

GRUMMAN

USPS

LONG LIFE VEHICLE

OPERATOR'S MANUAL

GRUMMAN[®]

The Grumman logo consists of the word "GRUMMAN" in a bold, sans-serif font, with a registered trademark symbol (®) to its upper right. Below the text is a stylized, dark silhouette of a winged figure, possibly a griffin or a similar mythical creature, which is the Grumman logo.

**UNITED STATES POSTAL SERVICE
LONG LIFE VEHICLE (LLV)
OPERATOR'S MANUAL**

This manual should be considered a permanent part of this LLV. It should stay with the LLV to provide the next operator with important operating, safety, and maintenance information.

All information, illustrations and specifications in this manual are based on the latest product information available at the time of printing. We reserve the right to make changes at any time without notice.

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This manual has been prepared to acquaint you with the operation and maintenance of your LLV, and to provide important safety information. We urge you to read this manual carefully. Following the recommendations will help assure the most enjoyable, safe and troublefree operation of your vehicle.

When it comes to service, remember that your LLV dealer knows your vehicle best and is interested in your complete satisfaction.

As with other vehicles of this type, failure to operate this vehicle correctly may result in loss of control or an accident. Be sure to read Section 2, including "on-pavement" and "off-road" Driving Guidelines.

VEHICLE IDENTIFICATION NUMBER (VIN)

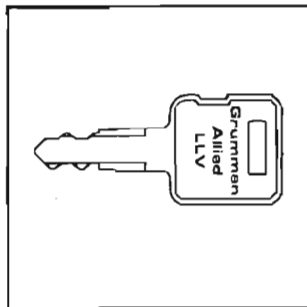
The VIN is the legal identifier of the vehicle. It appears on a plate attached to the top of the instrument panel on the driver's side. This plate can be easily

seen through the windshield from outside the vehicle.

Engine Identification Number

The engine identification number is used to identify specific engine data such as date of manufacture, place where manufactured, number of cylinders, and other important engine information. It is located on the engine block.

KEYS



This vehicle comes with one key which fits ALL lock cylinders on the LLV. There is a notch cut on one side of the key head. When inserting the key in the ignition cylinder, be certain that the notch on the key head is facing upward.

WARNING

Do not remove key from steering lock while you are driving or as the vehicle is rolling to a stop. The steering column is locked when you remove the key, and you will not be able to steer the vehicle.

- **Do not leave your vehicle unattended with the key in the ignition lock. Take the key and lock the doors.**

SAFETY PRECAUTIONS

- CAUTION: ALWAYS**
- USE YOUR MIRRORS WHEN CHANGING LANES AND PULLING AWAY FROM CURBS.
 - USE CARE WHEN JUDGING THE SIZE OR DISTANCE OF A VEHICLE OR OBJECT VIEWED IN THE CONVEX MIRROR.
 - SECURE ALL MATERIALS IN THE LOAD COMPARTMENT AS WELL AS THE CAB AREA.
 - USE SHOULDER BELTS AS WELL AS LAP BELTS.
 - OPERATE THE VEHICLE WITH THE PARTITION DOOR CLOSED UNLESS AN OBSERVER IS PRESENT IN THE LOAD COMPARTMENT.
 - MAKE SURE PASSENGER AND/OR OBSERVER IS SECURELY BUCKLED UP BEFORE OPERATING VEHICLE.
- CAUTION: NEVER**
- USE THE FRONT OR REAR BUMPER AS A STEP.
 - OCCUPY THE OBSERVER SEAT IN THE LOAD COMPARTMENT WHILE THE VEHICLE IS LOADED.
 - ALLOW UNAUTHORIZED PERSONNEL TO OPERATE THE VEHICLE.

FAILURE TO COMPLY WITH THESE SAFETY PRECAUTIONS COULD RESULT IN PERSONAL INJURY.

INSTRUMENT CLUSTER

INSTRUMENTS

The instruments, gages and indicator lights conveniently grouped in the instrument cluster are designed to tell you at a glance many important things about the performance of your vehicle. The following information will enable you to more quickly understand and properly interpret these instruments.

Speedometer

The speedometer hand indicates vehicle speed in miles per hour and kilometers per hour.

Odometer

The group of figures in the speedometer lower center section indicates the accumulated mileage in miles.

Tamper-Resistant Odometer

Federal law prohibits tampering with vehicle odometers to alter accumulated mileage. For your protection the odometer of this vehicle is designed with tamper-resistant features to indicate tampering. If silver lines appear vertically between odometer numerals, it is likely that the odometer has been turned back or reversed. The mileage shown may not be actual.

Whenever a new odometer is installed and cannot be set to the same mileage registered on the prior odometer, the law requires the owner to install a label on the driver's door frame to show the previous odometer reading and the date of replacement. The replacement odometer must then be set to zero. To determine the actual vehicle mileage, add the mileage shown on the label to the current odometer reading. If the replacement odometer can be set up to the same mileage as the prior odometer, no door frame label is needed.

Fuel Gage

The fuel gage will register the APPROXIMATE fuel level in the tank, when the ignition is in the RUN position.

When the gage registers EMPTY, some fuel is still available as a reserve. When the gage registers FULL, some fuel can still be added to the tank.

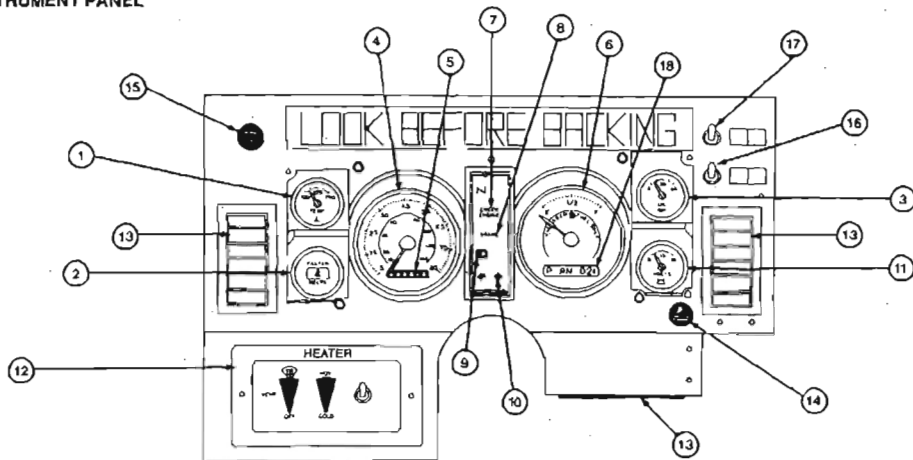
The following conditions may be considered normal:

- Fuel station pump may shut off before fuel gage indicates FULL.
- Amount of fuel required for fill-up may not exactly correspond to gage reading.
- Needle may not move away from FULL until some time after fill-up.
- Needle may move during turns, stops and accelerations.

When the ignition switch is turned to the OFF position, the needle will not necessarily return all the way to the EMPTY mark.

2.2 INSTRUMENTS, CONTROLS, EQUIPMENT

INSTRUMENT PANEL



- | | | |
|------------------------------------|--|----------------------------------|
| 1. Engine Coolant Temperature Gage | 7. Check Engine Light | 13. Air Outlet |
| 2. Fasten Seat Belt Light | 8. Brake System Warning Light | 14. Cigar Lighter |
| 3. Engine Oil Pressure Gage | 9. Headlight High Beam Indicator Light | 15. Headlight Switch |
| 4. Speedometer | 10. Turn Signal Indicator Light | 16. Cargo Area Dome Light |
| 5. Odometer | 11. Voltmeter | 17. Hazard Light Switch |
| 6. Fuel Gage | 12. Heater Control Panel | 18. Transmission Range Indicator |

"CHECK ENGINE" Light

The Long Life Vehicle has both the Computer Command Control and Closed Loop Emission systems.

An important part of these systems is an instrument panel mounted "CHECK ENGINE" light designed to indicate the need for system service. The light will come on during engine starting to let you know that the bulb is working. (The light will stay on for a short time after the engine starts.) Have the system repaired if the "CHECK ENGINE" light does not come on during engine starting.

If the light comes on, either intermittently or continuously while driving, service to the Computer Command Control system or the Closed Loop Emission system is required. Although in most cases the vehicle is drivable, and does not require towing, report to your supervisor as soon as possible for service of the system.

Continued driving without having the Computer Command Control system or the Closed Loop Emission system serviced could cause damage to the emission control system. It could also affect fuel economy and drivability.

See also "Computer Command Control system" or the "Closed Loop Emission system."

Brake System Warning Light

The regular braking system is a dual system designed so that one part will provide some braking if there is a loss of hydraulic pressure in the other part of the system. The system has a "BRAKE" warning light located in the instrument panel. For bulb check, the "BRAKE" light should come on briefly during engine starting. To serve as a reminder, the light should stay on when the parking brake is not fully released and the ignition is on. Have the system repaired if the light does not come on when it should. This warning light does not do away with the need for brake in-

spection and maintenance. The brake fluid level must be checked regularly. See your Maintenance Schedule for other brake checks.

If the light remains on after engine start up or comes on during operation of the vehicle, it may mean that there is something wrong with part of the brake system.

What to do:

1. Check to see that the parking brake has been released. If it has been:
2. Pull off the road and stop carefully. Remember that:
 - Stopping distances may be longer.
 - You may have to push harder on the pedal.
 - The pedal may go down farther than normal.

2.4 INSTRUMENTS, CONTROLS, EQUIPMENT

3. Try out the brakes by starting and stopping on the road shoulder-- then:

- If you judge it to be safe, drive cautiously at a safe speed to the maintenance department for repair. Or,
- Have vehicle towed to the maintenance department.

Continued driving without necessary repairs could be dangerous.

Engine Coolant Temperature Gage

This gage is located in the instrument cluster. If the gage shows that an **overheat condition exists** as indicated by pointer moving beyond the normal band **immediate action by the driver is required**. If an overheat condition is shown, see "Engine Cooling System Overheating." The coolant temperature indication will vary with air temperature and operating conditions. The ignition must be on for accurate readings.

Prolonged driving or idling in very hot weather may cause the pointer to move beyond the normal band of the gage. Make a practice of scanning this and other gages while driving, especially in hot weather and/or when the vehicle is under load.

CAUTION: If the Engine Coolant Temperature Gage shows an overheat condition or you have other reason to suspect the engine may be overheating, continued operation of the engine **EVEN FOR A SHORT TIME** may result in a fire and the risk of personal injury and/or severe vehicle damage. Take immediate action as outlined under "Engine Cooling System Overheating."

Voltmeter

When the engine is operating, the voltmeter indicates the charging system voltage. During minimum electrical load, the pointer will read to the right of the center. As the electrical load is increased, or in stop-and-go driving, the pointer will rotate to the left. A meter

reading continuously in the left or right zone indicates an electrical system failure. Cause of the failure should be determined and corrected.

Oil Pressure Gage

The oil pressure gage indicates the pressure at which oil is being delivered to the various parts of the engine requiring lubrication. Oil pressure of a cold engine being operated at a given speed will be somewhat higher than when the engine is at normal operating temperature at the same speed. Prolonged high speed operation on a hot day at the given speed will result in somewhat lower oil pressure readings. Readings of 30 to 40 psi (205 to 275 kPa) may be considered normal during moderate road speeds of 35 to 40 mph (55 to 60 km/h) with the engine at proper operating temperature. Gage readings which are consistently high or low under these conditions may indicate lubrication system and/or engine malfunction; turn off the engine and report to your supervisor.

Headlight High Beam Indicator Light

The headlights of your vehicle have high and low beams to provide you with proper nighttime visibility for most driving conditions. The "low" beams are used during most city driving. The "high" beams are especially useful when driving on dark roads since they provide long range illumination. The headlight beam indicator light (located on the speedometer face) will be ON whenever the high beams or "brights" are in use. The turn signal lever controls the headlight beams and is described in "Steering Column Controls."

Hazard Light Switch

Operate switch to make all turn signals and side marker lights flash.

WARNING

Move the vehicle a safe distance off the road when stalled or stopped for repairs. Do not park or operate the vehicle in areas where

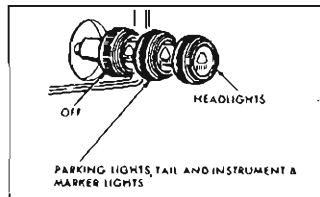
the hot exhaust system may come in contact with dry grass, brush, fuel spill or other flammable material.

Cargo Area Dome Light Switch

The two-position switch controls the two overhead dome lights located in the rear cargo area. An additional switch is located in the right rear corner of the cargo compartment.

Headlight Switch

The three-position light switch controls the headlights, taillights, parking lights, sidemarker lights, instrument lights and dome lights.



Instrument light intensity can be varied by turning knob clockwise or counterclockwise. Full counterclockwise position turns on interior light.

The headlight circuit is protected by a circuit breaker in the light switch. An overload on the breaker will cause the lights to "flicker" on and off. If this condition develops, have your headlight wiring checked immediately. The headlight beam changer is located in the Turn Signal Lever; for operation see heading "Turn Signal and Multi-Function Lever."

2.6 INSTRUMENTS, CONTROLS, EQUIPMENT

HEATER SYSTEM

The windshield defrosting and defogging system assists in providing good visibility through designated areas of the windshield under most inclement weather conditions. For immediate operation of the vehicle, the windshield should be scraped clear.

The heater/defroster control panel is located in the lower left corner of the instrument panel, just above the driver's left knee. A lightbulb in the instrument panel illuminates the heater/defroster control panel when the vehicle's parking lights or headlights are on.

Max/Min Temp Control

The max/min temp control knob is located in the center of the heater/defroster control panel. For maximum air temperature, twist the temp control knob fully clockwise. For minimum air temperature, twist the knob fully counterclockwise.

Heat/Defrost Control

The heat/defrost control knob is located at the left of the heater/defroster control panel. To direct all heated air to the defroster outlets, twist the heat/defrost knob fully clockwise. To direct all heated air to the heater outlets, twist the knob fully counterclockwise.

Operating Tips

- Clear snow and ice from the hood and air inlet in front of the windshield. This helps the heater and defroster work better and reduces the chance of fogging the inside of the windshield.
- Run the blower on "HI" for a few moments before driving off. This helps clear the intake ducts of snow and moisture and reduces the chance of fogging the inside of the windows.
- Always keep the front inlet grilles clear of obstructions (leaves, ice, snow, etc.).

WARNING

- Familiarize yourself thoroughly with the proper use and function of the heating and defogging/defrosting system.
- For safe driving it is extremely important that you follow the operating instructions in this manual.
- Maximum heating output and fast defrosting can be obtained only after the engine has reached operating temperature.

Fan Switch

The fan switch has three positions from OFF to MAX.

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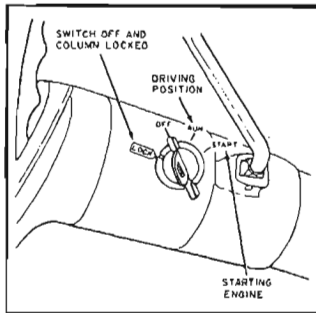
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STEERING COLUMN CONTROLS

ANTI-THEFT STEERING COLUMN LOCK

The anti-theft lock (ignition) on the right side of the steering column has four positions:



- **Lock**-Normal parking position. It locks the ignition and prevents normal use of the steering wheel and shift controls. The ignition key cannot be turned to "Lock" and removed until the shift lever is moved to "P" (Park), "Lock" prevents normal use of the steering wheel.
- **Off**-You can turn off the engine without locking the steering wheel and shift controls.
- **Run**-Normal operating position.
- **Start**-Cranks the engine.

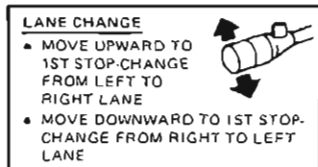
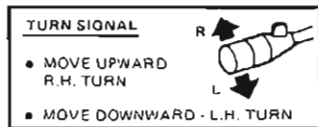
If you have trouble turning the key to unlock the ignition, first be sure the key is pushed in all the way. Then, try to turn the steering wheel as hard as you can in the direction the wheels are turned. At the same time, turn the ignition key with as much effort as you can apply with your hand. Do not try to use a tool of any kind to apply more force on the lock knob, as this could break the knob.

TURN SIGNAL AND MULTI-FUNCTION LEVER

The turn signal lever on the left side of the steering column also controls headlight low-beam and high-beam, and the windshield wiper/washer.

- **Turn Signal** - Move the lever up to the second stop to signal a right turn. Move it down to the second stop to signal a left turn. When the turn is completed, the signal will cancel and the lever will return to horizontal.
- **Lane Change Signal** - In some turns, such as changing lanes, the steering wheel is not turned far enough to cancel the turn signal. For convenience, you can flash the turn signal by moving the lever part way (to the first stop) and holding it there. The lever will return to horizontal when you release it.

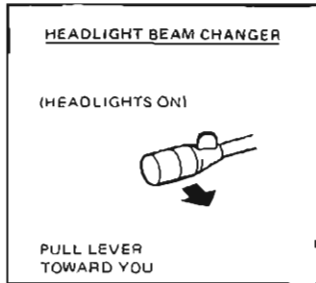
2.8 INSTRUMENTS, CONTROLS, EQUIPMENT



A green light on the instrument panel is designed to flash to tell you that the front and rear turn signal lights are working. If the light stays on, but does not flash, check for burned-out turn signal bulbs. If the green light does not come on when you move the lever, check the fuse and indicator bulb.

- **Headlight Beam Changer** - With the headlights on, pull the lever toward you until you hear a click, then release it. The lights will change from low-beam to high-beam or

from high-beam to low-beam. When the high-beams are on, a light will appear on the instrument panel.

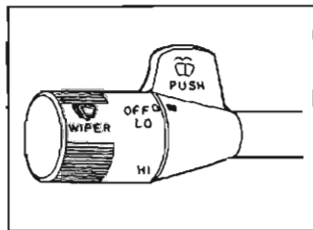


- **Windshield Wiper** - The standard windshield wiper system controls are on the band marked "WIPER" on the turn signal lever.

— For steady wiping at low speed, turn the band away from you to the first stop. For high-speed wiping, turn the band to the next stop. Turn the band back to "OFF" to turn off the wipers.

- **Windshield Washer** - To spray washer fluid on the windshield, push the "paddle" on top of the turn signal lever. (This will also turn on the low-speed wipers.) The spray will continue as long as you hold in the paddle.

After using the windshield washer on the standard wiper system, turn the band back to "OFF" to turn off the wipers.



Operating Tips

- Clear ice or packed snow from the wiper blades before using the wipers. Carefully loosen or thaw wipers that are frozen to the windshield.
- Check the washer fluid level regularly. Do it often when the weather is bad.
- Use a fluid such as GM Optikleen to help prevent freezing damage, and for better cleaning. Be sure to put the fluid in the proper reservoir.
- Fill the washer fluid reservoir only $\frac{3}{4}$ full during the winter to allow for expansion if the temperature should fall low enough to freeze the solution.
- Do not use radiator antifreeze in the windshield washer; it could cause paint damage.
- In cold weather, warm the windshield with the defroster before using the washer, to help prevent icing that may block the driver's vision.

HORN

The horn on your vehicle is actuated by firmly pressing on the pad in the center of the steering wheel.

FLOOR CONTROLS

BRAKING SYSTEM

The regular braking system is designed for braking performance under a wide range of driving conditions even when the vehicle is loaded to its full rated vehicle load capacity.

BRAKE WARNING LIGHT

The brake system warning light is covered in the "Instrument Panel" section.

RIDING THE BRAKE

NOTICE: "Riding the brake" by resting your foot on the pedal when you do not intend to brake can overheat the brakes and wear out the brake linings and pads faster. This may also damage the brakes and will waste fuel.

WET BRAKES

CAUTION: Driving through water deep enough to wet brake components may cause the brakes not to work as well. As a result, the vehicle will not slow down at the usual rate, and it may pull to the right or left. After checking to the rear for other vehicles, apply the brakes lightly to check whether this has happened. To dry them quickly, lightly apply the brakes. At the same time keep a safe forward speed, with plenty of clear space ahead, to the rear, and to the sides. Do this until the brakes return to normal. Always do this after driving through water to help reduce the risk of personal injury.

VACUUM POWER BRAKES

If the engine stops, do not pump the brakes. The system is designed to stop the vehicle with reserve power assist if the brake pedal is held down. This reserve is greatly reduced each time you apply and release the brakes. **If, when you turn the steering wheel during braking, the vehicle does not turn, don't push as hard on the brake pedal.**

2.10 INSTRUMENTS, CONTROLS, EQUIPMENT

Without power assist the vehicle can still be stopped by pushing much harder on the brake pedal, however, the stopping distance may be longer.

BRAKES (Except Parking Brake)

If the brake pedal goes down farther than normal, it may be due to a lack of adjustment of any rear drum brakes. To find out if this is the case, drive backward and forward a few times, applying the brakes firmly when going in each direction.

Report to your supervisor if pedal height does not return to normal, or if there is a rapid increase in pedal travel. This could be a sign of brake trouble.

DISC BRAKE WEAR INDICATORS

Front disc brake pads have built-in wear indicators which should make a high-pitched squealing or cricket-like warning sound when the brake pads are worn to where new pads are needed. The sound

will come and go, or be heard all the time when the vehicle is moving and when the brake pedal is pushed down firmly. Expensive rotor damage can result if pads are not replaced when needed.

See also the brake checks listed in the Maintenance Schedule.

PARKING BRAKE

The parking brake lever is located at the driver's right side, just below the instrument panel.

- To set the parking brake, hold the regular brake pedal down and pull the parking brake lever toward you until the lever locks in place.
- To release the parking brake, hold the regular brake pedal down and push the parking brake lever forward until the lever reaches its stop. The brake system warning light is designed to remind you if the parking brake lever is not fully released when the ignition is on. **Never drive the vehicle with the parking brake set as this will reduce**

rear brake effectiveness due to overheating, shorten brake life, and may cause permanent brake damage. If the parking brake does not hold the vehicle securely, or does not fully release, report to your supervisor.

TORQUE LOCK

The parking brake should be set first whenever leaving the driver's seat. If the vehicle is parked on the grade and the transmission selector lever is placed in "P" (Park) before the parking brake is set, the weight of the vehicle may exert so much force on the parking pawl in the transmission that it may be difficult to pull the selector lever out of "P" (Park). This condition is called torque lock. To prevent this, the parking brake should be applied **BEFORE** moving the selector lever to "P" (Park).

When preparing to move the vehicle, the selector lever should be moved out of the "P" (Park) position **BEFORE** releasing the parking brake. It is good driving practice to set the parking brake

first, then release the transmission from "P" (Park), even on level surfaces.

If "torque lock" does occur, it may be necessary to have another vehicle nudge this vehicle uphill to take some of the pressure off the transmission while the driver pulls on the transmission selector lever.

DOORS

Always Lock the Doors

CAUTION: To help reduce the risk of personal injury in an accident, always lock the doors (and rear roll-up) when driving. Along with using the seat belts properly, locking the doors (etc.) helps prevent people from being thrown from the vehicle. It also helps prevent unintended opening of the doors and helps keep out intruders.

Side Door Latch - Outside

The sliding doors will latch when fully open or fully closed. They can be locked with a key. To release latch with

door in fully closed position, swing door handle toward the rear of the vehicle. To release latch with door in fully open position, swing door handle toward the front of the vehicle.

Side Door Latch - Inside

To release latch with door in fully closed position, swing door handle toward the rear of the vehicle. To release latch with door in fully open position, swing door handle toward the front of the vehicle.

Cargo Area/Driver Compartment Partition Door

The partition door is opened or closed by unlocking the lock, removing the key, and sliding the door in the desired direction.

Cargo Door

To open the cargo door, unlock the latch with the key, and pull the latch outward. Lift the door upward using the handhold provided to the left of the latch.

To close the cargo door, pull the door down using the strap provided at the right of the door opening. Lock the latch with the key.

CAUTION: Never drive the LLV while any of its doors are either fully or partially open.

Sunvisor

The sunvisor, is designed to be effective in blocking glare not only from the windshield but also from the side door window. The visor can be pivoted to the desired position.

Side Vent

Two side vents are located in the Cargo area of the vehicle. To open the vent, rotate the handle in either direction. To close the vent, move the handle to the middle position.

2.12 INSTRUMENTS, CONTROLS, EQUIPMENT

Forward Visibility Mirror

Adjust the mirror so you can just see the bumper and ground immediately in front of the vehicle. This will allow you to determine if there are any obstacles in front of the vehicle that are hidden from view.

SEAT CONTROLS

Adjust Driver Seat While Parked

CAUTION: Do not adjust the driver's seat while the vehicle is moving. The seat could move suddenly and cause the driver to lose control of the vehicle.

Seat Rotation Control

The seat rotation control is located at the lower right side of the driver's seat. To adjust the seat, pull the rotation control knob outward and rotate the seat to the desired position. The seat will latch **ONLY** in the forward driving position.

Seat Fore and Aft Control

The seat fore and aft control is located at the lower left side of the driver's seat. To adjust the seat fore or aft, pivot the control lever outward until the locking mechanism releases; then, move the seat to the desired position. Release the lever and the seat will lock in place.

Companion Seat

The companion seat, if installed, is similar in construction to the driver's seat except that it does not swivel and is not adjustable. The companion seat can be mounted in either the cab (companion position) or the cargo compartment (observer position).

SEAT BELT SYSTEMS

CAUTION: To help reduce the risk of personal injury in collisions or sudden maneuvers use the seat belts following the instructions in this section on their proper use and maintenance.

NEVER:

- Use a belt for more than one person at a time.
- Wear the belts twisted.
- Let the belt system become damaged by a door or seat.

Seat Belt Operation

Driver

To engage the seat belt, grasp the latch plate protruding from the belt retractor at the right of the seat, pull the belt across your lap, and insert the latch plate in the buckle at the left of the seat. Be certain that the pin on the shoulder strap latch plate is inserted in the slot on the lap belt latch plate. Never operate the vehicle without the lap belt and shoulder strap securely in place.

To release the seat belt, press the button on the lap belt buckle and allow the belt retractors to rewind the lap belt and shoulder strap.

Passenger

To engage the shoulder belts, loosen each belt until you can place your arms (l & r) between the belt (l & r) and the seat back. Bring each belt (l & r) forward until it passes in front of your shoulders (l & r) and pull each belt tight. To engage the lap belt, grasp the latch plate protruding from the belt retractor at the right of the seat, pull the belt across your lap, and insert the latch plate in the buckle at the left of the seat.

To release the lap belt, press the button on the lap belt buckle and allow the belt retractor to rewind the lap belt. To release the shoulder straps, loosen the straps until you can move them outward enough to leave the seat.

Seat Belt Inspection

Now and then check that belts, buckles, latch plates, retractors, reminder systems and guide loops work properly; look for loose parts or damage that could keep the restraint system from doing its job. Replace a belt if the

webbing has been cut or otherwise damaged. Replace belts in use during all but a minor collision; if there is any question, replace the belt.

HOOD RELEASE, LATCH AND PROP

Hood Release

The hood release is located on the engine cover to the left of the heater control panel. To release the hood, pull the handle.

Hood Latch and Prop

To open the hood, first pull the hood release handle on the engine cover until the hood releases. Then, while standing in front of the vehicle, push down slightly on the hood and move the hood safety catch lever under the right front corner of the hood until you can raise the hood. Pull the hood prop rod from its storage position on top of the radiator support and insert the prop rod in the opening provided at the left side of the hood.

To close the hood, lift the hood slightly until the hood prop rod can be disengaged from the opening in the hood panel. Return the prop rod to its storage position. Lower the hood until it is nearly closed, then close it firmly, ensuring that the hood is securely latched in the closed position.

ENGINE EXHAUST GAS CAUTION

(CARBON MONOXIDE)

CAUTION: Do not breathe exhaust gas because it contains carbon monoxide, which by itself has no color or odor. Carbon monoxide is a dangerous gas. It can cause unconsciousness and can be lethal.

If at any time you think exhaust fumes are entering the vehicle, have the cause determined and corrected as soon as possible. If you must drive under these conditions, drive only with ALL windows fully OPEN.

Protect against carbon monoxide entry into the vehicle body. The best way is to keep the engine exhaust system, vehicle body and body ventilation system properly maintained. We recommend that the exhaust system and body be inspected by a competent technician:

- each time the vehicle is raised for an oil change;

- whenever a change is noticed in the sound of the exhaust system;
- whenever the exhaust system, underbody or rear of the vehicle is damaged or becomes corroded.

See your Maintenance Schedule for parts requiring inspection.

To allow proper operation of your vehicle's ventilation system, keep the air inlet grille in front of the windshield clear of snow, leaves or other obstructions at all times.

CAUTION:

Do not park with the engine running or idle this vehicle for more than 10 minutes with the ventilation system control switch in the "OFF" position. Even with the ventilation system on, running the engine while parked or stopped for longer periods of time is not recommended. Entry of carbon monoxide into the vehicle body is possible with a poorly repaired, damaged, or corroded exhaust system or body.

Do not run the engine in CONFINED areas (such as garages or next to a building) any more than needed to move the vehicle. When the vehicle has to be stopped in an UNCONFINED area with the engine running for any more than a few minutes, take the following steps:

- Adjust the heating or cooling system to force outside air into the vehicle as by setting the fan to intermediate or high speed.
- Keep the exhaust tailpipe area clear of snow and other material to help reduce the buildup of exhaust gases under the vehicle. This is particularly important when parked in blizzard conditions.

Driving with the rear roll-up door or rear cargo compartment vents open is not recommended. Under some conditions, exhaust gas may be drawn into the vehicle. If the roll-up door must remain open for some reason while moving, follow these precautions:

3.2 STARTING

- Close all windows.
- Adjust the heating or ventilation system to force outside air into the vehicle as described above, but set the fan to high speed.

NEW VEHICLE "BREAK-IN" PERIOD

You can drive the vehicle from its very first mile/kilometer without following a formal "break-in" schedule. However, there are things you can do during the first few hundred miles/kilometers of driving that will add to the future performance and economy of the vehicle.

We recommend you limit your speed during the first 500 miles (800 kilometers) to a maximum of 55 mph (90 km/h); but do not drive for long periods at any one constant speed, either fast or slow. During this time, avoid full throttle starts and, if possible, avoid hard stops especially during the first 200 miles (320 kilometers) of driving.

Always drive at moderate speed until the engine has completely warmed up.

FUEL REQUIREMENTS

The gasoline engine is designed to use **only unleaded gasoline**. Unleaded gasoline must be used for the emission control system to operate properly. Its use will also reduce spark plug fouling, exhaust system corrosion and engine oil deterioration.

Using leaded gasoline can damage the emission control system and could result in loss of emission control warranty coverage. The effectiveness of the catalyst in the catalytic converter decreases after the use of as little as one tank of leaded gasoline. Also the vehicle has the Computer Command Control system and the Closed Loop Emission system which include an oxygen sensor. Leaded gasoline will damage the sensor and deteriorate emission control. (For more information, see "Computer Command Control System" or "Closed Loop Emission System.")

Federal regulations require that pumps delivering unleaded gasoline be labeled with the word UNLEADED. Only these pumps have nozzles which fit the filler neck of the vehicle's gasoline tank.

In the United States, Federal law also requires that gasoline octane ratings be posted on the pumps. The octane rating shown is an average of Research (R) octane number and Motor (M) octane number. In most parts of the United States, you should use unleaded gasoline with an octane rating of at least 87. However, you may use unleaded gasoline with an octane rating as low as 85 in these high-altitude areas: Colorado, Montana, New Mexico, Utah, Wyoming, northeastern Nevada, southern Idaho, western South Dakota, and Texas directly south of New Mexico.

Using unleaded gasoline with an octane rating lower than stated above can cause persistent, heavy "spark knock."

("Spark knock" is a metallic rapping noise.) If severe, this can lead to engine damage. If you detect heavy spark knock even when using gasoline of the recommended octane rating, or if you hear steady spark knock while holding a steady speed on level roads, have the problem corrected.

However, now and then you may notice light spark knock for a short time while accelerating or driving up hills. This is no cause for concern, because you get the greatest fuel economy benefit from the gasoline's octane rating when there is occasional light spark knock. Using gasoline with a higher octane rating than that which allows occasional spark knock is an unnecessary expense.

Gasoline/Ethanol Blends

Blends of unleaded gasoline and ethanol (grain alcohol) sometimes known as gasohol are available in some areas. You may use these blends in the vehicle, if they are no more than 10 percent

ethanol, without jeopardizing the New Vehicle and Emission Warranties. Be sure the gasoline-ethanol blend has octane ratings no lower than those recommended for unleaded gasoline. Most drivers will not notice operating differences with blends of up to 10 percent ethanol, but some may. In that case, your maintenance department can make certain adjustments, provided they do not violate the Federal Emission Standards. If you are still not satisfied with ethanol-gasoline blend performance, you may prefer to use unleaded gasoline.

Other Gasoline/Alcohol Blends

Some fuel suppliers sell gasoline containing alcohol without advertising the presence of alcohol or giving it a special name such as gasohol. If you are not sure whether there is alcohol in the gasoline you buy, check with the service station operator.

DO NOT USE gasolines containing methanol (methyl or wood alcohol) that

do not also contain co-solvents and corrosion inhibitors for methanol. Also, DO NOT USE gasolines that contain more than 5 percent methanol even if they contain co-solvents and corrosion inhibitors. Fuel system damage or vehicle performance problems resulting from the use of such fuels is not the responsibility of Grumman LLV and may not be covered under the new vehicle warranties.

Although gasolines containing 5 percent or less methanol and appropriate co-solvents and inhibitors for methanol may be suitable for use in your vehicle, evidence of their suitability is as yet incomplete; therefore, Grumman LLV cannot, at this time, endorse their use.

NOTICE: Try not to spill gasoline during refueling. Gasoline containing alcohol can cause paint damage, which may not be covered under the New Vehicle warranty.

3.4 STARTING

STARTING THE ENGINE

1. Apply the parking brake.
2. **Automatic Transmission — Shift the transmission to Park or Neutral (Park preferred).** A starter safety device is designed to keep the starter from operating if the shift lever is in any drive position. (If you need to restart the engine while the vehicle is moving, shift the transmission to Neutral.)
3. Start the engine as outlined below for different conditions.

NOTICE: Do not crank the engine for more than about 15 seconds at a time. Wait 10 to 15 seconds before trying again. This will help prevent damage to the starter.

• COLD OR WARM ENGINE

DO NOT PUSH DOWN THE ACCELERATOR PEDAL. With your foot off the accelerator pedal, crank the engine by turning the ig-

nition key to "Start." Release the key when the engine starts. It is not necessary to push down the accelerator pedal.

If the engine does not start, or starts but fails to run, repeat this procedure.

• ENGINE FAILS TO START AFTER FOLLOWING NORMAL STARTING PROCEDURE

1. If you tried the Cold or Warm Engine starting procedure and the engine still does not start, push the accelerator pedal down to the floor and hold it there while cranking the engine. This should clear the engine if it is flooded.
2. If the engine has been flooded with too much fuel, it may start to run but not have enough power to keep running. In that case, continue cranking with the accelerator pedal all the way to the floor until the engine clears itself of excess gasoline and runs smoothly.

NOTICE: Do not crank more than 15 seconds at a time or you could damage the starter.

After starting, the idle speed will automatically be reduced as the engine warms up.

DRIVER DAILY CHECKLIST

Be sure you know how to use the vehicle and its equipment before operating it.

Before Entering the Vehicle

1. See that windows, mirrors, lights and reflectors are undamaged, clean and unobstructed.
2. If any tire does not look normal, check it with a pressure gage.
3. Look for fluid leaks.
4. **Be sure everything is properly stowed.**
5. Check the area behind the vehicle if you are about to back up.

Before Driving

1. Lock all doors.
2. Adjust the seat.

3. Adjust outside mirrors.
4. **NEVER let anyone ride in the cargo area or any other place in or on this vehicle where there is no seat belt. ALWAYS properly fasten the seat belt.**
5. Check that all the warning lights work as the key is turned to "Run" or "Start."
6. Check all gages (including the fuel gage).
7. Release the parking brake (and make sure the "BRAKE" light turns off).

See related topics in this manual, especially if problems are found. **The items above which are printed in bold face like this sentence are associated with cautions -- which relate to the possibility of personal injury -- to find them, see the headings throughout this manual that relate to the above subjects.**

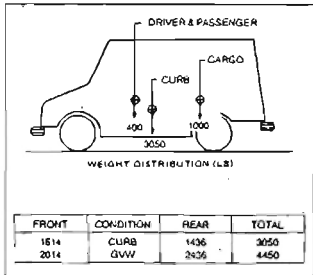
IMPORTANT INFORMATION ON VEHICLE LOADING**Overloading**

CAUTION: The components of your vehicle are designed to provide satisfactory service if the vehicle is not loaded in excess of either the Gross Vehicle Weight Rating (GVWR) or the maximum front and rear Gross Axle Weight Ratings (GAWRs).

Overloading can result in loss of vehicle control and personal injury, either by causing component failures or by affecting vehicle handling. It can also shorten the service life of the vehicle.

Weight and center of gravity (C.G.) data for the LLV has been estimated based on the weights of all components. The following figure shows the weight distribution.

4.2 DRIVING



Maximum Front And Rear Axle Weights

The weight of the cargo load must be properly distributed over both the front and rear axles. The GVWR is the maximum permissible loaded weight of the vehicle and takes into account the capabilities of the engine, transmission, frame, springs, brakes, axles and tires. Actual loads at the front and rear axles can only be determined by weighing the vehicle. This can be done at highway weigh stations or other such places. The cargo load should be distributed on

both sides of the centerline as equally as possible.

Gross Vehicle Weight

Gross Vehicle Weight (GVW) is the weight of the originally equipped vehicle and all items added to it after it has left the factory. This would include bodies, winches, booms, 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.

The Payload Rating is the maximum allowable cargo load (including the weight of the driver and all occupants) that the vehicle can carry based on all factory installed equipment on the vehicle. The Payload Rating is reduced if any accessories or other equipment is added to the vehicle after final date of manufacture. The weight of these items should be determined and deducted from the Payload Rating.

Tires

The tires on the vehicle must be the proper size and must be inflated to the pressures indicated on the vehicle body above each wheel opening.

SECURE CARGO

CAUTION: To help avoid personal injury during a collision or sudden maneuver, always take extra care when stowing things. Place cargo in the rear area. Cargo weight inside the vehicle should be located as far forward as possible. Distribute cargo weight as evenly as possible. Secure all items in place to help keep them from being thrown about.

LLV Loading Information

The total cargo load of the LLV consists of:

- the weight of installed additional equipment not included in the manufacturer's weight figure,
- the weight of cargo, and

- the weight of passengers in the vehicle.

The total cargo load should not exceed the LLV's cargo weight rating, and the center of gravity should fall within the LLV's recommended cargo center of gravity zone when installed.

Cargo Weight Rating (CWR) means the amount specified by the vehicle manufacturer as the vehicle's cargo carrying capacity in pounds. The CWR does not include the weight of occupants.

CAUTION: The cargo center of gravity is only one of many factors which may affect the LLV's overall performance, including handling, steering, and braking.

IMPORTANT FACTS YOU SHOULD KNOW ABOUT FUEL ECONOMY AND HOW TO IMPROVE IT

How you drive, where you drive, and when you drive all affect how many miles/kilometers you can get from a gallon/liter of fuel. You can save fuel if you avoid "Jackrabbit" starts, maintain as constant a throttle position as traffic conditions allow once you have reached cruising speed, and avoid sudden stops which waste energy in the form of heat generated in braking.

The careful attention you give the vehicle as far as maintenance and repairs are concerned will also help fuel economy. Proper engine and air cleaner maintenance, lubrication intervals, wheel alignment and tire inflation pressures, when closely adhered to, will pay dividends in improved fuel economy as well as longer vehicle life.

Fuel Selection (Gasoline Engines)

Use only unleaded gasoline, meeting the octane ratings given under "Fuel

Requirements (Gasoline Engines)" in this section of the manual. Unleaded gasoline must be used for the emission control system to operate properly. Leaded gasoline will damage the Computer Command Control system or the Closed Loop Emission system oxygen sensor, reduce the effectiveness of the catalyst and affect emission control. Using leaded gasoline can also damage other parts of the emission control system and could result in loss of emission warranty coverage.

AUTOMATIC TRANSMISSIONS

Automatic transmissions replace the standard clutch and transmission. After starting the engine with the selector lever in "P" (Park) or "N" (Neutral) position, select the range desired (see table) and depress the accelerator. A gradual start with a steady increase in accelerator pressure will result in best possible fuel economy. Rapid acceleration for fast starts will result in greater fuel consumption.

4.4 DRIVING

Automatic transmission shift quadrants of this vehicle continue the uniform sequence of selector positions. Shift indicators are arranged with "P" (Park) position at one end, followed in sequence by "R" (Reverse), "N" (Neutral) and the forward driving ranges. All automatic transmissions are equipped with a starter safety switch designed to permit starting the engine only when the transmission selector is in the "P" (Park) or "N" (Neutral) position. For additional engine braking effect, as sometimes needed in mountainous driving, place the transmission in an intermediate or low range.

The automatic transmission has a clutch-type torque converter. The clutch is designed to engage when the vehicle reaches a steady speed above 25 to 45 mph (40 to 72 km/h). When engaged, the clutch provides a direct connection between the engine and the drive wheels. This direct connection allows for more efficient operation of the transmission and thereby helps contribute to improved fuel economy.

With the clutch-type converter, you may

notice some operational differences compared to open-type automatic transmission equipped vehicles. When the clutch engages, for example, you may notice what feels like an extra transmission shift. Also, on occasion, you may feel certain incidental engine pulsations in the 30 to 50 mph (50 to 80 km/h) range. This feel is similar to that sometimes experienced in a manual transmission equipped vehicle. In addition, when the accelerator pedal is released abruptly, you may feel a slight impulse before the clutch disengages.

These conditions are normal. They have no adverse effect on the vehicle and do not indicate the need for repairs.

Notice

The following practices could result in automatic transmission failure:

- Shifting between forward and reverse driving range while operating the engine at high speed or heavy throttle, such as when the driving wheels are on snow or ice--commonly called "rocking." (See the correct method for "rocking" a vehicle under "Freeing Vehicle

from Sand, Mud, Snow or Ice" in "In Case of Emergency.")

- Shifting to "R" (Reverse) or any forward range while operating the engine at high speed in "N" (Neutral) or "P" (Park).
- Shifting to "P" (Park) while the vehicle wheels are still turning.
- Operating the transmission at or near "stall condition" for more than 10 seconds at a time. ("Stall condition" is when the engine is running at high speed while the transmission is in a driving range and the drive wheels aren't moving, such as when stuck in deep sand or when the vehicle is against a fixed barrier.)
- Holding vehicle on an upgrade with the accelerator pedal. (Use the regular brakes to hold vehicle on an uphill grade.)

Shift at the highest vehicle speed listed unless you have reached cruising speed. (Cruising speed is a relatively steady speed which includes slight variations in speed to allow for road and traffic conditions.) For cruise, use the highest gear for that speed.

**AUTOMATIC 3-SPEED
TRANSMISSION SHIFT
QUADRANT POSITIONS**

P (PARK)	This position is used to lock the transmission when the vehicle is parked or while starting the engine. Never move the shift lever to Park until your vehicle is fully stopped. Use this position together with the parking brake.
R (REVERSE)	This position is used for backing the vehicle. Bring the vehicle to a complete stop before shifting to Reverse.

N (NEUTRAL)	This is the out-of-gear position. You may restart a stalled engine while the vehicle is still moving with the selector in Neutral. This position is also used when towing the vehicle. See the "In Case of Emergency" section for towing facts.
D (THIRD GEAR)*	This is the gear range position, used for most normal driving. This position lets the transmission choose the appropriate gear for load and driving conditions.
2 (SECOND GEAR)	This range is used when extra performance is required for hill climbing or it can be used to provide "engine braking" to slow the vehicle when going down medium grades. The shift lever

	may be moved from "D" to "2" (and vice versa) under most driving conditions.
1 (FIRST GEAR)	This position is used to provide maximum engine braking when driving down very sharp grades or when maximum performance is required to climb a steep hill or run through deep snow or mud. You may shift into "1" at any speed but the transmission will not lock into low until the vehicle speed is under 40 mph (65 km/h).

*If you need more power for passing, you can force the transmission to downshift by fully pressing the accelerator pedal.

4.6 DRIVING

Driving On Slippery Surfaces

While driving on a slippery surface avoid sudden acceleration or engine braking actions (due to shifting to a lower gear). Such actions could cause the wheels to skid. Skid correction is called for at these times.

Descending A Grade

CAUTION: To reduce the risk of personal injury, before going down a steep long grade, reduce speed and shift the automatic transmission to low range. Do not hold the brake pedal down too long or too often while going down a steep or long grade. This could cause the brakes to get hot and not work as well. As a result, the vehicle will not slow down at the usual rate. Failure to take these steps may result in loss of vehicle control.

GUARD AGAINST THEFT

Your new LLV has many features to help prevent theft of the vehicle, its

equipment, and contents. But these anti-theft features depend upon you to work.

The time to be most on guard is when leaving the vehicle:

1. **Park in a lighted spot when you can.**
 - Be sure to turn the steering wheel sharply to one side to help prevent towing of this vehicle from the rear.
2. **Lock the steering column and take the keys:**
 - Turn the key to the "Lock" position. This locks the ignition and both steering and shift controls.
3. **Keep items that may appear to be of value out of sight and locked up when possible.**
4. **Fully close all windows and lock all doors.**

EMERGENCIES

HAZARD WARNING FLASHER

Use the hazard warning flasher to warn other drivers any time the vehicle becomes a traffic hazard, day or night. Avoid stopping on the roadway, if possible. To activate the hazard warning flasher, operate the switch on the instrument panel.

Be sure to turn off the hazard warning flasher when it is no longer needed. If a turn signal is activated while the hazard warning flasher is on, it will not be clear to on-coming traffic that the turn signal is operating. To turn off the hazard warning flasher, operate the switch on the instrument panel.

EMERGENCY STARTING THE 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"

NOTICE: Do not push or tow this vehicle to start it. Under some conditions this may damage the catalytic converter or other parts of the vehicle. Also, since this vehicle has a 12 volt battery, be sure the vehicle or equipment used to jump start the engine is also 12 volt. Use of any other type system may damage the vehicle's electrical components.

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 the battery whenever possible.
- Do not expose the 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 do not have loose or missing insulation.

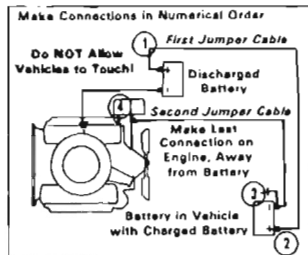
2. In both vehicles:

- Turn off the ignition and all lights and accessories except the hazard flasher or any lights needed for the work area.
- Apply the parking brake firmly, and shift the automatic transmission to Park (or manual 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. Never connect (+) to (-).

4. Clamp one end of the second cable to the negative (-) terminal of the good (charged) battery and make the final connection to a heavy metal bracket on the engine about 450 millimeters (18 inches) 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.



4.8 DRIVING

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 the discharged battery.
6. Remove the booster cables by reversing the above installation sequence exactly. While removing each clamp, take care it does not touch any other metal while the other end remains attached.

ENGINE COOLING SYSTEM OVERHEATING

If you see or hear escaping steam or have other reason to suspect there is a serious overheat condition, **stop and park the vehicle as soon as it is safe to do so and turn off the engine immediately and get out of the vehicle.**

The cooling system may overheat if the coolant level is too low, if there is a sudden loss of coolant (such as a worn hose splitting), or if other problems oc-

cur. It may also temporarily overheat during severe operating conditions such as:

- climbing a long hill on a hot day,
- stopping after high-speed driving,
- idling for long periods in traffic.

If the Engine Coolant Temperature Gage shows an overheat condition, or you have any reason to suspect the engine may be overheating:

- If you are stopped in traffic, shift the transmission to "N" (Neutral).

If the engine coolant temperature does not start to drop within a minute or two:

- Pull over, stop and park the vehicle as soon as it is safe to do so.

- Press the accelerator pedal to increase engine speed to about twice as fast as normal idle speed. Bring the idle speed back to normal after two or three minutes.

If the engine coolant temperature does not start to drop, **turn off the engine and get out of the vehicle**, then proceed as follows:

CAUTION: To help avoid being burned:

- **DO NOT OPEN THE HOOD** if you see or hear steam or coolant escaping from the engine compartment. Wait until no steam or coolant can be seen or heard before opening the hood.

- DO NOT REMOVE THE RADIATOR CAP OR COOLANT RECOVERY TANK CAP IF THE COOLANT IN THE RECOVERY TANK IS BOILING. Also do not remove the radiator cap while the engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon.

If no steam or coolant can be seen or heard, raise the engine hood. If the coolant is boiling, wait until it stops before proceeding. Look at the coolant level in both the see-through recovery tank and the radiator level indicator. Coolant level should be at or above the "FULL COLD" mark on the recovery tank.

Make sure the fan belts are not broken, or off the pulleys, and that the fan turns when the engine is started.

If the coolant level in the recovery tank is low, look for leaks at the radiator hoses and connections, heater hoses and connections, radiator, and water pump. If you find major leaks, or spot

other problems that may have caused the engine to overheat, do not run the engine until these problems have been corrected. If you do not find a leak or other problem, carefully add coolant to the recovery tank. (Coolant is a mixture of ethylene glycol antifreeze and water; see "Engine Cooling System" for the proper antifreeze and mixture.)

CAUTION: Under some conditions, the ethylene glycol in engine coolant is combustible. To help avoid being burned, DO NOT spill antifreeze or coolant on the exhaust system or hot engine parts.

If the coolant level in the recovery tank is at the correct level but there is still an indication on the instrument panel of an overheat condition:

- YOU MUST LET THE ENGINE COOL FIRST. You may then add coolant directly to the radiator. See "Cooling System Care" under "Engine Cooling System." Follow steps 1 through 3 for the correct way to remove the radiator cap and add coolant.

Once the Engine Coolant Temperature gage no longer signals an overheat condition, you can resume driving at a reduced speed. Return to normal driving after about ten minutes if the gage pointer does not again show an overheat condition.

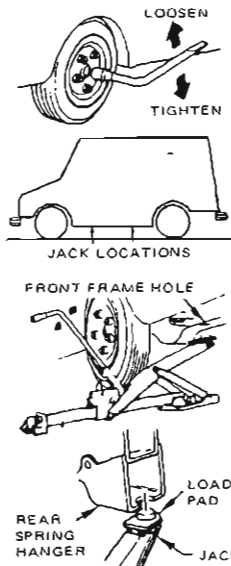
If no cause for the overheat condition was found, report to your supervisor.

JACKING

CAUTION: To help avoid personal injury:

- Follow all jacking and stowage instructions.
- Use jack only for lifting this vehicle during wheel change.
- Never get beneath the vehicle, start or run engine while vehicle is supported by jack.
- Always securely restow spare tire (or flat tire) and all jacking equipment.

JACKING INSTRUCTIONS



WHenever a wheel is changed, always remove any corrosion that may be present on inside of wheel and wheel mounting surface on vehicle.

- 1 PARK ON A LEVEL SURFACE AND SET PARKING BRAKE FIRMLY
- 2 SET AUTOMATIC TRANSMISSION IN "PARK"
- 3 TURN ON THE HAZARD WARNING FLASHER
- 4 REMOVE JACKING TOOLS AND SPARE TIRE FROM STOWAGE AREA
- 5 BLOCK FRONT AND REAR OF WHEEL DIAGONALLY OPPOSITE WHEEL BEING REMOVED BEFORE OPERATING JACK
- 6 LOOSEN, BUT DO NOT REMOVE WHEEL NUTS BY TURNING WRENCH - COUNTERCLOCKWISE (IF EQUIPPED WITH CHROME CAPPED WHEEL NUTS, NUTS MAY BE DAMAGED IF WHEEL NUT WRENCH IS NOT FULLY SEATED ON NUT)
- 7 PLACE LEVER IN "UP" POSITION AND PLACE JACK UNDER NEAREST WHEEL BEING REMOVED
- 8 RAISE JACK UNTIL LOAD PAD FITS INTO FRAME HOLE (FRONT) OR SPRING HANGER HOLE (REAR)
- 9 OPERATE JACK WITH SLOW, SMOOTH MOTION, USING HAND OR FOOT TO PUMP HANDLE
- 10 RAISE VEHICLE SO AN INFLATED TIRE WILL JUST CLEAR SURFACE. REMOVE NUTS AND WHEEL
- 11 INSTALL WHEEL AND REPLACE WHEEL NUTS WITH CONE SHAPED END TOWARD WHEEL. THEN SLIGHTLY TIGHTEN EACH NUT. WHEEL MUST BE SEATED ON HUB
- 12 PLACE LEVER IN "DOWN" POSITION
- 13 LOWER VEHICLE AND FULLY TIGHTEN WHEEL NUTS IN A CRISS-CROSS SEQUENCE BY TURNING WRENCH CLOCKWISE
- 14 JACK RATCHET MECHANISM SHOULD BE OILED AFTER EACH USE.

STOWAGE OF TIRE AND JACK

CAUTION: Always securely restow the spare tire assembly (or flat tire), all jacking equipment, and any covers or doors, using the means provided. This will help keep such things from being thrown about and injuring people during a collision or sudden maneuver.

FREEING VEHICLE FROM SAND, MUD, SNOW OR ICE

If your vehicle gets stuck in sand, mud, snow or ice, shift the transmission from a forward range to reverse in a repeat pattern. Apply a light pressure to the accelerator pedal while the transmission is in gear. Remove your foot from the accelerator while shifting. Do not race the engine. For best traction, avoid spinning the wheels. Incorrect rocking of your vehicle while it is stuck may result in damage to vehicle components.

CAUTION: Do not spin the wheels faster than 35 mph (35 km/h). Personal injury and damage (including tire, vehicle body parts, transmission and/or

rear axle failure) may result from excessive wheel spinning.

If the vehicle remains stuck after several rocking attempts, seek other assistance. Also see the Notice under "Automatic Transmissions."

TOWING

Proper equipment must be used to prevent damage to vehicles during any towing.

Your vehicle, equipped with an automatic transmission, may be towed on all four wheels at speeds less than 35 mph (55 km/h) for distances up to 50 miles (80 kilometers). The driveline and steering must operate normally.

For such towing, the steering must be unlocked, transmission in neutral and the parking brake released. Connect the towing device to main structural parts of the vehicle. Do NOT attach to bumpers or brackets. Remember also that optional power assist for brakes

and steering will not be available when the engine is off.

A safety chain system must be used for all towing.

CAUTION: The front air dam is flexible, however, it may tear or break under extreme loading.

REPLACEMENT FASTENERS

During vehicle maintenance, any fasteners used to replace older ones must have the same measurements and strength as those removed, whether metric or customary. (The numbers on the heads of metric bolts and on the surfaces of metric nuts show their strength. Customary bolts use radial lines to show this, while most customary nuts do not have strength markings.) Fasteners taken from the vehicle should be saved for re-use in the same spot when possible. Where a fastener cannot be used again, take care to choose a replacement that matches the old one.

CAUTION: This vehicle is primarily dimensioned in the metric system. Most fasteners are metric and many are very close in dimension to well-known customary fasteners in the inch system. Mismatched or incorrect fasteners can result in damage to the vehicle or possibly personal injury.

FUEL DOOR

The fuel door is located on the rear left side of the vehicle.

The fuel tank filler cap has a "screw-on ratcheting type" feature.

- To remove — rotate cap counter-clockwise to clear the inside of the filler neck. This will allow any residual pressure to escape.
- To install — reverse this procedure and tighten cap securely until a "ratcheting", clicking sound is heard indicating cap is on properly.

NOTICE: If you need to replace the fuel cap, use only a cap specified for your model. An incorrect fuel cap can result in a serious malfunction of the fuel system or emission control system.

CATALYTIC CONVERTER

The catalytic converter is an emission control device added to the ex-

haust system to reduce exhaust gas pollutants. The converter contains a ceramic material coated with noble metal catalysts. To prevent contamination and loss of effectiveness of the catalysts, unleaded gasoline must be used. Unleaded gasoline also reduces spark plug fouling, exhaust system corrosion and engine oil deterioration. Leaded gasoline will also damage the oxygen sensor in the Computer Command Control system or the Closed Loop Emission system which could affect emission control.

To help prevent damage:

1. Keep your engine properly maintained. Engine malfunctions involving the electrical, carburetion, electronic fuel injection or ignition systems may result in unusually high catalytic converter and exhaust system temperatures which, under extreme malfunctioning conditions, may ignite interior floor-covering materials above the converter. Do not keep driving the vehicle if you detect engine misfire, noticeable

5.2 SERVICE/MAINTENANCE

loss of performance, or other unusual operating conditions. Instead, have it serviced promptly. See the Maintenance Schedule for information on inspecting and maintaining the engine, exhaust system, and other components.

2. Do not push or tow this vehicle to start it. This may result in unusually high catalytic converter and exhaust system temperatures which under extreme conditions may ignite interior floor-covering material above the converter.

Disregarding these instructions could damage the catalytic converter, the vehicle, or nearby property and affect warranty coverage.

THE COMPUTER COMMAND CONTROL SYSTEM OR THE CLOSED LOOP EMISSION SYSTEM

Your LLV has both the Computer Command Control system and the Closed Loop Emission system.

The Computer Command Control system and the Closed Loop Emission system monitor the exhaust stream with an oxygen sensor. The sensor provides information to the electronic control module which adjusts air-fuel ratio as needed. It is very important that you use only unleaded gasoline in the LLV. Leaded gasoline will damage the oxygen sensor, and may affect emission control.

"CHECK ENGINE" LIGHT

Vehicles with the Computer Command Control and Closed Loop Emission systems have an instrument panel mounted "CHECK ENGINE" light designed to indicate the need for system service. The light will come on during engine starting to let you know that the bulb is working. (The light will stay on for a short time after the engine starts.) Have the system repaired if the "CHECK ENGINE" light does not come on during engine starting.

If the light comes on, either intermittently or continuously while driving, service to the Computer Command Control system or the Closed Loop Emission system is required. Although in most cases the vehicle is drivable, and does not require towing, report to your supervisor as soon as possible for service of the system.

Continued driving without having the Computer Command Control system or the Closed Loop Emission system serviced could cause damage to the emission control system. It could also affect fuel economy and drivability. See also "Computer Command Control System" or "Closed Loop Emission System."

AIR CLEANER - FLAME ARRESTOR

CAUTION: The air cleaner also functions as a flame arrester in the event of engine backfire. The air cleaner should be installed at all times unless its removal is necessary for repair or maintenance. To help reduce the risk of

personal injury and/or property damage, be sure that no one is near the engine compartment before starting the engine with the air cleaner removed. If engine backfire occurs with the air cleaner removed, there could be a burst of flame and possibly other fire in the engine compartment.

Also take care not to let objects fall into the engine if the air cleaner is removed. If the engine is running, suction can pull loose objects into the engine. Objects pulled or dropped into the engine can cause costly engine damage.

When replacement of the air cleaner filter element is necessary, an AC air filter element is recommended.

See your Maintenance Schedule for change intervals. Operation of vehicle in dusty areas will necessitate more frequent replacement.

ENGINE OIL AND FILTER RECOMMENDATIONS

The following engine oil recommendations are based upon the operation of your engine with the fuels recommended under "Fuel Requirements."

Checking Oil Level

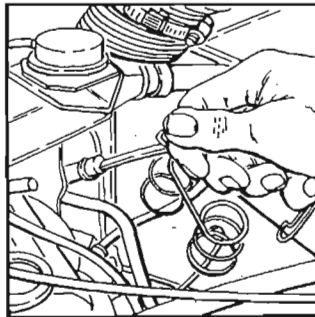
The engine oil must be kept at the right level to help assure proper lubrication of the vehicle's engine. It is normal for an engine to use some oil, and some engines may use more oil when they are new. It is the operator's responsibility to check the oil level at regular intervals (such as every fuel stop), according to the following instructions:

- The best time to check the engine oil level is when the oil is warm, such as during a fuel stop. After stopping the engine, wait a few minutes for the oil to drain back to the oil pan. Then, pull out the dipstick located on the left hand (passenger's) side of the engine. Wipe it clean, and push the dipstick back down all the way. Now,

pull out the dipstick and look at the oil level on it.

Add oil, if needed, to keep the oil level above the "ADD" line. Avoid overfilling the engine since this may cause engine damage. Push the dipstick back down all the way after taking the reading.

- If you check the oil level when the oil is cold, do not run the engine first. The cold oil will not drain back to the pan fast enough to give a true oil level.



5.4 SERVICE/MAINTENANCE

Choosing the Right Quality Oil

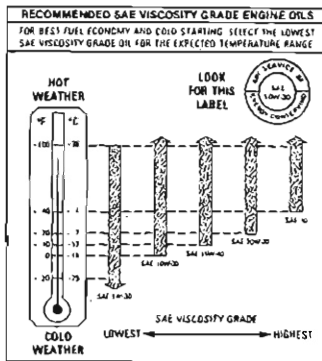
Engine oils are labeled on the containers with various API (American Petroleum Institute) designations of quality. Be sure the oil you use has the API designation "SF," either alone or shown with other designations such as SF/CC or SF/CD. These designations may be separated by commas, slashes or dashes. Oils which are not labeled "SF" should not be used. For example, do not use oils labeled ONLY SA, SB, SC, SD, SE, CA, CB, CC, or CD; or oils with a combination of any of these letters — such as "SE/CD" as this may cause engine damage.

Choosing Oil Viscosity

Engine oil viscosity (thickness) has an effect on fuel economy and cold-weather operation (starting and oil flow). Lower viscosity engine oils can provide better fuel economy and cold-weather performance; however, higher temperature weather conditions require higher viscosity engine oils for satisfactory lubrication. Using oils of any viscosity other than those vis-

cosities recommended could result in engine damage.

When choosing an oil, consider the range of temperature the vehicle will be operated in before the next oil change. Then, select the recommended oil viscosity from the following chart. If outside temperatures are not expected to exceed 38°C (100°F) prior to the next oil change, SF-quality, SAE 10W-30, Energy-Conserving engine oil is the preferred viscosity grade.



Energy Conserving Oils

It is recommended that you select an oil not only of the proper quality and viscosity, but also a fuel-saving product. These oils can be found in dealer-service departments, service stations and other retail stores. They are identified by words such as: "Energy Conserving," "Energy Saving," "Conserves Gasoline," "Gas Saving," "Gasoline Saving," "Friction Reducing," "Improved Gasoline Mileage," "Improved Fuel Economy" or "Fuel Saving."



Oil Identification Logo

Starting in 1983, a logo (symbol) was added to some oil containers to help you select the oil you should use. The top portion of the logo shows the oil

quality by API designations such as SF, SF/CC, or others. The center portion of the logo will probably show the SAE viscosity grade, such as SAE 10W-30. "Energy Conserving," shown in the lower portion, indicates that the oil has fuel-saving capabilities.

Change Intervals

The oil and oil filter change intervals for the engine are based on the use of the recommended oil quality and viscosity, as well as high-quality filters such as AC oil filters. **Using oil other than recommended, or oil and filter change intervals longer than recommended could reduce engine life.** Damage to engines due to improper maintenance or use of incorrect oil quality and/or viscosity is not covered by the new vehicle warranties.

The engine was filled with a high-quality engine oil when it was built. You do not have to change this oil before the first recommended change interval.

Oil and filter change intervals depend upon how you use the vehicle. The following should assist in determining the proper oil and filter change intervals:

TYPE OF USE	CHANGE INTERVAL
<ul style="list-style-type: none"> • Operating in dusty areas. • Idling for extended periods and/or low speed operation. 	<ul style="list-style-type: none"> • Change engine oil and filter every 3,000 miles (5,000 kilometers) or 3 months, whichever comes first.
<ul style="list-style-type: none"> • When none of the above conditions apply, and as a general rule the vehicle is driven daily for <ul style="list-style-type: none"> — a minimum of 15 miles (25 kilometers) or more — or continuously for 30 minutes or more. 	<ul style="list-style-type: none"> • Change engine oil every 7,500 miles (12,500 km) or 12 months, whichever comes first. Change engine oil filter at first oil change, then every other oil change if mileage determines when you change oil. If time determines change intervals, change the filter with each oil change.

5.6 SERVICE/MAINTENANCE

Engine Oil Additives

Engine oils contain a variety of additives. The engine should not need any extra additives if you use the recommended oil quality and change intervals. However, if you think your engine has an oil-related problem, a supplemental additive ("GM Engine Oil Supplement") is available that may solve the problem. Supplemental engine oil additives should be used only for remedial purposes and not on a regular basis.

Used Oil Disposal

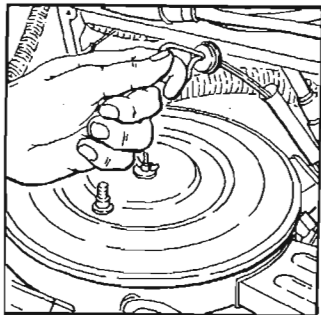
Do not dispose of used engine oil (or any other oil) in a careless manner such as pouring it on the ground, into sewers, or into streams or bodies of water. Instead, recycle it by taking it to a used oil collection facility which may be found in your area.

AUTOMATIC TRANSMISSION FLUID RECOMMENDATIONS

Proper Fluid

Use only automatic transmission fluid labeled DEXTRON® II. You can buy

this fluid from your dealer or other service outlets.



Checking Fluid Level

Check the automatic transmission fluid level at each engine oil change. Driving with too much or too little fluid can damage the transmission.

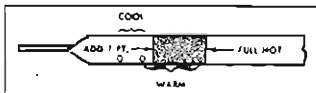
To check the fluid level, first set the parking brake, then start the engine in "P" (Park), and let idle for two minutes. You must check the fluid level with the engine running at slow idle and the vehicle level.

You cannot read the correct fluid level if you have just driven the vehicle for a long time at high speed, in city traffic in hot weather, or if the vehicle has been pulling a trailer. Wait until the fluid cools down (about 30 minutes).

Remove the dipstick located at the rear of the engine compartment on the driver's side. Carefully touch the wet end of the dipstick to find out if the fluid is cool, warm or hot. Wipe it clean and push it back in until the cap seats. Pull out the dipstick and read the fluid level.

- If it felt cool (about room temperature), the level should be 3 to 10 millimeters (1/8 to 3/8 inch) below the "ADD" mark. The dipstick has two dimples below the "ADD" mark to show this range.

- If it felt warm, the level should be close to the "ADD" mark (either above or below).
- If it was too hot to hold, the level should be at the "FULL" mark.



Add just enough DEXRON® II fluid to fill the transmission to the proper level. It takes only 0.5 liter (one pint) to raise the level from "ADD" to "FULL" with a hot transmission.

Automatic Transmission Drain Intervals

Change the transmission fluid and change the filter (or clean the screen) as outlined in the Maintenance Schedule.

ENGINE COOLING SYSTEM

CAUTION: If the cooling system overheats, see "Engine Cooling System

Overheating." CONTINUED OPERATION OF THE ENGINE EVEN FOR A SHORT TIME MAY RESULT IN A FIRE AND THE POSSIBILITY OF PERSONAL INJURY AND/OR SEVERE VEHICLE DAMAGE.

The vehicle has a coolant recovery system. Coolant in the system expands with heat and overflows into the recovery tank. When the system cools, coolant is drawn back into the radiator.

The cooling system was filled at the factory with a quality coolant that meets GM Specifications. It is important to use proper coolant to prevent damage to cooling system components. Coolants meeting GM Specification 1825-M or those specially formulated for aluminum component protection should be used. The cooling system is designed to use coolant (a mixture of ethylene glycol, corrosion inhibitors and water) rather than plain water. The coolant solution must be used year round to provide:

- freezing protection down to -34°F .

- boiling protection up to 125°C (258°F).
- protection against rust and corrosion in the cooling system,
- the proper engine temperature for efficient operation and emission control, and
- proper operation of the coolant temperature light or gage.

See the Maintenance Schedule to find out when the coolant must be replaced. Note that changing the coolant is needed to replenish the rust and corrosion inhibitors to make certain that all parts of the cooling system work well.

Cooling System Care

Check the cooling system at regular intervals, such as during fuel stops. You usually do not need to remove the radiator cap to check the coolant level. Lift the engine hood and look at the "see-through" coolant recovery tank. When the engine is cold the coolant level

5.8 SERVICE/MAINTENANCE

should be above the "Add" mark on the recovery tank. When the engine has fully warmed up, the level should be at or slightly above the "Full Hot" mark on the recovery tank.

If the coolant level is low, remove the cap on the coolant recovery tank. Add to the recovery tank enough of a 50/50 mixture of water and a good quality ethylene glycol antifreeze (meeting GM Specification 1825-M) to bring the level up to the proper mark. Put the cap back on the recovery tank.

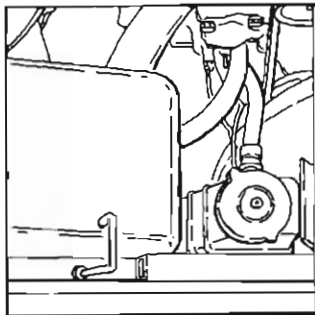
CAUTION: Under some conditions the ethylene glycol in engine coolant is combustible. To help avoid being burned when adding coolant, DO NOT spill it on the exhaust system or engine parts that may be hot. If there is any question, have this service performed by a qualified technician.

Certain conditions, such as air trapped in the system, may affect the coolant level in the radiator. You should check the coolant level in the radiator at the time you change the engine oil and when the engine is cold. Follow the

steps under "Adding Coolant" for the correct way to remove the radiator cap and add coolant.

If you have to add coolant more than four times a year (either to the recovery tank or to the radiator), or if coolant is dirty or discolored, have a technician perform a cooling system check.

NOTICE: If you use the proper quality antifreeze, there is no need to add extra inhibitors or additives which claim to improve the system. They may be harmful to the proper operation of the system.



CAUTION: To help avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if the cap is taken off too soon.

1. When the engine is cool, remove the radiator cap.
 - Turn the cap slowly to the left until it reaches a "stop." Do not press down while turning the cap.
 - Wait until any remaining pressure (indicated by a hissing sound) is relieved, then press down on the cap and continue turning it to the left.
2. Add enough water and ethylene glycol antifreeze (meeting GM Specification 1825-M) to provide the required cooling, freezing and corrosion protection. Use a solution that is at least 44 percent antifreeze but no more than 70 percent antifreeze. Fill the radiator to the base of

the filler neck and fill the coolant recovery tank to at or above the "Full Hot" mark. Put the recovery tank cap back on.

- Run the engine, with the radiator cap removed, until the upper radiator hose is hot. With the engine idling, add coolant to the radiator until it reaches the bottom of the filler neck. Install the radiator cap, making sure the arrows on the cap line up with the overflow tube on the radiator filler neck.

It is the operator's responsibility to:

- Maintain cooling system freeze protection at -37°C (-34°F) to ensure protection against corrosion and loss of coolant from boiling. (A 50/50 mixture of water and ethylene glycol antifreeze will provide freeze protection to -37°C (-34°F). You should do this even if you don't expect freezing temperatures. Periodic replacement of coolant is needed to replace the anti-corrosion additives that wear

out with use. Coolant that has become dark in color shows that it needs to be changed for this reason.

- Use only ethylene glycol base antifreeze that meets GM Specification 1825-M.

NOTICE: Do not use methanol-based antifreeze, or alcohol, or plain water alone, in the vehicle at any time. They will boil at a lower point than that at which the "TEMP" light (or temperature gage) will warn of overheating, and they do not provide proper protection against corrosion.

Thermostat

The engine coolant temperature is controlled by a thermostat. It stops coolant flow through the radiator until a preset temperature is reached. This thermostat is installed in the engine coolant outlet on the engine block. The same thermostat is used in both winter and summer. When a replacement is needed, GM AC-Delco parts are recommended.

Radiator Pressure Cap

The radiator cap, a 105 kPa (15 psi) pressure type, must be installed tightly, otherwise coolant may be lost and damage to engine may result from overheating. Radiator pressure cap should be checked periodically for proper operation. If replacement is required, an AC cap is recommended.

REAR AXLE

Add lubricant, if needed, to fill to the level of the filler plug hole on the driver's side of the differential case. Use SAE 80W GL-5 or SAE 80W-90 GL-5 gear lubricant. You can also use special gear lubricant GM Part No. 9985290

Accelerator Linkage

Lubricate all pivot points with engine oil at the interval shown in the Maintenance Schedule. **Do not lubricate the accelerator cable.**

Hood Latches and Hood Hinge

See the Maintenance Schedule to find out how to lubricate hood latch and hood hinge assembly.

5.10 SERVICE/MAINTENANCE

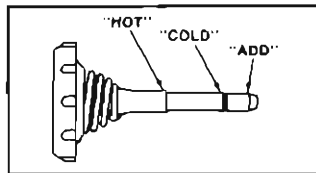
Brake Master Cylinder

Check master cylinder fluid level in the reservoir at the interval shown in the Maintenance Schedule. If the fluid is low in the reservoir, it should be filled to a point about $\frac{1}{4}$ " (6mm) below the top edge of the reservoir with DOT-5 silicon fluid. **BE SURE TO USE ONLY DOT-5 BRAKE FLUID.**

POWER STEERING SYSTEM



Check the fluid level in the optional power steering pump as recommended in the Maintenance Schedule. Add GM Power Steering Fluid (GM Part Number 1050017 or equivalent) as needed:



- If the fluid is warmed up (about 66°C or 150°F -- hot to the touch), the fluid level should be between the "HOT" and "COLD" marks on the filter cap indicator.
- If cool (about 21°C or 70°F), the fluid level should be between the "ADD" and "COLD" marks.

This fluid does not need periodic changing.

Front Suspension and Steering Linkage

Lubricate fittings at the interval shown in the Maintenance Schedule with water resistant EP Chassis Lubricant which meets GM Specification 6031M.

NOTICE: Ball joints should not be lubricated unless their temperature is -12°C (10°F), or higher. During cold weather, they should be allowed to warm up as necessary before being lubricated or damage to the ball joint could occur.

FREEDOM BATTERY

Work Near Battery

CAUTION: Follow the precautions listed in the "Jump Starting" Caution (see the "In Case of Emergency" section of this manual) when working on or near the battery. Personal injury (particularly to eyes) or property damage may result from battery explosion, battery acid, or electrical (short circuit) burns.

The vehicle has a Delco FREEDOM battery. It needs no periodic maintenance. Its top is permanently sealed (except for two small vent holes) and has no filler caps. You will never have to add water.

The hydrometer (test indicator) in the top of the battery provides information for testing purposes only.

If the vehicle is not going to be driven for 30 days or longer, disconnect the cable from the "-" (black) negative terminal of the battery to prevent discharge.

For full power needs at replacement time, a Delco battery with the same catalog number as shown on the original battery's label is recommended.

Front Wheel Bearings

Clean and repack front wheel bearing at the intervals shown in the Maintenance Schedule. Due to the weight of the tire and wheel assembly it is recommended that they be removed from hub before lubricating bearings to prevent

damage to oil seal. Then remove the front wheel hub to lubricate the bearings. Use wheel bearing lubricant GM Part Number 1051344 or equivalent.

NOTICE: "Long fiber" or "viscous" type lubricant should not be used. Do not mix wheel bearing lubricants. Be sure to thoroughly clean bearings and hubs of all old lubricant before repacking.

Tapered roller bearings used in this vehicle have a slightly loose feel when properly adjusted. They must never be over tightened (preloaded) or severe bearing damage may result. Consult your service manual for proper detailed adjustment procedures and specifications.

Body Lubrication

Normal use of a vehicle causes metal-to-metal movement at certain points in the cab or body. Noise, wear and improper operation at these points will result when a protective film of lubricant is not provided.

For exposed surfaces, such as door checks, door lock bolts, lock striker plates, dovetail bumper wedges, etc., apply a thin film of light engine oil.

Propeller Shaft Slip Joints

Propeller shaft slip joints should be lubricated at the interval shown in the Maintenance Schedule, with water resistant EP Chassis lubricant which meets General Motors Specification GM 6031M.

TIRES

CAUTION: To reduce the risk of loss of vehicle control and personal injury:

- Tires must be properly inflated, and the vehicle **MUST NOT BE** overloaded (see the information on "Inflation Pressure" in this section and "Important Information On Vehicle Loading.")
- The vehicle **MUST NOT BE** operated at speeds in excess of 55 mph (88 km/h).

5.12 SERVICE/MAINTENANCE

For more safety information, see the rest of this "Tires" section.

The tires installed on the vehicle are engineered to provide a proper balance of performance characteristics for normal vehicle operation. The size of the tires equipped on the vehicle are shown on the Certification Label.

This section has some tips on how you can get the most benefit from these tires.

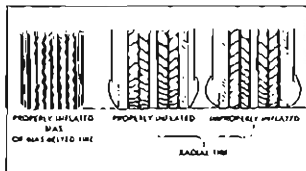
Inflation Pressure

Incorrect tire inflation pressures can have adverse effects on tire life and vehicle performance. Air pressure that is too low causes increased tire flexing and heat buildup. This weakens the tire and increases the chance of damage or failure and can result in tire overloading, abnormal tire wear, adverse vehicle handling, and reduced fuel economy. Air pressure that is too high can result in abnormal wear, harsh ride, and can increase the chance of damage from road hazards.

Check tire inflation pressures at least monthly and whenever the vehicle is serviced (including the spare, if so equipped). When possible, check tire inflation pressures when tires are "cold."

- The "cold" tire inflation pressure is the tire pressure when a vehicle has not been driven more than one mile (1.6 kilometers) after sitting for three hours or more. This is the most accurate reading.
- It is normal for tire pressures to increase 30 to 60 kilopascals (4 to 8 pounds per square inch) or more when the tires become hot from driving. If you must set inflation pressures when the tires are not "cold", add 28 kilopascals (4 pounds per square inch) to the cold inflation pressures recommended for the load you are carrying.
- Always use a tire pressure gage when checking inflation pressures. We suggest you purchase a quality pocket-type tire pressure gage to

check inflation pressures. Simply looking at the tires to check inflation pressures is not enough, especially with radial tires. Underinflated radial tires may look like correctly inflated radial tires.



- The inflation pressure shown on page 5.13 should be used for all speeds up to 55 mph (88 km/hr). Also maximum axle loads must not exceed either the values shown for your tire size or the Gross Axle Weight Rating (GAWR) on the Certification Label, whichever is less. If the load shown exceeds the axle rating (see Certification Label) for your vehicle, use the axle rating as the load limit.

Tire Size	LT195/75R14
Maximum Axle Load* kg (Lbs.)	1108 (2444)
Inflation Pressure kPA (psi)	343 (50)

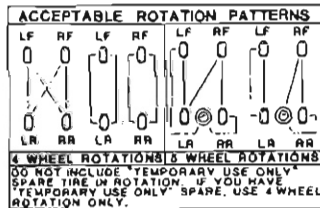
- Maximum axle load must not exceed either the value shown for your tire size on this chart, or the gross axle weight rating (GAWR) on the certification label, whichever is less.
- Be sure to put the tire inflation valve caps or extensions back on, if so equipped. This will help keep dirt and moisture from getting into the valve core which could cause a leak.
- If an air loss occurs while driving, do not drive on the flat tire more than is needed to stop safely. Driving even a short distance on a flat tire can damage a tire and wheel beyond repair.

Inspection and Rotation

Front and rear tires perform different jobs and can wear differently depending on the types of roads driven, your

driving habits, etc. For longer tire life, you should inspect and rotate your tires as recommended in the Maintenance Schedule. If the vehicle has tires with different load ratings between the front and the rear, the tires should not be rotated front to rear. Vehicle handling could be adversely affected and the tires having the lower load rating could be overloaded. (See "Important Information on Vehicle Loading.")

For longer tire life, any time uneven wear is seen, have the tires checked and rotated and the cause of the uneven wear corrected. After rotation, adjust the front and rear tire pressures and be sure to check wheel nut tightness. See "In Case of Emergency," for further information.



CAUTION: Whenever a wheel is changed, always remove any corrosion that may be present on the inside of wheel and wheel mounting surface on vehicle.

Installing wheels without good metal-to-metal contact at the mounting surfaces can cause the wheel nuts to loosen, which can later allow a wheel to come off while the vehicle is moving, possibly causing loss of control.

Alignment And Balance

Proper wheel alignment improves tire tread life. The vehicle's suspension parts should be inspected often and aligned when needed. (See the Maintenance Schedule for more information.) Ball joints have built-in wear indicators and some movement in the joints is normal. Improper alignment will not cause the vehicle to vibrate. However, improper toe alignment will cause the front tires to roll at an angle which will result in faster tire wear. Incorrect caster or camber alignment will cause the front tires to wear unevenly and can cause the vehicle to "pull" to the left or right.

5.14 SERVICE/MAINTENANCE

Proper tire balancing provides the best riding comfort and helps reduce tire tread wear. Out-of-balance tires can cause annoying vibration and uneven tire wear such as cupping and flat spots.

Traction

Driving, cornering, and braking traction are reduced when water, snow, ice, gravel, or other materials is on the road. Adjust driving practices and vehicle speed to the road conditions.

When driving on wet or slushy roads, a wedge of water can build up between the tire and the road. This is known as hydroplaning and may cause partial or complete loss of traction, vehicle control, and stopping ability. To reduce the chance of traction loss, follow these tips:

- Slow down during rainstorms or when roads are slushy.
- Slow down if the road has standing water or puddles.

- Replace the tires when the tread wear indicators are showing.
- Keep the tires properly inflated.

The vehicle has TPC all season radial tires (see "Tire Replacement" in this section), the tires were designed to provide better snow traction. In fact, these tires should be adequate for driving in most winter conditions. However, if you do feel you need to buy conventional snow tires, be sure they are the same size, load range, and construction type (bias, bias-belted, or radial) as the other tires.

Tire Chains or Similar Traction Devices

If you use tire chains, make sure the side chain fasteners are not wider than the side chain links; otherwise, the chains may contact and possibly damage the vehicle.

Use of chains may adversely affect the vehicle's handling. When using chains adjust speed to road conditions, avoid sharp turns and avoid lock-wheel braking.

In addition, to prevent chain damage to the vehicle:

- Install the chains as tightly as possible, and tighten them again after driving 1/4 to 1/2 mile (0.4 to 0.8 kilometer).
- Do not exceed 20 mph (32.2 km/h), or the chain manufacturer's speed limitation, if lower.
- Drive in a restrained manner and avoid large bumps, potholes, severe turns and other maneuvers which could cause the tires to bounce up and down.
- Follow any additional instructions of the chain manufacturer.

Tire Replacement

CAUTION: Do not mix different tire construction types (such as radial, bias, and bias-belted tire) on the vehicle except in emergencies, because vehicle handling could be affected and may result in loss of control.

Some light truck-type and most passenger-car-type radial tires have a TPC Spec. No. (Tire Performance Criteria Specification Number) molded into the tire sidewall near the tire size marking. This shows that the tire meets rigid size and performance standards which were developed for the vehicle. The TPC Spec. No. assures a proper combination of endurance, load capacity, handling, and traction on wet, dry and snow covered surfaces. When you replace the tires with tires having the same TPC Spec. No., the new tires will be compatible with the vehicle. If you intend to replace the tires with an all season tread design, make sure the TPC Spec. Number has a "MS" (Mud and Snow) following the number.

When replacing tires with those not having a TPC Spec. No., you should

use the same size, load range, and construction type (bias, bias-belted, or radial) as the original tires on the vehicle.

Use of any other size or type tire may affect such things as load carrying capacity, ride, handling, speedometer/odometer calibration, vehicle ground clearance, and tire clearance to the body and chassis. If replacing only a single tire, the new tire should be used on the same axle with the least worn tire.

Uniform Tire Quality Grading

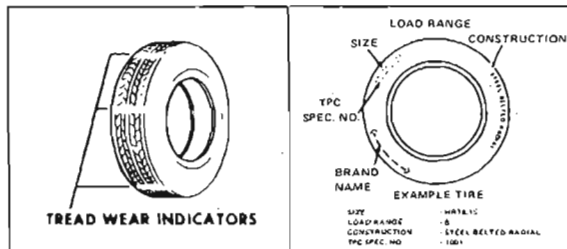
The following information relates to the system developed by the National Highway Traffic Safety Administration which grades tires by traction and temperature performance.

Traction - A, B, C

The traction grades, from highest to lowest are: A, B, and C, and they represent the tire's ability to stop on wet pavement as measured under controlled conditions on specified government test surfaces of asphalt and concrete. A tire marked C may have poor traction performance.

WARNING

The traction grade assigned to this tire is based on braking (straight-ahead) traction tests and does not include cornering (turning) traction.



5.16 SERVICE/MAINTENANCE

Temperature – A, B, C

The temperature grades are A (the highest), B, and C, representing the tire's resistance to the generation of heat and its ability to dissipate heat when tested under controlled conditions on a specified indoor laboratory test wheel. Sustained high temperature can cause the material of the tire to degenerate and reduce tire life, and excessive temperature can lead to sudden tire failure. The grade C corresponds to a level of performance which all passenger car tires must meet under the Federal Motor Vehicle Safety Standard No. 109. Grades B and A represent higher levels of performance on the laboratory test wheel than the minimum required by law.

WARNING

The temperature grade for this tire is established for a tire that is properly inflated and not overloaded. Excessive speed, underinflation, or excessive loading, either separately or in combina-

tion, can cause heat buildup and possible tire failure.

These grades are molded on the sidewalls of tires. While the tires available as standard or optional equipment may vary with respect to these grades, all such tires meet performance standards and have been approved for use.

You should replace the tires when:

- They are worn to a point where 1.6 millimeters (2/32 inch) or less tread remains, or the cord or fabric is showing. To help you detect this, the tires have built-in tread wear indicators that appear between the tread grooves when the tread depth is 1.6 millimeters (2/32 inch) or less. When the indicators appear in two or more adjacent grooves at three spots around the tire, the tire should be replaced.
- The tire tread or sidewall is cracked, cut or snagged deep enough to expose the cord or fabric.

- The tire has a bump, bulge or split.
- The tire has a puncture, cut, or other damage that can't be correctly repaired because of the size or location of the damage.

Wheel Replacement

Damaged wheels must be replaced. For example, replace wheels if they are bent, cracked or heavily rusted or if wheel nuts often become loose. Also replace wheels that leak air. See the Caution under "Inspection and Rotation" in this section regarding the importance of obtaining good metal-to-metal contact when replacing or changing wheels.

Do not use bent wheels which have been straightened, and do not use inner tubes in leaking wheels designed for tubeless tires. Such wheels may have structural damage and could fail without warning.

The wheels originally installed on the vehicle will provide optimum life up to the maximum load and inflation pressures shown in the Wheel Code and Limits Chart. Maximum loads, maximum inflation pressures, wheel identification codes, and wheel sizes are stamped on each wheel.

A wheel of the wrong size or type may adversely affect such things as load carrying capacity, wheel and bearing life, brake cooling, speedometer/odometer calibration, stopping ability, headlight aim, bumper height, vehicle ground clearance, and tire or tire chain clearance to the body and chassis. Replacement with used wheels is not advised: they may have been treated harshly or have very high mileage, and they could fail without warning.

The use of wheels and/or tires with higher load-carrying limits than originally equipped on the vehicle does not in itself increase the GAWR or the GVWR of the vehicle.

WHEEL CODE AND LIMITS

Code ¹	TX
Wheel Size	14 x 6
Max. Load kg (lbs)	632 (1393)
Max. Pressure	343 (50)
<u>kPA (psi)</u>	

¹Wheel code is located on the wheel just to the right of valve stem hole.

APPEARANCE CARE

CLEANING PRODUCTS

Any motor vehicle is subjected to abuse from industrial fumes, corrosive road salts, etc. However, a well cared for vehicle can look like new for many years.

Your auto parts dealer carries a variety of car-care products suitable for use on your LLV. Before using any such product, be sure of its correct application.

WARNING

- Cleaning agents may be poisonous. Keep them out of the reach of children.
- Observe all caution labels.
- Always read directions on the container before using any product.
- Some chemical cleaners are concentrates which require dilution.

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- Do not use gasoline, kerosene, naphtha, nail polish remover or other volatile cleaning fluids. They may be toxic, flammable or hazardous in other ways. Use spot removing fluids only in well ventilated areas.
- Do not wash, wax or dry the vehicle with the engine running.
- Do not clean the underside of chassis or fenders, without protecting your hands and arms. You may cut yourself on sharp-edged metal parts.
- Moisture on brakes may affect braking efficiency. Test the brakes after each vehicle wash.

WASHING AND WAXING

The paint on the LLV is very durable but must be protected from losing its luster due to outside influences. Therefore, wash and wax your vehicle often. The longer the dirt is left on the paint the

greater the risk of damaging the glossy finish, either by scratching if the dirt is rubbed into the paint, or simply by the chemical effect dirt particles have on painted surfaces. Do not wash or wax in direct sunlight. Do not use hot water. Lukewarm to cool water is kinder to the paint.

Use plenty of water, a car-wash and wax solution, and a soft sponge or hose brush. Begin by spraying water over the dry surface to remove all loose dirt before applying the car-wash and wax solution. Use plenty of water to rinse the vehicle off. Wipe everything dry with a chamois to avoid water spots.

To guard against corrosion from inside out, inspect all weatherstrips to make sure they do not allow water to enter between body panels.

Do not aim the water jet directly at doors. Tape key holes to prevent water from seeping into lock cylinders. Water in lock cylinders should be removed with compressed air. To prevent locks

from freezing in the winter, squirt glycerine or lock deicer into lock cylinders. Do not use any solution that can damage the body paint.

The underside of the vehicle picks up dirt and road salts used to keep streets and highways free of snow and ice. To guard against corrosion, it is important to remove mud, debris and road salt from the underside with a powerful jet of water. Be sure to include the wheel housings, bumpers, muffler, tailpipe and brackets. This should be done twice a year and is best accomplished after the vehicle has been driven through a heavy rain. Let engine and exhaust cool down before washing.

Waxing is not really needed when you have used a car-wash and wax solution. If you do not use a car-wash liquid with wax, apply wax to preserve the natural shine of the body paint. To obtain a long lasting finish, apply hard wax. Wax again when water remains on the surface in large patches instead of forming beads and rolling off.

Use a polish when it becomes evident that waxing no longer accomplishes the job. If the polish you are using does not contain wax, apply hard wax after polishing.

EXTERIOR

Tar or oil

Do not allow tar or oil to remain on the paint. Remove as soon as possible with a cloth soaked with special paint cleaner. If you do not have a tar or oil remover, you may substitute with turpentine. After applying a cleaning fluid, always wash with lukewarm soap/water solution and apply a new wax coat.

Insects

Remove as soon as possible with a lukewarm soap/water solution or insect remover.

Tree sap

Do not allow tree sap or bird droppings to harden on the paint. Remove with a lukewarm soap/water solution.

Touch-up

Scratches and chips should be touched up. The affected surface must be smoothed with sand paper and covered with a primer, before restoring the painted finish.

Windows

Keep silicone sprays off the windshield to avoid wiper smear in rain.

Clean all windows regularly to remove road film and car-wash wax buildup. Use a lukewarm soap/water solution or an alcohol base commercial window cleaning agent. If a chamois is used for polishing the glass, it should exclusively be used for that purpose.

To assure that windshield washers function at freezing temperatures, anti-freeze must be added to the washer fluid reservoir beforehand. It is advisable to use window washer solvent with anti-freeze all year round. Follow directions for the right amounts to be used.

Do not use engine coolant anti-freeze or any other solution that can damage the paint.

Wiper blades

Always loosen frozen wiper blades from glass as they may tear otherwise. Remove all wiper blades periodically and clean them thoroughly with an alcohol base cleaning solution. Use a sponge or soft cloth and wipe lengthwise.

Weatherstrips

To seal properly, weatherstrips around windows and doors must be pliable. Spray with silicon or coat with talcum powder or glycerine to maintain flexibility of the rubber, and to protect against freezing in the winter.

Dull finishes and plastics

Plastic parts, such as light bulb lenses, will come clean with regular washing. Should additional cleaning or spot removal be necessary, use a soft brush or cloth soaked with a mild detergent solution. Then rinse thoroughly and imme-

5.20 SERVICE/MAINTENANCE

diately with clear water. Do not use anything which could mar the plastic or dull finished surface, such as polish, abrasive detergents or chemical cleaning solvent.

Bright metal trim

Bright trim will come clean with regular washing. To protect metal trim, use car wax. Remove spots and dirt from chrome with a chrome cleaner. Apply a chrome polish for continued luster and protection.

INTERIOR

Glass

Use the same cleaning agents as for exterior.

Fabric

Use a vacuum cleaner or a soft bristle brush to remove dust and loose dirt from upholstery. Dirt stains can usually be removed with a lukewarm soap/water or all purpose cleaner solution, or a dry foam cleaner. For greasy, oily and

other stubborn stains, use a spot remove. Do not pour the liquid on the fabric. Dampen a clean cloth and rub carefully, starting at the edge and working inward.

Seat belts

Keep belts clean. Very dirty belts may not retract properly. Do not remove belts from the vehicle to be cleaned. Do not use chemical cleaning agents, bleach or dyes. They contain corrosive properties which will weaken the webbing. Do not allow inertia reel safety belts to retract before they are completely dry.

For cleaning, use a mild soap/water solution. Let belts dry out thoroughly and away from direct sunlight.

Plastic and vinyl

Use a clean, damp cloth or sponge to keep free from dust. For other soilage, use a lukewarm all purpose cleaning solution or a mild saddle soap for vinyl. Remove water spots and soap traces

with a clean, damp cloth or sponge. Use a clean, soft cloth to rub dry.

Grease, tar or oil stains can be removed with a clean cloth or sponge soaked with all purpose cleaner, or with a solvent-type vinyl cleaning agent.

Occasionally apply a colorless vinyl or preservative such as Armor-All or equivalent to retain the material's luster and pliability.

CORROSION PROTECTION

WARNING

Do not apply undercoating or rust-proofing on or near the exhaust manifold, exhaust pipes or heat shields. During driving, the substance used for undercoating could catch fire.

Chassis

The lower body shell of the LLV is thoroughly protected against corrosion. However, it is recommended to

have the underside inspected twice a year. Any detected damage to the undercoating, due to road hazards, should be repaired promptly. Oil based protective sprays must not be applied. Only tar or wax based anti-corrosion protectors are compatible with the factory applied undercoating. Before application, road dirt, salt spray deposits and oil substances must be removed.

Whenever the lower body shell, axle, transmission or engine assemblies have been repaired, the lost anticorrosion coating of the affected surfaces should be renewed by an authorized dealer.

SCHEDULED MAINTENANCE REQUIREMENTS

The following maintenance services are required to be performed at scheduled intervals to extend the life and performance of the vehicle.

Chassis Maintenance

The following program of chassis (especially frame) preventive maintenance is recommended for the LLV in order to insure 24 year performance in areas of the U.S. where corrosion exposure is severe.

1. After delivery and prior to operational exposure of the vehicle, have the frame and chassis treated by a qualified after-market applier of corrosion protection materials. Material used shall, at least, meet the requirements M11L-C-0083933A (MR) AM3. Processing must include:

- all frame components
- fuel tank
- rear axle and brake lines
- rear springs and hangers
- steering linkage
- front springs, upper & lower control arm assemblies
- front & rear stabilizer bar assemblies

NOTE: Chassis components other than the frame are not expected to meet the 24 year life goal. However, it appears economical to apply the protection treatment to these items.

2. Approximately two (2) calendar years from the date of first treatment, present the vehicle to the qualified applicator for chassis/frame cleaning, inspection, and, if necessary, reapplication of the approved corrosion protection material.
3. Approximately five (5) years after the first inspection, present the vehicle to the qualified applicator for chassis/frame cleaning, inspection, and, if necessary, reapplication of the approved corrosion protection material.

Repeat this process, each five (5) years, for the life of the vehicle.

5.22 SERVICE/MAINTENANCE

SECTION A—SCHEDULED MAINTENANCE SERVICES FOR LLV'S WITH LIGHT DUTY EMISSIONS - GASOLINE ENGINES

Item No.	Service	Miles (000)					Maintenance Schedule 1 Maintenance Schedule 2																			
		3	6	7.5	9	12	15	18	21	22.5	24	27	30	33	36	37.5	39	42	45	48	51	52.5	54	57	60	
	Kilometers (000)	5	10	12.5	15	20	25	30	35	37.5	40	45	50	55	60	62.5	65	70	75	80	85	87.5	90	95	100	
1	Engine Oil Change *	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Oil Filter Change *	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2A	Chassis Lubrication	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2B	Clutch Fork Ball Stud												○	●												○
4	Cooling System Service * — Every 24 Months or																									○
5	Air Cleaner Element *																									○
6	Front Wheel Bearing Repack												○	●					○							○
7	Transmission Service - Refer to Section B for Service Interval																									
8A	PCV System Inspection *																									○
9	Fuel Filter Replacement *												○													○
12	Spark Plugs *																									○
13	Spark Plug Wire Inspection *																									○
15	Electronic Vacuum Regulator Valve (EVRV) Inspection *																									○
16	Engine Timing Check *																									○
17	Fuel Tank, Cap and Lines Inspection *																									○
20	Engine Accessory Drive Belts Inspection *																									○
31	Tire Rotation		○	●		○																				○

FOOTNOTES:

- In California, these are the minimum Emission Control Maintenance Services the USFS must perform according to the California Air Resources Board. General Motors, however, urges that all Emission Control Maintenance Services shown be performed. To maintain your other new vehicle warranties, all services shown in this booklet should be performed.
- An Emission Control Service

The maintenance services contained in Maintenance Schedule 1 and 2 are based on the assumption that your vehicle will be used as designed:

- To carry passengers and cargo within the limits shown on the tire certification label located on the edge of the driver's door.
- On reasonable road surfaces within legal driving limits.
- With unleaded fuel.

Engine

- Four stroke gasoline engine.
- Four cylinder, in-line.
- Block cast iron
- Head aluminum
- Bore 4.0 in/101.6 mm
- Stroke 3.0 in/76.2 mm
- Displacement 2.5L/151 in³
2474/cm³
- Compression ratio 9:1
- Maximum output SAE
net 92 hp at 4400 rpm
- Maximum torque SAE
net 134 ft-lb at 2600 rpm

Automatic Transmission

- Hydrodynamic torque converter and planetary gearing with three forward gears and one reverse gear.
- Final drive in separate housing.
- Rear wheel drive, with two constant velocity joints per drive shaft.

Rear wheel suspension

- Solid beam, with leaf springs, direct acting shock absorbers.
- Rear stabilizer bar

Steering

- Power Assist.

Brakes

- Hydraulic power-assisted and pressure-proportioned dual brake circuits with disc brakes at front and drum brakes at rear.
- Parking brake for rear wheels.
- Front rotor 10.5 in/
26.67 cm dia.
- Rear drum 9.5 in/
24.13 cm dia.
2.0 in/5.08 cm wide.

Body/Chassis

- All aluminum unitized body/steel chassis.
- Front and rear ends designed to help absorb impact energy.

Battery

- Type Delco Lead—Acid, maintenance-free, Rating ... 12V,

Capacities

- Fuel tank 13.5 gal/51.9 liters
Reserve (of total
capacity) 1.3 gal/5.0 liters
- Cooling system 12 qt/
11.5 liters
- Engine oil
— with filter change 3.32 qt/
3.14 liters
— without filter change 3 qt/
2.84 liters
- Automatic transmission
fluid
— at change 5.0 qt/4.8 liters
- Windshield washer
container 1.8 qt/1.7 liters

Vehicle weights

Curb.....	3050 lbs/1383.48 kg
Payload.....	1400 lbs/ 635.04 kg
FAWR.....	2014 lbs/ 913.55 kg
RAWR.....	2436 lbs/1104.97 kg
Gross.....	4450 lbs/2018.52 kg

6.2 SPECIFICATIONS

WARNING

Never exceed individual axle weight ratings or gross vehicle weight rating. Always be sure that cargo is secured.

Vehicle dimensions

Wheelbase	100.5 in/255 cm
Length	175.5 in/446 cm
Height	85 in/216 cm
Width	76 in/193 cm
Front track	54.1 in/137 cm
Rear track	63.0 in/160 cm

Cargo Area Dimensions

Length	66 in/168 cm
Width	48 in/122 cm
Height	55.7 in/141 cm

Tires

Type	radial
Size	LT195/75R14
Pressure	50 psi (F&R) 343 kPa (F&R)

Bulbs

Headlight	2B1
Front turn/park	1157
Front side marker	1157
Tail/stop	1157
Rear turn	1156
Back up	1156
Dome	1076
Indicators	194
Hazard	1156
Instrument Panel	1003

REPLACEMENT PARTS

Replacement part numbers listed in this section are based on the latest information available at the time of printing, and are subject to change. If a part listed in this manual is not the same as the part used in your vehicle when it was built, or if you have any questions, please contact your dealer or parts supplier. Use a part that is equivalent to the one being replaced.

SERVICE REPLACEMENT PARTS AND FILTER RECOMMENDATIONS

Item	Model or Part No.
Oil Filter	PF47
Air Filter	A785C
PCV Valve	CV881C
Battery	70-405
Spark Plugs	R43TS6

FUSES-CIRCUIT BREAKERS

Electrical components are protected from short circuits by a combination of fuses, circuit breakers, and fusible thermal links in the wiring. This greatly reduces the hazard of electrically caused fires in the vehicle.

The headlamp wiring is protected by a circuit breaker in the light switch. An electrical overload will cause the lights to go on and off, or in some cases to remain off. If this happens,

have your headlight wiring checked right away.

The windshield wiper motor is protected by a circuit breaker. In addition to a fuse. If the motor overheats, due to overloading caused by heavy snow, etc., the wiper will remain stopped until the motor cools. Be sure to have the cause of overloading corrected.

Fuses are located in the Fuse Panel beneath the I.P. on the driver's side:

Do not use fuses of higher amperage than those recommended.

FUSES AND CIRCUIT BREAKERS

Name	Circuits Protected	Fuse
Inst. Lps.	Instrument Panel Lamps	5 Amp
Ign.	Ignition	20 Amp
Fan	Heater Fan	10 Amp
Heater	Heater	25 Amp
Stop Lps.	Stop Lamps	15 Amp
Cigar	Cigar Lighter	20 Amp
Horn/Lps.	Horn, Dome Lamps	20 Amp
ECM I & B	Electronic Control Module	10 Amp
Tail Lps.	Stop Lamps	20 Amp
Wiper	Windshield Wipers & Washers	25 Amp
Turn B/U	Turn Signal & Back-up Lamps	15 Amp
Hazard	Hazard Warning Lamps	15 Amp
Crank		3 Amp

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