EZGO®

A Textron Company

TECHNICIAN'S REPAIR AND SERVICE MANUAL

GASOLINE POWERED UTILITY VEHICLE

625619

ISSUED JUNE 2012

REVISED AUGUST 2012

SAFETY

For any questions on material contained in this manual, contact an authorized representative for clarification.

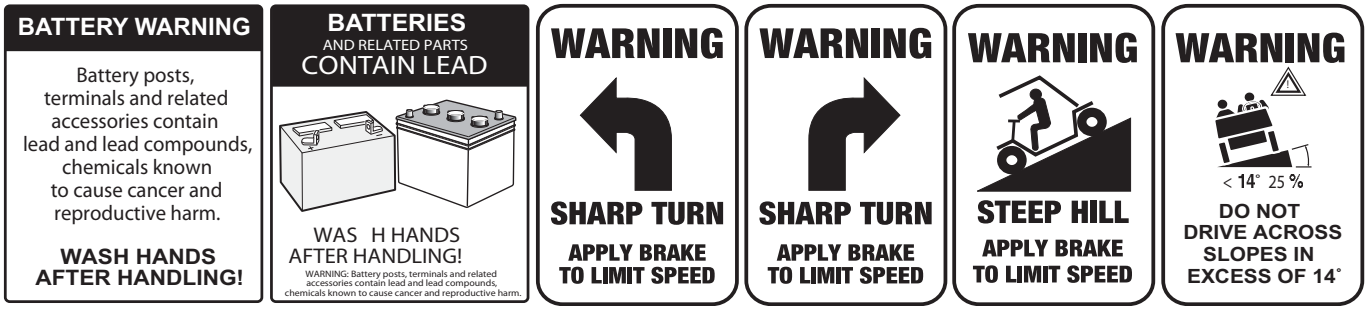
Read and understand all labels located on the vehicle. Always replace any damaged or missing labels.

On steep hills it is possible for vehicles to coast at greater than normal speeds encountered on a flat surface. To prevent loss of vehicle control and possible serious injury, speeds should be limited to no more than the maximum speed on level ground. See GENERAL SPECIFICATIONS. Limit speed by applying the service brake.

Catastrophic damage to the drivetrain components due to excessive speed may result from driving the vehicle above specified speed. Damage caused by excessive speed may cause a loss of vehicle control, is costly, is considered abuse and will not be covered under warranty.

For towing/transporting vehicle, refer to “TRANSPORTING VEHICLE”.

Signs similar to the ones illustrated should be used to warn of situations that could result in an unsafe condition.



Be sure that this manual remains as part of the permanent service record should the vehicle be sold. Throughout this guide **NOTICES, CAUTION** and **WARNING** will be used.

Observe these **NOTICES, CAUTIONS** and **WARNINGS;** be aware that servicing a vehicle requires mechanical skill and a regard for conditions that could be hazardous. Improper service or repair may damage the vehicle or render it unsafe.

NOTICE

*A **NOTICE** indicates a condition that should be observed.*

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Engine exhaust from this product contains chemicals known, in certain quantities, to cause cancer, birth defects, or other reproductive harm.

NOTICE

The exhaust emissions of this vehicles’ engine complies with regulations set forth by the Environmental Protection Agency (EPA) of the United States of America (USA) at time of manufacture. Significant fines could result from modifications or tampering with the engine, fuel, ignition or air intake systems.

⚠ WARNING

Battery posts, terminals and related accessories contain lead and lead compounds. Wash hands after handling.

NOTICE

This spark ignition system meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Ce système d'allumage par étincelle de véhicule respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

(NOTICES, CAUTIONS AND WARNINGS CONTINUED ON INSIDE OF BACK COVER)

SERVICE AND REPAIR MANUAL

GASOLINE POWERED
UTILITY VEHICLE

TERRAIN 1500

STARTING MODEL YEAR 2012

TO CONTACT US

NORTH AMERICA:

TECHNICAL ASSISTANCE & WARRANTY PHONE: 1-800-774-3946, FAX: 1-800-448-8124

SERVICE PARTS PHONE: 1-888-GET-EZGO (1-888-438-3946), FAX: 1-800-752-6175

INTERNATIONAL: PHONE: 001-706-798-4311, FAX: 001-706-771-4609

GENERAL INFORMATION

This vehicle has been designed and manufactured in the United States of America (USA) as a 'World Vehicle'. The Standards and Specifications listed in the following text originate in the USA unless otherwise indicated.

The use of non Original Equipment Manufacturer (OEM) approved parts may void the warranty.

Tampering with or adjusting the governor to permit vehicle to operate at above factory specifications will void the vehicle warranty.

When servicing engines, all adjustments and replacement components must be per original vehicle specifications in order to maintain the United States of America Federal and State emission certification applicable at the time of manufacture.

BATTERY PROLONGED STORAGE

All batteries will self discharge over time. The rate of self discharge varies depending on the ambient temperature and the age and condition of the batteries.

A fully charged battery will not freeze in winter temperatures unless the temperature falls below -75° F (-60° C).

BATTERY DISPOSAL

Lead-acid batteries are recyclable. Return whole scrap batteries to distributor, manufacturer or lead smelter for recycling. For neutralized spills, place residue in acid-resistant containers with absorbent material, sand or earth and dispose of in accordance with local, state and federal regulations for acid and lead compounds. Contact local and/or state environmental officials regarding disposal information.

TABLE OF CONTENTS

NOTES:

SAFETY INFORMATION

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

This manual has been designed to assist in maintaining the vehicle in accordance with procedures developed by the manufacturer. Adherence to these procedures and troubleshooting tips will ensure the best possible service from the product. To reduce the chance of personal injury or property damage, the following must be carefully observed:

⚠ CAUTION

Certain replacement parts can be used independently and/or in combination with other accessories to modify an E-Z-GO-manufactured vehicle to permit the vehicle to operate at or in excess of 20mph. When an E-Z-GO-manufactured vehicle is modified in any way by the Distributor, Dealer or customer to operate at or in excess of 20mph, UNDER FEDERAL LAW the modified product will be a Low Speed Vehicle (LSV) subject to the strictures and requirements of Federal Motor Vehicle Safety Standard 571.500. In these instances, pursuant to Federal law the Distributor or Dealer MUST equip the product with headlights, rear lights, turn signals, seat belts, top, horn and all other modifications for LSV's mandated in FMVSS 571.500, and affix a Vehicle Identification Number to the product in accordance with the requirements of FMVSS 571.565. Pursuant to FMVSS 571.500, and in accordance with the State laws applicable in the places of sale and use of the product, the Distributor, Dealer or customer modifying the vehicle also will be the Final Vehicle Manufacturer for the LSV, and required to title or register the vehicle as mandated by State law.

E-Z-GO will NOT approve Distributor, Dealer or customer modifications converting E-Z-GO products into LSV's.

The Company, in addition, recommends that all E-Z-GO products sold as personal transportation vehicles BE OPERATED ONLY BY PERSONS WITH VALID DRIVERS LICENSES, AND IN ACCORDANCE WITH APPLICABLE STATE REQUIREMENTS. This restriction is important to the SAFE USE AND OPERATION of the product. On behalf of E-Z-GO, I am directing that E-Z-GO Branch personnel, Distributors and Dealers advise all customers to adhere to this SAFETY RESTRICTION, in connection with the use of all products, new and used, the Distributor or Dealer has reason to believe may be operated in personal transportation applications.

Information on FMVSS 571.500 can be obtained at Title 49 of the Code of Federal Regulations, section 571.500, or through the Internet at the website for the U.S. Department of Transportation - at Dockets and Regulation, then to Title 49 of the Code of Federal Regulations (Transportation).

GENERAL

Many vehicles are used for a variety of tasks beyond the original intended use of the vehicle; therefore, it is impossible to anticipate and warn against every possible combination of circumstances that may occur. No warnings can take the place of good common sense and prudent driving practices.

Good common sense and prudent driving practices do more to prevent accidents and injury than all of the warnings and instructions combined. The manufacturer strongly suggests that all users and maintenance personnel read this entire manual paying particular attention to the CAUTIONS and WARNINGS contained therein.

If you have any questions regarding this vehicle, contact your closest representative or write to the address on the back cover of this publication, Attention: Product Service Department.

The manufacturer reserves the right to make design changes without obligation to make these changes on units previously sold and the information contained in this manual is subject to change without notice.

The manufacturer is not liable for errors in this manual or for incidental or consequential damages that result from the use of the material in this manual.

This vehicle conforms to the current applicable standard(s) for safety and performance requirements.

These vehicles are designed and manufactured for off-road use. They do not conform to Federal Motor Vehicle Safety Standards of the United States of America (USA) and are not equipped for operation on public streets. Some communities may permit these vehicles to be operated on their streets on a limited basis and in accordance with local ordinances.

Refer to GENERAL SPECIFICATIONS for vehicle seating capacity.

SAFETY INFORMATION

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Never modify the vehicle in any way that will alter the weight distribution of the vehicle, decrease its stability or increase the speed beyond the factory specification. Such modifications can cause serious personal injury or death. Modifications that increase the speed and/or weight of the vehicle will extend the stopping distance and may reduce the stability of the vehicle. Do not make any such modifications or changes. The manufacturer prohibits and disclaims responsibility for any such modifications or any other alteration which would adversely affect the safety of the vehicle.

Vehicles that are capable of higher speeds must limit their speed to no more than the speed of other vehicles when used in a golf course environment. Additionally, speed should be further moderated by the environmental conditions, terrain and common sense.

GENERAL OPERATION

Always:

- Use the vehicle in a responsible manner and maintain the vehicle in safe operating condition.
- Read and observe all warnings and operation instruction labels affixed to the vehicle.
- Follow all safety rules established in the area where the vehicle is being operated.
- Reduce speed to compensate for poor terrain or conditions.
- Apply service brake to control speed on steep grades.
- Maintain adequate distance between vehicles.
- Reduce speed in wet areas.
- Use extreme caution when approaching sharp or blind turns.
- Use extreme caution when driving over loose terrain.
- Use extreme caution in areas where pedestrians are present.

MAINTENANCE

Always:

- Maintain the vehicle in accordance with the manufacturer's periodic service schedule.
- Ensure that repairs are performed by those that are trained and qualified to do so.
- Follow the manufacturer's maintenance procedures for the vehicle. Be sure to disable the vehicle before performing any maintenance. Disabling includes removing the key from the key switch and removal of a battery wire.
- Insuate any tools used within the battery area in order to prevent sparks or battery explosion caused by shorting the battery terminals or associated wiring. Remove the battery or cover exposed terminals with an insulating material.
- Use specified replacement parts. Never use replacement parts of lesser quality.
- Use recommended tools.
- Determine that tools and procedures not specifically recommended by the manufacturer will not compromise the safety of personnel nor jeopardize the safe operation of the vehicle.
- Support the vehicle using wheel chocks and jack stands. Never get under a vehicle that is supported by a jack. Lift the vehicle in accordance with the manufacturer's instructions.
- Empty the fuel tank or plug fuel hoses to prevent fuel leakage.
- Maintain the vehicle in an area away from exposed flame or persons who are smoking.

SAFETY INFORMATION

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

- Be aware that a vehicle that is not performing as designed is a potential hazard and must not be operated.
- Test drive the vehicle after any repairs or maintenance. All tests must be conducted in a safe area that is free of both vehicular and pedestrian traffic.
- Replace damaged or missing warning, caution or information labels.
- Keep complete records of the maintenance history of the vehicle.

The manufacturer cannot anticipate all situations, therefore people attempting to maintain or repair the vehicle must have the skill and experience to recognize and protect themselves from potential situations that could result in severe personal injury or death and damage to the vehicle. Use extreme caution and, if unsure as to the potential for injury, refer the repair or maintenance to a qualified mechanic.

VENTILATION

Always store gasoline vehicles in a well ventilated area. Ventilation prevents gasoline fumes from accumulating.

Never fuel a vehicle in an area that is subject to flame or spark. Pay particular attention to natural gas or propane water heaters and furnaces.

Never work around or operate a vehicle in an environment that does not ventilate exhaust gases from the area. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

TABLE OF CONTENTS FOR SECTION 'A'

LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

SERIAL NUMBER LOCATION

Three serial number and manufacture date code labels are on the vehicle. One is on the body below the front, driver side of the seat. The other two are located on the chassis under the seat. The serial number is also engraved on the flat portion of the frame rail.

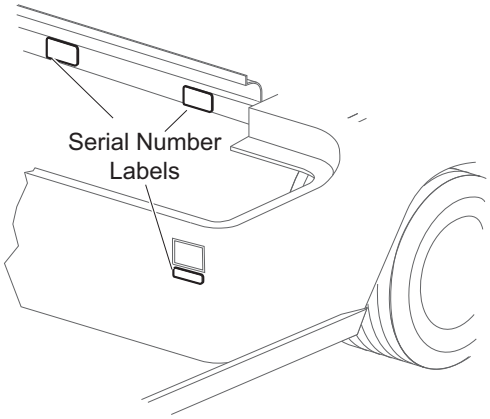


Fig. 1 Serial Number Location

Design changes take place on an ongoing basis. In order to obtain correct components for the vehicle, the manufacture date code, serial number and vehicle model must be provided when ordering service parts.

STARTING THE VEHICLE WITH A DISCHARGED BATTERY

⚠ WARNING

Do not attempt to 'jump start' a vehicle using another vehicle.

The vehicle is equipped with a starter/generator. When starting the engine, the starter/generator functions as a starter and with the engine running, it functions as a generator.

With the short running times associated with this kind of vehicle, the generator is more than adequate to maintain the battery charge level. The generator is not designed to charge a discharged battery.

Since the engine stops when the accelerator is released, **jump starting should not be attempted**.

If the vehicle is equipped with lights and/or accessories that are used when the vehicle is not in motion, the starter/generator may not be adequate to maintain battery charge. In this situation, the battery may require charging with a 12V 10 amp max charger.

Observe all instructions provided by the manufacturer of the charger.

SERVICING THE VEHICLE

⚠ WARNING

To prevent severe injury or death, resulting from improper servicing techniques, observe the following Warnings:

Do not attempt any type of servicing operations before reading and understanding all notes, cautions and warnings in this manual.

Any servicing requiring adjustments to be made to the powertrain while the motor is running must be made with both drive wheels raised.

Wear eye protection when working on the vehicle. In particular, use care when working around batteries, or using solvents or compressed air.

To reduce the possibility of causing an electrical arc, which could result in a battery explosion, turn off all electrical loads from the batteries before removing any heavy gauge battery wires.

To prevent the possibility of motor disintegration, never operate vehicle at full throttle for more than 4 - 5 seconds while vehicle is in a "no load" condition.

It is in the best interest of both vehicle owner and servicing dealer, to carefully follow the procedures recommended in this manual. Adequate preventative maintenance, applied at regular intervals, is the best guarantee for keeping the vehicle both dependable and economical.

In any product, components will eventually fail to perform properly as the result of normal use, age, wear or abuse.

It is virtually impossible to anticipate all possible component failures or the manner in which each component may fail.

A vehicle requiring repair indicates the vehicle is no longer functioning as designed and should be considered potentially hazardous. Use extreme care when working on a vehicle. When diagnosing, removing or replacing

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

any components that are not operating properly, consider the safety of yourself and those around you, should the component move unexpectedly.

Some components are heavy, spring loaded, highly corrosive, explosive, may produce amperage or reach high temperatures. Gasoline, carbon monoxide, battery acid and hydrogen gas could result in serious bodily injury to the technician/mechanic and bystanders, if not treated with the utmost caution. Be careful not to place hands, face, feet or body in a location that could expose them to injury should an unforeseen dangerous situation occur.

Always use the appropriate tools listed in the tool list and wear approved safety equipment.

Before a new vehicle is put into operation, it is recommended the items shown in the INITIAL SERVICE CHART be performed.

ITEM	SERVICE OPERATION
Battery	Charge battery
Seats	Remove protective plastic covering
Brakes	Check operation and adjust if necessary
	Establish new vehicle braking distance
Tires	Check pressure
Fuel	Fill tank with correct fuel
Engine	Check oil level

Fig. 2 Initial Service Chart

FUEL

The fuel tank is located under the seat, on the passenger side of the vehicle. Fill tank with fresh, clean, automotive grade, unleaded, 87 octane (minimum) gasoline. Heavy use/load applications may benefit from higher octane gasoline.

⚠ CAUTION

DO NOT over fill the fuel tank. Allow adequate space for the expansion of gasoline. Leave at least 1" (2.5 cm) of space below the bottom of the filler neck.

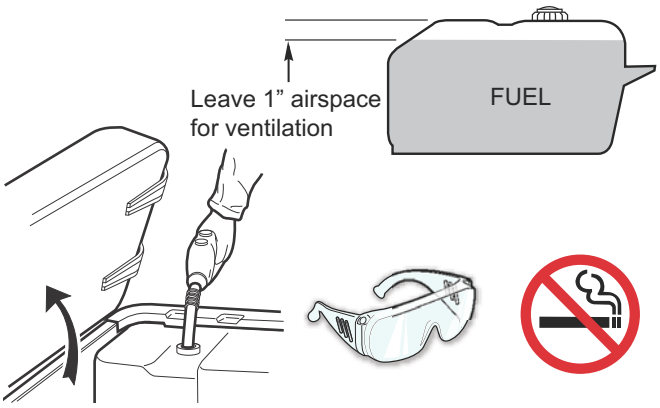


Fig. 3 Fuel Tank

⚠ WARNING

When refueling, inspect the fuel tank cap for leaks or breaks in the housing that could result in fuel spillage.

To prevent a possible explosion, do not smoke near the fuel tank or refuel near open fire or electrical items which could produce a spark.

Always wear safety glasses while refueling to prevent possible injury from gasoline or gasoline vapor.

Do not handle fuel in an area that is not adequately ventilated. Do not permit anyone to smoke in an area where vehicles are being fueled.

TOWING

⚠ WARNING

This vehicle is not designed to be towed.

To activate the direction selector, pull the neutral lock pin handle out and rotate until the pointed portion of the handle fits into the hole (3) in the direction selector cam.

NEUTRAL LOCK

To prevent the driven clutch from turning the rear axle during any service operations, a neutral lock is located on the rear axle (Ref Fig. 3 on page A-2). To operate, place the direction selector in a position between 'F' and 'R'. Turn the key switch to 'OFF'. Raise bed for access to the rear axle. Rotate the tabs on the rear axle shift lever as shown. The attached pin will snap into a cavity in the

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

differential case. When in this position, the rear axle remains locked in the neutral position. To make the direction selector functional, pull the tab out and rotate until the pointed portion of the tab fits into the detent position in the rear axle shift lever.

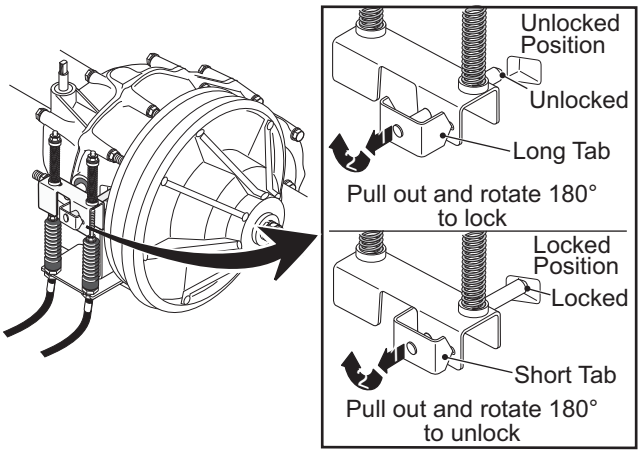


Fig. 4 Neutral Lock

ROUTINE MAINTENANCE

This vehicle will give years of satisfactory service, providing it receives regular maintenance. Refer to the Periodic Service Schedule for appropriate service intervals (Ref. Fig. 8).

NOTICE

Some maintenance items must be serviced more frequently on vehicles used under severe driving conditions.

Periodic lubrication of the steering is recommended.

⚠ CAUTION

Do not use more than three pumps of grease in each grease fitting at any one time. Excess grease may cause grease seals to fail or grease migration into areas that could damage components.

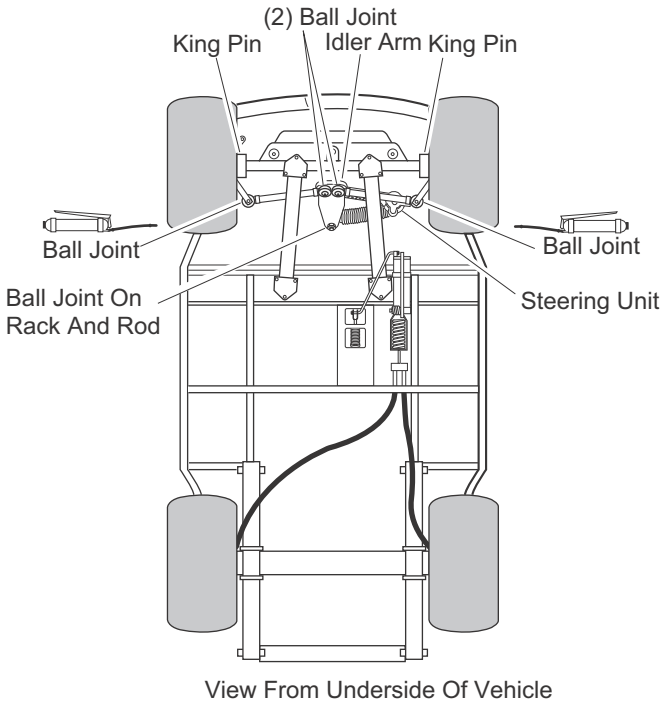


Fig. 5 Lubrication Points

POWERTRAIN MAINTENANCE

Access the powertrain by raising or removing the seat bottom. Some service procedures may require the vehicle be lifted. Refer to LIFTING THE VEHICLE in section 'B' for proper lifting procedure and safety information.

For maintenance procedures relating to the engine, speed control, fuel system, transmission, and rear axle or suspension refer to the particular section. See the TABLE OF CONTENTS for section location.

⚠ WARNING

Always install a positive stop to prevent severe injury that could result if the load bed lift mechanism should unexpectedly fall. Wrap wrenches with vinyl tape to prevent the possibility of a dropped wrench 'shorting out' a battery, which could result in an explosion and severe personal injury or death.To prevent accidental starting, remove and ground spark plug wires and disconnect battery at negative terminal before servicing.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

BRAKES

After the vehicle has been put into service, it is recommended that the brakes be checked by periodically conducting a brake performance test.

⚠ WARNING

To prevent severe injury or death resulting from operating a vehicle with improperly operating brake system, the braking system must be properly maintained. All driving brake tests must be done in a safe location with regard for the safety of all personnel.

NOTICE

Over time, a subtle loss of performance may take place. Therefore, it is important to establish the standard with a new vehicle.

For test method and brake service, refer to BRAKES section.

TIRES

NOTICE

Standard tires for this vehicles are uni-directional and should never be moved from one side of vehicle to the other. Left side tires should always remain on the left side of the vehicle. Right side tires should always remain on the right side of the vehicle. Uni-directional tires have an arrow on the sidewall indicating direction of rotation when moving forward.

Tire condition should be inspected on a daily basis. Inflation pressures should be checked on a weekly basis when the tires are cool. Be sure to reinstall valve dust cap after checking or inflating tire. For additional information, refer to WHEELS AND TIRES section.

CARE AND CLEANING OF THE VEHICLE

⚠ CAUTION

When pressure washing vehicle, do not use pressure in excess of 700 psi (48.26 bar). To prevent cosmetic damage, do not use any abrasive or reactive solvents to clean plastic parts.

It is important that proper techniques and cleaning materials be used.

Normal cleaning of vinyl seats and plastic or rubber trim requires the use of a mild soap solution applied with a sponge or soft brush and wipe with a damp cloth.

Removal of oil, tar, asphalt, shoe polish, etc. will require the use of a commercially available vinyl/rubber cleaner.

The painted surfaces of the vehicle provide attractive appearance and durable protection. Frequent washing with lukewarm or cold water is the best method of preserving the painted surfaces.

Do not use hot water, strong soap or harsh chemical detergents.

Rubber parts should be cleaned with non-abrasive household cleaner.

Occasional cleaning and waxing with non-abrasive products designed for ‘clear coat’ automotive finishes will enhance the appearance and durability of the painted surfaces.

Corrosive materials used as fertilizers or for dust control can collect on the underbody of the vehicle. These materials could cause corrosion of underbody parts. It is recommended that the underbody be flushed occasionally with plain water. Thoroughly clean any areas where mud or other debris can collect. Sediment packed in closed areas should be loosened to ease it’s removal, taking care not to chip or otherwise damage paint.

NOTICE

If the engine does not start or runs improperly after washing, remove the spark plug wire (by pulling the spark plug boots, never the wires) and blow them dry. Reinstall the wires. Remove moisture from coil by blowing across top.

VEHICLE CARE PRODUCTS

To help maintain the vehicle, the manufacturer has several products, available through a local Distributor, an authorized Branch, or the Service Parts Department, among them are

- Touch-up paint specially formulated to match vehicle colors for use on both metal and TPE (plastic) bodies. (P/N 28432G**)
- Multi-purpose Battery Protectant formulated to form a long-term, flexible, non-tacky, dry coating that will not crack, peel or flake over a wide temperature range. (P/N 606312)
- Multi-purpose Hand Cleaner is an industrial strength cleaner containing no harsh solvents, yet gently lifts grease off hands. May be used with or without water. (P/N 607636) Plexus plastic cleaner and polish removes minor scratches from windshield. (P/N 606314)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

SUN TOP AND WINDSHIELD

⚠ WARNING

The top does not provide protection from roll over or falling objects.The windshield does not provide protection from tree limbs or flying objects.

Clean with lots of water and a clean cloth. Minor scratches may be removed using a commercial plastic polish or Plexus plastic cleaner.

TRAILERING

⚠ WARNING

To prevent personal injury to occupants of other highway vehicles, be sure that the vehicle and contents are adequately secured to trailer.

Do not ride on vehicle being trailered.

Remove windshield before trailering.

Maximum speed with top is 50 mph (80 kph).

If the vehicle is to be transported on a trailer at highway speeds, the windshield and top must be removed and the seat bottom secured. Always check that the vehicle and contents are adequately secured before trailering the vehicle. The rated capacity of the trailer must exceed the weight of the vehicle (see GENERAL SPECIFICATIONS for vehicle weight) and load. Lock the parking brake and secure the vehicle to the trailer using ratchet tie downs.

WINTER OR PROLONGED STORAGE

⚠ WARNING

To reduce the possibility of severe injury or death resulting from a possible explosion:

Do not handle fuel in an area that is not adequately ventilated. Do not smoke near the fuel tank or refuel near open flame or electrical items which could produce a spark.

Store vehicle in a clean, dry area. Do not store in same area as a stove, furnace, water heater, or other appliance that uses a pilot light or has a device that can create a spark.

When refueling, inspect the fuel cap for leaks or breaks that could result in fuel spillage.

Always wear safety glasses while refueling to prevent possible eye injury from gasoline or gasoline vapour.

Keep hands, clothing and jewelry away from moving parts. Use care not to contact hot objects. Raise the rear of the vehicle and support on jack stands before attempting to run the engine.

Preparing the engine for a prolonged storage period calls for a few simple steps to prevent build up of varnish and gum in the carburetor and corrosion in the engine.

- Turn the Key Switch to OFF position, and leave the Forward/Reverse switch in the NEUTRAL position during storage.
- Perform all required routine maintenance per the Periodic Service Schedule.
- Properly inflate the tires to recommended pressure (psi) stated on sidewall of tires.
- Place the Forward/Reverse handle in the NEUTRAL position and engage the neutral lock (Ref. Fig. 4).
- Turn the Fuel Shut-Off Valve to the closed (OFF) position.
- With proper ventilation, run engine until the remaining fuel in carburetor and fuel lines is depleted and the engine stalls.
- Return the neutral lock to the OPERATE position.
- Loosen, but do not remove the carburetor drain screw. Drain any fuel remaining in bowl into an approved container and pour the fuel collected into the vehicle fuel tank. Add Sea Foam (4 oz. for a full tank of fuel) to stabilize fuel and install the tank cap securely.
- Tighten the carburetor drain screw.
- Remove spark plug and pour about 1/2 oz. (15 ml) of SAE 10 - 30 weight oil or Fogging oil into the cylinder.
- Do not engage the park brake, but secure the car from rolling.
- While engine is still warm, change oil.
- Clean body, chassis and engine of debris, mud, chaff or grass.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

HARDWARE

Periodically the vehicle should be inspected for loose fasteners. Fasteners should be tightened in accordance with the Torque Specifications table (Ref. Fig. 6). Use care when tightening fasteners and refer to the sections in this manual for specific torque values.

Generally, two grades of hardware are used in the vehicle. Grade 5 hardware can be identified by the three marks on the hexagonal head. Unmarked hardware is Grade 2 (Ref. Fig. 6).

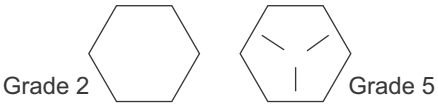


Fig. 6 Bolt Grades

TORQUE SPECIFICATIONS

ALL TORQUE FIGURES ARE IN FT. LBS. (Nm)

Unless otherwise noted in text, tighten all hardware in accordance with this chart.
The table below specifies 'lubricated' torque figures. Fasteners that are plated or lubricated when installed are considered 'wet' and require approximately 80% of the torque required for 'dry' fasteners.

BOLT SIZE	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	3/4"	7/8"	1"
Grade 2	4 (5)	8 (11)	15 (20)	24 (33)	35 (47)	55 (75)	75 (102)	130 (176)	125 (169)	190 (258)
Grade 5	6 (8)	13 (18)	23 (31)	35 (47)	55 (75)	80 (108)	110 (149)	200 (271)	320 (434)	480 (651)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

PERIODIC SERVICE SCHEDULE

***** - CHECK **C&A** - CHECK & ADJUST **CL** - CLEAN **R** - REPLACE

REMARKS	before each use DAILY	WEEKLY	20 rnds/20 hrs 100 miles/160 kms MONTHLY	60 rnds/60 hrs 300 miles/500 kms QUARTERLY	125 rnds/125 hrs 600miles/1000 kms SEMI-ANNUAL	250 rnds/250 hrs 1200miles/2000 kms ANNUAL	5 YEARS	PAGE
Tires - pressure, condition of tires & rims	*	*	*	*	*	*		
Hardware - loose or missing	*	*	*	*	*	*		
Reverse Warning Indicator	*	*	*	*	*	*		
Overall Vehicle Condition	*	*	*	*	*	*		
Battery - state of charge, condition, loose terminals, corrosion, hold down & hardware	*	*	CL	CL	CL	CL		
Service Brake (Mechanical) - smooth operation	*	*	*	*	*	*		
Brakes - aggressive stop test			C&A	C&A	C&A	C&A		
Park Brake - operation, does it hold on a hill	*	*	C&A	C&A	C&A	C&A		
Accelerator - smooth operation	*	*	*	*	*	*		
Starter/Generator Belt - tension, wear, cracks		*	*	*	*	*		
Wiring - loose connections, broken or missing insulation			*	*	*	*		
Carburetor Linkage - attachment			C&A	C&A	C&A	C&A		
Carburetor						CL		
Direction Selector - attachment and mechanism			C&A	C&A	C&A	C&A		
Cooling Fan - build up of debris inside blower housing		C&A	C&A	C&A	C&A	C&A		
Engine Oil ** - oil level	*	C&A	C&A	C&A	C&A	C&A		
Engine Oil **& Filter - drain and change					R	R		
Engine - noise, vibration, acceleration, oil leaks			C&A	C&A	C&A	C&A		
Valves - check cold - Ref: Repair & Service Manual						C&A		
Cylinder Head & Pistons - remove carbon							CL	
Choke Cable - smooth movement & adjustment			C&A	C&A	C&A	C&A		
Cooling Fan - build-up of foreign matter inside housing & fins			CL	CL	CL	CL		

Fig. 8 PERIODIC SERVICE SCHEDULE

**Initial oil change after 8 hours of run time.

NOTE: Some maintenance items must be serviced more frequently on vehicles used under severe driving conditions.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

REMARKS	before each use DAILY	WEEKLY	20 rnds/20 hrs 100 miles/160 kms MONTHLY	60 rnds/60 hrs 300 miles/500 kms QUARTERLY	125 rnds/125 hrs 600miles/1000 kms SEMI-ANNUAL	250 rnds/250 hrs 1200miles/2000 kms ANNUAL	5 YEARS	PAGE
Steering Assembly - excessive play, loose or missing hardware			*	*	*	*		
Tie Rods - excessive play, bent rods, loose or missing hardware			*	*	*	*		
Rear Axle - fluid level, oil leakage, noise, loose or missing hardware			*	*	*	*		
Rear Axle - drain & replace fluid							R	
Rear Suspension - shock oil leakage, worn bushings, loose or missing hardware				*	*	*		
Front Suspension - strut oil leakage, excessive play in hubs or kingpins, worn bushings, loose or missing hardware			*	*	*	*		
Front Wheel Alignment - unusual tire wear				C&A	C&A	C&A		
Fuel System - leaks at tank, cap, system lines for cracks/deterioration, filters, pump				*	*	*		
Fuel Filter						R		
Spark Plug						R		
Throttle/Governor Linkage - operation & governed speed				*	*	*		
Air Filter Element - check & replace as necessary					*	*		
Drive Belt - cracks, frayed, excessive wear				*	*	*		

Fig. 8 PERIODIC SERVICE SCHEDULE (CONTINUED)

**Initial oil change after 8 hours of run time.

NOTE: Some maintenance items must be serviced more frequently on vehicles used under severe driving conditions.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

TABLE OF CONTENTS FOR SECTION 'B'

SAFETY

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTICES, CAUTIONS WARNINGS AND DANGERS

Throughout this manual, the following **NOTICES, CAUTIONS**, **WARNINGS and DANGERS** are used. For the protection of all personnel and the vehicle, be aware of and observe the following:

NOTICE

A **NOTICE** indicates a condition that should be observed.

⚠ CAUTION

A CAUTION indicates a condition that may result in damage to the vehicle or surrounding facilities.

⚠ WARNING

A WARNING indicates a hazardous condition which could result in serious injury or death.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

IMPORTANT SAFETY WARNING

In any product, components will eventually fail to perform properly as the result of normal use, age, wear or abuse.

It is virtually impossible to anticipate all possible component failures or the manner in which each component may fail.

Be aware that a vehicle requiring repair indicates that the vehicle is no longer functioning as designed and therefore should be considered potentially hazardous. Use extreme care when working on any vehicle. When diagnosing, removing or replacing any components that are not operating correctly, take the time to consider the safety ramifications if the component should move unexpectedly.

Some components are heavy, spring loaded, highly corrosive, explosive or may produce high amperage or reach high temperatures. Gasoline, carbon monoxide, battery acid and hydrogen gas could result in serious bodily injury to the technician/mechanic and bystanders if not treated with utmost caution. Be careful not to place hands, face, feet or body in a location that could expose them to injury should an unforeseen situation occur.

Always use the appropriate tools listed in the tool list and wear approved safety equipment.

MODIFICATIONS TO VEHICLE

Do not modify the vehicle in any manner that will change the weight distribution of the vehicle.

⚠ CAUTION

Changes to the weight distribution or the center of gravity may make the vehicle unstable or prone to roll over which could result in injury or death to the operator or passenger(s).

GENERAL MAINTENANCE

When any maintenance procedure or inspection is performed, it is important that care be exercised to insure the safety of the technician/mechanic or bystanders and to prevent damage to the vehicle.

Always read the **entire** relevant manual section (chapter) before attempting any inspection or service.

BEFORE SERVICING THE VEHICLE

Before attempting to inspect or service a vehicle, be sure to read the following warnings:

⚠ WARNING

To prevent personal injury or death, observe the following:

Before working on the vehicle, remove all jewelry (rings, watch, necklaces, etc.).

Be sure that no loose clothing or hair can become caught in the moving parts of the powertrain.

Use care not to contact hot objects.

Before attempting to operate or adjust the powertrain, the rear of the vehicle must be raised and supported on jack stands.

Wear OSHA approved clothing and eye protection when working on anything that could expose the body or eyes to potential injury. In particular, use care when working with or around batteries, compressed air or solvents.

Always turn the key switch to 'OFF' and remove the key before disconnecting a live circuit.

When connecting battery cables, pay particular attention to the polarity of the battery terminals. Never confuse the positive and negative cables.

Set the parking 'PARK' brake before performing any work on the vehicle.

If repairs are to be made that will require welding or cutting, the battery and fuel tank must be removed and the fuel system drained.

⚠ WARNING

To prevent explosion that could result in severe personal injury or death, keep all smoking materials, open flame or sparks away from gasoline and batteries.

Never operate the starter with the spark plugs removed unless the ignition system has been disabled and the engine/exhaust are cold. Fuel expelled from the cylinders could be ignited by the ignition system or the hot exhaust system.

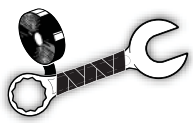
Never work on an engine that is hot.

Never test the ignition system without either connecting the spark plug lead to a tester or spare grounded spark plug.

If the spark function is to be observed at the spark plug, be sure to install a spare spark plug into the open cylinder before operating the starter.

Never test the function of a fuel pump in the vicinity of a hot engine or other source of flame or combustion.

Never confuse the hoses to and from the fuel pump. Verify that the carburetor and pulse lines are correctly installed before starting the engine (see FUEL SYSTEM section).



Wrap wrenches with vinyl tape to prevent the possibility of a dropped wrench from 'shorting out' a battery, which could result in an explosion and severe personal injury or death.

Aerosol containers of battery terminal protectant must be used with extreme care. Insulate metal container to prevent can from contacting battery terminals which could result in an explosion.

⚠ WARNING

To prevent illness or death, observe the following:

Never work around or operate a vehicle in an environment that does not ventilate exhaust gases from the area.

Exhaust gas (carbon monoxide) is deadly.

Carbon monoxide is an odorless gas that is formed as a natural part of the incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal.

The following are symptoms of carbon monoxide inhalation:

- *Dizziness*
- *Vomiting*
- *Intense headache*
- *Muscular twitching*
- *Weakness and sleepiness*
- *Throbbing in temples*

If experiencing any of these symptoms, get fresh air immediately.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Battery Removal and Installation

Tool List	Qty.
Insulated Wrench, 1/2”	1
Socket, 1/2"	1
Extension, 12"	1
Ratchet	1
Battery Carrier	1

NOTICE

In the following text, there are references to removing/installing bolts etc. Additional hardware (nuts, washers, etc.) that is removed must always be installed in its original position unless otherwise specified. Non-specified torques are as shown in table contained in Section ‘A’.

At the battery, remove hardware from the **negative** (-) cable before removing the **positive** (+) cable. Remove the bolt from the battery hold down and remove the battery (Ref. Fig. 1).

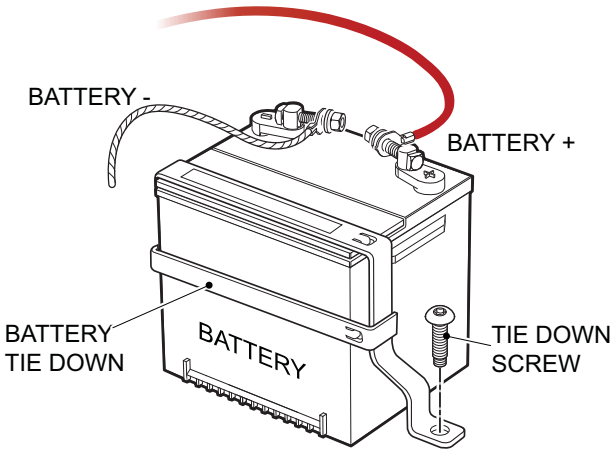


Fig. 1 Battery Removal

Connect the positive (+) battery cable first. **Connect negative (-) battery cable last.** Tighten the hold down bolt between 14 - 18 ft. lbs. (19 - 24 Nm).

Be sure to remove all corrosion from terminals and hardware. After installing battery, coat terminals with commercially available terminal protectant.

LIFTING THE VEHICLE

Tool List	Qty.
Floor Jack	1
Jack Stands	4
Chocks	4

Some servicing operations may require the front, rear or the entire vehicle to be raised.

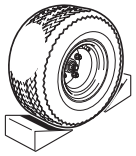
WARNING

To prevent possible injury or death resulting from a vehicle falling from a jack, be sure the vehicle is on a firm and level surface. Never get under a vehicle while it is supported by a jack. Use jack stands and test the stability of the vehicle on the stands. Always place chocks in front and behind the wheels not being raised. Use extreme care since the vehicle is extremely unstable during the lifting process.

CAUTION

When lifting the vehicle, position jacks and jack stands only on the areas indicated.

To raise the entire vehicle, install chocks in front and behind each front wheel (Ref. Fig. 2). Center the jack under the rear frame crossmember. Raise the vehicle and locate a jack stand under the outer ends of the rear axle.



Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

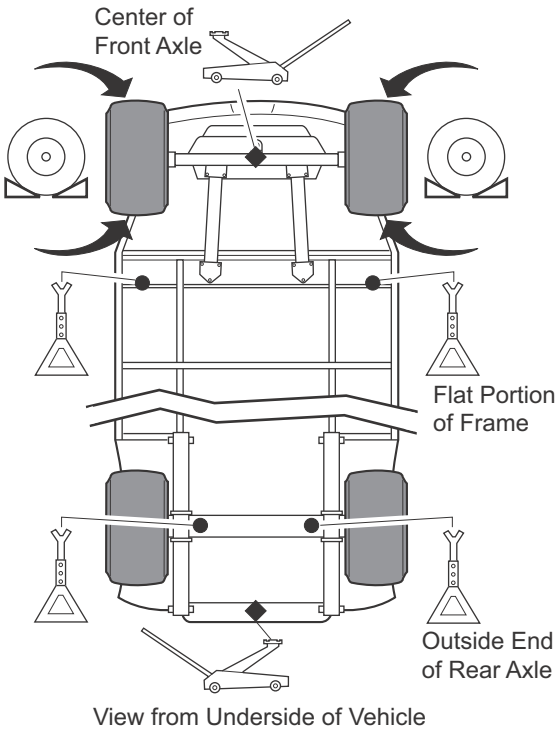


Fig. 2 Lifting the vehicle

Lower the jack and test the stability of the vehicle on the two jack stands.

Place the jack at the center of the front axle. Raise the vehicle and position jack stands under the frame cross-member as indicated.

Lower the jack and test the stability of the vehicle on all four jack stands.

If only the front or rear of the vehicle is to be raised, place the chocks in front and behind each wheel not being raised in order to stabilize the vehicle.

Lower the vehicle by reversing the lifting sequence.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

TABLE OF CONTENTS FOR SECTION 'C'

SECTION TITLE **PAGE NO.**

LIST OF ILLUSTRATIONS

BODY

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

GENERAL

NOTICE

In the following text, there are references to removing/installing bolts etc. Additional hardware (nuts, washers etc.) that are removed must always be installed in their original positions unless otherwise specified. Non-specified torques are as shown in the table in Section A.

⚠ WARNING

To prevent possible injury or death from battery explosion, batteries should always be removed before any servicing that will generate sparks.

It is important to use a sharp drill bit when removing the rivets on the side of the vehicle. Extreme care must be used when drilling out the rivets located in the front of the body and the bottom side of the body. Excessive pressure could result in the drill bit being forced through the body panel and penetrating a battery. As extra protection, it is recommended that a protective piece of sheet metal be placed between the battery and the rivet. Use of a drill depth stop will provide additional protection.

In general, body component replacement can be accomplished with a minimum of specialized tools. Most body components are held in place with conventional removable hardware (nuts, bolts, washers and screws). Some components are mounted with 'pop' rivets which require that the rivet head be removed in order to push out the shank of the rivet. The rivet head is easily removed by drilling into the head with a **sharp** drill bit that is **slightly** larger than the shank of the rivet (Ref. Fig. 1). Care must be exercised when drilling to prevent the drill from being forced through and damaging components where it could damage components located immediately behind the rivet. The best way to prevent this from occurring is to use a sharp drill bit that requires very little pressure to cut successfully and to place a piece of protective sheet metal between the surface being drilled and components directly behind it.

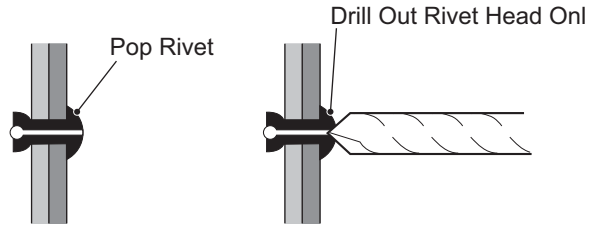


Fig. 1 Drill Out Metal Rivet

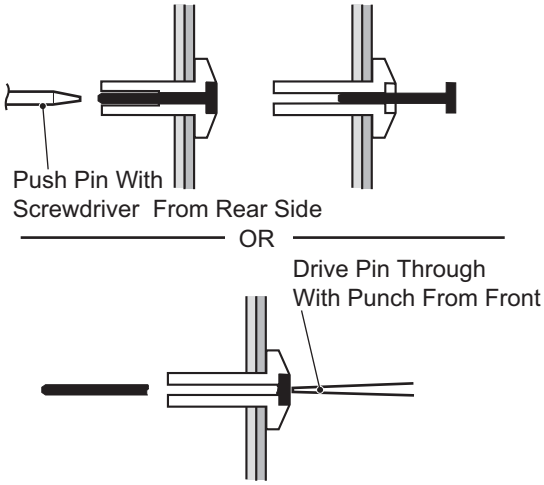


Fig. 2 Drive Rivet Removal

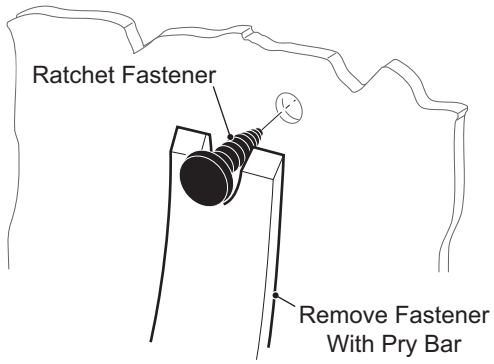


Fig. 3 Removing Ratchet Fasteners

BODY COMPONENT REPLACEMENT

The body components can be replaced by removing the securing hardware, replacing the component and securing with hardware in the same orientation as removed. The illustrations on the following pages indicate the assembly methods for the various components.

NOTICE

If the instrument panel is to be replaced, the serial number plate and CE plate must be removed and reinstalled on the new instrument panel (Ref Fig. 4 on page C-2).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

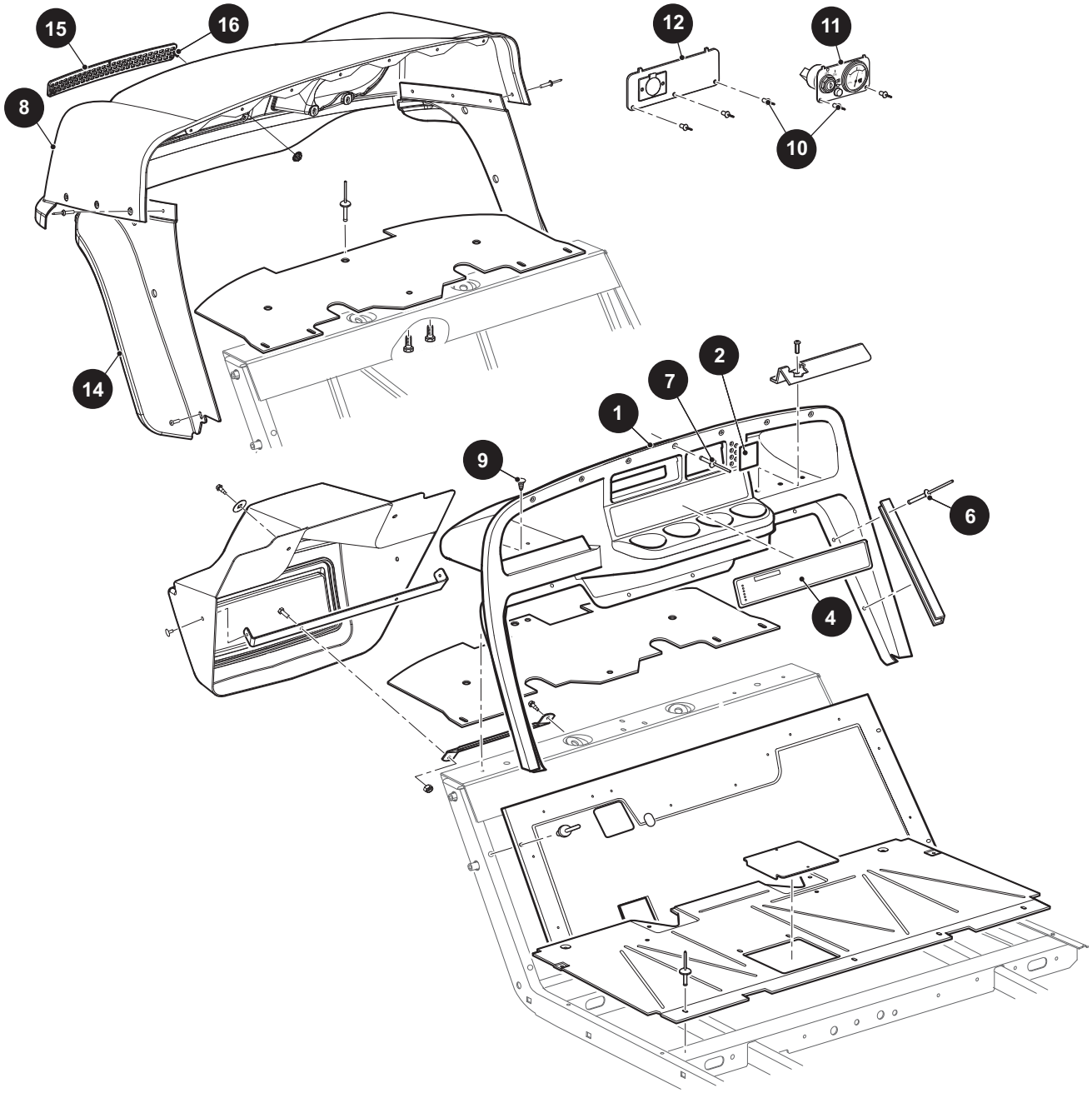


Fig. 4 Body Components (Front)

Instrument Panel Replacement

Tool List	Qty.
Insulated wrench, 1/2”	1
Electric/air drill	1
Drill bit, 7/32”	1
Pry bar	1
Punch, small	1
Hammer	1
Rivet Gun	1

NOTICE

If the instrument panel is to be replaced, the serial number plate must be removed and reinstalled on the new instrument panel (Ref Fig. 4 on page C-2). The instrument panel may be removed without removing the cowl or may be removed as part of the cowl.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ WARNING

To prevent the possibility of injury due to lack of vehicle information, the correct safety label must be on the instrument panel at all times.

To prevent personal injury, disconnect negative (-) battery cables before servicing vehicle.

If instrument panel (1) is to be replaced, the label (T-holder cover) (2) must be removed from old instrument panel and reinstalled on replacement panel (Ref Fig. 4 on page C-2). When installing a replacement instrument panel, a new safety label (4) **must** be ordered and placed on new instrument panel. When ordering a replacement instrument panel, provide vehicle serial number to the Service Parts Representa tive who will provide the correct part number for the safety label.

Using an insulated wrench, disconnect cables at negative (-) battery terminal to prevent electrical shorts that could cause an explosion.

Pull front of floor mat (5) up to expose rivets (6) that secure instrument panel (1) to floor. Drill out rivets (6, 7) attaching bottom of instrument panel to floor and across top of the instrument panel attaching it to cowl (8).

Pry out four ratchet fasteners (9) located within instrument panel storage compartments.

Pull instrument panel away from the cowl.

Remove the drive rivets (10) securing the key switch (11) and power outlet plate (12) to the instrument panel. Rotate key switch and power outlet plate and push them through instrument panel openings, freeing panel for removal.

Assemble in reverse order of disassembly using new rivets.

Cowl Replacement

Tool List	Qty.
Insulated wrench, 1/2"	1
Socket, 1/2"	1
Ratchet	1
Electric/air drill	1
Drill bit, 7/32"	1
Phillips screwdriver	1
Rivet gun	1
Torque wrench, ft. lbs	1

⚠ WARNING

To prevent personal injury, disconnect the negative (-) battery cables before servicing vehicle.

Using an insulated wrench, disconnect negative (-) cables from battery to prevent electrical shorts that could cause an explosion.

Remove front bumper (13). See 'Front Bumper Replacement' on page C-3.

Drill out rivets (7) across top of instrument panel (1) and fender flares (14) attaching them to cowl (8) (Ref Fig. 4 on page C-2).

Remove label (15) and screw (16) securing front of cowl and lift cowl up to unplug lights.

Remove cowl assembly from vehicle and transfer lights to new cowl.

Assemble in reverse order of disassembly using new rivets. Tighten front bumper bolts (17) to 17 ft. lbs. (23 Nm) torque.

Front Bumper Replacement

Tool List	Qty.
Socket, 1/2"	1
Ratchet	1
Torque wrench, ft. lbs .	1

⚠ WARNING

The front bumper is heavy and awkward to handle. To prevent personal injury, it is strongly recommended that adequate help be used to remove bumper from vehicle.

Remove the sun top, if equipped, allowing front strut to be removed with bumper. See WEATHER PROTECTION section.

Remove two bolts (17) from one end of bumper (13) and remove spacer (20) and washer (21) (Ref Fig. 5 on page C-4). Have an assistant hold this end and repeat at other side to remove bumper.

With the aid of an assistant, position bumper and spacer tubes (or front strut) along side cowl (8). Take care not to scratch the cowl while installing bumper.

On each side of vehicle, align top holes in bumper and spacer tube (or front strut) with upper hole in cowl. Insert bolt (17) with lock washer (18) through top hole in bum-

per and spacer tube (or front strut) only. Insert spacer (20) and push bolt through cowl and threading it into frame. Finger tighten hardware at this time to allow for adjustment.

Align bottom hole in bumper with hole in fender flare (14). Insert bolt with lock washer through bumper, spacer tube (or front strut) and cowl threading bolt into frame. Finger tighten bolts at this time to allow for adjustment.

Once all bolts are in place, tighten to 17 ft. lbs. (23 Nm) torque.

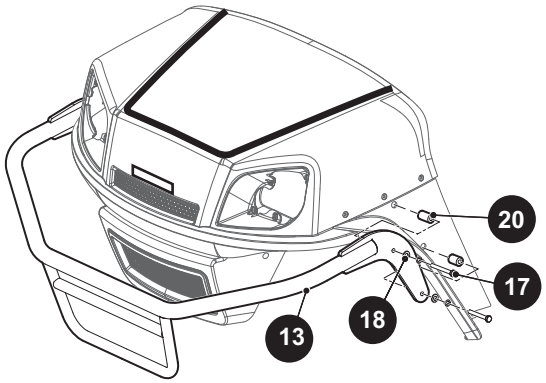


Fig. 5 Front Bumper

Rocker Panel Replacement

Tool List	Qty.
Phillips screwdriver	1
Wrench, 3/8"	1
Wrench, 7/16"	1

Remove screws (22, 23) securing each end and top of rocker panel to vehicle (Ref Fig. 7 on page C-5). Save hardware for reuse and note the location of each spacer (25, 26) to ensure proper placement.

Remove rocker panel.

Replacement is the reverse order of disassembly, making sure hardware and spacers are replaced in the appropriate locations.

Seat Bottom Replacement

Tool List	Qty.
Straight blade screwdriver, small	1
Phillips screwdriver, large	1

To remove driver seat bottom (27), loosen setscrew (28) in choke knob (29) and remove knob (Ref Fig. 6 on page C-4). Raise seat high enough to slide it in front of center console and off hinge pins.

To remove passenger seat bottom (30), remove four screws (31) securing seat bottom to hinges.

Install replacement in reverse order of disassembly.

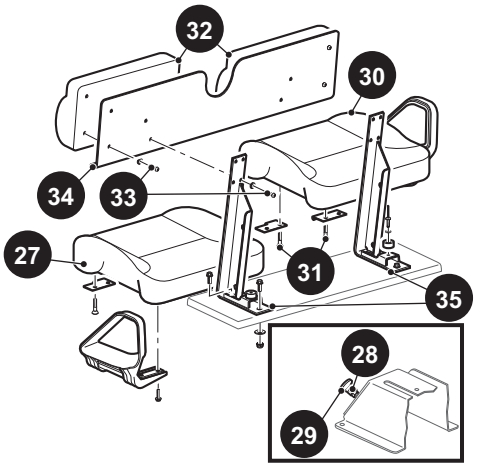


Fig. 6 Seat Components

Seat Back Replacement

Tool List	Qty.
Philips screwdriver	1

WARNING

To prevent personal injury caused by the seat back assembly falling, replace only one seat back at a time.

To remove a seat back (32), remove four screws (33) securing seat back to plate (34) and support bracket (35) (Ref Fig. 6 on page C-4).

Install replacement in the reverse order of disassembly.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

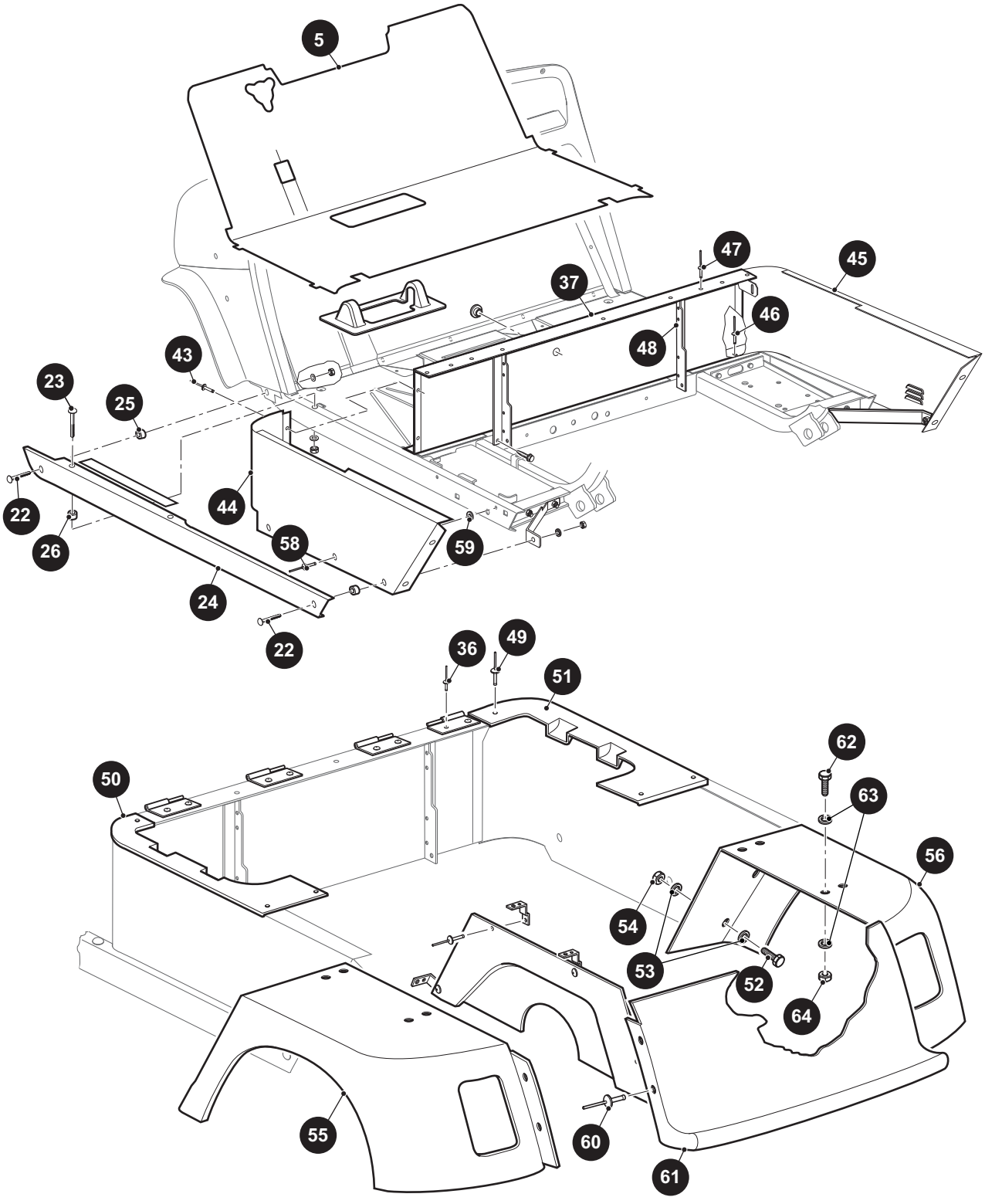


Fig. 7 Body Components (Rear)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Seat Support Panel Replacement

Tool List	Qty.
Electric/air drill	1
Drill bit, 7/32"	1
Pliers	1
Philips screwdriver	1
Wrench, 7/16"	1
Wrench, 3/8"	1
Rivet gun	1

Remove both seat bottoms (27, 30) by drilling out rivets (36) securing hinges to seat support panel (37) (Ref Fig. 7 on page C-5).

Remove toggle switch nut (38) and drill out rivets (39) securing toggle switch guard (40) to seat support panel (Ref Fig. 8 on page C-6). Remove hardware (41) securing winch receptacle (42) to seat support panel.

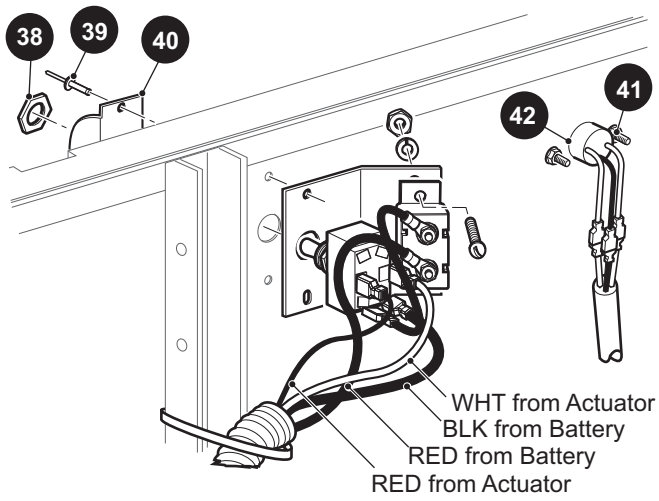


Fig. 8 Electric Lift Toggle Switch and Winch Receptacle

Drill out rivets (43) attaching seat support panel to each side panel (44, 45).

Loosen bolts (23) at top of each rocker panel (24), freeing the floor mat (5). Pull floor mat back to expose rivets (46) that attach seat support panel to floor and drill out rivets.

Drill out rivets (47) across top of seat support panel attaching it to seat frame (48).

Remove seat support panel.

Install in reverse order of disassembly using new rivets.

Seat Filler Panel Replacement

Tool List	Qty.
Electric/air drill	1
Drill bit, 7/32"	1
Rivet gun	1

Drill out rivets (49) securing filler panel (50, 51) to side panel (44, 45) (Ref Fig. 7 on page C-5). Remove seat filler panel. Install using new rivets.

Side Panel Replacement

Tool List	Qty.
Electric/pneumatic drill	1
Drill bit, 7/32"	1
Socket, 7/16"	1
Ratchet	1
Wrench, 7/16"	1
Rivet gun	1

To replace either driver or passenger side panel, first remove rocker panel (24). See 'Rocker Panel Replacement' on page C-4.

Remove two bolts (52) securing side panel (44, 45) to rear fender (55, 56), retaining hardware (53, 54) for reuse during installation.

⚠ CAUTION

To prevent piercing the fuel tank when using a drill, place a piece of protective sheet metal between the tank and the panel being removed.

If replacing passenger side panel (56), drill out rivets (49) securing filler panel (51) and remote air hose adapter (57) to side panel (45) (Ref Fig. 7 on page C-5). Place a piece of sheet metal between fuel tank and seat support panel before drilling out rivets attaching side panel to seat support panel.

Drill out rivets (43) securing side panel to seat support panel (37).

Drill out rivets (58) securing side panel to frame (Ref Fig. 7 on page C-5). Retain the washers (59) behind side panel for reuse during installation.

Remove side panel.

Install in reverse order of disassembly using new rivets.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Rear Fender Replacement

Tool List	Qty.
Socket, 7/16"	1
Ratchet	1
Wrench, 7/16"	1
Electric/air drill	1
Drill bit, 7/32"	1
Rivet gun	1

If the vehicle is equipped with tail lights, unplug the tail light leads from the wiring harness. Remove tail lights by pushing on the small tabs around perimeter of tail lights enabling them to be pushed out of rear fenders (55, 56) (Ref Fig. 7 on page C-5). Retain tail lights for use at fender installation.

Drill out two rivets (60) on side of rear panel (61) securing it to rear fender.

Remove four bolts (52, 62) securing rear fender to side panel (44, 45) and frame. Retain the hardware (53, 54, 63, 64) for reuse during installation.

Remove rear fender from vehicle.

Replacement is the reverse order of rear fender removal. Tail light should be replaced in rear fender with wiring at top of tail light.

Rear Panel Replacement

Tool List	Qty.
Electric/air drill	1
Drill bit, 7/32"	1
Rivet gun	1

Drill out two rivets (60) on each side of rear panel (61) securing it to rear fenders (55, 56) (Ref Fig. 7 on page C- 5).

Remove rear panel.

Install in reverse order of disassembly using new rivets.

Truck Bed Replacement

Tool List	Qty.
Back Brace	2

⚠ WARNING

The truck bed is heavy and awkward to handle. To prevent possible personal injury, it is strongly recommended that an assistant or adequate lifting device be used to remove truck bed from vehicle.

Raise bed using electric lift toggle switch.

With a person on each side of bed, remove cotter pin (66), spacers (67) and clevis pin (68) that connect electric lift actuator (65) to bed (69) and swing actuator down to rest on rear axle (Ref Fig. 9 on page C-7).

NOTICE

If removing bed to replace engine, remove electnc lift actuator for additIOnal clearance. Unplug chassis harness lead and pull out cotter and clevis pin connecting actuator to fame.

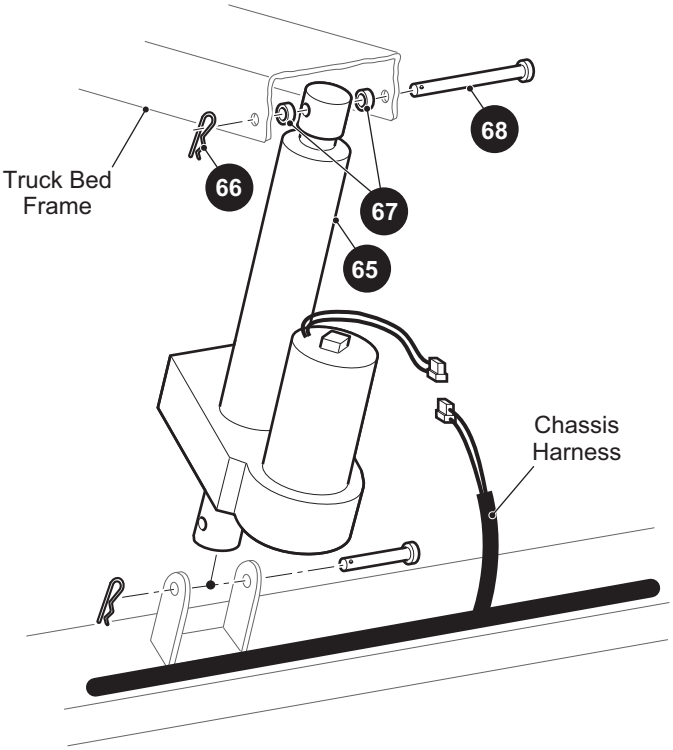


Fig. 9 Electric Lift Actuator

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

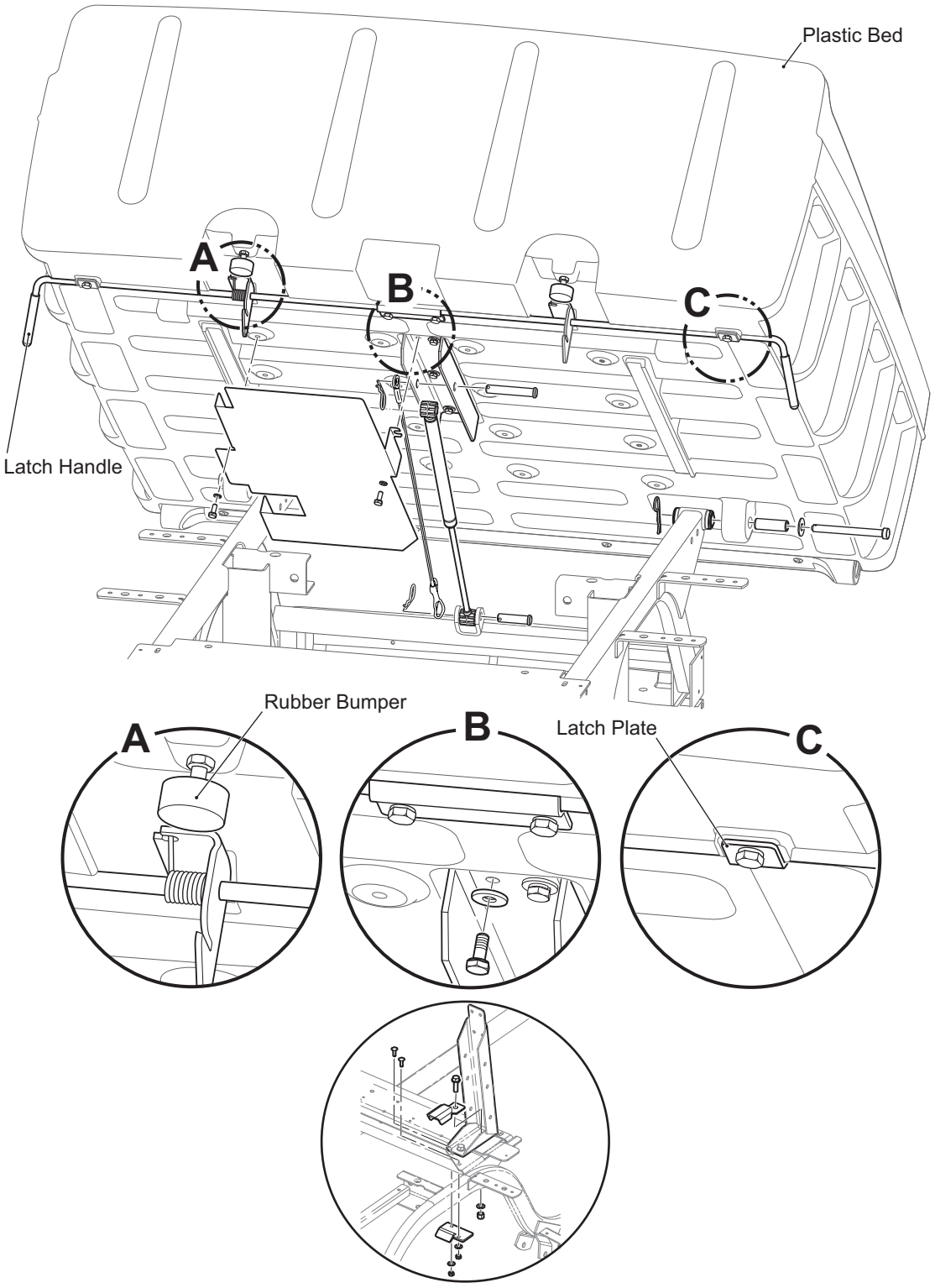


Fig. 10 Plastic Truck Bed Components (manual Lift)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

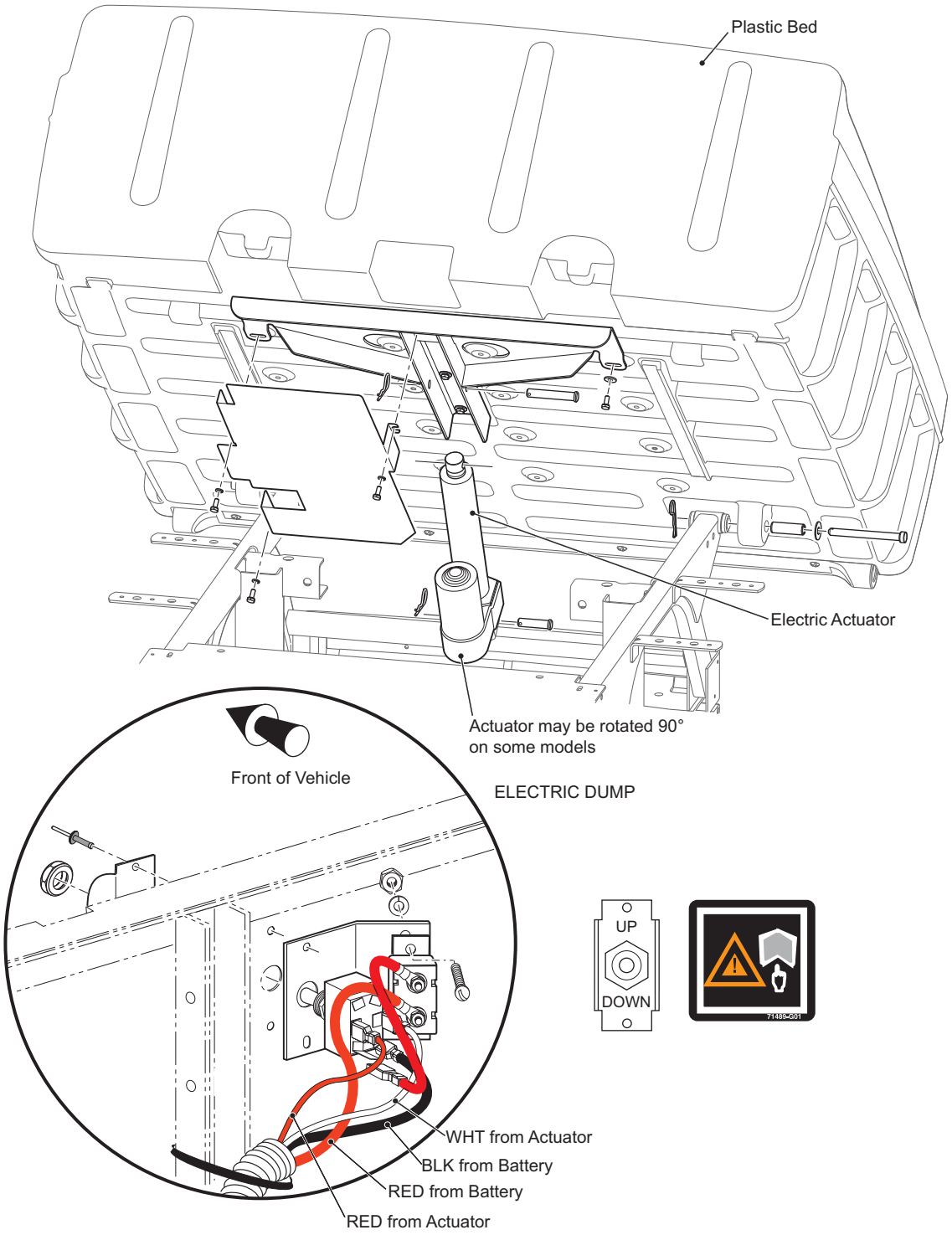


Fig. 11 Plastic Truck Bed Components (Power Actuator)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

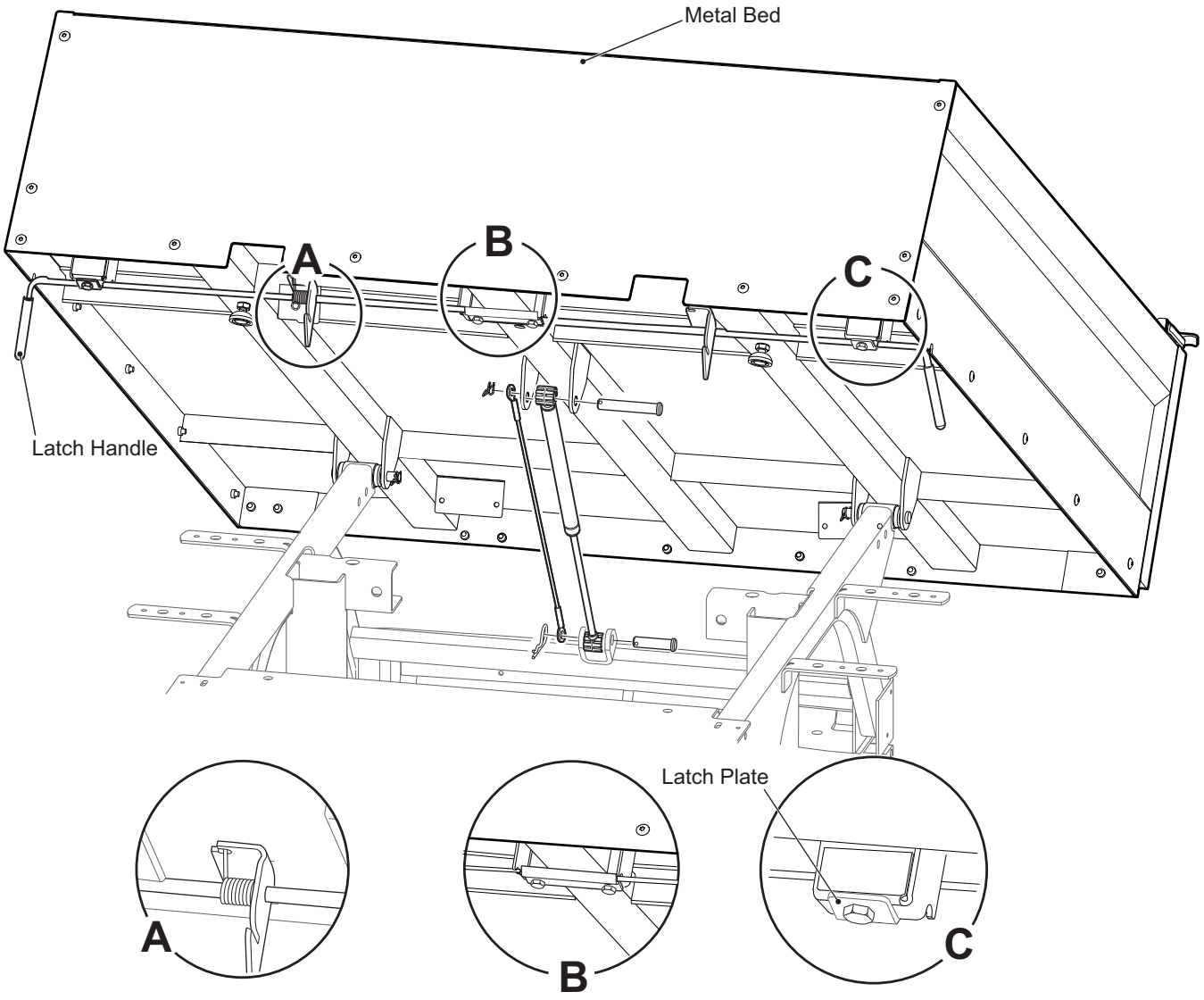


Fig. 12 Metal Truck Bed Components (Manual Lift)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

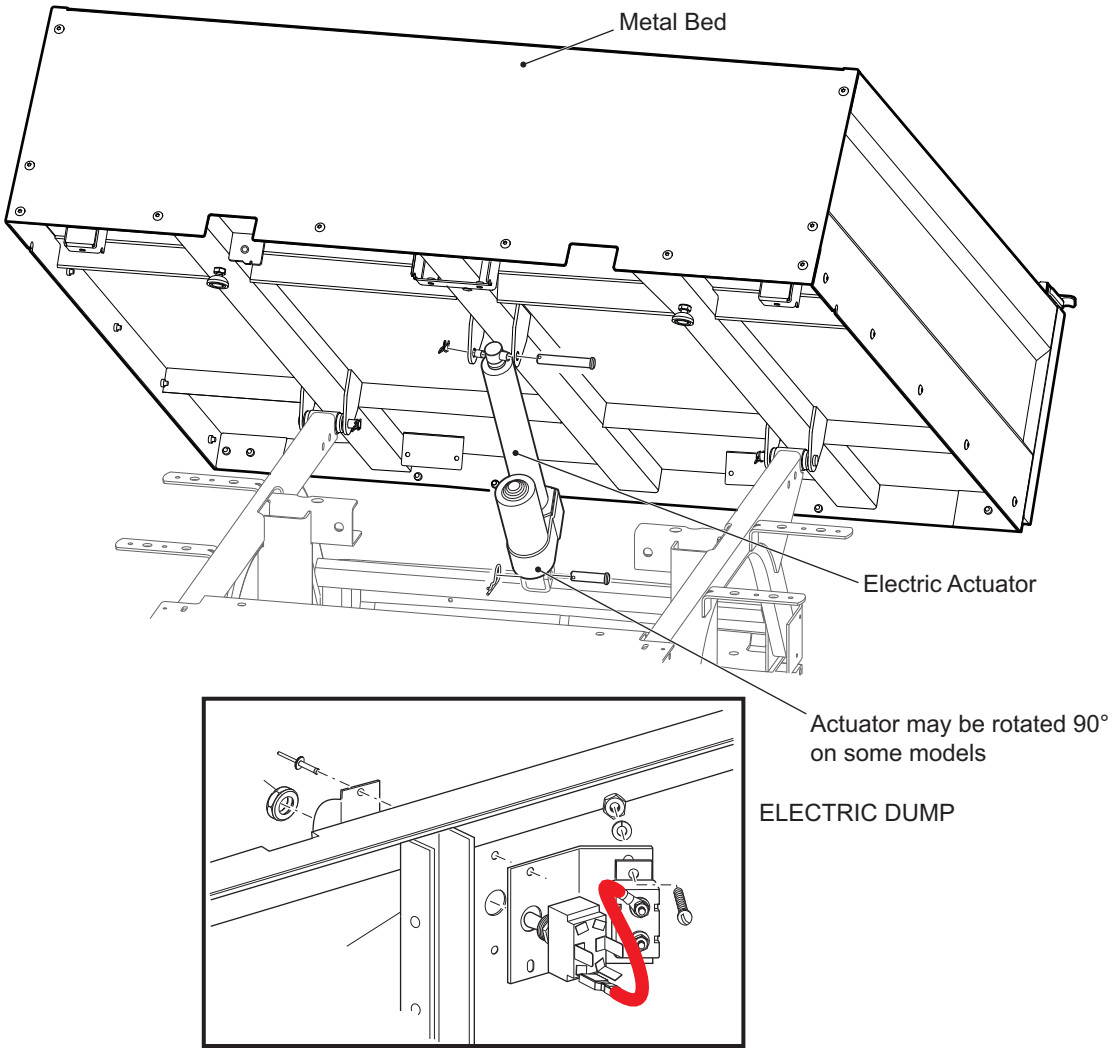


Fig. 13 Metal Truck Bed Components (Power Actuator)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

PAINTING

Follow the paint manufacturer's recommendations for specific painting procedures and information.

⚠ WARNING

All painting must be done in an area with adequate ventilation to *safely disperse harmful vapors.*

Wear eye protection and respirator, following manufacturer's instructions, to protect from overspray and airborne mist.

⚠ CAUTION

Provide protection from overspray to vehicle and surrounding area.

Minor Scratches

For minor scratches, the manufacturer suggests the following steps be taken to repair the Durashield™ body:

I. Thoroughly clean the surface to be repaired with alcohol and dry.

II. Touch up damaged area with sequential coats (two coats minimum recommended, allowing 30 - 45 minutes between coats, increasing to 45 - 60 minutes in higher humidity) using brush on touch-up paint, until coating layer is visible, slightly above the surface of the part.

III. Use 400 grit "wet" sand paper to blend touch up area level with the rest of the part being repaired. Use a polishing compound (3M Finesse or automotive grade) to renew gloss and to further blend and transition newly painted surface.

IV. Clean with alcohol and dry.

V. Optional but recommended) Follow this process with clear coat to renew and protect depth of finish.

VI. Wax or polish with Carnauba base product, available at any automotive parts distributor.

Larger Scratches

For larger scratches, the manufacturer suggests the following steps be taken to repair the Durashield™ body:

I. Thoroughly clean the surface to be repaired with alcohol and dry.

II. Mask area to be painted (common masking tape is adequate) prior to repair and use aerosol type touch-up paint.

III. Apply spray touch up paint in light even overlapping strokes. Multiple coats may be applied to provide adequate coverage and finish. Always remember to shake the can for a minimum of one minute to mix the paint and achieve the best color match.

IV. After painting, allow to dry overnight. Smooth the mask lines using 400 grit "wet" sand paper to blend touch up area level with the rest of the part being repaired. Use a polishing compound (3M Finesse or automotive grade) to renew gloss and to further blend and transition newly painted surface.

V. Clean with alcohol and dry.

VI. (Optional but recommended) Follow this process with clear coat to renew and protect depth of finish.

VII. Wax or polish with Carnauba base product, available at any automotive parts distributor.

Complete Panel Repair

In situations where large panels or areas must be painted, touch up paint is not recommended. In such cases professional painting or panel replacement is called for. The manufacturer suggests body panel replacement be considered as a cost effective alternative to painting. If the decision to repaint is taken, the task can be accomplished by any paint and body shop with experience in painting 'TPE' panels. TPE is a common material in modern automobile bodies and all body shops should be familiar with the materials and processes required.

The finish will include an application of a primer coat, a base color coat and a clear coat. The manufacturer does not supply these materials due to the variety of paint manufacturers and the preferences of the individual painter.

Most paint manufacturers can perform a computer paint match to assure accurate color matching.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

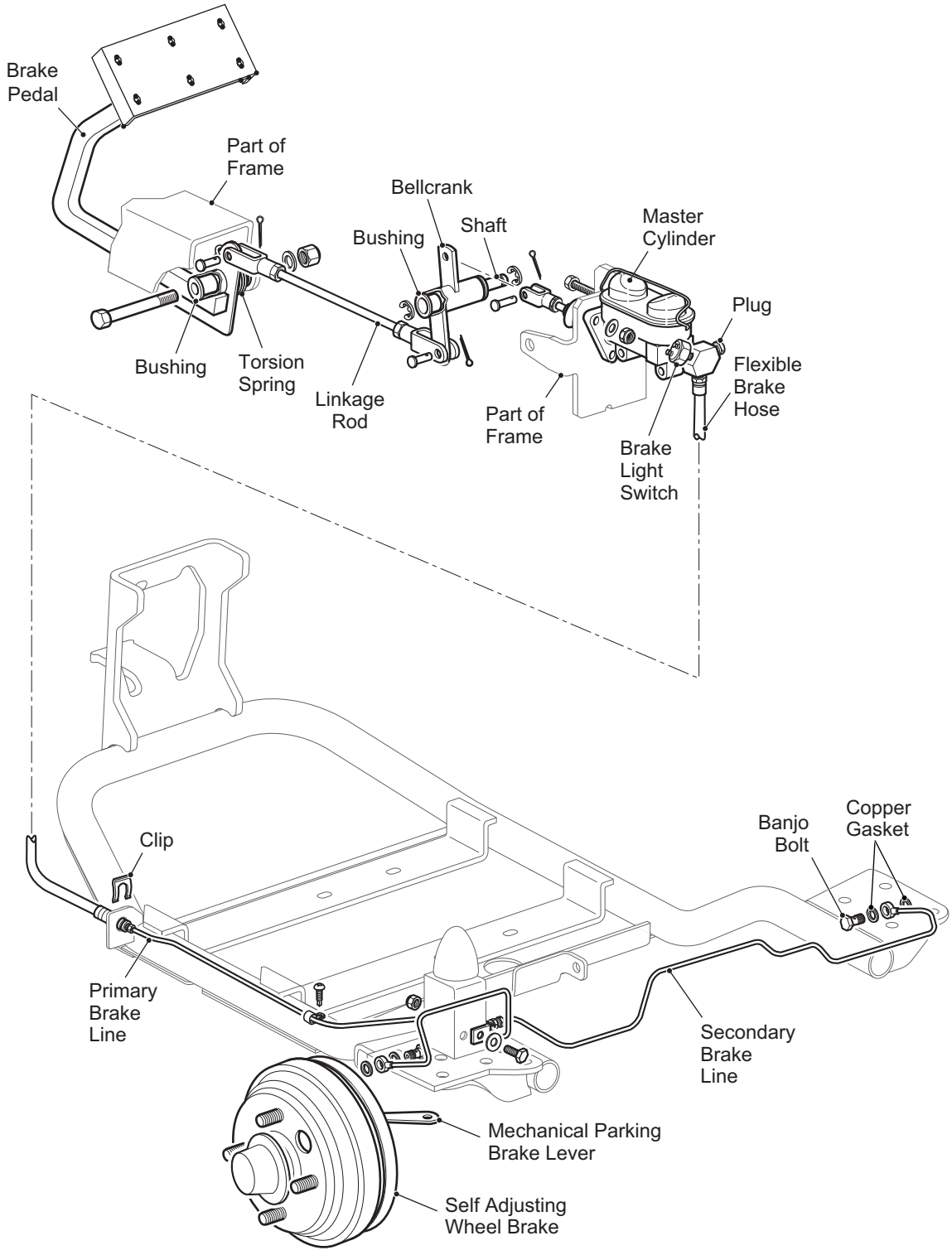

Fig. 1 Hydraulic Brake System Components

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

GENERAL

How The Hydraulic System Works

A hydraulic system actuates the rear brakes. The system transmits the power required to activate the friction surfaces (brake shoes) of the braking system from the pedal to the individual brake units at each wheel.

The hydraulic system operates as follows:

When at rest, the entire system is full of brake fluid. Upon application of the brake pedal, fluid trapped in front of the master cylinder piston is forced through the lines to the wheel cylinders. Here, it forces the pistons outwards against the brake shoes which in turn contact the brake drum. Upon release of the brake pedal, a spring located inside the master cylinder immediately returns the piston to the normal position. The brake shoe return springs retract the brake shoes and wheel cylinders which returns the brake fluid to its original position within the master cylinder.

Wheel Brake

The 160 x 30mm hydraulic brake is a leading-trailing design. The shoes are held to the backing plate by hold-down springs, pins, and spring retainers. The shoes are fitted to the anchor at the bottom and secured by a lower shoe to shoe spring. At the top, the shoe web rests on the wheel cylinder piston. The shoes are held to the wheel cylinder pistons by the upper shoe to shoe spring.

The wheel cylinders are of the double piston design, permitting even distribution of force to each shoe. There are no links. Shoes rest directly on the piston ends. Wheel cylinders incorporate external boots.

Brake adjustment is automatic. Adjustment takes place, if needed, whenever the brakes are applied, whether during a forward or reverse stop or when the vehicle is stationary. Upon any brake application, the shoes move outward contacting the drum. As the shoes move outward, the automatic adjuster levers (attached to each shoe by a pin) follow the shoe movement. The automatic adjuster pin is smaller than the slot in the brake shoe web; therefore, when the brakes are released, the shoes are allowed to return slightly, providing brake shoe to drum running clearance.

The rear brake includes a parking feature consisting of a lever and strut. The lever is applied by a cable attached to the parking brake lever (hand operated). The parking brake is used to retain the vehicle when stationary. It may also be used as an emergency brake in the event of hydraulic system failure.

MAINTENANCE

Daily Brake Performance Test

NOTICE

To assure correct braking performance, all periodic maintenance, inspections and procedures must be performed as indicated in the Periodic Service Schedule in Section A of this manual. **It is important that a Daily Brake Performance Test be performed and the entire brake system be serviced in accordance with the Periodic Service Schedule.**

The brake system must be bled whenever **any part of the brake system** has been replaced.

Depress brake pedal. The pedal should have some free play and then become hard. A brake pedal that has no free travel, excessive free travel or a spongy feel indicates a brake inspection is required. A brake pedal that falls after it is applied indicates a leak in the master or wheel cylinders. Check brake fluid level. Adjust brakes if required and inspect system for fluid leaks.

Brake System Inspection

Brake failure usually occurs as either a gradual decrease in braking effect from the shoe material being worn away, a loss of braking at one wheel or a sudden and complete failure with no brakes working except the parking brake. Should the brakes at one wheel become ineffective while the brakes at the other wheel functions properly, remove the wheel and drum. See 'BRAKE DRUM REMOVAL AND INSTALLATION' on page D-5. Inspect the brake for evidence of a leaking or inoperative wheel cylinder assembly.

NOTICE

Care should be taken to prevent brake fluid from coming into contact with the brake shoes. If the brake shoes should become wet with hydraulic fluid, remove the brake drum and wipe the brake shoes and drum until they are dry.

Complete brake failure usually indicates a loss of hydraulic fluid pressure.

The hydraulic system may be checked for leaks by applying pressure to the pedal gradually and steadily. If the pedal sinks very slowly to the floor, the system has a leak. This is not to be confused with a springy or spongy feel due to the compression of air within the lines.

Check for leaks along all lines and at brake assembly. If no external leaks are apparent, the problem is inside the master cylinder.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ CAUTION

Do not allow brake fluid to contact surfaces. Wipe off immediately.

After making any repairs to hydraulic lines, wheel cylinders or master cylinder, the brakes must be bled to remove any trapped air. A bleeder valve is located at each wheel cylinder for this purpose. See 'BLEEDING AND FLUSHING' on page D-9.

MASTER CYLINDER

Just like any other brake part, the master cylinder will eventually require replacement. The usual reason for a master cylinder failure is the cylinder seals (cups) deteriorate. Fluid leaks past the cups and shows as an external leak. A common symptom is a 'spongy' brake pedal that goes all the way to the floor when all the other brake components are in good condition. The rubber parts wear with usage or deteriorate with age or fluid contamination. Corrosion or deposits formed in the cylinder bore due to moisture or dirt in the hydraulic system may result in wear of the cylinder bore or related parts. Do not try to remove corrosion or deposits with a cylinder hone. If corrosion or deposits are present, discard master cylinder and replace with new one.

Brake Fluid

NOTICE

Hydraulic brake systems must be totally flushed if the fluid becomes contaminated with water, dirt or other corrosive chemicals. To flush, bleed the entire system until all brake fluid has been replaced with fresh DOT 3 standard automotive brake fluid.

It is important to maintain proper fluid levels in the master cylinder. The fill cap for the cylinder is located under the driver seat. To prevent contamination when checking fluid, wipe off any dirt from fill cap before removing it. Reservoir fluid level should be checked per 'PERIODIC SERVICE SCHEDULE' in Section A. When required, clean brake fluid should be added to maintain fluid level 1/4" (6 mm) from top of reservoir. Use fresh DOT 3 standard automotive brake fluid.

Master Cylinder Replacement

Tool List	Qty.
Insulated wrench	1
Shop towels	A/R
Catch pan	1
Wrench, 3/8"	1
Wrench, 5/8"	1
Needle nose pliers	1
Wrench, 9/16"	2
Wrench, 1"	1
Wrench, 7/16"	1
Teflon tape	A/R
Crowsfoot, 1"	1
Torque wrench, in. lbs.	1
Socket, 7/16"	1
Crowsfoot, 5/8"	1
Socket, 9/16"	1
Ratchet	1

⚠ WARNING

Wrap wrenches with vinyl tape to prevent the possibility of a dropped wrench 'shorting out' a battery, which could result in an explosion and severe personal injury or death.

⚠ CAUTION

During this process, it is likely that brake fluid will leak from the master cylinder. Avoid allowing brake fluid to contact the painted body components of the vehicle. Wipe off immediately.

Turn vehicle key to 'OFF' and remove. Insure all optional electrical accessories are turned OFF. At the battery, remove the negative (-) cables. Cover top of battery with a cloth or non-conductive material to prevent the possibility of a dropped wrench or metal object from 'shorting out' the battery.

Clean the area around the master cylinder to prevent dirt and grease from contaminating the hydraulic system.

Disconnect wire terminal block from brake light switch on top of branch tee (Ref Fig. 2 on page D-4).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

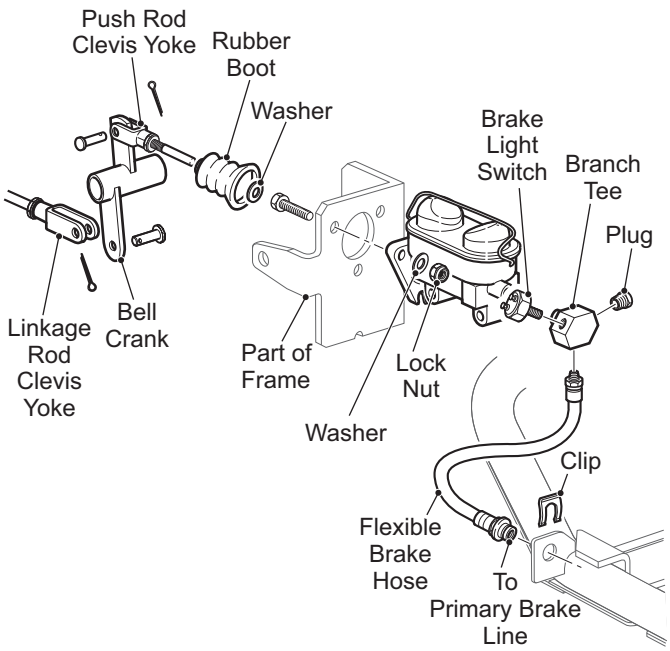

Fig. 2 Replacing Master Cylinder

Disconnect primary brake line where it connects to flexible brake hose. Provide a catch pan for the released brake fluid. Remove clip anchoring flexible brake hose to subframe.

Disconnect clevis yoke from upper arm of bellcrank in front of master cylinder. Disconnect linkage rod clevis yoke from lower arm of bellcrank to allow bellcrank to swing out of the way. Pull clevis yoke and push rod out of master cylinder and remove boot.

Remove three lock nuts, lock washers and bolts and remove master cylinder from vehicle.

Remove flexible brake hose from branch tee.

Remove brake light switch from branch tee.

Remove plug from branch tee.

Do **not** reuse existing branch tee on new master cylinder.

Install **new** branch tee on new master cylinder using teflon tape and tighten so that one of the three threaded holes points straight down toward the ground at 70 - 80 in. lbs. (8 - 9 Nm) torque.

Install plug into branch tee using teflon tape and tighten to 70 - 80 in. lbs. (8 - 9 Nm) torque.

Connect flexible brake hose to branch tee using teflon tape and tighten to 190 - 200 in. lbs. (21.5 - 22.6 Nm) torque. Anchor other end to subframe with clip. Connect primary brake line to flexible brake hose and tighten fitting to 70 - 80 in. lbs. (8 - 9 Nm) torque.

Install brake light switch into branch tee using teflon tape and tighten to 70 - 80 in. lbs. (8 - 9 Nm) torque.

Mount master cylinder to frame bracket using new lock nuts. Do **not** reuse original lock nuts. Tighten lock nuts to 28 - 32 in. lbs. (3 - 4 Nm) torque.

Insert push rod through rubber boot and washer into master cylinder (make sure rod is through washer inside boot). Snap rubber boot back onto master cylinder.

Install both clevis yokes back onto bellcrank using clevis pins and new cotter pins.

⚠ WARNING

To prevent brake failure resulting from contaminated brake fluid, never reuse any excess fluid or return to the original container. Dispose of brake fluid properly.

Fill reservoir with DOT 3 brake fluid and bleed brake system. See ‘BLEEDING AND FLUSHING’ on page D-9.

After bleeding brake system, check for leaks along all lines and at master cylinder.

Connect the negative (-) battery cables.

BRAKE LINKAGE

The brake pedal linkage is set at the factory. However, if the master cylinder should have to be replaced, the linkage may require adjustment.

The master cylinder is located under the driver seat and is connected to the brake pedal by clevis yokes, threaded rods and a bellcrank.

Adjustment

Tool List	Qty.
Wrench, 1/2”	1
Pliers	1
Crowsfoot, 1/2”	1
Torque wrench, in. lbs.	1

NOTICE

The master cylinder has built in free travel.

Distance between rubber bumper and bumper mounting plate should be 7/8” - 1" and the brake pedal arm should be approximately parallel to brake pivot bracket (Ref Fig. 3 on page D-4). If adjustment is needed, loosen lock nut and thread bumper in or out of mounting bracket as required and tighten lock nut to 13 ft. lbs. (18 Nm) torque.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

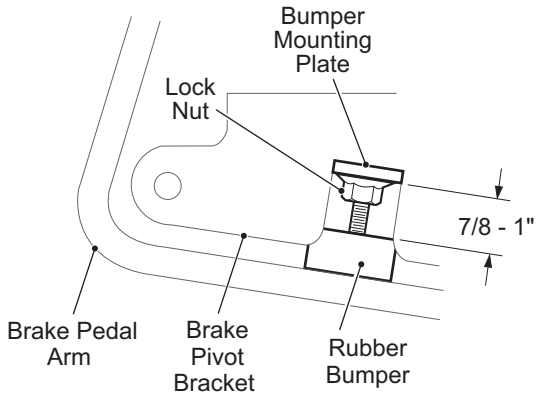

Fig. 3 Brake Pedal Bumper Adjustment

Remove cotter and clevis pins attaching linkage rod to brake pedal arm but maintain alignment of holes (Ref Fig. 4 on page D-5). At this position, the push rod on opposite arm of bellcrank should be against piston in master cylinder but should not be applying any force. If push rod is not against piston or is applying force, loosen jam nut at free end of linkage rod and thread clevis yoke forward or back as required. Tighten jam nut to 65 - 75 in. lbs. (7 - 8 Nm) torque.

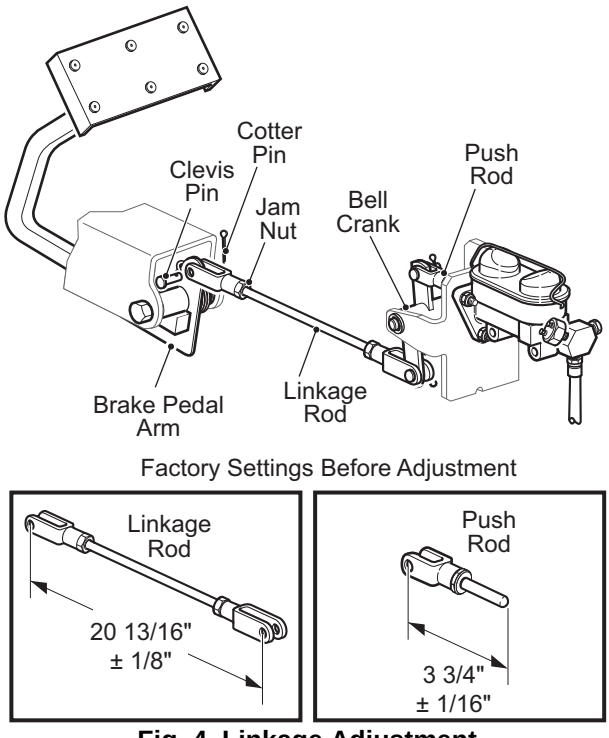

Fig. 4 Linkage Adjustment

Master cylinder piston should begin to move immediately upon any activation of the brake pedal.

BRAKE DRUM REMOVAL AND INSTALLATION

Tool List	Qty.
Slip joint pliers	1
Needle nose pliers	1
Socket, 1 1/8”	1
Ratchet	1
Drum puller (P/N 15947G1)	1
Wrench, 7/16”	1
Anti-seize compound	A/R
Torque wrench, ft. lbs	1

⚠ WARNING

***T**he drum must not be turned to ‘true’ a worn friction surface. Turning will make the drum too thin causing drum and brake failure which could cause severe injury or death.*

Wear a dust mask and eye protection whenever working on wheel brakes. Do not use pressurized air to blow dust from brake assemblies.

Remove cap to gain access to the castellated nut and the cotter pin (Ref Fig. 5 on page D-6).

Remove the cotter pin and castellated nut as shown.

NOTICE

Do not apply the brake when removing the nut as the shoes may not fully retract preventing removal of the brake drum.

Remove washer

Slide the brake drum from the axle shaft. If required, tap the drum with a plastic faced hammer to loosen it from the axle shaft or use drum puller (P/N 15947G1).

If shoes interfere with drum removal, rotate adjuster bolt on back side of backing plate towards the axle to retract shoes and remove brake drum.

NOTICE

Pay particular attention to the location of the inner brake drum washer inside the brake drum, which may be on the axle shaft or attached to the rear of the drum hub. This washer must be reinstalled when the brake is reassembled.

To install the brake drum, clean the axle shaft and the splines on the brake drum to remove dirt, grease and foreign matter. Apply a small amount of anti-seize compound to the axle spline. Install the inner brake drum washer and slide the brake drum into place. Check to insure the nose of drum hub is beyond the end of the

axle splines. If not, remove drum and install one additional inner brake drum washer (total of 2) to obtain required spacing. If two inner brake drum washers do not provide the required spacing, the brake drum is incorrect and must be replaced with a new drum.

⚠ CAUTION

Do not back off nut to install cotter pin.

Install the remaining hardware and tighten the nut to 70 ft. lbs. (95 Nm) torque. Continue to tighten until a new cotter pin can be installed through the castellated nut and the hole in the axle. Maximum torque is 140 ft. lbs. (190 Nm).

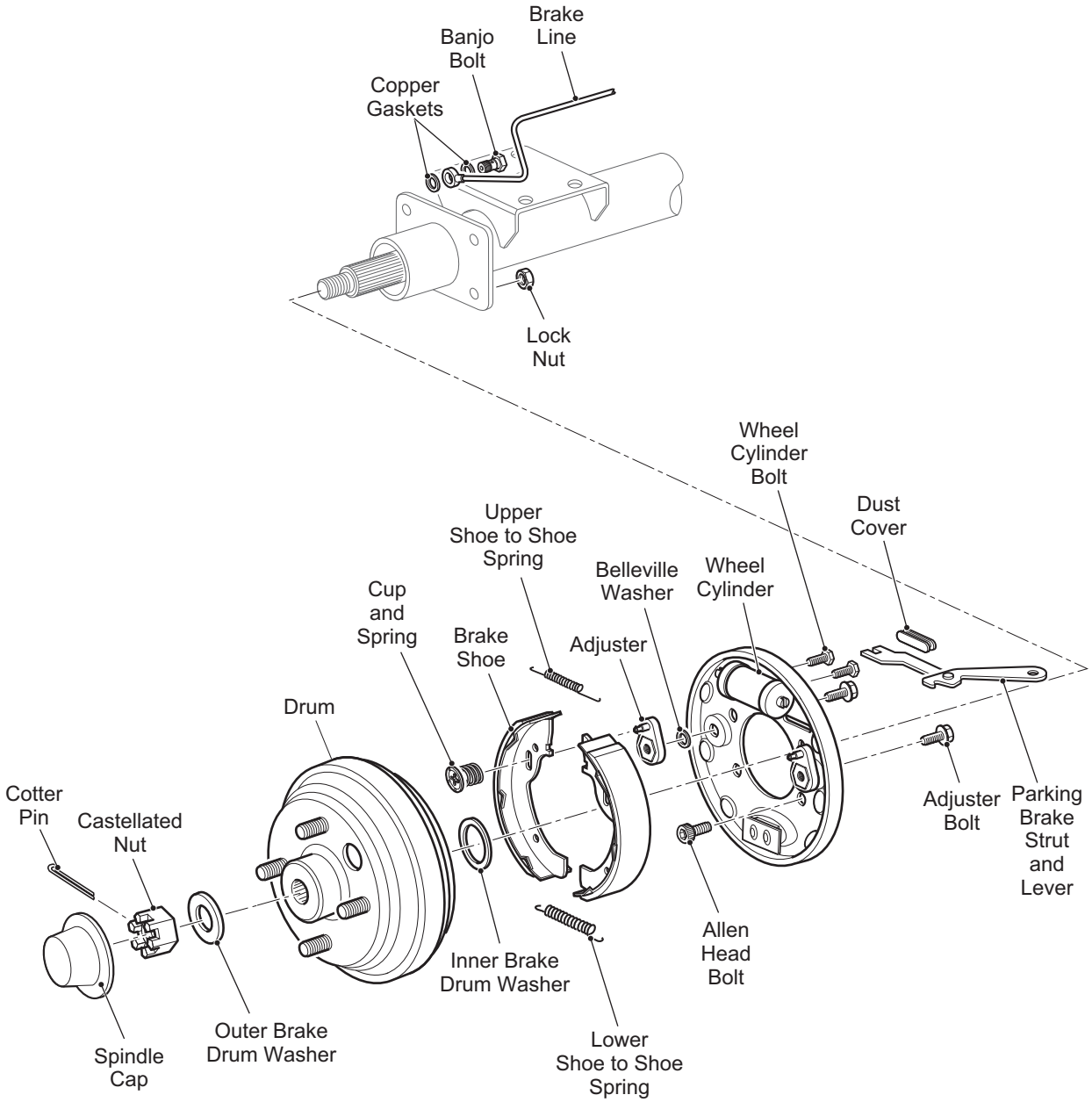

Fig. 5 Wheel Brake Components

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

WHEEL BRAKE SERVICE

Tool List	Qty.
Dust mask	1
Safety glasses	1
Socket, 3/4”	1
Ratchet	1
Wheel chocks	4
Hydraulic floor jack	1
Jack stands	2
Brush	1
Wheel cylinder clamp	1
Pliers	1
Wrench, 9/16”	1
Wrench, 10 mm	1
Cleaner	A/R
Shop towels	A/R
Socket, 7/16”	1
Torque wrench, in. lbs	1
Wire brush	1
Grease	A/R
High temperature lubricant	A/R
Socket, 10 mm	1
Socket, 9/16”	1
Locking pliers	1
Thread locking compound	1

Disassembly

⚠ WARNING

Wear a dust mask and eye protection whenever working on wheel brakes. Do not use pressurized air to blow dust from brake assemblies. Replace both brake shoes on both wheels if one or more shoes are worn below .06" (1.5mm) thickness at any point.

⚠ CAUTION

Do NOT touch any of the wheel brake mechanism except as instructed.

Do NOT use a commercial brake cleaner unless the entire brake has been disassembled.

Be sure that the parking brake is released.

Loosen rear wheel lug nuts and lift rear of vehicle per Section B.

Remove wheel and drum. See ‘BRAKE DRUM REMOVAL AND INSTALLATION’ on page D-5. Remove excess dust and dirt from the drum with a brush.

Remove any accumulated brake dust from the wheel brake assembly with a brush.

Install wheel cylinder clamp, then unhook upper and lower shoe to shoe springs.

Remove parking brake strut and lever.

Remove shoe hold-down springs and remove shoes.

If the wheel cylinder must be removed, begin by loosening and removing the brake line from the back of the wheel cylinder. Next remove the wheel cylinder bolts and remove the wheel cylinder from the backing plate.

Cleaning and Inspection

⚠ WARNING

The drum must not be turned to ‘true’ a worn friction surface. Turning will make the drum too thin causing drum and brake failure which could cause severe injury or death.

Inspect the brake drum. Look for a blue coloration or blistered paint that would indicate that it has overheated. Check for evidence of scoring. Check for excessive wear indicated by the friction surface being significantly worn and leaving a ledge of unworn drum. Inspect the splines for galling, wear and corrosion. If any of these problems are found, the drum must be replaced.

Visually inspect the axle seal for oil leakage and the condition of the thrust washer. If oil is present, see REAR AXLE section.

Verify the inner brake drum washer is present and check its condition. Replace if damaged or missing.

Clean the backing plate with an approved cleaner for this purpose.

⚠ WARNING

A backing plate assembly that shows any indication of galling or gouging is not repairable and must be replaced with a new wheel brake assembly. Always replace wheel brake assemblies in pairs.

Inspect the backing plate. Inspect for gouges, galling or other damage, particularly where the backing plate is contacted by the brake shoes. Be sure shoe ledges are smooth and free of rough edges. Replace both wheel brake assemblies if any gouges or galling is found.

Measure the brake shoe thickness. Measure at the most worn area. Brake shoe thickness must never be less

than .06" (1.5 mm) at any point on the shoe. It is normal for the shoes to show more wear at the leading and trailing edges. If the brake shoe thickness is approaching .06" (1.5 mm), it is recommended that the shoes be replaced. It is recommended that the brake shoe springs and brake adjusters be replaced when installing new brake shoes

Check springs for loss of tension and damage. Replace weak springs and any damaged or badly worn parts.

Check adjuster operation. Insure that each adjuster will move with approximately 30 - 50 in. lbs. (3.4 - 5.6 Nm) of torque. If adjusters are frozen, badly worn or loose, replace the adjuster assembly. See ‘Replacing an Adjuster’ on page D-8.

Replace the wheel cylinder if there is any sign of leakage.

Insure that the parking lever and strut assembly can be easily moved by hand. If necessary, this assembly can be serviced as follows:

Disassemble by removing the C-clip. Wire brush contact surfaces to remove any corrosion and contaminants. Lightly grease the pin and contact surfaces before reassembly.

⚠ WARNING

Insure that the C-clip is completely seated in its' groove when finished. Failure to do so could result in a non-functioning parking brake if the clip comes off.

Reassembly

Apply a light coat of high temperature lubricant to shoe support points on the backing plate, to adjuster pin, and to anchor.

Position the adjusters so that the pins are at the 12 o'clock position.

If the wheel cylinder was removed, install it now into the backing plate. Insert and tighten the wheel cylinder mounting bolts to 120 in. lbs. (14 Nm) torque. Reconnect and tighten the brake fluid line to 124 - 177 in. lbs. (14 - 20 Nm) torque.

Position shoes on backing plate and install hold-down springs.

Install parking brake strut with tab on strut engaged in brake shoe web.

Place upper end of shoe webs against wheel cylinder, and install upper shoe-to-shoe spring. Remove wheel cylinder clamp.

Install lower shoe-to-shoe spring.

Install wheel and drum. See ‘BRAKE DRUM REMOVAL AND INSTALLATION’ on page D-5.

Pre-adjust shoes by rotating adjuster nut away from the axle until shoes contact drum and then back off just enough to eliminate drag.

Replacing an Adjuster

Replace the adjuster assembly if the adjuster requires more than 50 in. lbs. (5.6 Nm) torque to rotate.

Secure the adjuster arm with locking pliers and remove the bolt on the back side of the backing plate with a wrench or socket. The bolt may shear off which is acceptable. Remove and discard all adjuster components.

Clean the backing plate surfaces that contact with the adjuster.

Prepare to install the new adjuster by applying a light coat of grease to the belleville washer. Install the washer onto the adjuster arm with arch up as shown in the illustration (Ref Fig. 6 on page D-8)

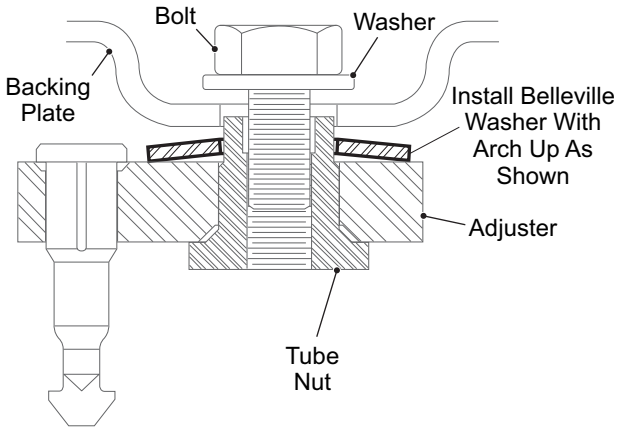

Fig. 6 Installing Belleville Washer

Apply thread locking compound to the bolt. Insert the nose of the tube nut into the backing plate. Install the bolt into the tube nut and tighten to 110 - 120 in. lbs. (12 - 14 Nm) torque.

Although not strictly necessary, it is recommended to replace both adjusters if one is found to require replacement.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Adjustment

After the brake system has been bled, make 3 to 10 forward and reverse stops by applying firm pressure to the brake pedal on each stop to bring shoes to proper adjustment.

WHEEL BRAKE ASSEMBLY REPLACEMENT

Tool List	Qty.
Socket, 3/4”	1
Ratchet	1
Wheel chocks	4
Hydraulic floor jack	1
Jack stands	2
Socket, 1/4” hex bit	1
Ratchet	1
Socket, 1/2”	1
Socket, 9/16”	1
Needle nose pliers	1
Torque wrench, in. lbs	1
Torque wrench, ft. lbs	1

⚠ WARNING

If one wheel brake assembly requires replacement, the second must also be replaced. Wear a dust mask and eye protection whenever working on wheel brakes. Do not use pressurized air to blow dust from brake assemblies.

Be sure that the parking brake is released.

Loosen rear wheel lug nuts and lift rear of vehicle per Section B.

Remove wheel and drum. See ‘BRAKE DRUM REMOVAL AND INSTALLATION’ on page D-5.

Loosen the four allen head bolts and lock nuts securing the wheel brake backing plate to the flange on the axle tube (Ref Fig. 5 on page D-6). Remove banjo bolt to detach brake line from wheel cylinder. Remove the four allen head bolts and lock nuts and discard.

Remove the clevis pin securing the park brake cable to the wheel brake lever.

Installation is the reverse of removal. Connect the brake cable to the wheel brake lever with the clevis pin installed from the top down and a new cotter pin. Loosely install wheel brake assembly to axle tube flange using new hardware. Attach brake line to wheel cylinder using new copper gaskets and tighten banjo bolt to 124 - 177 in. lbs. (14 - 20 Nm) torque. Tighten allen head bolts and lock nuts to 23 - 27 ft. lbs. (31 - 37 Nm) torque.

BLEEDING AND FLUSHING

Tool List	Qty.
Shop towels	A/R
Hose	A/R
Clean container	1
Brake fluid, DOT 3	A/R
Wrench, 1/4” box end	1
Crowfoot wrench, 1/4”	1
Torque wrench, in. lbs.	1

Bleeding

The brake hydraulic system must be free of air to function properly. Any air in the system is compressed when pressure is applied, and the result is a springy, spongy brake pedal.

Air may enter the system if any of the hydraulic parts are disconnected or if the brakes are operated with the master cylinder fluid very low.

The process of removing any air that may be trapped in the hydraulic system is known as bleeding the brakes.

Bleeding requires the use of the brake pedal and master cylinder as a hydraulic pump to expel air and brake fluid from the system when a bleeder screw is opened.

Bleed the complete hydraulic system at both wheels if …

- Primary brake line was disconnected from the flexible brake hose
- Air was introduced into the system through low fluid level in master cylinder reservoir.

If a line or hose was disconnected at any fitting located between the master cylinder and the wheel cylinders, then all wheel cylinders served by the disconnected line or hose must be bled.

Bleeding Sequence

Bleed at each wheel cylinder in succession, beginning with the passenger side wheel, which is farthest from the master cylinder, and then the driver side wheel.

⚠ WARNING

Never reuse any excess fluid or return to the original container. Dispose of brake fluid properly.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTICE

An assistant will be necessary to perform this procedure.

Use a clean cloth to wipe off the master cylinder reservoir and wheel cylinder bleeder valves (Ref Fig. 7 on page D-10). Clean each fitting before opening to prevent contaminating the system.

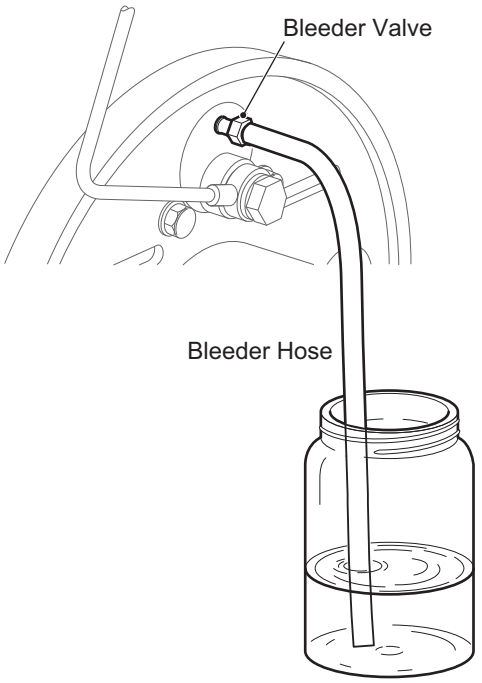

Fig. 7 Bleeder Valve

Fill master cylinder reservoir to within 1/4” (6 mm) of top with new brake fluid before starting and after bleeding is completed.

Check the master cylinder fluid level frequently during bleeding and keep the reservoirs at least one-half full.

The following steps apply to one bleeder screw and should be repeated at both bleeder points.

1. Attach a bleeder hose to the bleeder screw. Place the other end of the hose in a glass jar partially filled with brake fluid.

NOTICE

Be sure that the free end of the hose is submerged in brake fluid. This helps to show up air bubbles as they come out of the system, and prevents air from being accidentally sucked into the system through the bleeder screw

2. Apply moderate (40 - 50 lbs. [18 - 23 kg]), steady pressure on the brake pedal, and open the bleeder screw.

⚠ CAUTION

Do not force brake pedal to floor. The operating rod jam nut could be forced into master cylinder where it could damage internal components.

3. If the brake pedal goes to the floorboard without removing all of the air bubbles, close the bleeder screw and release the brake pedal slowly. Then repeat Steps 2 and 3.

NOTICE

The bleeder valve at the wheel cylinder must be closed at the end of each stroke and before the brake pedal is released to insure that air cannot enter the system. It is also important that the brake pedal be returned to full ‘up’ position.

4. When fluid coming from the submerged end of the hose is clear and free of bubbles, close the bleeder screw and release the brake pedal. Tighten bleeder screw to a maximum torque of 38 in. lbs. (4.3 Nm).

Flushing

The process of removing old brake fluid to rid the system of water, mineral oil or other contaminants is called flushing the hydraulic system. The flushing procedure is the same as bleeding except that a greater quantity of brake fluid is discharged from each bleeder point to be sure that all of the dirty or contaminated fluid is removed.

BRAKE PEDAL REMOVAL AND INSTALLATION

Tool List	Qty.
Needle nose pliers	1
Straight blade screwdriver	1
Socket, 9/16”	1
Ratchet	1
Wrench, 3/4”	1
Torque wrench, ft. lbs.	1

Disconnect the linkage rod from the brake pedal by removing the cotter pin and the clevis pin. Unhook the torsion spring by inserting a thin blade screwdriver between the small hook and the bracket. Move the hook back and to the side to release the torsion spring (Ref Fig. 8 on page D-11).

Remove the lock nut, the shoulder bolt and remove the brake pedal.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

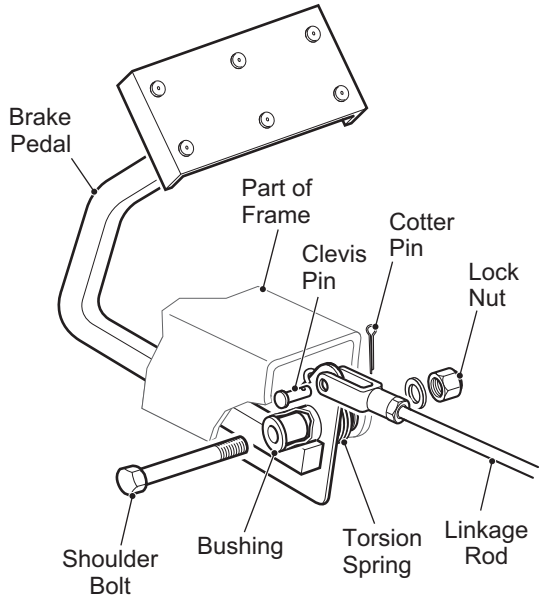

Fig. 8 Removing and Installing Brake Pedal

Inspect the shoulder bolt for corrosion that could cause binding. This bolt and both bushings must be replaced with new ones if corrosion or wear is found.

Brake pedal installation is in the reverse order of disassembly. Tighten the nut to 25 - 29 ft. lbs. (34 - 39 Nm) torque and use a new cotter pin when installing the linkage rod.

PARKING BRAKE

The rear brake includes a parking feature consisting of a wheel brake lever and strut. The wheel brake lever is applied by a cable attached to the parking brake lever (hand or foot operated). The parking brake is used to retain the vehicle when stationary. It may also be used as an emergency brake in the event of hydraulic system failure.

The hand operated parking brake lever is located at the right side of the driver in the console between the front seats (Ref Fig. 9 on page D-12).

Lubrication

⚠ CAUTION

When lubricating parking brake, be sure to use the recommended dry spray lubricant. Commercial grease can attract dirt and accelerate wear.

The hand operated parking brake lever requires periodic lubrication with a dry graphite or molybdenum disulfide lubricant. Raise the lever and spray into the underside to access the pivot arm and ratchet mechanism of the parking brake. See Section A - Periodic Service Schedule for recommended lubrication schedule.

Adjustment

The parking brake adjustment is made at the clevis yoke on the end of the parking brake lever cable located under the front seats (Ref Fig. 9 on page D-12).

Loosen jam nut at clevis yoke.

Remove cotter and clevis pin attaching clevis yoke to equalizer.

Rotate clevis yoke up or down the threaded end of cable and reconnect to equalizer to check tension. Correct tension is when, at the sixth click of the hand operated parking brake lever, vehicle movement is prevented while under a load on a typical area slope. Readjust if necessary

Tighten jam nut firmly against clevis yoke to secure.

Cable Replacement

Cables should be replaced when they become inoperable. Cable replacement consists of first removing the cotter and clevis pins securing the cable to the equalizer and wheel brake levers. Then remove the retaining rings securing the cable to the frame and subframe. Install new cable in reverse order of removal and adjust parking brake system per instructions above.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

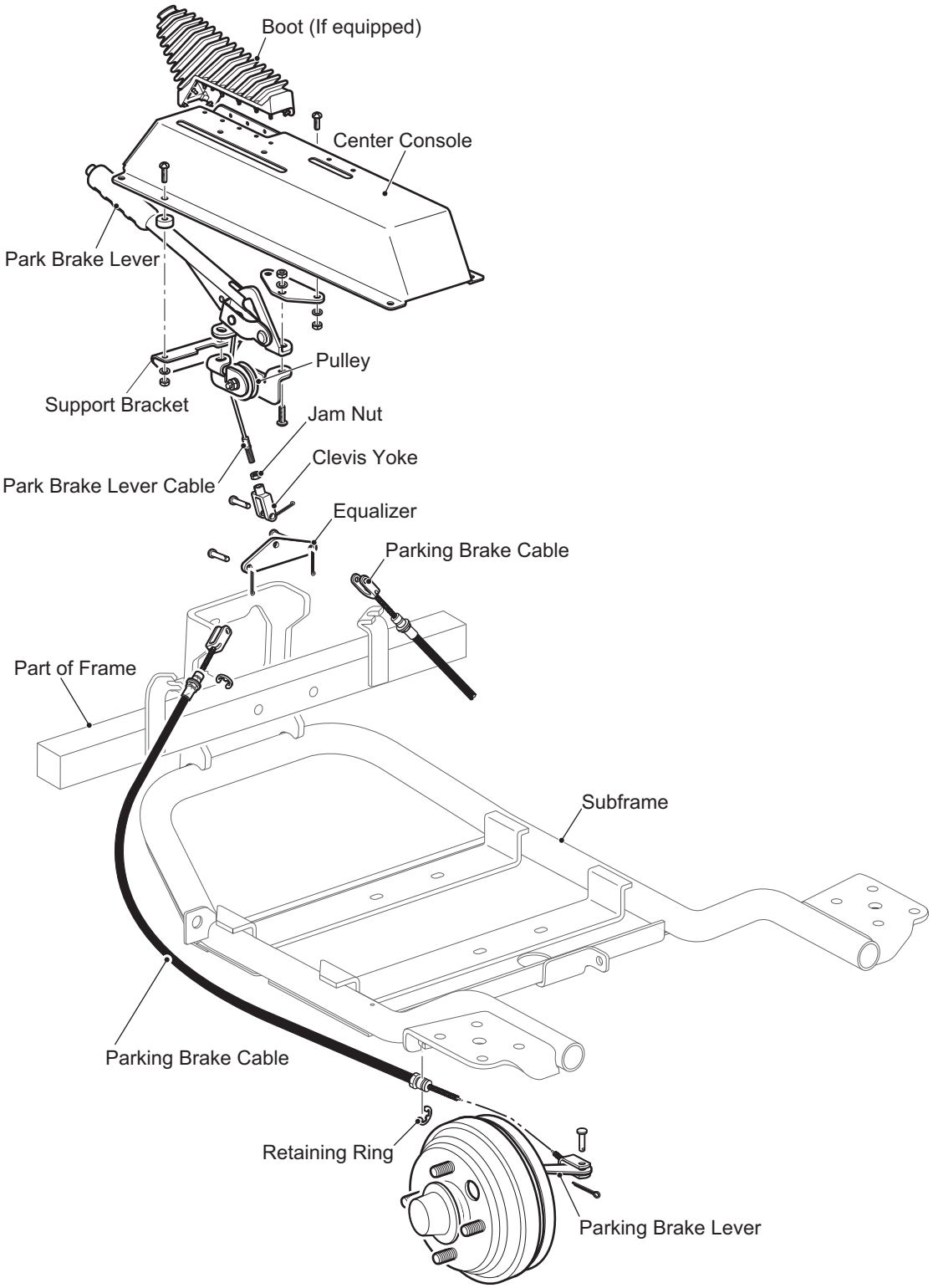

Fig. 9 Parking Brake System Components

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

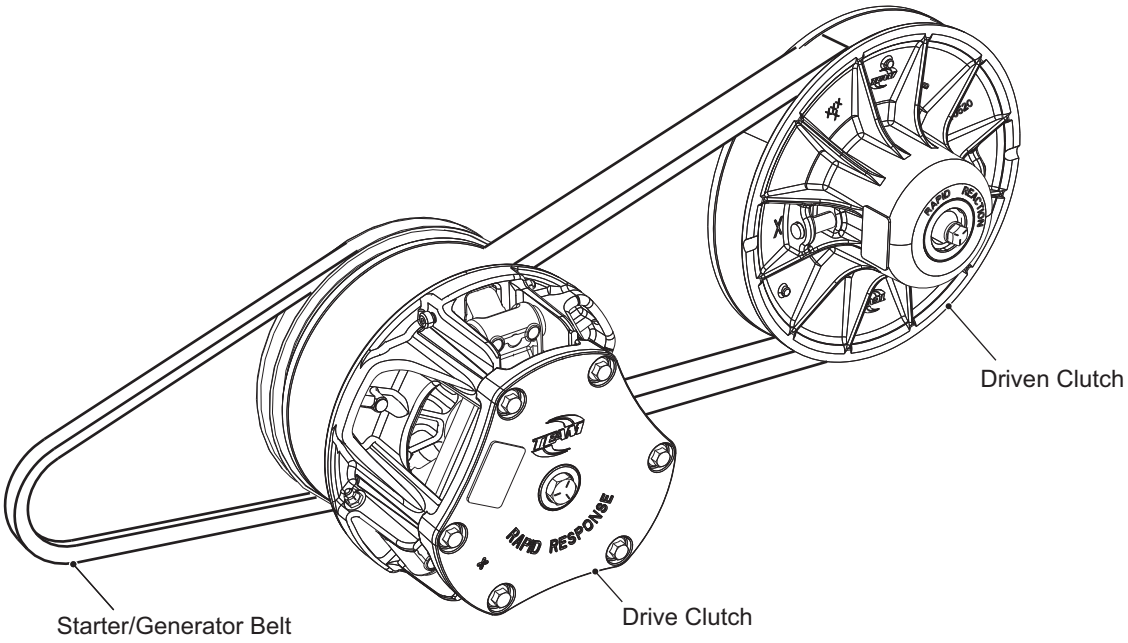

Fig. 1 Continuously Variable Transmission System (CVT)

GENERAL

Power transmission from the engine to the rear axle is by means of a continuously variable transmission (CVT). The CVT consists of two matched clutch units joined by a drive belt (Ref. Fig. 1). The engine mounted drive clutch is a centrifugal unit that responds to engine speed and the rear axle mounted driven clutch is a load sensing unit.

CLUTCHES

Drive Clutch

When the accelerator is depressed, the engine speed is increased which causes the cams (weights) within the centrifugal drive clutch to move outwards and force the moveable sheave inwards. The drive belt is engaged by the clutch sheaves and begins to rotate. At this point, the ratio between drive and driven clutch is approximately 3:1.

As the engine speed continues to rise, the drive clutch sheave continues to move inwards forcing the drive belt to the outer diameter of the drive clutch sheaves which increases the speed of the belt. The ratio is greatly decreased and provides maximum speed.

When the accelerator is released, the engine speed is decreased and the cams exert less pressure on the moveable sheave which is forced outwards against the cams by a compression spring. The drive belt disengages from the clutch sheave when engine speed is reduced to the point where the cams exert less force than the spring.

Driven Clutch

The driven clutch sheaves are closed at rest which results in the drive belt being held at the outer diameter of the driven clutch. The driven clutch has no weights but is held closed by a torsion spring which is joined to the moveable sheave and a torque ramp (cam) that is attached to the fixed sheave. The moveable sheave slides against the cam with the three points of contact provided by low friction ‘buttons’.

As the drive belt starts to rotate, the driven clutch starts to rotate. As the speed of the drive clutch increases and the belt starts to climb the sheaves, the driven clutch responds by being forced open in order to permit the belt to ride lower in the driven clutch sheaves. The sheaves overcome the pressure exerted by the torsion spring and cam.

As the driven clutch slows, the belt rides lower in the drive clutch sheaves. The driven clutch compensates by closing in response to the torsion spring and cam.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Increased Load

When a vehicle traveling at governed speed begins to climb a grade or is subjected to other increased load conditions, a change in wheel speed is detected by the clutch system and the drive belt seeks a position where it can achieve adequate friction to overcome the load change. The belt moves outwards on the driven clutch which closes due to the torsion spring moving the moveable sheave against the torque ramps. The movement of the drive belt overcomes some of the centrifugal force exerted by the cams in the drive clutch. This forces the belt lower into the drive clutch which increases the drive ratio. This 'downshifting' applies more torque to the rear axle without an appreciable change to the engine speed since the governor opens the carburetor in direct response to the reduction in ground speed.

Equilibrium

The CVT functions because the drive and driven clutches maintain equilibrium. Clutch sets are tuned to the vehicle that they are designed to operate. Changes in vehicle weight or desired performance characteristics require that both clutches be tuned to the needs of the vehicle and remain compatible with each other.

Drive Clutch Removal

Tool List	Qty.
Plastic faced hammer	1
Socket, 5/8”	1
Ratchet	1
Clutch puller (PIN 19779G2)	1
Impact socket, 13/16”	1
Impact wrench	1
Thread locking adhesive	AR
Torque wrench, ft. lbs.	1

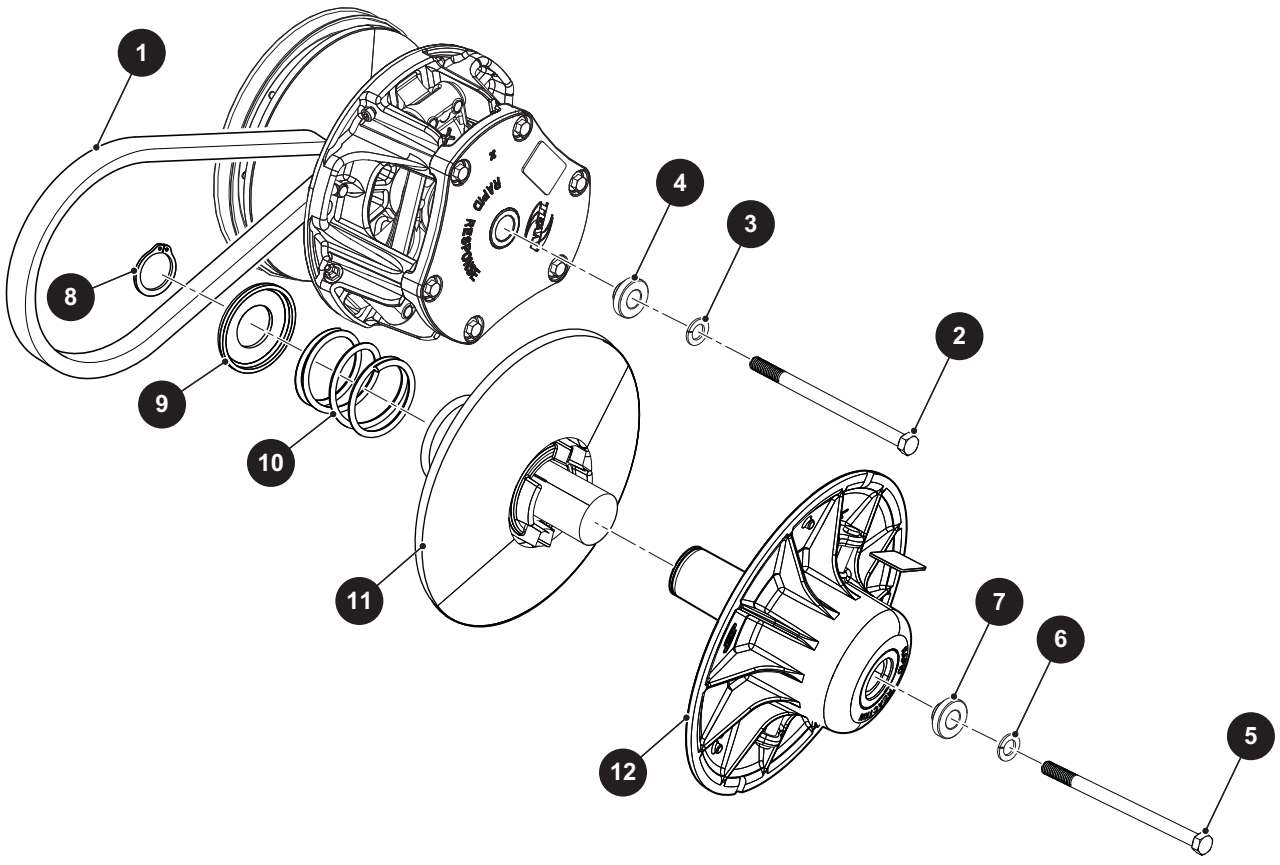

Fig. 2 CVT Components

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ WARNING

To prevent burns and other possible injuries:

Disable the electrical system before attempting to remove the drive belt to prevent the engine from inadvertently starting.

Be sure that the engine and exhaust components have cooled before attempting any service.

Do not allow fingers to become trapped between the belt and clutch sheave.

Use only sockets designed for use with an impact wrench. Never use a socket intended for use with hand tools.

Remove the drive belt (1). See 'Removing the Drive Belt' on page E-4. Remove the starter/generator belt per ENGINE section.

Remove the clutch bolt (2), lock washer (3) and pilot washer (4) (Ref Fig. 2 on page E-2). Insert a greased clutch puller and tighten (clockwise) using an impact wrench which will remove the clutch from the engine crankshaft.

NOTICE

In some extreme cases, the clutch may not separate from the crankshaft. Remove the clutch puller and fill the cavity with grease. Replace the clutch puller and tighten it with the impact wrench. The combined mechanical and hydraulic effect will remove the clutch. Remove all excess grease.

Drive Clutch Installation

⚠ CAUTION

To prevent damage to the clutch, be sure to remove all grease from the body of the clutch since grease penetrating the seal may cause premature clutch failure.

Do not install the bolt with an impact wrench.

Clean both the engine crankshaft and the drive clutch bore. Slide the clutch onto the engine crankshaft and rotate the clutch while lightly pushing the moveable sheave in and out several times to seat the clutch with the tapered crankshaft (Ref Fig. 2 on page E-2).

Install the lock washer (3) and the large pilot washer (4) onto the clutch bolt (2).

Apply thread locking adhesive to the threads of the clutch bolt and install and tighten to 40 ft. lbs. (55 Nm) torque.

Driven Clutch Removal

Tool List	Qty.
External snap ring pliers	1
Socket, 5/8”	1
Ratchet	1
Phillips screwdriver	1
Thread locking adhesive	AR
Socket, Phillips screwdriver bit	1
Torque wrench, in. lbs.	1
Anti-seize compound	AR
Torque wrench, ft. lbs.	1

Remove the drive belt (1) (Refer to 'Removing The Drive Belt' procedure elsewhere in this section).

Remove the clutch bolt (5), the lock washer (6) and the pilot washer (7) and slide the clutch from the rear axle input shaft.

Driven Clutch Repair

NOTICE

Parts must be reassembled in same position as their original position. Mark all components to facilitate accurate reassembly.

Some minor field repairs may be made to the driven clutch. Remove the retaining ring (8) and remove the torque ramp (Ref Fig. 2 on page E-2). Remove the spring (10) and the moveable sheave (11).

Inspect the shaft for signs of wear and inspect the bushings for signs of deterioration. If there is wear to the point of causing vibration, the clutch must be replaced.

Driven Clutch Assembly

Assemble the moveable sheave (11) to the fixed sheave (12) and insert the spring (10) in the pilot hole in the moveable sheave (Ref Fig. 2 on page E-2). Insert the ther end of the spring in the torque ramp (9) and rotate the ramp counterclockwise 140° before engaging the splines and inserting the retaining ring (8).

Driven Clutch Installation

Coat the rear axle input shaft with a light coating of anti-seize compound and slide the clutch onto the shaft (Ref Fig. 2 on page E-2). Install the lock washer (6) and pilot washer (7) to the clutch bolt (5) and apply thread locking

adhesive to the threads of the clutch bolt. Install the bolt and tighten to 14 - 17 ft. lbs. (19 - 23 Nm) torque.

DRIVE BELT

Removing the Drive Belt

With the vehicle on level ground, remove the drive belt by pulling the belt upwards which will cause the driven clutch sheaves to open and loosen the belt tension (Ref Fig. 3 on page E-4). The belt may then be rolled off the driven clutch.

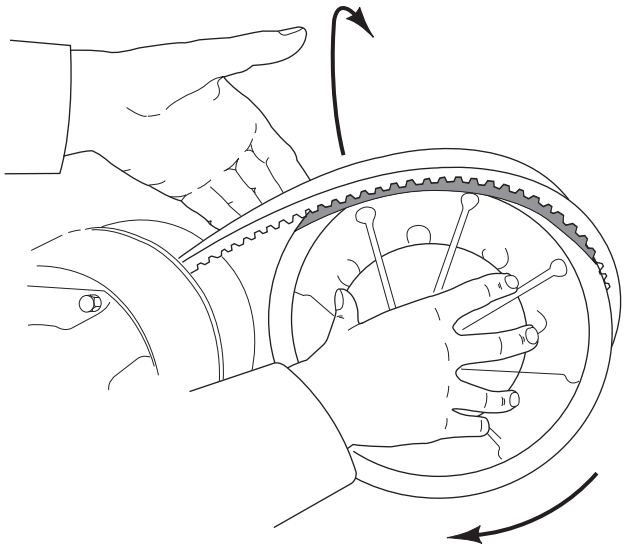

Fig. 3 Removing the Drive Belt

Drive Belt Service

The drive belt will require no service unless the vehicle has been operated in an extremely dusty or muddy location in which case it should be washed with plain water. If the belt becomes frayed or badly worn, it must be replaced.

STORAGE

If the vehicle is to be out of service for an extended period of time, the clutches should **not** be coated with any protecting spray. The drive clutch sheaves may develop some surface rust which will be removed within a few minutes of running time. The driven clutch is aluminum and requires no treatment.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

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Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

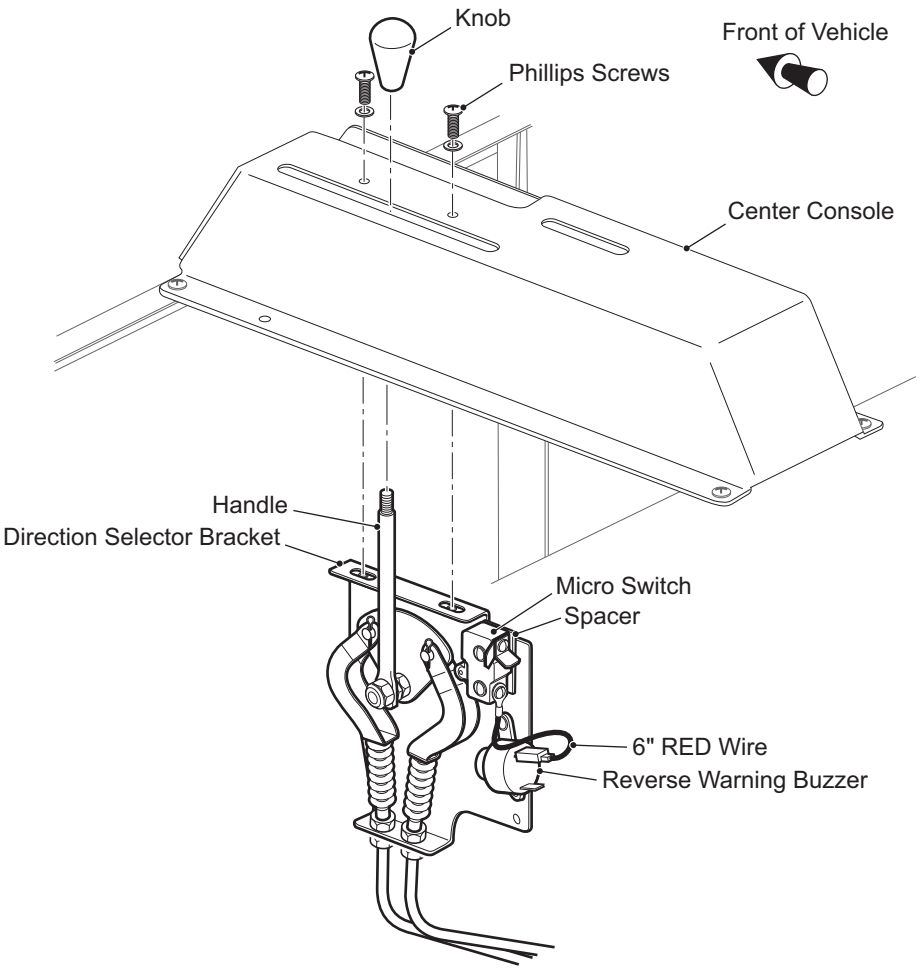

Fig. 1 Direction Selector

DIRECTION SELECTOR

Removing Direction Selector

Tools List	Qty.
Insulated Wrench, 1/2"	1
Phillips Screwdriver	1

NOTICE

Always observe the following warnings when working on or near batteries:

⚠ WARNING

To prevent an electrical arc that could cause an electrical explosion, be sure that the key switch is off and all electrical accessories are turned off before starting work on vehicle.

Never disconnect a circuit under load at a battery terminal.

The battery negative (-) cable must be removed before starting work on vehicle.

Wrap wrenches with vinyl tape to prevent the possibility of a dropped wrench from 'shorting out' a battery, which could result in an explosion and severe personal injury or death.

Before replacing a suspect direction selector or replacing the buzzer or micro switch, insure the shift cables are properly adjusted, the electrical wires are firmly attached and the wire is in good condition. Test suspect component to insure it is not in good condition before

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

replacing. It is not necessary to remove the direction selector assembly to replace the reverse buzzer or micro switch.

Prior to removing the direction selector from the body, the battery negative (-) cable(s) must be disconnected to prevent the possibility of electrical spark or 'shorting out' the battery, either of which could result in an explosion and severe personal injury or death.

Unscrew knob from the direction selector handle (Ref Fig. 1 on page F-1). Remove the two screws attaching the direction selector bracket to the center console and remove direction selector from vehicle.

Install in reverse order of removal.

After replacing direction selector, the shift lever must be checked for proper operation of the direction selector and cables must be checked for correct length to insure full engagement of 'Forward' and 'Reverse' at the rear axle when selected by the shift lever. See 'Shift Cable Adjustment' on the same page.

Replacing the Reverse Warning Buzzer

Tools List	Qty.
Test Leads	2
Straight Blade Screwdriver	1
Wrench, 5/16"	1

Before replacing the warning buzzer, test it to insure it is not working properly. To test the reverse warning buzzer, carefully remove the two electrical wires from the buzzer. Using two test leads, attach one lead to each terminal. Touch the loose end of one wire to the positive (+) battery terminal and the other wire to the negative (-) terminal. If the buzzer is in good condition the buzzer will sound. If no sound is heard, the buzzer must be replaced.

Remove the wires from the failed buzzer and attach the wires to the replacement buzzer. Test as above to insure replacement buzzer is in good condition. After restoring power, test the wiring to insure it is operational by connecting wires to replacement buzzer and moving the direction selector to 'REVERSE' position before continuing. Once it is determined that the buzzer and wiring are good, remove the failed buzzer from the direction selector assembly and replace with new buzzer.

Replacing a Micro Switch

Tools List	Qty.
Digital Volt Ohm Meter (DVOM)	1
Phillips Screwdriver	1
Wrench, 5/16"	1
Socket, 5/16"	1
Torque Wrench, in. lbs.	1

To test a micro switch, carefully remove the two electrical wires from the switch terminals. Using a DVOM set to 'continuity', test the switch continuity by operating the switch to insure it is not good before continuing. Once it is determined that the switch is not good, remove the failed switch from the direction selector assembly, keeping the spacer for reuse, and replace with new micro switch. Tighten the brass screw attaching the wires to the switch and the screws attaching the switch to the assembly to 8 - 11 in. lbs. (0.7 - 0.9 Nm) torque.

Shift Cable Adjustment

Tools List	Qty.
Wrench, 3/8"	1

NOTICE

To assure proper engagement of the transmis. . sian, the shift cable length must be maintained.

The direction selector is a mechanical device that operates cables connected to the rear axle. The cables are sealed and do not require lubrication, but may require occasional adjustment. The factory installed length of 1 3/8" (3.5 cm) must be maintained (Ref Fig. 2). The only other maintenance required is periodic lubrication of the linkage and related moving parts.

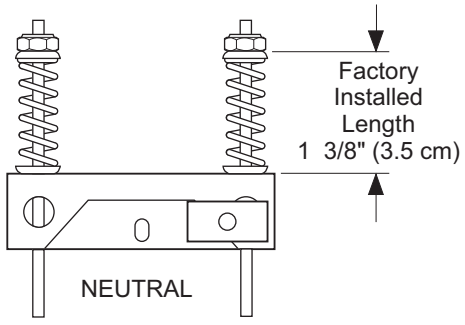

Fig. 2 Shift Cable Adjustment

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

DIRECTION SELECTOR

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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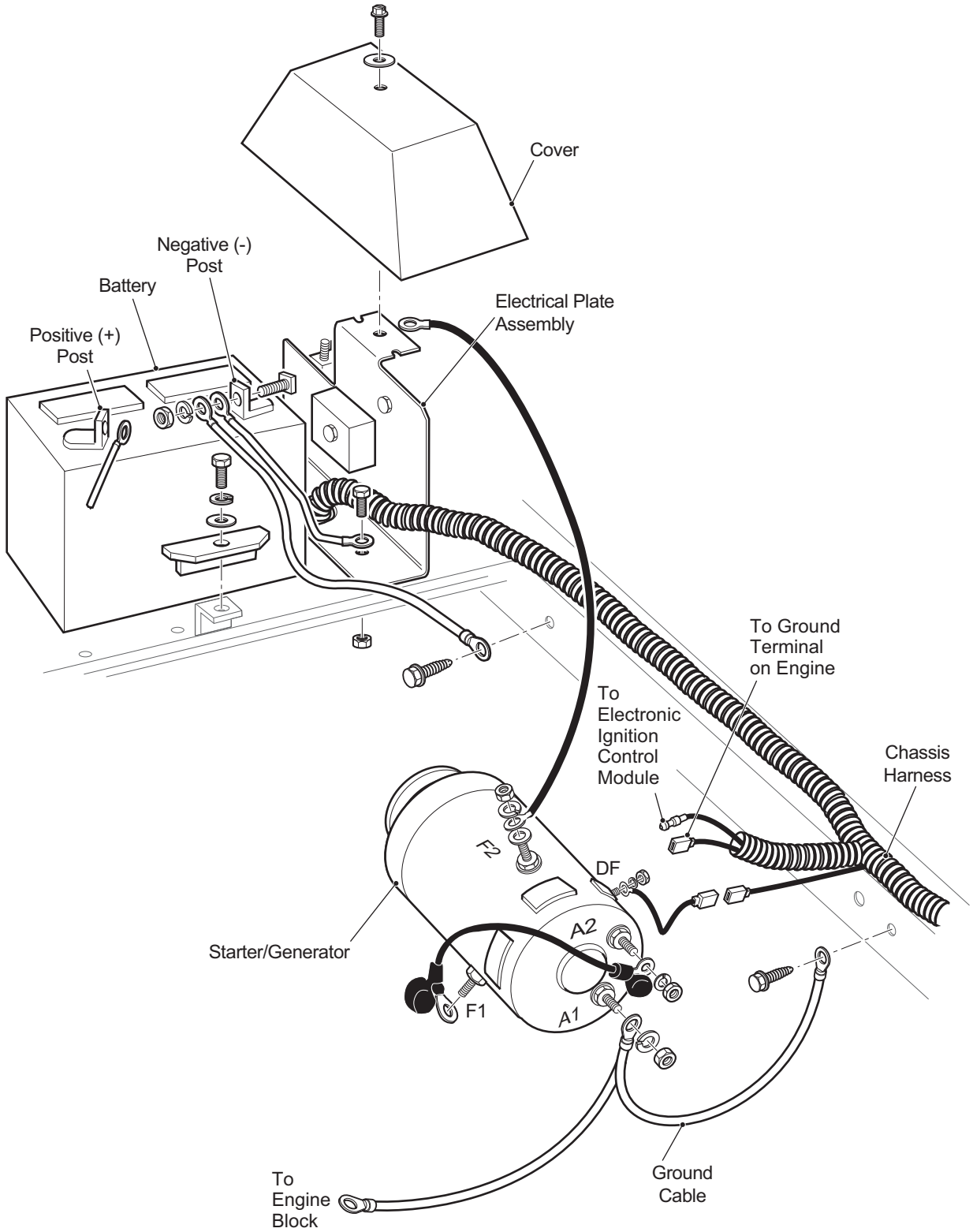


Fig. 1 Electrical System Components

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

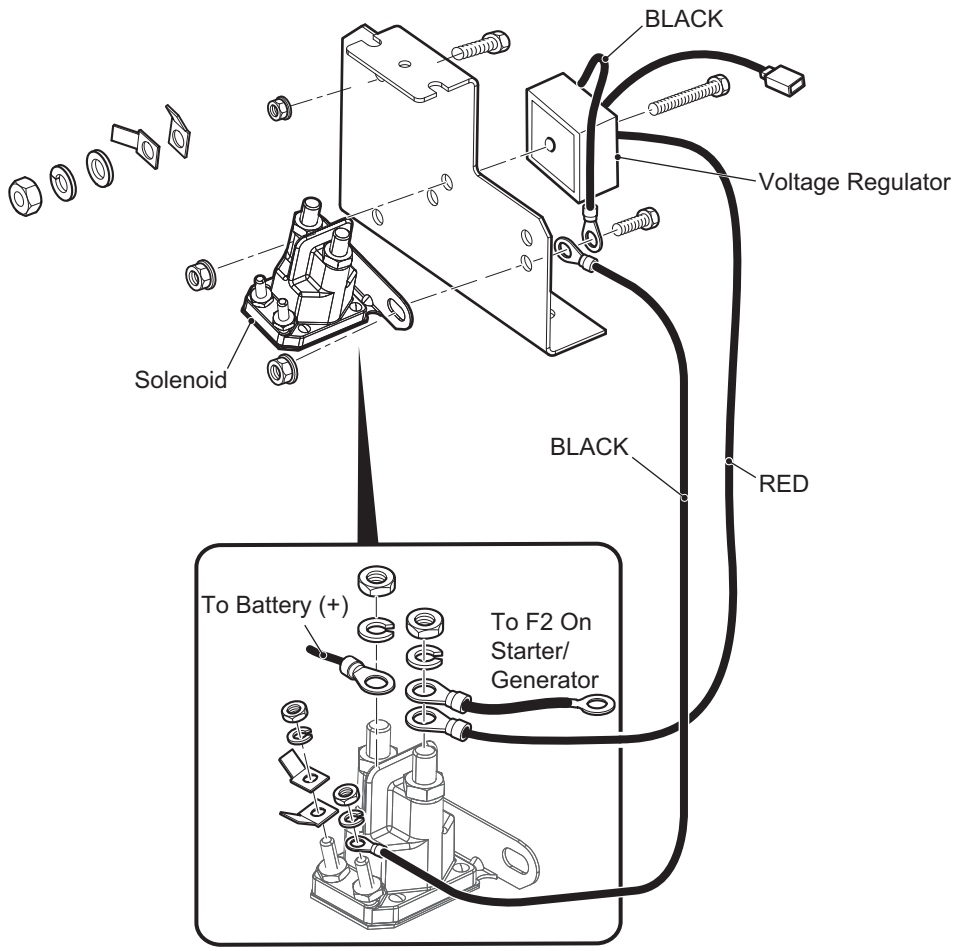


Fig. 2 Electrical Plate Assembly

CIRCUITS AND CONTROLS

The electrical system is a 12 volt negative ground system (Ref. Fig. 1) (Ref. Fig. 2) consisting of:

- battery
- starter/generator
- voltage regulator
- solenoid
- accelerator limit switch
- fuses
- key switch

These components comprise the Starting and Charging Circuits.

⚠ WARNING

To prevent injury or death from inadvertent movement of vehicle, all tests performed requiring starter/generator or engine to rotate must be performed with the rear wheels raised (see Section "B") or the neutral lock engaged (see Section "A").

Follow the lifting procedure in Section "B" of this manual. Place wheel chocks in front of and behind the front wheels. Check the stability of the vehicle on the jack stands before starting any repair procedure. Never work on a vehicle that is supported by a jack alone.

This section will assist in troubleshooting the vehicle electrical system and accessory wiring. To troubleshoot the ignition electrical system, refer to the Briggs & Stratton engine Operating & Maintenance Instructions (Form No. 274272) supplied with the vehicle. For more in depth assistance, refer to the Repair Manual for Vanguard™ V-Twin Overhead Valve engine (Part No. 272144).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

STARTER/GENERATOR

Starter Mode

When starting the engine, the field coils are in series with the armature and the starter/generator operates as a motor (Ref Fig. 4 on page G-5). This circuit is controlled by a key switch, fuse, accelerator limit switch and a solenoid. With the key in the 'ON' position, battery current is available to the accelerator limit switch which remains open until the accelerator pedal is pressed. When the pedal is pressed, the plunger on the switch is released, the contacts close and the ignition circuit is energized. Battery current then energizes the solenoid which closes the contacts and energizes the starter circuit. The starter/ generator now functions as a starter to start the engine.

Generator Mode

When the engine is running, the starter/generator functions as a generator. This is used for charging the battery and for the ignition system. Generated output is controlled by the voltage regulator at 14.25 - 14.75 V, without regard to engine speed. However, the charging current will vary depending on the condition of the battery. If it is fully charged, current is controlled at 3 to 5 amps.

DIGITAL VOLT OHM METER

⚠ WARNING

Before performing any test of wiring components, disconnect the battery cables from the battery posts to prevent electrical shock or explosion (see procedure in Section "B").

Electrical tests of the wiring for continuity may be made with a DVOM (Digital Volt Ohm Meter) available through the Service Parts Department (P/N 27481G01). The actual model may vary depending on availability. The DVOM (digital volt ohm meter) shown is representative only (Ref Fig. 3 on page G-3). Any DVOM may be used, however the controls, displays and features may vary depending on the make and model. Always follow the meter manufacturer's recommendations and instructions for the use and care of meter. For the purpose of this section, the red probe (+) and black probe (-) are used. Set the meter selector to the ohms scale and check continuity between each circuit component as indicated. Example: If a switch is open or if there is a break in the wiring, the meter will display a visual signal. If an analog meter is used it will read infinity (∞).

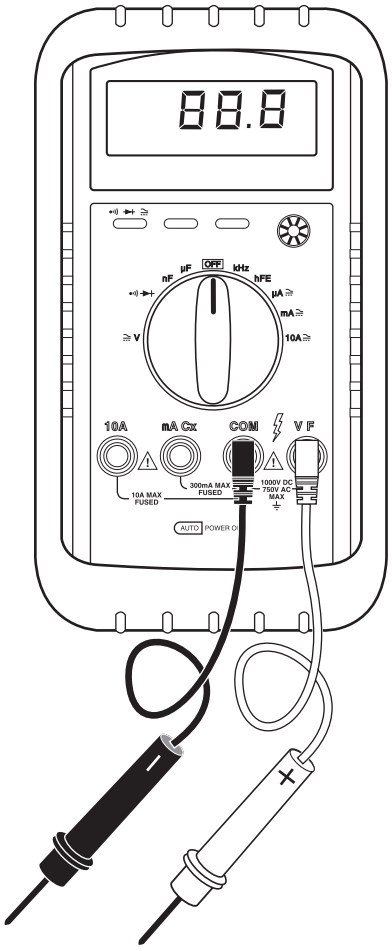


Fig. 3 DVOM

TESTING IGNITION CIRCUIT

⚠ WARNING

To prevent the possibility of injury resulting from vehicle inadvertently starting, disconnect battery for steps 1 through 8 (see Section B).

Tool List **Qty.**

DVOM 1

If the engine will **not** turn over, proceed as follows:

1.Check the battery for a voltage reading which should be between 12.2 and 12.5 volts. Inspect for loose or dirty battery post connections.

2.Check for a blown in line fuse and replace if necessary with a 7.5 amp fuse (Ref Fig. 4 on page G-5).

3.Check for loose wires at all terminal connections.

4.Check the complete electrical system for correct circuitry.

5.Inspect for worn insulation or bare wires touching the frame. Bare wires will cause a short circuit.

6.Check for continuity through the key switch. Set the DVOM to the ohms (Q) scale. Remove key switch plate from instrument panel. See BODY AND TRUCK-BED section. Detach electrical plug from key switch. Place positive (+) probe on terminal of green (GRN) wire and negative (-) probe on terminal of blue (BLU) wire. The reading on the meter should be "0" Q with the switch key in the 'ON' position and a visual signal (00) with the switch in the 'OFF' position. If the meter does not register, replace the switch. Reconnect the wires.

7.Turn the key switch to 'OFF'.

(a) Place one probe of the DVOM (set to ohms scale) on the red wire at the solenoid. Place the other probe on the key switch terminal with the blue wire.

(b) Press the accelerator and observe the DVOM. A reading of less than 2 Q indicates a good limit switch. A reading of greater than 2 Q indicates that the switch terminals should be checked. A reading of infinity, a visual signal (00), indicates that the switch must be replaced. Connect the battery.

8.Check the starting solenoid operation. Turn the key switch to the 'ON' position.

(a) Place the DVOM (set to appropriate DC volts scale) negative (-) probe on terminal A of the solenoid. Place positive (+) probe on terminal B. The DVOM should indicate approximately 12 V.

(b) Press the accelerator pedal. The DVOM will indicate "0" voltage if the solenoid contacts are closed.

(c) If "0" voltage is not indicated while the accelerator pedal is pressed, replace the solenoid.

TESTING CHARGING CIRCUIT

Tool List **Qty.**

DVOM 1

⚠ WARNING

To prevent the possibility of injury resulting from vehicle inadvertently starting, the drive belt must be removed or both rear wheels raised (see procedure in Section B).

The charging circuit consists of a starter/generator, voltage regulator and battery (Ref Fig. 4 on page G-5). The solenoid must be functional in order to start the vehicle, but is not considered part of the charging circuit.

1. If the battery charge is inadequate (less than 11 VDC), proceed as follows:

   a) Check the battery voltage and inspect for loose or corroded terminal posts and connections. Check electrolyte level.

   b) Check charging circuit component terminals for proper, clean, tight connections.

   c) Check for charging voltage as follows:

      1) Raise the vehicle (see procedure in Section B) so that both rear wheels are free to rotate.

      2) With the engine off, measure the voltage at the battery's terminals by placing the negative (-) probe on the negative (-) post and the positive (+) probe on the positive (+) post of the battery. Note the reading.

      3) Attach the DC voltmeter across the regulator's red and black leads.

      4) Start the engine and accelerate to governed speed.

      5) The meter should read higher than before starting the engine. In a reasonable amount of time, the reading should settle between 14 and 15 volts, indicating the regulator is functioning properly.

      6) If no increase over battery voltage is observed, there is a malfunction in the charging circuit.

      7) If the reading is above 15 volts, check to assure the wiring harness and generator field winding (green lead) is not grounded. If it is not, replace the regulator.

      8) If the reading is below 14 volts, disconnect the regulator's green field wire from the system harness. Temporarily connect the green field wire to ground. If the voltage rises above its prior reading, replace the regulator.

      9) If the above procedures do not correct the problem, check for faults in the vehicles wiring harness and/or generator.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

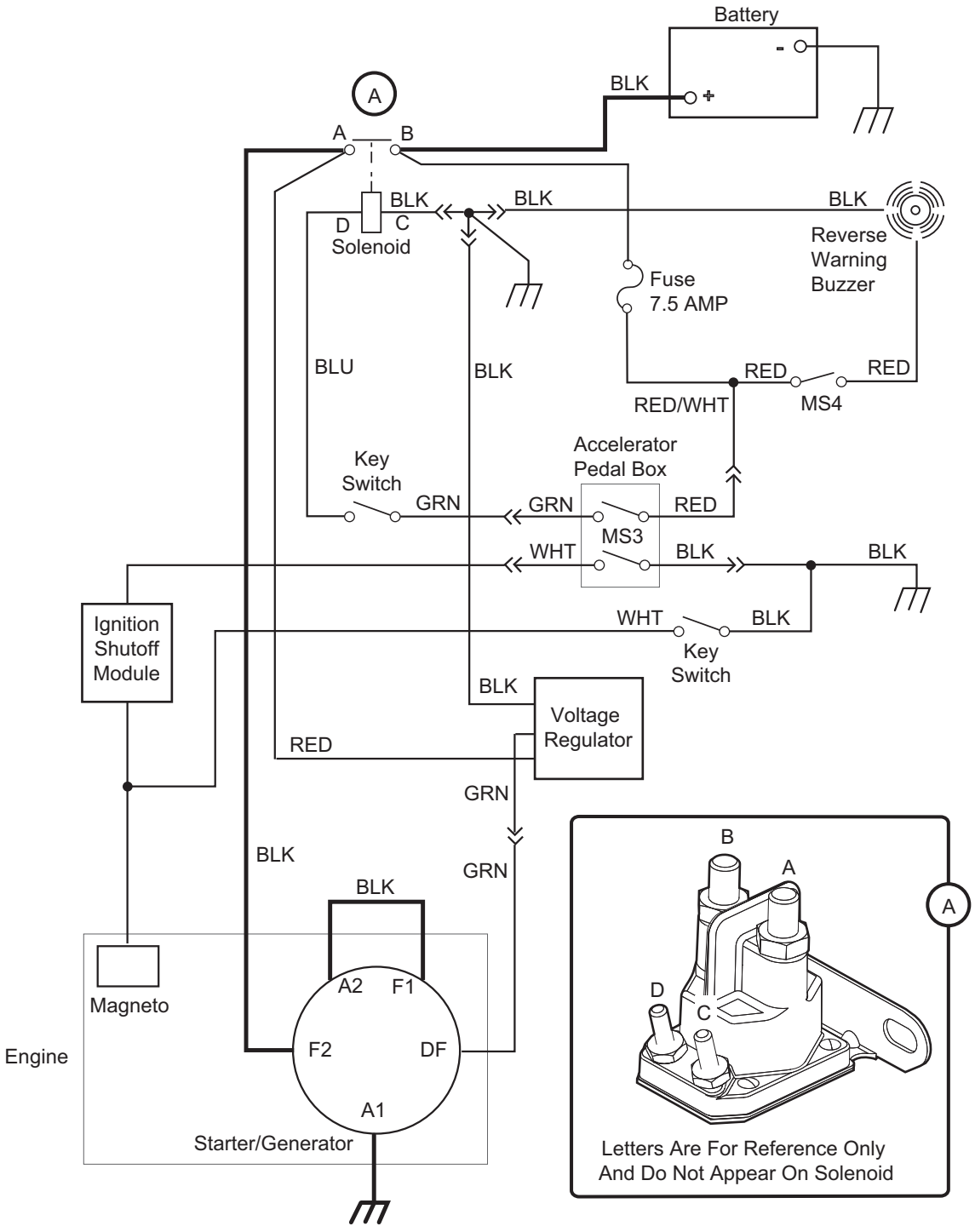


Fig. 4 Starting and Charging System Wiring Diagram

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

STARTER/GENERATOR

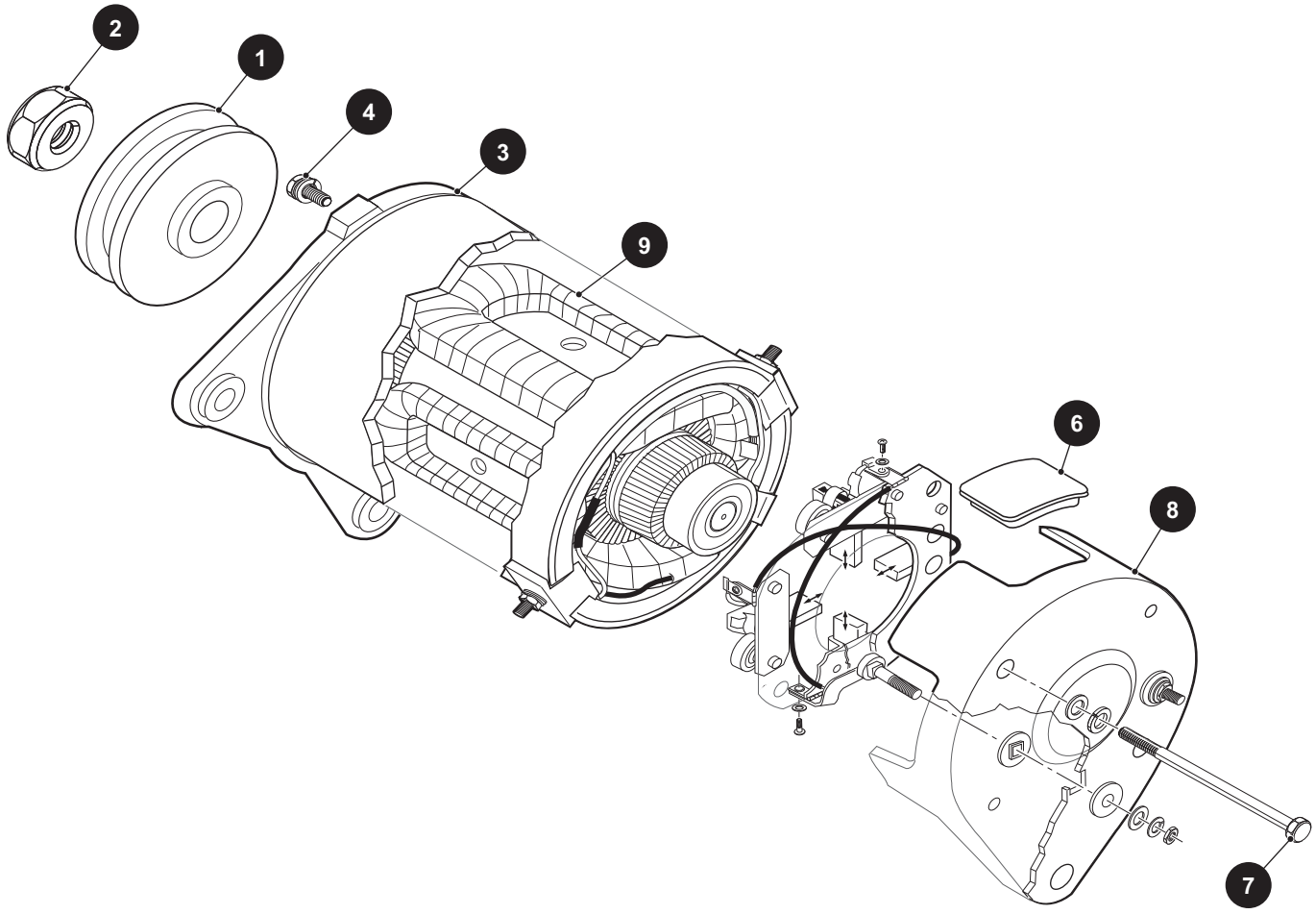


Fig. 5 Starter/Generator

Starter/Generator Removal

See ENGINE section.

Starter/Generator Disassembly

Tool List	Qty.
DVOM	1
Wrench, 24 mm	1
Wrench, 10 mm	1
Wrench, 6 mm	1
Wrench, 5 mm	1
Socket, 10 mm	1
Phillips screwdriver	1
Two jaw puller	1
Straight blade screwdriver	1
Ratchet	1

NOTICE

In general, starter/generator service is best performed by trained motor technicians who have the knowledge and equipment to overhaul the unit. Some checks and repairs however, can be accomplished by a skilled mechanic. Make your own evaluation of the equipment and skills available before starting disassembly.

Hold the pulley (1) and remove the pulley nut (2). Remove the pulley, screws (4) and front cover (3) (Ref Fig. 5 on page G-6).

Remove the brush covers (6) by prying out with a screwdriver. Pull up on the brush springs and move to the side of brushes, slide the brushes out approximately 1/4" (6 mm) (Ref Fig. 6 on page G-7). Remove the through bolts (7) and the rear cover (8). Remove the frame and field coils (9). Remove the 5 mm screws from the brush holder and 6 mm nuts from A 1 and A2 terminals. Remove the brush holder. If the bearing needs to be replaced, use an automotive style two jaw puller to remove the bearing from armature (Ref Fig. 7 on page G-7).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

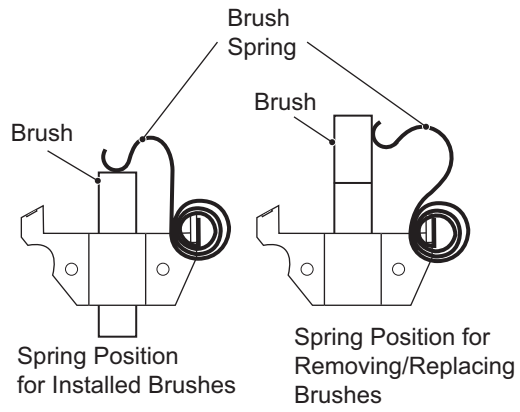


Fig. 6 Removing Starter/Generator Brush

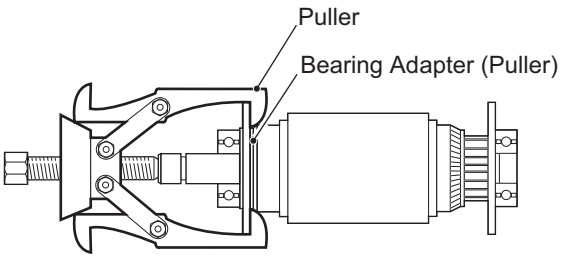


Fig. 7 Removing Bearing

Starter/Generator Inspection

1. Inspect the commutator for wear or damage.
2. Inspect the brush assembly for wear and damage to the brush holder insulators. Check the brushes for length, approximately 11/16" (17 mm) or to the line marked on the brush and signs of carbonization.
3. Inspect the armature for distortion or broken wires.
4. Inspect the field coil insulators and lead wire.
5. Check the bearings for free rotation and lack of end play on shaft. Replace if necessary.

Starter/Generator Repair and Replacement

Tool List	Qty.
DVOM	1
Torque wrench, ft. lbs	1
Torque wrench, in. lbs	1
Clean cloth	1
Socket, 5 mm	1
Socket, 6 mm	1
Socket, 10 mm	1
Socket, 24 mm	1

1. Commutator - Clean with a soft, clean cloth.
2. Replace any damaged or cracked brush holders or brushes worn to less than 11/16" (17 mm) in length or to the line marked on the brush.
3. Test the insulation between the core and the commutator segments and shaft with a circuit tester. If continuity is indicated, the insulation is defective and the armature must be replaced.
4. With the brushes removed, using a OVOM, check the field coils for continuity between 'F1' and 'F2' and 'OF' and 'F1 '. If an open circuit exists, replace the field coils. Check for continuity between all four terminals and the frame (outer shell). If continuity is indicated, the field coils are grounded against the frame and the field coils must be replaced.
5. Clean all parts to be reinstalled and reassemble in the reverse order of disassembly. Tighten bolts and nuts to the following values:
   - 5 mm - torque to 15 - 21 in. lbs. (1.66 - 2.35 Nm)
   - 6 mm - torque to 30 - 43 in. lbs. (3.43 - 4.90 Nm)
   - 10 mm - torque to 52 - 74 in. lbs. (5.88 - 8.33 Nm)
   - 24 mm - torque to 33 - 40 ft. lbs. (45 - 54 Nm)

Tighten terminal nuts to the following torques:

- F1 - F2 - torque to 43 - 52 in. lbs. (4.90 - 5.88 Nm)
- OF - torque to 26 - 35 in. lbs. (2.91 - 3.92 Nm)

BATTERY VOLTAGE TEST

⚠ WARNING

Hydrogen gas formed during battery charging is explosive and can cause personal injury or death. Avoid any electrical spark or open flame near battery.

NOTICE

If the temperature of the battery or the ambient temperature is below 60° F (15° C), the capacity of the battery will be less. It will require more time to charge.

A cold battery will build up voltage and more rapidly reduce the charging rate.

⚠ CAUTION

Do not overcharge battery.

Battery voltage can be checked using a voltmeter. Attach the negative (-) lead of the DVOM to the ground terminal of the battery. The positive (+) lead is then attached to the positive battery terminal. The voltage reading obtained should be 12 volts or above. If the reading is below 12 volts, the battery requires either charging or replacement.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

STORAGE OF BATTERY

A battery that is removed from service for storage must be cared for as follows:

For battery removal see 'Battery Removal' in Section B. Charge fully. Cover terminals with petroleum jelly to prevent oxidation (use commercially available battery protectant when installed in vehicle). Store in a cool place not below 32° F (0° C) or above 80° F (27° C) Battery should be charged every 30 days using a 2 amp trickle charger.

TROUBLESHOOTING

In order to effectively troubleshoot the circuits that include the horn, lighting, brake/turn signals and gauges, the technician must be able to use the wiring diagram and a DVOM.

The wiring diagram shows the path followed by a voltage or signal from its origination point to its destination. Each wire is indicated by color. (Ref Fig. 8 on page G-9) The technician should use simple logic troubleshooting in order to reduce the number of steps required to isolate the problem.

Example 1: If the vehicle will not start and none of the lights function (or burn dimly) the battery should be tested before trying to troubleshoot the lighting circuit.

Example 2: If a problem occurs in the lighting circuit that results in only one of the headlights not working, there is no reason to check battery wiring or the fuse since it is obvious that voltage is present. Since bulbs will burn out over time, the obvious place to start is at the headlight that is not functioning. If power is present at the connector and the ground wiring is satisfactory, the only possibilities that exist are a burned out bulb or a poor contact

between the connectors and the headlight.

If power is not present but the other headlight functions, a wiring problem is indicated between the two headlights.

In some cases where battery voltage is expected, the easiest way to test the circuit is to set the DVOM to DC volts and place the negative (-) probe of the DVOM on the negative battery terminal. Move the positive (+) probe to each wire termination starting at the battery and working out to the device that is not working. Be sure to check both sides of all switches and fuses.

When no battery voltage is found, the problem lies between the point where no voltage is detected and the last place that voltage was detected. In circuits where no voltage is expected, the same procedure may be used except that the DVOM is set to continuity. Place the negative (-) probe on a wire terminal at the beginning of the circuit and work towards the device that is not working with the positive (+) probe. When continuity is no longer indicated, a failed conductor or device is indicated.

POWER SUPPLY

Tool List **Qty.**

DVOM 1

1. **Check for Loose or Bare Wires**
   Check for loose wires at each terminal connection and for worn insulation or bare wires touching the frame.BARE WIRES MAY CAUSE A SHORT CIRCUIT.

NOTICE

If any DVOM readings indicate a faulty wire, it is recommended that the condition of the terminals and wire junction be examined. A faulty wire must be replaced. See 'FAULTY WIRE REPLACEMENT'.

2. **Check Battery Condition**
   Check for adequate battery volts (nominal 12 VDC) by setting DVOM to 30 VDC range and place the red probe (+) on the battery post with the white (WHT) wire attached. Place the black probe (-) on the battery post with the black (BLK) wire attached. A reading of 11 VDC or greater indicates adequate battery condition. No reading indicates (a) a poor connection between the probes and the battery terminals; (b) a faulty DVOM. A voltage reading below 11 volts indicates poor battery condition and the vehicle should be recharged before proceeding with the test.

NOTICE

Due to the resistance of the wires involved within the harness, voltage readings may be somewhat lower than battery voltage. A reading of 1 volt below battery voltage is acceptable.

3. **Check Power Wire**
   Firmly attach the black probe (-) to the battery post with the black wire attached and the red probe (+) to the power (white) wire terminal at the fuse block. A reading of battery voltage indicates that the power wire is in good condition.

NOTICE

The power wire supplies power to the entire fuse block.

4. **Check Fuse**
   Place the red probe (+) to each wire terminal on the fuse block. A reading of battery voltage indicates that the fuse is in good condition. No reading indicates a faulty fuse; replace with a good fuse of the same amperage rating

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ CAUTION

Use of incorrect fuse rating can damage electrical components.

ACCESSORY WIRING

After determining that there is power to the fuse panel, and the fuse is good, continue checking the circuit using the procedures previously used to check the power supply, i.e. loose or rusted connections, bare wires, continuity of the wiring from terminal to terminal, operating condition of switch, etc.

Use the wiring schematic (Ref Fig. 8 on page G-10) to check correct wiring and wire routing. If there is power at the fuse end of the wire, there must also be power at the other end of the wire at the switch or electrical accessory, and eventually at the ground connection. Electricity must flow from the fuse panel through the full length of the circuit to the ground connection. Any interruption of electricity flow must be corrected, whether by repairing or replacing the wire, the switch or accessory.

FAULTY WIRE REPLACEMENT

A faulty wire should be replaced with one of the same gauge and color, wired between the correct components, and secured to the harness bundle with a wire tie. The faulty wire should be cut back close to the harness and the ends protected with vinyl electrical tape.

LIGHT BULB REPLACEMENT

To replace the headlight bulb, locate the two screws in back of the headlight underneath the cowl that secure the front part of the light (bulb) to the rear housing. Remove the screws allowing the bulb to be removed from the outside of the cowl. Disconnect the two wires from the bulb. Connect the wires to the new bulb and put new light bulb in place. Secure with screws previously removed.

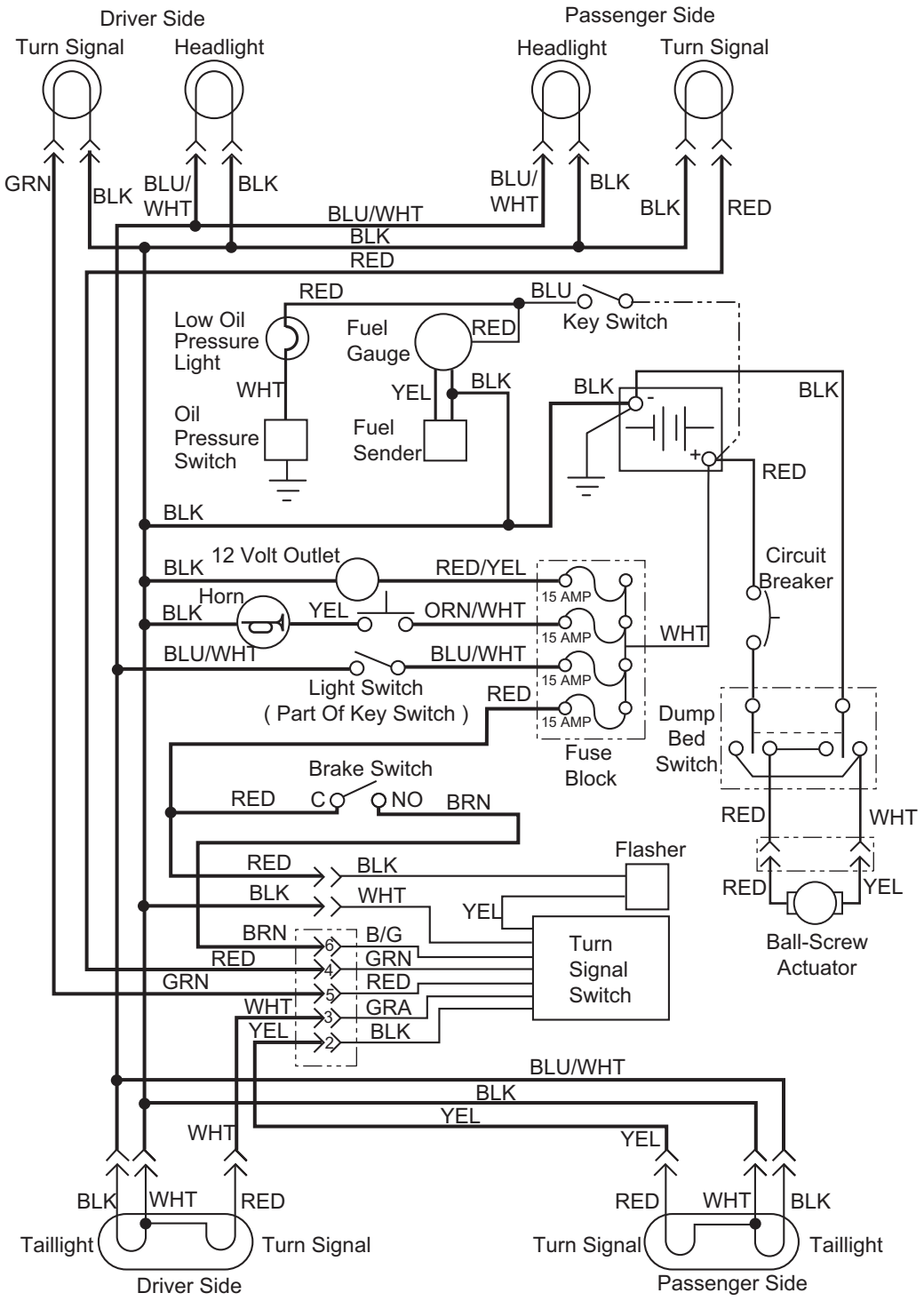
NOTICE

It will be necessary to push or pull the splash. panel as necessary to remove the headlight.

To replace the taillight bulb, roll the rubber bezel from around the edge of the taillight and remove the lens. Replace with new bulb. Replace lens.

Headlight and taillight bulbs and fuses are available from a local Distributor, an authorized Branch or the Service Parts Department.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.



● Indicates Butt Connection Within Wiring Harness

Fig. 8 Accessory Wiring Diagram

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

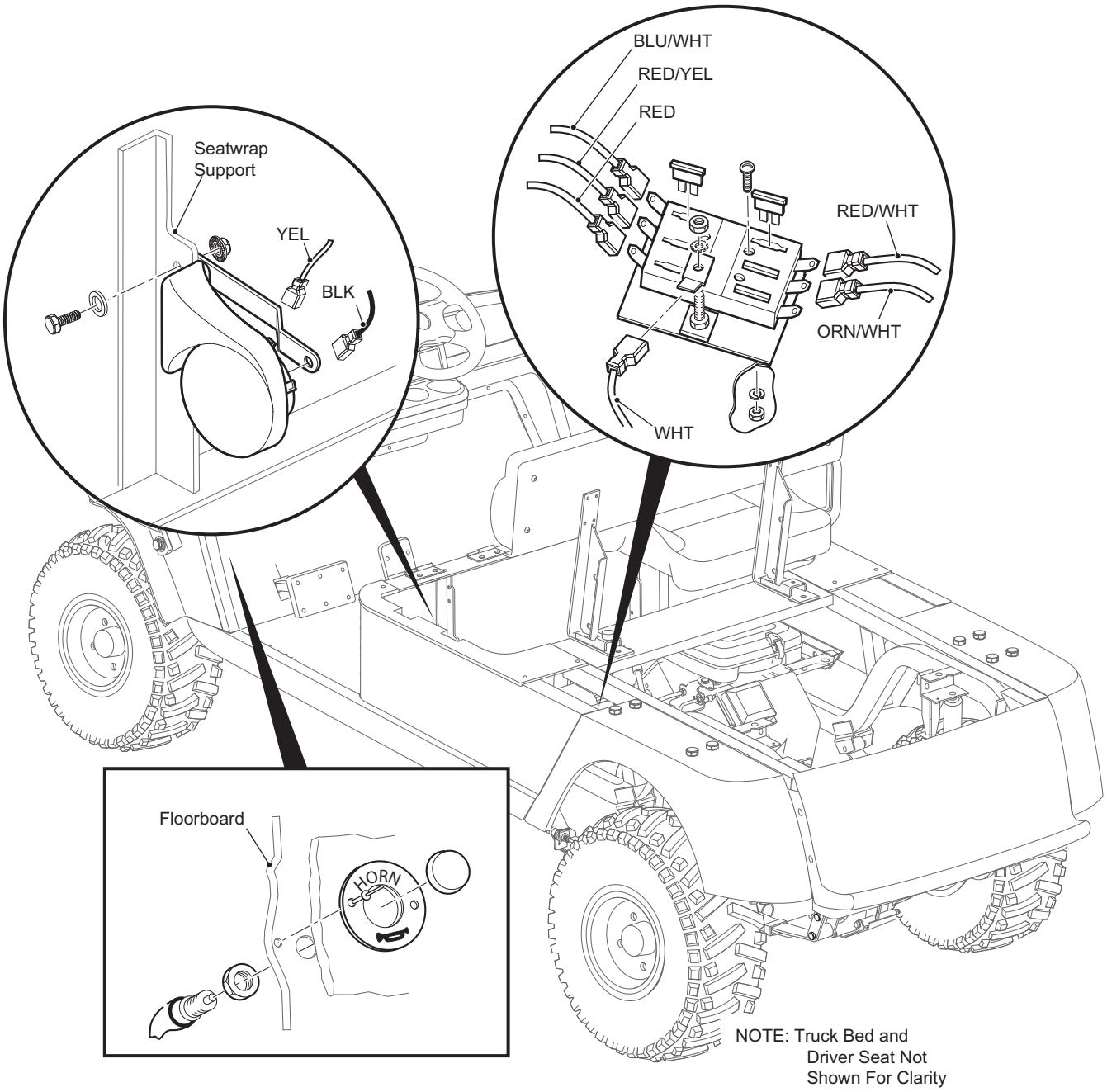


Fig. 9 Horn and Fuse Block

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

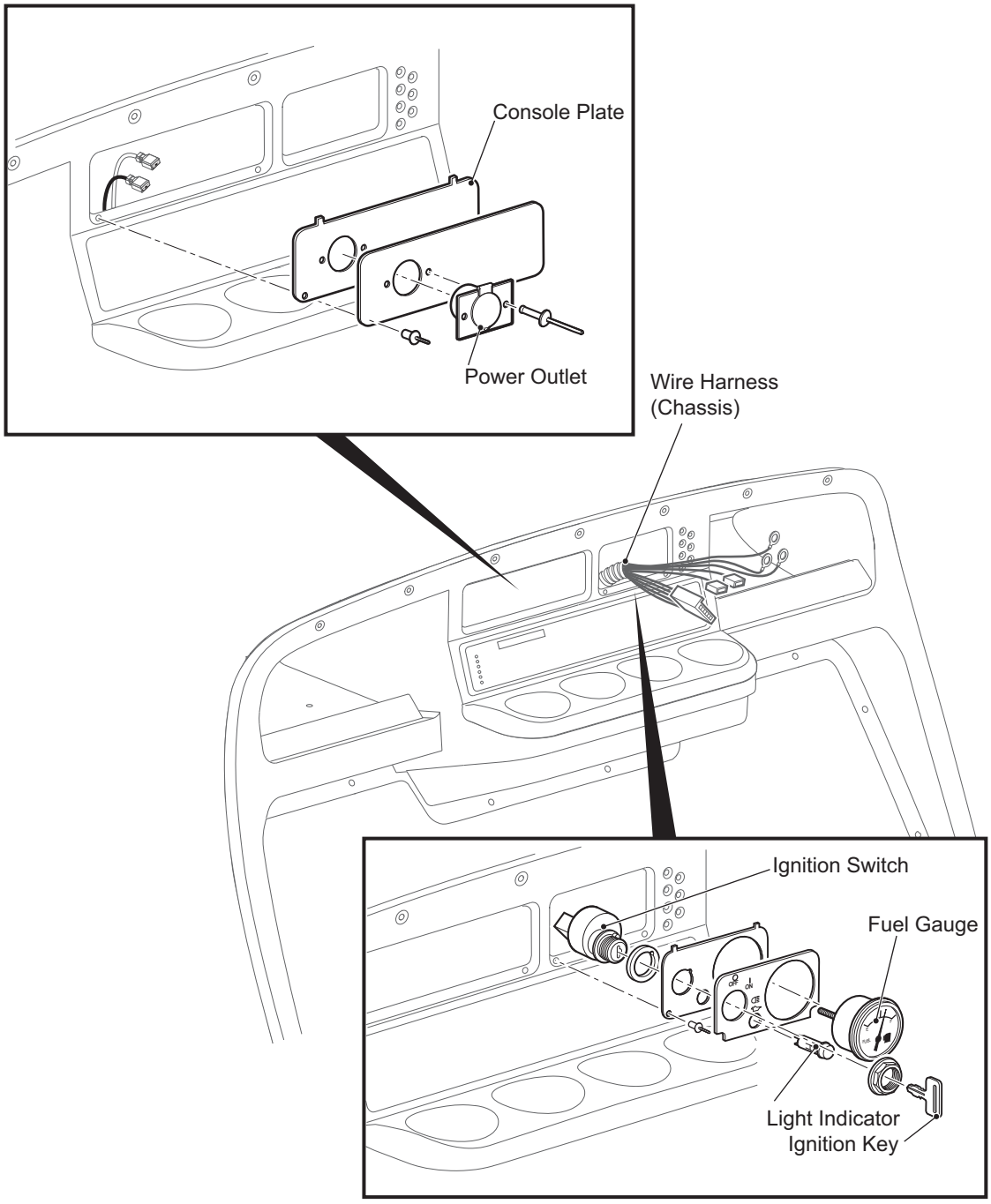


Fig. 10 Ignition Switch and 12 Volt Power Outlet

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

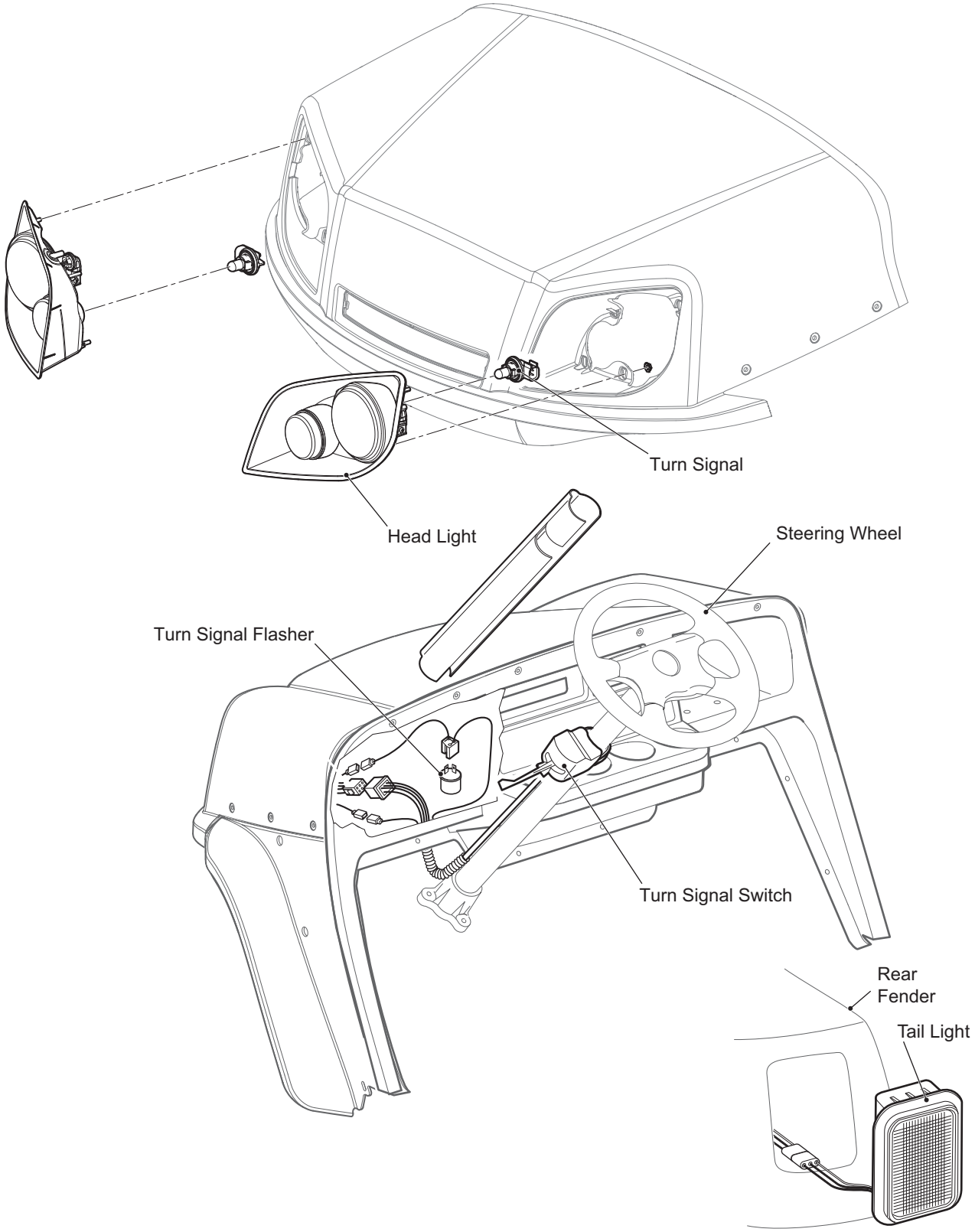


Fig. 11 Headlight, Turn Signal and Taillight

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

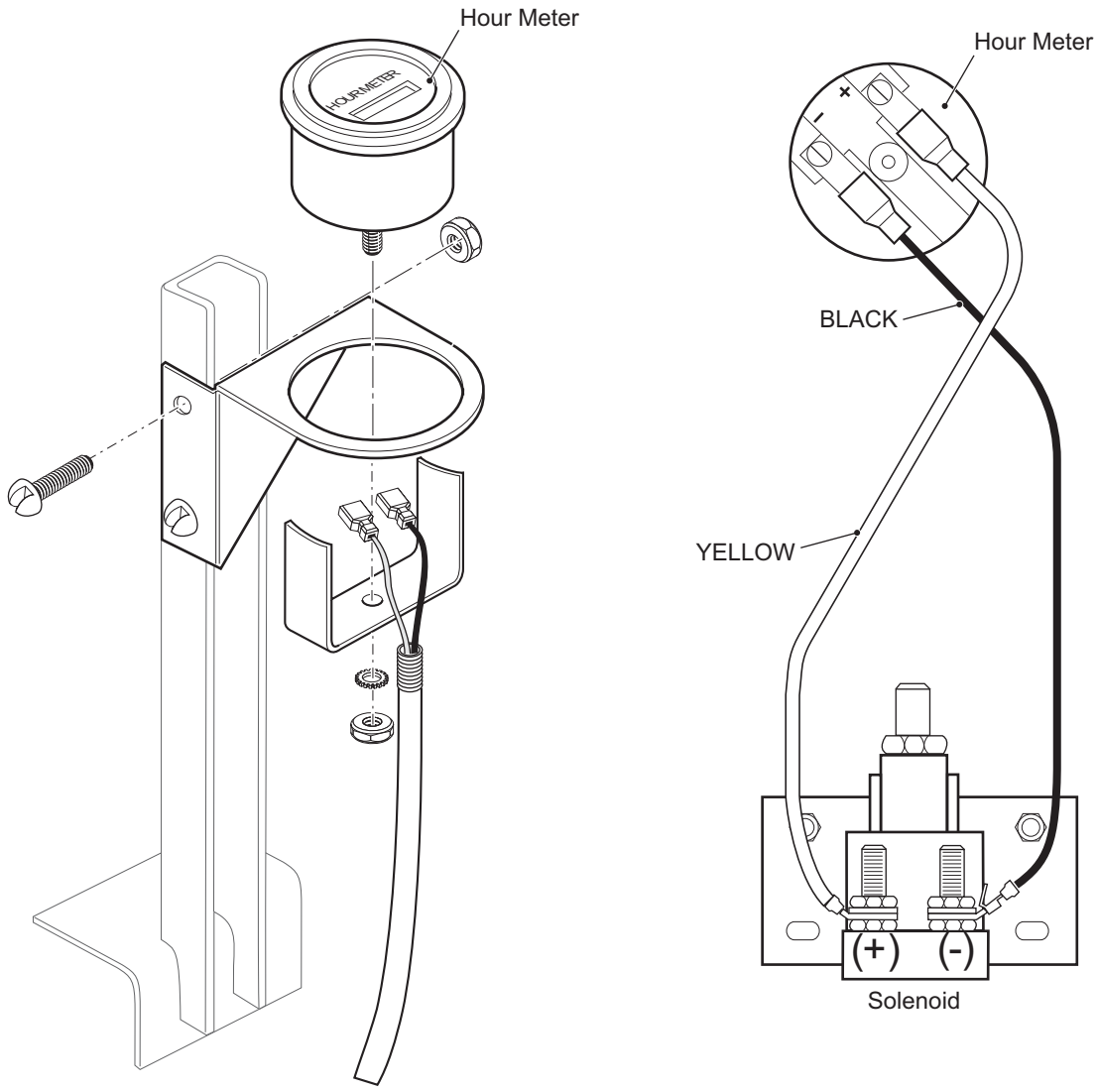


Fig. 12 Hour Meter

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

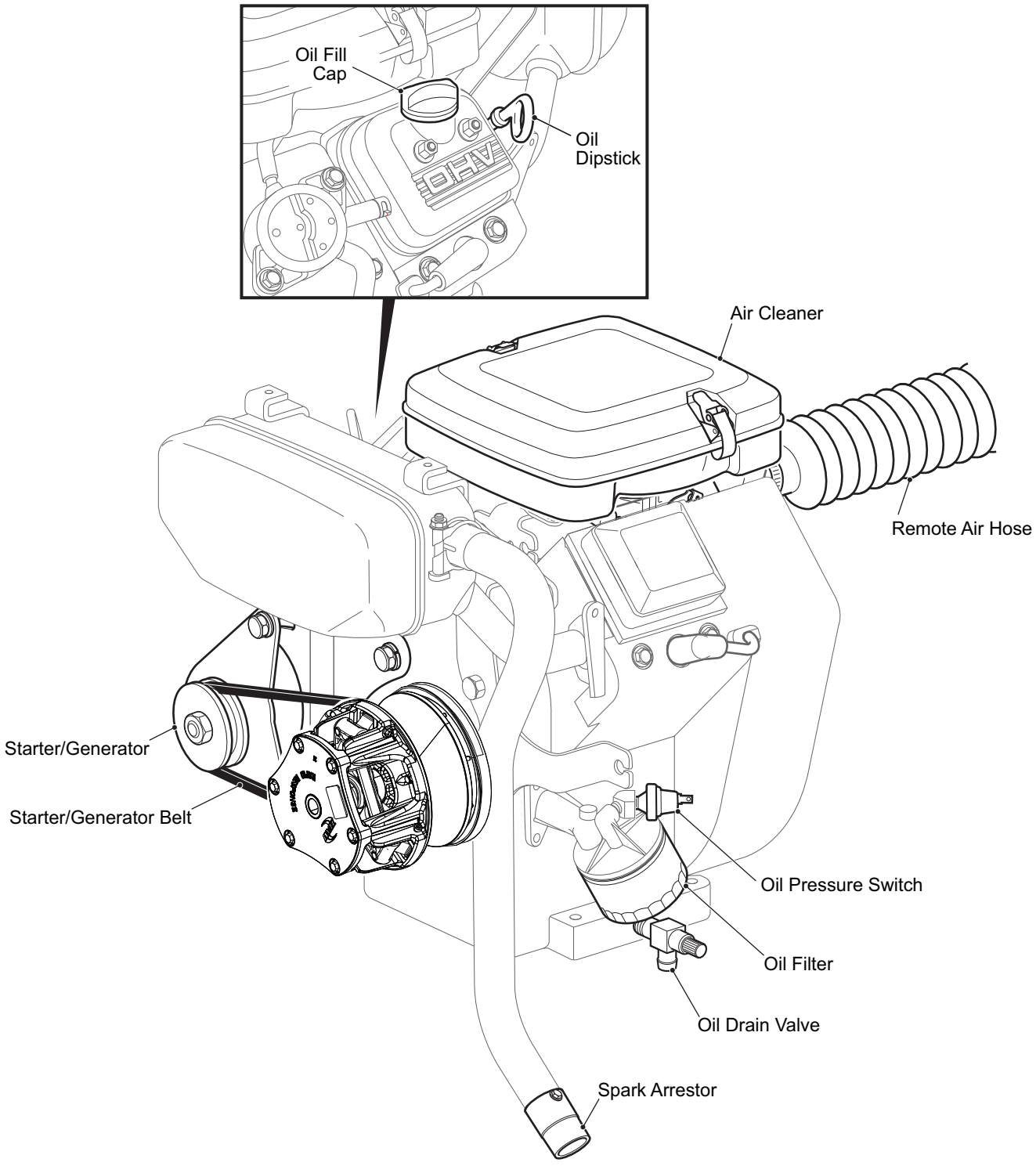

Fig. 1 Engine

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

This section describes procedures for performing regular maintenance, preparing vehicle to test engine condition and replacing engine. For engine condition testing and repair procedures, Briggs & Stratton Repair Manual (PIN 272144) for Vanguard™ V-Twin Overhead Valve engine is available.

POWERTRAIN MAINTENANCE

Access the powertrain by raising or removing seat. Some service procedures may require the vehicle be lifted. Refer to LIFTING THE VEHICLE in section 'B' for proper lifting procedure and safety information.

Removing Debris

⚠ WARNING

Engine parts should be kept clean to reduce risk of overheating and ignition of accumulated debris which could result in severe injury.

After every off road use, allow to cool and then check for a build up of dirt and debris in the air intake and cooling fins. Dirt and debris may clog the engine's air cooling system. Clean areas shown to prevent engine damage (Ref Fig. 2 on page H-2). Keep linkages, springs and controls clean. To prevent fire, keep area around muffler free of any combustible material.

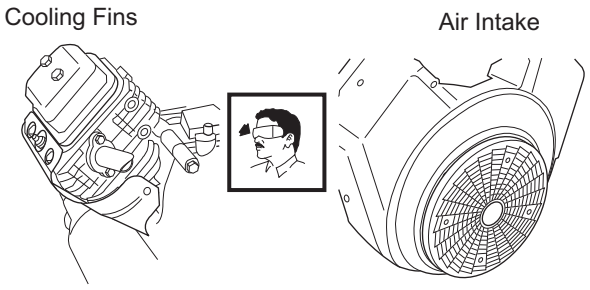

Fig. 2 Cleaning Air Intake

Oil Capacity

Engine oil capacity is approximately 1 *1/2* quarts (1.4 liters) when changing oil and filter.

Oil Recommendations

The oil must be high quality detergent oil classified "For Service SF, SG, SH, SJ" or higher. Do not use special additives and do not mix oil with gasoline. The selection of oil viscosity is dependent upon the climate in which the vehicle will be used. Most vehicles require SAE 30 oil; however, vehicles used in cold climates will require a mUlti-viscosity oil (Ref Fig. 3 on page H-2). Synthetic oil meeting ILSAC GF-2, API certification mark and API service symbol with "SJ/CF ENERGY CONSERVING" or higher, is an acceptable oil at all temperatures. Use of synthetic oil does not alter required oil change intervals.

NOTICE

Do not use special additives in recommended oil.

Do not mix oil with gasoline.

⚠ CAUTION

Air cooled engines run hotter than automotive engines. The use of non-synthetic multi-viscosity oils (5W-30, 10W-30, etc.) in temperatures above 40° F (4° C) will result in higher than normal oil consumption. When using a multi-viscosity oil, check oil level more frequently.

SAE 30 oil, if used below 40° F (4° C) will result in hard starting and possible engine bore damage due to inadequate lubrication.

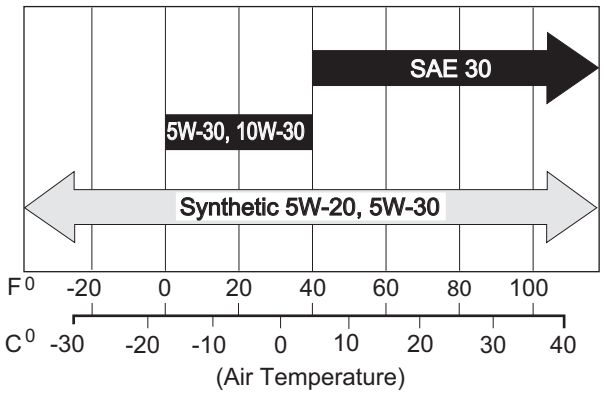

Fig. 3 Oil Viscosity Chart

Checking the Oil Level

Tool List **Qty.**

Clean cloth.....2

Check oil level daily before starting the engine. The vehicle must be on a level surface with the parking brake engaged. Use a cloth to wipe clean the oil dipstick handle and oil fill cap (Ref Fig. 4 on page H-3). This is necessary to prevent debris from falling into the engine. Remove the dipstick and wipe off the entire area indicated with a clean cloth (Ref Fig. 5 on page H-3).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

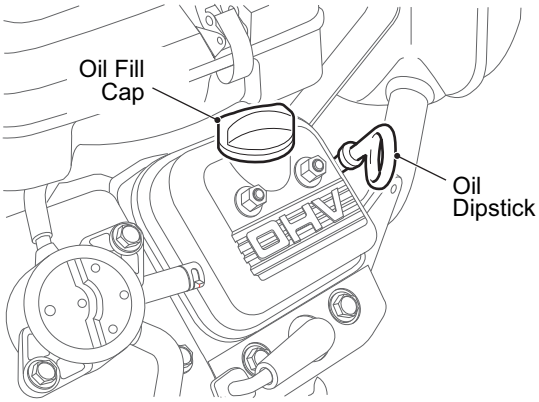

Fig. 4 Cleaning the Top of the Engine

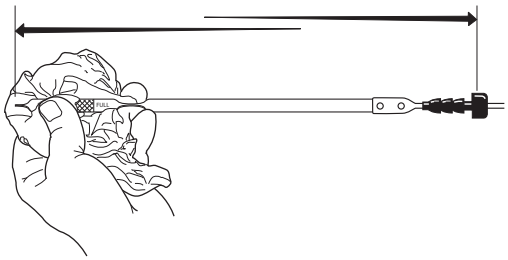

Fig. 5 Cleaning Entire Dipstick

Insert the dipstick **fully** into the dipstick tube and remove. Examine the level of oil on the dipstick. Oil should be at the FULL mark (Ref Fig. 6 on page H-3).

If oil is required, remove oil fill cap and add oil slowly to bring level to the FULL mark. **Do not overfill.**

Replace dipstick **fully** into the dipstick tube and firmly replace the oil fill cap.

NOTICE

When adding oil between oil changes, do not mix brands and viscosity grades of oil.

Both the oil dipstick and fill cap must be in place before operating the engine. Failure to install the dipstick and fill cap will result in oil becoming contaminated and/or oil being discharged into the engine compartment.

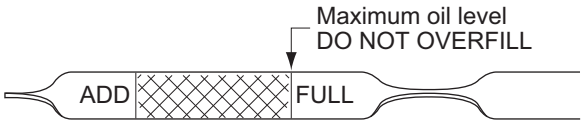

Fig. 6 Checking Oil Level on Dipstick

Changing the Oil

Tool List	**Qty.**
Pliers	1
Oil drain pan	1
Clean cloth	2

For maximum performance and longevity, the engine oil should be replaced after the first five (5) to eight (8) hours of operation. After the initial oil change, it should be changed per the Periodic Service Schedule in Section A.

⚠ WARNING

Be aware that engine fluids may be hot and contact to the skin may cause severe burns. Wear rubber gloves to protect skin from exposure to the old oil and degreaser.

The oil should be changed with the engine warm. Park the vehicle on a level surface, engage the parking brake and remove the key. Place a drain pan under the engine. Wipe the oil fill cap clean with a cloth and remove the cap (Ref Fig. 4 on page H- 3).

Clean the area around the oil drain valve (Ref Fig. 7 on page H-3). Open the valve and allow the oil to drain through the hole in the engine mounting plate. Close valve once oil has drained.

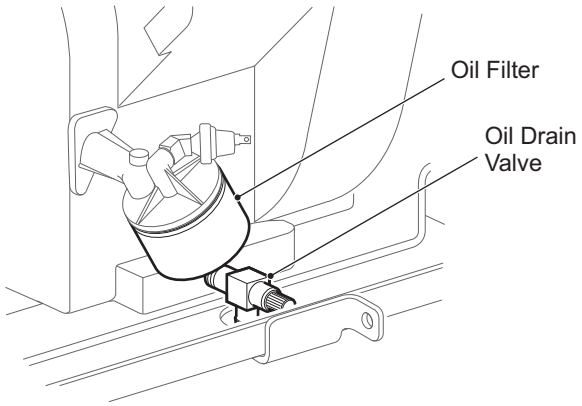

Fig. 7 Removing Oil Filter

Add 1 quart (1 liter) of oil. Start and drive vehicle at a slow speed long enough to warm the oil. Stop and turn off vehicle on a level surface and wait 30 seconds for the oil to settle to the bottom of the engine. Check for leaks. Slowly add more oil to bring level to the FULL mark on dipstick. **Do not overfill.**

Replace dipstick **fully** into the dipstick tube and firmly replace the oil fill cap.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Changing the Oil Filter

Tool List	Qty.
Oil filter wrench, to fit 3" (76 mm) oil filter	1
Oil drain pan	1
Clean cloth	1

Clean the area around the oil filter and oil drain. Drain engine oil per “Changing the Oil” and remove oil filter (Ref Fig. 7 on page H-3). Make sure the seal came off with filter and is not stuck to the engine.

Wipe around the sealing surface of filter mount with a clean, lint free cloth. Lightly oil the seal on the new filter with fresh, clean oil. Screw filter on by hand until the seal contacts the filter mount. Tighten 1/2 to 3/4 turn more. Refill engine with new oil per “Changing the Oil”.

AIR CLEANER MAINTENANCE

The air cleaner is a dual filter cleaner, equipped with a foam pre-cleaner over a conventional paper cartridge. The filters must be serviced per the Periodic Service Schedule in Section A for optimum engine life and performance.

⚠ CAUTION

To prevent engine damage, be careful not to let debris fall into the carburetor when servicing the air cleaner.

To prevent water entering air cleaner and causing starting or engine problems, replace air cleaner cover making sure the entire flange around the bottom of the cover fits over the top edge of the air cleaner base. Secure with the spring clips.

Access the filters by unsnapping the spring clip on each side of the air cleaner and removing the air cleaner cover (Ref Fig. 8 on page H-4). If necessary, vacuum or wipe out any loose dirt or trash from the air cleaner base.

Pre-Cleaner Service

Carefully remove pre-cleaner from cartridge and wash it in liquid detergent and water. Rinse. Dry by squeezing pre-cleaner in a clean cloth. Saturate with engine oil and squeeze with a clean absorbent cloth to remove all excess oil. Install pre-cleaner over cartridge. Replace air cleaner cover making sure that the entire flange around the bottom of the cover fits over the top edge of the air cleaner base. Secure with the spring clips.

Cartridge Service

Unscrew the knob securing the cartridge to the air cleaner base and remove plate. Remove cartridge and inspect. Replace if too dirty to clean or at the first sign of fitter paper deterioration. Clean cartridge by gently tapping on a flat surface.

⚠ CAUTION

Do not use petroleum solvents, pressurized water, or compressed air to clean cartridge. Doing so will damage the cartridge and will damage the engine.

.

NOTICE

The Paper cartridge is a dry unit. Do not use oil on the cartridge.

Install cartridge, plate, knob and pre-cleaner.

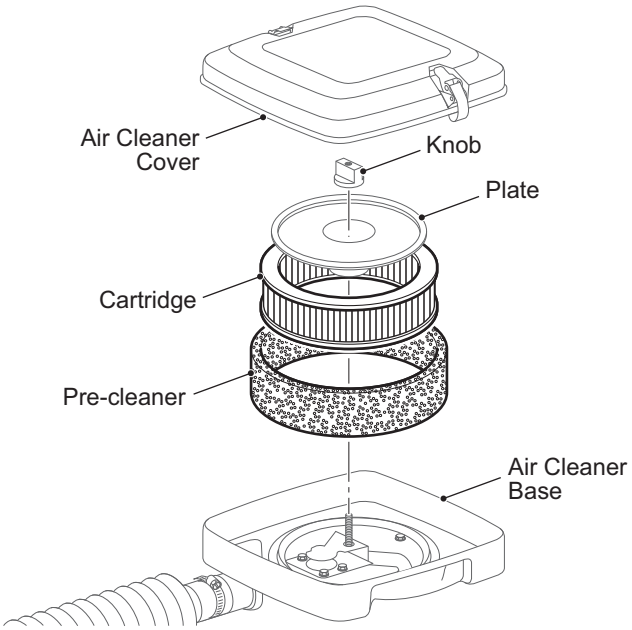

Fig. 8 Air Cleaner

STARTER/GENERATOR BELT TENSION

Tool List	Qty.
Belt tension gauge	1
Wrench, 3/4”	1
Wrench, 1/2”	2
Ratchet	1
Socket, 3/4”	1
Socket, 1/2”	1
Pry bar	1

The starter/generator belt tension should be checked after the first 15 - 20 hours and set to 75 - 80 lbs. (34 - 36 kg).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTICE

A loose belt can cause audible vibration and squeal.

Tighten a **new** starter/generator belt to 115 - 125 lbs. (52 - 57 kg) tension when a gauge is applied half way between the two pulleys.

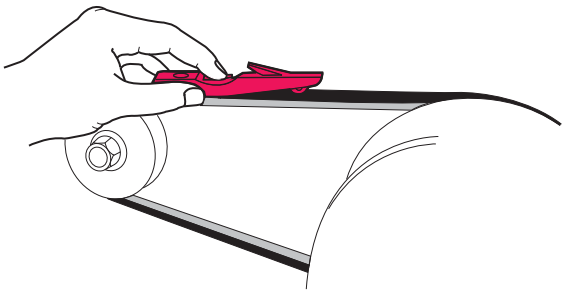

Fig. 9 Checking Belt Tension with Gauge

Although not as accurate, the belt may be depressed with a finger. A maximum deflection of 3/8” (1 cm) is acceptable for a **new** belt.

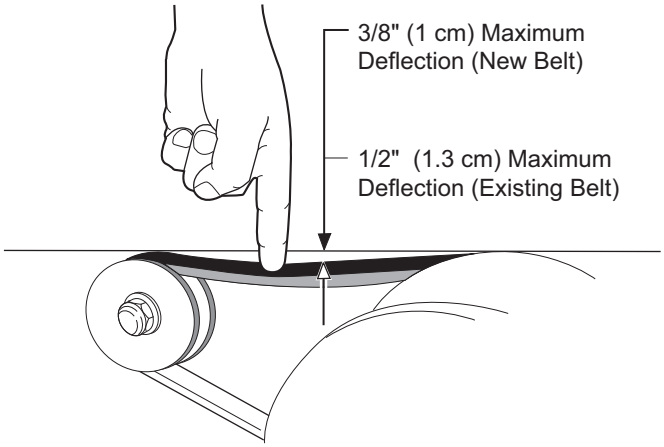

Fig. 10 Checking Belt Tension with Finger

Re-tighten an **existing** belt to 75 - 80 lbs. (34 - 36 kg) tension using the same technique. A maximum deflection of 1/2" (13 mm) is acceptable.

Adjusting the Belt Tension

Loosen front and back pivot bolts of starter/generator.

Loosen adjusting bolt. Use pry bar to force starter/generator towards front of vehicle until proper belt tension is achieved. Hold starter/generator in place and tighten adjusting bolt.

Tighten pivot bolts to 25 ft. lbs. (35 Nm) torque.

SPARK PLUGS

Tool List	Qty.
Spark plug socket, 5/8”	1
Ratchet	1
Plug gauge, wire type	1
Anti-seize compound	AR
Torque wrench, ft. lbs	1

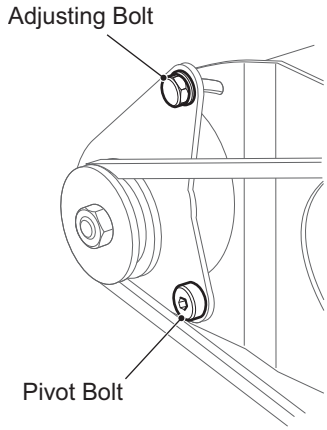

Fig. 11 Adjusting the Belt Tension

Remove and inspect the spark plugs per the Periodic Service Schedule located in Section A. Fouled spark plugs are indicated by a wet, black appearance. This could be caused by a dirty air filter element or other restrictions in the air intake system. Incorrectly adjusted valves, spark plug wires which are in poor condition or poor quality fuel could also contribute to the problem. Clean and gap to .030" (.76 mm). **If** a plug has been burned beyond .035" (.89 mm) or the porcelain is cracked, it should be replaced.

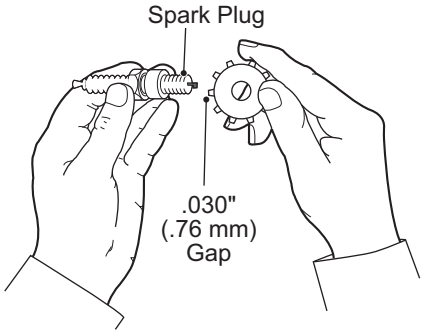

Fig. 12 Gapping the Spark Plug

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTICE

Do not sand blast spark plugs. They should be cleaned by scraping or wire brushing by hand and washing in a commercial solvent.

Spark plugs should be properly gapped to .030" (.76 mm) (CHAMPION RC12YC), given a light coat of anti-seize compound and tightened to 15 ft. lbs. (20 Nm) torque.

ENGINE DESCRIPTION

The engine is a four cycle air cooled, V block, twin cylinder, overhead valve unit. It incorporates pressure lubrication, and a replaceable oil filter.

The OHV V-Twin engine uses a Magnetron® ignition consisting of an ignition armature with a self-contained transistor module. Two armatures are used with a flywheel containing a permanent magnet.

Engine Specifications

Engine model.....303440
Type.....Four cycle, overhead valve
Number of cylinders.....2 (V block)
Displacement.....480 cc
Rated horsepower.....16 hp (11.9 kw)
Spark plug type.....Champion RC12YC
Spark plug gap.....030" (.76 mm)
Cooling.....Fan
Oil Filter.....Replaceable, Spin-off

Engine Operation

To understand the operation of a four cycle engine, it is easiest to consider a single cylinder.

The first cycle (stroke) takes place with the piston moving down and the intake valve open. Fuel is drawn into the combustion chamber from the carburetor and through the intake valve and is known as the **intake stroke.** As the piston reaches the bottom (BDC) of its travel and starts to move upwards, the second cycle begins. The intake valve closes which seals the combustion chamber since the exhaust valve is already closed and causes the fuel air mixture to be compressed as the piston rises. This is known as the **compression stroke.** Just before the piston reaches TDC (Top Dead Center) the spark plug fires which causes a rapid burning of the air fuel mixture. The temperature rises rapidly which causes the air fuel mixture to expand. The piston has been carried through TDC by centrifugal force and is now forced downwards into the third, or **power stroke** by the expanding gases. As the piston reaches BDC it enters the fourth cycle. The exhaust valve opens and the piston rises forcing burned gases from the combustion chamber in what is known as the **exhaust stroke.** As the piston moves through TDC and starts down, the first cycle is repeated.

The camshaft is gear driven from the crankshaft. The ignition timing is controlled by an electrical pulse received from a magnet mounted on the crankshaft flywheel. The ignition timing is not adjustable.

VEHICLE PREPARATION TO TEST ENGINE CONDITION

Tool List	Qty.
Heat resistant gloves	1
Pliers	1
Compression gauge	1
Spark plug socket, 5/8”	1
Ratchet	1

⚠ WARNING

To prevent possibility of personal injury, disconnect negative (-) battery cable before beginning starter/generator removal.

To properly prepare for a compression test:

a) If possible, drive vehicle long enough to bring the engine to normal operating temperature.
b) Engage neutral lock per Section B.
c) Disconnect fuel line from fuel tank and plug line to prevent contamination. Run engine until it stops from lack of fuel.
d) Remove the air filter to eliminate the possibility of a restricted air passage.
e) A good, well charged battery should be used. Weak batteries may not provide the correct cranking speed.
f) Starter belts that drag or slip will affect the compression reading. Adjust belt as necessary.

⚠ WARNING

To prevent possibility of personal injury, never operate without magneto being grounded. Any fuel drawn into the cylinders will be expelled through the spark plug opening and could be ignited by the ignition system or another source, resulting in a *fire.*

g) Ground magneto by attaching a wire lead, with alligator clips, from the terminal with the white wire

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

(located on fan cover at side of engine) to the ground cable bolted to the frame.

h) Follow procedure to check compression as outlined in the Briggs & Stratton® Repair Manual (PIN 272144) for Vanguard™ V-Twin Overhead Valve engine.

ENGINE REMOVAL

Tool List	Qty.
Masking tape	AR
Back brace	2
Insulated wrench, 1/2”	1
Oil drain pan	1
Socket, 1/2”	1
Ratchet	1
Clutch puller (P/N 19779G2)	1
Pliers	1
Wrench, 1/2”	2
Utility knife	1
Needle nose pliers	1
Straight blade screwdriver	1
Socket, 12mm	1
Wrench, 1/4”	1
Socket, deep well, 10mm	1
Shop towel, clean	AR
Plug, for fuel line	1
Cap, for fuel pump	1
Wrench, 10mm	1
Wrench, 3/4”	1
Socket, 1/4” hex bit	1
Impact wrench	1
Impact socket, 5/8”	1
Impact socket, 13/16”	1
Socket, 6mm hex bit	1
Socket, 5/8”	1

NOTICE

In the following text, there are references to removing/ installing bolts, etc. Additional hardware (nuts, washers, etc.) that is removed must always be installed in its original position unless otherwise specified. Non specified torque figures are as shown in the table contained in Section A.

Note the location of wires, wire ties and clamps before removal and always install them in their original location. Use of masking tape to label wires is recommended.

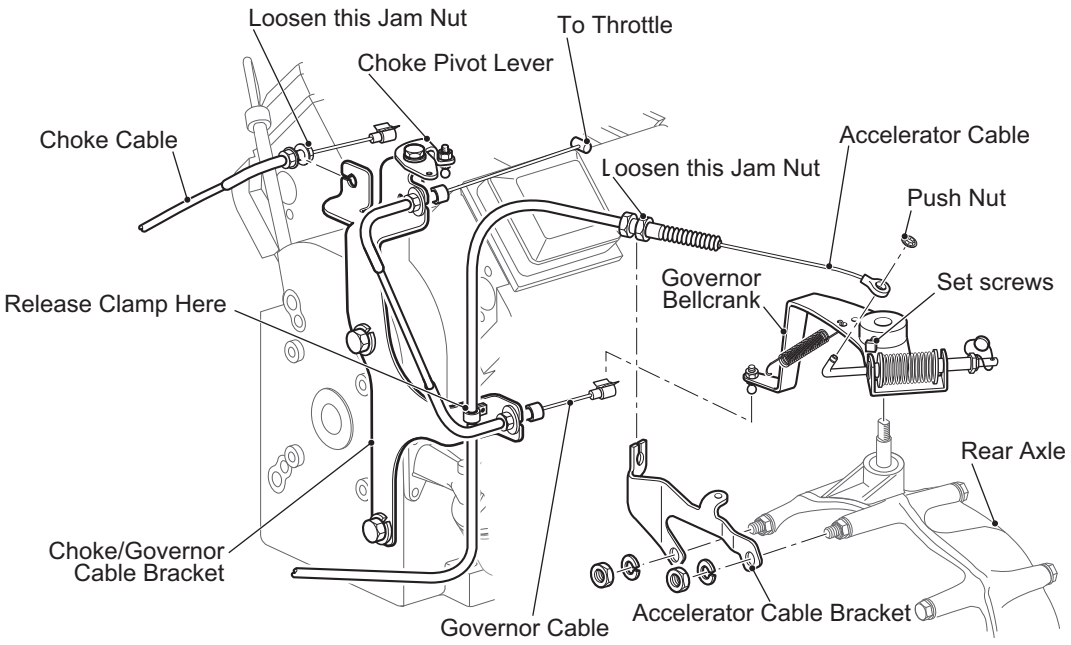

Fig. 13 Disconnecting Accelerator, Governor, and Choke Cables

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Remove truck bed per BODY AND TRUCK BED section. If engine is to be repaired, not replaced, wash engine and chassis to remove dirt build-up.

⚠ WARNING

To prevent the possibility of personal injury, disconnect the negative (-) battery cables before starting engine removal.

Disconnect negative (-) cables from battery to prevent electrical shorts that could cause an explosion (Ref Fig. 16 on page H-9).

Drain oil from engine.

Loosen clamp and remove exhaust pipe from muffler.

Remove drive belt and driven clutch. See CONTINUOUSLY VARIABLE TRANSMISSION section.

Remove push nut securing end of accelerator cable to governor. To maintain cable adjustment, loosen only the back jam nut anchoring accelerator cable to accelerator cable bracket and remove cable (Ref Fig. 13 on page H-7). Release clamp securing cable to choke/governor cable bracket and pull accelerator cable down from between bracket and governor cable to clear engine.

Pry governor cable off ball stud on lower end of governor bellcrank located between engine and differential (Ref Fig. 13 on page H-7). Remove two nuts mounting accelerator cable bracket to differential. Loosen two setscrews and pull governor bellcrank assembly and accelerator cable bracket from differential.

Pry choke cable off ball stud of choke pivot lever. To maintain cable adjustment, loosen only the back nut anchoring choke cable to choke/governor cable bracket, remove cable and moor between seat back supports (Ref Fig. 13 on page H-7).

Disconnect remote air hose from air cleaner. Remove air cleaner cover and filter. Remove five bolts that mount air cleaner base to engine, disconnect crankcase breather hose and remove base. Secure a clean towel over carburetor with a rubber band to prevent any debris falling into engine.

At rear axle, remove cotter and clevis pin connecting differential lock cable to differential lock arm. To maintain cable adjustment, loosen only the back nut anchoring differential lock cable to bracket and remove cable (Ref Fig. 14 on page H-8).

Disconnect wire from oil pressure switch, located above oil filter, and free from any wire ties or clamps anchoring it to engine.

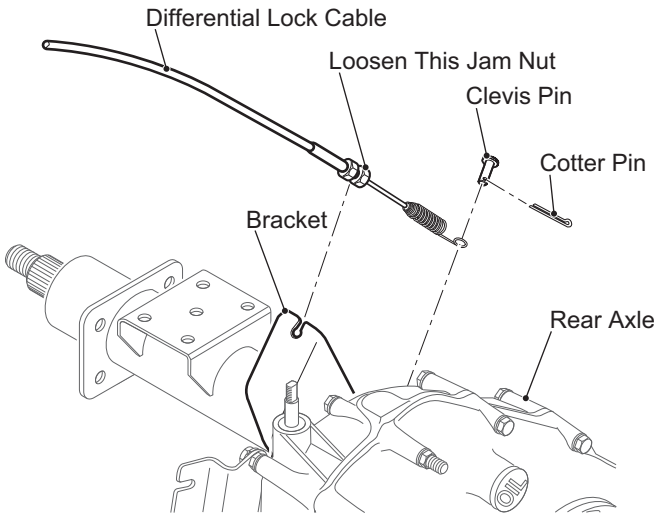

Fig. 14 Disconnecting Differential Lock Cable

⚠ WARNING

To prevent a possible explosion, do not smoke near the fuel tank or in an area where gasoline is being handled. Do not perform procedures involving the fuel system near open fire or electrical items which could produce a spark.

Do not handle gasoline in an area that is not adequately ventilated.

Always wear safety glasses to prevent possible eye injury from gasoline or gasoline vapor.

Do not smoke and wear eye protection before opening the fuel system. Provided ventilation is adequate, remove and plug fuel line from fuel pump and cap fuel pump nipple (Ref Fig. 15 on page H-9).

Detach ground cable from starter/generator and engine block (Ref Fig. 16 on page H-9). Discard lock nut but retain bolt and washers for engine installation.

At starter/generator terminal F2, disconnect black power cable running from solenoid to starter (Ref Fig. 16 on page H-9).

Disconnect green wire of chassis harness from starter/generator lead (Ref Fig. 16 on page H-9).

Disconnect the two white wires, located at side of fan cover, from the engine stop terminal and ignition control module (Ref Fig. 15 on page H-9).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

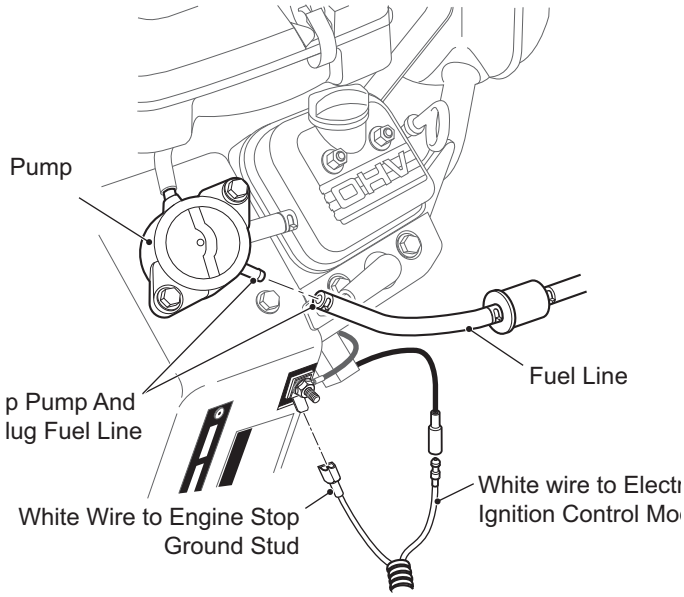

Fig. 15 Disconnecting White Engine Stop Wire, Ignition Control Module and Fuel Line

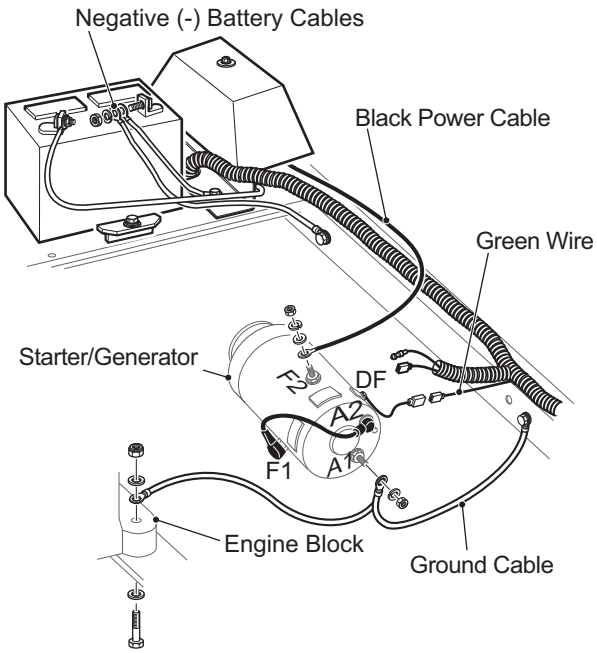

Fig. 16 Disconnecting Starter and Ground Cables

Loosen and remove starter/generator belt. See 'Adjusting Belt Tension' on page H-5.

Remove drive clutch. See CONTINUOUSLY VARIABLE TRANSMISSION section.

Remove three remaining bolts securing engine to subframe. Discard lock nuts but retain bolts and washers for engine installation

NOTICE

The engine will be lifted out between differential and wide crossmember of frame.

⚠ WARNING

The following step involves lifting substantial weight. Two people are recommended. Use of a personal back support brace and proper lifting technique is required to prevent personal injury.

Wear a personal back support brace and use proper lifting technique when lifting engine. With a person on each side of vehicle, rotate and lean engine back to position the muffler down, where the driven clutch was, and carefully maneuver engine out of vehicle.

If replacing engine:

- Remove starter/generator and its mounting brackets from old engine.
- Remove choke/governor cable bracket from old engine. Detach governor cable and choke link from carburetor.
- Remove oil drain valve and clamp from fan cover of old engine. Retain for use on new engine.

ENGINE INSTALLATION

Tool List	Qty.
Socket, 5/8”	1
Socket, 6mm hex bit	1
Ratchet	1
Teflon tape	AR
Crowsfoot, 1/4”	1
Torque wrench, ft. lbs	1
Torque wrench, in. lbs	1
Socket, 1/2”	1
Wrench, 1/2”	2

If installing a replacement engine:

- Attach starter/generator. See 'Starter/Generator Installation' on page H-10.
- Attach governor cable and choke link to carburetor and secure choke/governor cable bracket to new engine using existing hardware. Tighten bolts to 260 - 280 in. lbs. (29 - 32 Nm).
- Apply teflon tape to threads of oil drain valve and install so that nipple is pointed away from oil filter at approximately the 4 to 5 o'clock position. Attach clamp to fan cover using existing bolt.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ WARNING

The following step involves lifting substantial weight. Two people are recommended. Use of a personal back support brace and proper lifting technique is required to prevent personal injury.

Wear a personal back support brace and use proper lifting technique before lowering engine into vehicle. With a person on each side of vehicle, install engine in reverse order of removal replacing all lock nuts with new lock nuts.

Tighten engine to subframe mounting hardware to 20 ft. lbs. (30 Nm) torque.

Tighten drive clutch bolt to torque specified in CONTINUOUSLY VARIABLE TRANSMISSION section.

Tighten starter/generator belt. See 'STARTER/GENERATOR BELT TENSION' on page H-4.

Tighten starter terminal nuts to specified torque. See 'Starter/Generator Installation' on page H-10.

If differential lock cable adjustment is required, adjust per REAR AXLE section.

If choke cable adjustment is required, adjust per FUEL SYSTEM section.

Tighten two governor bellcrank assembly setscrews to 70 - 84 in. lbs. (8 - 9 Nm).

⚠ CAUTION

A new push nut must be used when installing the accelerator cable to the governor.

Secure end of accelerator cable to governor with new push nut. If accelerator cable adjustment was lost, adjust per SPEED CONTROL section.

Tighten driven clutch bolt to torque specified in CONTINUOUSLY VARIABLE TRANSMISSION section.

Center end of exhaust pipe between driven clutch and subframe and tighten clamp till no loose play is present.

Check oil level in engine and adjust as needed. See 'POWERTRAIN MAINTENANCE' on page H-2.

Reconnect negative (-) battery cables and tighten hard ware to 60 in. lbs. (7 Nm).

STARTER/GENERATOR REPLACEMENT

Starter/Generator Removal

Tool List	Qty.
Insulated wrench, 1/2”	1
Socket 10 mm	1
Socket, 1/2”	1
Socket, 1/4” hex bit	1
Socket, 3/4”	1
Ratchet	1
Torque wrench, in. lbs.	1
Pry bar	1
Belt tension gauge	1
Torque wrench, ft. lbs.	1

⚠ WARNING

To prevent the possibility of personal injury, disconnect the negative (-) battery cable before starter/generator removal.

Disconnect negative (-) cables from battery to prevent electrical shorts that could cause an explosion (Ref Fig. 16 on page H-9).

Disconnect wires from starter/generator (Ref Fig. 17 on page H-11). Loosen adjusting bolt and pivot bolts securing starter/generator and remove starter/generator belt. Remove adjusting bolt and pivot bolts and remove starter/generator from vehicle.

Starter/Generator Installation

Align starter/generator between mounting brackets on engine and loosely install pivot hardware. Attach wires to their original locations (Ref Fig. 18 on page H-11). Tighten terminal nuts to the following torques:

- A 1, A2, F1, F2 - torque to 43 - 52 in. lbs. (4.90 - 5.88 Nm)
- DF - torque to 26 - 35 in. lbs. (2.94 - 3.92 Nm)

Install belt and adjusting hardware. Adjust belt tension. See 'STARTER/GENERATOR BELT TENSION' on page H-4.

Reconnect negative (-) battery cables and tighten hardware to 60 in. lbs. (7 Nm).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

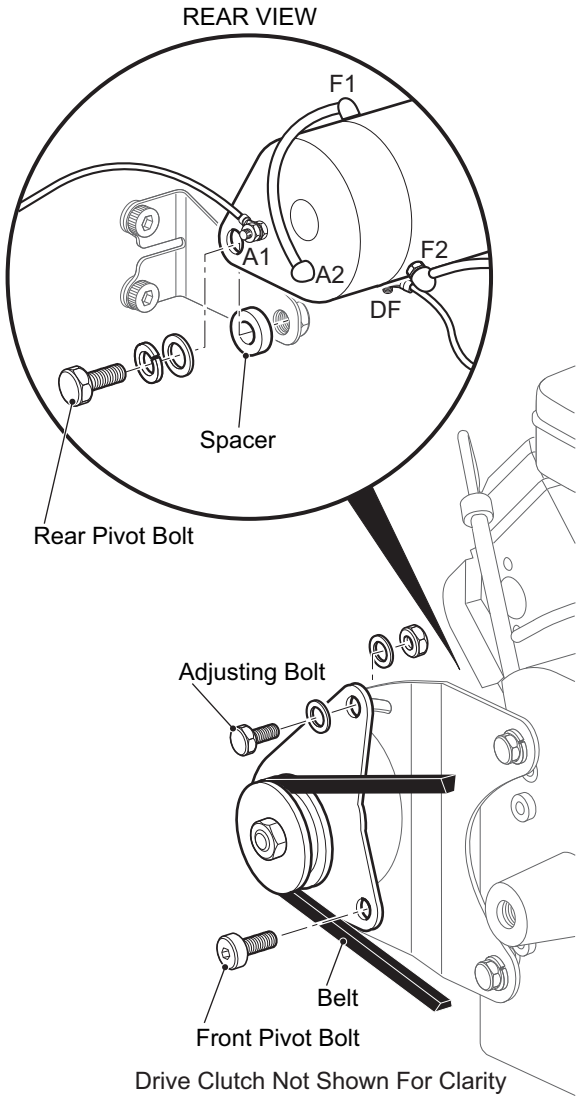

Fig. 17 Starter/Generator Mounting

FROM	TO
A1	Ground
A2	F1 (On Starter/Generator)
F1	A2 (On Starter/Generator)
F2	A on Solenoid
DF	Green from Voltage Regulator

Fig. 18 Starter/Generator Wiring

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

TABLE OF CONTENTS FOR SECTION 'J'

SECTION TITLE **PAGE NO.**

LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

FRONT SUSPENSION

NOTICE

In the following text, there are references to removing/installing bolts etc. Additional hardware (nuts, washers etc.) that is removed must always be installed in its original position unless otherwise specified. Non-specified torque specifications are as shown in the table contained in Section A.

⚠ WARNING

To reduce the possibility of personal injury, follow the lifting procedure in Section B of this manual. Place wheel chocks in front and behind the rear wheels. Check the stability of the vehicle on the jack stands before starting any repair procedure. Never work on a vehicle that is supported by a jack alone.

Front Shock Absorber Replacement

Tool List	Qty.
Wrench, 9/16”	1

Remove the nut (4) from the bottom of the shock absorber (1) at the front axle (2) (Ref Fig. 1 on page J-2). Compress the shock absorber to clear the mounting bracket.

Loosen the nut (4) securing the top of the shock absorber to the vehicle frame and then rotate the shock absorber while holding the nut in place with a wrench.

Remove the shock absorber.

The installation of the shock absorber is the reverse of disassembly, except that the mounting nuts should be tightened until the rubber bushings (5) expand to the diameter of the shock absorber washers (6).

Shock Boot Removal and Replacement

Tool List	Qty.
Wrench, 9/16”	1

Remove the nut (4) from the bottom of the shock absorber (1) at the front axle (2) (Ref Fig. 1 on page J-2). Compress the shock absorber to clear the mounting bracket.

Remove clamps securing the boot to the shock absorber and slide boot down and off the shock absorber.

Replace shock boot and reattach shock absorber as instructed above.

Front Axle Replacement

Tool List	Qty.
Wheel chocks	4
Floor jack	1
Jack stands	2
Impact wrench	1
Impact socket, 3/4”	1
Pliers	1
Wrench, 3/4”	1
Plastic faced hammer	1
Socket, 9/16”	1
Wrench, 9/16”	1
Torque wrench, ft. lbs.	1

Lift and support front of vehicle per SAFETY section.

Remove the front wheels. Remove the bottom shock absorber mounting hardware (Ref Fig. 1 on page J-2).

Loosen the nut (9) until the threaded end of king pin (8) is protected. Tap the nut with a plastic faced hammer to loosen the king pin.

Remove the nut (9) and washer (23) from the king pin. Remove the king pin (8), washer (21), thrust washer (10) and spindle sleeve (22) from the spindle and swing it to the side. Remove the hardware (12) that secures the front of the leaf spring to the front axle. Front axle installation is in the reverse order of disassembly.

NOTICE

The thrust washer is located on top of the spindle bushing.

Tighten the king pin nut (9) to 40 - 50 ft. lbs. (55 - 70 Nm) torque.

NOTICE

After replacing the front axle, the axle must be aligned with the frame. This not a wheel alignment, Replacing the axle will also require that the front wheels be aligned.

When the front axle is replaced, it must be aligned to the frame. The distance from the center bolt at rear of left spring to the center bolt at front of right spring must be the same as the distance from the center bolt at rear of right spring to the center bolt at front of left spring (Ref Fig. 2 on page J-2).

Tighten leaf spring hardware (12) to 35 - 50 ft. lbs (50 - 70 Nm) torque.

Tighten the shock absorber mounting hardware until the rubber bushings expand to the diameter of the shock absorber washer.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

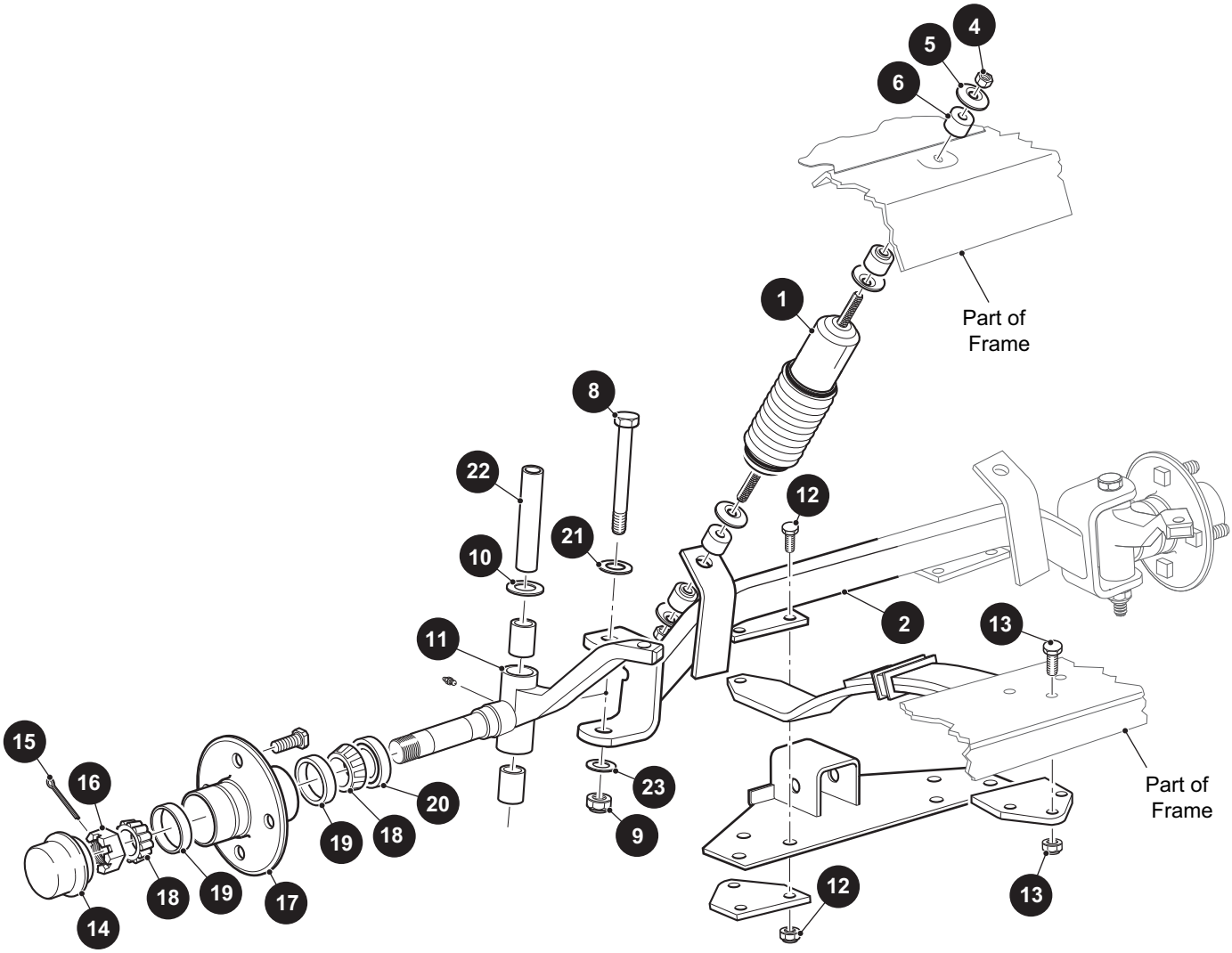

Fig. 1 Suspension Components

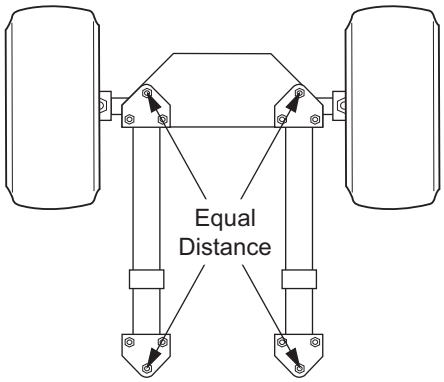

Fig. 2 Front Axle Alignment

Replace front wheels per WHEELS AND TIRES section and lower vehicle.

Front Spring Replacement

Tool List	Qty.
Wheel chocks	4
Floor jack	1
Jack stands	4
Impact wrench	1
Impact socket, 3/4”	1
Torque wrench, ft. lbs	1
Pliers	1
Wrench, 3/4”	1
Socket, 9/16”,	1
Wrench, 9/16”	1

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTICE

A worn tie rod is likely to be out of adjustment. The vehicle will require a wheel alignment before being returned to service (Ref Fig. 12 on page J-10).

Lift and support front of vehicle. (See SAFETY section.) Support front axle with jack stands.

Remove the front wheels.

Remove the hardware (12) securing the front of the damaged leaf spring to the axle (2) (Ref Fig. 1 on page J-2).

Pull the top of the floor mat down. Locate and remove the hardware (13) securing the rear of the spring to the vehicle frame.

Install a new spring by first attaching the rear of the spring to the vehicle frame with hardware (13) and then installing the front of the leaf spring to the axle with hardware (12).

Repeat at opposite side.

NOTICE

If a spring is replaced, the axle will need to be aligned to the frame. Unless the axle has been replaced, this will not affect the wheel alignment. It is always good practice to check the wheel alignment any time the front end components are replaced or adjusted.

When springs are replaced, the front axle must be aligned to the frame. The distance from the center bolt at rear of left spring to the center bolt at front of right spring must be the same as the distance from the center bolt at rear of right spring to the center bolt at front of left spring (Ref Fig. 2 on page J-2). Tighten the spring hardware to 35 - 50 ft. lbs. (50 - 70 Nm) torque.

Replace front wheels per WHEELS AND TIRES section and lower vehicle.

Tie Rod, Wheel Bearing and King Pin

Inspection

Grasp the tie rod and check for any vertical motion which would indicate a worn condition and require replacement. Grasp the top and bottom of the wheel and use a rocking motion to check for excessive king pin or wheel bearing movement which indicates a worn or loose condition.

Tie Rod Replacement

Tool List	Qty.
Wheel chocks	4
Floor jack	1
Jack stands	2
Impact wrench	1
Impact socket, 3/4”	1
Impact socket, 11/16”	1
Torque wrench, ft. lbs.	1
Pliers	1
Wrench, 3/4”	1
Ball joint separator	1

Lift and support front of vehicle per SAFETY section.

Remove front wheels.

Remove the cotter pin (1) from the ball joint (2) and remove the castellated nut (3). (Ref Fig. 3 on page J-3) Insert a ball joint separator between the ball joint and the linkage and separate the ball joint from the linkage at both ends.

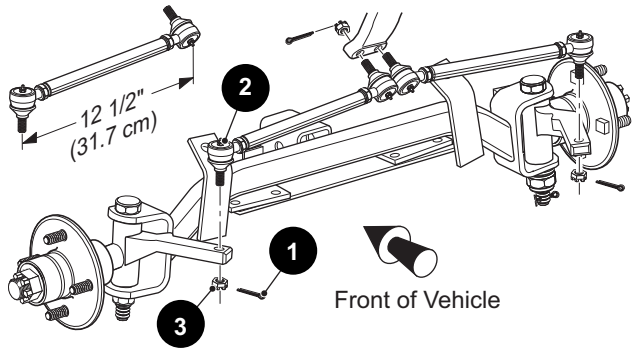

Fig. 3 Replacing Tie Rod

NOTICE

A worn tie rod is likely to be out of adjustment. The vehicle will require a wheel alignment before being returned to service (Ref Fig. 12 on page J-10).

Adjust tie rod to 12 1/2” (31.7 cm) between center of tie rod ends and install in reverse order of disassembly (Ref Fig. 3 on page J-3). The castellated nut (3) should be tightened to a **minimum** of 35 ft. lbs. (50 Nm) torque and continue tightening as required in order to insert a new cotter pin. Maximum torque is 50 ft. lbs. (70 Nm).

Once the tie rod has been replaced, the front wheel toe in will need to be checked and adjusted as necessary. See 'Wheel Alignment' later in this section.

STEERING

Steering Wheel Replacement

Tool List	Qty.
Phillips screwdriver	1
Socket, 15/16”	1
Ratchet	1
Plastic faced hammer	1
Ball peen hammer	1
Torque wrench	1

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTICE

To maintain correct orientation when replacing.steering wheel, first turn wheels straight ahead.

⚠ CAUTION

To prevent damage to the hub cover, perform the following removal procedure. Do not use a screwdriver to push or pry the retaining tabs.

From the front side of the steering wheel (1), remove the hub cover (2) by first pulling straight up on the bottom of the hub cover to release the two bottom retaining tabs. Then first pull down, and then push up to release the two top retaining tabs.

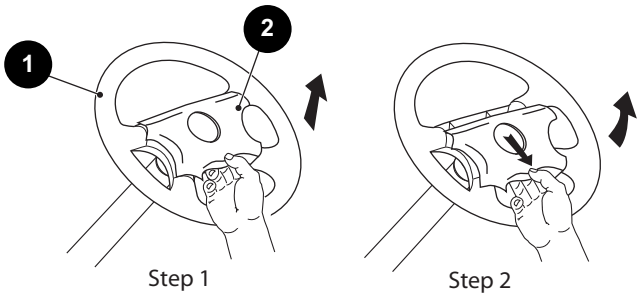

Fig. 4 Removing Steering Wheel Cover

Loosen the steering wheel retaining nut (3) two to three turns. DO NOT REMOVE NUT AT THIS TIME. Apply upward pressure to the steering wheel. Place a plastic faced hammer against the steering wheel nut and strike plastic faced hammer sharply with a ball peen hammer.

⚠ CAUTION

Do not strike the steering nut or the end of the steering shaft directly with the ball peen hammer.

When steering wheel is loosened, remove retaining nut and remove steering wheel.

If installing new steering wheel, assemble the steering wheel and rear collar hub (4) by aligning the retaining tabs on the hub with slots in back of steering wheel. Squeeze tabs to allow insertion of hub. **Do not force**. Squeeze hub on top and bottom to fully seat.

Replace steering wheel by first lightly coating the splines of the steering shaft with a commercially available anti-seize compound. With the vehicle wheels in the straight ahead position, align the steering wheel on the steering shaft and slide wheel on shaft. Tighten the steering wheel nut (3) to 10 - 15 ft. lbs. (15 - 20 Nm) torque.

Inspect the four retaining tabs on the hub cover (5) for white stress lines. If stress lines are present, replace hub cover. Install by carefully pressing, first the top two, then the bottom two retaining tabs into the matching slots in steering wheel.

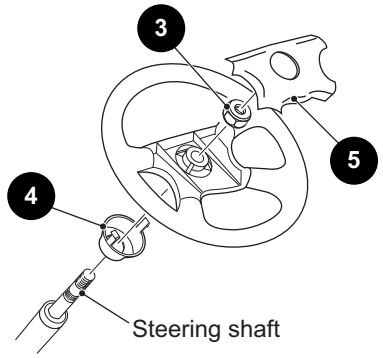

Fig. 5 Removing Hub Cover

Steering Shaft Replacement

Tool List	Qty.
Ratchet	1
Socket, 9/16”	1
Torque wrench	1
Allen wrench 3/16”	1
Socket, 7/16”	1
Ratchet	1

Remove the steering wheel (as previously described). Remove the three epoxy patch bolts (6) and washers (7) that secure the steering column (5) to the steering housing (13) (Ref Fig. 6 on page J-5). Remove the column and gasket (8) from the steering housing. Remove the bolts (9) and nuts (10) from the coupling (11) and remove shaft (12) from the steering assembly.

Replace steering shaft in reverse order of removal. Gasket (8) should be replaced with a new gasket. Bolts (9) should be tightened to a light drag between shaft (12) and coupling (11). **Do not over tighten.**

Bolts (6) must be replaced with new bolts. Tighten bolts to 18 - 22 ft. lbs. (25 - 30 Nm) torque.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

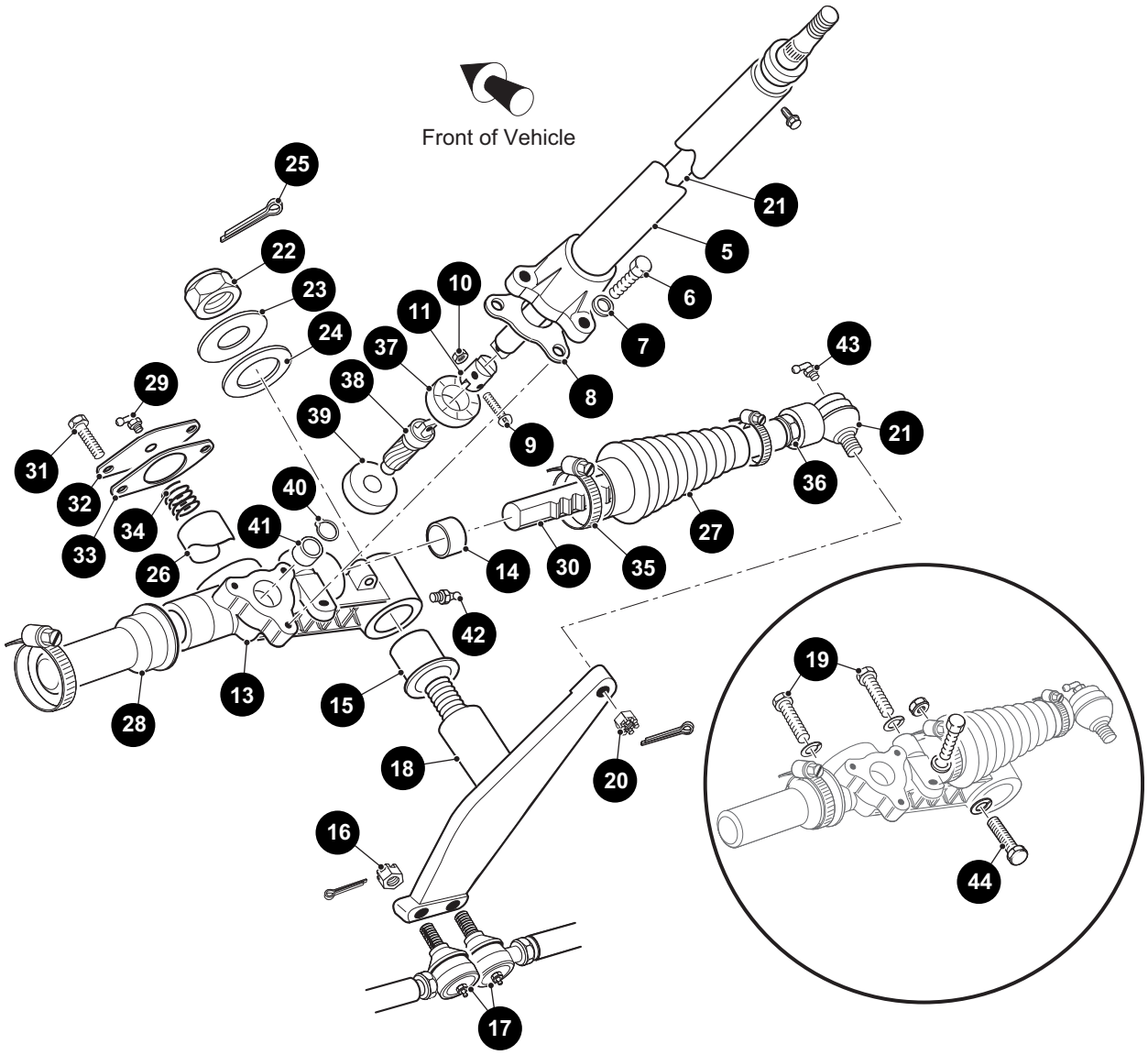

Fig. 6 Steering Components

Steering Housing Assembly Replacement

Tool List **Qty.**

Needle nose pliers 1
Wrench, 11 /16” 1
Ball joint separator 1
Plastic faced hammer..... 1
Wrench, S/8” 1

Except for major damage to the steering assembly housing, there is no need to remove the housing (13) from the vehicle. The only components requiring replacement due to wear that would require removing the housing from the vehicle would be the replacement of the bearing (14) and bushing (15) (Ref Fig. 6 on page J-S). The bearing and bushing must be pressed out.

To remove the steering housing assembly, remove the driver side front wheel, remove the steering wheel (3), and remove the steering shaft (12) as instructed above. Remove the cotter pins and loosen the two nuts (16) until ball joint (17) end threads are protected. Using a ball joint separator as a lever, apply pressure to ball joint and tap nut with plastic faced hammer to release ball joint from idler arm (18). Remove tie rods, and lastly, remove the two epoxy patch bolts (19) and longer bolt (44) attaching the steering housing to the frame mount and remove the housing from the underside of the vehicle.

Replace steering housing in reverse order of removal. Bolts (19) must be replaced with new bolts. Tighten mounting bolts to 35 - 50 ft. lbs. (50 - 70 Nm) torque. Tighten tie rod nuts (16) to 35 ft. lbs. (50 Nm) torque and continue to tighten as needed to insert new cotter pin. Maximum torque 50 ft. lbs. (70 Nm).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Idler Arm Replacement

Tool List	Qty.
Needle nose pliers	1
Wrench, 11/16”	1
Wrench, 1 1/4”	1

To remove the idler arm (18) from the steering housing assembly (13), remove the steering housing assembly from the vehicle (as described above) (Ref Fig. 6 on page J-5). Remove the cotter pin and nut (20) attaching the steering rack ball joint (21) to the upper idler arm, remove the lock nut (22) and the two washers (23, 24) from the idler and remove the idler arm from the steering housing.

Replace idler arm in reverse order of removal.

Tighten nut (22) to 70 - 80 ft. lbs. (95 - 110 Nm) torque. Insert new cotter pin (25).

Tighten nut (20) to 35 ft. lbs. (50 Nm) torque and continue to tighten as needed to insert new cotter pin. Maximum torque 50 ft. lbs. (70 Nm).

Lubricate through grease fitting (42).

Rack Tensioner Replacement

Tool List	Qty.
Wrench, 9/16”	1

In general, there is no need to remove the rack tensioner (26) unless the rack bellows (27) and or the rack cover (28) have been torn or damaged and there is reason to believe that water or dirt has entered the housing (Ref Fig. 6 on page J-5). The tensioner can be greased through a right angle grease fitting (29) located on the steering housing directly behind the front shield. The tensioner does need to be removed in order to replace the rack (30).

To remove the tensioner, remove the bolts (31), the cover plate (32) and gasket (33) that secures the rack tensioner in the steering housing. Remove the spring (34) and tensioner.

Replace rack tensioner in the reverse order of removal, replacing gasket (33) with a new one.

Tighten bolts (31) to 18 - 22 ft. lbs. (25 - 30 Nm) torque.

Lubricate through grease fitting (29).

Rack Replacement

Tool List	Qty.
Wrench, 9/16”	1
Needle nose pliers	1
Wrench 11/16”	1
Ball joint separator	1
Plastic faced hammer	1
Straight blade screwdriver	1

The rack can be removed by loosening the tensioner bolts (31), removing cotter pin and backing off nut (20) on rack ball joint (21) until end threads of ball joint are protected (Ref Fig. 6 on page J-5). Using a ball joint separator as a lever, apply pressure to ball joint and tap nut with plastic faced hammer to release ball joint from idler arm. Remove nut from ball joint and ball joint from idler arm. Remove the large clamp (35) that secures rack bellows (27) to the steering housing. The rack and the bellows may now be pulled from housing.

To test for straightness, lay smooth side of rack on the edge of a metal straight edge in good condition. If a .015" (.381 mm) feeler gauge passes between the rack and the straight edge, the rack is excessively bent and must be replaced. **The rack and steering pinion must be** replaced as a set.

Rack replacement is the reverse order of removal. Pull rack into steering assembly by turning steering wheel.

Rack Ball Joint Removal

For rack ball joint replacement, the rack must be removed from the steering assembly in order to properly adjust the rack/ball joint length. (See above for rack removal). The rack end ball joint (21) can be removed from the steering rack (30) once the rack is removed from the steering housing by loosening the jam nut (36) and removing the ball joint (21) from the rack.

Rack Ball Joint Installation

Clean threads. Apply primer (LOCTITE LOCQUIC PRIMER T, #7471) and thread locking adhesive (LOCTITE RED #271) to rack ball end before attachment to steering rack. The ball joint (21) and jam nut (36) should be threaded into the rack until the dimension between the end of the rack and the center of the ball joint stud is 14 7/32” (37.7 cm). Tighten the jam nut (36) to 25 - 30 ft. lbs. (35 - 40 Nm) torque.

See 'Rack Replacement' above for installation of rack into steering housing.

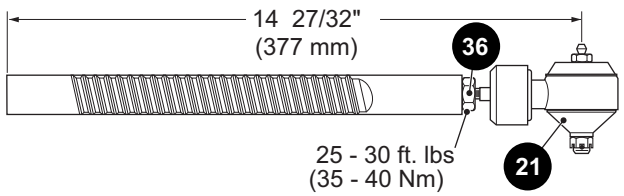

Fig. 7 Installing Rack Ball Joint

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Steering Pinion and Bearing Replacement

Tool List	Qty.
Retaining ring pliers	1

To remove the steering pinion bearing, refer to 'Steering Shaft Replacement' above. Once the steering shaft is removed, remove the pinion retainer (37) from the steering housing and pull the pinion (38) and bearing (39) as an assembly from the housing (Ref Fig. 6 on page J-5).

The steering pinion bearing (39) can be removed from the pinion gear (38) by removing the external snap ring (40) and pressing the bearing from the pinion shaft.

The steering pinion gear bushing (41) is designed to last the life of the vehicle. If in the unlikely event that it should require replacement, a competent machine shop must remove the bushing without damage to the bore. A new pinion bushing can then be inserted. The rack and steering pinion must be replaced as a set.

MAINTENANCE

Good routine maintenance of the front suspension and steering consists of routine lubrication (See Lubrication Chart and the Periodic Service Schedule in Section A). Be sure to use only the recommended lubricants. Maintain the correct adjustment of the front bearings and repack them in accordance with the periodic service schedule or if a bearing replacement is required. Routine examination of the tires will provide indications that an alignment is required.

Lubrication

Tool List	Qty.
Grease gun	1

Grease the rack tensioner (26) at fitting (29), the idler bushing (15) at (42), rack ball joint (21) at (43), tie rod ends (17) and spindle (11) (Ref Fig. 8 on page J-8) per Periodic Service Schedule.

⚠ CAUTION

Do not use more than three (3) pumps of grease in each grease fitting at any one time. Excess grease may cause grease seals to fail or grease migration into areas that could damage components.

NOTICE

Some maintenance items must be serviced more frequently on vehicles used under severe driving conditions.

Wheel Bearing Inspection/Packing

Tool List	Qty.
Floor jack	1
Jack stands	2
Wheel chocks	4
Wrench, 1 1/2”	1
Needle nose pliers	1
Non-ferrous punch	1
Ball peen hammer	1
Ratchet	1
Socket, 3/4”	1
Extension, 6"	1
Grease gun	1
Bearing packer	1

Lift the front of the vehicle and support on jack stands as per Section B. Rotate the front wheel and feel for any roughness. Grasp the outside of the tire and rock it. If any movement is detected the wheel bearing may require replacement/adjustment. If the wheel bearing is satisfactory, a worn king pin/bearing is indicated. See 'King Pin Bushing Replacement'.

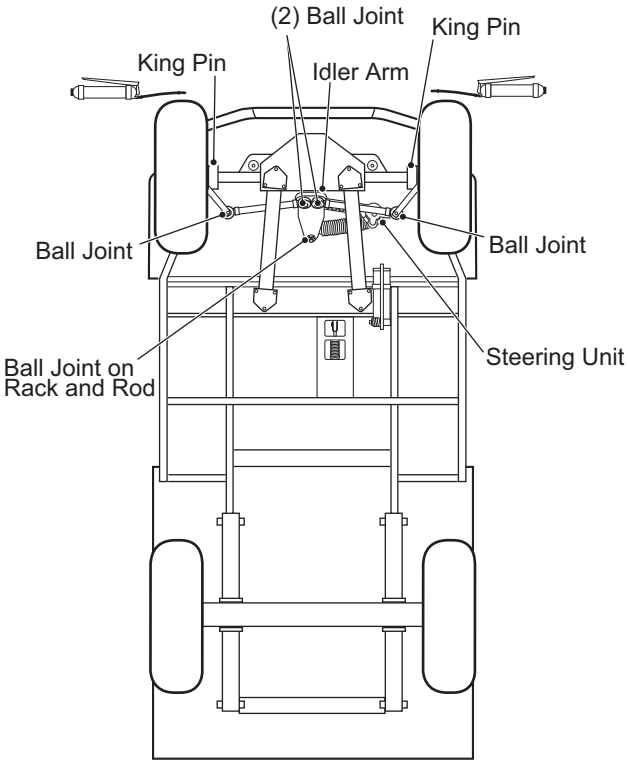

Fig. 8 Lubrication Points

Remove the wheel.

Remove the dust cap (14), cotter pin (15), castellated nut and washer (16), outer roller bearing (18) and hub assembly (17) from the spindle (Ref Fig. 9 on page J-8).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Remove the inner bearing seal (20), inner roller bearing (18) and bearing races (19) by tapping lightly around the bearing race through the hub using a soft non ferrous punch. Tap the punch in a circular pattern to avoid damaging the bore of the hub. Clean all bearings, seal, hub and dust cap in solvent and dry thoroughly. Inspect for signs of damage. Pitting or a blue coloration of the rollers will require replacement of the bearing. If the roller portion of the bearing is to be replaced, the race must also be replaced. Install new bearing only after packing with grease.

The front wheel bearings are tapered roller type and must be packed with grease at installation, or any time that the bearing is removed for inspection. It is recommended that a bearing packer attached to a grease gun be used; however, manual packing is acceptable if done correctly. To pack a bearing manually requires that a dab of grease be placed in the palm of the hand and the bearing be dipped in the grease. Force the grease up through and around all of the rollers until the entire bearing is coated in grease. Fill the area between the rollers with grease and apply a light coating to the bearing race. Install bearing in race.

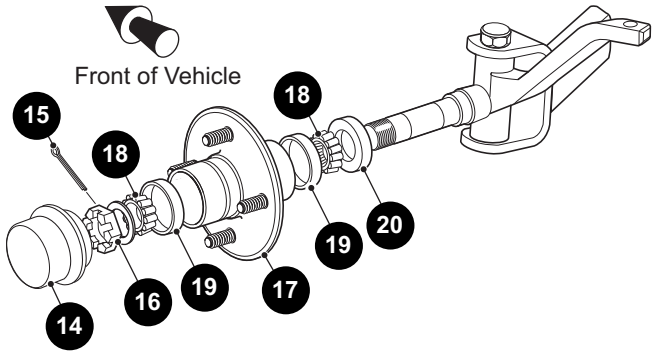

Fig. 9 Replacing Wheel Bearing

Seal Installation

Clean the hub seal surface to remove grease and press the inner bearing seal into place with the flange side of the seal facing into the bore. Tap gently into place with a seal installation tool until it is flush with the outside of the hub assembly. Lubricate the seal surface with a light oil. (Ref Fig. 10 on page J-8)

Bearing Adjustment

Assemble hub with bearings on spindle. Reinstall wheel on hub. Rotate the wheel while tightening the castellated nut (1) (Ref Fig. 11 on page J-8). Tighten the castellated nut until slight resistance to rotation is noticed.

Rotate the wheel 2 - 3 more turns to displace excess grease. If required, tighten castellated nut again until slight resistance is felt. If the cotter pin hole in the spindle (2) aligns with a slot in the castellated nut (1), insert a new cotter pin (3). If the hole does not align, the castellated nut must be **loosened** to align with the **closest available** slot in the nut.

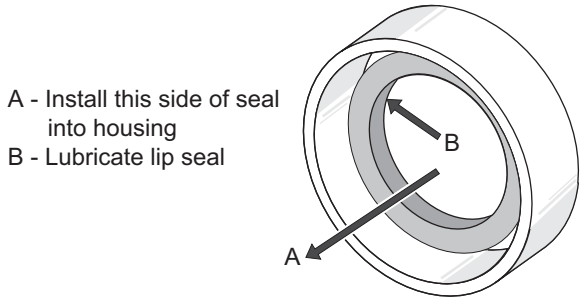

Fig. 10 Installing Seal

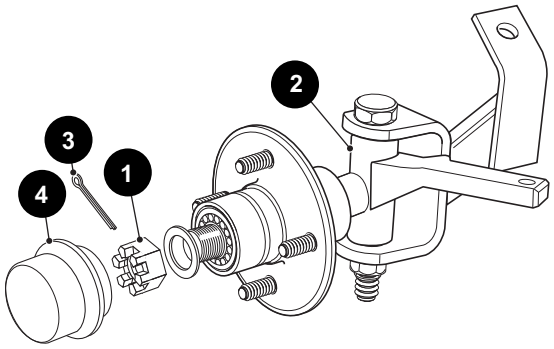

Fig. 11 Front Spindle and Bearing

Check for smooth and free rotation of the wheel and an absence of play when the wheel is grasped by the out side of the tire. Bend the cotter pin (3) against the flats of the castellated nut (1) and cut off any excess. Replace the dust cap (4).

King Pin Bushing Replacement Torque

Tool List	Qty.
Floor jack	1
Jack stands	2
Wheel Chocks	4
Pliers	1
Box end wrench, 15/16”	1
Sizing reamer, .875"	1
Socket, 15/16”	1
Torque wrench, ft. lbs.	1
Inside micrometer, 1"	1

Grasp top and bottom of tire and rock. If excessive motion is present, check wheel bearing adjustment. If adjustment is satisfactory, a worn king pin/bearing is indicated.

Remove the spindle assembly and clean the king pin bushings with solvent. (Ref Fig. 1 on page J-2) If the inside diameter of the bushings are worn to .880" (22

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

mm) or greater, the bushings should be replaced. Press out the old bushings and press new ones into the spindle until flush with the spindle housing.

NOTICE

As a result of the press operation, the bushing inside diameter will close slightly. Use an .875" diameter sizing reamer to correctly size the new bushings.

Reinstall the spindle and tighten the king pin nut to 40 - 50 ft. lbs. (55 - 70 Nm) torque.

Wheel Alignment

Tool List **Qty.**

Floor jack 1
Jack stands 2
Wheel chocks.....4
Box end wrench, 1 1/4”.....1
Tape measure 1
Chalk.....1

Lift the front of the vehicle and support on jack stands as per Section B. Confirm the alignment of the springs as described in 'Front Spring Replacement'.

Rotate each wheel and scribe or chalk a line around the circumference of the tire at the center of the tread pattern. Lower the vehicle and roll it forward approximately five feet in order to allow the tires to take their normal running position.

Measure the distance between the chalk lines at both the front and rear of the tires (Ref Fig. 12 on page J-9). The measurement taken at the front of the tire should be 1/4” ± 1/8” (6 mm ± 3 mm) less than the rear. Manufacturing tolerances may cause some variance, however typical dimensions would be 33 1/2” (85 cm) front and 33 3/4” (86 cm) rear.

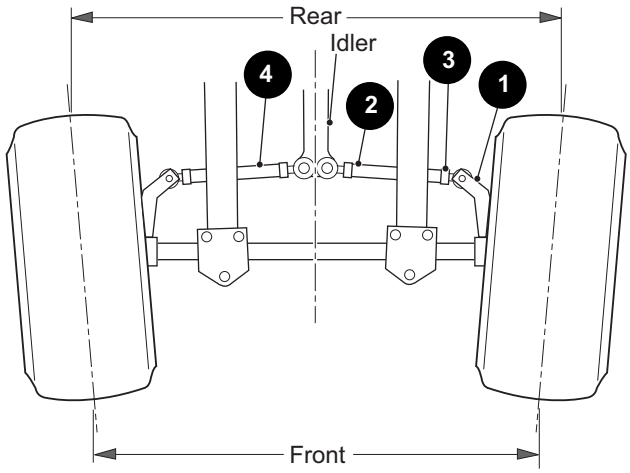

Fig. 12 Front End Alignment

To adjust the wheel alignment, first turn the steering wheel to the left until it stops. Look at the driver side spindle arm (1) (Ref Fig. 12 on page J-9) and see if it is touching the 'U' shaped bracket at the front axle. If not, adjust the driver side tie rod (2). Loosen the tie rod jam nuts (3) and adjust the driver's side tie rod (2) until the spindle arm contacts the 'U' bracket with the steering wheel turned fully to the left. Lock the tie rod jam nuts 25 - 30 ft. lbs. (35 - 40 Nm) torque. Center the steering wheel and adjust the passenger side tie rod (4) until the correct alignment is achieved. Lock the tie rod jam nuts 25 - 30 ft. lbs. (35 - 40 Nm) torque.

Check that the idler is centered ± 1/2” (± 13 mm). Adjustment may be made at one tie rod providing the dimension difference does not exceed 3/4” (19 mm).

Test drive the vehicle and confirm that the steering wheel is correctly centered. If not, remove steering wheel and rotate it to the correct position.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

TABLE OF CONTENTS FOR SECTION 'K'

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

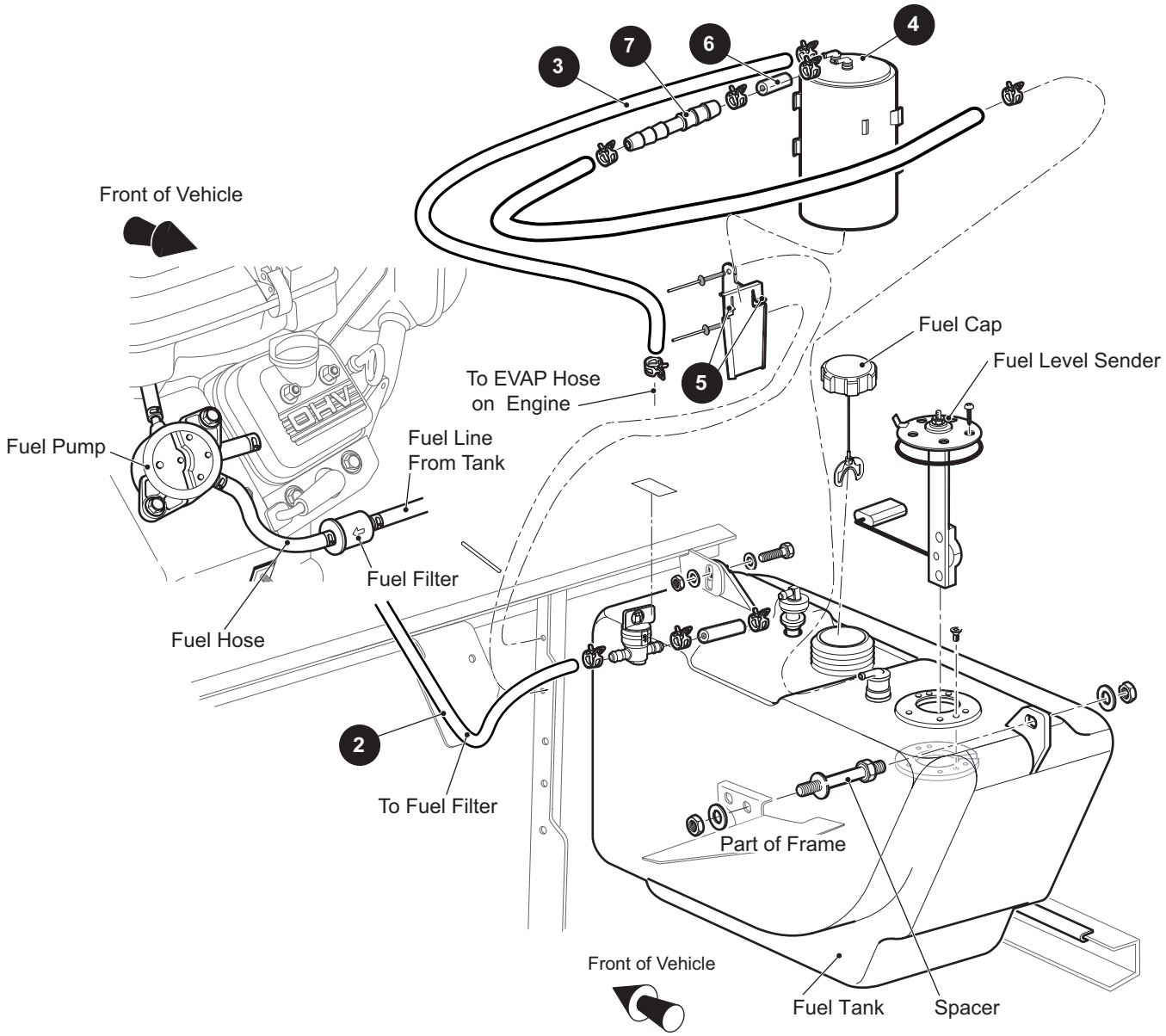

Fig. 1 Fuel System Components

GENERAL

Illustrations in this section may include components used on vehicles that comply with requirements of the California Air Resource board (CARB).

The position of the air filter may change depending upon the vehicle model. The air filter components are the same regardless of the position of the air filter.

NOTICE

In the following text, there are references to removing/installing bolts etc. Additional hardware (nuts, washers etc.) that are removed must always be installed in their original positions unless otherwise specified. Non-specified torque specifications are as shown in the table contained in Section A.

The fuel system consists of a fuel tank, fuel lines, fuel filter, fuel pump and carburetor; on CARB vehicles it also includes the CARB Canister (Ref. Fig. 1). For fuel pump or carburetor service, refer to the Briggs & Stratton

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Engine Manual (PIN 272144) for Vanguard™ VTwin Overhead Valve engines.

CARB CANISTER

Tool List **Qty.**

Flat Blade Screwdriver 1

To remove the CARB canister (4) pull and disconnect the EVAP hose (3). To disconnect the fuel tank hose (2), disconnect the hose (6) from the CARB canister and remove the fuel hose reducer (7) from the fuel tank hose (2) (Ref Fig. 4 on page K-5) . Press the tabs (5) (Ref Fig. 4 on page K-5) on the mounting bracket and slide the canister upward to clear the mounting bracket.

To install a CARB canister position the canister ears above the mounting bracket and push against the bracket and downward so that the canisters ears slide into the channels on the bracket. Make sure that the canister is seated completely and the retaining tabs are clear of the canister ears then connect the hoses.

FUEL

⚠ WARNING

To prevent serious injury or death resulting from a possible explosion, do not smoke near the fuel tank or refuel near open flame or electrical items which could produce a spark.

Always wear safety glasses while refueling to prevent possible eye injury from gasoline or gasoline vapor.

When refueling, inspect the fuel cap for leaks or breaks that could result in fuel spillage.

Do not handle fuel in an area that is not adequately ventilated. Do not permit anyone to smoke in an area where vehicles are being fueled.

⚠ CAUTION

Some fuels, called oxygenated or reformulated gasoline, are gasoline blended with alcohols or ethers. Excessive amounts of these blends can damage the fuel system or cause performance problems. If any undesirable operating symptoms occur, use gasoline with a lower percentage of alcohol or ether.

Do not over fill the fuel tank. Allow adequate space for the expansion of gasoline. Leave at least 1" (2.5 cm) space below bottom of filler neck.

The fuel tank cap is located under the passenger seat (Ref Fig. 2 on page K-2). Fill tank with fresh, clean, automotive grade, unleaded, 87 octane (minimum) gasoline. Leaded gasoline may be used if it is commercially available and if unleaded is unavailable.

Do not use gasoline which contains Methanol.

Do not mix oil with gasoline.

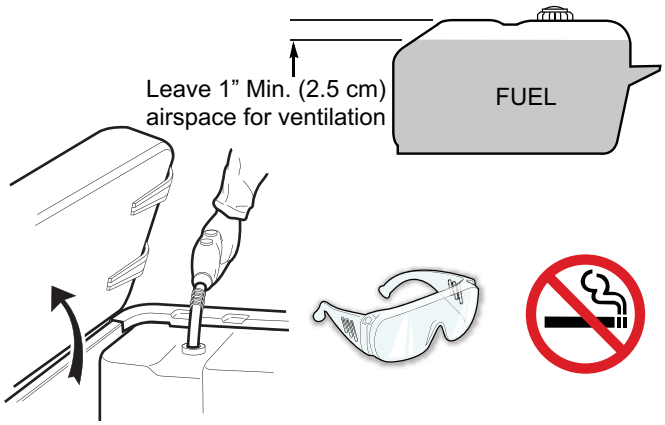

Fig. 2 Fuel Tank

FUEL SYSTEM COMPONENT SERVICE AND REPLACEMENT

⚠ WARNING

To prevent personal injury resulting from explosion or fire:

Check for clogged or kinked hoses. Clogged or kinked carburetor hoses are not only detrimental to the proper operation and performance of the vehicle, but can also be a safety hazard in the case of fuel leaking on a hot engine.

Tests that involve fuel flow should be avoided if at all possible. If a test to determine fuel/vapor presence or flow is required, the ignition system must be disabled. Ground the magneto in order to prevent an ignition spark that could ignite the fuel/ vapor. Never permit smoking or an open flame in an area that contains fuel/ vapor. Clean up al/ fuel spills immediately.

Never attempt to repair a damaged or leaking fuel tank. It must be replaced.

Disconnect the negative (-) battery cables before servicing fuel system.

The fuel filter, tank, hoses and cap should be checked frequently for leaks or signs that the cap vent or filter

has become clogged. The filter should be replaced periodically. See 'Periodic Service Schedule' in Section A.

Fuel Lines and Filters

Tool List **Qty.**

Pliers 1
Hose plug 1

Fuel is supplied to the fuel pump and carburetor through flexible fuel hoses. An in-line filter is installed in the hose between the fuel tank and fuel pump.

⚠ CAUTION

The filters are marked with a flow direction arrow. Be sure that the arrow points towards the fuel pump.

To replace fuel filter, move clamps off ends of filter and pull filter up higher than the fuel pump to reduce the amount of gas that will spill (Ref Fig. 1 on page K-1). Remove hose coming from fuel tank first and plug. Remove filter from hose going to fuel pump and discard.

NOTICE

Orient direction of new fuel filter according to FLOW arrow on side of filter.

Install new fuel filter in reverse order of removal.

Fuel Pump

Tool List **Qty.**

Pliers 1
Wrench, 10mm 1

Raise passenger seat.

Disconnect fuel hose coming from fuel filter.

Remove pump mounting hardware and disconnect pump from hoses going to carburetor and valve cover.

Remove pump from vehicle.

Install new fuel pump in reverse order of removal.

Fuel Tank

Tool List **Qty.**

Phillips screwdriver 1
Pliers 1
Wrench, 3/8” 2
Wrench, 1/2” 2

Raise passenger seat.

Remove seat filler panel. See BODY AND TRUCKBED section.

Disconnect fuel hose and gauge wires from tank.

Remove tank mounting hardware and tank from vehicle.

Install new fuel tank in reverse order of removal.

Carburetor Service

Be sure that the ignition system is functioning correctly before determining that servicing the carburetor is required. Refer to ELECTRICAL section for ignition system information.

Choke System

The choke functions to make initial starting of the engine easier in cold weather conditions. The choke plate restricts the air flow into the carburetor which enriches the air/fuel ratio.

Choke Operation

Pull choke knob out to operate choke. Check that cable operates smoothly and that cable returns when the knob is released. The motion should be smooth throughout the entire operating range. If there is any binding or sharp bends, the choke cable assembly and linkage must be inspected and parts replaced as necessary.

NOTICE

Do not attempt to lubricate the choke cable. Lubricant tends to retain dirt on the moving parts which will cause premature deterioration of the cable.

Choke Cable Removal

Tool List **Qty.**

Wrench, 1 /2” 1
Wrench, 5/8” 1
Straight screwdriver, small 1

Pry choke cable off ball stud of choke pivot lever (Ref Fig. 3 on page K-3). Loosen jam nuts securing choke cable to bracket and remove. At the center console, loosen setscrew securing knob to end of cable and remove knob. Remove nut securing end of cable to console and remove choke cable from vehicle.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

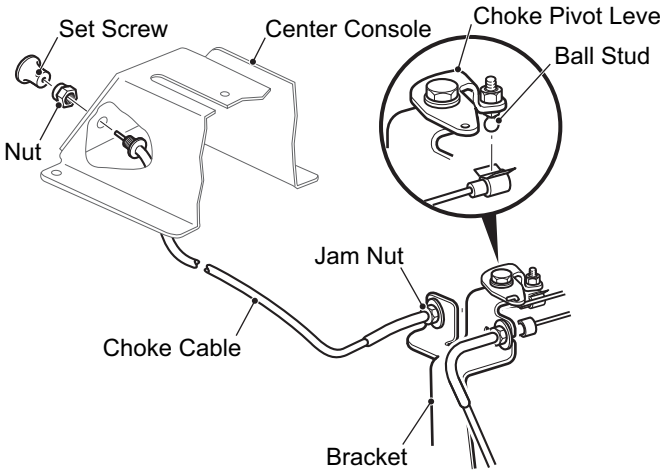

Fig. 3 Choke Cable

⚠ WARNING

To prevent an ignition spark which could ignite gasoline from the fuel system and result in personal injury, the negative battery cable must be removed from battery (see Section 'B').

Choke Cable Installation and Adjustment

From below the console, feed the choke cable through the hole in the console and secure end of cable with nut (Ref Fig. 3 on page K-4). Place knob on end of cable and firmly tighten setscrew to retain knob. At other end of cable, place cable in slot of bracket with a jam nut and washer on each side of bracket. Snap ball stud into socket on end of choke cable.

Remove air cleaner cover and filter cartridge to see choke plate in carburetor. Adjust the position of the cable in the bracket using the jam nuts until the choke plate fully opens and closes using the knob. Check the cable to be sure that there are no sharp bends or kinks in the cable before firmly tightening the jam nuts.

Carburetor

Tool List	**Qty.**
Pliers	1
Insulated wrench, *1/2*"	1
Wire lead with alligator clips	1

To properly prepare for carburetor service:

a) Disconnect fuel hose at fuel filter and plug ends to prevent contamination. Empty carburetor by running engine until it stops from lack of fuel.

b) Disconnect negative (-) cables from battery to prevent electrical shorts that could ignite fuel vapors.

c) Wash engine and chassis to remove dirt build-up, especially the underside of the wide frame crossmember directly above the air cleaner.

d) Ground magneto by attaching a wire lead, with alligator clips, from the terminal with the white wire (located on fan cover at side of engine) to the ground cable bolted to the frame.

Follow carburetor removal and service procedures outlined in the CARBURETION section of the Briggs & Stratton® Repair Manual (PIN 272144) for Vanguard™ V-Twin Overhead Valve engine.

WINTER OR PROLONGED STORAGE

For information on preparing vehicle for prolonged storage, refer to the GENERAL INFORMATION AND ROUTINE MAINTENANCE section.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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SECTION TITLE **PAGE NO.**

LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

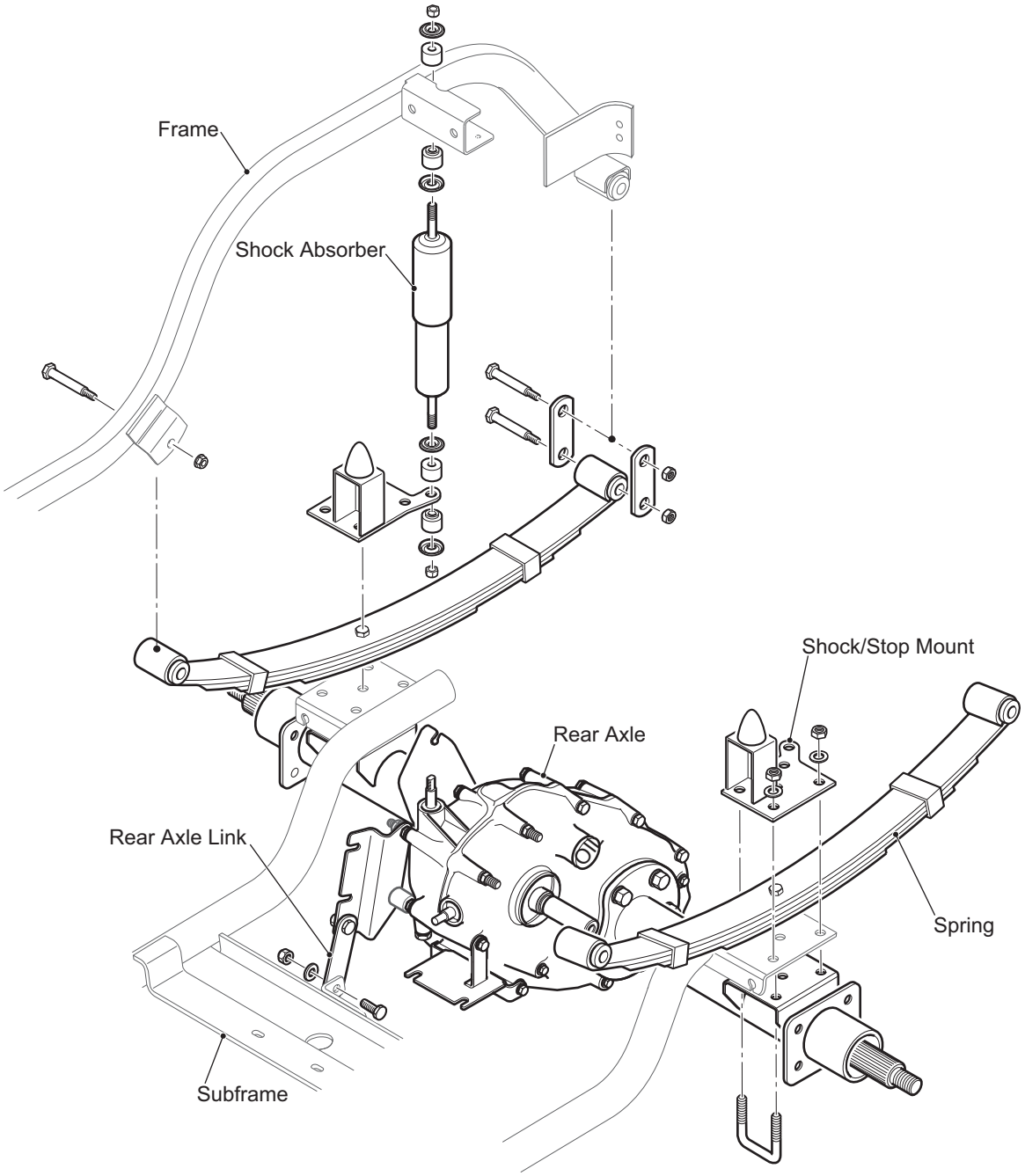

Fig. 1 Rear Axle and Suspension Components

REAR AXLE

Maintenance

The rear axle is provided with a lubricant level check plug located on the driver side at rear of housing. Unless leakage is evident, an annual lubricant check is sufficient.

Checking the Lubrication Level

Tool List	Qty.
Wrench, 13 mm	1
Funnel	1

NOTICE

For vehicles with LSD axle, add 2 ounce of friction modifier during refill.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

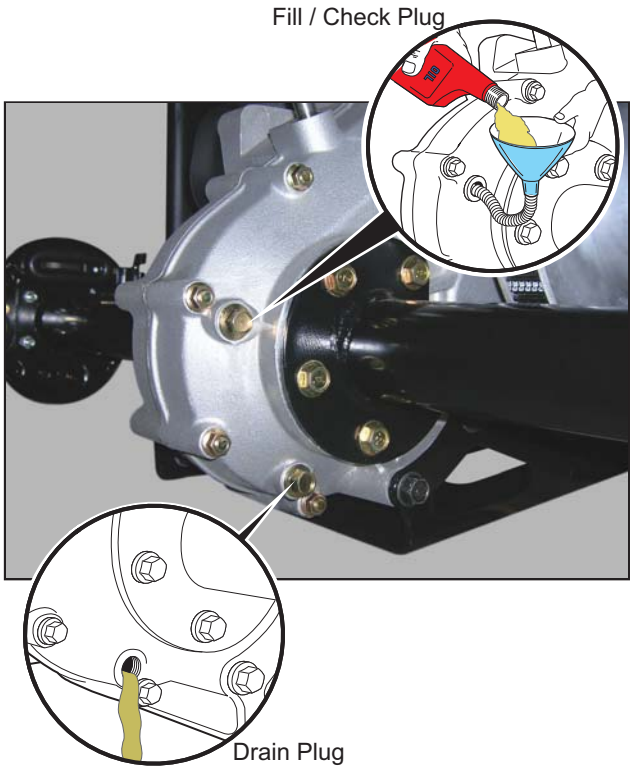

Fig. 2 Checking, Adding or Draining Rear Axle Lubricant

Clean area around check and fill plugs. Remove check plug (Ref Fig. 2 on page L-2).

The correct lubricant level is **just** below the bottom of the threaded hole. If lubricant is to be added, remove the fill plug and add lubricant (SAE 30 oil) using a funnel. Add lubricant slowly until lubricant starts to seep from the check plug. Install the check plug and the fill plug. In the event that the lubricant is to be replaced, a drain plug is provided at the bottom of the differential housing. Capacity of axle is 48 oz. (1.4 liters).

Differential Lock Cable Adjustment

Tool List	Qty.
Wrench, 1/2”	1

With lever in the unlocked position, loosen jam nuts at bracket (Ref Fig. 3 on page L-2).

Tighten front jam nut until arm on differential lock unit begins to pivot.

Back off front jam nut one turn and hold while tightening rear jam nut.

Rear Axle Removal

Tool List	Qty.
Lug wrench, 3/4”	1
Wheel chocks	1
Jack stands	1
Floor jack‘	1
Socket, 1 1/8”	1
Ratchet	1
Needle nose pliers	1
Socket, 1/4” hex bit	1
Socket, 1/2”	1
Wrench, 9/16”	1
Wrench, 1/2”	1
Straight blade screwdriver	1
Socket, 12 mm	1
Wrench, 1/4”	1
Socket, 9/16”	1
Wrench, 3/4”	1
Torque wrench, ft. lbs	1
Anti-seize compound	AR
Crowsfoot, 9/16”	1
Torque wrench, in. lbs.	1
Thread locking sealant	AR

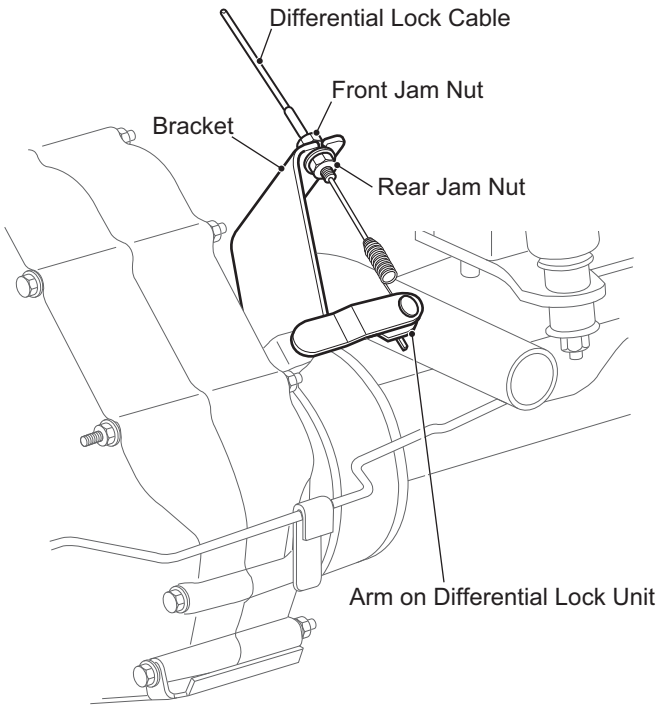

Fig. 3 Differential Lock Cable Adjustment

Remove load bed per BODY AND LOAD BED section.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ WARNING

To reduce the possibility of personal injury, follow the lifting procedure in SAFETY section of this manual. Place wheel chocks in front and behind the front wheels and check the stability of the vehicle on the jack stands before starting any repair procedure. Never work on a vehicle that is supported by a jack alone.

Loosen lug nuts at rear wheels and lift rear of vehicle according to lifting procedure in SAFETY section.

Remove rear wheels and brake drums.

Disconnect parking brake cables by first removing cotter and clevis pins from actuating levers and then retaining rings from subframe brackets (Ref Fig. 4 on page L-3).

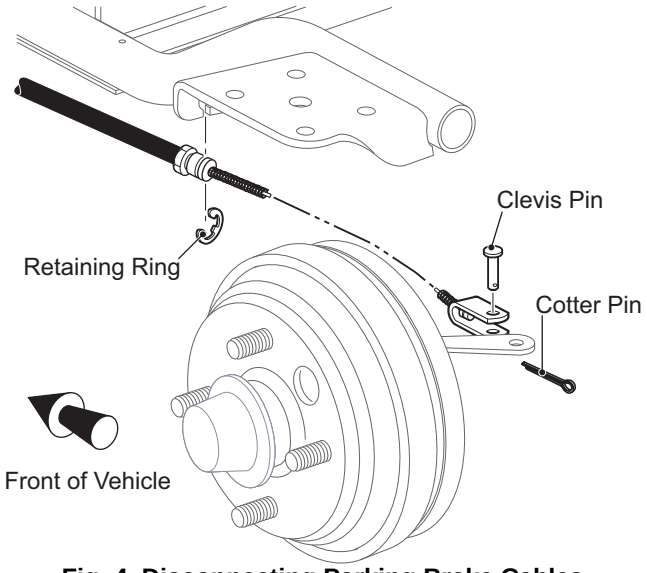

Fig. 4 Disconnecting Parking Brake Cables

To gain clearance for banjo bolts, loosen backing plate hardware until lock nuts are at end of bolts.

Disconnect hydraulic brake lines at backing plates by removing banjo bolts and copper gaskets (Ref Fig. 5 on page L-3). Remove brake line, running across rear axle, from clamp on rear axle. Bleeding the hydraulic brakes is required after any hydraulic part is removed or replaced.

Loosen clamp and remove exhaust pipe from muffler.

Remove drive belt and driven clutch. See CONTINUOUSLY VARIABLE TRANSMISSION section.

Remove push nut securing end of accelerator cable to governor. To maintain cable adjustment, loosen only the rear jam nut anchoring accelerator cable to accelerator cable bracket and remove cable (Ref Fig. 6 on page L- 4).

Remove governor cable from ball stud on lower end of governor bellcrank located between engine and differential (Ref Fig. 6 on page L-4). Remove two nuts mounting accelerator cable bracket to differential. Loosen two setscrews and pull governor bellcrank assembly and accelerator cable bracket from differential.

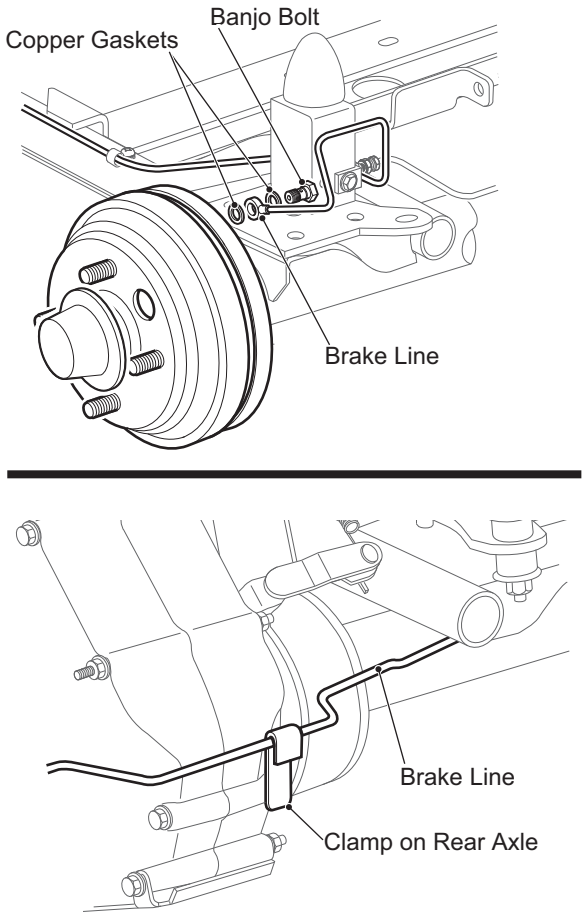

Fig. 5 Disconnecting Brake Lines

At differential, remove cotter and clevis pin connecting differential lock cable to differential lock arm (Ref Fig. 7 on page L-4). To maintain cable adjustment, loosen only the rear jam nut anchoring differential lock cable to bracket and remove cable.

Loosen nuts anchoring direction selector cables to differential bracket (Ref Fig. 8 on page L-4). Remove nut attaching pivot to differential and slide pivot from shaft. Remove hardware securing rear axle link to subframe (Ref Fig. 9 on page L-4).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

⚠ WARNING

The differential makes the rear axle assembly top heavy and may tend to rotate when separated from springs. To reduce possibility of personal injury while removing rear axle, be sure to support differential when removing the 'U' bolts. If no lifting device is available, a second person should hold the rear axle in the correct position until the 'U' bolts are removed. Both persons should remove the rear axle assembly.

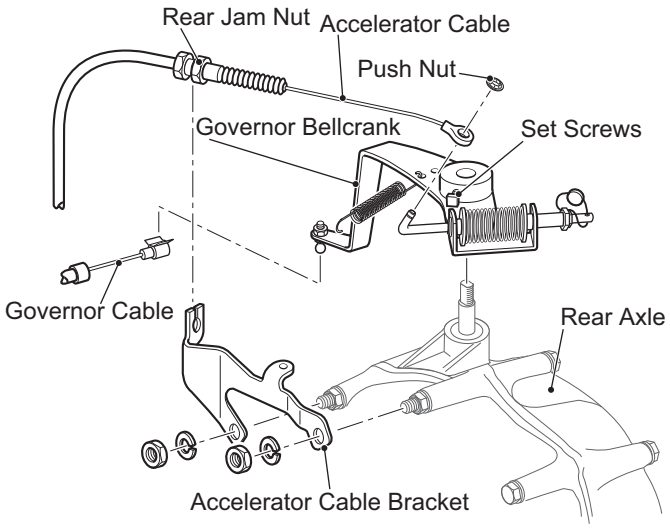

Fig. 6 Disconnecting Accelerator Cable and Governor

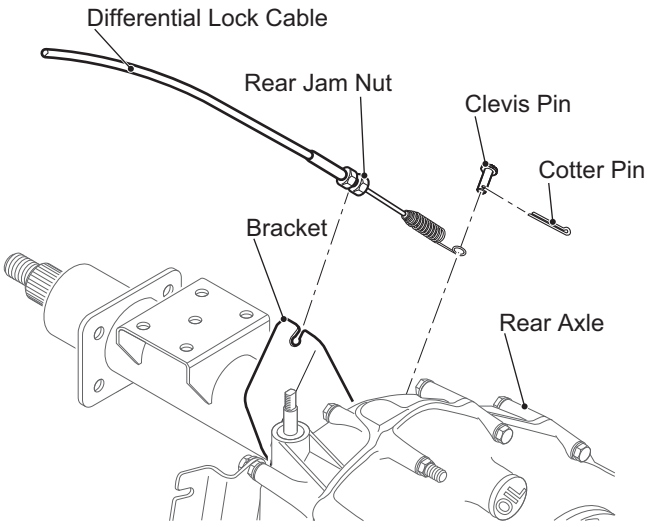

Fig. 7 Disconnecting Differential Lock Cable

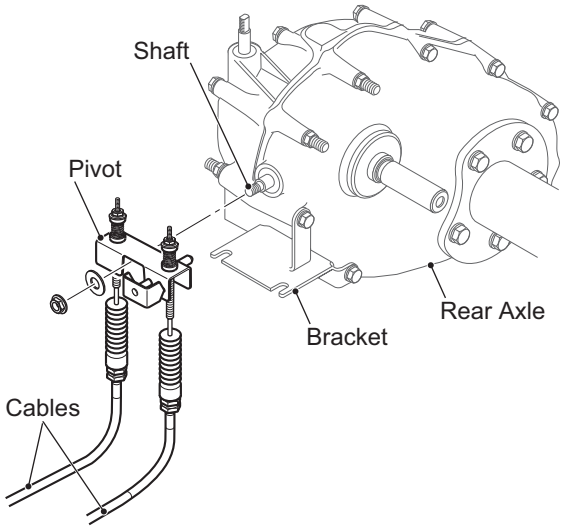

Fig. 8 Disconnecting Direction Selector Cables

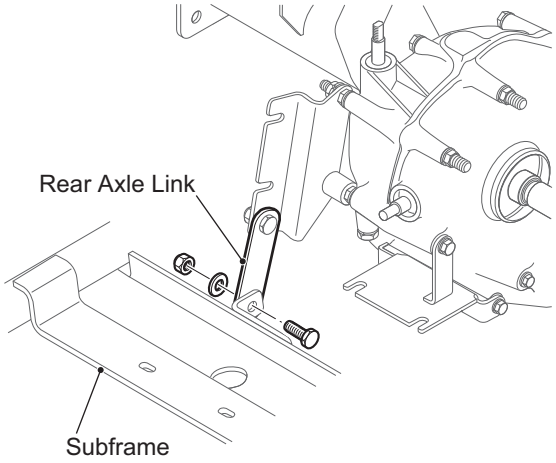

Fig. 9 Detaching Differential Link

Place floor jack under center section of rear axle and raise it just enough to take weight off springs. With both rear axle and frame properly supported, remove 'U' bolts mounting axle to subframe (Ref Fig. 10 on page L-6). Lower rear axle and pull it out from under side of vehicle.

Rear Axle installation

Rear axle installation is in the reverse order of disassembly using new lock nuts.

Tighten 'U' bolt lock nuts to 18 ft. lbs. (25 Nm) torque.

Tighten two governor bellcrank assembly setscrews to 70 - 84 in. lbs. (8 - 9 Nm).

Tighten driven clutch bolt to torque specified in CONTINUOUSLY VARIABLE TRANSMISSION section.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Center end of exhaust pipe between driven clutch and subframe and tighten clamp till no loose play is present. Tighten banjo bolts to 124 - 177 in. lbs. (14 - 20 Nm) torque.

Tighten backing plate lock nuts and castellated nuts securing brake drums to torque specified in HYDRAULIC BRAKES section.

Install rear wheels and tighten lug nuts. See WHEELS AND TIRES section.

Bleed brake system before installing load bed. See HYDRAULIC BRAKES section.

REAR SUSPENSION

NOTICE

In the following text, there are references to removing/installing bolts, etc. Additional hardware (nuts, washers, etc.) that is removed must always be installed in its original position unless otherwise specified. Non specified torque specifications are as shown in the table contained in Section A.

General

Tool List	Qty.
Wheel chocks	4
Jack stands	4
Floor jack	1
Wrench, 9/16”	1
Socket, 9/16”	1
Socket, 9/16”, deepwell	1
Extension, 3"	1
Ratchet	1
Wrench, 3/4”	1
Torque wrench, ft. lbs	1

The rear suspension consists of the rear axle and attachments that secure it to the subframe, springs and shock absorbers (Ref Fig. 10 on page L-6). This section is confined to the removal and replacement of the springs and shock absorbers.

Shock Absorber Removal

Raise load bed.

Raise the rear of the vehicle in accordance with the instructions provided in Section B of this manual and support the rear of the vehicle on the outer ends of the rear bumper.

Remove the bottom shock absorber nut (Ref Fig. 10 on page L-6).

Compress the shock absorber and remove the top shock absorber nut.

Remove the shock absorber.

Shock Absorber Installation

Shock absorber installation is in the reverse order of disassembly except that the shock absorber nuts must be tightened until the shock absorber bushings expand to the diameter of the shock absorber washer.

Rear Spring Removal

⚠ WARNING

To reduce the possibility of personal injury, follow the lifting procedure in section B of this manual. Place wheel chocks in front and behind the front wheels and check the stability of the vehicle on the jack stands before starting any repair procedure. Never work on a vehicle that is supported by a jack alone.

NOTICE

If both springs are to be replaced and the rear axle is not to be removed, it is important to remove and replace one spring at a time. Springs must be replaced in sets. Never replace just one

Remove the bottom shock absorber nut (Ref Fig. 10 on page L-6).

Place a floor jack under the center section of the rear axle and raise just enough to place a second set of jack stands under the axle tubes. With both the rear axle and the frame supported, the 'U' bolts and shock/stop mount can be removed.

Remove the rear spring shackle assembly and the front spring mounting hardware.

Remove the spring.

Rear Spring Installation

Spring installation is in the reverse order of disassembly.

The shock absorber nuts must be tightened until the shock absorber bushings expand to the diameter of the shock absorber washer (Ref Fig. 10 on page L-6).

Tighten the front spring hardware to 20 ft. lbs. (30 Nm) torque.

Tighten the rear spring shackle hardware to 12 ft. lbs. (20 Nm) torque.

Tighten 'U' bolt lock nuts to 18 ft. lbs. (25 Nm) torque.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

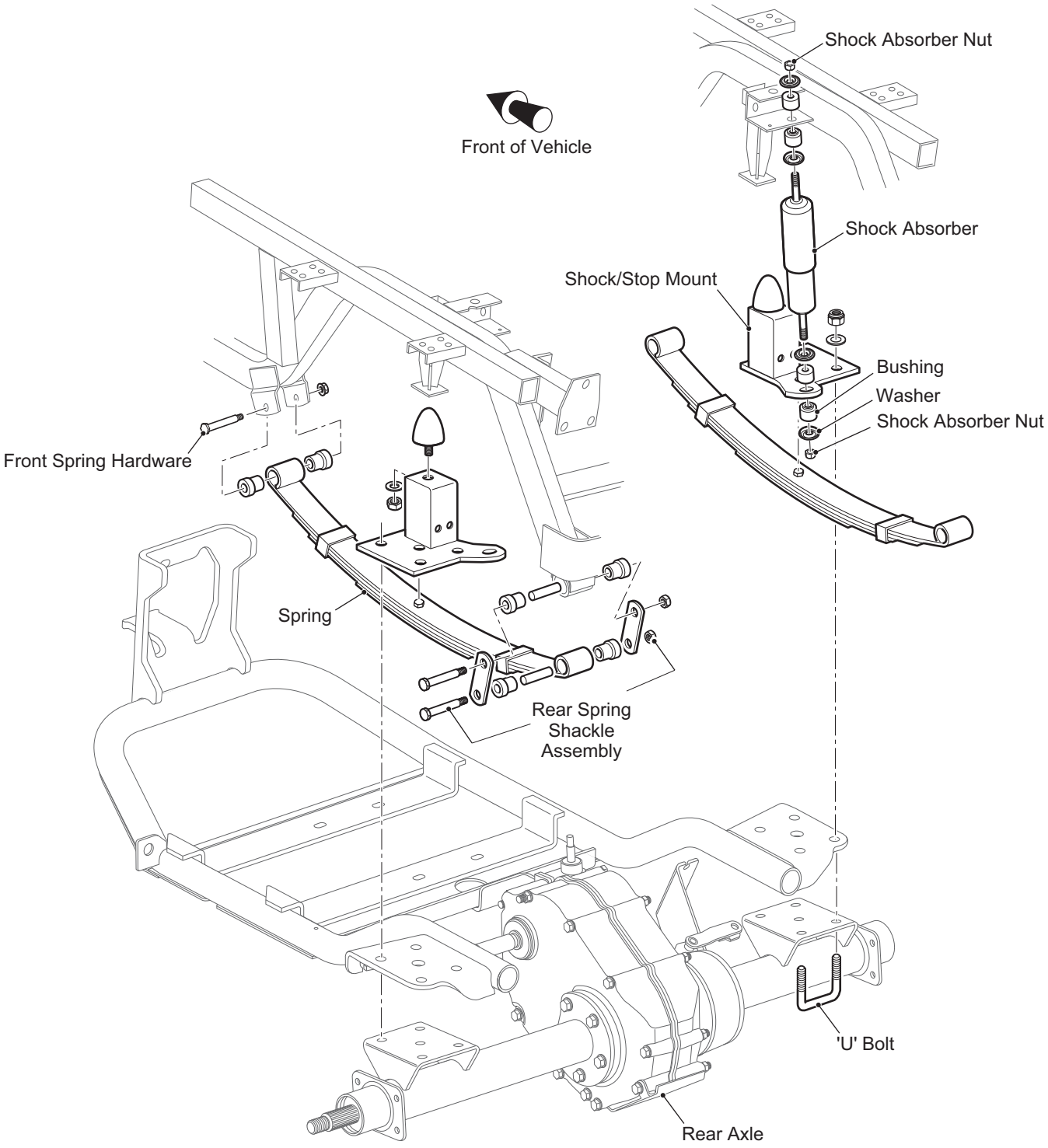

Fig. 10 Rear Suspension

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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SECTION TITLE **PAGE NO.**

LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

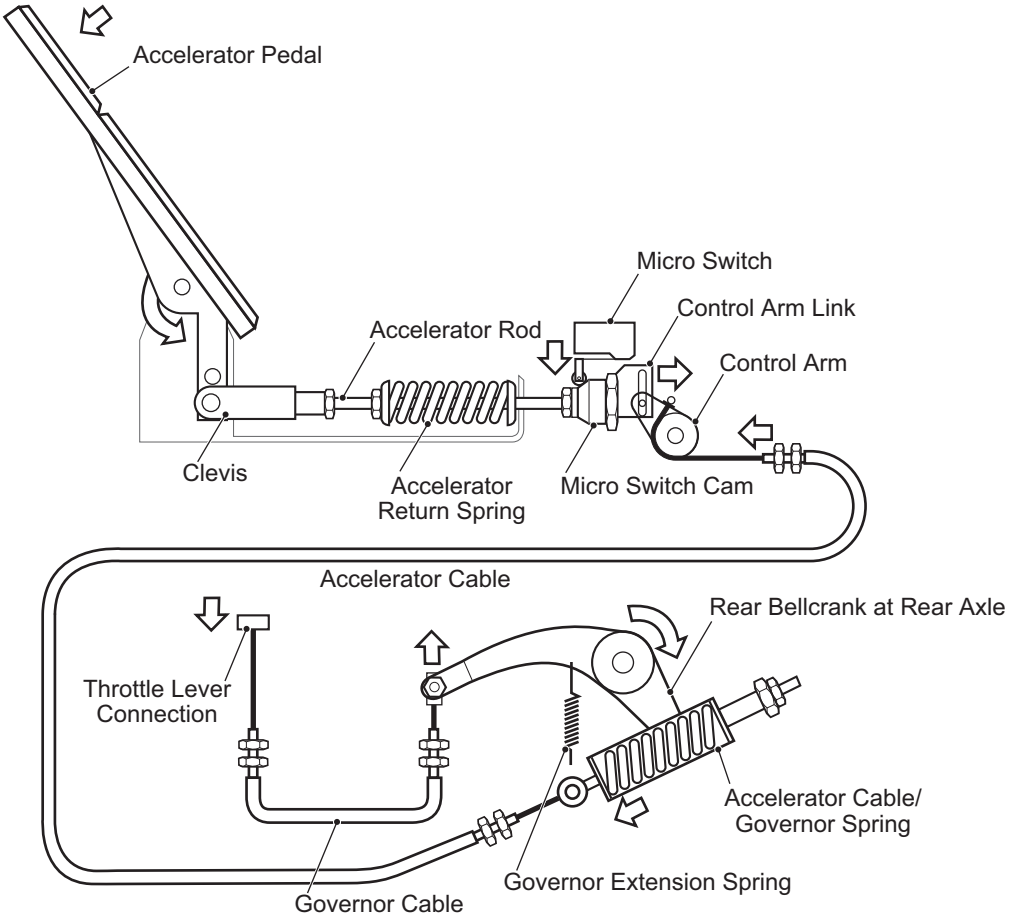

Fig. 1 Accelerator and Speed Control System

ACCELERATOR, GOVERNOR AND CARBURATOR LINKAGE

System Operation

NOTICE

The linkages that control the accelerator mechanism, governor and carburetor are designed to operate as an integrated assembly. Any adjustment to one portion of the system will have an effect on the other components within the system.

As the accelerator pedal is depressed, the accelerator rod moves towards the rear of the vehicle by overcoming the resistance of the accelerator return spring (Ref Fig. 1 on page M-1).

When the accelerator pedal is depressed, the accelerator rod moves towards the rear of the vehicle by overcoming the resistance of the accelerator return spring (Ref Fig. 1 on page M-1).

As the accelerator pedal moves, the micro switch closes and activates the ignition circuit. The rear end of the accelerator rod is joined to the control arm link, which in turn is attached to the control arm with a pin which slides within a slot in the control arm link.

As the accelerator rod moves to the rear of the vehicle, the control arm rotates and pulls the accelerator cable.

When the accelerator cable pulls against the accelerator cable/governor spring, the spring compresses until it overcomes the resistance exerted by the governor mechanism and its extension spring. As the accelerator cable/ governor spring overcomes these forces, the governor bell crank moves and the motion is transferred through the governor cable to the throttle lever on the carburetor.

Governor Operation

Until the vehicle reaches its governed speed, the vehicle will continue to accelerate in relation to the accelerator pedal position. When the governed speed is reached,

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

the ground speed governor in the rear axle assembly operates against the governor spring and closes the carburetor until the correct governed speed is achieved (Ref Fig. 1 on page M-1).

It is the force of the governor spring in response to accelerator pedal and governor arm position which controls the position of the carburetor throttle plate. This spring cushions sudden changes in throttle linkage position to provide smooth power transmission.

⚠ WARNING

Tampering with or adjusting the speed control system to go beyond factory specified speed will void the warranty, is dangerous, could cause a loss of vehicle control and possible injury or death.

NOTICE

If the governor requires service, the service must be performed by an authorized service branch or distributor who will reseal the governor after calibration.

TROUBLESHOOTING

Erratic acceleration and performance that does **not** include a notable increase in governed speed, may indicate the need for a linkage adjustment.

Symptoms that include an increase in governed speed indicate:

- A possible governor failure within the rear axle.
- Worn components in the governor system.
- Improper adjustment of linkage system.

NOTICE

Other factors may effect the performance characteristics of the vehicle but they should be investigated only after confirming the linkage adjustment.

GENERAL CABLE ADJUSTMENT PROCEDURE

Properly adjusted, the cable should be short enough to be slightly loose but not too short to be pulling on the lever when at rest (Ref Fig. 2 on page M-2).

To permit proper cable adjustment, the cable length may be increased/decreased at its mounting bracket. This is

accomplished by moving the cable housing forward/backward at the bracket attachment to increase/decrease the amount of available cable.

To decrease amount of available cable, loosen the nuts on either side of the bracket and move the cable away from the lever. Once correct length is achieved, tighten the nuts.

To increase amount of available cable, loosen the nuts on either side of the bracket and allow the cable to move closer to the lever. Once correct length is achieved, tighten the nuts.

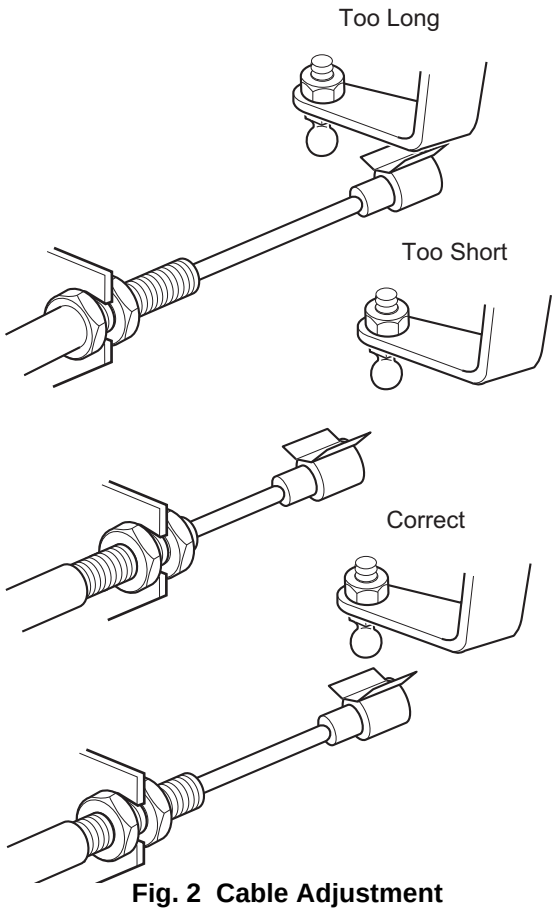

Fig. 2 Cable Adjustment

ACCELERATOR/GOVERNOR CABLE ADJUSTMENT

Tool List **Qty.**

Insulated wrench, 1/2” 2

⚠ WARNING

Remove the negative (-) battery cable at the battery to prevent the vehicle moving and the possible personal injury that may result. Refer to section ‘B’ of this manual for additional cautions and warnings.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Loosen the adjustment nuts on the accelerator cable bracket. Tighten front adjustment nut till governor bell crank begins to pivot. Back off adjustment nut 1 turn and tighten rear adjustment nut. As a final check, with the gas pedal up, the accelerator cable must be slightly loose between the accelerator cable bracket and the governor spring assembly.

⚠ CAUTION

The function of the carburetor and governor system may be impaired if no movement is evident.

If, after adjusting accelerator cable, the vehicle backfires (indicating carburetor is not closing fully) or shows a lack of performance (indicating carburetor is not opening fully), an adjustment to the governor cable is required.

Loosen the adjustment nuts on each end of the governor cable. With governor bell crank at rest, tighten the outside upper adjustment nut till the throttle lever begins to lift off the carburetor throttle stop. Back off adjustment nut 1 1/2 turns and tighten the inside upper adjustment nut. Tighten the nuts at the lower end of cable. Pull cable to check that throttle lever has full travel (Le. contacts throttle stop in both full open and full closed throttle plate position).

Check choke function and adjust choke cable if required. See 'Choke Cable Installation and Adjustment' in the FUEL SYSTEM section.

If, after performing the cable adjustments, the vehicle performance is still not satisfactory, proceed to the pedal box and accelerator pedal area for adjustments.

PEDAL BOX ADJUSTMENTS

Tool List	Qty.
Wrench, 1/2”	1
Phillips screwdriver	1
Wrench, 7/16”	1
Wrench, 3/8”	1
Socket, 1/8” hex bit	1
Ratchet	1
Torque wrench, in. I bs.	1
Crowfoot wrench, 1/2”	1
White lithium grease	1
Socket, 3/8”	1
Socket, 9/16”	1

NOTICE

if any adjustments are made in the Pedal box or accelerator area, it is necessary to go back and perform the accelerator/governor cable adjustment again. This **must** be done because any adjustment made in the pedal box or accelerator area will effect the cable adjustment.

Accelerator Pedal Arm Adjustment

Lift vehicle using procedures and safety information in section 'B'.

Confirm the accelerator pedal arm (1) contacts the accelerator pedal bracket (2) when in the released position (Ref Fig. 4 on page M-4). If there is no contact, loosen jam nut (3) and rotate the rod (4) until contact is made.

NOTICE

Note that the factory applies a thread sealant to the accelerator rod threads before threading the rod into the clevis.

Tighten the jam nut (3) firmly.

Micro Switch Adjustment

When system is correctly adjusted, the micro switch (5) in the accelerator pedal box (6) will click when the top of the accelerator pedal moves approximately 1/2” - 5/8” (13 - 16 mm). The accelerator cable (7) (as seen at the rear axle) should have some slack present and not show any movement until after the micro switch clicks.

To access micro switch, loosen rocker panel, lift floor mat and remove access cover (Ref Fig. 3 on page M-3).

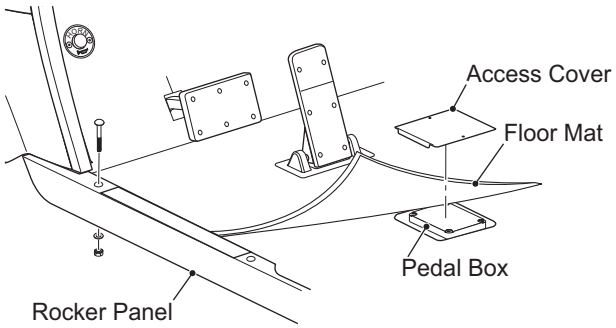

Fig. 3 Accessing Pedal Box

The micro switch can be accessed by removing the screws (S) securing the cover (9) on the pedal box (Ref Fig. 4 on page M-4). Loosen the setscrew (10) and rotate the cam (11) to adjust it. Adjust to permit 1/2” - 5/8” (13 - 16 mm) of travel at **top** of accelerator pedal before the micro switch clicks. Make sure the setscrew in the cam does not contact the micro switch actuator

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

and tighten set screw to 45 - 55 in. lbs. (5 - 6 Nm) torque.

Control Arm Link

Be sure that the control arm link (12) is parallel with the bottom of the pedal box and tighten nuts (13) to 120 - 132 in. lbs. (14 - 15 Nm) torque (Ref Fig. 4 on page M-4). Apply a thin coating of white lithium grease to the slot in the control arm link.

If control arm (14) has been removed from control arm link (12), tighten nut (15) to 25 - 43 in. lbs. (3 - 5 Nm) torque and be sure that arm rotates smoothly on its shaft.

If shaft (16) has been removed from pedal box, tighten nut (17) to 120 - 144 in. lbs. (14 - 16 Nm) torque.

Be sure accelerator pedal moves smoothly and accelerator cable (7) pulls smoothly on governor arm (18) (Ref Fig. 4 on page M-4).

Replace the cover on the pedal box. Tap lightly to set the cover before installing screws. Replace the access cover on the floor. Replace floormat and rocker panel.

Check wide open throttle adjustment. See 'ACCELERATOR/ GOVERNOR CABLE ADJUSTMENT' on page M-2.

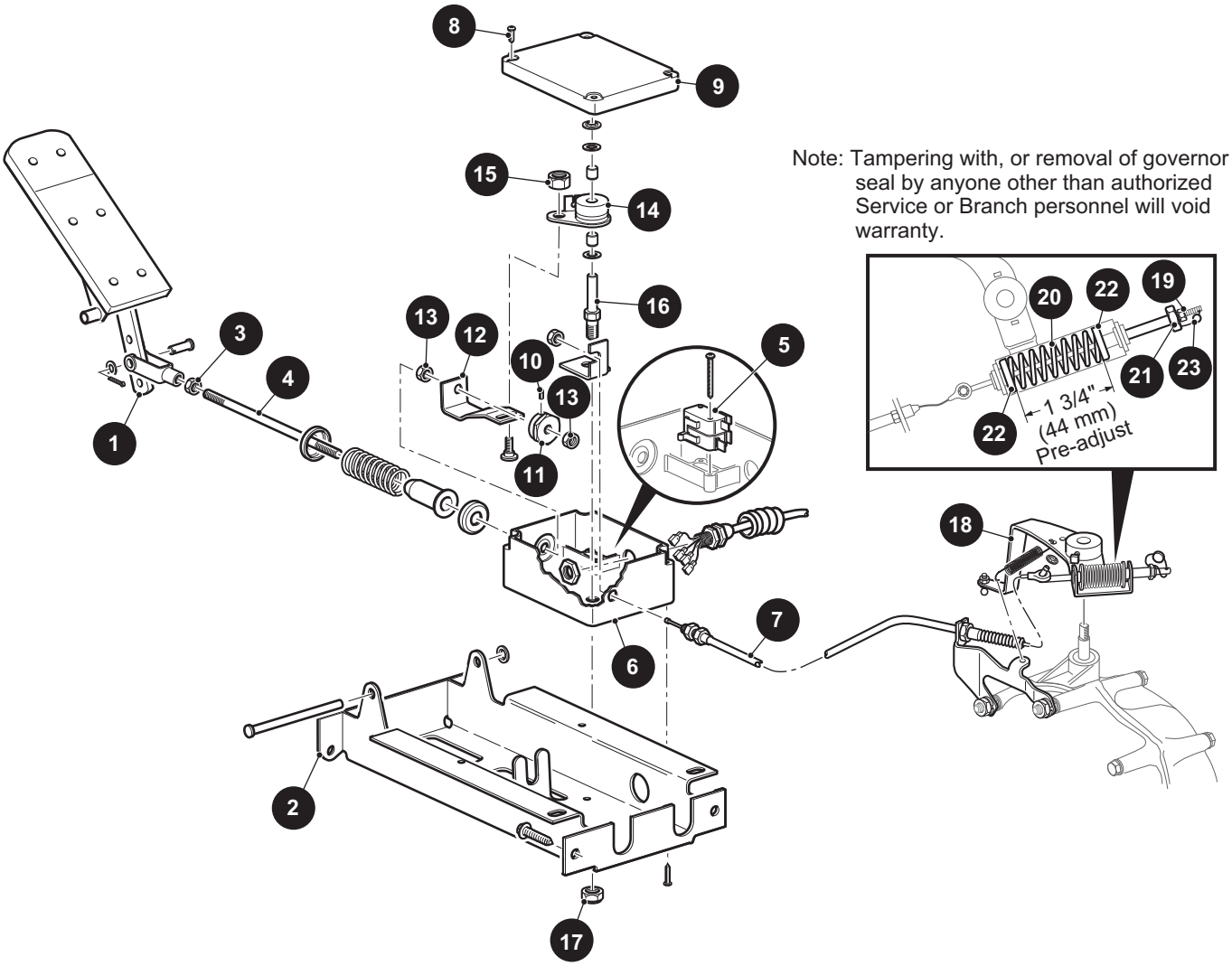

Fig. 4 Accelerator Linkage

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

GOVERNOR COMPRESSION SPRING ADJUSTMENT

Tool List	Qty.
Wire cutter	1
Pliers	1
Wrench, 3/8”	1
Wrench, 9/16”	1

⚠ WARNING

Tampering with or adjusting the speed control system to go beyond factory specified speed will void the warranty, is dangerous, could cause a loss of vehicle control and possible injury or death.

⚠ CAUTION

If the governor requires service, the service must be performed by an authorized service branch or distributor who will reseal the governor after calibration.

Hold the governor compression spring adjuster rod when turning the governor adjuster (21). Failure to hold the rod will cause the accelerator cable to twist which may cause premature failure.

Cut and remove safety seal (23). Hold governor adjuster (21) and loosen the jam nut (19) (Ref Fig. 4 on page M-4).

Pre-adjust governor compression spring (20) by holding governor rod and rotating governor adjuster until a dimension of 1 3/4” (44 mm) is achieved between the inside of the cup washers (22). This dimension is a starting point and may be further adjusted after a road test. Tighten the jam nut (19) and perform road test. See 'Road Test' on page M-5.

Road Test

Install the negative (-) battery cable.

Test drive the vehicle and confirm that the compression spring adjustment results in the maximum governed speed specified in the GENERAL SPECIFICATIONS section. Determine speed by measuring the time it takes to travel a known set distance with vehicle at maximum speed. Enter time and distance into this formula to calculate speed:

Rate (in MPH) = (Distance in feet / 5280) / (Time in seconds / 3600)

or

Rate (in KPH) = (Distance in meters / 1000) / (Time in seconds / 3600).

For example: (300 ft. / 5280) / (13.6 sec. / 3600) = 15 MPH

or

(100 m / 1000) / (15 sec. / 3600) = 24 KPH.

If the speed is not within the specified speed range, stop the vehicle and adjust the governor compression spring as described in procedure above.

Repeat the test and adjustment until the factory recommended governed speed is achieved. Tightening the spring results in a speed increase while loosening it will result in a speed decrease.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

ENGINE

For engine troubleshooting, diagnostic and repair procedures, refer to Briggs & Stratton® Repair Manual (PIN 272144) for Vanguard™ V-Twin Overhead Valve Engine

GASOLINE VEHICLE PERFORMANCE

Condition	Possible Cause	Correction
STARTER DOES NOT TURN	Weak or bad battery	Recharge or replace as necessary
	Terminals are loose or corroded	Clean and retighten
	Poor wiring connections	Repair or replace wire and/or connections
	Faulty Ignition Switch	Repair or replace wire and/or connections
	Blown fuse	Investigate cause and replace fuse
	Solenoid faulty	If no audible 'click' is heard, check power and ground. Replace solenoid if power and ground is good
	Accelerator switch	Check continuity
	Starter/generator terminals are loose or corroded	Tighten or clean
	Leads are broken or faulty ground	Check for breaks at bend or joint. Replace cable
	Field coils are open	Replace fields
	Armature coil is open	Replace armature
STARTER TURNS SLOWLY	Terminals are loose or corroded	Retighten or clean
	Weak battery	Charge battery
	Leads are nearly broken or connections are faulty	Check for any defect of leads at bend or joint. Replace wire leads
	Mechanical problem inside starter/generator	Check
	Internal engine damage	Inspect and repair
	Crankcase over filled with oil	Drain and fill to recommended level with approved oil

TROUBLESHOOTING

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
STARTER ROTATES BUT VEHICLE WILL NOT START OR HARD TO START	Weak Battery	Recharge or replace as necessary
	Corroded or loose battery connections	Clean and tighten battery connections. Apply a coat of battery protectant to terminals
	Check for adequate fuel level	Fill with correct grade gasoline to 1" (2.5 cm) below bottom of filler neck
	No spark at spark plug. Broken or disconnected spark plug wire	Check and replace if required
	Spark plug fouled	Clean or replace
	Broken or disconnected coil wires	Check or replace
	Faulty magneto	Check or replace
	Incorrect spark plug gap/type	Set gap correctly
	Fuel pump faulty	Repair or replace
	Fuel line clogged or clamp loose	Clean or replace if required
	Cracked or broken fuel line	Replace with new hose
	Main jet blocked	Clean jet
	Throttle lever motion restricted	Check all linkages
	Dirt or water in fuel line or carburetor	Clean lines and carburetor. Replace filter
	Clogged fuel filter	Check and replace if required
	Incorrect carburetor float setting	Check/Replace float
	Engine flooded	Push choke in. Clean/or replace spark plugs
	Engine fuel starved	Use choke and push in as soon as engine runs smoothly
	Air intake tube is blocked	Repair or clean
	Clogged air filter	Wash or replace as required
	Plugged muffler or pipe	Repair or replace
	Low compression in engine	Check and repair

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
POOR LOW SPEED PERFORMANCE	Plugged gas tank vent	Clean or repair
	Choke on	Push choke in
	Carburetor float level incorrect	Check/Replace float
	Clutches not shifting out	Replace clutch/clutches
	Fuel pump faulty	Repair or replace
	Insufficient fuel level	Add fuel
	Air leak at carburetor gasket	Repair component
	Spark plug fouled	Clean or replace
	Weak spark	Check magneto
	Incorrect valve lash	Check and adjust
	Belt slipping	Check belt & clutch surfaces Replace belt or clean clutches
	Faulty accelerator adjustment	Check and adjust
	Faulty governor adjustment	Check and adjust
POOR MIDRANGE OR HIGH SPEED PERFORMANCE	Spark plug fouled	Clean or replace
	Weak spark	Check magneto
	Carburetor float not level	Adjust
	Incorrect or plugged main jet	Check size for appropriate altitude. Clean
	Dirty air filter	Clean or replace
	Brake dragging	Perform brake maintenance
	Low compression	Check engine
	Governor not adjusted properly	Adjust
	Faulty accelerator adjustment	Check and adjust
	Faulty governor adjustment	Check and adjust
ENGINE OVERHEATING	Foreign matter in cylinder fins and blower housing	Clean
	Damaged blower housing or fins	Replace
	Damaged or plugged muffler	Repair or replace
	Inadequate oil supply	Check oil system, inspect oil pump, change oil, fill to correct level
	Heavy loads	Lighten load
	Incorrect Fuel	Use correct seasonal blend fuel. Do not use old fuel

TROUBLESHOOTING

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
REPEATED SPARK PLUG FOULING	Wrong spark plug type	Replace with correct spark plug
	Wrong spark plug gap	Check and adjust if required
	Faulty ignition system	Check and replace if required
	Excessive ring blow by	Check/replace rings
	Poor quality gasoline	Use correct fuel, check bulk storage tank for proper storage and handling
	Air leak allowing dirt to enter system	Repair
	Choke sticking closed	Repair
	Wrong main jet for conditions (high altitude operations)	Replace with correct altitude jet for conditions
CARBURETOR FLOODS ENGINE	Inlet valve/seat dirty	Clean or replace
	Fuel contamination	Clean fuel system/carburetor
	Incorrect float level	Adjust
	Clogged air filter element	Clean or replace
EXCESSIVE SMOKING	Wrong oil weight	Replace with recommended oil
	Dirty oil	Change
	Crankcase overfilled with oil	Drain and fill to recommended level
	Clogged PCV valve	Replace
	Piston rings worn or broken	Replace
	Valves worn	Replace
	Valve seals or valve guides worn	Replace
BACKFIRING	Accelerator limit switch out of adjustment	Adjust
	Loose muffler or leaking gasket	Repair
	Carburetor throttle lever motion restricted	Repair
	Carburetor throttle lever not closing fully	Adjust
	Throttle stop preventing throttle from closing fully	Adjust
	Incorrect adjustment of accelerator, governor and carburetor linkages	Adjust
	Carburetor throttle lever shaft bent	Replace or rebuild carburetor
	Faulty plug wire	Replace
	Faulty ignition system	Check
	Carburator throttle valve spring weak or broken	Replace
	Governor torsion spring weak or broken	Replace

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
ERRATIC, SURGING, OR SUDDEN CHANGE IN GOVERNED SPEED	Governor bracket spring dragging	Replace
	Problem with adjustment of accelerator, governor and carburetor linkage	Adjust
	Bent governor arm	Repair or replace
	Bent governor shaft	Replace
	Governor failure within the rear axle	Repair

FUEL ACCUMULATION IN THE CRANKCASE

FUEL DISTRIBUTION	Dirty Carburetor	Clean or replace. Set air/fuel mixture screw to 1.5 turns out from the lightly seated position (No adjustment on CARB?EPA certified engines).
	Clogged carburetor vents	Remove carburetor and clean with solvent
	Carburetor float sticking	Disassemble and correct per the service manual
	Faulty fuel pump	Check for correct output. Verify fuel is not returning through the pulse line. Clean vent screen.
	Faulty accelerator adjustment/function	Correct per the service manual
	Dirty or restricted air filter	Replace and clean air box
	High pressure in the fuel system	Check fuel cap for venting. Make sure carburetor vent tubes are venting
	Over choking or faulty choke setting	Instruct operator or adjust to limit choke to 3/4 blade travel
	Wrong carburetor jet for the altitude	Verify per the altitude chart. Call your tech rep. for more information
MECHANICAL	Faulty Ignition system	Check ignition output per the service manual.
	Low or unbalanced compression	Perform compression or leak down test. Refer to the service manual for the specification.
	Poor valve sealing	Verify by compression or leak down test

TROUBLESHOOTING

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
OPERATION AND APPLICATION	Engine not reaching full temperature	Increase run time intervals to build higher cylinder temperature
	Continuous use at 1/4 throttle or less at low engine speed	Instruct operator
	Wide open throttle cranking	Instruct operator per operator's manual
	Long and continuous down hill use	Down hill use without the accelerator partially depressed will flood the cylinder with fuel due to no ignition present
	Poor fuel quality	Do not use old fuel. Add stabilizer for extended storage. Have fuel tested for contaminants.
	Use of summer blend fuel in the winter	Correct with fresh fuel

CARBURETOR

OVERFLOW/LEAK	Worn inlet valve or dirty valve seat	Replace valve or clean valve seat
	Worn float mounting tang	Replace float
	Worn float pin	Replace pin
	Damaged float bowl gasket	Replace gasket
	Damaged float	Replace float
POOR LOW SPEED PERFORMANCE	Clogged pilot port	Clean pilot port
	Clogged low speed jet	Clean low speed jet
	Loose low speed jet	Tighten jet
POOR FUEL ECONOMY	Loose jets	Tighten jets
	Choke not opening fully	Adjust choke
	Dirty air cleaner	Clean/replace air filter
	Poor fuel quality	Replace with fresh fuel
POOR ACCELERATION	Clogged fuel passages	Clean fuel passages
	Clogged low speed jet or bleed tube	Clean
	Fuel level too low	Adjust float
	Dirty air cleaner	Clean/replace air filter
HARD STARTING	Choke plate not operating properly	Adjust choke system
	Dirty carburetor	Clean carburetor
	Loose carburetor	Tighten carburetor
	Fuel overflow	Inspect float and valve. Repair or replace
	Faulty fuel pump	Replace fuel pump
	Poor fuel quality	Replace with fresh fuel

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
POOR HIGH SPEED OPERATION	Fuel pump faulty	Replace fuel pump
	Loose main jet	Tighten main jet
	Incorrect fuel level in float bowl	Adjust float
	Dirt in fuel tank or hoses	Clean
	Clogged fuel filter	Replace fuel filter
	Clogged main jet or main jet air passage	Clean jet
	Dirty air filter	Clean/replace filter element
ABNORMAL COMBUSTION (FUEL MIXTURE)	Dirty carburetor	Clean carburetor
	Dirt in fuel tank, hoses or filter	Clean or replace
	Clogged air or fuel filter	Replace
	Poor fuel quality	Replace with fresh fuel
LOSS OF POWER (INSUFFICIENT FUEL)	Faulty fuel pump	Replace fuel pump
	Dirty carburetor	Clean carburetor
	Dirt in fuel tank or hoses	Clean
	Clogged fuel filter	Replace fuel filter
	Air leak in system	Check mounting hardware and gaskets. Repair or replace
LOSS OF POWER (INSUFFICIENT AIR)	Dirty air cleaner	Clean/replace filter element
	Throttle linkage	Adjust or Repair
	Blocked air inlet	Clean fuel filter
SURGING	Governor linkage	Refer to SPEED CONTROL section

STARTER / GENERATOR

Condition	Possible Cause	Correction
STARTER IS NOISY	Bolts are loose	Retighten
	Starter/generator has foreign matter inside	Clean starter/generator interior
	Bearings are faulty	Replace
	Bearings contain foreign matter	Replace
	Bearing needs grease	Replace

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
RECTIFICATION IS IMPERFECT	Load exceeds specification	Adjust load to specification
	Armature bent	Repair or replace if necessary
	Brushes are worn beyond limits	Replace
	Commutator is excessively rough	Smooth with emery cloth
	Incorrect voltage output	Check and replace any components if required
	Commutator is dirty with oil or dust	Clean with a cleaner and dry cloth
	Field coil is shorted or broken	Repair or replace
GENERATOR DOES NOT CHARGE	Corroded or loose battery connections	Clean and tighten battery connections
	Incorrect voltage regulator output	Replace
	Poor voltage regulator ground connection	Repair
	Open or short circuit	Repair or replace
	Faulty starter/generator	Repair starter/generator

SUSPENSION AND STEERING

Condition	Possible Cause	Correction
UNEVEN TIRE WEAR	Incorrect tire pressure	Inflate to recommended pressure
	Improper alignment (Incorrect toe in)	Align front tires
	Damaged or worn components	Replace
STIFF STEERING	Rusted or contaminated king pin sleeve or bushings	Replace or clean
	Bent rack	Remove rack and place on flat surface with rack teeth up; If a .015" (.381 mm) feeler gauge will pass under the rack, the rack must be replaced
PLAY IN STEERING	Steering wheel loose	Inspect splines - replace steering wheel if required; Tighten steering wheel nut
	Steering components worn	Replace
	Loose wheel bearings	Adjust or replace
VIBRATION	Steering components worn	Replace
	Loose wheel bearings	Adjust or replace
	Out of round tires, wheels, or brake drums	Inspect and replace if out of round
	Loose lug nuts	Tighten to 50 - 85 ft. lbs. (68 - 115 Nm)

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
STEERING PULLS TO ONE SIDE	Incorrect tire pressure	Inflate to recommended pressure
	Dragging wheel brakes	Service brake system
	Suspension component failure	Repair
	Alignment incorrect	Align

BRAKE SYSTEM

Condition	Possible Cause	Correction
FAILS BRAKE PERFORMANCE TEST BY STOPPING IN A LONGER DISTANCE THAN NORMAL	Wheel brake failure due to severely worn or damaged components	Replace all severely worn or damaged components
	Brake pedal not returning Brake not adjusting	Check for binding of brake pedal Check brake pedal free travel Check brake cables Check brake adjusters Check pedal pivot
	Brake shoes wet	Check again when shoes are dry
	Brake cables damaged or sticky	Check brake cable and replace if sticky or damaged
	Brake shoes severely worn	Replace
	Brake shoes glazed	Sand shoes with emery cloth provided that shoes have .06" (1.5 mm) min. material
	System not adjusted properly	Check and adjust per manual
	End of brake cable loose from anchor brackets	Check and repair
	Cracked brake drum	Replace
IN EXCESS OF 1" (2.5 CM) FREE PEDAL TRAVEL (SOFT PEDAL)	Low pedal force at parking brake latch	Adjust per manual
	Brake cables damaged	Replace
	Brake return bumper out of adjustment	Adjust per manual
	End of brake cable loose from anchor brackets	Check and repair
	Wheel brake failure due to severely worn or damaged components	Replace all severely worn or damaged components
	System not adjusted properly	Adjust per Manual
LESS THAN 3/4" (1.9 CM) FREE PEDAL TRAVEL (HARD PEDAL)	High pedal force at parking brake latch	Adjust per Manual
	Brake cables damaged or sticky	Check brake cable and replace if sticky or damaged
	System not adjusted properly	Check and adjust per manual
	Wheel brake failure due to severely worn or damaged components	Replace all severely worn or damaged components

TROUBLESHOOTING

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Condition	Possible Cause	Correction
NEITHER WHEEL LOCKS WHEN PARK BRAKE IS LATCHED. (NOTE: AT FULL SPEED THE WHEELS MAY NOT LOCK, BUT SHOULD BRAKE AGGRESSIVELY).	Incorrect cable adjustment	Return to factory specification
	Excessive brake pedal free travel	Adjust per manual
UNEQUAL BRAKING (ONE WHEEL LOCKS WHILE OTHER ROTATES)	Wheel not locking is not adjusting	Check brake operation of wheel that is **not** locking
	Sticky/dragging cable	Check for brake lever return Check that brake levers return at equal rate - (Indication of dragging cable)
	Cracked brake drum	Replace
	Brake shoes wet or glazed	Check again when shoes are dry
	Rusted or sticky brake pivot hardware	Replace
NEITHER WHEEL LOCKS	Brake system requires complete adjustment	Adjust entire system
	Brake pedal not returning	Check for binding of brake pedal Check brake pedal free travel
GRABBING BRAKES (OVERSENSITIVE)	Moisture has caused surface rust on drums	Apply moderate force to pedal while at maximum level ground speed to remove rust until condition is relieved.
	Brake Pivot binding	Check and replace poor components

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

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LIST OF ILLUSTRATIONS

WEATHER PROTECTION

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

SUN TOP AND WINDSHIELD

⚠ WARNING

The top does not provide protection from roll over or falling objects.

The windshield does not provide protection from tree limbs or flying objects.

The sun top and windshield are designed for weather protection only.

Clean with lots of water and a clean cloth. Minor scratches may be removed using a commercial plastic polish or Plexus plastic cleaner.

Trailering

⚠ WARNING

Personal injury to occupants of other highway vehicles may occur is vehicle and contents are not adequately secured to trailer.

Do not ride on vehicle being trailered.

Remove windshield before trailering

Maximum speed with top is 50 mph (80 kph).

If the vehicle is to be transported on a trailer at highway speeds, the windshield and top must be removed and the seat bottoms secured. Always check that the vehicle and contents are adequately secured before trailering the vehicle. The rated capacity of the trailer must exceed the weight of the vehicle (see GENERAL SPECIFICATIONS for vehicle weight) and load. Lock the parking brake and secure the vehicle to the trailer using ratchet tie downs.

SUN TOP

Tool List	Qty.
Plastic faced mallet	1
Wrench, 1/2”	2
Wrench, 9/16”	2
Hex wrench, 7/32”	1
Straight blade screwdriver	1

Rear Support Installation

At driver side of vehicle, align the holes in the rear strut (5) with the holes in the seat back support bracket, being sure that the open end of the strut faces the front of the vehicle as shown (See Detail C).

Insert bolt (11) through the seat back support bracket. Place nylon washer (8) between seat back support bracket and rear strut. Secure with washer (10) and lock nut (11) at outer side of rear strut as shown. Finger tighten hardware to allow for adjustment.

Repeat procedure with rear strut at passenger side of vehicle.

Front Struts

Remove and discard the four bolts from the front cowl (See Detail A).

At the upper hole (both sides of vehicle), install the front strut (3) with bolt (18) on the outside of strut, and a spacer between the front cowl and strut. Finger tighten hardware to allow for adjustment.

At the lower hole, secure the strut with bolt (18) and lock nut (1) on the outside of strut between the front cowl and strut as shown. Finger tighten hardware to allow for adjustment.

Sun Top

Place sun top (17) onto struts (See Detail D).

At front of vehicle, secure sun top loosely with bolts (18), washers (15) and lock nuts (16). Finger tighten hardware to allow for adjustment.

Tighten all hardware to 13 - 15 ft. lbs. (18 - 20 Nm) torque. (See Detail D)

WEATHER PROTECTION

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

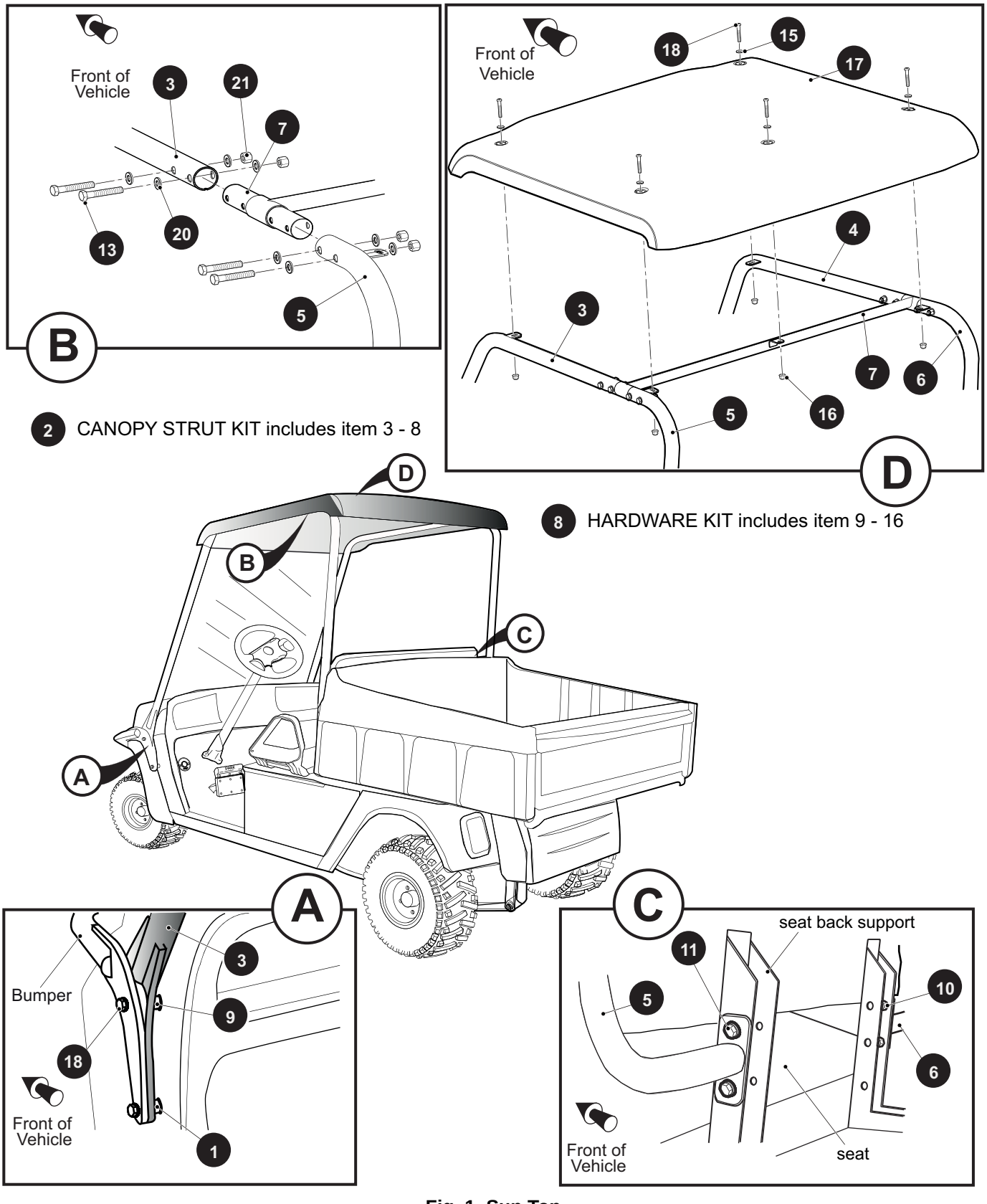

Fig. 1 Sun Top

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

SPLIT WINDSHIELD

Tool List	Qty.
Plastic faced mallet	1
Wrench, 7/16”	1
Phillips screwdriver	1

Remove protective covering from the windshield (2) (Ref. Fig. 2 on page P-3).

Install sash (3) on each side of the lower section of windshield. Using a plastic faced mallet, gently tap sash to ensure windshield seats properly (See Detail A).

Insert bolt (4) through washer (5), rubber grommet (6) and existing hole in front strut. Secure with washer (5) and lock nut (7) (See Detail B). ***Do not over-tighten or squeeze grommet***.

Place bottom section of windshield on rubber grommets and press the sash, starting at the bottom, onto the front strut so that it snaps into place (See Details B and C). Repeat for opposite side of windshield.

Position top grips (8) as shown (See Detail D) at top hole on each side of front strut. Secure with top grip fasteners (9).

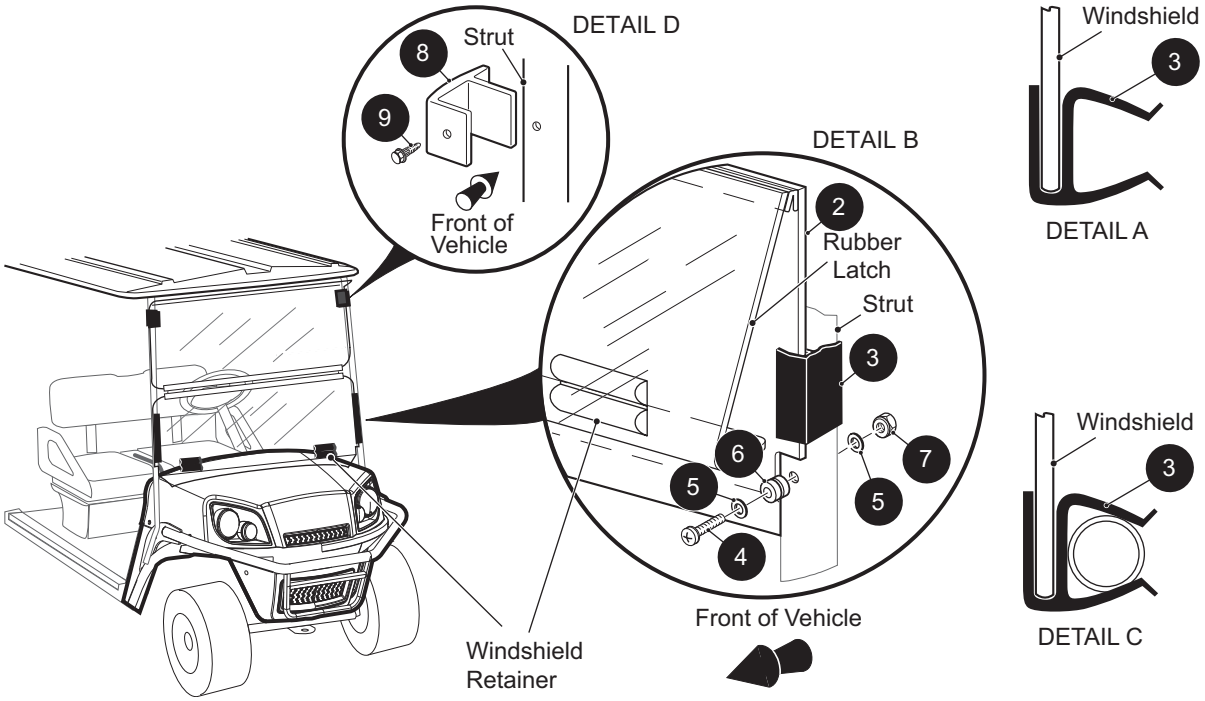

Fig. 2 Split Windshield

NOTICE

It may be necessary on early production sun tops to drill a 9/32” hole in front face of both sides of front strut approximately 7" down from top of strut.

Swing the top section of windshield up and secure by hooking the top grip on each side of strut around the windshield.

To secure windshield when lowered, press edge of windshield firmly into windshield retainers (See Detail B).

⚠ CAUTION

Take care not to warp windshield when raising and lowering the top section of windshield.

FULL WINDSHIELD

Tool List	Qty.
Plastic faced mallet	1
Wrench, 7/16”	1
Phillips screwdriver	1

Remove protective covering from the windshield (2) (Ref. Fig. 3 on page P-4).

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Install sash (3) on each side of the windshield. Using a plastic faced mallet, gently tap sash to ensure windshield seats properly (See Detail A).

Insert screw (4) through washer (5), rubber grommet (6) and existing hole in front strut. Secure with washer (5) and lock nut (7) (See Detail B). ***Do not over-tighten or squeeze grommet***.

Place bottom section of windshield on rubber grommets and press the sash, starting at the bottom, onto the front strut so that it snaps into place (See Details B and C). Repeat for opposite side of windshield.

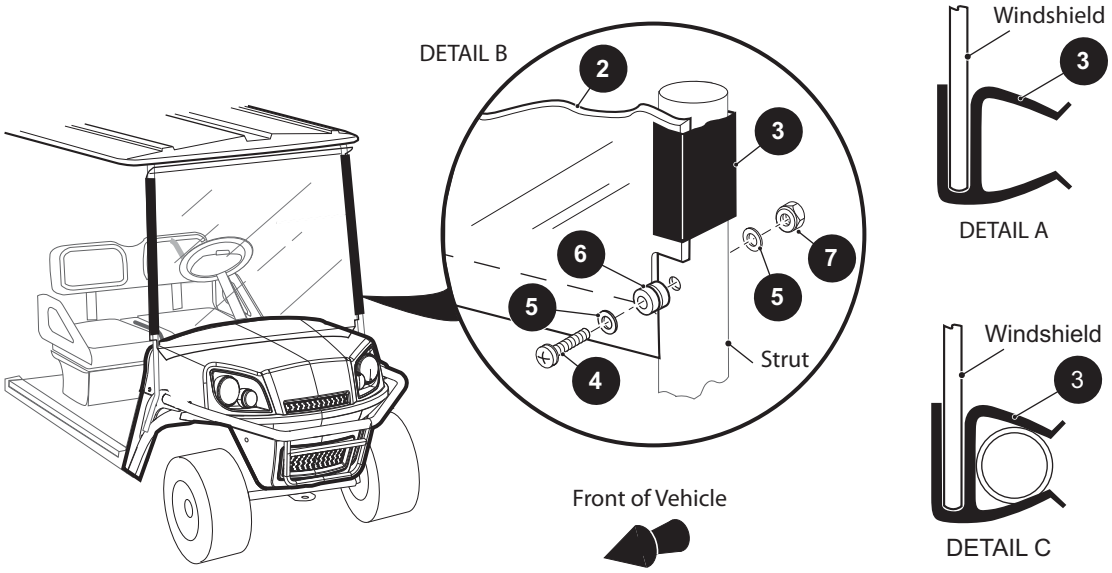

Fig. 3 Full Windshield

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

TABLE OF CONTENTS FOR SECTION 'Q'

LIST OF ILLUSTRATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

WHEEL AND TIRE SERVICE

NOTICE

Standard tires for this vehicle are uni-directional and should never be moved from one side of vehicle to the other. Left side tires should always remain on the left side of the vehicle. Right side tires should always remain on the right side of the vehicle. Uni-directional tires have an arrow on the sidewall indicating direction of rotation when moving forward.

Tool List	Qty.
Lug Wrench, 3/4"	1
Impact Wrench	1
Impact Socket, 3/4"	1
Torque Wrench, ft. lbs.	1

⚠ WARNING

To prevent injury caused by a broken socket, use only sockets designed for impact wrench use. Never use a conventional socket.

Tire condition should be inspected per the Periodic Service Schedule. Inflation pressures should be checked when the tires are cool. When removing wheels with an impact wrench, use only impact sockets. Regular sockets are not designed for impact pressures exerted by power tools.

⚠ WARNING

A tire explosion can cause severe injury or death. Never exceed inflation pressure rating on tire sidewall.

To prevent tire explosion, pressurize tire with small amount of air applied intermittently to seat beads. Never exceed the tire manufacturer's recommendation when seating a bead. Protect face and eyes from escaping air when removing valve core.

Use caution when inflating tires. Due to the low volume of these small tires, overinflation can occur in a matter of seconds. Overinflation could cause the tire to separate from the wheel or cause the tire to explode, either of which could cause personal injury.

Do not use low inflation pressure tires on any E-Z-GO vehicle. Do not use any tire which has a recommended inflation pressure less than the inflation pressure recommended in Owner's Manual

Use caution when inflating tires. Due to the low volume of these small tires, over inflation can occur in a matter of seconds. Over inflation could cause the tire to separate from the rim or cause the tire to explode, either of which could cause personal injury.

Tire inflation should be determined by the condition of the terrain. See **GENERAL SPECIFICATIONS** section for recommended tire inflation pressure. For outdoor applications with major use on grassy areas, the following should be considered. On hard turf, it is desirable to have a **slightly** higher inflation pressure. On very soft turf, a lower pressure prevents tires from cutting into the turf. For vehicles being used on paved or hard surfaces, tire inflation pressure should be in the higher allowable range, but under no condition should inflation pressure be higher than recommended on tire sidewall. **All four tires** should have the same pressure for optimum handling characteristics. Be careful not to over inflate. Due to the low volume of these small tires, over inflation can occur in a matter of seconds. Be sure to install the valve dust cap after checking or inflating.

Tire Repair

The vehicle is fitted with low pressure tubeless tires mounted on one piece rims.

Generally, the most cost effective way to repair a flat tire resulting from a puncture in the tread portion of the tire is to use a commercial tire plug.

NOTICE

Tire plug tools and plugs are available at most automotive parts outlets and have the advantage of not requiring the tire be removed from the wheel.

If the tire is flat, remove the wheel and inflate the tire to the maximum recommended pressure for the tire. Immerse the tire in water to locate the leak and mark with chalk. Insert tire plug in accordance with manufacturer's specifications.

If tire is to be removed or mounted, the tire changing machine manufacturer's recommendations must be followed in order to minimize possibility of personal injury.

⚠ WARNING

To prevent injury, be sure mounting/demounting machine is anchored to floor. Wear OSHA approved safety equipment when mounting/demounting tires.

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

Follow all instructions and safety warnings provided by the mounting/demounting machine manufacturer.

Wheel Installation

⚠ CAUTION

Do not tighten lug nuts to more than 85 ft. lbs. (115 Nm) torque.

NOTICE

It is important to follow the 'cross sequence' pattern when installing lug nuts. This will assure even seating of the wheel against the hub.

With the valve stem to the outside, mount the wheel onto the hub with lug nuts. Be sure to position the wheel on hub correctly with arrow indicating direction of rotation when moving forward. Finger tighten lug nuts in a 'cross sequence' pattern (Ref Fig. 1 on page Q-2). Then, tighten lug nuts to 50 - 85 ft. lbs. (70 - 115 Nm) torque in 20 ft. lbs. (30 Nm) increments following the same 'cross sequence' pattern.

ITEM NO	TORQUE SPECIFICATION
1	50 - 85 ft. lbs. (70 - 115 Nm)

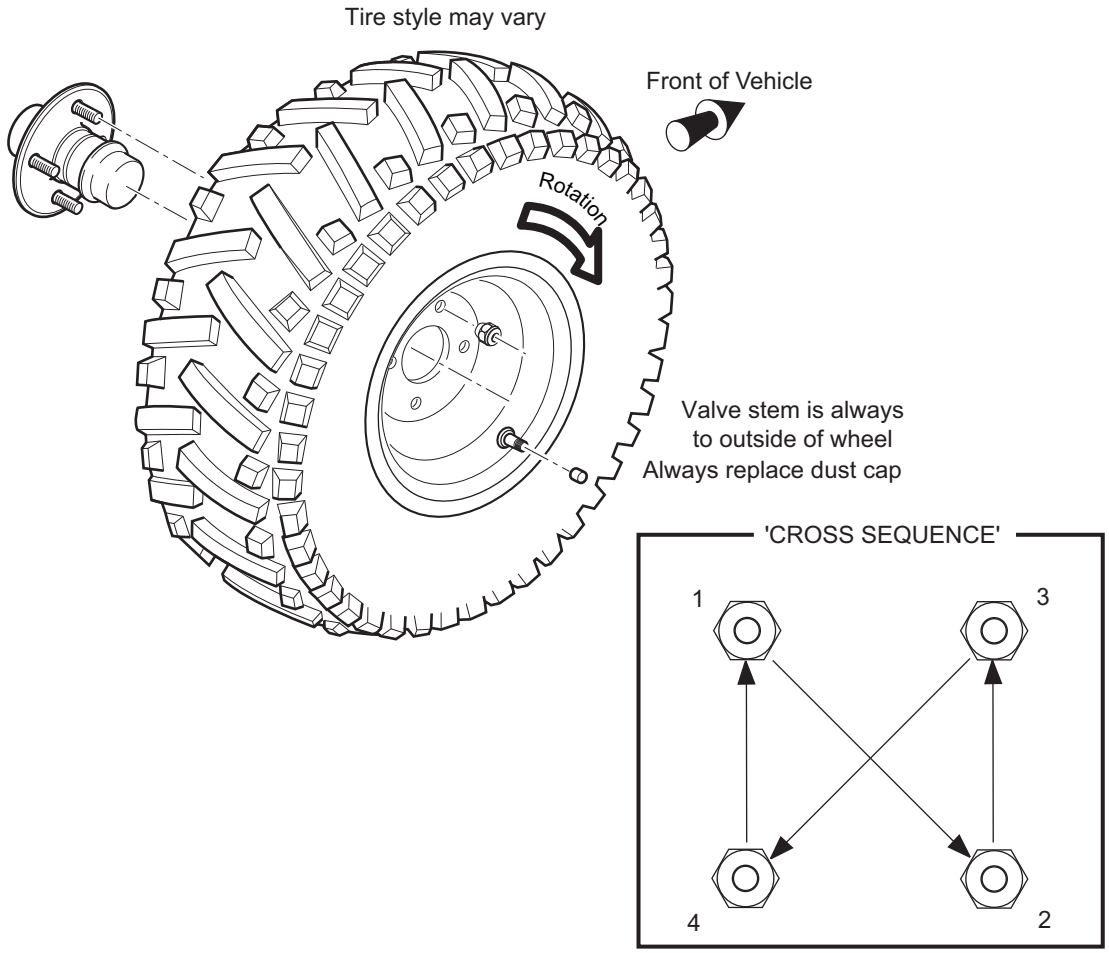

Fig. 1 Wheel and Tires

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

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LIST OF ILLUSTRATIONS

GENERAL SPECIFICATIONS

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

NOTES:

Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.

MODEL: TERRAIN 1500
TYPE: GASOLINE POWERED TRUCK
MODEL YEAR: 2012
Part No:. 618860

PRODUCT SPECIFICATION

CONFIGURATION HIGHLIGHTS

Engine: 16 hp (11.9 kW) rated, 4 cycle, 29.2 ci (480 cc) V-Twin, air-cooled Vanguard

- **Valve Train:** Overhead valve
- **Lubrication:** Pressurized oil system, spin-on oil filter
- **Balancer:** Internal counter rotating balance shaft
- **Fuel System:** Fixed float bowl with remote pulse fuel pump
- **Ignition:** Electronic spark/magneto
- **Air Cleaner:** Replaceable dry cartridge w/permanent pre-filter/remote air

Electrical: Starter/Generator, solid-state regulator, 12 Volt maintenance free battery (525 CCA, 60 minute reserve)
Drive Train: Automatic, continuously variable transmission (CVT). Locking rear axle (Operator selectable from center console)
Brakes: Dual rear wheel hydraulic self-adjusting drum brakes. Hand operated park brake located in center console
Transaxle: Differential with helical gears, ground speed governor, forward/reverse
Seating: Two bucket seats
Cargo Bed: Roto-molded cross-linked polyethelene. Lifts for access to powertrain. Removable hinged multi-position tailgate requires no latch mechanism

PRODUCT OVERVIEW

Dimensions	
Overall Length	110.5 in (281.0 cm)
Overall Width	50.0 in (127.0 cm)
Overall Height (No Canopy)	49.0 in (125.0 cm) (Top of steering wheel)
Overall Height (With Canopy)	75.0 in (191.0 cm)
Wheel Base	78.5 in (199.0 cm)
Front Wheel Track	38.0 in (96.0 cm)
Rear Wheel Track	38.5 in (97.0 cm)
Gnd Clearance @ Differential	6.0 in (15.0 cm)
Cargo Box Width (inside)	44.0 in (112.0 cm)
Cargo Box Length (inside)	36.0 in (91.0 cm)
Cargo Box Depth (inside)	10.5 in (27.0 cm)
Cargo Box Capacity	9.6 cu ft (0.27 m3)
Cargo Box Material	Roto-molded polyethylene

Vehicle Power	
Power Source	4 cycle, 29.2 ci (480 cc)
Valve Train	V Twin Cylinder OHV
Horsepower (kW)	16.0 hp (11.9 kW) rated
Electrical System	Starter/Generator, solid-state regulator
Battery (Qty, Type)	One 12 Volt maintenance free
Key or Pedal Start	Pedal Start
Air Cleaner	Dry cartridge w/permanent pre-filter/remote air
Lubrication	Pressurized oil system
Oil Filter	Spin-on oi filter
Cooling System	Air cooled
Fuel Capacity	5.8 gallon (22.0 L) tank
Drive Train	Continuously variable transmission (CVT)
Differential	Helical gears with manual lock-up

Vehicle Power Cont.	
Gear Selection	Forward-Reverse
Rear Axle Ratio	13.32:1

Performance	
Seating Capacity	2 Persons
Dry Weight	1110 lb (505 kg)
Curb Weight	1150 lb (525 kg)
Bed Load Capacity	500 lb (225 kg)
Vehicle load capacity	800 lb (360 kg)
Outside Clearance Circle	23.5 ft (7.2 m)
Intersecting Aisle Clearance	N/A
Speed (Level Ground)	16 mph ± 0.5 mph (25.7 kph ± 0.8 kph)
Towing Capacity	500 lb (225 kg)

Steering & Suspension	
Steering	Self-compensating rack and pinion
Front Suspension	Leaf springs with hydraulic shock absorbers
Rear Suspension	Leaf springs with hydraulic shock absorbers
Service Brake	Rear wheel hydraulic self-adjusting drum
Parking Brake	Hand operated
Front Tires	Stryker 22 x 9 - 10 Uni-Directional
Rear Tires	Stryker 22 x 9 - 10 Uni-Directional

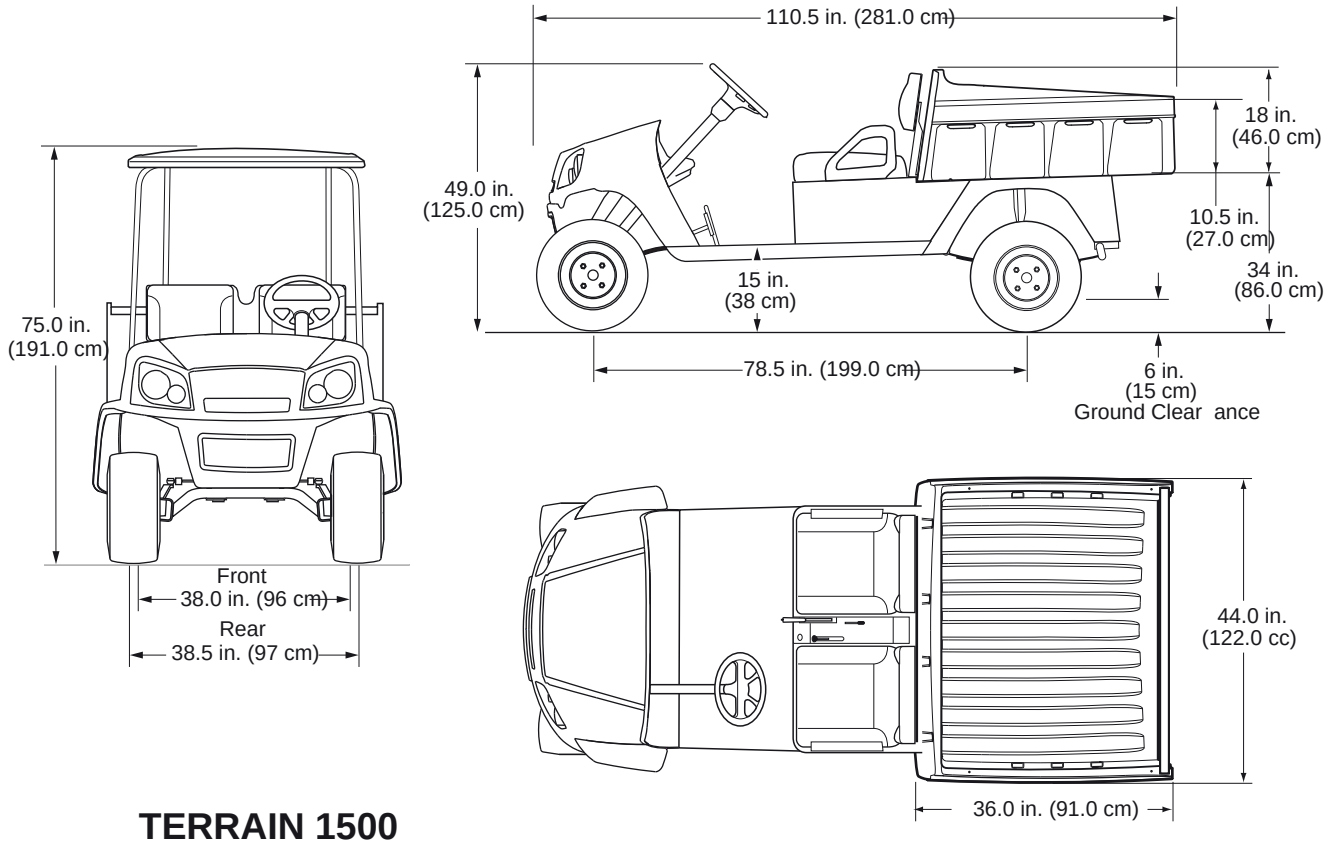
Body & Chassis	
Frame	Welded steel with DuraShield™ powder coat
Front Body & Finish	Injection Molded TPO
Rear Body & Finish	Steel. Base coat/clear coat
Standard Color	Hunter Green

Noise & Vibration	
Noise	Sound pressure; continued A-weighted equal to or less than 80 db(A)
Vibration, WBV	Highest RMS value of weighted acceleration is 1.25 m/s^2
Vibration, HAV	Highest RMS value of weighted acceleration is less than 2.5 m/s^2
	The uncertainty of measurement is 0.24 m/s^2

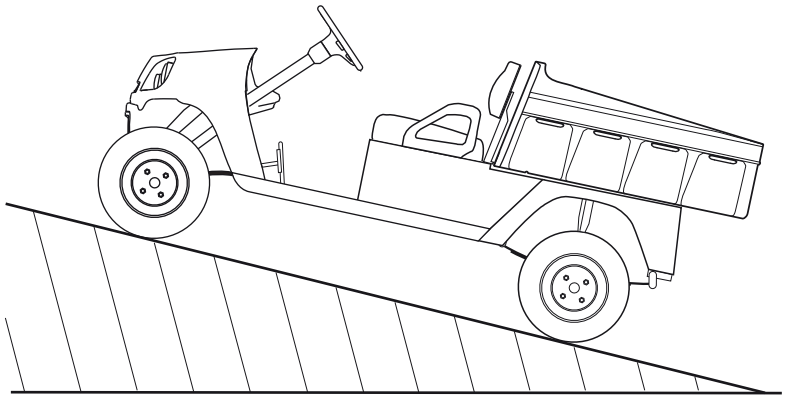
Some items shown may be optional equipment

Specifications are subject to change without notice
* Field installed accessories may require installation charges

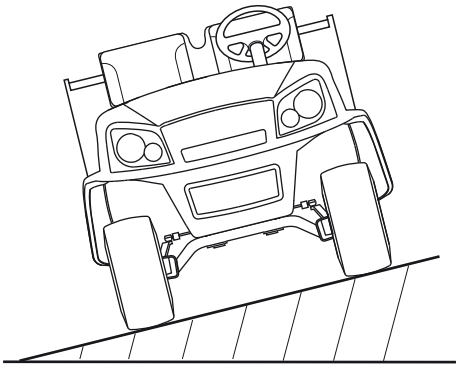
Read all of Section B and this section before attempting any procedure. Pay particular attention to Notices, Cautions, Warnings and Dangers.



TERRAIN 1500



Maximum Recommended Ramp Grade
25% or 14° Max.



Maximum Recommended Side Tilt
25% or 14° Max.

Fig. 1 Vehicle Dimensions

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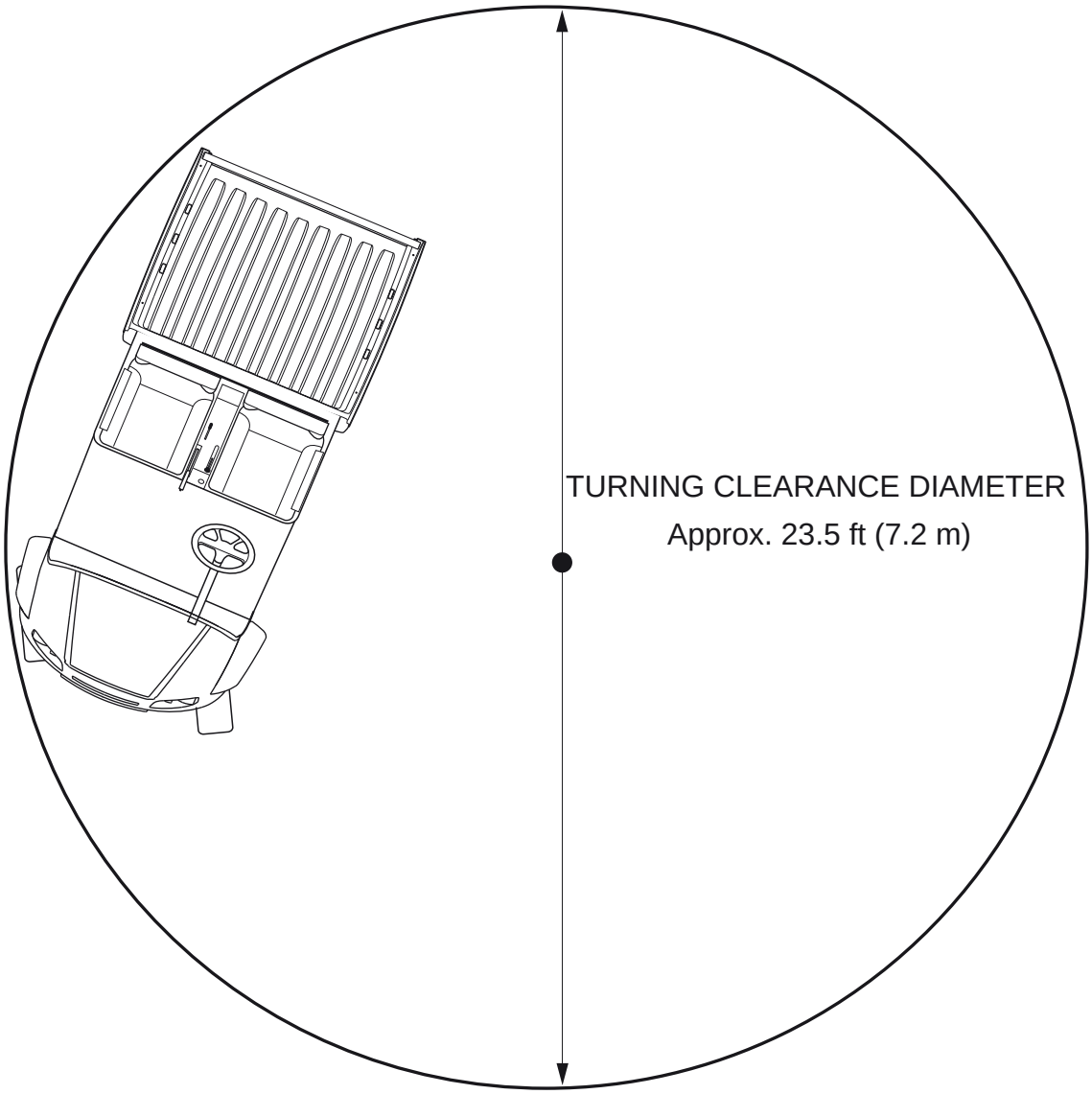

Fig. 2 Incline Specifications and Turning Clearance Diameter

GENERAL SPECIFICATIONS

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NOTES:

A Textron Company

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TO CONTACT US...
North America:

Technical Assistance & Warranty	Phone: 1-800-774-3946, FAX: 1-800-448-8124
Service Parts	Phone: 1-888-GET-E-Z-GO (1-888-438-3946), FAX: 1-800-752-6175
International:	Phone: 001-706-798-4311, FAX: 001-706-771-4609

Service Parts Manuals, as well as Repair and Service Manuals
are available from a local Distributor, an authorized Branch,
Genuine E-Z-GO Parts & Accessories Department or at www.shopezgo.com.

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