



**ISUZU**



**GMC**  
MEDIUM DUTY TRUCKS



**CHEVROLET**  
MEDIUM DUTY TRUCKS

# **ISUZU COMMERCIAL TRUCK FORWARD TILTMASTER**

**NPR/NPR HD  
W3500/W4500  
(V8-GASOLINE ENGINE)**

**SERVICE MANUAL  
SUPPLEMENT  
(2001)**

# FOREWORD

This service supplemental manual contains diagnosis, on-vehicle service, wiring diagrams, and component unit repair for Medium Duty Steel Tilt Cab Vehicle (NPR/V8 GASOLINE ENGINE, W3500, W4500). When used with the Medium Duty Truck Service Manuals (Pub. No. NPG97-WSM-C01, NPG98-WSM-CS1 and NPG99-WSM-CS1), complete service coverage is provided.

Keep this manual in a handy place for ready reference. If properly used, it will enable the technician to serve the owners of these vehicles.

## CAUTION:

This service manual is intended for use by professional, qualified technicians. Attempting repairs or service without the appropriate training, tools, and equipment could cause injury to you or others and damage to your vehicle that may cause it not to operate properly.

These vehicles contain parts dimensioned in the metric system as well as in the customary system. Some fasteners are metric and are very close in dimension to familiar customary fasteners in the inch system. It is important to note that, during any vehicle maintenance procedures, replacement fasteners must have the same measurements and strength as those removed, whether metric or customary. (Numbers on the heads of metric bolts and on surfaces of metric nuts indicate their strength. Customary bolts use radial lines for this purpose, while most customary nuts do not have strength markings.) Mismatched or incorrect fasteners can result in vehicle damage or malfunction, or possibly personal injury. Therefore, fasteners removed from the vehicle should be saved for re-use in the same location whenever possible. Where the fasteners are not satisfactory for re-use, care should be taken to select a replacement that matches the original. For information and assistance, see your Authorized dealer.

## CAUTION

To reduce the chance of personal injury and/or property damage, the following instructions must be carefully observed.

Proper service and repair are important to the safety of the service technician and the safe, reliable operation of all motor vehicles. If a part replacement is necessary, the part must be replaced with one of the same part number or with a part of the same quality. Do not use an incorrect or a replacement part of lesser quality.

The service procedures recommended and described in this service manual are effective methods of performing service and repair. Some of these procedures require the use of tools specially designed for the purpose.

Accordingly, anyone who intends to use a replacement part, service procedure or tool, which is not recommended by the vehicle manufacturer, must first determine that neither technician safety nor the safe operation of the vehicle will be jeopardized by the replacement part, service procedure or tool selected.

It is important to note that this manual contains various **Cautions** and **Notices** that must be carefully observed in order to reduce the risk of personal injury during service or repair, or the possibility that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that these 'Cautions' and 'Notices' are not exhaustive, because it is impossible to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

**2001  
SERVICE  
MANUAL  
(SUPPLEMENT)**

**NPR GAS/NPR HD GAS  
GMC W-SERIES W3500, W4500  
CHEVROLET W-SERIES W3500, W4500  
(V8 GASOLINE ENGINE)  
MODELS**

Any reference to brand names in this manual is intended merely as an example of types of lubricants, tools, materials, etc., recommended for use. In all cases, an equivalent may be used.

All information, illustrations, and specifications contained in this manual are based on the latest product information available at the time of publication approval. The right is reserved to make changes at any time without notice.

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## NPR/W4 V8 GASOLINE ENGINE MODEL DATA

Truck Model	Engine	Clutch	Front Axle	Rear Axle	Transmission
	Standard	—	Standard	Standard	Standard
NPR GAS NPR HD GAS W-SERIES	V8 GASOLINE ENGINE	—	Reverse Elliott, I-Beam	Single Speed Banjo, Full Floating	AUTOMATIC TRANSMISSION

Truck Model	BRAKE
NPR GAS NPR HD GAS W-SERIES	Vacuum assist + ABS

\* ABS : Anti-Lock Brake System

**MEMO**

A series of horizontal dotted lines for writing.

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## Cautions and Notices

### Definition of Caution, Notice, and Important

The diagnosis and repair procedures in the GM Service Manual contain both general and specific Cautions, Notices, and Important. GM is dedicated to the presentation of service information that helps the technician to diagnose and repair the systems necessary for the proper operation of the vehicle, however, certain procedures may present a hazard to the technician if they are not followed in the recommended manner. Cautions, Notices, and Important are elements designed to prevent these hazards, however, not all hazards can be foreseen. This information is placed at strategic locations within the service manual. This information is designed to prevent the following from occurring:

- Serious bodily injury to the technician
- Damage to the vehicle
- Unnecessary vehicle repairs
- Unnecessary component replacement
- Improper repair or replacement of vehicle components. Any caution or notice that appears in general information is referenced from the individual service categories.

### CAUTION Defined

When encountering a CAUTION, you will be asked to take a necessary action or not to take a prohibited action. If a CAUTION is not heeded, the following consequences may occur:

- Serious bodily injury to the technician
- Serious bodily injury to other technicians in the workplace area
- Serious bodily injury to the driver and/or passenger(s) of the vehicle, if the vehicle has been improperly repaired

### NOTICE Defined

Notices call special attention to a necessary action or to a prohibited action. If a NOTICE is not heeded, the following consequences may occur:

- Damage to the vehicle
- Unnecessary vehicle repairs
- Unnecessary component replacement
- Improper operation or performance of the system or component under repair
- Damage to any systems or components which are dependent upon the proper operation of the system or component under repair
- Improper operation or performance of any systems or components which are dependent upon the proper operation or performance of the system or component under repair
- Damage to fasteners, basic tools, or special tools
- The leakage of coolant, lubricant, or other vital fluids

### IMPORTANT Defined

IMPORTANT statements emphasize a necessary characteristic of a diagnostic or repair procedure. IMPORTANT statements are designed to do the following:

- Clarify a procedure
- Present additional information for accomplishing a procedure
- Give insight into the reason or reasons for performing a procedure in the manner recommended
- Present information that will help to accomplish a procedure in a more effective manner
- Present information that gives the technician the benefit of past experience in accomplishing a procedure with greater ease

### ABS Component Handling Caution

**Caution:** *Certain components in the Antilock Brake System (ABS) are not intended to be serviced individually. Attempting to remove or disconnect certain system components may result in personal injury and/or improper system operation. Only those components with approved removal and installation procedures should be serviced.*

### Batteries Produce Explosive Gases Caution

**Caution:** *Batteries produce explosive gases. Batteries contain corrosive acid. Batteries supply levels of electrical current high enough to cause burns. Therefore, in order to reduce the risk of personal injury while working near a battery, observe the following guidelines:*

- *Always shield your eyes.*
- *Avoid leaning over the battery whenever possible.*
- *Do not expose the battery to open flames or sparks.*
- *Do not allow battery acid to contact the eyes or the skin.*
  - *Flush any contacted areas with water immediately and thoroughly.*
  - *Get medical help.*

### Battery Disconnect Caution

**Caution:** *Before servicing any electrical component, the ignition key must be in the OFF or LOCK position and all electrical loads must be OFF, unless instructed otherwise in these procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.*

### Brake Dust Caution

**Caution:** Avoid taking the following actions when you service wheel brake parts:

- Do not grind brake linings.
- Do not sand brake linings.
- Do not clean wheel brake parts with a dry brush or with compressed air.

Some models or aftermarket brake parts may contain asbestos fibers which can become airborne in dust. Breathing dust with asbestos fibers may cause serious bodily harm. Use a water-dampened cloth in order to remove any dust on brake parts. Equipment is available commercially in order to perform this washing function. These wet methods prevent fibers from becoming airborne.

### Brake Fluid Irritant Caution

**Caution:** Brake fluid may irritate eyes and skin. In case of contact, take the following actions:

- Eye contact—rinse thoroughly with water.
- Skin contact—wash with soap and water.
- If ingested—consult a physician immediately.

### Breathing R-134a Caution

**Caution:** Avoid breathing the A/C Refrigerant 134a (R-134a) and the lubricant vapor or the mist. Exposure may irritate the eyes, nose, and throat. Work in a well ventilated area. In order to remove R-134a from the A/C system, use service equipment that is certified to meet the requirements of SAE J 2210 (R-134a recycling equipment). If an accidental system discharge occurs, ventilate the work area before continuing service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

### Cleaning Solvent Caution

**Caution:** Bodily injury may occur if the cleaning solvent is inhaled or exposed to the skin.

### Exhaust Gas Recirculation (EGR) Caution

**Caution:** Avoid breathing fumes and swallowing EGR exhaust deposits when removing components for cleaning as bodily injury may result.

### Express Window Down Caution

**Caution:** Disconnect the power window switch when working inside the driver door. When operated, the Express Up/Down Feature allows the door window to move very quickly, without stopping, which could cause personal injury.

### Fuel and EVAP Pipe Caution

**Caution:** In order to reduce the risk of fire and personal injury observe the following items:

- Replace all nylon fuel pipes that are nicked, scratched or damaged during installation, do not attempt to repair the sections of the nylon fuel pipes
- Do not hammer directly on the fuel harness body clips when installing new fuel pipes. Damage to the nylon pipes may result in a fuel leak.
- Always cover nylon vapor pipes with a wet towel before using a torch near them. Also, never expose the vehicle to temperatures higher than 115° C (239° F) for more than one hour, or more than 90° C (194° F) for any extended period.
- Apply a few drops of clean engine oil to the male pipe ends before connecting fuel pipe fittings. This will ensure proper reconnection and prevent a possible fuel leak. (During normal operation, the O-rings located in the female connector will swell and may prevent proper reconnection if not lubricated.)

### Fuel Gage Leak Caution

**Caution:** Wrap a shop towel around the fuel pressure connection in order to reduce the risk of fire and personal injury. The towel will absorb any fuel leakage that occurs during the connection of the fuel pressure gauge. Place the towel in an approved container when the connection of the fuel pressure gauge is complete.

### Fuel Pipe Fitting Caution

**Caution:** Always apply a few drops of clean engine oil to the male pipe ends before connecting the fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure proper reconnection and prevent a possible fuel leak. During normal operation, the O-rings located in the female connector will swell and may prevent proper reconnection if not lubricated.

### Fuel Rail Stop Bracket Installation Caution

**Caution:** The fuel rail stop bracket must be installed onto the engine assembly. The stop bracket serves as a protective shield for the fuel rail in the event of a vehicle frontal crash. If the fuel rail stop bracket is not installed and the vehicle is involved in a frontal crash, fuel could be sprayed possibly causing a fire and personal injury from burns.

### Fuel Storage Caution

**Caution:** Do not drain the fuel into an open container. Never store the fuel in an open container due to the possibility of a fire or an explosion.

### Fuel Vapors in Evaporative Emission (EVAP) Components Caution

**Caution:** Do not breathe the air through the EVAP component tubes or hoses. The fuel vapors inside the EVAP components may cause personal injury.

### Gasoline/Gasoline Vapors Caution

**Caution:** Gasoline or gasoline vapors are highly flammable. A fire could occur if an ignition source is present. Never drain or store gasoline or diesel fuel in an open container, due to the possibility of fire or explosion. Have a dry chemical (Class B) fire extinguisher nearby.

### Halogen Bulb Caution

**Caution:** Halogen bulbs contain gas under pressure. Handling a bulb improperly could cause it to shatter into flying glass fragments. To help avoid personal injury:

- Turn off the lamp switch and allow the bulb to cool before changing the bulb.
- Leave the lamp switch OFF until the bulb change is complete.
- Always wear eye protection when changing a halogen bulb.
- Handle the bulb only by its base. Avoid touching the glass.
- Keep dirt and moisture off the bulb.
- Properly dispose of the used bulb.
- Keep halogen bulbs out of the reach of children.

### Lower O-Ring Removal Caution

**Caution:** Verify that the lower (small) O-ring of each injector does not remain in the lower manifold in order to reduce the risk of fire and personal injury.

If the O-ring is not removed with the injector, the replacement injector with new O-rings will not seat properly in the injector socket. Improper seating could cause a fuel leak.

### Moving Parts and Hot Surfaces Caution

**Caution:** Avoid contact with moving parts and hot surfaces while working around a running engine in order to prevent physical injury.

### Radiator Cap Removal Caution

**Caution:** To avoid being burned, do not remove the radiator cap or surge tank cap while the engine is hot. The cooling system will release scalding fluid and steam under pressure if radiator cap or surge tank cap is removed while the engine and radiator are still hot.

### Relieving Fuel Pressure Caution

**Caution:** Remove the fuel tank cap and relieve the fuel system pressure before servicing the fuel system in order to reduce the risk of personal injury. After you relieve the fuel system pressure, a small amount of fuel may be released when servicing the fuel lines, the fuel injection pump, or the connections. In order to reduce the risk of personal injury, cover the fuel system components with a shop towel before disconnection. This will catch any fuel that may leak out. Place the towel in an approved container when the disconnection is complete.

### Repair Material Curing Caution

**Caution:** At least 24 hours are required for complete curing of repair material. The repair area should not be physically disturbed until after that time. Insufficient curing of urethane adhesive may allow unrestrained occupants to be ejected from the vehicle resulting in personal injury.

### Road Test Caution

**Caution:** Road test a vehicle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize vehicle control. Failure to adhere to these precautions could lead to serious personal injury and vehicle damage.

### Safety Glasses and Compressed Air Caution

**Caution:** Wear safety glasses when using compressed air in order to prevent eye injury.

### Safety Glasses Caution

**Caution:** Wear safety glasses in order to avoid eye damage.

### Safety Goggles and Fuel Caution

**Caution:** Always wear safety goggles when working with fuel in order to protect the eyes from fuel splash.

## SIR Caution

**Caution:** This vehicle is equipped with a Supplemental Inflatable Restraint (SIR) System. Failure to follow the correct procedure could cause the following conditions:

- Air bag deployment
- Personal injury
- Unnecessary SIR system repairs

In order to avoid the above conditions, observe the following guidelines:

- Refer to SIR Component Views in order to determine if you are performing service on or near the SIR components or the SIR wiring.
- If you are performing service on or near the SIR components or the SIR wiring, disable the SIR system. Refer to Disabling the SIR System in SIR.

## SIR Deployed Inflator Modules Are Hot Caution

**Caution:** After an air bag deploys, the metal surfaces of the inflator module are very hot. To help avoid a fire or personal injury:

- Allow sufficient time for cooling before touching any metal surface of the inflator module.
- Do not place the deployed inflator module near any flammable objects.

## SIR Handling Caution

**Caution:** When you are performing service on or near the SIR components or the SIR wiring, you must disable the SIR system. Refer to Disabling the SIR System. Failure to follow the correct procedure could cause air bag deployment, personal injury, or unnecessary SIR system repairs.

## SIR Inflatable Module Deployment Outside Vehicle Caution

**Caution:** When you are deploying an inflator module for disposal, perform the deployment procedures in the order listed. Failure to follow the procedures in the order listed may result in personal injury.

## SIR Inflator Module Disposal Caution

**Caution:** In order to prevent accidental deployment of the air bag which could cause personal injury, do not dispose of an undeployed inflator module as normal shop waste. The undeployed inflator module contains substances that could cause severe illness or personal injury if the sealed container is damaged during disposal. Use the

following deployment procedures to safely dispose of an undeployed inflator module. Failure to dispose of an inflator module as instructed may be a violation of federal, state, province, or local laws.

## SIR Inflator Module Handling and Storage Caution

**Caution:** When you are carrying an undeployed inflator module:

- Do not carry the inflator module by the wires or connector on the inflator module
- Make sure the bag opening points away from you

When you are storing an undeployed inflator module, make sure the bag opening points away from the surface on which the inflator module rests. When you are storing a steering column, do not rest the column with the bag opening facing down and the column vertical. Provide free space for the air bag to expand in case of an accidental deployment. Otherwise, personal injury may result.

## SIR Special Tool Caution

**Caution:** In order to avoid deploying the air bag when troubleshooting the SIR system, use only the equipment specified in this manual and the instructions given in this manual. Failure to use the specified equipment as instructed could cause air bag deployment, personal injury to you or someone else, or unnecessary SIR system repairs.

## Vehicle Lifting Caution

**Caution:** To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed.

## Window Removal Caution

**Caution:** When working with any type of glass, wear approved safety glasses and gloves in order to reduce the chance of personal injury.

## Window Retention Caution

**Caution:** When replacing stationary windows, Urethane Adhesive Kit GM P/N 12346392, or a urethane adhesive system meeting GM Specification GM3651M, must be used to maintain original installation integrity. Failure to use the urethane adhesive kit will result in poor retention of the window which may allow unrestrained occupants to be ejected from the vehicle resulting in personal injury.

## Work Stall Test Caution

**Caution:** One or more of the following guidelines may apply when performing specific required tests in the work stall:

- **When a test requires spinning the drive wheels with the vehicle jacked up, adhere to the following precautions:**
  - Do not exceed 56 km/h (35 mph) when spinning one drive wheel with the other drive wheel stopped. This limit is necessary because the speedometer indicates only one-half the actual vehicle speed under these conditions. Personal injury may result from excessive wheel spinning.
  - If all of the drive wheels are spinning at the same speed, do not exceed 112 km/h (70 mph). Personal injury may result from excessive wheel spinning.
  - All persons should stay clear of the rotating components and the balance weight areas in order to avoid possible personal injury.
  - When running an engine in the repair stall for an extended period of time, use care not to overheat the engine and the transmission.
- **When a test requires jacking up the vehicle and running with the wheels and brake rotors removed, adhere to the following precautions:**
  - Support the suspension at normal ride height.
  - Do not apply the brake with the brake rotors removed.
  - Do not place the transmission in PARK with the drive axles spinning.
  - Turn Off the ignition in order to stop the powertrain components from spinning.

## Belt Dressing Notice

**Notice:** Do not use belt dressing on the drive belt. Belt dressing causes the breakdown of the composition of the drive belt. Failure to follow this recommendation will damage the drive belt.

## Brake Caliper Notice

**Notice:** Support the caliper with a piece of wire to prevent damage to the brake line.

## Brake Fluid Effects on Paint and Electrical Components Notice

**Notice:** Avoid spilling brake fluid onto painted surfaces, electrical connections, wiring, or cables. Brake fluid will damage painted surfaces and cause corrosion to electrical components. If any brake fluid comes in contact with painted surfaces, immediately flush the area with water. If any brake fluid comes in contact with electrical connections, wiring, or cables, use a clean shop cloth to wipe away the fluid.

## Component Fastener Tightening Notice

**Notice:** Replacement components must be the correct part number for the application. Components requiring the use of the thread locking compound, lubricants, corrosion inhibitors, or sealants are identified in the service procedure. Some replacement components may come with these coatings already applied. Do not use these coatings on components unless specified. These coatings can affect the final torque, which may affect the operation of the component. Use the correct torque specification when installing components in order to avoid damage.

## Emission Modification Notice

**Notice:** Modifications made to the following can affect the vehicle's emission controls and may cause the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon lamp to illuminate:

- The engine
- The transmission
- The exhaust
- The fuel system

Replacement tires that do not meet the same Tire Performance Criteria (TPC) of the original tires can also affect the vehicle's emission controls. This may also cause the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon lamp to illuminate.

Modifications to these systems or the installation of incorrect TPC tires could lead to repairs that are not covered by the manufacturer's warranty. This may also cause a required Emission Inspection/Maintenance test to fail.

## Engine Emission Notice

**Notice:** Modifications made to the engine or its individual components can effect the vehicle's emission controls and may cause the Malfunction Indicator Lamp (MIL), Check Engine, or Service Engine Soon lamp to illuminate. Modifications may also cause the vehicle to fail a required Emission Inspection/Maintenance test.

## Engine Lifting Notice

**Notice:** When raising or supporting the engine for any reason, do not use a jack under the oil pan, any sheet metal, or the crankshaft pulley. Lifting the engine in an unapproved manner may cause component damage.

## Engine Mounting Notice

**Notice:** Broken engine mountings can cause misalignment of certain drive-train components. Misalignment of drive-train components causes eventual destruction of the drive-train components.

If one engine mount breaks, the rest of the engine mounts will have increased stress put on them. This could cause the rest of the engine mounts to break.

## Excessive Force and Oxygen Sensor Notice

**Notice:** The oxygen sensor may be difficult to remove when the engine temperature is below 48°C (120°F). Excessive force may damage threads in the exhaust manifold or the exhaust pipe.

## Fastener Notice

**Notice:** Use the correct fastener in the correct location. Replacement fasteners must be the correct part number for that application. Fasteners requiring replacement or fasteners requiring the use of thread locking compound or sealant are identified in the service procedure. Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener joint surfaces unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems.

## Fuel Pressure Notice

**Notice:** Do not allow the fuel pressure to exceed the specified value because damage to the fuel pressure regulator or the fuel pressure gauge may result.

## Fuel Tank Strap Fastener Notice

**Notice:** Tighten the strap fasteners by steps, alternating between the fasteners, until the specified torque is reached. A failure to tighten the strap fasteners as specified will cause the bottom of the tank to flex upward. This will result in the fuel gauge indicating that there is fuel remaining in the tank when the tank is empty.

## Handling Bearing Inserts Notice

**Notice:** Do not shim, scrape, or file bearing inserts. Do not touch the bearing surface of the insert with bare fingers. Skin oil and acids will etch the bearing surface.

## Handling ESD Sensitive Parts Notice

**Notice:** Electrostatic discharge (ESD) can damage many solid-state electrical components. ESD susceptible components may or may not be labeled with the ESD symbol. Handle all electrical components carefully. Use the following precautions in order to avoid ESD damage:

- Touch a metal ground point in order to remove your body's static charge before servicing any electronic component; especially after sliding across the vehicle seat.
- Do not touch exposed terminals. Terminals may connect to circuits susceptible the ESD damage.
- Do not allow tools to contact exposed terminals when servicing connectors.

- Do not remove components from their protective packaging until required to do so.
- Avoid the following actions unless required by the diagnostic procedure:
  - Jumpering or grounding of the components or connectors.
  - Connecting test equipment probes to components or connectors. Connect the ground lead first when using test probes.
- Ground the protective packaging of any component before opening. Do not rest solid-state components on metal workbenches, or on top of TVs, radios, or other electrical devices.

## Handling IAC Valve Notice

**Notice:** If the IAC valve has been in service: DO NOT push or pull on the IAC valve pintle. The force required to move the pintle may damage the threads on the worm drive. Also, DO NOT soak the IAC valve in any liquid cleaner or solvent, as damage may result.

## Heated Oxygen and Oxygen Sensor Notice

**Notice:** Do not remove this pigtail from either the heated oxygen sensor (HO2S) or the oxygen sensor (O2S). Removing the pigtail or the connector will affect sensor operation.

Handle the oxygen sensor carefully. Do not drop the HO2S. Keep the in-line electrical connector and the louvered end free of grease, dirt, or other contaminants. Do not use cleaning solvents of any type.

Do not repair the wiring, connector or terminals. Replace the oxygen sensor if the pigtail wiring, connector, or terminal is damaged.

This external clean air reference is obtained by way of the oxygen sensor signal and heater wires. Any attempt to repair the wires, connectors, or terminals could result in the obstruction of the air reference and degraded sensor performance.

The following guidelines should be used when servicing the heated oxygen sensor:

- Do not apply contact cleaner or other materials to the sensor or vehicle harness connectors. These materials may get into the sensor causing poor performance.
- Do not damage the sensor pigtail and harness wires in such a way that the wires inside are exposed. This could provide a path for foreign materials to enter the sensor and cause performance problems.
- Ensure the sensor or vehicle lead wires should not be bent sharply or kinked. Sharp bends or kinks could block the reference air path through the lead wire.

- Do not remove or defeat the oxygen sensor ground wire (where applicable). Vehicles that utilize the ground wired sensor may rely on this ground as the only ground contact to the sensor. Removal of the ground wire will cause poor engine performance.
- Ensure that the peripheral seal remains intact on the vehicle harness connector in order to prevent damage due to water intrusion. The engine harness may be repaired using Packard's Crimp and Splice Seals Terminal Repair Kit. Under no circumstances should repairs be soldered since this could result in the air reference being obstructed.

### **Ignition OFF When Disconnecting Battery Notice**

**Notice:** Always turn the ignition OFF when connecting or disconnecting battery cables, battery chargers, or jumper cables. Failing to do so may damage the Powertrain Control Module (PCM) or other electronic components.

### **Nylon Fuel Lines Notice**

**Notice:** Do not attempt to straighten any kinked nylon fuel lines. Replace any kinked nylon fuel feed or return pipes in order to prevent damage to the vehicle.

### **PCM and ESD Notice**

**Notice:** Do not touch the connector pins or soldered components on the circuit board in order to prevent possible electrostatic discharge (ESD) damage to the PCM.

### **Power Steering Hose Disconnected Notice**

**Notice:** Do not start the vehicle with any power steering gear inlet or outlet hoses disconnected. When disconnected, plug or cap all openings of components. Failure to do so could result in contamination or loss of power steering fluid and damage to the system.

### **Single Cylinder Flooding Notice**

**Notice:** In order to prevent flooding of a single cylinder and possible engine damage, relieve the fuel pressure before performing the fuel injector coil test procedure.

### **Spark Plug Boot Removal Notice**

**Notice:** Use only the spark plug boot special removal tool to remove the spark plug boots. Prying or using regular pliers could damage the boots.

### **Steering Wheel in the Full Turn Position Notice**

**Notice:** Do not hold the steering wheel in the full turn position longer than 5 seconds, as damage to the steering pump may result.

### **Test Probe Notice**

**Notice:** Do not insert test equipment probes into any connector or fuse block terminal. The diameter of the test probes will deform most terminals. A deformed terminal can cause a poor connection, which can result in system failures. Always use the J 35616-A Connector Test Adapter Kit or the J 42675 Flat Wire Probe Adapter Kit in order to frontprobe terminals. Do not use paper clips or other substitutes as they can damage terminals and cause incorrect measurements.



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## SECTION 0

## GENERAL INFORMATION

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## SECTION 0A

## GENERAL INFORMATION

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**HANDLING ELECTROSTATIC DISCHARGE (ESD) SENSITIVE PARTS**

When handling an electronic part that has as ESD sensitive sticker (figure 1), the service technician should follow these guidelines to reduce any possible electrostatic charge build-up on the service technician's body and the electronic part in the dealership:

1. Do not open the package until it is time to install the part.
2. Avoid touching the electrical terminals of the part.
3. Before removing the part from its package, ground the package to a known good ground on the vehicle.
4. Always touch a known good ground before handling the part. This should be repeated while handling the part and more frequently after sliding across the seat, sitting down from a standing position or walking a distance.

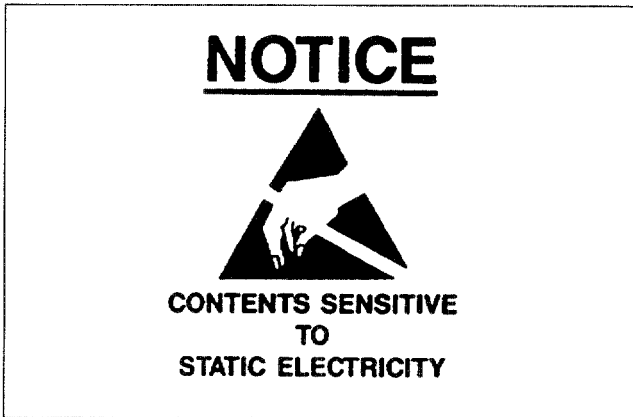


Figure 1. Electrostatic Discharge Symbol

**MODEL DESIGNATION**

The model designation for this vehicle is NPR/W4S042. Refer to figure 2 for the model explanation and figure 3 for the model identification.

CODE	DESCRIPTION
W	Steel Tilt Cab
4	GVW Range - 10,001–16,000 lb
S	Cab Style-68.0 in BBC Steel Cab
0	Constant - For Future Expansion
42	Chassis Type-4 × 2

Figure 2. Model Explanation

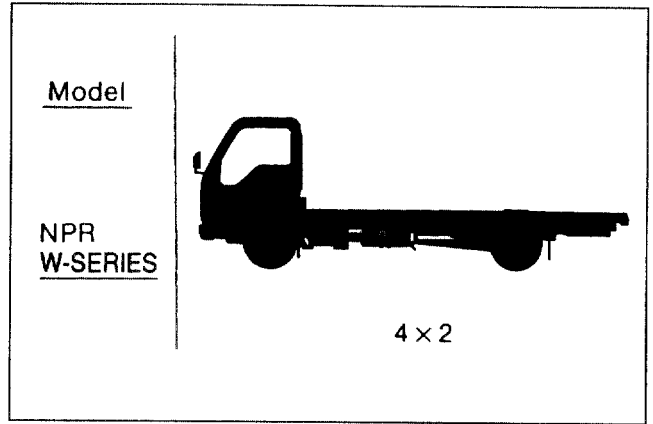


Figure 3. Model Identification

**VIN (VEHICLE IDENTIFICATION NUMBER) AND WEIGHT RATING PLATE**

The VIN and Weight Rating Plate (figure 4) lists the manufacturer, gross vehicle weight for the vehicle, maximum front end weight at ground, maximum rear end weight at ground, and the VIN (vehicle identification number). This plate is located on the driver's door in the lower right hand corner.

The vehicle identification number is a legal identifier of your vehicle. It not only appears on the VIN plate, but also on the Vehicle Certificates of Title and Registration. The vehicle identification number specifically identifies a vehicle by code. Figure 5 displays plays the codes and descriptions for the model covered in this manual.

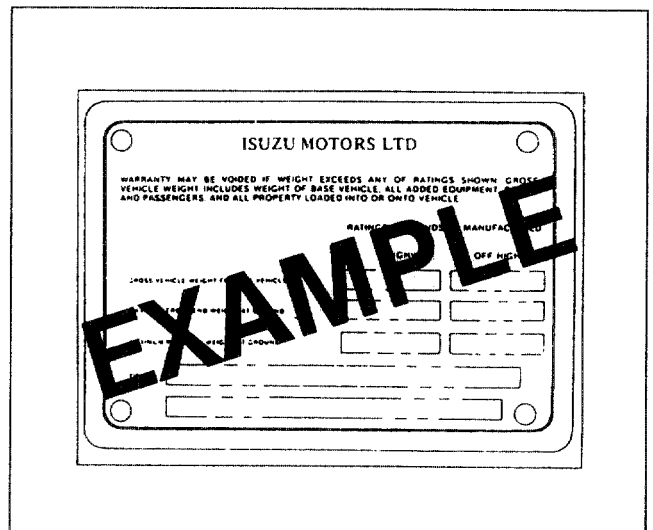


Figure 4. VIN Weight Rating Plate

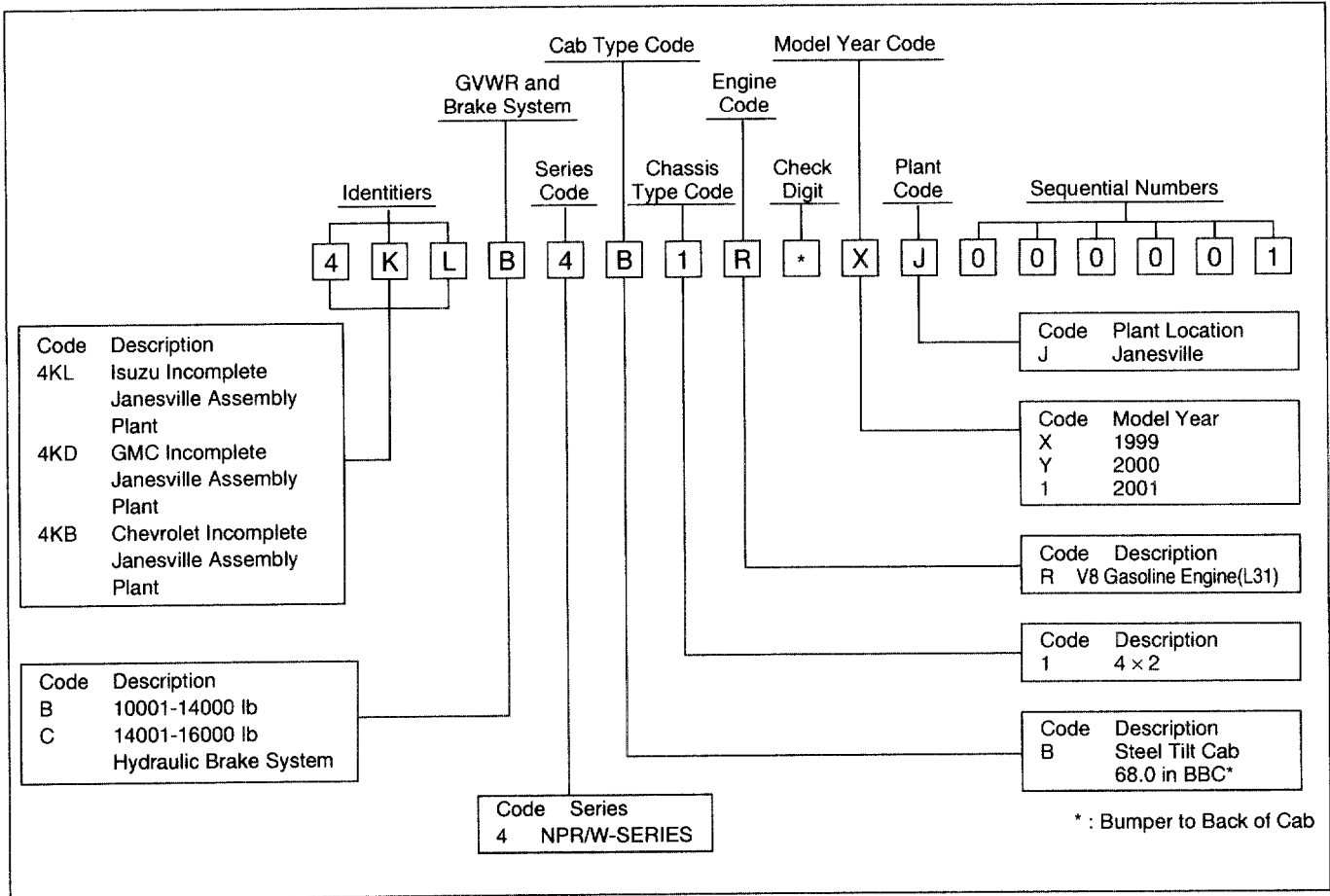


Figure 5. VIN Chart

### GVWR (GROSS VEHICLE WEIGHT RATING)

The GVWR is the weight of a vehicle plus the weight of a vehicle's load. For the gross vehicle weight rating and the gross vehicle combined weight rating, refer to Model Explanation (figure 3). For the gross vehicle weight rating range refer to the VIN Chart (figure 5).

### SERVICE PARTS IDENTIFICATION LABEL

The "Service Parts Identification" label (figure 6) lists major components and their part numbers plus vehicle options and their codes. The information on the label was printed at the factory; therefore, it represents only the equipment on the vehicle when it was shipped from the factory. **Always** refer to this label when ordering replacement service parts. (Refer to the "NOTICE" on the label.)

The service parts identification label is located on the right-hand step support panel.

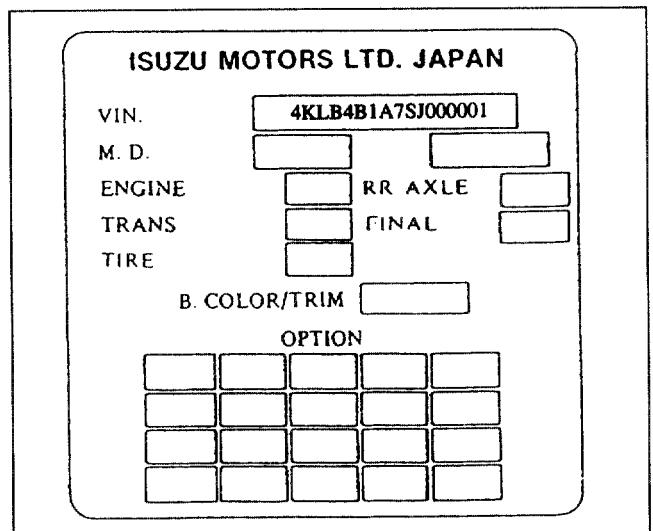


Figure 6. Service Parts Identification Label