± 50	X			
11. On Automatic Overdrive Transmission (AOD) applications check TV pressure adjustment.				X			

NOTE: For Step 5: After the time frame idle speed may change due to strategy parameter.

Idle Speed Setting Procedures

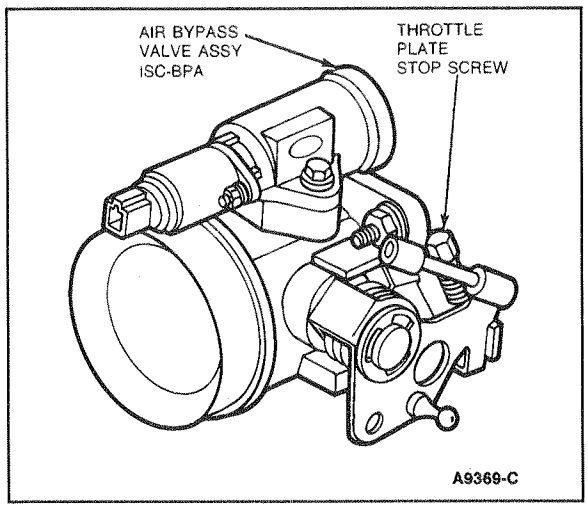


Figure 1 1.9L EFI

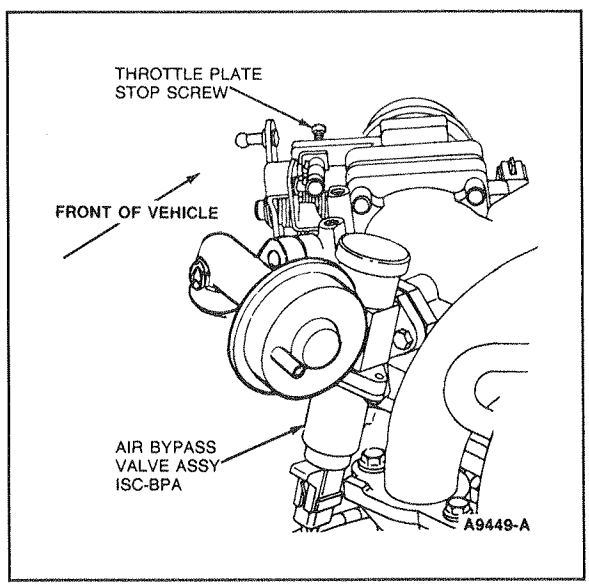


Figure 2 2.3L EFI HSC

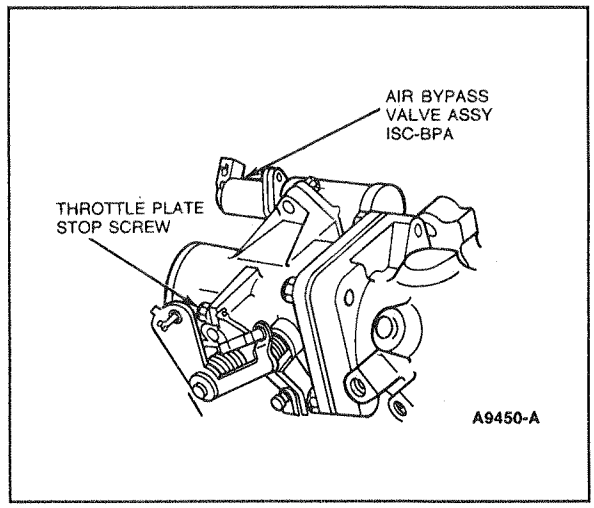


Figure 3 2.3L EFI OHC Car and 2.3L EFI Turbo

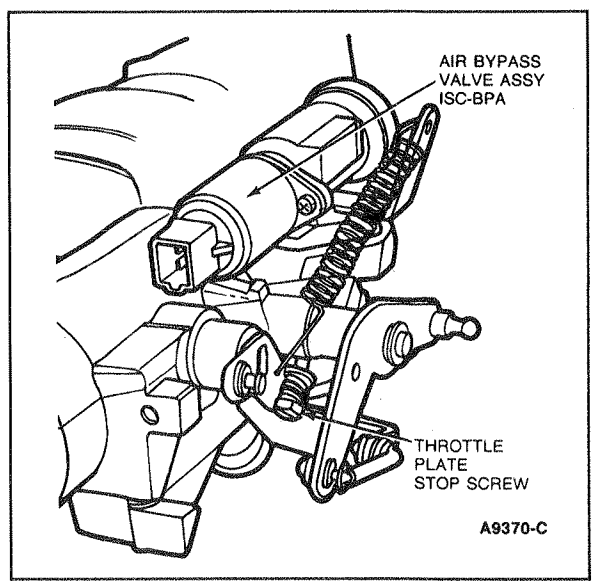


Figure 4 3.0L EFI

Idle Speed Setting Procedures

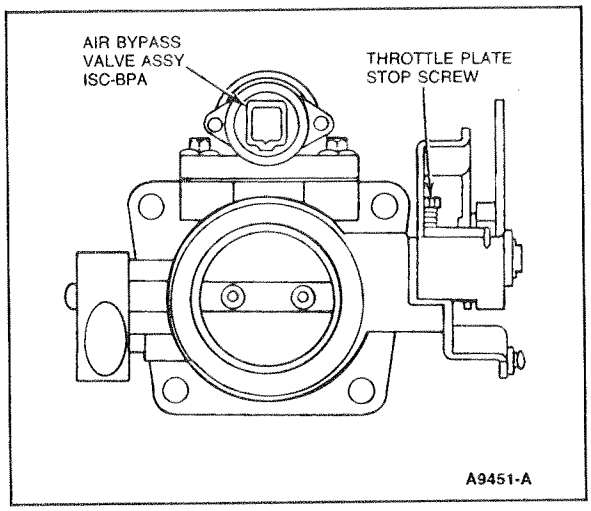


Figure 5 3.8L EFI AXOD/RWD

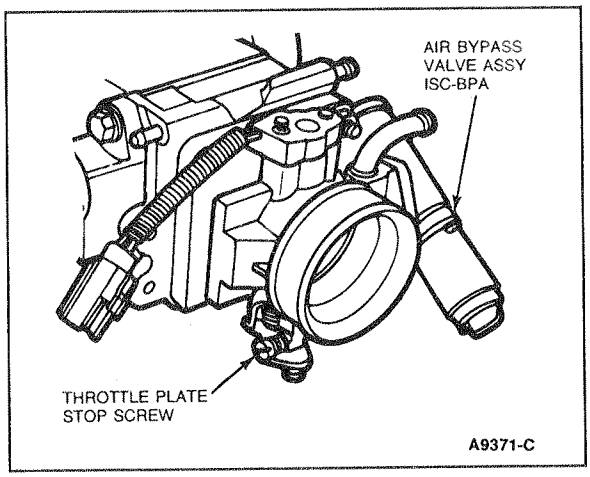


Figure 6 5.0L SEFI

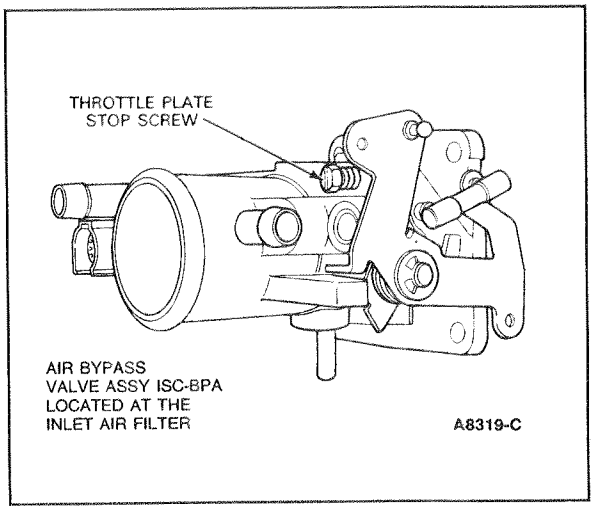


Figure 7 2.3L EFI OHC Truck

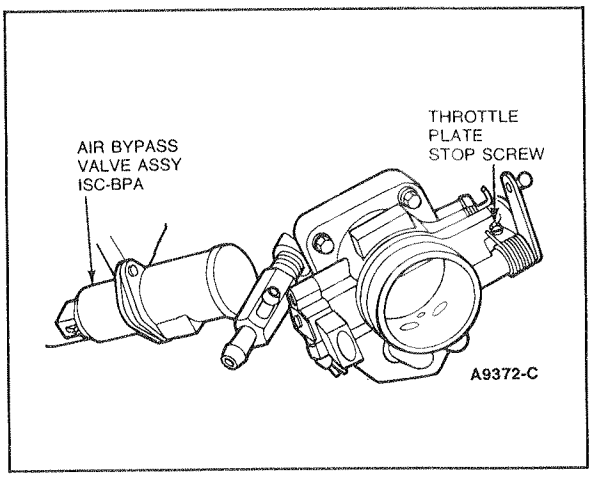


Figure 8 2.9L EFI

Idle Speed Setting Procedures

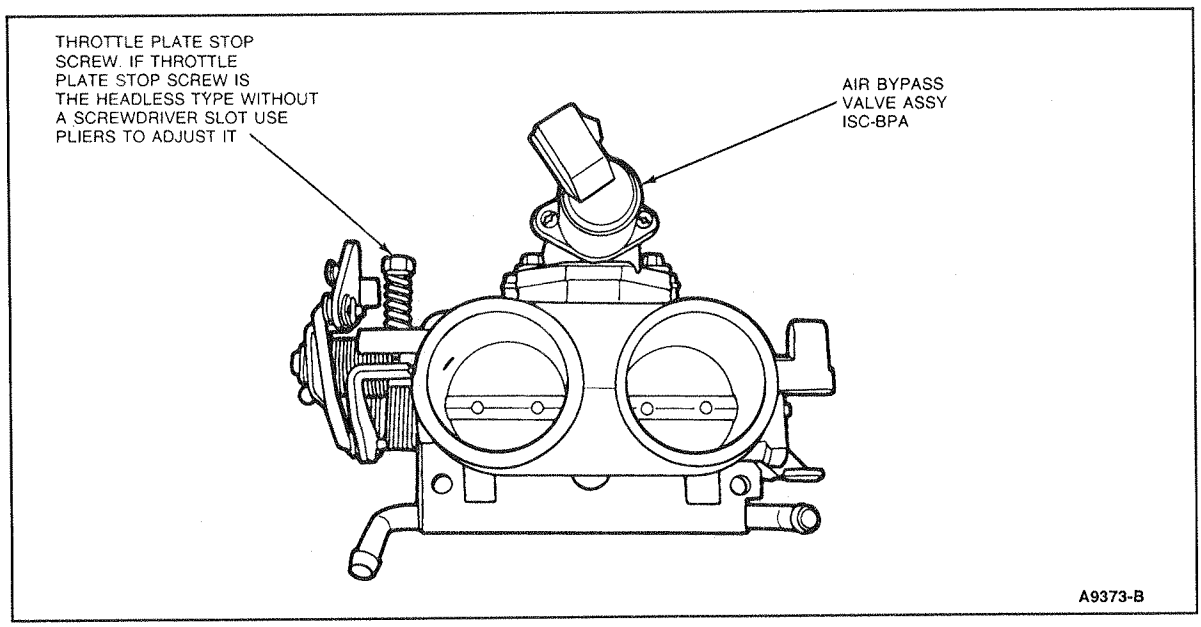


Figure 9 4.9L, 5.0L and 5.8L EFI

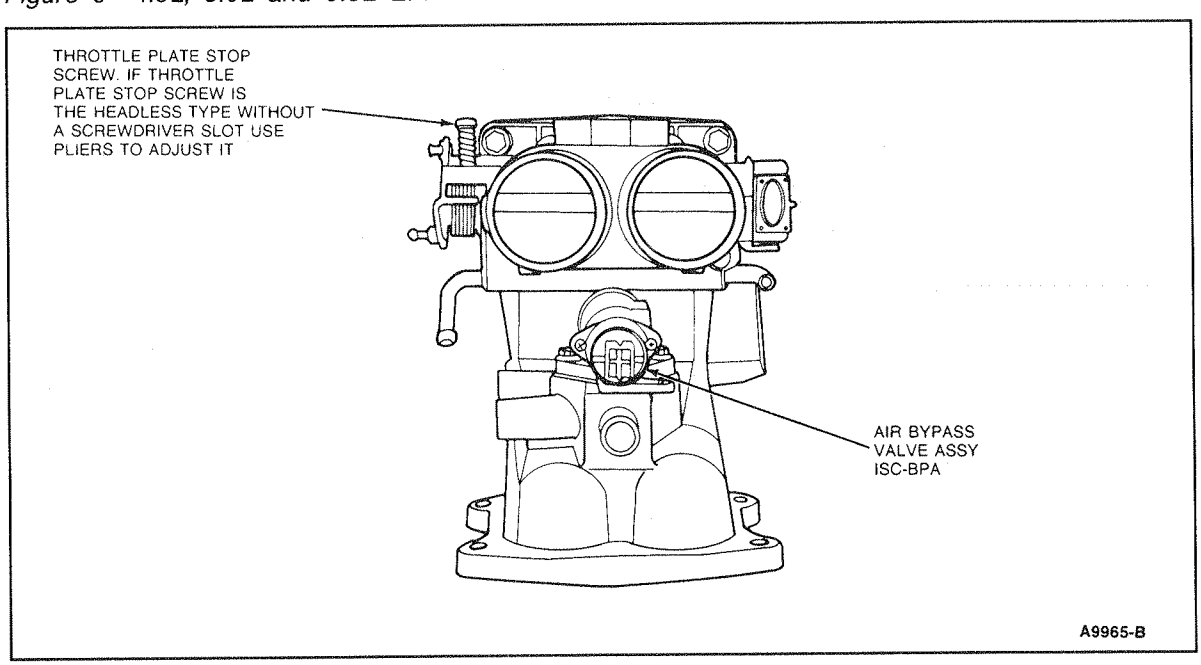


Figure 10 7.5L EFI

Idle Speed Setting Procedures

TRUCK, UNDER 8500 GVW

2.0L Engine w/Aisan Carburetor and Electronic Idle Speed Control (ISC) — Curb Idle Speed and Fast Idle Speed Checks/Adjustments

Instructions

1. Idle Speed Verification Procedure
   a. Place the transmission in NEUTRAL.
   b. Bring engine to normal operating temperature.
   c. Turn off all accessories.
   d. Verify engine idle speed as specified on the VECI decal. No adjustment required.
2. Closed Throttle Fast Idle rpm/ISC Max Extension Adjustments
   a. Turn the ignition key to the OFF position.
   b. Disconnect ISC DC motor connector. Disconnect the vacuum hose at the fast idle cam breaker (FICB) and plug (Figure 2). Connect insulated jumper clip leads from the battery terminals to the DC motor connector pins (Figure 3). Observe motor shaft movement with battery voltage applied.

      CAUTION: Battery voltage must not be applied to the idle tracking switch (ITS) terminals. Isolate the ITS terminals with electrical tape during this test.

      NOTE: If the motor shaft does not move, refer to Section 14 for diagnosis.
   c. If the motor extends instead of retracting, reverse polarity across the DC motor connector pins. Disconnect jumper leads after motor has fully retracted.
   d. Restart engine and check closed throttle rpm (700 or less). If adjustment is required remove tamperproof cap. Adjust throttle stop adjusting screw (Figure 2).
   e. Place the fast idle lever on the specified step (1st step) on the fast idle cam (Figure 2).
   f. Without touching the accelerator pedal: check/adjust fast idle rpm to specification. Adjust the fast idle adjusting screw (Figure 2).
   g. Rev the engine momentarily, allowing engine to return to closed throttle speed.
   h. Reconnect jumper leads to ISC motor terminals.
   i. If the motor retracts instead of extending, reverse polarity across the DC motor connector pins. Disconnect jumper leads after motor has fully extended.
   j. Check/adjust ISC full stroke speed to 2000 ± 200 rpm. Adjust the full stroke speed adjusting screw (Figure 1).
   k. Remove electrical tape from ITS terminals of DC motor connector and reconnect ISC DC motor to engine wiring harness. Remove plug from the FICB vacuum hose and reconnect.
3. Idle Speed Control (ISC) Function Check.

Idle Speed Setting Procedures

NOTE: If idle speed does not adjust properly in Steps a or d, perform the diagnostic routines described in Section 14.

a. Turn off all accessories. Idle speed should adjust to the speed specified on the VECI decal.
b. Turn ignition switch off.
c. Disconnect engine coolant temperature (ECT) switch.
d. Restart engine. Idle speed should adjust to 1200 ± 75 rpm.
e. Turn ignition switch off, then reconnect ECT switch.

NOTE: After adjustments are completed, reconnect all parts.

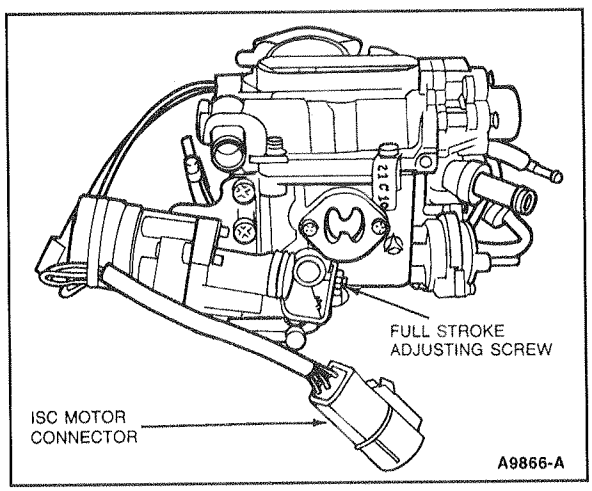


Figure 1 2.0L Engine Carburetor Full Stroke Adjustment

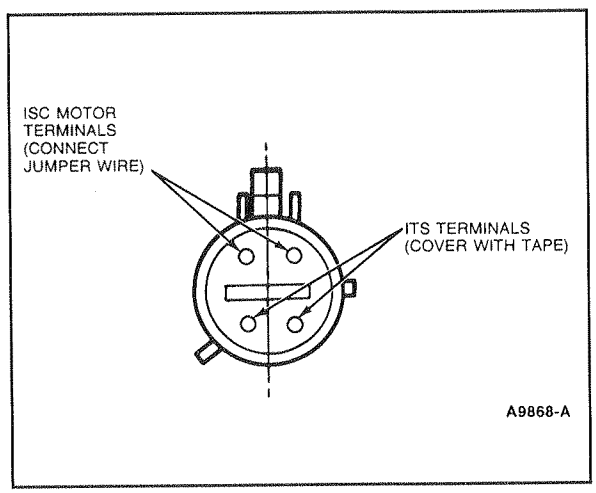


Figure 3 2.0L Engine ISC Motor Connectors

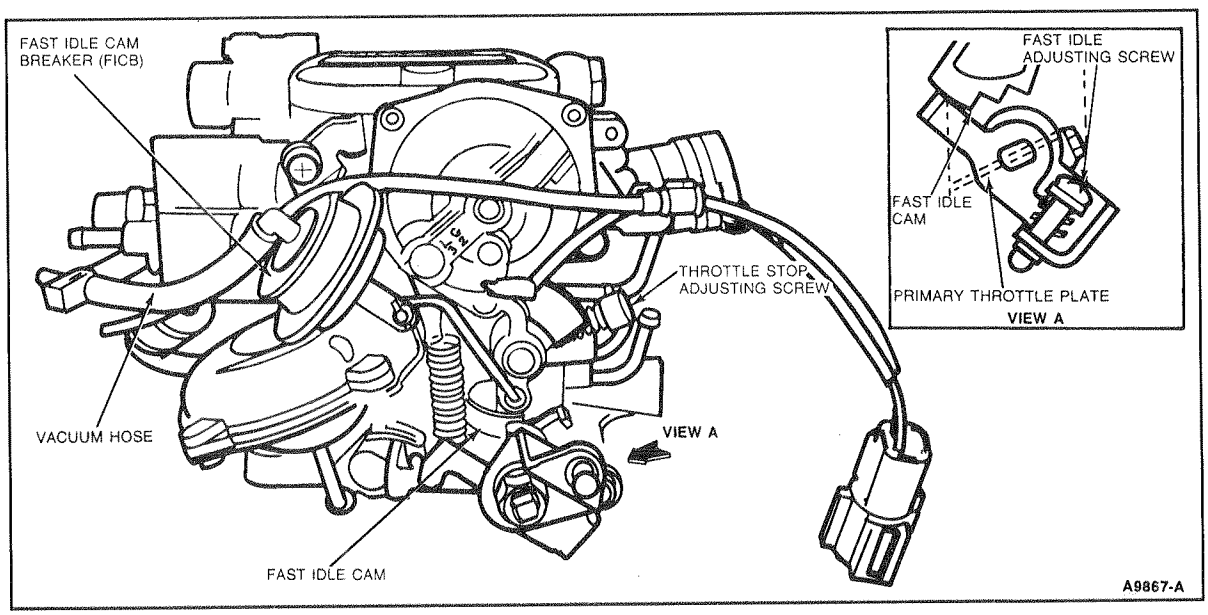


Figure 2 2.0L Engine Carburetor Fast Idle and Throttle Stop Adjustment

Idle Speed Setting Procedures

TRUCK, OVER 8500 GVW

6.1L & 7.0L Engines — Fast Idle RPM

Instructions	6.1L 2380EG-2V	7.0L 4190EG-4V
1. Stabilize engine temperature.	X	X
2. Place the vehicle in PARK or NEUTRAL, A/C in OFF position, and set parking brake.	X	X
3. Remove air cleaner.	X	X
4. Disconnect and plug evaporative emission purge valve hose.	X	X
5. Disconnect and plug EGR valve vacuum hose.	X	X
6. Bypass vacuum retard delay valve in distributor advance line with vacuum hose.	X	X
7. Depress accelerator pedal fully, pull choke control to full choke and release accelerator pedal.	X	X
8. Check/adjust choke plate pulldown clearance.		
a. Move the choke operating lever to the first detent, Figure	1	5
b. Measure the choke plate pulldown clearance using a size drill. Place the drill between the air horn wall and lower edge of the choke plate.	.200 in	.234 in
c. Adjust the clearance if necessary by bending the choke link, Figure	1	3
9. Check/adjust fast idle rpm. Insert a 0.375-inch gauge between choke plate and air horn in the down-stream side of the choke plate. Adjust fast idle rpm by turning fast idle adjusting screw, Figure	1	4
10. Remove the plug from the EGR vacuum hose and reconnect.	X	X
11. Remove bypass hose and reinstall the vacuum retard delay valve.	X	X
12. Remove the plug from the evaporative emission purge valve hose and reconnect.	X	X
13. Reinstall air cleaner.	X	X

Idle Speed Setting Procedures

TRUCK, OVER 8500 GVW

6.1L & 7.0L Engines — Curb Idle Speed Decel Throttle Control Speed and Anti-Dieseling Set Speed

Instructions	6.1L 2380EG-2V	7.0L 4190EG-4V
1. Stabilize engine temperature.	X	X
2. Place the transmission in PARK or NEUTRAL, A/C in OFF position, and set parking brake.	X	X
3. Disconnect shed system hose and hot and cold air supply from air cleaner.	X	X
4. Remove air cleaner.	X	X
5. Adjust curb idle, if necessary, using the curb idle adjusting screw with transmission in NEUTRAL for manual and in DRIVE for automatic. Refer to Figure	1	2
6. Rev the engine momentarily, recheck curb idle and adjust if necessary.	X	X
7. With solo-pot collapsed (de-energized), set the anti-dieseling speed if necessary by adjusting the screw until specified rpm is attained. Refer to Figure	1	2
8. Reinstall the air cleaner.	X	X
9. Reinstall shed system hose and hot and cold air supply systems.	X	X

Idle Speed Setting Procedures

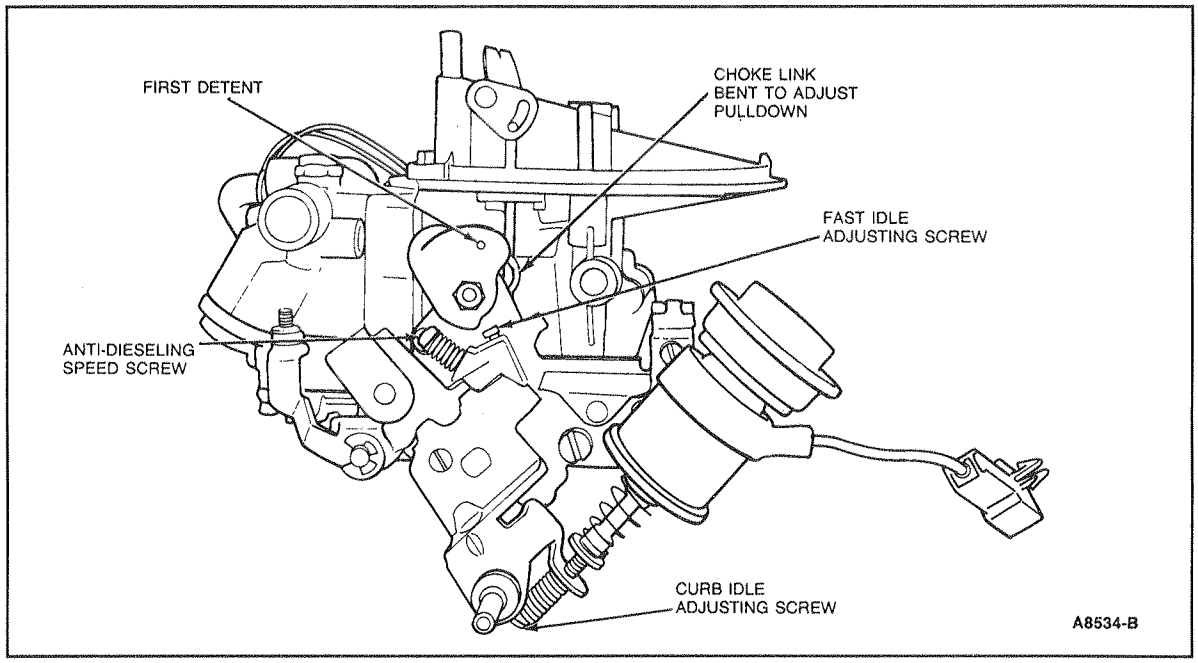


Figure 1 6.1L Engine with 2380 EG2V-Curb Idle, Anti-Dieseling and Fast Idle Speed Adjustments

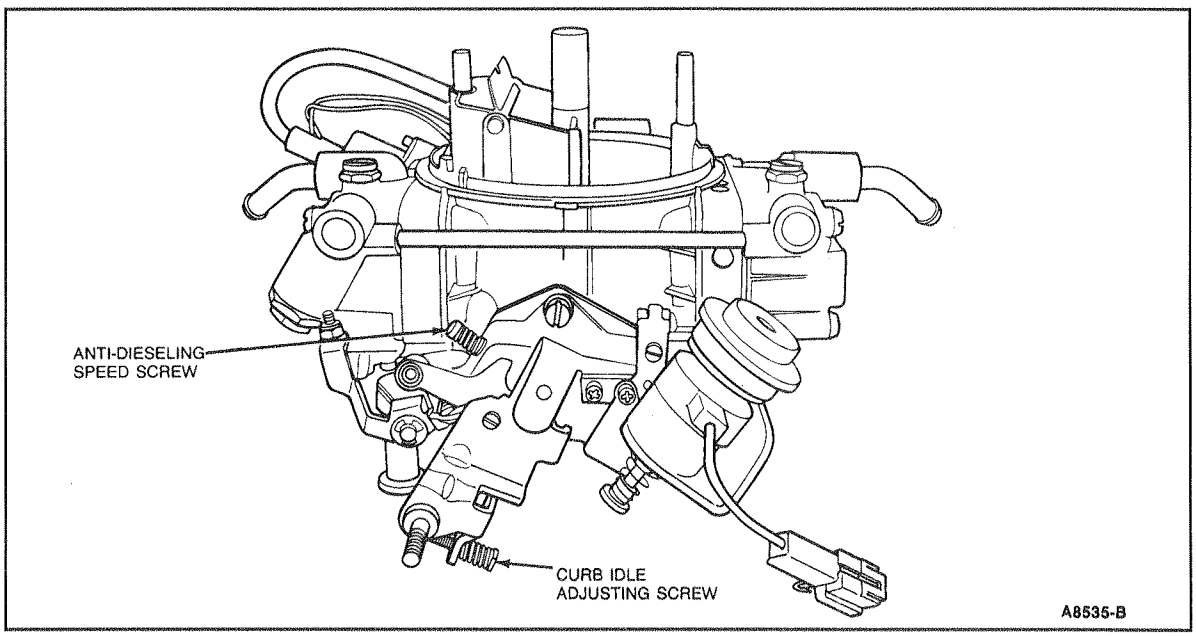


Figure 2 6.1L and 7.0L Engines with 4190EG-4V-Curb Idle and Anti-Dieseling Adjustments

Idle Speed Setting Procedures

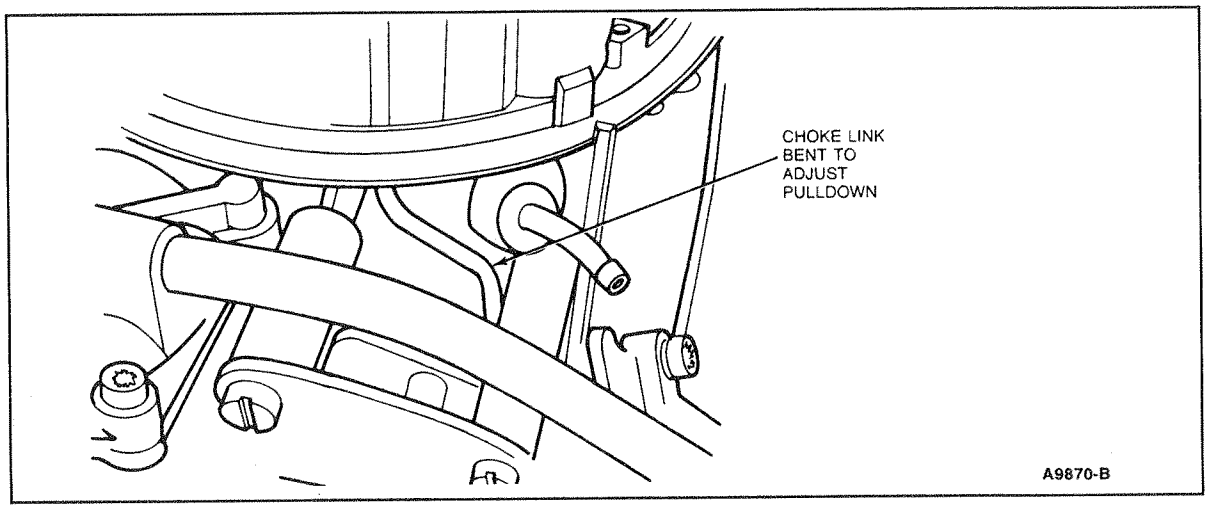


Figure 3 7.0L Engines with 4190EG-4V — Choke Plate Pulldown Clearance Adjustment

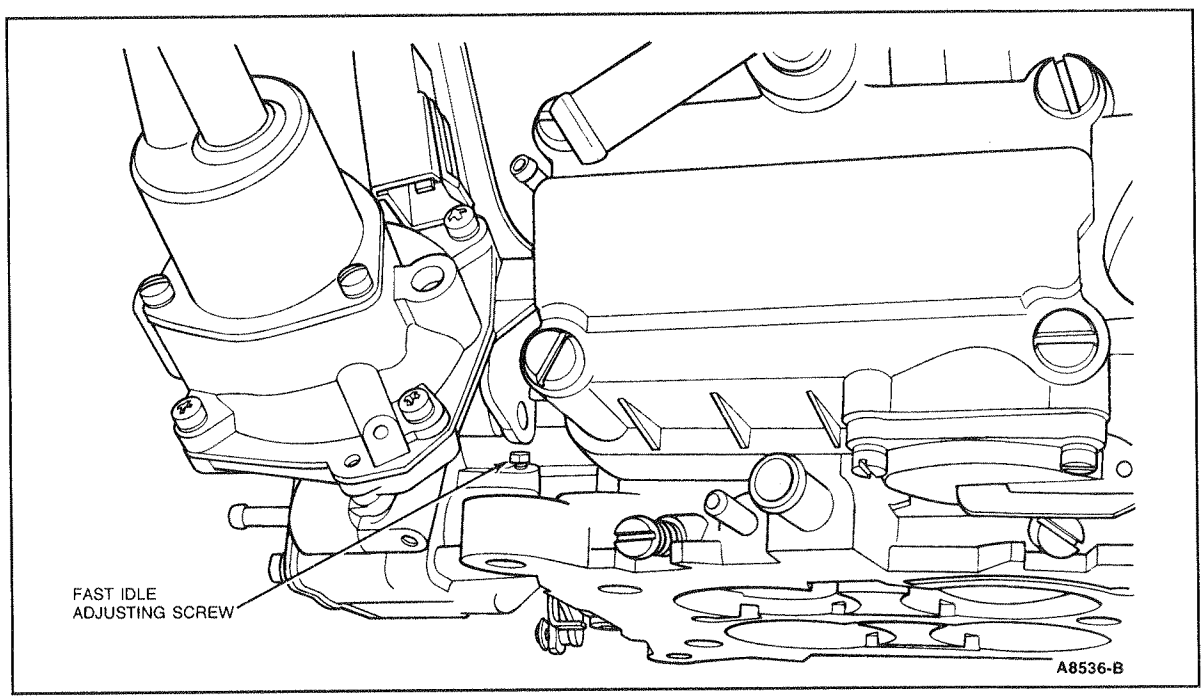


Figure 4 7.0L Engines with 4190 EG-4V-Fast Idle Speed Adjustment

Idle Speed Setting Procedures

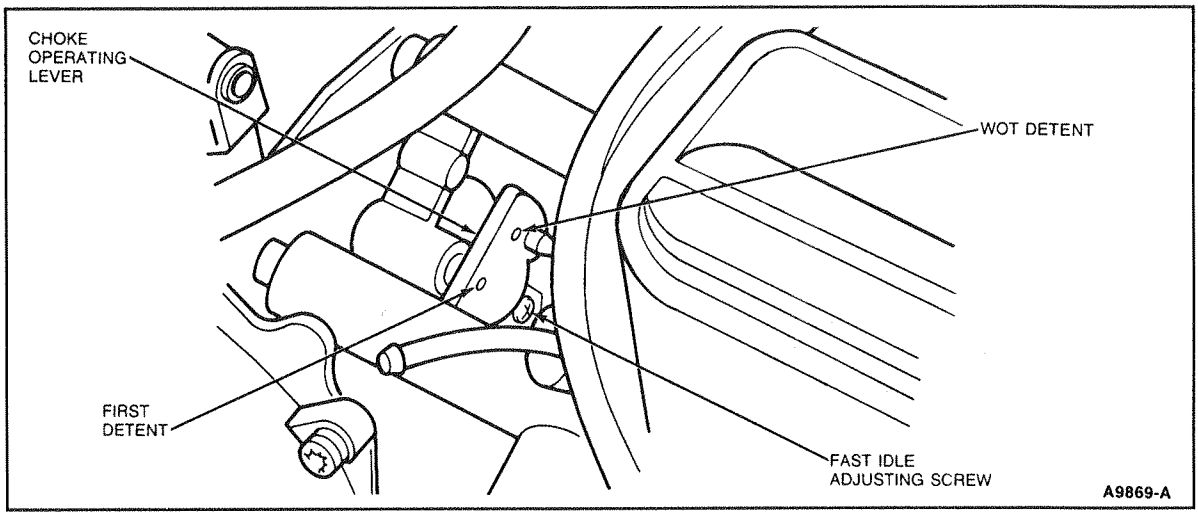


Figure 5 7.0L Engines w/4190EG-4V — Fast Idle Speed Adjustment

Idle Mixture Setting Procedures

IDLE FUEL MIXTURE — PROPANE ENRICHMENT METHOD

2.0L TRUCK UNDER 8500 GVW w/Aisan Carburetor

NOTE: This procedure is for 2.0L Truck engines only. If CO and HC are not within specification, go to Diagnostic Routines in Section 2. Also refer to Maintenance Schedule.

I. Vehicle Preparation

A. Apply the parking brake and block the wheels.

B. Connect a tachometer, Rotunda Model 059-00001, 099-00001 or equivalent.

C. Disconnect the flexible fresh air tube from the air cleaner duct or adapter. Using propane enrichment Tool T75L-9600-A or equivalent, insert the tool hose approximately 3/4 of the way into the duct or fresh air tube. If necessary, secure the hose with tape.

D. Disconnect and plug the hose at the air bypass valve.

E. Disconnect and plug the hose between the purge valve and the spacer at the purge valve.

II. Propane Enrichment Method

NOTE: Leave all vacuum signal hoses attached to the air cleaner assembly when relocating the assembly to perform carburetor adjustments. The air cleaner assembly must be in place, however, when measuring engine speeds.

CAUTION: Prolonged engine idling can result in catalyst overheating and excessive underbody temperatures.

A. Verify engine timing is set to specification — reset if necessary, Section 15.

B. Verify that the curb idle speed is being controlled to specification. Then, electrically disconnect idle speed control (ISC) motor from wiring harness.

C. Place A/C-heat selector in the OFF position and verify that lamps are off.

NOTE: Remove PCV valve from grommet, locate the crankcase closure hose and disconnect at the air cleaner end (allowing the PCV valve and closure hose to vent to underhood air during idle fuel mixture check).

D. With the transmission in NEUTRAL, run the engine at approximately 2500 rpm for 15 seconds before each mixture check. If check is not completed within 60 seconds, repeat this cleanout Step.

E. With the engine idling at normal operating temperature, **gradually** open the propane tool valve and watch for engine speed gain on the tachometer. When the engine speed reaches a maximum and then begins to drop off, note the amount of speed gain. (Propane cartridge must be in vertical position).

NOTE: If the engine speed will not drop off, check the propane cartridge gas supply. If necessary repeat Steps D & E with a new propane cartridge gas supply.

Idle Mixture Setting Procedures

F. Compare measured speed gain to specified speed gain.*

1. If the measured speed gain is within specification, proceed to Step H.

   NOTE: The carburetor assembly is equipped with a tamper-resistant idle adjustment feature, the carburetor must be removed from the vehicle. Refer to Shop Manual, Group 24 for removal of the above feature.

   NOTE: If it is determined that idle fuel mixture adjustment will be necessary, adjust the mixture according to the reset rpm specification.

2. If the measured speed gain is higher than the speed gain specification:*

   Turn the mixture screw counterclockwise (rich) and simultaneously repeat Steps D and E until the measured-speed rise meets the reset rpm specification:* After final adjustment, proceed to Step G.

3. If the measured speed gain is lower than the speed gain specification:*

   Turn the mixture screw clockwise (lean) and simultaneously repeat Steps D and E until the measured speed rise meets the reset rpm specification.* After final adjustment, proceed to Step G.

4. If there is no rpm rise and the minimum speed gain specification is "0" rpm, perform the following speed drop test:

   NOTE: Speed drop test information is specified with the artificial enrichment requirements whenever the minimum speed gain specification is "0" rpm.*

   a. While watching the tachometer, adjust the mixture screw 1/4 turn clockwise (lean). Note the drop in engine speed.

   b. If the measured speed drop is greater than "0" and less than or equal to 40 rpm, proceed to Step G.

   c. If the measured speed drop is more than 40 rpm, return the mixture screw to the position before adjustment. Proceed to Step G.

   d. If the measured speed drop is still "0" rpm repeat steps a, b, and c.

G. The carburetor fuel air adjustment must have the tamper-resistant feature reinstalled, see Section III.

H. Reinstall PCV valve in grommet. Reconnect air bypass valve, purge valve and crankcase closure hose. Reconnect ISC motor to wiring harness.

I. Remove all test equipment. Reconnect all system components, reinstall air cleaner, and tighten the air cleaner wing nut(s) to specification.

III. Removal and Installation for Tamper-Resistant Fuel Air Adjustment Feature:

A. See appropriate carburetor disassembly instructions in Shop Manual, Group 24.

*Refer to the Special Specifications Issue TSB Publications.

Choke Adjustment Procedure

TRUCK

AUTOMATIC CHOKE SYSTEM APPLICATION: 2.0L WITH AISAN CARBURETOR AND ALL-ELECTRIC CHOKE

I. Pre-Check Instructions

A. Apply parking brake and block the wheels.

B. Start the engine, bring to normal operating temperature, and turn off.

C. Remove the air cleaner assembly and plug the vacuum hose(s) to the air cleaner.

II. Freedom of Linkage and System Integrity Check

A. Verify that all vacuum hoses and solenoid wires are properly connected and intact; correct as required. Check torque of carburetor hold-down nuts; retighten to specification, if necessary. Refer to the Special Specifications Issue TSB Publications.

B. Check all carburetor linkages for freedom of operation as follows:

1. Manually depress the throttle lever to one-quarter open position, and rotate the choke plate to the closed position. Release the choke plate; the choke plate should rotate smoothly to the open position. If sticking or binding is exhibited, clean/service/replace/adjust the choke linkage, as required to restore freedom of choke plate movement. If necessary, bring engine to normal operating temperature and recheck linkage freedom.

III. Choke Functional Test

A. To set the choke on high cam, depress the throttle lever to the one-half open position, then push the choke plate completely closed. While holding the choke plate closed, release the throttle lever, then release the choke plate.

B. Cool the choke housing following the choke tester manufacturer's instructions, except as follows:

1. Do not use the manufacturer's choke come-off time specifications if supplied with tester kit.

2. Turn off choke tester or inlet valve momentarily at 15-second intervals until the bimetal closes the choke plate lightly in the air horn.

C. Move the fast idle cam to the kickdown step to avoid excessive engine speed. Choke plate should still be lightly closed in the air horn — recool if necessary. Without touching the throttle, start the engine. Measure the time required for the choke plate to rotate from closed position to full open against the stop.

1. Choke plate rotation time is measured from engine startup until the choke plate reaches the stop in the vertical position.

2. Refer to the Special Specifications Issue TSB Publications for rotation time.

3. If the choke come-off times does not meet specification, allow the engine to return to curb idle speed. Turn the engine off and proceed to Step E.

4. If the choke come-off time meets specification, allow the engine to return to curb idle speed. Turn engine off and proceed to Step D.

NOTE: Do not go to Step E unless choke failed to function properly.

Choke Adjustment Procedure

D. Choke Cap Resistance Test

With an ohmmeter, set to lowest range that will indicate 30-ohms (maximum). Connect one lead of an ohmmeter to choke cap terminal and the other lead to choke cap clamp. Ensure metal-to-metal contact is achieved (not metal-oxide film) and false readings are prevented. The ohm reading should be under 30 but never zero. If the ohm reading is outside this range, start the test over. If this improper reading repeats, the choke cap is defective. The cap should be replaced per Group 24, Shop Manual.

E. Choke Circuit Test

1. Do not perform this test unless choke failed Step C.
2. Disconnect the choke wire at the choke and connect a test lamp in series with the choke wire and ground. With the engine running, if the lamp glows, go to Step 3, if the lamp does not glow, service or replace the choke power relay circuit as required.
3. If the lamp glows in Step 2, check that the choke cap is grounded by connecting one end of a test lamp to the choke cap attaching ring and the other end to the positive terminal of the battery, if the lamp glows, replace the choke cap. If the lamp does not glow correct the poor choke cap grounding.
4. Stop the engine, remove the test lamp.

IV. Carburetor Choke Adjustment

A. Two stage choke pulldown adjustment

Refer to Figure 1.

1. First stage
   a. Set the choke on high cam by depressing the throttle lever to the one-half open position and then pushing the choke plate completely closed. While holding the choke plate closed, release the throttle lever, and then release the choke plate.
   b. Activate the first stage pulldown by applying an external vacuum source (16 in-Hg minimum) to the first stage vacuum connection.
   c. Using a drill of the specified diameter, check the clearance between the lower edge of the choke plate and the air horn wall while applying light finger-pressure to the choke plate in the closing direction. Refer to the Special Specifications Issue TSB for specifications.
   d. If required, adjust by bending the lever as shown in Figure 1. (NOTE: Choke cap must be removed per procedure in Shop Manual, Group 24.)
2. Second Stage
   a. **Continuing** with the above procedure, apply an external vacuum source (16 in-Hg minimum) to the Second Stage vacuum connection.

      NOTE: The external vacuum source must **not** have been removed from the first stage. At this point in the procedure, vacuum is applied to **both** the first-and second-stage simultaneously.
   b. Using a drill of the specified diameter, check the clearance between the lower edge of the choke plate and the air horn wall while applying light finger-pressure to the choke plate in the closing direction. Refer to the Special Specifications Issue TSB for specification.

Choke Adjustment Procedure

c. If required, adjust by turning the Second Stage adjustment screw as shown in Figure 1.

B. De-Choke

Refer to Figure 2.

1. Remove the air cleaner.
2. Hold the throttle plate fully open, and close the choke plate as far as possible without forcing it. Use a drill of the specified diameter to check the clearance between the lower edge of the choke plate and the air horn wall. Refer to the Special Specifications Issue TSB.
3. If the clearance is not within specification, adjust by bending the tang on the throttle lever as shown in Figure 2.

C. Fast Idle Cam Index Setting

Refer to Figure 3.

1. Position the fast idle screw on the second step of the fast idle cam against the shoulder of the high step. Refer to Figure 3.
2. Check the clearance between the lower edge of the choke plate and air horn wall using a drill of specified diameter. Refer to the Special Specifications Issue TSB.
3. If required, adjust by bending the tang as shown in Figure 3.

D. Fast Idle Cam Breaker Adjustment (FICB). Refer to Figure 3.

1. Fully retract the idle speed control motor electrically. Refer to the curb idle speed check/adjustment procedure.
2. Set the throttle on the Hi cam position.
3. Apply 18 in-Hg minimum to the FICB motor (Figure 3).
4. The fast idle lever should now be on Step 3 (low step), of the fast idle cam.
5. Adjust by bending the link.

V. Post-Check Instructions

Reinstall air cleaner assembly and reconnect pertinent vacuum lines. Tighten air cleaner hold-down bolts to specification.

VI. Removal and Installation of Adjustment Limiting Choke Cap

Refer to appropriate carburetor disassembly instructions in Shop Manual, Group 24.

Choke Adjustment Procedure

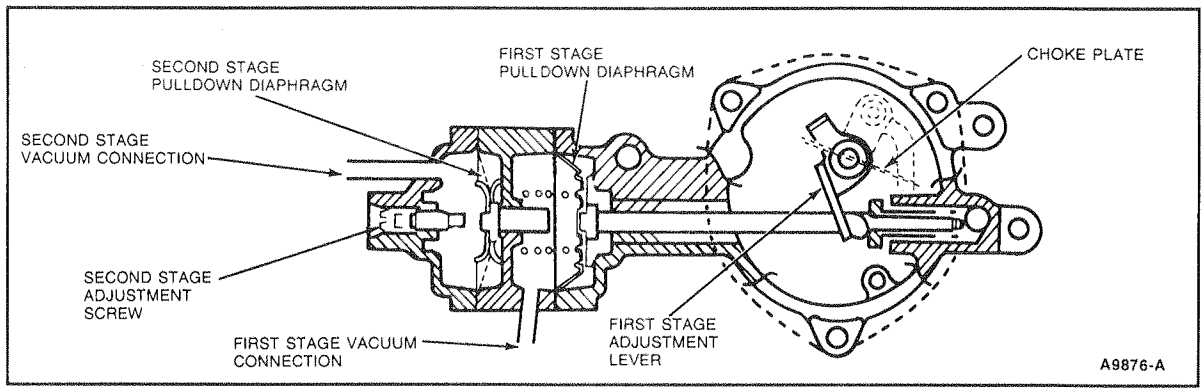


Figure 1 Choke Plate Pulldown — Two — Staged Type

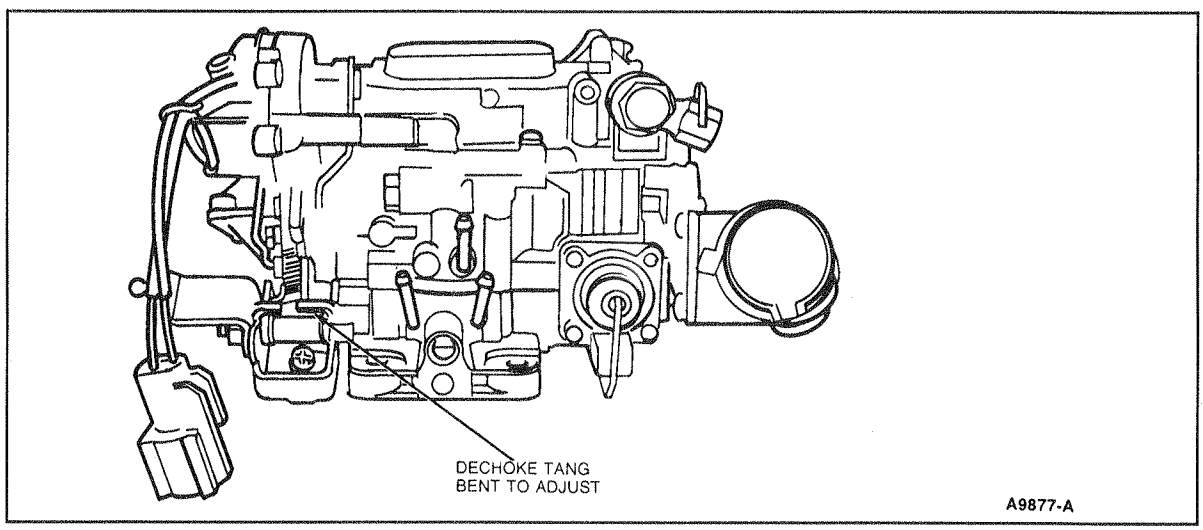


Figure 2 De-Choke

Choke Adjustment Procedure

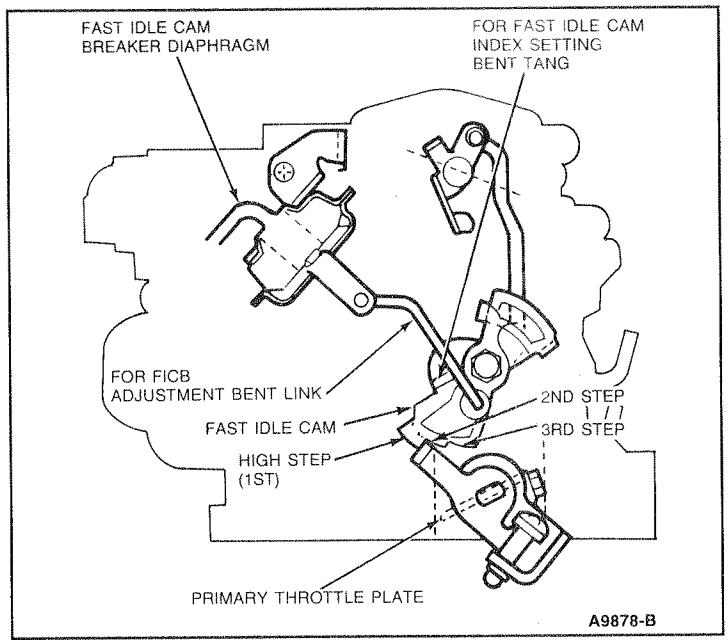


Figure 3 Fast Idle Cam Index Fast Idle Cam Breaker

Cold Enrichment System

PASSENGER CAR

COLD ENRICHMENT SYSTEM — MOTORCRAFT 7200-VV

I. Pre-Check Instructions

A. Apply parking brake and block the wheels.

B. Remove the air cleaner assembly and plug the vacuum hose(s) leading to the air cleaner.

1. With the choke cap cool to the touch, turn the ignition key to the RUN position **without** starting the engine for two minutes. The choke cap should not be warm to the touch.
2. Start up the engine if the cold enrichment rod is up when the fast idle cam is freed from the fast idle lever. Run the engine; do not exceed three minutes. The cold enrichment rod should seat. Turn the engine off.

C. Manually set the fast idle lever on the specified step (refer to Engine Emission Decal) of the cam, counting the highest step as the first.

D. Start the engine and bring it to normal operating temperature.

E. Open the throttle and check to see if the cam freely falls to the full off position. If it is functioning properly, there should be a definite drop in engine speed when the throttle is released.

F. Turn off the engine.

II. Freedom of Linkage and System Integrity Check

A. Verify that vacuum hoses, solenoid and electric choke wires are properly connected and intact. Check to make sure all carburetor hold-down nuts are tightened to specification. Correct as required.

B. Check all carburetor linkages for freedom of operation. If no binding exists, proceed to Section III. If binding exists, proceed to C.

C. Cold Enrichment Rod Mechanism Check

1. Check for damaged, foreign, missing and/or misaligned parts. Check for dirt, grease, or any foreign material on moving parts. Service or replace as required.

   If linkage is serviced or replaced, check choke adjustments. Reset if necessary.
2. Remove the retaining E-ring that holds the choke control rod to the choke shaft lever, then disengage the linkage from the lever.
3. Open the throttle slightly and check the choke shaft lever for freedom of movement. The choke cap and the pulldown diaphragm return spring should provide the only resistance, and the choke shaft lever should spring back to the original position. Clean, service or replace as required.
4. To check if the carburetor has a sticking/binding CER, perform the following procedure.
   a. Open the throttle to allow fast idle cam to move to "choke on" position.
   b. Hold the choke pulldown diaphragm in its retracted position.
   c. Push the CER down to its seated position, feel for any friction/binding.

Cold Enrichment System

d. Release the CER, it should return to its original position automatically (room temperature or colder).

e. Observe the upward movement of the CER for any indication of sticking/binding.

f. Rotate the CER 90 degrees from its original position and repeat Steps b through e.

NOTE: CER can be rotated using your fingers if the rod is placed in its full up position. The number identification on top of the CER can be used for determining the 90 degree rotation requirement.

g. Rotate the CER another 90 degrees (total of 180 degrees from its original position) and repeat Steps b through e.

5. Verify if the carburetor has a sticking/binding CVR with the following procedure:

a. Hold the choke pulldown diaphragm in its retracted position.

b. Place the fast idle lever on the highest step of the fast idle cam.

c. Push the CVR down to its seated position. Feel for any friction/binding.

d. Release the CVR, 70°F or warmer, the CVR should lift-off its seat automatically, colder than 70°F, push down on the CER to lift the CVR.

e. Observe the upward movement of the CVR for any indication of sticking/binding.

6. If cam movement is still not free, remove carburetor from vehicle, then remove the throttle body from the carburetor. Remove the choke cap, the choke shaft and lever assembly, and the fast idle cam. Check the surfaces of all parts for grease, foreign material, bends, cracks, or distortion. Clean or replace parts as required. If a new fast idle cam is installed, adjust cam set per procedure in Section V, and tighten to specification.

7. If movement is okay, make sure the choke control rod is connected to the choke shaft lever with the retaining E-ring. If the "CVR" causes binding, replace and reset, as outlined in Section V and Shop Manual, Group 24.

8. Reinstall the carburetor, as outlined in Section VI.

III. Electric Choke Functional Test

A. Choke Circuit Test

NOTE: Refer to body wiring diagrams for detail information on electrical circuitry affected in this test. Two different types of circuitry are used. For battery powered choke, the choke cap and the oil pressure switch are connected in series through the wiring harness connectors.

For alternator powered choke, the choke cap wire is connected to the alternator stator terminal connection.

Either type is readily identifiable by visually tracing the routing from the choke cap terminal.

Cold Enrichment System

To perform continuity tests of Section III Steps A-1 and -2, listed below, disconnect the stator terminal of the alternator for alternator powered choke. Reconnect after completion of testing.

1. Choke Cap Continuity
   a. Turn ignition switch off.
   b. Connect one end of a test lamp to the positive terminal of the battery and the other end to the choke cap terminal. The test lamp should light, indicating continuity. If it does light proceed to Step 2, if it does **not** light continue with Step c.
   c. Connect one end of a jumper wire to the choke cap clamp shroud and the other end to the negative terminal of the battery. Also connect one lead of a test lamp to the positive terminal of the battery and the other lead to the choke cap terminal.
   d. The test lamp should light indicating continuity; if not, connect the jumper wire directly to the choke cap ground; if the lamp lights, correct the poor contact between the choke cap clamp shroud and the choke cap ground. If the lamp does not light, replace the choke cap.
2. Continuity of all other circuit components, battery powered choke.
   a. Turn engine and ignition switch off.
   b. Disconnect oil pressure switch from harness, use a jumper wire in place of the switch to complete the circuit.
   c. Connect one lead of a test lamp to the negative terminal of the battery and the other lead to the choke cap terminal.
   d. Turn the ignition key to the RUN position without starting the engine. The lamp should be lit. If not, locate and service the open circuit by checking fuse, fuse link, connector, etc.
   e. Remove the jumper wire used as a substitute for the oil pressure switch; reconnect the harness lead wire to the oil switch terminal.
   f. Turn the ignition switch to the RUN position without starting the engine. The test lamp should not indicate continuity. If the lamp indicates continuity, the oil pressure switch is defective.
   g. Start the engine. The test lamp should indicate continuity. If the lamp does not indicate continuity, the oil pressure switch is defective.
3. Continuity of all other circuit components, alternator powered choke:
   a. Connect one lead of a test lamp to the choke cap ground and the other lead to the negative terminal of the battery.
   b. Start the engine, the test lamp should indicate continuity. If not, locate and service open circuit between choke cap to alternator stator terminal. If no open circuit is found, check alternator output and service as required.

Cold Enrichment System

B. Choke Control Diaphragm Check

1. Check for bending, misaligned linkage, broken parts, contamination and/or loose parts. Service as required.

NOTE: There are three different vacuum systems used; they are as follows:

a. **Internally Ported:** there is no vacuum connector tube provided on the control diaphragm cover; the vacuum passage is internal to the casting.

b. **Externally Ported, No Vacuum Trap:** a vacuum connector tube is provided on the diaphragm cover, and the vacuum line runs directly from this tube to the manifold vacuum tap.

c. **Externally Ported With Vacuum Trap:** same as above but there is a vacuum trap in the line between diaphragm cover and manifold vacuum tap.

The method of testing is different for each system.

2. Running Engine Test

Start the engine and watch for the choke diaphragm rod to retract. If the retraction timing is within specification, listed in Special Specifications Issue TSB Publications, the choke control diaphragm is functioning properly and no further check is necessary. To perform the above for the Externally Ported With Vacuum Trap type vacuum system when the underhood temperature is 35°C (95°F) and above, bypass the vacuum trap (convert the system to Externally Ported, No Vacuum Trap type) first. Restore the original routing after completion of testing.

If the timing is out of specification or there is no retraction, the check must be continued. For Externally Ported, No Vacuum Trap or Externally Ported with Vacuum Trap, continue the check with Step 3 in the following. For the Internally Ported type, continue the check with Step 4 and the following:

3. Diaphragm Inspection, Cover Removed.

a. Remove the diaphragm cover and the diaphragm as outlined in Shop Manual, Group 24 (removal of the carburetor is not necessary, but helpful).

b. Visually inspect the diaphragm. If cut or torn, replace the diaphragm with a new one and assemble it with the original cover on the carburetor and continue with Step C.

If the diaphragm is not cut or torn, replace the cover with a new one and assemble it with the original diaphragm on the carburetor and continue with Step C. Ensure the assembly is sufficiently tight to prevent vacuum bleed-off at diaphragm mounting.

c. Connect a vacuum line from the connector tube on the diaphragm cover to a powered vacuum source. Apply 60 kPa (18 In-Hg.) vacuum to the diaphragm and proceed with one of the following substeps, depending upon how the carburetor reacts to the vacuum:

1. It retracts the diaphragm within the specification timing. No further check is necessary since the control diaphragm is functioning properly. Adjust any CER setting affected by component replacement per Section V, Step B.

Cold Enrichment System

2. It does not retract the diaphragm within specification or it does not retract at all. Replace the cover with a new part, assemble* it with the existing diaphragm onto the carburetor, and repeat this test again. Be sure the assembly is sufficiently tight to prevent vacuum bleed-off at diaphragm mounting.

4. Diaphragm Inspection and Vacuum Passage Inspection.

   a. Remove the carburetor and place it on a workstand. Remove the diaphragm and the cover as outlined in Shop Manual, Group 24.

   b. Using compressed air or vacuum, check and remove any restriction in the vacuum passage, internal to the carburetor throttle body. Note that the choke air passage connects to the diaphragm vacuum passage in the casting.

   c. Visually inspect the diaphragm. If the diaphragm is cut or torn, replace it with a new part and assembly with the original cover to the carburetor. Ensure the assembly is sufficiently tight to prevent vacuum bleed-off at diaphragm mounting site.

   d. Connect a vacuum line from the port at the bottom of the casting to a powered vacuum source. Be sure to seal the junction at the casting properly to prevent bleed-off. Block the choke air inlet by capping the connector tube on the casting at a location right beneath the diaphragm cover. Apply 60 kPa (18 in.-Hg.) to the diaphragm and proceed with one of the following sub steps, depending upon how the carburetor reacts to the vacuum:

      1. It retracts the diaphragm within the specification timing. Go to Step e.

      2. It holds the vacuum but does not retract the diaphragm within specification or does not retract at all. Go to Step f.

      3. It does not hold vacuum; hence, no retraction. Go to Step g for casting leak check. Repeat of Step g is not necessary. If the carburetor still does not hold the vacuum after Step g was performed, go to Step f.

   e. No further check is necessary since the control diaphragm is functioning properly. Adjust any CER setting affected by component replacement as outlined in Section V, Step B. Reinstall the carburetor and perform checks as outlined in Section VI.

   f. Replace the cover with a new one and assemble it with the existing diaphragm onto the carburetor and repeat Step d. Ensure the assembly is sufficiently tight to prevent vacuum bleed-off at diaphragm mounting site.

   g. Remove the diaphragm cover and block the upper diaphragm vacuum port at the lower side of the diaphragm seating surface. Apply 60 kPa (18 in.-Hg.) vacuum to the casting through the lower port as in Step d. If the vacuum is now held, go to Step f. If the vacuum is not held, locate and service the excess bleed-off at choke cap gasket, choke shaft bearing, etc. When the problem is fixed and the vacuum is now held, unblock the upper vacuum port. Reassemble the diaphragm and cover which were just removed and repeat Step d. Be sure the assembly is sufficiently tight to prevent vacuum bleed-off at the diaphragm mounting site.

   NOTE: This casting check is required only once for the entire test.

Cold Enrichment System

C. Choke Cap Resistance Test

1. Connect one lead of an ohmmeter to choke cap terminal and the other lead to choke cap ground. Ensure metal-to-metal contact is achieved (not metal-oxide film-metal) and false readings are prevented. Throughout this test, the ohm reading should be under 30 but never zero. At any point of this test, if the ohm reading is outside this range, start the test all over. If this same improper reading repeats, the choke cap is defective. The cap should be replaced as outlined in Shop Manual, Group 24.
2. With the choke cap connected electrically, start the engine and run for three minutes. Shut the engine off. During this three minutes, the CER should remain seated for an engine which was warm at the beginning. This rod should gradually lower to seat for an engine which was cold at the beginning. If the CER does not respond this way, note this fact and continue on with the test.
3. The choke cap should be quite warm to the touch now. Using choke tester, cool the cap down by directing cold air toward the oval-shaped insulator (not the case) around the cap terminal. The ohm reading should gradually vary and eventually a sudden increase is noticeable. Stop the cooling. This sudden increase should take place within 10 minutes since cooling began, if the Rotunda tool is employed at maximum effectiveness and was placed as close to the cap as possible. If this sudden resistance change does not take place within the above time limit, the choke cap is defective and should be replaced as outlined in Shop Manual, Group 24. If this sudden change takes place within this time limit, continue on with the testing.
4. Using the choke tester of Step 3 (or equivalent), warm up the cap by directing hot air towards the oval-shaped insulator. The ohm reading should vary gradually and eventually a sudden decrease is noticeable. Stop the warming. This sudden decrease should take place within 10 minutes since warming began, if the tool is employed at maximum effectiveness and was placed as close to the cap as possible.

   If the sudden resistance change does not take place within the above time limit, the choke cap is defective and should be replaced as outlined in Shop Manual, Group 24.

   If this sudden change takes place within this time limit, the choke cap has been checked-out all right as far as its resistance is concerned. This means, it generates heat in the way it should.
5. The choke cap test itself is concluded. However, if the CER response in Step 2 is not proper, the procedure shown in Section II should be performed to identify and service the linkage-related problem that causes this improper response.

IV. Choke Cooling Air Circuit

A. Remove choke cooling air supply line at throttle body and attach a vacuum gauge to the cooling air supply tube.

B. Warm engine to normal operating temperature, and, at curb idle, observe vacuum reading.

C. If vacuum reading is present, remove vacuum gauge, reconnect cooling air supply line, and proceed to Section VI.

D. If no vacuum reading, clean, service, or replace as required; and repeat Section IV Steps A through C, then proceed to Section VI.

Cold Enrichment System

V. Carburetor Choke Adjustment — CER, CVR Settings

CER 24°C (75°F) Run, CER — 18°C (0°F) Start and Control Vacuum Regulator Setting

A. Cold Enrichment Rod (CER) Adjustment Sequence

NOTE: The CER mechanism affects carburetor air/fuel mixtures throughout engine operation, cold and warm. Several adjustments are required. Although each adjustment does affect a particular phase of operation, and each "maladjustment" can lead to a particular performance symptom, the adjustment procedure must be performed completely and in the following described sequence to provide desired CER performance.

If adjustment cannot be accomplished due to epoxy in the adjustment nut, a new service assembly (9F685) must be installed. Refer to Step B.

1. Remove carburetor from engine.
2. Assemble Dial Indicator Kit TOOL-4201-C or equivalent, to carburetor.

   NOTE: CER adjustment specifications are listed on a tag attached to the carburetor above the choke cap (Figure 1), and published in the Special Specifications Issue TSB Publications.
3. Remove choke diaphragm cover and spring.
4. Remove choke cap according to appropriate instructions.
5. Compress the idle speed positioner where applicable and insert a 5/16-1/2 inch spacer between the positioner stem and the throttle lever contact paddle. Retain in this position with a rubber band. This will locate the fast idle pick-up lever away from the cam and allow the cam to rotate freely.
6. Install Stator Cap T77L-9848-A or equivalent as a weight to rotate bimetal lever counterclockwise (CCW) and seat the CER.
7. Install dial indicator with tip centered on top surface of CER. Set the dial indicator to zero. Raise weight slightly and release to check for accurate zero.

NOTE: This adjustment will be the reference for other adjustments. Be sure dial indicator reading is accurate (Figure 2).

B. Control Vacuum Regulator (CVR) Swivel Assembly Replacement

Refer to Figure 3.

CVR/CER nuts have cylindrical projections above the threads which are filled with epoxy after final adjustment. To adjust, the existing parts must be removed and a new assembly installed. After adjusting, CVR/CER nut cavities must again be filled with epoxy.

1. Remove the E-clip and hinge pin.
2. Turn the CER adjusting nut counterclockwise until nut disengages from rod.
3. Remove the CVR and swivel assembly. Replace with new assembly.
4. The unbroken rod must be in place first before further assembly. Install the assembly and tighten the CER adjusting nut to lower and locate into position. Connect lever to swivel.

Cold Enrichment System

5. Install the hinge pin and E-clip.
6. For CVR/CER adjustments, refer to Step 3.
7. Fill two nuts and stop screw with MT13 epoxy or equivalent.

NOTE: The rod has an undercut designed to break, if breakage does occur, a new rod assembly must be installed. The upper body must be loosened to position the rod through the opening. Replace the upper body gasket as necessary (Fig. 4).

C. CER Run Position (24°C, 75°F) Adjustment

Refer to Figure 5.

1. Install stator cap and rotate clockwise (CW) to index. Dial should indicate the tag specification for Run at 24°C (75°F) ± 0.010 inch.
2. Adjust by turning choke adjusting nut CW to increase or CCW to decrease height.

D. CER Start (Crank) Position (18°C, 0°F) Adjustment

Refer to Figure 6.

1. Remove stator cap.
2. Rotate choke bimetal lever CW until CER travel stop screw bottoms on choke seal retainer (full travel). Dial should indicate the tag specification for Start at 18°C (0°F) ± 0.005 inch.
3. Adjust by turning CER travel stop screw with 5/64 inch hex wrench, CW to decrease or CCW to increase height.

E. Choke Diaphragm Start (Crank) Position for Warm Engine (24°C, 75°F)

Refer to Figure 7.

1. Push in diaphragm assembly. Dial should indicate the tag specification for Start at 24°C (75°F) ± 0.020 inch.
2. Adjust by rotating the diaphragm assembly CW to decrease or CCW to increase height.

F. Control Vacuum Rod (CVR) Position

Refer to Figures 8 and 9.

1. Seat CER again using stator cap weight and check for zero dial indicator reading. Reset zero position of indicator if required. Remove stator cap weight (Figure 8).
2. Depress the CVR until seated. Dial should indicate the tag specification for CVR ± 0.10 inch.
3. Adjust by holding CVR with 3/8 inch wrench, and turning adjustment with 3/32 inch hex wrench CW to decrease or CCW to increase height, (Figure 9).
4. Reinstall original choke diaphragm cover with original spring.

Cold Enrichment System

G. Choke Diaphragm Run Position for Cold Engine (– 18°C, 0°F)

Refer to Figure 10.

1. Apply vacuum to choke diaphragm cover, or, depress choke diaphragm rod to seated position.
2. Rotate choke bimetal lever CW until choke shaft lever pin contacts fast idle intermediate lever. Dial should indicate the tag specification for Run at 0°F ± 0.005 inch.
3. If an adjustment is required, remove the choke diaphragm cover and install a new cover with the original spring. This is necessary due to tamper-resistant material on the adjustment screw.
4. Adjust by rotating screw in diaphragm housing with 5/64 hex wrench, CW to increase or CCW to decrease height.
5. Apply sealing liquid on adjustment screw to secure adjustment.
6. Install lead ball plug in adjusting screw hole.

H. Fast Idle Cam Setting

Refer to Figure 11.

Position fast idle pick-up lever on second step of fast idle cam against shoulder of high step.

1. Install stator cap and rotate CW until fast idle pick-up lever contacts fast idle cam adjusting screw. Dial should indicate specification 0.360 inch ± 0.005 inch.
2. Adjust by rotating fast idle cam adjusting screw.
3. Remove stator cap.
4. Assemble choke cap, gasket, and retainer with breakaway screws.
5. Remove dial indicator and rubber band.
6. Install carburetor and adjust idle speeds.

VI. Post-Check Instructions

A. Inspect the gaskets and sealing surfaces between the carburetor and intake manifold. Service as required.

B. Reinstall the carburetor.

C. Reconnect all wire connections and hoses.

D. Check/adjust engine idle speeds.

E. Reinstall the air cleaner assembly and reconnect pertinent vacuum lines.* Tighten air cleaner wing nuts to specification.

Verify that air cleaner heat riser tube and fresh air pick-up connections are correct.

VII. Removal and Installation of Adjustment Limiting Choke Bimetal Housing and Enrichment Rods

A. Refer to Shop Manual, Group 24.

*Refer to the Special Specifications Issue TSB Publications.

Cold Enrichment System

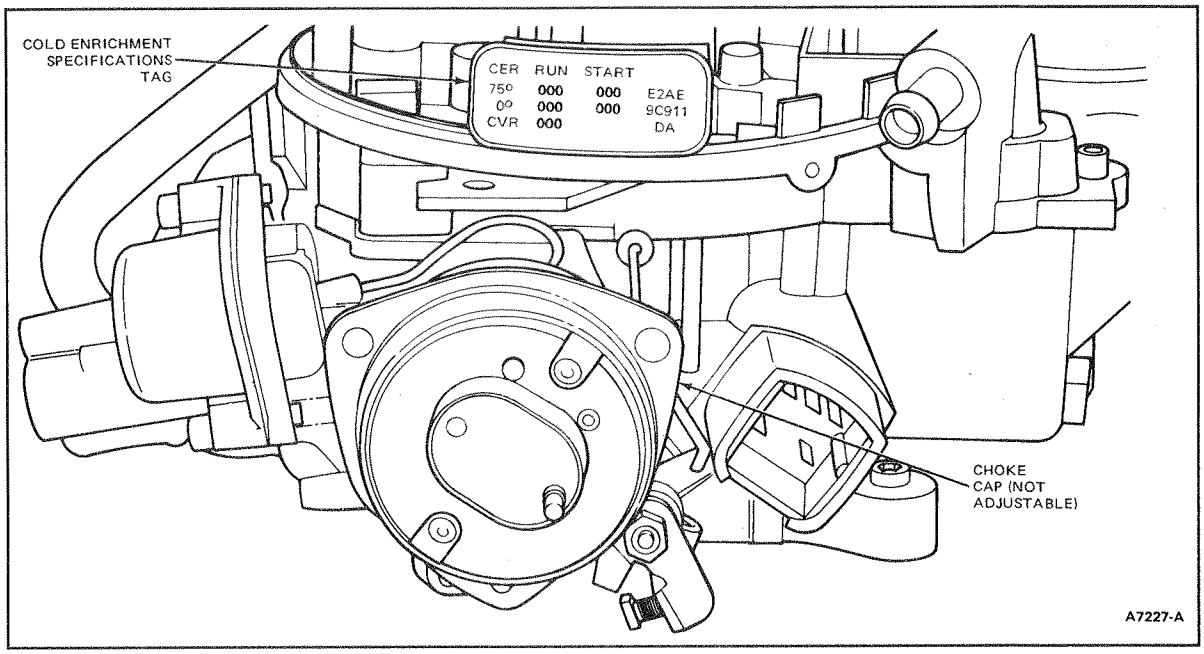


Figure 1 Cold Enrichment Rod (CER) Adjustment Sequence

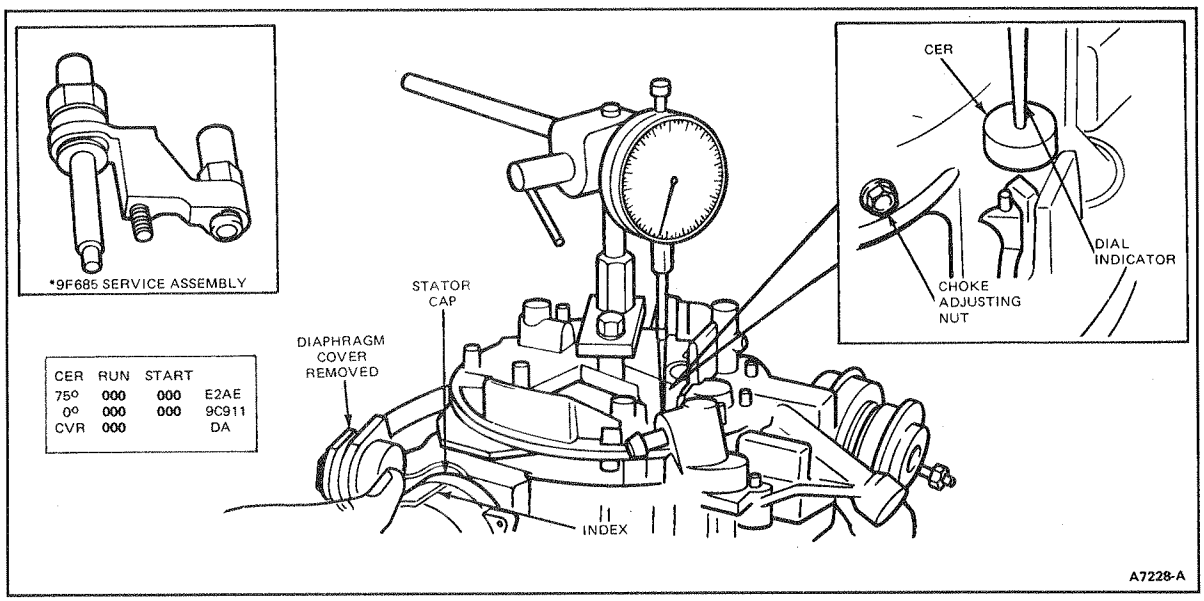


Figure 2 CER Run Position (24°C, 75°F) Adjustment

Cold Enrichment System

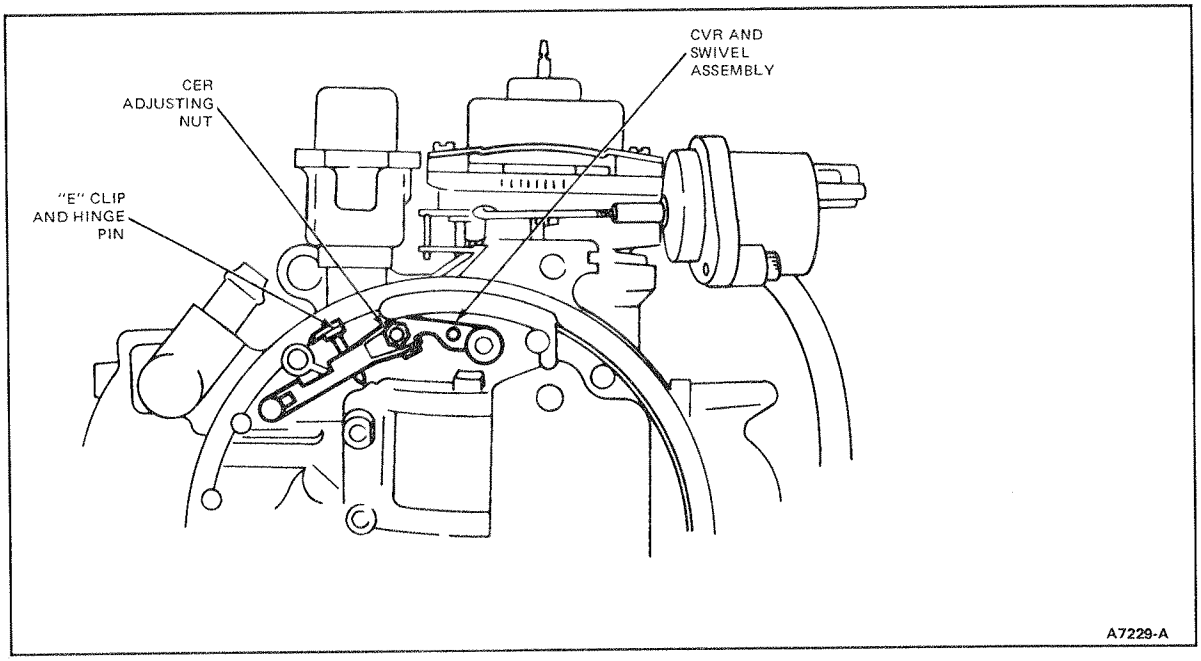


Figure 3 Control Vacuum Regulator (CVR) Swivel Assembly Replacement

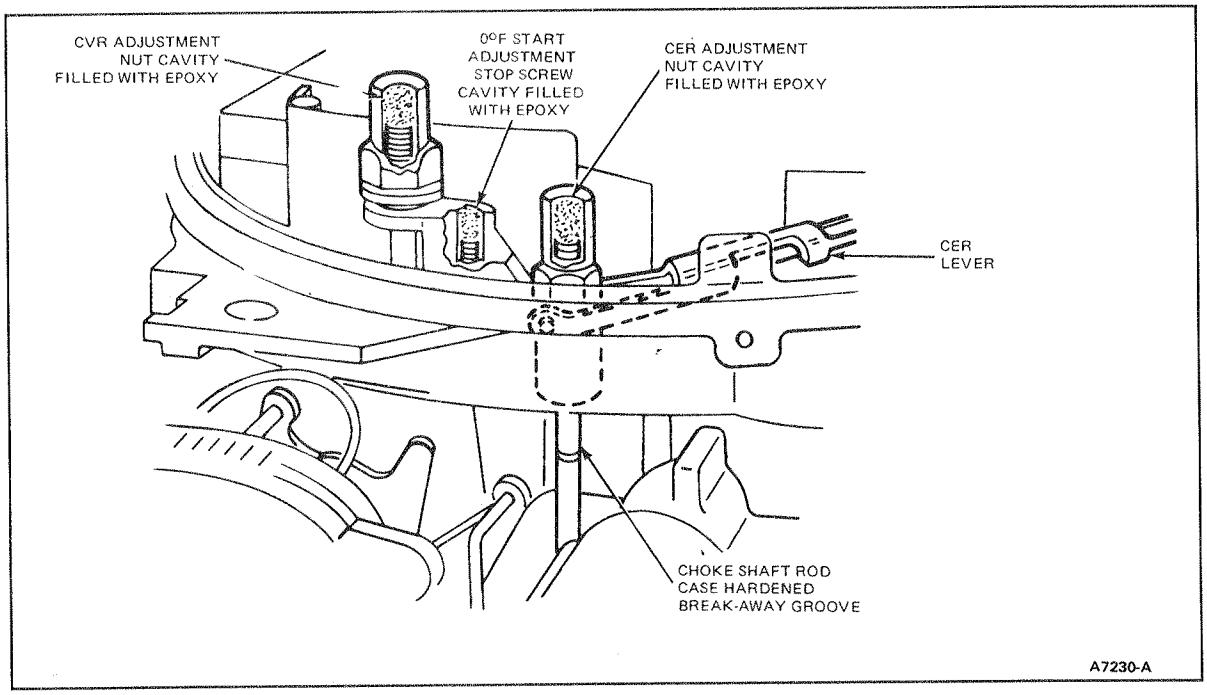


Figure 4 CER/CVR Tamper Resistant Installation

Cold Enrichment System

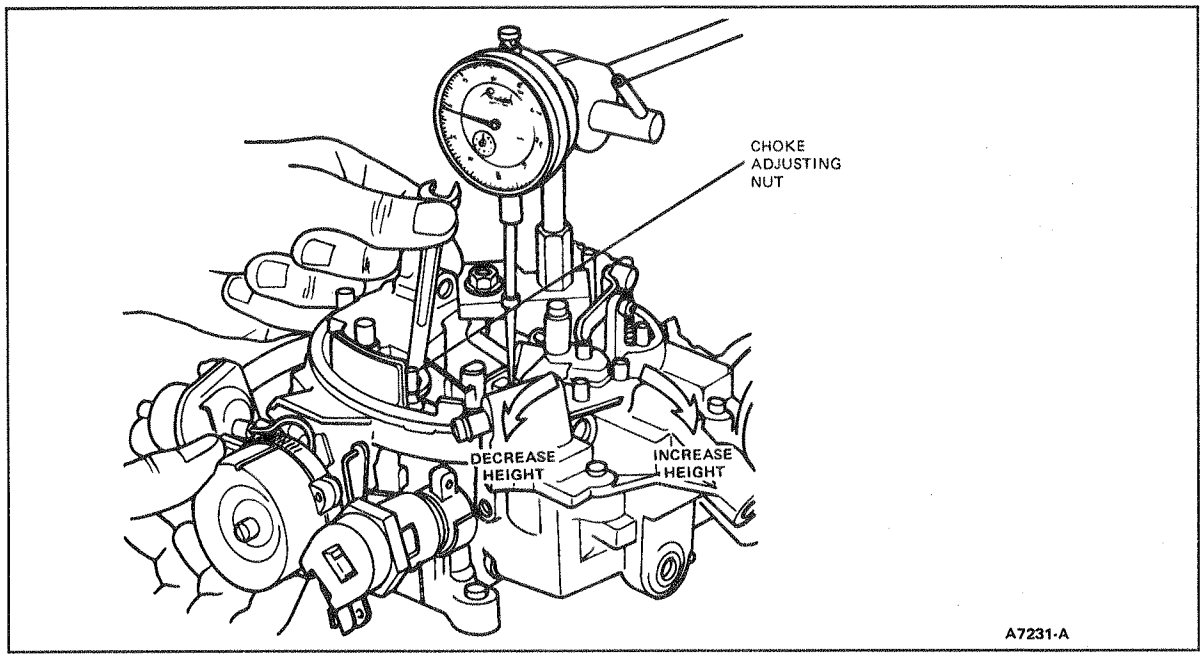


Figure 5 CER Run Position (24°C, 75°F) Adjustment

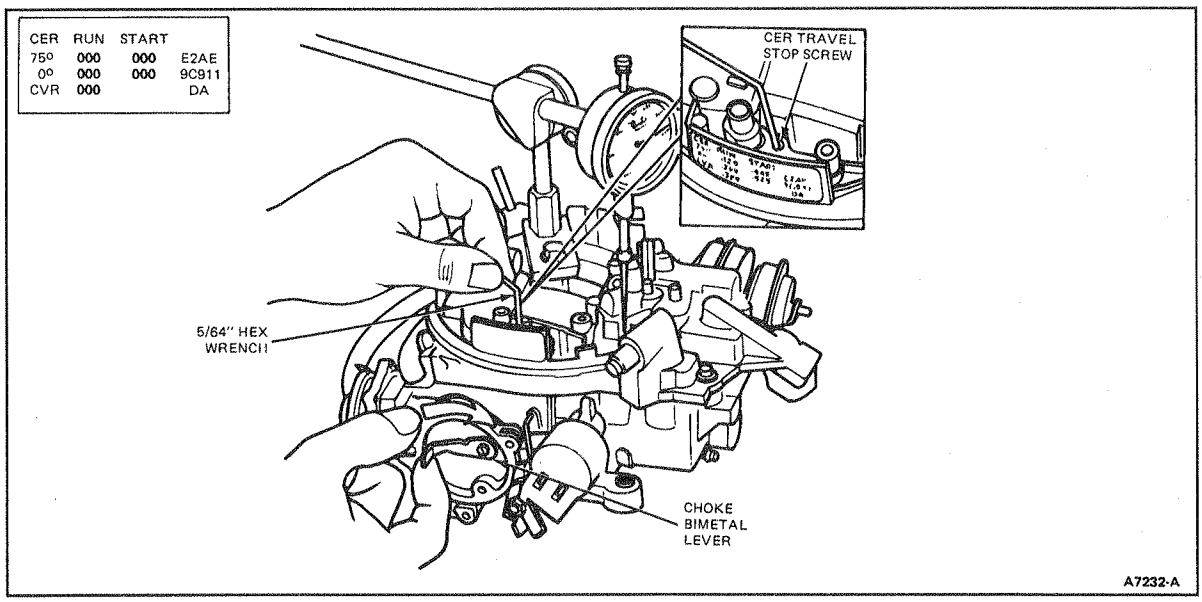


Figure 6 CER Start (Crank) Position (– 18°C, 0°F) Adjustment

Cold Enrichment System

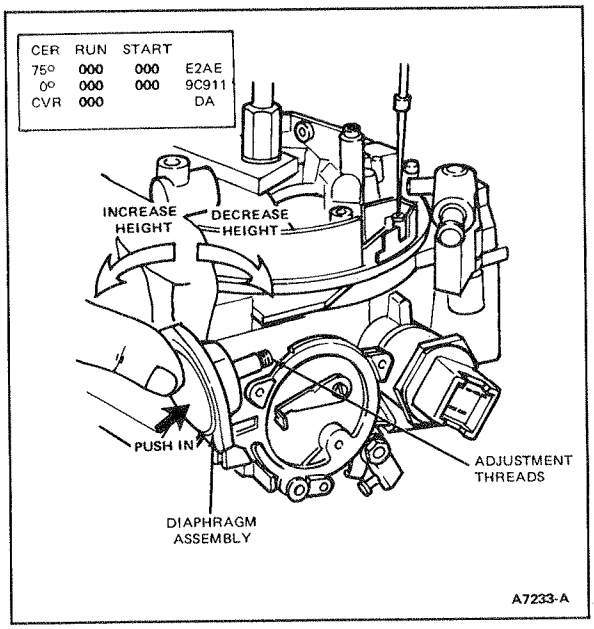


Figure 7 Choke Diaphragm Start (Crank) Position — Warm (24°C, 75°F)

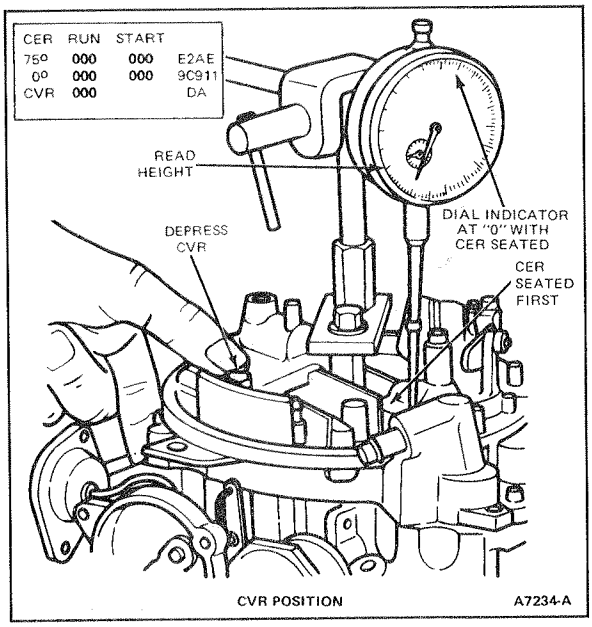


Figure 8 Control Vacuum Rod (CVR) Position — Check

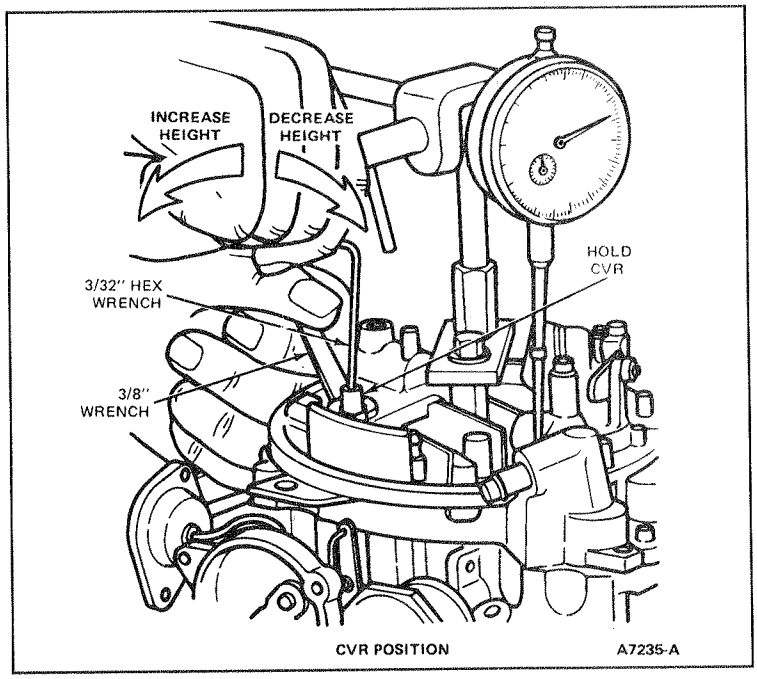


Figure 9 Control Vacuum Rod (CVR) Adjustment

Cold Enrichment System

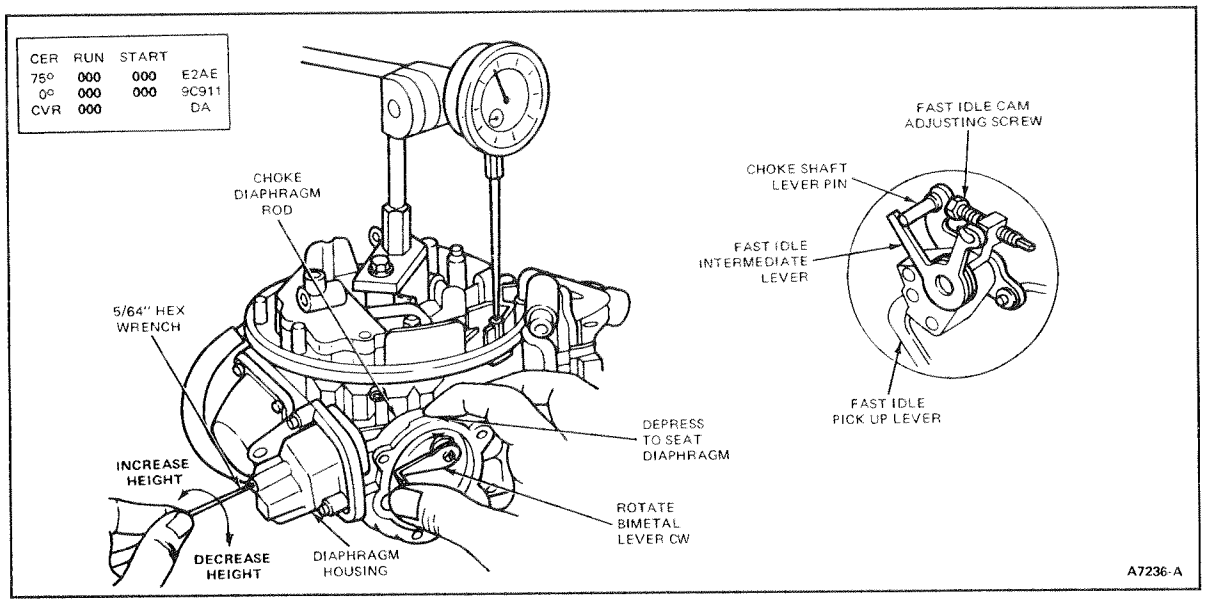


Figure 10 Choke Diaphragm Run Position for Cold Engine (– 18°C, 0°F)

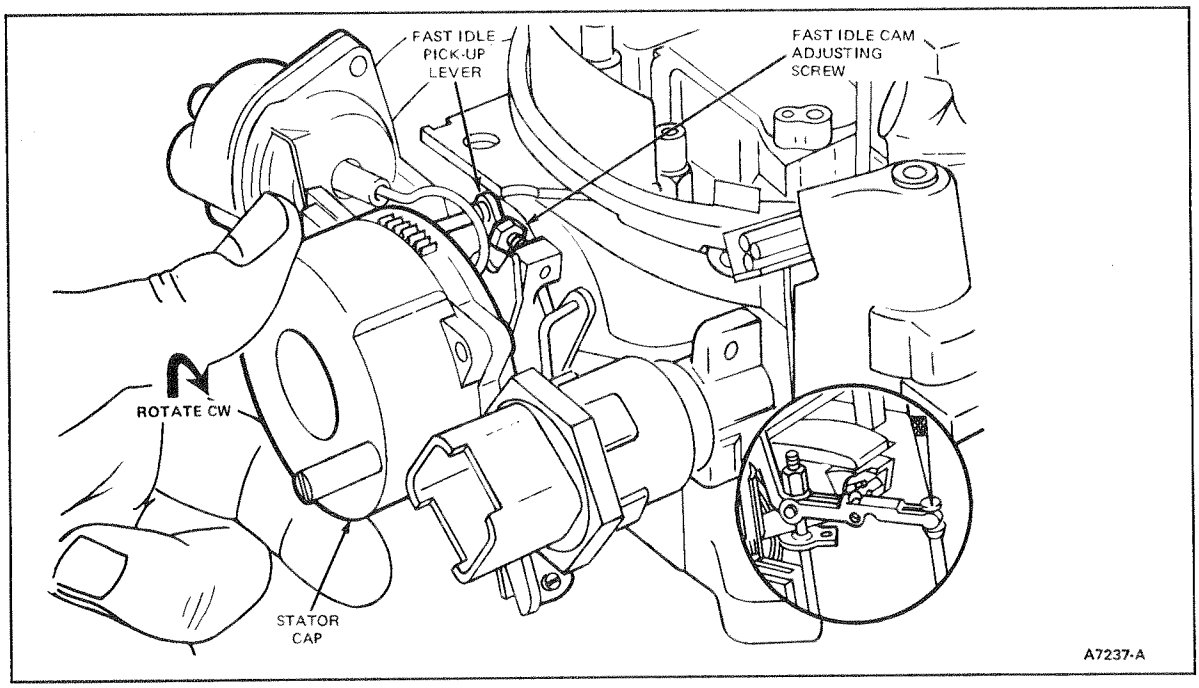


Figure 11 Fast Idle Cam Setting

Choke Adjustment Procedure

TRUCK

MANUAL CHOKE CARBURETORS ONLY — HOLLEY 2380EG-2V and 4190EG-4V

I. Pre-Check Instructions

A. Apply parking brake, and block wheels. Manual/Auto transmission in NEUTRAL or PARK.

B. Bring the engine to normal operating temperature.

C. Remove the air cleaner assembly and plug the vacuum line(s) to the air cleaner assembly.

D. Disconnect choke cable from carburetor.

E. Check all carburetor linkages for freedom of operation. Service, replace or adjust as required.

F. Check for freedom of operation of choke plate for closing and opening in the air horn bore. Correct as required.

G. Reconnect choke cable and check choke plate travel using dashboard control. Depress throttle and pull choke full on. Choke should be fully closed in air horn bore. Depress throttle and push choke in. Choke should be fully open. Correct choke cable adjustment as required.

II. Post-Check Instructions

Reinstall the air cleaner assembly and reconnect pertinent vacuum lines. Tighten the air cleaner wing nut to specification.

*Refer to Shop Manual, Group 24.

ELECTRONIC GOVERNOR MODULE CHECK

1. Check harness to following chart.

NOTE: No. 1 terminal is nearest to locator key.

Terminals	Condition	Meter Type	Value
1-2	• Engine running	• Tachometer	• Engine rpm
1-8	• Key On	• Volt	• 12 volts
4-6	• Key Off	• OHM	• Continuity
5-7	• Key Off	• OHM	• Continuity

Service wiring as required.

2. Repeat "System Quick Check." If system is not functioning and all other components have been checked as OK, replace the governor module.

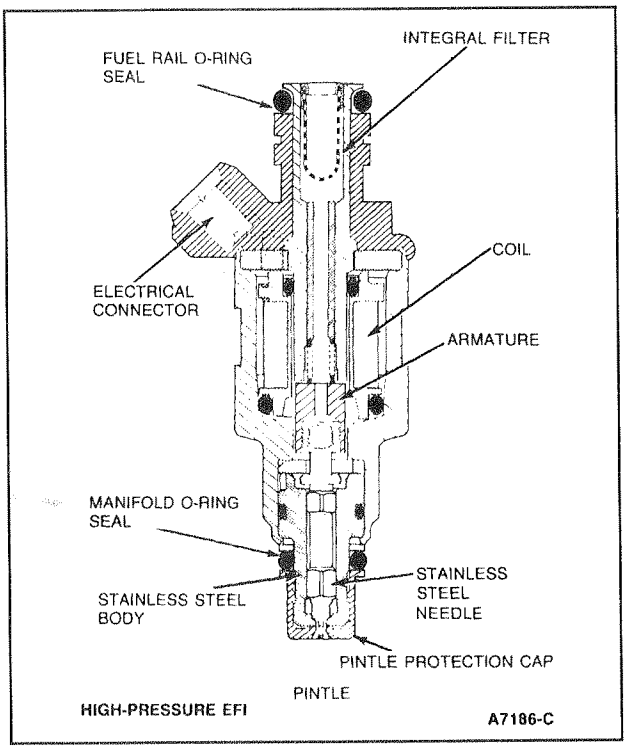
Fuel Injector Testing/Cleaning

High-Pressure, High-Resistance, High-Pressure, Low-Resistance Ported EFI Injectors Only

To help diagnose EFI fuel injector problems, use the following trouble shooting chart along with the Rotunda Fuel Injector Tester/Cleaner 113-00001 or equivalent.

The majority of fuel injector problems are due to plugged injectors caused by fuel deposits. These injectors can be cleaned and restored back to their normal operating condition.

If injectors will not clean, or have another of the listed problems, injectors must be tested before replacement.



Fuel Injector Testing/Cleaning

FUEL INJECTOR TROUBLE SHOOTING CHART

FOR HIGH-PRESSURE, HIGH-RESISTANCE AND HIGH-PRESSURE LOW-RESISTANCE PORTED EFI SYSTEMS ONLY

Symptom	Fuel Injector Failure Mode	Cause	Corrective Action
Rough Idle, Hard Start, Hot/Cold.	Lean Injector. Rich Injector. Injector will not pulse.	Tip deposits. (Plugged) Internal contamination. Stuck open. (Leaks) Short or open circuit.	Clean Injectors. Test/Replace if necessary. Test/Replace if necessary. Test/Replace if necessary.
Misses Under Load Hesitates or Stalls on Acceleration Backfires Lacks Power Surges at Steady Speed	Lean Injector.	Tip deposits. (Plugged) Internal contamination.	Clean Injectors. Test/Replace if necessary.
Gas Smell	Injector stuck open. Injector leaks internally (into intake manifold). Injector leaks externally.	Internal contamination. Internal contamination. Defective O Rings.	Test/Replace if necessary. Test/Replace if necessary. Test/Replace if necessary.
NOTE: Test and clean injectors using the Rotunda Tester/Cleaner 113-00001 or equivalent.			

Fuel Injector Testing/Cleaning

Fuel Injector Tester/Cleaner

The Fuel Injector Tester/Cleaner was designed to facilitate fuel injector servicing by cleaning and/or testing fuel injectors without removing them from the engine.

Fuel Injector Test Before Cleaning

1. Turn manual shutoff valve (Figure 3) of test stand panel to OFF (closed) position.
2. Filter (use paint-type filter) and pour clean gasoline into the tester fuel tank, and fill to lower fill line for 8 cylinder vehicles, use less for 4 and 6 cylinder vehicles.

   DO NOT ADD ANY CLEANER SOLVENT IN TANK FOR TESTING.
3. Connect power supply line (Figure 2) to vehicle battery (red terminal, positive; black terminal, negative). Red light (on cleaner side) will flash indicating power connection has been made and the unit is off.
4. Activate the 10 minute timer switch, check pressure gauge. The gauge should read 38-40 psi. If adjustment is necessary, turn shutoff valve to ON (open) position, for resetting of regulator (refer to Figure 3). Remove black cap, back-off locknut, turn screw to obtain proper setting and retighten lock nut. Replace cap. Turn unit off.
5. Connect fuel supply hose to outlet (Figure 3) and place other end of hose back into tank. Actuate the 10 minute timer switch and turn flowmeter selection valve to flowmeter No. 1 and then to flowmeter No. 2. Repeat this procedure several times to eliminate all air bubbles from the system. Turn unit off. Flowmeter selection valve must be in position No. 1 or No. 2 for unit to function properly. Reinstall fuel tank cap snugly and back-off one turn.
6. Disconnect engine fuel inlet connection at the fuel manifold (rail). Connect the supply hose from testing equipment to the fuel inlet connection (Figure 1).
7. Disconnect engine fuel return connection at the fuel manifold (rail) from fuel return. Plug the return line as shown in Figure 1. Install the U-Tube (supplied) between the chassis supply line and the chassis return line (Figure 1).
8. Install the turnbuckle (Figure 6) loosely between throttle control rod and suitable hook-up point on vehicle fender wall. Activate the 10 minute timer switch.

   CAUTION: Be sure vehicle is in PARK or NEUTRAL position, parking brake on and/or wheels blocked front and rear.

   Start engine and check for leaks.
9. When the engine speed has stabilized (warm-up period), set the idle speed to 2000 rpm with the turnbuckle.
10. Run the remainder of the 10 minute cycle to eliminate all the air in fuel supply hose and fuel rail.

    When automatic timer shuts off, reactivate 10 minute timer and turn ignition switch to OFF position.
11. Select the proper flow range. Turn the flowmeter selection valve to
    Flowmeter No. 1 for Blue, Grey or Yellow injectors, or
    Flowmeter No. 2 for White, Black, Green or Brown injectors.
    The flow band colors correspond to the injector top color. (Color may vary slightly between manufacturers.)

    Refer to EFI Application Chart.

Fuel Injector Testing/Cleaning

12. Install the tester injector harness (Figure 7) on the vehicle injectors. Match the injector number on the harness to that of the cylinder (or use 10 pin connector FA-412, Figure 8) for 5.0L engine.
13. Position injector selector switch to each injector number while pressing fuel injector test button.
14. Observe the position of the flowmeter float at eye level when the ball stops rising. A float level within the color code range on the scale indicates a good injector. Flow readings slightly higher than the flow band after cleaning ARE ACCEPTABLE.
15. To confirm initial test readings, a maximum of three testings on the set of the injectors can be performed restarting the engine.
16. Any injectors removed from an engine should be bench tested to confirm diagnostic conclusions. A continuity checker FA-407 (Figure 6) is provided to check continuity of injector harness leads between the injector and the ECM unit. Disconnect injector and insert continuity checker FR-407 into injector plug. Start engine. Observe. Continuity checker will blink showing completed circuit for that injector being tested.

NOTE

a. If the flowmeter readings are high or low on the color code scale, the fuel injectors should be cleaned.

b. If all the readings are high, there may be leaky injectors (one or more). To check for leaky injectors, observe pressure gauge. It should hold pressure with the fuel pump off. If there is a pressure drop, detect the leaky injector by observing flowmeter (the leaky injector shows less flow). If this is not possible, remove all injectors and test individually. Refer to Bench Testing procedure.

c. If fuel injector cleaner is required, turn manual shutoff valve to the ON position. Refer to Fuel Injector Cleaning Procedure.

d. Testing may be performed before or after cleaning process.

NO CLEANING SOLVENT IN TANK DURING INJECTOR TESTING

Fuel Injector Cleaning Instructions

1. Turn shutoff valve (Figure 3) at the back of test stand to ON (open) position.
2. Filter (use paint-type filter) and pour clean gasoline into tester fuel tank and fill to lower fill line for 8 cylinder vehicles (use less for 4 and 6 cylinder vehicles). Add injector cleaner solvent from lower fill line to upper fill line (7 ounces). Premixed gasoline and cleaner solvent may be used. Mixture: approximately 1 oz. of cleaner solvent to 7 oz. of unleaded gasoline per cylinder.
3. Connect power supply line (Figure 2) to vehicle battery (red terminal, positive; black terminal, negative). Red light (on cleaner side) will flash indicating power connection has been made and that the unit is off.
4. Activate the 10 minute timer switch, check pressure gauge. The gauge should read 38-40 psi. If adjustment is necessary, turn shutoff valve to ON (open) position, for resetting of regulator. Remove black cap, back-off locknut, turn screw to obtain proper setting and retighten locknut. Replace cap. Turn unit off.

Fuel Injector Testing/Cleaning

5. Connect fuel supply hose to outlet (Figure 3) and place other end of hose back into tank. Actuate the 10 minute timer switch and turn the flowmeter selector valve to flowmeter No. 1 and then to flowmeter No. 2 and back to flowmeter No. 1. Repeat this procedure several times to eliminate all air from the system. Turn flowmeter selector valve to flowmeter No. 2 for all cleaning applications. This allows maximum flow. Turn unit off.
6. Disconnect engine fuel inlet line at the supply manifold (rail). Connect the supply hose from cleaning equipment to the fuel inlet (Figure 1).
7. Disconnect engine return line at the supply manifold (rail). Plug the return line as shown in Figure 1. Install the U-tube (supplied) between the chassis supply line and the chassis return line (Figure 1).
8. Install the turnbuckle (Figure 6) loosely between throttle control rod and suitable hook-up point on vehicle fender wall. Activate the 10 minute timer switch.

   CAUTION: Be sure vehicle is in PARK or NEUTRAL position, parking brake on and/or wheels blocked front and rear.

   Start engine and check for leaks.
9. When the engine speed has stabilized, set the idle speed to 2000 rpm with the turnbuckle (Figure 6).
10. Reset the remaining 10 minute cycle (automatic). Turn ignition switch to OFF, remove turnbuckle.
11. Disconnect the cleaner supply hose from the fuel supply manifold connection inlet.

    Drain and discard remaining mixture from cleaner fuel tank.
12. Turn power switch off and disconnect power supply. Reinstall vehicle fuel lines. Start the engine and check for leaks.

    Use new fuel connector retaining clips when reinstalling vehicle fuel lines in 1983-1985 models. Lubricate O-rings. Put safety ring onto fuel line connector when reinstalling vehicle fuel lines on late models equipped with spring lock connectors. Safety indicator ring will pop off when connection is properly installed. Check for proper "seating of connection" by using hand force to separate connection, check for leaks.

Fuel Injector Bench Testing Procedure

Individual Injector Performance and Leakage Testing.

1. Check that the manual shutoff valve, (Figure 3) at the back of test stand is in ON (open) position.
2. Fill the Tester/Cleaner fuel tank with several ounces of clean fresh gasoline.
3. Connect the fuel supply hose FA-402 (Figure 4) to the fuel supply outlet (Figure 3) and to the Bench Fixture (Figure 9).
4. Insert injector to be tested in Bench Fixture as shown in Figure 9.
5. Connect the No. 1 tester harness connector (Figure 7) to the fuel injector. Turn the injector selector switch (Figure 3) to No. 1 position.
6. Direct the injector nozzle into the tester fuel tank.

Fuel Injector Testing/Cleaning

7. Connect the power supply leads (Fig. 2) to the battery, observing correct polarity.
8. Activate the 10 minute timer switch and check for leaks.
9. Press the injector test switch (Figure 3) and the purge switch together for about 30 seconds to eliminate air from the supply hose and injector.
10. No leakage from the fuel injector nozzle tip should be visible. Replace any leaking injector.
11. Press injector test switch (Figure 3) to test injector, observe float in flowmeter.
12. Check the flowmeter readings and record all test results.

Factors That Cause False Flow Readings

- Air bubbles in the system fuel lines.
- Excessive amount of cleaner solution in the system.
- Fuel pressure other than recommended 39-40 psi for high-pressure EFI vehicles.
- Low voltage from a weak power source.

Use the following approved solvents: D9AZ-19579-B or E6AZ-19579-C or equivalent.

Service Maintenance

Periodically the flowmeters need cleaning. Follow the Matheson Instrument instructions enclosed or flush unit with denatured alcohol, allow the fluid to recirculate several minutes, switching flowmeter selection valve from No. 1 to No. 2 several times while unit is operating. Discard fluid. Reflush again using above procedure, discard fluid. Change filter.

To gain access to filter located under the front cover, refer to Figures 2 and 3, unscrew and remove the cover access bolts, each side and slide the cover off. Replace filter with in-line type filter. Change filter frequently.

This unit is suitable for conversion for K-Jetronic fuel systems. If K-Jetronic fuel system cleaning is desired, a modification kit is available from Miller Special Tools.

Fuel Injector Testing/Cleaning

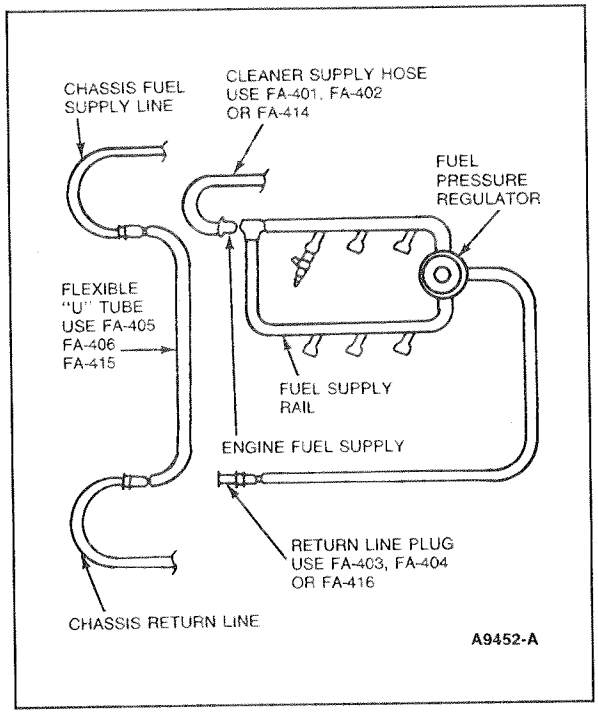


Figure 1

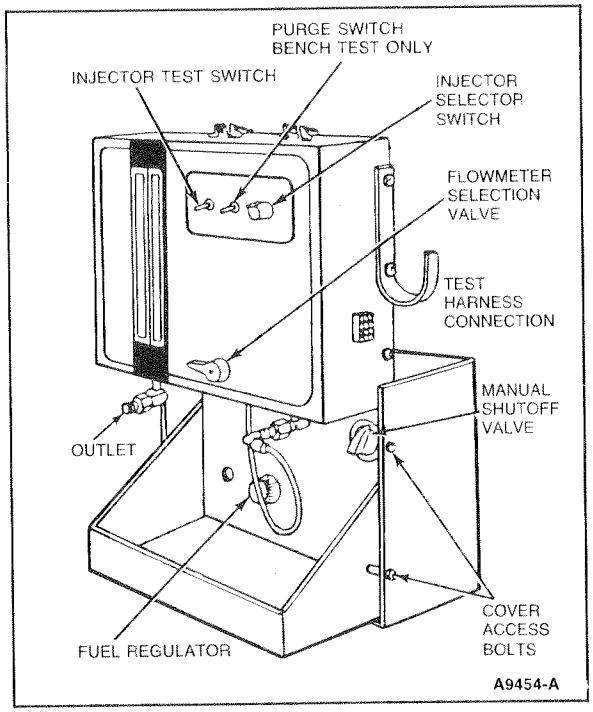


Figure 3

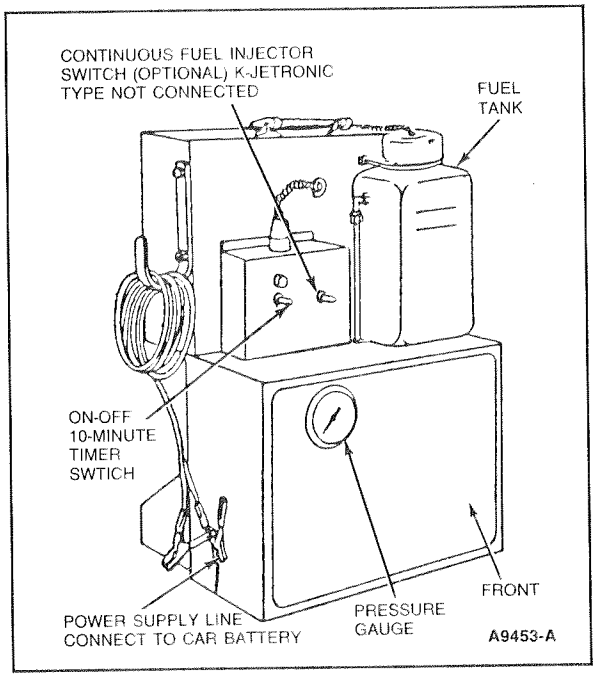


Figure 2

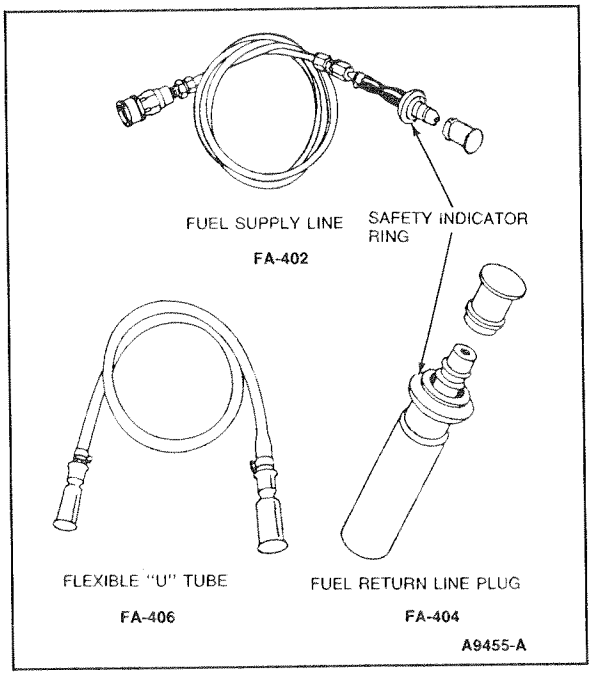
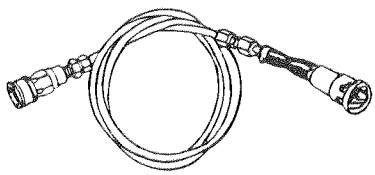


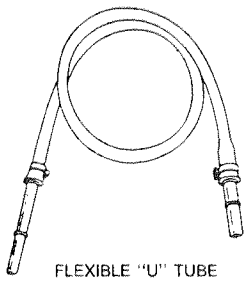
Figure 4

Fuel Injector Testing/Cleaning



FUEL SUPPLY LINE

FA-401



FLEXIBLE "U" TUBE

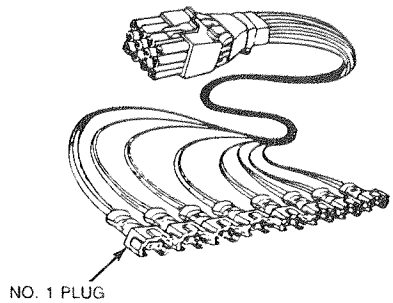
FA-405

FUEL RETURN LINE PLUG

FA-403

A9456-A

Figure 5



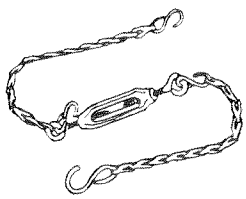
NO. 1 PLUG

TESTER INJECTOR
HARNESS PUSH TYPE

FA-411

A9458-A

Figure 7



TURNBUCKLE-SPEED ADJUSTER

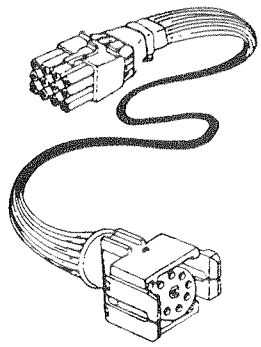
FA-413

CONTINUITY CHECKER

FA-407

A9457-A

Figure 6



TESTER INJECTOR HARNESS
10 PIN CONNECTOR
(5.0L ENGINE BLACK CONNECTOR)

FA-412

A9459-A

Figure 8

Fuel Injector Testing/Cleaning

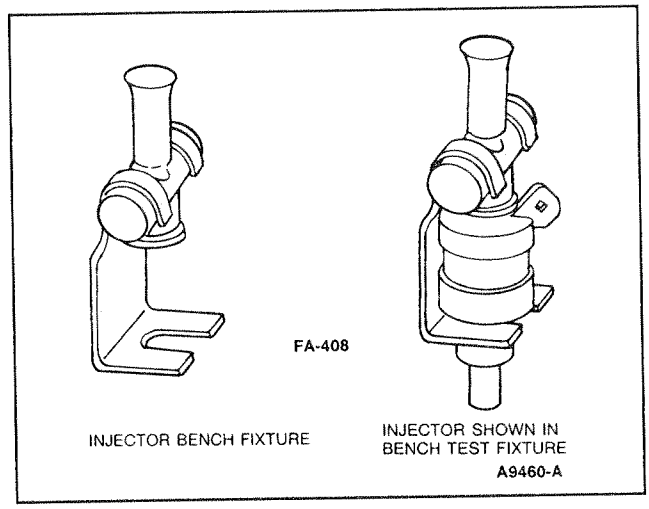


Figure 9

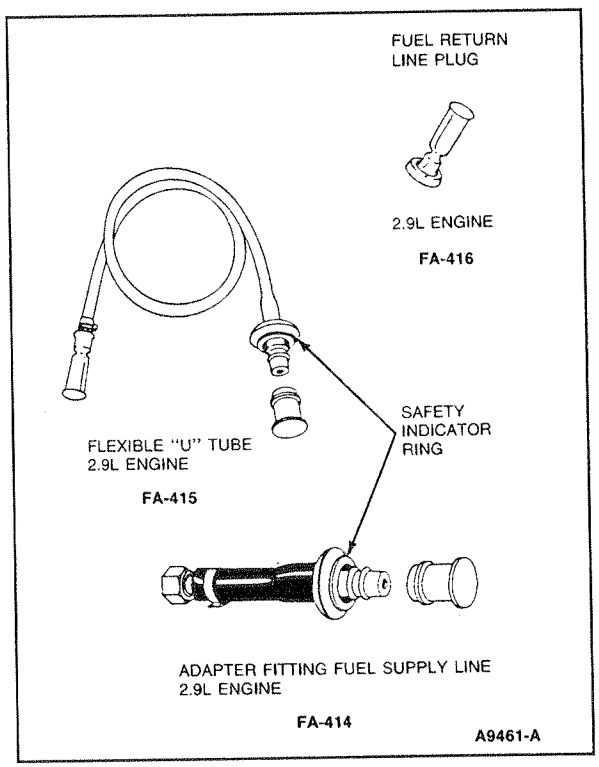


Figure 10

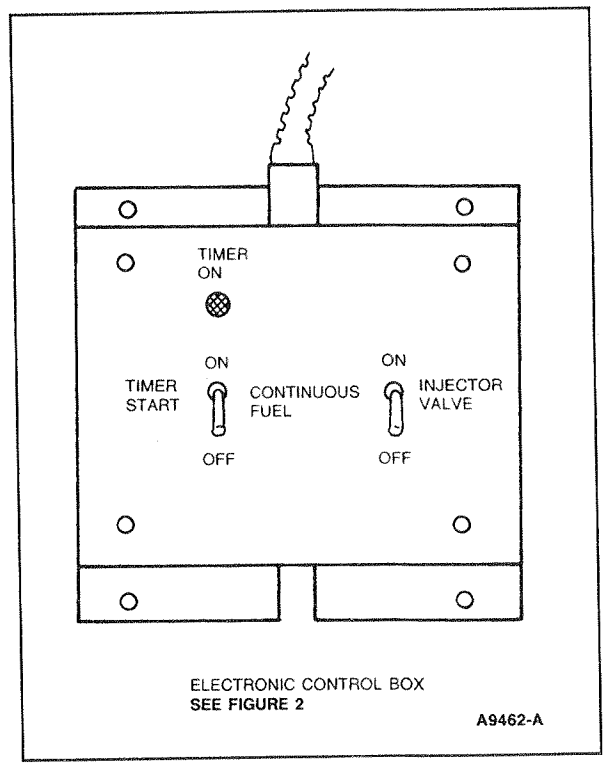


Figure 11

EFI Injectors

Model Year	Engine Application	Source Source	# /HR	Part Number	Connector Color
1983	1.6L Car	Bosch	(14)	E3EE-9F593-BA	Dk. Blue
	2.3L T/C Car	Bosch	(30)	E3ZE-9F593-BA	Green
1984	1.6L Car	ND	(14)	E4EE-9F593-AA	Dk. Blue
	1.6L T/C Car	Bosch	(23)	E4EX-9F593-AA	Black
	2.3L T/C Car	DKK	(30)	E4ZE-9F593-AA	Green
1985	1.6L Car	ND	(14)	E4EE-9F593-AA	Dk. Blue
	1.6L T/C Car	Bosch	(23)	E4EX-9F593-AA	Black
	2.3L T/C Car	DKK	(35)	E5ZE-9F593-AA	Brown
	2.3L Truck	ND	(14)	E59E-9F593-AA	Grey
	5.0L Truck	Bosch, ND, DKK	(19)	E5TE-9F593-AA	Yellowish Orange
1986	1.9L Car	Bosch	(19)	E6EE-9F593-AB	White
	2.3L T/C Car	DKK	(35)	E5ZE-9F593-AB	Brown
	2.3L Truck	ND	(14)	E59E-9F593-AB	Grey
	2.9L Truck	Bosch	(14)	E67E-9F593-AB	Grey
	3.0L Car	ND	(14)	E59E-9F593-AB	Grey
	3.0L Truck	ND	(14)	E59E-9F593-BB	Grey
	5.0L Car	Bosch	(14)	E67E-9F593-BB	Grey
	5.0L HO Car	ND	(19)	E6TE-9F593-AB	Yellowish Orange
	5.0L Truck	DKK, Bosch	(19)	E5TE-9F593-AB/BB	Yellowish Orange
1987	1.9L Car	Bosch	(19)	E6EE-9F593-AB	White
	2.3L T/C Car	DKK	(35)	E5ZE-9F593-AB	Brown
	2.3L Car	ND	(14)	E59E-9F593-AB	Grey
	2.3L Truck	ND	(14)	E59E-9F593-AB	Grey
	2.9L Truck	Bosch	(14)	E7DE-9F593-BB	Grey
	3.0L Car	ND	(14)	E59E-9F593-AB	Grey
	3.0L Truck	ND	(14)	E59E-9F593-AB	Grey
	4.9L Truck	Bosch	(14)	E67E-9F593-BB	Grey
	5.0L Car	Bosch/Ford/ND	(14)	E67E-9F593-BB	Grey
	5.0L HO Car	ND	(19)	E6TE-9F593-AB	Yellowish Orange
	5.0L Truck	Bosch, DKK	(19)	E5TE-9F593-BB/AB	Yellowish Orange
1988	1.9L Car	Bosch	(19)	E6EE-9F593-AC	White
	2.3L T/C Car	DKK	(35)	E5ZE-9F593-AC	Brown
	2.3L Car	ND	(14)	*E59E-9F593-AC	Grey
	2.3L HSC Car	Bosch	(14)	E67E	Grey
	2.3L Truck	ND	(14)	*E59E-9F593-AC	Grey
	2.9L Truck	Bosch	(14)	E67E-9F593-BC	Grey
	3.0L Car	ND	(14)	E59E-9F593-AC	Grey
	3.0L Truck	ND	(14)	E59E-9F593-AC	Grey
	4.9L Truck	Bosch/Ford	(14)	*E67E-9F593-BC	Grey
	5.0L Car	Bosch/Ford/ND	(14)	E67E-9F593-BC	Grey
	5.0L HO Car	ND/DKK	(19)	E6TE-9F593-AC	Yellowish Orange
	5.0L Truck	Bosch, DKK	(19)	E5TE-9F593-BC/AC	Yellowish Orange
	5.8L Truck	Bosch	(19)	E57E-9F593-BC	Yellowish Orange
	7.5L Truck	Bosch	(24)	E7TE-9F593-BC	Blue

NOTE: * Means 55 PSI fuel pressure.