BRIGGS&STRATTON CORPORATION

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ADVANCE PRODUCT SERVICE INFORMATION

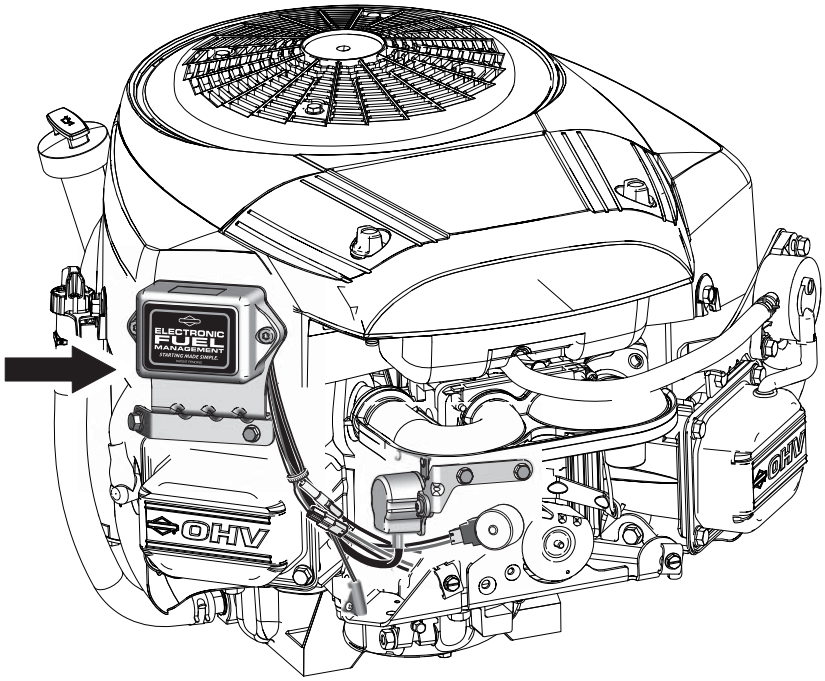
SUBJECT: **Electronic Fuel Management™ (EFM) System - Update**

No: **60** Revised

DATE: **10/09**

MODELS: **M40/44/49**

This APSI is an update and replacement for APSI #60 dated 5/09. It includes additional troubleshooting flowcharts.



The Electronic Fuel Management™ (EFM) System controls the position of the carburetor choke plate during engine starting and warm-up. The system is controlled by an Electronic Control Unit (ECU) and a geared-down stepper motor that actuate the choke. A thermistor attached to the cylinder head reads engine temperature while the program in the ECU senses engine speed. Together, this information allows the ECU to determine the appropriate choke position for starting the engine.

ASSEMBLY

A. Electronic Control Unit (ECU)
- **A1.** ECU - Mounting Bracket
- **A2.** ECU - Harness Plugs
- **A3.** ECU - Part Number Label

B. Choke Link

C. Stepper Motor
- **C1.** Stepper Lever

D. Speed Input Connection

E. Power Harness (EFM)
- **E1.** Connection

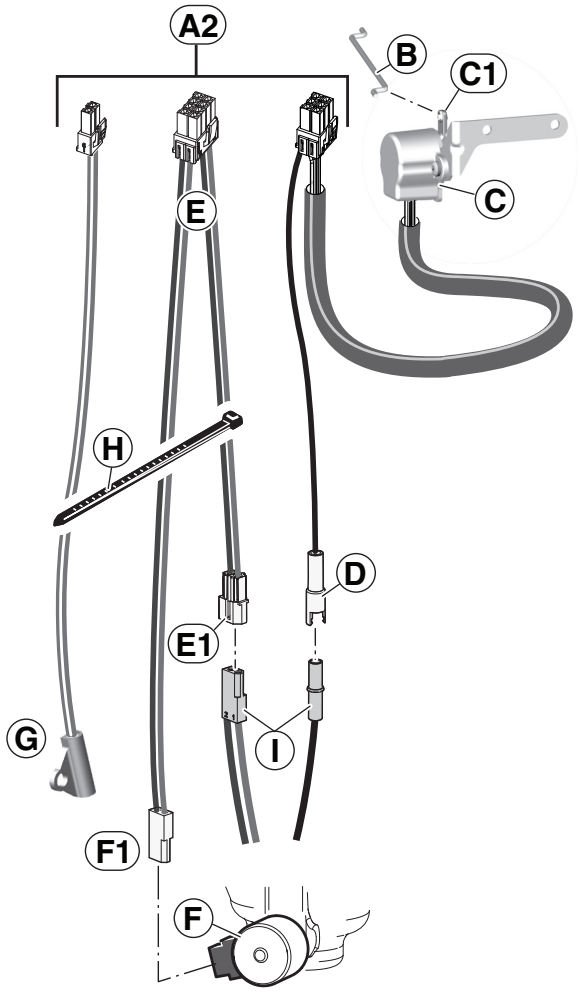
F. Fuel Solenoid
- **F1.** Plug

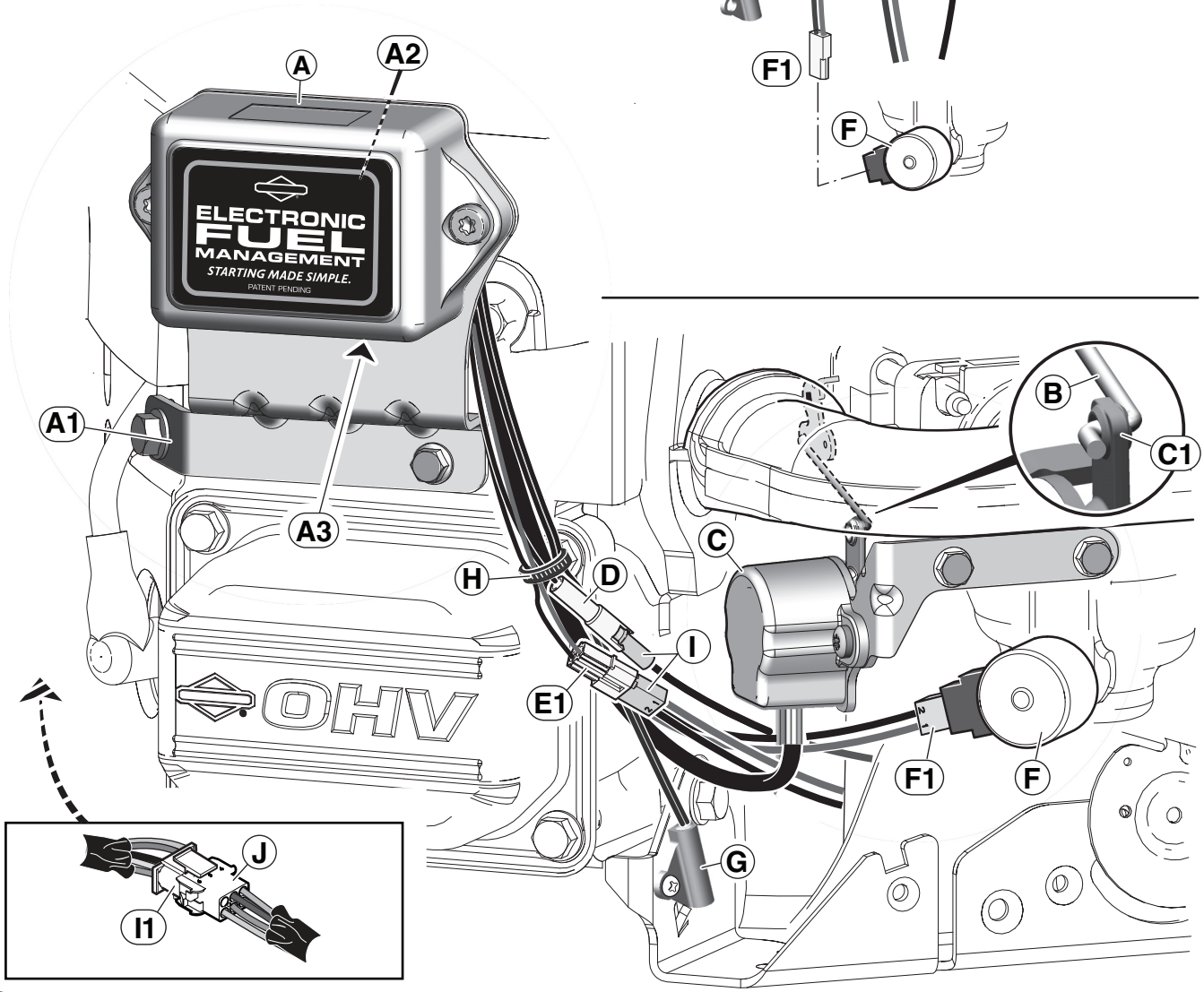
G. Thermistor

H. Cable Tie

I. Engine Harness Plugs (2)
- **I1.** Engine (6-pin) Harness Connector

J. Application (6-pin) Harness Connector





SERVICE PRECAUTIONS

VOLTAGE SPIKES, can damage the Electronic Control Unit (ECU).

To avoid such damage please follow these instructions carefully.

VOLTAGE SPIKE

A Voltage Spike or static electricity can damage the ECU, during the following service activities:

- Disconnecting Harnesses
- Starting the Engine
- Before Making Weld Repairs
- Disconnecting the Battery
- Connecting the Battery
- Charging the Battery

Use the following procedures to avoid voltage spikes.

Disconnecting Harnesses

The ignition switch must be in the **OFF** position when disconnecting or connecting any wire harnesses (engine, application, or EFM).

NOTICE: Never disconnect any electrical connection with engine running.

Starting the Engine

Never use a battery charger to directly start the engine. Use only a fully charged battery properly installed.

Never start the engine if the battery cables are loose or poorly connected to the battery terminals.

Never start the engine if any wire harnesses (engine, application, or EFM) are loose or poorly connected.

Before Making Weld Repairs

1. The ignition switch must be in the **OFF** position.
2. Remove ECU bracket assembly and unplug harnesses from rear of ECU.
3. Disconnect and remove the battery.
4. Disconnect (6-pin) harness plug (**J**) between engine and application.

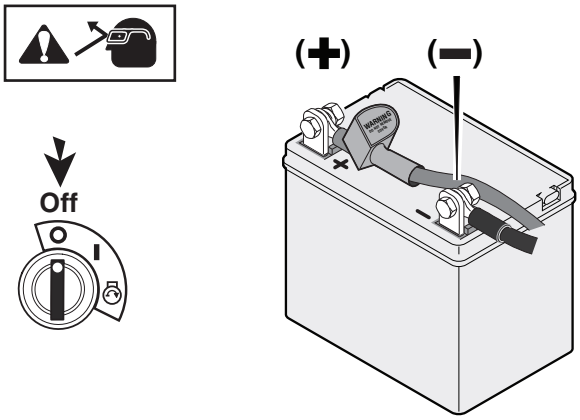
⚠ WARNING

Battery posts, terminals and related accessories contain lead and lead compounds - chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Disconnecting the Battery

NOTICE: Never disconnect the battery with the engine running.

1. The ignition switch must be in the **OFF** position when disconnecting the battery.
2. Always disconnect the NEGATIVE (**−**) cable first.
3. Disconnect the POSITIVE (**+**) cable last.



Connecting the Battery

1. The ignition switch must be in the **OFF** position when connecting the battery.
2. Always connect the POSITIVE (**+**) cable first.
3. Connect the NEGATIVE (**−**) cable last.

Charging the Battery

1. Ignition switch must be in the **OFF** position.
2. Always disconnect the NEGATIVE (**−**) battery cable before charging.
3. Always attach the POSITIVE (**+**) charger clamp to the (**+**) terminal of the battery first.
4. Attach the NEGATIVE (**−**) clamp to the (**−**) terminal of the battery last.

GENERAL TROUBLESHOOTING

Refer to ASSEMBLY art on page 2 for (**Item**) references.

Before performing troubleshooting procedures, check the ECU part number (A3).

Does the number on the ECU label match the part number for the engine model/application shown below?

Engine Model	Application	ECU Part No.
M40/44	Tractor	796350
M40/44	ZT-Mower (Zero Turn)	796351
M49	Tractor	796352
M49	ZT-Mower (Zero Turn)	796353

NO → Replace the ECU

YES → **Done!**

DOES THE ENGINE:

NOT CRANK ?

Turn ignition switch to the **OFF** position.

Is the main tractor fuse blown ?

NO → Check battery condition, battery ground cable (–) connection to tractor frame, ignition switch, electrical safety interlock switches. Check that the 6-pin engine /application harness connection (**J**) is secure. Also see troubleshooting procedures in repair manual #273521.

YES → Using a voltmeter (**M**), check ECU (**A**) for a short.

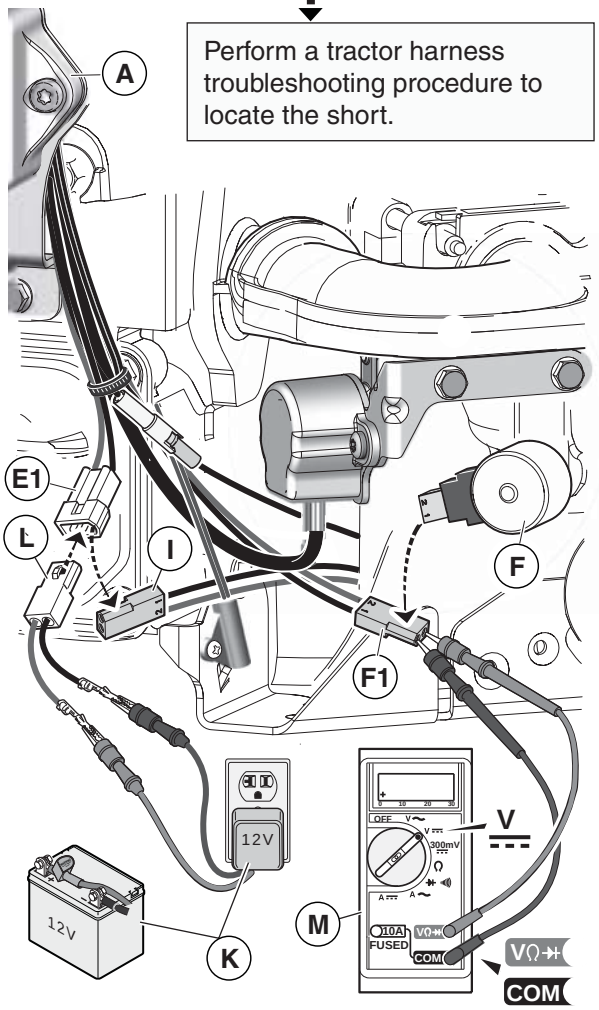
1. Turn the key to the **OFF** position.
2. Disconnect the fuel solenoid plug (**F1**).
3. Disconnect the EFM power connector (**E1**).
4. Connect an adaptor wire harness (**L**) (optional) into connector (**E1).**
5. Connect power source clips to the adaptor harness ends and attach to a 12V power source (**K**).
6. Rotate voltmeter selector to the V ⎓ position.
7. Connect the test leads to the solenoid plug (**F1**) pins.
8. Take reading.

Short Circuited ECU (Very little or no reading)

Replace ECU.

ECU OK (Reading between ~12-18 V)

Perform a tractor harness troubleshooting procedure to locate the short.



DOES THE ENGINE:

CRANK BUT NOT START ?

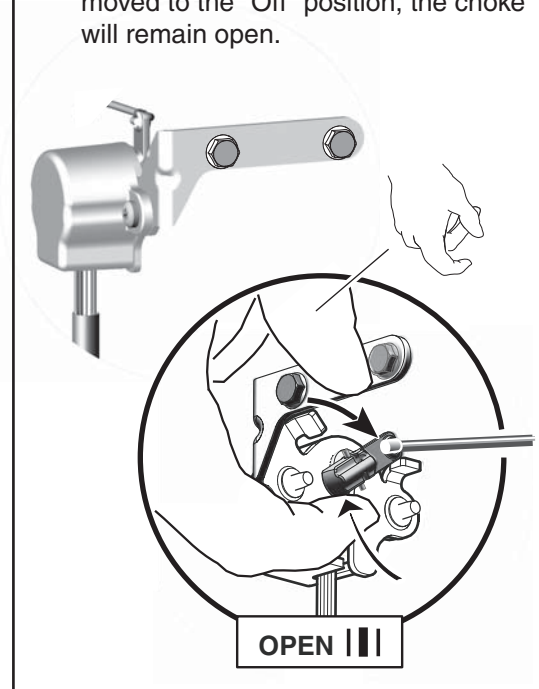
Is the carburetor flooded ?

NO

YES

1. Turn the key to the RUN (On) position.
2. Raise the hood and manually open the choke. It will not damage the stepper motor to force the lever arm open.

   Note: As long as the key switch is not moved to the "Off" position, the choke will remain open.



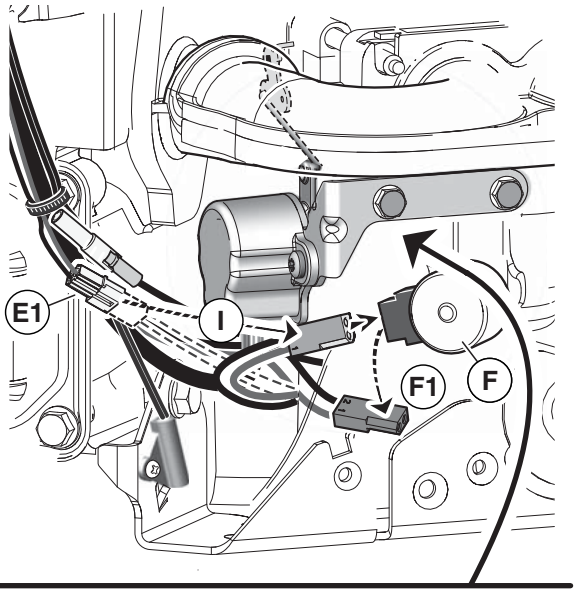
3. Close the hood and sit in the seat.
4. Turn the key to the START position.

Does the engine start/run?

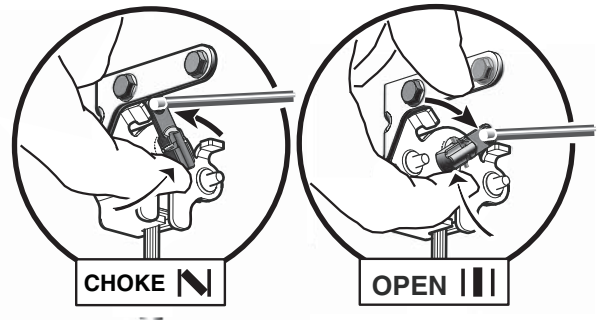
NO

YES → **Done!**

1. Turn the key to the **OFF** position.
2. Disconnect the fuel solenoid plug (**F1**).
3. Disconnect engine power harness plug (**I**) from the EFM power plug (**E1**) and connect it to the fuel solenoid (**F**).



4. Manually set the choke to start engine.



Does the engine start/run?

YES

Engine is OK. See EFM TROUBLESHOOTING page 6.

NO

The EFM system is OK.

Perform the engine troubleshooting procedures in repair manual #273521.

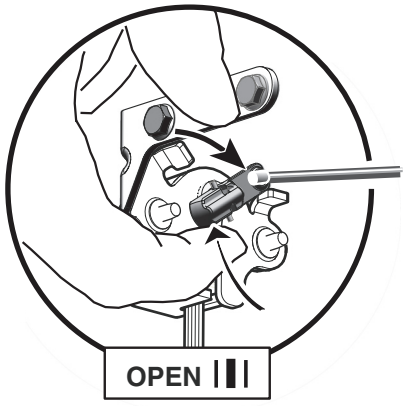
- Ignition
- Carburetion
- Compression

EFM TROUBLESHOOTING

Refer to ASSEMBLY art on page 2 for (**Item**) references.

Reconnect EFM system to the engine, if previously disconnected.

1. Turn the key to the **OFF** position.
2. Manually move the choke to the OPEN position.



3. Have an observer note the stepper lever (**C1**) actuation as the key is turned to the **Run/On** position.

A **Stepper Lever (C1) moves to FULL choke and stays.**

— or —

B **Stepper Lever (C1) moves to FULL choke but then immediately returns to OPEN choke.**

— or —

C **Stepper Lever (C1) does not move.**

A **Stepper Lever (C1) moves to FULL choke and stays.**

Initial actuation is correct.

Does the engine start / run correctly ?

NO — YES → **Done!**

Replace the Thermistor (**G**).

Retest engine - OK ?

NO — YES → **Done!**

Replace the ECU.

Retest engine - OK ?

NO — YES → **Done!**

The EFM system is OK.

Perform the engine troubleshooting procedures in repair manual #273521.

B **Stepper Lever (C1) moves to FULL choke but then immediately return to OPEN choke.**

Replace the Thermistor (**G**).

Does stepper lever move to full choke and stay?

NO

YES

Does the engine start/run?

NO

YES

Done!

Replace the ECU.

Does the engine start/run?

NO

YES

Done!

At this point the EFM system is in working order.

Perform the engine troubleshooting procedures in repair manual #273521.

C **Stepper Lever (C1) does not move.**

Turn the key to the **OFF** position. Disconnect and reconnect the EFM power harness (**E1**) to make sure the connections are correctly plugged in and secure.

Does the engine start/run?

NO

YES

Done!

Test wiring harnesses to ensure continuity between corresponding pins and plugs.

If needed, repair/replace parts and reconnect harnesses.

Does the engine start/run?

NO

YES

Done!

Replace the Thermistor (**G**)

Does the engine start/run?

NO

YES

Done!

Replace the ECU (**G**).

Does the engine start/run?

NO

YES

Done!

Replace the Stepper Motor (**C**).

Does the engine start/run?

NO

YES

Done!

At this point the EFM system is in working order.

Perform the engine troubleshooting procedures in repair manual #273521.