

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

1. MAINTAINABILITY

**1.2 SERVICING, PREVENTIVE MAINTENANCE, AND REPAIR  
AND MAINTENANCE 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)	- 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

1.2-I. TEST OBJECTIVE

The objective of this test is to collect maintenance data about the servicing, preventive maintenance, and repair.

1.2.-II. TEST DESCRIPTION

The test will be conducted by operating the bus during the testing period and collecting the following data on Work Order Forms and a Driver Log.

- a. Bus number
- b. Date
- c. Mileage
- d. Detailed description of malfunction
- e. Repair action and parts used
- f. Man-hours required

The bus will be operated in durability service. While typical items are given below, the specific service schedule will be that specified by the manufacturer.

- A. Service
  1. Fueling
  2. Consumable checks
  3. Interior cleaning
- B. Preventive Maintenance
  4. Brake adjustments
  5. Lubrication
  6. Oil and filter change
- C. Periodic Repairs
  1. Brake reline
  2. Transmission change
  3. Engine change
  4. Windshield wiper motor change
  5. Stoplight bulb change

1.2-III. TEST ARTICLE

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

1.2-IV. TEST EQUIPMENT/FACILITIES/PERSONNEL

Test equipment and facilities at ABTC are used for this test. In addition, any maintenance done at PSBRTF will be added to the maintenance log. Test personnel include:

1. Test personnel (TP)
2. Bus driver (DR)

1.2-V. TEST DATA

The test data consists of the Work Order Forms for all scheduled and unscheduled maintenance and repair and the Driver Log.

1.2-VI. TEST PREPARATION AND PROCEDURES

The detailed procedures are listed in procedure 1.2-1.

DETAILED TEST PROCEDURES		TITLE: 1. Maintainability
Procedure 1.2-1		NOMENCLATURE: 1.2 Servicing, Preventative Maintenance, and Repair and Maintenance During Testing
OPER STEP	ACTION BY	TEST PREPARATION AND PROCEDURE
1	TP	Perform all service and maintenance according to the manufacturer's recommended procedures.
2	TP	Fill out Work Order Forms for all servicing, preventative maintenance and repair, and maintenance during testing. Be sure all forms are filled out completely. Provide a detailed description of the failure and repair. In particular, record the parts that are repaired or replaced and the bus mileage at the time of failure. In addition, record diagnostic time, repair time, special tools required, and date.
3	DR	Keep a daily log of all bus activity. In particular, record all bus malfunctions, the date, and the bus mileage at the time of failure. Listen for unusual noises. Record comments on Driver's Log.
4	DR/TP	Note any bus part that is removed from service for an extended period of time for repair or replacement. Attach a tag to any parts that are removed. The tag must include the bus number, date and mileage.
5	TP	Photograph broken or worn parts and any other failures. If new part is available, may want to photograph side by side.
6	TP	File completed test procedure and Work Order Forms.

**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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