

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

1. MAINTAINABILITY

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS

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

1.3-I. TEST OBJECTIVE

The objective of this test is to identify the time required to replace and/or repair selected parts or subsystems.

1.3-II. TEST DESCRIPTION

The test will address components that may be expected to fail or require replacement during the service life of the bus. In addition, any component that fails during the test is included in the data. Components to be included are:

1. Transmission
2. Alternator
3. Starter
4. Batteries
5. Windshield wiper motor

1.3-III. TEST ARTICLE

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

1.3-IV. TEST EQUIPMENT/FACILITIES/PERSONNEL

All tests are conducted at the ABTC. Tests are performed by:

1. Test personnel (TP)
2. Driver (DR)

1.3-V. TEST DATA

The Maintainability Evaluation Form is filled out for the items listed in the reliability test procedure section and shall be forwarded to the ABTC manager. When the bus is returned for scheduled or unscheduled maintenance or repair, the form is to be updated for additional repairs and shall be forwarded to the ABTC manager.

1.3-VI. TEST PREPARATION AND PROCEDURES

The detailed test procedures are listed in procedure 1.3-1. This section also includes Maintainability Evaluation Form - 1.3.

DETAILED TEST PROCEDURES**TITLE: 1. Maintainability****Procedure 1.3-1****NOMENCLATURE: 1.3 Replacement and/or Repair of Selected Subsystems**

OPER STEP	ACTION BY	TEST PREPARATION AND PROCEDURE
1	DR	Position the bus into the requested mechanics stall.
2	TP	<p>Record the bus number, date, and test personnel on the Maintainability Evaluation Form.</p> <p>NOTE: Record date, mileage, diagnostic time, repair time, and special tools required, on the Work Order Form for each subsystem.</p> <p>NOTE: Some of the following procedures may need to be performed during the course of testing. If they have been previously evaluated, they do not need to be repeated here as long as all the appropriate information has been recorded on Work Order Forms and the Maintainability Evaluation Form.</p>
3	TP	Remove and replace the transmission. Record the time required and any unusual difficulty.
4	TP	Remove and replace the alternator. Record the time required and any unusual difficulty.
5	TP	Remove and replace the starter. Record the time required and any unusual difficulty.
6	TP	Remove and replace the batteries. Record the time required and any unusual difficulty.
7	TP	Remove and replace the windshield wiper motor. Record the time required and any unusual difficulty.
8	TP	Fill out the Maintainability Evaluation and Work Order Forms.
9	TP	Any time the bus is returned for service or repair, add the components involved to the Maintainability Form.

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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