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Spirit of Freedom - Ford



ARBOC Specialty Vehicles, LLC. **Service Manual**

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To Our Valued Customer,

Thank you for your business and congratulations on your purchase of your Spirit of Freedom – Ford (SOF-F). Every ARBOC Specialty Vehicles, LLC. bus we build complies with or exceeds ADA standards. Our primary focus is on all of your passengers, all of the time.

Our Spirit of Freedom – Ford features premium technology for safety, reliability, and ease of operation. Your understanding of the parts and procedures to maintaining the vehicle is vital to your satisfaction. We hope that you will find this manual to be an informative and useful reference tool.

Our Spirit of Freedom - Ford is built on the Ford Transit T350 Cutaway Chassis and includes premium components for the most reliable and comfortable travel experience. Because most functions and features are unchanged, the Ford service manual should be reviewed in conjunction with this guide for location, proper operation, and service of these features. Reference to the Ford Service Manual is REQUIRED for specific information on safety practices, cautions, and important information such as torque specifications.

This guide was crafted to familiarize the operator with basic procedures. It must be read and understood before driving and operating the controls. It is not all-inclusive of situations that may occur. Operators must have a level of skill and familiarity that does not come without conventional experience. Once understood and practiced, operation will be straightforward and comfortable.

In this guide you will find examples of standard and optional equipment. Your Spirit of Freedom-Ford bus is equipped as specified and may have features in addition to this guide's content. There may also be examples represented that are not part of your bus as built. All information contained is based on information available at the time of printing. With our program of ongoing improvement, ARBOC Specialty Vehicles, LLC reserves the right to make changes without notice.

ARBOC Specialty Vehicles, LLC provides multiple documents on your specific unit to the dealership that can be obtained that may not be part of this manual. This information can be found at your customer link. Please contact your selling dealer or ARBOC Specialty Vehicles to obtain the customer link. Information includes:

- **ARBOC Limited Warranty**
- **Floor Plan** – document that shows the layout of the bus floor plan as ordered and initially produced
- **Unit Information Sheet** – document identifies the options that were included on the bus at time of production
- **Product Data Sheet** –document contains the model and serial numbers of the primary optional components that were installed on the bus at the time of production. These are required by suppliers for proper replacement and warranty coverage.
- **Weight Analysis** – document contains details the curb weight of that bus as built for each wheel location.
- **Paint Schematic** - document identifies any special paint or decals that were included in the production of the bus.
- **Parts List** – list of components used during the production of the bus.
- **Front End Alignment Sheet** – document shows the alignment specifications for the vehicle prior to shipping

Please contact ARBOC Specialty Vehicles, LLC Service Operations with any questions and/or suggestions at 574-825-4880.

This Owner's Manual covers the Spirit of Freedom-Ford bus produced by ARBOC Specialty Vehicles, LLC. Before operating or servicing your bus, you must read, understand and follow the instructions and safety warnings in this manual. Your bus may not be equipped with some of the optional equipment shown in the illustrations in this manual.

Read and understand this manual and the manufacturers manuals provided with your bus. Make sure that you understand the controls and operating instructions before attempting to operate the bus. **Improper operation is dangerous!**



The safety of risk in this manual is denoted by the safety alert symbol:

The level of risk is indicated by the following signal words:



DANGER

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.



WARNING

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.



NOTICE

Indicates a situation that could result in damage to the bus or other property.

Hazards from Operation



WARNING

Ensure all paths are clear to prevent injury or death. Mirrors are provided for safety. It is the operator's responsibility to adjust them properly before moving the bus.



WARNING

Risk of injury or bus damage. Do not attempt to operate controls on ARBOC Specialty Vehicles panel until a clear path for the doors and ramp is confirmed.

Hazards from Maintenance



WARNING

Crush hazard. Do not enter area under bus before confirming that transmission is in park and parking brake is set. Place "Do Not Operate" tag on steering wheel.



WARNING

Falling hazard. Wet surfaces can cause slips and falls. Never put a bus into service with a floor wet from washing.

Vehicle Operation Safety

Do not drive the vehicle if:

- Indicators, instruments, or gauges show that vehicle operating systems are malfunctioning.
- Exhaust fumes are evident in the passenger compartment.
- Beneath the vehicle, engine oil, hydraulic fluid, or coolant has been leaking.
- Seating stanchions and grab rails are loose or damaged.
- Wheelchair restraints are inoperative.
- Driving mirrors are broken, missing, or cannot be properly adjusted.
- Exterior or interior lights are broken, discolored, or malfunctioning.

Report the occurrence of any of the above to maintenance personnel so the vehicle can be serviced before beginning revenue service.

Before operating the vehicle, ensure:

- Seat belts are fastened.
- Obstructions do not block or interfere with your safe range of driving and operating vision.
- Any debris or garbage is removed from the passenger area and the doors. This is important to eliminate any foot obstructions that could cause tripping or falling.
- All exterior and interior access doors and panels are securely shut and latched.

Safety Equipment

Additional safety equipment may be installed in your vehicle per transit requirements and locations. Prior to usage of the vehicle, locations of these items and training on usage should occur.

- **Fire Extinguisher:** Use the extinguisher only after the vehicle is in a safe location, and all passengers are evacuated. Use only if there is no risk to your personal safety.
- **Safety Triangles:** Position the triangles at the front and rear of the vehicle to warn other drivers during emergency situations.

Vehicle Safety Systems

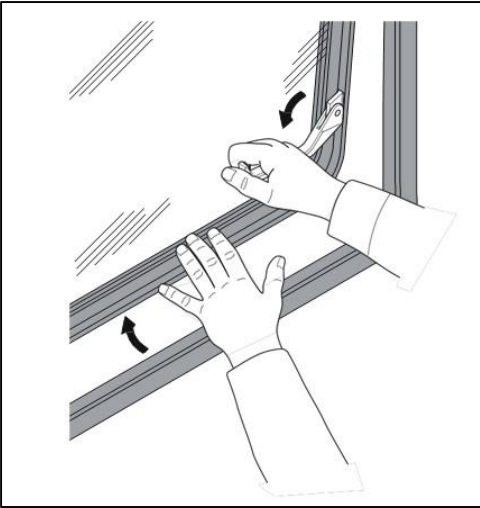
Exit Door Sensitive Edges: Your bus may be equipped with an optional door sensitive edge system. Pressure sensitive rubber seals are mounted to the leading edges of the exit door panels. If they encounter an object or passenger during door closure, the doors fully reopen. The doors will again close once they have fully reopened.

Vehicle Evacuation & Shutdown

In the event of an emergency, follow the evacuation and shutdown procedure in the sequence shown:

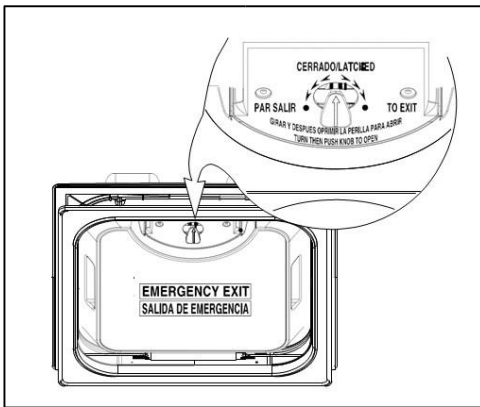
1. Pull the vehicle over to a safe location.
2. Apply the parking brake
3. Open the front and rear passenger doors. (if so equipped)
4. Shutdown the vehicle by turning the key to the 'OFF' position.
5. Direct all passengers to a safe area, away from the vehicle.
6. Alert the transit authority of the emergency.
7. If safe to do so, locate the Battery Disconnect Switch (Battery Disconnect Switch is located inside the OEM fuel fill door next to the driver door.
8. Shut off all 12V electrical power by setting the switch to the 'OFF' position.
9. Wait for emergency response personnel to arrive and assist them by providing details of the emergency.

Emergency Exits



Side Windows: The windows which function as emergency exits are identified by labels and red egress lights.

To operate the emergency window, pull the red handle downward. Push out on the bottom of the window frame. The window will open on hinges at the top of the frame. To close, pull the window shut and push the red handle upwards.



Roof Hatch: Your bus is equipped with emergency exit windows and may be equipped with an emergency exit in the roof.

In order to open the emergency exit windows, rotate red knob and push hatch up and out.



Passenger Entry Door Emergency Release Handle:

In order to release the entry doors, pull the red handle 90 degrees until it is facing you and push the doors open. To re-engage, close the doors, and push the red handle back against ABS plastic access panel.

Ford Motor Company Cut-Away (E450) Chassis

Our Spirit of Freedom-Ford is built on the Ford E450 Cutaway Chassis and includes premium components for the most reliable and comfortable travel experience. Because most functions and features are unchanged, the Ford service manual should be reviewed in conjunction with this guide for location, proper operation, and service of these features. Reference to the Ford Service Manual is REQUIRED for specific information on safety practices, cautions, and important information such as torque specifications. Including (not limited to):

VEHICLE TYPE	
Model	ARBOC Spirit of Freedom-Ford
ENGINE	
Engine	7.3L Gasoline
Horsepower at RPM	310 @ 5,000
Torque at RPM	400 @ 2,500
FUEL	
Fuel	Gasoline
Usable Fuel Capacity	55 U.S. gallons
TRANSMISSION	
Transmission Controls	6-Speed Automatic
DIMENSIONS	
Length (over bumpers)	SOF-F 25 190" WB/25" Overall Length SOF-F 27 208" WB/27" Overall Length
Width	100 inches maximum excluding mirrors
Height	108 inches maximum excluding roof hatch or A/C units
Turning Radius	SOF-F 25 190= feet (wall to wall) SOF-F 27 208= feet (wall to wall)
Approach/Departure Angle	9 Degrees
Gross Vehicle Weight Rating (GVWR)	14,500 lbs

AXLES & SUSPENSION	
Front Axle	Ford Motor Company (FMC)
Front Gross Axle Weight Rating (GAWR)	5,000 lbs.
Front Axle Ride Height	34 inches (ground to center of wheel well of front wheel) +/- 1"
Front Suspension	Ford OEM
Suspension Shock Absorbers	MOR/RIDE
Rear Axle	Ford Motor Company (FMC)
Rear Gross Axle Weight Rating	9,600 lbs.
Rear Axle Ride Height	12 inches (ground to bottom of sidewall frt of rear wheel) +/- 1"
Rear Suspension	Ford OEM
Driveshaft	Action Machine
WHEELS & TIRES	
Tires	Ford Motor Company (choice)
Tire Size	LT225/75Rx16E
Inflation Pressure	75 PSI Front, 80 PSI Rear
Wheels	White Steel Rims
Rims	16"
BRAKE SYSTEM	
Brakes	Ford Motor Company Heavy Duty Disc Brakes with four-wheel Anti-lock Braking System
Parking Brake Application	Internal Rear Disc
HVAC SYSTEM	
HVAC Unit	Determined by option
Dash Defroster, HVAC	Ford Motor Company (FMC)

Floor Mounted Heaters	Pro-Air Low Profile Heaters (determined by option)
Compressor	Determined by option
Refrigerant	R134A

COOLING SYSTEM

Engine Radiator	Ford Motor Company
Transmission Oil Cooler	Ford Motor Company

STARTING SYSTEM

Starter	Ford Motor Company
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MULTIPLEXING SYSTEM

Multiplexing Module (VMM) System with J1939 Network Communication	I/O Controls (1) Master Module I/O Controls (1) Remote Module
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CHARGING SYSTEM

Alternator	Ford Motor Company
Alternator Voltage	12 Volt
Alternator Current	240-Amp
Alternator Cooling	Air
Voltage Regulator	Integrated
Batteries	Dual Batteries
Battery Type	Maintenance-free
Battery Group Size	78
Battery Cranking Capacity	Dual 500 CCA

EXTERIOR LIGHTING

Headlights	Ford Motor Company (Daytime Running Lights)
Exterior Stop/Tail Lights	12 Volt LED
Side Turn/Marker Lights	12 Volt LED

Clearance Lights	12 Volt LED
INTERIOR LIGHTING	
Passenger Lights	12 Volt LED

DOORS	
Entrance Door	A&M Systems Electric Door
Entrance Door Opening Size	39" wide clear opening (35" w/standard entry assist handles) and 75" high clear opening.
Limit Switches	Mechanical microswitches
Driver's Door Control	3 position momentary switch on driver main panel
Door Entry Exterior Control	Toggle Switch on front side of entry door closeout panel
Emergency Egress	Manual Lever at the Door Header
WINDOWS	
General	Lippert Components
Mounting	Clamp Ring
Frame	Black anodized aluminum
Glazing	Tempered glass
Driver's Window	Ford Motor Company
Glazing	Tempered glass
Emergency Egress	1 curbside & 2 streetside identified with labels
SEATING	
Driver's	Ford OEM (only)
Passenger	Freedman Seating
FLOOR & SUBFLOOR	

Subfloor	Performax Engineered Wood (composite/wolmanized optional)
Flooring	Gerflor Flooring (Altro optional)
Sealant	Altro
SAFETY FEATURES	
Exit Door Emergency Release	Release Handle
Sensitive Edge	Exit Door Panels
ACCESSIBILITY FEATURES	
Wheelchair Ramp	Braun
Wheelchair Ramp Width	Power Lift 68" with Release Cable
Wheelchair Ramp Slope Ratio	1:6
Wheelchair Ramp Max. Load Capacity	1000 lbs.

Important Decal Information and Location

ARBOC Specialty Vehicles, LLC provides several informative decals.

1. **Vehicle Certification Labels** are in the driver's doorjamb area and identifies the following:
 - A. Vehicle manufacturer and all identifying VIN Tag & model numbers, and Gross Vehicle Weight Rating (GVWR)
 - B. Gross Axle Weight Rating (GAWR) for both front and rear
 - C. Cold tire inflation for front and rear tires
 - D. Date of Manufacture
2. **A/C and Belt Routing Labels** are located under the hood and will provide component information including model and serial numbers. Belt routing information is also provided. See below for examples:
3. **Fuse Sheets** are in the forward electrical compartment door.

Prior to entering service, ARBOC Specialty Vehicles suggests that the operator conduct a pre-trip inspection of the bus:

1. Engine Compartment
 - a. Engine oil, coolant, transmission fluid, power steering, brake fluid, and battery electrolyte levels.
 - b. Hoses for leaks
 - c. Belts for wear and tension
 - d. Cables for fraying and security
2. Exterior
 - a. All exterior lights for proper operation
 - i. Front Lights – Headlights, Right Front Turn Signal, Left Front Turn Signal, and Clearance Lights
 - ii. Side Lights - Side Turn Marker Lights
 - iii. Rear Lights – Tail Lights, Stop/Brake Lights, Reverse Lights, Four-way Flashers, Right Rear Turn Signal, Left Rear Turn Signal, Rear Side Marker Lights, License Plate Light, and Clearance Lights
 - b. Windshield wipers
 - c. Tires
 - i. Wear and Damage – Replace worn or damaged tires before driving bus
 - ii. Air Pressure – Inflate to recommended air pressure shown on the Fed Tag located above operator area
 - iii. Lug Nuts
 - d. Side Windows
 - e. Body Damage
 - f. Under engine – fluid leaks
 - g. Bike Rack (optional) for function
 - h. Storage compartment doors (optional) for function
 - i. Disconnect switch is in the “ON” position.
3. Interior
 - a. Driver Compartment
 - i. Wiper controls
 - ii. Horn
 - iii. Adjust driver seat
 - iv. Adjust steering wheel
 - v. Adjust interior/exterior mirrors
 - vi. ARBOC Control Panel Function Test
 1. Door open/close
 2. Ramp deploy/stow
 3. Interior Lights
 4. Auxiliary floor heater
 - b. Emergency exits – side windows, rear window/rear door, and emergency exit handle above the passenger entry door – verify that they are closed/latched
 - c. Passenger seats and belts (optional) – damage and function
 - d. Mobility Aid Securement – damage and function
 - e. Fire Extinguisher (optional) – check level of charge
 - f. Emergency Triangle Kit (optional)
 - g. Verify the interior of the bus is clean and free of debris.

Battery Disconnect

The battery disconnect switch (A) is located inside the OEM fuel door near the driver door. Rotate the rotary switch to the “ON” position before starting the bus and to the “OFF” position when the bus is not being used. This will prevent the batteries from being depleted if an accessory is left on.



NOTICE

Do not operate the bus with the Battery Disconnect Switch in the “OFF” position. The engine will start and allow the vehicle to be shifted into gear with the Battery Disconnect Switch ‘OFF’. However, none of the other bus functions will operate including Park Interlock, Ramp, Interior Lights etc.



Starting

The following conditions must exist when attempting to start the vehicle using the ignition key in the driver's area:

- Transmission must be in park [P].

Transmission

- Transmission will not shift unless brake is depressed.
- Transmission will not shift unless wheelchair ramp is stowed.

Brake & Accelerator Interlocks

The Interlock System is intended to protect passengers from inadvertent vehicle movement and function when the Battery Disconnect Switch is in the 'ON' position. Interlocks apply if any of the following conditions occur:

- Wheelchair ramp is not stowed
- Rear exit door is locked
- Rear exit door is not closed

Fast Idle

A fast idle system is installed which will automatically increase the engine speed (RPM) to approximately 1200 RPM. The fast speed idle shall engage only when the transmission in neutral [N], and parking brake applied. Fast Idle is controlled by I/O System and can vary speed on its own.

Warning Alarms

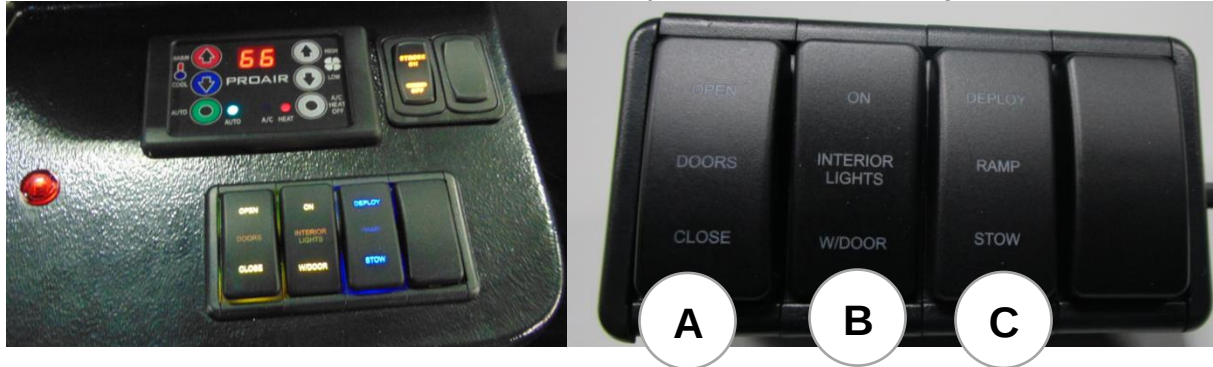
An exterior alarm or beeper will sound if any of the following conditions occur:

- The backup alarm sounds if the transmission is shifted into reverse [R].
- The ramp alarm sounds if the ramp is deploying or stowing. (Optional)

Operations

ARBOC Specialty Vehicles Control Panel

The Dash Panel houses electronics from both Ford Motor Company (FMC) and aftermarket body installed controls. The ARBOC Switch Panel controls all the major bus functions including:



A. Door Switch	• With the switch held in the open position, the door will open • With the switch held in the close position, the door will close • The door cannot be opened above (2) mph. If the door is not closed, the system will automatically close the door above (2) mph.
B. Interior Light Switch	• With the switch in the on position, the interior lights will turn on and stay on • With the switch in the with door position, the interior lights will turn on when the door opens fully
C. Ramp Switch	• With the Vehicle in park [P], park brake applied and the passenger door fully open, press and hold the RAMP switch in the “DEPLOY” position until the ramp is fully extended. • Press and hold the RAMP switch in the “STOW” position to retract the ramp. • If the switch is released at any time before passing the 90 degree point, the ramp will stop AND RETRACT. If the switch is released after the center mark, gravity will take over and deploy the ramp. THIS METHOD IS NOT RECOMMENDED.

Fast Idle

- A fast idle system shall be installed which will automatically increase the engine speed (RPM) to approximately 1200 RPM. The fast idle shall be controlled by I/O Controls.
- With the Vehicle in park [P] and key 'ON', the Fast Idle will automatically function and light will illuminate.
- Fast Idle will alternate between activated and deactivated every 5 minutes until it is stopped by depressing the brake pedal.

Multiplex System (I/O Controls)

The vehicle shall be equipped with a heavy-duty (12 volt) Multiplex controlled electrical system. All components are to be selected and integrated to function in an environment characterized by low engine (alternator) speeds and high amperage draws due to lights, air compressor, wheelchair ramp, 4-way flashers, air conditioning/heater, and other accessories in constant operation.

- I/O Controls remains active for 30 seconds after vehicle ignition key has been cycled to 'OFF'.
- The system can be woken by cycling the Key 'ON/OFF'.

The standard configuration for the Main I/O Control Module contains (16) inputs and (16) outputs. The Remote I/O Control modules contain (15) inputs and (15) outputs. Additional items will be fused in the Power Distribution Module (PDM). Although every unit may vary. **For unit specifics, please check the Vehicle Program Sheet in your Customer Link.**

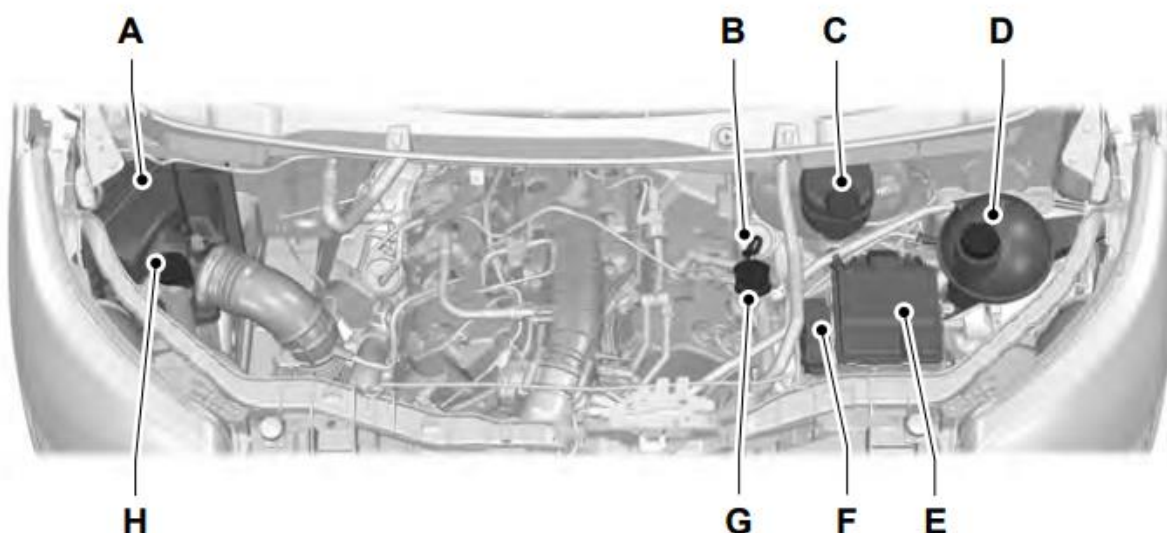
Electrical Compartment

The location of the Electrical Compartment is on the curbside B-Pillar and contains:



- A. I/O Master Module
- B. I/O Remote Module
- C. 6-Way Ignition Fuse Block
- D. 6-Way Battery Fuse Block
- E. Power Distribution Module (PDM)
- F. 60A Circuit Breaker – I/O Controls
- G. Circuit Breaker – A/C System (sized by manufacturer)

UNDER HOOD OVERVIEW - 3.5L ECOBOOST™



- A Air filter assembly.
- B Engine oil dipstick.
- C Brake fluid reservoir.
- D Engine coolant reservoir.
- E Engine compartment fuse box.
- F Battery connection.
- G Engine oil filler cap.
- H Washer fluid reservoir.

Because most functions and features are unchanged, the Ford service manual should be reviewed in conjunction with this guide for location, proper operation, and service of these features. Reference to the Ford Service Manual is REQUIRED for specific information on safety practices, cautions, and important information such as torque specifications.

Engine Compartment

There are two engine accesses on the FMC Chassis – hood and interior doghouse.

- Engine Oil Level
- Transmission Oil Level (varies by year & model)
- Engine Coolant Levels
- Chassis Main Battery

Entrance Doors

- The Passenger door – dual panel, outward opening electrically operated with one full length window in each panel and may be optionally equipped with sensitive edges for safety. For emergency situations, a manual door release control is provided over the top of the door and is designed to permit a simple operation to override the electric door operator.
- Standard configuration of the passenger entry door will not allow the door to be opened when vehicle is traveling faster than 2 mph for safety.

Windows

- Passenger windows are located along both sides of the vehicle and consist of tinted safety glass windows retained within a clamp-type anodized aluminum frame.

Lighting

- The exterior lighting system consists of headlights, turn indicators clearance markers, stop lights, tail lights, backup lights, kneeling lights, and curb lights.

Exterior Door Toggle Switch (if so equipped)

The vehicle shall be equipped with an Exterior Door Toggle Switch.

- This switch is for the operator to open/close the passenger door from outside the bus, if needed.
- The switch will function with the battery disconnect switch in the “ON” position and the ignition switch is ON.
- To use exterior door toggle switch with ignition switch OFF, the battery disconnect switch has to be in the ON position and a wake up process needs to be completed. (see below)
- Wake up process: Hold exterior door toggle switch in the open position for 3 seconds, then release the toggle switch. Operate switch as needed.

Exterior Ramp Toggle Switch (if so equipped)

The vehicle may be equipped with a Ramp Activation System that includes an Exterior Ramp Toggle Switch located to the right of the front entry door.

- This switch is for the operator to deploy the ramp from outside the bus, if needed.
- The Battery Disconnect Switch must be on and the bus ignition must be on for this switch to function.

Lifting Procedures

Lifting Procedure

Read this information first, before you attempt to raise the vehicle off the shop floor and set on jack stands. It is important that these instructions and the safety guidelines be closely followed.



DANGER

DO NOT use non-standard or makeshift lifting or blocking systems. These could result in the vehicle falling off the lifting or blocking equipment resulting in severe injury or death to working personnel.



DANGER

DO NOT allow individuals to board vehicle while it is supported solely by a raising device.



DANGER

DO NOT run engine or engage transmission while vehicle is on raising device.



DANGER

If left on the raising device for any length of time, ensure safety stands are placed under vehicle at the designated areas and that a filtered shop air supply is connected to vehicle. The auxiliary air supply will prevent suspension system leak down which causes the vehicle to sag and become imbalanced while on the safety stand.

Three methods for raising the vehicle for servicing are: lifting with wheel lifts, hoisting with floor hoists, and jacking using a specific jacking attachment. These three systems are the only ones endorsed by this manual. All the working procedures are based on using these systems:

1. Wheel Lift System

- a. Position wheel lift, centering each tire exactly between the lift forks. Make sure each tire is tightened up against the stop.
- b. Make sure all wheel lifts are sitting squarely on the floor. Also check that the lift forks at the drive wheels support only one (outside) drive wheel on each side of the drive axle.
- c. Determine that each tire is squarely seated in the lifting forks before raising. Ensure the wheel lift system is set up to simultaneously lift the four-wheel lift points.
- d. Always inspect above lift area, before raising vehicle to ensure that nothing will interfere with the procedure or cause damage to the vehicle.
- e. Release parking brake.
- f. Raise the vehicle high enough to provide adequate working clearance.
- g. Monitor the vehicle as it goes up to ensure that all four lifts operate, and the vehicle remains level.
- h. Position a jack stand squarely under each reinforced jacking point on the frame. Each jack stand must have a minimum weight bearing capacity of 12,000 lbs. (5,443 kg).

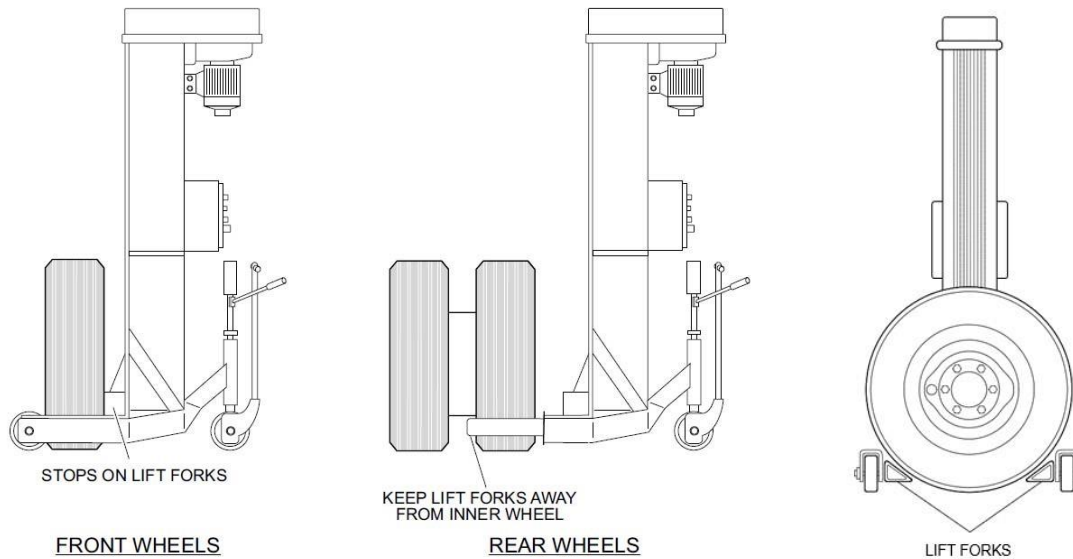


WARNING

At this point make sure each jack stand is precisely at the same height and is sitting completely level on the shop floor.

- i. Raise the contact pad of each jack stand until it positively seats in the jacking point.
- j. Slowly and carefully lower the wheel lifts until the weight of the vehicle is take up on the jack stands.

Lifting Procedures



2. Hoisting the Vehicle

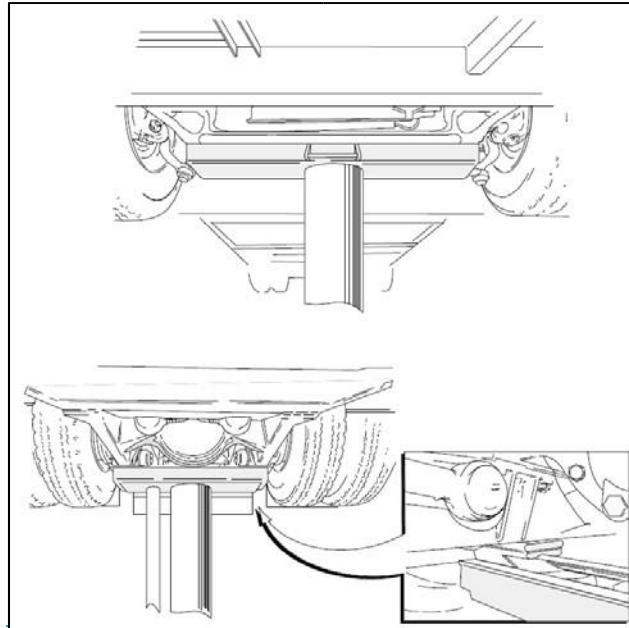
- a. Position vehicle over hoist and align hoist posts and adapter pads so these will contact the designated points.
- b. Note hoisting points:
 - i. At Rear - hoist on suspension beams below axle.
 - ii. At Front - hoist on hoisting points.
- c. Raise hoist posts just enough so that hoist adapter pads positively contact the axle hoist points.
- d. Release parking brake.
- e. Always inspect above hoist area, before raising the vehicle to ensure that nothing will interfere with the procedure or cause damage to the vehicle.
- f. Ensure that hoist adapter pads are still properly located, then raise vehicle.
- g. Raise front and rear of vehicle at the same rate, maintaining correct level always.
- h. Raise the vehicle high enough to provide adequate working clearance.
- i. Engage hoist safety locks.
- j. Position a jack stand squarely under each reinforced jacking point on the frame. Each jack stand must have a minimum weight bearing capacity of 12,000 lbs. (5,443 kg).



WARNING

At this point make sure each jack stand is precisely at the same height and is sitting completely level on the shop floor.

- k. Raise the contact pad of each jack stand until it positively seats in the jacking point.
- l. Slowly and carefully lower the center post hoists until the weight of the vehicle is taken up on the jack stands.



3. Jacking the Vehicle

- a. Apply the park brake.
- b. Place blocks behind the rear wheels.
- c. Locate the chassis lifting point.
- d. Using a 10" bottle jack on a stable, level surface, jack the vehicle as follows:
 - i. Position the bottle jack under the jacking lifting point.
 - ii. Raise the bottle jack to its maximum height.
 - iii. Place support blocks under the chassis tube assembly.
 - iv. Lower the bottle jack to rest the chassis tube assembly on the blocks.
- e. Lower the vehicle using the bottle jack as follows:
 - i. Position the bottle jack under the jacking lifting point.
 - ii. Raise the bottle jack to free the support blocks.
 - iii. Remove the support blocks.
 - iv. Lower and remove the bottle jack.

Towing Safety

The operator of the towing vehicle is ultimately responsible for safely securing and towing the vehicle.

Ensure that the operator of the towing vehicle is aware of the safety requirements and towing procedures.

- Follow all State (Provincial in Canada) and local traffic regulations.
- A vehicle safety restraint system must be used that is independent of the primary lifting and towing attachments.
- All loose or protruding parts of a damaged vehicle should be secured prior to towing.
- Do not go under a vehicle which is being lifted by the towing equipment, unless the vehicle is adequately supported by safety stands or appropriate blocking.
- No towing operation should be attempted for any reason which jeopardizes the safety of the operator, wrecker, bystanders, or other motorists.
- Do not exceed the recommended maximum speed of 35 mph (55 km/h) while towing.
- Reduce speed over uneven roads, railway tracks or other obstacles.
- Do not exceed the maximum front and minimum rear clearance specifications when the vehicle is raised.
- The vehicle being towed must have its steering secured with the wheels positioned straight ahead.
- If the vehicle being towed is not equipped with an electrical plug for operating the vehicle tail lights, a light bar must be placed at the rear bumper of the towed vehicle.

Towing Methods

Ford recommends a flatbed tow truck to transport a disabled vehicle. Use ramps to help reduce approach angles, if necessary. A towed vehicle should have its drive wheels off the ground. Contact Roadside Assistance or a professional towing service if the disabled vehicle must be towed.



CAUTION

Incorrectly towing a disabled vehicle may cause damage. The damage would not be covered by the vehicle warranty. Do not lash or hook to suspension components. Use the proper straps around the tires to secure the vehicle. Do not drag a locked wheel/tire while loading the vehicle. Do not use a sling type lift to tow the vehicle. This could damage the vehicle.

DIAGNOSTIC TOOLS		
Item	ARBOC Part #	Explanation
I/O Controls Module With I/O Programming Kit	2006192 (Optional)	The I/O Controls T2-MK-USB Module is a green interface module and cable that connects between a special connector and a computer. The cable comes with several adapters and a CD ROM that includes two pieces of software that can be used by a technician. First, the software "Superdownload" may be used to install revised vehicle software code (obtained from ARBOC engineering) into a vehicle to update the control logic of the bus. Secondly, the software "RealTimeMonitor" may be used to connect to a running vehicle and observe the status of various inputs and outputs from the I/O Controls system. It can also be used to watch the logic program make decisions and activate outputs based on the status of the inputs. This can be helpful for diagnosing if a certain function is operating correctly or not, and whether there is an issue preventing the I/O Controls system from turning on or off a device, etc. No additional subscription or license is necessary for these programs. The software necessary to rewrite the vehicle control is not included in the package and is reserved for ARBOC engineering.

Preventative Maintenance

The transit authority is responsible for the performance of all scheduled maintenance as outlined in this preventive maintenance manual to maintain the vehicle warranty. ARBOC reserves the right to deny warranty coverage on claims due to lack of maintenance, misuse, abuse, or neglect.

The maintenance intervals indicated in this manual are based upon average vehicle use and typical operating conditions. Unusual vehicle operating conditions, such as geographic environmental conditions, will require service at more frequent intervals. It is the customer's responsibility based upon experience with localized environmental conditions and local regulations to determine if more frequent intervals are required.

All the described maintenance operations must be performed by qualified personnel using standard shop practices. All replacement parts used for maintenance services or repairs must be OEM parts or parts with equivalent quality and performance. Use of inferior parts will void the warranty. Warranty claims in question must be supported by preventive maintenance records. For a full copy of the Warranty, see the Limited Warranty found in the Customer Link.

STANDARD WARRANTY COVERAGE: The basic components originally built, installed, or modified by ARBOC, in which a Customer does not get a choice in supplier option such as the windows, floor covering, suspension, interior ABS, stanchions, and electrical system including lights, switches and entry door are warranted free from defects in workmanship or materials for a period of 36 months or 50,000 miles, whichever occurs first. **ANY ACTION FOR BREACH OF THIS WARRANTY OR ANY IMPLIED WARRANTIES OR FOR REVOCATION OF ACCEPTANCE MUST BE COMMENCED BY THE EARLIER OF 39 MONTHS AFTER THE ORIGINAL PURCHASER TAKES DELIVERY OF THE VEHICLE OR 3 MONTHS AFTER THE VEHICLE'S ODOMETER REACHES 50,000 MILES.**

STRUCTURAL WARRANTY COVERAGE: The basic structural components originally built, installed, or modified by ARBOC, such as the exterior sidewall structure, rear wall structure, roof structure, floor structure, and chassis frame sections are warranted free from defects in workmanship or materials for a period of 84 months or 100,000 miles, whichever occurs first. **ANY ACTION FOR BREACH OF THIS WARRANTY OR ANY IMPLIED WARRANTIES OR FOR REVOCATION OF ACCEPTANCE COVERING THE STRUCTURE MUST BE COMMENCED BY THE EARLIER OF 87 MONTHS AFTER THE ORIGINAL PURCHASER TAKES DELIVERY OF THE VEHICLE OR 3 MONTHS AFTER THE VEHICLE'S ODOMETER REACHES 100,000 MILES.**

MANUFACTURER SUPPLIED COVERAGE: The optional accessories and/or components covered by separate manufacturer warranties and originally installed by ARBOC include, but are not limited to electronic components (alternators, batteries, TVs, radios, PA systems, destination signs, camera systems), air conditioning/heating (not related to chassis system), paint, wheelchair ramps, safety equipment, and seating equipment. Warranty terms on these items will be subject to separate manufacturer warranties and may be administrated separately by the component manufacturer.

Consumable maintenance items such as (but not limited to) lights, light bulbs, lamps, belts, bushings, and items with progressive wear characteristics, lubricants, fluids, filters, hoses, wiper blades and tires are not covered by warranty.

The transit authority is responsible for the performance of all scheduled maintenance as outlined in this preventive maintenance manual to maintain the vehicle warranty. For compliance to warranties covering the following equipment, refer to complete preventive maintenance intervals and procedures contained in the applicable vendor supplied information found in your Customer Link:

- A&M Systems: Door Mechanism
- Braun: Ramp
- HVAC (by sales option)

Please refer to your Ford Transit Incomplete Vehicle owner's manual for information about vehicle care and Service/Maintenance. In addition to the OEM preventative maintenance items, ARBOC suggests:

- Adjustment of entry door limit switches – every three months
- Check the function of the Master Body Switch – every three months
- Clean/lubricate battery slide trays (if equipped) – every three months
- Inspect emergency exits (open exits and clean gaskets) – every three months
- Clean/replace aftermarket a/c return filters – every spring/fall
- Close/open heater shut-off valves – close in the spring/open in the fall

Ford Motor Company Preventative Maintenance

FMC Preventative Maintenance Guide

Extensive idling or low-speed driving for long distances, as in heavy commercial use (such as delivery, taxi, patrol car or livery)	
As required	Change engine oil and filter as indicated by the information display and perform services listed in the Normal Scheduled Maintenance chart.
Inspect frequently, service as required	Replace engine air filter.
Every 60,000 mi (96,000 km)	Replace the spark plugs.

Exterior Check

- Wheels are undamaged and studs and nuts are secure.
- Tires correctly inflated.
- Vehicle is level.
- Exterior panels are undamaged.
- No fluid leaks exist under vehicle.
- No fluid leaks exist at axles.
- Power steering reservoir level is correct.
- Engine oil level is correct.
- Transmission fluid level is correct.
- Fuel tanks are full.

Operational Check

Start the vehicle and check the following for correct condition and operation:

- Instrument panel indicators.
- Turn signals.
- Mirror condition and adjustment.
- Window and windshield visibility.
- Windshield wipers and washer.
- Destination signs.
- Front and rear doors.
- Exit door sensitive edge.
- Wheelchair ramp.
- Interior and exterior lights.
- Steering column.
- Headlights.
- Instrument panel gauges
- Brake pedal.
- Parking brake.
- Accelerator.
- Transmission shift selector.

Wheelchair Ramp

Inspect the wheelchair ramp area for cleanliness on a regular basis depending on operating conditions. Exposure to salt, sand, or slush during the winter months may require inspection daily. Likewise, operating in gritty, dusty conditions during the summer months will require more frequent inspections. Clean any dirt or foreign matter from the ramp, hinge, and operating shaft areas. Inspect the recessed area between the floor and ramp for any accumulation of debris. Manually deploy and stow the ramp to check for smooth operation. Inspect hinge for binding or distortion. Repair or replace hinge as necessary.

1. Put Battery Disconnect Switch in the 'ON' position.
2. Enter the bus and start the engine.
3. Open entry door to a fully open position which will cause the interior lights to illuminate.
4. Engage the parking brake.
5. Deploy the ramp.
6. Stow the ramp.
7. Once the ramp is stowed, close the door(s).

Daily Preventative Maintenance

Stop Request

1. Put Battery Disconnect Switch in the 'ON' position.
2. Enter the bus.
3. Start the bus.
 - a. For systems with the pull string stop request, pull down on each section of the string (between the eyelets), listen for the chime and look for the flashing sign, if installed. After each test, reset the system by fully opening and closing the main entry door to ensure proper operation of the stop request system
 - b. For systems with the push button stop request, push each button, listen for the chime and look for the flashing sign, if installed. The push button system will reset automatically. For the handicap stop request, these push buttons are located under the folding seats
4. Once the stop request test is completed, return the bus to normal operation.

Wheelchair Tie-Down & Occupant Restraints

- Check the retractors by pulling out the webbing to ensure they are locking properly
- Check to ensure webbing is not cut, frayed, damaged, or contaminated by polishes, oils, or chemicals
- Check that metal parts are not worn, broken, or cracked
- Check pin connector bushings to ensure they are not cracked, broken, or missing
- Check that all mounting hardware, such as bolt, nuts, etc. are secure
- Check floor anchorages to ensure cleanliness and securement
- Check shoulder belt anchorages for proper securement and operation
- Check lap and shoulder belt webbing to ensure it is not cut, frayed, damaged, or contaminated with polishes, oils, or chemicals
- Check buckles for damage and ensure proper operation
- Check male buckle pin connector bushing to ensure it is not cracked, broken, or missing
- Check any other parts of the securement system and accessories that may not be specifically indicated in this checklist, but are pertinent to a safe operational system

Floor Covering

Inspect the interior flooring for cleanliness on a regular basis depending on operating conditions. Exposure to salt, sand, or slush during the winter months may require inspection daily.



CAUTION

DO NOT clean the vehicle interior with pressure washing equipment. This type of cleaning causes excessive soaking of the floor covering and can result in separation of the rubber floor covering from the floor substrate, warping or deterioration of the floor substrate, and possible damage to floor mounted equipment such as floor heaters.

- Vacuum or sweep the floor area daily to remove surface soil before it becomes embedded in the rubber floor covering.
- Wash the floor using a mild detergent and a minimum amount of water to avoid soaking seams and edge areas.
- Visually inspect rubber flooring for gouges, cracks, seam separation, lifting, or any other damage.

HVAC Systems Test

Perform a visual inspection of the HVAC system every month or 6,000 miles (9,600 km), whichever occurs first. Operate all systems periodically, especially during the off season. By operating the system weekly for short intervals (5 to 10 minutes) year-round, the internal parts of the compressor will remain lubricated. Off- season operation also helps reduce compressor shaft seal leakage and allows early detection of refrigerant loss.



CAUTION

Prior to operating the compressor during winter months, you must warm up the vehicle interior to normal operating temperature of 60 to 76° F (5 to 21° C). Unless this precaution is taken, liquid refrigerant might be forced into the compressor, causing severe damage.

Fire Extinguisher

Inspect the fire extinguisher every month as follows:

- Ensure the fire extinguisher is securely mounted in its proper location.
- Check that the safety pin lock is installed.
- Ensure that the hose is in good condition and the nozzle is not obstructed.
- Confirm that the cylinder pressure indicated on the gauge is within the green operating range.

Entry Door Limit Switches

1. Disengage the RED emergency exit handle.
2. Remove the ABS Plastic door above the RED emergency handle.
3. Grab the large silver rods on the back of the door header.
4. Push the rods as far as they will go towards the front and the rear of the bus.
5. Reengage the RED emergency handle while holding one of the bars in place.
6. Test the door operation for smooth operation.
7. With the doors fully open, deploy and stow the ramp to ensure the ramp does not strike the door.

Battery Disconnect Switch

1. With the bus not running, place the Master Body Switch in the 'ON' position.
2. Using a Multimeter, check that 12VDC voltage to ground is found on both sides of the switch.
3. Turn the Master Body Switch to the 'OFF' position.
4. Using a Multimeter, check that 12VDC voltage to ground is found on only one side of the switch.
5. Replace the Master Body Switch if any voltage is found on both sides of the switch in the 'OFF' position.

Emergency Exits

1. With the bus not running and the Battery Disconnect Switch in the 'OFF' position, release the RED Emergency handles on the window and push the window out.
2. Using a light soap and water mix on a clean washcloth, wipe down the rubber gasket/seal around the outside and inside of the window.
3. Using a clean washcloth and water mix re-wipe down the rubber gasket/seal around the outside and inside of the window ensuring there is no soap left on the gasket/seal.
4. Leave the window open until the gasket/seal dries completely.
5. Using a light, inspect the gasket/seal for rips, tears, gouges etc.
6. Once the gasket/seal has been verified clean, close and re-latch the window.