RESOLUTION NO. 2023 -372

A RESOLUTION BY THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA, AUTHORIZING THE COUNTY ADMINISTRATOR, OR DESIGNEE, TO PIGGYBACKTHE FLORIDA SHERIFF'S CONTRACT (FSA22-VEH20.0), TO EXECUTE AND ISSUE A PURCHASE ORDER FOR FOUR (4) CUTAWAY BUSES FOR THE COUNTY'S TRANSITY SYSTEM, FOR A TOTAL PURCHASE PRICE OF $575,818.00.

RECITALS

WHEREAS, the County's transit system requires four (4) cutaway buses to replace old buses that have exceeded their useful life, and must be taken out of use; and

WHEREAS, the SJC Purchasing Division compared the FDOT TRIPS contract and the Florida Sheriff's Contract and determined that the FSA contract pricing was more cost effective to purchase the required buses which meet the required specifications, resulting in a $94781.80 cost savings; and

WHEREAS, the proposal from Creative Bus Sales, Inc, under FSA22-VEH20.0 contract complies with the funding requirements of the County transit system; and

WHEREAS, the purchase will be funded through the St Johns County, Federal Transit Administration-DOT funds that are currently available for capital purchases; and

WHEREAS, the County finds that making this purchase serves a public purpose.

NOW, THEREFORE BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA, as follows:

Section 1. The above Recitals are incorporated by reference into the body of this Resolution and such Recitals are adopted as finds of fact.

Section 2. The County Administrator, or designee, is hereby authorized to piggyback the Florida Sheriff's Contract #FSA22-VEH20.0 to purchase four (4) cutaway buses for the County's transit system.

Section 3. The County Administrator, or designee, is further authorized to execute and issue a purchase order to Creative Bus Sales, Inc dba Model1 Commercial Vehicles for a total purchase price of $575,818.00, in accordance with the provisions of the FSA contract #FSA22-VEH20.0.

Section 4. To the extent that there are typographical and/or administrative errors that do not change the tone, tenor, or concept of this Resolution, then this Resolution may be revised without subsequent approval by the Board of County Commissioners.

PASSED AND ADOPTED by the Board of County Commissioners of St. Johns County, Florida, this 3rd day of October , 2023.

Rendition Date OCT 03 2023

BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA

By: _____
Christian Whitehurst, Chair

ATTEST: Brandon J. Patty,
Clerk of Circuit Court & Comptroller

By: Crystal Smith
Deputy Clerk

ST. JOHNS COUNTY FLORIDA

Creative Bus Sales
THE NATION'S LARGEST BUS DEALER SINCE 1980

FSA Item 15 2023 Starcraft Allstar 22'

Price Proposal

Sales Experience

550+ Years of Collective Bus Sales Experience
Servicing Over 1,500 Customers Annually

Nationwide Network

22 Full-Service Locations Nationwide
Partners with 25+ Top Manufacturers

Competitive Pricing

Volume Discounts
Fixed Contract Pricing

In-House Financing

Seamless Transactions
Flexible Structures

41	22	350+	1,500
Years In Business	Nationwide Locations	Dedicated Employees	Annual Customers

Creative Bus Sales offers dedicated sales, parts, and service departments to help you in all stages of bus ownership. Our customers benefit from our strong manufacturer partnerships, the largest in-stock inventory, and a nationwide team of experts. As a family-owned business with experience in the transportation industry since 1980, it's no coincidence that we've grown to become the nation's largest bus dealership.

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2023 Starcraft Allstar 22'




Pictures do not reflect completed bus. Please see Floor Plan below.

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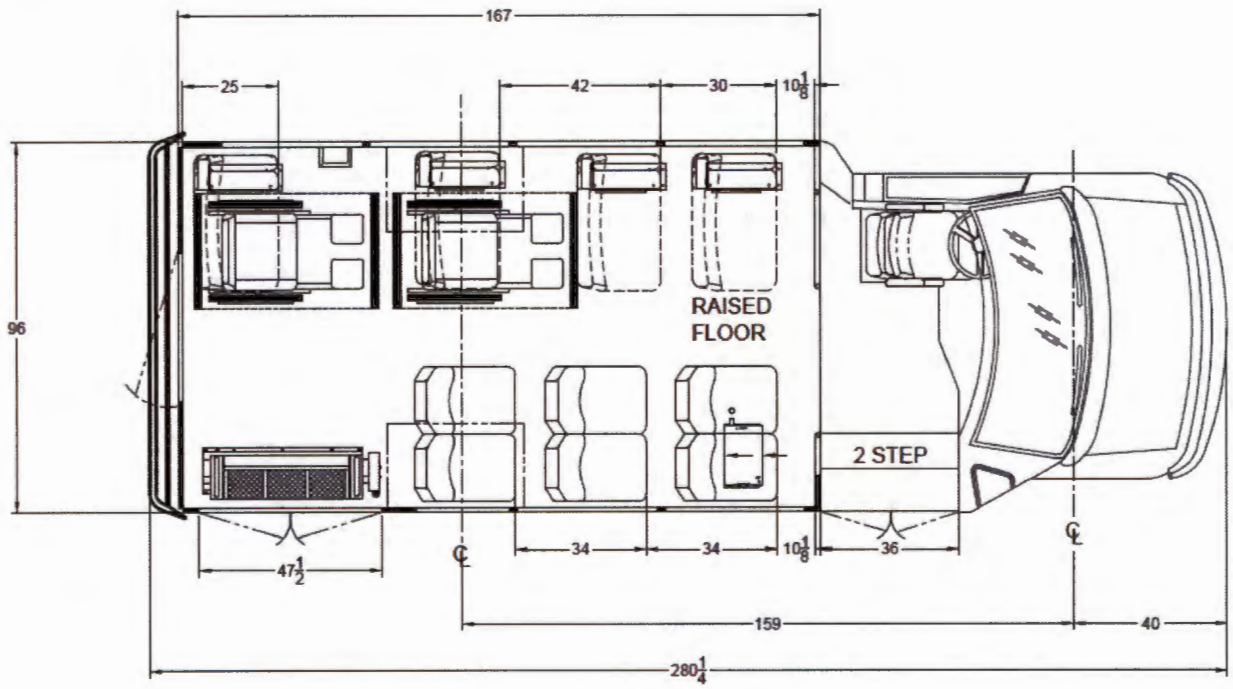

Specifications

Chassis	• 2023 Ford E-450 • Engine: 7.3L V-8 • Fuel Type: Gas
Exterior	• Exterior Color: White • Wheelbase: 158" • Fully welded steel cage construction meeting all applicable FMVSS requirements • "Starview" driver's visibility window in front of entry door • Electric actuated 36" 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 • Pre-painted white aluminum side, skirts • Fiberglass front and rear caps • One-piece seamless FRP (fiberglass reinforced plastic) roof • Breakaway rearview mirrors with built-in convex
Interior	• 93" Interior Width • 80" Interior floor to ceiling height (raised floor is 75")

	• Floor and wall seat track for flexible seating • 5/8" exterior grade plywood flooring • Ceiling and rear wall fabric for sound abatement • White step nosing • Printed circuit board with automotive type fuses and LED troubleshooting lights • Driver Area: Grey padded vinyl • Walls and Ceiling: Grey padded vinyl • Flooring: Gerflor Sirius Graphite Grey • Ceiling grab rail on street side • 1 ¼" dual entry grab rails parallel to entrance steps (both sides) • Stanchion and modesty panel behind driver • Driver storage in cab overhead
A/C and Heat	• A/C System: TA733 Super 68K Dual Compressor • Heater: 65K BTU floor mounted, 3 speed low profile OK side sliders
Lighting	• Door activated interior lights • Surface mount LED entry door exterior light • Sealed LED stop, tail, and turn signal lights with LED back-up lights • LED front and rear marker lights • LED entry door step well lights • LED driver and passenger area lighting
Electrical	• 240 AMP OEM alternator • Intermotive Flex Tech Electrical System
Audio/Visual	• Deluxe AM/FM/CD with clock & 4 speakers PA ready • Rosco back-up camera system w/ 7" rearview monitor/mirror combo
Wheelchair Accessibility	• 34" x 54" Braun wheelchair lift located in the rear of the unit • Intermotive Gateway Transit Fast Idle with lift interlock • Wheelchair door upfit package
Accessories	• Manual Q' Straint securement kit (2) • Priority seating sign **Required for ADA Compliance** • Wheelchair decal
Safety	• Back-up alarm SAE type C 97 db(A)
Passenger Seating Options	• 12 Passenger, 2 Wheelchair • 13 Passenger, 1 Wheelchair • 14 Passenger, 0 Wheelchair
Seating	• Passenger Seating: – Seat Fabric: Level 6 Duratex Jordan Blue – Mid high, double seat (6) – Econo Flip, single seat (2) – Seat belt, non-retractable (14) – Seat belt loop (14) – Anti-vandal grab handle on aisle seats (6) • Driver Seating: SHIELD FC Recliner, RH Arm, 4 Position Lumbar, Mesh Pocket – Driver Seat Cover: Level 6 Duratex Jordan Blue Cloth

Florida Sheriffs Association Contract Item 15 additional options compared to above specification for stock buses.

93119	Allstar 24 158" WB E450 7.3L Gas Engine	$4,441
2113	Grey Padded Vinyl Interior (wall and ceiling)	$319
8045	Rear Heater 65K BTU	$650
20192	Driver Storage In Cab Overhead	$163
20206	Double W/C Doors w/ windows	$1,450
8744	Braun Century Lift	$8,115
99	Intermotive Fast Idle with Interlock	$708
8688	(2) Q Straint Standard Retractors L Track	$1,648
8104	Priority Seating Sign	$18
2112	Driver Seat Cover Level 6	$232
8084	(2) Foldaway seats double	$3,040
2122	(14) Passenger Seat Cover Level 6	$2,030
8016	Rear Door (1) Window	$551.00
(Non Schduled)	Season (6) Camera System	$7,551
2008	Bike Rack	$4,345
2623	Driver Running Board	$470
Triangle refelectors, fire extinguisher and first aid kit		(No Charge)
ADA/Title VI TRIPS spec signage		(No Charge)
8004	Spare Tire and Wheel	$563
Total		**$35,731.00**

Options removed from FSA Base Specification

8067	(3) Passenger Seat Mid High Back Double	-$2,646
8068	Passenger Seat Mid High Back Single	-$482
Total		**-$3,128**

Warranty

Manufacturer Warranty	• Starcraft 5 Year/100,000 Miles
Chassis Warranty	• Ford E-450 Bumper to Bumper: 3 Year/36,000 Miles • Ford E-450 Powertrain: 5 Year/60,000 Miles

All vehicles come with warranty, but Creative Bus Sales offers more value without the added cost. Our coverage and support comes with each of our new buses — *standard.*

We Process All The Warranty Registrations
We register all of your bus parts for you, no more pesky warranty cards to fill out. This includes *all* parts, wheelchair lift, electronics, HVAC, etc.

We Handle All The Paperwork
We administer and coordinate any warranty work. You make one call to our warranty department, and they take it from there.

Repair Facilities Near You
When warranty work is needed, we use service repair facilities near the bus location. We have over 3200 authorized centers and growing. You will never have to drive far to get repairs completed.

No More Claim Forms
Creative Bus handles all parts of the claim process, you will have no out of pocket expenses, no reimbursements, and the service facility will be paid directly by us.

Longer Warranty Period
We have negotiated extended periods for the units we sell. Unprecedented 60 month/100,000 mile bumper-to-bumper warranty on the Starcraft bus upfit.

Pricing

Description	Amount
Bus Cost	$107,233.00
Additional Stock Unit Options (see above) $35,731	
Subtracted Stock Unit Options from FSA Item 15 (see above) -$3,128	
Total* (2) Buses	$279,672.00

** Pricing does not include sales tax.*
**Pricing can adjust due to Ford rebate availability .*

Contact:

Date Issued:
Name: Les Burres
Phone:904-537-7710
Email:lesb@creativebussales.com

Creative Bus Sales
THE NATION'S LARGEST BUS DEALER SINCE 1980

FSA Item 15 2023 Starcraft Allstar 22'

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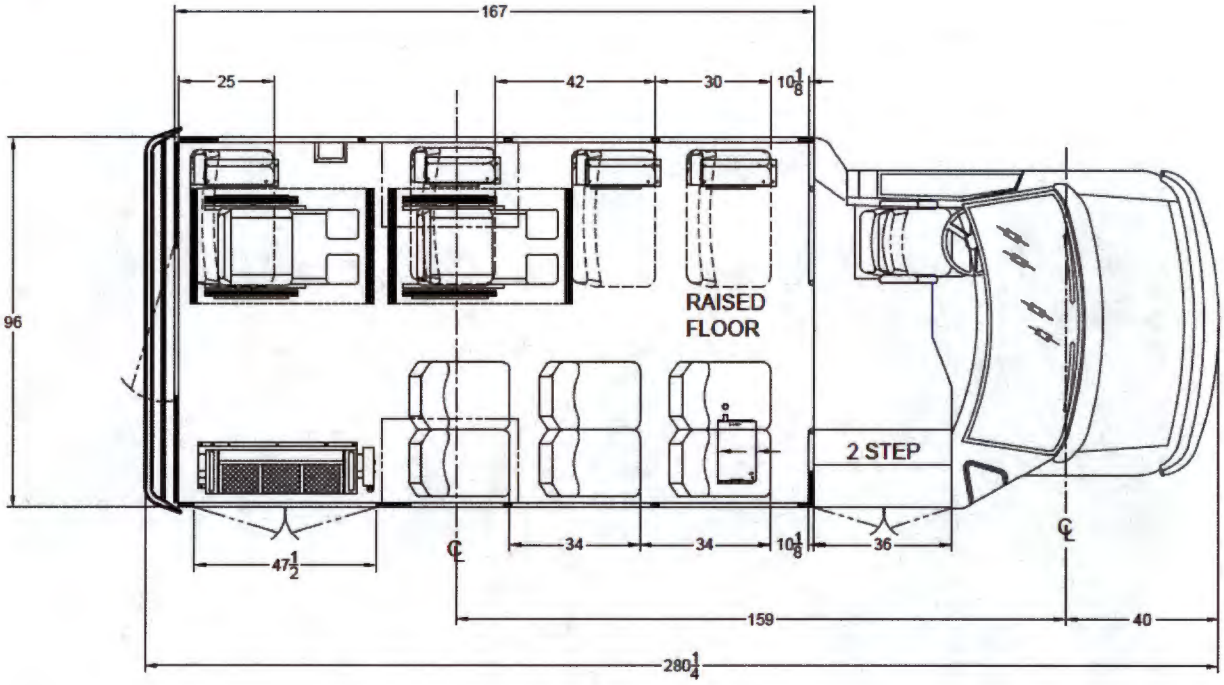

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Interior	• 93" Interior Width • 80" Interior floor to ceiling height (raised floor is 75")

	• Floor and wall seat track for flexible seating • 5/8" exterior grade plywood flooring • Ceiling and rear wall fabric for sound abatement • White step nosing • Printed circuit board with automotive type fuses and LED troubleshooting lights • Driver Area: Grey padded vinyl • Walls and Ceiling: Grey padded vinyl • Flooring: Gerflor Sirius Graphite Grey • Ceiling grab rail on street side • 1 ¼" dual entry grab rails parallel to entrance steps (both sides) • Stanchion and modesty panel behind driver • Driver storage in cab overhead
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Wheelchair Accessibility	• 34" x 54" Braun wheelchair lift located in the rear of the unit • Intermotive Gateway Transit Fast Idle with lift interlock • Wheelchair door upfit package
Accessories	• Manual Q' Straint securement kit (2) • Priority seating sign **Required for ADA Compliance** • Wheelchair decal
Safety	• Back-up alarm SAE type C 97 db(A)
Passenger Seating Options	• 12 Passenger, 2 Wheelchair • 13 Passenger, 1 Wheelchair • 14 Passenger, 0 Wheelchair
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2112	Driver Seat Cover Level 6	$232
8084	(2) Foldaway seats double	$3,040
2122	(14) Passenger Seat Cover Level 6	$2,030
8016	Rear Door (1) Window	$551.00
(Non Schduled)	Season (6) Camera System	$7,551
2008	Bike Rack	$4,345
2623	Driver Running Board	$470
99	Full Body Paint 20' to 27'	$7,674.00
Total		**$43,405.00**

Options removed from FSA Base Specification

8067	(3) Passenger Seat Mid High Back Double	-$2,646
8068	Passenger Seat Mid High Back Single	-$482
Total		**-$3,128**

Warranty

Manufacturer Warranty	• Starcraft 5 Year/100,000 Miles
Chassis Warranty	• Ford E-450 Bumper to Bumper: 3 Year/36,000 Miles • Ford E-450 Powertrain: 5 Year/60,000 Miles

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Longer Warranty Period
We have negotiated extended periods for the units we sell. Unprecedented 60 month/100,000 mile bumper-to-bumper warranty on the Starcraft bus upfit.

Pricing

Description	Amount
Bus Cost	$107,233.00
Additional Stock Unit Options (see above) $43,405	
Subtracted Stock Unit Options from FSA Item 15 (see above) -$3,128	
Total*	$147,510.00

** Pricing does not include sales tax.*
**Pricing can adjust due to Ford rebate availability .*

Contact:

Date Issued:

Name: Les Burres

Phone:904-537-7710

Email:lesb@creativebussales.com

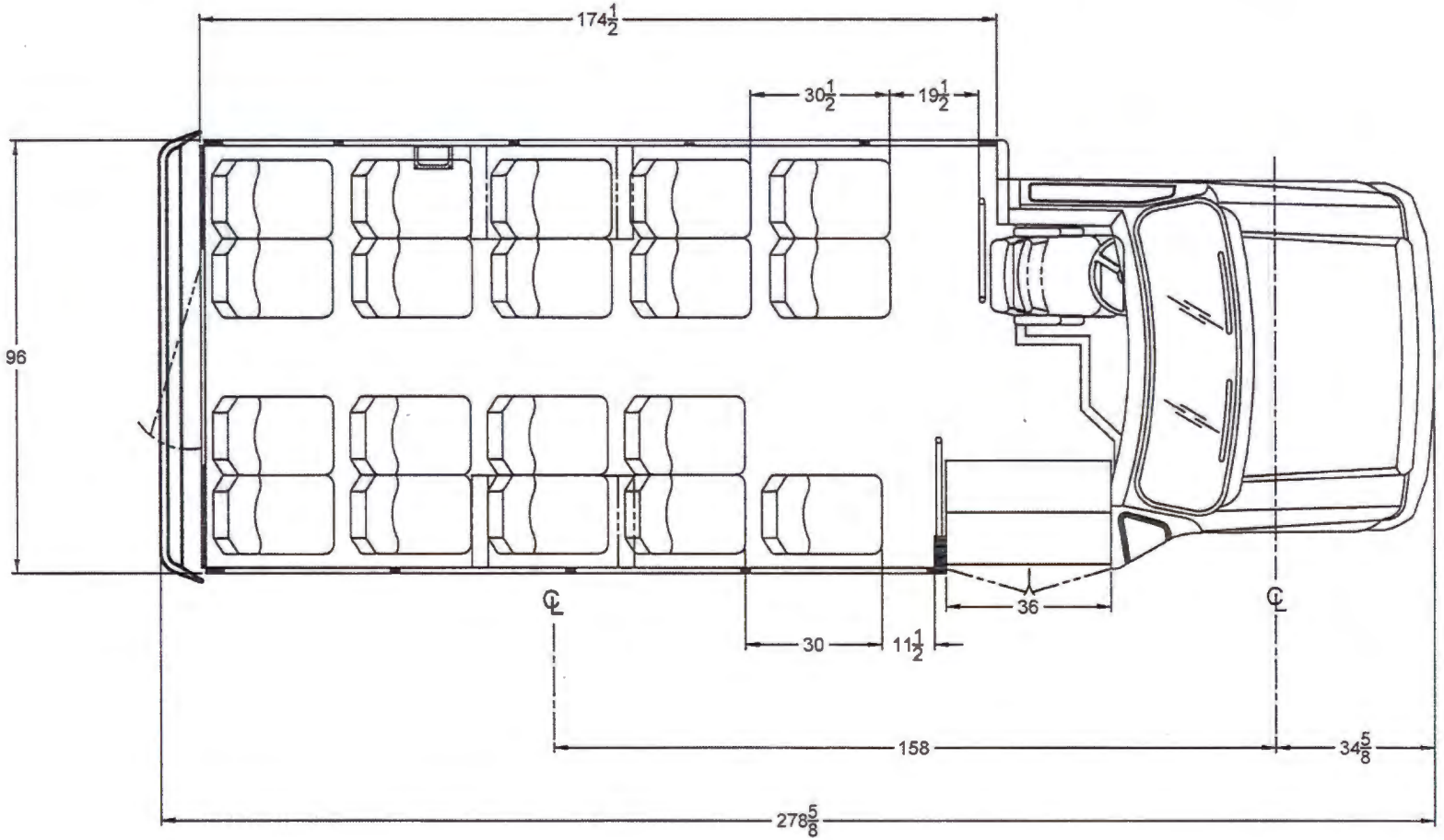
Creative Bus Sales

14 to 25 Passenger Capacity Range, Van Type Cutaway Chassis

Make: Starcraft, Model: Allstar

Allstar 22 158" WB E-350 7.3L Premium Gas Engine W/240 Amp Ford Alt
ELECTRICAL SYSTEM
Intermotive Flex Tech Electrical System
SIDEWALL / REARWALL / CEILING
Sidewall: Grey FRP
Rearwall: Grey Seaspray Fabric
Ceiling: Grey Seaspray Fabric
Driver Area: Grey Padded Vinyl
FLOORING - WHITE NOSING IS STANDARD
Aisle: Gerflor Sirius NT #6801 Graphite (Black)
Under Seats: Gerflor Sirius NT #6801 Graphite (Black)
Yellow Step Nosing - Per Step
ENVIRONMENTAL CONTROL
TRANS/AIR AIR CONDITIONING SYSTEMS
DUAL COMPRESSOR SYSTEMS CEILING MOUNT EVAPORATOR
TA712 SUPER 60K - TA71 EVAP - SMC2S COND - 10 C.I.D. COMP
TA712 SUPER 10 FORD 7.3 LITRE GAS PREMIUM ENGINE
HEATERS
Rear Hot Water Heater, 45K BTU 3 Speed Low Profile
ELECTRICAL
Door Ajar Buzzer on Rear Door
Wiring Diagram "AS BUILT" ON USB Flash Drive
EXTERIOR LIGHTS
Surface Mount LED Entry Door Exterior Light - STD Choose Optional Below or Special builds
LED Mid-Ship Turn / Marker Lights
INTERIOR LIGHTS
Door Activated Interior Lights
AUDIO / VISUAL
Deluxe AM/FM/CD With Clock & 4 Speakers **PA Ready**
DOORS / HATCH / WINDOWS
Electric Entry Door is Standard. Add Option #2056 if Manual is Desired

Passenger Door Electric (standard)
Passenger Door 36" ROUGH OPENING (STANDARD)
Rear Door, (1) Window - Standard Left Hand Hinge
SAFETY OPTIONS
STANDARD ROSCO STSK4750 BACK-UP CAMERA SYSTEM W/ 7" REARVIEW MONITOR / MIRROR COMBO
GRAB RAIL / STANCHION / PANELS
Ceiling Grab Rail - Install on **Both Sides**
Left Hand Entry Vertical Grab Rail - **1 1/4"**
1 1/4" Dual Entry Grab Rails Parallel to Entrance Steps (both sides)
Stanchion and Modesty Panel at Entry Door
Stanchion and Modesty Panel Behind Driver
SEATING - DRIVER
SHIELD FC Recliner(GM&Ford), RH Arm, 4 Position Lumbar, Mesh Pocket
FREEDMAN SHIELD DRIVER SEAT FABRICS
Driver Seat Cover - Level 1 Newport Vinyl; Oxen Vinyl; Olefin
SEATING - PASSENGER
STD RIGID SEATS
Mid High Double Seat (Quantity 9)
Mid High Single Seat (Quantity 1)
SEAT OPTIONS
Anti-Vandal Grab Handle, Black Ea **on:**
SEAT BELTS
Seat Belt, Non-Retractable ****STANDARD ITEM - ENTER QUANTITY



DEALER APPROVAL

☐ APPROVED

CUSTOMER SIGNATURE

NOTE: SHOWN WITH MID HI FREEDMAN SEATS
E-350 12,500 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.

SCALE IN INCHES 0 12 24 36 48

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

TOLERANCE UNLESS OTHERWISE SPECIFIED

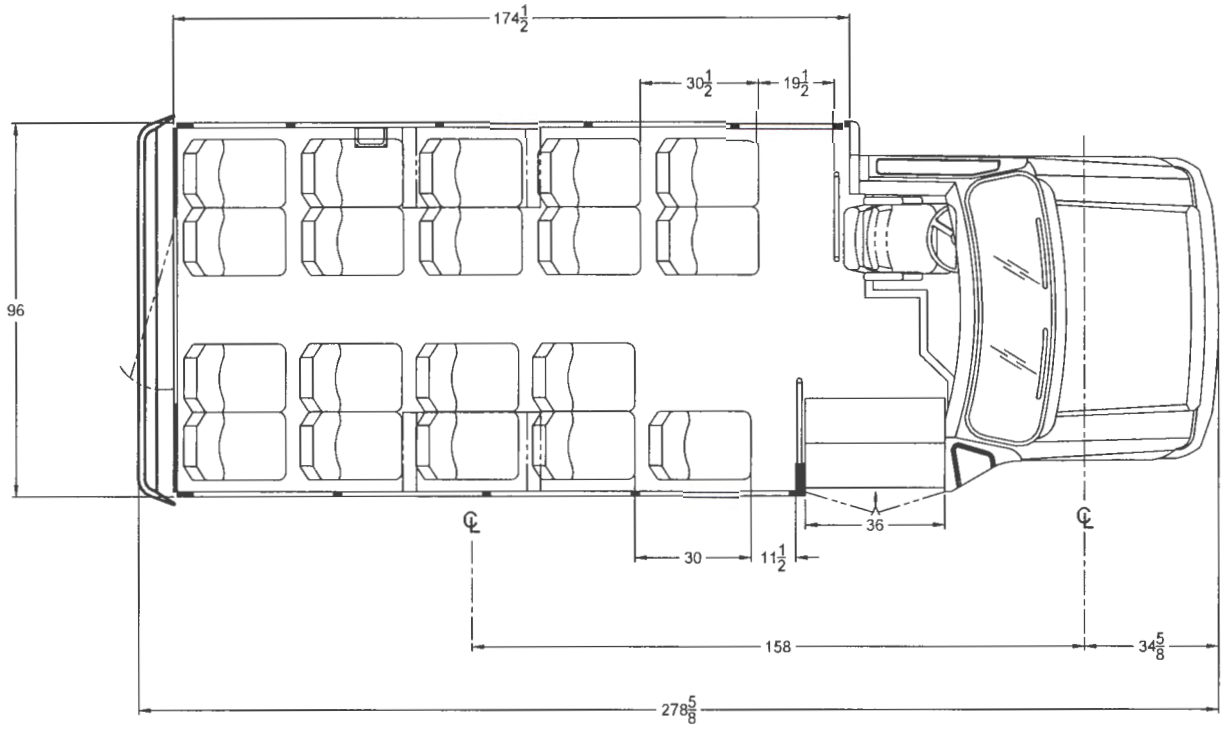
WOOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2"

FOREST RIVER BUS

TITLE: 19 PASS. 158" WB MODEL 22

NAME: CRANS DATE: 8/24/22

DWG. No. 19 PASS 158 163 FRB



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FOREST RIVER BUS

TITLE: 19 PASS. 158" WB MODEL 22

NAME CRANS DATE 8/24/22

DWG. No. 19 PASS 158 163 FRB

Starcraft Bus — Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

COMPONENT NAME	MANUFACTURER NAME		% U.S. CONTENT	%FOREIGN CONTENT
ALLSTAR 22' 158" WB ON FORD E350	Starcraft Bus		73.10%	26.90%
SUBCOMPONENT NAME	**MANUFACTURER NAME**	**MFG LOCATION**	**% OF TOTAL**	
Chassis	Ford Motor Co.	U.S.	55.90%	
A/C System	Trans Air	U.S.	6.15%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	0.39%	
Seating	Freedman	U.S.	6.88%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.71%	
Windows	StarQuest		1.25%	
Electrical System	LGS Group		1.82%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY 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, 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.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

TBD

FINAL ASSEMBLY % OF TOTAL COST NOT INCLUDED IN THE MATERIAL COSTS ABOVE: 4.78%

FINAL ASSEMBLY $$ NOT INCLUDED IN THE COSTS ABOVE $3,097.57

AUTHORIZED SIGNATURE	Government Bids (TITLE)	8/24/2022 (DATE)

Scott Defrees
PRINT NAME

STURAA TEST

10 YEAR

350,000 MILE BUS

from

STARCRAFT BUS
A DIVISION OF
FOREST RIVER, INC.

MODEL ALLSTAR XL

MAY 2009

PTI-BT-R0815

PENNSTATE

The Thomas D. Larson
Pennsylvania 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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Starcraft Bus, a Division of Forest River. Inc. submitted a model Allstar XL, diesel-powered 31 seat (including the driver) 34-foot bus, for a 10 yr/350,000 mile STURAA test. The odometer reading at the time of delivery was 512 miles. Testing started on October 9, 2008 and was completed on May 1, 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 November 5, 2008 and was completed on March 20, 2009.

The interior of the bus is configured with seating for 31 passengers including the driver. Free floor space will accommodate 19 standing passengers resulting in a potential load of 50 persons. At 150 lbs per person, this load results in a measured gross vehicle weight of 22,170 lbs. The first segment of the Structural Durability Test was performed with the bus loaded to a GVW of 22,170 lbs. The middle segment was performed at a seated load weight of 19,450 lbs and the final segment was performed at a curb weight of 14,880 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 2 failures. Of the 29 reported failures, 15 were Class 3 and 14 were Class 4.

The Safety Test, (a double-lane change, obstacle avoidance test) was safely performed in both right-hand and left-hand directions up to a maximum test speed of 45 mph. The performance of the bus is illustrated by a speed vs. time plot. Acceleration and gradeability test data are provided in Section 4, Performance. The average time to obtain 50 mph was 18.04 seconds.

The Shakedown Test produced a maximum final loaded deflection of 0.329 inches with a permanent set ranging between -0.005 to 0.007 inches under a distributed static load of 18,750 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 test bus was not equipped with any type of tow eyes or tow hooks, therefore the Static Towing Test was not performed. The Dynamic Towing Test was performed by means of a front-lift tow. The towing interface was accomplished using a hydraulic under-lift wrecker. The bus was towed without incident and no damage resulted from the test. The manufacturer does not recommend towing the bus from the rear, therefore, a rear test was not performed. The Jacking and Hoisting Tests were also performed without incident. The bus was found to be stable on the jack stands, and the minimum jacking clearance observed with a tire deflated was 4.9 inches.

A Fuel Economy Test was run on simulated central business district, arterial, and commuter courses. The results were 4.72 mpg, 4.78 mpg, and 8.88 mpg respectively; with an overall average of 5.47 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 Starcraft Bus, model Allstar XL. The bus has a driver's door and passenger door rear of the front axle and a handicap entrance which is not equipped with a lift, rear of the rear axle. Power is provided by a diesel-fueled, General Motors Corp., model Duramax 6.6 L engine coupled to an Allison model 2000 Series transmission.

The measured curb weight is 6,180 lbs for the front axle and 8,700 lbs for the rear axle. These combined weights provide a total measured curb weight of 14,880 lbs. There are 31 seats including the driver and room for 19 standing passengers bringing the total passenger capacity to 50. Gross load is 150 lb x 50 = 7,500 lbs. At full capacity, the measured gross vehicle weight is 22,170 lbs.

VEHICLE DATA FORM

Bus Number: 0815	Arrival Date: 10-9-08
Bus Manufacturer: Starcraft Bus	Vehicle Identification Number (VIN): 5NHBSFE2X8L014012
Model Number: Allstar XL	Date: 10-9-08
Personnel: S.C.	

WEIGHT:

Individual Wheel Reactions:

Weights (lb)	Front Axle		Middle Axle		Rear Axle	
	Right	Left	Right	Left	Right	Left
CW	2,860	3,320	N/A	N/A	4,410	4,290
SLW	3,260	3,800	N/A	N/A	6,200	6,190
GVW	3,480	4,030	N/A	N/A	7,350	7,310

Total Weight Details:

Weight (lb)	CW	SLW	GVW	GAWR
Front Axle	6,180	7,060	7,510	8,000
Middle Axle	N/A	N/A	N/A	N/A
Rear Axle	8,700	12,390	14,660	18,700
Total	14,880	19,450	22,170	GVWR: 26,000

Dimensions:

Length (ft/in)	34 / 8.0
Width (in)	97.0
Height (in)	127.0
Front Overhang (in)	36.0
Rear Overhang (in)	12.0
Wheel Base (in)	260.0
Wheel Track (in)	Front: 83.2
	Rear: 75.0

Bus Number: 0815	Date: 10-9-08

CLEARANCES:

Lowest Point Outside Front Axle	Location: Sway bar Clearance(in): 11.9
Lowest Point Outside Rear Axle	Location: Exhaust pipe Clearance(in): 15.8
Lowest Point between Axles	Location: Body Clearance(in): 15.0
Ground Clearance at the center (in)	15.0
Front Approach Angle (deg)	23.8
Rear Approach Angle (deg)	10.1
Ramp Clearance Angle (deg)	6.6
Aisle Width (in)	18.0
Inside Standing Height at Center Aisle (in)	80.5

BODY DETAILS:

Body Structural Type	Integral		
Frame Material	Steel		
Body Material	Aluminum & fiberglass		
Floor Material	Plywood		
Roof Material	Aluminum & fiberglass		
Windows Type	□ Fixed	■ Movable	
Window Mfg./Model No.	SAFETY DOT 269 / AS3 M180		
Number of Doors	1 Front	1 Rear (handicap)	1 Driver's
Mfr. / Model No.	Duramold / 2133		
Dimension of Each Door (in)	Front–32.4 x 86.0	Rear–44.9 x 69.9	Driver's–33.6 x 48.0
Passenger Seat Type	□ Cantilever	■ Pedestal	□ Other (explain)
Mfr. / Model No.	Freedman Seating Co. / na		
Driver Seat Type	□ Air	□ Spring	■ Other (cushion)
Mfr. / Model No.	OEM / na		
Number of Seats (including Driver)	31		

Bus Number: 0815	Date: 10-9-08

BODY DETAILS (Contd..)

Free Floor Space (ft^2)	28.5			
Height of Each Step at Normal Position (in)	Front 1. 11.5	2. 8.9	3. 8.9	4. 8.9
	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	■ C.I.	□ Alternate Fuel	
	□ S.I.	□ Other (explain)	
Mfr. / Model No.	General Motors Corp. / Duramax / 6.6 L		
Location	■ Front	□ Rear	□ Other (explain)
Fuel Type	□ Gasoline	□ CNG	□ Methanol
	■ Diesel	□ LNG	□ Other (explain)
Fuel Tank Capacity (indicate units)	80 gals		
Fuel Induction Type	■ Injected	□ Carburetion	
Fuel Injector Mfr. / Model No.	General Motors Corp. / Duramax / 6.6 L		
Carburetor Mfr. / Model No.	N/A		
Fuel Pump Mfr. / Model No.	General Motors Corp. / Duramax / 6.6 L		
Alternator (Generator) Mfr. / Model No.	AC Delco / D R44G		
Maximum Rated Output (Volts / Amps)	14 volts/ 15 amps		
Air Compressor Mfr. / Model No.	N/A		
Maximum Capacity (ft^3 / min)	N/A		
Starter Type	■ Electrical	□ Pneumatic	□ Other (explain)
Starter Mfr. / Model No.	AD Delco / na		

Bus Number: 0815	Date: 10-9-08

TRANSMISSION

Transmission Type	□ Manual	■ Automatic	
Mfr. / Model No.	Allison / 2000 Series		
Control Type	■ Mechanical	□ Electrical	□ Other
Torque Converter Mfr. / Model No.	Allison / 2000 Series		
Integral Retarder Mfr. / Model No.	N/A		

SUSPENSION

Number of Axles	2		
Front Axle Type	□ Independent	■ Beam Axle	
Mfr. / Model No.	Arvin Meritor / MFS08153BNN79		
Axle Ratio (if driven)	N/A		
Suspension Type	□ Air	■ Spring	□ Other (explain)
No. of Shock Absorbers	2		
Mfr. / Model No.	Cofap / 15887728		
Middle Axle Type	□ Independent	□ Beam Axle	
Mfr. / Model No.	N/A		
Axle Ratio (if driven)	N/A		
Suspension Type	□ Air	□ Spring	□ Other (explain)
No. of Shock Absorbers	N/A		
Mfr. / Model No.	N/A		
Rear Axle Type	□ Independent	■ Beam Axle	
Mfr. / Model No.	Spicer / 19060S		
Axle Ratio (if driven)	4.88		
Suspension Type	□ Air	■ Spring	□ Other (explain)
No. of Shock Absorbers	2		
Mfr. / Model No.	Cofap / 15174903		

Bus Number: 0815	Date: 10-9-08

WHEELS & TIRES

Front	Wheel Mfr./ Model No.	Accuride / 19.5 x 6.75
	Tire Mfr./ Model No.	Goodyear RHS / 245/70R 19.5
Rear	Wheel Mfr./ Model No.	Accuride / 19.5 x 6.75
	Tire Mfr./ Model No.	Goodyear RHS / 245/70R 19.5

BRAKES

Front Axle Brakes Type	□ Cam	■ Disc	□ Other (explain)
Mfr. / Model No.	Meritor / na		
Middle Axle Brakes Type	□ Cam	□ Disc	□ Other (explain)
Mfr. / Model No.	N/A		
Rear Axle Brakes Type	□ Cam	■ Disc	□ Other (explain)
Mfr. / Model No.	Meritor / na		
Retarder Type	N/A		
Mfr. / Model No.	N/A		

HVAC

Heating System Type	□ Air	■ Water	□ Other
Capacity (Btu/hr)	65,000		
Mfr. / Model No.	GMC / ProAir 65M BTU		
Air Conditioner	■ Yes	□ No	
Location	Dash & rear interior ceiling.		
Capacity (Btu/hr)	87,000		
A/C Compressor Mfr. / Model No.	Carrier / C181447 Delphi / 15888060		

STEERING

Steering Gear Box Type	Hydraulic gear
Mfr. / Model No.	ZF / 8014974107
Steering Wheel Diameter	15.4
Number of turns (lock to lock)	5.0

Bus Number: 0815	Date: 10-9-08

OTHERS

Wheel Chair Ramps	Location: N/A	Type: N/A
Wheel Chair Lifts	Location: N/A	Type: N/A
Mfr. / Model No.	N/A	
Emergency Exit	Location: Window Door	Number: 4 1

CAPACITIES

Fuel Tank Capacity (units)	80 gals
Engine Crankcase Capacity (quarts)	14.6
Transmission Capacity (gallons)	4.38
Differential Capacity (pints)	31.0
Cooling System Capacity (quarts)	33.9
Power Steering Fluid Capacity (gallons)	.38

VEHICLE DATA FORM

Bus Number: 0815	Date: 10-9-08

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

Part Number	Description	Qty.
Goodyear RHS 245/70R 19.5	Mounted tires	6
003 953-20	Vacuum pump	1
15296912	Isolator	4
PF 2232	Oil filter	1
W34-107-B1	Fuel filter	1
W46-116-B1	Brake pad kit	2
594K-6 EB	Drive belt (engine)	1
19152817	Air Cleaner (engine)	1
19152843	Shock absorber	2
88982687	Shock absorber	2
8-97329-062-0	Belt tensioner	1

COMPONENT/SUBSYSTEM INSPECTION FORM

Bus Number: 0815	Date: 10-9-08

Subsystem	Checked	Comments
Air Conditioning Heating and Ventilation	✓	A/C compressor for coach not functioning, clutch locked.
Body and Sheet Metal	✓	
Frame	✓	
Steering	✓	
Suspension	✓	
Interior/Seating	✓	
Axles	✓	
Brakes	✓	
Tires/Wheels	✓	
Exhaust	✓	
Fuel System	✓	Diesel
Power Plant	✓	
Accessories	✓	
Lift System	✓	Not equipped.
Interior Fasteners	✓	
Batteries	✓	

CHECK - IN

STARCRAFT BUS
MODEL ALLSTAR XL

CHECK - IN CONT.

DEDICATED HANDICAP ENTRANCE

(TEST BUS WAS NOT EQUIPPED WITH LIFT)

DRIVER'S STATION

CHECK - IN CONT.

INTERIOR
FRONT TO REAR

INTERIOR
REAR TO FRONT

CHECK - IN CONT.

UNDERCARRIAGE FRONT

UNDERCARRIAGE REAR

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: 0815	Date: 4-30-09

Component	Checked	Comments
ENGINE :		
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	✓	
TRANSMISSION :		
Fluid Dip-Stick	✓	
Filler Hole	✓	
Drain Plug	✓	
SUSPENSION :	✓	
Bushings	✓	
Shock Absorbers	✓	
Air Springs	✓	
Leveling Valves	✓	
Grease Fittings	✓	

ACCESSIBILITY DATA FORM

Bus Number: 0815	Date: 4-30-09

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

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

1.2-I. TEST OBJECTIVE

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

1.2.-II. TEST DESCRIPTION

The test will be conducted by operating the NBM and collecting the following data on work order forms and a driver log.

1. Unscheduled Maintenance
    a. Bus number
    b. Date
    c. Mileage
    d. Description of malfunction
    e. Location of malfunction (e.g., in service or undergoing inspection)
    f. Repair action and parts used
    g. Man-hours required

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

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

A. Service
    1. Fueling
    2. Consumable checks
    3. Interior cleaning

B. Preventive Maintenance
    4. Brake adjustments
    5. Lubrication
    6. 3,000 mi (or equivalent) inspection

7. Oil and filter change inspection
8. Major inspection
9. Tune-up

C. Periodic Repairs
1. Brake reline
2. Transmission change
3. Engine change
4. Windshield wiper motor change
5. Stoplight bulb change
6. Towing operations
7. Hoisting operations

1.2-III. DISCUSSION

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

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SCHEDULED MAINTENANCE

Starcraft #0815

DATE	TEST MILES	SERVICE	ACTIVITY	DOWN TIME	HOURS
11-18-08	719	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
12-18-08	2,014	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-09-09	3,422	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-21-09	4,045	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-29-09	5,534	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-03-09	6,243	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00

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SCHEDULED MAINTENANCE

Starcraft #0815

DATE	TEST MILES	SERVICE	ACTIVITY	DOWN TIME	HOURS
02-11-09	7,398	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-24-09	8,726	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
03-02-09	9,668	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
03-09-09	10,183	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
04-23-09	11,250	P.M. / Inspection Fuel Economy Prep.	Linkage, tie rods, universals/u-joints all lubed. Oil changed. Oil, fuel, and air filters changed. Transmission oil and filter changed.	8.00	8.00

Table 1. STANDARD LUBRICANTS

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

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

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS

1.3-I. TEST OBJECTIVE

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

1.3-II. TEST DESCRIPTION

The test will involve components that may be expected to fail or require replacement during the service life of the bus. In addition, any component that fails during the NBM testing is added to this list. Components to be included are:

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

1.3-III. DISCUSSION

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

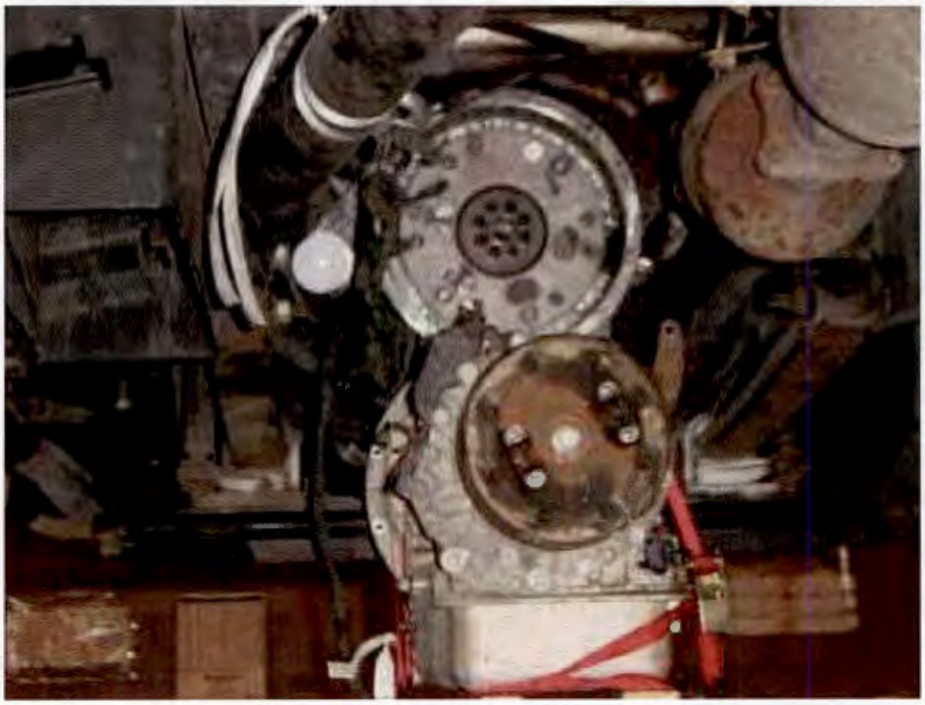
	MAN HOURS
Exhaust down pipe.	2.0
Four body-to-frame brackets.	6.0
Left front sway bar mount.	1.5
Tail pipe hanger.	1.0
Fuel hose & fuel filter.	9.0
Rear bumper & brackets.	1.0
Engine mount bolt.	2.0
Drive axle tires.	0.5
Five body supports.	1.0

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

REPLACEMENT AND/OR REPAIR FORM

Subsystem	Replacement Time
Transmission	8.00 man hours
Wiper Motor	0.50 man hours
Starter	0.50 man hours
Alternator	0.75 man hours
Batteries	0.25 man hours

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS



TRANSMISSION REMOVAL AND REPLACEMENT (8.0 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)

ALTERNATORS (2) REMOVAL AND REPLACEMENT (0.75 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 2 failures. Of the 15 Class 3 failures, six occurred in the exhaust system, five involved the engine/transmission, two with the frame/body and one each with the suspension and electrical system. These and the remaining 14 Class 4 failures are available for review in the Unscheduled Maintenance List, located in Section 5.7 Structural Durability.

RELIABILITY DATA FORMS

Bus Number: 0815	Date: 05-20-09
Personnel: Bob Reifsteck	

Subsystems	Failure Type: Class 4 Bad Order Mileage	Class 3 Bus Change Mileage	Class 2 Road Call Mileage	Class 1 Physical Safety Mileage	Man Hours	Down Time
Body	719				3.50	216.00
		4,045			6.00	56.00
	6,208				0.50	4.00
	6,246				1.00	8.00
	6,715				0.50	0.50
	6,940				3.00	1.00
		7,613			1.00	3.00
	8,490				1.00	0.50
	9,347				1.00	0.50
Electrical		719			3.00	6.00
Suspension		4,045			1.50	3.00
Wheels and Tires	9,347				0.50	0.50
Engine/Transmission	6,246				1.00	8.00
	7,390				0.50	6.00
		7,836			12.00	26.00
		8,024			9.00	8.00
		8,726			2.00	8.00
	8,912				2.00	3.00
	9,347				0.50	8.00
		10,183			2.00	54.00
		10,503			2.00	64.00

RELIABILITY DATA FORMS

Bus Number: 0815	Date: 05-20-09
Personnel: Bob Reifsteck	

Failure Type			
Class 4 Bad Order	Class 3 Bus Change	Class 2 Road Call	Class 1 Physical Safety

Subsystems	Mileage	Mileage	Mileage	Mileage	Man Hours	Down Time
Exhaust System		1,642			2.00	20.00
	1,702				1.00	0.50
		3,612			2.00	24.00
		6,715			2.00	4.00
		6,715			1.00	0.50
	8,565				2.00	10.00
		10,183			1.00	0.50
		10,183			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: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	

Temperature (°F): 62	Humidity (%): 37
Wind Direction: S	Wind Speed (mph): 9
Barometric Pressure (in.Hg): 30.18	

SAFETY TEST: DOUBLE LANE CHANGE	
Maximum safe speed tested for double-lane change to left	45 mph
Maximum safe speed tested for double-lane change to right	45 mph
Comments of the position of the bus during the lane change: A safe profile was maintained through all portions of testing.	
Comments of the tire/ground contact patch: 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 18.04 seconds.

PERFORMANCE DATA FORM

Bus Number: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	
Temperature (°F): 62	Humidity (%): 37
Wind Direction: S	Wind Speed (mph): 9
Barometric Pressure (in.Hg): 30.18	
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

ACCELERATION, GRADEABILITY, TOP SPEED

Counter Clockwise Recorded Interval Times

Speed	Run 1	Run 2	Run 3
10 mph	3.02	2.79	2.57
20 mph	5.92	5.23	4.76
30 mph	9.67	8.63	8.04
40 mph	14.36	12.69	12.32
Top Test Speed(mph) 50	20.02	18.60	17.69

Clockwise Recorded Interval Times

Speed	Run 1	Run 2	Run 3
10 mph	2.66	2.76	2.98
20 mph	4.73	4.92	5.20
30 mph	7.70	7.82	8.36
40 mph	11.82	11.92	12.26
Top Test Speed(mph) 50	17.04	17.35	17.54

PERFORMANCE SUMMARY SHEET

BUS MANUFACTURER :Starcraft
BUS MODEL :Allstar XL

BUS NUMBER :0815
TEST DATE :04/24/09

TEST CONDITIONS :

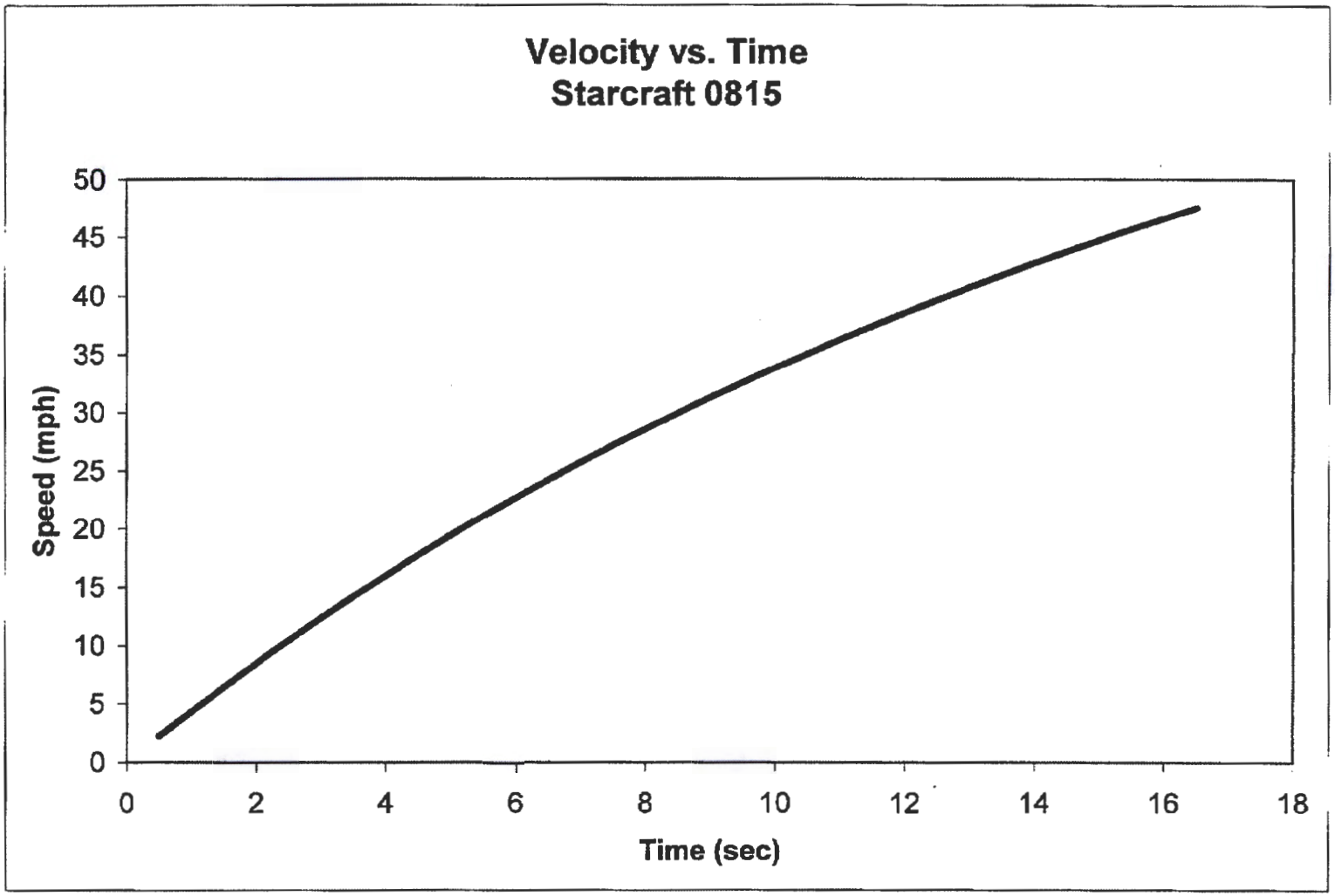
TEMPERATURE (DEG F) : 62.0
WIND DIRECTION : S
WIND SPEED (MPH) : 9.0
HUMIDITY (%) : 37
BAROMETRIC PRESSURE (IN. HG) : 30.2

VEHICLE SPEED	AVERAGE TIME (SEC)		
(MPH)	CCW DIRECTION	CW DIRECTION	TOTAL
10.0	2.79	2.80	2.80
20.0	5.30	4.95	5.13
30.0	8.78	7.96	8.37
40.0	13.12	12.00	12.56
50.0	18.77	17.31	18.04

TEST SUMMARY :

VEHICLE SPEED (MPH)	TIME (SEC)	ACCELERATION (FT/SEC^2)	MAX. GRADE (%)
1.0	.22	6.5	20.6
5.0	1.15	6.2	19.5
10.0	2.39	5.7	18.0
15.0	3.73	5.2	16.5
20.0	5.19	4.8	15.1
25.0	6.79	4.4	13.7
30.0	8.55	4.0	12.4
35.0	10.50	3.6	11.1
40.0	12.68	3.2	9.9
45.0	15.13	2.8	8.8
50.0	17.92	2.5	7.7

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
Starcraft 0815
Speed (mph)
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
Time (sec)

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 50 people including the driver. The resulting test load is (50 x 375 lb) = 18,750 lb. The load is distributed evenly over the passenger space. Deflection data before and after each loading and unloading sequence is provided on the Structural Shakedown Data Form.

The unloaded height after each test becomes the original height for the next test. Some initial settling is expected due to undercoat compression, etc. After each loading cycle, the deflection of each reference point is determined. The bus is then unloaded and the residual (permanent) deflection is recorded. On the final test, the maximum loaded deflection was 0.329 inches at reference point 4. The maximum permanent deflection after the final loading sequence ranged from -0.005 inches at reference points 1 and 6 to 0.007 inches at reference points 8 and 9.

STRUCTURAL SHAKEDOWN DATA FORM

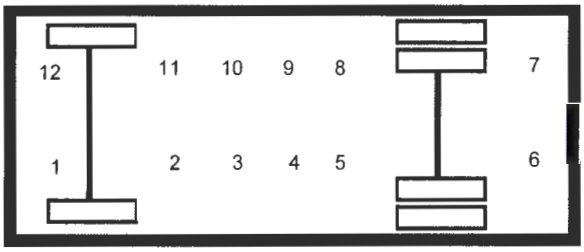
Bus Number: 0815	Date: 10-22-08
Personnel: T.S., E.L., E.D. & S.C.	Temperature (°F): 40
Loading Sequence: ■ 1 □ 2 □ 3 (check one) Test Load (lbs): 118,750	

Indicate Approximate Location of Each Reference Point

Right

Front of Bus

Left



Top View

Reference Point No.	A (in) Original Height	B (in) Loaded Height	B-A (in) Loaded Deflection	C (in) Unloaded Height	C-A (in) Permanent Deflection
1	0	-.050	-.050	.000	.000
2	0	.158	.158	.020	.020
3	0	.278	.278	.027	.027
4	0	.240	.240	.032	.032
5	0	.300	.300	.032	.032
6	0	.000	.000	-.018	-.018
7	0	.032	.032	-.022	-.022
8	0	.296	.296	.028	.028
9	0	.327	.327	.028	.028
10	0	.273	.273	.024	.024
11	0	.160	.160	.015	.015
12	0	.-033	-.033	.000	.000

STRUCTURAL SHAKEDOWN DATA FORM

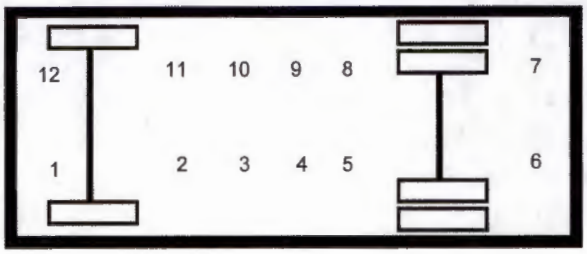
Bus Number: 0815	Date: 10-23-08
Personnel: T.S., E.L., E.D. & S.C.	Temperature (°F): 50
Loading Sequence: □ 1 ■ 2 □ 3 (check one) Test Load (lbs): 18,750	

Indicate Approximate Location of Each Reference Point

Right

Front of Bus

Left



Top View

Reference Point No.	A (in) Original Height	B (in) Loaded Height	B-A (in) Loaded Deflection	C (in) Unloaded Height	C-A (in) Permanent Deflection
1	.000	-.050	-.050	-.005	-.005
2	.020	.169	.149	.025	.005
3	.027	.296	.269	.026	-.001
4	.032	.361	.329	.032	.000
5	.032	.323	.291	.034	.002
6	-.018	-.025	-.007	-.023	-.005
7	-.022	-.049	-.027	-.024	-.002
8	.028	.312	.284	.035	.007
9	.028	.355	.327	.035	.007
10	.024	.290	.266	.028	.004
11	.015	.170	.155	.016	.001
12	.000	-.023	-.023	-.004	-.004

5.1 STRUCTURAL SHAKEDOWN TEST

DIAL INDICATORS IN POSITION

BUS LOADED TO 2.5 TIMES GVL (18,750 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▪ before	▫ after
Left front	▫ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▫ after
Left front	▪ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	■ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▫ after
Left front	▫ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▪ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▫ after
Left front	▫ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▪ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▫ after
Left front	▫ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▪ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	■ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▫ after
Left front	▫ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▪ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▫ after
Left front	▫ 6 in higher	▪ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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: 0815	Date: 10-27-08
Personnel: T.S., E.L. & E.D.	Temperature(°F): 45

Wheel Position : (check one)		
All wheels level	▫ before	▪ after
Left front	▫ 6 in higher	▫ 6 in lower
Right front	▫ 6 in higher	▫ 6 in lower
Right rear	▫ 6 in higher	▫ 6 in lower
Left rear	▫ 6 in higher	▫ 6 in lower
Right center	▫ 6 in higher	▫ 6 in lower
Left center	▫ 6 in higher	▫ 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.

5.2 STRUCTURAL DISTORTION TEST

LEFT REAR FRONT WHEEL SIX INCHES HIGHER

RIGHT 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 test bus submitted for testing was not equipped with any type of tow eyes or tow hooks, therefore, the Static Towing Test was not performed.

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: 0815	Date: 4-22-09
Personnel: T.S. & S.C.	

Temperature (°F): 48	Humidity (%): 48
Wind Direction: SW	Wind Speed (mph): 7
Barometric Pressure (in.Hg): 29.67	

Inspect tow equipment-bus interface.
Comments: A safe and adequate connection was made between the tow equipment and the bus.
Inspect tow equipment-wrecker interface.
Comments: A safe and adequate connection was made between the tow equipment and the wrecker.
Towing Comments: A front lift tow was performed incorporating a hydraulic under lift wrecker.
Description and location of any structural damage: No noted.
General Comments: No problems with the tow or towing interface were encountered.

5.4 DYNAMIC TOWING TEST

TOWING INTERFACE

TEST BUS IN TOW

5.5 STRUCTURAL STRENGTH AND DISTORTION TESTS – JACKING TEST

5.5-I. TEST OBJECTIVE

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

5.5-II. TEST DESCRIPTION

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

5.5-III. DISCUSSION

The jack used for this test has a minimum height of 8.75 inches. During the deflated portion of the test, the jacking point clearances ranged from 4.9 inches to 27.3 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	20.4"
Rear axle – one tire flat	27.3"
Rear axle – two tires flat	25.7"

JACKING TEST DATA FORM

Bus Number: 0815	Date: 10-9-08
Personnel: T.S. & S.C.	Temperature (°F): 70

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

Deflated Tire	Jacking Pad Clearance Body/Frame (in)	Jacking Pad Clearance Axle/Suspension (in)	Comments
Right front	22.2 " I 20.5 " D	7.2 " I 5.0 " D	
Left front	22.1 " I 20.4 " D	7.1 " I 4.9 " D	
Right rear—outside	27.5 " I 27.3 " D	10.7 " I 10.5 " D	
Right rear—both	27.5 " I 25.7 " D	10.7 " I 9.0 " D	
Left rear—outside	27.5 " I 27.3 " D	10.8 " I 10.5 " D	
Left rear—both	27.5 " I 26.0 " D	10.8 " I 8.8 " D	
Right middle or tag—outside	NA	NA	
Right middle or tag—both	NA	NA	
Left middle or tag—outside	NA	NA	
Left middle or tag—both	NA	NA	

Additional comments of any deformation or difficulty during jacking:
None noted.

5.6 STRUCTURAL STRENGTH AND DISTORTION TESTS - HOISTING TEST

5.6-I. TEST OBJECTIVE

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

5.6-II. TEST DESCRIPTION

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

5.6-III. DISCUSSION

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

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

HOISTING TEST DATA FORM

Bus Number: 0815	Date: 10-16-08
Personnel: E.D. & E.L.	Temperature (°F): 68

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

5.7 STRUCTURAL DURABILITY TEST

5.7-I. TEST OBJECTIVE

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

5.7-II. TEST DESCRIPTION

The test vehicle is driven a total of 11,250 miles; approximately 8,750 miles on the PSBRTF Durability Test Track and approximately 2,500 miscellaneous other miles. The test will be conducted with the bus operated under three different loading conditions. The first segment will consist of approximately 4,625 miles with the bus operated at GVW. The second segment will consist of approximately 2,000 miles with the bus operated at SLW. The remainder of the test, approximately 4,650 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 November 5, 2008 and was conducted until March 20, 2009. The first 4,625 miles were performed at a GVW of 22,170 lbs. and completed on January 26, 2009. The next 2,000 mile SLW segment was performed at 19,450 and completed on February 5, 2009 and the final 4,625 mile segment was performed at a CW of 14,880 lbs and completed on March 20, 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. Finally, photographs illustrating some of the failures that were encountered during the Structural Durability Test are included.

Starcraft - TEST BUS #0815

MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS

DATE	TOTAL DURABILITY TRACK	TOTAL OTHER MILES	TOTAL
11/03/08 TO 11/09/08	229.00	59.00	288.00
11/10/08 TO 11/16/08	241.00	11.00	252.00
11/17/08 TO 11/23/08	102.00	77.00	179.00
11/24/08 TO 11/30/08	0.00	96.00	96.00
12/1/08 TO 12/07/08	699.00	31.00	730.00
12/08/08 TO 12/14/08	113.00	52.00	165.00
12/15/08 TO 12/21/08	291.00	13.00	304.00
12/22/08 TO 12/28/08	339.00	25.00	364.00
12/29/08 TO 01/04/09	91.00	4.00	95.00
01/05/09 TO 01/11/09	851.00	148.00	999.00
01/12/09 TO 01/18/09	0.00	573.00	573.00
01/19/09 TO 01/25/09	542.00	68.00	610.00
01/26/09 TO 02/01/09	1141.00	78.00	1219.00
02/02/09 TO 02/08/09	744.00	229.00	973.00

Starcraft - TEST BUS #0815

MILEAGE DRIVEN/RECORDED FROM DRIVER'S LOGS

02/09/09 TO 02/15/09	842.00	147.00	989.00
02/16/09 TO 02/22/09	686.00	43.00	729.00
02/23/09 TO 03/01/09	785.00	184.00	969.00
03/02/09 TO 03/08/09	566.00	83.00	649.00
03/09/09 TO 03/15/09	333.00	77.00	410.00
03/16/09 TO 03/22/09	156.00	499.00	655.00
TOTAL	8751.00	2497.00	11248.00

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

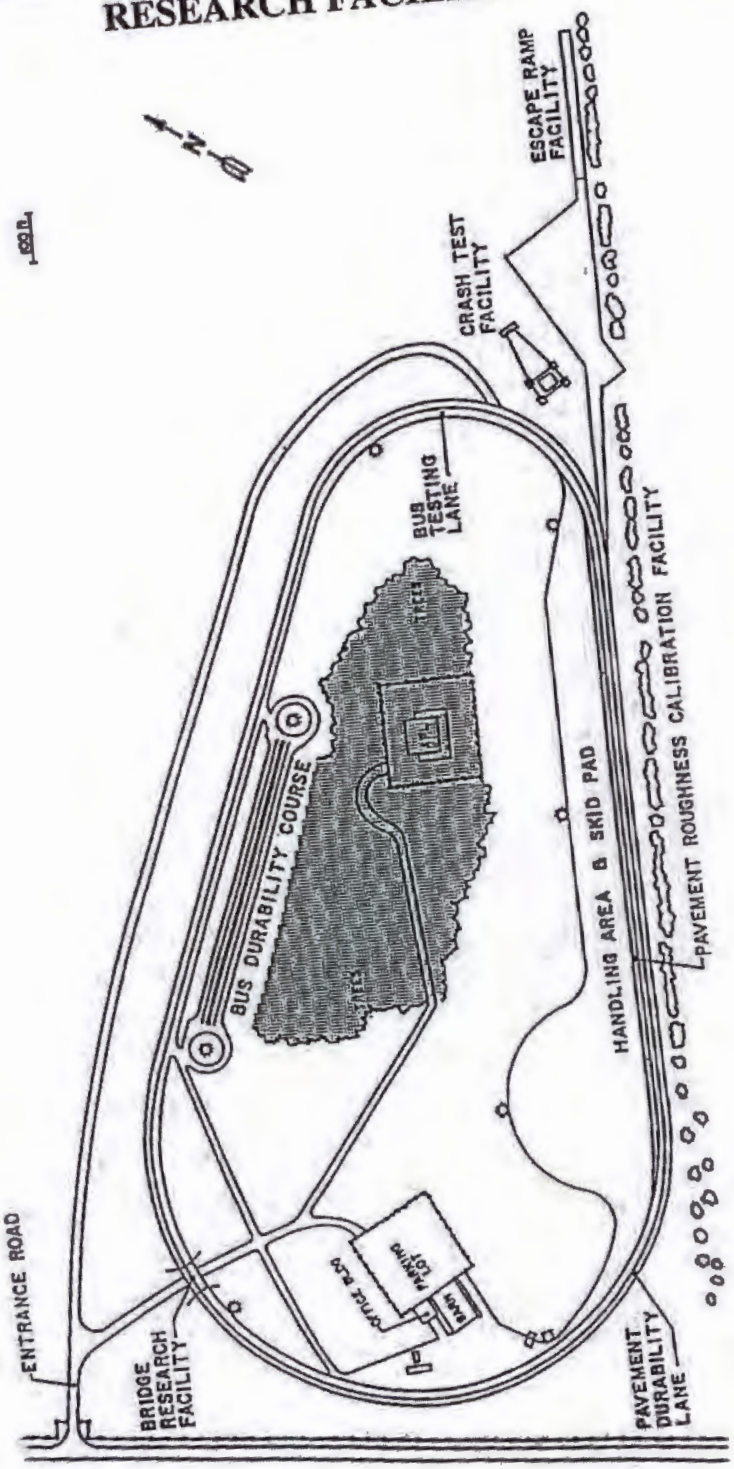
STANDARD OPERATING SCHEDULE

Monday through Friday

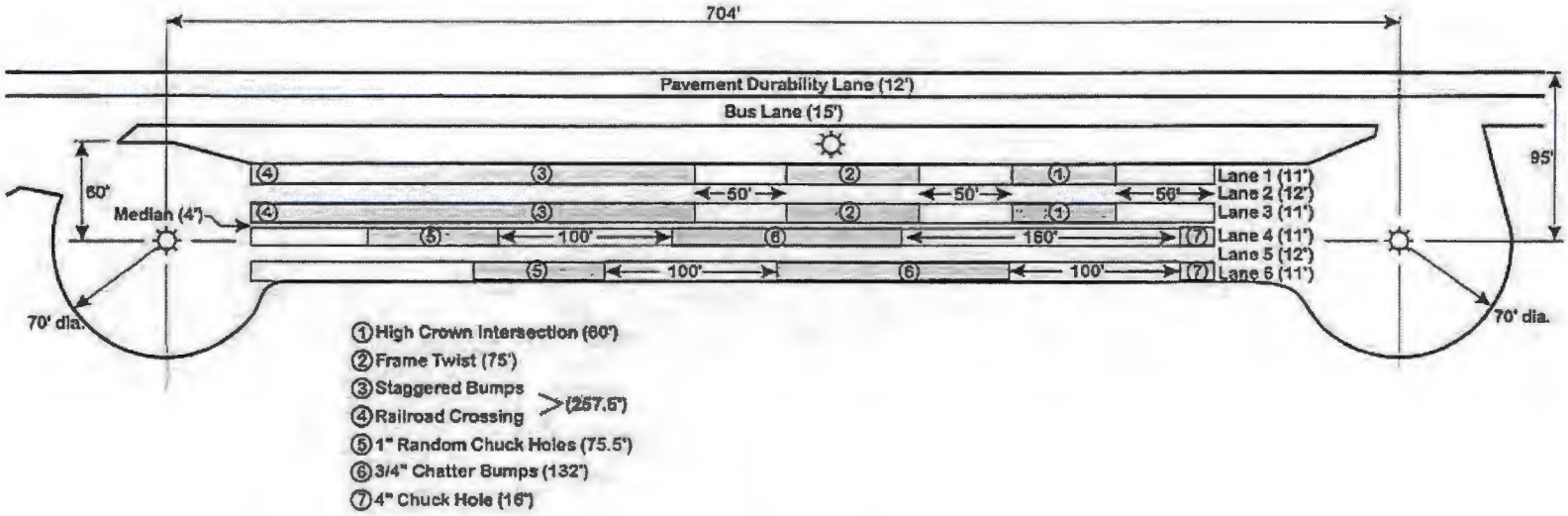
	HOUR	ACTION
Shift 1	midnight	D
	1:40 am	C
	1:50 am	B
	2:00 am	D
	3:35 am	C
	3:45 am	B
	4:05 am	D
	5:40 am	C
	5:50 am	B
	6:00 am	D
	7:40 am	C
	7:50 am	F
Shift 2	8:00 am	D
	9:40 am	C
	9:50 am	B
	10:00 am	D
	11:35 am	C
	11:45 am	B
	12:05 pm	D
	1:40 pm	C
	1:50 pm	B
	2:00 pm	D
	3:40 pm	C
	3:50 pm	F
Shift 3	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"



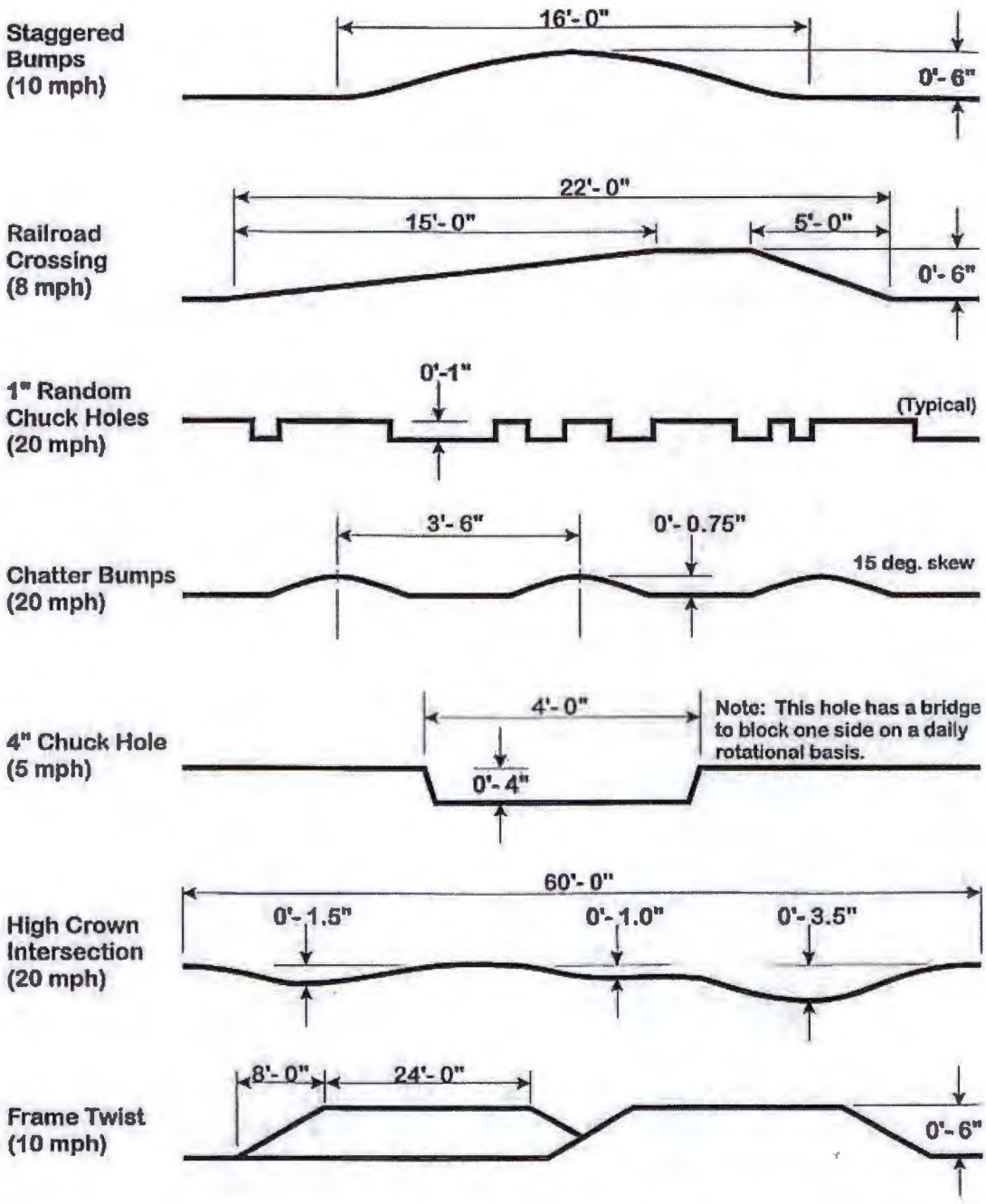
BUS TESTING AND RESEARCH TEST TRACK
UNIVERSITY PARK, PA



Plan View

Vehicle Durability Test Track

The Pennsylvania Transportation Institute
Penn State



Durability Element Profiles

The Pennsylvania Transportation Institute
Penn State

UNSCHEDULED MAINTENANCE

Starcraft Bus #0815

DATE	TEST MILES	SERVICE	ACTIVITY	MAN HOURS	DOWN TIME
11-18-08	719	Two body-to-frame mounts are broken, one on each side directly above rear axle.	Welded/repaired mounts.	3.50	216.00
11-24-08	719	The "Check Engine" and "Regen" lights are on.	Wiring harness chaffed through near the AC compressor. Warranty dealer replaced wiring harness.	3.00	6.00
12-10-08	1,642	The flange is cracked on the exhaust down pipe.	Replaced exhaust down pipe. Ordered flange clamp.	2.00	20.00
12-11-08	1,702	Flange clamp that was ordered on 12/10/08 has arrived.	Installed flange clamp on exhaust down pipe.	1.00	0.50
01-15-09	3,612	The flange is worn on the exhaust down pipe and is leaking exhaust.	Replaced exhaust down pipe and clamp.	2.00	24.00
01-21-09	4,045	Four body-to-frame brackets are broken on the lower body panels; two forward of the rear axle and one rear of the rear axle on the right side and one rear of the axle on the left side.	Replaced four body-to-frame brackets.	6.00	56.00

UNSCHEDULED MAINTENANCE

Starcraft Bus #0815

DATE	TEST MILES	SERVICE	ACTIVITY	MAN HOURS	DOWN TIME
01-21-09	4,045	The left front stabilizer bar bracket is broken.	Replaced left front stabilizer bar braket.	1.50	3.00
02-03-09	6,208	The right body panel behind the rear axle is loose.	Welded/repaired two body panel braces.	0.50	4.00
02-04-09	6,246	The upper right side fan shroud mounting bolts are missing and the left side bolts are loose.	Replaced missing bolts and retorqued loose bolts.	1.00	8.00
02-04-09	6,246	The lower bushing, washer and nut are missing from the left side body mount above the rear axle.	Installed new bushing, nut and washer.	1.00	8.00
02-06-09	6,715	The flange is broken off the exhaust down pipe.	Replaced exhaust down pipe.	2.00	4.00
02-06-09	6,715	The tailpipe hanger is broken.	Replaced tailpipe hanger.	1.00	0.50
02-06-09	6,715	The body brace on the left rear panel behind the axle is broken.	Welded/repaired the brace.	0.50	0.50
02-09-09	6,940	The rear bumper is loose.	Welded/repaired the broken right rear bumper bracket.	3.00	1.00

UNSCHEDULED MAINTENANCE

Starcraft Bus #0815

DATE	TEST MILES	SERVICE	ACTIVITY	MAN HOURS	DOWN TIME
02-11-09	7,390	The exhaust system stayed in "Regen" mode for approximately 12 hours with the red "Exhaust Gas Filter" light on. The "Check Engine" light is also on.	The exhaust gas filter light went out after approximately one hour of highway driving, the "Check Engine" light stayed on. Found codes P2453 and P0234 in history. Cleared history codes; "Check Engine" light is out.	0.50	6.00
02-12-09	7,613	The right rear bumper bracket is broken.	Removed rear bumper and both brackets. Ordered new brackets.	1.00	3.00
02-16-09	7,836	Engine cranks but will not start.	Found fuel filter empty. Filled fuel filter and primed fuel system.	12.00	26.00
02-17-09	8,024	Engine cranks but will not start.	Found a hole in the fuel supply hose at the filter housing. Fuel hose and fuel filter replaced.	9.00	8.00
02-19-09	8,490	Rear bumper bracket ordered on 02/12/09 has arrived.	Installed rear bumper bracket and bumper.	1.00	0.50
02-23-09	8,565	The exhaust pipe is leaking at the turbo connection.	Replaced exhaust down pipe clamp and gasket.	2.00	10.00

UNSCHEDULED MAINTENANCE

Starcraft Bus #0815

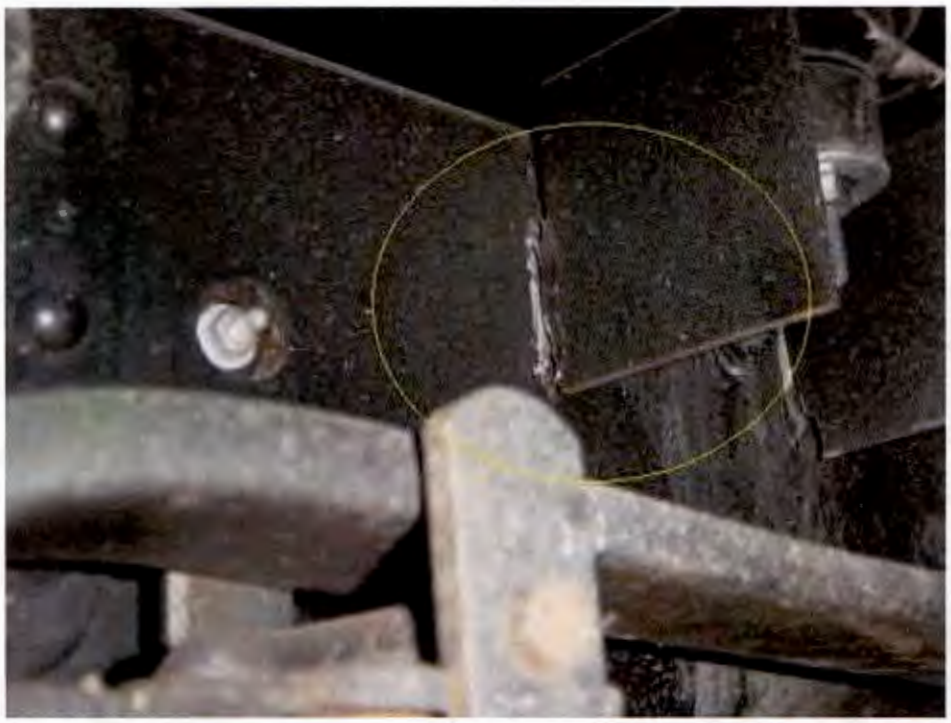
DATE	TEST MILES	SERVICE	ACTIVITY	MAN HOURS	DOWN TIME
02-24-09	8,726	The right side engine mount bolt is broken.	Replaced broken engine mount bolt.	2.00	8.00
02-25-09	8,912	The "Check Engine" light is on.	Codes #P0102, #P0113 and #P2453 found. All wiring connections inspected. Codes cleared. "Check Engine" light out.	2.00	3.00
02-27-09	9,347	The drive axle tires are worn.	Replaced drive axle tires.	0.50	0.50
02-27-09	9,347	Five body panel supports are broken. Two on the right side, one on the left side forward of the rear axle and two on the right side rear of the rear axle.	Replaced five broken body supports.	1.00	0.50
02-27-09	9,347	The emission system staying in "Regen" for an extended period of time. "Check Engine" light is on.	Codes #P0102, #P0113 and #P2453 are present. Codes cleared, "Check Engine" light is out.	0.50	8.00
03-09-09	10,183	The exhaust down pipe is broken.	Replaced exhaust down pipe.	1.00	0.50
03-09-09	10,183	The tail pipe is broken.	Welded/repaired tail pipe.	1.00	1.00

UNSCHEDULED MAINTENANCE

Starcraft Bus #0815

DATE	TEST MILES	SERVICE	ACTIVITY	MAN HOURS	DOWN TIME
03-09-09	10,183	The "Check Engine" and "Limited Power" lights are on.	Checked electrical connections and checked for codes. Found codes P0102 (mass air flow "A" circuit low input), P0113 (intake air temp. sensor 1 circuit high input), and P2453 (diesel particulate filter pressure sensor "A" circuit range/ performance). Checked and cleaned ground wires. Codes cleared.	2.00	54.00
03-13-09	10,503	The "Check Engine" and "Limited Power" lights are on. Will not regenerate.	Checked for codes, checked sensor wiring, checked air intake system. Repaired air leak in the air induction (found hole in the bottom of the air filter box). Cleared codes.	2.00	64.00

UNSCHEDULED MAINTENANCE



CRACKED BODY TO FRAME MOUNT
(719 TEST MILES)

UNSCHEDULED MAINTENANCE CONT.

FLANGE CRACKED ON EXHAUST DOWN PIPE (1,642 TEST MILES)

UNSCHEDULED MAINTENANCE CONT.

BROKEN BODY TO FRAME BRACKETS (4,045 TEST MILES)

UNSCHEDULED MAINTENANCE CONT.

BROKEN LEFT FRONT STABILIZER BAR BRACKET
(4,045 TEST MILES)

BROKEN TAILPIPE HANGER
(6,715 TEST MILES)

UNSCHEDULED MAINTENANCE CONT.

FAILED BUMPER MOUNTING BRACKET
(6,940 TEST MILES)

BROKEN BODY PANEL SUPPORT
(9,347 TEST MILES)

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

6-I. TEST OBJECTIVE

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

6-II. TEST DESCRIPTION

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

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

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

1. The ADB cycle is structured as a set number of miles in a fixed time in the following order: CBD, Arterial, CBD, Arterial, CBD, and Commuter. A separate idle fuel consumption measurement is performed at the beginning and end of the fuel economy test. This phase sequence permits the reporting of fuel consumption for each of these phases separately, making the data more useful to bus manufacturers and transit properties.

2. The operating profile for testing purposes shall consist of simulated transit type service at seated load weight. The three test phases (figure 6-1) are: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph; an arterial phase of 2 miles with 2 stops per mile and a top speed of 40 mph; and a commuter phase of 4 miles with 1 stop and a maximum speed of 40 mph. At each designated stop the bus will remain stationary for seven seconds. During this time, the passenger doors shall be opened and closed.

3. The individual ADB phases remain unaltered with the exception that 1 mile has been changed to 1 lap on the Penn State Test Track. One lap is equal to 5,042 feet. This change is accommodated by adjusting the cruise distance and time.

4. The acceleration profile, for practical purposes and to achieve better repeatability, has been changed to "full throttle acceleration to cruise speed".

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

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

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

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

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

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

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

FUEL ECONOMY CALCULATION PROCEDURE

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

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

The fuel economy correction consists of three steps:

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

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

$$FEo_{mi/lb} = \text{Observed fuel economy} = \frac{\text{miles}}{\text{lb of fuel}}$$

2.) Convert the observed fuel economy to miles per gallon [mpg] by multiplying by the specific gravity of the test fuel Gs (referred to water) at 60°F and multiply by the density of water at 60°F

$$\mathbf{FEo_{mpg}} = \mathbf{FEc_{mi/lb}} \times Gs \times Gw$$

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

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

$$\mathbf{FEc} = \mathbf{FEo_{mpg}} \times \frac{Q}{H}$$

where

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

Combining steps 1-3 yields

$$\Rightarrow FEc = \frac{miles}{lbs} \times (Gs \times Gw) \times \frac{Q}{H}$$

4.) Covert the fuel economy from mpg to an energy equivalent of miles per BTU. Since the number would be extremely small in magnitude, the energy equivalent will be represented as miles/BTUx10^6.

Eq = Energy equivalent of converting mpg to mile/BTUx10^6.

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

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

The reported fuel economy is based on the following: measured test quantities--distance traveled (miles) and fuel consumed (scf); density of test fuel, and volumetric heating value (BTU/lb) of test fuel at standard conditions (P=14.73 psia and T=60°F). These combine to give a fuel economy in miles per lb. The energy equivalent

(mile/BTUx10^6) 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 per run
CBD	1.9097	5.7291
ART	1.9097	3.8193
COM	3.8193	3.8193

$$\mathbf{FEo_{mi/scf}} = \text{Observed fuel economy} = \frac{\text{miles}}{\text{scf of fuel}}$$

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^3).

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.

$$\mathbf{FEo_{mi/lb}} = FEo / Gm$$

where Gm = Density of test fuel at standard conditions

3.) Convert the observed fuel economy (FEomi/lb) to an energy equivalent of (miles/BTUx10^6) by dividing the observed fuel economy (FEomi/lb) by the heating value of the test fuel at standard conditions.

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

where

Eq = Energy equivalent of miles/lb to mile/BTUx10^6
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 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 – 4.72 mpg, ART – 4.78 mpg, and COM – 8.88 mpg. Average fuel consumption at idle was 0.52 gph.

FUEL ECONOMY PRE-TEST MAINTENANCE FORM

Bus Number: 0815	Date: 4-16-09	SLW (lbs): 19,450
Personnel: T.S. & S.C.		

FUEL SYSTEM	OK	Date	Initials
Install fuel measurement system	✓	4/16/09	S.C.
Replace fuel filter	✓	4/16/09	S.C.
Check for fuel leaks	✓	4/16/09	S.C.
Specify fuel type (refer to fuel analysis)	Diesel		
Remarks: None noted.			
BRAKES/TIRES	OK	Date	Initials
Inspect hoses	✓	4/16/09	T.S.
Inspect brakes	✓	4/16/09	T.S.
Relube wheel bearings	✓	4/16/09	T.S.
Check tire inflation pressures (mfg. specs.)	✓	4/16/09	T.S.
Remarks: None noted.			
COOLING SYSTEM	OK	Date	Initials
Check hoses and connections	✓	4/16/09	S.C.
Check system for coolant leaks	✓	4/16/09	S.C.
Remarks: none noted.			

FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 2)

Bus Number: 0815	Date: 4-16-09
Personnel: T.S. & S.C.	

ELECTRICAL SYSTEMS	OK	Date	Initials
Check battery	✓	4/16/09	S.C.
Inspect wiring	✓	4/16/09	S.C.
Inspect terminals	✓	4/16/09	S.C.
Check lighting	✓	4/16/09	S.C.
Remarks: None noted.			

DRIVE SYSTEM	OK	Date	Initials
Drain transmission fluid	✓	4/16/09	T.S.
Replace filter/gasket	✓	4/16/09	T.S.
Check hoses and connections	✓	4/16/09	T.S.
Replace transmission fluid	✓	4/16/09	T.S.
Check for fluid leaks	✓	4/16/09	T.S.
Remarks: None noted.			

LUBRICATION	OK	Date	Initials
Drain crankcase oil	✓	4/16/09	T.S.
Replace filters	✓	4/16/09	T.S.
Replace crankcase oil	✓	4/16/09	T.S.
Check for oil leaks	✓	4/16/09	T.S.
Check oil level	✓	4/16/09	T.S.
Lube all chassis grease fittings	✓	4/16/09	T.S.
Lube universal joints	✓	4/16/09	T.S.
Replace differential lube including axles	✓	4/16/09	T.S.
Remarks: None noted.			

FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 3)

Bus Number: 0815	Date: 4-16-09
Personnel: T.S. & S.C.	

EXHAUST/EMISSION SYSTEM	OK	Date	Initials
Check for exhaust leaks	✓	4/16/09	S.C.
Remarks: None noted.			

ENGINE	OK	Date	Initials
Replace air filter	✓	4/16/09	S.C.
Inspect air compressor and air system	✓	4/16/09	S.C.
Inspect vacuum system, if applicable	✓	4/16/09	S.C.
Check and adjust all drive belts	✓	4/16/09	S.C.
Check cold start assist, if applicable	✓	4/16/09	S.C.
Remarks: None noted.			

STEERING SYSTEM	OK	Date	Initials
Check power steering hoses and connectors	✓	4/16/09	S.C.
Service fluid level	✓	4/16/09	S.C.
Check power steering operation	✓	4/16/09	S.C.
Remarks: None noted.			

	OK	Date	Initials
Ballast bus to seated load weight	✓	4/16/09	S.C.

TEST DRIVE	OK	Date	Initials
Check brake operation	✓	4/16/09	S.C.
Check transmission operation	✓	4/16/09	S.C.
Remarks: None noted.			

FUEL ECONOMY PRE-TEST INSPECTION FORM

Bus Number: 0815	Date: 4/23/09
Personnel: S.C.	

PRE WARM-UP	If OK, Initial
Fuel Economy Pre-Test Maintenance Form is complete	S.C.
Cold tire pressure (psi): Front 110 Middle N/A Rear 110	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 124 Middle N/A Rear 118	S.C.
Environmental conditions Average wind speed <12 mph and maximum gusts <15 mph Ambient temperature between 30°F(-1C°) and 90°F(32°C) Track surface is dry Track is free of extraneous material and clear of interfering traffic	S.C.

FUEL ECONOMY DATA FORM (Liquid Fuels)

Bus Number: 0815	Manufacturer: Starcraft	Date: 4-23-09
Run Number: 1	Personnel: M.R., T.S. & S.C.	
Test Direction: ▫CW or ▪CCW	Temperature (°F): 41	Humidity (%): 68
SLW (lbs): 19,450	Wind Speed (mph) & Direction: 9 / W	Barometric Pressure (in.Hg): 30.02

Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell Reading (lb)		Fuel Used (lbs)
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:19	8:19	17.6	0	.477	.477
ART #1	0	4:03	4:03	24.8	0	.395	.395
CBD #2	0	7:59	7:59	27.6	0	.384	.384
ART #2	0	3:49	3:49	28.2	0	.376	.376
CBD #3	0	8:01	8:01	28.8	0	.372	.372
COMMUTER	0	5:55	5:55	28.6	0	.415	.415
							Total Fuel = 2.419 lbs

20 minute idle : Total Fuel Used = .203 gals
Heating Value = 19,631 BTU/LB
Comments: None noted.

FUEL ECONOMY DATA FORM (Liquid Fuels)

Bus Number: 0815	Manufacturer: Starcraft	Date: 4-23-09
Run Number: 2	Personnel: M.R., T.S. & S.C.	
Test Direction: ■CW or □CCW	Temperature (°F): 43	Humidity (%): 68
SLW (lbs): 19,450	Wind Speed (mph) & Direction: 9 / W	Barometric Pressure (in.Hg): 30.02

Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell Reading (lb)		Fuel Used (lbs)
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:03	8:03	24.8	0	.370	.370
ART #1	0	3:47	3:47	26.1	0	.378	.378
CBD #2	0	7:58	7:58	27.8	0	.370	.370
ART #2	0	3:50	3:50	24.8	0	.365	.365
CBD #3	0	8:03	8:03	28.6	0	.364	.364
COMMUTER	0	5:55	5:55	28.8	0	.401	.401
							Total Fuel = 2.248 lbs

20 minute idle : Total Fuel Used = N/A lbs
Heating Value = 19,631 BTU/LB
Comments: None noted.

FUEL ECONOMY DATA FORM (Liquid Fuels)

Bus Number: 0815	Manufacturer: Starcraft	Date: 4-23-09
Run Number: 3	Personnel: M.R., T.S. & S.C.	
Test Direction: ▫CW or ■CCW	Temperature (°F): 46	Humidity (%): 62
SLW (lbs): 19,450	Wind Speed (mph) & Direction: 8 / W	Barometric Pressure (in.Hg): 30.08

Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell Reading (lb)		Fuel Used (lbs)
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:16	8:16	22.2	0	.379	.379
ART #1	0	3:49	3:49	23.8	0	.361	.361
CBD #2	0	8:09	8:09	26.8	0	.364	.364
ART #2	0	3:49	3:39	26.6	0	.372	.372
CBD #3	0	8:16	8:16	29.8	0	.360	.360
COMMUTER	0	5:55	5:55	29.4	0	.390	.390
							Total Fuel = 2.226 lbs

20 minute idle : Total Fuel Used = N/A lbs

Heating Value = 19,631 BTU/LB

Comments: None noted.

FUEL ECONOMY DATA FORM (Liquid Fuels)

Bus Number: 0815	Manufacturer: Starcraft	Date: 4-23-09
Run Number: 4	Personnel: M.R., T.S. & S.C.	
Test Direction: ■CW or ▫CCW	Temperature (°F): 48	Humidity (%): 62
SLW (lbs): 19,450	Wind Speed (mph) & Direction: 8 / W	Barometric Pressure (in.Hg): 30.08

Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell Reading (lb)		Fuel Used (lbs)
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:18	8:18	29.4	0	.350	.350
ART #1	0	3:52	3:52	34.4	0	.352	.352
CBD #2	0	8:17	8:17	29.2	0	.353	.353
ART #2	0	3:53	3:53	35.1	0	.350	.350
CBD #3	0	8:15	8:15	35.0	0	.350	.350
COMMUTER	0	5:58	5:58	32.2	0	.381	.381
							Total Fuel = 2.136 lbs

20 minute idle : Total Fuel Used = .141 lbs
Heating Value = 19,631 BTU/LB
Comments: None noted.

0815 .ful
FUEL ECONOMY SUMMARY SHEET

BUS MANUFACTURER :Starcraft BUS NUMBER :0815
BUS MODEL :Allstar XL TEST DATE :04/23/09

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 USED(GAL)	TOTAL MILES	FUEL ECONOMY MPG(Measured)	FUEL ECONOMY MPG (Corrected)
Run # :1, CCW				
CBD	1.233	5.73	4.647	4.28
ART	.771	3.82	4.955	4.57
COM	.415	3.82	9.205	8.48
TOTAL	2.419	13.37	5.527	5.09
Run # :2, CW				
CBD	1.104	5.73	5.190	4.78
ART	.743	3.82	5.141	4.74
COM	.401	3.82	9.526	8.78
TOTAL	2.248	13.37	5.948	5.48
Run # :3, CCW				
CBD	1.103	5.73	5.195	4.79
ART	.733	3.82	5.211	4.80
COM	.390	3.82	9.795	9.03
TOTAL	2.226	13.37	6.006	5.54
Run # :4, CW				
CBD	1.053	5.73	5.442	5.01
ART	.702	3.82	5.442	5.01
COM	.381	3.82	10.026	9.24
TOTAL	2.136	13.37	6.259	5.77

IDLE CONSUMPTION (MEASURED)

First 20 Minutes Data : .20GAL Last 20 Minutes Data : .14GAL
Average Idle Consumption : .52GAL/Hr

RUN CONSISTENCY: % Difference from overall average of total fuel used

Run 1 : -7.2 Run 2 : .4 Run 3 : 1.4 Run 4 : 5.4

SUMMARY (CORRECTED VALUES)

Average Idle Consumption : .56 G/Hr
Average CBD Phase Consumption : 4.72 MPG
Average Arterial Phase Consumption : 4.78 MPG
Average Commuter Phase Consumption : 8.88 MPG
Overall Average Fuel Consumption : 5.47 MPG
Overall Average Fuel Consumption : 39.78 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 46.9 dB(A); ranging from 45.3 dB(A) at the driver's seat to 47.6 dB(A) in line with the middle speaker. The interior ambient noise level for this test was < 34.0 dB(A).

The second test measures interior noise during acceleration from 0 to 35 mph. This noise level ranged from 68.3 dB(A) at the middle passenger seats to 73.0 dB(A) at the driver's seat. The overall average was 70.6 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: 8015	Date: 8-22-08
Personnel: T.S. & E.D.	
Temperature (°F): 70	Humidity (%): 64
Wind Speed (mph): 3	Wind Direction: S
Barometric Pressure (in.Hg): 30.29	
Initial Sound Level Meter Calibration: ▪ checked by: S.C.	
Interior Ambient Noise Level dB(A): 34.0	Exterior Ambient Noise Level dB(A): 47.3
Microphone Height During Testing (in): 48.0	

Measurement Location	Measured Sound Level dB(A)
Driver's Seat	45.3
Front Passenger Seats	46.7
In Line with Front Speaker	47.2
In Line with Middle Speaker	47.6
In Line with Rear Speaker	47.4
Rear Passenger Seats	46.9

Final Sound Level Meter Calibration: ▪ checked by: S.C.

Comments: All readings taken in the center aisle.

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

Bus Number: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	
Temperature (°F): 62	Humidity (%): 37
Wind Speed (mph): 9	Wind Direction: S
Barometric Pressure (in.Hg): 30.18	
Initial Sound Level Meter Calibration: ▪ checked by: S.C.	
Interior Ambient Noise Level dB(A): < 34.0	Exterior Ambient Noise Level dB(A): 42.2
Microphone Height During Testing (in): 48.0	

Measurement Location	Measured Sound Level dB(A)
Driver's Seat	73.0
Front Passenger Seats	70.2
Middle Passenger Seats	68.3
Rear Passenger Seats	71.0

Final Sound Level Meter Calibration: ▪ checked by: S.C.

Comments: All readings taken in the center aisle.

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

Bus Number: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	
Temperature (°F): 62	Humidity (%): 37
Wind Speed (mph): 9	Wind Direction: S
Barometric Pressure (in.Hg): 30.18	

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

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

Comment on any other vibration or noise source which may have occurred
that is not described above: None noted.

7.1 INTERIOR NOISE TEST

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

7.2 EXTERIOR NOISE TESTS

7.2-I. TEST OBJECTIVE

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

7.2-II. TEST DESCRIPTION

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

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

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

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

During the test, special attention should be paid to:

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

7.2-III. DISCUSSION

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

With an exterior ambient noise level of 42.2 dB(A), the average test result obtained while accelerating from a constant speed was 75.5 dB(A) on the right side and 77.5 dB(A) on the left side.

When accelerating from a standstill with an exterior ambient noise level of 42.2 dB(A), the average of the results obtained were 76.2 dB(A) on the right side and 79.1 dB(A) on the left side.

With the vehicle stationary and the engine, accessories, and air conditioning on, the measurements averaged 52.2 dB(A) at low idle, 57.2 dB(A) at high idle, and 73.2 dB(A) at wide open throttle. With the accessories and air conditioning off, the readings averaged 3.0 dB(A) lower at low idle, 0.9 dB(A) lower at high idle, and 0.3 dB(A) lower at wide open throttle. The exterior ambient noise level measured during this test was 42.2 dB(A).

EXTERIOR NOISE TEST DATA FORM
Accelerating from Constant Speed

Bus Number: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	
Temperature (°F): 62	Humidity (%): 37
Wind Speed (mph): 9	Wind Direction: S
Barometric Pressure (in.Hg): 30.18	
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ▪ checked by: S.C.	
Initial Sound Level Meter Calibration: ▪ checked by: S.C.	
Exterior Ambient Noise Level dB(A): 42.2	

Accelerating from Constant Speed Curb (Right) Side		Accelerating from Constant Speed Street (Left) Side	
Run #	Measured Noise Level dB(A)	Run #	Measured Noise Level dB(A)
1	72.2	1	74.3
2	72.9	2	75.0
3	73.1	3	77.2
4	75.4	4	77.5
5	75.5	5	77.5
Average of two highest actual noise levels = 75.5 dB(A)		Average of two highest actual noise levels = 77.5 dB(A)	

Final Sound Level Meter Calibration Check: ▪ checked by: S.C.
Comments: None noted.

EXTERIOR NOISE TEST DATA FORM
Accelerating from Standstill

Bus Number: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	
Temperature (°F): 62	Humidity (%): 37
Wind Speed (mph): 9	Wind Direction: S
Barometric Pressure (in.Hg): 30.18	
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ▪ checked by: S.C.	
Initial Sound Level Meter Calibration: ▪ checked by: S.C.	
Exterior Ambient Noise Level dB(A): 42.2	

Accelerating from Standstill Curb (Right) Side		Accelerating from Standstill Street (Left) Side	
Run #	Measured Noise Level dB(A)	Run #	Measured Noise Level dB(A)
1	75.9	1	77.7
2	75.9	2	78.2
3	76.1	3	79.0
4	75.8	4	78.1
5	76.2	5	79.1
Average of two highest actual noise levels = 76.2 dB(A)		Average of two highest actual noise levels = 79.1 dB(A)	
Final Sound Level Meter Calibration Check: ▪ checked by: S.C.			
Comments: None noted.			

EXTERIOR NOISE TEST DATA FORM
Stationary

Bus Number: 0815	Date: 4-24-09
Personnel: T.S., E.D. & M.R.	
Temperature (°F): 62	Humidity (%): 37
Wind Speed (mph): 9	Wind Direction: S
Barometric Pressure (in.Hg): 30.18	

Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ▪ checked by: S.C.

Initial Sound Level Meter Calibration: ▪ checked by: S.C.

Exterior Ambient Noise Level dB(A): 42.2

Accessories and Air Conditioning ON

Throttle Position	Engine RPM	Curb (Right) Side dB(A)	Street (Left) Side db(A)
		Measured	Measured
Low Idle	600	50.6	53.7
High Idle	1,185	56.1	58.3
Wide Open Throttle	3,350	72.6	73.8

Accessories and Air Conditioning OFF

Throttle Position	Engine RPM	Curb (Right) Side dB(A)	Street (Left) Side db(A)
		Measured	Measured
Low Idle	605	49.2	49.1
High Idle	1,150	55.6	57.0
Wide Open Throttle	3,350	72.9	72.8

Final Sound Level Meter Calibration Check: ▪ checked by: S.C.

Comments: None noted.

7.2 EXTERIOR NOISE TESTS

TEST BUS UNDERGOING
EXTERIOR NOISE TESTING

PennState

CONTRACT FOR BUS TESTING
No. PA-2021-052-00
Task Order No. 007

THIS CONTRACT made on February 15, 2022, by and between The Pennsylvania State University, a non-profit university and an instrumentality of the Commonwealth of Pennsylvania with principal offices at University Park, Centre County, Pennsylvania, acting by and through The Thomas D. Larson Pennsylvania Transportation Institute, hereinafter called **"Operator"**
and Forest River Bus LLC hereinafter called **"Manufacturer"**.

BACKGROUND:

A. Operator under contract with the Federal Transit Administration hereinafter called "FTA", operates a bus testing facility in accordance with the provisions of the Federal Transit Act. The Bus Testing Program is authorized at 49 USC Section 5318. FTA manages the Bus Testing Program according to the Bus Testing Regulation, 49 CFR Part 665 as amended, and the Proposed Rule Making, Interim Final Rule and Final Rules and Regulations on Bus Testing promulgated in accordance therewith, as from time to time enacted, made effective or amended ("Regulations").

B. Manufacturer desires to contract with Operator to have Operator perform testing in accordance with the formal determination letter provided to the Manufacturer by the FTA on a Ford E-450 Cutaway Shuttle Bus model bus, hereinafter called **"Bus"**, owned by Manufacturer as contemplated by Surface Transportation and Uniform Relocation Assistance Act (STURAA) and the Regulations.

C. Operator and Manufacturer hereby enter into this Contract to accomplish the above purposes.

NOW, THEREFORE, in consideration of the mutual terms contained in this Contract and intending to be legally bound Operator and Manufacturer herby agree as follows:

1. AUTHORITY AND TERMS

Operator and Manufacturer hereby incorporate in this Contract by this reference the matters set forth in the BACKGROUND paragraphs above, including the applicable provisions of Federal Transit Act, as amended, and the FTA Bus Testing Regulations. It is further agreed that the defined words and terms as used in the Regulations shall also be used herein.

2. DUTIES OF OPERATOR

Operator shall perform all required testing of Manufacturer's Bus in accordance with the FTA Regulations and the established testing procedures used at the bus testing facility and provided to Manufacturer which procedures are attached hereto marked Exhibit "A" and fully described and incorporated herein by this reference.

3. DUTIES OF MANUFACTURER

Manufacturer shall:

A. At its sole expense, deliver the Bus on March 21, 2022 or within seven (7) days of this date to the Altoona Bus Research and Testing Center, 2237 Plank Road, Duncansville, Pennsylvania.

- The Bus shall be delivered in such condition that testing can immediately commence.
- Manufacturer shall arrange for unloading of Bus, including all parts and equipment.
- The Bus shall be certified to be roadworthy and shall be licensed in such a manner as shall be valid in the Commonwealth of Pennsylvania for operation of the Bus at the testing facility or over the road between testing facility locations.
- The Bus shall meet all Federal Motor Vehicle Safety Standards as promulgated by the National Highway Traffic Safety Administration in 49 CFR Part 571.
- An agent of Manufacturer shall be present at the time of delivery of the Bus to Operator.
- The Bus shall be delivered with:
  (i) a spare parts kit containing filters, one set of mounted tires, suspension components special lubricants and other such items contemplated to be used, consumed, or replaced during the scope of the testing procedures, but not to include ordinary fuel and lubricants which shall be supplied by Operator.

  (ii) all operator's manuals, maintenance manuals, parts manuals and wiring schematics applicable to the Bus which shall include the recommended servicing procedures and specifications to be used in the course of maintenance and operation of the Bus.

  (iii) all special tools, nozzles, adapters, and fixtures required for repairs, adjustments, fueling and towing relating to the Bus.

B. At its sole expense, load and transport the Bus from the testing facility at the completion of the testing.

4. FEES

Manufacturer shall pay to Operator as its portion of the fee for testing the sum of Seven Thousand Four Hundred Dollars $7,400.00 ($____) Dollars, which shall be due in full at the time of the delivery of the Bus, and in any event shall be paid in full prior to the commencement of any test procedures.

Said sum represents a twenty (20%) percent portion of the test fee as set forth in accordance with the Schedule of Fees attached to as **Exhibit "B".**

The remaining eighty (80%) percent of the test fee is paid to the Operator by the FTA pursuant to the terms of 49 CFR Part 665, as amended and regulations promulgated or to be promulgated thereunder. The FTA's fee subsidy is intended to reimburse the Operator for test procedures performed and applies only to the standard fee schedule which includes the normal cost for testing, vehicle servicing, routine maintenance, and fuel.

It does not include any non-fee costs and expenses incurred during testing, and Manufacturer shall pay in addition to the amount previously set forth any such costs and expense including but not limited to those associated with non-routine maintenance or extraordinary repairs as provided in Paragraph 8 hereof.

All such non-fee costs and expenses due from the manufacturer shall be paid to the Operator prior to the completion of the testing program and issuance of the test report.

In the event that the testing program is terminated and the Bus is withdrawn from the facility by the Manufacturer before the completion of the testing, Manufacturer may be entitled to a refund of a portion of the fee amount paid by Manufacturer to Operator for testing procedures not completed as more fully set forth in Exhibit "B".

5. DURATION OF TESTING

The anticipated time for completing the testing will be within 53.5 days of when testing on the Bus commences, subject to:
(i) Extension for a time equivalent to any period of mechanical breakdown of the Bus or other matter beyond the control, such as delays in parts availability or technical decisions of Operator which shall cause a delay in the performance of the testing.

(ii) Extension for a time equivalent to any period of delay. In the event of any delay, resumption of testing shall be scheduled by the Operator subject to the availability of the test facility and personnel, and the time for completion of the testing shall be extended to accommodate such scheduling.

Operator shall provide reasonable notice to Manufacturer of any Operator-created delays which cause an extension of the completion date. In the event of a delay of more than ten (10) days, Operator will send a written notification that provides a new expected test completion date to Manufacturer 's Technical Service Contact, as identified in Article 10.

6. TERMINATION OF TESTING BY MANUFACTURER

Manufacturer shall have the right to terminate the test program at any time before completion of testing by providing written notification to Operator, in which event Manufacturer shall be responsible for the fees of any tests completed or portion of tests completed as of date of notification from Manufacturer as set forth in Exhibit "B" hereof.

7. TERMINATION OF TESTING BY OPERATOR

Operator shall have the right to terminate the test program at any time for cause, by providing written notification describing cause to Manufacturer, in which event Manufacturer shall be responsible for the fees of any test completed or portion of tests completed as of date of notification from Operator as set forth in Exhibit "B" hereof.

Cause shall include:
(i) A breach of any obligation of Manufacturer under the terms of this Contract.

(ii) Nonpayment of any fees, costs, or expenses.

(iii) Technical or mechanical problems which, in the judgment of Operator, make continuation of testing unsafe.

(iv) The failure of Manufacturer to supply equipment, parts, or material necessary for repairs as required by this Contract.

(v) Any other just cause.

8. MAINTENANCE AND REPAIRS

Operator shall perform all routine maintenance and ordinary repairs on the Bus consistent with the Manufacturer's specifications to be delivered to Operator in accordance with Paragraph 3A hereof.

Any non-routine maintenance and extraordinary repairs required to be performed on the Bus shall be done at the sole cost and expense of Manufacturer; provided, however, that any such non-routine maintenance or extraordinary repairs required to be performed on a Bus which arise solely from Operator's negligent maintenance of a Bus shall be performed at the sole cost and expense of the Operator.

In the event of the necessity for non-routine maintenance or extraordinary repairs not of an emergency nature, Operator shall provide Manufacturer reasonable notice thereof before commencing such maintenance or repairs.

Any non-routine maintenance or extraordinary repairs of an emergency nature may be performed by Operator and notice thereof shall be given to Manufacturer as soon as practical thereafter.

Manufacturer shall pay Operator for all costs of labor and materials necessary to perform non-routine maintenance and repair services for which Manufacturer is responsible.

Any maintenance or repair or change in operating parameters to be performed by the Manufacturer must be pre-approved by Operator and conducted under the direct observation of the Operator.

All parts, equipment or supplies necessary for such repairs and maintenance shall be furnished without charge to Operator by Manufacturer within twenty-four (24) hours after Operator's notification to Manufacturer of the need for such parts, equipment, or supplies.

9. OBSERVATION OF TESTING

Manufacturer will provide request to Operator that includes names of any Manufacturer representatives that will be visiting and/or observing testing. Operator will provide approval or denial to request prior to permitting any Manufacturer representatives access to facilities. Manufacturer shall have the right to observe any and all testing, provided that nothing contained herein shall allow Manufacturer to alter the scheduling of testing which scheduling shall be solely within the control of Operator.

Manufacturer's access to the Bus during testing for the purpose of data collection, repair or maintenance is solely at the discretion of the Operator.

Operator shall provide space at the test facility which will be available to Manufacturer for on-site personnel to observe testing.

Manufacturer representatives who do not comply with the requirements in Articles 8 and 9 may be barred from the test site.

Manufacturer agrees to comply with all Operator policies and procedures relevant to external visitors and as more fully described in Exhibit "C".

10. DESIGNATION OF TECHNICAL SERVICE CONTACT

Manufacturer hereby designates the following individual as the principal technical service contact of Manufacturer with respect to the testing to be performed hereunder:

Name: Larry Hall

Title: Engineering Manager

Address: 2367 Century Drive

Goshen, IN. 46528

Phone: (800) 348-7440 Ext. 52252

Email: lhall@forestriverinc.com

11. TEST REPORTS

Upon completion of testing, the Operator shall prepare a test report which shall state the results of the test(s) performed on each Bus, and shall provide that test report to the Manufacturer not later than the forty-fifth (45^{th}) day following the completion of testing. The test report shall be available to the public on or after the sixtieth (60^{th}) day following the completion of testing unless:

(i) The Manufacturer provides written notification to the Operator within ten (10) days of receiving test report from Operator indicating that the Bus has been withdrawn from the market and that no buses have, or will be delivered to an FTA funded recipient, in which event the test report will not be made available to the public; or

(ii) The Manufacturer provides written notification to the Operator within ten (10) days of receiving test report from Operator indicating that the Bus has not been delivered to an FTA funded recipient, and further setting forth the date upon which the Bus is scheduled to be delivered, in which event that date of delivery provided by the Manufacturer will be the date when the test report is made available to the public.

12. INSURANCE

Manufacturer, and any of its Subcontractors, shall at its own expense, carry and maintain the following insurance or self-insurance during the term of this Contract, in amounts not less than that specified for each type.

The limits required for the Employers' Liability, Automobile Liability and Commercial General Liability coverages may be satisfied through primary insurance or any combination of primary and umbrella/excess liability insurance as long as the umbrella/excess liability insurance follows the form of the primary coverage.

Failure to procure the following insurance or self-insurance shall not relieve the Manufacturer, and any Subcontractor thereof, of any obligation or liability assumed under the Contract, nor of any obligation or liability imposed by law. In no event shall the liability of the manufacturer be limited to the extent of any insurance or self-insurance or the minimum limits required herein, or the Contract value. Any self-insured retentions, deductibles, and exclusions in coverage in the insurance required shall be assumed by and at the sole risk of the Manufacturer.

The Manufacturer or its insurers must provide thirty (30) days advanced written notice to the Operator of any cancellation or material reduction in the required insurance or self-insurance programs below.

Workers' Compensation for statutory obligations imposed by workers' compensation and occupational disease laws.

Employers' Liability insurance shall be provided with limits of not less than $500,000 for each subcategory of coverage.

Automobile Liability insurance (Bodily Injury Liability and Property Damage Liability) for all owned, leased, hired, non-owned vehicles with limits not less than $1,000,000 Combined Single Limit. Such insurance shall also provide physical damage coverage on any vehicle delivered to the Operator for testing. Such physical damage coverage shall include collision and comprehensive insurance in an amount not less than the actual cash value of the vehicle.

Commercial General Liability insurance including coverage for bodily injury, property damage, and personal injury for premises and operations, products and completed operations, and contractual liability arising from all operations, written on an occurrence basis with limits not less than $1,000,000, and which must apply to ongoing operations. **"The Pennsylvania State University"** must be named as an additional insured.

Insurance coverages must be written with an insurer rated not less than A- by A. M. Best.

An Insurance Certificate evidencing the above required insurance coverages, limits, and the Commercial General Liability additional insured provision, must be provided to the Operator at the time of delivery of this Contract and in any event, not later than ten (10) days prior to the delivery of the vehicle. The Certificate Holder must be as follows:

The Pennsylvania State University
c/o Risk Management Office
Rider Building – Suite 103
227 West Beaver Avenue
State College, PA 16801

13. INDEMNIFICATION

Manufacturer further agrees to indemnify and hold Operator harmless from and against any and all claims and demands for or in connection with any accident, injury or damage whatsoever caused to any person or property arising, directly or indirectly, out of the testing, maintenance, repairs or operation of the Bus, and from and against any and all costs and expenses, including reasonable attorney fees, incurred in connection with any such claim, demand or proceeding brought thereon.

14. CHOICE OF LAWS

This Contract shall be governed by the laws of the United States of America and the Commonwealth of Pennsylvania.

15. NOTICES

Any notices provided for in this Contract shall be effective upon receipt and shall be sent by electronic mail, United States registered or certified mail (return receipt requested), or by any commonly recognized overnight courier service which requires a receipt upon delivery, and shall be addressed as follows:

Operator: Director, Altoona Bus Research and Testing Center
The Pennsylvania State University
The Thomas D. Larson
Pennsylvania Transportation Institute
201 Transportation Research Building

University Park, Pennsylvania 16802Email:

Manufacturer: Larry Hall

Forest River Bus LLC.

2367 Goshen, IN. 46528

lhall@forestriverinc.com

Email:

16. MISCELLANEOUS

This is the entire Contract between the parties with respect to the subject matter hereof. Any changes, modifications or waivers of any terms shall not be effective unless in writing and signed by the parties. This Agreement shall be binding on the parties, their respective heirs, successors, administrators, and assigns. The section headings in this Contract are for reference only and shall not be considered for purposes of construing or interpreting the Contract.

IN WITNESS WHEREOF, the parties have executed this Contract the day and year first above written.

Operator – The Pennsylvania State University

Name & Title: Penny L. Brewer, CRA
Associate Director, OSP

Manufacturer

Larry Hall Engineering Manager

Name & Title

Exhibit A

Maintainability

There are three procedures that comprise this test sequence.

Accessibility of Components and Subsystems: The objective of this test is to check the general accessibility of components and subsystems. Items that are checked are ones that would typically require maintenance or repair during transit service.

Servicing, Preventive Maintenance, and Repair Maintenance: The objective of this test is to collect data about the servicing, preventive maintenance, and repair of the vehicle.

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

Reliability

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

Safety

Double Lane Change

The objective of this test is to determine handling and stability characteristics of the bus by measuring the forward speed through a double lane change, obstacle avoidance course.

Brake Performance

The objective of this test is to demonstrate the ability of the parking brake to hold the bus on a 20 percent grade and to measure the stopping distance required when the service brakes are activated at various speeds

Performance

The performance test includes the following:

Acceleration — Using a large-roll chassis dynamometer, the vehicle is accelerated and the speed verses time data is recorded and plotted.

Gradeability — From the acceleration data, the gradeability is calculated at 5-mile-per-hour increments.

Top Speed — The top speed obtained on the dynamometer is recorded. It is noted whether the top speed is power-limited or governed.

Structural Integrity & Durability

There are six procedures that comprise this testing sequence.

Distortion: The objective of this test is to observe the operation of various subsystems when the bus is placed in a longitudinal twist (simulating operation over a 6-inch curb or through a 6-in pothole) and subjected to a water spray mechanism simulating rain and traffic spray.

Static Tow: The objective of this test is to determine the strength characteristics of the bus towing fixtures during static loading conditions.

Dynamic Tow: The objective of this test is to verify the integrity of the towing fixtures and determine the feasibility of towing the bus using a heavy-duty wrecker and specified procedures.

Jacking: The objective of this test is to determine the damage caused by a deflated tire and to determine the feasibility of jacking the bus with a portable hydraulic jack to a height sufficient to replace a deflated tire.

Hoisting: The objective of this test is to determine possible damage or deformation caused by the jack stands on the jacking pads.

Durability: 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.

Fuel/Energy Economy

Fuel Economy

The objective of this test is to provide accurate comparable fuel consumption data on transit buses produced by different manufacturers. This test bears no relation to the calculations done by the Environmental Protection Agency. The results of this test will not represent actual "in service" fuel economy but will provide comparative data.

The test is performed using a large-roll chassis dynamometer.

Energy Economy (Battery Electric Buses)

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

The test is performed using a large-roll chassis dynamometer.

Noise

There are two procedures that comprise this test sequence.

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

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

Emissions

The objective of this test is to provide accurate, comparable gas and particulate emissions data for transit buses produced by different manufacturers while operating the vehicle over a simulated transit duty cycle on a dynamometer. The test will be performed on a engine after the bus has accumulated several thousand miles of operation, thus providing a more realistic indication of the level of emissions that can be expected in actual transit service. The results of this test may be used by transit operators for making relative comparisons between buses. The test is performed using a large-roll chassis dynamometer.

Please Note: This is not the same procedure that is used to meet the Environment Protection Agency (EPA) for engine certification.

For full descriptions of all above test procedures, please go to:

https://www.altoonabustest.psu.edu/bus-tests

Exhibit B

PennState

Altoona Bus Research and Testing Center
The Thomas D. Larson
Pennsylvania Transportation Institute
The Pennsylvania State University
2237 Old Route 220 North
Duncansville, PA 16635

814-695-3404
Fax: 814-695-4069
altoonabustest.org

Invoice #: 452122
Date: 02/08/2022
Manufacturer: Forest River Bus
Bus Model(s): Allstar 25 built on E-450 Chassis with a Lightning EV Conversion
Partial test
Exhibit B. Time and Fee Schedule for Bus Testing
PLEASE MAKE CHECK PAYABLE TO: THE PENNSYLVANIA STATE UNIVERSITY

		Partial Test	
		Cost ($)[1]	Days[2]
	Check-In	3,500	1.0
1.1	Inspect for Accessibility	2,000	0.5
1.3	Selected Maintainability	5,000	1.5
3.1	Safety	3,500	1.0
4	Performance[3]	3,000	1.0
6	Energy Economy/ Range	16,000	2.0
7.1	Interior Noise	2,000	0.5
7.2	Exterior Noise	2,000	0.5
	Allowable Down Time		14.0
TOTAL FOR FULL TESTING		$37,000	53.5
MANUFACTURER'S FEE[4]		$7,400	

[1] Totals in bottom two rows represent full testing (and manufacturers 20% portion) and reflect set-up cost saving realized by combining the tests performed on the dynamometer

[2] Days indicate approximate time for test completion not including downtime due to reliability problems, parts deliveries, weather and items beyond the control of operator.

[3] Fee for performance test only will be $10,000, fuel economy test only will be $16,000, and performance and fuel economy tests together will be $19,000.

[4] Manufacturer's portion of the test fee shall pay for the first twenty percent (20%) of the test cost incurred. Prorated Refund. If manufacturer withdraws the bus from testing before the first twenty percent of the test costs have been incurred, manufacturer is entitled to a refund for tests not performed equivalent to 5785 times the days required to complete the first twenty percent of the test schedule. If the bus is withdrawn after the first twenty percent of testing is completed, manufacturer is entitled to no refund. Non-routine maintenance, extraordinary repairs, and operator's observation of maintenance performed by manufacturer shall be billed at actual time expended and cost of materials.

Exhibit B. Time and Fee Schedule for Bus Testing (Page 2 of 2)

- Totals in bottom two rows represent full testing (and manufacturers 20% portion) and reflect set-up cost saving realized by combining the tests performed on the dynamometer.
- Days indicate approximate time for test completion not including downtime due to reliability problems, parts deliveries, weather, and items beyond the control of operator.
- Reliability and Maintainability cost and time are included in the Structural Durability Test.
- Fee for performance test only will be $10,000; fuel economy test only will be $16,000; and performance and fuel economy tests together will be $19,000.
- Fuel surcharge is determined based on type of fuel, category of bus, and date of contract.
- Manufacturer's portion of the test fee shall pay for the first twenty percent (20%) of the test cost incurred. Prorated Refund: If manufacturer withdraws the bus from testing before the first twenty percent of the test costs have been incurred, Manufacturer is entitled to a refund for tests not performed equivalent to $785 times the days required to complete the first twenty percent of the test schedule; if the bus is withdrawn after the first twenty percent of testing is completed, manufacturer is entitled to no refund. Non-routine maintenance, extraordinary repairs, and Operator's observation of maintenance performed by manufacturer shall be billed at actual time expended and cost of materials.
- Any additional testing that results in a failing test score may require additional testing as determined by the FTA. Additional tests required to obtain a passing score (re-testing) will be billed to the manufacturer according to the established Time and Fee Schedule.
- In the event that the FTA determines that additional durability testing is required due to a structural failure or reliability concern, manufacturer will be responsible for paying a portion of the durability test fee set forth as follows:
- The cost for extended durability testing will be based on the per-mile structural durability test cost for that service-life category and the number of miles required by the FTA for each durability segment (loading condition). The total number of extended durability miles required will be determined by the FTA on a case-by-case basis.

Exhibit C

The following COVID-19 provisions apply to the extent that the Bus Manufacturers employees, representatives, or agents will be physically present on Operator property or in a Operator leased facility:

Bus Manufacturer acknowledges and agrees that it is solely responsible for its activities and the activities of its employees. Bus Manufacturer confirms that is has adopted policies and practices to mitigate the risk of transmission of COVID-19 for the safety of any persons with whom Bus Manufacturer's employees may come in contact.

Bus Manufacturer agrees that its policies and practices include, at a minimum, following any applicable guidance or directive from the Centers for Disease Control, Occupational Safety and Health Administration, the Pennsylvania Department of Health, any specific guidance which may be issued by the Commonwealth of Pennsylvania, and any other guidelines or recommendations which the Operator may provide and update on its website located at https://ehs.psu.edu/sites/ehs/files/covid19_guidance_for_contractors_vendors_and_third_parties.pdf. Key elements of the relevant guidance may include but are not limited to:

(i) staying home when sick;

(ii) avoiding close contact with other individuals (maintain social distancing of at least six feet, handshaking, or gatherings ten people or more);

(iii) washing hands often for at least 20 seconds with warm water and soap;

(iv) avoiding touching the face and eyes with one's hands;

(v) utilizing face masks, which Bus Manufacturer shall provide to its employees at its sole expense;

(vi) avoiding sharing tools, phones, and other objects (items which must be shared are to be immediately cleaned after each use).

While acknowledging that these rules and precautions may or may not be effective in mitigating the spread of COVID-19, Bus Manufacturer shall require its employees, at a minimum, to comply with such rules and precautions while on Operator property.

Bus Manufacturer further acknowledges and agrees that it has policies and procedures in place that prohibit any of its employees to enter onto any Operator property if such employee has exhibited symptoms which may be attributed to COVID-19 in the prior 14 days, including symptoms of acute respiratory illness, a fever of 100.4°F or higher, or signs of a fever. Bus Manufacturer acknowledges and agrees that it is responsible for enforcing such policies and procedures, monitoring the health and wellness of its employees entering Penn State's property and removing such employee from the property. Bus Manufacturer will report any confirmed or suspected cases that may impact Operator personnel to its Penn State contract representative.

Bus Manufacturer shall maintain Workers' Compensation insurance or approved self-insurance for statutory obligations imposed by workers' compensation and occupational disease laws. Bus Manufacturer agrees to abide by the Workers' Compensation system for all work-related claims of its employees, including, without limitation, any claims associated with COVID-19.

Bus Manufacturer assumes all risk that its employees may be exposed to or infected by COVID-19 by entering the Operator's property and acknowledges that such exposure or infection may result in personal injury, illness, permanent disability, and/or death.

Bus Manufacturer has provided a copy of these terms to each of its employees who will be entering or using Operator premises, and affirms that said employees were required to read these terms in their entirety prior to their entry upon Operator property.

FORERIV-05 BNIXON

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 2/15/2022

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 License # 0019304-1 Hub International Midwest East 1591 Galbraith Ave SE Grand Rapids, MI 49546	CONTACT NAME:	
	PHONE (A/C, No, Ext): (616) 233-4111	FAX (A/C, No): (616) 233-4110
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Admiral Insurance Company	24856
INSURED Forest River, Inc. 900 County Rd 1 Elkhart, IN 46515	INSURER B : Hartford Fire Insurance Company	19682
	INSURER C : Great American Excess & Surplus	37532
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **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, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC OTHER:	X		CA000043525-01	11/1/2021	11/1/2022	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 300,000 $ 5,000 $ 2,000,000 $ 2,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY SCHEDULED AUTOS HIRED AUTOS ONLY NON-OWNED AUTOS ONLY	X		81CSES47809	11/1/2021	11/1/2022	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 3,000,000 $ $ $
C	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED X RETENTION $ 0			XSE782592	11/1/2021	11/1/2022	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N N If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		81WNS47808	11/1/2021	11/1/2022	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Auto Policy includes Trailer Interchange - $100,000 Limit / $10,000 Deductible
Auto Physical Damage Deductible - $50,000 Comp / Collision - ($10,000 for PPTs)
Workers Compensation Deductible - $500,000

The Pennsylvania State University is recognized as Additional Insured with regards to General Liability per form AD6937 10/15 and Auto Liability per form HA9916 03/12 if required by contract. Umbrella follows form
30 Day notice of Cancellation applies.

CERTIFICATE HOLDER

The Pennsylvania State University
c/o Risk Management Office
Rider Building- Suite 103
227 West Beaver Avenue
State College, PA 16801

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

Neil R. Hughes

Florida Sheriffs Association Cooperative Purchasing Program Options Template FSA22-VEH20.0 Heavy Trucks & Buses	
Bidder:	Creative Bus Sales, Inc.
Item make & model	StarCraft Allstar
Item number	Item #15 $107,233.00 base price

Manufacturer Order Code	Description	Price
	ALLSTAR - CHEVROLET 12,300 GVW	
93191	Allstar 20' 139" WB 6.6L Gas Engine	$ 121.00
93177	Allstar 22' 159" WB 6.6L Gas Engine	$ -
93192	Allstar 24' 159" WB 6.6L Gas Engine	$ 696.00
	ALLSTAR - CHEVROLET 14,200 GVW	$ -
93170	Allstar 22 159" WB 6.6L Gas Engine	$ 3,745.00
93179	Allstar 24 159" WB 6.6L Gas Engine	$ 4,441.00
93193	Allstar 25 177" WB 6.6L Gas Engine	$ 5,833.00
93180	Allstar 26 190" WB 6.6L Gas Engine	$ 6,528.00
	STARLITE - FORD E350	$ -
93092	Starlite 20 138" WB E-350 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 121.00
93219	Starlite 22 158" WB E-350 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 121.00
	STARLITE - TRANSIT350 HD 10,360 GVWR	$ -
93108	Starlite 20 138" WB Transit350 3.5L EcoBoost Gas Engine W/250 Amp Ford Alt	$ 2,977.00
93082	Starlite 22 156" WB Transit350 3.5L EcoBoost Gas Engine W/250 Amp Ford Alt	$ 5,066.00
	ALLSTAR - FORD E350	$ -
93113	Allstar 20 138" WB E-350 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 121.00
	ALLSTAR - FORD E350	$ -
93161	Allstar 20 158" WB E-350 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 121.00
	ALLSTAR - FORD E450	$ -
93142	Allstar 20 158" WB E-450 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 3,050.00
93109	Allstar 22 158" WB E-450 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 3,745.00
93119	Allstar 24 158" WB E-450 7.3L Premium Gas Engine W/240 Amp Ford Alt	$ 4,441.00
93091	Allstar 25 176" WB E-450 7.3L Premium Gas Engine W/240 Amp Ford Alt **	$ 5,833.00
93102	Allstar 25 190" WB E-450 7.3L Premium Gas Engine W/240 Amp Ford Alt *	$ 6,528.00
93110	Allstar 27 208" WB E-450 7.3L Premium Gas Engine W/240 Amp Ford Alt ***	$ 7,920.00
	Forest River Ford OEM E Transit	
ETransADA	Conversion to Ford OEM E Transit ADA	$ 5,075.00
Etrans	Conversion to Ford OEM E Transit Non ADA	$ 5,075.00
2289	FRP on Ceiling, Grey	$ 476.00
2040	FRP on Rearwall, Grey	$ 244.00
2093	FRP on Sidewall Under Seat Track, Grey	$ 157.00
2238	Cove Colored Flooring on Sidewall to Seat Track	$ 319.00
2055	Grey Padded Cloth Interior (walls and ceiling)	$ 244.00
2113	Grey Padded Vinyl Interior (walls and ceiling)	$ 319.00
2853	Black Padded Vinyl Interior (walls and ceiling)	$ 354.00
2054	Strips on Ceiling to Match Seats Up to Level 5 Fabric	$ 476.00
2248	Altro Flooring	$ 534.00
2885, 22534	Gerflor Gaya or Harmonia Wood	$ 2,170.00
8820	Yellow Step Nosing - Per Step	$ 24.00

2291	3/4" Marine Tech Plywood Floor	$ 720.00
2202	5/8" Marine Tech Plywood Floor	$ 638.00
2130	Raised Floor - Flat Floor	$ 708.00
99	Full Body Paint 20' to 27'	$ 7,674.00
2001	Front Mud Flaps pair	$ 53.00
2623	Driver Running Board	$ 470.00
2002	Rear Tow Hooks	$ 116.00
2668	Exhaust Pipe Downturn	$ 105.00
99	Mor-Ryde RS Suspension	$ 1,526.00
2186	Telma Break Retarder	$ 12,482.00
2446	Exrerior Mirror Remote/Heated Chevy	$ 1,184.00
2444	Exterior Mirror Remote/Heated Ford	$ 876.00
2008	Bike Rack	$ 4,345.00
2156	Romeo Rim Rear Bumper	$ 1,056.00
2670	Romeo Rim Rear Bumper w/Hawkey RAS Installed	$ 1,978.00
2190	Rear Step Bumper	$ 244.00
99	Spare Tire and Wheel Ford Transit	$ 824.00
8004	Spare Tire and Wheel Ford E and Chevy	$ 563.00
8005	Stainless Steel Wheel Insert, set of 4	$ 383.00
8606	Valve Stem Extender Inner Dual Rear Wheel, pair	$ 105.00
2814	Intermotive Gateway Fast Idle	$ 708.00
22045	Metal Locking Door for Fuel Fill	$ 215.00
104793	Upgrade base to Trans Air AC 80K BTU Dual Compressor system (Chevy 3500, Chevy 4500)	$ 4,200.00
104792	Upgrade base to Trans Air AC 80K BTU Dual Compressor system (Ford E350, E450)	$ 2,332.00
104831	Upgrade base to ACC AC 60K BTU Dual Compressor system (Ford Transit 350)	$ 998.00
104836	Upgrade base to ACC AC 70K BTU Dual Compressor system (Ford E350, E450)	$ 1,601.00
104838	Upgrade base to ACC AC 70K BTU Dual Compressor system (Chevy 3500, Chevy 4500)	$ 1,532.00
2627	Rear Heater 45K BTU	$ 609.00
8045	Rear Heater 65K BTU	$ 650.00
20086	Wall Mount Heater 32K BTU	$ 609.00
20088	Heater Booster Pump	$ 401.00
8789	Perimeter Seating Heater Kit	$ 198.00
22080	Door Ajar Buzzer on Wheelchair Door	$ 105.00
2298	Stop Request, Pull Cord, Chime, Sign	$ 778.00
2786	Touch Tape at WC area for ADA Stop Request	$ 105.00
22097	Hourmeter	$ 163.00
2651	Additional 12V Power Outlet	$ 41.00
20115	Front Illumiated ID Sign (no lettering)	$ 401.00
2180	Front Multiple Destination Sign (Transign)	$ 2,460.00
20118	Side Multiple Destination Sign (Transign)	$ 2,460.00
20126	Diamond Farebox NV	$ 2,668.00
20127	Diamond Farebox SV	$ 3,202.00
20128	Diamond Farebox D	$ 1,387.00
8812	LED Dual Reading Lights (Each) In Overhead Luggage Required	$ 58.00
8287	Delux AM/FM/CD with Clock and 4 speakers	$ 511.00
8830	Jensen AM/FM/CD/Clock/Blue Tooth/USB	$ 708.00
8139	Hand Held Mic and Clip Added to PA Ready Radio	$ 244.00

20157	Additional Speakers	$ 35.00
2241	Passenger Door 42"	$ 708.00
8133	Exterior Passenger Door Key	$ 111.00
8126	Rear Door No Window	$ 441.00
8016	Rear Door (1) Window	$ 551.00
20179	Roof Hatch	$ 551.00
20192	Driver Storage in Cab Overhead	$ 163.00
8020	Overhead Luggage Racks (both side)	$ 865.00
20198	30" Interior Luggage Rack	$ 1,120.00
20199	36" Interior Luggage Rack	$ 1,172.00
20200	48" Interior Luggage Rack	$ 1,218.00
20201	60" Interior Luggage Rack	$ 1,305.00
20202	72" Interior Luggage Rack	$ 1,358.00
20203	Rear Luggage Area w/ rear door	$ 1,195.00
20206	Double W/C Doors w/windows	$ 1,450.00
20207	2" Wider Double W/C Doors w/ windows	$ 1,839.00
8744	Braun Centry Lift	$ 8,115.00
8766	Braun Vista Lift	$ 8,538.00
20229	Braun Centry 1000lb Lift	$ 9,083.00
2531	Intermotive Gateway Fast Idle with Interlock for Lift Chevy	$ 946.00
99	Intermotive Gateway Fast Idle with Interlock for Lift Ford E Series and Transit	$ 708.00
8688	Q Straint Standard Retractro Tie Down with L Track	$ 824.00
8003	Q Straint DeLuxe Retractor Tie Down L Track	$ 946.00
8689	Q Straint Max Retractor L Track	$ 998.00
20246	Q Straint Max Retractor Slide N Click	$ 1,323.00
8826	Q Straint QRT 360 Retractor Tie Down L Track	$ 1,445.00
8827	Q Straint QRT 360 Retractor Tie Down Slide N Click	$ 1,659.00
2681	TDSS Under Seat Storage Slide N Click	$ 285.00
2680	TDS Under Seat Storage L Track	$ 145.00
8102	Q Straint Belt Storage Pouch	$ 87.00
8104	Priority Seating Sign	$ 18.00
8179	Q Straint Belt Cutter	$ 35.00
8089	5lb Fire Extinguisher	$ 87.00
8616	10lb Fire Extinguisher	$ 198.00
20260	Dual Spectrum Fire Suppresion System	$ 5,621.00
20261	Amerex Fire Suppresion System	$ 4,211.00
8090	16 Unit First Aid Kit	$ 76.00
20263	25 Unit First Aid Kit	$ 87.00
8091	Emergency Triangle Kit	$ 82.00
20264	Body Fluid Kit	$ 70.00
20267	Back Up Alarm 97db	$ 82.00
20276	Interior Convex Mirror	$ 64.00
8802	White or Yellow Standee Line	$ 35.00
2050	Ceiling Grab Rail Street Side	$ 151.00
2050	Ceiling Grab Rail Curb Side	$ 151.00
99	Ceiling Grab Rail Both Sides	$ 296.00
20297	Yellow Powder Coating of Grab Rails	$ 505.00

8049	Right Hand Entry Grab Rail	$ 99.00
8130	Dual Entry Grab Rails Parallel to Entrance Steps (both sides)	$ 151.00
20301	Stanchion and Modesty Panel behind driver	$ 203.00
2064	Sheild,FC Recliner Drivers Seat	$ 1,004.00
99	Sheild Sport Recliner Drivers Seat	$ 2,071.00
2631	Recaro LXS Driver Seat	$ 3,289.00
2167	USSC G2 Drivers Seat	$ 3,289.00
2205	Adnik 6 Way Driver Seat Power Base	$ 783.00
2111	Driver Seat Cover Level 2	$ 70.00
2042	Driver Seat Cover Level 3	$ 116.00
2043	Driver Seat Cover Level 4	$ 145.00
2046	Driver Seat Cover Level 5	$ 221.00
2112	Driver Seat Cover Level 6	$ 232.00
8065	Passenger Seat High Back Double	$ 917.00
8066	Passenger Seat High Back Single	$ 505.00
8067	Passenger Seat Mid High Back Double	$ 882.00
8068	Passenger Seat Mid High Back Single	$ 482.00
20312	Passenger Seat Low Back Double Seat	$ 836.00
20313	Passenger Seat Low Back Single Seat	$ 459.00
2851	Berkshire Seat Upgrade	$ 64.00
20320	Flip Seat Double	$ 1,398.00
20319	Flip Seat Single	$ 957.00
8084	Foldaway Seat Mid High Double	$ 1,520.00
8832	Foldaway Seat Mid High Single	$ 1,044.00
2364	Foldaway Seat High Back Single	$ 1,189.00
2335	Foldaway Seat High Back Double	$ 1,793.00
2546	3PT Mid High Double Seat	$ 1,624.00
2547	3PT Mid High Single Seat	$ 1,050.00
2546	3PT High Back Double Seat	$ 1,624.00
2547	3PT High Back Single Seat	$ 1,050.00
2553	3PT High Back Single Foldaway Seat	$ 1,920.00
2552	3PT High Back Double Foldaway Seat	$ 2,402.00
2552	3PT Mid High Double Foldaway Seat	$ 2,402.00
2553	3PT Mid High Single Foldaway Seat	$ 1,920.00
2072	Passenger Seat Cover Level 2	$ 41.00
2073	Passenger Seat Cover Level 3	$ 53.00
2663	Passenger Seat Cover Level 4	$ 87.00
2075	Passenger Seat Cover Level 5	$ 128.00
2122	Passenger Seat Cover Level 6	$ 145.00
2311	Anti Vandal Grab Handles	$ 76.00
2077	Black US Arm Rests	$ 64.00
2282	USR Retractable Seat Belts	$ 163.00