Ford vehicles are suitable for producing ambulances **ONLY** if equipped with Ford Ambulance Prep Package.

**Ambulance – Qualified Vehicle Modifier**  
**Unique Guidelines and Requirements**

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A. SCOPE OF THIS MANUAL
This manual provides guidelines for final stage ambulance manufacturers building on Ford incomplete vehicle products. It also includes an introduction to process controls, quality controls, customer support, and management practices recommended by Ford.

This manual is a supplement to, not a substitute for, the Incomplete Vehicle Manual and the Ford Truck Body Builders Layout Book (available in book or CD form).

Final stage manufacturers should note that following the guidelines furnished in this manual is not alone sufficient to ensure that a completed vehicle will meet all applicable federal, state, and local vehicle and user laws and regulations.

Ford Motor Company recognizes the need for final stage manufacturers to meet special vehicle requirements of their customers and attempts to supply guidelines, such as this manual, to assist in meeting this need. Major chassis modifications, like wheelbase changes, four wheel drive conversions, or air suspension systems, may adversely affect several areas of vehicle performance including vehicle steering and handling, braking, tire wear, and component reliability. Therefore, in addition to meeting FMVSS, CMVSS, KKK, NTEA-AMD guidelines or other motor vehicle requirements or specifications, final stage manufacturers are to exercise sound engineering judgment in the execution of vehicle modifications to avoid adverse effects to vehicle performance. Final stage manufacturers are to incorporate appropriate testing and vehicle evaluation as part of its sign-off process before new models or major modifications are released to the customer.

The Ford Truck Quality Program specifies that each builder is to maintain records outlining their product compliance strategies and make them available to Ford for review during FTQP visits. This review by Ford will not constitute Ford's concurrence in C/FMVSS and emissions systems compliance of the final manufacturer's products. Ford will use this review to assess the strength of the manufacturer's compliance verification program. Responsibility for the compliance and performance of the completed vehicle rests with the final stage manufacturer. See Title 49 of the Code of Federal Regulations, Part 568, or Section 8 of the Canadian Motor Vehicle Safety Regulations. This includes responsibility for modifications that may be subcontracted to an intermediate stage builder.

B. WARRANTY POLICY
Warranty requirements are presented in the Ford Truck Quality Program Guideline

C. THE ENGINEERING ASSESSMENT
Engineering assessment for ambulance manufacturers includes all common quality program guideline elements and ambulance specific items

D. ELEMENTS OF AN EFFECTIVE QUALITY PLAN
AM-D0100 MANAGEMENT COMMITMENT

| AM-D0101 | A formal procedure must exist that ensures management sign-off for engineering, production, purchasing, quality control, and sales activities original design and assembly. Ford vehicles are suitable for producing ambulances ONLY if equipped with Ford Ambulance Prep Package. |

AM-D0300 ENGINEERING
AM-D0301 There must be a formal engineering analysis for all vehicle modifications.

AM-D0309 There must be engineering drawings and written direction created to describe the assembly and any critical processes. These should be easily understood by production.

AM-D0313 Engineering should approve all options listed in the sales literature.
AM-D0400 PROCESS CONTROL

A formal change control process must be incorporated with a Change Control Form for identifying and documenting the change. The change control form should include a description of the change, the date it is effective, the first affected unit production number, a reason for the change, and a place for signature approvals from engineering, production, quality control, purchasing and management. The change form can usually be initiated by anyone but all activities must sign off before the change is incorporated into production. Engineering sign-off must include an assessment for compliance with government regulations and engineering drawing requirements. Refer to appendix VII for an example of a change control form.

E. DESIGN AND MANUFACTURING GUIDELINES

AM-E0100 HEAT MANAGEMENT

HEAT SHIELDS (Refer to Figure #1 – APPENDIX VI)

- Do not remove, reposition, or otherwise modify any existing OEM body, chassis, or exhaust heat shielding.
- Additional shields must be installed by the final stage manufacturer on Cutaway and Chassis Cab units, and also on any vehicle where the frame has been modified.
- Required shielding: Shields must extend from above the right frame rail to a minimum of 20 inches inboard to at least 4 inches beyond the exhaust inside edge. Longitudinally, the shielding must cover from 4 inches forward of the Ford OEM body floor rear edge rearward to the exhaust outlet.
- Material Specification: A minimum of 18 gauge Aluminized or Galvanized Steel.
- Attachment and Clearance:
  >Preferred Attachment: All underbody heat shielding should be attached to the vehicle body and maintain an air gap of 1/4 inch to 3/8 inch between the heat shield and the floor underbody.
  >Optional Attachment: Attach the underbody heat shielding directly on top of the OEM frame side rail or crossmembers. Do not drill or weld on frame rail or flanges.
  >All heat shields added must provide a minimum clearance of 3/4 inch to all moving components.

Ford recommends that the above air gap be filled with a fiber glass blanket insulator to further protect the underbody from heat. A simple air gap as defined above would provide optimal insulation if it were sealed. Fiber Glass insulation (1/4 to 3/4 inch thick) can be installed by fastening it to the metal skinned floor bottom and then attaching the underbody heat shield directly below it with no air space.
**FLOOR CONSTRUCTION** (Refer to Figure #1 – Appendix VI)

Proper floor construction and material usage is **CRITICAL** to overall vehicle heat management. All materials must meet **C/FMVSS 302, Flammability of Interior Materials.** The recommendations below meet minimum specifications for flooring and should provide adequate heat management properties when used in conjunction with proper heat shielding.

- **Plywood Floor Top:** If wood is used in your vehicle floor, special attention should be given to the quality and integrity of the wood materials chosen. Some factors to consider are thermal conductivity, water vapor and gas permeability, acoustical and electrical properties, and moisture resistance. Ford recommends a minimum of 3/8 inch thick APA (A-C, B-C, or C-C Plugged) quality underlayment exterior grade plywood as a top of floor material, based on research completed by the American Plywood Association (APA).

- **Metal Skin Bottom:** Bottom surfaces of the floor, within 24 inches of any exhaust component, must be protected with a minimum skin of aluminized or galvanized steel.

- **Molded Expanded Polystyrene (Bead Board) Insulation:** Consider thickness and the ASTM specifications for water absorption, flammability, and thermal conductivity in your material selection.

**AIR FLOW RESTRICTION THROUGH THE RADIATOR MUST BE MINIMIZED.**

- Sirens, lights, or other accessories must not be located in the grille area, or other cooling inlets, forward of the radiator or air cleaner inlets. Keep all items to the side or mounted out in front of the grille and cooling inlets. Reference: Body Builder Layout Book

- Components mounted underhood must be out of the fan blast pattern to prevent radiator air flow restriction.

**CLIMATE CONTROL – HEATING AND AIR CONDITIONING**

This section applies to 12 volt automotive climate control systems.

**STEERING AND SUSPENSION**

**Avoid static body leans greater than 3/4 inch.** This is the side-to-side difference between the heights of the body side wheel house openings. Spacers between the springs and axles can be added to help balance any lean. The total spacer thickness should not exceed 3/8 inch and must not adversely affect driveline operating angles. Using a tapered spacer may help control driveline angles. The body builder is encouraged to avoid as much side-to-side weight imbalance as possible by balancing floor plans in the original body design, with due consideration for the customer’s plans for equipment placement.

**Rubber jounce bumpers are required in combination with a dedicated metal jounce stop.** Axles should contact the rubber before the metal stop.
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AM-E0404 Any suspension component contact with the fuel system is unacceptable. Suspension components must clear the fuel tank(s) throughout their functional geometry, by 2 inches minimum. Recognize that the rubber fuel filler hose can sag with age. Provide sufficient suspension clearance or fuel filler hose support to preclude interference.

AM-E0405 All suspension components loosened, or removed and reinstalled, must be properly reassembled (new fasteners when required) and torqued in accordance with the Ford Shop Manual.

AM-E0406 Ambulance QVM Program 4 x 4 conversions are permitted only on models that Ford does not build with a 4 x 4 option. All C/FMVSS issues must be addressed, including 105 (Hydraulic Brakes), 106 (Brake Hoses), 208 (Occupant Crash Protection), and 301 (Fuel System Integrity).

AM-E0500 BRAKES
AM-E0501 It is the responsibility of the modifier to comply with C/FMVSS 105 if any changes are made to the OEM system.

AM-E0502 Brake system line changes should follow the guidelines in QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases.

AM-E0503 The brake fluid reservoir must remain accessible for servicing and for adding brake fluid. Note that the Ford reservoir is translucent to facilitate checking the level of fluid without opening the reservoir, thereby reducing the risk of contamination. Avoid obstructing the view of the reservoir level.

AM-E0504 Splicing the parking brake cable is unacceptable. A new cable must be used. Follow QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases.

AM-E0507 The brake system must be fully functional when the vehicle is completed. Consideration must be given to the EMI/RFI effect of added components to the OEM ABS system.

AM-E0600 POWERTRAIN – ENGINE, TRANSMISSION, and AXLES
AM-E0601 The Powertrain Control Module (PCM) has a “keep alive” memory system that adjusts driveability performance under varying driving conditions and provides component history for service diagnostics. The loss of battery power will temporarily defeat this feature. Abnormal transmission operation can be expected for some time after disconnection until the memory system can re-establish this history.

The addition of a battery cut-off switch, if used, requires the maintenance of power to the appropriate pin of the PCM at all times (See Common Section E1103).

AM-E0602 Allow for any cab-to-frame alignment adjustments that are made or for potential settling of the cab due to second unit body attachment. Movement of the cab relative to the frame may require a readjustment of the transmission gear selector and “PRNDL” indicator. Refer to the shop manual. Refer to the Incomplete Vehicle Manual for C/FMVSS 102 compliance considerations.

AM-E0603 Welding to an axle assembly is unacceptable. It can cause damage to wheel bearings, races, and seals. It can also weaken the axle tube.
AM-E0604  Revision of the front end accessory drive, including the installation of fan spacers, should be avoided. Operation of the accessories may be adversely affected, creating NVH issues. Changing alternators is not recommended. If it is done, belt alignment, wrap, and tension must be maintained. Do not lock the engine cooling fan clutch this will affect OEM warranty.

AM-E0605  Never re-route the exhaust underneath the transmission.

AM-E0606  The addition of an engine hour meter is recommended to log engine run time to assist in determining maintenance intervals.

AM-E0607  Driveline universal joint operating angles must not be adversely affected by chassis modifications (i.e., OEM spring selection changes, brake retarders, etc.). Excessive driveline operating angles can cause transmission damage. Refer to QVM Bulletin Q-14, Guidelines for Modifying Light Truck Drivelines.

AM-E0608  The Ambulance Prep Package includes a built-in idle speed control, in the Powertrain Control Module (PCM, or ECM) which provides the operator a choice of either a fixed high idle speed or voltage maintenance. Voltage maintenance will maintain a positive charge rate, up to the maximum engine design speed. Other idle speed advance devices must not be installed.

AM-E0609  All components removed during the modification process should be properly stored and protected, including connectors. In addition, the engine air inlet ducts must be covered whenever they are opened for any reason.

AM-E0700  FUEL SYSTEM

• Before working on the vehicle fuel system, review the information contained in QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases.
• When welding anywhere on the vehicle, precautionary measures must be taken to prevent damage to vehicle components. Prior to welding, the battery cables and PCM must be disconnected and any parts which would be damaged should be removed or adequately shielded. After welding, when the weldments have cooled, reinstall the components per the Ford Truck Shop Manual and inspect the fuel and electrical components for damage.

AM-E0701  FUEL TANKS

• A slight relocation of the aft of axle OEM fuel tank and fuel system on vehicles of over 10,000 lb GVWR is allowable for clearance reasons. This could be necessary when the rear suspension is modified for an air suspension. However the fuel system must comply with C/FMVSS 301 and all emission certification requirements.

• Reinstallation of the fuel tank sender units always requires a new sender gasket and assurance of proper torque. Refer to the Truck Shop Manual or IVM for the proper torque specifications.

• Before working on fuel tanks or fuel systems, disconnect all battery cables from the batteries.
• To remove and reinstall the E-Series mid-ship fuel tank, refer to the Truck Shop Manual for detailed instructions.
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AM-E0701 Cont’d

- Tanks removed for processing should be stored where protected and all openings of the removed tank and the disconnected fuel lines must be capped at all times. Dirt and dust can plug fuel filters or cause engine damage.
- Fuel tank clearance to second unit body or frame components is 3/4 inch, minimum. All body mounting rubber components must be removed when determining if there is compliance to this dimension. This metal-to-metal condition simulates the rubber compressing or decomposing over time.

AM-E0702 FUEL FILLER

Fuel fillers on new units must meet the locations specified in the Incomplete Vehicle Manual.
- Fuel filler location on a remount may deviate slightly from the specified location, providing the builder follows the criteria published in the IVM.
- Modifications or welding to fuel filler pipe must be avoided.
- Fuel filler and vent hoses must not be exposed to sharp corners and should have a minimum of 1 inch clearance to the body and surrounding chassis components (except the frame). Shielding or abrasion protection must be provided to protect fuel filler and vent hoses with less clearance to exposed edges or corners. If the fuel filler hoses or vent hoses are replaced, the new hose material must meet Ford Engineering Specifications.
- Hose clamps must be worm gear drive type, be installed inside of the normal exterior body surface plane, and be properly torqued.
- The fuel filler mounting at the body must not allow any fuel or vapor to enter the passenger or cargo area. Spillage (fuel overflow or kick back) must be directed toward the ground.
- The fuel filler pipe must be sealed off from dust and dirt during the build process. Use the filler cap or a masking cover to prevent in-process contamination.

AM-E0703 FUEL LINES

The cutting of fuel lines is unacceptable. Always use new lines per QMV Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases. Auxiliary fuel ports are available in the fuel sender to provide fuel to power auxiliary equipment. Fuel tanks must not be tapped.

AM-E0704 The fuel system must provide fuel delivery (supply and return) without leakage.

AM-E0800 EXHAUST SYSTEM

AM-E0801
- Exhaust heat or grass shields attached to the OEM exhaust system must be left intact.

AM-E0802
- Exhaust component extensions must be similarly shielded.
- Exhaust pipes must not be routed near fuel tanks or under the fuel filler.
- If the exhaust pipe is lengthened, the extension must be located aft of the catalyst.
- Exhaust system revisions must consider the thermal expansion of materials to maintain design clearances.
- Exhaust tail pipes that are extended rearward directly past the spare tire should contain adequate heat shielding to protect the tire.
- The modified exhaust design should maintain the OEM hanger bracket design and spacing.
- Rerouted tailpipes may require recertification to federal noise standards. Refer to the Truck Body Builders Layout Book.
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AM-E0900 FRAME

AM-E0901 Welding, cutting, or drilling of the OE frame rail flanges is unacceptable, except in the frame extension area behind the rear suspension. Do not weld to any part of the "L" reinforcement on the F-Super Duty chassis cab frame.

When drilling holes in the frame side rail vertical web, follow the restrictions for hole sizes and edge distances outlined in the Truck Body Builders Layout Book. Protect the brake, fuel & electrical systems during frame drilling.

AM-E0902 GENERAL FRAME GUIDELINES

- Always disconnect the batteries and PCM before welding on the frame.
- Frame modifications must meet the requirements in QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases and MVE-11.
- All rear overhangs extending 36 inches or more beyond the last OEM crossmember require additional crossmembers for structural integrity.
- Shortening the frame behind the rear spring shackle bracket is permissible. For the F-Super Duty chassis, the following is required: The optional mid-ship fuel tank must be ordered. The rear cross-member must be removed and repositioned forward to the predrilled holes in the frame. The frame can be cut at or aft of the two triangle shaped holes provided using a cutoff wheel or saw.
- The removal and reinstallation of the front bumper on trucks of 10,000 lb GVWR or less must conform to the directions specified in the Ford Truck Shop Manual to maintain certification.
- Altering or relocating the front bumper on trucks of 10,000 lb GVWR or less requires recertification to C/FMVSS 301, Fuel System Integrity.

To maintain acceptable minimum departure angles, 176 inch wheelbase E-Series cutaways equipped with the optional 55 gallon fuel tank require a minimum frame extension of 18 inches. Refer to Appendix V.

AM-E0903 The addition of front tow hooks is not recommended. If added, C/FMVSS recertification may be required on vehicles of 10,000 lb GVWR or less. Tow hooks must not be located across the frame convolutes.

- See Ford Towing Manual specific to vehicle models for towing instructions.

AM-E1000 BODY

Any deviations from the Incomplete Vehicle Manual must be supported by engineering analysis, development prove-out, or testing to demonstrate equivalency to the OEM body design and compliance with the affected standards.

AM-E1001 Equipment mounted near the headlight adjusters must allow access for aiming adjustments. Headlight aim should be confirmed before shipping the completed unit.

- Cab to second unit body attachment on the E-Series cutaway should follow the guidelines in the Incomplete Vehicle Manual and the Body Builders Layout Book. The use of prevailing torque fasteners and washers to provide adequate clamp load, without sheet metal distortion around gasketed joints, is recommended.
- Attachment of the second unit body to the F-Series cab may affect the structural integrity of the cab or FMVSS/CMVSS certification.
- Protect all body panel cutouts from corrosion with a product containing zinc-phosphate or
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barium-sulfate as the active ingredient. Zinc coating materials should contain a minimum of 92 percent zinc. Two part epoxy coatings are also effective.

- The removal or alteration of under hood noise abatement components or the addition of hood louvers may require federal or local noise emission recertification.
- For mounting added components, the use of mounting pads or Butyl Sealer C9AZ-19554-B or equivalent between the body and the added components is recommended. Minimize the corrosive effect of mating dissimilar metals by the careful selection of materials.
- Running boards should be designed to attach only to the body. If equipment is attached to the body and braced to the frame side rail, chassis NVH is transmitted through the braces and into the body. Relative movement between the body and the frame may loosen the running board attachments.
- A-Pillar mounted spotlights are not recommended as they could lead to an occupant injury in an accident. If spotlights are added, recertification of C/FMVSS 212 and 219, Windshield Mounting/Windshield Zone Intrusion, is required for vehicles of 10,000 lb GVWR or less.
- Polycarbonate headlamp lenses have a film coating that must be protected. Do not apply harsh solvents or tape to them.

AM-E1002  SECOND UNIT BODY

The second unit body should be designed to meet KKK-A-1822 (latest revision) certified for:

- Roof crush criteria (1-1/2 times the completed vehicle weight)
- Cabinet pull criteria
- Door latching and pull criteria
- Electrical wiring criteria
- Interior flammability requirements
- Seat belt pull requirements
- Seat retention

Avoid mounting bodies directly to the top of the frame. Doing so restricts frame torsional flexibility, may promote body cracking, and provides a direct path for chassis NVH (noise, vibration, and harshness). The use of the OEM rubber body isolators with frame to body mounting rails or outrigger brackets added to the frame vertical side webs is recommended

AM-E1003

Never weld body supports directly to the frame flanges.

- Body attachment methods should remain consistent along the entire frame length. Welding body structures directly to frame extensions behind the rear suspension is not recommended.
- If U-bolts are used to attach bodies to the truck chassis, vertical spacers must be used between the upper and lower frame flanges at each U-bolt to prevent collapse of the flanges.
- Vent locations for the second unit body interior must be located to preclude intrusion of exhaust fumes and gases. See Body Builder Book.
**AM-E1004  INTERIOR**

- Controls, components, or panels must not be mounted in occupant impact protection zones; refer to the *Incomplete Vehicle Manual* for definition of these zones.
- Overhead consoles should minimize contact points in the head swing areas. Refer to the *Incomplete Vehicle Manual* under Section 208 for E-Series recommendations. All overhead equipment must be secured so that it will not come loose in an accident.
- Added equipment must allow for the removal of the E-Series engine cover for service.
- The use of adhesives or rivets for securing carpet or other items to the E-Series engine cover is recommended. If screws are used, their installation must be considered a critical element in the manufacturing process to insure that they pose no threat to components in the engine compartment. Items attached to the engine cover should leave a 1/8 inch clearance to the instrument panel to preclude squeaks and rattles.
- If the floor covering is revised, assure that the carpet thickness is minimal under the accelerator pedal to allow full pedal travel. The carpet should not extend under the E-Series engine cover seal. Refer to Figure 4 of Appendix VI.

**AM-E1005**

Protect the fuel system components from damage during the build. Use floor templates to identify areas of the floor to be avoided to protect the brake, electrical and fuel systems and use drill stops when drilling through floor or frame rails.

**AM-E1006**

Verify that no bolts or screws are pointed toward the fuel tanks or lines. Any fastener projections in close proximity should be shielded to preclude penetration in a crash. Attempt to locate fastener protrusions within body sills and frame crossmembers.

**AM-E1007  SEATING**

Attention to the following items is required to help provide safe and reliable seating and restraint systems.

- The Seating Reference Points (SRP) for the driver and the front passengers must agree with the locations shown in the *Incomplete Vehicle Manual*. The use of the OEM factory seats is recommended to help retain SRP and pass-through certification. Do not revise the shoulder harness attachment, location, or surrounding structure. Their relationship to the SRP is important to the restraint system integrity.
- If the factory seat belt restraints are removed for any reason, the original belts must be re-installed in their original position using seat belt bolt tool number T77L-2100A or its equivalent. Bolt torque should be assured on all re-installations (100 percent). Shoulder bolts must allow the restraint D-Ring to swivel to maintain the proper belt angle.
- Refer to *Ford Shop Manual* for the installation torque specifications for OEM Ford seat and Ford restraint hardware.
- When checking fastener torques during a static audit, slowly apply a tightening torque to the fastener and note the minimum torque required for breakaway. The minimum breakaway torque must fall into the specifications shown in the *Ford Shop Manual*.
- If the seats are replaced, the replacement seats must comply to all C/FMVSS requirements.
- Consider the potential for torque loss if the seat pedestals and seat belt mountings attach to the floor through layers of compressible material such as carpeting, trim, and plywood. These materials “creep” to compress over time and lose bolt tension. Use prevailing torque fasteners or re-design to avoid this condition.
- Use appropriate fasteners as supplied by seat supplier; quality nuts, bolts, and back-up washers at all locations. Reinforce the floor in all fastener locations, if necessary, to be at least equal to the OEM designs.

**AM-E1008**

The seat restraint system must be accessible and operate freely on the completed vehicle (full movement of shoulder harness D-rings). Full travel of the driver’s seat must not be restricted.
The OEM air bag supplemental restraint system (SRS) must not be removed, relocated, or altered in any way.

**ELECTRICAL SYSTEMS**

These guidelines apply to the vehicle’s low voltage automotive systems. Modifications or additions to the OEM electrical system must comply with the recommendations stated here and in the Ford *Truck Body Builders Layout Book* or in *QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases* (for wheelbase changes) and *MVE-11*.

The completed vehicle total electrical load must not exceed the maximum output of the alternator at normal (200 degrees F.) operating temperatures.

**CONNECTIONS**

- All added electrical connectors and connections should provide adequate current carrying capability to meet the circuit current requirements.
- All wire splices should be either twisted, soldered and sealed, or crimped using the proper size crimp connector to match the wires being joined.
- All electrical connections exposed to hostile environments should be properly sealed with either sealable crimp connectors or heat shrinkable tubing. Sealed butt connectors are available from Ford Component Sales:
  
  **| Ford Part Number | Part Name |
  ---|---|---|
  E6FZ-14488-A | 18-22 gauge connector, red |
  E6FZ-14488-B | 14-16 gauge connector, blue |
  E6FZ-14488-C | 10-12 gauge connector, yellow |

A heat shrink tool for wire splices, that includes a torch, is available from Rotunda. Rotunda Torch Number 107-R0305 is made by Wright Tool Company, 1738 Mapelawn Boulevard, Troy, Michigan 48099 (telephone: 800-783-9826)

**ANTI-LOCK BRAKE SYSTEM (ABS) AND REAR ANTI-LOCK BRAKE SYSTEM (RABS)**

The ABS vehicle Speed Sensor wiring consists of 18 gauge twisted pair wires. When replacing or extending the ABS Vehicle Speed Sensor circuit, the OEM specification of 1 FULL TWIST PER INCH must be maintained as originally provided. Insure that the wires to ABS Vehicle Speed Sensor are long enough to allow for suspension travel and avoid pinched or broken wires.

- Any modifications or alterations to the ABS system are not acceptable without approval from Ford’s QVM activity.

**MATERIALS, GENERAL**

Body sealer such as liquid Butyl Sealer C9AZ-19554-B, or equivalent, is recommended. This sealer does not run, is fast drying, and remains semi-elastic. It can be used in areas such as the floor pan, wheel house, dash panel, running board, door openings, and drip rails.
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AM- E1202 Cab to body seals must be made of a material to withstand the elements of nature to seal this dynamic joint. Specification D6AZ-19560-A, or equivalent is recommended.

AM- E1203 Chassis that are stored should be maintained in accordance with the new vehicle storage guidelines in the Safety and Emission Section of the Ford Body Builders Layout Book.

F. DESIGN & MANUFACTURING GUIDELINES – UNIQUE INDUSTRY MODIFICATIONS

AM-F0100 RE-RATING THE O.E.M. CHASSIS

AM-F0101 • Up-rating of any Ford GAWR, either front or rear, is unacceptable.
• Up-rating of any Ford chassis GVWR, or GCWR, is unacceptable.

AM-F0102 • Trailer hitches are not to be installed on ambulances.
• Ambulances are not to be used for towing.

AM-F0200 AIR SUSPENSION SYSTEMS

This section applies to “active” air suspension systems that rely upon air as the primary element for suspension load-carrying support. These include air tanks, pumps, and height sensors to control ride height and load carrying capacity automatically.

These guidelines are recommended on “passive” air suspension systems that only supplement the primary load carrying suspension system or as a manual feature for adjusting for static vehicle lean.

AM-F0201 There must be a pathway of compliance when the OEM suspension is replaced (C/FMVSS, durability, reliability, structural, ride and handling requirements).

AM-F0202 Driveline angles must not be adversely affected by non-OEM suspensions.

AM-F0203 An air pressure sensor warning light and/or audible warning signal must be incorporated to warn the driver of unexpected air bag pressure loss.

Loss of load-carrying air may result in poor vehicle handling and cause air bag damage if not immediately corrected.

AM-F0204 The air compressor or pump must be enclosed in a compartment that will adequately protect it against damage from the environment such as water, dirt, road salt and debris, mud packing, and stone pecking

Air pressure lines, fittings, and valves should be protected from stone pecking. The incorporation of abrasion covers, such as nylon convolute, for the nylon or plastic airlines is recommended. An air leak test should be included as part of the completed vehicle sign-off.

AM-F0205 A suspension jounce clearance study should be performed throughout the full range of suspension travel to assure adequate clearance of suspension and brake hose components. Refer to Appendix V for a more detailed description of a suspension jounce clearance study.

The air supply tank, compressor or pump, and control system, are components critical to the load carrying air support system. They should be securely mounted and have sufficient ground clearance to preclude damage from road hazards or contact with uneven ground.
**AM-F0206**  Heat shields should be incorporated to protect the air bags and air supply lines where the exhaust system is routed within 6 inches of these components. None of these components should ever be positioned directly above the exhaust system.

**AM-F0300**  **EDDY-CURRENT TYPE BRAKE RETARDERS**

**AM-F0301**  The addition of a brake retarder must not subvert the effectiveness of the OEM anti-lock brake system.

**AM-F0302**  Driveline angles must not be adversely affected by adding a brake retarder.

The final stage manufacturer is responsible for compliance to **C/FMVSS 105, Hydraulic Brake Systems**, and should qualify the braking performance of the vehicle using a brake retarder under all reasonably expected weather and road surface conditions. Driver training under various weather conditions should be recommended to the user to acclimate the driver to braking characteristics unique to these vehicles.

**AM-F0303**  Assure proper electrical grounding of the brake retarder. Grounding to Ford powertrain components can result in damaged bearings. The grounding of brake retarders must follow these guidelines:

- A 2 AWG (minimum) ground cable must connect the retarder to the frame.
- A second 2 AWG ground cable must connect the retarder ground to the vehicle battery negative terminal.
- A third 2 AWG ground cable must connect the battery negative terminal to the vehicle frame.
- NEVER add a ground cable from the vehicle frame to the transmission.

**AM-F0400**  **WHEELBASE CHANGES AND REAR FRAME EXTENSIONS**

Refer to **MVE-11** and **QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases**, for detailed guidelines for the modification of wheelbase lengths or frame extensions. This QVM Bulletin also covers the necessary factors that must be considered for the associated electrical, fuel, exhaust, driveline, and body mounting systems. Final stage modifiers that choose to modify Ford’s chassis will be required to adhere to these guidelines. The customer should be advised of any modifications made to the Ford chassis and their potential implications on vehicle warranty.

**AM-F0401**  Documentation is required showing that the following vehicle characteristics have been qualified:

- Braking performance (Reference **C/FMVSS 105**).
- Vehicle attitude and ground clearance, including departure angle.
- Vehicle steering and handling.

**AM-F0402**  The frame splice technique, and the methods used to splice and re-connect the related vehicle systems, must be in accordance with the guidelines established in **MVE-11** and **QVM Bulletin Q-18, Guidelines for Modifying Ford Light Truck Wheelbases**.