



**ISUZU**



**GMC**  
MEDIUM DUTY TRUCKS



**CHEVROLET**  
MEDIUM DUTY TRUCKS

# **ISUZU COMMERCIAL TRUCK FORWARD TILTMASER**

**FRR (WT5500)**

## **SERVICE MANUAL SUPPLEMENT (2002)**

## **FOREWORD**

This service supplemental manual contains diagnosis, on-vehicle service, wiring diagrams, and component unit repair for Medium Duty Steel Tilt Cab Vehicles FRR/WT5500.

When used with the Isuzu Commercial Truck Service Manual: Pub. No. FRR97-WSM-C01, FRR00-WSM-CS1, and FSE01-ESM-C01, 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 part replacement is necessary, the part must be replaced with one of the same part number or with an equivalent part. Do not use 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 his 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.

# **2002**

# **SERVICE MANUAL**

## **(SUPPLEMENT)**

### **FRR/WT5500 MODEL**

Any reference to brand names in this manual is intended merely as an example of the 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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## MEDIUM DUTY STEEL TILT MODEL DATA

Truck Model	Engine	Clutch	Transmission	Propeller Shaft	Rear Axle	Front Axle	Brake
FRR/ WT5500	6HK1-TCN	Spicer 14"-1	MLD6, S1000	SPL90	R065	F036	A.H.B. + ABS

\* A.H.B.: Air Over Hydraulic Brake

\* ABS: Anti-Lock Brake System

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# MEMO

A series of horizontal dotted lines for writing.

# 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 an ESD sensitive sticker (figure 1), the service technician should follow the guidelines described below to reduce any possible electrostatic charge built up on the service technician's body and the electronic part in the dealership:

1. Do not open the package until installing the part.
2. Avoid touching 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.

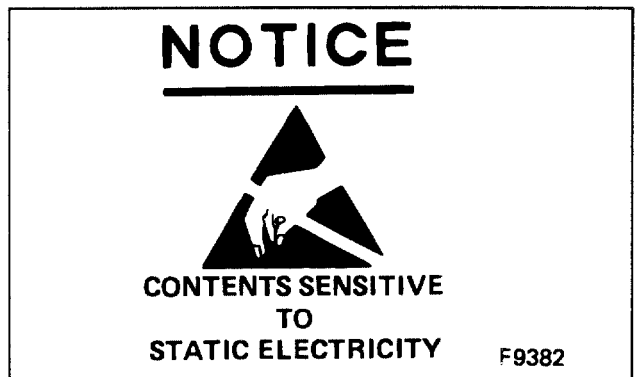


Figure 1 - Electrostatic Discharge Warning



## SERVICE PARTS IDENTIFICATION LABEL

The Service Parts Identification Label (figure 2) is provided on all vehicle models. It is located on the lower right side of the dashboard. The label lists the VIN (Vehicle Identification Number), wheelbase, paint information and all production options or special equipment on the vehicle when it was shipped from the factory. Always refer to this information when ordering parts.

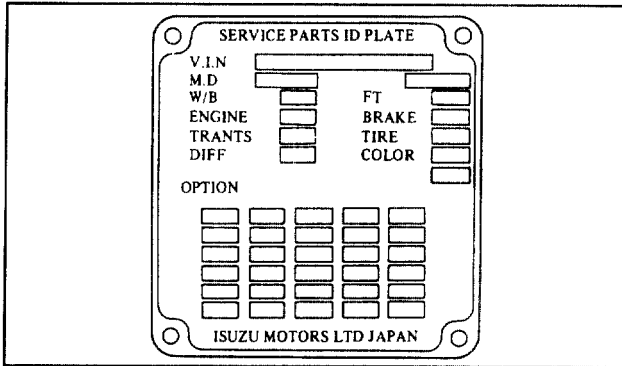


Figure 2 - Service Parts Identification Label

## RPO (REGULAR PRODUCTION OPTIONS) LIST

The following list contains RPOs available on this model. Also, refer to the "Service Parts Identification" label in your vehicle for the RPOs on that specific vehicle.

OPTION CODE	OPTION DESCRIPTION
729	BODY COLOR CODE-ARC WHITE W301-P801
B4G	ANTI CORROSION
SP5	CANADA EQUIPMENT
WK8	U.S.A EQUIPMENT
PS1	GMC BRAND PACKAGE
ST4	PRESSURE METER - KPA
WQ1	PRESSURE METER - PSI
6FM	US TERRITORY
W60	CAB UP (+60MM)
VG7	BUMPER - REINFORCEMENT
SDK	CAB SUSPENSION - SEMI FLOATING
YM4	GLASS - LAMINATE, WINDSHIELD TINTED
YS1	MIRROR - OUTSIDE REARVIEW, FLAT
A30	POWER WINDOW
SKF	DOOR WINDOW CONTROL - MANUAL
B30	FLOOR COVERING - CARPET (VINYL)
A83	SEAT ASSEMBLY - VINYL W/RECLINING
AK3	BELTS - FRONT SEAT & SHOULDER, W/RETRACTOR
PR2	DRIVING POSITION - WIDE LEG SPACE
D20	SUN VISOR - ASSIST

OPTION CODE	OPTION DESCRIPTION
C41	HEATER & DEFROSTER
37W	WHEEL BASE 3700 MM
42W	WHEEL BASE 4200 MM
45W	WHEEL BASE 4500 MM
48W	WHEEL BASE 4800 MM
55W	WHEEL BASE 5500 MM
F59	STABILIZER SHAFT - FRONT
C5K	HUB LUBRICATION - OIL BATH
PQ6	FRONT AXLE - TOE-IN "0"
W1N	AXLE RATIO - 4.333 (39/9) 13.5" HYPOID
W1P	AXLE RATIO - 3.900 (39/10) 13.5" HYPOID
W4M	AXLE RATIO - 3.545 (39/11) 13.5" HYPOID
Z05	AIR OVER HYDRAULIC DUAL CIRCUIT
BCU	BRAKE AUTO ADJUSTER
SKR	BRAKE LINING MATERIAL - NON ASBESTOS
NF8	EXHAUST BRAKE
B1T	PARKING BRAKE DRUM - 10"
82L	ENGINE - 6 CYLINDER 6HK1TC-N
TCA	EMISSION REGULATION - W/CONVERTER
E6U	AIR CLEANER - DRY DONALDSON 13"
E1Q	AIR COMPRESSOR - HEAVY DUTY
KC2	FILTER - OIL, PARTIAL (CARTRIDGE TYPE)
E2J	OIL FILLER - CAB BACK
WY9	ENGINE OIL LEVEL GAUGE - WIDE NECK
KA3	FAN - FLUID DRIVE
8AA	LONG LIFE COOLANT - 50%
WD3	ENGINE OIL HEATER
K05	HEATER - ENGINE BLOCK
K97	AC GENERATOR - DENSO 12V 80A (1KW)
RC6	STARTER - DENSO
KB6	ENGINE SHUTOFF - AUTOMATIC (ELECTRIC)
SFF	CLUTCH - 14" SIGNAL PLATE (SPICER)
WY5	CLUTCH - CERAMETALIX FACED DISC
B1Y	CLUTCH SYSTEM - SLAVE CYLINDER
MT9	ALLISON AT542 A/T
X5J	MANUAL TRANSMISSION - ISUZU MLD6Q
X9A	MANUAL TRANSMISSION - ISUZU
X9D	TRANSMISSION - AUTOMATIC
SHT	FUEL TANK 160L RECTANGULAR
WC2	SUB FUEL TANK
PS9	FUEL SEDIMENTER
N37	STEERING COLUMN - TILT TELESCOPING
N40	STEERING - POWER
22N	TIRE - FRT, RR 225/70R19.5
SMA	DISC WHEEL - FRT, RR 6STUD 19.5X6.00
W20	DISC WHEEL - SPECIAL PAINTED (WHITE)
R46	SPARE TIRE&DISC WHEEL - REAR TIRE (ONE)
P10	CARRIER - SPARE WHEEL (FRAME REAR)
TN8	BATTERY - DELCO 31-751
TR4	HEADLAMPS - RECTANGULAR
U01	LAMPS - FIVE, ROOF MARKER
UY9	SPEEDOMETER - KILO&MILES, MILES
	ODOMETER
U19	SPEEDOMETER - KILO&MILES, KILO
	ODOMETER
UD7	TACHOMETER
UG2	GAGE - DUAL AIR
C13	WIPER - WITH INTERMITTENT
UJ2	INDICATOR LAMP - LOW BRAKE FLUID
WX7	BRIGHT CONTROL - METER
SL1	TOOL B KIT
RR8	CAUTIONS - ENGLISH

## VEHICLE IDENTIFICATION NUMBER (VIN)

A vehicle may be specifically identified by referring to the VIN (Vehicle Identification Number) Plate (figure 3). This plate is located on the driver's door frame under the striker.

The VIN is the legal identifier of your vehicle. In order to find out the manufacturer, chassis type, engine type, GVW range, model year, plant code and sequential number for the vehicle, refer to figure 4.

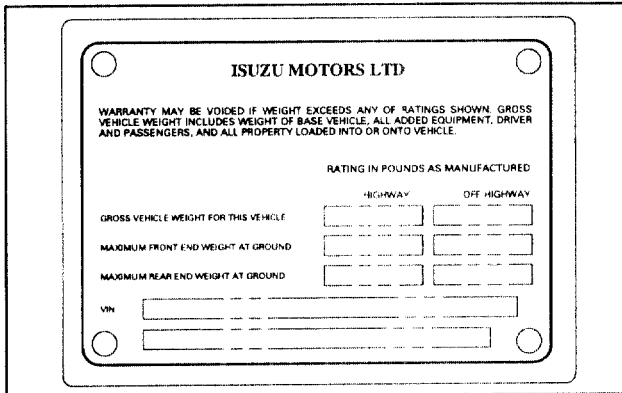


Figure 3 – VIN Plate

### WEIGHT RATINGS

Your VIN Plate also shows the GVWR and the front and rear GAWR's for your vehicle. Refer to "Certification Label" for more information on vehicle weights.

## CERTIFICATION LABEL

The Certification Label shows the GVWR and the front and rear GAWR's for your vehicle (figure 5).

Gross Vehicle Weight (GVW) is the weight of originally equipped vehicle and all items added to it after it has left the factory. This would include bodies, winches, etc.; the driver and all occupants; and the load the vehicle is carrying. The GVW must not exceed the GVWR. Also, the front and rear gross axle weights must not exceed the front and rear GAWRs.

### TIRES

The tires on your vehicle must be of the proper size and properly inflated for the load which the vehicle are carrying.

The Vehicle Certification Label shows the originally equipped tire size and recommended inflation pressures.

## MODEL REFERENCE

The model designation for this vehicle is FRR/WT5500 (figure 6). It will be referred to as a Steel Tilt model.

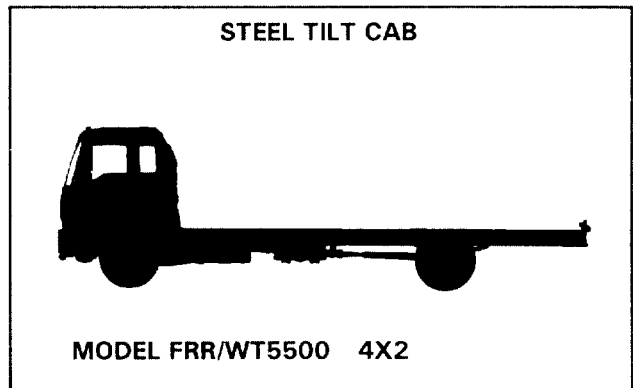


Figure 6 – Model Reference

## ENGINE IDENTIFICATION NUMBER

The engine identification number is on the front right-hand side of the cylinder block.

## EMERGENCY STARTING YOUR VEHICLE DUE TO A DISCHARGED BATTERY

If your vehicle will not start due to a discharged battery, it can often be started by using energy from another battery, a procedure called "jump starting."

This vehicle has a 12-volt starting system and a negative ground electrical system. Make sure that the other vehicle also has a 12-volt starting system, and that it is the negative ("–") terminal which is grounded (attached to the engine block or frame rail). Its operator's manual may give you that information. Do not try to jump start if you are unsure of the other vehicle's voltage or ground (or if the other vehicle's voltage and ground are different from your vehicle).

Some diesel engine vehicles have more than one battery because of the higher torque required to start a diesel engine. This procedure can be used to start a single-battery vehicle from any of the diesel vehicle's batteries. However, it may not be possible to start a diesel engine from a single battery in another vehicle at low temperatures.

**NOTICE:** *Never tow the vehicle to start, because the surge forward when the engine starts could cause a collision with the tow vehicle. Also, since this vehicle has a 12-volt battery, be sure the vehicle or equipment used to jump start your vehicle is also 12-volt.*

*Use of any other type system may damage the vehicle's electrical components.*

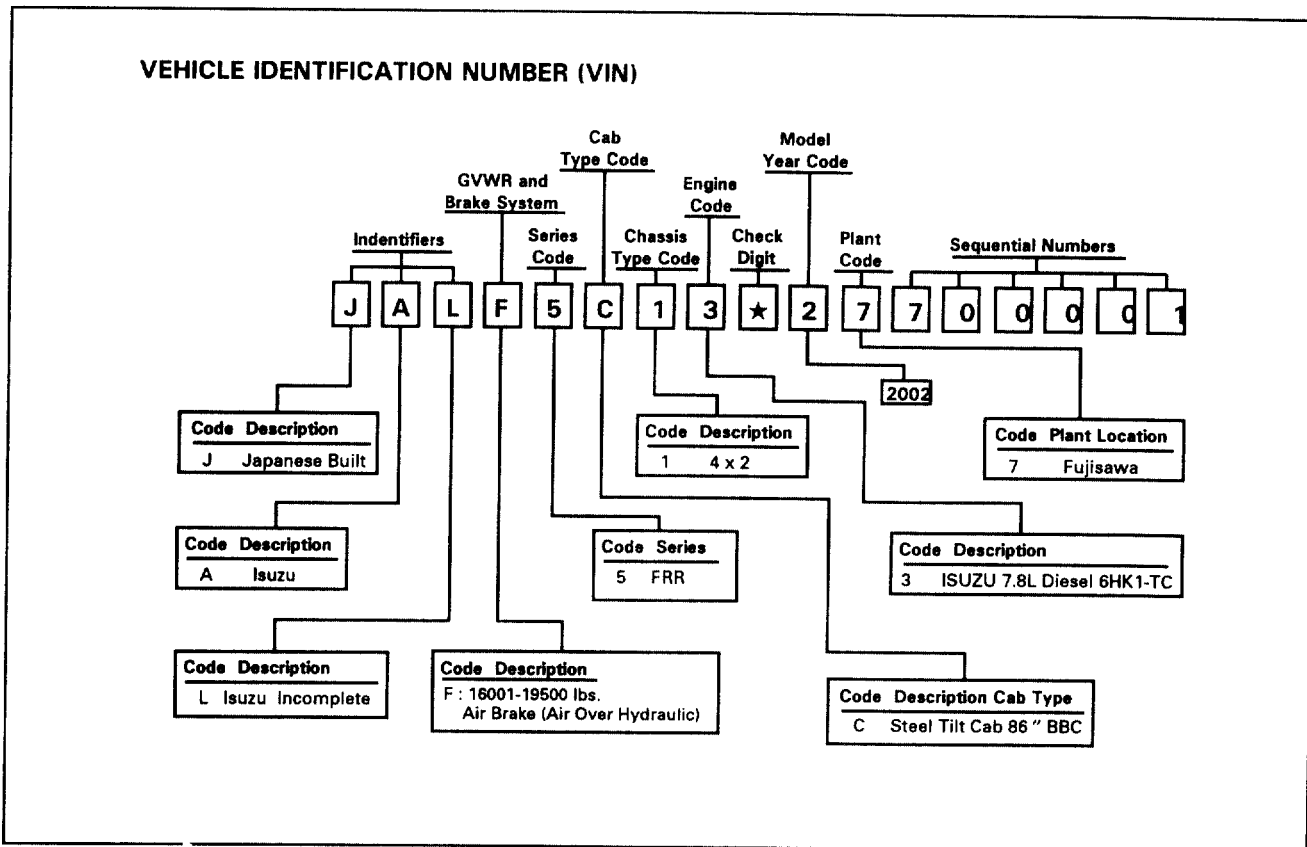


Figure 4 - Vehicle Identification (VIN) Number

### JUMP STARTING INSTRUCTIONS

**CAUTION:** Batteries produce explosive gases, contain corrosive acid and supply levels of electrical current high enough to cause burns. Therefore, to reduce the risk of personal injury when working near a battery:

- Always shield your eyes and avoid leaning over a battery whenever possible.
- Do not expose a battery to open flames or sparks.
- Be sure any batteries that have filler caps are properly filled with fluid.
- Do not allow battery acid to contact eyes or skin. Flush any contacted area with water immediately and thoroughly, and get medical help.
- Follow each step in the jump starting instructions.

1. Position the vehicle with the good (charged) battery so that the booster (jumper) cables will reach, but never let the vehicles touch. Also, be sure booster cables to be used do not have loose or missing insulation.

**EXAMPLE**

**CERTIFICATION LABEL FOR INCOMPLETE VEHICLE**

A24893 4 5387

INCOMPLETE VEHICLE MFD BY  
GENERAL MOTORS CORP, DETROIT, MICHIGAN 48202

MONTH/YEAR

VIN- JALF5C13★27700001

GVWR- 023160LB/10500 KG

GAWR FRT-007000LB/03175 KG

TIRES-225/70R19.5

RIMS- 20X7.0CR-3 , @ 100PSI/690KPA COLD SGL

GAWR RR-01616LB/0075 KG

TIRES-225/70R19.5

RIMS- 20X7.0CR-3 , @ 100PSI/690KPA COLD DUAL

THIS INCOMPLETE VEHICLE MAY BE COMPLETED INTO A TRUCK OR MULTIPURPOSE PASSENGER VEHICLE—NOT BUS OR SCHOOLBUS.

MAX VERT CG = 700

411

L-78

↑  
SEE  
SERVICE STATEMENT  
CHART

F-01799

Figure 5 - Certification Label

2. In both vehicles:
  - Turn off ignition (engine control switch), all lights and accessories except the hazard flasher or any light needed for the work area.
  - Apply the parking brake firmly and shift the transmission to Neutral.
3. Making sure the cable clamps do not touch any other metal parts, clamp one end of the first booster cable to the positive (+) terminal on one battery, and the other end to the positive terminal on the other battery (figure 7). Never connect (+) to (-).
4. Clamp one end of the second cable to the negative (-) terminal of the good (charged) battery and the final connection to the frame rail, chassis, or to any solid, stationary metallic object on the engine at least 450 millimeters (18 inch) from the discharged battery. Make sure the cables are not on or near pulleys, fans, or other parts that will move when the engine is started.
5. Start the engine of the vehicle with the good (charged) battery and run the engine at a moderate speed for several minutes. Then, start the engine of the vehicle that has discharged battery.
6. Remove the jumper cables by reversing the above installation sequence exactly. While removing each clamp, take care that it does not touch any other metal while the other end remains attached.

## TOWING PROCEDURE

Your vehicle should be towed by an authorized dealership or professional towing service to prevent damage. Proper equipment must be used and state (Provincial in Canada) and local laws that apply to vehicles in tow must be followed. Vehicles should not be towed in excess of 55 mph (90 km/h).

Connect to the main structural parts of the vehicle. Do not attach to bumpers, tow hooks or brackets. Use only equipment designed for this purpose. Follow the instructions of the wrecker manufacturer. A safety chain system must be used.

### FRONT END TOWING (FRONT WHEELS OFF THE GROUND)

#### Before Towing

To prepare a disabled vehicle for front end towing with front wheels raised off ground, the following steps are necessary.

- Block the rear wheels of the disabled vehicle.
- Remove the air deflector if equipped from beneath the front bumper to prevent damage from towing equipment.
- Release the parking brake.

#### Manual Transmission Models

- Shift into neutral position.
- If there is damage or suspected damage to the transmission, disconnect the propeller shafts at the rear axle. Secure the propeller shafts to the frame or crossmember.

#### Automatic Transmission Models

- Disconnect the propeller shafts at the rear axle. Secure the propeller shaft to the frame or crossmember.

**NOTICE: Never tow the vehicle with propeller shafts is connected, as this may cause damage to the automatic transmission.**

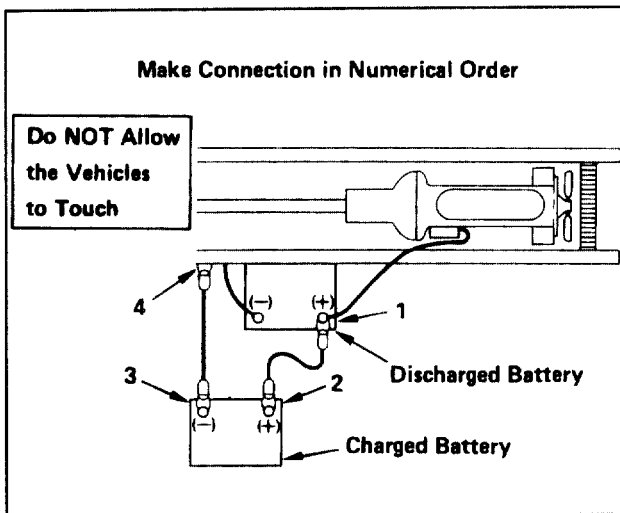


Figure 7 - Jump Starting Connections

- If there is damage or suspected damage to the rear axle, remove the axle shafts. Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.

#### After Towing

- Block the rear wheels and install the axle and propeller shafts if removed.
- Apply the parking brake before disconnecting from the towing vehicle.
- Check and fill rear axle with oil if required.
- Install air deflector, if applicable.

#### FRONT END TOWING (ALL WHEELS ON THE GROUND)

##### Before Towing

Your vehicle may be towed on all wheels provided the steering is operable. Remember that power steering and brakes will not power assist. There must be a tow bar installed between the towing vehicle and the disabled vehicle.

To prepare a disabled vehicle for front end towing with all wheels on the ground, the following steps are necessary.

- Block the rear wheels of the disabled vehicle.
- Release the parking brake.

##### Manual Transmission Models

- Shift into neutral position.
- If there is damage or suspected damage to the transmission, disconnect the propeller shafts at the rear axle.  
Secure the propeller shafts to the frame or crossmember.

##### Automatic Transmission Models

- Disconnect the propeller shafts at the rear axle.  
Secure the propeller shaft to the frame or crossmember.

***NOTICE: Never tow the vehicle with propeller shafts is connected, as this may cause damage to the automatic transmission.***

- If there is damage or suspected damage to the rear axle, remove the axle shafts. Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.

##### After Towing

- Block the rear wheels and install the axle and propeller shafts if removed.
- Apply the parking brake before disconnecting from the towing vehicle.
- Check and fill rear axle with oil if required.

#### REAR END TOWING (REAR WHEELS OFF THE GROUND)

##### Before Towing

- Release the parking brake.
- Secure the steering wheel to maintain straight ahead position.
- Be certain that the front axle is not loaded above the front axle Gross Axle Weight Rating (GAWR) as indicated on the vehicle's VIN and Weight Rating plate.

##### After Towing

- Block the rear wheels and release the steering.
- Apply the parking brake before disconnecting from the towing vehicle.
- Check and fill the rear axle with oil as required.

#### SPECIAL TOWING INSTRUCTIONS

1. Call your local authorized dealership or professional towing service.
2. All state and local laws regarding such items as warning signals, night illumination, speed, etc. must be followed.
3. Safety chains must be used.
4. No vehicle should ever be towed over 55 mph (90 km/h).
5. Loose or protruding parts of damaged vehicles should be secured prior to moving.
6. A safety chain system completely independent of the primary lifting and towing attachment must be used.
7. Operators should refrain from going under a vehicle that is being lifted by the towing equipment unless the vehicle is adequately supported by safety stands.
8. No towing operation that for any reason jeopardizes the safety of the wrecker operator or any bystanders or other motorists should be attempted.

## GRAPHIC SYMBOLS


Graphic symbols are used on some controls and displays on the vehicle (figure 8). Many of these symbols are used internationally.


## ACTION SYMBOLS

Much of the general narrative in this manual has been replaced with step-by-step procedures and the addition of "Action Symbols." To improve readability and to provide emphasis where necessary, the following symbols are used in many portions of the text:

 Assemble

 Disassemble

 Remove or Disconnect

 Install or Connect

 Tighten

 Inspect

 Clean

 Measure

 Adjust

 Important

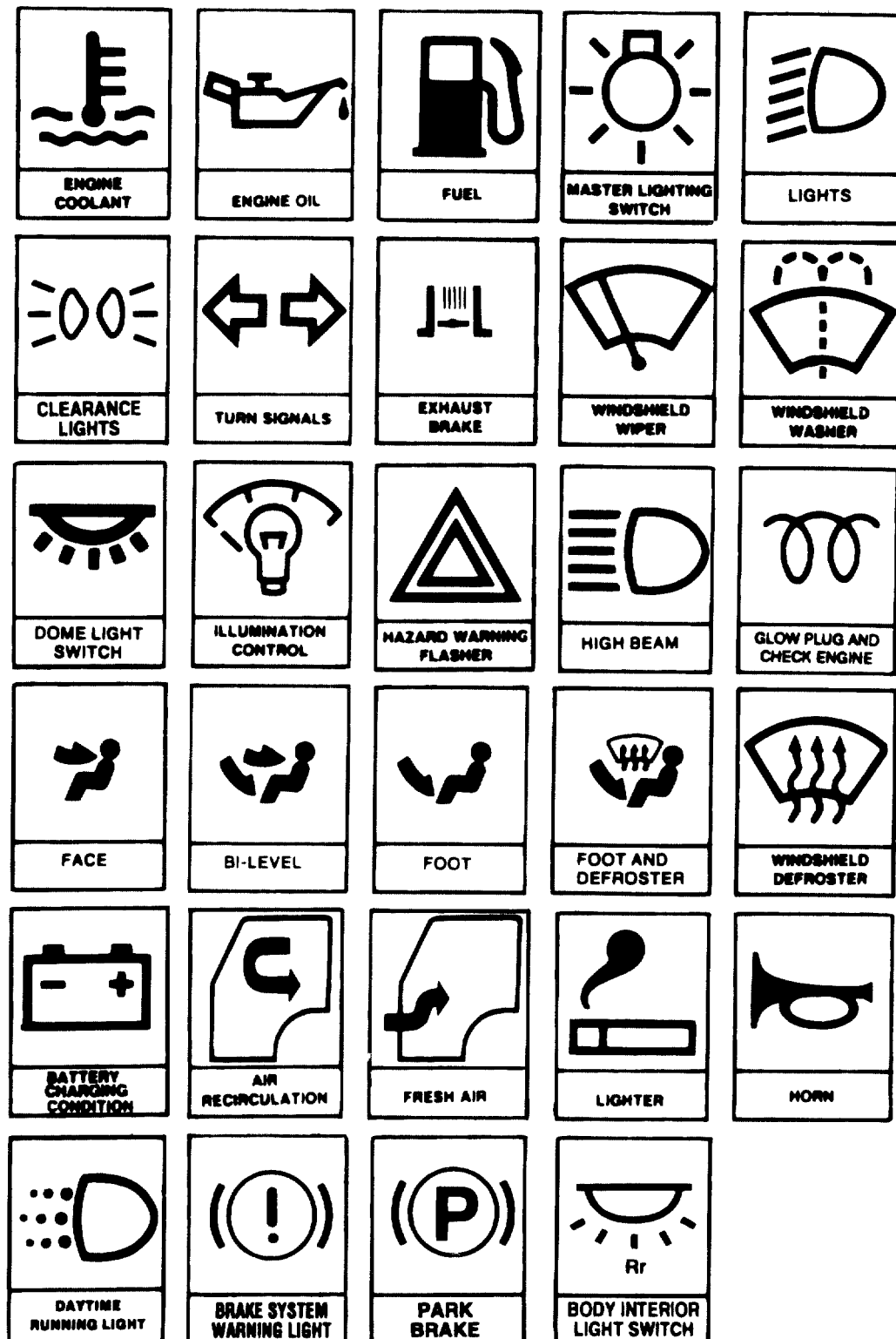


Figure 8 - Graphic Symbols

## COMMON AUTOMOTIVE ABBREVIATIONS

### LIST OF AUTOMOTIVE ABBREVIATIONS WHICH MAY BE USED IN THIS MANUAL

A – Ampere(s)	DVM – Digital Voltmeter (10 meg.)
ABS – Antilock Brake System	DVOM – Digital Volt Ohmmeter
AC – Alternating Current	EBCM – Electronic Brake Control Module
A/C – Air Conditioning	ECM – Engine Control Module
ACCEL – Accelerator	ECT – Engine Coolant Temperature
ACC – Accessory	EEPROM – Electronically Erasable Programmable Read Only Memory
ACL – Air Cleaner	EGR – Exhaust Gas Recirculation
Adj – Adjust	EI – Electronic Ignition
A/F – Air Fuel Ratio	ETR – Electronically Tuned Receiver
AIR – Secondary Air Injection System	EVAP – Evaporation Emission
Alt – Altitude	Exh – Exhaust
AMP – Ampere(s)	°F – Degrees Fahrenheit
ANT – Antenna	Fed – Federal (All States Except Calif.)
ASM – Assembly	FF – Front Drive Front Engine
A/T – Automatic Transmission	FL – Fusible Link – Front Left
ATDC – After Top Dead Center	FLW – Fusible Link Wire
ATF – Automatic Transmission Fluid	FP – Fuel Pump
Auth – Authority	FR – Front Right
Auto – Automatic	FRT – Front
BARO – Barometric Pressure	ft – Foot
Bat – Battery	FWD – Front Wheel Drive
B+ – Battery Positive Voltage	4WD – Four Wheel Drive
Bbl – Barrel	4 × 4 – Four Wheel Drive
BHP – Brake Horsepower	4 A/T – Four Speed Automatic Transmission
BPT – Back Pressure Transducer	g – Gram
BTDC – Before Top Dead Center	Gal – Gallon (3.785 ℓ)
°C – Degrees Celsius	GAWR – Gross Axle Weight Rating
CAC – Charge Air Cooler	GEN – Generator
Calif – California	GND – Ground
cc – Cubic Centimeter	Gov – Governor
CID – Cubic Inch Displacement	GVWR – Gross Vehicle Weight Rating
CKP – Crankshaft Position	Harn – Harness
CKT – Circuit	HC – Hydrocarbons
CL – Closed Loop	HD – Heavy Duty
CLCC – Closed Loop Carburetor Control	Hg – Hydrargyrum (Mercury)
CMP – Camshaft Position	HiAlt – High Altitude
CO – Carbon Monoxide	HO2S – Heated Oxygen Sensor
Coax – Coaxial	HU – Hydraulic Unit
Conn – Connector	HVAC – Heater-Vent-Air Conditioning
Conv – Converter	IAC – Idle Air Control
Crank – Crankshaft	IAT – Intake Air Temperature
Cu.In. – Cubic Inch	IC – Integrated Circuit – Ignition Control
CV – Constant Velocity	ID – Identification – Inside Diameter
Cyl – Cylinder(s)	IGN – Ignition
DI – Distributor Ignition	Int – Intake
Diff – Differential	IP – Instrument Panel
Dist – Distributor	IPC – Instrument Panel Cluster
DLC – Data Link Connector	ISC – Idle Speed Control
DOHC – Double (or Dual) Overhead Camshaft	
DTC – Diagnostic Trouble Code	
DTM – Diagnostic Test Mode	
DTT – Diagnostic Test Terminal	



## COMMON AUTOMOTIVE ABBREVIATIONS

### LIST OF AUTOMOTIVE ABBREVIATIONS WHICH MAY BE USED IN THIS MANUAL

J/B – Junction Block	PSP – Power Steering Pressure
kg – Kilograms	Pt. – Pint = 1/8 gallon 0.473125 ℓ
km – Kilometers	Pri – Primary
km/h – Kilometer per Hour	PWM – Pulse Width Modulate
kPa – KiloPascals	Qt – Quart = 1/4 gallon 0.94625 ℓ
KS – Knock Sensor	REF – Reference
kV – Kilovolts (thousands of volts)	RF – Right Front
kW – Kilowatts	RFI – Radio Frequency Interference
L – Liter	RH – Right Hand
lb-ft – Foot Pounds	RPM – Revolutions per Minute
lb-in – Inch Pounds	RPM Sensor – Engine Speed Sensor
LF – Left Front	RPO – Regular Production Option
LH – Left Hand	RPS – Revolution per Second
LR – Left Rear	RR – Rear
LS – Left Side	– Right Rear
LWB – Long Wheel Base	RS – Right Side
L-4 – In-line Four Cylinder Engine	RTV – Room Temperature Vulcanizing
L-6 – In-line Six Cylinder Engine	RWAL – Rear Wheel Antilock Brake
MAF – Mass Air Flow	RWD – Rear Wheel Drive
MAN – Manual	SAE – Society of Automotive Engineers
MAP – Manifold Absolute Pressure	Sec – Secondary
Max – Maximum	SFI – Sequential Multiport Fuel Injection
MC – Mixture Control	SI – System International
MFI – Multiport Fuel Injection	SIR – Supplemental Inflatable Restraint System
MIL – Malfunction Indicator Lamp	SOHC – Single Overhead Camshaft
Min – Minimum	Sol – Solenoid
mm – Millimeter	SPEC – Specification
MPG – Miles per Gallon	Speedo – Speedometer
MPH – Miles per Hour	SRS – Supplemental Restraint System
M/T – Manual Transmission/Transaxle	ST – Start
MV – Millivolt	– Scan Tool
NA – Natural Aspirated	Sw – Switch
NC – Normally Closed	SWB – Short Wheel Base
N·m – Newton Meters	SYN – Synchronize
NO – Normally Open	Tach – Tachometer
NOx – Nitrogen Oxides	TB – Throttle Body
OBD – On-Board Diagnostic	TBI – Throttle Body Fuel Injection
OD – Outside Diameter	TCC – Torque Converter Clutch
O/D – Over Drive	TCM – Transmission Control Module
OHC – Overhead Camshaft	TDC – Top Dead Center
OL – Open Loop	Term – Terminal
O2 – Oxygen	TEMP – Temperature
O2S – Oxygen Sensor	TP – Throttle Position
PAIR – Pulsed Secondary Air Injection System	TRANS – Transmission/Transaxle
P/B – Power Brakes	TURBO – Turbocharger
PCM – Powertrain Control Module	TVRS – Television & Radio Suppression
PCV – Positive Crankcase Ventilation	TVV – Thermal Vacuum Valve
PRESS – Pressure	TWC – Three Way Catalytic Converter
PROM – Programmable Read Only Memory	3 A/T – Three Speed Automatic
PNP – Park/Neutral Position	Transmission/Transaxle
P/S – Power Steering	2WD – Two Wheel Drive
PSI – Pounds per Square Inch	4 × 2 – Two Wheel Drive

**COMMON AUTOMOTIVE ABBREVIATIONS**

## LIST OF AUTOMOTIVE ABBREVIATIONS WHICH MAY BE USED IN THIS MANUAL

U-joint - Universal Joint  
V - Volt(s)  
VAC - Vacuum  
VDC - Volts DC  
VIN - Vehicle Identification Number  
VRRRE - Vehicle Refrigerant Recovery and  
Recycling Equipment  
V-ref - ECM Reference Voltage  
VSS - Vehicle Speed Sensor  
VSV - Vacuum Switching Valve  
V-6 - Six Cylinder "V" Engine  
V-8 - Eight Cylinder "V" Engine  
W - Watt(s)  
w/ - With  
w/b - Wheel Base  
W/L - Warning Light  
w/o - Without  
WOT - Wide Open Throttle  
WSS - Wheel Speed Sensor



# SECTION 0B

## MAINTENANCE AND LUBRICATION

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## ENGINE OIL VISCOSITY RECOMMENDATIONS

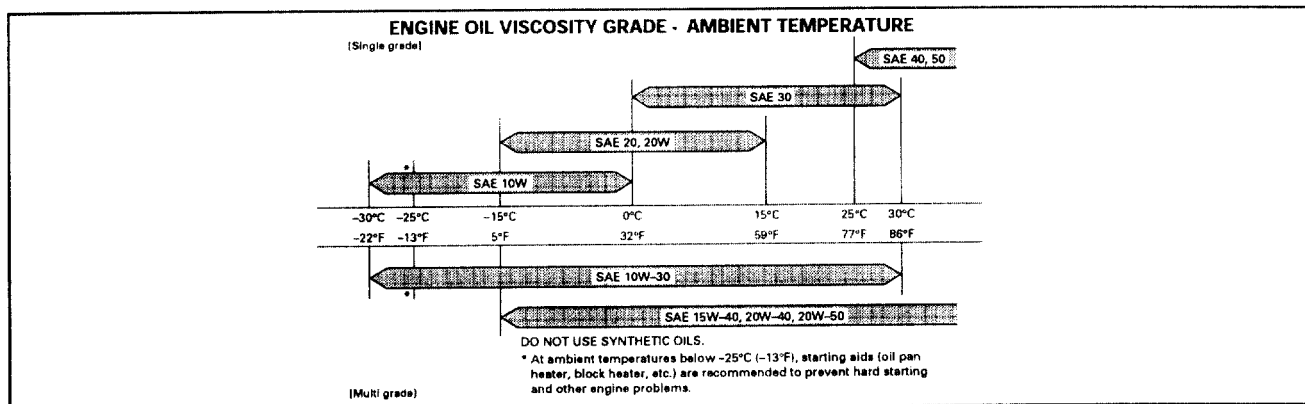


Figure 1 - Engine Oil Viscosity Grade

### CHOOSING THE RIGHT QUALITY OIL

Engine oils are labeled on the containers with various API (American Petroleum Institute) designations of quality. Use an oil labeled with the designations CD, or with both designations SF and CD, or with both designations SG and CE.

These designations may be separated by commas, slashes or dashes; it does not matter, as

long as "SF" and "CD" (or "SG" and "CE") appear.

Oils which are not labeled "CD", "SF/CD" or "SG/CE" should not be used. For example, do not use oils labeled with only SA, SB, SC, SD, SE, SF, CA, CB or CC; or oils with a combination of any of these letters (such as "SC/CC") as this may cause engine damage. Do not use synthetic oils.