Prepared for:
[redacted]
LANCASTER AREA SEWER
AUTHORITY
130 CENTERVILLE ROAD
LANCASTER, PA 17602
[redacted]

Prepared by:
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1675 ROHRERSTOWN ROAD
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Phone: 610-322-2749

Manual

A proposal for

LANCASTER AREA SEWER AUTHORITY

Transmission

2013 TANK TRUCK

Prepared by

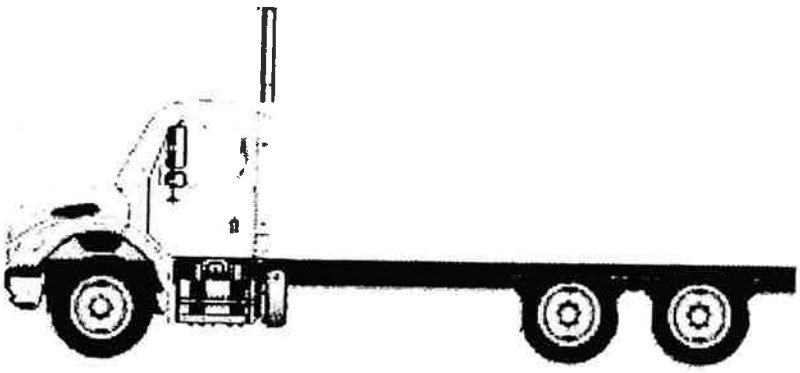
FREIGHTLINER OF LANCASTER

Fred Pawlowski

May 10, 2012

Freightliner M2 106

(REVISED TO LOWER PRICE, MANUAL TRANSMISSION AND AIR RIDE REAR SUSPENSION)



Components shown may not reflect all spec'd options and are not to scale

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SPECIFICATION PROPOSAL

Data Code	Description	Weight Front	Weight Rear	Retail Price
Price Level				
PRL-03M	M2 PRL-03M (EFF:01/25/12)			STD
Data Version				
DRL-017	SPECPRO21 DATA RELEASE VER 017			N/C
Vehicle Configuration				
001-172	M2 106 CONVENTIONAL CHASSIS	5,205	3,055	[redacted]
004-213	2013 MODEL YEAR SPECIFIED			STD
002-004	SET BACK AXLE - TRUCK			STD
019-002	STRAIGHT TRUCK PROVISION			STD
003-001	LH PRIMARY STEERING LOCATION			STD
General Service				
AA1-002	TRUCK CONFIGURATION			STD
AA6-001	DOMICILED, USA 50 STATES (INCLUDING CALIFORNIA AND CARB OPT-IN STATES)			N/C
A85-010	UTILITY/REPAIR/MAINTENANCE SERVICE			N/C
A84-1GM	GOVERNMENT BUSINESS SEGMENT			N/C
AA4-002	LIQUID BULK COMMODITY			N/C
AA5-002	TERRAIN/DUTY: 100% (ALL) OF THE TIME, IN TRANSIT, IS SPENT ON PAVED ROADS			STD
AB1-008	MAXIMUM 8% EXPECTED GRADE			STD
AB5-001	SMOOTH CONCRETE OR ASPHALT PAVEMENT - MOST SEVERE IN-TRANSIT (BETWEEN SITES) ROAD SURFACE			STD
995-091	MEDIUM TRUCK WARRANTY			STD
A66-99D	EXPECTED FRONT AXLE(S) LOAD : 18000.0 lbs			
A68-99D	EXPECTED REAR DRIVE AXLE(S) LOAD : 40000.0 lbs			
A63-99D	EXPECTED GROSS VEHICLE WEIGHT CAPACITY : 58000.0 lbs			
GVWR	RATED MAXIMUM VEHICLE CAPACITY - GVWR : 58000.0 lbs			N/C

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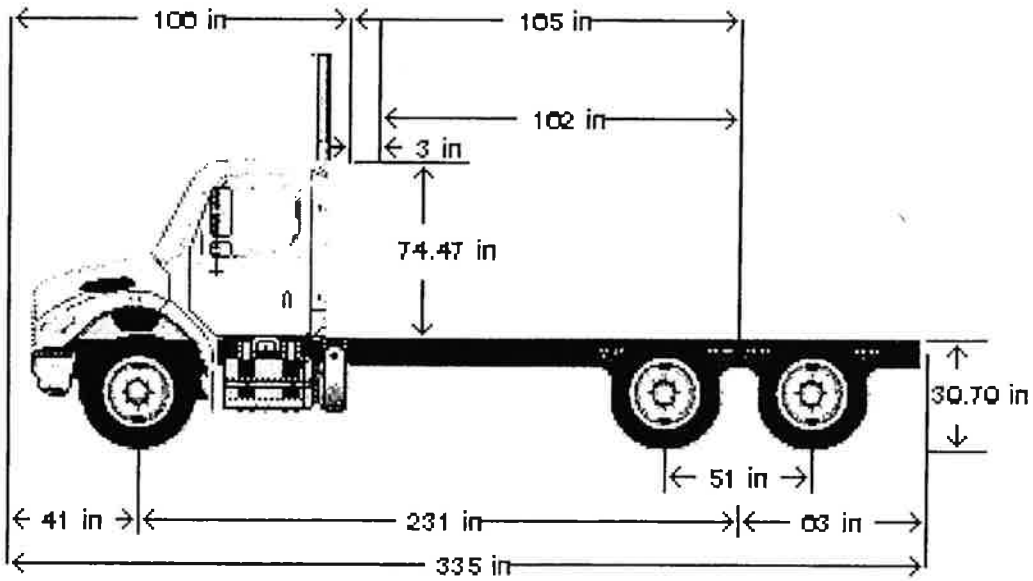
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Data Code	Description	Weight Front	Weight Rear	Retail Price
Truck Service				
AA3-034	SEWER/INDUSTRIAL VACUUM BODY			N/C
AF7-99D	EXPECTED BODY/PAYLOAD CG HEIGHT ABOVE FRAME "XX" INCHES : 32.0 in			
Engine				
101-13N	CUM ISC-300 300 HP @ 2000 RPM, 2200 GOV, 860 LB/FT @ 1300 RPM	510	-10	[redacted]
Electronic Parameters				
79A-075	75 MPH ROAD SPEED LIMIT			STD
79B-000	CRUISE CONTROL SPEED LIMIT SAME AS ROAD SPEED LIMIT			N/C
79K-007	PTO MODE ENGINE RPM LIMIT - 1100 RPM			N/C
79M-001	PTO MODE BRAKE OVERRIDE - SERVICE BRAKE ONLY ENABLED			N/C
79N-001	PTO MODE CLUTCH OVERRIDE - CLUTCH ENABLED			N/C
79P-002	PTO RPM WITH CRUISE SET SWITCH - 700 RPM			N/C
79Q-003	PTO RPM WITH CRUISE RESUME SWITCH - 800 RPM			N/C
79S-001	PTO MODE CANCEL VEHICLE SPEED - 5 MPH			N/C
79U-007	PTO GOVERNOR RAMP RATE - 250 RPM PER SECOND			N/C
80G-002	PTO MINIMUM RPM - 700			N/C
80J-002	REGEN INHIBITIT SPEED THRESHOLD - 5 MPH			N/C
Engine Equipment				
99C-010	2010 EPA/CARB EMISSION CERTIFICATION			STD
99D-011	2008 CARB EMISSION CERTIFICATION - CLEAN IDLE (INCLUDES 6X4 INCH LABEL ON LOWER FORWARD CORNER OF DRIVER DOOR)			[redacted]
105-001	ENGINE MOUNTED OIL CHECK AND FILL			STD
133-004	ONE PIECE VALVE COVER			STD
014-099	SIDE OF HOOD AIR INTAKE WITH FIREWALL MOUNTED DONALDSON AIR CLEANER			STD
124-1D7	DR 12V 160 AMP 28-SI QUADRAMOUNT PAD ALTERNATOR WITH REMOTE BATTERY VOLT SENSE			STD
292-1D8	(2) ALLIANCE MODEL 1131, GROUP 31, 12 VOLT MAINTENANCE FREE 1850 CCA THREADED STUD BATTERIES			STD
290-017	BATTERY BOX FRAME MOUNTED			STD

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DIMENSIONS



VEHICLE SPECIFICATIONS SUMMARY - DIMENSIONS

Model	M2106
Wheelbase (545)	5875MM (231 INCH) WHEELBASE
Rear Frame Overhang (552)	1600MM (63 INCH) REAR FRAME OVERHANG
Fifth Wheel (578)	NO FIFTH WHEEL
Mounting Location (577)	NO FIFTH WHEEL LOCATION
Maximum Forward Position (in)	0
Maximum Rearward Position (in)	0
Amount of Slide Travel (in)	0
Slide Increment (in)	0
Desired Slide Position (in)	0.0
Cab Size (829)	106 INCH BBC FLAT ROOF ALUMINUM CONVENTIONAL CAB
Sleeper (682)	NO SLEEPER BOX/SLEEPERCAB

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Exhaust System (016)..... RH OUTBOARD UNDER STEP MOUNTED HORIZONTAL AFTERTREATMENT SYSTEM ASSEMBLY WITH RH B-PILLAR MOUNTED VERTICAL TAILPIPE

TABLE SUMMARY - DIMENSIONS

Dimensions	Inches
Bumper to Back of Cab (BBC)	106.3
Bumper to Centerline of Front Axle (BA)	40.7
Min. Cab to Body Clearance (CB)	3.0
Back of Cab to Centerline of Rear Axle(s) (CA)	165.4
Effective Back of Cab to Centerline of Rear Axle(s) (Effective CA)	162.4
Back of Cab Protrusions (Exhaust/Intake) (CP)	1.6
Back of Cab Protrusions (Side Extenders/Trim Tab) (CP)	0.0
Back of Cab Clearance (CL)	3.0
Back of Cab to End of Frame	228.4
Cab Height (CH)	74.5
Wheelbase (WB)	231.0
Frame Overhang (OH)	63.0
Overall Length (OAL)	334.7
Rear Axle Spacing	51.0
Unladen Frame Height at Centerline of Rear Axle	39.8

Performance calculations are estimates only. If performance calculations are critical, please contact Customer Application Engineering.

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G V W R

VEHICLE SPECIFICATIONS SUMMARY - GVWR

Model	M2106
Cab Size (829)	106 INCH BBC FLAT ROOF ALUMINUM CONVENTIONAL CAB
Expected Front Axle(s) Load (lbs)	18000.0
Expected Pusher Axle(s) Load (lbs)	0.0
Expected Rear Axle(s) Load (lbs)	40000.0
Expected Tag Axle(s) Load (lbs)	0.0
Expected GVW (lbs)	58000
Expected GCW (lbs)	0.0
Front Axle (400)	DETROIT DA-F-18.0-5 18,000# FL1 71.0 KPI/3.74 DROP SINGLE FRONT AXLE
Front Suspension (620)	18,000# TAPERLEAF FRONT SUSPENSION
Front Hubs (418)	CONMET PRE-SET BEARING IRON FRONT HUBS
Front Disc Wheels (502)	ACCURIDE 29039 22.5X9.00 10-HUB PILOT 5.25 INSET 5-HAND STEEL DISC FRONT WHEELS
Front Tires (093)	MICHELIN XZY-3 315/80R22.5 20 PLY RADIAL FRONT TIRES
Front Brakes (402)	MERITOR 16.5X6 Q+ CAST SPIDER CAM FRONT BRAKES, DOUBLE ANCHOR, FABRICATED SHOES
Steering Gear (536)	TRW TAS-85 POWER STEERING
Rear Axle (420)	MT-40-14X 40,000# R-SERIES TANDEM REAR AXLE WITHOUT PUMP
Rear Suspension (622)	AIRLINER 40,000# EXTRA DUTY REAR SUSPENSION
Rear Hubs (450)	CONMET PRE-SET BEARING IRON REAR HUBS
Rear Disc Wheels (505)	ACCURIDE 28828 22.5X8.25 10-HUB PILOT 2-HAND HD STEEL DISC REAR WHEELS
Rear Tires (094)	MICHELIN XDE M/S 11R22.5 14 PLY RADIAL REAR TIRES
Rear Brakes (423)	MERITOR 16.5X8.62 Q+ CAST SPIDER CAM REAR BRAKES, DOUBLE ANCHOR, FABRICATED SHOES
Pusher / Tag Axle (443)	NO PUSHER OR TAG AXLE
Pusher / Tag Suspension (626)	NO PUSHER OR TAG SUSPENSION
Pusher / Tag Hubs (449)	NO PUSHER OR TAG HUBS
Pusher/Tag Disc Wheels (509)	NO PUSHER/TAG DISC WHEELS
Pusher / Tag Tires (095)	NO PUSHER/TAG TIRES
Pusher / Tag Brakes (456)	NO PUSHER/TAG BRAKES

TABLE SUMMARY - GVWR

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	Front	Rear 1	Rear 2
Axle Component Weight Ratings			
Axles	18000	20000	20000
Suspension	18000	20000	20000
Hubs	23000	26000	26000
Brakes	20000	20000	20000
Wheels	20000	32000	32000
Tires	18180	23360	23360
Power Steering	18000	N/A	N/A
GAWR (per axle)	18000	20000	20000
GAWR (per axle system)	18000		40000
Expected Load (per axle system)	18000		40000
Vehicle GVWR Summary			
Calculated GVWR	58000		
Expected GVWR	58000		
All weights displayed in pounds			

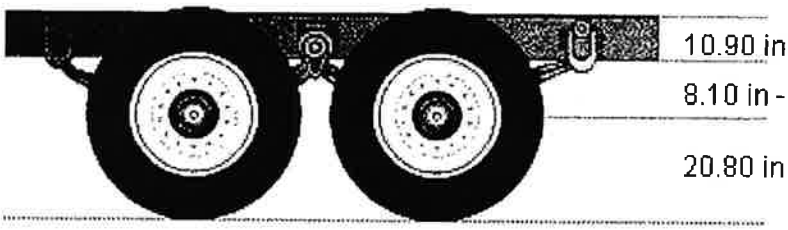
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UNLADEN FRAME HEIGHT

Unladen Height	Requested	Calculated
Frame (in)	N/A	39.80



VEHICLE SPECIFICATIONS SUMMARY - UNLADEN FRAME HEIGHT

Model.....M2106
Cab Size (829).....106 INCH BBC FLAT ROOF ALUMINUM CONVENTIONAL CAB
Frame Rails (546).....11/32X3-1/2X10-15/16 INCH STEEL FRAME (8.73MMX277.8MM/0.344X10.94 INCH) 120KSI(546)
Web Height (in).....10.9375
Flange Thickness (in).....0.34375
Rear Suspension (622).....AIRLINER 40,000# EXTRA DUTY REAR SUSPENSION
Rear Suspension Ride Height (621).....AIRLINER HIGH POSITION RIDE HEIGHT
Axle C/L to Bottom of Frame (in).....8.053
Rear Tires (094).....MICHELIN XDE M/S 11R22.5 14 PLY RADIAL REAR TIRES
Unladen Radius (in).....20.8
Fifth Wheel (578).....NO FIFTH WHEEL
Requested Min Height (in).....0.0
Requested Max Height (in).....1
Fifth Wheel Leg Height (582).....NO FIFTH WHEEL LEG HEIGHT
Rear Tow Device (587).....NO REAR TOWING DEVICE
Tow Device Height(588).....null
Requested Min Height (in).....0.0
Requested Max Height (in).....0.0

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F R A M E R B M

VEHICLE SPECIFICATIONS SUMMARY - FRAME RBM

Wheelbase (545) ..... 5875MM (231 INCH) WHEELBASE
Frame Rails (546) ..... 11/32X3-1/2X10-15/16 INCH STEEL FRAME (8.73MMX277.8MM/0.344X10.94 INCH) 120KSI(546)
Yield Strength (psi) 120000
Section Modulus (per rail) (cu in) 16.979
RBM (per rail) (lbf-in) 2040000
Inner Frame Reinforcement (547) ..... 1/4 INCH (6MM) C-CHANNEL INNER FRAME REINFORCEMENT
Outer Frame Reinforcement (548) ..... NO OUTER FRAME REINFORCEMENT

TABLE SUMMARY - FRAME RBM

Item	Description / Value
Wheelbase	5875MM (231 INCH) WHEELBASE
Frame	11/32X3-1/2X10-15/16 INCH STEEL FRAME (8.73MMX277.8MM/0.344X10.94 INCH) 120KSI
Inner Frame Reinforcement	1/4 INCH (6MM) C-CHANNEL INNER FRAME REINFORCEMENT
Outer Frame Reinforcement	NO OUTER FRAME REINFORCEMENT
Yield Strength (psi)	120000
Section Modulus - per rail (cu. in.)	26.80
Frame RBM - per rail (lbf-in)	3217200

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FRAME SIDE SPACE

VEHICLE SPECIFICATIONS SUMMARY - FRAME SIDE SPACE

Model	M2106
Wheelbase (545)	5875MM (231 INCH) WHEELBASE
Cab Size (829)	106 INCH BBC FLAT ROOF ALUMINUM CONVENTIONAL CAB
Sleeper (682)	NO SLEEPER BOX/SLEEPERCAB
Exhaust System (016)	RH OUTBOARD UNDER STEP MOUNTED HORIZONTAL AFTERTREATMENT SYSTEM ASSEMBLY WITH RH B-PILLAR MOUNTED VERTICAL TAILPIPE
Frame Side Space LH (in)	87.564
Frame Side Space RH (in)	120.46
Battery Box (290)	BATTERY BOX FRAME MOUNTED
Left-Hand Fuel Tank (204)	50 GALLON/189 LITER SHORT RECTANGULAR ALUMINUM FUEL TANK - LH
Left-Hand Auxiliary Fuel / Oil Tank(200)	NO LH AUXILIARY FUEL TANK
Right-Hand Fuel Tank (206)	NO RH FUEL TANK
Right-Hand Auxiliary Fuel / Oil Tank(201)	NO RH AUXILIARY FUEL TANK
Diesel Exhaust Fluid Tank(23U)	6 GALLON DIESEL EXHAUST FLUID TANK
Rear Fenders(583)	NO REAR QUARTER FENDERS
Hydraulic Tank (203)	NO HYDRAULIC OIL TANK

TABLE SUMMARY - FRAME SIDE SPACE

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Dimensions (Left Side)	Inches
Max CP - Maximum value of all Cab Protrusions	3.0
Bumper to chassis zero dimension	3.3
First front axle to chassis zero dimension	37.4
Bumper to Centerline of Front Axle (BA)	40.7
Wheelbase (WB)	231.0
Frame Overhang (OH)	63.0
Overall Length (OAL)	334.7
Length of Front Tire Unladen Radius (UR)	21.2
Length of Rear Tire Unladen Radius (UR)	20.8
Length Rear Axle Spacing factor	51.0
Pusher Axle Spacing	0.0
Length of Pusher Tire Unladen Radius (UR)	0.0
Frame Space Left Side	87.6
Side Step Left Side	0.0
Exhaust Left Side	0.0
Urea Tank Left Side	5.9
Battery Box Left Side	20.4
Fuel Tank Left Side	32.5
Hydraulic Tank Left Side	0.0
Aux1 Tank Left Side	0.0
Aux2 Tank Left Side	0.0
StoreBox1 Tank Left Side	0.0
StoreBox2 Tank Left Side	0.0
Frame Step Left Side	0.0
Fender Left Side	0.0
Other1 Left Side	0.0
Other2 Left Side	0.0
Adj Left Side	0.0

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Dimensions (Right Side)	Inches
Max CP - Maximum value of all Cab Protrusions	3.0
Bumper to chassis zero dimension	3.3
First front axle to chassis zero dimension	37.4
Bumper to Centerline of Front Axle (BA)	40.7
Wheelbase (WB)	231.0
Frame Overhang (OH)	63.0
Overall Length (OAL)	334.7
Length of Front Tire Unladen Radius (UR)	21.2
Length of Rear Tire Unladen Radius (UR)	20.8
Length Rear Axle Spacing factor	51.0
Pusher Axle Spacing	0.0
Length of Pusher Tire Unladen Radius (UR)	0.0
Frame Space Right Side	120.5
Side Step Right Side	0.0
Exhaust Right Side	35.9
Urea Tank Right Side	0.0
Battery Box Right Side	0.0
Fuel Tank Right Side	0.0
Hydraulic Tank Right Side	0.0
Aux1 Tank Right Side	0.0
Aux2 Tank Right Side	0.0
StoreBox1 Tank Right Side	0.0
StoreBox2 Tank Right Side	0.0
Frame Step Right Side	0.0
Fender Right Side	0.0
Other1 Right Side	0.0
Other2 Right Side	0.0
Adj Right Side	0.0

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Freightliner (FTL)

FREIGHTLINER Run Smart

Freightliner Medium-Duty/Business Class

	Coverage	
Description	**Time[1]**	**Distance[1]**
Basic Vehicle	2 Years	Unlimited
Battery	1 Year	100,000 mi/161 000 km
Brightwork	6 Months	Unlimited
Cab Corrosion/Perforation	5 Years	Unlimited
Cab Structure	2 Years	Unlimited
Chassis Paint	6 Months	Unlimited
Corrosion	6 Months	Unlimited
Crossmembers	5 Years	Unlimited
Drivetrain	2 Years	Unlimited
Frame Rails	5 Years	Unlimited
Paint	1 Year	100,000 mi/161 000 km
Steer Axle[2]	2 Years	Unlimited

[1]Time or distance, whichever comes first
[2] Steer axle coverage-group applies to glider only.

Warranty Statement & Warranty Coverage Descriptions follow on page two of this document.

The information provided in this document is for general information only and is not offered as customer's warranty.
This coverage may be superseded without notification.
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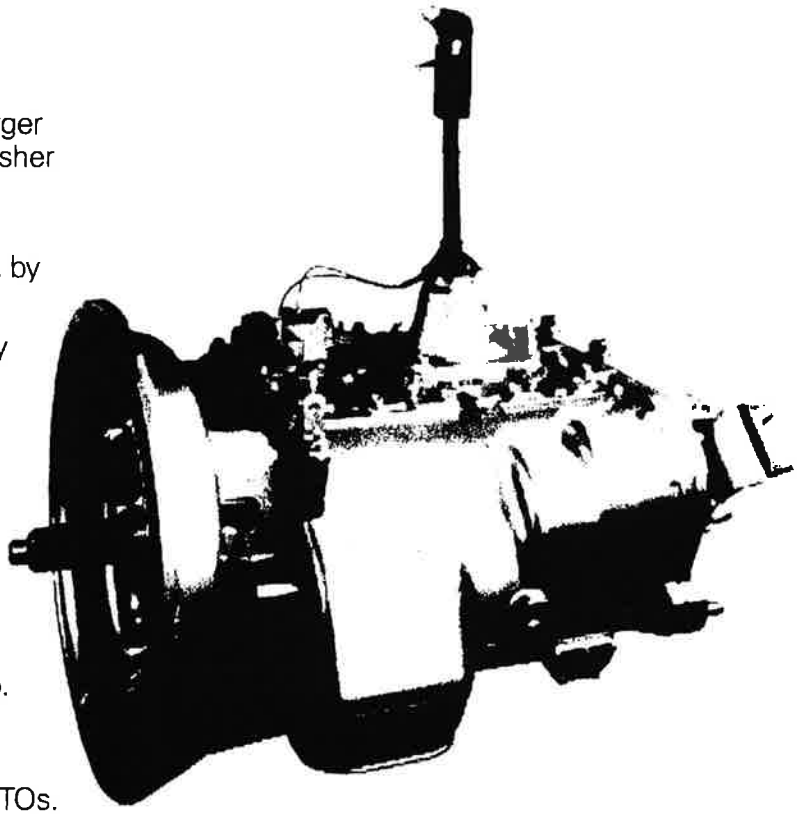
Fuller® 10-Speed Transmissions

FR-9210B	FR/FRO-13210B	FRO-16210B	FRO-13210C	FRO-16210C
FR/FRO-11210B	FR/FRO-14210B	FRO-11210C	FRO-14210C	FRO-17210C
FR/FRO-12210B	FR/FRM/FRO-15210B	FRO-12210C	FRO-15210C	FRO-18210C

Roadranger® More time on the road™

The FR Series 10-Speed ("B" ratio, "C" ratio and High Torque Models)

A standard in transmission performance, reliability and durability.



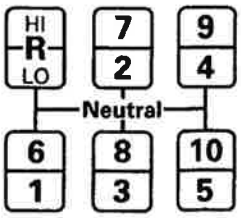
- Improved tolerance to driver abuse with larger diameter mainshaft and new mainshaft washer design.
- Patented SynchroSaver™ feature protects against range synchronizer damage caused by improper operation.
- Integrated air module improves reliability by eliminating separate components and external air hoses.
- Exclusive output seal design improves seal life and eliminates potential for seal damage during yoke removal.
- Better rail definition, more precise shifting and improved durability with patented single-rod shift controls.
- Increased payload capacity with up to 32 lb. weight reduction compared to RT Series.
- Enhanced PTO options, with relocated side opening and option for two through-shaft PTOs.
- Roadranger warranties are available for a wide variety of applications. To find the coverage that applies to your specific vocation, please see the Vocational Warranty Guide (TCWY0900) at www.roadranger.com.

Fuller® 10-Speed Transmissions

SPECIFICATIONS	CAPACITY	WEIGHT*	LENGTH**	SPEEDS
FR-9210B	950 lbs.ft. [1288 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FR-11210B	1150 lbs.ft. [1559 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FR-12210B	1250 lbs.ft. [1694 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FR/FRO-13210B	1350 lbs.ft. [1830 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FR/FRO-14210B	1450 lbs.ft. [1965 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FR/FRM/FRO-15210B	1550 lbs.ft. [2101 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-16210B	1650 lbs.ft. [2237 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-11210C	1150 lbs.ft. [1559 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-12210C	1250 lbs.ft. [1694 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-13210C	1350 lbs.ft. [1830 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-14210C	1450 lbs.ft. [1965 Nm]	592 lbs. [268.53 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-15210C	1550 lbs.ft. [2101 Nm]	602 lbs. [273.10 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-16210C	1650 lbs.ft. [2237 Nm]	602 lbs. [273.10 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-17210C	1750 lbs.ft. [2373 Nm]	602 lbs. [273.10 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse
FRO-18210C	1850 lbs.ft. [2508 Nm]	602 lbs. [273.10 kg]	29.9 in. [760.22 mm]	10 forward, 2 reverse

* *Less clutch housing, lubricant and end yoke.*
** *Lengths listed are from face of clutch housing to front bottoming surface of companion flange or yoke.*

Shift Pattern:



FRO Series models feature an "X" style shift pattern as standard. No "U" style shift pattern is available.

Ratios and Steps:

MODEL	OVERALL	REVERSE L	REVERSE H	1	%	2	%	3	%	4	%	5	%	6	%	7	%	8	%	9	%	10
FR-9210B*																						
FR-11210B*																						
FR-12210B*																						
FR-13210B*	14.80	16.21	3.63	14.80	34	10.95	36	8.09	34	5.97	38	4.46	35	3.32	36	2.45	34	1.81	35	1.35	34	1.00
FR-14210B*																						
FR-15210B*																						
FRM-15210B*																						
FRO-11210B*																						
FRO-12210B*																						
FRO-16210B*	14.80	12.12	2.72	11.06	35	8.19	35	6.05	35	4.46	34	3.34	35	2.48	35	1.83	35	1.36	35	1.00	34	.75
FRO-13210B*																						
FRO-14210B*																						
FRO-15210B*																						
FRO-11210C*																						
FRO-12210C*																						
FRO-13210C*	17.17	13.75	2.80	12.69	37	9.29	38	6.75	38	4.90	35	3.62	40	2.59	37	1.90	38	1.38	38	1.00	35	.74
FRO-14210C*																						
FRO-15210C*																						
FRO-16210C*																						
FRO-17210C*	17.51	13.75	2.80	12.94	39	9.29	38	6.75	38	4.90	35	3.62	37	2.64	39	1.90	38	1.38	38	1.00	35	.74
FRO-18210C																						

**These (950 lb-ft. - 1750 lb-ft.) transmissions can be rated at 100 additional lb-ft. torque above the stated limit in the top two gears only.*

Specifications:

- Clutch Housing SAE #1 and #2. Grey iron or aluminum available.

Power Take-Offs:

- 2 SAE standard openings.
- Right side, regular duty, 6-bolt. Bottom, heavy-duty, 8-bolt. Thru-shaft PTO upper right and/or lower left available.

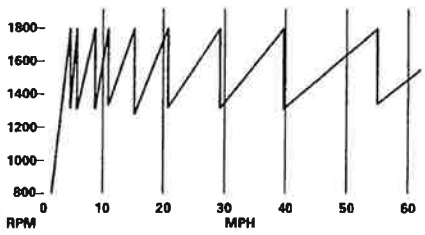
PTO Drive Gears:

- Right: 6 bolt; 45-tooth; 6/8 pitch gear. Left: 8 bolt; 47-tooth; 6/8 pitch gear turn at .65 engine speed -direct, .87 for overdrive.

Oil Capacity:

- Approx. 23.5 pints [11.1 liters].
- Integral oil pump, internal and external oil coolers are available.

Performance Chart:



Based on 1800 RPM engine operating at 1550 RPM/62 MPH.

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