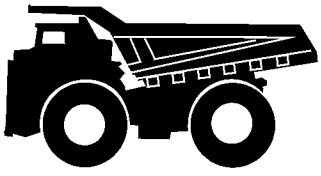
DG621

Operator Handbook



830E

DUMP TRUCK

SERIAL SUFFIX **AFE32-A thru AFE32-BN**

KOMATSU

EMISSION CONTROL WARRANTY

EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)

1. Products Warranted

Komatsu America International Company, Komatsu Mining Systems Inc. and Komatsu Utility Corporation (collectively "Komatsu") produce and/or market products under brand names of Komatsu, Dresser, Dressta, Haulpak and Galion. This emissions warranty applies to new engines bearing the Komatsu name installed in these products and used in Canada in machines designed for industrial off-highway use. This warranty applies only to these engines produced on or after January 1, 2000. This warranty will be administered by Komatsu distribution in Canada.

2. Coverage

Komatsu warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform, at the time of sale by Komatsu, with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within five years or 3,000 hours of operation, whichever occurs first, as measured from the date of delivery of the engine to the ultimate purchaser.

3. Limitations

Failures, other than those resulting from defects in materials or workmanship, are not covered by this warranty. Komatsu is not responsible for failures or damage resulting from what Komatsu determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; over fueling; over speeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the engine. Komatsu is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel. Komatsu is not responsible for non-engine repairs, "downtime" expense, related damage, fines, all business costs or other losses resulting from a warrantable failure.

KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This warranty, together with the express commercial warranties, are the sole warranties of Komatsu. **THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICUALR PURPOSE.**

GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS

ÉNONCÉ DE GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS (APPLICABLE AU CANADA SEULEMENT):

1. Produits garantis:

Komatsu America International Company, Komatsu Mining Systems Inc. et Komatsu Utility Corporation (collectivement Komatsu) produisent et/ou font la mise en marché de produits portant les noms de marque Komatsu, Dresser, Dressta, Haulpak et Galion. Cette garantie sur les émissions s'applique à tous les nouveaux moteurs portant le nom Komatsu, installés dans ces produits et utilisés au Canada dans des machines conçues pour utilisation industrielle non-routière. Cette garantie s'applique seulement sur les moteurs produits à partir du 1er Janvier 2000. Cette garantie sera administrée par la distribution de Komatsu au Canada.

2. Couverture:

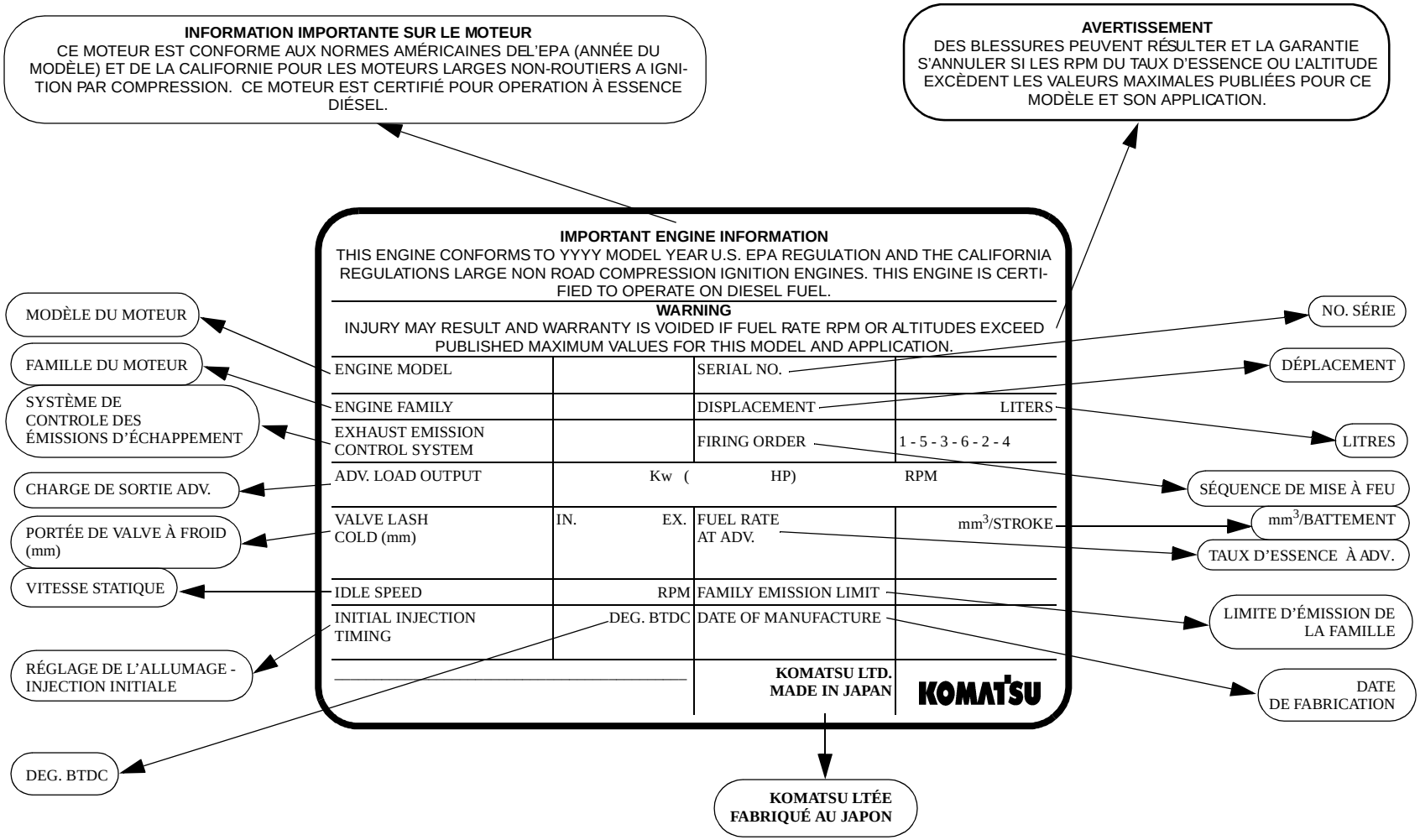
Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de défauts de construction ou de matériaux qui auraient pour effet de contrevenir à ces réglementations en dedans de 5 ans ou 3000 heures d'opération, mesuré à partir de la date de livraison du moteur au client ultime.

3. Limitations:

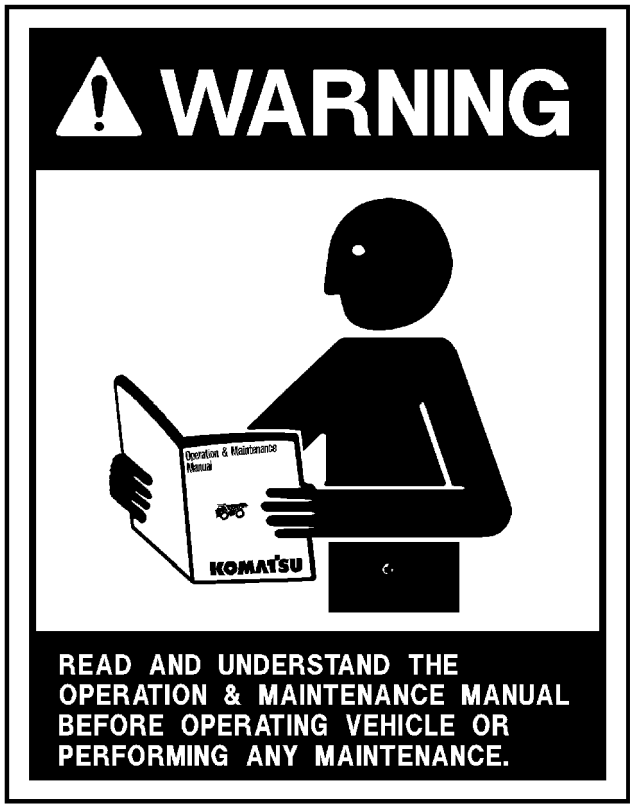
Les bris, autres que ceux résultant de défauts de matériaux ou de construction, ne sont pas couverts par cette Garantie. Komatsu n'est pas responsable pour bris ou dommages résultant de ce que Komatsu détermine comme étant de l'abus ou négligence, incluant mais ne se limitant pas à: l'opération sans lubrifiants ou agent refroidissants adéquats; la suralimentation d'essence; la survitesse; le manque d'entretien des systèmes de lubrification, de refroidissement ou d'entrée; de pratiques non-propices d'entreposage, de mise en marche, de réchauffement, de conditionnement ou d'arrêt; les modifications non-autorisées du moteur. De plus, Komatsu n'est pas responsable de bris causés par de l'essence inadéquate ou de l'eau, des saletés ou autres contaminants dans l'essence. Komatsu n'est pas responsable des réparations non-reliées au moteur, des dépenses encourues suite aux temps d'arrêts, des dommages relatifs, amendes, et de tout autre coût d'affaires ou autres pertes résultant d'un bris couvert par la garantie.

KOMATSU N'EST PAS RESPONSABLE DES INCIDENTS OU DOMMAGES CONSÉQUENTS.

Cette garantie, ainsi que les garanties expresses commerciales, sont les seules garanties de Komatsu. **IL N'Y A AUCUNE AUTRE GARANTIE, EXPRESSE OU SOUS-ENTENDUE, MARCHANDABLE OU PROPICE A UNE UTILISATION PARTICULIÈRE.**



ENGINE DATAPLATE - ENGLISH / FRENCH



Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read and understand this manual before operating or maintaining this machine.
This manual should be kept in or near the machine for reference, and periodically reviewed by all personnel who will come into contact with it.

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

CALIFORNIA
Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
Wash hands after handling.

NOTES:

FOREWORD

This handbook is intended to provide the HAULPAK® operator with the necessary information to allow for safe and efficient truck operation.

The HAULPAK® operator should be a qualified individual who has had proper training to achieve full production with the truck. An efficient, qualified operator can help insure long production life of the truck and avoid costly down time due to misuse of the unit and its systems. Training for both operators and maintenance personnel is recommended and is available upon request. Operator training is accomplished at the job site by qualified operator instructors. Maintenance training is provided both in the factory setting and in field schools. All requests for operator and/or maintenance training should be forwarded to the local HAULPAK® Distributor for action.

This handbook shows dimensioning of U.S. standard and metric (SI) units, and all references to "Right", "Left", "Front", or "Rear" are made with respect to the operator's normal seated position, unless specifically stated otherwise. Illustrations used in this handbook are typically representative and may not necessarily depict a specific model.

A Product Identification plate is normally located on the frame in front of the right side front wheel and designates the Truck Model Number, Product Identification Number (vehicle serial number), and Maximum G.V.W. (Gross Vehicle Weight) rating.

The HAULPAK® Model designation consists of three numbers and one letter (i.e. 830E). The three numbers represent the basic truck model. The letter "M" designates a Mechanical drive and the letter "E" designates an Electrical propulsion system.

The Product Identification Number (vehicle serial number) contains information which will identify the original manufacturing bill of material for this unit. This complete number will be necessary for proper ordering of many service parts and/or warranty consideration.

The Gross Vehicle Weight (GVW) is what determines the load on the drive train, frame, tires, and other components. The vehicle design and application guidelines are sensitive to the **total maximum Gross Vehicle Weight (GVW)** and this **means the total weight**: the Empty Vehicle Weight + the fuel/lubricants + the payload.

To determine allowable payload:
Service all lubricants for proper level and fill fuel tank of empty truck (which includes all accessories, body liners, tailgates, etc.) and then weigh truck.
Record this value and subtract from the GVW rating. The result is the allowable payload.
NOTE: Accumulations of mud, frozen material, etc. become a part of the GVW and reduces allowable payload. To maximize payload and to keep from exceeding the GVW rating, these accumulations should be removed as often as practical.

Exceeding the allowable payload will reduce expected life of truck components.

⚠WARNING
Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept in or near the machine for reference and periodically reviewed by all personnel who come in contact with it.

This* "ALERT"** ***symbol is used with the signal words,
"CAUTION", "DANGER", ***and*** **"WARNING"** ***in this manual to alert the reader to hazards arising from improper operating and maintenance practices.***

"DANGER" ***identifies a specific potential hazard***
WHICH WILL RESULT
in either INJURY OR DEATH
if proper precautions are not taken.

"WARNING" ***identifies a specific potential hazard***
WHICH MAY RESULT
in either INJURY OR DEATH
if proper precautions are not taken.

"CAUTION" ***is used for general reminders of proper safety practices***
OR
to direct the reader's attention to avoid unsafe or improper practices which may result in damage to the equipment.

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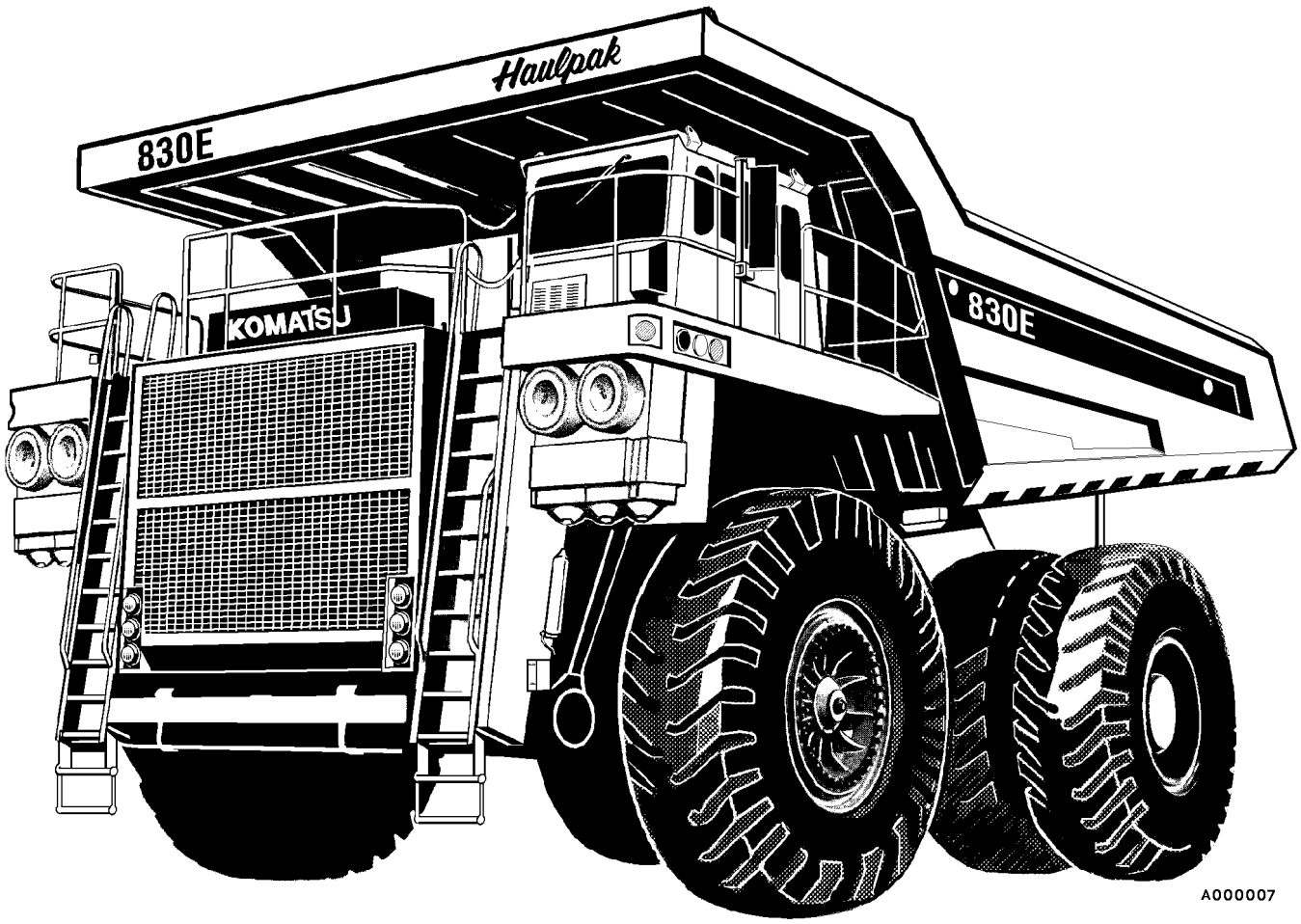


MODEL 830E HAULPAK® TRUCK

TRUCK COMPONENT DESCRIPTION

ENGINE

The Model 830E HAULPAK® is an electric drive, off-highway, rear dump truck which is powered by a Detroit Diesel 16V-149TIB diesel engine with rated brake power @ 2200 hp (1640 kW) @ 1900 RPM. The radiator, engine, alternator, and blower are mounted on a separate subframe to provide fast, easy removal and installation of the power module.

ALTERNATOR

The alternator is mounted in-line with the engine. The alternating current (AC) output of the alternator is rectified to direct current (DC) and sent to the wheel mounted DC drive traction motors.

BLOWER

The dual impeller, in-line blower supplies cooling air for the alternator, rectifiers, and both traction motors. The air is exhausted to atmosphere through the wheel motors.

WHEEL MOTORS

Traction motors located within each rear wheel structure receive electrical energy from the alternator. The two traction motors convert electrical energy back to mechanical energy through built-in gear trains within the wheel structure. The direction of the drive motors is controlled by a forward or reverse hand selector switch located on a console in the cab to the right side of the operator.

POWER STEERING

The HAULPAK® truck is equipped with a full time power steering system which provides positive steering control with a minimum of effort by the operator. The system includes a nitrogen-charged accumulator which automatically provides emergency power if the steering hydraulic pressure is reduced below an established minimum.

OPERATOR'S CAB

The HAULPAK® Operator's Cab has been engineered for operator comfort and to allow for efficient and safe operation of the truck. The cab contains an integrated ROPS and is fully insulated to reduce noise and vibration. The tinted safety-glass windshield and side windows provide excellent visibility. The seat is a comfortable, adjustable suspension seat, the steering wheel provides tilt and telescoping adjustments and controls are mounted within easy reach of the operator. The instrument panel provides the operator with instruments and gauges that are necessary to control and monitor the truck's operating systems and is marked with international symbols for easy identification of functions.

DYNAMIC RETARDING

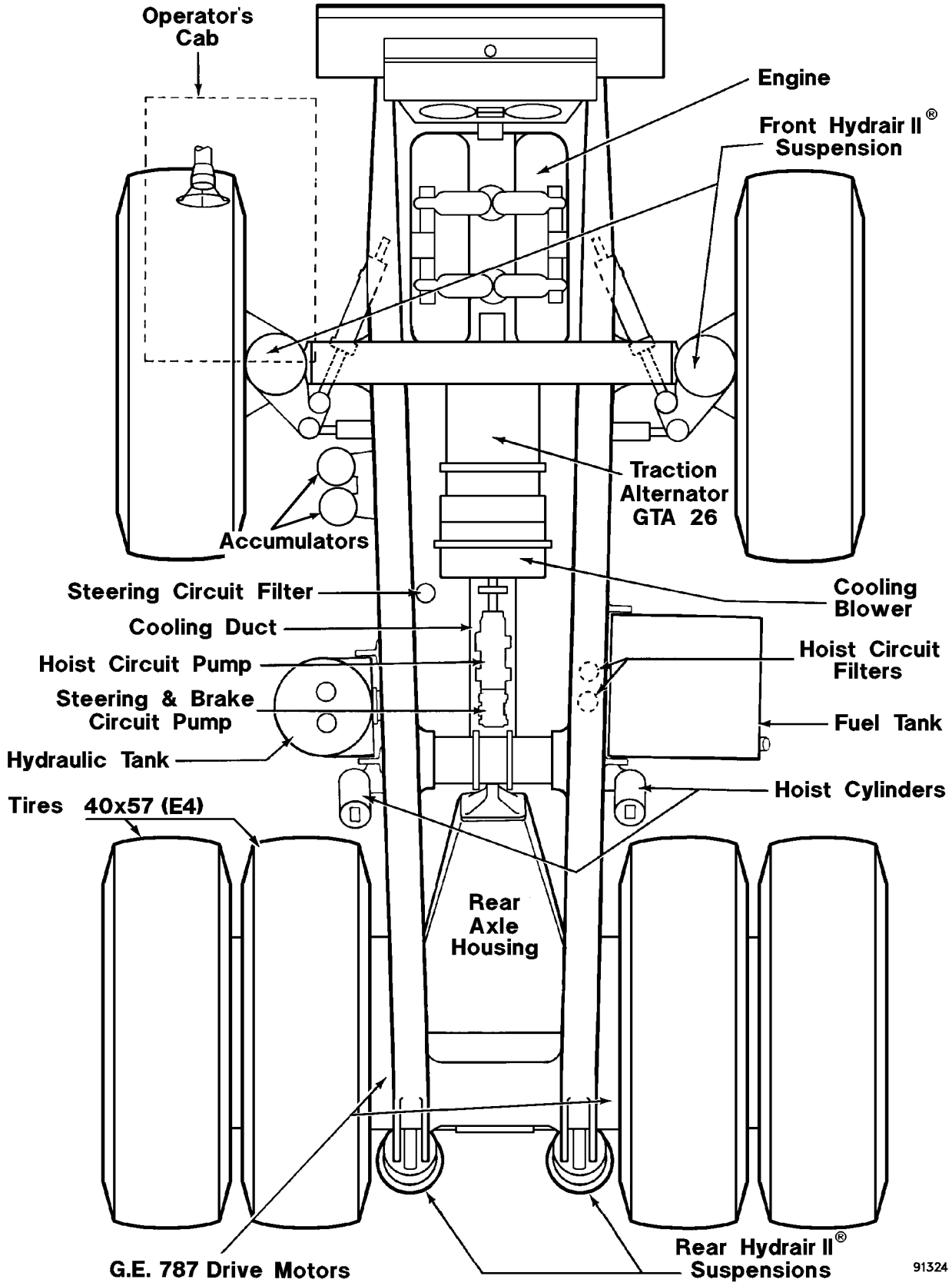
Dynamic retarding is used to slow the truck during normal operation or control speed coming down a grade. The dynamic retarding ability of the DC electric system is controlled by the operator by depressing the foot operated retarder pedal and/or setting the RSC (Retarder Speed Control) on the instrument panel. Dynamic Retarding is automatically activated if truck exceeds the overspeed setting.

BRAKE SYSTEM

The braking system consists of an all hydraulic actuation system. Depressing the brake pedal actuates wheel-speed single disc front brakes and armature-speed dual disc rear brakes. The brakes can also be activated by operating a switch on the instrument panel. The brakes will be applied automatically if system pressure decreases below a preset minimum.

SUSPENSION

HYDRAIR®II suspension cylinders located at each wheel provide a smooth and comfortable ride for the operator and dampens shock loads to the chassis during loading.



830E HAULPAK® MAJOR COMPONENTS

SPECIFICATIONS

ENGINE - DETROIT DIESEL 16V-149TIB

Number of Cylinders 16
Operating Cycle 2-Stroke
Rated Brake HP . . 2200 HP (1640kW) @ 1900 RPM
Flywheel HP . . . (2054 HP (1530kW) @ 1900 RPM
(w/68 in. fan)
Weight (Dry) . . . . . 11,210 pounds (5085 kg)

ELECTRIC DRIVE SYSTEM - STATEX II

(AC/DC Current)

Alternator . . . . . General Electric GTA - 26
Gross 2400 HP (1790 kW); Net 2250 HP (1678 kW)
Dual Impeller, In-Line Blower 9000 cfm (255 m^3/min)
Motorized Wheels . . . . . General Electric 787
Ratio 32.38:1
Maximum Speed . . . . . 30.1 MPH (48.4 km/h)
(w/40.00-57 Tires)

DYNAMIC RETARDING

Extended Range Retarding With Fully Blown
18-Resistor Grids and Reverse Retarding Standard
Maximum Rating . . . . . 3700 HP (2760 kW)

TIRES

Rock Service, Deep Tread . . . . . (E-4) Tubeless
Standard Tire . . . . . 40.00 - 57, 68 Ply Rating
(w/787 Wheelmotor)
Separable Tire Rims *
* Tires and Rims are interchangeable.
Rim Size
29 in. (737 mm) X 57 in. (1448 mm) X 5 in. (127 mm)

24 VDC ELECTRIC SYSTEM

Batteries . . . . . Two 12 Volt Batteries in Series
. . . . . 90 Ampere-Hour Capacity
Alternator . . . . . 24 Volt, 140 Ampere Output
Lighting . . . . . 24 Volt

SERVICE CAPACITIES

	U.S. Gallons	(Liters)
Crankcase *		
Detroit Diesel	52.5	198.7
Cooling System		
Detroit Diesel	135	511
Fuel	1000	3785
Hydraulic System	250	947
Wheel Motor Gear Box (each)	10.5	39.7

* Includes Lube Oil Filters

AIR SYSTEM

Compressor . . Bendix-Westinghouse TU-FLO 501
Capacity . . . . . 12 cfm (0.34 m^3/min)
Starter with Interlock . . . . . Ingersol Rand 815
Main Tank Capacity . . . . . 15 $ft.^3$ (425 liters)

HYDRAULIC SYSTEMS

Pumps
Hoist . . . . . Tandem Gear Pumps
Rated @ . . . . 240 GPM (908 l/min.) @ 1900 RPM
Steering . . Radial Piston-Pressure Compensating
(also Brake) . . 65 GPM (246 l/min.) @ 1900 RPM
System Relief Pressures
Hoist/Steering . . . . . 2500 psi (17.2 MPa)
Brakes . . . . . 3500 psi (24.1 MPa)
Hoist Cylinders (2) 3-Stage
Tank (Vertical/Cylindrical) . . . . . Non-Pressurized
Filtration . Remote-mounted, Replaceable, Elements
Suction . . . . . Single, Full Flow, 100 Mesh
Hoist * & Steering * . . . . . Full Flow, 7 Micron
(* High Pressure Filters)

STEERING

Turning Circle - Front Wheel Track . 93 ft. (28.35 m)
Full Time Power Steering . . . . . Twin Cylinders
Automatic Emergency Steering . . . . . Standard
(w/Accumulators)

SERVICE BRAKES

Actuation . . . . . All Hydraulic
Front . . . . . Wheel Speed, Single Disc
Inboard Mounted . . . . . 3 Calipers
Disc Diameter . . . . . 46.00 in. (116.8 cm)
Rear . . . . . Armature Speed, Dual Disc
Disc Diameter . . . . . 25.00 in. (63.5 cm)
Emergency Brake-Automatically Applied Standard
Wheel Brake Lock . . . . Manual Switch on Panel
(Loading and Dumping)

DISC PARKING BRAKE

Each Rear Wheel . . . . . Single Caliper
Spring Applied . . . . . Hydraulically Released

DUMP BODY CAPACITIES AND DIMENSIONS

Standard, Heaped @ 2:1 (SAE) 171 yd^3 (130.7 m^3)
Loading Height Empty . . . . . 20 ft. 1 in. (6.12 m)
Optional Heaped @ 2:1 (SAE) . 160 yd^3 (122.3 m^3)
Loading Height Empty . . . . . 19 ft. 6 in. (5.97 m)
Dumping Angle . . . . . 45^o
Non-heated Body w/Exhaust Mufflers . . Standard

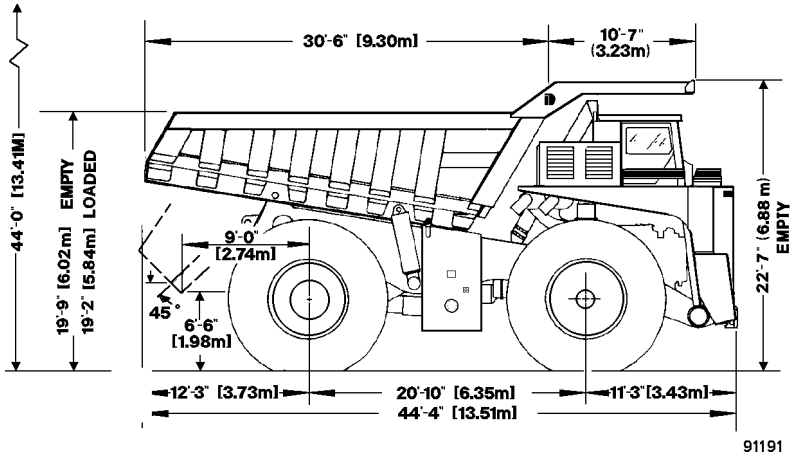
WEIGHT DISTRIBUTION

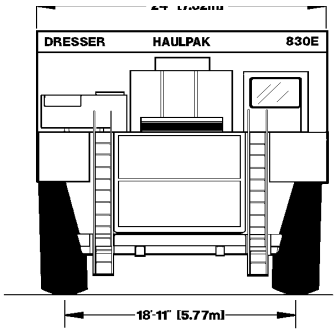
(w/Detroit Diesel 16V-149TIB)

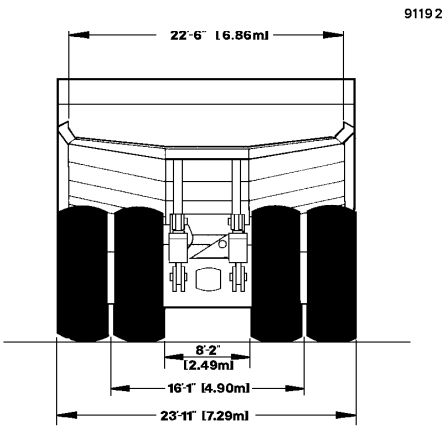
Empty Vehicle	**Pounds**	**(Kilograms)**
Front Axle	151,767	(68 842)
Rear Axle	176,733	(80 166)
Total	328,500	(149 008)

Loaded Vehicle	**Pounds**	**(Kilograms)**
Front Axle	269,750	(122 359)
Rear Axle	560,250	(254 129)
Total *	830,000	(376 488)

* Not To Exceed 830,000 lbs. (376 485 kg) including options, fuel and payload.







OVERALL TRUCK DIMENSIONS

(Empty with Standard Body)

Length	44 ft. 4 in.	(13.51 m)
Width	24 ft.	(7.32 m)
Height With Canopy	22 ft. 7 in.	(6.88 m)
Height With Dump Body Up . .	44 ft.	(13.41 m)
Turning Circle (On Front Track)	95.5 ft.	(28.35 m)

GENERAL SAFETY

Safety records of most organizations will show that the greatest percentage of accidents are caused by unsafe acts of persons. The remainder are caused by unsafe mechanical or physical conditions. Report all unsafe conditions to the proper authority.

The following safety rules are provided as a guide for the HAULPAK® operator. However, local conditions and regulations may add many more to this list.

SAFETY IS THINKING AHEAD

Prevention is the best safety program. Prevent a potential accident by knowing the employer's safety requirements, all necessary job site regulations as well as use and care of the safety equipment on the HAULPAK® Truck. Only qualified operators or technicians should attempt to operate the HAULPAK® Truck.

Safe practices start before the operator gets to the equipment!

1. Wear the proper clothing. Loose fitting clothing, unbuttoned sleeves and jackets, jewelry, etc., can catch on a protrusion and cause a potential hazard.
2. Always use the personal safety equipment provided for the operator such as hard hat, safety shoes, safety glasses or goggles. There are some conditions when protective hearing devices should also be worn for operator safety.
3. When walking to and from the truck, maintain a safe distance from all machines even if the operator is visible.

At The Truck - Ground Level Inspection

4. Before operating truck, a careful visual inspection should be completed. Report any items that need attention to the proper authority.
   a. Visually inspect all headlights, worklights, clearance lights, and taillights for damage and be certain lenses are clean. Good visibility may prevent an accident.
   b. Visually inspect entire truck for oil or coolant leaks, and loose nuts and bolts, especially at the load carrying areas, such as: wheels, suspensions, steering, and brakes.

⚠WARNING

If engine has been running, allow coolant to cool before removing the fill cap or draining radiator.

Any operating fluid, such as hydraulic oil, or engine coolant escaping under pressure, can have sufficient force to enter a person's body by penetrating the skin and cause serious injury and possibly death, if proper medical treatment by a physician who is *familiar with this type of injury is not received immediately.*

c. When checking coolant in radiator, relieve pressure before removing radiator cap.

⚠WARNING

Do not stand in front of rim and locking ring when inflating tire.

d. Check tires for cuts, damage or “bubbles”. Check tires for proper inflation. If tire is warm from operation, **allow tire to cool before adjusting tire pressure**. If inflation is needed, use an air chuck with extension hose clipped on the tire inflation valve to allow service from behind the tread of the tire and away from front of wheel.

e. Clean ladder and handrails of any foreign material such as ice, snow, mud or oil.

f. Upon completion of an exterior inspection of the truck, clean mud, grease, or snow from shoes before climbing access ladder.

Preparing For Operation

⚠WARNING

Always mount and dismount facing the truck. Never attempt to mount or dismount the truck while it is in motion.

5. Always use handrails and ladder when mounting or dismounting from the truck.
6. Check the deck areas for debris, loose hardware or tools.
7. Become familiar with all protective equipment devices on the truck and insure that these items (anti-skid material, grab bars, seat belts, etc.) are securely in place.
8. Read and understand the contents of this handbook. Read the sections pertaining to safety and operating instructions with special attention. Become thoroughly acquainted with all gauges, instruments and controls before attempting operation of the truck.
   Read and understand **WARNING** and **CAUTION** decals in the operator’s cab.
9. Keep all unauthorized reading material out of truck cab.
10. Do not carry tools and supplies or allow trash to accumulate in cab of truck.

11. Insure steering wheel, horn, controls and pedals are free of any oil, grease or mud.

12. Insure headlights, worklights and taillights are in proper working order.

13. Insure windshield and all cab windows are clean and unbroken. Good visibility may prevent an accident.

14. Check operation of windshield wiper, condition of wiper blades, and check windshield washer reservoir for fluid level.

15. Be familiar with all steering and brake system controls and warning devices, road speeds and loading capabilities, before operating the truck.

Truck Operation

16. DO NOT leave truck unattended while engine is running.

17. **WEAR SEAT BELTS AT ALL TIMES.** Only authorized persons are allowed to ride in truck. Riders should be in cab only.

18. Do not allow anyone to ride on decks or steps of truck.

19. Do not allow anyone to get on or off truck while it is in motion.

20. Do not move truck into or out of a building without a signal person present.

21. Know and obey the hand signal communications between operator and spotter. When other machines and personnel are present, the operator should move in and out of buildings, loading areas and through traffic, under the direction of a signal person. **Courtesy at all times is a safety precaution!**

22. Report immediately to supervisor any conditions on haul road, pit or dump area that may present an operating hazard.

23. Check for flat tires periodically during shift. If truck has been run on a "flat", **it must not be parked in a building until the tire cools.**

    If tire must be changed, do not stand in front of rim and locking ring when inflating tire mounted on the machine. Observers should not be permitted in the area and should be kept away from the side of such tires.

24. Always have parking brake applied when the truck is parked and unattended.

25. When parking, park a safe distance from other vehicles as determined by supervisor.

26. Keep serviceable fire fighting equipment at hand. Report used extinguishers for replacement or refilling.

⚠WARNING

Tire and rim assembly may expode if subjected to excessive heat. Personnel should move to a remote or protected location if sensing excessively hot brakes, smell of burning rubber or evidence of fire near tire and wheel area.

If the truck must be approached, such as to fight a fire, those personnel should do so only while facing the tread area of the tire (front or back), unless protected by use of large heavy equipment as a shield. Stay at least 50 ft. (15 m) from the tread of the tire.

In the event of fire in the tire and wheel area (including brake fires), stay away from the truck at least 8 hours or until the tire and wheel are cool.

27. Stay alert at all times! In the event of an emergency, be prepared to react quickly and avoid accidents. If an emergency arises, know where to get prompt assistance.

WHEN REPAIRS ARE NECESSARY

1. Only qualified maintenance personnel who understand the systems being repaired should accomplish repairs.
2. Many components on the HAULPAK® Truck are large and heavy. Insure that lifting equipment - hoists, slings, chains, lifting eyes - are of adequate capacity to handle the lift.
3. DO NOT WORK under a suspended load. Do not work under raised body unless body safety cables, props, or pins are in place to hold the body in up position.
4. Do not repair or service truck while engine is running, except when adjustments can only be made under such conditions. **Keep a safe distance from moving parts.**
5. When servicing air conditioning system with refrigerant (Freon), wear a face shield and cold resistant gloves for protection against freezing. Be certain to follow all current requirements for handling and recapturing freon gas.
6. Follow package directions carefully when using cleaning solvents.
7. If an auxiliary battery assist is needed, first use one cable to connect the 24V positive (+) post of the disabled truck batteries to the 24V positive (+) post of the auxiliary assist. Use second cable to connect the 24V negative (-) post of the auxililary assist battery to a **frame ground (-)** on the disabled truck *away from the battery*.

8. Always disconnect the positive and negative battery cables of the vehicle before doing any welding on the unit. Failure to do so may seriously damage the battery and electrical equipment. Disconnect battery charging alternator lead wire and isolate electronic control components before making welding repairs. It is not necessary to disconnect or remove any control circuit cards on electric drive HAULPAK® Trucks or any of the "AID" circuit control cards.

   Always fasten the welding machine ground (-) lead to the piece being welded; **grounding clamp MUST BE ATTACHED AS NEAR AS POSSIBLE to the weld area**. Never allow welding current to pass through ball bearings, roller bearings, suspensions, or hydraulic cylinders. Always avoid laying welding cables over or near the vehicle electrical harnesses. Welding voltage could be induced into the electrical harness and possibly cause damage to components.

9. If truck is to be towed for any reason, use a rigid tow bar. Check truck cab for decal recommending special towing precautions. (Also refer to Towing Procedure in OPERATING INSTRUCTIONS.)

10. Drain, clean and ventilate fuel tanks and/or hydraulic tanks before making any welding repairs.

⚠WARNING

Any operating fluid, such as hydraulic oil or brake fluid escaping under pressure, can have sufficient force to enter a person's body by penetrating the skin. Serious injury and possibly death may result if proper medical treatment by a physician familiar with this injury is not received immediately.

11. Relieve pressure in lines or hoses before making any disconnects.

12. After adjustments or repairs, replace all shields, screens and clamps.

13. Tire Care:

⚠WARNING

Do not stand in front of rim and locking ring when inflating tire mounted on the machine. Observers should not be permitted in the area and should be kept away from the side of such tires.

Do not weld or apply heat on the rim assembly with the tire mounted on the rim. Resulting gases inside the tire may ignite, causing explosion of tire and rim.

14. Only a qualified operator or experienced maintenance personnel who are also qualified in operation should move the truck under its own power in the repair facility or during road testing after repairs are complete.

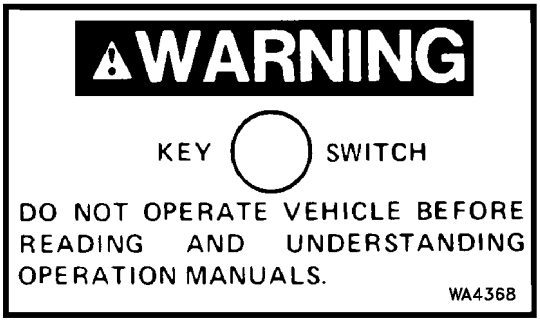
NOTES

WARNINGS AND CAUTIONS

The following paragraphs give an explanation of the Warning, Caution, and Service Instruction plates and decals attached to the HAULPAK® truck. The plates and decals listed here are typical of this HAULPAK® model, but because of customer options, individual trucks may have plates and decals that are different from those shown here.

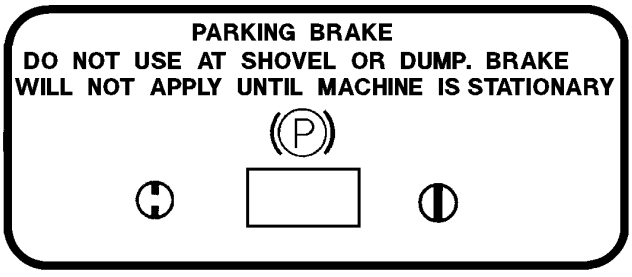
The plates and decals must be kept clean and legible. If any decal or plate becomes unable to be read or damaged, it should be replaced with a new one.

A warning plate is mounted around the key switch on the instrument panel. The warning stresses the importance of reading the operator's manual before operation.

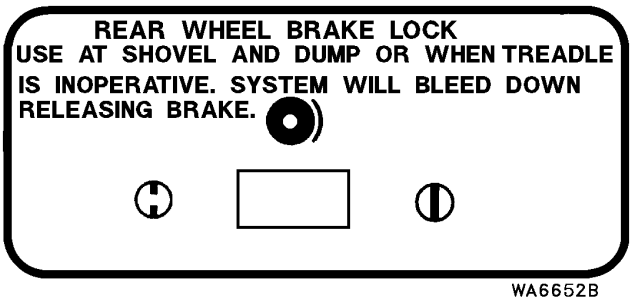


A warning plate is mounted directly over the parking brake switch. The plate stresses the parking brake is not to be used while the truck is being loaded at a shovel or when parked at a dump.

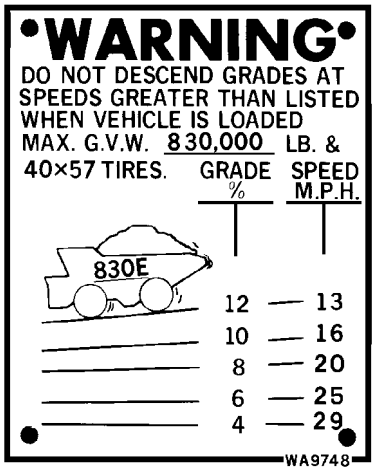
The truck must be completely stopped before applying the parking brake or damage may occur to parking brake. The parking brake is **not** designed to stop a moving truck.



A warning plate over the "Rear Wheel Brake Lock" switch stresses the use of this brake for use during truck loading while parked at a shovel or during dumping. If an emergency occurs where the brake treadle valve does not operate, apply this brake to stop the truck. Do not use this brake as a parking brake when leaving the truck as the hydraulic system will eventually bleed down, releasing the Brake Lock.

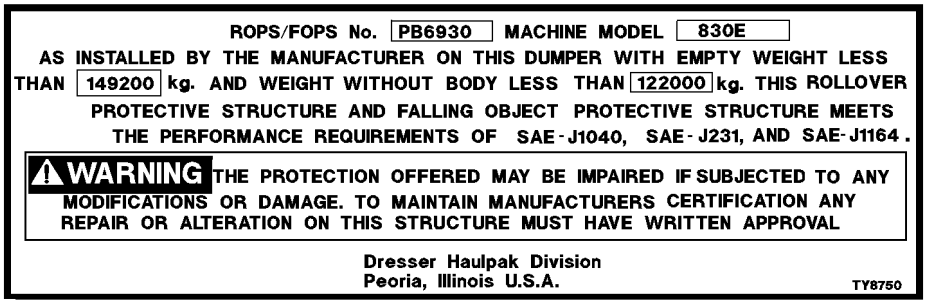


A plate located on the instrument panel in the operator's cab lists maximum speeds when descending various grades with a loaded truck.



MAXIMUM ALLOWABLE TRUCK SPEED IS 30.1 MPH (48.4 km/h)

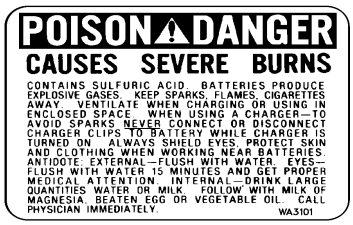
A plate attached to the right rear corner of the cab states the Rollover Protective Structure and Falling Object Protective Structure meets various SAE performance requirements.



Do not make modifications to this structure or attempt to repair damage without written approval from the Manufacturer. Unauthorized repairs will void certification.

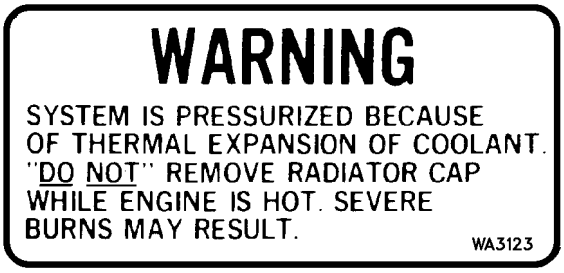
Attached to the exterior of the battery compartment is a danger plate. This plate stresses the need to keep from making any sparks near the battery. When another battery or 24VDC power source is used for auxiliary power, all switches must be "Off" prior to making any connections. When connecting auxiliary power cables, positively maintain correct polarity; connect the positive (+) posts together and then connect the negative (-) lead of the auxiliary power cable to a good frame ground. **Do not connect to the negative posts of the truck battery or near the battery box.** This hookup completes the circuit but minimizes danger of sparks near the batteries.

Sulfuric acid is corrosive and toxic. Use proper safety gear, goggles, rubber gloves and rubber apron when handling and servicing batteries.



A warning plate is mounted on top of the radiator surge tank cover near the radiator cap.

The engine cooling system is pressurized by the truck air system when the key switch is turned “On”. **Always turn the key switch off and allow the engine to cool before removing radiator cap.** Unless the pressure is first released, removing the radiator cap after the engine has been running for a time will result in the hot coolant being expelled from the radiator. **Serious scalding and burning can result.**



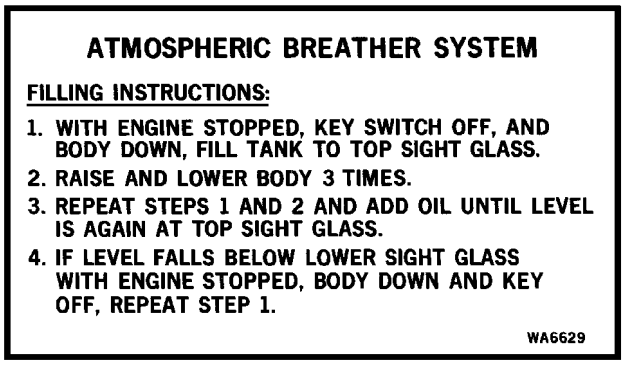
Warning plates are mounted on the frame just in front of and to the rear of the front tires. Technicians making adjustments while the truck is being steered are warned the clearances change when the truck is steered and could cause serious injury.

A plate on the side of the hydraulic tank furnishes instructions for filling the hydraulic tank.

Keep the system open to the atmosphere only as long as absolutely necessary to lessen chances of system contamination.

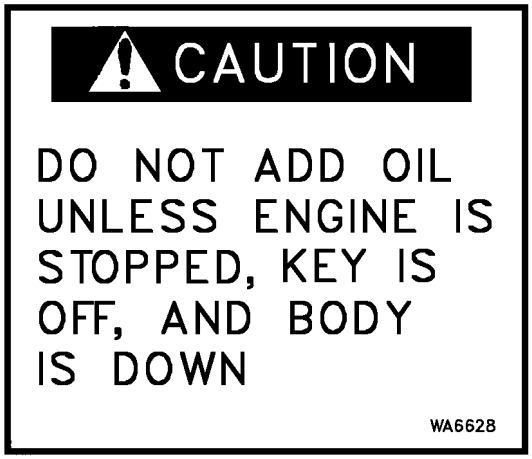
Service the tank with clean Type C-4 hydraulic oil.

All oil being put into the hydraulic tank should be filtered through 3 micron filters.

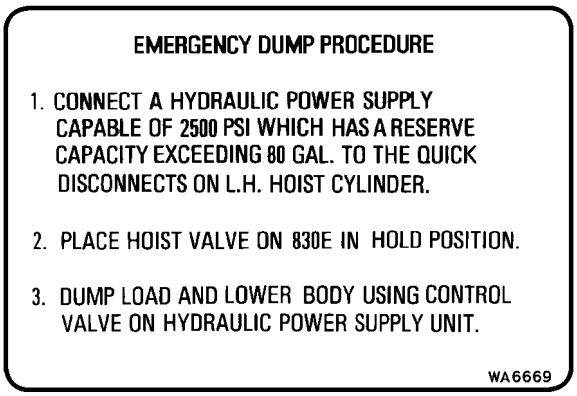


A caution decal is attached below the hydraulic tank oil level sight gauge. Check level with body down, engine stopped, and key switch "Off".

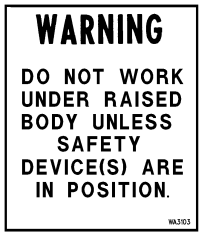
Add oil per filling instructions if oil level is below top of sight glass.



An emergency dump procedure decal plate is located on the frame near the left hoist cylinder which provides the operator or technician with the proper hook-up procedure for dumping a loaded, disabled truck.



Warning plates are attached to both the hydraulic and fuel tank to alert technicians **not to work** on the truck **with the body in the raised position** unless body-up retention device (pin) is in position.



A warning plate is attached to the frame above the hydraulic system (APU) quick disconnect fittings to alert technicians that high pressure hydraulic oil is present during operation. Care must be taken when it is necessary to open the hydraulic system. There is always a chance of residual pressure being present. Open fittings slowly to allow any pressure to bleed off before removing any connections.

⚠WARNING

Any operating fluid, such as hydraulic oil, escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. Serious injury and possibly death may result if proper medical treatment by a physician familiar with this injury is not received immediately.

A warning plate is located above the hydraulic system (APU) quick disconnect fittings in front of the hydraulic tank which provides instructions to the operator or technician for towing a disabled truck. This plate specifies the requirements for an auxillary source of supply for hydraulic oil and the proper hookup.

TEST
STEERING AND BRAKE SYSTEM OPERATION
BEFORE TOWING.

⚠ WARNING

EMERGENCY TOWING PROCEDURE

1. ENGINE MUST BE STOPPED AND ACCUMULATOR DISCHARGED.
2. EXTERNAL SUPPLY MUST BE ABLE TO MAINTAIN 3000 PSI AND HAVE A MIN. CAPACITY OF 20 GAL.
3. CONNECT EXTERNAL SUPPLY TO THE .75 INCH SUPPLY AND 1.00 RETURN QUICK DISCONNECTS.
4. CHECK OPERATION OF STEERING AND BRAKES.
5. PROCEED WITH TOWING OPERATION.

WA6670

High Voltage Danger Plates and Caution Plates are attached to the doors of the Electrical Control Cabinet. The High Voltage Plate is also attached to the blown grid housing, extended range housing, rectifier housing, inlet duct structure and rear hatch cover.

⚠ DANGER

HIGH VOLTAGE

WA3108

CAUTION

PRIOR TO WELDING ON TRUCK DISCONNECT PLUG IN CARDS AND DISCONNECT LEAD WIRE ON BATTERY CHARGING ALT.

WA2987

A wheel motor oil level decal is attached to the gear cover on both electric wheel motors. This decal stresses the fact that the truck must be on a level surface and parked for 20 minutes prior to checking the oil level. This is necessary in order to get an accurate reading.

CHECK OIL LEVEL ONLY AFTER TRUCK HAS BEEN PARKED FOR 20 MINUTES

TB2464

Warning and Danger plates are located inside the door of the brake system cabinet behind the cab.

This plate alerts technicians to read the warning labels attached to the accumulators prior to releasing internal nitrogen pressure or disconnecting any hydraulic lines or hardware.

⚠DANGER

HIGH PRESSURE CYLINDER

READ WARNING LABEL MOUNTED ON ACCUMULATOR BEFORE LOOSENING OR DISASSEMBLING ANY PARTS

WA4328

This plate warns the technician to stop the engine, turn off the key switch, and open the drain valves on all three accumulators to bleed the hydraulic pressure before loosening or disconnecting a brake line.

⚠WARNING

HIGH PRESSURE

DO NOT LOOSEN OR DISCONNECT ANY HYDRAULIC BRAKE LINE OR COMPONENT UNTIL ENGINE IS STOPPED, KEY SWITCH IS OFF AND DRAIN VALVES ON ACCUMULATORS ARE OPENED.

WA4329

A Danger plate is attached to each suspension and the steering accumulator. The plate contains instructions for releasing internal pressure before disconnecting any hydraulic lines or hardware.

⚠ DANGER

HIGH PRESSURE CYLINDER CHARGED WITH DRY NITROGEN

DO NOT REMOVE ANY HARDWARE INCLUDING CAPSCREWS, PLUGS, VALVE, OR VALVE CORE UNTIL ALL PRESSURE HAS BEEN RELEASED. REMOVAL OF ANY HARDWARE WHILE CYLINDER IS UNDER PRESSURE MAY RESULT IN HARDWARE FLYING VIOLENTLY FROM CYLINDER. TO RELEASE PRESSURE, REMOVE VALVE CAP, TURN TOP HEX ON VALVE THREE TURNS IN A COUNTERCLOCKWISE DIRECTION (DO NOT TURN MORE THAN THREE TURNS), THEN DEPRESS VALVE CORE.
DO NOT TURN BOTTOM HEX UNTIL ALL PRESSURE HAS BEEN RELEASED.
1. CHECK OIL LEVEL ACCORDING TO INSTRUCTION MANUAL.
2. CHARGE CYLINDER WITH DRY NITROGEN GAS ONLY.

TO CHARGE CYLINDER: SEE YOUR HAULPAK® DISTRIBUTOR WHO HAS ALL TOOLS AND INFORMATION REQUIRED FOR CHARGING CYLINDERS.

WA2892

The Lubrication Chart is located on the right hand side of the radiator grille and is for reference. Refer to the "Lubrication Section" in this manual for more complete lubrication instructions.

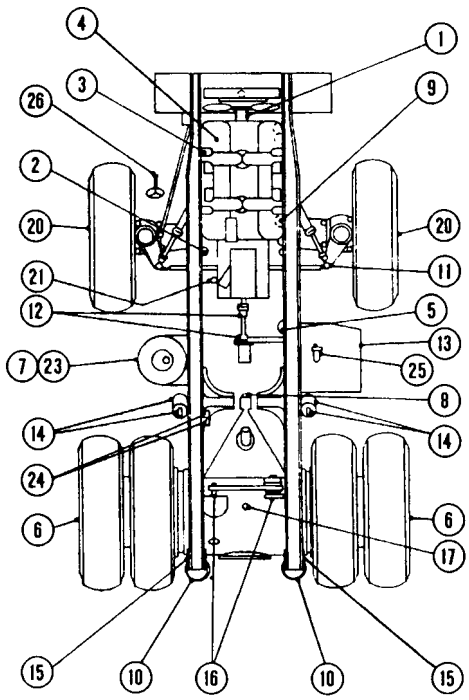
LUBRICATION CHART

LUBRICATION SPECIFICATIONS

LUBE KEY	DESCRIPTION	-65°F TO -25°F	-25°F TO +32°F	+32°F TO +90°F	ABOVE 90°F
A	ENGINE OIL	* * *	SEE ENG. MANUAL	SEE ENG. MANUAL	SEE ENG. MANUAL
B	LUBRICATING OIL	SAE 10W	SAE 10W	SAE 10W	SAE 10W
C	MULTI-PURPOSE GEAR OIL	MIL-L-2105D SAE 75W	MIL-L-2105D SAE 80W-90	MIL-L-2105D SAE 80W-90	MIL-L-2105D SAE 85W-140
D	TYPE C-4 OIL	SAE 10W * * *	SAE 10W * * *	SAE 10W	SAE 30W
E	MOLYBDENUM DISULPHIDE GREASE -3% MIN	#0	#2	#2	#2
F	MULTI-PURPOSE GREASE NLGI	#0	#0	#0	#0

SYM.	DESCRIPTION	PTS.	LUBE KEY	10 HR	50 HR	100 HR	250 HR	500 HR	1000 HR	2000 HR	5000 HR
1	FAN DRIVE	1	SEE ENGINE MANUAL								
2	AIR STARTERS	1	E						GREASE		
3	CRANKCASE	1	A	CHECK			CHANGE				
	CRANKCASE BREATHERS	1							WASH DRY		
4	FUEL FILTER	1		DRAIN			CHANGE				
5	FUEL STRAINER	1		DRAIN			CHANGE				
6	MOTORIZED WHEEL GEAR CASE	2	C	SEE GENERAL ELECTRIC PLANNED MAINTENANCE MANUAL AND SPECIFIC MOTORIZED WHEEL SERVICE MANUAL							
	SPEED SENSOR	2	E								
7	HYDRAULIC OIL RESERVOIR	1	D		CHECK				CHANGE *		
8	FINAL DRIVE PIVOT PIN	1	E		GREASE						
9	ENGINE LUBE OIL FILTERS	4				CHANGE					
10	REAR SUSPENSION BALL JOINTS	4	E			GREASE					
11	STEERING LINKAGE BALL JOINTS	8	E				GREASE				
12	HYDRAULIC PUMP DRIVE SHAFT	2	F			GREASE					
13	FUEL TANK	1				DRAIN H20 & SEDIMENT					
14	HOIST CYLINDER BALL JOINTS	4	E			GREASE					
15	BODY HINGE PINS	2	E			GREASE					
16	ANTI-SWAY BAR	2	E			GREASE					
17	REAR AXLE AIR BREATHER	2						CHANGE CLEAN			
18											
19											
20	FRONT WHEEL BEARINGS	2	* *			CHECK					CHANGE
21	AIR SYSTEM LUBRICATOR	1	D				REFILL -				
22	SEAT ADJ. STUD & SLIDE RAILS	4	E						GREASE		
23	HYDRAULIC STRAINER	1							CLEAN		
24	HYDRAULIC FILTERS	1						CHANGE			
25	FUEL TANK BREATHER	1							CLEAN		
26	STEERING COLUMN	1	E			GREASE					
27											
28											

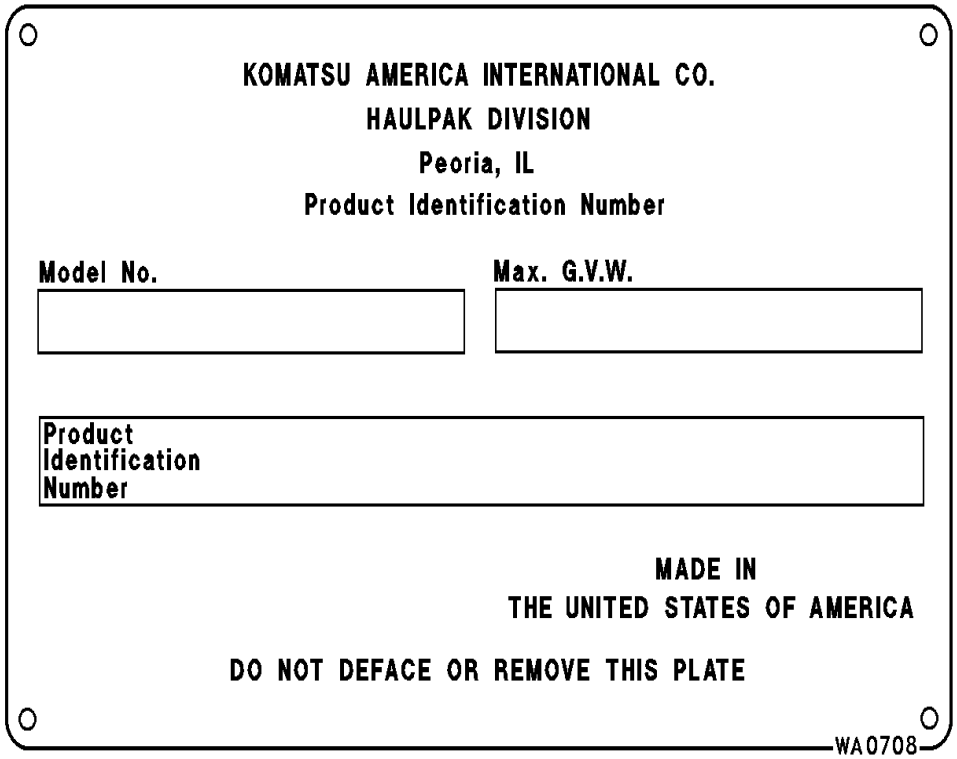
* 1000 HR INTERVAL CAN BE EXTENDED TO 5000 HR PROVIDED HYDRAULIC OIL SAMPLING AND ANALYSIS IS CONDUCTED EVERY 250 HR.
** DO NOT USE OTHER THAN SAE 80W-90 FOR FRONT WHEEL BEARINGS.
*** AUXILIARY HEATERS REQUIRED BELOW -10° F.



ITEM 22 NOT SHOWN

WA8867

A Product Identification plate is located on the frame in front of the right side front wheel and gives the Model Number, Maximum G.V.W. and Product Identification Number.



OPERATOR CONTROLS AND EQUIPMENT

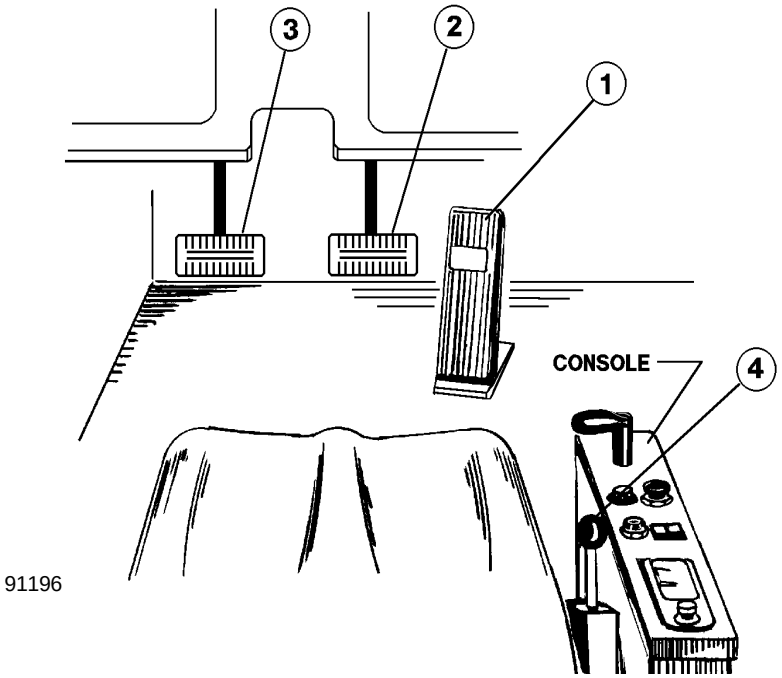


FIGURE 4-1. OPERATOR CONTROLS

(1) THROTTLE PEDAL

The Throttle Pedal is a foot operated pedal which allows the operator to control engine RPM.

(2) DYNAMIC RETARDING PEDAL

The Dynamic Retarding Pedal is a foot operated pedal which allows the operator to slow the truck without the use of the service brakes to maintain a safe productive speed. The Dynamic Retarding should be used to slow and control the speed of the truck. Service brakes should be used to bring the truck to a complete stop.

When Dynamic Retarding is in operation, the engine RPM will automatically go to retard RPM setting.

The Dynamic Retarding system will be applied automatically if operator allows speed of truck to reach the predetermined overspeed retard setting.

(3) BRAKE PEDAL

The Brake Pedal is a foot operated pedal controlling a hydraulic valve, which modulates pressure to the service brakes.

NOTE: In some applications, the functions of the service brake pedal (3) and the dynamic retarding pedal (2) are combined into a single pedal.

(4) HOIST CONTROL LEVER

The hoist control valve is a four position ("DOWN", "FLOAT", "HOLD", "RAISE"), hand operated device located to the right of the operator seat.

To Raise dump body:

1. Pull the lever to the rear ("RAISE") to actuate hoist circuit. (Releasing the lever anywhere during "hoist up" will place the body in "HOLD" at that position.)
2. Raise engine RPM to accelerate hoist speed.
3. Reduce engine RPM as last stage of hoist cylinder begins to extend and let engine go to low idle as last stage reaches half-extension.
4. Release hoist lever as last stage reaches full extension.
5. After dumped material clears body, lower body to frame before moving forward.

To lower body:

Move hoist lever forward to "DOWN" position and release. When lever is released, hoist control valve returns to "FLOAT" position allowing the body to return to frame.

NOTE: For more specific details regarding proper dumping procedures, refer to "DUMPING" in the "Operating Instructions" section of this handbook.

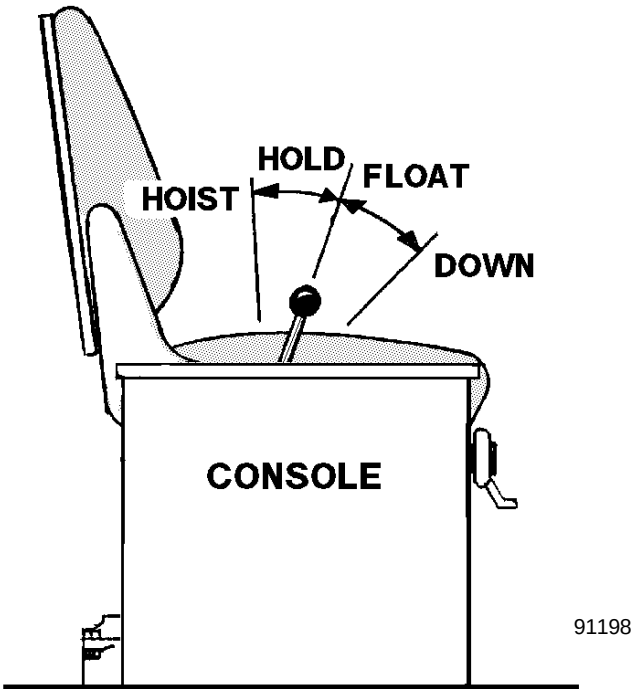
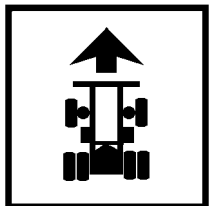


FIGURE 4-2. HOIST CONTROL LEVER

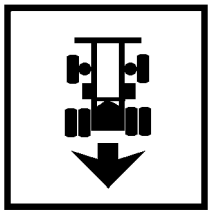
(5) SELECTOR SWITCH

The Selector Switch is mounted on a console to the right of the operator's seat. The console includes the Selector Switch, an Engine Idle Switch, an Override Switch, the Retard Speed Control Engagement Switch and Retard Speed Adjustment Control

The Selector Switch is a three position switch which controls the directional motion of the truck. When the Selector Switch handle is positioned to the left, it is in the center "N" position and is in "Neutral". **The handle must be in neutral to start the truck.**



The operator can select Forward drive by moving the handle forward.



Reverse drive is selected by moving the handle to the rear.

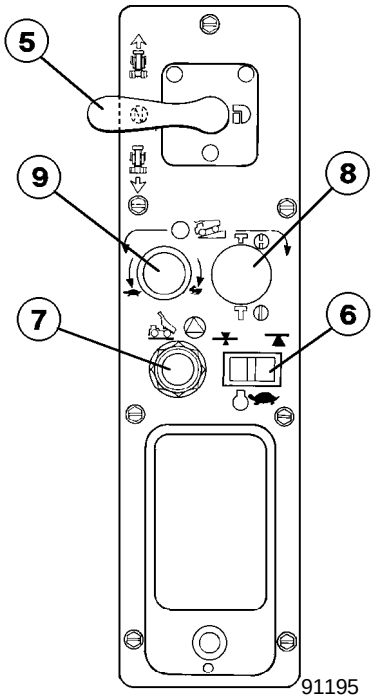
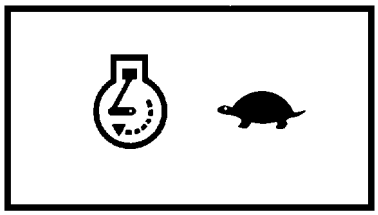
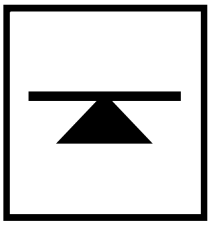


FIGURE 4-3. CONSOLE CONTROLS

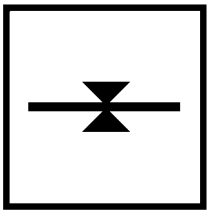
(6) ENGINE IDLE SWITCH
(NOT FUNCTIONAL w/STATEX III & FUEL ENHANCEMENT)



The Engine Idle Switch controls the engine idle RPM when the operator has released the accelerator pedal.

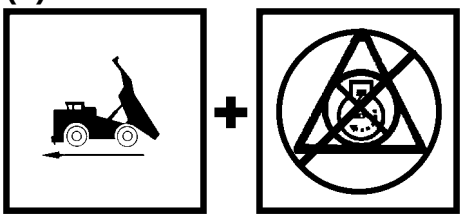


When the switch lever is pressed on the right side, the operator can control engine speed anywhere between low idle and high idle settings. This is the "low" engine idle position. This position should be used when maneuvering in confined areas (i.e. shop area).



When the switch lever is pressed on the left side toward this symbol and truck speed is above 3 mph (4.8 kph), the operator may control engine speed only between dynamic retard engine speed (1675 RPM) and high idle. The switch should be in this postion during hauling operations. Increased engine RPM is required to insure adequate flow of cooling air to the main alternator and wheel motors when dynamic retarding is applied. When truck speed is below 3 mph (4.8 kph), truck operates the same as "low" idle position.

(7) OVERRIDE PUSHBUTTON



When pushed in and held, this switch permits the truck to be moved forward when the dump body is raised and the brakes are released.

⚠WARNING ***Use of the override switch is intended for emergency situations only.***

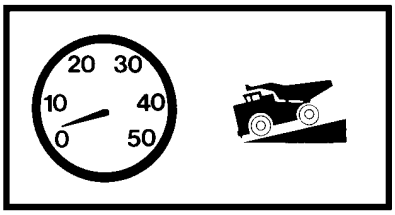
If the operator stops the truck on an uphill incline, the override switch can be used to set up forward propulsion while the brakes are applied. As soon as forward propulsion is felt, completely release the brakes and a few seconds later release the override switch.

The push button deactivates the retard pedal function when speed of truck is below 3 mph (4.8 kph).

The override switch is also used to reset the electric system fault when indicated by the red warning light.
(Refer to "Electric System Fault" light indicator in “Instruments and Indicators”.)

NOTE: STATEX III records the number of "faults/events". When a predetermined number of "faults/events" are recorded within a given time frame, the operator will not be able to reset the fault/event by using the override switch.
If this occurs, notify maintenance personnel immediately.

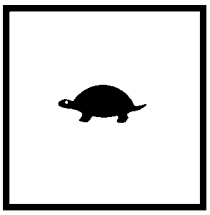
(8) RETARD SPEED CONTROL SWITCH



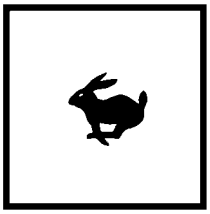
The Retard Speed Control Switch turns the system “ON” or “OFF”. Pull out the knob to turn the system “ON” and push the knob in to turn “OFF”. When the system is “ON”, an amber indicator light on the instrument panel is illuminated.
(Refer to “Instruments and Indicators” for location.)

(9) RSC ADJUST DIAL

The RSC Adjust Dial allows the operator to vary the amount of retarding effort to maintain safe operating speeds when descending a grade.



When the dial is rotated counterclockwise toward this symbol, retarding effort is increased and the truck will descend a grade at lower speeds.



When the dial is rotated clockwise toward this symbol, retarding effort is reduced and the truck speed will increase.

Throttle pedal position will override RSC setting. If operator depresses throttle pedal to increase truck speed, Dynamic Retarding will not come on unless truck over-speed setting is reached or foot operated retard pedal is used. When throttle pedal is released and RSC switch is "On", Dynamic Retarding will come on at the RSC pre-selected speed and will maintain that maximum speed.

To adjust RSC control, pull switch (8) "On" and start with dial (9) rotated toward fastest speed while driving truck at desired maximum speed. Relax throttle pedal to let truck coast and turn RSC Adjusting Dial slowly counterclockwise until Dynamic Retarding is activated. Dynamic Retarding will now be activated automatically anytime the "set" speed is reached, the RSC switch is "On", and throttle pedal is released.

With RSC switch "On" and dial adjusted, the system will function as follows: As truck speed increases to the "set" speed and throttle pedal released, Dynamic Retarding will apply. As truck speed tries to increase, the amount of retarding effort will automatically adjust to keep the selected speed. When truck speed decreases, the retarding effort is reduced to maintain the selected speed. If truck speed continues to decrease to approximately 3 mph (4.8 kph) below "set" speed, Dynamic Retarding will turn off automatically. If truck speed must be reduced further, the operator can turn the Adjust Dial to a new setting or depress the foot operated retard pedal.

If the operator depresses the foot operated retard pedal and the retard effort called for is greater than that from the automatic system, the foot pedal retard will override RSC.

(10) STEERING COLUMN AND CONTROLS

The steering column will adjust through a tilt angle to provide the most comfortable wheel position for operators.

Adjust the tilt of the steering wheel by pulling the tilt adjustment lever (11) toward the steering wheel and moving the wheel to the desired angle. Releasing the lever will lock the wheel in the desired location.

The Turn Signal Lever (12) is used to activate turn signal lights and to select either high or low headlight beams. Move the lever upward to signal a turn to the right. Move the lever downward to signal a turn to the left. A lamp (13 or 14) will illuminate to indicate turn direction selected.

Headlight beam selection is made by moving the lever (12) toward the steering wheel. An indicator lamp (15) on the instrument panel illuminates when high beams are selected.

The air horn is actuated by the horn button (16) in the center of the steering wheel. Operation of the horn should be verified before moving the truck. Observe all local safety rules regarding the use of the horn as a warning signal device before moving.

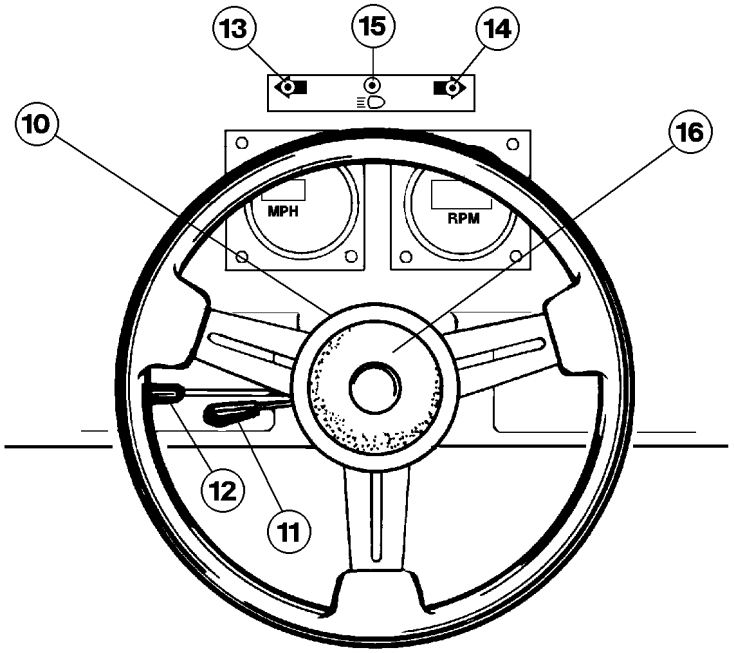


FIGURE 4-4. STEERING COLUMN AND CONTROLS

OPERATOR SEAT

The operator's seat provides a fully adjustable cushioned ride for the driver's comfort and ease of operation. The seat is independently mounted from the cab for easy maintenance and repair.

Adjustment

The following adjustments must be made while sitting in the seat.

1. To adjust fore/aft location of seat:
   a. Raise adjustment lever "Lift to Slide" (3, Figure 4-5).
   b. Move seat backward or forward as desired.
2. To adjust seat height:
   a. Depress the "Height Adjust Push" lever (1).
   b. Adjust seat assembly to desired height.
3. To adjust weight:
   a. Turn knob "Weight Adjust" (2).
   b. Moving knob clockwise decreases cushioning effect of seat and turning counterclockwise increases cushioning effect.
   c. Proper adjustment results in Weight Indicator (4) being flush with seat base while operator is seated.
4. To adjust seat cushion:
   a. Raise "Cushion Tilt Latch" lever (1, Figure 4-6) on left side of seat.
   b. When lever is unlatched, choose between two different positions.

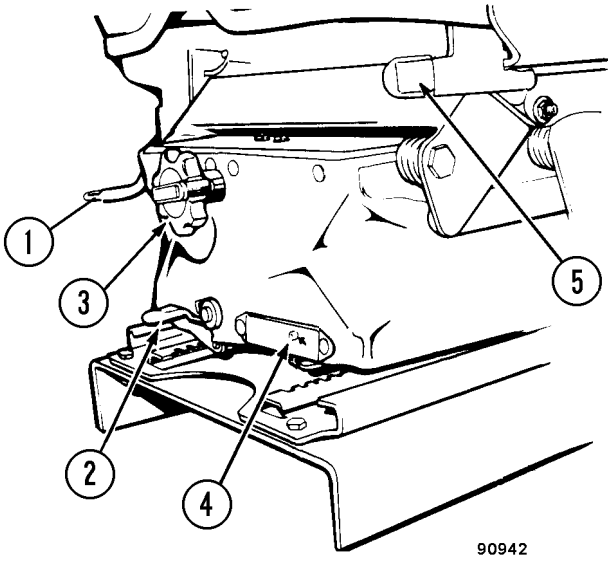


FIGURE 4-5. SEAT ADJUSTMENT CONTROLS

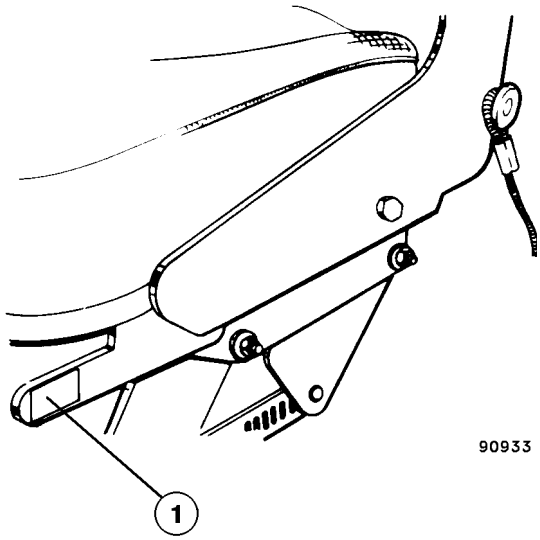


FIGURE 4-6. SEAT TILT LATCH

ISRINGHAUSEN OPERATOR SEAT (OPTIONAL)

The operator's seat provides a fully adjustable cushioned ride for the driver's comfort and ease of operation.

Adjustment

The following adjustments must be made while sitting in the seat.

Seat Height: No manual adjustment is necessary; seat will automatically adjust to operator's weight.

1. **Headrest**: headrest (1, Figure 4-7) will move up, down, fore, or aft by moving headrest to desired position.
2. **Armrests**: rotate adjusting knob (2) until until armrest is in desired position.

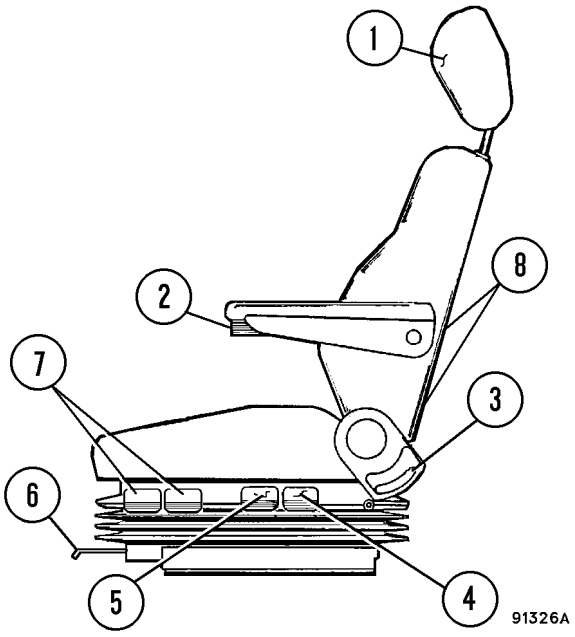


FIGURE 4-7. OPTIONAL SEAT – ADJUSTMENT CONTROLS

1. Headrest
2. Armrest Adjustment
3. Backrest Adjustment
4. Rear Height and Slope Adjustment
5. Front Height and Slope Adjustment
6. Fore and Aft Adjustment
7. Lumbar Support Adjustment (Optional)
8. Air Pillows for Optional Lumbar Support

3. **Backrest**: Rotate control (3) upward and hold, select backrest angle; release control handle.
4. **Rear Height and Slope Adjustment of Seat Cushion**:
   a. Rear height and slope; lift control lever (4) and hold.
   b. Distribute weight to desired position; (fore, aft, up, or down). Release control lever to lock adjustment.
5. **Front Height and Slope Adjustment of Seat Cushion**:
   a. Front height and slope; lift control lever (5) and hold.
   b. Bend knees to move seat to a comfortable position; release control lever to lock adjustment.
6. **Fore/Aft Location of Seat**:
   a. Raise adjustment lever (6).
   b. Move seat to desired position; release lever.
7. **Air Lumbar Support** – (Optional) – Each rocker switch (7) controls an air pillow. To inflate, press on top of rocker switch and hold for desired support, then release. To deflate, press on bottom of rocker switch and hold for desired support, then release. Adjust each pillow for desired support.

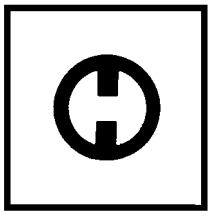
INSTRUMENTS AND INDICATORS

INSTRUMENT PANEL

The operator must understand the function and operation of each instrument and control. Control functions are identified with "International" symbols that the operator should learn to recognize immediately. This knowledge is essential for proper and safe operation of the machine. Items that are marked **OPTIONAL** do not apply to every truck.

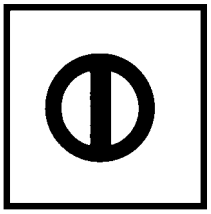
The following symbols are general indicators and may appear in multiple locations and combinations on the instrument panel.

"OFF"



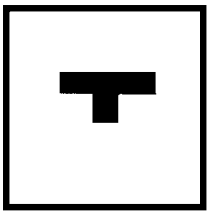
This symbol may be used alone or with another symbol. This symbol identifies the "Off" position of a switch or control.

"ON"



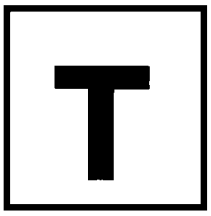
This symbol may be used alone or with another symbol. This symbol identifies the "On" position of a switch or control.

"IN"



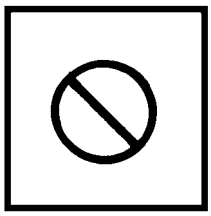
This symbol identifies the "Pushed-In" position of a push-pull switch or control.

"OUT"



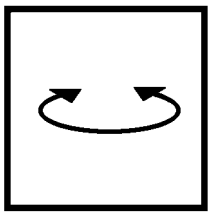
This symbol identifies the "Pulled-Out" position of a push-pull switch or control.

"NO"



This symbol, when it appears on an indicator or control, identifies that this indicator or control is **NOT** used.

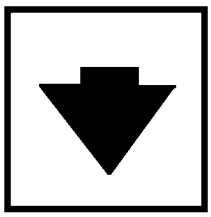
“ROTATE”



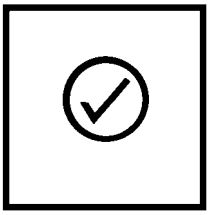
This symbol identifies a rotary control or switch. Rotate the knob clockwise or counterclockwise for functions.

“PUSH”

This symbol identifies a switch or control that must be pushed in to select the function.



“CHECK”



This symbol identifies a switch used to test or check a function. Press the switch on the side near the symbol to perform the test.

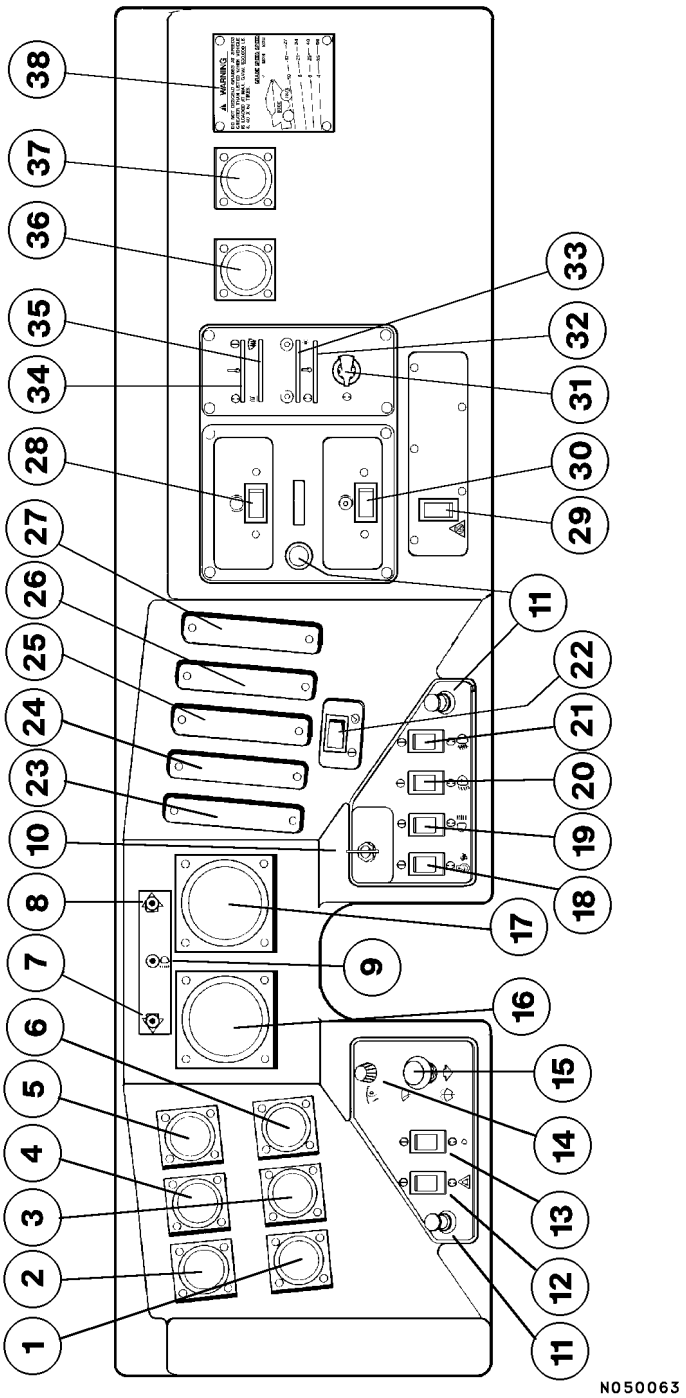
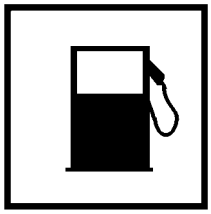


FIGURE 5-1. PANEL GAUGES, INDICATORS, AND CONTROLS

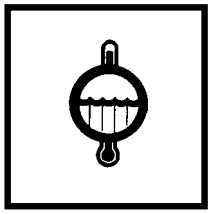
PANEL GAUGES, INDICATORS, AND CONTROLS

(1) FUEL GAUGE



The fuel gauge indicates how much diesel fuel is in the fuel tank. Fuel tank capacity is 1000 gallons (3785 liters).

(2) WATER TEMPERATURE GAUGE

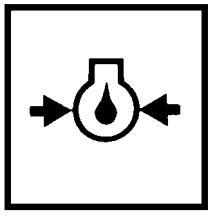


The water temperature gauge indicates the temperature of the coolant in the engine cooling system. The temperature range after engine warm-up and truck operating under normal conditions should be:

165°-195°F (74°-91°C)

(3) (Not Used)

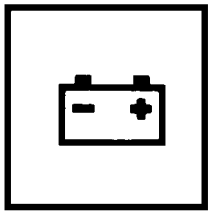
(4) ENGINE OIL PRESSURE GAUGE



The engine oil pressure gauge indicates pressure in the engine lubrication system in pounds per square inch (psi).
Normal operating pressure after engine warm up should be:

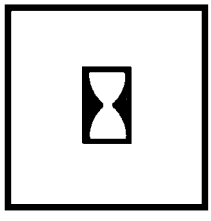
Idle - 20 psi (138 kPa)
Rated Speed - 45 to 70 psi (310 to 483 kPa)

(5) VOLTMETER



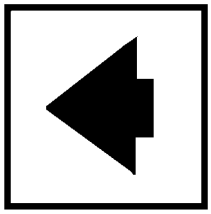
The voltmeter indicates the voltage of the 24V battery system. Normal indicated voltage at high RPM is 27 to 28 volts with batteries in fully charged condition.
When keyswitch (10) is "On" and engine NOT running, voltmeter indicates battery charge condition.

(6) HOURMETER



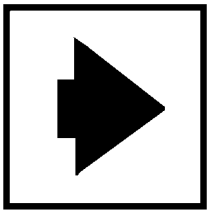
The hourmeter registers the total number of hours the engine has been in operation.

(7) LEFT TURN SIGNAL INDICATOR



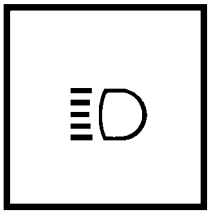
This indicator light illuminates to indicate the left turn signals are operating when the turn signal lever on the steering column is moved downward. Moving the lever to its center position will turn indicator "Off".

(8) RIGHT TURN SIGNAL INDICATOR



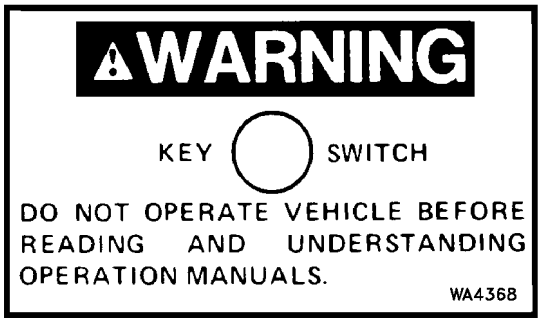
This indicator light illuminates to indicate the right turn signals are operating when the turn signal lever on the steering column is moved upward. Moving the lever to its center position will turn indicator "Off".

(9) HIGH BEAM INDICATOR



The high beam indicator when lit, indicates that the truck headlights are on "High" beam. To switch headlights to "High" or "Low" beam, move the steering column mounted lever toward the steering wheel. (Refer to “Operator Controls and Equipment”.)

(10) KEY SWITCH



The key switch is a three position (Off, Run, Start) switch. When switch is rotated one position clockwise, it is in the "Run" position and all electrical circuits (except "Start") are activated. With Selector Switch in "**N**eutral", rotate keyswitch fully clockwise to "Start" position and hold this position until engine starts. "Start" position is spring loaded to return to "Run" when key is released.

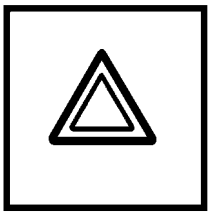
With truck stopped, turn keyswitch counterclockwise to "Off" for normal engine shutdown. Use Emergency Engine Shutdown (29), if engine does not shutdown with keyswitch.

NOTE: A ground level shutdown switch is located on front left side of truck below the air purifier assembly.

(11) PANEL ILLUMINATION LIGHTS

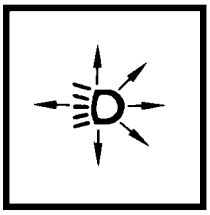
These lights provide illumination for the instrument panel. Brightness is controlled by the panel light dimmer (14).

(12) HAZARD WARNING LIGHTS



The hazard warning light switch flashes all the turn signal lights.

(13) LIGHT SWITCH

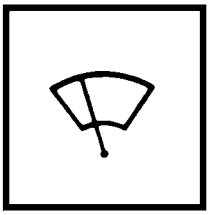


The instrument panel lights, clearance lights, and the headlights are controlled by this three position rocker type switch. "Off" is selected by pressing the bottom of the switch.
Press the top of the switch until it reaches the first detent to select the panel, clearance, and tail lights only.
Press the top of the switch again, until it reaches the second detent to select headlights, as well as panel, clearance, and tail lights.

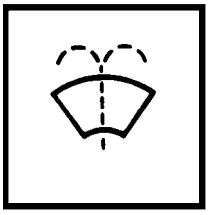
(14) PANEL LIGHT DIMMER

The panel light dimmer control is a rheostat which allows the operator to vary the brightness of the instruments and panel lights. Rotating knob to the full counterclockwise position turns panel lights "On" to brightest condition. Rotating knob clockwise continually dims lights until "Off" position is reached at full clockwise rotation.

(15) WINDSHIELD WIPER/WASHER SWITCH



The windshield wiper control switch is a four position rotary switch with intermittent wiper delay and wash feature. "Off" position is the detented position when the knob is rotated fully counterclockwise against the stop.
The intermittent wiper position is located between "Off" and the first detent position, when rotating the knob clockwise.
Rotating the knob closer to the first detent position decreases the time interval between wiper strokes.
Rotate the knob clockwise to the first detent position for slow speed.
Rotate the knob to the second detent position for fast speed.



Push the knob in to activate the windshield washer system. When knob is released, the washer pump will stop and the wipers will make 3 or 4 additional cycles to clear the windshield and then stop.

When activated, the wipers operate at low speed while the washer pump operates.

(16) SPEEDOMETER

The speedometer indicates the truck speed in miles per hour (MPH), or with OPTIONAL speedometer, kilometers per hour (KPH).

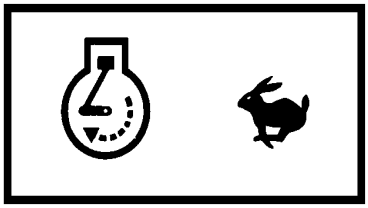
(17) TACHOMETER

The tachometer registers engine crankshaft speed in revolutions per minute (RPM).

Governed RPM (Detroit Diesel):

Low Idle — 750 RPM (650 RPM with DDEC Fuel Saver)
High Idle, No load — 2040 ± 20 RPM (1920 RPM with DDEC)
High Idle, loaded — 1900 RPM

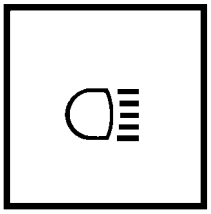
(18) ENGINE HIGH IDLE SWITCH



When this switch is "On", engine speed will automatically go to dynamic retard engine speed (1250 – 1675 RPM) and **no electric propulsion will be allowed** when in the "ON" position. This position may be used if truck is to remain idle with engine running for an extended period of time, such as engine warming during cold weather operation.

When switch is "Off", operator can control engine speed anywhere between low idle and high idle settings and operate truck, depending on the position of the Engine Idle Switch on the operator's center console. Refer to OPERATOR CONTROLS AND EQUIPMENT, previous section, for a description of the Engine Idle Switch.

(19) MANUAL BACKUP LIGHT SWITCH

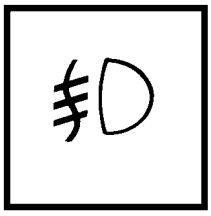


The Manual Backup Light Switch allows backup lights to be turned "On" providing added visibility and safety when the Selector Switch (see OPERATOR CONTROLS AND EQUIPMENT) is not in "REV" position. When the SWITCH is pressed toward the "on" position, the MANUAL BACK UP LIGHT indicator (24E) will be illuminated.

(20) LADDER LIGHT SWITCH

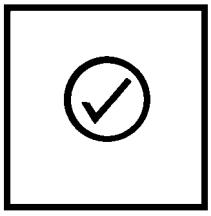
This switch turns the ladder lights "On" or "Off". Another switch is mounted at the front left of truck near the base of ladder.

(21) FOG LIGHTS (OPTIONAL)



Fog Lights are optional equipment that are useful in foggy conditions and heavy rain. Pressing the top of the rocker switch turns the lights "On". Pressing the bottom of the switch turns the lights "Off".

(22) LAMP TEST SWITCH



The lamp test switch is provided to allow the operator to test the amber Caution (23, 24, 25) and red Warning (26, 27) indicator lamps prior to starting the engine. To test the lamps, and the warning horn, turn the key switch (10) to the "Run" position and press the right side of the rocker switch for the "Check" position. All lamps, except those that are optional equipment and therefore not installed, should illuminate. The warning horn should also sound. Any lamp bulbs which do not illuminate should be replaced before operating the truck.

CAUTION INDICATOR LIGHTS

Caution Indicator Light Strips (23, 24, 25, Figure 5-1) are amber in color and alert the operator of the status of truck functions and that some precaution may be required when lighted. Refer to Figure 5-2 for location of symbols (A-E) in each of the indicator strips.

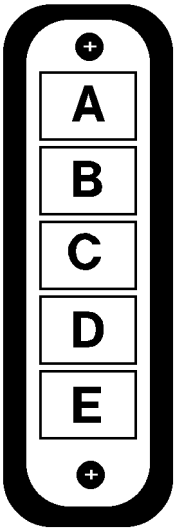
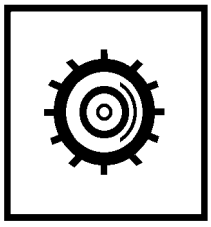


FIGURE 5-2. INDICATOR LIGHT SYMBOL LOCATION

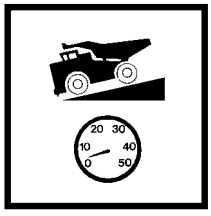
(23) INDICATOR LIGHT PANEL (AMBER)

23A: Dynamic Retarding



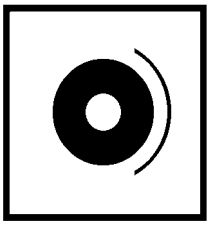
This amber dynamic retarding indicator light illuminates when the retarder pedal is operated, RSC (Retarder Speed Control) is activated, or the automatic overspeed retarding circuit is energized, indicating the dynamic retarding function of the truck is operating.

23B: Retard Speed Control Indicator



This amber light is illuminated when the RSC switch mounted on the console is pulled out to the "On" position.

23C: Service Brake

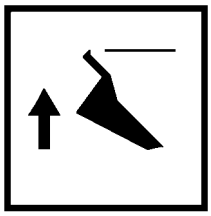


This amber service brake indicator light will illuminate when the service brake pedal is applied or when wheel brake lock or emergency brake is applied. Do not attempt to drive truck from stopped position with service brakes applied.

23D: Parking Brake

This amber parking brake indicator will illuminate when the parking brake is applied. Do not attempt to drive truck with parking brake applied.

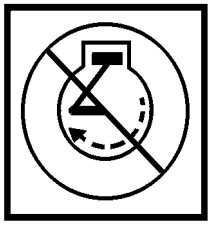
23E: Body Up



This amber Body Up indicator, when illuminated, shows that the body is not completely down on the frame. The truck should not be driven until body is down and light is off.

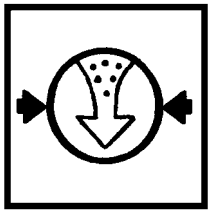
(24) INDICATOR LIGHT PANEL (AMBER)

24A: Engine Monitor



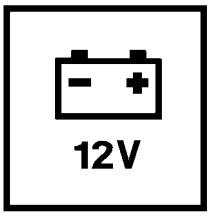
This *amber* "Engine Monitor" indicator will illuminate if a malfunction is detected by the electronic engine control system. **If this indicator illuminates, alert maintenance personnel as soon as possible**.

24B: Low Air Pressure



This amber low air pressure indicator light will illuminate when the air pressure is below 90 psi (621 kPa).
A warning buzzer will also sound indicating low air pressure.

24C: Battery Protection

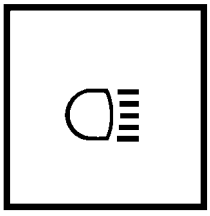


The battery protection indicator light will illuminate if a malfunction is detected in the battery equalizer system. The system should be inspected and repaired as soon as possible.

24D: Low Fuel (Optional)

This amber low fuel indicator will illuminate when the usable fuel remaining in the tank is approximately 25 gallons (95 liters). A warning buzzer will also sound.
Fuel should be added to the tank as soon as possible.

24E: Manual Backup Lights



This amber manual backup light indicator will illuminate when the manually operated switch (19) is turned "on".

(25) INDICATOR LIGHT PANEL (AMBER)

25A/B/C/D/E: NOT USED WITH THIS APPLICATION

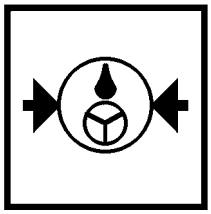
This indicator strip (if present) is not currently used with Detroit Diesel engine. Reserved for future use or options.

WARNING INDICATOR LIGHTS

Warning Indicator light Strips (26, 27, Figure 5-1) are RED in color and alert the operator to safely stop the truck and shut down the engine.
DO NOT OPERATE THE TRUCK WITH A RED WARNING LIGHT ILLUMINATED.
Refer to Figure 5-2 for location of symbols (A-E) for the indicator Strips.

(26) WARNING LIGHT PANEL (RED)

26A: Low Steering Pressure



When the keyswitch is in the “On/Run” position, the low steering pressure warning light will illuminate and the warning horn will sound until the steering system hydraulic pressure reaches 2100 psi (14.7 MPa), and the accumulator(s) are properly charged.

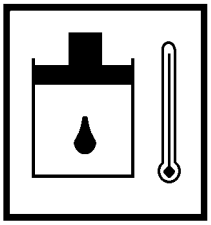
If the indicator light and warning horn remain "on", and do not turn off after running the engine for a few minutes, a problem exists in either the accumulator nitrogen precharge pressure [precharge pressure is below 1300 psi (9.1 MPa)], the steering system hydraulic circuit, or the steering system hydraulic monitoring circuit.
Notify maintenance personnel. Do not operate truck until the fault has been corrected.

During truck operation, this indicator light and warning horn will turn on if steering system hydraulic pressure drops below 2100 psi (14.7 MPa).

- If the light illuminates momentarily ("flickers") while turning the steering wheel at low truck speed and low engine RPM, this may be considered "normal", and truck operation may continue.
- If the indicator light illuminates at higher truck speed and high engine RPM, DO NOT OPERATE TRUCK.

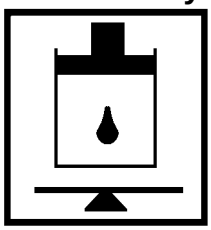
⚠WARNING ***If the low steering warning light continues to illuminate and the alarm continues to sound, low steering pressure is indicated. The remaining pressure in the accumulators allows the operator to control the truck to a stop. Do not attempt further operation until the malfunction is located and corrected.***

26B: High Hydraulic Oil Temperature (optional)



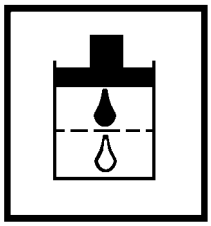
This warning light indicates high oil temperature in the hydraulic tank. Continued operation could damage components in the hydraulic system. Notify maintenance personnel immediately. The light turns on at 225° F (107° C).

26C: Low Hydraulic Tank Level (optional)



This warning light indicates the oil level in the hydraulic tank is below recommended level. Damage to hydraulic pumps may occur if operation continues. Shut truck down and notify maintenance personnel immediately.

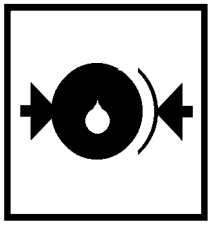
26D: Filter Monitor



The filter monitor warning light will illuminate if the hoist system or steering system hydraulic filter restriction reaches 40 psid (276 kPa), indicating filter replacement is required.

NOTE: The filter monitor warning light may also illuminate after the engine is initially started if the oil is cold. If the light turns off after the oil is warmed, filter maintenance is not required.

26E: Low Brake Pressure



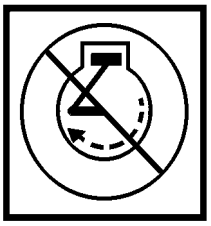
This red indicator light indicates a malfunction within the hydraulic brake circuit.

When the keyswitch is turned "ON", this indicator light will illuminate until the hydraulic brake circuit has been charged. If this light illuminates and buzzer sounds during operation, **shut down truck operation** and notify maintenance personnel.

NOTE: Adequate hydraulic fluid is stored to allow the operator to safely stop the truck.

(27) WARNING LIGHT PANEL (RED)

27A: Engine Monitor



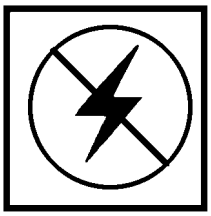
The **RED** engine monitor warning light will illuminate if a serious engine malfunction is detected in the electronic engine control system. Electric propulsion to the wheelmotors will be discontinued and the maximum engine speed will be reduced to 1650 RPM. Dynamic Retarding will still be available if needed to slow or stop the truck.

Stop the truck as quickly as possible in a safe area and apply parking brake.
SHUT DOWN THE ENGINE IMMEDIATELY. Additional engine damage is likely to occur if operation is continued.

27B: NOT USED - BLANK

Not currently used. Reserved for future use.

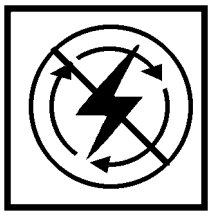
27C: Electric System Fault



The Electric System fault warning light will flash on and off when a malfunction occurs in the electrical system. The warning horn will also signal intermittently.
When light comes "On", propulsion will be dropped automatically. Reset by pushing override button. If fault repeats again, stop truck and report problem to maintenance personnel.

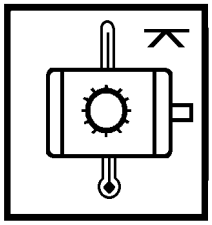
NOTE: STATEX III records the number of "faults/events". When a predetermined number of "faults/events" are recorded within a given time frame, the operator will not be able to reset the fault/event by using the override switch.
If this occurs, notify maintenance personnel immediately.

27D: Motor Blower Warning



The motor blower warning light will flash on and off and an alarm will sound if a malfunction occurs in the cooling air circuit for the alternator and motorized wheels.
Stop the truck immediately and notify maintenance personnel if warning light glows. Damage to electrical components may result without proper ventilation of rotating equipment.

27E: High Motor Temperature (Optional)

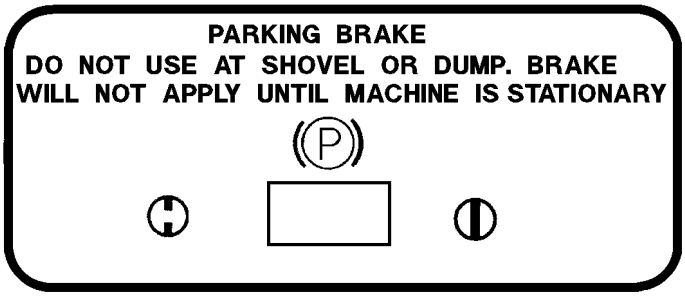


When this light is lit and alarm sounds, high wheel motor temperature is indicated. Stop truck, place Selector Switch in "Neutral" and raise engine RPM to high idle for several minutes to cool wheel motors. If indicator does not turn off, notify maintenance personnel.

(28) PARKING BRAKE CONTROL

Stop truck, then press the rocker switch on the right side toward the "On" symbol to apply the parking brake. To release, press the rocker switch on the left side toward the "Off"symbol. The parking brake is spring applied and hydraulically released. When the parking brake is applied, Parking Brake indicator (23D) will be illuminated on the instrument panel.

A warning plate is mounted around the parking brake switch. The plate stresses that the parking brake switch is only for parking and will not apply until the truck has reached a full stop.



WA6652A

NOTE: Do not use the parking brake at shovel or dump.

(29) EMERGENCY ENGINE SHUTDOWN

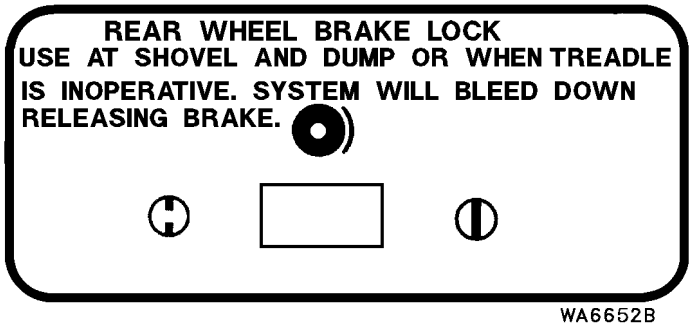
This rocker-type Engine Shutdown switch must be depressed and held until engine stops. This Engine Shutdown switch may be used if engine does not shutdown normally with keyswitch.

WARNING! Use of this switch does not turn off 24 VDC electric accessories!

Normal engine shutdown is accomplished by turning key switch "Off", which also turns off all 24 VDC electric accessories, including hydraulic bleeddown timer.

(30) REAR WHEEL BRAKE LOCK CONTROL

The Wheel Brake Lock should be used with engine running for dumping and loading operations only. The brake lock switch actuates the hydraulic brake system which locks the rear wheel brakes. When pulling into shovel or dump area, stop the truck using the service brake pedal. When truck is completely stopped and in position, apply the brake lock by pressing the rocker switch on the right side.



WA6652B

⚠WARNING

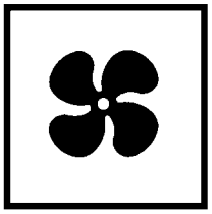
Do not use to stop truck.

Use at shovel and dump only.

Do not use brake lock for parking.

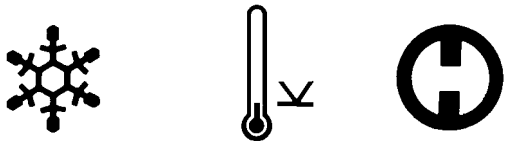
Use of the brake lock for extended period of time with the engine shut down will allow eventual release of brakes.

(31) FAN CONTROL KNOB



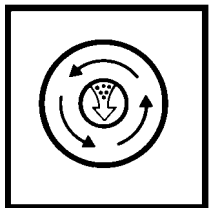
The fan control knob is provided to control the cab air fan motor. The fan motor is a 3-speed motor (low, medium and high). Speeds are selected by rotating the control knob clockwise to the desired position. "Off" position is marked by a symbol on the panel.

(32) AIR CONDITIONER CONTROL (OPTIONAL)



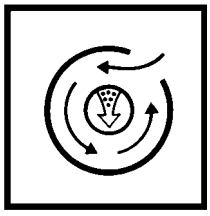
The Air Conditioner control lever is moved from right (off) to left to cool the cab air. Full left position is coldest setting.

(33) OUTSIDE/INSIDE AIR CONTROL LEVER

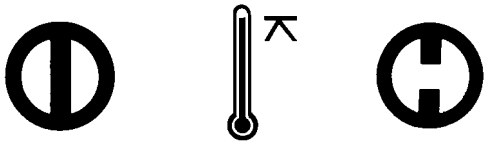


The outside/inside air control lever is connected to a vent, which allows either outside or inside air to be circulated through the cab heater assembly.

Moving the lever to the right directs outside air to be circulated through the heater assembly.
Moving the lever to the left directs inside air to be recirculated through the heater assembly.



(34) HEATER TEMPERATURE CONTROL LEVER



The heater temperature control lever is provided for the operator to select a comfortable temperature.

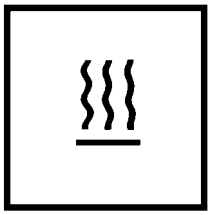
The far right position turns heat off for warm weather operation (or air conditioning, if so equipped).

Milder temperatures can be regulated by moving the control lever to the left.

Moving the control lever to the far left selects the warmest temperature for cold weather operation.

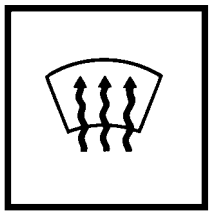
(35) DEFROSTER/HEAT CONTROL LEVER

The defroster/heater control lever permits the operator to select either defroster or heater.



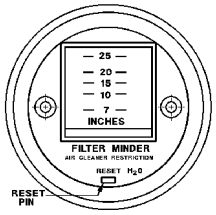
Moving the control lever to the far left position directs heated air to the cab floor for most efficient heating of cab air.

Moving the lever to the far right selects the defroster function. This directs heated air to the windshield.



Selecting a center position for the control lever divides the air to both floor heat and defroster.

(36, 37) AIR CLEANER SERVICE VACUUM GAUGES



The air cleaner service gauges provide a continuous reading of maximum air cleaner restriction reached during operation.
The air cleaner(s) should be serviced when the gauge(s) shows the following maximum recommended restriction for Detroit Diesel:

20.0 inches of H_2O vacuum.

NOTE: After service, push the reset pin at bottom of gauge to allow the needle to return to zero.

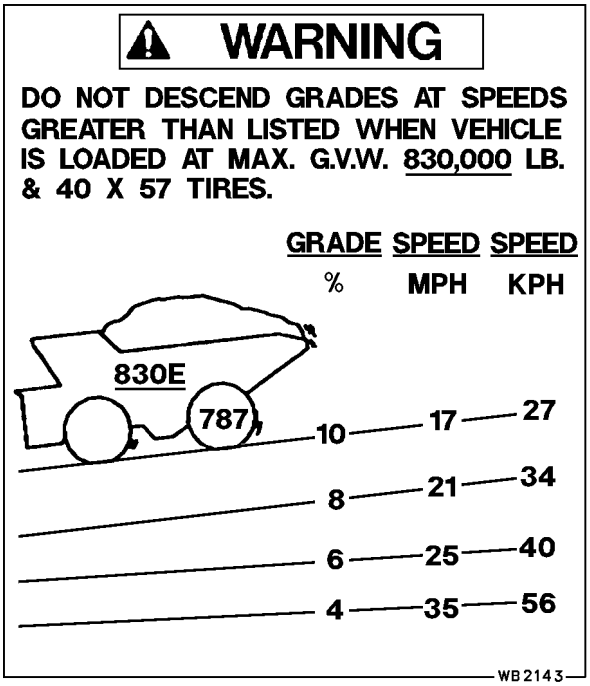
(38) GRADE/SPEED WARNING

The Grade/Speed WARNING plate provides recommended MAXIMUM speeds to be used when descending various grades with a loaded truck.

This decal may change with **optional** wheelmotor drive train ratios.

ALWAYS refer to the decal in the operator's cab, and follow these recommendations for truck operation.

DO NOT exceed these recommended MAXIMUM speeds when descending grades with a loaded truck.



NOTES

OPERATING INSTRUCTIONS

PREPARING FOR OPERATION

The safest trucks are those which have been properly prepared for operation. At the beginning of each shift, a careful check of the truck should be made before the operator attempts engine start-up.

1. When walking to and from the truck, BE ALERT, remain a safe distance from all other machines even if the operator is visible.
2. Check for any oil or coolant leaks. When checking coolant in radiator, use coolant level sight gauge (if equipped). If necessary to remove radiator cap, shut down engine, and relieve coolant pressure SLOWLY before removing radiator cap.

⚠WARNING ***If engine has been running, allow coolant to cool, before removing the fill cap or draining radiator. Serious burns may result if coolant is not allowed to cool.***

NOTE: If truck is equipped with the MTU Engine and WEBASTO Coolant Heater System for cold weather starting, the coolant heater switch [located on small box on L.H. frame near front of engine] must be turned "On" for approximately 20 minutes before starting engine; a green light will illuminate to indicate heater system is operating. **Turn heater switch "Off" before starting engine! DO NOT operate engine with coolant heater "On"!**

3. Check tires for cuts, damage or "bubbles". Check tires for proper inflation before beginning shift and periodically during shift.
4. Visually inspect all headlights, worklights and taillights and safety equipment for external damage from rocks or misuse. Make sure lenses are clean.
5. Always use hand rails and ladder when mounting or dismounting from the truck. Clean ladder and hand rails of all accumulations, such as ice, snow, oil, or mud.

⚠CAUTION ***Always mount and dismount the truck facing the truck. Never attempt to mount or dismount the truck while it is in motion.***

6. Dirt or trash buildup, specifically in the operator's cab, should be cleared. Do not carry tools or supplies in cab of truck or on the deck.
7. Insure steering wheel, controls and pedals are free of any oil, grease or mud.
8. Insure adequate ventilation before start-up if the truck is in an enclosure. Exhaust fumes are dangerous!

ENGINE START-UP SAFETY PRACTICES

1. Insure all personnel are clear of truck before starting engine. Always sound the horn as a warning before actuating any operational controls.

2. Check and insure Selector Switch is in "**N**eutral" before starting.

3. If truck is equipped with auxiliary cold weather heater system(s), **DO NOT attempt to start engine while heaters are in operation**. *DAMAGE TO COOLANT HEATERS WILL RESULT!*

   Also refer to: PREPARING FOR OPERATION, item 2. *"NOTE"*.

4. The keyswitch is a three position (Off, Run, Start) switch. When switch is rotated one position clockwise, it is in the "Run" position and all electrical circuits (except "Start") are activated. With Selector Switch in "**N**eutral", rotate keyswitch fully clockwise to "Start" position and hold this position until engine starts. "Start" position is spring loaded to return to "Run" when key is released.
   For MTU engine, see NOTE 2: below.

   NOTE 1: If truck is equipped with the Cummins Engine Prelube System, a noticeable time delay will occur (while engine lube oil passages are being filled) before starter engagement and engine cranking will begin. The colder the engine oil temperature, the longer the time delay will be. In addition, if truck is also equipped with Engine Starting Aid for cold weather starting, the Engine Prelube System should be engaged FIRST for 5-10 seconds, or until starter is engaged, BEFORE activating the Engine Starting Aid .

   ⚠WARNING ***Starting fluid is extremely volatile and flammable! Use with extreme care.***

   If truck is equipped with optional Engine Starting Aid and ambient temperature is below 50°F (10°C), turn the keyswitch to the "Start" position, and while cranking engine, move the Engine Starting Aid switch to the "On" position for three (3) seconds **MAXIMUM**; then release Engine Starting Aid. If engine does not start, wait at least fifteen (15) seconds before repeating the procedure.

   Do not crank an electric starter for more than 30 seconds.
   Allow two minutes for cooling before attempting to start engine again.
   Severe damage to starter motor can result from overheating.

   NOTE 2: If truck is equipped with the MTU Engine:

   a. Turn keyswitch to "Run" (not "Start") position.

   b. Wait approximately 10 seconds for MTU governor to complete "self-check". Red light on instrument panel will stop blinking.

   c. Turn keyswitch to "Start" position and hold until engine starts.

AFTER ENGINE HAS STARTED

1. After engine has started, do not accelerate engine speed or drive truck until low pressure and warning systems are normal, and the coolant temperature is at least 160°F (71°C).

2. Become thoroughly familiar with steering and emergency controls. Test the truck steering in extreme right and left directions. If the steering system is not operating properly, shut engine down immediately. Determine the steering system problem and have repairs made before resuming operation.

3. Operate each of the truck's brake circuits at least twice prior to operating and moving the truck. These circuits include individual activation from the operator's cab of the service brake, parking brake, and brake lock (also emergency brake, if equipped). With the engine running and with the hydraulic circuit fully charged, activate each circuit individually. If any application or release of any brake circuit appears sluggish or improper, or if warning alarms are activated on application or release, shut the engine down and notify maintenance personnel. Do not operate truck until brake circuit in question is fully operational.

4. Check gauges, warning lights and instruments before moving the truck to insure proper system operation and proper instrument functioning. Give special attention to braking and steering circuit hydraulic warning lights. If warning lights come on, shut down the engine immediately and determine the cause.

5. Insure headlights, worklights and taillights are in proper working order. Good visibility may prevent an accident. Check operation of windshield wiper.

6. When truck body is in dump position, do not allow anyone beneath it unless body-up retaining pin or cable is in place.

7. Do not use the fire extinguisher for any purpose other than putting out a fire! If extinguisher is discharged, report the occurrence so the used unit can be refilled or replaced.

8. Do not allow unauthorized personnel to ride in the truck. Do not allow anyone to ride on the ladder of the truck.

9. Do not leave truck unattended while engine is running. Shut down engine before getting out of cab.

MACHINE OPERATION SAFETY PRECAUTIONS

After the truck engine is started and all systems are functioning properly, the operator must follow all local safety rules to insure safe machine operation.

⚠WARNING ***If any of the red warning lights come "On" or if any gauge reads in the red area during truck operation, a malfunction is indicated. Stop truck as soon as safety permits, shut down engine if problem indicates and have problem corrected before resuming truck operation.***

⚠CAUTION ***Operating truck with stalled or free spinning wheel motors may cause serious damage to wheel motors! If truck does not begin to move within 10 seconds after depressing throttle pedal (Selector Switch in a drive position), release throttle pedal and allow*** *wheels to regain traction before accelerating engine again.*

1. Always look to the rear before backing the truck. Watch for and obey ground spotter's hand signals before making any reverse movements. Sound the warning horn (3 blasts). Spotter should have a clear view of the total area at the rear of the truck.
2. Operate the truck only while properly seated with seat belt fastened. Keep hands and feet inside the cab compartment while truck is in operation.
3. Check gauges and instruments frequently during operation for proper readings.
4. Observe all regulations pertaining to the job site's traffic pattern. Be alert to any unusual traffic pattern. Obey the spotter's signals.
5. Match the truck speed to haul road conditions and slow the truck in any congested area. Keep a firm grip on steering wheel at all times.
6. Do not allow engine to run at "Idle" for extended periods of time.
7. Check parking brake periodically during shift. Use parking brake **ONLY** for parking. Do not use park brake for loading / dumping.
   Do not attempt to apply parking brake while truck is moving!

⚠WARNING ***Do not use "Brake Lock" or "Emergency Brake" (if equipped) for parking.***

8. Check brake lock performance periodically for safe loading and dump operation.
9. Proceed slowly on rough terrain to avoid deep ruts or large obstacles. Avoid traveling close to soft edges and the edge of fill area.
10. Truck operation requires concentrated effort by the driver. Avoid distractions of any kind while operating the truck.

LOADING

1. Pull into the loading area with caution. Remain at a safe distance while truck ahead is being loaded.
2. Do not drive over unprotected power cables.
3. When approaching or leaving a loading area, watch out for other vehicles and for personnel working in the area.
4. When pulling in under a loader or shovel, follow "Spotter" or "Shovel Operator" signals. The truck operator may speed up loading operations by observing the location and loading cycle of the truck being loaded ahead, then follow a similiar pattern.
5. When being loaded, operator should stay in truck cab. Place Selector Switch in "**N**eutral" and apply brake lock with engine running.

⚠WARNING ***If operator must leave truck cab during loading, engine must be shut down and parking brake applied. DO NOT use brake lock or emergency brake (if equipped) for parking. Remain far enough away from truck to avoid being struck by flying material.***

6. When loaded, pull away from shovel as quickly as possible but with extreme caution.

HAULING

1. Always stay alert! If unfamiliar with the road, drive with extreme caution. Cab doors should remain closed at all times if truck is in motion or unattended.
2. Obey all road signs. Operate truck so it is under control at all times. Govern truck speed by the road conditions, weather and visibility. Report haul road conditions immediately. Muddy or icy roads, pot holes or other obstructions can present hazards.
3. When backing the truck, give back-up signal (three blasts on the horn); when starting forward, two blasts on the horn. These signals must be given each time the truck is moved forward or backward.
4. Use extreme caution when approaching a haul road intersection. Maintain a safe distance from oncoming vehicles.
5. Maintain a safe distance when following another vehicle. Never approach another vehicle from the rear, in the same lane, closer than 50 ft. (15 m). When driving on a down grade, this distance should not be less than 100 ft. (30 m).

6. Do not stop or park on a haul road unless unavoidable. If you must stop, move truck to a safe place, apply parking brake, block wheels securely, shut down engine and notify maintenance personnel for assistance.

7. Before starting up or down a grade, maintain a speed that will insure safe driving and provide effective retarding under all conditions. Refer to Grade/Speed decal in operator's cab.

8. When operating truck in darkness, or when visibility is poor, do not move truck unless headlights are on. Do not back truck if back-up horn or lights are inoperative. Always dim headlights when meeting oncoming vehicles.

9. If the "Emergency Steering" light and/or "Low Brake Pressure Warning" light (*if equipped*) illuminate during operation, steer the truck **immediately** to a safe stopping area, away from other traffic if possible. Refer to item 6 above.

10. The Statex III w/Fuel Enhancement system monitors wheel motor, ambient, and static exciter temperatures. If any one of these values is outside the limits established, the Statex III controls will cause the engine to increase to 1650 RPM. (Normal engine RPM for haul road/retarding operation is 1250 RPM.)

11. When maximum truck speed is reached, haul trucks equipped with Statex III w/Fuel Enhancement system will experience a DECREASE in engine RPM.
NOTE: This is different from trucks equipped with Statex II or Statex III <u>without</u> Fuel Enhancement, which <u>increase</u> RPM upon reaching speed limit.

12. Check tires for proper inflation periodically during shift. If truck has been run on a "flat", or under-inflated tire, **it must not be parked in a building until the tire cools**.

PASSING

1. Do not pass another truck on a hill or blind curve!

2. Before passing, make sure the road ahead is clear. If a disabled truck is blocking your lane, slow down and pass with extreme caution.

3. Use only the areas designated for passing.

DUMPING

1. Pull into dump area with extreme caution. Make sure area is clear of persons and obstructions, including overhead utility lines. Carefully maneuver truck into dump position. Obey signals directed by the spotter, if present.

2. Avoid unstable areas. Stay a safe distance from edge of dump area. **Position truck on a solid, level surface before dumping**.

⚠DANGER ***As body raises, the truck Center of Gravity (CG) will move. Truck must be on level surface to prevent tipping / rolling!***

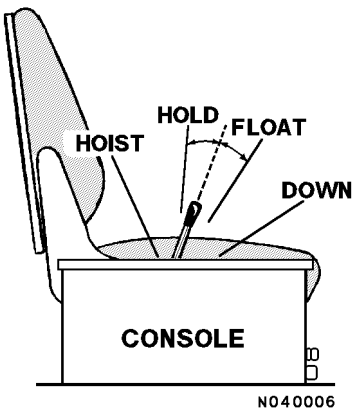
3. When in dump position, apply Brake Lock and move Selector Switch to the "**N**eutral" position.

To Raise dump body:

⚠WARNING ***The dumping of very large rocks (10% of payload, or greater) or sticky material (loads that do not flow freely from the body) may allow the material to move too fast and cause the body to move RAPIDLY and SUDDENLY. This sudden movement may jolt the truck violently and cause possible injury to the operator, and/or damage to the hoist cylinders, frame, and/or body hinge pins. If it is necessary to dump this kind of material, refer to the CAUTION in the following procedure:***

4. Pull the lever to the rear to actuate hoist circuit. (Releasing the lever anywhere during "hoist up" will place the body in "hold" at that position.)

5. Raise engine RPM to accelerate hoist speed. Refer to the CAUTION below.



CAUTION! ***If dumping very large rocks or sticky material as decribed in WARNING above, slowly accelerate engine RPM to raise body. When the material starts to move, release hoist lever to "HOLD" position. If material does not continue moving and clear body, repeat this procedure until material has cleared body.***

6. Reduce engine RPM as last stage of hoist cylinder begins to extend and let engine go to low idle as last stage reaches half-extension.

7. Release hoist lever as last stage of hoist cylinder reaches full extension.

8. After material being dumped clears body, lower body to frame.

To Lower Body:

Move hoist lever forward to "down" position and release. Releasing the lever places hoist control valve in the "float" position allowing the body to return to frame.
NOTE: If dumped material builds up at the rear of the body and the body cannot be lowered, shift Selector Switch to "Forward", release Brake Lock, depress Override button and drive forward to clear material. Stop, shift Selector Switch to "Neutral", apply Brake Lock and lower body.

***! CAUTION! The HAULPAK® Truck is not to be moved with the dump** body raised except for emergency moves only. Failure to lower body before moving truck may cause damage to hoist cylinders, frame and/or body hinge pins.*

9. With body returned to frame, move Selector Switch to "Forward", release Brake Lock, and leave dump area carefully.

TOWING

Prior to towing a truck, many factors must be carefully considered. Serious personal injury and/or significant property damage may result if important safety practices, procedures and preparation for moving heavy equipment are not observed.
Do not tow the truck any faster than 5 MPH (8 kph).

A disabled machine may be towed after the following MINIMUM precautions have been taken.

1. Shut down engine.
2. If truck is equipped, install hydraulic connections for steering and dumping between towing and towed vehicles. Check towed vehicle for braking system.
3. Inspect tow bar for adequacy (approximately 1.5 times the gross vehicle weight of truck being towed).
4. Determine that towing vehicle has adequate capacity to both move and stop the towed truck under all conditions.
5. Protect both operators in the event of tow bar failure.
6. Block disabled truck to prevent movement while attaching tow bar.
7. Release disabled truck brakes and remove blocking.
8. Sudden movement may cause tow bar failure. Smooth and gradual truck movement is preferred.
9. Minimize tow angle at all times - NEVER EXCEED 30^{o}. The towed truck must be steered in the direction of the tow bar.

SAFE PARKING PROCEDURES

The operator must continue the use of safety precautions when preparing for parking and engine shutdown.

In the event that the equipment is being worked in consecutive shifts, any questionable truck performance the operator may have noticed must be checked by maintenance personnel before the truck is released to another operator.

1. The truck should be parked on level ground, if at all possible. If parking must be done on a grade, the truck should be positioned at right angles to the grade.
2. The parking brake must be applied and/or chocks placed fore/aft of wheels so that the truck cannot roll. Each truck should be parked at a reasonable distance from another.
3. Haul roads are not safe parking areas. In an emergency, pick the safest spot most visible to other machines in the area. If the truck becomes disabled where traffic is heavy, mark the truck with warning flags in daylight or flares at night.

SHUTDOWN PROCEDURE

The following procedure (1. – 4.) should be followed at each engine shutdown.

1. Stop truck. Reduce engine RPM to low idle. Place Selector Switch in "**N**eutral" and apply parking brake.
2. Allow engine to cool gradually by running at low idle for 3 to 5 minutes.
3. With truck stopped and engine cooled down, turn keyswitch counterclockwise to "Off" for normal shutdown of engines equipped with electronic engine controls (MTU, Detroit Diesel w/DDEC, or Cummins w/Centry™ Fuel Control). If engine does not shutdown with keyswitch, use engine shutdown switch (*) and hold switch down until engine stops.

* For 445E – 685E, this is the Engine Shutdown Switch on center console (see "Operator Controls" section).

* For 830E, this is the instrument panel Emergency Engine Shutdown switch (see "Instruments and Indicators" section).

4. With keyswitch "Off", and engine stopped, wait at least 90 seconds. Insure steering circuit is completely bled down by turning steering wheel back and forth several times. No front wheel movement will occur when hydraulic pressure is relieved.

   NOTE: A switch is located at lower left front of truck for ground level engine shutdown.

5. Close and lock all windows, remove key from keyswitch and lock cab to prevent possible unauthorized truck operation. Dismount truck properly.

NOTES

LUBRICATION AND SERVICE

One of the most important factors which will contribute to the long life and dependability of the HAULPAK® truck and its components is the use of proper lubricants at recommended intervals. The lubrication intervals are presented in hours of operation. However, if truck operations are being carried out under extreme conditions, some or all of the intervals may need to be shortened and the servicing carried out more frequently.

Refer to manufacturer's service manual when servicing the engine or any components of the General Electric System.

The information presented on these pages should be used as a reference when servicing the truck on a daily or shift basis. Lubrication requirements are referenced to the lube key found in the Lubrication Specifications Chart. For more detailed lubrication and service specifications for extended intervals, refer to Section "P" of the service manual.

10 HOUR LUBRICATION AND MAINTENANCE CHECKS

1. AIR CLEANERS (NOT SHOWN)- Check air cleaner vacuum gauges in operator cab. The air cleaner(s) should be serviced, if the gauge(s) shows the following maximum restriction:

   20 inches of H_2O vacuum for Detroit Diesel engine.

   See Section "C" of the service manual for servicing air cleaner elements. Empty air cleaner dust caps.

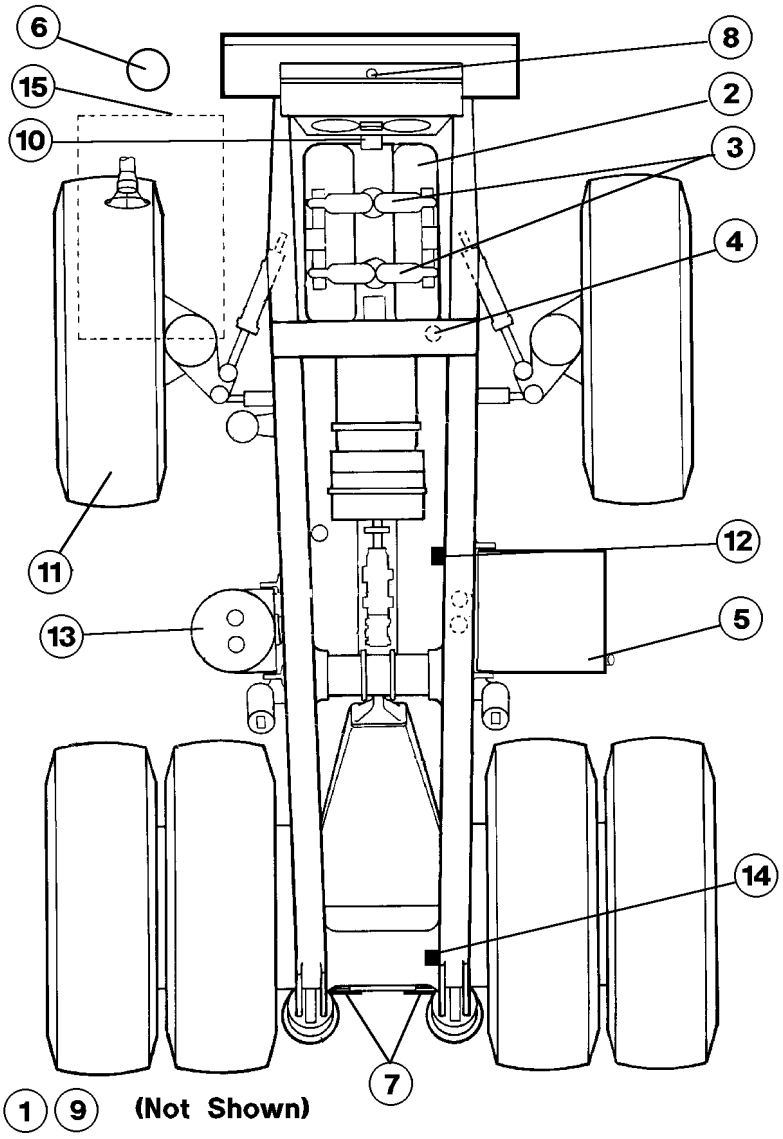
   After service, push the reset button on face of gauge to allow the needle to return to zero.

2. ENGINE - Check oil level. Use Lube Key "A" on Lubrication Specification Chart.
3. ENGINE TURBOCHARGERS - Check for leaks, vibration or unusual noise.
4. FUEL FILTER - Drain water from bottom of filter housing.
5. FUEL TANK - Drain water and sediment at drain cock.
6. AIR TANK - Drain water from air tank.
7. MOTORIZED WHEEL DIRT SEALS - Add grease to each grease fitting. (8 grease fittings per wheel.) Refer to G.E. Service Manual for quantity. Lube Key "E".
8. RADIATOR - Check coolant level and fill with proper mixture as shown in Cooling System Recommendation Chart. Refer to Engine Manual for proper DCA levels.
9. BATTERIES (NOT SHOWN) - Check electrolyte level and add water if necessary.

10. DRIVE BELTS - Check generator and fan belts for proper tension and condition.
11. TIRES - Check for proper inflation and general condition.
12. BODY UP SWITCH - Clean sensing area of any dirt accumulation. Check Section "D" of the service manual for mounting dimensions.
13. HYDRAULIC TANK - Check oil level in tank. Lube Key "D".
14. HOIST LIMIT SWITCH - Clean sensing area of any dirt accumulation. Check Section "D" of the service manual for mounting dimensions.
15. CAB AIR FILTER - Under normal operating conditions, clean every 250 hours. In extremely dusty conditions, service as frequently as required. Clean filter element with mild soap and water, rinse completely clean and air dry with maximum of 40 psi (275 kPa). Reinstall filter.

⚠CAUTION

After each wheel mounting operation, recheck wheel mounting capscrew tighteness after about five hours operation, check again at the end of the shift and then periodically until all capscrews hold at the prescribed 450 ft.lbs. (610 N.m) torque. This requirement is prescribed for both front and rear wheels



10 HOUR SERVICE

LUBRICATION SPECIFICATION CHARTS

SERVICE CAPACITIES		
	GALLONS	LITERS
CRANKCASE Detroit Diesel	40	151
COOLING SYSTEM Detroit Diesel	135	511
HYDRAULIC SYSTEM	250	947
FUEL	1000	3785
WHEEL MOTOR GEARBOX 787 (Each Wheel)	5	19

NALCOOL (Detroit Diesel)		
COOLING SYSTEM CAPACITY	NALCOOL	MAKEUP DOSAGE
135 gal. (511 liters)	34 pints (16 liters)	7 pints (3.3 liters)

COOLING SYSTEM ANTI-FREEZE RECOMMENDATIONS
(Ethylene Glycol Permanent Type Anti-Freeze)

Percentage of Anti-Freeze	Protection To:	
	Degrees, Farenheit	Degrees, Celsius
10	+ 23	- 5
20	+ 16	- 9
25	+ 11	- 11
30	+ 4	- 16
35	- 3	- 19
40	- 12	- 24
45	- 23	- 30
50	- 34	- 36
55	- 48	- 44
60	- 62	- 52

Use only antifreeze that is compatible with the engine as specified by the engine manufacturer.

LUBRICATION SPECIFICATIONS CHART

LUBE KEY	TYPE OF LUBRICANT		-25℉ or Colder (-32℃ or Colder)	-25℉ to + 32℉ (-32℃ to 0℃)	+ 32℉ to + 90℉ (0℃ to + 32℃)	Above 90℉ (Above + 32℃)
A	ENGINE OIL	DETROIT DIESEL	SEE ENGINE MANUAL	SEE ENGINE MANUAL	SEE ENGINE MANUAL	SEE ENGINE MANUAL
B	LUBRICATING OIL		SAE 10W	SAE 10W	SAE 10W	SAE 30W
C*	MULTI-PURPOSE GEAR OIL GE WHEEL MOTORS		MIL -L- 2105C SAE 75W	MIL -L- 2105C SAE 80W-90	MIL -L- 2105C SAE 80W-90	MIL -L- 2105C SAE 85W-140
D	TYPE C-3 OIL	HYDRAULIC SYSTEM	SAE 10W	SAE 10W	SAE 10W	SAE 30W
E	MOLY DISULPHIDE GREASE		No. 0	No. 2	No. 2	No. 2
F	MULTI-PURPOSE LITHIUM BASED GREASE		NGLI No. 0	NGLI No. 0	NGLI No. 0	NGLI No. 0

** NOTE: Use SAE80w-90 only for front wheel bearings.*

NOTES

OPTIONAL EQUIPMENT INDEX

PAYLOAD METER SYSTEM M20-1

Operating Instructions . . . . . M20-2 .

Replacing Paper . . . . . M20-5 .

NOTES

PAYLOAD METER

GENERAL INFORMATION

The Payload Meter digitally displays the weight of the payload in a Haulpak® truck in either short tons or metric tons. External deck mounted lights also indicate the payload weight as divided into three stages.

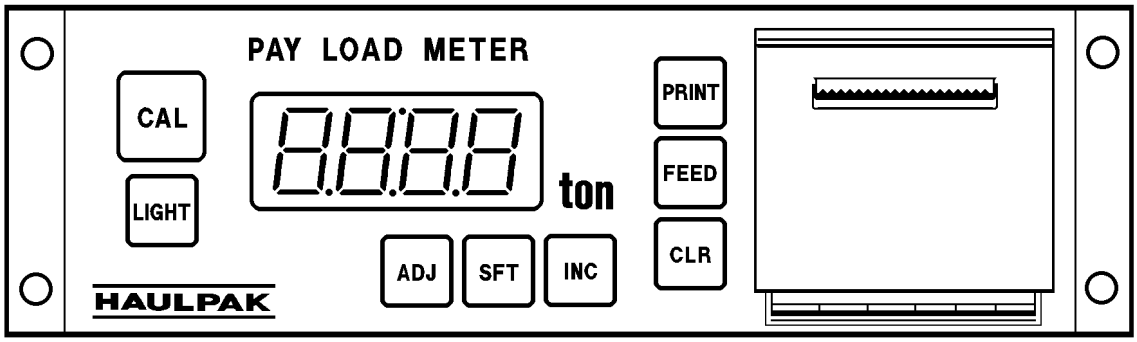
A forecast function flashes an external deck mounted light predicting the payload weight after the next bucket of material is dropped into the body.

Up to two hundred haul cycles of payload data can be stored in the payload meter's memory. The stored data is backed up by an internal battery and can be printed out on demand.

The Payload Meter calculates the payload weight by sensing Hydrair suspension pressures and the pitch angle of the truck. A pressure sensor is mounted on each suspension and an inclinometer is mounted in the cab.

Logic inputs include a wheel brake lock signal, body up signal, short/metric ton display select and two model select inputs.

FRONT PANEL CONTROLS



CAL	Calibration Switch - Carry out routine calibration of the Payload Meter.
LIGHT	Light Switch - Adjust the brightness of load indicating display.
ADJ	Adjustment Switch - Select time setting mode.
SFT	Shift Switch - In time setting mode, selects the digit to be changed.
INC	Increment Switch - Advance the digit selected in time setting mode.
CLR	Clear Switch - Erase haul cycle data stored in the Payload Meter.
FEED	Feed Switch - Feed paper to the printer.
PRINT	Print Switch - Print payload data stored in the Payload Meter.
	Printer paper cover.

OPERATION AND FUNCTIONS

When power is applied to the Payload Meter, a self test function turns on all LED segments and the deck mounted lights. The LED segments remain lit for 3 seconds. Then the time of day is displayed for 7 seconds. When the 10 second self test is complete, the deck mounted lights turn off and normal display logic begins.

NOTE: For best results, the truck should be positioned on a level surface with rear tires not positioned on large rocks or berms while being loaded.

DISPLAY LOGIC

The Payload Meter displays payload weight, the time of day, or 0 according to the following logic.

1. **Time of day** is displayed if the wheel brake lock is off.
2. **Payload weight** is displayed when the wheel brake lock is on and the payload is greater than 5% of rated payload.
3. **0** is displayed:
   a. For one second after the wheel brake lock is switched off **or**
   b. The wheel brake lock is on and the payload is less than 5% of rated payload **or**
   c. The body is up.

METRIC / SHORT TON SELECTION

The payload meter can display either metric tons or short tons. The displayed payload weight can be changed to metric tons by installing an EB0865 jumper wire in the plug socket provided in the payload meter harness near the number 21 pin payload meter connector.

To display and store short tons - no jumper.

To display and store metric tons - install jumper.

DECK MOUNTED LIGHTS

The Payload Meter controls three relays that are located near the payload meter. The relays operate six deck mounted lights, three on each side of the truck. On each side of the truck there is one green light, one amber light and one red light. The lights come on according to the following schedule:

DECK MOUNTED LIGHTS			PAYLOAD WEIGHT
GREEN	OFF	OFF	50% and Greater
GREEN	AMBER	OFF	90% and Greater
GREEN	AMBER	RED	105% and Greater

The shovel or loader operator can predict the payload weight by observing these lights. During the loading operation a forecast function flashes a deck mounted light predicting the payload weight after the next bucket of material is dropped into the body. The logic is as follows:

1. If the measured payload is varying 3% or less of the rated load for more than 0.5 second, the current load is deemed a steady value.
2. If the difference between the previous steady value and the current steady value is greater than 15% of rated load or greater than 10 tons, the difference is taken to be the size of the current bucket.
3. The average size of previous buckets is added to the **current** load. The deck mounted light that will come on if another "average" bucket is dropped in the body will blink at one second intervals.

DATA STORAGE LOGIC

Load data is stored in the battery-backed memory when the wheel brake lock is turned "off", if:

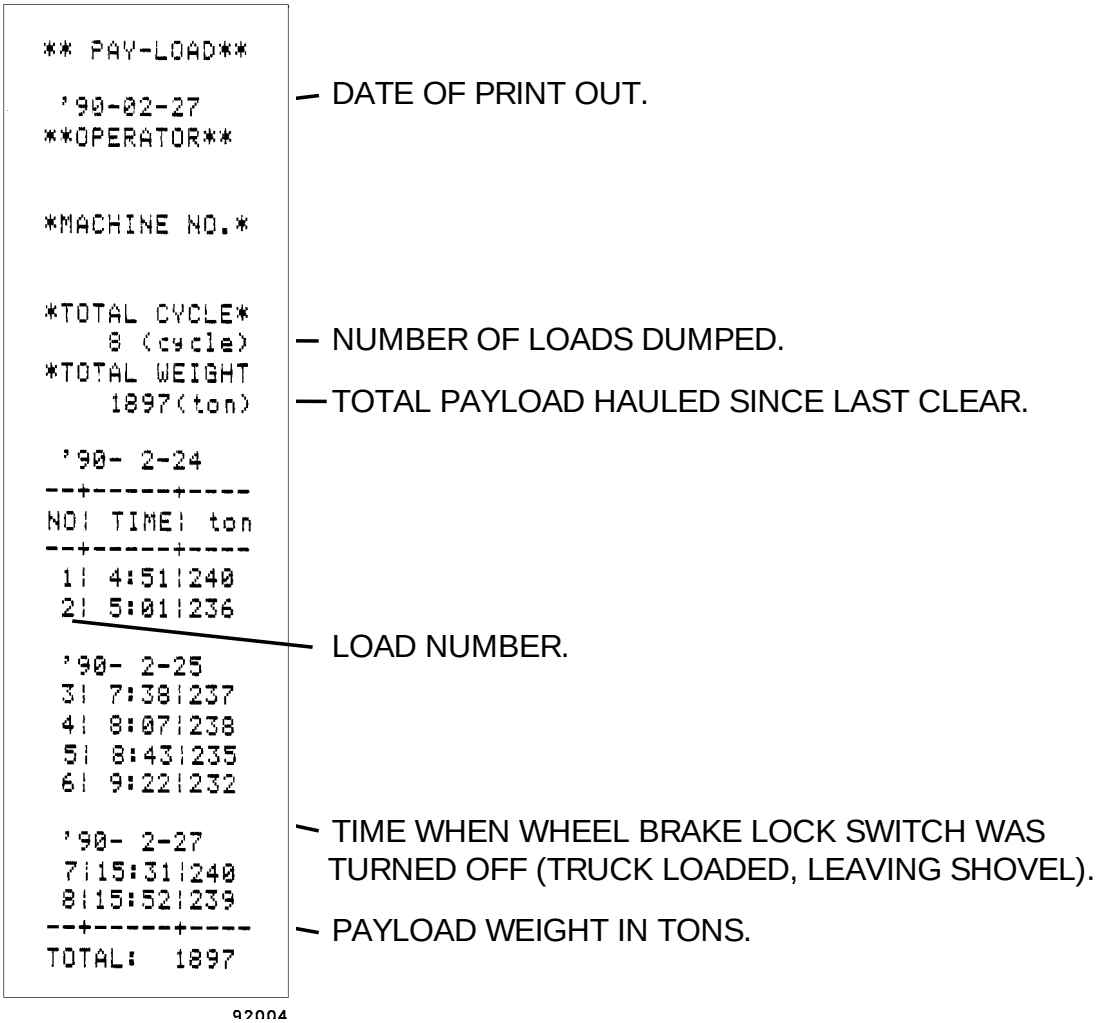
1. The previous payload has been reduced to a level lower than 20% of rated payload **and**
2. The current payload is greater than 50% of rated payload.

Note: This logic prevents the payload meter from recording the current payload weight more than once if the wheel brake lock is used while the truck is loaded.

The payload meter has the capacity to store data for two hundred haul cycles.

DATA PRINT OUT

The data stored in memory will be printed when the "PRINT" button is pushed for one second. If data has been cleared from memory with the clear function the message "NO DATA" will be printed. The printer is a thermal type and has an approximate life of 500,000 lines.

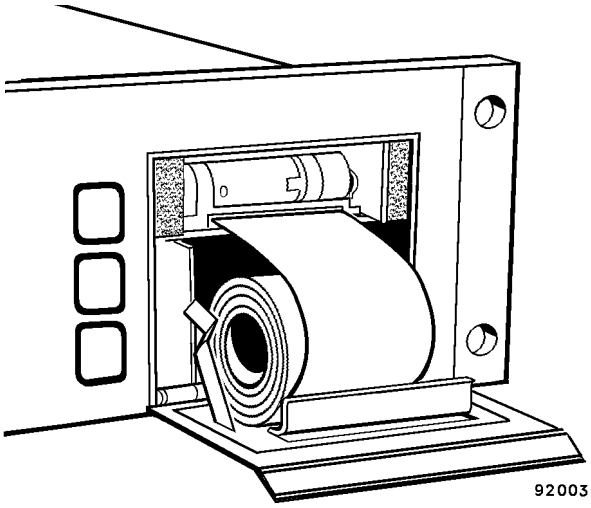


This is a sample print-out only. Actual data will vary according to truck model, payload capacity, location and operating conditions. **DO NOT** exceed the factory recomended **MAXIMUM PAYLOAD RATING.**

REPLACING PRINTER PAPER

A roll of printer paper is 26 ft. long. This will print about 1900 lines of data. When the roll of paper is 12 in. from the end a red line appears indicating replacement is necessary.

To replace paper:



1. Press the "FEED" button to roll out the remaining paper. **Do not forcibly pull the paper out.**
2. Pull the cover open from the top.
3. Unroll about 3 inches from a new roll.
4. Hold the new roll in front of the printer paper input with the 3 inch leader coming from the top of the roll.
5. Insert the leader into the printer paper input and press the "FEED" button. Hold the button until about 6 inches has fed through the printer.
6. Pass the paper through the cover and close.

CLEAR MEMORY

NOTE: Print out all data stored in memory before clearing memory.

1. Push the "CLEAR" button for 1 second. Display will blink "CLEA".
2. Push the "CLEAR" button again. Display will show "CLEA" for 3 seconds then return to normal display logic.

NOTE: To cancel clear operation when display is blinking "CLEA", push "CAL".

CALIBRATION

The calibration function measures and stores in memory the empty truck sprung weight. This data is subtracted from live load data to calculate payload weight. During calibration suspension pressure sensors and inclinometer outputs are acquired and averaged over a 30 seconds interval while the empty truck is driven at a steady 6 MPH on a level smooth haul road. This data is not lost when power is removed from the payload meter. Carry out the calibration procedure:

- After delivery of the machine
- After adjusting suspension oil/gas charge
- After modifying the machine
- After adjusting tire pressure
- After replacing a sensor
- After a sensor check indicates the no load weight has changed.

To perform calibration:

1. Stop the truck and set the wheel brake lock.

NOTE: If the "CAL" button is pressed while the wheel brake lock is off, the "CAL" button will be ignored.

2. Press the "CAL" button. The display will blink "CAL". To cancel press the "CAL" button again. The display will blink "SCH". Press the "CAL" button one more time and the display will return to normal display logic.

3. Begin driving the empty truck at 6 MPH on a level smooth haul road. Press the "CAL" button again. The display will stop blinking and "CAL" will be displayed. Continue to drive the truck. After 30 seconds the display will return to the time of day display and calibration will be complete.

SENSOR CHECK

A sensor check is performed to determine if the empty condition of the truck has changed or a sensor's sensitivity has changed. Pressure and inclinometer outputs are measured under the same conditions as the calibration procedure. An error code will be displayed if a sensor is out of order. See error code table. If an error code is displayed carry out the calibration procedure.

To perform a sensor check:

1. Stop the truck and set the wheel brake lock.

NOTE: If the "CAL" button is pressed while the wheel brake lock is off, the "CAL" button will be ignored.

2. Press the "CAL" button. The display will blink "CAL".

3. Press the "CAL" button again. The display will blink "SCH". To cancel press the "CAL" button one more time and the display will return to normal display logic.

4. Begin driving the empty truck at 6 MPH on a level smooth haul road. Press the "CAL" button again. The display will stop blinking and "SCH" will be displayed. Continue to drive the truck. After 30 seconds the display will return to the time of day display **or** an error code will be displayed and the sensor check will be complete.

DIMMING DISPLAY

Press the "LIGHT" button and hold. The LED display will dim in ten steps. Release the button at the desired level.

SETTING THE TIME OF DAY

1. Press the "ADJ" button and hold until the digits begin blinking.
2. Press the "INC" button to change the blinking digits. The time is displayed as a 24 hour clock.
3. Press the "SFT" button to blink the hours digits, then month, day and year digits.
4. Press the "ADJ" button to end the time setting function.

The clock accuracy is ± 3 minutes per month.

ERROR CODES

The payload meter continually monitors the status of the sensor inputs and relay driver outputs. If an abnormality is found, an error code is displayed. Once an error code has appeared, it may be canceled by pressing the "CAL" button or cycling the power.

ERROR CODE	ERROR CODE TABLE DESCRIPTION	DETECT TIME DELAY
E-31 E-32 E-33	18 Volt sensor power short circuit to ground. Relay short circuit. Backup battery voltage less than 2.6 volts.	5.0 sec. 0.1 sec. 5.0 sec.
E-01 E-02 E-03 E-04	Right rear sensor disconnected – circuit 39FA. Left rear sensor disconnected – circuit 39FB. Right front sensor disconnected – circuit 39FC. Left front sensor disconnected – circuit 39FD.	5.0 sec.
E-11 E-12 E-13 E-14	Right rear sensor short circuit. Left rear sensor short circuit. Right front sensor short circuit. Left front sensor short circuit.	5.0 min.
E-41 E-42	Inclinometer output > = + 10 degrees. Inclinometer output < = – 10 degrees.	5.0 min.
PAPE	Paper jammed.	10 sec.
FULL	Memory full (200 haul cycles).	
E-21 E-22 E-23 E-24	Right rear sensor check error. Left rear sensor check error. Right front sensor check error. Left front sensor check error.	
Once an error code has appeared, it may be cancelled by pushing the "CAL" button or cycling the power.		

NOTES

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L. G. HAGENBUCH holder of
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