

FEDERAL TRANSIT BUS TEST

Performed for the Federal Transit Administration U.S. DOT
In accordance with CFR 49, Volume 7, Part 665

Manufacturer:
Model:

Submitted for Testing in Service-Life Category
7 Year /200,000 Miles

Report Number: LTI-BT-R1314-P

PENNSSTATE



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Quality Authorization

Director, Bus Research
and Testing Center
Title

4/29/14
Date

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EXECUTIVE SUMMARY

submitted a model e, gasoline-powered 17 seat (including the driver) 26-foot bus, for a partial STURAA Test in the 7 yr. /200,000 mile category. The Federal Transit Administration determined that the following tests would be performed; 1.2 Servicing, Preventive Maintenance, and Repair and Maintenance during Testing, 2. Reliability and 5.7 Structural Durability. Testing started on September 19, 2013 and was completed on November 15, 2013. The Check-In section of the report provides a description of the bus and specifies its major components.

The primary part of this Partial Test is the Structural Durability Test, which also provides the information for the Maintainability and Reliability results. The Structural Durability Test was started on September 23, 2013 and was completed on November 12, 2013.

The interior of the bus is configured with seating for 17 passengers including the driver and 2 wheelchair positions. Note: this test bus is not designed to accommodate standing passengers. At 150 lbs. per person and 600 lbs. per wheelchair position, the load results in a measured gross vehicle weight of 13,130 lbs. The first segment of the Structural Durability Test was performed with the bus loaded to a GVW (Gross Vehicle Load) of 13,130 lbs. Note: due to no standees, GVW and SLW are the same at 13,130 lbs. The middle SLW (Seated Load Weight) segment was performed at 13,130 lbs. and the final segment was performed at a CW (Curb Weight) of 9,560 lbs. Durability driving resulted in unscheduled maintenance and failures that involved a variety of subsystems. A description of failures, and a complete and detailed listing of scheduled and unscheduled maintenance is provided in the Maintainability section of this report.

Effective January 1, 2010, the Federal Transit Administration determined that the total number of simulated passengers used for loading all test vehicles will be based on the full complement of seats and free-floor space available for standing passengers (150 lbs per passenger). The passenger loading used for dynamic testing will not be reduced in order to comply with Gross Axle Weight Ratings (GAWR's) or the Gross Vehicle Weight Ratings (GVWR's) declared by the manufacturer. Cases where the loading exceeds the GAWR and/or the GVWR will be noted accordingly. During the testing program, all test vehicles transported or operated over public roadways will be loaded to comply with the GAWR and GVWR specified by the manufacturer.

The Reliability section compiles failures that occurred during Structural Durability Testing. Breakdowns are classified according to subsystems. The data in this section are arranged so that those subsystems with more frequent problems are apparent. The problems are also listed by class as defined in Section 2. The test bus encountered no Class 1 or Class 2 failures. Of the three reported failures, two were Class 3 and one was a Class 4.

ABBREVIATIONS

ABTC	Altoona Bus Test Center
A/C	Air Conditioner
ADB	Advance design bus
CBD	Central business district
CI	Compression ignition
CNG	Compressed natural gas
CW	Curb weight (bus weight including maximum fuel, oil, and coolant; but without passengers or driver)
dB(A)	Decibels with reference to 0.0002 microbar as measured on the "A" scale
DIR	Test director
DR	Bus driver
EPA	Environmental Protection Agency
FFS	Free floor space (floor area available to standees, excluding ingress/egress areas, area under seats, area occupied by feet of seated passengers, and the vestibule area)
FTA	Federal Transit Administration
GAWR	Gross axle weight rating
GL	Gross load (150 lb. for every designed passenger seating position, for the driver, and for each 1.5 sq ft of free floor space)
GVW	Gross vehicle weight (curb weight plus gross vehicle load)
GVWR	Gross vehicle weight rating
hr	Hour
LNG	Liquefied natural gas
LTI	Larson Transportation Institute
mpg	Miles per gallon
mph	Miles per hour
NBM	New bus models
PSTT	Penn State Test Track
rpm	Revolutions per minute
SAE	Society of Automotive Engineers
SCF	Standard cubic feet
SCFM	Standard cubic feet per minute
SCH	Test scheduler
SA	Staff Assistant
SI	Spark ignition
SLW	Seated load weight (curb weight plus 150 lb for every designated passenger seating position and for the driver)
TD	Test driver
TM	Track manager
TP	Test personnel

VEHICLE DATA FORM

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Bus Number: 1314-P	Arrival Date: 9-19-13
Bus Manufacturer:	Vehicle Identification Number (VIN):
Model Number:	Date: 9-19-13
Personnel: T.S. & E.D.	

WEIGHT:

Individual Wheel Reactions:

Weights (lb)	Front Axle		Middle Axle		Rear Axle	
	Right	Left	Right	Left	Right	Left
CW	1,670	1,820	N/A	N/a	2,740	3,330
SLW	1,620	1,980	N/A	N/A	4,640	4,890
GVW	1,620	1,980	N/A	N/A	4,640	4,890

Total Weight Details:

Weight (lb)	CW	SLW	GVW	GAWR
Front Axle	3,490	3,600	3,600	5,000
Middle Axle	N/A	N/A	N/A	N/A
Rear Axle	6,070	9,530	9,530	9,600
Total	9,560	13,130	13,130	GVWR: 14,500

Dimensions:

Length (ft/in)	26 / 6.7
Width (in)	95.0
Height (in)	114.7
Front Overhang (in)	34.5
Rear Overhang (in)	97.2
Wheel Base (in)	187.0
Wheel Track (in)	Front: 68.7
	Rear: 78.1

VEHICLE DATA FORM

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CLEARANCES:

Lowest Point Outside Front Axle	Location: Bumper	Clearance(in): 13.1
Lowest Point Outside Rear Axle	Location: Fuel tank heat shield	Clearance(in): 10.4
Lowest Point between Axles	Location: Step well	Clearance(in): 10.3
Ground Clearance at the center (in)	12.2	
Front Approach Angle (deg)	20.8	
Rear Approach Angle (deg)	8.7	
Ramp Clearance Angle (deg)	7.4	
Aisle Width (in)	17.5	
Inside Standing Height at Center Aisle (in)	79.0	

BODY DETAILS:

Body Structural Type	Integral		
Frame Material	Steel		
Body Material	Fiberglass		
Floor Material	Plywood		
Roof Material	Fiberglass		
Windows Type	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Movable	
Window Mfg./Model No.	Clear Vision / AS3 DOT 960		
Number of Doors	<u>2</u> Front	<u>2</u> Rear	
Mfr. / Model No.	Driver's – Ford / OEM Passenger – A & M Systems / FOD 290-L-002939 Handicap – Challenger / OEM Rear center –Challenger/OEM		
Dimension of Each Door (in)	Driver's – 27.1 x 54.6 Passenger – 32.6 x 87.1	Handicap – 44.6 x 69.5 Rear center – 35.3 x 60.7	
Passenger Seat Type	<input type="checkbox"/> Cantilever	<input checked="" type="checkbox"/> Pedestal	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	Freedman Seating Co. / OEM		
Driver Seat Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	Freedman Seating Co. / OEM		
Number of Seats (including Driver)	17 + 2 wheelchair positions		

VEHICLE DATA FORM

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BODY DETAILS (Contd..)

Free Floor Space (ft ²)	16.5
Height of Each Step at Normal Position (in)	Front 1. <u>12.3</u> 2. <u>9.0</u> 3. <u>9.0</u> 4. <u>N/A</u>
	Middle 1. <u>N/A</u> 2. <u>N/A</u> 3. <u>N/A</u> 4. <u>N/A</u>
	Rear 1. <u>N/A</u> 2. <u>N/A</u> 3. <u>N/A</u> 4. <u>N/A</u>
Step Elevation Change - Kneeling (in)	N/A

ENGINE

Type	<input type="checkbox"/> C.I.	<input type="checkbox"/> Alternate Fuel	
	<input checked="" type="checkbox"/> S.I.	<input type="checkbox"/> Other (explain)	
Mfr. / Model No.	Ford / 6.8 L		
Location	<input checked="" type="checkbox"/> Front	<input type="checkbox"/> Rear	<input type="checkbox"/> Other (explain)
Fuel Type	<input checked="" type="checkbox"/> Gasoline	<input type="checkbox"/> CNG	<input type="checkbox"/> Methanol
	<input type="checkbox"/> Diesel	<input type="checkbox"/> LNG	<input type="checkbox"/> Other (explain)
Fuel Tank Capacity (indicate units)	55 gals		
Fuel Induction Type	<input checked="" type="checkbox"/> Injected	<input type="checkbox"/> Carburetion	
Fuel Injector Mfr. / Model No.	Ford / 6.8 L		
Carburetor Mfr. / Model No.	N/A		
Fuel Pump Mfr. / Model No.	Ford / 6.8 L		
Alternator (Generator) Mfr. / Model No.	FoMoCo / TN104210-6630		
Maximum Rated Output (Volts / Amps)	Not available. OEM		
Air Compressor Mfr. / Model No.	N/A		
Maximum Capacity (ft ³ / min)	N/A		
Starter Type	<input checked="" type="checkbox"/> Electrical	<input type="checkbox"/> Pneumatic	<input type="checkbox"/> Other (explain)
Starter Mfr. / Model No.	FoMoCo / TN348000-0410		

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TRANSMISSION

Transmission Type	<input checked="" type="checkbox"/> Manual	<input type="checkbox"/> Automatic
Mfr. / Model No.	FoMoCo / OEM	
Control Type	<input checked="" type="checkbox"/> Mechanical	<input type="checkbox"/> Electrical <input type="checkbox"/> Other
Torque Converter Mfr. / Model No.	FoMoCo / OEM	
Integral Retarder Mfr. / Model No.	N/A	

SUSPENSION

Number of Axles	2		
Front Axle Type	<input checked="" type="checkbox"/> Independent	<input type="checkbox"/> Beam Axle	
Mfr. / Model No.	FoMoCo / OEM		
Axle Ratio (if driven)	N/A		
Suspension Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers	2		
Mfr. / Model No.	Motorcraft / H102G2		
Middle Axle Type	<input type="checkbox"/> Independent	<input type="checkbox"/> Beam Axle	
Mfr. / Model No.	N/A		
Axle Ratio (if driven)	N/A		
Suspension Type	<input type="checkbox"/> Air	<input type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers	N/A		
Mfr. / Model No.	N/A		
Rear Axle Type	<input type="checkbox"/> Independent	<input checked="" type="checkbox"/> Beam Axle	
Mfr. / Model No.	Dana / M70HD		
Axle Ratio (if driven)	4.56		
Suspension Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers	2		
Mfr. / Model No.	Motorcraft / H123G1		

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WHEELS & TIRES

Front	Wheel Mfr./ Model No.	Ford / 16 x 6
	Tire Mfr./ Model No.	Michelin LT225/75R16
Rear	Wheel Mfr./ Model No.	Ford / 16 x 6
	Tire Mfr./ Model No.	Michelin LT225/75R16

BRAKES

Front Axle Brakes Type	<input type="checkbox"/> Cam	<input checked="" type="checkbox"/> Disc	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	FoMoCo / OEM		
Middle Axle Brakes Type	<input type="checkbox"/> Cam	<input type="checkbox"/> Disc	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	N/A		
Rear Axle Brakes Type	<input type="checkbox"/> Cam	<input checked="" type="checkbox"/> Disc	<input type="checkbox"/> Other (explain)
Mfr. / Model No.	FoMoCo / OEM		
Retarder Type	N/A		
Mfr. / Model No.	N/A		

HVAC

Heating System Type	<input type="checkbox"/> Air	<input checked="" type="checkbox"/> Water	<input type="checkbox"/> Other
Capacity (Btu/hr)	65,000		
Mfr. / Model No.	Pro-Air / OEM		
Air Conditioner	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Location	Front dash & rear ceiling		
Capacity (Btu/hr)	Front – OEM Rear 70,000		
A/C Compressor Mfr. / Model No.	Front – FoMoCo / 0464 Rear ceiling – Vale / 004875		

STEERING

Steering Gear Box Type	Hydraulic gear
Mfr. / Model No.	FoMoCo / OEM
Steering Wheel Diameter	15.4
Number of turns (lock to lock)	4.0

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OTHERS

Wheel Chair Ramps	Location: N/A	Type: N/A
Wheel Chair Lifts	Location: Rear	Type: Hydraulic electric platform
Mfr. / Model No.	Braun / NCL919FIB-2	
Emergency Exit	Location: Doors Windows Roof hatch	Number: 3 2 1

CAPACITIES

Fuel Tank Capacity (units)	55.0 gals
Engine Crankcase Capacity (gallons)	1.2
Transmission Capacity (gallons)	Not available. OEM
Differential Capacity (gallons)	1.1
Cooling System Capacity (quarts)	8.6
Power Steering Fluid Capacity (quarts)	Not available. OEM

COMPONENT/SUBSYSTEM INSPECTION FORM

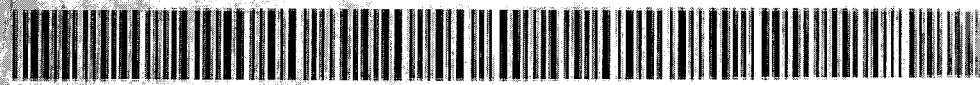
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Subsystem	Checked	Initials	Comments
Air Conditioning Heating and Ventilation	✓		
Body and Sheet Metal	✓		
Frame	✓		
Steering	✓		
Suspension	✓		
Interior/Seating	✓		
Axles	✓		
Brakes	✓		
Tires/Wheels	✓		
Exhaust	✓		
Fuel System	✓		
Power Plant	✓		
Accessories	✓		
Lift System	✓		
Interior Fasteners	✓		
Batteries	✓		

CHECK - IN CONT.

INCOMPLETE VEHICLE MFD. BY FORD MOTOR COMPANY

<p>DATE: 05/13 FRONT GAWR: 2268 KG (5000 LB) WITH LT225/75R16E 115/112R 16x6.0K AT 515 kPa/ 75 PSI COLD VIN: </p>	<p>TIRES RIMS</p>	<p>GVWR: 6577 KG (14500 LB) REAR GAWR: 4355 KG (9600 LB) WITH LT225/75R16E 115/112R 16x6.0K AT 550 kPa/ 80 PSI COLD</p>	<p>TIF R11 DA</p>
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EXT PNT: YZ	RC: 86	DSO:					
WB 158	INT TR XE	TP/PS	R F	AXLE 83	TR T	SPR XXBB ULN	DE418 NOS ▽ 5U5A-3520472-AA
MADE IN U.S.A.							

VIN TAG