



The following documentation is an electronically-submitted 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.

Header 5

List View

**General Information** | [Contact](#) | [Default Values](#) | [Discount](#) | [Document Information](#) | [Clarification Request](#)

Procurement Folder: 1089736

Procurement Type: Central Master Agreement

Vendor ID: VS0000004719

Legal Name: Rohrer Enterprises Inc

Alias/DBA:

Total Bid: \$0.00

Response Date: 10/12/2022

Response Time: 9:13

Responded By User ID: TClawson

First Name: Teresa

Last Name: Clawson

Email: tclawson@rohrerbus.com

Phone: 800-735-3900

SO Doc Code: CRFQ

SO Dept: 0810

SO Doc ID: DMT2300000004

Published Date: 9/21/22

Close Date: 10/12/22

Close Time: 13:30

Status: Closed

Solicitation Description: Mid Size, Medium Duty Cutaway Bus

Total of Header Attachments: 5

Total of All Attachments: 5





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

State of West Virginia  
Solicitation Response

**Proc Folder:** 1089736  
**Solicitation Description:** Mid Size, Medium Duty Cutaway Bus  
**Proc Type:** Central Master Agreement

| Solicitation Closes | Solicitation Response        | Version |
|---------------------|------------------------------|---------|
| 2022-10-12 13:30    | SR 0810 ESR10122200000001848 | 1       |

**VENDOR**  
VS0000004719  
Rohrer Enterprises Inc

**Solicitation Number:** CRFQ 0810 DMT2300000004  
**Total Bid:** 0  
**Response Date:** 2022-10-12  
**Response Time:** 09:13:41  
**Comments:**

**FOR INFORMATION CONTACT THE BUYER**  
David H Pauline  
304-558-0067  
david.h.pauline@wv.gov

**Vendor**  
**Signature X** **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

| Line | Comm Ln Desc                      | Qty     | Unit Issue | Unit Price     | Ln Total Or Contract Amount |
|------|-----------------------------------|---------|------------|----------------|-----------------------------|
| 1    | Mid Size, Medium Duty Cutaway Bus | 0.00000 | EA         | 9957020.000000 | 0.00                        |

| Comm Code | Manufacturer | Specification | Model # |
|-----------|--------------|---------------|---------|
| 25101502  |              |               |         |

**Commodity Line Comments:** Thank you for the opportunity to respond to this Bid.  
David M Clawson  
Senior Vice President  
Rohrer Bus Sales

**Extended Description:**

See Attached Exhibit A Pricing Page  
To establish an open ended contract for Mid-Size, Medium Duty Cutaway Buses o provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

# ROHRER

School & Commercial Bus Sales

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October 12, 2022

Department of Administration  
Purchasing Division  
2019 Washington St. E  
Charleston, WV 25305

RE: CRFQ DMT2300000004 Mid-Size, Medium Duty Cutaway Bus

Dear Mr. Pauline,

Rohrer Bus Sales appreciates the opportunity to submit a proposal for RFQ DMT23\*04 Mid-Size Medium Cutaway Bus. Our offerings, a Champion Defender mounted on a Freightliner SC2 chassis meets the intent and letter of your specifications with the following documentation, clarifications and/or explanations set forth in the RFQ.

Items to be uploaded to WVOasis:

Letter and Enclosure 1

Exhibit A Pricing Page

Enclosure 2

Signed Bid Forms and Documents,  
No Debt Affidavit  
Addendum Acknowledgement

Enclosure 3

Technical Proposal and Supporting  
Documentation from Check list

Enclosure 4

Champion complete description and Altoona Test

Enclosure 5

Misc. Documentation  
Company History  
Service and Parts  
Copy of Proposed Warranty

Item to be Addressed:

1. Section 3.4.2 calls for the shift control to automatically engage the parking brake when placed in the "P" position. Freightliner Custom Chassis no longer offers this feature. The vehicle will be built to fully meet ADA requirements, the primary reason for auto engage.

Please contact us immediately at (800) 735-3900 if any additional documentation is required.  
Thank you for your consideration.

Thanks,

*David*

David M Clawson  
Senior Vice President of Sales



**ROHRER**

1.800.735.3900 x 1363

540.729.3751 Cell

717.957.4884 Fax

[dclawson@rohrerbus.com](mailto:dclawson@rohrerbus.com)

Enclosures:(5)

# CRFQ DMT23\*04 - Exhibit A PRICING PAGE

## Mid-Sized Medium Duty Transit Vehicles

VENDOR Rohrer Enterprises dba Rohrer Bus Sales

Manufac Forest River/Champion

| Class | Item Description  | Unit Price<br>Per Vehicle | Estimated<br>Quantity | Extended Price        |
|-------|---|---------------------------|-----------------------|-----------------------|
| A     | Bus; Rear Air Suspension  | \$216,890.00              | 8                     | \$1,735,120.00        |
| B     | Bus; Rear Air Suspension; Extended length +4                          | \$221,390.00              | 8                     | \$1,771,120.00        |
| C     | Bus; Rear Air Suspension; Extended length +8                          | \$227,260.00              | 8                     | \$1,818,080.00        |
| D     | Bus, Automatic Tire Chain Devices; full bus paint                     | \$227,000.00              | 5                     | \$1,135,000.00        |
| E     | Bus, Automatic Tire Chain Device; Extended length +4, full bus paint  | \$232,900.00              | 5                     | \$1,164,500.00        |
| F     | Bus, Automatic Tire Chains Device; Extended length +8, full bus paint | \$239,640.00              | 5                     | \$1,198,200.00        |
| G     | Bus; Automatic Tire Chain Device: full bus paint;                     | \$227,000.00              | 5                     | \$1,135,000.00        |
|       |   |                           | <b>TOTAL</b>          | <b>\$9,957,020.00</b> |

*\*Complete Form provided.*

*\*Please note these are only estimated quantities and do not reflect any guarantee of purchase.*

*\*The WV DPT may purchase more or less as needed.*





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

State of West Virginia  
Centralized Request for Quote

|   |                            |                         |                                 |
|---|----------------------------|-------------------------|---------------------------------|
| <b>Proc Folder:</b> 1089736                               |                            |                         | <b>Reason for Modification:</b> |
| <b>Doc Description:</b> Mid Size, Medium Duty Cutaway Bus |                            |                         |                                 |
| <b>Proc Type:</b> Central Master Agreement                |                            |                         |                                 |
| <b>Date Issued</b>  | <b>Solicitation Closes</b> | <b>Solicitation No</b>  | <b>Version</b>                  |
| 2022-09-13  | 2022-09-29 13:30           | CRFQ 0810 DMT2300000004 | 1                               |

|   |
|---|
| <b>BID RECEIVING LOCATION</b>   |
| BID CLERK<br>DEPARTMENT OF ADMINISTRATION<br>PURCHASING DIVISION<br>2019 WASHINGTON ST E<br>CHARLESTON WV 25305<br>US |

|  |                      |                    |
|--|----------------------|--------------------|
| <b>VENDOR</b>  |                      |                    |
| <b>Vendor Customer Code:</b> VS0000004719                                      |                      |                    |
| <b>Vendor Name :</b> Rohrer Enterprises, Inc. DBA Rohrer Bus Sales             |                      |                    |
| <b>Address :</b> 1515 State Road PO Box 100                                    |                      |                    |
| <b>Street :</b>  |                      |                    |
| <b>City :</b> Duncannon  |                      |                    |
| <b>State :</b> PA  | <b>Country :</b> USA | <b>Zip :</b> 17020 |
| <b>Principal Contact :</b> David M Clawson, Senior Vice President Sales        |                      |                    |
| <b>Vendor Contact Phone:</b> 1800-735-3900/540-729-3751 <b>Extension:</b> 1363 |                      |                    |

|   |
|---|
| <b>FOR INFORMATION CONTACT THE BUYER</b>                  |
| David H Pauline<br>304-558-0067<br>david.h.pauline@wv.gov |

|   |                         |                      |
|---|-------------------------|----------------------|
| <b>Vendor Signature X</b>  | <b>FEIN#</b> 23-2059976 | <b>DATE</b> 10-12-22 |
|---|-------------------------|----------------------|

All offers subject to all terms and conditions contained in this solicitation



**ADDITIONAL INFORMATION**

The State of West Virginia Purchasing Division, is soliciting bids for the West Virginia Division of Public Transit to establish an open ended contract for Mid-Size, Medium Duty Cutaway Buses to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles at the WV Div of Public Transit 1550 4th Ave, Charleston, WV 25324. per the attached documentation.

\*\*\*\*Federal Terms and Conditions Apply\*\*\*\*

**INVOICE TO**

PUBLIC TRANSIT DIVISION  
OF  
BLDG 5 RM 663

1900 KANAWHA BLVD E  
CHARLESTON WV  
US

**SHIP TO**

PUBLIC TRANSIT DIVISION  
OF  
KANAWHA VALLEY  
REGIONAL  
TRANSPORTATION  
AUTHORITY  
1550 FOURTH AVE  
CHARLESTON  
US

WV

| Line | Comm Ln Desc                      | Qty     | Unit Issue | Unit Price    | Total Price |
|------|-----------------------------------|---------|------------|---------------|-------------|
| 1    | Mid Size, Medium Duty Cutaway Bus | 0.00000 | EA         | See Exhibit A |             |

| Comm Code | Manufacturer | Specification | Model # |
|-----------|--------------|---------------|---------|
| 25101502  | Champion     | Defender      | S2C     |

**Extended Description:**

See Attached Exhibit A Pricing Page

To establish an open ended contract for Mid-Size, Medium Duty Cutaway Buses to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

**SCHEDULE OF EVENTS**

| Line | Event  | Event Date |
|------|--|------------|
| 1    | Vendor Technical Questions Due 11:00 am est. | 2022-09-20 |

REQUEST FOR QUOTATION – CRFQ DMT23\*04  
Mid-Size – Medium Duty Cutaway Bus

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**BID FORM #1**

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:** Ryan Renninger

**Address:** 1515 State Road PO Box 100

Duncannon, PA 17020

**Telephone:** 800-735-3900

**Name:** David M Clawson

**Address:** 2075 B West Main Street

Waynesboro, VA 22980

**Telephone:** 540-729-3751

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

**Name:** Rohrer Bus Sales

**Address:** 1515 State Road PO Box 100

Duncannon, PA 17020

**Telephone:** 800-735-3900

**Name:** N/A

**Address:**

**Telephone:**

**BID FORM #2**

**CERTIFICATION FOR AIR & WATER POLLUTION**

The Vendor certifies that the vehicles proposed:

**ARE** X 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.

10-12-22

Date



Authorized Signature

Senior Vice President Sales

Title

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales  
Company Name



**BID FORM #3**

**DISADVANTAGED BUSINESS ENTERPRISE  
VENDORS/ MANUFACTURERS CERTIFICATION**

**(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.

10-12-22

Date



Authorized Signature

Senior Vice President Sales

Title

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales  
Company Name

REQUEST FOR QUOTATION – CRFQ DMT23\*04  
Mid-Size – Medium Duty Cutaway Bus

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**BID FORM #4**

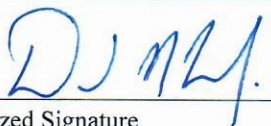
**BUY AMERICA CERTIFICATION  
ROLLING STOCK**

**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:

10-12-22

Date



Authorized Signature

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales

Company Name

David M Clawson

Name

Senior Vice President Sales

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

**BID FORM #5**

**FEDERAL MOTOR VEHICLE  
SAFETY STANDARDS CERTIFICATION**

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.

10-12-22

Date



Authorized Signature

Senior Vice President Sales

Title

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales

Company Name



REQUEST FOR QUOTATION – CRFQ DMT23\*04  
Mid-Size – Medium Duty Cutaway Bus

---

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


Rohrer Enterprises, Inc. DBA Rohrer Bus Sales hereby certifies that it

       **IS or**

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

10-12-22

Date

  
\_\_\_\_\_  
Authorized Signature

Senior Vice President Sales

Title

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales  
Company Name

---

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

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

- 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.)

27th

Signature and Title of Authorized Official

REQUEST FOR QUOTATION  
Passenger Type Dual Rear Tire Van (Non-Raised Roof)

---


**BID FORM #8**

***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.

10-12-22

Date



Authorized Signature

Senior Vice President Sales

Title

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales

Company Name

**SPECIFICATION COMPLIANCE**

NOTE: Please check if what is offered is in exact compliance with specifications. **Any discrepancies required 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.**

X

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.



REQUEST FOR QUOTATION  
Passenger Type Dual Rear Tire Van (Non-Raised Roof)

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**BID FORM #9**

**CERTIFICATION OF RESTRICTIONS ON LOBBYING**

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

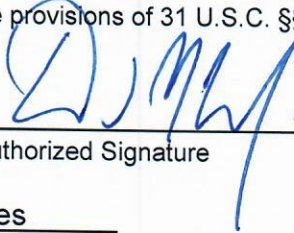
1. No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress regarding 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) Rohrer Enterprises, Inc. DBA Rohrer Bus Sales, 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.

10-12-22

Date

  
Authorized Signature

Senior Vice President Sales

Title

REQUEST FOR QUOTATION  
Passenger Type Dual Rear Tire Van (Non-Raised Roof)

---

**BID FORM #10**

**REQUIRED BID DOCUMENTATION CHECKLIST**

Model Year: 2023

Model: Champion Defender

**Bid Forms**

- ☒ 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
- ☒ Exhibit A Pricing Page



STATE OF WEST VIRGINIA  
Purchasing Division

## PURCHASING AFFIDAVIT

**CONSTRUCTION CONTRACTS:** Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

**ALL CONTRACTS:** 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 exceeds 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: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, 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: Rohrer Enterprises, dba Rohrer Bus Sales

Authorized Signature: [Signature] Date: 10-12-22

State of Virginia

County of Augusta, to-wit:

Taken, subscribed, and sworn to before me this 12 day of October, 2022.

My Commission expires June 30, 2026.



NOTARY PUBLIC

[Signature]





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

State of West Virginia  
Centralized Request for Quote

Proc Folder: 1089736

Doc Description: Mid Size, Medium Duty Cutaway Bus

Reason for Modification:

Addendum No. 1

Proc Type: Central Master Agreement

| Date Issued | Solicitation Closes | Solicitation No         | Version |
|-------------|---------------------|-------------------------|---------|
| 2022-09-21  | 2022-10-12 13:30    | CRFQ 0810 DMT2300000004 | 2       |

BID RECEIVING LOCATION

BID CLERK  
DEPARTMENT OF ADMINISTRATION  
PURCHASING DIVISION  
2019 WASHINGTON ST E  
CHARLESTON WV 25305  
US

VENDOR

Vendor Customer Code: VS0000004719

Vendor Name : Rohrer Enterprises, Inc. DBA Rohrer Bus Sales

Address : 1515 State Road PO Box 100

Street :

City : Duncannon

State : PA

Country : USA

Zip : 17020

Principal Contact : David M Clawson, Senior Vice President Sales

Vendor Contact Phone: 1800-735-3900/540-729-3751 Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline  
304-558-0067  
david.h.pauline@wv.gov

Vendor  
Signature X

FEIN# 23-2059976

DATE 10-12-22

All offers subject to all terms and conditions contained in this solicitation

**ADDITIONAL INFORMATION**

Addendum No. 1

To respond to vendor technical questions, see attached  
To made changes to the specifications or modify specifications, see attached.  
To move bid opening date to October 12, 2022, at 1:30 pm est.

No other changes.

\*\*\*\*Federal Terms and Conditions Apply\*\*\*\*

**INVOICE TO**

PUBLIC TRANSIT DIVISION  
OF  
BLDG 5 RM 663

1900 KANAWHA BLVD E  
CHARLESTON WV  
US

**SHIP TO**

PUBLIC TRANSIT DIVISION  
OF  
KANAWHA VALLEY  
REGIONAL  
TRANSPORTATION  
AUTHORITY  
1550 FOURTH AVE  
CHARLESTON WV  
US

| Line | Comm Ln Desc                      | Qty     | Unit Issue | Unit Price | Total Price |
|------|-----------------------------------|---------|------------|------------|-------------|
| 1    | Mid Size, Medium Duty Cutaway Bus | 0.00000 | EA         |            |             |

**Comm Code****Manufacturer****Specification****Model #**

25101502

**Extended Description:**

See Attached Exhibit A Pricing Page

To establish an open ended contract for Mid-Size, Medium Duty Cutaway Buses o provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

**SCHEDULE OF EVENTS**

| <u>Line</u> | <u>Event</u>                                 | <u>Event Date</u> |
|-------------|--|-------------------|
| 1           | Vendor Technical Questions Due 11:00 am est. | 2022-09-20        |

|               |                |                                   |           |
|---------------|----------------|-----------------------------------|-----------|
|               | Document Phase | Document Description              | Page<br>3 |
| DMT2300000004 | Draft          | Mid Size, Medium Duty Cutaway Bus |           |

**ADDITIONAL TERMS AND CONDITIONS**

See attached document(s) for additional Terms and Conditions



# SOLICITATION NUMBER: CRFQ DMT2300000004

## Addendum Number: 1

The purpose of this addendum is to modify the solicitation identified as CRFQ DMT2200000004 to reflect the change(s) identified and described below.

### Applicable Addendum Category:

- ☒ Modify bid opening date and time
- ☒ Modify specifications of product or service being sought
- ☒ To respond to technical questions
- ☐ Attachment of pre-bid sign-in sheet
- ☐ Correction of error
- ☐ Other

### Additional Documentation:

1. To respond to vendor technical questions, see attached
2. To made changes to the specifications or modify specifications, see attached responses to questions which contain the specification changes.
3. To move bid opening date to October 12, 2022, at 1:30 pm est.
4. No other changes.

### Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

## **CRFQ 0810 DMT 23-4**

### **Vendor Questions / Agency Responses:**

**Question:** Please require the use of Docket 90 for the vinyl upholstery and have the polyurethane foam completely encapsulated by the vinyl, also please approve the use of Docket 90 Vinyl for this sonication.

**Answer:** The Division is requiring the use of Docket 90 for all vinyl upholstery and have the polyurethane foam completely encapsulated.

**Question:** Will the Division allow the Solicitation Due date to be moved to October 12, 2022?

**Answer:** The Division will move the Solicitation Due date to October 12, 2022.

**Question:** Section 3.1.11 Water Test. Will the Division allow the use of our Rain Booth as approved equal for water leakage testing?

**Answer:** The Division will allow the use of the Rain Booth testing as equal.

**Question:** Section 3.2.8 will the Division accept the use of Intermotive Interlock as an approved equal?

**Answer:** The Division will accept Intermotive Interlock as approved equal.

**Question:** Section 3.8.8 Rear End Alignment, please accept that a rear end alignment is not available on a Freightliner Chassis.

**Answer:** It is understood that a Rear End Alignment isn't available on this type of vehicle.

**Question:** Section 3.11.6 please accept the OEM powder coated battery box and tray as an approved equal.

**Answer:** The Division will accept the power coated battery box and tray as equal.

**Question:** Section 3.11.6 will the Division accept one OEM master disconnect switch rather than 2 disconnect switches?

**Answer:** The Division will accept the one OEM disconnect switch as equal.

**Question:** Section 3.14.1 Body Construction please accept our Body Construction: Manufactured from all aluminized steel products, the floor, roof, side walls, rear wall, driver halo assembly and entry door assembly are all wire welded (MIG) together to form an integral aluminized steel frame that is thoroughly coated in our primer paint shop, then mounted with specified hardware to the rubber body mount points (pucks) supplied by the chassis manufacturer. Once joined to the chassis, the bus finishing process begins.

**Answer:** The Division will accept this method of body construction as equal.

**Question:** Section 3.14.3 please accept T-140 Aluminized Steel case as approved equal?

**Answer:** The Division will accept this request as equal.

**Question:** Section 3.14.3 please accept ZPG-9902S Anti-Corrosion as equal?

**Answer:** The Division will accept this request as equal.



**Question:** Section 3.14.4 will the Division accept that exterior materials will be zinc coated, nickel coated, or stainless steel in lieu of being painted to provide “additional corrosion protection?”

**Answer:** The Division will accept this request.

**Question:** Section 3.14.13 will the Division accept Gavaneal Steel as equal?

**Answer:** The Division will accept Gavaneal Steel as equal.

**Question:** Section 3.17.1 Undercoating will the Division accept Z Guard 9902 Star for the undercoating of each vehicle?

**Answer:** The Division will accept Z Guard 9902 for the undercoating.

**Question:** Section 3.19.6 is a rear door required?

**Answer:** A rear door isn't necessary.

**Question:** Section 3.20.5 will the Division accept Trans Air TA777132 Dual Super 10,15 CID Compressor Air Conditioning System as an approved equal?

**Answer:** The Division will accept Trans Air TA777132 Dual Super 10,15 CID Compressor Air Conditioning System as an approved equal?

**Question:** Section 3.24.4 Stepwells and walkways will the Division accept Gerfor Sirius Graphite Flooring and step nosing in a color to contrast?

**Answer:** The Division will accept this as approved equal.

**Question:** Section 3.25.5 is a stanchion pole required behind the rear most passenger seat?

**Answer:** The Division will remove Section 3.25.5

**Question:** Section 3.27.10 Please clarify that one double seat, with both seats being ICS capable is required?

**Answer:** The Division is only asking that there are 2 ICS installed on 2 seats, not on a double seat.

**Question:** Section 3.34.1 SYNC radio is specified, and this is a Ford radio, please specify what radio capabilities is required.

**Answer:** The Division is asking for an AM/FM radio that can be paired to a cell phone for hands free operation.

**Question:** Section 3.38.1 Please specify if Twin Vision or Transign is required?

**Answer:** The Division is asking for the front and side digital destination signs to have the characteristics outlined in Section 3.38.

**Question:** Section 4.1 being that this vehicle is a truck chassis, will the Division be flexible on the ground to first step measurements?

**Answer:** The Division will allow up to 2" difference in what is specified.

**Question:** Section 4.3 what is expected for Class D as the specs state that it should match Class A but also states Class C, should this read Class D?

**Answer:** This is a clerical error, it should be Class D.

**Question:** Section 4.6, it appears Class D and Class G have the same requirements?

**Answer:** It is a clerical error; they are the same requirements but both fields in Exhibit A **MUST BE FILLED OUT.**

**Question:** Section 3.24 Floor and Floor Covering please remove filled and replace with heat welded only.

**Answer:** The Division will accept either method of sealing the floors.

**Question:** Section 3.24.4 please remove RCA Transit Flooring the company went out of business in March of 2022.

**Answer:** The Division will remove RCA Transit Flooring for the specification.

**Question:** Section 3.24.6 refers to RCA flooring, please remove.

**Answer:** The Division will remove Section 3.24.6 from the Specifications.

**Question:** Section 3.24.7 please remove; it refers to RCA flooring.

**Answer:** The Division will remove Section 3.24.7 since it refers to RCA flooring.

**Question:** Section 3.24.4 Please accept Gerflor's Tarabus as equal.

**Answer:** The Division will accept Gerflor Tarabus flooring as equal.



**ADDENDUM ACKNOWLEDGEMENT FORM**  
**SOLICITATION NO.: CRFQ DMT2300000004**

**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)

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6  |
| <input type="checkbox"/> Addendum No. 2            | <input type="checkbox"/> Addendum No. 7  |
| <input type="checkbox"/> Addendum No. 3            | <input type="checkbox"/> Addendum No. 8  |
| <input type="checkbox"/> Addendum No. 4            | <input type="checkbox"/> Addendum No. 9  |
| <input type="checkbox"/> Addendum No. 5            | <input type="checkbox"/> 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 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.

Rohrer Enterprises, Inc. DBA Rohrer Bus Sales

Company



Authorized Signature

10-12-22

Date

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

REQUEST FOR QUOTATION  
Passenger Type Dual Rear Tire Van (Non-Raised Roof)

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**Documentation – to be submitted with bid:**

**Referenced**

- ☒ 3.2 Engine: An ISB-10 Engine (6.7 liter) with EGR and Diesel Particulate Filter exhaust system – provide product description, warranty information and product literature.
- ☒ 3.2.8 High Idle System: provide product description, warranty information and product literature.
- ☒ 3.4 Transmission (separate cooling system): provide product description, warranty information and product literature.
- ☒ 3.5.4 Back Up Camera System: provide product description, warranty information and product literature.
- ☒ 3.10 Tires: provide product description, warranty information and product literature.
- ☒ 3.15.5 Alternator: provide product description, warranty information and product literature.
- ☒ 3.1.11 Water Testing: provide details of water testing procedures.
- ☒ 3.14 f. Exterior Vinyl Colors: provide samples/chart of available colors.
- ☒ 3.15 Undercoating and Rustproofing: provide product description, warranty information and literature.
- ☒ 3.16.2 Ambulatory Passenger Entrance/Exit: provide location, size, door operating details.
- ☒ 3.16.8 Stepwell Heater: provide product description, warranty information and product literature.
- ☒ 3.22 Floor Covering: provide samples of floor covering and colors to be provided.
- ☒ 3.27 Seating: provide product description, warranty information, product literature and color charts for all of the seating products to be utilized. **Proposed floor plans.**
- ☒ 3.27.11 Driver's Seat: provide description of product.
- ☒ 3.27.1 Exterior Mirrors: provide product description, warranty information and product literature.
- ☒ 3.19 Dual Purpose Safety Vent: provide product description, warranty information and product literature.
- ☒ 3.30 Wheelchair Securement System: provide product description, warranty information and product literature.
- ☒ 3.37 Strap/Buckle Storage: provide description and location of product.



REQUEST FOR QUOTATION  
Passenger Type Dual Rear Tire Van (Non-Raised Roof)

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- ☒ 3.31 Wheelchair Occupant Restraint System: provide product description, warranty information and product literature.
- ☒ 3.32 Wheelchair Lift: provide Make, Model #, product description, warranty information and product literature.
- ☒ 3.34 AM/FM Radio/CD: provide product description, warranty information and product literature.
- ☒ 3.39 Training: submit letter of understanding to the terms in this Section.
- ☒ 3.38.4 Fare box Provisions: provide description of proposed location.
- ☒ 3.38.1 Destination Signs: provide product description, warranty information and product literature.
- ☒ 3.38.5 PA System: provide product description and product literature.
- ☒ 3.21.15 Strobe Light: provide product description and product literature.
- ☒ 3.28.11 Security Cameras Only: provide product description, warranty information and product literature.
- ☒ 4.10 Security Camera System Including Playback: provide product description, warranty information and product literature.
- ☒ 4.15 Warranty on complete vehicle.
- ☒ 4.16 Warranty on Basic Vehicle Structure.
- ☒ 4.17.1 Warranty: warranties to be provided on subsystems and components.
- Dnc N/A* ☒ 6.1.2 Complete two (2) bids in binder form – one (1) marked for DPT. - *submitted through Oasis.*
- ☒ 10.2 A. 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.
- ☒ 21 Proposed interior floor plans, showing detailed dimensions including the location of the wheelchair securement system and stanchions.
- ☒ 10.2 C. Curb weight (empty weight) and gross vehicle weight rating (GVWR) of vehicle.
- ☒ 10.2 D. Samples or paint charts of available exterior paint colors and vinyl.
- ☒ 10.2 H. Identification of the conversion location of the van.



REQUEST FOR QUOTATION  
Passenger Type Dual Rear Tire Van (Non-Raised Roof)

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- ☒ 10.2 I. A list of five (5) users names, addresses, emails, and telephone numbers who have been provided similar equipment by the Vendor.
- ☒ No Debt Affidavit
- ☒ Addendum Acknowledgement

# Perfectly Adapted

ISB Euro 6 Diesel Engines 150-310PS



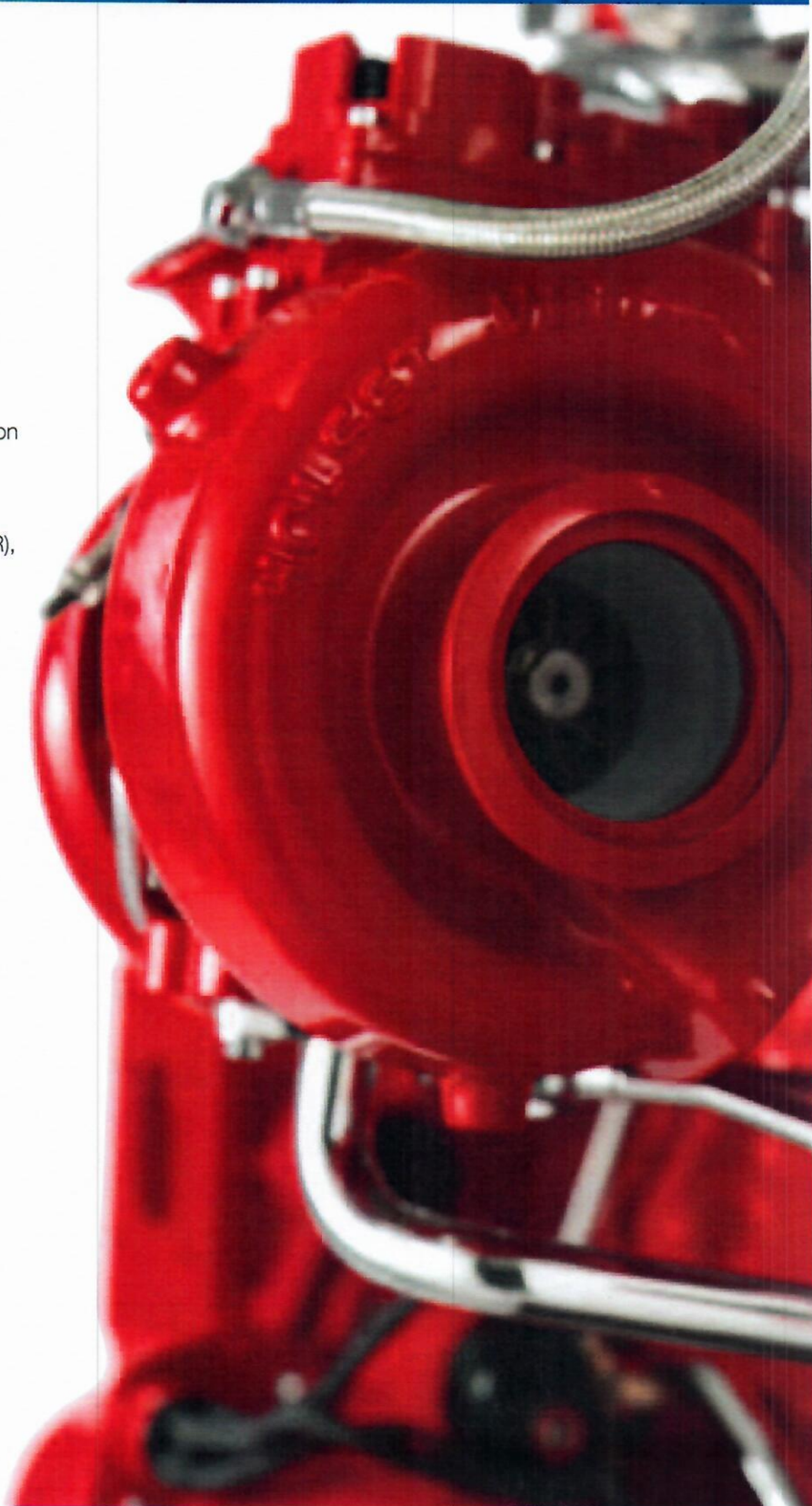




## EURO 6

### The Natural Choice

Cummins B Series engines have built a pedigree for performance, durability and dependability over more than 20 years and 10 million engines. The newest version of the ISB takes this further, using the latest ultra-low emissions technologies of cooled exhaust gas re-circulation (EGR), variable geometry turbocharging (VGT), selective catalytic reduction (SCR) and diesel particulate filtration (DPF) to meet the near-zero levels of Euro 6.





# We'll fit in with your plans

Our engineers will work as part of your team to provide the best possible installations

## Experience

With over 90 years of engineering experience, product innovation is a key part of our heritage. Cummins has developed an air intake to exhaust integration capability, with all core technologies of combustion, fuel systems, electronic controls, turbocharging, exhaust aftertreatment and filtration in-house. This allows Cummins to develop the most optimum product for the environment and our customers.

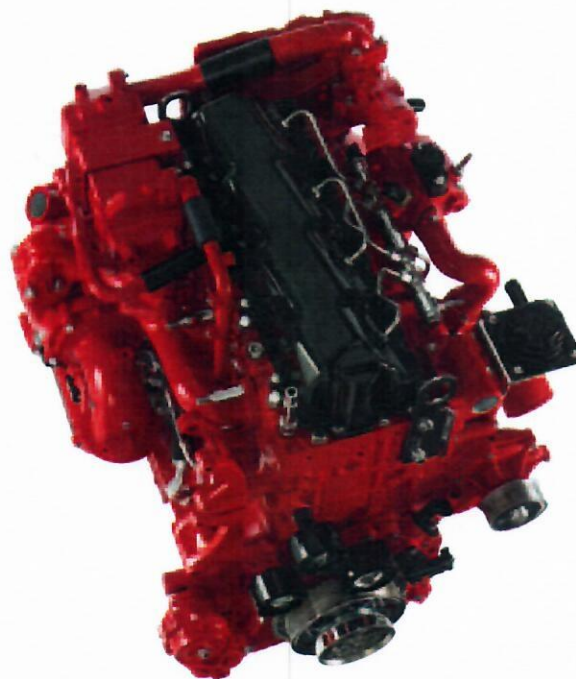
Euro 6 represents the most significant emissions step so far and provides the biggest challenge for engine and vehicle manufacturers alike. Cummins are ideally positioned in having the widest experience in all emissions technologies. Since legislation began, we have developed a level of proven in-service experience that no-one else can match.

Over 1 million EGR engines have been manufactured since 2002, more than 750,000 SCR systems produced since 2004, and over 1 million DPFs supplied since 2007. Cummins EPA 2010 products for North America use the same level of technologies as Euro 6, and we will have 3 years and many hundreds of thousands of engines in operation by the time Euro 6 is introduced.

## Support

Cummins technology and engineering expertise enables us to partner with our customers to manage the complexity of Euro 6 with them. Strong integration support capability means that we can work closely with the vehicle manufacturers to maximise the potential of their products powered by our engines. Our ability to tailor the engine to the installation is a positive advantage for them.

All Cummins engines are backed by the widest support network in the industry, with over 5,000 service outlets worldwide. Your local Cummins customer assistance centre is available to provide technical support when you need it. Visit [cumminsengines.com](http://cumminsengines.com) for more details.







## ISB Features and Benefits

Available in 4 cylinder 4.5 litre and 6 cylinder 6.7 litre configurations, the ISB products form the basis of Cummins strategy to provide evolutionary product features which continue to keep the company in its leading market position.

- **Electronic Integration** – industry standard datalink accepts inputs from all powertrain components including electronic transmissions and brakes. Creates a seamless flow of information shared along a high speed network.
- **Electronic Control Module (ECM)** – with increased capability it maintains an optimum balance between load demands, fuel-efficiency and emissions. The ECM ensures that the engine and aftertreatment meet the more challenging on-board diagnostics (OBD) monitoring requirements for Euro 6.
- **Electronic Protection** – sensors throughout the engine and aftertreatment continually transfer data back to the ECM for self diagnosis and protection. Rapid diagnostics and data downloading are available, helping to ensure maximum uptime for vehicles.
- **High Pressure Common Rail fuel system** – works at higher pressure and provides more precise control of the combustion process. Capable of generating up to 1800 bar injection pressures for refined and rapid power delivery, reduced noise, and improved cold start.
- **Variable Geometry Turbocharger** – developed by Cummins Turbo Technologies the VGT is optimised for high torque and low speed capability, delivering significant performance and driveability improvements.
- **Latest Engine Filtration** – a new nanotechnology based fuel filter media offers unmatched protection for the engine's fuel system, removing up to 98.7% of all particles as small as 4 microns. The filter's replaceable service element has less environmental impact than its predecessor, and unique patented no-filter, no-run design prevents the engine from running without a media element installed, eliminating the risk of debris entering the engine.
- **New aftertreatment system** – a switch back configuration for compact installations, packaged ready for manufacturers to fit direct to their chassis. Controlled by the engine ECM, it incorporates a Cummins Particulate Filter (CPF) with Selective Catalytic Reduction (SCR) to meet the ultra-low levels required at Euro 6. A patented SCR design uses Copper Zeolite technology for very high conversion efficiency, even at low temperatures.
- **Emissions control** – the EGR and SCR systems are closely balanced to meet the regulated NOx levels and optimise the fuel economy and Adblue usage for the lowest possible running costs.







# We'll evolve to match your needs

Cummins are the engine emissions experts, we'll tailor your product to meet the latest emissions regulations

## Features and Benefits – 4.5

This next generation Cummins ISB 4 cylinder engine makes a significant leap forward for Euro 6 by merging the key benefits of the ISB4.5 Euro 5 product with the recently launched ISF3.8 engine and the US EPA 2010 emission technologies. It incorporates leading automotive modular design features enabling key components to be simpler and lighter. This enables the engine weight to be 10% lower than the current product, despite the addition of emissions technologies. The combustion design also makes the new engine even quieter than the Euro 5 version.

Proven in trucks up to 18 tonnes and buses up to 12m at Euro 5, the ISB4.5 has also become one of the most widely used engines for diesel electric hybrid buses in the UK and Europe.

## ISB4.5 Specifications

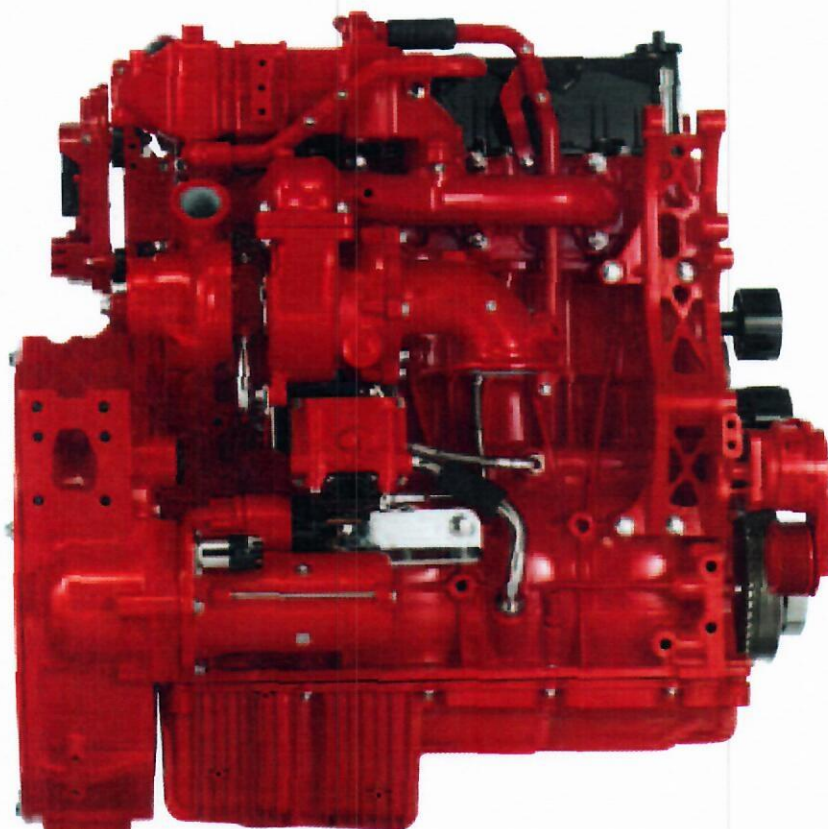
|                       | BUS     | TRUCK   |
|-----------------------|---------|---------|
| POWER (PS)            | 150-210 | 150-210 |
| PEAK TORQUE (NM)      | 580-760 | 580-760 |
| GOVERNED SPEED (RPM)  | 2300    | 2300    |
| NO. OF CYLINDERS      | 4       | 4       |
| DISPLACEMENT (LITRES) | 4.5     | 4.5     |
| DRY WEIGHT (KG)       | 316     | 316     |

- EPA 2010 engine technology – proven cooled exhaust gas recirculation and variable geometry turbocharging has been tailored for a 4 cylinder product and European vehicle operations.
- High Power – the engine is available up to 210ps for buses and trucks, delivering high power to weight ratios.
- High Torque – the engine has up to 760Nm for excellent responsiveness and vehicle productivity.
- Closed crankcase ventilation (CCV) – new patented design which is integrated into the camshaft with no servicing required.





- Engine block and cylinder head design – less mass than traditional designs with no reduction in durability. The block is 10% lighter, and the head 20% lighter than the previous ISB4.5. Additional benefits include improved coolant flow and cylinder pressure capability with reduced noise, vibration and harshness.
- Composite materials – used for components such as the valve cover and oil pan to reduce weight and noise.
- Lubricating pump – driven by the crankshaft via a gerotor design rather than traditionally driven by gear from the camshaft. The simpler design reduces noise and improves oil flow during cold starts.
- Cooling module – brings together the water pump, oil filter and oil cooler, leading to improved pressure management and enhanced robustness and durability.







## ISB6.7

Ideally suited for rigid trucks, buses and speciality vehicles, this engine provides exceptional performance with the reliability and durability expected from Cummins. Torque and power are high for an engine of this size, allowing them to be used in application classes traditionally associated with engines of higher displacement.

Weight sensitive installations such as multi-axle rigid trucks and size constrained installations such as full size and double deck buses are easily in the reach of the ISB's capabilities. Like the 4.5 litre engine, it is used in a number of diesel-electric hybrid installations.

## ISB6.7 Specifications

|                       | Bus      | Truck    |
|-----------------------|----------|----------|
| POWER (PS)            | 220-280  | 225-310  |
| PEAK TORQUE (NM)      | 850-1100 | 850-1100 |
| GOVERNED SPEED (RPM)  | 2100     | 2300     |
| NO. OF CYLINDERS      | 6        | 6        |
| DISPLACEMENT (LITRES) | 6.7      | 6.7      |
| DRY WEIGHT (KG)       | 522      | 522      |

- Rear Engine Power Take-Off (REPTO) with a drive capability of 400Nm is available. It is suitable for applications such as cement mixers, road sweepers, gritters and compactors.
- High Power – the engine is available up to 280ps for buses and 310ps for trucks and coaches.
- High Torque – the engine has up to 1100Nm for excellent responsiveness and vehicle productivity.
- Closed crankcase ventilation (CCV) – new system mounted to the engine valve cover required to re-cycle blow-by gases now counted in the engine emissions. Positioned for cab over truck designs.





# Perfectly Adapted

The new Euro 6 engines will be tailored by our engineers to meet your specific needs

## EURO 6 SCHEMATIC



- 1 On-Board Diagnostic (OBD) in-cab display
- 2 Electronic Control Module – can be remote or engine mounted
- 3 Cummins Designed EGR Mixing Device
- 4 High Pressure Common Rail Fuel System
- 5 Closed Crankcase Breather (CCV)
- 6 Exhaust Gas Re-circulation (EGR) Cooler
- 7 Cummins Variable Geometry Turbocharger (VGT)

- 8 Charge Air Cooler
- 9 Diesel Oxidation Catalyst (DOC)
- 10 Diesel Particulate Filter (DPF)
- 11 AdBlue Tank
- 12 AdBlue Doser
- 13 Decomposition Reactor Tube
- 14 Selective Catalytic Reduction (SCR) Catalyst
- 15 Ammonia Slip Catalyst
- 16 Ultra-clean exhaust outlet



# ITM129-T20 & ITM129ADL-T20

2020+Ford Transit Platform Lift Interlock



*Ford Interlock system for monitoring platform lift door and up to four auxiliary doors.*

## Technical Description

InPower's Models ITM129\ITM129ADL-T20 interlock systems provide the required FMVSS 403/404 interlock functions for public-use platform lifts installed in Ford Transit chassis. The system consists of a combined driver's display and control module as well as an easy-to-install plug-and-play chassis wiring harness.

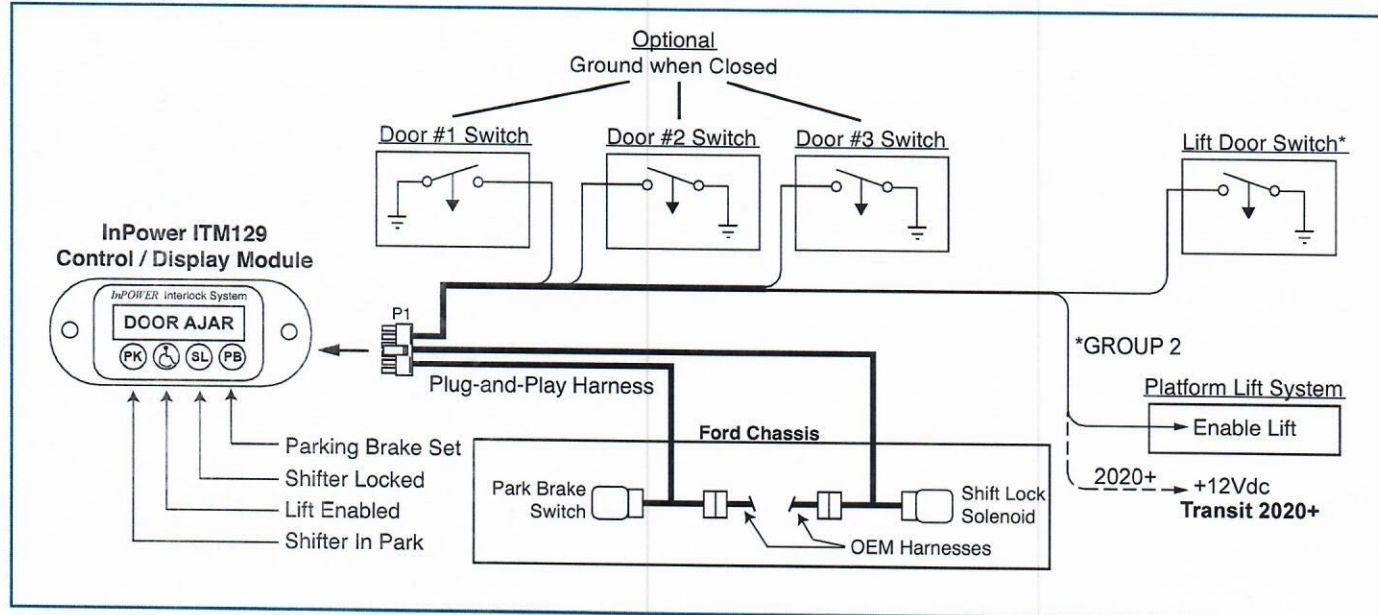
The wiring harness includes a set of blunt cut wires for connecting to the platform lift system door switches and 12 volt power and T-cables for interfacing with the Ford shift lock solenoid, park signal and parking brake switch. The interlock's Lift Enable output is rated at +12 volts @ 1.8 amps, and it is compatible with current production platform lifts manufactured by Braun, Ricon and Maxon.

The driver display includes a two-inch flashing Door Ajar indicator as well as indicators for Park, Park Brake, Shifter Locked and Lift Enabled. The interlock monitors the lift door and up to four auxiliary doors. With the standard ITM129 model, if any of these doors are not fully closed, the display's Door Ajar indicator will flash. Only the lift door input will set the shift lock. With the ITM129ADL, if any door is not fully closed, the Door Ajar indicator will flash and the shift lock will set.

## Key Features

- Supports Ford Transit Chassis
- Combined Driver Display and Control Module
- Works for both rear and side doors
- Status / Diagnostic Indicators
- Monitors up to Four Door Switches plus Lift Door
- Plug-and-Play Wiring Harness
- Direct Interface to Platform Lift Systems

## System Diagram





### Specifications

#### Module Inputs

|                           |   |
|---------------------------|---|
| Power Input:              | Power and ground are obtained from Shifter T-Harness                            |
| Rear Lift Door* In:       | From lift door closed switch. Ground when door is Closed. (Blunt-cut Violet)    |
| Side Lift Door* In:       | From lift door closed switch. Ground when door is open/ajar. (Blunt-cut Tan)    |
| Side Door* In:            | From side door closed switch. Ground when door is open/ajar. (Blunt-cut Orange) |
| Door #1 or Rear Door* In: | From Door #1 closed switch. Ground when door is closed. (Blunt-cut Blue)        |
| Door #2 In:               | From Door #2 closed switch. Ground when door is closed. (Blunt-cut Blue)        |
| Door #3 In:               | From Door #3 closed switch. Ground when door is closed. (Blunt-cut Blue)        |

\* Lift may be installed on either the side door or the rear door. When installed in the side door, use the Tan wire for the lift door and one of the Blue wires for the rear door. When installed in the rear door, use the Violet wire for the lift door and the Orange wire for the side door.

#### Module Output

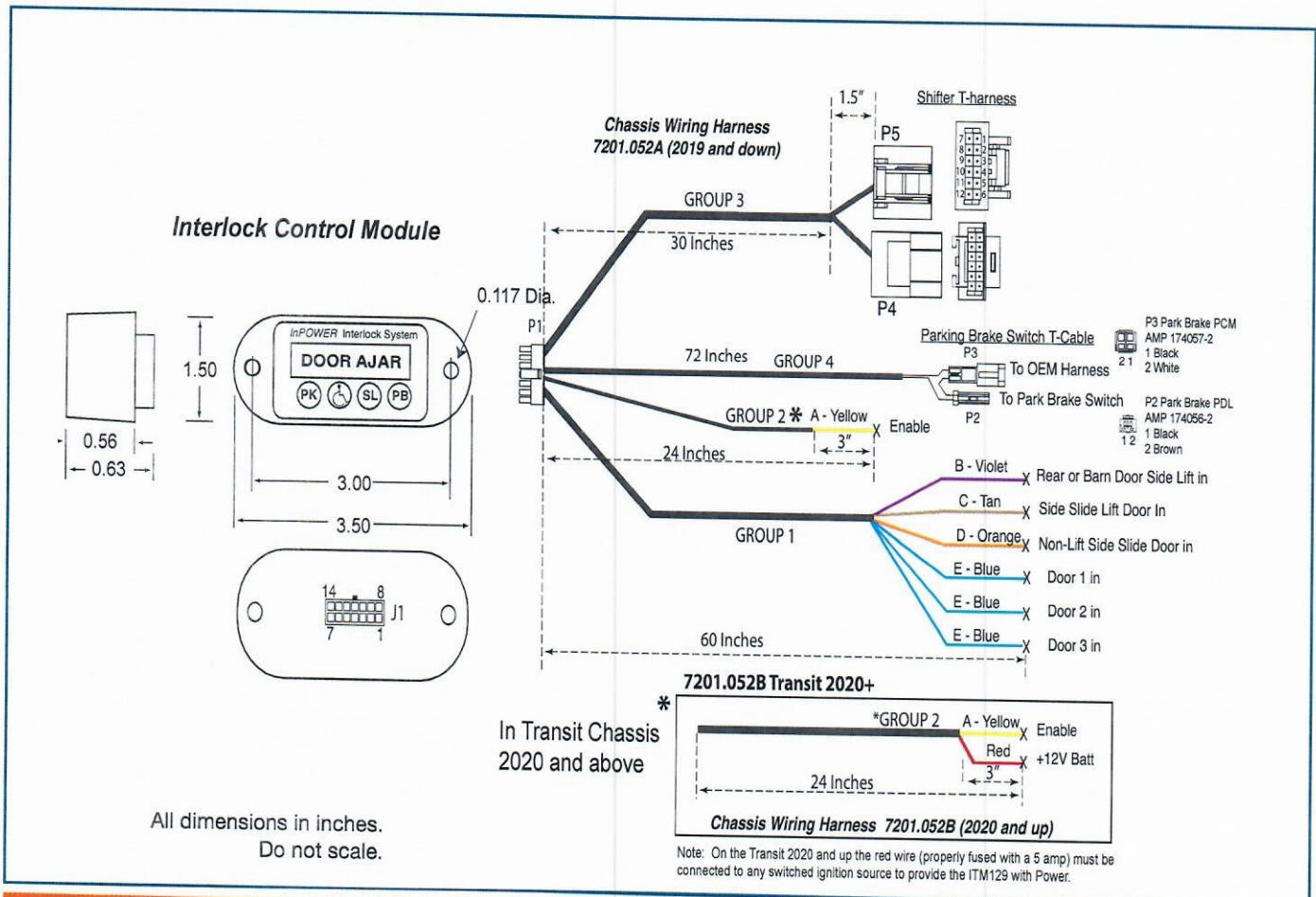
Lift Enable: +12 volts @ 1.8 amps to allow platform switch operation. (Blunt-cut Yellow)

#### Mechanical

Dimensions: 3.50 W x 1.50 H x 0.56 D inches  
 Weight: 0.15 lbs  
 Operating Temperature: -40° C to +85° C

Please see owner's manual OM-190 for the ITM129 and ITM129ADL for detailed cable information.

### Mechanical Drawing





# OWNERS MANUAL

## ITM129 & ITM129ADL and ITM129-T20 & ITM129ADL-T20 Platform Lift Interlock System for Ford Transit Chassis



### Contents

|                                  |   |
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| 2. Product Description .....     | 2 |
| 3. System Operation .....        | 2 |
| 4. Interlock System Diagram..... | 3 |
| 5. Installation Procedures ..... | 4 |
| 6. Wiring Instructions .....     | 5 |
| 7. System Troubleshooting .....  | 7 |
| 8. Mechanical Drawing .....      | 8 |
| 9. Reference information .....   | 8 |

## 1. Introduction

This system is intended for installation in Ford Transit chassis with FMVSS compliant, public-use platform lifts manufactured by The Braun Corporation, Ricon Corporation or Maxon Mobility. If another type of lift is to be used, contact the lift manufacturer to determine compatibility.

The system is designed to meet the requirements of FMVSS 403/404 and therefore must be installed in accordance with the lift manufacturer's instructions. The installer must be trained and skilled in installing FMVSS compliant lift systems. The installation must also comply with SAE (Society of Automotive Engineers) and Ford Motor Company electrical wiring procedures.

## 2. Product Description

InPower's Model ITM129 and ITM129-T20 platform lift interlock system consists of a control module with integral driver's status display and a chassis wiring harness (See Interlock System Diagram on Page 3). The interlock's control/display module is designed to mount on the dash with its wiring harness routed through the dash. The harness contains two T-cables that connect to the shift lock solenoid and parking brake switch. The harness also contains a set of blunt-cut wires for connection to the three door switches, lift door switch and Lift Enable output to the platform lift system.

The ITM129, ITM129-T20, ITM129ADL, and ITM129-T20 interlock systems provide inputs from the platform lift door switch and three other door switches (Door 1 Switch, Door 2 Switch and Door 3 Switch); however, each model responds differently to the door switch signals.

ITM129 and ITM129-T20: When Door Switches 1, 2 or 3 are activated (door not fully closed) the DOOR AJAR display indicator will flash. When the Lift Door Switch is activated (door not fully closed) the DOOR AJAR display indicator will flash and the shift lock will be set. If the vehicle is in PARK and the parking brake is set, the Lift Enable will be set, allowing the platform lift to be operated.

ITM129ADL and ITM129-T20: When any door switch is activated (door not fully closed), the DOOR AJAR display indicator will flash and the shift lock will be set. If the vehicle is in PARK and the parking break is set, the Lift Enable will be set, allowing the platform lift to be operated.

**Installation Note:** The Standard ITM129 gets +12Vdc power from the Pin 2 of the Shifter T-harness (Chassis 2019 and Prior) and 2020 and later comes from the Group 2 Red 12V Batt wire attached to an ignition source fused appropriately. +12vdc comes from Auxilliary Junction Box (AJB), Fuse-31 and should be a 10 Amp Fuse. Depending on the truck options installed (ex. Auxilliary Brake Controller), the Fuse-31 may or may not be installed.

Fuse-31 is a 10 Amp fuse for the Auxilliary Brake Controller or options. If these options and/or the fuse are not installed, the ITM129 doesn't require much power so a 5 or 10 Amp fuse is acceptable to put in the F-31 location for the ITM129.

**Alternately**, if F31 and the AJB are not available, any reliable fused and ignition switched +12VDC source will do as a power source for the ITM129 red wire in the T Harness.

## 3. System Operation

The interlock system is powered only when the Ignition Switch is on. The following is the interlock system sequence of operation:

- Step 1 - Turn the Ignition switch on and start the engine.
- Step 2 - Press the service brake and place shifter in Park.
- Step 3 - Set the parking brake.
  - The Shift Lock will activate
- Step 4 - Open lift door.
  - The display Door Ajar indicator will flash
  - The Lift Enable will activate, allowing operation of platform lift.
- Step 5 - The platform lift may now be operated (Refer to the platform lift operating instructions).
  - During the Lift Enable sequence, if the parking brake is released the Lift Enable will be deactivated, preventing lift operation.
- Step 6 - When the lift cycle is completed return the lift to its fully stowed position.
- Step 7 - Close the lift door.
  - The Lift Enable is now deactivated.
- Step 8 - Release parking brake. When released, the interlock will release the shift lock.
- Step 9 - The cycle is now complete and the vehicle can be taken out of Park and driven.

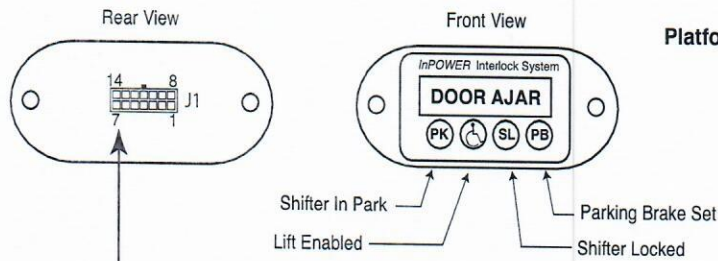
### Notes:

1. For model ITM129 and ITM129-T20, anytime Doors #1, #2 or #3 are opened (or ajar) the Door Ajar indicator will flash but the shifter will not lock unless the parking brake is also set.
2. For model ITM129ADL and ITM129-T20, anytime any door is opened (or ajar), the Door Ajar indicator will flash and the shifter will lock.



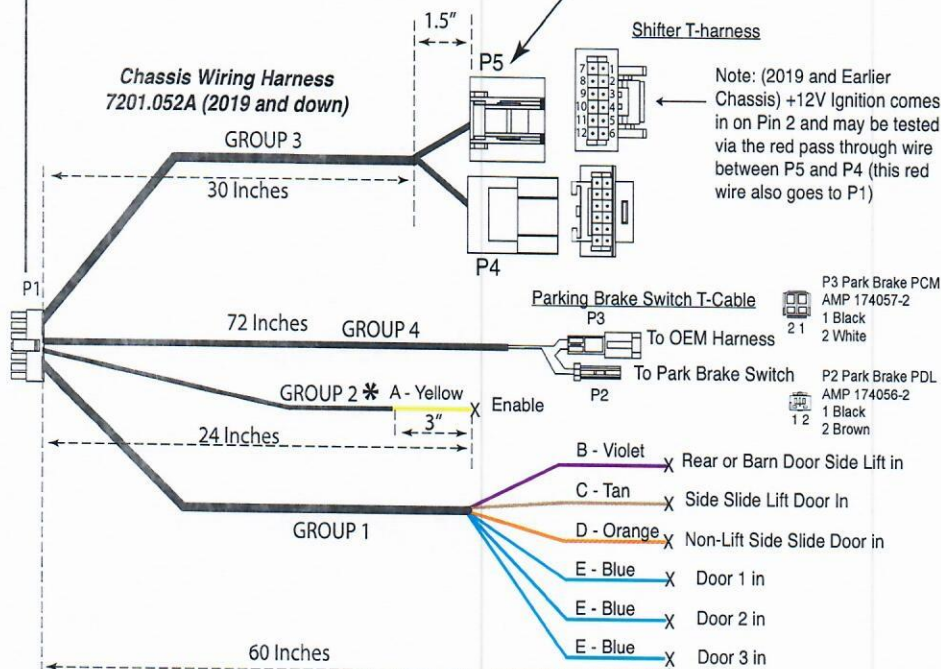
#### 4. Interlock System Diagram

##### Interlock Control Module



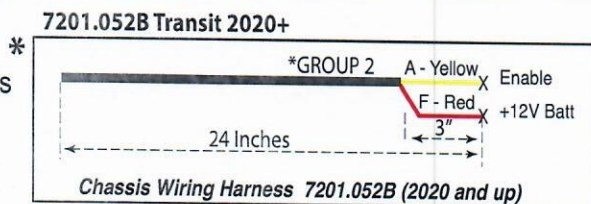
##### Platform Lift Interlock System

Note: Fuse 31 on the Auxiliary Junction Box normally supplies 12Vdc Power to Shifter T-harness (Pin 2, 2019 and earlier) which powers the ITM129. If F31 is not populated, install a 5 amp or 10 amp fuse to power the ITM129. Alternatively, the red wire (properly fused with a 5 amp) may be connected to any switched ignition source.



Note: On 2020 and later chassis Pin 2 is passed straight through from P5-2 to P4-2 without going to P1

In Transit Chassis 2020 and above



Note: On the Transit 2020 and up the red wire (properly fused with a 5 amp) must be connected to any switched ignition source to provide the ITM129 with Power.

| Item | Color  | Description | Sensor Position             | Qty |
|------|--------|-------------|-----------------------------|-----|
| A    | Yellow | 12V Enable  | Enable                      | 1   |
| B    | Violet | Gnd=Closed  | Rear or Barn Door Side Lift | 1   |
| C    | Tan    | Gnd=Open    | Side Slide Lift             | 1   |
| D    | Orange | Gnd=Open    | Non-Lift Side Slide         | 1   |
| E    | Blue   | Gnd=Closed  | Non-Lift Door               | 3   |
| F    | Red    | +12V Power  | Rev B Only! System Pwr      | 1   |



## 5. Installation Procedures

### 5.1 Safety Precautions



## WARNING

This interlock product has been designed and manufactured to meet the intended application requirements and specifications, complying with FMVSS 403/404. Any modifications to the product or to the installation procedure can be dangerous and will void InPower's warranty.

- Read and understand the instructions in this manual and any other applicable manuals before starting the installation.
- Make sure that the vehicle battery power is disconnected during installation of the Interlock and lift systems.
- Reconnect the battery when the system installation is complete.
- Wear appropriate safety equipment, such as protective eyeglasses, face shield and clothing when installing equipment and handling the battery.
- Be careful when working near a battery. Make sure that the area is well ventilated and that there are no flames near the battery. Never lay objects on the battery that can short the terminals together. If battery acid gets in your eyes, immediately seek first aid. If acid gets on your skin, immediately wash it off with soap and water.

### 5.2 Getting Started

This manual provides instructions for installing the InPower Interlock System in a Ford transit chassis with a FMVSS compliant, public use (commercial) platform lift. It is important that you follow these instructions carefully and contact InPower if you need assistance or more information. Note that product technical documents are available on InPower's web site.



## WARNING

This interlock system installation requires additional parts and materials that are not supplied with the interlock product. Identify all required parts before starting the installation and ensure that these items are the correct type and quality (See Section 10.2).

Inspect the interlock product and all other components for damage before starting the installation. Do not perform the installation if any problems exist.

Determine the type of interlock interface required for the platform lift. This interlock system provides a +12 volt @ 1.8 amps Enable Lift output to allow the platform lift to be operated. If the lift system is not compatible with this interface signal, you must take the necessary actions to adapt the lift system interface to the interlock system's interface. Refer to the lift manufacturer's installation instructions for further details.

The recommended mounting location for the interlock control module is on the center console of the dashboard, with the wiring harness through the dash. Be certain that the chosen location permits the cables to reach the parking break and shift lock connectors. The wiring harness will connect to the shift lock solenoid, located under the center console and parking brake switch, beside the driver's seat. The unit must not be located in the engine compartment or any location that is not protected from the environment.

## 6. Wiring Instructions



### WARNING

Make sure that the vehicle battery power is disconnected during installation of the interlock and lift system. Reconnect the battery when the system installation is complete.

#### Installation Procedure

1. Remove steering column cover. (See Figures 1 and 2)



Figure 1. Steering column



Figure 2. Steering column with panel removed.

2. Drop down glove box
3. Remove HVAC controls cover, cup holder and lift shifter cover. (See figures 3 and 4)



Figure 3. Center console



Figure 4. Covers removed



4. Remove console cover screws and pull back center cover enough to gain access to shifter connector. (See figure 5)



Figure 5. Shifter connector.

5. Mount module in center cover where desired.
6. Install T-harness to shifter connector 2810. Tuck chassis connector and T-harness under shifter to ensure the paneling fits correctly. (See figure 6)

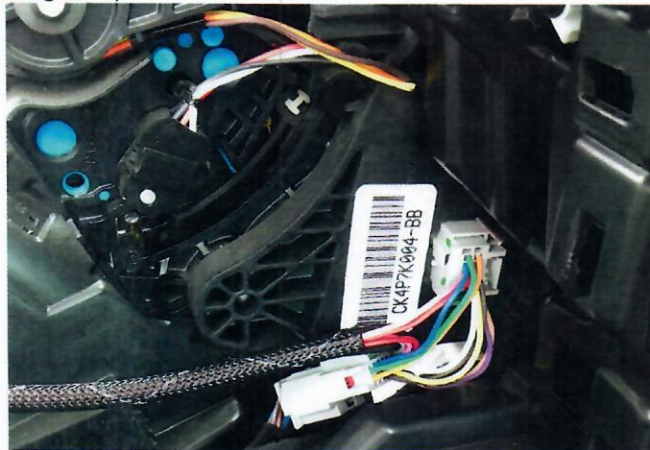


Figure 6. Shifter connector 2810

7. Run parking brake harness under carpet to parking brake connector. (See figures 7 and 8)



Figure 7. View of brake connector area.

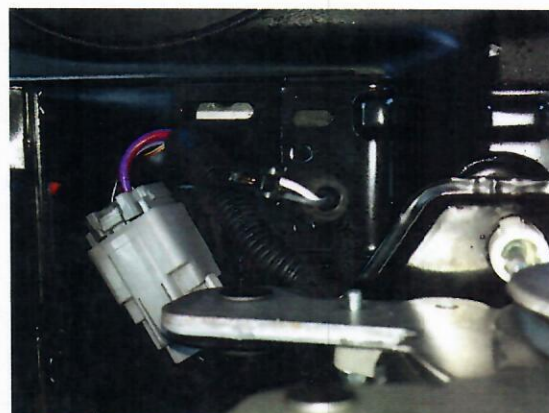


Figure 8. View of parking brake connector.

8. Run door wires to BCM. (See figure 9 on next page)



9. On the Ford Transit, the front driver's, front passenger and rear doors all generate a +12V signal when the doors are open ajar. The side door, however, generates a ground signal. The lift may be installed on either the rear door or the side door. Therefore, there are two lift door wires. The rear lift door input wire is violet, while the side lift door input wire is tan. There are three blue wires for the driver's, front passenger and rear door ajar signals, and there is one orange wire for the side door ajar signal.

If the lift is installed on the rear door, one blue wire and the tan wire will not be used. If the lift is installed on the side door, the violet wire and the orange wire will not be used.

Connect the four wires to be used to their respective connections in the BCM connector 2280C.

The driver door ajar signal comes from pin 44 (green/violet wire); the passenger door ajar signal comes from pin 34 (white wire); the right side door ajar comes from pin 51 (yellow wire); and the rear door ajar comes from pin 50 (brown/violet wire).



10. Review the platform lift installation manual to determine how to wire the interlock system to the platform lift's interlock interface. The yellow blunt cut wire in the interlock harness will supply a +12 volt @ 1.8 amp output to operate the lift. Verify that this is the correct polarity for the platform lift and then connect the yellow wire to the lift enable input on the lift.

11. Test

## 7. System Troubleshooting

This owners manual describes the InPower Model ITM129 Platform Lift Interlock Systems. Note that the control module contains an integral driver's status display which should be used for system troubleshooting. The interlock systems provide a Lift Enable signal output that is wired to the platform lift system to enable the lift operation when the chassis interlock conditions are satisfied. The Lift Enable signal is +12 volts when the lift can be operated.

### Replacement Parts

- |                                     |                       |
|-------------------------------------|-----------------------|
| 1. ITM129 Control/Display Module    | P/N: ITM129-MODULE    |
| OR ITM129ADL Control/Display Module | P/N: ITM129ADL-MODULE |
| 2. Chassis Wiring Harness           | P/N: 7201.052         |

### Troubleshooting Procedures and Tips:

1. Determine if the interlock system is getting power. +12 volts should be present on pin 2 in shifter T Harness connector 2810 (2019 and prior). On Chassis from 2020 and up, +12V should be available on the Group 2 Red Wire. With power, you should have some display lights on. Note that the interlock system gets its ground from pin 11 of the same connector. If everything is properly connected, and you are not getting power, check fuse F31 located in the auxiliary junction box.

2. If the interlock system has power and is not operating there is a high probability that the control module is good but that there is a problem with one or more of the system inputs (e.g., the Lift Door Switch not working correctly). Operate each remote door switch and determine if the correct display indicator operates properly. You can also measure voltage at the J1 connector pins to see if the remote devices are working correctly. A common problem on interlock systems is the lift door switch failing or sticking in the open position. This will



3. If the interlock system appears to be working properly but the platform lift system will not work check the voltage on the Lift Enable output to the lift system. This signal is on pin 4 of connector J1. There should be +12 volts present to operate the lift. **CAUTION - Do not apply an external +12 volt power source to this circuit to see if the lift will operate without disconnecting the wire from the interlock system! Applying power will cause a circuit breaker to trip in the Lift Enable output circuit. If tripped, remove the power source and the circuit breaker will reset automatically.** With the Lift Enable wire disconnected from the interlock control module it is safe to apply +12 volts to the lift system's Enable input to see if the lift will operate.

[illegible]

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Truck Body Builder Advisory Service  
Product Development Center  
MD 410  
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1-877-840-4338  
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[bbasqa@ford.com](mailto:bbasqa@ford.com)

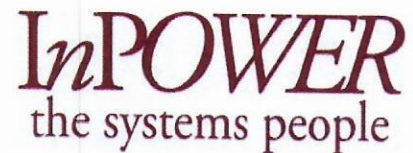
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## **Warranty And Limitation of Damages**

Released 5/13/2009  
CD-02 120604



InPower LLC (hereinafter "InPower") warrants its products to be free from defects in material and workmanship under normal use, care, and maintenance for a period of two (2) years from the date of shipment from InPower.

This warranty shall not apply to any failure or damage due to neglect, lack of maintenance, misuse, abuse, improper installation, improper application, vehicle obsolescence, failure of or damage inflicted by non-InPower equipment, or Acts of God, of any of the products on the part of the Buyer or to any other cause beyond the control of InPower.

Buyer's exclusive remedy in the event that any of InPower's products do not conform to the foregoing warranty shall be the repair or replacement of the defective item or parts within two years from date of shipment. All goods claiming to be nonconforming must be returned per InPower's RETURNS POLICY (CD-03), and will be shipped to InPower's business location, after first receiving a return authorization number from InPower (see CD-03). Such goods will be returned to Buyer, repaired, or replaced at InPower's option within a reasonable time per the terms set forth in the RETURNS POLICY (CD-03). InPower's acceptance of any goods so returned by Buyer shall not be deemed an admission that the goods are nonconforming; and if InPower determines that any goods returned are not defective, or are exempt from this warranty under conditions set forth above, such goods shall be reshipped to Buyer at its expense and Buyer will be charged for shipping charges incurred by InPower.

InPower's obligations under this limited material and workmanship warranty, and Buyer's exclusive remedy, shall be limited solely to the repair, exchange or replacement, at InPower's option under the terms of the RETURNS POLICY (CD-03), of any materials or workmanship which may prove defective under normal use within two years from the shipment date, and which InPower's examination shall disclose to its satisfaction to be defective. InPower's obligations under this Warranty do not extend to coverage of labor, travel, service, or non-InPower repair parts costs incurred.

**THE FOREGOING WARRANTY IS IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHER WARRANTIES, EXPRESS OR IMPLIED. CORRECTION OF NONCONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE, SHALL CONSTITUTE FULFILLMENT OF ALL OBLIGATIONS OF INPOWER TO BUYER, WHETHER BASED ON CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE WITH RESPECT TO, OR ARISING OUT OF, SUCH MERCHANDISE.**

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PO Box 2520, Westerville, OH 43086  
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# The World's Leading Bus Transmission Series

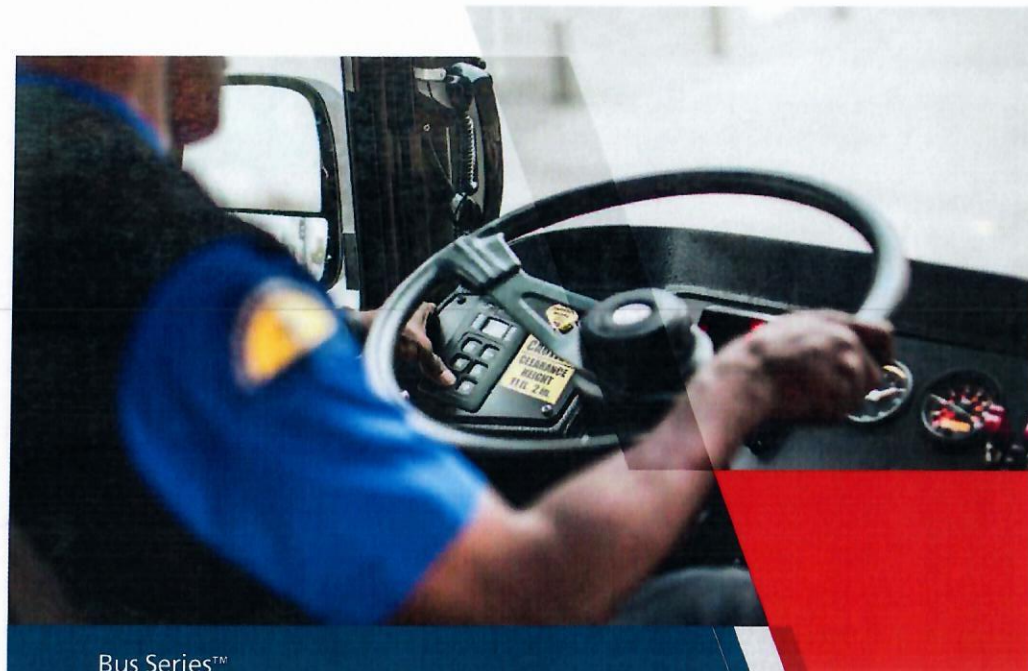
Around The Corner And Around The World



## A World Of Support

From our headquarters in Indianapolis, Indiana, USA, to our manufacturing plants in Hungary and India, to approximately 1,400 Allison Authorized Distributors and Dealers around the globe, you are never far from the products, training, service and support you demand.

Our support starts from the moment an Allison transmission is specified. We work with you to ensure that the model and ratings fit your engine to create a tailored package of powerful performance and reliable efficiency. When you need parts or service, you can count on global access to factory-trained specialists and Allison Genuine Parts™.



Bus Series™

One Allison Way  
Indianapolis, Indiana, USA, 46222-3271  
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SA7760EN (2016/04)  
ISO/TS 9000 and ISO 14001 Certified  
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Allison Bus Series™ Models Are Now Available  
With FuelSense® and xFE Technology

## Proven Reliability And Durability

Allison fully automatic transmissions are built to last and require minimal service—meaning not only lower maintenance costs, but also more time on the road. Our commercial-duty automatic transmissions are designed for durability to handle the frequent starts, stops and high mileage demands that buses place on components.

**FUELSense**

## More Fuel Efficient With xFE

With xFE, Allison has taken fuel economy to the next level. xFE is another in a string of innovative, fuel-saving ideas from Allison, a leader in bus transmission technology. New gear ratios allow the torque converter to lock up at lower speeds, improving fuel economy up to seven percent in xFE-equipped vehicles.

This seven percent improvement in fuel economy is in addition to the already greater efficiency created by Allison's FuelSense®, a unique package of software and electronic controls that supports an advanced array of features. The combination of these packages provides a substantial fuel economy advantage.

|   |  |
|---|--|
| <b>Dynamic Shift Sensing</b>              | Automatically selects between lower/higher speed shift schedules based on the vehicle's actual payload and the grade on which it is operating. This optimizes fuel economy while maintaining superior performance. |
| <b>EcoCal</b>                             | Provides lower shift points to get into lock up as soon as possible, providing necessary performance without shift cycling.  |
| <b>Neutral at Stop</b>                    | Automatically eliminates the load on the engine when the vehicle is a full stop to save fuel and reduce overall emissions.   |
| <b>Acceleration Rate Management</b>       | Mitigates aggressive driving practices by automatically controlling engine torque based on the vehicle's grade and load.   |
| <b>5th Generation Electronic Controls</b> | Allison 5th Generation Electronic Controls offer an enhanced array of smart controls designed to increase fuel economy and fuel efficiency for the specific needs of buses.  |

*Results depend on duty-cycle. xFE provides maximum fuel savings in high start-stop duty-cycles with low average speeds. Contact your Allison representative to ensure xFE is the best choice for your specific need.*

## Making Natural Gas More Efficient

Allison Automatics are perfectly suited to natural gas engines in the heavy start-stop cycle of city and transit buses. The inherent benefits of Allison's Continuous Power Technology™, featuring full-power shifts and a patented torque converter, realize the best performance and most efficient use of fuel from buses. Natural gas engines are more responsive when joined to an Allison Automatic.

## Proven Dependable And Efficient Hybrid Systems

The Allison Hybrid H 40/50 EPT™ systems feature a two-mode split parallel architecture—a pure mechanical path and a pure electric path—to achieve the highest energy efficiency. The technology operates automatically as a series or parallel hybrid, improving fuel consumption by up to 25 percent over a typical bus. Additionally, its regenerative braking capability can significantly extend the brake change interval by as much as 350 percent.





## Driven To Exceed

Our commitment to understand and satisfy your needs drives us to constantly analyze, refine and improve our products and their features. Nothing else delivers the durability, productivity and fuel economy of an Allison fully automatic transmission.

When it comes to transit and charter bus applications, Allison Bus Series™ transmissions help keep your vehicles and your business on schedule with maximum efficiency, improved vehicle performance, safer driver operation and better passenger comfort.



## The Power Of The Torque Converter

Allison's torque converter smoothly multiplies engine torque, delivering more power to the wheels. By multiplying the engine power, drivers get increased performance, faster acceleration and greater operational flexibility. An Allison Automatic eliminates power interrupts so you can accomplish more, even with a smaller engine.



B 210, B 220, B 295



B 300, B 400,  
B 3400 xFE



B 500

## Increased Safety

Since gear shifting is automatic, drivers are better able to concentrate on the task at hand... getting riders safely to the next stop.

## Comprehensive Coverage

All Allison Bus Series™ models offer comprehensive coverage with 100% parts and labor. Coverage may vary by model and application. Contact your local Allison representative for details.

## Easy Maintenance

A fully automatic transmission from Allison, a trusted brand around the world, is the best way to keep your fleet on the road while reducing total cost of ownership. With extended periods between scheduled maintenance and a proven track record of reliability, Allison puts you in control of your fleet and your budget.

|   |   |
|---|---|
| <b>Prognostics</b>                      | Calibrated to the vehicle's particular operating requirements, Allison prognostics monitor various operating parameters to determine and alert when service is due. This eliminates unnecessary oil and filter changes and provides maximum transmission protection.  |
| <b>Retarder Benefits</b>                | Allison's integral hydraulic retarder complements and enhances vehicle service brake performance. It reduces braking distance, while offering full integration with the Anti-Lock Braking System, Engine Braking Systems and cruise control systems. In stop-and-go driving, the transmission retarder may be automatically activated at various levels, each time the vehicle brakes are in use, extending service brake life. |
| <b>Secondary Shift Schedule</b>         | Allows driver to select between two pre-programmed shift patterns, quickly and easily, to match driving conditions.   |
| <b>Direction Change Enabled</b>         | Prohibits shifts from Neutral to Drive or Reverse without first pressing a dash switch or applying the service brakes.  |
| <b>Auxiliary Function Range Inhibit</b> | Will not allow transmission to shift into forward or reverse unless the service brakes are applied.   |





# Ratings And Specifications

## Bus Series™

| RATINGS           |               |             |           |  |   |   |  |   |                     |                     |
|-------------------|---------------|-------------|-----------|--|---|---|--|---|---------------------|---------------------|
| MODEL             | SERIAL NUMBER | RATIO       | PARK PAWL | MAX INPUT POWER <sup>1</sup><br>w/o SEM<br>hp (kW) | MAX INPUT POWER<br>w/SEM TORQUE<br>LIMITING <sup>1,2</sup><br>hp (kW) | MAX INPUT TORQUE <sup>1</sup><br>w/o SEM<br>lb-ft (N•m) | MAX INPUT TORQUE<br>w/SEM TORQUE<br>LIMITING <sup>1,2</sup><br>lb-ft (N•m) | MAX TURBINE<br>TORQUE <sup>3</sup><br>lb-ft (N•m) | MAX GVW<br>lbs (kg) | MAX GCW<br>lbs (kg) |
| B 210             | 6310          | Close Ratio | No        | 230 (172)  | 270 (201)   | 520 (705)   | 575 (780)  | 850 (1152)  | 29,000 (13,150)     | 29,000 (13,150)     |
| – Transit         |               |             |           |  |   |   |  |   |                     |                     |
| B 220             | 6310          | Close Ratio | Yes       | 230 (172)  | 270 (201)   | 520 (705)   | 575 (780)  | 850 (1152)  | 29,000 (13,150)     | 29,000 (13,150)     |
| – Transit         |               |             |           |  |   |   |  |   |                     |                     |
| B 295             | 6510          | Close Ratio | N/A       | 230 (172)  | N/A   | 620 (841)   | N/A  | 1370 (1857)                                       | 33,000 (14,968)     | 33,000 (14,968)     |
| – Transit         |               |             |           |  |   |   |  |   |                     |                     |
| B 300             | 6510          | Close Ratio | N/A       | 280 (209)  | N/A   | 735 (997)   | N/A  | 1370 (1857)                                       | 38,000 (17,236)     | 38,000 (17,236)     |
| – Transit         |               |             |           |  |   |   |  |   |                     |                     |
| B 400             | 6510          | Close Ratio | N/A       | 300 (224)  | N/A   | 925 (1254)  | N/A  | 1370 (1857)                                       | 45,000 (20,412)     | 45,000 (20,412)     |
| – Transit         |               |             |           |  |   |   |  |   |                     |                     |
| – Tour Coach      |               | Close Ratio | N/A       | 330 (246)  | N/A   | 1000 (1356)   | N/A  | 1600 (2170)                                       | 45,000 (20,412)     | 45,000 (20,412)     |
| B 3400 XFE        | 6510          |             |           |  |   |   |  |   |                     |                     |
| – Transit         |               | Close Ratio | N/A       | 300 (224)  | N/A   | 925 (1254)  | N/A  | 1370 (1857)                                       | 45,000 (20,412)     | 45,000 (20,412)     |
| B 500             | 6610          |             |           |  |   |   |  |   |                     |                     |
| – Transit         |               | Close Ratio | N/A       | 420 (313)  | N/A   | 1300 (1763)   | N/A  | 2450 (3322)                                       | —                   | —                   |
| – Intercity Coach |               |             |           |  |   |   |  |   |                     |                     |
|                   |               | Close Ratio | N/A       | 550 (410)  | N/A   | 1700 (2305)   | N/A  | 2450 (3322)                                       | —                   | —                   |
|                   |               |             |           |  |   |   |  |   |                     |                     |

<sup>1</sup> Gross ratings as defined by ISO 1585 or SAE J1995. <sup>2</sup> SEM = engine controls with Shift Energy Management. <sup>3</sup> Turbine torque limit based on ISCAAN standard deductions.

1 Gross ratings as defined by ISO 1585 or SAE J1995. 2 SEM = engine controls with Shift Energy Management. 3 Turbine torque limit based on ISCAAN standard deductions.

| GEAR RATIOS – TORQUE CONVERTER MULTIPLICATION NOT INCLUDED |        |        |        |        |        |        |         |         |
|--|--------|--------|--------|--------|--------|--------|---------|---------|
| MODEL  | FIRST  | SECOND | THIRD  | FOURTH | FIFTH  | SIXTH  | SEVENTH | REVERSE |
| B 210  | 3.10:1 | 1.81:1 | 1.41:1 | 1.00:1 | 0.71:1 | 0.61:1 | —       | -4.49:1 |
| B 220  | 3.10:1 | 1.81:1 | 1.41:1 | 1.00:1 | 0.71:1 | 0.61:1 | —       | -4.49:1 |
| B 295  | 3.10:1 | 1.81:1 | 1.41:1 | 1.00:1 | 0.71:1 | 0.61:1 | —       | -4.49:1 |
| B 300  | 3.49:1 | 1.86:1 | 1.41:1 | 1.00:1 | 0.75:1 | 0.65:1 | —       | -5.03:1 |
| B 400  | 3.49:1 | 1.86:1 | 1.41:1 | 1.00:1 | 0.75:1 | 0.65:1 | —       | -5.03:1 |
| B 3400 xFE   | 3.49:1 | 2.03:1 | 1.47:1 | 1.00:1 | 0.69:1 | 0.59:1 | —       | -3.80:1 |
| B 500  | 3.51:1 | 1.91:1 | 1.43:1 | 1.00:1 | 0.74:1 | 0.64:1 | —       | -4.80:1 |

| ENGINE SPEEDS |   |                                      |                             |
|---------------|---|--------------------------------------|-----------------------------|
| MODEL         | FULL LOAD GOVERNED SPEED<br>Min-Max (rpm) | IDLE SPEED IN DRIVE<br>Min-Max (rpm) | OUTPUT SHAFT SPEED<br>(rpm) |
| B 210/220     | 2200-3800                                 | 500-820                              | 4500                        |
| B 295         | 2200-5000                                 | 500-820                              | 5000                        |
| B 300/400     | 1950-2800                                 | 500-800                              | 3600 <sup>1</sup>           |
| B 3400 xFE    | 1950-2800                                 | 500-800                              | 3600 <sup>1</sup>           |
| B 500         | 1700-2300                                 | 500-800                              | —                           |

1 Retarder-equipped models only.

| OIL SYSTEM                 |  |                     |                     |                                      |
|----------------------------|--|---------------------|---------------------|--------------------------------------|
| MODEL                      | CAPACITY <sup>1</sup><br>quarts (liters) | MAIN CIRCUIT FILTER | LUBE CIRCUIT FILTER | ELECTRONIC OIL LEVEL<br>SENSOR (OLS) |
| B 210/220                  |  | Spin-On Canister    | —                   | —                                    |
| — Standard Oil Sump        | 13.7 <sup>2</sup> (13.0) <sup>2</sup>    |                     |                     |                                      |
| — Shallow Oil Sump         | 11.6 <sup>2</sup> (11.0) <sup>2</sup>    |                     |                     |                                      |
| B 300/400                  |  | Integral            | Integral            | Standard                             |
| — Deep Oil Sump w/ PTO     | 29.75 <sup>2</sup> (28.1) <sup>2</sup>   |                     |                     |                                      |
| — Deep Oil Sump w/o PTO    | 29 <sup>2</sup> (27.4) <sup>2</sup>      |                     |                     |                                      |
| — Shallow Sump w/o PTO     | 26.75 <sup>2</sup> (25.3) <sup>2</sup>   |                     |                     |                                      |
| — Shallow Oil Sump w/o PTO | 26 <sup>2</sup> (24.6) <sup>2</sup>      |                     |                     |                                      |
| B 3400 xFE                 |  | Integral            | Integral            | Standard                             |
| — Deep Oil Sump w/ PTO     | 29.75 <sup>2</sup> (28.1) <sup>2</sup>   |                     |                     |                                      |
| — Deep Oil Sump w/o PTO    | 29 <sup>2</sup> (27.4) <sup>2</sup>      |                     |                     |                                      |
| — Shallow Sump w/o PTO     | 26.75 <sup>2</sup> (25.3) <sup>2</sup>   |                     |                     |                                      |
| — Shallow Oil Sump w/o PTO | 26 <sup>2</sup> (24.6) <sup>2</sup>      |                     |                     |                                      |
| B 500                      |  | Integral            | Integral            | Standard                             |
| — Deep Oil Sump and PTO    | 51 <sup>2</sup> (48) <sup>2</sup>        |                     |                     |                                      |
| — Deep Oil Sump            | 48 <sup>2</sup> (45) <sup>2</sup>        |                     |                     |                                      |
| — Shallow Oil Sump and PTO | 43 <sup>2</sup> (41) <sup>2</sup>        |                     |                     |                                      |
| — Shallow Oil Sump         | 40 <sup>2</sup> (38) <sup>2</sup>        |                     |                     |                                      |

Recommended oil types for all models are Allison Approved TES 295® transmission fluid.

1 Transmission only. Does not include cooler, hoses or fittings. 2 Amount of oil necessary to fill a dry transmission.

| TORQUE CONVERTER SPECIFICATIONS |                     |                      |
|---------------------------------|---------------------|----------------------|
| MODEL                           | TORQUE<br>CONVERTER | NOMINAL STALL TORQUE |
| B 210/220                       | TC-210              | 2.05                 |
|                                 | TC-211              | 1.91                 |
|                                 | TC-221              | 1.73                 |
|                                 | TC-222              | 1.58                 |
| B 300/400<br>B 3400 xFE         | TC-411              | 2.71                 |
|                                 | TC-413              | 2.44                 |
|                                 | TC-415              | 2.35                 |
|                                 | TC-417              | 2.20                 |
|                                 | TC-418              | 1.98                 |
|                                 | TC-419              | 2.02                 |
| B 500                           | TC-421              | 1.77                 |
|                                 | TC-521              | 2.42                 |
|                                 | TC-531              | 2.34                 |
|                                 | TC-541              | 1.90                 |
|                                 | TC-551              | 1.79                 |
|                                 | TC-561              | 1.58                 |
|                                 | TC-571              | 1.62                 |

| STANDARD POWER TAKEOFF – CONTINUOUS OPERATION |   |   |   |         |
|---|---|---|---|---------|
| MODEL   | MOUNTING PAD<br>POSITIONS VIEWED<br>FROM REAR | DRIVE GEAR<br>RATING<br>WITH ONE PTO<br>lb-ft (N•m) | DRIVE GEAR RATING<br>WITH TWO PTOS<br>lb-ft (N•m) | DRIVE   |
| B 210 <sup>1</sup>                            | 3 and 9 o'clock                               | 250 (339)   | 200 <sup>2</sup> (271) <sup>2</sup>               | Turbine |
| B 220 <sup>1</sup>                            | 3 and 9 o'clock                               | 250 (339)   | 200 <sup>2</sup> (271) <sup>2</sup>               | Turbine |
| B 300 <sup>1</sup>                            | 4 and 8 o'clock                               | 485 (660)   | 685 <sup>3</sup> (930) <sup>3</sup>               | Engine  |
| B 3400 xFE <sup>1</sup>                       | 4 and 8 o'clock                               | 485 (660)   | 685 <sup>3</sup> (930) <sup>3</sup>               | Engine  |
| B 400 <sup>1</sup>                            | 4 and 8 o'clock                               | 485 (660)   | 685 <sup>3</sup> (930) <sup>3</sup>               | Engine  |
| B 500 <sup>1</sup>                            | 1 and 8 o'clock                               | 685 (930)   | 1175 (1595)                                       | Engine  |

1 PTO-delete option available. 2 Rating per PTO. 3 Total on the drive gear.

| PHYSICAL DESCRIPTION  |                                |  |  |                        |
|-----------------------|--------------------------------|--|--|------------------------|
| MODEL                 | LENGTH <sup>1</sup><br>in (mm) | DEPTH <sup>2</sup> w/DEEP<br>OIL PAN/SUMP<br>in (mm) | DEPTH <sup>1</sup> w/SALLOW<br>OIL PAN/SUMP<br>in (mm) | DRY WEIGHT<br>lbs (kg) |
| B 210/220             |                                |  |  |                        |
| — SAE No. 3 mounting  | 28.01 (711.4)                  | 11.22 (285.1)  | 10.71 (272.0)  | 323 (146.5)            |
| — SAE No. 2 mounting  | 28.39 (721.1)                  | 11.22 (285.1)  | 10.71 (272.0)  | 323 (146.5)            |
| B 300/400             |                                |  |  |                        |
| — Basic model         | 28.3 (718.7)                   | 12.90 (327.7)  | 11.14 (283.1)  | 535 (243)              |
| — With PTO only       | 32.5 (825.4)                   | 12.90 (327.7)  | 11.14 (283.1)  | 575 (261)              |
| — With retarder only  | 28.29 (718.5)                  | 12.90 (327.7)  | 11.14 (283.1)  | 615 (279)              |
| — With PTO & retarder | 32.49 (825.4)                  | 12.90 (327.7)  | 11.14 (283.1)  | 655 (298)              |
| B 3400 xFE            |                                |  |  |                        |
| — Basic model         | 28.3 (718.7)                   | 12.90 (327.7)  | 11.14 (283.1)  | 535 (243)              |
| — With PTO only       | 32.5 (825.4)                   | 12.90 (327.7)  | 11.14 (283.1)  | 575 (261)              |
| — With retarder only  | 28.29 (718.5)                  | 12.90 (327.7)  | 11.14 (283.1)  | 615 (279)              |
| — With PTO & retarder | 32.49 (825.4)                  | 12.90 (327.7)  | 11.14 (283.1)  | 655 (298)              |
| B 500                 |                                |  |  |                        |
| — Basic model         | 30.54 (775.8)                  | 14.75 (374.7)  | 13.29 (337.6)  | 831 (377)              |
| — With PTO only       | 33.41 (848.7)                  | 14.75 (374.7)  | 13.29 (337.6)  | 893 (405)              |
| — With retarder only  | 33.54 (775.7)                  | 14.75 (374.7)  | 13.29 (337.6)  | 906 (411)              |
| — With PTO & retarder | 33.41 (848.7)                  | 14.75 (374.7)  | 13.29 (337.6)  | 968 (439)              |

1 Length measured from flywheel housing to end of output shaft. 2 Depth measured below transmission centerline.



## Vulcan™ Series HD1700V ▽ 180° Lens 1080P Camera

### CAMERA FEATURES

The Anvil™ HD1700V camera from AngelTrax features a fully articulated lens casing, adjustable vertically and horizontally, to obtain extreme 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™ HD1700V 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

- 180° lens/  
170° field of view
- 1.7mm focal length
- 2.12MP
- 1/2.7" CMOS sensor
- Fully articulated lens casing for image orientation

### MINIMUM ILLUMINATION

- 0.05 Lux / F1.8
- 0 Lux when IR on

### AUTO ELECTRONIC SHUTTER

- 1/60s (1/50s) - 1/100,000s

### INFRARED

- Smart 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)  
1,800°K ~ 10,500°K
- Automatic Gain Control: (AGC)

### SIGNAL TO NOISE RATIO

- S/N > 60dB

### VIDEO OUTPUT LEVEL

- 1.0 Vp-p Composite video/  
75 Ohm



### OPERATING CONDITIONS

- -40°F ~ +158°F (-40° C ~ +70°C)

### POWER INPUT

- DC 12V (9V ~ 16V)

### POWER CONSUMPTION

- (IR on) 300mA @ DC 12V
- (IR off) 75mA @ DC 12V

### IP RATING

- IP68

### HOUSING/CASING MATERIAL

- Steel
- Anti-vibration
- Vandal-resistant

### VIDEO COMPRESSION

- H.264

### IMAGE RESOLUTION

- 1080P high definition
- NTSC: 1920 x 1080 @30fps
- PAL: 1920 x 1080 @ 25fps

### IMAGE FRAME RATE

- 30fps

### AUDIO

- Noise-gated microphone



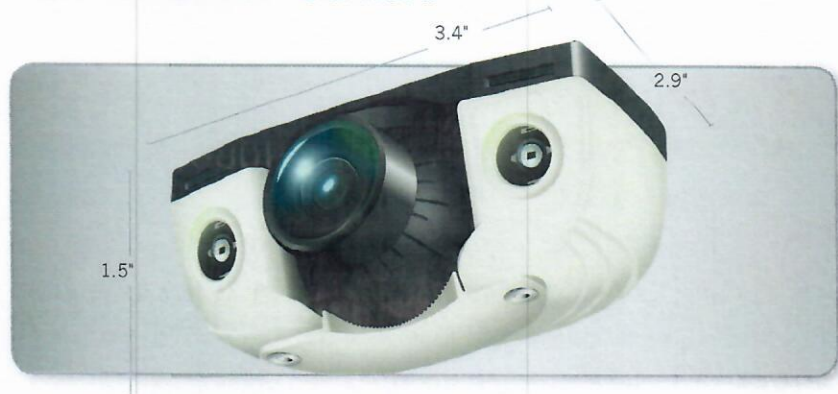
Specifications, features and applications of use are subject to change without notice. ▽ 9/2018



## 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: 0.1 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

- Noise-gated microphone

### OPERATING CONDITIONS

- -40°F ~ +158°F (-40°C ~ +70°C)

### POWER INPUT

- DC 12V ± 10%

### POWER CONSUMPTION

- (IR on) 300mA @ DC 12V
- (IR off) 75mA @ DC 12V

### IP RATING

- IP68

### HOUSING/CASING MATERIAL

- Steel
- Anti-vibration
- Vandal-resistant



Specifications, features and applications of use are subject to change without notice. ▽ 9/2018 A

## 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: 0.1 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

- Noise-gated microphone

### OPERATING CONDITIONS

- -40°F ~ +158°F (-40°C ~ +70°C)

### POWER INPUT

- DC 12V ± 10%

### POWER CONSUMPTION

- (IR on) 300mA @ DC 12V
- (IR off) 75mA @ DC 12V

### IP RATING

- IP68

### HOUSING/CASING MATERIAL

- Steel
- Anti-vibration
- Vandal-resistant

### HD3600V SHOWN WITH YELHS1 YELLOW HOUSING

For use in school bus applications as overview camera with IntelliGuard™ Automated Stop Arm Violation System



Specifications, features and applications of use are subject to change without notice. ▼ 3/2019 B



# LIMITED WARRANTY

Q'STRAIT provides limited warranty coverage on Q'STRAIT products (the "Products") as described in this Limited Warranty. For customers in the U.S.: this warranty gives you specific legal rights; you also may have other rights, which vary from state to state. For customers in the European Union: the purchaser may have additional legal rights under applicable national legislation governing the sale of consumer goods, and those rights (if applicable) are not affected by this warranty.

## COVERED PRODUCTS AND LIMITATIONS:

**Q'STRAIT's limited warranty coverage applies only to factory defects in materials and workmanship in the Products as follows:**

- **QUANTUM** – 3 years\* or 10,000 cycles.
- **Q'POD, QRT-3 Series, QRT-5 Series** – 5 years\* limited warranty coverage.
- **QRT Max, QRT Deluxe, QLK-150, Q'UBE** – 3 years\* limited warranty coverage.
- **QRT Standard, Q-5000, M-Series, QLK-110, INQLINE, INQLINE Loader** – 2 years\* limited warranty coverage.
- **All other Products** – 1 year limited warranty coverage.

**\*Only valid if product is registered with Q'STRAIT.** Otherwise a 1 year limited warranty applies to all products.

Each of the warranty coverage periods runs from the date the Products are shipped from Q'STRAIT, and applies only to warranted defects that first manifest themselves and are reported to Q'STRAIT within the applicable warranty period. Q'STRAIT retains the right to determine to its reasonable satisfaction whether any claimed defect is covered by this warranty.

**CERTAIN ITEMS ARE EXCLUDED FROM WARRANTY COVERAGE BY Q'STRAIT, AND THIS LIMITED WARRANTY COVERAGE DOES NOT APPLY TO:**

1. Products which are not installed and maintained in accordance with Q'STRAIT's instructions.
2. Products which are subject to misuse, abuse, accident, negligence, or exposure to the elements or chemicals.
3. Products which are altered or not repaired by a Q'STRAIT authorized repair service.
4. Normal wear and tear, and routine maintenance.
5. Products which are not used in applications or in a manner approved by Q'STRAIT.

**ALL STATUTORY OR IMPLIED WARRANTIES (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), CONDITIONS AND GUARANTIES ARE EXCLUDED AND DISCLAIMED TO THE FULLEST EXTENT ALLOWED BY LAW.** If any implied warranties, conditions or guarantees are required under applicable law, they are limited to the minimum duration allowed by law (not longer than the duration of the applicable express limited warranty coverage). For customers in the U.S.: some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

## **REMEDIES UNDER THIS LIMITED WARRANTY**

If a defect covered by this warranty occurs, Q'STRAIT (or one of its authorized dealers, as determined by Q'STRAIT) will repair or replace the defective Products, in its sole discretion. This "repair or replacement" remedy is the **exclusive remedy** under this warranty. Q'STRAIT has **no responsibility or liability for any incidental or consequential damages**, such as loss of use, interest or finance charges, the cost of repairs by unauthorized repair services, depreciation, etc., all of which are specifically **excluded and disclaimed** from this warranty. For customers in the U.S.: some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

## **RESPONSIBILITY OF PURCHASER**

1. Any claims under this limited warranty must be made to Q'STRAIT within fifteen (15) days after the defect first arises.



2. The Products must be returned to Q'STRAIT (or its authorized repair facility, as determined by Q'STRAIT) within the warranty period for inspection and warranty service. The expense of disassembly, returning the Products for warranty service, and of returning the Products to the owner and reassembly after any warranty service has been completed, is the responsibility of the owner and will not be reimbursed by Q'STRAIT. Contact Q'STRAIT Customer Service for information on how to return Products.
3. If your Product includes a registration form it must be returned to Q'STRAIT within thirty (30) days after the Products are delivered to the purchaser.

*Q'STRAIT reserves the right to improve its products through changes in design or materials without being obligated to the owners of other Products.*

Q'STRAIT may be contacted at **800-987-9987** or via email at [customersatisfaction@qstraint.com](mailto:customersatisfaction@qstraint.com).



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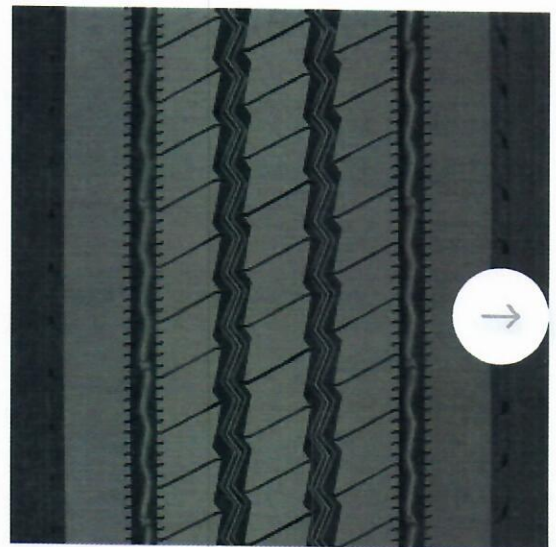
# MICHELIN XZE®

Robustness

Traction



MICHELIN® XZE®



MICHELIN® XZE®



[6 tires for this product](#)

**Exceptional all-position radial with extra-wide, extra-deep tread designed to help deliver our best wear in high scrub regional and line haul applications.**





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## Application



Line Haul



Regional Transport

Retreadable ([Learn more](#))

## Technical Specifications

[Find a Dealer](#)

## WHY THIS TIRE?

Application specific, high scrub compound (chip and cut resistant in versions with ☆ designation) make the MICHELIN® XZE® our longest wearing regional steer tire.

Deep, wide tread and optimized footprint shape help deliver long, even tread wear.

Beefy, buttressed shoulders help resist tearing and accelerated wear in high scrub applications.

Extra strong curb guards help protect sidewalls against most impacts and abrasions casing life.



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---

## BENEFITS AND FEATURES

### 1. Anti-Cut/Chip Compound

Long Tread Life – Delivers chip and cut resistance (in LRH versions with designation).

### 2. Optimized Tread Design

Long Tread Life and Excellent Handling – Combines fast water evacuation for excellent wet traction with an aggressive, evolving tread pattern that helps maintain driver confidence throughout the long tread life.

### 3. Miniature Groove Wall Sipes

Long Tread Life – Help deliver even wear, along with traction.

### 4. Solid Shoulders

Long Tread Life – Help resist tearing and accelerated wear in high scrub applications.

### 5. Full-Width Elastic Protector Ply

Casing Durability – Helps protect the working plies from bruising and penetrations, and downtime.

### 6. Curb Guards

Casing Durability – Help protect sidewalls against most impacts and abrasions for long casing life.

### 7. Groove Bottom Protector

Casing Durability – Protects against stone drilling.

### 8. Variable Pitch Groove Walls

Casing Durability – Protect against stone drilling.



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## REFERENCE MATERIALS - DOCUMENTS

### MICHELIN® XZE® Product Sheet

Download (405.72Kb)



### MICHELIN® Truck Tire Warranty

Download (861.7Kb)



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**MICHELIN® Truck Tire Reference Chart**

Download (6.54Mb)

**MICHELIN**

XZE®

**225/70R19.5 G (Steer/All Position)** Filter on sizes**ALL SIZES (6)****Steer/All Position****225/70R19.5 G**

245/70R19.5 H

10R22.5 G

12R22.5 H

**Technical Specifications**



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Recommended Wheels

6.75

Approved Wheels

6.00

Min Dual Spacing ⓘ

9 inch

Tread depth

17/32 nds

Max Speed

87

Max Load per Tire Single

3970 lbs

CAI

980982

MSPN

91043



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Application

Tread Depth

[XZE Siped - 225/70R19.5](#)

Z

line haul, regional

18/32 nds

[XZE - 225/70R19.5](#)

Z

line haul, regional

16/32 nds

[XZE - 225/70R19.5](#)

Z

line haul, regional

16/32 nds

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Z

line haul, regional

18/32 nds

[XZE - 225/70R19.5](#)

Z





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Z

line haul, regional

18/32 nds

[XZE - 225/70R19.5](#)

Z

line haul, regional

18/32 nds

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line haul, regional

18/32 nds

[XZE - 225/70R19.5](#)

Z

line haul, regional

18/32 nds

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Z

line haul, regional

18/32 nds

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18/32 nds

**XZA Siped - 225/70R19.5**

Z

line haul, regional

13/32 nds

**XZA Siped - 225/70R19.5**

Z

line haul, regional

15/32 nds

**XZA Siped - 225/70R19.5**

Z

line haul, regional

15/32 nds

**XZA - 225/70R19.5**

Z

line haul, regional

15/32 nds

**XZA - 225/70R19.5**

Z

line haul, regional

13/32 nds





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line haul, regional

15/32 nds

[XZA - 225/70R19.5](#)

Z

line haul, regional

15/32 nds

[XZA - 225/70R19.5](#)

Z

line haul, regional

15/32 nds

[XZA - 225/70R19.5](#)

Z

line haul, regional

13/32 nds

[XZA - 225/70R19.5](#)

Z

line haul, regional

13/32 nds

[XZA - 225/70R19.5](#)

Z

line haul, regional



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Z

line haul, regional

15/32 nds

[XZA - 225/70R19.5](#)

Z

line haul, regional

15/32 nds





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**XZA - 225/70R19.5**

Z

line haul, regional

15/32 nds

**XZA - 225/70R19.5**

Z

line haul, regional

13/32 nds

**XZE-SA - 225/70R19.5**

Z

line haul, regional

18/32 nds

**XZE-SA - 225/70R19.5**

Z

line haul, regional

18/32 nds

**XZE-SA - 225/70R19.5**

Z

line haul, regional

18/32 nds



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line haul, regional

18/32 nds

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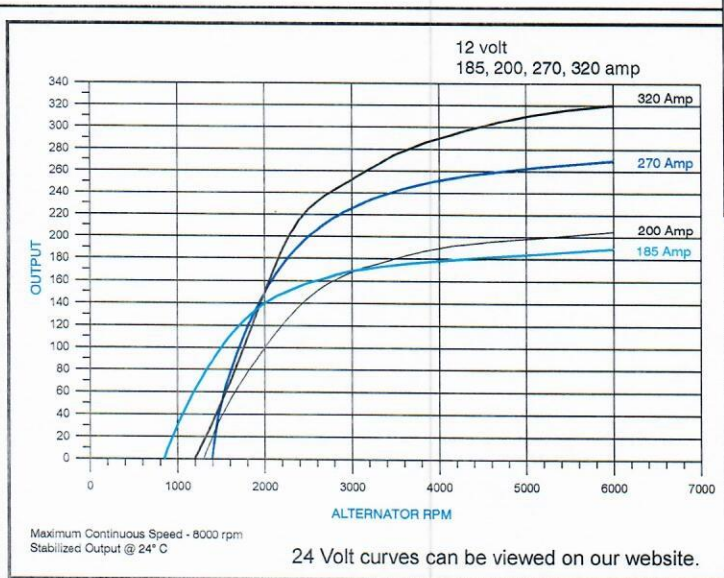
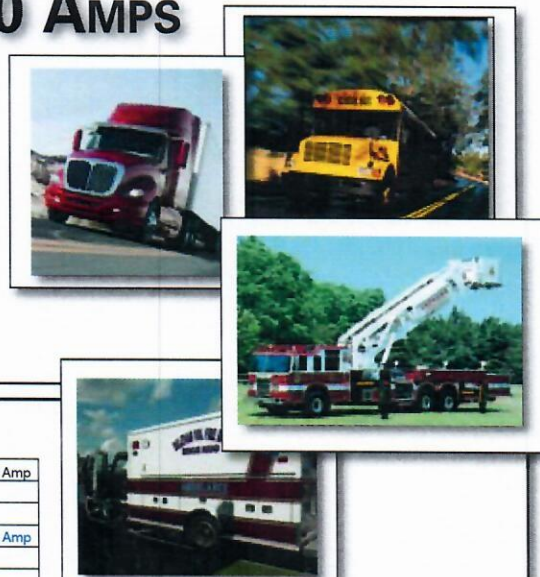
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# 4000 SERIES ALTERNATORS

125°C

## Severe Duty High Amp / High Temp Rated Alternators 12 VOLT - 185 AMPS To 320 AMPS 24 VOLT- 200 AMPS

- Designed for reliable high output
- State-of-the-Art rectifier system
- Enclosed brush/slip ring system
- Multi-Power- Multiple alternator system can produce up to 1280 Amps!



Internal rectifier



External rectifier

- Internal rectifier system  
Solid lead frame design  
Welded connections to diodes
- High temp rated

**For information call your  
Leece-Neville representative today.**

**Prestolite**  
electric

**Leece-Neville**  
HEAVY DUTY SYSTEMS



## CHAMPION QUALITY ASSURANCE WATER TEST PROCESS

The following is a description of the current water test procedure for all units produced by Champion Bus, Inc.

### FACILITY

- Water test bay: 20' wide x 56' long x 18' high with attached pump room measuring 15' wide x 20' long x 9' high.
- Water jets:
- 5 Lengths of 1 1/2" schedule 80 pipe at 45' long running lengthwise inside the building.
  - 15 Active nozzles per pipe length for a total of 75 nozzles (Model 24 WSQ Nozzles with 110" spray pattern).
  - Water supplied by 3" schedule 80 pipe with 3" schedule 80 pipe headers on each end of system.
  - System supply pump rated at 300 gpm
- Water Pressure:
- System water pressure adjustable up to 45 psi
  - Example: - 20 psi = 3.3 gpm/nozzle
  - 40 psi = 4.4 gpm/nozzle
  - System recovery pump rated at 300 gpm

### PROCEDURE

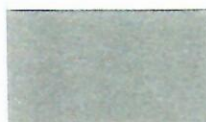
1. DRIVE VEHICLE INTO BAY.
2. ACTIVATE WATER SPRAY. (SYSTEM GOES ON, AUTOMATICALLY)
- \*3. *LET VEHICLE SET FOR A MINIMUM OF 15 MINUTES PER UNIT. (MORE TIME MAY BE NECESSARY, IF VEHICLE IS SLATED FOR HARSH ENVIRONMENTS. ENGINEERING SHOULD REVIEW AND APPROVE ALL REQUESTS FOR CHANGES TO THIS SYSTEM AND PROCEDURE. USE THE "ECR" SYSTEM FOR REQUESTED CHANGES.)*

\*NOTE: Currently, our system pressure, at the main pump is set at 10 psi. this is approximately equivalent to a rainfall of 18" per a 1 hour period.

4. EXAMINE ALL WINDOWS, DOORS, WHEELWELLS, ESCAPE HATCHES, VENTS, WALLS, CEILING, FLOOR, AND ANY OTHER JOINT FOR WATER LEAKS.
5. RECORD RESULTS ON "WATER TEST LOG".
6. TURN OFF WATER SPRAY. (SYSTEM SHUTS OFF AUTOMATICALLY.)
7. EXIT BOOTH AND RETURN VEHICLE TO REPAIR BAY AND REPAIR ALL LEAKS.
8. IF ANY LEAKS WERE FOUND, RETEST VEHICLE (STEPS 1-5).
9. PROVIDE COMPLETED "WATER TEST LOG" TO QA PERSON, GROUP 50 (NORTH BLDG) OR GROUP 70 (SOUTH BLDG.) FOR REVIEW AND FILING WITH VEHICLE'S MASTER FILE.
10. QA PRODUCTION PERSONNEL SHOULD ALERT ALL GROUPS, OF CONSISTENTLY FOUND, NON-CONFORMING ASSEMBLY CONCERNS.

## Graphic Films for Opaque Applications

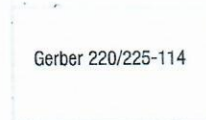
- 3M™ Scotchcal™ ElectroCut™  
Graphic Film Series 7125,  
7725, and 7725SE
- 3M™ Controltac™ Plus Graphic  
Film with Comply™ Adhesive  
Series 180C



**Satin Aluminum**  
180C-120  
7725-120, 7125-120  
PANTONE® 877 C



**Satin Gold**  
180C-131  
7725-131, 7125-131  
PANTONE 872 C



Gerber 220/225-114

**Transparent**  
180C-114  
7725-114, 7125-114



**White**  
180C-10



**White**  
7725-10, 7125-10



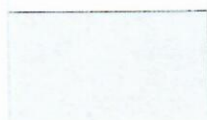
**Matte White**  
7725-20, 7125-20



**Eggshell**  
7725-130



**Antique White**  
7725-90, 7125-90



**Pearl Gray**  
7725-11, 7125-11  
PANTONE Cool  
Gray 2 C



**Medium Gray**  
180C-31  
7725-31, 7125-31  
PANTONE Cool  
Gray 7 C



**Dark Gray**  
180C-41  
7725-41, 7125-41



**Black**  
180C-12  
7725-12, 7125-12  
PANTONE Process  
Black C



**Matte Black**  
180C-22,  
7725-22, 7125-22,  
PANTONE Black C



**Deep Mahogany  
Brown**  
180C-19  
7725-19, 7125-19  
PANTONE 4625 C



**Russet Brown**  
7725-29, 7125-29  
PANTONE 175 C



**Saddle Brown**  
7725-139, 7125-139



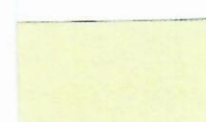
**Tan**  
180C-39  
7725-39, 7125-39



**Putty**  
7725-59, 7125-59



**Sandstone**  
7725-89, 7125-89



**Fawn**  
7725-99, 7125-99



**Beige**  
180C-49  
7725-49, 7125-49



**Mauve**  
7725-193



**Salmon Pink**  
7725-173



**Magenta**  
7725-103, 7125-103  
PANTONE 205 C



**Process Magenta**  
7725-273  
PANTONE 214 C



**Perfect Match Red**  
7725-263, 7125-263  
PANTONE 186 C



**Tomato Red**  
180C-13  
7725-13, 7125-13  
PANTONE 1795 C





**Geranium**  
180C-63  
7725-63, 7125-63



**Deep Red**  
180C-23  
7725-23, 7125-23



**Cardinal Red**  
180C-53  
7725-53, 7125-53



**Burgundy**  
180C-58  
7725-58, 7125-58



**Terra Cotta**  
7725-24, 7125-24



**Bright Orange**  
180C-14  
7725-14, 7125-14  
PANTONE Orange  
021 C



**Apricot**  
7725-64



**Light Orange**  
180C-54  
7725-54, 7125-54



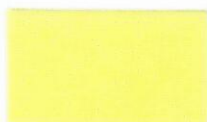
**Harvest Gold**  
7725-105, 7125-105  
PANTONE 7510 C



**Sunflower**  
180C-25  
7725-25, 7125-25  
PANTONE 1235 C



**Bright Yellow**  
180C-15  
7725-15, 7125-15  
PANTONE 109 C



**Vista Yellow**  
7725-85



**Apple Green**  
180C-196  
7725-196, 7125-196



**Kelly Green**  
180C-46  
7725-46, 7125-46



**Bright Green**  
180C-186  
7725-186, 7125-186  
PANTONE 348 C



**Dark Green**  
180C-56  
7725-56, 7125-56  
PANTONE 3425 C



**Bottle Green**  
7725-276, 7125-276



**Forest Green**  
7725-66, 7125-66  
PANTONE 3302 C



**Bermuda Blue**  
7725-357, 7125-357  
PANTONE 323 C



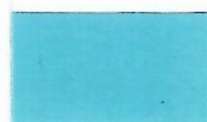
**Teal**  
180C-96  
7725-96, 7125-96  
PANTONE 322 C



**Dark Aqua**  
7725-307



**Aqua**  
7725-176



**Peacock Blue**  
180C-77  
7725-77, 7125-77  
PANTONE 298 C



**Robin Egg Blue**  
7725-86



**Olympic Blue**  
180C-57  
7725-57, 7125-57  
PANTONE 7461 C



**Intense Blue**  
180C-47  
7725-47, 7125-47  
PANTONE 301 C



**Vivid Blue**  
180C-17  
7725-17, 7125-17



**Sapphire Blue**  
180C-37  
7725-37, 7125-37  
PANTONE 2747 C



**Wedgewood Blue**  
7725-187



**Shadow Blue**  
7725-177, 7125-177

## Other Product Series:

Most colors are available in other product series.

## Can't find your color?

Allow us to custom match your color with our three-day, no-



**Light Navy**  
7725-197, 7125-197  
PANTONE 289 C



**Indigo**  
180C-27  
7725-27, 7125-27  
PANTONE 2767 C



**Royal Purple**  
180C-38  
7725-38, 7125-38



**Purple**  
7725-48, 7125-48



**Dark Violet**  
7725-98



**Violet**  
7725-88

## Metallic Graphic Film



**Sage Green  
Metallic**  
180C-216



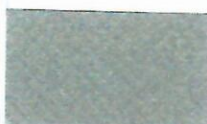
**Dark Blue  
Metallic**  
180C-217



**Bright Blue  
Metallic**  
180C-227



**Silver Blue  
Metallic**  
180C-237



**Light Silver  
Metallic**  
180C-220  
PANTONE 877 C



**Slate  
Metallic**  
180C-201



**Gray  
Metallic**  
180C-221



**Charcoal  
Metallic**  
180C-211



**Dark Burgundy  
Metallic**  
180C-228



**Gold  
Metallic**  
180C-241



**Copper  
Metallic**  
180C-229

## Fluorescent Graphic Film



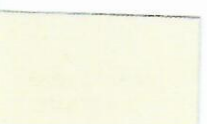
**Yellow-Orange**  
7725SE-404



**Red-Orange**  
7725SE-414



**Fuchsia**  
7725SE-413



**Yellow**  
7725SE-405



**Green**  
7725SE-406

## Films for application to opaque surfaces

The components used in sign construction, including sources of illumination, adhesives and substrates, affect color. Although color variation is usually slight, certain components have a more obvious effect, particularly with shades of white. PANTONE® color numbers are based on reflective light measurements of product samples applied to a standard white substrate.

103

a

ed  
263

13



# PURE ASPHALT

MANUFACTURER OF SPECIALTY COATINGS SINCE 1927

## PRODUCT DATA

3300 W. 31<sup>ST</sup> STREET  
CHICAGO, IL 60623  
PH: 773.247.7030  
FAX: 773.247.7066  
WWW.PUREASPHALT.COM

### # 76-M Undercoating/Chassis Coating

#### DESCRIPTION

A premium haps free polymer waterborne coating for the protection of metal frames and other underbody components on the underside of trailers, utility bodies, bus bodies, RV's and other vehicles. #76-M can be applied to a variety of substrates (wood, foam, FRP, plastic) or direct to metal over pickled, galvanized and lightly rusted surfaces. Excellent sprayability, coverage and sag allows for a wide variety of tip sizes and spray equipment. #76-M is a water based formula with quick dry capabilities to achieve early water and weather resistance making it suitable for a variety of production situations. 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, fiberglass and plastic surfaces at higher film builds. Dry coating is tack free and can be top coated.

#### MATERIALS

#76-M is composed of an abrasive free material, formulated with emulsified petroleum hydrocarbons, modified polymer additives and inert fillers.

#### PRODUCT DATA

Color  
Weight per Gal.  
Solids  
Flash Point  
V.O.C. Content  
Viscosity & Sag  
Fed Spec. TTC-520-B  
Dry to light touch (70F/30%humidity)

#### PROPERTIES

Black  
9.3 lbs +/- .2  
53% +/- 3  
Not Applicable  
< .35 lbs per gallon  
Per customer specification and application equipment  
Pass  
20 -30 minutes (at 10 mils wet/70F)

#### APPLICATION

#76-M can be cold applied with conventional airless or air assist spray equipment with a minimum amount of spray back and fogging. The product is formulated to be used as supplied. Although mixing is usually not required, ensure uniform consistency prior to use. The ambient and product temperature should be 50-95 F (10-35 C) at time of application. Before top coating, contact Pure Asphalt Co. to ensure compatibility. Refer to the MSDS (Material Safety Data Sheet) for additional handling instructions, Personal Protection Equipment requirements and first aid information before using.

#### APPLICATION EQUIPMENT

30:1 Reciprocating pumps with 30 - 40 lbs of air .021 - .025 inches tip size  
(For Industrial applications w/ large pumps)  
15-1 Air Motor pumps with 65-75 lbs of air (drum/keg pump) .021 - .023 inches tip size

#### DRY TIME

# 76-M will dry to light touch in 20-40 minutes (depending on film thickness, temperature, humidity and airflow), and fully cure in 24 hrs @ 70F. Air movement will speed drying. 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.

#### 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

This product may be damaged if frozen. Please protect from severe weather. Store in a warm place. (50-90 degrees F)

#### PACKAGING

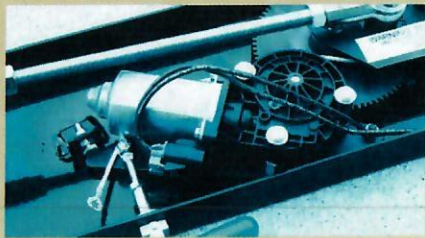
Available in 16-gallon kegs, 55-gallon drums and 330 gal. totes

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.



## Quality in Design

Looking past the simplicity in design, you'll see a quality product—from powdercoated base plates to plated rods, from zinc plating to tempered glass. Indeed, "reliability" is a descriptor that applies to the entire product. With confidence, we offer a comprehensive one-year warranty. Beyond the warranty period however, you can expect years of trouble-free operation. In the unlikely event that service is ever required, the design also facilitates unparalleled ease of access.



## Custom Design

While we do offer specific product families to address the needs of most manufacturers, A&M Systems specializes in designing to your specifications. Pin to pin lengths can vary between 26 and 46 inches. Header width can range from 7 to 11.5 inches. Our ability to manufacture to specification has lead top manufacturers to abandon their own production and design efforts and to choose the A&M Systems product.

In addition, those operating in the after-market have found that our actuators can be used as drop-in, direct replacement for older, less reliable door headers.

## About A&M Systems

For years we've specialized in designing and manufacturing problem-free door actuators. In more recent times, we took our expertise to the door leaves as well.

We are a service-oriented company with keen insight into the industry. We offer agile manufacturing, short lead times, and just-in-time production. Our cost-conscious approach pleases the purchasing agent. Ease-of-installation pleases production personnel. Ease-of-operation pleases the end user. And the quality and reliability of our products pleases everyone.

We are committed to quality in design, quality in production, and quality in service.

## Contact Information

A&M Systems, Inc.  
1845 Fieldhouse  
Elkhart, IN 46517  
Phone: 574.522.5000  
Fax: 574.522.9099

Email: [sales@anmsystems.com](mailto:sales@anmsystems.com)

[www.anmsystems.com](http://www.anmsystems.com)



## Transit Bus Doors & Actuators

USING 42" WIDE MODEL  
FOR WEST VIRGINIA

## Simple is Better

One look at our product line reveals our design approach: simple is better. We carefully engineer bus doors and actuators (headers) to operate smoothly and reliably while eliminating the problem-prone and complex design elements that plague our competitors' products. The result is a product line which has become the number one choice for manufacturers of small and medium-size buses.

Simplicity in design leads to simplicity in installation and simplicity in operation. It also means that we can offer a superior product at the best possible pricing to you.

Simplicity in design does not mean short-cuts in our production, however. We've put years of engineering effort into perfecting the design of our manual and electric door actuators and door leaves. Operational testing is conducted 24/7. Life-cycle testing has produced in excess of a quarter million trouble-free cycles.

Innovation is not lost in our efforts to maintain simplicity. For example, the variable ratio closing on our manual actuator is a patent-pending design. Consider also the re-engagement of our electric actuator following emergency opening. This scenario resulted in extremely complex approaches in competitive products. Our actuator easily and automatically recycles when the motor is reengaged.

In operation, our products are unsurpassed, achieving perpendicular door openings with either electric and manual models as well as secure closings—even at highway speeds.



## Product Line Overview

The A&M product line consists of door leaves (often called “flops”) and manual and electric door actuators (often referred to as “headers”). In working together, these products create an attractive, functional, efficient, and robust entry system for small and medium-size buses in the transit industry.

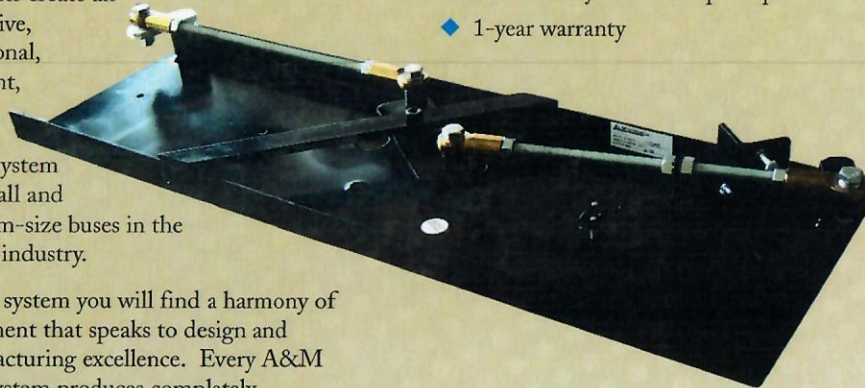
In this system you will find a harmony of movement that speaks to design and manufacturing excellence. Every A&M door system produces completely perpendicular door openings—every time. In the A&M system, the forward door opens first and closes last—always. In the A&M system there is not a reliance on troublesome components (such as spring-loaded push-pull rods)—ever.

You can rely on A&M Systems to provide a distinctive entry system that opens smoothly and closes securely. Likewise, we will provide a business relationship guaranteed to help you succeed.



## Manual Actuators Features

- ◆ Low-profile design
- ◆ Powder-coated base plate
- ◆ Plated push rods
- ◆ Permanently lubricated pivot points
- ◆ 1-year warranty



## New! Wireless Remote Option

Now enjoy the benefits of remote door operation through a wireless key fob. This option adds to the convenience of an electronic A&M door system. It offers plug-n-play installation and it's retrofitable!



USING ELECTRIC ACTUATOR  
FOR WEST VIRGINIA

## Electric Actuators Features

- ◆ Low-profile design
- ◆ Powder-coated base plate
- ◆ Plated push rods
- ◆ Permanently lubricated pivot points
- ◆ Motor control PC board
- ◆ Proprietary, heavy-duty motor
- ◆ Available wireless remote
- ◆ 1-year warranty

## Door Features

- ◆ Key-lock joint (extremely rigid, no-weld design)
- ◆ Corrosion resistance aluminum and stainless steel
- ◆ Torque arm on upper hinge (unique and zinc plated)
- ◆ Tempered glass
- ◆ Tough, clear coat, anodized finish (204 R1 rated)
- ◆ Radius edge for clean mating to seal
- ◆ Leaves are ambidextrous! (Use in either forward or aft position)
- ◆ 1-year warranty





welcome

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## SAFER BOARDING

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Since 1991, Warm Welcome® low voltage step heaters have been used throughout North America in major city transit systems that provide services in cold weather. These same snow-melting heaters have been installed on airport shuttles, school buses, passenger trains, and even on off-shore oil platforms in the North Sea. You'll find Warm Welcome® low voltage step heaters from NYC to Toronto, Toledo to Washington DC, Cleveland to Spokane and many more metropolitan areas.



6/9/2021

For Mass Transit - Warm Welcome®



*welcome*

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With a thin profile and zero moving parts WARM WELCOME® Step heaters can easily be installed (at the factory or retrofitted to existing vehicles) beneath the treads of any size steps or lifts. Each one is pre-wired for quick and easy installation. The step treads are environmentally friendly replacing corrosive salts and potentially damaging de-icing chemical to preserve the steps of your vehicles and save on maintenance.

Whatever your specific transit requirements, WARM WELCOME® can help your passengers board and debark with more safety. Manufacturers offer the step heaters pre-installed at the factory. However,

  
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Whatever your specific transit requirements, WARM WELCOME® can help your passengers board and debark with more safety. Manufacturers offer the step heaters pre-installed at the factory. However, retrofitting is not a problem for after-market installations in existing vehicles and fleets.

The step heaters come pre-wired, install quickly, and work beneath any size step or lift.



welcome

HOME

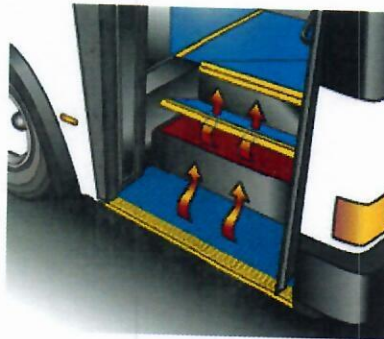
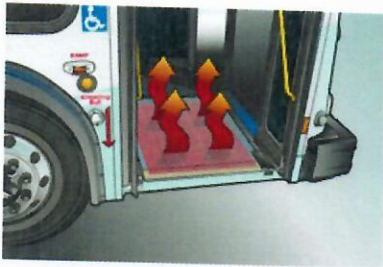
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## HOW THEY WORK FOR MASS TRANSIT

Your commercial vehicles will be safer for boarding and debarking, so your passengers won't be concerned about snow or ice covered steps. When

  
*welcome*

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Manufacturers offer the step heaters pre-installed at the factory.

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Retrofitting is not a problem for after-market installations in existing vehicles and fleets. The step heaters come pre-wired, install quickly, and work beneath any size step or lift.

Mass Transit step heaters are built with a thin profile and are installed between the transit vehicles' factory step treads, and the floor. The top layer floor tread overlays the foil-covered heat element while the bottom (also foil-covered) lays flat against the vehicle floor. In this manner, the look and feel of the vehicle step is preserved while the heater is protected and your passengers are ensured a comfortable step.

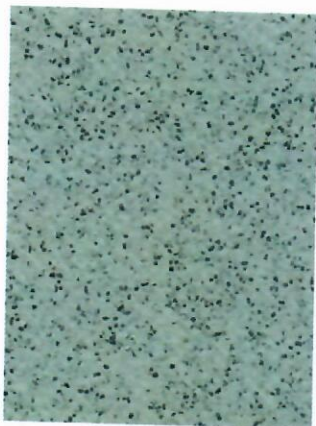
WATCH EVERY STEP



| DESCRIPTION                   |   |  |
|-------------------------------|---|--|
| Backing                       |   | NT   |
| Thickness                     |   | 2.25 ± 0.15 mm<br>0.088 ± 0.006"   |
| Weight                        |   | 2.20 ± 0.15 kg/m²<br>4.05 lb/Sq.Yd   |
| Roll width                    |   | 200 cm<br>6.56'  |
| Roll length                   |   | 24 lm<br>78.72'  |
| PERFORMANCE                   |   |  |
| Dimensional stability         | ASTM D 1204                             | ≤ 0.3 %  |
| Abrasion resistance           | ISO 9352<br>TABER TEST                  | 300 ± 50 mg<br>0.01 ± 0.002 oz   |
| Indentation resistance        | EN 433                                  | ≤ 0.2 mm<br>< 0.008"   |
| Low temperature resistance    | D 42 1235 A                             | - 20°C / -4°F  |
| Sound Damping Characteristics | ISO 717/2                               | ΔI = 5 dB  |
| Color fastness                | ASTM D 4459                             | ≥ 7  |
| Slip resistance               | ASTM D 2047                             | > 0.6  |
| Fire resistance               | FMVSS 302<br>(ISO 3795/76)              | Conform  |
|                               | Docket 90a<br>(ASTM E648)<br>(NFPA 253) | Class 1<br>(CRF> 0.45 W/cm²)   |
| Resistance to chemicals       | EN 423                                  | Unaffected by diluted acids and bases<br>Unaffected by domestic products<br>(excluding solvents for plasticized PVC) |

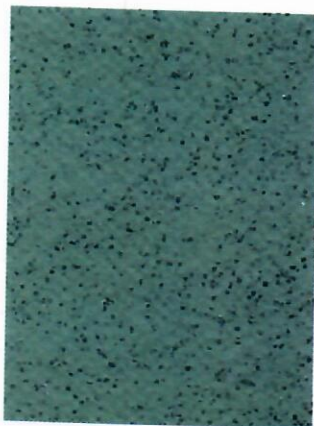
## SIRIUS

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NT

6768 Griffon



NT

6782 Dune



NT

6451 Corsaire



NT

6727 Anthracite



NT

6801 Graphite

## APOLLO

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MK

NT

4776 Masan



MK

NT

4479 Kilimanjaro



MK

NT

4517 Fuji



# FEATHER WEIGHT

## 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."



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

Not Just Seats



THE FEATHER WEIGHT SERIES BY

**FREEDMAN**

SEATING COMPANY

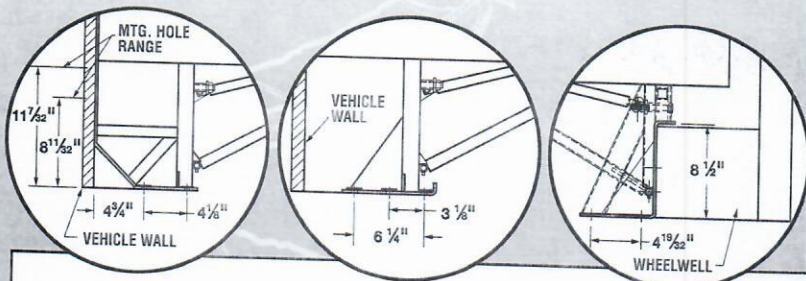
an ISO 9001:2000 certified company

Seating Solutions™



# FEATHER WEIGHT

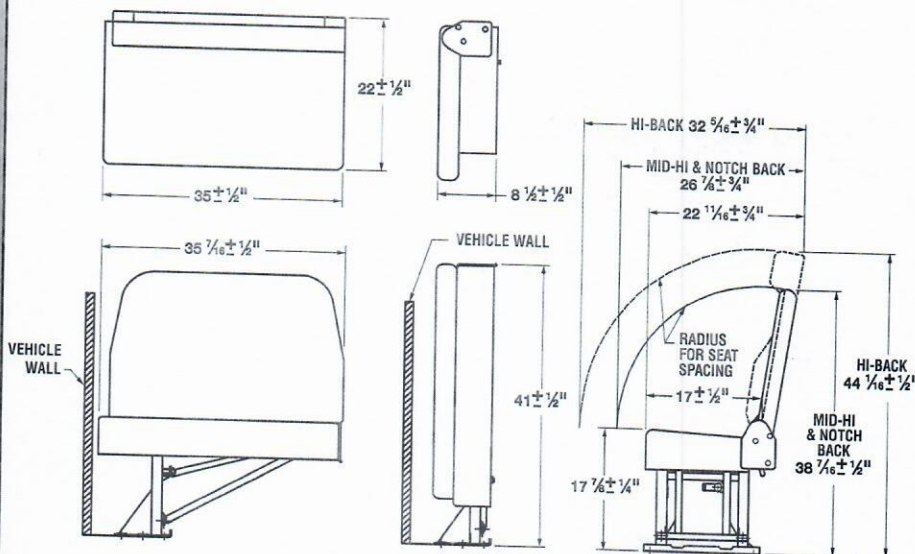
## Foldaway BV & AM STYLES



AM2 Floor/Wall Mount

BV Floor Mount

BVWW3 Floor Mount



Corner Grabs

TDSS with belts

TDSS without belts



Belts not included.

### Standard Features:

- BV Foldaways mount to the vehicle with four bolts to the floor (no wall mount)
- AM Foldaways mount to the vehicle with four bolts to the floor and two to the wall mount
- Seat belt ready (FMVSS 210 compliant with no leg or tether)
- Ultra-thin backrest for added hip-to-knee room and lumbar support
- High quality molded polyurethane seat and back cushions
- Folds up to less than 10" thick when in the stowed position
- Cantilever design provides reduced installation time; no floor cutting for aisle leg and easy vehicle clean up
- Wire mesh grid seat springs for even support
- 2 locking mechanisms to hold seat in stowed position

### Options:

- Single or double seats
- Bench back, notch back or high back
- Wheel well seats
- Wide variety of vinyl's or cloths
- Molded U.S. arms or upholstered arms
- Black or yellow top grabs (not on high backs)
- Black or yellow corner grabs (black side only on high back)
- Vertical stitching
- FTA foam
- ABS backs (Notchback only)
- Adjustable headrests (Single and Notchback only)
- Shrouds to cover the Foldaway when stowed
- USR seat belts (Under Seat Retractors)
- CRS-225 hooks and tethers
- TDSS (Tie Down Storage System)

## Not Just Seats



THE FEATHER WEIGHT SERIES BY

**FREEDMAN**  
SEATING COMPANY

an ISO 9001:2000 certified company

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

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.

Seating Solutions™



# FREEDMAN SEATING CAREGIVER

## SAFETY FOR ALL PASSENGERS

Standard 3PT seat belts with optional ICS (Integrated Child Seat) and/or CRS (Child Restraint System) for children



ICS Integrated Child Seat  
FMVSS compliant

Not Just Seats



THE FEATHER WEIGHT SERIES BY

**FREEDMAN**  
SEATING COMPANY

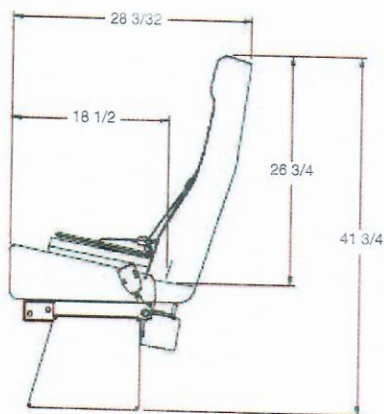
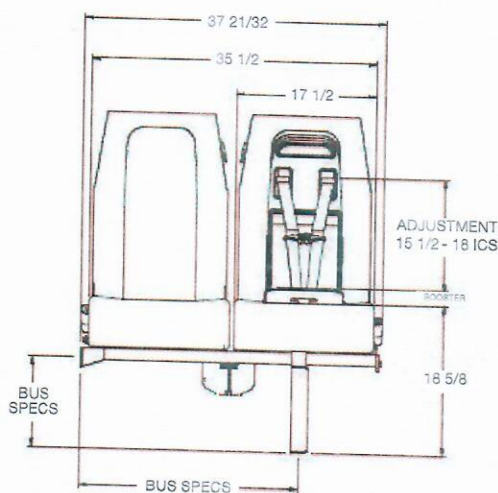
Seating Solutions™



# FREEDMAN



3PT seat belts



# SEATING CAREGIVER

**Safety for all passengers. Standard 3PT seat belts with optional ICS (Integrated Child Seat) and/or CRS (Child Restraint System) for children.**

The newly upgraded Caregiver seat is designed for a comfortable, safe ride for both children and guardians. 3PT seat belts have been added for adults, while the optional ICS is available for children from 22-78 lbs. 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, avoiding clumsy operations.

## Standard Features:

- Accommodates children 22-78 lbs
- Standard 3-point seat belts with FMVSS 207 and 210 seat belt anchorage compliance
- Fits where most 3PT seats were placed
- Use existing GO, GO-ES, or 3PT legs

## Options:

- Available in a wide variety of vinyls and cloths
- Upholstered or US Arms
- Adjustable footrests
- Available as a single or double
- Optional Integrated Child Seat (ICS) accommodates children 22-78 lbs with FMVSS 213 Compliance
  - Fold down tongue can be folded to act as a booster seat
  - Easily adjustable ICS shoulder straps
- Optional Child Restraint System (CRS) with FMVSS 225 Compliance

Not Just Seats



THE FEATHER WEIGHT SERIES BY  
**FREEDMAN**  
SEATING COMPANY

Seating Solutions™

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



Freedman Seating is committed to lessening our impact on the planet. For your convenience, materials are now available online to download at [www.freedmanseating.com](http://www.freedmanseating.com).

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.



# FEATHER WEIGHT

## 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



THE FEATHER WEIGHT SERIES BY

**FREEDMAN**  
SEATING COMPANY

Seating Solutions™



# FEATHER WEIGHT

## HIGH-BACK SEAT

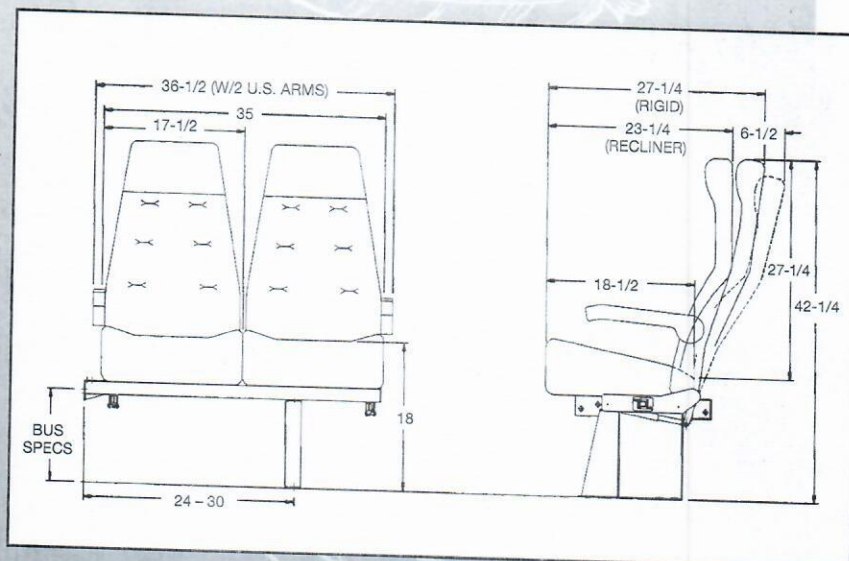
Cross-country or cross-town, the Freedman Feather Weight High-Back gets you there in safety and comfort. The headrest actually cradles your head, and provides unrestricted viewing. The ultra-thin backrest gives out-standing support and creates more hip-to-knee room than any other seat in its class. The 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:

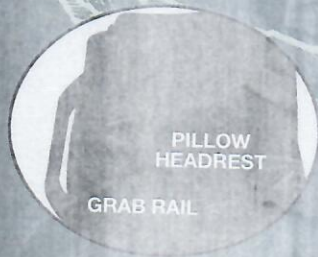
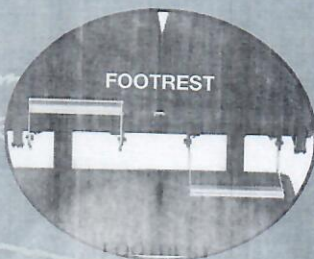
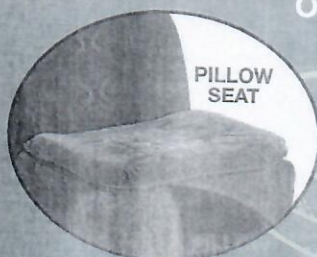
- An ultra-thin *Knee-Saver* type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17½" wide seat cushions
- 27¼" back height off the seat cushion, 42¼" off the floor
- Wire mesh-grid seat springs for even support
- 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
- Mesh map pockets
- Vertical stitching
- FTA foam
- Snack trays
- Aluminum folding footrests
- Pillow seat cushions
- Pillow headrests
- Side grab rail
- U.S.R.—Under Seat Retractors
- 16" or 19" wide seats available
- Rear row quick disconnect
- CRS-225 hooks and tethers
- Side sliders
- Cup holders
- Seat belt loops



### OPTIONS



Not Just Seats



Seating Solutions™

THE FEATHER WEIGHT SERIES BY

**FREEDMAN**  
SEATING COMPANY

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

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.



# FEATHER WEIGHT

MID-HI SEAT  
"ROCK SOLID"



## 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 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™

THE FEATHER WEIGHT SERIES BY

**FREEDMAN**

SEATING COMPANY

an ISO 9001:2000 certified company



# FEATHER WEIGHT

## MID-HI SEAT "ROCK SOLID"



### 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:

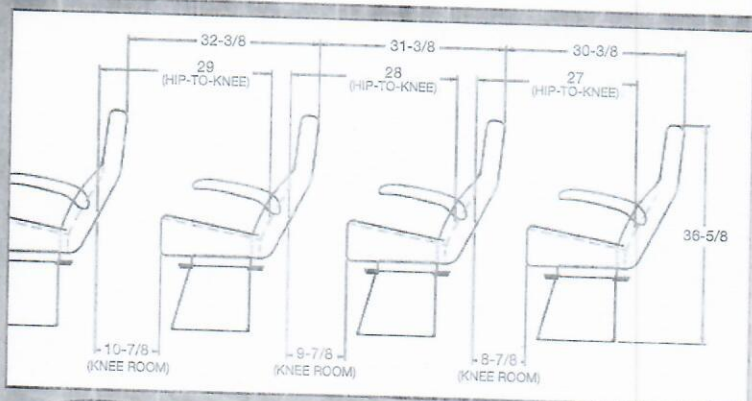
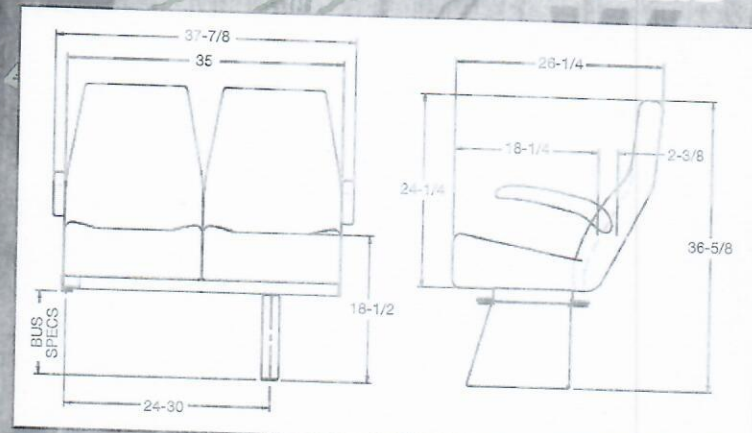
- An ultra-thin *Knee-Saver* type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17½" wide seat cushions
- 22½" back height off the seat cushion, 37" off the floor
- Wire mesh-grid seat springs for even support
- 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



#### OPTIONS

PILLOW SEAT

FOOTREST

SNACK TRAY

Not Just Seats



Seating Solutions™

**FREEDMAN**

SEATING COMPANY

an ISO 9001:2000 certified company

4545 W. Augusta Blvd., Chicago, IL 60651  
(773) 524-2440 (800) 443-4540 Fax (773) 252-7450

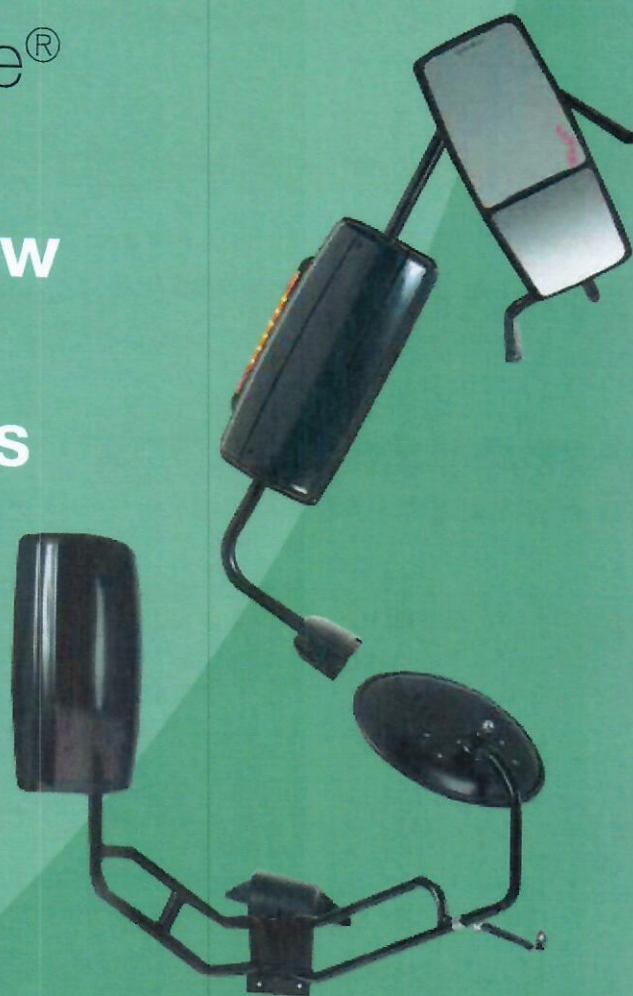
e-mail: sales@freedmanseat.com

WWW.FREEDMANSEATING.COM





AccuStyle® &  
EuroStyle®  
Series  
**Rearview  
Mirror  
Systems**



A Century of Automotive Vision Safety



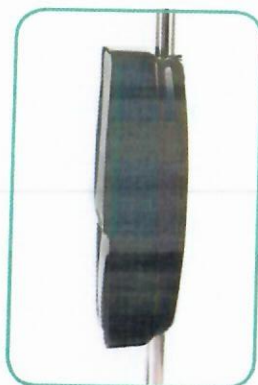
The following pages demonstrate all the advantages of Rosco's dual-lens remote mirrors for the school bus industry. Two distinct sizes and models cover all the needs of a multitude of applications. A list of some major features is shown at bottom right. A variety of heavy-duty breakaway mounting arms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

## The AccuStyle® Story

The 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 cover for connector and clamp access



Available in two-point mount configuration



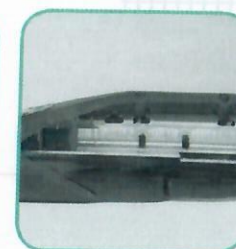
Heavy duty spine structure



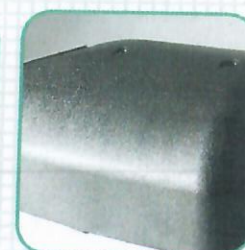
Easy access to connectors



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



Heavy-duty spine structure



Textured finish hides scratches and fingerprints

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## 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.
- 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.



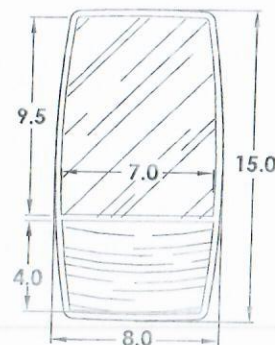
## AccuStyle® 815 Series

### 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.



## Rearview Mirror System



### REPLACEMENT PARTS

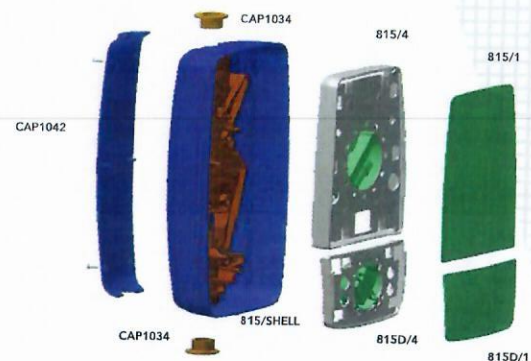
| PART NO.       | DESCRIPTION   |
|----------------|---|
| 815/1          | 7" x 9.5" flat mirror glass                                   |
| 815D/1         | 7" x 4" convex mirror glass                                   |
| 815/4          | 7" x 9.5" flat mirror carrier and motor assembly              |
| 815D/4         | 7" x 4" convex mirror carrier and motor assembly              |
| M815/4         | 7" x 9.5" flat mirror carrier and hand swivel assembly        |
| M815D/4        | 7" x 4" convex mirror carrier and hand swivel assembly        |
| CAP1042        | Rear access cover for 815 mirror head, two point mount        |
| CAP1056        | Rear access cover for 815 mirror head, overhang or upright mt |
| CAP1034        | Grommet, rubber, for 3/4" tube, no harness hole               |
| CAP1058        | Grommet, rubber, for 3/4" tube, no harness hole               |
| CAP1041        | Grommet, rubber, for 1" tube, harness hole                    |
| CAP1045        | Grommet, rubber, for 3/4" tube, harness hole                  |
| 815/SHELL      | 815 two point mount housing (includes internal spine/clamps)  |
| 815/OVER/SHELL | 815 overhang/upright housing (includes internal spine/clamps) |
| 815SL/1        | 7" x 9.5" flat mirror glass with Left signal LEDs             |
| 815SR/1        | 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® 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 / 815SROG | 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  |

For Heated Mirrors, Add "H" to the End of All Part Numbers Without a "/"  
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## AccuStyle® 818 Series

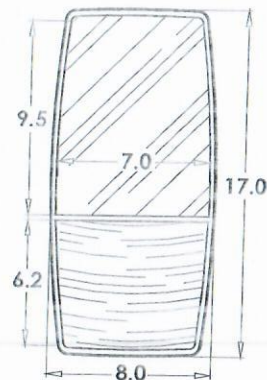
### Features and Benefits

- 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.
- 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

## Rearview Mirror System



### REPLACEMENT PARTS

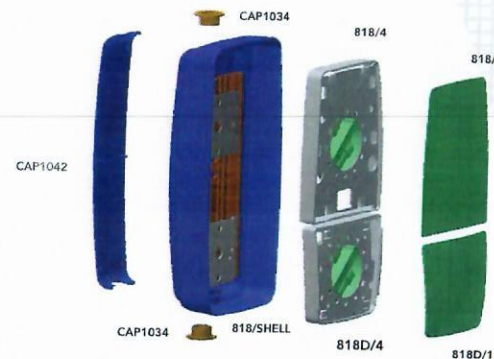
| PART NO.     | DESCRIPTION  |
|--------------|--|
| 818/1        | 7" x 9.5" flat mirror glass                                      |
| 818D/1       | 7" x 6" convex mirror glass                                      |
| 818/4        | 7" x 9.5" flat mirror carrier and motor assembly                 |
| 818D/4       | 7" x 6" convex mirror carrier and motor assembly                 |
| M818/4       | 7" x 9.5" flat mirror carrier and hand swivel assembly           |
| M818D/4      | 7" x 6" convex mirror carrier and hand swivel assembly           |
| CAP1057      | Rear access cover for 818 mirror head, two point mount           |
| CAP1071      | Rear access cover for 818 mirror head, overhang or upright mount |
| CAP1034      | Grommet, rubber, for 1" tube, no harness hole                    |
| CAP1058      | Grommet, rubber, for 3/4" tube, no harness hole                  |
| CAP1044      | Grommet, rubber, for 1" tube, with harness hole                  |
| CAP1045      | Grommet, rubber, for 3/4" tube, with harness hole                |
| 818/SHELL    | 818 two point mount housing (includes internal spine/clamps)     |
| 818OGU/SHELL | 818 overhang/upright housing (includes internal spine/clamps)    |
| 818SL/1      | 7" x 9.5" flat mirror glass with Left signal LEDs                |
| 818SR/1      | 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 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.





## EuroStyle® 715 Series

### 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.



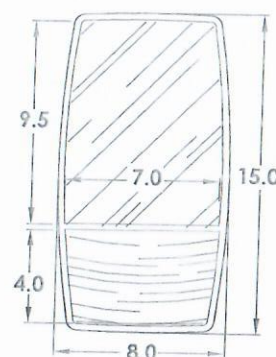
Model 715  
shown with upright  
Spring-Break®  
mounting arm



Model 715SR



Model 715OG



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## EuroStyle® 717 Series

### 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.



Model 717OG  
Shown with Spring-Break®  
mounting arm

## Rearview Mirror System

### REPLACEMENT PARTS

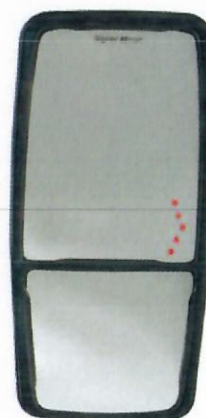
| PART NO.  | DESCRIPTION   |
|-----------|---|
| 717/1     | 7" x 9.5" flat mirror glass                                 |
| 717D/1    | 7" x 6" convex mirror glass                                 |
| 717/4     | 7" x 9.5" flat mirror carrier and motor assembly            |
| 717D/4    | 7" x 6" convex mirror carrier and motor assembly            |
| 717SL/1   | 7" x 9.5" flat mirror glass with Left signal LEDs           |
| 717SR/1   | 7" x 9.5" flat mirror glass with Right signal LEDs          |
| M717/4    | 7" x 9.5" flat mirror carrier and hand swivel assembly      |
| M717D/4   | 7" x 6" convex mirror carrier and hand swivel assembly      |
| CAP       | Connector access panel available with various company logos |
| CAP1001   | Rubber grommet for 715 & 717 series mirrors                 |
| 717/SHELL | 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.

## 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

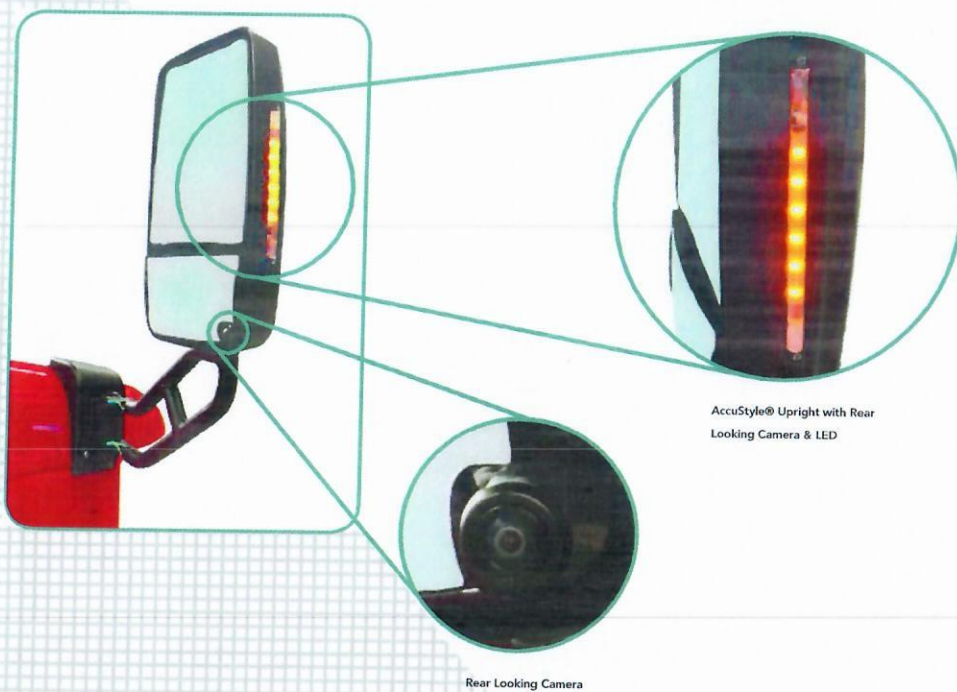




## Advanced Options for AccuStyle® Mirror Heads

### AccuStyle® with Rear Looking Camera

### & External Signal LED



### External Signal LED

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

### Rear Looking Camera

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).

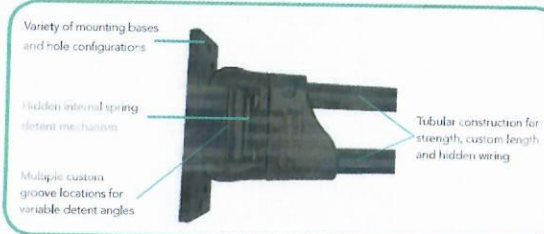
## Spring-Break® and Swivel Arm Breakaway Systems

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.

### Spring-Break® Detent



### Swivel and Fixed Mount Arms





## E-Z Bracket®

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

### 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

## Rosco's Unique Mounting and Arm Options

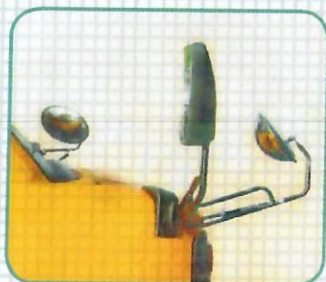
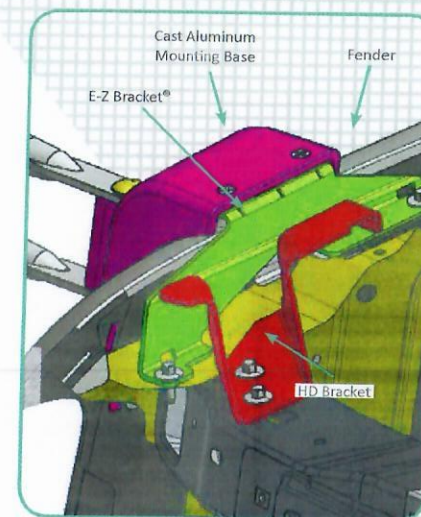
HD E-Z Bracket®

Dual-Wall Breakaway Swivel Arm



### 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

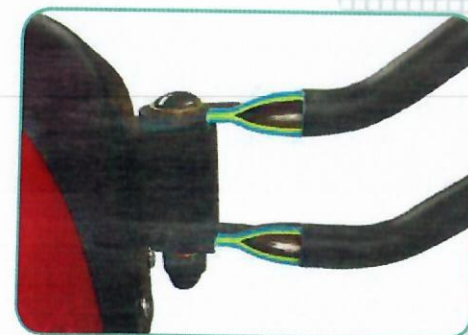
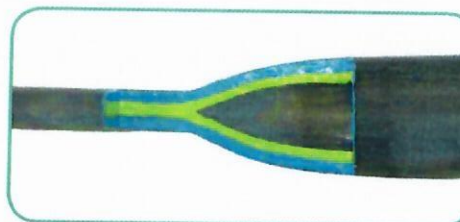


Fender Mount Rearview Mirror Assembly with Spring-Break® Detent (Non Combination Assembly)



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, 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-5-1T | 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   |



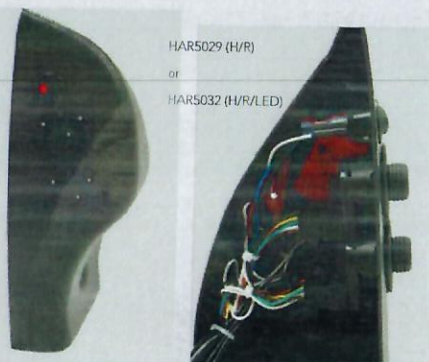
SW1011

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.

### Ford E - Series Driver Door Mounted Switches

| PART NO | DESCRIPTION   |
|---------|---|
| HAR5020 | Switch Pod w/toggle heater switch, red illuminated & 2 remote 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 |

Heater Switches for Ford Switch Pod



## 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.

## 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.

## 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](mailto:info@roscomirrors.com)



**FIELD OF VISION**  
A video guide to proper school bus mirror adjustment in accordance with FMVSS-111

[Info@Roscomirrors.com](mailto:Info@Roscomirrors.com) 17



## OTHER INNOVATIVE ROSCO

Fleet Safety Management Continuous Video & Event Recording,

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.

Dual-Vision™ XC 2 + 1



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® driver tools give greater control of information generated by high capacity Dual-Vision™ XC recorders. You can conduct searches based on detailed criteria and quickly make note of key events such as speed overages.

## VISION PRODUCTS

Backup Safety Products, Cameras & Monitors

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.



## 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.



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

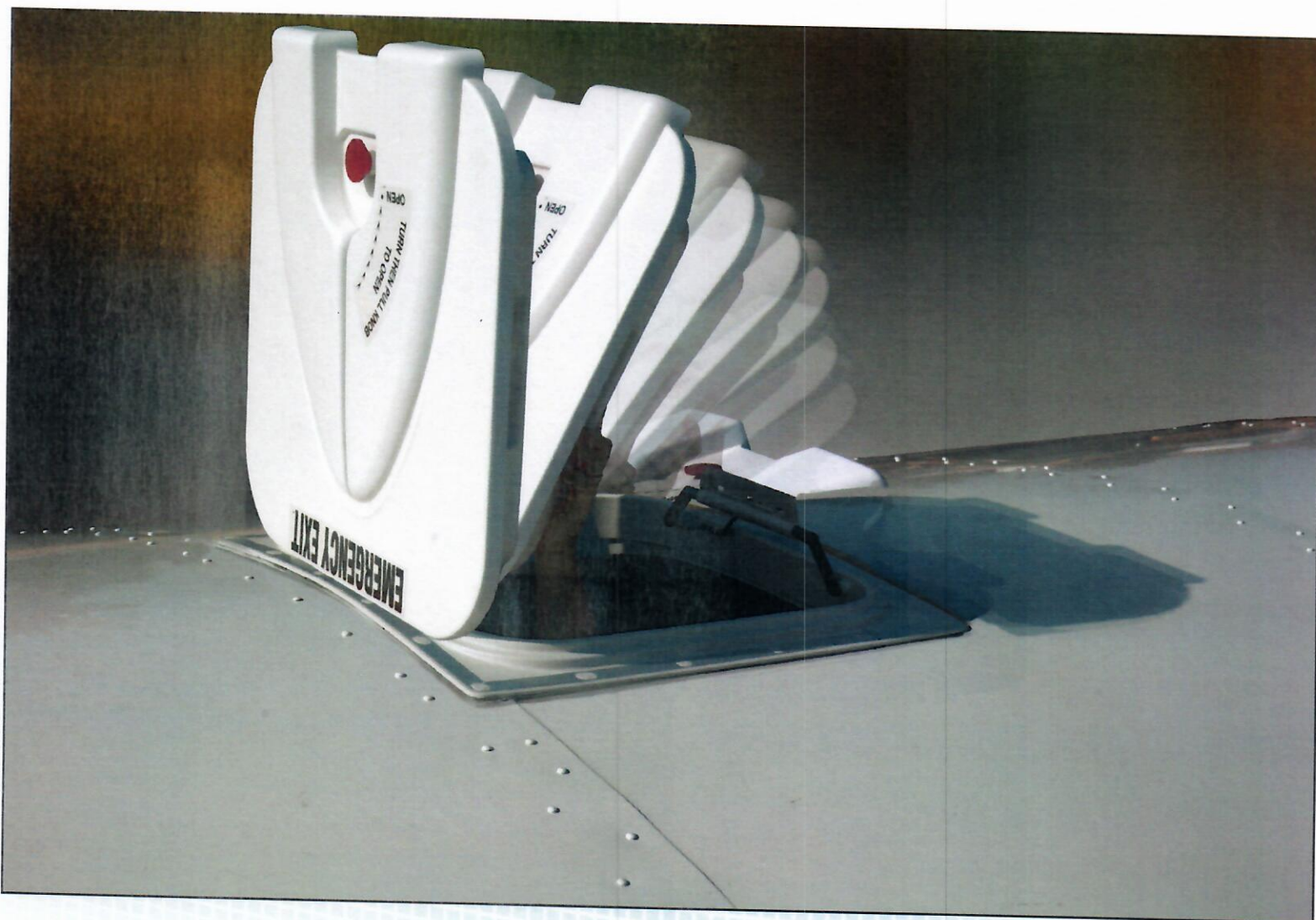
Info@Roscomirrors.com 19



# SCHOOL AND SHUTTLE BUS ROOF HATCHES

**TRANSPEC**<sup>®</sup>  
A Safe Fleet Brand

**SAFE EGRESS. PROVEN PERFORMANCE.**



#### **ADAPTABLE**

Low profile design  
adapts to wide range of  
roof surfaces



#### **MADE IN THE USA**

Proudly manufactured  
in North Carolina  
with 35 years proven  
product performance



#### **MAINTENANCE**

No external fasteners  
required for installation



#### **WARRANTY**

5 year



#### **STRENGTH**

Constructed of high  
strength UV stable  
materials



Serves as a vent on hot summer days



## SCHOOL AND SHUTTLE ROOF HATCHES

■ = Standard    O = Optional

| MODEL                                       | STANDARD FEATURES & OPTIONS               |                                     |                                     |                                     |                                     |                       |                       |                       | APPLICATIONS          |                                     |                                     |                                     | SIZES                               |                                     |  |
|---|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|
| T1170 Series<br>Triple Value Safety Vent II | White<br>Light Gray<br>Dark Gray          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |  |
| T1670 Series<br>Power Safety Vent II        | White<br>Light Gray<br>Dark Gray<br>Beige | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |  |
| T1970 Series<br>Standard Safety Vent II     | White<br>Light Gray<br>Dark Gray<br>Beige | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |  |
| 9245 Series<br>Pro Lo Roof Hatch            | White<br>Light Gray<br>Dark Gray          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |  |

## T1170 Series / Triple Value Safety Vent II

The Triple Value Safety Vent II is a combination roof ventilator/emergency exit that provides 5-position fresh air ventilation as well as incorporating a built in non-closeable static exhaust vent. The product also includes a simple release handle that allows the hatch to hinge open for emergency exit.



## Additional Features

- Static Vent provided with one piece outer cover designed to minimize leaks
- Interchangeable with earlier Transpec models
- Available in various radiuses to fit different roof curvatures
- Available with vandal lock feature
- Constructed of high strength UV stable materials
- Available with optional adhesive sealant and reflective tape
- Meets D250 Standard for Canadian school bus

## T1670 Series / Power Safety Vent II

The Power Safety Vent II provides all the features of the Triple Value Safety Vent II with the addition of an electric fan for extracting condensation, stale or hot air from inside the vehicle to improve passenger comfort.



## Additional Features


- Interchangeable with earlier Transpec models
  - Available in 12 and 24 volt
  - Available in various radiuses to fit different roof curvatures
  - Constructed of high strength UV stable materials
  - Available with optional adhesive sealant and reflective tape
  - Meets D250 Standard for Canadian school bus
- 

## T1970 Series / Standard Safety Vent II

The Standard Safety Vent II is a combination roof ventilator/emergency exit that provides 5-position fresh air ventilation and a simple release handle that allows the hatch to hinge open for emergency exit.



## Additional Features

- Retrofits to all hatch openings
  - Interchangeable with earlier Transpec models
  - Available in various radiuses to fit different roof curvatures
  - Constructed of high strength UV stable materials
  - Available with optional adhesive sealant and reflective tape
- 

## 9245 Series / Pro Lo Roof Hatch

The Pro Lo is a combination roof ventilator/emergency exit that mounts nearly flush with the roof (0.75" above the roof). Designed to fit the roof curvature, it creates a tight seal virtually eliminating water intrusion. The hatch also incorporates a release handle allowing it to be opened as an emergency exit.



## Additional Features

- Available in various radiuses to fit different roof curvatures
- Nearly flush at 0.75" above the bus
- Constructed of high strength UV stable materials
- No exterior screws for installation
- Available with vandal lock feature
- Meets D250 Standard for Canadian school bus



# QRT<sup>®</sup>-1 SERIES



**MAX / DELUXE / STANDARD**  
4-POINT SECUREMENT  
WHEELCHAIR RETRACTORS





# QRT-1<sup>®</sup> SERIES

## The Securement System That Changed Everything

The original 4-point wheelchair securement system, QRT-1 Series retractors defined the way passenger safety devices are designed and tested.

With a range of 3 different options to fit every need and every budget, the QRT-1 Series of retractors offer easy to use, effective 4-Point securement of wheelchairs for virtually any vehicle application.



### QRT MAX

FULLY AUTOMATIC, premium knobless retractor that allows for one-handed operation.



More than 30 years ago, Q'STRAIT introduced the world's first fully integrated 4-Point wheelchair passenger securement system, now an industry standard the world over.

**The QRT line of retractors are the linchpin of that system.**



## Anchorage Options

All QRT-1 Series Retractors are compatible with L-Track, L-Pockets and Slide 'N Click anchorages, or may be directly mounted to vehicle floors, seat legs or barriers.



Every QRT retractor is fully ADA compliant, and meets or exceeds all standards and regulations, including:

- SAE J2249, ISO 10542,
- FMVSS 209, 302, 210, 222
- CMVSS 209
- CSA Z605
- and 30mph/20g crash testing

## L-TRACK / L-POCKETS

For kits that use L-Track or L-Pocket anchorages, QRT Series retractors feature our patented Positive Lock Indicator (PLI) that clearly indicates when the fitting is locked in the anchorage.

## SLIDE 'N CLICK

For kits that include Slide 'N Click anchorages, QRT Series retractors feature a single-bolt SNC assembly and plunger that allows a full 360° rotation, eliminating anchorage alignment guesswork.

## QRT-1 SERIES FEATURES COMPARISON

|  | MAX | DLX | STD |  |
|--|-----|-----|-----|--|
| <b>Knobless, One-Handed Operation.</b> No knobs to interfere with wheels and footrests.                          | ○   |     |     |  |
| <b>Dual Tensioning Knobs.</b> Provides additional tensioning if needed.  |     | ○   |     |  |
| <b>Single Tensioning Knob.</b> Provides additional tensioning if needed.   |     |     | ○   |  |
| <b>Automatic, Self-Locking.</b> Allows easy, one-handed hook-up.   | ○   | ○   |     |  |
| <b>Self-Tensioning.</b> Retractors automatically take up 'slack'.  | ○   | ○   |     |  |
| <b>Positive Lock Indicator.</b> Patented feature clearly indicates when fitting is locked in anchorage.          | ○   | ○   | ○   |  |
| <b>Interchangeable.</b> Eliminates confusion: no right, left, front or rear locations.                           | ○   | ○   | ○   |  |
| <b>Low Profile &amp; Compact.</b> Elimination of mounting bracket allows retractors to fit under most footrests. | ○   | ○   | ○   |  |
| <b>Accommodates Larger Wheelchairs.</b> Reduced overall length leaves more room for wheelchairs.                 | ○   | ○   |     |  |
| <b>Ultra-Durable.</b> Hardened steel and coated zinc for maximum corrosion resistance.                           | ○   | ○   | ○   |  |
| <b>Universal Design.</b> Accommodates virtually all wheelchair designs, including scooters.                      | ○   | ○   | ○   |  |
| <b>J-Hook.</b> Reduces twisting of belts and ensures proper securement for all wheelchair designs.               | ○   | ○   | ○   |  |
| <b>Foot Release Lever.</b> Easy release eliminates the stress of bending down.                                   | ○   | ○   | ○   |  |





[WWW.QSTRAINT.COM/QRT-1-SERIES](http://WWW.QSTRAINT.COM/QRT-1-SERIES)

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# QS00073

## Description

Heavy-Duty Storage Pouch provides storage for a complete securement system when not in use. Meets FMVSS 302.

## Product Associations

General Accessories

## Includes:

- (1) Heavy-Duty Storage Pouch (QS00073)







## CENTURY SERIES NCL1000-2 WHEELCHAIR LIFTS

### THE ONE-STOP-SHOP FOR ALL YOUR MOBILITY TRANSPORTATION NEEDS

Since 1963, BraunAbility® has been the trusted industry leader. Our wheelchair accessible vehicles and lifts are designed to meet your specific needs, with performance, safety, and reliability that will keep your fleet up and running day after day, year after year. With the most diverse product portfolio of any mobility vehicle company in the industry, BraunAbility delivers the right solution to every commercial mobility need.



# NCL1000-2 CENTURY SERIES WHEELCHAIR LIFT

## STANDARD FEATURES

- **1,000-pound lifting capacity**
- NHTSA-compliant
- Fully automatic FMVSS 403-compliant lift, operated by an attendant
- Interfaces with OEM interlocks
- Long-lasting LED lift-mounted lights
- Side or rear door application\*
- Platform options up to 37" wide
- Floor to ground lift heights up to 48"
- Made in the USA

\* Vehicle suspension dynamics affect body roll and FMVSS 404 platform tilt allowance. Before selecting a lift with a 1000# rated capacity, ensure this load does not induce excessive platform tilt.

## SAFETY FEATURES

- Locking mechanical Inboard Barrier (IB), powder coated yellow for safety and high visibility, prevents operation if occupied
- Visual and audible warnings alert both passengers and attendants to unsafe conditions
- Interlocked gas spring activated outer barrier
- Dual handrails for security and convenience
- Pump design prevents platform folding when occupied

## EASE OF USE FEATURES

- Hand-held control box with illuminated functions
- Durable redesigned baseplate reduces lift weight, and allows for quicker and easier service
- Bridging feature permits the wheelchair user to board the lift from sidewalks
- Equipped with an adjustable anti-rattle feature
- Lift-Tite™ system stows the lift platform securely while the vehicle is in transit
- Pump module with removable cover offers easy access to all components
- Integrated back-up pump

## BRAUNABILITY'S UNRIVALED SERVICE

Every BraunAbility® commercial mobility product comes with our team of commercial mobility experts. They will work to find the ideal mobility transportation solution, no matter the requirements, complexity, or scale. And after you make a purchase, they will continue to work just as hard to offer you all the service and repair support you need.

## The NCL1000-2 Century Series Wheelchair Lift from BraunAbility

With dual hydraulic lift arms, and a design that has withstood the test of time, the Century Series offers all the benefits and quality of a BraunAbility wheelchair lift in a streamlined, economical package. The simplified electrical system offers trouble-free operation, while the non-hydraulic spring-loaded outer barrier keeps the wheelchair safely and securely on the wheelchair lift platform throughout the lifting cycle. In addition to all these standard features, the NCL1000-2 also comes equipped with an increased lifting capacity of 1000 pounds.



The NCL1000-2 Century Series also features new and improved inboard barriers, baseplates, vertical channels, and lower parallel arms for a more rigid and stable ride.

BraunAbility offers several models of the Century 2 Wheelchair Lift to address the right application, including usable platforms of 33" x 51", 34" x 51", 34" x 54", as well as 37" x 51" and 37" x 54". The models also vary based on the placement of the front or rear pump module, the lifting capacity (1,000 pounds), and the overall floor-to-ground lift height (up to 48"). The Century 2 Wheelchair Lift is available with or without the handrail belt. See your BraunAbility dealer or [braunability.com](http://braunability.com) for lift models available for your specific application.



 **MADE IN THE USA**

631 West 11th Street • Winamac, IN 46996  
(574) 946-6153 | 1-800-THE-LIFT  
[www.braunability.com/commercial](http://www.braunability.com/commercial)

All illustrations, descriptions and specifications in this brochure are based on the latest product information at the time of publication. BraunAbility reserves the right to make changes at any time without notice. © 2019 The Braun Corporation 405245



## **Braun® Limited Warranty**

**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 SURVIVE 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**

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.

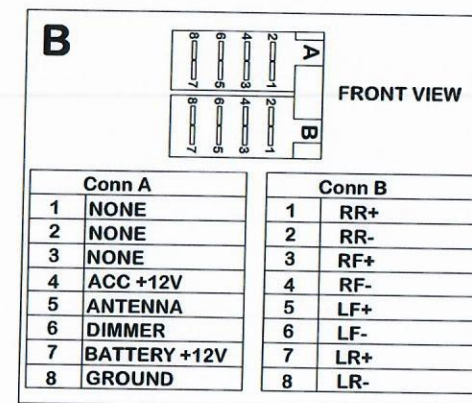
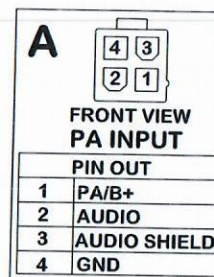
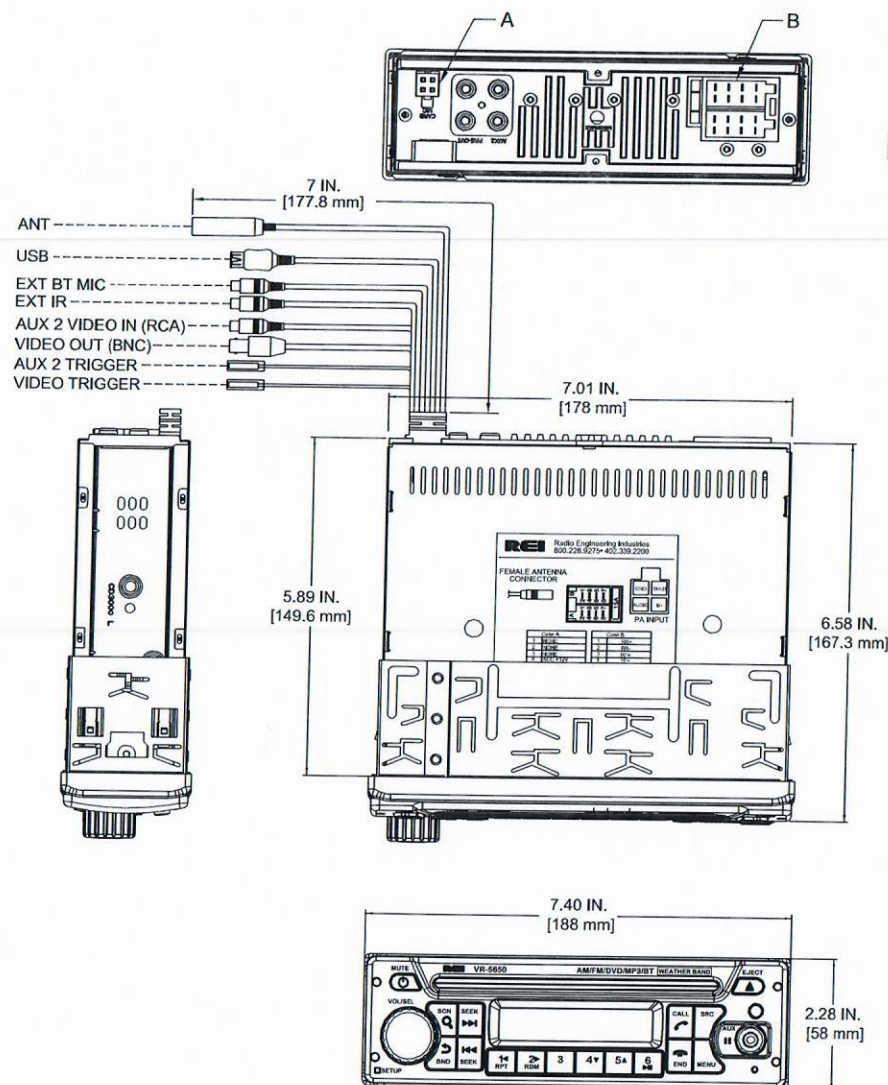


| REVISIONS |                 |       |          |          |
|-----------|-----------------|-------|----------|----------|
| REV       | DESCRIPTION     | ECO # | APPROVAL | DATE     |
| A         | RELEASE DRAWING | NONE  | R.WOODS  | 04/26/19 |

# REI

## Proprietary/Uncontrolled Document

For West Virginia, will  
also include PA with  
Gooseneck mic &  
Foot Switch.



|            |  |  |            |   |             |
|------------|--|--|------------|---|-------------|
| WHERE USED | UNLESS OTHERWISE SPECIFIED   | APPROVAL   |            | <div>REI</div> <div>PROPRIETARY PROPERTY</div> <div>6534 'L' Street Omaha, NE</div> |             |
|            | Decimal Dimensions (Imperial)<br>X.XX +/- 0.03    X.XXX +/- 0.015<br>ANGLES +/- 1° | <div>APPROVED</div> <div>By woodsr</div> <div>10:22 am, Apr 02, 2020</div> |            |   |             |
|            | MATERIAL   | DRAWING NO.  |            | TITLE   |             |
|            | N/A  | A.1  |            | RADIO,VR-5650<br>AM/FM/CD/DVD/BT,ISO  |             |
|            | APPLIED FINISH   | DRAWN BY   | DATE       | SCALE   | REI PART #  |
|            | N/A  | AJC  | 04/02/20   | NONE  | 710767      |
|            |  | FILENAME   | 710767_A.1 |   | PAGE 1 OF 2 |



# SPECIFICATIONS

## RADIO, VR-5650 AM/FM/CD/DVD/BT, ISO

### REI PART No. 710767

#### GENERAL

|                                 |   |
|---------------------------------|---|
| Power Supply Voltage            | 10.0-18V DC (Negative Ground)                   |
| Load Impedance                  | 4 ohm (4 ohm to 8 ohm allowance)                |
| Current Consumption             | less than 10A / 5mA Standby                     |
| Maximun Power Output            | 4 x 50 Watts (Ref: 1 kHz/4 Ohm load)            |
| Continuous Average Power Output | 4 x 25 Watts (4 ohms) 20-20,000 Hz @ 10% THD    |
| Chassis (W x H x D)             | 7 in x 2 in x 6 in (178 x 51 x 154 mm)          |
| Nosepiece (W x H x D)           | 7-3/8 in x 2-1/4 in x 5/8 in (188 x 58 x 17 mm) |
| Weight                          | 3.5 lbs (1.6 kg)                                |

#### FM TUNER

|                                |  |
|--------------------------------|--|
| Range                          | (USA) 87.5 - 107.9 MHz<br>(EUR) 87.50 - 108.00 MHz |
| Usable Sensitivity (S/N=30 dB) | 7.34 dBf (0.6 uV / 75 ohm)                         |
| Signal to Noise Ratio          | 58 dB mono   |
| Stereo Separation (@ 1 kHz)    | 42 dB  |

#### AM TUNER

|                                |  |
|--------------------------------|--|
| Range                          | (USA) 530 - 1710 KHz<br>(EUR) 522 - 1620 KHz |
| Usable Sensitivity (S/N=20 dB) | 23 dBuV (14.4uV)                             |
| Signal to Noise Ratio          | 60 dB  |

REI

Proprietary/Uncontrolled  
Document

#### WEATHER BAND RADIO

|                                |                       |
|--------------------------------|-----------------------|
| Frequency Range                | 162.400 - 162.550 MHz |
| Usable Sensitivity (S/N=20 dB) | 0.7 uV (-9 dBuV)      |
| Signal to Noise Ratio          | 42 dB                 |

#### DISC PLAYER

|                       |                           |
|-----------------------|---------------------------|
| Signal to Noise Ratio | 85 dB                     |
| Frequency Response    | 10 Hz - 20 kHz (+/- 5 dB) |
| Video Output          | NTSC/PAL 1.0V p-p 75 Ohms |

#### AUX INPUTS

|                               |              |
|-------------------------------|--------------|
| Frequency Response (+/- 1 dB) | 20-20,000 Hz |
| Input Impedance               | 10K ohm      |
| Maximum Input Voltage         | 1.2 V        |

#### USB

|                    |                          |
|--------------------|--------------------------|
| USB Interface      | USB 1.1/2.0 (Full Speed) |
| File System        | FAT 16/32                |
| Max Supply Current | 1.5A                     |

#### BLUETOOTH

|                 |                  |
|-----------------|------------------|
| Version         | Bluetooth v5.00  |
| Frequency Range | 2.402-2.480 GHz  |
| Profiles        | HFP, A2DP, AVRCP |

**NOTE:** Specification and design are subject to modification without notice due to improvements in technology.



# REI

Radio Engineering Industries, Inc.

[www.radioeng.com](http://www.radioeng.com)

Rev A.0 Date: 9-02-19

# REI

Heavy Duty AM/FM/CD/DVD Weather Band Receiver, Rear USB w/ 1.5A Charging, Bluetooth® Hands Free Calling and Wireless Audio Streaming, Front/Rear Auxiliary Inputs and built in PA.



Installation/ Operation Manual

50W x 4

VR-5650

Thank you for purchasing VR-5650 AM/FM/CD/DVD Receiver from REI. This product is designed and tested to with stand temperature and vibration extremes. Please read the owner's manual carefully before attempting to install this unit.

If you have an installation question or need installation assistance, please call the:

**SERVICE HOT LINE**

**1-877-726-4617 Toll Free USA & CANADA**

IF ADDITIONAL INSTALLATION COMPONENTS ARE NECESSARY, CONTACT YOUR REI SALES REP FOR:

- \*\* OEM /FACTORY WIRING HARNESS ADAPTERS
- \*\* ANTENNAS & ANTENNA ADAPTERS
- \*\* SPEAKERS & GRILLS

**Radio Engineering Industries, Inc.**

6534 "L" Street

Omaha, Nebraska 68117

(800)228-9275

[www.radioeng.com](http://www.radioeng.com)

Your player will play DVDs with region code **1** labels on them.

**FEATURES:**

- Heavy Duty construction for Tough Environments
- Non-volatile memory back-up stores user settings when battery is disconnected
- Clock Battery back-up
- Output Power 50W x 4
- Full Dot Matrix LCD display
- Anti-skip Gear driven CD/DVD Mechanism
- 7 channel NOAA® Weather Band Tuner
- AM/FM Stereo Tuner w/RBDS
- Presets for up to 30 Radio Stations (18 FM, 12 AM)
- EURO and USA frequency bands
- USB MP3/WMA file playback w/ ID3 Tag Support
- 2 Aux Inputs (Front 3.5mm/Rear RCA A/V)
- iPod® /iPhone® Smartphone Charging and Playback Control
- Bluetooth® audio Streaming w/ support for Hands Free calling
- Integrated Bluetooth® Microphone input
- Rear Channel RCA Line outputs
- Composite Video Output via locking BNC connection
- Built in PA input (Microphones & Adapter Sold Separately)
- ISO Connector for vehicles manufactured with the ISO connect harness
- Wireless Remote Control

## REI LIMITED WARRANTY

### What Does This Warranty Cover?

This warranty only covers failures due to defects in materials or workmanship which occur during normal use.

### What Does This Warranty Not Cover?

This warranty does not cover damage which occurs in shipment or failures which are caused by products not supplied by REI or failures which result from accident, misuse, abuse, neglect, mishandling, misapplication, faulty installation, set-up adjustment, improper maintenance, alteration, improper antenna, inadequate signal pick-up, maladjustment of consumer controls, modification, line power surge, or damage that is attributable to acts of God, or service by anyone other than a REI Factory Service Center. This warranty does not include service or labor charges connected with the determination or replacement of defective parts or the operation of this equipment. REI is not responsible for any labor charges incurred by any person or company other than REI authorized repair centers.

### LIMITS AND EXCLUSIONS

There are no express warranties except as listed above.

REI SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THIS PRODUCT, OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING WITHOUT LIMITATION, DAMAGES TO TAPES OR DISCS. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, ARE LIMITED TO THE APPLICABLE WARRANTY PERIOD SET FORTH BELOW. Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions or limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

### What Is the Period of Coverage?

REI will repair this product, free of charge, from the date of original purchase in the event of a defect in materials or workmanship as follows:

**For ninety (90) days** - microphones, speakers, antennas, housings, rechargeable batteries, remanufactured product and all non-warranty repairs (replaced parts and labor only).

**For one (1) year** - all other manufactured products.

**For three (3) years** - select manufactured motorcoach products.

**For three (3) years** - select surveillance equipment.

REI may have contractual agreements which provide REI motorcoach and surveillance products with additional coverage. Call 877-726-4617 for details.

Any product supplied by REI, but not manufactured by REI, will include the original manufacturers warranty only.

### What Will REI Do to Correct Problems?

Once the product is deemed by REI to be a warrantable defect, REI will, at its own discretion, repair or replace the product with new or reconditioned product. All warranty repairs and/or product replacements will include the remaining warranty from the original purchase date.

### How Do You Get Service?

For assistance in obtaining service for REI products call toll free 877-726-4617 (Continental United States and Canada only) or 402-339-2200 (outside Continental United States and Canada) between the hours of 7:00A.M. - 5:00P.M. CST Monday thru Friday (excluding Holidays).

Prior to calling REI, customers must have the part number, serial number, VIN number (if it's a motorcoach product) and detailed description of the problem ready to provide to the REI service representative. After providing the proper information to REI, customers will be issued a return authorization number. When the REI service representative provides the return authorization number, they will also give instructions for returning the item. Any discrepancies in following this procedure may cause shipments to be refused or warranty claims to be rejected.

**IMPORTANT!** REI does not accept product returns for repair or replacement without first issuing a return authorization number. All returns must be sent freight prepaid and insured by the customer. REI will not accept COD shipments.

**IMPORTANT!** REI does not accept responsibility for lost shipments. It is the customer's responsibility to provide REI with the part number, serial number, return authorization number and shipper tracking number in the event REI does not have record of receiving product for repair or replacement.

Once warranty service has been performed on your product, REI will ship the item freight prepaid to any business address in the Continental United States or Canada. Customers located outside the Continental United States and Canada are responsible for all freight charges. Any duties or fees, if any, are the customer's responsibility.

Any repair deemed non-warranty by REI will be subject to all freight charges, and in some cases inspection fees, to be paid by the customer. These fees may exist regardless of whether the product is repaired. If a customer requires help in trouble shooting a problem, contact REI and request technical assistance before requesting a return authorization number.

### What Must You Do To Keep This Warranty in Effect?

KEEP YOUR ORIGINAL PROOF OF PURCHASE AS IT MAY BE REQUIRED IN ORDER TO RECEIVE WARRANTY SERVICE.

Make sure the serial number is not removed, altered or defaced.

Do not attempt to have your product repaired by anyone other than a REI Factory Service Center.

Also, see "What Does This Warranty Not Cover"

### REI AUTHORIZED REPAIR FACILITIES:

REI  
6534 L Street  
Omaha, Nebraska 68117  
Phone: 877-726-4617

REI  
1376 Bennett Drive, Unit 126  
Longwood, Florida 32750

### What if your Product is a Non-Warranty Repair?

All Products sent to REI for repair which are determined, at REI's discretion, to be non-warrantable repair may incur inspection fees regardless of actual repair being performed or will incur repair fees if the product is repaired. All non-warranty repairs include a 90 day warranty for any components that are replaced, if any, and labor performed. Inspection fees apply regardless of whether a product is determined to be non-warrantable prior to shipping to REI. All freight charges, duties or fees associated with non-warranty repair are the customer's responsibility.

FORM 64020 REV 0.1



### USB INTERFACE

USB Standard.....USB1.1/2.0 (Full Speed)  
Maximum Supply .....5V/1.5A  
File System.....Fat16/32

### AUXILIARY INPUT SPECIFICATIONS

Input Voltage Maximum Voltage.....1.2V  
Frequency Response (+/- 1dB).....20 – 20,000Hz  
Input impedance.....10KΩ

### VIDEO

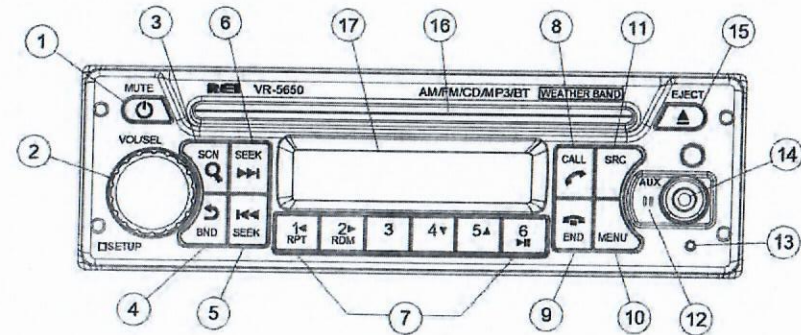
Color System .....NTSC / PAL  
Video Output .....Composite 1.0 Vp-p (+/- 0.2) 75ohm  
Video Input.....Composite 1.0 Vp-p (+/- 0.2) 75ohm

### DIMENSIONS

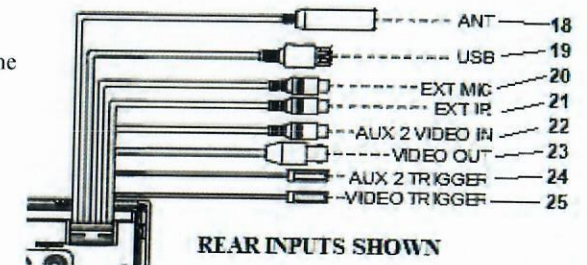
Chassis (W x H x D) .....178mm (7") x 50mm (2") x 154mm (6")  
Nosepiece (W x H x D) .....188mm (7-3/8") x 58mm (2-1/4") x 17mm (5/8")  
Weight .....3.5lbs

*\*Due to continuous product improvement, specifications and design are subject to change without notice.*

### CONTROLS AND INDICATORS



1. Power/Mute Button
2. Volume/Select Knob
3. Scan /Search Button
4. Band /Back Button
5. Tune /Seek/Track Back Button
6. Tune /Seek/Track Up Button
7. Preset Memory/Recall, Media Control Buttons
8. Call Connect/Transfer Button
9. Call End Button
10. MENU/Display Button
11. Source Select Button
12. Internal Bluetooth Microphone
13. Reset switch
14. Front AUX1 Input Jack
15. Disc EJECT Button
16. Disc Slot
17. Dot Matrix Display
18. Antenna input
19. USB input
20. EXTERNAL Bluetooth Microphone input
21. IR Remote extension input
22. Aux 2 RCA Composite Video Input
23. BNC Composite Video Output
24. Aux 2 Trigger Input
25. Video Trigger Output (Power Relay Control)



REAR INPUTS SHOWN

## OPERATION

### 1) Power/Mute Button

Press the Power Button to turn the unit ON or hold to turn the unit OFF. The button will illuminate RED when OFF and BLUE when ON. When ON, press to MUTE the audio on/off. **Note: Radio can also be powered on by pressing any front button.**

### 2) Volume/Select Knob

Rotate the knob left or right to change the volume level.

Press the knob to select one of the following functions:

VOL---BASS---TREB---BAL---FAD

Upon choosing the function, rotate the knob to adjust the desired setting.

PLEASE NOTE: If the Volume/Select Knob has not been adjusted for 3 seconds it will automatically revert to the previous informational display.

Press and hold this button to access the radio SETUP MENU.

### 3) Scan/Search Button

Press and hold this button for 2 seconds to auto program available stations into the preset memory buttons. This function will erase previous memorized stations and store the newly searched stations. Once completed, the radio will scan for 5 seconds through each of the preset stations of either the AM or FM band and stop.

### 4) BAND/Back Button

Press this button to change radio bands as follows:

FM1—FM2—FM3—AM1—AM2

### 5) TUNE/SEEK DOWN Button

Under Radio mode, press this button momentarily to manually tune downward. Press and hold a button and the radio will automatically seek to the previous radio station. When playing digital media, use this button to track backwards to the previous track. This button also functions as Weather Band Channel access. Under Weather Band mode, press this button to select Weather Band channels 1-7.

### 6) TUNE/SEEK UP Button

Under Radio mode, press this button momentarily to manually tune upward. Press and hold a button and the radio will automatically seek to the next radio station. When playing digital media, use this button to track forwards to the next track. This button also functions as Weather Band Channel access. Under Weather Band mode, press this button to select Weather Band channels 1-7.

### 7) Preset Memory/Recall Buttons 1-6

Press these buttons momentarily to select the preset stations.

Press and holding a button will set the current station to the button being pressed.

**\*\*Preset buttons are pre-assigned frequencies in Weather Band Mode.**

## SPECIFICATIONS

### AUDIO SECTION

|  |                      |
|--|----------------------|
| Power supply voltage (negative ground) | 12V DC (10V-18V)     |
| Standby Current                        | <5mA                 |
| Max Current Consumption                | 10A                  |
| Speaker impedance                      | 4-8 Ohms per channel |
| Maximum Pre-output Voltage             | 2.0Vrms/10k ohms     |

### POWER OUTPUT

|   |                 |
|---|-----------------|
| Continuous Output into 4Ω, @1KHz at 10 % THD  | 4 x 25Watts     |
| Maximum Power Output (Volume control Maximum) | 50W×4 (at 1kHz) |

### FM TUNER

|                                 |  |
|---------------------------------|--|
| Range                           | (USA) 87.5 – 107.9 MHz<br>(EUR) 87.50 – 108.00 MHz |
| Usable Sensitivity (S/N = 30dB) | 7.34dBf.(0.6uV/75ohms)                             |
| Signal to noise ratio           | 58dB (Mono)  |
| Stereo separation (@ 1K Hz)     | 42 dB  |

### AM TUNER

|                                     |   |
|-------------------------------------|---|
| Range                               | (USA)530 – 1,710 kHz<br>(EUR) 522 – 1,620 kHz |
| Usable Sensitivity (S/N = 20dB)     | 23dBuV (14.4uV)                               |
| Signal to noise ratio (LEVEL60dbuV) | 60 dB   |

### WEATHER BAND TUNER

|                                     |                      |
|-------------------------------------|----------------------|
| Range                               | 162.400 – 162.550MHz |
| Usable Sensitivity (S/N = 20dB)     | 0.7uV(-9dBuV)        |
| Signal to noise ratio (LEVEL40dbuV) | 42dB                 |

### CD/DVD PLAYER

|                              |  |
|------------------------------|--|
| Signal/Noise Ratio (1kHz)    | 85dB                                       |
| Frequency Response (+/- 1dB) | 10 – 20,000Hz (+/-1dB)                     |
| Channel Separation           | 2 Channel (Stereo) > 60dB @ 1 kHz          |
| Playable disc file format    | ISO 9660 Level 1/2, Romeo, Joliet          |
| Usable Discs                 | DVD, DVD-R/RW, DVD+R/RW/DL,<br>CD-R/RW, CD |

### BLUETOOTH®

|                    |                   |
|--------------------|-------------------|
| Version            | Bluetooth® v5.0   |
| Frequency Range    | 2.402 – 2.480 GHz |
| Output power       | +4dBm Typ         |
| Profiles supported | HFP, A2DP, AVRCP  |



## **PLAYABLE FILE TYPES:**

### **FILE REQUIREMENTS (.MP3/.WMA using ISO 9660 formatting)**

- The MP3 files with a sampling frequency of 8-48 kHz. And a bitrates between 8 to 320 kbps. Supports ID3 Tag Versions 1.0/1.1/2.2/2.3/2.4
- The WMA file with a sampling frequency of 32-48 kHz. And a bitrates between 48 to 320 kbps.

### **MPEG-4 FILE REQUIREMENTS (.MP4)**

- Video Codec: MPEG-4 Simple Profile
- Audio Codec: AAC
- Bitrate: Max. 4 Mbps
- Frame rate: Max. 30 fps (30p/60i)
- Image size: Max. 720 \*480 pixels
- File extension: .mp4

### **DivX® FILE REQUIREMENTS (.AVI)**

- Files encoded with Xvid or divX Profiles. Max frame rate 30 fps (30p/60i)
- Video Codec: MPEG-4 Advanced Simple Profile
- Audio Codec: MP3/AC3/PCM
- Frame rate: Max. 30 fps
- Image size: Max. 720 \*480 pixels

### **MPEG-1/MPEG-2 (.MPG)**

- Video Codec: MPEG1/2 MPG1/2
- Audio Codec: MP1/2/3
- Frame rate: Max. 30 fps
- Image size: Max. 720 \*480 pixels

### **JPEG(.JPG)**

- Still image files up to a resolution of 3072 x 2048.
- File format used by digital still cameras.
- Not compatible with progressive JPEG.
- JPEG file name requires .jpg as extension

### **NOTE:**

Individual file size limit is 2G in accordance with Fat16/32 file restrictions.

### **8) CALL Button**

Press this button to Place or Answer an incoming call when successfully paired using the Hands-Free Profile on a Bluetooth® enabled phone. Press this button to transfer the call from the radio to the phone and vice versa.

### **9) END Button**

Press this button to END a call when successfully paired using the Hands-Free Profile on a Bluetooth® enabled phone. Press this button to quickly disconnect a paired device from the radio when in BT PHONE mode.

### **10) MENU Button**

Press this button to access the DVD menu. Press to change between Clock and Mode Information display when available.

### **11) Source Button**

Press this button to navigate between source modes:

TUNER—WB—CD/DVD—USB(when connected)—BT PHONE—BT MUSIC (if paired)—AUX1—AUX2.

### **12) Internal Bluetooth® Microphone**

Internal Microphone for Hands Free Bluetooth calling.

### **13) Reset Switch**

In the unlikely event that the radio is not operating correctly, press the RESET button to restart the operating system of the radio.

### **14) Front AUX 1 Input Jack**

The unit is equipped with a front panel 3.5mm auxiliary input (AUX 1) so you can connect your external portable audio player or portable satellite radio receiver. A second REAR (AUX 2)\* RCA A/V jacks are also included on the rear of the radio.

### **15) Disc EJECT button**

With the radio ON, press this button to EJECT the Compact Disc from the radio.

### **16) Disc Slot**

Insert a Compact Disc label side up here. The radio will switch modes and begin playback after the file is loaded.

### **17) Dot Matrix Display**

LED Dot Matrix display shows the radios operational information.

\*It may be necessary to adjust the volume level of your devise to achieve an optimal volume level.

## SETUP MENU

With the unit ON, press and hold the VOL/SEL button for 2 seconds. The LCD will display MENU. Rotate the VOL/SEL knob to choose the option and press to select.

### • SCROLL ON/OFF

Choose how iPod/iPhone®, and ID3 tag information is displayed on the LCD. With the scroll set to ON, information is repeated continuously on the front display. When set to OFF, information is not displayed unless the user presses the MENU/DISPLAY button.

### • LOUD ON/OFF

Choose to turn LOUDNESS ON or OFF.

### • RDS ON/OFF

Choose to turn the RDS (Radio Broadcast Data System) Scrolling display ON or OFF.

### • BT SET

- BLUETOOTH ON/OFF (Must be set to ON to access further)
- SEL DEV
- DISCOVER ON/OFF
- ANSWER AUTO ON/OFF
- DELETE ALL NO/YES (Delete ALL previously paired devices)
- RESET BLUETOOTH NO/YES
- ALL ON/Front ON/Front RIGHT/FRONT RIGHT/REAR ON

Press the BACK button to EXIT the BT SET menu and return to previous

### • MIC CARBON/DYNAMIC

The first option is to select a correct PA input based on the microphone type you are using. Rotate VOL/SEL button to choose type:

#### DYNAMIC

Microphone does NOT have on on-board volume control. PA volume control is built into the radio. Adjustments are made by keying the microphone.

#### CARBON

Microphone has on on-board volume control. Radio will not control the volume. Press VOL/SEL knob to make the desired selection.

### • CONTRAST 0-35

Rotate the VOL/SEL knob to choose the desired CONTRAST level of the display. Press the VOL/SEL knob to select.

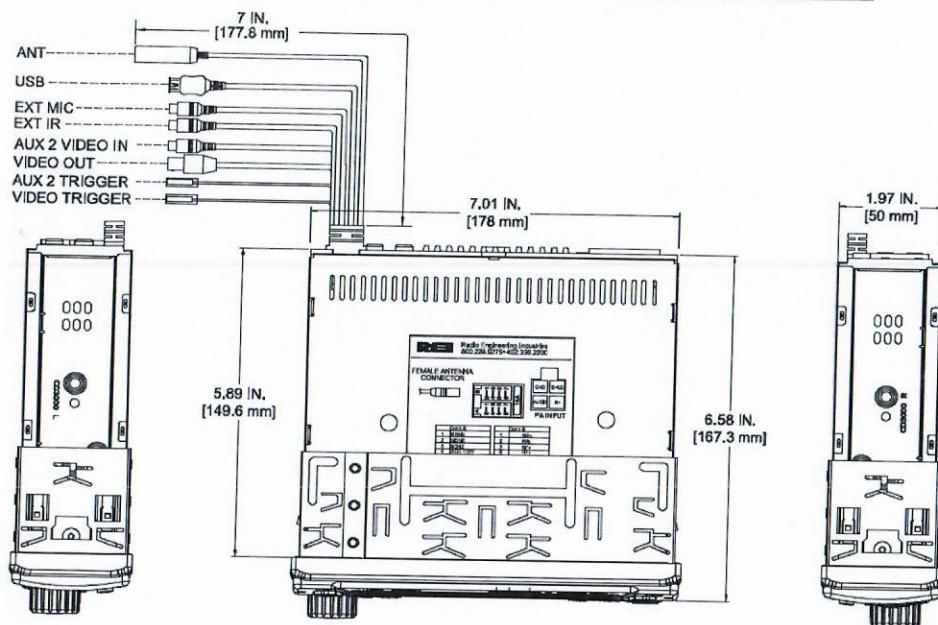
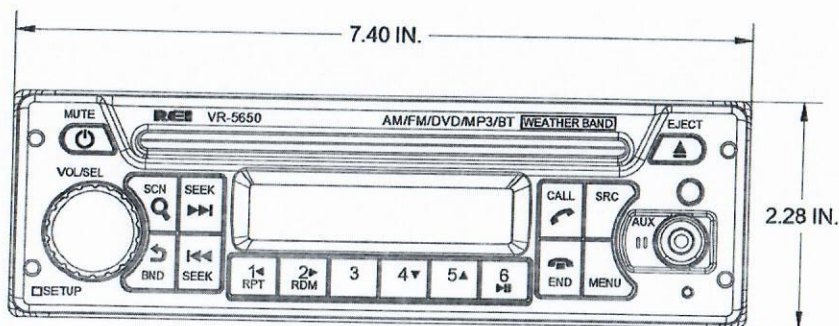
### • VER VR-5650-XXX

This is the firmware version present on the radio. Not all features described in this manual may be available on the radio at this time.

## TROUBLE SHOOTING

| Problem  | Cause  | Solution   |
|--|--|--|
| Backlighting is on, but no LCD display   | No power to BATTERY wire or blown 10A main fuse.   | Check for both ACC & BATTERY voltage with Multi-meter, check all fuses.  |
| No sound   | Speakers not connected; speakers connected with bad splices; Speakers shorted to ground; speaker load is not within 4-8 Ω. | Connect speakers to harness; check all spliced wires; verify speakers not shorted to chassis; verify total speaker impedance. Check volume level.                          |
| Public Address can NOT be audible over speakers  | PA setting in MENU is wrong; microphone is pinned wrong; wrong microphone type is used. Microphone is defective.           | Turn the volume up on the microphone or radio when the LCD displays MIC; Check that the correct microphone type is connected. Check the PA settings in the radio menu.     |
| LCD Display says MIC and front controls are locked   | PA system is triggered   | Remove microphone connection and verify correct pinning and or type, replace microphone. Reset the unit.   |
| Cannot tune radio stations   | The antenna cable is not connected. The signal is too weak. The radio is in the wrong frequency steps.                     | Connect the antenna cable. Check the frequency spacing in the SERVICE menu to the radio.   |
| Audio is distorted or low.   | Source audio level is too weak or overdriven. Bitrate of audio file is too large.  | Adjust the volume level of the auxiliary source. Change the sample frequency or Bitrate of the file.   |
| iPod® screen displays "loading" for a long period of time.   | Device is not a supported device. The radio supports a majority of iPod® models, but not all are guaranteed.               | Wait for iPod® to load or reconnect 30-pin plug. If still loading, then device is not supported, or has low battery. Use the AUX input or a Bluetooth® connection instead. |
| The Radio does NOT respond to the front buttons  | An error in operation has occurred   | Reset the unit from the front panel.   |
| The Radio does not charge my device  | The device requires additional current via the USB to charge the device  | Unplug and try again. The USB can support 5V/1500mA.   |
| My device will not connect to the radio via Bluetooth® &/or my device can't find the VR-5650 radio | Bluetooth® is set to OFF or the Discover mode is set to OFF on the radio.  | Enter SETUP and set Bluetooth® to ON, set Discover mode to ON. Delete previously paired devices or Reset BT.   |
| Digital media won't play, says Unsupported File Type   | File Type is incompatible.   | Re-encode file to a playable file type, see chart for details.   |





#### What's Included:

- 5mm Screws (Qty 4)
- Removal Tools
- Mounting Strap
- Rear Stud Hardware
- Operators Manual
- Remote

#### •CLOCK PRI ON/OFF

When set to on, the display defaults to LARGE format clock display. When set to off the clock displays in SMALL text format.

#### •LCD NORMAL/REVERSE/DIMMER

When set to NORMAL, the display defaults to BLACK text. When set to REVERSE, The TEXT is illuminated in Amber. When set to DIMMER, the ILLUMINATION +12V input controls the display.

To save and exit MENU mode, press and hold the VOL/SEL button.

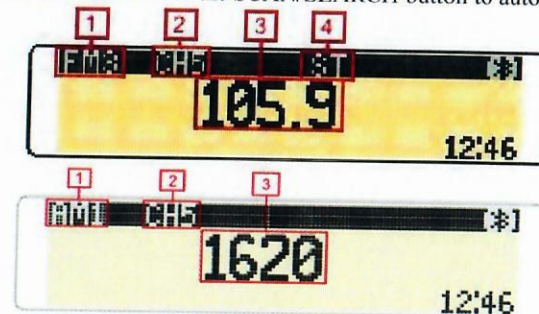
Note: Menu will exit automatically after 5 continuous seconds without saving any selections.

### SETTING THE CLOCK

With the BLUE power light ON, press and hold the MENU button until the hour display begins to flash. Rotate Volume/Select Knob to adjust the hour. Press the MENU button again, and the minute display will flash. Rotate VOL/SEL Knob to adjust the minute. Press either the MENU button or let the radio time out for 3seconds on the LCD.

### RADIO OPERATION

Use the SEEK/TUNE up/down buttons to tune stations. Press and hold any of the Preset buttons to save a desired station. Use the SCAN/SEARCH button to auto set and Scan channels.



#### 1. AM/FM Band Preset Mode

Press the BAND button to switch from FM1, FM2, FM3, AM1, or AM2.

#### 2. Preset Number

Displays the Preset Channel of the frequency.

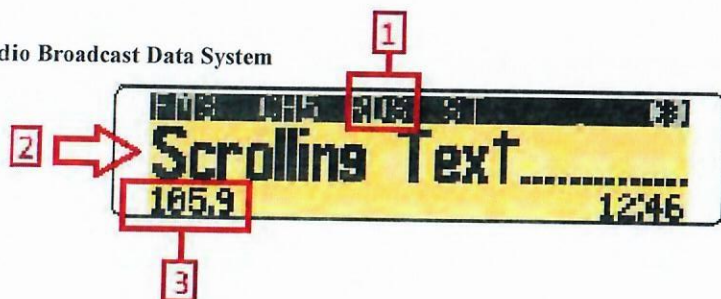
#### 3. Frequency Display

Displays the Frequency of the current tuned station.

#### 4. Stereo Indicator

Displays when the FM frequency is tuned in Stereo.

### Radio Broadcast Data System



#### 1. RDS Display Indication

When RDS is set to ON in the MENU, FM station's receiving RDS PS data will display this indicator.

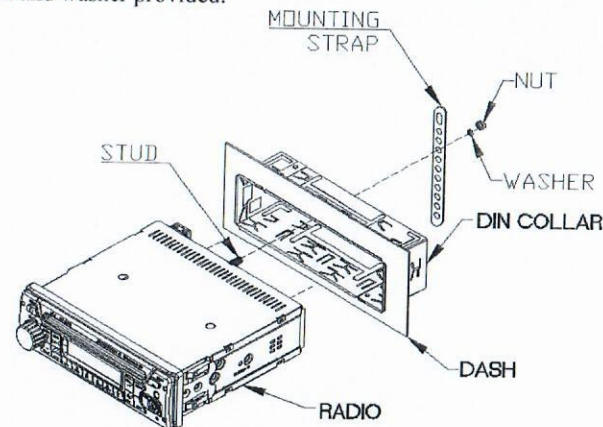
#### 2. RDS Text Information

Information such as the title and artist of the currently playing song.

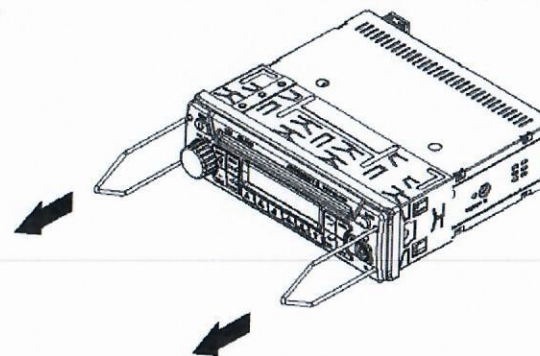
#### 3. Frequency Display

Displays the alternate location of the frequency when RDS is set to ON and

3. If additional support is needed, bend the included support bracket, and secure it to the vehicle using a screw. Secure the opposite end to the rear stud on the radio using the nut and washer provided.



4. To remove the radio, insert the two release keys into the holes on the front face of the radio. The tools must be inserted with the notched side facing the radio. Slide the keys forward until a click is heard. Then pull the radio out, releasing it from the DIN collar.



### WEATHER BAND OPERATION

NOAA National Weather Radio Broadcasts from over 380 Locations throughout the U.S. on seven VHF/FM frequencies. Tune to receive continuous weather information 24 hours a day on one of the following frequencies.

For local station listing see: <http://www.nws.noaa.gov/nwr/nwrbro.htm>

Press preset 1 to select weather band channel 1 - 162.400MHZ

Press preset 2 to select weather band channel 2 - 162.425MHZ

Press preset 3 to select weather band channel 3 - 162.450MHZ

Press preset 4 to select weather band channel 4 - 162.475MHZ

Press preset 5 to select weather band channel 5 - 162.500MHZ

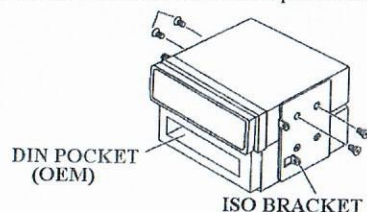
Press preset 6 to select weather band channel 6 - 162.525MHZ

\*\*Press SEEK UP/DOWN to select weather band channel 7 - 162.550 MHz



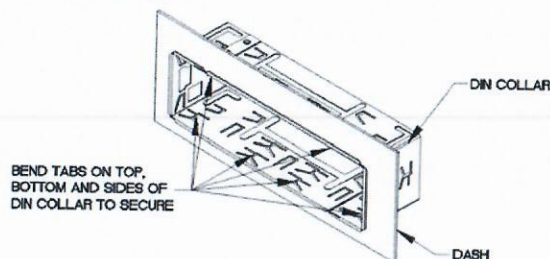
## ISO INSTALLATION

1. For installations that do NOT require the use of the DIN collar. The radio has threaded holes in the chassis side panels for ISO mount applications. If necessary, four M5x10mm screws are included with the hardware pack to assist you.

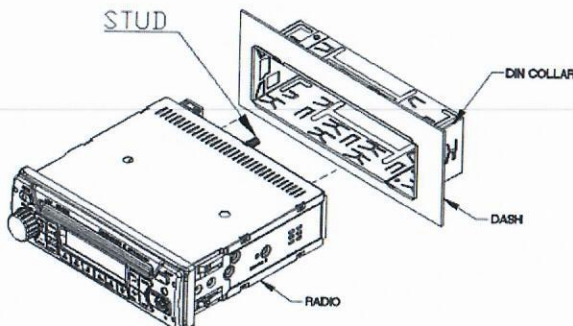


## INSTALLING THE RADIO

1. Place the DIN collar into the dash opening. Bend the tabs outward as shown on the drawing below to lock into place.



2. Pass the harness and antenna cable through the DIN collar and connect to the back of the radio. Verify clearance; then gently insert the radio into the DIN Collar until both spring clips are locked into place.



## CONNECTING A NEW BLUETOOTH® DEVICE

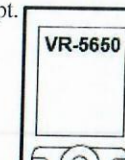
To connect your Bluetooth® device to the Radio, the device must first be paired. Verify that "BLUETOOTH" is set to "ON", (refer to BT SET menu) and verify that "DISCOVERY" is set to "ON", (refer to BT SET menu).

### Pairing the Your mobile device with the Head Unit

Your mobile phone can initiate a search for new devices and pair to the unit. The following paragraph describes the pairing process:

**NOTE:** Procedures for pairing mobile phones may vary slightly from manufacturer to manufacturer.

1. Verify that the Radio is powered up and ON.
2. Set the Bluetooth® function of the Mobile Device to ON.
3. Access the "Look for devices" feature of the Mobile device and begin searching. After searching, the Radio should appear in the list of devices as VR-5650. Press to accept.



4. A prompt to bond should appear on your Mobile device. Press to accept and continue the process. The device will then ask for the passkey, enter it on the mobile device.

**NOTE:** Some mobile devices require the passkey to connect. If your mobile device requires the passkey, you will need to enter it now. The default code is "0000".

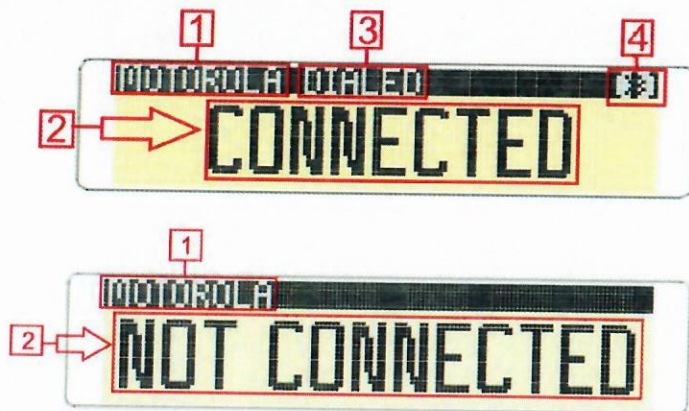


5. After entering the passkey, press OK. The Mobile device should display connected. The Bluetooth® icon on the Radio should appear in the upper right-hand corner of the screen.

### NOTES:

- Only ONE mobile device can be paired with the Radio at a time.
- Turn "DISCOVERY OFF" to disable any unwanted Bluetooth® devices.
- After turning off the ignition, the Radio will automatically search for the last-connected Bluetooth® device, and if possible, restore the connection.
- This Radio does NOT support HSP (Head Set Profile)

## BLUETOOTH® PHONE OPERATION



### 1. Bluetooth Phone ID

Displays the ID of previously paired Bluetooth Phones. Rotate to the VOL/SEL knob to display other paired devices and press the VOL/SEL to initiate re-connection.


### 2. Display information

Shows the connection status and phone number of the incoming or outgoing call.

### 3. Options Menu

When connected to a Bluetooth Enabled phone, Rotate the VOL/SEL knob to access DIALED, RECEIVED, MISSED, or PHONEBOOK.

- **DIALED** Displays all dialed calls from the currently connect phone.
- **RECEIVED** Displays all answered incoming calls from the currently connect phone.
- **MISSED** Displays all missed calls from the currently connect phone.
- **PHONEBOOK** Displays the contacts currently stored on the connected phone. Some phones require the user to accept the radio's permission to view contacts before displaying them on the radio.

The use can rotate and choose using the VOL/SEL button and press it to also select the desired number. Use the  button to return to the previous menu.

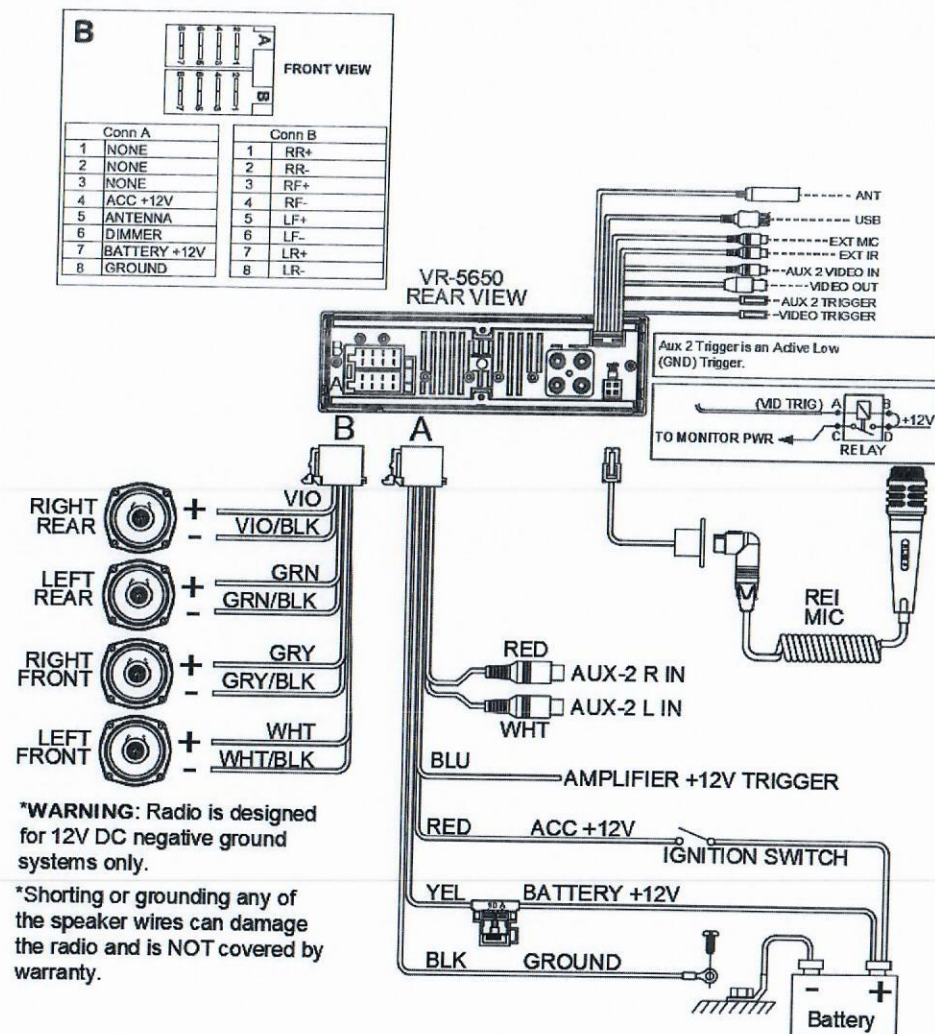
Once the phone number is displayed, press the CALL button to place the call.

### 4. Connection Status

Displays the Bluetooth® icon connection status of the radio.

## TYPICAL INSTALLATION:

Follow this easy wiring diagram when installing Radio and Speakers.







#### TV RATIO:

To select the appropriate aspect ratio of the connected monitors, select TV RATIO and press the PLAY/PAUSE button. Once selected, the user can scroll to choose either; 4:3 PAN & SCAN, 4:3 LETTERBOX, or 16:9 WIDE-SCREEN. Press the PLAY/PAUSE button to select the option.



\*The ZOOM button found on the remote control will also allow the user to adjust the picture during DVD playback to ZOOM in by 2X, 3X, 4X, 1/2, 1/3, 1/4, or OFF

## BLUETOOTH® STREAMING AUDIO OPERATION

The unit allows you to play back audio files from your mobile device using a Bluetooth® connection. The Radio can control a Bluetooth® audio player via Advanced Audio Distribution Profile (A2DP) or Audio/Video Remote Control Profile (AVRCP). Bluetooth® audio players (or Bluetooth® adapters) compatible with these profiles can be connected to this Radio. Verify the device is connected via Bluetooth®, then Touch the SRC button on the front to access BT AUDIO.



### 1. Bluetooth Phone ID

Displays the ID of the paired Bluetooth Phone you are trying to stream audio from.

### 2. Connection Status

Displays the Bluetooth® icon connection status of the radio.

Press the PLAY/PAUSE button to listen to audio. While listening to audio the following functions are available:

- **SEEK UP:** Touch this button to play the next track.
- **PLAY/PAUSE:** Touch this button to pause playback. Touch again to resume playback.
- **SEEK DOWN:** Touch this button to play the previous track.

Press the MENU button to display Metadata information on the track itself (artist, track name, etc.). This option is only available on compatible devices.

#### NOTE:

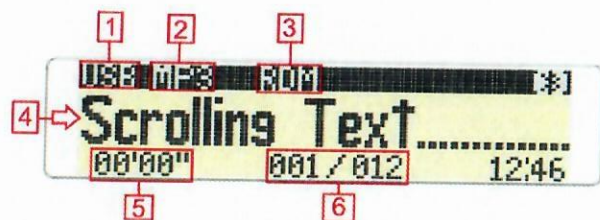
When there is an incoming call, the song will be paused. After the incoming call is finished, the screen will return to the music function screen and playback will continue.

Functionality may vary depending on the profile or device used.

## iPod®/iPhone® OPERATION

To listen to audio through your apple device, verify that a Certified USB extension is connected to the USB pigtail on the rear of the radio. Next, connect the USB cable to the Apple device. Once connected, the iPod/iPhone® will begin charging the device. Press the SRC button to switch the source for playback. If the device has enough battery power, it will begin playback.





1. Operational Mode
2. Displays the file type
3. Shows the current playback option
4. Displays the Track Title, Artist, and Album information of the file if available.
5. Shows the elapse time of the audio track.
6. Indicates the file number and number of files in the folder.

When connected, the user can playback specific files or folders. First press the SEARCH button. The user can then rotate the VOL/SEL knob to select one of the following search options:

- Playlists
- Podcasts
- Audiobooks
- Songs
- Albums
- Artists

Press the VOL/SEL knob to choose. To return to a previous menu, press the RETURN button and choose again using the VOL/SEL knob. Use the radio's SEEK up/down buttons to change tracks, or the button to PAUSE or PLAY the track. To return to the iPod/iPhone® source from any other source menu, touch SRC on the front panel until the iPod/iPhone® icon is shown on the front display.

### AUX 1/2 OPERATION

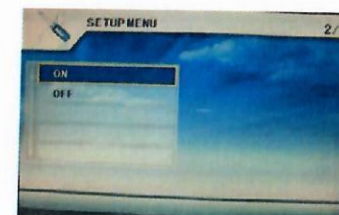
Press the SRC button on the front panel until the display shows either AUX 1 or AUX2. AUX 1 uses the front 3.5mm audio input while AUX 2 uses the rear RCA L/R audio inputs and the Composite Video RCA input. It may be necessary to adjust the VOLUME level of the AUXILARLY input device if too little or too much signal is present.

Aux 2 mode will pass video when connected to the RCA Video input. By connecting the AUX 2 trigger wire to ground, the radio will automatically switch sources to AUX 2.



### AUTOPLAY:

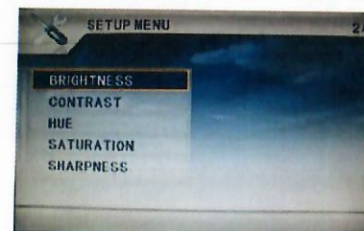
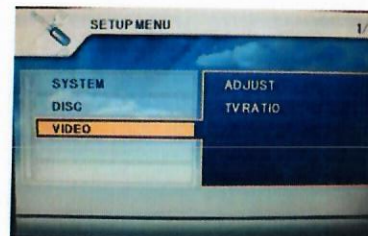
The AUTOPLAY option enables AUTO PLAY of most the DVD discs. When set to ON the disc will immediately begin playback when inserted, allowing the user to skip the MENU and previews section. When set to OFF the user must navigate to the disc MENU to playback the disc.



### VIDEO OPTIONS

#### ADJUST:

The VIDEO options give the user control of the Video Output settings. To change, scroll to select ADJUST and press the PLAY/PAUSE button. Once selected, the user can scroll to choose the desired screen option to modify. Press the PLAY/PAUSE button to select the option; then scroll to choose the desired setting from 0 to 100. Press the PLAY/PAUSE button to confirm.





### AUDIO LANG:

The AUDIO LANG option allows the user to change the default audio soundtrack on a DVD disc. The disc must support the language type. Due to different DVD encodings, this feature may not work on all discs, and the user may be required to access this feature from the main menu to the DVD. Press the PLAY/PAUSE button to confirm selection.






### SUBTITLE LANG:

The SUBTITLE LANG option allows the user to change the default Subtitle Language displayed on the bottom of the screen for DVD discs. The disc must support the language type selected. Due to different DVD encodings, this feature may not work on all discs. If playing DIVX encoded media, select DIVX SUBTITLE LANG to change the subtitle language. Press the PLAY/PAUSE button to confirm selection.



### CD OPERATION

Insert a disc into the unit, the radio will automatically switch MODE and begin playback after the media is successfully loaded. Use the SEEK UP/DOWN buttons to change tracks.

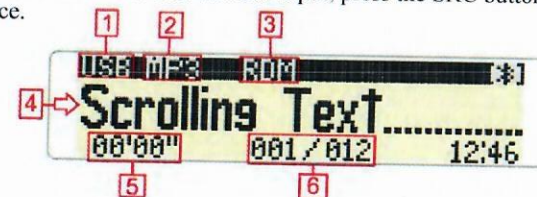
-  Press and hold this button to REPEAT Chapter, Title, or Off.
-  Press and hold this button to turn RANDOM on/off
-  Press this button to PAUSE/PLAY the media



1. Operational Mode
2. Shows the Track number of the ID3 tag information of the MP3 file. Press the DISPLAY button to switch from Title, Artist, or Album information
3. Shows the elapse time of the audio track.
4. File number and number of files in the folder.

### USB OPERATION

Insert a USB device into the rear input, press the SRC button to select this source.



1. Operational Mode
2. Compressed media file format  
Displays either WMA or MP3 Compressed media file format file formats.
3. Playback Mode of Operation  
Displays either RDM, RPT or nothing at all
4. Shows the Track number of the ID3 tag information of the MP3 file.  
Press the DISPLAY button to switch from Title, Artist, or Album information
5. Shows the elapse time of the file.
6. File number and number of files in the folder.

Once selected, playback should begin automatically. Press the MENU button and use the PRESET buttons ▼ ▲ ◀ ▶ to navigate to a desired folder or file for playback.



Use the



SEARCH Button to change the file type for playback when using

i.e., MUSIC, PHOTO, or MOVIE when multiple formats are available.

See “**PLAYABLE FILE TYPES**” page for a list of compatible format types.

#### **DVD OPERATION**

Insert a disc into the unit, the radio will automatically switch MODE and begin playback after the media is successfully loaded.



1. Operational Mode
2. Shows the Track number
3. Shows the elapse time of the title.

Use the



button to return to the disc MENU.

Use the PRESET buttons ▼ ▲ ◀ ▶ to navigate the disc MENU for playback.

#### **DEFAULT:**

The DEFAULT option allows the user the option to return all SETUP settings to their default conditions including language options. Press the PLAY/PAUSE button to confirm selection.



#### **DISC OPTIONS**

##### **OSD LANG:**

The OSD LANG option allows the user to change the default On-Screen Display (OSD) language displayed on the SETUP menu from ENGLISH, SPANISH to PORTUGUESE. Press the PLAY/PAUSE button to confirm selection.





### RADIO:

The RADIO option allows the user choices between either EURO MODE or USA MODE. These modes will change the frequency steps of the FM/AM tuner in the radio. Press the PLAY/PAUSE button to confirm selection.



### MUSIC VIDEO:

The MUSIC VIDEO option gives the user the option to output a composite video image during digital music playback. When ON is selected, the file information is displayed on the VIDEO OUT signal. When OFF is selected, the VIDEO OUT is not active. Press the PLAY/PAUSE button to confirm selection.



Below is CD IMAGE when set to ON



Below is MP3/WMA image when set to ON

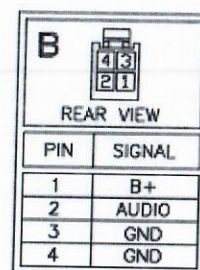


### PA OPERATION (microphone sold separately)

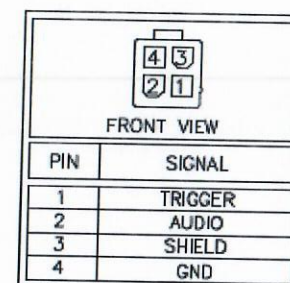
Connect a PA microphone into the 4-pin connector. Microphone has priority over all other audio modes and mutes the source audio being played when keyed. When the PA is triggered, the front display will show MIC, until the trigger is un-keyed. Any digital media being played at that time will be sent a PAUSE command. Once released, it will return to the previous source mode at the previous volume level. Any digital media will be given a PLAY command.

The PA operates regardless of radio status if the ACC and Battery power is applied to the radio.

When CARBON mode is set, the volume of the PA is only adjustable on the microphone itself. When set to DYNAMIC mode, the volume level is adjustable only when keyed from the front using the VOL/SEL button. A rear view of the optional radio PA pin connection is shown below:



Carbon PA



Dynamic PA

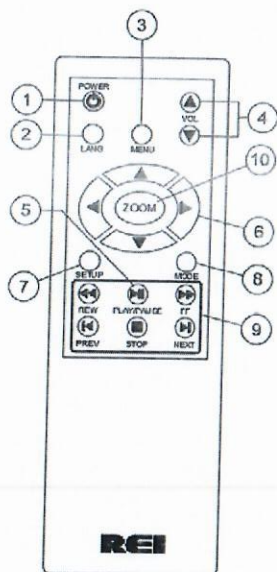
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## REMOTE CONTROL

\*Requires 2AA Batteries (included)



- (1) Power Button
- (2) Language Button
- (3) Menu Button
- (4) Volume Up/Down Buttons
- (5) Enter/Play/Pause Button
- (6) 4 Scroll Buttons
- (7) Setup Button
- (8) Mode Button
- (9) Playback Buttons
- (10) Zoom Button

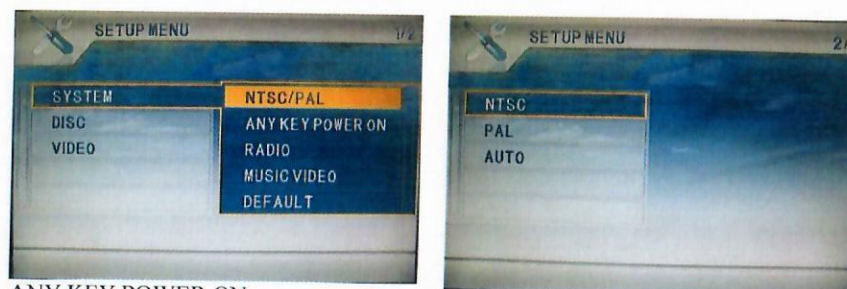
## SETUP OPERATION

Setup operation requires the user be in either DVD/CD/USB mode to operate. When in one of these source modes, press SETUP on the remote to activate the on-screen display. Use the scroll up/down/left/right buttons to make changes. Use the PLAY/PAUSE button to accept changes. Press SETUP again to go BACK and/or EXIT at any time. Changes made in the SETUP menu will not return to default by pressing the RESET button on the front of the radio. To reset these changes, refer to the DEFAULT option in the SETUP menu.

## SYSTEM OPTIONS:

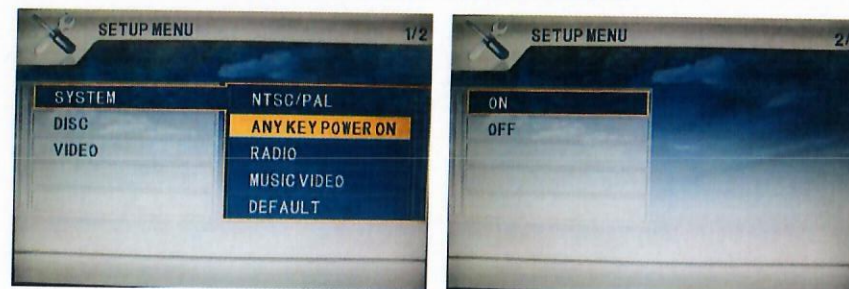
### NTSC/PAL/AUTO:

This option allows the user to choose a composite output signal to either NTSC or PAL depending on the video monitor used. The AUTO option will output the signal according to the current DVD title. Scroll to highlight the desired selection as shown on the right. Press the PLAY/PAUSE button to confirm selection.



### ANY KEY POWER ON:

This option gives the user a choice between having any of the front panel buttons turn the radio on, or only the power button. Having the selection at ON means any button will power up the radio, having it set to OFF means only the power button can turn the radio on. Press the PLAY/PAUSE button to confirm selection.





# ROHRER

School & Commercial Bus Sales

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Looking for R & R instructions or a wiring diagram look no further. Under OEM Literature we have manuals, wiring diagrams and even some videos. If you don't see what your looking for then contact our support department at 1-888-594-3135 ext. 731.

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### Body Shop

Rohrer Bus is one of the only full-service body shops in the area for buses and large vehicles. Our team of experienced body shop technicians can handle just about any variety of body and/or structural damage to your vehicle.

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CRFQ 0810 DMT23-004

## Mid Size Medium Duty Vehicles

### 3.38 Farebox Provision Location

As the location of the farebox varies widely in our industry, Rohrer Bus will count on each ordering agency to provide us with their desired location of any farebox provision equipment.

2075 West Main Street, Waynesboro, VA 22980

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# TRANSIGN®

YOUR DESTINATION BEGINS HERE



The LED Destinator® Series - perfect for fleets of all types - is available in a variety of sizes and colors to fit your installation and display needs. These versatile and highly adaptive signs offer full integration into Destination, Route, and Next Stop announcement services, always keeping your customers pointed towards their next destination.



## STANDARD FEATURES

- Destination Messages
- Next Stop Announcements
- Public Relations Messaging
- Scrolling/Flashing/Stacked Messages

## SOFTWARE AND PROGRAMMING

Our signs and control modules are pre-programmed and include FREE software. Advanced controllers are available for J1708/J1587 system integration and Hands-Free operation, ensuring the safest and most reliable performance for any fleet.



## AVAILABLE ADVANCED FEATURES INCLUDE:

- Automated GPS message progression
- Hands-Free operation for safety
- Voice Announcements
- J1708/J1587 integration compatible
- Automatic brightness control
- Basic programming software included (USB)
- Maintenance free- ZERO cost of ownership
- Many OCU options to suit your needs



## BUY AMERICA - MADE IN U.S.A.

Using the highest quality parts, our LED Destinator® Signs are proudly made in Detroit, Michigan USA in full compliance with the Buy America Act.

## LED DESTINATOR™ WARRANTY INFO

With a lifetime warranty that outlasts the lifetime of most vehicles (100,000 hours at full brightness), our signs will exceed your expectations in reliability and performance.



## ABOUT TRANSIGN

Established in 1959, Transign is a leading provider of high-quality signage for the transit industry. We remain committed to providing world-class U.S. based customer service and technical support.

Transign®, 281 Collier Road, Auburn Hills, Michigan 48326  
Toll Free: 855.535.7446 | Main: 248.623.6400 | Fax: 248.623.2930  
[www.transignllc.com](http://www.transignllc.com)



# TRANSIGN®

YOUR DESTINATION BEGINS HERE

## LED Destinator® Electronic Signs - Dimensions

| Signs   | Pixel Count<br>H x W (pixels) | Display<br>H x W (in) | Enclosure<br>H x W x D (in) |
|---------|-------------------------------|-----------------------|-----------------------------|
| LD16160 | 16 x 160                      | 6 1/2 x 63 1/8        | 9 1/2 x 64 5/8 x 2 3/8      |
| LD16128 | 16 x 128                      | 6 1/2 x 50 1/2        | 9 1/2 x 52 x 2 3/8          |
| LD16112 | 16 x 112                      | 6 1/2 x 44 1/8        | 9 1/2 x 45 3/4 x 2 3/8      |
| LD1696  | 16 x 96                       | 6 1/2 x 37 7/8        | 9 1/2 x 39 3/8 x 2 3/8      |
| LD1680  | 16 x 80                       | 6 1/2 x 31 5/8        | 9 1/2 x 33 x 2 3/8          |
| LD1632  | 16 x 32                       | 6 1/2 x 12 3/4        | 9 1/2 x 14 x 2 3/8          |
| LD12112 | 12 x 112                      | 4 7/8 x 44 1/8        | 8 x 45 3/4 x 2 3/8          |
| LD1280  | 12 x 80                       | 4 7/8 x 31 5/8        | 8 x 33 1/8 x 2 3/8          |
| LD1232  | 12 x 32                       | 4 3/4 x 12 3/4        | 8 x 14 x 2 3/8              |
| LD896   | 8 x 96                        | 3 1/4 x 37 7/8        | 6 3/8 x 39 3/8 x 2 3/8      |
| LD864   | 8 x 64                        | 3 1/4 x 25 1/4        | 6 3/8 x 26 3/4 x 2 3/8      |

Be sure to check out our other great products!

### Stop Requested

#### Stop Request Signs

- Flush, ceiling or surface mount
- Any font/color combination
- Back-lit by efficient LED's



#### Interior Passenger Information Sign

- Easy to install
- ADA compliant
- LED's rated at 100K hours



#### Roller Curtain Signs

- High-res logos & graphics
- Perfect for large fleets
- Virtually maintenance free
- Reliable, efficient LED backlight
- Available in 12 and 24 VDC
- Up to 120 destinations



#### Run Number Box

- Metal or plastic frame
- Available in 2, 3, or 4 digits
- Easy to read 4" lettering
- Spring loaded return
- Reliable, efficient LED backlight
- Virtually maintenance free



#### LED Run Number Box

- Steel enclosure
- ADA compliant
- Reliable LED's
- Multiple colors
- Automatic brightness
- 12 and 24 VDC

#### Join Our Mailing List


[www.transignllc.com/subscribe](http://www.transignllc.com/subscribe)

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LED Destinator® Series





## MS5006

- 5.25-inch waterproof speaker
- Available in black (MS5006B) or white (MS5006W)
- 30 watt maximum power
- Corrosion and UV resistant
- One-piece molded plastic chassis with integrated drip-edge
- Polypropylene cloth woofer cone

[LEARN MORE](#)



Hand Held Microphone

# JMICHND



Features:

- Momentary push to talk button
- Thumb Wheel variable gain level control
- Metal mounting clip and hardware
- Standard 4 pin connector
- 8' fully extended coiled cable

DESIGNED TO MOVE [YOU]™

**asa**  
ELECTRONICS

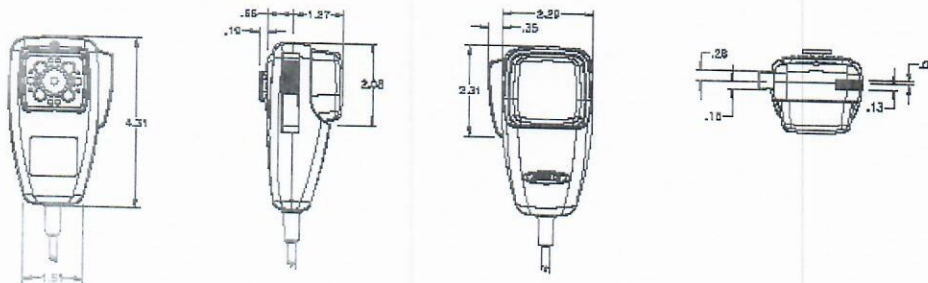
2602 Marina Drive • Elkhart, IN 46514  
[www.asaelectronics.com](http://www.asaelectronics.com)



**JENSEN®**

Hand Held Microphone

# JMICHND



|                             |                             |               |
|-----------------------------|-----------------------------|---------------|
| Sensitivity                 | -74 dB +/- 2 dB             |               |
| Frequency Response          | 100 Hz to 10 kHz            |               |
| Impedance                   | 600 $\Omega$                |               |
| 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 (unpacked)   | 9.25 oz.                    |               |



Universal PA Amplifier

# JPA600



## PRODUCT FEATURES

- 2 Wire - 12VDC switched power
- 4 Channel Audio Amplifier with Public Address (PA)
- Universal harness leads
- Compatible with JMICHND for volume control instead of integrated volume knob
- 4 Ohm ~ 8 Ohm Stable
- Frequency Response 100Hz ~ 10KHz
- 10 Amp Fuse in holder
- Universal PA, works with any 4 channel stereo or standalone.
- Installation: In-line between existing stereo & speakers
- Automatically interrupts stereo audio when mic is keyed
- Dimensions: 3.0"W x 1.9"H x 4.0"D

DESIGNED TO MOVE [YOU]<sup>™</sup>

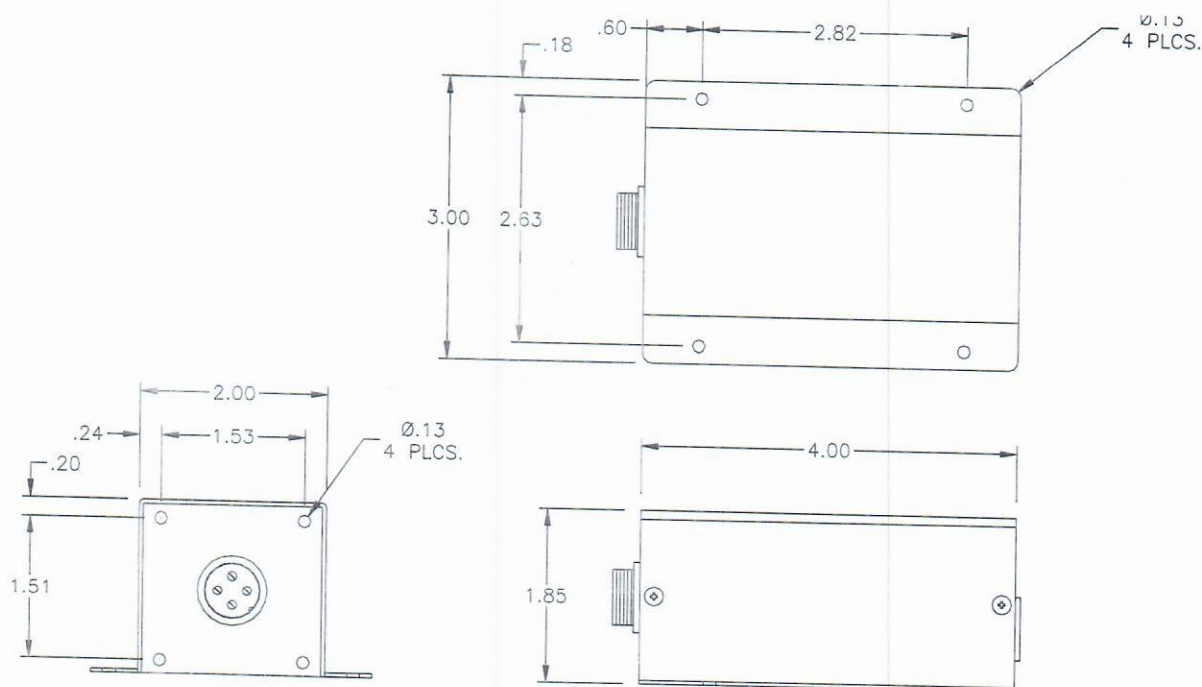
**asa**  
ELECTRONICS  
2802 Marina Drive • Elkhart, IN 46514  
[www.asaelectronics.com](http://www.asaelectronics.com)





Universal PA Amplifier

# JPA600



## Specifications

### General Specifications

|  |                |               |
|--|----------------|---------------|
| Power System                           | 12V DC         |               |
| Operating Voltage Range                | 10V to 18V     |               |
| Current Draw @ 12V                     | Idle           | 380 mA        |
|  | Nominal        | 2.6 A         |
|  | Maximum        | 9.0 A         |
| Operating Temperature Range            | -4F to 149°F   | -20°C to 65°C |
| Storage Temperature Range              | -25°F to 185°F | -30°C to 70°C |
| Maximum Relative Humidity              | N/A            |               |
| Product Weight (unpackaged)            | 1.0 lb         |               |
| Output Power RMS                       | 4 x 18Watts    |               |
| Output Power Maximum                   | 4 x 25Watts    |               |
| Total Harmonic Distortion (1W @ 1Khz)  | 0.5%           |               |
| Applied Test Suite Environ/ Electrical | ASA ES0001     |               |
|  |                |               |
|  |                |               |
|  |                |               |
|  |                |               |



**5 YEAR**  
NO-HASSLE  
WARRANTY



## BEACONS

### 7945 SERIES Pulse® SAE Class II or III LED



The 7945 Series beacon combines all the major benefits of the latest LED technology with a traditional, strobe style housing at a price point comparable to a strobe. Available in either 5" or 7" height profiles the 7945 is suitable for a wide range of applications where an SAE Class II light is required. The 7945 features 12-48VDC operation and 11 flash patterns to produce an attention getting warning signal.

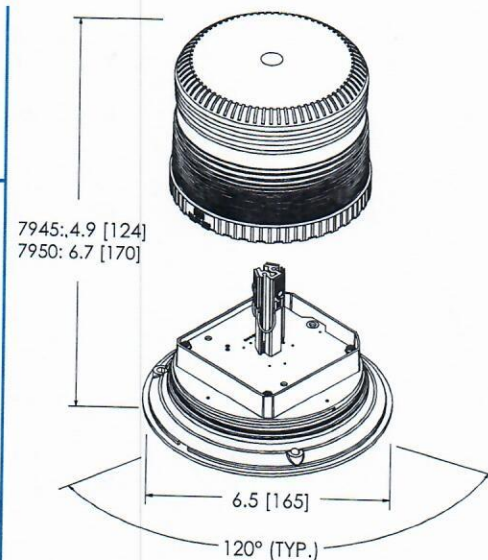
#### Models

| PART NO.  | MOUNT              | LENS COLOR OPTIONS   | LED COLOR                |
|-----------|--------------------|--|--------------------------|
| 7945X     | 3 Bolt / 1" Pipe   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |
| 7950X     | 3 Bolt / 1" Pipe   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |
| 7945X-VM  | Vacuum-Magnet      | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |
| 7950X-VM  | Vacuum-Magnet      | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |
| 7945X-HBT | Semi-Permanent HBT | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |
| 7950X-HBT | Semi-Permanent HBT | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |

Replace "X" in part number with desired color: A = amber, B = blue, C = clear, G = green, R = red

#### Features and Benefits

- 12-48 VDC, 1.3 Amps
- Choose profile height 5" (7945) or 7" (7950)
- 11 flash patterns
- Reinforced polypropylene base, polycarbonate lens
- Switched cigarette plug adapter (vacuum-magnet models)
- Rechargeable battery powered model available in amber
- Temperature Range: -22°F to +122°F (-30°C to +50°C)



#### Parts & Accessories

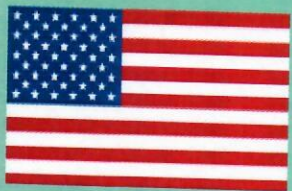
- Lenses: 7945 - R6050LX  
7950 - R6070LX

**ECCOESG.com**

T 800-635-5900 | [orders@eccogroup.com](mailto:orders@eccogroup.com)

**WARNING:** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)





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.



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www.roscomirrors.com www.roscovision.com

Cat. No. 081414



QUEENS, NY



**NEW YORK SINCE 1907**



## 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 recording

### INTERFACE

#### NETWORK DATA CONNECTION

- One RJ45 x 1 (10/100 M/1000M)

#### EXPANSION

- RS232 x 2, RS485 x 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 up to 24 hours

#### OPERATING VOLTAGE

- 8-36VDC

#### 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



## **Teresa Clawson**

---

**From:** David Clawson  
**Sent:** Monday, October 10, 2022 2:14 PM  
**To:** Teresa Clawson  
**Subject:** FW: AXALTA  
**Attachments:** AXALTA COLORS.pdf

David

**D.M.Clawson, Jr.**  
Senior Vice President  
School and Commercial Sales



***The Transportation  
Company You Can  
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Cell Phone: (540) 729-3751  
Check out our [Facebook](#) and [Blog](#)!

---

**From:** Scott A. Mamone <[smamone@forestriverinc.com](mailto:smamone@forestriverinc.com)>  
**Sent:** Monday, October 10, 2022 1:52 PM  
**To:** David Clawson <[dclawson@rohrerbus.com](mailto:dclawson@rohrerbus.com)>  
**Subject:** [External] AXALTA

David,

See attached Axalta paint samples along with the web link below to us as a guide.

<http://spectramaster.axaltacs.com/spectramaster/#home>

Thank you



**FOREST RIVER BUS**

**Scott Mamone**  
General Sales Manager  
Glaval Bus  
O 1.800.348.7440 ext. 52334  
C 574.349.1544



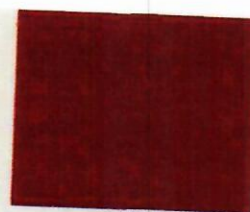
**29605**  
Red



**5080**  
Orange



**6282**  
Red



**5470**  
Red



**6543**  
Red



**44128**  
Red



**2622**  
Scarlet



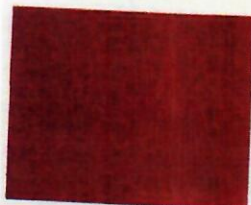
**5027**  
Red



**29198**  
Red



**8554**  
Flame Red



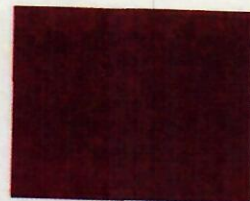
**674**  
Red



**48**  
Red



**77968**  
Red



**51078**  
Medium Red



**4992**  
Red



**143**  
Maroon



**32678**  
Red



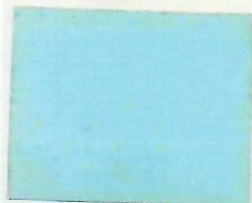
**75334**  
Purple



**58360**  
Aquatone Blue



**5079**  
Blue



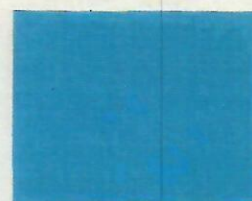
**95605**  
Baffin Blue



**92095**  
Blue



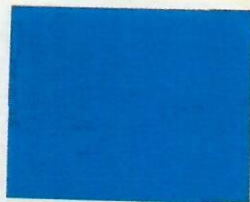
**43500**  
Pastel Blue



**96581**  
Sierra Blue



**78387**  
Light Blue



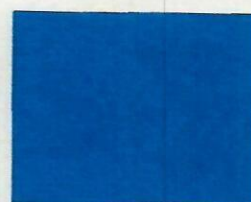
**K9441**  
Blue



**6544**  
Blue



**5351**  
Blue



**5205**  
Blue



**K9359**  
Blue



**G9369**  
Blue



**77257**  
Blue



**5240**  
Bright Med. Blue



**7165**  
Blue

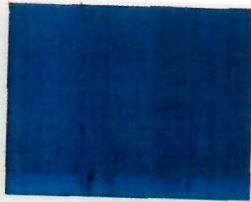


**42811**  
Med. Blue

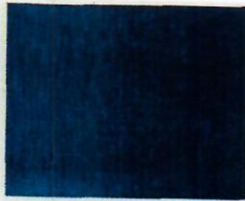




**K9740**  
Blue



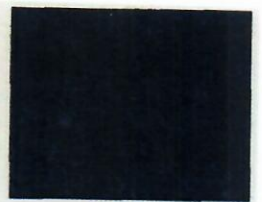
**24160**  
Blue



**63203**  
Blue



**2063**  
Blue



**81501**  
Dark Blue



**62703**  
Light Green



**43521**  
Med. Green Gold



**80334**  
Green



**1650**  
Green



**29609**  
Green



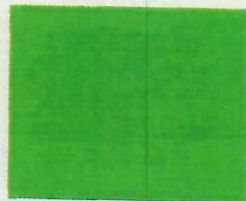
**29608**  
Green



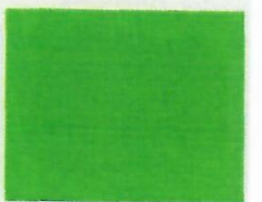
**5181**  
Lime



**43757**  
Green



**5081**  
Green



**43073**  
Signal Green



**74844**  
Green



**79039**  
Green



**7456**  
Bright Green



**5316**  
Green



**1317**  
Green



**546**  
Green



**7666**  
Green



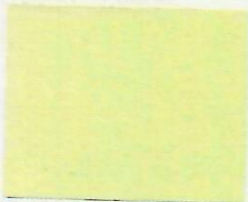
**7498**  
Green



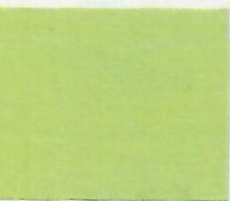
**62006**  
Green



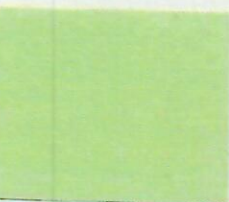
**2015**  
Green



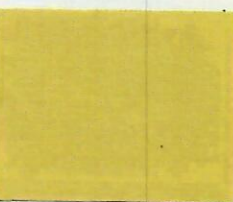
**5363**  
Pastel Lime



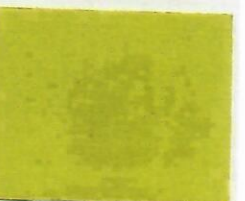
**43522**  
Light Green Gold



**5371**  
Green



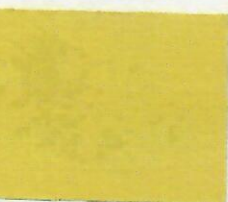
**7364**  
Cream



**5577**  
Bright Lime



**530**  
Cream



**5443**  
Cream Yellow



**42831**  
Dark Yellow



**7863**  
Bahama Yellow

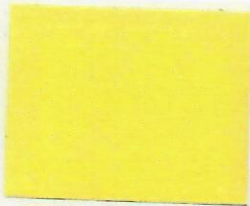


**44129**  
Harvest Gold





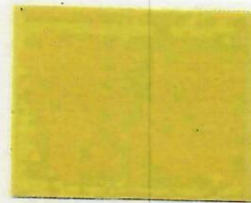
**44162**  
Solar Yellow



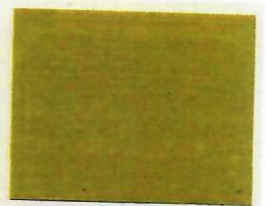
**76556**  
Lunar Yellow



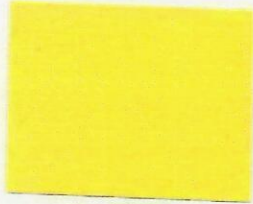
**K9599**  
Yellow



**42882**  
Yellow



**5283**  
Sunflower



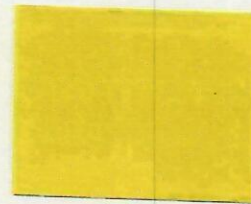
**8550**  
Chrome Yellow



**58199**  
Golden Yellow



**44139**  
Bright Yellow



**5194**  
Bright Yellow



**78134**  
Yellow



**224**  
Yellow



**5248**  
Yellow



**54701**  
Yellow



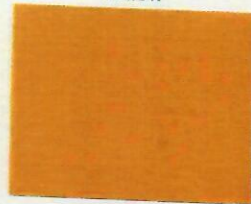
**6561**  
Yellow



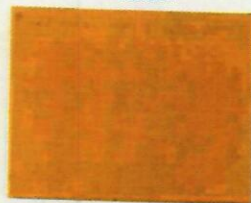
**K9590**  
Yellow



**218**  
Yellow



**G9737**  
Yellow



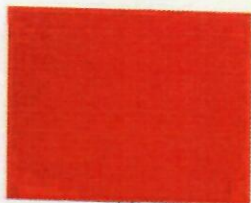
**4357**  
Yellow



**24316**  
Yellow



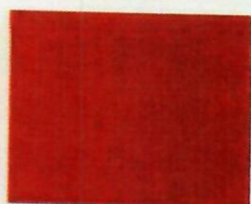
**1021**  
Orange



**31**  
Omaha Orange



**60659**  
Orange



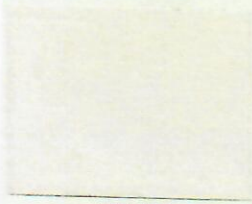
**5146**  
Orange



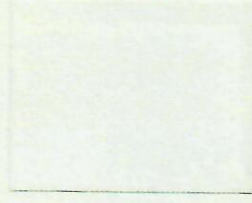
**24592**  
Orange



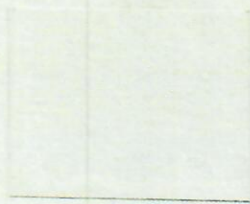
**7455**  
Burnt Orange



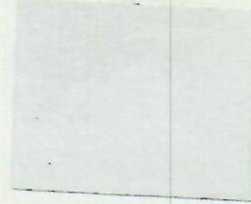
**55769**  
White



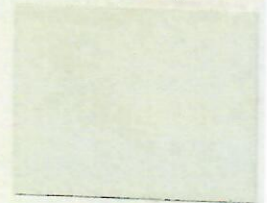
**95922**  
White



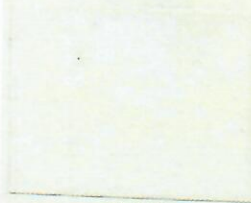
**508**  
White



**6538**  
White



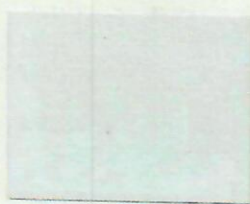
**28072**  
White



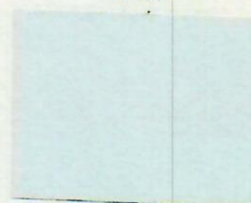
**7372**  
White



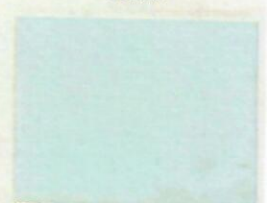
**7414**  
White



**817**  
White



**8796**  
White

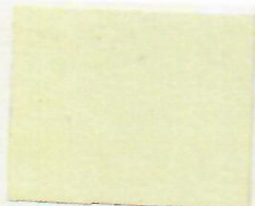


**4950**  
Blue

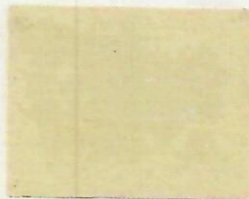




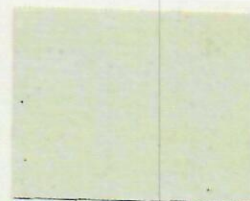
**59373**  
White



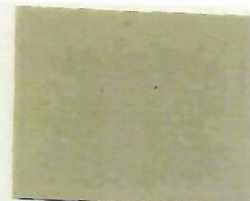
**4296**  
White



**4775**  
White



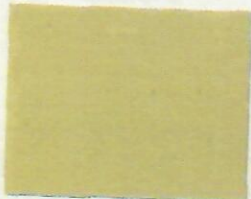
**93774**  
White



**78390**  
Beige



**43938**  
Cream



**42807**  
Beige



**96939**  
Bengal Tan



**3295**  
Brown



**29607**  
Brown



**96704**  
Tan



**7444**  
Dark Brown



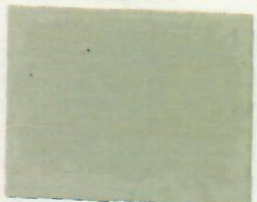
**7502**  
Brown



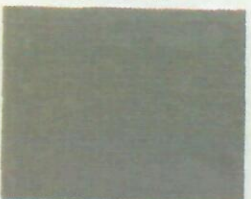
**72092**  
Gray



**57704**  
Gray



**71537**  
Polar Gray



**55137**  
Gray



**6334**  
Gray



**99**  
Black



**5093**  
Dark Blue



**45406**  
Aztec Silver Met.



**44716**  
Silver Blue Met.



**N8075**  
Indian Silver Met.



**44434**  
Silver Met.



**43862**  
Silver Met.



**43523**  
Cloud Silver Met.



**5032**  
Quick Silver Met.



**43859**  
Silver Met.



**44401**  
Pewter Gray Met.



**14163**  
Gray Met.



**5563**  
Silver Met.



**44489**  
Smoke Gray Met.



**44488**  
Cumulus Gray Met.



**B8012**  
Dk.Charcoal Met.



**44433**  
Slate Gray Met.





**44490**  
Pepper Gray Met.



**45537**  
Shadow Gray Met.



**5031**  
Phantom Gray Met.



**44494**  
Sable Met.



**44435**  
Black Met.



**H7994**  
Seminole Red Met.



**44460**  
Lt. Firethorne Met.



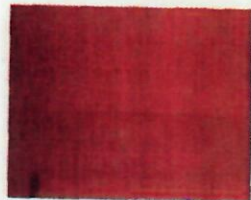
**44459**  
Dk. Firethorne Met.



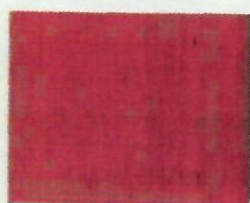
**44467**  
Dk. Persimmon Met.



**44471**  
Burnt Orange Met.



**44466**  
Lt. Persimmon Met.



**44458**  
Autumn Red Met.



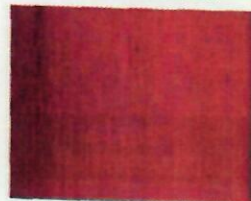
**H7926**  
Carmine Met.



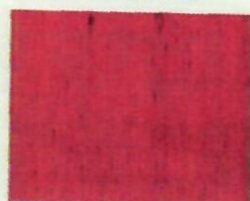
**44456**  
Dk. Burgundy Met.



**44457**  
Lt. Burgundy Met.



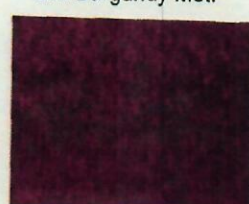
**43821**  
Red Bronze Met.



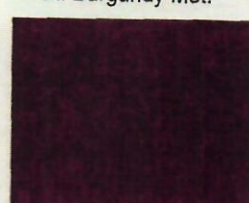
**5477**  
Dark Red Met.



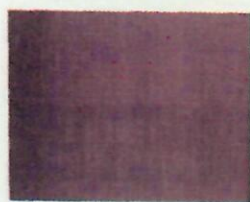
**45731**  
Regent Red Met.



**4490**  
Burgundy Met.



**44455**  
Lt. Maroon Met.



**44461**  
Lt. Rose Met.



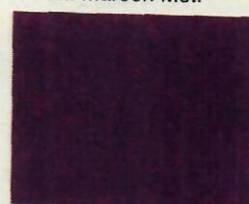
**44472**  
Lt. Rose Gray Met.



**44473**  
Dk. Rose Gray Met.



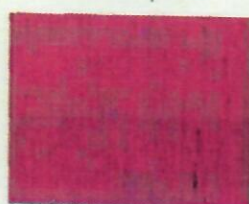
**44402**  
Red Met.



**44493**  
Dk. Violet Met.



**44465**  
Orchid Met.



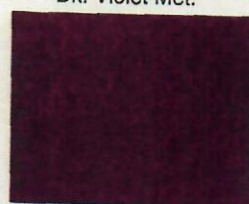
**44462**  
Med. Rose Met.



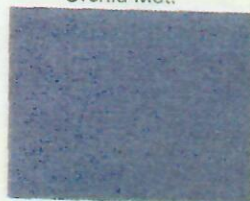
**44464**  
Berry Red Met.



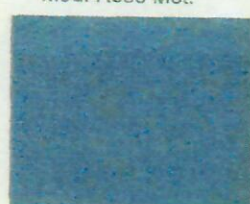
**44474**  
Wine Met.



**44463**  
Dk. Rose Met.



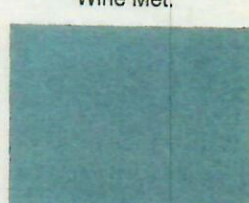
**44491**  
Lt. Violet Met.



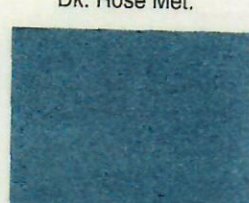
**5513**  
Diamond Blue Met.



**B8141**  
Lt. Blue Met.



**44436**  
Lt. Blue Met.



**44410**  
Seascape Blue Met.





**44717**  
Lt. Blue Met.



**B8103**  
Lt. Jadestone Met.



**44479**  
Med. Potomac Blue Met.



**44403**  
Teal Blue Met.



**44438**  
Lt. Continental Blue Met.



**G8124**  
Lt. Blue Met.



**4839**  
Med. Blue Met.



**44425**  
Med. Aqua Met.



**44409**  
Turquoise Met.



**43866**  
Turquoise Met.



**44442**  
Dk. Continental Blue Met.



**44482**  
Bay Blue Met.



**5535**  
Bright Blue Met.



**N8076**  
Lauderdale Blue Met.



**44431**  
Med. Concord Blue Met.



**44426**  
Bright Blue Met.



**45615**  
Regal Blue Met.



**7446**  
Mariner Blue Met.



**44429**  
Dk. Rich Blue Met.



**G8125**  
Sovereign Blue Met.



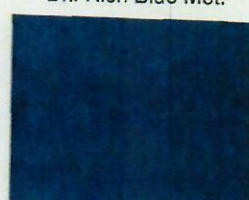
**44404**  
Biscayne Blue Met.



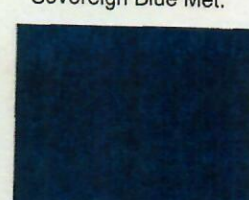
**44427**  
Lt. Rich Blue Met.



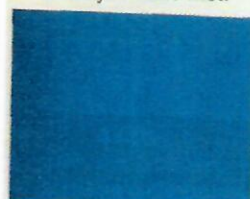
**G8067**  
Vivid Blue Met.



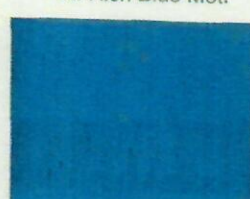
**44428**  
Med. Rich Blue Met.



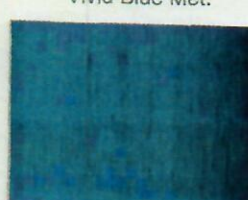
**G8064**  
Concord Blue Met.



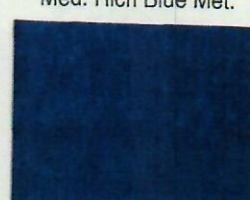
**H8061**  
Panama Blue Met.



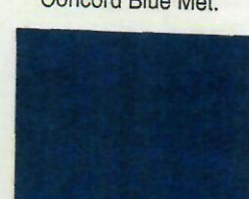
**44441**  
Dk. Aqua Met.



**44405**  
Dk. Blue Met.



**44481**  
Plum Met.



**44432**  
Lt. Concord Blue Met.



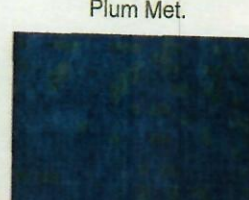
**5155**  
Blue Met.



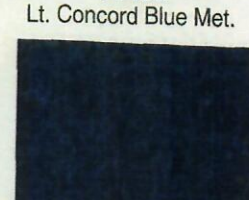
**45721**  
Ensign Blue Met.



**7870**  
Haze Blue Met.



**B8007**  
Midnight Blue Met.



**44430**  
Dk. Concord Blue Met.





**44437**  
Ice Blue Met.



**H7924**  
Sky Mist Blue Met.



**5056**  
Turquoise Met.



**44440**  
Lt. Aqua Met.



**44477**  
Pacific Blue Met.



**44439**  
Lt. Turquoise Met.



**43867**  
Turquoise Met.



**45024**  
Sea Sprite Green Met.



**44415**  
Bright Green Met.



**44417**  
Dark Ivy Met.



**44424**  
Lt. Lime Met.



**44421**  
Med. Lime Met.



**5055**  
Yellow Green Met.



**45803**  
Med. Green Met.



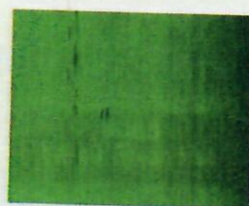
**29235**  
Green Met.



**44422**  
Lt. Olive Met.



**44416**  
Med. Ivy Met.



**44420**  
Med. Olive Met.



**G8068**  
Olive Green Met.



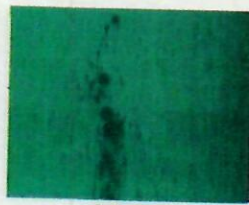
**44423**  
Dk. Olive Met.



**44406**  
Lt. Green Met.



**44407**  
Med. Green Met.



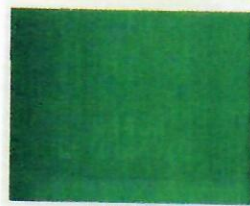
**14283**  
Jade Green Met.



**44414**  
Med. Jade Met.



**44413**  
Dk. Jade Green Met.



**10552**  
Glade Green Met.



**15394**  
Green Met.



**43517**  
April Green Met.



**H8070**  
Spruce Green Met.



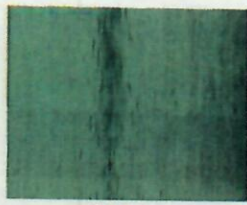
**44408**  
Dk. Green Met.



**45192**  
Dk. Green Met.



**44487**  
Alpine Green Met.



**44412**  
Midnight Green Met.



**H7925**  
Sherwood Green Met.



**C8068**  
Dark Pine Met.





**44484**  
Lt. Moss Green Met.



**44483**  
Dk. Moss Green Met.



**44418**  
Lt. Frost Green Met.



**44419**  
Dk. Frost Green Met.



**7274**  
Green Met.



**5537**  
Lime Gold Met.



**44485**  
Tropic Green Met.



**92654**  
Pearl Fawn Met.



**B8178**  
Heather Mist Met.



**44448**  
Med. Taupe Met.



**G7809**  
Gold Met.



**44411**  
Green Gold Met.



**43820**  
Spanish Gold Met.



**G8065**  
Gold Met.



**14814**  
Gold Met.



**44495**  
Saturn Gold Met.



**G8070**  
Gold Met.



**5242**  
Las Vegas Gold Met.



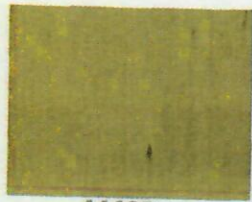
**44453**  
Sand Met.



**44447**  
Lt. Saddle Met.



**N8014**  
Med. Gold Met.



**44469**  
Med. Gold Met.



**44468**  
Brt. Yellow Gold Met.



**44450**  
Lt. Chestnut Met.



**43822**  
Bronze Met.



**H9135**  
Red Gold Met.



**G8066**  
Brown Met.



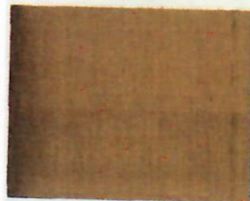
**5185**  
Dark Bronze Met.



**44454**  
Dk. Maroon Met.



**44475**  
Deep Maroon Met.



**44449**  
Dk. Chestnut Met.



**45785**  
Desert Gold Met.



**44444**  
Dk. Brown Met.



**44445**  
Lt. Brown Met.



**45189**  
Dk. Carmine Met.





## FOREST RIVER BUS, LLC

2367 CENTURY DRIVE ► GOSHEN, INDIANA 46528 ► 1.800.348.7440

October 10, 2022

To Whom It May Concern:

Forest River Bus, LLC, doing business as Champion Bus, affirms that the place of assembly is located at 2367 Century Drive, Goshen, Indiana.

The following activities take place at this location. All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, steel, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

Signed,

Mark LeRoy  
Government Contract Administrator



10.2.1 A list of five (5) users names, addresses, emails and telephone numbers who have been provided similar equipment

REFERENCE #1: Pennsylvania Department of General Services

Rohrer Bus Sales has held the state contract for Pennsylvania since 2007 and currently holds a contract. This contract contains shuttle bus products from 21' – 31' in length and includes Ford, Chevrolet and Freightliner chassis. This contract also includes wheelchair minivan conversions.

Contact: John Levitsky, Program Manager

Department of General Services

Bureau of Procurement

555 Walnut Street, 6th Floor Forum Place

Harrisburg, PA 17101

717-787-1206

[jlevitsky@pa.gov](mailto:jlevitsky@pa.gov)

REFERENCE #2: Federal Government's General Service Administration

For over ten years, Rohrer Bus Sales has provided Ford and Freightliner chassis to the Federal government. Our current contract is GS-30F-DA024 and is in process of being renewed for the 3rd of 4 option periods. The annual volume on this contract is generally in the 40-50 buses per year range

Contact: Craig D. Yokum, Contract Officer

U.S. General Services Administration/Federal Acquisition Service

Office of Travel, Transportation and Logistics

Light Vehicles Branch - QMAAA

1800 F Street, NW, 3rd Floor, Hub 3200

Washington, DC 20405

[craig.yokum@gsa.gov](mailto:craig.yokum@gsa.gov)

Phone 703-605-9291

Cell 571-748-8753

REFERENCE #3 – New Jersey Transit

Operates a fleet of 1000+ motorcoaches, heavy duty and medium duty paratransit fixed route buses, super duty fixed route and paratransit buses and MAV's.

Contact: Kimberley Murray, Senior Contract Specialist

New Jersey Transit

One Penn Plaza East

Newark, NJ 07105

973-491-7469

[KMurray@njtransit.com](mailto:KMurray@njtransit.com)

REFERENCE #4 - Harrisburg International Airport

For over twenty years, Rohrer Bus Sales has provided Ford and Chevrolet cutaways, Freightliner M2, rear engine and low floor buses to HIA.

Contact: Robert Gardner, Vehicle Maintenance Supervisor

513 Airport Drive

Middletown, PA 17057

717-948-3900

[bobg@saraa.org](mailto:bobg@saraa.org)

REFERENCE #5 - MOVTA

Contract history extends for multiple years - Rohrer Bus Sales combined with Andrew Clawson management experience has provided Ford F-550, E-350 and E-450 buses to MOVTA.

Contact: Michael Kesterson

Mid-Ohio Valley Transit Authority

520 Juliana Street

Parkersburg, WV 26101

304.422.4100



## The Defender S2C



### Quality, Style and Durability

The Defender S2C is sure to impress with its updated stylish standards, comfortable ride and rugged durability. Built on the heavy-duty Freightliner S2C diesel chassis, the Defender S2C offers the comfort, sophistication and room to move your most elite clientele while keeping affordability in mind. Standard 5/8" marine grade plywood flooring, stainless steel exterior screws and a fully undercoated chassis protects the bus from the most extreme conditions. With an abundance of options and layouts, the Defender S2C will exceed your customers' expectations.

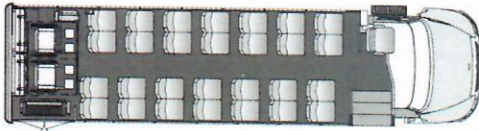


**CHAMPION®**

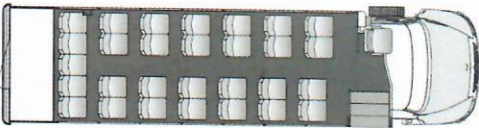
Meeting America's Transportation Needs  
One Customer at a Time



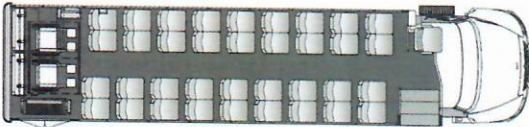
# The Defender S2C



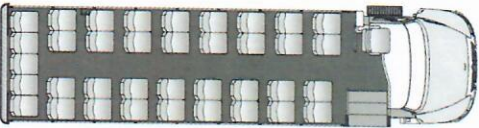
28 Passenger 2 Wheelchair  
2 Passenger Foldaway and 4 Passenger Flip Seats  
Plus Driver



29 Passenger with Rear Luggage Plus Driver



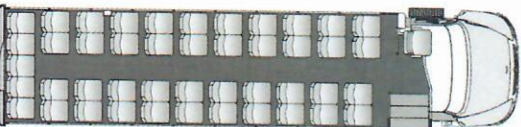
36 Passenger 2 Wheelchair  
2 Passenger Foldaway and 4 Passenger Flip Seats  
Plus Driver



37 Passenger Plus Driver



41 Passenger with Rear Luggage Plus Driver



45 Passenger Plus Driver

## Standard Exterior Feature Highlights

- Fully welded corrosion-preventative coated aluminized steel cage construction with laminated sidewall structure meeting all applicable FMVSS requirements
- "Starview" drivers visibility window in front of entry door
- Electric actuated passenger entry door with full length glass
- 36" wide x 36" high upper double T-Slider tempered safety glass windows with climate control tint
- Black powder coated steel rear bumper
- Rear mud flaps
- Molded wheel flares
- Pre-painted white galvanized steel sidewalls and skirts
- Fiberglass front and rear caps
- One-piece seamless FRP (fiberglass reinforced plastic) roof
- Breakaway rearview mirrors with built-in convex
- Sealed LED stop, tail, and turn signal lights with reverse lights
- Exterior LED front and rear marker lights

## Standard Interior Feature Highlights

- 93" and 99" interior width
- 96" and 102" exterior width
- 81" interior floor to ceiling height with standard floor
- Floor and wall seat track for flexible seating
- Black slip resistant Gerflor floor covering
- 5/8" marine tech plywood flooring
- Coved flooring to bottom of seat track
- Gray padded vinyl or cloth interior
- White step nosing at passenger door
- 1.25" left hand vertical passenger assist rail at entry door
- LED entry door step well lights
- LED driver and passenger area lighting
- FlexTech Electrical System
- Backup camera system with 7" monitor/rearview mirror combo
- Non-retractable seat belts

## Popular Option Highlights

- Stainless steel wheel inserts
- Luggage storage areas (overhead luggage racks with reading lights, interior luggage racks, rear storage area)
- Rear emergency door with window(s)
- Passenger area rear heat and air conditioning
- Passenger grab rails
- Audio and video systems
- Mid back or high back seating
- ADA and FMVSS compliant wheelchair lifts and securement systems
- Fiberglass side walls and skirts



**CHAMPION®**



A / D  
G

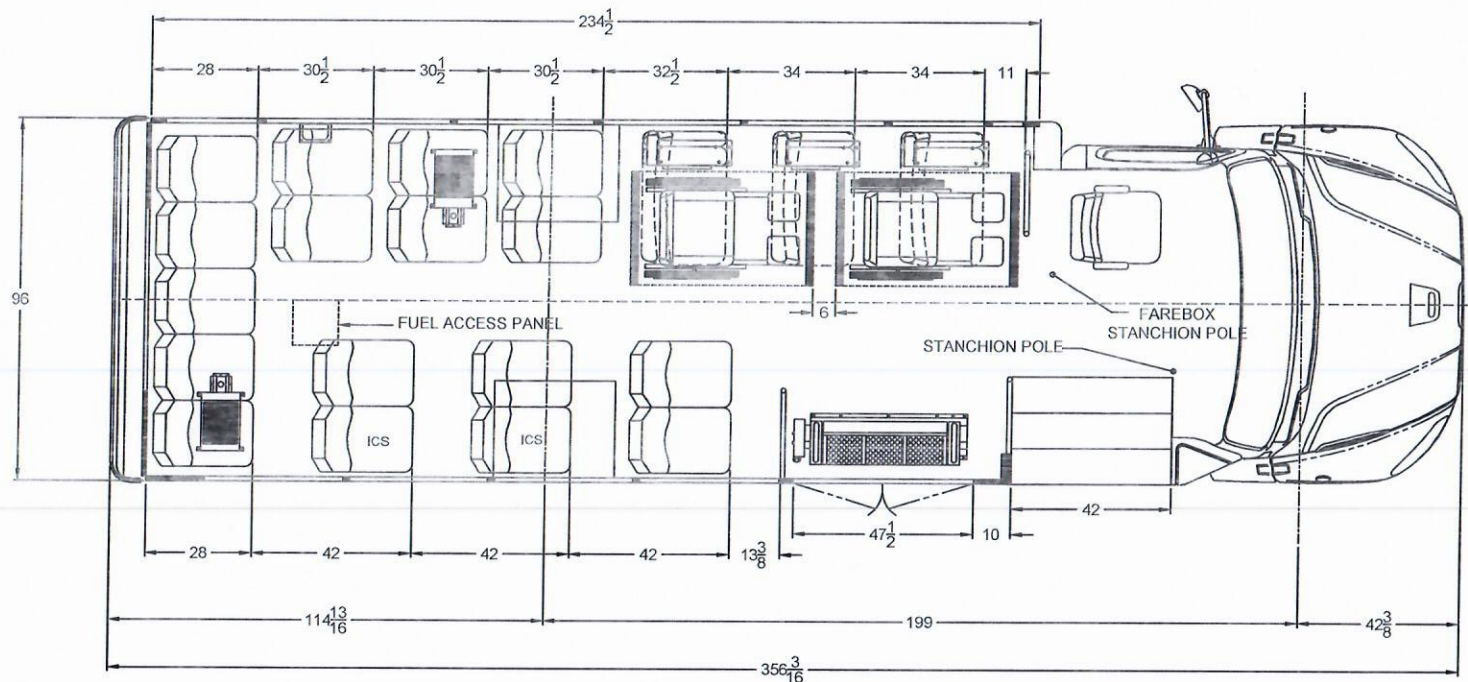
| DEFENDER FREIGHTLINER - 96" WIDE   |    |       |   |
|--|----|-------|---|
| Defender Freightliner 30 96" WIDE 199" WB Cummins 6.7L 240HP Allison 2200 PTS  | G  | TBD   | 1 |
| SPECIAL INSTRUCTIONS OR NOTES  |    |       |   |
| Wiring loomed and supported at least every 12" w/ insulated clamps   |    |       | 1 |
| All Exterior fasteners to be stainless steel   |    |       | 1 |
| Water test document is required to be placed in each vehicle   |    |       | 1 |
| SPECIAL BUILD ORDER  |    |       |   |
| Front End Alignment-Include Documentation in each vehicle  | ST | 99    | 1 |
| As-Built Parts Manual on Flash Drive   | ST | 99    | 1 |
| Skirt Mounted Storage Box. 20"W X 11.5"H X 18.75" D. Mount curbside just aft of wheelchair door. Non-locking latches. Store wheel chocks here. | ST | 99    | 1 |
| Wheel Chocks (Pair)  | ST | 99    | 1 |
| Angel Trax Vulcan 12 System with 6 cameras. 1TB Hardrive. SD card back up. DVR Mounted on Drivers Modesty Panel.                               | ST | 99    | 1 |
| Mud Flaps Around AC Condenser  | ST | 99    | 1 |
| WARRANTY   |    |       |   |
| Optional 3 Year / 36,000 Mile Limited Warranty   |    |       | 1 |
| ELECTRICAL SYSTEM  |    |       |   |
| Intermotive Flex Tech Electrical System  | 05 | STD   | 1 |
| SIDEWALL / REARWALL / CEILING  |    |       |   |
| Driver Area: Grey Padded Vinyl   | 05 | STD   | 1 |
| FRP on Ceiling, Grey   | 05 | 22000 | 1 |
| FRP on Rearwall & Side Walls, Grey   | 05 | 99    | 1 |
| Cove Flooring on Sidewall to Seat Track  | 05 | STD   | 1 |
| FLOORING   |    |       |   |
| Aisle: Gerflor Sirius #6801 Graphite (Black)   | 05 | STD   | 1 |
| Under Seats: Gerflor Sirius #6801 Graphite (Black)   | 05 | STD   | 1 |
| Fuel Tank Access Plate In Floor - N/A ALL APPLICATIONS - CHECK AVAILABILITY  | 05 | 22020 | 1 |
| GerFlor Aluminum Step Nosing with Yellow Insert (PN: E049001)  | ST | 99    | 4 |
| 3/4" Marine Grade Plywood ILO Standard Plywood   | ST | 99    | 1 |
| EXTERIOR   |    |       |   |
| ALL FIBERGLASS/COMPOSITE EXTERIOR  | 05 | 22385 | 1 |
| Paint Skirt 28' - 32' MODEL BUS (LIST PAINT COLOR BELOW)   | 05 | 22022 | 1 |
| PAINT CODE & COLOR: TBD  |    |       | 1 |
| Clear Reflective 1" Tape below windows on each side & encircling one egress window on each side & the rear egress window.                      |    |       |   |
| Black Rubber Rub Rails ILO standard White Rub Rail (BOTH SIDES)  | ST | 99    | 1 |
|  | ST | 99    | 1 |
| CHASSIS  |    |       |   |
| Galvanized Belly Metal   | 05 | 22032 | 1 |
| Heated /Remote Exterior Mirrors Accustyle 8x15 Head (Pair)   | 05 | 22363 | 1 |
| Romeo Rim Rear Bumper  | 05 | 22034 | 1 |
| Valve Stem Extender Inner Dual Rear Wheel, pair  | 05 | 22040 | 1 |
| TRANS/AIR FREIGHTLINER 6.7L OPTIONS ***  |    |       |   |
| ALL CHASSIS ORDERED WITH OEM A/C ONLY  |    |       |   |
| TA777132 Dual Super 10 & 15 (135K BTU) TA77 & TA71 EVAP, SMC3L & SMC2S COND, 10 CID & 15 CID COMP, 6.7L DIESEL                                 | ST | 99    | 1 |
| HEATERS  |    |       |   |
| Hot Water Heater, 65K BTU - Floor Mounted  | 05 | 20083 | 2 |
| MISCELLANEOUS  |    |       |   |
| Heater Booster Pump - does not include electric valves   | 05 | 8677  | 1 |
| Defroster Fan - Mount Location: one blowing across entrance door and 2nd blowing across dash   | 05 | 20092 | 2 |
| ELECTRICAL   |    |       |   |
| Circuit Breakers in lieu of Fuses  | 05 | 22093 | 1 |
| ADA Compliant Stop Request Dual Display Sign, Dual Chime Tone, Pull Cord-Requires Touch Tape   | 05 | 22095 | 1 |
| Touch Tape for ADA Stop Request -Each - Requires ADA Stop Request System   | 05 | 22096 | 2 |
| Digital Clock, 12 volt, in driver overhead   | 05 | 22099 | 1 |
| PRE-WIRE BATTERY HOT & GROUND TO DRIVER MOD PANEL AREA FOR FUTURE FAREBOX  | ST | 99    | 1 |
| LIGHT MOUNTED IN ENGINE COMPARTMENT  | ST | 99    | 1 |
| ENTRY DOOR BATTERY HOT   |    | NOTE  | 1 |
| DESTINATION SIGNS/I.D. SIGN/FRONT VIEW WINDOW  |    |       |   |
| Transign LD12112 Front LED Sign 12x112 Display w/OCU   | 05 | 20122 | 1 |
| Transign LD1280 Side LED Sign 12x80 Display-Requires Front Sign  | 05 | 20123 | 1 |
| FRONT SIGN BRACKET NEEDS TO BE SECURED TOP AND BOTTOM  | ST | 99    | 1 |
| EXTERIOR LIGHTS  |    |       |   |
| Surface Mount LED Entry Door Exterior Light - STD Choose Optional Below or Special builds  | 05 | STD   | 1 |
| Turn Signals Flash With Open Door  | 05 | 20135 | 1 |
| LED Rear Center Mount Brake Light, Rectangular   | 05 | 20136 | 1 |
| LED Mid-Ship Turn / Marker Lights  | 05 | 20138 | 1 |
| Independent RED Brake & AMBER Turn Signal Lights (per NJ specs)  | 05 | 20139 | 1 |
| Safe-Fleet Model 848 Low Profile Strobe Light with Branch Guard-AMBER  | ST | 99    | 1 |
| Fog Lights AMBER (Maxxima PN: MFL-200SY) Pair  | ST | 99    | 1 |



| INTERIOR LIGHTS  |    |       |   |
|--|----|-------|---|
| Additional Interior Lights (LED If Option Selected) Each   | 05 | 8041  | 4 |
| Door Activated Interior Lights   | 05 | 8810  | 1 |
| AUDIO / VISUAL   |    |       |   |
| Additional Speaker(s), Each  | 05 | 20157 | 3 |
| Ground Plane for 2-Way Radio, Pull Cord, Conduit Terminates B Pillar Floor   | 05 | 20160 | 1 |
| External Speaker With ON/OFF Switch (each)   | 05 | 20162 | 1 |
| REI Radio w/ PA System & Gooseneck Mic w/Foot Switch & 4 Speakers (INCLUDES VR-5650 AM/FM/CD/ BT PA READY, 750248 GOOSENECK MIC W/FOOT SWITCH, 512202 HARNESS 15") | ST | 99    | 1 |
| 6 speakers in Passenger Cabin & One Speaker in Driver Area   |    | NOTE  | 1 |
| DOORS / HATCH / WINDOWS  |    |       |   |
| Required: please select one passenger door option.   |    |       |   |
| Passenger Door Electric (Standard)   | 05 | STD   | 1 |
| Passenger Door 42" *** Choose either Electric, Air, or Manual Above  | 05 | 20166 | 1 |
| Exterior Passenger Entrance Door Key   | 05 | 8133  | 1 |
| Roof Hatch - Transpec 1070 Series Dual Purpose Safety Vent II  | 05 | 20179 | 2 |
| LUGGAGE RACK / STORAGE   |    |       |   |
| Driver Storage in Cab Overhead   | 05 | 20191 | 1 |
| PARATRANSIT OPTIONS  |    |       |   |
| Double W.C. Doors w/ Windows, LED Interior Lights, Leaf Spring, LED Exterior Lighting  | 05 | 20206 | 1 |
| 4" Grommet Mount LED is STD. Use Special Builds for Optional Choices   |    |       | 1 |
| IS THE LIFT IN THE FRONT OR REAR OF THE UNIT?  |    | FRONT | 1 |
| BRAUN LIFTS  |    |       |   |
| Braun Century NCL 1000 3454HB-2 1000# Lift (34"x54")   | 05 | 20230 | 1 |
| LIFT INTERLOCK   |    |       |   |
| Fast Idle w/Interlock - Intermotive GTWY805-F-P2 Freightliner  | 05 | 20233 | 1 |
| Q Straint W.C. Securement Kits, Accessories  |    |       |   |
| Q-8101-L DeLuxe Retrctr Tie Down, Q8-6326-A1 Comb Lap/Shldr, L Trk   | 05 | 8003  | 2 |
| Q5-7580-4 18" Blue Webbing Loops   | 05 | 20250 | 8 |
| Q Straint Belt Storage Pouch   | 05 | 8102  | 2 |
| Q-Straint Belt Cutter (ship loose)   | 05 | 8179  | 1 |
| Miscellaneous Accessories  |    |       |   |
| Priority Seating Sign **Required for ADA Compliance**  | 05 | 8104  | 2 |
| Wheelchair Decal (International Symbol of Accessibility) Each  | 05 | 8105  | 1 |
| Q'STRAIN CLEAR ANODIZED L-TRACK ILO STANDARD (PER EACH WC POSITION)  | ST | 99    | 2 |
| SAFETY OPTIONS   |    |       |   |
| 5 Lb Fire Extinguisher   | 05 | 8089  | 1 |
| Emergency Triangle Kit   | 05 | 8091  | 1 |
| Back-Up Alarm SAE Type C 97 db(A)  | 05 | 20267 | 1 |
| STANDARD ROSCO STSK4750 BACK-UP CAMERA SYSTEM W/ 7" REARVIEW MONITOR / MIRROR COMBO  | 05 | STD   | 1 |
| Interior Flat Mirror, 6" x 16" N/A/ ON DUAL DOOR CHASSIS   | 05 | 20277 | 1 |
| Wide Angle Lens 11"x14", Fresnel   | 05 | 20278 | 1 |
| Red Light Over Emergency Exit Ea: ON: ALL EGRESS WINDOWS   | 05 | 8155  | 5 |
| "NO SMOKING" Sign  | 05 | 20282 | 1 |
| Yellow "Standee" Line  | 05 | 8802  | 1 |
| Decal - Vehicle Height   | 05 | 20289 | 1 |
| American Safety First Aid Kit #0122-LOG  | ST | 99    | 1 |
| American Safety Body Fluid Clean-up Kit #2701  | ST | 99    | 1 |
| American Safety Mylar Blanket #2466  | ST | 99    | 2 |
| American Safety Wool Fire Blanket #2460  | ST | 99    | 1 |
| American Safety Reflective Safety Vest   | ST | 99    | 1 |
| INTERIOR DECALS:   | ST | 99    | 1 |
| "All passengers are required to wear a seat belt when vehicle is in motion"  | ST | 99    | 1 |
| "Emergency Dial 911"   | ST | 99    | 1 |
| "Emergency Equipment"  | ST | 99    | 1 |
| EXTERIOR DECALS: Letters 1.25" high. Red background. White letters   |    |       | 1 |
| "This vehicle makes frequent stops"  | ST | 99    | 1 |
| "CAUTION: LOADING AND UNLOADING PASSENGERS"  | ST | 99    | 1 |
| "THIS VEHICLE STOPS AT RAILROAD CROSSINGS"   | ST | 99    | 1 |
| "CAUTION: STAND CLEAR OF THE LIFT"   | ST | 99    | 1 |
| DECAL: WATCH YOUR STEP (YELLOW BACKGROUND WITH BLACK LETTERS) w/BACKER   | ST | 99    | 2 |
| EXTRA RED DOT REFLECTOR STICKERS (SHIP LOOSE)  | ST | 99    | 2 |
| EXTRA AMBER DOT REFLECTOR STICKERS (SHIP LOOSE)  | ST | 99    | 2 |
| GRAB RAIL / STANCHION / PANELS   |    |       |   |
| Ceiling Grab Rail - Install on Both Sides  | 05 | 99    | 1 |
| Left Hand Entry Vertical Grab Rail - 1 1/4"  |    | STD   | 1 |
| 1 1/4" Grab Rail Parallel to Entrance Steps (both sides)   | 05 | 8130  | 1 |
| Stanchion and Modesty Panel at Entry Door  |    | STD   | 1 |
| Stanchion and Modesty Panel Behind Driver  | 05 | 20301 | 1 |
| Padding on Stanchion - Gray  | 05 | 20304 | 4 |
| PAD VERTICAL STANCHIONS AT LIFT, ENTRY & DRIVER MODESTY PANELS   |    | NOTE  | 1 |



|   |        |       |      |      |
|---|--------|-------|------|------|
| Modesty Panel at Wheelchair Lift (extend from floor to ceiling)   | 05     | 20306 |      | 1    |
| Add Tinted Plexiglass Upper Panel   | 05     | 8146  |      | 1    |
| Additional vertical floor to bulkhead stanchion at top right of entrance steps  | ST     | 99    |      | 1    |
| CANE STYLE STANCHION ATTACHED TO DRIVER MODESTY PANEL FOR FUTURE FAREBOX  | ST     | 99    |      | 1    |
| <b>SEATING - DRIVER</b>   |        |       |      |      |
| <b>FREIGHTLINER DRIVER SEATING</b>  |        |       |      |      |
| OEM Driver's Seat - National 2000 SRS Air Suspension - High Back, Black Cloth, 3-Point Lap & Shoulder Belt, RH Armrest - Ordered On Chassis |        |       | NOTE | 1    |
| <b>SEATING - PASSENGER</b>  |        |       |      |      |
| <b>STD RIGID SEATS</b>  |        |       |      |      |
| High Back Double Seat   | 05     | 8065  |      | 2    |
| High Back Single Seat   | 05     | 8066  |      | 1    |
| Mid High Double Seat  | 05     | 8067  |      | 4    |
| <b>FOLDAWAY SEATS</b>   |        |       |      |      |
| Foldaway Seat - Mid-High Notch Back Double AM (non-wheelwell)   | 05     | 2336  |      | 3    |
| <b>ICS &amp; 3POINT SEATS **REQUIRES WEIGHT ANALYSIS FOR APPROVAL**</b>   |        |       |      |      |
| Double Seat with (1) Integrated Child Seat and (1) Mid High Back 2nd Seat   | 05     | 2331  |      | 2    |
| <b>PASSENGER SEAT FABRICS</b>   |        |       |      |      |
| <b>EUROPEAN OR AMERICAN WOOL QUOTED AT TIME OF ORDER!!!!</b>  |        |       |      |      |
| Seat Cover - Level 4 Ice Pinstripe; Mor-Care; Leathermate   | 05     | 2074  |      | 23   |
| <b>SEAT OPTIONS</b>   |        |       |      |      |
| ABS Seat Backs Per Person (Mid-High and Notchback Folds Only)   | 05     | 2664  |      | 16   |
| Anti-Vandal Grab Handle, Black Ea on:   | 05     | 2311  |      | 18   |
| Black US Armrest - Each - on:   | 05     | 2077  |      | 9    |
| Docket 90 Fabric Wrapped Around Seat Cushion, Including Bottom (each)   | 05     | 2883  |      | 23   |
| <b>FREEDMAN SEATING SPECIAL BUILD OPTIONS</b>   |        |       |      |      |
| ABS seat backs on all seats except rear row & ICS Seats   | ST     | 99    |      | 1    |
| High-Back Seats in Rear Row   | ST     | 99    |      | 1    |
| 27" Hip to Knee minimum   | ST     | 99    |      | 1    |
| <b>SEAT BELTS</b>   |        |       |      |      |
| Seat Belt, Freedman USR Retractable (Per Person)  | 05     | 2282  |      | 23   |
| <b>MISCELLANEOUS</b>  |        |       |      |      |
| CHAMPION DISCOUNT   |        |       |      | 1    |
| <b>CONVERSION ONLY PRICE TOTAL</b>  |        |       |      |      |
| <b>NET CHASSIS PRICE (SHOW ALL DISCOUNTS AT TOP)</b>  |        |       |      |      |
| FREIGHT CHARGE  | MILES: | 385   | ST   | 1.86 |
| CHASSIS HANDLING FEE  |        |       |      | 1    |
| TOTAL   |        |       |      | 170  |



NOTE: SHOWN WITH MID HI FREEDMAN SEATS  
 FREIGHTLINER CHASSIS 96" WIDE  
 25,850 GVWR  
 THIS FLOOR PLAN IS FOR ILLUSTRATION PURPOSES ONLY.  
 A WEIGHT ANALYSIS HAS NOT YET BEEN PERFORMED.  
 FINAL APPROVAL WITH A WEIGHT ANALYSIS IS REQUIRED UPON RECEIPT OF A  
 COMPLETED ORDER WITH ALL OPTIONS SHOWN.  
 OPTIONAL EQUIPMENT MAY BE SHOWN.  
 THE SALES ORDER PLACED DICTATES ACTUAL OPTION CONTENT.

## DEALER APPROVAL

☐ APPROVED

CUSTOMER SIGNATURE

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REV.  
LET.

DESCRIPTION OF CHANGE

BY

CHK

DATE

ECN No.

TOLERANCE UNLESS  
OTHERWISE SPECIFIED

WOOD OTHER

+ 1/8" + 1/16"

+ 1° + 1/2°



FOREST RIVER BUS

TITLE:

17 2 WC 199" WB 235" BDY  
MODEL 30

NAME: CR

DATE: 10/10/22

DWG. No. 17 2 WC 3 DB FOLDS 199 WB 235 BDY FRB

SCALE  
IN INCHES





B/E

| DEFENDER FREIGHTLINER - 96" WIDE   |    |             |  |   |
|--|----|-------------|--|---|
| Freightliner S/2 25,850 GVWR - Air Suspension - Hydraulic Brakes   |    |             |  | 1 |
| Defender Freightliner 32 96" WIDE 238" WB Cummins 6.7L 240HP Allison 2200 PTS  | CH | 1036        |  | 1 |
| SPECIAL INSTRUCTIONS OR NOTES  |    |             |  |   |
| Wiring loomed and supported at least every 12" w/ insulated clamps   |    |             |  | 1 |
| All Exterior fasteners to be stainless steel   |    |             |  | 1 |
| Water test document is required to be placed in each vehicle   |    |             |  | 1 |
| SPECIAL BUILD ORDER  |    |             |  |   |
| Front End Alignment-Include Documentation in each vehicle  | ST | 99          |  | 1 |
| As-Built Parts Manual on Flash Drive   | ST | 99          |  | 1 |
| Skirt Mounted Storage Box. 20"W X 11.5"H X 18.75" D. Mount curbside just aft of wheelchair door. Non-locking latches. Store wheel chocks here. | ST | 99          |  | 1 |
| Wheel Chocks (Pair)  | ST | 99          |  | 1 |
| Angel Trax Vulcan 12 System with 6 cameras. 1TB Harddrive. SD card back up. DVR Mounted on Drivers Modesty Panel.                              | ST | 99          |  | 1 |
| Mud Flaps Around AC Condenser  | ST | 99          |  | 1 |
| WARRANTY   |    |             |  |   |
| Optional 3 Year / 36,000 Mile Limited Warranty   | 05 | 99          |  | 1 |
| ELECTRICAL SYSTEM  |    |             |  |   |
| Intermotive Flex Tech Electrical System  | 05 | STD         |  | 1 |
| SIDEWALL / REARWALL / CEILING  |    |             |  |   |
| Driver Area: Grey Padded Vinyl   | 05 | STD         |  | 1 |
| FRP on Ceiling, Grey   | 05 | 22000       |  | 1 |
| FRP on Rearwall & Side Walls, Grey   | 05 | 99          |  | 1 |
| Cove Flooring on Sidewall to Seat Track  | 05 | STD         |  | 1 |
| FLOORING   |    |             |  |   |
| Aisle: Gerflor Sirius #6801 Graphite (Black)   | 05 | STD         |  | 1 |
| Under Seats: Gerflor Sirius #6801 Graphite (Black)   | 05 | STD         |  | 1 |
| Fuel Tank Access Plate In Floor - <b>N/A ALL APPLICATIONS - CHECK AVAILABILITY</b>   | 05 | 22020       |  | 1 |
| GerFlor Aluminum Step Nosing with Yellow Insert (PN: E049001)  | ST | 99          |  | 4 |
| 3/4" Marine Grade Plywood ILO Standard Plywood   | ST | 99          |  | 1 |
| EXTERIOR   |    |             |  |   |
| ALL FIBERGLASS/COMPOSITE EXTERIOR  | 05 | 22385       |  | 1 |
| Paint Skirt 28' - 32' MODEL BUS (LIST PAINT COLOR BELOW)   | 05 | 22022       |  | 1 |
| PAIN CODE & COLOR: <b>TBD</b>  |    |             |  | 1 |
| Clear Reflective 1" Tape below windows on each side & encircling one egress window on each side & the rear egress window.                      |    |             |  |   |
| Black Rubber Rub Rails ILO standard White Rub Rail (BOTH SIDES)  | ST | 99          |  | 1 |
| CHASSIS  |    |             |  |   |
| Galvanized Belly Metal   | 05 | 22032       |  | 1 |
| Heated /Remote Exterior Mirrors Accustyle 8x15 Head (Pair)   | 05 | 22363       |  | 1 |
| Romeo Rim Rear Bumper  | 05 | 22034       |  | 1 |
| Valve Stem Extender Inner Dual Rear Wheel, pair  | 05 | 22040       |  | 1 |
| TRANS/AIR FREIGHTLINER 6.7L OPTIONS ***  |    |             |  |   |
| ALL CHASSIS ORDERED WITH OEM A/C ONLY  |    |             |  |   |
| TA777132 Dual Super 10 & 15 (135K BTU) TA77 & TA71 EVAP, SMC3L & SMC2S COND, 10 CID & 15 CID COMP, 6.7L DIESEL                                 | ST | 99          |  | 1 |
| HEATERS  |    |             |  |   |
| Hot Water Heater, 65K BTU - Floor Mounted  | 05 | 20083       |  | 2 |
| MISCELLANEOUS  |    |             |  |   |
| Heater Booster Pump - does not include electric valves   | 05 | 8677        |  | 1 |
| Defroster Fan - Mount Location: <b>one blowing across entrance door and 2nd blowing across dash</b>  | 05 | 20092       |  | 2 |
| ELECTRICAL   |    |             |  |   |
| Circuit Breakers in lieu of Fuses  | 05 | 22093       |  | 1 |
| ADA Compliant Stop Request Dual Display Sign, Dual Chime Tone, Pull Cord-Requires Touch Tape   | 05 | 22095       |  | 1 |
| Touch Tape for ADA Stop Request -Each - Requires ADA Stop Request System   | 05 | 22096       |  | 2 |
| Digital Clock, 12 volt, in driver overhead   | 05 | 22099       |  | 1 |
| <b>PRE-WIRE BATTERY HOT &amp; GROUND TO DRIVER MOD PANEL AREA FOR FUTURE FAREBOX</b>   | ST | 99          |  | 1 |
| <b>LIGHT MOUNTED IN ENGINE COMPARTMENT</b>   | ST | 99          |  | 1 |
| <b>ENTRY DOOR BATTERY HOT</b>  |    | <b>NOTE</b> |  | 1 |
| DESTINATION SIGNS/I.D. SIGN/FRONT VIEW WINDOW  |    |             |  |   |
| Transign LD12112 Front LED Sign 12x112 Display w/OCU   | 05 | 20122       |  | 1 |
| Transign LD1280 Side LED Sign 12x80 Display-Requires Front Sign  | 05 | 20123       |  | 1 |
| <b>FRONT SIGN BRACKET NEEDS TO BE SECURED TOP AND BOTTOM</b>   | ST | 99          |  | 1 |
| EXTERIOR LIGHTS  |    |             |  |   |
| Surface Mount LED Entry Door Exterior Light - STD Choose Optional Below or Special builds  | 05 | STD         |  | 1 |
| Turn Signals Flash With Open Door <b>WC LIFT</b>   | 05 | 20135       |  | 1 |
| LED Rear Center Mount Brake Light, Rectangular   | 05 | 20136       |  | 1 |
| LED Mid-Ship Turn / Marker Lights <b>REQUIRED 30' AND LONGER</b>   | 05 | 20138       |  | 1 |
| Independent RED Brake & AMBER Turn Signal Lights (per NJ specs)  | 05 | 20139       |  | 1 |
| <b>Safe-Fleet Model 848 Low Profile Strobe Light with Branch Guard-AMBER</b>   | ST | 99          |  | 1 |
| <b>Fog Lights AMBER (Maxxima PN: MFL-200SY) Pair</b>   | ST | 99          |  | 1 |



| INTERIOR LIGHTS  |    |       |   |
|--|----|-------|---|
| Additional Interior Lights (LED If Option Selected) Each   | 05 | 8041  | 4 |
| Door Activated Interior Lights   | 05 | 8810  | 1 |
| AUDIO / VISUAL   |    |       |   |
| Additional Speaker(s), Each  | 05 | 20157 | 3 |
| Ground Plane for 2-Way Radio, Pull Cord, Conduit Terminates B Pillar Floor   | 05 | 20160 | 1 |
| External Speaker With ON/OFF Switch (each)   | 05 | 20162 | 1 |
| REI Radio w/ PA System & Gooseneck Mic w/Foot Switch & 4 Speakers (INCLUDES VR-5650 AM/FM/CD/ BT PA READY, 750248 GOOSENECK MIC W/FOOT SWITCH, 512202 HARNESS 15") | ST | 99    | 1 |
| 6 speakers in Passenger Cabin & One Speaker in Driver Area   |    | NOTE  | 1 |
| DOORS / HATCH / WINDOWS  |    |       |   |
| Required: please select one passenger door option.   |    |       |   |
| Passenger Door Electric (Standard)   | 05 | STD   | 1 |
| Passenger Door 42" *** Choose either Electric, Air, or Manual Above  | 05 | 20166 | 1 |
| Exterior Passenger Entrance Door Key   | 05 | 8133  | 1 |
| Roof Hatch - Transpec 1070 Series Dual Purpose Safety Vent II  | 05 | 20179 | 2 |
| LUGGAGE RACK / STORAGE   |    |       |   |
| Driver Storage in Cab Overhead   | 05 | 20191 | 1 |
| PARATRANSIT OPTIONS  |    |       |   |
| Double W.C. Doors w/ Windows, LED Interior Lights, Leaf Spring, LED Exterior Lighting  | 05 | 20206 | 1 |
| 4" Grommet Mount LED is STD. Use Special Builds for Optional Choices   |    |       | 1 |
| IS THE LIFT IN THE FRONT OR REAR OF THE UNIT?  |    | FRONT | 1 |
| BRAUN LIFTS  |    |       |   |
| Braun Century NCL 1000 3454HB-2 1000# Lift (34"x54")   | 05 | 20230 | 1 |
| LIFT INTERLOCK   |    |       |   |
| Fast Idle w/Interlock - Intermotive GTWY805-F-P2 Freightliner  | 05 | 20233 | 1 |
| Q Straint W.C. Securement Kits, Accessories  |    |       |   |
| Q-8101-L DeLuxe Retrctr Tie Down, Q8-6326-A1 Comb Lap/Shldr, L Trk   | 05 | 8003  | 2 |
| Q5-7580-4 18" Blue Webbing Loops   | 05 | 20250 | 8 |
| Q Straint Belt Storage Pouch   | 05 | 8102  | 2 |
| Q-Straint Belt Cutter (ship loose)   | 05 | 8179  | 1 |
| Miscellaneous Accessories  |    |       |   |
| Priority Seating Sign **Required for ADA Compliance**  | 05 | 8104  | 2 |
| Wheelchair Decal (International Symbol of Accessibility) Each  | 05 | 8105  | 1 |
| Q'STRAIN CLEAR ANODIZED L-TRACK ILO STANDARD (PER EACH WC POSITION)  | ST | 99    | 2 |
| SAFETY OPTIONS   |    |       |   |
| 5 Lb Fire Extinguisher   | 05 | 8089  | 1 |
| Emergency Triangle Kit   | 05 | 8091  | 1 |
| Back-Up Alarm SAE Type C 97 db(A)  | 05 | 20267 | 1 |
| STANDARD ROSCO STSK4750 BACK-UP CAMERA SYSTEM W/ 7" REARVIEW MONITOR / MIRROR COMBO  | 05 | STD   | 1 |
| Interior Flat Mirror, 6" x 16" N/A/ ON DUAL DOOR CHASSIS   | 05 | 20277 | 1 |
| Wide Angle Lens 11"x14", Fresnel   | 05 | 20278 | 1 |
| Red Light Over Emergency Exit Ea: ON: ALL EGRESS WINDOWS   | 05 | 8155  | 5 |
| "NO SMOKING" Sign  | 05 | 20282 | 1 |
| Yellow "Standee" Line  | 05 | 8802  | 1 |
| Decal - Vehicle Height   | 05 | 20289 | 1 |
| American Safety First Aid Kit #0122-LOG  | ST | 99    | 1 |
| American Safety Body Fluid Clean-up Kit #2701  | ST | 99    | 1 |
| American Safety Mylar Blanket #2466  | ST | 99    | 2 |
| American Safety Wool Fire Blanket #2460  | ST | 99    | 1 |
| American Safety Reflective Safety Vest   | ST | 99    | 1 |
| INTERIOR DECALS:   |    |       |   |
| "All passengers are required to wear a seat belt when vehicle is in motion"  | ST | 99    | 1 |
| "Emergency Dial 911"   | ST | 99    | 1 |
| "Emergency Equipment"  | ST | 99    | 1 |
| EXTERIOR DECALS: Letters 1.25" high. Red background. White letters   |    |       |   |
| "This vehicle makes frequent stops"  | ST | 99    | 1 |
| "CAUTION: LOADING AND UNLOADING PASSENGERS"  | ST | 99    | 1 |
| "THIS VEHICLE STOPS AT RAILROAD CROSSINGS"   | ST | 99    | 1 |
| "CAUTION: STAND CLEAR OF THE LIFT"   | ST | 99    | 1 |
| DECAL: WATCH YOUR STEP (YELLOW BACKGROUND WITH BLACK LETTERS) w/BACKER   | ST | 99    | 2 |
| EXTRA RED DOT REFLECTOR STICKERS (SHIP LOOSE)  | ST | 99    | 2 |
| EXTRA AMBER DOT REFLECTOR STICKERS (SHIP LOOSE)  | ST | 99    | 2 |
| GRAB RAIL / STANCHION / PANELS   |    |       |   |
| Ceiling Grab Rail - Install on Both Sides  | 05 | 99    | 1 |
| Left Hand Entry Vertical Grab Rail - 1 1/4"  |    | STD   | 1 |
| 1 1/4" Grab Rail Parallel to Entrance Steps (both sides)   | 05 | 8130  | 1 |
| Stanchion and Modesty Panel at Entry Door  |    | STD   | 1 |
| Stanchion and Modesty Panel Behind Driver  | 05 | 20301 | 1 |
| Padding on Stanchion - Gray  | 05 | 20304 | 4 |
| PAD VERTICAL STANCHIONS AT LIFT, ENTRY & DRIVER MODESTY PANELS   |    | NOTE  | 1 |
| Modesty Panel at Wheelchair Lift (extend from floor to ceiling)  | 05 | 20306 | 1 |
| Add Tinted Plexiglass Upper Panel LOCATION: DRIVER   | 05 | 8146  | 1 |
| Additional vertical floor to bulkhead stanchion at top right of entrance steps   | ST | 99    | 1 |
| CANE STYLE STANCHION ATTACHED TO DRIVER MODESTY PANEL FOR FUTURE FAREBOX   | ST | 99    | 1 |



| SEATING - DRIVER  |    |      |  |     |
|---|----|------|--|-----|
| FREIGHTLINER DRIVER SEATING   |    |      |  |     |
| OEM Driver's Seat - National 2000 SRS Air Suspension - High Back, Black Cloth, 3-Point Lap & Shoulder Belt, RH Armrest - Ordered On Chassis |    | NOTE |  | 1   |
| SEATING - PASSENGER   |    |      |  |     |
| STD RIGID SEATS   |    |      |  |     |
| High Back Double Seat   | 05 | 8065 |  | 2   |
| High Back Single Seat   | 05 | 8066 |  | 1   |
| Mid High Double Seat  | 05 | 8067 |  | 6   |
| FOLDAWAY SEATS  |    |      |  |     |
| Foldaway Seat - Mid-High Notch Back Double AM (non-wheelwell)   | 05 | 2336 |  | 3   |
| ICS & 3POINT SEATS **REQUIRES WEIGHT ANALYSIS FOR APPROVAL**  |    |      |  |     |
| Double Seat with (1) Integrated Child Seat and (1) Mid High Back 2nd Seat   | 05 | 2331 |  | 2   |
| PASSENGER SEAT FABRICS  |    |      |  |     |
| EUROPEAN OR AMERICAN WOOL QUOTED AT TIME OF ORDER!!!!   |    |      |  |     |
| Seat Cover - Level 4 Ice Pinstripe; Mor-Care; Leathermate   | 05 | 2074 |  | 27  |
| SEAT OPTIONS  |    |      |  |     |
| ABS Seat Backs Per Person (Mid-High and Notchback Folds Only)   | 05 | 2664 |  | 20  |
| Anti-Vandal Grab Handle, Black Ea on: all seats except rear row   | 05 | 2311 |  | 22  |
| Black US Armrest - Each - on: aisle seats   | 05 | 2077 |  | 11  |
| Docket 90 Fabric Wrapped Around Seat Cushion, Including Bottom (each)   | 05 | 2883 |  | 27  |
| FREEDMAN SEATING SPECIAL BUILD OPTIONS  |    |      |  |     |
| ABS seat backs on all seats except rear row & ICS Seats   | ST | 99   |  | 1   |
| High-Back Seats in Rear Row   | ST | 99   |  | 1   |
| 27" Hip to Knee minimum   | ST | 99   |  | 1   |
| SEAT BELTS  |    |      |  |     |
| Seat Belt, Freedman USR Retractable (Per Person)  | 05 | 2282 |  | 27  |
| MISCELLANEOUS   |    |      |  |     |
| CHAMPION DISCOUNT   |    |      |  | 1   |
| CONVERSION ONLY PRICE TOTAL   |    |      |  | 1   |
| NET CHASSIS PRICE (SHOW ALL DISCOUNTS AT TOP)   |    |      |  | 1   |
| FREIGHT CHARGE MILES: 385   | ST | 1.86 |  | 1   |
| CHASSIS HANDLING FEE  |    |      |  | 1   |
| TOTAL   |    |      |  | 171 |





C/F

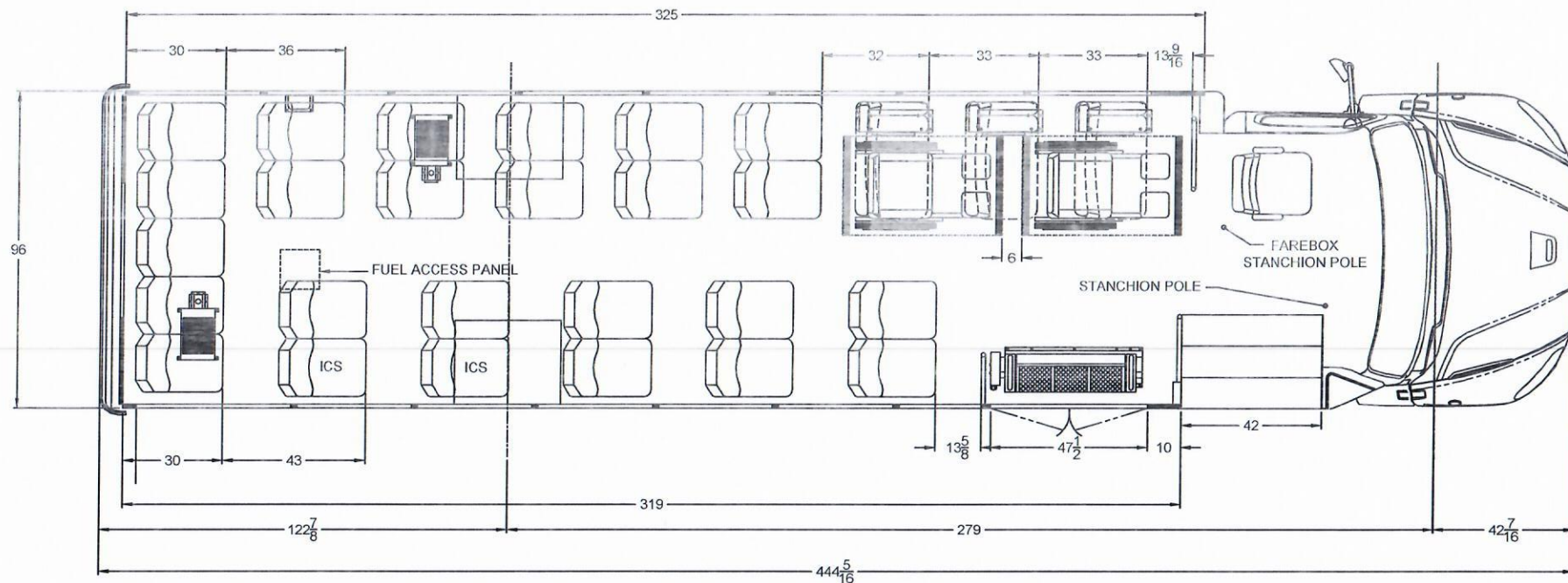
| DEFENDER FREIGHTLINER - 96" WIDE   |    |       |   |
|--|----|-------|---|
| Freightliner S/2 25,850 GVWR - Air Suspension - Hydraulic Brakes   |    |       | 1 |
| Defender Freightliner 36 96" WIDE 279" WB Cummins 6.7L 240HP Allison 2200 PTS  | CH | 1037  | 1 |
| SPECIAL INSTRUCTIONS OR NOTES  |    |       |   |
| Wiring loomed and supported at least every 12" w/ insulated clamps   |    |       | 1 |
| All Exterior fasteners to be stainless steel   |    |       | 1 |
| Water test document is required to be placed in each vehicle   |    |       | 1 |
| SPECIAL BUILD ORDER  |    |       |   |
| Front End Alignment-Include Documentation in each vehicle  | ST | 99    | 1 |
| As-Built Parts Manual on Flash Drive   | ST | 99    | 1 |
| Skirt Mounted Storage Box. 20"W X 11.5"H X 18.75" D. Mount curbside just aft of wheelchair door. Non-locking latches. Store wheel chocks here. | ST | 99    | 1 |
| Wheel Chocks (Pair)  | ST | 99    | 1 |
| Angel Trax Vulcan 12 System with 6 cameras. 1TB Harddrive. SD card back up. DVR Mounted on Drivers Modesty Panel.                              | ST | 99    | 1 |
| Mud Flaps Around AC Condenser  | ST | 99    | 1 |
| WARRANTY   |    |       |   |
| Optional 3 Year / 36,000 Mile Limited Warranty   | 05 | 99    | 1 |
| ELECTRICAL SYSTEM  |    |       |   |
| Intermotive Flex Tech Electrical System  | 05 | STD   | 1 |
| SIDEWALL / REARWALL / CEILING  |    |       |   |
| Driver Area: Grey Padded Vinyl   | 05 | STD   | 1 |
| FRP on Ceiling, Grey   | 05 | 22000 | 1 |
| FRP on Rearwall & Side Walls, Grey   | 05 | 99    | 1 |
| Cove Flooring on Sidewall to Seat Track  | 05 | STD   | 1 |
| FLOORING   |    |       |   |
| Aisle: Gerflor Sirius #8801 Graphite (Black)   | 05 | STD   | 1 |
| Under Seats: Gerflor Sirius #8801 Graphite (Black)   | 05 | STD   | 1 |
| Fuel Tank Access Plate In Floor - <b>N/A ALL APPLICATIONS - CHECK AVAILABILITY</b>   | 05 | 22020 | 1 |
| Gerflor Aluminum Step Nosing with Yellow Insert (PN: E049001)  | ST | 99    | 4 |
| 3/4" Marine Grade Plywood ILO Standard Plywood   | ST | 99    | 1 |
| EXTERIOR   |    |       |   |
| ALL FIBERGLASS/COMPOSITE EXTERIOR  | 05 | 22385 | 1 |
| Paint Skirt 36" - 40" MODEL BUS (LIST PAINT COLOR BELOW)   |    | 99    | 1 |
| PAINT CODE & COLOR:  |    |       | 1 |
| Clear Reflective 1" Tape below windows on each side & encircling one egress window on each side & the rear egress window.                      | ST | 99    | 1 |
| Black Rubber Rub Rails ILO standard White Rub Rail (BOTH SIDES)  | ST | 99    | 1 |
| CHASSIS  |    |       |   |
| Galvanized Belly Metal   | 05 | 22032 | 1 |
| Heated /Remote Exterior Mirrors Accustyle 8x15 Head (Pair)   | 05 | 22363 | 1 |
| Romeo Rim Rear Bumper  | 05 | 22034 | 1 |
| Valve Stem Extender Inner Dual Rear Wheel, pair  | 05 | 22040 | 1 |
| TRANS/AIR FREIGHTLINER 6.7L OPTIONS ***  |    |       |   |
| ALL CHASSIS ORDERED WITH OEM A/C ONLY  |    |       |   |
| TA777132 Dual Super 10 & 15 (135K BTU) TA77 & TA71 EVAP, SMC3L & SMC2S COND, 10 CID & 15 CID COMP, 6.7L DIESEL                                 | ST | 99    | 1 |
| HEATERS  |    |       |   |
| Hot Water Heater, 65K BTU - Floor Mounted  | 05 | 20083 | 2 |
| MISCELLANEOUS  |    |       |   |
| Heater Booster Pump - does not include electric valves   | 05 | 8677  | 1 |
| Defroster Fan - Mount Location: <b>one blowing across entrance door and 2nd blowing across dash</b>  | 05 | 20092 | 2 |
| ELECTRICAL   |    |       |   |
| Circuit Breakers in lieu of Fuses  | 05 | 22093 | 1 |
| ADA Compliant Stop Request Dual Display Sign, Dual Chime Tone, Pull Cord-Requires Touch Tape   | 05 | 22095 | 1 |
| Touch Tape for ADA Stop Request -Each - Requires ADA Stop Request System   | 05 | 22096 | 2 |
| Digital Clock, 12 volt, in driver overhead   | 05 | 22099 | 1 |
| PRE-WIRE BATTERY HOT & GROUND TO DRIVER MOD PANEL AREA FOR FUTURE FAREBOX  | ST | 99    | 1 |
| LIGHT MOUNTED IN ENGINE COMPARTMENT  | ST | 99    | 1 |
| ENTRY DOOR BATTERY HOT   |    | NOTE  | 1 |
| DESTINATION SIGNS/I.D. SIGN/FRONT VIEW WINDOW  |    |       |   |
| Transign LD12112 Front LED Sign 12x112 Display w/OCU   | 05 | 20122 | 1 |
| Transign LD1280 Side LED Sign 12x80 Display-Requires Front Sign  | 05 | 20123 | 1 |
| FRONT SIGN BRACKET NEEDS TO BE SECURED TOP AND BOTTOM  | ST | 99    | 1 |
| EXTERIOR LIGHTS  |    |       |   |
| Surface Mount LED Entry Door Exterior Light - STD Choose Optional Below or Special builds  | 05 | STD   | 1 |
| Turn Signals Flash With Open Door <b>WC LIFT</b>   | 05 | 20135 | 1 |
| LED Rear Center Mount Brake Light, Rectangular   | 05 | 20136 | 1 |
| LED Mid-Ship Turn / Marker Lights <b>REQUIRED 30" AND LONGER</b>   | 05 | 20138 | 1 |
| Independent RED Brake & AMBER Turn Signal Lights (per NJ specs)  | 05 | 20139 | 1 |
| Safe-Fleet Model 848 Low Profile Strobe Light with Branch Guard-AMBER  | ST | 99    | 1 |
| Fog Lights AMBER (Maxxima PN: MFL-200SY) Pair  | ST | 99    | 1 |



| INTERIOR LIGHTS  |       |       |   |
|--|-------|-------|---|
| Additional Interior Lights (LED If Option Selected) Each   | 05    | 8041  | 4 |
| Door Activated Interior Lights   | 05    | 8810  | 1 |
| AUDIO / VISUAL   |       |       |   |
| Additional Speaker(s), Each  | 05    | 20157 | 3 |
| Ground Plane for 2-Way Radio, Pull Cord, Conduit Terminates B Pillar Floor   | 05    | 20160 | 1 |
| External Speaker With ON/OFF Switch (each)   | 05    | 20162 | 1 |
| REI Radio w/ PA System & Gooseneck Mic w/Foot Switch & 4 Speakers (INCLUDES VR-5650 AM/FM/CD/ BT PA READY, 750248 GOOSENECK MIC W/FOOT SWITCH, 512202 HARNESS 15") | ST    | 99    | 1 |
| 6 speakers in Passenger Cabin & One Speaker in Driver Area   |       | NOTE  | 1 |
| DOORS / HATCH / WINDOWS  |       |       |   |
| Required: please select one passenger door option.   |       |       |   |
| Passenger Door Electric (Standard)   | 05    | STD   | 1 |
| Passenger Door 42" *** Choose either Electric, Air, or Manual Above  | 05    | 20166 | 1 |
| Exterior Passenger Entrance Door Key   | 05    | 8133  | 1 |
| Roof Hatch - Transpec 1070 Series Dual Purpose Safety Vent II  | 05    | 20179 | 2 |
| LUGGAGE RACK / STORAGE   |       |       |   |
| Driver Storage in Cab Overhead   | 05    | 20191 | 1 |
| PARATRANSIT OPTIONS  |       |       |   |
| Double W.C. Doors w/ Windows, LED Interior Lights, Leaf Spring, LED Exterior Lighting  | 05    | 20206 | 1 |
| 4" Grommet Mount LED is STD. Use Special Builds for Optional Choices   |       |       | 1 |
| IS THE LIFT IN THE FRONT OR REAR OF THE UNIT?  | FRONT |       | 1 |
| BRAUN LIFTS  |       |       |   |
| Braun Century NCL 1000 3454HB-2 1000# Lift (34"x54")   | 05    | 20230 | 1 |
| LIFT INTERLOCK   |       |       |   |
| Fast Idle w/Interlock - Intermotive GTWY805-F-P2 Freightliner  | 05    | 20233 | 1 |
| Q Straint W.C. Securement Kits, Accessories  |       |       |   |
| Q-8101-L DeLuxe Retrict Tie Down, Q8-6326-A1 Comb Lap/Shldr, L Trk   | 05    | 8003  | 2 |
| Q5-7580-4 18" Blue Webbing Loops   | 05    | 20250 | 8 |
| Q Straint Belt Storage Pouch   | 05    | 8102  | 2 |
| Q-Straint Belt Cutter (ship loose)   | 05    | 8179  | 1 |
| Miscellaneous Accessories  |       |       |   |
| Priority Seating Sign **Required for ADA Compliance**  | 05    | 8104  | 2 |
| Wheelchair Decal (International Symbol of Accessibility) Each  | 05    | 8105  | 1 |
| Q'STRAIN CLEAR ANODIZED L-TRACK ILO STANDARD (PER EACH WC POSITION)  | ST    | 99    | 2 |
| SAFETY OPTIONS   |       |       |   |
| 5 Lb Fire Extinguisher   | 05    | 8089  | 1 |
| Emergency Triangle Kit   | 05    | 8091  | 1 |
| Back-Up Alarm SAE Type C 97 db(A)  | 05    | 20267 | 1 |
| STANDARD ROSCO STSK4750 BACK-UP CAMERA SYSTEM W/ 7" REARVIEW MONITOR / MIRROR COMBO  | 05    | STD   | 1 |
| Interior Flat Mirror, 6" x 16" N/A/ ON DUAL DOOR CHASSIS   | 05    | 20277 | 1 |
| Wide Angle Lens 11"x14", Fresnel   | 05    | 20278 | 1 |
| Red Light Over Emergency Exit Ea: ON: ALL EGRESS WINDOWS   | 05    | 8155  | 5 |
| "NO SMOKING" Sign  | 05    | 20282 | 1 |
| Yellow "Standee" Line  | 05    | 8802  | 1 |
| Decal - Vehicle Height   | 05    | 20289 | 1 |
| American Safety First Aid Kit #0122-LOG  | ST    | 99    | 1 |
| American Safety Body Fluid Clean-up Kit #2701  | ST    | 99    | 1 |
| American Safety Mylar Blanket #2466  | ST    | 99    | 2 |
| American Safety Wool Fire Blanket #2460  | ST    | 99    | 1 |
| American Safety Reflective Safety Vest   | ST    | 99    | 1 |
| INTERIOR DECALS:   | ST    | 99    | 1 |
| "All passengers are required to wear a seat belt when vehicle is in motion"  | ST    | 99    | 1 |
| "Emergency Dial 911"   | ST    | 99    | 1 |
| "Emergency Equipment"  | ST    | 99    | 1 |
| EXTERIOR DECALS: Letters 1.25" high. Red background. White letters   |       |       | 1 |
| "This vehicle makes frequent stops"  | ST    | 99    | 1 |
| "CAUTION: LOADING AND UNLOADING PASSENGERS"  | ST    | 99    | 1 |
| "THIS VEHICLE STOPS AT RAILROAD CROSSINGS"   | ST    | 99    | 1 |
| "CAUTION: STAND CLEAR OF THE LIFT"   | ST    | 99    | 1 |
| DECAL: WATCH YOUR STEP (YELLOW BACKGROUND WITH BLACK LETTERS) w/BACKER   | ST    | 99    | 2 |
| EXTRA RED DOT REFLECTOR STICKERS (SHIP LOOSE)  | ST    | 99    | 2 |
| EXTRA AMBER DOT REFLECTOR STICKERS (SHIP LOOSE)  | ST    | 99    | 2 |
| GRAB RAIL / STANCHION / PANELS   |       |       |   |
| Ceiling Grab Rail - Install on Both Sides  | 05    | 99    | 1 |
| Left Hand Entry Vertical Grab Rail - 1 1/4"  |       | STD   | 1 |
| 1 1/4" Grab Rail Parallel to Entrance Steps (both sides)   | 05    | 8130  | 1 |
| Stanchion and Modesty Panel at Entry Door  |       | STD   | 1 |
| Stanchion and Modesty Panel Behind Driver  | 05    | 20301 | 1 |
| Padding on Stanchion - Gray  | 05    | 20304 | 4 |
| PAD VERTICAL STANCHIONS AT LIFT, ENTRY & DRIVER MODESTY PANELS   |       | NOTE  | 1 |
| Modesty Panel at Wheelchair Lift (extend from floor to ceiling)  | 05    | 20306 | 1 |
| Add Tinted Plexiglass Upper Panel LOCATION: DRIVER   | 05    | 8146  | 1 |
| Additional vertical floor to bulkhead stanchion at top right of entrance steps   | ST    | 99    | 1 |
| CANE STYLE STANCHION ATTACHED TO DRIVER MODESTY PANEL FOR FUTURE FAREBOX   | ST    | 99    | 1 |



| SEATING - DRIVER  |                           |         |            |
|---|---------------------------|---------|------------|
| FREIGHTLINER DRIVER SEATING   |                           |         |            |
| OEM Driver's Seat - National 2000 SRS Air Suspension - High Back, Black Cloth, 3-Point Lap & Shoulder Belt, RH Armrest - Ordered On Chassis |                           | NOTE    | 1          |
| SEATING - PASSENGER   |                           |         |            |
| STD RIGID SEATS   |                           |         |            |
| High Back Double Seat   | 05                        | 8065    | 2          |
| High Back Single Seat   | 05                        | 8066    | 1          |
| Mid High Double Seat  | 05                        | 8067    | 8          |
| FOLDAWAY SEATS  |                           |         |            |
| Foldaway Seat - Mid-High Notch Back Double AM (non-wheelwell)   | 05                        | 2336    | 3          |
| ICS & 3POINT SEATS **REQUIRES WEIGHT ANALYSIS FOR APPROVAL**  |                           |         |            |
| Double Seat with (1) Integrated Child Seat and (1) Mid High Back 2nd Seat   | 05                        | 2331    | 2          |
| PASSENGER SEAT FABRICS  |                           |         |            |
| EUROPEAN OR AMERICAN WOOL QUOTED AT TIME OF ORDER!!!!   |                           |         |            |
| Seat Cover - Level 4 Ice Pinstripe; Mor-Care; Leathermate   | 05                        | 2074    | 31         |
| SEAT OPTIONS  |                           |         |            |
| ABS Seat Backs Per Person (Mid-High and Notchback Folds Only)   | 05                        | 2664    | 24         |
| Anti-Vandal Grab Handle, Black Ea on:   | all seats except rear row |         | 05 2311 26 |
| Black US Armrest - Each - on:   | aisle seats               |         | 05 2077 13 |
| Docket 90 Fabric Wrapped Around Seat Cushion, Including Bottom (each)   | 05                        | 2883    | 31         |
| FREEDMAN SEATING SPECIAL BUILD OPTIONS  |                           |         |            |
| ABS seat backs on all seats except rear row & ICS Seats   | ST                        | 99      | 1          |
| High-Back Seats in Rear Row   | ST                        | 99      | 1          |
| 27" Hip to Knee minimum   | ST                        | 99      | 1          |
| SEAT BELTS  |                           |         |            |
| Seat Belt, Freedman USR Retractable (Per Person)  | 05                        | 2282    | 31         |
| MISCELLANEOUS   |                           |         |            |
| CHAMPION DISCOUNT   |                           |         | 1          |
| CONVERSION ONLY PRICE TOTAL   |                           |         | 1          |
| NET CHASSIS PRICE (SHOW ALL DISCOUNTS AT TOP)   |                           |         | 1          |
| FREIGHT CHARGE  | MILES: 385                | ST 1.86 | 1          |
| CHASSIS HANDLING FEE  |                           |         | 1          |
| TOTAL   |                           |         | 171        |



NOTE: SHOWN WITH MID HI FREEDMAN SEATS  
 FREIGHTLINER CHASSIS 96" WIDE  
 26,000 GVWR  
 THIS FLOOR PLAN IS FOR ILLUSTRATION PURPOSES ONLY.  
 A WEIGHT ANALYSIS HAS NOT YET BEEN PERFORMED.  
 FINAL APPROVAL WITH A WEIGHT ANALYSIS IS REQUIRED UPON RECEIPT OF A  
 COMPLETED ORDER WITH ALL OPTIONS SHOWN.  
 OPTIONAL EQUIPMENT MAY BE SHOWN.  
 THE SALES ORDER PLACED DICTATES ACTUAL OPTION CONTENT.

## DEALER APPROVAL

☐ APPROVED

CUSTOMER SIGNATURE

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| REV. LET. | DESCRIPTION OF CHANGE | BY | CHK | DATE | ECN No. |
|-----------|-----------------------|----|-----|------|---------|
|           |                       |    |     |      |         |
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|           |                       |    |     |      |         |

SCALE  
IN INCHES



TOLERANCE UNLESS  
OTHERWISE SPECIFIED

| WOOD   | OTHER   |
|--------|---------|
| ± 1/8" | ± 1/16" |
| ± 1°   | ± 1/2°  |



FOREST RIVER BUS

DWG. No. 25 2 WC 3 DB FOLDS 279 325 FRB

TITLE:

25 2 W/C 279" WB 325" BDY  
MODEL 36

NAME: CR

DATE: 10/10/22



## Teresa Clawson

---

**From:** David Clawson  
**Sent:** Monday, October 10, 2022 2:22 PM  
**To:** Teresa Clawson  
**Subject:** FW: Freightliner Chassis Price for WV  
**Importance:** High

---

**From:** Mark LeRoy <Mleroy@forestriverinc.com>  
**Sent:** Monday, October 10, 2022 1:54 PM  
**To:** David Clawson <dclawson@rohrerbus.com>  
**Cc:** Teresa Clawson <tclawson@rohrerbus.com>  
**Subject:** [External] Freightliner Chassis Price for WV  
**Importance:** High

David,

All the chassis pricing I sent you for West Virginia is for model year 2023, which is the current model year.

However, we just heard from Freightliner that the cut-off date for 2023MY chassis will be around 11/20/22

They have not given us any word on what the increase is for 2024MY.

We are trying to get something out of them, but it may not happen in time for this bid.

So I'm not sure what to tell you about the chassis price except "stand by".



FOREST RIVER BUS

### Mark LeRoy

Government Bid Sales  
Starcraft, StarTrans,  
Glaval, Champion, Eldorado  
O 1.800.348.7440 ext. 52154  
C 574.214.7716

Freightliner Chassis Cost West Virginia Medium Duty Bid

| Wheelbase | Suspension | Brakes    | Tires | Tire Chains | Cost        |
|-----------|------------|-----------|-------|-------------|-------------|
| 199       | Air        | Hydrailic | 19.5" | N/A         | \$75,764.00 |
| 199"      | Spring     | Hydrailic | 19.5" | N/A         | \$75,399.00 |
| 199"      | Spring     | Hydrailic | 22.5" |             | \$76,310.00 |
| 238"      | Air        | Hydrailic | 19.5" | N/A         | \$75,888.00 |
| 238"      | Spring     | Hydrailic | 19.5" | N/A         | \$75,786.00 |
| 238"      | Spring     | Hydrailic | 22.5" |             | \$76,697.00 |
| 279"      | Air        | Hydrailic | 19.5" | N/A         | \$76,037.00 |
| 279"      | Spring     | Hydrailic | 19.5" | N/A         | \$75,935.00 |
| 279"      | Spring     | Hydrailic | 22.5" |             | \$76,846.00 |



**STURAA TEST**

**10 YEAR**

**350,000 MILE BUS**

**from**

**CHAMPION BUS INC.  
GENERAL COACH AMERICA INC.**

**MODEL DEFENDER**

**DECEMBER 2009**

**PTI-BT-R0911**

**PENNSTATE**



**The Thomas D. Larson Transportation Institute**

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. (814) 695-3404  
Duncansville, PA 16635

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## EXECUTIVE SUMMARY

Champion Bus Inc. General Coach America Inc. submitted a model Defender. The bus is built on a Freightliner model Business Class M2 chassis, diesel-powered 29 seat (including the driver) 35-foot bus, for a 10 yr/350,000 mile STURAA test. The odometer reading at the time of delivery was 2,670 miles. Testing started on June 15, 2009 and was completed on November 27, 2009. 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 3, 2009 and was completed on November 23, 2009.

The interior of the bus is configured with seating for 29 passengers including the driver plus 2 wheelchair positions. Free floor space will accommodate 20 standing passengers resulting in a potential load of 49 persons plus 2 handicap positions. At 150 lbs per person and 600 lbs per wheelchair position, this load results in a measured gross vehicle weight of 24,540 lbs. The first segment of the Structural Durability Test was performed with the bus loaded to a GVW of 24,540 lbs. The middle segment was performed at a seated load weight of 21,630 lbs and the final segment was performed at a curb weight of 16,440 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.

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 4 failures. Of the three reported failures, 1 was a Class 2 and two were Class 3.

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 24.46 seconds.

The Shakedown Test produced a maximum final loaded deflection of 0.274 inches with a permanent set ranging between -0.004 to 0.002 inches under a distributed static load of 19,575 lbs. The Distortion Test was completed with all subsystems, doors and escape mechanisms operating properly. No water leakage was observed throughout the test. All subsystems operated properly.

The Static Towing Test was performed using a target load (towing force) of 19,728 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 5.0 inches.

A Fuel Economy Test was run on simulated central business district, arterial, and commuter courses. The results were 6.39 mpg, 6.86 mpg, and 14.21 mpg respectively; with an overall average of 7.73 mpg.

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



## 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   |
| TM     | - track manager   |
| TP     | - 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 Champion Bus Inc., General Coach America Inc., model Defender. The bus is built on a Freightliner model Business Class M2 chassis. The bus has an O.E.M. driver's and a passenger door rear of the front axle and a dedicated handicap entrance equipped with a Braun Corp. model NL919F1BHB-2 handicap lift rear of the rear axle. Power is provided by a diesel-fueled, Mercedes-Benz model OM926 LA engine coupled to an Allison Series 2200 transmission.

The measured curb weight is 7,180 lbs for the front axle and 9,260 lbs for the rear axle. These combined weights provide a total measured curb weight of 16,440 lbs. There are 29 seats including the driver and room for 20 standing passengers plus 2 wheelchair positions bringing the total passenger capacity to 49 plus 2 wheelchair positions. Gross load is  $150 \text{ lb} \times 49 = 7,350 \text{ lbs}$  plus 2 wheelchair positions = 8,550 lbs. At full capacity, the measured gross vehicle weight is 24,540 lbs.



## VEHICLE DATA FORM

|                                |  |
|--------------------------------|--|
| Bus Number: 0911               | Arrival Date: 6-15-09                                  |
| Bus Manufacturer: Champion Bus | Vehicle Identification Number (VIN): 559AM350RLM218504 |
| Model Number: Defender         | Date: 6-15-09  |
| Personnel: S.C.                | Chassis: Freightliner / Business Class M2              |

WEIGHT:

Individual Wheel Reactions:

| Weights (lb) | Front Axle |       | Middle Axle |      | Rear Axle |       |
|--------------|------------|-------|-------------|------|-----------|-------|
|              | Right      | Left  | Right       | Left | Right     | Left  |
| CW           | 3,550      | 3,630 | N/A         | N/A  | 4,790     | 4,470 |
| SLW          | 3,890      | 4,010 | N/A         | N/A  | 6,860     | 6,870 |
| GVW          | 4,140      | 4,280 | N/A         | N/A  | 8,090     | 8,030 |

Total Weight Details:

| Weight (lb) | CW     | SLW    | GVW    | GAWR         |
|-------------|--------|--------|--------|--------------|
| Front Axle  | 7,180  | 7,900  | 8,420  | 9,880        |
| Middle Axle | N/A    | N/A    | N/A    | N/A          |
| Rear Axle   | 9,260  | 13,730 | 16,120 | 17,500       |
| Total       | 16,440 | 21,630 | 24,540 | GVWR: 16,440 |

Dimensions:

|                     |             |
|---------------------|-------------|
| Length (ft/in)      | 35 / 5.0    |
| Width (in)          | 96.0        |
| Height (in)         | 122.0       |
| Front Overhang (in) | 41.0        |
| Rear Overhang (in)  | 125.0       |
| Wheel Base (in)     | 259.0       |
| Wheel Track (in)    | Front: 82.8 |
|                     | Rear: 72.6  |

|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-15-09 |
|------------------|---------------|

CLEARANCES:

|   |                     |                     |
|---|---------------------|---------------------|
| Lowest Point Outside Front Axle             | Location: Oil pan   | Clearance(in): 9.6  |
| Lowest Point Outside Rear Axle              | Location: Body      | Clearance(in): 14.5 |
| Lowest Point between Axles                  | Location: Step well | Clearance(in): 9.6  |
| Ground Clearance at the center (in)         | 11.2                |                     |
| Front Approach Angle (deg)                  | 17.0                |                     |
| Rear Approach Angle (deg)                   | 11.9                |                     |
| Ramp Clearance Angle (deg)                  | 4.9                 |                     |
| Aisle Width (in)                            | 18.3                |                     |
| Inside Standing Height at Center Aisle (in) | 77.3                |                     |

BODY DETAILS:

|                                    |   |  |   |
|------------------------------------|---|--|---|
| Body Structural Type               | Integral                                  |  |   |
| Frame Material                     | Steel                                     |  |   |
| Body Material                      | Steel & fiberglass                        |  |   |
| Floor Material                     | Plywood                                   |  |   |
| Roof Material                      | Steel & fiberglass                        |  |   |
| Windows Type                       | <input checked="" type="checkbox"/> Fixed | <input type="checkbox"/> Movable             |   |
| Window Mfg./Model No.              | Clear Vision / AS3 M30 DOT22              |  |   |
| Number of Doors                    | <u>1</u> Front                            | <u>1</u> Rear                                | <u>1</u> Handicap                           |
| Mfr. / Model No.                   | A & m / 12V Auto Re-open                  |  |   |
| Dimension of Each Door (in)        | Front-30.8 x90.3                          | Rear-36.1 x 55.4                             | Handicap-46.7 x 72.5                        |
| Passenger Seat Type                | <input type="checkbox"/> Cantilever       | <input checked="" type="checkbox"/> Pedestal | <input type="checkbox"/> Other<br>(explain) |
| Mfr. / Model No.                   | Freedman Seating Co. / na                 |  |   |
| Driver Seat Type                   | <input checked="" type="checkbox"/> Air   | <input type="checkbox"/> Spring              | <input type="checkbox"/> Other<br>(explain) |
| Mfr. / Model No.                   | Bostrum Seating Inc. / Talladega 910      |  |   |
| Number of Seats (including Driver) | 29 + 2 wheelchair positions               |  |   |



|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-15-09 |
|------------------|---------------|

BODY DETAILS (Contd..)

|   |        |         |        |        |        |
|---|--------|---------|--------|--------|--------|
| Free Floor Space ( ft <sup>2</sup> )        | 30.5   |         |        |        |        |
| Height of Each Step at Normal Position (in) | Front  | 1. 11.2 | 2. 9.0 | 3. 9.0 | 4. 9.1 |
|   | Middle | 1. N/A  | 2. N/A | 3. N/A | 4. N/A |
|   | Rear   | 1. N/A  | 2. N/A | 3. N/A | 4. N/A |
| Step Elevation Change - Kneeling (in)       | N/A    |         |        |        |        |

ENGINE

|  |  |  |  |
|--|--|--|--|
| Type                                     | <input checked="" type="checkbox"/> C.I.       | <input type="checkbox"/> Alternate Fuel  |  |
|  | <input type="checkbox"/> S.I.                  | <input type="checkbox"/> Other (explain) |  |
| Mfr. / Model No.                         | Mercedes-Benz / OM926 LA                       |  |  |
| Location                                 | <input checked="" type="checkbox"/> Front      | <input type="checkbox"/> Rear            | <input type="checkbox"/> Other (explain) |
| Fuel Type                                | <input type="checkbox"/> Gasoline              | <input type="checkbox"/> CNG             | <input type="checkbox"/> Methanol        |
|  | <input checked="" type="checkbox"/> Diesel     | <input type="checkbox"/> LNG             | <input type="checkbox"/> Other (explain) |
| Fuel Tank Capacity (indicate units)      | 60 gals  |  |  |
| Fuel Induction Type                      | <input checked="" type="checkbox"/> Injected   | <input type="checkbox"/> Carburetion     |  |
| Fuel Injector Mfr. / Model No.           | Mercedes-Benz / OM926 LA                       |  |  |
| Carburetor Mfr. / Model No.              | N/a  |  |  |
| Fuel Pump Mfr. / Model No.               | Mercedes-Benz / OM926 LA                       |  |  |
| Alternator (Generator) Mfr. / Model No.  | Prestolite Leece-Neville / A0014949            |  |  |
| Maximum Rated Output (Volts / Amps)      | 14 / 270                                       |  |  |
| Air Compressor Mfr. / Model No.          | Wabco / na                                     |  |  |
| Maximum Capacity (ft <sup>3</sup> / min) | 15.5   |  |  |
| Starter Type                             | <input checked="" type="checkbox"/> Electrical | <input type="checkbox"/> Pneumatic       | <input type="checkbox"/> Other (explain) |
| Starter Mfr. / Model No.                 | Delco / 38MT                                   |  |  |

|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-15-09 |
|------------------|---------------|

#### TRANSMISSION

|                                    |  |   |                                |
|------------------------------------|--|---|--------------------------------|
| Transmission Type                  | <input type="checkbox"/> Manual                | <input checked="" type="checkbox"/> Automatic |                                |
| Mfr. / Model No.                   | Allison Transmission / Series 2200             |   |                                |
| Control Type                       | <input checked="" type="checkbox"/> Mechanical | <input type="checkbox"/> Electrical           | <input type="checkbox"/> Other |
| Torque Converter Mfr. / Model No.  | Allison Transmission / Series 2200             |   |                                |
| Integral Retarder Mfr. / Model No. | N/A  |   |                                |

#### SUSPENSION

|                        |   |   |  |
|------------------------|---|---|--|
| Number of Axles        | 2                                       |   |  |
| Front Axle Type        | <input type="checkbox"/> Independent    | <input checked="" type="checkbox"/> Beam Axle |  |
| Mfr. / Model No.       | Arvin Meritor / MFS10143ANN202          |   |  |
| Axle Ratio (if driven) | N/A                                     |   |  |
| Suspension Type        | <input type="checkbox"/> Air            | <input checked="" type="checkbox"/> Spring    | <input type="checkbox"/> Other (explain) |
| No. of Shock Absorbers | 2                                       |   |  |
| Mfr. / Model No.       | Sachs / 10-13760-000                    |   |  |
| Middle Axle Type       | <input type="checkbox"/> Independent    | <input type="checkbox"/> Beam Axle            |  |
| Mfr. / Model No.       | N/A                                     |   |  |
| Axle Ratio (if driven) | N/A                                     |   |  |
| Suspension Type        | <input type="checkbox"/> Air            | <input type="checkbox"/> Spring               | <input type="checkbox"/> Other (explain) |
| No. of Shock Absorbers | N/A                                     |   |  |
| Mfr. / Model No.       | N/A                                     |   |  |
| Rear Axle Type         | <input type="checkbox"/> Independent    | <input checked="" type="checkbox"/> Beam Axle |  |
| Mfr. / Model No.       | Arvin Meritor / ARS-17.5-2              |   |  |
| Axle Ratio (if driven) | 4.56                                    |   |  |
| Suspension Type        | <input checked="" type="checkbox"/> Air | <input type="checkbox"/> Spring               | <input type="checkbox"/> Other (explain) |
| No. of Shock Absorbers | 2                                       |   |  |
| Mfr. / Model No.       | Gabriel / 16-15817-000                  |   |  |



|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-15-09 |
|------------------|---------------|

#### WHEELS & TIRES

|       |                       |                             |
|-------|-----------------------|-----------------------------|
| Front | Wheel Mfr./ Model No. | Accuride / 19.5 x 7.5       |
|       | Tire Mfr./ Model No.  | Michelin XZE / 245/70R 19.5 |
| Rear  | Wheel Mfr./ Model No. | Accuride / 19.5 x 7.5       |
|       | Tire Mfr./ Model No.  | Michelin XZE / 245/70R 19.5 |

#### BRAKES

|                         |   |                               |  |
|-------------------------|---|-------------------------------|--|
| Front Axle Brakes Type  | <input checked="" type="checkbox"/> Cam | <input type="checkbox"/> Disc | <input type="checkbox"/> Other (explain) |
| Mfr. / Model No.        | Arvin Meritor / Q Plus                  |                               |  |
| Middle Axle Brakes Type | <input type="checkbox"/> Cam            | <input type="checkbox"/> Disc | <input type="checkbox"/> Other (explain) |
| Mfr. / Model No.        | N/A                                     |                               |  |
| Rear Axle Brakes Type   | <input checked="" type="checkbox"/> Cam | <input type="checkbox"/> Disc | <input type="checkbox"/> Other (explain) |
| Mfr. / Model No.        | Arvin Meritor / Q Plus                  |                               |  |
| Retarder Type           | N/A                                     |                               |  |
| Mfr. / Model No.        | N/A                                     |                               |  |

#### HVAC

|                                 |   |   |                                |
|---------------------------------|---|---|--------------------------------|
| Heating System Type             | <input type="checkbox"/> Air                      | <input checked="" type="checkbox"/> Water | <input type="checkbox"/> Other |
| Capacity (Btu/hr)               | Dash -na Interior ceiling 130,000                 |   |                                |
| Mfr. / Model No.                | Dash OEM Rear - ACT / ACT50 HD                    |   |                                |
| Air Conditioner                 | <input checked="" type="checkbox"/> Yes           | <input type="checkbox"/> No               |                                |
| Location                        | Dash & rear interior ceiling                      |   |                                |
| Capacity (Btu/hr)               | 70,000  |   |                                |
| A/C Compressor Mfr. / Model No. | Dash - Sanden Corp. / U4417 Rear - ACT / ACT50 HD |   |                                |

#### STEERING

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

|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-15-09 |
|------------------|---------------|

#### OTHERS

|                   |  |                          |
|-------------------|--|--------------------------|
| Wheel Chair Ramps | Location: N/A                            | Type: N/A                |
| Wheel Chair Lifts | Location: Right rear                     | Type: Hydraulic platform |
| Mfr. / Model No.  | The Braun Corp. / NL919F1BHB-2           |                          |
| Emergency Exit    | Location: Windows<br>Doors<br>Roof hatch | Number: 3<br>2<br>1      |

#### CAPACITIES

|  |         |
|--|---------|
| Fuel Tank Capacity (units)             | 60 gals |
| Engine Crankcase Capacity (gallons)    | 7.75    |
| Transmission Capacity (gallons)        | 3.75    |
| Differential Capacity (gallons)        | 4.0     |
| Cooling System Capacity (gallons)      | 8.0     |
| Power Steering Fluid Capacity (quarts) | 3.1     |



## VEHICLE DATA FORM

|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-15-09 |
|------------------|---------------|

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

[illegible]

# COMPONENT/SUBSYSTEM INSPECTION FORM

|                  |               |
|------------------|---------------|
| Bus Number: 0911 | Date: 6-26-09 |
|------------------|---------------|

| Subsystem                                | Checked | Comments |
|--|---------|----------|
| Air Conditioning Heating and Ventilation | ✓       |          |
| Body and Sheet Metal                     | ✓       |          |
| Frame                                    | ✓       |          |
| Steering                                 | ✓       |          |
| Suspension                               | ✓       |          |
| Interior/Seating                         | ✓       |          |
| Axles                                    | ✓       |          |
| Brakes                                   | ✓       |          |
| Tires/Wheels                             | ✓       |          |
| Exhaust                                  | ✓       |          |
| Fuel System                              | ✓       | Diesel   |
| Power Plant                              | ✓       |          |
| Accessories                              | ✓       |          |
| Lift System                              | ✓       |          |
| Interior Fasteners                       | ✓       |          |
| Batteries                                | ✓       |          |



## CHECK - IN



CHAMPION BUS INC., GENERAL  
COACH AMERICA INC. MODEL DEFENDER



## CHECK - IN CONT.



CHAMPION BUS INC., GENERAL COACH AMERICA  
INC., MODEL DEFENDER EQUIPPED WITH A BRAUN  
CORP. MODEL NL919F1BHB-2 HANDICAP LIFT



DRIVER'S STATION



## CHECK - IN CONT.



## TEST BUS INTERIOR FRONT TO REAR



## TEST BUS INTERIOR REAR TO FRONT

# 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.



## ACCESSIBILITY DATA FORM

|                  |                |
|------------------|----------------|
| Bus Number: 0911 | Date: 11-25-09 |
|------------------|----------------|

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

## ACCESSIBILITY DATA FORM

|                  |                |
|------------------|----------------|
| Bus Number: 0911 | Date: 11-25-09 |
|------------------|----------------|

| Component                  | Checked | Comments |
|----------------------------|---------|----------|
| <b>HVAC :</b>              |         |          |
| A/C Compressor             | ✓       |          |
| Filters                    | ✓       |          |
| Fans                       | ✓       |          |
| <b>ELECTRICAL SYSTEM :</b> |         |          |
| Fuses                      | ✓       |          |
| Batteries                  | ✓       |          |
| Voltage regulator          | ✓       |          |
| Voltage Converters         | ✓       |          |
| Lighting                   | ✓       |          |
| <b>MISCELLANEOUS :</b>     |         |          |
| Brakes                     | ✓       |          |
| Handicap Lifts/Ramps       | ✓       |          |
| Instruments                | ✓       |          |
| Axles                      | ✓       |          |
| Exhaust                    | ✓       |          |
| Fuel System                | ✓       |          |
| <b>OTHERS :</b>            |         |          |
|                            |         |          |
|                            |         |          |
|                            |         |          |
|                            |         |          |
|                            |         |          |
|                            |         |          |
|                            |         |          |
|                            |         |          |



## 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**  
 Champion #0911

| DATE     | TEST MILES | SERVICE           | ACTIVITY  | DOWN TIME | HOURS |
|----------|------------|-------------------|---|-----------|-------|
| 07-16-09 | 575        | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |
| 08-03-09 | 1,521      | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |
| 08-20-09 | 2,599      | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |
| 09-11-09 | 3,081      | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |
| 09-17-09 | 3,769      | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |
| 09-29-09 | 5,221      | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |
| 10-19-09 | 6,642      | P.M. / Inspection | Linkage, tie rods, universals/u-joints all lubed; all fluids checked. | 4.00      | 4.00  |

(Page 2 of 2)  
**SCHEDULED MAINTENANCE**  
 Champion #0911

| DATE     | TEST MILES | SERVICE                                | ACTIVITY  | DOWN TIME | HOURS |
|----------|------------|--|---|-----------|-------|
| 10-21-09 | 6,723      | P.M. / Inspection<br>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  |
| 10-27-09 | 7,493      | P.M. / Inspection                      | Linkage, tie rods, universals/u-joints all lubed; all fluids checked.   | 4.00      | 4.00  |
| 11-03-09 | 8,545      | P.M. / Inspection                      | Linkage, tie rods, universals/u-joints all lubed; all fluids checked.   | 4.00      | 4.00  |
| 11-09-09 | 9,654      | P.M. / Inspection                      | Linkage, tie rods, universals/u-joints all lubed; all fluids checked.   | 4.00      | 4.00  |
| 11-16-09 | 11,154     | P.M. / Inspection                      | Linkage, tie rods, universals/u-joints all lubed; all fluids checked.   | 4.00      | 4.00  |
| 11-23-09 | 11,255     | P.M. / Inspection                      | Linkage, tie rods, universals/u-joints all lubed; all fluids checked.   | 4.00      | 4.00  |



**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>                       | <u>PRODUCT CODE</u> | <u>TEXACO DESCRIPTION</u>                                 |
|-----------------------------------|---------------------|---|
| Engine oil                        | #2112               | URSA Super Plus SAE 30                                    |
| Transmission oil                  | #1866               | Automatic Trans Fluid<br>Mercon/Dexron II<br>Multipurpose |
| Gear oil                          | #2316               | Multigear Lubricant<br>EP SAE 80W90                       |
| Wheel bearing &<br>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. DISCUSSION**

During the test no additional components were removed for repair or replacement. At the end of the test, the remaining items on the list were removed and replaced. The transmission assembly took 4.0 man-hours (two men 2.0 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.



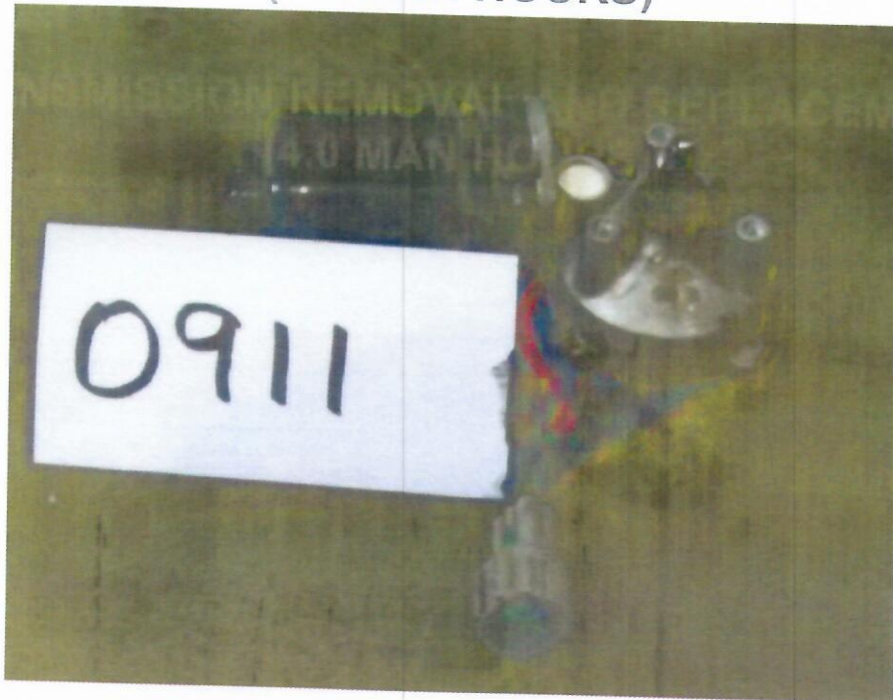
### REPLACEMENT AND/OR REPAIR FORM

| Subsystem    | Replacement Time |
|--------------|------------------|
| Transmission | 4.0 man hours    |
| Wiper Motor  | 0.5 man hours    |
| Starter      | 0.5 man hours    |
| Alternator   | 1.0 man hours    |
| Batteries    | 0.5 man hours    |

### 1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS



#### TRANSMISSION REMOVAL AND REPLACEMENT (4.0 MAN HOURS)



#### WIPER MOTOR REMOVAL AND REPLACEMENT (0.5 MAN HOURS)



### 1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS CONT.



STARTER REMOVAL AND REPLACEMENT  
(0.5 MAN HOURS)



ALTERNATOR REMOVAL AND REPLACEMENT  
(1.0 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) Class 1: Physical Safety. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- (b) Class 2: Road Call. 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) Class 3: Bus Change. 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) Class 4: Bad Order. 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 Class 4 failures. The one Class 2 failure was the result of a failed Re-Gen. The two Class 3 failures involved the electrical system. These three failures are available for review in the Unscheduled Maintenance List, located in Section 5.7 Structural Durability.

# RELIABILITY DATA FORMS

|                          |                |
|--------------------------|----------------|
| Bus Number: 0911         | Date: 11/23/09 |
| Personnel: Bob Reifsteck |                |

| Failure Type            |                          |                         |                               |
|-------------------------|--------------------------|-------------------------|-------------------------------|
| Class 4<br>Bad<br>Order | Class 3<br>Bus<br>Change | Class 2<br>Road<br>Call | Class 1<br>Physical<br>Safety |

| Subsystems          | Mileage | Mileage | Mileage | Mileage | Man<br>Hours | Down<br>Time |
|---------------------|---------|---------|---------|---------|--------------|--------------|
| Engine/Transmission |         |         | 5,677   |         | 4.00         | 168.0        |
| Electrical          |         | 6,793   |         |         | 1.00         | 1.00         |
|                     |         | 7,443   |         |         | 1.00         | 1.00         |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |
|                     |         |         |         |         |              |              |



### **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: 0911             | Date: 10-22-09 |
| Personnel: B.S., B.L. & S.C. |                |

|                                    |                     |
|------------------------------------|---------------------|
| Temperature (°F): 58               | Humidity (%): 66    |
| Wind Direction: SW                 | Wind Speed (mph): 5 |
| Barometric Pressure (in.Hg): 30.03 |                     |

| 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 |
| <b>Comments of the position of the bus during the lane change:</b> A safe profile was maintained through all portions of testing. |        |
|   |        |
|   |        |
| <b>Comments of the tire/ground contact patch:</b> Tire/ground contact was maintained through all portions of testing.             |        |
|   |        |
|   |        |



### 3. SAFETY



**RIGHT - HAND APPROACH**



**LEFT - HAND APPROACH**

## 4. PERFORMANCE - AN ACCELERATION, GRADEABILITY, AND TOP SPEED TEST

### 4-I. TEST OBJECTIVE

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

### 4-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-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 24.46 seconds.



## PERFORMANCE DATA FORM

|  |       |                     |       |
|--|-------|---------------------|-------|
| Bus Number: 0911                             |       | Date: 10-22-09      |       |
| Personnel: B.S., B.L. & S.C.                 |       |                     |       |
| Temperature (°F): 58                         |       | Humidity (%): 66    |       |
| Wind Direction: SW                           |       | Wind Speed (mph): 5 |       |
| Barometric Pressure (in.Hg): 30.03           |       |                     |       |
| Air Conditioning compressor-OFF              |       | ✓ Checked           |       |
| Ventilation fans-ON HIGH                     |       | ✓ Checked           |       |
| Heater pump motor-Off                        |       | ✓ Checked           |       |
| Defroster-OFF                                |       | ✓ Checked           |       |
| Exterior and interior lights-ON              |       | ✓ Checked           |       |
| Windows and doors-CLOSED                     |       | ✓ Checked           |       |
| <b>ACCELERATION, GRADEABILITY, TOP SPEED</b> |       |                     |       |
| Counter Clockwise Recorded Interval Times    |       |                     |       |
| Speed  | Run 1 | Run 2               | Run 3 |
| 10 mph                                       | 4.14  | 4.98                | 4.23  |
| 20 mph                                       | 7.14  | 7.45                | 6.98  |
| 30 mph                                       | 10.57 | 10.76               | 11.58 |
| 40 mph                                       | 16.89 | 16.04               | 17.67 |
| Top Test Speed(mph) 50                       | 24.98 | 23.61               | 23.33 |
| Clockwise Recorded Interval Times            |       |                     |       |
| Speed  | Run 1 | Run 2               | Run 3 |
| 10 mph                                       | 5.17  | 5.07                | 4.85  |
| 20 mph                                       | 8.45  | 8.82                | 8.26  |
| 30 mph                                       | 12.61 | 12.16               | 11.51 |
| 40 mph                                       | 16.60 | 17.98               | 17.20 |
| Top Test Speed(mph) 50                       | 24.64 | 25.26               | 24.95 |

0911.ACC

PERFORMANCE SUMMARY SHEET

BUS MANUFACTURER :Champion  
BUS MODEL :Defender

BUS NUMBER :0911  
TEST DATE :10/22/09

TEST CONDITIONS :

TEMPERATURE (DEG F ) : 58.0  
WIND DIRECTION : SW  
WIND SPEED (MPH) : 5.0  
HUMIDITY (%) : 66  
BAROMETRIC PRESSURE (IN. HG) : 30.0

| VEHICLE SPEED<br>(MPH) | AVERAGE TIME (SEC) |              |       |
|------------------------|--------------------|--------------|-------|
|                        | CCW DIRECTION      | CW DIRECTION | TOTAL |
| 10.0                   | 4.45               | 5.03         | 4.74  |
| 20.0                   | 7.19               | 8.51         | 7.85  |
| 30.0                   | 10.97              | 12.09        | 11.53 |
| 40.0                   | 16.87              | 17.26        | 17.06 |
| 50.0                   | 23.97              | 24.95        | 24.46 |

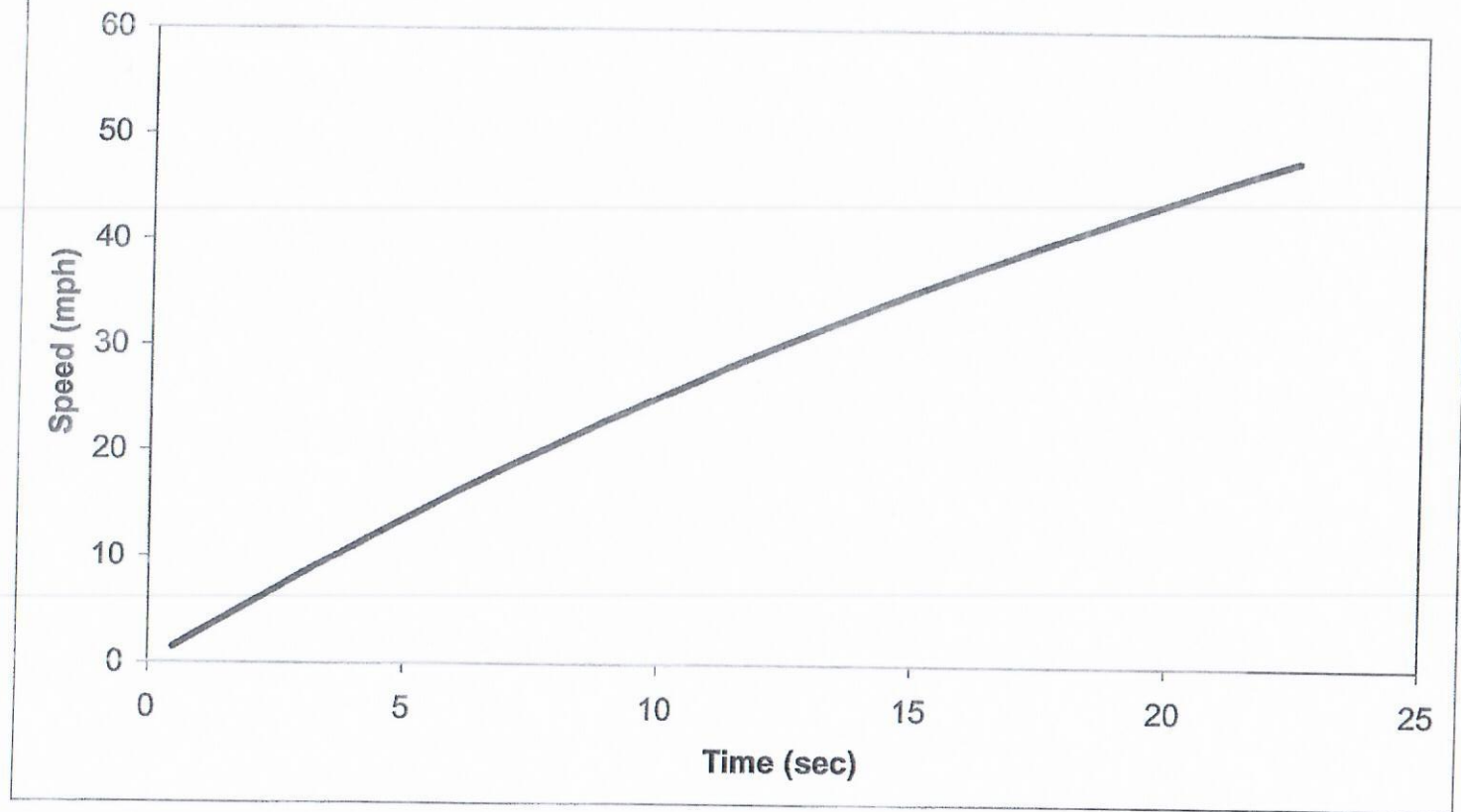
TEST SUMMARY :

| VEHICLE SPEED<br>(MPH) | TIME<br>(SEC) | ACCELERATION<br>(FT/SEC^2) | MAX. GRADE<br>(%) |
|------------------------|---------------|----------------------------|-------------------|
| 1.0                    | .34           | 4.2                        | 13.3              |
| 5.0                    | 1.76          | 4.1                        | 12.7              |
| 10.0                   | 3.62          | 3.8                        | 12.0              |
| 15.0                   | 5.59          | 3.6                        | 11.3              |
| 20.0                   | 7.68          | 3.4                        | 10.6              |
| 25.0                   | 9.92          | 3.2                        | 9.9               |
| 30.0                   | 12.31         | 3.0                        | 9.2               |
| 35.0                   | 14.89         | 2.7                        | 8.6               |
| 40.0                   | 17.66         | 2.5                        | 7.9               |
| 45.0                   | 20.67         | 2.3                        | 7.3               |
| 50.0                   | 23.93         | 2.2                        | 6.7               |

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.



Velocity vs. Time  
Champion 0911



## 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 49 people including the driver plus 2 wheelchair positions. The resulting test load is  $(49 \times 375 \text{ lb}) = 18,375 \text{ lbs} + 1,200 \text{ lbs}$  (2 wheelchair positions) = 19,575 lbs. 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 0.274 inches at reference point 9. The maximum permanent deflection after the final loading sequence ranged from -0.004 inches at reference points 1 and 12 to 0.002 inches at reference points 4 and 5.



# STRUCTURAL SHAKEDOWN DATA FORM

|   |                      |
|---|----------------------|
| Bus Number: 0911  | Date: 6-22-09        |
| Personnel: E.D., E.L., P.S. & K.D.  | Temperature (°F): 75 |
| Loading Sequence: <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 (check one) |                      |
| Test Load (lbs): 19,575   |                      |

Indicate Approximate Location of Each Reference Point

Right

Front  
of  
Bus

Left



Top View

| Reference Point No. | A (in)<br>Original Height | B (in)<br>Loaded Height | B-A (in)<br>Loaded Deflection | C (in)<br>Unloaded Height | C-A (in)<br>Permanent Deflection |
|---------------------|---------------------------|-------------------------|-------------------------------|---------------------------|----------------------------------|
| 1                   | 0                         | -.157                   | -.157                         | .011                      | .011                             |
| 2                   | 0                         | .135                    | .135                          | .018                      | .018                             |
| 3                   | 0                         | .234                    | .234                          | .020                      | .020                             |
| 4                   | 0                         | .282                    | .282                          | .023                      | .023                             |
| 5                   | 0                         | .239                    | .239                          | .022                      | .022                             |
| 6                   | 0                         | .078                    | .078                          | .052                      | .052                             |
| 7                   | 0                         | -.040                   | -.040                         | -.020                     | -.020                            |
| 8                   | 0                         | .246                    | .246                          | .020                      | .020                             |
| 9                   | 0                         | .297                    | .297                          | .024                      | .024                             |
| 10                  | 0                         | .251                    | .251                          | .022                      | .022                             |
| 11                  | 0                         | .150                    | .150                          | .016                      | .016                             |
| 12                  | 0                         | -.197                   | -.197                         | .005                      | .005                             |

# STRUCTURAL SHAKEDOWN DATA FORM

|   |                      |
|---|----------------------|
| Bus Number: 0911  | Date: 6-23-09        |
| Personnel: T.S., E.D., E.L. & P.S.  | Temperature (°F): 80 |
| Loading Sequence: <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 (check one) |                      |
| Test Load (lbs): 19,575   |                      |

Indicate Approximate Location of Each Reference Point

Right

Front  
of  
Bus

Left



Top View

| Reference Point No. | A (in)<br>Original Height | B (in)<br>Loaded Height | B-A (in)<br>Loaded Deflection | C (in)<br>Unloaded Height | C-A (in)<br>Permanent Deflection |
|---------------------|---------------------------|-------------------------|-------------------------------|---------------------------|----------------------------------|
| 1                   | .011                      | -.157                   | -.168                         | .007                      | -.004                            |
| 2                   | .018                      | .140                    | .122                          | .018                      | .000                             |
| 3                   | .020                      | .241                    | .221                          | .021                      | .001                             |
| 4                   | .023                      | .291                    | .268                          | .025                      | .002                             |
| 5                   | .022                      | .247                    | .225                          | .024                      | .002                             |
| 6                   | .052                      | .083                    | .031                          | .050                      | -.002                            |
| 7                   | -.020                     | -.051                   | -.071                         | -.021                     | -.001                            |
| 8                   | .020                      | .249                    | .229                          | .021                      | .001                             |
| 9                   | .024                      | .298                    | .274                          | .024                      | .000                             |
| 10                  | .022                      | .250                    | .228                          | .021                      | -.001                            |
| 11                  | .016                      | .149                    | .133                          | .014                      | -.002                            |
| 12                  | .005                      | -.203                   | -.208                         | .001                      | -.004                            |



## 5.1 STRUCTURAL SHAKEDOWN TEST



BUS LOADED TO 2.5 TIMES GVL  
(19,575 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. No water leakage was observed during the test. The results of this test are indicated on the following data forms.



**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |  |                                     |
|------------------------------|--|-------------------------------------|
| Wheel Position : (check one) |  |                                     |
| All wheels level             | <input checked="" type="checkbox"/> before | <input type="checkbox"/> after      |
| Left front                   | <input type="checkbox"/> 6 in higher       | <input type="checkbox"/> 6 in lower |
| Right front                  | <input type="checkbox"/> 6 in higher       | <input type="checkbox"/> 6 in lower |
| Right rear                   | <input type="checkbox"/> 6 in higher       | <input type="checkbox"/> 6 in lower |
| Left rear                    | <input type="checkbox"/> 6 in higher       | <input type="checkbox"/> 6 in lower |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |

**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |   |                                     |
|------------------------------|---|-------------------------------------|
| Wheel Position : (check one) |   |                                     |
| All wheels level             | <input type="checkbox"/> before                 | <input type="checkbox"/> after      |
| Left front                   | <input checked="" type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower |
| Right front                  | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Right rear                   | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Left rear                    | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |



**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |   |                                     |
|------------------------------|---|-------------------------------------|
| Wheel Position : (check one) |   |                                     |
| All wheels level             | <input type="checkbox"/> before                 | <input type="checkbox"/> after      |
| Left front                   | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Right front                  | <input checked="" type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower |
| Right rear                   | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Left rear                    | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |

**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |   |                                     |
|------------------------------|---|-------------------------------------|
| Wheel Position : (check one) |   |                                     |
| All wheels level             | <input type="checkbox"/> before                 | <input type="checkbox"/> after      |
| Left front                   | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Right front                  | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Right rear                   | <input checked="" type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower |
| Left rear                    | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |



**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |   |                                     |
|------------------------------|---|-------------------------------------|
| Wheel Position : (check one) |   |                                     |
| All wheels level             | <input type="checkbox"/> before                 | <input type="checkbox"/> after      |
| Left front                   | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Right front                  | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Right rear                   | <input type="checkbox"/> 6 in higher            | <input type="checkbox"/> 6 in lower |
| Left rear                    | <input checked="" type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower |

|                                       | Comments         |
|---------------------------------------|------------------|
| ■ Windows                             | No deficiencies. |
| ■ 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: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |                                      |  |
|------------------------------|--------------------------------------|--|
| Wheel Position : (check one) |                                      |  |
| All wheels level             | <input type="checkbox"/> before      | <input type="checkbox"/> after                 |
| Left front                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Right front                  | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Right rear                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Left rear                    | <input type="checkbox"/> 6 in higher | <input checked="" type="checkbox"/> 6 in lower |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |



**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |                                      |  |
|------------------------------|--------------------------------------|--|
| Wheel Position : (check one) |                                      |  |
| All wheels level             | <input type="checkbox"/> before      | <input type="checkbox"/> after                 |
| Left front                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Right front                  | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Right rear                   | <input type="checkbox"/> 6 in higher | <input checked="" type="checkbox"/> 6 in lower |
| Left rear                    | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |

**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |                                      |  |
|------------------------------|--------------------------------------|--|
| Wheel Position : (check one) |                                      |  |
| All wheels level             | <input type="checkbox"/> before      | <input type="checkbox"/> after                 |
| Left front                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Right front                  | <input type="checkbox"/> 6 in higher | <input checked="" type="checkbox"/> 6 in lower |
| Right rear                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Left rear                    | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |



**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |                                      |  |
|------------------------------|--------------------------------------|--|
| Wheel Position : (check one) |                                      |  |
| All wheels level             | <input type="checkbox"/> before      | <input type="checkbox"/> after                 |
| Left front                   | <input type="checkbox"/> 6 in higher | <input checked="" type="checkbox"/> 6 in lower |
| Right front                  | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Right rear                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |
| Left rear                    | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower            |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |

**DISTORTION TEST INSPECTION FORM**  
(Note: Ten copies of this data sheet are required)

|  |                     |
|--|---------------------|
| Bus Number: 0911                         | Date: 6-26-09       |
| Personnel: J.P., E.L., T.S., P.S. & S.C. | Temperature(°F): 71 |

|                              |                                      |   |
|------------------------------|--------------------------------------|---|
| Wheel Position : (check one) |                                      |   |
| All wheels level             | <input type="checkbox"/> before      | <input checked="" type="checkbox"/> after |
| Left front                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower       |
| Right front                  | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower       |
| Right rear                   | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower       |
| Left rear                    | <input type="checkbox"/> 6 in higher | <input type="checkbox"/> 6 in lower       |

|   | Comments         |
|---|------------------|
| <input checked="" type="checkbox"/> Windows                             | No deficiencies. |
| <input checked="" type="checkbox"/> Front Doors                         | No deficiencies. |
| <input checked="" type="checkbox"/> Rear Doors                          | No deficiencies. |
| <input checked="" type="checkbox"/> Escape Mechanisms/ Roof Vents       | No deficiencies. |
| <input checked="" type="checkbox"/> Engine                              | No deficiencies. |
| <input checked="" type="checkbox"/> Handicapped Device/ Special Seating | No deficiencies. |
| <input checked="" type="checkbox"/> Undercarriage                       | No deficiencies. |
| <input checked="" type="checkbox"/> Service Doors                       | No deficiencies. |
| <input checked="" type="checkbox"/> Body                                | No deficiencies. |
| <input checked="" type="checkbox"/> Windows/ Body Leakage               | No deficiencies. |
| <input checked="" type="checkbox"/> Steering Mechanism                  | No deficiencies. |



## 5.2 STRUCTURAL DISTORTION TEST



RIGHT FRONT WHEEL SIX INCHES HIGHER



LEFT REAR WHEEL SIX INCHES HIGHER

## 5.3 STRUCTURAL STRENGTH AND DISTORTION TESTS - STATIC TOWING TEST

### 5.3-I. TEST OBJECTIVE

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 front test was performed to the full target test load of 19,728 lbs ( $1.2 \times 16,440$  lbs CW). No damage or deformation was observed during all four pulls of the test. The manufacturer recommends no towing from the rear, therefore a rear test was not performed.



## STATIC TOWING TEST DATA FORM

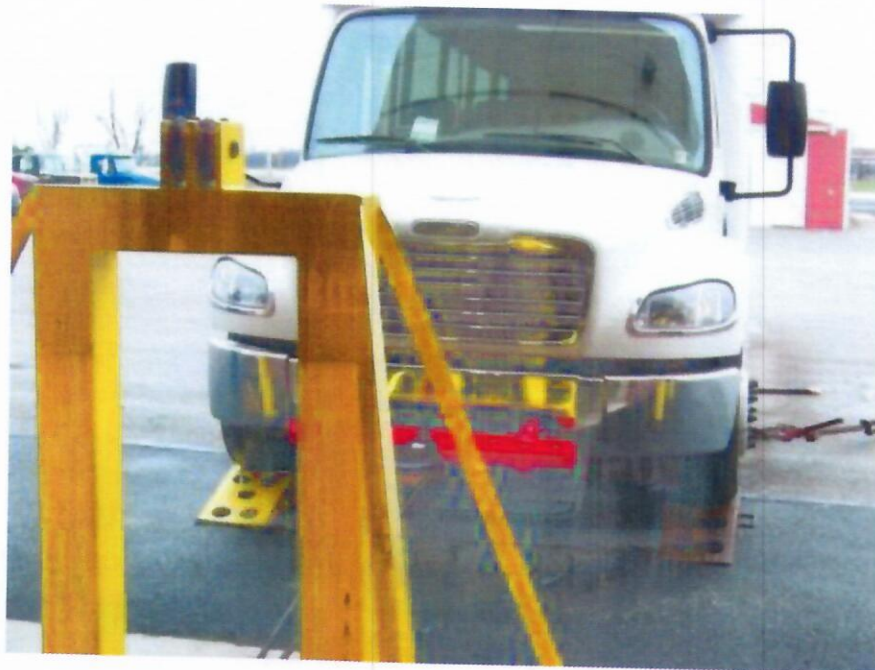
|                              |                      |
|------------------------------|----------------------|
| Bus Number: 0911             | Date: 11-19-09       |
| Personnel: B.L., T.S. & S.C. | Temperature (°F): 50 |

|   |
|---|
| <b>Inspect right front tow hooks and adjoining structure.</b>                           |
| Comments: No damage or deformation observed.  |
| <b>Check the torque of all bolts attaching tow hooks and surrounding structure.</b>     |
| Comments: Torques verified.   |
| <b>Inspect left tow hooks and adjoining structure.</b>                                  |
| Comments: No damage or deformation observed.  |
| <b>Check the torque of all bolts attaching tow hooks and surrounding structure.</b>     |
| Comments: Torques verified.   |
| <b>Inspect right rear tow hooks and adjoining structure.</b>                            |
| Comments: N/A   |
| <b>Check the torque of all bolts attaching tow hooks and surrounding structure.</b>     |
| Comments: N/A   |
| <b>Inspect left rear tow hooks and adjoining structure.</b>                             |
| Comments: N/A   |
| <b>Check the torque of all bolts attaching tow hooks and surrounding structure.</b>     |
| Comments: N/A   |
| <b>General comments of any other structure deformation or failure:</b> All four front   |
| Pulls were completed to the full target test load of 19,728 lbs. (1.2 x 16,440 lbs CW). |
| No damage or deformation was observed. Manufacturer recommends no towing                |
| from the rear.  |

### 5.3 STATIC TOWING TEST



FRONT 20° UPWARD PULL



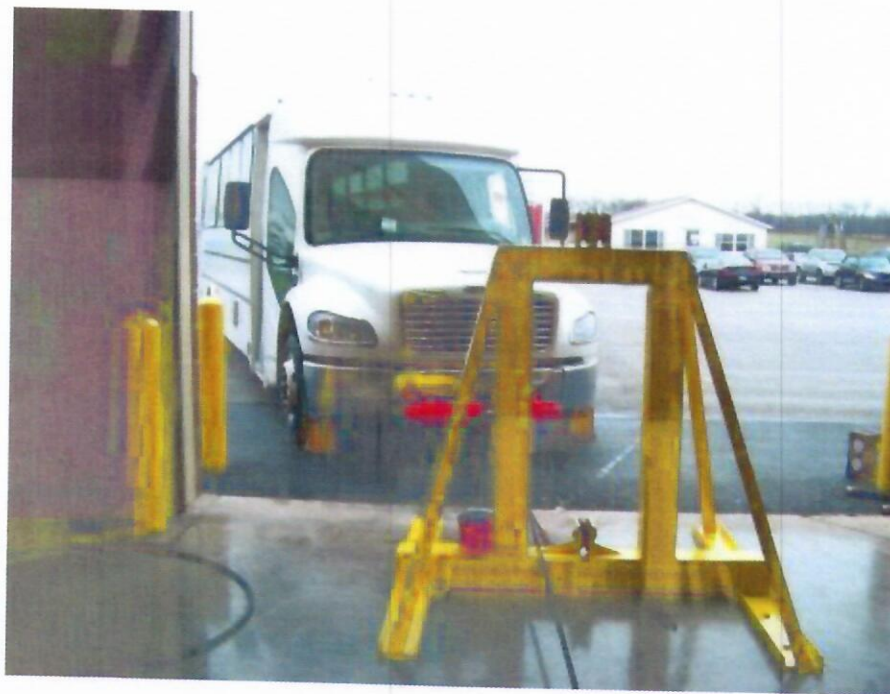
20° DOWN PULL



### 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: 0911       | Date: 10-7-09 |
| Personnel: S.C. & B.L. |               |

|                                    |                      |
|------------------------------------|----------------------|
| Temperature (°F): 56               | Humidity (%): 63     |
| Wind Direction: SE                 | Wind Speed (mph): 12 |
| Barometric Pressure (in.Hg): 30.01 |                      |

|   |
|---|
| <b>Inspect tow equipment-bus interface.</b>   |
| <b>Comments:</b> A safe and adequate connection was made between the tow equipment and the bus.         |
| <b>Inspect tow equipment-wrecker interface.</b>   |
| <b>Comments:</b> A safe and adequate connection was made between the tow equipment and the wrecker.     |
| <b>Towing Comments:</b> A front lift tow was performed incorporating a hydraulic under lift wrecker.    |
|   |
|   |
| <b>Description and location of any structural damage:</b> None noted.                                   |
|   |
| <b>General Comments:</b> No problems with the tow or towing interface were encountered during the test. |
|   |

## 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 5.0 inches to 14.6 inches. No deformation or damage was observed during testing. A complete listing of jacking point clearances is provided in the Jacking Test Data Form.

### JACKING CLEARANCE SUMMARY

| Condition                  | Frame Point Clearance |
|----------------------------|-----------------------|
| Front axle – one tire flat | 8.5"                  |
| Rear axle – one tire flat  | 13.5"                 |
| Rear axle – two tires flat | 11.2"                 |

## JACKING TEST DATA FORM

|                        |                      |
|------------------------|----------------------|
| Bus Number: 0911       | Date: 6-17-09        |
| Personnel: E.D. & E.L. | Temperature (°F): 63 |

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

| Deflated Tire   | Jacking Pad Clearance<br>Body/Frame<br>(in) | Jacking Pad Clearance<br>Axle/Suspension<br>(in) | Comments |
|---|---|--|----------|
| Right front   | 12.1 " I<br>8.5 " D                         | 7.2 " I<br>5.0 " D                               |          |
| Left front  | 12.0 " I<br>8.5 " D                         | 7.2 " I<br>5.1 " D                               |          |
| Right rear—outside  | 13.9 " I<br>13.5 " D                        | 14.7 " I<br>14.3 " D                             |          |
| Right rear—both   | 13.9 " I<br>11.2 " D                        | 14.7 " I<br>12.8 " D                             |          |
| Left rear—outside   | 14.1 " I<br>13.7 " D                        | 15.0 " I<br>14.6 " D                             |          |
| Left rear—both  | 14.1 " I<br>11.3 " D                        | 15.0 " I<br>13.0 " 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   |          |
| <b>Additional comments of any deformation or difficulty during jacking:</b> |   |  |          |
| 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.

## HOISTING TEST DATA FORM

|                              |                      |
|------------------------------|----------------------|
| Bus Number: 0911             | Date: 6-18-09        |
| Personnel: E.D., E.L. & P.S. | Temperature (°F): 68 |

|  |
|--|
| <b>Comments of any structural damage to the jacking pads or axles while both the front wheels are supported by the jack stands:</b>          |
| None noted.  |
|  |
|  |
|  |
|  |
|  |
| <b>Comments of any structural damage to the jacking pads or axles while both the rear wheels are supported by the jack stands:</b>           |
| None noted.  |
|  |
|  |
|  |
|  |
|  |
| <b>Comments of any structural damage to the jacking pads or axles while both the front and rear wheels are supported by the jack stands:</b> |
| 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 3, 2009 and was conducted until November 23, 2009. The first 4,625 miles were performed at a GVW of 24,540 lbs. and completed on September 17, 2009. The next 2,000 mile SLW segment was performed at 21,630 lbs and completed on September 30, 2009, and the final 4,625 mile segment was performed at a CW of 16,440 lbs and completed on November 23, 2009.

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.

**Wright Bus- TEST BUS #0911**

**MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS**

| DATE                   | TOTAL<br>DURABILITY<br>TRACK | TOTAL<br>OTHER<br>MILES | TOTAL  |
|------------------------|------------------------------|-------------------------|--------|
| 6-29-09 TO<br>07/05/09 | 0.00                         | 45.00                   | 45.00  |
| 6-29-09 TO<br>07/05/09 | 81.00                        | 3.00                    | 84.00  |
| 7-13-09 TO<br>07/19/09 | 410.00                       | 36.00                   | 446.00 |
| 7-20-09 TO<br>07/26/09 | 130.00                       | 6.00                    | 136.00 |
| 7-27-09 TO<br>08/02/09 | 715.00                       | 49.00                   | 764.00 |
| 8-03-09 TO<br>08/09/09 | 800.00                       | 40.00                   | 840.00 |
| 8-10-09 TO<br>08/16/09 | 220.00                       | 41.00                   | 261.00 |
| 8-17-09 TO<br>08/23/09 | 58.00                        | 3.00                    | 61.00  |
| 8-24-09 TO<br>08/30/09 | 54.00                        | 1.00                    | 55.00  |
| 8-31-09 TO<br>09/06/09 | 61.00                        | 4.00                    | 65.00  |
| 9-07-09 TO<br>09/13/09 | 448.00                       | 20.00                   | 468.00 |
| 9-14-09 TO<br>09/20/09 | 755.00                       | 40.00                   | 795.00 |
| 9-21-09 TO<br>09/27/09 | 891.00                       | 51.00                   | 942.00 |
| 9-28-09 TO<br>10/04/09 | 682.00                       | 31.00                   | 713.00 |



**Wright Bus- TEST BUS #0911**  
**MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS**

|                         |         |         |          |
|-------------------------|---------|---------|----------|
| 10-05-09 TO<br>10/11/09 | 1.00    | 1.00    | 2.00     |
| 10-12-09 TO<br>10/18/09 | 786.00  | 86.00   | 872.00   |
| 10-19-09 TO<br>10/25/09 | 380.00  | 164.00  | 544.00   |
| 10-26-09 TO<br>11/01/09 | 923.00  | 141.00  | 1064.00  |
| 11-02-09 TO<br>11/08/09 | 1273.00 | 141.00  | 1414.00  |
| 11-09-09 TO<br>11/15/09 | 83.00   | 1500.00 | 1583.00  |
| 11-16-09 TO<br>11/22/09 | 0.00    | 0.00    | 0.00     |
| 11-23-09 TO<br>11/29/09 | 0.00    | 101.00  | 101.00   |
|                         |         |         |          |
| TOTAL                   | 8751.00 | 2504.00 | 11255.00 |

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

| STANDARD OPERATING SCHEDULE |          |        |
|-----------------------------|----------|--------|
| Monday through Friday       |          |        |
|                             | Hour     | Action |
| Shift 1                     | midnight | D      |
|                             | 1:40 am  | C      |
|                             | 1:50 am  | B      |
|                             | 2:00 am  | D      |
|                             | 3:35 am  | C      |
|                             | 3:45 am  | B      |
|                             | 4:05 am  | D      |
|                             | 5:40 am  | C      |
|                             | 5:50 am  | B      |
|                             | 6:00 am  | D      |
|                             | 7:40 am  | C      |
| Shift 2                     | 7:50 am  | F      |
|                             | 8:00 am  | D      |
|                             | 9:40 am  | C      |
|                             | 9:50 am  | B      |
|                             | 10:00 am | D      |
|                             | 11:35 am | C      |
|                             | 11:45 am | B      |
|                             | 12:05 pm | D      |
|                             | 1:40 pm  | C      |
|                             | 1:50 pm  | B      |
|                             | 2:00 pm  | D      |
| Shift 3                     | 3:40 pm  | C      |
|                             | 3:50 pm  | F      |
|                             | 4:00 pm  | D      |
|                             | 5:40 pm  | C      |
|                             | 5:50 pm  | B      |
|                             | 6:00 pm  | D      |
|                             | 7:40 pm  | C      |
|                             | 7:50 pm  | B      |
|                             | 8:05 pm  | D      |
|                             | 9:40 pm  | C      |
|                             | 9:50 pm  | B      |
|                             | 10:00 pm | D      |
|                             | 11:40 pm | C      |
|                             | 11:50 pm | F      |

B—Break

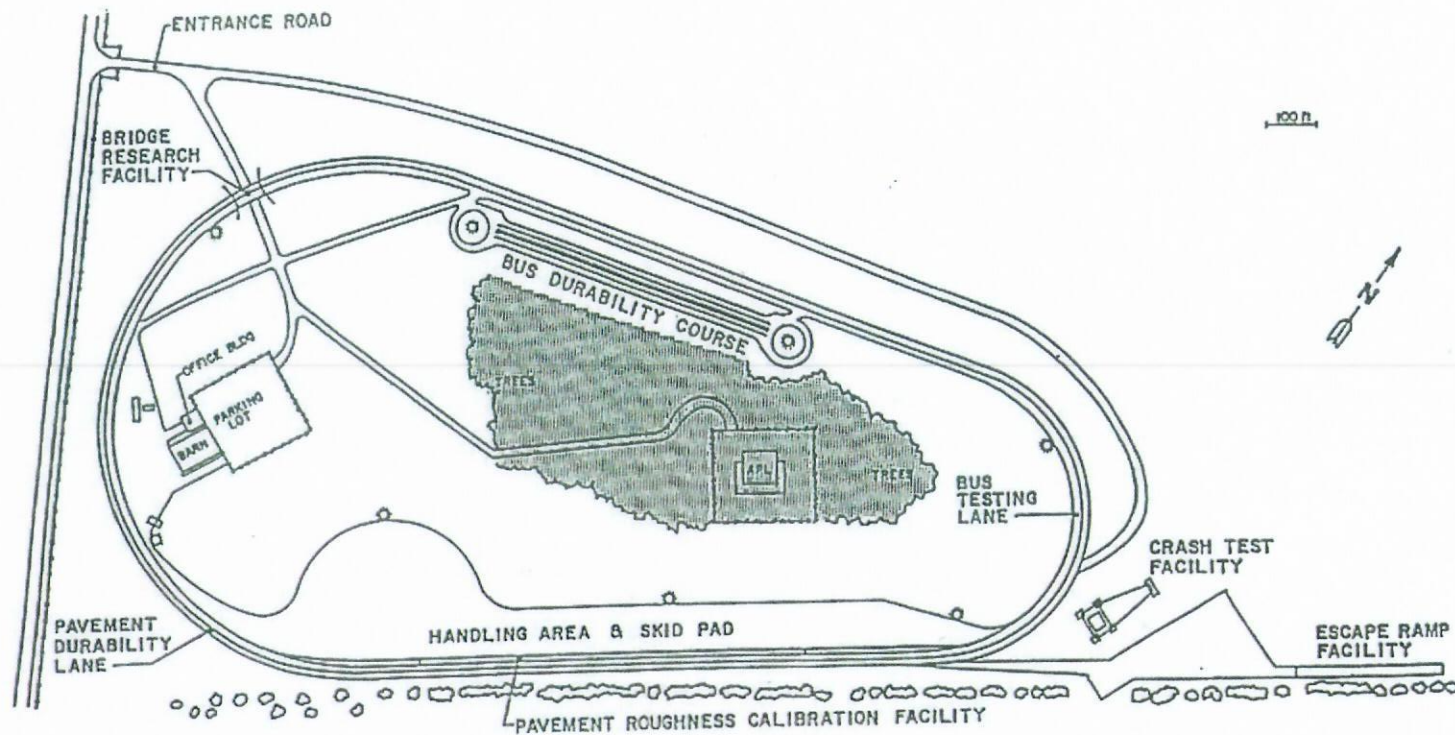
C—Cycle all systems five times, visual inspection, driver's log entries

D—Drive bus as specified by procedure

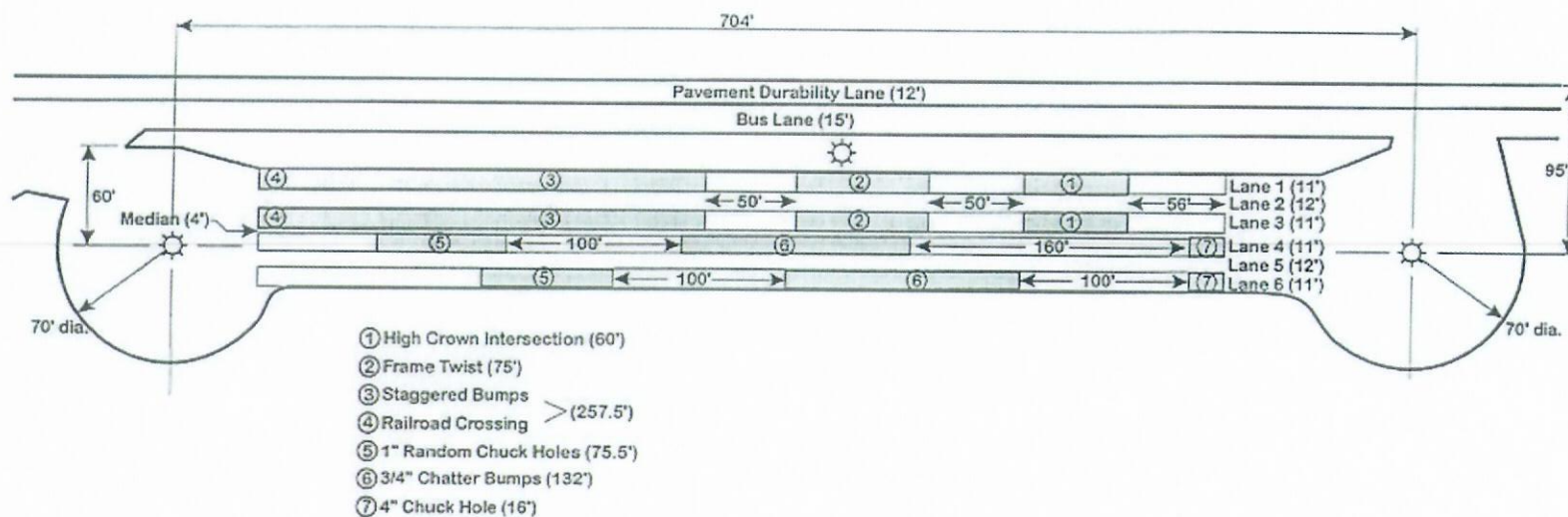
F—Fuel bus, complete driver's log shift entries



**“PLAN VIEW OF PENN STATE BUS TESTING AND  
RESEARCH FACILITY”**



**BUS TESTING AND RESEARCH TEST TRACK  
UNIVERSITY PARK, PA**



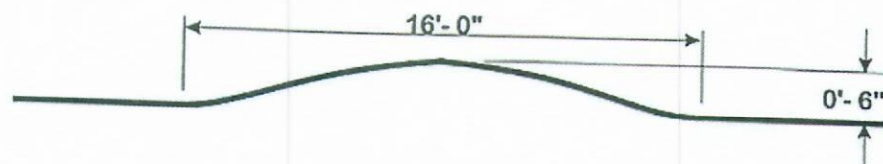
Plan View

## Vehicle Durability Test Track

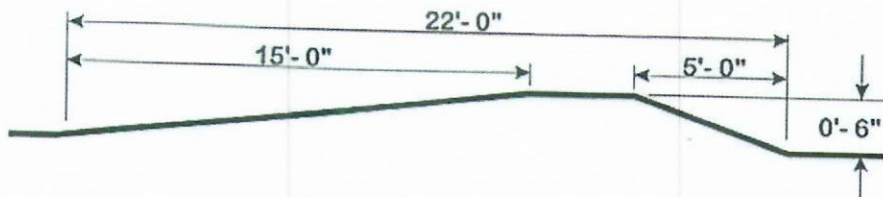
The Pennsylvania Transportation Institute  
Penn State



Staggered  
Bumps  
(10 mph)



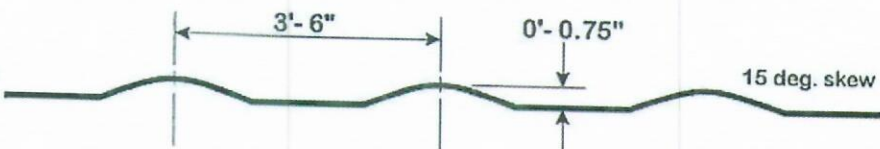
Railroad  
Crossing  
(8 mph)



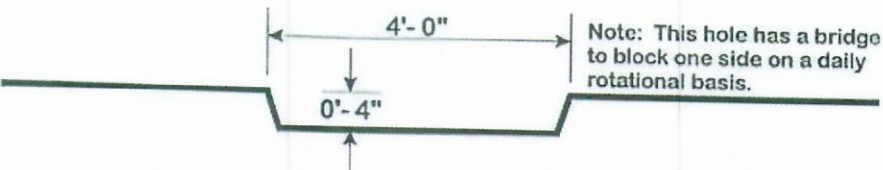
1" Random  
Chuck Holes  
(20 mph)



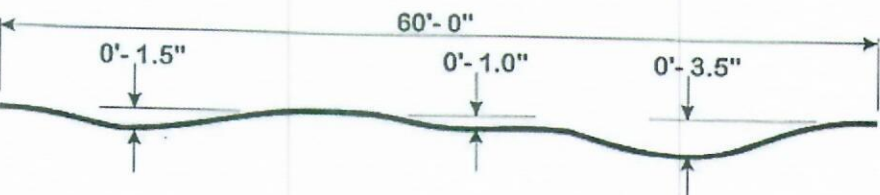
Chatter Bumps  
(20 mph)



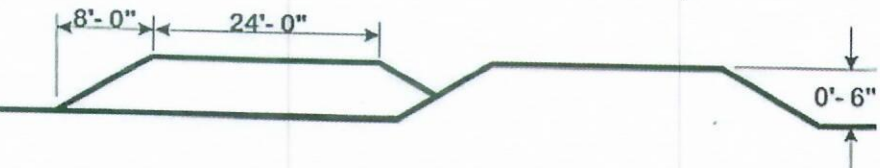
4" Chuck Hole  
(5 mph)



High Crown  
Intersection  
(20 mph)



Frame Twist  
(10 mph)



## Durability Element Profiles

The Pennsylvania Transportation Institute  
Penn State

(Page 1 of 1)  
**UNSCHEDULED MAINTENANCE**  
 Champion Bus #0911

| DATE     | TEST<br>MILES | SERVICE   | ACTIVITY   | MAN<br>HOURS | DOWN<br>TIME |
|----------|---------------|---|--|--------------|--------------|
| 10-07-09 | 5,677         | Bus will not go in to Re-Gen. "Engine shut down" light on.  | Towed bus to warranty dealer. Warranty dealer performed "forced" Re-Gen. | 4.00         | 168.00       |
| 10-22-09 | 6,793         | The battery hold came loose and wore a hole in the battery. | Replaced damaged battery with used battery. Ordered new battery.         | 1.00         | 1.00         |
| 10-27-09 | 7,443         | Battery that was ordered on 10/22/09 arrived.               | Installed new battery.   | 1.00         | 1.00         |
|          |               |   |  |              |              |



## **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  $\pm 4$  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

| phase | miles per phase | total miles<br>per run |
|-------|-----------------|------------------------|
| CBD   | 1.9097          | 5.7291                 |
| ART   | 1.9097          | 3.8193                 |
| COM   | 3.8193          | 3.8193                 |

$$FE_{o_{mi/lb}} = \text{Observed fuel economy} = \frac{\text{miles}}{\text{lb of fuel}}$$

- 2.) Convert the observed fuel economy to miles per gallon [mpg] by multiplying by the specific gravity of the test fuel  $G_s$  (referred to water) at 60°F and multiply by the density of water at 60°F

$$FE_{o_{mpg}} = FE_{c_{mi/lb}} \times G_s \times G_w$$

where  $G_s$  = Specific gravity of test fuel at 60°F (referred to water)  
 $G_w$  = 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.

$$FE_c = FE_{o_{mpg}} \times \frac{Q}{H}$$

where

$H$  = Volumetric heating value of test fuel [BTU/gal]

$Q$  = Volumetric heating value of standard reference fuel

Combining steps 1-3 yields

$$\Rightarrow FE_c = \frac{\text{miles}}{\text{lbs}} \times (G_s \times G_w) \times \frac{Q}{H}$$

- 4.) Convert 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/BTU $\times 10^6$ .

$E_q$  = Energy equivalent of converting mpg to mile/BTU $\times 10^6$ .

$$E_q = ((\text{mpg})/(H)) \times 10^6$$

## 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  $T=60^\circ\text{F}$ ). These combine to give a fuel economy in miles per lb. The energy equivalent



(mile/BTUx10<sup>6</sup>) 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.

| phase | miles per phase | total miles<br>per run |
|-------|-----------------|------------------------|
| CBD   | 1.9097          | 5.7291                 |
| ART   | 1.9097          | 3.8193                 |
| COM   | 3.8193          | 3.8193                 |

$$FE_{mi/scf} = \text{Observed fuel economy} = \frac{\text{miles}}{\text{scf of fuel}}$$

- 2.) Convert the observed fuel economy to miles per lb by dividing FEO by the density of the test fuel at standard conditions (Lb/ft<sup>3</sup>).

**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.

$$FE_{mi/lb} = FEO / G_m$$

where  $G_m$  = Density of test fuel at standard conditions

- 3.) Convert the observed fuel economy (FE<sub>mi/lb</sub>) to an energy equivalent of (miles/BTUx10<sup>6</sup>) by dividing the observed fuel economy (FE<sub>mi/lb</sub>) by the heating value of the test fuel at standard conditions.

$$Eq = ((FE_{mi/lb})/H) \times 10^6$$

where

Eq = Energy equivalent of miles/lb to mile/BTUx10<sup>6</sup>

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 19,631.0 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 127,700.0 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 – 6.39 mpg, ART – 6.86 mpg, and COM – 14.21 mpg. Average fuel consumption at idle was 0.44 gph.



## FUEL ECONOMY PRE-TEST MAINTENANCE FORM

|                              |                |                   |
|------------------------------|----------------|-------------------|
| Bus Number: 0911             | Date: 10-19-09 | SLW (lbs): 21,630 |
| Personnel: J.P., B.L. & S.C. |                |                   |

| FUEL SYSTEM                                  | OK     | Date     | Initials |
|--|--------|----------|----------|
| Install fuel measurement system              | ✓      | 10/19/09 | S.C.     |
| Replace fuel filter                          | ✓      | 10/19/09 | B.L.     |
| Check for fuel leaks                         | ✓      | 10/19/09 | S.C.     |
| Specify fuel type (refer to fuel analysis)   | Diesel |          |          |
| Remarks: None noted.                         |        |          |          |
|  |        |          |          |
| BRAKES/TIRES                                 | OK     | Date     | Initials |
| Inspect hoses                                | ✓      | 10/19/09 | J.P.     |
| Inspect brakes                               | ✓      | 10/19/09 | J.P.     |
| Relube wheel bearings                        | ✓      | 10/19/09 | J.P.     |
| Check tire inflation pressures (mfg. specs.) | ✓      | 10/19/09 | S.C.     |
| Remarks: None noted.                         |        |          |          |
|  |        |          |          |
| COOLING SYSTEM                               | OK     | Date     | Initials |
| Check hoses and connections                  | ✓      | 10/19/09 | S.C.     |
| Check system for coolant leaks               | ✓      | 10/19/09 | S.C.     |
| Remarks: None noted.                         |        |          |          |
|  |        |          |          |

## FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 2)

|   |    |                |          |
|---|----|----------------|----------|
| Bus Number: 0911                          |    | Date: 10-19-09 |          |
| Personnel: S.C., J.P. & B.L.              |    |                |          |
| <b>ELECTRICAL SYSTEMS</b>                 | OK | Date           | Initials |
| Check battery                             | ✓  | 10/19/09       | S.C.     |
| Inspect wiring                            | ✓  | 10/19/09       | S.C.     |
| Inspect terminals                         | ✓  | 10/19/09       | S.C.     |
| Check lighting                            | ✓  | 10/19/09       | S.C.     |
| Remarks: None noted.                      |    |                |          |
|   |    |                |          |
| <b>DRIVE SYSTEM</b>                       | OK | Date           | Initials |
| Drain transmission fluid                  | ✓  | 10/19/09       | J.P.     |
| Replace filter/gasket                     | ✓  | 10/19/09       | J.P.     |
| Check hoses and connections               | ✓  | 10/19/09       | J.P.     |
| Replace transmission fluid                | ✓  | 10/19/09       | J.P.     |
| Check for fluid leaks                     | ✓  | 10/19/09       | J.P.     |
| Remarks: None noted.                      |    |                |          |
|   |    |                |          |
| <b>LUBRICATION</b>                        | OK | Date           | Initials |
| Drain crankcase oil                       | ✓  | 10/19/09       | B.L.     |
| Replace filters                           | ✓  | 10/19/09       | B.L.     |
| Replace crankcase oil                     | ✓  | 10/19/09       | B.L.     |
| Check for oil leaks                       | ✓  | 10/19/09       | B.L.     |
| Check oil level                           | ✓  | 10/19/09       | B.L.     |
| Lube all chassis grease fittings          | ✓  | 10/19/09       | B.L.     |
| Lube universal joints                     | ✓  | 10/19/09       | B.L.     |
| Replace differential lube including axles | ✓  | 10/19/09       | B.L.     |
| Remarks: None noted.                      |    |                |          |
|   |    |                |          |



# **FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 3)**

|   |     |                |          |
|---|-----|----------------|----------|
| Bus Number: 0911                          |     | Date: 10-19-09 |          |
| Personnel: S.C.                           |     |                |          |
| EXHAUST/EMISSION SYSTEM                   | OK  | Date           | Initials |
| Check for exhaust leaks                   | ✓   | 10/19/09       | S.C.     |
| Remarks: None noted.                      |     |                |          |
| ENGINE                                    | OK  | Date           | Initials |
| Replace air filter                        | ✓   | 10/19/09       | B.L.     |
| Inspect air compressor and air system     | ✓   | 10/19/09       | B.L.     |
| Inspect vacuum system, if applicable      | N/A | 10/19/09       | B.L.     |
| Check and adjust all drive belts          | ✓   | 10/19/09       | B.L.     |
| Check cold start assist, if applicable    | ✓   | 10/19/09       | B.L.     |
| Remarks: None noted.                      |     |                |          |
| STEERING SYSTEM                           | OK  | Date           | Initials |
| Check power steering hoses and connectors | ✓   | 10/19/09       | S.C.     |
| Service fluid level                       | ✓   | 10/19/09       | S.C.     |
| Check power steering operation            | ✓   | 10/19/09       | S.C.     |
| Remarks: None noted.                      |     |                |          |
|   | OK  | Date           | Initials |
| Ballast bus to seated load weight         | ✓   | 10/19/09       | S.C.     |
| TEST DRIVE                                | OK  | Date           | Initials |
| Check brake operation                     | ✓   | 10/19/09       | S.C.     |
| Check transmission operation              | ✓   | 10/19/09       | S.C.     |
| Remarks: None noted.                      |     |                |          |

# FUEL ECONOMY PRE-TEST INSPECTION FORM

|  |                |
|--|----------------|
| Bus Number: 0911   | Date: 10-21-09 |
| Personnel:   |                |
| PRE WARM-UP  | If OK, Initial |
| Fuel Economy Pre-Test Maintenance Form is complete   | S.C.           |
| Cold tire pressure (psi): Front <u>120</u> Middle <u>N/A</u> Rear <u>120</u>   | S.C.           |
| Tire wear:   | S.C.           |
| Engine oil level   | S.C.           |
| Engine coolant level   | S.C.           |
| Interior and exterior lights on, evaporator fan on   | S.C.           |
| Fuel economy instrumentation installed and working properly.   | S.C.           |
| Fuel line -- no leaks or kinks   | S.C.           |
| Speed measuring system installed on bus. Speed indicator installed in front of bus and accessible to TECH and Driver.  | S.C.           |
| Bus is loaded to SLW   | S.C.           |
| WARM-UP  | If OK, Initial |
| Bus driven for at least one hour warm-up   | S.C.           |
| No extensive or black smoke from exhaust   | S.C.           |
| POST WARM-UP   | If OK, Initial |
| Warm tire pressure (psi): Front <u>125</u> Middle <u>N/A</u> Rear <u>128</u>   | S.C.           |
| Environmental conditions<br>Average wind speed <12 mph and maximum gusts <15 mph<br>Ambient temperature between 30°F(-1C°) and 90°F(32°C)<br>Track surface is dry<br>Track is free of extraneous material and clear of interfering traffic | S.C.           |



### FUEL ECONOMY DATA FORM (Liquid Fuels)

|  |  |                                    |  |                                    |  |
|--|--|------------------------------------|--|------------------------------------|--|
| Bus Number: 0911   |  | Manufacturer: Champion             |  | Date: 10-20-09                     |  |
| Run Number: 1  |  | Personnel: B.L., T.S. & S.C.       |  |                                    |  |
| Test Direction: <input type="checkbox"/> CW or <input checked="" type="checkbox"/> CCW |  | Temperature (°F): 62               |  | Humidity (%): 78                   |  |
| SLW (lbs): 21,630  |  | Wind Speed (mph) & Direction: Calm |  | Barometric Pressure (in.Hg): 30.15 |  |

| Cycle Type              | Time (min:sec) |        | Cycle Time (min:sec) | Fuel Temperature (°C) | Flow Meter Reading (gals) |        | Fuel Used (gals) |
|-------------------------|----------------|--------|----------------------|-----------------------|---------------------------|--------|------------------|
|                         | Start          | Finish |                      |                       | Start                     | Finish |                  |
| CBD #1                  | 0              | 8:25   | 8:25                 | 27.2                  | 0                         | .295   | .295             |
| ART #1                  | 0              | 3:53   | 3:53                 | 30.4                  | 0                         | .260   | .260             |
| CBD #2                  | 0              | 8:29   | 8:29                 | 32.4                  | 0                         | .301   | .301             |
| ART #2                  | 0              | 3:58   | 3:58                 | 41.8                  | 0                         | .250   | .250             |
| CBD #3                  | 0              | 8:26   | 8:26                 | 34.8                  | 0                         | .309   | .309             |
| COMMUTER                | 0              | 5:58   | 8:58                 | 42.2                  | 0                         | .286   | .286             |
| Total Fuel = 1.701 gals |                |        |                      |                       |                           |        |                  |

|   |
|---|
| 5 minute idle*: Total Fuel Used = .038 gals *   |
| Heating Value = 19,631.0 BTU/LB   |
| Comments: A 5 minute idle was performed instead of a 20 minute idle due to design. This bus is designed with a "no-idle" 5 minute shutdown. |

### FUEL ECONOMY DATA FORM (Liquid Fuels)

|  |  |                                      |  |                                    |  |
|--|--|--------------------------------------|--|------------------------------------|--|
| Bus Number: 0911   |  | Manufacturer: Champion               |  | Date: 10-21-09                     |  |
| Run Number: 2  |  | Personnel: B.L., B.S. & S.C.         |  |                                    |  |
| Test Direction: <input checked="" type="checkbox"/> CW or <input type="checkbox"/> CCW |  | Temperature (°F): 51                 |  | Humidity (%): 72                   |  |
| SLW (lbs): 21,630  |  | Wind Speed (mph) & Direction: 7 / SW |  | Barometric Pressure (in.Hg): 30.24 |  |

| Cycle Type                                  | Time (min:sec) |        | Cycle Time (min:sec) | Fuel Temperature (°C) | Flow Meter Reading (gals) |        | Fuel Used (gals) |
|---|----------------|--------|----------------------|-----------------------|---------------------------|--------|------------------|
|   | Start          | Finish |                      |                       | Start                     | Finish |                  |
| CBD #1                                      | 0              | 8:22   | 8:22                 | 25.4                  | 0                         | .302   | .302             |
| ART #1                                      | 0              | 3:56   | 3:56                 | 26.4                  | 0                         | .266   | .266             |
| CBD #2                                      | 0              | 8:25   | 8:25                 | 26.9                  | 0                         | .299   | .299             |
| ART #2                                      | 0              | 3:55   | 3:55                 | 27.5                  | 0                         | .254   | .254             |
| CBD #3                                      | 0              | 8:27   | 8:27                 | 28.6                  | 0                         | .290   | .290             |
| COMMUTER                                    | 0              | 5:56   | 5:56                 | 27.2                  | 0                         | .265   | .265             |
| Total Fuel = 1.676 gals                     |                |        |                      |                       |                           |        |                  |
| 20 minute idle : Total Fuel Used = N/A gals |                |        |                      |                       |                           |        |                  |
| Heating Value = 19,631.0 BTU/LB             |                |        |                      |                       |                           |        |                  |
| Comments: None noted.                       |                |        |                      |                       |                           |        |                  |



### FUEL ECONOMY DATA FORM (Liquid Fuels)

|  |  |                                      |  |                                    |  |
|--|--|--------------------------------------|--|------------------------------------|--|
| Bus Number: 0911   |  | Manufacturer: Champion               |  | Date: 10-21-09                     |  |
| Run Number: 3  |  | Personnel: B.S., B.L. & S.C.         |  |                                    |  |
| Test Direction: <input type="checkbox"/> CW or <input checked="" type="checkbox"/> CCW |  | Temperature (°F): 56                 |  | Humidity (%): 72                   |  |
| SLW (lbs): 21,630  |  | Wind Speed (mph) & Direction: 4 / SW |  | Barometric Pressure (in.Hg): 30.24 |  |

| Cycle Type              | Time (min:sec) |        | Cycle Time (min:sec) | Fuel Temperature (°C) | Flow Meter Reading (gals) |        | Fuel Used (gals) |
|-------------------------|----------------|--------|----------------------|-----------------------|---------------------------|--------|------------------|
|                         | Start          | Finish |                      |                       | Start                     | Finish |                  |
| CBD #1                  | 0              | 8:29   | 8:29                 | 26.8                  | 0                         | .320   | .320             |
| ART #1                  | 0              | 3:59   | 3:59                 | 27.6                  | 0                         | .266   | .266             |
| CBD #2                  | 0              | 8:30   | 8:30                 | 29.8                  | 0                         | .320   | .320             |
| ART #2                  | 0              | 4:01   | 4:01                 | 28.8                  | 0                         | .253   | .253             |
| CBD #3                  | 0              | 8:27   | 8:27                 | 30.2                  | 0                         | .180   | .180             |
| COMMUTER                | 0              | 6:01   | 6:01                 | 33.6                  | 0                         | .194   | .194             |
| Total Fuel = 1.533 gals |                |        |                      |                       |                           |        |                  |

|   |
|---|
| 20 minute idle : Total Fuel Used = N/A gals |
| Heating Value = 19,631 BTU/LB               |
| Comments: None noted.                       |
|   |

### FUEL ECONOMY DATA FORM (Liquid Fuels)

|   |  |                                      |  |                                    |  |
|---|--|--------------------------------------|--|------------------------------------|--|
| Bus Number: 0911  |  | Manufacturer: Champion               |  | Date: 10-21-09                     |  |
| Run Number: 4   |  | Personnel: B.S., B.L. & S.C.         |  |                                    |  |
| Test Direction: <input type="checkbox"/> CW or <input type="checkbox"/> CCW |  | Temperature (°F): 65                 |  | Humidity (%): 70                   |  |
| SLW (lbs): 21,630   |  | Wind Speed (mph) & Direction: 4 / SW |  | Barometric Pressure (in.Hg): 30.24 |  |

| Cycle Type              | Time (min:sec) |        | Cycle Time (min:sec) | Fuel Temperature (°C) | Flow Meter Reading (gals) |        | Fuel Used (gals) |
|-------------------------|----------------|--------|----------------------|-----------------------|---------------------------|--------|------------------|
|                         | Start          | Finish |                      |                       | Start                     | Finish |                  |
| CBD #1                  | 0              | 8:21   | 8:21                 | 29.2                  | 0                         | .125   | .125             |
| ART #1                  | 0              | 3:54   | 3:54                 | 33.7                  | 0                         | .252   | .252             |
| CBD #2                  | 0              | 8:29   | 8:29                 | 35.4                  | 0                         | .294   | .294             |
| ART #2                  | 0              | 3:58   | 3:58                 | 39.8                  | 0                         | .252   | .252             |
| CBD #3                  | 0              | 8:29   | 8:29                 | 47.5                  | 0                         | .297   | .297             |
| COMMUTER                | 0              | 6:02   | 6:02                 | 41.4                  | 0                         | .269   | .269             |
| Total Fuel = 1.489 gals |                |        |                      |                       |                           |        |                  |

|   |
|---|
| 5 minute idle*: Total Fuel Used = .035 gals   |
| Heating Value = 19,631.0 BTU/LB   |
| Comments: A 5 minute idle was performed instead of a 20 minute idle due to design. This bus is designed with a "no-idle" 5 minute shutdown. |



0911 .ful  
FUEL ECONOMY SUMMARY SHEET

BUS MANUFACTURER :Champion  
BUS MODEL :Defender

BUS NUMBER :0911  
TEST DATE :10/21/09

FUEL TYPE : DIESEL  
SP. GRAVITY : .8400  
HEATING VALUE : 19631.00 BTU/Lb  
FUEL TEMPERATURE : 60.00 deg F  
Standard Conditions : 60 deg F and 14.7 psi  
Density of Water : 8.3373 lb/gallon at 60 deg F

| CYCLE         | TOTAL FUEL<br>USED(GAL) | TOTAL MILES | FUEL ECONOMY<br>MPG(Measured) | FUEL ECONOMY<br>MPG (Corrected) |
|---------------|-------------------------|-------------|-------------------------------|---------------------------------|
| Run # :1, CCW |                         |             |                               |                                 |
| CBD           | .905                    | 5.73        | 6.331                         | 5.83                            |
| ART           | .510                    | 3.82        | 7.490                         | 6.90                            |
| COM           | .286                    | 3.82        | 13.357                        | 12.31                           |
| TOTAL         | 1.701                   | 13.37       | 7.860                         | 7.24                            |
| Run # :2, CW  |                         |             |                               |                                 |
| CBD           | .891                    | 5.73        | 6.431                         | 5.93                            |
| ART           | .520                    | 3.82        | 7.346                         | 6.77                            |
| COM           | .265                    | 3.82        | 14.415                        | 13.28                           |
| TOTAL         | 1.676                   | 13.37       | 7.977                         | 7.35                            |
| Run # :3, CCW |                         |             |                               |                                 |
| CBD           | .820                    | 5.73        | 6.988                         | 6.44                            |
| ART           | .519                    | 3.82        | 7.360                         | 6.78                            |
| COM           | .194                    | 3.82        | 19.691                        | 18.15                           |
| TOTAL         | 1.533                   | 13.37       | 8.721                         | 8.04                            |
| Run # :4, CW  |                         |             |                               |                                 |
| CBD           | .716                    | 5.73        | 8.003                         | 7.38                            |
| ART           | .504                    | 3.82        | 7.579                         | 6.98                            |
| COM           | .269                    | 3.82        | 14.201                        | 13.09                           |
| TOTAL         | 1.489                   | 13.37       | 8.979                         | 8.27                            |

-----  
IDLE CONSUMPTION (MEASURED)

First 20 Minutes Data : .04GAL Last 20 Minutes Data : .04GAL  
Average Idle Consumption : .11GAL/Hr

RUN CONSISTENCY: % Difference from overall average of total fuel used

Run 1 : -6.3 Run 2 : -4.8 Run 3 : 4.2 Run 4 : 6.9

-----  
SUMMARY (CORRECTED VALUES)

Average Idle Consumption : .12 G/Hr  
Average CBD Phase Consumption : 6.39 MPG  
Average Arterial Phase Consumption : 6.86 MPG  
Average Commuter Phase Consumption : 14.21 MPG  
Overall Average Fuel Consumption : 7.73 MPG  
Overall Average Fuel Consumption : 56.20 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 43.5 dB(A); ranging from 42.1 dB(A) in line with the middle speaker to 44.8 dB(A) at the driver's seat. 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 67.8 dB(A) at the middle passenger seats to 74.3 dB(A) at the driver's seat. The overall average was 70.5 dB(A). The interior ambient noise level for this test was < 34.0 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: 0911  | Date: 6-12-09                            |
| Personnel: T.S. & S.C.                                    |  |
| Temperature (°F): 71                                      | Humidity (%): 72                         |
| Wind Speed (mph): Calm                                    | Wind Direction: Calm                     |
| Barometric Pressure (in.Hg): 30.11                        |  |
| Initial Sound Level Meter Calibration: ■ checked by: S.C. |  |
| Interior Ambient Noise Level dB(A): < 34.0                | Exterior Ambient Noise Level dB(A): 48.5 |
| Microphone Height During Testing (in): 48.0               |  |

| Measurement Location        | Measured Sound Level dB(A) |
|-----------------------------|----------------------------|
| Driver's Seat               | 44.8                       |
| Front Passenger Seats       | 43.6                       |
| In Line with Front Speaker  | 42.1                       |
| In Line with Middle Speaker | 43.1                       |
| In Line with Rear Speaker   | 43.3                       |
| Rear Passenger Seats        | 43.9                       |

|   |
|---|
| Final Sound Level Meter Calibration: ■ checked by: S.C. |
|---|

|  |
|--|
| <b>Comments:</b> All readings taken in the center aisle. |
|  |
|  |
|  |
|  |
|  |

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

|   |  |
|---|--|
| Bus Number: 0911  | Date: 10-22-09                           |
| Personnel: B.S., B.L. & S.C.                              |  |
| Temperature (°F): 61                                      | Humidity (%): 61                         |
| Wind Speed (mph): 5                                       | Wind Direction: SW                       |
| Barometric Pressure (in.Hg): 30.03                        |  |
| Initial Sound Level Meter Calibration: ■ checked by: S.C. |  |
| Interior Ambient Noise Level dB(A): < 34.0                | Exterior Ambient Noise Level dB(A): 49.9 |
| Microphone Height During Testing (in): 48.0               |  |

| Measurement Location   | Measured Sound Level dB(A) |
|------------------------|----------------------------|
| Driver's Seat          | 74.3                       |
| Front Passenger Seats  | 70.6                       |
| Middle Passenger Seats | 67.8                       |
| Rear Passenger Seats   | 69.3                       |

|   |
|---|
| Final Sound Level Meter Calibration: ■ checked by: S.C. |
|---|

|  |
|--|
| <b>Comments:</b> All readings taken in the center aisle.<br><br><br><br><br> |
|--|



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

|                                    |                    |
|------------------------------------|--------------------|
| Bus Number: 0911                   | Date: 10-22-09     |
| Personnel: B.S., B.L. & S.C.       |                    |
| Temperature (°F): 61               | Humidity (%): 61   |
| Wind Speed (mph): 5                | Wind Direction: SW |
| Barometric Pressure (in.Hg): 30.03 |                    |

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. |

|   |
|---|
| <p><b>Comment on any other vibration or noise source which may have occurred that is not described above:</b> None noted.</p> |
|   |
|   |
|   |
|   |

## 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 41.5 dB(A), the average test result obtained while accelerating from a constant speed was 71.6 dB(A) on the right side and 72.4 dB(A) on the left side.

When accelerating from a standstill with an exterior ambient noise level of 42.5 dB(A), the average of the results obtained were 69.5 dB(A) on the right side and 70.3 dB(A) on the left side.

With the vehicle stationary and the engine, accessories, and air conditioning on, the measurements averaged 62.9 dB(A) at low idle and 75.8 dB(A) at wide open throttle. With the accessories and air conditioning off, the readings averaged 2.6 dB(A) lower at low idle and 0.7 dB(A) lower at wide open throttle. The exterior ambient noise level measured during this test was 41.8 dB(A). Note; this test bus was not equipped with a high idle mode; therefore data for that condition is not available.



# **EXTERIOR NOISE TEST DATA FORM** **Accelerating from Constant Speed**

|  |                    |
|--|--------------------|
| Bus Number: 0911   | Date: 10-22-09     |
| Personnel: B.S., B.L. & S.C.   |                    |
| Temperature (°F): 64   | Humidity (%): 61   |
| Wind Speed (mph): 5  | Wind Direction: SW |
| Barometric Pressure (in.Hg): 30.03   |                    |
| Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: <input checked="" type="checkbox"/> checked by: S.C. |                    |
| Initial Sound Level Meter Calibration: <input checked="" type="checkbox"/> checked by: S.C.  |                    |
| Exterior Ambient Noise Level dB(A): 41.5   |                    |

| Accelerating from Constant Speed<br>Curb (Right) Side   |                               | Accelerating from Constant Speed<br>Street (Left) Side     |                               |
|---|-------------------------------|--|-------------------------------|
| Run #   | Measured Noise<br>Level dB(A) | Run #  | Measured Noise Level<br>dB(A) |
| 1   | 70.8                          | 1  | 72.1                          |
| 2   | 71.2                          | 2  | 72.3                          |
| 3   | 71.5                          | 3  | 72.3                          |
| 4   | 71.3                          | 4  | 72.3                          |
| 5   | 71.6                          | 5  | 72.4                          |
| Average of two highest actual<br>noise levels = 71.6 dB(A)                                      |                               | Average of two highest actual<br>noise levels = 72.4 dB(A) |                               |
| Final Sound Level Meter Calibration Check: <input checked="" type="checkbox"/> checked by: S.C. |                               |  |                               |
| Comments: None noted.   |                               |  |                               |
|   |                               |  |                               |
|   |                               |  |                               |

# **EXTERIOR NOISE TEST DATA FORM** **Accelerating from Standstill**

|  |                    |
|--|--------------------|
| Bus Number: 0911   | Date: 11-22-09     |
| Personnel: B.S., B.L. & S.C.   |                    |
| Temperature (°F): 64   | Humidity (%): 61   |
| Wind Speed (mph): 5  | Wind Direction: SW |
| Barometric Pressure (in.Hg): 30.03   |                    |
| Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: <input checked="" type="checkbox"/> checked by: S.C. |                    |
| Initial Sound Level Meter Calibration: <input checked="" type="checkbox"/> checked by: S.C.  |                    |
| Exterior Ambient Noise Level dB(A): 42.5   |                    |

| Accelerating from Standstill<br>Curb (Right) Side   |                            | Accelerating from Standstill<br>Street (Left) Side      |                            |
|---|----------------------------|---|----------------------------|
| Run #   | Measured Noise Level dB(A) | Run #   | Measured Noise Level dB(A) |
| 1   | 69.6                       | 1   | 70.5                       |
| 2   | 69.1                       | 2   | 69.3                       |
| 3   | 69.4                       | 3   | 69.7                       |
| 4   | 69.3                       | 4   | 70.1                       |
| 5   | 68.7                       | 5   | 69.9                       |
| Average of two highest actual noise levels = 69.5 dB(A)   |                            | Average of two highest actual noise levels = 70.3 dB(A) |                            |
| Final Sound Level Meter Calibration Check: <input checked="" type="checkbox"/> checked by: S.C. |                            |   |                            |
| Comments: None noted.   |                            |   |                            |
|   |                            |   |                            |
|   |                            |   |                            |



# **EXTERIOR NOISE TEST DATA FORM** **Stationary**

| Bus Number: 0911   |            | Date: 10-22-09          |                          |
|--|------------|-------------------------|--------------------------|
| Personnel: B.S., B.L. & S.C.   |            |                         |                          |
| Temperature (°F): 64   |            | Humidity (%): 61        |                          |
| Wind Speed (mph): 5  |            | Wind Direction: SW      |                          |
| Barometric Pressure (in.Hg):   |            | 30.03                   |                          |
| Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: <input checked="" type="checkbox"/> checked by: S.C. |            |                         |                          |
| Initial Sound Level Meter Calibration: <input checked="" type="checkbox"/> checked by: S.C.  |            |                         |                          |
| Exterior Ambient Noise Level dB(A): 41.8   |            |                         |                          |
| Accessories and Air Conditioning ON  |            |                         |                          |
| Throttle Position  | Engine RPM | Curb (Right) Side dB(A) | Street (Left) Side db(A) |
|  |            | Measured                | Measured                 |
| Low Idle   | 798        | 62.2                    | 63.5                     |
| High Idle  | N/A        | N/A                     | N/A                      |
| Wide Open Throttle   | 2,675      | 76.0                    | 75.5                     |
| Accessories and Air Conditioning OFF   |            |                         |                          |
| Throttle Position  | Engine RPM | Curb (Right) Side dB(A) | Street (Left) Side db(A) |
|  |            | Measured                | Measured                 |
| Low Idle   | 800        | 59.6                    | 60.9                     |
| High Idle  | N/A        | N/A                     | N/A                      |
| Wide Open Throttle   | 2,675      | 75.6                    | 74.5                     |
| Final Sound Level Meter Calibration Check: <input checked="" type="checkbox"/> checked by: S.C.  |            |                         |                          |
| Comments: None noted.  |            |                         |                          |

## 7.2 EXTERIOR NOISE TESTS



TEST BUS UNDERGOING  
EXTERIOR NOISE TESTING







# CHAMPION®

**REVGROUP**

## Federal Motor Vehicle Safety Standards

The following is a brief summary of all applicable **FMVSS Title 49 (Federal Motor Vehicle Safety Standards)** of which Champion Bus Ford E350 & E450 Challenger Transit Buses comply. Complete and up to date copies of the FMVSS worksheets supporting test data is available upon request by calling 1-810-724-6474 or writing to Champion Bus Inc. 331 Graham Rd. Imlay City, Mi. 48444.

**Definitions:** OEM                      Original Equipment Manufacturer  
FSM                                      Final Stage Manufacturer

**FMVSS 101 Control Location, Identification and Illumination**

\* This is certified by the OEM and the FSM.

**FMVSS 102 Transmission Shift Lever Sequence & Starter Interlock**

\* This is certified by the OEM and the FSM.

**FMVSS 103 Windshield Defrosting and Defogging System**

\* This is certified by the OEM.

**FMVSS 104 Windshield Wiping and Washing System**

\* This is certified by the OEM.

**FMVSS 105 Hydraulic Brake System**

\* This is certified by the OEM and the FSM does not alter their system.

**FMVSS 106 Brake Hoses**

\* This is certified by the OEM and the FSM does not alter their hoses.

**FMVSS 108 Lamps, Reflective Devices & Associated Equipment**

\* The devices installed by the FSM meet all requirements.

**FMVSS 111 Rearview Mirrors**

\* The is certified by the OEM.

**FMVSS 113 Hood Latch System**

\* This is certified by the OEM.

**FMVSS 115 Vehicle Identification Number**

\* This is certified by the OEM and the FSM does not alter their numbers.

**FMVSS 116 Hydraulic Brake Fluids**

\* This is certified by the OEM and the FSM does not alter their system.

**FMVSS 119 New Pneumatic Tires for Motor Vehicles Other Than Passenger Cars**

\* This is certified by the OEM and the FSM does not alter their system.

**FMVSS 120 Tire Selection and Rims for Motor Vehicles Other Than Passenger Cars**

\* This is certified by the OEM and the FSM does not alter their tires or rims.

**FMVSS 124 Accelerator Controls**

\* This is certified by the OEM and the FSM does not alter their system.

**FMVSS 125 Warning Devices**

\* This is not a requirement of the OEM or FSM. This is a requirement the end user must meet.

**FMVSS 204 Steering Control Rearward Displacement**

\* This is certified by the OEM and the FSM does not alter their system.

**FMVSS 205 Glazing Material (Windows)**

\* The windows supplied by the FSM meet all requirements.

**FMVSS 207 Seating Systems**

\* The seating supplied by the FSM meet all requirements.

**FMVSS 209 Seat Belt Assemblies**

\* The seat belts supplied by the FSM meet all requirements.

**FMVSS 210 Seat Belt Assemblies Anchorages**

\* The seat belt assemblies' anchorages supplied by the FSM meet all requirements.

**FMVSS 217 Bus Window Retention and Release**

\* The windows installed by the FSM meet all requirements.

**FMVSS 220 School Bus Roll Over Protection**

\* Even though this is not a requirement for transit buses, Champion Bus Inc. has tested to this standard and meets all requirements.

**FMVSS 301 Fuel System Integrity**



\* This is certified by the OEM and the FSM does not alter their system.

**FMVSS 302 Flammability of Interior Materials**

- The interior materials supplied by the FSM meet all requirements.

**FMVSS 403 Platform Lift Systems for Motor Vehicles**

- \* The Platform Lift installed by the FSM meet all requirements.

**FMVSS 404 Platform Lift Installations in Motor Vehicles**

- \* The Platform Lift installed by the FSM meet all requirements.



Ben Cupp  
Director of Engineering  
Champion Bus Inc.

13, February 2019



U.S. Department  
Of Transportation  
Federal Transit  
Administration

Headquarters

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

September 30, 2019

Kathleen Czewski, DBELO  
Champion Bus Inc., General Coach America, Inc.  
& Goshen Coach Inc.  
331 Graham Road  
Imlay City, MI 48444

Re: TVM DBE Goal Concurrence/Certification Letter – Fiscal Year 2020

Dear Ms. Czewski:

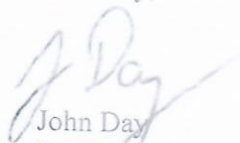
This letter is to inform you that the Federal Transit Administration's (FTA) Office of Civil Rights has received Champion Bus Inc., General Coach America, Inc., & Goshen Coach Inc.'s Disadvantaged Business Enterprise (DBE) goal and methodology for FY 2020 for the period of October 1, 2019–September 30, 2020. 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 2020 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 2020 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, 2019. This report should reflect all FTA-funded contracting activity for the second period of FY 2019 (i.e., from April 1 to September 30).

Please also be mindful that your FY 2021 DBE goal methodology must be submitted to FTA by August 1, 2020. Any significant 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](mailto:FTATVMSubmissions@dot.gov).

Sincerely,

  
John Day  
Program Manager  
Office of Civil Rights





# CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY)  
05/19/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER  
Aon Risk Services Central, Inc.  
Chicago IL Office  
200 East Randolph  
Chicago IL 60601 USA

CONTACT NAME:  
PHONE (A/C No. Ext): (866) 283-7122 FAX (A/C No.): (800) 363-0105  
E-MAIL ADDRESS:

INSURED  
H.E. Rohrer, Inc.  
P.O. Box 100  
Duncannon PA 17020 USA

| INSURER(S) AFFORDING COVERAGE |                        | NAIC # |
|-------------------------------|------------------------|--------|
| INSURER A:                    | Zurich American Ins Co | 16535  |
| INSURER B:                    | American Zurich Ins Co | 40142  |
| INSURER C:                    |                        |        |
| INSURER D:                    |                        |        |
| INSURER E:                    |                        |        |
| INSURER F:                    |                        |        |

## COVERAGES

CERTIFICATE NUMBER: 570093140513

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS.

| INSR LTR | TYPE OF INSURANCE  | ADDL INSD | SUBR WVD | POLICY NUMBER                    | POLICY EFF (MM/DD/YYYY)  | POLICY EXPI (MM/DD/YYYY) | Limits shown are as requested  |
|----------|--|-----------|----------|----------------------------------|--------------------------|--------------------------|--|
| A        | <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY<br><input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR<br><br><input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PROJECT <input type="checkbox"/> LOC<br><input type="checkbox"/> OTHER |           |          | GLO651054827                     | 04/01/2022               | 04/01/2023               | EACH OCCURRENCE \$2,000,000<br>DAMAGE TO RENTED PREMISES (Ea occurrence) \$500,000<br>MED EXP (Any one person) \$10,000<br>PERSONAL & ADV INJURY \$2,000,000<br>GENERAL AGGREGATE \$4,000,000<br>PRODUCTS - COM/PROP AGG \$4,000,000 |
| A        | AUTOMOBILE LIABILITY<br><input type="checkbox"/> ANY AUTO<br><input type="checkbox"/> OWNED AUTOS ONLY<br><input checked="" type="checkbox"/> HIRED AUTOS ONLY<br><input type="checkbox"/> SCHEDULED AUTOS<br><input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY                               |           |          | BAP 6510812-27<br>BAP 6510547-27 | 04/01/2022<br>04/01/2022 | 04/01/2023<br>04/01/2023 | COMBINED SINGLE LIMIT (Ea accident) \$2,000,000<br>BODILY INJURY (Per person)<br>BODILY INJURY (Per accident)<br>PROPERTY DAMAGE (Per accident)  |
|          | UMBRELLA LIAB<br>EXCESS LIAB<br>DED RETENTION  |           |          |                                  |                          |                          | EACH OCCURRENCE<br>AGGREGATE   |
| B        | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY<br>ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER (Mandatory in NH)<br>If yes, describe under DESCRIPTION OF OPERATIONS below   | Y/N<br>N  | N/A      | WC651054627                      | 04/01/2022               | 04/01/2023               | <input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER<br>E.L. EACH ACCIDENT \$1,000,000<br>E.L. DISEASE-EA EMPLOYEE \$1,000,000<br>E.L. DISEASE-POLICY LIMIT \$1,000,000                                    |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is needed)

## CERTIFICATE HOLDER

West Virginia Division of Public Transit  
Purchasing Division  
Attn: David Pauline  
2019 Washington St. East  
Charleston WV 25305 USA

## CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

*Aon Risk Services Central, Inc.*

Holder Identifier:

570093140513  
Certificate No:



U.S. Department  
Of Transportation  
**Federal Transit  
Administration**

Headquarters

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

August 31, 2021

Donall Hasty  
Forest River: Elkhart Coach, Glaval Bus,  
Starcraft, StarTrans Bus, Van, Eldorado-KS  
Lone Star Van, Champion Bus  
2367 Century Drive  
Goshen, IN 46528

FY23  
not yet  
received

Re: TVM DBE Goal Concurrence/Certification Letter – Fiscal Year 2022

Dear Mr. Hasty:

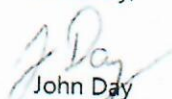
This letter is to inform you that the Federal Transit Administration's (FTA) Office of Civil Rights has received Forest River's Disadvantaged Business Enterprise (DBE) goal and methodology for FY 2022 for the period of October 1, 2021–September 30, 2022. This goal submission is required by the U.S. Department of Transportation's DBE regulations at 49 CFR Part 26 and must be implemented in good faith.

We have reviewed your firm's FY 2022 DBE goal and determined that it complies with DOT's DBE regulations. Your firm is 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 firm's 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 2022 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, 2021. This report should reflect all FTA-funded contracting activity for the second period of FY 2021 (i.e., from April 1 to September 30).

Also note that your FY 2023 DBE goal methodology must be submitted to FTA by August 1, 2022. Any significant updates to the program plan must be submitted to FTA as they occur. If you have any questions, please contact the FTA DBE Team via email at [FTATVMSubmissions@dot.gov](mailto:FTATVMSubmissions@dot.gov).

Sincerely,

  
John Day  
Program Manager  
Office of Civil Rights



See p. 2

Search

[Home](#) / [Regulations and Programs](#) / [Civil Rights/ADA](#)

## Civil Rights/ADA

[Americans with Disabilities Act \(ADA\)](#) >

[Title VI of the Civil Rights Act of 1964](#) >

[Disadvantaged Business Enterprise \(DBE\)](#) >

[Equal Employment Opportunity \(EEO\)](#) >

[Training Materials](#) >

[File a Complaint with FTA](#)

[FAQ](#)

## Related Links

- [Transit Vehicle Manufacturers \(TVMs\)](#)
- [Transit Vehicle Award Reporting Form](#)

## Contact Us

Office of Civil Rights  
Federal Transit  
Administration  
1200 New Jersey Avenue,  
SE  
Washington, DC 20590  
United States

**Phone:** [888-446-4511](tel:888-446-4511)

**Business Hours:**  
8:30am-5:00pm ET, M-F

If you are deaf, hard of hearing, or have a speech disability, please dial 7-1-1 to access telecommunications relay services.

## Eligible Transit Vehicle Manufacturers

DBE regulations require FTA recipients to report transit vehicle procurement awards (49 CFR 26.49). Since November 2014, FTA grantees have been 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. Transit vehicle manufacturers that have submitted a goal methodology to FTA that has been approved, or has not been disapproved, at the time of solicitation are eligible to bid (49 CFR 26.49(a)(1)). To remain eligible, TVMs must submit their DBE goal methodology to FTA by August 1 of each year. The following is a list of eligible TVMs:

| Transit Vehicle Manufacturer         | Address  | FY2022 DBE Goal % | DBE Liaison Offi Email            |
|--------------------------------------|--|-------------------|-----------------------------------|
| A and J Vans, Inc.                   | 333 West Washington Street<br>Valders, WI                          | 1.93%             | <a href="#">Travis Pfife</a>      |
| Advanced Wheels of Technology, Inc.  | 33 Bradley Park Road<br>P.O. Box 908<br>East Granby, CT            | 1.90%             | <a href="#">Ed Basile</a>         |
| Alexander Dennis                     | 31566 Railroad Canyon Road,<br>Suite 342<br>Canyon Lake, CA        | 2.50%             | <a href="#">Judy Lovitt</a>       |
| Alstom Transportation, Inc.          | 1 Transit Drive<br>Hornell, NY                                     | 6.69%             | <a href="#">James "JD" Daniel</a> |
| ARBOC Specialty Vehicles, LLC        | 51165 Greenfield Parkway<br>Middlebury, IN                         | 0.80%             | <a href="#">Jessica Bordeau</a>   |
| Arrival Automotive USA, Inc.         | 240 Twin Dolphin Drive,<br>Suite A<br>Redwood City, CA             | 1.86%             | <a href="#">Richard Colley</a>    |
| Blue Bird Body Company               | 402 Blue Bird Boulevard,<br>P.O. Box 937<br>Fort Valley, GA        | 1.97%             | <a href="#">Linda Belflower</a>   |
| Braun Corporation d/b/a BraunAbility | 631 W. 11th Street<br>Winamac, IN                                  | 7.00%             | <a href="#">Ken Morgei</a>        |
| Brookville Equipment Corporation     | 175 Evans Street<br>Brookville, PA                                 | 2.82%             | <a href="#">Ron Rodgers</a>       |
| BYD Coach & Bus, LLC                 | 1800 South Figueroa Street<br>Los Angeles, CA                      | 2.50%             | <a href="#">Enid Santiago</a>     |
| CAD Railway Industries Ltd.          | 155 Boulevard Montreal-Toronto,<br>Lachine,<br>Quebec City, Canada | 7.74%             | <a href="#">Mikael Levy</a>       |
| CAF USA, Inc.                        | 1401 K Street, NW<br>Washington, DC                                | 3.15%             | <a href="#">Tonia Crosby</a>      |

| Transit Vehicle Manufacturer   | Address   | FY2022 DBE Goal % | DBE Liaison Offi Email            |
|--|---|-------------------|-----------------------------------|
| Coach & Equipment Manufacturing  | 130 Horizon Park Drive<br>Penn Yan, NY                    | 2.35%             | <a href="#">Kenny Hancharik</a>   |
| Complete Coach Works   | 1863 Service Court<br>Riverside, CA                       | 1.00%             | <a href="#">Amber Lindsey</a>     |
| CRRC MA Corporation  | 108 Myrtle Street,<br>Quincy, MA                          | 2.62%             | <a href="#">Jing Jing</a>         |
| CRRC Sifang America, Inc.  | 13535 S. Torrence Ave<br>Chicago, IL                      | 2.95%             | <a href="#">Haitao "Kevin" Qu</a> |
| Diamond Aquisition, LLC d/b/a<br>Diamond Coach   | 2300 W. 4th Street<br>Oswego, KS                          | 1.10%             | <a href="#">Kate Strickland</a>   |
| Driverge Vehicle Innovations<br>(Formerly TransitWorks, LLC)   | 1090 W. Wilbeth Road<br>Akron, OH                         | 0.74%             | <a href="#">Ken Richards</a>      |
| ElDorado National California,<br>Inc.  | 9670 Galena Street<br>Riverside, CA                       | 3.84%             | <a href="#">Jake Calvo</a>        |
| Endera Automotive, LLC   | 804 N. Pratt Street<br>Ottawa, OH                         | 1.37%             | <a href="#">Kevin Hernandez</a>   |
| Fenton Mobility Products, Inc.   | 1209 E. Second Street<br>Jamestown, NY                    | 0.71%             | <a href="#">Mary Gabalski</a>     |
| Forest River:<br>- Champion Bus<br>- ElDorado<br>- Elkhart Coach<br>- Forest River Van; Glaval Bus;<br>Starcraft/ StarTrans Bus<br>- Lone Star Van | 2367 Century Drive<br>Goshen, IN                          | 2.00%             | <a href="#">Donall Hasty</a>      |
| FR Conversions, Inc.   | 1231 Tech Court<br>Wesminster, MD                         | 0.23%             | <a href="#">Jeff Shay</a>         |
| Gillig, LLC  | 451 Discovery Drive<br>Livermore, CA                      | 1.70%             | <a href="#">Chris Turner</a>      |
| Gomaco Corporation   | P.O. Box 151<br>Ida Grove, IA                             | 2.90%             | <a href="#">Troy Kruse</a>        |
| GreenPower Motor Company   | 10737 Laurel Street,<br>Suite 140<br>Rancho Cucamonga, CA | 0.90%             | <a href="#">Michael D. Perez</a>  |
| Higher Power Industries  | 11 Sunny Slope Terrace<br>Yonkers, NY                     | 2.22%             | <a href="#">Michael Liebler</a>   |
| Hometown Manufacturing,<br>Inc.  | 701 North Rail Road Avenue<br>Crandon, WI                 | 3.00%             | <a href="#">Jessica Donek</a>     |
| Ilderton Conversion  | P.O. Box 350<br>High Point, NC                            | 1.00%             | <a href="#">Odell McBride</a>     |
| Kawasaki Rail Car, Inc.  | 29 Wells Avenue,<br>Building 4<br>Yonkers, NY             | 7.90%             | <a href="#">Tadashi Doi</a>       |





# CHAMPION®

## CHAMPION BUS STANDARD WARRANTY

### Notice

Please ensure that the warranty registration is completed online in Dealer Connect by your purchasing dealer. Electronic entry into the warranty system registers the warranty with Champion Bus so that Champion Bus has record of your rights under this limited warranty and to assure prompt assistance. Your dealer will provide the warranty info for you to sign in order for entry into this system. If you do not remember signing a Champion Bus warranty registration at the time of delivery, please contact your dealer.

### Definition of Terms

**Authorized Champion Bus Dealer ("Dealer"):** This agreement is applicable only in the United States, Puerto Rico and Canada. Any Authorized Dealer of the owner's choice may perform warranty service work under the Champion Bus Warranty Agreement. This vehicle should be delivered to the authorized dealer during normal service hours. A reasonable time should be allowed after taking the vehicle to the authorized dealer for performance of the repair.

**Champion Bus, Division of Forest River, Inc. ("Warrantor"):** The party obligated to perform under this Agreement.

**Original Purchaser:** Person or entity that is a recipient of this product provided by a dealer under a purchase order or contract sales.

**Wear and Tear:** The deterioration of a part or material beyond the manufacturer's specified tolerances that occur naturally over time and under normal operating conditions.

### 1. Who Warrants The Product

The product, as described and limited here, is warranted by the manufacturer and installer of the body: Champion Bus, Division of Forest River, Inc., hereinafter referred to as Champion Bus, 331 Graham Road, Imlay City, MI 48444; a Michigan Corporation; and is administered by the Champion Bus Customer Service Department, Imlay City, Michigan.

### 2. Who Is Covered

Champion Bus, the warrantor, extends this limited warranty agreement to the original owner only of the vehicle during the Warranty Period.

### 3. What Is Covered

Champion Bus, your warrantor, extends the following limited warranty to you; in which the limited warranty covers your conversion only pertaining to material defects in all materials and workmanship supplied by or performed by Champion Bus.

### 4. Warranty Period

The Champion Bus limited warranty is for a period of one (1) year from the date of first delivery or 12,000 miles, whichever occurs first, except for other coverages listed under "Other Warranties That May Apply" and items listed under "Exclusions and Limitations" and "Limits of the Warranty."

### 5. Extended Warranty on Structural Items

Warrantor warrants to the original purchaser for a period of five (5) years from the date of first delivery or 100,000 miles, whichever comes first, that this produce shall be free of SUBSTANTIAL DEFECTS arising out of or relating to the structural portion of the product. THIS STRUCTURAL WARRANTY IS INTENDED TO COVER ONLY THE PERFORMANCE OF THE STEEL CAGE STRUCTURE OF THE BUS BODY, INCLUDING CORROSION DAMAGE TO THE BODY STRUCTURE.

### 6. Exterior Paint

Exterior Paint, performed by Champion Bus, is fully warranted to be free of substantial defects in workmanship by Champion Bus for the first three (3) years (36,000 miles) from date of original purchase, 50% warranted four (4) years (70,000 miles), and 25% warranted five (5) years (100,000 miles) from date of original purchase.

### 7. Other Warranties That May Apply

Champion Bus does not warrant the base chassis itself. The vehicle engine, chassis, drive-train, suspension system, battery and other chassis components are covered by a separate warranty offered by the manufacturer of the chassis and administered by the chassis manufacturer's authorized dealers. The tire manufacturer separately warrants tires. In addition, all aftermarket springs, suspensions, driveline retarders, etc., such as Liquid Springs, Mor Ryde, Kelderman, Telma, etc. are not covered by Champion Bus. These items are covered by their original manufacturer and their warranties may vary.

### 8. Owner's Responsibility

Proper preventative maintenance of the exterior and interior of the vehicle is the responsibility of the owner. See the owner's manual(s) for proper care instructions. Defects or damage as a result of improper care or maintenance are not covered by this warranty agreement.

### 9. Exclusions and Limitations

Damage caused by abuse, misuse, failure to observe reasonable required maintenance practices, acid rain, accidents, natural disasters, acts of war, facing of fabrics, carpeting and/or fiberglass are not covered. Light bulbs and fuses are not covered.



Damage to the unit if such damage is the result of deterioration due to normal use, wear and tear, or exposure to the elements.

Damages that may occur to the chassis, frame, other parts or components that occur due to overloading will not be covered and may invalidate portions of the Champion Bus warranty agreement.

Cosmetic or surface corrosion resulting from stone chips or scratches in paint are not covered.

Replacement parts provided under terms of the warranty agreement will whenever possible, match original equipment. When necessary, Champion Bus will substitute parts of comparable function and value. Defective items may be replaced with new, remanufactured, reconditioned or repaired components.

Modifications, alterations or repairs performed by unauthorized personnel may invalidate portions of the Champion Bus warranty. In addition, using the vehicle to tow another vehicle is prohibited and may void warranty. Contact Champion Bus Customer Service before you make modifications, alteration or repairs.

#### **10. Recovery Limitations**

No person shall be entitled to recover from warrantor for any consequential or incidental damages arising out of or relating to any defect in the product. These limitations include but are not limited to, loss of time; loss of use; loss of revenues, salaries or commissions; towing charges; bus fares; bus rentals; car rentals; gasoline expenses; telephone charges; inconvenience or other incidental damages.

#### **11. How To Get Warranty Service**

To obtain warranty service, contact or visit the dealership where you originally purchased your vehicle or another warranty service facility designated by Champion Bus. The dealership must contact Champion Bus Customer Service Department for authorization to have a warranty claim submitted. If you or your dealer has moved, or if your dealer is no longer in business, contact Champion Bus Customer Service Department (see address and telephone numbers below) for the name of a Champion Bus dealer nearest to you. Your claim must be made within 14 days of the discovery of the defect. Champion Bus will determine authorization based on and subject to the terms of the warranty agreement. All warranty claims must be reported within the warranty period. Warranty personnel must authorize all warranty service prior to performance. Warranty service may be reported directly to the warrantor or to one of their authorized dealers. If warranty personnel approve warranty service, you must leave the unit at the appropriate warranty service location for a sufficient time to perform service.

#### **12. Who Performs Warranty Service**

It is recommended you obtain warranty service at the dealership where you originally purchased your bus. If the dealership cannot perform the service work, they should call Champion Bus Customer Service Department for assistance (see number below). If you are unable to visit your original dealer, contact Champion Bus Customer Service Department (address below) for the name and location of a Champion Bus dealer near you.

#### **13. 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 Champion Bus Customer Service Department (see address below). If a dispute about warranty service arises between Champion 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 submitted to a panel of three (3) arbitrators for decision. The panel will be made up of one member appointed by Champion Bus, one member appointed by the complainant/owner, and one member from the arbitrator 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 Champion Bus and Champion Bus fails to abide by the ruling. The expenses of arbitration will be paid by the party against whom the arbitrator(s) rule.

#### **14. Limits Of Warranty**

This written statement of limited warranty represents the entire warranty authorized and offered by Champion Bus. There are no warranties or representations beyond those expressed in this written document. Any dealership, salesperson or agent cannot amend it. It expressly limits all warranties, including, but not limited to, by way of specification, both express and implied warranties, including warranties or merchantability and fitness for a particular purpose along with all other liabilities or obligations of Champion Bus.

#### **FEDERAL COMPLIANCE**

THE TERMS OF THE WARRANTOR'S UNDERTAKING EXPRESSED IN THIS LIMITED WARRANTY ARE DRAFTED TO COMPLY WITH THE MAGNUSSEN 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.

Champion Bus  
Division of Forest River, Inc.  
CUSTOMER SERVICE DEPT.  
331 Graham Road  
Imlay City, MI 48444  
Phone: 844.473.8287



# ROHRER

School & Commercial Bus Sales

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## Company History

### **Rohrer Bus... four generations of transportation experience.**

Rohrer's history all began in the early 1920's when Howard E. Rohrer Sr. started transporting school children with his horse and wagon in Allen's Cove, just south of Duncannon, Pennsylvania. The early horse-and-wagon evolved to a few wooden school bus bodies being built on car chassis'. Over the years, the need for student transportation grew. That's the way Rohrer Bus began.

Now fast forward to 1975. Howard E. Rohrer Jr. was running the business and our school bus fleet had grown to 70 buses. In addition to our growing school transportation service, Rohrer Bus added a Sales company and teamed up with Wayne school buses to represent their products. It was soon apparent that our **school bus company** was quickly outgrowing the facility on the family farm. So, in 1976, ground was broken for a new sales and service facility where our headquarters remain today.

By 1981, the 3rd generation of the Rohrer family was well on their way to continuing our company's transportation legacy. H.E. "Skip" Rohrer III and his brother-in-law John Schrantz, who continue to oversee the business operations today, took over the company from H.E. Rohrer Jr. By this time, our operating fleet had grown to over 200 buses and, in 1982, we became a dealer for Champion Bus selling commercial buses.

In the fall of 1999, Rohrer Bus Sales proudly became the Thomas Built Bus dealer for the much of the state of Pennsylvania. Our experience in the sale and operation of school and commercial buses, along with our reputation for providing outstanding customer service made Rohrer the logical choice when Thomas Built Buses was looking for a full-service dealership to partner with. And in 2006, just one year after receiving the Pennsylvania School Bus Association's (PSBA) Platinum Bus Award for 75 years of service to the transportation industry, Rohrer Bus was celebrated as the Thomas Built Bus Dealer of the Year.

Today, the 4th generation of the Rohrer transportation legacy is now in place with Tahva Rohrer Wylie and David Schrantz continuing our family's dedication to the transportation industry. We currently sell vehicles throughout the mid-Atlantic states of Pennsylvania, Maryland, New Jersey, Delaware, and Virginia. Rohrer Bus offers a complete lineup of vans and buses ranging from small, wheelchair-accessible passenger vans to 90-passenger buses. On top of that, we are a FULL service dealer with factory-trained, ASE certified technicians providing factory approved service and warranty repairs for the ENTIRE bus.

In addition to our dealership growth, over fifteen (15) Pennsylvania school districts, intermediate units, and other entities rely on our fleet of over 500 vehicles to provide them with safe transportation services for their students. Our Duncannon headquarters has expanded several times, now with over 30,000 square feet, offering complete support along with the latest tools and equipment. With that, we are proud to be recognized as Perry County's largest employer. In addition to our Duncannon facility, Rohrer Bus has instituted several satellite facilities located throughout our growing sales territory.

Although we may have grown much larger over our many years in business, our Rohrer Bus family still prides itself on one thing: providing the very best transportation products and services available. With over 1000 years of combined industry experience, we can handle just about any transportation need, while consistently demonstrating our commitment to the highest level of quality, safety, and customer service. So, as **"The Transportation Company You Can Depend On"**, we look forward to a very long and successful relationship as your partner in safe and reliable transportation!

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1515 State Road, P.O. Box 100, Duncannon, Pennsylvania 17020 • OFFICE 717.957.2141 • TOLL FREE 800.735.3900 • FAX 717.957.4884

[rohrerbus.com](http://rohrerbus.com)



# **ROHRER**

*School & Commercial Bus Sales*

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## Warranty Service & Product Recalls

When buying a vehicle from Rohrer Bus, you can rest assured that you will be taken care of long after the sale. Our dedicated account representatives, Ryan Renninger (warranty) and Greg Kline (parts), are committed to service. They are here to help you from 8am – 4:30pm Monday thru Friday. Mr. Renninger is hands on and our most knowledgeable employee regarding warranty. Mr. Renninger and Mr. Kline can be reached at 1-800-735-3900.





# ROHRER

School & Commercial Bus Sales

When you purchase a vehicle you are fully aware that, at some point, you will need to repair it. That is why Rohrer Bus has stocked our bus parts warehouse with items from the most reputable manufacturers in the business. We've built our reputation as a leading commercial and school bus parts dealer by partnering with highly regarded manufacturers like Thomas Built Buses®, AutoAbility, Braun Corporation, Champion Bus, El Dorado National, Federal Coach, General Coach, Krystal Coaches, StarTrans, and Vehicle Production Group (VPG). By working with such well-regarded industry leaders, Rohrer Bus is able to provide the exact bus parts that you are looking for.

## A Massive Inventory of Bus Parts For Sale

At Rohrer Bus, our customers operate vehicles in all models, sizes, and from just about every different model year. Because of this, our inventory of bus parts for sale is massive. Even if we do not have the exact part that you need in our warehouse, we have the resources to locate it and get it to you quickly. Don't spend your time scouring for bus parts online. Call our friendly team of bus parts experts and let us get you what you are looking for quickly.



Parts Stock Room

## A Transportation Company You Can Depend On.

Rohrer Bus is a company that provides the safest and most efficient [bus transportation services](#) and solutions available. We're large enough to offer the best products and services in the industry, but small enough to provide all of our customers with the personalized attention they deserve. If we don't have the bus parts that fit your needs, we have the resources available to find it. [Contact us](#) to learn more about our complete selection of bus parts for sale or call 1-888-594-3135!

## Service Offerings

Rohrer Bus is a full-service transportation equipment maintenance facility. No matter how minor or serious your vehicle's problem is, we have the resources to fix it. With over 500 years of combined bus and automotive experience, our shop maintenance personnel are equipped to get your vehicle back on the road quickly. Our goal is to be your preferred bus service company, and we won't let you down!

### Our Service Capabilities

- Major / minor [bus repairs](#)
- Factory trained – certified technicians
- Engine Warranty – Cummins, CAT, Mercedes / Detroit
- Lift repair & Warranty – Braun, Ricon, Maxon
- Hand Controls – Mobility Driving Aids
- Air Conditioning – ACT, Trans-Air, AC Carrier
- Front End / All Wheel Alignment – Minivans through Class Truck & Buses
- Custom Preventative Maintenance Packages
- Emergency Vehicle Repairs – Ambulance / Fire Apparatus
- Automatic Tire Chain Installation & Repair
- D.O.T Inspection
- PA State Inspection
- Open till 6:00 AM till 11:00
- Call us: 1-888-594-3135

