

The following documentation is an electronicallysubmitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at *wvOASIS.gov*. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at *WVPurchasing.gov* with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

WOAS	[S	Jump to: PRCUID 🚖 Go 😵 Home 🔑 Personalize 🚳 Accessibility 🛜 App Help 🐔 About 😈
Welcome, Lu Anne Cottrill		Procurement Budgeting Accounts Receivable Accounts Payable
Solicitation Response(SR) Dept: 080	5 ID: ESR05181700000005668 Ver.: 1	Function: New Phase: Final Modified by batch , 05/18/2017
Header () 45		
		List View
General Information Contact	Default Values Discount Document In	formation
Procurement Folder:	291915	SO Doc Code: CRFQ
Procurement Type:	Central Master Agreement	SO Dept: 0805
Vendor ID:	VS0000011255	SO Doc ID: PTR1700000007
Legal Name:	CREATIVE BUS SALES INC	Published Date: 5/10/17
Alias/DBA:		Close Date: 5/18/17
Total Bid:	\$0.00	Close Time: 13:30
Response Date:	05/18/2017	Status: Closed
Response Time:	13:12	Solicitation Description: Addendum No. 1 Mid Size Medium duty Transit Vehicle
		Total of Header Attachments: 45
		Total of All Attachments: 45



Purchasing Division 2019 Washington Street East Post Office Box 50130 Charleston, WV 25305-0130

State of West Virginia Solicitation Response

Proc Folder: 291915 Solicitation Description: Addendum No. 1 Mid Size Medium duty Transit Vehicle Proc Type: Central Master Agreement					
Date issued	Solicitation Closes	olicitation Response Version			
	2017-05-18 13:30:00	SR 0805 ESR0518170000005668	1		

VENDOR			
VS0000011255			
CREATIVE BUS SALES	INC		
Solicitation Number:	CRFQ	0805	PTR170000007

Total Bid :	\$0.00	Response Date:	2017-05-18	Response Time:	13:12:55

Comments:

FOR INFORMATION CONTACT THE BUYER		
Melissa Pettrey		
(304) 558-0094 melissa.k.pettrey@wv.gov		
Signature on File F	EIN #	DATE

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Mid Size Medium duty Transit Vehicle	0.00000	EA	\$1.000000	\$0.00
Comm Code	Manufacturer	Specification		Model #	
25101502					
Extended De	scription : Mid Size Medium duty Tran	sit Vehicle			

REQUIRED BID DOCUMENTATION CHECKLIST

Model Year: 2017 Model: Legacy
Mandatory Bid Forms – must be submitted with bid:
Bid Form #1: Locations of Technical Service Representatives and Parts Distribution Centers
Bid Form #2: Certification for Air & Water Pollution
Bid Form #3: Disadvantaged Business Enterprise Vendors/Manufacturers Certification
Bid Form #4: Buy America Certification Rolling Stock
Bid Form #5: Federal Motor Vehicle Safety Standards Certification
Bid Form #6: U.S. Comptroller's Debarment List Certification
Bid Form #7: Certification of Primary Participant Regarding Debarment, Suspension, and Other Responsibility Matters
Bid Form #8: Vendor's Certification of Understanding and Acceptance
Bid Form #9: Certification of Restrictions on Lobbying
Bid Form #10: Certification of Compliance with FTA's Bus Testing Requirements
Exhibit A Pricing Page (8.2)

Letter of Qualifications



Responder Information

Creative Bus Sales, Inc. 28293 Clay Street Elkhart, IN 46517 Mike Wilson – Regional Sales Manager (800) 862-5478 – Phone (574) 830-0063 - Fax mikew@creativebussales.com

Company History - Bidders Qualifications

Creative Bus Sales, Inc. began serving the needs of California transportation providers in 1980 under the name of Creative Transportation Services, Inc. (CTS). In 1980, CTS was sold and became Creative Bus Sales, Inc. Tony Matijevich subsequently purchased Creative in 1993. Prior to the purchase Tony was the President of ElDorado National, the largest manufacturer of small and mid-size buses in the nation. Under the current leadership and vision, Creative Bus Sales has become the largest volume small and mid-size bus dealership in the United States. Creative is unique in the bus industry as a dealer that focuses only on the needs of the commercial bus customer.

Creative Family of Companies Include:

Creative Bus Sales - Chino, California Creative Bus Sales - Atlantic Beach, Florida Creative Bus Sales - Phoenix, Arizona Creative Bus Sales - Irving, Texas Creative Collision and Paint-Chino, California Green Alternative Systems- Chicago, IL Creative Bus Sales- Tulsa, OK Creative Bus Sales- Jacksonville, FL Creative Bus Sale- Portland, OR El Dorado Bus Sales - San Mateo, California Green Alternative Systems -Elkhart, Indiana Creative Bus Sales -Albuquerque, New Mexico Creative Fleet Leasing - Chino, California Green Alternative Systems – Brooklyn, NY Green Alternative Systems- Yorba, CA Creative Bus Sales- Orlando, FL Creative Bus Sales- Colorado Springs, CO Creative Bus Sales- Seattle, WA

Creative Bus Sales was incorporated in the State of California in 1993 under the current ownership. Creative Bus Sales has had no judgments, litigation, licensing violations or other violations outstanding or resolved against it within the past five (5) years.

Background Creative Bus Sales is the largest commercial bus dealership in the United States and sells, delivers and services hundreds of buses per year to agencies and companies in California and throughout the United States. Creative Bus Sales has held several State Contracts over the last 17 years and has delivered several thousand State contract vehicles during this time.

Experience (a partial listing of significant projects)

Significant Transit Projects Completed Over the Last 4-5 Years

ОСТА	Over 950 Paratransit Buses
City of Los Angeles	Over 500 Paratransit Buses
Caltrans Division of Mass Transit	Over 2,000 Paratransit Buses
RTC Las Vegas	Over 400 Paratransit and Transit Buses
Access Services	Over 700 Paratransit Mini Vans
Dallas DART	398 Paratransit Buses
Montgomery County, MD.	93 Paratransit Buses

Notices should be sent c/o:

Mike Wilson – Regional Manage	er Creative Bus Sa	les, Inc.	28293 Clay Street, Elkhart IN 46517
(800) 862-5478 – Phone	(574) 830-0063 – Fax	mikew(@creativebussales.com

Preparer: Marcus Hoffman, Transit Bid Manager for Creative Bus Sales, Inc. is the preparer of this proposal.

<u>Flexible Scope</u>: Creative Bus Sales, Inc. is committed to flexibility in the products and services offered in the contract upon request by the State.

Independent Pricing: Creative Bus Sales, Inc. certifies that in connection with this Contract the prices proposed have been arrived at without consultation, communication or agreement for the purpose of restricting competition.

Signer(s): Each person signing this proposal and/or addenda is the person responsible for or authorized to make decisions as to the prices quoted in the cost proposal and has not participated and will not participate in any action contrary to those stated above.

Key Personnel: Project Manager – Matt Mashuda is the proposed Project Manager for this contract.

Organization and Key Staff Members Assigned to This Contract:

Creative Bus Sales, Inc. currently employs over 250 employees in all locations.

Tony Matijevich, President Terry McCrea, Chief Financial Officer TJ Matijevich, VP Sales/General Manager Mike Wilson, Regional Sales Manager Marcus Hoffman, Transit Bid Manager Matt Mashuda, Transit Sales Carl Henderson, Eastern Corporate Operations & Service Manager Jason Hohalek, Corporate Warranty Manager Keith Grube, Corporate Parts Manager

Project Team: Matt Mashuda, Project Manager will be responsible for the day-to-day maintenance of this contract. Some or all of the above mentioned personnel will be utilized as needed during the course of this project.

<u>Consent</u>: Creative Bus Sales, Inc. if awarded a contract will not assign any part of its interest in the agreement without prior consent of the State.

Acceptance of Terms: Creative Bus Sales, Inc. accepts the Contract Terms and Conditions.

<u>RFP Response</u>: Our understanding of the scope of work pertaining to this RFP solicitation and components includes but not limited to:

<u>Customer Service</u> Capabilities: Our service locations or are located within 5 hours of all recipients locations. Technical assistance is provided on the day of the phone call. We are exclusively able to direct factory personnel from any discipline including engineering, manufacturing, parts, service and management, in response to your need at the time. No delay in problem resolution due to out of state factory personnel availability is experienced. Swift and accurate resolutions to issues and needs are achieved through factory personnel directly reviewing issues, "first hand", as they are presented.

Creative has excellent relations with all major component manufacturers. Creative's service technicians and supervisory team are certified by John Deere, Cummins, A/C Carrier, Trans Air, Thermo King, Ricon, and Braun. Service technicians are graduates of the Automotive Technical College and Automotive Service Excellence (ASE) Master Technicians. Creative's parts service department is dedicated solely to the service and support of commercial and transit buses and does not service any other type of equipment, school buses or trucks. Such focus insures an unmatched level of competency in the industry. Technical assistance can be provided immediately during business hours by contacting Creative Bus Sales service technicians. Complete description of warranty policy and procedures can be provided upon award.

List of Centers

One call to our Warranty Administration team will facilitate the best warranty option. Creative Bus Sales is an authorized repair facility. They have the authority to make on the spot decisions regarding warranty repairs. As needed, local to the end user warranty repair facilities will be authorized to perform the required repair.

Spare Parts and Inventory Levels

A critical part of the project is a quick response time to service assistance and parts supply. Both of these items are provided from locations in Arizona, California, Florida, Indiana, and Texas. Once again, one call to our Parts network will facilitate the end users needs.

Creative Bus Sales provides parts supply and aftermarket support from five of our facilities. Over \$10,000,000 worth of inventory is maintained at all times. Parts department personnel have over sixty years of experience in this field. Most parts can be shipped within twenty-four hours of order. Complete description of parts policy and procedures can be provided upon award.

Inspection procedures

Each vehicle will have a PDI (Pre-Delivery Inspection) performed before final delivery to the end customer. Any deficiency noted shall be repaired before delivery. All documents required under the contract shall be provided upon delivery or pickup. This pre-delivery inspection will be in addition to inspections performed by the manufacturer and/or line inspectors hired by the end user.

Cutoff Dates

CBS agrees to comply with this section. Model year cutoffs are well communicated by the OEM's and chassis dealers alike. We generally receive 60 - 90 days' notice and will promptly notify the agency promptly.

Sincerely,

Marcus Hoffman Transit Sales Creative Bus Sales, Inc. **DESIGNATED CONTACT:** Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Mike	Wilson,	Region	al Sales	Manager		
(Name,	, Title)					
(Printed 28293	d Name an 3 Clay St	d Title) treet El	.khart II	N 46517		
(Addres	ss) 686-9448	/ 5	74-830-0	063		
(Phone mikes	Number)/ w@creati	(Fax Nu vebussa	mber) les.com			
(email a	address)					

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

Creative Bus Sales, Inc. (Company) (Authorized Signature) (Representative Name, Title) Marcus Hoffman, Transit Bid Manager (Printed Name and Title of Authorized Representative) 5/17/17 (Date)

602-437-2255 / 602-437-2758

(Phone Number) (Fax Number)

REQUEST FOR QUOTATATION Mid-Size Medium Duty Transit Vehicles

determined by multiplying the number of actual man-hours' straight wage rate plus 53 percent fringe benefits, plus the cost of towing in the vehicle if such action was necessary. These wage and fringe benefit rates shall not exceed the rates in effect in the Recipient Agency's service garage at the time the defect correction is made.

- 12.10.6 <u>Reimbursement For Parts</u>. The Recipient Agency shall be reimbursed by the Vendor for defective parts that must be replaced to correct the defect. The reimbursement shall include taxes where applicable and 10 percent handling cost.
- 12.11 Delivery Payment/Risk of Loss: Standard order delivery shall be F.O.B. destination to the Agency's designated location. Vendor shall include the cost of standard order delivery charges in its bid pricing/discount and is not permitted to charge the Agency separately for such delivery.

13.0 MISCELLANEOUS:

- **13.1** No Substitutions: Vendor shall supply only Contract Items submitted in response to the RFQ unless a contract modification is approved in accordance with the provisions contained in this Contract.
- 13.2 Contract Manager: During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manage	r: Mike Wilson
Telephone Numb	er: 877-686-9448
Fax Number:5	74-830-0063
Email Address:	mikew@creativebussales.com

13.3 Federal funding for this project is being provided by the Federal TransitAdministration through CFDA 20.500 for Sec 5309, CFDA20.509 for Sec5311 and CFDA 20.506 for Sec 5339 to cover 80% of the project cost.

REQUEST FOR QUOTATATION Mid-Size Medium Duty Transit Vehicles

BID FORM #1

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

Location(s) of the Technical Service Representative(s) and parts distribution center(s) closest or in the State of West Virginia.

Location(s) of the technical service representative(s). Name: Creative Bus Sales, Inc.

Address: 28293 Clay Street Elkhart IN 46517

Contact: Mike Wilson or Curt Smith

Telephone: 877-686-9448

Name: Creative Bus Sales, Inc.

Address: 800 Picken Drive Ext NE Marietta GA 30062

Contact: Carl Henderson Eastern Service Manager

Telephone: 770-422-8920

Location(s) of parts distribution center(s).

Name: Creative Bus Sales - Elkhart IN

Address: 28293 Clay Street Elkhart IN 46517

Telephone: 877-686-9448

Name: Creative Bus Sales - Part Distribution Warehouse

Address: 3832 East Roeser Phoenix AZ 85040

Telephone: 602-437-0016

CERTIFICATION FOR AIR & WATER POLLUTION MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

The Vendor certifies that the vehicles proposed:

ARE ______ in compliance with the regulations in 40 CFR Part 85, 40 CFR Part 86, 40 CFR Part 600, Clean Water Act and the air/water pollution criteria established by the Environmental Protection Agency of the United States Government.

ARE NOT ______ in compliance with the regulations in 40 CFR Part 85, 40 CFR Part 86, 40 CFR Part 600, Clean Water Act and the air/water pollution criteria established by the Environmental Protection Agency of the United States Government.

5/17/17		
Date		
mA	2_	
Authorized Signature		

Transit Bid Manager

Title

Creative Bus Sales, Inc.

Company Name

DISADVANTAGED BUSINESS ENTERPRISE **VENDORS/ MANUFACTURERS CERTIFICATION**

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

(Check appropriate statement)

The Vendor, if a transit vehicle manufacturer, hereby certifies that it has complied with the requirements of 49 CFR Section 26.49 by submitting an annual DBE goal to the Federal Transit Administration (FTA). The goal has either been approved or not disapproved by FTA.

The Vendor, if a non-manufacturing supplier, hereby certifies that the manufacturer of the transit vehicle to be supplied has complied with the above-referenced requirement of 49 CFR Section 26.49.

5/17/17 Date Authorized Signat Transit Bid Manager

Title

Creative Bus Sales, Inc.

Company Name

BUY AMERICA CERTIFICATION ROLLING STOCK MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

Certificate of Compliance

The bidder or offeror hereby certifies that it will comply with the requirements of section 165(b) (3), of the Surface Transportation Assistance Act of 1982, as amended, and the applicable regulations of 49 CFR 661.11:

5/17/17

Date 11	
MART	
Authorized Signature	

Creative Bus Sales, Inc.

Company Name

Marcus Hoffman

Name

Transit Bid Manager

Title

Certificate for Non-Compliance

The bidder or offeror hereby certifies that it cannot comply with the requirements of section 165(b) (3) of the Surface Transportation Assistance Act of 1982, as amended, but may qualify for an exception to the requirement consistent with section 165(b) (2) or (b) (4) of the Surface Transportation Assistance Act, as amended, and the applicable regulations in 49 CFR 661.7.

Date

Authorized Signature

Company Name

Name

Title

FEDERAL MOTOR VEHICLE SAFETY STANDARDS CERTIFICATION

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

The vendor hereby certifies that it shall submit, as required by Title 49 of the CFR, Part 663 - Subpart D, it's self-certification information stating that the vehicle(s) will comply with the relevant Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 of the Code of Federal Regulations, Part 571.

5/17/17	
Date Authorized Aigneture Transit Bid Manager	
Title	
Creative Bus Sales, Inc.	

Company Name

BID FORM #6 U.S. Comptroller's Debarment List Certification

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

Creative Bus Sales, Inc. hereby certifies that it

____ IS or

IS NOT (specify one) included on the. U.S. GSA's debarment and suspension information available at <u>https://www.sam.gov</u>.

5/17/17

Date Authorized Sign ure

Transit Bid Manager

Title

Creative Bus Sales, Inc.

Company Name

MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

CERTIFICATION OF PRIMARY PARTICIPANT REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

The Primary Participant (applicant for an FTA grant or cooperative agreement, or potential contractor for a major third party contract),

Creative Bus Sales, Inc. (COMPANY NAME) certifies to the best of its knowledge and belief, that it and its principals:

- 1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- 2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.
- 3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and
- 4. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

If the primary participant (applicant for an FTA grant, or cooperative agreement, or potential third party contractor) is unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.)

THE PRIMARY PARTICIPANT (APPLICANT FOR AN FTA GRANT OR COOPERATIVE AGREEMENT, OR POTENTIAL CONTRACTOR FOR A MAJOR THIRD PARTY CONTRACT), Creative Bus Sales, Inc., CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 <u>ET SEQ</u>. ARE APPLICABLE THERETO.

Transit Bid Manager Signature and Title of Authorized Official

BID FORM #8 MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

VENDOR'S CERTIFICATION OF UNDERSTANDING AND ACCEPTANCE

The Vendor hereby certifies that all Technical Specifications and Contract Terms and Conditions have been carefully reviewed, are fully understood and shall be adhered to in performance and completion of any contract resulting from this bid.

5/17/1	.7		
Date	H 1		
Authorized	Signature		
Transit	Bid Manag	Jer	
Title			

Creative Bus Sales, Inc.

SPECIFICATION COMPLIANCE

NOTE: <u>Please check</u> if what is offered is in exact compliance with specifications. Any discrepancies must be listed as an attachment to the bid proposal. Exact dimensions and/or descriptions must be provided as a part of the Vendor's bid proposal when submitted.



Bid proposal submitted meets and/or exceeds all specification requirements.



Bid proposal submitted contains deviations from specification requirements. Detailed descriptions of these deviations have been provided with this bid proposal.

BID FORM #9 MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

CERTIFICATION OF RESTRICTIONS ON LOBBYING

The undersigned (Vendor, Contractor) certifies, to the best of his or her knowledge and belief, that:

- 1. No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress regarding the award of a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance, or the extension, continuation, renewal, amendment, or modification of any Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance.
- 2. If any funds other than Federal appropriated funds have been or will be paid to any person to influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or any employee of a Member of Congress in connection with any application for a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance, the undersigned assures that it will complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," Rev. 7-97; and
- 3. The undersigned understands that the language of this certification shall be included in the award documents for all sub awards at all tiers (including subcontracts, sub grants, sub agreements. and contracts under grants, loans (including a line of credit), cooperative agreements, loan guarantees, and loan insurance.

Undersigned understands that this certification is a material representation of fact upon which reliance is placed by the Federal government and that submission of this certification is a prerequisite for providing a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance for a transaction covered by 31 U.S.C. 1352. The undersigned also understands that any person who fails to file a required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The (Vendor, Contractor) <u>Creative Bus Sales, Inc.</u>, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the (Vendor, Contractor understands and agrees that the provisions of 31 U.S.C. §§ 3801, et seq., apply to this certification and disclosure.

5/17/17 Date Authorized Signature Transit Bid Manager

Title

MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS

The undersigned (Vendor/Manufacturer) certifies that the vehicle offered in this procurement complies with 49 U.S.C. 5318, as amended by MAP-21, and FTA regulations, "Bus Testing," 49 CFR Part 665.

The undersigned understands that misrepresenting the testing status of a vehicle acquired with Federal financial Assistance may subject the undersigned to civil penalties as outlined in the Department of Transportation's regulation on Program Fraud Civil Remedies, 49 CFR Part 31. In addition, the undersigned understands that FTA may suspend or debar a manufacturer under the procedures in 49 CFR Part 29.

5/17/17 Date Authorized Sig ature Transit Bid Manager Title

Creative Bus Sales, Inc.

Company Name

STURAA TEST

10 YEAR

350,000 MILE BUS

from

GLAVAL BUS, a division of FOREST RIVER, INC.

MODEL LEGACY

APRIL 2012

PTI-BT-R1110



The Thomas D. Larson Pennsylvania Transportation Institute Vehicle Systems and Safety Program

201 Transportation Research Building (814) 865-1891 The Pennsylvania State University University Park, PA 16802

Bus Testing and Research Center

2237 Old Route 220 N. Duncansville, PA 16635 (814) 695-3404



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EXECUTIVE SUMMARY

Glaval Bus, a division of Forest River, inc. submitted a model Legacy, dieselpowered 45 seat (including the driver) 39-foot bus, for a 10 yr/350,000 mile STURAA test. The odometer reading at the time of delivery was 535 miles. Testing started on June 14, 2011 and was completed on April 6, 2012. The Check-In section of the report provides a description of the bus and specifies its major components.

The primary part of the test program is the Structural Durability Test, which also provides the information for the Maintainability and Reliability results. The Structural Durability Test was started on July 26, 2011 and was completed on March 9, 2012.

The interior of the bus is configured with seating for 45 passengers including the driver. Free floor space will accommodate 23 standing passengers resulting in a potential load of 68 persons. At 150 lbs per person, this load results in a Measured Gross Vehicle Weight (GVW) of 27,300 lbs. Note: at Gross Vehicle Load (GVL) the weight of the rear axle is 1,530 lbs over the rear GAWR and 1,300 lbs over the GVWR. The first segment of the Structural Durability Test was performed with the bus loaded to a GVW of 27,300 lbs. The middle segment was performed at a seated load weight of 24,070 lbs and the final segment was performed at a curb weight of 16,280 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.

Accessibility, in general, was adequate, components covered in Section 1.3 (Repair and/or Replacement of Selected Subsystems) along with all other components encountered during testing, were found to be readily accessible and no restrictions were noted.

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 six reported failures, three were Class 3 and three were Class 4.

The Safety Test, (a double-lane change, obstacle avoidance test) was safely performed in both right-hand and left-hand directions up to a maximum test speed of 45 mph. The performance of the bus is illustrated by a speed vs. time plot. Acceleration and gradeability test data are provided in Section 4, Performance. The average time to obtain 50 mph was 25.39 seconds. The Stopping Distance phase of the Brake Test was completed with the following results; for the Uniform High Friction Test average stopping distances were 28.91' at 20 mph, 57.10' at 30 mph, 90.35' at 40 mph and 116.07' at 45 mph. The average stopping distance for the Uniform Low Friction Test was 37.12'. There was no deviation from the test lane during the performance of the Stopping Distance phase. During the Stability phase of Brake Testing the test bus experienced no deviation from the test lane but did experience pull to the left during both approaches to the Split Friction Road surface. The Parking Brake phase was completed with the test bus maintaining the parked position for the full five minute period with no slip or roll observed in both the uphill and downhill positions.

The Shakedown Test produced a maximum final loaded deflection of 0.444 inches with a permanent set ranging between -0.005 to 0.006 inches under a distributed static load of 25,500 lbs. The Distortion Test was completed with all subsystems, doors and escape mechanisms operating properly. Water leakage was observed throughout the test across the top of the windshield.

The Static Towing Test was performed using a target load (towing force) of 20,184 lbs. All four front pulls were completed to the full test load with no damage or deformation observed. The Dynamic Towing Test was performed by means of a front-lift tow. The towing interface was accomplished using a hydraulic under-lift wrecker. The bus was towed without incident and no damage resulted from the test. The manufacturer does not recommend towing the bus from the rear, therefore, a rear test was not performed. The Jacking and Hoisting Tests were also performed without incident. The bus was found to be stable on the jack stands, and the minimum jacking clearance observed with a tire deflated was 4.6 inches.

A Fuel Economy Test was run on simulated central business district, arterial, and commuter courses. The results were 4.59 mpg, 5.37 mpg, and 10.32 mpg respectively; with an overall average of 5.74 mpg.

A series of Interior and Exterior Noise Tests was performed. These data are listed in Section 7.1 and 7.2 respectively.

The Emissions Test was performed. These results are available in Section 8 of this report.

ABBREVIATIONS

ABTC	-	Altoona Bus Test Center
A/C	-	air conditioner
ADB	-	advance design bus
ATA-MC	-	The Maintenance Council of the American Trucking Association
CBD	-	central business district
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)
GVL	-	gross vehicle 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
MECH	-	bus mechanic
mpg	-	miles per gallon
mph	-	miles per hour
PM	-	Preventive maintenance
PSBRTF	-	Penn State Bus Research and Testing Facility
PTI	-	Pennsylvania Transportation Institute
rpm	-	revolutions per minute
SAE	-	Society of Automotive Engineers
SCH	-	test scheduler
SEC	-	secretary
SLW	-	seated load weight (curb weight plus 150 lb for every designed passenger seating
		position and for the driver)
STURAA	-	Surface Transportation and Uniform Relocation Assistance Act
TD	-	test driver
TECH	-	test technician
ТМ	-	track manager
ТР	-	test personnel

TEST BUS CHECK-IN

I. OBJECTIVE

The objective of this task is to log in the test bus, assign a bus number, complete the vehicle data form, and perform a safety check.

II. TEST DESCRIPTION

The test consists of assigning a bus 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 an initial safety check, and performing the manufacturer's recommended preventive maintenance. The bus manufacturer must certify that the bus meets all Federal regulations.

III. DISCUSSION

The check-in procedure is used to identify in detail the major components and configuration of the bus.

The test bus consists of a Glaval Bus, model Legacy. The bus has an OEM driver's door and front passenger door rear of the front axle and a rear cargo/handicap entrance centered at the rear of the bus. Note; this test bus was not equipped with any type of handicap lift or ramp. Power is provided by a diesel-fueled, Cummins model IBS 6.7 L 240 HP engine coupled to an Allison model 2200 PTS transmission.

The measured curb weight is 6,530 lbs for the front axle and 10,290 lbs for the rear axle. These combined weights provide a total measured curb weight of 16,820 lbs. There are 45 seats including the driver and room for 23 standing passengers bringing the total passenger capacity to 68. Gross load is 150 lb x 68 = 10,200 lbs. At full capacity, the measured gross vehicle weight is 27,300 lbs. Note: at GVL the load is 1,530 lbs over the rear GAWR and 1,300 lbs over the GVWR.

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

VEHICLE DATA FORM

Bus Number: 1110	Arrival Date: 6-14-11
Bus Manufacturer: Glaval	Vehicle Identification Number (VIN): 5NHBGY524BF012294
Model Number: Legacy	Date: 6-14-11
Personnel: E.D., E.L. & T.S.	Chassis: Freightliner / Type Bus/Autobus

WEIGHT:

Individual Wheel Reactions:

Weights	Front Axle		Middle Axle		Rear Axle	
(lb)	Right	Left	Right	Left	Right	Left
CW	3,260	3,270	N/A	N/A	4,700	5,590
SLW	3,570	3,590	N/A	N/A	8,280	8,630
GVW	4,030	4,100	N/A	N/A	9,350	9,820

Total Weight Details:

Weight (lb)	CW	SLW	GVW	GAWR
Front Axle	6,530	7,160	8,130	9,350
Middle Axle	N/A	N/A	N/A	N/A
Rear Axle	10,290	16,910	19,170	17,640
Total	16,820	24,070	27,300	GVWR: 26,000

Dimensions:

Length (ft/in)	39 / 7.25
Width (in)	97.00
Height (in)	127.25
Front Overhang (in)	40.50
Rear Overhang (in)	154.50
Wheel Base (in)	280.25
Wheel Track (in)	Front: 82.30
	Rear: 72.50

Bus Number: 1110

Date: 6-14-11

CLEARANCES:

Lowest Point Outside Front Axle	Location: Radiator hose	Clearance(in): 16.2
Lowest Point Outside Rear Axle	Location: Fuel tank mounts	Clearance(in): 16.4
Lowest Point between Axles	Location: Driveshaft guard	Clearance(in): 7.9
Ground Clearance at the center (in)	14.1	
Front Approach Angle (deg)	21.8	
Rear Approach Angle (deg)	6.1	
Ramp Clearance Angle (deg)	3.2	
Aisle Width (in)	15.8	
Inside Standing Height at Center Aisle (in)	79	

BODY DETAILS:

Body Structural Type	Integral			
Frame Material	Steel			
Body Material	Composite			
Floor Material	Plywood			
Roof Material	Composite			
Windows Type	□ Fixed	■ Movable		
Window Mfg./Model No.	KTG / DOT620 ANSI 297.1-1984 16 CFR 1201			
Number of Doors	<u>1</u> Driver	<u>1</u> Passenger	1_Rear	
Mfr. / Model No.	Driver's – Freightliner / OEM Passenger – A&M Systems Inc. Rear – Glaval Bus			
Dimension of Each Door (in)	52.3 x 29.3	87.6 x 30.3	63.6 x 34.1	
Passenger Seat Type	Cantilever	Pedestal	□ Other (explain)	
Mfr. / Model No.	Freedman Seating (Co. / Featherweight		
Driver Seat Type	■ Air □ Spring □ Other (explain)			
Mfr. / Model No.	Bostrom Seating / Talladega 910 High Back Air-Suspension			
Number of Seats (including Driver)	45			

Bus	Number:	1	11(0
Duo	i tunnoon.			0

Date: 6-14-11

BODY DETAILS (Contd..)

Free Floor Space (ft ²)	35.8				
Height of Each Step at Normal Position (in)	Front 1. <u>10.6</u>	2. <u>9.1</u>	3. <u>9.1</u>	4. <u>9.1</u> _	5. <u>8.5</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

Туре	■ C.I.	Alternate Fuel	
	□ S.I.	□ Other (explain)	
Mfr. / Model No.	Cummins / ISB 6.7 L	_ 240 Hp	
Location	■ Front	□ Rear □ Other (explain)	
Fuel Type	□ Gasoline		Methanol
	■ Diesel		□ Other (explain)
Fuel Tank Capacity (indicate units)	100 gals		
Fuel Induction Type	Injected	□ Carburetion	
Fuel Injector Mfr. / Model No.	Cummins / ISB 6.7 L 240 Hp		
Carburetor Mfr. / Model No.	N/A		
Fuel Pump Mfr. / Model No.	Cummins / ISB 6.7 L 240 Hp		
Alternator (Generator) Mfr. / Model No.	Prestolite / 4944PA Leece Neville / A0014944PA		
Maximum Rated Output (Volts / Amps)	14 / 270		
Air Compressor Mfr. / Model No.	Cummins / 107-032		
Maximum Capacity (ft ³ / min)	18.7		
Starter Type	■ Electrical	Pneumatic	□ Other (explain)
Starter Mfr. / Model No.	Denso / 428000-5230		

Bus Number: 1110		Date: 6-14-11		
TRANSMISSION	TRANSMISSION			
Transmission Type			Automatic	
Mfr. / Model No.	Allison / 22	200 PTS		
Control Type	■ Mechan	nical	Electrical	□ Other
Torque Converter Mfr. / Model No.	Allison / 22	200 PTS		
Integral Retarder Mfr. / Model No.	N/A			
SUSPENSION				
Number of Axles	2			
Front Axle Type	🗆 Indeper	ndent	Beam Axle	
Mfr. / Model No.	Axle Allian	ce Co. / F	10-3N	
Axle Ratio (if driven)	N/A			
Suspension Type	□ Air		■ Spring	□ Other (explain)
No. of Shock Absorbers	2			
Mfr. / Model No.	Sachs / 47	1700 000) 449	
Middle Axle Type	🗆 Indeper	ndent	🗆 Beam Axle	
Mfr. / Model No.	N/A			
Axle Ratio (if driven)	N/A			1
Suspension Type	🗆 Air		□ Spring	□ Other (explain)
No. of Shock Absorbers	N/A			
Mfr. / Model No.	N/A			
Rear Axle Type	🗆 Indeper	ndent	Beam Axle	
Mfr. / Model No.	Axle Alliance Co. / R18-2N			
Axle Ratio (if driven)	5.125			r
Suspension Type	■ Air		□ Spring	□ Other (explain)
No. of Shock Absorbers	2			
Mfr. / Model No.	Sachs / 47	1700 131	1 777	

Bus Number: 1110	Date: 6-14-11

WHEELS & TIRES

Front	Wheel Mfr./ Model No.	Accuride / 22.5 x 7.5
	Tire Mfr./ Model No.	Michelin / 235/80R 22.5
Rear	Wheel Mfr./ Model No.	Accuride / 22.5 x 7.5
	Tire Mfr./ Model No.	Michelin / 235/80R 22.5

BRAKES

Front Axle Brakes Type	□ Cam	■ Disc	□ Other (explain)
Mfr. / Model No.	Bosch / 73 mm		
Middle Axle Brakes Type	□ Cam	□ Disc	□ Other (explain)
Mfr. / Model No.	N/A		
Rear Axle Brakes Type	□ Cam	■ Disc	□ Other (explain)
Mfr. / Model No.	Bosch / 73 mm	1	
Retarder Type	N/A		
Mfr. / Model No.	N/A		

HVAC

Heating System Type	□ Air	■ Water	□ Other
Capacity (Btu/hr)	130,000		
Mfr. / Model No.	Pro-Air / (2) 65K Floor Heaters		
Air Conditioner	■ Yes	🗆 No	
Location	Rear		
Capacity (Btu/hr)	120,000		
A/C Compressor Mfr. / Model No.	Seltec / Dual TM-21		

STEERING

Steering Gear Box Type	Hydraulic gear
Mfr. / Model No.	TRW / THP-60
Steering Wheel Diameter	17.7
Number of turns (lock to lock)	4.25

Bus Number: 1110	Date: 6-14-11

OTHERS

Wheel Chair Ramps	Location: N/A	Type: N/A
Wheel Chair Lifts	Location: N/A	Type: N/A
Mfr. / Model No.	N/A	
Emergency Exit	Location: Door Windows Roof hatch	Number: 2 6 1

CAPACITIES

Fuel Tank Capacity (units)	100 gals.
Engine Crankcase Capacity (gallons)	4.4
Transmission Capacity (gallons)	Initial fill 3.7 Refill 2.6
Differential Capacity (gallons)	Unknown.
Cooling System Capacity (quarts)	Unknown. Fill to line.
Power Steering Fluid Capacity (quarts)	Unknown.

VEHICLE DATA FORM

Bus	Number [.]	1110
Dus	number.	1110

Date: 6-14-11

List all spare parts, tools and manuals delivered with the bus.

Part Number	Description	Qty.
NA	Tires & rims	6
47 1700 131 777	Shocks	2
47 1700 000 449	Shocks	2
01-32241-065	Belt	1
LF 3970	Oil filter	2
29539579	Transmission filter	2
P607955 Donaldson	Air filter	2

COMPONENT/SUBSYSTEM INSPECTION FORM

Bus Number: 1110

Date: 6/14/11

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	√	

CHECK - IN



GLAVAL BUS MODEL LEGACY



CHECK - IN CONT.



OPERATOR'S AREA

GVWR/PNI	BV: 11794 AT CAP./NOMBRE	KG (2600018 "D'ESIGNE" DE PLACES	TYPE/TYPE E	BUS/AUTOBUS 1=3060 kg or 45X150lbs=6750 lb
GAN	WRIFTIEE	TRESPINEU	FEMERAANTE	COLD INFL PRESSPRESS DE
AVAND I	4241 ³⁶⁵ 9350 ^{1.83}	235/80R22.5 (G)	22.5X7.5	759 KP STALLE ERIAL
IMTERMA NTERMA	0 KG			O HAY SUNCLE DUA
REARD Marie Re	8002 KG	235/80R22 5 (C)	22 5X7.5	759 KP SPACE DAR

VIN TAG
CHECK - IN CONT.



INTERIOR VIEW FROM FRONT



INTERIOR VIEW FROM REAR

CHECK - IN CONT.



UNDERCARRIAGE REAR



UNDERCARRIAGE FORWARD

1. MAINTAINABILITY

1.1 ACCESSIBILITY OF COMPONENTS AND SUBSYSTEMS

1.1-I. TEST OBJECTIVE

The objective of this test is to check the accessibility of components and subsystems.

1.1-II. TEST DESCRIPTION

Accessibility of components and subsystems is checked, and where accessibility is restricted the subsystem is noted along with the reason for the restriction.

1.1-III. DISCUSSION

Accessibility, in general, was adequate. Components covered in Section 1.3 (repair and/or replacement of selected subsystems), along with all other components encountered during testing, were found to be readily accessible and no restrictions were noted.

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

ACCESSIBILITY DATA FORM

Bus Number: 1110

Date: 10-20-11

Component	Checked	Comments
ENGINE :		
Oil Dipstick	E.D.	
Oil Filler Hole	E.D.	
Oil Drain Plug	E.D.	
Oil Filter	E.D.	
Fuel Filter	E.D.	
Air Filter	E.D.	
Belts	E.D.	
Coolant Level	E.D.	
Coolant Filler Hole	E.D.	
Coolant Drain	E.D.	
Spark / Glow Plugs	E.D.	
Alternator	E.D.	
Diagnostic Interface Connector	E.D.	
TRANSMISSION :		
Fluid Dip-Stick	E.L.	
Filler Hole	E.L.	
Drain Plug	E.L.	
SUSPENSION :		
Bushings	E.L.	
Shock Absorbers	E.L.	
Air Springs	E.L.	
Leveling Valves	E.L.	
Grease Fittings	E.L.	

ACCESSIBILITY DATA FORM

Bus Number: 1110

Date: 10-20-11

Component	Checked	Comments
HVAC :		
A/C Compressor	E.D.	
Filters	E.D.	
Fans	E.D.	
ELECTRICAL SYSTEM :		
Fuses	E.D.	
Batteries	E.D.	
Voltage regulator	E.D.	
Voltage Converters	E.D.	N/A
Lighting	E.D.	
MISCELLANEOUS :		
Brakes	E.D.	
Handicap Lifts/Ramps	E.D.	
Instruments	E.D.	
Axles	E.D.	
Exhaust	E.D.	
Fuel System	E.D.	
OTHERS :		

1.2 SERVICING, PREVENTIVE MAINTENANCE, AND REPAIR AND MAINTENANCE DURING TESTING

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 NBM and collecting the following data on work order forms and a driver log.

- 1. Unscheduled Maintenance
 - a. Bus number
 - b. Date
 - c. Mileage
 - d. Description of malfunction
 - e. Location of malfunction (e.g., in service or undergoing inspection)
 - f. Repair action and parts used
 - g. Man-hours required
- 2. Scheduled Maintenance
 - a. Bus number
 - b. Date
 - c. Mileage
 - d. Engine running time (if available)
 - e. Results of scheduled inspections
 - f. Description of malfunction (if any)
 - g. Repair action and parts used (if any)
 - h. Man-hours required

The buses will be operated in accelerated 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. 3,000 mi (or equivalent) inspection

- 7. Oil and filter change inspection
- 8. Major inspection
- 9. Tune-up
- C. Periodic Repairs
 - 1. Brake reline
 - 2. Transmission change
 - 3. Engine change
 - 4. Windshield wiper motor change
 - 5. Stoplight bulb change
 - 6. Towing operations
 - 7. Hoisting operations

1.2-III. DISCUSSION

Servicing and preventive maintenance were performed at manufacturer-specified intervals. The following Scheduled Maintenance Form lists the mileage, items serviced, the service interval, and amount of time required to perform the maintenance. Table 1 is a list of the lubricating products used in servicing. Finally, the Unscheduled Maintenance List along with Unscheduled Maintenance-related photographs is included in Section 5.7, Structural Durability. This list supplies information related to failures that occurred during the durability portion of testing. The Unscheduled Maintenance List includes the date and mileage at which the malfunction occurred, a description of the malfunction and repair, and the time required to perform the repair.

(Page 1 of 2) **SCHEDULED MAINTENANCE** Glaval Bus #1110

DATE	TEST MILES	SERVICE	ACTIVITY	DOWN TIME	HOURS
08-24-11	597	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
08-30-11	1,352	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
09-08-11	2,426	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
10-31-11	3,722	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-17-12	4,600	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-25-12	5,837	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-03-12	7,092	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-07-12	7,556	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00

(Page 2 of 2) SCHEDULED MAINTENANCE Glaval Bus #1110

DATE	TEST MILES	SERVICE	ACTIVITY	DOWN TIME	HOURS
02-14-12	8,628	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-20-12	9,852	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-27-12	10,829	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
03-21-12	11,257	P.M. / Inspection Fuel Economy Prep	Linkage, tie rods, universals/u-joints all lubed. Oil changed. Oil, fuel, and air filters changed. Transmission oil and filter changed.	8.00	8.00
					-

Table 1. STANDARD LUBRICANTS

The following is a list of Texaco lubricant products used in bus testing conducted by the Penn State University Altoona Bus Testing Center:

<u>ITEM</u>	PRODUCT CODE	TEXACO DESCRIPTION
Engine oil	#2112	URSA Super Plus SAE 30
Transmission oil	#1866	Automatic Trans Fluid Mercon/Dexron II Multipurpose
Gear oil	#2316	Multigear Lubricant EP SAE 80W90
Wheel bearing & Chassis grease	#1935	Starplex II

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS

1.3-I. TEST OBJECTIVE

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

1.3-II. TEST DESCRIPTION

The test will involve 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 NBM testing is added to this list. Components to be included are:

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

1.3-III. <u>DISCUSSION</u>

During the test, several additional components were removed for repair or replacement. Following is a list of components and total repair/replacement time.

MAN HOURS

All 6 tires.

4.5

At the end of the test, the remaining items on the list were removed and replaced. The transmission assembly took 8.00 man-hours (two men 4.00 hrs) to remove and replace. The time required for repair/replacement of the four remaining components is given on the following Repair and/or Replacement Form.

REPLACEMENT AND/OR REPAIR FORM

Subsystem	Replacement Time
Transmission	8.00 man hours
Wiper Motor	0.50 man hours
Starter	0.75 man hours
Alternator	0.50 man hours
Batteries	0.50 man hours

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS



TRANSMISSION REMOVAL AND REPLACEMENT (8.00 MAN HOURS)



WIPER MOTOR REMOVAL AND REPLACEMENT (0.50 MAN HOURS)

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS CONT.



STARTER REMOVAL AND REPLACEMENT (0.75 MAN HOURS)



ALTERNATOR REMOVAL AND REPLACEMENT (0.50 MAN HOURS)

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

2-I. TEST OBJECTIVE

The objective of this test is to document unscheduled breakdowns, repairs, down time, and repair time that occur during testing.

2-II. TEST DESCRIPTION

Using the driver log and unscheduled work order forms, all significant breakdowns, repairs, man-hours to repair, and hours out of service are recorded on the Reliability Data Form.

CLASS OF FAILURES

Classes of failures are described below:

- (a) <u>Class 1: Physical Safety</u>. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- (b) <u>Class 2: Road Call</u>. A failure resulting in an en route interruption of revenue service. Service is discontinued until the bus is replaced or repaired at the point of failure.
- (c) <u>Class 3: Bus Change</u>. A failure that requires removal of the bus from service during its assignments. The bus is operable to a rendezvous point with a replacement bus.
- (d) <u>Class 4: Bad Order</u>. A failure that does not require removal of the bus from service during its assignments but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.

2-III. DISCUSSION

A listing of breakdowns and unscheduled repairs is accumulated during the Structural Durability Test. The following Reliability Data Form lists all unscheduled repairs under classes as defined above. These classifications are somewhat subjective as the test is performed on a test track with careful inspections every two hours. However, even on the road, there is considerable latitude on deciding how to handle many failures.

The Unscheduled Repair List is also attached to provide a reference for the repairs that are included in the Reliability Data Forms.

The classification of repairs according to subsystem is intended to emphasize those systems which had persistent minor or more serious problems. There were no Class 1 or 2 failures. Of the three Class 3 failures, one each occurred with the body/frame, air conditioning and cooling system. These, and the remaining three Class 4 failures are available for review in the Unscheduled Maintenance List, located in Section 5.7 Structural Durability.

RELIABILITY DATA FORMS

Page 1 of 1

Bus Number: 1110

Date: 03-09-12

Personnel: Bob Reifsteck

	Failure Type					
	Class 4 Bad Order	Class 3 Bus Change	Class 2 Road Call	Class 1 Physical Safety		
Subsystems	Mileage	Mileage	Mileage	Mileage	Man Hours	Down Time
Body/Frame	1,352				2.00	1.00
	2,184				1.50	1.50
		8,207			4.00	4.00
Air Conditioning		3,022			4.00	296.00
Cooling System		1,352			2.00	4.00
Tires	4,600				4.50	1.50

3. SAFETY - A DOUBLE-LANE CHANGE (OBSTACLE AVOIDANCE)

3-I. TEST OBJECTIVE

The objective of this test is to determine handling and stability of the bus by measuring speed through a double lane change test.

3-II. TEST DESCRIPTION

The Safety Test is a vehicle handling and stability test. The bus will be operated at SLW on a smooth and level test track. The bus will be driven through a double lane change course at increasing speed until the test is considered unsafe or a speed of 45 mph is reached. The lane change course will be set up using pylons to mark off two 12 foot center to center lanes with two 100 foot lane change areas 100 feet apart. The bus will begin in one lane, change to the other lane in a 100 foot span, travel 100 feet, and return to the original lane in another 100 foot span. This procedure will be repeated, starting first in the right-hand and then in the left-hand lane.

3-III. DISCUSSION

The double-lane change was performed in both right-hand and left-hand directions. The bus was able to safely negotiate the test course in both the right-hand and left-hand directions up to the maximum test speed of 45 mph.

SAFETY DATA FORM

Bus Number: 1110	Date: 3/19/12
Personnel: G.C., T.S. & J.P.	

Temperature (°F): 68°	Humidity (%): 56
Wind Direction: Calm	Wind Speed (mph): Calm
Barometric Pressure (in.Hg): 30.16	

SAFETY TEST: DOUBLE LANE CHANGE	
Maximum safe speed tested for double-lane change to left	45 mph
Maximum safe speed tested for double-lane change to right	45 mph
Comments of the position of the bus during the lane change: A sa	afe profile was
maintained through all portions of testing.	
Comments of the tire/ground contact patch: Tire/ground contact wa	as maintained
through all portions of testing.	

3. SAFETY



RIGHT - HAND APPROACH



LEFT - HAND APPROACH

4.0 PERFORMANCE

4.1 PERFORMANCE - AN ACCELERATION, GRADEABILITY, AND TOP SPEED TEST

4.1-I. <u>TEST OBJECTIVE</u>

The objective of this test is to determine the acceleration, gradeability, and top speed capabilities of the bus.

4.1-II. TEST DESCRIPTION

In this test, the bus will be operated at SLW on the skid pad at the PSBRTF. The bus will be accelerated at full throttle from a standstill to a maximum "geared" or "safe" speed as determined by the test driver. The vehicle speed is measured using a Correvit non-contacting speed sensor. The times to reach speed between ten mile per hour increments are measured and recorded using a stopwatch with a lap timer. The time to speed data will be recorded on the Performance Data Form and later used to generate a speed vs. time plot and gradeability calculations.

4.1-III. DISCUSSION

This test consists of three runs in both the clockwise and counterclockwise directions on the Test Track. Velocity versus time data is obtained for each run and results are averaged together to minimize any test variability which might be introduced by wind or other external factors. The test was performed up to a maximum speed of 50 mph. The fitted curve of velocity vs. time is attached, followed by the calculated gradeability results. The average time to obtain 50 mph was 25.39 seconds.

PERFORMANCE DATA FORM

Bus Number: 1110		Date: 3-19-12			
Personnel: G.C., T.S. & J.P					
Temperature (°F):	68°	Humidity (%): 56	Humidity (%): 56		
Wind Direction: Ca	alm	Wind Speed (mph):	Calm		
Barometric Pressu	ıre (in.Hg): 30.16				
Air Conditioning co	ompressor-OFF	✓Checked			
Ventilation fans-Ol	N HIGH				
Heater pump moto	or-Off	✓Checked			
Defroster-OFF		✓ Checked			
Exterior and interio	or lights-ON	✓ Checked			
Windows and door	rs-CLOSED	✓ Checked			
Å	ACCELERATION, GRA	ADEABILITY, TOP SP	EED		
	Counter Clockwise F	Recorded Interval Time	Ś		
Speed	Run 1	Run 2	Run 3		
10 mph	3.58	3.42	3.82		
20 mph	6.98	6.92	6.82		
30 mph	11.48	11.20	11.11		
40 mph	18.04	18.10	17.67		
Top Test Speed(mph) 50	26.63	26.44	26.28		
	Clockwise Reco	orded Interval Times			
Speed	Run 1	Run 2	Run 3		
10 mph	3.35	3.42	3.42		
20 mph	6.35	6.70	6.55		
30 mph	10.63	10.29	10.48		
40 mph	16.63	16.57	16.61		
Top Test Speed(mph) 50	24.03	24.28	24.69		

1110.ACC

PERFORMANCE SUMMARY SHEET

:Glaval :Mod Legacy	BUS NUMBER TEST DATE	:1110 :3/19/12
F) RE (IN. HG)	: 68.0 : Calm : .0 : 56 : 30.2	
	AVERAGE TIME (SEC)	
CCW DIRECTIO	N CW DIRECTION	TOTAL
3.61 6.91 11.26 17.94 26.45	3.40 6.53 10.47 16.60 24.33	3.50 6.72 10.87 17.27 25.39
TIME (SEC)	ACCELERATION (FT/SEC^2)	MAX. GRADE (%)
.28 1.45 3.03 4.77 6.70 8.86 11.28 14.04 17.22 20.92 25.30	5.2 4.8 4.4 4.0 3.6 3.2 2.8 2.5 2.1 1.8 1.5	$ \begin{array}{r} 16.3\\ 15.2\\ 13.9\\ 12.5\\ 11.3\\ 10.0\\ 8.9\\ 7.7\\ 6.7\\ 5.7\\ 4.8\end{array} $
	:Glaval :Mod Legacy F) RE (IN. HG) CCW DIRECTION 3.61 6.91 11.26 17.94 26.45 	:Glaval BUS NUMBER :Mod Legacy TEST DATE F) : 68.0 : Calm .0 : 56 .0 RE (IN. HG) : 30.2 AVERAGE TIME (SEC) CCW DIRECTION TIME ACCELERATION 3.61 3.40 6.91 6.53 11.26 10.47 17.94 16.60 26.45 24.33 TIME ACCELERATION (SEC) .28 5.2 1.45 4.8 3.03 4.4 4.77 4.0 6.70 3.6 .866 3.2 11.28 2.8 14.04 2.5 17.22 2.1 20.92 1.8 25.30 1.5

NOTE : Gradeability results were calculated from performance test data. Actual sustained gradeability performance for vehicles equipped with auto transmission may be lower than the values indicated here.



4.0 PERFORMANCE

4.2 Performance - Bus Braking

4.2 I. TEST OBJECTIVE

The objective of this test is to provide, for comparison purposes, braking performance data on transit buses produced by different manufacturers.

4.2 II. TEST DESCRIPTION

The testing will be conducted at the PTI Test Track skid pad area. Brake tests will be conducted after completion of the GVW portion of the vehicle durability test. At this point in testing the brakes have been subjected to a large number of braking snubs and will be considered well burnished. Testing will be performed when the bus is fully loaded at its GVW. All tires on each bus must be representative of the tires on the production model vehicle

The brake testing procedure comprises three phases:

- 1. Stopping distance tests
 - i. Dry surface (high-friction, Skid Number within the range of 70-76)
 - ii. Wet surface (low-friction, Skid Number within the range of 30-36)
- 2. Stability tests
- 3. Parking brake test

Stopping Distance Tests

The stopping distance phase will evaluate service brake stops. All stopping distance tests on dry surface will be performed in a straight line and at the speeds of 20, 30, 40 and 45 mph. All stopping distance tests on wet surface will be performed in straight line at speed of 20 mph.

The tests will be conducted as follows:

- 1. Uniform High Friction Tests: Four maximum deceleration straight-line brake applications each at 20, 30, 40 and 45 mph, to a full stop on a uniform high-friction surface in a 3.66-m (12-ft) wide lane.
- 2. Uniform Low Friction Tests: Four maximum deceleration straight-line brake applications from 20 mph on a uniform low friction surface in a 3.66-m (12-ft) wide lane.

When performing service brake stops for both cases, the test vehicle is accelerated on the bus test lane to the speed specified in the test procedure and this speed is maintained into the skid pad area. Upon entry of the appropriate lane of the skid pad area, the vehicle's service brake is applied to stop the vehicle as quickly as possible. The stopping distance is measured and recorded for both cases on the test data form. Stopping distance results on dry and wet surfaces will be recorded and the average of the four measured stopping distances will be considered as the measured stopping distance. Any deviation from the test lane will be recorded.

Stability Tests

This test will be conducted in both directions on the test track. The test consists of four maximum deceleration, straight-line brake applications on a surface with split coefficients of friction (i.e., the wheels on one side run on high-friction SN 70-76 or more and the other side on low-friction [where the lower coefficient of friction should be less than half of the high one] at initial speed of 30 mph).

(I) The performance of the vehicle will be evaluated to determine if it is possible to keep the vehicle within a 3.66m (12 ft) wide lane, with the dividing line between the two surfaces in the lane's center. The steering wheel input angle required to keep the vehicle in the lane during the maneuver will be reported.

Parking Brake Test

The parking brake phase utilizes the brake slope, which has a 20% grade. The test vehicle, at its GVW, is driven onto the brake slope and stopped. With the transmission in neutral, the parking brake is applied and the service brake is released. The test vehicle is required to remain stationary for five minutes. The parking brake test is performed with the vehicle facing uphill and downhill.

4.2-III. DISCUSSION

The Stopping Distance phase of the Brake Test was completed with the following results; for the Uniform High Friction Test average stopping distances were 28.91' at 20 mph, 57.10' at 30 mph, 90.35' at 40 mph and 116.07' at 45 mph. The average stopping distance for the Uniform Low Friction Test was 37.12' There was no deviation from the test lane during the performance of the Stopping Distance phase.

During the Stability phase of Brake Testing the test bus experienced no deviation from the test lane but did experience pull to the left during both approaches to the Split Friction Road surface.

The Parking Brake phase was completed with the test bus maintaining the parked position for the full five minute period with no slip or roll observed in both the uphill and downhill positions.

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

Table 4.2-6. Braking Test Data Forms

Bus Number: 1110	Date:10-17-11	
Personnel: G.C., T.S. & S.C.		
Amb. Temperature (°F): 53	Wind Speed (mph): 10 - 12	
Wind Direction: NW	Pavement Temp (°F) Start: 52	End: 57

TIRE INFLATION PRESSURE (psi):					
Tire Type: Front: Michelin XZE 235/80R 22.5 Rear: Michelin XZE 235/80R 22.5					
Left Tire(s) Right Tire(s)					
Front	110		110		
	Inner	Outer	Inner	Outer	
Rear	110	110	110 110		
Rear	N/A	N/A	N/A	N/A	

AXLE LOADS (lb)				
Left Right				
Front	4,100	4,030		
Rear	9,820	9,350		

FINAL INSPECTION				
Bus Number: 1110 Date: 10-17-11				
Personnel: S.C.				

Table 4.2-7. Record of All Braking System Faults/Repairs.

Date	Personnel	Fault/Repair	Description
10/17/11	G.C., T.S. & S.C.	None noted.	

Vehicle		.			
Direction	CW	CW	CCW	CCW	
Speed (mph)	Stop 1	Stop 2	Stop 3	Stop 4	Average
20 (dry)	27.82	29.75	28.96	29.08	28.91
30 (dry)	56.88	56.20	58.33	56.96	57.10
40 (dry)	96.21	92.19	85.15	87.85	90.35
45 (dry)	118.57	115.45	114.64	115.60	116.07
20 (wet)	33.87	32.89	42.22	39.50	37.12

Table 4.2-8.1. Stopping Distance Test Results Form

Table 4.2-8.2. Stability Test Results Form

Stability Test Results (Split Friction Road surface)				
Vehicle Direction	Attempt	Did test bus stay in 12' lane? (yes/no)		
	1	Yes		
CW	2	Yes		
	1	Yes		
CCW	2	Yes		

Table 4.2-8.3. Parking Brake Test Form

PARKING BRAKE (Fully Loaded) - GRADE HOLDING							
Vehicle Direction	Attempt	Hold Time (min)	Slide (in)	Roll (in)	Did Hold	No Hold	
	1	5 min			X		
Front up	2						
	3						
	1	5 min			X		
Front down	2						
	3						

5. STRUCTURAL INTEGRITY

5.1 STRUCTURAL STRENGTH AND DISTORTION TESTS -STRUCTURAL SHAKEDOWN TEST

5.1-I. DISCUSSION

The objective of this test is to determine certain static characteristics (e.g., bus floor deflection, permanent structural deformation, etc.) under static loading conditions.

5.1-II. TEST DESCRIPTION

In this test, the bus will be isolated from the suspension by blocking the vehicle under the suspension points. The bus will then be loaded and unloaded up to a maximum of three times with a distributed load equal to 2.5 times gross load. Gross load is 150 lb for every designed passenger seating position, for the driver, and for each 1.5 sq ft of free floor space. For a distributed load equal to 2.5 times gross load, place a 375-lb load on each seat and on every 1.5 sq ft of free floor space. The first loading and unloading sequence will "settle" the structure. Bus deflection will be measured at several locations during the loading sequences.

5.1-III. DISCUSSION

This test was performed based on a maximum passenger capacity of 68 people including the driver. The resulting test load is $(68 \times 375 \text{ lb}) = 25,500 \text{ lb}$. The load is distributed evenly over the passenger space. Deflection data before and after each loading and unloading sequence is provided on the Structural Shakedown Data Form.

The unloaded height after each test becomes the original height for the next test. Some initial settling is expected due to undercoat compression, etc. After each loading cycle, the deflection of each reference point is determined. The bus is then unloaded and the residual (permanent) deflection is recorded. On the final test, the maximum loaded deflection was 0.444 inches at reference point 3. The maximum permanent deflection after the final loading sequence ranged from -0.005 inches at reference points 2, 6 and 10 to 0.005 inches at reference point 10.

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

STRUCTURAL SHAKEDOWN DATA FORM

Bus Number: 1110	Date: 7-6-11
Personnel: T.S., B.L., E.L., E.D. & P.D.	Temperature (°F): 88
Loading Sequence: ■ 1 □ 2 □ 3 (check one) Test Load (lbs): 25,500 (45 seated & 23 standees)	

Indicate Approximate Location of Each Reference Point



Left

Top View

Reference Point No.	A (in) Original Height	B (in) Loaded Height	B-A (in) Loaded Deflection	C (in) Unloaded Height	C-A (in) Permanent Deflection
1	0	223	233	003	003
2	0	.201	.201	.024	.024
3	0	.357	.357	.040	.040
4	0	.370	.370	.041	.041
5	0	.352	.352	.033	.033
6	0	.245	.245	.038	.038
7	0	.229	.229	.030	.030
8	0	.250	.250	.029	.029
9	0	.348	.348	.029	.029
10	0	.350	.350	.025	.025
11	0	.210	.210	.012	.012
12	0	227	227	007	007

STRUCTURAL SHAKEDOWN DATA FORM

Bus Number: 1110	Date: 7-6-11
Personnel: T.S., B.L., E.L., E.D. & P.D.	Temperature (°F): 88
Loading Sequence: □ 1 ■ 2 □ 3 (check one) Test Load (lbs): 25,500 (45 seated & 23 standees)	

Indicate Approximate Location of Each Reference Point

Right Front of Bus

Left

Top View

Reference Point No.	A (in) Original Height	B (in) Loaded Height	B-A (in) Loaded Deflection	C (in) Unloaded Height	C-A (in) Permanent Deflection
1	003	242	239	005	002
2	.024	.215	.191	.019	005
3	.040	.484	.444	.036	004
4	.041	.398	.357	.039	002
5	.033	.277	.244	.035	.002
6	.038	.210	.172	.033	005
7	.030	.198	.168	.028	002
8	.029	.272	.243	.035	.006
9	.029	.382	.353	.027	002
10	.025	.382	.357	.030	.005
11	.012	.230	.218	.014	.002
12	007	244	237	007	.000

5.1 STRUCTURAL SHAKEDOWN TEST



DIAL INDICATORS IN POSITION



BUS LOADED TO 2.5 TIMES GVL (25,500 LBS)

5.2 STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL DISTORTION

5.2-I. TEST OBJECTIVE

The objective of this test is to observe the operation of the bus subsystems when the bus is placed in a longitudinal twist simulating operation over a curb or through a pothole.

5.2-II. TEST DESCRIPTION

With the bus loaded to GVWR, each wheel of the bus will be raised (one at a time) to simulate operation over a curb and the following will be inspected:

- 1. Body
- 2. Windows
- 3. Doors
- 4. Roof vents
- 5. Special seating
- 6. Undercarriage
- 7. Engine
- 8. Service doors
- 9. Escape hatches
- 10. Steering mechanism

Each wheel will then be lowered (one at a time) to simulate operation through a pothole and the same items inspected.

5.2-III. DISCUSSION

The test sequence was repeated ten times. The first and last test is with all wheels level. The other eight tests are with each wheel 6 inches higher and 6 inches lower than the other three wheels.

All doors, windows, escape mechanisms, engine, steering and handicapped devices operated normally throughout the test. The undercarriage and body indicated no deficiencies. Water leakage was observed throughout the test across the top of the windshield. The results of this test are indicated on the following data forms.

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

DISTORTION TEST INSPECTION FORM

(Note: Ten copies of this data sheet are required)

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)	
All wheels level	■ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

DISTORTION TEST INSPECTION FORM

(Note: Ten copies of this data sheet are required)

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)			
All wheels level	□ before	□ after	
Left front	■ 6 in higher	□ 6 in lower	
Right front	□ 6 in higher	□ 6 in lower	
Right rear	□ 6 in higher	□ 6 in lower	
Left rear	□ 6 in higher	□ 6 in lower	

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
■ Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.
Bus Number: 1110	Date: 7-12-11
--	---------------------
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	■ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
■ Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	■ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
■ Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)			
All wheels level	□ before	□ after	
Left front	□ 6 in higher	□ 6 in lower	
Right front	□ 6 in higher	□ 6 in lower	
Right rear	6 in higher	□ 6 in lower	
Left rear	■ 6 in higher	□ 6 in lower	

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
■ Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	■ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
■ Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	■ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	The windshield is leaking across the top.
■ Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	■ 6 in lower
Right rear	6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
■ Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	■ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies.
Service Doors	No deficiencies.
■ Body	No deficiencies.
■ Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

Bus Number: 1110	Date: 7-12-11
Personnel: T.S., B.L., P.D., E.D., E.L. & S.C.	Temperature(°F): 78

Wheel Position : (check one)		
All wheels level	□ before	■ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	The windshield is leaking across the top.
■ Front Doors	No deficiencies.
Rear Doors	No deficiencies.
Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	No deficiencies.
Undercarriage	No deficiencies
Service Doors	No deficiencies.
■ Body	No deficiencies.
Windows/ Body Leakage	No deficiencies.
Steering Mechanism	No deficiencies.

5.2 STRUCTURAL DISTORTION TEST



RIGHT FRONT WHEEL SIX INCHES HIGHER



LEFT REAR WHEEL SIX INCHES LOWER

5.3 STRUCTURAL STRENGTH AND DISTORTION TESTS - STATIC TOWING TEST

5.3-I. <u>TEST OBJECTIVE</u>

The objective of this test is to determine the characteristics of the bus towing mechanisms under static loading conditions.

5.3-II. TEST DESCRIPTION

Utilizing a load-distributing yoke, a hydraulic cylinder is used to apply a static tension load equal to 1.2 times the bus curb weight. The load will be applied to both the front and rear, if applicable, towing fixtures at an angle of 20 degrees with the longitudinal axis of the bus, first to one side then the other in the horizontal plane, and then upward and downward in the vertical plane. Any permanent deformation or damage to the tow eyes or adjoining structure will be recorded.

5.3-III. DISCUSSION

The load-distributing yoke was incorporated as the interface between the Static Tow apparatus and the test bus tow hook/eyes. The test was performed to the full target test weight of 20,184 lbs ($1.2 \times 16,820$ lbs CW). No damage or deformation was observed during all four pulls of the test. The manufacturer does not recommend rear towing therefore a rear test was not performed.

STATIC TOWING TEST DATA FORM

Bus Number: 1110	Date: 3-1-12
Personnel: B.L., P.D., J.P. & S.C.	Temperature (°F): 43

Comments: No damage or deformation was observed.

Check the torque of all bolts attaching tow eye and surrounding structure.

Comments: All torques and structure inspected.

Inspect left tow eye and adjoining structure.

Comments: No damage or deformation was observed.

Check the torque of all bolts attaching tow eye and surrounding structure.

Comments: All torques and structure inspected.

Inspect right rear tow eye and adjoining structure.

Comments: N/A

Check the torque of all bolts attaching tow eye and surrounding structure.

Comments: N/A

Inspect left rear tow eye and adjoining structure.

Comments: N/A

Check the torque of all bolts attaching tow eye and surrounding structure.

Comments: N/A

General comments of any other structure deformation or failure: All four front

pulls were completed to the full target test load of 20,184 lbs. (1.2 x 16,820 lbs CW)

No damage or deformation was observed. The manufacturer does not recommend

rear towing therefore a rear test was not performed.

5.3 STATIC TOWING TEST



FRONT 20° UPWARD PULL



FRONT 20° DOWN PULL

5.3 STATIC TOWING TEST CONT.



FRONT 20° LEFT PULL



FRONT 20° RIGHT PULL

5.4 STRUCTURAL STRENGTH AND DISTORTION TESTS -DYNAMIC TOWING TEST

5.4-I. TEST OBJECTIVE

The objective of this test is to verify the integrity of the towing fixtures and determine the feasibility of towing the bus under manufacturer specified procedures.

5.4-II. TEST DESCRIPTION

This test requires the bus be towed at curb weight using the specified equipment and instructions provided by the manufacturer and a heavy-duty wrecker. The bus will be towed for 5 miles at a speed of 20 mph for each recommended towing configuration. After releasing the bus from the wrecker, the bus will be visually inspected for any structural damage or permanent deformation. All doors, windows and passenger escape mechanisms will be inspected for proper operation.

5.4-III. DISCUSSION

The bus was towed using a heavy-duty wrecker. The towing interface was accomplished by incorporating a hydraulic under lift. A front lift tow was performed. Rear towing is not recommended. No problems, deformation, or damage was noted during testing.

DYNAMIC TOWING TEST DATA FORM

Bus Number: 1110	Date: 4-6-12
Personnel: B.L. & K.D.	

Temperature (°F): 41	Humidity (%): 45
Wind Direction: NE	Wind Speed (mph): 6
Barometric Pressure (in.Hg): 30.07	

Inspect tow equipment-bus interface.

Comments: A safe and adequate connection was made between the tow equipment

and the bus.

Inspect tow equipment-wrecker interface.

Comments: A safe and adequate connection was made between the tow equipment

and the wrecker.

Towing Comments: A front lift tow was performed incorporating a hydraulic under

lift wrecker.

Description and location of any structural damage: No damage or deformation

observed.

General Comments: No problems with the tow or towing interface were

encountered.

5.4 DYNAMIC TOWING TEST



TOWING INTERFACE



TEST BUS IN TOW

5.5 STRUCTURAL STRENGTH AND DISTORTION TESTS – JACKING TEST

5.5-I. TEST OBJECTIVE

The objective of this test is to inspect for damage due to the deflated tire, and determine the feasibility of jacking the bus with a portable hydraulic jack to a height sufficient to replace a deflated tire.

5.5-II. TEST DESCRIPTION

With the bus at curb weight, the tire(s) at one corner of the bus are replaced with deflated tire(s) of the appropriate type. A portable hydraulic floor jack is then positioned in a manner and location specified by the manufacturer and used to raise the bus to a height sufficient to provide 3-in clearance between the floor and an inflated tire. The deflated tire(s) are replaced with the original tire(s) and the hack is lowered. Any structural damage or permanent deformation is recorded on the test data sheet. This procedure is repeated for each corner of the bus.

5.5-III. DISCUSSION

The jack used for this test has a minimum height of 8.75 inches. During the deflated portion of the test, the jacking point clearances ranged from 4.6 inches to 18.6 inches. No deformation or damage was observed during testing. A complete listing of jacking point clearances is provided in the Jacking Test Data Form.

Condition	Frame Point Clearance
Front axle – one tire flat	11.1"
Rear axle – one tire flat	18.5"
Rear axle – two tires flat	15.5"

JACKING CLEARANCE SUMMARY

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

JACKING TEST DATA FORM

Bus Number: 1110	Date: 6-21-11
Personnel: E.D. & E.L.	Temperature (°F): 75

Record any permanent deformation or damage to bus as well as any difficulty encountered during jacking procedure.

Deflated Tire	Jacking Pad Clearance Body/Frame (in)	Jacking Pad Clearance Axle/Suspension (in)	Comments
Right front	13.6 " I 11.3 " D	9.5 " I 6.3 " D	
Left front	13.3 " I 11.1 " D	9.4 " I 6.3 " D	
Right rear—outside	20.1 " I 18.6 " D	7.0 " I 6.8 " D	
Right rear—both	20.1 " I 15.6 " D	7.0 " I 4.6 " D	
Left rear—outside	19.1 " I 18.5 " D	7.1 " I 6.7 " D	
Left rear-both	19.1 " I 15.5 " D	7.1 " I 4.6 " D	
Right middle or tag—outside	NA	NA	
Right middle or tag—both	NA	NA	
Left middle or tag— outside	NA	NA	
Left middle or tag— both	NA	NA	
Additional comments of any deformation or difficulty during jacking:			
None noted.			

5.6 STRUCTURAL STRENGTH AND DISTORTION TESTS - HOISTING TEST

5.6-I. TEST OBJECTIVE

The objective of this test is to determine possible damage or deformation caused by the jack/stands.

5.6-II. TEST DESCRIPTION

With the bus at curb weight, the front end of the bus is raised to a height sufficient to allow manufacturer-specified placement of jack stands under the axles or jacking pads independent of the hoist system. The bus will be checked for stability on the jack stands and for any damage to the jacking pads or bulkheads. The procedure is repeated for the rear end of the bus. The procedure is then repeated for the front and rear simultaneously.

5.6-III. DISCUSSION

The test was conducted using four posts of a six-post electric lift and standard 19 inch jack stands. The bus was hoisted from the front wheel, rear wheel, and then the front and rear wheels simultaneously and placed on jack stands.

The bus easily accommodated the placement of the vehicle lifts and jack stands and the procedure was performed without any instability noted.

These test results were obtained prior to the accreditation of the lab on November 8, 2011; therefore, are not considered to be accredited in accordance with A2LA policy.

HOISTING TEST DATA FORM

Bus Number: 1110	Date: 6-21-11
Personnel: E.D. & E.L.	Temperature (°F): 78

Comments of any structural damage to the jacking pads or axles while both the front wheels are supported by the jack stands:
None noted.
Comments of any structural damage to the jacking pads or axles while both the rear wheels are supported by the jack stands:
None noted.
Comments of any structural damage to the jacking pads or axles while both the front and rear wheels are supported by the jack stands:
None noted.

5.7 STRUCTURAL DURABILITY TEST

5.7-I. TEST OBJECTIVE

The objective of this test is to perform an accelerated durability test that approximates up to 25 percent of the service life of the vehicle.

5.7-II. TEST DESCRIPTION

The test vehicle is driven a total of 11,250 miles; approximately 8,750 miles on the PSBRTF Durability Test Track and approximately 2,500 miscellaneous other miles. The test will be conducted with the bus operated under three different loading conditions. The first segment will consist of approximately 4,625 miles with the bus operated at GVW. The second segment will consist of approximately 2,000 miles with the bus operated at SLW. The remainder of the test, approximately 4,625 miles, will be conducted with the bus loaded to CW. If GVW exceeds the axle design weights, then the load will be adjusted to the axle design weights and the change will be recorded. All subsystems are run during these tests in their normal operating modes. All recommended manufacturers servicing is to be followed and noted on the vehicle maintainability log. Servicing items accelerated by the durability tests will be compressed by 10:1; all others will be done on a 1:1 mi/mi basis. Unscheduled breakdowns and repairs are recorded on the same log as are any unusual occurrences as noted by the driver. Once a week the test vehicle shall be washed down and thoroughly inspected for any signs of failure.

5.7-III. DISCUSSION

The Structural Durability Test was started on July 26, 2011 and was conducted until March 9, 2012. The first 4,625 miles were performed at a GVW of 27,300 lbs. and completed on January 17, 2012. Note; at GVL the load is 1,530 lbs over the rear GAWR and 1,300 lbs over the GVWR. The next 2,000 mile SLW segment was performed at 24,070 lbs and completed on January 31, 2012, and the final 4,625 mile segment was performed at a CW of 16,820 lbs and completed on March 9, 2012.

The following mileage summary presents the accumulation of miles during the Structural Durability Test. The driving schedule is included, showing the operating duty cycle. A detailed plan view of the Test Track Facility and Durability Test Track are attached for reference. Also, a durability element profile detail shows all the measurements of the different conditions. Finally, photographs illustrating some of the failures that were encountered during the Structural Durability Test are included.

Glaval - TEST BUS #1110

MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS

DATE	TOTAL DURABILITY TRACK	TOTAL OTHER MILES	TOTAL
07/25/11 TO	0.00	30.00	30.00
07/31/11			
08/01/11 TO	0.00	0.00	0.00
08/07/11	- 11 a FM		
08/08/11 TO	0.00	0.00	0.00
08/14/11			
08/15/11 TO	75.00	35.00	110.00
08/21/11			
08/22/11 TO	865.00	71.00	936.00
08/28/11			
08/29/11 TO	731.00	. 36.00	767.00
09/04/11			
09/05/11 TO	781.00	114.00	895.00
09/11/11			
09/12/11 TO	247.00	12.00	259.00
09/18/11			
09/19/11 TO	0.00	0.00	0.00
09/25/11			
09/26/11 TO	24.00	1.00	25.00
10/02/11			
10/03/11 TO	221.00	10.00	231.00
10/09/11	May 40 West Notes		
10/10/11 TO	681.00	326.00	1007.00
10/16/11			
10/17/11 TO	0.00	340.00	340.00
10/23/11			
10/24/11 TO	0.00	0.00	0.00
10/30/11			

Glaval - TEST BUS #1110 MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS

DATE	TOTAL DURABILITY	TOTAL OTHER	TOTAL
	TRACK	MILES	
10/31/11 TO	0.00	0.00	0.00
11/06/11			
11/07/11 TO	0.00	0.00	0.00
11/13/11	in in the		
11/14/11 TO	0.00	0.00	0.00
11/20/11			
11/21/11 TO	0.00	0.00	0.00
11/27/11			
11/28/11 TO	0.00	0.00	0.00
12/04/11			
12/05/11 TO	0.00	0.00	0.00
12/11/11			
12/12/11 TO	0.00	0.00	0.00
12/18/11			
12/19/11 TO	0.00	0.00	0.00
12/25/11	<u></u>		
12/26/11 TO	0.00	0.00	0.00
01/01/12			
1/2/12 TO	0.00	0.00	0.00
01/08/12			
1/9/12 TO	0.00	0.00	0.00
01/15/12			
1/16/12 TO	433.00	220.00	653.00
01/22/12			
01/23/12 TO	1067.00	88.00	1155.00
01/29/12			

Glaval - TEST BUS #1110 MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS

DATE	TOTAL	TOTAL	TOTAL
	DURABILITY	OTHER	
	TRACK	MILES	
01/30/12 ТО	489.00	289.00	778.00
02/05/12			
02/06/12 TO	1056.00	79.00	1135.00
02/12/12	Mar i		
02/13/12 TO	1305.00	132.00	1437.00
02/19/12			
02/20/12 TO	775.00	296.00	1071.00
02/26/12			
02/27/12 TO	0.00	288.00	288.00
03/04/12	1798-101 Ref.		
03/05/12 TO	0.00	67.00	67.00
03/11/12			
03/12/12 TO	0.00	0.00	0.00
03/18/12			
03/19/12 TO	0.00	73.00	73.00
03/25/12			
TOTAL	8750.00	2507.00	11257.00

Table 4. Driving Schedule for Bus Operation on the Durability Test Track.

Monday through Friday			
	HOUR	ACTION	
Shift 1	midnight	D	
	1:40 am	С	
	1:50 am	В	
	2:00 am	D	
	3:35 am	С	
	3:45 am	В	
	4:05 am	D	
	5:40 am	С	
	5:50 am	В	
	6:00 am	D	
	7:40 am	С	
	7:50 am	F	
Shift 2	8:00 am	D	
	9:40 am	С	
	9:50 am	В	
	10:00 am	D	
	11:35 am	С	
	11:45 am	В	
	12:05 pm	D	
	1:40 pm	С	
	1:50 pm	В	
	2:00 pm	D	
	3:40 pm	С	
	3:50 pm	F	
Shift 3	4:00 pm	D	
	5:40 pm	С	
	5:50 pm	В	
	6:00 pm	D	
	7:40 pm	С	
	7:50 pm	В	
	8:05 pm	D	
	9:40 pm	С	
	9:50 pm	В	
	10:00 pm	D	
	11:40 pm	С	
	11:50 pm	F	

STANDARD OPERATING SCHEDULE

_

_

B-Break

C----Cycle all systems five times, visual inspection, driver's log entries D----Drive bus as specified by procedure F----Fuel bus, complete driver's log shift entries



BUS TESTING AND RESEARCH TEST TRACK UNIVERSITY PARK, PA

82

"PLAN VIEW OF PENN STATE BUS TESTING AND



Plan View Vehicle Durability Test Track

The Pennsylvania Transportation Institute Penn State



DATE						
DAIE	1531	SERVICE	ACTIVITY	MAN	DOWN	
	MILES			HOURS	TIME	
08-30-11	1,352	Four mounting bolts and grommets are	Grill and mounting bolts and	2.00	1 00	
		out of the grill causing it to fall off	grommets replaced			
			grommoto replaced.			
08-30-11	1 352	The brass quarter turn coolont volve	Propo quarter turn value tightered	0.00	4.00	
00 00 11	1,002	loopted by the right front check is	brass quarter turn valve tightened.	2.00	4.00	
		located by the right front shock is				
		leaking.				
09-07-11	2,184	The roof is leaking in the area of the	Leak around antenna sealed.	1.50	1.50	
	,	antenna.				
10-05-11	3,022	The A/C line through the firewall to the	Warranty dealer repaired leaking A/C	4 00	296.00	
	•	evaporator is leaking refrigerant	line and added support brackets at the	1.00	200.00	
			firewall			
			inewan.			
01-17-12	4 600	All 6 tires are worn	All 6 tires replaced	4 50	1 50	
	1,000		Air o tires replaceu.	4.50	1.50	
02.10.12	8 207	Numerous fleer cross member wolds	9 Direkt side and 0 laft side flag	(00	1.00	
02-10-12	0,207	numerous noor cross member weids	8 Right side and 8 left side floor cross	4.00	4.00	
		are broken or cracked.	members welded/repaired.			

(Page 1 of 1) UNSCHEDULED MAINTENANCE Glaval Bus #1110

UNSCHEDULED MAINTENANCE



NUMEROUS BROKEN FLOOR CROSSMEMBER WELDS (8,207 TEST MILES)



UNSCHEDULED MAINTENANCE CONT.



NUMEROUS BROKEN FLOOR CROSSMEMBER WELDS (8,207 TEST MILES)



6. FUEL ECONOMY TEST - A FUEL CONSUMPTION TEST USING AN APPROPRIATE OPERATING CYCLE

6-I. TEST OBJECTIVE

The objective of this test is to provide accurate comparable fuel consumption data on transit buses produced by different manufacturers. This fuel economy test bears no relation to the calculations done by the Environmental Protection Agency (EPA) to determine levels for the Corporate Average Fuel Economy Program. EPA's calculations are based on tests conducted under laboratory conditions intended to simulate city and highway driving. This fuel economy test, as designated here, is a measurement of the fuel expended by a vehicle traveling a specified test loop under specified operating conditions. The results of this test will not represent actual mileage but will provide data that can be used by recipients to compare buses tested by this procedure.

6-II. TEST DESCRIPTION

This test requires operation of the bus over a course based on the Transit Coach Operating Duty Cycle (ADB Cycle) at seated load weight using a procedure based on the Fuel Economy Measurement Test (Engineering Type) For Trucks and Buses: SAE 1376 July 82. The procedure has been modified by elimination of the control vehicle and by modifications as described below. The inherent uncertainty and expense of utilizing a control vehicle over the operating life of the facility is impractical.

The fuel economy test will be performed as soon as possible (weather permitting) after the completion of the GVW portion of the structural durability test. It will be conducted on the bus test lane at the Penn State Test Facility. Signs are erected at carefully measured points which delineate the test course. A test run will comprise 3 CBD phases, 2 Arterial phases, and 1 Commuter phase. An electronic fuel measuring system will indicate the amount of fuel consumed during each phase of the test. The test runs will be repeated until there are at least two runs in both the clockwise and counterclockwise directions in which the fuel consumed for each run is within ± 4 percent of the average total fuel used over the 4 runs. A 20-minute idle consumption test is performed just prior to and immediately after the driven portion of the fuel economy test. The amount of fuel consumed while operating at normal/low idle is recorded on the Fuel Economy Data Form. This set of four valid runs along with idle consumption data comprise a valid test.

The test procedure is the ADB cycle with the following four modifications:

- 1. The ADB cycle is structured as a set number of miles in a fixed time in the following order: CBD, Arterial, CBD, Arterial, CBD, and Commuter. A separate idle fuel consumption measurement is performed at the beginning and end of the fuel economy test. This phase sequence permits the reporting of fuel consumption for each of these phases separately, making the data more useful to bus manufacturers and transit properties.
- 2. The operating profile for testing purposes shall consist of simulated transit type service at seated load weight. The three test phases (figure 6-1) are: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph; an arterial phase of 2 miles with 2 stops per mile and a top speed of 40 mph; and a commuter phase of 4 miles with 1 stop and a maximum speed of 40 mph. At each designated stop the bus will remain stationary for seven seconds. During this time, the passenger doors shall be opened and closed.
- 3. The individual ADB phases remain unaltered with the exception that 1 mile has been changed to 1 lap on the Penn State Test Track. One lap is equal to 5,042 feet. This change is accommodated by adjusting the cruise distance and time.
- 4. The acceleration profile, for practical purposes and to achieve better repeatability, has been changed to "full throttle acceleration to cruise speed".

Several changes were made to the Fuel Economy Measurement Test (Engineering Type) For Trucks and Buses: SAE 1376 July 82:

1. Sections 1.1, and 1.2 only apply to diesel, gasoline, methanol, and any other fuel in the liquid state (excluding cryogenic fuels).

1.1 SAE 1376 July 82 requires the use of at least a 16-gal fuel tank. Such a fuel tank when full would weigh approximately 160 lb. It is judged that a 12-gal tank weighing approximately 120 lb will be sufficient for this test and much easier for the technician and test personnel to handle.

1.2 SAE 1376 July 82 mentions the use of a mechanical scale or a flowmeter system. This test procedure uses a load cell readout combination that provides an accuracy of 0.5 percent in weight and permits on-board weighing of the gravimetric tanks at the end of each phase. This modification permits the determination of a fuel economy value for each phase as well as the overall cycle.

2. Section 2.1 applies to compressed natural gas (CNG), liquefied natural gas (LNG), cryogenic fuels, and other fuels in the vapor state.

2.1 A laminar type flowmeter will be used to determine the fuel consumption. The pressure and temperature across the flow element will be monitored by the flow computer. The flow computer will use this data to calculate the gas flow rate. The flow computer will also display the flow rate (scfm) as well as the total fuel used (scf). The total fuel used (scf) for each phase will be recorded on the Fuel Economy Data Form.

3. Use both Sections 1 and 2 for dual fuel systems.

FUEL ECONOMY CALCULATION PROCEDURE

A. For diesel, gasoline, methanol and fuels in the liquid state.

The reported fuel economy is based on the following: measured test quantities-distance traveled (miles) and fuel consumed (pounds); standard reference values-density of water at 60EF (8.3373 lbs/gal) and volumetric heating value of standard fuel; and test fuel specific gravity (unitless) and volumetric heating value (BTU/gal). These combine to give a fuel economy in miles per gallon (mpg) which is corrected to a standard gallon of fuel referenced to water at 60EF. This eliminates fluctuations in fuel economy due to fluctuations in fuel quality. This calculation has been programmed into a computer and the data processing is performed automatically.

The fuel economy correction consists of three steps:

1.) Divide the number of miles of the phase by the number of pounds of fuel consumed

		total miles
phase	miles per phase	per run
CBD	1.9097	5.7291
ART	1.9097	3.8193
COM	3.8193	3.8193

FEo_{mi/lb} = Observed fuel economy = <u>miles</u> Ib of fuel 2.) Convert the observed fuel economy to miles per gallon [mpg] by multiplying by the specific gravity of the test fuel Gs (referred to water) at 60°F and multiply by the density of water at 60°F

FEompg = FEcmi/lb x Gs x Gw
where Gs = Specific gravity of test fuel at 60°F (referred to water)
Gw = 8.3373 lb/gal

3.) Correct to a standard gallon of fuel by dividing by the volumetric heating value of the test fuel (H) and multiplying by the volumetric heating value of standard reference fuel (Q). Both heating values must have the same units.

where

H = Volumetric heating value of test fuel [BTU/gal]Q = Volumetric heating value of standard reference fuel

Combining steps 1-3 yields

==> $FEc = \underline{miles} x (Gs x Gw) x \underline{Q}$ Ibs H

4.) Covert the fuel economy from mpg to an energy equivalent of miles per BTU. Since the number would be extremely small in magnitude, the energy equivalent will be represented as miles/BTUx10⁶.

Eq = Energy equivalent of converting mpg to mile/BTUx10⁶.

 $Eq = ((mpg)/(H))x10^{6}$

B. CNG, LNG, cryogenic and other fuels in the vapor state.

The reported fuel economy is based on the following: measured test quantities-distance traveled (miles) and fuel consumed (scf); density of test fuel, and volumetric heating value (BTU/lb) of test fuel at standard conditions (P=14.73 psia and T=60°F). These combine to give a fuel economy in miles per lb. The energy equivalent (mile/BTUx10⁶) will also be provided so that the results can be compared to buses that use other fuels.

1.) Divide the number of miles of the phase by the number of standard cubic feet (scf) of fuel consumed.

		total miles				
phase	miles per phase	per run				
CBD	1.9097	5.7291				
ART	1.9097	3.8193				
COM	3.8193	3.8193				
FEo mi/scf = Observed fuel economy = <u>miles</u>						
		scf of fuel				

2.) Convert the observed fuel economy to miles per lb by dividing FEo by the density of the test fuel at standard conditions (Lb/ft³).

Note: The density of test fuel must be determined at standard conditions as described above. If the density is not defined at the above standard conditions, then a correction will be needed before the fuel economy can be calculated.

FEO_{mi/lb} = FEo / Gm

where Gm = Density of test fuel at standard conditions

3.) Convert the observed fuel economy (FEomi/lb) to an energy equivalent of (miles/BTUx10⁶) by dividing the observed fuel economy (FEomi/lb) by the heating value of the test fuel at standard conditions.

 $Eq = ((FEomi/lb)/H)x10^{6}$

where

Eq = Energy equivalent of miles/lb to mile/BTUx10⁶ H = Volumetric heating value of test fuel at standard conditions
6-III. DISCUSSION

This is a comparative test of fuel economy using diesel fuel with a heating value of 19,860 btu/lb. The driving cycle consists of Central Business District (CBD), Arterial (ART), and Commuter (COM) phases as described in 6-II. The fuel consumption for each driving cycle and for idle is measured separately. The results are corrected to a reference fuel with a volumetric heating value of 126,700.0 btu/gal.

An extensive pretest maintenance check is made including the replacement of all lubrication fluids. The details of the pretest maintenance are given in the first three Pretest Maintenance Forms. The fourth sheet shows the Pretest Inspection. The next sheet shows the correction calculation for the test fuel. The next four Fuel Economy Forms provide the data from the four test runs. Finally, the summary sheet provides the average fuel consumption. The overall average is based on total fuel and total mileage for each phase. The overall average fuel consumption values were; CBD – 4.59 mpg, ART – 5.37 mpg, and COM – 10.32 mpg. Average fuel consumption at idle was 0.64 gph.

FUEL ECONOMY PRE-TEST MAINTENANCE FORM

Bus Number: 1110	Date: 3-14-12	SLW (lbs): 24,070
Personnel: T.S & P.D.		

FUEL SYSTEM	ОК	Date	Initials
Install fuel measurement system	✓	3/14/12	T.S.
Replace fuel filter	✓	3/14/12	T.S.
Check for fuel leaks	✓	3/14/12	T.S.
Specify fuel type (refer to fuel analysis)	Diesel		
Remarks: None noted.			
BRAKES/TIRES	ОК	Date	Initials
Inspect hoses	✓	3/14/12	P.D.
Inspect brakes	✓	3/14/12	P.D.
Relube wheel bearings	✓	3/14/12	P.D.
Check tire inflation pressures (mfg. specs.)	✓	3/14/12	P.D.
Remarks: None noted.			
COOLING SYSTEM	ОК	Date	Initials
Check hoses and connections	✓	3/14/12	T.S.
Check system for coolant leaks	✓	3/14/12	T.S.
Remarks: None noted.			

FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 2)

Bus Number: 1110	Date: 3-14-12)					
Personnel: T.S. & P.D.							
ELECTRICAL SYSTEMS	Ok	(Date	Initials			
Check battery	✓		3/14/12	T.S.			
Inspect wiring	1		3/14/12	T.S.			
Inspect terminals	1		3/14/12	T.S.			
Check lighting	1		3/14/12	T.S.			
Remarks: None noted.							
DRIVE SYSTEM	Ok	(Date	Initials			
Drain transmission fluid	✓		3/14/12	P.D.			
Replace filter/gasket	✓		3/14/12	P.D.			
Check hoses and connections	✓		3/14/12	P.D.			
Replace transmission fluid	✓		3/14/12	P.D.			
Check for fluid leaks	✓		3/14/12	P.D.			
Remarks: None noted.							
LUBRICATION	Ok	(Date	Initials			
Drain crankcase oil	✓		3/14/12	T.S.			
Replace filters	✓		3/14/12	T.S.			
Replace crankcase oil	✓		3/14/12	T.S.			
Check for oil leaks	1		3/14/12	P.D.			
Check oil level	1		3/14/12	P.D.			
Lube all chassis grease fittings	1		3/14/12	T.S.			
Lube universal joints	1		3/14/12	T.S.			
Replace differential lube including axles	1		3/14/12	P.D.			
Remarks: None noted.							

Bus Number: 1110	14-12						
Personnel: T.S. & P.D.							
EXHAUST/EMISSION SYSTEM		OK	Date	Initials			
Check for exhaust leaks		✓	3/14/12	P.D.			
Remarks: None noted.							
ENGINE		OK	Date	Initials			
Replace air filter		✓	3/14/12	P.D.			
Inspect air compressor and air system		✓	3/14/12	P.D.			
Inspect vacuum system, if applicable		✓	3/14/12	P.D.			
Check and adjust all drive belts		✓	3/14/12	T.S.			
Check cold start assist, if applicable		✓	3/14/12	T.S.			
Remarks: None noted.							
			1				
STEERING SYSTEM		OK	Date	Initials			
Check power steering hoses and connectors		✓	3/14/12	T.S.			
Service fluid level		✓	3/14/12	T.S.			
Check power steering operation		✓	3/14/12	T.S.			
Remarks: None noted.							
		OK	Date	Initials			
Ballast bus to seated load weight		✓	3/14/12	T.S.			
TEST DRIVE		OK	Date	Initials			
Check brake operation		✓	3/14/12	P.D.			
Check transmission operation ✓ 3/14/12 P.D.							
Remarks: None noted.							

FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 3)

FUEL ECONOMY PRE-TEST INSPECTION FORM

Bus Number: 1110	Date: 3-2-12					
Personnel: T.M., T.S. & E.D.						
PRE WARM-UP	If OK, Initial					
Fuel Economy Pre-Test Maintenance Form is	s complete	T.S.				
Cold tire pressure (psi): Front <u>110</u> Middle <u>N/</u>	<u>⁄A</u> Rear <u>110</u>	T.S.				
Tire wear:		T.S.				
Engine oil level		T.S.				
Engine coolant level		T.S.				
Interior and exterior lights on, evaporator fan	T.S.					
Fuel economy instrumentation installed and	T.S.					
Fuel line no leaks or kinks	T.S.					
Speed measuring system installed on bus. S installed in front of bus and accessible to TE	E.D.					
Bus is loaded to SLW	T.S. & E.D.					
WARM-UP	If OK, Initial					
Bus driven for at least one hour warm-up		T.M.				
No extensive or black smoke from exhaust		T.S.				
POST WARM-UP	If OK, Initial					
Warm tire pressure (psi): Front <u>110</u> Middle <u>N</u>	T.S.					
Environmental conditions Average wind speed <12 mph and maximum Ambient temperature between 30°F(-1C°) a Track surface is dry Track is free of extraneous material and cle interfering traffic	T.S.					

Bus Number: 11	10	Manufact	Manufacturer: Glaval Da			Date: 3-21-12		
Run Number: 1	Run Number: 1		I: T.M., T.S. & E	.D.				
Test Direction:	□CW or ■CCV	/ Temperat	Temperature (°F): 54 Humidity (%): 71					
SLW (lbs): 24,07	0	Wind Spe	ed (mph) & Dire	ection: Calm	Barometric F	Pressure (in.H	g): 30.32	
Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Flow Mete (ga	er Reading als)	Fuel Used (gals)	
	Start	Finish		Start	Start	Finish		
CBD #1	0	9:01	9:01	30.5	0	.379	.379	
ART #1	0	4:04	4:04	30.9	0	.329	.329	
CBD #2	0	8:57	8:57	31.4	0	.387	.387	
_ART #2	0	4:03	4:03	31.5	0	.336	.336	
CBD #3	0	9:01	9:01	36.5	0	.386	.386	
COMMUTER	0	6:07	6:07	34.3	0	.343	.343	
Total Fuel = 2.160 gals								
20 minute idle : Total Fuel Used = 0.189 gals								
Heating Value = 19,860 BTU/LB								
Comments: None noted.								

FUEL ECONOMY DATA FORM (Liquid Fuels)

Bus Number: 11	110	Manufact	Manufacturer: Glaval			Date: 3-21-12		
Run Number: 2	Run Number: 2		l: T.M., T.S. & F	Ξ.D.			·	
Test Direction:	■CW or □CCW	V Temperat	ure (°F): 61°		Humidity (%)): 71	· · · · · · · · · · · · · · · · · · ·	
SLW (lbs): 24,07	0	Wind Spe	ed (mph) & Dire	ection: Calm	Barometric F	^{>} ressure (in.H	lg): 30.32	
Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Flow Meter Reading (gals)		Fuel Used (gals)	
	Start	Finish		Start	Start	Finish		
CBD #1	0	8:57	8:57	36.7	0	.382	.382	
ART #1	0	4:07	4:07	35.1	0	.321	.321	
CBD #2	0	8:55	8:55	37.9	0	.392	.392	
ART #2	0	4:06	4:06	36.6	0	.329	.329	
CBD #3	0	8:50	8:50	39.8	0	.389	.389	
COMMUTER	0	6:04	6:04	38.7	0	.343	.343	
						Total Fue	el = 2.156 gals	
20 minute idle :	Total Fuel Use	∋d = N/A gals						
Heating Value =	19,860 BTU/L	В				Mare	· · · · · · · · · · · · · · · · · · ·	
Comments: Non	Comments: None noted.							

FUEL ECONOMY DATA FORM (Liquid Fuels)

FUEL ECONOMY DATA FORM (Liquid Fuels)

Bus Number: 1	110	Manufact	Manufacturer: Glaval			Date: 3-21-12			
Run Number: 3		Personne	el: T.M., T.S. & E	E.D.					
Test Direction:	□CW or ■CCV	V Temperat	Temperature (°F): 63 Humidity (%): 73						
SLW (lbs): 24,07	70	Wind Spe	ed (mph) & Dire	ction: Calm	Barometric F	Pressure (in.H	lg): Calm		
Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Flow Mete (ga	er Reading als)	Fuel Used (gals)		
	Start	Finish		Start	Start	Finish			
CBD #1	0	8:42	8:42	40.3	0	.375	.375		
ART #1	0	4:01	4:01	38.1	0	.329	.329		
CBD #2	0	8:52	8:52	41.0	0	.385	.385		
ART #2	0	4:04	4:04	40.4	0	.332	.332		
CBD #3	0	9:01	9:01	41.4	0	.391	.391		
COMMUTER	0	6:06	6:06	39.1	0	.347	.347		
Total Fuel = 2.159 gals									
20 minute idle : Total Fuel Used = N/A gals									
Heating Value = 19,860 BTU/LB									
Comments: None noted.									

Bus Number: 11	10	Manufacturer: Glaval			Date: 3-21-12		
Run Number: 4		Personn	<u>el: T.M., T.S. & I</u>	Ξ.D.			
Test Direction:	CW or □CCV	V Tempera	ature (°F): 63		Humidity (%): 73	
SLW (lbs): 24,07	0	Wind Sp	eed (mph) & Dire	ection: 5/SE	Barometric I	Pressure (in.F	lg): 30.3
Time (m Cycle Type		Time (min:sec)		Fuel Temperature (°C)	Flow Mete	er Reading als)	Fu Us (ga
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:53	8:53	39.1	0	.378	.37
ART #1	0	4:08	4:08	38.8	0	.322	.32
CBD #2	0	8:53	8:53	39.1	0	.385	.38
ART #2	00	4:07	4:07	37.7	0	.326	.32
CBD #3	0	8:50	8:50	40.5	0	.372	.37
COMMUTER	0	6:03	6:03	39.3	0	.331	.33
Total Fuel =2.114 g							
20 minute idle :	Total Fuel Us	ed = 0.207 ga					
Heating Value = 19,860 BTU/LB							
Comments: Non	e noted	u,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					

BUS MANU BUS MODE	JFACTURER EL	:Glaval B :Legacy	us	BUS NUMBER :1110 TEST DATE :03/21/12
FUEL TYP SP. GRAV HEATING FUEL TEN Standard Density	PE VITY VALUE MPERATURE d Conditions of Water	: DIESEL : .8400 : 19860.000 : 37.30 de : 60 deg F : 8.3373 1) BTU/Lb eg F 'and 14.7 psi b/gallon at 60	deg F
CYCLE T	TOTAL FUEL USED(GAL)	FOTAL MILES	5 FUEL ECONOMY MPG (Measure	FUEL ECONOMY d) MPG (Corrected)
Run # : 1 CBD ART COM TOTAL	1, CCW 1.152 .665 .343 2.160	5.73 3.82 3.82 13.37	4.974 5.744 11.137 6.190	4.58 5.29 10.26 5.70
Run # : 2 CBD ART COM TOTAL	2, CW 1.163 .650 .343 2.156	5.73 3.82 3.82 13.37	4.927 5.877 11.137 6.201	4.54 5.41 10.26 5.71
Run # : 3 CBD ART COM TOTAL	8, CCW 1.151 .661 .347 2.159	5.73 3.82 3.82 13.37	4.978 5.779 11.009 6.193	4.59 5.32 10.14 5.71
Run # : 4 CBD ART COM TOTAL	4, CW 1.135 .648 .331 2.114	5.73 3.82 3.82 13.37	5.048 5.895 11.541 6.325	4.65 5.43 10.63 5.83
IDLE CON	ISUMPTION (M	EASURED)		
First 20 Average RUN CONS) Minutes Da Idle Consum SISTENCY: % used	ta : .196 ption : . Difference	GAL Last 20 1 59GAL/Hr from overall a	Minutes Data :.21GAL verage of total fuel
Run 1 :	6 Ru:	n 2 :4	Run 3 : -	.5 Run 4 : 1.5
SUMMARY Average Average Average Overall Overall	(CORRECTED) Idle Consum CBD Phase C Arterial Ph Commuter Ph Average Fue Average Fue	VALUES) otion onsumption ase Consump ase Consump l Consumpti l Consumpti	: .64 : 4.59 Dition : 5.37 Dition : 10.32 Con : 5.74 Lon : 41.25	G/Hr MPG MPG MPG MIles/ Million BTU

7. NOISE

7.1 INTERIOR NOISE AND VIBRATION TESTS

7.1-I. TEST OBJECTIVE

The objective of these tests is to measure and record interior noise levels and check for audible vibration under various operating conditions.

7.1-II. TEST DESCRIPTION

During this series of tests, the interior noise level will be measured at several locations with the bus operating under the following three conditions:

- 1. With the bus stationary, a white noise generating system shall provide a uniform sound pressure level equal to 80 dB(A) on the left, exterior side of the bus. The engine and all accessories will be switched off and all openings including doors and windows will be closed. This test will be performed at the ABTC.
- 2. The bus accelerating at full throttle from a standing start to 35 mph on a level pavement. All openings will be closed and all accessories will be operating during the test. This test will be performed on the track at the Test Track Facility.
- 3. The bus will be operated at various speeds from 0 to 55 mph with and without the air conditioning and accessories on. Any audible vibration or rattles will be noted. This test will be performed on the test segment between the Test Track and the Bus Testing Center.

All tests will be performed in an area free from extraneous sound-making sources or reflecting surfaces. The ambient sound level as well as the surrounding weather conditions will be recorded in the test data.

7.1-III. DISCUSSION

This test is performed in three parts. The first part exposes the exterior of the vehicle to 80.0 dB(A) on the left side of the bus and the noise transmitted to the interior is measured. The overall average of the six measurements was 50.1 dB(A); ranging from 49.4 dB(A) at the rear passenger seats to 51.1 dB(A) in line with the middle speaker. The interior ambient noise level for this test was < 34.0 dB(A).

The second test measures interior noise during acceleration from 0 to 35 mph. This noise level ranged from 65.9 dB(A) at the rear passenger seats to 73.5 dB(A) at the driver's seat. The overall average was 69.2 dB(A). The interior ambient noise level for this test was 23.3 dB(A).

The third part of the test is to listen for resonant vibrations, rattles, and other noise sources while operating over the road. No vibrations or rattles were noted.

INTERIOR NOISE TEST DATA FORM Test Condition 1: 80 dB(A) Stationary White Noise

Bus Number: 1110	Date: 6-15-11				
Personnel: E.D. & T.S.					
Temperature (°F): 75	Humidity (%): 41				
Wind Speed (mph): 3	Wind Direction: Variable				
Barometric Pressure (in.Hg): 30.01					
Initial Sound Level Meter Calibration: ■ checked by: E.D.					
Interior Ambient Noise Level dB(A): < 34.0	Exterior Ambient Noise Level dB(A): 44.2				
Microphone Height During Testing (in): 29" above seat cushion.					

Measurement Location	Measured Sound Level dB(A)	
Driver's Seat	49.6	
Front Passenger Seats	50.9	
In Line with Front Speaker	49.5	
In Line with Middle Speaker	51.1	
In Line with Rear Speaker	50.6	
Rear Passenger Seats	49.4	

Final Sound Level Meter Calibration: ■ checked by: E.D.

Comments: All readings taken in the center aisle.

INTERIOR NOISE TEST DATA FORM Test Condition 2: 0 to 35 mph Acceleration Test

Bus Number: 1110	Date: 3/19/12	
Personnel: G.C., T.S. & J.P.		
Temperature (°F): 68	Humidity (%): 56	
Wind Speed (mph): Calm	Wind Direction: Calm	
Barometric Pressure (in.Hg): 30.17		
Initial Sound Level Meter Calibration:	ecked by: T.S.	
Interior Ambient Noise Level dB(A): 23.3	Exterior Ambient Noise Level dB(A): 44.8	
Microphone Height During Testing (in): 48"		

Measurement Location	Measured Sound Level dB(A)
Driver's Seat	73.1
Front Passenger Seats	71.0
Middle Passenger Seats	66.3
Rear Passenger Seats	65.9

Final Sound Level Meter Calibration: ■ checked by: T.S.

Comments: All readings taken in the center aisle.

INTERIOR NOISE TEST DATA FORM Test Condition 3: Audible Vibration Test

Bus Number: 1110	Date: 3/19/12
Personnel: G.C., T.S. & J.P.	
Temperature (°F): 68	Humidity (%): 56
Wind Speed (mph): Calm	Wind Direction: Calm
Barometric Pressure (in.Hg): 30.17	

Describe the following possible sources of noise and give the relative location on the bus.

Source of Noise	Location
Engine and Accessories	None noted.
Windows and Doors	None noted.
Seats and Wheel Chair lifts	None noted.

Comment on any other vibration or noise source which may have occurred

that is not described above: None noted.

7.1 INTERIOR NOISE TEST



TEST BUS SET-UP FOR 80 dB(A) INTERIOR NOISE TEST

7.2 EXTERIOR NOISE TESTS

7.2-I. TEST OBJECTIVE

The objective of this test is to record exterior noise levels when a bus is operated under various conditions.

7.2-II. TEST DESCRIPTION

In the exterior noise tests, the bus will be operated at a SLW in three different conditions using a smooth, straight and level roadway:

- 1. Accelerating at full throttle from a constant speed at or below 35 mph and just prior to transmission up shift.
- 2. Accelerating at full throttle from standstill.
- 3. Stationary, with the engine at low idle, high idle, and wide open throttle.

In addition, the buses will be tested with and without the air conditioning and all accessories operating. The exterior noise levels will be recorded.

The test site is at the PSBRTF and the test procedures will be in accordance with SAE Standards SAE J366b, Exterior Sound Level for Heavy Trucks and Buses. The test site is an open space free of large reflecting surfaces. A noise meter placed at a specified location outside the bus will measure the noise level.

During the test, special attention should be paid to:

- 1. The test site characteristics regarding parked vehicles, signboards, buildings, or other sound-reflecting surfaces
- 2. Proper usage of all test equipment including set-up and calibration
- 3. The ambient sound level

7.2-III. DISCUSSION

The Exterior Noise Test determines the noise level generated by the vehicle under different driving conditions and at stationary low and high idle, with and without air conditioning and accessories operating. The test site is a large, level, bituminous paved area with no reflecting surfaces nearby.

With an exterior ambient noise level of 35.9 dB(A), the average test result obtained while accelerating from a constant speed was 69.7 dB(A) on the right side and 71.4 dB(A) on the left side.

When accelerating from a standstill with an exterior ambient noise level of 35.9 dB(A), the average of the results obtained were 67.5 dB(A) on the right side and 69.9 dB(A) on the left side.

With the vehicle stationary and the engine, accessories, and air conditioning on, the measurements averaged 57.7 dB(A) at low idle, 61.4 dB(A) at high idle, and 70.7 dB(A) at wide open throttle. With the accessories and air conditioning off, the readings averaged 1.6 dB(A) lower at low idle, 0.4 dB(A) lower at high idle, and 0.6 dB(A) higher at wide open throttle. The exterior ambient noise level measured during this test was 35.9 dB(A).

EXTERIOR NOISE TEST DATA FORM Accelerating from Constant Speed

Bus Number: 1110	Date: 3/19/12		
Personnel: G.C., T.S. & J.P.			
Temperature (°F): 68	Humidity (%): 56		
Wind Speed (mph): Calm	Wind Direction: Calm		
Barometric Pressure (in.Hg): 30.16			
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ■ checked by: T.S.			
Initial Sound Level Meter Calibration: ■ checked by: T.S.			
Exterior Ambient Noise Level dB(A): 35.9			

Accelerating from Constant Speed Curb (Right) Side		Accelerating from Constant Speed Street (Left) Side	
Run #	Measured Noise Level dB(A)	Run #	Measured Noise Level dB(A)
1	69.9	1	71.2
2	68.4	2	71.3
3	69.2	3	70.5
4	69.5	4	71.3
5	69.5	5	71.5
Average of two hig noise levels = 69.7	ghest actual 7 dB(A)	Average of two hi noise levels = 71.	ghest actual 4 dB(A)

Final Sound Level Meter Calibration Check: ■ checked by: T.S.

Comments: None noted.

EXTERIOR NOISE TEST DATA FORM Accelerating from Standstill

Bus Number: 1110	Date: 3/19/12		
Personnel: G.C., T.S. & J.P.			
Temperature (°F): 68	Humidity (%): 56		
Wind Speed (mph): Calm	Wind Direction: Calm		
Barometric Pressure (in.Hg): 30.16			
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ■ checked by: T.S.			
Initial Sound Level Meter Calibration: ■ checked by: T.S.			
Exterior Ambient Noise Level dB(A): 35.9			

Accelerating from Standstill Curb (Right) Side		Accelerating from Standstill Street (Left) Side	
Run #	Measured Noise Level dB(A)	Run #	Measured Noise Level dB(A)
1	66.5	1	69.5
2	67.2	2	69.6
3	66.8	3	70.0
4	67.7	4	69.7
5	67.3	5	69.6
Average of two highest levels = 67.5 dB(A)	actual noise	Average of two highes levels = 69.9 dB(A)	t actual noise

Final Sound Level Meter Calibration Check: ■ checked by: T.S.

Comments: None noted.

EXTERIOR NOISE TEST DATA FORM Stationary

otationary			
Bus Number: 1110 Date: 3/19/12			
Personnel: G.C., T.S. & J.P.			
Temperature (°F): 68		Humidity (%): 56	
Wind Speed (mph): Ca	alm	Wind Direction: Ca	Im
Barometric Pressure (i	in.Hg): 30.16		
Verify that microphone temperature is betwee	e height is 4 feet, wi n 30°F and 90°F: ∎	nd speed is less than ∎ checked by: T.S.	12 mph and ambient
Initial Sound Level Me	ter Calibration: ■ c	hecked by: T.S.	
Exterior Ambient Noise	e Level dB(A): 35.9		
	Accessories and	Air Conditioning ON	
Throttle Position	Engine RPM	Curb (Right) Side dB(A)	Street (Left) Side db(A)
		Measured	Measured
Low Idle	775	56.5	58.9
High Idle	995	60.1	62.6
Wide Open Throttle	2,750	69.7	71.7
	Accessories and	Air Conditioning OFF	
Throttle Position	Engine RPM	Curb (Right) Side dB(A)	Street (Left) Side db(A)
		Measured	Measured
Low Idle	775	56.2	56.0
High Idle	995	59.9	62.1
Wide Open Throttle	Wide Open Throttle 2,750 70.1 72.5		
Final Sound Level Meter Calibration Check: ■ checked by: T.S.			
Comments: None noted.			

7.2 EXTERIOR NOISE TESTS



TEST BUS UNDERGOING EXTERIOR NOISE TEST



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8. EMISSIONS TEST – DYNAMOMETER-BASED EMISSIONS TEST USING TRANSIT DRIVING CYCLES

8-I. TEST OBJECTIVE

The objective of this test is to provide comparable emissions data on transit buses produced by different manufacturers. This chassis-based emissions test bears no relation to engine certification testing performed for compliance with the Environmental Protection Agency (EPA) regulation. EPA's certification tests are performed using an engine dynamometer operating under the Federal Test Protocol. This emissions test is a measurement of the gaseous engine emissions CO, CO2, NOx, HC and particulates (diesel vehicles) produced by a vehicle operating on a large-roll chassis dynamometer. The test is performed for three differed driving cycles intended to simulate a range of transit operating environments. The cycles consist of Manhattan Cycle, the Orange County Bus driving cycle, and the Urban Dynamometer Driving Cycle (UDDS) and. The test is performed under laboratory conditions in compliance with EPA 1065 and SAE J2711. The results of this test may not represent actual in-service vehicle emissions but will provide data that can be used by recipients to compare buses tested under different operating conditions.

8-II. TEST DESCRIPTION

This test is performed in the emissions bay of the LTI Vehicle Testing Laboratory. The Laboratory is equipped with a Schenk Pegasus 300 HP, large-roll (72 inch diameter) chassis dynamometer suitable for heavy-vehicle emissions testing. The dynamometer is located in the end test bay and is adjacent to the control room and emissions analysis area. The emissions laboratory provides capability for testing heavy-duty diesel and alternative-fueled buses for a variety of tailpipe emissions including particulate matter, oxides of nitrogen, carbon monoxide, carbon dioxide, and hydrocarbons. It is equipped with a Horiba full-scale CVS dilution tunnel and emissions sampling system. The system includes Horiba Mexa 7400 Series gas analyzers and a Horiba HF47 Particulate Sampling System. Test operation is automated using Horiba CDTCS software. The computer controlled dynamometer is capable of simulating over-the-road operation for a variety of vehicles and driving cycles.

The emissions test will be performed as soon as permissible after the completion of the GVW portion of the structural durability test. The driving cycles are the Manhattan cycle, a low average speed, highly transient urban cycle (Figure 1), the Orange County Bus Cycle which consists of urban and highway driving segments (Figure 2), and the EPA UDDS Cycle (Figure 3). An emissions test will comprise of two runs for the three different driving cycles, and the average value will be reported. Test results reported will include the average grams per mile value for each of the gaseous emissions for gasoline buses, for all the three driving cycles. In addition, the particulate matter emissions are included for diesel buses, and non-methane hydrocarbon emissions (NMHC) are included for CNG buses. Testing is performed in accordance with EPA CFR49, Part 1065 and SAE J2711 as practically determined by the FTA Emissions Testing Protocol developed by West Virginia University and Penn State University.



Figure 1. Manhattan Driving Cycle (duration 1089 sec, Maximum speed 25.4mph, average speed 6.8mph)



Figure 2. Orange County Bus Cycle (Duration 1909 Sec, Maximum Speed 41mph, Average Speed 12mph)



Figure 3. HD-UDDS Cycle (duration 1060seconds, Maximum Speed 58mph, Average Speed 18.86mph)

8-III. TEST ARTICLE

The test article is a Glaval Bus model Legacy transit bus equipped with diesel fueled, Cummins model ISB 6.7L 240 HP engine. The bus was tested on April 3, 2012.

8-IV. TEST EQUIPMENT

Testing is performed in the LTI Vehicle Testing Laboratory emissions testing bay. The test bay is equipped with a Schenk Pegasus 72-inch, large-roll chassis dynamometer. The dynamometer is electronically controlled to account for vehicle road-load characteristics and for simulating the inertia characteristics of the vehicle. Power to the roller is supplied and absorbed through an electronically controlled 3phase ac motor. Absorbed power is dumped back onto the electrical grid.

Vehicle exhaust is collected by a Horiba CVS, full-flow dilution tunnel. The system has separate tunnels for diesel and gasoline/natural gas fueled vehicles. In the case of diesel vehicles, particulate emissions are measured gravimetrically using 47mm Teflon filters. These filters are housed in a Horiba HF47 particulate sampler, per EPA 1065 test procedures.. Heated gaseous emissions of hydrocarbons and NOx are sampled by Horiba heated oven analyzers. Gaseous

emissions for CO, CO2 and cold NOx are measured using a Horiba Mexa 7400 series gas analyzer. System operation, including the operation of the chassis dynamometer,

and all calculations are controlled by a Dell workstation running Horiba CDCTS test control software. Particulate Filters are weighed in a glove box using a Sartorius microbalance accurate to 1 microgram.

8-V. TEST PREPARATION AND PROCEDURES

All vehicles are prepared for emissions testing in accordance with the Fuel Economy Pre-Test Maintenance Form. (In the event that fuel economy test was performed immediately prior to emissions testing this step does not have to be repeated) This is done to ensure that the bus is tested in optimum operating condition. The manufacturer-specified preventive maintenance shall be performed before this test. The ABS system and when applicable, the regenerative braking system are disabled for operation on the chassis dynamometer. Any manufacturer-recommended changes to the pre-test maintenance procedure must be noted on the revision sheet. The Fuel Economy Pre-Test Inspection Form will also be completed before performing. Both the Fuel Economy Pre-Test Maintenance Form and the Fuel Economy Pre-Test Inspection Form are found on the following pages.

Prior to performing the emissions test, each bus is evaluated to determine its road-load characteristics using coast-down techniques in accordance with SAE J1263. This data is used to program the chassis dynamometer to accurately simulate over-the-road operation of the bus.

Warm-up consists of driving the bus for 20 minutes at approximately 40 mph on the chassis dynamometer. The test driver follows the prescribed driving cycle watching the speed trace and instructions on the Horiba Drivers-Aid monitor which is placed in front of the windshield. The CDCTS computer monitors driver performance and reports any errors that could potentially invalidate the test.

All buses are tested at half seated load weight. The base line emissions data are obtained at the following conditions:

- 1. Air conditioning off
- 2. Evaporator fan or ventilation fan on
- 3. One Half Seated load weight
- 4. Appropriate test fuel with energy content (BTU/LB) noted in CDTCS software
- 5. Exterior and interior lights on
- 6. Heater Pump Motor off
- 7. Defroster off
- 8. Windows and Doors closed

The test tanks or the bus fuel tank(s) will be filled prior to the fuel economy test with the appropriate grade of test fuel.

8-VI DISCUSSION

The following Table 1 provides the emissions testing results on a grams per mile basis for each of the exhaust constituents measured and for each driving cycle performed.

Driving Cycle	Manhattan	Orange County Bus	UDDS
CO ₂ , gm/mi	2,217	1,585	1,124
CO, gm/mi	0.29	0.25	0.17
THC, gm/mi	0.02	0.03	0.01
NMHC, gm/mi	NA	NA	NA
NO _x , gm/mi	2.25	0.80	0.52
Particulates. gm/mi	0.002	0.002	0.002
Fuel consumption mpg	4.59	6.42	9.05

TABLE 1 Emissions Test Results

FUEL ECONOMY/EMISSIONS PRE-TEST MAINTENANCE FORM

Bus Number: 1110	Date: 3-14-12	SLW (lbs): 24,070
Personnel: T.S & P.D.		

FUEL SYSTEM	ОК	Date	Initials	
Install fuel measurement system	✓	3/14/12	T.S.	
Replace fuel filter	✓ 3/14/12 T.S.			
Check for fuel leaks	✓ 3/14/12 T.S.			
Specify fuel type (refer to fuel analysis)	Diesel			
Remarks: None noted.				
BRAKES/TIRES	ОК	Date	Initials	
Inspect hoses	✓	3/14/12	P.D.	
Inspect brakes	✓	3/14/12	P.D.	
Relube wheel bearings	✓	3/14/12	P.D.	
Check tire inflation pressures (mfg. specs.)	✓ 3/14/12 P.[
Remarks: None noted.				
COOLING SYSTEM	ОК	Date	Initials	
Check hoses and connections	✓	3/14/12	T.S.	
Check system for coolant leaks	✓	3/14/12	T.S.	
Remarks: None noted.				

FUEL ECONOMY/EMISSIONS PRE-TEST MAINTENANCE FORM (page 2)

Bus Number: 1110	Number: 1110 Date: 3-14-12			
Personnel: T.S. & P.D.				
ELECTRICAL SYSTEMS	0	K	Date	Initials
Check battery	•	/	3/14/12	T.S.
Inspect wiring	•	/	3/14/12	T.S.
Inspect terminals		/	3/14/12	T.S.
Check lighting	•	/	3/14/12	T.S.
Remarks: None noted.				
DRIVE SYSTEM	0	K	Date	Initials
Drain transmission fluid	~	/	3/14/12	P.D.
Replace filter/gasket		/	3/14/12	P.D.
Check hoses and connections	•	/	3/14/12	P.D.
Replace transmission fluid	•	/	3/14/12	P.D.
Check for fluid leaks	•	/	3/14/12	P.D.
Remarks: None noted.				
LUBRICATION	0	К	Date	Initials
Drain crankcase oil	~	/	3/14/12	T.S.
Replace filters	•	/	3/14/12	T.S.
Replace crankcase oil	•	/	3/14/12	T.S.
Check for oil leaks		/	3/14/12	P.D.
Check oil level	•	/	3/14/12	P.D.
Lube all chassis grease fittings	•	/	3/14/12	T.S.
Lube universal joints	•	/	3/14/12	T.S.
Replace differential lube including axles	•	/	3/14/12	P.D.
Remarks: None noted.				

FUEL ECONOMY/EMISSIONS PRE-TEST MAINTENANCE FORM (page 3)

Bus Number: 1110	nber: 1110 Date: 3-14-12			
Personnel: T.S. & P.D.				
EXHAUST/EMISSION SYSTEM		OK	Date	Initials
Check for exhaust leaks		✓	3/14/12	P.D.
Remarks: None noted.				
ENGINE		OK	Date	Initials
Replace air filter		✓	3/14/12	P.D.
Inspect air compressor and air system		\checkmark	3/14/12	P.D.
Inspect vacuum system, if applicable			3/14/12	P.D.
Check and adjust all drive belts		✓	3/14/12	T.S.
Check cold start assist, if applicable		✓	3/14/12	T.S.
Remarks: None noted.				
STEERING SYSTEM		OK	Date	Initials
Check power steering hoses and connectors		✓	3/14/12	T.S.
Service fluid level		✓	3/14/12	T.S.
Check power steering operation		✓	3/14/12	T.S.
Remarks: None noted.				
		OK	Date	Initials
Ballast bus to seated load weight		\checkmark	3/14/12	T.S.
TEST DRIVE		OK	Date	Initials
Check brake operation		✓	3/14/12	P.D.
Check transmission operation		✓	3/14/12	P.D.
Remarks: None noted.				

FUEL ECONOMY/EMISSIONS PRE-TEST INSPECTION FORM

Bus Number: 1110	Date: 4-3-12		
Personnel: T.M., T.S. & E.D.			
PRE WARM-UP		If OK, Initial	
Fuel Economy Pre-Test Maintenance Form is complete		T.S.	
Cold tire pressure (psi): Front <u>110</u> Middle <u>N/A</u> Rear <u>110</u>		T.S.	
Tire wear:		T.S.	
Engine oil level		T.S.	
Engine coolant level		T.S.	
Interior and exterior lights on, evaporator fan on		T.S.	
Fuel economy instrumentation installed and working properly.		T.S.	
Fuel line no leaks or kinks		T.S.	
Speed measuring system installed on bus. Speed indicator installed in front of bus and accessible to TECH and Driver.		E.D.	
Bus is loaded to SLW		T.S. & E.D.	
WARM-UP		If OK, Initial	
Bus driven for at least one hour warm-up		T.M.	
No extensive or black smoke from exhaust		T.S.	
POST WARM-UP		If OK, Initial	
Warm tire pressure (psi): Front <u>110</u> Middle <u>N</u>	I <u>/A</u> Rear <u>110</u>	T.S.	
Environmental conditions Average wind speed <12 mph and maximum gusts <15 mph Ambient temperature between 30°F(-1C°) and 90°F(32°C) Track surface is dry Track is free of extraneous material and clear of interfering traffic		T.S.	

Exhibit A PRICING PAGE

Mid-Sized Medium Duty Transit Vehicles- Diesel

VENDOR NAME: Creative Bus Sales	
Manufacturer/ Brand: Glaval Bus	
Model % Number: Legacy	

		Unit Price	Estimated	Extended Bries
Class	Item Description	Per Vehicle	Quantity	
Α	Bus; Rear Air Suspension	\$ 128,946.00	10	\$1,289,460.00
В	Bus; Rear Air Suspension; Extended length +4	\$ 130,952.00	10	\$1,309,520.00
С	Bus; Rear Air Suspension; Extended length +8	\$ 133,097.00	10	\$1,330,970.00
D	Bus, Automatic Tire Chain Devices; full bus paint	\$ 134,626.00	5	\$673,130.00
E	Bus, Automatic Tire Chain Device; Extended length +4, full bus paint	\$ 136,983.00	5	\$684,915.00
F	Bus, Automatic Tire Chains Device; Extended length +8, full bus paint	\$ 139,638.00	5	\$698,190.00
G	Bus; Automatic Tire Chain Device: full bus paint;	\$ 134,626.00	5	\$673,130.00
			TOTAL	\$6,659,315.00

Pricing Page: Complete the form provided. Please note that these are only estimated quantiles and do not reflect any guarantee of pu The Agency may purchase more or less as needed.

Vendor should type or clearly print the information into the Pricing Page to prevent errors in the evaluation. If Vendor is submitting b Vendor must submit Pricing Page as an attachment. TOTAL BID AMOUNT is the amount vendor is to enter into wvOASIS commodity Notwithstanding the foregoing, the Purchasing Division may correct errors at its discretion.

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id on line, [,] line when submitting.

ADDENDUM ACKNOWLEDGEMENT FORM SOLICITATION NO.: PTR1700000007

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received: (Check the box next to each addendum received)

XAddendum No. 1Image: Addendum No. 6Image: Addendum No. 2Image: Addendum No. 7Image: Addendum No. 3Image: Addendum No. 8Image: Addendum No. 4Image: Addendum No. 9Image: Addendum No. 5Image: Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Creative Bus Sales, Inc.

Company Authorized Sig 5/17/17

Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

Documentation – to be submitted with bid: Referenced

- X 3.5 Engine: An ISB-10 Engine (6.7 liter) with EGR and Diesel Particulate Filter exhaust system provide product description, warranty information and product literature.
- X 3.5.13 High Idle System: provide product description, warranty information and product literature.
- X 3.6 Transmission (separate cooling system): provide product description, warranty information and product literature.
- X 3.8.38 Back Up Camera System: provide product description, warranty information and product literature.
- X 3.7.15 Tires: provide product description, warranty information and product literature.
- X 3.8.3 Alternator: provide product description, warranty information and product literature.
- X 3.12.9 Water Testing: provide details of water testing procedures.
- x 3.15.4.1Exterior Vinyl Colors: provide samples/chart of available colors.
- X 9.9.7 Undercoating and Rustproofing: provide product description, warranty information and literature.
- X 3.12.23 Ambulatory Passenger Entrance/Exit: provide location, size, door operating details.
- X 3.12.30 Stepwell Heater: provide product description, warranty information and product literature.
- X 3.12.42 Floor Covering: provide samples of floor covering and colors to be provided.
- X 3.15 Seating: provide product description, warranty information, product literature and color charts for all of the seating products to be utilized. **Proposed floor plans.**
- X 3.1510 Driver's Seat: provide description of product.
- <u>x</u> 3.20.1 Exterior Mirrors: provide product description, warranty information and product literature.
- X 3.10 Roof Hatch: provide product description, warranty information and product literature.
- X 3.16 Mobility and Securement System: provide product description, warranty information and product literature.

- x 3.24 Strap/Buckle Storage: provide description and location of product-
- X 3.14 Wheelchair Lift: provide Make, Model #, product description, warranty information and product literature.
- X 3.23 AM/FM Radio/CD: provide product description, warranty information and product literature.
- x 9.39 Training: submit letter of understanding to the terms in this Section.
- <u>x</u> 3.26.3 Fare box Provisions: provide description of proposed location-
- <u>x</u> 3.26.1 Destination Signs: provide product description, warranty information and product literature.
- X 3.26.4 PA System: provide product description and product literature.
- <u>x</u> 3.8.19 Strobe Light: provide product description and product literature.
- <u>x</u> 3.26.6 Security Cameras: provide product description, warranty information and product literature.
- \underline{x} 5.12.1 Warranty on complete vehicle.
- X 5.12.2 Warranty on Basic Vehicle Structure.
- \underline{x} 5.12.4 Warranty: warranties to be provided on subsystems and components.
- 6.1.2 Complete two (2) bids in binder form one (1) marked for DPT.
- <u>X</u> 9.3.1 Complete mechanical description of vehicle, its construction and equipment including manufacturer's model name and /or number. Include description of front and rear air conditioning and heat systems.
- X 14 Proposed interior floor plans, showing detailed dimensions including the location of the wheelchair securement system and stanchions.
- X 9.3.3 Curb weight (empty weight) and gross vehicle weight rating (GVWR) of vehicle.
- X 3.28.1 Samples or paint charts of available exterior paint colors and vinyl.
- X 9.3.8 Identification of the conversion location of the van.
- X 9.3.9 A list of five (5) users names, addresses, emails and telephone numbers who have been provided similar equipment by the Vendor.
- X No Debt Affidavit
- X Addendum Acknowledgement

STATE OF WEST VIRGINIA Purchasing Division PURCHASING AFFIDAVIT

MANDATE: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (*W. Va. Code* §61-5-3) that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Creative Bus Sales, Inc.	
Authorized Signature:	_ Date:5/17/17
State of	
County of <u>Maricopa</u> , to-wit:	
Taken, subscribed, and sworn to before me this 17 day of May	, 20 <u>17</u> .
My Commission expires Durynbur 14, 2020.	
AFFIX SEAL HERE NOTARY PUBLIC	Jane Alorg
	Purchasing Affidavit (Revised 08/01/2015)
PAULA J DONG Notary Public - Arizona Maricopa County My Comm Expires Dec 14, 2020	


CERTIFICATE

The Certification Body of TÜV SÜD AMERICA INC.

hereby certifies that

Glaval Bus 914 County Rd #1 N Elkhart, IN 46514 USA

(see page 2 for additional locations)

has implemented a Quality Management System in accordance with:

ISO 9001:2008

The scope of this Quality Management System includes:

Design and Manufacture of Shuttle Buses

Certificate Expiry Date: September 14, 2018

Certificate Registration No: 951 07 4532

Effective Date: January 3, 2017





Page 1 of 2





CERTIFICATE

Glaval Bus 914 County Rd #1 N Elkhart, IN 46514 USA

Design and Manufacture of Shuttle Buses

Glaval Bus 55135 CR#1 Elkhart, IN 46514

Final Inspection on Mid-Sized Buses to Individually Designed Customer Specifications

Certificate Expiry Date: September 14, 2018

Certificate Registration No: 951 07 4532

Effective Date: January 3, 2017



Gary W. Minks



VP, Regulatory Affairs Page 2 of 2



CERTIFICATE

Glaval Bus 914 County Rd #1 N Elkhart, IN 46514 USA

Design and Manufacture of Shuttle Buses

Glaval Bus 55135 CR#1 Elkhart, IN 46514

Final Inspection on Mid-Sized Buses to Individually Designed Customer Specifications

Certificate Expiry Date: September 14, 2018

Certificate Registration No: 951 07 4532

Effective Date: January 3, 2017



Gary W. Minks VP, Regulatory Affairs



1. GENERAL REQUIREMENTS, (Ref: DOT, 49 CFR, SUBPART A)

1.1 Program Objectives, (Ref: DOT, 49 CFR, Section 26.1):

The objectives are found in the policy statement on the first page of this program.

1.2 Applicability, (Ref: DOT, 49 CFR, Section 26.3):

The Glaval Bus Division of Forest River Inc. is the recipient of federal airport funds authorized by 49 U.S.C. 47101, et seq.

The Glaval Bus Division of Forest River Inc., through its network of Dealers, is the indirect recipient of federal transit funds authorized by Titles I,III,V, and VI of ISTEA, Pub. L. 102-240 or by Federal transit laws in Title 49, U.S. Code, or Titles I, II, and V of the Teas-21, Pub. L. 105-178.

1.3 Definitions (Ref: DOT, 49 CFR, Section 26.5):

The Glaval Bus Division of Forest River Inc. has adopted the definitions contained in DOT 49 CFR, Part 26.5 for this program.

1.4 Non-discrimination Requirements (Ref: DOT, 49 CFR, Section 26.7):

The Glaval Bus Division of Forest River Inc. will never exclude any supplier from participation in, deny any supplier the benefits of, or otherwise discriminate against any supplier in connection with the award and performance of any contract covered by DOT 49 CFR, part 26 on the basis of race, color, sex, or national origin.

In administering its DBE program, The Glaval Bus Division of Forest River Inc. will not, directly or through contractual or other arrangements, use criteria or methods of administration that have the effect of defeating or substantially impairing accomplishment of the objectives of the DBE supplier program with respect to individuals of a particular race, color, sex, or national origin.

1.5 Record Keeping Requirements, (Ref: DOT, 49 CFR, Section 26.11):

The Glaval Bus Division of Forest River Inc. will report DBE supplier participation on an annual basis, using DOT Form 4630. These reports will reflect payments actually made to DBE suppliers who support the Glaval Bus Division in the manufacture of vehicles to be purchased for DOT assisted contracts.

1.5.1 Bidders List(Ref: DOT, 49 CFR, Section 26.11c):

The Glaval Bus Division of Forest River Inc. will maintain a suppliers list, consisting of information about all DBE and non-DBE suppliers that bid or quote on components and/or services which will be utilized by Glaval Bus in the manufacture of vehicles being purchased for DOT-assisted contracts. This "Bidder's List" will include the name and address of both DBE suppliers and non-DBE suppliers, the type of products or services offered, and the actual annual purchase that are made by Glaval Bus.

The Glaval Bus Division will use this "Bidder's List" approach to calculating overall DBE supplier goals for the Division, and will retain this bidders list on file at its facility in Elkhart, Indiana.

1.6 Federal Financial Assistance Agreement, (Ref: DOT, 49 CFR, Section 26.13):

N/A – Glaval Bus does not receive any direct DOT/FTA financial assistance and is therefore not obligated to enter into any financial assistance contracts or agreements with its suppliers.

1.6.1 Assurance, (Ref: DOT, 49 CFR, Section 26.13a)

N/A – Glaval Bus does not receive any direct DOT/FTA financial assistance and as a result, does not enter into any financial assistance agreements.

1.9 Contract Assurance, (Ref: DOT, 49 CFR, Section 26.13b)

N/A – Glaval Bus does not receive any direct DOT/FTA financial assistance and is therefore not obligated to enter into any financial assistance contracts or agreements with its suppliers.

2.0 ADMINISTRATIVE REQUIREMENTS, (Ref: DOT, 49 CFR 26 SUBPART B)

2.1 DBE Program Updates, (Ref: DOT, 49 CFR, Section 26.21)

The Glaval Bus Division of Forest River Inc. does not receive any direct DOT/FTA grants or financial assistance. The Glaval Bus Division will provide DOT/FTA updates on its DBE Supplier Program on an annualized basis.

2.2 Policy Statement, (Ref: DOT, 49 CFR, Section 26.23)

The Policy Statement is elaborated on the first page of this program.

2.3 DBE Liaison Officer (DBELO), (Ref: DOT, 49 CFR, Section 26.25)

The Glaval Bus Division of Forest River Inc. has designated the following individual as our DBE Liaison Officer:

Jim Shupert 914 County Road # 1 North Elkhart, IN 46514 574-262-2212 jshupert@forestriverinc.com

In that capacity, the DBELO is responsible for implementing all aspects of the DBE program and ensuring that The Glaval Bus Division of Forest River Inc. complies with all provision of 49 CFR Part 26. The DBELO has direct, independent access to the General Manager concerning DBE program matters. An organization chart displaying the DBELO's position in the organization is found in Attachment "A" to this program.

The DBELO is responsible for developing, implementing and monitoring the DBE Supplier Program, in coordination with other appropriate officials. The duties and responsibilities include the following:

- 1. Gathers and reports statistical data and other information as required by DOT.
- 2. Reviews third party contracts and purchase requisitions for compliance with this program.
- 3. Works with all departments to set overall annual goals.
- 4. Ensures that bid notices and requests for proposals are available to DBE suppliers in a timely manner.
- Identifies contracts and procurements so that DBE supplier goals are included in solicitations (both race-neutral methods and contract specific goals attainment and identifies ways to improve progress.
- 6. Analyzes Glaval Bus Division's progress toward attainment and identifies ways to improve progress.
- 7. Participates in pre-bid meetings.
- 8. Advises the General Manager\governing body on DBE matters and achievement.
- 9. Acts as the DBE Advisor.
- 10. Provides DBE Suppliers with information and assistance in preparing bids, obtaining bonding and insurance.
- 11. Plans and participates in DBE supplier training seminars.
- 12. Certifies DBEs suppliers according to the criteria set by DOT and acts as liaison to the Uniform Certification Process in state of Indiana.
- 13. Provides outreach to DBE suppliers and community organizations to advise them of opportunities.
- 14. Maintains The Glaval Bus Division of Forest River Inc.'s updated directory on certified DBE suppliers.

2.4 DBE Financial Institutions, (Ref: DOT, 49 CFR, Section 26.27)

It is the policy of The Glaval Bus Division of Forest River Inc. to investigate the full extent of services offered by financial institutions owned and controlled by socially and economically disadvantaged individuals in the community, to make reasonable efforts to use these institutions, and to encourage Glaval Bus suppliers, providing products or services in the manufacture of vehicles purchased through DOT assisted contracts, to make use of these institutions. Information on the availability of such institutions can be obtained from the DBE Liaison Officer.

2.5 Prompt Payment Mechanisms, (Ref: DOT, 49 CFR, Section 26.29)

N/A – Glaval Bus does not receive any direct DOT/FTA grants or financial assistance and is therefore will employ its standard payment schedule of 30days

2.6 DBE Directory, (Ref: DOT, 49 CFR, Section 26.31)

The Glaval Bus Division of Forest River Inc. maintains a directory identifying all supplier firms eligible to participate as DBE suppliers. The directory lists the supplier's name, address, phone number, date of the most recent certification, and the type of work the firm has been certified to perform as a DBE supplier. The Directory is revised on an annual basis the same time the state of Indiana revises its published DBE supplier listing. The Directory is available to potential DBE & non-DBE suppliers through the Division. The latest version of this Directory may be found in Attachment "B" to this program document.

2.7 Overconcentration, (Ref: DOT, 49 CFR, Section 26.33)

Glaval Bus Division of Forest River Inc. has not identified that overconcentration exists in the types of work that relevant DBE suppliers perform.

2.8 Business Development Programs, (Ref: DOT, 49 CFR, Section 26.35)

Glaval Bus Division of Forest River Inc. has not established a business development program.

2.9 Monitoring and Enforcement Mechanisms, (Ref: DOT, 49 CFR, Section 26.37)

The Glaval Bus Division of Forest River Inc. will take the following monitoring and enforcement mechanisms to ensure compliance with 49 CFR Part 26.

- 1. The Glaval Bus Division will bring to the attention of the Department of Transportation any false, fraudulent, or dishonest conduct in connection with the DBE supplier program, so that DOT can take the steps (e.g., referral to the Department of Justice for criminal prosecution, referral to the DOT Inspector General, action under suspension and debarment or Program Fraud and Civil Penalties rules) provided in 26.109.
- 2. The Glaval Bus Division will consider similar action under our own legal authorities, including responsibility determinations in future contracts. Attachment "C" lists the regulation, provisions, and contract remedies available to us in the events of non-compliance with the DBE regulation by a participating DBE supplier in the Division's procurement activities.
- 3. The Glaval Bus Division will also provide a monitoring and enforcement mechanism to verify that work committed to DBE suppliers at contract award is actually performed by the DBE supplier. This will be accomplished by the DBELO monitoring the selection of component suppliers by the Glaval Bus Division of Forest River Inc. at the time of each contract award, and reporting to the Division's General Manager the DBE suppliers who have been awarded business and given purchase orders for products or services.
- 4. Glaval Bus will keep a running tally of actual payments to DBE suppliers for work committed to them at the time of contract award.

3.0 GOALS, GOOD FAITH EFFORTS, AND COUNTING, (Ref: DOT, 49 CFR 26, SUBPART C)

3.1 Set-asides or Quotas, (Ref: DOT, 49 CFR, Section 26.43)

The Glaval Bus Division of Forest River Inc. does not use quotas in any way in the administration of this DBE Supplier Program.

3.2 Overall Goals, (Ref: DOT, 49 CFR, Section 26.45)

A description of the methodology to calculate the overall goal and the goal calculations can be found in Attachment "D" to this DBE Supplier Program. This section of the program will be updated annually.

The Glaval Bus Division of Forest River Inc. will submit its overall goal to DOT on August 1 of each year. Before establishing the overall goal each year, Glaval Bus Division or Forest River Inc. will consult with the federal and Indiana State and regional DBE affiliated Agencies to obtain information concerning the availability of disadvantaged and non-disadvantaged businesses, the effects of discrimination on opportunities for DBE suppliers, and the efforts by the Glaval Bus Division to establish a level playing filed for the participation of DBE suppliers, (Partial listing of available contacts are shown in attachment "E" to this DBE Supplier Program).

Following this consultation, Glaval Bus will publish a notice of the proposed overall goals, informing the public that the proposed goal and its rational are available for inspection

during normal business hours at your principal office for 30 days following the date of the notice, and informing the public that Glaval Bus and DOT will accept comments on the goals for 45 days from the date of the notice. Normally, Glaval Bus will issue this notice by June 1 or each year.

The overall goal submission to DOT will include a summary of information and comments received during this public participation process and the corresponding responses made by the Glaval Bus Division.

Glaval Bus will begin using our overall goal on October 1 of each year, unless The Glaval Bus Division has received other instructions from DOT.

3.3 Transit Vehicle Manufacturers Goals, (Ref: DOT, 49 CFR, Section 26.49)

Upon request, the Glaval Bus Division or Forest River Inc. will provide copies of its DBE Program and Goals to DOT/FTA assisted Transit Agencies who are soliciting bids for DOT/FTA assisted transit vehicle procurements.

Alternatively, the Glaval Bus Division may, at its discretion and with DOT/FTA approval, establish project-specific goals for the DBE supplier participation in the procurement of components or services required for vehicles being manufactured by the Glaval Bus Division, that are to be purchased through DOT assisted contracts.

3.4 <u>Breakout of Estimated Race-Neutral & Race-Conscious Participation, (Ref: DOT, 49 CFR, Section 26.51. a-c)</u>

The breakout of estimated race-neutral and race-conscious participation can be found in Attachment "D" to this DBE Supplier Program. This section of the DBE Supplier Program will be updated annually when the goal calculation is updated.

3.5 Contract Goals, (Ref: DOT, 49 CFR, Section 26.51. d-g)

The Glaval Bus Division of Forest River Inc. will use contract goals to meet any portion of the overall goal Glaval Bus Division or Forest River Inc. does not project being able to meet using race-neutral means.

The Glaval Bus Division of Forest River Inc. will establish contract goals only on those DOTassisted contracts that have component or service subcontracting possibilities corresponding with the products or services being offered by DBE suppliers.

The Division is not required to establish a contract goal on every such contract, and the size of contract goals will be adapted to the circumstances of each such contract (e.g., type and location of work, availability of DBE suppliers to perform the particular type of work.)

3.6 Good Faith Efforts Procedures, (Ref: DOT, 49 CFR, Section 26.53)

3.6.1 Demonstration of good faith efforts, <u>(Ref: DOT, 49 CFR, Section 26.53. a & c)</u>

The Glaval Bus Division is obligated to make good faith efforts in securing DBE suppliers for components or services required for vehicles being manufactured by the Glaval Bus Division which will be purchased for DOT/FTA assisted contracts. The Glaval Bus Division will demonstrate it has done so either by meeting its published DBE goal or documenting its good faith efforts in attempting to meet this goal.

Glaval Bus will ensure that all information is complete and accurate and adequately documents the Division's good faith efforts in attempting to secure DBE suppliers for providing components or services required for vehicles being manufactured by the Glaval Bus Division which will be purchased for DOT/FTA assisted contracts.

3.6.2 Information to be submitted, (Ref: DOT, 49 CFR, Section 26.53. b)

When submitting Annual DBE Goals to DOT/FTA, the Glaval Bus Division of Forest River Inc. will submit the following information with regards to DBE suppliers who will potentially provide components or services required for vehicles manufactured by the Glaval Bus Division and will be purchased for DOT/FTA assisted contracts.

- 1. The names and addresses of DBE supplier firms that will participate in the contract;
- 2. A description of the work that each DBE supplier will perform;
- The dollar amount of the participation of each DBE supplier firm participating;
 Written and signed documentation of commitment to use a DBE supplier whose
- Participation it submits to meet a contract goal.
- 5. Written and signed confirmation from the DBE supplier that it is participating in the contract as provided in the prime contractor's commitment.
- 6. If the DBE supplier goal is not met, evidence of good faith efforts.

3.6.3 Administrative reconsideration, (Ref: DOT, 49 CFR, Section 26.53. d)

Within 15 days of being informed by a customer that the Glaval Bus Division has been non-responsive or non-responsible, because it has not documented sufficient good faith efforts, the Division will request administrative reconsideration.

The Glaval Bus Division will make the request for administrative reconsideration in writing to the Customer's designated reconsideration official, and request confirmation that the assigned reconsideration official did not play any role in the original determination that the Glaval Bus Division did not document sufficient good faith efforts.

The Glaval Bus Division will provide written documentation or argument concerning the issue of whether it met the goals or made adequate good faith efforts to do so. The Glaval Bus Division will also provide a written request to meet in person with the Customer's assigned reconsideration official to discuss the issue of whether the Glaval Bus Division met the goal or made adequate good fait efforts to do so.

The Glaval Bus Division will also request that the Customer's assigned reconsideration official provide a written decision on reconsideration, explaining the basis for finding that the Glaval Bus Division did or did not meet the goal or make adequate good faith efforts to do so.

3.6.4 Good Faith Efforts when a DBE is replace on a contract, <u>(Ref: DOT, 49</u> <u>CFR, Section 26.53. f)</u>

Glaval Bus Division of Forest River Inc. will make good faith efforts to replace a DBE supplier that is terminated or has otherwise failed to complete its work on a contract with another certified DBE supplier, to the extent needed to meet the Division's vehicle delivery commitments on a DOT/FTA funded contract.

The Glaval Bus Division's Purchasing Agent will notify the Division's DBE Liaison Officer immediately of the DBE supplier's inability or unwillingness to perform. The DBE Liaison Officer will then be responsible for providing reasonable documentation as to the non-performance of the responsible DBE supplier.

In this situation, The Glaval Bus Division will require the Division's Purchasing Agent, (in conjunction with the Division's DBE Liaison Officer), will be responsible for obtaining prior approval from the Division's General Manager or Materials Manager for a replacement DBE supplier. The Division's DBE Liaison Officer will be responsible for obtaining copies of any new or amended supplier purchase orders, or place on file documentation of good faith efforts by the Division's Purchasing Agent to replace the non-performing DBE supplier.

If the DBE supplier fails or refuses to comply in the time specified, our contracting office will issue an order stopping all or part of payment/work until satisfactory action has been taken. If the DBE supplier still fails to comply, the Division's Purchasing Agent may issue a termination for default by the DBE supplier.

The following statements will appear on all supplier solicitations and request for quotations (RFQ's), issued by the Glaval Bus Division when attempting to purchase supplier products and services for vehicles being manufactured by the Glaval Bus Division which will be purchased for DOT/FTA assisted contracts.

The requirements of 49 CFR Part 26, Regulations of the U.S. Department of Transportation, apply to this Request for Quotation, (RFQ), and any subsequent awarded of business for this DOT/FTA funded program.

"It is the policy of the Glaval Bus Division of Forest River Inc. to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. All suppliers qualifying under this solicitation are encouraged to submit bids/proposals. Award of business will be conditioned upon satisfying the requirements of this RFQ specification. These requirements apply to all potential suppliers, including those who qualify as a DBE supplier."

3.7 Counting DBE Participation, (Ref: DOT, 49 CFR, Section 26.55)

The Glaval Bus Division will count DBE participation toward overall and contract goals as provided in 49 CFR 26.55.

4.0 CERTIFICATION STANDARDS, (Ref: DOT, 49 CFR, Section 26SUBPART D)

4.1 Certification Process, (Ref: DOT, 49 CFR, Section 26.61-26.73)

The Glaval Bus Division will use the certification standards of Subpart D of Part 26 to determine the eligibility of firms to participate as DBE suppliers in DOT-assisted contracts. To be certified as a DBE supplier, a firm must meet all certification eligibility standards. The Glaval Bus Division will make our certification decisions based on the facts as a whole.

5.0 CERTIFICATION PROCEDURES, (Ref: DOT, 49 CFR, Section 26 SUBPART E)

5.1 Unified Certification Programs, (Ref: DOT, 49 CFR, Section 26.81)

Glaval Bus Division of Forest River Inc. is not a member of a Unified Certification Program (UCP) at this time.

5.2 Procedures for Certification Decisions, (Ref: DOT, 49 CFR, Section 26.83)

5.2.1 DBE Supplier Re-certifications, (Ref: DOT, 49 CFR, Section 26.83 a & c)

The Glaval Bus Division will review the eligibility of DBE suppliers that The Glaval Bus Division certified under former part 23, to make sure that they will meet the standards of

Subpart E of Part 26. The Division will complete this review no later than three years from the most recent certification date of each firm.

For the DBE suppliers that the Glaval Bus Division has certified or reviewed and found eligible under part 26, The Glaval Bus Division will again review their eligibility every (5) years.

5.2.2 <u>"No Change" Affidavits and Notices of Change, (Ref: DOT, 49 CFR, Section</u> 26.83 j)

The Glaval Bus Division require all DBE suppliers to inform the Division, in a written affidavit, of any change in its circumstances affecting its ability to meet size, disadvantaged status, ownership or control criteria of 49 CFR Part 26 or of any material changes in the information provided with the DBE suppliers application for certification.

The Glaval Bus Division also require all owners of all DBE suppliers The Glaval Bus Division has certified to submit, on the anniversary date of their certification, a "no change" affidavit meeting the requirements of 26.83(j).

The Glaval Bus Division requires DBE suppliers to submit with this affidavit documentation of the firm's size and gross annual sales.

The Glaval Bus Division will notify all currently certified DBE suppliers of these obligations annually via email. This notification will inform DBE suppliers that to submit the "no change" affidavit, their owners must swear or affirm that they meet all regulatory requirements of DOT 49 CFR part 26, including personal net worth. Likewise, if a DBE supplier's owner knows or should know that he or she, or the supplier, fails to meet a part 26 eligibility requirement (e.g. personal net worth), the obligation to submit a notice of change applies.

5.3 Denials of Initial Requests for Certification, (Ref: DOT, 49 CFR, Section 26.85)

If The Glaval Bus Division deny a DBE supplier's application or decertify it, it may not reapply until 12months have passed from our action.

5.4 Removal of a DBE's Eligibility, (Ref: DOT, 49 CFR, Section 26.87)

In the event The Glaval Bus Division proposes to remove a DBE supplier's certification, The Glaval Bus Division will follow procedures consistent with 26.87.

To ensure separation of functions in a de-certification, The Glaval Bus Division has determined that the Division's General Manager will serve as the decision-maker in de-certification proceedings. The Glaval Bus Division has established an administrative "firewall" to ensure that the Division's General Manager will not have participated in any way in the de-certification proceeding against the DBE supplier firm (including in the decision to initiate such a proceeding).

5.5 Certification Appeals, (Ref: DOT, 49 CFR, Section 26.89)

Any DBE supplier or complainant may appeal the Division's decision in a certification matter to DOT. Such appeals may be sent to:

U.S. Department of Transportation Departmental Office of Civil Rights External Civil Rights Programs Division (S-33) 1200 New Jersey Ave., S.E. Washington, DC 20590 Phone: (202) 366-4754 TTY: (202) 366-9696 Fax: (202) 366-5575

The Glaval Bus Division will promptly implement any DOT certification appeal decisions affecting the eligibility of DBE suppliers for our DOT-assisted contracting (e.g., certify a supplier if DOT has determined that our denial of its application was erroneous).

[Note: If a recipient has a system for administrative appeals of certification decision, it should mention it here and provide details of the procedure in an Attachment. The program should inform the public that resort to this system is not a remedy a firm need exhaust before making a certification appeal to DOT under 26.89].

6.0 COMPLIANCE AND ENFORCEMENT, (Ref: DOT, 49 CFR, Section 26 SUBPART F)

6.1 Information, Confidentiality, Cooperation, (Ref: DOT, 49 CFR, Section 26.109)

The Glaval Bus Division will safeguard from discloser to third parties information that may reasonably be regarded as confidential business information, consistent with Federal, state, and local law. [Program should summarize applicable state and local law, such as state FOIA laws and how they apply.]

Notwithstanding any contrary provisions of state or local law, The Glaval Bus Division will not release personal financial information submitted in response to the personal net worth requirement to a third party (other than DOT) without the written consent of the submitter.

6.2 Monitoring Payments to DBE Suppliers

As a prime contractor, The Glaval Bus Division will maintain records and documents of payments to DBE suppliers for three years following the performance of the contract. These records will be made available for inspection upon request by any authorized representative of The Glaval Bus Division of Forest River Inc. or DOT. This reporting requirement also extends to any certified DBE supplier.

The Glaval Bus Division will perform interim audits of contract payments to DBE suppliers. The audit will review payments to DBE suppliers to ensure that the actual amount paid to DBE supplier equals or exceeds the dollar amounts states in the schedule of DBE supplier participation.



U.S. Department Of Transportation Federal Transit Administration

Headquarters

East Building, 5th Floor – TCR 1200 New Jersey Avenue, SE Washington, DC 20590

November 8, 2016

Donall Hasty Glaval Bus DBE Liaison Officer 2367 Century Drive Goshen, IN 46525

Re: TVM DBE Goal Concurrence/Certification Letter – Fiscal Year 2017

Dear Mr. Hasty:

This letter is to inform you that the Federal Transit Administration's (FTA) Office of Civil Rights has received Glaval Bus' Disadvantaged Business Enterprise (DBE) goal and methodology for FY 2017 for the period of October 1, 2016–September 30, 2017. This goal submission is required by the U.S. Department of Transportation's DBE regulations at 49 CFR Part 26 and must be implemented in good faith.

We have reviewed your FY 2017 DBE goal and determined that it is compliant with DOT's DBE regulations. You are eligible to bid on FTA-funded transit contracts. This letter or a copy of the TVM listing on FTA's website may be used to demonstrate your compliance with DBE requirements when bidding on federally funded vehicle procurements.

FTA reserves the right to remove/suspend this concurrence if your DBE program or FY 2017 DBE goal is not implemented in good faith. In accordance with this good faith requirement, you must submit your DBE Uniform Report to FTA by December 1, 2016. This report should reflect all FTA-funded contracting activity for the second period of FY 2016 (i.e., from April 1 to September 30).

Please also be mindful that your FY 2018 DBE goal methodology must be submitted to FTA by August 1, 2017. Any updates to the program plan must be submitted to FTA as they occur. Thank you for your cooperation. If you have any questions regarding this approval, please contact the FTA DBE Team via e-mail at *FTATVMSubmissions@dot.gov*.

Sincerely,

Program Manager for Policy and Technical Assistance Office of Civil Rights

Eligible TVMs List

DBE regulations require FTA recipients to report transit vehicle procurement awards (49 CFR 26.49). After November 2014, FTA recipients are required to submit, within 30 days of making an award, the name of the successful bidder and the total dollar value of the contract. Only eligible TVMs may bid on FTA-assisted transit vehicle procurements. The following is a list of eligible TVMs.

Transit Vehicle Manufacturer	Address	DBE Goal %	DBE Liaison Officer/ Email
Alexander Dennis	31566 Railroad Canyon Road Suite 342 Canyon Lake, CA	2.80%	Judy Lovitt
Alstom Transport	1 Transit Drive Hornell, NY	9.23%	<u>Michelle</u> <u>Studer</u>
ARBOC	51165 Greenfield Parkway Middlebury, IN	0.70%	<u>Debbie</u> <u>Baker</u>
Blue Bird	402 Blue Bird Blvd. P.O. Box 937 Fort Valley, GA	1.00%	Linda Belflower
Bombardier	1101 Parent Street Saint- Bruno Quebec, Canada	10.00%	Sophie Moore
Braun	631 W 11th Street Winamac, IN	5.00%	Ken Morgel
		3.10%	Submit Feedbac

Brookville Equipment Corp.	175 Evans Street Brookville, PA		Ron Rodgers
BYD	1800 South Figueroa Street Los Angeles, CA	7.00%	<u>Greg Davis</u>
CAF USA	1401 K Street, N.W. Washington, DC	3.55%	Tonia Crosby
Champion Bus/General Coach America	331 Graham Road Imlay City, MI	1.00%	<u>Larry</u> <u>Mabery</u>
CRRC MA Corporation	100 Summer Street, Suite 1603 Boston, MA	6.45%	Lydia Rivera
CRRC Sifang America	300 North LaSalle Street, Suite 2240 Chicago, IL	1.90%	Kevin Qu
CRRC ZELC North America Inc.	2275 Huntington Drive, # 806 San Marino, CA	5.50%	York Yunguang LL
Coach & Equipment Manufacturing	130 Horizon Park Drive Penn Yan, NY	1.24%	Carl Birx
Collins Bus	415 W. 6th Avenue	.50%	Jeff Eriksen
Dlamond Aquisition d/b/a Dlamond Coach	2300 W. 4th Street Oswego, KS	1.10%	<u>Kate</u> <u>Strickland</u>
ElDorado	9670 Galena Street Riverside, CA	5.00%	Jake Calvo
Fenton Mobility	1209 E. Second Street	.01%	<u>Mary</u> <u>Gabalski</u>
Forest River: Elkhart Coach, <mark>Glaval Bus,</mark> Starcraft/StarTrans Bus	914 County Road 1 Elkhart, IN	Elkhart: 1.00%; Glaval: 1.00%;	Donall Hasty Submit Feedback >

		Starcraft: 1.25%	
Gillig	25800 Clawiter Road Hayward, CA	2.60%	<u>Chris Turner</u>
Gomaco	P.O. Box 151 Ida Grove, IA	1.30%	Troy Kruse
GoshenCoach	25161 Leer Drive Elkhart, IN	0.16%	Angie Shaum
Green Power	31-7000 Merrill Ave Chino, CA	1.30%	<u>Fraser</u> <u>Atkinson</u>
itachi Rall	Via Cilliegiole 110/B 51100 Pistoria, Italy	10.00%	<u>Andrea Pepi</u>
ltachi Rail USA	101 The Embarcadero, Suite 210 San Francisco, CA	3.00%	JunSu Kim
ometown rolley/Double K	701 North Rall Road Ave. Crandon, WI	4.00%	<u>Talia</u> <u>Walerko</u>
ekon	350 SE 2nd Street, Suite 730 Fort Lauderdale, FL	3.22%	<u>Milo Srkal</u>
awasaki	29 Wells Ave. Building #4 Yonkers, NY	8.17%	<u>Tadashi Doi</u>
inkisharyo hternational	300 North Continental Boulevard, Suite 300 El Segundo, CA	7.00%	<u>Melissa Rath</u>
one Star	12953 Highway 63 West Tyler, TX	3.00%	<u>Norma</u> <u>Niderhofer</u>
etro Worldwide, LLC	3101 Willow Creek Court, P.O.	0.40%	Scott Loges Submit

Glaval Bus	DOCUMENTATION	
	STATE OF WEST VIRGINIA	
A Division Of Forest River, Inc.	CRFQ 0805 PTR1700000007	, <u> </u>
	05.16.17	
COMPONENT	MANUFACTURER	% OF TOTAL COST
Chassis	Freightliner Custom Chassis / USA	0.453938894
ENGINE	Cummins / USA	
TRANSMISSION	Allison / USA	
FRONT AXLE	AAC / USA	
REAR AXLE	AAC / USA	
DRIVE SHAFT	Dana Spicer / USA	
FRONT SUSPENSION	Hendrickson / Canada	
REAR SUSPENSION	Freightliner / USA	
STEERING SYSTEM	TRW / USA	
AIR CONDITIONING	Seltec Compressor / Japan	
Glaval Base Build	Glaval Bus / USA	0.204407488
Air Conditioning System	ACC / USA	0.05264457
Heat System	Pro Air / USA	0.005553713
Wheelchair Securement System	Sure-Lok / USA	0.007482085
Wheelchair Lift Assembly	Braun / USA	0.035752027
Seating	Freedman Seating / USA	0.063381748
Help Bumper	Romeo Rim / USA	0.009449025
		=====
Total unit cost minus discount		83.26%
Final assembly point will be Elkhart Indiana At this	location the raw cut away chassis is converte	d into



COMPONENT SUPPLIER "BUY AMERICA" CERTIFICATION

The undersigned acknowledges an understanding that the information provided by Freightliner Custom Chassis, in this certification to Glaval Bus will be used in connection with certification requirements under the "Buy America" regulations, 49 c.f.r. §661.1 *et seq.*

As noted below, >60% of the subcomponents and components, by cost, were manufactured at our Freightliner Custom Chassis Plant in Gaffney, South Carolina, calculated as follows:

Vender Name	Description	Mfr in US? (Y/N)	% of US Content
Freightliner Custom Chassis Corp.	VIN # 4UZADEFC1JCJM9598	Y	>60%

The undersigned, on behalf of the Freightliner Custom Chassis Corporation, represents and warrants that he/she has carefully read and understands the foregoing information, and the requirements of the "Buy America" regulations, 49 c.f.r. §661.1 *et seq.*; that she has authority to execute this Certification on behalf of Daimler Trucks North America; and that the information set forth in this Certification is true and correct to the best of her knowledge, information, and belief.

Freightliner Custom Chassis

	(Manufacturer)	5
By:	Amay	
Name:	Roberta Major	
Title:	Sr. Manager – International Trade	
Date:	April 3, 2017	



COMPONENT SUPPLIER "BUY AMERICA" CERTIFICATION

The undersigned acknowledges an understanding that the information provided by Freightliner Custom Chassis, in this certification to Glaval Bus will be used in connection with certification requirements under the "Buy America" regulations, 49 c.f.r. §661.1 *et seq.*

As noted below, >60% of the subcomponents and components, by cost, were manufactured at our Freightliner Custom Chassis Plant in Gaffney, South Carolina, calculated as follows:

Vender Name	Description	Mfr in US? (Y/N)	% of US Content
Freightliner Custom Chassis Corp.	VIN # 4UZADRFD4JCJM4993	Y	>60%

The undersigned, on behalf of the Freightliner Custom Chassis Corporation, represents and warrants that he/she has carefully read and understands the foregoing information, and the requirements of the "Buy America" regulations, 49 c.f.r. §661.1 *et seq.*; that she has authority to execute this Certification on behalf of Daimler Trucks North America; and that the information set forth in this Certification is true and correct to the best of her knowledge, information, and belief.

Freightliner Custom Chassis

(Manufacturer)				
By:	Salurta Majo			
Name:	Roberta Major			
Title:	Sr. Manager – International Trade			
Date:	March 27, 2017			



Company Name: <u>ACC Climate Control; A Spheros Company</u>

Address: <u>22150 Challenger Drive</u>

Elkhart, IN 46514

Phone #: <u>574-264-2190</u>

Fax # <u>574-266-6744</u>

The above named supplier does hereby certify that **at least 60 percent** of the cost of the components supplied to Glaval Bus in support of the manufacture of its transit buses is of domestic (U.S.) origin.

As defined under the Buy America Requirement: Final Rule, 49 CFR Part 661.11, the cost includes the cost of labor, material, allowance for profit, and the administrative and overhead cost attributable to those components under normal accounting principles.

I. COMPONENTS

Subcomponent

Subcomponent /Percent

I

SPHEROS

A/C Components AIR CONDITIONING AND HEATER COMPONETS

II. TOTAL /PERCENT: GREATER THAN 70%

III. LOCATION OF FINAL ASSEMBLY: Elkhart, Indiana

IV.	AUTHORIZING	
	SIGNATURE: Day Washington	DATE:
	PRINTED NAME: DHKKL WASHINGTON	TITLE: SALES MCR.

ACC Climate Control; A Spheros Company • 22150 Challenger Dr. • P.O. Box 1905 • Elkhart, IN 46514 Ph (574) 264-2190 • Fax (574) 266-6744 • www.spheros.us • www.accclimatecontrol.com



631 W. 11th Street P.O. Box 310 Winamac, IN 46996 1-800-THE-LIFT (574) 946-6153 Fax (574) 946-4670

www.braunability.com

January 2, 2017

CERTIFICATE

BUY AMERICA PROVISIONS

THE BRAUN CORPORATION/BRAUNABILITY HEREBY CERTIFIES THAT IT WILL COMPLY WITH THE REQUIREMENTS OF SECTION 165 (b) OF THE SERFACE TRANSPORTATION ASSISTANCE OF 1982, AS AMMENDED, AND REGULATIONS CONTAINED IN 49 CFR PART 661.11 WITH GREATER THAN 65% OF LIFTS/RAMPS AMERICAN MADE.

ALL LIFTS/RAMPS MANUFACTURED BY THE BRAUN CORPORATION/BRAUNABILITY ARE PRODUCED IN WINAMAC, INDIANA.

SIGNED:

Steven B. Cooper

Purchasing Manager

GLAVAL BUS

BUY AMERICA CERTIFICATION - 2017

Company Name:	Romeo RIM, Inc.	Attn: Marcie Hamilton		
Address:	74000 Van Dyke Ave.	Phone	e: 586-336-5800	
	Romeo, MI 48065	Fax:	586-752-5021	
The above name su supplied to GLAVAL origin. * (Cost is do overhead cost attril Itemized below are BUS.	pplier does hereby certify that at BUS in support of the manufacture efined as the cost of labor, mater butable to those components und the primary sub-components of	least 60% of the cost o ure of transit buses is of ial, allowance for profit der normal accounting p the following product so	the components domestic (U.S.) administrative and principles.) upplied to GLAVAL	
Component:	All Componets Sold			
SUB-CO	MPONENT	SUB-C	COMPONENT COST (%)	
Percent Domestic: 100%		100% Perce	Percent Foreign:	
TOTAL:		10	0%	
If components prov threshold for dome Domestic %	ided by the above named supplie stic content, please indicate wha	er do not meet the 60% t percentage is of dome	minimum cost stic origin.	=====
	LOCATION OF FINAL ASSEMB	LY: Romeo, MI USA		-
The undersigned do and correct.	pes hereby certify that the inform	nation provided herein is	s true, complete	
AUTHORIZING SIGN	ATURE: Marcui	Danut	DATE: 12-Jan-17	
NAME: Marcie	Hamilton		TITLE: Sales Coord	linator

*Ref: Buy America Requirement: final rule 49 CFR Part 661 Docket No. 88-G

IMPORTANT BASIC COMMERCIAL BUS CHASSIS WARRANTIES



FCCC CHASSIS

		BASIC DOMESTIC WARRANTY*		BASIC EXPORT WARRANTY*	
VOCATION	APPLICABLE MODELS	(Whichever occurs first)		(Whichever occurs first)	
		Years	Miles (km)	Years	Miles (km)
		2 yr	0 - 50,000 miles	2 yr	Nolimit
	MB65	5-yi	0 - 80,000 km	2-yi	
SHUTTLE BUS,	62	2 . ur	0 - 50,000 miles	2.54	Nolimit
TOUR COACH and	52	3-yr	0 - 80,000 km	2-yr	
TRANSIT RUS	626	2 ym	0 - 50,000 miles	2-yr	No Limit
TRANSIT DUS	520	3-yr	0 - 80,000 km		
		2 . um	0 - 50,000 miles	2-yr	No Limit
	XBA	3-yr	0 - 80,000 km		
	VPD	2_vr	0 - 50,000 miles	2	No Limit
	ADP	5-91	0 - 80,000 km	2-yi	
		2	0 - 50,000 miles	2-yr	No Limit
	XBR	5-yi	0 - 80,000 km		
	2	2	0 - 50,000 miles	2-yr	Nolimit
	XBS	5-yi	0 - 80,000 km		

NOTES: *This chart is intended to be a guide. See manufacturer's warranty for all details outlining limitations.

"DTNA Connect" (formerly "Access Freightliner") Website is available to registered chassis owner for various specific information to include warranty info, recall bulletins, part#'s, drawings, and schematics.

See your local Freightliner Dealer for shop/service manuals, special tools, etc.

FCCC chassis are approved for export to Guam and Puerto Rico only. Chassis should be ordered for the appropriate domicile and approved for FCCC Export Warranty coverage through your OEM Account Manager.

FCCC BUS CAB AND CHASSIS - COMMERCIAL

FCCC Bus Cab and Chassis - Commercial



Coverage ^a				
Description	Time ^b	Distance ^b		
Basic Vehicle	3 Years	50,000 mi/80 500 km		
Battery	1 Year	100,000 mi/161 000 km		
Brightwork	6 Months	Unlimited		
Corrosion	6 Months	Unlimited		
Cab Corrosion/Perforation	3 Years	50,000 mi/80 500 km		
Cab Structure	3 Years	50,000 mi/80 500 km		
Crossmembers	5 Years	100,000 mi/161 000 km		
Diesel Emission 2010 ^c	5 Years	100,000 mi/161 000 km		
Frame Rails	5 Years	100,000 mi/161 000 km		
GHG14 ^d (Light Heavy Duty Trucks)	5 Years	50,000 mi/80 500 km		
GHG14 ^d (Medium Heavy Duty to Heavy Heavy Duty Trucks)	5 Years	100,000 mi/161 000 km		
GHG14 ^d Tire	2 Years	24,000mi/38 400 km		
Paint	1 Year	100,000 mi/161 000 km		
Paint, Chassis	6 Months	Unlimited		
Towing/Roadside Assistance ^e	1 Year	Unlimited		
Front Axle	3 Years	36,000 mi/58 000 km		
Rear Axle	3 Years	36,000 mi/58 000 km		
Transfer Case	3 Years	36,000 mi/58 000 km		
Transmission	3 Years	36,000 mi/58 000 km		

DISCLAIMER: Failure to read or distribute this information does not provide exemption from compliance with the information contained herein.

FCCC BUS CAB AND CHASSIS - COMMERCIAL

Coverage ^a				
Description	Time ^b	Distance ^b		
Detroit Front Axle (File Direct)				
Pre-Model Year 2011 ^f	3 Years	36,000 mi/58 000 km		
Post-Model Year 2011 ^g	3 Years	Unlimited		
Detroit Rear Axle (File Direct)				
Pre-Model Year 2011 ^f	3 Years	36,000 mi/58 000 km		
Post-Model Year 2011 ^g	3 Years	Unlimited		

a. Coverage may vary; check vehicle's actual warranty coverage online via OWL's Coverage Info/Check Coverage screen.

Time or distance, whichever comes first b.

Applies to vehicles equipped with EPA 2010 compliant diesel engines. c.

Applies to models 2013 and later domiciled in the United States, check actual warranty online via OWL's Coverage Info/Check Coverage screen for d. coverage listed as "GHG14..."

Up to a maximum of \$450 per occurrence. e.

Pre-Model Year 2011 Detroit Axle: Warranty coverage is determined by Gross Combination Weight Rating, road surface, and vocation. Please see f. www.ddcsn.com for specific coverage details.
 g. Bus & Chassis - Custom Chassis: Warranty coverage is determined by Gross Combination Weight Rating, road surface, and vocation. Please see

www.ddcsn.com for specific coverage details.

FCCC BUS CHASSIS - COMMERCIAL

FCCC Bus Chassis - Commercial



Coverage ^a				
Description	Time ^b	Distance ^b		
Basic Chassis	3 Years	50,000 mi/80 500 km		
Battery	1 Year	100,000 mi/161 000 km		
Brightwork	6 Months	Unlimited		
Corrosion	6 Months	Unlimited		
Cowl Corrosion	5 Years	Unlimited		
Cowl Structure	5 Years	Unlimited		
Crossmembers	5 Years	100,000 mi/161 000 km		
Diesel Emission 2010 ^c	5 Years	100,000 mi/161 000 km		
Frame Rails	5 Years	100,000 mi/161 000 km		
GHG14 ^d (Light Heavy Duty Trucks)	5 Years	50,000 mi/80 500 km		
GHG14 ^d (Medium Heavy Duty to Heavy Heavy Duty Trucks)	5 Years	100,000 mi/161 000 km		
GHG14 ^d Tire	2 Years	24,000mi/38 400 km		
Paint, Chassis	6 Months	Unlimited		
Towing/Roadside Assistance ^e	1 Year	Unlimited		
Front Axle	3 Years	36,000 mi/58 000 km		
Rear Axle	3 Years	36,000 mi/58 000 km		
Transfer Case	3 Years	36,000 mi/58 000 km		
Transmission	3 Years	36,000 mi/58 000 km		
Detroit Front Axle (File Direct)				

DISCLAIMER: Failure to read or distribute this information does not provide exemption from compliance with the information contained herein.

FCCC BUS CHASSIS - COMMERCIAL

Coverage ^a				
Description	Time ^b	Distance ^b		
Pre-Model Year 2011 ^f	3 Years	36,000 mi/58 000 km		
Post-Model Year 2011 ^g	3 Years	Unlimited		
Detroit Rear Axle (File Direct)				
Pre-Model Year 2011 ^f	3 Years	36,000 mi/58 000 km		
Post-Model Year 2011 ^g	3 Years	Unlimited		

a. Coverage may vary; check vehicle's actual warranty coverage online via OWL's Coverage Info/Check Coverage screen.

b. Time or distance, whichever comes first

Applies to vehicles equipped with EPA 2010 compliant diesel engines. Applies to models 2013 and later domiciled in the United States, check actual warranty online via OWL's Coverage Info/Check Coverage screen for d. Coverage listed as "GHG14..." Up to a maximum of \$450 per occurrence. Pre-Model Year 2011 Detroit Axle: Warranty coverage is determined by Gross Combination Weight Rating, road surface, and vocation. Please see

e.

f. www.ddcsn.com for specific coverage details.

Bus & Chassis - Custom Chassis: Warranty coverage is determined by Gross Combination Weight Rating, road surface, and vocation. Please see g. www.ddcsn.com for specific coverage details.

IMPORTANT BASIC COMMERCIAL BUS ENGINE WARRANTIES



CUMMINS ENGINES

		STANDARD WARRANTY* (Whichever occurs first)		EMISSIONS WARRANTY*	
VOCATION	APPLICABLE MODELS			(Whichever occurs first)	
		Years	Miles (km)	Years	Miles (km)
SHUTTLE BUS,	ISB-6.7L	2-yr	No Limit	5-yr	0 - 100,000 miles 0 - 160,935 km
TOUR COACH, and	ISL-9L	2-yr	No Limit	5-yr	0 - 100,000 miles 0 - 160,935 km
TRANSIT BUS					

NOTES: *This chart is intended to be a guide. See manufacturer's warranty for all details outlining limitations. Go to http://cumminsengines.com/brochures.aspx?sMarket=59&sKeyword=warranty for more info

See your local Cummins Dealer for shop/service manuals , special tools, etc.

IMPORTANT BASIC COMMERCIAL BUS TRANSMISSION WARRANTIES

Allison Transmission Warranty and Coverage Summary Shuttle Bus, School Bus, Intercity Bus/Tour Coach, and Transit Bus Freightliner Custom Chassis Corporation August 7, 2015

Allison coverage for transmissions supplied on FCCC Chassis

w/ option to purchase Allison ETC

VOCATION		STANDARD WARRANTY LIMITATIONS#		STANDARD WARRANTY + PARTNERSHIP COVERAGE LIMITATIONS*		STANDARD WARRANTY + EXTENDED TRANSMISSION COVERAGE (ETC) LIMITATIONS	
VUCATION		(Whichever occurs first)		(Whichever occurs first)		(Whichever occurs first)	
		Years	Transmission Miles (km)	Years	Transmission Miles (km)	Years	Transmission Miles (km)
	B210, B220, B300, B400	2-yr	No Limit	2-yr	No Limit	5-yr	No Limit
	В500	2-yr	No Limit	2-yr	No Limit		
SHUTTLE BUS	1000PTS	3-yr	0 - 100,000 miles 0 - 160,000 km	3-yr	0 - 100,000 miles 0 - 160,000 km		
	2100PTS, 2200PTS, 3000PTS	3-yr	0 - 100,000 miles 0 - 160,000 km	4-yr	No Limit		
SCHOOL, CHURCH,	1000PTS	3-yr	0 - 100,000 miles 0 - 160,000 km	4-yr	No Limit	5-yr	No Limit
ACTIVITY BUS	2100PTS, 2200PTS, 2500PTS, 3000PTS	3-yr	0 - 100,000 miles 0 - 160,000 km	5-yr	No Limit	n.a.	n.a.
INTERCITY BUS or	B210, B220, B300, B400	2-yr	No Limit	2-yr	No Limit	5-yr	No Limit
TOUR COACH	B500	2-yr	No Limit	5-yr	No Limit	n.a.	n.a.
TRANSIT BUS	B210, B220, B300, B400, B500	2-yr	No Limit	2-yr	No Limit	5-yr	No Limit

NOTES: Buses requiring PTO and all revenue-generating/FTA transit bus applications must use "B" (Bus) series transmissions. All shuttle bus applications greater than 33,000 lbs GVW require B300 or B400 transmissions.

*This chart is intended to be a guide. See manufacturer's warranty for all details outlining limitations. Go to http://www.allisontransmission.com/transmissions for more info.

See your local Allison Dealer for shop/service manuals, special tools, etc.

8/11/15

GATEWAYA

High Idle & Lift Interlock With Programmable Load Control

FEATURES & BENEFITS

- Fully compliant FMVSS 403/404 wheelchair lift interlock
- Dynamic Load Response (DLR) technology– monitors engine RPM & maintains speed at all load conditions
- Charge protect on gas & diesel engines
- Automatic engagement when on A/C command is detected
- Heater Boost for improved cabin heat
 on diesel engines
- Dash-mounted control panel has LEDs to display electrical system, Automatic Fast Idle (AFIS) & Intelligent Lift Interlock System (ILIS) status
- Simple, single-point "Plug & Play" connection.. Super fast installation & No cutting of factory wires
- Solid state microprocessor controller.. No additional solenoids, cables, or brackets
- Capable of providing "Real-Time" chassis data via the CAN Bus
- Diagnostic trouble codes can be retrieved for "hard" faults & intermittent faults in non-volatile memory
- Intermittent Fault Filter (IFF)® technology filters out all erroneous changes in sensor signals
- Multiple & configurable chassis electrical load inputs/outputs



Gateway^{AI} Module

WHY GATEWAY^{AI}?

- Gateway^{AI} is a fully Compliant FMVSS 403/404 wheelchair interlock & fast idle system all in one, easy to install module!
- Fast Idle- monitors OEM sensor inputs from transmission, engine, charging system, air conditioner, ambient air temperature, & vehicle speed to determine if high idle is needed. Automatically maintained when loads are added or removed such as A/C or wheelchair lift.
- Lift Interlock Controls shift interlock by processing signals from transmission, parking brake and lift door to electronically lock down the vehicles ability to move in unsafe conditions









An ISO 9001:2008 Registered Manufacturer www.InterMotive.net 800-969-6080

GATEWAY

Gateway^{AI} Options

THE GATEWAY^{AI} PRODUCT FAMILY

Gateway with BrakeMax Controller

- All of the features of the Gateway/ ILIS plus a controller for Ford & GM vehicles with Tow/ Haul mode. This controller engages the Tow/Haul mode on start-up of the vehicle thereby providing the fleet with maximum "Tow/ Haul" mode benefits without having the driver think about it.
- Gateway with DuraTrans
 - All of the features of the Gateway/ ٠ ILIS plus a controller for Ford & GM vehicles with an Overdrive button. Overdrive is disabled until the vehicle speed reaches 55 MPH. Overdrive will not be disabled until the vehicle speed drops below 30MPH

Gateway with Merlin

 All of the features of Gateway/ILIS plus the ability of the Merlin Multiplex System to use real-time chassis data to operate coach loads

Azure Option

ILIS interlock functions for use on an ٠ Azure hybrid electric vehicle



Standard Gateway^{AI} LED Panel



Standard Gateway^{AI} Door Ajar LED Panel



Interlock Only LED Panel



Interlock Only Door Ajar LED Panel

SPECIFICATIONS

Physical Specifications: Dimensions: Weight: Operating Temperature: 40°C to 85°C

2.0"W x 4.0"L x 0.9"H 14 lbs

Electrical Specifications Power Input:

Lift Enable:

+8 to 16 Vdc @ 1 amps for module control +8 to 16 Vdc @ 8 amps for lift enable +12v @ 8 amps Programmable Outputs: Ground @ 0.5 amps each

US Patent No's. 6,594,565 / 6,965,819 / 7,274,980







NEW PRODUCT WARRANTY



PARTICIPATING OEM SALES DISTRIBUTOR SALES

LIMITED WARRANTY ON NEW ALLISON AUTOMATIC TRANSMISSIONS USED IN SHUTTLE & OTHER BUS APPLICATIONS-EXCEPT TRANSIT, SCHOOL BUS, INTERCITY BUS, or MOTORHOME

Allison Transmission, Inc. will provide for repairs or replacement, at its option, during the warranty period of each new Allison transmission listed below that is installed in a Bus, other than School Bus, Transit Bus, Intercity Bus, or Motorhome in accordance with the following terms, conditions, and limitations.

WHAT IS COVERED

- WARRANTY APPLIES This warranty is for new Allison transmission models listed below installed in a Bus, other than School Bus, Transit Bus, Intercity Bus, or Motorhome and is provided to the original and any subsequent owner(s) of the vehicle during the warranty period.
- **REPAIRS COVERED** The warranty covers repairs or replacement, at Allison Transmission's option, to correct any transmission malfunction resulting from defects in material or workmanship occurring during the warranty period. Needed repairs or replacements will be performed using the method Allison Transmission determines most appropriate under the circumstances.
- **TOWING** Towing is covered to the nearest Allison Transmission Distributor or authorized Dealer only when necessary to prevent further damage to your transmission.
- **PAYMENT TERMS** Warranty repairs, including parts and labor, will be covered per the schedule shown in the chart contained in section "APPLICABLE MODELS, WARRANTY LIMITATIONS, AND ADJUSTMENT SCHEDULE."
- **OBTAINING REPAIRS** To obtain warranty repairs, take the vehicle to any Allison Transmission Distributor or authorized Dealer within a reasonable amount of time and request the needed repairs. A reasonable amount of time must be allowed for the Distributor or Dealer to perform necessary repairs.
- TRANSMISSION REMOVAL AND REINSTALLATION Labor costs for the removal and reinstallation of the transmission, when necessary to make a warranty repair, are covered by this warranty.
- WARRANTY PERIOD The warranty period for all coverages shall begin on the date the transmission is delivered to the first retail purchaser, with the following exception:

Demonstration Service –A transmission in a new truck or bus may be demonstrated to a total of 5000 miles (8000 kilometers). If the vehicle is within this limit when sold to a retail purchaser, the warranty start date is the date of purchase. Normal warranty services are applicable to the demonstrating Dealer. Should the truck or bus be sold to a retail purchaser after these limits are reached, the warranty period will begin on the date the vehicle was first placed in demonstration service and the purchaser will be entitled to the remaining warranty.

APPLICABLE	WAR (W	RANTY LIMITATIONS 'hichever occurs first)	ADJUSTMENT CHARGE TO BE PAID BY THE CUSTOMER		
MODELS	Months Transmission Miles Or Kilometers		Parts	Labor	
B 210, B 220, B 300, B 400, B 500	0–24	No Limit	No Charge	No Charge	
1000 Series, 2000 Series, 2400 Series	0–36	No Limit	No Charge	No Charge	
1000 PTS, 2100 PTS, 2200 PTS, 2350 PTS, 2500 PTS, 2550 PTS, 3000 PTS	0–36*	0–100,000 m 0–160 000 km	No Charge	No Charge	

APPLICABLE MODELS, WARRANTY LIMITATIONS, AND ADJUSTMENT SCHEDULE

* Effective July 2006, the Allison transmission in your vehicle may be covered by additional extended coverage, dependent on the Original Equipment Manufacturer (OEM) which manufactured your vehicle. This additional coverage requires continued use of an Allison Approved TES 295 automatic transmission fluid and genuine Allison filters. Please consult your OEM Dealer or authorized Allison Transmission Distributor or Dealer for specific information.

Page 1 of 2

- DAMAGE DUE TO ACCIDENT, MISUSE, or ALTERATION Defects and damage caused as the result of any of the following are not covered:
 - Flood, collision, fire, theft, freezing, vandalism, riot, explosion, or objects striking the vehicle;
 - Misuse of the vehicle;
 - Installation into unapproved applications and installations;
 - Alterations or modification of the transmission or the vehicle, and
 - Damage resulting from improper storage (refer to long-term storage procedure outlined in the applicable Allison Service Manual)
 - Anything other than defects in Allison Transmission material or workmanship

NOTE: This warranty is void on transmissions used in vehicles currently or previously titled as salvaged, scrapped, junked, or totaled.

- CHASSIS, BODY, and COMPONENTS The chassis and body company (assemblers) and other component and equipment manufacturers are solely responsible for warranties on the chassis, body, component(s), and equipment they provide. Any transmission repair caused by an alteration(s) made to the Allison transmission or the vehicle which allows the transmission to be installed or operated outside of the limits defined in the appropriate Allison Installation Guideline is solely the responsibility of the entity making the alteration(s).
- DAMAGE CAUSED by LACK of MAINTENANCE or by the USE of TRANSMISSION FLUIDS NOT RECOMMENDED in the OPERATOR'S MANUAL Defects and damage caused by any of the following are not covered:
 - Failure to follow the recommendations of the maintenance schedule intervals applicable to the transmission;
 - Failure to use transmission fluids or maintain transmission fluid levels recommended in the Operator's Manual.
- MAINTENANCE Normal maintenance (such as replacement of filters, screens, and transmission fluid) is not covered and is the owner's responsibility.
- **REPAIRS by UNAUTHORIZED DEALERS** Defects and damage caused by a service outlet that is not an authorized Allison Transmission Distributor or Dealer are not covered.
- USE of OTHER THAN GENUINE ALLISON TRANSMISSION PARTS Defects and damage caused by the use of parts that are not genuine Allison Transmission parts are not covered.
- EXTRA EXPENSES Economic loss and extra expenses are not covered. Examples include but are not limited to: loss of vehicle use; inconvenience; storage; payment for loss of time or pay; vehicle rental expense; lodging; meals; or other travel costs.
- "DENIED PARTY" OWNERSHIP Warranty repair parts and labor costs are not reimbursed to any participating or non-participating OEMs, dealers or distributors who perform warranty work for, or on behalf of, end users identified by the United States as being a "denied party" or who are citizens of sanctioned or embargoed countries as defined by the U.S. Department of Treasury Office of Foreign Assets Control. Furthermore, warranty reimbursements are not guaranteed if the reimbursement would be contrary to any United States export control laws or regulations as defined by the U.S. Department of State, or the U.S. Department of Treasury.

OTHER TERMS APPLICABLE TO CONSUMERS AS DEFINED by the MAGNUSON-MOSS WARRANTY ACT

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. Allison Transmission does not authorize any person to create for it any other obligation or liability in connection with these transmissions. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE APPLICABLE TO THESE TRANSMISSIONS IS LIMITED IN DURATION TO THE DURATION OF THIS WRITTEN WARRANTY. PERFORMANCE OF REPAIRS AND NEEDED ADJUSTMENTS IS THE EXCLUSIVE REMEDY UNDER THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY. ALLISON TRANSMISSION SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (SUCH AS, BUT NOT LIMITED TO, LOST WAGES OR VEHICLE RENTAL EXPENSES) RESULTING FROM BREACH OF THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY.**

** Some states do not allow limitations on how long an implied warranty will last or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

OTHER TERMS APPLICABLE TO OTHER END-USERS

THIS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THE ALLISON TRANSMISSION MODELS LISTED ABOVE AND IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ALLISON TRANSMISSION DOES NOT AUTHORIZE ANY PERSON TO CREATE FOR IT ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH SUCH TRANSMISSIONS. ALLISON TRANSMISSION SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM BREACH OF THIS WARRANTY OR ANY IMPLIED WARRANTY.

QUESTIONS

If you have any questions regarding this warranty or the performance of warranty obligations, you may contact any Allison Transmission Distributor or Dealer or write to:

Allison Transmission, Inc. P.O. Box 894 Indianapolis, IN 46206-0894 Attention: Warranty Administration PF-9 Form SE0614EN (201112)





PRESTOLITE ELECTRIC INCORPORATED

LIMITED COMMERCIAL WARRANTY POLICY

-North America-

Prestolite Electric Incorporated (hereafter "Prestolite") warrants each Prestolite product to be free of defects in material or workmanship under normal use and service. This warranty applies to both Original Equipment Manufacturers and authorized Warehouse Distributors. The length of the Warranty Period may be determined by referring to the warranty period included with this policy statement.

This warranty covers products manufactured by Prestolite and sold under the trade names PRESTOLITE™ and LEECE-NEVILLE™.

The warranty period commences on the in-service or install date and is not transferable. **Failure to pro**vide the in-service or install date on the warranty claim form will cause the warranty period to begin on the date the part was manufactured.

A completed warranty claim form should accompany all parts submitted to Prestolite for warranty consideration. The claim form should contain all of the information required. Lack of proper information will result in denial of warranty claim. Claims must be submitted no later than 60 days after part is removed.

This warranty does not apply if in sole judgement of Prestolite, the product has been consumed, subject to accident, faulty repair, improper adjustment, installation, lubrication, wiring, neglect, misuse; or is caused by failure of a part not manufactured by Prestolite. Also excluded from this warranty are parts subject to normal wear (i.e. brushes).

This warranty shall not apply if any Prestolite product is used for a purpose for which it is not designed or altered in any way so as to effect adversely its performance and reliability. Prestolite requires the examination of ALL products or parts to confirm that the part has failed as a result of material or workmanship. Transportation for products and parts submitted to Prestolite for warranty consideration must be prepaid. Repaired or replaced Prestolite parts will be returned, transportation and handling charges collect. No charge will be made for labor or material in effecting such repairs.

The obligation of Prestolite under this Commercial Warranty is limited to making good by repair or replacement, as Prestolite deems most appropriate. This Commercial Warranty does not apply to products or parts where adjustments will correct the alleged defect Prestolite neither assumes nor authorizes any other person to assume on its behalf any other warranty or liabilities in connection with Prestolite products.

THIS WARRANTY DOES NOT APPLY TO LOSS OF VEHICLE OR EQUIPMENT, LOSS OF TIME, INCONVENIENCE, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. PRESTOLITE SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES arising out of or from the use of Prestolite's products by the buyer, its assignees, employees, agents or customers.

This supersedes all previous Warranty Policies issued for PRESTOLITE™ and LEECE-NEVILLE™.

PRESTOLITE ELECTRIC INCORPORATED LIMITED COMMERCIAL WARRANTY POLICY

Warranty Schedule - North America

Application (*1)	Warranty P	R&R LABOR	
	Молтня	MILES / HOURS	
Agricultural Equipment	12	2,000 hrs (*4)	(*3)
Ambulance and Emergency Vehicle	12	100,000 miles	(*3)
Construction Equipment	12	2,000 hrs (*4)	(*3)
Electric Vehicle	12	100,000 miles	No
Industrial Equipment	12	2,000 hrs (*4)	No
Marine Engine	12	2,000 hrs (*4)	No
Material Handling Equipment	12	2,000 hrs (*4)	No
School Bus	12 / 24 / 36	100,000 miles (*7)	(*3)
Transit Bus	12	100,000 miles	(*3)
Any Application not specified	(*5)	(*5)	(*5)
Medium and Heavy Duty Truck	See Appendix A (Below)		(*3)

Appendix A - Medium & Heavy Truck			Warranty Period (*2)		
Product	Family / Series	Months	Miles		
Alternator	All Alternators (See exceptions below)	12	Unlimited		
Alternator	8LHA2070VF, 8LHP2170VF	24 (*9)	250,000 Miles		
Alternator	Brushless (BLD / BLP)	36	350,000 Miles		
Alternator	Long Brush (LBA / LBP)	24	250,000 Miles		
Alternator	AC172	18	200,000 Miles		
Alternator	AVi160	24/36 (*7)	250,000 Miles		
Alternator	All other AVI	12	150,000 Miles		
Alternator	AS / AS123 / AS128e / AS128i	12	150,000 Miles		
Starter Motor	All Starter Motors (See exceptions below)	12	Unlimited		
Starter Motor	M105 - With OverCrank Protection	36	350,000 Miles		
Starter Motor	M110 - With OverCrank Protection	36	350,000 Miles		
Starter Motor	MS2 - With OverCrank Protection	12 (*6)	Unlimited		
Starter Motor	M125 (Titan™ Series)	12/36 (*8)	(*8)		

Service Components / Replacement Parts are warranted for ninety (90) days. If used in the repair of Prestolite original equipment the unexpired portion of the original warranty period will apply, provided all original equipment service parts are used.

- (*1) Warranties offered by Application are general guidelines. *Each specific application listed must be pre-approved by Prestolite Engineering before these warranties will be honored.*
- (*2) Whichever comes first.
- (*3) Removal and Reinstallation (R&R) labor only allowed for drive-in service on new Prestolite charging systems (alternators and regulators), cranking motors and instruments. Refer to the Flat Rate Time Allowance Schedule L212 for allowable times.
- (*4) Prestolite will match OEM's published warranty up to 2000 hours of service.
- (*5) Warranty terms will be established by Prestolite after review and approval of application.
- (*6) MS2 Starters with OCP manufactured prior to October 1, 2007 (DateCode 200739) carry 36 month, 350,000 mile warranty.
- (*7) 12 Month standard warranty on standard product, 24 month warranty on approved applications, 36 month warranty for AVI160 on approved applications. Contact U.S. Technical Service at (866) 288-9853 for details.
- (*8) On Highway 36 months/350,000 Miles, Off Highway 1 year./150,000 Miles.
- (*9) Last letter in model number may define warranty time. IE: VF=2 Years, VE=1 Year.

PP1143a 9/9/11

COMMERCIAL GRADE BACKUP CAMERA SYSTEM RVS - 770613





This backup camera system is complete with a crystal clear 7" DIGITAL TFT LCD color monitor with distance grid lines and mirror image capability, a 3 channel multiplexer with automatic system switch, a 130° SHARP® CCD backup camera with 50 foot infra-red night vision and all the wires, connectors and mounts you will need. The rear view camera system is completely weather proof with an IP69K rating, strong and reliable, shock resistant, with a 20G vibration and 100G shock rating (highest in the industry). It comes with a full year warranty.
BACKUP CAMERA SYSTEM RVS - 770613



COMPLETELY WEATHERPROOF WITH AN IP69K RATING

TFT LCD

16:9 / 500:1

3 CHANNEL

1VP-P, 75Ω

-30°C ~ +80° C AUTO NTSC/PAL

5W

400G

INTERNAL

5G

400CD/m

800 X 3 (RGB) X 480

U:50° D:60° L/R:70°

DC 12V-24V (+/- 10%)

7" (L) X 5" (H) X 1" (D)

0.192 (H) X 0.1805 (V)

- 7" DIGITAL TFT LCD COLOR MONITOR WITH MIRROR IMAGE CAPABILITY
- 1/4 SHARP® COLOR CCD, 250K PIXELS, 2.1 MM WIDE LENS WITH 130° ANGLE
- 3 CHANNELS ALLOWING YOU TO CONNECT ADDITIONAL CAMERAS
- SHOCK RESISTANT WITH A 20G VIBRATION AND 100G IMPACT RATING



MONITOR

MONITOR TYPE SCREEN SIZE DOT RESOLUTION DISPLAY FORMAT/CONTRAST DISPLAY BRIGHTNESS VIEWING ANGLE VIDEO INPUT VIDEO SOURCE POWER SUPPLY POWER CONSUMPTION OPERATING TEMPERATURE VIDEO SYSTEM OVERALL DIMENSIONS WEIGHT IMPACT RATING DOT PITCH SYNC SYSTEM

CAMERA

SENSOR PICTURE ELEMENTS GAMMA CORRECTION IMAGE SENSOR

LENS VIEW ANGLE WATERPROOF RATING SYNC SYSTEM INFRA-RED DISTANCE USABLE ILLUMINATION POWER SOURCE S/N RATIO ELECTRONIC IRIS VIDEO OUTPUT IR SWITCH CONTROL VIBRATION AND SHOCK RATING OPERATING TEMPERATURE STORAGE TEMPERATURE NET WEIGHT

1/4" SHARP* COLOR CCD 250,000 PIXELS R=0.45 TO 1.0 600 TV LINES, PAL: 500 (H) X 582 (V) NTSC: 510 (H) X 492 (V) 2.1MM 130° IP69K INTERNAL SYNCHRONIZATION 50 FEET (18 INFRARED) 0 LUX (IR ON) DC 12V-24V (+/- 10%) MORE THAN 48DB 1/50, 160-1/100,000SEC 1VP - P, 75 Ω ACDS AUTOMATIC CONTROL 20G / 100G -40°C ~ +80°C / RH 95% MAX -40°C ~ +60°C / RH 95% MAX 220Z



WATER TEST DOCUMENTATION

The Glaval Bus water test booth offers exceptional performance in the area of water leak detection. With nozzles directed at the roof, sidewalls, and front, nothing goes untouched in our quest for leak elimination. Using both velocity and volume in our test procedure ensures our valuable customers that we are doing the utmost to deliver a leak-free product to them.

The approximately 25' x 45' test facility utilizes 158 nozzles, (5) rows on the front, (12) rows each side, and (4) rows on the roof with 45° angled nozzles at the rear. The test booth includes two recycling tanks and utilizes a 12HP pump with a dual filtering system capable of delivering approximately 30 psi.

The water test runs for a minimum of 15 minutes per a certified timer before the visual inspection begins. The vehicle is then checked by sight and touch at no less than (12) individual inspection points while the water spray is continuing.

A complete passing test document is then signed, dated, and kept on file for review. A copy is available upon request. Visitors are always welcome to witness the test booths whenever they are in operation.





914 County Road 1 North • Elkhart, IN 46514 • 800-445-2825 • 574-262-2212 • Fax: 574-264-4259 • www.glavalbus.com

Door Leaves



Product Features

- **⊿**Distinctive door leaf design
- ■Key-lock joint
- →Corrosion resistance through use of aluminum, stainless steel, and zinc plating
- **⊿**Torque arm on upper hinge
- **⊿**Tempered glass
- **⊿**Tough, clear coat, anodized finish (204 R1 rated)
- **⊿**Radiused edge for clean mating to seal
- ⊿Ambidextrous! (Use in either forward or aft position)

Harmony of Movement

- **J**Our design produces completely perpendicular door opening--always.
- **⊿**Forward door opens first and closes last--always.
- **⊿**No need to rely on spring-loaded push-pull rods--ever.

Secure Closing

JOur design ensures an unequalled, strong closing.JThe actuator will reliably hold the door shut, even at highway speeds.

Serviceability

- J The reliability of the design,
- dtogether with the ease-of-access,
- ⊿and the documentation tools we provide,
- →work together to create unparalleled serviceability.

Model: 1432, 1437, 1442, 1445

Index No.	Part No.	Description	No Req'd
1	M1518-24	1432 Base plate weldment, with bushings	1
1	M1576-24	1437 Base plate weldment, with bushings	1
1	M1522-24	1442 Base plate weldment, with bushings	1
1	M1539-24	1445 Base plate weldment, with bushings	1
2	P100044	Actuator arm, forward	1
3	P100061	Rod end, female	4
4	P100319	1432 Push-pull rod assembly, forward	1
4		1437 Push-pull rod assembly, forward	1
4	P100325	1442 Push-pull rod assembly, forward	1
4	P100326	1445 Push-pull rod assembly, forward	1
5	P100022	Nut, 1/2-20 zinc plated	2
6	P100071	Gear, with bushing	2
7	P100319	1432 Push-pull rod assembly, aft	1
7		1437 Push-pull rod assembly, aft	1
7	P100325	1442 Push-pull rod assembly, aft	1
7	P100326	1445 Push-pull rod assembly, aft	1
8	P100043	Actuator arm, aft	1
9	P100340	Placard, warning	1
10	P100217	Motor assembly	1
11	P100049	Emergency release lever	1
12	P100198	Bolt, hanger, 1/4 flattened end x 2"	1
13	P100073	PC board, Solid State	1
13	P100074	PC board, Solid State, Auto Re-open	1
14	1493	Gear stabilizer (1432, 1437 only)	1
14	1879	Gear stabilizer, Heavy duty (1442, 1445 only)	1
15	P100058	Switch, limit	As Req'd
18	P100027	Snap ring, (1" shaft)	2
19	P100005	Bolt, 1/2-20 x 1-3/4" zinc plate grade 5	2
20	P100019	Lock washer, spring type, 1/2"	4
23	1655	Fiber washer	2
24	P100086	Motor spacer	3
25	P100001	Bolt, 1/4-20 x 1/2"	5
26	P100004	Bolt, 1/4-20 x 1-3/8"	3
27	1517	Motor mount	1
28	P100003	Bolt, 1/4-20 x 1"	2
29	P100026	Nut, plain, 1/4-20	4
30	P100024	Nut, nylock, 1/4-20	2
34		Screw, 4-40 Round Phillips Head	As Req'd
35	P100006	Bolt, 1/2-20 x 2-1/4"	2
36	P100047	Motor	1
37	1010	Spacer, Rod End	2
38	P100018	Washer, 1/4 SAE Flat Zinc	3
39	P100041	Bushing, bronze	2
40	P100056	Wire Clip	1
41	P100060	Switch, limit, Auto Reverse Only	1
42	P100011	Screw, 4-40 x 5/8" Round Phillips Head	2
43	P100331	Nut, Nylock, 4-40	2
50	1654	Switch tab, ABS	1



51	P100007	Bolt, 1/4-20x1/2 Serrated Head	2
53	P100203	Nut, Nyloc, 6-32	2
54	P100200	Screw, Phillips, Round, 6-32 x 1-1/4"	1
61	P100062	Set Screw, 1/4"-20	2
73	W3131	Pigtail (optional)	1
77	1714	Actuator Arm, 2 in 1	2
78	1560	Switch Spacer	As Req'd
79	K9038	Switch Tab Kit	
80	K9037	Switch Tab and Switch Kit	
81	K9039	3rd Switch Kit	
82A	K9065	Remote - 1 Key FOB (optional)	
		Bolt, Button Head, 1/2-20x 1-3/4",	
	P100038	(XXXX.2 designation only)	1





updated 7/28/2008













TARABUS PRODUCT WARRANTY

TO REGISTER YOUR PRODUCT WARRANTY under the terms of Gerflor's North America Limited Product Warranty, please complete the form below and mail to:

Gerflor USA Inc 595 Supreme Dr Bensenville 60106 IL USA.

I acknowledge having received and read GERFLOR's technical documents and specifications concerning the product warranty:

Product Type:

Roll numbers & Quantity (sq.yds/m²):

Installation Date:

Transit Authority:

Address:

State/Prov:

Zip/Postal Code:

OEM:

Address:

State/Prov:

Zip/Postal Code:

Represented by:_

Signature:



TARABUS FLOORCOVERINGS LIMITED WARRANTY AGREEMENT

Warranty Terms and Conditions

GERFLOR, as a manufacturer, expressly warrants that TARABUS floorcoverings for buses and coaches are conform to the technical data sheet in force at the time of delivery.

GERFLOR further expressly warrants that the wear layer of TARABUS floorcoverings shall be free from defects in material for **12 years (twelve years)** from the date of sale, provided such floorcoverings are exclusively subject to normal use and service, and are installed and maintained in accordance exactly with GERFLOR's recommendations that the buyer declares to be aware of.

The wear layer consists of the material above the glass fiber web in the floorcovering. GERFLOR expressly warrants that the glass fiber web will not appear in the floorcovering for **12 years (twelve years)** from the date of sale.

This entire warranty will become null and void if conditions of the subflooring and method of installation do not conform exactly to GERFLOR's specifications.

This entire warranty does not cover damage caused, in whole or in part, by conditions beyond the control of GERFLOR, including but not limited to:

- Use for which material is not designated.
- Fire, explosion, or natural disasters.
- Faulty installation
- Casualties
- Ordinary wear and tear
- Abuse
- Faulty design or construction of the vehicles.
- Failure of the adhesive to adhere to the subfloor because of presence of moisture.
- Fault in the subfloor.
- Failure of the welding



- Oneven wear of sections of the hoorcovern
 Alteration of the initial appearance of the
- floorcovering, particularly in high traffic areas exposed to extreme heavy wear.
- Damage caused by negligent or improper maintenance procedures and other causes not specified but beyond the control of GERFLOR.
- Fading or discoloration from sunlight or heat.
- Mechanical damages. burns, chemical soiling or damage due to clamp or inadequate cleaning, not recommended by GERFLOR.

The presence of moisture between the TARABUS and the subfloor shall be considered proof of subfloor failure or faulty design or construction.

This warranty will be applied only if the product is admitted to be the only cause of disorder.

The sole and exclusive remedy against GERFLOR arising from the purchase or use of TARABUS is limited to supply of material in replacement of the sole defective part of material (after examination. verification and approval by GERFLOR) with material of equivalent quality –(colour shade between brand new material and existing one will be accepted by the owner)-. All other compensation of whatever nature will be excluded.

If the claim is accepted by GERFLOR, with respect to the warranty of the wear layer, for the first 2 (two) years from the date of sale, GERFLOR will supply the material, in replacement of defective one, free of charge. More than 2 (two) years from the date of sale, until the expiration of this express warranty of the wear layer, a depreciation of 7% (seven per cent) per year of the cost of supplied material will apply.

THE ABOVE EXPRESSED MANUFACTURER's WARRANTY SHALL BE THE **EXCLUSIVE** WARRANTY AND LIMITED TO THE THE QUALITY OF PRODUCT, AND GERFLOR MAKES NO OTHER WARRANTIES. GERFLOR EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANBILITY AND IMPLIED WARRANTIES OF FITNESS FOR А PARTICULAR PURPOSE.

WARRANTY AND LIABILITY LIMITS

IT IS AGREED THAT GERFLOR SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, including but not limited to, loss of income, loss of use, damage to other property, the cost of removing and reinstalling TARABUS floorcoverings, attorney's fees, and any liability you may have with respect to any other person.



TIME LIMIT FOR PLACING A CLAIM

To be admissible, all claims by means of this warranty contract must be carried out by **registered letter with return receipt** addressed to GERFLOR, at the address indicated at the top of this warranty contract, **accompanied by the purchase invoice** for the Product, within THIRTY DAYS following finding of irregularities and within the aforementioned warranty contract time limit. If any clauses of this Warranty Agreement conflicted with the law or a given jurisdiction, only said clause would be considered inapplicable, the remaining text of the Agreement remaining unaffected.

This Limited Warranty shall be governed and construed in accordance with the laws of the State of Illinois without regard to any choice of low principles: All disputes that may arise between You and GERFLOR relating in any way to this Limited Warranty Agreement, to the extent such disputes cannot be resolved by negotiation between You and GERFLOR, shall be decided by arbitration carried out in accordance with the Federal Arbitration Act and the Commercial Arbitration Rules of the American Arbitration Association. In the event of such a dispute, arbitration may be initiated by a request for arbitration by either party hereto addressed to the other party, and shall be completed within sixty (60) days of such request unless extended because of unavailability of an arbitrator or other events beyond the control either party. The arbitrator shall be chosen by mutual agreement of the parties and, in the event the parties cannot so agree, either party may file a written application to have the arbitrator designated by the American Arbitration Association. The arbitration proceeding shall take place in Chicago, Illinois or such other location as the parties shall agree and shall be conducted in accordance with the Commercial Arbitration, but subject to the terms of this Limited Warranty, any damages. The decision of the arbitrator shall be final and conclusive, both as to costs and the merits, and the parties agree that they shall be bound by this decision.



Braun® Limited Warranty For Dual Parallel Arm Public Use Lifts

WARRANTY COVERAGE AND WARRANTY COVERAGE TIME PERIODS

The Braun Corporation ("Braun") warranty covers certain parts of this wheelchair lift for three (3) years or 10,000 cycles and the cost of labor to repair or replace those parts for one (1) year or 3,000 cycles. If The Braun Corporation receives the warranty registration card within 20 days after the lift is put into service, the warranty labor coverage will increase from one (1) year or 3,000 cycles to three (3) years or 10,000 cycles. In addition, providing the warranty registration card is returned as noted above, the following lift's power train parts are warrantied for five (5) years or 15,000 cycles: Cable, Cylinder, Flow Control, Gear Box, Motor, Pump, Hydraulic Hose and Fittings. This limited warranty covers substantial defects in materials and workmanship of the lift, provided that the lift is operated and maintained properly and in conformity with the owner's manual. The warranty period begins on the date that the product is delivered to the first retail purchaser by an independent, authorized dealer of Braun, or, if the dealer places the product into any type of service prior to retail sale, on the date the dealer first places the product in such service. This limited warranty applies only to the first purchaser. It may not be transferred.

WHAT BRAUN WILL DO TO CORRECT PROBLEMS

In the event that a substantial defect in material or workmanship, attributable to Braun, is found to exist during the first year of warranty coverage, it will be repaired or replaced, at Braun's option, without charge for parts or labor to the owner, in accordance with the terms, conditions and limitations of this limited warranty. If the substantial defect in material or workmanship, attributable to Braun, is found to exist during the second or third year of warranty coverage, it will be repaired or replaced, at Braun's option, without charge to the owner for parts, only, in accordance with the terms, conditions and limitations of this limited warranty. Providing the warranty card is returned within 20 days as outlined above, the labor warranty period will be extended by two years of coverage in accordance with the terms, conditions, and limitations of this limited warranty. In addition, if a substantial defect in material or workmanship, attributable to Braun, is found to exist during the fourth or fifth year of warranty coverage to the following lift's power train parts: Cable, Cylinder, Flow Control, Gear Box, Motor, Pump, Hydraulic Hose and Fittings, it will be repaired or replaced, at Braun's option, without charge to the owner for parts, only, in accordance with the terms, conditions and limitations and limitations of this limited warranty. The cost of labor for repair or replacement at any time after the warranty coverage detailed above is the sole responsibility of the owner.

Braun's obligation to repair or replace defective materials or workmanship is the sole obligation of Braun under this limited warranty. Braun reserves the right to use new or remanufactured parts of similar quality to complete any work, and to make parts and design changes from time to time without notice to anyone. Braun reserves the right to make changes in the design or material of its products without incurring any obligation to incorporate such changes in any previously manufactured product. Braun makes no warranty as to the future performance of this product, and this limited warranty is not intended to extend to the future performance of the product. In addition, the owner's obligation to notify Braun, or one of its authorized, independent dealers, of a claimed defect does not modify any obligation placed on the owner to contact Braun directly when attempting to pursue remedies under state or federal law.

LIMITATIONS, EXCLUSIONS AND DISCLAIMER OF IMPLIED WARRANTIES

ANY IMPLIED WARRANTY THAT IS FOUND TO ARISE BY WAY OF STATE OR FEDERAL LAW, IN-CLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS, IS LIMITED IN DURATION TO THE TERMS OF THIS LIMITED WARRANTY AND IS LIMITED IN SCOPE OF COVERAGE TO THE SCOPE OF COVERAGE OF THIS LIMITED WARRANTY. Braun disclaims any express or implied warranty, including any implied warranty of fitness or merchantability, on items excluded from coverage as set forth in this limited warranty. Braun makes no warranty of any nature beyond that contained in this limited warranty. No one has authority to enlarge, amend or modify this limited warranty, and Braun does not authorize anyone to create any other obligation for it regarding this product. Braun is not responsible for any representation, promise or warranty made by any independent dealer or other person beyond what is expressly stated in this limited warranty. Any selling or servicing dealer is not Braun's agent, but an independent entity.

Braun® Limited Warranty For Dual Parallel Arm Public Use Lifts

BRAUN SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT MAY RESULT FROM BREACH OF THIS LIMITED WARRANTY OR ANY IMPLIED WARRANTY. THIS EXCLUSION OF CONSEQUENTIAL AND INCIDENTAL DAMAGES SHALL BE INDEPENDENT OF ANY FAILURE OF THE ESSENTIAL PURPOSE OF ANY WARRANTY, AND THIS EXCLUSION SHALL SUR-VIVE ANY DETERMINATION THAT THIS LIMITED WARRANTY OR ANY IMPLIED WARRANTY HAS FAILED OF ITS ESSENTIAL PURPOSE. This warranty does not cover, and in no event shall Braun be liable for towing charges, travel, lodging, or any other expense incurred due to the loss of use of the product or other reason.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

HOW TO GET SERVICE

To obtain warranty service the owner must do all of the following:

- 1. Notify an authorized service center, of the claimed defect attributable to Braun, within the warranty coverage period designated above
- 2. Provide the notification mentioned in (1), above, within ten (10) days of when the owner discovered, or should have discovered, the claimed defect
- 3. Promptly schedule an appointment with and take the product to an authorized service center for service.
- 4. Pay any transportation costs and all expenses associated with obtaining warranty service.

Since Braun does not control the scheduling of service work at the independent dealerships you may encounter some delay in scheduling or completion of work. If you need assistance you may contact Braun, at 631 West 11th Street, Winamac, Indiana 46996; 1-800-THE-LIFT, (843-5438).

If two (2) or more service attempts have been made to correct any covered defect that you believe impairs the value, use or safety of the product, or if it has taken longer than thirty (30) days for repairs to be completed, you must, to the extent permitted by law, notify Braun directly, in writing, at the above address, of the unsuccessful repair(s) of the alleged defect(s) so that Braun can become directly involved in providing service pursuant to the terms of this limited warranty.

WHAT IS NOT COVERED

This Limited Warranty does not cover any of the following: defects in materials, components or parts of the product not attributable to Braun, any material, component or part of the product that is warranted by another entity (Note: the written warranty provided by the manufacturer of the material, component or part is the direct responsibility of that manufacturer); items that are added or changed after the product leaves Braun's possession; additional items installed at any dealership, or other place of business, or by any other party, other than Braun; normal wear, tear, usage, maintenance, service, periodic adjustments, the effects of condensation or moisture from condensation; mold or any damage caused by mold; imperfections that do not affect the product for its intended purpose; items that are working as designed but that you are unhappy with; problems related to mis-operation, misuse, mishandling, neglect or abuse, including failure to maintain the product in accordance with the owner's manual, or other routine maintenance such as inspections, lubricating, adjustments, tightening of screws, sealing, wheel alignments or rotating tires; damage due to accident or collision, including any acts of weather or damage or corrosion due to the environment; theft, vandalism, fire, or other intervening acts not attributable to Braun; damage resulting from tire wear or tire failure; defacing, scratches, dents or chips on any interior or exterior surface of the product, including those caused by rocks or other road hazards, damage caused by off road use, overloading or alteration of the product, or any of its components or parts.

Defects and/or damage to interior and exterior surfaces and other appearance items may occur at the factory or when the product is in transit. These items are usually detected and corrected at the factory or by

Braun[®] Limited Warranty For Dual Parallel Arm Public Use Lifts

a dealer prior to delivery to the purchaser. You must inspect the product for this type of damage when you take delivery. If you find any such defect or damage you must notify the selling dealer, or Braun, at the time of delivery to have these items covered by this limited warranty and to have work performed on the items at no cost to you as provided by this limited warranty.

EVENTS DISCHARGING BRAUN FROM OBLIGATION UNDER WARRANTY

The following shall completely discharge Braun from any express or implied warranty obligation to repair or replace anything and void this warranty: misuse, neglect, collision, accidents, failure to provide routine maintenance (See Owner's Manual), unauthorized alteration, off road use, Acts of Nature, damage from weather or the environment, theft, vandalism, tampering, fire, explosions, overloading the product and odometer tampering.

LEGAL REMEDIES

Any action to enforce any portion of this limited warranty, or any implied warranty, must be commenced within six (6) months after expiration of the warranty coverage period designated above or the action will be barred because of the passage of time. Any performance of repairs shall not suspend this limitation period from expiring. Any performance of repairs after the warranty coverage period has expired, or performance of repairs regarding any thing excluded from coverage under this limited warranty shall be considered "good will" repairs, and they will not alter the terms of this limited warranty, or extend the warranty coverage period or the filing limitation period in this paragraph. In addition, since it is reasonable to expect that the product will need some service during the warranty period; this warranty does not extend to future performance. It only sets forth what Braun will do and does not guarantee anything about the product for any time period. Nothing in this warranty, or any action of Braun, or any agent of Braun, shall be interpreted as an extension of any warranty period or the filing limitation period in this paragraph. Some states do not allow a reduction in the statute of limitations, so this reduction may not apply to you.

WARRANTY REGISTRATION and MISCELLANEOUS

Your warranty registration records should be completed and delivered to the appropriate companies, including the Braun Delivery Checklist & Warranty form. That form must be returned to Braun within twenty (20) days of purchase. The Braun warranty will not be registered unless this warranty registration is completed and received by Braun. Failure to file this warranty registration with Braun will not affect your rights under this limited warranty as long as you can present proof of purchase, but it can cause delays in obtaining the benefits of this limited warranty, and it changes the start date of the warranty to the date of final assembly of the product by Braun.

Braun agrees to repair or replace any of its factory installed parts found to have substantial defects within the appropriate warranty period designated above, provided that the repair is authorized by Braun and carried out by an authorized service center (a Braun labor schedule determines the cost allowance for repairs). Braun will not honor any warranty claim for repairs or replacement of parts unless the claim is submitted with the appropriate paperwork, and the work is completed by an independent, factory authorized service center. The appropriate paperwork can be obtained by written or phone contact with Braun at the contact information in this warranty.

Braun reserves the right to designate where any warranty work can be performed. Braun also reserves the right to examine any defective workmanship or part prior to giving any authorization for warranty work. Braun's return authorization procedure must be adhered to in order to process any warranty claims.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.









FOLDAWAY BV & AM STYLES



Freedman Seating gives you the largest selection of Foldaways in the industry. Whether you need space for luggage or wheel chairs, we have the right seat. Easy to install and easier to operate, our Foldaways will provide you with miles and miles of happy riders and drivers. Maybe we should say, "smiles and smiles". Freedman Seating, "Not just seats – seating solutions."





THE FEATHER WEIGHT SERIES BY

Seating Solutions^{**}

an ISO 9001:2000 certified company

Notch-Back, standard Bench-Back and High-Back are shown.



HIGH-BACK SEAT

Freedman Seating Company's Feather Weight seats are designed to be like feathers on a bird: light and airy to satisfy weight restrictions and ensure a smooth ride, yet durable for years of service and low maintenance.

Freedman Seating Feather Weight seats are the most severely tested in the company's history, and meet all applicable federal motor vehicle safety standards for strength and safety (including 210 for seat belts). Less weight means one thing to bus builders and operators: they can get more passengers per bus. And when we say more passengers, **we mean more happy passengers**.

Not Just Seats –

Seating Solutions

SEATING COMPANY an ISO 9001:2000 certified company



27-1/4 36-1/2 (W/2 U.S. ARMS) (RIGID) 35 23-1/4 6-1/2 17-1/2 (RECLINER) 27-1/4 18-1/2 42-1/4 10 ÷ Щ 18 BUS SPECS ÷ 24 – 30





Cross-country or cross-town, the Freedman Feather Weight High-Back gets you there in safety and comfort. The headrest actually cradles your head, and provides unrestricted viewing. The ultra-thin backrest gives out-standing support and creates more hip-to-knee room than any other seat in its class. The steel frame system meets or exceeds all applicable government standards for safety and durability. And, it's light as a feather!

Feather Weight High-Back features include:

- An ultra-thin Knee-Saver type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17¹/₂" wide seat cushions
- 27¼" back height off the seat cushion, 42¼" off the floor
- Wire mesh-grid seat springs for even support
- FMVSS 210 compliance–all Feather Weight seats are seat belt ready
- · Covers that can be removed and replaced easily and without the use of special tools

Feather Weight High-Back options include:

- Black molded U.S. Arms or upholstered flip-up armrests
- Side grab rail
- U.S.R.—Under
- Mesh map pockets
- Vertical stitching
- FTA foam
- Snack trays
- Aluminum folding footrests
 - Pillow seat cushions
- Pillow headrests
- Seat Retractors 16" or 19" wide
 - seats available
 - Rear row guick disconnect
 - CRS-225 hooks and tethers
 - Side sliders
 - Cup holders
 - Seat belt loops



We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

MID-HI SEAT "ROCK SOLID"

FEATER



Sustainable Seating Solutions

Freedman Seating Company's Feather Weight seats are designed to be like feathers on a bird: light and airy to satisfy weight restrictions and ensure a smooth ride, yet durable for years of service and low maintenance.

Freedman Seating Feather Weight seats are the most severely tested in the company's history, and meet all applicable federal motor vehicle safety standards for strength andsafety (including 210 for seat belts). Less weight means one thing to bus builders and operators: they can get more passengers per bus. And when we say more passengers, we mean more happy passengers.



Seating Solutions ...

THE FEATHER WEIGHT SERIES BY FREEDMAN SEATING COMPANY an ISO 9001:2000 certified company

FEATHER WEIGHT MID-HI SEAT "ROCK SOLID"







4545 W. Augusta Blvd., Chicago, IL 60651 (773)524-2440 (800)443-4540 Fax (773)252-7450 e-mail: sales@freedmanseat.com WWW.FREEDMANSEATING.COM

Sustainable Seating Solutions

Whether your bus is for tour/charter, para-transit, or shuttle, Feather Weight Mid-Hi works for you. Optional adjustable headrests and reclining back-rests give you luxuries for long journeys, while grab rails and ABS plastic backs provide the function and safety required for shorter trips. The ultra-thin backrest gives outstanding support and creates more hip-to-knee room than any other seat in its class. The steel frame system meets or exceeds all applicable government standards for safety and durability. And, it's light as a feather!

Feather Weight Mid-Hi features include:

- An ultra-thin *Knee-Saver* type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17½" wide seat cushions
- $22\frac{1}{2}$ " back height off the seat cushion, 37" off the floor
- Wire mesh-grid seat springs for even support
- FMVSS 210 compliance–all *Feather Weight* seats are seat belt ready
- Transit style-rigid backrests (starting weight without options-43 lbs.)
- Touring style-reclining backrests (starting weight without options-47 lbs.)
- Covers that can be removed and replaced easily and without the use of special tools

Feather Weight Mid-Hi options include:

- Black molded *U.S. Arms* or upholstered flip-up armrests
- Adjustable headrests
- Black or yellow corner AV grab rails
- Black or yellow top AV grab rails
- ABS plastic backs
- Mesh map pockets
- Vertical stitching
- FTA foam
- Snack trays
- Aluminum folding footrests
- Pillow seat cushions
- Rear row quick disconnect
- Side sliders
- 16", 18" or 19" wide seats available
- Rigid or reclining backrests
- Seat belts
 - Non-retracting seat belts
 - Retracting seat belts
 - USR (Under Seat Retractors)
- S3 Bio-Cushions (Made with vegetable oil)
- A wide variety of cloths and vinyls
- S3 cloths (Made with recycled yarn)

We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

ISO 9001:2000 registered





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Also available the ICS-10, for children up to 10 years old.



FREEDMAN



(Integrated Child Seat)

Kids and safety, what could be more important? Nothing!

That's the underlying principle behind the Freedman ICS (Integrated Child Seat) and ICS-10.

The ICS is designed for children from 22–51 lbs. and the ICS-10 can accommodate children up to 10 years old, 22–78 lbs. Both ICS seats are comfortable for adults and safe for children. A tapered back provides unrestricted viewing for drivers, and best of all, the shoulder belts can be adjusted in seconds without taking the seat apart or clumsy operations.

Standard Features:

- Accommodates children 22–51 lbs. (22–78 lbs for the ICS-10)
- Matching companion seat available
- Fold down tongue can be folded to act as a booster seat
- Easily adjustable shoulder straps
- Standard with FMVSS 213 and 210 seat belt anchorage compliance
- Retrofitable; Fits on most Feather Weight frames!

Options:

- Available in a wide variety of vinyls and cloths
- Upholstered or US Arms
- Adjustable footrests
- Freedman USR (Under Seat Retractor)
- Available as a single or double
- Grab rails



We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

EREEDINAN SEATING COMPANY

Passenger Seats Limited Warranty & Sales Terms

WARRANTY:

Freedman Seating Company warrants to the original buyer that its Passenger Seats are free from defects in material and workmanship for the following components:

- Metal Components Five (5) years
- Plastic Components Three (3) years
- Moving Components Three (3) years
- Gas Shock Components One (1) year
- Upholstered Components (foam) Two (2) years

Cover Warranty is for defects in the material or sewing and is limited to replacement covers. It does not include labor:

- One (1) year for Level #1 in-stock FSC material and perforated vinyl
- Two (2) years for Level #3 in-stock FSC material and higher
- No warranty for COM (Customer Own/supplied Material)

The warranty period begins at time of sales to customer or 180 days after shipment from the Freedman Seating

Company's factory to the customer, whichever occurs first.

NON-PRORATED REPLACEMENT:

In the event that a warranty-covered failure should occur within the warranty period, Freedman Seating Company will repair or replace the seat without charge and without prorating, at Freedman Seating Company's option. This is the sole and exclusive remedy for breach of any warranty. Any replacement seat or part is only covered by this warranty for the remainder of warranty period applicable to the original seat.

EXCLUSIONS:

This warranty specifically excludes foam, upholstery material, belts, and items exposed to normal wear and tear such as metal finish and paint and does not apply to any seat that is damaged as result of accident, derailment, improper installation, structural defects, intentional damage, abuse, vandalism, negligence, misuse, improper operating conditions, lack of maintenance, or extreme natural phenomena. Seats exposed to toxic or corrosive materials are excluded from this warranty. Seats exposed to cleaning solutions that are not listed on the Freedman Seating Company Cleaning Guide are excluded from this warranty. This warranty is provided directly to the purchaser only and does not extend to any subsequent party and is solely for the Freedman Seating Company product as it is originally manufactured.

INCIDENTAL, CONSEQUENTIAL DAMAGES, & LIMITATIONS:

This warranty shall be in lieu of any other warranty or terms, expressed warranty or terms, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. The purchaser's sole and exclusive remedy against Freedman Seating Company shall be for the repair and replacement of the defective product as provided herein. No other remedy; including but not limited to incidental or consequential damages for lost profits, lost sales, injury to person or property, shipping, freight, installation, removal, or any other incidental or consequential loss shall be available to the purchaser.

All reports, claims, or notices required by the warranty to be provided to Freedman Seating Company must be in writing and delivered to: Attention – Freedman Seating Company, Warranty Claim Department, 4545 W. Augusta Blvd., Chicago, IL 60630. Repairs being claimed for warranty must be sent to Freedman Seating Company for prior approval and warranty acceptance before any warranty claims can be made. Parts being claimed for warranty must be sent to Freedman Seating Company for prior approval and warranty

acceptance before any warranty claims can be made.

INSPECTION AND VERIFICATION:

The owner must provide access to the failed seat so that Freedman Seating Company's authorized representative can perform an onsite inspection. Alternatively, Freedman Seating Company may ask the owner to ship the failed seat to Freedman Seating Company's laboratory for inspection. Within 30 days of the inspection, either on-site or in the laboratory, Freedman Seating Company will render an opinion as to whether or not the claimed failure is covered by the warranty.

GENERAL MAINTENANCE:

Freedman Seating Company provides the proper maintenance instructions, as well as recommended service intervals with each seat. Warranty is contingent upon documented performance of recommended maintenance and service. All replacement parts should be recommended or authorized Freedman Seating Company components. Failure to purchase proper components will null and void the warranty.

DESIGN:

Freedman Seating Company reserves the right to modify parts and design specifications without notice as long as the seats meet general specifications, unless otherwise committed per contract. In case further non-conforming changes have to be incorporated, Freedman Seating Company will submit such changes to customer for prior approval.

OTHER:

The terms and warranty are contingent upon customers meeting agreed upon payment terms as specified in Freedman Seating Company proposals. Terms and warranty supersede any other terms including but not limited to customer terms printed on the back of Purchase Orders, listed on websites, or other sources from customers.

Warranty - Passenger Seats 1-15

GENI HIGH PERFORMANCE	OPAQUE SER	RIES
A9 PAN	Opaque Choose from 120 high p standard colors includin PANTONE's most specifi	erformance industry J 24 matched to ed colors.
CON	DURABILITY FORMABILITY RINTABILITY ADHESIVE GLOSS TYPE cast vinyl	pound curves / White and Black are now 10-year durable.
A9001 	Cocoa O A9278-O	Sunshine Yellow PANTONE®116 C A9114-0
T Wi A9005	ue Terra Cotta lite A9260-O O	Medium Yellow A9130-0
Matte Wh A9002	ite Imitation O Gold A9250-0	Sunflower A9140-0 32
Cli A9003	Parchment Parchment A9205-O	Dark Yellow A9150-0
Matte Cli A9004	Almond A9210-O	Apricot A9155-O
PANTO Warm Gray A9027	NE* Navajo Beige 2 C -O PANTONE*468 C A9255-0	Orange A9160-O
Light G A9010	ray Beige A9220-O	PANTONE" Orange 021 C A9169-0
Palm Oys A9020	ter Dark Beige A9230-O	Bright Orange A9180-O
Light / G A9025	Ash Dark Taupe PANTONE*466 C •0 A9252-0 ■ + ◆	Tangerine A9315-O
Slate G A9030	ray Sandstone A9265-O	Warm Red A9304-O
Medi G A9035	um ray Buckskin -O	Luminous Red A9318-0
Pew A9050	ter •O A9240-O	PANTONE® Red 032 C A9306-0 ■ X ◆
Silver Shim PANTONE*87 A9065	ner Putty 7 C A9235-0 -0 *	Real Red A9317-O
Dark G A9055	ray -O Process Yellow C A9106-O ■ × ◆	Firecracker PANTONE®485 C A9321-0 ■ * ◆
Medi Marine G A9060	um ray -0 A9102-0	Holiday Red PANTONE®1797 C A9305-0 ■ + ◆
Matte Bi A9080	ack Butter A9105-O	Tomato Red A9325-O
A9090 +•	Lemon Zest PANTONE*109 C A9113-0 ■ × ◆	Fire Red A9345-0
Brc A929	wn Canary FO Yellow A9120-O	Cardinal Red A9330-0

Avery Graphics high performance opaque films are now available in 120 colors including 20 that are also available with Avery Dennison's Easy Apply™ technology. Our A7 Opaque cast film in 12 colors is a great alternative to our industry standard high performance film.



DAIMLER

Premium D/C 756-1D9 / 760-1D9 & Elite D/C 756-1E1 / 760-1E1 Air Suspension Seats



Seat Feature Matrix

Features	760-1DC	756-1J1 760-1J1	756-1J3 760-1J3	756-1D9 760-1D9	756-1E1 760-1E1
Adjustable Seat Fore/ Aft Position	-	Х	х	Х	×
Fore/ Aft Isolation	-	-	х	Х	х
Adjustable Cushion Position	22	<u>u</u>	х	х	х
Recline	-	-	х	х	х
Air Suspension	<u></u>	2	х	Х	х
6 position Front & Rear Cushion adj.		-	π.	х	х
Basic Control Pod	(- 0,	-	х	- 1	2
Stylized Control Pod & Trim	-	Ξ.	-	х	х
Mechanical Lumbar	-	-	х	-	<u>~</u>
Air Lumbar 3 Chamber	-	(三)	1.31	Х	х
Heat	-	-			х
Adjustable Suspension Dampening	<u>12</u>	2	-	Х	х

AL700 Titan Series Systems

With its distinctive blue webbing and highly-visible, yellow "locked" indicator tag, the AL700 Titan Retractor Series lets operators know when the retractor is in locked mode. This auto-tension, auto-lock wheelchair securement system allows operators to quickly secure a wheelchair in seconds — with only one hand. The Titan Retractor System has a low-profile bracket and a sleeker, cleaner retractor case with a stud fitting to attach the occupant restraint system.



Accessories

AL701051

Series L Connector Assembly Kit

This kit converts AL700 Titan Series wheelchair tie-down retractor assemblies to a Series L Track application.



AL701052

Series A Connector Assembly Kit

This kit converts AL700 Titan Series wheelchair tie-down retractor assemblies to a Series A Track application.



AL701053 Solo Cleat Connector Assembly Kit

This kit converts AL700 Titan Series wheelchair tie-down retractor assemblies to a Solo Cleat fitting application.



Standards Compliance

AL700 Titan Series Systems when properly used with a complete Sure-Lok System, comprised of wheelchair tie-down, a complete occupant restraint system (including lap and shoulder belt), track and anchorages are designed to meet the following requirements where applicable:

- 30mph/20g Impact Test Criteria
 per SAE J2249
- 30mph/20g Impact Test Criteria per Canadian Z605 Standard
- 30mph/20g Impact Test Criteria per National Standards for School Buses
- 30mph/20g Impact Test Criteria per ISO 10542 Standard
- 49 CFR Part 38 Americans with Disabilities Act (ADA)
- 49 CFR Part 571.222 (FMVSS 222) School Bus Passenger Seating and Crash Protection
- FMVSS 302 Flammability Test

Certificates of Conformance available upon request.





- 1. The AL700 Titan Series retractors have distinctive blue webbing and a highly-visible, yellow "locked" indicator tag, letting operators know when the retractor is in locked mode.
- S-hook configuration makes it easy for operators to quickly secure a wheelchair in seconds — with only one hand — and keeps webbing flat and untwisted when properly attached to the wheelchair.
- **3.** The low-profile bracket on the AL700 Titan Series retractor is close to the ground and the chrome-plated case provides a cleaner, sleeker appearance.
- 4. Titan's low-profile design minimizes interference with most wheelchairs. With the auto-tensioning feature, webbing automatically retracts into the housing and stays off the floor keeping it cleaner and longer lasting.
- **5.** The stud fitting, located at the top of the retractor case, provides an easy attachment point for integrated occupant restraint systems.

WARNING Always secure the occupant in the vehicle with a complete Sure-Lok Occupant Restraint System, consisting of lap and shoulder belts. Secure the wheelchair in the vehicle with a Sure-Lok Wheelchair Tie-Down System.

AL700 Titan Series Systems

Determine which Titan Retractor System is right for you. Select the Floor Anchor type you have or want installed. Then just order the corresponding kit part number. It's that easy. Retractor assembly part numbers are listed in the chart below and retractor kit part numbers are in the charts on the opposite page. For more information on occupant restraints, refer to pages 16-21.



EXAMPLE OF KIT AL712S-4C




FLOOR ANCHOR TYPE	ATTACHMENT STYLE	KIT PN	PN IN KIT	QTY	OCCUPANT RESTRAINT
L TRACK	S-HOOK	AL712S-4C	AL700855S AL700907S AL700727HA	2 2 1	
A TRACK	S-HOOK	AL715S-4C	AL700857S AL700925S AL700727HA	2 2 1	
SOLO	S-HOOK	AL760S-4C	AL700944S AL700945S AL700727HA FE200922	2 2 1 4	AL700727HA

TITAN RETRACTOR KITS WITH OCCUPANT RESTRAINTS

					4
L TRACK	S-HOOK	AL712S-4C-7	AL700855S AL700907S AL700868-4	2 2 1	AL700868-4
					<i>/</i>

TITAN RETRACTOR KITS WITHOUT OCCUPANT RESTRAINTS

FLOOR ANCHOR TYPE	ATTACHMENT STYLE	KIT PN	PN IN KIT	QTY	OCCUPANT RESTRAINT	
L TRACK	S-HOOK	AL727S-4C	AL700855S AL700907S	2 2	For available Occupant Restraints, refer to pages 16-21.	
A TRACK	S-HOOK	AL728S-4C	AL700857S AL700925S	2 2	WARNING Always secure the occupant in the vehicl with a complete Sure-Lok Occupant Restraint System, consisting of lap and shoulder belts. Secure the wheelchair in the vehicle with a Sure-Lok Wheelchair Tie-Down System	
SOLO	S-HOOK	AL761S-4C	AL700944S AL700945S FE200922	2 2 4		



AccuStyle® & EuroStyle® Series Rearview Mirror Systems



A Century of Automotive Vision Safety

The following pages demonstrate all the advantages of Rosco's dual-lens remote mirrors for the school bus industry. Two distinct sizes and models cover all the needs of a multitude of applications. A list of some major features is shown at bottom right. A variety of heavy-duty breakaway mounting arms are available to satisfy every requirement and budget. (pls see pgs. 13,15)

The AccuStyle® Story

The EuroStyle® Story

The AccuStyle® Series mirrors combine the functionality of the EuroStyle® Series with the unique engineering capability to also be retrofitted to old or new "Loop" style arms. The AccuStyle® mirrors can be mounted on two-point, upright or overhang arms. Although employing light weight materials and construction principles, the heavy duty "spine" structure isolates the mirror from vibrations. In addition, the sleek, aerodynamic shape and light texture lowers wind drag which can lead to cost savings through greater fuel efficiency.

Smooth aerodynamic shape with full rear



Available in two-point mount configuration



Heavy duty spine structure

These masterpieces of design engineering, combine a traditional yet elegant design in an extremely functional and feature-rich package. Advantages range from hidden wiring and fasteners to vibration resistance. Space-age resins and attractive heavy texture finish, combined with stainless steel internal components make these mirrors durable and corrosion proof.



Easy access to connectors



Mirror-Lok system holds mirror glass tightly while allowing for easy replacement

Advanced Features for AccuStyle® and EuroStyle®

- Heavy-duty A.S.A. resin injection-molded housing.
- Aerodynamic styling with no obvious wires or fasteners.
- Available in different sizes with a variety of mounting options.
- Easily replaceable glass. No need for velcro.
- Both flat and convex mirrors separately motorized and heated. Each 4 way adjustable.
- Internal lens or exterior LED turn directionals.
- Available in manual version with fingertip adjustable glass.
- Packaged as components or as complete systems.

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cover for connector and clamp access

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Heavy-duty spine structure



Textured finish hides scratches and fingerprints

- Custom wire harnessing available with many styles of connectors and switches.
- Internal harnessing fed through arm to eliminate unsightly wire ties and protect wiring.
- Available in 12 or 24 volt, heated or unheated.
- Spring-loaded breakaway mechanism on mounts allows for easy return to detent position.
- Patented Spring-Break® Breakaway arm system, dampens vibration.

AccuStyle[®] 815 Series

Rearview Mirror System

Features and Benefits

- Lightweight, vibration reducing design.
- Certified by OEMs to meet FMVSS-111 requirements.
- Same model can be mounted as upright, overhang or two point mount.
- Reduces inventory of replacement parts.
- Aerodynamic, wind tunnel tested profile has lower drag coefficient for increased fuel economy.
- Available motorized or hand adjustable.
- Available with heated and LED turn signal options •
- Each motorized mirror lens is four way adjustable.
- Hidden wire and connectors. •
- Black or chrome finish is available.
- Full height rear entry cap allows for simple installation and ease of maintenance, including access to all wires and harnesses.







AccuStyle[®] 815 series 8"x15" Dual Mirrors

PART NO. DESCRIPTION

815	8″ x 15″ dual mirror, two point mount, motorized, 12 volt
815ELU / 815ERU	8" x 15" dual mirror, upright mount, motorized 12 volt with Left or Right external signal LEDs
815OG	8″ x 15″ dual mirror, overhang mount, motorized, 12 volt
815SL / 815SR	8" x 15" dual mirror, two point mount, motorized 12 volt with Left or Right mirror lens signal LEDs
815SLU / 815SRU	8" x 15" dual mirror, upright mount, motorized 12 volt with Left or Right mirror lens signal LEDs
815SLOG / 815ROG	8" x 15" dual mirror, overhang mount, motorized 12 volt with Left or Right mirror lens signal LEDs
815U	8″ x 15″ dual mirror, upright mount, motorized, 12 volt
CBL815U	8" x 15" dual mirror, upright mount, motorized 12 volt with Left or Right integrated camera
CBR815U	8" x 15" dual mirror, upright mount, motorized 12 volt with Left or Right integrated camera
M815	8" x 15" dual mirror, two point mount, hand adjustable
M815OG	8″ x 15″ dual mirror, overhang mount, hand adjustable
M815U	8″ x 15″ dual mirror, upright mount, hand adjustable

8" x 15" dual mirror, upright mount, hand adjustable

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.



CAP1042

REPLACEMENT PARTS

DESCRIPTION
7" x 9.5" flat mirror glass
7" x 4" convex mirror glass
7" x 9.5" flat mirror carrier and motor assembly
7" x 4" convex mirror carrier and motor assembly
7" x 9.5" flat mirror carrier and hand swivel assembly
7" x 4" convex mirror carrier and hand swivel assembly
Rear access cover for 815 mirror head, two point mount
Rear access cover for 815 mirror head, overhang or upright mt
Grommet, rubber, for 1" tube, no harness hole
Grommet, rubber, for 3/4" tube, no harness hole
Grommet, rubber, for 1" tube, harness hole
Grommet, rubber, for 3/4" tube, harness hole
815 two point mount housing (includes internal spine/clamps)
815 overhang/upright housing (includes internal spine/clamps)
7" x 9.5" flat mirror glass with Left signal LEDs
7" x 9.5" flat mirror glass with Right signal LEDs

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.



AccuStyle[®] 818 Series

Rearview Mirror System

Features	and	Benefits	3
----------	-----	----------	---

- Lightweight,vibration reducing design.
- Certified by OEMs to meet FMVSS-111 requirements.
- Same model can be mounted as upright, overhang or two point mount.
- Reduces inventory of replacement parts.
- Aerodynamic, wind tunnel tested profile has lower drag coefficient for increased fuel economy.
- Oversized 8" x 17" housing provides additional mirror surface.
- Used on all large school and commercial bus types, including conventional and transit style platforms.
- Available motorized or hand adjustable.
- Available heated and with LED turn signal options.
- Each motorized mirror lens is four way adjustable.
- Full height rear entry cap allows for simple installation and ease of maintenance, including access to all wires and harnesses.
- Black or chrome finish is available.

Model 818 with Stainless Steel Arm





818SR/1

AccuStyle[®] 818 series 8"x17" Dual Mirrors

PART NO.	DESCRIPTION
818	8" x 17" dual mirror, two point mount, motorized, 12 volt
818OG	8″ x 17″ dual mirror, overhang mount, motorized, 12 volt
818SLU / 818SRU	8" x 17" dual mirror, upright mount, motorized 12 volt with Left or Right signal LEDs
818SLOG / 818SROG	8" x 17" dual mirror, overhang mount, motorized 12 volt with Left or Right signal LEDs
818U	8" x 17" dual mirror, upright mount, motorized, 12 volt
M818	8" x 17" dual mirror, two point mount, hand adjustable
M818OG	8″ x 17″ dual mirror, overhang mount, hand adjustable
M818U	8" x 17" dual mirror, upright mount, hand adjustable

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.



REPLACEMENT PARTS

DESCRIPTION
7" x 9.5" flat mirror glass
7" x 6" convex mirror glass
7" x 9.5" flat mirror carrier and motor assembly
7" x 6" convex mirror carrier and motor assembly
7" x 9.5" flat mirror carrier and hand swivel assembly
7" x 6" convex mirror carrier and hand swivel assembly
Rear access cover for 818 mirror head, two point mount
Rear access cover for 818 mirror head, overhang or upright mount
Grommet, rubber, for 1" tube, no harness hole
Grommet, rubber, for 3/4" tube, no harness hole
Grommet, rubber, for 1" tube, with harness hole
Grommet, rubber, for 3/4" tube, with harness hole
818 two point mount housing (includes internal spine/clamps)
818 overhang/upright housing (includes internal spine/clamps)
7" x 9.5" flat mirror glass with Left signal LEDs
7" x 9.5" flat mirror glass with Right signal LEDs

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.



EuroStyle[®] 715 Series

Rearview Mirror System

PART NO 715/1 715D/1 715/4 M715/4 M715D/4 CAP

CAP1001 715/SHEL

715SL/1

715SR/1

Features and Benefits

- Certified by OEM's to meet FMVSS-111 requirements.
- Compact 8" x 15" housing reduces forward blind spots.
- Available in upright and overhang configurations.
- Used on all large school and commercial bus types, including conventional and transit style platforms.
- Available motorized or hand adjustable.
- Available heated and with LED turn signal options.
- Hidden wiring and connectors.
- 4-way adjustable motors.
- Available in black textured finish to help conceal surface blemishes such as scratches and road grime.









EuroStyle[®] 715 series 8"x15" Dual Mirrors

PART NO.	DESCRIPTION
715	8" x 15" dual mirror, upright mount, 12 volt motorized
715	8" x 15" dual mirror, upright mount, 12 volt motorized,
715OG	8" x 15" dual mirror, overhang mount, 12 volt motorized
715IOG	8" x 15" dual mirror, overhang mount, 12 volt motorized
715SL / 715SR	8" x 15" dual mirror, upright mount, motorized 12 volt v

715SL / 715SR	8" x 15" dual mirror, upright mount, motorized 12 volt with Left or Right signal LEDs
715SLOG / 715SROG	8" x 15" dual mirror, overhang mount, motorized 12 volt with Left or Right signal LEDs
715T	8" x 15" dual mirror, two point mount, 12 volt motorized
W715	8" x 15" dual mirror, upright mount, hand adjustable
M715OG	8" x 15" dual mirror, overhang mount, hand adjustable
W715T	8" x 15" dual mirror, two point mount, hand adjustable

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.

wired for International switch

, wired for International switch



REPLACEMENT PARTS

	DESCRIPTION
	7″x 9.5″ flat mirror glass
	7″x 4″ convex mirror glass
	7"x 9.5" flat mirror carrier and hand swivel assembly
	7"x 9.5" convex mirror carrier and hand swivel assembly
	7"x 4" convex mirror carrier and hand swivel assembly
	Connector access panel available with various company logos
	Rubber grommet for 715 & 717 series mirrors
L	Shell for 715 mirrors
	7″x 9.5″ flat mirror glass with left signal LEDS
	7"x 9.5" flat mirror glass with right signal LEDS

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.



EuroStyle[®] 717 Series

Rearview Mirror System

Features and Benefits

- Certified by OEMs to meet FMVSS-111 requirements.
- Oversized 8" x 17" housing provides additional mirror surface.
- Available in upright and overhang configurations.
- Used on all large school and commercial bus types, including conventional and transit style platforms.
- Available motorized or hand adjustable.
- Available heated and with LED turn signal options.
- Hidden wiring and connectors.
- 4-way adjustable motors.
- Available in black textured finish to help conceal surface blemishes such as scratches and road grime.





9.5 - 7.0 17.0 6.2

8.0

EuroStyle® 717 series 8"x17" Dual Mirrors

PART NO.	DESCRIPTION
717OG	8" x 17" dual mirror, overhang mount, 12 volt motorized
717IOG	8" x 17" dual mirror, overhang mount, 12 volt motorized, wired for International switch
717U	8" x 17" dual mirror, upright mount, 12 volt motorized
717IU	8" x 17" dual mirror, upright mount, 12 volt motorized, wired for International switch
717SLU / 717SRU	8" x 17" dual mirror, upright mount, motorized 12 volt with Left or Right signal LEDs
717SLOG / 717SROG	8" x 17" dual mirror, overhang mount, motorized 12 volt with Left or Right signal LEDs
M717OG	8" x 17" dual mirror, overhang mount, hand adjustable
M717U	8″ x 17″ dual mirror, upright mount, hand adjustable

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/"

or Add "H" in Front of the "/" When Present.



Model 717SRU

TANTN	0.
717/1	
717D/1	
717/4	
717D/4	
717SL/1	
717SR/1	I
M717/4	
M717D	/4
CAP	
CAP100)1

717/SHELL

10

REPLACEMENT PARTS

DESCRIPTION
7″ x 9.5″ flat mirror glass
7" x 6" convex mirror glass
7" x 9.5" flat mirror carrier and motor assembly
7" x 6" convex mirror carrier and motor assembly
7" x 9.5" flat mirror glass with Left signal LEDs
7" x 9.5" flat mirror glass with Right signal LEDs
7" x 9.5" flat mirror carrier and hand swivel assembly
7" x 6" convex mirror carrier and hand swivel assembly
Connector access panel available with various company logos
Rubber grommet for 715 & 717 series mirrors

Shell for 717 mirrors

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/" or Add "H" in Front of the "/" When Present.



Advanced Options for AccuStyle[®] Mirror Heads AccuStyle[®] with Rear Looking Camera & External Signal LED

Spring-Break[®] and Swivel Arm Breakaway Systems

This line of mounting arms has a unique spring loaded detent mechanism that dampens vibration and keeps the arm locked in position. Heavy-duty aluminum castings sandwich a dual tubular arm for maximum hold with no maintenance requirements.

Tubular arm construction keeps things economical. The arm is concealed inside the AccuStyle® or EuroStyle® mirror housing with concealed fasteners.

Economy models offer breakaway swivel arms, or fixed arms. Fender mount systems are available for Ford, GM, and other cutaway buses.





AccuStyle® Upright with Rear

Looking Camera & LED

Rear Looking Camera

Add Rosco LED side marker lights for omni-directional vehicle alerts to other drivers and pedestrians.

Add Rosco blind spot/wide angle viewing cameras to help driver visibility. The industry's only integrated

mirror camera that adjusts positions with the convex mirror lens adjustment (both manual and remote control).













External Signal LED

Rear Looking Camera

12

E-Z Bracket®

Combination Rearview and Cross View Arm Assemblies Rearview Fender Mount with Spring-Break[®] Detent

Rosco's Unique Mounting and Arm Options HD E-Z Bracket[®] Dual-Wall Breakaway Swivel Arm

Features and Benefits

- Simple and Fast Installation: Rosco's patented E-Z Bracket[®] System makes installation of a Type "A" school bus mirror system easier than ever before (Patent No. 7,055,973).
- The under-the-fender mount utilizes existing fender mounting bolts to secure the mount below the hood.
- Rosco's unique ferrule system transfers the strength of the inner heavy-gage wall to the exterior of the vehicle.
- Installation is completed with three holes instead of as many as twelve.
- Eliminates the large arms and two braces commonly used on passenger side mirrors until now.
- Massive cast aluminum mounting base provides a stable mount for vibration resistance and durability.
- Low-profile construction is aerodynamic and aesthetically appealing.
- Contoured profile matches the fender perfectly for a solid mount that looks great on the vehicle.
- Available for both Ford and GM vehicles.



Ford E-Z Bracket® Installation with Model 815U AccuStyle® and Hawk-Eye® Cross View Combo Assembly



HD E-Z Bracket® Installation Rosco's HD E-Z Bracket® maximizes holding force with OEM inner hood components to simplify installation and minimize vibration.



GM E-Z Bracket® Installation with Model 715 EuroStyle® and Hawk-Eye® Cross View Combo Assembly



Fender Mount Rearview Mirror Assembly with Spring-Break[®] Detent (Non Combination Assembly)



GM E-Z Bracket[®] with Model 815 AccuStyle[®] and Eye-Max® LP Cross View Combo Assembly

Rosco's Dual-Wall breakaway swivel arms allow for unlimited adjustment and positioning of the mirror while rigidifying the connection to the mounting base. The result is a mirror arm that virtually eliminates vibration.







Control Switches & Custom Wire Harnessing

A variety of switches, including heater controls and timers, are available to suit all requirements. Wire harnesses are available from stock or in custom lengths, with many different standard and weatherproof connectors.

- A variety of mirror control switches in various sizes to meet every need.
- Heater control switches available in two types with optional heater timer.
- Illuminated membrane switches with combination heater and remote control for up to four lenses.

Switches and Components

PART NO	DESCRIPTION
SW-1	Remote mirror control switch, 12V lighted, 1.330"x 1.330", 12" harness
SW-3	Remote mirror control switch, 12V, 1.4" diameter, 12" harness
SW-4	Mirror heater toggle switch, 1"x 0.5"
SW-5	Mirror heater momentary switch, 1″x 0.5″
SW-5-HT	Mirror heater momentary switch, with 10 minute heater timer relay
SW-6	Mirror heater toggle switch, 1/2" diameter
HAR5012	Switch Plate Assembly, 2 remote switches and 1 momentary heater switch w/ 10 minute heater timer relay, w/ 10 pin connectors for LED turn signal
HAR5013	Switch Plate Assembly, 2 remote switches and 1 momentary heater switch w/ 10 minute heater timer relay





HAR5012 (H/R/LED) or HAR5013 (H/R





SWI1011

Rosco's family of remote control/heater membrane switches consolidates the function of two "knob" style switches and one heater with auto shut-off switch. The membrane switch combines the switches into a small solid package with illumination, circuit protection and unmatched durability.

PART NO DESCRIPTION

HAR5020 Switch Pod w/toggle heater switch, red illuminated & 2 remote switches

Ford E - Series Driver Door Mounted Switches

HAR5024 Switch Pod w/toggle heater switch, green illuminated

- HAR5029 Switch Pod w/momentary heater switch (red), timer, 2 remote switches
- HAR5032 Switch Pod w/momentary heater switch (red), timer, 2 remote switches, 10 pin connectors for LED mirror turn



Custom Wire Harnessing

- Harnesses can have custom lengths.
- Conductors available in various gauges.
- Durable connection systems for superior harnessing between mirror, arm and switch.
- Weather proof connectors are available and grommets pre-installed on harnesses.
- Connectors from various companies, including: Tyco/AMP, ITT Canon, Delphi Packard and Deutsch, as well as others.
- In house high speed termination equipment provides fast turnaround.
- UL certified wire.
- Miniature connectors allow smaller holes in vehicle body.
- Multi-conductor cabling available in 2-lead for heating only, 4-lead for single motor control and 8-lead for dual motor control and heating.

Mirror Systems **Testing For Compliance** to FMVSS-111

Our AccuStyle® and EuroStyle® rearview mirror systems and front cross view mirror systems (Eye-Max® LP, HD®, Hawk-Eye®), have been certified for compliance to FMVSS-111 by all the major school bus body builders. Companies including IC Corporation, Thomas Built Buses, Blue-Bird, Collins and Girardin, have shown time and again that Rosco mirrors not only meet, but exceed the requirements of FMVSS-111. However, we continue to test and improve our mirrors to make sure that they cover areas around the bus, beyond the requirements of FMVSS-111. We can not rest in this regard, because we know that the safety of our children depends on it.

Proper School Bus Mirror Adjustment

You know your buses are being manufactured with FMVSS-111 compliant mirrors, but how do you know that your mirrors are being properly adjusted? Can you be sure that your drivers are seeing the blind areas around the bus? Are there blind areas around the bus beyond the FMVSS-111 mandated coverage? If these questions are bothering you, then you need to see "Field of Vision", the first video which teaches you how to keep your mirrors properly adjusted at all times. This free video guideline is a perfect addition to your driver training program. It not only shows how to keep your mirrors adjusted in compliance with FMVSS-111, but also how to see blind areas beyond FMVSS-111 regulations.

Email us for your free copy: info@roscomirrors.com

Heater Switches for Ford Switch Pod





Harness Types

- 1. Arm Harness- Concealed inside arm. Can be made very short to plug into a flush mount connector on the exterior of the vehicle or to pass just inside the vehicle skin. Can be made longer to be run all the way to the control switch.
- 2. Intermediate Harness- Joins the arm harness to the switch harness. Advantageous because it can be run before installation of the arm on the vehicle assembly line. Also allows arm to be removed from bus by disconnecting a connector instead of cutting a longer wire. More commonly used on passenger side.
- 3. Switch Harness- Attached to control switch. Often integrates heater control switch. Has leads for power and mirror heater circuits. Usually very short in length.







FIELD OF VISION A video guide to proper school bus mirror adjustment in accordance with FMVSS-111

OTHER INNOVATIVE ROSCO

Fleet Safety Management Continuous Video & Event Recording,

VISION PRODUCTS Backup Safety Products, Cameras & Monitors

Rosco's Dual-Vision[™] XC is the only windshield based camera that offers all the benefits of event based recording with the added benefit of continuous recording. With Dual-Vision™ XC in your fleet has the ability to reduce your liability and insurance premiums. Some Dual-Vision™ XC features include:

- No Monthly Fees
- Up to 160 hours of continuous video on a 32GB SD card
- Tamper proof
- G-Force recognition
- Vehicle speed
- Integrated post route GPS tracking
- Driver panic button
- 24 hour surveillance timer audio, night vision
- Up to 6 camera views
- Wi-Fi download capability and much, much more.





DV231







Maximize your data's potential with our DV-Pro[®] fleet database management system. This software was developed specifically for organizing information captured by Dual-Vision™ XC recording devices. DV-Pro[®] makes it fast and easy to view or transfer footage, archive or discard content and compile reports or email files. DV-Pro $^{\textcircled{R}}$ driver tools give greater control of information generated by high capacity Dual-Vision[™] XC recorders. You can conduct searches based on detailed criteria and guickly make note of key events such as speed overages.

Safety Starts With a Rearview Camera

We cover all the safety angles so your vehicle can backup safely. Replace a standard rearview mirror with one that displays an LCD monitor as soon as the vehicle is shifted into reverse. Or install a rearview mirror backup camera that delivers an unobstructed view of what's behind the vehicle even when it's dark outside. Reduce the risks of moving in reverse. Drivers will be able to maneuver easily in reverse with one of our backup camera kits.





BULLET CAM

STSC109B **REAR LOOK DOWN OR SIDE MOUNT**

MOR-Vision Mirror/Monitor Backup Camera Kits



Rosco Vision Systems introduces a revolutionary new backup camera system (STSK6630) for large school buses and vehicles. This new system utilizes an interior 6" x 30" rearview mirror (STSM630) to display a 7" LCD monitor when the vehicle is in reverse operation. This monitor allows the driver to see behind the vehicle, and once the vehicle is shifted to all other modes of operation a normal full mirror view reappears.

The MOR-Vision series also includes our STSK5530 kit and STSK1030 kit for small and large buses. Buses equipped with MOR-Vision have options for multiple cameras and automatic monitor view changes based on operational conditions of the school bus.

With two camera inputs, the MOR-Vision systems allow for a second camera to be installed for increased visibility and security. Upgrade the MOR-Vision Mirror/ Monitor Backup Camera System with a second interior or exterior camera.



COMPLETE CAMERA KIT





STSC112 LICENSE PLATE CAM



STSC118 INTERIOR DOME CAM



STSC128 UNIVERSAL SIDE CAM



STSK1030 Mirror/Monitor 10" x 30" Backup Camera Kit STSM1030 Monitor, STSC109B Camera, and STSH341 Harness



STSK6630 Mirror/Monitor 6" x 30" Backup Camera Kit STSM630 Monitor, STSC109B Camera, and STSH341 Harness



STSK5530 Mirror/Monitor 6" x 16" Backup Camera Kit STSM530 Monitor, STSC109B Camera, and STSH341 Harness



STSK4530 Mirror/Monitor 6" x 16" Backup Camera Kit STSM230 Monitor, STSC130 Camera, and STSH330 Harness



Rosco was established in 1907. For over a century, our goals have remained the same: We are committed to producing the highest quality automotive products and providing the superior service our customers have grown to expect.

Today, we supply our products to every school bus manufacturer in North America. Our products are designed and built in the USA. Our staff has grown to over two hundred people in facilities totaling over one hundred thousand square feet.

As we move forward we have set our goals even higher. We are now certified to ISO-9001:2008. Our focus on Total Quality Management and continuous improvement will keep our product quality at levels our customers demand.

We will strive to improve our customer service through online and other electronic resources. We will continue to develop newer and better products to serve the ever-changing needs of the marketplace of tomorrow.





A Century of Automotive Vision Safety

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AM|FM|CD Stereo

ST

- Fixed Front Face
- Maximum Power Output: 160 Watts (4x40W)
- CD Player with 40 second Electronic Skip Protection (ESP)

JENSEN

FMI 106.5 5

JBR550

R

CH

MUTE

START

1

RDM

4

BND

SCAN

2

5

RPT

3

6

- · CD Player Functions: Intro, Repeat, Random
- Single Disc CD/CDR/CDRW Playback
- Selectable Electronic AM/FM (US Tuner Only)
- · Electronic Control for volume/Bass/Treble/Balance/Fader
- Time/Frequency Display Selector (T/F)
- · Manual Up/Down and Seek Tuning
- Integrated PA Microphone Input
- Rear Auxiliary Audio Input (RCA left/right)
- · Large user friendly controls and buttons

DESIGNED TO MOVE [YOU]

- Built-in Clock
- Mute
- · Positive LCD Display



1 2 3 3 3 6 6 7 9 9 8



30

AMIFMICD Stereo





Specifications				
General Specifica	tions			
Power System		12 VI	DC	
Operating Voltage R	ange	10 V to	16 V	
	Idle	6 m A	4	
Current Draw @ 12	V Nominal	1.10	A	
	Maximum	10 A	A	
Operating Temperat	ure Range	-4°F to 149°F	-20°C to 65°C	
Storage Temperatur	e Range	-22°F to 158°F	-30°C to 70°C	
Maximum Relative I	Humidity	95%	, D	
Overall Dimensions		7.5" L x 7.4"	7.5" L x 7.4" W x 2.3"H	
Product Weight (unj	oackaged)	3.5 lb	3.5 lbs.	
Performance Spe	cifications			
FM Sensitivity		2	uV	
AM Sensitivity		50	50 uV	
CD Frequency Resp	onse	20 Hz te	20 Hz to 20 kHz	
CD Signal to Noise		>7(>70 dB	
CD Skip Threshold (Random Freq. Profile) 1.	1.5 g	
Compatible CD Formats		Audio CD,	Audio CD, CD-R, R/W	
Output Power	RMS	4 x	4 x 15 W	
Output I ower	Maximum	4 x 4	40 W	
Total Harmonic Distortion @ 1 Watt		<	1%	
Applied Test Suite		ASA I	ASA ES0001	
Regulatory Certifications		FCC P	FCC Part 15B	

TRANSIGN LED DESTINATOR *Electronic Destination Sign Systems For Cutaway and Medium-Duty Bus Applications*

Destinator LED destination sign systems are fully ADA compliant and ideal for use in cutaway bus applications including: university and private transit as well as parking systems and public transit routes.



Features

- Full range of sizes to fit most cutaway designs
- Sign dimensions and viewing areas compatible with industry standard.
- Short lead times
- Efficient robust design
- Easy Installation
- Long-term, hassle-free operation
- Easy to use and program

Benefits

- Affordable
- Easy to program and operate
- Light weight
- Durable
- Attractive
- Easy installation
- Low maintenance

- Programming assistance and training
- ADA compliant fonts
- Lifetime product warranty
- Industry leading OEM and end-user support
- Available in multiple colors
- Unique "LED-Visor" technology for improved readability in bright light



TRANSIGN LED DESTINATORElectronic Destination Sign Systems For Cutaway and Medium-Duty Bus Applications

Specifications

Display and Case Dimensions inches (H x W x D)

Front Sign	Matrix	Display	Case	Weight	Amps
Destinator 612	-16 x 112	6.500 x 44.250	9.500 x 45.750 x 2.250	14.0	3.5
Destinator 696	16 x 96	6.500 x 37.875	9.500 x 39.380 x 2.250	12.0	3.0
Destinator 680	16 x 80	6.500 x 31.625	9.5 00x 33.000 x 2.250	12.0	2.2
Destinator 212	12 x 112	4.875 x 56.805	8.000 x 45.750 x 2.380	12.0	2.7
Side Sign	Matrix	Display	Case	Weight	Amps
Destinator 280	12 x 80	4.875 x 31.625	8.000 x 33.125 x 2.380	10.0	1.9
Destinator 896	8 x 96	3.250 x 37.875	6.380 x 39.380 x 2.010	10.0	1.5
Destinator 864	8 x 64	3.250 x 25.250	6.380 x 26.750 x 2.010	7.5	1.0
Route Sign	Matrix	Display	Case	Weight	Amps
Destinator 648 R	16 x 48	6.500 x 18.94	9.5 x 20.380 x 2.250		
Exterior Rear Sign	Matrix	Display	Case	Weight	Amps
Destinator 648 E	16 x 48	6.500x 18.94	TBD		
Run Number Sign	Matrix	Display	Case	Weight	Amps
Destinator 232 RT	12 x 32	4.875 x 12.625	8.000 x 14.000 x 2.250		0.76

Interior Sign

See representative for details

Operator Control Unit

Up to 999 destinations (pre-programmed by Transign if desired) Every Destinator sign system uses this control unit Double-line message capable Case

5.000 X 8.000 X 1.940



Made in USA

Transign LLC 3777 Airport Rd., Waterford, MI 48329 • P.O. Box 300005, Waterford, MI 48330 Phone: 855.535.7446 Fax 248.623.6400 www.transignllc.com



- Element: Dynamic Microphone
- Directional Characteristic: Uni-directional
- 1 pc. JMIC1 Microphone
- · 20' (fully extended) coiled cable
- Metal Holder
- · Metal wall mounting bracket with hardware

Boom Microphone

- Element: Dynamic Microphone
- Directional Characteristic: Uni-directional
- 1 pc. JMIC1 Microphone
- 18" Metal goose neck with integral microphone cable
- 59" Straight cable length
- Mounting base
- Mounting hardware



JMICBOMFP - Boom Mic and Foot Pedal Kit



JMICHND – Hand Held Microphone

- Momentary push to talk button
- Thumb Wheel variable gain level control
- · Metal mounting clip and hardware
- ASA Standard 4 pin connector
- 8' fully extended coiled cable

Compatible with JENSEN PA500 Universal PA and JENSEN PADIN5 Premium PA/DVD Controller

Compatible with JENSEN JBR550, JHD1620, and JHD3620 bus radios via 31100037 connector

Microphone Extensions also available: 3 ft, 10 ft, and 20 ft.

OEM REPLACEMENT ADAPTERS:

JMICADP: Most MCI, Prevost, Bluebird coaches JIMCADPVH: Most Van Hool Coaches



DESIGNED TO MOVE [YOU] THE

Com



JMICHST – Hostess Microphone



Sensitivity	-72 dB +/- 3 dB		
Frequency Response	50 Hz to 17000 Hz		
Output Impedance	600 Ω +/- 30%		
Operating Temperature Range	-4°F to 158°F	-20°C to 70°C	
Storage Temperature Range	-4°F to 158°F	-20°C to 70°C	
Maximum Relative Humidity	85%		
Overall Dimensions	6.63 " H x " 2.05 " W		
Product Weight (unpackaged)	14.5 oz.		

JMICBOM - Boom Microphone



Sensitivity	-72 dB +/- 3 dB	
Frequency Response	50 Hz to 17000 Hz	
Output Impedance	600 Ω +/- 30%	
Operating Temperature Range	-4°F to 158°F	-20°C to 70°C
Storage Temperature Range	-4°F to 158°F	-20°C to 70°C
Maximum Relative Humidity	85%	
Overall Dimensions (Microphone)	6.63" H x 2.05 " W	
Overall Dimensions (Boom)	21.48" H x 2.74 " W (Base)	
Product Weight (unpackaged)	32 oz.	

JMICHND - Hand Held Microphone







Sensitivity	-74 dB +/- 2 dB	
Frequency Response	100 Hz to 10 kHz	
Impedance	600	Ω
Operating Temperature Range	-4°F to 149°F -20°C to 65°C	
Storage Temperature Range	-22°F to 158°F	-30°C to 70°C
Maximum Relative Humidity	85%	
Overall Dimensions	4.31" H x 1.95" D x 2.29" W	
Product Weight (unpackaged)	9.25 oz.	

Vulcan[™] Series HD2500V ▼ 2.5mm 1080P Camera

CAMERA FEATURES

The versatile Anvil[™] HD2500V camera from AngelTrax features a fully articulated lens casing, adjustable vertically and horizontally, to obtain wide-angle views of the vehicle's interior or exterior and surroundings. Equipped with Super Infrared, automated white balance and digital noise reduction, the Anvil HD2500V camera is capable of capturing astonishingly clear high-definition images day or night.

DIMENSIONS

- Height: 1.5 inches
- Width: 3.4 inches
- Depth: 2.9 inches
- Weight: 0.6 pounds

LENS

- 2.5mm focal length
- 3MP
- CMOS sensor
- Fully articulated lens casing for image orientation

MINIMUM ILLUMINATION

- Color: 1.0 Lux
- B/W: 0.5 Lux
- Sens-up x 60: 0.02 Lux

ELECTRONIC SHUTTER

- NTSC: 1/60s · 1/50,000s
- PAL: 1/50s · 1/50,000s

INFRARED

- Super IR circuit design for auto-exposure control when IR is ON
- Super IR: 98 · 164 feet

DAY AND NIGHT

• External sensor for auto switch between day and night modes

IMAGE CONTROL

- Digital Wide Dynamic Range (DWDR)
- Auto Tracking White Balance (ATW)
- Automatic Gain Control: High



SIGNAL TO NOISE RATIO • S/N > 50db

VIDEO OUTPUT LEVEL

1.0 Vp·p (75 composite)

AUTOMATIC GAIN CONTROL
• Auto

VIDEO COMPRESSION • H.264

IMAGE RESOLUTION • NTSC: 1920 x 1080

IMAGE FRAME RATE • 1920 x 1080@25/30fps

FRAME INTEGRATION • Sens-up: Low

AUDIO • Built-in

OPERATING CONDITIONS

-40°F ~ +158°F (-40° C ~ +70°C)

POWER SUPPLY • DC 12V ± 10%

IP RATING

• IP66

HOUSING/CASING MATERIAL

- Steel
- Anti-vibration
- Vandal-resistant



1/2017 · Specifications, features and applications of use are subject to change without notice.



Vulcan[™] Series HD3600V ▼ 3.6mm 1080P Camera

CAMERA FEATURES

The versatile Anvil[™] HD3600V camera from AngelTrax features a fully articulated lens casing, adjustable vertically and horizontally, to obtain the desired view of the vehicle's interior or exterior and surroundings. Equipped with Super Infrared, automated white balance and digital noise reduction, the Anvil HD3600V camera is capable of capturing astonishingly clear high-definition images day or night.

DIMENSIONS

- Height: 1.5 inches
- Width: 3.4 inches
- Depth: 2.9 inches
- Weight: 0.6 pounds

LENS

- 3.6mm focal length
- 3MP
- CMOS sensor
- Fully articulated lens casing for image orientation

MINIMUM ILLUMINATION

- Color: 1.0 Lux
- B/W: 0.5 Lux
- Sens-up x 60: 0.02 Lux

ELECTRONIC SHUTTER

- NTSC: 1/60s · 1/50,000s
- PAL: 1/50s · 1/50,000s

INFRARED

- Super IR circuit design for auto-exposure control when IR is ON
- Super IR: 98 · 164 feet

DAY AND NIGHT

• External sensor for auto switch between day and night modes

IMAGE CONTROL

- Digital Wide Dynamic Range (DWDR)
- Auto Tracking White Balance (ATW)
- Automatic Gain Control: High



SIGNAL TO NOISE RATIO • S/N > 50db

VIDEO OUTPUT LEVEL

1.0 Vp-p (75 composite)

AUTOMATIC GAIN CONTROL
• Auto

VIDEO COMPRESSION • H.264

IMAGE RESOLUTION • NTSC: 1920 x 1080

IMAGE FRAME RATE • 1920 x 1080@25/30fps

FRAME INTEGRATION • Sens-up: Low

AUDIO • Built-in

OPERATING CONDITIONS

-40°F ~ +158°F (-40° C ~ +70°C)

POWER SUPPLY • DC 12V ± 10%

IP RATING

• IP66

HOUSING/CASING MATERIAL

- Steel
- Anti-vibration
- Vandal-resistant



 $1/2017\cdot$ Specifications, features and applications of use are subject to change without notice.



Vulcan[™] Series V12 HD/IP Mobile DVR

12-CHANNEL DVR

DIMENSIONS

- Height: 3.5 inches
- Width: 8.7 inches
- Depth: 11.6 inches
- Weight: 5.7 pounds

TWELVE (12) A/V INPUTS

8 channels D1, WD1, 720P, or up to 1080P
 + 4 channels IP up to 1080P

VIDEO OUTPUTS

2 channels

AUDIO OUTPUTS

2 channels

CAMERA COMPATIBILITY

- 8 channels D1, WD1, 720P, or up to 1080P (see NTSC)
- 4 channels IP up to 1080P

STORAGE MEDIA

RECORDING MEDIUM

• One (1) 2.5" SATA hard drive and one (1) optional solid-state SD card

CAPACITY

 1TB (standard) up to 2TB (capable) (optional) 64GB SD card up to 512GB

RECORDING OPTIONS

 SD card slot for redundant and sequential recording

INTERFACE

NETWORK DATA CONNECTION • One RJ45 x 1 (10/100 M/1000M)

- EXPANSION
- RS232 × 2, RS485 × 2

GPS INTERFACE

• Built-in, compatible with optional GPS antenna

DRIVER ACTION DETECTION

PANIC BUTTON

- The remote status indicator (panic button) can be connected to show DVR power/record status without using a video monitor
- The driver-operated panic button has the following functions:
 - Solid green LED indicates that the unit has power and is recording
 - Event marker (panic button)

DRIVER ACTION DETECTION WIRES

• 8 signal wires individually programmable to indicate alarm or event



BUILT-IN G-FORCE SENSOR

COMPRESSION FORMAT

- Video: H.264
- Audio: ADPCM, G.711A G.711U

RECORD RESOLUTION

NTSC

 1080P, 720P, WD1(928X480), WHD1(928X240), WCIF(464X240), D1(704x480), HD1(704x240), CIF(352x240)

PAL

 1080P, 720P, WD1(928X576), WHD1(928X288), WCIF(464X288), D1(704X576), HD1(704x288), CIF(352x288)

RECORDING OPTIONS

- **Continuous record:** System will record all channels continuously while vehicle is running (factory setting).
- Alarm record: System will record when an alarm is triggered.
- Motion record: System will record when the cameras detect motion while vehicle is running.
- Schedule record: System will boot and record according to user-selectable schedule.

ELECTRICAL & OPERATING REQUIREMENTS

AUTO ON/OFF DETECTION

ACC detection

DELAY OFF SETTING • user selectable

OPERATING VOLTAGE • 8~36VDC

0 00000

OPERATING TEMPERATURE • -14°F (-25°C) ~ +158°F (+70°C); -40°F (-40°C) ~ +158°F (+70°C) with heater

POWER CONSUMPTION

• 0W-105.3W

POWER SUPPLY

INPUT RANGE

• DC 8-36V

OUTPUT RANGE • DC5V/DC12V

OUTPUT CURRENT

5V@500mA, 12V@500mA

BUILT-IN POWER PROTECTION

LOW VOLTAGE PROTECTION

• User selectable and programmed at installation

HOUSING/CASING

- Removable, shock-mounted
- · Vandal-resistant locking front cover
- Shock-resistant: MIL-STD-810F
- Aluminum
- Optional fan with filter, removable for cleaning

BUILT-IN WI-FI MODULE

OPTIONAL COMPONENTS

- VIRTUAL SYNCHRONIZED MAPPING • External Virtual Synchronized Mapping[™]
- module with North American maps
- Includes GPSV1 antenna
- Embeds GPS tracking information synchronized with recorded video footage

GPS ANTENNA

FIREPROOF BOX BACKUP

CELLULAR MODEM





- s ·
 - Removable
 will record all
 Vandal-res

GENI HIGH PERFORMANCE	OPAQUE SER	RIES	
A9 PA	Opaque Choose from 120 high p standard colors includin PANTONE's most specifi	performance industry g 24 matched to ed colors.	
CON	DURABILITY FORMABILITY PRINTABILITY ADHESIVE GLOSS TYPE Up to 9-year rivets/corrugations, con CAS, thermal transfer permanent solvent 90 cast vinyl	npound curves / White and Black now 10-year dura	are ible.
A900 	/hite 1-0 BL	Sunshine Yellow PANTONE®116 C A9114-0	
W 0069	True Terra Cotta Vhite A9260-O 5-O BL	Medium Yellow A9130-0	
Matte W A900	/hite Imitation Gold Gold GL A9250-0	Sunflower A9140-O	
A900	lear Parchment 3-0 A9205-0	Dark Yellow A9150-0	
Matte C A900	Llear Almond 4-0 A9210-0	Apricot A9155-O	
PANTC Warm Gray A902	Navajo Beige V 2 C PANTONE*468 C A9255-0	Orange A9160-0	
Light (A901	Gray Beige O-O A9220-O	PANTONE* Orange 021 C A9169-0 ■ * ◆	
Palm Oy A902	yster Dark Beige 0-0 A9230-0	Bright Orange A9180-O	
Light A902	Ash Dark Taupe Gray PANTONE*466 C 49252-0 ■+◆	Tangerine A9315-O	
Slate A903	Gray Sandstone A9265-O	Warm Red A9304-O	
Mec A903	dium Buckskin Gray A9270-O 15-O	Luminous Red A9318-0	
Pe A905	wter Camel A9240-0	PANTONE® Red 032 C A9306-0 ■ ★ ◆	
Silver Shin PANTONE®8 A906	Putty 77 C A9235-0 59-0	Real Red A9317-O	
Dark A905	Gray PANTONE® 55-0 Process Yellow C A9106-0	Firecracker PANTONE®485 C A9321-0 ■ × ◆	
Mer Marine A906	dium Gray Sio-O A9102-O	Holiday Red PANTONE*1797 C A9305-0 III + ◆	
Matte E A908	Black Butter 80-0 A9105-0	Tomato Red A9325-O	
A909 	Black Lemon Zest PANTONE*109 C A9113-0 ■ * ◆	Fire Red A9345-0	E.S
B A925	rown 95-0 895-0 895-0 89120-0 822	Cardinal Red A9330-0	

Avery Graphics high performance opaque films are now available in 120 colors including 20 that are also available with Avery Dennison's Easy Apply™ technology. Our A7 Opaque cast film in 12 colors is a great alternative to our industry standard high performance film.





Limited Warranty and Owners Information

GLAVAL BUS LIMITED WARRANTY AND CUSTOMER INFORMATION

GLAVAL BUS Commitment
About this Booklet
Warranty Registration Notice
Warranty Start Date
Who Warrants the Bus
Who Is Covered
What Is Covered
Warranty Period
Other Warranties That May Apply
What Is Not Covered
Exclusions and Limitations
LIMITS OF WARRANTY
PURCHASER'S EXCLUSIVE REMEDY
LIMITATION OF LIABILITY
DISPUTE RESOLUTION
FEDERAL COMPLIANCE
Who Performs Warranty Service
Who Pays For Warranty Repairs
Owner Assistance

GLAVAL BUS Commitment

We are committed to supplying you with a bus that has been designed and manufactured using quality materials and the finest workmanship available to our industry.

We focus on providing the highest standards of quality control over every component that goes into your bus to ensure maximum safety and reliability. Due to our commitment and focus we are able to provide you with one of the longest warranties in the industry.

About this Booklet

This booklet explains in detail the warranty coverage for your bus. This booklet also explains **Owner Assistance** information and information regarding alternative **Dispute Resolution**.

Please note that other warranty coverage's are provided by the chassis and/or other component manufacturers. Review the other manufacturers' warranty manuals for their particular warranty coverage. Refer to **Other Warranties That May Apply**.

We ask that you keep this booklet in your bus for reference and to be available to any repair facility that is providing warranty service. We also ask that you pass this manual on to any future owners.

Warranty Registration Notice

As an Owner your Warranty Registration Start Form must be completed, signed and mailed to GLAVAL BUS. If you do not remember signing the warranty card during the initial delivery please contact your dealer.

The warranty registration helps ensure that we can find you in the event that either GLAVAL BUS or a Component Manufacturer needs to contact you. We must have the company name, owner's name, street address, city, state/province, zip/postal code and telephone number.

This signed form **must** be returned to GLAVAL BUS Warranty Department **before** the GLAVAL BUS Limited Warranty will be in affect.

Note: The GLAVAL BUS Limited Warranty is one of the many express warranties that accompany your bus and are included within your packet of information. Please review the information to be sure you are properly registered with the manufacturers of the chassis and other components. Refer to **Other Warranties That May Apply**.

Warranty Start Date

<u>For a new bus</u> the Warranty Start Date for the GLAVAL BUS Limited Warranty is the day you take delivery of your new bus.

<u>For a GLAVAL BUS Demo</u> the Warranty Start Date for the GLAVAL BUS Limited Warranty is the day you take delivery. However, the Manufacturers' warranties for other components will run from the original in service date for the bus.

For a GLAVAL BUS Dealer Demo the Warranty Start Date for the GLAVAL BUS Limited Warranty is the day the Dealer put the bus into service.

Who Warrants the Bus

Each new bus body is warranted by the manufacturer and installer of the body: GLAVAL BUS, Division of Forest River, Inc., hereinafter referred to as GLAVAL BUS, 914 County Road 1 North, Elkhart, Indiana; and is administered by the GLAVAL BUS Customer Service Department, Elkhart, Indiana 46514.

Who Is Covered

GLAVAL BUS, the warrantor, extends this limited warranty to the original and any subsequent owners of the bus during the WARRANTY PERIOD.

What Is Covered

GLAVAL BUS warrants that each new bus body will be free from defects in any materials or workmanship supplied or performed by GLAVAL BUS that occur under normal use within the applicable warranty period and subject to certain limitations and exclusions as specified in this limited warranty.

Refer to items under **Other Warranties That May Apply**, **Exclusions and Limitations** and **Limits of Warranty**.

Replacement parts provided under the terms of the warranty will whenever possible, match original equipment. When necessary, GLAVAL BUS will substitute parts of comparable function and value. Defective items may be replaced with new, remanufactured, reconditioned or repaired components.

Warranty Period

The GLAVAL BUS Limited Warranty is for a period of five (5) years from the date of first delivery or 100,000 miles, whichever occurs first, **except** for other coverage's listed under this paragraph and items listed under **Other** Warranties That May Apply, Exclusions and Limitations and Limits of Warranty.

Paint and/or Tape application, if performed by GLAVAL BUS, is warranted to be free of substantial defects in workmanship and materials provided by GLAVAL BUS for **1 year (12 months)** from date of first delivery.

Exterior Body parts are warranted against rust-through due to improper application or assembly for two (2) years from date of first delivery, regardless of mileage.

Other Warranties That May Apply

The bus's engine, chassis, drive train, suspension system, battery, and other chassis components are covered by a separate warranty offered by the chassis manufacturer and are administered by the chassis manufacturer's authorized dealers. The tire manufacturer separately warrants tires.

Other components throughout the bus may also be covered by separate warranties from the component manufacturer(s) and administered by the manufacturer(s) and/or their authorized dealers.

If you do not understand the different warranty cards and registrations supplied with your bus please contact your dealer for assistance.

Examples of the other manufacturer warranties. These are subject to change per the manufacturer and there may be others.

Elec. Components Limited Warranty	1 year	Unlimited mileage
Alternators Limited Warranty	1 year	Unlimited mileage
Air Conditioning Limited Warranty	2 year	Unlimited mileage
Heater(s) Limited Warranty	2 year	Unlimited mileage
Electric Door Limited Warranty	1 year	Unlimited mileage
Wheelchair lift		
Braun Limited Warranty	3 year	Unlimited mileage
Ricon Limited Warranty	5 year	Unlimited mileage
Wheelchair tie down	90 days	Unlimited mileage

What Is Not Covered

As stated previously, GLAVAL BUS does not warrant the base vehicle engine, chassis, drive train, suspension system, battery, and other chassis components. These components are covered by a separate warranty offered by the chassis manufacturer and administered by the chassis manufacturer's authorized dealers. The tire manufacturer separately warrants tires.

GLAVAL BUS does not cover any accessory covered by a separate warranty offered and administered by the component manufacturer. Examples of these are listed in "Other Warranties That May Apply."

All items are subject to the terms set forth under "Exclusions and Limitations" and "Limits of Warranty."

Exclusions and Limitations

The GLAVAL BUS Limited Warranty specifically does not extend to the following:

Components that have been Altered, Modified or Substituted

Components or systems which have been modified, altered, substituted or repaired by unauthorized personnel without the written authorization of GLAVAL BUS.

Contact GLAVAL BUS Customer Service before you make any changes to your bus.

Damages resulting from Overloading

Damages that may occur as the result of overloading or uneven weight distribution, including damages to the chassis, frame, and other parts or components, will not be covered and can invalidate portions of the GLAVAL BUS Limited Warranty.

Note: To avoid damage when loading make sure the weight is evenly distributed throughout the unit.

Deterioration from Normal Wear and Tear

Deterioration from normal wear and tear is not covered including, but not limited to, wear and tear to the interior seating, flooring, facing of fabrics, carpeting or windows and exterior body panels, lights, trim, mirrors and other accessories.

Maintenance and Consumable Items

The GLAVAL BUS Limited Warranty does not cover parts and/or consumables needed to maintain the bus including, but not limited to, light bulbs, fuses, wiper blades, batteries, etc.

Damages Caused by Lack of Maintenance

Damages caused by failure to perform regular and reasonable preventive maintenance are not covered including, but not limited to,

- Failure to maintain the paint and/or finishes which can result in rust or corrosion.
- Failure to maintain and flush the underbody to remove salt and other road chemicals which can result in rust or corrosion.
- Failure to yearly inspect undercoating and to replace gouged or missing areas which can result in rust or corrosion.
- Failure to yearly inspect and repair exterior caulk and sealant resulting in leaks.

Damages resulting from Accidents, Abuse or Misuse

Your warranty does not cover damages caused by driver, other people in or around the bus and/or road situations including, but not limited to,

- Accidents, collisions or objects striking the bus (including power washers)
- Negligence
- Theft, vandalism
- Customer applied chemicals or accidental spills.
- Misuse (driving over curbs, etc) or otherwise using the bus in a manner other than its intended purpose.

Damages caused by the Environment

Damages or surface corrosion caused by the environment, exposure to road chemicals or exposure to the elements are not covered including, but not limited to,

- Acid rain, air borne fallout, road salt or other road condition chemicals.
- Tree sap, bird and bee droppings, tree damage
- Natural disasters, flood, fire or explosion, lightning, hail, freezing conditions, or windstorms
- · Acts of war or riot

Damages caused by Road Hazard

Road hazard damage is not covered. It may be necessary for the owner to check and adjust the chassis alignment due to rough road conditions, or hitting curbs, pots holes, etc.

The need for a front suspension alignment is maintenance and not covered under the GLAVAL BUS Limited Warranty.

Stones or rocks and other items hitting into glass and/or the body causing cosmetic damage and/or surface corrosion are not covered.

Other Expenses

GLAVAL BUS does not cover the costs of loss of vehicle use, rental vehicle, interim transportation, storage, payment for loss of time or pay, lost revenue or profits, lodging, meals, transporting of the bus to an appropriate Warranty Service Location for service, travel costs, downtime, or any other incidental or consequential damages or expenses or inconvenience incurred while your bus is out of service due to warranty repair work.

LIMITS OF WARRANTY

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF ANY KIND WHETHER WRITTEN, ORAL, OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IT CANNOT BE AMENDED BY ANY DEALERSHIP, SALESPERSON OR AGENT. THE SOLE OBLIGATION OF GLAVAL BUS UNDER THIS WARRANTY SHALL BE TO REPAIR OR REPLACE AT THE DISCRETION OF GLAVAL BUS, ANY DEFECTIVE COMPONENT OR PART.

PURCHASER'S EXCLUSIVE REMEDY

THIS WARRANTY SHALL BE THE OWNER'S SOLE AND EXCLUSIVE REMEDY AGAINST GLAVAL BUS, WHETHER IN CONTRACT, UNDER STATUTE (INCLUDING STATUTORY PROVISIONS AS TO CONDITIONS AS TO QUALITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF GOODS SUPPLIED PURSUANT TO THE CONTRACT OF SALE), WARRANTY, TORT, STRICT LIABILITY OR ANY OTHER LEGAL THEORY.

LIMITATION OF LIABILITY

THE LIABILITY OF GLAVAL BUS UNDER THIS WARRANTY IS LIMITED TO THE COST TO REPAIR OR REPLACE, IN THE SOLE DISCRETION OF GLAVAL BUS, THE DEFECTIVE COMPONENT OR PART, WHICH IN NO EVENT SHALL EXCEED THE FAIR MARKET VALUE OF THE BUS AT THE TIME THE DEFECT IS DISCOVERED. IN NO EVENT SHALL GLAVAL BUS BE LIABLE ON A CLAIM OF ANY KIND FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO INJURIES TO PERSONS OR DAMAGE TO PROPERTY, LOSS OF PROFITS OR ANTICIPATED PROFITS, OR ANY LOSS OF VEHICLE USE, RESULTING FROM THE OWNERSHIP OR USE OF THE BUS.

DISPUTE RESOLUTION

Should you be unable to resolve a disagreement with your dealer regarding your right to pursue warranty coverage for a needed repair, contact the GLAVAL BUS Customer Service Manager (see address on page 8). If a dispute about warranty service arises between GLAVAL BUS and you, the owner, the disagreement will be resolved in accordance with the customary procedures of the American Arbitration Association relating to commercial transactions, or the dispute will be made up of one member appointed by GLAVAL BUS, one member appointed by the complainant/ owner, and one member from the arbitrators group mentioned above. Any and all legal remedies shall be available to the owner after pursuing this informal dispute resolution if a ruling is entered against GLAVAL BUS and GLAVAL BUS fails to abide the ruling. The expenses of the arbitration will be paid by the party against whom the arbitrator(s) rule.

FEDERAL COMPLIANCE

THE TERMS OF THE WARRANTOR'S UNDERTAKING EXPRESSED IN THIS LIMITED WARRANTY ARE DRAFTED TO COMPLY WITH THE MAGNUSEN MOSS WARRANTY LEGISLATION, P.L. 93-637 OF 1974, AND OTHER APPLICABLE LAW. ANY WARRANTY PROVISIONS PROMULGATED BY THE FEDERAL TRADE COMMISSION PURSUANT TO RULES OR ANY OTHER LAW RELATIVE THERETO ARE EXPRESSLY INCORPORATED HEREIN. TO THE EXTENT ANY PROVISIONS OF THIS LIMITED WARRANTY ARE INCONSISTENT WITH STATE LAWS, ONLY THOSE PARTS INCONSISTENT ARE VOID.

Who Performs Warranty Service

You need to be aware that not all dealers and/or repair facilities are equipped to understand a bus body and/or features.

To obtain warranty service, contact or visit the dealership where you originally purchased your vehicle. Your dealer should be able to meet your service needs or can refer you to another GLAVAL BUS warranty service facility. If you need assistance in locating a servicing dealer and/or repair facility contact GLAVAL BUS Customer Service Department listed below.

Who Pays For Warranty Repairs

When you have warranty work performed by a GLAVAL BUS dealer or a GLAVAL BUS repair facility you will not be charged for the repairs.

Your claim must be made within 30 days of the discovery of the defect. Based on the determination of GLAVAL BUS, and subject to the terms of the warranty, the warranty repair work will be authorized by GLAVAL BUS.

If you prefer a non GLAVAL BUS service facility, or a GLAVAL BUS service center is not available, you may be required to initially pay for the repairs.

Please Note: In the case that you need to stop at or rely on a non GLAVAL BUS repair facility, **before** the repair is started, have the facility call GLAVAL BUS for assistance and authorization. Unauthorized repairs amount could alter your reimbursement.

Once the job is complete send a copy of the paid repair order either by mail or fax along with the authorization number for reimbursement. See below for contact information.

Owner Assistance

Should you ever encounter a problem or issue that is not resolved to your satisfaction with either your dealer or repair facility please contact GLAVAL BUS Customer Service.

Please have available the Vehicle Identification Number or the GLAVAL BUS Unit number when calling and/or include with any written correspondence.

GLAVAL BUS Customer Service 914 County Road #1 North· Elkhart, IN 46514 Phone: 1-800-445-2825 or 574-262-2212 • Fax: 574-264-9036

If we can not resolve the issue to your satisfaction please follow the steps outlined under **Dispute Resolution** on page 7.



OPTRONICS® LED LIFETIME LIMITED WARRANTY



Optronics LED lighting products are warranted for the lifetime of original purchaser from defects in workmanship and/or materials only. Optronics will replace the product to the original purchaser or refund the purchase price if the product fails because of defect due to workmanship and/or materials. This limited lifetime warranty covers every and all diodes within each unit. Connector failure is covered by our three year limited warranty. The LED Lifetime Warranty does not apply to severe applications such as construction or off-road use and does not cover damage resulting from accident, misuse, or abuse. If warrantor is unable to provide replacement and repair is not commercially practicable or cannot be timely made, then warrantor will refund the purchase price. This offer does not constitute in any way a product guarantee and Optronics does not assume any obligations beyond replacement of the product. This warranty is not transferable and applies to the original installation of the product.

INCANDESCENT 3-YEAR LIMITED WARRANTY

Optronics' incandescent 12-volt lighting products are warranted for a period of three years from defects in workmanship and/or materials only. Optronics will replace the product to the original purchaser or refund the purchase price if the product fails because of defect due to workmanship and/or materials within the limited warranty period from the date or lot code printed on the product. If warrantor is unable to provide replacement and repair is not commercially practicable or cannot be timely made, then warrantor will refund the purchase price. This offer does not constitute in any way a product guarantee and Optronics does not assume any obligations beyond replacement of the product. This warranty is not transferable and applies to the original installation of the product.

OPTI-BRITE[™]/MILLENNIUM SERIES[™] LIMITED WARRANTY

Opti-Brite and Millennium Series LED Lights are warranted against leakage and failure to the original retail purchaser for 3 full years (applies only to failed components). Millennium Series chrome-plated bezels are warranted against defects in workmanship for one (1) full year from the original retail purchase date. These warranties do not cover any damage resulting from road hazards, accident, abuse, misuse, corrosive environment, improper installation or other mishandling. Damage includes breakage, wear and tear on the lens, severing of the wiring and/or modification or alteration to any part of the unit. Optronics assumes no responsibility for the cost of installation or removal of any products. Any alteration or modification of the light or the wiring will void the warranty.

CONSPICUITY TAPE LIMITED WARRANTY

Optronics' conspicuity tape products are warranted for a period of seven years from defects in workmanship and/or materials and adhesion failure only. Optronics will replace the product to the original purchaser or refund the purchase price if the product fails within the limited warranty period from the date or lot code printed on the product. If warrantor is unable to provide replacement and repair is not commercially practicable or cannot be timely made, then warrantor will refund the purchase price. This offer does not constitute in any way a product guarantee and Optronics does not assume any obligations beyond replacement of the product. This warranty is not transferable and applies to the original installation of the product.

PRODUCT REPLACEMENT PROCEDURES

To be eligible for Limited Warranty consideration, please contact your local authorized distributor/dealer or Optronics' customer service. Optronics' authorized distributor/dealer has full authority to issue an upfront warranty replacement/credit. If the product is found to be out of warranty at a later date, Optronics' customer service will rebill the customer for the replacement/credit. Customer service will determine if the failed product requires a return to Optronics. If return is required, a RETURN GOODS AUTHORIZATION NUMBER (RGA) will be issued.

THESE WARRANTIES DO NOT COVER DAMAGE RESULTING FROM ACCIDENT, MISUSE, OR ABUSE. CONSEQUENTIAL DAMAGES ARE EXCLUDED UNDER THIS WARRANTY AND ANY IMPLIED WARRANTY, EXCEPT FOR PERSONAL INJURY. THIS WARRANTY IS OFFERED IN LIEU OF ALL OTHER WARRANTIES. HOWEVER, MODIFICATION, LIMITATIONS OR EXCLUSIONS ON IMPLIED WARRANTIES MAY BE UNENFORCEABLE IN SOME STATES. THIS WARRANTY GIVES YOU SPECIFIC



OKLAHOMA

401 South 41st Street East Muskogee OK 74403 Warranty Contact – Leslie Cook Phone – 800-364-5483 ext. 228 Fax – 918-683-9517



INDIANA 3535 Corrie Drive Goshen, IN 46526 Warranty Contact – Kate Wine Phone – 800-826-5483 ext. 119 Fax – 574-389-0041

Up to 45 Passenger Seating

Glaval Bus

D

The Legacy is built on the heavy-duty Freightliner S2C chassis and powered by the proven Cummins 6.7L ISB diesel engine and Allison Transmission. Built with rear air-ride suspension, the Legacy is sure to impress with stylish beauty, outstanding ride quality and rugged durability.

Whether you are looking for first-class transportation or even public shuttle service, the Legacy is just the answer. The Legacy can seat up to 45 passengers and is available with a wide variety of ADA-compliant paratransit options. Also available with rear luggage, overhead and under floor storage, the Legacy has the versatility to fit all of your transportation needs.

Unit shown with optional features

CHASSIS SPECIFICATIONS

Chassis	Freightliner S2C	
Engine	Cummings 6 7L V8 Diesel	
Engine Rating	240 hp ⁻ 560 lb-ft	
GVWR	26.000 lbs	
Alternator	320 Amp	
Fuel System	65 gal or 100 gal depending on wheelbase	
Alternate Fuel	B-20 "BioDiesel" canable	
Transmission	Allison 2200 PTS w/ Park Pawl 5 Speed	
Parking Brako	Air operated w/push and pull knob on dash	
Winors	Intermittent single wiper motor	
Rettory	2 Patteries 1000 CCA total	
Cruise Control	2 Datteries 1900 CCA total	
East Idle	Standard electronic	
Fast fule		
Steering	Adjustable tilt/telescoping	
Wheels	x 7.5" RW steel painted white	
Tires	Michelin XZE 235/80R 22.5 14 ply	
Stereo	Not included. Optional	
Speakers	Total of 8 speakers included in conversion (includes 2 in the drivers area)	
Tow Hooks	Front frame mounted	
Driver's Seat	Bostrom Talladega 910 Highback Air Suspension	
DEF Tank	10 gal	
Rear Axle Ratio	5.13 to 1	
Air System	DV-2 Autodrain valve w/ heater	
Front Axle Rating	10,000 lb	
Front Spring	10,000 lb Tape Leaf	
Rear Axle Rating	19,000 lb	
Rear Spring	21,000 lb Air-Ride Air Liner	
Door Handles/Locks	Manual	
Aux Power	In dash 12-Volt	
Front Bumper	OEM Chrome	
Windshield Washer Reservoir	1 Gallon under hood	



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A Berkshire Hathaway company.

MODEL SPECIFICATIONS

* All Measurements Approximate

FIT -		
Wheelbase	219"/259"/279"	
Overall Length (Bumper to Bumper)	32'/35'/37'/40' (Up to 481")	
Overall Width	96"	
Overall Height (Excludes Escape Hatch or Roof A/C)	Approximately 129" (Overall height can vary depending on bus length, wheelbase and option content)	
Front Overhang	41 3/8"	
Interior Height	78 1/2"	
Interior Width	92"	
Interior Floor Height From Ground	46 1/2"	
Aisle Width	18"	
Clear Door Opening	30"	
Ground to First Step	11"	
Step Riser	9"	
Step Tread	9"	
Step Width	34"	

STANDARD CONVERSION FEATURES

Flat Floor

Vinyl Clad Lauan Ceiling

Curbside Entrance Modesty

• Rear Center Brake Light (LED)

& Interior Sidewalls

Full Track Seating

Panel & Stanchion

Rear Mud Shield

Steel Rear Bumper

(Powder Coated)

Window Drip Rails

White Exterior

Foamed In-Place

Roof Insulation

Front End Alignment

(Toe-In, Toe Out)

- "Steel-Safe" Constructed
- Floor, Roof and Sidewalls
- Galvanized Steel Floor Frame
- Galvanized Steel Stepwell
- Galvanized, All Structure
- 5/8" Treated Plywood
- Flooring Gray Koroseal Commercial
- Flooring w/Ribbed Aisle Cove Moldina Vacuum Laminated
- Construction, Side and Rear
- Fiberglass Front Cap
- 5-Piece ABS Rear Cap
- Fiberglass Composite Roof T-Slide Windows
- Full View Curb Window
- Electic Panel w/
- Diagnostic Fuses
- LED Stepwell Lights Exterior Heated

Double Doors (Lift)

Belt Storage Box

• ADA Signs

Remote Mirrors

PARATRANSIT OPTIONS

- ADA Lighting (Lift and Door) Padding Kit
 - Surelok/Ostraint Tiedowns
- Interlock System

Lift Package Includes: Single Door; Lift; Park Interlock; ADA Signs; Door Activated Lift and Entrance Lighting, Rear Exhaust (Rear or Roadside Exhaust Required on Rear Lift Models.)

5 YEAR/100,000 MILE LIMITED CONVERSION WARRANTY

SPECIFICATIONS AND OPTIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE



32' 33 Passenger plus Driver



35' 33 Passenger with Rear Luggage



37' 24 Passenger with 2 Wheelchair Positions and Mid-Ship Door



40' 36 Passenger with 2 Wheelchair Positions



40' 45 Passenger plus Driver



Driver's Area Shown with Optional Observation Window

- Lift Package, Braun • Lift Package, Maxon
- Lift Package, Ricon

- Under-Coating with Warranty Flat Floor • 30" Electric Door
- All Exterior Lighting (LED) • OEM Battery Box w/

Slide-Out Tray


Final Assembly Location

Glaval Bus 914 County Road #1 North Elkhart, In 46515

Final Assembly Manufacturing Activities Performed

Glaval Bus interconnects the OEM chassis incomplete vehicle consisting of but not limited to engine, transmission, axles, cooling system, heating system, air conditioning system and braking system with our bus body design consisting of but not limited to items and processes listed below. Glaval Bus creates an end product through many manufacturing processes starting with an incomplete vehicle and after adding many different elements and components completes the vehicle as a passenger Bus.

Chassis Cab Alterations

- Remove Chassis Components (Place in Dunnage Box for Re-Installation)
 - Driver and Passenger Seats
 - Remove Seat Belts
 - Remove Sun Visors and Courtesy Light
 - Remove Front Marker Lights
- Rear cab panel sheet metal cut out
- Cab roof panel sheet metal cut out (Removing area to allow more head room)
- Apply Rust Proofing to Cut Edges
- Rear Frame Extensions Added

Floor Assembly and Installation

- Cut all steel for floor assembly
- Weld all steel for floor assembly
- Install floor assembly onto chassis (floor bolted to chassis)

Wall Assembly and Installation

- Cut all steel for wall assembly (roadside and curbside)
- Weld all steel for wall assembly (roadside and curbside)
- Laminate interior, exterior and insulation in a vacuum press (roadside and curbside)
- Install wall assemblies to floor assembly (walls bolted to floor assembly)

Roof Assembly and Installation

- Cut all steel for roof assembly
- Weld all steel for roof assembly
- Laminate interior, exterior and insulation in a compression press
- Install roof assembly to wall assemblies (roof bolted to wall assemblies)

Connection of Body Structure to Chassis Cab

- Install steel tube supports along cab "B" pillar (tubes bolted to "B" Pillar)
- Install steel structure above chassis cab (Upper roof support)
- Install Passenger steps / entry way
- Install steel structure and sheet metal for lower skirt panels
- Installation of plywood flooring
- Installation of flooring (Gerflor, RCA, Altro, etc.)

Exterior ABS and Fiberglass

- Install Front Overhead Cap (fiberglass)
- Install Driver's Side Transition (fiberglass)
- Install Passenger Side Transition (fiberglass)
- Install Rear ABS Caps (3-5 pieces)

Electrical, Heating and Air Conditioning

- Install wiring harnesses for:
 - Interior lighting
 - o Heaters
 - Speakers
 - Destination Signs
 - o Entrance Doors
 - Wheelchair Lift
 - o Interlocks (for wheelchair lifts & emergency rear doors)
 - o Front and Rear marker/clearance lights
 - Rear Stop, Tail and Turn Lights
- Installation of all Electrical items, same as harness requirements
- Install hoses for auxiliary heaters
- Install auxiliary heaters and controls
- Install hoses for auxiliary air conditioning
 - Install auxiliary air conditioning system/s
 - o Condensers
 - o Evaporators
 - Compressors (engine mounted) requires modification of chassis engine components like compressor mount, belts, tensioners, etc.
 - Operation Controls
 - Charge and Test System

Passenger Seating, ADA components, Doors, Windows

- Installation of Seats may include
 - Armrests
 - Headrests
 - Grab Handles
 - Footrests
- Installation of Wheelchair Tie-Downs and Belts
- Installation of Wheelchair Lift
- Installation of Wheelchair Lift Doors (built in-house)
- Installation of Emergency Rear Door (built in-house)
- Installation of Passenger Entry Doors, Step Treads and Door Seals
- Installation or Overhead Grab Rails

- Installation of Entry Grab Rails and Modesty Panels (built in-house)
- Installation of Windows in Walls, Doors and Transitions
- Install Rear Bumper
- Re-Installation of Parts From Dunnage Box

Destination Signage and Interior Panels

- Installation of Front Destination Sign (requires window installed in front Fiberglass cap)
- Side Destination Sign
- Controller (ODK) if applicable
- Installation of Interior Panels
 - o "B" Pillar
 - o Mor/View Panel
 - o Windshield Liner
 - o Front Vertical
 - Entry Door Header
 - $\circ \quad \text{Entry Door Surround} \\$
 - o Light Bar Panels
 - o Finish Trim work

Inspections / Testing/Final Finish

- Inspections performed in three places online
- Inspection performed in Final Finish
- Underbody Sealants Applied
- Front End Alignment (Toe-In / Toe-Out)
- Headlights Aimed
- Unit Weighed and Federal Tags Applied
- Test Drive and Road Inspections Performed
- Water Test Performed
- Paint and Body Damage Repair
- Cleaned and Detailed Inside and Out
- Graphics and Decals Applied
- After all Inspection Write-Ups are Corrected Unit Is Released for Shipment

THE GLAVAL ADVANTAGE

Glaval utilizes a "Steel-Safe" construction to provide superior structural integrity for maximum safety and impact protection. All body structures are fixture welded including the floor, both sidewalls, the roof, and the rear wall. All joints are welded to form the structure with the exception of window radius extrusions which are mechanically fastened. No electrical and electronic subsystem or component will generate, or be affected by, electromagnetic interference or radio frequency interference that can disturb the performance of electrical/electronic equipment as defined in SAE J1113.

Glaval's unique body-to-chassis mounting system provides full length isolation of our floor frame and the chassis frame. This process spreads the load of the body evenly across the frame from front to rear for a unified weight load resulting in less stress on the floor structure and chassis frame, reduction of vibration and road noise, and conforming to SAE standard J366. Each vehicle meets the air pollution control standards of the US Environmental Protection Agency (EPA) and all applicable state and local regulations at time of manufacturing.

CHASSIS SPECIFICATION

MANUFACTURER

Freightliner

STANDARD CHASSIS EQUIPMENT

- Freightliner S2C chassis
- Engine Block Heater
- Front and Rear Sachs Shock Absorbers
- Heavy-duty 320 amp alternator
- Chrome Front Bumper with Chrome Grill
- License Plate Holder Clips in Front Bumper
- Driver & Passenger Sunvisors
- Front Frame Mounted Tow Hooks
- Air ride Driver's Seat
- Tilt Steering Wheel
- Power Steering
- Dual Electric Horns

GVWR

- 26,000
- 32,000

AXLES & SUSPENSION

The front suspension consists of taper leaf springs. The front axle has a maximum load capacity of 10,000 lbs. The rear suspension consists of dual air springs with leveling valves. The rear axle has a maximum load capacity of 23,000 lbs.

ENGINE

A front mounted OEM 6.7L Cummins ISB diesel engine. The engine is certified to all applicable Federal EPA and State of California (CARB) emissions standards at the time of manufacture.

• Diesel engine has a peak horsepower of 240 HP and a peak torque of 560 lbs./ft.

EXHAUST SYSTEM

Exhaust system is OEM aluminized exhaust pipes and muffler properly installed with heat shields and baffles. The tailpipe is designed as to direct exhaust toward the rear of the bus.

FUEL TANK

This chassis has three different fuel tank options; 60 gallon (between the frame rails, 65 gallon (right side mount) or 100 gallon (between the frame rails). The fuel tank must be installed by the chassis manufacturer; fully compliant with California Air Resources Board (CARB) standards and must not be modified in any way.

TIRES & WHEELS

Six identical, white painted, steel belted radial, all-season tires designed for the primary use on "highways" are provided. The tires are rated to meet or exceed the GVWR of the chassis and are designed for the use on the steel wheels provided with each vehicle. All tires must be "dual-planed" or dynamically" balanced and inflated for rated GVWR rating prior to performing any road test. Tire size is 255-70R x 22.5.

TRANSMISSION

The transmission is an Allison 2200 PTS with park pawl 5-speed. A heavy duty auxiliary air to transmission fluid cooler is provided and installed by the chassis manufacturer.

DRIVE SHAFT, STEERING, BRAKES

DRIVE SHAFT

The drive shaft(s) are the largest available and a minimum of 4" in diameter. The drive shaft is easily removed from the bus without the disassembly of the universal joints. Universal joints are equipped with lube fittings. One (1) driveshaft guard per drive shaft section are installed to prevent contact with the undercarriage of the bus and the ground in the case of drive shaft universal joint failure.

STEERING

Each chassis is equipped with power-assisted steering installed by the chassis manufacturer. The steering wheel has tilt function.

BRAKING

The braking system provided complies with FMVSS 105 and 106. It is a hydraulic braking system (with optional air supply) including hydro-boost assisted, anti-lock braking (ABS and disc-type brakes) at both the front and rear axles. All brake friction material is asbestos-free. The parking brake is an air park brake with the control button in the dash.

DRIVER'S CONTROLS & INSTRUMENTATION

The driver's area consists of an ergonomically designed molded dash console and molded driver's console complete with controls and instrumentation. All system control switches are labeled and illuminated. SLF062.06 Page 2 of 10

WINDSHIELD WIPERS & WASHERS

OEM two (2) speed, intermittent electric wipers are provided with variable speed control to allow timed intermittent windshield wiping. Arms are single type, 25" long. Blades are 21" long and park at the lower edge of the windshield. The washer is powered by an electric pump with 1 gallon washer reservoir.

EXTERIOR

FLOOR

4 step- (Flat floor)-The floor structure is constructed of 2" x 4" 13 gauge G-90 galvanized cross members welded on 24" centers. A 2" x 4" galvanized longitudinal tube runs the entire length of the floor above each frame rail and is welded to the cross members. One-piece 14 gauge (minimum) galvanized steel wheel plates are installed over the rear wheels for a flat floor layout.

3 step- (raised wheel wells)-The floor structure is constructed of 2" x 2" 13 gauge G-90 galvanized cross members welded on 24" centers. A 1.5" x 2" galvanized longitudinal tube runs the entire length of the floor above each frame rail and is welded to the cross members.

SIDEWALLS

The roadside and curbside walls are constructed of one 1.5" x 1.5" 18 gauge G-90 galvanized tubes welded on 24" centers. A modified galvanized C-Channel is welded to the bottom of the wall and a 1.5" galvanized angle is welded at the top. The exterior skin is .024" galvanized steel with white exterior face laminated to 2.7 mm lauan. All wall cavities are filled with 1 1/2" block foam insulation. This insulation meets a value of R-7. The interior panels are 3.2 mm gray vinyl covered lauan. The components are vacuum laminated using water activated urethane adhesive. Azdel or exterior FRP are available as upgrades.

ROOF

The roof structure is constructed of 1.5" x 1.5" 18 gauge G-90 galvanized formed bows welded on 24" centers. The roof bows are seated into a 1 1/2" galvanized C-Channel bottom rail. The exterior skin is a one piece, thermoplastic substrate comprised of polypropylene resin reinforced with continuous bi-directional glass fibers, and laminated to 2.7 mm lauan. The cavities of the roof structure are filled with expandable, value R-6, spray foam insulation. The interior panels are 3.2 mm gray vinyl covered lauan. Upgraded Azdel is available upon request. The roof components are compression laminated using a water activated urethane adhesive.

REAR WALL

The rear wall structure is constructed of 1.5" x 1.5" 18 gauge G-90 galvanized tubing. The exterior skin is .024" galvanized steel with white exterior face laminated to 2.7 mm lauan. All wall cavities are filled with 1.5" block foam insulation. This insulation meets a value of R-7. The interior panels are 3.2 mm gray vinyl covered lauan. The components are vacuum laminated using water activated urethane adhesive. Azdel or exterior FRP are available as upgrades.

FIBERGLASS FRONT

The front cap consists of three fiberglass components: a front overhead cap, driver's side transition panel and a curbside transition panel. These panels overlap the roof and sidewalls, and then mechanically fastened at the seams with an aluminum trim and vinyl cover. With the cutaway option, the curbside transition panel has a MOR-view window in it.

SLF062.06

Legacy Build Specifications

DRIVER & PASSENGER STEP

A double step is installed at the driver side cab entry door. If a dual door option is selected, then a double step is installed at the passenger side cab entry door.

ABS REAR CAP

96" wide body- The rear cap consists of five ABS components: a top halo, and an upper and lower vertical panel on each side. These panels overlap the roof and sidewalls and are mechanically fastened at the seams with an aluminum trim and vinyl cover. Each individual panel can be shipped and replaced separately for ease of repair.

102" wide body- The rear cap consists of three ABS components: a top halo, and a vertical panel on each side. These panels overlap the roof and sidewalls and are mechanically fastened at the seams with an aluminum trim and vinyl cover. Each individual panel can be shipped and replaced separately for ease of repair.

ASSEMBLY

The floor structure is bolted to chassis frame mount angles. Frame mount angles are welded flush (facing down) to the bottom side of the floor and another set is welded flush (facing up) to the chassis frame rail. The opposing mounts have a continuous $\frac{1}{4}$ " rubber isolator between and are fastened together using $\frac{1}{2}$ " - 13 grade 5 bolts torqued to 49-59 ft.-lbs. Sidewalls are fastened to the floor structure with $\frac{3}{8}$ " - 16 grade 5 bolts passing through the bottom C-channel into mounting tabs which are welded to the floor cross members every 24". The roof is fastened to the sidewall structures with $\frac{3}{8}$ " - 16 grade 5 bolts passing through the roof C-channel into the sidewall top angle every 24". The rear wall is welded to the sidewall, roof and floor structures at mounting tabs located at points around the perimeter of rear wall. The front cap, rear cap and door seams are trimmed with an aluminum trim channel and white vinyl cover. Any fastener exposed to the elements is constructed of zinc, stainless steel or black oxide.

WINDOWS

WINDSHIELD

The windshield is an OEM one-piece laminated safety glass with an AS-1 rating.

DRIVER WINDOW

The driver's side window is power opening and tempered or laminated safety glass with an AS-2 rating.

PASSENGER WINDOWS

Side passenger windows are transit style 1/8" thick tempered glass with top sliders and a 20% light transmitting tint. The window size is 46.5" W x 32.5" H. An interior clamp ring and a bulb seal allow a water tight fit. Emergency egress windows are constructed in the same manner, but capable of being opened in an emergency situation. They feature a top hinge and heavy duty red handles which when released allow the window to open. Emergency windows are clearly labeled with instructions of operation in a visible location on window. The number of passengers designates the quantity. Filler windows are 20.5", 22.5", 44.5", or 46.5" wide fixed style window. Passenger windows have an AS-3 rating and are compliant with FMVSS 217.

REAR EMERGENCY WINDOW

The rear emergency window is a fixed style 1/8" thick tempered glass egress window. The window size is 60" W x 22 $\frac{1}{2}$ " H with a 20% light transmitting tint, AS-3 rating and FMVSS217 compliant.

DRIP RAIL

A continuous rain gutter is installed along both sides of vehicle ensuring water is diverted from entrance locations.

UNDERCOATING

Every vehicle is undercoated standard with #7960. This sprayed undercoating is a tough, pliable, corrosion protectant material with sound-deadening properties in accordance with chassis manufacturer's guidelines. #7960 is composed of an abrasive free material, formulated with emulsified petroleum, additives and inert fillers. Pure Asphalt Company warrants that that supplied undercoating has been produced in accordance with all applicable specifications and is properly applied by Glaval Bus and will protect the components from rust and abrasion damage for a period of three (3) years from the original sales date.

DOORS

ENTRY

The entry door surround is an integrally welded galvanized construction and installed as a single unit. The components utilized to make up the assembly are a minimum 14 gauge with all welds being treated with cold galvanized spray or other corrosion resistant material. The surround is welded to the wall and floor. Stainless steel surround is available as an upgrade. The entry door consists of dual outward opening panels utilizing an electric controller operable from the driver's seated position, and includes an exterior key switch. The door is constructed of aluminum extrusions which encapsulate the full-length glass, and has an AS2 rating of 70% - 80% light transmission. The doors incorporate center overlapping rubber seals and bottom brush guards. The door's clear opening after install is 30" wide by 87" high. A 40" entry door option is available as an upgrade. On the 4-step (flat floor) model, the ground to first step is approximately 11.5". Step treads are 9.25" and risers are 9.25". On the 3-step (raised wheel wells) model, the ground to first step is approximately 13". Step treads are 10.5" and risers are 9.5". All dimensional data may vary depending on options selected.

LIFT AND/OR REAR DOOR CONSTRUCTION

The door structure is constructed of 1" x 1" and one 1.5" x 1" aluminum tubing with a 2" x 1" center support. Double lift doors and rear door(s) have an exterior skin of .024" galvanized steel with a white exterior face laminated to 2.7 mm lauan. The single lift door has an exterior skin of .060 white FRP laminated to 2.7 mm lauan. All cavities of the door structure are filled with 1" block foam insulation. This insulation meets a value of R-5. All door components are vacuum laminated using water activated urethane adhesive. Interior panels are 3.2 mm gray vinyl covered lauan. There are (2) stainless steel strap hinges per panel and they are attached with stainless fasteners. All hardware is fastened into structural members welded to the inner door frame.

Legacy Build Specifications

LIFT DOOR HARDWARE

Each door panel utilizes a 2-pt locking system. The lift door single panel has a T-style hold open device and plunger. The double door option has a T-style hold open device with a plunger on one leaf, and a gas shock with cable protection on the other. Window(s) are 1/8" thick tempered glass and have an AS3 rating with 20% light transmitting tint. The single door window is 32.5" W x 32.5" H. The double door window is 10" W x 32.5" H. Additional door holds are available upon request.

REAR DOOR HARDWARE

Rear door may be non-emergency or emergency optioned. The door panel utilizes either a 2-pt locking or non-locking system. The door has a gas shock. Optional window(s) are 1/8" thick tempered glass and have an AS3 rating with 20% light transmitting tint. The upper window is 22.5" W x 32.5" H and the lower is 22.5" W x 12.5" H.

INTERIOR

INTERIOR ROOF

The interior liner is installed in a multi-piece design. Alum H-rails are mechanically fastened longitudinally to the roof rails running from front to back. A plastic divider bar is placed horizontally across the rear roof bow and mechanically fastened. Depending upon the liner material used, a wood strip backer or a double-sided foam tape is applied to the back side of the liner. A urethane adhesive is applied to the roof bows. The liner is then placed onto the roof structure and the edges are slid into the plastic divider bars. After all the panels have been placed, they are mechanically fastened into each roof bow. The roof is constructed to prevent vibration, drumming and flexing.

INTERIOR TRIM

The cab ceiling liner is constructed in the same manner as the body liner. The front and sides are trimmed with a combination of ABS and fabric covered plywood.

STANCHIONS

Stanchion assemblies are constructed of 1 1/4" diameter 18 gauge stainless steel tubes and attached to structural members. Stanchions are standard aft of the entry door and aft of a front lift door. A left-hand handrail is incorporated into the entry stanchion assembly and is oriented to follow the slope of the steps to assist passengers when entering or exiting the vehicle. Additional stanchion options are available.

MODESTY PANELS

Modesty panels are constructed of gray Rontex (a fabric/carpet backer material) adhered to a 3/8" plywood panel and trimmed with metal C-channel on exposed edges. These panels are mechanically fastened to stanchion assemblies in the vehicle. A modesty panel is standard aft of the entry door and aft of a front lift door.

96" wide body-	The panel aft of entry is 20"w x 21"h The panel aft of the front lift is 18"w x 21"h.
102" wide body-	The panel aft of entry is 23"w x 21"h The panel aft of the front lift is 18"w x 21"h
062.06	The puller art of the front fift is 10 w x 21 fi.

FLOOR

The floor structure is covered with 5/8" marine tech 7-ply plywood. It is attached with a polyurethane adhesive sealant, and mechanically fastened into the cross members. The floor structure is sealed to keep outside elements from entering the vehicle with expandable, polyure than spray foam. A marine grade $\frac{3}{4}$ " plywood upgrade is available.

FLOOR COVERING

Standard flooring is Gerflor, Sirius Dune, smooth under the seats and smooth throughout the aisle and entry steps with optional colors/manufacturers available upon request. Floors have full-length cove molding, for cleaning ease, extending up to the seat track and trimmed with an aluminum trim. Entry step nosing is white with Gerflor on the sides and vertical risers.

ELECTRICAL

PANEL

The electrical system is designed to provide and distribute 12 Volt DC power to all electrical components in the vehicle. The electrical control panel consists of Intermotive's FlexTech PRPC (Programmable Relay Power Center) with built-in relays and fuses. FlexTech PRPC consists of programmable relay power outputs with LED indicators that illuminate green when activated, and red when an issue occurs on the circuit. The PRPC also includes 10 separate digital inputs and 8 programmable low-current outputs; 7 sourcing and 1 syncing. Outputs can be configured as momentary, latching, flashing or timed. FlexTech expansion boards are installed pending option content and are located to the left of the main power center. The PRPC also includes built-in diagnostic codes utilizing LED lights that illuminate in multiple patterns which help to reduce diagnostic times. FlexTech expansion boards consists of, four 10 amp relay fused outputs, four 1 amp low- current outputs and four active low inputs. FlexTech communicates with Ford, Chevy and Freightliner Controller Area Networks through OBD II as well as J1939, to provide real time chassis data. The electrical panel is installed for easy access above the driver's seat in a compartment with a hinged door and 1/4 turn latch. A wiring diagram (electrical legend) is installed on the interior of the compartment door.

WIRING

All wiring meets FMVSS and SAE regulations, standards and practices. All wiring is cross-linked polyolefin insulated, colored, numbered, and function coded every 6" for positive identification, and meets the requirements of SAE J1127 & J1128, types GXL and SGX. All wiring is installed in convoluted, high-temperature (125°C) and split loom. All loomed harnesses are secured every 12" to structural members to prevent chaffing, cuts, rattling, pinching or any damage to harnesses. All interior connectors are one-way, amp plug-in type connectors. All exterior loomed wire harnesses will have Amphenol-Sine AT Series weatherproof connectors and terminals. All exterior electrical terminations will have Dynatex brand dielectric grease applied to the terminals. The exterior of the connectors will be sprayed with NoCo brand corrosion resistance spray. Primary distribution center typically offers two (2) available ignition slots and two (2) available battery slots for aftermarket add- ons. All harnesses are terminated to ensure proper installation; male connectors and female terminals.

CONSOLE

Add on accessory switches are installed into the OEM switch plate mounted into the driver's dash panel. The switches are backlit and clearly marked with permanent labels. A two cup holder panel is mounted below the switch panel within reach of the driver. **SLF062.06** Page 7 of 10

BATTERY

Standard batteries are dual heavy duty, maintenance free 12 volt DC power with minimum of 1400 cold cranking amps (CCA). Diesel chassis batteries are located within the battery box unless specified otherwise. Gas chassis batteries are located one under hood and one on the chassis frame; however, it is suggested both batteries are relocated into the battery box. The positive and ground battery cables are properly sized per SAE standards and continuously run.

LIGHTING

OEM LIGHTING

Front headlights and turn signals are chassis OEM.

EXTERIOR LIGHTING

All exterior lights are LED type. Exterior lighting consists of the following standard lights.

- Clearance lights
 - \circ Five (5) front amber lights
 - \circ Five (5) rear red lights
 - o Two (2) rear side lower red lights
- Tail lights

• Two (2) round amber turn signals

- o Two (2) round red stop lights
- \circ Two (2) round white back up lights
- Turn signal lights

o Two (2) oval side-mid mount turn signals, one (1) in each skirt.

1. One (1) oval rear center mount red brake light is installed above the rear window/door.

96" wide body- A lighted license plate holder is installed on the roadside lower rear wall. **102" wide body-** A lighted license plate holder is molded into the roadside vertical ABS panel.

INTERIOR LIGHTING

Interior lighting consists of the following standard LED lights.

- Driver's dome light, mounted in the cab area
- Passenger light bars, installed above each window location.

STEPWELL LIGHTING

Two (2) LED lights are installed in the entry step well, one on each side. All stepwell lights meet, or exceeds all Fc (Foot candle) ADA requirements.

REFLECTORS

Reflectors are installed in the following locations.

- Two (2) red on the rear bumper or rear wall
- Two (2) red one under each lower side marker light
- Two (2) amber one under each side mount turn signal (if applicable).

SEATING

DRIVER SEAT

The standard driver seat is OEM supplied. Optional upgrades are available.

SEAT TRACK

A track is installed on the sidewall and the floor for seat installation in locations for optioned seating on orders. This track is welded to the sidewall and floor structures every 24". Slide inserts are placed into this track to fasten the seats.

PASSENGER SEATS

A wide variety of Freedman Seating is available in an array of configurations to meet individual customer needs. Freedman Seating products are designed, built and tested to meet FMVSS requirements including, but not limited to FMVSS 207, 208, 210 and 302.

SEATBELTS

A 74" manual lap belt is included on passenger seats with option upgrades available. Seat belt assemblies meet FMVSS 209, 302 and SAE J386.

WHEELCHAIR EQUIPMENT

LIFT PLATFORM INSTALLATION

A flat steel plate is welded directly onto the floor assembly structure to become the lift platform. Galvanized metal is formed to create a pan and placed onto the flat steel plate. A vinyl backer is adhesively bonded to this platform for noise reduction and insulation. An aluminum trim is then mechanically fastened to the platform and surround for a clean finished look. No plywood is located between the lift and the structure.

LIFT DOOR INSTALLATION

The lift frame surround is built into the sidewall assembly structure. The surround is trimmed with aluminum, which is both adhesively sealed and mechanically fastened. The lift door(s) are attached and fastened into structural steel. Rubber seals are installed around the perimeter of the surround and the entire assembly is sealed.

LIFT INSTALLATION

The wheelchair lift is mounted directly to the steel platform providing superior strength and allowing for constant torque and stability. The lift is installed according to the lift manufacturer's installation instructions. All lift installations meet FMVSS 403 and 404 requirements.

L-TRACK INSTALLATION

The plywood floor is routed out to recess the L-track flush to the floor. L-track is installed with F-type fasteners and standard bolts. The L-tracks are 30" wide per tie-down position, meeting manufacturer's recommended installation instructions and ADA compliance. L-track is installed side to side unless otherwise ordered. Additional tie down options are available upon request.

MISCELLANEOUS

BUMPERS

The front bumper is chassis OEM standard. The rear bumper assembly is 10 gauge black powder coat steel with 4 gauge bumper brackets. It is mounted directly to chassis frame using 1/2" 13 grade 8 bolts.

SKIRTING

The exterior skirting is .024" galvanized steel with a white exterior face. Galvanized angled skirt braces are welded onto the bottom of the wall and cross members. The skirting is placed overlapping the sidewall skin. A polyurethane adhesive is added to the vertical skirt braces. The skirting is then mechanically fastened to the sidewall and to the bottom of the skirt braces. The skirt seam is trimmed with an aluminum retainer with an approximate 1 ¹/₄" aluminum cap.

MUD FLAPS

Glaval trademarked mud flaps are installed rear of the rear wheels allowing for clearance of the tires, exhaust and ground. Mud flaps are fabricated from low density polyethylene, and flap dimensions are 20"w x 37"h. A single front flap can be ordered for the passenger side if required.

MIRRORS

The exterior mirrors are Rosco black exterior finish, manual, heated and breakaway style. The driver's side exterior mirror is installed on the driver's door. The curbside is cab mounted forward of the mor-view. Both assemblies incorporate a flat mirror head and a convex mirror. Additional upgrades are available upon request.

PAINT

The exterior finish is white to match chassis OEM white with optional paint designs available.

VEHICLE ALIGNMENT

Full front end alignment included.

TESTING / CERTIFICATIONS VEHICLE ALIGNMENT

10 year/350K miles Altoona tested FMVSS & CMVSS certified ADA, Ford QVM, & ISO compliant Adheres to chassis body builder guidelines

Glaval Bus individually tests each completed vehicle with two independent road/brake tests. The first road test is approximately 100 miles and the second is approximately 25 miles. Each completed unit also under goes a 15 minute water-leak test, conducted within a specialized water- spray bay area. Any leaks detected are immediately repaired and these units will then undergo a secondary water-leak test.

WARRANTY

Glaval Limited Warranty is 5 yr/100K mile

All dimensional data may vary depending on options selected.



CONSTRUCTION

GLAVAL BUS surrounds the passenger compartment with ribs of steel, then covers that rigid skeleton with a galvannealed steel skin. "STEEL-SAFE" construction is your best protection for both your passengers and your investment in transportation.

GLAVAL BUS

FLEXTECH[©] System

Programmable Electronic Vehicle Control System

FEATURES & BENEFITS

- Controls electrical loads using real-time chassis data
- Customized programming using our Graphical User Interface
- "Simple Matter of Programming" Easy to change vehicle operating characteristics at any point in time
- Reduces wiring, complexity & volume
- Eliminates timers, flashers, latching relays & multi-relay logic
- Speeds production line while simplifying installations
- Fast, efficient adoption of unique customer requests without changing wiring or hardware



OVERVIEW

FlexTech© system when used with the Programmable Relay Center with CAN data uses real-time chassis data to control loads.

FlexTech© system connects electronic modules within an automotive environment on a common control network, thereby reducing overall wiring, centralizing & improving diagnostic capabilities, & sharing valuable vehicle information between modules.

The InterMotive FlexTech© System begins with the Programmable Relay Power Center (PRPC). The Switch Backer Board can communicate with the PRPC & control loads. The Expansion board can be added if you need to control more loads. High idle & Interlock capabilities can be added by plugging in a simple LED panel.



FLEXTECH[©] System

PROGRAMMABLE RELAY POWER CENTER (PRPC) PROGRAMMABLE RELAY POWER CENTER (PRPC)



SWITCH BACKER BOARD (SBB)



EXPANSION BOARD (EXP)



OPTIONAL GATEWAY KIT



- 8 Programmable relay power outputs
- 10 separate digital inputs
- 8 programmable low-current outputs 7 sourcing (0.5 amps), 1 sinking (0.5 amps)
- Outputs can be configured as momentary, latching, flashing or timed
- Easy diagnostics, LED indicators for status of output, blown fuse, ect.
- Piezo buzzer– Programmable audible patters for multiple uses– solid, pulsed
- Easy to program using our Graphical User Interface

SWITCH BACKER BOARD (SBB)

- Controls system inputs & outputs
- Backlighting with optional dimming
- 8 switches per board (ground inputs)
- 8 Load light outputs (0.5 amps)
- 2 Switch backer boards can be used together
- 6 Outputs- 2 (1.0 Amp), 4 (0.5 Amp)
- Compatible with any brand or style of switches
- Dimensions: 7"L x 2.375"W x 1"H

EXPANSION BOARD (EXP)

- 4– 10 Amp relay fused outputs
- ♦ 4– 1 Amp low-current outputs
- 4 Active low inputs
- Loads controlled by the PRPC
- Dimensions: 3"L x 4"W x 1"H

OPTIONAL MODULES

- Gateway– Compliant FMVSS 403/404 wheelchair interlock & fast idle system
- Gateway with Brakemax Compliant FMVSS 403/404 wheelchair interlock & fast idle system with BrakeMax
- AFIS Advanced fast idle system with charge protect & optional A/C auto trigger







LED Interior/Utility Lights







ILL36 SERIES

Opti-Brite™ LED Sealed Dome Light

- Raw lumen output: 400 lm, Effective lumen output: 227 lm
- Low profile surface mount design less than 3/4" thick
- Sealed, waterproof
- Durable polycarbonate construction

465 Floor Mount			
		Model: 465	Part#: 50 000 510
	High performance heater for large areas, lightweight design. 2 speed motor with twin 7" fans. Made with high impact polypropylene.	BTU Heatin 640	g 65,000/CFM
		Dimensions x 9.375"	: 21.5" x 10.5"
		8 Amps @ 1	13.5 Volts
		Weight: 15 I	bs.



2 Year Unlimited/3 Year 75,000 Mile Limited Warranty

ACC Climate Control, hereinafter referred to as "ACC", warrants its products to the original purchaser, subject to normal use and service, for a period of 24 months w/unlimited mileage or 36 months 75000 miles Part only, and while in possession of the original owner. If the in service date is more than 6 months past the build date the warranty will start at 6 month from the build date.

ACC agrees to repair or replace with a new or repaired part, any part of an ACC unit which, after inspection has proven to fail because of a manufacturing defect, within the warranty period. Replacement of a defective part within the warranty period will include labor for replacement at factory established rates in the first 24 months if performed at any authorized Service Center, part only no labor in the third year if less than 75,000 miles. Compensation at factory established rates for loss of refrigerant will be paid only when caused by a defective part and if the defective part itself was under warranty at the time of failure refrigerant is not covered in the third year.

CONDITIONS OF WARRANTY

1. Handling of Warranty Claims.

- A. Should a failure occur to an ACC component under warranty, call ACC at (574) 264-2190 for authorization (**pre-authorization** is required before work is performed) or return the vehicle to the installer or dealer from whom the air conditioning was purchased. Present your copy of the warranty registration card. They will make the necessary repairs to the system or replacement parts as covered by the warranty.
- B. If it is not possible to return to the original dealer, take the vehicle to any convenient ACC dealer and present your Warranty Card. They will contact the factory for authorization for the necessary repairs. Should you be unable to locate an authorized ACC dealer, contact the factory and you will be assisted.
- 2. EXCLUSIONS FROM WARRANTY

THIS WARRANTY SHALL NOT APPLY TO:

- A. Any part or parts of products becoming defective as a result of negligence, accident, or other casualty.
 B. Owner's failure to provide normal maintenance such as lubrication of engine tightening belts cleaning
 - Owner's failure to provide normal maintenance such as lubrication of engine, tightening belts, cleaning coils and return air filters, loss of refrigerant, accumulator/drier replacement, or improper voltage or electrical connections.
- C. Improper installation, repair, or alterations.
- D. Operation in a manner contrary to ACC's printed instructions.
- E. Any parts or products which have been repaired or altered outside of ACC's factory unless specific written authorization for such repair or alteration has been issued by ACC.
- F. Any OEM failures. No additional labor will be allowed for the repair/replacement of OEM failed parts. This warranty does not extend to or include any portions of the vehicle not manufactured by ACC.
- 1. Conditions
 - A. ACC neither assumes nor authorizes any person to assume for it, any obligations or warranty other than stated herein.
 B. ACC reserves the right to make changes in design or improvements of its products or parts thereof without obligations to make
 - Accenter of the restrict of and the restrict of t
 - C. Remedies available to the owner for breach of the A/C Factory Warranty are expressly limited to an action to recover the cost of repairs or replacement due hereunder.
 - D. Repair or replacement of any part or parts of the products under this Warranty shall not extend this Warranty with respect to such repaired or replaced part or parts beyond the warranty period.
 - E. ACC does not warrant the workmanship of the installer and will not bear any cost due to faulty or incorrect installation or shipping damage.
 - F. ACC will not be liable for loss of time, labor, equipment, towing, rental, or other expenses while products are out of service.
 G. ACC shall credit authorized dealers for labor for replacement or repair of defective parts discovered during the warranty period
 - according to the published schedule of labor allowance in the Warranty Policy and Procedures Manual.
 - H. This Warranty shall remain in effect during the warranty period when the equipment is properly installed, serviced and operated under normal conditions according to ACC's instructions.
 - I. Items such as filters, belts, pulleys, , lubricants, etc. are considered expendable and not covered under warranty. Replacement of accumulator/driers and orifice tubes are warrantable only when approved by ACC Climate Control, Inc.
 - All replacement parts are shipped UPS Ground only. Expedited shipping is available at the expense of the purchaser.

ACC DISCLAIMS ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE OF THE VEHICLE, LOSS OF TIME, INCONVENIENCE; EXPENSE FOR TRAVEL, LODGING, LOST INCOME OR REVENUE,

LIMITED TO LOSS OF USE OF THE VEHICLE, LOSS OF TIME, INCONVENIENCE; EXPENSE FOR TRAVEL, LODGING, LOST INCOME OR REVENUE, TRANSPORTATION CHARGES OR LOSS OR DAMAGE OF PERSONAL PROPERTY. SOME STATES DO NOT ALLOW EXCLUSIONS OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSIONS MAY NOT APPLY TO YOU.

THIS WARANTY IS THE ONLY EXPRESSED WARRANTY BY ACC AND NO DEALER OR SERVICE FACILITY IS AUTHORIZED BY ACC TO MODIFY OR EXTEND IT. ANY IMPLIED WARRANTIES, INCLUDING WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, OR WARRANTY OF MERCHANTABILITY, ARE EXPRESSLY LIMITED IN DURATION TO THE SAME PERIOD AS THE EXPRESSED WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS WARRANTY IS NULL AND VOID UNLESS THE WARRANTY REGISTRATION CARD IS COMPLETED AND MAILED TO ACC WITHIN

THIS WARRANTY IS NULL AND VOID UNLESS THE WARRANTY REGISTRATION CARD IS COMPLETED AND MAILED TO ACC WITHIN THIRTY DAYS OF THE DATE OF ORIGINAL RETAIL PURCHASE.IN ADDITION TO THE ABOVE RIGHTS, THE PURCHASER HAS CERTAIN LEGAL REMEDIES PROVIDED BY THE MAGNUSON MOSS WARRANTY ACT, PUBLIC LAW 93-637. YOU MAY ALSO HAVE CERTAIN RIGHTS UNDER STATE LAW.



1-1-2014



MEDIUM DUTY TRANSIT REFERENCES

AGENCY: ADDRESS: TELEPHONE: CONTACT: PROCUREMENT:	FLORIDA DEPARTMENT OF TRANSPORTATION TALAHASSEE, FL. 32399-0450 850-414-4526 CECIL CARTER 600+ LIGHT DUTY FORD/CHEVY TRANSIT BUSES; FEW MEDIUM DUTY FCCC First year built for FDOT was 2002. Glaval has maintained a contract with FDOT form 2002 to 2017's current contract. Multiple vehicles have been and delivered during this span. 600+ LIGHT DUTY FORD/CHEVY TRANSIT BUSES
AGENCY: ADDRESS: PHONE: CONTACT: PROCUREMENT:	FIRST TRANSIT Multiple Locations 412-475-4591 Tom Greaves 50+ MEDIUM DUTY FORD & FCCC First year built for First Transit was 2012. Glaval has delivered 50+ medium duty vehicles from 2013 to 2017.
AGENCY: ADDRESS: TELEPHONE: CONTACT: PROCUREMENT:	ALABAMA DOT MONTGOMERY, AL 36110 334-242-7173 Susan Jana 40+ MEDIUM DUTY FORD TRANSIT BUSES First year built for AL DOT was 2010. Glaval has maintained a contract with AL DOT from 2010 to 2017.
AGENCY: ADDRESS: TELEPHONE: CONTACT: PROCUREMENT:	NORTH CENTRAL REGIONAL TRANSIT DISTRICT ARLINGTON, TX 817-640-3300 KARINA MALDONADO 12+ MEDIUM DUTY FORD First year built for NCRTD was 2014.
AGENCY: ADDRESS: PHONE: CONTACT: PROCUREMENT:	GROOME TRANSPORTATION Multiple Locations 228-234-4085 PAUL BENIGNO 20+ MEDIUM DUTY FORD & FCCC First year built for GROOME was 2011 . Glaval has delivered 30+ medium duty vehicles from 2011 to 2017.

914 County Road 1 North • Elkhart, IN 46514 • 800-445-2825 • 574-262-2212 • Fax: 574-264-4259 • <u>www.glavalbus.com</u>

PURE ASPHALT

MANUFACTURER OF SPECIALTY COATINGS SINCE 1927

3300 W. 31st Street CHICAGO, IL 60623 PHONE: 773.247.7030 FAX: 773.247.7066 WWW.PUREASPHALT.COM

7960 Undercoating

PRODUCT

DATA

DESCRIPTION

A semi-fluid polymer modified waterborne coating for the protection of metal chassis and other underbody components of mobile homes, trailers, utility bodies, bus bodies, RV's and other vehicles. Provides a tough, pliable rubberized coating for protection against abrasion and corrosion. Resists salt, alkalis and seals out moisture. Affords sound deadening and vibration dampening to metal and fiberglass surfaces. This fast drying coating dries tack free and can be top coated.

MATERIALS

7960 is composed of an abrasive free material, formulated with an asphalt emulsion, modified polymer additives and inert fillers.

APPLICATION

7960 can be cold applied with conventional airless spray equipment with a minimum amount of spray back and fogging. #7960 has been formulated for factory "direct to metal" applications to cover, adhere and protect when applied over pickled / oily surfaces and flash rusted metals. Coverage per mil of thickness will be 1600 sq ft. wet film / 800 sq ft per gallon dry film.

APPLICATION EQUIPMENT

31:1 Reciprocating pumps with 40 - 50 lbs of air (For Industrial applications w/ large pumps)

Tip sizes .021 - .029 inches

DRY TIME

7960 will dry to light touch in 20-30 min., and fully cure in 24 hrs @ 70F. Product is formulated to achieve early water and freeze resistance that will be indicated by a change of color from shiny dark gray (when first sprayed) to matte black.

PHYSICAL PROPERTIES

Color	Black
Weight per Gal.	9.4 lbs +or2
Solids by Volume	50%
% Water	49.5%
Volatiles	50% (includes water)
HAPS Content	None – HAPS free
Flash Point	Not Applicable (water based)
V.O.C. Content	Zero (nominal)
Viscosity	Per customer specification & application equipment
Fed Spec. TTC-520-B	Pass
Bend Resistance ASTM D522	Passes 0.5 inch mandrel bend at 0 $^{\Box}$ F
Salt Spray Resistance (B-117)	Passes 1000 hours minimum

PACKAGING

Available in 16-gallon kegs, 55-gallon drums; totes or tankers.

CARE AND CLEAN UP OF EQUIPMENT

Spray guns, brushes and tools used for application, should be immersed in soapy water or mineral spirits when not in use. Dried material can be removed with mineral spirits.

PROTECT FROM FREEZING

The information presented herein is based on the data available and is believed to be correct. However, nothing stated in this bulletin is to be taken as a warranty, expressed or implied regarding the accuracy of the information of the use of our product used singly or in conjunction with other products.

PURE ASPHALT

MANUFACTURER OF SPECIALTY COATINGS SINCE 1927

3300 W. 31ST STREET CHICAGO, IL 60623 PHONE: 773.247.7030 FAX: 773.247.7066 WWW.PUREASPHALT.COM

This product will be permanently damaged if frozen. Please protect from severe weather. Store in a warm place.

PRODUCT

DATA

PURE ASPHALT CO SAFETY DATA SHEET (SDS)

SECTION 1: IDENTIFICATION

Product Name	#7960 Und	lercoating	
Other Names	Water based Protective Coating		
	Underbody	y coating	
Use	Water bas	ed protective coating	
-			
Company	Pure Aspha	alt Co.	
	3455 W. 3	1st Place	
	Chicago, IL	. 60623	
	Tel: (773) 2	247-7030	
	Fax: (773)	247-7066	
Emergency Tel.	ChemTrec	800-262-8200	
	SECTI	ON 2: HAZARD(s) IDENTIFICATION	
GHS HAZARD CLASSIFICATION:			
Physical Hazards		None	
Health Hazards		Acute Toxicity-Oral	Category 5
		Acute Toxicity-Inhalation	Category 5
		Skin Corrosion/Irritation	Category 3
		Eye Damage/Irritation	Category 2B
LABEL ELEMENTS:			
Signal Word	Warning		
Hazard Statements	H303:	May be barmful if swallowed	
	H333:	May be harmful if inhaled	
	H316	Causas mild skin irritation	
	нзэр.		
	11520.		
Precautionary statements			
Prevention			
	P264:	Wash thoroughly after handling.	
Response			
	P312:	Call a POISON CENTER or doctor if you feel unwell.	
	P304+312:	IF INHALED: Call a POISON CENTER or doctor/physician if you	ı feel unwell.
	P332+313:	If skin irritation occurs: Get medical advice/attention.	
	_		

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	 P305+351+ IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if 338: present and easy to do – continue rinsing. P337+313: If eye irritation persists get medical advice/attention.
Storage	
Disposal	P501: Dispose of contents and container in accordance with local, regional, national, and international regulation.
Canadian WHMIS	NA
SECTION	3: COMPOSITION/INFORMATION ON HAZARDOUS INGREDIENTS
Mixture	

Chemical Name	Common Name	CAS number	Percent by weight
Petroleum Asphalt	Asphalt	8052-42-4	30-60%

SECTION 4: FIRST-AID MEASURES		
General Advice	Take off immediately all contaminated clothing. Get Medical advice/attention if you feel unwell. Wash contaminated clothing before reuse.	
Inhalation	Remove person to fresh air and keep comfortable for breathing. Get Medical attention if you feel unwell.	
Skin	Take off immediately all contaminated clothing and wash it before reuse. Wash with plenty of soap and water. If skin irritation or a rash occurs: Get medical advice/attention.	
Еуе	Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do and continue rinsing. If eye irritation persists: Get medical attention.	
Ingestion	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Get Medical advice and/or attention if you feel unwell.	
Most important symptoms/effects, acute and	Eye irritation. Symptoms may include stinging, tearing, redness, swelling and blurred vision.	
delayed	Skin irritation: May cause redness, itching and/or pain. Inhalation of mist/vapors: Prolonged or repeated exposure may cause chronic effects.	
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically.	

SECTION 5: FIRE-FIGHTING MEASURES

This material is water based and is not combustible under normal conditions. If the material is exposed to sufficient heat for sufficient time to evaporate the water, combustion may occur.

Suitable Extinguisher type(s)	Use carbon dioxide (CO2), alcohol foam, water fog or dry chemical to extinguish.
Unsuitable Extinguisher type	Do not use stream or jet of water as this will spread fire.

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Specific hazardous arising from fire.	Vaporized material may form explosive mixture with air. Thermal decomposition (burning) will produce oxides of carbon including carbon monoxide and may also produce irritating, corrosive and/or toxic gases, vapors and fumes.
Special protective equipment for fire fighting.	Self-contained breathing apparatus and full protective gear must be worn in case of fire.
	SECTION 6: ACCIDENTAL RELEASE MEASURES

Leak or spill procedures	Remove all sources of ignition. Provide adequate ventilation.
Containment	Contain and absorb with inert material. (e.g. oil dry, sand)
Cleanup	Dispose in accordance with all local, state and federal regulations.
Precautions	In the event of a large spill, contain material and recover for use if possible. Avoid
	discharge into drains, water courses and the ground.

SECTION 7: HANDLING AND STORAGE		
Storage	Keep away from ignition sources. Keep containers tightly closed. Store in a cool, dry and well ventilated area.	
Handling	Avoid prolonged or repeated skin contact and avoid breathing vapors.	
Incompatible Contaminants	Avoid exposure to oxidizing agents.	

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use with adequate ventilation.
PPE	Eye/Face: Face shield, goggles
	Skin: Chemical protective gloves. Respiratory: Level of exposure needs to be determined. If required, use a particulate
	filter, a NIOSH-approved air purifying respirator with organic vapor cartridge or a
	supplied air respirator.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance	
Form	Viscous Liquid
Color	Dark brown to Black
Flammability Limits	
Upper	Not applicable
Lower	Not applicable
Odor	Mild Petroleum Odor
Odor Threshold	Not Determined
Vapor Pressure at 20°C	2.3 kilopascal
рН	8-10
Vapor Density (air=1)	>1
Evaporation Rate	Not Determined
Specific Gravity, 16°C	>1.0
Melting Point/Range	Not applicable
Boiling Point/Range	212°F (100°C)
Solubility	Dispersible
Partition Coefficient	Not Determined

Flash Point	Not applicable
Flammability	Nonflammable
Auto ignition Temperature	Not applicable
Decomposition Temperature	Not Determined
Viscosity	Time, temperature and shear dependent

SECTION 10: STABILITY AND REACTIVITY

Reactivity	
Chemical Stability	Stable
Other	
Hazardous Reactions	None known
Polymerization	Will not occur.
Conditions to Avoid	Freezing and boiling
Incompatible Materials	None known
Decomposition Hazards	Combustion products: Oxides of carbon, nitrogen, and sulfur and potentially irritating

SECTION 11: TOXICOLOGICAL INFORMATION

Routes of Exposure		
Inhalation	Excessive inhalation of mist may cause blockage of airways.	
Ingestion	Expect low ingestion hazard. Do NOT induce vomiting.	
Skin Contact	Causes mild skin irritation	
Eye Contact	Causes eye irritation	
Delayed, Immediate, and Long		
Term Exposure	None known	
Carcinogenicity	None of the components of this mixture are considered to be a carcinogen by IARC, ACGIH, NTP, OR OSHA.	
	Bitumen fumes generated at paving temperatures in excess of 250°F (120°C) are classified by IARC as "possibly carcinogenic to humans" (Group 2B) but this product is	
	used at ambient temperatures and does not generate fumes.	
SECTION 12: ECOLOGICAL INFORMATION		
Eco toxicity	This mixture contains components that are potentially toxic to freshwater and saltwater ecosystems.	
Environmental Fate	This material may be harmful to aquatic organisms and may cause long term adverse effects in the aquatic environment.	

SECTION 13: DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper handling and disposition for disposal according to local, state, federal and international regulations.

SECTION 14: TRANSPORT INFORMATION

For Industrial/Professional Use Only-Keep out of reach of Children

DOT

No label required. Not regulated for transport.

Proper shipping name: n/a Identification Numbers: n/a Class or Division: n/a Packing Group: n/a Label Codes: n/a Special Provisions: n/a Packaging

Exceptions: n/a Non-Bulk: n/a Bulk: n/a

Quantity Limitations

Passenger Aircraft/Rail: n/a

Cargo Aircraft Only: n/a

Vessel Stowage

Location: n/a Other: n/a

Transport in Bulk according to Annex II of MARPOL 73/78 and the IBC Code

SECTION 15: REGULATORY INFORMATION

TSCA Sara Title III, Section 313 Sara Title III, Section 311, 312 All components are on the TSCA inventory. No, None No, None

SECTION 16: OTHER INFORMATION

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind expressed or implied is made with respect to the information contained herein.



UNDERCOAT DOCUMENTATION

The Glaval Bus undercoat application protects the vehicles most exposed areas from the likes of moisture, dirt, grime, salt and more. It is partnered with a spray foam designed to make things quieter on the inside of your vehicle. Every Glaval Bus receives this treatment from a technician trained in the application to ensure our valued customers acquire a quality product.

The approximately 35' x 50' bay contains a 4 post mobile lifting system. The body is lifted and various areas are masked off. (fuel fill, mud flaps, wheel wells, etc.) A rust preventative is added to the bottom edge of metal skirts (if applicable). A spray foam is applied for additional noise reduction as well as body seam sealing. The underbody is then sprayed with a tough, pliable, corrosion protectant material which incorporates a sound-deadening property at a pressure of 40 psi. The application runs between 45 minutes to 1 ½ hours based upon vehicle length.

Glaval Bus follows the guidelines established by QVM. No undercoating is sprayed within 12" of the exhaust system or on fuel fill/vent hoses, fuel tank(s), driveshaft, steering dampener, or shock absorbers.

A log is signed, dated, and kept on file for review in the undercoat area. Undercoating and spray foam data are available upon request. Visitors are always welcome to witness the application when in operation.



914 County Road 1 North • Elkhart, IN 46514 • 800-445-2825 • 574-262-2212 • Fax: 574-264-4259 • www.glavalbus.com

Limited Warranty

For Pure Asphalt Company Undercoating Applied to Glaval Buses

Warranty: Pure Asphalt Company warrants that the supplied undercoating has been produced in accordance with all applicable specifications and as properly applied by Glaval Bus will protect the components from rust and abrasion damage for a period of **three (3) Years** from the original sales date.

Coverage: In the unlikely event that refurbishing is required due to rust or abrasion damage within the terms of this warranty, Pure Asphalt Co. will provide replacement undercoating, advise the owner of proper refurbishing method and reimburse costs for the reapplication. This warranty applies to the original purchaser/ owner of the bus.

Limitations: Damage resulting from misuse, alteration, negligence; additional coatings applied over the factory coating; collision, dents, scratches, trailer modifications, or fair wear and tear; exposure to fire, excessive heat, chemicals, explosion or natural disasters are excluded from this warranty. Incidental and consequential damages or other additional liabilities are not included or covered under this warranty.

Claim Procedure: If corrosion or abrasion damage appears to have occurred within the terms of this warranty, owner shall contact Glaval Bus who will in turn notify Pure Asphalt Co. to arrange for refurbishment. Pure Asphalt Company has the right to inspect the vehicle and will make the final determination as to whether the repairs are authorized under this warranty.

Pure Asphalt Company 3300 W. 31st St. Chicago, IL 60623 PH: 773-247-7030 Web: pureasphalt.com





5/17/2017

Re: PTR170000007 - 9.39 Training

Creative Bus Sales has read section 9.39 Training, and understands the requirements. If awarded, Creative Bus Sales will, at its own expense, conduct two one day training sessions at two different locations. The Division will arrange a venue and registration.

Qualified instructors will perform training geared towards both drivers and mechanics. The agenda for the trainings will include all requirements listed in section 9.39.

Sincerely,

Marcus Hoffman Transit Bid Manager (602) 571-4475 marcush@creativebussales.com





