OPERATOR'S HANDBOOK

MR Series

TS50801

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THE INFORMATION CONTAINED IN THIS HANDBOOK IS CURRENT AT TIME OF PUBLICATION.

Mack Trucks, Inc. reserves the right to make changes without prior notification.

TABLE OF CONTENTS

TABLE OF CONTENTS

TO THE OWNER

In Appreciation

Thank you for buying a MACK® vehicle. With proper care and maintenance, your new MR model will help you gain a competitive edge with its fuel-efficient drivetrain combinations, low maintenance, extended service intervals and, eventually, good resale value.

The MR model is available for a wide range of applications. Because of this versatility, drivetrains and components vary and operating instructions may differ from one model to another. While every effort has been made to cover all current arrangements, do not hesitate to consult your MACK distributor if a question arises. Honest, personal service is standard with every MACK sale.

⚠ CAUTION

Mack Trucks, Inc. would like to point out the important role that the driver plays in the life of the vehicle. Only trained and informed drivers should operate this vehicle.

We, at Mack Trucks, Inc., hope that you will be happy with your new MR model, and that you see many years of trouble-free driving.

This vehicle was built to conform to all federal standards and regulations applicable at the time of manufacture.

About This Handbook

This handbook is referred to as the MR Series Operators Handbook. It covers all MR models. Its identification number is TS50801. Keep this handbook with the vehicle at all times to ensure that each owner and/or operator will have access to all pertinent information relating to the operation and handling of this vehicle.

This handbook was prepared to provide the driver with all relevant information concerning the daily operation of this vehicle. Please read it thoroughly; pay particular attention to advisory labels that have been included to draw attention to important issues of operator safety and overall performance.

Information and illustrations in this handbook are based on the latest production usage at the time of printing and are subject to change without prior notice.

NOTE

Basic maintenance and lubrication procedures are found in this manual beginning on page 162. For further information, refer to the MAINTENANCE AND LUBRICATION manual, TS494. Other important information can be found in the EMISSION CONTROL SYSTEMS booklet, TS505.

THE VEHICLE

Basic Configuration

The MR model has a low-entry, cab-forward-style operators compartment. Low profile and excellent visibility make this model popular throughout the refuse-hauling, construction and firefighting industries.

Vehicle Management and Control System (V-MAC®)

The Vehicle Management and Control System (V-MAC) is an electronic control system that manages engine and vehicle functions. In addition, the DataMax™ portion of V-MAC monitors and stores a variety of information (i.e., maintenance schedules, overspeed logs, fault tables, trip summaries).

For a complete description of the V-MAC III system, refer to the V-MAC III Operators Guide (TS799), which is supplied with the vehicle.

Additional information concerning service, diagnostics, programming and vendor equipment interface application is available from the Mack Trucks, Inc. Service Publications Department. Contact your local MACK dealer for details.

⚠ WARNING

Never cut into the V-MAC system wire harness to power additional equipment. If such equipment is to be installed, contact your MACK dealer for assistance.

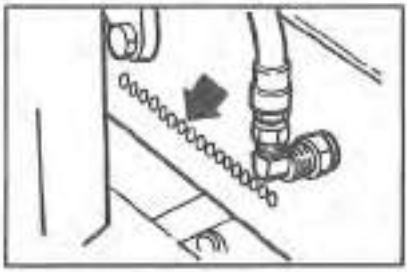
COMPONENT IDENTIFICATION

Locate the following serial numbers and write them in the boxes provided next to each illustration.

VIN Locations

The Vehicle Identification Number (VIN) is displayed in two locations (a frame rail stamping and a plate). The 17-digit VIN must be identical in both locations.

The **VIN frame stamping** is located on the right front frame rail.



Vehicle Identification Number

000038a

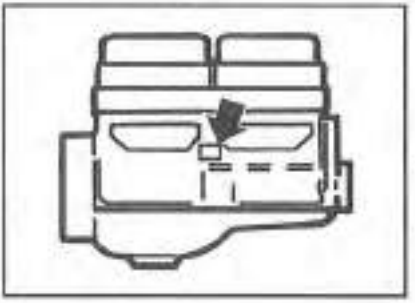
The **VIN plate** is located on the driver side, mounted on the seat riser.

Vehicle Identification Number

000037a

Engine Identification

All **MACK E-Tech™** engine stampings are located on the right side center of the engine block, below the turbocharger oil drain tube.



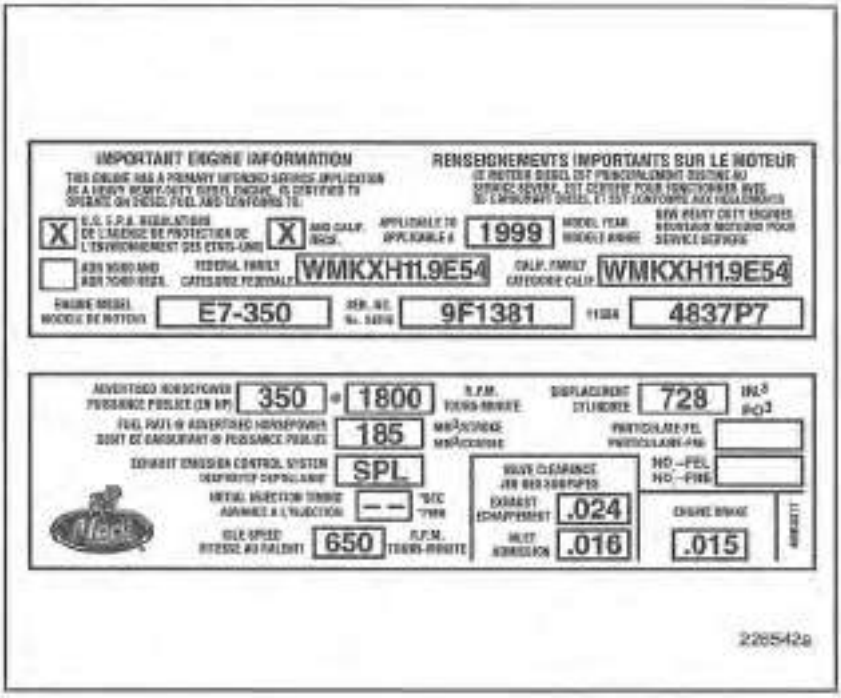
Mack
E-Tech™ Engine
Serial Number

206177a

Engine Information Plate

In compliance with the emissions standards requirements, an engine exhaust emissions control plate is affixed to one of the engine valve covers for all MACK engines. This plate provides basic engine identification information, as well as specifications for injection pump-to-engine timing and valve clearances.

The engine information plate is found on the back valve cover on **MACK E-Tech** engines.

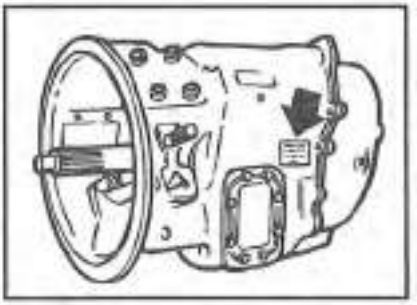


NOTE

On the E-Tech engine, the plate is separated along the perforation, and the two pieces are mounted side-by-side.

Transmission Identification

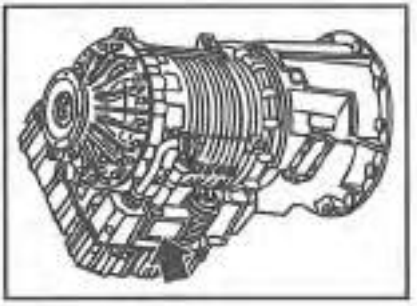
The **MACK T200 Series transmission** serial number is located on the rear left side of the main case.



Mack T200 Transmission Serial Number

300130a

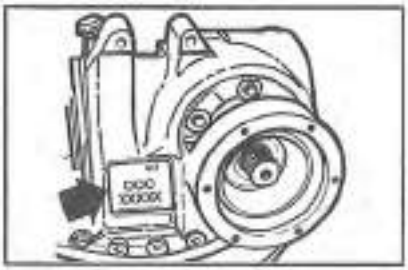
The **Allison HD and MD transmission** identification plate is located on the rear right side of the main case, near the lower end.



Allison HD & MD Transmission Serial Number

301358a

The **MACK carrier assembly** serial number is located on the front right side of the housing.



Carrier Assembly Serial Number

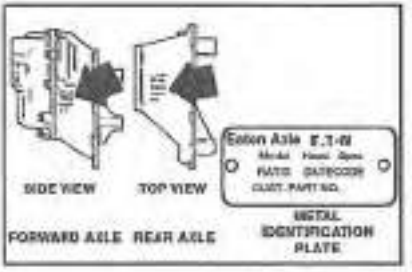
400024b

The **Eaton Fuller rear axle** serial number is located on the rear of the axle housing toward the carrier.

Rear Axle Serial Number

400013a

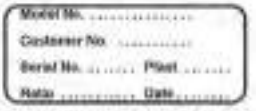
The **Eaton Fuller carrier assembly** serial number is located on the left side of the forward carrier, and the top of the rear carrier.



Carrier
Serial Number

400020a

The **MERITOR rear axle** identification tag is located on the left or right rear of the rear axle housing, next to the carrier.

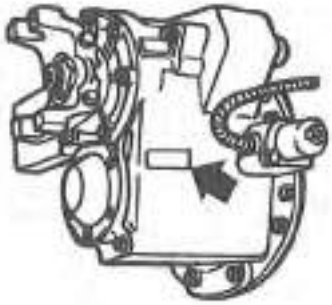


IDENTIFICATION TAG

REAR AXLE
SERIAL NUMBER

400563a

The **MERITOR carrier assembly** serial number is located on the left side of the forward carrier, and the top of the rear carrier.



CARRIER
SERIAL NUMBER

400564a

WARRANTY INFORMATION

Air Brake System

The MACK Standard Vehicle Warranty applies to the air brake system, as set forth in the Warranty, but only if the air brake system has not been subjected to unauthorized additions, deletions or modifications. If any such unauthorized additions, deletions or modifications are performed, Mack Trucks, Inc. disclaims any and all liability for any loss or damage arising out of a malfunction of the air brake system.

The air brake system was designed and built to conform to all applicable federal motor vehicle safety standards in effect at the time of manufacture.

Tractor air systems are designed for operation as a tractor only, and truck air systems are designed to be operated as a truck only. If a tractor is going to be converted for operation as a truck, the air brake system must be reconfigured to that of a truck. Conversely, if a truck is going to be converted for operation as a tractor, the air system must be reconfigured to that of a tractor. Consult your MACK trucks distributor for additional information.

If any unauthorized additions, deletions or modifications are made to any portion of the air brake system which is required by Federal Motor Vehicle Safety Standards, Mack Trucks, Inc. makes no representation as to conformity with the Standards.

For complete warranty information, refer to the Pedigreed Protection Plan (US-TS468, CANADA-TS590) or Standard Vehicle Warranty (Form F034) provided with each vehicle.

SERVICE LITERATURE

The MACK Service Publications department offers a variety of service literature that can be ordered through any MACK dealer.

NOTE

Mack Trucks, Inc. would like to emphasize the importance of proper service and maintenance procedures. Service, repair and replacements must be performed by certified, licensed mechanics in accordance with MACK standards.

Individual Service Manuals

Each individual service manual provides service information for the specified component (i.e., E-Tech Engine Service Manual, T200 Transmission Service Manual).

TS576 — MACK Components Service Manual

This multi-binder set contains service information covering all MACK components (i.e., engines, transmissions, front and rear axles, cabs, fuel systems, electrical systems).

NOTE

If your vehicle contains a number of non-MACK (vendor) components, the TS473 might be more appropriate.

TS473 — Custom Service Manual

This tailor-made set provides complete service information for all components in the specified vehicle (including both MACK and vendor service manuals). When ordering a TS473, be sure to include the complete model, chassis serial number and General Sales Order (GSO).

CUSTOMER SERVICE

Questions and Complaints

Your satisfaction is our most important concern.

If questions or complaints arise, first discuss the matter with the service manager at the MACK facility involved. If you are not satisfied with the service managers response, contact the branch manager, principal or general manager of the distributorship. If assistance is required at a service dealer, contact the owner of the establishment.

If, for any reason, you need further assistance after dealing with the personnel at a MACK subsidiary or distributor, contact the regional service manager at the nearest MACK regional service office. The regional service manager has the responsibility and the authority to recommend action in most cases and (with the aid of relevant district service personnel) will make every effort to conduct a fair review of the situation.

Addresses

The addresses, telephone and fax numbers of the Mack Trucks, Inc. regional offices are:

United States

Northeast Region — 2100 Mack Blvd., Mail: P.O. Box M, Allentown, PA 18105-5000, TEL: (610) 966-8093, FAX: (610) 966-8005

Southeast Region — 6768 Southlake Parkway, Morrow, GA 30260, TEL: (770) 960-0511, FAX: (770) 960-0593

Central Region — 900 S. Frontage Rd., Suite 100, Woodridge, IL 60517, TEL: (630) 910-3330, FAX: (630) 910-3331

Southwest Region — 5605 N. MacArthur Blvd., #550, Mail: P.O. Box 165408, Irving, TX 75016-5408, TEL: (972) 518-1614, FAX: (972) 550-0389

Western Region — 2525 E. Camelback Rd., Suite 760, Phoenix, AZ 85016, TEL: (602) 553-7090, FAX: (602) 553-7091

Canada

Executive Office — Mack Canada, Inc., 6860 Century Ave., East Tower, Suite 3000, Mississauga, ON L5N 2W5, TEL: (905) 814-5358, FAX: Marketing/Sales (905) 814-4528; FAX: Warranty/ Service (905) 814-4554

Laurentian District — Mack Canada, Inc., 1000-20 Boul. St. Jean, Suite 612, Point Claire, PQ H9R 5R1, TEL: (514) 620-6049, FAX: (514) 620-5103

Ontario/Atlantic District — Mack Canada, Inc., 10553 Guelph Line, Campbellville, ON L0P 1B0, TEL: (905) 854-3610, FAX: (905) 854-3611

Metro/Prairie District — Mack Canada, Inc., 2025 Guelph Line, Suite 163, Burlington, ON L7P 4X4, TEL: (905) 333-0065, FAX: (905) 333-4021

Western District — Mack Canada, Inc., #327-11948, 207th St., Maple Ridge, BC, V2X 1X7, TEL: (604) 463-1439, FAX: (604) 463-9329

Australia

Mack Trucks Australia Pty. Ltd., CNR Archerfield and Boundary Roads, Mail: P.O. Box 364, Richlands, QLD 4077, Australia, TEL: 61-7-3853-3333, FAX: 61-7-3853-3392

International

2100 Mack Blvd., Mail: P.O. Box M, Allentown, PA 18105-5000, TEL: (610) 709-3405, FAX: (610) 709-2323

Additional Assistance

If additional assistance is required, Mack Trucks, Inc. maintains a Customer Service Department (staffed by experienced personnel) to aid customers who need information or assistance not provided at the local or regional level.

The Customer Service Department phone number is **(610) 709-3961**.

When contacting the regional service offices or Customer Service Department, provide the following information:

- ❒ Vehicle Identification Number (VIN) — This 17-digit number is typically located on a plate on the driver-side door latch post and behind the front axle on the right, front frame rail.
- ❒ Model and year of the vehicle
- ❒ Date that the vehicle was purchased and put into service
- ❒ Date(s) and mileage of repair(s)
- ❒ Dealer that sold and/or serviced the vehicle
- ❒ Description of unresolved service complaint or inquiry
- ❒ Summary of action taken to date (by the dealer and the regional service office)
- ❒ Names of individuals (if known) contacted at the dealer and the Mack Trucks, Inc. regional service office

REPORTING SAFETY DEFECTS

United States

If you believe that your vehicle has a defect which could cause a crash, injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA), in addition to notifying Mack Trucks, Inc.

If NHTSA receives similar complaints, it may open an investigation and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your distributor, or Mack Trucks, Inc.

To contact NHTSA, either call the Auto Safety Hotline toll-free at 1-800-424-9393 (or 366-0123 in Washington, D.C. area) or write to: NHTSA, U.S. Department of Transportation, Washington, D.C. 20590. You can also obtain other information about motor vehicle safety from the Auto Safety Hotline.

Canada

For Canadian consumer complaints, contact Transport Canada — Department of Public Complaints, Recalls and Investigations. Call (613) 993-9851.

TABLE OF CONTENTS

SAFETY STATEMENT

Mack Trucks, Inc. cannot anticipate every possible occurrence which may involve a potential hazard. An accident can be avoided by recognizing potentially hazardous situations before a dangerous situation occurs. Correctly performed service procedures are critical for technician safety and safe, reliable operation of the vehicle.

⚠ DANGER

Do not operate the engine in an enclosed area. All internal combustion engines give off various fumes and gases while running. Inhalation of exhaust fumes can cause death.

⚠ DANGER

Do not sit in a parked vehicle for any extended amount of time with the engine running. Exhaust fumes could leak into the cab area and death can result.

⚠ DANGER

Driver attitude is the most important part of any effective vehicle safety system. Mack Trucks, Inc. strongly encourages all drivers and passengers to use their seat belts, drive defensively, remain alert and respect the speed limits. Many accidents can also be avoided through regular vehicle maintenance.

⚠ WARNING

Certain everyday procedures such as washing the vehicle and cleaning the windshield can also be hazardous because of the vehicles height. Mack Trucks, Inc. does NOT recommend climbing up on the vehicle to perform these operations. Instead, stand on the ground and use brushes and squeegees mounted on extension poles. When better access is necessary (for instance, when washing the cab roof), use sturdy ladders held in place by someone on the ground.

⚠ DANGER

Engine-driven components such as Power Take-Off (PTO) units, fans and fan belts, driveshafts and other related rotating assemblies, can be very dangerous. Do not service engine-driven components unless the engine is shut down. Always keep body parts and loose clothing out of range of these powerful components to prevent serious personal injury. Be aware of PTO engagement or nonengagement status. Always disengage the PTO when not in use.

⚠ WARNING

Secure loose objects. Loose objects in the cab or sleeper can be dangerous in a sudden stop or on bad roads. Secure any appliance added to the vehicle, such as a refrigerator or a radio.

CERTIFICATION LABELS

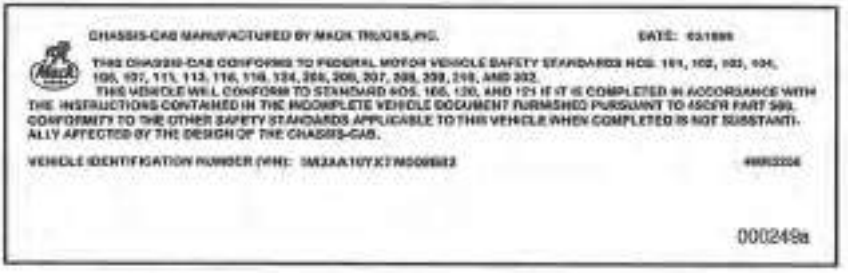
Safety Certification Label

National Highway Traffic Safety Administration (NHTSA) regulations require affixing a certification label to all vehicles.

NHTSA regulations also require that the certification label be affixed to either the hinge pillar, door latch post or the door edge that meets the door latch post next to the driver seat. If none of these locations are practical, it may be attached to the left side of the instrument panel or to an inward facing surface of the driver-side door.

In compliance with NHTSA regulations, your MR has a safety certification label affixed in one of the NHTSA locations listed above. This label may be either an Incomplete Vehicle and/or Completed Vehicle label. Both labels are described below.

Incomplete Vehicles


CHASSIS-CAB MANUFACTURED BY MACK TRUCKS,INC. DATE: 03/1999

THIS CHASSIS-CAB CONFORMS TO FEDERAL MOTOR VEHICLE SAFETY STANDARDS NOS. 101, 102, 103, 104, 105, 107, 111, 113, 116, 118, 124, 205, 206, 207, 208, 209, 210, AND 302.
THIS VEHICLE WILL CONFORM TO STANDARD NOS. 105, 120, AND 121 IF IT IS COMPLETED IN ACCORDANCE WITH THE INSTRUCTIONS CONTAINED IN THE INCOMPLETE VEHICLE DOCUMENT FURNISHED PURSUANT TO 49CFR PART 568. CONFORMITY TO THE OTHER SAFETY STANDARDS APPLICABLE TO THIS VEHICLE WHEN COMPLETED IS NOT SUBSTANTIALLY AFFECTED BY THE DESIGN OF THE CHASSIS-CAB.

VEHICLE IDENTIFICATION NUMBER (VIN): 1M2AA10Y3XW000002 4WR3224

000249a

A chassis-cab is an incomplete vehicle with a completed occupant compartment that requires the addition of cargo-carrying, work-performing or load-bearing components to perform its intended functions.

The chassis-cab manufacturer must affix a label to the incomplete vehicle in one of the NHTSA locations listed above. This label provides the chassis-cab date of manufacture, VIN and vehicle certification information.

Completed Vehicles

In addition to the label supplied by Mack Trucks, Inc. as the chassis-cab manufacturer, a Completed Vehicle certification label, supplied by the body manufacturer, is affixed in the same general location. This label provides information pertaining to Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating (GAWR), tire and rim information, etc.

On **MACK-completed vehicles**, this label contains the date of manufacture, VIN, GVWR, GAWR, and tire and rim data. It is found in one of the NHTSA locations listed above.


THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

U.S. VEHICLES

CANADIAN VEHICLES

000250a

ADVISORY LABELS

Throughout this book you will find paragraphs labeled *Danger*, *Warning*, *Caution*, *Note* and *Service Hint*. *Danger*, *Caution* and *Warning* labels are also found in various locations on the vehicle to alert drivers, operators and service technicians to situations which can cause personal injury or equipment damage. The labels shown are applicable to the MR model chassis at the time of publication and are representative of what can be typically found on an MR. (Your vehicle may not contain all of the labels illustrated in this handbook.) These labels are for your benefit. Please look through this section and note the labels, their locations and what they explain. Be sure to replace any label that is damaged.

Advisory Label Definitions (In Handbook)

Cautionary *signal words* (Danger-Warning-Caution) may appear in various locations throughout this manual. Information accented by one of these signal words must be observed to minimize the risk of personal injury to service personnel, or the possibility of improper service methods which may damage the vehicle or cause it to be unsafe. Additional Notes and Service Hints are used to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these advisory labels as they appear throughout the manual:

⚠ DANGER

Activities associated with* Danger *indicate that death or serious personal injury may result from failing to heed the advisory. Serious personal injury may be equated to career-ending injury.

⚠ WARNING

Activities associated with *Warning* indicate that personal injury may result from failing to heed the advisory. In this case, personal injury is not equated to career-ending injury, but results in possible change in quality of life.

⚠ CAUTION

*Activities associated with **Caution** indicate that product damage may result from failing to heed the advisory. Caution is not used for personal injury.*

NOTE

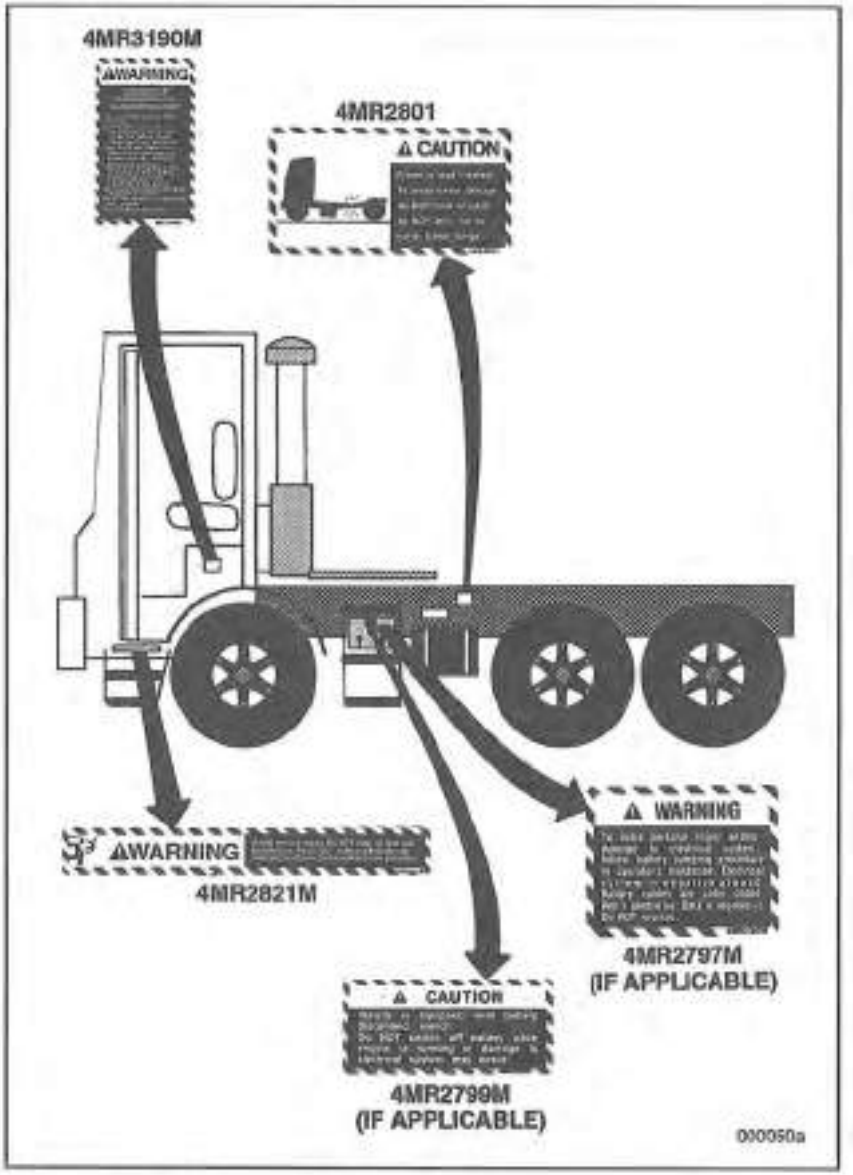
A procedure, practice, or condition that is essential to emphasize.

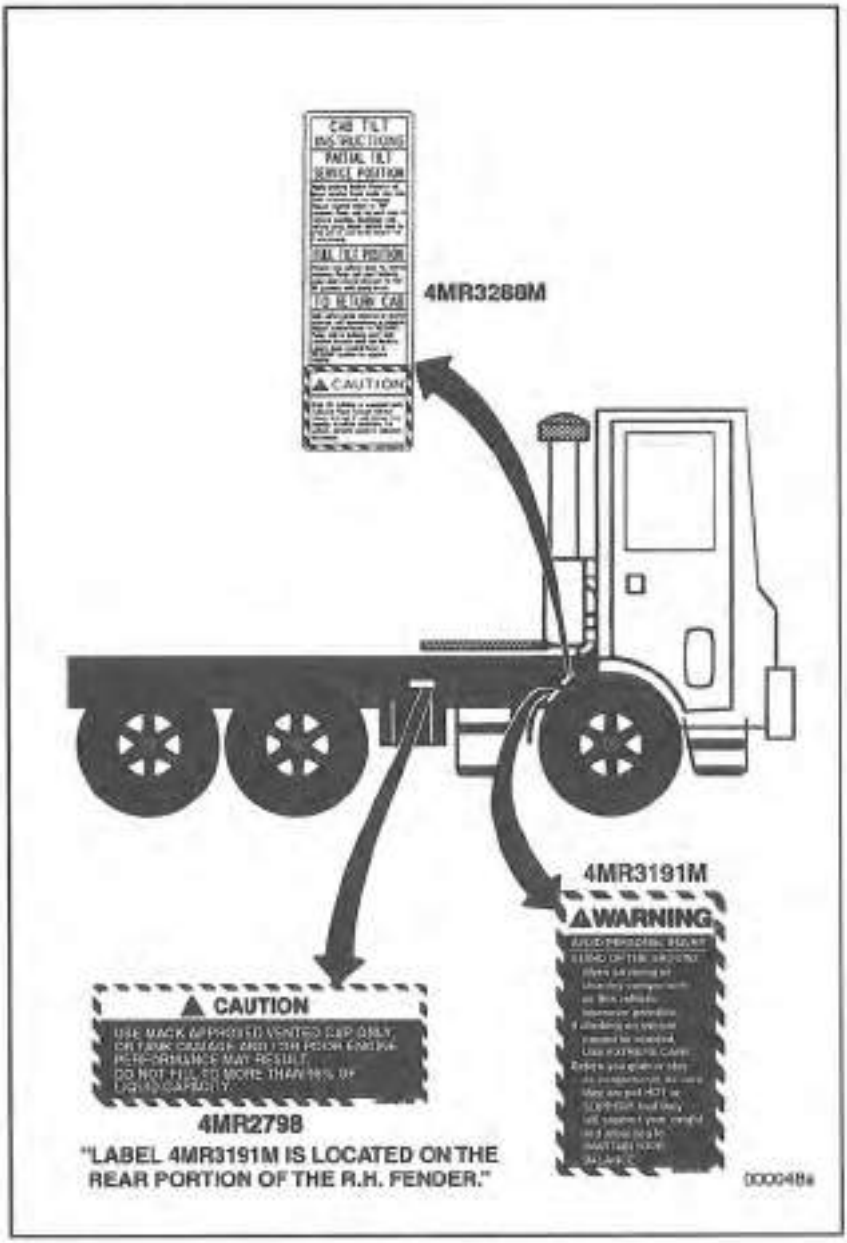
SERVICE HINT

A helpful suggestion that will make it quicker and/or easier to perform a procedure, while possibly reducing service cost.

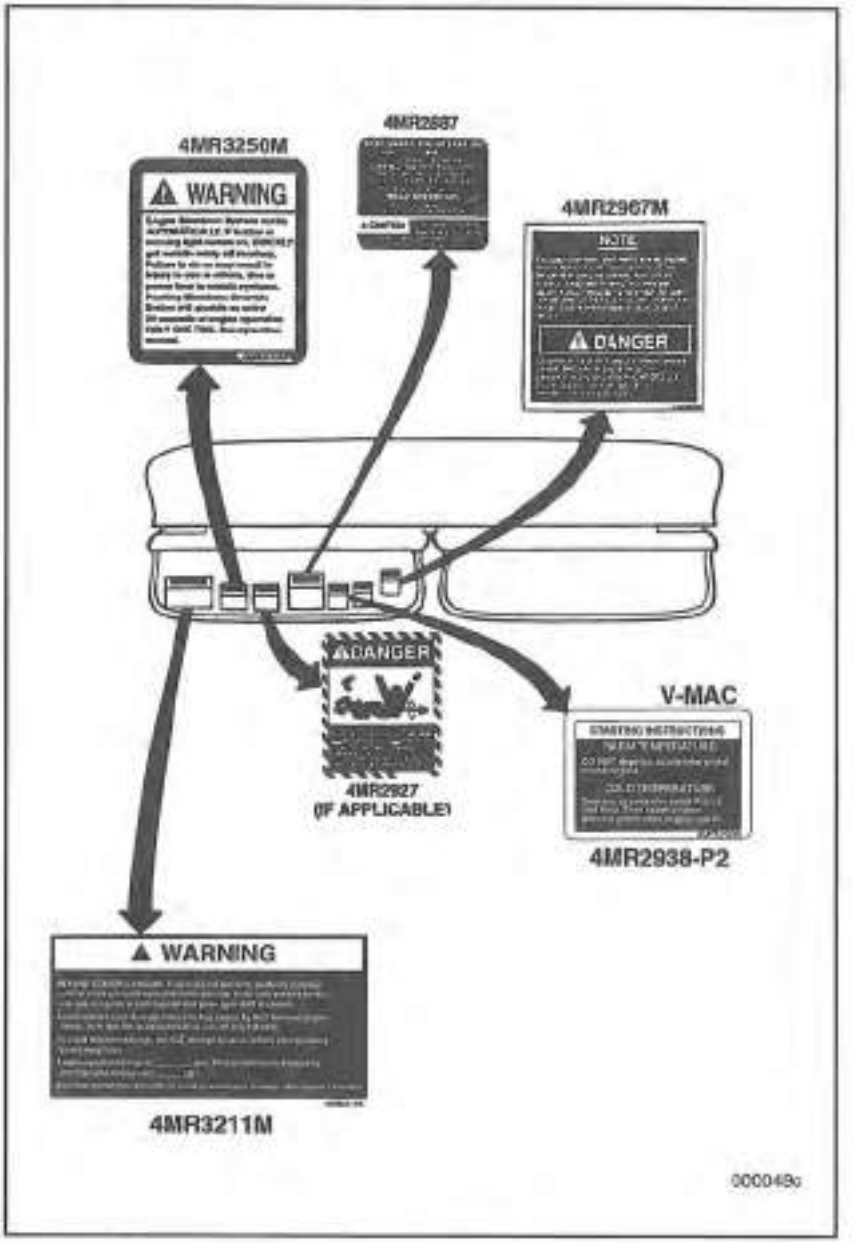
Advisory Label Locations (On Vehicle)

Labels Found on Chassis

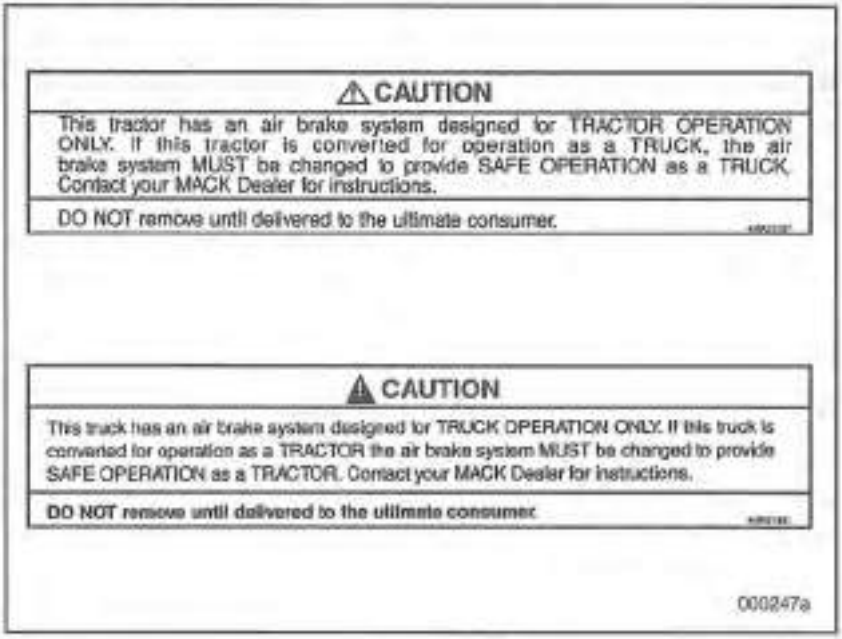




Labels Found on Driver-Side Sun Visor



Labels Found on Windshield

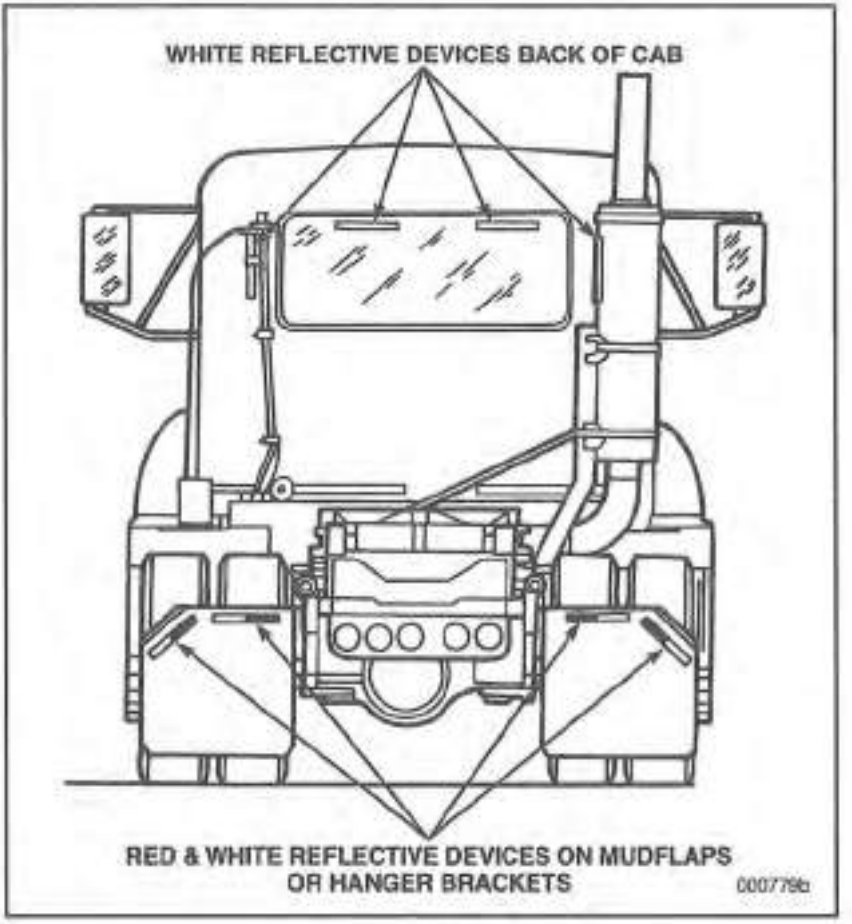


NOTE

Label to be removed upon delivery to the end user.
Refer to page 12 for additional information.

TRUCK-TRACTOR CONSPICUITY

To make the vehicle more conspicuous when approached from the rear (in times when visibility is reduced), all truck/tractors built on or after July 1, 1997 have reflective devices applied on the rear of the cab and on the mudflaps or mudflap hanger brackets if mudflaps or mudflap hanger brackets are supplied from the factory. Refer to the illustration. Locations of these reflective devices may vary from this illustration, depending on the cab model and/or equipment to the rear of the cab.



CAB ENTRY/EXIT

Three-Limb Contact

⚠ WARNING

When entering or exiting a cab, the driver and/or passenger must have at least three limbs in contact with the vehicle or ground at all times. This means that a minimum of two hands and one foot, or one hand and two feet must be in FIRM contact with the vehicle or ground.

⚠ WARNING

When entering or exiting the cab, be aware of the condition of the steps and handrails. Clean any fuel, oil or grease off of the steps before entering the cab. During cold weather operation, ice and snow may accumulate and should be cleaned off to prevent slipping.

During cold, wet conditions when ice, slush, or snow may accumulate on the cab doorstep and other external surfaces, extra caution must be observed when entering or exiting the cab.

⚠ WARNING

GUIDELINES FOR ENTERING AND EXITING TO AVOID SERIOUS INJURY

- **Face the cab when entering AND exiting.**
- **Place papers, coats, etc., in cab BEFORE entering — take out AFTER exiting — keep hands free to grip handholds.**
- **Keep hands and shoes clean — check hands and shoes for grease, mud, etc., BEFORE entering or exiting.**
- **Keep 3 limbs (2 hands and 1 foot or 1 hand and 2 feet) in FIRM contact with steps and handholds at ALL times.**
- **Be sure where you step and grab — keep the areas clean.**
- **Be EXTRA careful in rainy, snowy, etc., weather.**
- **Do NOT jump from vehicle.**

NOTE

The illustrations on the following pages are typical for purposes of emphasizing a safe method for hand/foot placement and movement during cab entry/exit. Your vehicle may not look exactly like the one pictured.

NOTE

The arrows in the illustrations are intended to show movement. Notice that three-limb contact is maintained even when one foot, or one hand, is moving.

Left Side

The following cab entry and exit procedures, along with the safety guidelines outlined in Three-Limb Contact earlier in this section, should be used with this MACK vehicle.

Entry

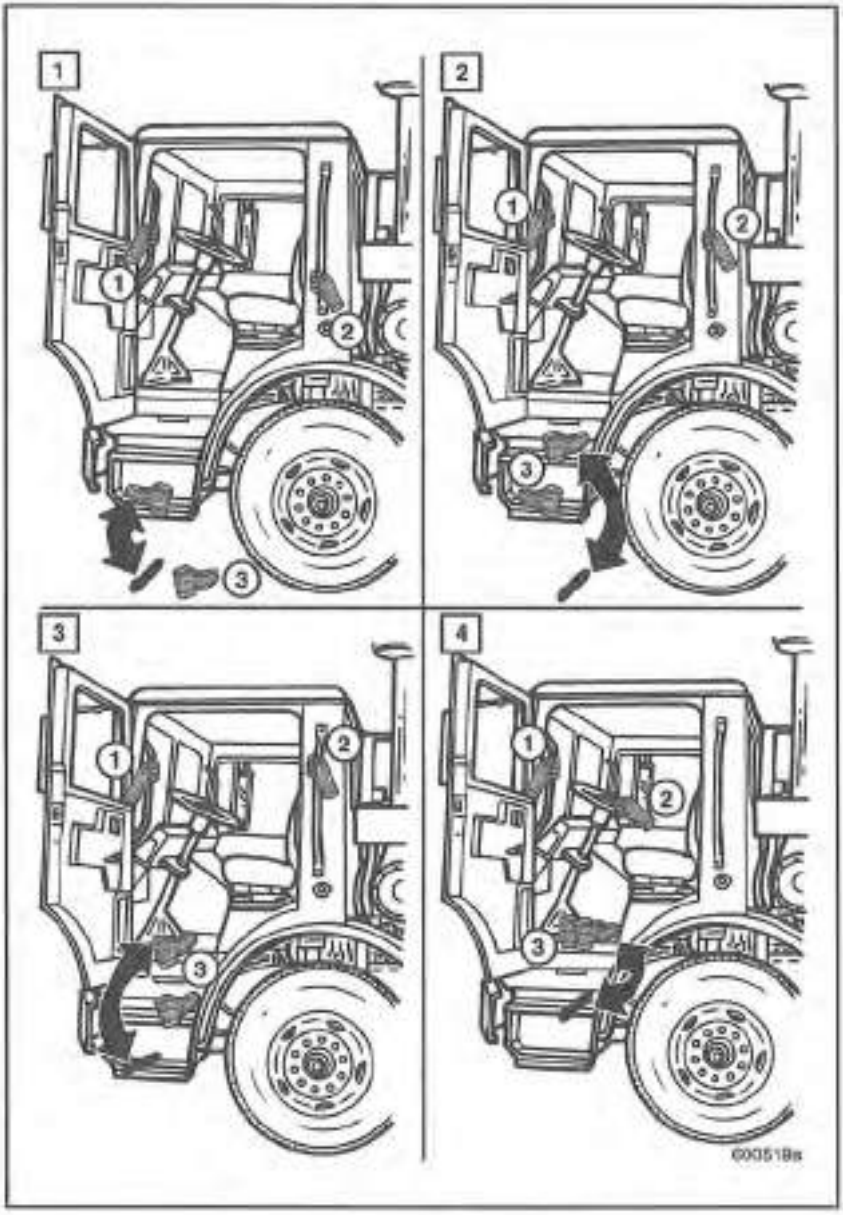
These entry procedures are illustrated on the following page:

1. With both feet firmly on the ground, grab the outside handhold with your right hand and the inside handhold with your left hand. Then raise one foot to the bottom step. (See figure 1.)
2. Maintain a firm grip on the handholds and raise your other foot to the top step. (See figure 2.)
3. While still gripping the handholds, raise one foot to the cab floor. (See figure 3.)
4. Move your right hand to the steering wheel. Bring the other foot inside the cab and sit down. (See figure 4.)

Exit

To exit, follow the illustrations in reverse order:

1. With your right hand gripping the steering wheel and your left hand gripping the inside handhold, stand up and face the inside of the cab. Move one foot to the top step. (See figure 4.)
2. Move your right hand to the outside handhold. With one foot firmly on the top step, lower the other foot to the bottom step. (See figure 3.)
3. Maintaining a firm grip on both handholds, lower the other foot to the ground. (See figure 2.)
4. With both hands still firmly gripping the handholds, lower the other foot to the ground. (See figure 1.)



Right Side

The following cab entry and exit procedures, along with the safety guidelines outlined in the Three-Limb Contact section, can be used with this MACK vehicle.

Entry

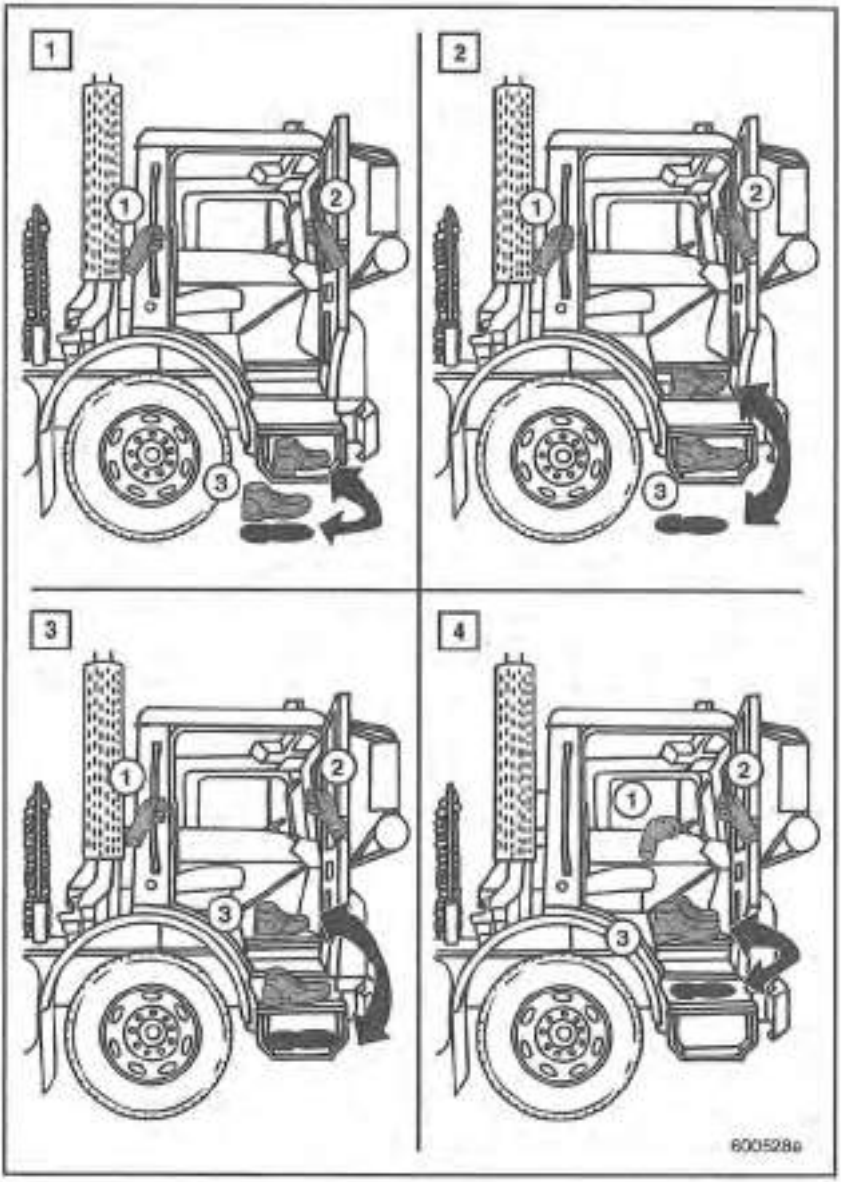
These entry procedures are illustrated on the following page:

1. With both feet firmly on the ground, grab the outside handhold with your left hand and the inside handhold with your right hand. Then raise one foot to the bottom step. (See figure 1.)
2. Maintain a firm grip on the handholds and raise your other foot to the top step. (See figure 2.)
3. While still gripping the handholds, raise one foot to the cab floor. (See figure 3.)
4. Move your left hand to the cab interior. Bring the other foot inside the cab and sit down. (See figure 4.)

Exit

To exit, follow the illustrations in reverse order:

1. With your left hand gripping the cab interior and your right hand gripping the inside handhold, stand up and face the inside of the cab. Move one foot to the top step. (See figure 4.)
2. Move your left hand to the outside handhold. With one foot firmly on the top step, lower the other foot to the bottom step. (See figure 3.)
3. Maintaining a firm grip on both handholds, lower the other foot to the ground. (See figure 2.)
4. With both hands still firmly gripping the handholds, lower the other foot to the ground. (See figure 1.)



Deck Plate Access

There may be a time when you will need to climb up behind the cab. If your vehicle is equipped with a deck access package, steps and a handhold are provided so you can get to this area safely. Review the rules in the Three-Limb Contact section before climbing behind the cab.

Climbing Up

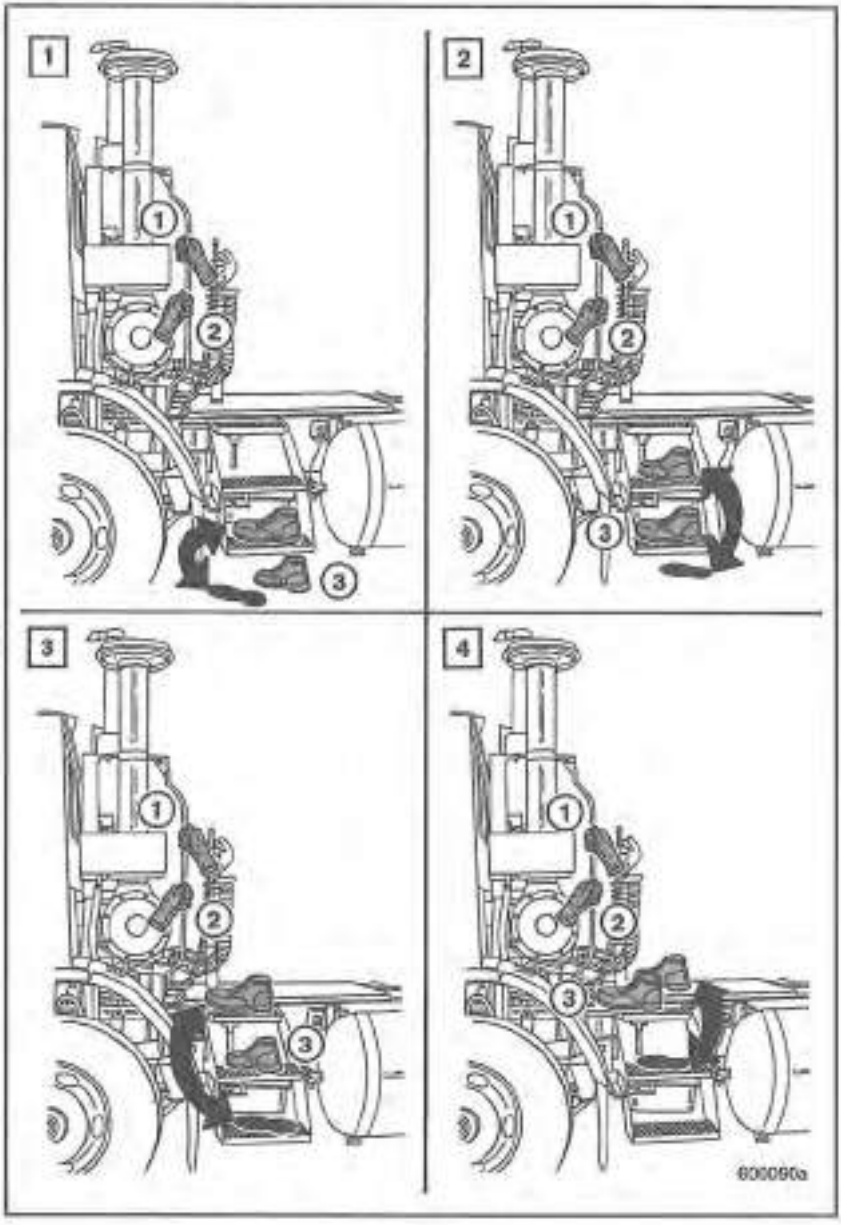
These procedures are illustrated on the following page:

1. Grab the handhold with both hands. Then move one foot to the bottom step. (See figure 1.)
2. While still gripping the handhold, and with one foot planted firmly on the bottom step, move your other foot to the middle step. (See figure 2.)
3. Then with one foot planted firmly on the middle step, move your left foot to the top step. (See figure 3.)
4. Finally, move your other foot from the middle step onto the deck plate. (See figure 4.)

Climbing Down

To climb down from behind the cab, follow the illustrations in reverse order:

1. Grab the handhold with both hands and move one foot to the top step. (See figure 4.)
2. While firmly gripping the handhold, and with one foot on the top step, move your other foot to the middle step. (See figure 4.)
3. Then with one foot planted firmly on the middle step, place the other foot on the bottom step. (See figure 3.)
4. With both hands still gripping the handhold, move your other foot from the middle step to the ground. (See figure 2.)
5. Finally, move foot from bottom step to the ground. (See figure 1.)



DOOR LOCKS

⚠ WARNING

Always lock the doors while driving. This will lessen the chance of personal injury. Locking the doors helps prevent the occupants from being ejected from the vehicle in the event of an accident.

For additional information on the operation of doors and locks, refer to the *OPERATION* section of this handbook.

SEAT ADJUSTMENT AND RECLINE (If Equipped)

⚠ WARNING

Do not adjust the driver's seat while the vehicle is moving. After adjusting the seat and before driving off, ensure that the seat is firmly latched in position.

⚠ WARNING

Do not drive or ride with the seat reclined. In case of a sudden stop, a person in a reclined position may slide under the seatbelt.

For additional information on seat adjustment, refer to the *OPERATION* section of this handbook.

SEAT BELTS

⚠ DANGER

Seat belts should always be secured BEFORE the vehicle is set in motion. Failure to use seat belts can result in SEVERE bodily injury. Unbelted riders could be thrown into the windshield or other parts of the cab, or thrown out of the cab entirely.

General Information

Seat Belt Operation

MACK vehicles manufactured on or after September 1, 1990 must have locking retractable seat belts.

For all seating positions on your MACK vehicle, this type of seat belt is a combination lap and shoulder belt.

This type of belt is designed to lock (prevent belt travel out of the retractor) only during sudden stops or impacts. This feature allows the operator to move freely under normal conditions. Seat belts cannot be locked by jerking on the belt, except during sudden stops or harsh bumps.

Fastening

1. Pull clip so the belt crosses your shoulder and lap and insert it into the buckle until an audible snap is heard.

⚠ DANGER

Use the shoulder belt only on the shoulder that is closest to the vehicle door. Never wear the shoulder portion of the belt under your arm or behind your back. Improper use will increase your chances of injury during a collision.

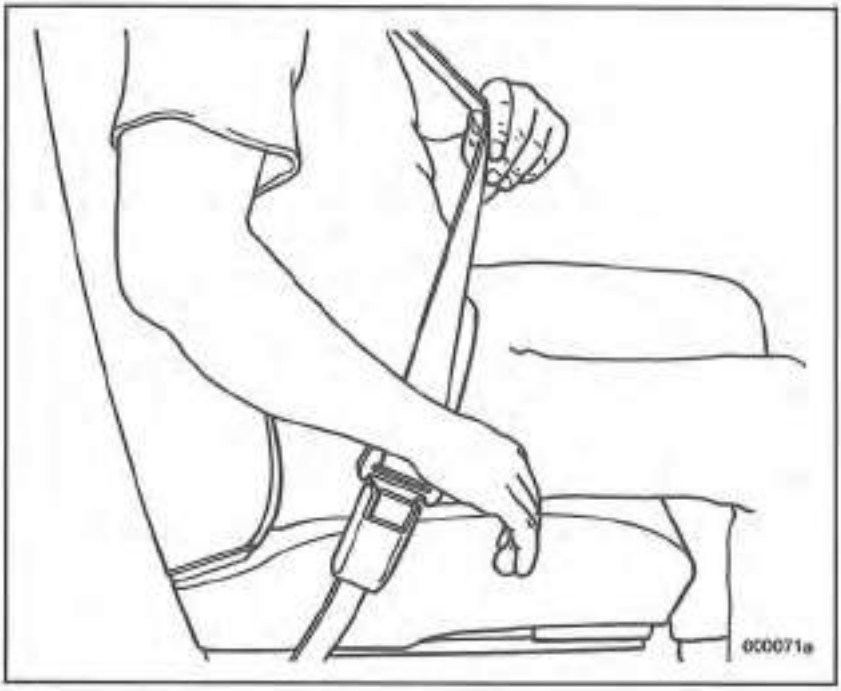
⚠ DANGER

To prevent possible injury the belt must be positioned low over the pelvis, below the abdomen. If the belt is buckled too high, it will apply force to the abdomen, not the pelvic region, and could cause serious internal injuries during a sudden stop.

⚠ DANGER

Do NOT wear seat belt loosely. Do NOT use one belt for more than one person.

2. Make sure the clip is securely fastened into the buckle.



3. To tighten the lap portion of the combination belt, pull upward on the shoulder portion until the lap portion fits snugly. The belt should rest as low on your hips as possible.

Unfastening

Push down on the button to release the belt.

Seat Belt Maintenance

- Keep belt clean and dry.
- Clean with mild soap solution and lukewarm water.

⚠ DANGER

Do NOT bleach or dye belt, as this may cause severe loss of strength. Do NOT install belt in a truck with a weakened floor until the floor has been replaced or reinforced.

- Periodically inspect the following areas and replace any inadequate parts:

  Buckle and Latchplate — The buckle and latchplate should mate easily with a solid click and release easily and quickly with moderate pressure on the release button. All metal seat belt components should be free of signs of damage, corrosion or rust.

  Webbing — The webbing should show no signs of wear, fraying or holes, and it should be reasonably free of dirt which could find its way into the retracting mechanism.

Retractors — The retractors should function smoothly and maintain an appropriate amount of tension. Loose webbing is an indicator that maintenance is needed; it's likely that a too-loose belt will fail to tighten properly when necessary.

Seat Belt Mounting Components — The tethering should be free of wear and debris; the webbing should show no signs of wear, fraying or holes; and the metal components should be free of signs of damage, corrosion or rust.

⚠ DANGER

Seat belt assemblies must be replaced after an accident if they have been subjected to loading by occupants (even if no damage is obvious), or if they have been damaged by an accident (bent retractor, torn webbing, etc.). If there is any question regarding belt or retractor condition, replace the appropriate part.

Komfort® Latch System

Seat Belt Assembly

The Track III three-point seat belts installed in this chassis are designed to provide the highest degree of operator safety, comfort and convenience. Additional comfort is provided by the Komfort Latch mechanism, which is incorporated into the seat belt assembly, and may be used to relieve any discomfort caused by the constant pressure of engaged seat belts.

Seat Belt Operation

To buckle the seat belt, grasp the latch portion of the buckle, bring it across your lap (from outboard to inboard) and insert it into the fixed buckle which is mounted to the floor or seat (depending on seat type). With the belt properly latched, the pelvic and upper torso restraints will be in place and automatically adjusted to provide a snug fit.

Komfort Latch Feature

If the constant tension of the buckled seat belt causes any discomfort, engage the Komfort Latch as follows:

⚠ DANGER

Do NOT attempt to engage the Komfort Latch feature while the truck is in motion.

Engagement — Pull the webbing of the shoulder belt away from the upper torso, pulling only as much slack as needed while still allowing the belt to exert slight pressure against your chest and shoulder. (Maximum amount of slack should not exceed one inch when measured from the chest to the belt.) While holding the slack, lift the lever located on top of the Komfort Latch mechanism upward to clamp the webbing in place.

Normal Release — To unfasten the seat belt, simply release the buckle and give the shoulder belt a quick tug to release the Komfort Latch mechanism. Allow the belt to retract into the retractor.

Emergency Release — In the event of an emergency, release the seat belt buckle. It is not necessary to release the Komfort Latch in an emergency situation.

NOTE

If forward movement is required while the Komfort Latch mechanism is latched, the latch automatically releases when you lean against the shoulder portion of the belt. Repeat the above steps to reset the Komfort Latch, if desired, after forward movement is no longer required.

⚠ DANGER

Excessive slack will reduce effectiveness of the seat belt, which could result in personal injury and death. CAREFULLY follow the instructions for adjusting the tension-relieving device.

SAFETY TIPS FOR COLD WEATHER OPERATION

Driver Visibility

Poor driver visibility is not only annoying, but extremely unsafe under any circumstance. Without proper maintenance of visibility-related components, adverse weather conditions — such as rain, snow and frost — can seriously reduce visibility. Take time before winter arrives to check the following:

- Windshield Wipers
  - — Check windshield wiper operation and speeds.
  - — Inspect condition and travel of blades. Install new refills for any blades that are cracked, brittle, torn, or coated with road oil along the wiping edge.
- Windshield Washers
  - — Check operation of windshield washer.
  - — Inspect system hoses and replace if brittle or worn.
  - — Inspect washer reservoir. Drain and flush if dirt particles are evident in washer solution.
  - — Fill reservoir with commercially available non-freezing type washer fluid.

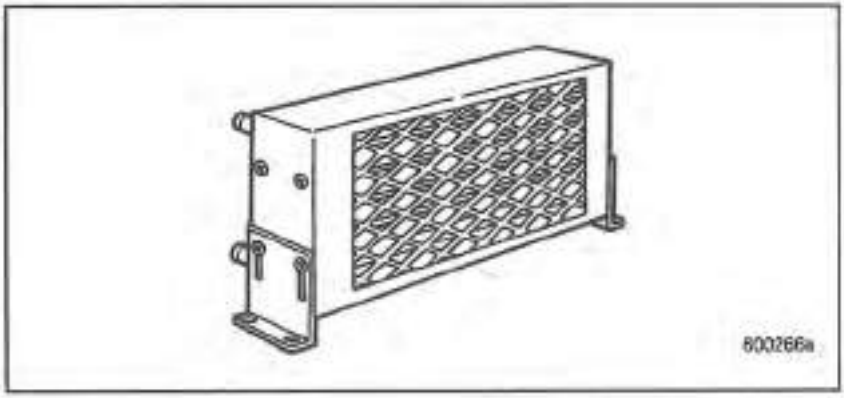
⚠ CAUTION

Do NOT fill reservoir with water only. Even though non-freezing type washer fluid is recommended, do not attempt to clear the windshield of ice by activating the windshield washer and wipers. Ice accumulations should be removed manually by using a scraper.

- Heater/Defroster
  - — Check operation and blowers for speed control, noise and temperature.
  - — Inspect heater core for signs of corrosion and/or leakage.
  - — Check that the defroster blend door is operating correctly and that all ducting is connected properly.
  - — Be sure that vents are not obstructed by debris or other objects.

Auxiliary Cab Heater

To ensure maximum in-cab comfort (even under severe cold weather conditions) contact a MACK subsidiary or distributor for details concerning auxiliary in-cab heaters (see figure below).



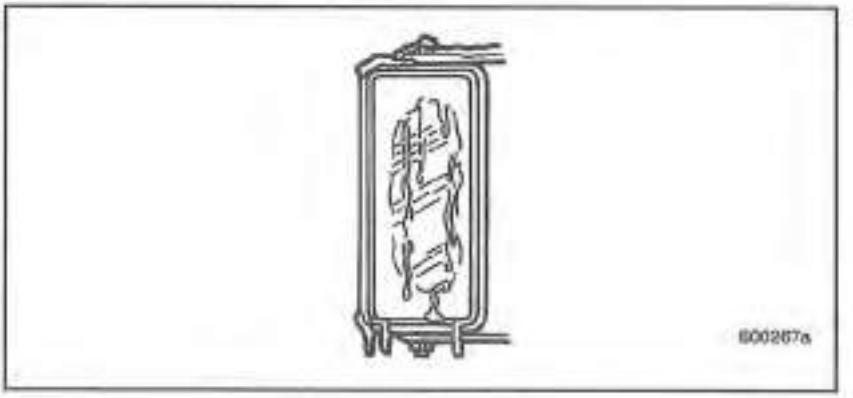
Cab Door Seals and Key Locks

Hollow-core rubber weather seals around some cab doors may lose their resilience in extremely cold temperatures (i.e., –40°F/–40°C and below). Under these conditions, it may be necessary to drill holes to penetrate the hollow core. This allows entrapped air to escape, thereby easing the opening/closing of cab door(s).

Be sure to keep the key locks clean and dry to prevent occasional winter freeze-up. Use of antifreeze lubricants is neither required nor recommended.

Outside Mirror Heater

In areas of frequent snowfall and ice, it may be beneficial to install heated mirrors which will defrost and de-ice cab mirrors. Heated mirrors eliminate the need to pull off the highway and stand on the roadside to scrape ice and snow from the mirrors during winter driving conditions.



Air Horn Snow Shield

Installation of an air horn snow shield is recommended to prevent snow from clogging the air horn bell (maintaining maximum sound output).

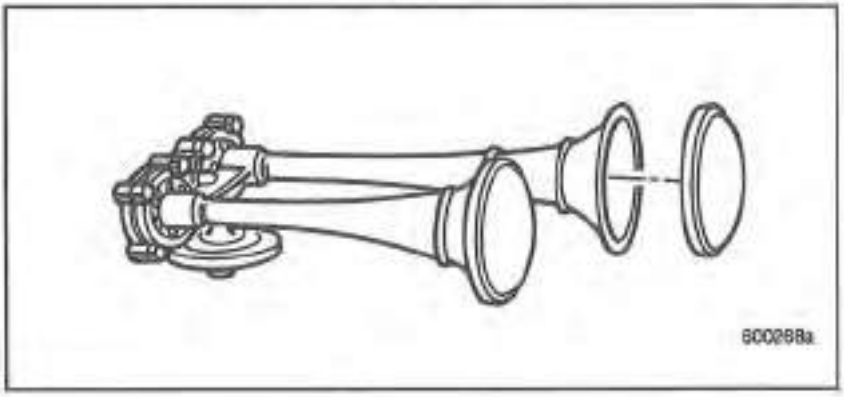
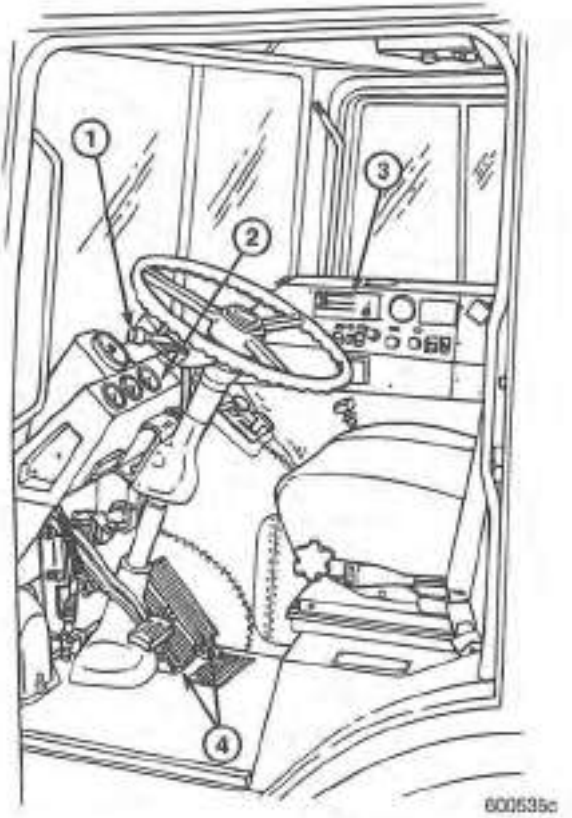


TABLE OF CONTENTS

CAB INTERIOR



1. Turn Signal, Hazard Switch and HI/LO Beam 2. Instrument Panels	3. Cab Climate Control Panel 4. Foot Pedals

INSTRUMENT PANEL

Tell-Tales

A tell-tale is a display that indicates the actuation of a device, a correct or defective condition, or a failure to function.

The operator should become familiar with these symbols in order to recognize and react (if necessary) to the indicated condition. Tell-tale symbols are shown in the instrument panel illustrations on the following pages.

Colors

To promote visual recognition internationally, specific colors for tell-tales have been established. Unless governmental regulations (in the area where the vehicle is to be used) or engineering directives specify otherwise, the standard colors are:

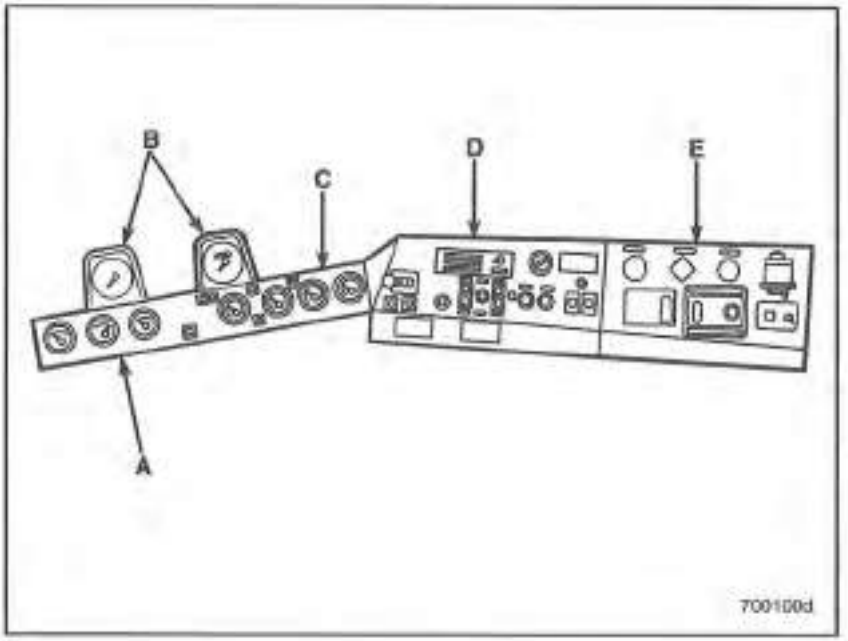
- **Blue** — high-beam headlights/engine maintenance
- **Flashing Green** — turn signals
- **Flashing Red** — hazard condition involving the safety of personnel
- **Steady Green** — system in operation
- **Steady Red** — warning, immediate action required
- **Amber** — early warning, such as low fuel or Anti-Lock Brake System (ABS) malfunction

Panel Arrangement

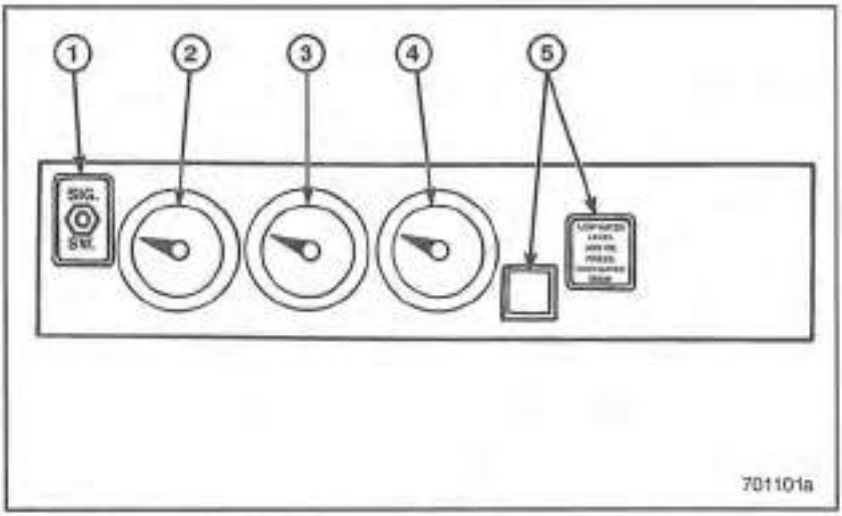
Your view from the driver seat should look something like the illustrations shown. The layout is designed to provide the operator with a good view of the gauges and controls (which are placed so they are within easy reach). The instrument panel, as shown in the following drawing, is broken down into several main sections. For easy identification we refer to them, from left to right, as Panels A, B, C, D, E and F (where necessary).

NOTE

This section is intended to show all of the possible instruments and controls available for this vehicle. However, depending on options, your vehicle may not have all of the instruments and controls shown here, and they may not be in exactly the same position.

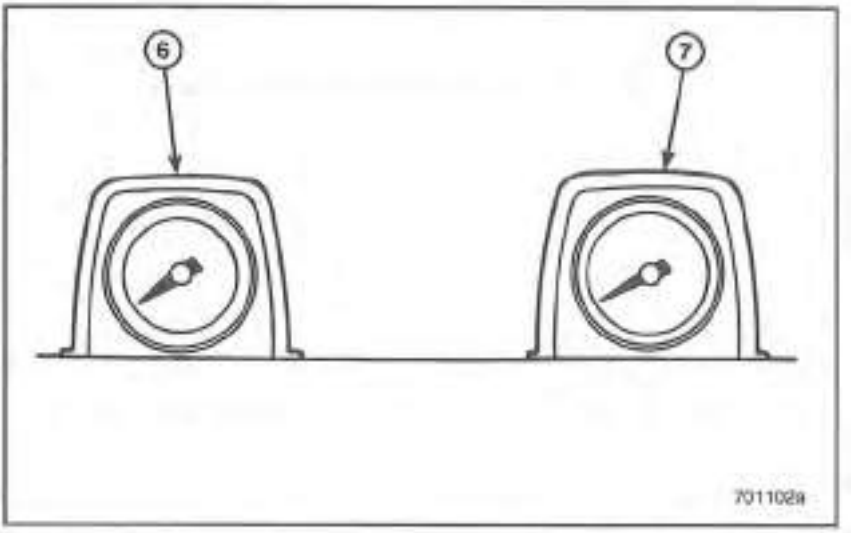


Panel A



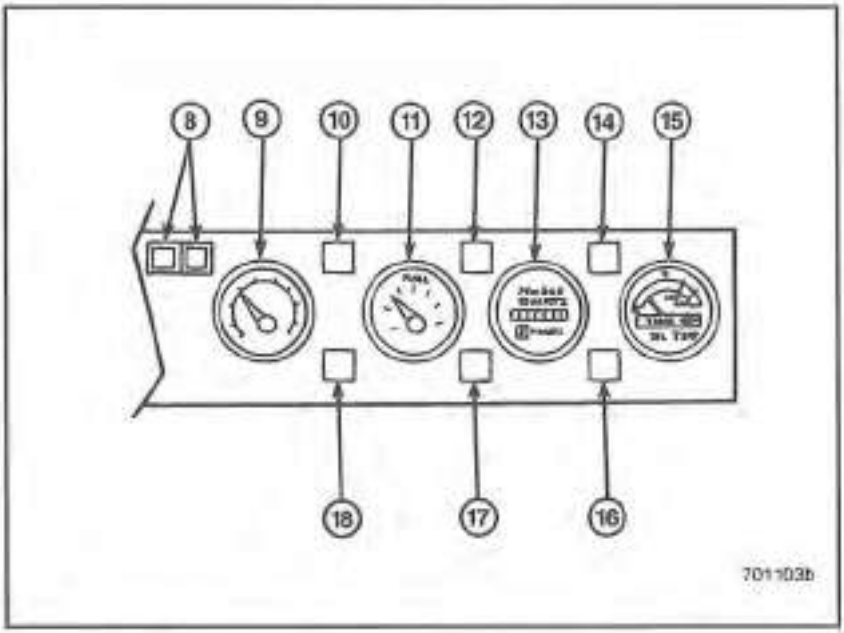
1. Signal Switch 2. Voltmeter 3. Coolant Temperature Gauge	4. Oil Pressure Gauge 5. Engine Shutdown Indicator (Red)

Panel B



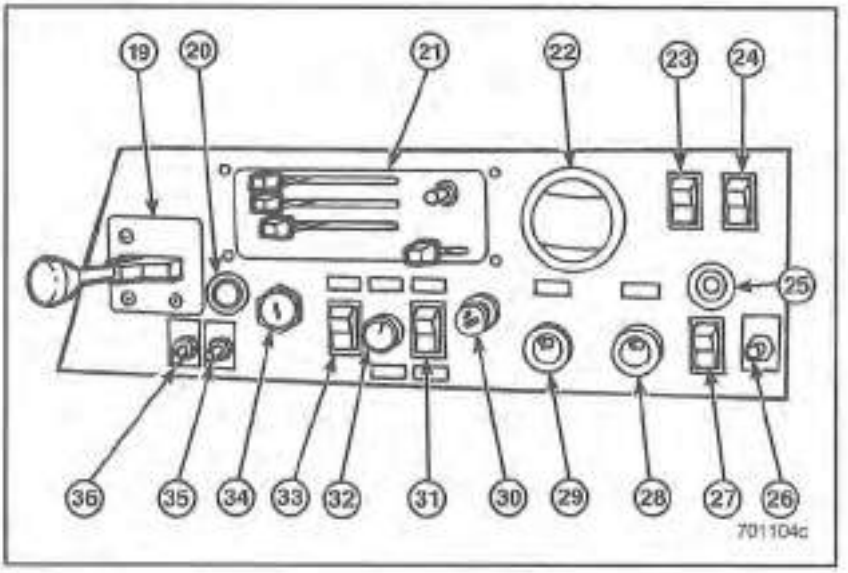
6. Tachometer	7. Speedometer/Odometer

Panel C



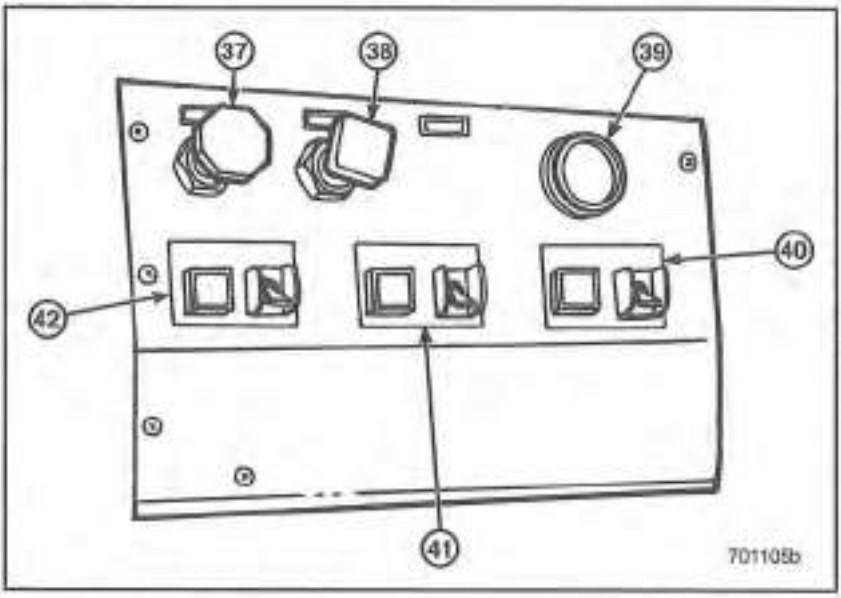
8. Turn Signal Indicators (Green) 9. Air Pressure Gauge 10. Low Air Pressure Warning Indicator (Red) 11. Fuel Gauge 12. Electronic Malfunction Indicator (Amber) 13. Hour Meter	14. Reverse Indicator (Amber) 15. Transmission Oil Temperature Gauge 16. Transmission Oil Warning Indicator 17. High Beam Indicator (Blue) 18. Parking Brake Indicator (Red)

Panel D



19. Hand-Control Brake Lever	28. Right Windshield Wiper/ Washer Control
20. Push-Button Start Switch (If Equipped)	29. Left Windshield Wiper/ Washer Control
21. Cab Climate Control Panel	30. Cigar Lighter
22. Air Vent	31. Headlight Switch
23. Speed Control Switch	32. Panel Lights Rheostat
24. Resume/Set Switch	33. Clearance Light Switch
25. Engine Shutdown Override (If Equipped)	34. Ignition Switch
26. Heated Mirror Switch (If Equipped)	35. Fog Light Switch (If Equipped)
27. Mirror Adjustment Switch	36. Engine Brake Switch (If Equipped)

Panel E



37. Trailer Air Supply Valve 38. Parking Brake Valve 39. Air Filter Restriction Indicator (Optional) 40. Automatic Traction Control (ATC) Mud/Snow Switch (Optional)	41. Power Take-Off Switch (Optional) 42. Power Divider Switch (Optional)

1. **Signal Switch** — Flashes the front and rear lights, eliminating the necessity of reaching for separate switches when signaling for passing or being passed by other vehicles. This switch is spring-loaded so it automatically returns to the neutral position when released.

   With the headlights on, moving the Signal switch to the rear turns the marker lights OFF. With the marker lights on, moving the Signal switch to the rear turns the lights on. Regardless of whether the headlights are on, moving the Signal switch forward turns on the high beams.

2. **Voltmeter** — Indicates the surface charge of the battery with the engine NOT running (and the ignition ON). Indicates the condition of charging system with the engine running.

   The voltmeter can be useful as a diagnostic tool. During cranking, the reading should not drop below 10 volts. Lower readings may indicate corroded connections at the cranking motor or battery terminals, or discharged or defective batteries.

3. **Coolant Temperature Gauge** — Indicates the temperature of the engine coolant. The normal operating temperature for MACK engines is between 170°F and 225°F (77°C and 107°C). Certain operating conditions, such as pulling heavy loads up steep grades and high ambient air temperatures, will affect operating temperature. The engine must not be operated if the coolant temperature exceeds 225°F (107°C).

   Consult the appropriate vendor engine manual if your vehicle is not equipped with a MACK engine.

⚠ CAUTION

Coolant temperature must NOT exceed 225°F (107°C).

4. **Oil Pressure Gauge** — Indicates engine oil pressure. The normal operating oil pressure for a MACK E-Tech engine (at governed speed) is between 30 and 84 psi (207 and 579 kPa). At idling speed, the oil pressure should be between 10 and 35 psi (69 and 241 kPa).

   Should the oil pressure drop suddenly from normal readings, stop the engine immediately and determine the cause.

   NOTE

   Consult the appropriate vendor engine manual if your vehicle is not equipped with a MACK engine.

5. **Engine Shutdown Indicator (Red)** — Indicates the occurrence of a condition which requires that the engine be shut down (i.e., low water level, low oil pressure or high water temperature). If the engine shutdown feature is enabled, the operator has about 15 seconds after the light goes on to pull to the side of the road before the engine shuts off. If the engine shutdown feature is disabled, the indicator will function as a warning light but the engine will not shut down.

6. **Tachometer** — Indicates engine speed in revolutions per minute (RPM). Tachometer readings should be used as a guide for shifting, as well as to prevent engine damage due to overspeed. The blue band indicates the optimum range for engine brake operation.

7. **Speedometer/Odometer** — Indicates road speed in miles and/or kilometers per hour and total distance vehicle has traveled.

8. **Turn Signal Indicators** — Flash green when the turn signals are activated.

9. **Air Pressure Gauge** — Indicates the air pressure in the air brake system(s). The normal operating air pressure is between 105 psi (724 kPa) and 135 psi (931 kPa) in both air brake systems. If pressure drops below 75 psi (± 5 psi) in either system, the warning buzzer and warning light will go on. Determine the cause of failure before proceeding. Primary air pressure is supplied to the rear brakes and is indicated by the green pointer on the gauge. Secondary air pressure is supplied to the steering axle brakes and indicated by the orange pointer.

10. **Low Air Pressure Warning Indicator (Red)** — Indicates low air pressure in the air brake system(s).

11. **Fuel Gauge** — Registers the fuel level in the supply tank(s).

12. **Electronic Malfunction Indicator (Amber)** — Illuminates when V-MAC detects an electronic malfunction. Refer to the appropriate V-MAC Operator's Manual (TS799) for details.

13. **Hour Meter** — Indicates hours of engine operation. Hours of operation should be used as a guide for certain engine or PTO maintenance operations.

14. **Reverse Indicator (Amber)** — Indicates that the transmission is in Reverse.

15. **Transmission Oil Temperature Gauge** — Indicates transmission oil temperature.

> **⚠ CAUTION**
>
> *The maximum safe oil temperature for MACK transmissions is 250°F (121°C) for mineral-based oil, or 300°F (148°C) for synthetic oil. Continued operation with oil above this temperature will cause rapid deterioration of the oil's lubricating properties and is NOT recommended. Consult the vendor manual for non-MACK components.*

16. **Transmission Oil Warning Indicator** — Indicates that the transmission oil temperature is above the warning limit.
17. **High Beam Indicator (Blue)** — Indicates that high beams are on.
18. **Parking Brake Indicator (Red)** — Indicates that the parking brake is engaged.
19. **Hand-Control Brake Lever** — Pull down to activate the trailer brakes, or the rear axle brakes in the case of a platform truck.
20. **Push-Button Start Switch (If Equipped)** — After turning ignition on, depress this button until the engine fires. See *STARTING THE VEHICLE* in the *OPERATION* section for specific starting instructions.
21. **Cab Climate Control Panel** — See the *CAB CLIMATE CONTROL* section for more information.
22. **Air Vent** — Rotate the knob to open or close the air vent.

23. **Speed Control Switch** — This is a V-MAC switch; refer to the appropriate V-MAC Operator's Manual (TS799) for more information.

24. **Resume/Set Switch** — This is a V-MAC switch; refer to the appropriate V-MAC Operator's Manual (TS799) for more information.

25. **Engine Shutdown Override (If Equipped)** — Allows the operator to temporarily override the engine shutdown system for the purpose of moving the vehicle to safety.

26. **Heated Mirror Switch (If Equipped)** — Activates the outside heated mirrors (for use in icy conditions).

27. **Mirror Adjustment Switch** — Allows the operator to adjust the passenger-side rearview mirror.

28. and **29. Windshield Wiper/Washer Controls** — Push the knob in to activate the washers. The 12 o'clock position is OFF. The 4 o'clock position is LOW speed. The 5 o'clock position is HIGH speed. The area between OFF and LOW is the intermittent wiper control.

30. **Cigar Lighter** — Press in the lighter; it will pop out when element is hot.

31. **Headlight Switch** — Allows the operator to choose between parking lights (middle position), headlights (push top in) or OFF (push bottom in).

32. **Panel Lights Rheostat** — Clockwise rotation decreases dash light intensity.

33. **Clearance Light Switch** — Push the top to activate the clearance lights on the tractor and the trailer. Push the bottom to turn the switch OFF.

34. **Ignition Switch** — Refer to *STARTING THE VEHICLE* in the *OPERATION* section for specific starting procedures. Insert the key into the switch. Turn the key clockwise to the ON position. To crank the engine, turn the key clockwise or push the optional starter button. To shut down the engine, turn the key to the left.

35. **Fog Light Switch (If Equipped)** — Push the top to activate the fog lights. Push the bottom to turn them off. The Headlight Switch must be in Parking Lights position to activate fog lights.

36. **Engine Brake Switch (If Equipped)** — Used to activate the engine brake. Refer to the *OPERATION* section for more information.

⚠ CAUTION

Do NOT activate the engine brake until the engine has reached normal operating temperature.

37. **Trailer Air Supply Valve** — Red octagonal-shaped knob. Pull to apply trailer emergency brakes. Push to pressurize the trailer air reservoir, releasing the trailer emergency brakes.

NOTE

The trailer air supply valve should NOT be used for parking.

38. **Parking Brake Valve** — Yellow diamond-shaped knob. Pull to apply. Push to release. Applies tractor parking brakes and trailer brakes, if equipped.

39. **Air Filter Restriction Indicator (Optional)** — Indicates that the element needs servicing or replacement. When the red flag locks into position, service as soon as possible to prevent engine damage; then reset the indicator after the filter change. Check the air filter restriction indicator daily.

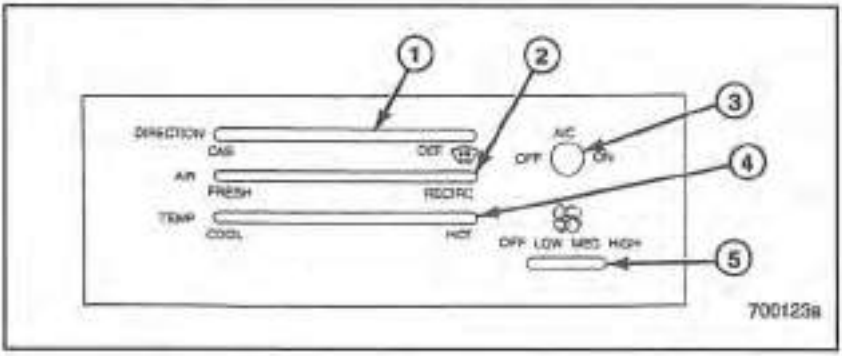
40. **Automatic Traction Control Switch/Heavy Mud/Snow (Optional)** — Activate for increased traction control in heavy mud or snow. (See page 101 in the *OPERATION* section of this manual for more details.) When the operator pushes the switch up, the Heavy Mud/Snow function is selected and the ATC indicator lamp blinks continuously. The ATC lamp stops blinking when the switch is returned to the bottom position for normal traction control.

> **⚠ CAUTION**
>
> *Be sure to deactivate the heavy mud/snow function when no longer needed. Continued operation with the heavy mud/snow function active will result in vehicle damage. If after a reasonable amount of time (no more than five minutes) the vehicle is still not moving, deactivate the ATC and put on chains.*

41. **Power Take-Off Switch (Optional)** — Push the top in to turn the PTO on. Push the bottom in to turn it off.

42. **Power Divider Switch (Optional)** — See *INTER-AXLE POWER DIVIDER LOCKOUT* in the *OPERATION* section.

CAB CLIMATE CONTROL



1. Mode Selection Lever 2. Air Selection Lever 3. Air Conditioner Switch	4. Temperature Control Lever 5. Fan Control Switch

1. **Mode Selection Lever** — Allows the operator to choose the air direction. The CAB position delivers air to the floor outlets, while the DEF position delivers air to the defrost louvers. Sliding the lever in between positions provides a blend of the two.
2. **Air Selection Lever** — This lever lets operator choose between fresh air (from the outside) and recirculated air (within the cab).
3. **Air Conditioner Switch** — Activates the air conditioning system.

> **⚠ CAUTION**
>
> *If your vehicle is equipped with air conditioning, the air conditioner unit should be run for FIVE MINUTES at least ONCE A WEEK throughout the year to keep the moving parts well lubricated.*

4. **Temperature Control Lever** — Controls the temperature of air from COOL (far left) to HOT (far right).
5. **Fan Control Switch** — Controls the amount of air delivered through the vents. Move lever for desired fan speed from OFF (far left) to HIGH (far right).

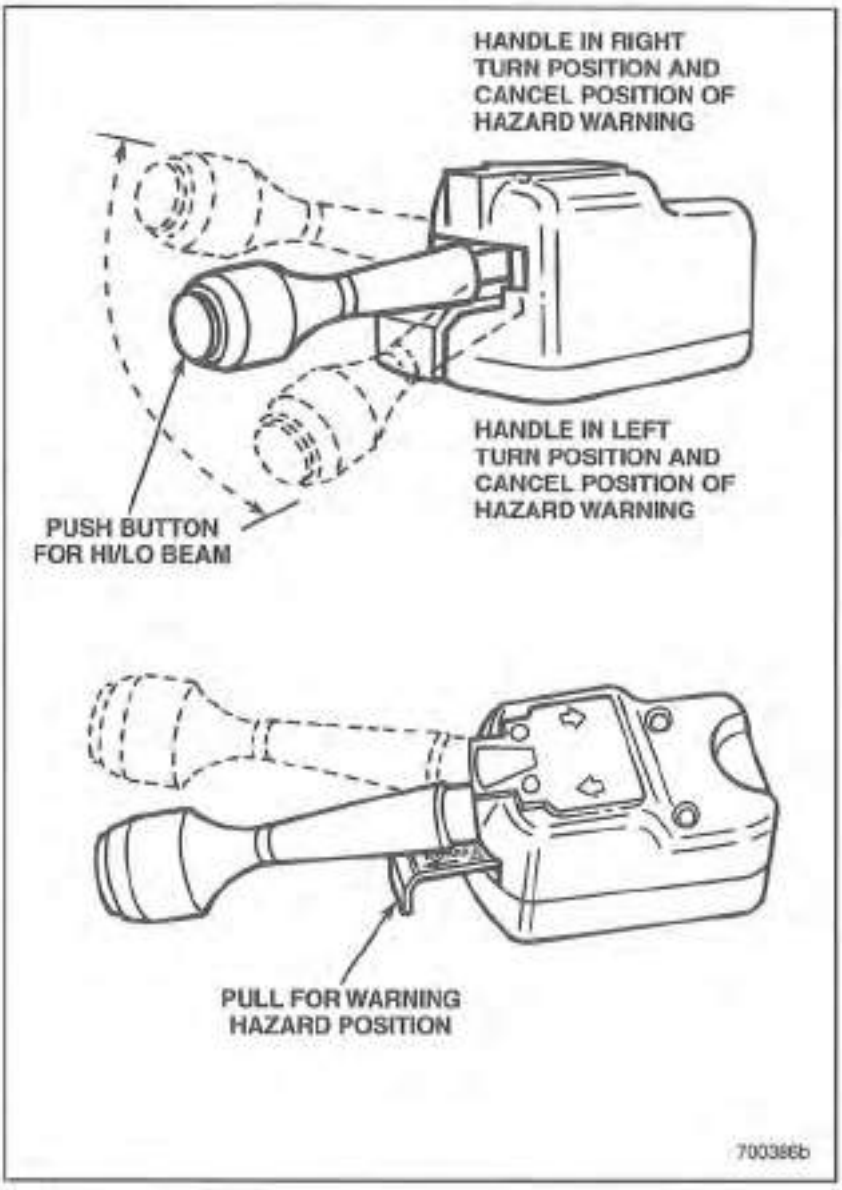
STEERING COLUMN

Turn Signal Lever

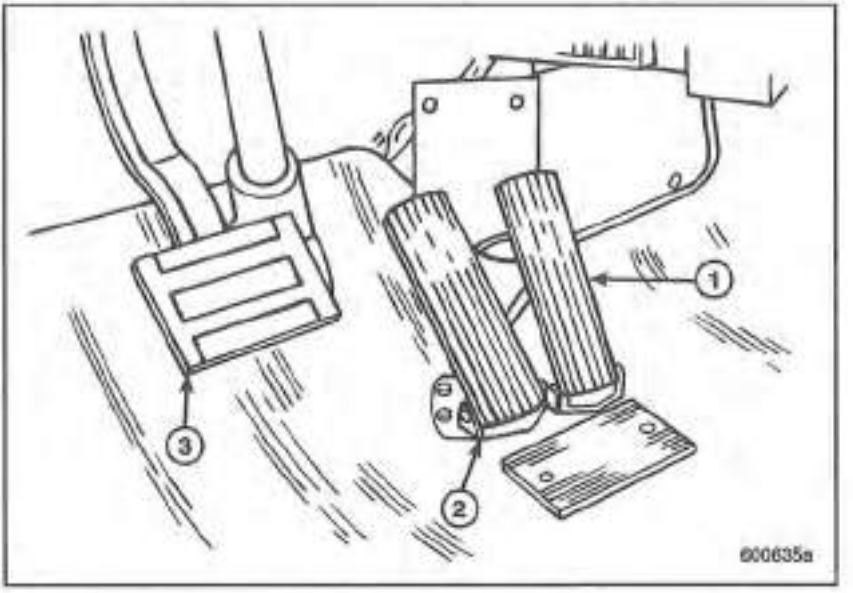
NOTE

The turn signals are not self-cancelling and must be returned to the middle position manually.

The turn signal lever is located on the steering column. It performs a number of functions, including activating the high and low beams and the hazard switch.



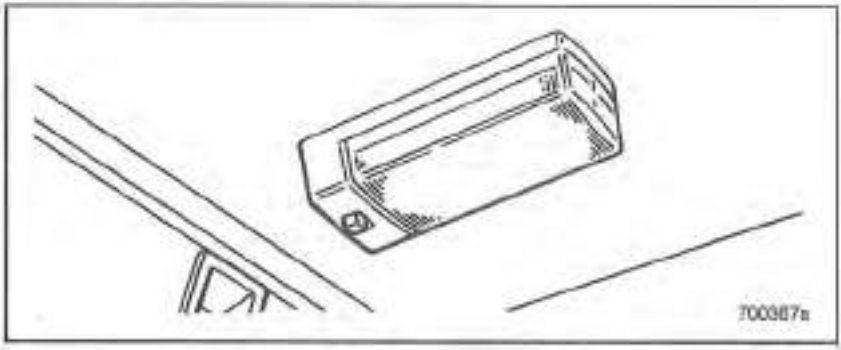
FLOOR PEDALS



1. **Accelerator Pedal** — Depress to increase engine/vehicle speed; release to decrease engine/vehicle speed.
2. **Brake Treadle Valve** — Depress to activate the service brakes.
3. **Clutch Pedal** — Depress to disengage the clutch. The clutch pedal is only found on trucks equipped with standard transmissions.

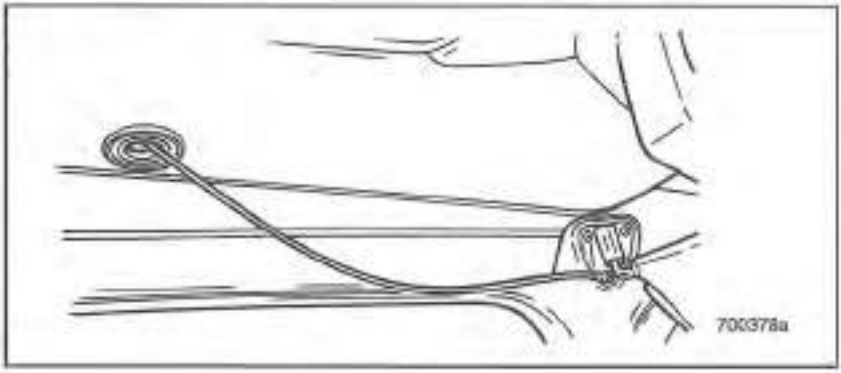
MISCELLANEOUS CONTROLS

Dome Light



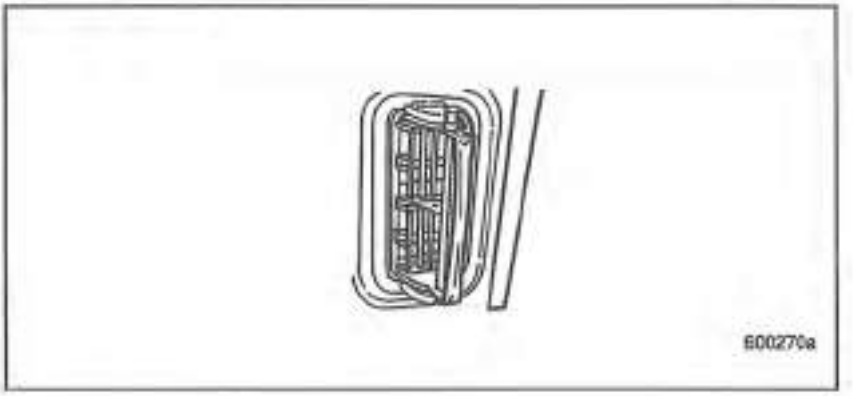
The dome lights are located in the cab headliner. With the switch in the left position, the dome light will come on when the cab door is opened and go off when it is closed. Push the switch to the right to turn on the dome light when the doors are closed.

Air Horn



The air horn(s), if equipped, is activated by pulling down on the cord that is located above the left-side window.

Fresh Air Vent



An air vent is provided to circulate outside air to the cab interior. Move the vent lever forward or rearward to open the vent. Move the lever to the center to close the vent.

TABLE OF CONTENTS

BEFORE OPERATING THE VEHICLE

Driver's Daily Walk-Around Inspection

With the proper care, your MR will give you years of efficient performance.

Before each shift, the driver should perform the following inspections:

⚠ WARNING

To avoid serious injury, do NOT step on fuel tank, battery box, frame, etc., unless adequate slip-resistant surfaces and handholds are provided.

Fluids

- ❒ Engine oil
- ❒ Engine coolant
- ❒ Fuel
- ❒ Power steering fluid

Leaks

- ❒ Air, coolant, oil, fuel, power steering fluid

Wheels and Tires

- ❒ Tire air pressure
- ❒ Tire/wheel condition
- ❒ Wheel stud nuts
- ❒ Front wheel bearings (oil)

Fasteners

- ❒ Steering linkage
- ❒ Seat belts
- ❒ Doors and windows

- ❒ Battery box covers
- ❒ Fuel tank straps
- ❒ Hood or engine compartment covers

Air Reservoir

- ❒ Drain to remove moisture

Lights/Reflectors

- ❒ Replace defective and burned-out bulbs
- ❒ Replace broken lenses and reflectors

Gauges and Instruments

- ❒ Air pressure gauge
- ❒ Oil pressure gauge
- ❒ Temperature gauge
- ❒ Voltmeter

Component Operation

- ❒ Brakes (service and parking)
- ❒ Horn
- ❒ Heater and defroster
- ❒ Signaling devices
- ❒ Windshield wipers/washers
- ❒ Foot pedals
- ❒ Back-up alarms (if equipped)

Component Adjustment

- ❒ Rearview mirrors
- ❒ Seats

New Vehicle Break-In

To ensure many years of reliable, trouble-free operation, the following "break-in" procedures are recommended:

NOTE

Oil change, filter change and chassis lubrication are no longer required at the 3,000-mile vehicle break-in interval.

Refer to the preventive maintenance schedules outlined in the MAINTENANCE AND LUBRICATION manual, TS494, or appropriate Cummins manual, for recommended lubrication change intervals for the following items:

- Gear oils (transmission, rear axle carrier[s], front drive axle carrier, transfer case, flywheel PTO)
- Engine oil
- Oil filters
- Fuel filters
- Coolant conditioner

NOTE

It is important that components be filled with lubricants meeting the specifications as given in the MAINTENANCE AND LUBRICATION manual, TS494.

NOTE

When checking oil levels, the vehicle must be parked on level ground, and the units at normal operating temperature. Components must be filled to the correct level. DO NOT OVERFILL.

NOTE

Oil and filter change intervals in this manual pertain to components built by Mack Trucks, Inc. For information concerning oil and oil filter change intervals for vendor components, refer to the specific vendor component service literature.

During the First 3000 Miles (5000 Kilometers)

- After the first 125 miles (200 km), retorque the wheel nuts using an accurately calibrated torque wrench. Recheck this torque again after 500 miles (800 km).
- Check oil and coolant levels frequently.
- Check brake and clutch adjustments per recommended maintenance schedule, and adjust as needed.
- Observe the instruments often, and shut down the engine at the first sign of any abnormal readings.
- Report all leaks, loose fasteners, unusual noises, etc., to the service representative at the nearest Mack dealership so they can be checked and corrected.
- Check the spring clip torque (U-bolts). (On Reyco suspensions, also check equalizer nut torque.)
- Check the U-bolt torque on the MACK air suspension at the end of the first 1000 miles (1600 km).

After the First 3000 Miles (5000 Kilometers) or Before 4000 Miles (6400 Kilometers) or Before 3 to 4 Months

- Retorque the spring clip (U-bolts). (On Reyco suspensions, also retorque the equalizer nut.)

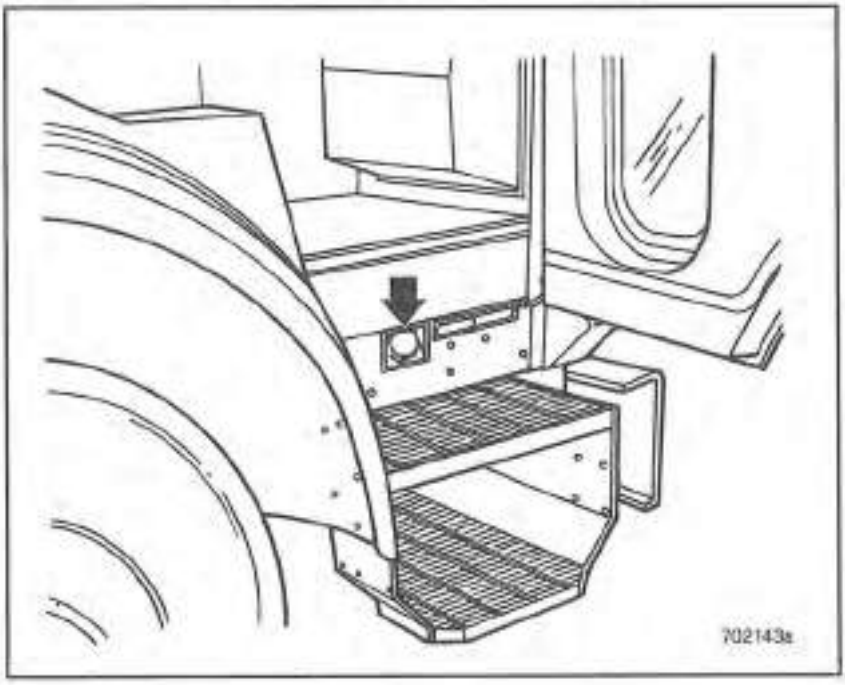
At the First A Inspection Interval

- Check front and rear axle alignment and adjust if the alignment is out of specifications.
- Check steering knuckle to axle beam clearance.

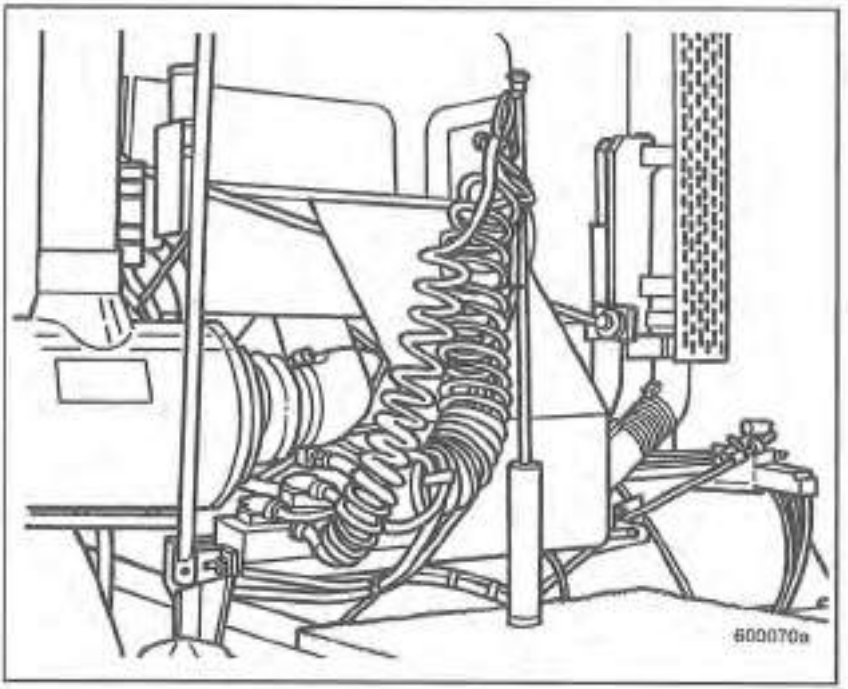
Although this quality-built vehicle has been inspected, lubricated and adjusted at the MACK Trucks Assembly Plant, an occasional air, oil or coolant leak may develop. Quick action to correct these minor items will prevent a major repair later. Take the vehicle to the nearest MACK service center as soon as any abnormal condition becomes evident.

WINDSHIELD WASHER RESERVOIR

As shown in the drawing below, the windshield washer reservoir opening is located on the chassis above the rider-side step.



HOSE TENDERS



⚠ CAUTION

Avoid loose hoses. Air lines and tractor-to-trailer electrical connections must be secured to the tractor hose tenders (hose hanger, towel bar, pogo stick, etc.) to prevent them from tangling in the driveline.

CAB TILT OPERATION

⚠ DANGER

Before attempting to tilt the cab, be certain to take the following steps:

- ***Park on a level surface.***
- ***Apply the parking brake.***
- ***Place the gearshift lever in NEUTRAL position.***
- ***Shut off the engine.***
- ***Secure all loose items within the cab.***
- ***Close the cab doors.***

The MR cab is mounted on the chassis frame by two front hinges and two rear cab locks. This arrangement allows the cab to tilt forward to a maximum of 60 degrees, exposing the engine compartment for easy accessibility.

The cab tilt system uses one hydraulic cylinder. It incorporates internal safety valves which lock up automatically if the cab moves too rapidly in either direction.

The hydraulic fluid pressure imbalance forces the check valves to seat, holding the cab in a hydraulically locked position. If this situation occurs, operate the pump in the opposite direction to open the check valves. The system will then be returned to normal operation.

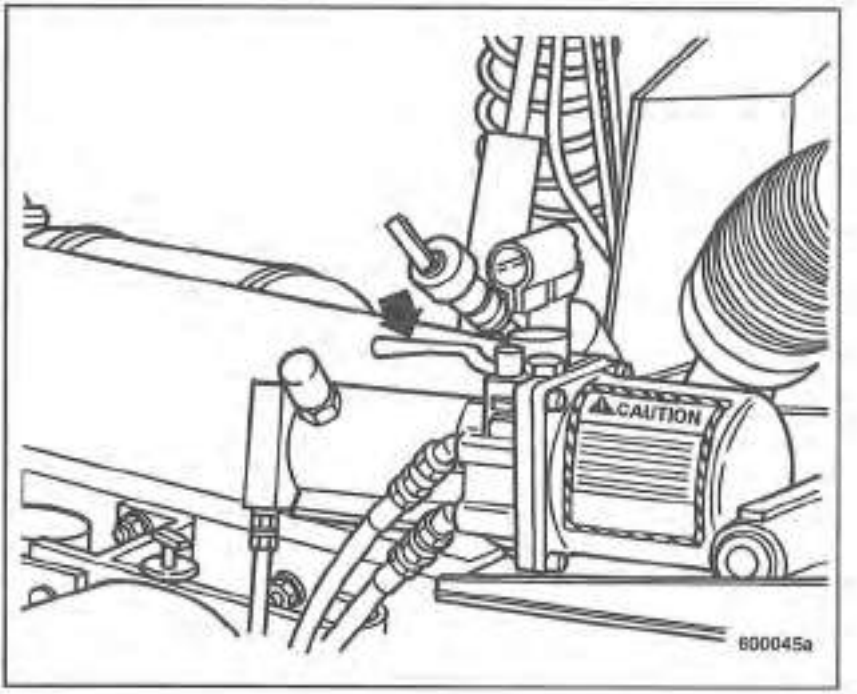
Tilting the Cab

Use the following instructions to tilt the cab:

NOTE

Before raising the cab, the engine must be shut off and all loose items in the cab must be secured.

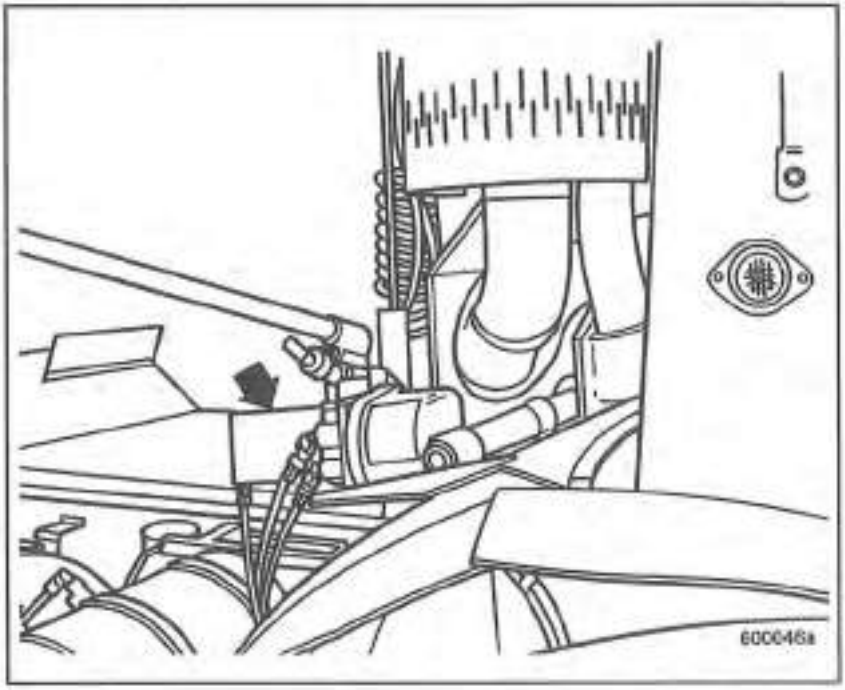
1. Take the cab tilt pump handle from its stored position.



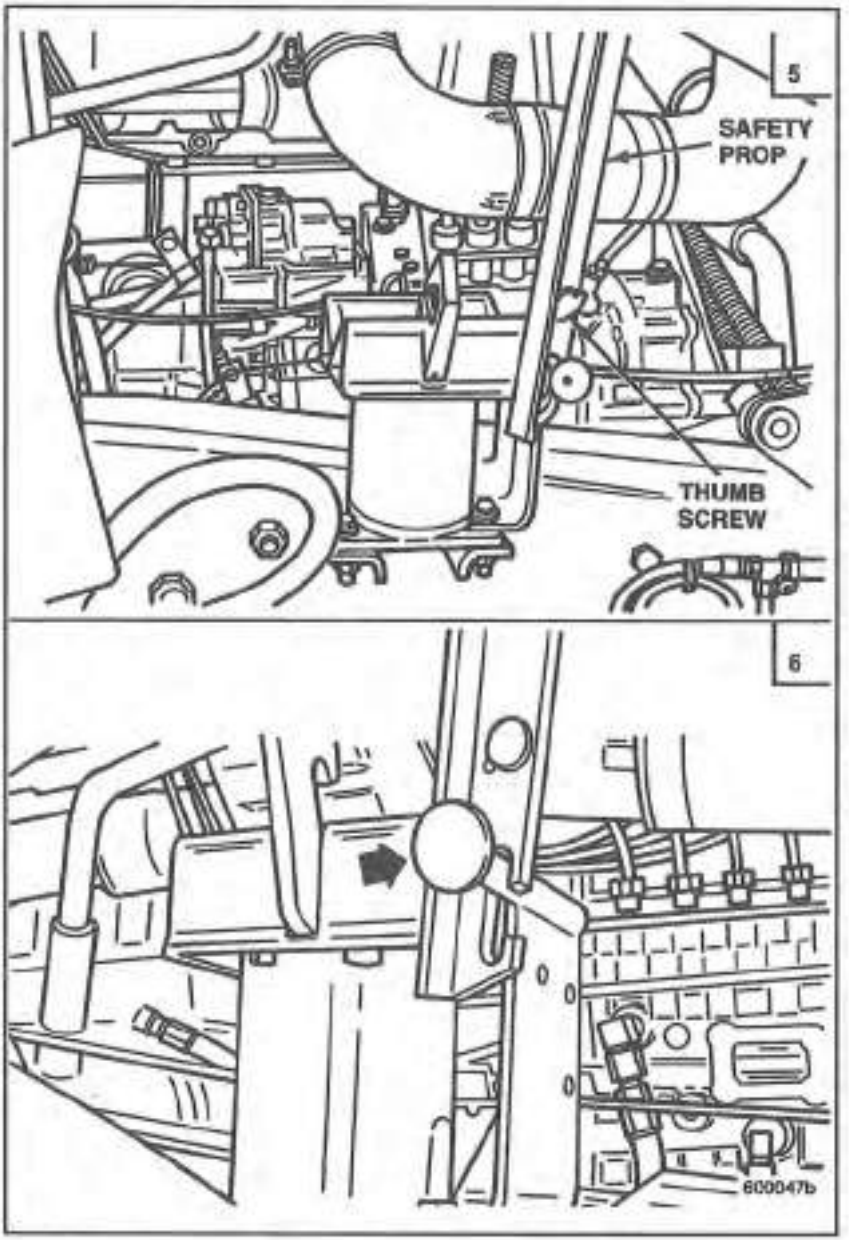
NOTE

The cab tilt pump handle is stored inside the cab, on the right side cab backwall, behind the folding seat.

2. Insert the handle into the pump and move the pump control lever (see arrow) to the RAISE position (refer to the illustration).



3. To raise to the service position, pump the cab up to the SERVICE HEIGHT position.



NOTE

In the service position, the cab must be secured with the safety prop.

4. To secure the cab in the service position, loosen the thumbscrew and swing the safety prop down onto the safety prop stud (see arrow). The slot in the safety prop should settle securely around the stud (refer to the illustration).

⚠ WARNING

Be certain that there are no people, tools or unsecured vehicle parts in the path of the descending cab before shifting the pump control lever.

5. It may be necessary to manipulate the pump control lever, while the cab is descending, so the safety prop settles on the stud.
6. To raise the cab to the full tilt position, pump the cab up past the balance point. Note that the cab will descend by itself, although the rate of descent may be controlled by manipulating the pump control lever from the RAISE to LOWER position.

Lowering the Cab

NOTE

Before lowering the cab, the cab safety prop must be in the stored position and the transmission must be in NEUTRAL.

1. Move the pump control lever to the LOWER position.
2. Pump until the cab is past the balance point and allow the cab to descend and latch.
3. Leave the pump control lever in the LOWER position while the vehicle is in operation.

Bleeding the Cab Tilt System

NOTE

In order to bleed the system, the cab must be in the lowered position.

NOTE

To perform a system bleed, the following steps must be performed in the designated order:

1. Connect all hydraulic lines.
2. Tighten all connections (except two) at the tilt cylinder.
3. Tighten one connection at each latch cylinder.
4. Fill the pump reservoir to the top with MACK specified oil.

⚠ CAUTION

Do not refill the reservoir with the cab in the RAISE position.

5. Close and tighten the fill plug.
6. Shift the pump control lever to the LOWER position and pump until the LOWER lines are bled; also tighten the corresponding connections.
7. Shift the pump control lever to the RAISE position and pump until the RAISE lines are bled; also tighten the corresponding connections.
8. Bleed the latch cylinders and tighten the connections.
9. Bleed the push port of the tilt cylinder and tighten the connections.
10. After the entire system has been bled, shift the pump control lever to the LOWER position; then check and refill the reservoir, if necessary.

SERVICE HINT

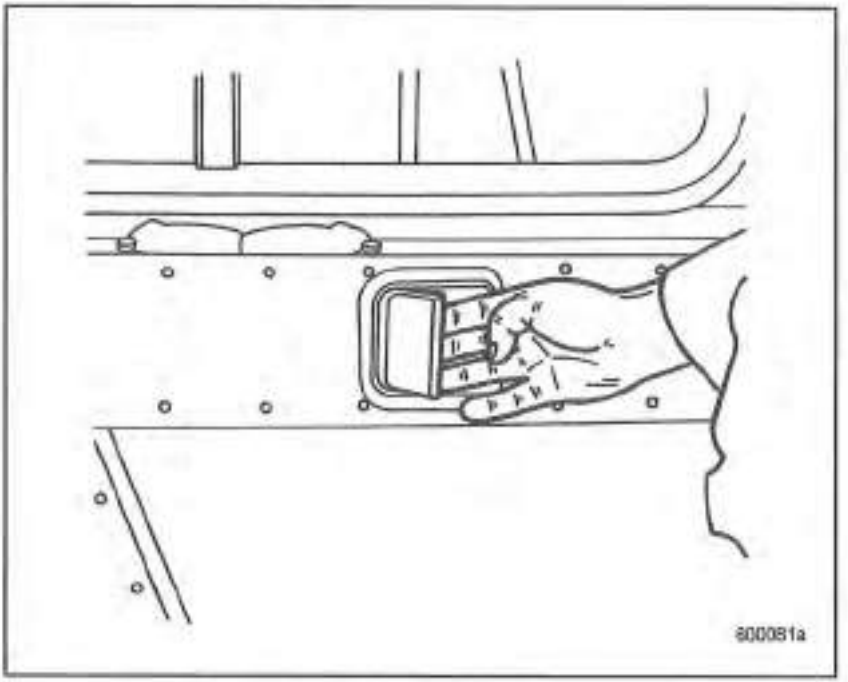
The recommended type of fluid for the cab tilt system is CF-A (MIL-H-5606E); the approximate capacity is 3 pints (1.4 liters).

⚠ WARNING

The pump control lever must be in the LOWER position before operating the vehicle.

DOORS

Opening the Cab Door



The inside door handles are flush-mounted, with paddle-type design. To open the door, grasp the handle and pull out while exerting some force on the door.

Locking the Cab Door

To lock with the door open, press the door handle inward and shut the door.

ENGINE INFORMATION

For engine starting procedures, refer to the *STARTING THE VEHICLE* section.

Precautions and Warnings

⚠ CAUTION

If a winterfront is required, use a winterfront that was designed for this specific chassis.

⚠ CAUTION

Be sure to avoid high intake/exhaust temperatures when using winterfronts under normal operating conditions (above freezing). The restriction of airflow can cause higher exhaust temperatures, power loss, excessive fan usage and reduced fuel economy.

⚠ CAUTION

When using a winterfront, a MACK-approved exhaust pyrometer must be installed and closely monitored while the engine is in operation. Do NOT exceed the maximum temperature indicated by the red line on the gauge. To reduce exhaust temperature, downshift or reduce engine power and open the winterfront.

⚠ CAUTION

Do not permit a heavy load to drive the engine above the governed speed. Operate in a gear low enough to allow the engine to accelerate to (or maintain) governed speed when applying the throttle.

⚠ WARNING

Misuse or modification of a turbocharger can result in serious injury and property damage. In addition, extreme care must be taken to avoid foreign material induction, excessive exhaust temperatures and lack of lubrication.

Engine Model Designations

The MACK engine model designation system uses letters and numbers to provide a complete unit description.

Prefix Letters and Numbers:

- E = MACK turbocharged diesel engine
- M = Maxidyne engine (high torque rise)
- 7 = 728 cubic inch displacement
- Digits = rated gross horsepower (BHP)
- E-Tech = Electronic unit pump injection

Engine Brake Operation (If Equipped)

⚠ WARNING

Operation of any vehicle on wet or slippery roads requires extreme caution. Because the engine brake converts the engine to a retarding device, it should NOT be used on wet or slippery roads if the vehicle has a single driving axle or if it has tandem driving axles that are lightly loaded. Use of an engine brake under these conditions can cause the vehicle to skid or jackknife.

The purpose of an engine brake is to assist in slowing down the vehicle and reduce brake wear.

An example of when to use the engine brake is when descending a hill with a load.

NOTE

The best engine braking performance is achieved in the 1800 to 2100 rpm range. For optimum retarding power, keep engine speed as close to 2100 rpm as possible. For additional information, refer to the Jacobs driver's manual supplied with the vehicle.

CRUISE CONTROL OPERATION

Speed Control Switches

Resume/Set Switch — Allows the driver to set and resume cruise control.

> **NOTE**
>
> In most cases, the Speed Control switch must be in the ON position in order to use the Resume/Set switch. However, when the Initial Set Using Resume Switch feature is enabled, cruise control can be activated using the Resume/Set switch.

The Resume/Set switch also functions as the Accel/Decel switch. Usually the Resume position (press the top) corresponds to an increase in engine speed (Accel) and the Set position (press the bottom) corresponds to a decrease in engine speed (Decel). However, V-MAC can be programmed so that the reverse is true.

> **NOTE**
>
> Under specific circumstances this switch can also be used to activate cruise control. For details concerning the Initial Set Using Resume Switch feature, refer to the V-MAC III User Guide.

Speed Control Switch — Activates the cruise control system.

Setting Cruise Control

At the desired speed, press and release the Resume/Set switch. This speed is now programmed and will be automatically maintained.

NOTE

To increase the engine speed, press and hold the Accel switch until the desired speed is attained, or press the accelerator pedal until the desired speed is attained and then press and release the Set switch.

Disengaging Cruise Control

To turn off the cruise control system, move the Speed Control switch to the OFF position.

NOTE

If the Speed Control switch is moved to the OFF position, the process of setting cruise control must be repeated in order to re-activate cruise control (unless the Initial Set Using Resume Switch feature is enabled).

To temporarily disengage cruise control, disengage the clutch or apply the service brakes.

NOTE

If cruise control is temporarily disengaged using the clutch or service brakes, press the Resume switch to resume the previously programmed speed.

BRAKE OPERATION

Air Brake System

This chassis features a dual braking system which has two complete air circuits: a primary circuit for rear brakes and a secondary circuit for front brakes. Each circuit receives air from separate reservoirs. Although there are two air circuits, they operate as one brake system through the dual-circuit treadle valve. This provides the driver with easy, graduated control when applying and releasing the brakes.

The air pressure in the two circuits is monitored by gauges on the instrument panel. (See the INSTRUMENT PANEL section for more information.) When air pressure drops below 75 ± 5 psi (517 ± 34 kPa) in either system at any time other than vehicle startup, pull to the side of the road and determine the problem. If air pressure continues to drop below 40 ± 5 psi in BOTH systems, spring brakes will automatically apply. The Low Air Pressure Warning indicator will be activated if low air pressure occurs in either circuit.

The air brake system consists of three main elements:

- The compressor, governor and reservoirs supply and store the air pressure.
- The brake application valve controls the brake application pressures.
- The brake chambers control the brake mechanism.

Air Brake Operation

⚠ CAUTION

Avoid sudden stops. Constant, sudden stops may negatively affect the performance of braking and driving parts.

When slowing for a stop, leave the clutch engaged for as long as possible to use the braking effect of the engine. When forward speed has dropped to a little above idling speed, push clutch pedal in and brake to a complete stop.

Parking Brake System

Spring-type parking brakes are standard on all single and tandem rear axles.

The spring brake system consists of an air cylinder with heavy springs, which is integrated with the spring brake air chamber. When there is no pressure in the air chamber, the springs expand (causing a brake application). When air pressure is applied to the air chamber, the springs are compressed (releasing the brakes).

Parking Brake Operation

The parking brakes can be applied and released from the cab, using the hand-operated control valve.

In the event of a significant air pressure loss in both the air brake systems, the spring brake air chambers will be automatically exhausted (applying the brakes). The parking brakes will remain applied until enough pressure is available to recompress the springs.

⚠ WARNING

WHEN PARKING A COMBINATION VEHICLE:

- **NEVER use the trailer parking brake system alone.**
- **NEVER use the tractor parking brake system alone.**
- **ALWAYS use the tractor and trailer parking break systems together.**
- **NEVER use the rear service brakes for parking.**
- **ALWAYS apply the parking brakes when parking and make sure the parking brakes are holding the vehicle from moving before leaving the driver's seat.**
- **When parking on a grade, use wheel chocks under the rear wheels or turn the front wheels to the curb. Do not leave diesel engine vehicles in gear; if the vehicle should move, the engine may start by heat of compression.**
- **Check brake adjustment frequently to be sure that the brakes will lock and hold the vehicle when parked.**
- **Do not use the parking brake to slow or stop the vehicle when in motion, except in an emergency.**

Anti-Lock Brake System (ABS)

ABS Operation

When operating an ABS-equipped vehicle, the following guidelines should be used.

- Apply the brakes as normal. If the anti-lock brake system begins to function, maintain brake pressure. Do NOT release the brakes.
- Avoid rapidly pumping the brakes. The anti-lock brake system automatically applies and releases the brakes up to five times per second.
- When towing a trailer (especially if only the tractor is equipped with anti-lock brakes), watch the trailer through the mirrors. Adjust brake application as necessary to keep the combination in a straight line. Make sure the trailer follows the tractor properly.
- If the trailer is equipped with ABS, an amber trailer ABS lamp on the instrument panel will illuminate for several seconds at start-up during an initial function check; when a trailer ABS fault occurs or (three blinks), there is a loss of communication between the tractor and trailer.

Precautions When Installing Electrical Equipment

Connecting electrically powered or electrically controlled equipment to the vehicle may cause interference with other vehicle components (e.g., the ABS system). The amount of interference will depend on the operating frequency of any new signals and the degree to which transient signals are coupled into the vehicle system.

NOTE

Whenever new electrical equipment is installed, it is the obligation of the installer to ensure that the new equipment does not interfere with the proper operation of all other electrical systems on the vehicle.

If new electrical equipment is installed, a vehicle checkout procedure should be performed.

1. Perform the checkout procedure under the following conditions:
   - Engine running
   - Brake system air pressure in operating range
   - Vehicle stationary
   - Brake pedal fully depressed
2. Operate the new equipment under all starting, running and shutdown conditions.
3. Listen for signs of air exhausting from ABS modulator valves (which is an indication of an interference condition).
4. Correct all interference conditions before operating the vehicle.

NOTE

The center pin of the standard seven-pin trailer electrical connector has been standardized as the dedicated connection for uninterrupted power for trailer ABS. This pin is always "hot" when the tractor ignition is turned on, so the possibility exists that this may interfere with certain electrical systems on non-equipped ABS trailers.

Automatic Traction Control (ATC) (If Equipped)

Automatic Traction Control (ATC) provides improved traction on slippery surfaces by reducing wheel spin. The system operates automatically as follows:

- If a drive wheel starts to spin, ATC applies air pressure to the brake of the spinning wheel. Doing this transfers engine torque to the wheels that have better traction.
- If all drive wheels are spinning, ATC limits engine torque which, in turn, reduces wheel spin to provide improved traction.

When ATC automatically becomes active, the ATC indicator lamp turns on to alert the operator. The lamp turns off when the wheel(s) stops spinning.

Heavy Mud/Snow Function (If Equipped)

ATC may also include a heavy mud/snow function which allows the operator to activate ATC when additional traction is needed. This function is activated with the ATC mode switch which is located on the dashboard (refer to INSTRUMENTS AND CONTROLS section). The heavy mud/snow function increases available traction by increasing permissible wheel spin.

When the operator selects the heavy mud/snow function, the ATC indicator lamp blinks continuously. The ATC lamp stops blinking when the ATC mode switch is turned off.

⚠ CAUTION

Be sure to deactivate the heavy mud/snow function when no longer needed. Continued operation with the heavy mud/snow function active will result in vehicle damage. If after a reasonable amount of time (no more than five minutes) the vehicle is still not moving, deactivate the ATC and put on chains.

GOOD DRIVING HABITS

Weight Ratings

Do not overload the vehicle. The gross vehicle weight and gross axle weight ratings for a given model vary with operating conditions, tire size, wheel base, type of wheels, axles, suspension, frame length and overhang. For economy and safety, it is important to observe the Gross Vehicle Weight (GVW) and Gross Axle Weight (GAW) ratings for your particular truck, which can be found on the Safety Certification Label.

Instruments

Glance at the instruments frequently. When problems develop, take prompt steps to correct them.

Shutting Down the Engine

After a hard run, allow the engine to idle three minutes before shutdown to stabilize the temperature of all engine parts. Quick shutdowns can cause engine damage and prevent the turbocharger from being properly lubricated. For additional options, see page 109.

Parking

⚠ WARNING

WHEN PARKING A COMBINATION VEHICLE:

- **NEVER use the trailer parking brake system alone.**
- **NEVER use the tractor parking brake system alone.**
- **ALWAYS use the tractor and trailer parking break systems together.**
- **NEVER use the rear service brakes for parking.**
- **ALWAYS apply the parking brakes when parking and make sure the parking brakes are holding the vehicle from moving before leaving the driver's seat.**
- **When parking on a grade, use wheel chocks under the rear wheels or turn the front wheels to the curb. Do not leave diesel engine vehicles in gear; if the vehicle should move, the engine may start by heat of compression.**
- **Check brake adjustment frequently to be sure that the brakes will lock and hold the vehicle when parked.**
- **Do not use the parking brake to slow or stop the vehicle when in motion, except in an emergency.**

General Observation

Make it a habit at stops to walk around your truck and look for fuel, oil and coolant leaks. Also check the condition of tires, wheel nuts, springs and lights. Stop trouble before it stops you!

STARTING THE VEHICLE

General Information

Before putting the key in the ignition switch, set the parking (spring) brake, disengage the clutch (if equipped) and put the transmission in NEUTRAL.

⚠ CAUTION

Do not engage the starting motor too soon after an incomplete start of the engine, or the starter may be damaged. Wait at least five seconds before attempting to restart the engine.

⚠ CAUTION

Do not rev the engine at start-up. Turbocharger damage may result because lubricants need time to establish a film between moving parts.

⚠ CAUTION

If the engine does not start immediately, limit cranking periods to 30 seconds to avoid overheating and damaging the starter.

Push Button Starters

Put the key in the ignition switch. Turn the key clockwise to the first "click" (about two o'clock position) to activate the instruments. Depress the starter button and release as soon as the engine starts. Keep the clutch (if equipped) disengaged until the engine runs smoothly.

Air Starters

On chassis equipped with an air starter, make sure that the air pressure gauge reads a maximum of 120 psi before shutting down and parking for the night. This will ensure sufficient air pressure for restarting the engine.

Starting E-Tech™ Engines

Use the following procedure:

1. Crank the engine until it starts.

> **NOTE**
>
> Throttle pedal position is not important during cranking.

2. After the engine has started, warm the engine until the coolant temperature reaches normal operating range (170°F to 225°F; 77°C to 107°C). Once the engine reaches this temperature, it can be operated in a normal fashion.

> **NOTE**
>
> Warm-up time can be reduced by increasing engine idle speed between 1000 and 1200 rpm by either applying the throttle pedal or by using the Electronic Hand Throttle feature.

> **NOTE**
>
> For bobtail or unloaded applications, the engine may be warmed up by moving the vehicle with "light" throttle application after only one minute of idle.

Priming the MACK E-Tech Fuel System

⚠ CAUTION

The only acceptable method of priming the fuel system is the hand-primer pump. The application of air pressure to the fuel tank or the use of an auxiliary pump to prime the fuel system is PROHIBITED. These priming techniques may result in severe engine damage caused by leakage of fuel past the supply pump seal and into the crankcase.

Using a hand-priming pump is usually only necessary when the fuel system has run dry. If the hand-priming pump is needed, use the following procedure:

1. Remove, fill and reinstall the primary and secondary fuel filters.
2. Disconnect the inlet hose at the secondary fuel filter.
3. Hand-prime until fuel is seen at the inlet hose fitting. This should take approximately 50 hand pumps.

SERVICE HINT

Excessive hand priming after fuel is seen at the fitting may make the engine difficult to start.

4. Reconnect the inlet hose to the secondary fuel filter and crank the engine.

SERVICE HINT

If the engine does not start, refill both filters and repeat priming procedure outlined in Steps 2, 3 and 4.

NOTE

Do not crank the engine continuously for more than 30 seconds without allowing the starter to cool for two minutes between cranks.

Engine Warm-Up

⚠ CAUTION

Idling the engine unnecessarily for long periods of time wastes fuel and fouls injection nozzles. Unburned fuel causes carbon formation and oil dilution. NEVER race an engine during warm-up.

Engine damage can occur if the engine is not warmed up to a minimum operating temperature of 170°F (77°C) before putting the vehicle into full operation.

Heavy-duty diesel engines are designed to operate at optimum efficiency when they are running loaded at (or very near) normal operating temperature, where efficient combustion takes place. When the engine is operated unloaded, lightly loaded (i.e., stop-and-go operations, PTO operations, or periods of extended engine idling) or in cold weather conditions, normal operating temperature may not be achieved or maintained. As a result, carbon and/or varnish build-up will occur and lubricating oil will become contaminated with combustion by-products.

Cold weather operations place added demands on a diesel engine. When operating in cold climates (particularly in stop-and-go operations, PTO operations or periods of extended engine idling), minimum operating temperature must be maintained to prevent engine damage resulting from valve varnishing and carbon build-up.

NOTE

Many accessories are available for cold weather operations. Refer to the MAINTENANCE AND LUBRICATION manual, TS494, for additional information concerning cold weather accessories.

Engine Idling

Idling the engine unnecessarily for long periods of time wastes fuel, fouls injector nozzles and can lead to valve carbon and varnish deposits. Unburned fuel causes carbon formation and oil dilution. Shut the engine down when prolonged loading or unloading of cargo is required.

When starting a cold engine, or if the vehicle has been parked and the engine coolant has fallen well below normal operating temperature, a fast idle speed of approximately 1200 rpm should be maintained to help the engine warm up more quickly.

Shutting Down the Engine

Standard Shutdown

After a hard run, allow the engine to idle three minutes before shutdown in order to stabilize the temperature of all engine parts. Quick shutdowns can cause engine damage and prevent the turbocharger from being properly lubricated.

⚠ CAUTION

Operating the engine below normal operating temperature for extended periods of time will allow varnish/carbon deposits to build up on the valve stems and guides. This will cause the valves to stick in the guides after the engine has been shut down and could result in push rod damage when the engine is restarted. If the engine has been operated below normal operating temperature for an extended period of time (and the odor of raw diesel fuel is detected or unburned fuel can be seen at the exhaust stack), the engine should be operated under "load" until normal operating temperature is achieved BEFORE shutting down the engine.

On chassis equipped with an air starter, make sure that the air pressure gauge reads a maximum of 120 psi before shutting down and parking for the night. This will ensure sufficient air pressure for restarting the engine.

V-MAC III Shutdown Option: Idle Cooldown

From the factory the IDLE COOLDOWN is set to the OFF (disabled) position, requiring the standard shutdown procedure.

IDLE COOLDOWN may be set to the ON (enabled) position using the V-MAC III Customer Data Programming Software. If the IDLE COOLDOWN option is ON, the engine may NOT shut down immediately when (1) the vehicle stops, (2) the parking brake is set, and (3) the key is turned off.

This feature allows the driver to lock the truck and walk away, while still allowing adequate cooldown if the system senses that the turbocharger is still hot. All switched accessories will then turn off once the engine has stopped. If this option is enabled, the engine can still be shut down immediately by cycling the key on and off again or by pressing the shutdown override switch.

Engine Shutdown System (If Enabled)

The engine may be protected by a shutdown system that prevents engine failure by shutting down the engine whenever a dangerous condition (such as loss of oil pressure, loss of coolant or engine overheating) is detected. If the system detects a condition that will initiate engine shutdown, a warning indicator light will illuminate to alert the driver before the engine actually shuts down. Should shutdown occur, the system can be overridden so the vehicle can be moved to a location where it will not pose a hazard.

Engine Shutdown Indicator — During normal operating conditions, this indicator should illuminate as soon as the key switch is turned on. After the engine is started, it will remain illuminated until engine oil pressure reaches normal idling range. During shutdown, if the system detects a condition that could lead to engine failure, the Engine Shutdown Indicator will illuminate prior to engine shutdown.

COLD WEATHER OPERATION

Cold Weather Starting Tips

- Save the batteries. Do not overtax the batteries and start motor by cranking for more than 30 seconds without interruption. Allow about two minutes between attempts at starting the vehicle; this allows the starter to cool and the batteries to re-energize.

NOTE

Always make sure that the battery is fully charged in cold weather.

- Use the correct grade of oil for the prevailing winter temperature.
- Drain the fuel tanks and filters regularly to prevent water accumulation in the fuel system. This accumulation can freeze in fuel tanks, fuel lines and filters.

⚠ WARNING

Do NOT (under any circumstances) add gasoline, alcohol, used oil or additives with metallic particles to the fuel.

- If the fuel gels and starts clogging filters and small passages, mix a small percentage of No. 1D fuel (kerosene) with No. 2D (diesel) fuel.

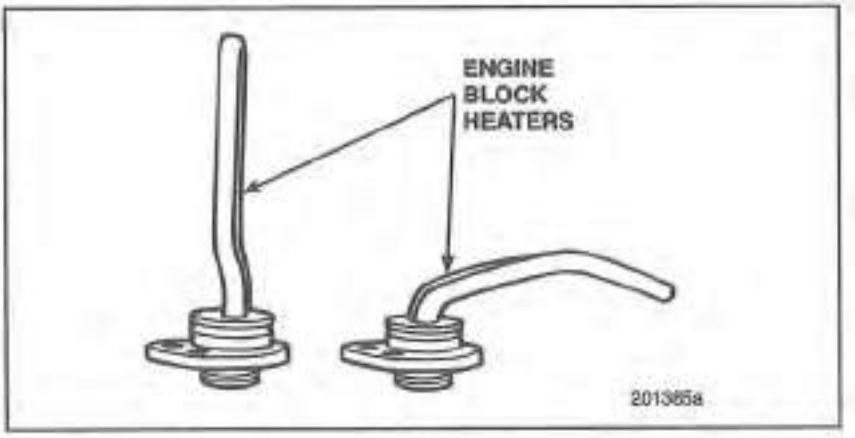
NOTE

Adding kerosene is NOT recommended for general use because both performance and fuel economy will be reduced.

- Refer to the MAINTENANCE AND LUBRICATION manual, TS494, for additional cold weather operating information.

Engine Block Heaters

An engine block heater works by heating the coolant surrounding the combustion chambers. Engine heaters are recommended to help combat the extreme demands of cold weather operating conditions. When the temperature drops, the engine heater can be plugged in overnight. The location of the engine heater power receptacle varies according to vehicle design.



Engine Heater Benefits

- Eliminates cold weather starting problems.
- Increases engine life significantly by keeping the engine warm and avoiding costly, excessive idling.
- Prevents external water leaks caused by excessive cold.
- Allows the cab to heat more quickly.
- Reduces the temperature at which ether is required.
- Allows the engine heaters to be activated as soon as the engine is stopped.

COUPLING

1. Position the tractor directly in front of the trailer.
2. Back the trailer slowly until the fifth wheel just contacts the trailer plate.
3. Place the transmission in neutral and apply the parking brakes.
4. Connect the trailer glad hands and electrical connector.

> **⚠ CAUTION**
>
> *Make sure the trailer air lines and the trailer electrical cord are properly supported so they will not be pinched or caught while the tractor is being backed under the trailer.*

5. Check that the fifth wheel height matches the height of the underside of the trailer. If the trailer is too high, use the landing gear to lower the trailer until fifth wheel and trailer height match. If the vehicle is equipped with AL suspension and the trailer is too low, use the AL suspension control switch to exhaust air from the suspension air bags until fifth wheel and trailer height match.

> **⚠ CAUTION**
>
> *Failure to match fifth wheel height with trailer height will result in the trailer being improperly connected.*

6. Back under the trailer slowly until the trailer king pin engages. Back slowly to avoid hitting the king pin too hard, and stop as soon as the king pin is locked into the fifth wheel.
7. If equipped with AL suspension, use the AL suspension control switch to reinflate the suspension air bags.
8. Raise the trailer landing gear slightly off the ground.

9. With the trailer parking brakes applied, pull the tractor ahead slightly to ensure that the trailer is locked onto the tractor.

10. Push the trailer air supply valve (red octagonal knob) in to supply the trailer system. With the air system at normal operating pressure, check the trailer air brake system for excessive leakage and proper operation.

11. Inspect the coupling to ensure the trailer is properly connected. Make sure there is no space between the fifth wheel and the trailer plate and that the fifth wheel jaws have closed around the shank of the king pin. Check that the locking lever is in the "lock" position and make sure the safety latch is in position over the locking lever.

12. After ensuring that the trailer is properly connected, raise the landing gear to its maximum height.

13. If wheel chocks were placed at the trailer wheels, remove the chocks and store.

⚠ CAUTION

If equipped with AL suspension, do NOT operate the vehicle with the suspension air bags deflated. Always reinflate the suspension after coupling or uncoupling a trailer.

UNCOUPLING

1. Park the tractor/trailer combination on a level surface. Make sure the parking surface will support the weight of the trailer, and make sure that the tractor is lined up straight with the trailer. Pulling out from under a trailer at an angle may damage the landing gear.
2. Push the trailer air supply valve (red octagonal knob) in to apply the trailer parking brakes.
3. Back the tractor slightly to ease pressure on the fifth wheel jaws. Apply the tractor parking brakes while still backing against the king pin so the combination will be held with pressure off the fifth wheel jaws.
4. Block the trailer wheels to prevent the trailer from moving.
5. Lower the trailer landing gear until the gear makes firm contact with the ground.
6. Disconnect the glad hands and the trailer electrical connector. Connect the glad hands to the dummy couplers at the back of the tractor and install the trailer electrical connector into the receptacle provided at the back of the cab.

⚠ CAUTION

Make sure the trailer air lines and electrical cord are properly suspended so they will not become tangled or damaged while the tractor is being driven.

⚠ WARNING

Keep legs and feet clear of the tractor rear wheels to avoid serious injury should the vehicle move when the fifth wheel is unlocked.

7. Unlock the fifth wheel.

8. Pull the tractor ahead slightly (approximately twelve inches) so that the king pin disengages the fifth wheel jaws.
9. If equipped with AL suspension, use the AL control switch to exhaust the air from the suspension air bags.
10. Pull the tractor ahead until the fifth wheel is out from under the trailer. Stop the tractor with chassis under the frame. This prevents the trailer from falling should the landing gear collapse or sink into the ground.
11. Place the transmission in neutral and apply the parking brakes.
12. Inspect the parked trailer to make sure the ground is supporting the trailer and the landing gear is not damaged.
13. If equipped with AL suspension, use the AL suspension control switch to reinflate the suspension air bags.
14. Release the parking brakes and drive the tractor forward until the tractor is clear of the trailer.

⚠ CAUTION

If equipped with AL suspension, do NOT operate the vehicle with the suspension air bags deflated. Always reinflate the suspension after coupling or uncoupling a trailer.

MOVING THE VEHICLE

General Information

Braking

Avoid sudden stops. Constant sudden stops may negatively affect braking performance and driving parts. When slowing, leave the clutch (if equipped) engaged as long as possible to use the braking effect of the engine.

⚠ CAUTION

When using the braking effect of the engine, final gear selection is critical. If gear selection is too high, the vehicle will buck which could cause loss of control.

E-Tech engines use a Jacobs engine brake. The best engine braking performance is achieved in the 1800 to 2100 rpm range. For optimum retarding power, keep engine speed as close to 2100 rpm as possible. For additional information, refer to the Jacobs driver's manual supplied with the vehicle.

Shifting

Operate in a gear low enough to allow the engine to accelerate to (or maintain) governed engine speed when applying full throttle. Allowing the engine to lug causes excessive strain on the engine, which could damage pistons, rings, cylinder walls, or bearings. However, be sure not to overspeed the engine.

⚠ DANGER

Always select the proper gear ratio BEFORE descending a grade (to avoid a runaway vehicle and to stay within safe and legal speed limits). Do NOT coast down hills. Gear ratios should be selected to allow the engine to operate between peak torque and rated speed.

⚠ CAUTION

Do not permit a load to drive the engine above governed speed. When descending steep grades, use lower gears and watch the tachometer. Overspeeding will cause severe drivetrain damage and eventually destroy the engine.

⚠ CAUTION

Running the engine at a speed that is too low for the load (or grade of the road) can cause damage to the drivetrain.

Shifting at the proper time will result in increased fuel efficiency, as well as a decrease in costly repairs. Remember that once the engine falls below peak torque, both torque and horsepower will drop off very rapidly. Before this happens, downshift to the next lower gear.

For vehicles with transmissions that have extreme reduction gearing coupled with high rear-axle loads, a torque-limiting device should be used. This device limits the amount of fuel that can be delivered to the engine and prevents overloading of drivetrain components while in extreme reduction gears.

Always use the same gear going downhill as uphill. This will reduce brake wear and prevent damage to the engine from overspeeding.

Engine Temperature

Before entering high-speed traffic conditions, allow the engine to reach normal operating temperature. A normal operating range is between 170°F and 225°F (77°C and 107°C) depending on weather and road conditions.

Clutch (If Equipped)

To avoid shock damage, release the clutch pedal smoothly, without shock-loading the driveline (especially on grades while carrying heavy loads). Do not ride the clutch pedal. Premature wear of the clutch facing and release bearing may result.

⚠ CAUTION

Always use the lowest drive gear combination to start the vehicle moving to avoid premature clutch failure.

General Instructions

1. To move the vehicle, start the engine and wait until it reaches operating temperature.
2. Disengage the clutch by pushing the pedal to the floor.
3. Shift the transmission into first or LO gear (see "Transmission Shifting Instructions" for specific procedures).
4. Release the parking brake.

> **⚠ CAUTION**
>
> *If the Parking Brake indicator is on, do NOT attempt to move the vehicle because driveline damage may result.*

5. Engage the clutch smoothly by allowing the clutch pedal to come up slowly. For comfortable starts, do not apply the accelerator until the clutch begins to engage.

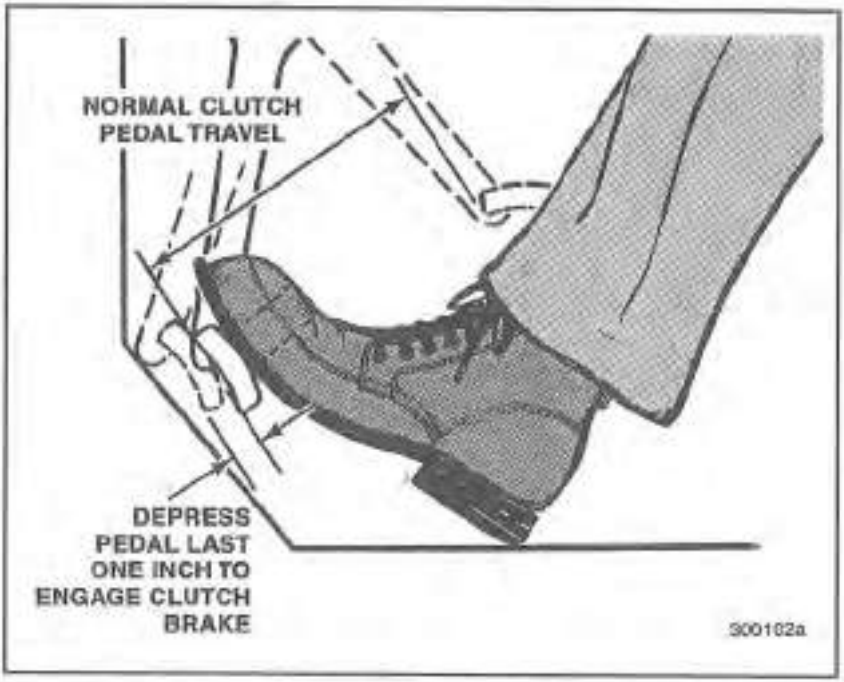
> **⚠ CAUTION**
>
> *Never allow your foot to ride the clutch pedal when the clutch is engaged. This will cause premature failure and increased clutch wear.*

6. As the vehicle gains speed, continue shifting until the transmission is in the highest gear possible (with engine in operating range).

> **NOTE**
>
> When the vehicle is equipped with a torque-limiting device, the engine must be warmed up to operating temperature before attempting to move in either REVERSE or LO-LO range.

Clutch Brake Operation

The clutch brake is designed to stop the rotation of the transmission input shaft while the truck is standing still. This makes shifting into first or reverse gears easier.



1. With the vehicle standing still, apply the clutch brake by pushing the clutch pedal all the way to the floor; the clutch brake is applied when the clutch pedal is fully depressed (the last one inch of travel past normal pedal travel).

NOTE

When the clutch is disengaged, a slight but definite resistance to clutch pedal downward travel will be felt in the last one inch.

2. Shift the transmission into first or reverse gear, engage the clutch and accelerate. The clutch brake is only to be used when the vehicle is stopped and is shifted into first or reverse gears. It is not designed to be used as an upshifting aid.

⚠ CAUTION

Clutch brake damage may result if used while the vehicle is in motion. The clutch brake must NOT be used when making a downshift or an upshift.

Double-Clutching

Double-clutching is a way to bring the speed of the transmission gears into synchronization so that the shift can be made without a clash. The engine is used to speed up the countershaft for a downshift and to slow it down for an upshift.

NOTE

For all nonsynchronized transmissions, double-clutching is necessary on downshifts and upshifts. It is advisable to use the torque-limiting clutch brake to engage first and REVERSE gears and to double-clutch for gear ratio changes.

1. Depress the clutch pedal and shift to NEUTRAL.
2. Release the clutch pedal and increase (downshift) or decrease (upshift) engine speed until it roughly corresponds to the road speed of the desired gear.
3. Depress the clutch pedal and complete the shift. Then release the clutch pedal.

POWER TAKE-OFF (PTO) OPERATION

If the vehicle is equipped with a Power Take-Off (PTO) unit, be sure to read the following section.

PTO Precautions

⚠ DANGER

Power Take-Off (PTO) units and related equipment can be very dangerous. Any PTO installation, repair or replacement should include a warning indicator light which indicates PTO engagement. The light must be located close to the PTO control and clearly visible to the operator.

⚠ DANGER

PTO units are driven by engine or drivetrain components (flywheel, crankshaft, transmission). Do not attempt to service the PTO and related units unless the engine is shut down.

⚠ DANGER

Always keep body parts and loose-fitting clothing out of the range of drivetrain components, or personal injury may result.

⚠ DANGER

Always be aware of the current PTO status (engaged or disengaged) and the position of the vehicle body (dump body controlled by PTO, etc.). Be sure to disengage the PTO when not in use.

PTO Classification

Rear-mounted PTO units, for MACK transmissions, are categorized according to operation.

Intermittent Service — The PTO unit is operated, under load, for less than seven minutes and then allowed to cool before it is operated again.

NOTE

If a PTO unit is operated for less than seven minutes but is "not" allowed to cool down before operating again, it is considered in Continuous Service.

Continuous Service — The PTO unit is operated, under load, for seven minutes or more.

NOTE

Rear-mounted PTO units operating under the Continuous Service guideline must not be run at more than 70% of the PTO output-rated torque/horsepower.

PTO Operating Procedures

Specific PTO operating procedures are described at the end of each type of transmission in the following section.

TRANSMISSION SHIFTING INSTRUCTIONS

⚠ CAUTION

The maximum safe oil temperature for manual transmissions is 250°F (121°C) for mineral-based oil, or 300°F (148°C) for synthetic oil. Continued operation with oil above this temperature will result in rapid deterioration of the oil's lubricating properties and is NOT recommended.

⚠ CAUTION

To avoid transmission damage, the vehicle must be completely stopped before shifted from REVERSE to any forward speed (and vice versa).

Shifting Instructions for Transmissions Other Than MACK

Please refer to the transmission operator's manual provided with your vehicle for shifting instructions.

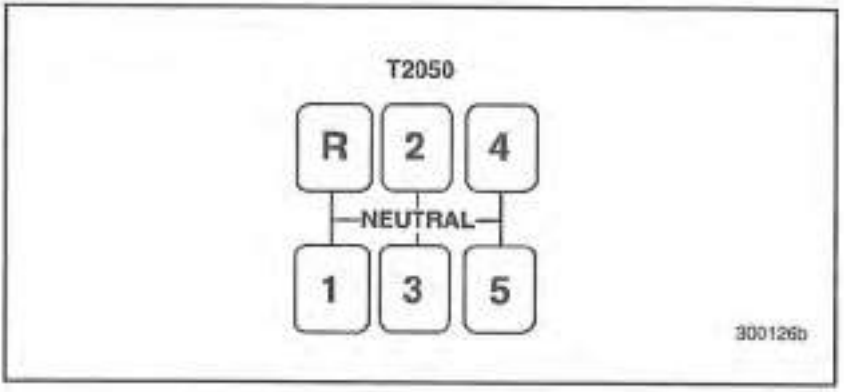
MACK T2050 Shifting Instructions

Upshift — The T2050 is a five-speed overgear transmission designed for general highway use. This is a nonsynchronized model that shifts through the use of a single shift lever in the traditional "H" pattern. Start out in first gear and shift up to second, third, fourth and fifth, double-clutching from one gear to the next.

Downshift — Downshift in reverse order, double-clutching through each gear.

⚠ CAUTION

Do NOT overspeed the engine during downshifting. Damage to the drivetrain components may result.



T2050 TRANSMISSION RATIOS

Gear	Ratio
1	5.24
2	3.05
3	1.73
4	1.00
5	0.60
Reverse	5.38

MACK T2060 Shifting Instructions

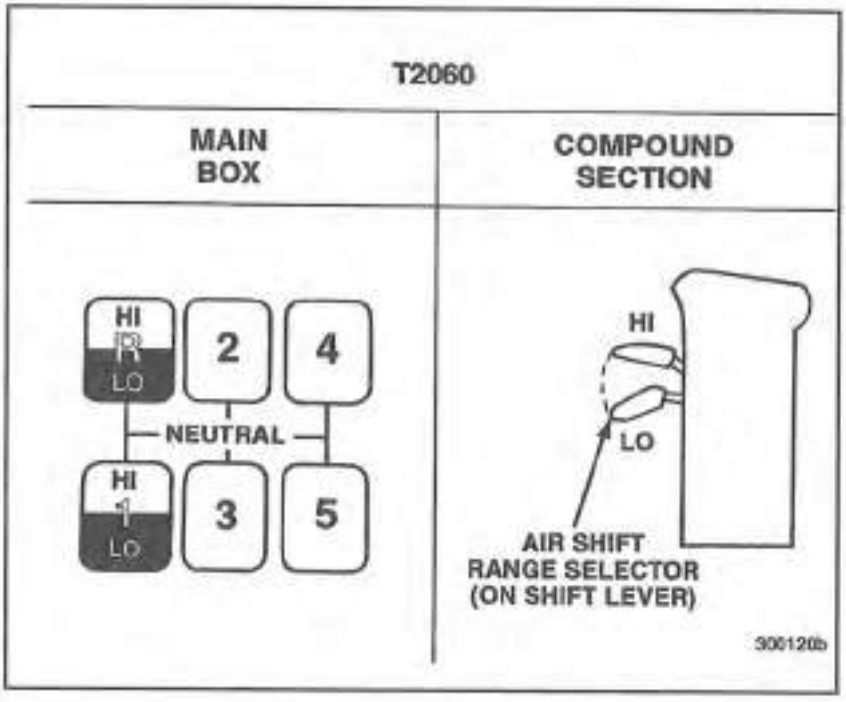
The T2060 is a nonsynchronized transmission. There is a LO and HI auxiliary compound section controlled by an air-shift range selector located on the shift lever. The LO range has one low ratio. The HI range has five forward gears which can be shifted in the standard manner. Remember, however, to double-clutch when moving up or down through the gears. For normal highway use, start in HI range, first gear and shift through second, third, fourth and fifth. The LO range is designed for off-highway use and in slow-moving operations (curb pouring, material spreading, heavy load, steep grade). REVERSE can be used in LO or HI range.

Upshift — Begin in first gear (LO range), depress the clutch pedal and release accelerator pedal. Flip air-shift range selector to HI range (while still in first gear). Release the clutch pedal and apply the accelerator to reach the top of the operating range. Shift through second, third, fourth and fifth, double-clutching through each gear.

Downshift — Downshift as normal through fifth, fourth, third, second and first (HI range), double-clutching through all gears. When you get to the low end of the first gear HI range, make final downshift to first gear, LO range by depressing the clutch pedal, releasing the accelerator, and flipping air-shift range selector to LO. Release the clutch pedal.

⚠ CAUTION

Do NOT overspeed the engine during downshifting. Damage to the drivetrain components may result. Do NOT preselect the air-shift range selector. Shift the auxiliary compound section only with the clutch pedal depressed and/or the shift lever in NEUTRAL.



T2060 TRANSMISSION RATIOS

Gear (Main Box)	Ratios	
	LO	HI
1	9.02	5.24
2	(5.25)	3.05
3	(2.98)	1.73
4	(1.72)	1.00
5 (T2060)	(1.03)	0.60
Reverse	9.25	5.38

( ) The ratios in parentheses are not practical to use.

MACK T2070-T2070F Shifting Instructions

The T2070-T2070F are nonsynchronized transmissions. These transmissions feature a LO and HI auxiliary compound section controlled by an air-shift range selector located on the shift lever. The LO range provides two low ratios. The HI range has five forward gears that can be shifted in the standard manner. Remember, however, to double-clutch when moving up or down through the gears. For normal highway usage, start in HI range, first gear and shift through second, third, fourth and fifth. The two gears in LO range are designed for off-highway use and in slow-moving applications (curb pouring, material spreading, heavy load/steep grade operation). REVERSE can be used in LO or HI range.

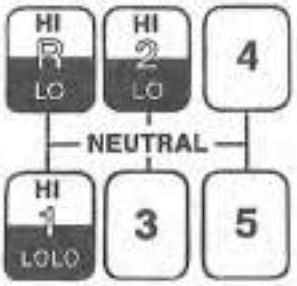
Upshift — Begin in first gear, LO range (commonly called LO-LO as shown on the shift pattern diagram). Double-clutch and upshift to second gear, LO range (called LO) in the normal manner. When ready to upshift again, depress the clutch pedal and release the accelerator pedal. Move the shift lever to NEUTRAL, then flip the air-shift range selector to HI range, double-clutch and move the shift lever back to first gear. This is first gear HI range, which provides the next higher ratio. Release the clutch pedal and apply the accelerator to reach the top of the operating range. Shift through second, third, fourth and fifth (HI range), being sure to double-clutch from one gear to the next.

Downshift — Downshift in reverse order from fifth through first gear (HI range), double-clutching through each gear. The next downshift will be to second gear, LO range (called LO). Proceed to depress the clutch pedal and release the accelerator pedal. Move the shift lever to NEUTRAL, then flip the air-shift range selector to LO range, double-clutch and move the shift lever to second gear. This is second gear, LO range, which provides the next lower ratio. When ready for the lowest ratio available (called LO-LO), double-clutch and downshift to first gear, LO range.

⚠ CAUTION

Do not overspeed the engine when downshifting the transmission. Damage to the drivetrain components can result. Do NOT preselect the air-shift range selector. Shift the auxiliary compound section only with the clutch pedal depressed and/or the shift lever in NEUTRAL.

T2070-T2070F

MAIN BOX	COMPOUND SECTION
	

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T2070-T2070F TRANSMISSION RATIOS

Gear (Main Box)	Ratios	
	LO	HI
1	14.16	5.24
2	8.25	3.05
3	(4.67)	1.73
4	(2.70)	1.00
5	(1.62)	0.60
Reverse	14.53	5.38

( ) The ratios in parentheses are not practical to use.

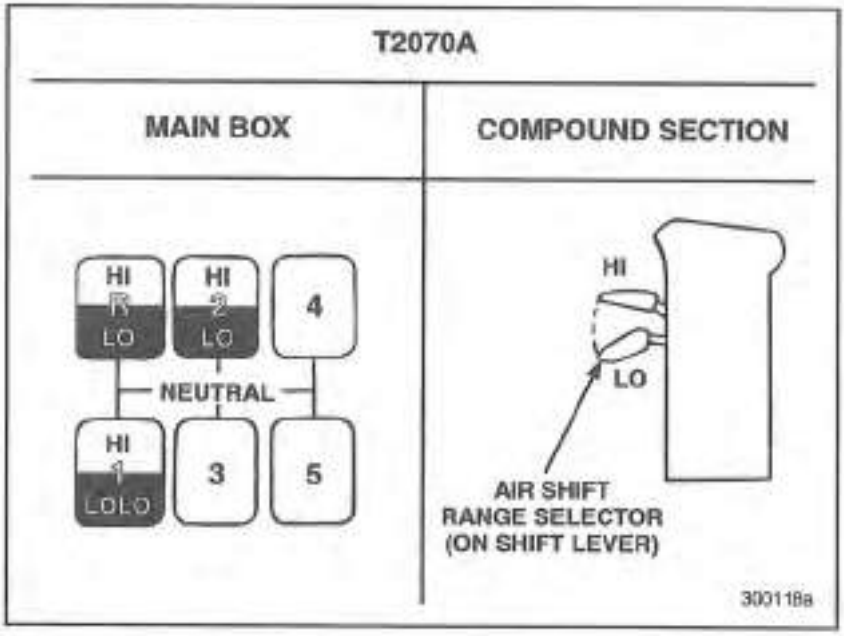
MACK T2070A (Long Compound) Shifting Instructions

The T2070A is a nonsynchronized transmission. There is a LO and HI auxiliary compound section controlled by an air-shift range selector located on the shift lever. There is also a compound neutral switch located on the dash to allow variable speed stationary (vehicle) operation of a rear case side-mounted PTO. The LO range has two low ratios. The HI range has five forward gears which can be shifted in the standard manner. Remember, however, to double-clutch when moving up or down through the gears. For normal highway use, start in HI range, first gear and shift through second, third, fourth and fifth. The two gears in LO range are designed for off-highway use and in slow-moving operations (curb pouring, material spreading, heavy load, steep grade). REVERSE can be used in LO or HI range.

⚠ CAUTION

Do NOT preselect the air-shift range selector on the T2070A. Shift the rear compound only with the clutch pedal depressed and the gearshift lever in NEUTRAL. To avoid transmission damage, do NOT change range while moving in reverse gear.

Upshift — Begin in first gear, LO range (commonly called LO-LO, as shown in the shift pattern illustration). Upshift to second gear, LO range (commonly called LO) in the normal manner (double-clutch). When you are ready to upshift again, depress the clutch pedal and release the accelerator pedal. Move the shift lever to NEUTRAL, then flip the air-shift range selector to HI, double-clutch and move the shift lever back to first gear. You are now in first gear, HI range (which is the next highest ratio). Release the clutch pedal and apply the accelerator to reach the top of the operation range. Shift through second, third, fourth and fifth (HI range), double-clutching through all gears.



T2070A TRANSMISSION RATIOS

Gear (Main Box)	Ratios	
	LO	HI
1	14.16	5.24
2	8.25	3.05
3	(4.67)	1.73
4	(2.70)	1.00
5	(1.62)	0.60
Reverse	14.53	5.38

( ) The ratios in parentheses are not practical to use.

Downshift — Downshift as normal from fifth to fourth, third, second to first (HI range), double-clutching through all gears. The next downshift will be to second gear, LO range (commonly called LO). When you are ready for this gear, depress the clutch pedal and release the accelerator pedal. Move the shift lever to NEUTRAL, then move the air-shift range selector to LO. Double-clutch and move the shift lever to second gear. You are now in second gear, LO range. Your next lower gear (and lowest ratio in the T2070A) is first LO (commonly called LO-LO). Double-clutch down to first gear (LO range) at the proper time.

⚠ CAUTION

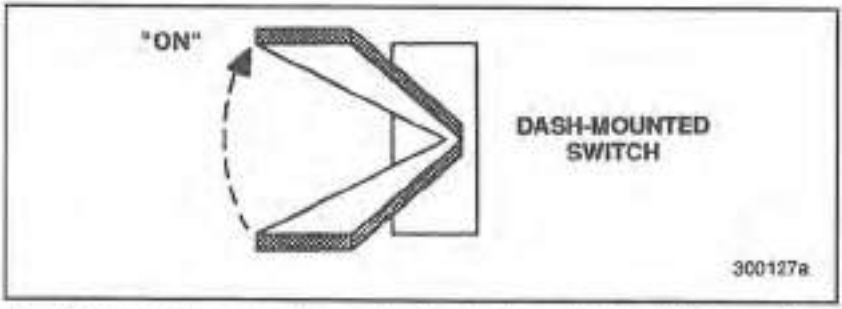
Do NOT overspeed the engine during downshifting. Damage to the drivetrain components may result. Do NOT preselect the air-shift range selector. Shift the auxiliary compound section only with the clutch pedal depressed and/or the shift lever in NEUTRAL.

Obtaining Neutral In Rear (Compound) Case

The T2070A has a two-position switch mounted on the dashboard which controls airflow to the rear case (compound). This allows the operator to obtain NEUTRAL in the rear case (compound) when needed for PTO operation when the vehicle is stationary. To get NEUTRAL in the rear case (compound), follow the procedure listed below.

Stationary PTO Operation (T2070A Only)

1. Depress the clutch pedal.
2. Apply the parking brake.
3. Move the main box shift lever to NEUTRAL.
4. Flip the dash-mounted compound neutral switch to ON.



5. Select and engage the required main box ratio for PTO operation.

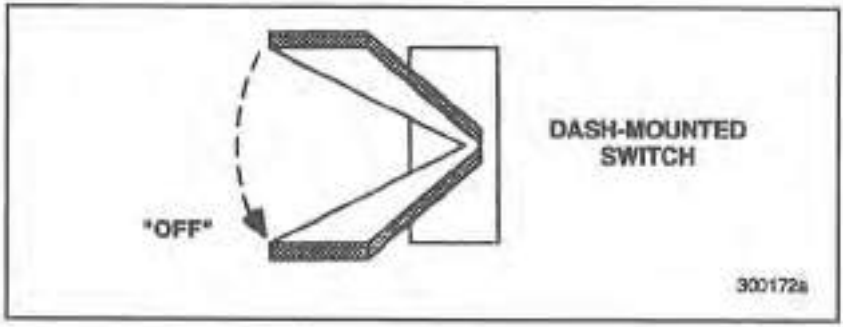
⚠ CAUTION

Very high PTO speed will cause equipment damage. Select the lowest gear that provides satisfactory operation.

6. Follow the applicable instructions for engaging the PTO.
7. Engage the clutch.

Road Operation (T2070A Only)

1. Depress the clutch pedal and move the main box shift lever to NEUTRAL.
2. Flip the dash-mounted compound neutral switch down to the OFF position.



MACK T2070B-T2070D Shifting Instructions

The T2070B-T2070D are nonsynchronized transmissions. These transmissions feature a LO and DIRECT auxiliary compound section controlled by an air-shift selector located on the main shift lever.

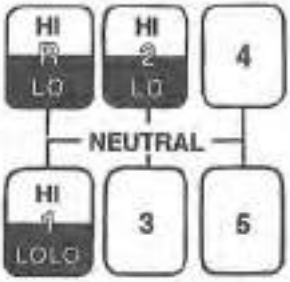
The T2070B-T2070D units also provide a multi-speed reverse feature by means of reverse gearing in the compound case which works in conjunction with the first-second-third speed gears in the main case. The air-shift selector must be moved to the R (REVERSE) position to use the multi-speed reverse feature.

The LO range provides two low ratios. The DIRECT provides five forward gears that can be shifted in the standard manner. Remember, however, to double-clutch when moving up or down through the gears. For normal highway use, start in DIRECT, first gear and shift through second, third, fourth and fifth. The two gears in LO range are designed for off-highway use and in slow-moving applications (curb pouring, material spreading, heavy load/steep grade operation).

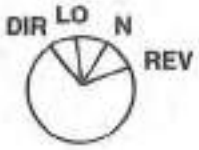
Upshift — Begin in first gear with the air-shift range selector at L (LO range), commonly called LO-LO as shown on the shift pattern diagram. Double-clutch and upshift to second gear, LO range (called LO) in the normal manner. When ready to upshift again, depress the clutch pedal and release the accelerator pedal. Push the shift lever to NEUTRAL, then move the air-shift selector to D (DIRECT), double-clutch and move the shift lever back to first gear. This is first gear DIRECT which provides the next higher ratio. Release the clutch pedal and apply the accelerator to reach the top of the operating range. Shift through second, third, fourth and fifth (DIRECT), being sure to double-clutch from one gear to the next.

T2070B – T2070D

MAIN BOX



COMPOUND SECTION



AIR SHIFT SELECTOR
(ON SHIFT LEVER)

300129b

T2070B-T2070D TRANSMISSION RATIOS

Gear (Main Box)	Ratios		
	LO	D	Reverse
T2070B			
1	14.16	5.24	12.42
2	8.23	3.05	7.23
3	(4.70)	1.73	4.12
4	(2.70)	1.00	(2.37)
5	(1.61)	0.60	(1.42)
T2070D			
1	14.16	5.24	12.42
2	8.23	3.05	7.23
3	(4.70)	1.73	4.12
4	(2.70)	1.00	(2.37)
5	(1.82)	0.67	(1.59)

( ) The ratios in parentheses are not practical to use.

Downshift — Downshift in reverse order from fifth through first gear (DIRECT), double-clutching through each gear. The next downshift will be to second gear, LO range (called LO). Proceed to depress the clutch pedal and release the accelerator pedal. Push the shift lever to NEUTRAL, then move the air-shift selector to L (LO range), double-clutch, and move the shift lever to second gear. This is second gear LO range, which provides the next lower ratio. When ready for the lowest ratio available (called LO-LO), double-clutch and downshift to first gear (LO range).

To utilize reverse gear(s), proceed as follows:

- Bring the vehicle to a complete stop. Check that shift lever is in NEUTRAL position.
- Move the air-shift selector to R (REVERSE). Depress the clutch pedal and move the shift lever to first gear. Release the clutch pedal and apply the accelerator to reach the top of the operating range. Shift through second and third gears as needed for desired reverse speed, being sure to double-clutch from one gear to the next.

⚠ CAUTION

Do not overspeed the engine when downshifting the transmission, or damage to drivetrain components can result.

Obtaining NEUTRAL in the Compound (Rear Case)

The T2070B and T2070D transmissions feature a neutral switch (N in illustration) located on the air-shift selector (on the shift lever). This allows variable speed stationary (vehicle) operation of a rear case, side-mounted power take-off (PTO).

Stationary PTO Operation (T2070B and T2070D)

1. Depress the clutch pedal.
2. Apply the parking brake.
3. Move the main box shift lever to NEUTRAL.
4. Move the air-shift selector to the N (NEUTRAL) position.
5. Move the shift lever to the correct gear position for the required main box ratio for PTO operation.

> **⚠ CAUTION**
>
> *Very high PTO speed will cause equipment damage. Select the lowest gear that provides satisfactory operation.*

6. Follow the applicable instructions for engaging the PTO.
7. Engage the clutch.

Road Operation

1. Depress the clutch pedal and move the main box shift lever to NEUTRAL.
2. Move the air-shift selector from the N (NEUTRAL) position, and place in D (DIRECT), L (LO range), or R (REVERSE) as needed.

MACK T2080 Shifting Instructions

⚠ CAUTION

Make sure air pressure is at least 100 psi and unit is warmed before making range shifts. Always start in LO range. This also applies to dynamometer testing. When the truck is stationary; do NOT shift into HI range and then start moving the truck. Otherwise, damage to the synchronizer may result. To avoid transmission damage, do NOT change range while in REVERSE.

The T2080 is a range-shifted transmission with eight forward speeds. LO and HI ranges are controlled by an air-shift range selector located on the shift lever.

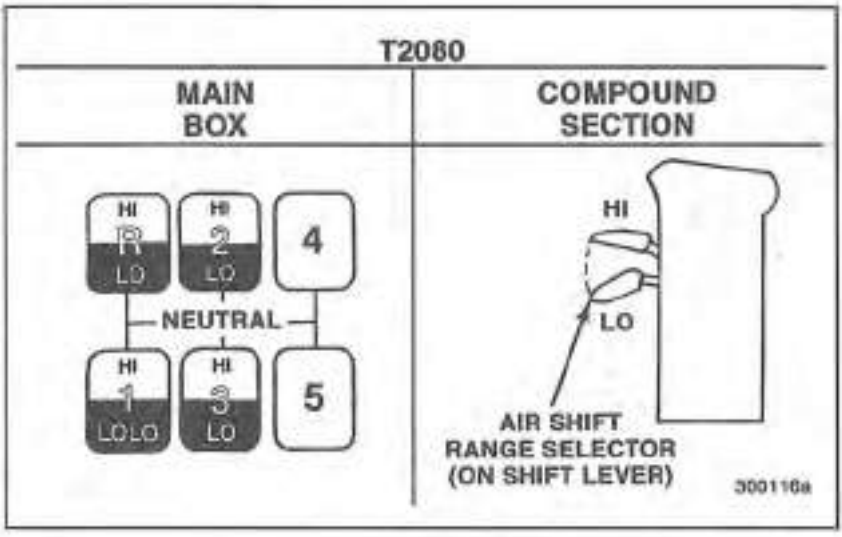
Never attempt to move the vehicle from a stopped position in any gear higher than third LO. Depending on load, grade or road conditions, you will very likely have to start in first LO-LO or second LO. All three speeds in LO range are torque limited.

Upshift — If all eight forward speeds are necessary to get up to fifth HI, the following procedures should be used. With shift lever in NEUTRAL, flip the air-shift range selector down to LO range, then shift the transmission into first LO-LO. Shift up through second LO and third LO, double-clutching between the gears. When maximum RPM has been reached in third LO, flip the air-shift range selector to HI range (preselect) and then move the shift lever through NEUTRAL to first HI. When passing through NEUTRAL, your shift lever will put you in HI range. Now follow the normal sequence (second HI, third HI, fourth HI and fifth HI), double-clutching through all gears.

⚠ CAUTION

Do NOT overspeed the engine during downshifting. Damage to the drivetrain may result.

Downshift — Shift from fifth HI down through HI range (fourth HI, third HI, second HI and first HI), double-clutching through all gears. While still in first HI, flip the air-shift range selector to LO range (preselect) and move the shift lever through NEUTRAL to third LO. The move through NEUTRAL again activates the air-shift mechanism, this time to LO range. Then shift down to second LO and first LO-LO, double-clutching between all gears.



T2080 TRANSMISSION RATIOS

Gear (Main Box)	Ratios	
	LO	HI
1	20.08	5.24
2	11.68	3.05
3	6.63	1.73
4	(3.83)	1.00
5	(2.29)	0.60
Reverse	20.61	5.38

( ) The ratios in parentheses are not practical to use.

MACK T2080B Shifting Instructions

⚠ CAUTION

Make sure air pressure is at least 100 psi and unit is warmed before making range shifts. Always start in LO range. This also applies to dynamometer testing. When the truck is stationary, do NOT shift into HI range and then start moving the truck. Otherwise, damage to the synchronizer may result. To avoid transmission damage, do NOT change range while in REVERSE.

The T2080B transmission features a LO and DIRECT auxiliary compound section controlled by an air-shift selector located on the main shift lever. This compound section is equipped with a synchronizer to facilitate LO-DIRECT range shifting.

The T2080B unit also provides a multi-speed reverse feature by means of reversing gearing in the compound case which works in conjunction with the first-second-third speed gears in the main case. The air-shift selector must be moved to the R (REVERSE) position to use the multi-speed reverse feature.

The LO range provides three low ratios. Never attempt to move the vehicle from a stopped position in any gear higher than third LO. Depending on the load, grade or road conditions, it may be necessary to start in first LO-LO or second LO. All three speeds in LO range are torque limited.

The DIRECT has five forward gears that can be shifted in the standard manner. Remember, however, to double-clutch when moving up or down through these gears.

Upshift — To upshift the transmission through all eight forward speeds, the following procedures should be used: With the shift lever in NEUTRAL, move the air-shift selector to L (LO range) and shift the transmission into first LO-LO. Shift up to second LO and third LO, double-clutching between the gears. When maximum engine RPM has been reached in third LO, preselect by moving the air-shift selector to D (DIRECT) and then move the shift lever through NEUTRAL to first DIRECT. As the shift lever passes through NEUTRAL, it will put the transmission in DIRECT range. Now follow the normal shift sequence (two-three-four-five DIRECT), being sure to double-clutch from one gear to the next.

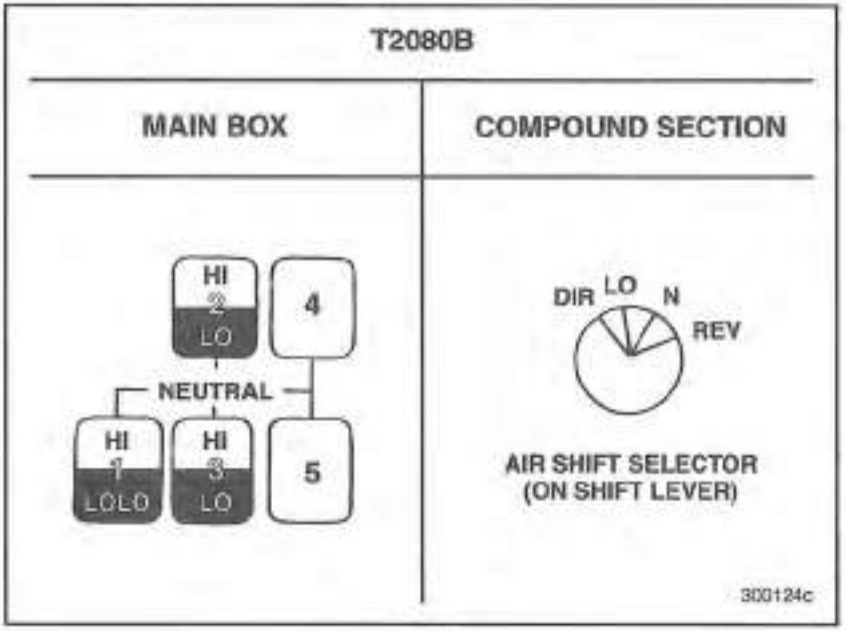
Downshift — Downshift in reverse order from fifth through first gear DIRECT, double-clutching through each gear. While still in first DIRECT, preselect by moving the air-shift selector to L (LO range) and then move the shift lever through NEUTRAL to third LO. The move through NEUTRAL activates the air-shift mechanism, this time to LO range. Then shift down to second LO and first LO-LO, double-clutching between all gears.

To use reverse gear(s), proceed as follows:

- Bring the vehicle to a complete stop. Check that shift lever is in NEUTRAL position.
- Move the air-shift selector to R (REVERSE). Depress the clutch pedal and move the shift lever to first gear. Release the clutch pedal and apply the accelerator to reach the top of the operating range. Shift through second and third gears as needed for desired reverse speed, being sure to double-clutch from one gear to the next.

⚠ CAUTION

Do NOT overspeed the engine when downshifting. Damage to the drivetrain may result. Also, when the truck is stationary, do NOT shift to DIRECT (D) and then start to move the truck. Damage to the synchronizer may result.



T2080B TRANSMISSION RATIOS

Gear (Main Box)	Ratios		
	LO	D	Reverse
T2080B			
1	20.08	5.24	17.62
2	11.68	3.05	10.25
3	6.63	1.73	5.82
4	(3.83)	1.00	(3.37)
5	(2.29)	0.60	(2.01)

( ) The ratios in parentheses are not practical to use.

Obtaining Neutral in Rear (Compound) Case

The T2080B transmission features a neutral switch (N in shift pattern illustration) located on the air-shift selector (on shift lever). This allows variable speed stationary (vehicle) operation of a rear case, side-mounted power take-off (PTO).

Stationary Operation for PTO on Transmission Compound, Rear Case (T2080B)

1. Depress the clutch pedal.
2. Apply the parking brake.
3. Move the main box shift lever to NEUTRAL.
4. Move the air-shift selector to the N (NEUTRAL) position.
5. Move the shift lever to the correct gear position for the required main box ratio for PTO operation.

> **⚠ CAUTION**
>
> *Very high PTO speed will cause equipment damage. Select the lowest gear that provides satisfactory operation.*

6. Follow the applicable instructions for engaging the PTO.
7. Engage the clutch.

Road Operation

1. Depress the clutch pedal and move the main box shift lever to NEUTRAL.
2. Move the air-shift selector from the N (NEUTRAL) position, and place in L (LO range) or R (REVERSE) as needed.

MACK T2090 Shifting Instructions

⚠ CAUTION

Make sure air pressure is at least 100 psi and unit is warmed before making range shifts. Always start in LO range. This also applies to dynamometer testing. When the truck is stationary, do NOT shift into HI range and then start moving the truck. Otherwise, damage to the synchronizer may result. To avoid transmission damage, do NOT change range while in REVERSE.

NOTE

The following shifting instructions are based on the RECOMMENDED T2090 shift pattern. If optional shift pattern is used, refer to T2090 OPTIONAL SHIFT PATTERN instructions.

The T2090 unit is a range-shifted transmission which has eight forward highway speeds plus an extra LO speed gear in the LO range. This transmission features a LO and HI auxiliary compound section controlled by an air-shift range selector located on the shift lever. The compound section is equipped with a synchronizer to facilitate LO-HI range shifting.

The LO range provides four low ratios. Never attempt to move the vehicle from a stopped position in any gear higher than third gear. Depending on the load, grade or road conditions, it may be necessary to start in LO speed gear or first-second gears. Note that LO speed gear was designed for off-highway use such as paving, material spreading or heavy load/steep grade conditions.

The HI range has five forward gears that can be shifted in the standard manner. Remember, however, to double-clutch when moving up or down through these gears.

REVERSE gear is used in LO range only. (With the shift lever in NEUTRAL, flip the air-shift range selector down to LO range, then shift the transmission into REVERSE gear.)

Upshift — Under normal highway conditions, with shift lever in NEUTRAL, flip air-shift range selector to LO range, then shift the transmission into first gear (see shift pattern). Shift through second and third, double-clutching between gears. When maximum RPM is reached in third gear, flip air-shift range selector to HI range (preselect) and then move shift lever through NEUTRAL to fourth gear. As the shift lever passes through NEUTRAL, it will put the transmission in HI range. Now continue double-clutching through fifth, sixth, seventh and eighth.

⚠ CAUTION

Do NOT move the air-shift range selector while moving in REVERSE. Also, when the truck is stationary, do NOT shift into HI range and then start moving the truck. Damage to the synchronizer may result.

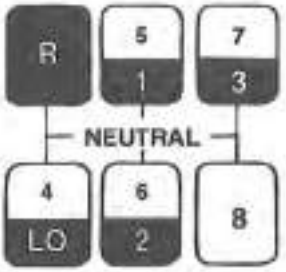
Downshift — To downshift the T2090, shift from eighth to seventh, sixth, fifth, and fourth (HI range), double-clutching between gears. While still in fourth gear, flip the air-shift range selector to LO range (preselect), then shift through NEUTRAL to third gear. As you shift through NEUTRAL, the range shift to LO will be completed. Move the shift lever to second and first, double-clutching between gears.

⚠ CAUTION

Do NOT overspeed the engine during downshifting. Damage to the drivetrain may result.

T2090
RECOMMENDED SHIFT PATTERN – CURRENT T2090 UNITS

MAIN BOX



COMPOUND SECTION

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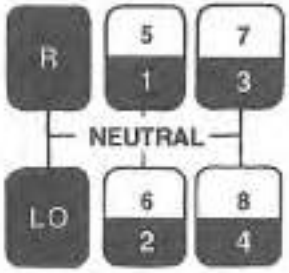
T2090 TRANSMISSION RATIOS — CURRENT T2090 UNITS

Gear (Main Box)	LO Range	Gear (Main Box)	HI Range
LO	10.69	4	2.78
1	7.45	5	1.94
2	5.33	6	1.39
3	3.84	7	1.00
(4)	(2.73)	8	0.71
Reverse	10.92	(Reverse)	(2.84)

( ) The ratios in parentheses are not practical to use.

T2090
OPTIONAL SHIFT PATTERN

MAIN BOX	COMPOUND SECTION



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T2090 OPTIONAL TRANSMISSION RATIOS

Gear (Main Box)	LO Range Ratio	Gear (Main Box)	HI Range Ratio
LO	10.69	(LO)	(2.78)
1	7.45	5	1.94
2	5.33	6	1.39
3	3.84	7	1.00
4	2.73	8	0.71
Reverse	10.92	(Reverse)	(2.84)

( ) The ratios in parentheses are not practical to use.

Preferred Methods for Engaging T2090 "Eighth" Gear for Output Shaft Driven Power Take-Off Operation

NOTE

OPTIONAL RANGE ENGAGEMENT INDICATOR LAMP — If the vehicle is so equipped, an indicator lamp, located in the cab, will illuminate to indicate that the range shift has occurred.

Method #1 — PTO Operation with Wheels OFF the Ground

1. Position the vehicle for power take-off operation.
2. Stop the vehicle and apply the spring brakes.
3. Raise the vehicle wheels off the ground.
4. Shift the transmission to neutral.
5. Turn on PTO.
6. Place the range selector to HIGH.
7. Fully depress the clutch pedal and shift the transmission to REVERSE.
8. Slowly release the clutch pedal until the transmission range clutch engagement is heard; or, if so equipped, until the range engagement indicator lamp is lit.
9. Fully depress the clutch pedal.
10. Shift the transmission to EIGHTH gear.
11. Release the clutch pedal to begin PTO operation.

Method #2 — PTO Operation with Wheels ON the Ground

1. Position the vehicle for power take-off operation.
2. Stop the vehicle and apply the spring brakes.
3. Keep the vehicle wheels on the ground.
4. Shift the transmission to neutral.
5. Place the range selector to HIGH.
6. Fully depress the clutch pedal and shift the transmission to REVERSE.
7. Slowly release the clutch pedal until the transmission range clutch engagement is heard; or, if so equipped, until the range engagement indicator lamp is lit.
8. Fully depress the clutch pedal.
9. Turn on PTO.
10. Shift the transmission to EIGHTH gear.
11. Release the clutch pedal to begin PTO operation.

AXLES

Rear Axle

Mack Trucks, Inc. provides axle housings in three capacity classifications:

- Medium Duty
- Heavy Duty
- Extra-Heavy Duty

To deliver the appropriate amount of torque to the driving wheels, MACK offers dual-reduction carriers in a variety of ratios.

Mack Trucks, Inc. offers a large variety of four-wheel-drive tandem axles with top-mounted, dual-reduction carriers (for straight line through drive). Carriers are also available in a large number of ratios.

All four-wheel-drive tandem carriers are available with the MACK inter-axle power divider third differential (with or without a power divider lockout).

MACK rear axles are designed so the entire load is carried by the axle housing (through the wheel bearings mounted on the housing spindle). The rear axle shafts are either free-splined (both ends) or integral flange type. Both types of axle shafts can be removed without removing or disturbing the rear wheels.

To avoid excessive tire wear, proper maintenance must be practiced and rear axle tires must be matched.

⚠ CAUTION

The maximum safe oil temperature for a MACK rear axle is 250°F (121°C). Continued operation with oil above this temperature will result in rapid deterioration of the oil's lubricating properties and is NOT recommended.

Two-Speed Rear Axle

The dual-reduction (two-speed) rear axle carrier provides two axle speeds. The axle shift button (on the transmission shifter lever) allows the driver to select the axle gear (HI or LO).

Split Shifting — To shift to a higher transmission gear and the LO axle speed at the same time:

1. Shift the transmission to the higher gear.
2. Push the axle shift button down just before re-engaging the clutch.
3. Re-engage the clutch and depress the accelerator pedal (to maintain road speed).

To shift to a lower transmission gear and the HI axle speed at the same time:

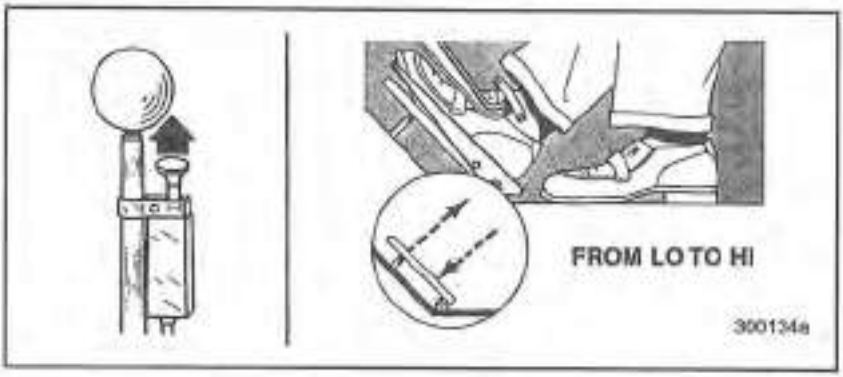
1. Depress the accelerator pedal and pull the axle shift button up.
2. Shift the transmission to a lower gear, then depress the accelerator pedal (to maintain road speed).

⚠ CAUTION

Always keep the accelerator pedal down when the axle shift button is moved, except when split shifting to LO axle speed. The vehicle must be brought to a full stop before shifting from forward to REVERSE, and vice versa.

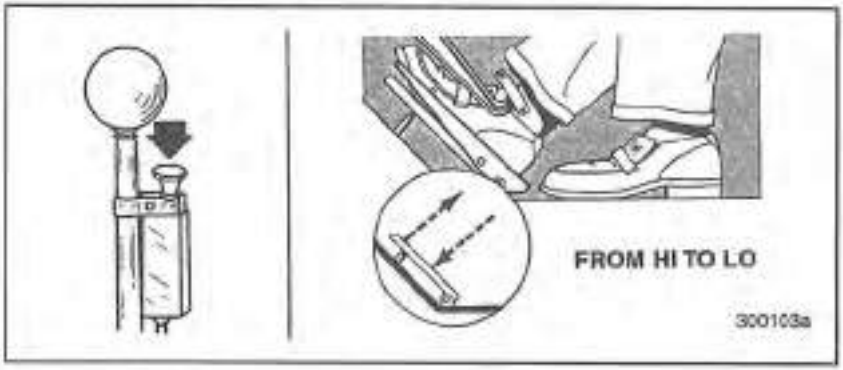
To shift from LO to HI speed:

1. Depress the accelerator pedal and pull the axle shift button up.
2. Release the accelerator pedal and pause until the shift is completed.
3. Depress the accelerator pedal to maintain road speed.



To shift from HI to LO speed:

1. Push the axle shift button down and depress the accelerator pedal.
2. Disengage and re-engage the clutch as quickly as possible while holding the accelerator pedal down (or release and depress the accelerator as quickly as possible without declutching).



Inter-Axle Power Divider Lockout (If Equipped)

The MACK power divider can be rendered inoperative, during short periods of poor traction, using a power divider lockout. When the power divider lockout is engaged, both axles are locked together (in positive through-drive) for maximum traction with no differential action between axles. It is not necessary to stop the vehicle to engage the power divider lockout. The lockout may be engaged while the vehicle is moving, as long as the wheels are not spinning.

⚠ CAUTION

Do not engage the power divider lockout if the wheels are spinning.

NOTE

Even when no traction is available at the spinning wheel, the driver can "feather" the brakes (apply the brakes slightly), creating enough resistance at that wheel to allow power to the axle with traction.

Engaging the Power Divider Lockout

Normally, the Power Divider switch is in the OUT (disengaged) position. In poor traction conditions, it may be necessary to provide positive through-drive to both axles by flipping the switch to the locked (engaged) position.

1. Push switch to engage.
2. Momentarily release the accelerator pedal to allow the shift to take place, then drive through the slippery area.

NOTE

A lockout indicator lamp will remain lit as long as the lockout is engaged. This is to remind the driver to release the lockout as soon as normal traction is regained.

3. When driving conditions permit, unlock the power divider by moving the Power Divider switch back to the OUT (disengaged) position. Then release the accelerator pedal momentarily (to shift out of the locked position) and drive as usual.

⚠ CAUTION

Do NOT (under any circumstances) engage or disengage the lockout while the drive wheels are actually slipping or spinning; clashing between the lockout sliding clutch and the outer cam may result.

TABLE OF CONTENTS

MAINTENANCE INTRODUCTION

Preventive maintenance is vital to the life of your new vehicle. This section of the Operator's Handbook covers items of importance concerning the proper care of MACK vehicles. A well-run maintenance and lubrication program is the best way to ensure a long life of productive operation.

The operator plays an important role in the proper care of this equipment. By performing daily checks and observing the equipment while in operation, minor defects can be caught and corrected before they become major problems. Make sure any problems are corrected before putting the equipment into operation.

If you have any questions concerning the proper care, maintenance and lubrication of your vehicle, or if you need help in developing a preventive maintenance program, contact the service manager at the local MACK Sales, Parts and Service Center.

NOTE

This handbook contains basic maintenance information. For complete maintenance and lubrication procedures, refer to the MAINTENANCE AND LUBRICATION manual, TS494.

TOWING

There is one center-mounted tow pin located in the front bumper. The device meets the requirements set forth by The Maintenance Council (TMC) of the American Trucking Association and can be used for towing a disabled vehicle from the immediate location.

If it is necessary to remove the tow pin, remove the retainer clip first. Once the retainer clip is pulled, the tow pin can be lifted out of the bumper hole.

⚠ CAUTION

Do NOT lift and tow any vehicle by tow pins, hooks, eyes, etc. If the vehicle is mired in heavy mud, snow, etc., use a suitable sling-type towing arrangement.

NOTE

Tow pins, hooks, eyes, etc., are NOT intended for use as long-term towing devices.

⚠ CAUTION

Failure to disconnect the driveline before towing or pushing the vehicle can cause serious transmission damage.

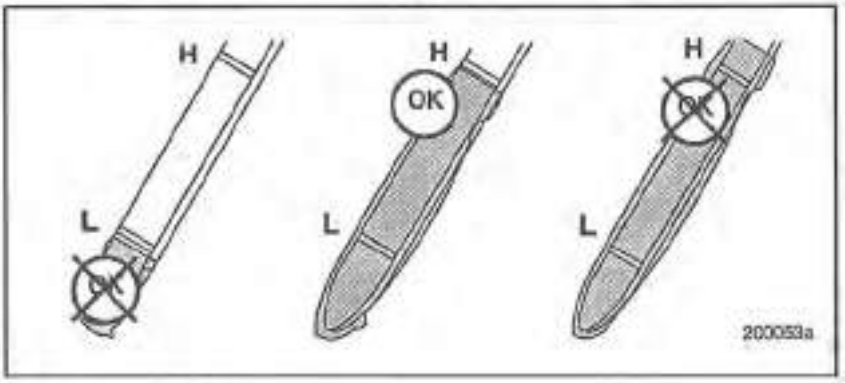
Before towing or pushing the vehicle, the driveline should be disconnected or the drive wheels should be lifted off the ground.

ENGINE OIL LEVEL CHECK

As the operator of this vehicle, it is important for you to perform the daily inspections necessary to keep your truck in good shape. Maintaining the proper oil level in your engine crankcase cannot be overemphasized.

Before checking the oil, remember these important points:

- Measurement of the oil level must be taken on level ground.
- If the engine has been running, allow about 15 minutes after shutdown for oil to drain down to the oil pan.
- The level must be close to the FULL line (at least between the ADD and FULL lines) on the dipstick, but must NOT exceed the FULL line (refer to illustration below).



COOLING SYSTEM

The cooling system is a pressurized system. The coolant is circulated by a centrifugal pump. It is a typical system in most respects, but there are a few things to keep in mind when checking or working on the cooling system.

⚠ WARNING

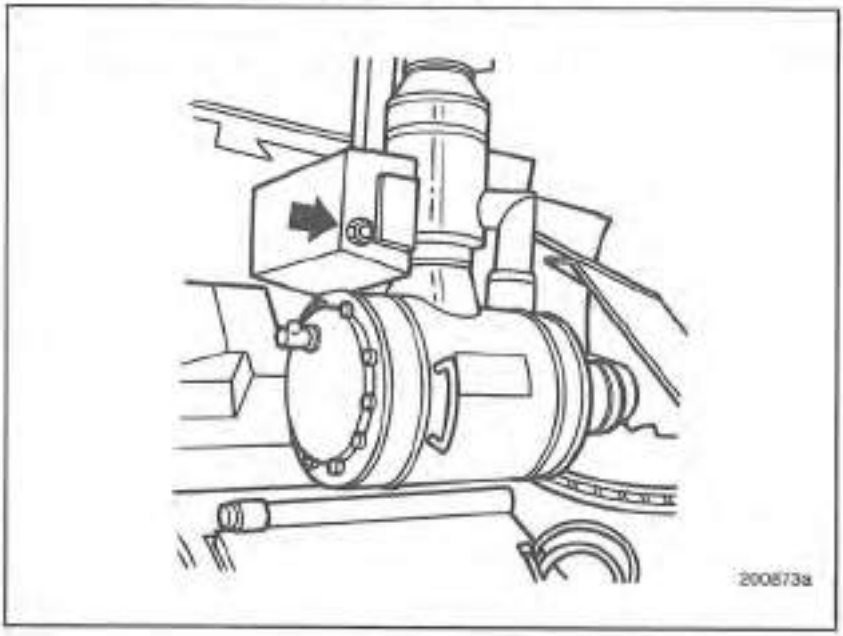
Avoid injury when checking coolant in a hot engine. Wait for the engine to cool prior to checking the level whenever possible.

Coolant Level Check

⚠ WARNING

Turn the radiator cap counterclockwise to the first stop but do NOT depress. After the pressure has completely dissipated, press the cap downward and continue turning to remove.

The MR model chassis has a pressurized surge tank located on the left-hand side of the chassis, mounted on the air cleaner assembly support bracket. Coolant should be visible in the sight glass (see arrow in illustration) located on the side of the tank.



Draining the Cooling System

Whenever repairs are to be made which would require disconnection of coolant hoses, etc., the cooling system should be drained. Carefully remove the filler cap and remove all pipe plugs.

Refilling the Cooling System

Close all drain cocks and fill with the proper coolant mixture. Run engine with the pressure cap removed until operating temperature is reached and the thermostat opens. Recheck level and add coolant if required. Run the engine long enough to be sure the system is free of air and has the correct amount of coolant.

Protecting the Cooling System

⚠ CAUTION

The concentration of ethylene glycol or propylene glycol in the cooling system must be checked with a refractometer prior to traveling or operating in areas where subfreezing temperatures may be encountered. When adding antifreeze to the system, run the engine for 20 minutes before checking with a hydrometer.

NOTE

Your chassis is currently supplied from the factory with engine coolant protection to –10°F (–23°C). Optional coolant protection to –40°F (–40°C) is also available.

Ethylene glycol or propylene glycol-based antifreezes are both approved for all MACK engines. All ethylene glycol and propylene glycol coolants must be low-silicate antifreezes which meet ASTM4985 test (GM6038M SPEC) criteria. These antifreezes are sometimes referred to as heavy-duty diesel coolants. Passenger car coolants do NOT meet this specification.

Be sure to maintain the required level of antifreeze protection for anticipated winter temperatures in your area of operation. A 40% to 60% concentration of antifreeze is required for E-Tech engines, regardless of application, geographic location or ambient air temperature.

⚠ CAUTION

Do NOT exceed a 60% concentration of antifreeze to water. A higher percentage of antifreeze will not increase protection. Concentrations over 60% adversely affect freeze protection and heat transfer rates.

NOTE

Propylene glycol should be checked with a refractometer.

NOTE

ALWAYS mix the water/antifreeze solution before pouring it into the cooling system.

NOTE

The piping arrangement may cause capacity variation depending on the type of cooling system and optional external cooling devices which may be attached. Therefore, it is difficult to tell exactly how much coolant it will take to fill any one particular system.

⚠ CAUTION

Do NOT use coolant solutions which contain anti-leak additives in trucks equipped with coolant filters or conditioners.

⚠ CAUTION

Do NOT use soluble oil-type coolants in any MACK cooling system.

Cooling System Maintenance

The cooling system must be maintained by performing regularly scheduled maintenance as outlined in the MAINTENANCE AND LUBRICATION manual, TS494. Cold weather operations, however, place added demands on the cooling system. Prevent potential cold weather problems by performing a quick check of the cooling system as outlined below:

- Make a general check for cooling system leaks.
- Inspect hoses and clamps for leaks and condition. Tighten hose clamps to specifications (as required).
- Check coolant level. Add fresh coolant (in specified concentration) as necessary.
- Check and record degree of antifreeze concentration. Add antifreeze as necessary to obtain required protection level.

Winterfronts

A MACK-approved winterfront, although not recommended for normal operation, may be used during cold weather to aid the engine in reaching and maintaining engine coolant temperatures within the normal operating range.

A winterfront, although not recommended for normal operation, may be used during cold weather to aid the engine in reaching and maintaining engine coolant temperatures within the normal operating range.

⚠ CAUTION

Use only a winterfront designed for the specific chassis. Restricted air flow through the charge air cooler can cause higher exhaust temperatures, power loss, excessive fan usage, reduced fuel economy and possible engine or charge air cooler damage. The use of any other type of device, such as a radiator cover, cardboard or similar material, is not approved by Mack Trucks, Inc.

NOTE

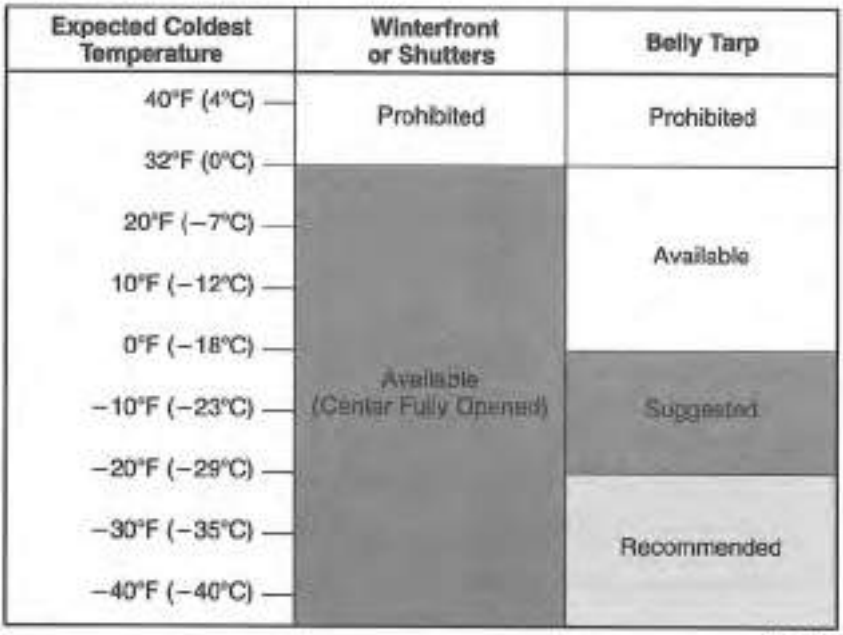
The minimum operating temperature is 170°F (77°C).

If a winterfront is used, a MACK-approved exhaust pyrometer must also be installed and closely monitored while the engine is in operation.

⚠ CAUTION

DO NOT exceed the maximum exhaust temperature listed on the pyrometer decal. To reduce exhaust temperature, open the winterfront, downshift or reduce engine power.

Refer to the following chart for suggested temperature ranges concerning the use of various cold-weather accessories.



⚠ CAUTION

Winter treatments are NOT RECOMMENDED for vehicles which only operate intermittently in cold climates.

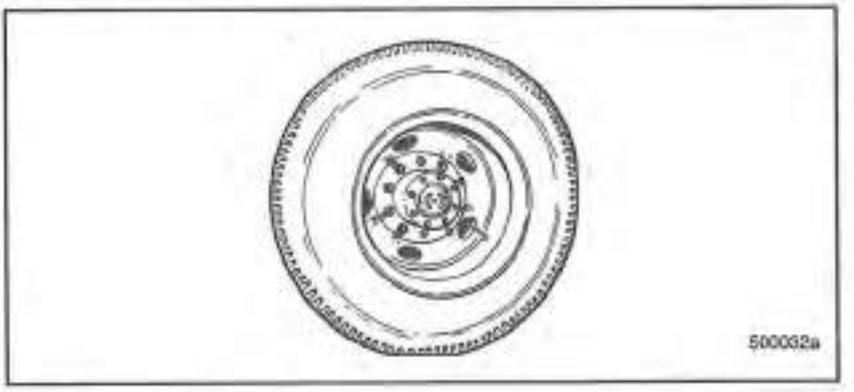
⚠ CAUTION

Never fully close the winterfront if equipped with viscous fan drive.

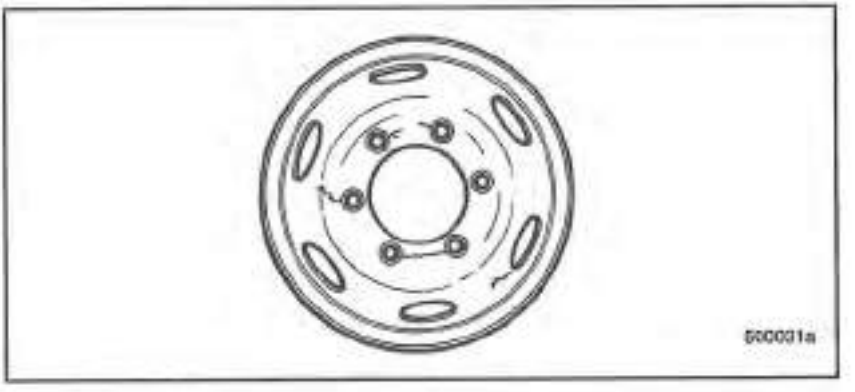
WHEELS

Wheel Inspection

Look at the wheels and cap nuts. Inspect them for evidence of cap nut looseness. Rust streaks from the cap nut ball seat are an indication of looseness. Refer to the MAINTENANCE AND LUBRICATION manual, TS494, for complete procedures concerning wheel inspection and wheel nut tightening.



Look for cracks around the hand hole, stud hole and wheel. Look for broken studs, wheel damage or improperly seated lock rings.



Tires

⚠ DANGER

Tires used on multipiece rims must be assembled and inflated only by experienced, qualified personnel. Tires must be inflated in a safety cage whenever possible. If, however, a safety cage is not available, use a portable lock-ring guard. The tire must be deflated prior to removal of the tire-and-rim assembly from the vehicle. Remove the valve core to ensure complete deflation.

⚠ DANGER

NEVER position your body in front of the rim during inflation.

⚠ CAUTION

NEVER use water-based sealants, puncture proofing, or liquid balance materials containing water in All-Steel Radial Ply truck tires.

Inflation Pressure

To ensure maximum mileage and overall performance from your tires, it is essential that they operate at the correct inflation pressure for the load carried. Inflation pressure should be checked daily while the tires are cold. Always use an accurate tire pressure gauge. NEVER bleed air from a hot tire, as it will then be underinflated. Refer to the specific tire manufacturer's data books, or to the vehicle certification label for a complete listing of tire inflation pressures. For additional information concerning tire care, refer to the MAINTENANCE AND LUBRICATION manual, TS494.

⚠ WARNING

UNDER NO CIRCUMSTANCES should you drive on underinflated or overloaded tires. A tire in this condition builds up excessive heat which can result in sudden tire destruction, property damage and personal injury.

⚠ CAUTION

Never bleed air from your tires in an attempt to gain traction for a vehicle stuck in snow, ice or mud. This practice provides no additional traction and typically results in underinflated tires. Never bleed air from a hot tire since that tire will then be underinflated.

To adjust for pressure fluctuations induced by temperature changes associated with winter weather, it is recommended that tire inflation pressure be checked daily when the tires are cold (i.e., before the vehicle is driven). Always use an accurate tire pressure gauge.

Inspection

Inspect your tires daily. Look for bulges, cracks, cuts, penetrations and/or oil contamination. If any such damage is found, the tire must be thoroughly inspected by a qualified tire inspector and repaired or discarded immediately, at his discretion. Also, check for uneven wear. If found, a thorough inspection of front end parts and alignment should be made by a qualified mechanic. Refer to the MAINTENANCE AND LUBRICATION manual, TS494, for more information.

Tire Manufacturer's Data Book

Specific and more detailed information can be obtained by referring to the technical data books provided by each tire manufacturer.

Subjects of interest are:

- High-speed or low-speed operation
- Repair, retreading and regrooving
- Use of tire chains
- Mixing radial and bias tires on the same vehicle
- Use of dynamometers
- Tire mounting/dismounting

⚠ CAUTION

For important tire information (i.e., high speed limits, inflation pressures, etc.), consult the product information available through the specific tire manufacturer.

Oil Contamination of Tires

Lubricating oils, fuel oil, gasoline and other petroleum derivatives, if allowed to contact tires, will soften the rubber and destroy the tire. Preventive maintenance is necessary to ensure that oil leakage does not occur. The following areas should be inspected on a regular basis:

- Axle end seals
- Engine seals
- Transmission seals
- Drive axle seals
- Oil filters
- Oil and hydraulic lines (if equipped)

Refer to the MAINTENANCE AND LUBRICATION manual, TS494, specific tire manufacturer's books, or to the vehicle certification label, for additional information concerning tires and their care.

BATTERY

⚠ CAUTION

To avoid damage to sensitive electronic equipment, disconnect ALL battery cables and harnesses to electronic control units before welding. Do NOT disconnect batteries while engine is running.

Jump-Starting Engine

If you encounter a situation in which it is necessary to jump-start an engine, use the following procedures.

⚠ WARNING

Batteries which are to be linked together must be of the same voltage (12 to 12, 24 to 24). Take care to observe proper polarity when connecting batteries. Batteries produce explosive gasses. Keep sparks, flames, cigarettes, etc., away from batteries at all times. Protect your eyes by wearing safety goggles. Be sure vehicles are NOT touching each other.

⚠ CAUTION

To avoid damaging any electronic controllers when jump-starting a V-MAC vehicle, always turn the ignition switch OFF before connecting the batteries.

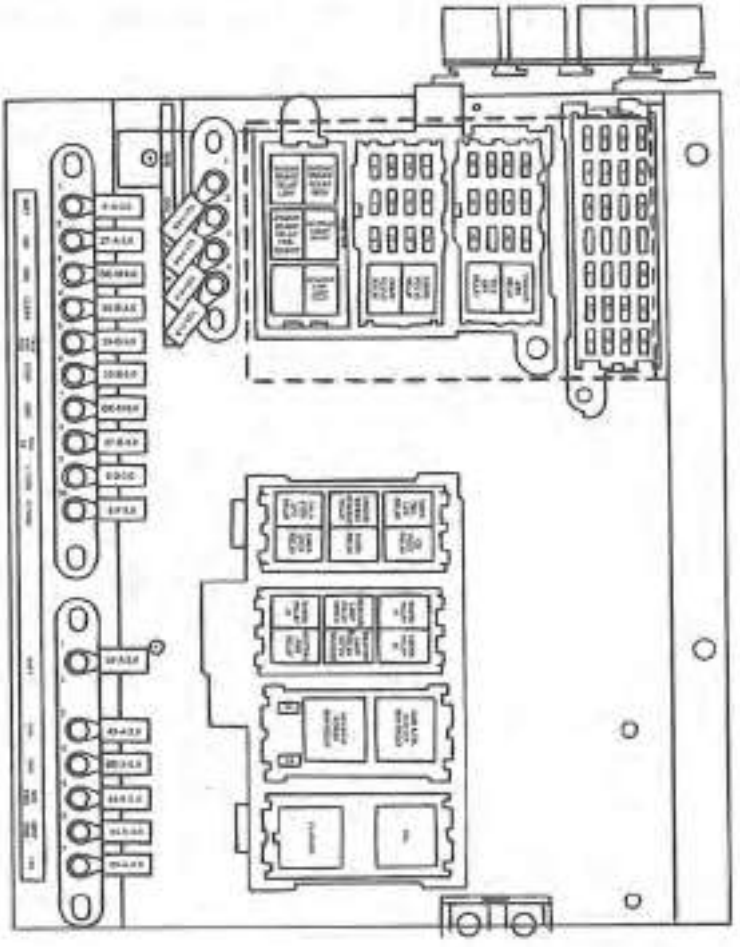
1. Connect positive (+) cable to positive (+) post of discharged battery.
2. Connect the other end of the same cable to the positive (+) post of the booster battery.
3. Connect the second cable, negative (–) side, to the other post of the booster battery.
4. Make the final connection to the negative (–) battery terminal of the stalled vehicle, and stand back.
5. Start the vehicle with the booster batteries and then start the stalled vehicle. Shut down the vehicle with the booster batteries and remove the cables in the reverse order of connection.

⚠ WARNING

Do NOT connect the final negative (–) connection to the frame of the stalled vehicle. This would cause all current to flow through the master ground circuit breaker resulting in overload.

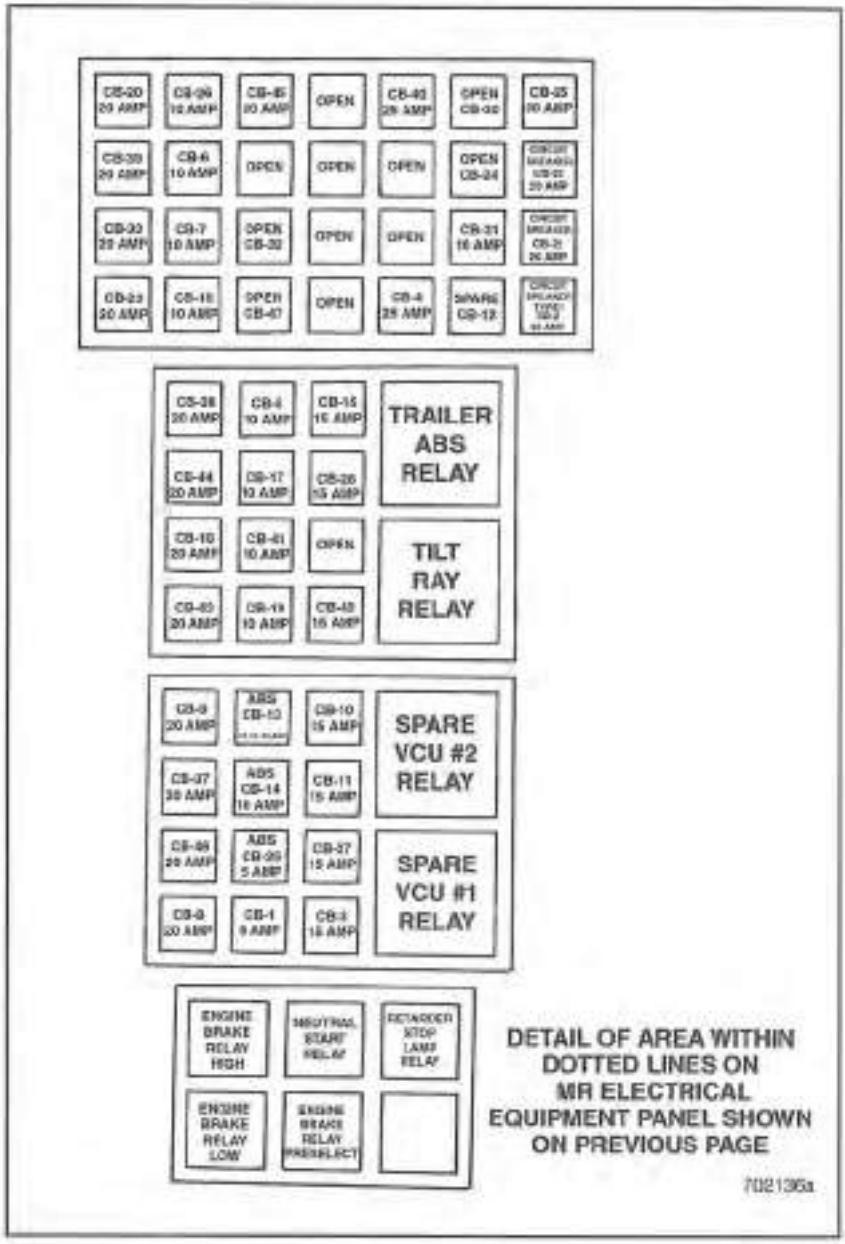
ELECTRICAL

Circuit Breaker and Relay Panels



MR ELECTRICAL EQUIPMENT PANEL
LOCATED IN AREA BENEATH CAB TUNNEL COVER
(SEE DETAIL OF AREA WITHIN DOTTED LINES ON NEXT PAGE)

702138a



DETAIL OF AREA WITHIN DOTTED LINES ON MR ELECTRICAL EQUIPMENT PANEL SHOWN ON PREVIOUS PAGE

702136a

NOTE

For circuit breaker designations, refer to the Circuit Protections charts.

Fuses are standard equipment for all circuits except the headlamps and windshield wipers. Circuit breakers are available as optional equipment.

⚠ CAUTION

For proper installation of electrical accessories, all wiring should meet SAE requirements and be routed through the circuit protection panel with proper amperage fuses or Type II circuit breakers. (Headlights and wipers will be on Type I, cycling-type circuit breakers.)

Some vehicles may be equipped with daytime running lights. For the daytime running lights to be operational, a DRL module must be installed in the relay socket marked either "DRL MOD" or "Running Lamps" on the electrical equipment panel. Do NOT install a standard relay into the daytime running light relay socket (marked either "DRL MOD" or "Running Lamps") or a short circuit in the headlight high beam circuit will result.

The headlight circuits are protected by SAE Type I (automatic reset-cycling) circuit breakers that automatically interrupt then restore the flow of current through the circuit in the event of an overload. This cycling will continue until the cause of the overload is repaired.

SAE Type II (automatic reset, non-cycling) circuit breakers (if equipped) provide a complete circuit disconnect until the overload is corrected. The power to the affected circuit breaker must be shut off before the circuit breaker will reset itself.

The circuit protection panel also provides access to battery, ignition and ground terminals for non-factory installed electronic equipment. (On V-MAC chassis, there are two serial link terminals for easy local connection of a trip recording device.)

Circuit Protection Charts

Circuit Protection (V-MAC® III)			
#1 — 5A	#2 — 20A	#3 — 15A	#4 — 25A
VCU (Clock)	Headlamps DRL Module	Marker Lps., Park & Tail Lps., Cab ID Lps., Panel Lps.	Direct Lps., Flasher
#5 — 10A	#6 — 10A	#7 — 10A	#8 — 20A
Tractor Stop Lps.	Dome Lps., Tachograph, Clock	Ign. Switch	Cigar Lighter, Horn
#9 — 20A	#10 — 15A	#11 — 15A	#12 — 10A
Radio, CB Posts	Communication Connector (DDL)	MACK Option Battery Stud	Spare
#13 — 10A	#14 — 10A	#15 — 15A	#16 — 10A
ABS	ABS	Spare	Vehicle Control Unit (VCU)
#17 — 10A		#18 — 20A	#19 — 10A
Clutch Switch, Engine Brake, Cruise, On/Off & Set/Resume, Override Switch, Park Brake, Indicator Lps., PTO w/o T2000, Spare (VCU) Switches		Spare (VCU) Relay Power	Gauges, Digital Display, Hourmeter
#20 — 20A	#21 — 20A	#22 — 20A	#23 — 20A
Htd. Mirrors, Cold Start	LH Windshield Wiper & Washer	RH Windshield Wiper & Washer	Body Builder Ignition Stud
#24 — 10A	#25 — 30A	#26 — 10A	#27 — 15A
Spare	Heater/Air Conditioner	Spare	MACK Option Ignition Stud., Motor Mirrors

Circuit Protection (V-MAC® III)			
#28 — 15A	#29 — 5A	#30 — 10A	#31 — 10A
Spare	ABS	Spare	Automatic Transmission ECU
#32 — 15A	#33 — 20A	#34 — 30A	#35 — 30A
Spare	Trailer Stop Lps.	Reverse/Neutral Power	Cab & Trailer Clearance Lps., Mirror Illum.
#36 — 15A	#37 — 20A	#38 — 20A	#39 — 25A
Fog Lps.	Trailer Function Tail Lamp Stud	Body Builder Battery Stud	Trailer ABS Power
#40 — 25A	#41 — 10A		#42 — 15A
Engine Control Unit (Ign.)	Fan Clutch, Torque Limiter, PTO w/ T2000, Exhaust Brake Solenoid, (ECU) Switches		Back-Up Lps.
#43 — 20A	#44 — 20A	#45 — 30A	#46 — 20A
Body Builder Ignition Stud	Air Dryer, Htd. Drain Valve	Spare/Fuel Separator, Fuel Heater	Spare
#47 — 15A			
Spare			

Electrical Grease

To prevent corrosion of the lamp socket terminals, particularly with the clearance and marker lamps, apply a coating of electrical sealing grease, such as Lubriplate DS-EX, to the socket and terminal assemblies.

⚠ CAUTION

Do not use electrical grease on any V-MAC connectors.

NOTE

Use all tools on the fasteners they were made to be used on. Use metric tools on SI metric units only. Never try to use metric tools on U.S. pound-inch units or U.S. pound-inch tools on SI metric units.

⚠ CAUTION

Potential external/internal thread mismatch condition(s) may occur with certain metric thread-inch thread fastener combinations, and with fastener combinations involving incompatible metric fastener systems. A given thread mismatch condition can result in thread stripping and/or assembly weakness leading to potential service failure, thereby rendering a vehicle non-operational and/or unsafe for operation. The specific external/internal thread combinations from which such problems can result are identified and set forth in TS494.

U.S. to SI Conversions		
1 inch	=	25.4 millimeters
1 mile	=	1.61 kilometers
1 pint (U.S. liquid)	=	.473 liter
1 quart (U.S. liquid)	=	.946 liter
1 cubic inch	=	.01639 liter
1 pound-foot	=	1.3558 Newton meters
1 horsepower	=	.746 kilowatt
1 pound/square inch	=	6.895 kilopascals
degrees Fahrenheit	=	(1.8 x degrees Celsius) + 32
1 gallon (U.S liquid)	=	.83267 Imperial gallon
SI to U.S. Conversions		
1 millimeter	=	.03937 inch
1 kilometer	=	.6214 mile
1 liter	=	2.1134 pints (U.S. liquid)
1 liter	=	1.0567 quarts (U.S. liquid)
1 liter	=	61.024 cubic inches
1 Newton meter	=	.7376 pound-foot
1 kilowatt	=	1.34 horsepower
1 kilopascal	=	.145 pound/square inch
degrees Celsuis	=	.556 x (degrees Fahrenheit –32)
1 Imperial gallon	=	1.2009 gallons (U.S. liquid)

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