Renewable Lubricants, Inc.
476 Griggy Rd., P.O. Box 474
Hartville, Ohio 44632-0474
Voice: 330.877.9982 Fax 330.877.2266
Web: www.renewablelube.com

Bio-Fleet™ Trans-Hydraulic

(Universal Tractor Fluid)

"Biobased Lubricants that Perform Like Synthetics"

Bio-Fleet™ Trans-Hydraulic is a universal tractor fluid (UTF) that incorporates Stabilized* additive technology with biodegradable[1] biobased oils. It provides improved performance, provides efficiency in synchronised and glide shift transmissions, and is interchangeable with standard UTF. This formulation contains special frictional modifiers for the Wet Brake's equipment design, and is compounded with detergent, dispersant, anti-wear, anti-rust, and anti-foam inhibitors. Bio-Fleet™ Trans-Hydraulic fluid is a multi-grade lubricant that can be used in agricultural, industrial, and construction equipment and has proven field performance.

Although it may differ from manufacturers' recommended fluids, Bio-Fleet™ Trans-Hydraulic Fluid has been highly tested, **Tractor Life.com Authenticated,** and can be used to meet or exceed all of the following performance specifications: Allison C-3, Cat TO-2 and API GL-4, FZG/Low-Speed/High Torque, J20-C/M1139 High Torque Axle, Wet Brake Chatter/Squawk, PTO Clutch, the North America Performance Requirements for Universal Tractor Transmission Oils (UTTOs), and Multipurpose Tractor Oils (MTO)

Biodegradable Tractor Transmission Oil Providing Excellent Performance, and suitable and commonly used in the following Tractor specifications: Bio Fleet UTF is usually recommended in moderate temperature applications (-35°C to 80 °C with a maximum temperature of 80 °C (176°F).

Ford, New Holland
M2C134-D, FNHA-2-201
M2C86-C, M2C86-C/B
**M2C41-B/A, M2C48-C/B, M2C92-A
M2C53-B/A, M2C134-C,B,A
CNH MAT 3525

Massey-Ferguson
M1135, M1141, M1139, M1143, M1145,
**M1110, M1127B/A, M1129A

John Deere J20C, J14A/B/C, **J20D

Kubota, UDT
Steiger, SEMS 1700A
Versatile, 28M, 24M

Case International
**JIC-145/MS-1210
JIC-185/MS-1204, MS-1205, MS-1206
MS-1207, MS-1209, MS1127, M1129-A

Agco, White Farm
Q-1826 Q-1705, Q-1766, Q-1802, Type 55

Agco, Deutz-Allis 821XL
Landini
Fiat-Hesston, AF-87, Multi-F

TRANSMISSION OEM'S
**J20C spec for Allison C4
Caterpillar TO-2

Hydraulic: Vickers, Denison, Commercial Intertech, Rexroth, Sauer-Sundstrand
**Lower viscosity specifications can be replaced where recommended by OEM.

Bio-Fleet™ Trans-Hydraulic meets the Environmental Protection Agency (EPA) 2013 Vessel General Permit (VGP) guidelines for Environmentally Acceptable Lubricants (EALs), and should be used where **LOW TOXICITY, BIODEGRADABILITY** and NON-**BIOACCUMULATION** properties are required. This product exceeds the acute toxicity (LC-50 / EC-50 >1000 ppm) criteria adopted by the US Fish and Wildlife Service and the US EPA. Bio-Fleet™ Trans-Hydraulic is an **ENVIRONMENTALLY ACCEPTED LUBRICANT (EAL)** that is formulated from renewable agricultural biobased resources. We believe Earth's environmental future rests in the use of renewable materials.

[1]Ultimate Biodegradation (Pw1) within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants
STABILIZED by Renewable Lubricants™* is RLI's trademark on their proprietary and patented anti-oxidant, anti-wear, and cold flow technology. High Oleic Base Stock (HOBS) are agricultural vegetable oils. This Stabilized technology allows the HOBS to perform as a high performance formula in high and low temperature applications, reducing oil thickening and deposits.

Availability	F.O.B.: Hartville, Ohio, USA	1 Gallon	5 Gallon Pail	Drum	Totes	Bulk
RLI Product Item #		81203	81204	81206	81207	81209

Test	Typical Results	Specification Limits
Viscosity @ 100°C ASTM D-445	10.26	9.10 min.
Viscosity @ 40°C ASTM D-445	47.8	Report
Viscosity Index ASTM D-2270	210	140
Shear Stability Orbahn ASTM D-6278		
Vis. @ 100°C (after shear)	9.6	9.10 min.
Brookfield Viscosity ASTM D-2983		
@-20°C	1,650	5,500 max.
@-35°C	21,150	70,000 max.
Flash Point, °C (ASTM D-92)	251	200 min.
Stable Pour Point, °C (ASTM D-97)	-39	-36 max.
Rust Prevention A&B, (ASTM D-665)	Pass Clean	No Visible Rust
Acid Number, mg KOH / g (ASTM D-974)	0.6	Report
Dielectric Strength (ASTM D-877)	46 KV	35 KV (Minimum)
Four Ball Wear (ASTM D-4172)		
1 h, 65°C, 1500 rpm, 40 kg,	0.36	0.40 max.
Oxidation Stability JDQ 16		
Evaporation Loss	0.65%	5.0% max.
Viscosity Increase @ 100°C	5.02%	10.0% max.
Viscosity Increase @ 40°C	4.0	--------
Sludge Formation	None	None
Additive Separation	None	None
Rust Protection JDQ 22	>100	100 hrs. min.
Copper Corrosion JDQ 32	1A	1B max.
Foaming Characteristics JDQ 33		
Sequence I	0/0	25/0 ml. max.
Foam Breaktime	0	30 sec. max.
Sequence II	50/0	50/0 ml. max.
Foam Breaktime	0	30 sec. max.
Sequence III	0/0	25/0 max.
Foam Breaktime	0	30 sec. max.
Water Sensitivity JDQ 19		
Solids	0.0	0.1 %v max.
Additive Loss	0.0	15.0% wt. max.
Extreme Pressure Properties JDQ 34		
Timken Abrasion Mass Loss	0.5 mg.	1.5 mg. max
Timken OK Load	73 N	45 N min.
Rubber Compatibility JDQ 9		
Volume Change	+1	0 to +5%
Hardness Change	-0.5	0 to –5 pts.
Precipitation	None	Trace
Rubber Compatibility		
Reference 69X311111		
Volume Change	+2.5	0 to +5
Hardness Change	-1.5	0 to –5
Precipitation	None	None
Oil Compatibility JDQ 23		
Additive Separation	None	None
Oxidation Stability		
Evaporation Loss	1.6	5.0% max.
Viscosity Increase @ 100°C	6.0	10.0% max.
Viscosity Increase @ 40°C	9.8	---------

Sludge Formation	None	None
Additive Separation	None	None
Low Temperature Fluidity JDQ 73/74		
Cold Soak @ -35°C	27 secs.	30.0 sec. max.*
Slow Cool		
@ -30°C	30 mm in 3 sec.	30.0 sec. max.*
@ -35°C flow in 30 sec.	30 mm in 11 sec.	10.0 mm min.**
*Must flow 30 mm in a maximum of 30 seconds to pass.		

Test	**Typical Results**	**Specification Limits**
JDQ 94 PST Clutch Friction		
Total Cycles	2,000	2,000
Initial Friction Coefficient	0.077	0.15 max.
Final Friction Coefficient	0.105	0.08 min.
Stall Time (sec.)	1.77	5.0 max.
Disk #1 Wear (mm)	0.178	0.38 max.
Disk #2 Wear (mm)	0.174	0.38 max.
Disk #3 Wear (mm)	0.254	0.38 max.
Disk #4 Wear (mm)	0.178	0.38 max.
JDQ 102 Shear Stability		
Viscosity @ 100°C	10.51	
Viscosity @ 100°C (sheared)	9.38	
% Viscosity Loss	10.8%	
JDQ 95 Spiral Bevel/Final Drive Gear Wear		
Gear Surface Condition		
Pinion	None	No Scoring
Ring	None	No Scoring
Spiral Bevel Rating	9	Scale of 1-10,
		10 = the best
Sun Pinion Wear		
Left Side Average	<0.025	<0.025
Right Side Average	<0.025	<0.025
JDQ 84 Sundstrand Hydraulic Pump		
Flow Degradation	3.9%	Equal to or better
		than reference which
		is –2.0%.
JDQ 96 Brake Torque Variation and Friction		

	Computer Results	Torque	SwRI
Cycles	Relative Capacity	Variation	Variation
1,000	293,131	44,470	559,780
10,000	308,090	36,730	424,130
20,000	310,651	36,220	421,620
30,000	312,768	42,380	506,220
Total	1,224,640	159,800	1,911,750

Allison C-4 Oxidation Test (J20C Spec.)		
Tan Increase	7.0	7.0 max.
Carbonyl Absorbance	0.9	0.9 max.
Front Pump Seal	Moderate to	Moderate to
	Heavy Hardening	Heavy Hardening
	Light Sludge	Light to Medium Sludge
Allison C-4 Wear Test		
Total weight loss	1.4 mg	15.0 max.

Allison C-4 Paper Clutch Friction test						
		<=5,000	>5,000		<=5,000	>5,000
		Cycles			Cycles	
Slip Time, max.		0.70	0.55		0.72	0.61
Mid-Point Friction Coeff. min.		0.076	0.095		0.068	0.088
Allison C-4 Graphite Clutch Friction Test						
		1,500			5,500	
		Cycles				
Slip Time, max.		0.70		0.74	0.71 max.	
Mid-Point Friction Coeff. min.		0.101		0.097	0.104 min.	
Biodegradability	CEC-L33A93	>80%				
	OECD 301B Mod. Sturm	>60%				
	ASTM D-5864	>60%				
WGK Rating	1					
Ecotoxicity						
Fathead minnow, 96h LC50,		>2000 ppm			EPA requirement >1000	
Daphnia magna, 48h EC50,		>2000 ppm			EPA requirement >1000	
Alga Growth Inhibition EC50>2000 ppm				EPA requirement >1000		

Meets EPA requirements 560/6-82-002, 560/6-82-003

Energy Conserving Formulation – USDA Biobased and BioPreferred