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EVINRUDE® Johnson® BRP

OUTBOARDS

S

SERVICE Bulletin

Date: July, 2006 **No.** 2006-06(S)

MODELS: *Evinrude®* and *Johnson®* Outboards **SUBJECT:** Fuel Requirements

Dear *Evinrude/Johnson* Dealers:

This communication is to provide information on fuel requirements for *Evinrude* and *Johnson* outboards.

Minimum Octane

Evinrude and *Johnson* outboards are certified to operate on high-quality unleaded automotive gasoline with an octane rating equal to or higher than:

- 87 (R+M)/2 AKI – Inside the U.S.
- 90 RON – Outside the U.S.

Using unleaded gasoline which contains methyl tertiary butyl ether (MTBE) is acceptable ONLY if the MTBE content does not exceed 15% by volume.

DO NOT use old or stale fuel. The use of old or poor quality fuel can lead to engine damage.

Alcohol-Extended Fuels

The use of alcohol-extended fuels is acceptable **ONLY** if the alcohol content does not exceed:

- 10% ethanol by volume; **or**
- 5% methanol with 5% cosolvents by volume

Evinrude and *Johnson* outboards are designed to operate on specified fuels; however, be aware of the following:

- Boat fuel systems may be damaged by the use of alcohol-extended fuels. Refer to boat owner's guide.
- Alcohol attracts and holds moisture that can cause corrosion of metallic parts in the fuel system.
- Alcohol-extended fuels may cause engine performance problems.

See http://www.ridgenet.net/~hideseng (Precision Fuel Testing Systems) for alcohol percentage in fuel test kits.

Performance Issues

Problems and concerns related to alcohol-extended fuels:

Hard Starting – Operating difficulties such as hard starting, vapor lock, heat-soak, low speed stalling.

Driveability – Increased alcohol levels result in lean running engines, rough running engines, performance loss, and engine damage.

Phase Separation – Alcohol-extended fuels attract moisture from the atmosphere and from system contamination. Fuel supplies with large amounts of moisture will experience fuel/water phase separation.

Material Damage / Component Wear – Corrosion of metal parts, damage to internal engine parts, deterioration of nonmetallic parts and fuel hoses.

IMPORTANT: The use of water-seperating fuel filters and alcohol resistent components is recommended for all built-in fuel systems.

Fuel Additives

The **ONLY** fuel additives recommended for use in *Evinrude* and *Johnson* outboards are:

Evinrude/Johnson 2+4 Fuel Conditioner

Evinrude/Johnson Carbon Guard

Evinrude/Johnson Fuel Systems Cleaner

IMPORTANT: DO NOT misuse additives. Refer to instructions on packing for proper use.

Liabilities and Warranty

Be sure customers are aware of fuel requirements and recognize issues related to fuel quality. Operating difficulties and damage resulting from the use of poor quality fuels are not covered under the engine's limited warranty.

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FUEL QUALITY ISSUES

Reference: Service Bulletin 2006-06(S)

Unleaded Fuels

Evinrude and *Johnson* outboards are certified to operated on high-quality unleaded automotive gasoline.

Use FRESH fuel. The use of old or poor quality fuel can lead to engine damage.

Minimum Octane

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Methyl tertiary butyl ether (MTBE) content not to exceed 15% by volume.

Alcohol-Extended Fuels

Use of alcohol-extended fuels is acceptable if alcohol content does NOT exceed:

- 10% ethanol by volume; or
- 5% methanol with 5% cosolvents by volume

E10 is a fuel blend of unleaded gasoline and up to 10% ethanol. In the U.S., fuel may contain up to 10% ethanol by law. It may be called gasoline, reformulated gasoline or gasohol. Note: Ethanol absorbs water.

E85 is a fuel blend of 85% ethanol and unleaded gasoline. DO NOT use *E85* in any outboard.

Phase separation occurs in *E10* fuels when the concentration of water in the fuel exceeds 0.49% by volume. When phase separation occurs two layers of liquid form in a fuel tank. The upper layer is gasoline, the lower layer is an ethanol and water mix. If the engine is run when this occurs, water and ethanol will enter the engine's fuel system.

Deteriorated hose pieces trapped by fuel filter

Damaged fuel primer bulb

Fuel pump – gelled deposit

Fuel hose dissolved from contaminated fuel

Fuel Related Issues Continue to Plague the Marine Industry

Remember, ethanol acts as a solvent, dissolving residues and increasing contaminants in the fuel. These particles are put into suspension and drawn into fuel filters and fuel system components. High concentrations of ethanol can damage rubber hoses and corrode the metal components.

Tar-like substances can form at the bottom of fuel tanks or in the outboard's fuel system. Salt, sand-like, and gelled deposits can occur.

Once phase separation occurs, drain the fuel tank and properly dispose of contaminated fuel. Clean the fuel tank and refill with fresh fuel. Otherwise, fuel pick-ups collect the ethanol / water mix from the bottom of the fuel tank and the engine will consume contaminated fuel.

Preventive Measures

Recommendations for customers:

- Always add fresh stabilizer to fresh fuel, use the recommended dosage.
- Go Boating! Use the boat frequently during the season so fuel in the tank doesn't go stale.
- For boats with large capacity fuel tanks, consider keeping them full to help limit the formation of condensation in the fuel tank.
- For boats with large capacity fuel tanks, whose operators are NOT using a tank of fuel in a season, consider using smaller capacity portable fuel tanks.
- Always try to buy clean, fresh fuel from name-brand, high-volume retailers.
- Be attentive when fueling trailered boats at a gas station, do NOT use E85.
- Add a water separating fuel filter to provide increased protection.
- Stay with manufacturer recommended additives, such as *Evinrude/Johnson 2+4 Fuel Conditioner* and *Evinrude/Johnson Fuel System Cleaner*.

Note: *Evinrude/Johnson 2+4 Fuel Conditioner* is approved for use with alcohol-extended fuels such as E-10.

Maintenance

Inspect fuel systems often. If you smell fuel, find the source and repair leaks immediately. Check:

- For leaks.
- For deteriorated rubber or plastic components.
- Fuel filters.
- Condition of all fuel connections and hose clamps.

Replace stiff, cracked, or softened hoses

Replace hoses and primer bulbs with signs of permeation (black residue on surfaces, comes off on hands). Replace leaking fuel system gaskets. Replace damaged hose clamps. Replace questionable fuel filters. Test fuel sample for alcohol concentration. Make sure replacement components are compatible with *E10* fuel.

Inspect fuel tanks. Look for:

- Corrosion or leakage on fuel tanks.
- Replace deteriorated tanks.
- Use correct hose diameters, fittings, and hose lengths for all installations.
- DO NOT create fuel system restrictions.

Remember:

- Prevent water accumulation in fuel tanks by keeping them full.
- Stabilize fresh gasoline before storage.
- Carefully monitor for water in fuel with large capacity fuel tanks, or fuel tanks used in unique applications.
- Do not store large quantities of unstabilized fuel for extended periods.
- Never run engines on old or contaminated fuel.

Fuel leak caused by hose damaged from contaminated fuel

Monitor fuel tanks in unique applications carefully for water in fuel

Fuel Issues

Reports received by the After Sales Department indicate fuel related problems persist in areas where alcohol extended fuels are used.

These problems include:
- Excessive alcohol content in fuel
- Water or other contaminants in the fuel tank
- Phase separation

These problems can result in:
- Corrosion of fuel system metal parts
- Deteriorated fuel hoses
- Blockage in the fuel system
- Engine damage

As part of routine maintenance, inspect fuel hoses from the tank to the outboard. Make sure fuel supply hoses have not deteriorated. Replace deteriorated fuel hoses. Routine inspection of fuel hoses can help prevent expensive repairs.

Refer **Service Bulletin 2006-06(S)** and to the 2008 and 2009 **Product Service Update** books for additional information and recommendations.

These problems can occur with all brands and types of outboards and are related to fuel blending, contaminants, and atmospheric conditions.

Deteriorated fuel hose and primer bulb

Blockage in the fuel system

FUEL AND ADDITIVES

Reference: Service Bulletin 2006-06(S)

Unleaded Gasoline

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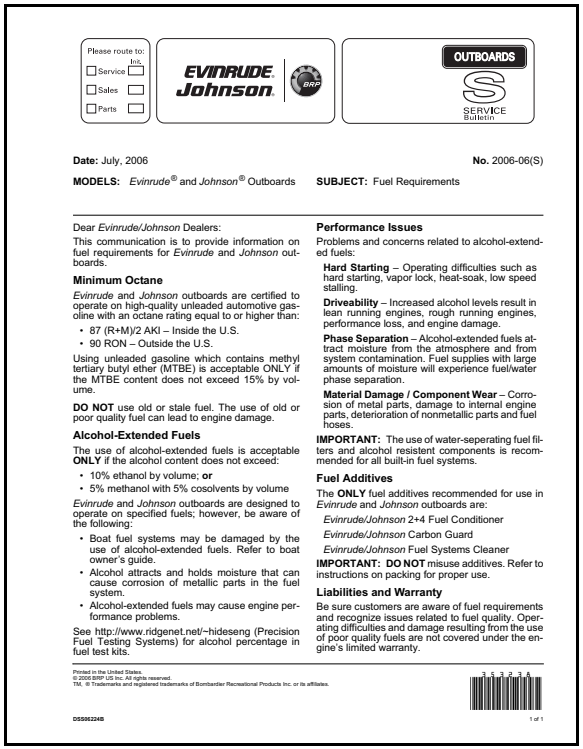
E85 is a fuel blend of 85% ethanol and unleaded gasoline. DO NOT use *E85* in any *Evinrude* or *Johnson* outboards.

Phase separation occurs in *E10* fuels when the concentration of water in the fuel exceeds 0.49% by volume. When phase separation occurs there will be two layers of liquid in a fuel tank. The upper layer is gasoline, the lower layer is an ethanol and water mix. If the engine is run when this occurs, water and ethanol will enter the engine's fuel system.

Visit the *Briggs & Stratton* web site (www.briggsandstratton.com) for information on gasohol test kit, P/N 100023. This kit is NOT available through BRP.



Please route to:
Service Inc.
Sales
Parts

EVINRUDE Johnson

OUTBOARDS
SERVICE Bulletin

Date: July, 2006 **No.** 2006-06(S)

MODELS: *Evinrude*® and *Johnson*® Outboards **SUBJECT:** Fuel Requirements

Dear *Evinrude*/*Johnson* Dealers:

This communication is to provide information on fuel requirements for *Evinrude* and *Johnson* outboards.

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- Alcohol-extended fuels may cause engine performance problems.

See http://www.ridgenet.net/~hideseng (Precision Fuel Testing Systems) for alcohol percentage in fuel test kits.

Performance Issues

Problems and concerns related to alcohol-extended fuels:

Hard Starting – Operating difficulties such as hard starting, vapor lock, heat-soak, low speed stalling.

Driveability – Increased alcohol levels result in lean running engines, rough running engines, performance loss, and engine damage.

Phase Separation – Alcohol-extended fuels attract moisture from the atmosphere and from system contamination. Fuel supplies with large amounts of moisture will experience fuel/water phase separation.

Material Damage / Component Wear – Corrosion of metal parts, damage to internal engine parts, deterioration of nonmetallic parts and fuel hoses.

IMPORTANT: The use of water-seperating fuel filters and alcohol resistent components is recommended for all built-in fuel systems.

Fuel Additives

The **ONLY** fuel additives recommended for use in *Evinrude* and *Johnson* outboards are:

Evinrude/*Johnson* 2+4 Fuel Conditioner

Evinrude/*Johnson* Carbon Guard

Evinrude/*Johnson* Fuel Systems Cleaner

IMPORTANT: DO NOT misuse additives. Refer to instructions on packing for proper use.

Liabilities and Warranty

Be sure customers are aware of fuel requirements and recognize issues related to fuel quality. Operating difficulties and damage resulting from the use of poor quality fuels are not covered under the engine's limited warranty.

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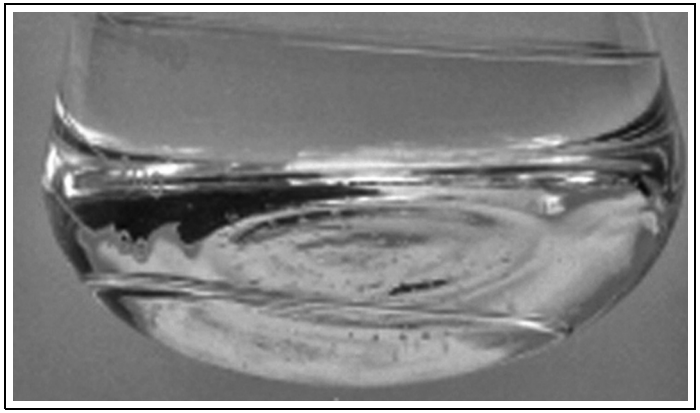
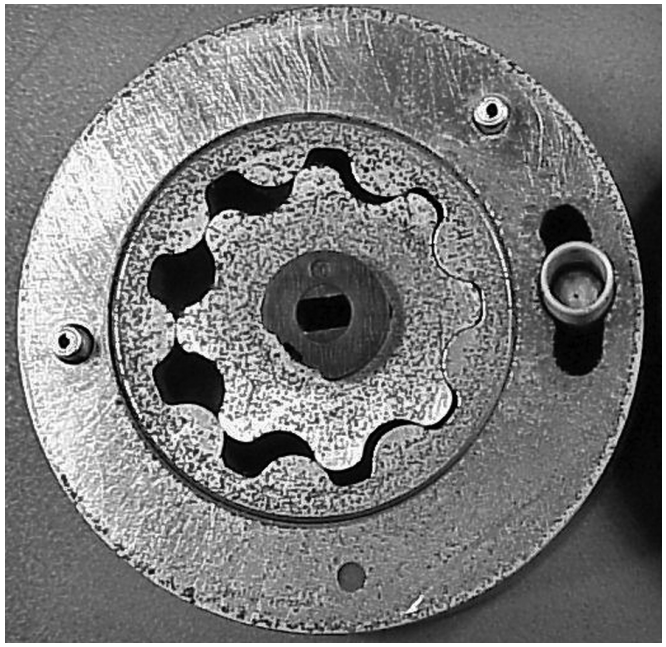
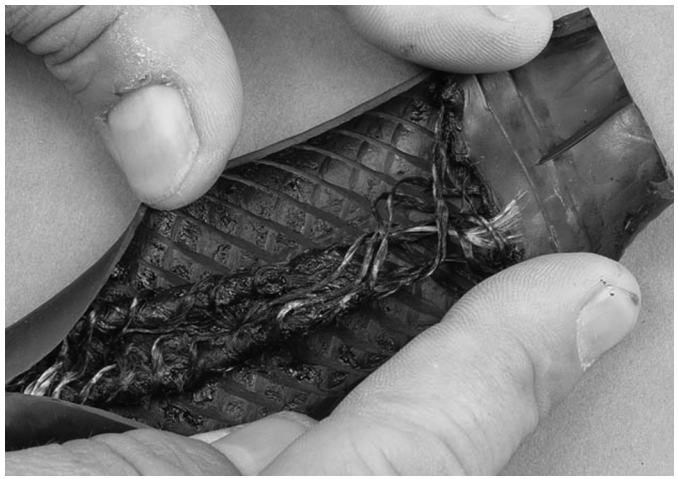


Lower layer is an ethanol and water mix



Corroded fuel pump gerotor



Damaged fuel hose

Fuel Contamination

Once phase separation occurs, dispose of the contaminated fuel. Clean the fuel tank and refill with fresh fuel. Otherwise, fuel pick-ups collect the ethanol / water mix from the bottom of the fuel tank and the engine runs on the contaminated fuel. At low speeds, the engine may appear to run normally. High speed performance and acceleration is affected. If the outboard is shut down with a high concentration of alcohol in the fuel system, fuel system components experience chemical reactions. Metal components corrode and rubber fuel system components deteriorate.

Over the course of time, gum or varnish form. Sludge forms on the walls of fuel tanks. Problems can occur when an area or region switches from “pure” gasoline to *E10*. The ethanol acts as a solvent, dissolving residues and increasing contaminants in the fuel. Particles are put into suspension in the fuel and are drawn into filters and other fuel system components. Tar-like substances can form at the bottom of fuel tanks or in the outboard’s fuel system. Salt, sand-like, and jelly-like formations can occur.

Possible causes:

- “Wrong” or contaminated fuel from marina or service station
- Contaminated after filling fuel tank—condensation in fuel tank
- Fuel tank vent damaged or located where water can enter
- Old or stale fuel
- Incorrect additives

Fill a glass jar with a sample of gasoline from the fuel tank. Inspect for:

- Pure gasoline, gasohol (*E10)*
- Separated appearance - water in fuel
- Clean and clear indicates fresh fuel
- Dark and cloudy indicates old or stale fuel

Fuel Additives

Fuel Stabilizers

Evinrude/Johnson 2+4 Fuel Conditioner is a fuel stabilizer. It contains isopropanol and ethanol-based additives which provide fuel stability and corrosion protection. Stabilizers are only effective when added to fresh fuel, at the recommended dosage.

Surfactants

Evinrude/Johnson Fuel System Cleaner is a surfactant. When added to gasoline it effectively cleans fuel system surfaces. Surfactants help to suspend or remove dirt, gum and varnish from fuel systems.

Remember to ask if fuel additives are being used whenever contaminated fuels are found. Some additives make contamination problems worse.

Evinrude/Johnson 2+4 Fuel Conditioner

MAINTENANCE

Inspect fuel systems often. Look for leaks or deteriorated rubber or plastic components. Replace stiff, cracked, or softened hoses. Replace hoses and primer bulbs with signs of permeation (black residue of surfaces, comes off on hands). Replace leaking fuel system gaskets. Make sure replacement components are compatible with *E10* fuel.

Inspect fuel tanks. Look for corrosion or leakage on fuel tanks. Replace all deteriorated tanks—plastic, fiberglass, aluminum or steel. If you smell fuel, find the source and repair all leaks immediately. Use correct hose diameters, fittings, and hose lengths for all installations. DO NOT create fuel system restrictions by using incorrect hose diameters or fittings.

Remember, prevent water accumulation in fuel tanks by keeping them full. Stabilize fresh gasoline before storage. Over-sized and large fuel tanks should be monitored carefully. Do not store large quantities of fuel for extended periods of time. Do not run engines on old or contaminated fuel. Add a water separating fuel filter to provide increased protection.

Water separating fuel filter

EVINRUDE E-TEC | BRP

OUTBOARDS
SERVICE
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Suggested Routing:
☐ Service ☐ Sales ☐ Parts

Date: November 24, 2014 **No.** 2014-07(S)

MODELS: All *Evinrude*® *E-TEC*® Outboards **SUBJECT:** Fuel Injector Inspection

Fuel injector and fuel system inspection is important for accurate identification of fuel related failures. Owners and technicians should inspect the boat's fuel supply frequently. Take fuel samples from ALL fuel tanks to identify all potential sources of contamination.

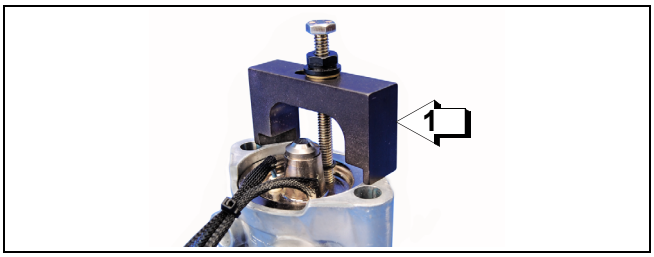
Understanding the source of fuel system contamination can prevent repeat failures and improve customer satisfaction. Based on use, some customer's may need more frequent fuel system maintenance. Fuel filter replacement and fuel tank cleaning may be beneficial if reoccurring fuel tank contamination is observed.

Inspect ALL failed fuel injectors for contamination damage prior to submitting any warranties claims. Fuel injectors damaged by fuel system contamination can NOT be submitted for warranty consideration.

Fuel Injector Inspection Procedure

IMPORTANT: Refer to the FUEL COMPONENT SERVICING section of the correct service manual.

Remove the fuel injector assembly from the outboard. Use Injector Puller Kit, P/N 356461, to remove the fuel injector from the mounting cup.



1. Injector Puller Kit, P/N 356461 008795

Inspect for damage from fuel contamination. Rust, corrosion, or foreign material, on the fuel injector, or inside the mounting cup, indicates fuel contamination. Damaged fuel injectors must be replaced.

Fuel Contaminated Injectors and Mounting Cups 2014-07(S)-01
2014-07(S)-02

Flush the fuel system if fuel contamination is found. Refer to bulletin 2013-03(S).

Warranty Coverage Reminder

IMPORTANT: Damage from fuel system contamination is not a warrantable repair.

Refer to bulletin 2012-07(A) before returning any fuel system component.

Include an engine report with the warranty claim for any fuel injector or

EVINRUDE E-TEC

OUTBOARDS
SERVICE
Bulletin

Suggested Routing:
☐ Service ☐ Sales ☐ Parts

Date: February 13, 2013 **No.** 2013-03(S)

MODELS: *Evinrude® E-TEC®* Outboards **SUBJECT:** Fuel System Inspection and Flushing

Evinrude/Johnson® Dealers:

This communication includes information about fuel system inspection and flushing for *Evinrude E-TEC* outboards with contaminated fuel systems.

Fuel system contamination is not a warrantable repair. Failure to inspect, flush, and clean fuel systems may result in long term damage.

Inspection and Flushing

⚠ WARNING

Protect against hazardous fuel spray. Before starting any fuel system service, carefully relieve fuel system pressure.

After servicing the fuel system check for leaks. Failure to check for fuel leakage could allow a leak to go undetected, resulting in fire or explosion.

Inspect the boat and the outboard fuel systems to identify possible sources of contamination.

Boat Fuel System Inspection

Obtain a sample from the fuel tank.

1) Remove the fuel inlet supply hose from the outboard. Clamp the fuel hose on the engine side to prevent fuel from leaking from the engine fuel system.

2) Position the boat or fuel tank so contaminants collect in a bottom corner of the fuel tank.

3) Use a piece of 3/8 in. fuel hose to access the tank through sender opening or the fill hose opening. Collect fuel from the bottom corner of the tank.

Do not collect a fuel sample through the tank-mounted pick up line. These lines may not extend to the bottom of the tank.

1) Collect a one quart (0.946L) sample in a clear container suitable for holding gasoline. Allow the sample to sit for 60 minutes. Inspect for water, contaminants, and phase separation.

Water in the sample may be a result of excessive condensation in the tank. Inspect the condition of the tank fill cap and vent. Replace or repair as necessary.

Contaminants or phase separation may indicate the use of ethanol extended fuel.

2) Use a fuel test kit to check the sample for excessive amounts of ethanol or water.

3) Inspect the boat-mounted fuel filter, clean and replace as required.

4) Remove contaminated fuel and thoroughly clean the tank.

Outboard Fuel System Flushing

Use the correct Service Manual to complete fuel system service, refer to the Fuel Component Servicing section in the Fuel System chapter.

Use the following fuel mixture for flushing and run testing:

- Fresh fuel with a minimum octane of 87 AKI(R+M)/2 or 90 RON
- *XD 100* oil mixed at 50:1
- The correct amount of *Fuel Systems Cleaner* (based on label instructions)

Procedure:

1) Relieve fuel system pressure.

2) Drain contaminated fuel from all outboard fuel system components, including:

- Fuel supply hoses
- Fuel lift pump
- Fuel filter

- Vapor Separator
- Fuel Circulation Pump
- Fuel Supply and Return Manifolds
- Fuel Injectors

3) Use a primer bulb and hose assembly and the fuel mixture to flush the components listed in Step 2.

Vapor Separator Inspection:

1) Remove the vapor separator assembly.

2) Cap and seal the vapor separator water outlet port.

3) Use a Gearcase Pressure Tester, P/N 507977. Apply 10 to 15 psi (76 to 103 kPa) to the water inlet port. The vapor separator must hold pressure for five minutes. If it does not hold pressure, replace the vapor separator assembly.

4) Replace the Fuel Return Filter, P/N 354190, it is located in the vapor separator fuel return inlet.

Fuel Injector Inspection and Fuel Circulation Pump Replacement

1) Remove the fuel injector assemblies.

2) Remove the injectors from the housings. Inspect the injectors and housings for signs of contamination.

3) Clean contaminated injectors and housings.

4) Replace damaged injectors and housings.

Contaminated or damaged injectors and housings indicate a similar condition exists with the vapor separator fuel circulation pump.

5) Replace the fuel circulation pump. See bulletin 2013-03(P) for fuel circulation pump service kits.

Reassemble the fuel system. Use the correct Service Manual to complete a fuel delivery test. Refer to the Fuel Delivery Test section in the System Analysis chapter.

Water Running Test

Complete an in the water running test under normal load. Do NOT run on a garden hose.

1) Use the fuel mixture, operate the outboard at 3000+ RPM for a minimum of 30 minutes.

2) Use normal/clean fuel, operate the outboard at 3000+ RPM for a minimum of 30 minutes.

3) Evaluate the running condition.

4) Reinspect the boat-mounted fuel filter for the presence of water.

NOTICE **Use normal/clean fuel mixed with the correct amount of *2 + 4® Fuel Conditioner* to store outboards. Do NOT store outboards with fuel systems which contain water or contaminants. Damage to the fuel system components can occur if contaminated fuel is left in the fuel system or used for storage.**

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EVINRUDE® Johnson® BRP

OUTBOARDS
P
PARTS AND ACCESSORIES
Bulletin

Date: October, 2003 **No.** 2003-03(P)

MODELS: ALL MODELS **SUBJECT:** New *Evinrude/Johnson* Outboard Oils

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This communication is to assist *Evinrude* and *Johnson* dealers with the identification of the new "family" of *Evinrude/Johnson* 2-stroke oils for outboards. The complete line-up of new 2-stroke oils are available through *Evinrude/Johnson* Genuine Parts and Accessories.

The new formulas replace current formulations and offer improved lubricity and increased protection against wear.

Evinrude/Johnson Genuine Parts has introduced three new oil formulations for 2-stroke outboard oils. The new formulations have new names:

- *Evinrude/Johnson XD30™*
- *Evinrude/Johnson XD50™*
- *Evinrude/Johnson XD100™*

Become familiar with the new line of 2-stroke outboard oils. Refer to the table and descriptions provided below.

Evinrude/Johnson XD30 **• Good**	***Evinrude/Johnson XD50*** **• Better**	***Evinrude/Johnson XD100*** **• Best**
Color accent – Red	**Color accent** – Blue	**Color accent** – Gold
Blend – Performance enhanced	**Blend** – Synthetic blend	**Blend** – Premium synthetic
Features and Benefits • Pre-mix and oil injection outboard oil • Minimizes carbon and deposit build-up • Protects against wear with premium lubricity	**Features and Benefits** • Direct Injection and oil injection outboard oil • Reduces smoke for cleaner operation • Contains *CarbX™* for carbon suspension • Protects against wear with superior lubricity	**Features and Benefits** • *Evinrude E-TEC* and Direct Injection outboard oil • Smokeless, ashless, odorless • Provides unsurpassed protection for 2-stroke outboards • Offers maximum detergency, reducing combustion deposits • Protects against friction and wear with ultimate lubricity • Produces superior protection in temperatures below 32°
(Formerly *Evinrude/Johnson* 2-stroke outboard oil)	(Formerly *Evinrude Ficht Ram* Injection oil)	New formulation

IMPORTANT: When used in *Evinrude E-TEC* outboards, use of *XD100* oil can provide added protection and reduce operating cost by programming the *EMM* to significantly reduce normal oil consumption, compared to using a conventional oil. Refer to the *Evinrude E-TEC* service manuals, P/Ns 5005642 and 5005644 for information to reprogram *Evinrude E-TEC EMM*s for *XD100* oil usage. Only an authorized *Evinrude E-TEC* dealer can program the *EMM* for this benefit.
