



1998-1999
MAINTENANCE
SERVICE
SUPPLEMENT



V-GLIDE
36-VOLT VEHICLES

MANUAL NUMBER 101968406
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FOREWORD

The Club Car V-Glide 36-volt electric vehicle is engineered and built to provide the ultimate in performance efficiency. However, timely and appropriate vehicle maintenance and repair is essential for long-term vehicle performance and continued safe and reliable service.

This supplement provides detailed information for the maintenance and repair of V-Glide 36-Volt electric vehicles and should be used in conjunction with the 1998/1999 DS Golf Car Maintenance and Service Manual, Publication Part No. 101968401. If you do not have a 1998/1999 DS Golf Car Maintenance and Service Manual, you may order one from your local Club Car representative. This supplement and the 1998/1999 DS Golf Car Maintenance and Service Manual should be thoroughly reviewed prior to servicing the vehicle. The procedures provided herein must be properly implemented, and the CAUTION, WARNING, and DANGER statements must be heeded.

This supplement was written for the vehicle mechanic who already possesses basic knowledge and skills in electrical and mechanical repair. *If the mechanic does not have such basic knowledge and skills, attempted service or repairs to the vehicle may render the vehicle unsafe.* For this reason, Club Car advises all repairs and/or service be performed by an authorized Club Car distributor/dealer representative or by a Club Car factory trained technician.

This service supplement, along with the 1998/1999 DS Golf Car Maintenance and Service Manual, covers all aspects of typical service requirements for the V-Glide 36-Volt electric vehicle. If you need additional information, you may write to us at: Club Car, Inc., P.O. Box 204658, Augusta, GA 30917 or contact a Club Car technical service representative at (706) 863-3000, extension 3580.

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This manual effective August 1, 1997

WARNING

- READ SECTION 1–SAFETY, IN THE MAINTENANCE AND SERVICE MANUAL BEFORE ATTEMPTING ANY SERVICE ON THIS VEHICLE.
- BEFORE SERVICING VEHICLE, READ COMPLETE SECTION(S) AND ANY REFERENCED INFORMATION RELEVANT TO SERVICE OR REPAIR TO BE PERFORMED.

NOTE

- THIS SUPPLEMENT REPRESENTS THE MOST CURRENT INFORMATION AT THE TIME OF PUBLICATION. CLUB CAR, INC. IS CONTINUALLY WORKING TO IMPROVE OUR VEHICLES AND OTHER PRODUCTS. THESE IMPROVEMENTS MAY AFFECT SERVICING PROCEDURES. ANY MODIFICATION AND/OR SIGNIFICANT CHANGE IN SPECIFICATIONS OR PROCEDURES WILL BE FORWARDED TO ALL CLUB CAR DISTRIBUTORS AND DEALERS AND WILL, WHEN APPLICABLE, APPEAR IN FUTURE EDITIONS OF THIS MANUAL.
- DAMAGE TO A VEHICLE OR COMPONENT THEREOF NOT RESULTING FROM A DEFECT OR WHICH OCCURS DUE TO UNREASONABLE OR UNINTENDED USE, OVERLOADING, ABUSE, OR NEGLIGENCE (INCLUDING FAILURE TO PROVIDE REASONABLE OR NECESSARY MAINTENANCE AS INSTRUCTED IN THE VEHICLE OWNER'S MANUAL), ACCIDENT OR ALTERATION, INCLUDING INCREASING VEHICLE SPEED BEYOND FACTORY SPECIFICATIONS OR MODIFICATIONS WHICH AFFECT THE STABILITY OF THE VEHICLE OR THE OPERATION THEREOF, WILL VOID THE WARRANTY.
- CLUB CAR, INC. RESERVES THE RIGHT TO CHANGE SPECIFICATIONS AND DESIGNS AT ANY TIME WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION OR LIABILITY WHATSOEVER.
- THERE ARE NO WARRANTIES EXPRESSED OR IMPLIED IN THIS MANUAL. SEE THE LIMITED WARRANTY FOUND IN THE VEHICLE OWNER'S MANUAL OR WRITE TO CLUB CAR, INC.

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⚠ WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL ELECTRICAL AND MECHANICAL REPAIR.
- FOLLOW ALL PROCEDURES EXACTLY AS STATED IN THIS MANUAL, AND HEED ALL DANGER, WARNING AND CAUTION STATEMENTS LISTED IN THIS MANUAL, AS WELL AS, THOSE AFFIXED TO THE VEHICLE.
- CHECK THE VEHICLE OWNER'S MANUAL FOR PROPER LOCATION OF ALL VEHICLE WARNING DECALS AND MAKE SURE THEY ARE IN PLACE AND ARE EASY TO READ.
- IF PROBLEMS ARE FOUND DURING SCHEDULED INSPECTION OR SERVICE, DO NOT OPERATE THE VEHICLE UNTIL REPAIRS ARE MADE. FAILURE TO MAKE NECESSARY REPAIRS COULD RESULT IN FIRE, PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.
- ALWAYS WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE. WEAR A FULL FACE SHIELD WHEN WORKING WITH BATTERIES.
- DO NOT WEAR LOOSE CLOTHING. REMOVE JEWELRY SUCH AS RINGS, WATCHES, CHAINS, ETC. BEFORE SERVICING VEHICLE.
- MOVING PARTS! - DO NOT ATTEMPT TO SERVICE THE VEHICLE WHILE IT IS RUNNING.
- HOT! - DO NOT ATTEMPT TO SERVICE HOT MOTOR OR RESISTORS. FAILURE TO HEED THIS WARNING COULD RESULT IN SEVERE BURNS.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.
- TO AVOID UNINTENTIONALLY STARTING THE VEHICLE, DISCONNECT BATTERIES AS SHOWN IN **FIGURE 10-2, PAGE 10-3**.
- TURN KEY SWITCH TO **OFF**, REMOVE THE KEY, PLACE THE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION, AND CHOCK WHEELS PRIOR TO SERVICING.
- IMPROPER USE OF THE VEHICLE OR FAILURE TO PROPERLY MAINTAIN THE VEHICLE COULD RESULT IN DECREASED VEHICLE PERFORMANCE OR SEVERE PERSONAL INJURY.
- LIFT ONLY ONE END OF THE VEHICLE AT A TIME. BEFORE LIFTING, LOCK THE BRAKES AND CHOCK THE WHEELS THAT REMAIN ON THE FLOOR. USE A SUITABLE LIFTING DEVICE (CHAIN HOIST OR HYDRAULIC FLOOR JACK) WITH 1000 LBS. (454 KG.) MINIMUM LIFTING CAPACITY. DO NOT USE LIFTING DEVICE TO HOLD VEHICLE IN RAISED POSITION. ALWAYS USE APPROVED JACKSTANDS OF PROPER WEIGHT CAPACITY TO SUPPORT VEHICLE.

GENERAL INFORMATION

To ensure continuing reliable performance of the 36-volt electric vehicle, a Preventive Maintenance program should be established and followed. Preventive Maintenance consists of the regular performance of scheduled vehicle service and maintenance procedures, and is the only way to ensure the vehicle provides the safe, reliable, and economical service it is designed to deliver. The following charts provide recommended service intervals for the lubrication and maintenance of the 36-volt vehicle. Note that critical areas such as brake operation, accelerator operation, steering and tires should be performed daily. These checks can easily be performed when moving the vehicle from the storage facility to the starting line. Any vehicle that is not functioning properly should be removed from service until it has been repaired.

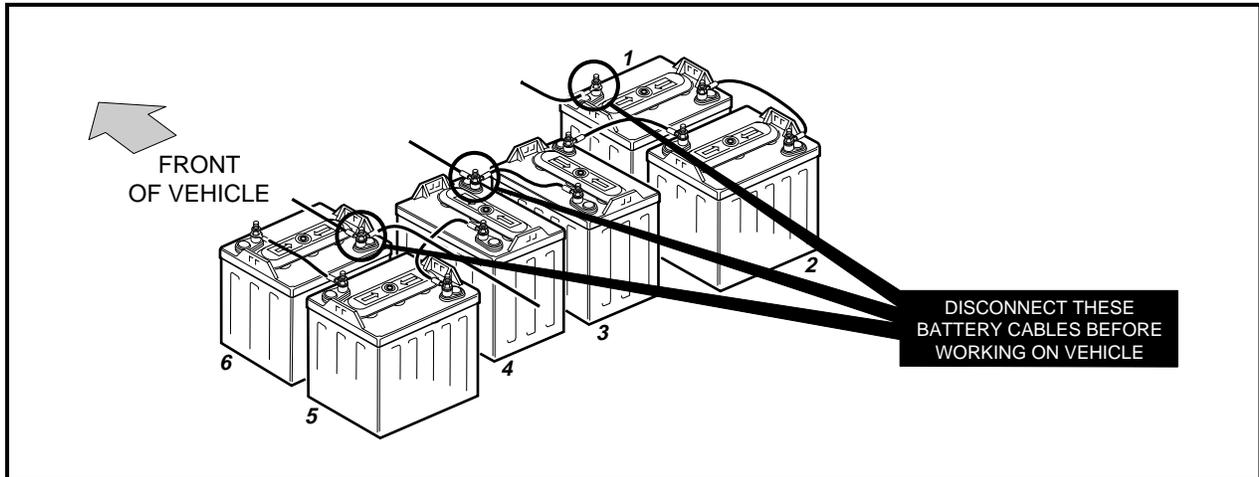


Figure 10-1 V-Glide Battery Configuration

DAILY PRE-OPERATION SAFETY CHECKLIST

Inspect and drive the vehicle, using the Pre-operation Checklist and Performance Inspection in Section 3 in the Maintenance and Service Manual as guides to check the following items.

- Vehicle warning decals
- Brake system
- Park brake
- Reverse warning buzzer
- Steering and linkages
- Proper acceleration and maximum speed
- Batteries
- Accelerator Switch

In addition, check the items listed below:

- Tires: Visually inspect for wear, damage and proper inflation.
- Forward/Reverse switch: Check for proper operation. **See Controls, Section 3—General Information in the 1998/1999 DS Golf Car Maintenance and Service Manual.**

PERIODIC SERVICE SCHEDULE

⚠ WARNING

- SERVICE, REPAIRS, AND ADJUSTMENTS MUST BE MADE PER INSTRUCTIONS IN THE MAINTENANCE AND SERVICE MANUAL AND THIS SUPPLEMENT.

NOTE

- IF THE VEHICLE IS CONSTANTLY SUBJECTED TO HEAVY USE OR SEVERE OPERATING CONDITIONS, THE PREVENTIVE MAINTENANCE PROCEDURES SHOULD BE PERFORMED MORE OFTEN THAN RECOMMENDED IN THE PERIODIC SERVICE AND LUBRICATION SCHEDULES.
- BOTH THE PERIODIC SERVICE SCHEDULE AND THE PERIODIC LUBRICATION SCHEDULE MUST BE FOLLOWED TO KEEP THE VEHICLE IN OPTIMUM OPERATING CONDITION.

PERIODIC SERVICE SCHEDULE		
REGULAR INTERVAL	SERVICE	
Daily Service by Owner	Batteries	Charge batteries (after each use only).
Weekly Service by Owner	Batteries	Check electrolyte level. Add water as necessary per Maintenance and Service Manual.
Monthly Service by Owner or Trained Technician	Batteries	Wash battery tops and clean terminals with baking soda/water solution. Dispose of waste water properly.
	Tires	Check air pressure and adjust as necessary (See Vehicle Capacities Chart on Page 4).
	Wiper Switch	Check for cracks or other damage; make sure switch is securely fastened to frame. Check movable contact for correct operation.
	General Vehicle	Wash battery compartment and underside of vehicle. Dispose of waste water properly.
Semi-annual Service by Trained Technician Only (Every 50 hours of operation or 100 rounds of golf)	Brake System	Check brake shoes; replace if necessary. (See DS Maintenance and Service Manual).
		Lubricate brake slides per Lubrication Schedule. (See DS Maintenance and Service Manual).
		Check brake cables for damage; replace as required.
	Electrical Wiring and connections	Check for tightness and damage.
	Forward and Reverse Switch	Check condition of contacts and wire connections; Make sure connections are tight.
Front Wheel Alignment and Camber	Check and adjust as required. (See Maintenance & Service Manual, Section 7).	
Annual Service by Trained Technician Only (Every 100 hours of operation or 200 rounds of golf)	Batteries	If batteries are not performing as expected, refer to Section 13–Batteries.

⚠ WARNING

- IF ANY PROBLEMS ARE FOUND DURING SCHEDULED INSPECTION OR SERVICE, DO NOT OPERATE THE VEHICLE UNTIL REPAIRS ARE MADE. FAILURE TO MAKE NECESSARY REPAIRS COULD RESULT IN FIRE, PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.

LUBRICATION

PERIODIC LUBRICATION SCHEDULE			
REGULAR INTERVAL	SERVICE	PLACE*	RECOMMENDED LUBRICANT
Semi-Annually by Owner or Trained Technician (Every 50 hours of operation or every 100 rounds for golf cars)	Brake pedal shaft bearings	1.	Dry Moly Lube - Club Car Part No. 1012151
	Brake Linkage and Pivots	2.	Dry Moly Lube - Club Car Part No. 1012151
	Accelerator push rod pivots and mounts	3.	Dry Moly Lube - Club Car Part No. 1012151
	Forward/Reverse Switch Contacts and charger receptacle	4.	WD 40
	Brake Slides	5.	Dry Moly Lube - Club Car Part No. 1012151
	Front Suspension (5 fittings)	6.	Chassis Lube - EP NLGI Grade 2
Periodic Lubrication Schedule continued on next page.			

PERIODIC LUBRICATION SCHEDULE			
REGULAR INTERVAL	SERVICE	PLACE*	RECOMMENDED LUBRICANT
Annually by Trained Technician Only (Every 100 hours of operation or 200 rounds of golf)	Check/fill transaxle to plug level	7.	22 oz. (.67 liter) SAE 30 WT.
	Inspect front wheel bearings (Repack as necessary)	8.	Chassis Lube - EP NLGI Grade 2

*See Figure 10-2.

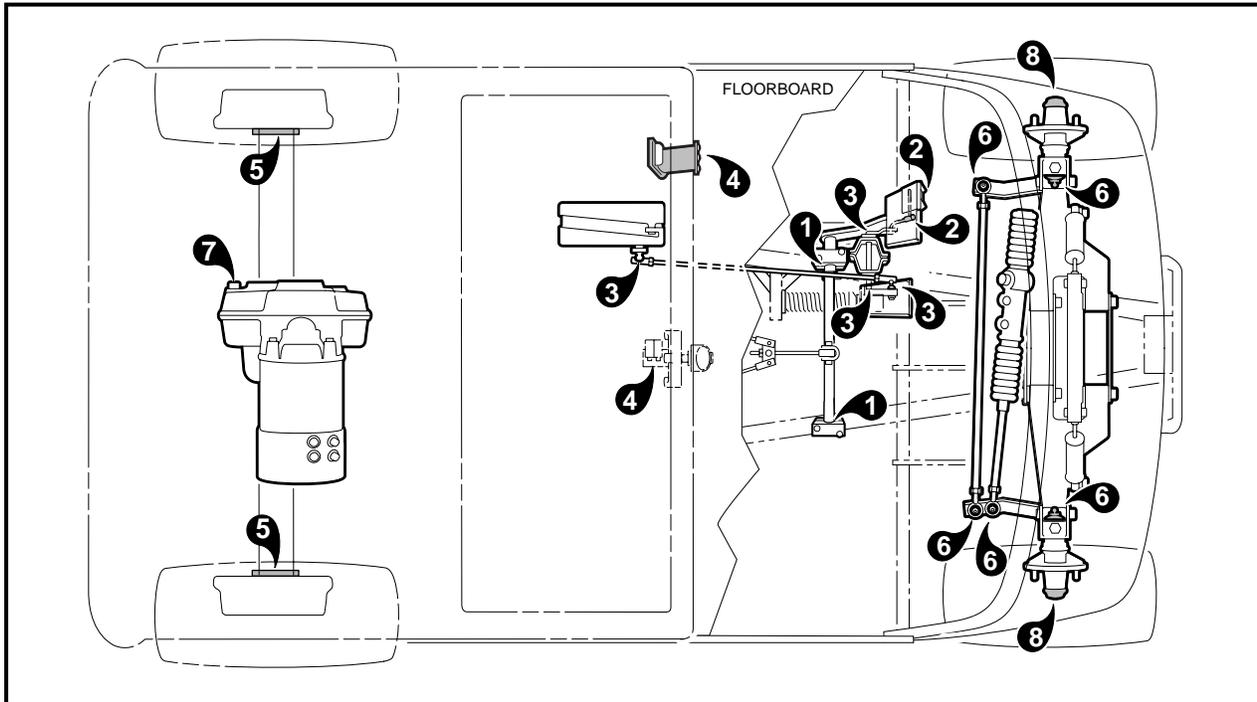


Figure 10-2 V-Glide 36-Volt Vehicle Lubrication Points

VEHICLE CAPACITIES

CAPACITIES	
Transaxle Oil	22 oz. (.67 liters)
Tire Pressure	18-20 psi (124-138 kPa)

SECTION 11—ELECTRICAL SYSTEM AND TESTING

⚠ DANGER

- THE BATTERY WIRES MUST REMAIN CONNECTED WHILE PERFORMING SOME TEST PROCEDURES.
- RAISE THE REAR END OF THE VEHICLE AND SUPPORT ON JACKSTANDS. REAR WHEELS SHOULD BE OFF THE GROUND WHILE PERFORMING ALL TEST PROCEDURES.
- BATTERY - EXPLOSIVE GASES! DO NOT SMOKE. KEEP ALL SPARKS AND FLAMES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR FULL FACE SHIELD WHEN WORKING ON OR NEAR BATTERIES.
- USE EXTREME CAUTION WHEN USING TOOLS, WIRES, OR METAL OBJECTS NEAR BATTERIES! A SHORT CIRCUIT AND (OR) SPARK COULD CAUSE AN EXPLOSION.
- BATTERY! - POISON! CONTAINS ACID! CAUSES SEVERE BURNS. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. ANTIDOTES:
 - EXTERNAL: FLUSH WITH WATER. CALL A PHYSICIAN IMMEDIATELY.
 - INTERNAL: DRINK LARGE QUANTITIES OF WATER OR MILK. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. *CALL A PHYSICIAN IMMEDIATELY.*
 - EYES: FLUSH WITH WATER FOR 15 MINUTES. *CALL A PHYSICIAN IMMEDIATELY.*

⚠ WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL ELECTRICAL REPAIR. FOLLOW ALL PROCEDURES EXACTLY AND HEED ALL WARNINGS STATED IN THIS MANUAL.
- ALWAYS WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE. WEAR A FULL FACE SHIELD WHEN WORKING WITH BATTERIES.
- TURN KEY SWITCH **OFF**, PLACE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION, AND REMOVE KEY PRIOR TO SERVICING.
- DO NOT WEAR LOOSE CLOTHING. REMOVE JEWELRY SUCH AS RINGS, WATCHES, CHAINS, ETC. BEFORE SERVICING VEHICLE.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.
- TO AVOID UNINTENTIONALLY STARTING THE VEHICLE, DISCONNECT BATTERIES, NEGATIVE CABLE FIRST, AS SHOWN IN **FIGURE 11-1, PAGE 11-1.**

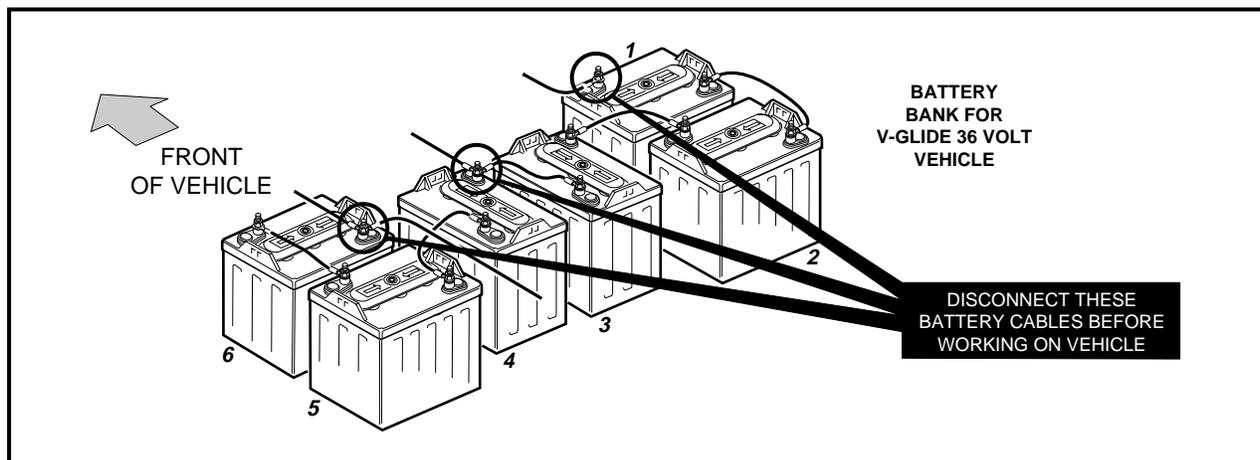


Figure 11-1 V-Glide Battery Configuration

GENERAL INFORMATION

To properly service and maintain the V-Glide 36-volt vehicle, it is necessary to understand the electrical circuitry and the functions of all the electrical components (**Figure 11-3, Page 11-4**). On the V-Glide 36-volt vehicle, there are three separate circuits: 1) the control circuit, 2) the power circuit, and 3) the charge circuit. A reverse buzzer is also included on every vehicle.

ELECTRICAL CIRCUITS

CONTROL CIRCUIT

The control circuit consists of the key switch, Forward and Reverse (F&R) anti-arcing limit switch, accelerator pedal limit switch, solenoid, and connecting wires.

The key switch has two positions, ON and OFF and is used to disable (open) the control circuit when the vehicle is not in use. With the key in the OFF position, the vehicle will not operate.

The F&R anti-arcing limit switch prevents arcing on the contacts of the F&R switch. When the vehicle is in NEUTRAL, the limit switch is open. The F&R anti-arcing limit switch closes only after full contact has been made on the F&R switch. As the F&R switch is disengaged, the F&R anti-arcing limit switch opens the power circuit by opening the control circuit before the contacts are separated. By using the F&R anti-arcing limit switch to control power to the F&R switch, arcing is prevented on the contacts of the F&R switch.

As the accelerator pedal is depressed, the lever of the accelerator pedal limit switch is released by the V-Glide wiper arm, closing that portion of the control circuit. When the accelerator pedal is fully upright, the V-Glide wiper arm depresses the accelerator pedal limit switch lever and keeps that portion of the control circuit open.

When the accelerator pedal is depressed (which closes the accelerator pedal limit switch) and the Forward/Reverse handle is in FORWARD or REVERSE (which closes F&R anti-arcing limit switch), and key switch is in the ON position, the control circuit is complete. The solenoid coil (enclosed in the solenoid) will then be activated and the solenoid power contacts will close, allowing power to reach the V-Glide wiper switch.

The reverse buzzer is a warning device that is activated when the Forward/Reverse handle is placed in REVERSE. The reverse buzzer will sound continuously until the vehicle is shifted to NEUTRAL or FORWARD.

THE POWER CIRCUIT

The power circuit consists of the V-Glide wiper switch contacts, resistors, F&R switch, solenoid power contacts, motor, batteries, and all connecting wires. The motor and batteries will be discussed in separate sections in this manual (**Section 15—Motor and Section 13—Batteries**).

When the control circuit is closed, the vehicle will start in first speed. As the accelerator pedal is depressed, the brush on the wiper switch arm moves across the contacts until the last contact is reached and full speed is attained. The V-Glide wiper switch brush and contacts conduct the motor current through or around each resistor, thereby controlling the speed (**Figure 11-2, Page 11-3**).

The F&R switch changes the direction of vehicle movement by changing the direction of electrical current through the motor, and consequently, the direction the motor turns. By limiting maximum voltage available in REVERSE to one-half that available in FORWARD, maximum vehicle speed in REVERSE is limited to one-half the maximum vehicle speed in FORWARD.

THE CHARGE CIRCUIT

The charge circuit consists of the battery charger, charger plug, charger receptacle, onboard fuse link, and the batteries. The batteries and the battery charger are discussed in separate sections in this manual (**Section 13—Batteries and Section 14—Accu-Power Battery Charger**).

The charger plug and receptacle connection is a critical link between the charger and the vehicle battery circuit. The contacts in the receptacle must grip the plug blades well enough to create enough pressure or drag for an adequate electrical connection. If little or no drag is felt, the receptacle or plug must be replaced. If either the plug or receptacle is damaged or feels hot when charging, one or both must be replaced. **See Section 14—Accu-Power Battery Charger.**

The onboard receptacle fuse link provides additional protection for the vehicle charging circuit. The fuse is rated for use with a Club Car Accu-Power Charger only. If it is blown, the cause should be determined before the fuse is replaced. A vehicle with a blown fuse will not charge. **See Section 14—Accu-Power Battery Charger.**

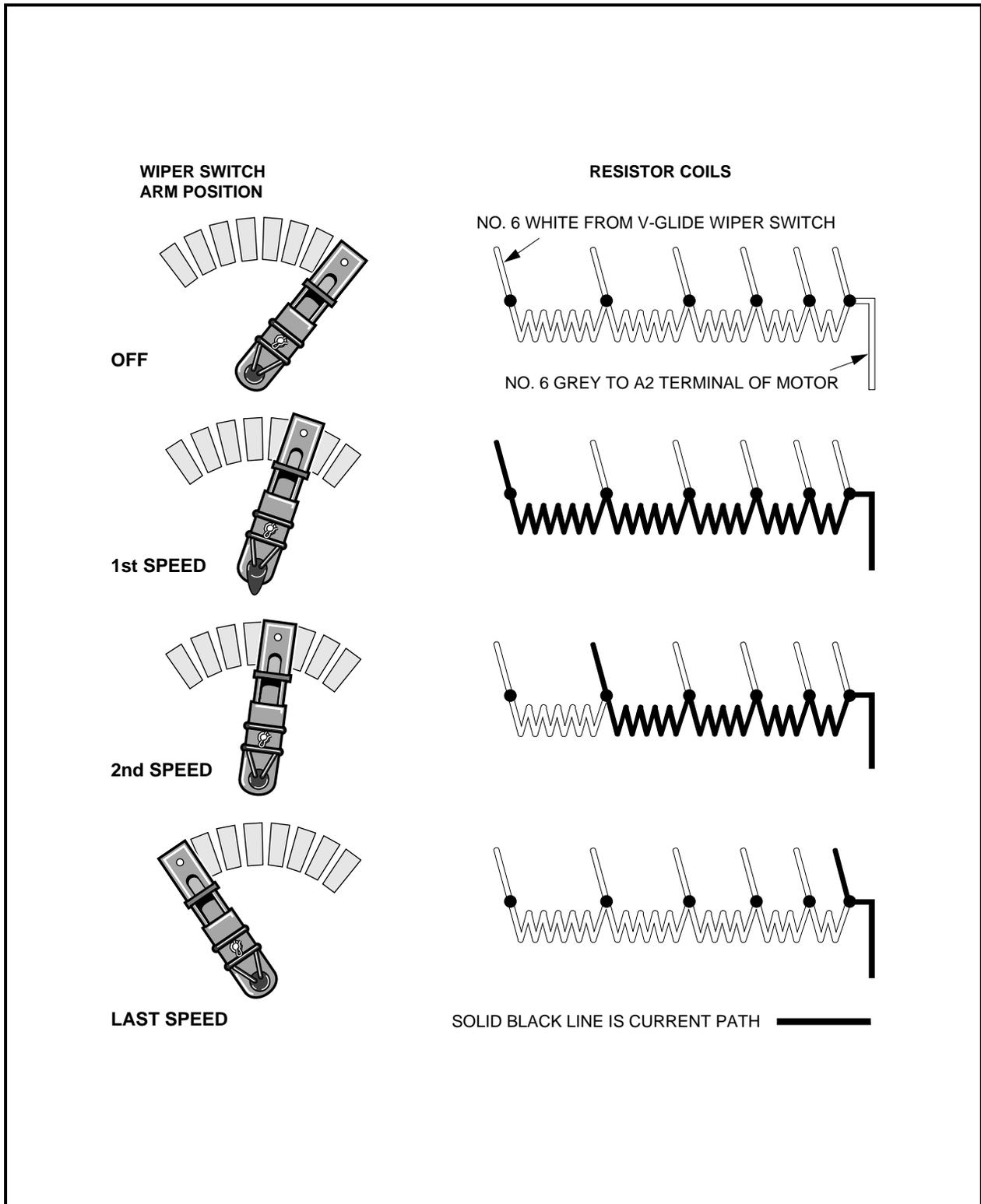


Figure 11-2 Speed Controller

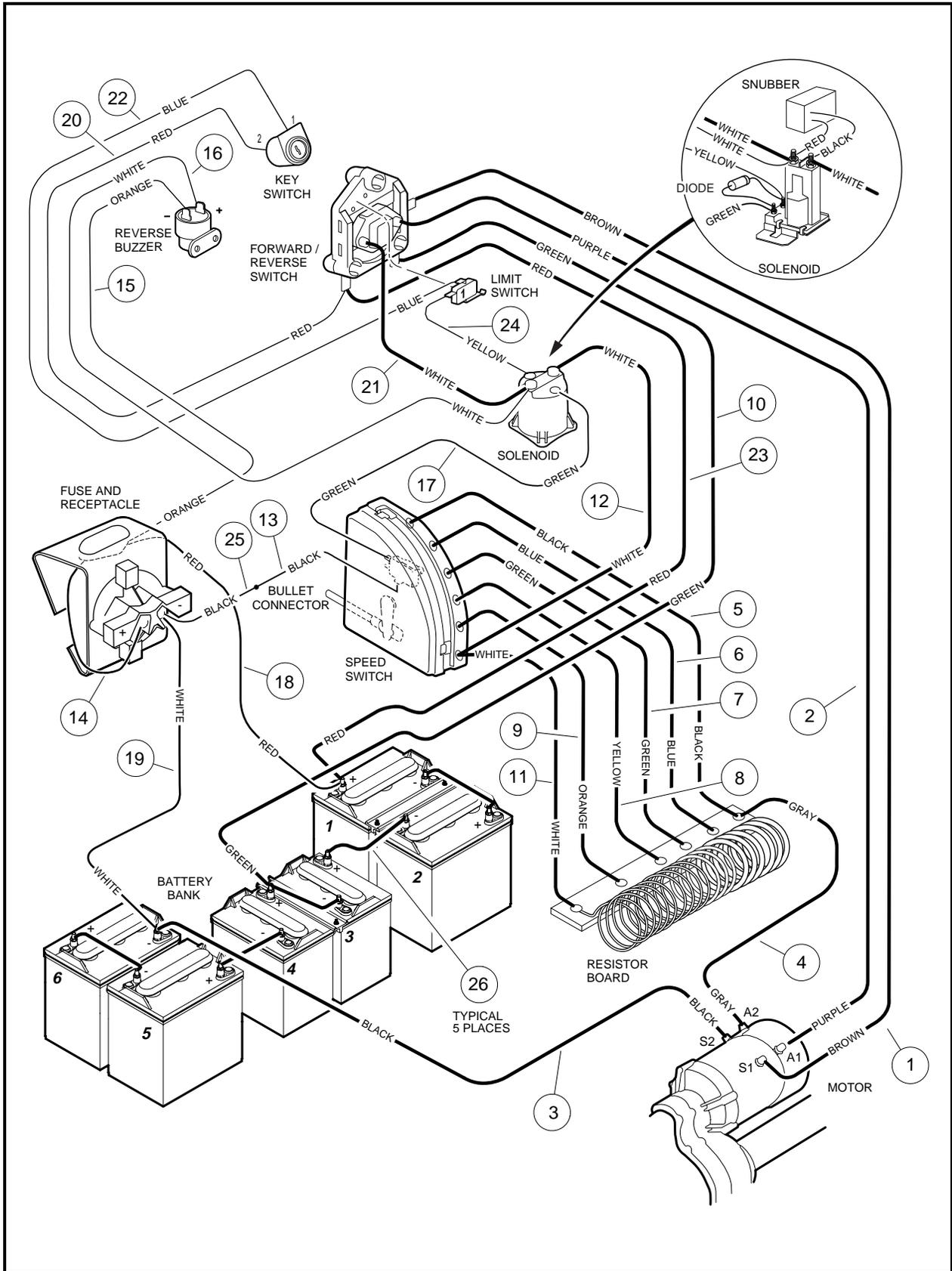


Figure 11-3 Vehicle Wiring Diagram

TROUBLESHOOTING

V-GLIDE 36-VOLT TROUBLESHOOTING GUIDE			
SYMPTOM	PROBLEM	POSSIBLE CAUSES	REFER TO
1. Vehicle will not operate - no solenoid click.	Batteries	1) Battery connections	Test Procedure 1, Page 11-7
		2) Batteries discharged	Test Procedure 1, Page 11-7
	Key Switch	1) Loose wires.	Test Procedure 2, Page 11-7
		2) Failed switch.	Test Procedure 2, Page 11-7
	F&R Anti-arching limit switch	1) Loose wires	Test Procedure 3, Page 11-7
		2) Failed Switch	Test Procedure 3, Page 11-7
		3) Cam is not activating switch	Test Procedure 3, Page 11-7
	Accelerator	1) Accelerator rod disconnected	Accelerator and Brake Pedal, Section 5
	Accelerator Pedal Limit Switch	1) Loose wire	Test Procedure 4, Page 11-8
		2) Disconnected or improperly connected wires.	Test Procedure 4, Page 11-8
		3) Failed switch.	Test Procedure 4, Page 11-8
	Solenoid	1) Loose switch	Test Procedures 10 & 11, Pages 11-12 & 11-13
2) Failed coil		Test Procedure 5, Page 11-8	
2. Vehicle will not operate - solenoid clicks.	F&R Switch	1) Loose wires.	Test Procedure 8, Page 11-10
		2) Failed contacts	Test Procedure 10, Page 11-12
	Solenoid	1) Failed contacts	Test Procedure 10, Page 11-12
	V-Glide Wiper Switch	1) Loose wires or broken wire connections	Test Procedure 12, Page 11-14
		2) Brush or contacts are dirty, burned, corroded, shorted, or worn.	Test Procedure 12, see also Electrical Components, Section 12
		3) Improperly wired	Figure 11-3, Page 11-4
	Motor	1) Loose wires	Test Procedure 9, Page 11-11
		2) Open circuits	Test Procedure 9, see also Motor, Section 15
		3) Worn brushes	Test Procedure 9, Page 11-11
	3. Vehicle skips one or more speeds.	V-Glide Wiper Switch	1) Loose or broken wire connections.
2) Brush or contacts are dirty, burned, corroded, shorted or worn.			Test Procedure 12, see also Electrical Components, Section 12.
3) Improperly wired.			Figure 11-3, Page 11-4
Resistors		1) Loose or broken resistor.	Test Procedure 7, Page 11-10

Troubleshooting Guide continued on next page.

V-GLIDE 36-VOLT TROUBLESHOOTING GUIDE			
SYMPTOM	PROBLEM	POSSIBLE CAUSES	REFER TO
4. Vehicle operates slowly.	V-Glide Wiper Switch	1) Poor wire connections	Figure 11-3, Page 11-4
		2) Dirty or worn contact points	Test Procedure 12, Page 11-14
	Batteries	1) Loose terminals or corrosion.	Test Procedure 1, see also Batteries, Section 13
		2) Improperly wired.	Figure 11-3, Page 11-4
		3) Batteries failed	See Batteries, Section 13
		4) Batteries not fully charged.	See Charger, Section 14
	Accelerator Push Rod	1) Accelerator rod is improperly adjusted.	V-Glide Wiper Switch, Section 12, Components
	Motor	1) Loose wire.	Test Procedure 9, Page 11-11
		2) Worn or misaligned brushes.	Motor, Section 15
		3) Dirty or rough commutator.	Motor, Section 15
Brakes	1) Dragging brakes.	Brakes, Section 6, and Accelerator, Section 5	
Tires	1) Under-inflated or flat tires.	Wheels and Tires, Section 8.	
5. Vehicle operates in first speed when the F&R switch is placed in Forward or Reverse with the keyswitch OFF.	Solenoid	1) Solenoid contacts are welded closed.	Test Procedure 10, Page 11-12
6. Vehicle operates in first speed when the F&R switch is placed in Forward or Reverse with keyswitch ON.	Accelerator Pedal Limit Switch	1) V-Glide Wiper Switch is wired wrong.	Accelerator Limit Switch, page 11-2.
		2) Accelerator Limit Switch failed in the closed position.	Test Procedure 4, Page 11-8
	Accelerator Rod	1) Accelerator Rod is bent or improperly adjusted.	Accelerator and Brake Pedal, Section 5.
	V-Glide Wiper Switch	1) Wiper switch brush or accelerator pedal is stuck.	Accelerator and Brake Pedal, Section 5.
2) Wiper Switch is improperly adjusted.		Accelerator and Brake Pedal, Section 5.	
7. Vehicle will operate in Forward but not in Reverse, or will operate in Reverse but not in Forward.	F&R Anti-arching Limit Switch	1) Improper actuation or faulty switch.	Test Procedure 3, Page 11-7
	F&R Switch	1) Dirty or corroded contacts on the F&R switch.	Section 12, Electrical Components
	Battery Wires	1) Improperly wired.	Figure 11-3, Page 11-4
8. Vehicle not being fully charged.	Charger connections	1) Loose wires at receptacle, batteries or F&R switch	Accu-Power Charger, Section 14
		2) Improper engagement of charger plug and receptacle.	Accu-Power Charger, Section 14
	Onboard receptacle fuse link	1) Fuse is blown	Accu-Power Charger, Section 14
	Charger	1) Incorrect incoming AC voltage.	Accu-Power Charger, Section 14
		2) Charger output is low.	Accu-Power Charger, Section 14
		3) Charger cord and plugs.	Accu-Power Charger, Section 14

CIRCUIT TESTING

Read **DANGER** and **WARNING** on page 11-1.

⚠ CAUTION

- IF WIRES ARE REMOVED OR REPLACED MAKE SURE WIRING AND/OR WIRING HARNESS IS PROPERLY ROUTED AND SECURED TO VEHICLE FRAME. FAILURE TO PROPERLY ROUTE AND SECURE WIRING COULD RESULT IN VEHICLE MALFUNCTION, PROPERTY DAMAGE OR PERSONAL INJURY.

Using the following procedures, the entire electrical system of the V-Glide vehicle can be tested without major disassembly, however, a multimeter will be necessary to perform these tests.

CONTROL CIRCUIT TEST PROCEDURES

Read **DANGER** and **WARNING** on page 11-1.

Test Procedure 1 - Batteries/Voltage Check

1. With batteries connected and using a multimeter set to 200 volts DC, place red (+) probe on the positive post of battery No. 1, and black (-) probe on the negative post of battery No. 6 (**Figure 11-4, Page 11-7**). If multimeter does not indicate at least 36 volts with battery fully charged, check for loose battery connections or a battery installed in reverse polarity. Refer to **Section 13–Batteries** for further details on battery testing.

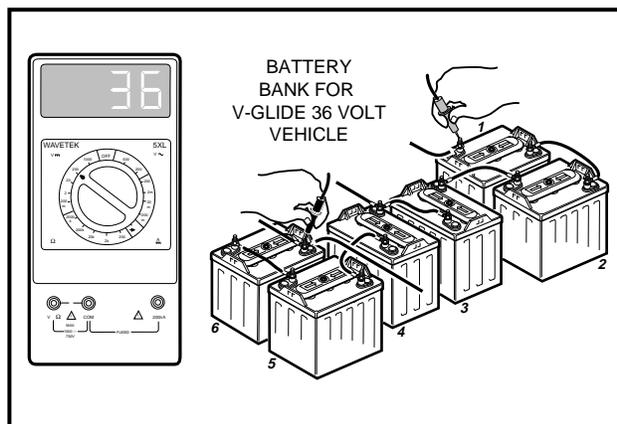


Figure 11-4 Batteries/Voltage Test

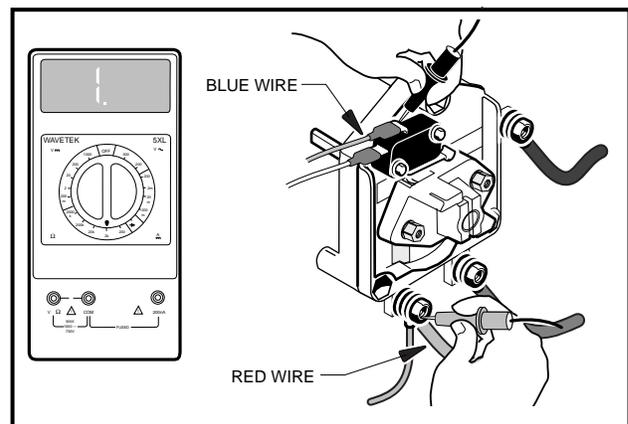


Figure 11-5 Key Switch Test

Test Procedure 2 - Key Switch

1. With batteries disconnected, place the red (+) probe of a multimeter (set at Ω) on the **forward** terminal of the F&R switch (**Figure 11-5, Page 11-7**) and place the black (-) probe on the upper (COM) terminal of the F&R anti-arcing limit switch (**Figure 11-5, Page 11-7**). With the key in the OFF position, the reading should be no continuity.
2. Insert the key and turn the key switch to the ON position. The reading should be continuity.
3. If the reading is incorrect at either of steps one or two, check the wires and terminals. If no problems are found with the wires or terminals, replace the key switch. **See Section 12–Components.**

Test Procedure 3 - Forward and Reverse Anti-Arcing Limit Switch

1. With batteries disconnected, place the red (+) probe of the multimeter (set to Ω) on the common terminal of the limit switch, and place the black (-) probe on the normally open (NO) terminal. The reading should be continuity when the limit switch lever is depressed and no continuity when the lever is released (**Figure 11-6, Page 11-8**).

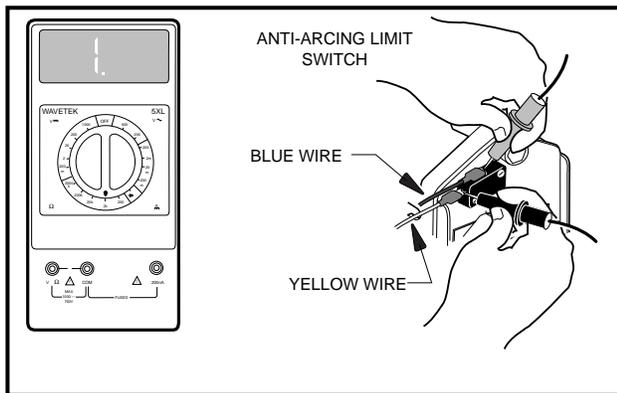
Test Procedure 3 - F&R Anti-Arching Limit Switch, Continued:

Figure 11-6 F&R Anti-arcing Limit Switch Test

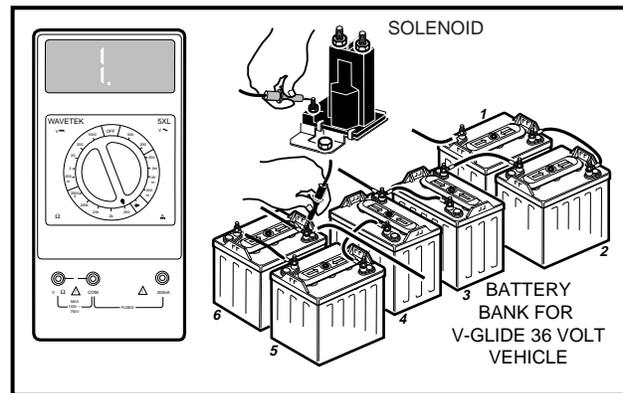


Figure 11-7 Accelerator Pedal Limit Switch Test

2. If the reading is incorrect at either lever position, replace switch. If readings are correct, check the wires, terminals and cam actuator on the F&R switch rotor. If no problems are found, the problem is not in the switch. **See Section 12—Components.**

Test Procedure 4 - Accelerator Pedal Limit Switch

1. With batteries disconnected, place the red (+) probe of the multimeter (set to 200 Ω) on the terminal of the green wire at its connection on the activating coil post of the solenoid, and place the black (-) probe on the negative (-) post of battery number 6 (**Figure 11-7, Page 11-8**). With the accelerator pedal fully up (not depressed), the reading should be no continuity.
2. Depress the accelerator pedal. The reading should be continuity.
3. If either reading is incorrect, remove the V-Glide wiper switch housing cover and check for proper activation of the limit switch by the wiper arm.
4. Also make sure the 18 gauge green wire is connected to the normally closed (NC) terminal of the limit switch, and the 18 gauge black wire is connected to the common (COM) terminal. There should be no wire attached to the normally open (NO) terminal.

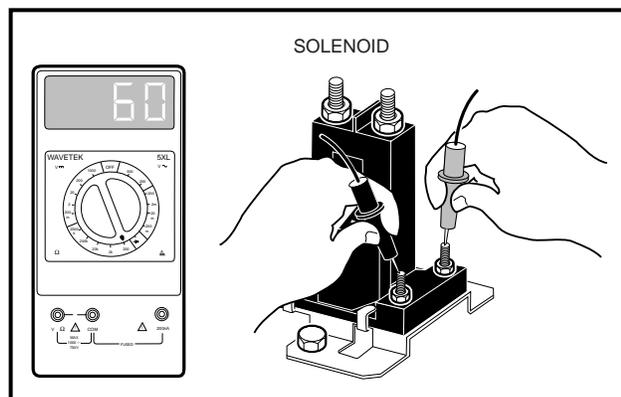


Figure 11-8 Solenoid Activating Coil Test

Test Procedure 5 - Solenoid Activating Coil

1. With batteries disconnected, place the red probe (+) of the multimeter (set to 200 Ω) on one of the small activating coil posts of the solenoid and place the black (-) probe on the other small post. There should be a reading of 55-60 ohms (**Figure 11-8, Page 11-8**).
2. If the reading is incorrect, replace the solenoid.

Test Procedure 6 - Reverse Buzzer

1. Disconnect the batteries, negative cable first (**Figure 11-1, Page 11-1**).
2. Remove the center dash:
 - 2.1. Remove the plastic cap covering the screw on each side of the center dash. Loosen (but do not remove) the screws.
 - 2.2. Insert a flat blade screwdriver at top center of the dash between the dash and the cowl brace. Gently pry the center dash out slightly from under the edge of the cowl brace.
 - 2.3. Pull dash out approximately 1 in. from the frame and then bend the top right corner of the dash panel inward while pulling the top of the panel out and down. **See following NOTE.**

NOTE

- BENDING THE TOP RIGHT CORNER OF THE CENTER DASH INWARD DURING REMOVAL WILL PREVENT THE CONTACTS ON THE BACK OF THE KEY SWITCH FROM TOUCHING THE METAL FRAME AROUND THE DASH.

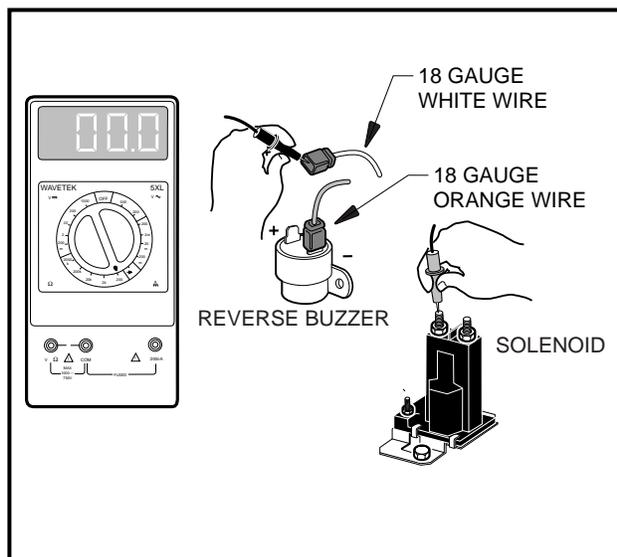


Figure 11-9 Reverse Buzzer Test - White Wire

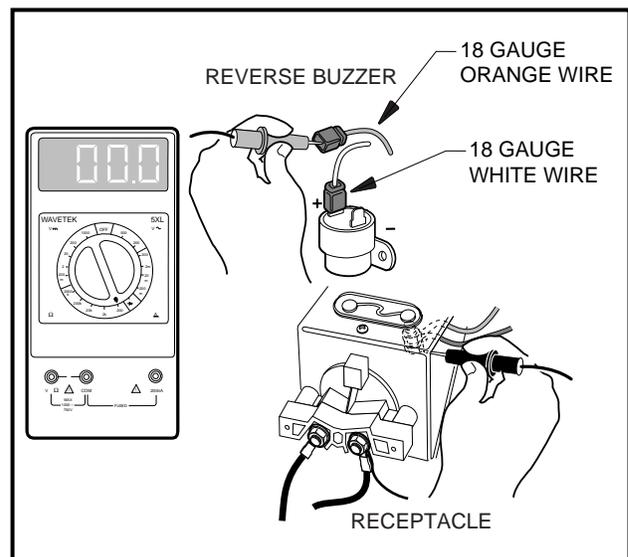


Figure 11-10 Reverse Buzzer Test - Orange Wire

3. Slide center dash panel up steering column by snapping the top out and then rotating the panel out and up.
4. Disconnect the 18 gauge white wire at the reverse buzzer. Place the red (+) probe of a multimeter (set to 200 Ω) on the large post of the solenoid (with the 6 gauge and the 18 gauge white wires attached), and place the black (-) probe on the terminal end of the 18 gauge white wire at the reverse buzzer. The reading should be continuity. If it is not, replace the 18 gauge white wire (**Figure 11-9, Page 11-9**).
5. Disconnect the 18 gauge orange wire at the reverse buzzer. Place the black (-) probe of a multimeter (set to Ω) on the receptacle fuse assembly at the 10 gauge red wire and 18 gauge orange wire connection, and place the red (+) probe on the terminal end of the 18 gauge orange wire at the reverse buzzer. The multimeter should indicate continuity. If not, replace the 18 gauge orange wire (**Figure 11-10, Page 11-9**).
6. If there is continuity in both wires, but the buzzer will not sound, replace the buzzer.
7. Reconnect the batteries, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m). Coat terminals with Battery Protector Spray (Club Car Part No. 1014395).

POWER CIRCUIT TEST PROCEDURES

Read **DANGER** and **WARNING** on page 11-1.

Test Procedure 7 - Resistors

⚠ WARNING

- DO NOT TOUCH HOT RESISTORS! HOT RESISTORS CAN CAUSE SEVERE BURNS.

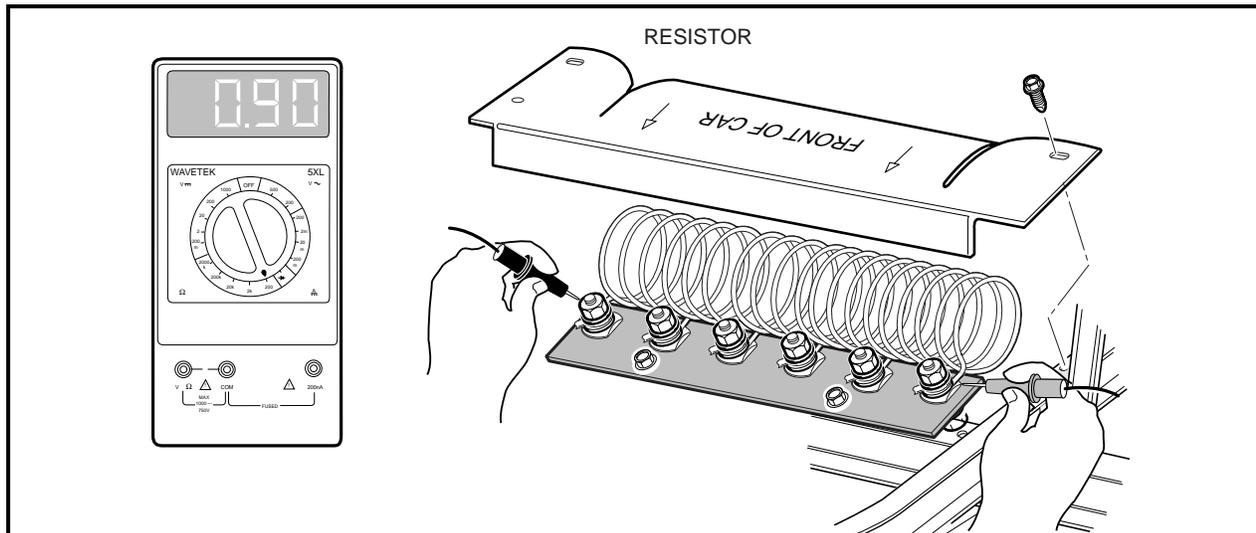


Figure 11-11 Resistor Test

1. Inspect the resistors for loose connections, damaged coils or wiring, or problems of any kind.
2. If there are no problems, place the red (+) probe of the multimeter (set to 200 Ω) on the first resistor connection, and place the black (-) probe on the last resistor connection. The reading should be continuity or approximately .9 ohms (**Figure 11-11, Page 11-10**).
3. If the reading is incorrect, check the resistors again for loose connections or damage. Replace any damaged parts.

Test Procedure 8 - Forward and Reverse (F&R) Switch

NOTE

- IF YOUR VEHICLE HAS A SERIAL NUMBER BETWEEN A9501-417833 AND A9926-773264, VISUALLY INSPECT THE F&R SWITCH TO MAKE SURE IT IS THE SAME DESIGN AS SHOWN IN **FIGURE 11-16, PAGE 11-12**. IF IT IS NOT, CONTACT YOUR LOCAL DISTRIBUTOR/DEALER OR A CLUB CAR TECHNICAL SERVICE REPRESENTATIVE FOR INFORMATION REGARDING A REPLACEMENT KIT FOR THIS COMPONENT.

1. Disconnect the batteries and use a multimeter (set to 200 Ω) to test the F&R switch in both directions:
 - 1.1. With the F&R switch in the FORWARD position, place the red (+) probe on the *common* terminal lug of the switch (with brown wire attached), and place the black (-) probe on the movable contact (with the purple wire attached) on the forward and reverse rotor (**Figure 11-12, Page 11-11**). The reading should be continuity.
 - 1.2. With the F&R switch in FORWARD, place the red (+) probe on the *forward* terminal lug (with the six gauge red wire attached) of the F&R switch, and place the black (-) probe on the movable contact (with the white wire attached) on the forward and reverse rotor (**Figure 11-13, Page 11-11**). The reading should be continuity.

- 1.3. With the F&R switch in the REVERSE position, place the red (+) probe on the *common* terminal lug (with brown wire attached) of the F&R switch, and place the black (-) probe on the movable contact (with the white wire attached) on the forward and reverse rotor (**Figure 11-14, Page 11-11**). The reading should be continuity.
 - 1.4. With the Forward/Reverse handle in the REVERSE position, place the red (+) probe on the *reverse* terminal lug of the F&R switch (with green wire attached), and place the black (-) probe on the movable contact (with the purple wire attached) on forward and reverse rotor (**Figure 11-15, Page 11-11**). Reading should be continuity.
2. If the reading is incorrect at any position in Step 1, refer to **Section 12–Components**.

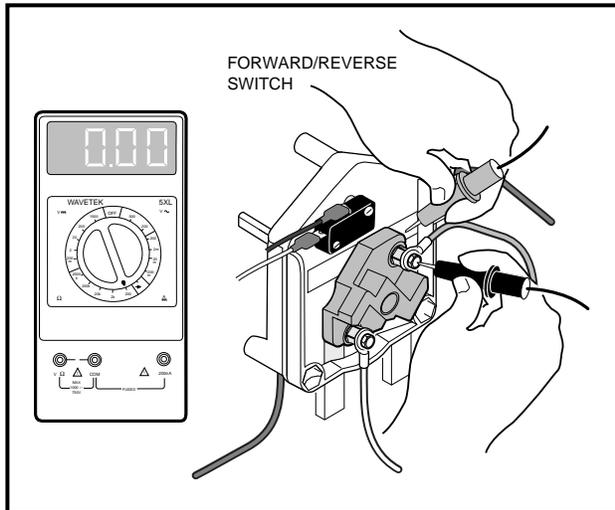


Figure 11-12 F&R Switch Test - Step 1.1

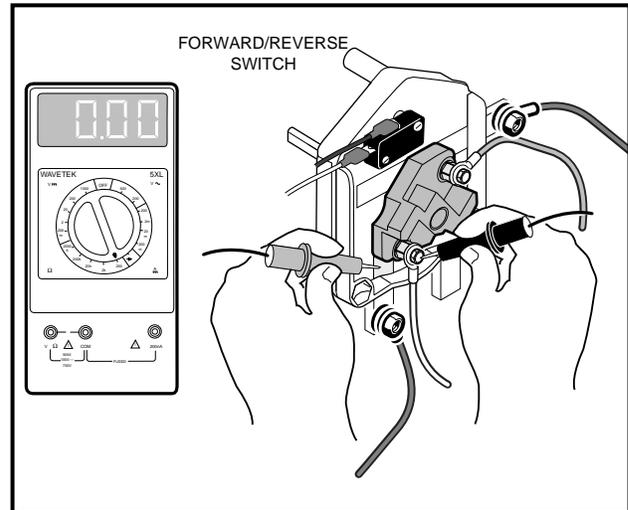


Figure 11-13 F&R Switch Test - Step 1.2

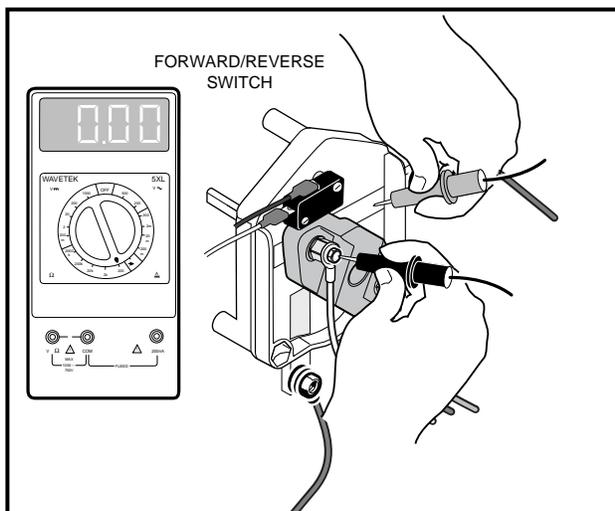


Figure 11-14 F&R Switch Test - Step 1.3

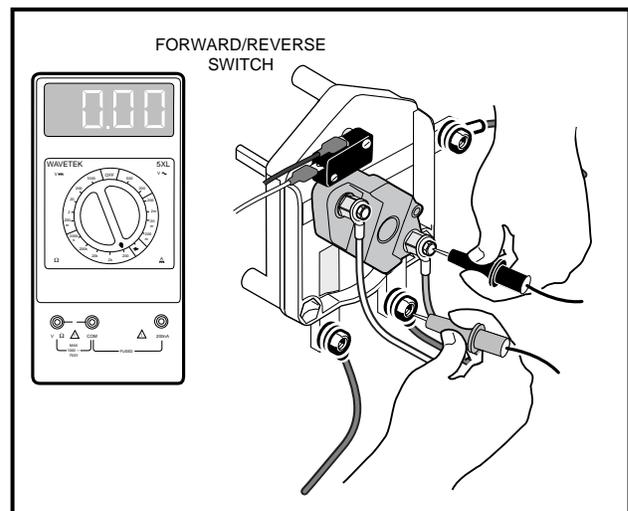


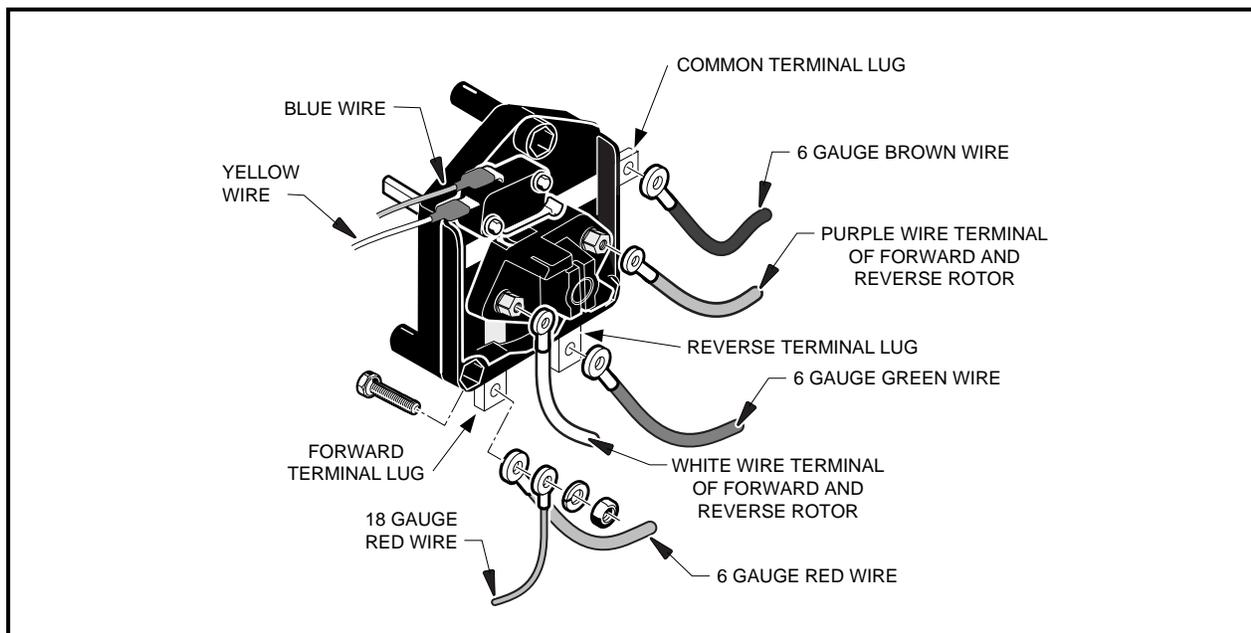
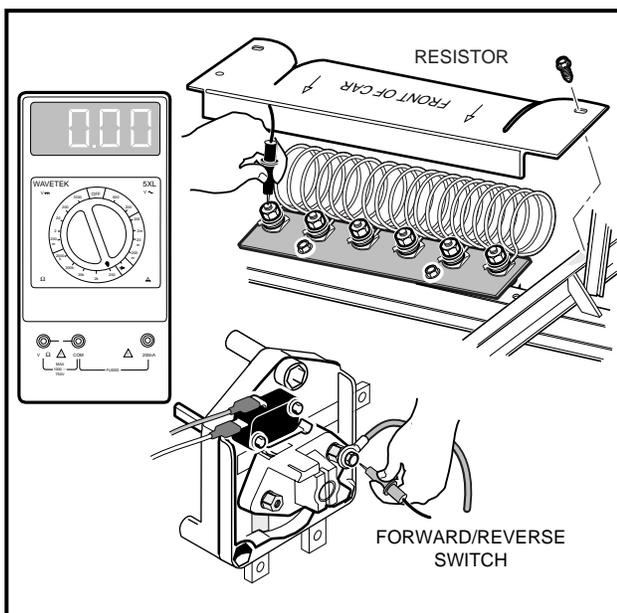
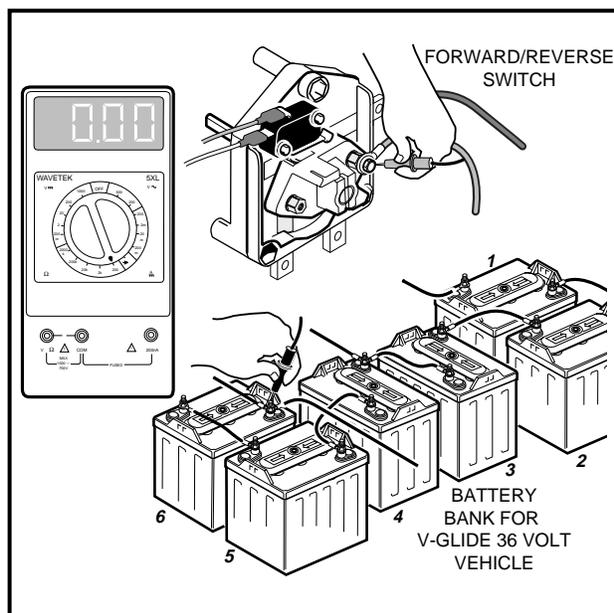
Figure 11-15 F&R Switch Test - Step 1.4

Test Procedure 9 - Motor

1. Disconnect batteries and use a multimeter (set to 200 Ω) to test motor armature and motor stator as follows:
 - 1.1. To test the motor armature place the Forward/Reverse handle in the NEUTRAL position, place the red (+) probe on the terminal (with the heavy purple wire attached) on the forward and reverse rotor, and place the black (-) probe on the last resistor coil connection (black and gray wires). The reading should be continuity (**Figure 11-17, Page 11-12**).

Test Procedure 9 - Motor, Continued:

- 1.2. To test motor stator, place Forward/Reverse handle in the NEUTRAL position, place the red (+) probe on the *common* terminal lug of the F&R switch (brown wire), and place the black (-) probe on the negative post of battery No. 6. The reading should be continuity (**Figure 11-18, Page 11-12**).
2. If either reading in Step 1 is incorrect, check for loose wires or terminals. Then refer to **Section 15-Motor**, for further testing and repair procedures.

**Figure 11-16 F&R Switch****Figure 11-17 Motor Test - Armature****Figure 11-18 Motor Test - Stator****Test Procedure 10 - Solenoid Contacts (Power Off)**

If the vehicle begins to move as soon as the Forward/Reverse handle is placed in FORWARD or REVERSE, without having depressed the accelerator pedal, the solenoid is probably welded closed. Test the solenoid as follows:

1. Heed all WARNING statements. Failure to do so could result in unexpected vehicle acceleration.
2. Place the red (+) probe of a multimeter (set at Ω) on one of the large terminal posts on the solenoid, and place the black (-) probe on the other large terminal post on the solenoid. The reading should be **no continuity** (**Figure 11-19, Page 11-13**).
3. If the reading is incorrect, replace the solenoid and snubber. **See Section 12—Components.**

Test Procedure 11 - Solenoid Contacts (Power On)

⚠ DANGER

- **BEFORE CONNECTING THE BATTERIES, DISCONNECT THE GRAY WIRE FROM THE RESISTOR BOARD TO THE A2 MOTOR TERMINAL AND REMOVE THE WIRE FROM THE VEHICLE. THEN RAISE THE REAR END OF THE VEHICLE UNTIL THE REAR WHEELS ARE OFF THE FLOOR (SEE WARNING ON PAGE 11-1). WITH THE GRAY WIRE REMOVED, THE SOLENOID CAN BE ACTIVATED WITHOUT SUPPLYING POWER TO THE REAR WHEELS. FAILURE TO DISCONNECT THE GRAY WIRE CAN CAUSE THE VEHICLE TO START ABRUPTLY.**

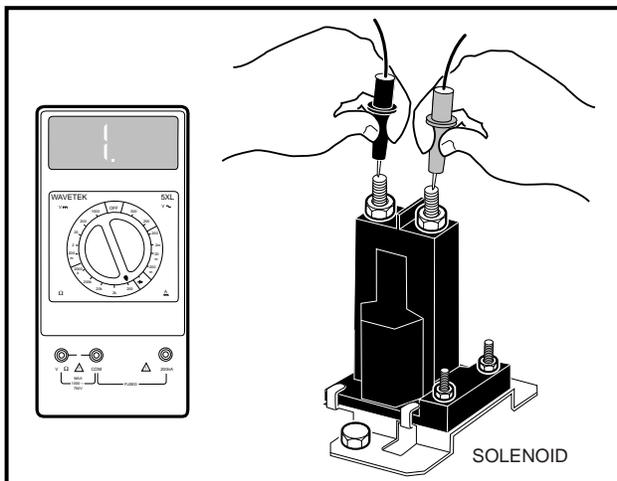


Figure 11-19 Solenoid Contacts - Power Off

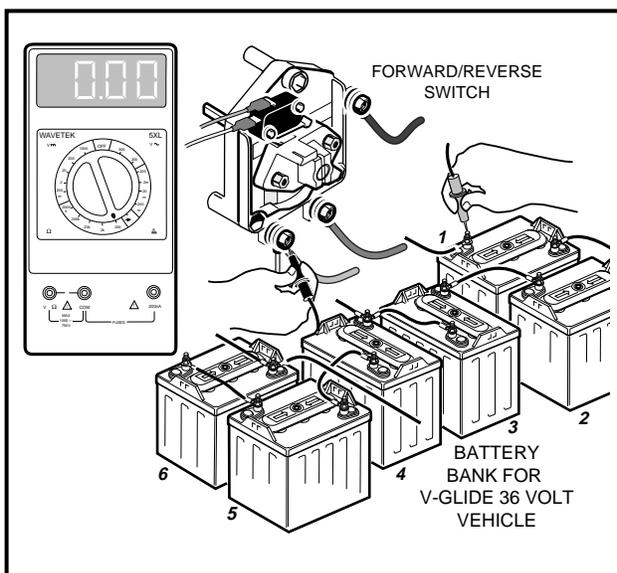


Figure 11-20 Solenoid Contacts - Power On, Step 1

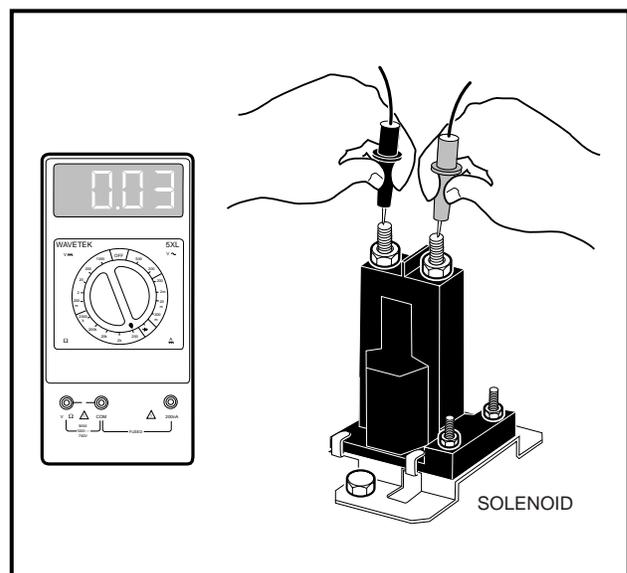


Figure 11-21 Solenoid Contacts - Power On, Step 2

Test Procedure 11 - Solenoid Contacts (Power On), Continued:

1. If the battery cables were disconnected, reconnect them, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m). **See preceding DANGER.**
2. With Forward/Reverse handle in NEUTRAL, place red (+) probe of multimeter (set to Ω) on positive post of battery No. 1. Place black (-) probe on the *forward* terminal lug on F&R switch. If reading is no continuity, inspect the wire assembly between these two positions and replace the wire assembly if it is defective (**Figure 11-20, Page 11-13**).
3. With the key switch in the ON position and the Forward/Reverse handle in the FORWARD position, depress the accelerator pedal to the floor (solenoid will click). With the accelerator pedal depressed, place the red (+) probe of a multimeter (set to Ω) on one of the large posts on the solenoid, and place the black (-) probe on the other large post on the solenoid. The multimeter should indicate continuity. If the reading is incorrect, replace the solenoid (**Figure 11-21, Page 11-13**). **See following WARNING.**

⚠ WARNING

- REMOVE KEY, PLACE FORWARD/REVERSE HANDLE IN **NEUTRAL**, AND DISCONNECT BATTERIES, NEGATIVE CABLE FIRST, AS SHOWN IN **FIGURE 11-1, PAGE 11-1** BEFORE REPLACING SOLENOID OR INSTALLING GRAY WIRE FROM RESISTOR BOARD TO A2 MOTOR TERMINAL.

Test Procedure 12 - V-Glide Wiper Switch

Read **DANGER** and **WARNING** on page 11-1.

1. Remove the V-Glide wiper switch cover and observe the wiper arm brush as it moves across the fixed contacts. There should be sufficient spring pressure in the arm to keep the wiper arm brush firmly against each of the fixed contacts as it travels across them. There should also be proper surface contact between the brush and each of the fixed contacts as shown (**Figure 11-22, Page 11-14**).

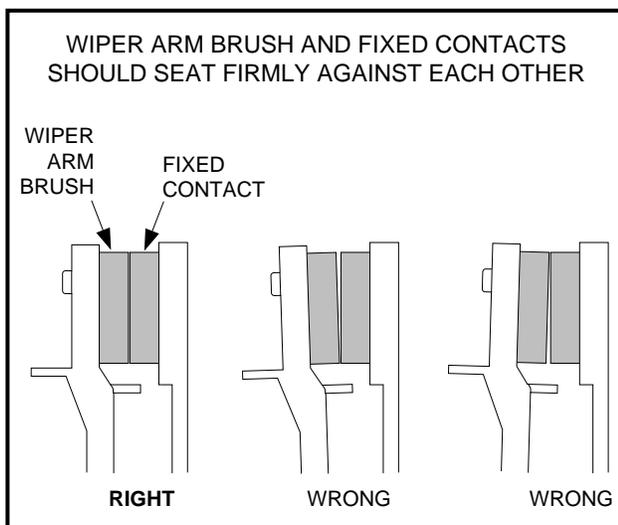


Figure 11-22 Wiper Arm Brush and Fixed Contacts

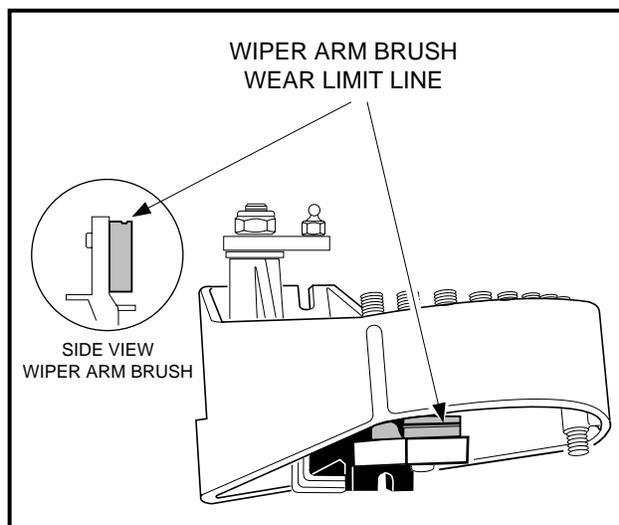


Figure 11-23 Wiper Arm Brush Wear Limit Line

2. Inspect both the brush and fixed contacts for excessive pitting, burns, or wear. If the brush is worn to the wear limit line (**Figure 11-23, Page 11-14**) it must be replaced. If the brush must be replaced, **see Section 12-Components**.
3. Make sure all the contacts are tight and the V-Glide wiper switch housing is not melted or burned around the contacts. If the housing or fixed contacts are damaged, the entire wiper switch housing with contacts must be replaced.
4. Make sure nuts attaching wires to the backs of the fixed contacts are tightened to 40 in.lb (4.5 N-m).

SECTION 12—ELECTRICAL COMPONENTS

⚠ DANGER

- **BATTERY - EXPLOSIVE GASES! DO NOT SMOKE. KEEP SPARKS AND FLAMES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR FULL FACE SHIELD WHEN WORKING ON OR NEAR BATTERIES.**
- **USE EXTREME CAUTION WHEN USING TOOLS, WIRES, OR METAL OBJECTS NEAR BATTERIES! A SHORT CIRCUIT AND (OR) SPARK COULD CAUSE AN EXPLOSION.**
- **BATTERY - POISON! CONTAINS ACID! CAUSES SEVERE BURNS. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. ANTIDOTES:**
 - **EXTERNAL: FLUSH WITH WATER. CALL A PHYSICIAN IMMEDIATELY.**
 - **INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL A PHYSICIAN IMMEDIATELY.**
 - **EYES: FLUSH WITH WATER FOR FIFTEEN MINUTES. CALL PHYSICIAN IMMEDIATELY.**

⚠ WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL MECHANICAL AND ELECTRICAL REPAIR. FOLLOW ALL PROCEDURES EXACTLY AND HEED ALL WARNINGS STATED IN THIS MANUAL.
- ALWAYS WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE. WEAR A FULL FACE SHIELD WHEN WORKING WITH BATTERIES.
- DO NOT WEAR LOOSE CLOTHING. REMOVE JEWELRY SUCH AS RINGS, WATCHES, CHAINS, ETC. BEFORE SERVICING VEHICLE.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS. WHEN BATTERIES ARE CONNECTED, USE EXTREME CAUTION TO AVOID SHORT CIRCUITS IN COMPONENTS OR WIRING.
- TO AVOID UNINTENTIONALLY STARTING THE VEHICLE, DISCONNECT BATTERIES, NEGATIVE CABLE FIRST, AS SHOWN IN **FIGURE 12-1, PAGE 12-1** WHEN PERFORMING TESTS THAT DO NOT REQUIRE THE ELECTRICAL SYSTEM TO BE ENERGIZED.

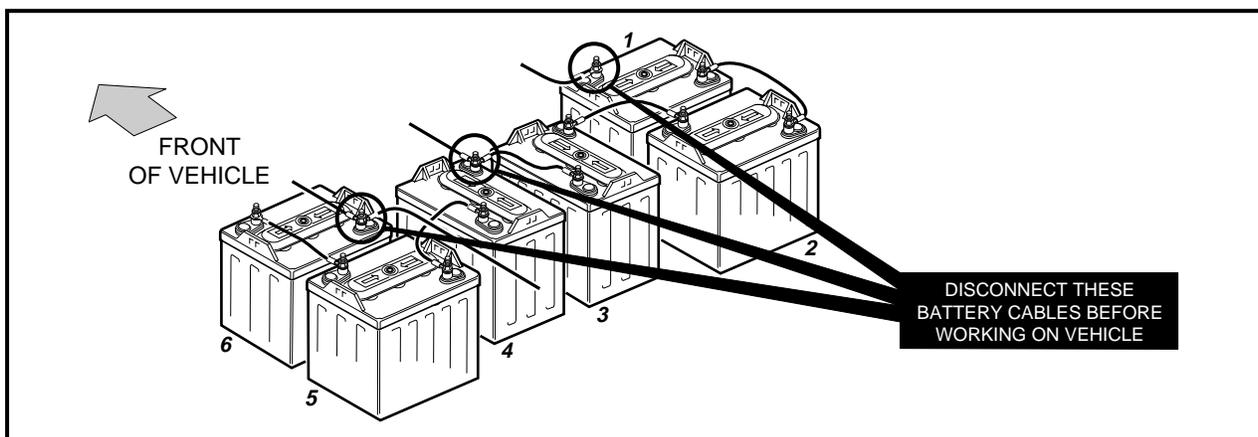


Figure 12-1 V-Glide Battery Configuration

KEY SWITCH

Read **DANGER** and **WARNING** on page 12-1.

The key switch is mounted to the right of the steering column on the center dash panel.

Testing the Key Switch

See Section 11, Test Procedure 2, Page 11-7.

Key Switch Removal

1. Disconnect the batteries, negative cable first (**Figure 12-1, Page 12-1**).
2. Remove the center dash:
 - 2.1. Remove the plastic cap covering the screw on each side of the center dash. Loosen (but do not remove) the screws.
 - 2.2. Insert a flat blade screwdriver at top center of the dash between the dash and the cowl brace. Gently pry the center dash out slightly from under the edge of the cowl brace.
 - 2.3. Pull dash out approximately 1 in. from the frame and then bend the top right corner of the dash panel inward while pulling the top of the panel out and down. **See following NOTE.**

NOTE

- BENDING THE TOP RIGHT CORNER OF THE CENTER DASH INWARD DURING REMOVAL WILL PREVENT THE CONTACTS ON THE BACK OF THE KEY SWITCH FROM TOUCHING THE METAL FRAME AROUND THE DASH.

3. Slide center dash panel up the steering column by snapping the top out and then rotating the panel out and up.
4. Disconnect the wires from the key switch. Do not allow the wires to touch.
5. From the back of the dash panel, push down on the retaining tabs surrounding the key switch and remove the key switch cap (8). Hold the key switch and remove the switch retaining nut (6) from the outside of the dash panel (**Figure 12-2, Page 12-3**).

Key Switch Installation

1. Position the key switch in the center dash and install the switch retaining nut. Press the plastic cap into place on the outside of the center dash (**Figure 12-2, Page 12-3**).
2. Connect the wires to the key switch terminals (**see Section 11, Figure 11-3, Vehicle Wiring Diagram, Page 11-4**) and then coat the terminals with Battery Protector Spray (Club Car Part No. 1014305).
3. Install the center dash by reversing the removal procedure. Make sure the key switch terminals **cannot** touch the frame and that the panel is properly seated and snapped into place.
4. Reconnect battery cables, positive cable first, and tighten terminal hardware to 110 in.lb (12.4 N-m).

FORWARD/REVERSE (F&R) ANTI-ARCING LIMIT SWITCH

Read **DANGER** and **WARNING** on page 12-1.

The F&R Anti-arcing Limit switch is located on the F&R switch and is activated by a cam on the F&R switch rotor.

Testing the Anti-arcing Limit Switch

See Section 11, Test Procedure 3, Page 11-7.

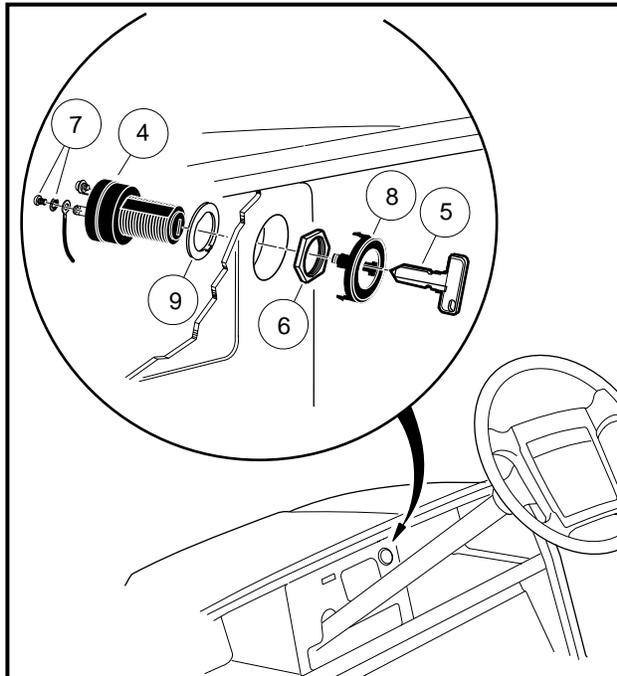


Figure 12-2 Key Switch

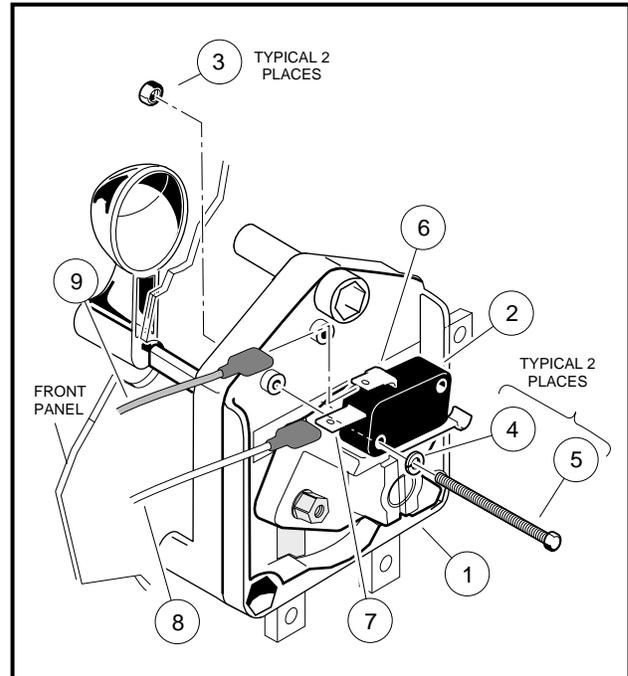


Figure 12-3 F&R Anti-arcing Limit Switch

Anti-arcing Limit Switch Removal

1. Remove the nuts, lock washers, and screws attaching the anti-arcing limit switch to the F&R switch (**Figure 12-3, Page 12-3**).

Anti-arcing Limit Switch Installation

1. Position the anti-arcing limit switch (2) on the F&R switch housing and install the screws, lock washers, and nuts. Tighten the screws to 5 in.lb (0.6 N-m) (**Figure 12-3, Page 12-3**).
2. Connect the blue wire (9) to the common (COM) terminal (6) and the yellow wire (8) to the normally open (NO) terminal (7) (**Figure 12-3, Page 12-3**).
3. After installation, make sure the switch makes an audible click (makes and breaks contact) when the forward and reverse rotor is turned. If it does not click, inspect the forward and reverse rotor and limit switch for damage.

ACCELERATOR PEDAL LIMIT SWITCH

Read **DANGER** and **WARNING** on page 12-1.

Testing the Accelerator Pedal Limit Switch

See Section 11, Test Procedure 4, Page 11-8.

Accelerator Pedal Limit Switch Removal

1. Disconnect battery cables, negative cable first. Remove No. 5 and No. 6 batteries from vehicle (**Figure 12-1, Page 12-1**).
2. Remove the cover (10) from the V-Glide wiper switch housing (1) (**Figure 12-8, Page 12-10**).
3. Disconnect the accelerator rod from the ball stud (5) on the wiper switch (**Figure 12-8, Page 12-10**).
4. Remove and retain the screws (19), lock washers (16), and nuts (22) attaching the limit switch (20) to the wiper switch (**Figure 12-8, Page 12-10**).
5. Disconnect the green (35) and black wires (36) from the limit switch (**Figure 12-8, Page 12-10**).

Accelerator Pedal Limit Switch Installation

1. Position accelerator pedal limit switch (20) on V-Glide wiper switch body and install mounting screws (19), lock washers (16), and nuts (22). Tighten screws to 5 in.lb (0.6 N-m) (**Figure 12-8, Page 12-10**).
2. Connect the accelerator rod ball joint to the ball stud (5) on the wiper switch (**Figure 12-8, Page 12-10**).
3. Connect the green wire (35) to the normally closed (NC) terminal and the black wire (36) to the common (COM) terminal of the limit switch. The normally open (NO) terminal should have *no* wire attached to it (**Figure 12-8, Page 12-10**).
4. Install cover (10) on V-Glide wiper switch (make sure all three tabs snap into place) (**Figure 12-8, Page 12-10**).
5. Install the No. 5 and No. 6 batteries and connect battery cables, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m) (**Figure 12-1, Page 12-1**).

REVERSE BUZZER

Read **DANGER** and **WARNING** on page 12-1.

Testing the Reverse Buzzer

See Section 11, Test Procedure 6, Page 11-9.

Reverse Buzzer Removal

1. Disconnect the batteries, negative cable first, (**Figure 12-1, Page 12-1**) and remove the center dash. See **Remove Center Dash, Page 12-2**.
2. Remove the orange and white wires from the buzzer terminals. See **Section 11, Figure 11-3, Vehicle Wiring Diagram, Page 11-4**. Remove the screws attaching the buzzer to the center dash.

Reverse Buzzer Installation

1. Install reverse buzzer and center dash by reversing removal procedures. Tighten screws to 4 in.lb (0.45 N-m).
2. Reconnect battery cables, positive cable first. Tighten battery hardware to 110 in.lb (12.4 N-m).

THE SOLENOID

Read **DANGER** and **WARNING** on page 12-1.

The solenoid is mounted in front of the No. 3 and No. 4 batteries (**Figure 12-1, Page 12-1**). It has two sets of terminal posts. The two large terminal posts are power contact terminals and the two small posts are activating coil terminals.

Testing the Solenoid

See Section 11, Test Procedure 5, Page 11-8, and Test Procedures 10 and 11, Page 11-12.

Solenoid Removal

1. Disconnect battery cables, negative cable first (**Figure 12-1, Page 12-1**). Disconnect wires from solenoid.
2. Remove the two thread rolling screws attaching the solenoid to the vehicle.

Solenoid Installation

1. Position the solenoid with the small posts toward the front of the vehicle and install one of the mounting screws through the driver side hole on the solenoid base and into the corresponding hole in the mounting plate (**Figure 12-4, Page 12-5**). Tighten screw to 50 in.lb (7.3 N-m).
2. Install passenger side screw and tighten to 50 in.lb (5.6 N-m) (**Figure 12-4, Page 12-5**).
3. Install diode assembly onto small solenoid posts. Make sure the direction of the diode is correct. The red insulated terminal of the diode assembly should be installed on the same post to which the 18 gauge yellow wire is attached, and the clear insulated terminal of the diode assembly should be installed on the same post to which the 18 gauge green wire is attached (**Figure 12-5, Page 12-5**).

⚠ WARNING

- DO NOT DAMAGE SNUBBER WHEN MOUNTING SOLENOID.
- INSTALL BOTH MOUNTING SCREWS. FAILURE TO INSTALL BOTH SCREWS CAN RESULT IN SOLENOID AND ELECTRICAL SYSTEM DAMAGE AND FAILURE.

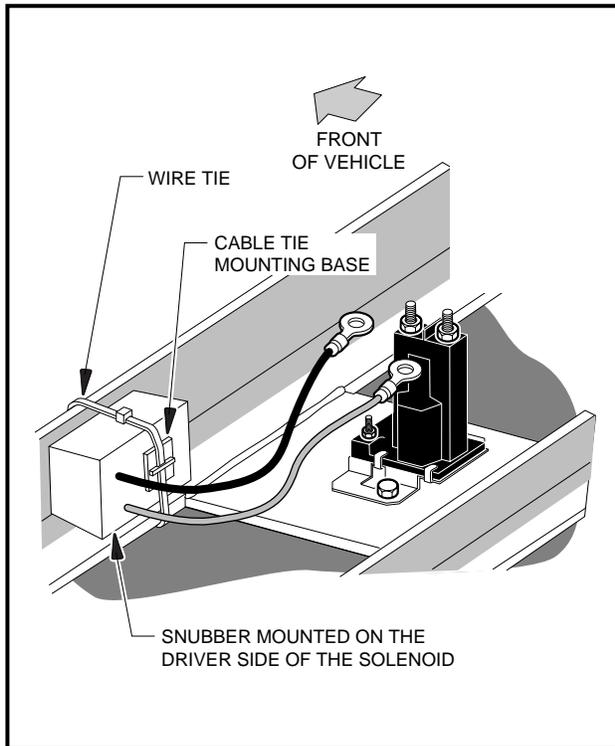


Figure 12-4 Mount Solenoid

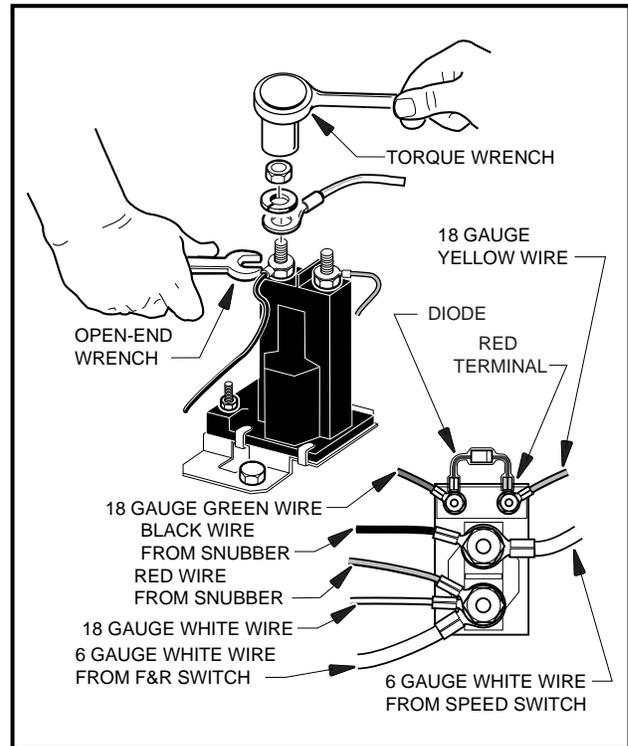


Figure 12-5 Connect Solenoid Wires

4. Attach snubber assembly to frame on either the passenger or the driver side of the solenoid using a wire tie and cable tie mounting base (Figure 12-4, Page 12-5).
5. Attach wiring to solenoid. Connect black wire from snubber to the same large solenoid post to which the 6 gauge white wire (from the speed switch) is attached. Connect red wire from the snubber to the same large post to which the 18 gauge and 6 gauge white wires are attached. **See following CAUTION.**

⚠ CAUTION

- MAKE SURE THE WIRES ARE ROUTED SO THE WIRE FROM THE FORWARD AND REVERSE ROTOR DOES NOT PULL ON OTHER WIRES AS THE FORWARD/REVERSE HANDLE IS SHIFTED.

6. Using a low profile wrench to hold the inner nuts on the solenoid posts in place, tighten the outer nuts of the large posts to 75 in.lb (8.5 N-m). Tighten the outer nuts of the small solenoid posts to 18 in.lb (2 N-m) (Figure 12-5, Page 12-5). **See following WARNING.**

⚠ WARNING

- FAILURE TO HOLD THE INNER NUTS ON THE SOLENOID POSTS WHILE TIGHTENING THE OUTER NUTS OR NOT TIGHTENING THE OUTER NUTS TO THE PROPER SPECIFICATIONS CAN RESULT IN SOLENOID DAMAGE AND FAILURE.

Solenoid Snubber

The solenoid snubber circuit is an arc suppression device that reduces the amount of sparking created as the solenoid contacts open while under a current load. This device minimizes pitting of the contacts and increases solenoid life. There is no method for troubleshooting the snubber circuit. If the solenoid fails, the snubber should also be replaced.

RESISTORS

Read **DANGER** and **WARNING** on page 12-1.

The resistors are attached to the resistor mounting board which is located behind the batteries.

Testing the Resistors

See Section 11, Test Procedure 7, Page 11-10.

Resistor Removal

1. Disconnect battery cables, negative cable first (**Figure 12-1, Page 12-1**). Loosen (do not remove) the nuts (1) that secure the resistors (R1 - R5) to the mounting board and then slide the resistors out from under the washers (3) (**Figure 12-6, Page 12-7**).

Resistor Installation

1. Position resistor ends under washers (3) and tighten nuts to 95 in.lb (11 N-m) (**Figure 12-6, Page 12-7**). Reconnect battery cables, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m). See following **CAUTION** and **NOTE**.

CAUTION

- BE SURE THE MOTOR WIRES ARE SECURED IN WIRE TIES SO THEY CANNOT COME INTO CONTACT WITH THE RESISTORS.
- BE SURE RESISTORS ARE NO CLOSER THAN ONE INCH TO RESISTOR SHIELD. IF RESISTORS ARE CLOSER THAN ONE INCH TO RESISTOR SHIELD, ADJUST THE RESISTORS.
- IF A 3-1/2 HORSEPOWER MOTOR IS BEING USED IN CONJUNCTION WITH A V-GLIDE WIPER SWITCH, THE FOURTH AND FIFTH SPEED RESISTOR COILS MUST BE REPLACED WITH NEW COILS (CLUB CAR PART NOS. 1014654 AND 1014655).

NOTE

- MAKE SURE RESISTOR COILS DO NOT TOUCH EACH OTHER. THE VEHICLE WILL NOT RUN PROPERLY IF ANY COILS ARE TOUCHING.
- MAKE SURE THE RESISTOR COILS ARE INSTALLED IN THE PROPER ORDER (**FIGURE 12-6, PAGE 12-7**). RESISTOR 1 HAS THE SMALLEST DIAMETER WIRE AND THE GREATEST NUMBER OF COILS. RESISTOR 5 HAS THE LARGEST DIAMETER WIRE AND THE SMALLEST NUMBER OF COILS.

V-GLIDE WIPER SWITCH

Read **DANGER** and **WARNING** on page 12-1.

The V-Glide wiper switch is located in the battery compartment next to battery No. 6 (**Figure 12-8, Page 12-10**). The wiper switch arm adjustment should be checked if the brush on the V-Glide wiper switch is replaced. The pedal group adjustments (see Section 5—Accelerator and Brake Pedal) should be checked if any of the pedal group or the accelerator rod has been adjusted, removed, or replaced. See following **WARNING**.

⚠ WARNING

- BE SURE THE V-GLIDE WIPER SWITCH ARM SHAFT ROTATES FREELY IN THE HOUSING. IF THE WIPER SWITCH ARM SHAFT BINDS OR STICKS, IT MUST BE REPLACED.
- MAKE SURE THE V-GLIDE WIPER SWITCH ASSEMBLY IS SECURELY FASTENED TO THE FRAME AFTER INSTALLATION.

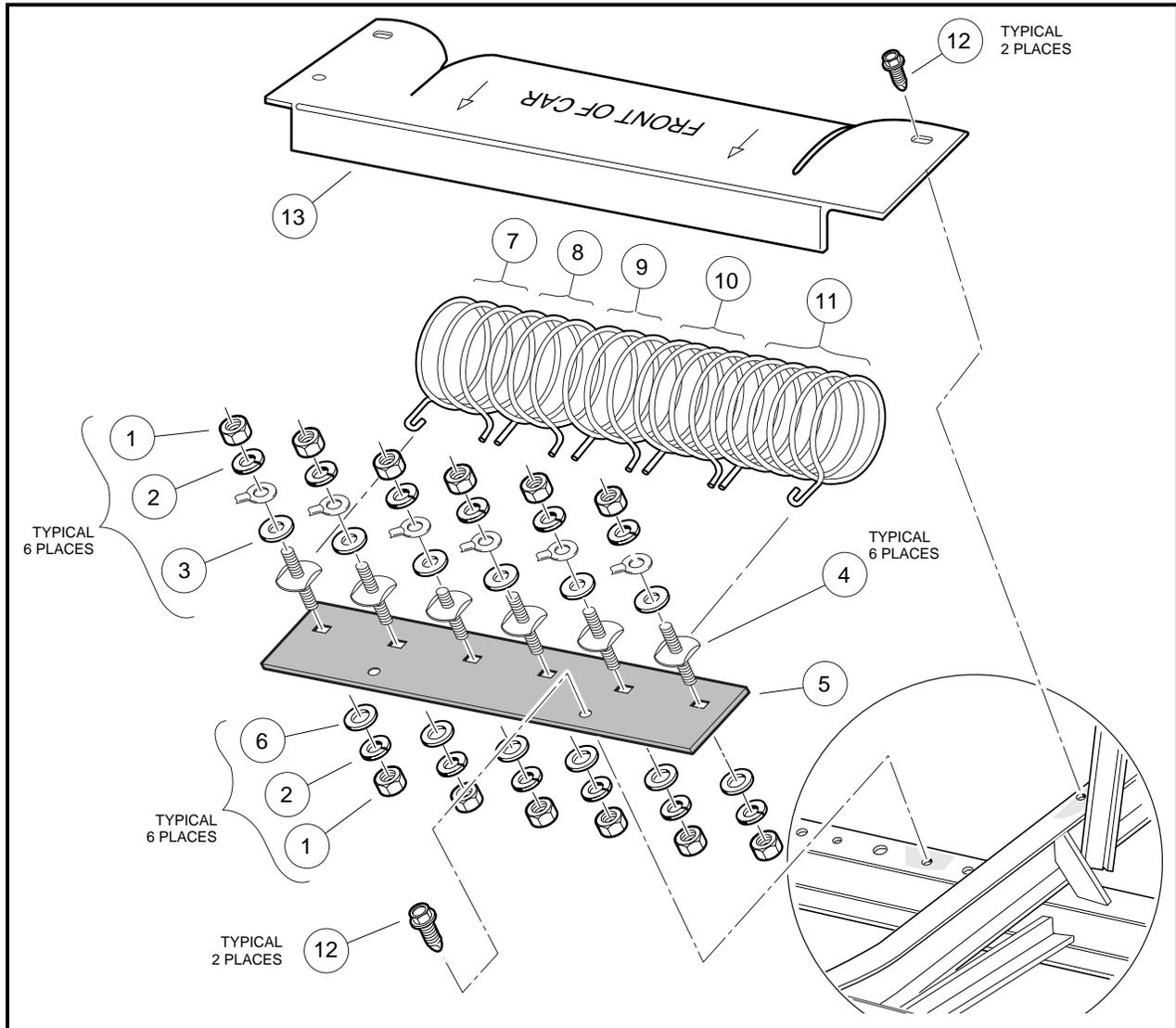


Figure 12-6 Mounting Board and Resistors

The V-Glide wiper switch assembly should be inspected on a monthly basis for cracks or damage and to verify it is securely attached to the vehicle frame.

⚠ CAUTION

- INSPECT THE V-GLIDE WIPER SWITCH HOUSING FOR CRACKS OR DAMAGE BEFORE INSTALLATION. IF THE HOUSING IS CRACKED OR DAMAGED, THE ENTIRE HOUSING WITH FIXED CONTACTS MUST BE REPLACED.
- WHEN WASHING THE VEHICLE, DO NOT DIRECT THE WATER STREAM AT THE WIPER SWITCH.
- DO NOT OPERATE THE VEHICLE WITHOUT THE V-GLIDE WIPER SWITCH COVER IN PLACE.

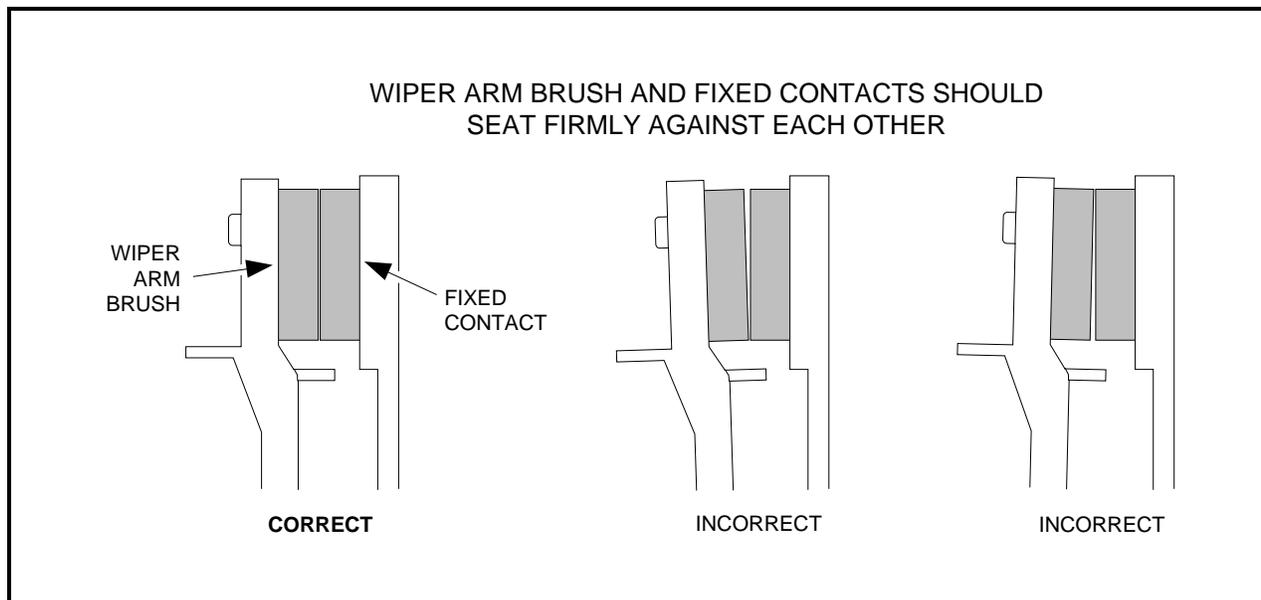


Figure 12-7 Wiper Switch Arm Brush and Fixed Contacts

V-GLIDE WIPER SWITCH ARM ADJUSTMENT

The contact surfaces on the wiper switch arm brush and the fixed contacts must be parallel to ensure efficient operation of the V-Glide wiper switch (**Figure 12-7, Page 12-8**). Adjust arm contact as follows:

1. Disconnect battery cables, negative cable first. Remove the No. 5 and No. 6 batteries from the vehicle (**Figure 12-1, Page 12-1**) and remove the cover from the V-Glide wiper switch.
2. Test the wiper switch arm and fixed contacts for proper adjustment:
 - 2.1. With a dry erase marker, completely color each of the fixed contacts.
 - 2.2. Sweep the V-Glide wiper switch arm brush back and forth across the fixed contacts. Scraping of the ink should show contact on at least 30% of the surface on each fixed contact. If 30% contact is not shown, surface contact should be adjusted.
3. To adjust surface contact, remove the spring cotter pin (24) and turn the adjustment screw (14) until the surfaces of the wiper switch arm brush and fixed contacts are parallel. (**Figure 12-8, Page 12-10**). See following **NOTE**.

NOTE

- A MID-MODEL YEAR (1998) DESIGN CHANGE RESULTED IN THE REMOVAL OF THE SPRING COTTER PIN (24) AND THE REPLACEMENT OF THE HEX NUT (11) WITH A NYLON LOCK NUT (**FIGURE 12-8, PAGE 12-10**).

4. After adjustment has been made, apply one drop of Loctite[®] 290 thread locking compound to the adjustment screw (14) at the hex nut (11). Then install the spring cotter pin (24) through the hole in the adjustment screw (**Figure 12-8, Page 12-10**). See following **NOTES**.

NOTE

- USE OF A LOCKING COMPOUND IS NOT NECESSARY IN CONJUNCTION WITH A NYLON LOCK NUT.

NOTE

- IF THE WIPER SWITCH ARM BRUSH IS WORN TO OR BEYOND THE WEAR LIMIT LINE, IT SHOULD BE REPLACED. IF ANY OF THE FIXED CONTACTS ARE EXCESSIVELY WORN, PITTED, OR BURNED, THE ENTIRE WIPER SWITCH HOUSING WITH FIXED CONTACTS MUST BE REPLACED.
- A THREAD LOCKING COMPOUND HAS BEEN PLACED ON THE THREADS OF THE CONTACT STUDS TO PREVENT REMOVAL OF THE FIXED CONTACTS.

V-GLIDE WIPER SWITCH ADJUSTMENT

Each of the adjustments listed in the following **WARNING** affects V-Glide wiper switch adjustment. To ensure proper vehicle operation, if any one item requires adjustment, all must be checked, and adjusted if necessary, in the order listed.

⚠ WARNING

- TO PROPERLY ADJUST WIPER SWITCH, CHECK, AND ADJUST IF NECESSARY, THE FOLLOWING ITEMS *IN THE ORDER LISTED*:
 - BRAKE PEDAL AND CABLE ADJUSTMENT. **SEE SECTION 5.**
 - ACCELERATOR ROD ADJUSTMENT. **SEE SECTION 5.**
 - ACCELERATOR PEDAL STOP ADJUSTMENT. **SEE SECTION 5.**
 - PARK BRAKE ADJUSTMENT. **SEE SECTION 6.**
- FAILURE TO CHECK ALL ADJUSTMENTS IN THE ORDER LISTED COULD RESULT IN IMPROPER VEHICLE OPERATION, PROPERTY DAMAGE, OR SEVERE PERSONAL INJURY.

V-GLIDE WIPER SWITCH ARM BRUSH REPLACEMENT

1. Disconnect battery cables, negative cable first. Remove battery Nos. 5 and 6 from the vehicle (**Figure 12-1, Page 12-1**).
2. Disconnect the accelerator rod from the V-Glide wiper switch ball stud (5) and place the wiper switch arm on the topmost fixed contact (**Figure 12-8, Page 12-10**).
3. Remove the cap protector (25), nut (30), and lock washer (31) from the bolt (9) and remove the two 6 gauge white wires (32 and 33) (**Figure 12-8, Page 12-10**).
4. Remove the second nut (3) from the bolt (9) and then remove the bolt from the V-Glide wiper switch housing (1) (**Figure 12-8, Page 12-10**).
5. Remove the third nut (3) and lock washer (23) and wire (34) from the bolt (9) (**Figure 12-8, Page 12-10**).
6. Replace the wiper switch arm brush (18) as follows (**Figure 12-8, Page 12-10**).
 - 6.1. Remove screw (15), lock washer (16) and pull the arm assembly (17) away from the fixed contacts (**Figure 12-8, Page 12-10**).
 - 6.2. Remove brush (18) by pulling wire through hole in wiper switch arm (17) (**Figure 12-8, Page 12-10**).
 - 6.3. Install the new wiper switch arm brush assembly (18) into the wiper switch arm assembly (17) (**Figure 12-8, Page 12-10**).
 - 6.4. Install the screw (15) and lock washer (16) through the wiper switch arm into the brush. Tighten the screw to 7 in.lb (0.8 N-m).
7. Install the arm brush wire terminal (34) onto the bolt (9) and then install the nut (3) and lockwasher (23). Thread the nut against the arm brush wire terminal and tighten it to 40 in.lb (4.5 N-m) (**Figure 12-8, Page 12-10**).
8. Install the bolt (9) through the wiper switch housing (1) and then install the nut (3) onto the bolt. Tighten the nut to 40 in.lb (4.5 N-m) (**Figure 12-8, Page 12-10**).

V-Glide Wiper Switch Arm Brush Replacement, Continued:

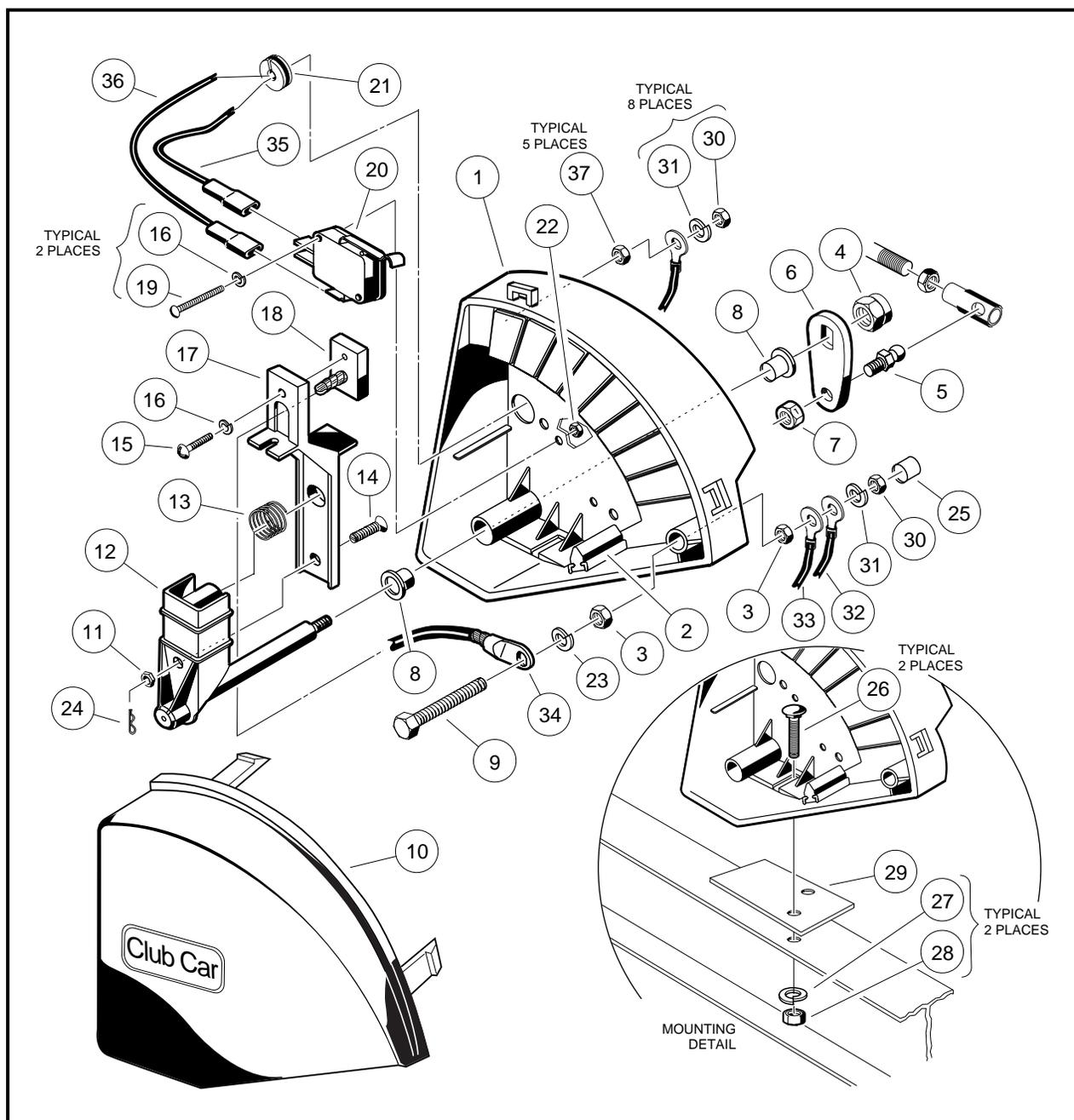


Figure 12-8 V-Glide Wiper Switch

9. Install the 6 gauge white wire from the first resistor and the 6 gauge white wire from the solenoid onto the bolt (9), then install the lock washer (31) and nut (30). Tighten nut to 40 in.lb (4.5 N-m) (Figure 12-8, Page 12-10).
10. Check wiper switch arm brush contact for proper adjustment. See Page 12-8.
11. Connect the accelerator rod to the V-Glide wiper switch ball stud (5) (Figure 12-8, Page 12-10).
12. Install the V-Glide wiper switch cover (10) (Figure 12-8, Page 12-10).
13. Install the No. 5 and No. 6 batteries. Reconnect batteries, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m) (Figure 12-1, Page 12-1).

V-GLIDE WIPER SWITCH REMOVAL

1. Remove battery Nos. 5 and 6 from the vehicle (**Figure 12-1, Page 12-1**).
2. Remove nuts (30) and lock washers (31), then remove resistor wires from wiper switch (**Figure 12-8, Page 12-10**).
3. Remove the cover (10) from the wiper switch (**Figure 12-8, Page 12-10**).
4. Disconnect the black wire (36) from the charger receptacle (**Figure 12-8, Page 12-10**).
5. Disconnect the green wire (35) from the small post on the solenoid (**Figure 12-8, Page 12-10**).
6. Remove nuts (28) and lock washers (27) securing V-Glide wiper switch to vehicle frame and then remove the wiper switch from vehicle (**Figure 12-8, Page 12-10**). Re-secure shim (29) to vehicle frame.

V-GLIDE WIPER SWITCH DISASSEMBLY

1. Remove the nut (3) and slide the bolt (9) out of the wiper switch housing (**Figure 12-8, Page 12-10**).
2. Remove the nut (4) and bell crank (6) (**Figure 12-8, Page 12-10**).
3. Slide wiper switch arm assembly out of the V-Glide wiper switch housing (1) (**Figure 12-8, Page 12-10**).
4. Remove the spring cotter pin (24) (if present) and disassemble the wiper switch arm assembly. Unscrew the adjustment screw (14), retainer nut (11), and spring (13). Remove all thread locking compound from the threads using gasket remover (**Figure 12-8, Page 12-10**). **See NOTES on page 12-8.**
5. To remove the bearings (8) (**Figure 12-8, Page 12-10**) lightly tap them from the back with a punch.

V-GLIDE WIPER SWITCH ASSEMBLY

1. Install bearings (8) into the wiper switch housing by lightly tapping them with a plastic hammer. Make sure that the collars of the bearings are flush against the wiper switch housing (**Figure 12-8, Page 12-10**).
2. With the spring (13) in place, hold the V-Glide wiper switch arm shaft (17) and carrier (12) together (**Figure 12-8, Page 12-10**). **See following CAUTION.**

CAUTION

- MAKE SURE THE SPRING IS IN THE GROOVE ON THE WIPER SWITCH. IF IT IS NOT IN PLACE, THE WIPER SWITCH ARM MAY BREAK IF FORCED.

3. Install the adjustment screw (14) and nut (11) (**Figure 12-8, Page 12-10**).

NOTE

- WIPER SWITCH ARM SHOULD BE ADJUSTED AFTER WIPER SWITCH IS FULLY ASSEMBLED.

4. Slide the wiper switch arm assembly into the wiper switch housing and install the bell crank with the ball stud down and away from the housing.
5. While holding the bell crank so the arm does not exert a load on the wiper switch housing, install the nut (4) and tighten to 9 ft.lb (12 N-m) (**Figure 12-8, Page 12-10**).
6. If the ball stud (5) was removed, insert it through the bell crank with the ball facing away from the wiper switch housing and install the lock nut (7). While holding the ball stud with a wrench, tighten the lock nut to 5 ft.lb (7 N-m) (**Figure 12-8, Page 12-10**).
7. Install bolt (9) with wire terminal, lock washer, and nut through switch housing (**Figure 12-8, Page 12-10**).
8. Install the nut (3) onto the bolt and tighten to 40 in.lb (4.5 N-m). **See following WARNING.**

WARNING

- MAKE SURE THE WIPER SWITCH ARM ROTATES FREELY IN THE HOUSING. IF THE ARM BINDS OR STICKS, IT MUST BE REPLACED.

9. Adjust the wiper switch. **See Page 12-9.**

V-GLIDE WIPER SWITCH INSTALLATION

⚠ CAUTION

- BEFORE INSTALLING THE WIPER SWITCH, INSPECT THE HOUSING FOR CRACKS OR DAMAGE. IF THE HOUSING IS DAMAGED, THE ENTIRE HOUSING WITH FIXED CONTACTS MUST BE REPLACED.

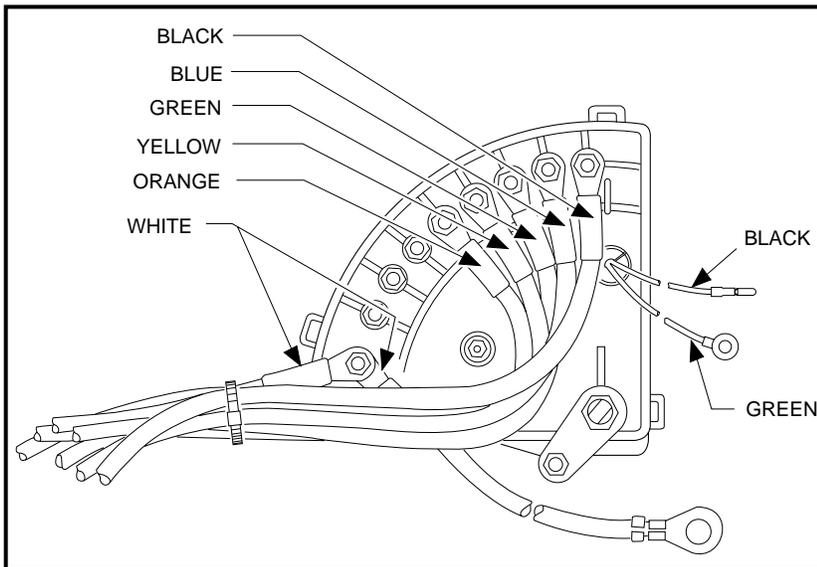


Figure 12-9 V-Glide Wiper Switch Wires

1. Position shim plate (29) on I-beam and then place V-Glide wiper switch assembly in position on shim plate. Install mounting bolts (26), lock washers (27) and nuts (28) (**Figure 12-8, Page 12-10**). Make sure square shoulders on the bolts fit squarely into the wiper switch housing. Tighten nuts to 36 in.lb (4.0 N-m).

⚠ WARNING

- AFTER INSTALLING THE V-GLIDE WIPER SWITCH, MAKE SURE IT IS SECURELY FASTENED TO THE VEHICLE FRAME.

2. Install the accelerator rod onto the ball stud.
3. Connect 18 gauge green wire from limit switch to the small post on the solenoid that does not have the 18 gauge yellow wire attached. **See Section 11, Figure 11-3, Vehicle Wiring Diagram, Page 11-4.**
4. Connect the 18 gauge black wire to black lead from charger receptacle (**Figure 12-9, Page 12-12**).
5. Connect the 6 gauge white wire from the resistor coil and the 6 gauge white wire from the solenoid to the bolt (9) in the wiper switch housing. Install the lock washer (31) and nut (30) onto the bolt and tighten to 40 in.lb (4.5 N-m). Install cap protector (25) (**Figure 12-8, Page 12-10**).
6. Connect the 6 gauge orange wire to the fourth contact from the bottom and tighten the nut to 40 in.lb (4.5 N-m). **Please note, the first three contacts have NO wires attached to them.**
7. Connect the 6 gauge yellow wire to the fifth contact from the bottom and tighten the nut to 40 in.lb (4.5 N-m).
8. Connect the 6 gauge green wire to the sixth contact from the bottom and tighten the nut to 40 in.lb (4.5 N-m).
9. Connect the 6 gauge blue wire to the seventh contact from the bottom and tighten nut to 40 in.lb (4.5 N-m).
10. Connect the 6 gauge black wire to the eighth contact from the bottom and tighten the nut to 40 in.lb (4.5 N-m). **See following WARNING and CAUTION.**

⚠ WARNING

- MAKE SURE WIRES ARE CONNECTED TO V-GLIDE WIPER SWITCH CONTACTS EXACTLY AS STATED. IF THEY ARE NOT, THE VEHICLE COULD START IN A SPEED OTHER THAN FIRST.

⚠ CAUTION

- DO NOT OPERATE VEHICLE WITHOUT V-GLIDE WIPER SWITCH COVER IN PLACE. OPERATING VEHICLE WITHOUT THE COVER ALLOWS DIRT, DUST, AND WATER TO CONTAMINATE WIPER SWITCH, WHICH COULD CAUSE SWITCH TO FAIL OR MALFUNCTION.

11. Make sure the wiper switch and pedal group are properly adjusted. **See Section 5—Accelerator and Brake Pedal in the 1998/1999 DS Golf Car Maintenance and Service Manual. See also WARNING on Page 12-9.**
12. Reconnect battery cables, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m). Drive the vehicle and inspect it for proper operation.

FORWARD/REVERSE (F&R) SWITCH

Read **DANGER** and **WARNING** on page 12-1.

NOTE

- IF YOUR VEHICLE HAS A SERIAL NUMBER BETWEEN A9501-417833 AND A9926-773264, VISUALLY INSPECT THE F&R SWITCH TO MAKE SURE IT IS THE SAME DESIGN AS SHOWN IN **FIGURE 12-10, PAGE 12-14**. IF IT IS NOT, CONTACT YOUR LOCAL DISTRIBUTOR/DEALER OR A CLUB CAR TECHNICAL SERVICE REPRESENTATIVE FOR INFORMATION REGARDING A REPLACEMENT KIT FOR THIS COMPONENT.

The F&R switch is mounted on the front panel of the rear body, in front of the two center batteries.

Testing the F&R Switch

Visually inspect the forward and reverse movable contact and stationary contacts. Make sure the stationary contacts are in good condition. If they are not, replace the entire forward and reverse assembly. If severe arcing has occurred, check the forward and reverse anti-arcing limit switch for proper operation. Keep the F&R switch clean. If the F&R switch is stiff or binds in operation, lubricate the contact face of the switch with WD-40[®] spray lubricant. **See Section 11, Test Procedure 8, Page 11-10. See following WARNING.**

⚠ WARNING

- DO **NOT** GREASE CONTACTS. THIS COULD CAUSE THE SWITCH TO MALFUNCTION OR BURN.

F&R Switch Removal

1. Remove F&R handle (2) by removing screw (3) (**Figure 12-10, Page 12-14**).
2. Disconnect the wires from the F&R switch.
3. Remove screws (4) and nuts (5) that mount F&R switch to the rear body (**Figure 12-10, Page 12-14**).
4. Remove F&R switch.

F&R Switch Installation

1. Connect the wires to the terminal lugs of the F&R switch as shown (**Figure 12-10, Page 12-14**). Tighten the nuts to 45 in.lb (5.1 N-m). **See following NOTE.**

F&R Switch Installation, Continued:**NOTE**

- IF THE VEHICLE HAD A 10 GAUGE RED WIRE FROM THE CHARGER RECEPTACLE TO THE F&R SWITCH, THE 10 GAUGE RED WIRE WILL **NOT** BE RECONNECTED TO THE F&R SWITCH AND CAN BE DISCARDED.
- MAKE SURE THE 6 GAUGE RED AND GREEN WIRES ARE ANGLED 45° TOWARD THE PASSENGER SIDE OF THE VEHICLE AS SHOWN **FIGURE 12-10, PAGE 12-14.**

2. Secure the F&R switch to rear body. Tighten hardware to 25 in.lb (2.8 N-m) (**Figure 12-10, Page 12-14**).
3. Connect the two 6 gauge wires to the movable contact on the back of the F&R switch. Tighten bolts to 27 in.lb (3.0 N-m) (**Figure 12-10, Page 12-14**). **See following NOTE.**

NOTE

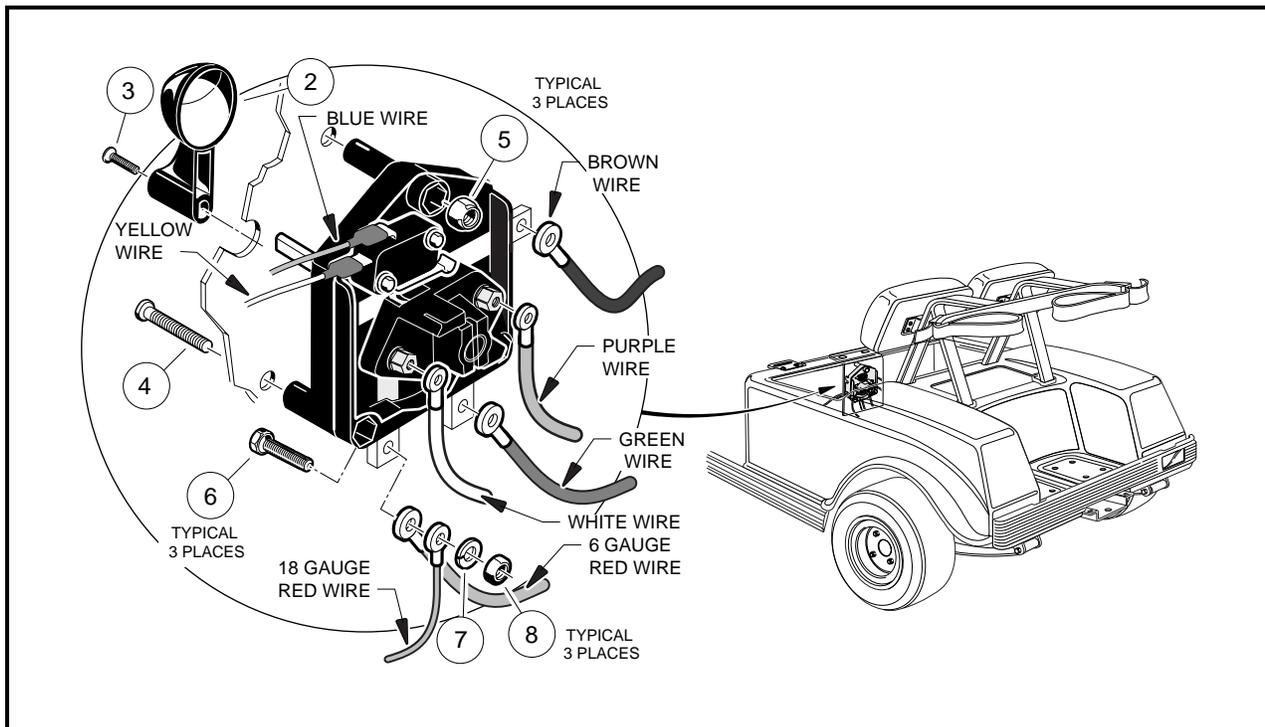
- USE A 7/16 IN. WRENCH TO PREVENT MOVABLE CONTACT FROM TURNING.

4. Reconnect the 18 gauge wires to the limit switch. **See following WARNING.**

⚠ WARNING

- MAKE SURE WIRES ARE PROPERLY CONNECTED TO F&R SWITCH. IF WIRES ARE NOT PROPERLY CONNECTED, THE VEHICLE MAY OPERATE IN AN UNEXPECTED MANNER, RESULTING IN PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

5. Place handle (2) on F&R switch. Tighten screw (3) to 14 in.lb (1.6 N-m) (**Figure 12-10, Page 12-14**).
6. Reconnect battery cables, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m).

**Figure 12-10 Removal and Installation of the F&R Switch**

SECTION 13—BATTERIES

DANGER

- **BATTERY - EXPLOSIVE GASES! DO NOT SMOKE. KEEP SPARKS AND FLAMES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR FULL FACE SHIELD AND RUBBER GLOVES WHEN WORKING ON BATTERIES.**
- **USE EXTREME CAUTION WHEN USING TOOLS, WIRES, OR METAL OBJECTS NEAR BATTERIES! A SHORT CIRCUIT AND (OR) SPARK COULD CAUSE AN EXPLOSION.**
- **BATTERY - POISON! CONTAINS ACID! CAUSES SEVERE BURNS. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. ANTIDOTES:**
 - **EXTERNAL: FLUSH WITH WATER. CALL A PHYSICIAN IMMEDIATELY.**
 - **INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL A PHYSICIAN IMMEDIATELY.**
 - **EYES: FLUSH WITH WATER FOR FIFTEEN MINUTES. CALL PHYSICIAN IMMEDIATELY.**

WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL ELECTRICAL REPAIR. FOLLOW ALL PROCEDURES EXACTLY AND HEED ALL WARNINGS STATED IN THIS MANUAL.
- ALWAYS WEAR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE.
- TURN KEY SWITCH **OFF**, PLACE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION, AND REMOVE KEY PRIOR TO SERVICING.
- DO NOT WEAR LOOSE CLOTHING. REMOVE JEWELRY SUCH AS RINGS, WATCHES, CHAINS, ETC. BEFORE SERVICING VEHICLE.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.
- TO AVOID UNINTENTIONALLY STARTING THE VEHICLE, DISCONNECT BATTERIES, NEGATIVE CABLE FIRST, AS SHOWN IN **FIGURE 13-5, PAGE 13-4.**

GENERAL INFORMATION

The batteries supplied with a V-Glide 36-volt vehicle are different from those supplied with an automobile. The outward appearance of these two batteries is similar, but the operating characteristics are very different. The V-Glide 36-volt vehicle battery is known as a “deep cycle” battery, and the automotive battery is known as a “starting, lighting and ignition” (SLI) battery. They should never be substituted for one another.

An automotive battery has to deliver high cranking currents of 300-400 amperes at a sufficient voltage for several seconds and maintain an accessory load of 10-25 amperes in stop and go driving. The energy removed from an automotive battery is immediately replaced by the alternator or generator of the car. As a result, the automotive battery operates at 90 to 100% of full charge at all times.

The batteries supplied with a V-Glide 36-volt electric vehicle must supply 100% of the energy required to move the vehicle. These batteries therefore receive deep discharge down to 30% to 40% of their full charge capacity. Then they must be recharged, hence their name “deep cycle.” The average amperage draw is considered to be 75 amps, although it varies greatly depending on the vehicle and how it is operated. V-Glide 36-volt batteries are specifically designed to handle this type of service.

General Information, Continued:

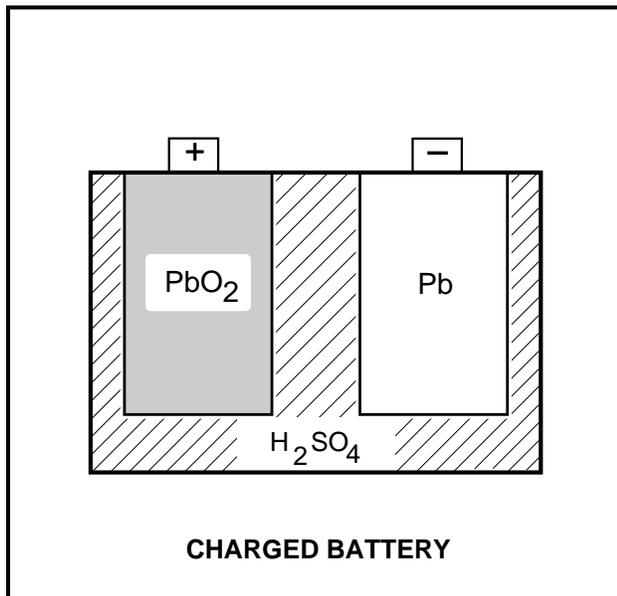


Figure 13-1 Charged Battery

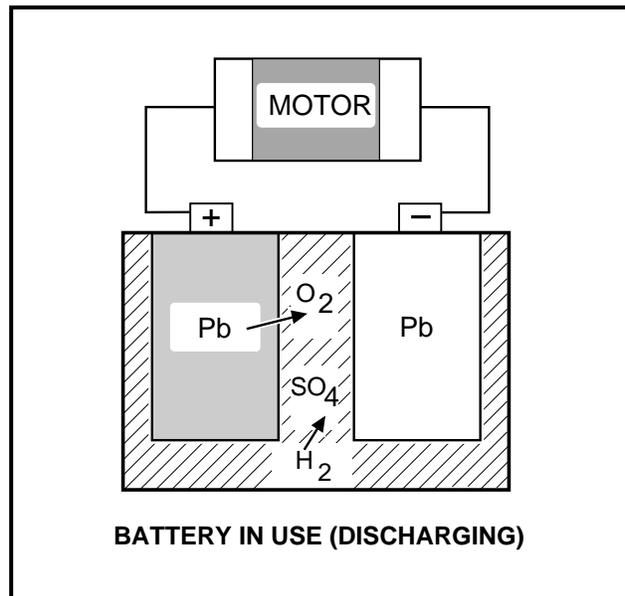


Figure 13-2 Discharging Battery

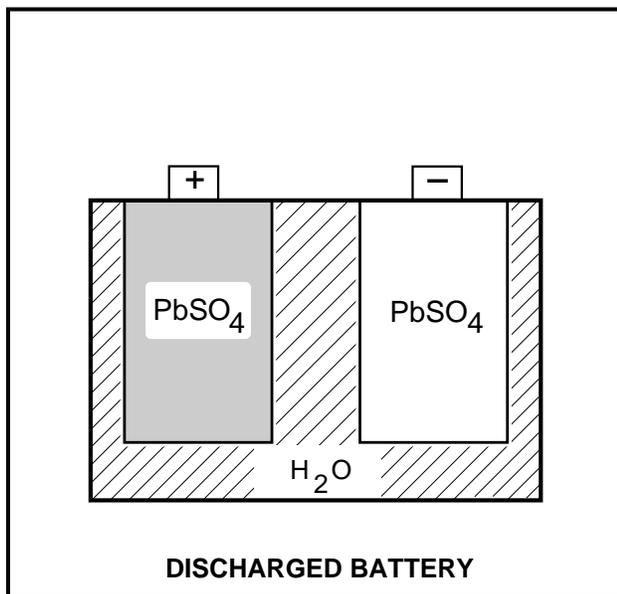


Figure 13-3 Discharged Battery

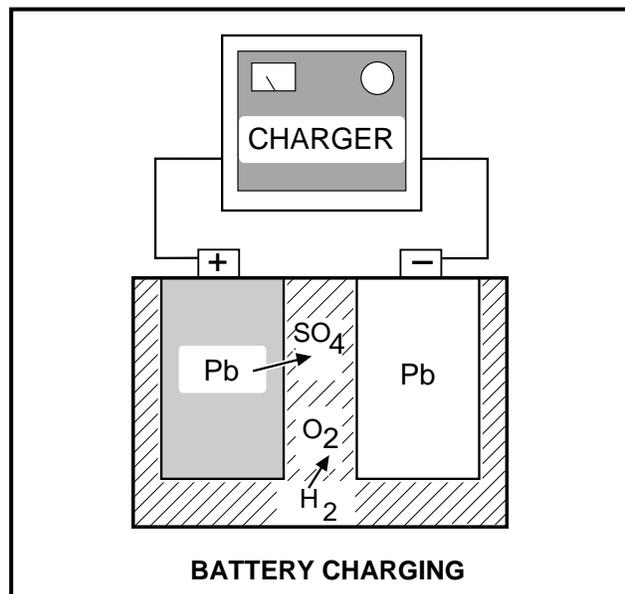


Figure 13-4 Battery Charging

The rechargeable lead-acid battery turns chemical energy into electrical energy and vice versa. The main active elements within a battery are the positive plates, the negative plates and the electrolyte (sulfuric acid). Another very important element (but inactive) is the separator. The separator does exactly what its name implies - it separates the material of the positive and negative plates and prevents them from touching each other and creating electrical shorts. It is porous enough to allow charged ions to pass through between the positive and the negative plates, but not allow the two materials to contact each other.

Whenever two unlike metals are immersed in an acid solution, an electric current is generated. In a "deep cycle" battery, the negative plates contain lead (Pb) and the positive plates contain lead dioxide (PbO₂). These plates are immersed in a sulfuric acid solution (H₂SO₄) (**Figure 13-1, Page 13-2**).

During discharge, the chemical reaction inside the battery causes the sulfate (SO_4) to break away from the H_2 (Figure 13-2, Page 13-2).

The sulfate (SO_4) combines with the lead (Pb) on both plates, forming lead sulfate (PbSO_4). Oxygen (O_2) from the positive plates combines with the hydrogen (H) from the electrolyte to form water (H_2O) (Figure 13-3, Page 13-2).

The result is two similar metals, lead sulfate (PbSO_4), immersed in water (H_2O). This, of course, will not generate electricity since the battery is completely discharged.

When a discharged battery is connected to a charger, the process is reversed. The sulfate (SO_4) is forced from the plates back into the electrolyte to make sulfuric acid (H_2SO_4). The oxygen returns to the positive plate to make lead dioxide (PbO_2) (Figure 13-4, Page 13-2).

The result is a charged battery that is again capable of generating electricity (Figure 13-1, Page 13-2).

COMMON MISCONCEPTIONS ABOUT BATTERIES

This chart below describes some of the more common misconceptions that are associated with the V-Glide 36-volt battery set and battery care.

PROBLEM	MISCONCEPTION AND REALITY
1. Deep Discharge	Misconception- "This vehicle is running slowly, but we can run it until it stops." Reality- This statement is wrong. Avoid deep discharge of batteries whenever possible. See Deep Discharge, Page 13-7.
2. Early Excessive Discharging	Misconception- "These are new batteries. They can run all day." Reality- This statement is wrong also. New batteries do not reach their full capacity until they have been used and recharged 20 to 50 times.
3. Mineral Content	Misconception- "Tap water will do for our batteries." Reality- Your tap water might be OK, but have it checked first. See Mineral Content, Page 13-6
4. Self-Discharge	Misconception- "Dirt and corrosion on the battery won't hurt anything." Reality- Wrong again. Dirt and corrosion might provide a path for current to flow and allow the batteries to self-discharge. See Self-Discharge, Page 13-5.
5. Overwatering	Misconception- "Batteries can be filled to the level indicator at night, so it won't have to be done in the morning." Reality- Under most circumstances, water should be added <i>after</i> charging. See Water Level, Page 13-5.
6. Underwatering	Misconception- "Checking the water takes too much time; it can be checked once a month." Reality- Insufficient watering can ruin batteries. Water level should be checked weekly. See Water Level, Page 13-5.
7. Vibration Damage	Misconception- "You should tighten battery hold-downs as tight as you can." Reality- Battery hold-downs should be tightened to specification. Hold-downs that are too tight or too loose can cause battery damage. See Vibration Damage, Page 13-6.

REPLACING BATTERIES

Read **DANGER** and **WARNING** on page 13-1.

⚠ WARNING

- TO PREVENT ELECTROLYTE LEAKAGE FROM THE BATTERY VENTS, BATTERIES MUST BE KEPT IN AN UPRIGHT POSITION. TIPPING A BATTERY BEYOND A 45° ANGLE IN ANY DIRECTION CAN ALLOW A SMALL AMOUNT OF ELECTROLYTE TO LEAK OUT THE VENT HOLE. DO NOT EXCEED THIS 45° ANGLE WHEN LIFTING, CARRYING, OR INSTALLING BATTERIES. BATTERY ACID CAN CAUSE SEVERE PERSONAL INJURY TO SKIN OR EYES, AND CAN DAMAGE CLOTHING.

1. Before removing batteries, note orientation of batteries and the connecting wires. Disconnect the batteries, negative cable first. Then remove remaining wires and batteries. **See Figure 13-5, Page 13-4 for V-Glide 36-volt vehicle battery wiring.**
2. Inspect the new batteries for any damage that may have occurred in transit.
3. If the old battery cables are going to be reused, inspect them for broken or frayed wires, damaged terminals, or worn insulation. Remove any corrosion on the connectors. One cup of bicarbonate of soda (baking soda) in a gallon of water and a bristle brush do an excellent job of neutralizing and removing the corrosion. Be careful not to allow this baking soda solution to enter the battery.

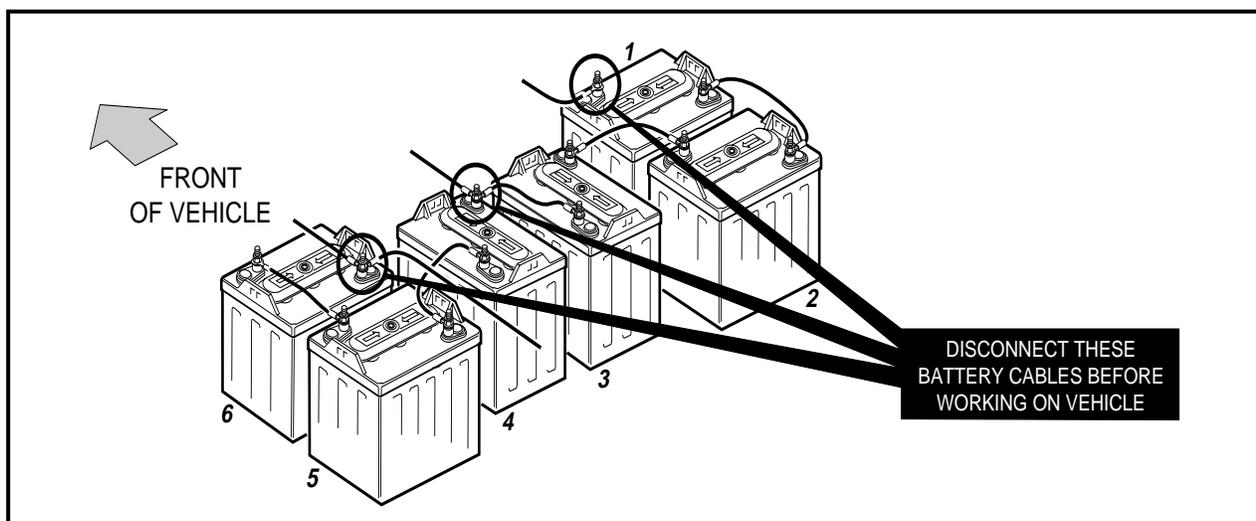


Figure 13-5 V-Glide 36-volt Battery Configuration

4. Check and clean the battery rack and hold-downs. The nuts and bolts on the hold-downs may corrode. It is therefore advised that they be cleaned periodically and replaced as necessary.
5. Install batteries in the proper orientation (**Figure 13-5, Page 13-4**). Install the battery hold-downs. The hold-downs should be tight enough so the batteries do not move while the vehicle is in motion, but not so tight as to crack or buckle the battery case. Tighten to 40 in.lb (4.5 N-m), alternating between hold-down bolts.
6. Install wires in proper sequence (**Figure 13-5, Page 13-4**). **See also Section 11, Page 11-3, Vehicle Wiring Diagram.** Install black wire to negative post of battery No. 6 last. Make sure all connections are tight. Tighten to 110 in.lb (12.4 N-m). Coat all terminals with Battery Protector Spray (CLUB CAR Part No.1014305) to minimize future corrosion.
7. Give the batteries a full charge prior to sending them out into service. This ensures that all the batteries are fully charged and the cells are equalized prior to use.

BATTERY CARE

Read **DANGER** and **WARNING** on page 13-1.

PREVENTIVE MAINTENANCE

To keep batteries in good operating condition, follow these steps on a regular basis.

1. Any corrosion build-up on or around batteries should be removed immediately. Terminal connections should be clean and tight. Any frayed or worn wires should be replaced. After all cables have been connected, coat all terminals with Battery Protector Spray (CLUB CAR Part No.1014305) to help prevent future corrosion.
2. Batteries should be kept clean and dry to prevent self-discharge. Any dirt, grime or acid spillage should be removed. Wash batteries with a bristle brush using water and bicarbonate of soda (baking soda - 1 cup per gallon of water). Rinse with water. Do not allow solution to enter battery through the vent cap holes. **See Self-Discharge below.**
3. Maintain proper water level. **See Water Level below.**
4. Batteries should be properly charged every day they are used. Check the batteries periodically to see that they are in a full state of charge. **See Battery Charging, Figure 13-6, Page 13-5.**
5. Keep hold-downs tight. **See Vibration Damage, Figure 13-6, Page 13-5.**

SELF-DISCHARGE

Dirty batteries can provide a path for a small current draw that can slowly discharge batteries, thus wasting valuable energy. To prevent self-discharge, batteries should always be kept clean.

Hot weather also has an effect on a battery's self-discharge rate. The higher the temperature, the quicker a set of batteries will discharge. In hotter climates, batteries should be checked more often. When storing batteries, keep in a cool place. **See Battery Storage, page 13-13.**

WATER LEVEL

⚠ CAUTION

- DO NOT ALLOW BATTERY ACID FROM BATTERY CAPS OR HYDROMETER TO DRIP ONTO THE FRONT OR REAR BODY OF THE VEHICLE. BATTERY ACID WILL CAUSE PERMANENT DAMAGE. WASH OFF IMMEDIATELY.

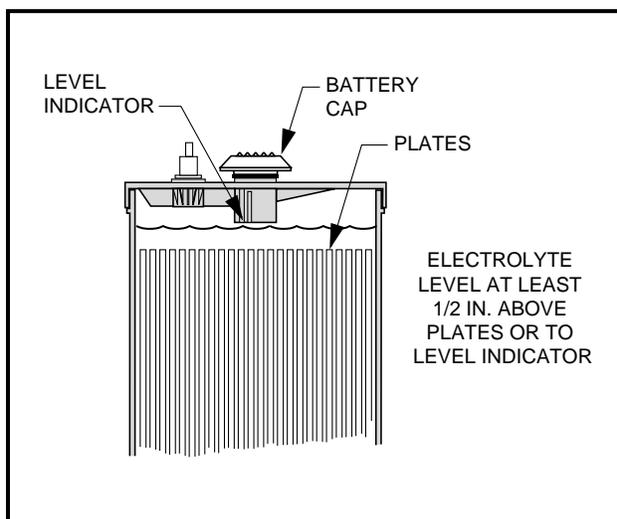


Figure 13-6 Battery Electrolyte Level

Water Level, Continued:

Add water only after charging unless the water is below the level of the plates. If the electrolyte level is below the level of the plates, add just enough water to cover the plates and then charge the batteries. After charging, fill with water to the level indicator. Filling a battery to the level indicator before charging will result in overfilling because the electrolyte level will rise during charging and some of the electrolyte may bubble out of the cap. This reduces its capacity and corrodes the metal parts around it. The electrolyte level should be checked weekly to be sure electrolyte is at its proper level (**Figure 13-6, Page 13-5**). Never allow the electrolyte level to fall below the tops of the plates because this will cause the exposed part of the plate to become permanently inactive. For best results, use a battery watering gun to add water to batteries. Check the electrolyte level more frequently in hot weather or when batteries are old.

Mineral Content

For the longest battery life, use distilled water in batteries. However, if tap water is used, be sure the mineral contents are below these levels:

IMPURITY	ALLOWABLE CONTENT IN PARTS PER MILLION
Suspended Matter	Trace
Total Solids	100.00
Calcium and Magnesium Oxides	40.0
Iron	5.0
Ammonia	8.0
Organic Matter	50.0
Nitrates	10.0
Nitrites	5.0
Chloride	5.0
Contact your local water department for this analysis.	

VIBRATION DAMAGE

The battery hold-downs should always be tight enough to keep the batteries from bouncing. Battery life may be severely shortened if the battery hold-downs are too loose. Excessive vibration causes the plates to shed prematurely and shortens the life of the battery. It may also cause acid to leak out of the vent caps and corrosion to build up on surrounding metal parts. The acid which is lost reduces the capacity of the battery and cannot be replaced. Battery hold-downs should not be so tight as to crack or buckle the battery case. This may cause leaks which would dry up a cell or cause internal shorts. **See Replacing Batteries, Page 13-4.**

BATTERY CHARGING

Read DANGER and WARNING on page 13-1.

General Information

The charger supplied with the V-Glide 36-volt electric vehicle resolves the most common problems associated with battery charging. Undercharging and overcharging are prevented provided the charger is allowed to shut off by itself. Also, all cells are automatically given an equalization charge at low current, which prolongs battery life. Batteries should never be left in a discharged state as this can reduce the capacity of the battery. The batteries should be charged every day they are used, even if only for ten minutes or after nine holes. However, the batteries should not be charged if they have not been used. If running 36 holes per day, it is recommended to put the vehicles on charge after the first 18 holes. Even if the charger is only on for an hour or two, it will prevent the batteries from being deeply discharged. If a charger is still on in the morning and it becomes necessary to send the vehicle out before charging is complete, be sure the vehicle gets a catch-up charge sometime during operation. As soon as practical, this vehicle must get a full charge.

CHARGER DOES NOT SHUT OFF AUTOMATICALLY

This may be due to one of the following factors:

1. New batteries
2. Hard use
3. Cold temperatures
4. Short charging times (e.g., in late at night, out early in the morning)

A catch-up charge may be necessary when these conditions are present. On an off day, when all or some of the vehicles are not in use, check the batteries in the vehicles for state of charge. Any batteries with a specific gravity lower than 1.250 need a catch-up charge. If the problem continues after a catch-up charge has been performed, refer to **Section 14—Accu-Power Battery Charger**.

DEEP DISCHARGE

Never discharge a vehicle's batteries to the point the vehicle will no longer operate. This will considerably shorten the cycle life of the batteries, and may permanently damage the batteries. It is possible the batteries will not accept a charge if they are completely discharged. The deeper the discharge, the harder it is on the batteries. For this reason, it is recommended that vehicles be charged after each use. Placing the batteries on charge after each use reduces the depth of discharge and prolongs battery life.

EARLY EXCESSIVE DISCHARGING

When vehicle batteries are new, they do not reach their full capacity until they have been used and charged 20 to 50 times. If they are excessively discharged early in their life, their effective service life will be shortened. It is advisable to limit the use of any vehicle with new batteries to 18 holes for at least the first 4 weeks and then gradually increase their service range.

INCOMING AC SERVICE

Make sure the incoming AC line service is sufficient. If circuit breakers are tripping, fuses blow during the night or the charger does not give the required starting rate when perfectly good batteries are put on charge, an AC line problem exists. The electrical service to the vehicle storage facility should be sufficient to deliver 115 volts (minimum 105 volts, maximum 128 volts) and 10.7 amps per charger with all the chargers turned ON. If not, consult your local power company or electrical contractor.

FLEET ROTATION

Rotate your vehicles. Use different vehicles first each morning. It is very hard on batteries if the last vehicles in at night are the first ones out in the morning. Spread the workload evenly, giving all vehicles the same amount of use. This will keep your fleet in balance and will not overwork certain sets of batteries.

NUMBERING VEHICLES AND CHARGERS

Return vehicles to the same chargers each night if possible. If the vehicles are put in a storage facility at random and a vehicle dies while in use and testing shows the batteries are sound, then the problem is most likely with the charger. However, finding the problem charger may prove to be quite time consuming. Numbering the vehicles and the chargers and returning each vehicle to its designated charger each night can significantly reduce the amount of time spent in troubleshooting this type of problem.

BATTERY TESTING

Read DANGER and WARNING on page 13-1.

The following four tests have been developed to help diagnose problems with batteries that have not performed as expected. Each test becomes progressively more detailed and time-consuming. It is therefore suggested to begin with the first test and follow through with the other tests until the problem has been identified as outlined in the **Battery Troubleshooting Chart (Figure 13-7, Page 13-9)**.

BATTERY CHARGER TEST

The easiest way to monitor the condition of a vehicle's batteries is simply to observe the reading on the battery charger ammeter at the end of the charge cycle. After a full charge, disconnect and reconnect the charger DC plug. The ammeter needle will jump to 15 amps or more and then taper into the 5 to 8 amp area within 10 to 20 minutes, indicating sound, fully charged batteries.

Continued poor performance may indicate a problem in the vehicle electrical system, brakes or battery charger. If the problem is not found in the vehicle or charging system, proceed to the on-charge voltage test. Batteries that remain at 8 amps or higher should be tested further using the on-charge voltage test.

ON-CHARGE VOLTAGE TEST

When batteries are fully charged, disconnect and reconnect charger DC plug to restart the charger. After 5 minutes, record the voltage of the battery set as well as the individual batteries, using a multimeter. Set the meter on 200 volts DC. Place the red (+) probe at the positive terminal and the black (-) probe at the negative terminal of each battery. Record reading. The on-charge voltage for the set should read between 42.0 volts and 47.4 volts depending on the make, size and age of the battery being tested. If the individual batteries read between 7.4 and 7.9 volts, the vehicle may not have been fully charged when the problem occurred. Send the vehicle back out to see if the problem reoccurs. If the problem persists, check the voltage of each battery. If any battery reads below 7.0 volts or differs by more than 0.5 volts from the other batteries, have it replaced. If readings are below 7.4 volts but within 0.5 volts of each other, the batteries are old. However, they may have enough capacity left to last several more months. Go to hydrometer test. **See Troubleshooting Chart, Figure 13-7 and the examples on the following pages.**

HYDROMETER TEST

A hydrometer measures specific gravity. The higher the specific gravity, the higher the state of charge of the batteries. A fully charged battery should read between 1.250 and 1.280 at 80°F. Never add acid to batteries to obtain a higher specific gravity.

Performing the Hydrometer Test

1. Be sure the batteries have sufficient water to cover the plates by approximately 1/2 in. and are fully charged prior to beginning the test. If water must be added, recharge the batteries before performing the hydrometer test.
2. Remove the vent cap.
3. Using a battery thermometer (CLUB CAR part No.1011767), record the electrolyte temperature of the No. 2 cell.
4. Squeeze the rubber bulb of the hydrometer and insert into the cell. Slowly release the bulb, drawing electrolyte up into the glass tube of the hydrometer.
5. When the float rises off the bottom, adjust the electrolyte level so the float rides free of the bottom but does not strike the top of the glass tube. Remove the hydrometer from the cell and release the pressure from the bulb.
6. Hold the hydrometer vertically, making sure the float is not contacting the sides of the barrel. Hold the hydrometer at eye level and read the scale at the level of electrolyte (**Figure 13-8, Page 13-10**).
7. Record the reading.
8. Return the electrolyte to the cell from which it was taken. Replace vent cap.
9. Repeat steps 2-8 on all cells.

Hydrometer Calibration

Most hydrometers are calibrated to read correctly at 80°F. The readings obtained as described above must be corrected for temperature. For each 10°F above 80°F, add .004 to the reading. For each 10°F below 80°F, subtract .004 from the reading.

BATTERY TROUBLESHOOTING CHART

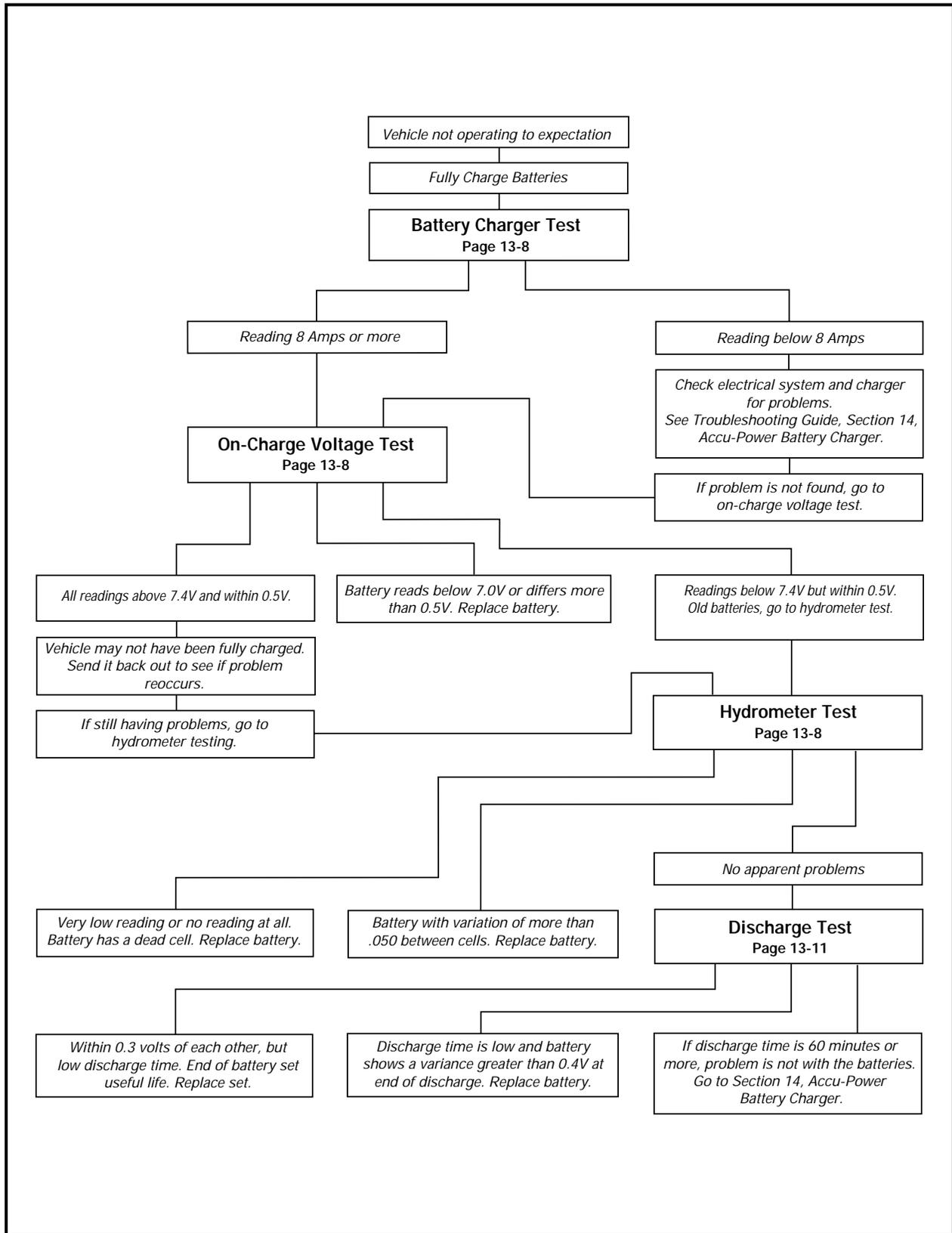


Figure 13-7 Battery Troubleshooting Flow Chart

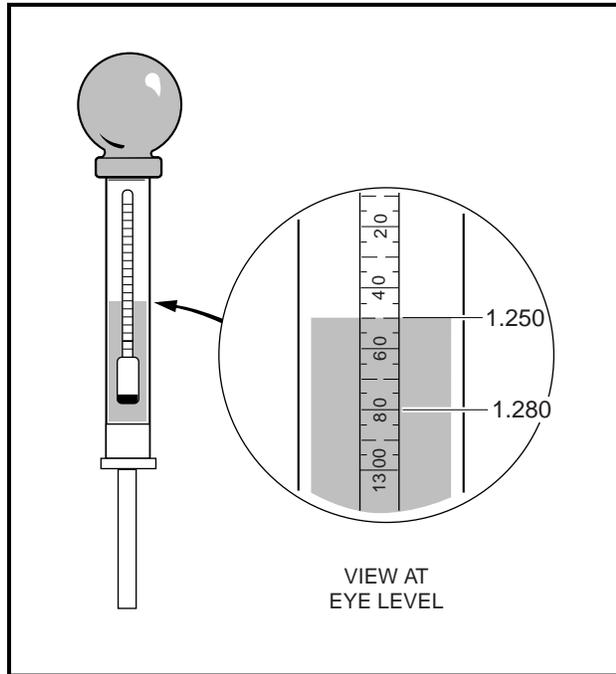


Figure 13-8 Hydrometer

Interpreting the Results of the Hydrometer Test

The approximate state of charge can be determined from the following table:

SPECIFIC GRAVITY AT 80°	STATE OF CHARGE
1.250 - 1.280	100%
1.220 - 1.240	75%
1.190 - 1.210	50%
1.160 - 1.180	25%

If the difference between the cells is .020 or more, the low cell should be suspected. It may require a catch-up charge or it may be a weak cell. When the variations between cells reach .050 or more, the battery with the low cell should be replaced.

CAR NO.	BATTERY NO.	ELECTROLYTE TEMP.	CORRECTION FACTOR	CORRECTED SPECIFIC GRAVITY			REQUIRED ACTION
				POSITIVE CELL	CENTER CELL	NEGATIVE CELL	
12	1	20°F	-.024	1.275-.024=1.251	1.280-.024=1.256	1.280-.024=1.256	Good Battery-Fully Charged
35	6	90°F	+.004	1.155+.004=1.159	1.165+.004=1.169	1.160+.004=1.164	Discharged Battery-Recharge
54	3	50°F	-.012	1.260-.012=1.248	1.200-.012=1.188	1.270-.012=1.258	Bad Center Cell
69	5	80°F	.000	1.250-0=1.250	1.255-0=1.255	1.230-0=1.230	Weak Negative Cell-Catch-up Charge
38	2	100°F	+.008	1.200+.008=1.208	1.180+.008=1.188	1.170+.008=1.178	Discharged Battery-Recharge and Recheck
22	4	80°F	.000	1.240-0=1.240	1.245-0=1.245	Float Does Not Rise	Negative Cell Dead-Replace Battery

DISCHARGE TEST

If the previous tests have failed to identify the problem with a set of batteries, conduct a discharge test. The discharge test comes closest to simulating actual vehicle operating conditions by continuously drawing amps from the batteries until voltage drops to 1.75 volts per cell. The discharge tester draws 75 amps until the batteries drop to 31.5 volts.

The discharge test is the hardest test on the batteries and the most time-consuming to perform. Use the battery discharge tester (CLUB CAR Part No.101831901).

Performing the Discharge Test

1. Be sure the batteries are fully charged and the electrolyte level is correct in all cells.
2. Connect the tester leads to the positive (+) post of battery No.1 and negative (-) post of battery No. 6 (Figure 13-9, Page 13-11).

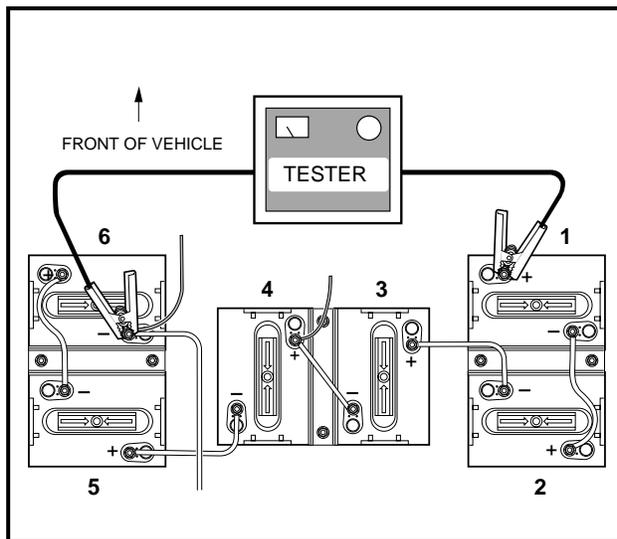


Figure 13-9 Discharge Test

3. Check and record the electrolyte temperature of the battery packs. Check center cell of each battery.
4. Reset discharge machine (or reset timer if using older discharge machine with 36-volt vehicle).
5. Turn the tester ON.
6. When the batteries have been discharging for approximately 60 minutes, set the discharge machine to function 3 and check voltage of the battery set. Check battery set voltage every 10 minutes from this point through the rest of the test. As soon as the battery set voltage reaches .50 volts above shut-off point (31.5 volts), use a multimeter to measure individual battery voltages. Measure and record the voltage of each battery to the nearest .01 volt.

NOTE

- THE TESTER WILL TURN OFF AUTOMATICALLY WHEN SHUT-OFF VOLTAGE IS REACHED.

Interpreting Discharge Test Results

1. If discharge time is 60 minutes or higher, the problem is not with the batteries.
2. If discharge times are low, compare individual battery voltages recorded in step 6 above. If any battery shows a 0.4 volt or greater variance, the battery is bad or nearing the end of its useful life and should be discarded or grouped with other batteries at or around same voltage. The voltage of a bad battery will drop more rapidly near the end of the discharge than that of a good battery.

Interpreting Discharge Test Results, Continued:

BATTERY VOLTAGES						BATTERY CONDITION
1	2	3	4	5	6	
5.25	5.25	5.25	5.25	5.25	5.25	EXCELLENT
5.3	5.3	5.4	4.9	5.3	5.3	BATTERY NO. 4 IS NEAR END OF USEFUL LIFE
5.4	5.4	5.0	5.5	4.7	5.5	BATTERY NOS. 3 AND 5 ARE NEAR END OF USEFUL LIFE

3. If all the batteries are within 0.30 volts of each other, but the discharge time is low, the batteries are approaching the end of their life and the whole set will have to be replaced. In general, cars that discharge in less than 60 minutes at 78°F on the discharge test will not normally make 36 holes. However, discharge time is dependent on the electrolyte temperature. The table shown gives the discharge times at various temperatures of a set of batteries that delivers 62 minutes at 80°F.

ELECTROLYTE TEMP. °F	DISCHARGE TIME TO SHUT-OFF POINT	ELECTROLYTE TEMP. °F	DISCHARGE TIME TO SHUT-OFF POINT
40 - 49	40 Minutes	85 - 89	64 Minutes
50 - 59	45 Minutes	89 - 99	66 Minutes
60 - 64	50 Minutes	100 - 109	68 Minutes
65 - 69	54 Minutes	110 - 119	70 Minutes
70 - 74	57 Minutes	120 - 129	72 Minutes
75 - 79	60 Minutes	130 - 150	74 Minutes
80 - 84	62 Minutes		

BATTERY TROUBLESHOOTING EXAMPLES

The following information represent a few examples of troubleshooting battery problems.

Example 1

Vehicle No. 68 was suspected of having a faulty battery due to its performance. As a result, the battery charger test was performed. After a full charge, the battery charger ammeter read 8.0 amps. Next, the on-charge voltage test was performed and the following results were recorded:

BATTERY NO.	1	2	3	4	5	6
ON-CHARGE VOLTAGE	7.61	7.95	7.36*	7.62	7.92	7.96

*Battery No. 3 appears to be suspect. Battery Nos. 1 and 4 are also suspect. Next, a hydrometer test should be conducted on all batteries.

Hydrometer test results:

BATTERY NO.	1	2	3	4	5	6
	SPECIFIC GRAVITY					
POSITIVE POST CELL	1.200*	1.265	1.300	1.250	1.280	1.260
CENTER CELL	1.285	1.275	1.290	1.270	1.295	1.265
NEGATIVE POST CELL	1.275	1.270	1.285	1.265	1.275	1.275

*After the hydrometer test, it appears that battery No. 1 is the problem.

BATTERY NO.	1	2	3	4	5	6
DISCHARGE VOLTAGE	4.08*	5.50	5.80	5.36	5.57	5.56

*After a discharge test which lasted 65 minutes, battery No. 1 is clearly shown to be the problem. Battery No. 4 should be watched a little more closely but appears to be functioning properly. Battery No. 1 should be replaced with a battery that has about the same age and usage as the other batteries.

Example 2

Vehicle No. 70 was also suspected of having a faulty battery due to its performance. The battery charger test showed 7.0 amps after a full charge. After confirming there were no problems with the electrical system, charger or brakes, the on-charge voltage was recorded as follows:

BATTERY NO.	1	2	3	4	5	6
ON-CHARGE VOLTAGE	7.86	7.33*	7.90	7.93	7.91	7.75

*Battery No. 2 was clearly identified as the problem. After checking the No. 2 battery with a hydrometer, it was discovered the negative post cell was completely dead. Battery No. 2 should be replaced with a battery that has the same age and usage as the other batteries.

BATTERY STORAGE

Read DANGER and WARNING on page 13-1.

When storing batteries during the off-season or when maintaining a replacement stock, follow these guidelines to keep batteries in good condition.

1. Keep the batteries clean and free of corrosion as outlined in the Battery Care section.
2. Batteries should be wired in series so they can be connected to the charger. Batteries that are in vehicles for winter storage can be left in the vehicles.
3. Fully charge the batteries prior to storage.
4. Store in a cool area. The colder the area in which the batteries are stored, the less the batteries will self-discharge. Batteries stored at 0°F will discharge very little over a four-month period. Batteries stored at 80°F will have to be recharged every few weeks.
5. Check the state of charge periodically. Batteries that are discharged and left in a cold environment can freeze and crack. If the specific gravity drops below 1.220, the batteries should be recharged. **See the following chart.**

SPECIFIC GRAVITY	FREEZING POINT
1.260	-70°F
1.230	-39°F
1.200	-16°F
1.170	-2°F
1.110	+17°F

6. The frequency of recharging required will depend on the temperature of the storage area, but it is recommended the batteries be monitored for state of charge every month. Also, if the storage area is unheated in a cold climate and recharge is required, it is recommended the area be heated to at least 60°F prior to charge. Batteries do not charge effectively in cold temperatures for the same reasons they do not discharge as rapidly in cold temperatures.

SECTION 14—ACCU-POWER BATTERY CHARGER

DANGER

- BATTERY - EXPLOSIVE GASES! DO NOT SMOKE. KEEP SPARKS AND FLAMES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR FULL FACE SHIELD AND RUBBER GLOVES WHEN WORKING ON BATTERIES.
- USE EXTREME CAUTION WHEN USING TOOLS, WIRES, OR METAL OBJECTS NEAR BATTERIES! A SHORT CIRCUIT AND (OR) SPARK COULD CAUSE AN EXPLOSION.
- BATTERY - POISON! CONTAINS ACID! CAUSES SEVERE BURNS. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. ANTIDOTES:
 - EXTERNAL: FLUSH WITH WATER. CALL A PHYSICIAN IMMEDIATELY.
 - INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL A PHYSICIAN IMMEDIATELY.
 - EYES: FLUSH WITH WATER FOR FIFTEEN MINUTES. CALL PHYSICIAN IMMEDIATELY.

WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL ELECTRICAL REPAIRS. FOLLOW ALL PROCEDURES EXACTLY AND HEED ALL WARNING STATEMENTS IN THIS MANUAL.
- ALWAYS WEAR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE. WEAR A FULL FACE SHIELD AND RUBBER GLOVES WHEN WORKING WITH BATTERIES.
- TURN KEY SWITCH **OFF**, PLACE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION, AND REMOVE KEY PRIOR TO SERVICING.
- DO NOT WEAR LOOSE CLOTHING. REMOVE JEWELRY SUCH AS RINGS, WATCHES, CHAINS, ETC. BEFORE SERVICING VEHICLE.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.
- TO AVOID UNINTENTIONALLY STARTING THE VEHICLE, DISCONNECT BATTERIES, NEGATIVE CABLE FIRST, AS SHOWN IN **FIGURE 14-4, PAGE 14-3**.

GENERAL INFORMATION

Each Club Car V-Glide 36-volt electric vehicle is equipped with a fully automatic Accu-Power battery charger. There are no knobs to turn or buttons to push. The charger will turn ON two to five seconds after it is plugged in, and it will automatically turn OFF when the batteries are fully charged. The charger automatically compensates for a variable AC voltage supply between 105 to 128 volts and then tapers the charge rate for longer battery life. Charging time depends on the age of the batteries and on the amount of use they have experienced. The charger compensates for these factors by measuring the voltage increase versus time, and turns OFF when the batteries are fully charged. As long as the charger is allowed to turn OFF by itself, overcharging and undercharging should be prevented (**Figure 14-1**). See following **WARNING** and **CAUTION**.

WARNING

- BECOME FAMILIAR WITH WIRING AND TERMINOLOGY OF CHARGER BEFORE ATTEMPTING ANY REPAIR TO THE CHARGER (**FIGURE 14-2, PAGE 14-2 AND FIGURE 14-3, PAGE 14-3**).

General Information, Continued:

CAUTION

- DO NOT LEAVE THE DC CORD PLUGGED INTO A VEHICLE RECEPTACLE WHILE UNATTENDED FOR MORE THAN TWO DAYS IN A ROW. SEVERE OVERHEATING AND DAMAGE TO THE BATTERIES MAY RESULT IF THE CHARGER DOES NOT TURN OFF.

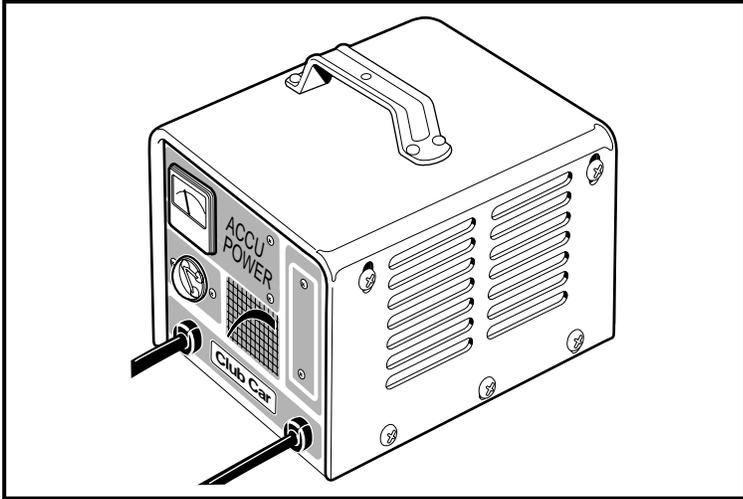


Figure 14-1 Accu-Power Battery Charger

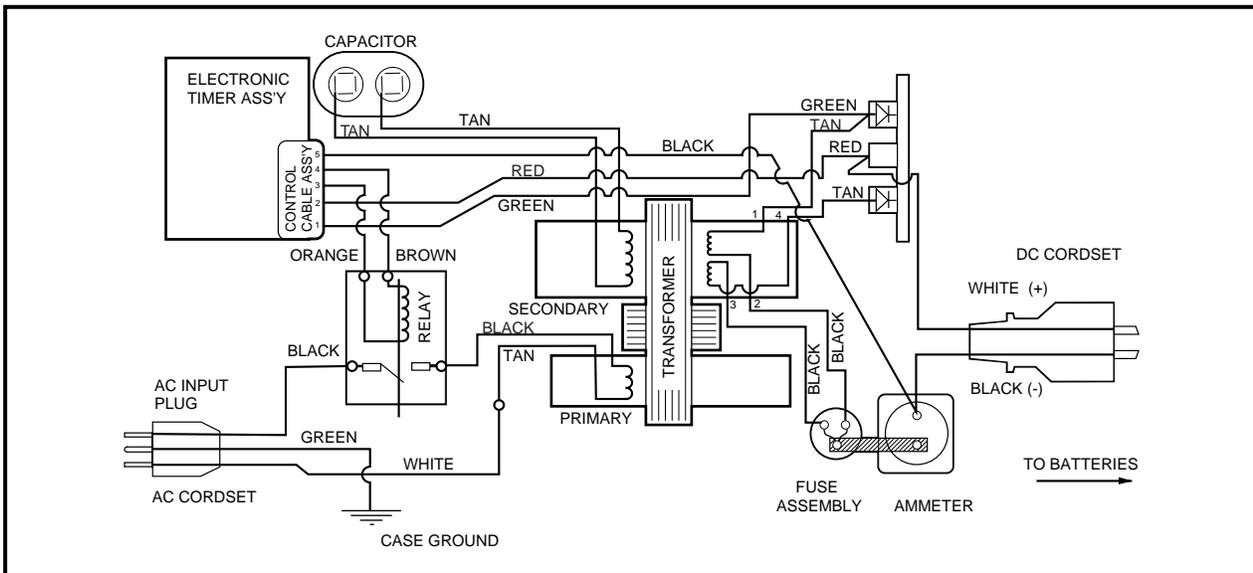


Figure 14-2 Charger Wiring Diagram

CHARGE CIRCUIT

The charge circuit consists of the charger receptacle, receptacle fuse link, and the batteries. The negative terminal of the receptacle is connected to the No. 6 battery by a 10 gauge white wire, and the positive terminal of the receptacle is connected to the fuse link. A 10 gauge red wire from the receptacle fuse link connects to the positive post of battery No. 1. If the charger operates properly with one vehicle, but will not operate properly with another, check this path to be sure the receptacle fuse link has not failed and all connections, including battery connections, are clean and tight (Figure 14-4, Page 14-3).

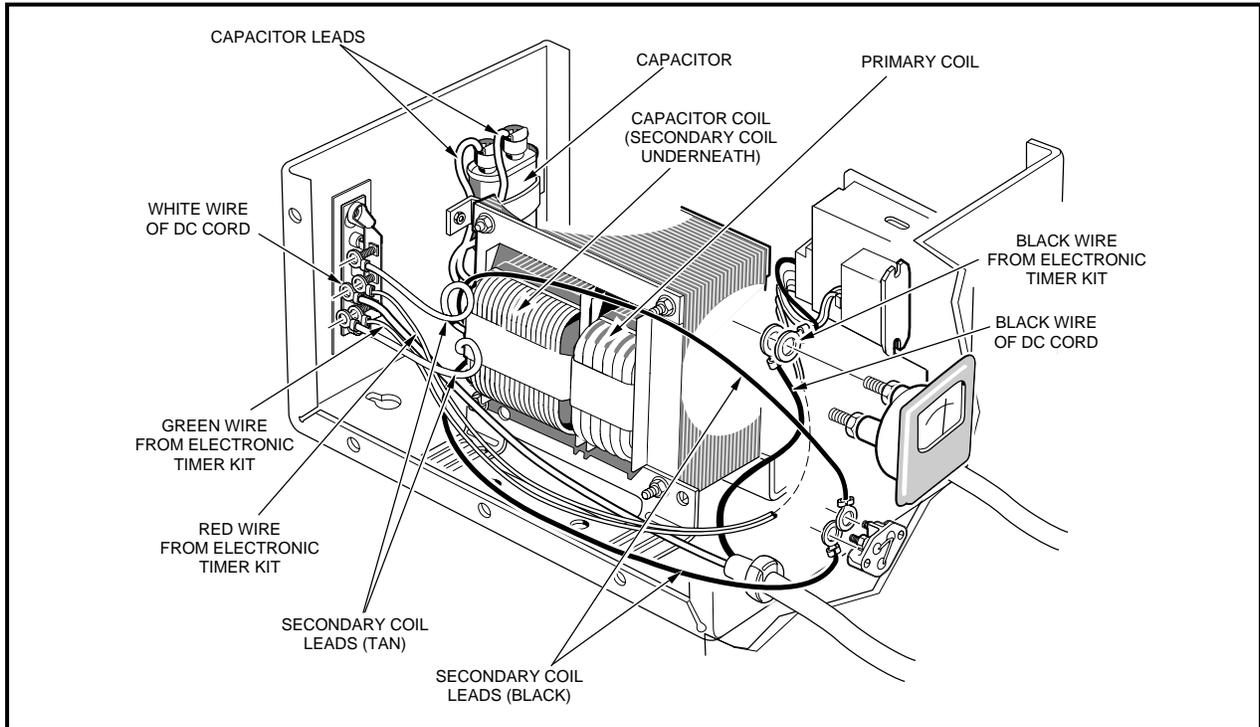


Figure 14-3 Charger Wiring

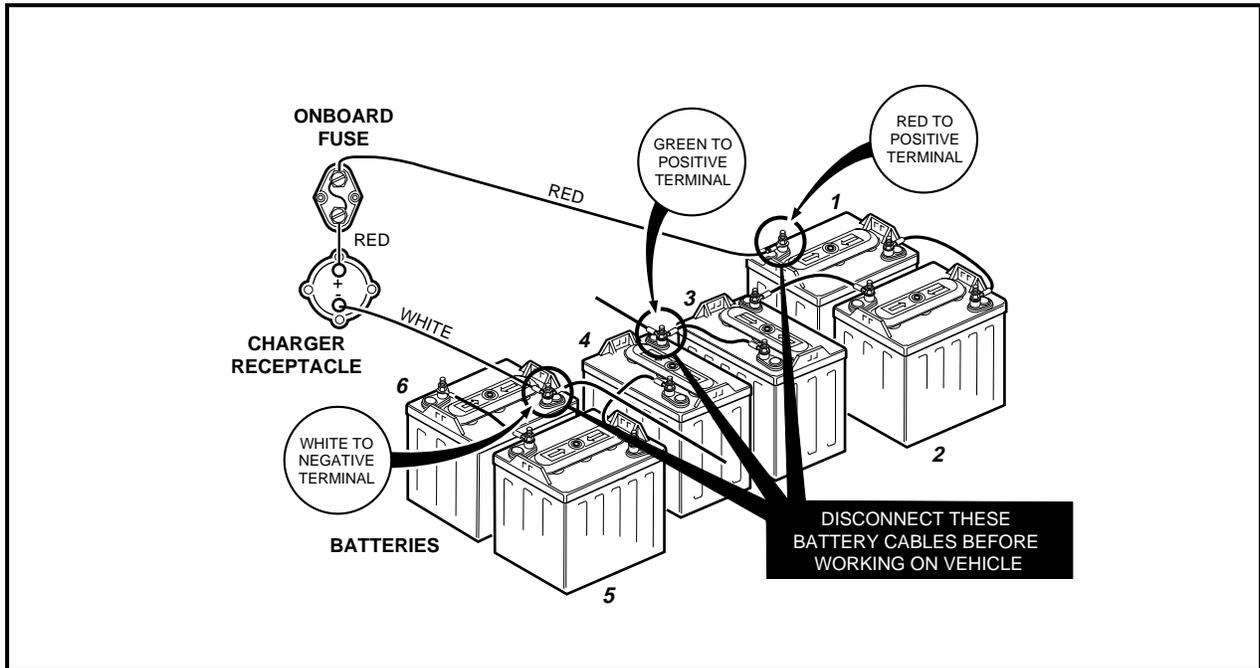


Figure 14-4 Charge Circuit

CHARGER INSTALLATION AND USE

Read **DANGER** and **WARNING** on page 14-1.

The AC line to which the charger is to be connected must be capable of supplying at least 15 amperes to each charger.

Charger Installation and Use, Continued:

To reduce the risk of electric shock, the battery charger must be grounded. The charger is equipped with an AC electric cord with an equipment-grounding conductor and a grounding type plug. It is for use on a nominal 120 volt, 60 hertz circuit. The AC plug must be connected to an appropriate receptacle that is properly installed and grounded in accordance with the National Electric Code and all local codes and ordinances.

The use of an extension cord with the charger is not recommended. If an extension cord must be used, use a three conductor No. 12 AWG cord with ground, properly wired and in good electrical condition. Keep it as short as possible (no more than twelve feet). Place all cords so they will not be stepped on, tripped over, or otherwise subject to damage or stress. **See following WARNING.**

⚠ WARNING

- EACH CHARGER SHOULD HAVE ITS OWN 15 OR 20 AMPERE BRANCH CIRCUIT PROTECTION (CIRCUIT BREAKER OR FUSE), IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ANSI/NFPA 70, AND LOCAL CODES AND ORDINANCES. IMPROPER AC SUPPLY CIRCUIT PROTECTION MAY RESULT IN A FIRE.
- DO NOT USE AN ADAPTER TO PLUG A CHARGER WITH A THREE-PRONG PLUG INTO A TWO-PRONG OUTLET. IMPROPER CONNECTION OF THE EQUIPMENT-GROUNDING CONDUCTOR CAN RESULT IN A FIRE OR AN ELECTRICAL SHOCK.
- AN EXTENSION CORD OR ELECTRICAL OUTLET MUST ACCEPT A THREE-PRONG PLUG. THE USE OF AN IMPROPER EXTENSION CORD COULD RESULT IN FIRE OR AN ELECTRICAL SHOCK.
- DO NOT OPERATE THE CHARGER IF IT HAS RECEIVED A SHARP BLOW, WAS DROPPED, OR OTHERWISE DAMAGED IN ANY WAY. CHECK IT TO BE SURE IT IS OPERATING PROPERLY BEFORE PUTTING IT BACK IN USE.

Provide adequate ventilation for the charger. Keep all charger ventilation openings at least 2 in. away from walls and other objects.

NORMAL CHARGER OPERATION**⚠ WARNING**

- DO NOT USE THIS CHARGER IF:
 - THE PLUG IS TOO LOOSE OR DOES NOT MAKE A GOOD CONNECTION.
 - THE PLUG AND/OR RECEPTACLE BECOME HOTTER THAN NORMAL DURING CHARGE.
 - THE PLUG BLADES OR RECEPTACLE CONTACTS ARE BENT OR CORRODED.
 - THE PLUG, RECEPTACLE, OR CORDS ARE CUT, WORN, HAVE EXPOSED WIRES, OR ARE DAMAGED IN ANY WAY.
- USING THE CHARGER WITH ANY OF THE ABOVE CONDITIONS COULD RESULT IN A FIRE, PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH. REPAIR OR REPLACE WORN OR DAMAGED PARTS BEFORE USING THE CHARGER.
- DO NOT ROCK OR BEND THE PLUG. TO CONNECT THE CHARGER PLUG TO THE VEHICLE RECEPTACLE, GRASP THE PLUG (NOT THE CORD) AND PUSH IT STRAIGHT INTO THE RECEPTACLE.
- TO DISCONNECT THE CHARGER PLUG FROM THE VEHICLE, GRASP THE PLUG (NOT THE CORD) AND PULL IT STRAIGHT OUT OF THE RECEPTACLE. DO NOT PULL ON THE CORD. DO NOT TWIST, ROCK, OR BEND THE PLUG SIDEWAYS.

1. With the charger DC output cord disconnected from the batteries, connect the power supply cord to a 120 volt, 60 hertz outlet.
2. Connect the charger DC plug to the charger receptacle located on the seat support panel (**Figure 14-5, Page 14-5**). The charger will turn ON automatically within 2 to 5 seconds after the DC plug is connected.

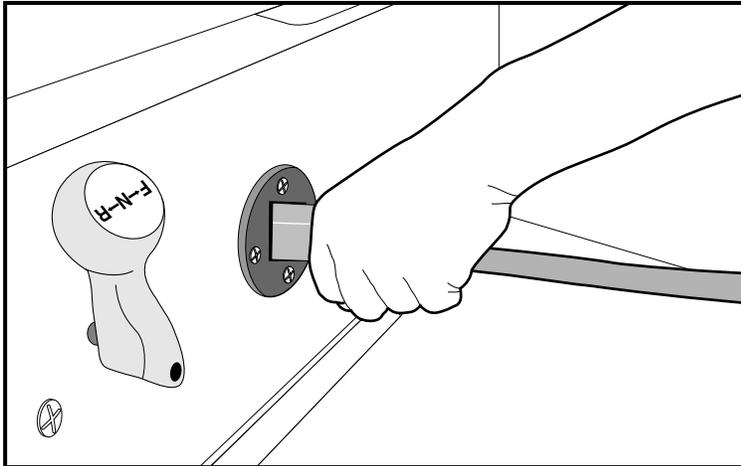


Figure 14-5 Charger Receptacle

3. Monitor the ammeter for the correct charge rate. The initial charge rate will vary from 16 to 25 amps, depending upon the condition and depth of discharge of the batteries. Slight variations in the initial charge rate may also result from AC line input voltages which are higher or lower than 120 volts. Higher line voltages increase the initial charge rate and lower line voltages reduce the initial charge rate.

NOTE

- WHEN AIR TEMPERATURES FALL BELOW 65°F (18.3°C), BATTERIES CHARGED IN UNHEATED AREAS SHOULD BE PLACED ON CHARGE AS SOON AS POSSIBLE AFTER USE. BATTERIES ARE WARMEST IMMEDIATELY AFTER USE, AND COLD BATTERIES REQUIRE MORE TIME TO FULLY CHARGE.

TROUBLESHOOTING

Read **DANGER** and **WARNING** on page 14-1.

⚠ DANGER

- **HIGH VOLTAGE! WITH THE CHARGER ON, THE VOLTAGE OF THE CAPACITOR INSIDE THE CHARGER IS APPROXIMATELY 650 VOLTS. USE EXTREME CAUTION WHEN WORKING NEAR CAPACITOR TERMINALS.**

⚠ WARNING

- **BEFORE ATTEMPTING ANY REPAIRS TO THE CHARGER, ALWAYS UNPLUG THE ELECTRICAL CORDS, FIRST FROM THE AC OUTLET AND THEN FROM THE VEHICLE RECEPTACLE.**

ACCU-POWER BATTERY CHARGER TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSES	REFER TO
1. Relay does not close, no transformer hum and ammeter does not move.	1) Batteries disconnected.	Figure 14-4, Page 14-3.
	2) Battery voltage is too low.	Test Procedure 1, Page 14-7
	3) Poor connection between plug and receptacle.	Test Procedure 1, Page 14-7
	4) DC plug and cord.	Test Procedures 1 and 9, Pages 14-7 & 14-12
	5) Electronic Timer Kit malfunction.	Test Procedure 2, Page 14-7
	6) Onboard receptacle fuse link is blown.	Page 14-16
2. Relay closes with an audible click but no transformer hum and ammeter does not move.	1) Improper AC outlet voltage.	Test Procedure 3, Page 14-8
	2) Failed AC plug and cord.	Test Procedure 3, Page 14-8
	3) Improper wiring of Electronic Timer Kit.	Figure 14-2, Page 14-2
	4) Transformer primary coil.	Test Procedure 7, Page 14-11
	5) Relay.	Test Procedure 9, Page 14-12
3. Relay closes and transformer hums but ammeter does not move.	1) Blown charger fuse.	Test Procedure 4-B, Page 14-9
	2) Both diodes failed.	Test Procedure 4-B, Page 14-9
	3) Failed capacitor.	Test Procedure 6, Page 14-10
	4) Failed transformer.	Test Procedure 7, Page 14-11
	5) Defective charger relay.	Test Procedure 9, Page 14-12
	6) Failed ammeter.	Test Procedure 9, Page 14-12
4. Single charger fuse link blows.	1) Diode failed.	Test Procedure 4-A, Page 14-8
	2) Loose internal fuse connection.	Test Procedure 4-A, Page 14-8
5. Both charger fuse links blow or receptacle fuse link blows.	1) Battery is wired in reverse polarity.	Test Procedure 4-B, Page 14-9
	2) DC cord is wired in reverse polarity.	Test Procedure 4-B, Page 14-9
	3) Both diodes failed.	Test Procedure 4-B, Page 14-9
6. Charger output is low.	1) One diode failed.	Test Procedure 4-A, Page 14-8
	2) Transformer coil short-circuit failure.	Test Procedure 7, Page 14-11
7. Charger turns OFF too soon.	1) AC power supply was turned off.	Test Procedure 3, Page 14-8
	2) Batteries may be fully charged.	Test Procedure 8, Page 14-12
8. Charger does not turn OFF.	1) Electronic Timer Kit has failed.	Test Procedure 2, Page 14-7
	2) Electronic Timer Kit is improperly wired.	Test Procedure 2, Page 14-7
	3) Bad battery.	Section 13–Batteries
9. AC line fuse or circuit breaker blows.	1) Electronic Timer relay.	Test Procedure 2 or 9, Pages 14-7 & 14-12
	2) AC plug or cord is shorted.	Test Procedure 9, Page 14-12
	3) Failed transformer.	Test Procedure 7, Page 14-11

TEST PROCEDURES

Read DANGER and WARNING on page 14-1.

The charger uses DC battery voltage to close an internal relay which in turn closes the AC circuit. When the charger is operating properly, there is a 2 to 5 second delay after the DC cord is plugged into the vehicle before the relay closes. This delay allows time for the DC plug to make a secure connection with the receptacle before the AC circuit is activated and AC power is supplied to the primary coil of the transformer. When the relay closes an audible “click” can be heard, and then as power is supplied, the transformer should hum and the ammeter should indicate the charge rate.

Test Procedure 1 - Battery Voltage is Too Low or Faulty DC Plug Connection

1. Check the DC plug and the receptacle for damage, dirt, corrosion, etc., that might prevent a sound electrical connection.
2. Measure the voltage at the receptacle using a multimeter set to 200 volts DC (**Figure 14-6, Page 14-7**).
3. Measure battery terminal voltage between the positive post on battery No. 1 and the negative post on battery No. 6 (**Figure 14-7, Page 14-7**). The voltage reading should be the same as at the receptacle.

NOTE

- TO CLOSE THE CHARGER RELAY, BATTERY VOLTAGE MUST BE BETWEEN 24 AND 50 VOLTS.

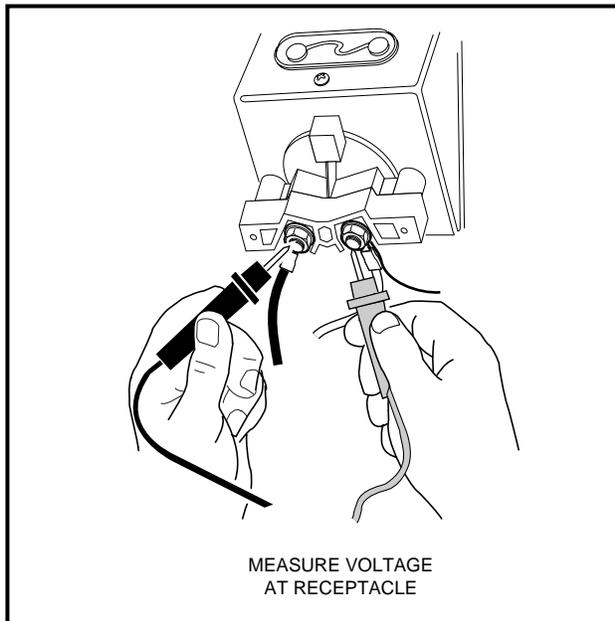


Figure 14-6 Voltage at Receptacle

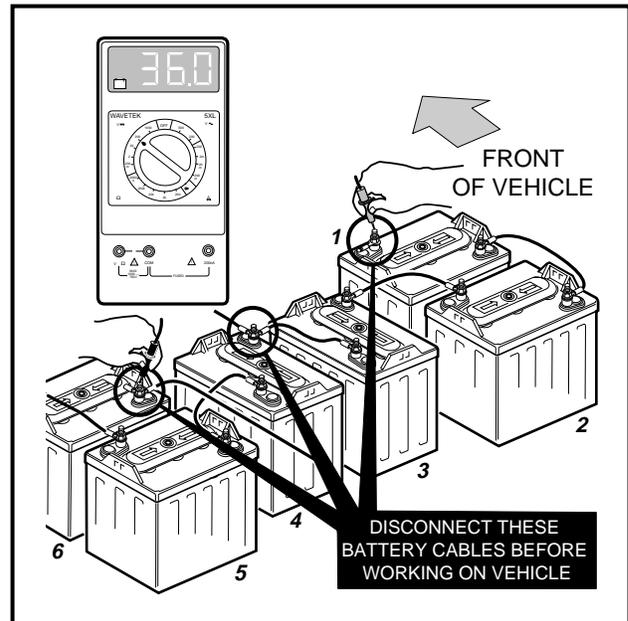


Figure 14-7 Battery Terminal Voltage

4. If the voltage readings obtained at the receptacle and at the batteries are not the same, check the wire connections at the receptacle and at the batteries. If the DC voltages are the same and within limits, remove the charger cover and verify that the charger is properly wired. With the AC cord disconnected, insert the DC plug into the charger receptacle. With a multimeter set to 200 volts DC, measure battery voltage at the white and black wires from the DC cord inside the charger (**Figures 14-2 and 14-3, Pages 14-2 and 14-3**). The voltage reading should be the same as at the receptacle. **See Test Procedure 9. See DANGER and WARNING on page 14-5.**

Test Procedure 2 - Electronic Timer Kit

1. Connect the charger AC plug to an outlet, then connect the DC plug to the vehicle. After a 2 to 5 second delay, the charger should start. If the charger starts immediately (without a 2 to 5 second delay), the electronic timer relay has failed.
2. If the charger does not turn off automatically when batteries are fully charged, check the connections of the green wire on the heat sink and check the relay (**see Test Procedure 9**). If the wire connections are secure and the relay has not failed, the electronic timer kit must be replaced. To verify the timer is malfunctioning:
 - 2.1. Unplug AC and DC cords and remove the cover from the charger. **See DANGER on page 14-5.**
 - 2.2. Locate and carefully remove the two black wires connected to the contact terminals of the relay.

Test Procedure 2, Continued:

- 2.3. Place a relay bypass wire (14 AWG minimum) between the two black wires (**Figure 14-13, Page 14-12**).
- 2.4. The power supply cord is now connected directly to the primary transformer coil and the transformer should hum when the AC cord is plugged into a live outlet.
- 2.5. Charger operation may now be checked by connecting the DC plug into the receptacle, and then connecting the AC cord into an outlet. If normal charging current is indicated on the ammeter, the electronic timer and/or the relay is defective and must be replaced. **See Test Procedure 9 for relay testing. See following CAUTION.**

⚠ CAUTION

- **DO NOT CHARGE BATTERIES WITH THE ELECTRONIC TIMER KIT BYPASSED. IF THE TIMER KIT IS BYPASSED, THE CHARGER WILL REMAIN OPERATING AS LONG AS THE AC CORD IS PLUGGED INTO AN OUTLET. SEVERE OVERCHARGING AND EVENTUAL DAMAGE TO THE BATTERIES WILL RESULT.**

- 2.6. If the transformer does not hum and the ammeter still does not register with the relay bypassed, it will be necessary to check the continuity of the charger AC circuit. **See Test Procedure 3.**

Test Procedure 3 - AC Power and Continuity Check of AC Circuit

1. Unplug AC and DC cords.
2. Check the AC line fuse or circuit breaker in the storage facility.
3. Insert the probes of a multimeter, set to 500 volts AC, into the AC outlet to check incoming AC voltage. A reading of 105 to 128 volts should be obtained.
4. If AC power is not present, have a licensed electrical contractor check the building wiring and service panel.
5. Check continuity of the AC circuit: **See DANGER on page 14-5.**
 - 5.1. Carefully disconnect the two black wires attached to the contact terminals of the relay.
 - 5.2. Connect a jumper wire between the two black wires.
 - 5.3. With relay bypassed, check the circuit across the AC cord plug blades (**Figure 14-8, Page 14-9**).
 - 5.4. If the reading is no continuity, check the wiring of the AC cord, the transformer primary coil leads, and the jumper wire. If the charger is wired correctly, check, individually, the continuity of the AC cord, the transformer primary coil, and the jumper wire.

Test Procedure 4 - Diodes

Use Test Procedure 4-A for single diode failures and diode testing. If both diodes have failed, use Test Procedure 4-B.

Test Procedure 4A - Single Diode Failure

A single diode failure is indicated by the failure of one fuse link (short circuited diode) or by low charger output (open circuit diode). If a diode has failed, the entire heat sink assembly must be replaced. To check the diodes:

1. Unplug the AC cord from its outlet and unplug the DC cord from the vehicle receptacle.
2. Disconnect one transformer secondary coil lead from the diode terminal (**Figure 14-2, Page 14-2**).
3. Using a low voltage continuity tester or multimeter set to diode, place one tester probe on the diode mounting plate and the other probe on a diode terminal and note the reading (**Figure 14-9, Page 14-10**).

4. Reverse the tester probes and check each diode again (**Figure 14-10, Page 14-10**). A diode is designed to conduct current in only one direction. If a diode shows continuity in both directions, the entire heat sink assembly with diodes must be replaced. If a diode shows no continuity in either direction, the entire heat sink assembly must be replaced.
5. Check all three fuse connections inside the charger to be sure they are clean and tight. It is possible that a loose internal fuse connection could create enough heat to cause a single fuse link to melt. The proper torque on all fuse link connections is 20 in.lb. (2.3 N-m).
6. Be sure the charger is wired properly and all connections are clean and tight.

⚠ CAUTION

- IF CONNECTIONS ARE NOT CLEAN AND TIGHT, EXCESSIVE HEAT WILL BE CREATED AND THE CHARGER MAY BE DAMAGED.

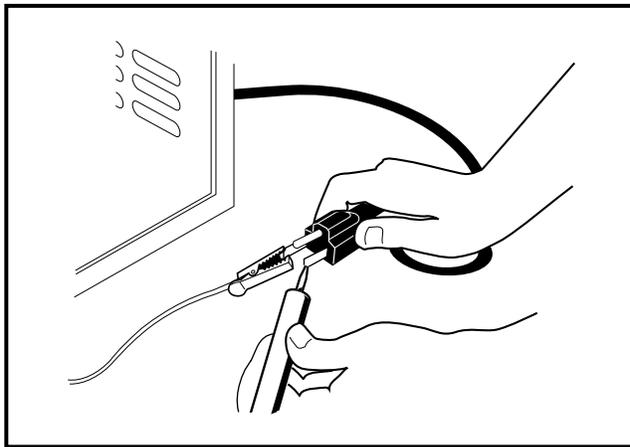


Figure 14-8 Test AC Plug Blades

Test Procedure 4B - Both Diodes Failed

Use Test Procedure 4A to test diodes. If both diodes have failed closed (shorted), both charger fuse links will be blown. If both diodes have failed open, the relay will close and the transformer will hum, but the ammeter will indicate *no* output. If both diodes have failed open or have shorted, the entire heat sink assembly must be replaced. To determine why both diodes failed:

1. Check the batteries and the receptacle to be sure they are wired in the correct polarity. Use a multimeter to check the voltage and polarity at the receptacle.
2. Make sure the charger DC plug is wired correctly. The white wire should be connected to the center terminal of the heat sink assembly and the black wire should be connected to the left side of the ammeter when viewed from inside the charger. Whether or not the AC cord is plugged into an outlet, both fuse links will blow if a reversed polarity connection is made between the charger and the batteries.
3. Although it is a rare occurrence, both diodes may fail due to a lightning strike at the charging location.
4. Excessive heat due to a loose connection could also cause both fuse links to melt. Be sure fuse connections are tightened to 20 in.lb (2.3 N-m).
5. Make sure the charger is wired properly and all connections are clean and tight.

Test Procedure 5 - Continuity Test of Charger DC Circuit

1. Connect the probes of a continuity tester (Club Car Part No. 1011273) to the blades of the charger DC plug and note the reading (**Figure 14-11, Page 14-10**).

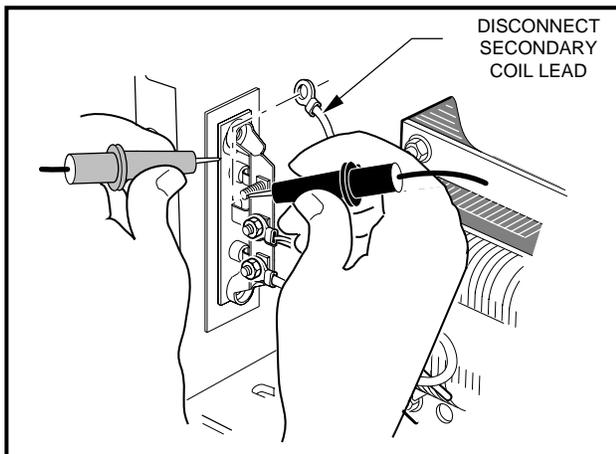
Test Procedure 5, Continued:

Figure 14-9 Single Diode Test

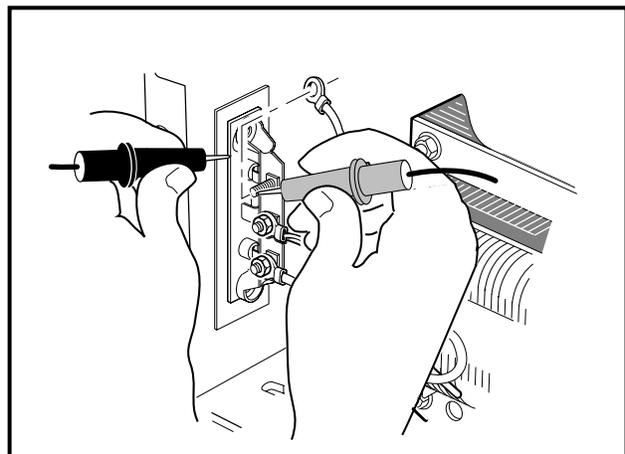


Figure 14-10 Reverse Tester Leads

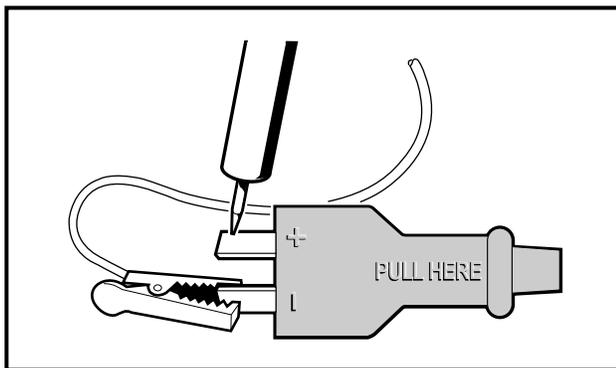


Figure 14-11 Charger DC Plug

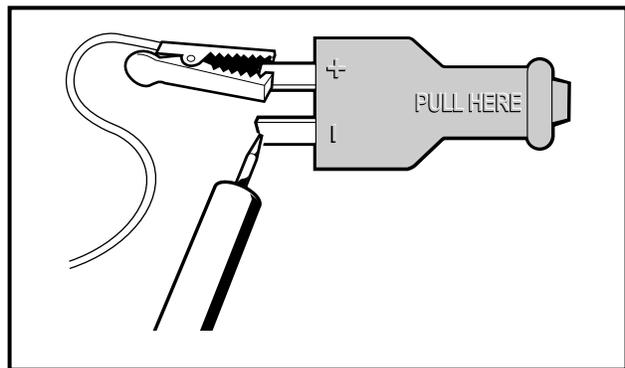


Figure 14-12 Charger DC Plug, Reverse Probes

2. Reverse the probes (**Figure 14-12, Page 14-10**) and note the reading.
3. Continuity should be observed in only one direction. If the circuit shows no continuity in either direction and the fuse is functional, check the continuity of the DC plug and cord (**Test Procedure 9**), the ammeter (**Test Procedure 9**), the diodes (**Test Procedure 4A**), and all connections.
4. If the circuit indicates continuity in both directions, a short circuit exists in the charger DC circuit, probably caused by failed diodes (**see Test Procedure 4**). If the diodes have not failed, check the DC output cord for a short circuit between the two wires (**Test Procedure 9**).
5. If the test shows the charger DC circuit is functional, check the capacitor (**Test Procedure 6**).

Test Procedure 6 - Capacitor**⚠ DANGER**

- **HIGH VOLTAGE! WITH THE CHARGER ON, THE VOLTAGE OF THE CAPACITOR INSIDE THE CHARGER IS APPROXIMATELY 650 VOLTS. USE EXTREME CAUTION WHEN WORKING NEAR CAPACITOR TERMINALS.**

⚠ CAUTION

- **TO AVOID BREAKING WIRES, DISCONNECT CAPACITOR LEADS CAREFULLY.**

1. Disconnect both transformer coil leads from the capacitor terminals.
2. Using insulated pliers, place uninsulated tips onto capacitor terminal ends to discharge controller.
3. Place probes of a multimeter, set to 2000k ohms (Ω), on the capacitor terminals and note the reading.
4. Reverse the probes and note the reading.
5. Interpret the readings as follows:
 - **Functional Capacitor** - When the multimeter probes are connected to the capacitor terminals, initially meter indicates low resistance then rapidly moves to high resistance and eventually to open circuit.
 - **Open Capacitor** - When the multimeter leads are connected to the capacitor terminals, and the meter does not indicate any initial resistance and only open circuit, the capacitor has failed open. A bulge in the top of the capacitor may be visible if the capacitor has failed open.
 - **Shorted Capacitor** - When the multimeter probes are connected to the capacitor terminals, and the meter indicates a closed circuit and does not change, the capacitor has failed closed.
6. If the capacitor is open or shorted, it must be replaced.

⚠ WARNING

- USE A CLUB CAR CAPACITOR (PART NO. 1015910) ONLY. THE USE OF A DIFFERENT VALUE CAPACITOR MAY RESULT IN IMPROPER CHARGING, CAPACITOR FAILURE, TRANSFORMER BURNOUT, AND/OR BATTERY DAMAGE.

Test Procedure 7 - Transformer

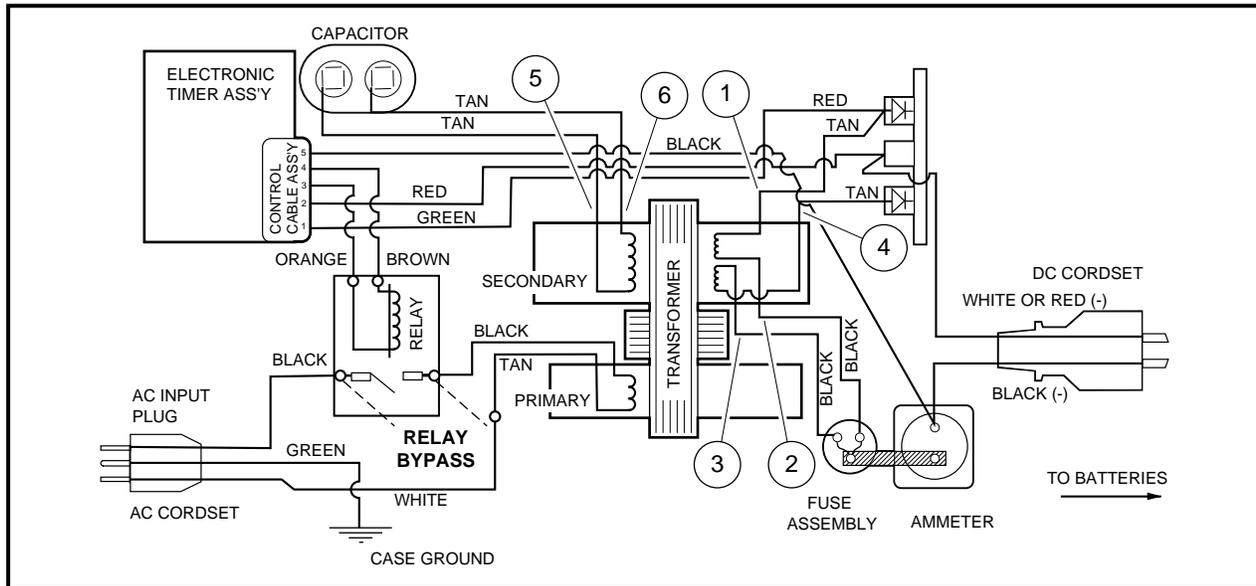
Failure of the transformer could be caused by natural aging or premature shorting of adjacent coil turns. If the transformer has failed, ammeter would indicate no output or low output even though the transformer might hum. A failed transformer could cause an AC line fuse to blow or a circuit breaker to trip in the storage facility. To check the transformer:

1. Disconnect the transformer secondary coil leads (1) and (4) from the diode terminals (**Figure 14-13, Page 14-12**). Remount nuts on diode assembly. **See following DANGER.**
2. Disconnect the transformer capacitor coil leads (5) and (6) from the capacitor terminals (**Figure 14-13, Page 14-12**). **See following DANGER.**

⚠ DANGER

- DO NOT ALLOW THE SECONDARY COIL LEADS TO TOUCH EACH OTHER. THERE ARE APPROXIMATELY 61 VOLTS AC PRESENT.
- DO NOT ALLOW THE CAPACITOR COIL LEADS TO TOUCH EACH OTHER. THERE ARE APPROXIMATELY 650 VOLTS AC PRESENT.
- HIGH VOLTAGE! WITH THE CHARGER ON, THE VOLTAGE OF THE CAPACITOR INSIDE THE CHARGER IS APPROXIMATELY 650 VOLTS. USE EXTREME CAUTION WHEN WORKING NEAR CAPACITOR TERMINALS.

3. In order to supply AC power directly to transformer coil, relay must be bypassed. **Refer to Test Procedure 2.**
4. Make sure the capacitor coil leads and the secondary coil leads are not touching one another. Then, with the relay by-passed, plug the AC cord into an outlet. If the AC line fuse blows or the circuit breaker trips, the transformer has failed internally and must be replaced.
5. If this does not occur, use a multimeter, set to 500 volts AC, to check transformer secondary voltage across lead Nos. 1 and 4, and capacitor coil voltage across lead Nos. 5 and 6 (**Figure 14-13, Page 14-12**). If measured voltages are approximately 48 volts or lower for secondary coil, or less than approximately 385 volts for capacitor, the transformer is shorted internally and must be replaced. **See previous DANGER.**
6. If the transformer output voltages are correct, disconnect the AC cord from the outlet and proceed as follows:

Test Procedure 7, Continued:**Figure 14-13 Relay Bypass Wire Placement**

- 6.1. Check the capacitor to be sure its rating is 3 microfarads (capacitor should be marked), 660 volts AC, and then carefully reconnect the capacitor coil lead Nos. 5 and 6 to the capacitor terminals.
- 6.2. After making sure the secondary coil leads are not touching one another, connect the AC cord to an outlet and measure the transformer secondary voltage across lead Nos. 1 and 4.
- 6.3. If the voltage reading is the same as the voltage reading in step 5 (which eliminates the capacitor from the circuit), the capacitor may be defective or the coil leads may not be making proper electrical contact (**see Test Procedure 6**). If the voltage readings are correct, both the transformer and the capacitor are functional; refer to Test Procedure 5 for further tests of the DC circuit.

Test Procedure 8 - Battery State of Charge Test

1. When the charger has turned off after a charge cycle, disconnect and then reconnect the charger AC plug. The ammeter should jump to 18-22 amps and taper to below 12 amps within 15 minutes. If it tapers to below 12 amps within 15 minutes, the batteries are fully charged and the charger is functioning properly.
2. If the charger does not taper to below 12 amps within 15 minutes, the batteries may not be receiving a full charge and the Electronic Timer Kit should be checked. **See Test Procedure 2.**

NOTE

- OLD BATTERIES NEAR THE END OF THEIR USEFUL LIVES MAY NOT TAPER TO BELOW 12 AMPS. **SEE SECTION 13—BATTERIES.**

Test Procedure 9 - Continuity Tests**AC Cord and Plug**

1. Disconnect black wire (1) of AC cord from the contact terminal of the relay (**Figure 14-14, Page 14-13**).
2. Disconnect the green wire (2) from the charger case (**Figure 14-14, Page 14-13**).
3. Connect the alligator clip of a continuity tester (Club Car Part No. 1011273) to the end of the black wire (1) and check for continuity on both flat blades and on the ground blade of the AC plug (**Figure 14-14, Page 14-13**). Continuity should be shown on only one flat blade. If continuity is indicated on more than one blade or on no blade, the AC cord and plug must be replaced.

4. Disconnect white wire terminal connector (4) at the transformer lead. Insert red probe into the white wire terminal end (4). Place black probe on each flat blade and then on the ground pin and check for continuity. Continuity should be shown on only one flat blade. If tester indicates continuity on more than one blade or on no blade, the AC cord and plug must be replaced (**Figure 14-14, Page 14-13**).
5. Attach alligator clip to end of green wire (2) and check for continuity on both flat blades and ground pin of AC plug (**Figure 14-14, Page 14-13**). Continuity should be shown on only ground pin. If continuity is indicated on flat blades or is not indicated on ground pin, AC cord and plug must be replaced.

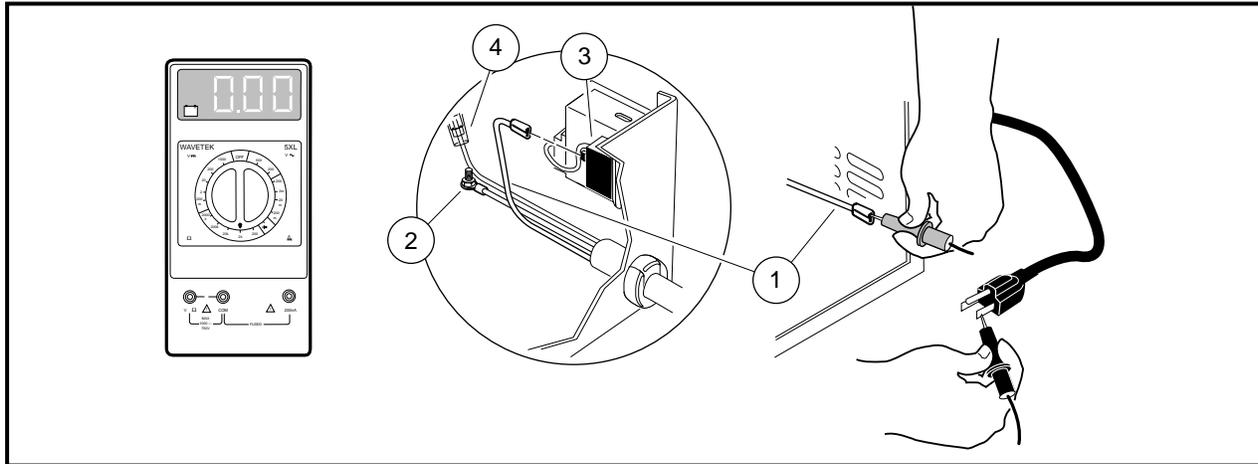


Figure 14-14 AC Plug

DC Cord and Plug

1. Disconnect the black wire (5) of the DC cord from the ammeter, and disconnect the white wire of the DC cord from the heat sink assembly (**Figure 14-15, Page 14-15**).
2. Attach alligator clip of continuity tester to the white wire (6) of the DC cord (**Figure 14-15, Page 14-15**).
3. Place the probe of the continuity tester on the positive (+) blade of the DC plug (the positive and negative blades are identified on the plug). The tester should indicate continuity. If the tester does not indicate continuity, the DC cord and plug must be replaced.
4. Place the probe of the tester on the negative (-) blade of the DC plug. The tester should indicate no continuity. If the tester indicates continuity, the cord and plug must be replaced.
5. Attach alligator clip to the black wire (5) of the DC cord and then place the probe on the negative (-) blade of the DC plug (**Figure 14-15, Page 14-15**). The tester should indicate continuity. Place the probe on the positive (+) side. The reading should be no continuity. If the readings are not correct, the cord and plug must be replaced.

Transformer

The transformer has three coils that must be tested (**Figure 14-3, Page 14-3**).

1. Test the Primary Coil:
 - 1.1. Disconnect the transformer primary coil leads from the terminals.
 - 1.2. Place the continuity tester probes on the primary coil leads. The tester should indicate continuity. If the tester indicates no continuity, replace the transformer.
2. Test the Secondary Coil:
 - 2.1. Disconnect the transformer secondary coil lead from the upper terminal of the heat sink assembly.
 - 2.2. Disconnect the other transformer secondary coil lead from the upper terminal of the heat sink assembly, then place the tester probes on the secondary coil leads (tan wires). The reading should be continuity. If the reading is no continuity, replace the transformer. Be sure the fuse is intact and has not failed. **See DANGER on page 14-11.**

Transformer, Continued:

3. Test the Capacitor Coil:
 - 3.1. Disconnect the transformer capacitor coil leads from the capacitor terminals.
 - 3.2. Place the tester probes on the capacitor coil leads. The reading should be continuity. If the reading is no continuity, replace the transformer.

Relay**⚠ WARNING**

- BEFORE PERFORMING THIS TEST, MAKE SURE THE AC PLUG IS **NOT** PLUGGED IN.

1. Disconnect the two black wires from the contact terminals of the relay.
2. Place the continuity tester probes on the contact terminals of the relay. The reading should be **no** continuity. If the tester shows continuity, the relay contacts are welded shut and the relay must be replaced.
3. Plug the DC cord into a vehicle receptacle (make sure the vehicle batteries are connected), then place the tester probes on the contact terminals of the relay. The reading should be continuity; if the tester shows **no** continuity, the relay must be replaced.

Ammeter

1. Disconnect both black wires from the left (when viewed from inside the charger) ammeter post.
2. Attach the alligator clip of the tester to one of the ammeter posts.
3. Place the tester probe on the other ammeter post. The reading should be continuity. If the tester indicates **no** continuity, the ammeter must be replaced.

PLUG AND RECEPTACLE REPLACEMENT**Read DANGER and WARNING on page 14-1.**

The charger DC cord and plug, and the charger receptacle on the vehicle are wear items that should be inspected daily. They **must** be replaced when worn or damaged. If the charger plug and receptacle show signs of corrosion or are becoming difficult to insert and remove, the receptacle contacts and plug blades can be cleaned with a good electrical contact cleaner or lightly sprayed with WD-40® brand spray lubricant.

TESTING THE RECEPTACLE

1. Inspect the receptacle for cracks, loose connections and frayed wiring.
2. Insert the tapered end of a test blade (Club Car Part No. 1013930) approximately 1-1/2 in. (38 mm) into one side of the receptacle, then withdraw the blade from the contact, pulling straight out from the receptacle.
3. Repeat for the other contact. Both contacts must grip the test blade well enough to create sufficient pressure (or drag) for an adequate electrical connection. If little or no drag is felt, the receptacle must be replaced.

CHARGER DC CORD REPLACEMENT**DC Cord Removal**

1. Unplug the AC and DC cords and remove the charger cover. **See DANGER and WARNING on page 14-5.**
2. Disconnect the black lead of the DC cord from the ammeter by loosening the nut (1). Support the terminal as the nut is loosened to prevent rotation of the connection. Leave the black wire from the electronic timer (4) on the terminal post (**Figure 14-15, Page 14-15**).
3. Remove the nut that retains the white lead of the DC cord on the heat sink assembly. Leave the red wire from the electronic timer on the screw at the heat sink assembly.
4. Using pliers, squeeze the strain relief bushing and remove the cord set.

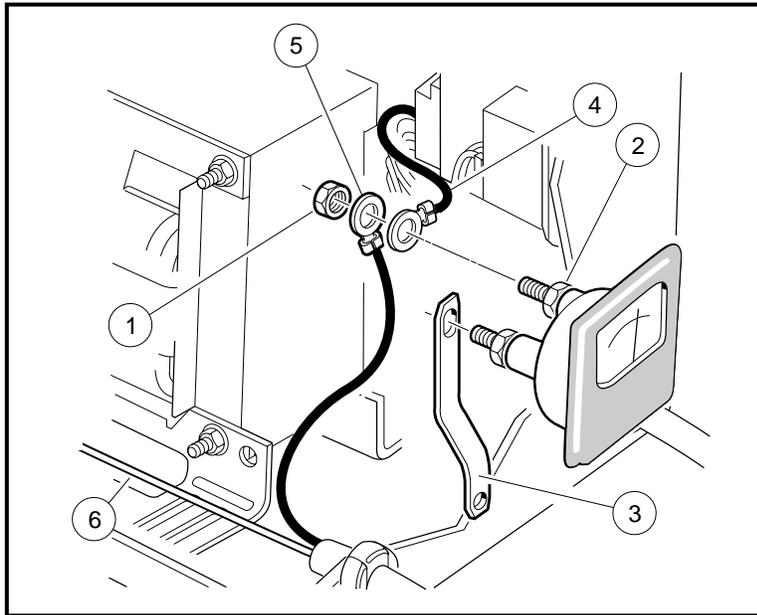


Figure 14-15 DC Cord

DC Cord Installation

1. Insert the leads of the new cord through the hole in the charger base.
2. Make sure the red wire of the electronic timer is on the middle terminal of the heat sink assembly, then place the white lead of the new cord on the terminal and tighten the nut to 14 in.lb (1.5 N-m).
3. Make sure the black wire (4) of the electronic timer is on the ammeter post. Attach the black lead (5) of the new cord and tighten nut (1) on the post until finger tight (**Figure 14-15, Page 14-15**). See following **CAUTION**.

⚠ CAUTION

- DO NOT ALLOW AMMETER POST TO ROTATE AS NUT IS TIGHTENED. IF IT ROTATES, THE AMMETER COULD BE DAMAGED.

4. While holding the outside of the nut (1), turn the inside nut (2) counterclockwise 1/4 turn (**Figure 14-15, Page 14-15**). See previous **CAUTION** and following **NOTE**.

NOTE

- CHECK THE POSITIONS OF THE TERMINALS TO MAKE SURE THEY ARE NOT TOUCHING THE AMMETER BUS BAR (3) OR THE AMMETER POST (**FIGURE 14-15, PAGE 14-15**).

5. Place the strain relief bushing on the cord and use pliers to insert bushing into the charger base.
6. Place the charger cover in position and install the mounting screws, starting with the bottom holes. Tighten the screws to 11 in.lb (1.2 N-m).

RECEPTACLE REPLACEMENT

⚠ WARNING

- REMOVE KEY AND PLACE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION.
- DISCONNECT THE BATTERIES AS SHOWN IN **FIGURE 14-4, PAGE 14-3**.

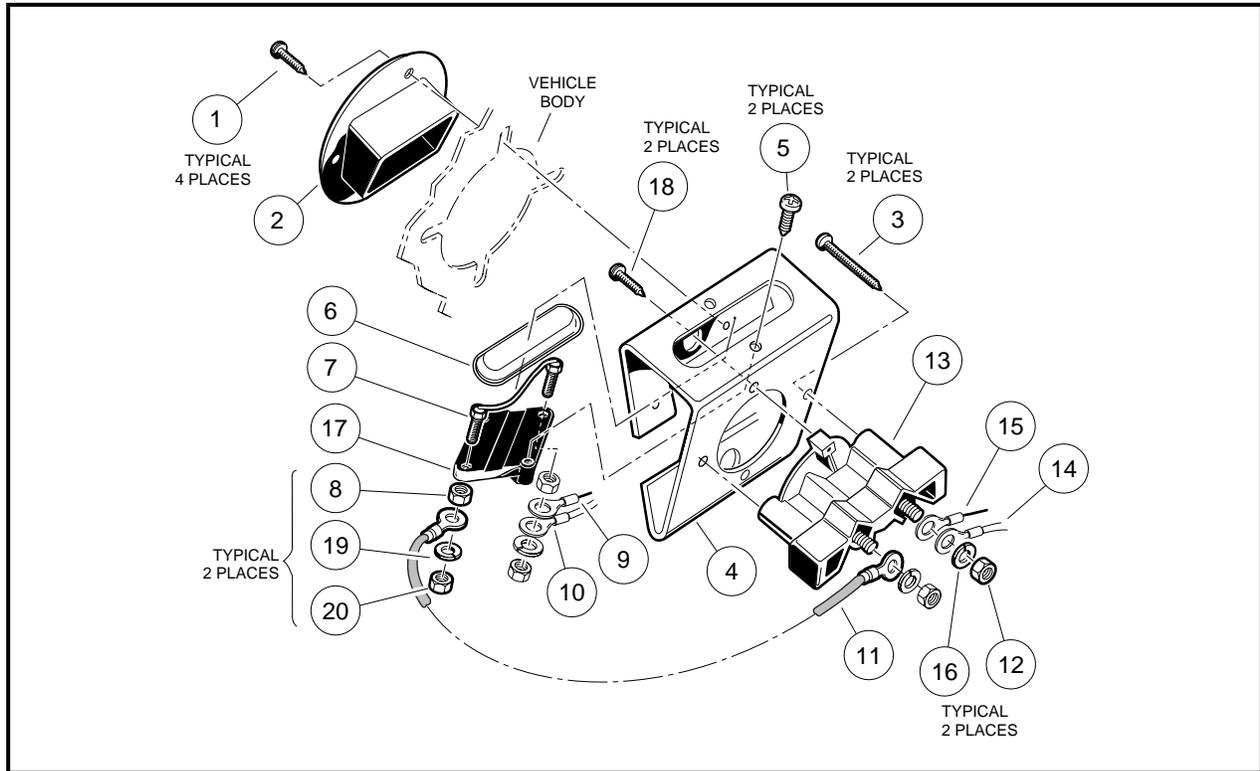


Figure 14-16 Receptacle

Receptacle Removal

1. Disconnect the small black wire (15) and the white wire (14) (to the negative battery post) from the negative terminal of the receptacle (**Figure 14-16, Page 14-16**).
2. Disconnect the red wire (11) (to the fuse link) from the positive terminal of the receptacle and remove the four screws (1) from the bezel (2) (**Figure 14-16, Page 14-16**). See following **WARNING**.

⚠ WARNING

- MAKE SURE THE BLACK AND WHITE WIRES DO NOT TOUCH.

3. Remove screws (3 and 18) attaching receptacle to the fuse link bracket (4) (**Figure 14-16, Page 14-16**).

Receptacle Installation

1. Install the screws (3 and 18) which attach the receptacle (13) to the fuse link bracket (4) (**Figure 14-16, Page 14-16**). Tighten the screws to 20 in.lb (2.2 N-m).
2. Install red wire of fuse link to positive (+) terminal of receptacle (the positive (+) and negative (-) terminals are labeled on face of receptacle) (**Figure 14-16, Page 14-16**). Tighten nut to 23 in.lb (2.6 N-m).
3. Install the small black wire (from wiper switch) and the white wire (from negative battery post) on the negative (-) terminal of the receptacle (**Figure 14-16, Page 14-16**). Tighten nut to 23 in.lb (2.6 N-m).
4. Position bezel (2) and fuse link bracket (4) and install the four mounting screws (1) through the bezel and into the fuse link bracket (**Figure 14-16, Page 14-16**). Tighten the screws to 20 in.lb (2.2 N-m).

ONBOARD RECEPTACLE FUSE LINK

If the receptacle fuse link has failed, the vehicle cannot be charged until the fuse has been replaced. The fuse link (7) is located on the fuse link bracket (4) in the battery compartment (rear portion of the charger receptacle) (**Figure 14-16, Page 14-16**). See also **Figure 14-4, Page 14-3**.

⚠ WARNING

- UNDER NORMAL OPERATING CONDITIONS, THE RECEPTACLE FUSE LINK SHOULD NEVER FAIL UNLESS THERE IS AN ELECTRICAL PROBLEM. IF THE FUSE BLOWS, DETERMINE THE CAUSE OF THE PROBLEM AND CORRECT IT BEFORE REPLACING THE FUSE.

Receptacle Fuse Link Removal

1. Remove the two screws (5) and then the lens (6) (**Figure 14-16, Page 14-16**).
2. Remove the outer nuts (20), lockwashers (19), and wires (9, 10, and 11) (**Figure 14-16, Page 14-16**).
3. Remove the remaining nuts (8) (**Figure 14-16, Page 14-16**).
4. Remove the fuse link (7) from the base (17) (**Figure 14-16, Page 14-16**).

Receptacle Fuse Link Installation

1. Install a new fuse link (7) (Club Car Part No. 1014516) into the base (17) (**Figure 14-16, Page 14-16**).
2. Install nuts (8) which attach fuse link to base and tighten to 18 in.lb (2.0 N-m) (**Figure 14-16, Page 14-16**).
3. Connect the red wire (9) (from the forward and reverse switch) and the orange wire (10) (from the reverse buzzer) to the passenger side of the fuse assembly and install the lock washer (19) and outer nut (20). Tighten the nut to 23 in.lb (2.5 N-m) (**Figure 14-16, Page 14-16**). **See also Figure 14-4, Page 14-3.**
4. Connect the red wire (11) (from the charger receptacle) to the driver's side of the fuse assembly and install the lock washer (19) and nut (20). Tighten the nut to 23 in.lb (2.5 N-m).
5. Install fuse link assembly and cover (6). Tighten screws (5) to 20 in.lb (2.2 N-m) (**Figure 14-16, Page 14-16**).

CHARGER REPAIRS

Read **DANGER** and **WARNING** on page 14-1.

ELECTRONIC TIMER KIT**Electronic Timer Kit Removal**

1. Remove the two screws attaching the electronic timer assembly to the face of the charger.
2. Slide the electronic timer assembly from the charger and carefully remove the control cable connector from the timer.

Electronic Timer Kit Installation

1. Carefully connect the control cable connector to the new timer and slide the timer assembly into the charger.
2. Install the two timer assembly retaining screws in the face of the charger.

Electronic Timer Relay Wiring

If the wires from the relay were disconnected, connect them to the numbered relay terminals as follows:

1. Attach the orange wire to terminal No. 6.
2. Attach the brown wire to terminal No. 1.
3. Attach the black wire from the AC cord to terminal No. 3.
4. Attach the black extension wire from the transformer primary coil to terminal No. 5.

⚠ WARNING

- MAKE SURE ALL CONNECTIONS ARE CLEAN AND TIGHT. MAKE SURE ALL WIRES AND TERMINALS ARE POSITIONED SO THEY DO NOT SHORT TOGETHER OR TO CHARGER BASE.

Checking Proper Operation of Electronic Timer Kit

1. With the DC plug disconnected from the receptacle, plug the AC cord into an outlet. The relay on the electronic timer kit should not close. A multimeter set to 200 volts DC and connected across the DC plug should indicate zero volts. The transformer should not hum.
2. Unplug the AC cord from its outlet and connect the DC plug to the receptacle. The relay, located next to the electronic timer kit, should close with an audible "click" after a two to five second delay.
3. If the electronic timer kit does not operate as in step one or two above, refer to the wiring diagram (**Figure 14-2, Page 14-2**) and make sure the charger is wired correctly. If the electronic timer kit operates properly, the charger is ready for use. Always monitor the first charge cycle to verify the charger is turning OFF properly.

CAPACITOR

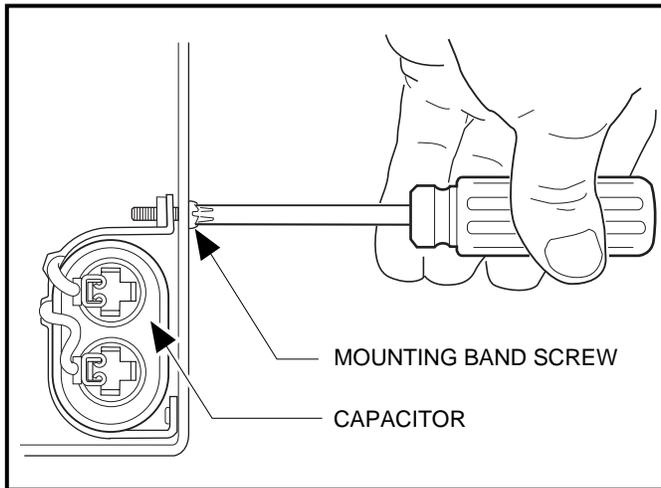


Figure 14-17 Capacitor

Capacitor Removal

1. Remove the charger cover. **See DANGER on page 14-5.**
2. Loosen the mounting band screw (**Figure 14-17, Page 14-18**). **See CAUTION on page 14-10.**
3. Remove the connectors from the capacitor terminals.
4. Pull the capacitor out of the band.

Capacitor Installation

1. Route the capacitor wires through the band and then slide the capacitor into the band.
2. Tighten the mounting band screw.
3. Connect the terminal connectors to the capacitor terminals.
4. Install the charger cover and check the charger for proper operation.

HEAT SINK ASSEMBLY

Heat Sink Assembly Removal

1. Remove the charger cover. **See DANGER on page 14-5.**
2. Disconnect both secondary transformer leads (tan) from the heat sink assembly.
3. Disconnect the red, green, and white wires from the heat sink assembly.
4. Remove the nuts and bolts which secure the heat sink assembly to the case.

Heat Sink Assembly Installation

1. Mount the heat sink assembly to the charger case. Make sure the clear plastic strip, which is coated with a white di-electric grease, is against the charger case and install the nuts and bolts that secure the assembly to the charger case. Tighten the bolts to 13 in.lb (1.4 N-m).
2. Connect the white wire from the DC cord and the red wire of the control cable to the center connector of the heat sink assembly. Tighten the nut to 13 in.lb (1.4 N-m).
3. Connect the green wire of the control cable and one of the secondary transformer leads (tan) to the bottom connector of the heat sink assembly. Tighten the nut to 13 in.lb (1.4 N-m).
4. Connect the other secondary transformer lead (tan) to the top connector of the heat sink assembly.
5. Install the charger cover and check the charger for proper operation.

TRANSFORMER

Transformer Removal

1. Remove the charger cover (**Figure 14-3, Page 14-3**). **See DANGER on page 14-5.**
2. Disconnect the black extension wire and the transformer primary coil lead, then disconnect the white wire in the AC cord and the transformer coil lead.
3. Disconnect the secondary transformer leads from the heat sink assembly.
4. Disconnect the secondary transformer leads from the fuse assembly.
5. Disconnect the capacitor coil leads from the capacitor. **See DANGER on page 14-11.**
6. Remove the plastic wire tie holding the red and green wires of the control cable and one secondary transformer lead (from the heat sink assembly) together.
7. Remove the four bolts and nuts from the transformer and remove the transformer.

Transformer Installation

1. Position the transformer in the charger, oriented with the secondary coil lead to the rear. Install the four mounting bolts and nuts and tighten them to 28 in.lb (3.0 N-m).
2. Connect one secondary transformer lead (tan) to the top of the heat sink assembly. Tighten the nut to 13 in.lb (1.4 N-m).
3. Connect the green wire of the control cable and the other secondary transformer lead (tan) to the bottom terminal of the heat sink assembly. Tighten the nut to 23 in.lb (2.5 N-m).
4. Connect one secondary transformer lead (black) to one terminal of the fuse assembly. Tighten the nut to 23 in.lb (2.5 N-m).
5. Connect the other secondary transformer lead (black) to the remaining terminal of the fuse assembly. Tighten the nut to 23 in.lb (2.5 N-m).
6. Connect the capacitor coil leads to the capacitor.
7. Tie the wires together as they were before the wire tie was removed.
8. Install the charger cover and check the charger for proper operation. **See following WARNING.**

WARNING

- MAKE SURE WIRING OR WIRING HARNESS IS PROPERLY SECURED TO THE VEHICLE FRAME. FAILURE TO PROPERLY SECURE WIRING COULD RESULT IN VEHICLE MALFUNCTION, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY.

AMMETER

Ammeter Removal

1. Remove the charger cover. **See DANGER on page 14-5.**
2. Disconnect all wires (4 and 5) and the bus bar (3) from the ammeter posts (**Figure 14-18, Page 14-20**).
3. Remove nuts (2) attaching ammeter to charger face, and remove the ammeter (**Figure 14-18, Page 14-20**).

Ammeter Installation

1. Position the ammeter in the charger face and install the mounting nuts. **See DANGER on page 14-5.**
2. Install the ammeter bracket on the back of the ammeter.
3. Connect the black wire (4) of the electronic timer kit and the black wire (5) of the DC cord to the left post of the ammeter (when viewed from the rear of the charger) **(Figure 14-18, Page 14-20).**

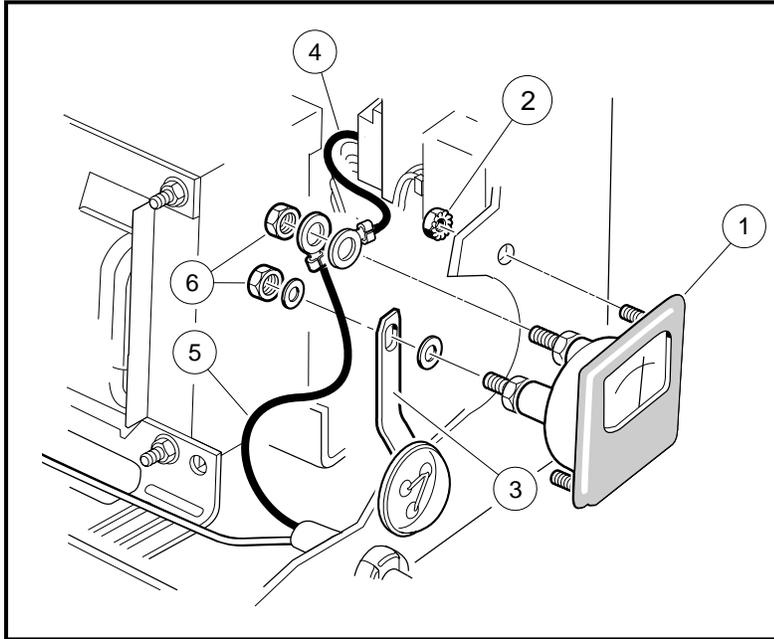


Figure 14-18 Ammeter

4. Connect the bus bar (3) from the fuse link to the right post of the ammeter. Make sure there is a washer on each side of the bus bar.
5. Install the nuts on both posts of the ammeter and tighten slightly more than finger tight. Then while holding the outside nut, turn the inside nut counterclockwise 1/4 turn. **See CAUTION on page 14-15.**
6. Install the charger cover.
7. Plug the charger into a vehicle and make sure the ammeter is operating properly.

CHARGER FUSE LINK

Fuse Link Assembly Removal

1. Remove the charger cover. **See DANGER on page 14-5.**
2. Remove both secondary transformer leads and the bus bar from the back of the fuse link assembly.
3. Remove the fuse link retaining screws from the face of the charger and remove the fuse link assembly.

Fuse Link Assembly Installation

1. Place the plastic cover over the fuse assembly and position the assembly on the charger face, then install the mounting screws from the front of the charger face.
2. Install the bus bar over center branch of fuse assembly and ammeter post. Tighten to 23 in.lb (2.6 N-m).
3. Connect one of the secondary transformer leads (black) to one of the remaining terminals on the back of the fuse assembly. Connect the remaining secondary transformer lead (black) to the remaining terminal. Tighten to 23 in.lb (2.6 N-m).
4. Install the charger cover.

SECTION 15–MOTOR

⚠ DANGER

- **BATTERY - EXPLOSIVE GASES! DO NOT SMOKE. KEEP SPARKS AND FLAMES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR FULL FACE SHIELD WHEN WORKING ON OR NEAR BATTERIES.**
- **USE EXTREME CAUTION WHEN USING TOOLS, WIRES, OR METAL OBJECTS NEAR BATTERIES! A SHORT CIRCUIT AND (OR) SPARK COULD CAUSE AN EXPLOSION.**
- **BATTERY - POISON! CONTAINS ACID! CAUSES SEVERE BURNS. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. ANTIDOTES:**
 - **EXTERNAL: FLUSH WITH WATER. CALL A PHYSICIAN IMMEDIATELY.**
 - **INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL A PHYSICIAN IMMEDIATELY.**
 - **EYES: FLUSH WITH WATER FOR FIFTEEN MINUTES. CALL PHYSICIAN IMMEDIATELY.**

⚠ WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL ELECTRICAL REPAIR. FOLLOW ALL PROCEDURES EXACTLY AND HEED ALL WARNINGS STATED IN THIS MANUAL.
- WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE.
- TURN KEY SWITCH **OFF**, PLACE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION, AND REMOVE KEY PRIOR TO SERVICING.
- DO NOT WEAR LOOSE CLOTHING. REMOVE JEWELRY SUCH AS RINGS, WATCHES, CHAINS, ETC. BEFORE SERVICING VEHICLE.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.
- TO AVOID UNINTENTIONALLY STARTING THE VEHICLE, DISCONNECT BATTERIES AS SHOWN IN **FIGURE 15-1, PAGE 15-1.**

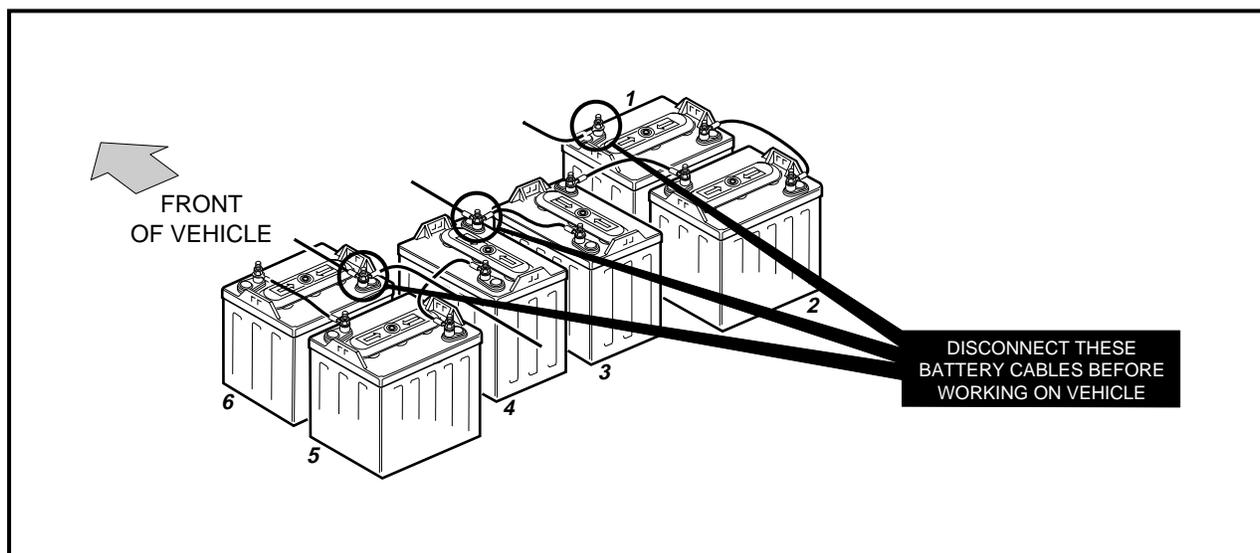


Figure 15-1 V-Glide 36-Volt Battery Configuration

GENERAL INFORMATION

All DS V-Glide electric vehicles are equipped with 36-volt DC, series wound, reversible traction motors. If the motor should require major repair, it should be sent to a qualified motor repair shop. There are, however, many minor repairs that can be made by a trained mechanic.

EXTERNAL MOTOR TESTING

Using a multimeter or a continuity tester, the following tests can be performed without disassembling the motor.

Test Procedure 1 - Internal Short Circuits

1. Disconnect the wires from the terminals on the motor. **See following NOTE.**

NOTE

- TAG THE MOTOR WIRES FOR IDENTIFICATION BEFORE DISCONNECTING.

2. Using a multimeter set to ohms, place the black (-) probe on the motor housing (it may be necessary to scrape the paint from the area to insure a sound connection). Place the red (+) probe on the A1, A2, S1, and S2 terminals respectively (**Figure 15-2, Page 15-2**). Multimeter should indicate no continuity. If the readings are incorrect, the motor will need to be removed from the vehicle and repaired by a qualified technician. **See Motor Removal.**
 - 2.1. An incorrect reading from the A1 or A2 terminal indicates three possible problems; a grounded A1 or A2 terminal, a grounded wire in the brush area, or a grounded armature/commutator. If the S1 or S2 reading is incorrect, it could be due to a grounded S1 or S2 terminal or a grounded field coil.

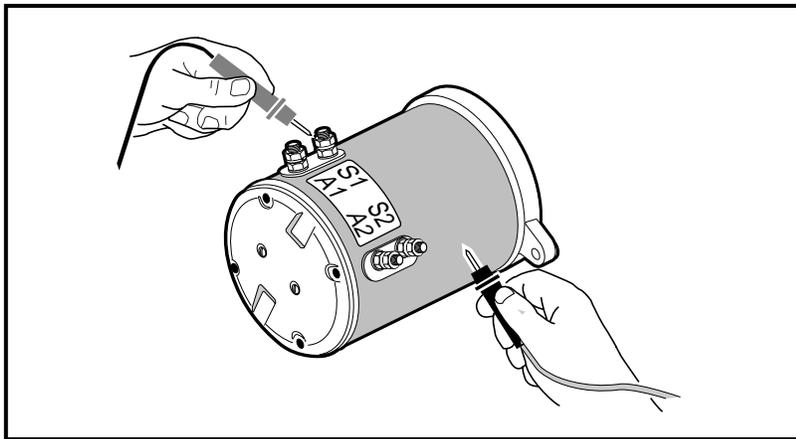


Figure 15-2 Test for Motor Short Circuits

Test Procedure 2 - Armature Circuit Open

1. Using two wrenches to prevent the post from turning, disconnect the wires from the A1 and A2 terminals. Using a multimeter set to ohms, place red (+) probe on the A1 terminal and the black (-) probe on the A2 terminal (**Figure 15-2, Page 15-2**). The reading should be continuity. If the reading is incorrect, a possible open or poor contact in a brush assembly and/or open armature windings may be the cause. The motor will need to be removed from the vehicle and repaired by a qualified technician. **See Motor Removal.**

Test Procedure 3 - Field Circuit Open

1. Using two wrenches to prevent the post from turning, disconnect the wires from the S1 and S2 terminals. Using a multimeter set to ohms, place the red (+) probe on the S1 terminal and the black (-) probe

on the S2 terminal (**Figure 15-2, Page 15-2**). The reading should be continuity. If the reading is incorrect, there may be an open field coil or bad connections at terminals. Remove motor from vehicle and send to a qualified technician for repair. **See Motor Removal.**

MOTOR REMOVAL AND DISASSEMBLY

Read **DANGER** and **WARNING** on page 15-1.

MOTOR REMOVAL

1. Disconnect the battery cables, negative cable first (**Figure 15-1, Page 15-1**).
2. Using two wrenches to prevent the post from turning, disconnect motor wires. Label the wires to ensure proper reconnection. **See NOTE on page 15-1.** Slightly loosen all lug nuts on both rear wheels.
3. Place floor jack under transaxle and raise rear of vehicle (**Figure 15-3, Page 15-3**) then place jackstands under frame cross-member between spring mount and side stringer, just forward of each rear wheel. Lower the vehicle to let jackstands support vehicle (**Figure 15-4, Page 15-3**). **See following WARNING.**

⚠ WARNING

- LIFT ONLY ONE END OF THE VEHICLE AT A TIME. BEFORE LIFTING, LOCK THE BRAKES AND CHOCK THE WHEELS THAT REMAIN ON THE FLOOR. USE A SUITABLE LIFTING DEVICE (CHAIN HOIST OR HYDRAULIC FLOOR JACK) WITH 1000 LBS. (454 KG.) MINIMUM LIFTING CAPACITY. DO NOT USE LIFTING DEVICE TO HOLD VEHICLE IN RAISED POSITION. ALWAYS USE APPROVED JACKSTANDS OF PROPER WEIGHT CAPACITY TO SUPPORT THE VEHICLE.

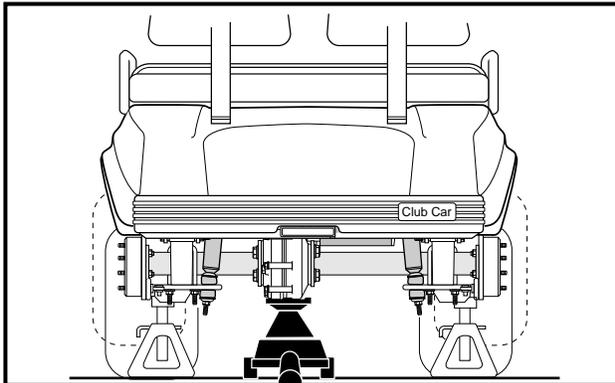


Figure 15-3 Support Transaxle on Floor Jack

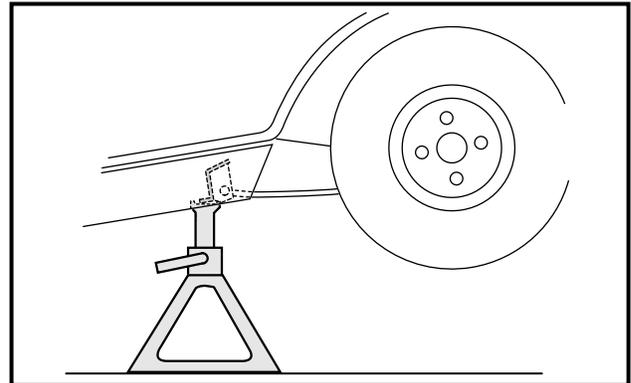


Figure 15-4 Support Vehicle on Jackstands

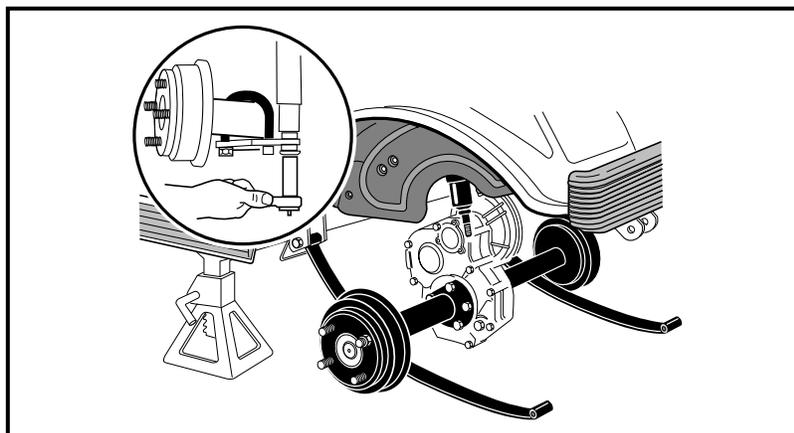


Figure 15-5 Lower Axle

Motor Removal, Continued:

4. Remove both rear wheels.
5. Remove the nut, cup washer, and bushing from the bottom side of the shock absorber. Compress the shock absorber (pushing upwards) to move it out of the way.
6. With the floor jack underneath the transaxle, remove the nuts and bolts mounting the rear leaf springs to the shackles.
7. To gain easier access to the motor, lower the transaxle as low as it will go. If more room is needed, remove the jack from beneath the transaxle and allow the springs to rest on the floor (**Figure 15-5, Page 15-3**).
8. Remove the four bolts that mount the motor to the transaxle.

CAUTION

- DO NOT PLACE FINGERS OR HANDS UNDER MOTOR DURING REMOVAL. SEVERE INJURY COULD RESULT IF FINGERS OR HANDS ARE CAUGHT BETWEEN MOTOR AND AXLE TUBE.

9. Carefully slide the motor away from the transaxle until the motor spline disengages the input shaft. Remove the motor from the vehicle.

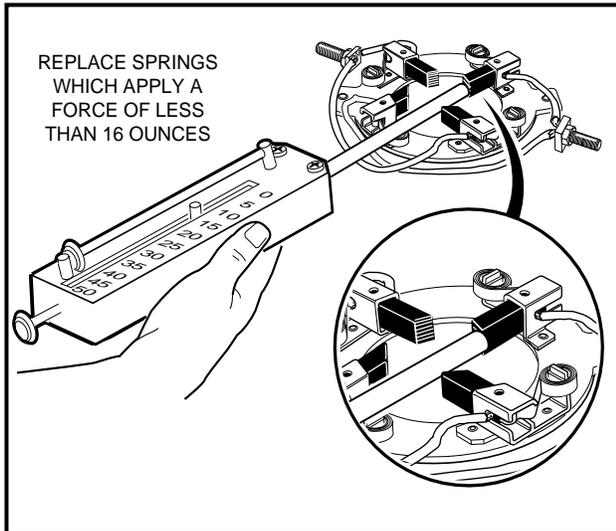


Figure 15-6 Brush Spring Tension

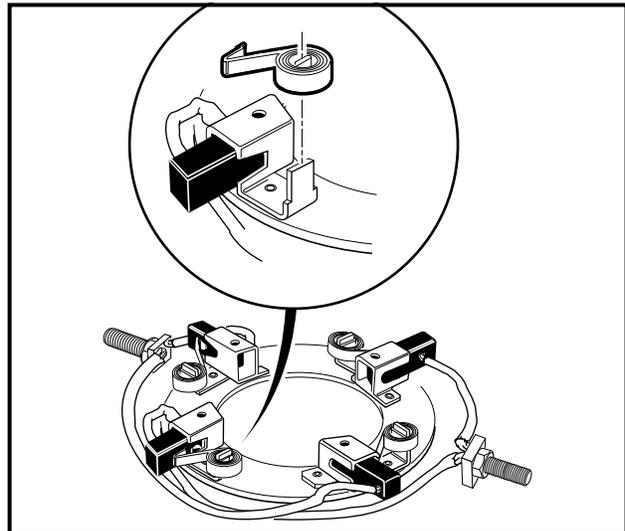


Figure 15-7 Brush Spring Removal

MOTOR DISASSEMBLY

1. Before beginning disassembly, match mark motor end shield and stator shell. Place motor in vice with wooden blocks as shown (**Figure 15-9, Page 15-6**).
2. Remove the four bolts (8) securing the end shield (10) to the stator shell (2) (**Figure 15-9, Page 15-6**).
3. Remove two screws (9) attaching the end shield to the bearing retainer (16) (**Figure 15-14, Page 15-10**).
4. Slide the stator shell (2) off the armature (17) (**Figure 15-9, Page 15-6**).
5. Remove the two screws (11) attaching the brush rigging (12) to the stator shell (**Figure 15-14, Page 15-10**).
6. Mark the brush terminal posts (A1 and A2) (27, 28) to identify their positions in the stator shell. Remove the nuts (6) and flat washers (5) (**Figure 15-14, Page 15-10**). From the outside, push the posts through the stator shell wall and into the interior of the stator shell.
7. Carefully remove the brush rigging and the terminal posts from the stator shell.
8. To remove the brush springs (14) from the rigging, lift the spring extensions out of and over the brush mounts and then slide the springs off their mounting tabs (**Figure 15-14, Page 15-10**). See also **Figure 15-7, Page 15-4**.

TESTING AND INSPECTING INDIVIDUAL COMPONENTS

Read **DANGER** and **WARNING** on page 15-1.

ARMATURE

1. Disassemble the motor and carefully inspect the armature. Look for these defects:

- Burned, charred or cracked insulation.
- Improperly cured varnish.
- Thrown solder.
- Flared armature windings.
- Damaged armature core laminations.
- Worn, burned or glazed commutators.
- Dirty or oily commutators.
- Raised commutator bars.
- Worn armature bearing or shaft.

If dirt or oil is discovered on commutator, commutator should be cleaned and wiped dry. Make note of any defects discovered during inspection. This information will be useful when determining actual cause of failure. Slight roughness on the commutator can be polished smooth with 400 grit or finer sandpaper.

⚠ CAUTION

- NEVER USE EMERY CLOTH TO SMOOTH THE COMMUTATOR. PARTICLES OF EMERY ARE CONDUCTIVE AND MAY SHORT-CIRCUIT THE COMMUTATOR BARS. NEVER USE OIL OR LUBRICANTS ON THE COMMUTATOR OR BRUSHES.

NOTE

- OIL ON THE COMMUTATOR MAY INDICATE A FAULTY TRANSAXLE INPUT SHAFT OIL SEAL.

ARMATURE GROUND TEST

⚠ CAUTION

- DO NOT SUBMERGE THE ARMATURE IN SOLVENT.

NOTE

- BEFORE TESTING THE ARMATURE, WIPE IT CLEAN WITH A CLEAN CLOTH. REMOVE ANY CARBON DUST AND METAL PARTICLES FROM BETWEEN THE COMMUTATOR BARS.

1. With multimeter set to ohms, place one probe on commutator and the other on the armature core. Tester should indicate no continuity (**Figure 15-8, Page 15-6**). If reading is incorrect, replace the motor.

WINDINGS

Burned or scorched insulation on the windings indicates the motor has overheated due to overloads or to grounded or shorted coil windings. If the insulation on the windings is scorched, replace the motor or the stator shell.

MOTOR COMPONENTS

1. Inspect the insulators (4 and 7) for cracks or other damage (**Figure 15-14, Page 15-10**).
2. Inspect brushes (13) for damage or excessive wear (**Figure 15-14, Page 15-10**). If brushes need to be replaced, **see NOTE on page 15-6**.

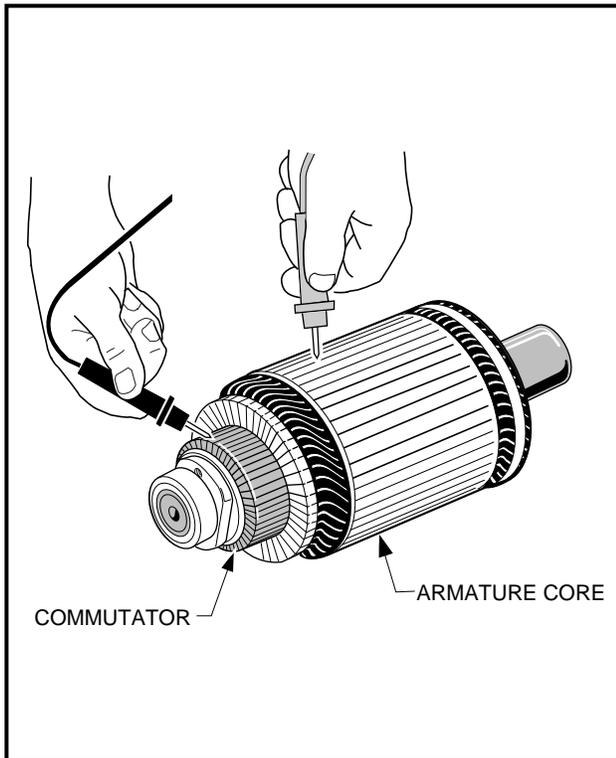
Motor Components, Continued:

Figure 15-8 Armature

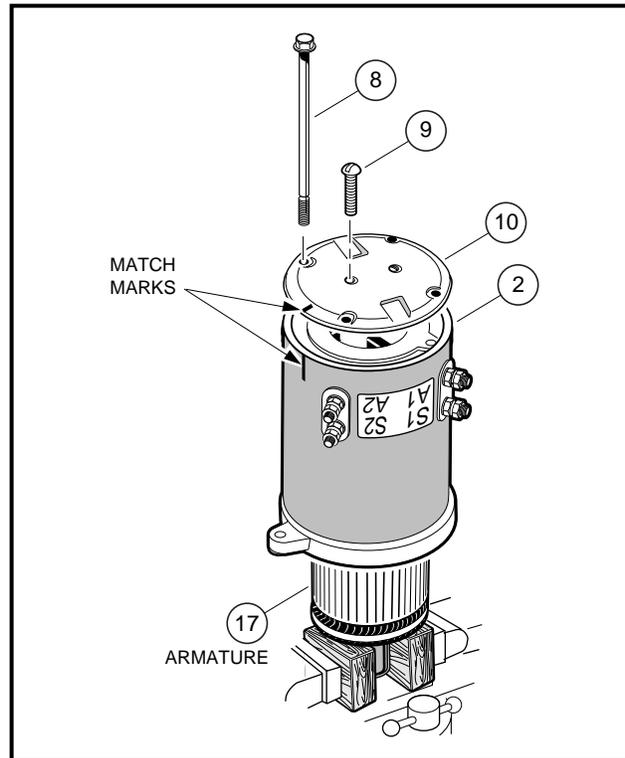


Figure 15-9 Motor Disassembly

3. Inspect brush springs (14) (**Figure 15-14, Page 15-10**). Replace springs that are discolored (light gold or blue tinted). Replace springs which apply a force of less than 16 oz. (**Figure 15-6, Page 15-4**). See following **CAUTION**.

CAUTION

- WHEN CHECKING BRUSH SPRING TENSION, DO NOT OVER EXTEND THE SPRING. USING EXCESSIVE FORCE WILL DAMAGE THE SPRING.

NOTE

- WHEN INSTALLING NEW BRUSHES, REMOVE AND REPLACE BRUSHES ONE AT A TIME. THIS METHOD ENSURES THE TERMINALS AND BRUSHES WILL BE PROPERLY POSITIONED IN THE RIGGING. **SEE PAGE 15-9** FOR BRUSH INSTALLATION.
- ALWAYS REPLACE ALL FOUR BRUSHES. NEVER REPLACE ONLY TWO.
- INSTALL THE BRUSHES IN THE SAME RIGGING 180° FROM EACH OTHER.

BEARING

1. Using a clean cloth, wipe the carbon dust off the bearing. Inspect the bearing by spinning it by hand and checking for both axial (A) and radial (B) play (**Figure 15-13, Page 15-8**).
2. Replace the bearing if it is noisy, does not spin smoothly, or has excessive play. Check the bearing and replace if rusted, worn, cracked, or if there is an abnormal color change in the metal of the bearing. The bearing should be replaced if there is wear or pitting on the balls or on the rolling surfaces. Do not remove the bearing from the armature shaft unless it is to be replaced.

Bearing Removal

1. Place the wedge attachment tool (Club Car Part No. 1012812) between the bearing (15) and the armature (17) (**Figure 15-14, Page 15-10**). Make sure the wedge attachment tool is supporting the inner race of the bearing. If a press is not available, secure a bearing puller (Club Car Part No. 1012811) to the bearing and pull the bearing off the end of the armature shaft. Support the shaft so it will not drop when the bearing is removed (**Figure 15-10, Page 15-7**). Do not reuse bearing.

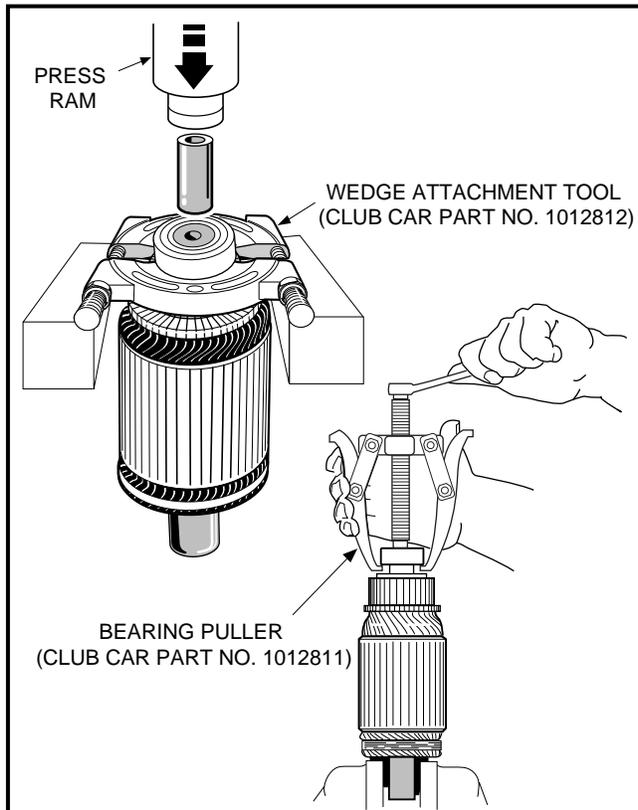


Figure 15-10 Bearing Removal

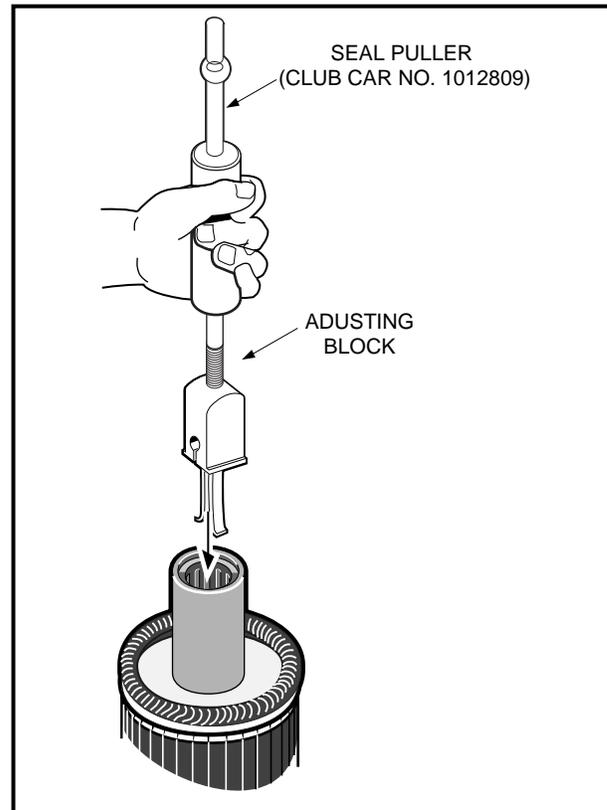


Figure 15-11 Guide Ring Removal

Bearing Installation

1. Press on a new bearing, using an arbor press with an outside diameter of less than 5/8 in. (16mm), that exerts pressure on the inner race only. Make sure the bearing retainer (16) is positioned on the armature shaft before the bearing is pressed on (**Figure 15-14, Page 15-10**).

GUIDE RING INSPECTION

NOTE

- ON SOME LATE MODEL 1999 VEHICLES, THE GUIDE RING (18) AND SNAP RING (20) WERE ELIMINATED (**FIGURE 15-14, PAGE 15-10**).

1. Insert the installation and alignment tool (**Figure 15-12, Page 15-8**) into the output end of the motor shaft and into the guide ring, stopping the tool before it reaches the armature splines. Turn the alignment tool in the shaft. If the guide ring moves and the armature does not move, the guide ring must be replaced.

Guide Ring Removal

1. Using snap ring pliers, remove the snap ring (20) (**Figure 15-14, Page 15-10**).

Guide Ring Removal, Continued:

2. Insert fingers of a seal puller (Club Car Part No. 1012809) through guide ring (18) (approximately 3/4 in. (19 mm) into shaft) (**Figure 15-14, Page 15-10**). Turn adjusting block to expand fingers until they are wedged under bottom edge of guide ring. Remove guide ring by quickly and forcefully sliding ram up the tool shaft and against the stop (**Figure 15-11, Page 15-7**). See following **NOTE**.

NOTE

- A GUIDE RING ALIGNMENT AND INSTALLATION TOOL CAN BE FABRICATED USING A TRANSAXLE INPUT SHAFT (CLUB CAR PART NUMBER 1013764) AND AN EXTRA GUIDE RING (CLUB CAR PART NUMBER 101789101). **SEE FIGURE 15-12, PAGE 15-8.**

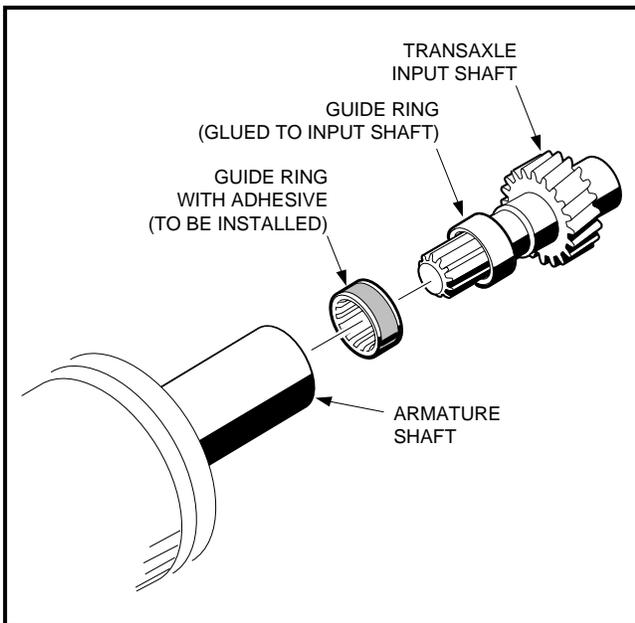


Figure 15-12 Guide Ring

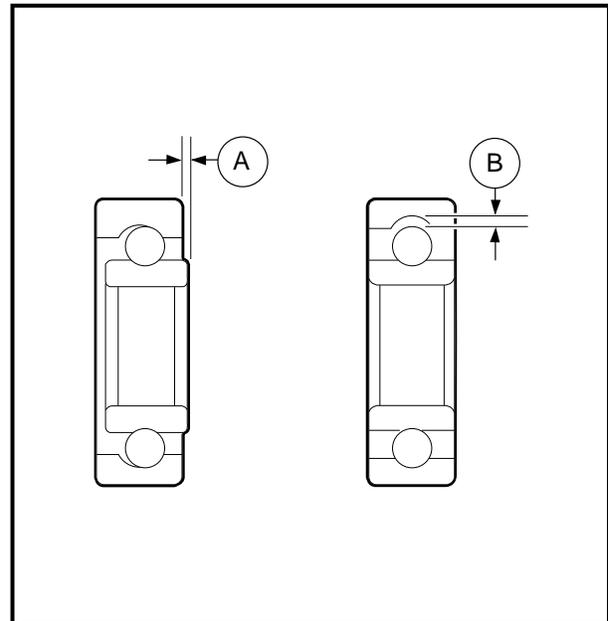


Figure 15-13 Bearing

Guide Ring Installation

1. Coat the outside surface of the new guide ring with a thin film of guide ring adhesive (Club Car Part No. 101813202), then slide the guide ring onto the input shaft next to the guide ring already in place. Mating the splines of the input shaft with the splines in the armature shaft, insert the input shaft into the armature shaft until the new guide ring is seated against the end of the armature splines. Remove the input shaft from the armature. Make sure the guide ring remains seated. See previous **NOTE**.
2. After guide ring (18) is installed, allow the glue to set for 24 hours before installing the snap ring (20). Install the motor onto the transaxle (**Figure 15-14, Page 15-10**).

RECONDITIONING THE MOTOR

Motor reconditioning must be performed by a qualified motor repair technician. The use of proper tools and procedures is absolutely essential. See following **CAUTION**.

Motor Specifications

Any rework must be performed by a qualified technician. Motor service specifications are listed in the following table.

⚠ CAUTION

- CLUB CAR RECOMMENDS ALL MOTOR RECONDITIONING BE PERFORMED BY A QUALIFIED MOTOR REPAIR TECHNICIAN.

ITEM	SERVICE LIMIT
Commutator diameter (minimum)	2.265 in. (66.675 mm)
Commutator concentric with armature shaft within	.001 in. (0.0508 mm)
Limit depth of cut when machining commutator	.005 in. (0.127 mm)
Bar to bar run out should not exceed	.0002 in. (.00508 mm)
If undercut of segment insulator is less than .016 in. (.406 mm), it should be undercut to	.031 in. (0.8 mm)
Machined face of commutator	8-16 micro in.
Field coil resistance (V-Glide 36-volt, 2.97 Hp)	.00711Ω

MOTOR ASSEMBLY**Read DANGER and WARNING on page 15-1.**

1. If the bearing has been removed, replace the bearing. **See Bearing Installation, page 15-7.**
2. Install the brushes. **See NOTE on page 15-6.**
3. With brush rigging (12) facing down and held slightly above the stator shell (2), insert the two terminal posts through the insulators in the stator shell wall at the A1 and A2 positions. Insert the brush holder screws (11) through the rubber sealed holes in the rigging and into the threaded holes in the mounting tab (2) (**Figure 15-14, Page 15-10**). Tighten the screws to 20 in.lb (2.3 N-m). **See also Figure 15-15, Page 15-11.**
4. One at a time, push the brush spring extensions back from the brushes and slide the brushes back until they are completely retracted into their mounting slots. Then position the brush springs against the sides of the brushes so that spring pressure will hold them in the retracted position.
5. Slide the armature, bearing end first, into the stator shell. Make sure the brushes are held back while positioning the armature for proper commutator/brush contact. Release the brushes and place the springs outside the brushes so the brushes are being held against the commutator. **See following CAUTION.**

⚠ CAUTION

- MAKE SURE THE BRUSHES ARE HELD BACK TO PREVENT DAMAGING BRUSHES. DO NOT ALLOW BRUSHES TO SUPPORT THE WEIGHT OF THE ARMATURE.

6. Install end shield onto the stator shell.
7. Attach the bearing retainer (16) to the end shield (10). Align the holes in the bearing retainer with the two holes in the end shield and install the screws (9) (**Figure 15-14, Page 15-10**). Tighten the screws to 17 in.lb (1.9 N-m). **See following NOTE.**

NOTE

- USE A LONG SCREW WITH THE SAME THREAD SPECIFICATIONS AS THE MOUNTING SCREWS TO MAINTAIN HOLE ALIGNMENT WHILE STARTING THE FIRST MOUNTING SCREW. **SEE FIGURE 15-16, PAGE 15-11.**

8. Align match marks on end shield and stator shell. Install the four screws (8) (**Figure 15-14, Page 15-10**). Tighten the screws to 90 in.lb (10.2 N-m).
9. Make sure the armature turns freely. If it does not turn freely, disassemble the motor to find the problem. Make sure the bearing is properly seated in the end shield when assembling the motor.

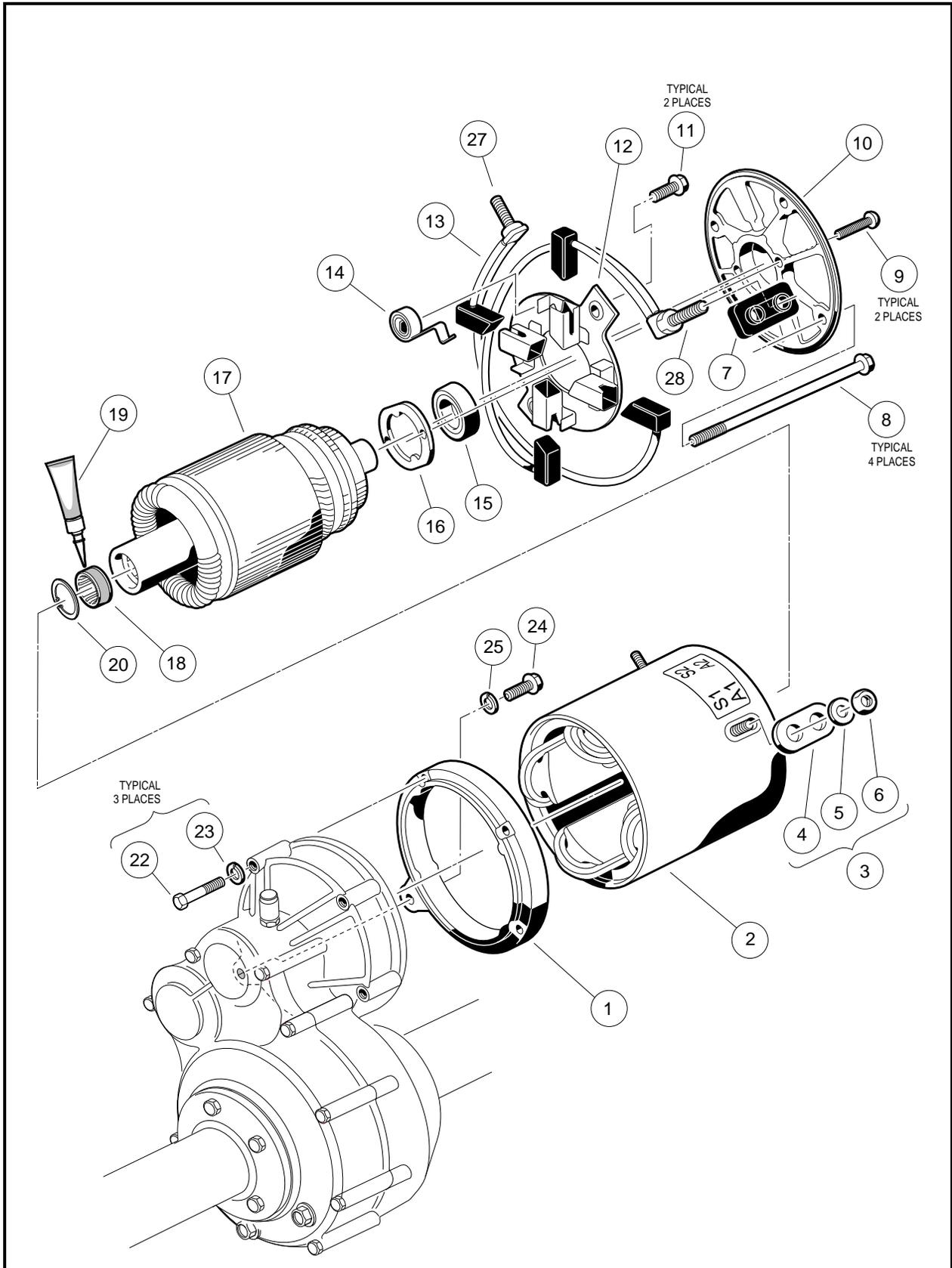


Figure 15-14 Motor

MOTOR INSTALLATION

Read **DANGER** and **WARNING** on page 15-1.

1. Apply "Molykote G" lubricant to the female splines of the motor armature shaft.
2. Slide motor onto the transaxle input shaft. Rotate the motor until the locating bolt mounting hole on the motor is aligned with its mounting hole in the transaxle case. Install, but do not tighten, the bolt (24) (threading in only a few turns) with lock washer (25) (**Figure 15-14, Page 15-10**). See also **Figure 15-17, Page 15-11**.
3. Install, but do not tighten the three bolts (22) with lock washers (23) that mount the motor to the transaxle (**Figure 15-14, Page 15-10**). See following **CAUTION**.

CAUTION

- MAKE SURE THE MOTOR IS PROPERLY SEATED ON THE TRANSAXLE HOUSING.

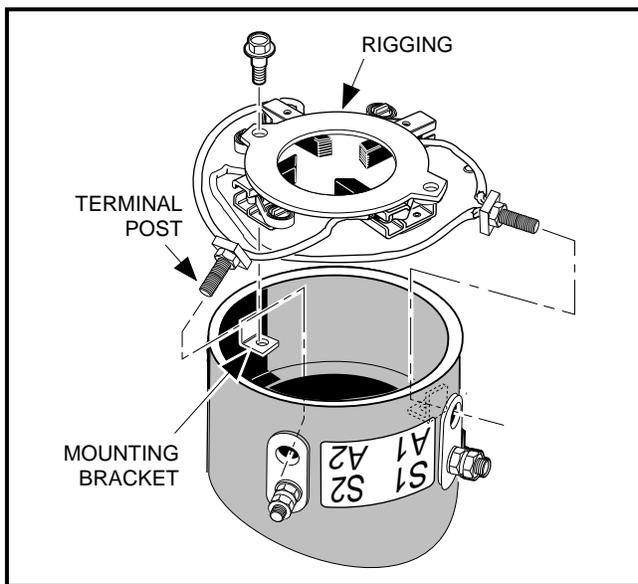


Figure 15-15 Brush Installation

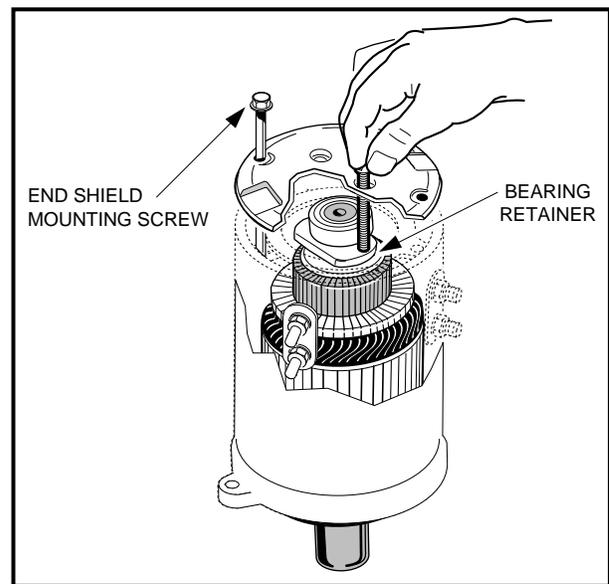


Figure 15-16 End Shield Installation

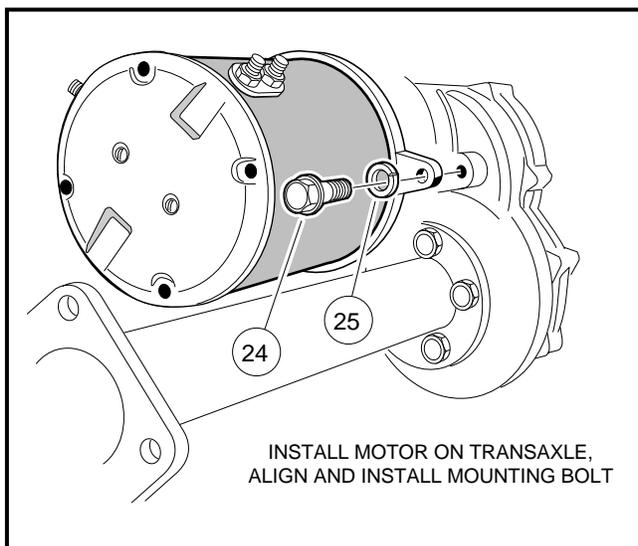


Figure 15-17 Motor Installation

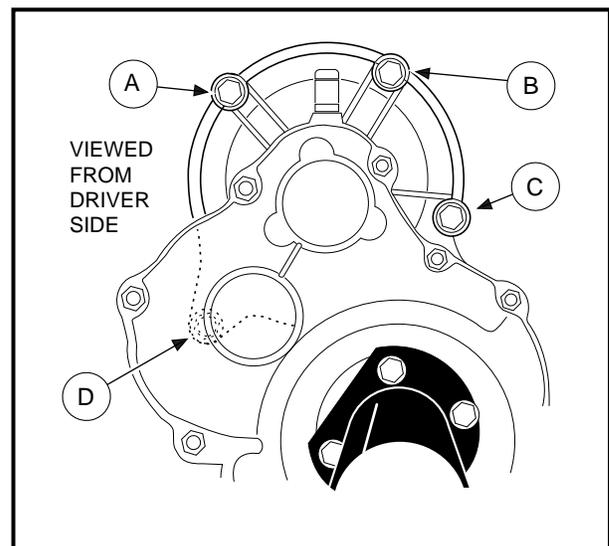


Figure 15-18 Motor Mount

Motor Installation, Continued:

4. Finger tighten the four screws, moving from screw (C) to screws (A, B, and D) until the motor is seated. Raise one rear wheel off the floor (making sure the other rear wheel remains immobilized on the floor) and rotate the axle to make sure the motor is not binding on the transaxle input shaft (**Figure 15-18, Page 15-11**).
5. Using a torque wrench, tighten the lower 1/4 in. screw (C). Now tighten the screw (A) across from the first screw, then tighten the center screw (B) at the top. Tighten these screws to 65 in.lb (7.3 N-m). Tighten the screw (D) to 155 in.lb (17.5 N-m) (**Figure 15-18, Page 15-11**).
6. Install the motor wires, making sure they are connected to the correct terminals. Tighten the terminal retaining nuts to 65 in.lb (7.3 N-m). **See following CAUTION and NOTE.**

⚠ CAUTION

- MAKE SURE THE MOTOR WIRES ARE ROUTED THROUGH THE WIRE TIE THAT PREVENTS THEM FROM MAKING CONTACT WITH THE RESISTORS.

NOTE

- IF MOTOR WIRES WERE NOT TAGGED FOR IDENTIFICATION BEFORE BEING DISCONNECTED, SEE WIRING DIAGRAM, **SECTION 11, FIGURE FIGURE 11-3, PAGE 11-4.**

7. With a floor jack, lift the transaxle while, at the same time, guiding the leaf springs into the shackles.
8. Insert the mounting bolts through the spring shackles and bushings in the leaf spring eyes, and install the locknuts. Tighten the bolts to 23 ft.lb (31 N-m). **See Section 9—Rear Suspension, in the 1998/1999 DS Golf Car Maintenance and Service Manual.**
9. Install the shock absorbers. **See Section 9—Rear Suspension, in the 1998/1999 DS Golf Car Maintenance and Service Manual.**
10. Install the wheels and finger tighten lug nuts.
11. Lift vehicle and remove jack stands. Lower vehicle to the floor and tighten lug nuts (using a criss-cross pattern) to 55 ft.lb (74.6 N-m).
12. Connect the battery cables, positive cable first. Tighten terminal hardware to 110 in.lb (12.4 N-m). Coat terminals with Battery Protector Spray (Club Car Part No. 10114305) to minimize corrosion (**Figure 15-1, Page 15-1**).

SECTION 16—TRANSAXLE

DANGER

- **BATTERY - EXPLOSIVE GASES! DO NOT SMOKE. KEEP SPARKS AND FLAMES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR FULL FACE SHIELD WHEN WORKING ON OR NEAR BATTERIES.**
- **USE EXTREME CAUTION WHEN USING TOOLS, WIRES, OR METAL OBJECTS NEAR BATTERIES! A SHORT CIRCUIT AND (OR) SPARK COULD CAUSE AN EXPLOSION.**
- **BATTERY - POISON! CONTAINS ACID! CAUSES SEVERE BURNS. AVOID CONTACT WITH SKIN, EYES, OR CLOTHING. ANTIDOTES:**
 - **EXTERNAL: FLUSH WITH WATER. CALL A PHYSICIAN IMMEDIATELY.**
 - **INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL A PHYSICIAN IMMEDIATELY.**
 - **EYES: FLUSH WITH WATER FOR FIFTEEN MINUTES. CALL PHYSICIAN IMMEDIATELY.**

WARNING

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL ELECTRICAL AND MECHANICAL REPAIR. FOLLOW ALL PROCEDURES EXACTLY AND HEED ALL WARNINGS STATED IN THIS MANUAL.
- ALWAYS WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE. WEAR A FULL FACE SHIELD WHEN WORKING WITH BATTERIES.
- TURN KEY SWITCH **OFF**, PLACE FORWARD/REVERSE HANDLE IN THE **NEUTRAL** POSITION, AND REMOVE KEY BEFORE SERVICING THE VEHICLE.
- MOVING PARTS! - DO NOT ATTEMPT TO SERVICE THE VEHICLE WHILE IT IS RUNNING.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.
- LIFT ONLY ONE END OF THE VEHICLE AT A TIME. BEFORE LIFTING, LOCK THE BRAKES AND CHOCK THE WHEELS THAT REMAIN ON THE FLOOR. USE A SUITABLE LIFTING DEVICE (CHAIN HOIST OR HYDRAULIC FLOOR JACK) WITH 1000 LBS. (454 KG.) MINIMUM LIFTING CAPACITY. DO NOT USE LIFTING DEVICE TO HOLD VEHICLE IN RAISED POSITION. ALWAYS USE APPROVED JACKSTANDS OF PROPER WEIGHT CAPACITY TO SUPPORT THE VEHICLE.
- TO AVOID UNINTENTIONALLY STARTING VEHICLE, DISCONNECT BATTERIES AS SHOWN IN **SECTION 11, FIGURE 11-1, PAGE 11-1.**

GENERAL INFORMATION

There are two types of transaxles used in the manufacture of the electric vehicle. The different transaxles are identified by the orientation of the gear case bolt heads. The Type G transaxle has gear case bolt heads oriented toward the passenger side of the vehicle. The Type K transaxle has gear case bolt heads oriented toward the driver side of the vehicle. Please note that parts used in these transaxles are not interchangeable with one another. Service and repair procedures specific to each transaxle are noted throughout this section.

LUBRICATION

There are two plugs located on the lower half of the transaxle housing. The upper plug (as viewed when the transaxle is in a horizontal position), is used as a lubricant level indicator. When the vehicle is parked on a

Lubrication, Continued:

level surface, the lubricant level should be even with the bottom of the hole. The lower plug is for draining the lubricant. When draining the lubricant, the upper plug should be removed so the lubricant will drain faster. Be sure the drain plug is reinstalled before filling.

NOTE

- RECYCLE OR DISPOSE OF USED OIL OR LUBRICANT IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

AXLE BEARING AND SHAFT

Read **DANGER** and **WARNING** on page 16-1.

AXLE SHAFT AND OIL SEAL**Axle Shaft and Oil Seal Removal**

1. Place chocks at the front wheels. Loosen lug nuts on rear wheels and lift the rear of the vehicle with a chain hoist or floor jack. Place jackstands under the axle tubes to support the vehicle.
2. Remove the rear wheel and brake drum. **See Section 6–Wheel Brake Assemblies and Section 8–Wheels and Tires in the 1998/1999 DS Maintenance and Service Manual.**
3. Using 90° internal snap ring pliers, remove the internal retaining ring (6) from the axle tube (**Figures 16-3 or 16-4, Pages 16-3 or 16-4**). **See also Figure 16-1.**
4. Remove the axle, retaining ring, and bearing assembly by pulling the axle straight out of the housing.

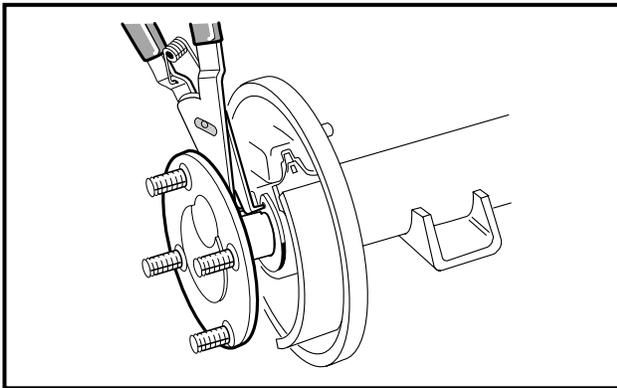


Figure 16-1 Axle Tube

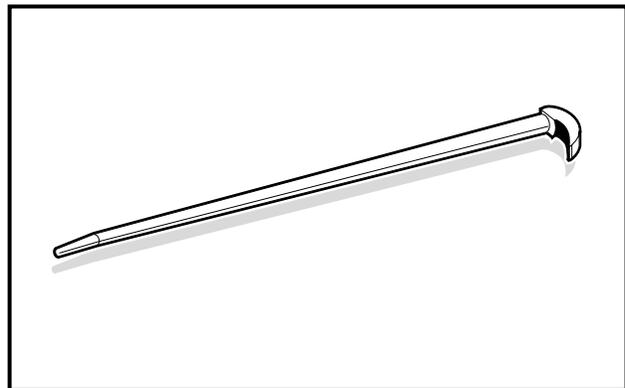


Figure 16-2 Rolling Wedge Bar

5. Use a 16 in. (40 centimeter) rolling wedge bar (**Figure 16-2, Page 16-2**) to remove the oil seal. Insert the wedge bar underneath the seal lip and pry out oil seal (**Figure 16-5, Page 16-5**). **See following CAUTION.**

⚠ CAUTION

- DO NOT SCAR OR DAMAGE THE INSIDE SURFACES OF THE TUBE WHEN REMOVING THE OIL SEAL. A DAMAGED TUBE MIGHT HAVE TO BE REPLACED.

6. Inspect the axle shaft assembly to be sure the bearing and collar have not slipped and are still seated against the shoulder on the axle shaft.
7. Inspect bearing (5) (**Figure 16-3 or 16-4, Page 16-3 or 16-4**). If the bearing in a Type K transaxle is worn or damaged, replace bearing. If the bearing in a Type G transaxle is worn or damaged, see NOTE at Axle Bearing on Page 16-5.

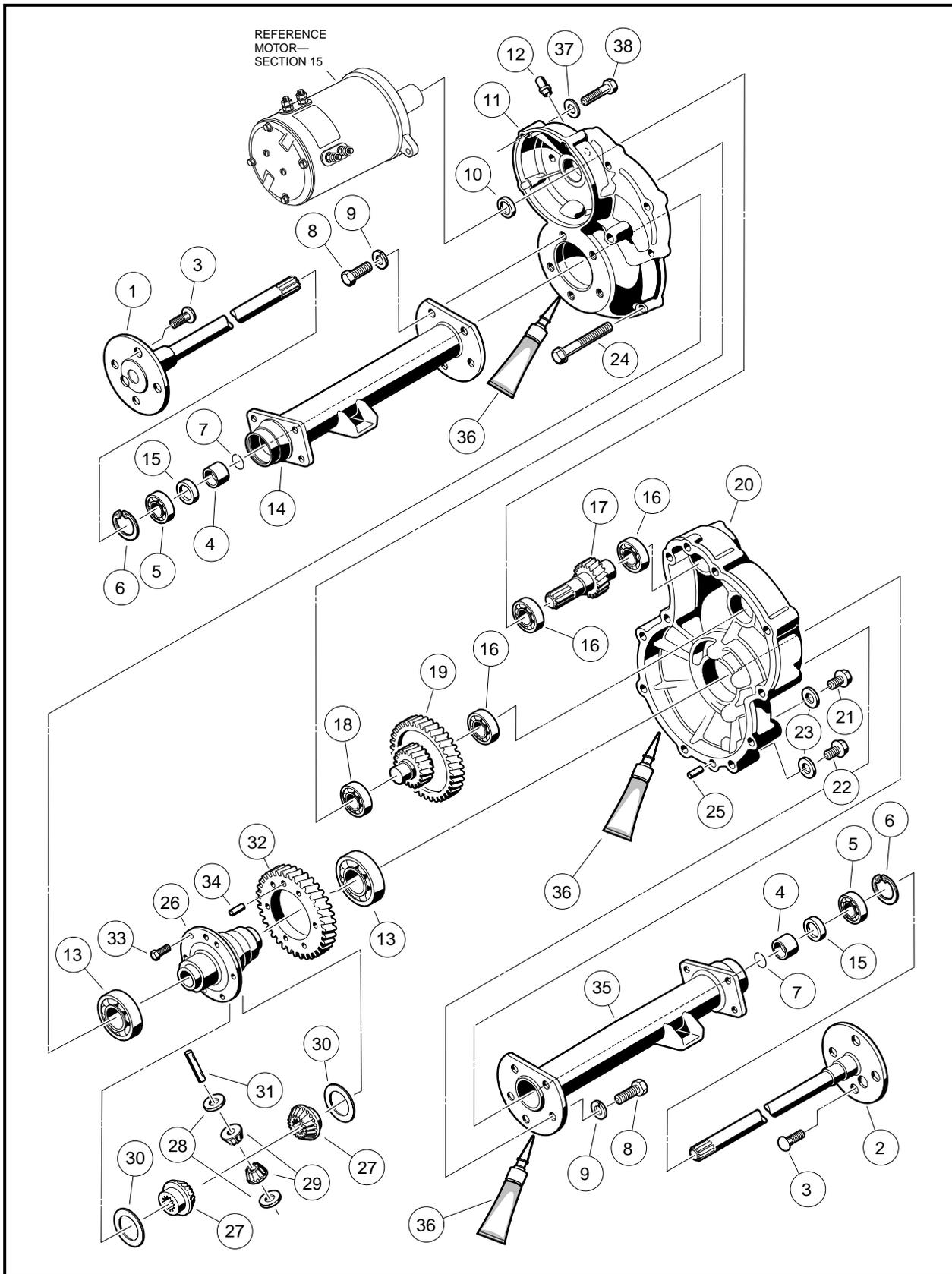


Figure 16-4 Transaxle - Type G

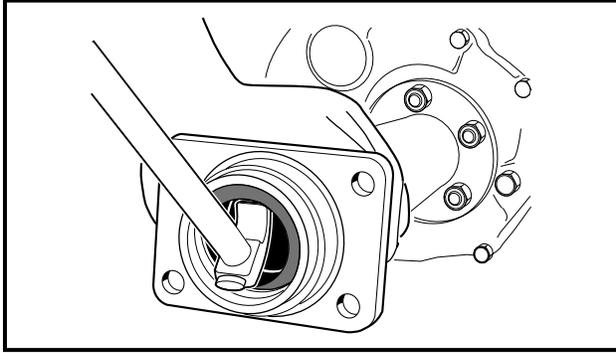


Figure 16-5 Seal Lip

AXLE BEARING

NOTE

- DO NOT REMOVE THE AXLE BEARING FROM A TYPE G TRANSAXLE. IF THE BEARING IS WORN, THE ENTIRE AXLE SHAFT ASSEMBLY (1 OR 2) MUST BE REPLACED (FIGURE 16-4, PAGE 16-4).

Axle Bearing Removal (Type K Transaxle Only)

1. Remove the retaining ring (7) from the axle shaft (Figure 16-3, Page 16-3).
2. Place a bearing puller wedge attachment (Club Car Part No. 1012812) on the axle shaft between the wheel mounting flange and the bearing.
3. Press bearing (5) and collar (4) off together (Figure 16-6). See following CAUTION and NOTE.

CAUTION

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE AXLE SHAFT. THIS COULD DAMAGE THE AXLE SHAFT WHEN PRESSING OFF THE BEARING AND COLLAR.

NOTE

- IT MAY BE NECESSARY TO HEAT THE COLLAR BEFORE THE COLLAR CAN BE REMOVED.

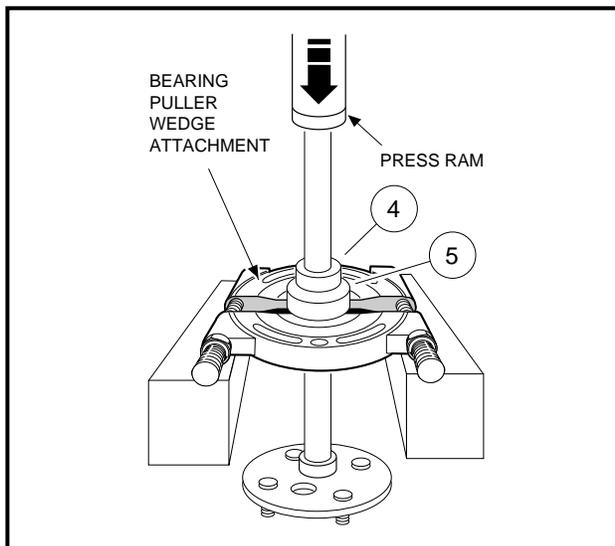


Figure 16-6 Bearing and Collar

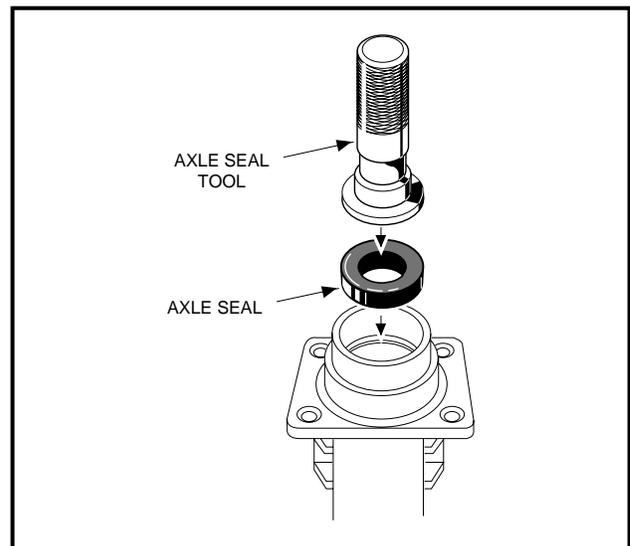


Figure 16-7 Axle Seal Tool

Axle Bearing Installation (Type K Transaxles Only)

1. If removed, place retaining ring (6) on axle shaft (1 or 2) (**Figure 16-3, Page 16-3**). The retaining ring will be loose on the axle shaft until it is installed into the axle tube.
2. Apply two drops of Loctite® 271 to the inside of the collar. **See following CAUTION.**

CAUTION

- APPLY LOCTITE 271® TO INSIDE OF COLLAR ONLY, NOT TO SHAFT, SO THAT THE LOCTITE WILL BE PUSHED AWAY FROM THE BEARING AS THE COLLAR AND BEARING ARE PRESSED ON. IF LOCTITE GETS ON OR IN THE BEARING, THE BEARING MUST BE REPLACED.
- THE COLLAR SHOULD BE REMOVED NO MORE THAN TWO TIMES. IF A BEARING IS REMOVED A THIRD TIME, THE SHAFT AND COLLAR WILL NOT GIVE A PROPER FIT.

3. Place the bearing and the collar on the shaft (note, this is a sealed bearing). **See following CAUTION.**

CAUTION

- IF THE BEARING WAS REMOVED FROM THE SHAFT, REPLACE BEARING WITH A NEW ONE.

4. Place the bearing puller wedge attachment against the collar and, using a hydraulic press, press on both the bearing and collar. **See CAUTION on page 16-5.**
5. Install retaining ring (7) into the groove on the axle shaft (**Figure 16-3, Page 16-3**).

Axle Shaft and Oil Seal Installation

1. Clean the bearing and seal seats in the axle tube (16 or 40) (**Figure 16-3, Page 16-3**) or (14 or 35) (**Figure 16-4, Page 16-4**).
2. Place a new seal (17) (**Figure 16-3**) or (15) (**Figure 16-4**) in the axle tube with the seal lip facing away from the bearing. Use an axle seal tool (Club Car Part No. 1014162) and mallet to tap it in until it seats firmly in position (**Figure 16-7, Page 16-5**). A hydraulic press may also be used with the axle seal tool.
3. Clean the shaft splines and then insert the shaft, splined end first, through the seal and into the axle tube. Be careful not to damage the seal. Then advance the shaft through the inner bearing and rotate it to align the shaft splines with the splined bore of the differential side gear. Continue advancing the shaft until the bearing seats against the axle tube shoulder.
4. Using snap ring pliers, install retaining ring (6) inside axle tube (**Figure 16-3 or 16-4, Page 16-3 or 16-4**). **See following NOTE.**

NOTE

- **TYPE G TRANSAXLES:** IF RETAINING RING (6) MUST BE REPLACED, THE ENTIRE AXLE SHAFT ASSEMBLY (1 OR 2) MUST BE REPLACED (**FIGURE 16-4, PAGE 16-4**).

5. Place a 1/4 in. to 3/8 in. (6 to 10 mm) diameter rod against the retaining ring and tap lightly at four to five locations around the retaining ring to ensure ring is properly seated. **See following WARNING.**

WARNING

- BE SURE THE RETAINING RING IS PROPERLY SEATED IN ITS GROOVE. IF THE RING IS NOT PROPERLY INSTALLED, THE AXLE ASSEMBLY WILL SEPARATE FROM THE TRANSAXLE AND DAMAGE THE AXLE ASSEMBLY AND OTHER COMPONENTS. LOSS OF VEHICLE CONTROL COULD RESULT, CAUSING SEVERE PERSONAL INJURY.

TRANSAXLE

Read **DANGER** and **WARNING** on page 16-1.

TRANSAXLE REMOVAL

1. Place chocks at the front wheels and loosen the lug nuts on the rear wheels. Lift the rear of the vehicle with a chain hoist or with a floor jack placed under the transaxle. Position jackstands under the frame cross-member between the spring mount and the side stringer, just forward of each rear wheel. Lower the vehicle to let the jackstands support the vehicle (**Figure 16-8, Page 16-7**).
2. Remove the rear wheels, then thread one lug nut onto a stud on each rear hub. This will keep the brake drums on the hubs.
3. Remove the cotter pins (1), brake cable clevis pins (2), and cable retaining E-clips (3). Disconnect the brake cables (4) (**Figure 16-9**).
4. Disconnect the shock absorbers from their lower mounts (**Figure 16-10**).

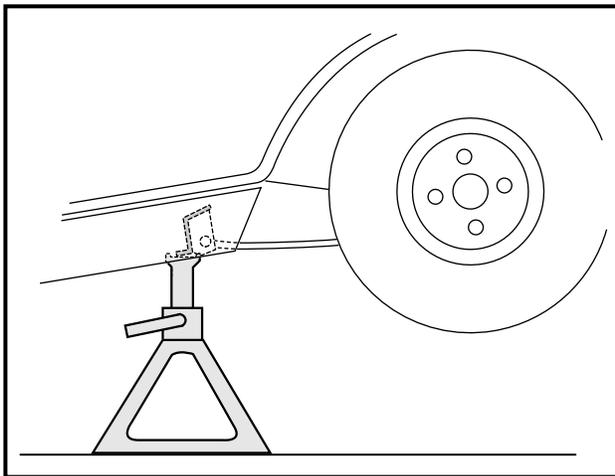


Figure 16-8 Support Vehicle on Jackstands

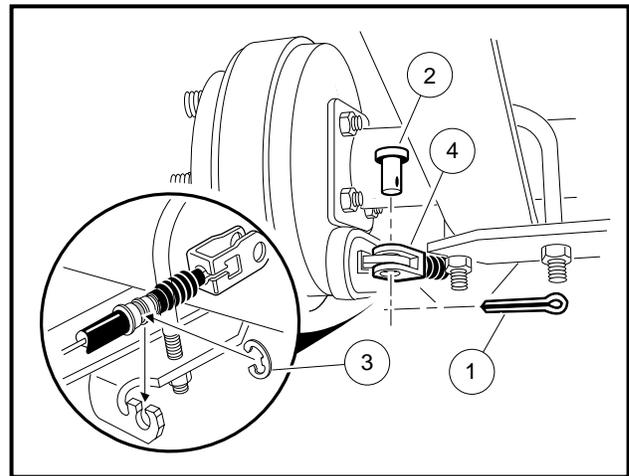


Figure 16-9 Disconnect Brakes

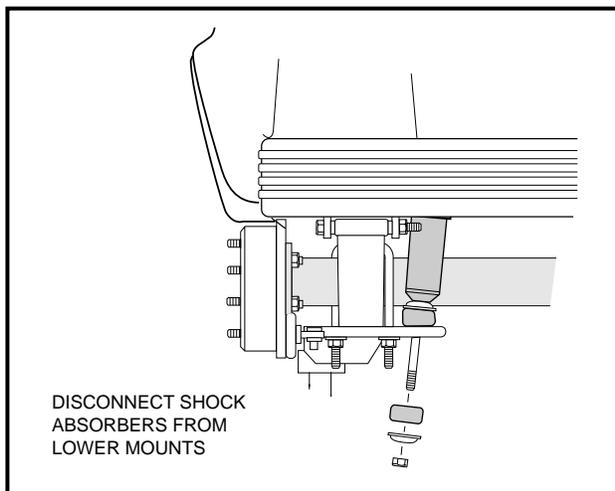


Figure 16-10 Disconnect Shocks

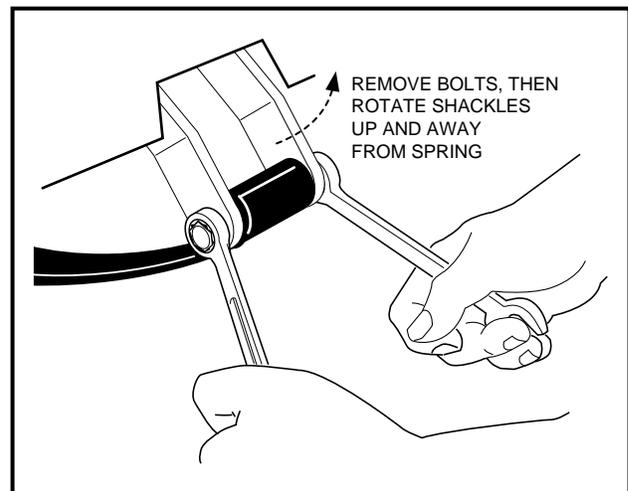


Figure 16-11 Shackles

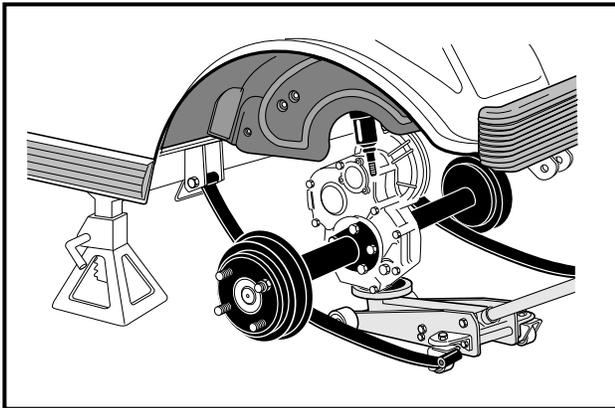
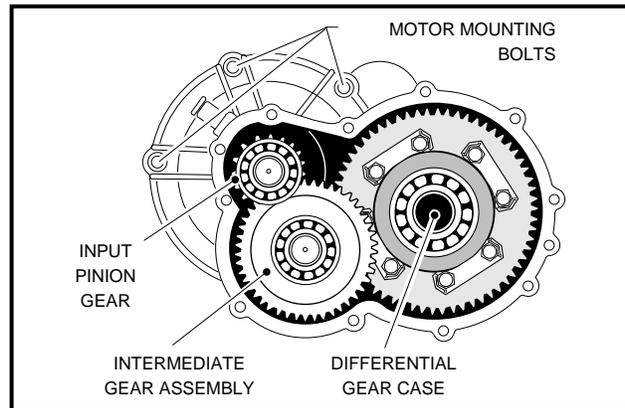
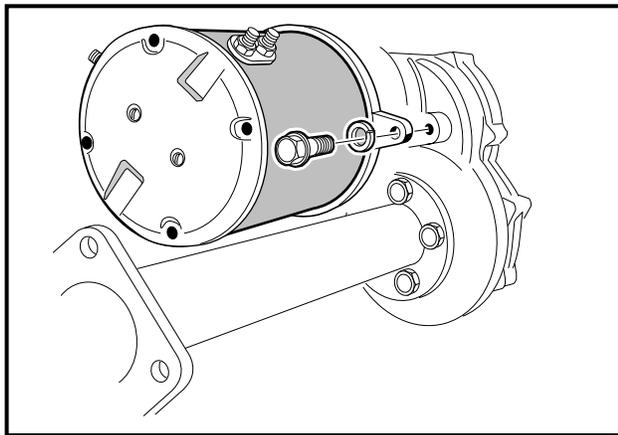
5. Disconnect the four motor wires. Use two wrenches to prevent the posts from turning.
6. With a floor jack supporting the transaxle, remove lower spring shackle nuts and bolts. Position shackles so they are clear of springs (**Figure 16-11**).

Transaxle Removal, Continued:

7. If a chain hoist was used to raise the vehicle, lift the vehicle high enough to permit easy access and clearance for removal of the motor. If a floor jack was used to raise the vehicle, lower the transaxle enough to permit easy access and clearance for removal of the motor.
8. Remove the three motor mounting bolts (**Figure 16-13, Page 16-8**) and the motor positioning bolt (**Figure 16-14, Page 16-8**) mounting the motor to the transaxle. **See following WARNING.**

⚠ WARNING

- DO NOT HOLD FINGERS UNDER MOTOR WHEN SLIDING MOTOR OFF INPUT SHAFT. FINGERS MAY GET PINCHED WHEN MOTOR DISENGAGES.

**Figure 16-12 Leaf Springs****Figure 16-13 Motor Mounting Bolts****Figure 16-14 Motor Positioning Bolt**

9. Carefully remove the motor from the transaxle. Slide the motor away from the transaxle until the motor spline becomes disengaged from the input shaft, then lift motor out. **See WARNING on page 16-7.**
10. If a floorjack was used, pull floorjack from beneath the transaxle and allow the springs to rest on the floor.
11. Remove the U-bolts attaching the transaxle to the leaf springs (**Figure 16-12, Page 16-8**).
12. Carefully lift each end of the transaxle off its positioning pin (on the leaf spring) and slide the transaxle to the rear and out of the vehicle.
13. Drain the lubricant from the transaxle and remove the axle shafts as instructed on page 16-2. **See also NOTE on page 16-2.**
14. If removal of the brake assemblies is required, see Section 6—Brakes in the Maintenance & Service Manual.

TRANSAXLE DISASSEMBLY, INSPECTION AND ASSEMBLY

Read **DANGER** and **WARNING** on page 16-1.

TRANSAXLE DISASSEMBLY AND INSPECTION

1. To detach the axle tubes (16 and 40) (**Figure 16-3, Page 16-3**) or (14 and 35) (**Figure 16-4, Page 16-4**) from the transaxle housing, remove the bolts and lock washers (8 and 9) (**Figure 16-3 or 16-4**). See following **NOTE**.

NOTE

- **TYPE K TRANSAXLES ONLY:** SHIMS ARE LOCATED BETWEEN THE DRIVER SIDE AXLE TUBE AND DIFFERENTIAL CASE BEARING. DO NOT DAMAGE SHIMS. IF SHIMS ARE REMOVED, SET THEM ASIDE FOR REINSTALLATION.

2. Remove 10 bolts (26) (**Figure 16-3, Page 16-3**) or 11 bolts, (24) (**Figure 16-4, Page 16-4**) holding housing together.
3. Pull the halves of the housing apart. If necessary, tap lightly on the spline of the input pinion.

CAUTION

- TO PREVENT DAMAGE TO THE HOUSING MATING SEAL SURFACES, USE CAUTION WHEN SEPARATING HALVES.

4. Remove input pinion gear by pulling gear out while rocking intermediate gear assembly. Lift intermediate gear assembly and differential gear case unit out simultaneously (**Figure 16-15**).

CAUTION

- DO NOT DAMAGE GEARS. USE EXTREME CARE WHEN HANDLING THEM.

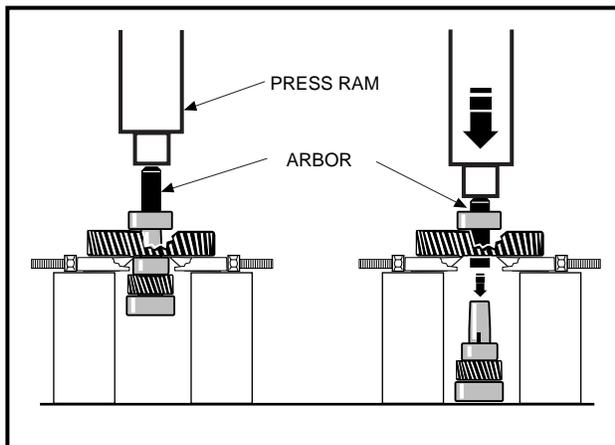


Figure 16-15 Intermediate Gear Assembly

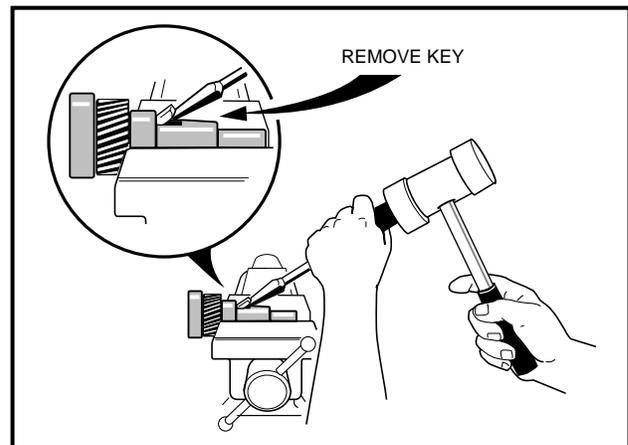


Figure 16-16 Remove Key

5. Use a bearing puller or arbor press to remove bearings (18) (**Figure 16-3, Page 16-3**) or (16) (**Figure 16-4, Page 16-4**) from the input pinion gear. If the oil seal (10) is damaged, replace it (**Figures 16-3 or 16-4, Pages 16-3 or 16-4**). See following **CAUTION**.

CAUTION

- DO NOT REUSE BEARINGS AFTER REMOVING THEM. REPLACE BEARINGS WITH NEW ONES.

Transaxle Disassembly and Inspection, Continued:

6. To disassemble the intermediate gear assembly, press off together bearing (18) (Figure 16-3, Page 16-3) or (16) (Figure 16-4, Page 16-4) and gear (23) (Figure 16-3, Page 16-3) or (19) (Figure 16-4, Page 16-4). See also Figure 16-15.
7. **Type K transaxles:** Remove key (22) (Figure 16-3, Page 16-3). See also Figure 16-16, Page 16-9.
8. Press the bearing (20) (Figure 16-3, Page 16-3) or (18) (Figure 16-4, Page 16-4) off the intermediate gear assembly.
9. Disassemble the differential gear case:
 - 9.1. **Type K transaxles:** Bend the bolt lock plates (29) down onto the ring gear (30) (Figure 16-3, Page 16-3). See also Figure 16-17, Page 16-10.
 - 9.2. Remove the eight hex bolts (28) (Figure 16-3, Page 16-3) or four hex bolts (33) (Figure 16-4, Page 16-4) that secure the ring gear to the differential case.

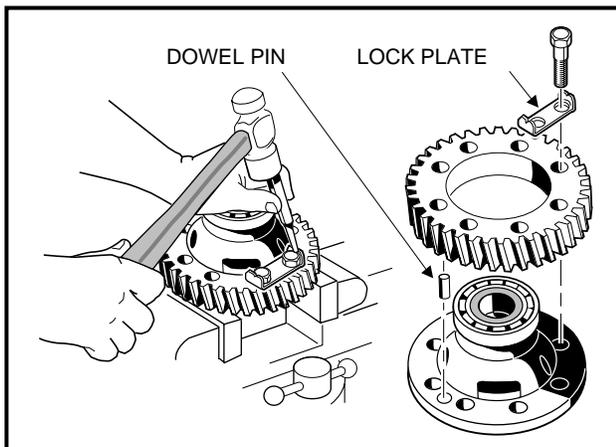


Figure 16-17 Lock Plate (Type K Only)

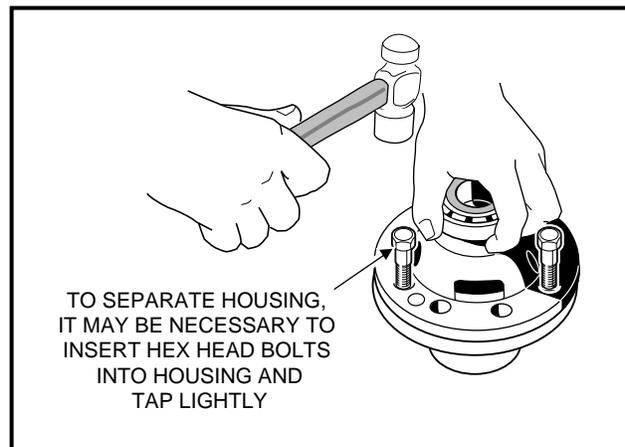


Figure 16-18 Separate Housing

- 9.3. Remove the ring gear. Retain dowel pin from between the ring gear and differential case for reassembly.
- 9.4. Separate the differential gear case housing. If necessary, reinstall two of the hex bolts (removed previously in step 9.2.) into the differential gear unit and, while holding the unit slightly above the work area, lightly tap the bolt heads (Figure 16-18, Page 16-10). Remove the two bolts.
- 9.5. Remove the differential pin (31) by pushing pin through differential gear case from one side (Figures 16-3 or 16-4, Pages 16-3 or 16-4). See also Figure 16-19.

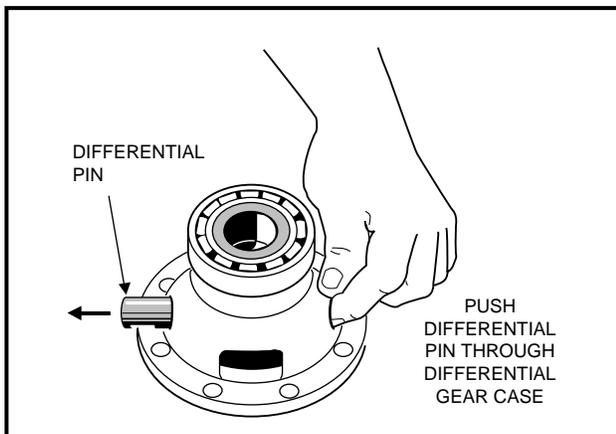


Figure 16-19 Differential Pin

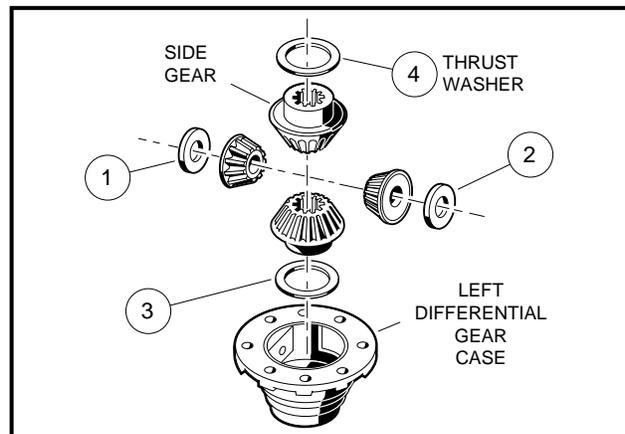


Figure 16-20 Left Differential

- 9.6. Remove the idler gears and thrust plates (38 and 35), (Figure 16-3, Page 16-3) or (29 and 28) (Figure 16-4, Page 16-4).

- 9.7. Remove the differential gears and thrust plates (34 and 37) (**Figure 16-3, Page 16-3**) or (30 and 27) (**Figure 16-4, Page 16-4**). **See also Figure 16-20.**
- 9.8. Inspect the bearings (14) (**Figure 16-3, Page 16-3**) or (13) (**Figure 16-4, Page 16-4**) of the differential case and replace them if they are damaged. To remove them, press them off. **See CAUTION at bottom of page 16-9.**
10. Inspect all parts for wear or damage. Any worn or damaged parts should be replaced. **See following NOTE.**

NOTE

- DAMAGED OR WORN GEARS SHOULD BE REPLACED AS SETS.

TRANSAXLE ASSEMBLY

⚠ CAUTION

- DO NOT PRESS AGAINST THE BEARING OUTER RACE.
- **TYPE K TRANSAXLES:** GASKET FACES OF THE HOUSING MUST BE CLEAN AND SMOOTH. USE ONLY A NEW GASKET (13) THAT IS NOT TORN OR DAMAGED. THE GASKET MUST LIE FLAT AGAINST THE HOUSING FACES (**FIGURE 16-3, PAGE 16-3**).
- THE HOUSING AND ALL PARTS MUST BE WIPED CLEAN AND DRY BEFORE REASSEMBLY.

1. If bearings (14) (**Figure 16-3, Page 16-3**) or (13) (**Figure 16-4, Page 16-4**) were removed during disassembly, install new bearings using an arbor press.
2. Assemble the differential gear case.
 - 2.1. Install the pin (31) (**Figures 16-3 or 16-4, Pages 16-3 or 16-4**). Apply a small amount of oil to all thrust plates and to both ends of the pin.
- **Type K transaxles:**
 - 2.2. While aligning the dowel pin, assemble the two halves of the differential gear case (33 and 36) and reinstall the output gear (30) (**Figure 16-3, Page 16-3**).
 - 2.3. Install eight hex bolts (28) and the bolt lock plates (29) (**Figure 16-3, Page 16-3**). Tighten the bolts to 18 ft.lb (24 N-m).
 - 2.4. Bend the edges of the bolt locking tabs securely against the flats of the bolt heads to prevent the bolts from loosening and possibly causing damage (**Figure 16-17, Page 16-10**).
 - 2.5. If the large gear (23) was removed from the intermediate gear, insert key (22) into the keyway in the shaft and then press the large gear and the bearing (18) onto the shaft. Be sure the key is properly positioned in the keyway before attempting to press on the large gear and bearing (**Figure 16-3, Page 16-3**).
- **Type G transaxles:**
 - 2.6. Install four hex bolts (33) and output gear (32) (**Figure 16-4, Page 16-4**). Tighten bolts to 51 ft.lb (69 N-m).
- **All transaxles:**
 3. Press a new bearing (20) (**Figure 16-3, Page 16-3**) or (18) (**Figure 16-4, Page 16-4**) onto the intermediate gear assembly.
 4. Press new bearing (18) (**Figure 16-3, Page 16-3**) or (16) (**Figure 16-4, Page 16-4**) onto input pinion gear.
 5. Apply grease to the lip of the new oil seal (10) (**Figures 16-3 or 16-4, Pages 16-3 or 16-4**) and install the seal using a transaxle pinion seal tool (Club Car Part No. 1014161). The lip of the oil seal should face the inside of the transaxle housing. Make sure the seal is firmly seated.
 6. Install the differential assembly, the intermediate gear assembly, and the input pinion gear simultaneously. Be sure all bearings are seated properly in the housing. Rotate the input shaft to check for smooth gear operation (**Figure 16-13, Page 16-8**).
 7. Install dowel pin (27) (**Figure 16-3, Page 16-3**) or (25) (**Figure 16-4, Page 16-4**) in the transaxle housing (24 or 20) (**Figures 16-3 or 16-4, Pages 16-3 or 16-4**).

Transaxle Assembly, Continued:

8. Install left half of transaxle housing:
 - **For Type K transaxles:**
 - 8.1. Place a new gasket (13) (**Figure 16-3, Page 16-3**) in position on the mating face of the housing. Use the dowel pin to position the gasket. Make sure all holes are aligned.
 - 8.2. Install left half of transaxle housing (24) (**Figure 16-3, Page 16-3**).
 - 8.3. Install the ten bolts (26) and tighten to 69 in.lb (7.8 N-m) (**Figure 16-3, Page 16-3**).
 - 8.4. If the axle tube (16 and 40) was removed, install the shims (39), (if the shims were removed) and a new gasket. Install the axle tube with five lock washers and bolts (9 and 8) (**Figure 16-3, Page 16-3**). Tighten the bolts to 22 ft.lb (30 N-m).

NOTE

- **TYPE K TRANSAXLES:** IF THE DIFFERENTIAL CASE (33 AND 36), THE TRANSAXLE HOUSING (11 AND 24) OR AXLE TUBE (16 AND 40) (**FIGURE 16-3, PAGE 16-3**) WAS REPLACED, SEE SHIMMING THE TRANSAXLE ON **PAGE 16-12**.

- **For Type G Transaxles:**

- 8.1. Place 1/8 in. bead of three bond liquid gasket on mating face of housing. **See following NOTE.**

NOTE

- **TYPE G TRANSAXLES DO NOT USE A GASKET ON THE MATING FACE OF THE HOUSING. USE AN 1/8 IN. BEAD OF THREE BOND LIQUID GASKET INSTEAD.**

- 8.1. Install left half of transaxle housing (20) (**Figure 16-4, Page 16-4**).
 - 8.1. Install eleven bolts in the case housing and tighten to 19 ft.lb (25.7 N-m). Type G transaxles have no shims or gasket.
 - 8.2. Install axle tube with lock washers and bolts (9 and 8) (**Figure 16-4, Page 16-4**). Tighten the bolts to 36 ft.lb (49 N-m).
- **For all transaxles:**
 9. Install the brake assemblies as instructed in Section 6—Brakes in the Maintenance & Service Manual.
 10. Apply a small amount of grease to the lip of the oil seal (17) (**Figure 16-3, Page 16-3**) or (15) (**Figure 16-4, Page 16-4**).
 11. Clean the splines on the axle shaft assembly (1 and 2). Rotate the axle to align the shaft splines with the splined bore of the differential side gear. Push the shaft in until the bearing seats against the shoulder in the axle tube (**Figures 16-3 and 16-4, Pages 16-3 and 16-4**).
 12. Install the retaining ring (6) (**Figures 16-3 and 16-4, Pages 16-3 and 16-4**) in the axle tube. **See WARNING on Page 16-6.**
 13. Make sure the drain plug is installed in the transaxle and tightened to 23 ft.lb (31 N-m). Fill the transaxle, through the level indicator hole, with 22 ounces of SAE 30 API Class SE, SF, or SG oil (a higher grade may also be used). Install and tighten the level indicator plug to 23 ft.lb (31 N-m).

SHIMMING THE TRANSAXLE**Type K Transaxles Only**

If differential case (36 and 33), transaxle housing (11 and 24), or axle tube (16 and 40) has been replaced, transaxle may need new shims. To determine whether new shims are necessary, transaxle must be completely assembled except for short axle tube (40) and both axle shafts (1 and 2) (**Figure 16-3, Page 16-3**).

1. Stand the transaxle on end, on the axle tube.

- Using a depth gauge, measure the distance from the gasket seal surface of the axle tube (gasket must be removed) to the outer race of the bearing (14) on the differential case (33) (**Figure 16-3, Page 16-3**). **See also Figure 16-21.**
- Use the following chart to determine whether shimming is required and, if so, how many shims (Club Car Part No. 1013781) should be used.

Distance from gasket seal surface to outer race or bearing - INCHES (MM)	SHIMS REQUIRED
Up to .134 inches (3.4 mm)	0
.134 - .142 inches (3.4 - 3.6 mm)	1
.142 - .150 inches (3.6 - 3.8 mm)	2
.150 - .155 inches (3.8 - 3.9 mm)	3

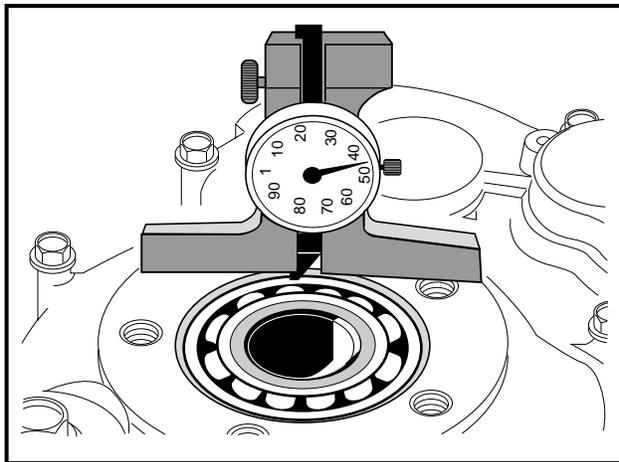


Figure 16-21 Depth Gauge

TRANSAXLE INSTALLATION

- If using a chain hoist, raise the vehicle and place transaxle in position on the jackstands. If using a floor jack, lower the jackstands to their lowest settings and place the transaxle in position on the jackstands. **See DANGER and WARNING on page 16-1.**
- Align the center hole in the saddle of the transaxle with the pilot bolt in the leaf spring assembly.
- Install the two U-bolts, lockwashers, and nuts. Tighten the nuts to 25 ft.lb (34 N-m). Tighten the U-bolt nuts so an equal amount of thread is visible on each leg of the bolt.
- Install motor. **See Motor—Section 15.**
- If using a chain hoist, lower the vehicle while guiding the leaf springs into the rear spring shackles. If using a floor jack, raise the differential while guiding the leaf springs into the rear spring shackles. Then raise the jackstands to support the transaxle.
- Reconnect the four motor wires. When tightening the retaining nuts, use two wrenches to prevent the motor studs from turning. **See following NOTE.**

NOTE

- IF THE MOTOR WIRES WERE NOT TAGGED WHEN DISCONNECTED, **SEE SECTION 11, FIGURE 11-3, PAGE 11-4, VEHICLE WIRING DIAGRAM** FOR PROPER CONNECTIONS.

Transaxle Installation, Continued:

7. Insert bolts through the spring shackles and bushings in the leaf spring eyes. Secure bolts with lock nuts.
8. Connect the brake cables.
9. Install the shock absorbers. Tighten shock absorber retaining nuts until the rubber bushings expand to the same size as the cup washers.
10. Install the rear wheels and finger tighten the lug nuts.
11. Lift the vehicle and remove the jackstands. Lower vehicle and tighten rear wheel lug nuts (using a criss-cross pattern) to 55 ft.lb (74.6 N-m).
12. Test drive the vehicle to check for proper operation.

CLUB CAR

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Golf Cars

Club Car Inc.
P.O. Box 204658
Augusta, GA 30917-4658