



Customer Bulletin

Commercial Products

General #03-05

Product: Reelmaster®

July 9, 2007

Toro Commercial Engineering has tested the long-term effects of biodiesel fuel and fuel-blends on product performance and durability extensively. Biodiesel conversion kits are now available for select 2002-2007 Toro Reelmaster® products.

Kit #	Model Name	Model Number	Serial Range
*112-9140	RM 5210	03660	260000001-279999999
	RM 5410	03670	260000001-279999999
	RM 5510	03680	260000001-279999999
	RM 5610	03690	260000001-279999999
110-9029	RM 2000-D	03428	220000001-259999999
		03431	260000001-279999999
112-9140	RM 3100-D	03200	220000001-259999999
		03201	220000001-259999999
		03206	260000001-279999999
		03207	260000001-279999999
	RM 5200-D	03540	220000001-269999999
	RM 5400-D	03543	220000001-269999999
		03544	220000001-269999999
	RM 5500-D	03550	220000001-269999999
	RM 4000-D	03706	220000001-279999999
		03707	220000001-279999999
	RM 6500-D	03806	220000001-279999999
		03807	220000001-279999999

Situation: Converting Select Reelmaster® - Toro Commercial Products to Run on Biodiesel

All 2006-2007 production fuel lines are biodiesel compliant and do not require replacement.

*After installation of the kit (112-9140) on RM5010 series product within the serial number range of 260000001-270000500, a Diagnostic Light may illuminate indicating a system fault has been recognized. Contact your local Toro Distributor to verify controller software revision (100-0690 Rev A or higher). The software was updated during production (beginning with serial number 270000501).

Instructions: Specific installation instructions are included in Biodiesel Fuel Conversion Kits 110-9029 and 112-9140.

Attachments: "Biodiesel Information"



Customer Bulletin

Commercial Products

General #03-05

Product: Groundsmaster®

July 9, 2007

Toro Commercial Engineering has tested the long-term effects of biodiesel fuel and fuel-blends on product performance and durability extensively. Biodiesel conversion kits are now available for select 2002-2007 Toro Groundsmaster® products.

Kit #	Model Name	Model Number	Serial Range
112-9140	GM 228-D	30241	220000001-249999999
		30242	220000001-249999999
	GM 3280-D	30308	250000001-259999999
		30309	250000001-259999999
		30344	260000001-279999999
		30345	260000001-269999999
	GM 7200	30360	270000001-279999999
		30361	270000001-279999999
		30362	270000001-279999999
	GM 7210	30363/TC/TE	270000001-279999999
		30364	270000001-279999999
		30365	270000001-279999999
	GM 4000-D	30410	220000001-279999999
	GM 4100-D	30411	220000001-279999999
	GM 328-D	30626	220000001-279999999
		30627	220000001-279999999
		30630	220000001-279999999
		30631	220000001-279999999
	GM 3500-D	30821	220000001-259999999
	GM 3505-D	30826	250000001-279999999
	GM 4500-D	30856	220000001-279999999
	GM 4700-D	30868	220000001-279999999
112-9130	GM 580-D	30582	250000001-279999999
		30583	260000001-279999999

Situation: Converting Select Groundsmaster® - Toro Commercial Products to Run on Biodiesel

2006 and 2007 production fuel lines are biodiesel compliant and do not require replacement.

The GM 328-D requires that the 7.5 amp fuse (fuse #4, powers the Glow Plug Controller, and over temp shut down) be upgraded to a 10 amp fuse. This fuse should be obtained locally.

Instructions: Specific installation instructions are included in Biodiesel Conversion kits 112-9140 and 112-9130.

Attachments: "Biodiesel Information"



Customer Bulletin

Commercial Products

General #03-05

Product: Multi Pro®

July 9, 2007

Toro Commercial Engineering has tested the long-term effects of biodiesel fuel and fuel-blends on product performance and durability extensively. Biodiesel conversion kits are now available for select 2004-2007 Toro Multi Pro® products.

Kit #	Model Name	Model Number	Serial Range
112-9140	MP 5700-D	41581	240000001-259999999
		41582	260000001-279999999

Situation: Converting Selected Multi Pro® - Toro Commercial Products to Run on Biodiesel

2006 and 2007 production fuel lines are biodiesel compliant and do not require replacement.

Instructions: Specific installation instructions are included in the kit 112-9140.

Attachments: "Biodiesel Information"



Customer Bulletin

Commercial Products

General #03-05

Product: Greensmaster®

July 9, 2007

Toro Commercial Engineering has tested the long-term effects of biodiesel fuel and fuel-blends on product performance and durability extensively. Biodiesel conversion kits are now available for select 2002-2006 Toro Greensmaster® products.

Conversion Kit	Model Description	Model Number	Serial Range
112-9182	GR 3250-D	04383	220000001-269999999

Situation: Converting Selected Greensmaster® - Toro Commercial Products to Run on Biodiesel

2006 production fuel lines are biodiesel compliant and do not require replacement. 2007 model vehicles are "biodiesel ready" as manufactured.

Instructions: Specific installation instructions are included in the kit 112-9182.

Attachments: "Biodiesel Information"



Customer Bulletin

Commercial Products

General #03-05

Product: Workman®

July 9, 2007

Toro Commercial Engineering has tested the long-term effects of biodiesel fuel and fuel-blends on product performance and durability extensively. Biodiesel conversion kits are now available for select 2002-2007 Toro Workman® products.

Kit #	Model Name	Model Number	Serial Range
110-9029	WM 3300-D	07213/07213TC	220000001-239999999
	WM 3300-D	07362/07362TC	240000001-259999999
	WM 4300-D	07217/07217TC	220000001-239999999
	WM 4300-D	07364/07364TC	240000001-259999999
No Kit Required*	WM 3300-D	07362/07362TC	260000001-279999999
No Kit Required*	WM 4300-D	07364/07364TC	260000001-279999999

Converting Selected Workman® - Toro Commercial Products to Run on Biodiesel

*2006 and 2007 vehicles are "biodiesel ready" as manufactured and do not require a conversion kit.

Instructions: Specific installation instructions are included in the kit 110-9029.

Attachments: "Biodiesel Information"



Biodiesel Information

Purpose

This document has been generated by the Toro Company to list important observations and information gleaned from biodiesel testing. It also provides external references concerning biodiesel's use and continuing development.

What is Biodiesel?

Biodiesel is an alternative fuel source produced from natural substances (such as regional corn crops), which is both biodegradable and environmentally sustainable. In its "pure" form, it is called biodiesel fuel or "B100."

Fuel Information

Biodiesel blended with petrodiesel is specified by percentage (e.g., a 5% biodiesel blend with 95% petrodiesel is B5).

- For those who wish to produce their own biodiesel "blends", the B100 Biodiesel Producer/Marketer should be certified by the National Biodiesel Accreditation Program (BQ-9000).
 - B100 fuel should meet American Society of Testing and Materials (ASTM) standard D6751 or European standard EN14214.
 - The blended fuel composition should meet standard ASTM D975 or EN590.
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Known Issues

- An energy content reduction of one to two percent and an increase in fuel consumption may be expected from B20 blends.
 - Painted surfaces may be damaged by biodiesel fuel/blend contact.
 - **Any on-site fuel tank must be equipped with a ten micron (or finer) filter.**
 - To maintain fuel quality, no more than six months fuel supply should be kept on-site.
 - Biodiesel concentrations of 5% or lower are recommended for winter (or "cold weather") operation. As with 2D petroleum-based fuel, blending with 1D fuel and/or cold weather additives (pour point depressants) is required.
 - All seals, hoses, gaskets, and wire coats must be monitored as they may swell, crack, or become tacky over time.
 - Following the conversion of a unit which has previously run on petroleum/diesel-based fuel, one or two instances of premature fuel filter plugging can be expected; this is caused by the dissolution and washing of fuel deposits into the filter and is considered normal.
 - Aging and oxidation lead to increased acids and the formation of gum that may plug the filters.
 - Biodiesel should not be left in the system. If product is going to be stored more than three months, drain the fuel tank and lines to the engine, put in a sufficient quantity of petroleum diesel fuel, and purge the engine of all biodiesel (approximately 5-10 minutes of operation).
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Fuel Lines



Figure 1 - (Top) 2005 and earlier standard fuel line/house, (Bottom) 2006 and later “Low Permeation” Hose.

Standard fuel lines on units (2005 and older) may swell, crack, or become tacky over time when exposed to high biodiesel blends. The newer “Low Permeation” Fuel Hose (see Figure 1) has a specialized interior lining that prevents excessive permeation and therefore lessens exposure of the outer cover to biodiesel.

Additional References

BIODIESEL – Handling and Use Guidelines/DOE/GO 12006-2358
(3rd Edition) September 2006

- Website: <http://www.nrel.gov/docs/fy06osti/40555.pdf>

National Biodiesel Board

- Website: <http://www.biodiesel.org/>

European Biodiesel Board

- Website: <http://www.ebb-eu.org/index.php>
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