FUEL SYSTEM

Section 3C - Electronic Enrichment & Turn Key Start Electronic Control Module (210 HP)

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Enrichment System

The Turn Key Start (TKS) Electronic Control Module (ECM) electrically controls the enrichment valve to provide a rich fuel charge for starting a cold engine.

The TKS ECM monitors engine coolant temperature (thru the temperature sensor) and ignition timing.

The TKS ECM electronically opens the enrichment valve for varying lengths of time – the colder the engine, the longer the valve remains open. The TKS ECM also advances ignition timing – Below 3,000 RPM the TKS ECM advances idle timing 5° until the engine reaches 104°F (40°C). Above 3,000 RPM, the TKS ECM does not affect ignition timing regardless of engine temperature.

Fuel is gravity fed to the enrichment valve from the top carburetor float bowl. When the valve is opened, fuel is drawn to outlet ports on each carburetor flange by crankcase vacuum. During cold start, throttle shutters should be closed – maximizing crankcase vacuum – to draw ample fuel from the enrichment valve.

Fuel Enrichment operates as a function of time and block temperature.

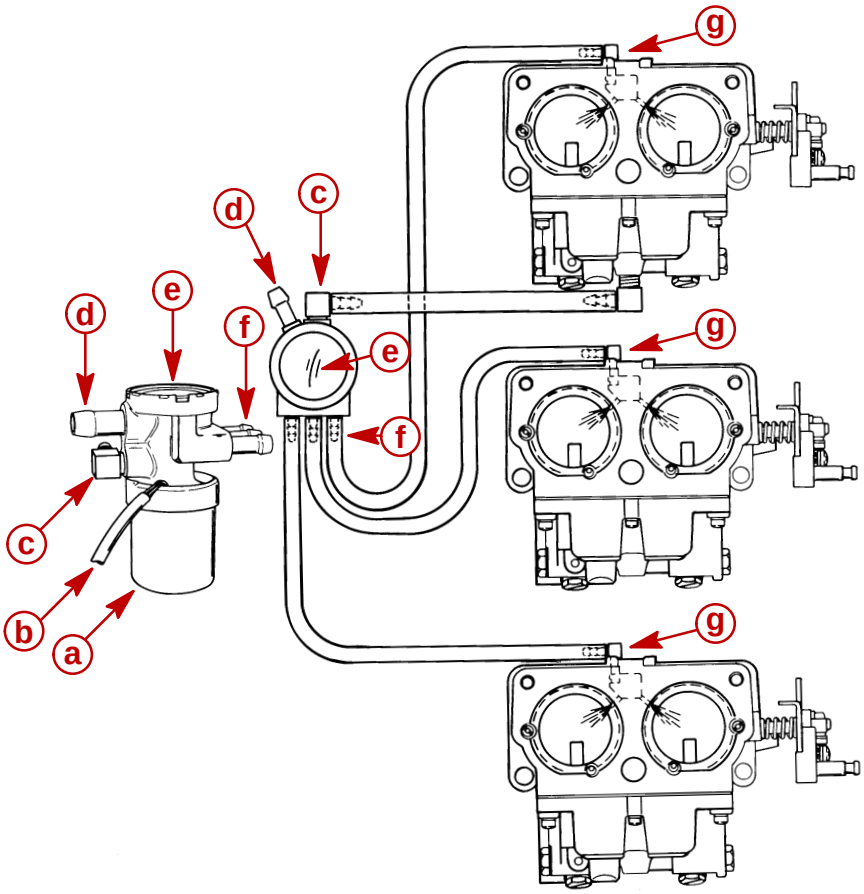
a. Enrichment valve will continue to provide fuel while engine is cranking until block temperature reaches approximately 122° F (50° C), at which point it will no longer provide fuel.

b. When block is hot (normal operating temperature – 140° to 155° F) enrichment valve will provide fuel for approximately 1/2 second when key is turned to “ON” position. The valve will not provide fuel during cranking at temperatures above 122° F (50° C).

Manual Operation of Enrichment Valve

IMPORTANT: Manual use of enrichment valve if engine is warm could result in engine flooding.

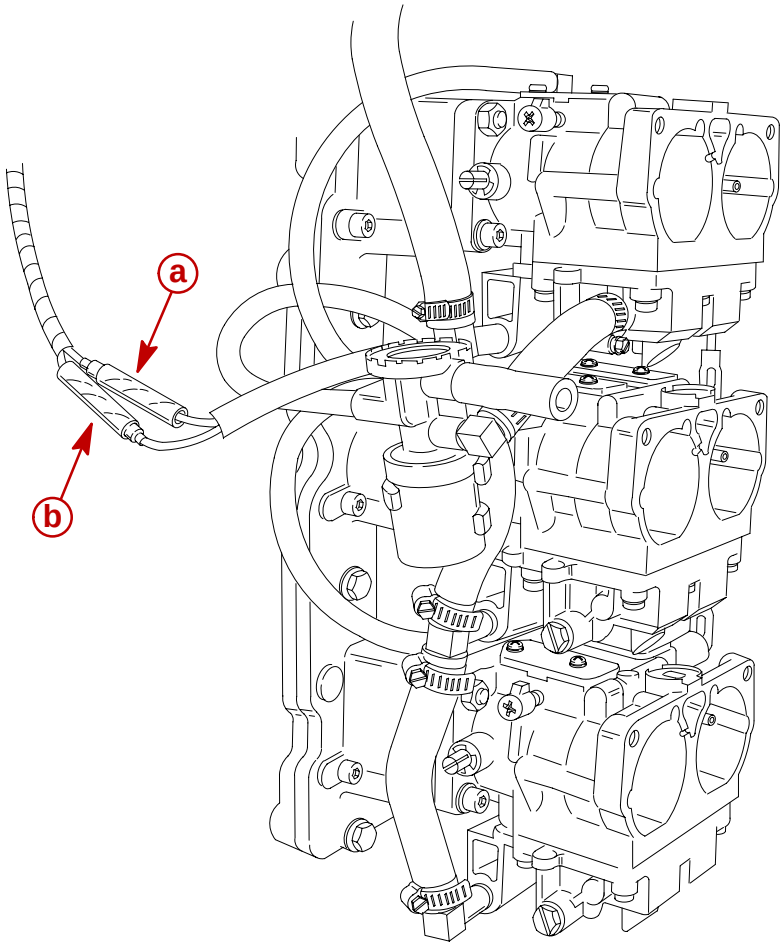
Should enrichment circuit of TKS ECM fail, press button on enrichment valve and hold approximately 5 seconds. Release button. Start engine.



a - Enrichment Valve
b - Enrichment Valve Harness (to ECM)
c - Inlet Fuel
d - Vent
e - Manual Button
f - Outlet Ports
g - Inlet Fuel Ports

Enrichment Valve Test

1. Remove top cowl.
2. Disconnect YELLOW/BLACK bullet connector (b) to enrichment valve.



55003

a - Purple
b - Yellow/Black

DVA Test of Fuel Enrichment Valve

Tested Part	DVA Leads	Connected To	Scale	Reading
Fuel Enrichment Solenoid Valve	RED BLACK	YELLOW/BLACK Engine Ground	200 DVA	When engine is initially started, DVA meter will deflect to 25 – 50 VDC. This will last only a short period and will then indicate 10 – 15 VDC. If above results are not obtained, valve is defective.

3. Disconnect PURPLE bullet connector lead of enrichment valve and touch MALE end to GROUND.
4. Remove one outlet hose from enrichment valve and place container under valve.
5. Turn ignition key to “ON” position.
6. While holding key ON, enrichment valve should click and fuel drain from exposed port.
7. If valve does not click, replace valve.

ENRICHMENT VALVE REPLACEMENT

1. Disconnect YELLOW/BLACK and PURPLE bullet connectors.
2. Place container under valve and remove 3 outlet hoses and 1 inlet hose.
3. Remove valve from clamp
4. Dispose of caught fuel in proper container.
5. Reconnect hoses to new valve. Secure hoses with sta-straps.
6. Place valve into clamp.
7. Reconnect YELLOW/BLACK and PURPLE bullet connectors.

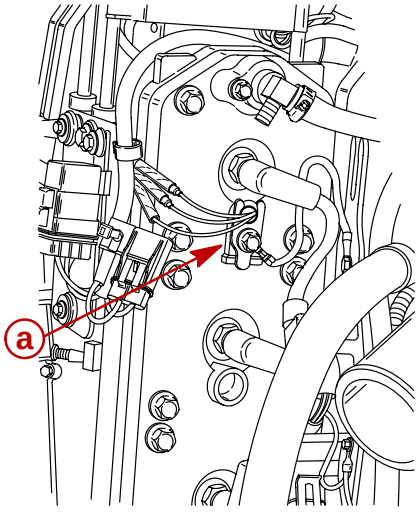
ENRICHMENT VALVE “CLICKS” BUT FUEL DOES NOT DRAIN FROM PORT

Inspect drain hose and top carburetor float bowl for blockage. Refer to SECTION 3B for carburetor disassembly.

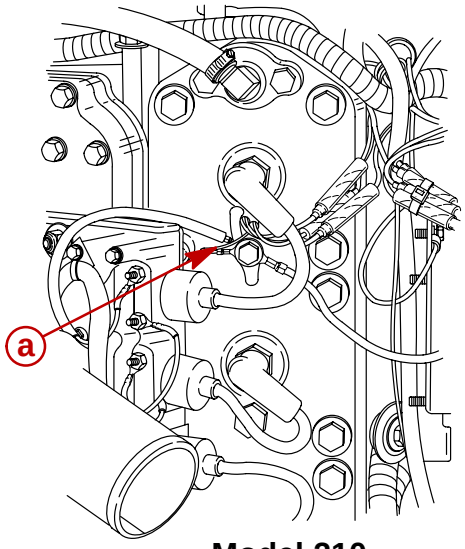
ENRICHMENT VALVE “CLICKS” AND FUEL DRAINS FROM PORT

1. Inspect wiring between valve and TKS ECM, between TKS ECM and TEMPERATURE SENSOR for breaks or loose connections. Refer to SECTION 2D for engine wiring diagram.
2. If wiring is functional, refer to TEMPERATURE SENSOR OHM CHART, following, for proper functioning of sensor.

ENGINE TEMPERATURE SENSOR



Model 240



Model 210

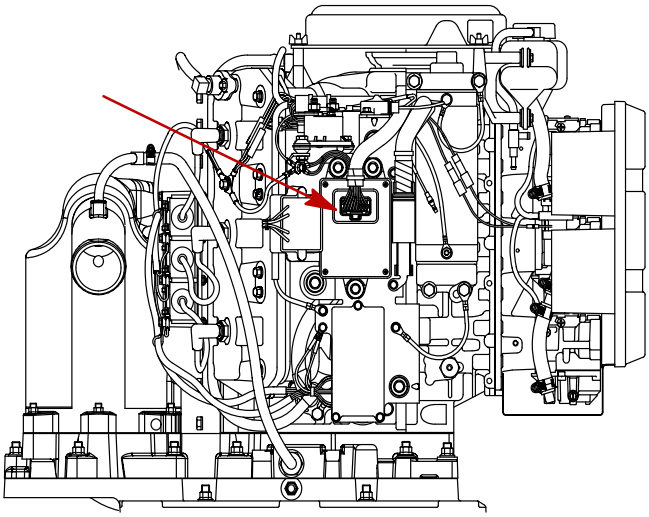
a - Engine Temperature Sensor

Insert digital or analog ohmmeter test leads into both TAN/BLACK sensor leads. With engine at temperature (C° or F°) indicated, ohm readings should be as indicated ± 10%.

Block Temperature C°	Block Temperature F°	Resistance (Ohms)
–15	5	7465
–10	14	5636
–5	23	4288
0	32	3287
5	41	2551
10	50	1996
15	59	1574
20	68	1250
25	77	1000
30	86	805
35	95	652
40	104	532
45	113	436
50	122	360
55	131	298
60	140	248
65	149	208
70	158	175
75	167	148
80	176	126
85	185	107
90	194	92
95	203	79
100	212	68
105	221	59
110	230	51
115	239	44
120	248	38
125	257	34

Engine Temperature Sensor and Ground	
Between BLACK and each TAN/BLK wire.	No Continuity

Turn Key Start Electronic Control Module (TKS ECM)



Model 210

The Turn Key Start Electronic Control Module (TKS ECM) provides four major functions:

- Electrically controls the enrichment valve to provide a rich fuel charge for starting a cold engine.
- Provides spark advance of 5° to start a cold engine.

IMPORTANT: Below 3,000 RPM the TKS ECM advances idle timing 5° until the engine reaches 104°F (40°C). Above 3,000 RPM, the TKS ECM does not affect ignition timing regardless of engine temperature.

- Monitors and provides warning horn sounds for:
  a. System Start Up Test
  b. Low Oil in Engine Mounted Oil Tank
  c. Over heat condition (cylinder head temperature)
- Provides engine over-rev protection by progressively cutting off spark to ignition coils.

NOTE: *There is no troubleshooting for the TKS ECM. The engine will run without the TKS ECM. If the TKS ECM is suspect, disconnect and run the engine to systematically troubleshoot.*