

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

**2. RELIABILITY - DOCUMENTATION OF BREAKDOWN AND
REPAIR TIMES DURING TESTING**

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) scale	- 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

2-I. TEST OBJECTIVE

The objective of this test is to evaluate the reliability of the bus by documenting unscheduled breakdowns, repairs, down time, and repair time that occur during testing.

2-II. TEST DESCRIPTION

All breakdowns and repairs that occur during the performance of testing are compiled on the Reliability Data Form. This form summarizes the type of failure, subsystem or part, mileage, and repair time. The failure types will be classified as follow:

1. Class 1: A malfunction that represents a potential crash situation and could lead directly to passenger or driver injury.
2. Class 2: A malfunction that results in test interruption because the bus cannot be operated. Service is discontinued until the bus is repaired at the site of the malfunction or it is towed to a service workshop.
3. Class 3: A malfunction that results in temporary interruption of testing, and the bus must be returned to a service workshop for repair.
4. Class 4: A malfunction that degrades bus operations but does not require immediate removal of the bus from testing.

2-III. TEST ARTICLE

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

2-IV. TEST EQUIPMENT/FACILITIES/PERSONNEL

The test facility is the ABTC. Test personnel include:

1. Secretary (SEC)
2. Data Supervisor

2-V. TEST DATA

The type of breakdown, and the accumulated bus mileage at the time of each breakdown will be recorded.

Within each type, breakdowns will be further classified by the specific subsystem or component that failed, e.g., engine, transmission, air conditioning per table 1 in the maintainability procedures. Upon completion of this procedure, all data shall be forwarded to the ABTC manager.

2-VI. TEST PREPARATION AND PROCEDURES

The detailed test preparation and procedures are listed in procedure 2.1-1. This section also includes Reliability Data Form - 2.

DETAILED TEST PROCEDURES		TITLE: 2. Reliability - Documentation of Breakdown and Repair Times During Testing
Procedure 2		NOMENCLATURE: 2. Reliability - Documentation of Breakdown and Repair Times During Testing
OPER STEP	ACTION BY	TEST PREPARATION AND PROCEDURE
1	SEC	Record the bus number, date, and personnel performing the test on the Reliability Data Form.
2	SEC	Fill out the Reliability Data Form on a weekly basis using information obtained from the Work Order Forms for unscheduled repairs and the driver log. Record the down time, man-hours to repair, and the bus mileage at the time of failure under the appropriate subsystem.

REVISIONS

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

Revision	Description	Date	Approval
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RELIABILITY DATA FORM

Bus Number:	Date Completed:
Personnel:	

	Failure Type				
	Class 1	Class 2	Class 3	Class 4	
Subsystem	mileage	mileage	mileage	mileage	Manhours
Engine					
Trans- mission					
Air Condi- tioning					
Brakes					
Electrical					

RELIABILITY DATA FORM (page 2)

Bus Number:	Date Completed:				
Personnel:					
	Failure Type				
	Class 1	Class 2	Class 3	Class 4	
Subsystem	mileage	mileage	mileage	mileage	Manhours
Steering					
Suspension					
Tires/ Wheels					
Cooling System					
Exhaust System					

RELIABILITY DATA FORM (page 3)

Bus Number:	Date Completed:
Personnel:	

	Failure Type				
	Class 1	Class 2	Class 3	Class 4	
Subsystem	mileage	mileage	mileage	mileage	Manhours