

**TEST PROCEDURES**  
**500,000-MILE BUS**  
**WITH A MINIMUM SERVICE LIFE OF**  
**12 YEARS**

**APRIL 2006**

PENNSSTATE



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**HEAVY-DUTY 500,000-MILE BUS  
WITH A MINIMUM SERVICE LIFE OF  
12 YEARS**

**TEST BUS CHECK-IN**

APRIL 2006

## 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
mpg	- miles per gallon
mph	- miles per hour
NBM	- new bus models
PSBRTF	- Penn State Bus Research and Testing Facility
PTI	- Pennsylvania Transportation Institute
rpm	- revolutions per minute
SAE	- Society of Automotive Engineers
SCF	- standard cubic feet
SCFM	- standard cubic feet per minute
SCH	- test scheduler
SEC	- secretary
SI	- spark ignition
SLW	- seated load weight (curb weight plus 150 lb for every designed passenger seating position and for the driver)
TD	- test driver
TM	- track manager
TP	- test personnel

## I. OBJECTIVE

The objective of the Check-In procedure is to document the "as arrived" condition and configuration of the new model bus. This includes recording the bus weights, dimensions and relevant vehicle information on the Vehicle Data Form. An inventory of all spare parts, special tools and service manuals delivered with bus is compiled and included with the data from this section.

The Check-In procedure is completed prior to the commencement of testing.

## II. TEST DESCRIPTION

The test consists of assigning a test number to the bus, cleaning the bus, completing the Vehicle Data Form, obtaining any special information and tools from the manufacturer, determining a testing schedule, performing a component inspection, and performing the manufacturer's recommended preventive maintenance. All relevant vehicle information and specifications will be recorded on the Vehicle Data Form. Finally, the various components and subsystems will be inspected for leaks, cracks, alignment, etc. to ensure that the bus is ready to begin testing. The bus manufacturer must certify that the bus meets all Federal regulations.

## III. TEST ARTICLE

The test article is a heavy-duty transit bus with a minimum service life of 12 years or 500,000 mi.

## IV. TEST EQUIPMENT/FACILITIES/PERSONNEL

All tests are conducted at the ABTC. Test personnel include:

1. Bus driver (DR)
2. Test personnel (TP)
3. Test scheduler (SCH)
4. Secretary (SEC)

#### V. TEST DATA

The test data consist of the Vehicle Data Form and the Bus Component Inspection Form. Copies of all records shall be forwarded to the ABTC manager.

#### VI. TEST PREPARATION AND PROCEDURES

The detailed check-in procedures are listed on the following page. This section also includes Vehicle Data Form and Bus Safety Inspection Form.

DETAILED TEST PROCEDURES		TITLE: Test Bus Check-In
Check-In Procedure		NOMENCLATURE: Test Bus Check-In
OPER STEP	ACTION BY	TEST PREPARATION AND PROCEDURE
1	DR	On delivery, position the bus in the inspection bay.
2	TP	Meet with the manufacturer's representative. Verify that all requiring materials are included. Arrange meeting between manufacturer's representative and ABTC management and engineering staff to verify test plan.
3	TP	Ensure evidence of ownership and insurance documents are in the bus at all times. Check expiration date on insurance certificate. Notify ABTC management if certificate will expire during test period.
4	TP	Photograph bus (inside and out) as arrived.
5	SEC	Working with the ABTC manager, assign test number and start a file for the bus.
6	TP	Fill out the Vehicle Data Form completely and forward copy to ABTC manager. (If a section does not apply, indicate on the form that it does not apply). Include comments when necessary.
7	TP	Log in and file manufacturer repair manuals in instrumentation room.
8	TP	Give the manufacturer's recommended servicing schedule to the test scheduler.
9	SCH	Develop a servicing and testing schedule. Prepare work order forms for each test.
10	TP	Clean the bus, including the undercarriage.
11	TP	Visually inspect the various components and subsystems listed on the Component/Subsystem Inspection Form to ensure proper operation. Record any problems or deficiencies on the Component/Subsystem Inspection Form.
12	TP	Install hubodometer and calibrate distance over the established bus route. Obtain calibration constant for hubodometer and bus odometer.

**DETAILED TEST PROCEDURES****TITLE: Test Bus Check-In****Check-In  
Procedure****NOMENCLATURE: Test Bus Check-In (continued)****OPER  
STEP****ACTION  
BY****TEST PREPARATION AND PROCEDURE**

13

TP

Install test speedometer and calibrate.

14

TP

Inspect suspension travel for any limitations (sharp edges, clearance, etc.) that may create problems during testing.

15

TP

Inspect the subsystems and report any unsafe conditions on the Bus Component Inspection Form. Photograph any unsafe conditions.

16

TP/TP

Determine connections and/or alterations necessary for performing fuel economy test procedure.

17

TP

Perform manufacturer's recommended preventative maintenance.

18

TP

Verify that all subsystems are set to manufacturer's specifications.

19

TP

File completed test procedure.

20

TP

Fill out work order for check-in procedure and forward to ABTC manager.

21

SCH

Forward a copy of the completed Vehicle Data Form to NBM manufacturer's representative within one week for verification of data.

**REVISIONS**

All revisions to this test procedure must be identified on this page. Briefly describe each revision in the space provided below.

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Revision	Description	Date	Approval
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## VEHICLE DATA FORM

Bus Number:	Arrival Date:
Bus Manufacturer:	Vehicle Identification Number (VIN):
Model Number:	Date:
Personnel:	

### WEIGHT:

#### Individual Wheel Reactions:

Weights (lb)	Front Axle		Middle Axle		Rear Axle	
	Right	Left	Right	Left	Right	Left
CW						
SLW						
GVW						

#### Total Weight Details:

Weight (lb)	CW	SLW	GVW	GAWR
Front Axle				
Middle Axle				
Rear Axle				
Total				GVWR:

#### Dimensions:

Length (ft/in)	
Width (in)	
Height (in)	
Front Overhang (in)	
Rear Overhang (in)	
Wheel Base (in)	
Wheel Track (in)	Front:
	Rear:

Bus Number:	Date:
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**CLEARANCES:**

Lowest Point Outside Front Axle	Location:	Clearance(in):
Lowest Point Outside Rear Axle	Location:	Clearance(in):
Lowest Point between Axles	Location:	Clearance(in):
Ground Clearance at the center (in)		
Front Approach Angle (deg)		
Rear Approach Angle (deg)		
Ramp Clearance Angle (deg)		
Aisle Width (in)		
Inside Standing Height at Center Aisle (ft)		

**BODY DETAILS:**

Body Structural Type			
Frame Material			
Body Material			
Floor Material			
Roof Material			
Windows Type	<input type="checkbox"/> Fixed	<input type="checkbox"/> Movable	
Window Mfg./Model No.			
Number of Doors	___ Front	___ Rear	
Mfr. / Model No.			
Dimension of Each Door (in)	Front	Rear	
Passenger Seat Type	<input type="checkbox"/> Cantilever	<input type="checkbox"/> Pedestal	<input type="checkbox"/> Other (explain)
Mfr. / Model No.			
Driver Seat Type	<input type="checkbox"/> Air	<input type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
Mfr. / Model No.			
Number of Seats (including Driver)			

Bus Number:	Date:
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BODY DETAILS (Cont'd.)

Free Floor Space ( ft <sup>2</sup> )	
Height of Each Step at Normal Position (in)	Front 1.____ 2.____ 3.____ 4.____
	Middle 1.____ 2.____ 3.____ 4.____
	Rear 1.____ 2.____ 3.____ 4.____
Step Elevation Change - Kneeling (in)	

ENGINE

Type	<input type="checkbox"/> C.I.	<input type="checkbox"/> Alternate Fuel	
	<input type="checkbox"/> S.I.	<input type="checkbox"/> Other (explain)	
Mfr. / Model No.			
Location	<input type="checkbox"/> Front	<input type="checkbox"/> Rear	<input type="checkbox"/> Other (explain)
Fuel Type	<input 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)			
Fuel Induction Type	<input type="checkbox"/> Injected	<input type="checkbox"/> Carburetion	
Fuel Injector Mfr. / Model No.			
Carburetor Mfr. / Model No.			
Fuel Pump Mfr. / Model No.			
Alternator (Generator) Mfr. / Model No.			
Maximum Rated Output (Volts / Amps)			
Air Compressor Mfr. / Model No.			
Maximum Capacity (ft <sup>3</sup> / min)			
Starter Type	<input type="checkbox"/> Electrical	<input type="checkbox"/> Pneumatic	<input type="checkbox"/> Other (explain)
Starter Mfr. / Model No.			

Bus Number:	Date:
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**TRANSMISSION**

Transmission Type	<input type="checkbox"/> Manual	<input type="checkbox"/> Automatic	
Mfr. / Model No.			
Control Type	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Electrical	<input type="checkbox"/> Other (explain)
Torque Converter Mfr. / Model No.			
Integral Retarder Mfr. / Model No.			

**SUSPENSION**

Number of Axles			
Front Axle Type	<input type="checkbox"/> Independent	<input type="checkbox"/> Beam Axle	
Mfr. / Model No.			
Axle Ratio (if driven)			
Suspension Type	<input type="checkbox"/> Air	<input type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers			
Mfr. / Model No.			
Middle Axle Type	<input type="checkbox"/> Independent	<input type="checkbox"/> Beam Axle	
Mfr. / Model No.			
Axle Ratio (if driven)			
Suspension Type	<input type="checkbox"/> Air	<input type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers			
Mfr. / Model No.			
Rear Axle Type	<input type="checkbox"/> Independent	<input type="checkbox"/> Beam Axle	
Mfr. / Model No.			
Axle Ratio (if driven)			
Suspension Type	<input type="checkbox"/> Air	<input type="checkbox"/> Spring	<input type="checkbox"/> Other (explain)
No. of Shock Absorbers			
Mfr. / Model No.			

Bus Number:	Date:
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**WHEELS & TIRES**

Front	Wheel Specification	
	Tire Specification	
Rear	Wheel Specification	
	Tire Specification	

**BRAKES**

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

**HVAC**

Heating System Type	<input type="checkbox"/> Air	<input type="checkbox"/> Water	<input type="checkbox"/> Other (explain)
Capacity (Btu/hr)			
Mfr. / Model No.			
Air Conditioner	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Location			
Capacity (Btu/hr)			
A/C Compressor Mfr. / Model No.			

**STEERING**

Steering Gear Box Type	
Mfr. / Model No.	
Steering Wheel Diameter	
Number of turns (lock to lock)	

Bus Number:	Date:
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OTHERS

Wheel Chair Ramps	Location:	Type:
Wheel Chair Lifts	Location:	Type:
Mfr. / Model No.		
Emergency Exit	Location:	Number:

CAPACITIES

Fuel Tank Capacity (units)	
Engine Crankcase Capacity (gallons)	
Transmission Capacity (gallons)	
Differential Capacity (gallons)	
Cooling System Capacity (gallons)	
Power Steering Fluid Capacity (gallons)	

COMPONENT/SUBSYSTEM INSPECTION FORM

Bus Number:	Date:
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Subsystem	Checked	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		