EZGO®

A Textron Company

2Five Electric
Repair & Service Manual

606779

ISSUED: APRIL 2010

REVISED: DECEMBER 2012

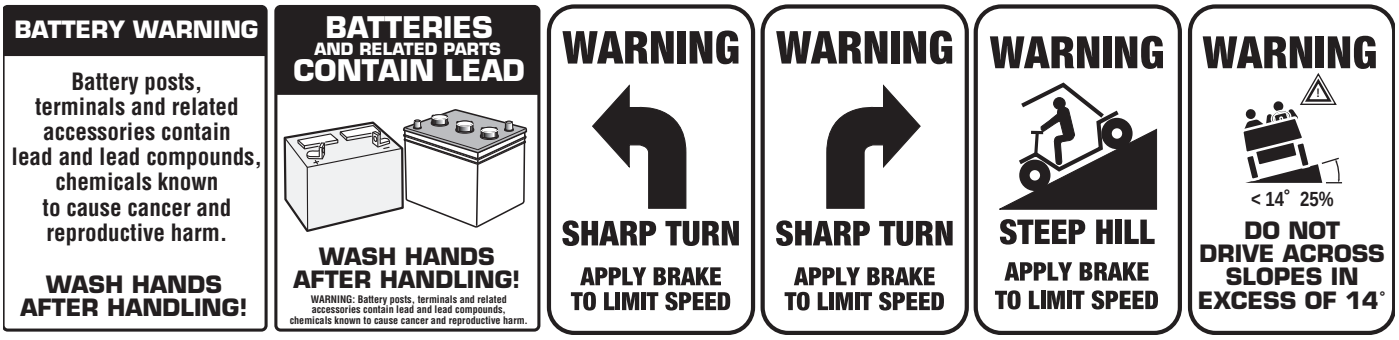
SAFETY

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

Read and 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. To prevent loss of vehicle control and possible serious injury, speeds should be limited to no more than 25 mph.

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.



Observe these **NOTICES, CAUTIONS, WARNINGS and Dangers;** 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.

NOTICES, CAUTIONS, WARNINGS AND DANGERS

NOTICE

Address practices not related to personal injury.

⚠ 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

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

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

SERVICE AND REPAIR MANUAL

ELECTRIC POWERED PERSONAL VEHICLES

2Five 2 PASSENGER

2Five 4 PASSENGER

STARTING YEAR 2010

(MANUFACTURED BEGINNING April 2010)

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:

SALES 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). 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.

Overfilling batteries may void the warranty.

BATTERY PROLONGED STORAGE

All batteries will self discharge over time. The rate of self discharge varies depending on the ambient temperature as well as 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).

For winter storage, the batteries must be clean, fully charged and disconnected from any source of electrical drain.

The batteries must be checked and recharged as required or at a minimum of 30 day intervals.

TOWING

Set the key switch to ‘N’ and the ‘RUN/TOW’ switch, located under the passenger seat, to the ‘TOW’ position before towing the vehicle.

TABLE OF CONTENTS

Notes:

SAFETY INFORMATION

Read all of Section B and this section before working on vehicle. Pay particular attention to all 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 and/or property damage, the following instructions must be carefully observed:

GENERAL

All vehicles can be used for a variety of tasks often 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 warning can replace 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. E-Z-GO strongly suggests that all users and maintenance personnel read this entire manual paying particular attention to the CAUTIONS, WARNINGS and DANGERS contained therein.

If you have any questions regarding this vehicle, contact your authorized E-Z-GO LSV dealer or write to the address on the back cover of this publication, Attention: Customer Care Department.

E-Z-GO IS NOT LIABLE FOR ERRORS IN THIS MANUAL. E-Z-GO IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT RESULT FROM THE USE OF, AND THE RELIANCE ON, THE MATERIAL IN THIS MANUAL.

This vehicle was designed and manufactured in accordance with FMVSS 571.500.

Be sure that all electrical accessories are grounded directly to the battery (-) post. Never use the chassis or body as a ground connection.

Refer to GENERAL SPECIFICATIONS for vehicle seating capacity.

⚠ WARNING

Never modify the vehicle in any way that will alter the weight distribution of the vehicle, decrease its stability, increase the speed or extend the stopping distance beyond the factory specification. Such modifications can result in serious personal injury or death.

Do not make any such modifications or changes. E-Z-GO prohibits and disclaims responsibility for any such modifications and alterations, 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

NOTICE

Read the Following warnings before attempting to operate the vehicle.

⚠ WARNING

To prevent personal injury or death, observe the following:

When vehicle is to be left unattended, turn key to OFF positions AND REMOVE KEY.

SAFETY INFORMATION

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Drive vehicle only as fast as terrain and safety considerations allow. Consider the terrain and traffic conditions. Consider the environmental factors which affect the terrain and the ability to control the vehicle.

Avoid driving fast downhill. Sudden stops or change of direction may result in a loss of control. Use brake to control speed when traveling down an incline.

Use extra care and reduced speed when driving in poor conditions or on poor surfaces.

Stay in designated areas where provided and avoid steep slopes.

Seat belts must be worn at all times while operating the vehicle.

Keep feet, legs, hands, and arms inside vehicle at all times.

Avoid extremely rough terrain.

Check area behind the vehicle before operating in reverse.

Make sure the direction selector is in correct position before depressing the accelerator pedal.

Slow down before and during turns.

Always bring vehicle to a complete stop before shifting the direction selector.

See GENERAL SPECIFICATIONS for vehicle load and seating capacity.

NOTICE

Read the following text and warnings before attempting to service vehicle:

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

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

A vehicle requiring repair is no longer functioning as designed and therefore could be potentially hazardous. Therefore, use extreme care when working on any vehicle. When diagnosing, removing, or replacing any components that are not operating correctly, take time to consider the safety of yourself and others around you.

Some components are heavy, spring-loaded, highly corrosive, explosive, may produce high amperage, or reach high temperatures. Exposure to battery acid and hydrogen gas could result in serious bodily injury. Be careful to protect hands, face, feet, and body from injury.

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

⚠ WARNING

Before working on the vehicle, remove all jewelry.

Be sure no loose clothing or hair can contact moving parts.

Use care not to touch hot objects.

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

Hydrogen gas is formed when charging batteries. Do not charge batteries without adequate ventilation.

Do not permit open flame or anyone to smoke in an area that is being used for charging batteries.

SAFETY INFORMATION

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

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

use extreme caution in areas where pedestrians are present

maintain adequate distance between vehicles

follow all safety rules established in the area where the vehicle is being operated

reduce speed to compensate for poor terrain or conditions

apply brake to control speed on steep grades

reduce speed in wet areas

use extreme caution when approaching sharp or blind turns

use extreme caution when driving over loose terrain

MAINTENANCE

ALWAYS:

replace damaged or missing warning, caution, or information labels

maintain the vehicle in accordance with the manufacturer's periodic service schedule

ensure that repairs are performed by trained and qualified personnel

follow the manufacturer's maintenance procedures

insulate any tools used within the battery area in order to prevent sparks or battery explosion

use specified replacement parts, NEVER use replacement parts of lesser quality

use recommended tools

maintain the vehicle in an area away from exposed flame or persons who are smoking

test drive the vehicle after all repairs or maintenance in a safe area that is free of both vehicular and pedestrian traffic

keep complete records of the maintenance history of the vehicle

support the vehicle using wheel chocks and safety stands, NEVER get under a vehicle that is supported by a jack, always be aware that a vehicle that is not performing as designed is a potential hazard and must not be operated.

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.

SAFETY INFORMATION

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

VENTILATION

ALWAYS:

charge the vehicle in a well ventilated area

charge in an area free of flammable liquids and items

charge the vehicle in an area that is free from flame or spark, pay particular attention to natural gas or propane water heaters and furnaces

use a dedicated 15-amp circuit for each battery charger, DO NOT permit other appliances to be plugged into the receptacle when the charger is in operation

operate the charger in accordance with E-Z-GO's recommendations or applicable electrical codes

SEAT BELTS

⚠ WARNING

Always operate the vehicle with seat belts properly fastened.

Be certain the seat belts are latched securely and are free from twists.

Position the shoulder belt across the top of the shoulder. DO NOT place the shoulder belt under an arm.

Loose fitting safety belts significantly reduce protection. Keep belts snug and positioned low on the hips.

DO NOT exceed the recommended number of occupants for the vehicle:

- *bucket seats are designed for one occupant only*
- *bench seats are designed for two occupants only*

The driver and all passengers must wear seat belts, one person per belt.

The two passenger LSV has two bucket seats and is equipped with two safety belts, one for the driver and one for the passenger. The four passenger LSV has a rear facing bench seat with two additional passenger seat belts. The safety belts must be used at all times while operating the vehicle.

This vehicle has not been tested for use with automotive style child safety seats or booster seats.

⚠ CAUTION

Do not use automotive style child safety seats or booster seats with this vehicle.

Inspect the safety belt webbing and hardware periodically. Check for cuts, frays or loose parts. Replace components if excessive wear or damage is noticed.

Keep safety belts clean and dry. To clean, use mild soap and warm water. Do not use bleach, dye or abrasive cleaners as this will weaken the belt webbing material.

Do not insert any foreign objects into the retractor mechanism.

Periodically check for smooth operation and replace if the mechanism is not operating properly.

Pregnant, disabled, or injured persons should consult their doctor for specific recommendations before using the LSV.

SAFETY INFORMATION

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Seat Belt Operation

To properly secure the seat belts, pull the metal tab out away from the retractor and insert into the appropriate buckle located near the center of the seat. A click will be heard when the tab is securely latched. Position the lap belt as low as possible on the hips, not the waist. Properly adjust and ensure a snug fit by pulling the shoulder portion upward.

The retractor will lock the belt during sudden stops. it may also lock if the person leans forward too quickly. slow, easy motions will allow for free travel.

To release the safety belt, press the buckle release button and allow the belt to retract. If the belt does not retract, check for twists.

REPORTING SAFETY DEFECTS

If you believe that a vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying E-Z-GO Division of Textron Inc.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between owner, dealer or E-Z-GO Division of Textron Inc.

To contact NHTSA, you may call the Vehicle Safety Hot-line toll-free at 1-888-327-4236 (TTY: 1-800-424-9153); go to http://nhtsa.safecar.gov; or write to:

Administrator, NHTSA

1200 New Jersey Avenue SE

Washington, DC 20590

You can also obtain other information about motor vehicle safety from http://www.safercar.gov

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

TABLE OF CONTENTS FOR SECTION 'A'

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Thank you for purchasing this vehicle. This repair manual contains information that will assist you in repairing and maintaining this vehicle. Some illustrations may show items that are optional for your vehicle. This guide covers the operation of several vehicles, therefore, some illustrations may not represent your vehicle. Physical differences in controls will be illustrated.

This vehicle has been designed and manufactured in the United States of America (USA). Some states or communities have individual requirements to comply with their specifications; therefore, some sections may not apply in your state or community.

Most of the service procedures in this guide can be accomplished using common automotive hand tools. Contact your service representative on servicing the vehicle in accordance with the Periodic Service Schedule.

Service Parts Manuals as well as Repair and Service Manuals are available from a local Distributor, an authorized Branch or the Service Parts Department. When ordering parts or requesting information for your vehicle, provide the vehicle model, and VIN; you may be asked for the serial number and manufacture date code.

VIN LOCATION

The VIN is located on the driver side near the top of the windshield.

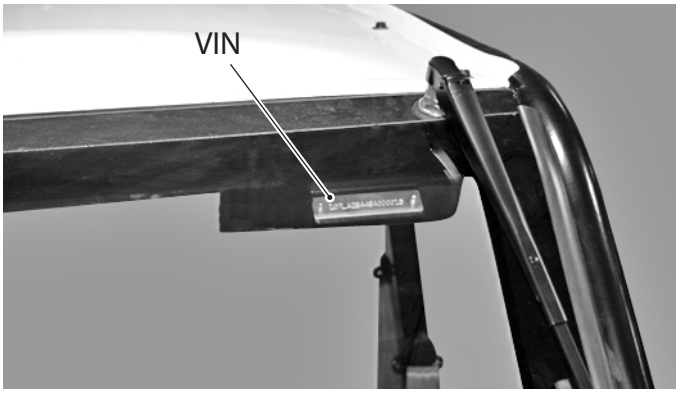


Fig. 1 VIN Location

SERIAL NUMBER LOCATION

Three serial number and manufacture date code labels are on the vehicle. One is placed on the steering column (Ref. Fig. 2), the second is located on the frame member under the front splash shield on the driver side (Ref. Fig. 3) and the third is located on the passenger side frame rail at the rear of the vehicle (Ref. Fig. 4).

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.

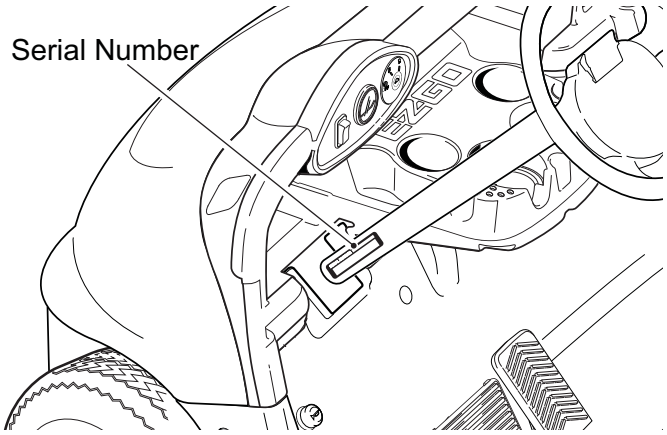


Fig. 2 Serial Number Location on Steering Column

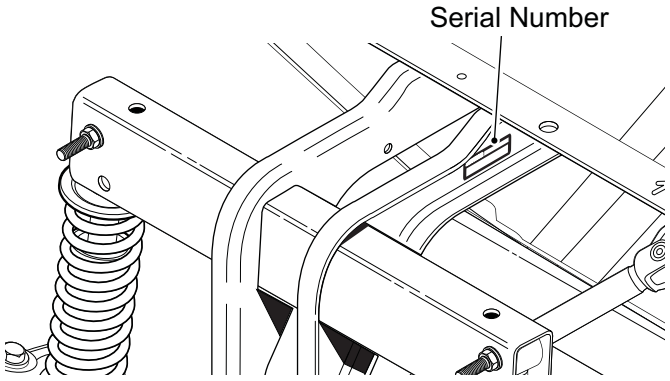


Fig. 3 Serial Number on Front Frame

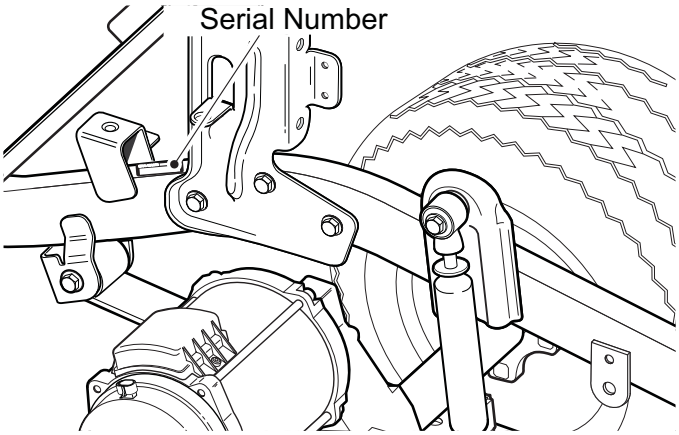


Fig. 4 Serial Number on Rear Frame

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

NEW VEHICLE INITIAL SERVICE

Before a new vehicle is put into operation, the items shown in the ***INITIAL SERVICE CHART*** must be performed (Ref. Fig. 5).

ITEM	SERVICE OPERATION
Batteries	Charge batteries
Seats	Remove protective plastic covering
Brakes	Check master cylinder fluid level & brake operation
	Perform brake burnishing procedure
	Establish acceptable stopping distance
Tires	Check air pressure (see SPECIFICATIONS)

Fig. 5 Initial Service Chart

The vehicle batteries must be fully charged before initial use.

BRAKE BURNISHING PROCEDURE

For new vehicles or after replacement of brake pads or rotors, it is recommended that approximately 20 stops with moderate braking from 20 mph to 5 mph should be made without coming to a complete stop. This procedure will assure that your new brakes will function to their full potential and maintain maximum wear resistance.

Determine and record the braking distance required to stop the vehicle for future brake performance tests.

TRANSPORTING VEHICLE

⚠ WARNING

To reduce the possibility of severe injury or death while transporting the vehicle:

Secure the vehicle and contents

NEVER ride on the vehicle being transported

ALWAYS transport the vehicle facing forward

Maximum speed while hauling the vehicle is 70 mph (112 kph)

If the vehicle is to be transported at highway speeds, the seat bottom and controls must be secured. Always check that the vehicle and contents are adequately secured before transporting. The rated capacity of the trailer or truck must exceed the weight of the vehicle (see GENERAL SPECIFICATIONS for vehicle weight) and the load plus 1000 lbs. (454 kg). secure the vehicle using ratchet tie-downs.

In the event that the vehicle will not move in forward or reverse, the parking brake can be released using the Run/Tow switch located under the seat on the passenger side. With the switch toggled to the 'TOW' position and the key switch in neutral (N) position, the vehicle will roll freely without activating the reverse warning beeper or damaging the controller and motor. After moving the vehicle, return the Run/Tow switch to the 'RUN' position; leaving the switch in the 'TOW' position will drain the batteries.

In case of total power loss and the Run/Tow switch does not release the parking brake the instructions below controller splash shield must be used. Chock the tires to prevent the vehicle moving when the brake is released.

To access the instructions raise the seat and remove three re-usable rivets securing the controller splash shield to the body and the controller. To remove the re-usable rivets, press the center of the rivet with the vehicle key, when the center pin snaps into place the rivet can be removed, repeat the process for each remaining rivet. Turn the splash shield over to reveal the instructions for releasing the parking brake.

⚠ WARNING

THIS PRCEDURE SHOULD ONLY BE PERFORMED BY QUALIFIED TRAINED PERSONNEL.

Make sure that the key is in the 'OFF' position and the tires are chocked to prevent the vehicle moving ; then perform the following.

1. Locate the 'Auxiliary Power' line (3) and remove the weather pack seal (4) from the connector.
2. Locate the 'Primary Power' line connector (1) and disconnect it from line (2).

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

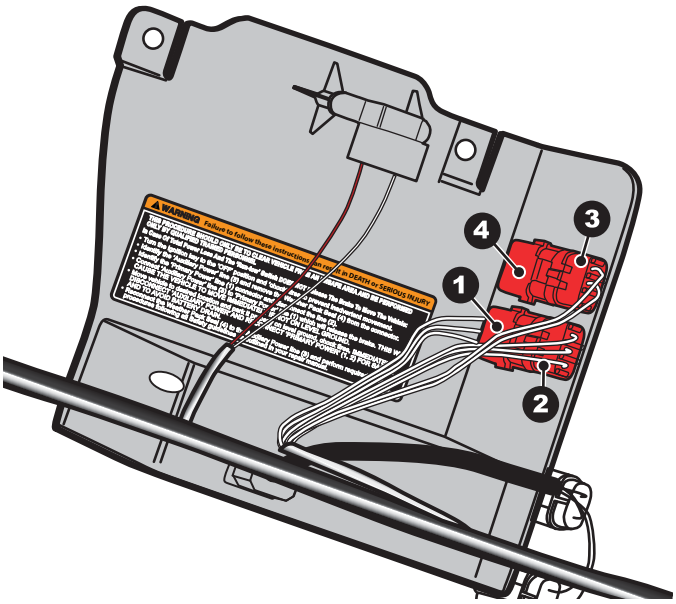


Fig. 6 Parking Brake Release Wires under Controller Splash Shield

3. Connect the 'Auxiliary Power' line (3) to the 'Primary Power' line (1) which will release the brake. If the tires are not chocked and the vehicle is not on flat ground the vehicle will move immediately.
4. Move the vehicle to desired, safe location and chock the tires immediately.
5. Disconnect the 'Auxiliary Power' line (3) from the 'Primary Power' line (1).
6. Connect the 'Primary Power' line (3) to line (2).
7. Replace the weather pack seal (4) on the 'Auxiliary Power' line connector (3).

Reinstall the controller splash shield when finished moving the vehicle. Place the splash shield in position and align the mounting holes with the holes in the body. Push the center pin of each rivet upward so the top of the pin is above the rivet head. Place a rivet in each mounting hole and press down on the center pin until the top of the pin is flush with the rivet head.

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 the powertrain while the motor is running must be made with both rear wheels raised.

Wear eye protection when working on the vehicle. Use extra 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 battery before removing battery wires.

Wrap wrenches with vinyl tape to reduce the possibility of a dropped wrench 'shorting out' a battery, which could result in an explosion.

ROUTINE MAINTENANCE

This vehicle will give years of satisfactory service providing it receives regular maintenance. Refer to the Periodic Service Schedule for service intervals.

REAR AXLE

The only maintenance required for the first five years or 1000 hours of operation is to check the Torque to Rotate (TTR) and the periodic inspection of the lubricant level. Unless leakage is evident, the lubricant need only be replaced after five years.

TIRES

The condition of the tires should be inspected daily, inflation pressures should be checked at least once a week when the tires are cool. All dust caps for the valves need to be reinstalled after checking the tire pressure. For additional information, refer to the section on TIRES AND WHEELS.

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

VEHICLE CLEANING AND CARE

⚠ WARNING

To reduce the possibility of severe injury or vehicle damage, read all instructions supplied by the manufacturer of the pressure washer.

⚠ CAUTION

When pressure washing the exterior of the vehicle, do not use pressure in excess of 700 psi. To reduce the possibility of 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. Using excessive water pressure may cause severe injury to the operator or bystander, damage to the seals, plastics, seat material, body finish or electrical system. Do not use pressure in excess of 700 psi to wash the exterior of the vehicle.

Clean the windshield with lots of water, a mild soap and a clean cloth.

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 wiped with a damp cloth.

Removal of oil, tar, asphalt, shoe polish, etc., requires 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 and mild detergent is required to preserve the painted surfaces.

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 will cause corrosion of underbody parts unless 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 its removal, taking care not to chip or otherwise damage paint.

TOP AND WINDSHIELD

⚠ WARNING

The top does not provide protection from roll-over or falling objects.

The windshield does not provide complete protection from tree limbs or flying objects.

The top and windshield provide some protection from the elements; however, they will not keep the operator and passenger dry in a downpour.

CAPACITIES AND REPLACEMENT PARTS

FLUID	QUANTITY
Rear Axle Lubricant Mobil 424 Gear Oil	25 oz. (740 ml)
Brake Fluid, DOT 3	As Required

Fig. 7 Capacities

ITEM	PART NUMBER
Fuses	**ATC 10A (E-Z-GO P/N 35212G07)** **ATC 7.5A (E-Z-GO P/N 35212G05)**
Headlight Bulb	**894 (E-Z-GO P/N 74004G01)**
Front Turn Signal Bulb	**92057 (E-Z-GO P/N 604311))**
Taillight/Brake Light Bulb	**92057 (E-Z-GO P/N 604311))**
*Vehicle Key	**E-Z-GO P/N 609680**

Fig. 8 Replacement Parts

* If replacing a lost key, the number on the key must match the number on the ignition.

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Fig. 9 Key Number Location

HARDWARE

Periodically, the vehicle should be inspected for loose fasteners. Fasteners should be tightened in accordance with the Torque Specifications table (Ref. Fig. 10).

Use care when tightening fasteners and refer to the Technician's Repair and Service Manual for specific torque values.

Generally, three classes of standard hardware and two classes of metric hardware are used in the vehicle. Grade 5 hardware can be identified by the three marks on the hexagonal head and grade 8 hardware is identified by 6 marks on the head. Metric hardware is marked on the head with 8.8 or 10.9. Unmarked hardware is Grade 2.

ALL TORQUE FIGURES ARE IN FT. LBS. (Nm)
Unless otherwise noted in text, tighten all hardware in accordance with this chart.
This chart 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)
Grade 8	6 (8)	18 (24)	35 (47)	55 (75)	80 (108)	110 (149)	170 (230)	280 (380)	460 (624)	680 (922)
BOLT SIZE	M4	M5	M6	M8	M10	M12	M14			
Class 5.8 (Grade 2) 5.8	1 (2)	2 (3)	4 (6)	10 (14)	20 (27)	35 (47)	55 (76.4)			
Class 8.8 (Grade 5) 8.8	2 (3)	4 (6)	7 (10)	18 (24)	35 (47)	61 (83)	97 (131)			
Class 10.9 (Grade 8) 10.9	3 (4)	6 (8)	10 (14)	25 (34)	49 (66)	86 (117)	136 (184)			

Fig. 10 Torque Specifications and Bolt Grades

The above torque values DO NOT apply to Platsite thread forming screw.

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

PERIODIC SERVICE SCHEDULE

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

REMARKS	before each use DAILY	250 miles/415 kms MONTHLY	750 miles/1250 kms QUARTERLY	1500 miles/2500 kms SEMI-ANNUAL	3000miles/5000 kms ANNUAL	REPLACE AFTER	PAGE
Tires - pressure, condition of tires & rims	✓	✓	✓	✓	✓		
Hardware - loose or missing	✓	✓	✓	✓	✓		
Reverse Warning Indicator	✓	✓	✓	✓	✓		
Overall Vehicle Condition	✓	✓	✓	✓	✓		
Batteries - state of charge, condition, loose terminals, corrosion, hold down & hardware	✓	**CL**	**CL**	**CL**	**CL**		
Batteries* - check electrolyte level, fill if required		**C&A**	**C&A**	**C&A**	**C&A**		
Brakes - check fluid level in master cylinder		✓	✓	✓	✓	**3000 mi/5000 km**	
Brakes - smooth operation of pedal, stopping distance	P	P	P	P	P		
Brakes - aggressive stop test, does brake hold on a hill		✓	✓	✓	✓		
Accelerator - smooth operation	✓	✓	✓	✓	✓		
Wiring - loose connections, broken or missing insulation		✓	✓	✓	✓		
Charger Receptacle - clean connections		**CL**	**CL**	**CL**	**CL**		
Steering Assembly - excessive play, loose or missing hardware		✓	✓	✓	✓		
Tie Rods - excessive play, bent rods, loose or missing hardware		✓	✓	✓	✓		
Rear Axle - oil leakage, noise, loose or missing hardware		✓	✓	✓	✓		
Rear Axle - drain & replace fluid						**5000 mi/8000 km**	
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**		
Rear Suspension - shock oil leakage, worn bushings, loose or missing hardware			✓	✓	✓		
Motor Coupling - Add Anti - Sieze compound (Apporx 1 tablespoon)						**20,000 AMP-Hrs**	

Fig. 11 Periodic Service Schedule

*Use only distilled or purified water that is free of contaminants to fill batteries.

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

Read all of section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

TABLE OF CONTENTS FOR SECTION 'B'

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

Read all of Section A and this section before working on vehicle. Pay particular attention to all 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

Address practices not related to personal injury.

⚠ 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.

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.

⚠ WARNING

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.

If repairs are to be made that will require welding or cutting, the batteries must be removed.

Additional Warnings

Before working on the electrical system, be sure to read and understand the following warnings that pertain to the electrical system repair or maintenance.

⚠ 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.

Hydrogen gas is generated in the charging cycle of batteries and is explosive in concentrations as low as 4%. Because hydrogen gas is lighter than air, it will collect in the ceiling of buildings necessitating proper ventilation. Five air exchanges per hour is considered the minimum requirement.

Be sure that the key switch is off and all electrical accessories are turned off before starting work on vehicle.

The batteries should always be removed before any servicing or repairs that will generate sparks.

Never disconnect a circuit under load at a battery terminal.

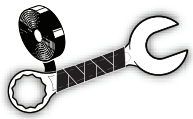
Batteries are heavy. Use proper lifting techniques when moving them. Always lift the battery with a commercially available battery lifting device. Use care not to tip batteries excessively when removing or installing them; spilled electrolyte can cause burns and damage.

The electrolyte in a storage battery is an acid solution which can cause severe burns to the skin and eyes. Treat all electrolyte spills to the body and eyes with extended flushing with clear water. Contact a physician immediately.

Always wear a safety shield or approved safety goggles when adding water or charging batteries.

Any electrolyte spills should be neutralized with a solution of 1/4 cup (60 ml) sodium bicarbonate (baking soda) dissolved in 1 1/2 gallons (6 liters) of water and flushed with water.

Overfilling batteries may result in electrolyte being expelled from the battery during the charge cycle. Expelled electrolyte may cause damage to the vehicle and storage facility.



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.

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.

⚠ CAUTION

ALL accessories that do NOT use the accessory wiring harness MUST be connected to draw from the entire 48 Volt battery pack. A DC to DC converter is included on this vehicle as part of the on-board charger for accessories that require voltage other than 48 volts to operate properly.

Read all of Section A and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

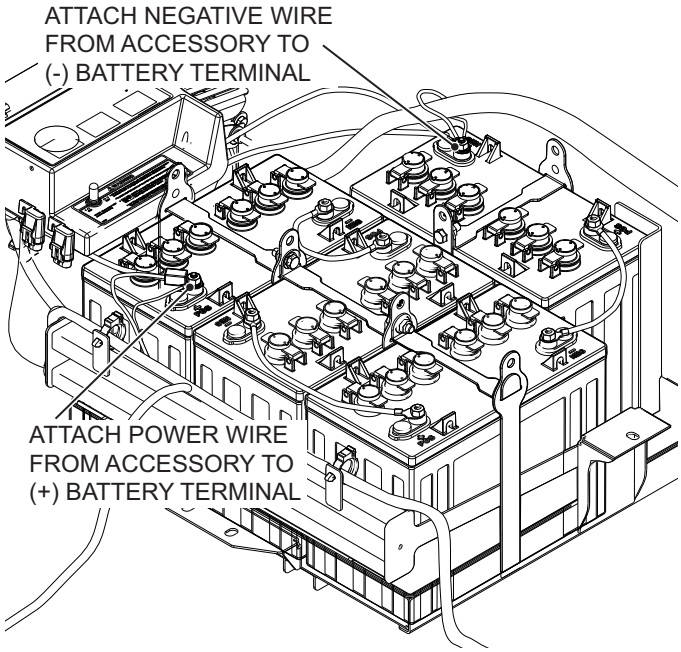


Fig. 1 Attach Accessory Wires to Battery Pack

Accessories connected to this vehicle that do not use the accessory harness must be connected across the entire 48 volt battery pack. This can be done by connecting to the two battery terminals shown in Figure 1. This can be done by connecting to the two battery terminals shown in the illustration.(Ref. Fig. 1) If the accessory requires voltage other than 48 volts it must be connected to the DC to DC converter to change the voltage to the amount required by the accessory. A DC to DC converter is supplied as part of the on-board battery charger on this vehicle.

Read all of Section A and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

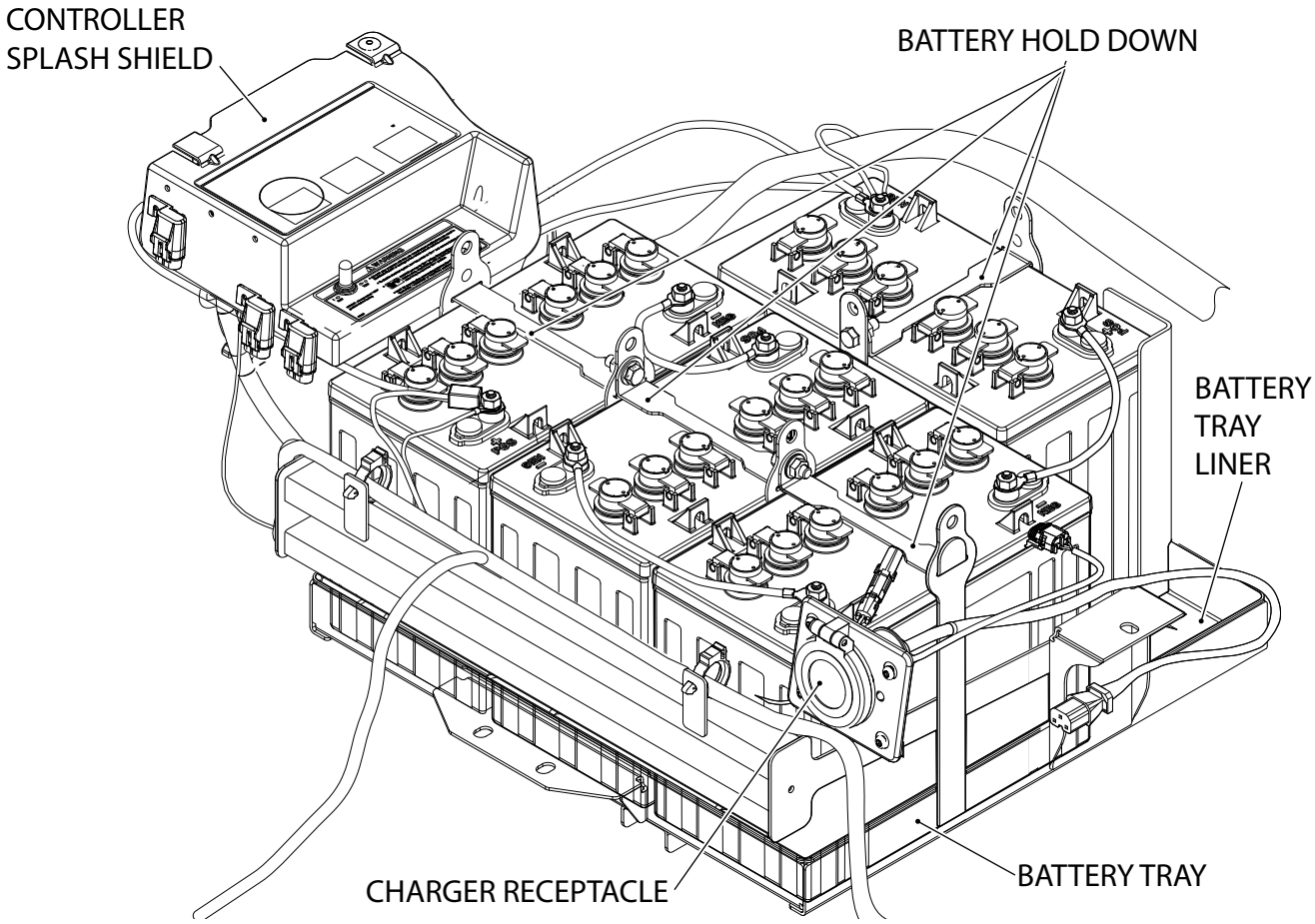


Fig. 2 Batteries, Charger Receptacle & Controller

BATTERY REMOVAL & INSTALLATION

Tool List	Qty.
Insulated Wrench, 9/16"	1
Insulated Wrench, 15mm	1
Socket, 15mm	1
Socket, 9/16"	1
Torx Bit, 50 IP	1
Ratchet, Insulated Grip	1
Battery Carrier Strap	2
Torque Wrench, in. lbs.	1
Portable Lifting Device	1
Rubber Mat	1

⚠ WARNING

When lifting a battery always use all 4 lifting lugs provided. Do not attempt to lift a battery with only one strap, this may break lifting lugs and result in personal injury or damage to the battery.

NOTICE

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 the table contained in Section 'A'.

1. Turn vehicle key to the off position and remove the key.

Read all of Section A and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

2. Using an insulated wrench, disconnect the main negative (-) battery cable, BL-.
3. Using an insulated wrench, disconnect the main positive (+) battery cable, BL+.
4. Using an insulated wrench, disconnect and remove all other wires connected to the batteries.
5. Remove three christmas tree rivets securing the controller splash shield in place. Lift the splash shield and set aside to allow access to the battery hold down hardware.
6. Use rubber mat to cover battery terminals in work area to prevent shorting if battery hold down strap drops across terminals.
7. Using an insulated wrench and insulated ratchet remove six hex nuts (1) and hex head bolts (2) securing four battery hold down straps (3).

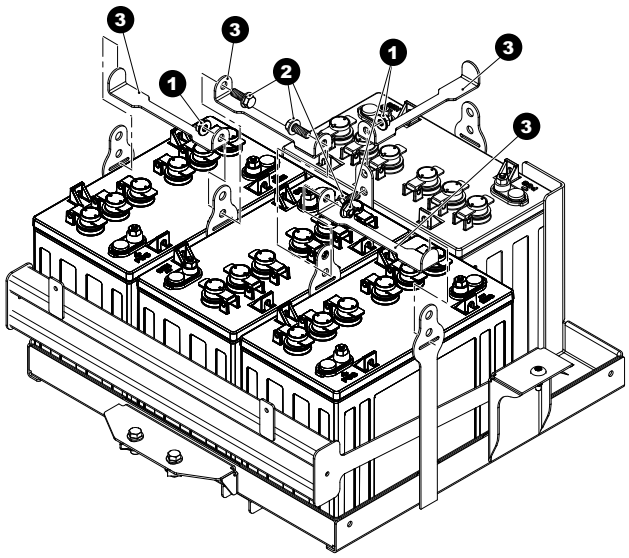


Fig. 3 Remove Battery Hold Downs

8. Remove the batteries using commercially available battery carrier straps (2 per battery) and a portable lifting device. Remove the three front batteries (1, 2, & 3) one at a time; push the rear hold down attachment tab towards the front of the vehicle, then using the carrier straps tilt the last battery (4) to the front of the vehicle just enough to clear the rear body and lift up and out of the vehicle.

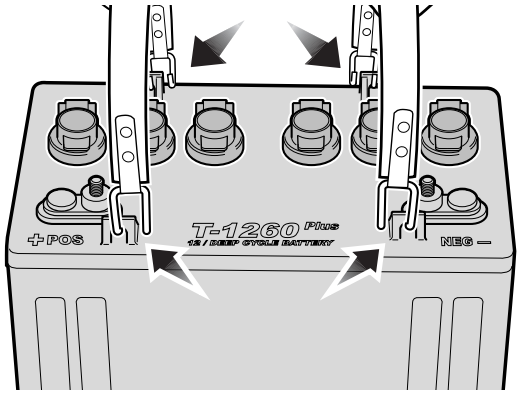


Fig. 4 Battery Removal

9. Remove the battery tray liner and check the area surrounding the battery tray for corrosion. If any corrosion is found, it should be immediately removed with a putty knife and a wire brush (for metal surfaces) or a plastic bristle brush (for plastic surfaces). The area should be washed with a solution of baking soda and water and dried thoroughly. All metal surfaces that have been cleaned must be primed and painted with a corrosion resistant paint.
10. Replace the battery tray liner.
11. Replace the batteries, starting with the battery located at the back of the battery tray (4), making sure that it is positioned as shown, push the rear hold down attachment tab back towards the battery.

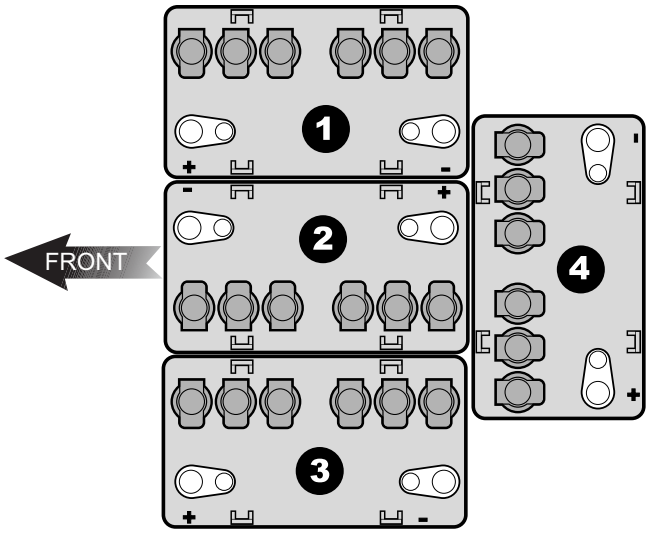


Fig. 5 Battery Placement & Orientation

Read all of Section A and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

12. .Install the battery hold downs (3), tighten the hex head bolts (2) and nuts (3) to the specified torque value.

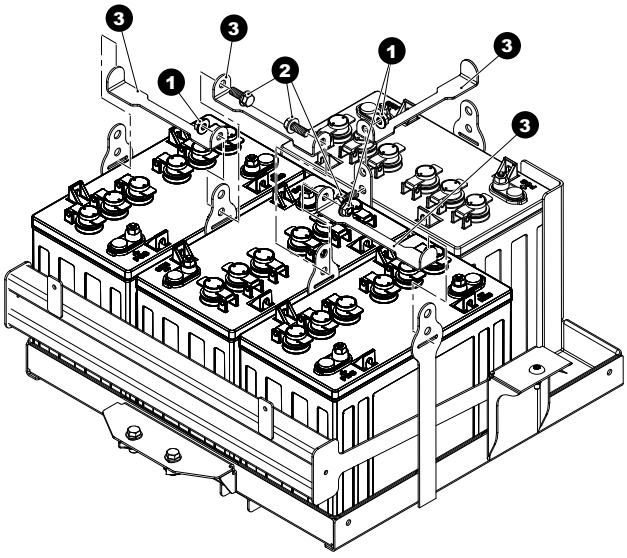


Fig. 6 Battery Hold Down

13. Inspect all wires and terminals and clean any corrosion from the battery terminals or wire terminals with a solution of baking soda and water, use a wire brush to completely remove corrosion if required.
14. Carefully replace the wires on the battery terminals as shown. Make sure to reconnect the main negative (-) battery cable, BL-, from the controller last.

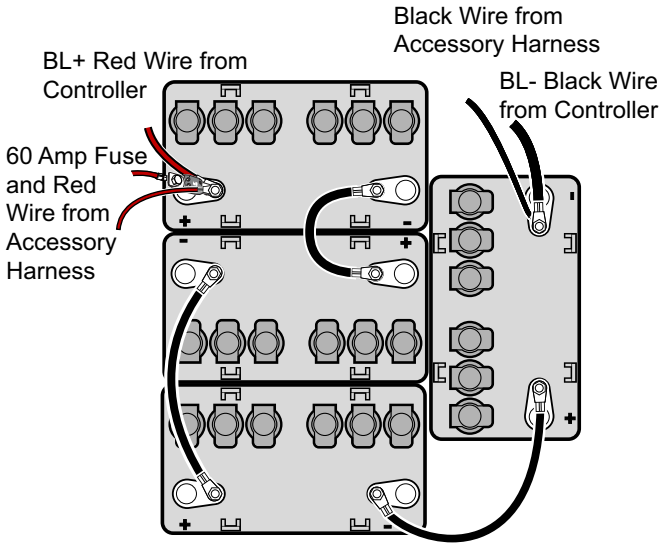


Fig. 7 Battery Connections

15. Tighten all battery terminal hardware to 95 - 105 in. lbs. (11 - 12 Nm) torque.
16. Protect the battery terminals and battery cable ends with a commercially available protective coating.

Read all of Section A and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

LIFTING THE VEHICLE

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

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

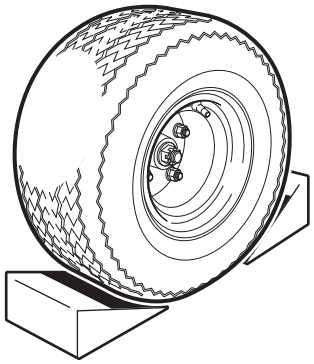
⚠ WARNING

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 wheel 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 jack stands only in the areas indicated.

To raise the entire vehicle, install the wheel chocks in front and behind each front wheel. Center the jack under the rear axle tube next to the differential housing. Raise the vehicle and position the jack stands under the frame where the leaf spring mounting bracket is welded to the frame.



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

Place the jack under the center front of the car just behind the bumper. Raise the vehicle and position the jack stands under the frame where the instrument panel support is attached to the frame as shown.

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

To raise only the front or rear of the vehicle, place the wheel chocks in front and behind the rear wheels. The jack may be left under the center front of the frame while the front end of the vehicle is on the jack stands.

Lower the vehicle by reversing the lifting sequence.

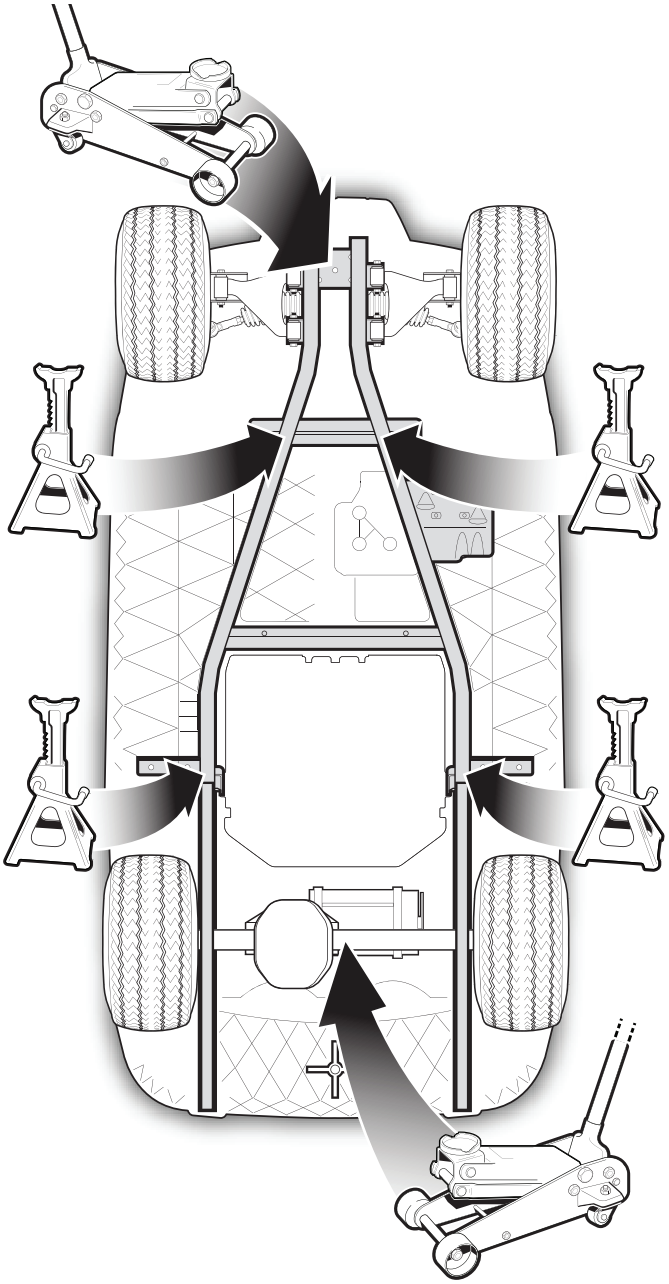


Fig. 8 Lifting Points

Read all of Section A and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

TABLE OF CONTENTS FOR SECTION 'C'

SECTION TITLE **PAGE NO.**

BODY

Read all of Section B and this section before working on vehicle. Pay particular attention to all Notices, Cautions, Warnings and Dangers.

Notes:

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

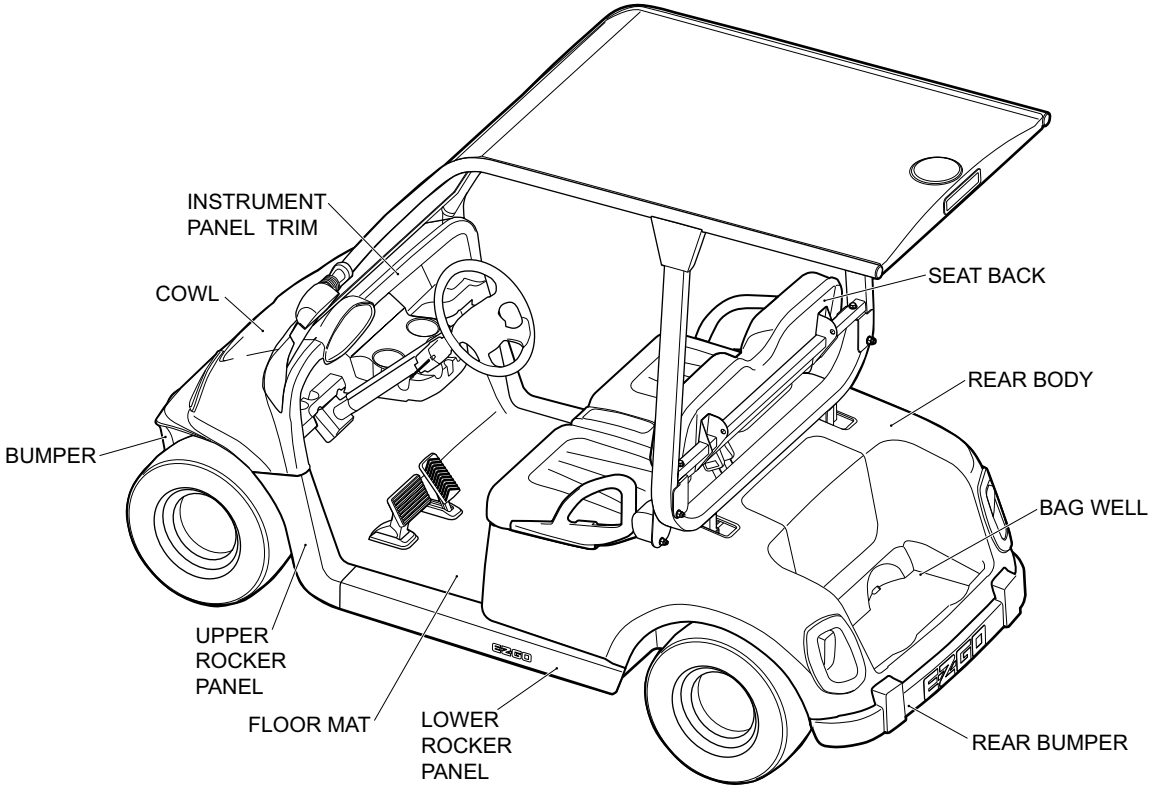


Fig. 1 Body

GENERAL

NOTICE

Vehicle top and windshield need to be removed before removing many body components.

In the following text, there are references to removing and installing bolts and other fasteners. Additional hardware (nuts, washers, etc.) that are removed must always be installed in their original positions unless otherwise specified. Non-specified torques are 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 could generate sparks or repairs that require welding or cutting.

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 and screws. Nylon or plastic ratchet type fasteners, commonly called christmas tree rivets; are used to secure items such as the floor mat to the floorboard.

The recommended method for removing christmas tree rivets is to slide a notched pry bar under the head of the rivet and press downward on the bar to pull the rivet from the hole.

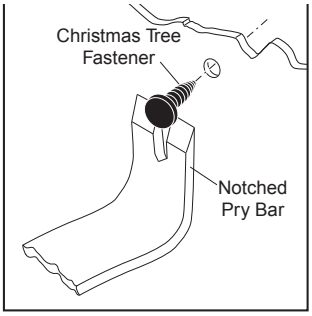


Fig. 2 Christmas Tree Rivet Removal

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

BODY COMPONENT REPLACEMENT

The body components can be replaced by removing the securing hardware, replacing the component and installing hardware in the same orientation as it was removed.

Front Fascia and Front Bumper *(Ref. Fig. 3)*

Tool List **Qty.**

Socket, 15mm.....1
Ratchet.....1
Phillips Screwdriver Bit.....1
Torx Bit, T-25.....1

1. Remove two screws (1) and washers (2) from the lower edge of the fascia and two screws (3) from the upper edge on the ends of the fascia (6).
2. Remove two hex nuts (4) and flat washers (5) securing the top of the fascia (6) and bumper (7) to the front strut mounting bolts.
3. Pull the fascia panel (6) with turn signals forward and off of the bolts. Disconnect the wires for the turn signal lights.
4. Pull top of bumper (7) forward and off of the bolts then lift upward to clear the frame channel between the front struts and pull the lower edge of the bumper down and away from the vehicle. Remove two flat washers (8) from the bumper mounting bolts.

Reassemble in reverse order. Replace any worn or damaged hardware as required. It is recommended that all locking nuts be replaced after 5 removals.

ITEM	TORQUE SPECIFICATION
1	13 - 18 in. lbs (1.5 - 2 Nm)
3	7 - 9 in. lbs (0.8 - 1 Nm)
4	27 - 44 in. lbs (3 - 5 Nm)

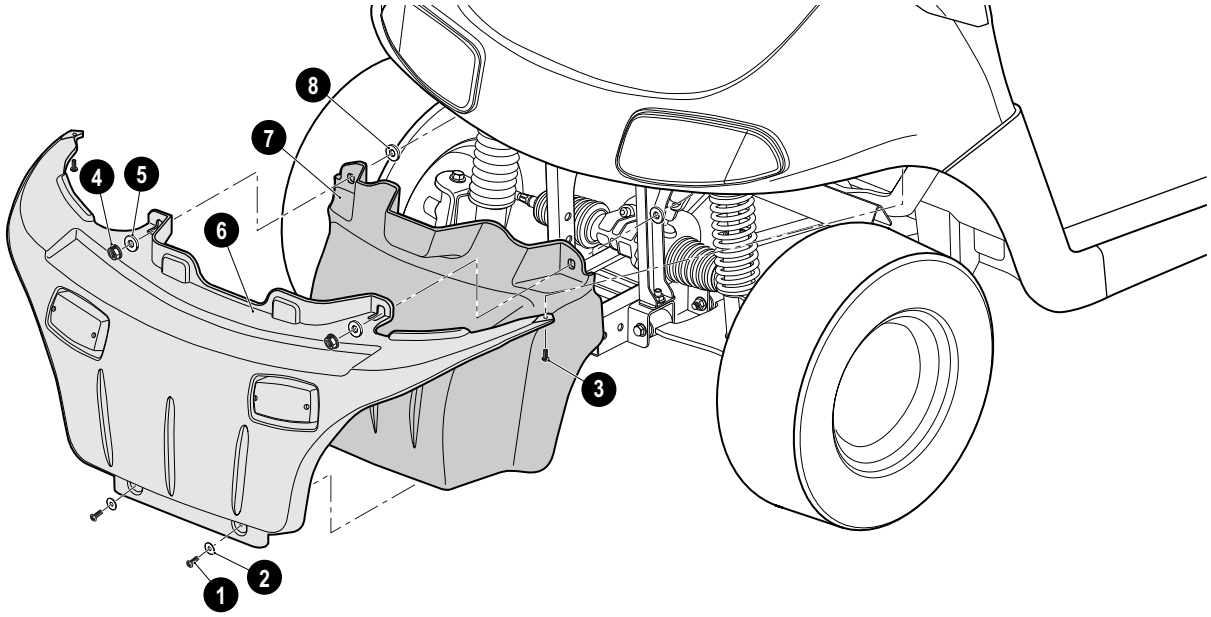


Fig. 3 Front Fascia and Bumper

Rocker Panels *(Ref. Fig. 4)*

Tool List **Qty.**

Torx bit, T-45.....1
Ratchet.....1
Torque Wrench, in. lbs.....1

1. Remove the lower rocker panel (9) by removing three torx screws (10).
2. Remove the upper rocker panel (11) by removing the two remaining torx screw (10).

Removal is the same for both sides of the vehicle.

Reassemble in reverse order. Replace any worn or damaged hardware as required. It is recommended that all locking nuts be replaced after 5 removals.

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

ITEM	TORQUE SPECIFICATION
10	27 - 44 in. lbs (3 - 5 Nm)

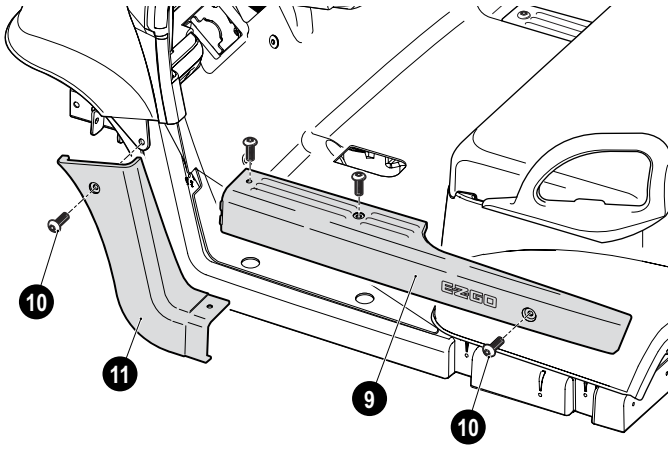


Fig. 4 Rocker Panel Removal

Floor Mat *(Ref. Fig. 5) (Ref. Fig. 6)*

Tool List **Qty.**

Notched Pry Bar 1

The upper and lower rocker panels must be removed before removing the floor mat.

1. Remove seven christmas tree rivets (12) securing the floor mat to the floorboard (13).
2. Pull edge of floor mat from under edge of instrument panel and lift over accelerator and brake pedals.

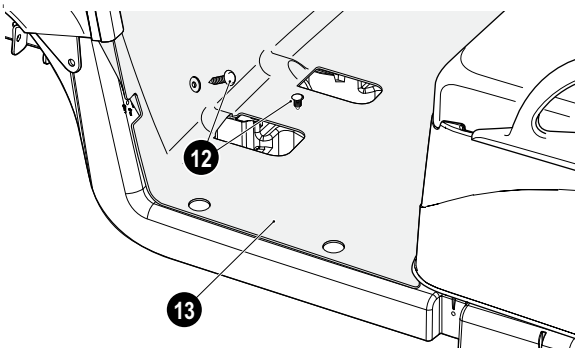


Fig. 5 Floor Mat Fastener Removal

Installation of the floor mat will require new christmas tree rivets **— install the two shorter christmas tree rivets in the upper corners of floor mat** (Ref. Fig. 6).

Reassemble in reverse order. Replace any worn or damaged hardware as required.

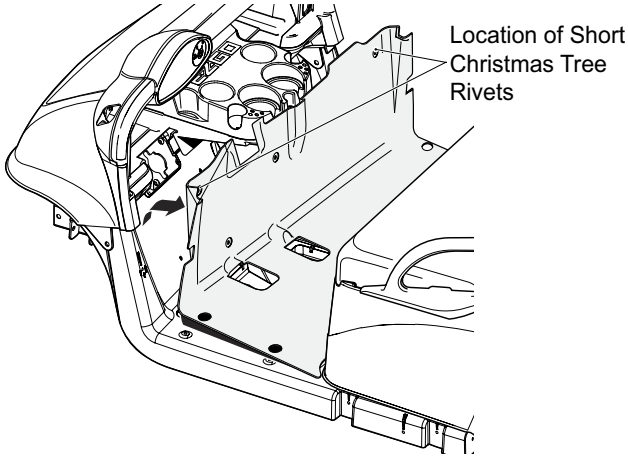


Fig. 6 Floor Mat

Cowl and Instrument Panel *(Ref. Fig. 7) (Ref. Fig. 8)*

Tool LIst **Qty.**

Torx Bit, T-50IP 1
Torx Bit, T-45 1
Torx Bit, T-30 1
Torx Bit, T-27IP 1
Insulated Wrench, 9/16" 1
Socket, 10 mm 1
Ratchet 1
Torque Wrench, in. lbs. 1
Torque Wrench, ft. lbs 1
Long Needle Nose Pliers 1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

The top and the support struts with windshield must be removed before proceeding. Instructions for removal of the top and windshield are located in the Weather Protection section of this manual. Remove the upper and lower rocker panels and the floor mat as described in the previous sections.

1. Remove four torx screws (14) securing the trim panel (15) to the instrument panel (16) and cowl (17).
2. Locate the tab in the fender well area, under the cowl. The tab extends from the instrument panel through a slot in the cowl, squeeze the legs of the tab together and push to the back of the vehicle while pulling forward on the cowl. Repeat for the other side — **at this**

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

point the cowl is completely loose — remove the cowl.

3. Loosen the trim panel (15) by pulling it away from the instrument panel along the upper edge then grip the ball holder with both hands and pull away from the instrument panel (16); move to the other side of the vehicle and grip the ball holder on that side with both hands and pull it away from the instrument panel (16).
4. Disconnect wires to the instruments located in the trim panel then remove the trim panel.

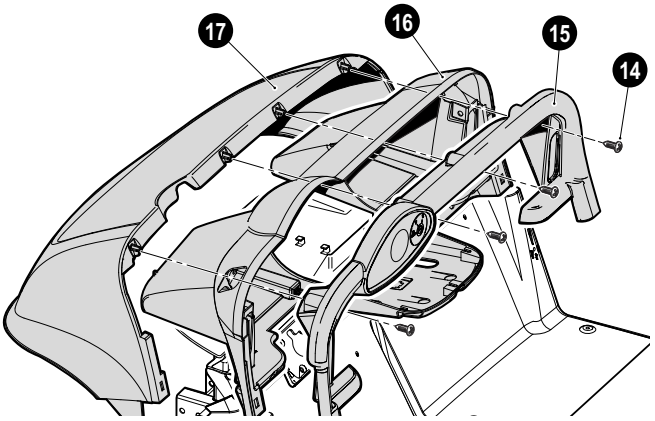


Fig. 7 Cowl and Instrument Panel Trim

5. Remove three self threading nuts (18) securing the cup holder assembly (19) to the instrument panel (16). Lift the lower edge of the cup holder (19) and pull the top edge down, disconnect the wires for the switch and outlet, set the cup holder aside. Disconnect the turn signal flasher unit and the brake switch relay.

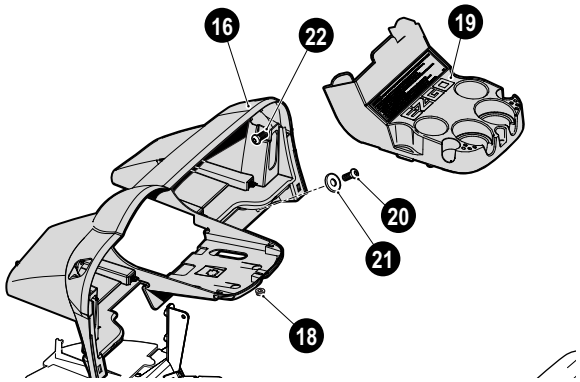


Fig. 8 Instrument Panel and Cup Holder

6. Remove four torx screws (20) and flat washers (21) securing the instrument panel along its lower edge and the two torx screws (22) located near the top of the instrument panel (16); one on each side. The instrument panel (16) can now be removed.

⚠ WARNING

To prevent the possibility of injury or death the correct safety label must be on the instrument panel cup holder at all times.

Reassemble in reverse order. Replace any worn or damaged hardware as required.

ITEM	TORQUE SPECIFICATION
14	27 - 44 in. lbs. (3 - 5 Nm)
18	18 - 26 in. lbs.(2 -3 Nm)
20	20 - 25 ft. lbs. (28 - 34 Nm)
22	13 - 16 ft. lbs. (18 - 22 Nm)

Front Splash Guard *(Ref. Fig. 9)*

Tool List **Qty.**

Notched Pry Bar 1

Remove upper and lower rocker panels, cowl, instrument panel trim and instrument panel.

1. Remove three christmas tree rivets (23) securing front splash guard (24) to vehicle.(Ref. Fig. 2)

Reassemble in reverse order. Replace any worn or damaged hardware as required.

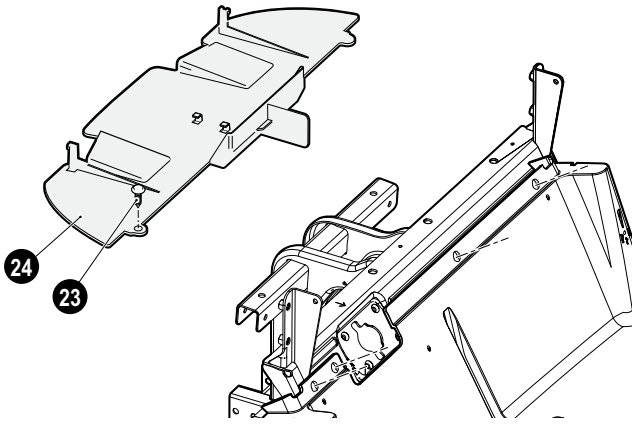


Fig. 9 Front Splash Guard

Seat Back Assembly

Tool LIst **Qty.**

Torx Bit, T-45IP 1

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

1. Remove four torx screws (26) and flat washers (27) that secure the seat back assembly (25) to the top support.

Installation of the seat back assembly is in reverse order of its removal. Replace any worn or damaged hardware with new as required. It is recommended that all locking nuts be replaced after 5 removals.

ITEM	TORQUE SPECIFICATION
26	7 - 9 ft. lbs. (9 - 12 Nm)

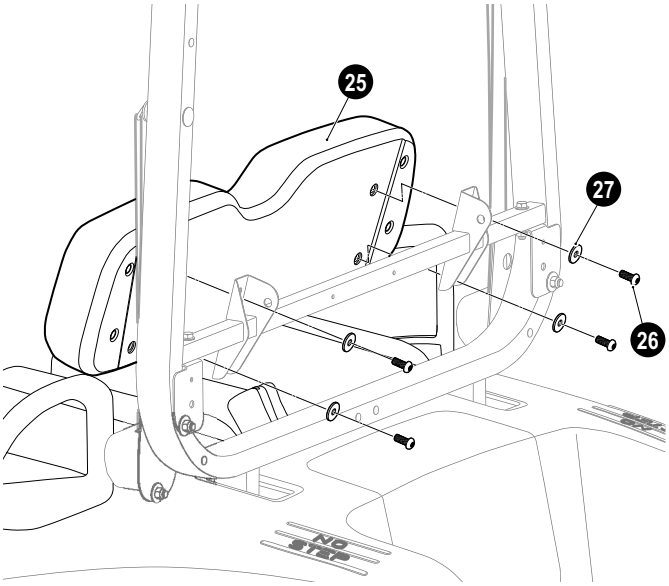


Fig. 10 Front Seat Back

Fender Liner *(Ref. Fig. 2) (Ref. Fig. 11)*

Tool LIst **Qty.**

Notched Pry Bar 1

NOTE — The fender liner can be removed without removing the rear body of the vehicle.

1. Remove four christmas tree rivets (42) that secure the liner (41) to the frame of the vehicle. Two christmas tree rivets are located on the lower front edge of the fender liner, the two remaining are located along the inside surface above the wheel.

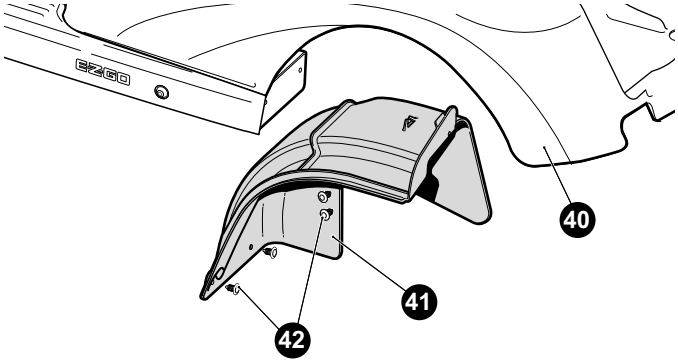


Fig. 11 Fender Liner

Installation is in the reverse order of removal. Replace any worn or damaged hardware with new as required.

Rear Body *(Ref. Fig. 12) (Ref. Fig. 13) (Ref. Fig. 14)*

Tool LIst **Qty.**

Torx Bit, T-45IP 1
Torx Bit, T-47IP 1
Torx Bit, T-50 1
Ratchet 1
Insulated Wrench 9/16" 1
Torque Wrench 1

Remove the lower and upper rocker panels, the seat back and the top with windshield. Fold the back edge of the floormat towards the front of the vehicle. If the vehicle is equipped as a 2 + 2 with a rear facing seat must also be removed.

1. Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.
2. Remove the three rivets (21) that secure the controller splash shield (20) to the body on the passenger side of the vehicle.

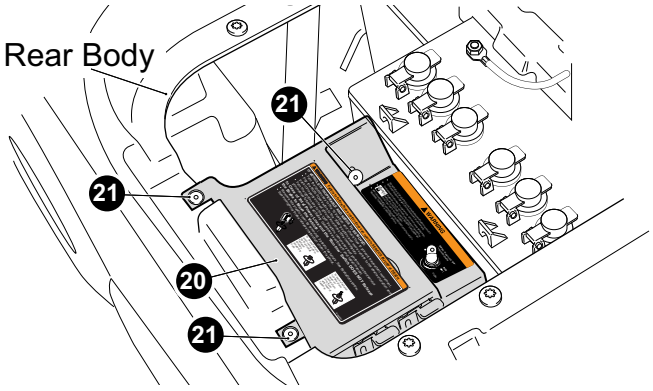


Fig. 12 Controller Splash Shield

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

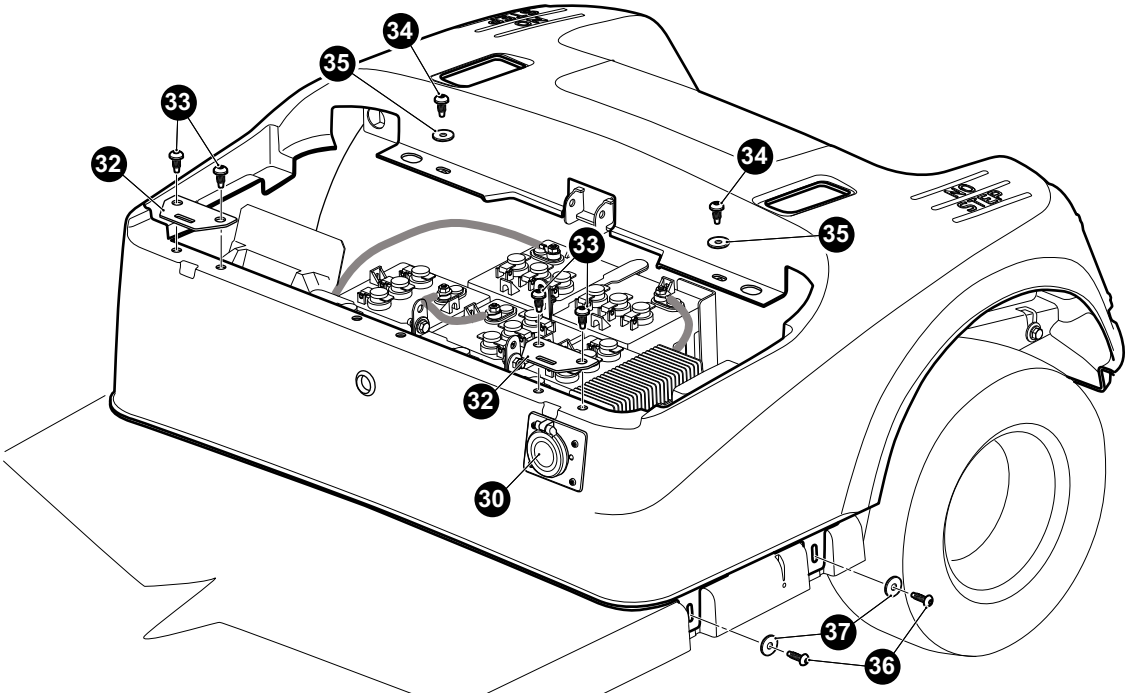


Fig. 13 Rear Body

3. Unplug the cord from the charger receptacle (30) to the on board battery charger, disconnect the plug to the accessory harness.
4. Remove two torx screws (33) securing each hinge plate (32) along the front edge of the rear body then remove both hinge plates.
5. Remove two inner torx screws (34) and washers (35) from the back edge of seat opening in the rear body.
6. Remove four torx screws (36) and washers (37) from the lower edge of the rear body, two on the driver side and two on the passenger side.
7. Remove two torx screws (38) from the bagwell floor.

It is recommended that the removal of the rear body is done using two people, one on each side of the vehicle.

8. Lift the rear body, pivot the seat opening upward and towards the back of the vehicle to clear the seat back supports.

Reassemble in reverse order of removal. Replace any worn or damaged hardware with new as required. It is recommended that all locking nuts be replaced after 5 removals.

ITEM	TORQUE SPECIFICATION
33, 34	13 - 16 ft. lbs. (18 - 22 Nm)
36	26 - 44 in. lbs. (3 - 5 Nm)
38	2 - 4 ft. lbs. (4 - 6 Nm)
39	10 - 13 ft. lbs. (14 - 17 Nm)

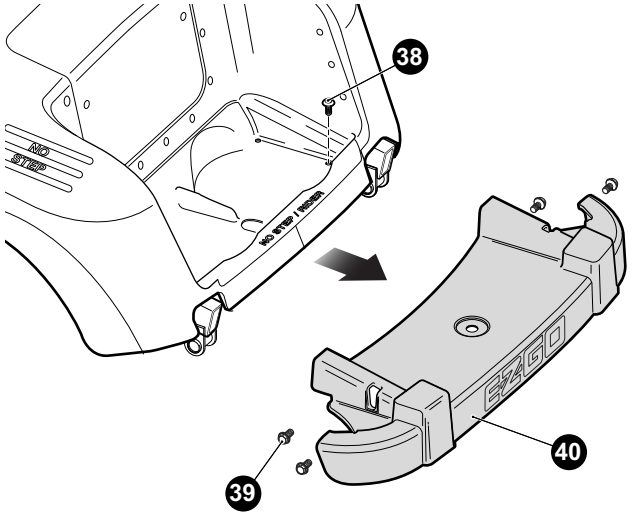


Fig. 14 Bagwell and Rear Bumper

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

Rear Bumper *(Ref. Fig. 14)*

Tool LIst	Qty.
Ratchet	1
Ratchet Extension, 9"	1
Universal Joint	1
Socket, 15mm	1
Torx Bit, T-47IP	1
Torque Wrench, ft. lbs.	1

NOTE — The rear bumper can be removed without removing the rear body of the vehicle.

1. Remove two torx head screws (38) from the bag well floor. If the rear body has been removed from the vehicle go to step 2.
2. Remove four hex head bolts (39) securing the bumper to the vehicle frame.
3. Pull the rear bumper backwards off the frame; lifting the rear edge of the body may make removal easier.

Installation is in the reverse order of removal. Replace any worn or damaged hardware with new as required.

ITEM	TORQUE SPECIFICATION
38	2 - 4 ft. lbs. (4 - 6 Nm)
37	10 - 13 ft. lbs. (14 - 17 Nm)

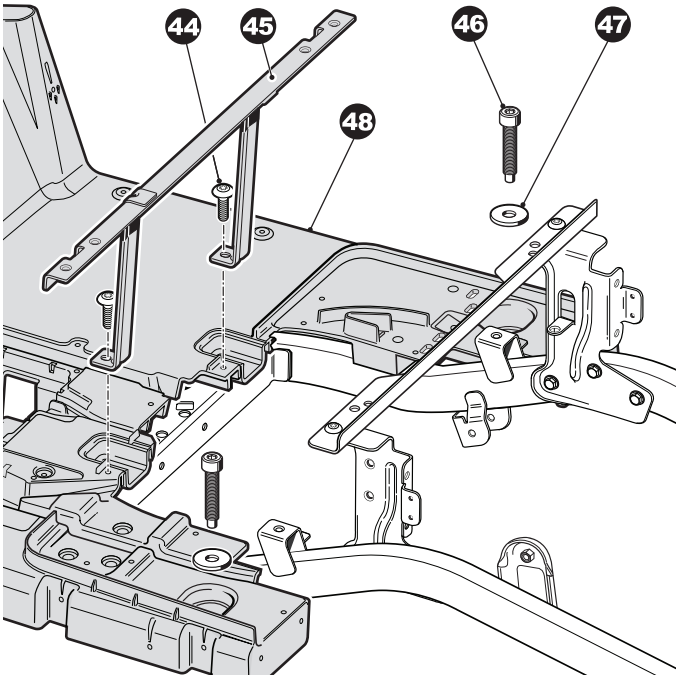
Floorboard

Tool LIst	Qty.
Torx Bit, T-50	1
Ratchet	1
Insulated Wrench 9/16"	1
Torque Wrench, ft. lbs.	1

Before the floorboard can be removed the top and windshield, the lower and upper rocker panels, the floor mat, the pedal cover, accelerator and brake pedal assemblies, the instrument panel with trim, the seat back and rear body must be removed. If the vehicle is equipped with a 2 + 2 rear facing seat, this must also be removed.

1. Remove the two Torx screws (44) securing the front seat support frame (45) to the floorboard (48).
2. Remove two Torx socket head cap screws (46) and washers (47) that secure the floorboard (48) to the vehicle frame

Installation is in the reverse order of removal. Replace any worn or damaged hardware with new as required.



Front Seat Support and Floorboard

ITEM	TORQUE SPECIFICATION
44, 46	13 - 16 ft. lbs. (18 - 22 Nm)

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

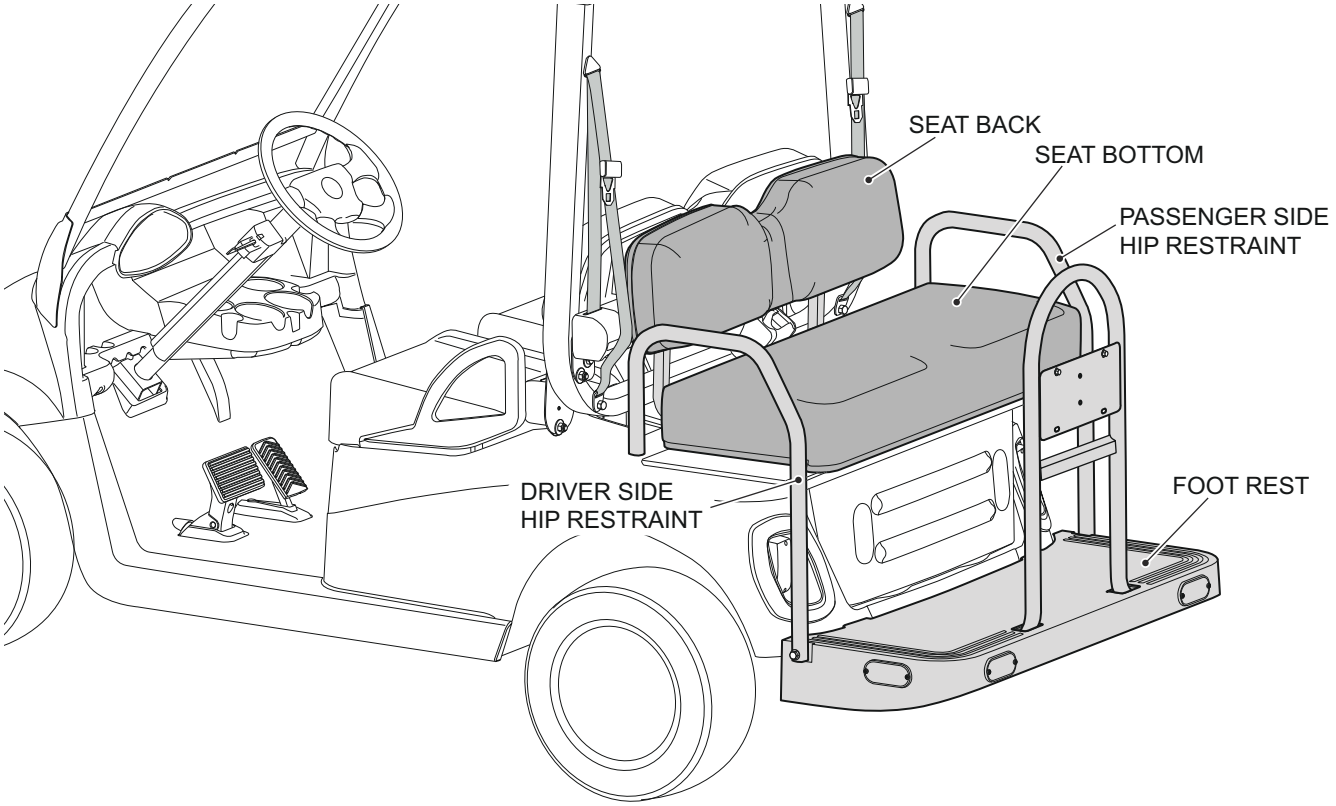


Fig. 15 2 + 2 Rear Facing Seat & Foot Rest

2 + 2 REAR FACING SEAT & FOOT REST

Tool LIst	Qty.
Torx Bit, T-45 IP	1
Socket, 15 mm	1
Ratchet	1
Torque Wrench, ft. lbs.	1
Wrench, 15 mm	1

1. Raise the rear facing seat bottom and pivot it towards the back of the vehicle then lift and remove it.
2. Remove two head bolts (23) and nuts (22) (Ref. Fig. 16) that secure the rear facing seat brackets to the front seat back support (14). **For removal of seat back assembly proceed to step 3, for removal of entire rear facing seat proceed to step 4**.
3. To remove only the seat back assembly loosen two hex head bolts (20) and nuts (21) that secure the hip restraints to the rear facing seat floor board. Pivot the seat frame assembly towards the rear of the vehicle to access the four torx head bolts securing the seat back to the mounting brackets. Remove the four torx head bolts and flat washers that secure the seat back assembly to the mounting brackets.

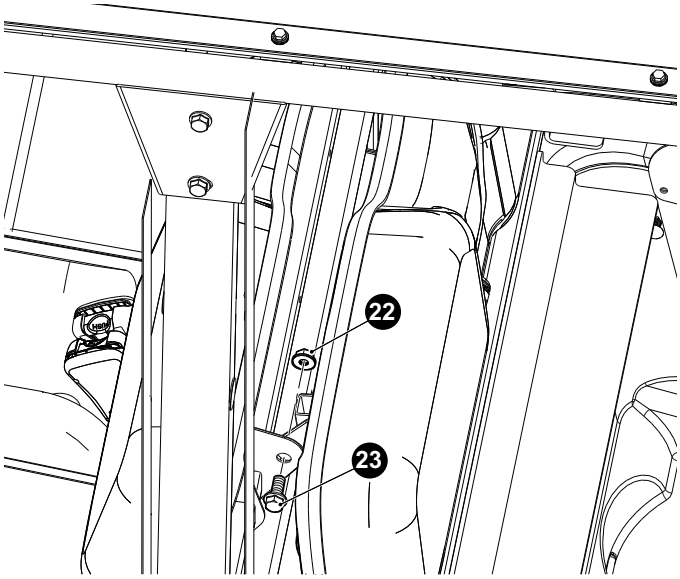


Fig. 16 Rear Facing Seat Back Hardware

4. Remove two hex head bolts (20) and nuts (21) that

secure the hip restraints to the rear facing seat floor board. The complete seat frame and seat back can now be removed from the vehicle.

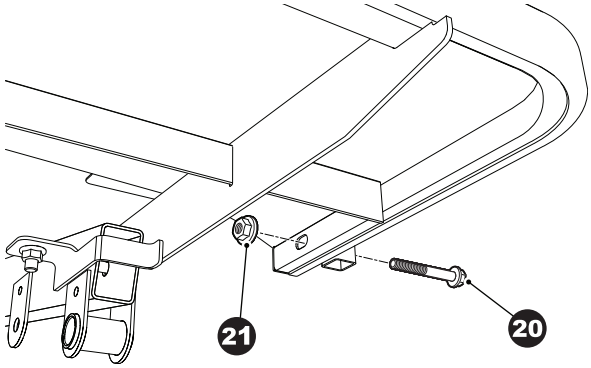


Fig. 17 Rear Facing Seat Hip Restraint

5. Remove two torx head bolts (28) from the bagwell floor.

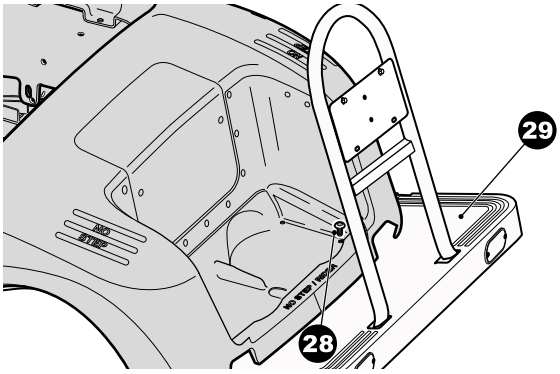


Fig. 18 Rear Facing Seat Foot Rest

6. Loosen four hex head bolts (30). Support the rear foot rest (29) before removing the two bolts closest to the rear of the vehicle completely. Once the bolts are removed the foot rest assembly (29) may be removed from the vehicle by sliding it backwards and off of the two remaining bolts.

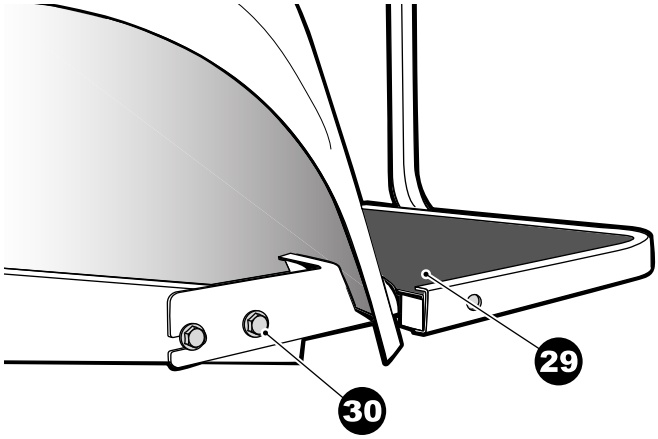
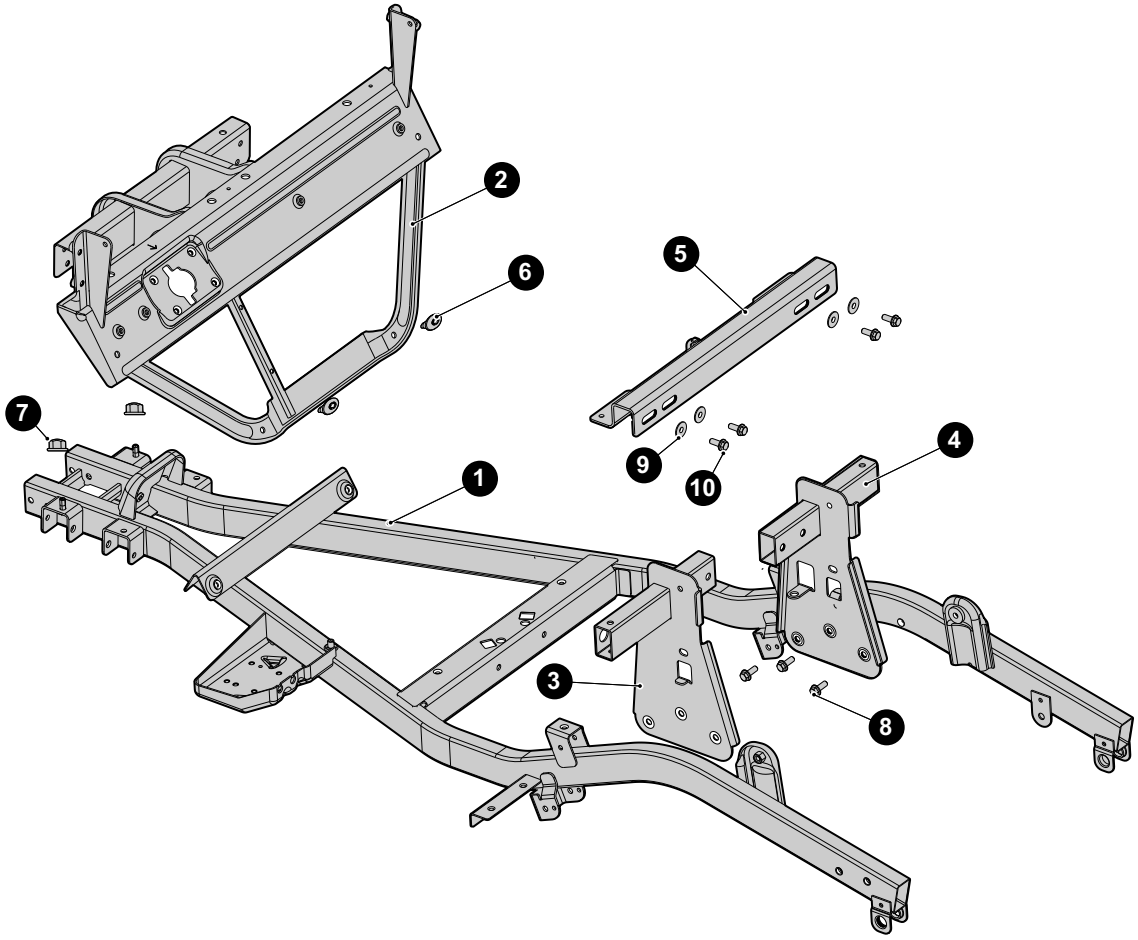


Fig. 19 Foot Rest Removal

Installation is in the reverse order of removal. Replace any worn or damaged hardware with new as required.

ITEM	TORQUE SPECIFICATION
28	5 - 6.5 ft. lbs. (7 - 9 Nm)
21	10 - 12 ft. lbs (14 - 16 Nm)
30	32 - 36 ft. lbs. (38 - 43 Nm)

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



FRAME

The vehicle frame is made up of five components, the frame weldment (1), the IP support weldment (2), the driver side seat support weldmtent (3), the passenger side seat support weldment (4) and the seat belt center front weldment (5).

The replacement of frame components will require the removal of the Ops structure.

The front cowl, instrument panel, rear body and floor-board will need to be removed before replacing the IP support weldment (2).

The seat supports (3 & 4) and the seat belt center front weldment can be replaced without removing the rear body.

ITEM	TORQUE SPECIFICATION
6, 7	15 - 17 ft. lbs. (20 - 23 Nm)
8, 10	32 - 36 ft. lbs. (38 - 43 Nm)

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

BODY CARE MAINTENANCE

Cleaning

Tools & Supplies List

Soft Clean Cotton Cloth
Mild soap

The body panels are painted and have a clear coat finish applied.

For a 'light' cleaning, spray the vehicle with a light mist of water and wipe clean with a soft cotton cloth. To clean a vehicle that has mud, dust or dirt on the body panels:

1. Wet the body with a low pressure hose to rinse off any loose dust and dirt.
2. Wash the vehicle with a solution of mild soap and water using a soft cotton cloth. *Do **not** use abrasive cleaners or solvents.*
3. Apply clear coat safe automotive car wax to revive lost luster as needed. *Test the wax on an inconspicuous area before applying to the entire vehicle.* Buff the wax by hand. *Do **not** use a power buffer to remove wax from the body panels.*

PAINTING

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

⚠ WARNING

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

Wear eye protection and a respirator, follow the manufacturer's instructions to protect the area from overspray and airborne mist.

⚠ CAUTION

Provide protection from overspray for the vehicle and the surrounding area.

Light Scratches

Tools & Supplies List	Qty.
Spray Bottle of Water	1
Variable Speed Rotary Buffer	1
3-M 39001 Medium Cut Rubbing Compound	1 qt.
3-M 39003 Finishing Material	1 qt.
3-M 39009 Polishing Pad Glaze (for dark colors)	1 qt.
3-M 05995 Polishing Pad Glaze (for light colors)	1 qt.
Coarse Cut Foam Compound Pad for Buffer	1
Fine Cut Polish Pad for Buffer	1
Sandpaper, 1200 Grit wet or dry	1
Sandpaper, 1500 Grit wet or dry	1
Wet Sanding Block	1
Soft Clean Cotton Cloths	

1. Clean the area to be repaired with clean, clear water.
2. Using 1200 grit sandpaper, water sand the entire area of the scratch in a circular motion, spraying with water as needed, until the original scratch is no longer visible.
3. Wipe the area dry and visually inspect to be sure that the original scratch has completely disappeared.
4. Using 1500 grit sandpaper, wet sand the area until all of the marks left by the 1200 grit sandpaper are gone, pay close attention to the edges of the sanded area.
5. Using the buffer with the 3-M 39001 compound on the foam pad, turn the buffer on at slow speed. Use a cris-crossed pattern to remove the sanding scratches left by the 1500 grit sandpaper. Use only enough compound to remove the scratches. Spray the area with water to keep the surface cool.
6. Using the buffer with the 3-M 39003 or 3-M 05995 Polishing glaze (depending upon the color of the vehicle body) on the foam pad, turn the buffer on at slow speed. Use a cris-crossed pattern to remove the swirls from the previous stage. Use only enough compound to remove the swirls. Spray the area with water to keep the surface cool. .
7. Wipe with a ***clean, soft*** cloth to remove any compound from the surrounding area. Any dirt on the cloth may mar the surface.

Minor Scratches

Tools & Supplies List	Qty.
Bottle of Touch-up Paint	1
Bottle of Alcohol	1
Spray Bottle of Water	1
Variable Speed Rotary Buffer	1
3-M 39001 Medium Cut Rubbing Compound	1 qt.
3-M 39003 Finishing Material	1 qt.
3-M 39009 Polishing Pad Glaze (for dark colors)	1 qt.
3-M 05995 Polishing Pad Glaze (for light colors)	1 qt.
Coarse Cut Foam Compound Pad for Buffer	1
Fine Cut Polish Pad for Buffer	1
Sandpaper, 1200 Grit wet or dry	1
Sandpaper, 1500 Grit wet or dry	1

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

Wet Sanding Block 1
Soft Clean Cotton Cloths

To repair minor scratches to the body:

1. Thoroughly clean the surface to be repaired with alcohol and dry.
2. 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 the coating layer is visible and slightly above the surface of the part.
3. Use 1200 grit “wet” sand paper to blend touch up area level with the rest of the part being repaired. Use a polishing compound to renew gloss and to further blend and transition newly painted surface.
4. Clean with alcohol and dry.
5. (Optional but recommended) Follow this process with clear coat to renew and protect depth of finish.
6. Wax or polish with Carnauba base product, available at any automotive parts distributor.

Larger Scratches

Tools & Supplies List **Qty.**

Spray Can of Touch-up Paint 1
Bottle of Alcohol 1
Spray Bottle of Water 1
Variable Speed Rotary Buffer 1
3-M 39001 Medium Cut Rubbing Compound ..... 1 qt.
3-M 39003 Finishing Material ..... 1 qt.
3-M 39009 Polishing Pad Glaze (for dark colors) ... 1 qt.
3-M 05995 Polishing Pad Glaze (for light colors) ... 1 qt.
Coarse Cut Foam Compound Pad for Buffer 1
Fine Cut Polish Pad for Buffer 1
Sandpaper, 1200 Grit wet or dry 1
Sandpaper, 1500 Grit wet or dry 1
Wet Sanding Block 1
Soft Clean Cotton Cloths
Masking Tape

For larger scratches to the body:

1. Thoroughly clean the surface to be repaired with alcohol and dry.
2. Mask the area to be painted (common masking tape is adequate) prior to repair and use aerosol type touch-up paint.
3. 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.
4. After painting, allow to dry overnight. Smooth the mask lines using 1200 grit “wet” sand paper to blend touch up area level with the rest of the part being repaired. Use a polishing compound to renew gloss and to further blend and transition newly painted surface.
5. Clean with alcohol and dry.
6. (Optional but recommended) Follow this process with clear coat to renew and protect depth of finish.
7. 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 ‘TPO’ panels. TPO 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 all Notices, Cautions, Warnings and Dangers.

Notes:

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

Notes:

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SECTION TITLE **PAGE NO.**

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

Notes:

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

WHEEL AND TIRE SERVICE

Tools 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, over inflation can occur in a matter of seconds. Over inflating could cause the tire to separate from the wheel or cause the tire to explode, either of which could cause personal injury.

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 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 overinflate. Due to the low volume of these small tires, overinflation can occur in a matter of seconds. Be sure to install the valve dust cap (item 2) after checking or inflating to 30 psi (207 kPa).

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 the 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.

Sidewalls of the tire can not be repaired by plugging. Attempting to plug a hole in the sidewall creates an unsafe condition.

Follow all instructions and safety warnings provided by the mounting/demounting machine manufacturer.

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

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.

Place the wheel spacer in between the wheel and the hub, with valve stem to the outside mount the wheel onto the hub. Install lug nuts (1) finger tight; make sure that the tapered end is against the wheel rim; and tighten in a **'cross sequence' pattern**; then, tighten lug nuts to specified 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)

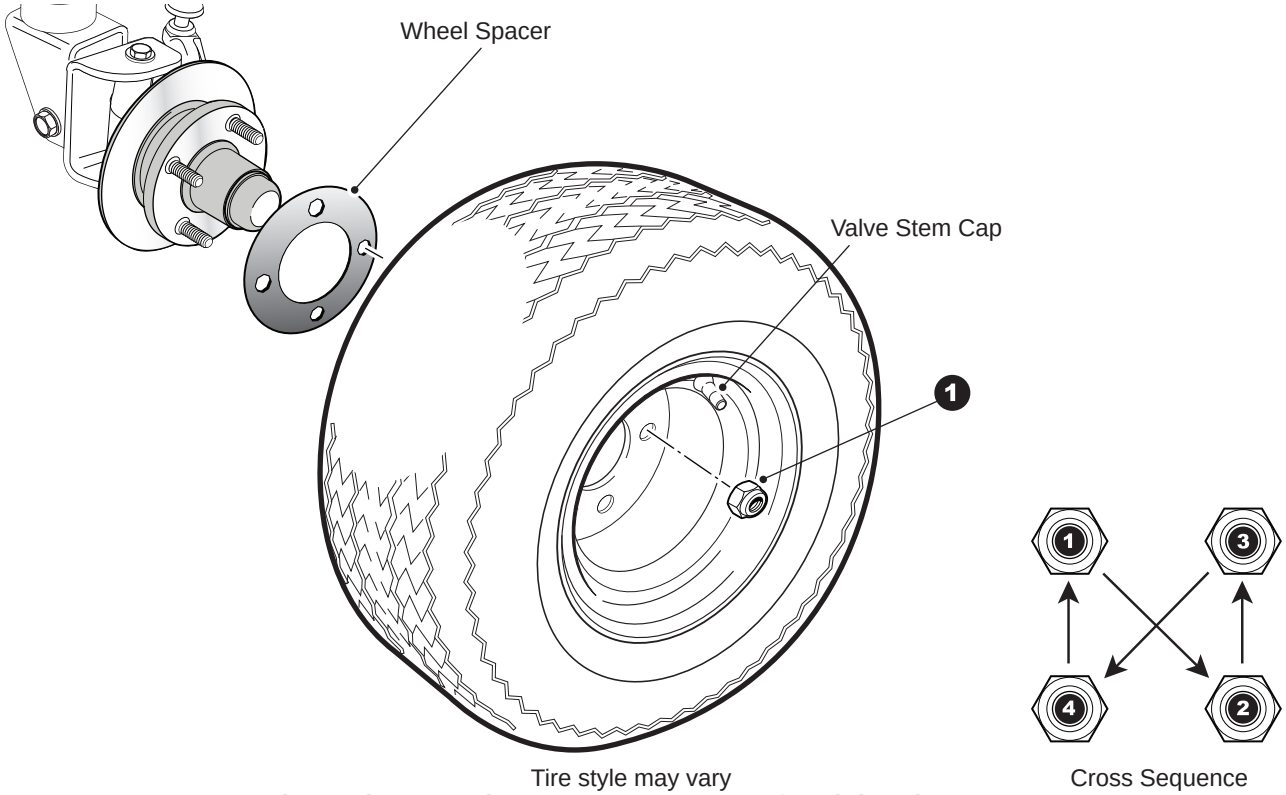

Fig. 1 Tire Mounting & Cross Sequence for Tightening

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

Notes:

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

Notes:

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SECTION TITLE **PAGE NO.**

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

Notes:

ELECTRONIC SPEED CONTROL (AC MOTOR)

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

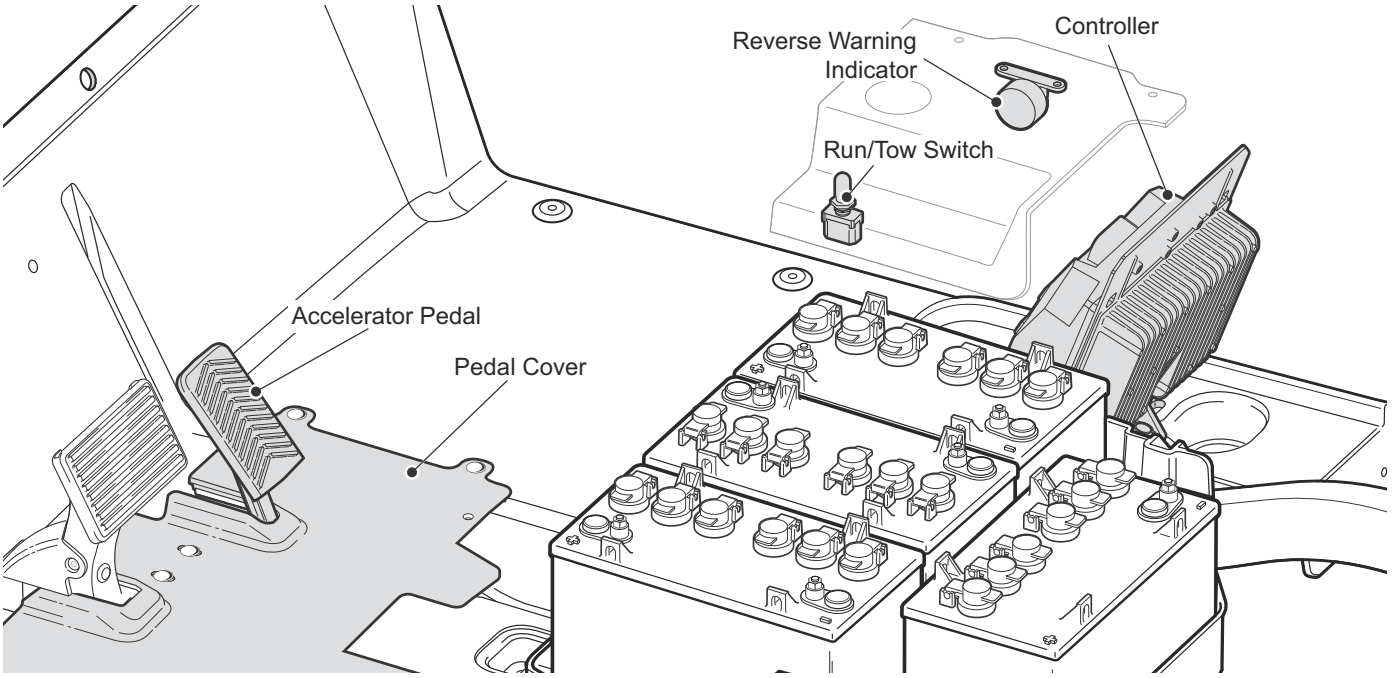

Fig. 1 Electronic Speed Control

GENERAL

NOTICE

In the following text, there are references to removing and installing bolts and other fasteners. Additional hardware (nuts, washers, etc.) that are removed must always be installed in their original positions unless otherwise specified. Non-specified torques are 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 could generate sparks or repairs that require welding or cutting.

The recommended method for removing christmas tree rivets is to slide a notched pry bar under the head of the rivet and press downward on the bar to pull the rivet from the hole.

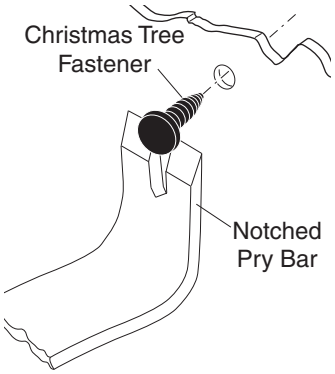

Fig. 2 Christmas Tree Rivet Removal

The Electronic Speed Control System consists of two separate units, the accelerator pedal assembly and the controller.

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

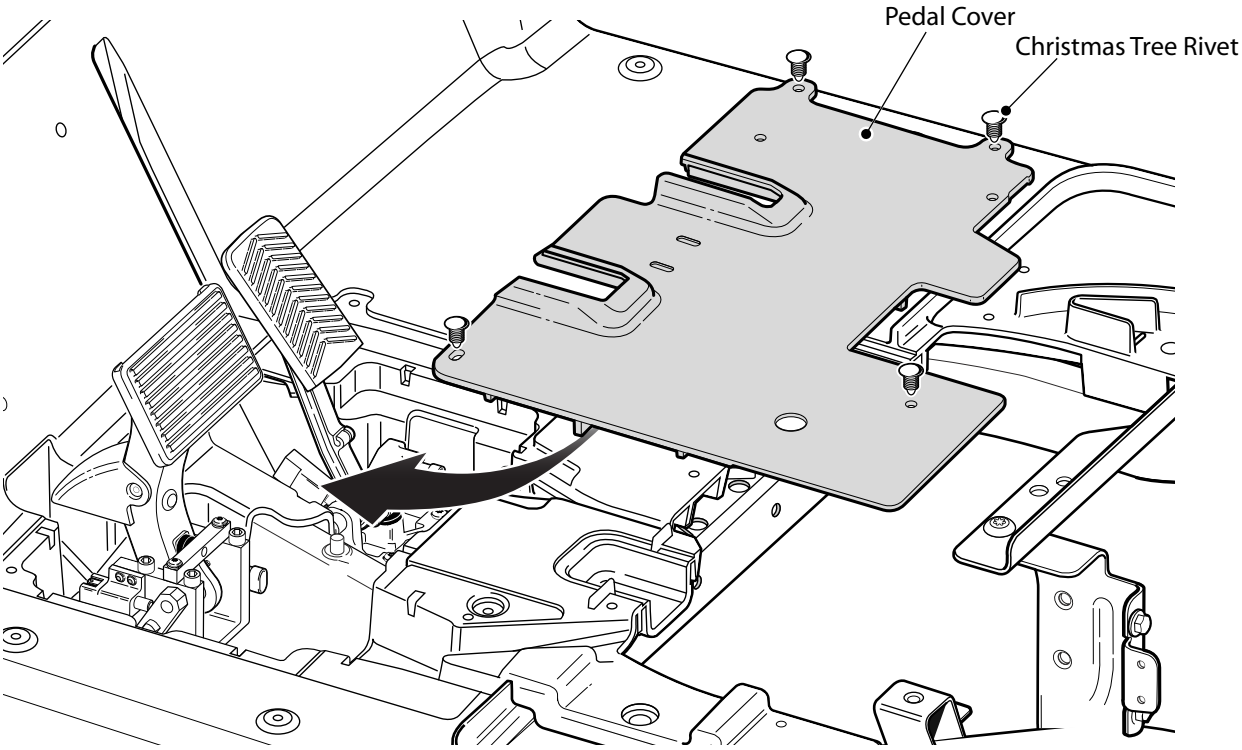

Fig. 3 Pedal Cover

ACCELERATOR PEDAL ASSEMBLY

Tool List	Qty.
Ratchet	1
Torx Bit, T-20	1
Torx Bit, T-30	1
Torque Wrench, in. lbs.	1
Notched Pry Bar	1
Insulated Wrench, 9/16"	1
Loctite® 242	A/R

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

The accelerator pedal assembly is a modular unit, the only serviceable items contained in the assembly are the pedal pad, the rotary position sensor and the throttle enable switch. The complete pedal assembly may be replaced as a unit.

To access the pedal assembly, remove the upper rocker panels, the lower rocker panels and the floormat (refer to page C2 for removal of rocker panels and floormat).

1. Remove four christmas tree rivets securing pedal cover to floorboard.
2. Remove pedal cover.
3. Remove three torx screws (2) securing accelerator pedal assembly (1) to the floorboard. (Ref Fig. 4)
4. Disconnect the wires from the rotary position sensor (5) and the throttle enable switch (12).
5. Remove the two Torx screws (4) from the rotary position sensor (5) and remove sensor.
6. Remove the two Torx screws (8) from the throttle enable switch (7) and remove the switch.

Installation

1. Align the slot in the rotary position sensor (5) to the pivot shaft and rotate into position oriented as shown, secure with two Torx screws (4). Use Loctite® 242; according to product instructions; on the two Torx screws.
2. Position the throttle enable switch (7) oriented as shown, secure in place with two Torx screws (6). Use Loctite 242; according to product instructions; on the two Torx screws.Reconnect electrical harness to rotary position sensor (5) and to the throttle enable switch connector (7).
3. Place pedal assembly in position on the floorboard and secure with three Torx screws (2).

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

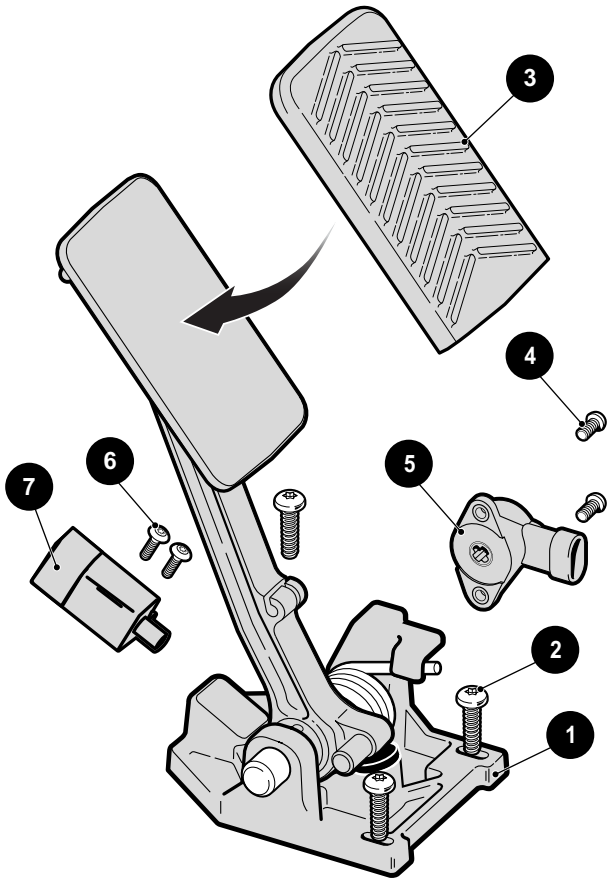

Fig. 4 Accelerator Pedal

4. Install the pedal cover, using new christmas tree rivets, replace the floormat and rocker panels.

Replace any worn or damaged hardware with new as required.

ITEM	TORQUE SPECIFICATION
4, 6	12- 15 in. lbs (1.3 - 1.7 Nm)
2	18 - 26 in. lbs (2 - 3 Nm)

SOLENOID REPLACEMENT

Notched Pry Bar 1
Ratchet 1
Torque Wrench, in. lbs 1
Torx Bit, T-45 IP 1
Wire Cutters 1
Wire Stripper 1
Wire Terminal Crimping Tool 1
1/2" Insulated Wrench 1
Slim Wrench, 10 mm 1
15 mm open end Wrench 1
15 mm socket 1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

The Solenoid is located on the passenger side of the vehicle under the seat and the Controller Splash Shield. Disconnect the battery cable at the negative (-), BL-, battery terminal using an insulated wrench.

1. Remove the three christmas tree rivets (1) that secure the controller splash shield (2) in place. After removing the fasteners place the splash shield off to the side out of the way.

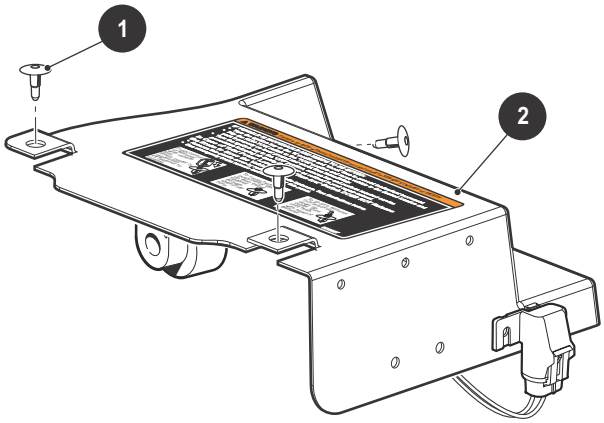

Fig. 5 Controller Splash Shield

Solenoid Removal

1. Disconnect the red wire (13) from the front terminal on the solenoid to the positive (+), BL+, battery terminal and the yellow wire (14) to the main wiring harness by removing the front hex nut (6).
2. Disconnect the red wire (11) from the back terminal on the solenoid (4) to B+ on the controller by removing the back hex nut (5).
3. Disconnect the red wire (9) and black wire (8) from the terminals by removing smaller hex nuts (15).
4. Remove two hex head nuts (10) securing the solenoid (4) to the controller heat sink.

Solenoid Installation

1. Secure the solenoid (4) to the controller heat sink with the two hex head nuts (10).
2. Reconnect the red wire (9) and black wire (8) from harness to solenoid (4) as shown and secure in place with two smaller hex nuts (15).
3. Reconnect the red wire (11) from the controller B+ to

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

the back terminal of the solenoid (4), secure in place using a hex nut (5). Be sure to place larger terminal wires first on studs with smaller wires on last.

4. Connect the red wire (13) from the positive (+), BL+, battery terminal and the yellow wire (14) from the wiring harness to the front terminal of the solenoid (4), secure in place with a hex nut (6). Be sure to place larger terminal wires first on studs with smaller wires on last.

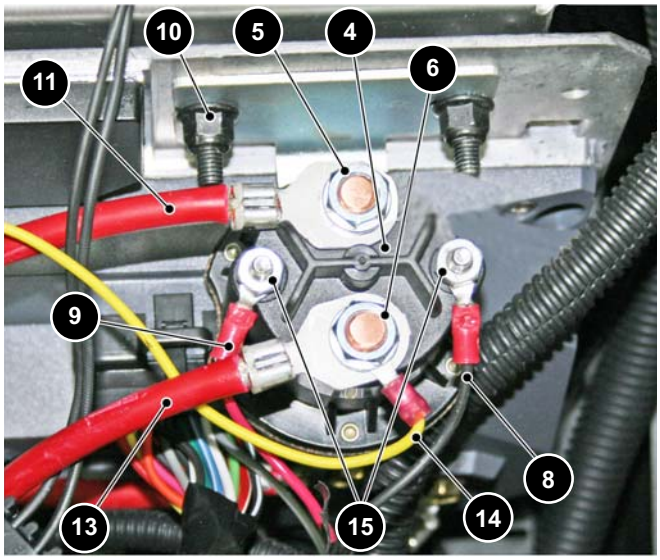

Fig. 6 Solenoid

5. Reinstall the electronic controller shield as before.
6. Reinstall three christmas tree rivets (1) to secure the shield to the body and the controller.
7. Connect the negative (-) cable to the battery.

Replace worn or damaged hardware as required.

ITEM	TORQUE SPECIFICATION
5, 6	26 - 36 in. lbs (3 - 4 Nm)
10	44 - 62 in. lbs (5 - 7 Nm)
15	7 - 13 in. lbs (.75 - 1.5 Nm)

CONTROLLER

Tool List **Qty.**

Ratchet 1
Extension, 3" 1
Extension, 9" 1
Socket, 15 mm 1
Socket, 10 mm 1
Torx Bit, T-27 IP 1
Wrench, 10 mm 1
Wrench, 15 mm 1
Notched Pry Bar 1
Insulated Wrench, 9/16" 1
Pin Punch 1
Torque Wrench, in. lbs. 1
Torque Wrench, ft. lbs. 1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

Drain the stored energy from the controller. Make sure that the Run/Tow switch is in the Run position, turn the key to reverse and allow the reverse warning indicator to run down.

The controller is a solid state unit activated by a solenoid, it is located under the seat on the passenger side of the vehicle. To access the controller, raise and remove the seat bottom.

1. Disconnect the battery cable at the negative (-), BL-, battery terminal using an insulated wrench.
2. Drain the stored energy from the controller. Place the Run/Tow switch in the Run position, turn the key switch to reverse, wait for the reverse warning indicator to become silent, turn the key switch to the off position and remove the key from the switch.
3. Remove three christmas tree rivets (1) securing the controller splash shield (2) to the rear body and to the controller heat sink; position splash shield off to one side to allow access to the controller.

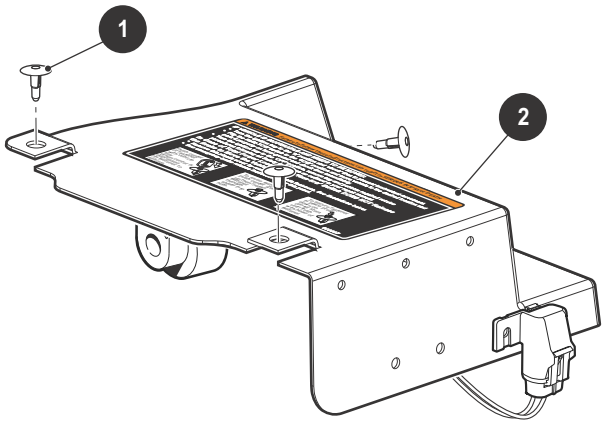

Fig. 7 Controller Splash Shield Cover

4. Disconnect the Red positive (+) battery cable(13) from the front terminal of the solenoid (4).

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

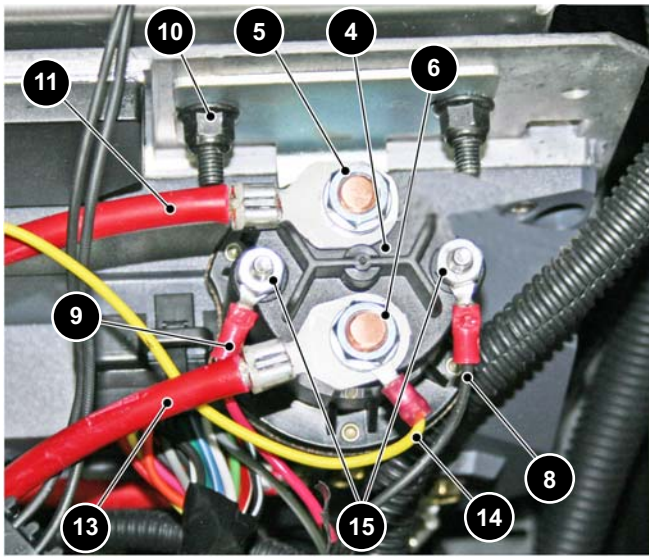

Fig. 8 Solenoid Connections

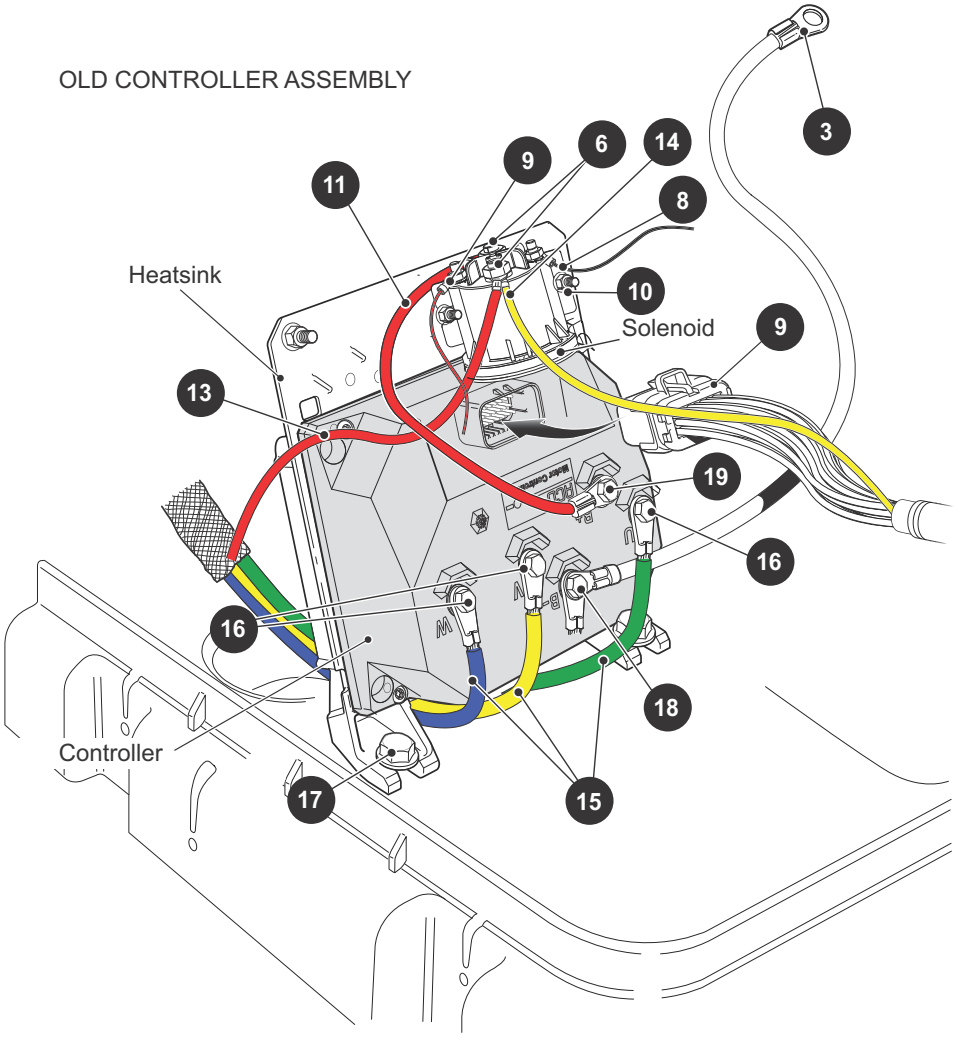

Fig. 9 Controller Connections

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

5. Disconnect the Red wire (11) from the controller B+ terminal to the back terminal of the solenoid.
6. Remove two hex head nuts (10) securing the solenoid to the controller heat sink, place the solenoid off to one side out of the way.
7. Disconnect the 23 pin connector (9) from controller by lifting up on the locking tab and pulling the connector housing away from the controller.
8. Disconnect the three wires (15) from the electric motor to terminals U, V and W by removing the three controller terminal screws (16).
9. Remove the front two hex head bolts (17) securing the controller assembly to the floorboard and loosen the rear hex head bolt (17). Slide the controller towards the front of the car and lift it out.

Installation

10. To install the controller, position it on the floorboard; making sure that all wires are not pinched or under the controller feet; and slide it to the back aligning the slot under the head of the hex head bolt (17). Install the two hex head bolts (17) in the holes at the front of the controller base. Torque all three hex head bolts as specified in the torque table.
11. Connect the three wires from the electric motor. Blue to the W terminal, Yellow to the V terminal and Green to the U terminal. Install the terminal screws finger tight, then torque as specified. ***Do not over tighten the terminal screws (16).***
12. Connect the black wire (3) from the B- terminal to the negative (-), BL-, battery terminal. ***Do not over tighten the terminal screw (18).***
13. Install the solenoid on the controller heat sink using two hex head nuts (10). Reconnect the Red positive (+) battery cable to the front terminal of the solenoid. Make sure that the red wire (9) and black wire (8) from the wire harness to the solenoid are located as shown.
14. Install the Red wire to the B+ terminal of the controller. ***(Do not over tighten the terminal screw (19).***
15. Plug the 23 pin connector (9); with the locking tab located on top; from the wire harness into the socket on the controller, push in firmly and make sure that the locking tab is latched.
16. Check all wires to be sure they are connected to the proper terminal.
17. Position the Splash Shield under the edge of the seat opening, install the three christmas tree rivets (1).
18. Reconnect wires to the battery pack. ***Replace any worn or damaged hardware as required.***

ITEM	TORQUE SPECIFICATION
10	44 - 62 in. lbs (5 - 7 Nm)
17	13 - 15 ft. lbs (18 - 20 Nm)
16	79 - 97 in. lbs (9 - 11 Nm)
18, 19	44 - 61 in. lbs (5 - 7 Nm)

For Curtis Controller (NEW VEHICLES)

Installation

19. Assemble the new controller (1) to left bracket (4) and right bracket (5) using four hex head bolts (3) and torque it to 53 - 71 in. lbs. (6 - 8 N.m).
20. Position the controller assembly on floorboard, make sure that no wires are pinched or under controller feet. Position it on the floorboard and secure with two BOSS screws (6). Tighten the two BOSS screws (6) as per the specified torque.

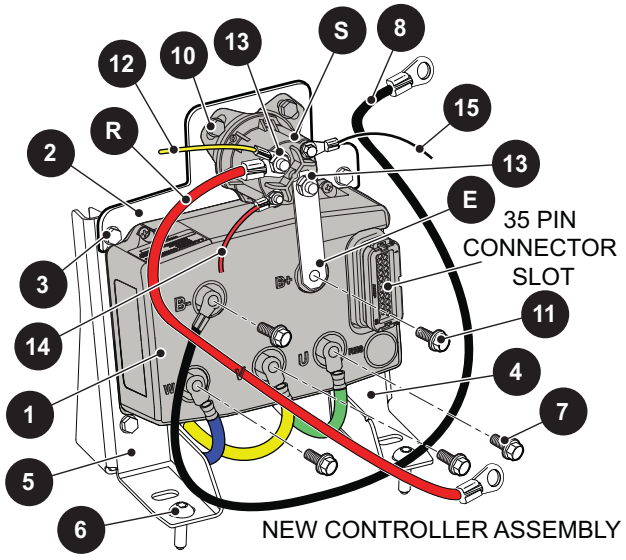

Fig. 10 Controller Connections

21. Connect the three wires from the electric motor. Blue to the W terminal, Yellow to the V terminal and Green to the U terminal. Install the terminal bolts (7), finger tighten, then torque as specified. ***Do not over tighten the terminal bolts (7).***

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

22. Connect the black wire (8) from the B- terminal to the negative (-), BL-, battery terminal. ***Do not over tighten the terminal bolt (7).***

23. Install the solenoid (S) on the controller bracket (2) using two hex head bolts (10). Connect the bus bar (E) from front terminal of the solenoid using hex head nut (13) to the B+ terminal of controller using terminal bolt (11). ***Do not over tighten the terminal bolt (11).***

24. Connect Red wire (R) from the positive (+), BL+, battery terminal and the yellow wire (12) from the wiring harness to the rear terminal of the solenoid, secure in place with a hex nut (13). Be sure to place larger terminal wires first on studs with smaller wires on last. Make sure that the red wire (14) and black wire (15) from the wire harness to the solenoid are located as shown in Fig. 10.

25. Two different main wire harness have been used on this vehicle. Determine which main harness is installed on the vehicle. On early vehicles the main wire harness have 23 pin connector, later vehicles have the main wire harness with 35 pin connector. Old main wire harness proceed to step 26, new main wire harness proceed to step 30.

26. OLD MAIN WIRE HARNESS: Cut orange wire (A) from motor in main harness and fold piece of wire towards front of vehicle back on itself and tape in place, splice remaining end of the orange wire (A) to orange wire from adaptor harness as shown in Fig. 11.

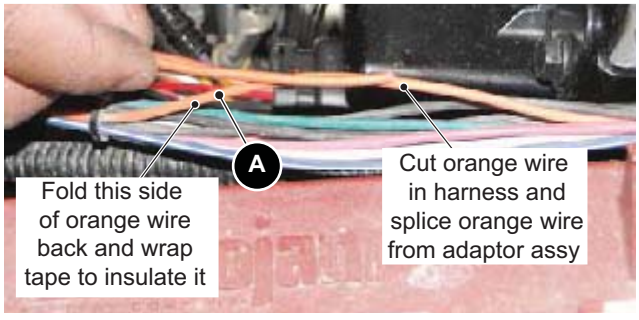

Fig. 11 Adaptor Connections

27. Plug the 23 pin connector (B) from adaptor harness into one slot and 23 pin connector from main harness into the second slot on the adaptor box (C). Ensure that the locking tab is latched firmly, ref Fig. 12.

28. Plug the 35 pin connector from the adaptor harness into the socket on the controller, push in firmly and make sure that the locking tab is latched .

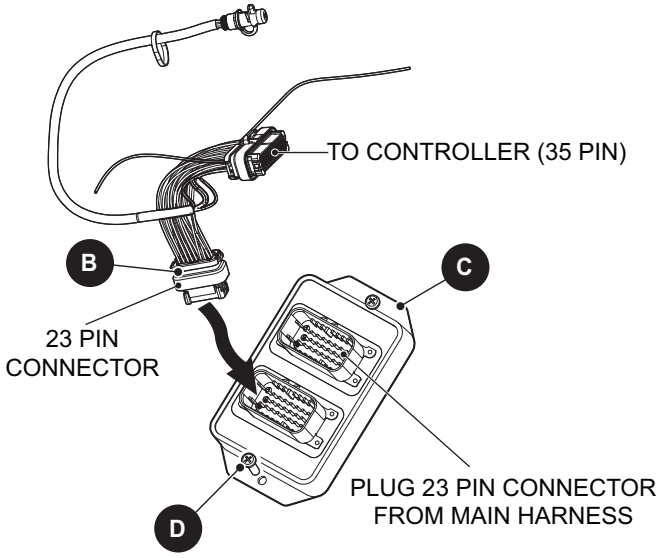

Fig. 12

29. Attach Adaptor box (C) to floorboard using two tapping screws (D).

30. NEW MAIN WIRE HARNESS: Plug the 35 pin connector from the main wire harness into the socket on the controller, push in firmly and make sure that the locking tab is latched.

31. Ensure all wires are connected to the proper terminal.

32. Position the Splash Shield under the edge of the seat opening, install the three christmas tree rivets (1).

33. Reconnect wires to the battery pack. ***Replace any worn or damaged hardware as required.***

ITEM	TORQUE SPECIFICATION
10	27 - 44 in. lbs (3 - 5 Nm)
6	53 - 71 in. lbs (6 - 8 Nm)
7	80 - 97 in. lbs (9 - 11 Nm)
3	53 - 71 in. lbs (6 - 8 Nm)
11	80 - 97 in. lbs (9 - 11 Nm)
13	44 - 50 in. lbs (5 - 5.7 Nm)

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

Notes:

TABLE OF CONTENTS FOR SECTION 'F'

SECTION TITLE **PAGE NO.**

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

Notes:

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

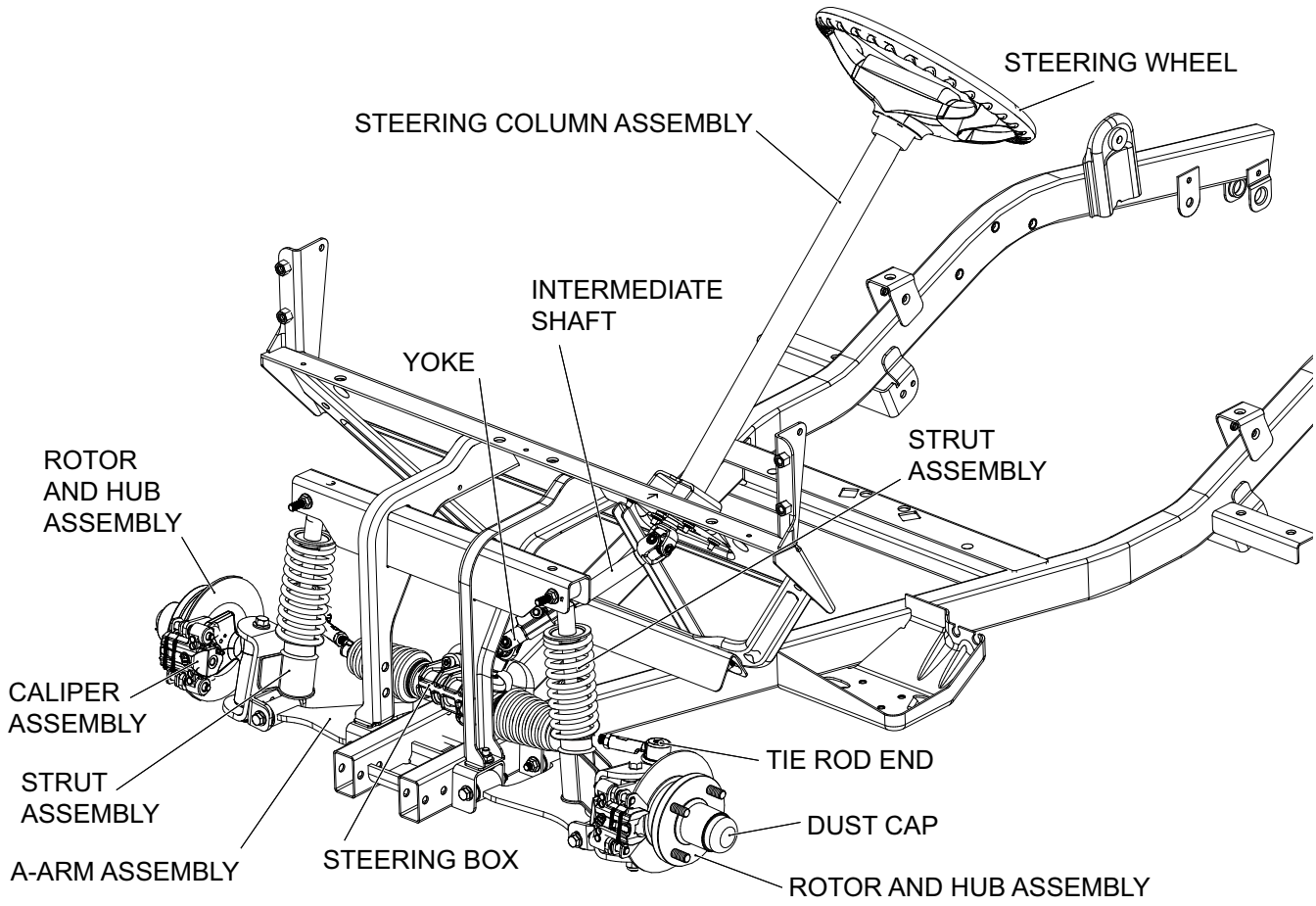

Fig. 1 Front Suspension and Steering

NOTICE

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

⚠ WARNING

To prevent possible injury or death, 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.

MAINTENANCE

Routine maintenance of the front suspension and steering consists of:

- Periodic inspections for loose , worn or da maged components
- Alignment checks

Routine examination of the tires will provide an indication if an alignment is required.

Tire Wear Diagnosis

It is important to evaluate wear patterns on tires, in order to diagnose common suspension and tire problems. A tire that is correctly inflated and aligned will show even wear over the entire tread area. A tire that is run under inflated will show wear on the outer edges of the tread. Over inflation will result in wear occurring at the center

Read all of Section B and this section before attempting any procedure. Pay particular attention to all Noti4ces, Cautions, Warnings and Dangers.

of the tread. Wear on either side of a correctly inflated tire indicates a tire that is out of alignment. The toe-in may be correct, but if the toe-in has not been set with the wheels in line with the body of the vehicle it will result in scuffing of the tire tread

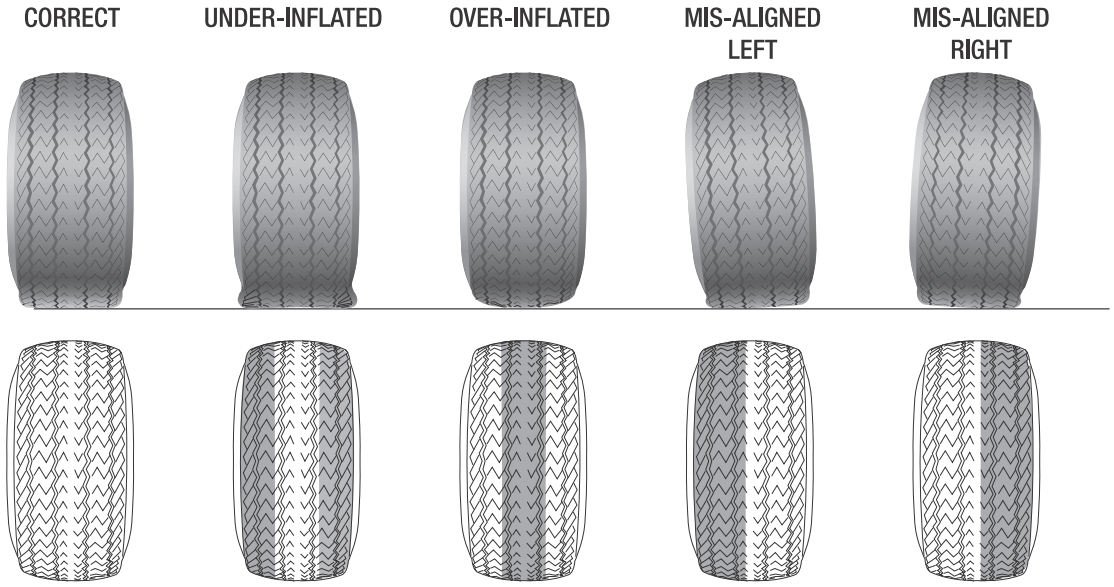

Fig. 2 Tire Wear

Wheel Alignment *(Ref Fig. 3) (Ref Fig. 4)*

Tool List	Qty.
Tape Measure	1
Paint Marker, White	1
Wrench, 12 mm Open-End	1
Wrench, 17 mm	1
Crowfoot Wrench, 12 mm	1
Torque Wrench, ft. lbs.	1
Socket, 18 mm	1
Ratchet	1

1. Lift the front of the vehicle and support on jack stands as instructed in the SAFETY section.
2. Rotate each wheel and scribe a paint line around the circumference of the tire at the center of the tread pattern.
3. Lower vehicle with the tires in the straight ahead position.
4. Roll vehicle forward approximately five feet in order to allow the tires to take their normal running position

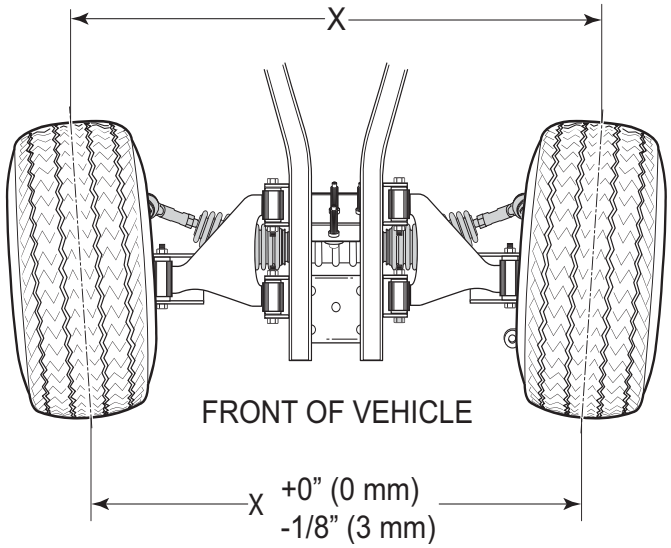

Fig. 3 Wheel Alignment

5. Measure the distance between the paint lines at both the front and rear of the tires. The measurement taken at the front of the tires should be 0" - 1/8" (0 - 3 mm) less than the rear measurement

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

6. To adjust the wheel alignment, loosen the tie rod jam nut (1) and turn the tie rods and equal number of turns until the correct alignment is achieved. ***Failure to turn both tie rods the same number of turns will result in poor turning radius.***
7. Tighten the tie rod jam nuts (1) and torque as specified.

ITEM	TORQUE SPECIFICATION
1	37 - 44 ft. lbs (50 - 60 Nm)

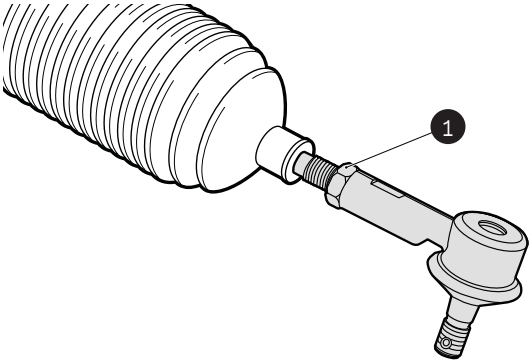

Fig. 4 Tie Rod Jam Nut

Wheel Bearing Inspection

Lift the front of the vehicle and support on jack stands; follow the lifting procedure in Section B of this manual. Rotate the front wheel and feel for any roughness. While holding the spindle with one hand, grasp the bottom of the tire with the other hand and rock the tire back and forth on the spindle.

NOTICE

Some minor rocking movement of the tire is normal.

If excess movement is detected, the wheel bearing may require repacking and adjusting or replacement. See 'Wheel Bearing Packing' section for complete instructions. If the wheel bearing is in satisfactory condition , a worn spindle bearing is indicated. The spindle bearing is not a serviceable item, the rotor and hub assembly must be replaced. See Rotor and Hub section for complete instructions.

Rotor and Hub Assembly *(Ref Fig. 5)*

Tool List **Qty.**

Socket, 1 1/2" 1
Ratchet 1
Torque Wrench, ft. lbs. 1
Flat Blade Screwdriver 1
Needle Nose Pliers 1
Ball Peen Hammer 1

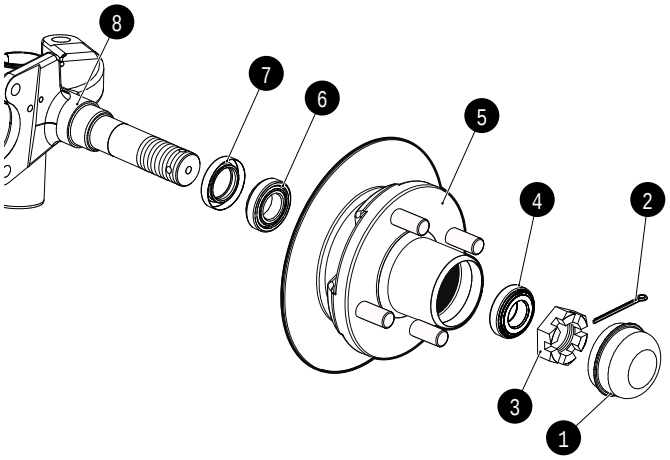

Fig. 5 Rotor and Hub

Remove the front wheel(s) as described in the Wheels and Tires section of this manual.

REMOVAL

1. Remove the brake caliper assembly, see the Brakes section for detailed instructions on the removal and replacement of the brake caliper.
2. Remove the dust cap (1) by tapping around the cap flange using a flat blade screwdriver and a ball peen hammer.
3. Remove cotter pin(2) and slotted hex nut (3).
4. Remove the outer wheel bearing and race (4).
5. Remove rotor and hub assembly (5) that includes the inner wheel bearing and race (6) and the grease seal (7) by sliding them off of the spindle (8).
6. Clean spindle (8) thoroughly with solvent and inspect spindle threads; if threads are damaged replace the spindle. Inspect the wheel bearings (4 & 6) and grease seal (7), replace if damaged or worn.

INSTALLATION

1. Pack bearings with grease. See Wheel Bearing Packing in this section of the manual.
2. Apply a light coat of grease to the inner race and place the inner wheel bearing and race (6) into the rotor and hub assembly (5).
3. Orient the new grease seal (7) with the flange side of

Read all of Section B and this section before attempting any procedure. Pay particular attention to all Noti4ces, Cautions, Warnings and Dangers.

the seal facing into the rotor and hub bore. Tap the grease seal (7) gently into place until the seal is flush with the end of the hub.

4. Lubricate the inner surface of the seal (7) with grease.
5. Place the rotor and hub assembly (5) onto the spindle (8) and fill the area between the outer wheel bearing (6) and the inner wheel bearing (4) about 1/2 - 3/4 with grease.
6. Apply a light coating of grease to the outer race of the outer wheel bearing (4) and install into the hub and rotor assembly (5).
7. Loosely secure outer wheel bearing (4) in place with the slotted hex nut (3).
8. Place the wheel onto the hub and hand tighten the lug nuts.
9. Adjust the wheel bearing according to 'Wheel Bearing Adjustment' section.

Wheel Bearing Packing

The front wheel bearings are tapered roller type and must be packed with grease at installation or any time the bearing is removed for inspection. .

Tool List	Qty.
Grease Gun	1
Bearing Packer (recommended)	1

1. Remove hub and rotor assembly from the spindle. See Rotor and Hub Assembly in this section of the manual.
2. Clean all bearings, grease seal, rotor and hub assembly and the dust cap with solvent, dry thoroughly.
3. Inspect bearings and hub for damage. Pitting or a blue coloration of the rollers will require replacement of the bearing and race assemblies.
4. Pack the bearings with grease. 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 to be dipped in the grease. Force the grease up through and around all of the rollers until the entire bearing is saturated in grease.
5. Assemble the rotor and hub assembly and place on the spindle. See Rotor and Hub Assembly in this section of the manual.

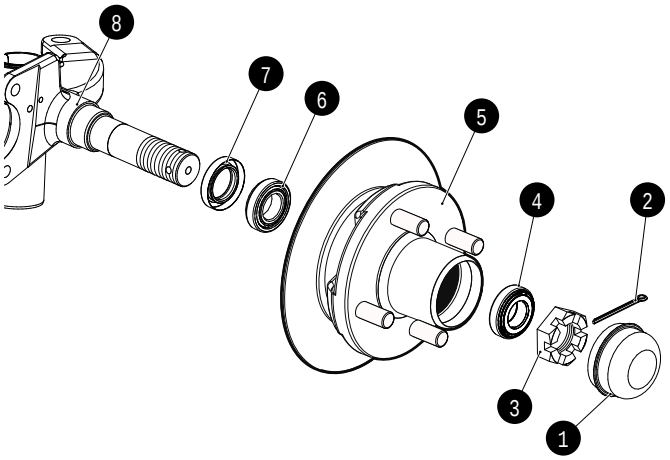

Fig. 6 Wheel Bearings

Wheel Bearing Adjustment

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

If performing a wheel bearing adjustment only, lift and support the front of the vehicle according to the lifting instructions in the **SAFETY** section of this manual then move to step 1 below.

If performing a wheel bearing adjustment as part of another procedure, make sure the rotor and hub assembly is loosely secured with the slotted nut and the wheel is mounted to the hub with lug nut hand tightened and proceed to step 3 below.

1. Remove the dust cap (1).
2. Remove the cotter pin (2) and loosen slotted hex nut (3).
3. Seat the bearings by rotating the wheel while tightening the slotted nut (3) until slight resistance is felt.
4. Rotate the wheel 2 - 3 more turns to displace excess grease. If required, tighten the slotted hex nut (3) again until slight resistance is felt.
5. If one of the slots in the slotted hex nut (3) is aligned with the hole through the spindle, install a new cotter pin (2). If the hole does not align with one of the slots the nut must be **loosened** to align with the **closest available** slot in the slotted nut (3), install a new cotter pin (2).

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

6. Check for smooth and free rotation of the wheel and an absence of play when the wheel is grasped by the outside of the tire.
7. Bend the legs of the cotter pin (2) in opposite directions against the flats of the slotted nut (3).
8. Replace the dust cap (1) and lower the vehicle according to instructions in the '**SAFETY**' section of this manual.
9. Tighten the lug nuts according to the instructions in the 'WHEELS and TIRES' section of this manual.

Spindle Assembly *(Ref Fig. 7)*

Tool List **Qty.**

Wrench, 16 mm 1
Socket, 16 mm 1
Socket, 18 mm Deep-well 1
Ratchet 1
Torque Wrench, ft. lbs 1
Ball Joint Separator 1
Ball Peen Hammer 1

Remove the front wheel(s) as described in the Wheels and Tires section of this manual.

1. Remove the hub assembly as described in the previous section.
2. Remove the cotter pin (21) and loosen the castle nut (22) securing the tie rod end to the spindle arm until it is flush with the end of the tie rod end.
3. Using a ball joint separator as a lever, apply pressure to the ball joint and tap the spindle arm sharply with the hammer to release the tie rod end from the spindle arm.
4. Remove the castle nut (22) and the tie rod end from the spindle arm.
5. Remove hex nut (9) and hex head bolt (8), remove the spindle assembly (4 & 5).

Reassemble in reverse order, replace worn or damaged hardware as required. It is recommended that all locking nuts be replaced after a maximum of 5 removals. Replace all cotter pins after 1 removal.

ITEM	TORQUE SPECIFICATION
8	71 - 79 ft. lbs (96 - 107 Nm)

Struts *(Ref Fig. 7)*

Tool List **Qty.**

Wrench, 15mm 1
Socket, 15mm Deep-Well 1
Ratchet 1
Torque Wrench, ft. lbs. 1

Remove the front fascia and bumper as shown in the Body section of this manual. Raise and support the vehicle as shown in the **SAFETY** section of this manual. Remove the front wheel(s) as described in the Wheels and Tires section of this manual.

1. Remove the disc brake caliper according to instructions in the Brakes section of this manual.
2. Remove the cotter pin (21) and loosen the castle nut (22) securing the tie rod end to the spindle arm until it is flush with the end of the tie rod end.
3. Using a ball joint separator as a lever, apply pressure to the ball joint and tap the spindle arm sharply with the hammer to release the tie rod end from the spindle arm.
4. Remove the castle nut (22) and the tie rod end from the spindle arm.
5. Remove hex nut (9) and hex head bolt (8); the spindle and hub assembly (1 - 7) can then be removed as a single unit.
6. Remove the hex head bolt (11) securing lower end of strut to A-arm (13).
7. Remove the hex nut (20) and the hex head bolt (19) securing the top of the strut to the frame.

Reassemble parts in reverse order, replace worn or damaged hardware as required.

ITEM	TORQUE SPECIFICATION
20	28 - 30 ft. lbs (38 - 40 Nm)

Read all of Section B and this section before attempting any procedure. Pay particular attention to all Noti4ces, Cautions, Warnings and Dangers.

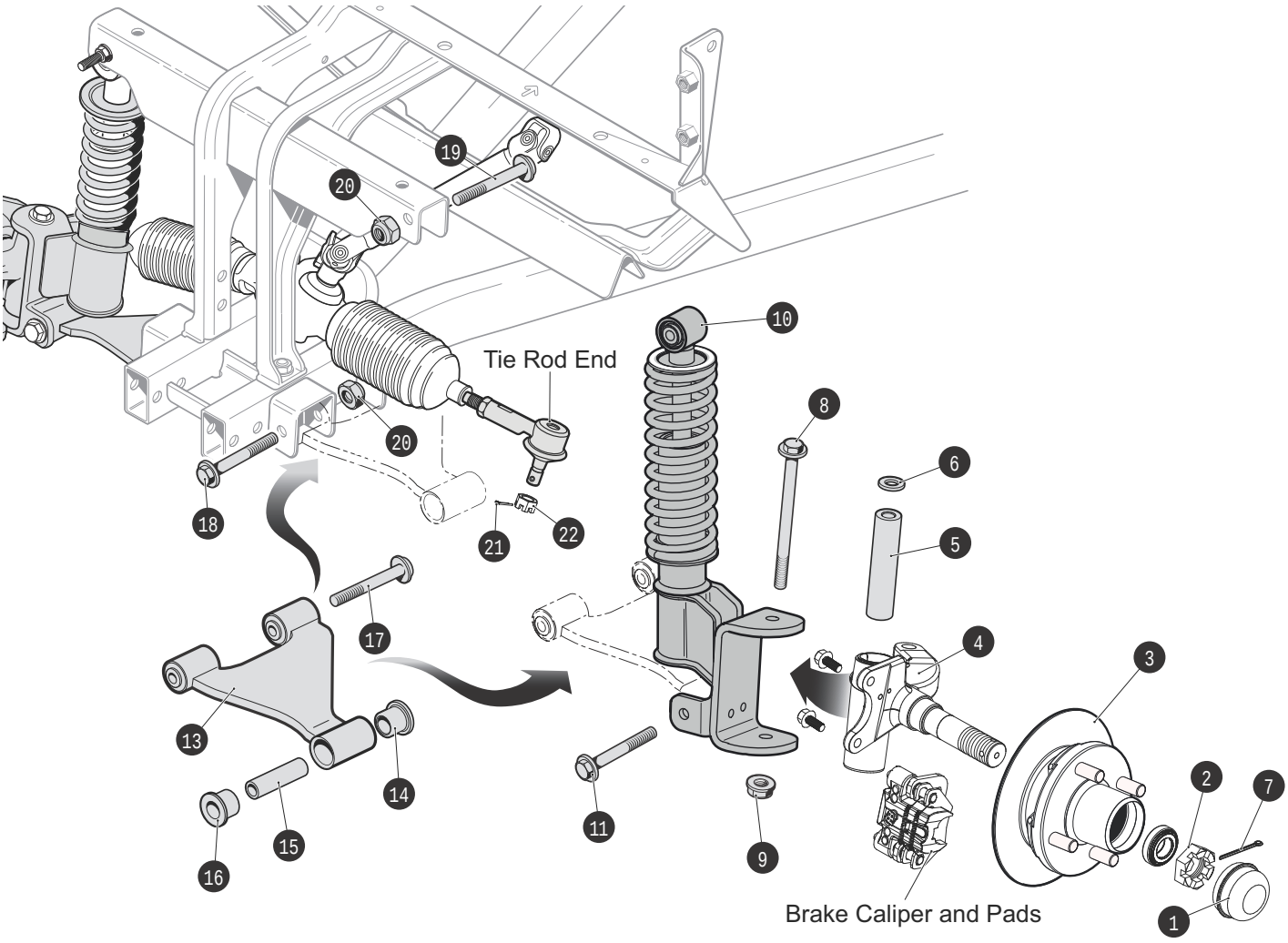

Fig. 7 Hub, Spindle, Strut and A-Arm Assemblies

A-Arm Assembly *(Ref Fig. 7)*

Tool List	Qty.
Wrench, 15mm	1
Socket, 15mm	1
Ratchet	1
Torque Wrench, ft. lbs	1

Remove the front bumper as shown in the Body section of this manual. Remove the front wheel(s) as described in the Wheels and Tires section of this manual.

1. Remove the hex head bolt (11) securing the a-arm (13) to the strut.
2. Remove bushings (14 & 16) from a-arm, being careful to retain sleeve (15).
3. Inspect the sleeve (15) for wear or pitting; replace if sleeve (15) shows signs of wear or pitting.
4. Remove two hex head bolts (17 & 18) securing the a-arm to the frame brackets.

Reassemble in reverse order, replace worn or damaged hardware as required.

ITEM	TORQUE SPECIFICATION
11, 17, 18	20 - 25 ft. lbs (27 - 34 Nm)
19	20 - 25 ft. lbs (34 - 41 Nm)

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

Steering Wheel *(Ref Fig. 8) (Ref Fig. 9) (Ref Fig. 10)*

Tool List	Qty.
Socket, 24 mm	1
Ratchet	1
Torque Wrench	1
Plastic Faced Hammer	1
Ball Peen Hammer	1

NOTICE

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

⚠ CAUTION

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

1. Pull straight up on the lower edge of the center cover to release the two retaining tabs.
2. Using thumb for leverage as shown, reach from underneath the steering wheel with fingertips to first pull down, and then push up to release the two top center cover retaining tabs

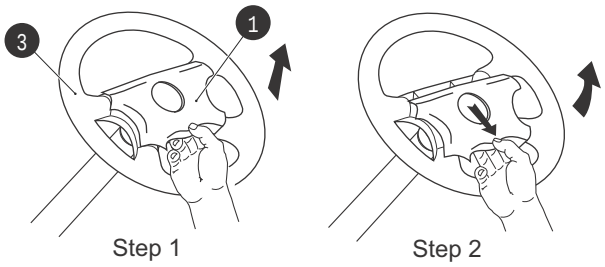

Fig. 8 Center Cover Removal

3. Loosen the steering wheel retaining nut two or three turns. **Do not remove nut at this time.**
4. Apply upward pressure to the steering wheel by placing a plastic faced hammer against the steering wheel retaining nut. Strike the plastic faced hammer sharply with a ball peen hammer. **Do not strike the steering wheel retaining nut or the end of the steering shaft directly with the ball peen hammer.**

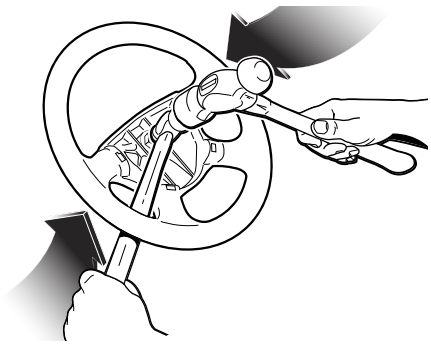

Fig. 9 Loosen Steering Wheel

5. When steering wheel is loosened, remove steering wheel retaining nut (1) and steering wheel (3).

Installation

6. Coat steering shaft splines lightly with a commercially available anti-seize compound.
7. Make sure that wheels are positioned straight ahead.
8. Align the steering wheel (3) on the steering shaft and push into place.

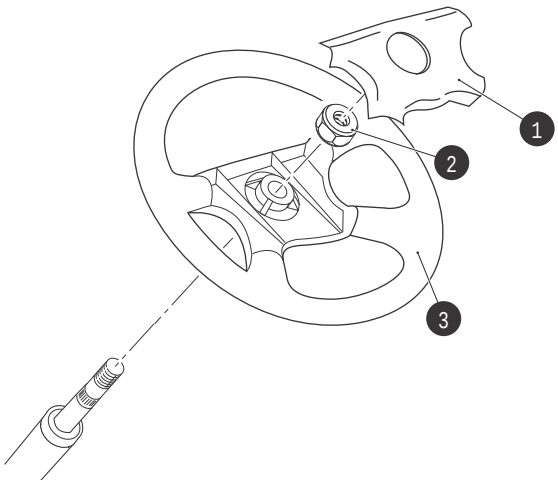

Fig. 10 Steering Wheel

9. Install steering wheel retaining nut (2).
10. Inspect the four retaining tabs on the center cover (1) for white stress lines. If stress lines are present, replace center cover with a new one.
11. Carefully press the top two tabs into the matching slots in the steering wheel, then press the bottom two tabs into the matching slots in the steering wheel

ITEM	TORQUE SPECIFICATION
2	15 - 20 ft. lbs (20 - 27 Nm)

Read all of Section B and this section before attempting any procedure. Pay particular attention to all Noti4ces, Cautions, Warnings and Dangers.

Steering Column Assembly & Yoke *(Ref Fig. 11) (Ref Fig. 12) (Ref Fig. 13)*

Tool List	Qty.
Wrench, 17 mm	1
Ratchet	1
Hex Bit, 8 mm	1
Torx Bit, T-45 IP	1
Torque Wrench, ft. lbs.	1

Remove the front bumper as shown in the Body section of this manual. Remove the front wheel(s) as described in the Wheels and Tires section of this manual.

1. Disconnect wiring for turn signals if vehicle is so equipped, as described in the Electrical Wiring section of this manual.
2. Remove the lower cross bolt (8) from the yoke.

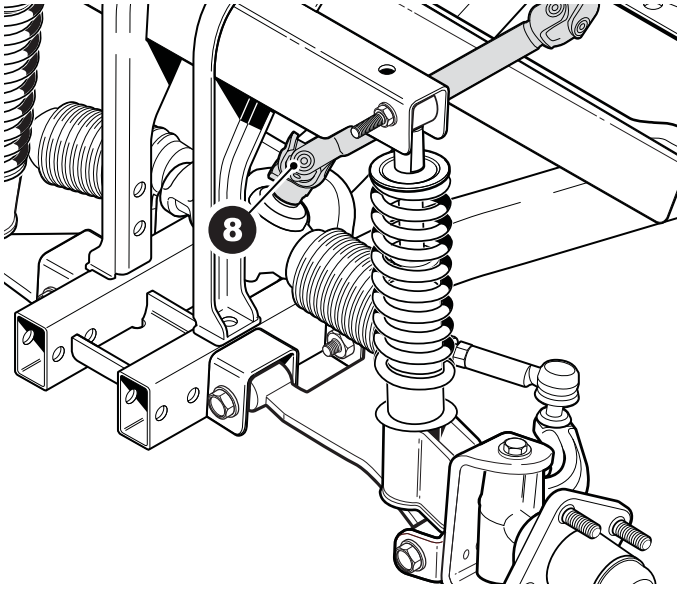

Fig. 11 Lower Cross Bolt

3. Remove four torx head screws (9) securing steering column assembly to vehicle frame.

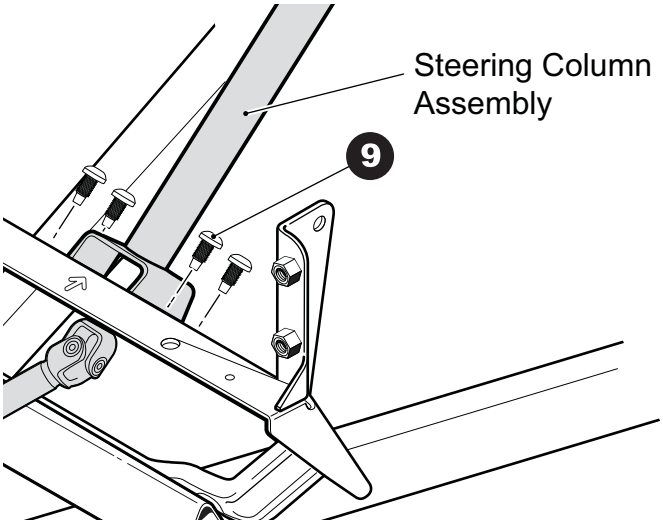

Fig. 12 Steering Column Assembly Screws

4. Loosen the upper cross bolt (10) on the yoke and slide the yoke upward on the intermediate shaft to disengage from the steering box pinion.
5. Turn the steering column assembly CCW about 10° to disengage the locking tabs and lift steering column with intermediate shaft and yoke out of vehicle, making note of the location of the notch in the steering column mounting bracket (up or down).
6. To separate the yoke from the intermediate shaft remove the upper cross bolt (10) and nut (11) then pull the yoke off of the intermediate shaft splines.

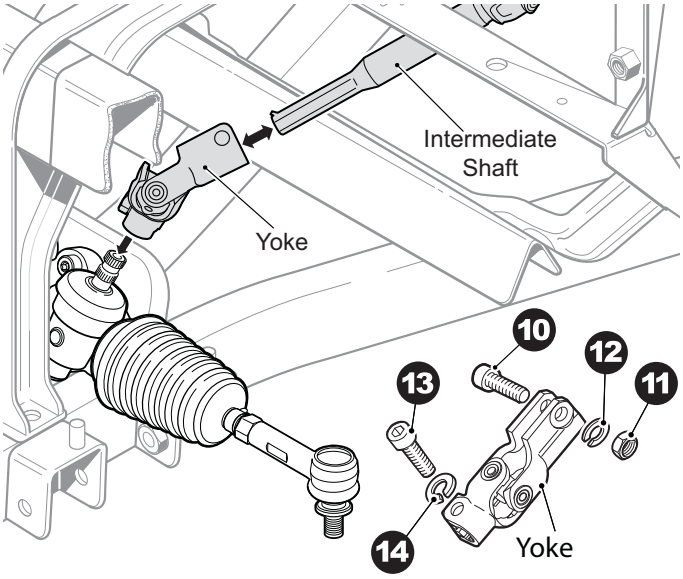

Fig. 13 Upper Cross Bolt

7. Apply a commercially available anti seize compound to the splines of the intermediate shaft and install the

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

yoke onto the shaft. Do not tighten the upper cross bolt and nut.

8. To install the steering column assembly align the locking tabs on the mounting bracket with the slots in the frame and turn the assembly CW about 10° to align the mounting holes. Make sure that the notch on the steering column assembly mounting bracket is in the same orientation as it was upon removal (up or down).
9. Install the four Torx screws (9) finger tight and then tighten to the proper toque.
10. Apply a commercially available anti-seize compound to the splines of the steering box pinion before installing the yoke. Do not install the lower cross bolt (8) at this time.
11. To align the steering wheel with the front wheels use the following procedure:
    a) Install the front wheels if they have been removed.
    b) Remove the jack stands and lower the vehicle to the ground.
    c) Push vehicle backward about 5 feet and then forward about 5 feet.
    d) If the steering wheel is not oriented properly remove the yoke from the steering box pinion and turn the steering wheel to the correct orientation.
    e) Install the yoke on the spline of the steering box pinion.
6. Install the lower cross bolt (13) through the unthreaded portion of the yoke, making sure that the lock washer (14) is in place, into the threaded side.
7. Tighten the upper cross bolt (10) and nut (11), making sure that the lock washer (12) is in place, then tighten the lower cross bolt (13) to the proper torque.

ITEM	TORQUE SPECIFICATION
9	20 - 25 ft. lbs (27 - 34 Nm)
11, 13	22 - 27 ft. lbs (30 - 36 Nm)

Rod End / Ball Joint

Tool List	Qty.
Socket, 16 mm	1
Ratchet	1
Torque Wrench, ft. lbs.	1
Ball Joint Separator	1
Ball Peen Hammer	1

Inspect rod end or ball joint by grasping the end and checking for vertical motion. If the rod moves up or down this is an indication that the ball joint is worn and requires replacement.

Raise and support the vehicle as described in the Safety section of this manual. Remove the front wheels as described in the Wheels and Tires section of this manual

1. Loosen the nut securing the tie rod end to the spindle arm.
2. Using a ball joint separator as a lever, apply pressure to the ball joint and tap the spindle arm sharply with the ball peen hammer to release tie rod from spindle arm.
3. Remove the nut and remove the tie rod end from the spindle arm.
4. Measure the length of the threaded part of the rod end to the jam nut or count the number of turns that it takes to remove the rod end.
5. Install the new rod end the same number of turns that were counted when removing the old rod end or to the same measured length of the threaded part of the rod end to the jam nut.
6. Install the rod end into the spindle.
7. Tighten the jam nut against the rod end.
8. Replace the other rod end if necessary.
9. Check the wheel alignment and correct if necessary. The procedure for alignment is detailed at the beginning of this section.

Steering Box *(Ref Fig. 14)*

Tool List	Qty.
Torx Bit, T-45 IP	1
Ratchet	1
Torque Wrench, ft. lbs.	1
Ball Joint Separator	1
Ball Peen Hammer	1

Raise and support the vehicle as described in the Safety section of this manual. Remove the front wheels as described in the Wheels and Tires section of this manual

1. Loosen the nut securing the tie rod end to the spindle arm.
2. Using a ball joint separator as a lever, apply pressure to the ball joint and tap the spindle arm sharply with the ball peen hammer to release tie rod from spindle arm.
3. Remove the nut and remove the tie rod end from the

Read all of Section B and this section before attempting any procedure. Pay particular attention to all Noti4ces, Cautions, Warnings and Dangers.

spindle arm.

4. Repeat steps 3 through 5 for the remaining tie rod end.
5. Remove the lower cross bolt securing the yoke to the steering box pinion.
6. Loosen the upper cross bolt securing the yoke to the intermediate shaft.
7. Remove the yoke from the steering box pinion by sliding it up the intermediate shaft.
8. Remove three torx head screws (15) securing the steering box (16) to the vehicle frame.
9. Remove steering box from the driver's side of the vehicle.

Reassemble in reverse order, replace worn or damaged hardware as required.

ITEM NO	TORQUE SPECIFICATION
15	20 - 25 ft. lbs (27 - 34 Nm)

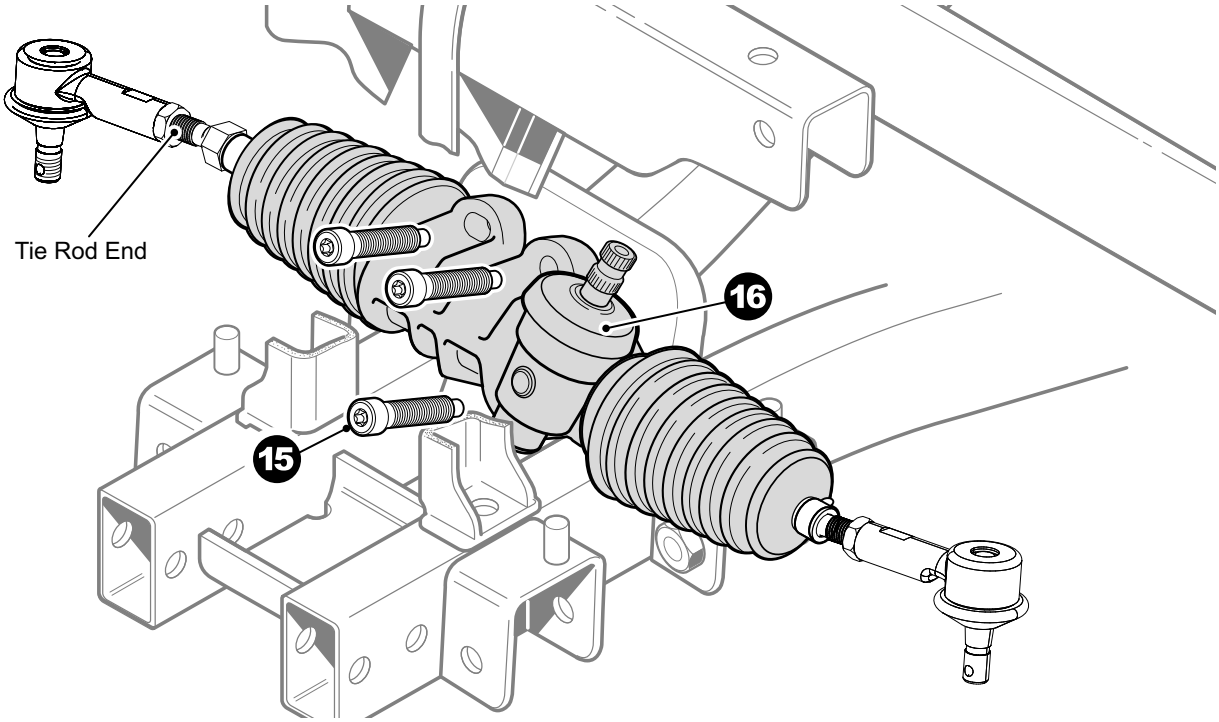

Fig. 14 Steering Box

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

Notes:

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

Notes:

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

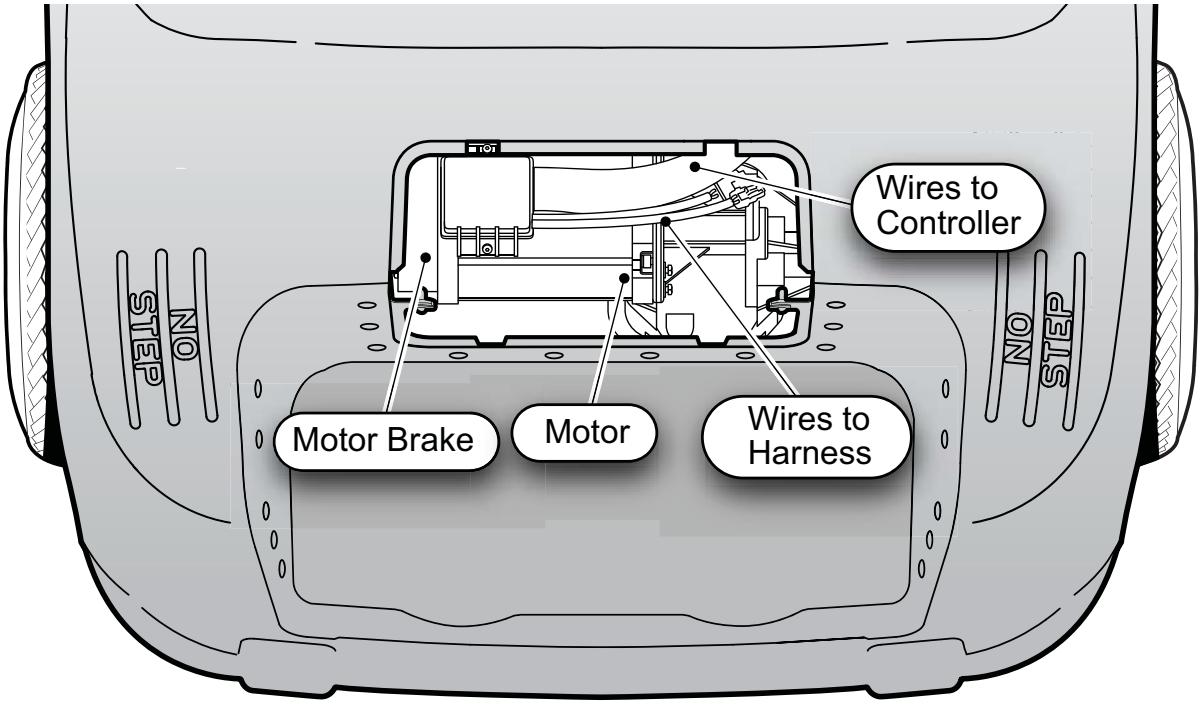

Fig. 1 Motor

GENERAL

The only serviceable items for the electric motor are the speed sensor and the entire Motor Brake.

SPEED SENSOR

TOOL LIST	QTY
Ratchet	1
Wheel Chocks	4
Socket, 9/16"	1
Phillips Screw Driver	1
Phillips Screw Driver Bit	1
Torque Wrench, in. lbs	1

Make sure that the key switch is turned to 'OFF' and the key is removed from the switch.

Removal

1. Chock the rear wheels of the vehicle.
2. Raise and remove seat bottom.
3. Remove the rear access panel. For detailed instructions see the BODY section of this manual.
4. Clean all dirt and debris from the motor.
5. Unplug the speed sensor connector from the wire harness.

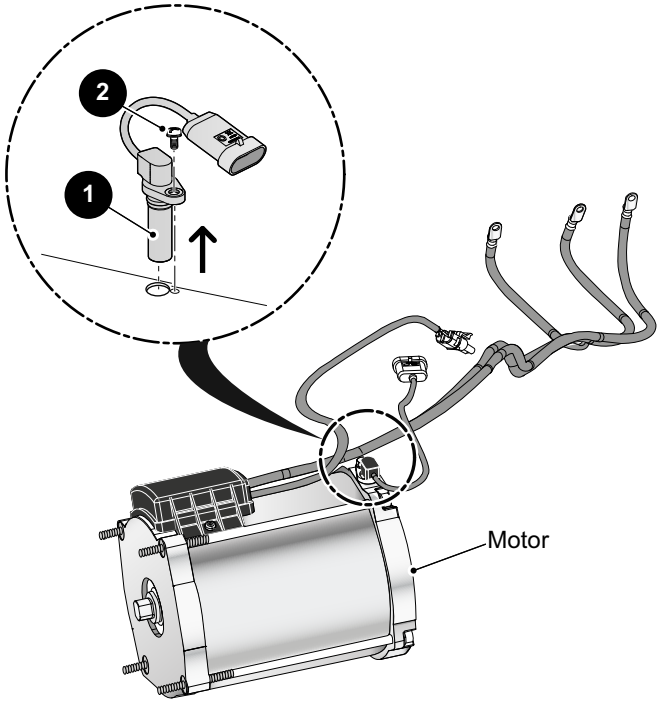

Fig. 2 Speed Sensor Removal

6. Remove the torx head screw (1) that secures the speed sensor (2) to the motor and pull the speed sen-

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

sor (2) straight up until it is clear of the motor.

Installation

1. Inspect the speed sensor (2), make sure that the O-ring is seated in the groove before installing in the motor.

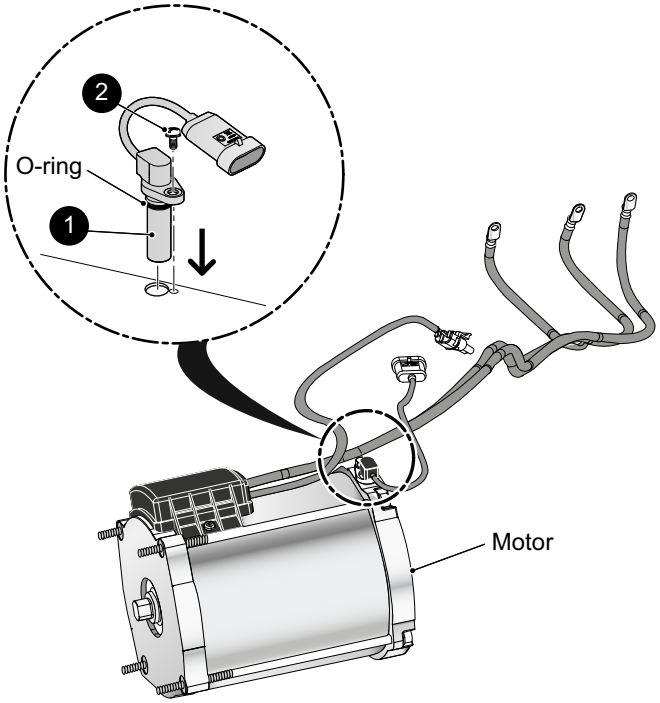

Fig. 3 Install Speed Sensor

2. Insert the speed sensor (2) into the opening in the motor, align the hole in the speed sensor with the screw hole in the motor and push down firmly to get past the O-ring.
3. Instal the torx head screw and tighten to 27 - 31 in. lbs. (3 - 3.5 Nm) of torque.
4. Plug the connector from the speed sensor into the wire harness.
5. Install the access cover as detailed in the BODY section of this manual.

MOTOR

⚠ WARNING

Disconnect the negative (BL-) battery cable with an insulated wrench before attempting to disconnect wires from the motor (see safety procedures in SAFETY section of this manual).

Tool List	Qty.
Ratchet	1
Torque Wrench, in. lbs.	1
Extension, 3"	1
Socket, 10 mm	1
Socket, 9/16"	1
Insulated Wrench, 9/16"	1
Torx Bit, T-27	1
Wheel Chocks	4

1. Chock the rear wheels of the vehicle.
2. Raise and remove seat bottom.
3. With an insulated wrench, disconnect the negative (-) battery, BL-, cable from the battery.
4. Drain the stored energy from the controller. Place the Run/Tow switch in the Run position, turn the key switch to reverse, wait for the reverse warning indicator to become silent turn the key switch to the off position and remove the key from the switch.
5. Remove the two Torx head screws and the rear access cover from the bagwell area.
6. Remove three plastic rivets securing the controller splash shield; two on the passenger side of the body at the seat opening and one from the controller.
7. Disconnect motor wires from controller terminals, U, V and W, refer to the Speed Control section of this manual for torque complete information on these connections.
8. Disconnect the main harness connector (31) to the motor brake.
9. Disconnect main harness connector (32) to the motor temperature sensor and the main harness connector (33) to the speed sensor

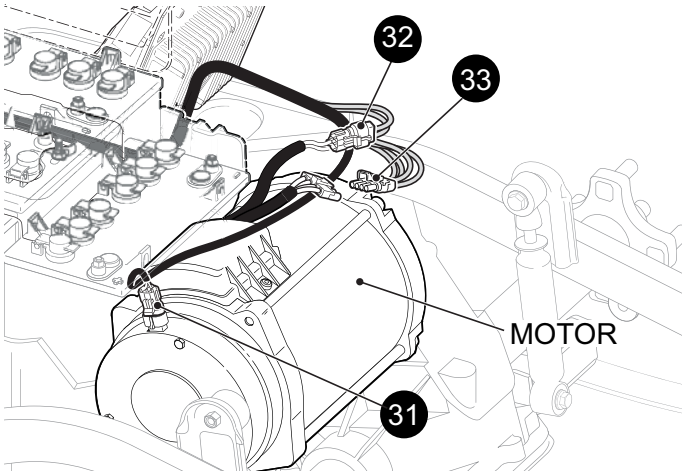

Fig. 4 Motor Connections

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

10. Pull the motor wires out through the bagwell.

11. Remove the six hex head bolts (2) and split lock washers (3) securing the motor (1) to the axle and carefully slide the motor straight out from the axle splines. ***Note: a drive belt or woven strap may be used as a sling to help support the motor during removal.***

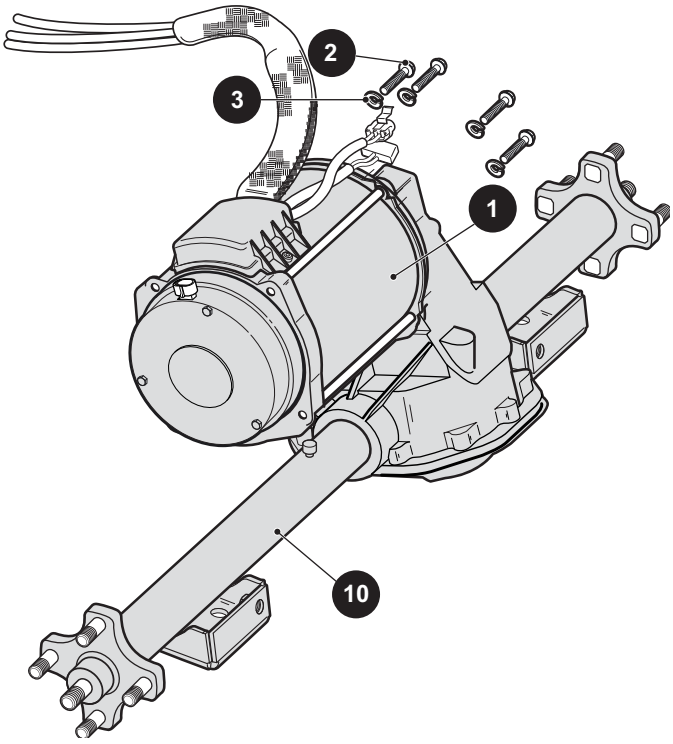

Fig. 5 Motor

Fig. 6 Air Blast Cleaning

12. Using air blower, blow compressed air and clean the motor coupler as shown in Fig 6. And use a scriber to scrap of any rust deposits.

Note: The motor must be examined every 20,000 AMP-Hrs

13. Apply Anti-seize Compound inside the coupler (approx. 1 tablespoon) towards the bottom. Coat all of the splines.The recommended anti-seize is Loctite Silver grade or equivalent.

14. Before installing the motor on the axle apply lubricant (80% molybdenum disulfide paste) to the input shaft spline. ***The approved lubricants are: Dow Corning 77, Molykote (r) M-77 paste or Tribology TAS 100 EP***

15. Carefully align the motor spline with the input shaft, orient the motor with the wires near the top and install the six hex head bolts (2) and split lock washers (3) finger tight. Tighten the hex head bolts (2) in a cross pattern to the specified torque.

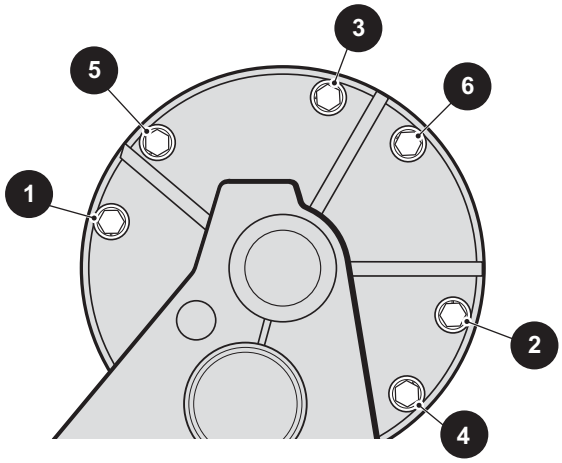

Fig. 7 Motor Bolt Tightening Sequence

16. Connect the wires from the main harness to the motor brake, the motor sensor and the motor temperature sensor.

17. Connect the wires from the motor to the controller; the green wire to terminal U, the yellow wire to terminal V and the blue wire to terminal W. Install the terminal screws (27 - For old controller), (28 - For new controller) finger tight, then torque as specified. ***Do not over***

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

tighten the terminal screws (27) & (28). .

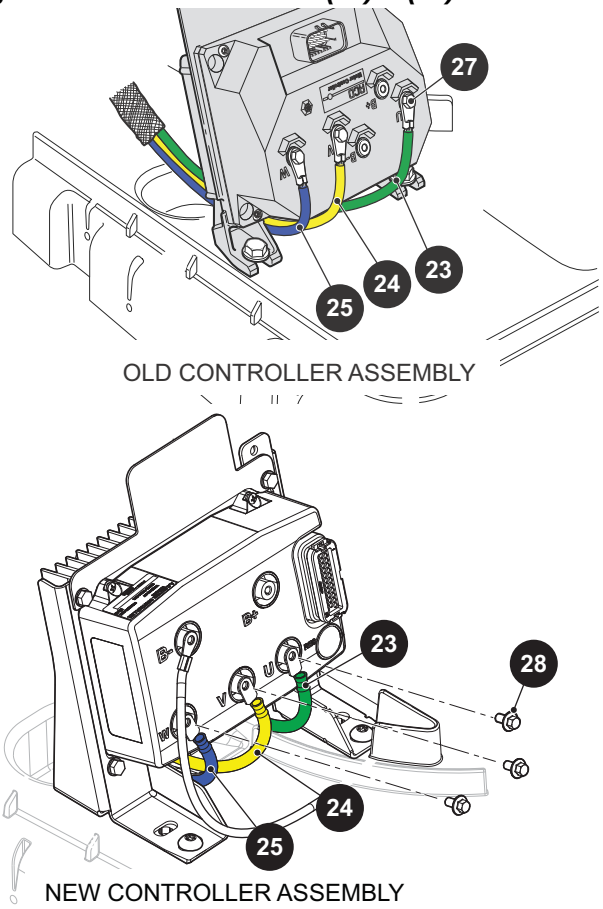

Fig. 8 Motor to Controller Connections

18. Connect the negative (-) battery cable, BL-, to the battery pack.

ITEM	TORQUE SPECIFICATION
2	53 - 79 in. lbs (6 - 9 Nm)
27	53 - 71 in. lbs (6 - 8Nm)
28	80 - 97 in. lbs (9 - 11Nm)

MOTOR BRAKE

The motor brake may be removed with the motor still in the vehicle or the motor and motor brake can be removed from the vehicle as a unit. If the motor and motor brake are to be removed as a unit see the previous section for instructions on the motor removal and installation.

The only service items for the motor brake is the entire motor brake assembly.

⚠ WARNING

Disconnect the negative (BL-) battery cable with an insulated wrench before attempting to disconnect wires from the motor (see safety procedures in SAFETY section of this manual).

Tool List	Qty.
Ratchet	1
Torque Wrench, in. lbs.	1
Socket, 10 mm	1
Socket, 9/16"	1
Torx Bit, T-27	1
Insulated Wrench, 9/16"	1
Wheel Chocks	4

Removal

1. Chock the rear wheels of the vehicle.
2. Raise and remove seat bottom.
3. Using an insulated wrench, disconnect the negative (-) battery, BL-, cable from the battery.
4. Drain the stored energy from the controller. Place the Run/Tow switch in the Run position, turn the key switch to reverse, wait for the reverse warning indicator to become silent turn the key switch to the off position and remove the key from the switch.
5. Remove the two Torx head screws and the rear access cover from the bagwell area.
6. Disconnect wire harness from motor brake.
7. Remove three hex head bolts (32) and lock washers (33) from the motor brake assembly (31).

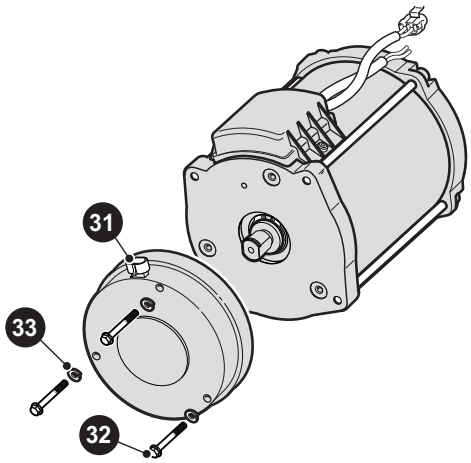

Fig. 9 Motor Brake

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

⚠ CAUTION

DO NOT drop the brake assembly. Dropping or hitting the brake assembly will damage it.

Installation

1. Position the brake with the connector at the top as shown above and install the three hex head bolts (32) loosely.
2. Connect the negative (-) battery cable, tighten terminal hardware to 95 - 105 in. lbs. (11 - 12 Nm).
3. Connect the wire harness to the motor brake and turn the key switch to 'N' (neutral) position. Move the Run/Tow switch to the 'TOW' position, this will provide power to the brake to align the disc material. Slide the brake disk to align the disc material.
4. Tighten the three hex head bolts evenly to the specified torque.
5. Move the Run/Tow switch to the 'RUN' position and turn the key to the 'OFF' position.

Replace worn or damaged hardware as required.

ITEM	TORQUE SPECIFICATION
32	53 - 71 in. lbs (6 - 8 Nm)

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

Notes:

TABLE OF CONTENTS FOR SECTION 'H'

SECTION TITLE **PAGE NO.**

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

Notes:

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

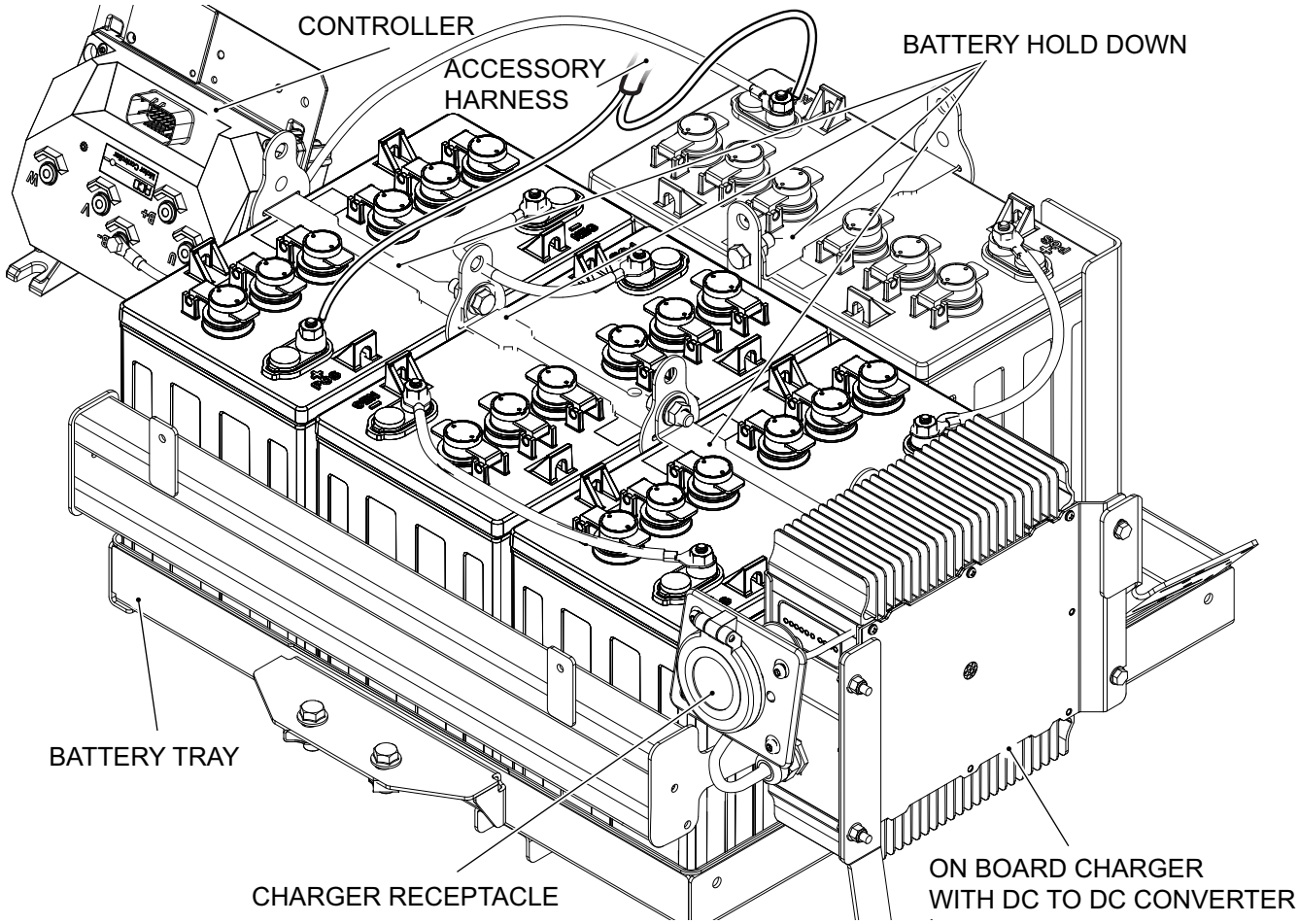

Fig. 1 Batteries and Charging Receptacle

SAFETY

NOTICE

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

⚠ WARNING

To prevent battery explosion that could result in severe personal injury or death, keep all smoking materials, open flames or sparks away from the batteries.

Hydrogen gas is formed when charging batteries. Do not charge batteries without adequate ventilation. A 4% concentration of hydrogen gas is explosive.

Be sure that the key switch is off and all electrical accessories are turned off before starting work on the vehicle.

Never disconnect a circuit under load at a battery terminal.

Batteries are heavy. Use proper lifting techniques when moving them. Always lift the battery with a commercially available lifting device. Use care not to tip batteries when removing or installing them; spilled electrolyte can cause burns and damage.

The electrolyte in a storage battery is an acid solution which can cause severe burns to the skin and eyes. Treat all electrolyte spills to the body and eyes with extended flushing with clear water. Contact a physician immediately.

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

Always wear a safety shield or approved safety goggles when adding water or charging batteries.

Any electrolyte spills should be neutralized with a solution of 1/4 cup (60 ml) sodium bicarbonate (baking soda) dissolved in 1 1/2 gallons (6 liters) of water and flushed with water.

Overfilling batteries may result in electrolyte being spilled from the battery during the charge cycle. Expelled electrolyte may cause damage to the vehicle and storage facility.

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.

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.

BATTERY

A battery is defined as two dissimilar metals immersed in an acid solution. If the acid is absent or if the metals are not dissimilar, a battery has not been created. The batteries most commonly used in these vehicles are lead acid.

A battery does not store electricity, but is able to produce electricity as the result of a chemical reaction which releases stored chemical energy in the form of electrical energy. The chemical reaction takes place faster in warm conditions and slower in cold conditions. Temperature is important when conducting tests on a battery and test results must be corrected to compensate for temperature differences.

As a battery ages, it still performs adequately except that its **capacity** is diminished. Capacity describes the time that a battery can continue to provide its design amperes from a full charge.

A battery has a maximum life, therefore good maintenance is designed to maximize the **available** life and reduce the factors that can reduce the life of the battery.

BATTERY MAINTENANCE

Tool List	Qty.
Insulated Wrench, 9/16"	1
Battery Carrier	2
Hydrometer	1
Battery Maintenance Kit P/N 25587-G01	1

At Each Charging Cycle

Before charging the batteries, inspect the plug of the battery charger and vehicle receptacle housing for dirt or debris.

Charge the batteries after each days use.

Monthly

- Inspect all wiring for fraying, loose terminations, corrosion or deterioration of insulation.
- Check that the electrolyte level is correct and add suitable water as required.
- Clean the batteries and wire terminations.
- Coat battery terminals with commercially available protectant.

Electrolyte Level and Water

The correct level of the electrolyte is 1/2" (13 mm) above the plates in each cell.

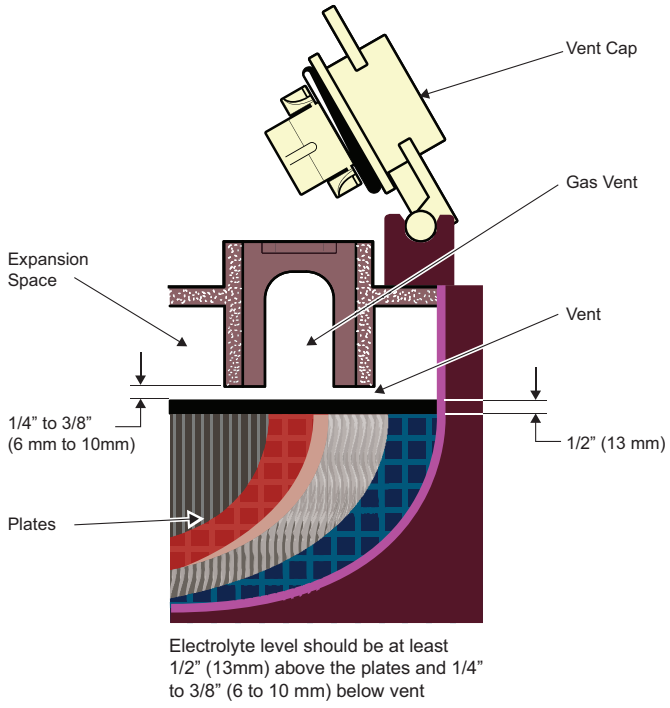

Fig. 2 Correct Electrolyte Level

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

This level will leave approximately 1/4" - 3/8" (6 - 10 mm) of space between the electrolyte and the vent tube. The electrolyte level is important since any portion of the plates exposed to air will be ruined beyond repair. Of equal importance is too much water which will result in electrolyte being forced out of the battery due to gassing and the decrease in volume of the electrolyte that results from the charging cycle.

⚠ CAUTION

Do not overfill batteries. The charging cycle will expel electrolyte and result in component damage

A battery being charged will 'gas' with the majority of the gassing taking place at the end of the charging cycle. This gas is hydrogen which is lighter than air. Water and sulfuric acid droplets will be carried out of the battery vents by the hydrogen gas, however, this loss is minimal. If the battery electrolyte level is too high, the electrolyte will block the vent tube and the gas will force it out of the vent tube and battery cap. The water will evaporate but the sulfuric acid will remain where it can damage vehicle components and the storage facility floor. Sulfuric acid loss will weaken the concentration of acid within the electrolyte and reduce the life of the battery.

Over the life of the battery, a considerable amount of water is consumed. It is important that the water used be pure and free of contaminants that could reduce the life of the battery by reducing the chemical reaction. The water must be distilled or purified by an efficient filtration system. Water that is not distilled should be analyzed and if required, filtration installed to permit the water to meet the requirements of the water purity table.

Impurity	Parts Per Million
Color	Clear
Suspended	Trace
Total Solids	100
Calcium & Magnesium Oxides	40
Iron	5
Ammonia	8
Organic & Volatile Matter	50
Nitrites	5
Nitrates	10
Chloride	5

Fig. 3 Water Purity Table

Even if the water is colorless, odorless, tasteless and fit for drinking, the water should be analyzed to see that it does not exceed the impurity levels specified in the table.

Cleaning Batteries

When cleaning the outside of the batteries and terminals, do not use a water hose without first spraying with a solution of baking soda (sodium bicarbonate) and water to neutralize any acid deposits. Use of a water hose without first neutralizing any acid, will move the acid from the top of the batteries to another area of the vehicle or storage facility where it will attack the metal structure or the concrete/asphalt floor. After hosing down the batteries, a residue will be left on the batteries which is conductive and will contribute to the discharge of the batteries.

⚠ CAUTION

To prevent battery damage, be sure that all battery caps are tightly installed.

The correct cleaning technique is to spray the top and sides of the batteries with a solution of baking soda and water. This solution is best applied with a garden type sprayer equipped with a non metallic spray wand. The solution should consist of 2 teaspoons (10 ml) of baking soda mixed with 1 quart (1 liters) of clear water. In addition to the batteries special attention should be paid to metallic components adjacent to the batteries which should also be sprayed with the baking soda solution.

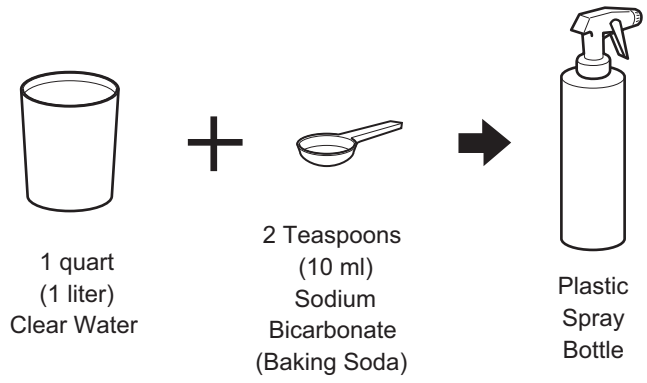

Fig. 4 Preparing Acid Neutralizing Solution

Allow the solution to sit for at least three minutes; use a soft bristle brush or cloth to wipe the tops of the batteries in order to remove any residue that could cause the self discharge of the battery. Rinse the entire area with low pressure clear water. Cleaning should take place once a month or more often under extreme conditions. After batteries are clean and dry the terminals should be coated with a commercially available protectant.

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

BATTERY REMOVAL & INSTALLATION

Tool List	Qty.
Insulated Wrench, 9/16"	1
Insulated Wrench, 15 mm	1
Socket, 15 mm	1
Socket, 9/16"	1
Ratchet	1
Battery Carrier Strap	2
Torque Wrench, in. lbs.	1

⚠ WARNING

When lifting a battery always use all 4 lifting lugs provided. Do not attempt to lift a battery with only one strap, this may break lifting lugs and result in personal injury or damage to the battery.

NOTICE

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 the table contained in Section 'A'.

1. Turn vehicle key to the off position and remove the key.
2. Using an insulated wrench, disconnect the main negative (-), BL-, battery cable.
3. Using an insulated wrench, disconnect the main positive (+), BL+, battery cable.
4. Using an insulated wrench, disconnect and remove all other wires connected to the batteries.
5. Remove the two pan head Torx screws (one each side) securing the battery strap.
6. Remove the battery hold down by loosening all three hex nuts until they are at the end of the J-bolt and unhooking the J-bolts from the battery tray. When removing the J-bolts from between the batteries it may help to tilt the battery to the outside of the car to release the pressure on the J-bolt.
7. Remove the batteries using commercially available battery carrier straps (2 per battery). Remove the three front batteries (1, 2, & 3) one at a time.
8. Remove the battery tie down upright by tilting it to the front of the vehicle and lifting upward to disengage it from the slot in the battery tray.

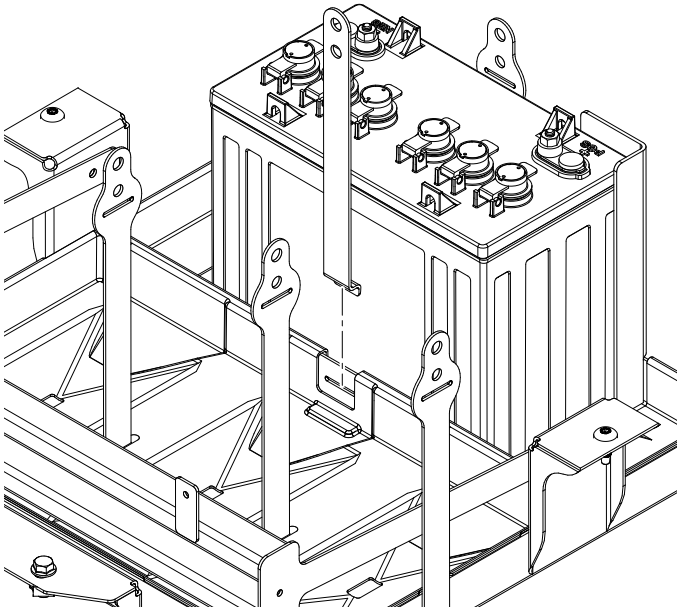

Fig. 5 Battery Tie Down Upright Post

9. Using the carrier straps tilt the last battery (4) to the front of the vehicle just enough to clear the rear body and lift up and out of the vehicle.

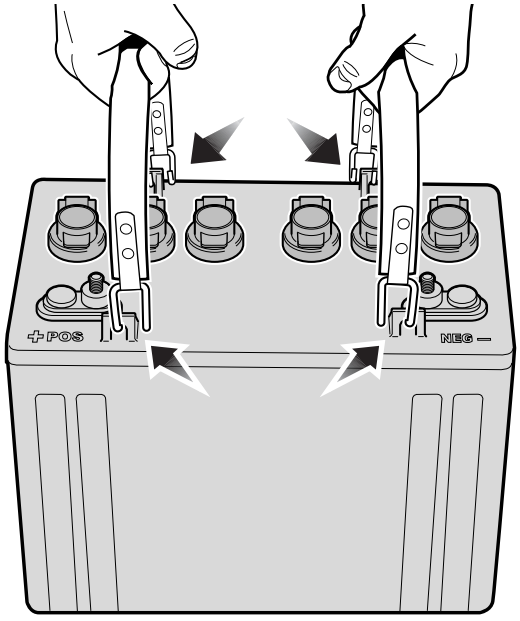

Fig. 6 Battery Removal

10. Lift the battery tray liner and check the battery tray and the area surrounding the battery tray for corrosion. If any corrosion is found, it should be immediately removed with a putty knife and a wire brush (for metal surfaces) or a plastic bristle brush (for plastic sur-

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

faces). The area should be washed with a solution of baking soda and water and dried thoroughly. All metal surfaces that have been cleaned must be primed and painted with a corrosion resistant paint.

11. Replace battery number 4, located at the back of the battery tray (4), making sure that it is positioned as shown.
12. Install the battery tie down upright, making sure that the offset is locked into the slot in the battery tray.

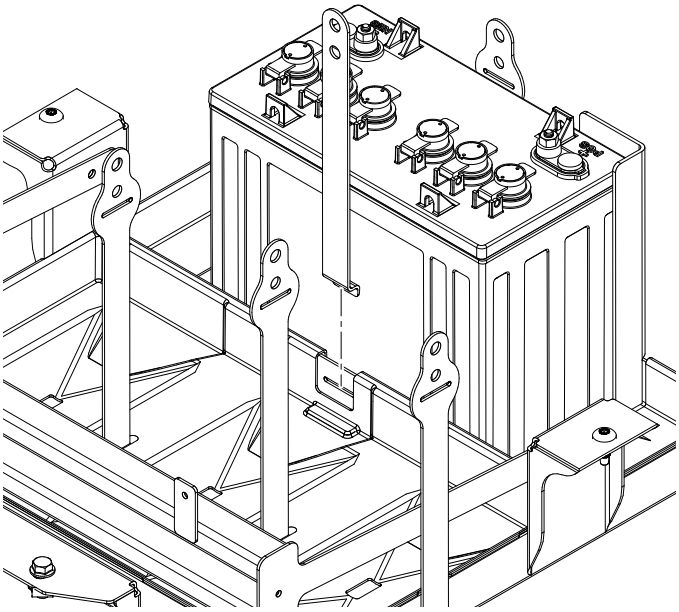

Fig. 7 Install Hold Down Upright Post

13. Replace batteries 1, 2 and 3 making sure that they are positioned as shown.

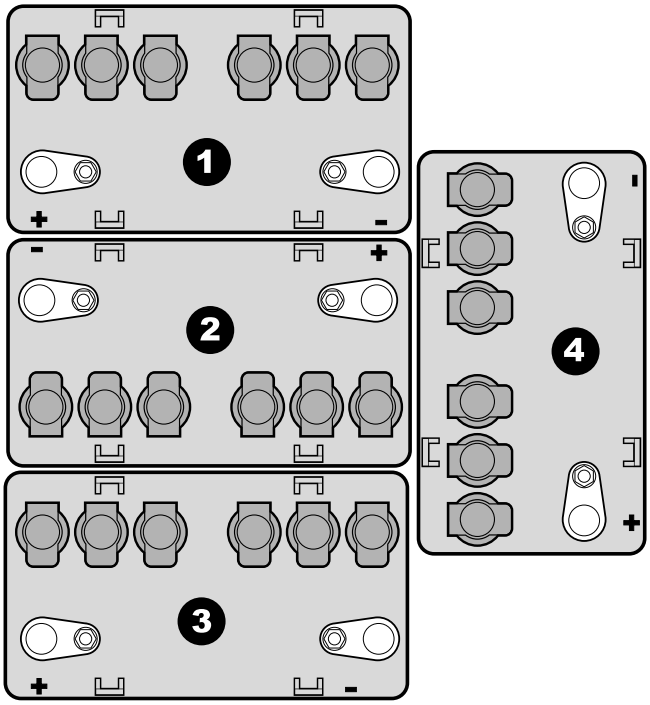

Fig. 8 Battery Placement & Orientation

14. Install each of the three outer battery straps by locking the tab end into the slots of the outer tie down upright posts.
15. Install the hex head bolts and locking nuts that secure the battery straps to the inner tie down upright posts.

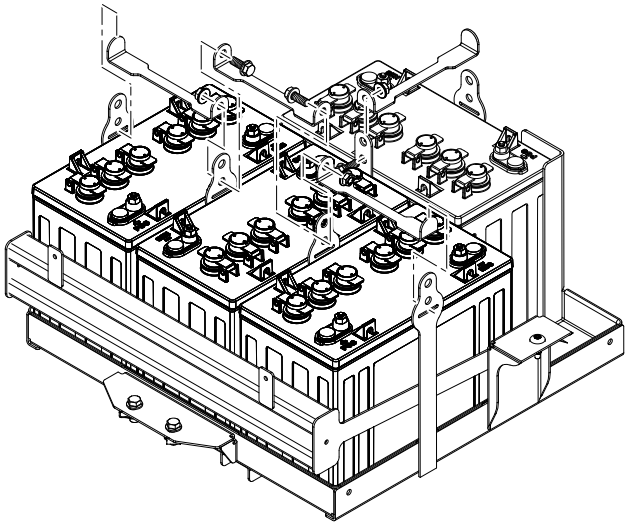

Fig. 9 Battery Components

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

16. Inspect all wires and terminals and clean any corrosion from the battery terminals or wire terminals with a solution of baking soda and water, use a wire brush to completely remove corrosion if required.
17. Carefully replace the wires on the battery terminals as shown. Make sure to reconnect the main negative (-) battery cable, BL-, from the controller last.
18. Tighten all battery terminal hardware to 95 - 105 in. lbs. (11 - 12 Nm) torque.
19. Protect the battery terminals and battery cable terminals with a commercially available protective coating.

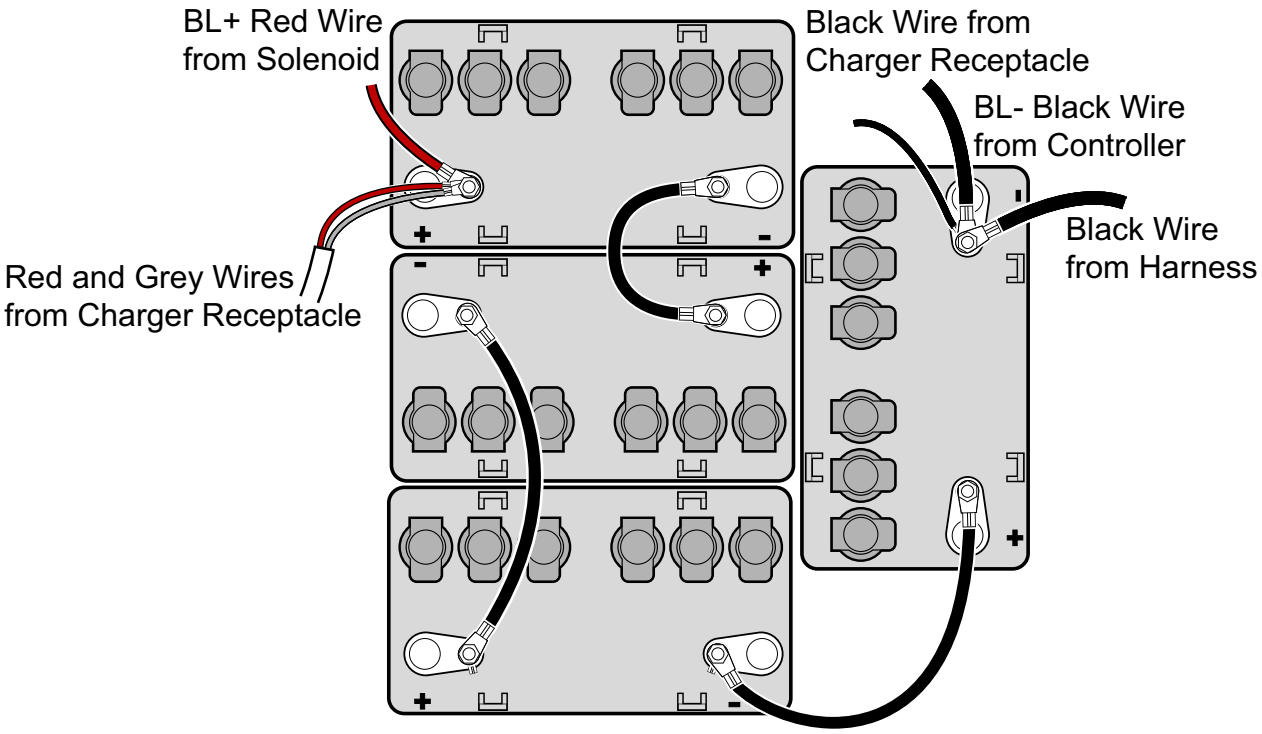

Fig. 10 Battery Connections

⚠ WARNING

To prevent battery explosion that could result in severe personal injury or death, extreme care must be used with aerosol containers of battery terminal protectant. Insulate the metal container to prevent the metal can from contacting battery terminals which could result in an explosion.

PROLONGED STORAGE

During periods of storage, the batteries will need attention to keep them maintained and prevent discharge.

In high temperatures the chemical reaction is faster, while low temperatures cause the chemical reaction to slow down. A vehicle that is stored at 90° F (32° C) will lose .002 of specific gravity each day. If a fully charged battery has a specific gravity of 1.275, and the battery is allowed to sit unused, it will become partially discharged. When it reaches 1.240, which it will do in less than twenty days, it should be recharged. If a battery is left in a discharged state, sulfating takes place on and within the plates. This condition is not reversible and will cause permanent damage to the battery. In order to prevent damage, the battery should be recharged. A hydrometer can be used to determine the specific gravity and therefore the state of charge of a battery.

In winter conditions, the battery must be fully charged to prevent the possibility of freezing. A fully charged battery will not freeze in temperatures above -75° F (-60° C). Although the chemical reaction is slowed in cold temperatures, the battery must be stored fully charged, and disconnected from any circuit that could discharge the battery. For portable chargers, disconnect the charging plug from the vehicle receptacle. For on-board chargers, disconnect the charging harness from the batteries. The batteries must be cleaned and all deposits neutralized and removed from the battery case to prevent self dis-

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

charge. The batteries should be tested or recharged at thirty day minimum intervals.

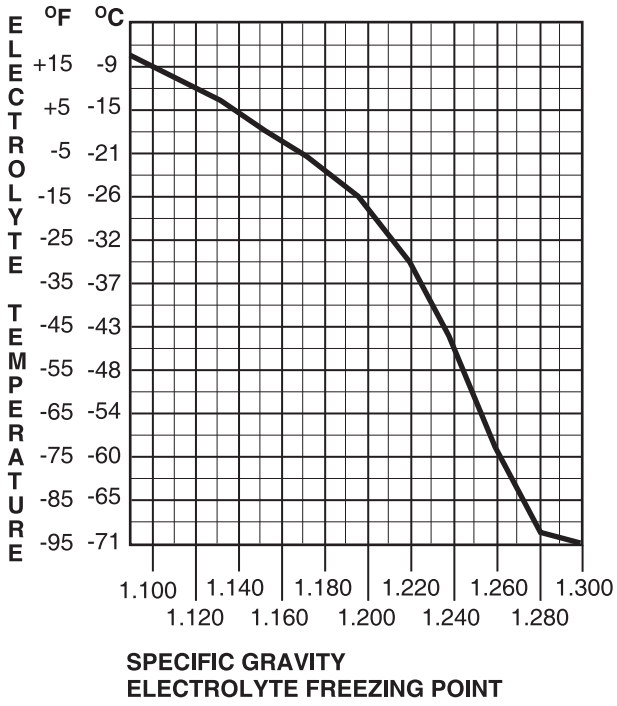

Fig. 11 Freezing Point of Electrolyte

BATTERY CHARGING

The battery charger is designed to fully charge the battery set. If the batteries are severely deep cycled, some automatic battery chargers contain an electronic module that may not activate and the battery charger will not function. Automatic chargers will determine the correct duration of charge to the battery set and will shut off when the battery set is fully charged. Always refer to the instructions of the specific charger used.

Before charging, the following should be observed:

⚠ CAUTION

Do not overfill batteries. The charging cycle will expel electrolyte and result in component damage.

- The electrolyte level in all cells must be at the recommended level and cover the plates.
- The charging must take place in an area that is well ventilated and capable of removing the hydrogen gas that is generated by the charging process. A **minimum** of five air exchanges per hour is recommended.
- The charging receptacle and power cord are in good condition and free from dirt or debris.
- The power cord is fully inserted into the vehicle receptacle.
- The power cord is protected from damage and is located in an area to prevent injury that may result from personnel running over or tripping over the cord.
- The charger is automatically turned off during the connect/disconnect cycle and therefore no electrical arc is generated at the DC plug/receptacle contacts.

TROUBLESHOOTING

In general, troubleshooting will be done for two distinct reasons. First, a battery that performs poorly and is outside of the manufacturers specification should be identified in order to replace it under the terms of the manufacturer's warranty. Different manufacturers have different requirements. Consult the battery manufacturer or the manufacturer's representative for specific requirements.

The second reason is to determine why a particular vehicle does not perform adequately. Performance problems may result in a vehicle that runs slowly or in a vehicle that is unable to operate for the time required.

A new battery must **mature** before it will develop its maximum capacity. Maturing may take up to 100 charge/discharge cycles. After the maturing phase, the older a battery gets, the lower the capacity. The only way to determine the capacity of a battery is to perform a load test using a discharge machine following manufacturer's recommendations.

A cost effective way to identify a poorly performing battery is to use a hydrometer to identify a battery in a set with a lower than normal specific gravity. Once the particular cell or cells that are the problem are identified, the suspect battery can be removed and replaced. At this point there is nothing that can be done to salvage the battery; however, the individual battery should be replaced with a good battery of the same brand, type and approximate age.

Hydrometer

A hydrometer is used to test the state of charge of a battery cell. This is performed by measuring the density of the electrolyte, which is accomplished by measuring the specific gravity of the electrolyte. The greater the concentration of sulfuric acid, the more dense the electrolyte becomes. The higher the density, the higher the state of charge.

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

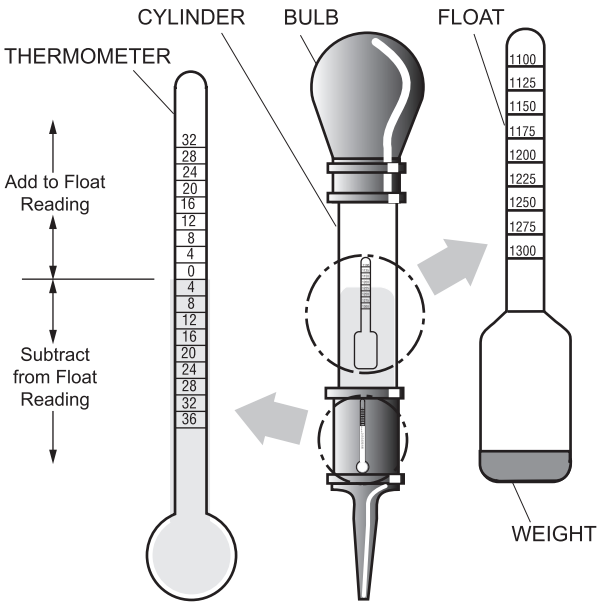

Fig. 12 Hydrometer

⚠ WARNING

To prevent battery explosion that could result in severe personal injury or death, never insert a metal thermometer into a battery. Use a hydrometer with a built in thermometer that is designed for testing batteries.

Specific gravity is the measurement of a liquid that is compared to a baseline. The baseline is water which is assigned a base number of 1.000. The concentration of sulfuric acid to water in a new golf car battery is 1.280 which means that the electrolyte weighs 1.280 times the weight of the same volume of water. A fully charged battery will test at 1.275 - 1.280 while a discharged battery will read in the 1.140 range.

NOTICE

Do not perform a hydrometer test on a battery that has just been watered. The battery must go through at least one charge and discharge cycle in order to permit the water to adequately mix with the electrolyte.

The temperature of the **electrolyte** is important since the hydrometer reading must be corrected to 80° F (27° C). High quality hydrometers are equipped with an internal thermometer that will measure the temperature of the electrolyte and will include a conversion scale to correct the float reading. It is important to recognize that the electrolyte temperature is significantly different from the ambient temperature if the vehicle has been operated.

Using A Hydrometer

1. Draw electrolyte into the hydrometer several times to permit the thermometer to adjust to the electrolyte temperature and note the reading. Examine the color of the electrolyte. A brown or gray coloration indicates a problem with the battery and is a sign that the battery is nearing the end of its life.
2. Draw the minimum quantity of electrolyte into the hydrometer to permit the float to float freely without contacting the top or bottom of the cylinder.
3. Hold the hydrometer in a vertical position at eye level and note the reading where the electrolyte meets the scale on the float.
4. Add or subtract four points (.004) to the reading for every 10° F (6° C) the electrolyte temperature is above or below 80° F (27° C). Adjust the reading to conform with the electrolyte temperature, e.g., if the reading indicates a specific gravity of 1.250 and the electrolyte temperature is 90° F (32° C), **add** four points (.004) to the 1.250 which gives a corrected reading of 1.254. Similarly if the temperature was 70° F (21° C), **subtract** four points (.004) from the 1.250 to give a corrected reading of 1.246.
5. Test each cell and note the readings (corrected to 80° F or 27° C). A variation of fifty points between any two cell readings (example 1.250 - 1.200) indicates a problem with the low reading cell(s).

As a battery ages the specific gravity of the electrolyte will decrease at full charge. This is not a reason to replace the battery providing all cells are within fifty points of each other.

Since the hydrometer test is in response to a vehicle exhibiting a performance problem , the vehicle should be recharged and the test repeated. If the results indicate a weak cell, the battery or batteries should be removed and replaced with a good battery of the same brand, type and approximate age.

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

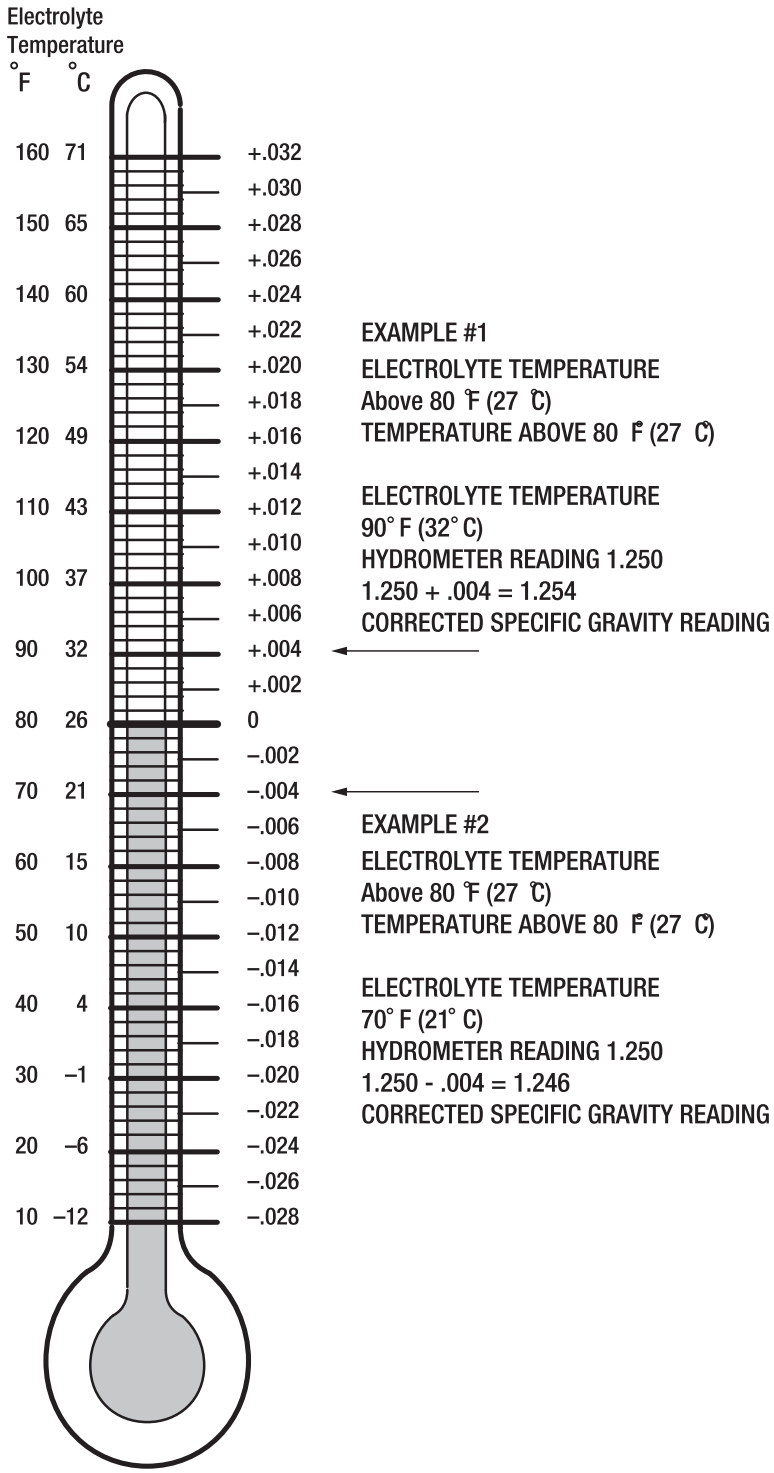

Fig. 13 Hydrometer Temperature Correction

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

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TABLE OF CONTENTS FOR SECTION 'I'

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BATTERY CHARGER

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

Notes:

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

CHARGER DESCRIPTION

The on-board charger with built in DC to DC converter is automatic and is designed specifically for charging electric vehicle batteries.

When the power cord is plugged into an external power source the on-board charger will automatically turn on and the vehicle's power receptacle LED will start flashing GREEN to indicate the battery is charging.

When the LED is GREEN continuously the batteries are fully charged.

⚠ DANGER

Risk of electric shock. Connect charger power cord to an outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded outlet is required to reduce risk of electric shock – do not use ground adapters or modify plug. Do not touch uninsulated portion of output connector or uninsulated battery terminal. Disconnect the power cord before making or breaking the connections to the battery while charging. Do not open or disassemble charger. Do not operate charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way – refer all repair work to qualified personnel. Not for use by children.

Provide Protection From Elements

Keep cooling fins clean and free of dirt and debris

NEMA 15 - 5R Grounded AC Receptacle
110 - 120 VAC. Dedicated 15 AMP Circuit

Locations outside the US and Canada: Reference appropriate local electrical code and charger manufacturer recommendations for AC power requirements

Fig. 1 Charger Installation

The power cord may remain plugged into the AC outlet. To charge the vehicle refer to the instructions in the owner's manual. Insert the polarized DC plug completely into the vehicle receptacle. The charger will automatically start a few seconds after the plug is in place. The charger will automatically stop when the batteries are fully charged and the power cord can be removed to permit use of the vehicle.

NOTICE

Looping the power cord through the steering wheel when charging serves as a good reminder to store the cord out of the way when finished with charging. The plug can be damaged by driving over or catching the cord on the vehicle when driving away.

⚠ WARNING

An ungrounded electrical device may become a physical hazard that could result in an electrical shock or electrocution.

UNDERSTANDING THE CHARGER

When a power cord is plugged into the vehicle's charger receptacle, the charger will automatically turn on and the charger's LED will start flashing GREEN to indicate the batteries are charging.

Once a minimum battery voltage of 2 volts per cell (Vpc) is reached, the charger's output current will change from a full current charge to the trickle rated charging current. The length of charge time will vary by how depleted the batteries are, the input AC voltage, and/or charger ambient temperatures. The charger's LED will give a SHORT flash if the charge is less than 80% and a LONG flash if the charge is greater than 80%. If the charger's LED is a steady GREEN the batteries are fully charged and the charger may be unplugged, although not necessary. The charger may be left plugged in for up to 24 hours.

If a fault occurred anytime during the charging, the receptacle's LED will quickly flash RED. The specific fault is indicated by the number of RED flashes that occur, there will be a pause and then the flashes will repeat again. There are several possible conditions that will generate errors. Some errors will require human intervention to first resolve the problem and then reset the charger by unplugging the power cord from the vehicle.

If the AC voltage is interrupted and restored, the charger will turn back on automatically.

BATTERY CHARGER

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

LED DISPLAY INFORMATION

LED Operation Codes:

SHORT GREEN FLASH = less than 80% charged

LONG GREEN FLASH = more than 80% charged

SOLID GREEN = 100% charged

LONG AMBER = charger is operating in reduced output mode due to thermal cutback

RED FLASH = fault code

LED Fault Code:

RED FLASH: Light turns on briefly, but does not flash after that - check for valid AC voltage.

ONE RED FLASH: One flash, a pause and then again one flash and a pause - Battery Temperature Fault: battery temperature is out of range (greater than 122° F (50° C) or less than 14° F (-10° C)).

TWO RED FLASHES: Two flashes, a pause and then again two flashes and a pause - Battery Voltage Fault: Battery pack is less than 36.0 Volts or more than 67.2 Volts. Battery pack is too discharged or over charged for the charger to work.

THREE RED FLASHES: Three flashes, a pause and then again three flashes and a pause - Battery Charge Time-out: Charge time exceeded. This may indicate a problem with the battery pack or that the charger output current was severely reduced due to high ambient temperatures.

FOUR RED FLASHES: Four flashes, a pause and then again four flashes and a pause - Battery Fault: Charge time exceeded (16 hours) with battery voltage still below nominal voltage. This indicates a problem with the battery pack voltage not reaching the required nominal level within the maximum time allowed.

FIVE RED FLASHES: Five flashes, a pause and then again five flashes and a pause - Internal over temperature shut down.

SIX RED FLASHES: Six flashes, a pause and then again six flashes and a pause - Charger Fault: An internal fault has been detected. If this fault is displayed again after unplugging the charger's power cord and plugging it back in, the charger must be taken to a qualified service center.

MAINTENANCE INSTRUCTIONS

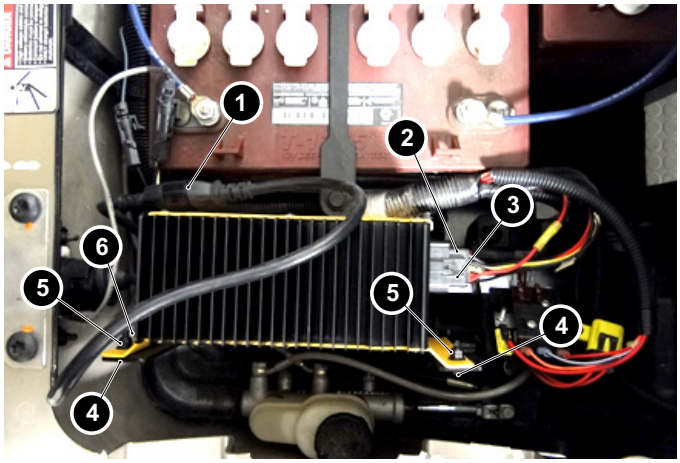
1. For flooded lead-acid batteries, regularly check the water levels of each battery cell after charging and add distilled water as required to the level specified by the battery manufacturer. Follow the safety instructions recommended by the battery manufacturer.
2. Make sure the charger connections to the battery terminals are tight and clean. Check for any deformations or cracks in the plastic parts. Check the charger harness for chaffing and rubbing. Inspect all wiring for fraying, loose terminals, chaffing, corrosion or deterioration of the insulation.
3. Keep the cooling fins free of dirt and debris, do not expose the charger to oil, dirt, mud or to direct heavy water spray when cleaning equipment.
4. Inspect the plug of the vehicle charger receptacle for dirt or debris every time the power cord is connected.

REPLACING THE CHARGER/DC to DC CONVERTER

Tool List	Qty.
Rubber Mat	1
Torque Wrench, in. lbs.	1
Ratchet	1
Socket, 10 mm	1
Wrench, 10 mm	1
Wrench, 7 mm	1

Removal

1. Turn the key switch to 'OFF' and remove the key from the switch.
2. Raise and remove the seat bottom.



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

3. Unplug the cord (1) from the charger receptacle to the charger.
4. Unplug the Charger DC Output connector (2) and the DC-DC Output connector (3).
5. Place a rubber mat over the exposed battery pack.
6. Remove the four flanged hex head bolts (4) and locking nuts (5) securing the charger to the charger brackets.
7. Lift the charger carefully and place it so the nut (6) securing the green ground wire to the charger can be removed.

Installation

8. Connect the green ground wire to the stud on the front flange of the charger and secure with hex nut (6). Tighten to the specified torque.
9. Lower the charger down between the brackets and the battery pack, install four flanged hex head bolts (4) and secure with locking nuts (5). Tighten hardware to the specified torque.

ITEM	TORQUE SPECIFICATION
5	53 - 79 in. lbs (6 - 9 Nm)
6	13 - 15 in. lbs (1.5 - 1.7Nm)

10. Plug in the charger DC output connector (2) and the DC-DC coutput connector (3).
11. Plug in the cord from the charger receptacle (1).
12. Remove the protective rubber mat from the battery pack.
13. Install the seat bottom.

BATTERY CHARGER

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

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Notes:

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

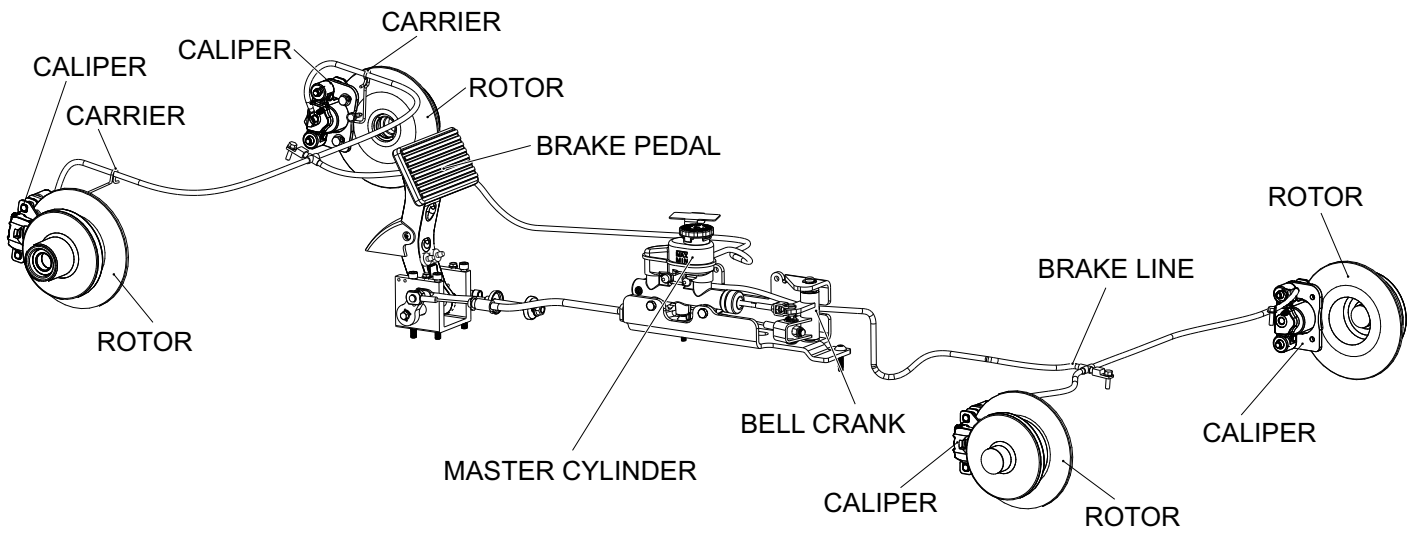

Fig. 1 Brake System

GENERAL

The vehicle is equipped with four wheel hydraulic disc brakes and an automatic parking brake mounted to the electric motor.

NOTICE

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

⚠ WARNING

Never work on a vehicle supported by a jack alone. To prevent possible personal injury, the vehicle must be supported on jack stands during procedures that require the vehicle to be off the ground.

ROUTINE MAINTENANCE

Tool List	Qty.
Shop Rag	A/R
Flashlight	1
Transmission Fluid Funnel	1

The recommended method for removing christmas tree rivets is to slide a notched pry bar under the head of the rivet and press downward on the bar to pull the rivet from the hole.

Fig. 2 Christmas Tree Rivet Removal

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.

Check Brake Fluid

The brake fluid should be checked at regular intervals (as specified in the Periodic Service Schedule) or immediately if fluid leaks are found. The easiest way to check fluid level is to clean the cap with a shop rag and remove the cap. Check fluid level if the level has fallen below the MIN marking add enough brake fluid to bring the level up to the MAX marking.

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

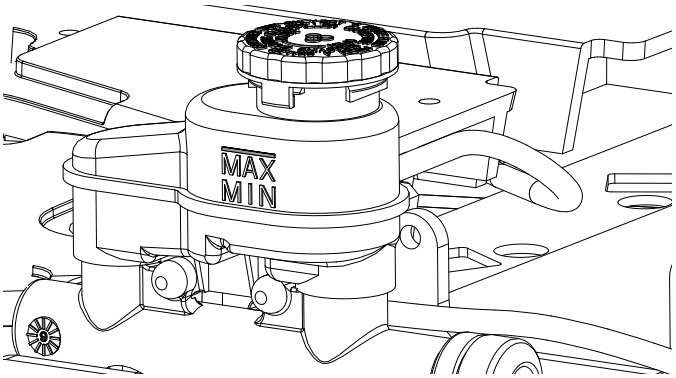

Fig. 3 Master Cylinder Fill Line

⚠ WARNING

Never work on a vehicle supported by a jack alone. To prevent possible personal injury, the vehicle must be supported on jack stands during this procedure.

Brake Cable Adjustment

If the brake pedal is soft, do the following before adjusting the cable:

1. Check the brake pads; are they worn, in need of replacement? If the pads need to be replaced see Brake Pad Replacement under REPLACEMENT OF WEAR ITEMS in this section of the manual.
2. Bleed the brake lines to be sure that they are free of trapped air. For detailed instructions on bleeding the brakes see BLEEDING BRAKES in this section of the manual.

Adjust the brake cable only after performing steps 1 and 2 above.

Tool List	**Qty.**
Locking Pliers	1
Ratchet	1
Socket, 9/16"	1

Raise and support at least the rear driver side of the vehicle. See the SAFETY section of this manual for the proper way to lift and support this vehicle.

1. Remove the driver side rear wheel.
2. Remove the christmas tree rivets on the lower edge of the fender liner. Pull the fender liner out away from the body to access the adjustment nut (16).

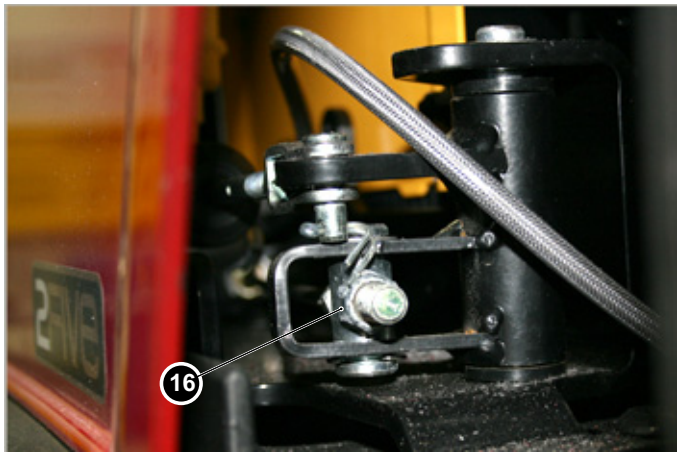

Fig. 4 Cable Adjusting Nut

3. Using locking pliers to hold the knurled end of the brake cable adjust the nut on the end of the cable 1/8 - 1/4 of a turn at a time. Check the pedal for free play before each adjustment. DO NOT over adjust the brake cable. With no pressure on the brake pedal make sure that there is no tension on the master cylinder push rod.

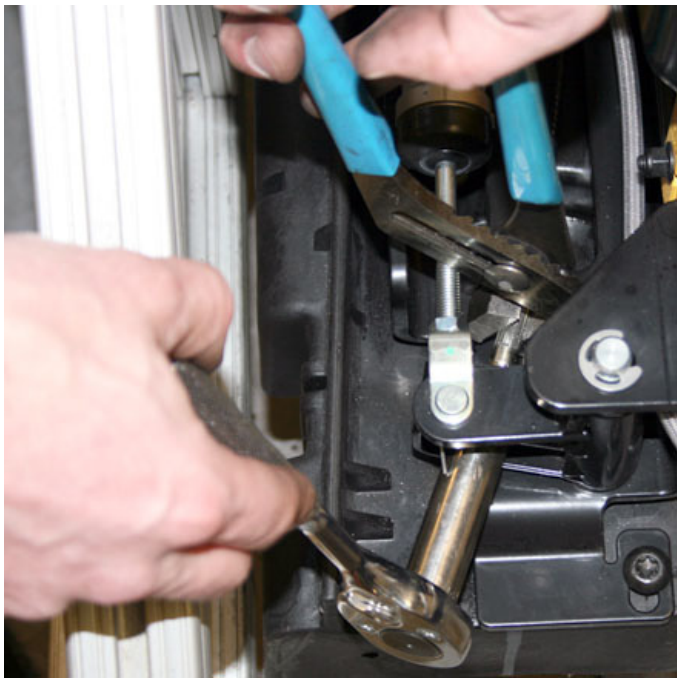

Fig. 5 Brake Cable Adjustment

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

REPLACEMENT OF WEAR ITEMS

Brake Pad Replacement

Brake pads should always be replaced as a full set on both front wheels or both back wheels. To remove the brake pads, raise and support the vehicle per 'Lifting the Vehicle' in the SAFETY section.

1. Remove the wheel.
2. Remove the brake line (1) from the carrier (2). Front wheels only, rear wheels proceed to step 3.
3. Remove both of the flanged hex head bolts (3) securing the caliper (4) to the spindle or axle.

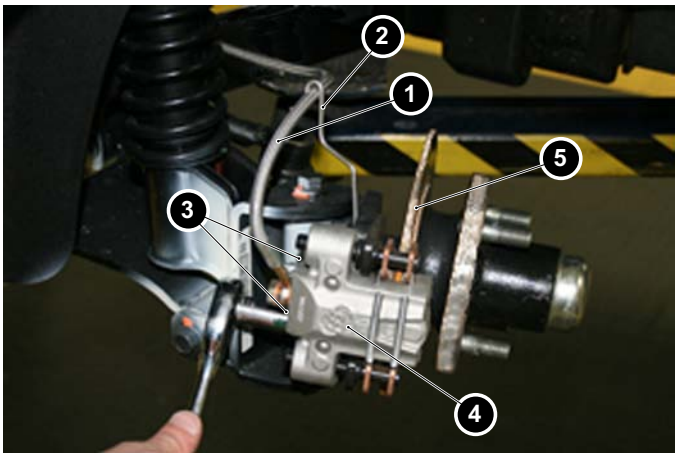

Fig. 6 Caliper Removal

4. Swing the caliper (4) free from the rotor (5) and remove both anti-rattle springs (6).

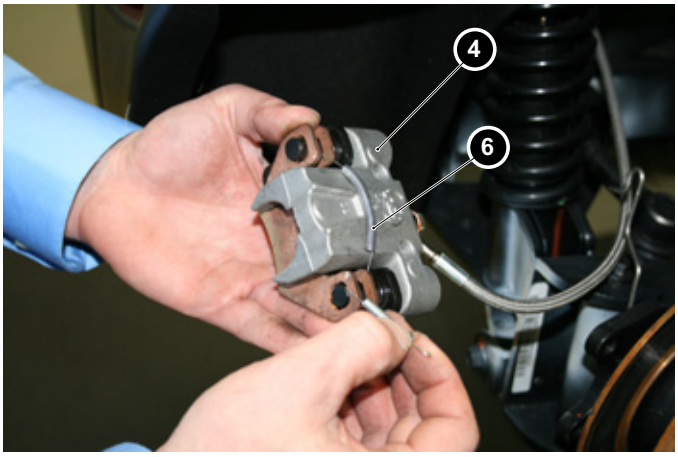

Fig. 7 Anti-Rattle Springs

5. Using channel lock pliers compress the side with the O Ring. Remove the brake pads (7) one at a time.

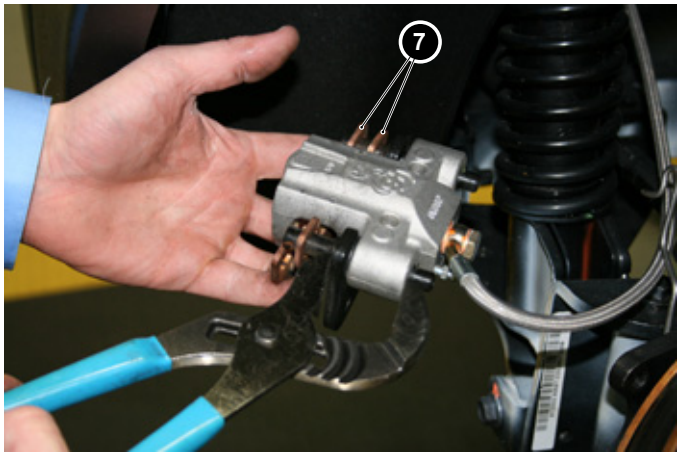

Fig. 8 Compress O Ring Side

6. Compress the caliper piston, once the piston is compressed it will stay in position until the brake pedal is pressed.
7. Compress the side with the O Ring and hold while installing the new pads (7). Once both pads are installed release pressure on the O Ring.
8. Install both anti-rattle springs (6).
9. Separate pads (7) and place caliper (4) over the rear flange of the rotor(5).
10. Install both flanged hex head bolts (3) finger tight. Tighten both bolts to specified torque value.
11. Replace wheel and tighten lug nuts as specified in the Wheels and Tires section of this manual.

ITEM	TORQUE SPECIFICATION
3	20 - 22 ft. lbs (27 - 30 Nm)

Unless fluid is lost or a brake line is disconnected, there is no need to bleed the system.

Rotor Replacement

NOTICE

The rotor (disc brake hub) is not designed to be turned to eliminate grooves or high spots.

If the rotor (disc hub) has deep grooves or gouges, it must be replaced. If the pad contact area has worn the rotor to a thickness of .120" or less, the rotor must be replaced.

If the rotor must be replaced, the caliper and pads must be swung out of the way to gain access to the rotor (See Brake Pad Replacement).

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

For Hub Replacement, Wheel Bearing and Race Replacement, Wheel Bearing Packing and Wheel Bearing Adjustment procedures, see FRONT SUSPENSION AND STEERING.

Spindle Replacement

See FRONT SUSPENSION AND STEERING.

Brake Pedal Assembly

Tool List	Qty.
Ratchet	1
Torx Bit, T-15 IP	1
Hex Bit 6 mm	1
Notched Pry Bar	1
Insulated Wrench, 9/16"	1
Loctite® 242	A/R

The brake pedal assembly is a modular unit that contains the brake pedal, a rotary position sensor and a brake switch. The only serviceable items in addition to the entire brake pedal assembly are the pedal pad and the rotary position sensor.

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

To access the pedal assembly, remove the upper rocker panels, the lower rocker panels and the floormat (refer to page C2 for removal of rocker panels and floormat).

1. Remove four christmas tree rivets (20) securing pedal cover (21) to floorboard.
2. Remove pedal cover (21).

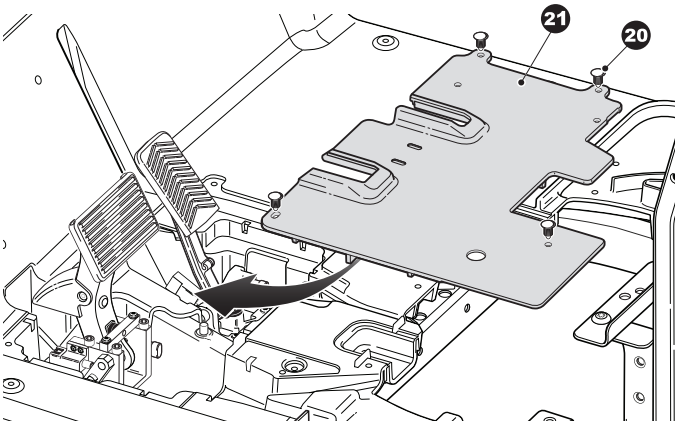

Fig. 9 Pedal Cover

3. Mark the position of the retaining nut (12) on the threaded portion of the pedal return spring rod (13).
4. Loosen the retaining nut (12) to release the spring tension.

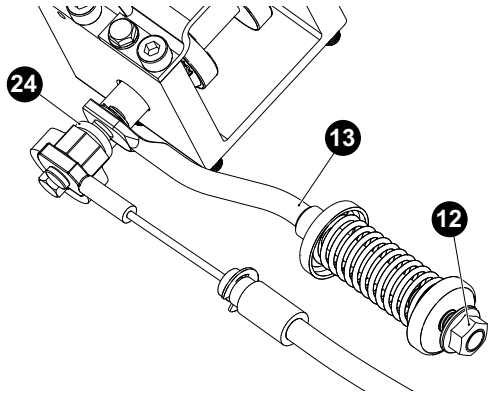

Fig. 10 Pedal Return Spring

5. Disconnect the wires from the rotary position sensor (18).
6. Remove four socket head hex screws (17) securing the brake pedal assembly to the floorboard.

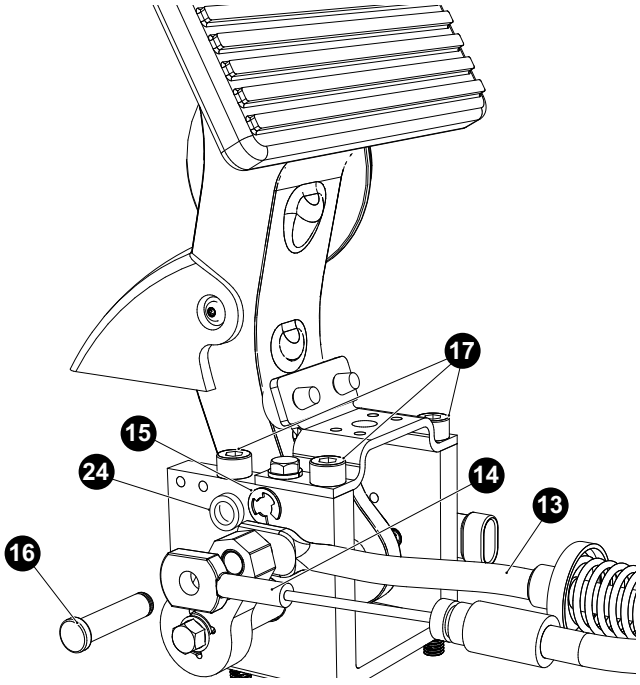

Fig. 11 Brake Pedal Cable and Return Spring

7. Disconnect the brake cable (14) and the brake pedal return spring (13) by removing the retaining ring (15), spacer (24) and the clevis pin (16).
8. Remove the two Torx screws (19) from the rotary position sensor (18) and remove sensor.

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

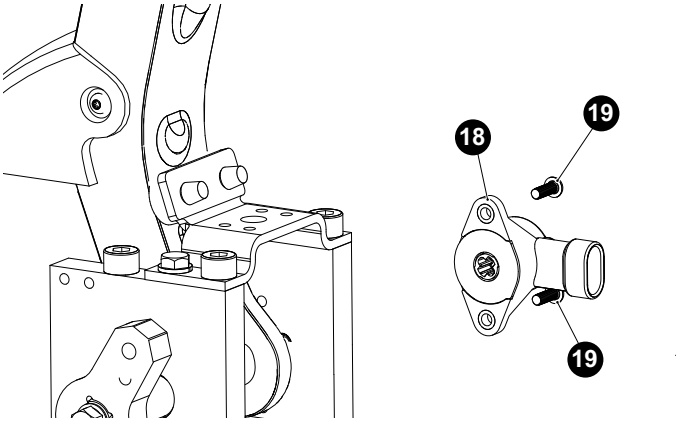

Fig. 12 Rotary Position Sensor

9. Install the rotary position sensor (18). Align the slot in the rotary position sensor (18) to the pivot shaft and rotate into position oriented as shown, secure with two Torx screws (19). Use Loctite® 242, according to product instructions, with the two Torx screws (19).

10. Reconnect electrical harness to rotary position sensor (18).

11. Install the clevis pin (16) through the brake cable end, the pedal assembly arm, spacer (24) and the brake pedal return spring arm (13) and secure with the E-clip (15).

12. Position the pedal assembly in the floorboard recess and secure with four socket head cap screws (17).

13. Tighten the return spring retaining nut (12) to the position marked.

14. Install the pedal cover (21), using new christmas tree rivets (20), replace the floormat and rocker panels.‘

Replace any worn or damaged hardware with new as required.

ITEM	TORQUE SPECIFICATION
19	12 - 15 in. lbs (1.3 - 1.7 Nm)
17	14.75 - 16 ft. lbs (20 - 21.5 Nm)

Bell Crank Bushings

Tool List **Qty.**

Ratchet 1
Socket, 14 mm 1
Socket, 9/16" 1
Channel Lock Pliers 1

⚠ 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.

Removing the driver side rear fender liner may improve access to the bell crank. (See BODY)

1. Hold brake cable with pliers and remove the nut (16) from the end of the brake cable and pull cable free of the bell crank.

Fig. 13 Clevis Pin Removal

2. Remove the three pan head torx bolts (18) that secure the master cylinder bracket to the floorboard.

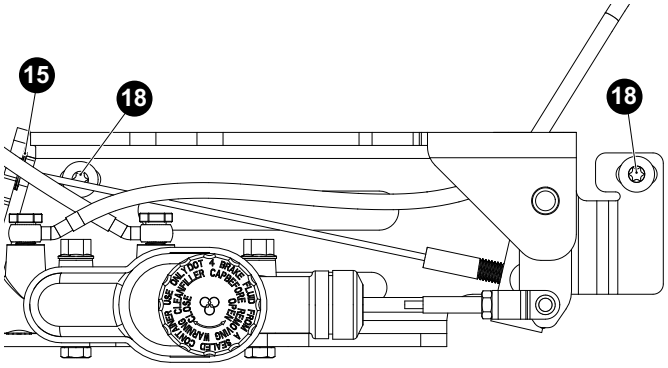

Fig. 14 Master Cylinder Bracket

3. Rock the master cylinder assembly and bracket to remove the E-clip (20) from the bottom of the bell crank shaft.

4. Remove the bell crank shaft (23) from the top of the mounting bracket.

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

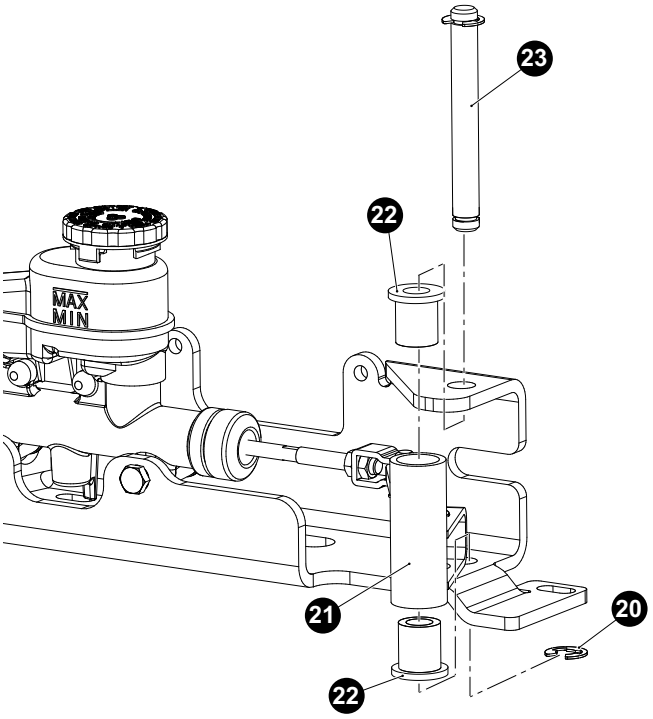

Fig. 15 Bell Crank Bushings

5. Pivot the bell crank (21) until it is clear of the bracket and the flanged bushings (22) can be removed.
6. Install new bushings (22) into the bell crank (21) and pivot the three items back into the bracket.
7. Install the pivot shaft (23) with one E-clip down through the bushings (22) and the bell crank (21).
8. Install the E-clip (20) into the groove of the bell crank shaft (23).
9. Reposition the master cylinder bracket with the master cylinder attached and install the three pan head torx screws (18) that secure the bracket to the floorboard. When installing the pan head torx screws (18) make sure that the screw threads go into the previously cut threads and do not cut new ones. Tighten the screws (18) to the specified torque value.

ITEM	TORQUE SPECIFICATION
18	27 - 44 in. lbs (3 - 5 Nm)

MASTER CYLINDER REPLACEMENT

Tool List	Qty.
Torque Wrench, ft. lbs.	1
Torque Wrench, in. lbs.	1
Ratchet	1
Socket, 14 mm	1
Socket, 1/2"	1
Wrench, 1/2"	1

⚠ 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. Rinse area with water and wipe off immediately.

To remove the master cylinder:

1. OPTIONAL: Remove the on-board battery charger from mounting brackets to gain better access to the master cylinder. For removal instructions refer to the 'Battery Charger' section of this manual.
2. Remove the driver side fender liner; this will give better access to the bell crank.
3. Remove the cotter pin (10) and the clevis pin (11) joining the master cylinder clevis and the bell crank.

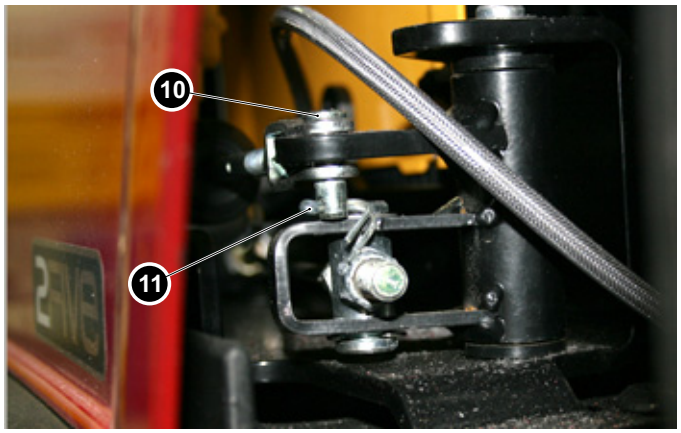

Fig. 16 Clevis Pin Removal

4. Remove the two hex head bolts (12) and nuts (13) that secure the master cylinder to the mounting bracket.

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

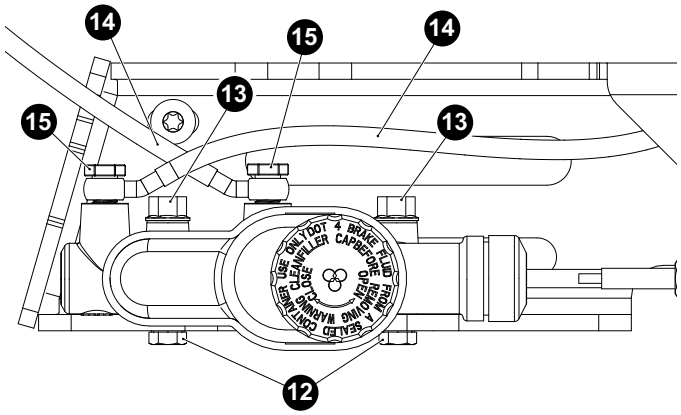

Fig. 17 Master Cylinder

5. Remove the banjo bolts (15) that secure the braided brake lines (14) to the master cylinder and allow brake fluid to drain into a container. **Do not reuse old brake fluid.**

To install master cylinder:

1. Use a new copper crush washer on each side of the banjo bolt (15) and connect the brake line from the rear wheels to the front port of the master cylinder . Tighten the banjo bolt (15) to the specified torque value.
2. Use a new copper crush washer on each side of the banjo bolt (15) and connect the brake line from the front wheels to the rear port on the master cylinder. Tighten the banjo bolt (15) to the specified torque value.
3. Install the two hex head bolts (12) and nuts (13) that secure the master cylinder to the mounting bracket. Tighten the nuts to the specified torque value.
4. Align the master cylinder rod clevis with the hole in the bell crank arm and install the clevis pin (10).
5. Install a new cotter pin through the clevis bolt, separate the legs of the clevis pin and bend legs in opposite directions.
6. Add clean fresh DOT 3 brake fluid into reservoir and bleed system per 'BLEEDING BRAKES'

ITEM	TORQUE SPECIFICATION
13	24 - 26 ft. lbs (32 - 35 Nm)
15	20 - 22 ft. lbs (27 - 30 Nm)

BLEEDING BRAKES

Tool List	Qty.
Hose	A/R
Clean Container	1
Brake Fluid, DOT 3	A/R
Wrench, 1/4" box end	1

The hydraulic brake system must be free of air to operate properly. Air can enter the system when hydraulic parts are disconnected for servicing or replacement, or when the fluid level in the master cylinder reservoir is very low. Air in the system will give the brake pedal a spongy feeling upon application.

NOTICE

An assistant will be necessary to perform this procedure.

1. Use a clean cloth to wipe off the master cylinder reservoir and wheel cylinder bleeder valves. Clean each fitting before opening to prevent contaminating the system.
2. Open the master cylinder reservoir and top off with standard automotive DOT 3 brake fluid.

⚠ WARNING

Never return brake fluid to the original container or reuse brake fluid due to the possibility of contamination by dirt, grease, moisture. Contaminated brake fluid could cause failure of the braking system. Dispose of brake fluid in accordance with Federal, state and local codes.

3. Attach a short length of clear hose to the caliper bleed valve and insert the other end into a suitable clean container containing fresh, clean brake fluid.

Check the fluid level in the master cylinder frequently during this operation to prevent air from entering the lines.

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

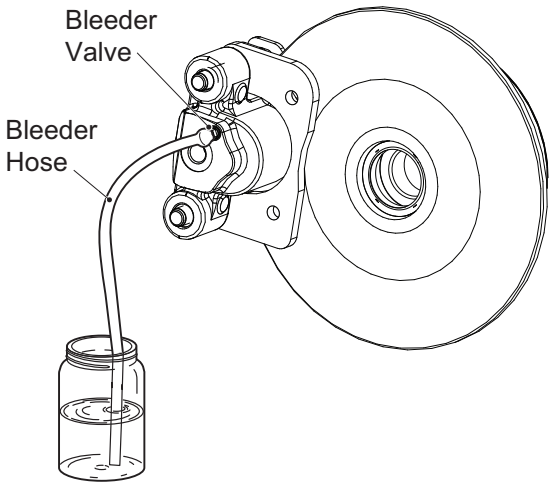

Fig. 18 Bleeding Brakes

4. Starting with the passenger side rear brake , then driver side rear brake, driver side front brake and passenger side front brake last. Bleeding the brakes requires an assistant to pump the brake pedal and keep pressure on the pedal. Bleed the brakes using the following procedure:
   a) Build pressure in the brake system, if possible, by slowly pumping the brake pedal.
   b) Open the bleeder valve while an assistant holds pressure on the brake pedal as the pedal slowly goes through the full stroke.
   c) Close the bleeder valve and have the assistant slowly release the brake pedal.
   d) Repeat the process until no bubbles can be seen leaving the bleeder valve.
   e) Close the valve and move to the next brake.

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

Notes:

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

Notes:

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TABLE OF CONTENTS FOR SECTION 'K' (CONT.)

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

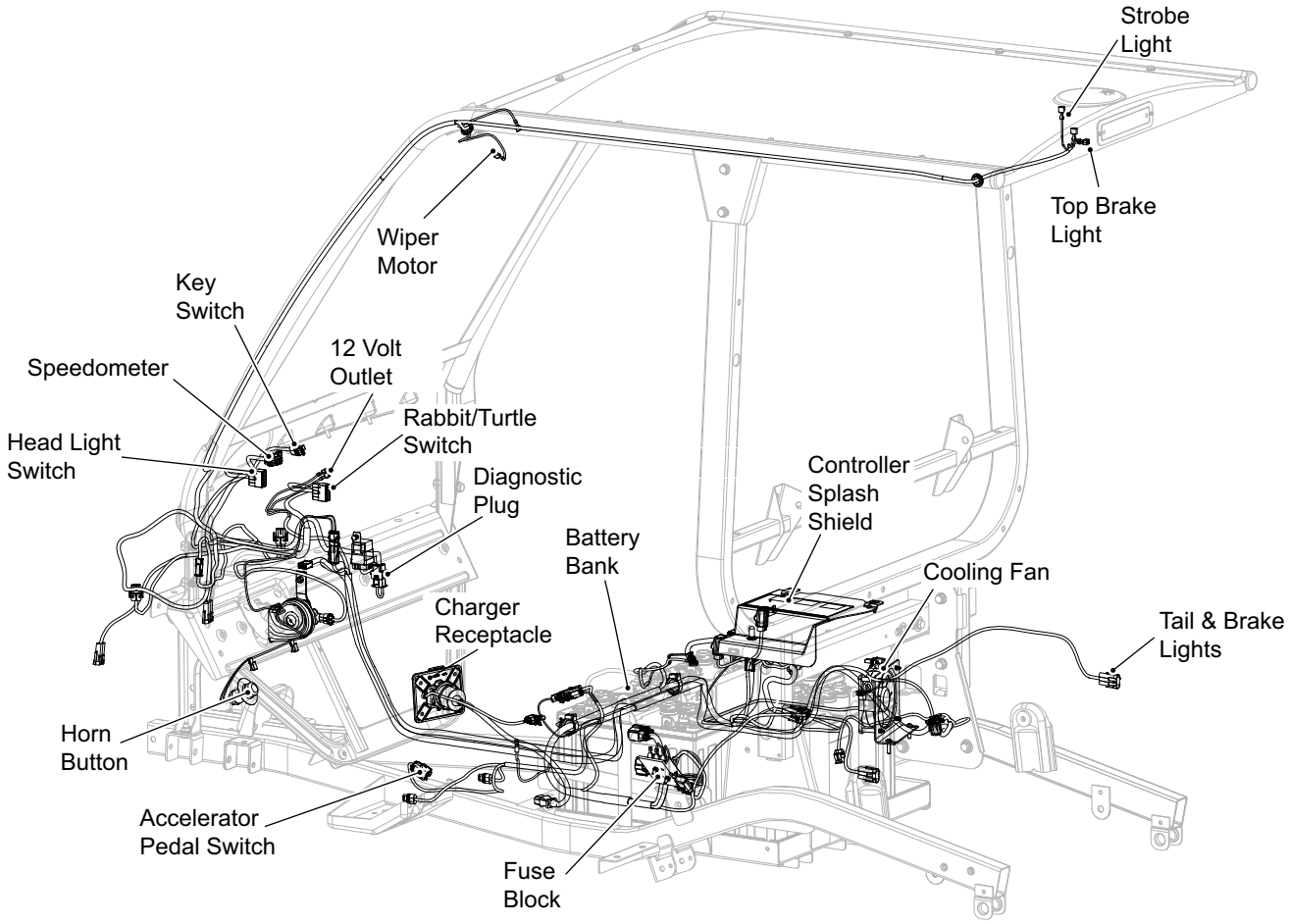


Fig. 1 Electrical Harnesses

MAIN WIRING HARNESS

The Main Electrical Harness for the vehicle is routed under the floormat, recessed into the floorboard, the forward section runs under the instrument panel into clips on the front splash shield, the rear section runs under the rear body and in front of the batteries. The harness has the Run/Tow switch, the Solenoid, and the Reverse Warning Indicator hard wired into the harness.

REPLACING THE MAIN WIRING HARNESS

Tool List	Qty.
Notched Pry Bar	1
Torx Bit 27 IP	1
Insulated Wrench, 9/16"	1
Torque Wrench, in. lbs	1
Socket, 9/16"	1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

To access the main wiring harness for replacement it is necessary to remove the OPS, upper and lower rocker panels, the floormat, the pedal cover, the front cowl, the top portion of the cup holder and the seat bottom. See the OPS Section and the Body Section in this manual for instructions on removal and replacement of these items.

1. Disconnect the main wiring harness from the battery pack using an insulated wrench.
2. Drain the stored energy from the controller. Place the Run/Tow switch in the 'Run' position, turn the key switch to reverse, wait for the reverse warning indicator to become silent then turn the key switch to the off

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

position and remove it from the switch.

3. Disconnect the rabbit/turtle switch in the cup holder from the wiring harness.
4. Loosen the trim panel (12) by pulling it away from the instrument panel along the upper edge then grip the ball holder with both hands and pull away from the instrument panel (13); move to the other side of the vehicle and grip the ball holder on that side with both hands and pull it away from the instrument panel (13).
5. Disconnect wires to the instruments located in the trim panel then remove the trim panel.

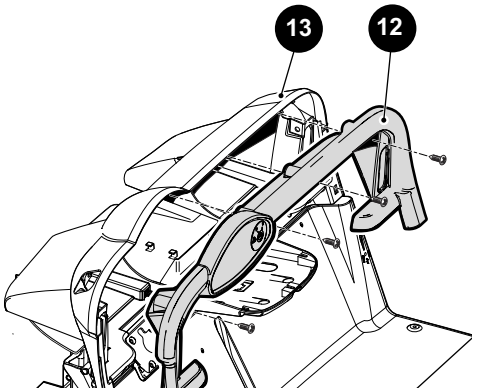
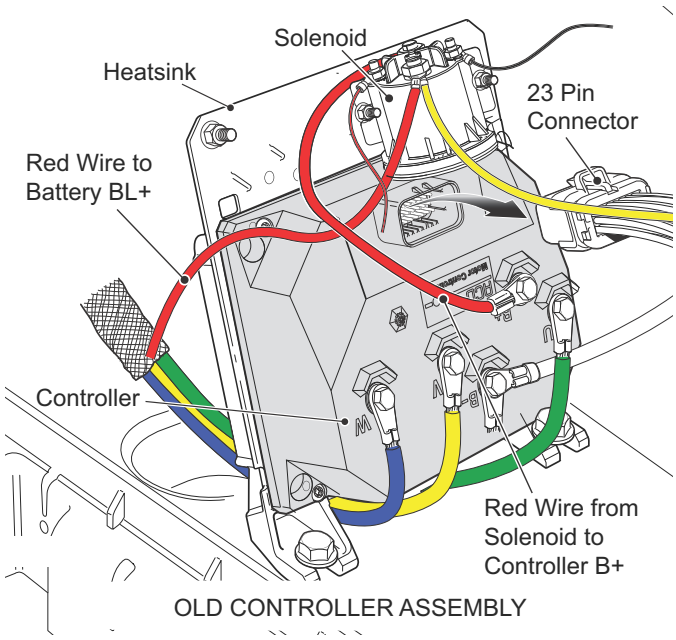


Fig. 2 Instrument Panel & Trim

6. Remove the wiring harness from the front splash shield retaining clips.
7. Disconnect the two wires to the brake light relay located on the front splash shield tab extending into the cup holder.
8. Remove the Diagnostic Plug from the bottom of the cup holder.
9. Disconnect the plug to the throttle enable switch.
10. Disconnect the plug from the rotary position sensor.
11. Remove the two Torx head screws that secure the front edge of the rear body and seat support frame to the floorboard.
12. Remove the two Torx head screws along back edge of the seat opening that secure the rear body to the seat support.
13. Remove two Torx head screws each side that secure the lower edge of the rear body to the floorboard.
14. Remove the two Torx head screws from the bagwell that secure the rear body to the rear bumper.
15. Remove three plastic rivets securing the controller splash shield; two on the rear body and one from controller heat sink, move the splash shield out of the way.
16. Raise the front edge of the rear body several inches and support it with a block or piece of 2" x 4" wood. This will allow the harness to be passed between the rear body and the floorboard.
17. Unplug the large 23 pin (35 pin for new controller) connector from the controller by lifting up on the locking tab and pulling the connector housing away from the controller.



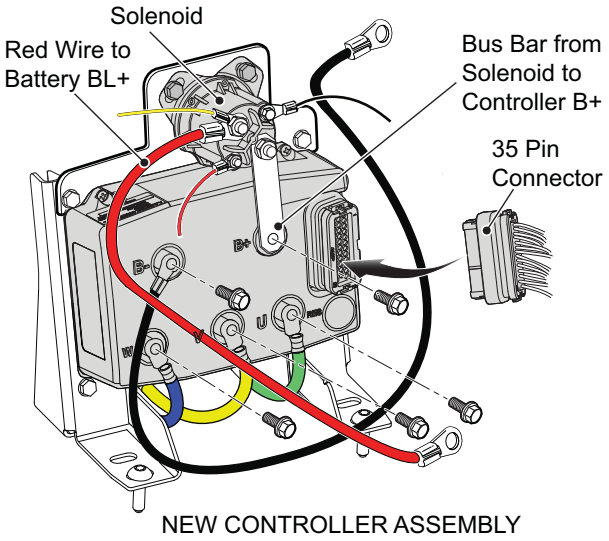


Fig. 3 Controller

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

18. Remove the Run/Tow switch from the splash shield by removing the seal (4) and upper nut (5) then push the switch (7) through the splash shield. CE vehicles will have a key switch in place of the toggle switch, unscrew the top ring to release the switch from the splash shield. **Check the Run / Tow label, if it has become difficult to read replace it with a new one available from service parts.**

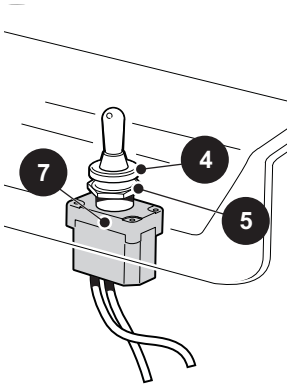


Fig. 4 Run / Tow Switch

19. Remove the two Torx head screws (10) securing the reverse warning indicator (11) to the splash shield.

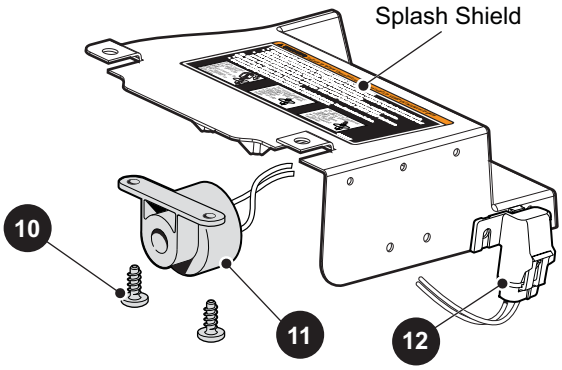


Fig. 5 Reverse Warning Indicator

20. OLD VEHICLES: Remove two larger hex nuts (16) from the larger terminal posts of solenoid and disconnect green wire from controller B+ terminal, green wire (20) from BL+, battery terminal, and yellow wire (21) from wire harness. Remove two smaller hex nuts (28) from the small terminal posts and disconnect black wire (23) and red wire (24) from the wire harness.

21. NEW VEHICLES: Remove two larger hex nuts (16) from the larger terminal posts of solenoid and disconnect bus bar from controller B+ terminal, red wire from BL+, battery terminal, and yellow wire (21) from main wire harness. Remove two smaller hex nuts (28) from the small terminal posts and disconnect black wire (23) and red wire (24) from the wire harness.

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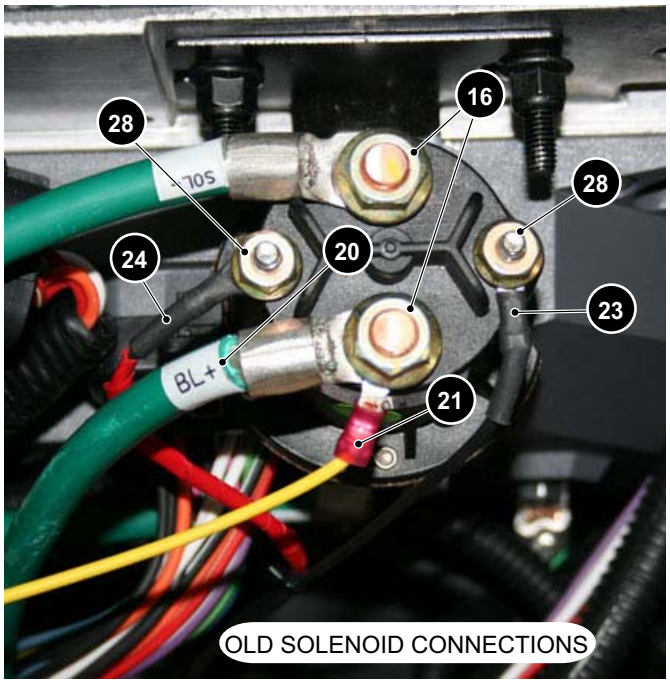


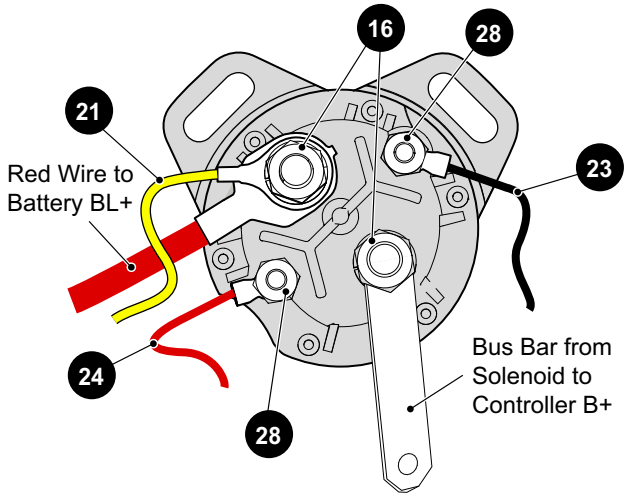


Fig. 6 Solenoid Connections

22. Unplug the connectors from the motor brake (31), the motor temperature sensor (32) and the speed sensor (33).

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

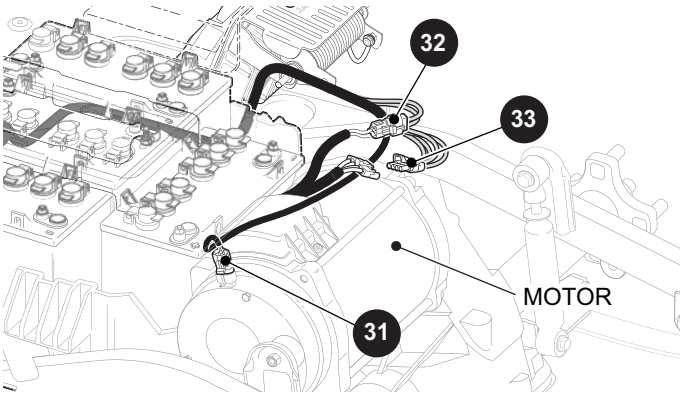


Fig. 7 Motor Connections

23. Remove main wiring harness from the vehicle.
24. Install new main wiring harness making sure that it follows the proper path.
    a) Starting in the middle of the vehicle, route the forward section of the harness under the rear body in the floorboard channels (1 & 2).
    b) Route the connections for the brake and accelerator pedals, making sure that the harness lays in the recessed floorboard channels.

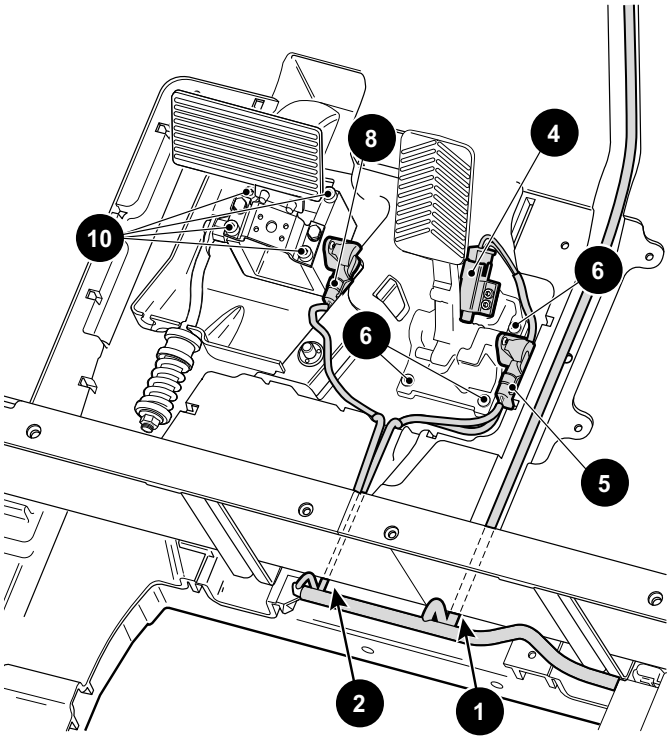


Fig. 8 Harness Routing & Pedal Connections

    c) Connect the wires to the accelerator rotary position sensor (5) and the throttle enable switch connector (4).
    d) Place pedal assembly in position on the floorboard and secure with three Torx screws (6).
    e) Connect the wires to the brake pedal rotary position sensor (8).
    f) Place pedal assembly in position on the floorboard and secure with four socket head hex screws (10).
    g) Route the remaining wires in the floorboard channel that runs up under the instrument panel.
    h) Feed the connectors for the key switch, the speedometer, the rabbit/turtle switch and the diagnostic plug through the opening in the cup holder base (12). Place the diagnostic plug (13) into the cup holder base and route the connectors for the key switch (14), the speedometer and the rabbit/turtle switch over the front splash shield.

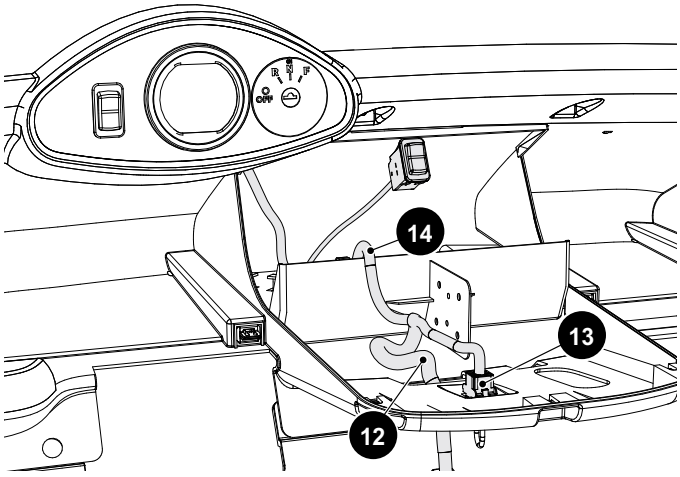


Fig. 9 Cup Holder

    i) Route the wires (14) for the key switch and the speedometer through the guide (15) on the front splash shield and the connectors for the key switch and the speedometer through the opening (16) in the back of the instrument panel.

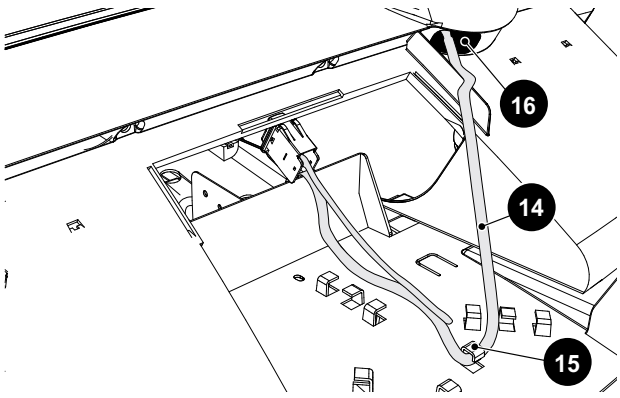
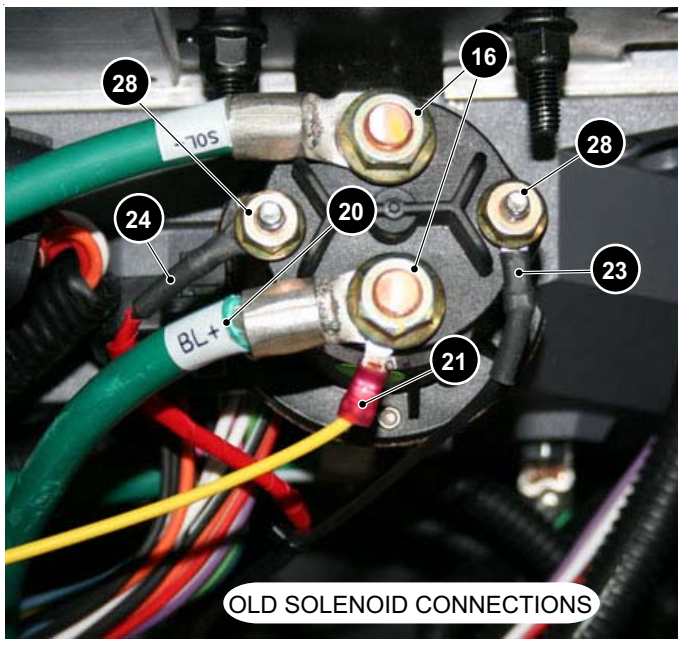


Fig. 10 Front Splash Shield

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

j) Connect the wire harness to the key switch, the speedometer and the rabbit/turtle switch.

k) Route the two rear sections of the harness between the rear body and the battery pack making sure that the longer wires (21) are routed to the passenger side.



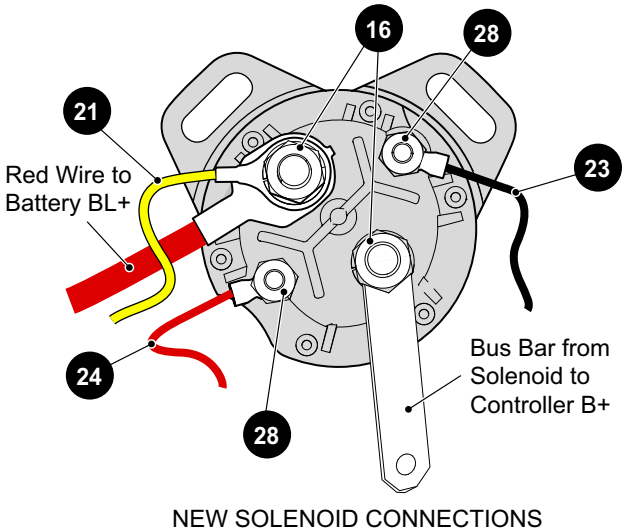
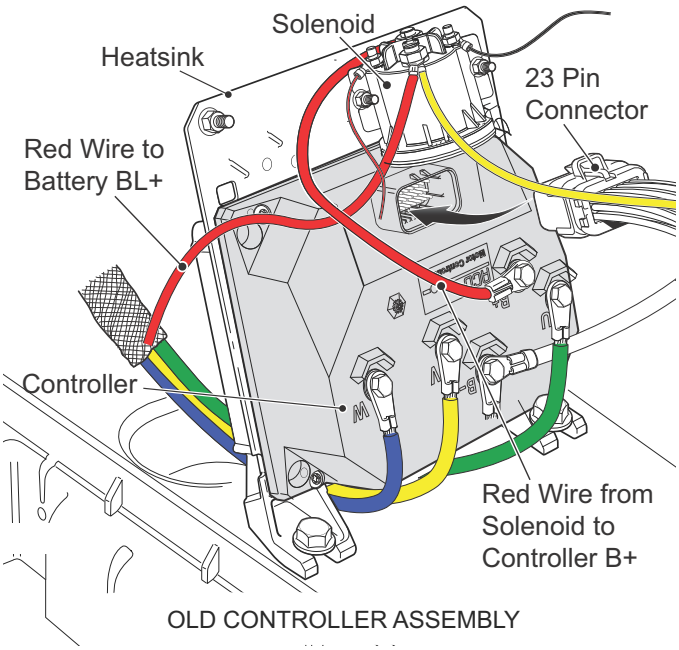


Fig. 11 Solenoid Connections

l) Reconnect the black wire (23) and red wire (24) to the solenoid as shown and secure in place with small hex nuts (28).

m) OLD VEHICLES: Connect the green wire from the controller B+ to the back terminal of the solenoid and secure in place using a hex nut (16). ***Do not over tighten the nut.***

n) OLD VEHICLES: Connect the green wire (20) from the positive (+), BL+, battery terminal and the yellow wire (21) from the wiring harness to the front terminal on the solenoid, secure in place with hex nut (16). Be sure to place larger wire terminals on the solenoid studs first and smaller wire terminals on last***. Do not over tighten the nut.***



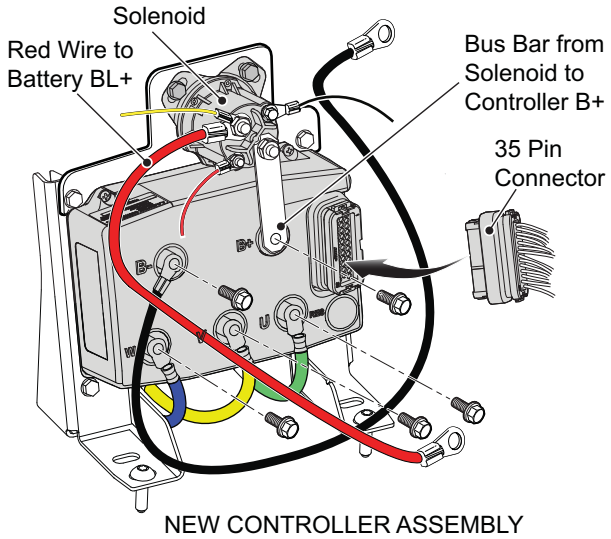


Fig. 12 Controller Connections

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

o) NEW VEHICLES: Connect the bus bar from the controller B+ to the front terminal of the solenoid and secure in place using a hex nut (16). ***Do not over tighten the nut.***

p) NEW VEHICLES: Connect the red wire from the positive (+), BL+, battery terminal and the yellow wire (21) from the wiring harness to the rear terminal on the solenoid, secure in place with hex nut (16). Be sure to place larger wire terminals on the solenoid studs first and smaller wire terminals on last***. Do not over tighten the nut.***

q) Plug the 23 pin (35 pin for new controller) connector from the wire harness into the socket on the controller, push in firmly and make sure that the locking tab is latched.

r) Plug the connectors for the motor brake (31), the motor temperature sensor (32) and the speed sensor (33) into the connectors on the motor and motor brake.

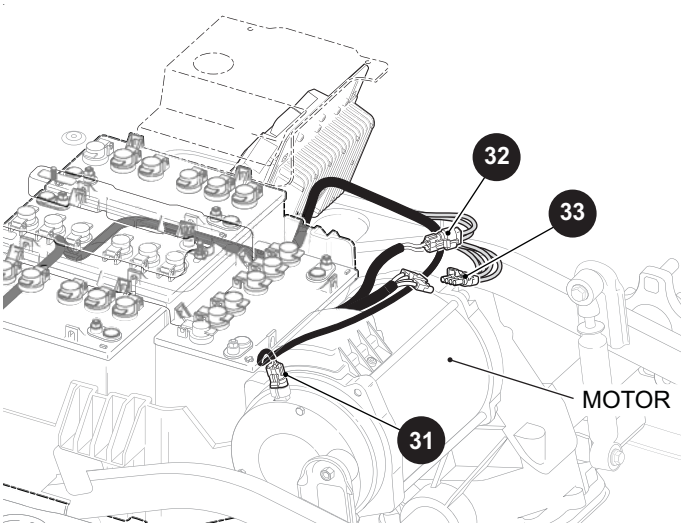


Fig. 13 Motor Connections

29. Install the reverse warning indicator (11) onto the controller splash shield using two Torx head screws (10).

30. Press the fuse holder (12) into the hole on the controller splash shield.

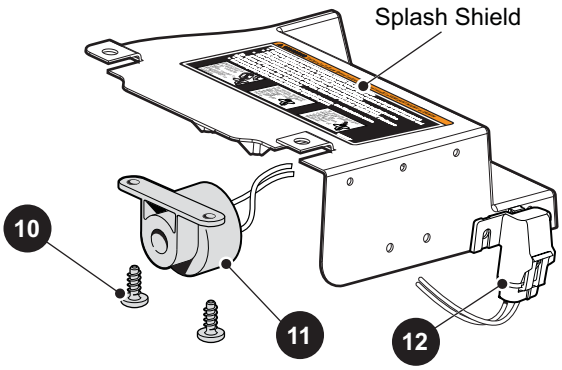


Fig. 14 Reverse Warning Indicator & Fuse

31. Install the Run/Tow switch (7) by removing the upper nut (5) and seal (4) from the switch. Position the switch with the notch towards the RUN direction. Install the upper nut (5) finger tight and torque as specified in the torque table, install the seal (4).

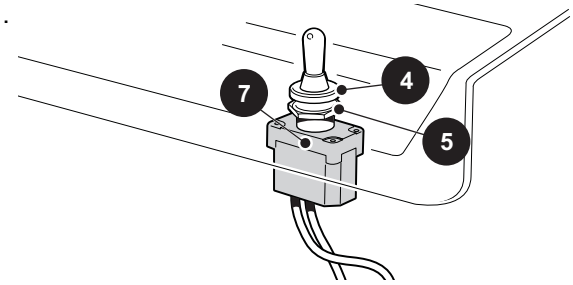


Fig. 15 Run / Tow Switch

32. Replace the controller splash shield and secure it to the body with three christmas tree rivets.

33. Install the top portion of the cup holder and secure with the speed nuts.

34. Connect the negative battery wires using an insulated wrench.

35. Connect the positive battery wires using an insulated wrench.

36. Be sure that all wires are connected properly before installing the body components that were removed to allow access to the wiring harness.

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

REPLACING ELECTRICAL COMPONENTS

Run / Tow Switch (Ref Fig. 16 on page K-7)

Tool List	Qty.
Notched Pry Bar	1
Torx Bit 27 IP	1
Wire Cutters	1
Wire Stripper	1
Wire Terminal Crimping Tool	1
Insulated Wrench, 9/16"	1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

To access the splash shield where the run/tow switch is mounted, raise and remove the seat bottom. The splash shield is mounted over the controller on the passenger side of the vehicle.

1. Disconnect the battery cable at the negative (-) battery terminal using an insulated wrench.
2. Remove three plastic rivets securing the controller splash shield; two on the rear body and one from controller heat sink, raise splash shield and turn over to expose the switch and wires.
3. Remove the seal and upper nut to allow the switch to be removed from the splash shield. **Check the Run / Tow label, if it has become difficult to read replace it with a new one available from service parts.**
4. Cut the wires from the existing run/tow switch close to the switch.
5. Strip insulation from the end of each wire, using a butt splice connector and heat shrink tubing connect the wires from the new run/tow switch to the wire harness.
6. Remove the upper nut and seal (7) from the new switch (8).
7. Install the switch (8) with the notch towards the RUN direction.
8. Install the upper nut and seal (7) finger tight and torque as specified in the torque table.

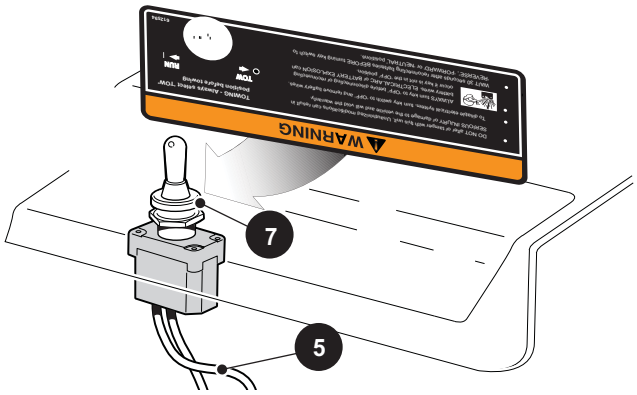


Fig. 16 Run / Tow Switch

9. Install the splash shield using three plastic rivets to secure the shield to the body and the controller.

Replace any worn or damaged hardware with new as required

ITEM	TORQUE SPECIFICATION
7	13 in. lbs (1.5 Nm) Max.

Reverse Warning Indicator (Ref Fig. 17 on page K-8)

Tool List	Qty.
Notched Pry Bar	1
Torx Bit 27 IP	1
Wire Cutters	1
Wire Stripper	1
Wire Terminal Crimping Tool	1
Insulated Wrench, 9/16"	1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

To access the splash shield containing the run/tow switch raise and remove the seat bottom.

1. Disconnect the battery cable at the negative (-), BL-, battery terminal using an insulated wrench.
2. Remove three plastic rivets securing the controller splash shield; two on the rear body and one from controller heat sink, raise splash shield and turn over to expose the reverse warning indicator and wires.

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

3. Remove the two torx head screws (10) securing the reverse warning indicator (11) to the splash shield.
4. Cut the wires close to the reverse warning indicator (11).
5. Strip insulation from the end of each wire, using a butt splice connector and heat shrink tubing connect the wires from the replacement reverse warning indicator (11) to the wire harness.
6. Secure the new reverse warning indicator (11) to the splash shield with the torx head screws (10).
7. Reinstall the splash shield.

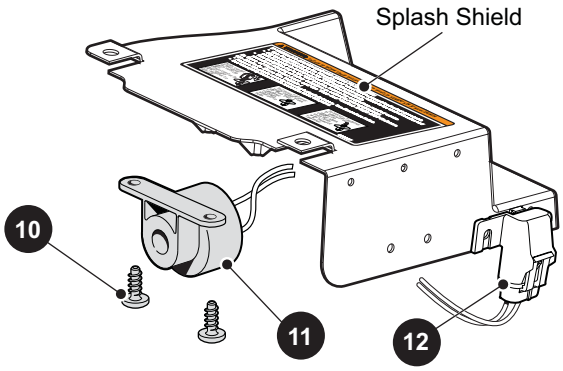


Fig. 17 Reverse Warning Indicator

ITEM	TORQUE SPECIFICATION
10	12- 15 in. lbs (1.3 - 1.7 Nm)

Speedometer

Tool List **Qty.**

Torx Bit 27 IP 1
Ratchet 1

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the four Torx head screws (10) that secure the instrument panel trim (11) to the instrument panel.

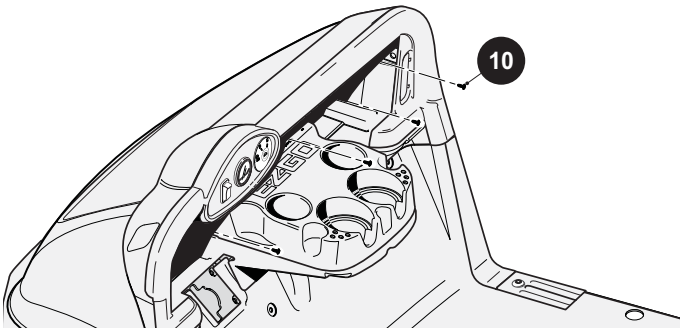


Fig. 18 Trim Panel Hardware

2. Pull the top of the trim panel (11) away from the instrument panel and disconnect the harness (21) from the fuel gauge/state of charge meter (20).
3. Depress the tabs on the speedometer (20) and push the unit out of the trim panel (11)

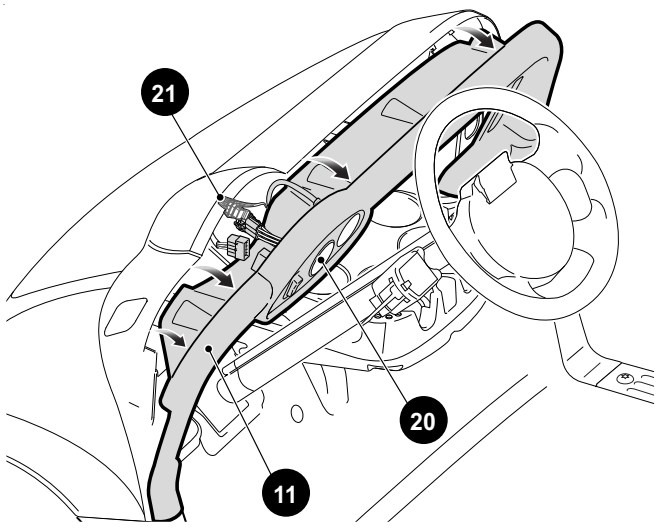


Fig. 19 Speedometer

4. Insert the speedometer (20) into the opening in the instrument panel trim (11), making sure that the tabs all lock in place.
5. Connect the main harness (21) to the fuel gage/state of charge meter (20)
6. Push the instrument panel trim (11) into place making sure that no wires are pinched.
7. Install the four Torx head screws (10) that secure the instrument panel trim (11) to the instrument panel and the front cowl.

ITEM	TORQUE SPECIFICATION
10	6 - 9 ft. lbs (8 - 12 Nm)

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

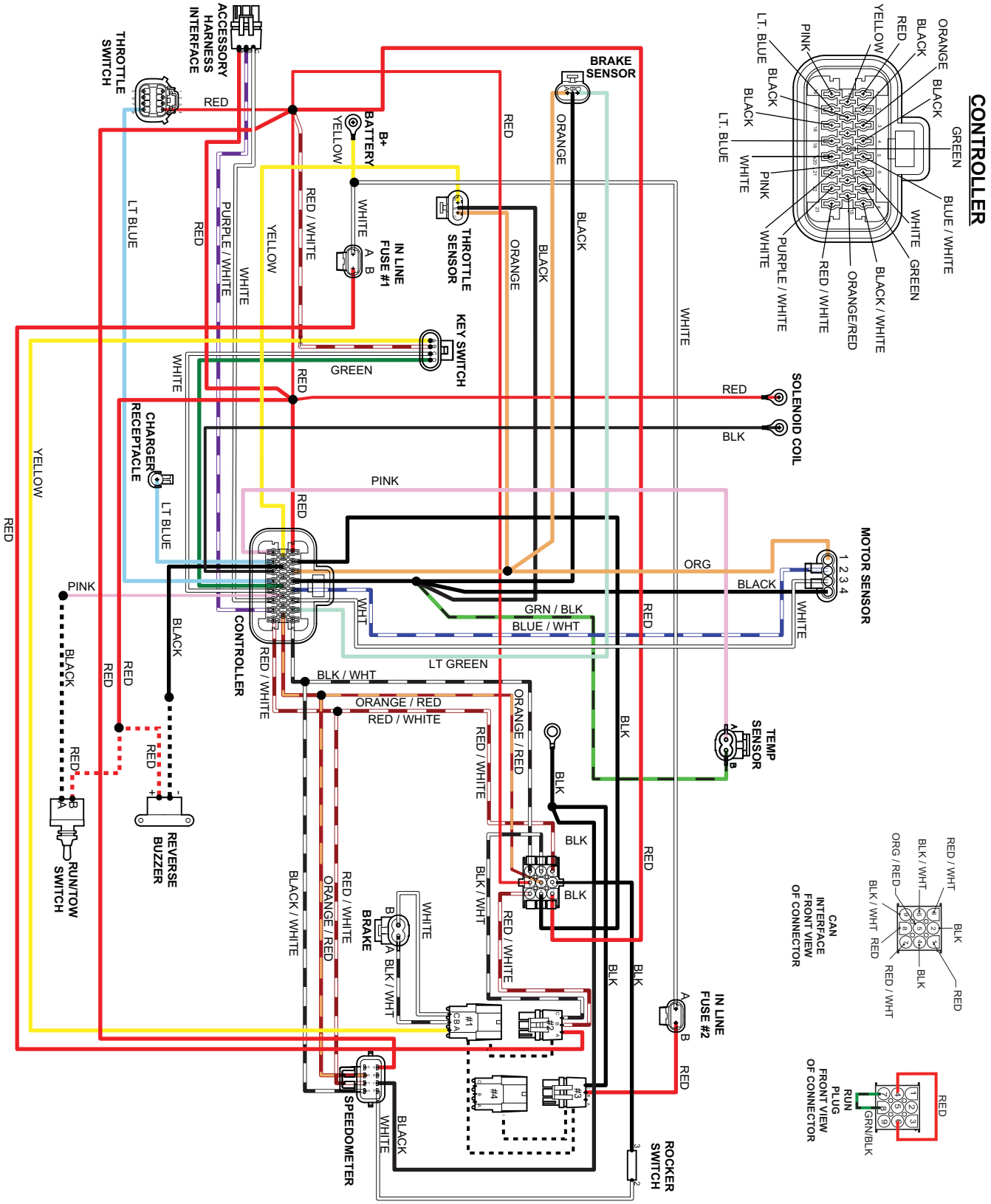


Fig. 20 Main Wiring Harness

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

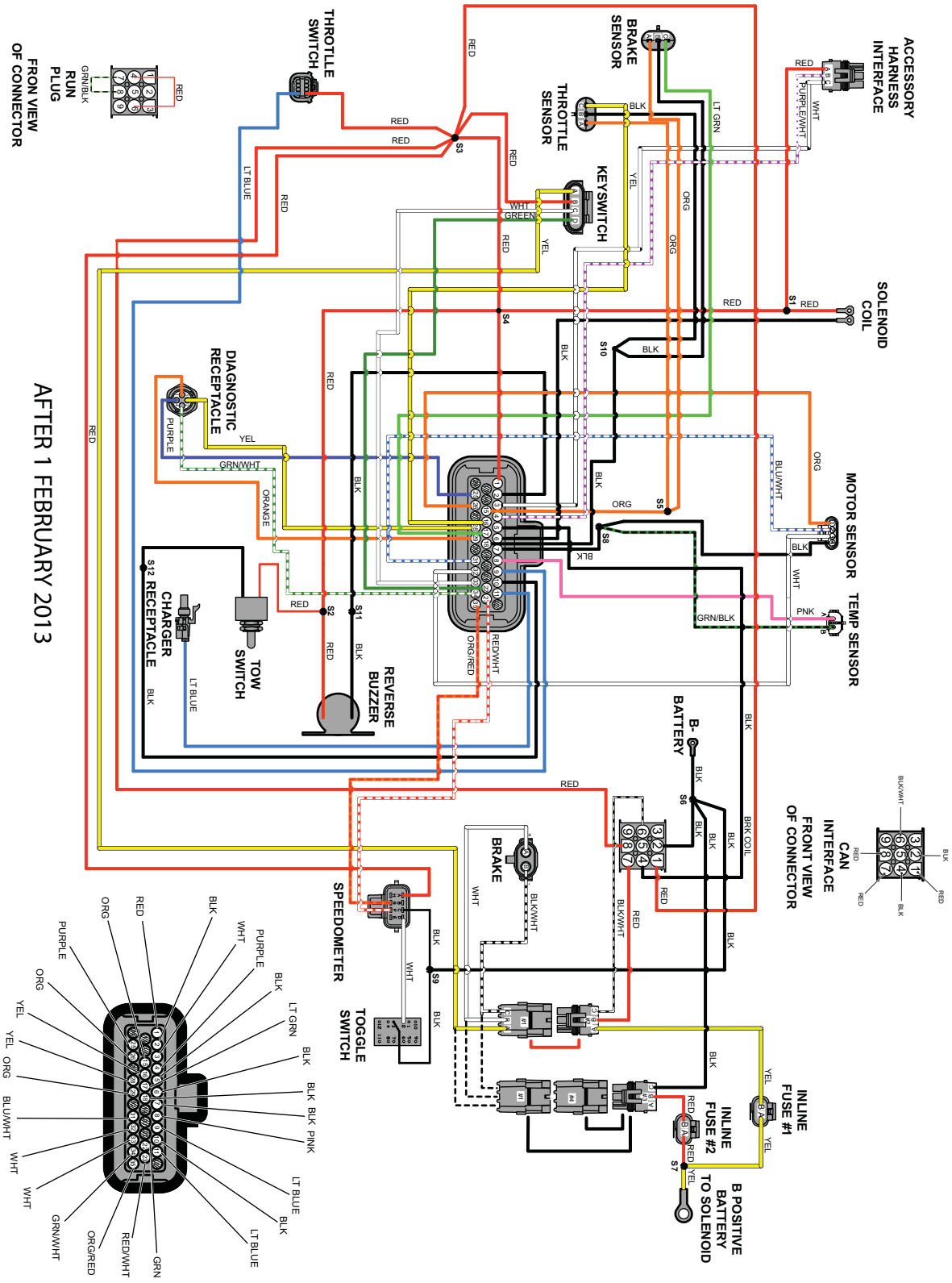


Fig. 20 Main Wiring Harness (AFTER 1 FEBRUARY 2012)

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

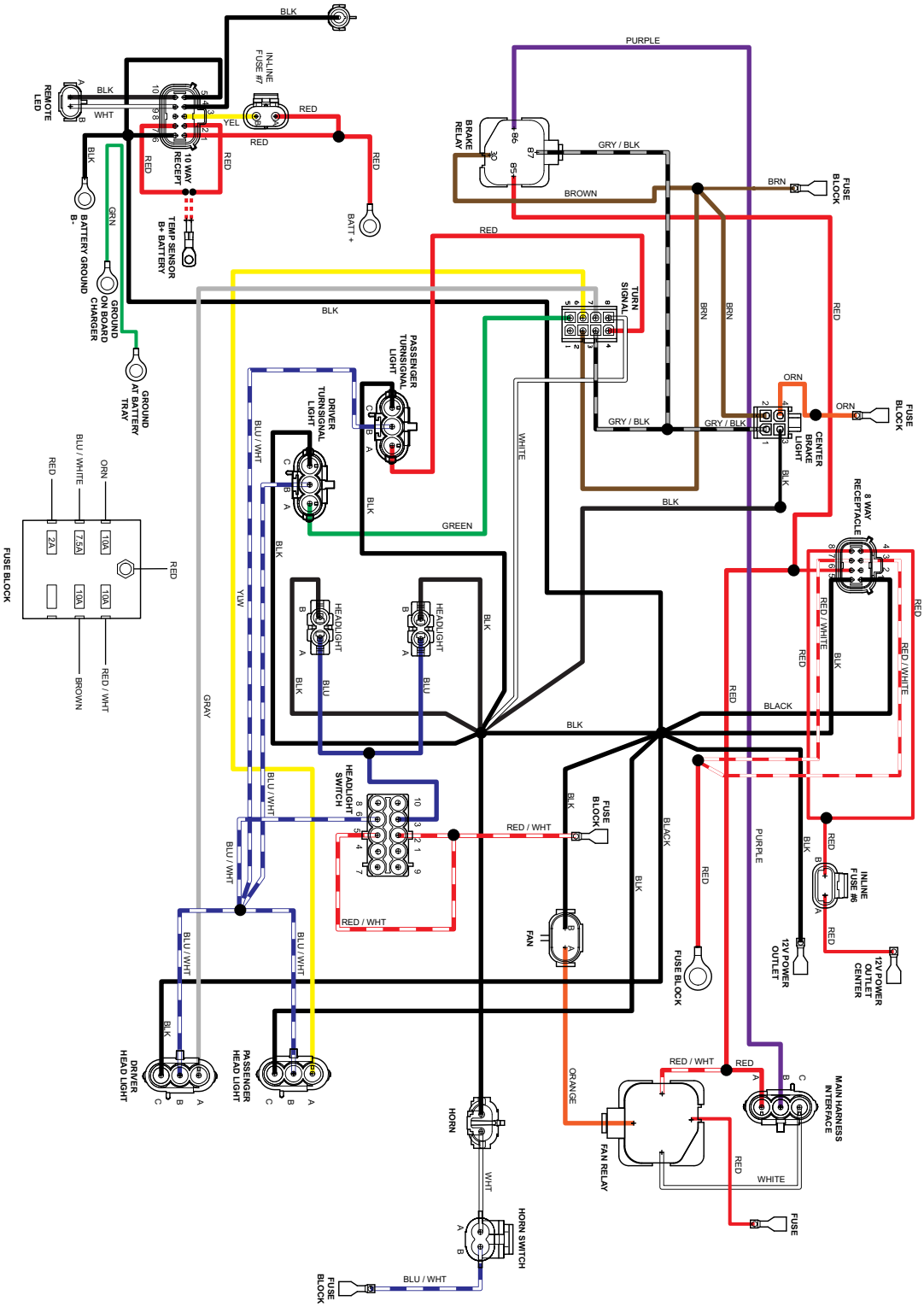


Fig. 21 Accessory Wiring Harness

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

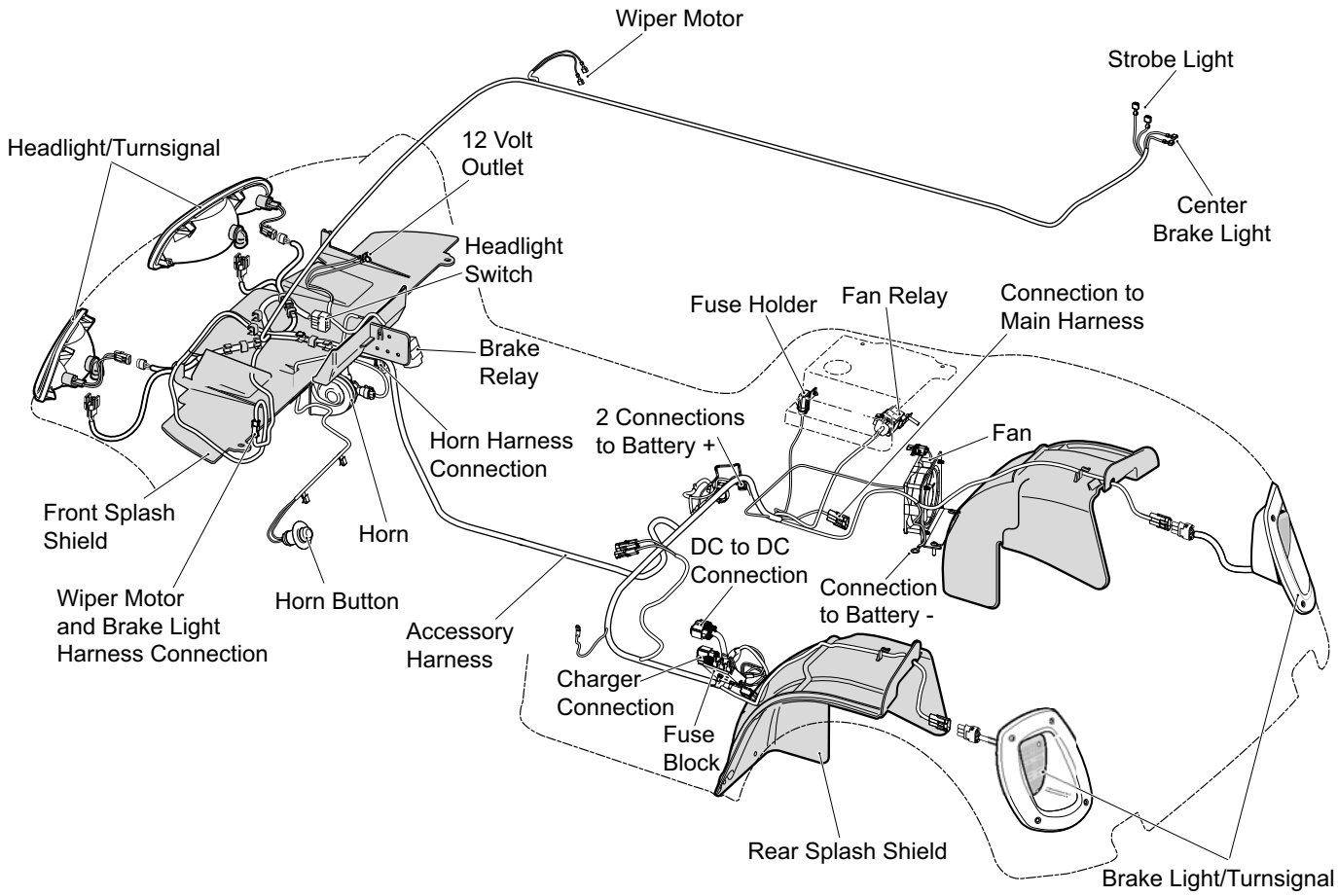


Fig. 22 Accessory Wiring Harness

ACCESSORY WIRING HARNESS

The Accessory Wiring Harness powers the controller cooling fan, headlights, turn signals, brake lights, and the horn. The Accessory Harness is routed under the floormat, recessed into the floorboard. The section for the headlights and turn signals is routed through the cup holder and on top of the front splash shield. The other end is routed under the rear body then splits and runs over the rear splash shields to the back of the vehicle for the rear lights. One fuse holder is mounted on the Splash Shield covering the Controller, a fuse block and a single fuse holder is mounted on a bracket just behind the DC to DC converter.

REPLACING THE ACCESSORY WIRING HARNESS

Tool List	Qty.
Notched Pry Bar	1
Torx Bit 27 IP	1
Ratchet	1
Socket, 9/16"	1
Socket, 10 mm	1
Torque Wrench, in. lbs.	1
Insulated Wrench, 9/16"	1

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-) battery terminal.

To access the accessory wiring harness for replacement, it is necessary to disconnect the wiper motor and

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

brake light harness from the accessory harness then remove the OPS, upper and lower rocker panels, the floormat, the front cowl, the top portion of the cup holder and the seat bottom. See the Weather Protection Section and the Body Section in this manual for instructions on removal and replacement of these items.

1. Using an insulated wrench disconnect the accessory harness from the battery pack, both positive (+) and negative (-) terminals.
2. Unplug wires going to the headlights, turn signals, headlight switch, turn signal switch, horn and the brake lights.
3. Remove the christmas tree rivet holding the brake switch relay in place on the front splash shield tab that extends into the cup holder.
4. Unplug the accessory harness from the main harness.
5. Remove the fuse holder from the controller splash shield.
6. Disconnect the Fan and the Fan Relay.
7. Disconnect wires from the Fuse Block.
8. Disconnect the green ground wire by removing the torx head bolt that secures the fuse holder bracket to the battery tray.
9. Disconnect the DC to DC connector and the Charger Connector.
10. Remove the screw securing the green wire to the on board charger.
11. Disconnect the tail light wiring connectors.
12. Remove the two Torx head screws that secure the front edge of the rear body and seat support frame to the floorboard.
13. Remove the two Torx head screws along back edge of the seat opening that secure the rear body to the seat support.
14. Remove the four Torx head screws; two on each side that secure the lower edge of the rear body to the floorboard.
15. Remove the two Torx head screws from the bagwell that secure the rear body to the rear bumper.
16. Raise the front edge of the rear body several inches and support it with a block or piece of 2" x 4" wood. This will allow the harness to be passed between the rear body and the floorboard.
17. Remove the accessory wiring harness from the vehicle.
18. Install new accessory wiring harness making sure that it follows the proper path.

a) Starting in the cup holder, route the forward section of the harness in the tabs on the front splash shield, making sure that the wires tagged 'Driver Side' are routed to the driver's side of the vehicle and the wires tagged 'Passenger Side' are routed to the passenger side. Secure the wires by routing them through the splash shield tabs

b) Route the wires for the headlight switch through the opening in the instrument panel for the headlight switch.

c) route the wires for the 12 Volt Outlet through the opening in the upper part of the cup holder.

d) Route the wires for the horn down through the flap in the front splash shield on the driver's side of the vehicle.

e) Route the wires and connector for the horn between the frame and the under side of the front splash shield and connect to the horn.

f) Connect the horn button connector to the accessory harness under the cup holder.

g) Position the brake relay (1) on the front splash shield tab that extends into the cup holder base and secure with a christmas tree rivet (2)

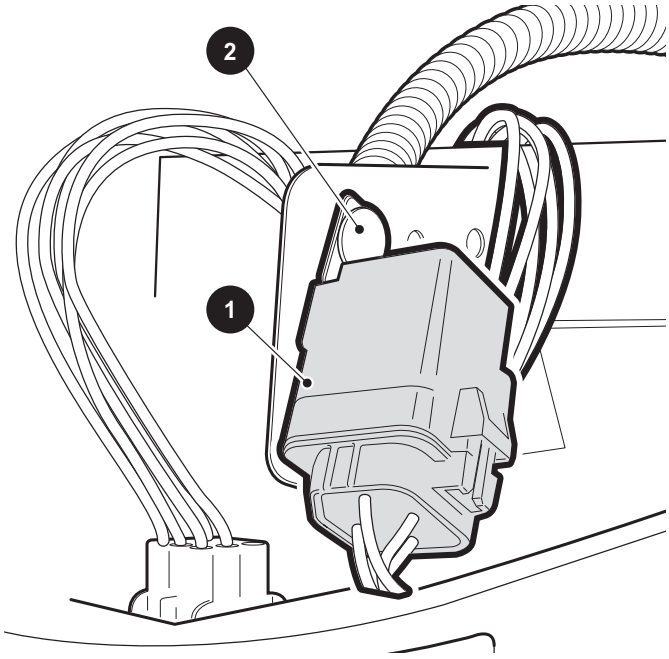


Fig. 23 Brake Light Relay

h) Route the rest of the harness down through the cup holder, in the floorboard channel and under the rear body in the floorboard channel along with the main wiring harness. ***Make sure that the harness sets below the level of the floor.***

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

i) Route the wires and connector for the fuse block, DC to DC converter, on-board battery charger and the driver side brake light between the rear body and the battery pack and around the driver's side of the battery pack to the splash shield. Secure the wires in the guides on the splash shield and connect to the brake light.

j) Install the fuse holder bracket and the green ground wire.

k) Route the connection to the main electric harness, one fuse, fan relay, fan connector and the passenger side brake light wires between the rear body and the battery pack.

l) Install the fan relay onto the controller heat sink.

m) Connect the connector to the cooling fan.

n) Snap the fuse holder into the hole on the controller splash shield.

o) Route the wires and connector for the passenger side brake light around behind the controller, over the passenger side rear splash shield, through the guides and connect to the brake light.

p) Connect the DC to DC converter and on-board battery charger connectors.

q) Install the single fuse holder on the driver's side on the underside of the fuse block bracket.

r) Connect the wires with push on connectors to the fuse block and attach the red wire with ring terminal to the post on the fuse block.

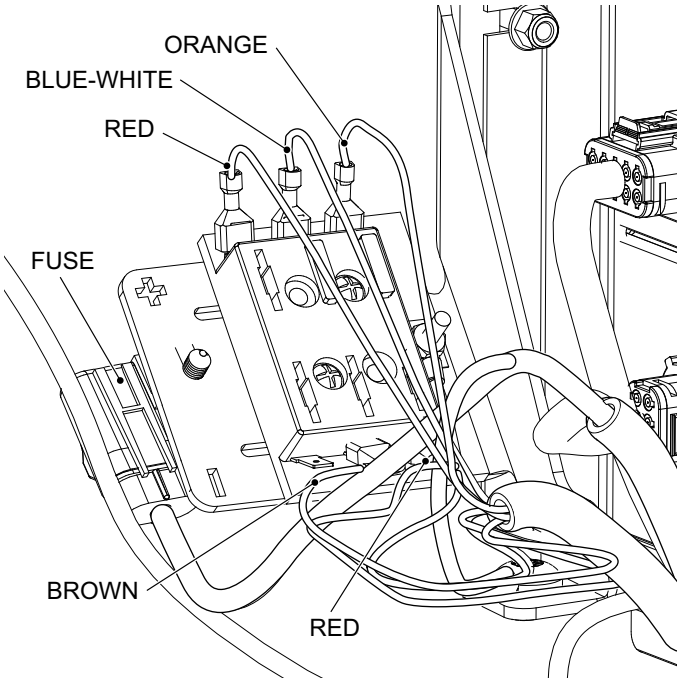


Fig. 24 Fuse Block

19. Be sure that all wires are connected properly before installing the body components that were removed to allow access to the wiring harness.

REPLACING ELECTRICAL ACCESSORIES

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-) battery terminal.

Head Light Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Depress the two bottom tabs (1) on the back of the headlight assembly and push outward.
2. Depress the two top tabs (2) on the back of the headlight assembly and push outward.
3. Disconnect the accessory harness connector (5) from the headlight (3).

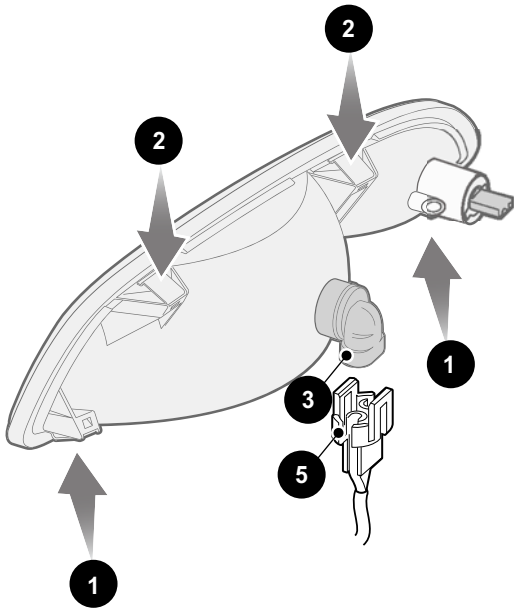


Fig. 25 Headlight Assembly

4. To install the headlight assembly, connect the accessory harness connection (5) to the headlight bulb (3).
5. Position headlight assembly in the cowl opening and press in firmly making sure that all tabs are locked into position.

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

Head Light Bulb Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Turn the headlight bulb (3) clockwise and pull to remove.
2. Disconnect the accessory harness from the light bulb.
3. Connect the accessory harness to the light bulb.
4. Align the bulb with the opening in the back of the headlight assembly.
5. Turn the bulb (3) counter clockwise until it stops.

Turn signal Bulb Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove two phillips head screws (8), pull turn signal lens (7) away from the housing to access the bulb.

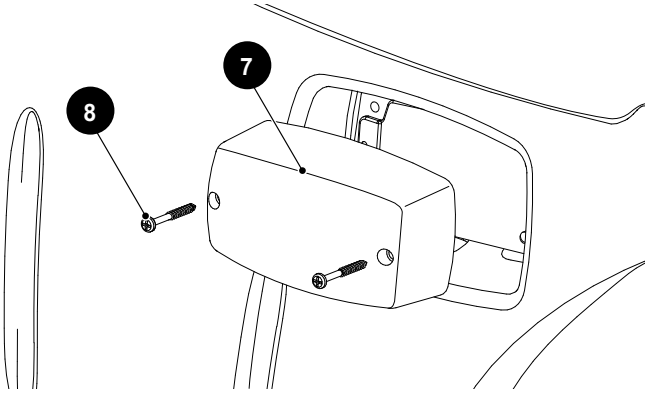


Fig. 26 Front Turn Signal Bulb Replacement

2. Remove bulb from socket and replace with a new one.
3. Replace the lens (7) and secure in place with the two phillips head screws (8).

Head Light Switch Replacement

Tool List	Qty.
Torx Bit 27 IP	1
Ratchet	1

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the four Torx head screws (10) that secure the instrument panel trim to the instrument panel.

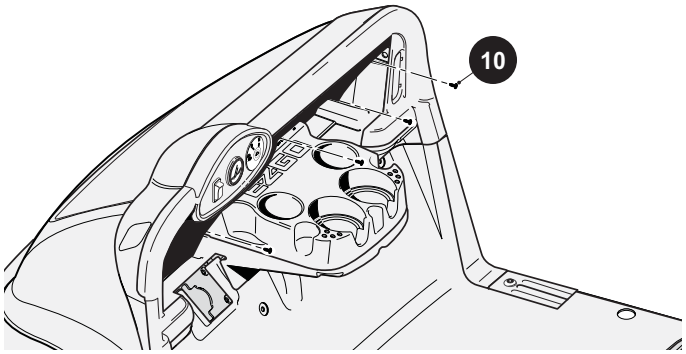


Fig. 27 Trim Panel Hardware

2. Pull the top of the trim panel (11) away from the instrument panel and disconnect the accessory harness (12) from the head light switch (13).
3. Depress the tabs on the top and bottom of the headlight switch (13) and push the switch out of the trim panel (11).

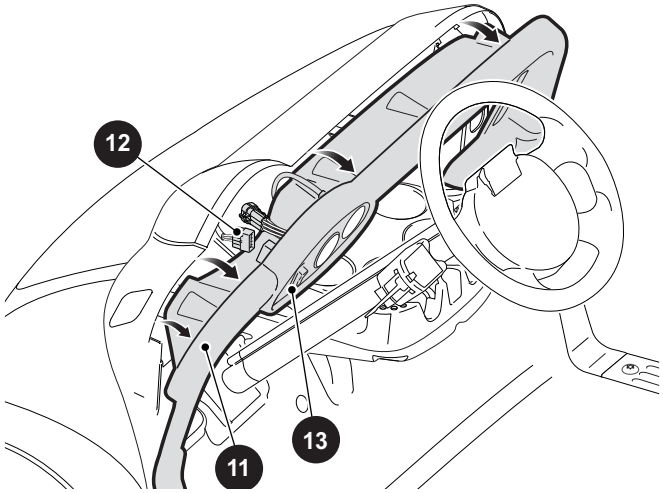


Fig. 28 Head Light Switch

4. Insert the new head light switch into the opening in the instrument panel trim (11), making sure that the tabs all lock in place.
5. Connect the accessory harness (12) to the headlight switch (13).
6. Push the instrument panel trim into place making sure that no wires are pinched.
7. Install the four Torx head screws (10) that secure the instrument panel trim (11) to the instrument panel and the front cowl.

ITEM	TORQUE SPECIFICATION
10	6- 9 ft. lbs (8 - 127 Nm)

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

Turn Signal Switch Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the top part of the cup holder (ref Section B)
2. Unplug the connector from the turn signal switch harness to the main electrical harness.
3. Feed the wires, connector and flasher unit down through the bottom of the cup holder.
4. Remove the plastic cover from the steering column.
5. Loosen the clamp that keeps the turn signal switch in place on the steering column. Continue loosening the clamp until the end is free of the worm screw.
6. Remove the turn signal switch assembly including the clamp.
7. Inspect the black electrical tape on the steering column, if worn through, remove the old tape and replace it with new electrical tape to cushion the turn signal switch and improve the fit to the column.
8. Feed the end of the clamp through the turn signal switch housing and position the switch on the steering column over the electrical tape.
9. Start the end of the clamp into the worm screw, making sure that the turn signal switch is properly positioned and tighten securely on the steering column.
10. Snap the steering column cover in place making sure that the wire harness stays in the cover groove.
11. Route the wire harness under the floor mat to the cupholder.
12. Feed the flasher unit and the connector up through the bottom of the cup holder and secure the flasher unit to the center of the splash shield tab using a christmas tree rivet.
13. Plug the turn signal wire harness connector into the accessory wire harness.

Turn signal Flasher Unit Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the top part of the cup holder (ref Section B)
2. Unplug the flasher unit from the turn signal wire harness.
3. Install the new flasher unit in the wire harness receptacle.
4. Replace the top part of the cup holder (ref Section B)

Tail Light Assembly Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the four Torx head screws (15) that secure the tail light assembly (16) to the rear body.
2. Pull the tail light (16) assembly away from the rear body and disconnect the assembly from the wire harness connector (17).

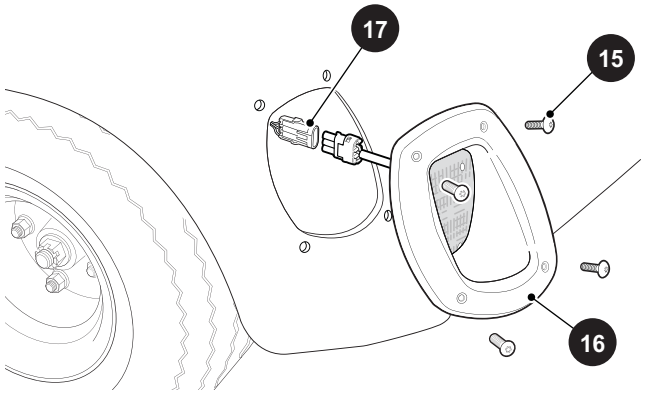


Fig. 29 Tail Light Assembly

3. Plug the new tail light assembly (15) into the accessory wire harness connector (16) and push the tail light assembly (16) into the opening.
4. Install the four Torx head screws (15).

Tail Light Lens Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the two phillips head screws that secure the lens to the tail light assembly.
2. Install the new lens and secure in place with the two phillips head screws.

Tail Light Bulb Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

1. Remove the two phillips head screws that secure the lens to the tail light assembly.
2. Remove the light bulb.
3. Install the new light bulb.
4. Install the lens and secure in place with the two phillips head screws.

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

Horn Button Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

To access the horn button switch for replacement, the lower and upper rocker panel on the driver side must be removed as well as the top portion of the cup holder (ref: Section B).

1. Remove the horn button cover using a flat blade to work the cover off of the switch.
2. Pull the upper corner of the floormat down to expose the switch retaining nut.
3. Remove the nut that secures the horn button.
4. Remove the horn button switch from the floor1board.
5. Install the new horn button switch through the floorboard and secure in place with the hex nut supplied with the switch.
6. Disconnect the horn button wire harness from the accessory harness in the lower portion of the cup holder.
7. Before removing the old horn button wire harness route the new one along the same path, removing the old harness clips just before the new clips are placed on the frame.
8. Route the new horn button harness up through the flap in the front splash shield and connect it to the accessory harness.
9. Replace the floormat and install the horn button cover.

Reinstall the rocker panels and the top portion of the cup holder.

Horn Replacement

Make sure that the vehicle key switch is in the 'OFF' position and the key has been removed.

The horn is located under the front cowl, mounted to the frame.

1. Disconnect the accessory wire harness from the horn.
2. Remove the hex head bolt that secures the horn to the mounting bracket.
3. Position the new horn with the opening to the front of the vehicle and secure in place with the hex head bolt.
4. Connect the accessory wire harness to the horn.

Top Mounted Brake Light Replacement

Tool List	Qty.
Ratchet	1
Torque Wrench, in. lbs.	1
Torx Bit, T-15	1

Make sure that the vehicle switch is in the 'OFF' position and the key has been removed.

1. Remove two torx head screws that secure the brake light assembly to the top.
2. Pull the brake light out away from the vehicle top, disconnect the wires from the wire harness.
3. Connect the wires from the new brake light to the wire harness.
4. Install the light assembly into the opening in the top, making sure that the wires are not pinched between the the light housing and the top openeing.
5. Install two torx head screws and tighten to 13 - 22 in. lbs. (1.5 - 2.5 Nm) of torque.

Top Mounted Brake Light Bulb Replacement

Tool List	Qty.
Phillips Screwdriver	1

Make sure that the vehicle switch is in the 'OFF' position and the key has been removed.

1. Remove two phillips head screws.
2. Remove red lens.
3. Pull straight out on the bad light bulb.
4. Install a new #921 wedge base bulb.
5. Replace red lens and secure with phillips head screws.

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

Notes:

TABLE OF CONTENTS FOR SECTION 'L'

SECTION TITLE **PAGE NO.**

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

Notes:

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

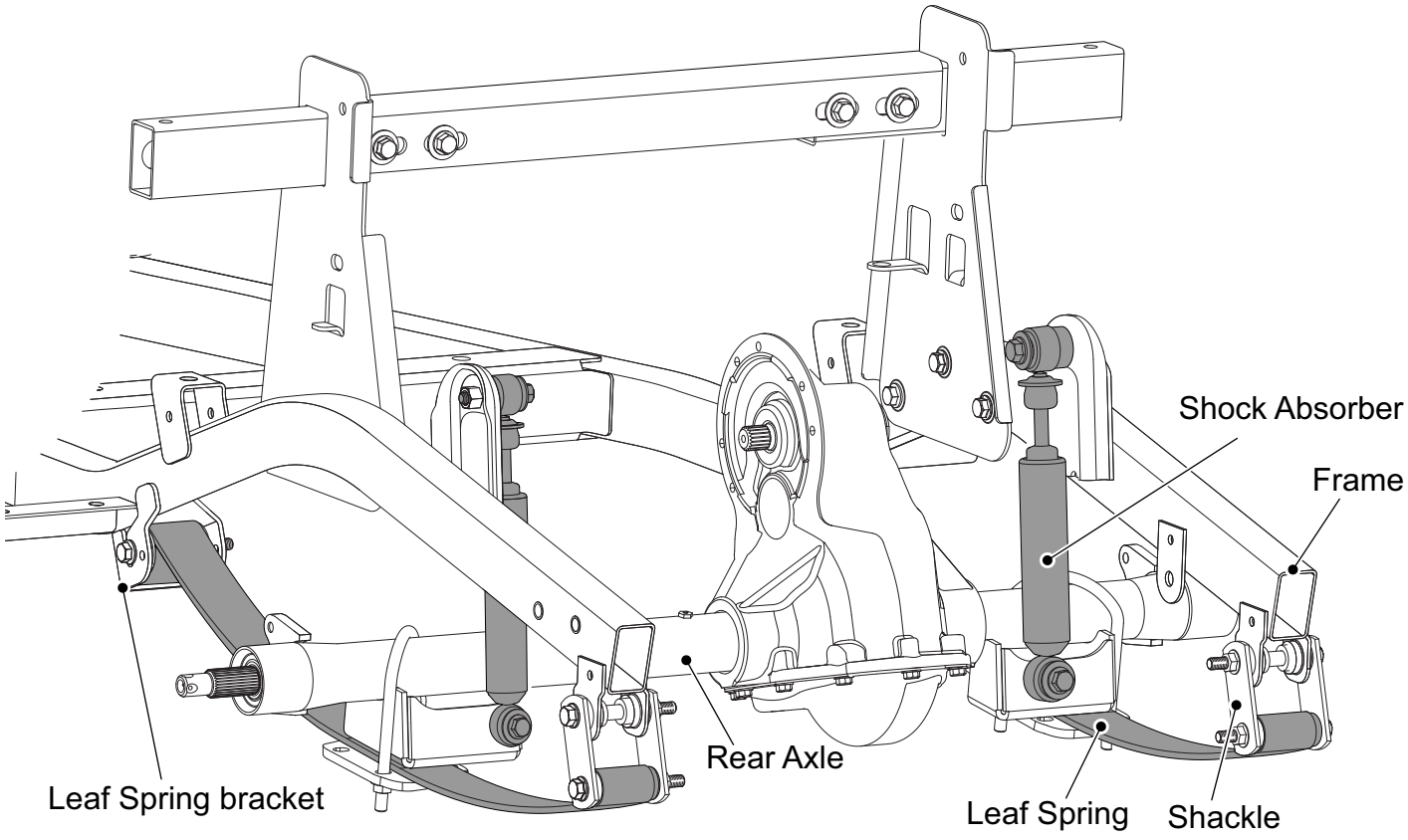


Fig. 1 Rear Suspension

GENERAL

NOTICE

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

The rear suspension consists of the leaf springs, shocks and the hardware that connects these items to the axle and to the vehicle frame. The removal of the rear axle is covered in the section in this manual titled REAR AXLE.

SHOCK ABSORBER *(Ref Fig. 2)*

Tool List	Qty.
Wheel Chocks	4
Jack Stands	4
Floor Jack	1
Insulated Wrench, 9/16"	1
Torx Bit, T-27	1
Wrench,15 mm	1
Socket, 15 mm	1
Ratchet	1
Torque Wrench, ft. lbs.	1

⚠ 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.

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

⚠ WARNING

Using an insulated wrench, disconnect the battery cable at the negative (-), BL-, battery terminal.

1. Remove the two Torx head screws that secure the rear access panel.
2. Remove the rear access panel.
3. Raise the rear of the vehicle in accordance with the instructions provided in Section B of this manual and support the rear of the vehicles on the outer ends of the rear bumper.
4. Remove the hex head bolt (5) and washer (4) from the lower end of the shock absorber.
5. Remove the hex head bolt (1) and washer (2) from the upper end of the shock absorber.

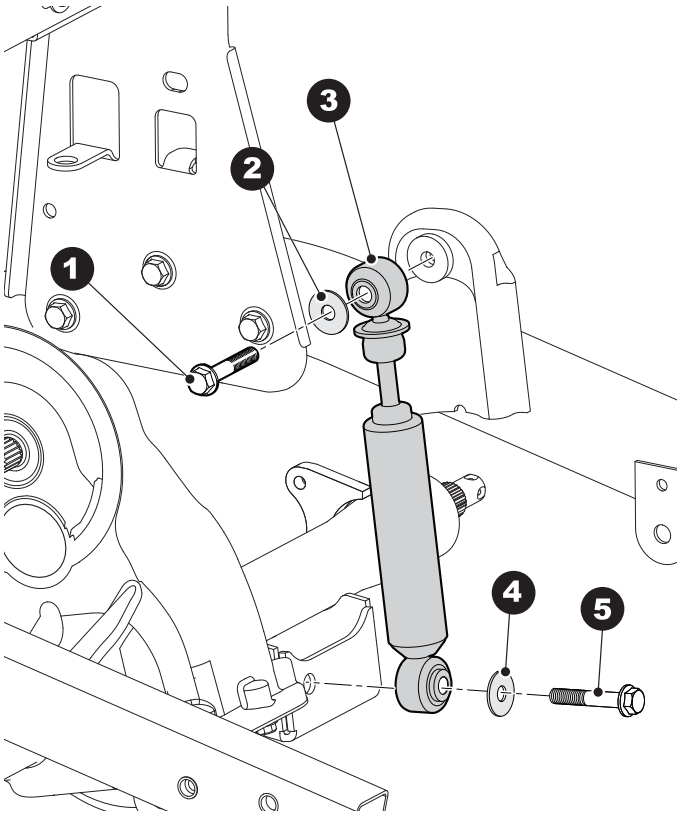


Fig. 2 Shock Absorber

6. Install the hex head bolt (1) and washer (2) for the upper shock mount, make sure that the shock (3) is oriented as shown.
7. Install the hex head bolt (5) and washer (4) through the lower end of the shock (3) into the mounting bracket on the axle.

Removal and installation of the shock is the same for both sides of the vehicle.

Replace any worn or damaged hardware with new as required.

ITEM	TORQUE SPECIFICATION
1, 5	27 - 32 ft. lbs (36 - 43 Nm)

REAR LEAF SPRING *(Ref Fig. 3)*

Tool List **Qty.**

Wheel Chocks....4
Jack Stands....4
Floor Jack....1
Wrench,15 mm....1
Insulated Wrench, 9/16"....1
Socket, 15 mm....1
Ratchet....1
Torque Wrench....1

NOTICE

If both leaf springs are to be replaced and the rear axle is not being removed, it is important to remove and replace one leaf spring at a time. It is recommended that leaf springs be replaced in pairs .

Removal

1. Raise the rear of the vehicle in accordance with the instructions provided in Section B of this manual.
2. Place a floor jack under the center section of the rear axle and raise the jack just enough to place a second set of jack stands under the axle tubes.
3. Remove the two hex nuts (3) from the U-bolt (1) on the axle allowing the leaf spring plate (2) to slide off of the U-bolt.
4. Remove the hex head bolts (15) and nuts (11) from the shackle plates (12) at the rear of the frame. Remove the flanged urethane bushings (13) and spacers (14) as well.
5. Remove the hex head bolt (7) and nut (4) from the forward leaf spring mounting bracket. The leaf spring (16) can now be removed from the vehicle.
6. Remove the flanged urethane bushings (6) and the spacer (5) from the leaf spring.

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

Installation

7. Install the large flanged urethane bushings (6) and spacer (5) in the end of the leaf spring (16) and place the leaf spring in the forward mounting bracket.
8. Install the hex head bolt (7) and nut (4) to secure the forward end of the leaf spring in the bracket.
9. Install one set of the smaller flanged urethane bushings (13) and spacer (14) in the rear frame mounting holes.
10. Position the shackle plates (12) over the bushings and install the hex head bolt (15) and nut (11).
11. Install the remaining pair of flanged urethane bushings (13) and spacer (14) in the leaf spring (16). Position the leaf spring between the shackle plates (12) and install the hex head bolt (15) and nut (11).
12. Align the pin on the leaf spring (16) with the hole in the axle bracket and install the leaf spring plate (2) on to the U-bolt (1). Secure plate in place with two hex nuts (3) and tighten both nuts equally to the specified torque.
13. Torque all hardware as specified making sure that the leaf spring pin remains aligned with the holes in the axle mounting bracket and the leaf spring mounting plate.

Removal and installation of the leaf spring is the same for both sides of the vehicle.

Replace any worn or damaged hardware with new as required. It is recommended that locking nuts be replaced after a maximum of 5 removals.

ITEM	TORQUE SPECIFICATION
3	22 - 26 ft. lbs (30 - 35 Nm)
4, 11	13-15 ft. lbs (17 - 21 Nm)

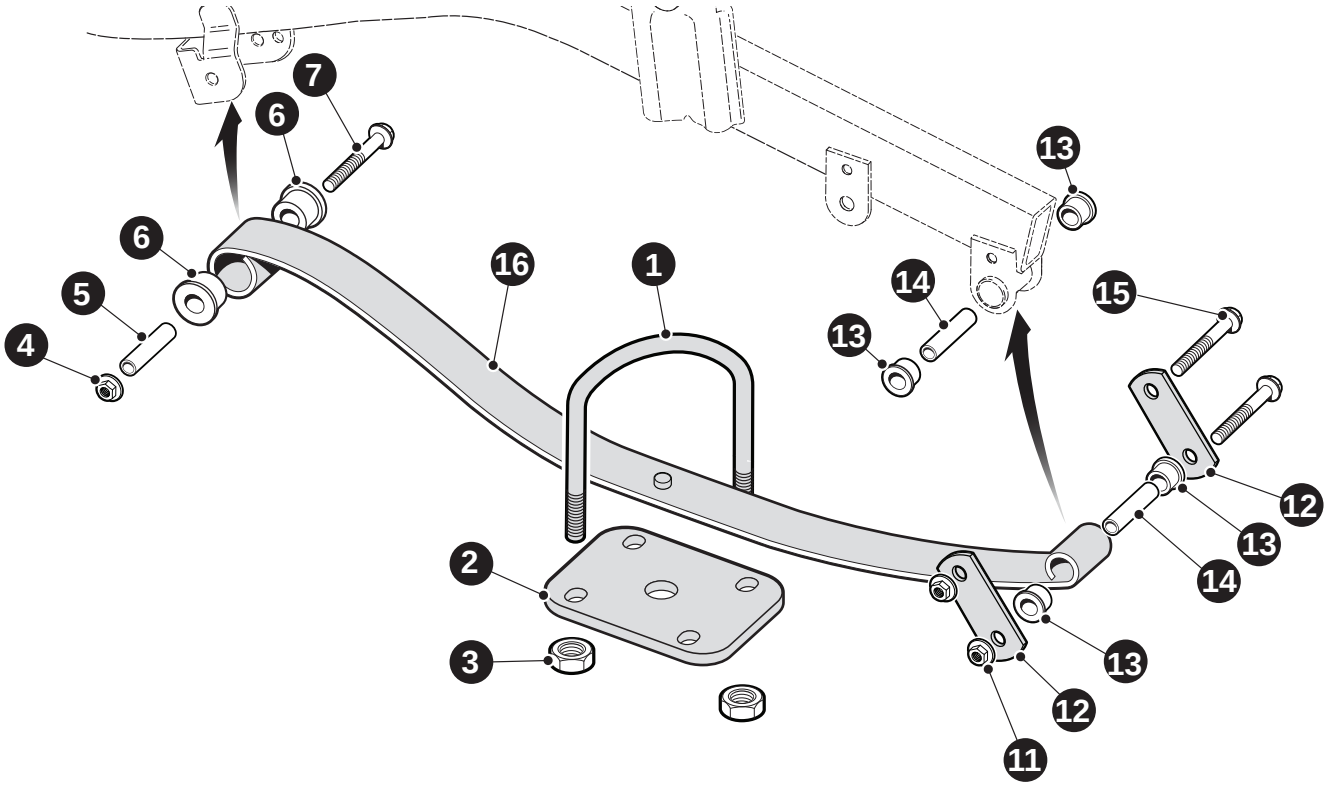


Fig. 3 Rear Leaf Spring

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

Notes:

TABLE OF CONTENTS FOR SECTION 'M'

SECTION TITLE **PAGE NO.**

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

Notes:

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

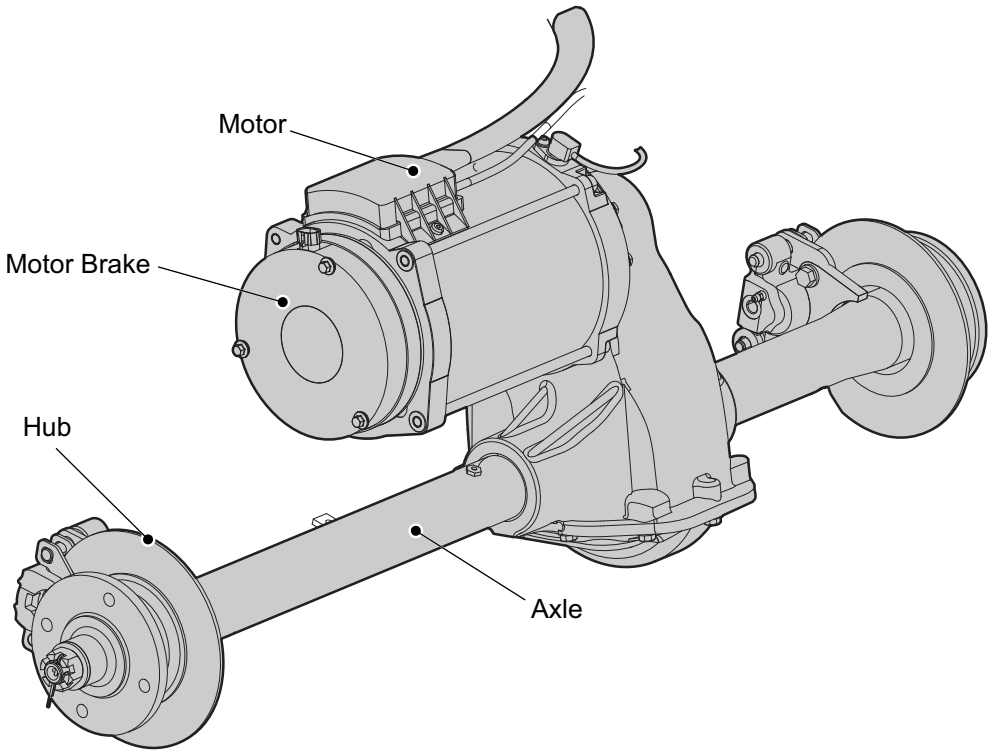


Fig. 1 Rear Axle

REAR AXLE MAINTENANCE

The only maintenance required for the first five years or 1000 hours of operation is the periodic inspection of the lubricant level. Unless leakage is evident, the lubricant need only be replaced after five years.

Replacing the Lubricant

Tool List	Qty.
Jack	1
Jack Stands	4
Rigid Gasket Scraper or Putty Knife	1
Ratchet	1
Socket, 1/2"	1
Ratchet Extension	1
Ball Peen Hammer	1
Fluid Pump	1
Flexible Tubing (to fit end of fluid pump	3’ - 4’

In the event that the lubricant is to be replaced, the vehicle must be raised and supported on a level plane. Raise the vehicle in accordance with the instructions provided in Section B of this manual.

⚠ 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.

1. Remove bolts securing the oil pan.
2. Using the rigid gasket scraper and the hammer separate the oil pan from the axle.
3. Remove all traces of the old gasket material from the both surfaces and from the bolt holes.
4. Clean oil pan after emptying the old oil.
5. Apply Permatex RTV or equivalent to the gasket flange on the oil pan according to product instructions.
6. Install the oil pan, tightening the bolts finger tight and then tighten to the proper torque value in a cross bolt pattern.a
7. Remove the fill plug.

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

8. Insert the flexible tubing into the opening where the fill plug was removed
9. Connect the flexible tubing to the fluid pump.
10. Fill with 25 oz. of Mobil 424 lubricant slowly.
11. Install the fill plug and tighten to 12 - 15 ft. lbs. (16 - 24 Nm) of torque.

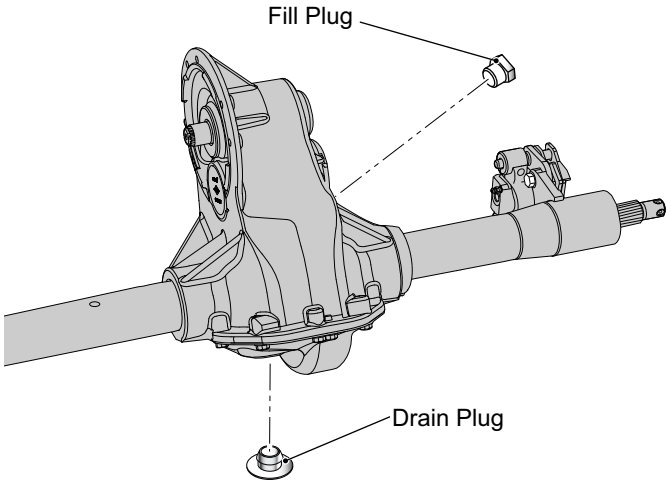


Fig. 2 Fill Plug

REAR AXLE DISASSEMBLY

⚠ CAUTION

The rear axle is a precision assembly and therefore any repair or replacement of parts must be done with extreme care in a clean environment. Before attempting to perform any service on the axle, read and understand all of the following text and illustrations before disassembling the unit.

Handle all splines with extreme care.

Snap rings must be removed and installed with care to prevent damage of the bearings, seals and bearing bores

NOTICE

It is recommended that whenever a bearing seal or 'O' ring is removed, it be replaced with a new one regardless of the mileage. Always wipe the seals and 'O' rings with a light oil before installing.

⚠ 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.

Rear Hub

Tool List	Qty.
Needle Nose Pliers	1
Ratchet	1
Socket, 1 1/8"	1
Torque Wrench, ft. lbs.	1

Raise the rear of the vehicle in accordance with the instructions provided in Section B of this manual.

Remove lug nuts and rear wheel as specified in Section D (Wheels and Tires) of this manual.

1. Remove the disk brake caliper as shown in the BRAKES section of this manual.
2. Remove cotter pin (1).
3. Remove castle nut (2) and flat washer(3).
4. Remove hub and disk assembly (4) from the axle splines (5).

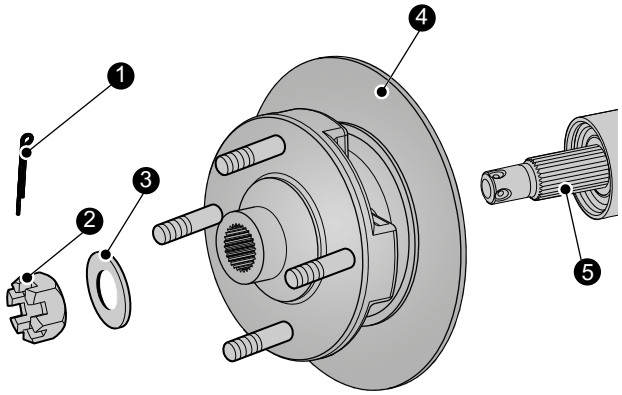


Fig. 3 Hub

5. Coat the splines of the axle shaft (5) with a Dow-Corning Moly Coat TM77 anti-seize compound.
6. Install hub (4) onto the axle shaft splines (5).
7. Install the flat washer (3) and the castle nut (2) onto the axle.
8. Tighten castle nut (2) to specified torque. If cotter pin

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

(1) can not pass through the hole in the axle shaft continue to tighten the nut until the hole in the shaft aligns with an opening in the nut to allow the cotter pin will pass through. Once the cotter pin (1) is through the nut and shaft, split the legs and bend in opposite directions.

ITEM	TORQUE SPECIFICATION
2	130-140 ft. lbs (176-190 Nm)

Axle Shaft, Bearing and Seal Removal and Disassembly

Tool List **Qty.**

Arbor Press 1
Bearing Separator 1
Needle Nose Pliers..... 1
Internal Snap Ring Pliers..... 1
Slide Hammer (E-Z-GO P/N 18753-G1)..... 1
Seal Puller 1
Seal Installer (E-Z-GO P/N 18739-G1)..... 1
Ball Peen Hammer 1

Remove the wheel and the hub from the axle.

1. Remove the outer snap ring from the axle tube.

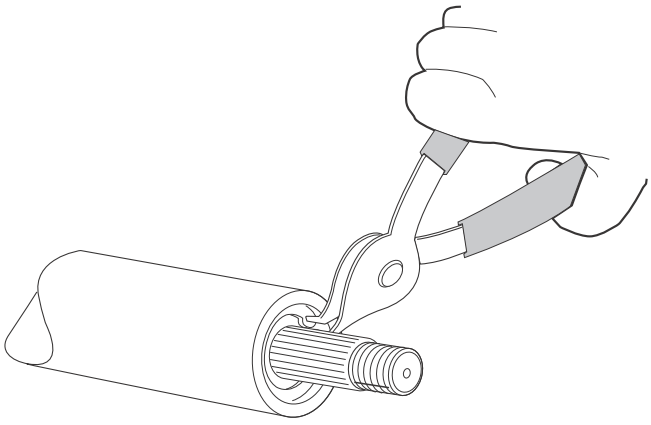


Fig. 4 Outer Snap Ring

2. Attach a slide hammer to the axle shaft thread and remove the axle and bearing from the axle tube.

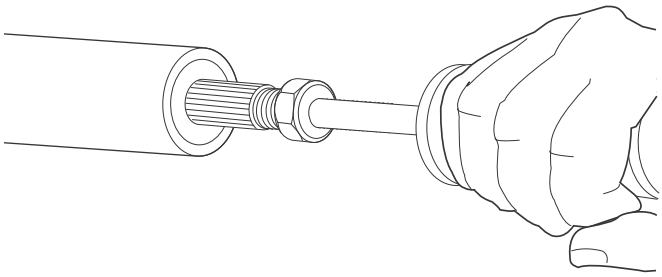


Fig. 5 Remove Axle Shaft

3. Remove the bearing by supporting the inner race of the bearing on an arbor press bed and applying pressure to the threaded end of the axle shaft.

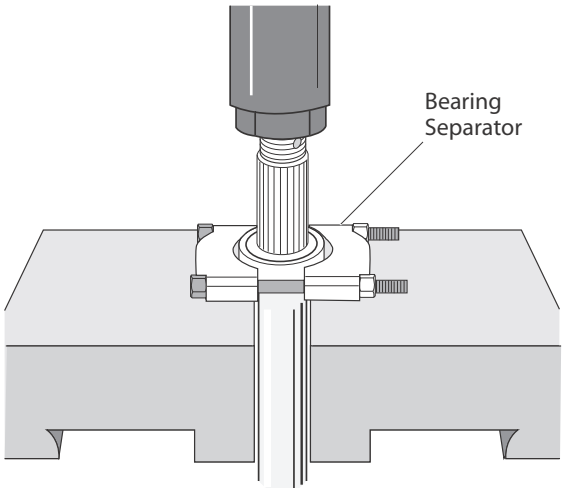


Fig. 6 Press Bearing from Shaft

4. Remove the inner snap ring.

⚠ CAUTION

Use care to prevent damage to the inner surface of the axle tube at the seal area.

5. Remove the oil seal using a seal puller.

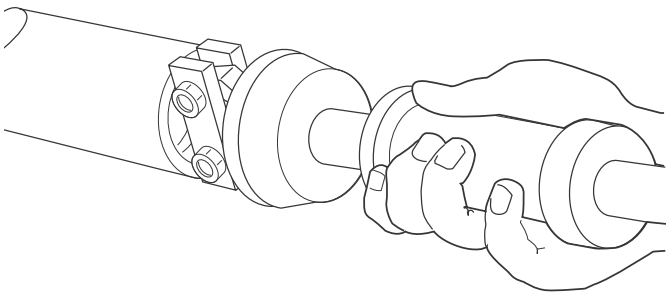


Fig. 7 Oil Seal Removal

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

6. Install the new oil seal using the seal installer (E-Z-GO P/N 18739-G1) to drive the seal into its correct position.

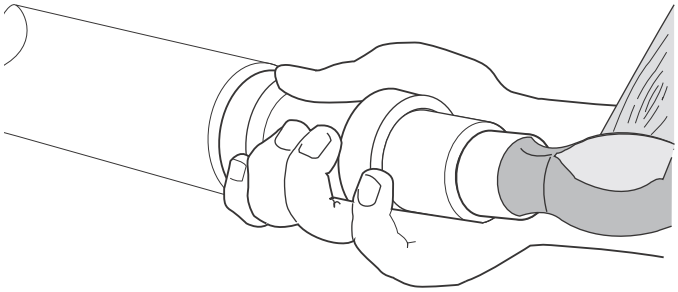


Fig. 8 Seal Installation

7. Install the inner snap ring.

⚠ CAUTION

To prevent damage to the oil seal, lightly coat the axle shaft with bearing grease and support the shaft during installation.

8. Carefully insert the axle shaft and bearing through the oil seal. Rotate the shaft until the spline engages with the differential side gears.
9. Install the outer snap ring.

Install the rear hub according to the instructions in the Rear Hub section.

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WEATHER PROTECTION

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

Notes:

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

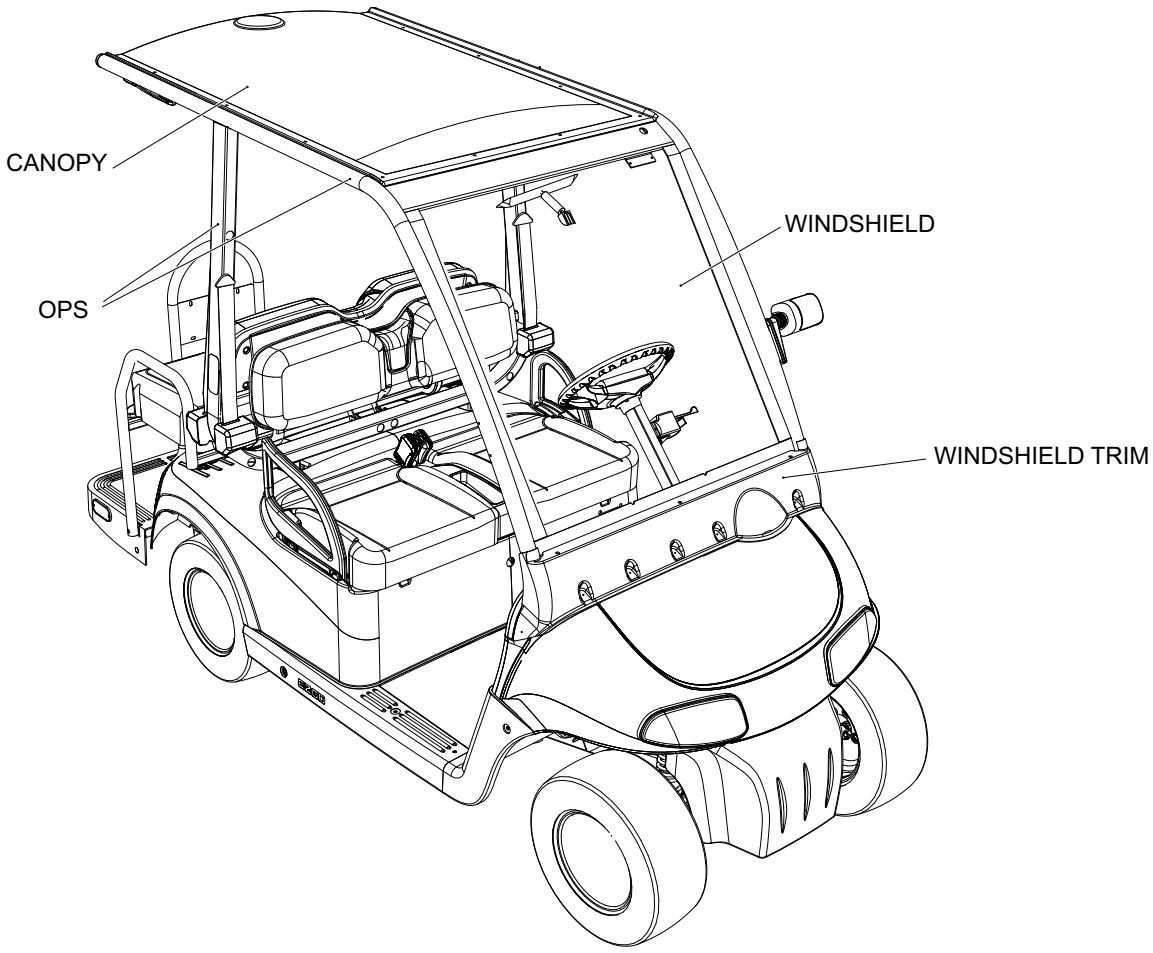


Fig. 1 Top and Windshield

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 top and windshield are designed for weather protection only.

⚠ CAUTION

Removing a windshield is best left to professional automotive windshield installer.

WINDSHIELD

Tool List	Qty.
Windshield Knife	1
Handle with Suction Cups	2
Pry Bar	1
Utility Knife	1
Safety Gloves	1
Eye Protection	1
An Assistant	1

Removal

1. Push the center pin through and remove ten plastic drive rivets (2) that secure the outer windshield trim (1) to the cowl.
2. Cover the front cowl with a soft cloth to protect it in case the glass breaks or tools drop on to it

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

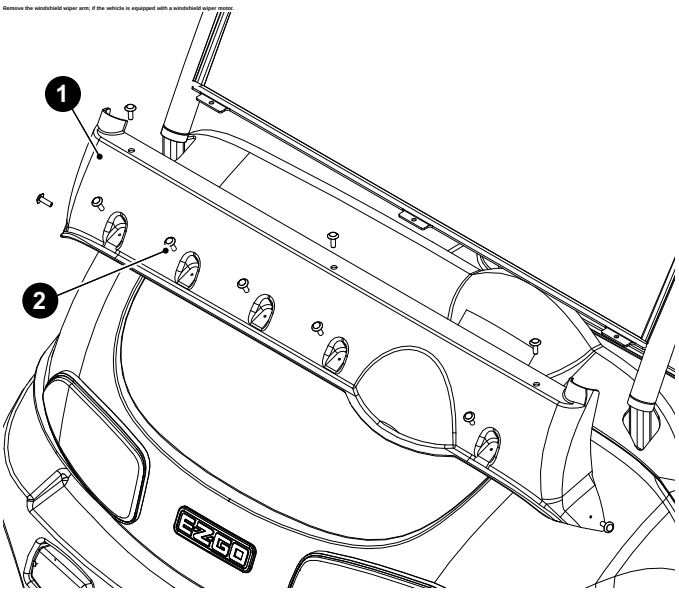


Fig. 2 Windshield Trim Removal

3. Work the windshield knife into place under the glass. Draw the knife towards you, steadily rocking back and forth while pulling on the knife. Work around the whole windshield to break the urethane seal.
4. If the windshield is in one piece, install the handles with suction cups, making sure the suction cups are securely locked to the windshield.
5. Hold onto the suction cup handles and have an assistant push the windshield outward from inside the vehicle.
6. Lift the windshield off and discard properly if broken, broken, cracked or badly chipped.
7. Remove the old urethane bead from the windshield opening using a utility knife.

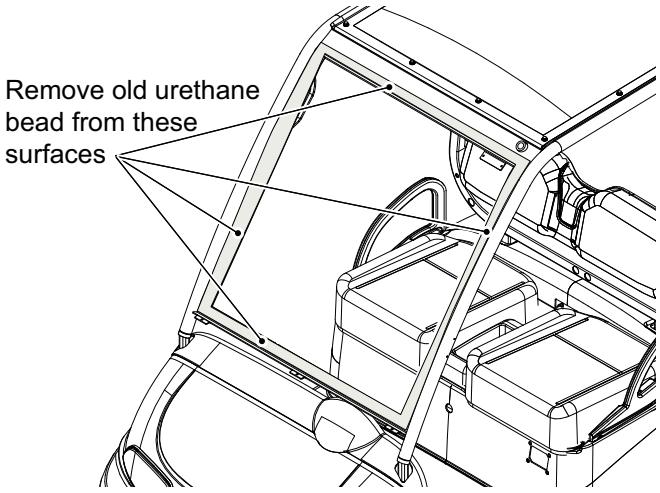


Fig. 3 Remove Urethane Bead

Installation

1. Attach the handles with suction cups, making sure the suctions cups are securely locked to the outside of the windshield.
2. Place the windshield, with the outside surface facing downward on a table or pair of stable supports.
3. Clean the windshield, make sure that the mounting surface and edges are free from all dirt, oil or grease.
4. Align the end of the windshield seal (3) to the top edge of the windshield (4), work down along the side of the windshield with the seal lip facing outward. Press the seal opening around the edge of the glass and apply pressure to the back of the glue bead. Repeat for the other side of the windshield.

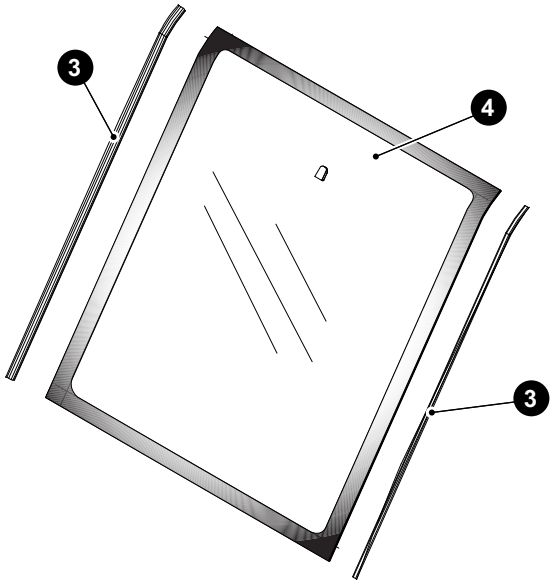


Fig. 4 Edge Trim Installation

5. Apply the windshield primer to the inner mounting surface of the windshield. Allow the primer to cure for 10 minutes.
6. Apply the urethane adhesive in the center of the black band on the outer edge of the windshield, all four sides.
7. Place the removable spacers on the lower edge of the windshield mounting frame.
8. Lift the windshield carefully and place the bottom edge on the removable spacers, centered between the outer frame tubes. Pivot the windshield towards the OPS frame and position the windshield on the mounting frame.
9. Apply light pressure to the windshield to ensure proper seating of the urethane adhesive. Allow 60 minutes for

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

the urethane adhesive to cure to a working state.

10. Install the windshield trim (1) at the lower edge of the windshield with 10 new plastic drive rivets (2).

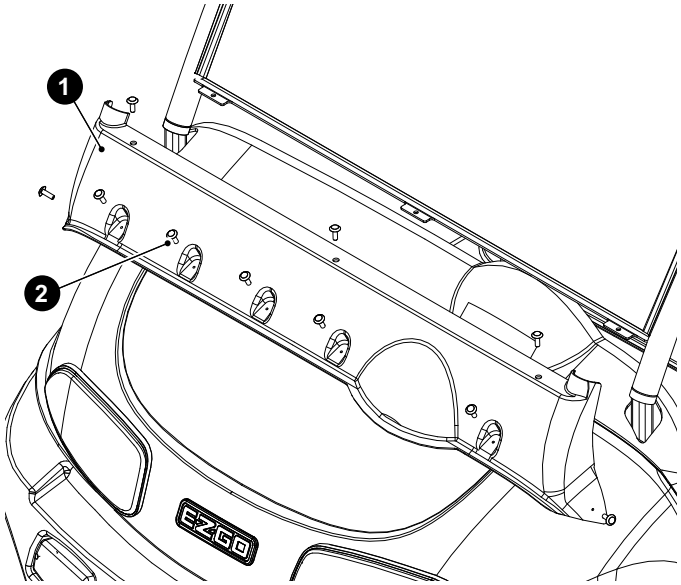


Fig. 5 Install Windshield Trim

11. Install the windshield wiper arm if the vehicle is equipped with a windshield wiper motor.

CANOPY TOP

Tool List	Qty.
Socket, 10 mm	1
Ratchet	1
Wrench, 10 mm	1
Torque Wrench, in. lbs.	1

Cover the windshield to help protect it from chipping or cracks caused by dropped tools.

Removal

1. Remove ten hex head bolts (3), bonded seal washers (4) and nuts (5) that secure the canopy top (6) to the OPS frame.
2. Lift the canopy top (6) along with the weather seal from the OPS frame.

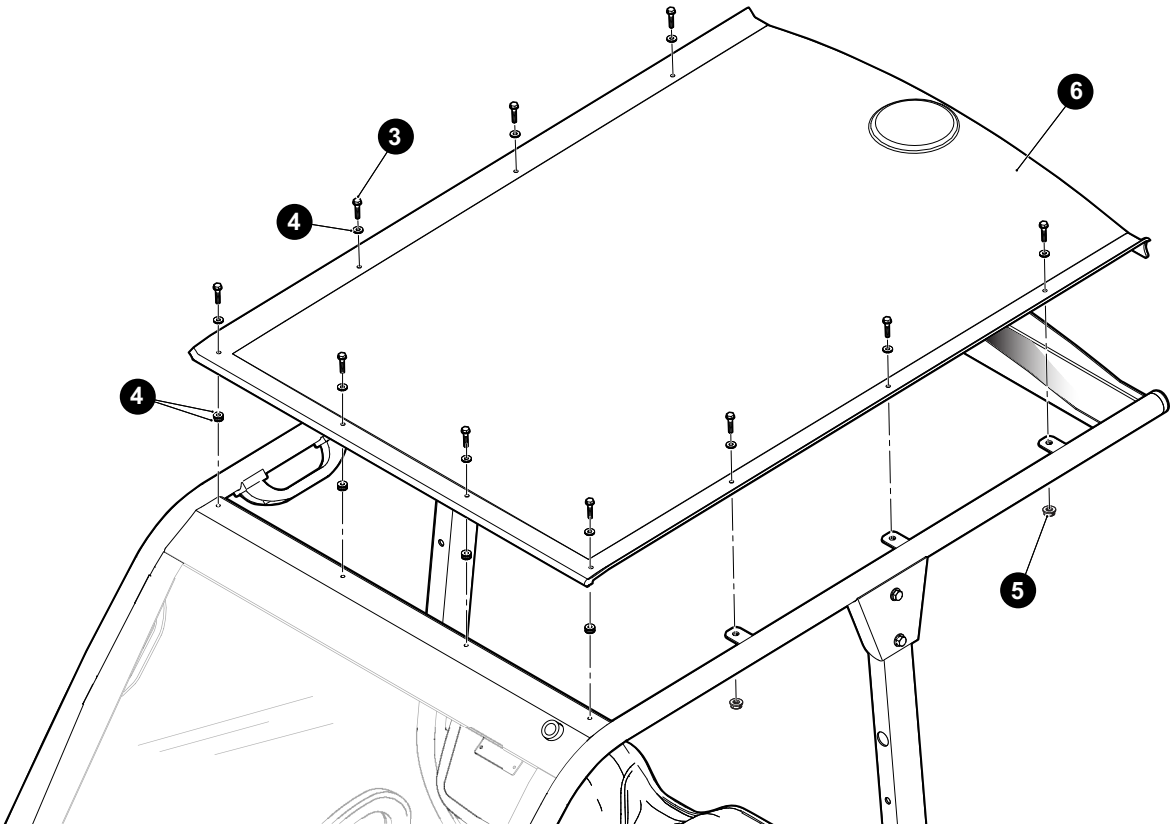


Fig. 6 Canopy Top

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

Installation

1. Clean the bottom edge of the canopy top (6) and attach the weather seal along both sides and the front of the canopy top.
2. Position the canopy top (6) with the weather seal attached on the OPS frame.
3. Install four hex head bolts (3) each with a bonded seal washer (4) down through the canopy top, place two more bonded seal washers (4) on the bolt before placing the bolt though the mounting holes in the OPS frame. Loosely install a nut (5) on each bolt.
4. Install three hex head bolts (3) each with a bonded seal washer (4) down through the canopy top (6) and the mounting holes in the OPS frame along each side of the canopy top. Loosely install a nut (5) on each bolt.
5. Make sure that the canopy top is centered up on the frame and tighten the hardware to the specified torque value.

ITEM	TORQUE SPECIFICATION
5	35 - 53 in. lbs (4 - 6 Nm)

OPS (Operator Protection System)

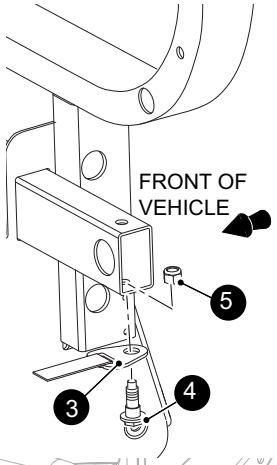
The entire OPS with the windshield and canopy top may be removed as a single unit.

Tool List **Qty.**

Torque Wrench, ft. lbs.....1
Ratchet 1
Socket, 15 mm.....1
Wrench, 15 mm 1
Flat Blade Screwdriver 1
Hoist or Lift 1
Sling.....1

Removal

1. Remove the outer windshield trim as shown previously in this section.
2. Disconnect the wires from the OPS from the wiring harness.
3. Remove the rear access panel and both rear splash shields. See BODY section for detailed instructions on removal of the access panel and rear splash shields.
4. Remove the bolts (4) and nuts (5) securing the front seat belt anchor straps (3) to the vehicle frame.
5. Attach hoist or lift sling to support the OPS when the attaching hardware is removed.
6. Remove four hex nuts (8) but DO NOT remove the four hex head bolts (9) securing the goalpost to the rear frame.



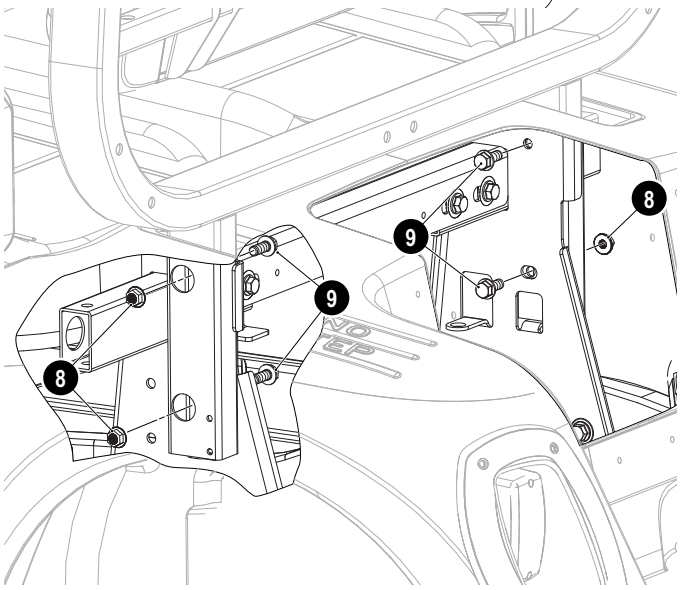


Fig. 7 Goalpost Hardware

7. Remove the access covers (10), one on each side of the instrument panel. Loosen two hex head bolts (11) on each side of the vehicle.

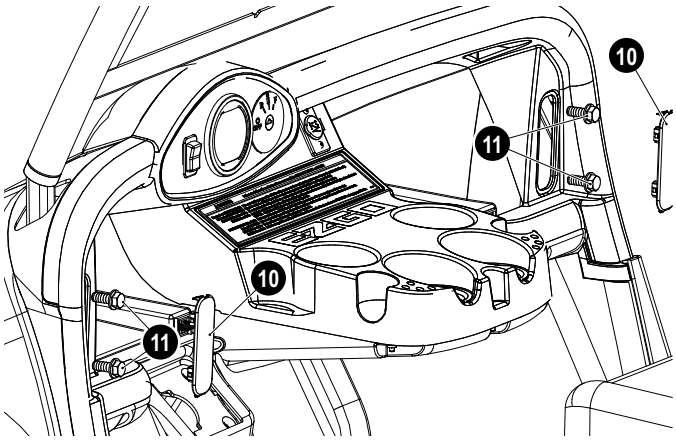


Fig. 8 Front Access Covers and Hardware

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

8. Make sure that the hoist and sling are positioned to take the weight of the OPS. Take all slack out of the hoist or lift cable.
9. Remove four hex head bolts (11) from the front supports, 2 on each side of the instrument panel.
10. Remove four hex head bolts (9) securing the goalpost legs to the vehicle frame.
11. Raise the hoist or lift until the legs of the OPS (12) clear the vehicle body, then move the OPS (12) away from the vehicle and lower it to the floor.

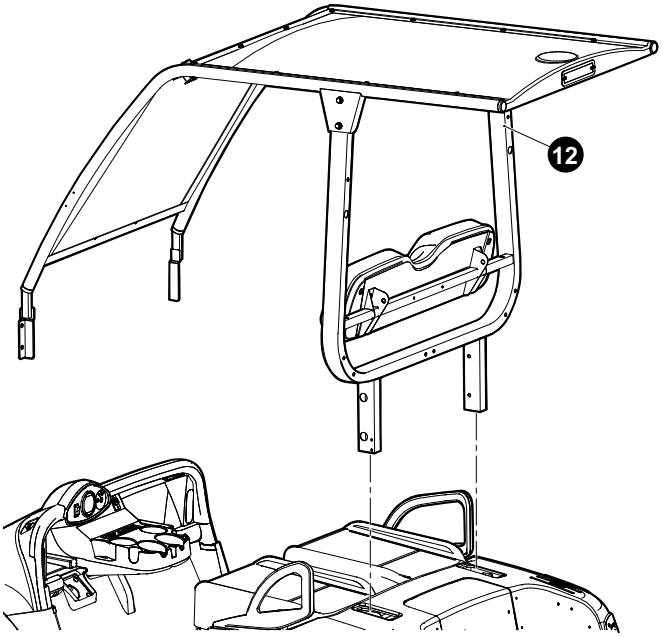


Fig. 9 Complete OPS Removal

Installation

1. Position the OPS (12) above the vehicle, lower slowly into position, guiding the legs through the openings in the instrument panel and the rear body.
2. Align the holes in the rear legs with the holes in the mounting brackets, install one hex head bolt (9) through each leg and loosely install a hex nut (8) on each bolt.
3. Align the holes in the front legs with the instrument panel support and install the four hex head bolts (11).
4. Install the two remaining hex head bolts (9) in the rear legs along with the two remaining nuts (8).
5. Tighten the eight bolts to the specified torque value.
6. Connect the wires from the OPS (12) to the wiring harness located near the front driver side support post.
7. Install the front seat belt anchor straps (3) with shoulder bolt (4) and locking nut (5). Tighten to the specified torque value.
8. Install the rear splash shields, rear access panel and the front access panels.

ITEM	TORQUE SPECIFICATION
9, 11	33 - 37 ft. lbs (45 - 50 Nm)
5	18 - 22 ft. lbs (24 - 30 Nm)

WINDSHIELD WIPER ASSEMBLY

The windshield wiper assembly is optional equipment and may not be present on all vehicles.

Tool List **Qty.**

Phillips Screwdriver, #2.....1
Rubber Mallet 1
Wrench, 19 mm 1
Torque Wrench, in. lbs.....1
Crows Foot, 19 mm. 1
Insulated Wrench, 9/16.....1
Flat Screwdriver.....1
Socket, 9/16.....1
Ratchet 1
Torx Driver 45 IP 1

Removal

1. Make sure that the key switch is in the 'OFF' position and the key is removed. With an insulated wrench, disconnect negative (-) battery cable at the battery.
2. Cover the windshield with a cloth or cardboard to protect it from dropped tools.
3. Raise the wiper arm and push the release tab with a flat screwdriver and pull the wiper arm off of the pivot shaft.

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

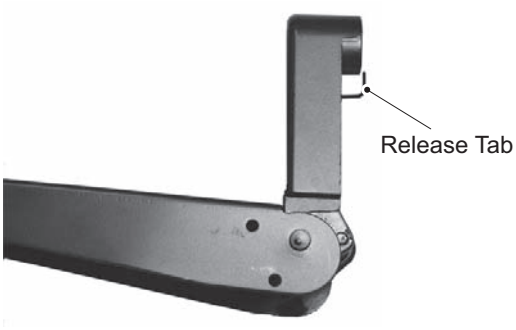
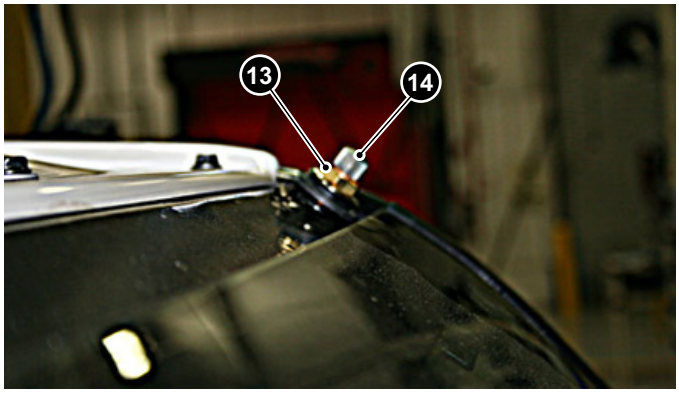


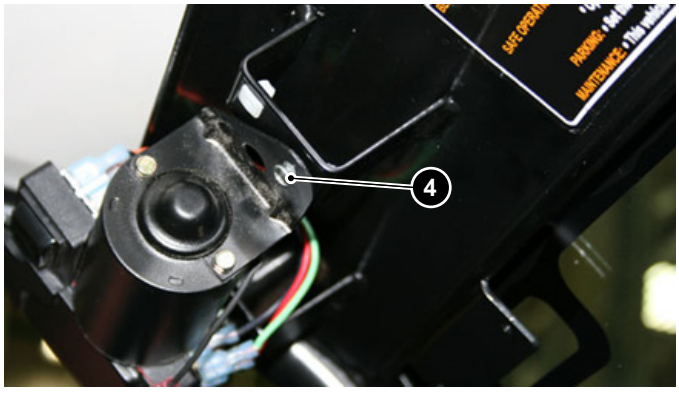
Fig. 10 Wiper Arm Release Tab

4. Remove the four screws (11) and cover (12) from the wiper motor.

5. Remove the hex nuts (13) and washers from the pivot shaft (14).



6. While holding the wiper motor remove the screw (4) securing the wiper motor to the mounting bracket.



7. Disconnect the wires from the wiper motor and remove the motor from the header bar making sure to retain the spacer and washers on the pivot shaft.

Installation

1. Install brake drum washer (1), Flat washer (2) to the motor shaft in order shown.

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

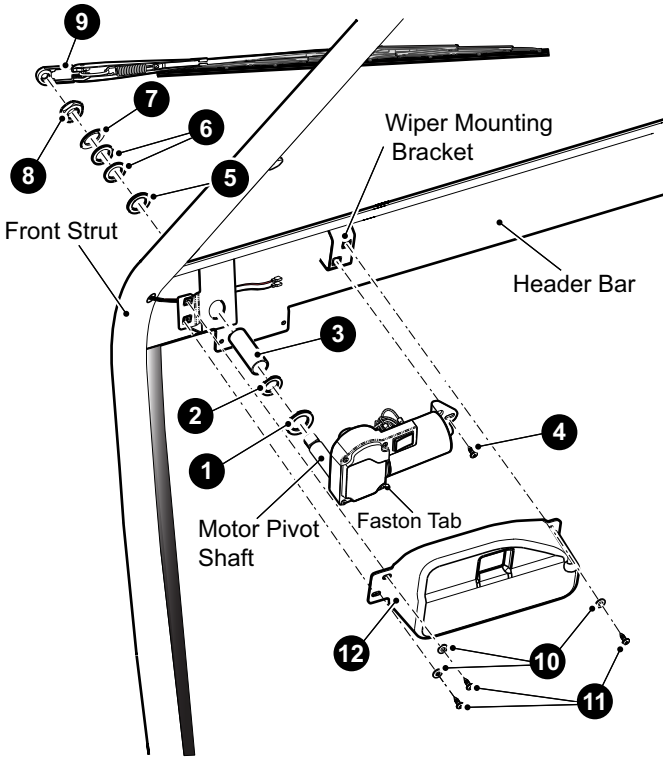


Fig. 11 Wiper Assembly

2. Connect the red power wire from the accessory harness to the motor as shown.

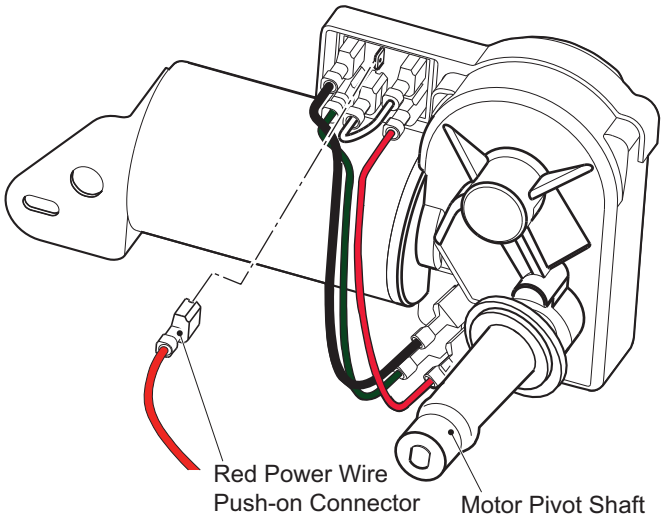


Fig. 12 Wiper Motor Power Wire Connection

3. Place the nylon tube (3) on the motor pivot shaft and insert the shaft through the opening in the header bar. Install screw (4) to secure the motor in place.

4. Install flat washer (5), rubber washers (6) and cup washer (7) with cup towards the windshield.
5. Install the hex nut (8) finger tight.
6. Tighten screw (4) and the hex nut (7) to the specified torque value.
7. Connect the black ground wire to the wiper motor.

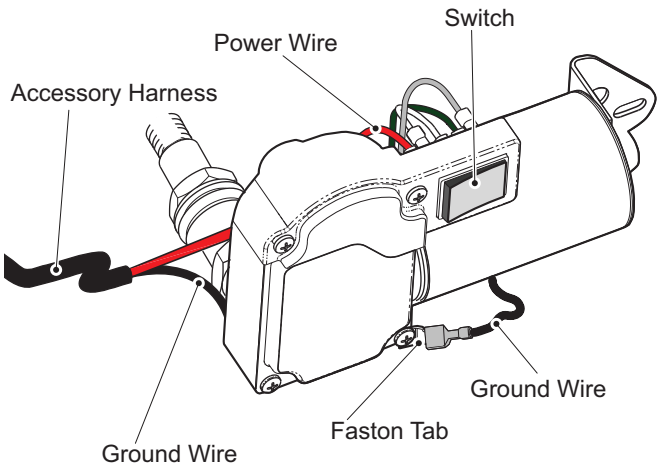
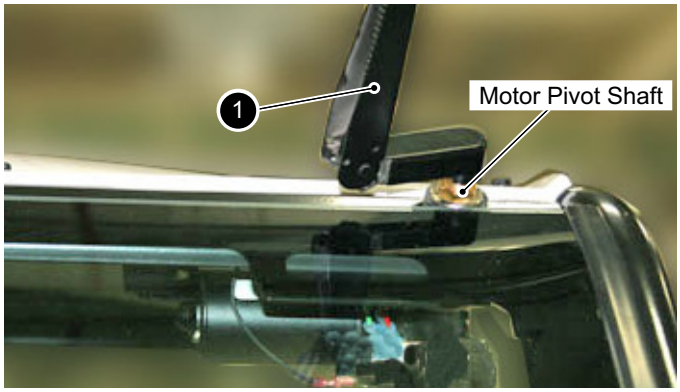


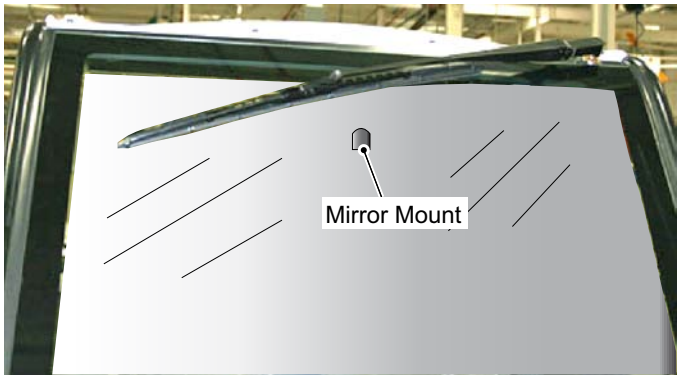
Fig. 13 Wiper Motor Connections

8. Install the motor cover (12) using the three washers (10) and screws (11). Tighten the screws (11) to the specified torque value.
9. With an insulated wrench, reconnect the battery wire at the battery. Tighten hardware to 97-101 in lbs (11-11.5 Nm) torque.
10. Cycle the motor ON then OFF to guarantee the pivot shaft is in the home position.
11. Bend the attachment point of the wiper arm (1) until it locks into position with bend point at about 90°.

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



12. Slide wiper arm (1) straight onto the motor pivot shaft and lower wiper arm onto the glass.
13. Cycle the wiper system to check the wiper position. The wiper arm should park above the mirror mount but not off the top of the windshield glass.



14. Cycle the wiper motor again; make sure the blade does not hit the side seal or the OPS structure. If the wiper blade is not in correct position on the windshield, push the release tab with a flat screwdriver to release the wiper arm from the motor pivot shaft, adjust to correct position and then slide the wiper arm back onto the wiper pivot shaft, cycle the wiper motor again and reposition the wiper arm if necessary.

ITEM	TORQUE SPECIFICATION
4, 11	4-10 in. lbs (0.56-1.12 Nm)
7	26-44 in. lbs (3.3-4.5 Nm)

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

Notes:

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

Notes:

TABLE OF CONTENTS FOR SECTION 'O'

TROUBLESHOOTING AND DIAGNOSTICS

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

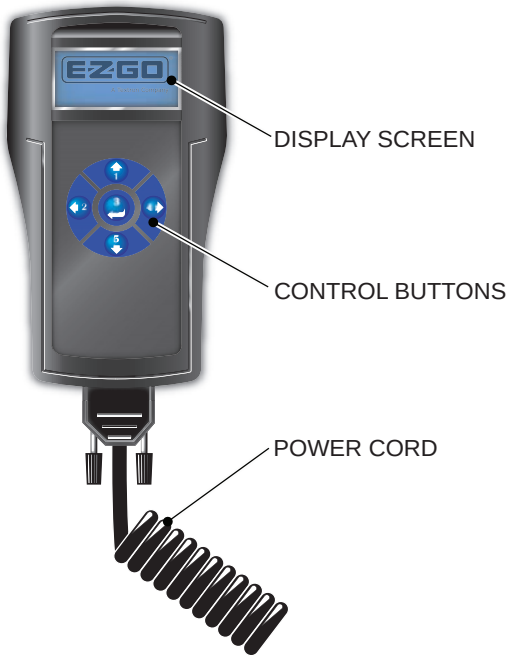
Notes:

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

HOW TO USE THE HAND HELD DIAGNOSTIC UNIT

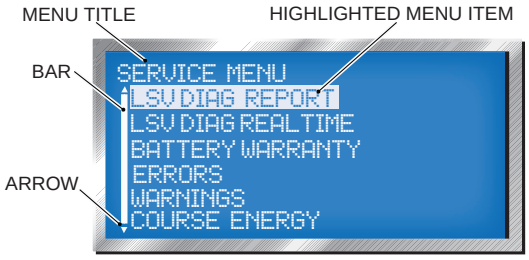
The E-Z-GO Hand Held Diagnostic Unit, P/N 614400 is used for troubleshooting, tuning, programming and the retrieval of warranty information on the 2Five vehicle.

The hand held diagnostic unit is connected to the vehicle by plugging the power cord connector into the receptacle located under the vehicle cup holder.



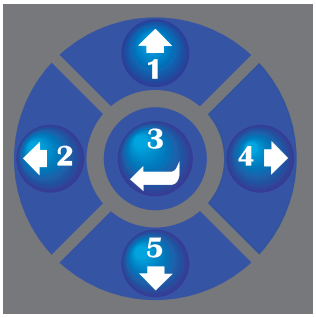
The E-Z-GO logo will display when the unit is first powered up, then the menu title is displayed on the first line of the display screen with the menu selections indented under it.

The vertical bar along the left side of the display screen moves up and down when buttons 1 or 5 are pressed. The length of the bar also changes depending on how many items are in a menu. When the bar is positioned at the top arrow the beginning of the menu has been reached; if the bar has reached the arrow at the bottom of the screen there are no more menu choices available.



To access the different diagnostic functions, use the five control buttons to scroll through the menus.

Buttons 1 and 5 will move the cursor up and down through the menu, button 4 will show the sub menu for the highlighted item. Button 2 will return to the top level menu. Button 3 is used as 'enter' or 'return'; hold the button for 3 seconds.



Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

MENUS

The Hand Held Diagnostic Unit, when connected to the vehicle, will provide access to information on the following:

LSV DIAGNOSTIC REPORT

BATTERY FUNCTIONS (1 - 3)

1. BATTERY VOLTAGE: displayed as 'VOLTAGE', the next line displays 'HIGH', the actual voltage or 'LOW' and voltage to 10th of a volt.

2. CALCULATED BATTERY CURRENT: displayed as 'CURRENT', the next line displays calculated current as 'LOW', the actual number in DC Amps or as 'HIGH'.

3. STATE OF CHARGE: displayed as 'SOC', the next line displays the state of charge for the battery pack as 'NORMAL' or 'LOW BATT'.

PEDAL FUNCTIONS (4 - 6)

4. THROTTLE SENSOR VOLTAGE: displayed as 'THROTVOLT', the next line displays the sensor voltage as 'LOW', 'NORMAL' or 'HIGH'.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

5. THROTTLE SWITCH POSITION: displayed as 'THROTTLESW', the next line displays the switch voltage as 'NORMAL' or 'HIGH'.

6. BRAKE SENSOR VOLTAGE: displayed as 'BRAKEVOLT', the next line displays the sensor voltage as 'LOW', 'NORMAL' or 'HIGH'.

MOTOR AND HEAT SINK FUNCTIONS (7 - 14)

7. MOTOR COMMAND SPEED: displayed as 'CMDSPEED', the next line displays the speed in RPMs (revolutions per minute) that is being requested of the motor by the pedal position.

8. MOTOR ACTUAL SPEED: displayed as 'ACTSPEED', the next line displays the actual motor speed in RPMs.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

9. MOTOR SPEED SENSOR displayed as 'SPEED SENSOR', the next line displays the speed sensor is working or not.

10. MOTOR VEHICLE SPEED displayed as 'VEHSPEED', shows the actual speed of the vehicle in miles per hour. .

11. MOTOR CURRENT: displayed as 'AC CURRENT', the next line displays the AC current in Amps.

12. MOTOR TEMPERATURE: displayed as 'MOTORTEMP', the next line displays the internal motor temperature in °C.

13. HEAT SINK TERMPERATURE: displayed as 'HEAT SINK TEMP', the next line displays the temperature in °C.

14. FAN function is displayed as "FAN", the next line displays whether or not the controller cooling fan is on or off.

INPUT FUNCTIONS (15 - 17)

15. FORWARD SWITCH: displayed as 'FWD SWITCH', the next line displays the switch position as 'ON' or 'OFF'.

16. REVERSE SWITCH: displayed as 'REV SWITCH', the next line displays the switch position as 'ON' or 'OFF'.

17. RUN TOW SWITCH POSITION: displayed as 'RUN TOW SW', the next line displays the position of the run/tow switch as 'RUN' or 'TOW'.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

OUTPUT FUNCTIONS (18 - 19)

18. REVERSE WARNING BUZZER: displayed as 'BUZZER', the next line displays the buzzer state as 'ON' or 'OFF'.

19. SOLENOID: displayed as 'SOLENOID', the next line displays the solenoid state as 'ON' or 'OFF.

BRAKE FUNCTIONS (20)

20. ELECTRIC BRAKE CURRENT: displayed as 'EBRAKECURR', the next line displays the brake current as a three place decimal in Amps; the brake current displayed below is 3 milliAmps.

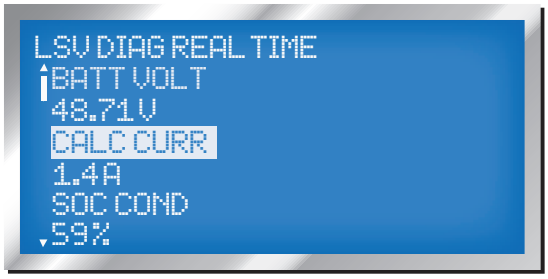
DIAGNOSTICS REPORT (real - time read only)

BATTERY FUNCTIONS - REAL TIME (1 - 4)

1. BATTERY VOLTAGE: displayed as 'VOLTAGE', the next line displays 'HIGH', the actual voltage to a 10th of a volt, or 'LOW' and voltage to 10th of a volt.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

2. CALCULATED BATTERY CURRENT: displayed as 'CURRENT', the next line displays calculated current as 'LOW', the actual number in DC Amps. .



3. STATE OF CHARGE: displayed as 'SOC', the next line displays the state of charge for the battery pack IN percentage (%)...

4. CHARGER CONNECTED: displayed as 'CHARCONN', the next line displays that the charger is connected by 'Yes' or 'NO'.

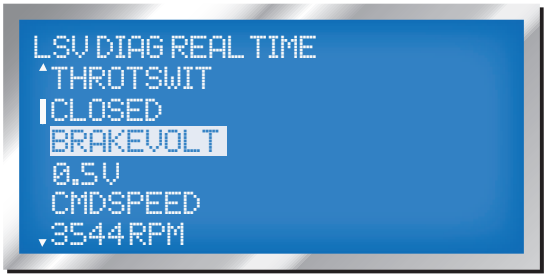
PEDAL FUNCTIONS (5 - 7)

5. THROTTLE SENSOR VOLTAGE: displayed as 'THROTVOLT', the next line displays the sensor voltage in tenths of a volt.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

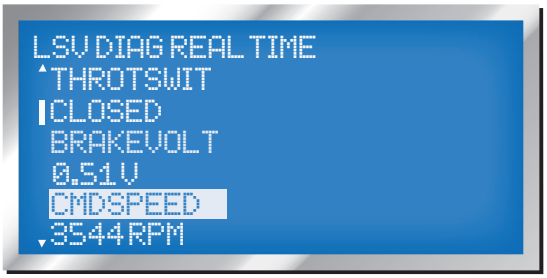
6. THROTTLE SWITCH POSITION: displayed as 'THROTTLESWIT', the next line displays the switch voltage as 'OPEN' or 'CLOSED'.

7. BRAKE SENSOR VOLTAGE: displayed as 'BRAKEVOLT', the next line displays the sensor voltage in tenths of a volt.



MOTOR AND HEAT SINK FUNCTIONS (8 - 15)

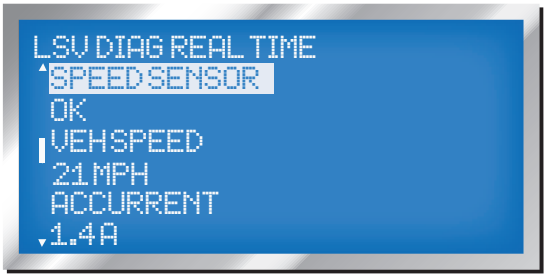
8. MOTOR COMMAND SPEED: displayed as 'CMDSPEED', the next line displays the speed in RPMs (revolutions per minute) that is being requested of the motor by the pedal position.



9. MOTOR ACTUAL SPEED: displayed as 'ACTSPEED', the next line displays the actual motor speed in RPMs.

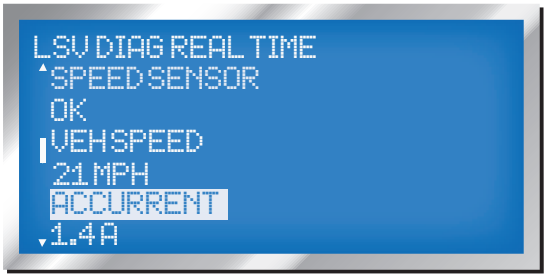
Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

10. MOTOR SPEED SENSOR displayed as 'SPEED SENSOR', the next line displays the speed sensor is working or not.



11. MOTOR VEHICLE SPEED displayed as 'VEHSPEED', shows the actual speed of the vehicle in miles per hour. .

12. MOTOR CURRENT: displayed as 'AC CURRENT', the next line displays the AC current in Amps.



13. MOTOR TEMPERATURE: displayed as 'MOTORTEMP', the next line displays the internal motor temperature in °C.

14. .HEAT SINK TEMPERATURE: displayed as 'HEATSINKTEMP', the next line displays the heat sink temperature in °C.

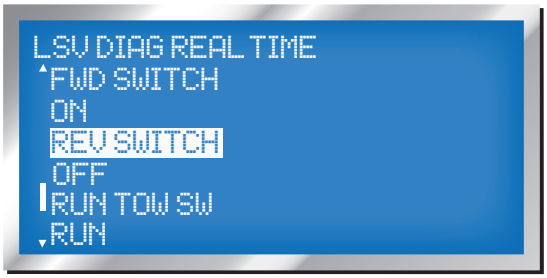
Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

15. FAN function is displayed as "FAN", the next line displays whether or not the controller cooling fan is on or off.

INPUT FUNCTIONS (16 - 18)

16. FORWARD SWITCH: displayed as 'FWD SWITCH', the next line displays the switch position as 'ON' or 'OFF'.

17. REVERSE SWITCH: displayed as 'REV SWITCH', the next line displays the direction selection as 'ON' or 'OFF'.



18. RUN TOW SWITCH POSITION: displayed as 'RUN TOW SW', the next line displays the position of the run/tow switch as 'RUN' or 'TOW'.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

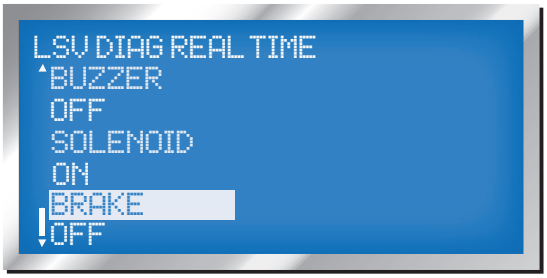
OUTPUT FUNCTIONS (19 - 20)

19. REVERSE WARNING BUZZER: displayed as 'BUZZER', the next line displays the buzzer state as 'ON' or 'OFF'.

20. SOLENOID: displayed as 'SOLENOID', the next line displays the solenoid state as 'ON' or 'OFF'

BRAKE FUNCTIONS (21 - 23)

21. ELECTRIC BRAKE: displayed as 'BRAKE', the next line displays the electric brake state as 'ON' or 'OFF'.



22. ELECTRIC BRAKE CURRENT: displayed as 'EBRAKECURR', the next line displays the brake current as a three place decimal in Amps; the brake current displayed below is 3 milliAmps.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

23. BRAKE LIGHT: displayed as 'BRAKELIGHT', the next line displays the brake light state as 'ON' or 'OFF'.

BATTERY AND WARRANTY (read only)

Display parameters based on data stored in the vehicle controller.

STATUS (1 - 6)

1. STATE OF BATTERY CHARGE: displayed as 'SOCBATT', the next line displays the battery pack state of charge in percentage (%).

2. TOTAL GROSS AMP-HOURS: displayed as 'TOTAL GROSS AH', this is the total Amp-Hours used for the life of the vehicle.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

3. TOTAL NET AMP-HOURS: displayed as 'TOTAL NET AH', this is the total net Amp-Hours used for the life of the vehicle.

4. TOTAL RUNNING TIME: displayed as 'TOTAL DRIVE TIME', the next line displays the number of hours of running time (pedal down) on the vehicle in hours.

5. TOTAL MILEAGE OF THE VEHICLE: displayed as 'TOT VEH MILES', the next line displays the total mileage of the vehicle in miles in 10ths.

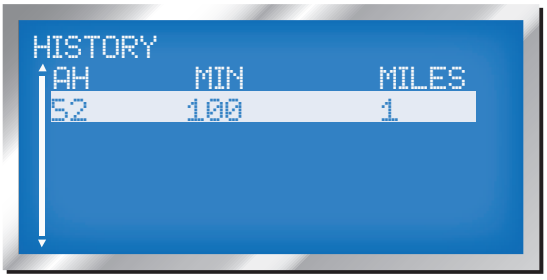
6. TOTAL LIFETIME OF THE CONTROLLER: displayed as 'TOTAL CPU TIME', the next line displays the total lifetime of the controller in hours and 10ths. .

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

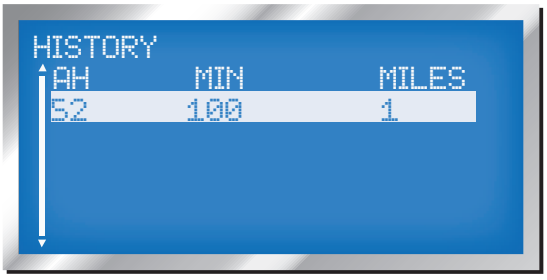
HISTORY (1 - 3)

The HISTORY screen displays the total number of amp hours, the minutes and the miles of the vehicle. The top line will reset to all zeros if the key is off and the car is plugged in to a charger. The charger must provide an increase in battery pack voltage to reset this screen. The reset will take place once the key is cycled. If these conditions are not met the history will keep counting from the prior day.

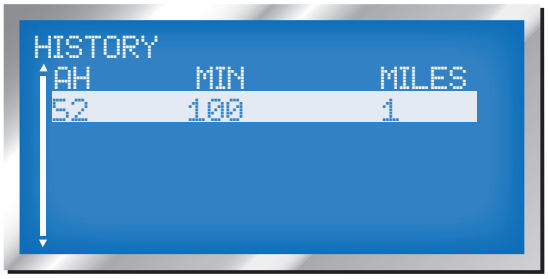
1. TOTAL GROSS AMP HOURS USED SINCE THE LAST RECORDED CHARGE CYCLE: displayed as 'GROSS AH', the next line displays gross amp hours used as a whole number.



2. TOTAL RUN TIME ON VEHICLE IN MINUTES SINCE THE LAST RECORDED CHARGE CYCLE: displayed as 'MIN', this is the total run time on vehicle in minutes.



3. TOTAL MILEAGE OF THE VEHICLE SINCE THE LAST RECORDED CHARGE CYCLE: displayed as 'MILES', this is the total mileage of the vehicle in whole numbers in 10ths of a mile.

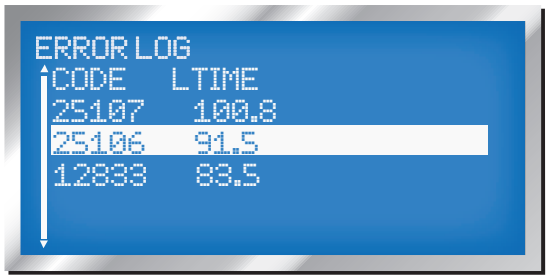


Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

ERROR MESSAGES

1. Current Error Message is displayed on the ERROR STATUS screen.

2. Past 7 Error Codes are displayed on ERROR LOG screen. The error code along with the run time when the error occurred. This is past history and is not the current fault being experienced unless the L time and CPU time are very close to being equal.



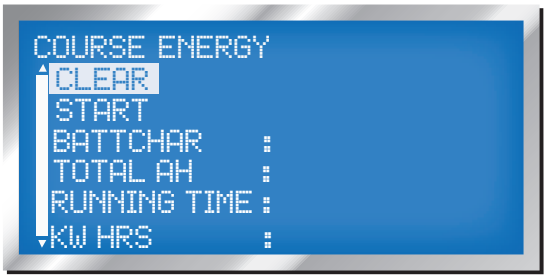
WARNING MESSAGES

1) See chart for warning codes and troubleshooting information.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

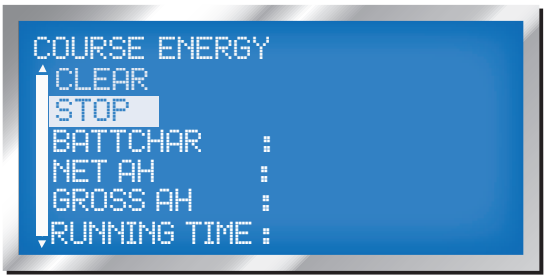
COURSE ENERGY CONSUMPTION (read only)

1. Scroll down to 'CLEAR' and press the enter key (button 3) to clear the energy consumption.

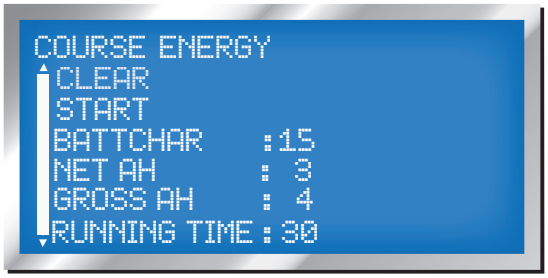


2. Scroll down to 'START' and press the enter key (button 3) to begin recording the energy consumption.

3. To 'STOP' the recording make sure that 'STOP' is highlighted and press the enter key (button 3). The energy consumed will be displayed on the screen. If the key switch is turned off or the diagnostic tool is unplugged this screen will be erased.

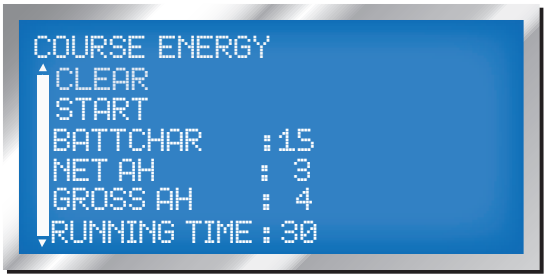


4. NET STATE OF BATTERY CHARGE CONSUMED: displayed as '%' as a whole number.

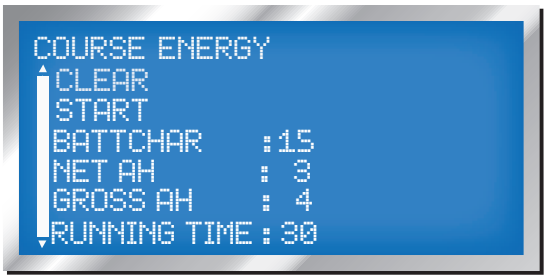


Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

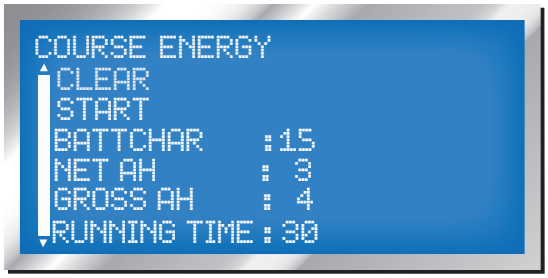
5. NET AMP-HOURS USED FOR THE ROUND: displayed as a whole number. .



6. GROSS AMP-HOURS USED FOR THE ROUND displayed as a whole number.



7. NET RUNNING TIME ON THE VEHICLE: displayed in # of minutes. .



CODE	DESCRIPTION	POSSIBLE CAUSES	DIAGNOSTIC STEP	ACTION (post diagnostics)
8976	AC Over Current	1. Software detects motor current 50% higher than controller peak rated current. NOTE: this error is seldom seen. It is usually the result of motor parameters such as stator inductance or resistance being out of spec. Transient Events can also cause this error without a component failure	1. Turn key to 'OFF' and then back 'ON'. If car does not run proceed to step 2. 2. Disconnect U, V, W from controller. Check resistance between U -V, V-W, and U-W, each should be 0.4-0.8 Ohms. If readings are out of range see ***ACTION 1***. If readings are in range and car does not run proceed to step 3. 3. Remove controller from the non-running car and install it in a running car, if this vehicle does not run with this controller the controller is suspect. See ***ACTION 2***	1. Replace Motor 2. Replace Controller
9024	AC Short Circuit	1. Short circuit detected in controller, motor cable or motor.	1. Turn key to 'OFF' and then back 'ON'. If car does not run proceed to step 2. 2. Disconnect U, V, W from controller. Check resistance between U -V, V-W, and U-W, each should be 0.4-0.8 Ohms. If readings are out of range see ***ACTION 1***. If readings are in range and car does not run proceed to step 3. 3. Remove controller from the non-running car and install it in a running car, if this vehicle does not run with this controller the controller is suspect. See ***ACTION 2***	1. Replace Motor 2. Replace Controller
12576	DC Bus Timeout	1. DC Bus voltage has not reached 24 volts within 10 seconds after key switch start.	1. Check battery voltage across all 4 batteries, voltage should read 42 VDC minimum, if O.K. proceed to step 2. 2. Check voltage across solenoid contacts, if more than 3 VDC but less than 24 VDC proceed to step 3, if not see ***ACTION 3***. 3. Remove resistor control module connection to controller B- terminal, if error status changes follow ***ACTION 1***.	1. Replace resistor control module. 2. If error does reoccur then replace controller. 3. Replace solenoid.
12817	DC Bus High - Software Detected	1. Battery Pack voltage is over 63 volts. NOTE: It is unlikely this error will occur in the factory. If it occurs in the field during regenerative braking, energy is transferred from the controller back to the battery pack raising the DC Bus voltage and battery pack terminal voltage only if the energy burn circuit is not properly functioning.	1. Verify that all battery wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and battery post. 2. Check the battery voltage across all 4 batteries, voltage should read 63 VDC **MAXIMUM**. 3. Check voltage across solenoid contacts. If more than 3 VDC but less than 24 VDC proceed to step 3, if it does not fall in this range follow ***ACTION 3***. 4. Verify power resistor ohm reading is between 0.2 and 0.5 ohms. 5. Remove resistor control module connection to controller B- terminal. If error status changes follow ***ACTION 1***.	1. Tighten or replace loose or high resistance power wire connections. 2. Replace power resistor. 3. Replace solenoid. 4. Replace resistor control module. 5. If error continues, replace the controller.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

CODE	DESCRIPTION	POSSIBLE CAUSES	DIAGNOSTIC STEP	ACTION (post diagnostics)
12818	DC Bus High - Hardware Detected	1. Battery Pack voltage is over 67 volts. NOTE: It is unlikely this error will occur in the factory and very rarely in the field. If it occurs in the field the most likely cause is a loose power wire or and internal controller fault	1. Verify that all battery wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and battery post. 2. Check the battery voltage across all 4 batteries, voltage should read 63 VDC **MAXIMUM**. 3. Check voltage across solenoid contacts. If more than 3 VDC but less than 24 VDC proceed to step 3, if it does not fall in this range follow ***ACTION 3***. 4. Verify power resistor ohm reading is between 0.2 and 0.5 ohms. 5. Remove resistor control module connection to controller B- terminal. If error status changes follow ***ACTION 1***.	1. Tighten or replace loose or high resistance power wire connections. 2. Replace power resistor. 3. Replace solenoid. 4. Replace resistor control module. 5. If error continues, replace the controller.
12833	DC Bus Low - Software Detected	1. Controller DC Bus voltage has dropped below 18 volts.	1. Verify that all battery wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and battery post. 2. Check the battery voltage across all 4 batteries, voltage should read 42 VDC **Minimum**. 3. Check voltage across solenoid contacts. If more than 3 VDC but less than 24 VDC proceed to step 3, if it does not fall in this range follow ***ACTION 3***. 4. Verify power resistor ohm reading is between 0.2 and 0.5 ohms. 5. Remove resistor control module connection to controller B- terminal. If error status changes follow ***ACTION 1***.	1. Tighten or replace loose or high resistance power wire connections. 2. Replace power resistor. 3. Replace solenoid. 4. Replace resistor control module. 5. If error continues, replace the controller.
16912	Motor Temp High	1. Vehicle is heavily loaded or overloaded. 2. Motor temperature of greater than or equal to 150°C (302°F), NOTE: 1300 ohms equals a motor temperature of 150°C.	1. Check external motor temperature, it should be less than 120°C (248°F). 2. Check thermocouple resistance, it should be more than 400 ohms and less than 1300 ohms. If not between these numbers perform ***ACTION 3***.	1. Allow motor to cool. 2. Reduce payload or travel grade. 3. Replace motor. 4. Replace the controller.
17168	Heat Sink Temp High	1. Vehicle is heavily loaded or overloaded. 2. Controller temperature is greater than or equal to 120°C (248°F).	1. Check the external heat sink temperature, it should be less than 80°C (176°F).	1. Allow to cool. 2. Reduce payload or travel grade. 3. Replace the controller.
20753	15V Supply Low Voltage	1. Problem with the reverse warning alarm (shorted) 2. Problem with controller's internal 15 volt supply.	1. With vehicle 'OFF', unplug 23 pin connector from the controller and measure the reverse alarm resistance, value should be between 100 ohms and 500 ohms. Perform ***ACTION 1***. 2. With vehicle 'OFF', unplug 23 pin connector from the controller and measure the relay resistance, value should be between 1 ohm and 50 ohms. Perform ***ACTION 2***.	1. Replace reverse alarm. 2. Replace controller.

CODE	DESCRIPTION	POSSIBLE CAUSES	DIAGNOSTIC STEP	ACTION (post diagnostics)
20755	5V Supply Low or High Voltage	1. Typically caused by a short in the 5 volt wire harness. 2. Malfunction in the controller's 5 volt (sensor) supply. 3. SOC meter (if equipped) may be shorted.	1. Check both +5V and 5V GND to chassis, resistance should be more than 10k ohms, if less perform ***ACTION 1***. 2. Check throttle and brake sensor for a short condition, if shorted perform ***ACTION 2***. 3. Check motor encoder for a short condition, if shorted perform ***ACTION 3***. 4. Check SOC meter (if equipped) for a short condition, if shorted perform ***ACTION 4***.	1. Replace wire harness. 2. Replace sensor. 3. Replace encoder. 4. Replace SOC meter. 5. Replace controller.
21008	Current Sensor Offset Calibration Error	1.Error detected in controller current measurement hardware.	1. Verify that U, V and W motor wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and power post. 2.Check resistance between U-V, V-W and U-W, each should be 0.4 - 0.8 ohms.	1. Replace controller.
21520	Open Drain Outputs Current High	1. Current in an open drain output (reverse warning alarm, park brake, resistor control, solenoid or brake relay) is more than rated current.	1. Check each output drain device (reverse warning alarm, park brake, resistor control, solenoid or brake relay) for a shorted condition (less than 0.1 ohms) with the key in the 'OFF' position.	1. If shorted condition is found replace shorted component. 2. Replace controller.
25106	Direction Error	1. Occurs only when the reverse and forward signals are simultaneously selected (normally a short condition in either the key switch or wiring)	1. Remove key switch, with switch in 'FWD' and check A-C and A-D, either A-C or A-D when tested should read less than 0.1 ohms, NOT BOTH. 2. Repeat step 1 with switch in 'REV', if step 1 or 2 fail see ***ACTION 1***. 3. Remove 23 pin connector form controller, check mating connector to key switch, pin C and D for a reading of less than 0.1 ohms, if over 0.1 ohms see ***ACTION 2***. 4. If steps 1 - 3 check out good then see ***ACTION 3***.	1. Replace key switch. 2. Replace wiring harness. 3. Replace controller.
25105	Throttle Sensor Error	1. Throttle position sensor has a low voltage condition, less than 0.35 volts. 2. Throttle position sensor has a high voltage condition, greater than 4.8 volts. 3. Throttle position sensor has a voltage less than 0.85 volts when throttle switch closes.	1. Verify that the 5 volt out put range is 5 volts ±0.1 volts. 2. Turn key switch to 'N' and place that the accelerator pedal is in the upright position. 3. Verify that accelerator pedal arm is in contact with the rubber bumper, if not in contact with bumper see ***ACTION 1***. 4. Verify the throttle sensor voltage is between 0.35 volts and 4.8 volts. If not in range see ***ACTION 2***. 5. Verify the throttle sensor voltage is less than or equal to 0.85 volts when throttle switch closes. If greater than 0.85 volts see ***ACTION 3***. 6. Verify other 5 volt supply devices; motor encoder, resistor module and brake sensor. 7. If diagnostic steps 1 and 3-6 fail see ***ACTION 5***.	1. Remove obstruction. 2. Replace throttle sensor. 3. Replace throttle switch. 4. Repair or replace bad device. 5. Replace controller.
25107	Brake Current Low	1. Open circuit, harness not connected. 2. Brake failure	1. Check for loose connection or open circuit in motor brake harness.	1. Tighten or replace harness. 2. Replace motor brake. 3. Replace controller.

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CODE	DESCRIPTION	POSSIBLE CAUSES	DIAGNOSTIC STEP	ACTION (post diagnostics)
25108	Brake Sensor Error	Brake position sensor input is out of range, there are three conditions which can cause this error. 1. Low sensor voltage, less than 0.35 volts. 2. High sensor voltage, greater than 4.8 volts. 3. Sensor voltage greater than 0.85 volts when brake switch closes.	1. Verify that the 5 volt out put range is 5 ±0.1 volts. 2. Turn key switch to 'N' and check that the accelerator pedal is in the upright position. 3. Verify that accelerator pedal arm is in contact with the rubber bumper, if not in contact with bumper see ***ACTION 1***. 4. Verify the throttle sensor voltage is between 0.35 volts and 4.8 volts. If not in range see ***ACTION 2***. 5. Verify the throttle sensor voltage is less than or equal to 0.85 volts when throttle switch closes. If greater than 0.85 volts see ***ACTION 3***. 6. Verify other 5 volt supply devices; motor encoder, resistor module and brake sensor.	1. Remove obstruction. 2. Replace throttle sensor. 3. Replace throttle switch. 4. Repair or replace bad device.
33024	CAN Timeout	1. This error occurs when the controller and the handled devices stop communicating.	1. Check for a loose handheld connection or a damaged handheld. Replace the CAN Bus plug (run plug).	1. Cycle the key switch (turn it off then back on). 2. Depress accelerator pedal, release and depress again.
Warning	Drive Fault	1. Indicates the current error is the result of a condition internal to the controller. The message can appear in combination with one of the above error messages.	1. Trouble shoot according to the controller error message displayed.	1. Replace motor controller
Warning	DC Bus Low	DC Bus voltage is less than 24 volts.	1. Verify that all battery wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and battery post. 2. Check the battery voltage across all 4 batteries, voltage should read 42 VDC **MINIMUM**. 3. Check voltage across solenoid contacts. If more than 3 VDC but less than 24 VDC proceed to step 3, if it does not fall in this range follow ***ACTION 3***. 4. Verify power resistor ohm reading is between 0.2 and 0.5 ohms.	1. Tighten or replace loose or high resistance power wire connections. 2. Replace power resistor. 3. Replace solenoid. 4. If error continues, replace the controller.
Warning	DC Bus High	Controller DC Bus voltage is greater than 67 volts.	1. Verify that all battery wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and battery post. 2. Check the battery voltage across all 4 batteries, voltage should read 63 VDC **MAXIMUM**. 3. Check voltage across solenoid contacts. If more than 3 VDC but less than 24 VDC proceed to step 3, if it does not fall in this range follow ***ACTION 3***.	1. Tighten or replace loose or high resistance power wire connections. 2. Replace power resistor. 3. Replace solenoid. 4. If error continues, replace the controller.
Warning (Speedometer code 1004)	BDI Calibration	1. The DC Bus measurement system is not calibrated.	no diagnostic steps to perform	1. Replace the controller

CODE	DESCRIPTION	POSSIBLE CAUSES	DIAGNOSTIC STEP	ACTION (post diagnostics)
Warning (Speedometer code 1001)	Motor Temp High	1. Measured motor temperature is greater than 140°C (284°F) but less than 150°C (302°F). Linear torque current reduction is active, drivability is affected (reduced speed).	1. Check external motor temperature, should be less than 120°C (248°F). 2. Check thermocouple resistance, should be more than 400 ohms and less than 1300 ohms, if out of range perform ***ACTION 3***.	1. Allow time to cool. 2. Reduce payload or driving grade. 3. Replace motor. 4. Replace controller.
Warning (Speedometer code 1003)	Motor Temp Sensor	1. Motor temperature sensor is shorted or not connected.	1. Check external motor temperature, should be less than 120°C (248°F). 2. Check thermocouple resistance, should be more than 400 ohms and less than 1300 ohms, if out of range perform ***ACTION 3***.	1. Allow time to cool. 2. Reduce payload or driving grade. 3. Replace motor. 4. Replace controller.
Warning	Heat Sink Temp Low	1. Controller heat sink temperature is less than -20°C (-4°F). Max torque current reduction is active, drivability is affected. This condition normally goes away after a few minutes of operation when the heat sink warms up to a temperature greater than -20°C (-4°F).	1. Check external heat sink temperature, it should be more than -20°C (-4°F). 2. If heat sink temperature is greater than -20°C (-4°F) then see ***ACTION 2***.	1. Warm vehicle to greater than -20°C (-4°F). 2. Replace controller.
Warning (Speedometer code 1005)	Heat Sink Temp High	1. Measured heat sink temperature is greater than 85°C (185°F) but less than 115°C (239°F), linear torque current reduction is active, drivability is affected.	1. Check external heat sink temperature, should be less than 80°C (176°F).	1. Allow time to cool. 2. Reduce payload or driving grade. 3. Replace controller.
Warning	Heat Sink Temp Sens	1. Heat sink temperature sensor shorted or not connected.	1. Check external heat sink temperature, it should be more than -20°C (-4°F) and less than 80°C (176°F). 2. If heat sink temperature is greater than -20°C (-4°F) and less than 70°C (158°F) then see ***ACTION 2***	1. Allow time to warm or cool depending upon temperature. 2. Replace controller.
Warning	Default Parameter	Default parameters are in place. 1. This warning is normal the first time the controller is powered up after down loading new software. 2. If not after new software download this indicates a problem with the EEPROM.	1. Cycle the key switch to 'OFF' then back to "F".	1. Replace controller.
Warning	Power Reduction	1. This warning occurs in conjunction with other motor and heat sink temperature warnings and indicates that max torque current reduction is in affect.	1. Refer to trouble shooting steps for the motor and controller temperature warning conditions.	- - -
Warning	Cur Meas Cal	1. The controller's AC current measurement system is not calibrated	No diagnostic steps	1. Replace controller
Warning (Speedometer code 1002)	Speed Sensor	1. Sensor or wire failure	1. Check pedal functions in diagnostic real time.	1. Replace pedal sensor.

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CODE	DESCRIPTION	POSSIBLE CAUSES	DIAGNOSTIC STEP	ACTION (post diagnostics)
Warning	OD Current High	1. The current in an open drain output (reverse warning alarm, park brake, resistor control, solenoid or brake relay) is greater than 2.5 amps.	1. Check each output drain device (reverse warning alarm, park brake, resistor control, solenoid and brake relay) for a shorted condition, less than 0.1 ohms with the key switch turned to 'OFF'	1. If shorted condition is found replace the shorted component. 2. Replace controller.
Warning (Speedometer code 1006)	Charger Connected	1. Battery charger is connected to the car. Driving is prohibited while charger is connected.	1. Check for charger connection to the vehicle. 2. Check charger receptacle for water ingestion or a shorted condition (is the green LED on?).	1. Disconnect the charger from vehicle. 2. Replace charger receptacle.
Warning (Speedometer code 1000)	Brake Slipping	1.Controller has detected motor rotation while brake is engaged	1. Can occur when key switch is turned to 'OFF' while vehicle is moving. 2. Check for vehicle resistance to movement with key switch turned to 'OFF', if vehicle moves see ***ACTION 1***.	1. Replace motor brake
Warning (Speedometer code 1007)	Throttle Switch Closed	1. If this occurs with the key switch turned on: Throttle switch is closed at key start, the throttle switch must be opened momentarily before driving is permitted.	1. Turn key switch to 'OFF'. 2. Release throttle, check throttle switch, it should be open, if closed see ***ACTION 1***.	1. Replace throttle switch 2. Replace controller.
Warning	BDI Low	Battery pack voltage is below 25%.	1. Check battery voltage across all 4 batteries, voltage should read 42 VDC **MINIMUM**. 3. Verify that all battery wires are securely fastened and have less than 0.1 ohms resistance between wire terminal and battery post.	1. Fully charge battery pack 2. Tighten or replace loose or high resistance power wire connections. 3. If error continues replace controller.
Warning (Speedometer code 1008)	Reverse Alarm Test Failed	1. Reverse warning alarm failed at startup check. The controller tests for a completed reverse warning alarm circuit.	1. Turn key switch to 'OFF' and unplug 23 pin connector from controller. 2. Check the reverse warning alarm for a shorted condition, less than 0.1 ohms, by measuring between pin 10 and pin 13 with the Run/Tow switch in the 'TOW' position. If test is greater than 0.1 ohms see ***ACTION 1***. 3. Turn key switch to 'R' and verify voltage to the reverse warning alarm is 48 volts, if not then see ***ACTION 2***.	1. Replace reverse warning alarm. 2. Replace wiring 3. Replace controller

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

DIGITAL VOLT OHM METER

A typical DVOM (digital volt ohm meter) is shown. A recommended model is available through the Service Parts Department as P/N 27481-G01. For the purpose of this section, the red probe (+) and black probe (-) are used. Any DVOM may be used, however the controls, displays, accuracy and features may vary depending on the make and model. Always follow the meter manufacturer's recommendations and instruction for the use and care of the meter.

Fig. 1 DVOM

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 voltage or a signal from its origination point to its destination. Each wire is indicated by color.

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 or 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 to 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.

ACCESSORY WIRING HARNESS

After determining that there is power to the fuse 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 diagram 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 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 the accessory.

POWER SUPPLY

Tool List	**Qty.**
DVOM	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 should be replaced with one of the same gauge and color and wired between the correct components and wire tied to the harness bundle. The faulty wire should be cut back close to the harness and the ends protected with vinyl electrical tape.

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 green wire attached. Place the black probe (-) on the battery post with the black 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.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

TABLE OF CONTENTS FOR SECTION 'P'

LIGHTNING PROTECTION AND GROUNDING

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

Notes:

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

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1. Grounding Requirements

For the purpose of this specification, building ground systems should serve two primary functions: personal safety and equipment protection. In order to be effective, all elements and functions of building ground system must receive equal consideration in design and installation. Once installed, it is up to the owner to adequately maintain the system by implementing periodic inspections and ground tests in order to determine its effectiveness.

2. Ground Systems

All electronic equipment is inherently related to earth by capacitive coupling, accidental or incidental contact and intentional connection. The earth forms a natural readily available form of common potential reference for all electrical circuits. For maximum effectiveness, grounding must be looked at from a total system viewpoint, with various sub-systems comprising the total facility ground system. The interconnection of the various sub-systems into a building ground system will provide a direct path, of known low impedance, between earth and the various electrical and other equipment. This effectively extends an approximation of ground reference throughout the building. The total building ground system is composed of an earth electrode system, a lightning protection system and an equipment fault protective system.

Resistance To Earth: The resistance to earth of the ground system should not exceed 10 ohms. Where the resistance of 10 ohms cannot be obtained due to high soil resistivity, rock formations or other abnormal conditions, alternate methods for reducing the resistance to earth must be considered.

Chemical Treatments: No salt, coke or other chemicals may be used to treat the soil in order to obtain the required ground resistance readings. Approved methods of enhancement are bentonite clay or the GEM product for ground enhancement as manufactured by Erico Products of Solon, Ohio.

Ground Tests: The resistance to earth of the ground system shall be measured by the “Fall of Potential Method”. Acceptable resistance meters/testers are those manufactured by Biddle or AEMC.

3. Lightning Protection Requirements

The external lightning protection system shall be designed and installed by a contractor who specializes in the lightning protection field. The contractor must be listed with Underwriters Laboratories Inc. and be in good standing. All work shall be under the direct supervision of a Certified Master Installer with current credentials from the Lightning Protection Institute.

The materials and design for the structure will comply with the most recent edition of the National Fire Protection Association Lightning Protection Code, NFPA 780 and the Materials Standard for Safety from Underwriters Laboratories UL96. Materials for this project may be those of Harger Lightning Protection, 1066 Campus Drive, Mundelein, Illinois (800-842-7437).

Upon completion of the project, the contractor will supply to the owner the Master Label issued by Underwriters Laboratories.

4. Equipment Fault and Personal Safety System

The standard method of providing an equipment fault protection ground network is to run a good ground conductor (green wire) through the conduit together with the AC distribution system. This method is required for all types of conduit, including metallic.

5. Ground Network Requirements

Install the conduit in accordance with local regulations or as prescribed by the National Electrical Code.

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

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6. External Grounding Requirements

For optimum results, earth electrode installation must be accomplished early in the construction of a new site. The earth electrode system should be established at the same time utilities are installed to insure proper interconnection of all utility grounds/systems.

For existing sites, the earth electrode installation shall be constructed using the most economical means possible in order to meet the intent of this specification.

Prior to the installation or design of the ground system, a survey should be taken in order to determine the earth resistivity, types of soil or any man-made features that may have a significant effect upon the efficiency of the grounding system. Based on the information gathered, deviations from this specification (Exceeding normal requirements) may be necessary in order to achieve desired results.

7. Materials

Ground Rod Electrodes: Ground rod electrodes shall have a minimum diameter of 5/8" and be no less than 10'-0" in length. Rods may be copper, copper-clad steel or stainless steel. Galvanized steel rods are not permitted unless it is determined that the galvanized rod will have a longer life expectancy due to soil conditions.

Ground Rod Spacing: Ground rods shall not be spaced at intervals exceeding 60'-0" around the perimeter of the structure.

Ground Loop Conductor: In no case shall the ground loop conductor be smaller than a 2/0 AWG bare, stranded, soft drawn copper wire. The ground loop must be installed at least 24" below grade and be at least 24" away from the structure. All bends in the conductor shall have a minimum radius of 8" and be no less than 90 degrees.

Ground Mats: In areas where electrodes cannot be driven, a ground mat consisting of a #6 solid copper or a copper-copper clad steel mesh, utilizing a 12" x 12" cross pattern may be used. All inter-connections in the mesh shall be brazed or silver soldered.

Ground Plates: Ground plates if utilized shall be 24" x 24" x .032" thick solid copper. Ground plates should only be used if a ground rod cannot be driven.

Ground Connections: Unless otherwise specified or approved by the owner, all connections below grade shall be by exothermic weld (Cadweld). Where exothermic welds may not be practical, UL approved grounding clamps that utilize two bolts for pressure may be used. NOTE: Prior approval must be obtained in order to use a mechanical connection below grade.

8. Earth Electrode System

The earth electrode system consists of a network of earth electrode rods, plates, mats or grids and their interconnecting conductors. The extensions into the building are used as the principle grounding point for connecting to the ground system serving the building. Ground potential is established by electrodes in the earth.

An electrode may be a metallic water pipe that has no isolation joints, a system of buried, driven rods interconnected with a bare wire that normally forms a ring around the building or a ground plane of horizontal buried wires. Depending upon soil conditions, building design and the existing water pipe networks, an electrode may be a combination of any of the above mentioned systems.

9. Lightning Protection System

The lightning protection system provides a non-destructive path to ground for lightning energy contacting or induced onto or in a building. To effectively protect from lightning damage, air terminals are installed according to the National Fire Protection Association Lightning Protection Code (NFPA 780). Air terminals will intercept the discharge to keep it from pene-

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trating or structurally damaging the building. This is done by providing a low impedance path from the air terminals to the earth electrode system.

10. Equipment Fault and Personal Safety System

The equipment fault protective system ensures that personnel are protected from shock hazard and equipment is protected from damage or destruction resulting from faults (lightning induced surges) that may develop in the electrical system. Deliberately engineered ground conductors (green wire safety ground) shall be provided throughout the AC distribution system to afford electrical paths of sufficient capacity, so that protective devices can operate promptly and efficiently. The use of conduit for grounding in lieu of a dedicated green wire is unacceptable.

Install the green wire ground (#6 stranded) with the AC power distribution conductors. There shall be no green wires spliced within the conduit. All splices shall be performed at the appropriate junction boxes.

Bond the ground conductor to all pull boxes, junction boxes and power panels.

In existing facilities where an existing conduit is not large enough to accommodate an additional ground conductor, or where a conduit section is insulated from other conduit sections, an external ground conductor may be installed to maintain continuity. All mounting hardware and connectors shall be UL approved.

All DC chargers are to be grounded to the green wire ground using UL approved connectors. At no point should the chargers be isolated from the grounding system.

All interior grounding should return to a single ground point. From this location it is then connected to the exterior ground system. Optional Interior Ground Halo: If an interior ground halo is to be installed around the inside perimeter of the structure, this conductor (#2/0 green insulated minimum) shall be securely fastened to the structure.

All connections to the halo shall be made using UL listed connectors.

Transient Voltage Surge Suppression: TVSS shall be provided at the main electrical service entrance panel. Protection at this point shall be as follows:

- UL 1449 Listed device
- 25,000 ampere surge capacity with maximum 495 volt clamping voltage
- Protection should be Line to Ground, Neutral to Ground and Line to Neutral
- Internally fused for safety
- Failure mode indicator lights

Suppression may be as the 14000 series of Harger Lightning Protection, Inc., 1066 Campus Drive, Mundelein, IL (800-842-7437), or MBP 120EFI series from EFI Electronics Corporation, 2415 South 2300 West, Salt Lake City, UT (801-977-9009).

LIGHTNING PROTECTION AND GROUNDING

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

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SPECIFICATIONS

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

Notes:

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

2Five TWO-PASSENGER VEHICLE SPECIFICATIONS

BATTERIES	Four 12 Volt deep cycle (70 minute minimum, 150 Amp-Hour discharge rate)
SPEED CONTROLLER	Solid state, 235 Amp capacity
MOTOR	3 phase AC induction
TRANSAXLE	14.76:1 Reverse helical geared with input pinion splined to the motor shaft
BRAKES	4 Wheel hydraulic disc
PARKING BRAKE	Automatic parking brake function
FRONT SUSPENSION	Coil springs over hydraulic shock absorbers
REAR SUSPENSION	Leaf springs with hydraulic shock absorbers
STEERING	Single reduction rack and pinion
STEERING WHEEL	Dual handgrips with textured rubber overmold
SEATING	Split bench, foam cushion with vinyl cover and hip restraints/hand holds
SEATING CAPAPCITY	Operator and one passenger
TOTAL LOAD CAPACITY	800 lbs. (363 kg) including operator, passenger, accessories and cargo
SPEED	Up to 25 mph (40 kph) in forward
CHASSIS	Welded tubular steel, powder coated (DuraShield™)
BODY	Flexible, Impact Resistant, Injection Molded TPO (Thermoplastic Polyolefin) with Base Coat / Clear Coat
DASH PANEL	Scuff resistant plastic with 4 drink holders, storage and 12-volt receptacle for accessories
TIRES	205/50-10**
TIRE PRESSURE	30 psi (207 kPa)**
GROUND CLEARANCE	4.7" (11.9 cm) at differential
WEIGHT	822 lbs (373 kg) without batteries
OPERATING CONTROLS & INSTRUMENTATION	Removable key, 'deadman' accelerator control, speedometer/odometer, horn, rabbit/turtle speed control switch, direction selector, audible reverse warning, state of charge meter
LIGHTS	Headlights, taillights, brake lights, turn signal/hazard light
BATTERY CHARGER WITH DC TO DC CONVERTER	On-board battery charger with anti-drive away interlock and integrated 48-volt to 12-volt DC to DC converter with 30-amp output for accessories. Charger will accept 110-230 VAC input, charging the batteries with 48-volt DC, 13-amp output charger is UL Listed and CSA Certified.

** 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 the Owner's Guide.

SPECIFICATIONS

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

2Five FOUR-PASSENGER VEHICLE SPECIFICATIONS

BATTERIES	Four 12 Volt deep cycle (70 minute minimum, 150 Amp-Hour discharge rate)
SPEED CONTROLLER	Solid state, 235 Amp capacity
MOTOR	3 phase AC induction
TRANSAXLE	14.76:1 Reverse helical geared with input pinion splined to the motor shaft
BRAKES	4 Wheel hydraulic disc
PARKING BRAKE	Automatic parking brake function
FRONT SUSPENSION	Coil springs over hydraulic shock absorbers
REAR SUSPENSION	Leaf springs with hydraulic shock absorbers
STEERING	Single reduction rack and pinion
STEERING WHEEL	Dual handgrips with textured rubber overmold
SEATING	Front: Split bench, foam cushion with vinyl cover and hip restraints/hand holds Rear: Bench-style foam cushion with vinyl cover and hip restraints/hand holds
SEATING CAPAPCITY	Operator and three passengers
TOTAL LOAD CAPACITY	800 lbs. (363 kg) including operator, passenger, accessories and cargo
SPEED	Up to 25 mph (40 kph) in forward
CHASSIS	Welded tubular steel, powder coated (DuraShield™)
BODY	Flexible, Impact Resistant, Injection Molded TPO (Thermoplastic Polyolefin) with Base Coat / Clear Coat
DASH PANEL	Scuff resistant plastic with 4 drink holders, storage and 12-volt receptacle for accessories
TIRES	205/50-10**
TIRE PRESSURE	30 psi (207 kPa)**
GROUND CLEARANCE	4.7" (11.9 cm) at differential
WEIGHT	872 lbs (397 kg) without batteries
OPERATING CONTROLS & INSTRUMENTATION	Removable key, 'deadman' accelerator control, speedometer/odometer, horn, rabbit/turtle speed control switch, direction selector, audible reverse warning, state of charge meter
LIGHTS	Headlights, taillights, brake lights, turn signal/hazard light
BATTERY CHARGER WITH DC TO DC CONVERTER	On-board battery charger with anti-drive away interlock and integrated 48-volt to 12-volt DC to DC converter with 30-amp output for accessories. Charger will accept 110-230 VAC input, charging the batteries with 48-volt DC, 13-amp output charger is UL Listed and CSA Certified.

** 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 the Owner's Guide.

inflation pressure less than the inflation pressure recommended in the Owner's Guide.

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

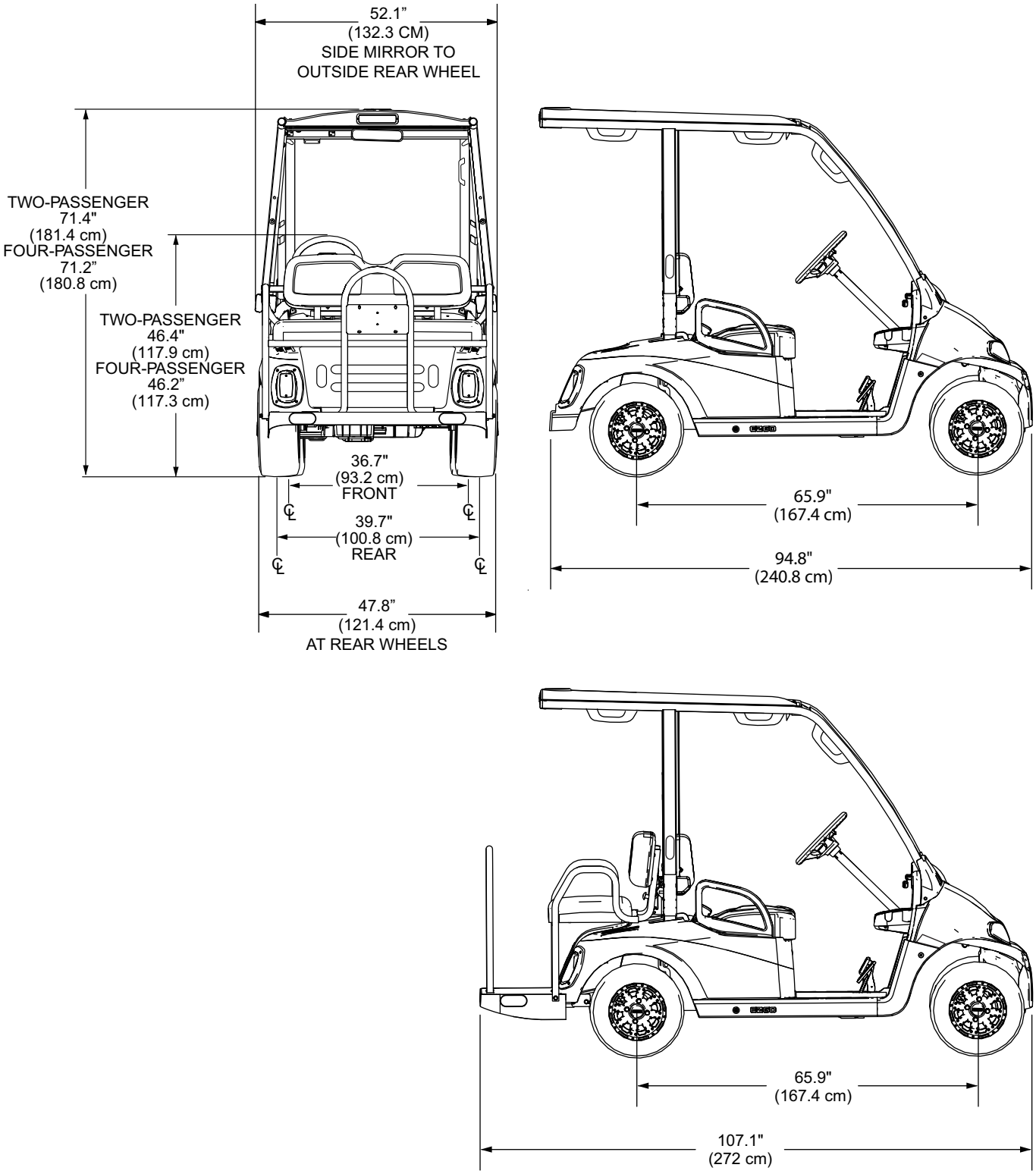

Fig. 1 Vehicle Dimensions

SPECIFICATIONS

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

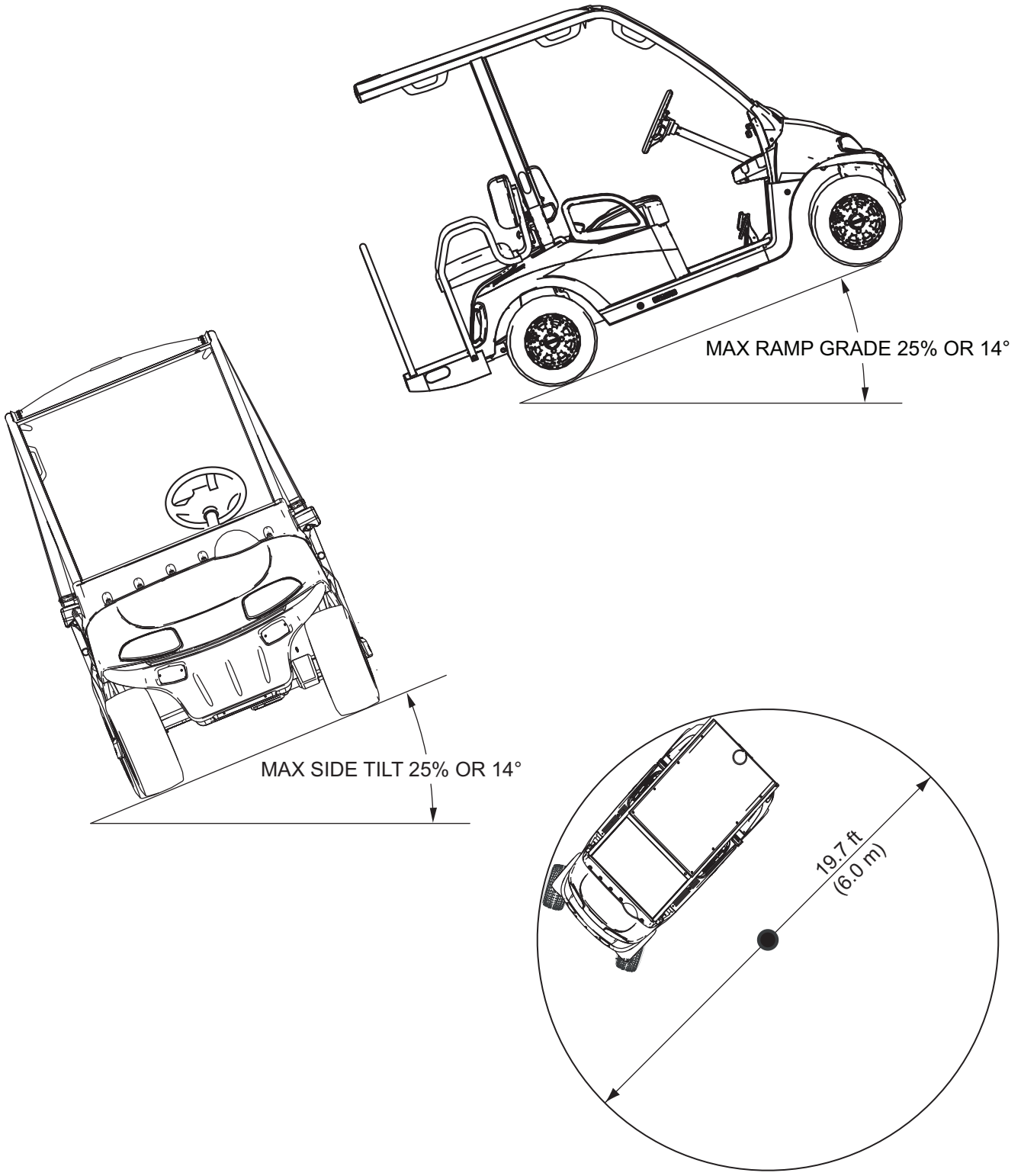

Fig. 2 Vehicle Incline Specifications and Turning Diameter

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

Notes:

SPECIFICATIONS

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

Notes:

NOTICE

Read the following warnings before attempting to operate the vehicle

:

⚠ WARNING

To prevent personal injury or death, observe the following:

When vehicle is to be left unattended, engage park brake, move direction selector to neutral, turn key to 'OFF' position and remove key.

Drive vehicle only as fast as terrain and safety considerations allow. Consider the terrain and traffic conditions. Consider environmental factors which effect the terrain and the ability to control the vehicle.

Avoid driving fast down hill. Sudden stops or change of direction may result in a loss of control. Use service brake to control speed when traveling down an incline.

Use extra care and reduced speed when driving on poor surfaces, such as loose dirt, wet grass, gravel, etc.

All travel should be directly up or down hills.

Use extra care when driving the vehicle across an incline.

Stay in designated areas and avoid steep slopes. Use the park brake whenever the vehicle is parked.

Keep feet, legs, hands and arms inside vehicle at all times.

Avoid extremely rough terrain.

Check area behind the vehicle before operating in reverse.

Make sure the direction selector is in correct position before attempting to start the vehicle.

Slow down before and during turns. All turns should be executed at reduced speed.

Always bring vehicle to a complete stop before shifting the direction selector.

See GENERAL SPECIFICATIONS for vehicle load and seating capacity.

NOTICE

Read and understand the following text and warnings before attempting to service vehicle:

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 time to consider the safety of yourself and others around you should the component move unexpectedly.

Some components are heavy, spring loaded, highly corrosive, explosive or may produce high amperage or reach high temperatures. 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 situation occur.

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

.

⚠ WARNING

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

Be sure no loose clothing or hair can contact moving parts.

Use care not to touch hot objects.

Raise rear of vehicle and support on jack stands before attempting to run or adjust powertrain.

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

Hydrogen gas is formed when charging batteries. Do not charge batteries without adequate ventilation.

Do not permit open flame or anyone to smoke in an area that is being used for charging batteries. A concentration of 4% hydrogen gas or more is explosive.

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

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