

**Club Car**

**1997  
MAINTENANCE  
SERVICE  
SUPPLEMENT**



**DS GOLF CARS  
GASOLINE/ELECTRIC**

MANUAL NUMBER 1019345-04  
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## USING THIS SUPPLEMENT

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The following pages are supplemental to the 1995-1996 DS Golf Car Maintenance and Service Manual (Club Car Part No. 1019051-01). This supplement documents only those sections of the manual requiring changes or additions describing features and procedures specific to **1997** DS Golf Cars. All other information in the 1995-1996 Maintenance and Service Manual pertaining to DS Golf Cars (unless noted as specific to another particular vehicle) applies to 1997 DS Golf Cars as well. **Sections 2, 4, 6, 9 (for gasoline vehicles only), 11, 12, 17, and 18 in the maintenance and service manual have been entirely superseded by sections in this supplement. This supplement also includes updates to information in Sections 3, 13, 14, and 16.** All other sections in the maintenance and service manual are unchanged. **With the exception of sections 9, 10, 25, and 26,** the placement of sections in this supplement corresponds to the placement of sections in the maintenance and service manual. References in this supplement refer to information elsewhere within the supplement unless they state specifically that they refer to the 1995-1996 Maintenance and Service Manual or other publication; for example, **(See Figure 12-50, Page 12-37 in the Maintenance and Service Manual).**

If you do not have a 1995-1996 DS Golf Car Maintenance and Service Manual, you may obtain one from your Club Car dealer or distributor. This supplement and the manual should be thoroughly studied prior to servicing the vehicle. The procedures provided must be properly implemented, and the NOTES, CAUTIONS, WARNINGS, and DANGER statements must be heeded. This supplement and the manual were 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 it unsafe.* For this reason, we advise that all repairs and/or service be performed by an authorized Club Car distributor/dealer representative or by a Club Car factory trained mechanic.

This supplement, in conjunction with the maintenance and service manual, covers all aspects of DS Golf Car service. However, unique situations do sometimes arise when servicing golf cars. If it appears that a service question is not answered in this supplement or in the manual, you may write to us or contact a Club Car technical service representative by phone at (706) 863-3000, ext. 580.

### **WARNING**

- **READ SECTION 1 - SAFETY - 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.**

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This manual effective August 1, 1996

## NOTE

- THIS SUPPLEMENT REPRESENTS THE MOST CURRENT INFORMATION AT TIME OF PUBLICATION. CLUB CAR, INC. IS CONTINUALLY WORKING TO FURTHER 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 THE 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.

# Practice Safety



Safety signs like you see above may at first seem shocking, but their impact is mild compared with the reality of severe personal injury.

Your safety and satisfaction are of the utmost importance to Club Car. That is why we urge you to study this supplement and the maintenance and service manual, and to read, understand, and heed the warnings in this manual, as well as the safety decals on your vehicle, before operating the vehicle.

Take time to understand the language of safety. It is a language that can save your life.

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See 1995-1996 DS Golf Car Maintenance and Service Manual.

## **SECTION 25 - TRANSAXLE, ELECTRIC VEHICLE**

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See **Section 9** in the 1995-1996 DS Golf Car Maintenance and Service Manual. Disregard information pertaining to gasoline vehicles.

## **SECTION 26 - REAR SUSPENSION, ELECTRIC VEHICLE**

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See **Section 25** in the 1995-1996 DS Golf Car Maintenance and Service Manual.



# SECTION 1 - SAFETY

To insure the safety of those servicing Club Car DS Golf Cars, and to protect the vehicles from possible damage resulting from improper service or maintenance, the procedures in this manual must be followed. It is important to note that throughout this manual there are statements which are contained within boxes labeled **DANGER**, **WARNING**, or **CAUTION**. These special statements relate to specific safety issues, and must be read, understood, and heeded before proceeding with procedures. There are also boxes labeled **NOTE**, which provide other essential service or maintenance information.

**⚠ DANGER**

- A DANGER INDICATES AN IMMEDIATE HAZARD WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH.

**⚠ WARNING**

- A WARNING INDICATES AN IMMEDIATE HAZARD WHICH COULD RESULT IN SEVERE PERSONAL INJURY.

**⚠ CAUTION**

- A CAUTION INDICATES HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN MINOR PERSONAL INJURY, OR DAMAGE TO THE VEHICLE OR OTHER PROPERTY.

**NOTE**

- A NOTE PROVIDES KEY INFORMATION TO MAKE PROCEDURES MORE EASILY UNDERSTOOD OR IMPLEMENTED.

Service technicians should become familiar with the following general safety statements. These will be found frequently throughout this manual:

**⚠ DANGER**

- **GASOLINE - FLAMMABLE! EXPLOSIVE! DO NOT SMOKE. KEEP SPARKS AND FLAMES AWAY FROM THE VEHICLE SERVICE AREA.**
- **DO NOT OPERATE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE, WHICH IS AN ODORLESS, DEADLY POISON.**
- **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.**
- **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.**

**General Safety Statements, Continued:****⚠ WARNING**

- ONLY TRAINED MECHANICS 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.
- IMPROPER USE OF THIS VEHICLE, OR FAILURE TO MAINTAIN IT PROPERLY, COULD RESULT IN DECREASED PERFORMANCE OR SEVERE PERSONAL INJURY.
- ANY MODIFICATION OR CHANGE TO THE VEHICLE WHICH AFFECTS THE STABILITY, OR INCREASES THE SPEED BEYOND FACTORY SPECIFICATIONS, COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.
- CHECK THE OWNER'S MANUAL FOR PROPER LOCATION OF ALL VEHICLE WARNING DECALS AND MAKE SURE THAT THEY ARE IN PLACE AND ARE EASILY READ.
- 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 AND REVERSE LEVER 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.
- MOVING PARTS! - DO NOT ATTEMPT TO SERVICE THE VEHICLE WHILE IT IS RUNNING.
- HOT! - DO NOT ATTEMPT TO SERVICE HOT MOTOR, RESISTORS, ENGINE, OR EXHAUST SYSTEMS. FAILURE TO HEED THIS WARNING COULD RESULT IN SEVERE BURNS.
- LIFT ONLY ONE END OF A 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.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.

**GASOLINE VEHICLES ONLY:**

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, OR OTHER METAL COMPONENT.

**ELECTRIC VEHICLES ONLY:**

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, DISCONNECT BATTERIES AS SHOWN IN FIGURE 22-5 OR 22-6, PAGE 22-5 IN THE MAINTENANCE AND SERVICE MANUAL. THEN DISCHARGE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES AS FOLLOWS:
  - TURN THE KEY SWITCH TO **ON** AND PLACE THE FORWARD AND REVERSE LEVER IN THE REVERSE POSITION.
  - SLOWLY DEPRESS THE ACCELERATOR PEDAL AND KEEP IT DEPRESSED UNTIL THE REVERSE WARNING BUZZER CAN NO LONGER BE HEARD. WHEN THE BUZZER STOPS SOUNDING, THE CONTROLLER IS DISCHARGED.

# SECTION 2 - VEHICLE SPECIFICATIONS

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Club Car, Inc. reserves the right to change specifications and design of either gasoline or electric vehicles at any time without notice and without obligation to make these changes on units previously sold.

SPECIFICATIONS	DS GASOLINE	POWERDRIVE SYSTEM 48 ELECTRIC	POWERDRIVE PLUS ELECTRIC	DS 36 VOLT ELECTRIC
<b>POWER SOURCE</b>				
<b>Engine:</b> 4 cycle, OHV, 286 cc, 9.0 hp rated, single cylinder, air cooled, with pressure lubrication system.	•			
<b>Drive Motor:</b> Direct drive, 48 volts DC, series wound, 3.1 hp.		•		
<b>Drive Motor:</b> Direct drive, 48 volts DC, shunt wound, 3.2 hp.			•	
<b>Drive Motor:</b> Direct drive, 36 volts DC, series wound, 2.97 hp.				•
<b>Fuel System:</b> Side draft carburetor with float bowl, fixed jets, fuel filter, and impulse fuel pump.	•			
<b>Governor:</b> Automatic ground speed sensing, internally geared in the unitized transaxle.	•			
<b>Ignition:</b> Transistor electronic ignition with electronic RPM limiter.	•			
<b>Unitized Transaxle:</b> Fully synchronized forward and reverse with neutral (11.8:1 forward, 17.1:1 reverse).	•			
<b>Transaxle:</b> Double reduction helical gear with 12.28:1 direct drive axle.		•	•	•
<b>Electrical System:</b> 12 volt, 460 cold cranking amp battery and 35 amp charging capacity.	•			
<b>Electrical System:</b> 48 volts DC, reduced speed reverse.		•	•	
<b>Electrical System:</b> 36 volts DC, reduced speed reverse.				•
<b>Batteries:</b> High capacity, deep cycle, Trojan PowerDrive 8 volt, 117 min. capacity.		•	•	
<b>Batteries:</b> High capacity, deep cycle, Trojan 6 volt, 115 min. capacity.				•
<b>Charger:</b> Automatic, 17 amp PowerDrive; UL and CSA listed.		•	•	
<b>Charger:</b> Automatic, 21 amp Accu-Power; UL and CSA listed.				•
<b>Torque Converter:</b> Automatic, variable speed, dry type.	•			
<b>STEERING/SUSPENSION/BRAKES</b>				
<b>Steering:</b> Self-adjusting rack and pinion.	•	•	•	•
<b>Suspension:</b> Front and rear tapered mono-leaf springs with dual hydraulic shocks.	•	•	•	•
<b>Brakes:</b> Dual rear wheel self-adjusting brakes with cast iron drums and single brake pedal with automatic-release park brake.	•	•	•	•
<b>BODY/CHASSIS</b>				
<b>Frame/Chassis:</b> Twin I-Beam welded aluminum.	•	•	•	•
<b>Front and Rear Body:</b> Armorflex®	•	•	•	•
<b>Body Finish:</b> Protective coat over molded-in color.	•	•	•	•
<b>Tires:</b> 18.00 x 8.50 - 8.00 tubeless, 4 ply rated.	•	•	•	•
<b>SEATING CAPACITY/FUEL CAPACITY</b>				
<b>Standard Seating Capacity:</b> 2 persons	•	•	•	•
<b>Fairway Villager Seating Capacity:</b> 4 persons	•	•	N/A	N/A
<b>Fuel Tank:</b> 7 gallons (26.5 liters), unleaded gasoline only.	•			
<b>Specifications Continued on Next Page.</b>				

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SPECIFICATIONS	DS GASOLINE	POWERDRIVE SYSTEM 48 ELECTRIC	POWERDRIVE PLUS ELECTRIC	DS 36 VOLT ELECTRIC
<b>DIMENSIONS/WEIGHT</b>				
<b>Overall Length</b>	91-1/2" (232 cm)	91-1/2" (232 cm)	91-1/2" (232 cm)	91-1/2" (232 cm)
<b>Overall Width</b>	47-1/4" (120 cm)	47-1/4" (120 cm)	47-1/4" (120 cm)	47-1/4" (120 cm)
<b>Overall Height:</b> At Steering Wheel.	48" (122 cm)	48" (122 cm)	48" (122 cm)	48" (122 cm)
<b>Wheelbase</b>	65-1/2" (166 cm)	65-1/2" (166 cm)	65-1/2" (166 cm)	65-1/2" (166 cm)
<b>Ground Clearance</b>	4-1/2" (11 cm)	4-1/2" (11 cm)	4-1/2" (11 cm)	4-1/2" (11 cm)
<b>Front Wheel Tread</b>	34-1/2" (88 cm)	34-1/2" (88 cm)	34-1/2" (88 cm)	34-1/2" (88 cm)
<b>Rear Wheel Tread</b>	38-1/2" (98 cm)	38-1/2" (98 cm)	38-1/2" (98 cm)	38-1/2" (98 cm)
<b>Weight:</b> Standard electric vehicle (without batteries)		455 lbs. (206 kg)	455 lbs. (206 kg)	448 lbs. (203 kg)
<b>Weight:</b> Fairway Villager electric vehicle (without batteries)		495 lbs. (225 kg)	N/A	N/A
<b>Weight:</b> Standard gasoline powered vehicle (dry)	593 lbs. (269 kg.)			
<b>Weight:</b> Fairway Villager gasoline powered vehicle (dry)	633 lbs. (287 kg.)			
<b>Forward Speed</b>	12 - 15 mph (19 - 24 kph)	12 - 15 mph (19 - 24 kph)	12 - 15 mph (19 - 24 kph)	12 - 15 mph (19 - 24 kph)
<b>Clearance Circle</b> (diameter)	17'-6" (533 cm)	17'-6" (533 cm)	17'-6" (533 cm)	17'-6" (533 cm)
<b>Braking Distance:</b> At 12 mph (19 kph).	14' (427 cm)	14' (427 cm)	14' (427 cm)	14' (427 cm)

# SECTION 3 - GENERAL INFORMATION

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*Because continuously variable potentiometers were used on some early 1997 DS PowerDrive System 48 and PowerDrive Plus Golf Cars, the Pre-Operation Checklist on Page 3-2 in the 1995-1996 DS Maintenance and Service Manual should read as follows:*

## PRE-OPERATION CHECKLIST

Your CLUB CAR has been thoroughly inspected and adjusted at the factory, and also by your CLUB CAR distributor/dealer. However, upon arrival of your new CLUB CAR(s), you should become familiar with its controls and operation, and carefully inspect each vehicle to be satisfied that it is in proper working condition before accepting delivery.

Use the following checklist as a guide to inspect your new vehicle. Any problems should be corrected only by your CLUB CAR distributor/dealer or a trained technician.

- **General:** All the parts should be in place and properly installed. Be sure that all nuts, bolts, and screws are tight. On the DS Gasoline vehicle, check all hose clamps for tight fit as well as the starter belt for tightness.
- **Warning Labels:** Check to ensure that all warning and operation labels are in place (**See Vehicle Identification pages at the beginning of vehicle Owner's Manual**).

### NOTE

- SEVERAL VEHICLE SAFETY DECALS HAVE BEEN RELOCATED FROM BENEATH THE SEAT ON THE VEHICLE FRONT BODY TO THE VEHICLE FRAME INSIDE THE ENGINE OR BATTERY COMPARTMENT.

- **Tires:** Check for proper tire pressure (**See Capacities, Page 9 in this supplement**).
- **DS Electric Batteries (all models):** Check electrolyte to ensure that it is at its proper level (**See Figure 22-7, Section 22, Page 6, in the Maintenance and Service Manual**). Check battery posts. Wires should be tight and free of corrosion. Charge batteries fully before first use of vehicle.
- **DS V-Glide Speed Switch and PowerDrive System 48 Multi-step Potentiometer:** Be sure speed switch or potentiometer cover is properly secured prior to operating the vehicle.

### NOTE

- CONTINUOUSLY VARIABLE POTENTIOMETERS WERE STANDARD ON EARLY 1997 DS POWERDRIVE SYSTEM 48 VEHICLES. ON DS POWERDRIVE SYSTEM 48 VEHICLES SERIAL NO. 9711-564736 AND LATER, THE MULTI-STEP POTENTIOMETER IS STANDARD.

- **DS Gasoline Engine:** Check for proper engine oil level (**See Section 13, Page 47 in the Maintenance and Service Manual**).
- **DS Gasoline Fuel:** Check fuel level.

### DANGER

- BE SURE THE PLASTIC HAS BEEN REMOVED FROM THE SEAT BOTTOM BEFORE OPERATING THE VEHICLE. FAILURE TO DO SO COULD RESULT IN A FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

## SECTION 4 - PERIODIC MAINTENANCE

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It is important to implement and follow a *Preventive Maintenance* program for your vehicle(s). Preventive Maintenance consists of the regular performance of scheduled vehicle service and maintenance procedures, and is the only way to insure that the vehicle provides the safe, reliable, and economical service that it is designed to deliver. The following charts provide recommended service intervals for the lubrication and maintenance of DS vehicles. Note that critical areas such as brake operation, accelerator operation, steering and tires should be performed daily. Any car that is not functioning properly should be removed from use until it is properly repaired.

### 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.
- ALWAYS WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION WHILE SERVICING VEHICLE. WEAR A FULL FACE SHIELD WHEN WORKING WITH BATTERIES.
- ONLY TRAINED MECHANICS 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 SUPPLEMENT AND IN THE MANUAL.
- TURN KEY SWITCH OFF, PLACE FORWARD AND REVERSE SWITCH IN THE NEUTRAL POSITION, AND REMOVE KEY PRIOR TO SERVICING.
- MOVING PARTS! - DO NOT ATTEMPT TO SERVICE THE VEHICLE WHILE IT IS RUNNING.
- HOT! - DO NOT ATTEMPT TO SERVICE HOT MOTOR, RESISTORS, ENGINE, OR EXHAUST SYSTEM. FAILURE TO HEED THIS WARNING COULD RESULT IN SEVERE BURNS.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.

#### **GASOLINE VEHICLES ONLY:**

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE; ALWAYS, BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, OR OTHER METAL COMPONENT.

#### **ELECTRIC VEHICLES ONLY:**

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, DISCONNECT BATTERIES AS SHOWN IN THE MAINTENANCE AND SERVICE MANUAL; FIGURE 22-5, PAGE 22-5 FOR V-GLIDE VEHICLES, OR FIGURE 22-6, PAGE 22-5 FOR POWERDRIVE VEHICLES. THEN DISCHARGE THE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES AS FOLLOWS:
  - TURN THE KEY SWITCH TO **ON** AND PLACE THE FORWARD AND REVERSE LEVER IN THE REVERSE POSITION .
  - SLOWLY DEPRESS THE ACCELERATOR PEDAL AND KEEP IT DEPRESSED UNTIL THE REVERSE WARNING BUZZER CAN NO LONGER BE HEARD. WHEN THE BUZZER STOPS SOUNDING, THE CONTROLLER IS DISCHARGED.

# LUBRICATION - GASOLINE VEHICLES

**1-9**  
**E**  
**G**

PERIODIC LUBRICATION SCHEDULE - GASOLINE VEHICLE			
REGULAR INTERVAL	SERVICE	PLACE*	RECOMMENDED LUBRICANT
<b>Quarterly by Owner or Trained Technician</b>	Brake 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 shifter cable pivots	3.	Dry Moly Lube - Club Car Part No. 1012151
	Front Suspension (5 fittings)	4.	Chassis Lube
<b>Annually by Trained Technician Only (Every 200 rounds or 100 hours of operation)</b>	Check/fill unitized transaxle to plug level	5.	27 oz. (.8 liter) 80-90 WT. API Class GL-5 or 80-90 WT. AGMA Class EP Gear Lube
	Inspect front wheel bearings (Repack as necessary)	6.	Chassis Lube
<b>First Change 100 Hours - Additional Change Every 400 Rounds or Every 200 Hours of Operation, or Annually - Whichever Comes First</b>	Change engine oil and oil filter	7.	32 oz. (.97 liter) without filter; 38 oz. (1.16 liters) with filter. SAE 30 above 32°F (0°C) or SAE 5W20 below 32°F (0°C) API Class SE, SF, or SG Oil (or higher)

\*See Figure 4-1 below.

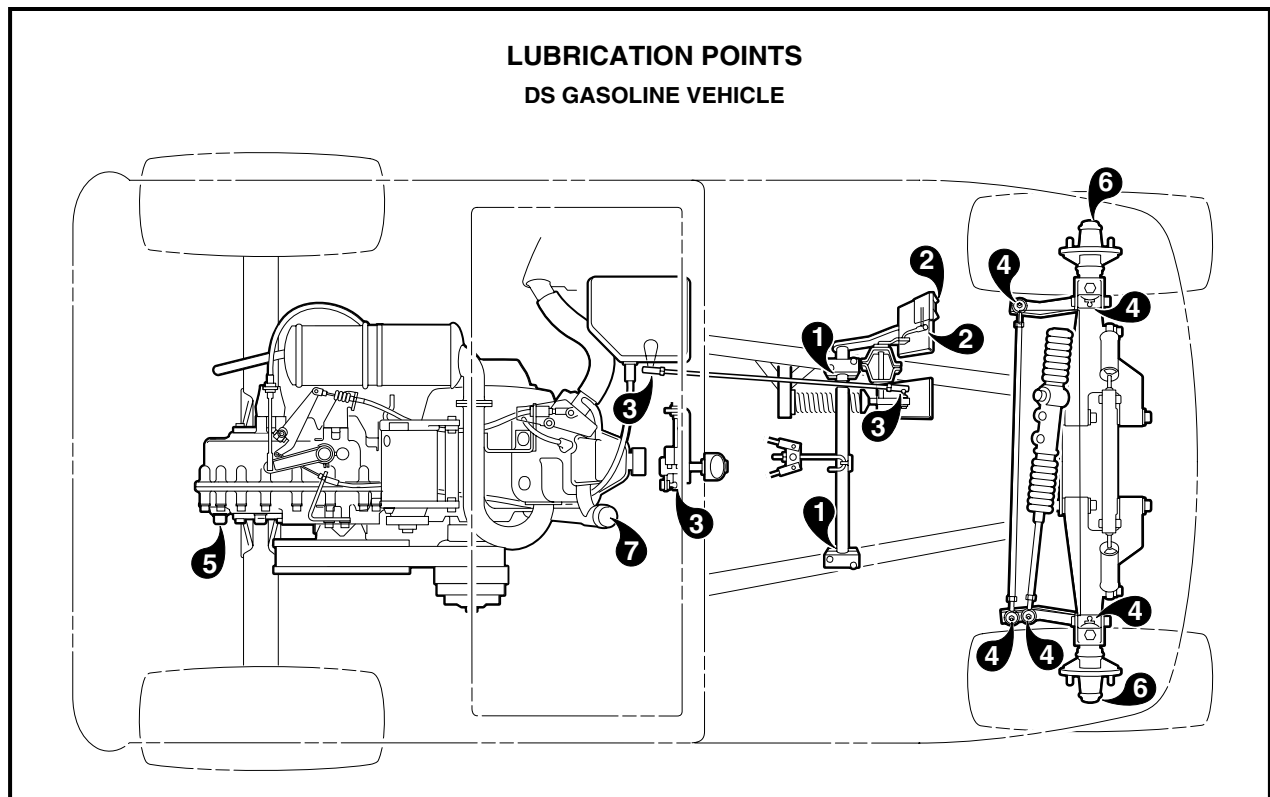


FIGURE 4-1

# 1-9 LUBRICATION - ELECTRIC VEHICLES

## E G

PERIODIC LUBRICATION SCHEDULE - ELECTRIC VEHICLES			
REGULAR INTERVAL	SERVICE	PLACE*	RECOMMENDED LUBRICANT
<b>Quarterly by Owner or Trained Technician</b>	Brake 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 pivots	3.	Dry Moly Lube - Club Car Part No. 1012151
	Forward and reverse switch shaft and contacts, charger receptacle (Do not lubricate forward and reverse switch on PowerDrive Plus vehicles)	4.	WD-40®
	Front Suspension (5 fittings)	5.	Chassis Lube
<b>Annually by Trained Technician Only (Every 200 rounds or 100 hours of operation)</b>	Check/fill transaxle to plug level	6.	22 oz. (.67 liter) SAE 30 WT. API Class SE, SF, or SG Oil (or higher)
	Inspect front wheel bearings (Repack as necessary)	7.	Chassis Lube

\*See Figure 4-2 below, and Figure 4-3 on Page 9.

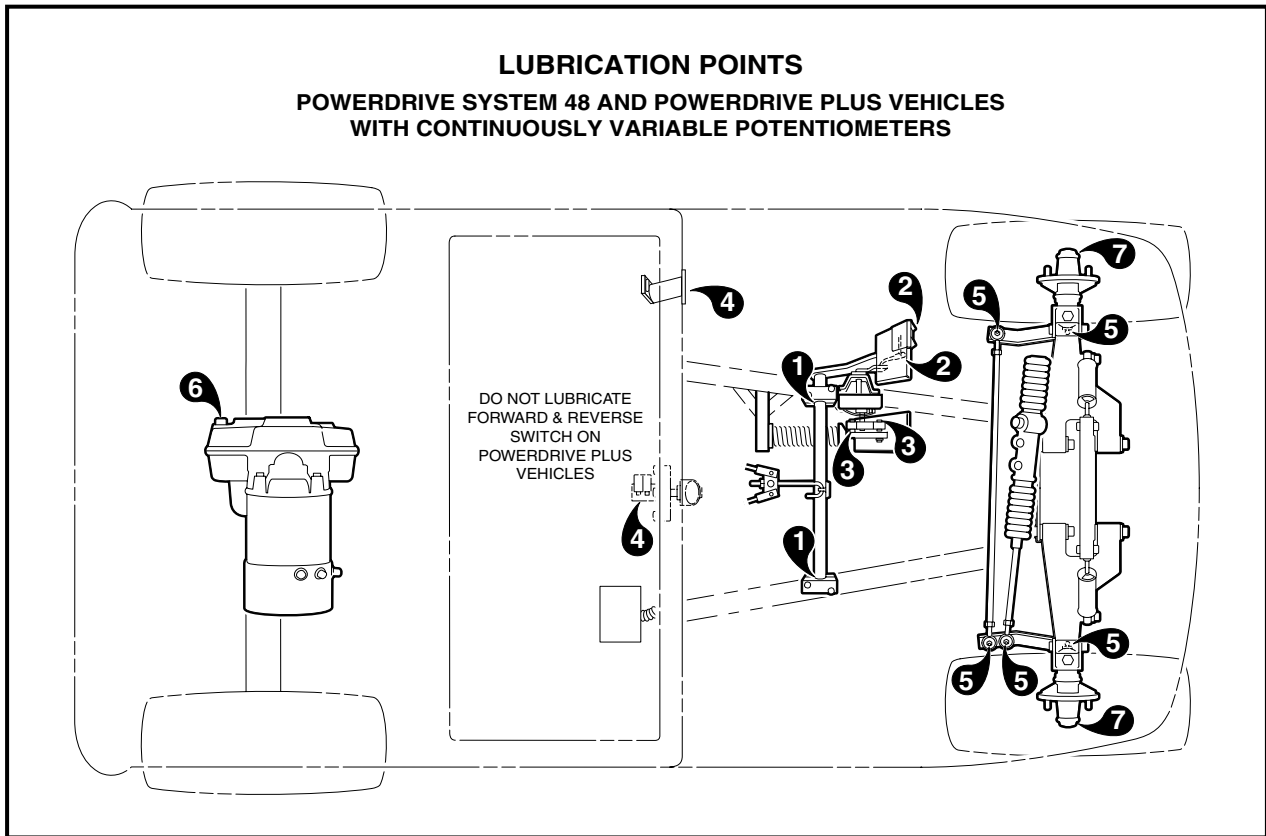


FIGURE 4-2



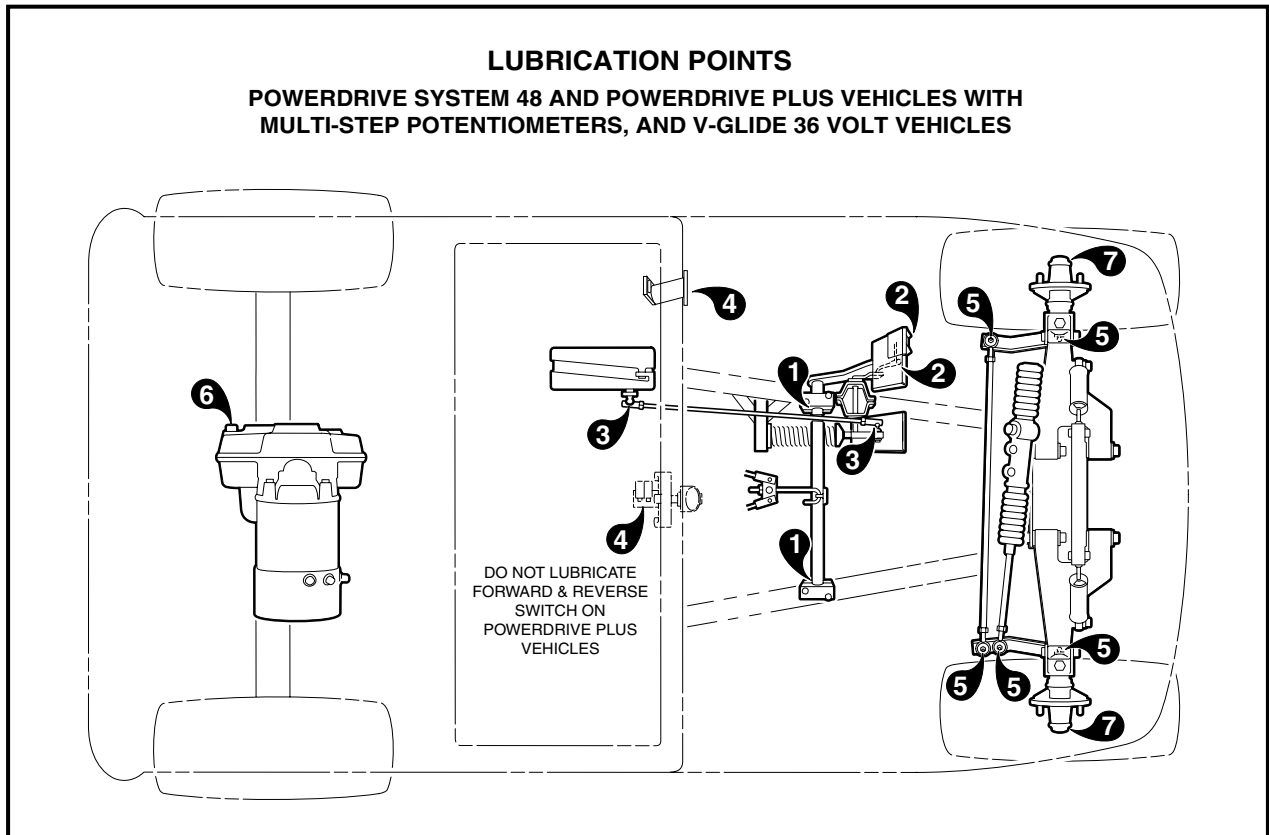


FIGURE 4-3

## VEHICLE CAPACITIES

CAPACITIES		
	GASOLINE VEHICLES	ELECTRIC VEHICLES
Engine Crankcase without filter	32 oz. (.98 liters)	
Engine Crankcase with filter	38 oz. (1.16 liters)	
Unitized Transaxle (gas vehicle)	27 oz. (.8 liters)	
Transaxle (electric vehicle)		22 oz. (.67 liters)
Gasoline Tank	7 gallons (26.5 liters)	
Tire Pressure	12-14 psi (83-96 kPa)	18-20 psi (124-138 kPa)

### **⚠ 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.

**PERIODIC SERVICE - GASOLINE VEHICLES**

<b>⚠ WARNING</b>
<ul style="list-style-type: none"> <li>• IF ANY PROBLEMS ARE FOUND DURING SCHEDULED INSPECTION OR SERVICE, DO NOT OPERATE VEHICLE UNTIL REPAIRS ARE MADE. FAILURE TO MAKE NECESSARY REPAIRS COULD RESULT IN FIRE, PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.</li> <li>• ALL SERVICE, REPAIRS, AND ADJUSTMENTS MUST BE MADE PER INSTRUCTIONS IN THIS MANUAL.</li> </ul>

<b>PERIODIC SERVICE SCHEDULE - GASOLINE VEHICLE</b>			
<b>REGULAR INTERVAL</b>	<b>SERVICE</b>		
<b>Daily Service by Owner</b>	Accelerator Pedal/Rod	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Adjust as necessary.	
	Accelerator/Governor Linkage and Cables	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Adjust as necessary.	
	Brake System	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Adjust as necessary.	
	Choke	Check for proper operation (See Section 14).	
	Engine	Check for proper operation (See Section 13).	
	Engine Air Intake System	Check air filter element, clean as necessary.	
	Engine Cooling Air Intake	Check for clogging, clean as necessary.	
	Fuel System	Check fuel tank, lines, cap, pump, and carburetor for fuel leakage.	
	Park Brake	Check proper operation. (See Performance Inspection, Page 3-2 in Maintenance & Service Manual).	
	Reverse Warning Buzzer	Check for proper operation (See NOTE, Page 3-4 in the Maintenance and Service Manual).	
	Steering and Linkages	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual).	
	Tires	Check for wear and damage.	
	Unitized Transaxle	Check shift linkage for proper operation.	
Vehicle Warning Decals	Make sure all are in place (See Gasoline Vehicle Feature Identification, in DS Owner's Manual).		
<b>Weekly Service by Owner</b>	Battery	Clean terminals and wash dirt from casing, check electrolyte level (See Section 22).	
	Electrical Wiring and Connections	Check for tightness and damage.	
	Torque Converter	Rinse with water.	
	General Vehicle		Check for loose hardware and tighten as required.
			Check maximum speed of vehicle. Maximum vehicle speed should be 12-15 mph (19-24 kph).
			Wash engine compartment and underside of vehicle.
	Check all daily items listed above.		
<b>Periodic Service Schedule Continued on Next Page.</b>			

**PERIODIC SERVICE SCHEDULE - GASOLINE VEHICLE**

REGULAR INTERVAL	SERVICE	
<b>Monthly Service by Owner or Trained Mechanic</b>	Battery	Wash battery top with baking soda/water solution (See Section 22).
	Brake System	Check brake cables for damage; replace as required.
		Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Check brake pedal free play. Adjust as necessary (See Section 6).
	Engine	Make sure that both ground wires are tight and properly connected.
		Check engine oil level - change as required (See Gas Vehicle Lubrication Chart on Page 7).
	Exhaust System	Check for leaks.
	Tires	Check for wear and damage.
Check air pressure and adjust as necessary (See Vehicle Capacities Chart on Page 9).		
Check all daily and weekly items listed above		
<b>Quarterly Service by Owner or Trained Mechanic</b>	Engine	Check engine oil level - change as required (See Gas Vehicle Lubrication Chart on Page 7).
		Check clamps for tightness; check hose for cracks.
	Engine Air Intake Hose	Check for proper operation, adjust as necessary (See Section 6).
	Accelerator Pedal/Rod	Check for proper operation, adjust as necessary.
	Accelerator/Governor Linkage and Cables	Lubricate per Gas Vehicle Lubrication Chart on Page 7.
	Steering	Lubricate per Gas Vehicle Lubrication Chart on Page 7.
	General Vehicle	Lubricate per Gas Vehicle Lubrication Chart on Page 7.
Check all daily, weekly, and monthly items listed above.		
<b>Semi-annual Service by Trained Mechanic Only (Every 100 rounds or 50 hours of operation)</b>	Brake System	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Check brake pedal free play. Adjust as necessary (See Section 6).
		Check brake shoes, replace if necessary.
		Lubricate slide plates with graphite (See Section 7).
	Drive Belt	Check for cracks, wear, or glazing, replace if necessary.
	Electrical Wiring	Check for cracked or worn insulation.
	Engine	Check spark plug wire and boot for damage and proper routing (See Section 13).
	Exhaust System	Check head and exhaust/header pipe flange connection gasket for leaks.
Check muffler condition.		
Front Wheel Alignment and Camber	Check and adjust as required (See Section 8).	
<b>Periodic Service Schedule Continued on Next Page.</b>		

**PERIODIC SERVICE SCHEDULE - GASOLINE VEHICLE**

REGULAR INTERVAL	SERVICE	
<b>Semi-annual Service by Trained Mechanic Only (Every 100 rounds or 50 hours of operation), Continued:</b>	Torque Converter/Drive Belt	Check for proper operation. Inspect belt and replace as required (See Section 16).
	Starter/Generator Belt	Check for cracks, wear, and glazing, replace if necessary.
		Check belt tension, adjust as required (Section 12).
	General Vehicle	Lubricate per Gas Vehicle Lubrication Chart, Page 7.
	Check all daily, weekly, monthly, and quarterly items listed above.	
<b>Annual Service by Trained Mechanic Only (Every 200 rounds or 100 hours of operation)</b>	Engine	Check engine oil level - change as required (See Gas Vehicle Lubrication Chart, Page 7).
		Check for leaks around gaskets, fill plugs, etc.
		Inspect, clean, and regap spark plug; replace if necessary.
	Engine Air Intake	Check air filter element, clean or replace.
	Fuel Filters	Replace.
	Front Wheel Bearings	Check front wheels for free play. Inspect and replace or repack wheel bearings with chassis lube as necessary.
	Starter/Generator	Check brush length (remove excess carbon dust); replace as necessary (See Section 12).
	Unitized Transaxle	Check/fill transaxle to plug level (See Gas Vehicle Lubrication Chart on Page 7).
	General Vehicle	Lubricate per Gas Vehicle Lubrication Chart on Page 7.
	Check all daily, weekly, monthly, quarterly, and semi-annual items listed above.	

**PERIODIC SERVICE - ELECTRIC VEHICLES****⚠ 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.
- ALL SERVICE, REPAIRS, AND ADJUSTMENTS MUST BE MADE PER INSTRUCTIONS IN THIS MANUAL.

**PERIODIC SERVICE SCHEDULE - ELECTRIC VEHICLES**

REGULAR INTERVAL	SERVICE	
<b>Daily Service by Owner</b>	Accelerator Pedal/Rod	Check for proper operation (See Section 6). Adjust as necessary.
	Accelerator Switch (Wiper Switch or Continuously Variable Potentiometer)	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual).
<b>Periodic Service Schedule Continued on Next Page.</b>		

PERIODIC SERVICE SCHEDULE - ELECTRIC VEHICLES		
REGULAR INTERVAL	SERVICE	
<b>Daily Service by Owner, Continued:</b>	Batteries	Charge batteries.
	Brake System	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Adjust as necessary.
	Charger and Receptacle	Check for damage and snug fit.
	Park Brake	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Adjust as necessary (See Section 6).
	Reverse Warning Buzzer	Check for proper operation (See NOTE, Page 3-4 in the Maintenance & Service Manual).
	Steering and Linkages	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual).
	Tires	Check for wear and damage.
	Vehicle Warning Decals	Make sure all are in place (See Electric Vehicle Feature Identification in the DS Owner's Manual).
<b>Weekly Service by Owner</b>	Batteries	Clean terminals and wash dirt from casing, check electrolyte level (See Section 22).
	Electrical Wiring and Connections	Check for tightness and damage.
	General Vehicle	Check for loose hardware and tighten as required.
		Check maximum speed of vehicle. Maximum vehicle speed should be 12-15 mph (19-24 kph).
	Check all daily items listed above.	
<b>Monthly Service by Owner or Trained Mechanic</b>	Batteries	Wash battery tops with baking soda/water solution.
	Brake System	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Check brake pedal free play. Adjust as necessary (See Section 6).
		Check brake cables for damage and replace as required.
	Tires	Check for wear and damage.
		Check air pressure and adjust as necessary (See Vehicle Capacities Chart on Page 9).
	Accelerator Switch (Wiper Switch or Continuously Variable Potentiometer)	Check for cracks or other damage; make sure switch is securely fastened to frame.
Check all daily and weekly items listed above.		
<b>Quarterly Service by Owner or Trained Mechanic</b>	Accelerator Pedal/Rod	Check for proper operation, adjust as necessary (See Section 6).
	Steering	Lubricate per Electric Vehicle Lubrication Chart on Page 8.
	General Vehicle	Lubricate per Electric Vehicle Lubrication Chart on Page 8.
	Check all daily, weekly, and monthly items listed above.	
<b>Periodic Service Schedule Continued on Next Page.</b>		

PERIODIC SERVICE SCHEDULE - ELECTRIC VEHICLES		
REGULAR INTERVAL	SERVICE	
<b>Semi-annual Service by Trained Mechanic Only (Every 100 rounds or 50 hours of operation)</b>	Batteries	Check specific gravity, electrolyte level, and on-charge voltage (See Section 22).
	Brake System	Check for proper operation (See Performance Inspection, Page 3-2 in the Maintenance & Service Manual). Check brake pedal free play. Adjust as necessary (See Section 6).
		Check brake shoes, replace if necessary.
		Lubricate slide plates with graphite (See Section 7).
	Electrical Wiring	Check for cracked or worn insulation.
	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 Section 8).
	General Vehicle	Lubricate per Electric Vehicle Lubrication Chart on Page 8.
Check all daily, weekly, monthly, and quarterly items listed above.		
<b>Annual Service by Trained Mechanic Only (Every 200 rounds or 100 hours of operation)</b>	Accelerator Switch (Wiper Switch or Continuously Variable Potentiometer)	Check for proper operation (See Performance Inspection, Page 3-2, DS Maintenance & Service Manual). Wiper switch type only: Remove cover and check contacts for burns, excessive heat, or arcing; check brush for wear.
	Batteries	Perform discharge test (See Section 22).
	Motor	Check motor brushes; replace as necessary (See Section 24).
	Front Wheel Bearings	Check front wheels for free play. Inspect and replace or repack wheel bearings with chassis lube as necessary (See Section 8).
	Transaxle	Check/fill transaxle to plug level (See Electric Vehicle Lubrication Chart on Page 8).
	General Vehicle	Lubricate per Electric Vehicle Lubrication Chart on Page 8.
	Check all daily, weekly, monthly, quarterly, and semi-annual items listed above.	

## SECTION 5 - BODY AND TRIM

All information in Section 5 of the 1995 - 1996 DS Maintenance and Service Manual, Club Car Part Number 1019051-01, is current for 1997. However, the following CAUTION, which is not stated in the manual, should also be heeded.

<b>⚠ CAUTION</b>
<ul style="list-style-type: none"> <li>IF A PRESSURE WASHER IS USED TO CLEAN THE VEHICLE, DO NOT EXCEED 500 PSI (3448 KPA). NOZZLE SHOULD BE SET TO WIDE ANGLE SPRAY.</li> </ul>

# SECTION 6 - ACCELERATOR AND BRAKE PEDAL GROUP

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*This supplemental section supersedes Section 6 in the 1995 - 1996 Maintenance and Service Manual.*

## GENERAL INFORMATION

### WARNING

- ONLY TRAINED MECHANICS 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.
- TURN KEY SWITCH OFF, PLACE FORWARD AND REVERSE LEVER 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 A 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.

#### **GASOLINE VEHICLES ONLY:**

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE; ALWAYS, BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, OR OTHER METAL COMPONENT.

#### **ELECTRIC VEHICLES ONLY:**

- TO AVOID UNINTENTIONAL STARTING OF VEHICLE, DISCONNECT BATTERIES AS SHOWN IN FIGURE 22-5 OR FIGURE 22-6, PAGE 22-5 IN THE MAINTENANCE & SERVICE MANUAL. THEN DISCHARGE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES AS FOLLOWS:
  - TURN THE KEY SWITCH TO **ON** AND PLACE THE FORWARD AND REVERSE LEVER IN THE REVERSE POSITION.
  - SLOWLY DEPRESS THE ACCELERATOR PEDAL AND KEEP IT DEPRESSED UNTIL THE REVERSE WARNING BUZZER CAN NO LONGER BE HEARD. WHEN THE BUZZER STOPS SOUNDING, THE CONTROLLER IS DISCHARGED.

### NOTE

- CONTINUOUSLY VARIABLE POTENTIOMETERS WERE STANDARD ON EARLY 1997 DS POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES. ON DS POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES SERIAL NO. 9711-564736 AND LATER, THE MULTI-STEP POTENTIOMETER IS STANDARD.

## PEDAL GROUP ADJUSTMENT

### 1. ADJUST BRAKE PEDAL HEIGHT - ALL DS VEHICLES

1.1. To provide slack in the brake cables, loosen hex nuts on the brake equalizer rod (**Figure 6-1**).

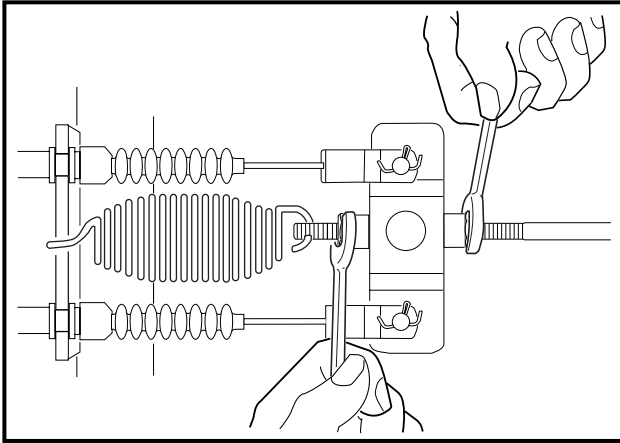


FIGURE 6-1

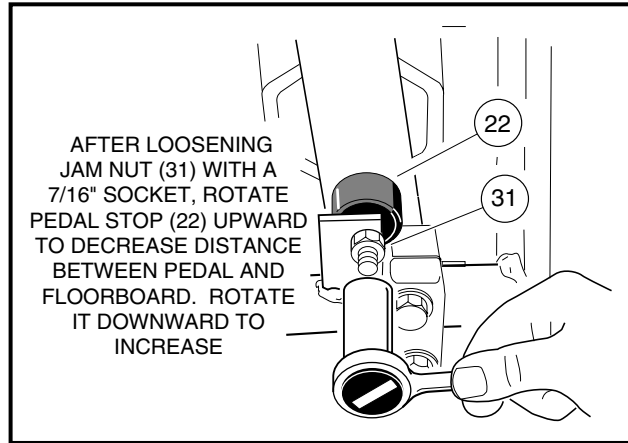


FIGURE 6-2

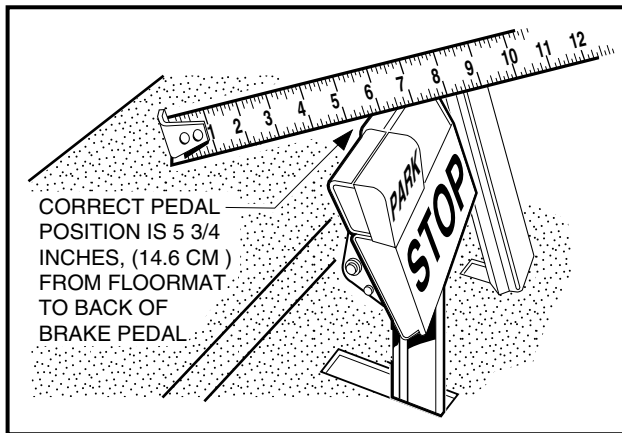


FIGURE 6-3

1.2. Using a 7/16" socket, loosen the brake stop jam nut (31), then relieve pedal pressure on the stop by pushing down slightly on the pedal. Then adjust the brake stop bumper (22) up or down (**Figure 6-2**). Adjusting the bumper upward decreases distance between pedal and floorboard. Adjusting the bumper downward increases distance between pedal and floorboard. Proper brake pedal height is 5-3/4 inches (14.6 cm) plus or minus 1/4 inch (.6 cm) (**Figure 6-3**).

1.3. Tighten the jam nut (31) to 7-9 ft.lbs. (9/10 N-m) (**Figure 6-2**).

### 2. ADJUST PARK BRAKE RATCHET/PAWL GAP AND PAWL ENGAGEMENT - ALL DS VEHICLES

2.1. Using a 1/2" wrench, adjust the retaining nut (7) on the spring support rod until there is a .060 plus or minus .030 inch gap between the pawl and the tips of the ratchet teeth. Use a feeler gauge to verify the gap (**Figure 6-4**). Read NOTES below and at top of page 17 before proceeding.

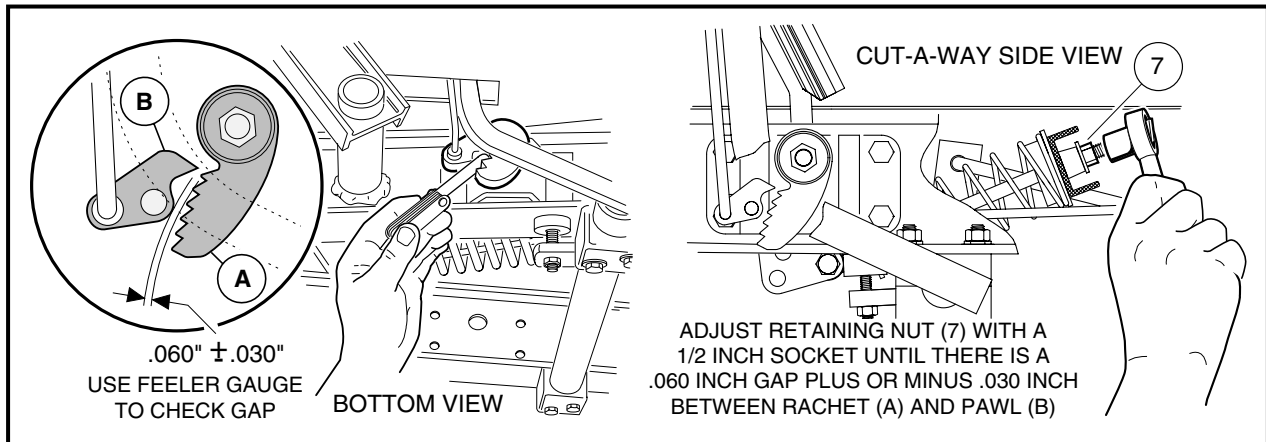
## NOTE

- ON ALL POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES PRIOR TO SERIAL NO. 9711-564736, THE ACTUATOR LEVER MUST ALSO BE ADJUSTED IF THE RATCHET/PAWL GAP IS ADJUSTED (**SEE STEP 4, PAGE 21**).

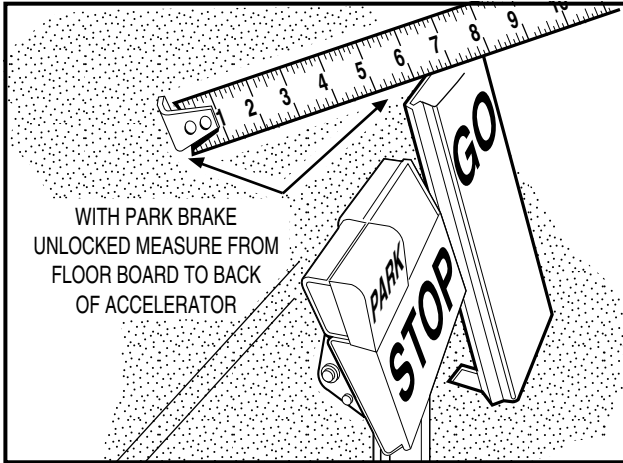


**NOTE**

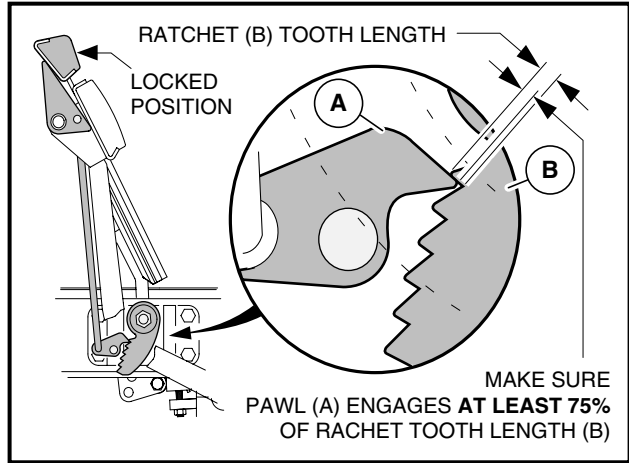
- ON ALL 1997 DS GASOLINE VEHICLES AND V-GLIDE 36 VOLT ELECTRIC VEHICLES, AND ON 1997 POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES SERIAL NO. 9711-564736 AND LATER, THE ACCELERATOR ROD ADJUSTMENT MUST ALSO BE CHECKED IF THE RATCHET/PAWL GAP IS ADJUSTED (**SEE STEP 4, PAGE 19, OR STEP 4, PAGE 20**).
- ON ALL 1997 DS GASOLINE VEHICLES AND V-GLIDE 36 VOLT ELECTRIC VEHICLES, AND ON POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES SERIAL NO. 9711-564736 AND LATER, THE ACCELERATOR ROD MUST BE DISCONNECTED BEFORE PROCEEDING TO STEP 2.2.

**FIGURE 6-4**

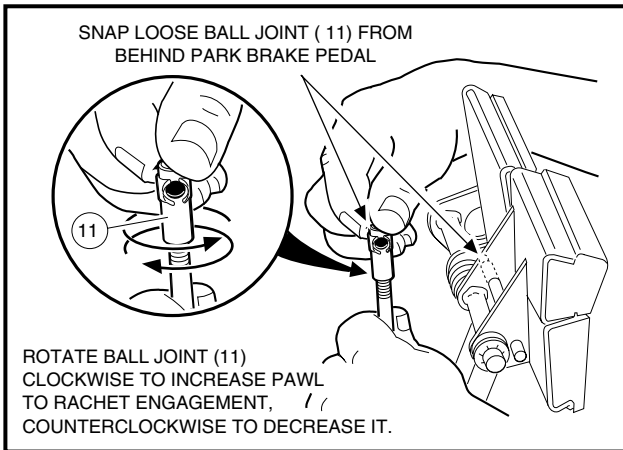
- 2.2. With the park brake unlocked, measure and note the distance from the top of the accelerator pedal to the floorboard, and then lock the park brake (**See Figure 6-5, Page 18**).
  - 2.3. With the park brake locked, make sure that at least 75% of ratchet tooth length engages the pawl (**Figure 6-6, Page 18**).
  - 2.4. With the park brake still locked, again measure the distance from the top of the accelerator pedal to the floorboard. If the measurement has changed, ratchet tooth engagement is too deep and must be adjusted.
  - 2.5. If ratchet/pawl engagement must be adjusted, disconnect the ball joint at the top of the brake brake rod and rotate the ball joint sleeve clockwise to increase engagement or counterclockwise to decrease engagement. Reconnect ball joint (**Figure 6-7, Page 18**).
  - 2.6. If the accelerator push rod was disconnected from the accelerator pedal, reconnect it.
3. **ADJUST ACCELERATOR PEDAL HEIGHT - ALL DS VEHICLES**
    - 3.1. Using a 1/2" socket and 1/2" wrench, loosen the nut and bolt (**Figure 6-8, Page 18**) securing the accelerator pedal to the pivot plate. Clamp the accelerator pedal adjustment tool (Club Car Part No. 1018710-01) to the accelerator pedal, with the end marked **accelerator pedal height** toward the floorboard, then depress the accelerator pedal until the end of the tool rests against the floorboard (pedal height should be 5-5/8" plus or minus 1/8"). Use a rubber strap to hold the pedal in position against the floorboard and then tighten the nut to 12-15 ft.lbs. (16/20 N-m) (**Figure 6-9, Page 18**).
      - For gasoline vehicles, proceed to Step 4.
      - For V-Glide 36 volt vehicles, and for PowerDrive System 48 and PowerDrive Plus vehicles serial number 9711-564736 and later, proceed to Page 20.
      - For PowerDrive System 48 and PowerDrive Plus vehicles prior to serial number 9711-564736, proceed to Page 21.



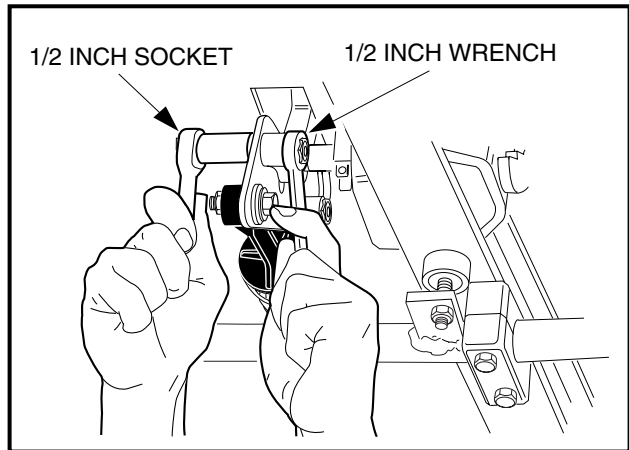
**FIGURE 6-5**



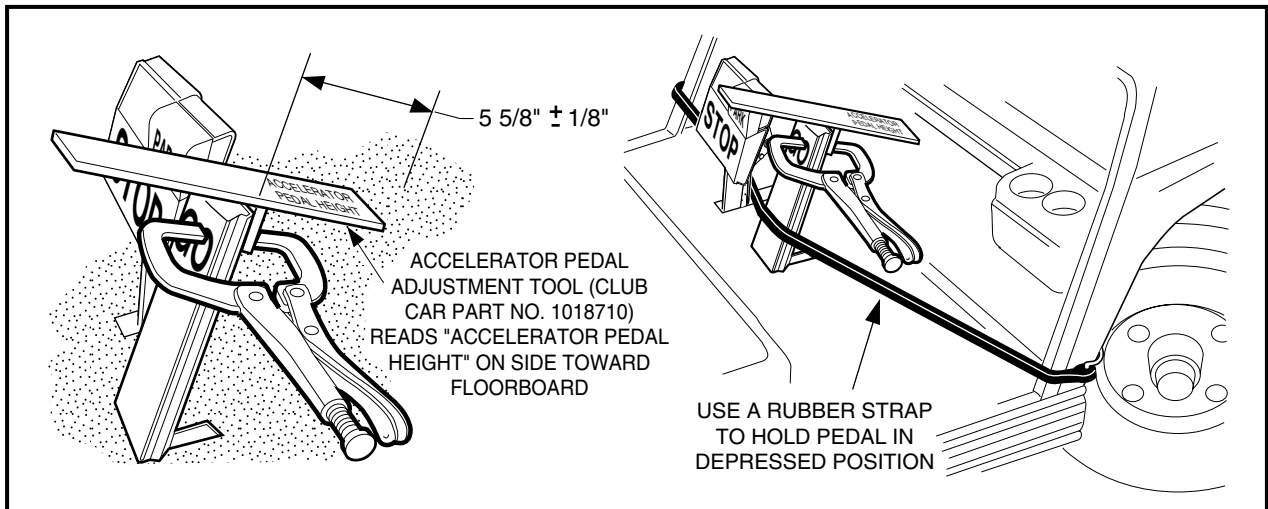
**FIGURE 6-6**



**FIGURE 6-7**



**FIGURE 6-8**



**FIGURE 6-9**

- ADJUST THE ACCELERATOR ROD (See page 20 for V-Glide 36 volt vehicles, and for PowerDrive System 48 and PowerDrive Plus electric vehicles serial numbers 9711-564736 and later, or page 21 for PowerDrive System 48 and PowerDrive Plus vehicles prior to serial number 9711-564736).

- Adjust the Accelerator Rod - Gasoline Vehicles Only:

## **⚠ DANGER**

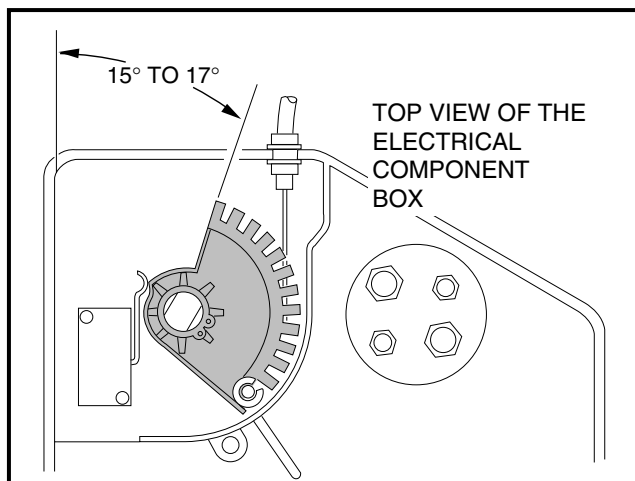
- **BEFORE SERVICING, TURN THE KEY SWITCH TO OFF AND PLACE THE FORWARD AND REVERSE LEVER IN THE NEUTRAL POSITION.**
- **TO PREVENT ACCIDENTAL STARTING OF THE ENGINE, DISCONNECT THE BATTERY CABLES, NEGATIVE (-) FIRST. THIS WILL PREVENT THE POSSIBILITY OF THE VEHICLE RUNNING OVER YOU WHEN YOU ARE ADJUSTING THE ACCELERATOR ROD.**

4.1. Remove the electrical box cover.

4.2. Disconnect the accelerator rod at the accelerator pedal, then loosen the jam nuts (20) and adjust the length of the rod (19) (**Figure 6-11, Page 21**) to obtain an accelerator cable cam position of 15°-17° as shown (**Figure 6-10**). See **CAUTION** below.

## **⚠ CAUTION**

- AFTER ACCELERATOR ROD ADJUSTMENT, MAKE SURE THAT APPROXIMATELY THE SAME NUMBER OF THREADS IS EXPOSED AT EACH END OF THE ROD.
- IF THE LEVER ON THE LIMIT SWITCH IN THE ELECTRICAL BOX IS BENT, REPLACE THE LIMIT SWITCH.
- WHEN LOOSENING OR TIGHTENING JAM NUTS ON THE ACCELERATOR ROD WHEN ONE END IS DISCONNECTED, HOLD THE DISCONNECTED BALL JOINT SLEEVE WITH PLIERS.



**FIGURE 6-10**

4.3. Reconnect the accelerator rod at the accelerator pedal.

4.4. Before tightening the jam nuts on the accelerator rod, set the park brake to the first ratchet and pawl position. Depress the accelerator pedal and make sure that the following events occur in the **exact order shown**: See NOTE at the top of Page 20.

<b>EVENT</b>	<b>APPROXIMATE PEDAL TRAVEL (REFERENCE ONLY)</b>
Park Brake Release	2° - 4°
Solenoid Activation	4° - 8°
Carburetor Throttle Actuation	8° - 12°

## Adjust the Accelerator Rod, Gasoline Vehicles, Continued:

### NOTE

- **AFTER** THE PEDAL GROUP AND ACCELERATOR ROD ARE ADJUSTED, THE FINAL GOVERNED ENGINE RPM SHOULD BE SET PER SPECIFICATIONS IN SECTION 13, PAGE 13-50.

- 4.5. If the events above occur as they should, hold the ball joint at each end of the accelerator rod with pliers and tighten the accelerator rod jam nut against it.
  - 4.6. Again, check that events occur as described in step 4.4.
  - 4.7. Install the electrical box cover.
- **Adjust the Accelerator Rod - V-Glide 36 Volt vehicles, and also PowerDrive System 48 and PowerDrive Plus vehicles serial numbers 9711-564736 and later.**

### DANGER

- **BEFORE SERVICING, TURN THE KEY SWITCH TO OFF AND PLACE THE FORWARD AND REVERSE LEVER IN THE NEUTRAL POSITION.**
- **TO PREVENT ACCIDENTAL STARTING OF THE VEHICLE, DISCONNECT THE BATTERIES (AND DISCHARGE THE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES) AS INSTRUCTED ON PAGE 6 (SEE FIGURE 22-6, PAGE 22-5 IN THE MAINTENANCE AND SERVICE MANUAL). THIS WILL PREVENT THE POSSIBILITY OF THE VEHICLE RUNNING OVER YOU WHEN YOU ARE ADJUSTING THE ACCELERATOR ROD.**

- 4.1. Remove the wiper switch cover.

### CAUTION

- **ADJUST THE ACCELERATOR ROD/WIPER SWITCH ARM EXACTLY AS STATED IN STEP 4.2 OR THE WIPER SWITCH COULD BECOME DAMAGED AND NOT OPERATE PROPERLY.**

- 4.2. Slowly depress the accelerator pedal fully to the floor and hold it in this position. With the accelerator pedal fully depressed, the wiper switch arm brush should be positioned entirely on the last fixed contact. It is acceptable for the wiper switch arm to come into contact with the wiper switch housing provided there is no excessive pressure against the housing. To check wiper arm pressure against the housing, keep the accelerator pedal fully depressed and disconnect the accelerator rod from the wiper switch ball stud. Then try to reconnect it. If the accelerator pedal must be released in order to reconnect the accelerator rod, then the wiper switch arm is exerting excessive pressure against the housing - proceed to step 4.3. If the accelerator rod can be easily connected, it is correctly adjusted.
- 4.3. If the accelerator rod is not adjusted correctly, disconnect it from the ball stud at the wiper switch and manually rotate the bell crank until the wiper switch arm brush is positioned **entirely** on the last fixed contact.
- 4.4. While holding the accelerator rod with pliers, loosen the jam nut (20) and adjust the ball joint (21) sleeve to fit on the wiper switch ball stud, with approximately the same number of threads showing at each end of the rod. Then tighten jam nut (20) against the sleeve (**Figure 6-11**).
- 4.5. Depress the accelerator pedal several times and then check to be sure that the wiper switch arm brush is positioned entirely on the eighth fixed contact, and that the wiper switch arm is not exerting excessive pressure against the wiper switch housing.
- 4.6. Install the wiper switch cover.

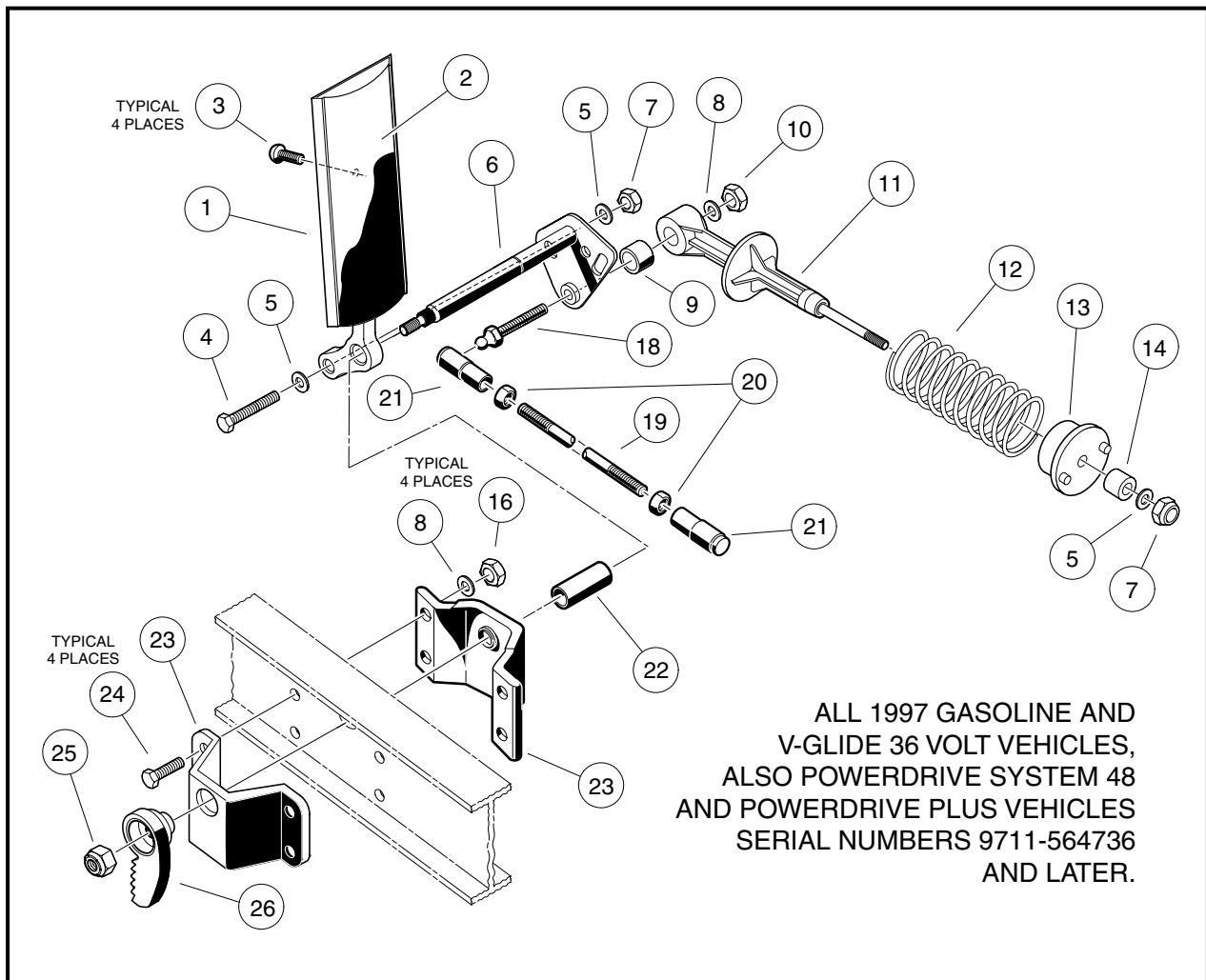


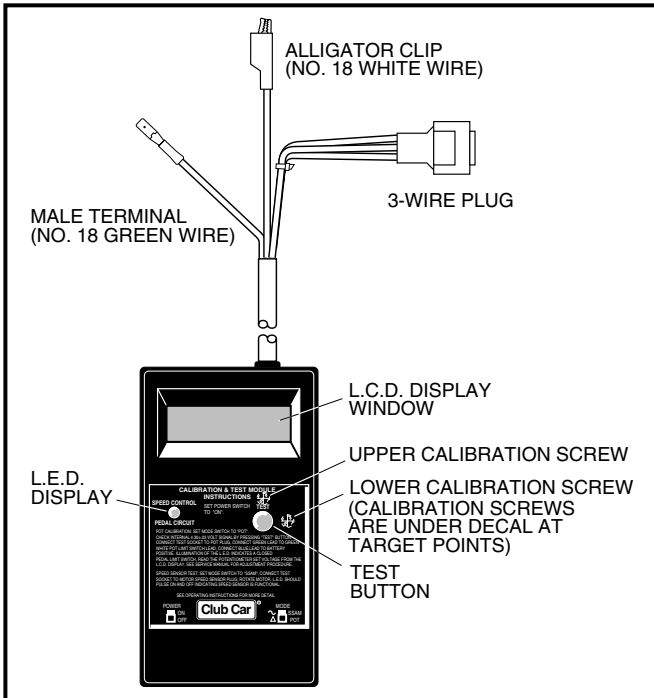
FIGURE 6-11

• **PowerDrive System 48 and PowerDrive Plus Vehicles, Serial Numbers Prior to 9711-564736 - Adjust the Actuator Lever (There is no accelerator rod on PowerDrive System 48 or PowerDrive Plus vehicles prior to serial number 9711-564736):**

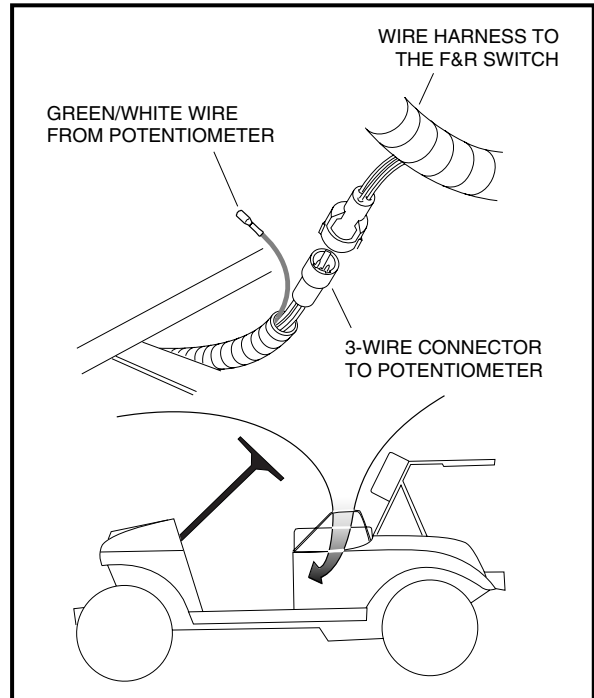
- 4.1. Connect the Calibration Test Module (Club Car Part No. 1018871-01) (**Figure 6-12, Page 22**) to the vehicle.
  - 4.1.1. Disconnect the 3-wire connector to the potentiometer from the wire harness as shown (**Figure 6-13, Page 22**).
  - 4.1.2. Connect the 3-wire plug of the Calibration Test Module to the 3-wire connector from the potentiometer (**Figures 6-12 and 6-13, Page 22**).
  - 4.1.3. Disconnect the green/white wire from the potentiometer housing assembly (**Figure 6-13, Page 22**) at the Forward and Reverse Limit Switch No. 1 on standard **PowerDrive System 48 vehicles**, or at the main wire harness (under the charger receptacle) on **PowerDrive Plus vehicles with motor braking**.
  - 4.1.4. Connect the green/white wire from the potentiometer housing to the green lead from the Calibration Test Module (**Figure 6-13**).
  - 4.1.5. If it is not already disconnected, disconnect the 6 gauge red wire from the positive (+) post of battery No. 6. Connect the Calibration Test Module's alligator clip to the end of the 6 gauge red wire.

**Adjusting Actuator Lever on PowerDrive System 48 and PowerDrive Plus Vehicles, Continued:**

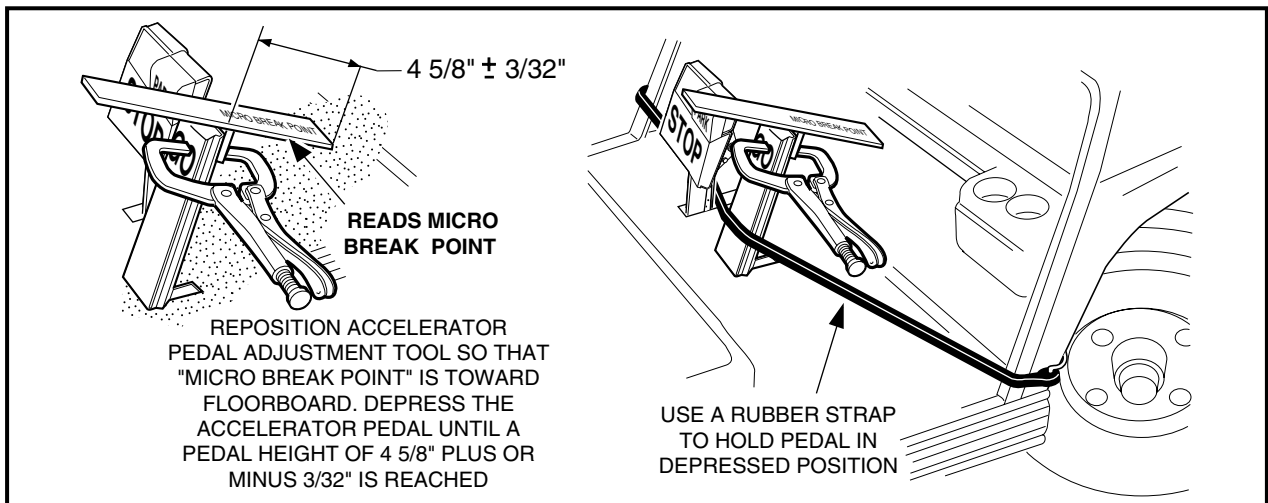
- 4.2. Position and clamp the Accelerator Pedal Adjustment tool on the accelerator pedal with the end marked **micro break point** toward the floorboard, then depress the pedal until the end of the tool rests against the floorboard (pedal height should be  $4\frac{5}{8}$ " plus or minus  $\frac{3}{32}$ "). Use a rubber strap to hold the pedal in depressed position and proceed to step 4.3. **(Figure 6-14).**
- 4.3. Use a 1/4" socket or nut driver to remove two screws (20) and detach the potentiometer housing cover **(Figure 6-15).**
- 4.4. Using a 7/16" deep well socket, slightly loosen the bolt (9) **(Figure 6-16)** attaching the actuator lever to the adjustment bracket.
- 4.5. Rotate the actuator lever (17) on the pivot rod weldment (6) **(Figure 6-19, Page 24)** counterclockwise until the red LED on the test module goes out (limit switch clicks off). Then slowly rotate the actuator lever clockwise until the red LED is illuminated again (limit switch clicks on).



**FIGURE 6-12**



**FIGURE 6-13**



**FIGURE 6-14**

- 4.6. With the actuator in this position, tighten the actuator bolt slightly.
- 4.7. Using a 5/16" wrench, loosen the potentiometer adjustment lock nut (See Figure 6-17).
- 4.8. Using a potentiometer adjustment tool or very small flat blade screwdriver (electronics type), turn the potentiometer adjustment screw until the test module reads from 3.38 to 3.42 volts. Then tighten the potentiometer lock nut to 4-6 in.lbs (.45/.68 N-m)(See Figure 6-18).
- 4.9. Again loosen the actuator lever bolt and rotate the actuator lever counterclockwise until the red LED goes off.
- 4.10. With the actuator lever in this position, tighten the actuator lever bolt to 70-80 in.lbs. This step sequence ensures that the solenoid will not engage with the accelerator pedal in the up position and the park brake set. If the red LED is illuminated at this point, repeat step 4.9.
- 4.11. Disconnect the Calibration Test Module from the vehicle and reconnect the three-wire connector (from the potentiometer) to the wire harness. Reconnect the green/white wire to the Forward and Reverse Limit Switch No. 1 **on standard PowerDrive System 48 vehicles**, or to the wiring harness **on PowerDrive Plus vehicles**.

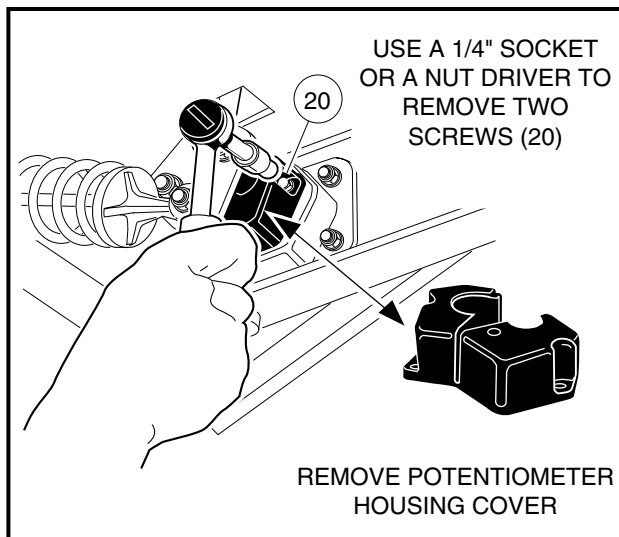


FIGURE 6-15

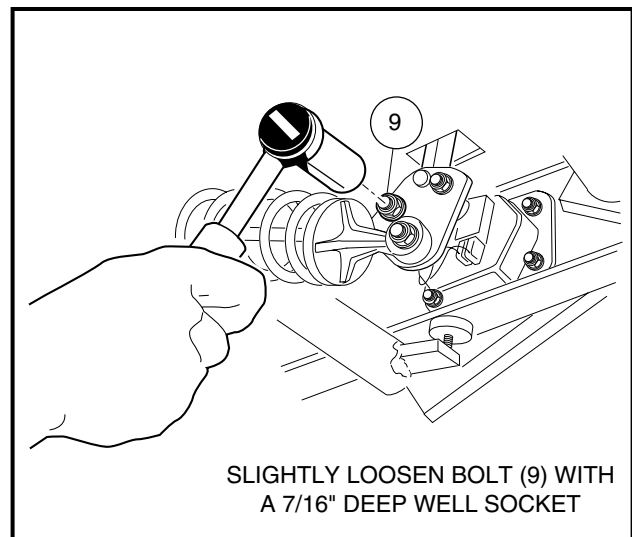


FIGURE 6-16

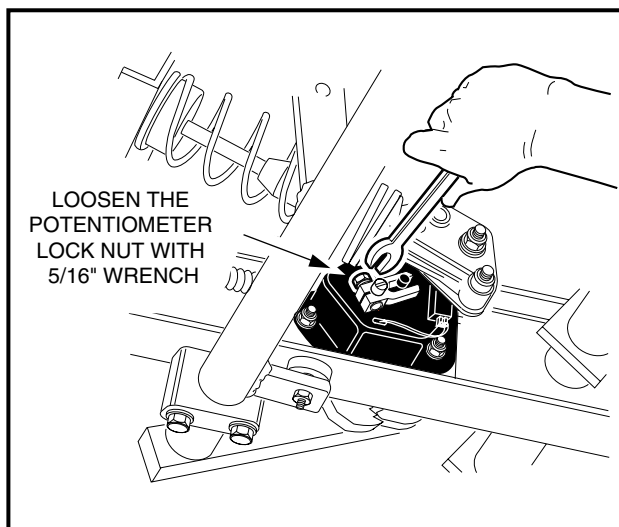


FIGURE 6-17

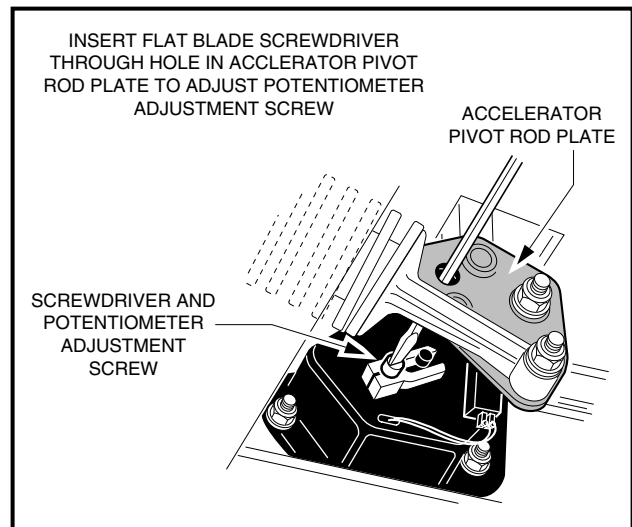


FIGURE 6-18

**Adjusting Actuator Lever on PowerDrive System 48 and PowerDrive Plus Vehicles, Continued:**

- 4.12. Check potentiometer adjustment (See 1995-1996 DS Maintenance and Service Manual, Section 20A, Page 20-17).
- 4.13. Install the potentiometer housing cover.

**NOTE**

- THE POTENTIOMETER IS PRESET AT THE FACTORY AND SHOULD NOT REQUIRE ADJUSTMENT. IF A PROBLEM IS SUSPECTED, SEE SECTION 20A, PAGE 20-17 IN THE MAINTENANCE AND SERVICE MANUAL.

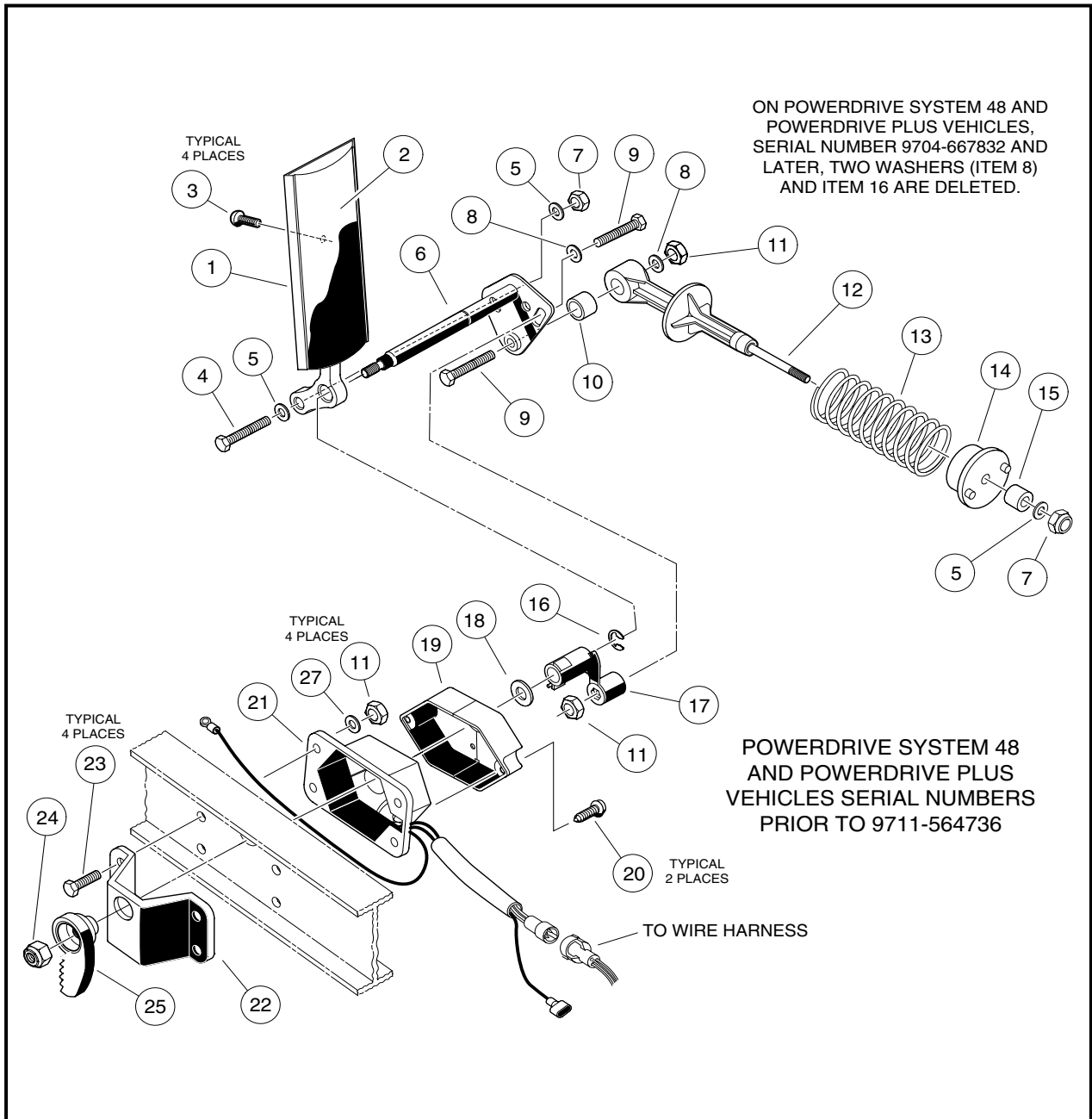


FIGURE 6-19



# PEDAL GROUP DISASSEMBLY AND ASSEMBLY

1-9

E

G

## ALL VEHICLES

### Removing the Brake Pedal Assembly

1. Make sure key switch is off and that the Forward and Reverse Switch is in neutral, then disconnect battery or batteries as shown (In the Maintenance and Service Manual, see Figure 12-1, Page 12-2 for gasoline vehicles, or Figure 22-5 or 22-6, Page 22-5 for electric vehicles). See CAUTION below.

#### **⚠ CAUTION**

- DISCHARGE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES PER WARNINGS ON PAGE 15.

2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jackstands under the front cross tube of the vehicle frame and lower the vehicle onto the jackstands. See WARNING below.

#### **⚠ WARNING**

- LIFT ONLY ONE END OF A 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.

3. Remove the brake pedal assembly.
  - 3.1. Disconnect the brake cables from the equalizer rod (26) (Figure 6-20, Page 26).
  - 3.2. Remove the pedal return spring (27) from the equalizer rod (26) (Figure 6-20).
  - 3.3. Remove the nuts (33), flat washers (25), bolts (28), and bearing blocks (23) (Figure 6-20).
  - 3.4. Loosen the brake equalizer rod hex nut (24) five turns, then disconnect the rod (26) from the pedal shaft (Figure 6-20).
  - 3.5. Remove the nut (31) and brake stop (22) (Figure 6-20).
  - 3.6. Lift the pedal assembly (6) up through the floorboard (Figure 6-20, Page 26).

### Installing the Brake Pedal Assembly

1. Install the brake pedal assembly.
  - 1.1. From the top side of the floorboard, insert the brake pedal weldment assembly (6) (Figure 6-20) through the opening in the floor as shown (Figure 6-21, Page 27), and install the pedal stop (22) (Figure 6-20) on the weldment.
  - 1.2. Attach the equalizer rod (26) to the brake pedal weldment assembly (6) as shown (Figure 6-20).
  - 1.3. Position and attach the brake pedal assembly and mounting blocks (23) to the vehicle frame as shown. Tighten the bolts and nuts to 40-60 in.lbs. (4.5/7 N-m) (Figure 6-20). See NOTE below.

#### **NOTE**

- EACH HALF OF EACH MOUNTING BLOCK ASSEMBLY IS MARKED WITH AN **A** OR **B**. THE HALVES MARKED **A** SHOULD BE ORIENTED TO THE TOP LEFT HAND AND BOTTOM RIGHT HAND SIDES OF THE BRAKE PEDAL ASSEMBLY, AND THE HALVES MARKED **B** SHOULD BE ORIENTED TO THE TOP RIGHT HAND SIDE AND BOTTOM LEFT HAND SIDE OF THE BRAKE PEDAL ASSEMBLY (FIGURE 6-20, PAGE 26).

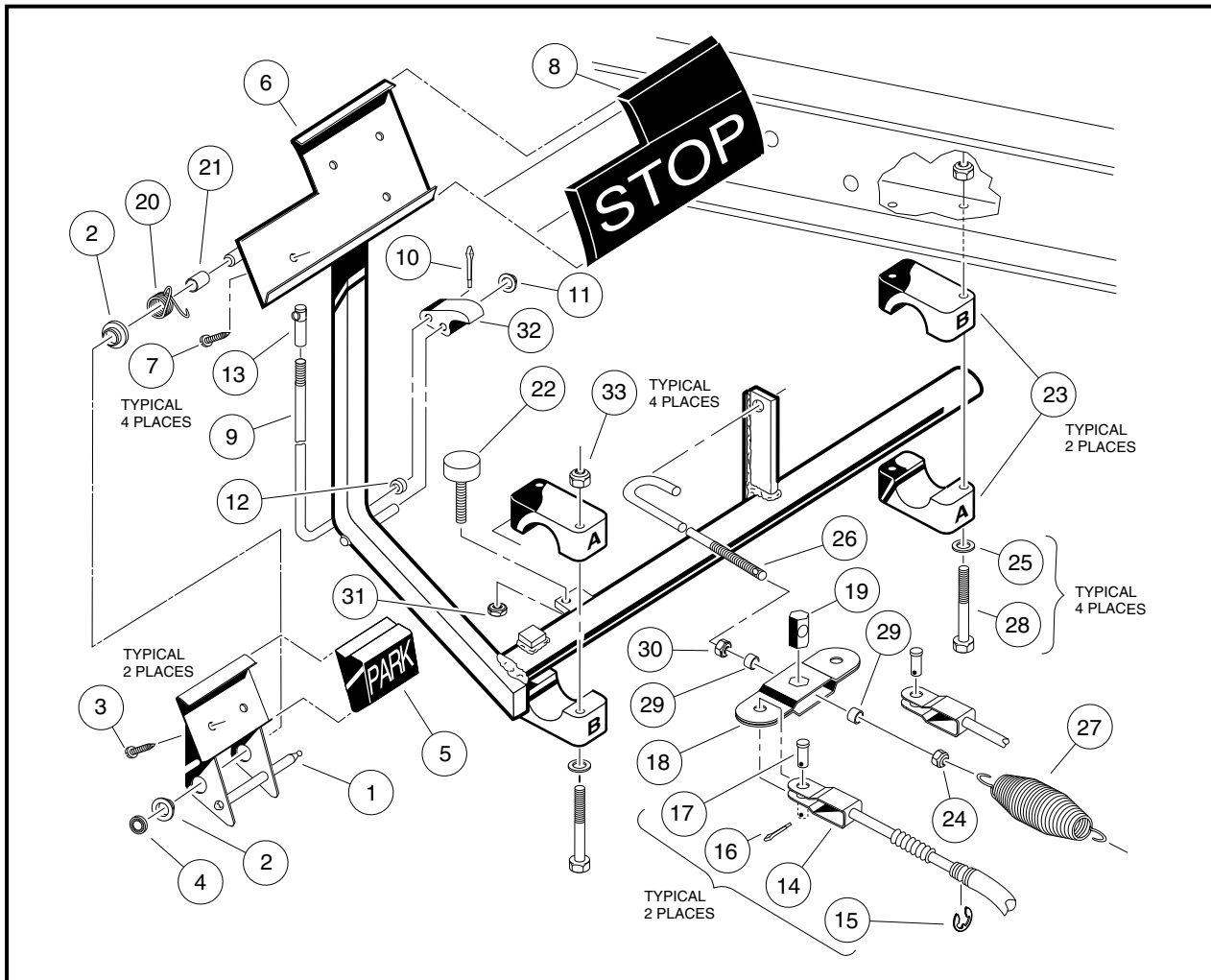


FIGURE 6-20

- 1.4. Install the brake cables (14) on the equalizer rod using **new** cotter pins (16) and the clevis pins (17) that were removed when the brake pedal assembly was disassembled (**Figure 6-20**). Tighten the nut (24) on the equalizer rod so that brake pedal free-play is 1/4 inch to 1/2 inch (6.35 mm to 12.7 mm) (**Figure 6-24, Page 28**). See **NOTE** below.

## NOTE

- BRAKE PEDAL FREE PLAY IS THE DISTANCE THE BRAKE PEDAL CAN BE DEPRESSED BEFORE THE BRAKE ACTUATOR ARM MOVES.

## Removing the Park Brake Assembly

1. Make sure the key switch is off and that the Forward and Reverse Switch is in neutral, then disconnect the battery or batteries as shown (**In the Maintenance and Service Manual, see Figure 12-1, Page 12-2 for gasoline vehicles, or Figure 22-5 or 22-6, Page 22-5 for electric vehicles**). See **CAUTION** below.

## ⚠ CAUTION

- DISCHARGE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES PER INSTRUCTIONS ON PAGE 15.

2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jackstands under the front cross tube of the vehicle frame and lower the vehicle onto the jackstands. **See WARNING below.**

## **⚠ WARNING**

- LIFT ONLY ONE END OF A 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.

3. Remove the park brake assembly.

- 3.1. To remove the park brake rod and pawl assembly (9 through 13 and 32), remove the push-on nut (11) and disconnect the ball joint sleeve (13) from the park brake pedal (1). Remove the ball joint sleeve (13) from the rod and pawl assembly (**Figure 6-20**). **See NOTE below.**

## **NOTE**

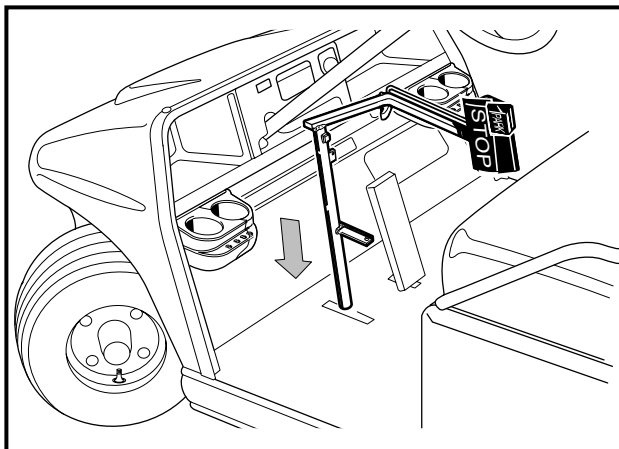
- A NEW PUSH-ON NUT (11) (**FIGURE 6-22**) MUST BE USED WHEN REASSEMBLING THE PARK BRAKE.

- 3.2. To remove the park brake pedal (1), remove the push-on retainer nut (4), disconnect the torsion spring (20) (**Figure 6-22**) and slide the pedal off of the shaft. **See NOTE below.**

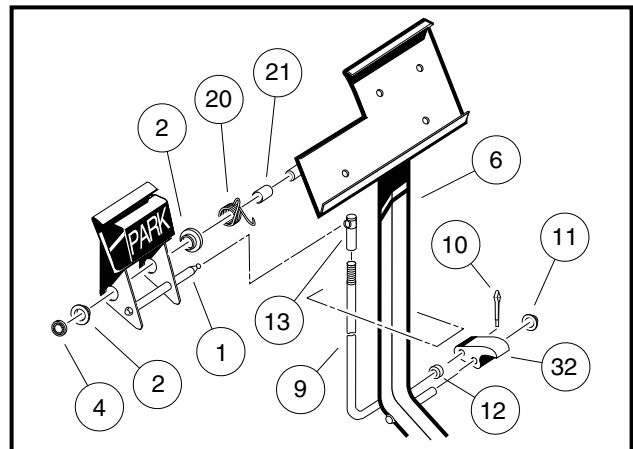
## **NOTE**

- A NEW PUSH-ON NUT (4) (**Figure 6-22**) MUST BE USED WHEN REASSEMBLING THE PARK BRAKE.

- 3.3. Inspect all parts for wear or damage and replace as necessary.



**FIGURE 6-21**



**FIGURE 6-22**

## **Installing the Park Brake Assembly**

1. From the bottom side of the floorboard, insert the park brake rod (9) through the brake pedal assembly opening as shown in Figure 6-22. Then install the park brake pawl (32) onto the shaft on the brake pedal assembly weldment (6) and also the park brake rod (9) into the park brake pawl (**Figure 6-22**).
2. Install the push nut (11) onto the park brake pawl shaft (**Figure 6-22**).

**Installing the Park Brake Assembly, Continued:**

3. Install the spacer (21) and torsion spring (20) on the park brake pedal shaft on the brake pedal weldment (**Figure 6-22, Page 27**).
4. Install the two bushings (2) in the park brake pedal and position the park brake pedal on the shaft on the brake pedal assembly weldment (**Figure 6-22**). Then attach the ends of the spring to the park brake pedal and to the brake pedal weldment as shown (**See Figure 6-23**).
5. Install the push nut (4) on the park brake pedal shaft (**Figure 6-22, Page 27**).
6. Connect park brake rod (9) ball joint to the ball stud on the park brake pedal assembly (**Figure 6-22**).

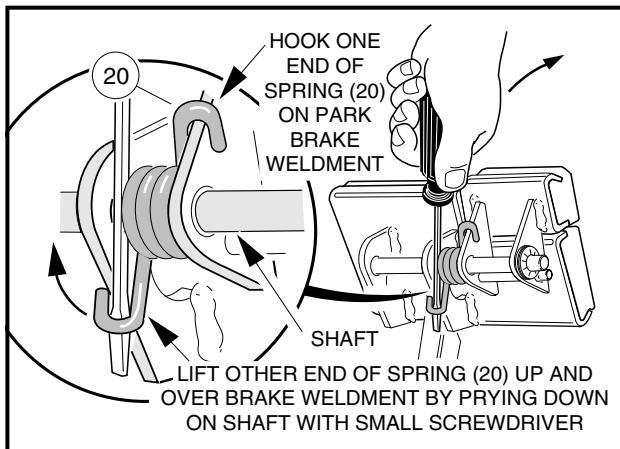


FIGURE 6-23

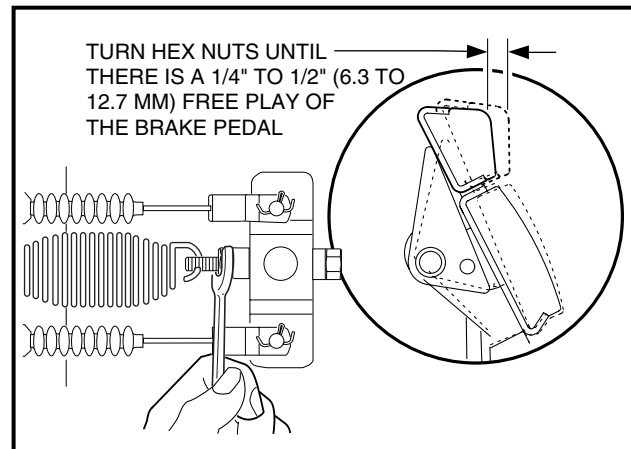


FIGURE 6-24

**REMOVING THE ACCELERATOR PEDAL ASSEMBLY****PowerDrive System 48 and PowerDrive Plus Electric Vehicles Serial Number 9711-564736 and Later, and all 1997 DS V-Glide 36 Volt and DS Gasoline Vehicles.**

(For PowerDrive System 48 and PowerDrive Plus vehicles prior to serial number 9711-564736, see page 30).

1. Make sure the key switch is off and that the Forward and Reverse Switch is in neutral, then disconnect the battery(ies):
  - **DS V-Glide, PowerDrive System 48 and PowerDrive Plus vehicles** - disconnect the batteries as shown (**Figure 22-5 or 22-6, Page 22-5 in the Maintenance and Service Manual**).
  - **DS Gasoline powered vehicle** - disconnect both battery cables, negative first.
2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jackstands under the front cross tube of the vehicle frame and lower the vehicle onto the jackstands. **See WARNING below.**

**⚠ WARNING**

- LIFT ONLY ONE END OF A 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.

3. Using a 1/2" socket and 1/2" wrench, remove the nut (7), two washers (5), and bolt (4) securing the accelerator pedal (1) to the pivot rod (6) (**Figure 6-11, Page 21**).
4. Disconnect the accelerator rod assembly (19, 20, and 21) (**Figure 6-11, Page 21**) at the front and rear ball studs and remove it from the vehicle.

5. Remove the nut (10), flat washer (8), ball stud (18), and pivot support bearing (9) from the accelerator pivot rod assembly (6) (**Figure 6-11, Page 21**).
6. Slide the spring retainer (11) off of the accelerator pivot rod.
7. Use a scribe to mark the position of the park brake ratchet (26) on the accelerator pivot rod (6) (**Figure 6-11, Page 21**). **See NOTE below.**

## NOTE

- FAILURE TO MARK POSITION OF THE RATCHET COULD CAUSE IT TO BE REINSTALLED IMPROPERLY, RESULTING IN IMPROPER ADJUSTMENT AND POSSIBLE FAILURE OF THE PARK BRAKE.

8. Remove the lock nut (25) from the accelerator pivot shaft (**Figure 6-11, Page 6-21**).
9. Depress the brake pedal slightly and then slide the park brake ratchet (26) (**Figure 6-11, Page 6-21**) toward the end of the accelerator pivot rod. Rotate the ratchet and remove it from the pivot rod.
10. Remove the four bolts (24), washers (8), and nuts (16) that secure the accelerator pivot rod supports (23) to the frame. Remove the pivot rod (6), and spacer (22) from the accelerator pivot rod supports (23) (**Figure 6-11, Page 21**).
11. Pull accelerator pedal (1) out of vehicle from the top side of the floorboard (**Figure 6-11, Page 21**).

## INSTALLING THE ACCELERATOR PEDAL ASSEMBLY

### PowerDrive System 48 and PowerDrive Plus Electric Vehicles Serial Number 9711-564736 and Later, and all 1997 DS V-Glide 36 Volt and DS Gasoline Vehicles.

1. Position the accelerator pivot rod supports (23) on the vehicle frame and install the four bolts (24), flat washers (8), and lock nuts (16). Tighten the nuts with fingers only at this time (**Figure 6-11, Page 21**).
2. Insert the lower end of the accelerator pedal (1) through the floorboard and install the accelerator pivot rod (6) through the uppermost hole in the pedal. Install the bolt (4), two washers (5), and nut (7) through the lower hole in the pedal and through the pivot rod. Tighten the nut with fingers only at this time (**Figure 6-11, Page 21**).
3. Install the plastic spacer (22) on the pivot rod (**Figure 6-11, Page 6-21**).
4. Insert the pivot rod through the pivot rod supports on the vehicle frame.
5. Tighten the four bolts (24) (**Figure 6-11, Page 21**) attaching the pivot rod supports to the frame to 70-80 in.lbs. (8/9 N-m).
6. Install the ball stud (18) through the pivot rod. Using needle-nose pliers, install the pivot support bearing (9) and the spring retainer (11) onto the ball stud. Secure these parts with the washer (8) and nut (10) (**Figure 6-11, Page 21**). Tighten the nut to 45-55 in.lbs. (5/6.2 N-m). **See CAUTION below.**

## CAUTION

- MAKE SURE THAT THE HARDWARE IS INSTALLED WITH THE FLAT WASHER POSITIONED ON THE PASSENGER SIDE OF THE SPRING RETAINER. FAILURE TO DO SO COULD RESULT IN THE ACCELERATOR BECOMING DISCONNECTED.

7. Depress the brake pedal slightly, and with the park brake ratchet oriented so that the tip of the ratchet is pointed toward the rear of vehicle, slide the ratchet onto the pivot rod (do not slide the ratchet onto the pivot rod splines). Release the brake pedal and allow the ratchet to rotate until its tip is pointed downward (**Figure 6-26, Page 32**). The ratchet should now rotate freely on the rod.

**Pedal Group Disassembly and Assembly, Continued:**

8. Rotate the ratchet clockwise until it touches the park brake pawl, then slide the ratchet onto the splines of the pivot rod (it may be necessary to push the pivot rod toward the driver side of the vehicle to make the splines accessible). The ratchet may have to be rotated counterclockwise slightly to align the splines.
9. Move the pivot rod back toward the driver side of the vehicle and line up the scribed match marks on the pivot rod and ratchet. Rotate the pivot rod back and forth slightly to align the splines and slide the ratchet onto the splines.
10. Install the nylon lock nut (25) on the pivot rod. Tighten the nut to 16-20 ft.lbs. (22/27 N-m).
11. Install the accelerator rod assembly (19, 20, and 21) (**Figure 6-11, Page 21**).
12. Adjust the accelerator pedal height. **See NOTE below.**

**NOTE**

- THE PROCEDURE FOR ADJUSTING THE ACCELERATOR PEDAL HEIGHT IS ON PAGE 17.

13. Adjust the accelerator rod. **See NOTE below.**

**NOTE**

- THE PROCEDURE FOR ADJUSTING THE ACCELERATOR ROD ON GASOLINE VEHICLES IS ON PAGE 19. ACCELERATOR ROD ADJUSTMENT FOR V-GLIDE 36 VOLT VEHICLES, AND FOR POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES SERIAL NUMBERS 9711-564736 AND LATER, IS ON PAGE 20.

**REMOVING THE ACCELERATOR PEDAL ASSEMBLY****DS PowerDrive System 48 and DS PowerDrive Plus Vehicles Prior to Serial Number 9711-564736)**

1. Make sure the key switch is off and that the Forward and Reverse Switch is in neutral, then disconnect the batteries as shown (**Figure 22-6, Page 22-5 in the Maintenance & Service Manual**). **See CAUTION below.**

**⚠ CAUTION**

- DISCHARGE CONTROLLER ON POWERDRIVE SYSTEM 48 VEHICLES PER INSTRUCTIONS IN WARNING ON PAGE 15.

2. Place chocks under the rear wheels and lift the front end of the vehicle with a chain hoist or floor jack. Place jackstands under the front cross tube of the vehicle frame and lower the vehicle onto the jackstands. **See WARNING below.**

**⚠ WARNING**

- LIFT ONLY ONE END OF A 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.

3. Remove the two hex head screws (20) attaching the potentiometer housing cover (**Figure 6-15, Page 23**) to the potentiometer and remove the cover.
4. Remove the bolt (9), washer (8) (**See NOTE below**), and lock nut (11) from the spring retainer (12) with the pivot support bearing (10) (**Figure 6-19, Page 24**).

## NOTE

- ON POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES, SERIAL NUMBER 9704-667832 AND LATER, ITEMS 8 AND 16 (FIGURE 6-19) ARE NO LONGER USED.

5. Remove the hex head cap screw (4), two flat washers (5), and lock nut (7) from the accelerator pedal and pivot rod assembly (6) (**Figure 6-19, Page 24**).
6. Remove the bolt (9), flat washer (8) (**See NOTE above**), and captured lock nut (11) from the actuator lever (17) and pivot rod assembly (**Figure 6-19, Page 24**).
7. Remove the brake ratchet retaining nut (24) from the pivot rod assembly (6) (**Figure 6-19, Page 24**).
8. Disconnect the spring retainer (12) from the accelerator pivot rod assembly (6) (**Figure 6-19, Page 24**).
9. Remove the crescent retaining ring (16) (**See NOTE above**) from the accelerator pivot rod (**Figure 6-19, Page 24**).
10. Depress the brake pedal slightly and then slide the park brake ratchet (25) toward the end of the accelerator pivot rod (**Figure 6-19, Page 24**). Rotate the ratchet towards the rear of the vehicle and remove it from the pivot rod.
11. Hold the actuator lever (17) and accelerator pedal (1) in place and remove the accelerator pivot rod and plastic washer (18) (**Figure 6-19, Page 24**).
12. Pull the accelerator pedal (1) (**Figure 6-19, Page 24**) out of the vehicle from the top side of the floorboard.
13. Remove the four hex head cap screws (23), flat washers (27), and lock nuts (11) attaching the accelerator pivot rod support (22) and potentiometer assembly (21) to the vehicle frame (**Figure 6-19, Page 24**), and remove the pivot rod support and the potentiometer assembly.

## INSTALLING THE ACCELERATOR PEDAL ASSEMBLY

### DS PowerDrive System 48 Vehicles and DS PowerDrive Plus Vehicles (Serial Numbers Prior to 9711-564736)

1. Position the accelerator pivot rod support (22) and the potentiometer assembly (21) on the vehicle frame and install the four hex head cap screws (23), flat washers (27), and lock nuts (11). Tighten the nuts with fingers only at this time (**Figure 6-19, Page 24**).
2. Insert the lower end of the accelerator pedal (1) through the floorboard and install the accelerator pivot rod (6) through the uppermost hole in the pedal. Install the bolt (4), two washers (5), and nut (7) through the lower hole in the pedal and through the pivot rod. Tighten the nut with fingers only at this time. Install the actuator lever (17) (**Figure 6-19, Page 24**) on the pivot rod and position the pedal and actuator lever on the rod so that about one-half of the total length of the pivot rod is protruding out of the actuator lever.
3. Place the plastic washer (18) on the end of the accelerator pivot rod and align the pivot rod and washer with the hole in the potentiometer housing (21), then insert the pivot rod through the potentiometer, vehicle frame, and pivot rod support until the end of the pivot rod is flush with the outside surface of the pivot rod support (22) (**Figure 6-19, Page 24**).

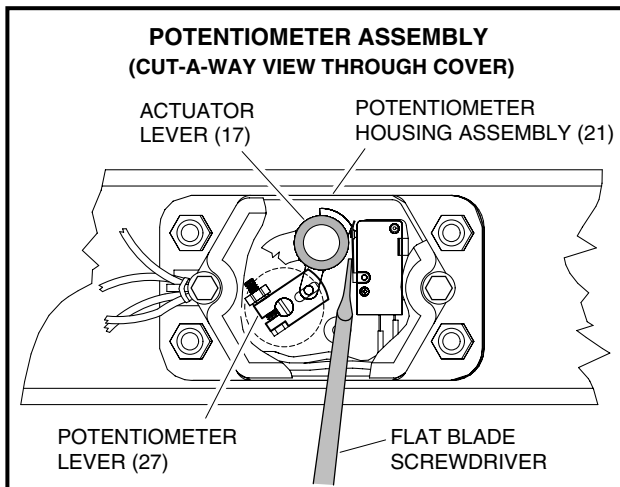
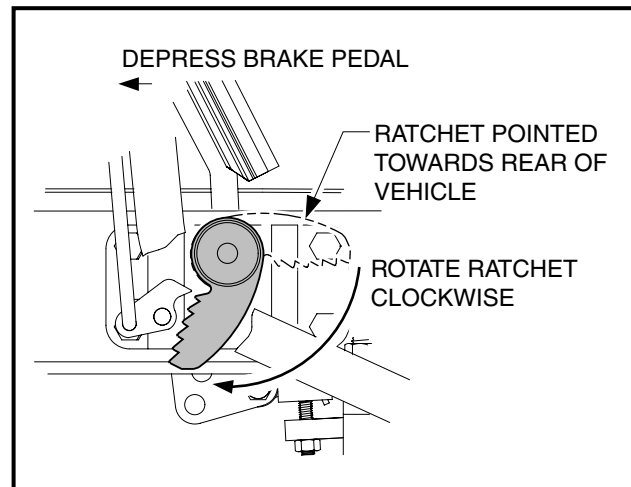
**Pedal Group Disassembly and Assembly, Continued:**

4. Rotate the potentiometer lever (27) clockwise until lever fork is at the two o'clock position (**Figure 6-25**). The lever must be at approximately two o'clock in order for it to mate with the alignment pin on the actuator lever.
5. Rotate the actuator lever until its alignment pin is aligned with the slot in the potentiometer lever fork (**Figure 6-25**), then slide the actuator lever toward the potentiometer housing. **See CAUTION below.**

**CAUTION**

- DO NOT BEND THE LIMIT SWITCH LEVER. THE CAM ON THE ACTUATOR LEVER SHOULD BE AT THE TWELVE O'CLOCK POSITION WHEN THE ACTUATOR LEVER IS IN POSITION TO MATE WITH THE POTENTIOMETER LEVER, ALLOWING THE ACTUATOR LEVER TO SLIDE PAST THE LIMIT SWITCH LEVER. IT MAY BE NECESSARY TO HOLD THE LIMIT SWITCH LEVER BACK WITH A FLAT BLADE SCREWDRIVER (**FIGURE 6-25**).

6. Push the accelerator pivot rod (6) through the potentiometer housing until the groove in the pivot rod is even with the end of the actuator lever (**Figure 6-19, Page 24**).
7. Install the spring retainer (12) on the pivot rod (**Figure 6-19, Page 24**).

**FIGURE 6-25****FIGURE 6-26**

8. Slide the pivot rod toward the passenger side of the vehicle until approximately one-half of the length of the pivot rod splines is exposed (**Figure 6-19, Page 24**).
9. Depress the brake pedal slightly, and with the park brake ratchet oriented so that the tip of the ratchet is pointed toward the rear of vehicle, slide the ratchet onto the pivot rod (do not slide the ratchet onto the pivot rod splines). Release the brake pedal and allow the ratchet to rotate until its tip is pointed downward (**Figure 6-26**). The ratchet should now rotate freely on the rod.
10. Rotate the ratchet clockwise until it touches the park brake pawl, then slide the ratchet onto the splines of the pivot rod (it may be necessary to push the pivot rod toward the driver side of the vehicle to make the splines accessible). The ratchet may have to be rotated counterclockwise slightly to align the splines.
11. Tighten the four bolts that secure the potentiometer assembly and pivot rod support to the vehicle frame to 70-80 in.lbs. (8/9 N-m).
12. Use a feeler gauge to check the gap between the ratchet and the pawl. The gap should be .060" plus or minus .030". Turn the nut (7) on the spring retainer (12) clockwise to widen the gap or counterclockwise to reduce the gap (**Figure 6-19, Page 24**). If the gap is .125" or more, slide the ratchet off the splines, rotate the ratchet clockwise one spline, and then slide the ratchet back onto the splines before adjusting with the spring retainer nut.



13. Install the nut (24) (**Figure 6-19, Page 24**) on the accelerator pivot rod and tighten it to 16-20 ft.lbs. (22/27 N-m). **See NOTE below.**

### NOTE

- MAKE SURE THE ACTUATOR LEVER AND THE POTENTIOMETER LEVER ARE STILL MATED BEFORE TIGHTENING THE ACCELERATOR PIVOT ROD RETAINING NUT.

14. Using needle-nose pliers, install the crescent retaining ring (16) (**See NOTE below**) on the pivot shaft (**Figure 6-19, Page 24**).

### NOTE

- ON POWERDRIVE SYSTEM 48 AND POWERDRIVE PLUS VEHICLES, SERIAL NUMBER 9704-667832 AND LATER, ITEMS 8 AND 16 (FIGURE 6-19) ARE NO LONGER USED.

15. Install the hex head cap screw (9), flat washer (8) (**See NOTE above**), and lock nut (11) that secure the spring retainer (12) to the pivot rod (**Figure 6-19, Page 24**), and tighten to 45-55 in.lbs. (5/6.2 N-m).

### CAUTION

- MAKE SURE THAT THE HARDWARE IS INSTALLED WITH THE FLAT WASHER POSITIONED ON THE PASSENGER SIDE OF THE SPRING RETAINER.

16. Install the hex head cap screw (4), two flat washers (5), and lock nut (7) that attach the accelerator pedal to the pivot rod (**Figure 6-19, Page 24**), and tighten with fingers only at this time.

17. Adjust the accelerator pedal height. **See NOTE below.**

### NOTE

- THE PROCEDURE FOR ADJUSTING THE ACCELERATOR PEDAL HEIGHT IS ON PAGE 17.

18. Adjust the actuator lever. **See NOTE below.**

### NOTE

- THE PROCEDURE FOR ADJUSTING THE ACTUATOR LEVER IS ON PAGE 21.

**1-9**

## **SECTION 7 - WHEEL BRAKE ASSEMBLIES**

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**E**

*See Section 7 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

**G**

## **SECTION 8 - STEERING AND FRONT SUSPENSION**

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*See Section 8 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 9 - WHEELS AND TIRES**

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*See Section 10 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01. Because of incorporation of the unitized transaxle in 1997 DS gasoline vehicles, Section 10 in the 1995-1996 DS Maintenance and Service Manual becomes Section 9 in this supplement.*

# SECTION 10 - UNITIZED TRANSAXLE

This section supersedes Sections 9 and 17 in the 1995-1996 DS Maintenance and Service Manual.

## GENERAL INFORMATION

All 1997 model gasoline powered DS Golf Cars are equipped with heavy-duty, fully-synchronized *Unitized Transaxles*. The unitized transaxle replaces the transmission / transaxle combination that was used previously, and performs the functions of both; utilizing fully synchronized internal gearing to change vehicle direction. Because the unitized transaxle is used to reverse vehicle direction, the engine, drive clutch, belt, and driven clutch rotate in one direction, and therefore engine and clutches are not subjected to reversing loads. This reduces maintenance requirements on the engine and clutches. With the unitized transaxle, power is transferred from the engine through the drive clutch, the drive belt, the driven clutch, and then through the unitized transaxle to the wheels.

A shifter lever, connected to a shifter arm on the unitized transaxle, is used to change the gears to one of three shift positions: forward (F), neutral (N), or reverse (R) (**Figure 10-1, Page 36**). See NOTE below.

### NOTE

- DURING NORMAL VEHICLE OPERATION, A NEUTRAL LOCK-OUT FEATURE PREVENTS THE ENGINE FROM RUNNING WHEN THE FORWARD AND REVERSE SWITCH IS IN THE NEUTRAL POSITION (**SEE NEUTRAL LOCK-OUT CIRCUIT, SECTION 12, PAGE 12-6 IN THE MAINTENANCE AND SERVICE MANUAL**).
- A SPECIAL NEUTRAL LOCKOUT CAM IS PROVIDED TO ALLOW MAINTENANCE PERSONNEL TO RUN THE ENGINE IN NEUTRAL FOR CERTAIN TESTS AND MAINTENANCE PROCEDURES. WHEN THE NEUTRAL LOCK-OUT CAM IS IN THE SERVICE POSITION, THE VEHICLE WILL RUN WHEN THE FORWARD AND REVERSE SWITCH IS IN THE NEUTRAL POSITION, BUT WILL NOT RUN WHEN THE FORWARD AND REVERSE SWITCH IS IN THE FORWARD OR REVERSE POSITION (**SEE NEUTRAL LOCK-OUT CIRCUIT, SECTION 12, PAGE 12-6 IN THE MAINTENANCE AND SERVICE MANUAL**).

The unitized transaxle is extremely durable and should require very little service under normal operating conditions. The vehicle should always be stopped before changing vehicle direction. The only service required on the unitized transaxle is to maintain proper lubricant level (**See Gasoline Vehicle Lubrication, Page 7 in this supplement**). Under normal operating conditions, weekly adjustment to the system should not be required.

The governor system is a flyweight type, and measures ground speed of the vehicle. It is mounted inside the unitized transaxle and is driven by transmission gears. Because the governor is mounted inside the transaxle, it is protected from abuse and damage that is common to externally mounted governor systems. If any of the governor linkage is removed in order to service other components, readjustment of the governor linkage is required (**See Governor Cable Installation and Adjustment, Page 140 in this supplement**).

### WARNING

- ONLY TRAINED MECHANICS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD HAVE KNOWLEDGE AND EXPERIENCE IN GENERAL 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 AND REVERSE LEVER IN THE NEUTRAL POSITION, AND REMOVE KEY PRIOR TO SERVICING.

## Unitized Transaxle General Information, Continued:

**⚠ WARNING**

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE; ALWAYS, BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.
- TURN KEY SWITCH OFF, PLACE FORWARD AND REVERSE LEVER 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.
- MOVING PARTS! - DO NOT ATTEMPT TO SERVICE THE VEHICLE WHILE IT IS RUNNING.
- LIFT ONLY ONE END OF A 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.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRICAL WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, OR OTHER METAL COMPONENT.
- ALWAYS USE INSULATED TOOLS WHEN WORKING NEAR BATTERIES OR ELECTRICAL CONNECTIONS.

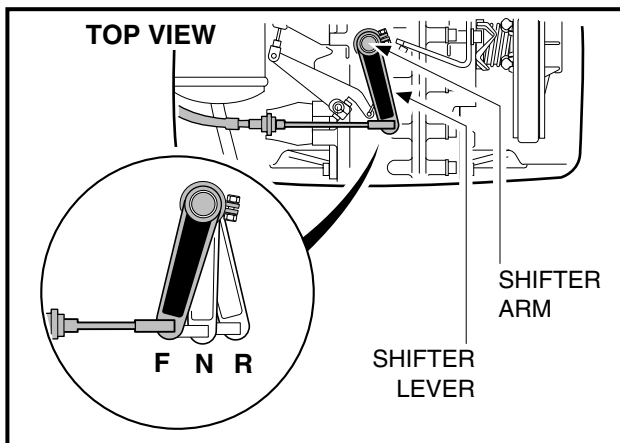


FIGURE 10-1

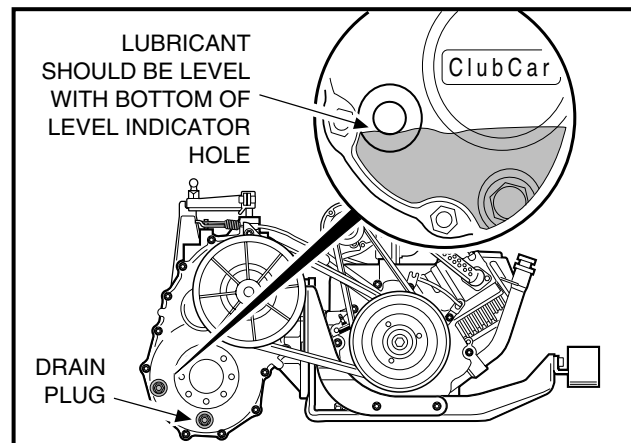


FIGURE 10-2

**TOOLS REQUIRED FOR THIS SECTION**

Hydraulic Floorjack (or Chain Hoist)	1/4" Diameter Drift or Metal Rod	1/2" Open End Wrench
Jackstands (2)	Small Ball Peen Hammer	9/16" Open End Wrench
Hydraulic Press	Wooden or Rubber Mallet	11/16" Open End Wrench
Bench Vise	Ratchet Wrench, 3/8 Drive	10 mm Open End Wrench
Standard Slip Joint Pliers	Torque Wrench, 3/8 Drive	14 mm Open End Wrenches (2)
Small External Snap Ring Pliers	3/8" Socket, 3/8 Drive	17 mm Open End Wrench
90° Internal Snap Ring Pliers	7/16" Socket, 3/8 Drive	Small Flat Blade Screwdriver
Feeler Gauge	1/2" Socket, 3/8 Drive	Medium Flat Blade Screwdrivers (2)
Seal Puller (Club Car Part No. 1012809)	9/16" Socket, 3/8 Drive	Small Phillips Head Screwdriver
16" Rolling Wedge Bar	5/8" Socket, 3/8 Drive	1/4" Nut Driver

**TOOLS, CONTINUED:**

Small Punch or Scratch Awl

12" to 18" Straight Edge

Bearing Puller Wedge Attachment (Club Car Part No. 1012812)

12 mm Socket, 3/8 Drive

7/16" Open End Wrench

Axle Seal Tool (Club Car Part No. 1014162)

5/16" Nut Driver

Small Knife or Wire Snippers

Governor Gear Shaft Installation Tool (Club Car Part No. 1019331-01)

**UNITIZED TRANSAXLE LUBRICATION**

There are two plugs located on the right (driven clutch) side of the unitized transaxle (**Figure 10-2**). When the vehicle is on a level surface, the upper plug is used as a lubricant level indicator. The lubricant level should be even with the bottom of this upper plug hole. The lower plug is used for draining lubricant from the transaxle. When draining lubricant, the upper plug should be removed also to allow the lubricant to drain faster. Be sure the drain plug is cleaned and reinstalled before filling the transaxle with new lubricant. Tighten the plug to 18-25 ft.lbs. (24/34 N-m). Use a funnel when filling the transaxle through the lubricant level indicator hole. Fill with 27 oz. (.8 liter) 80-90 WT. API Class GL or 80-90 WT. AGMA Class 5 EP gear lubricant.

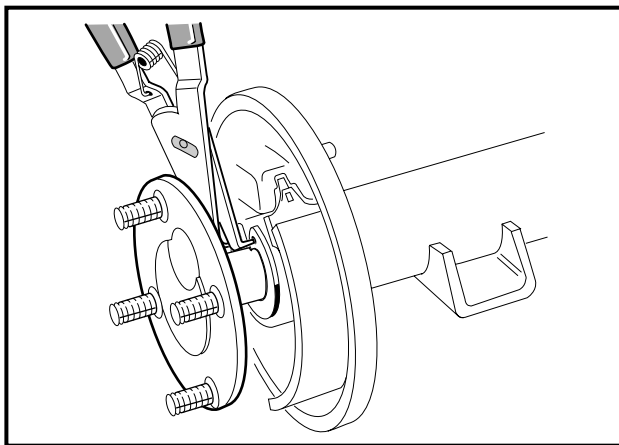


FIGURE 10-3

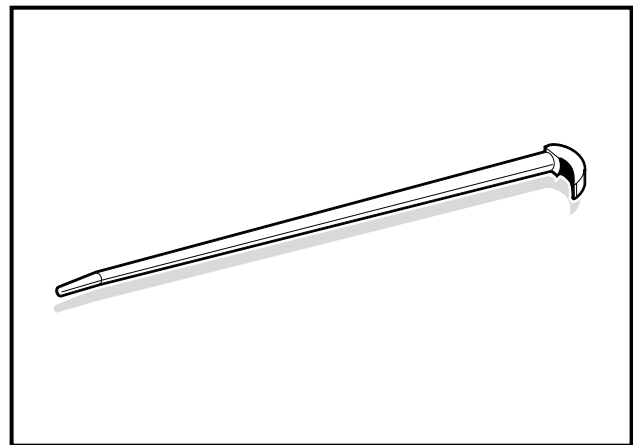


FIGURE 10-4

**AXLE SHAFT**

Removal of the unitized transaxle is not required for servicing or replacing of the axle shafts, axle bearings, and axle shaft oil seals. If the unitized transaxle is to be removed from the vehicle, then **do not** remove the wheels, axle shafts, or axle tubes first. Instructions for removing the unitized transaxle from the vehicle begin on page 41. See NOTE below.

**NOTE**

- DO NOT REMOVE THE WHEELS, AXLE SHAFTS, OR AXLE TUBES IF THE UNITIZED TRANSAXLE IS TO BE REMOVED FROM THE VEHICLE. SEE PAGE 41 FOR TRANSAXLE REMOVAL PROCEDURES.

**REMOVING THE AXLE SHAFT**

1. Place chocks at the front wheels and lift the rear of the vehicle with a floorjack. Then place jackstands under the axle tubes to support the vehicle. See WARNING on page 36.
2. Remove the rear wheel and brake drum.
3. Using 90° internal snap ring pliers, remove the internal retaining ring from the axle tube (**Figure 10-3**).
4. Carefully pull the axle shaft straight out of the axle tube.

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# G

## Removing the Axle Shaft, Continued:

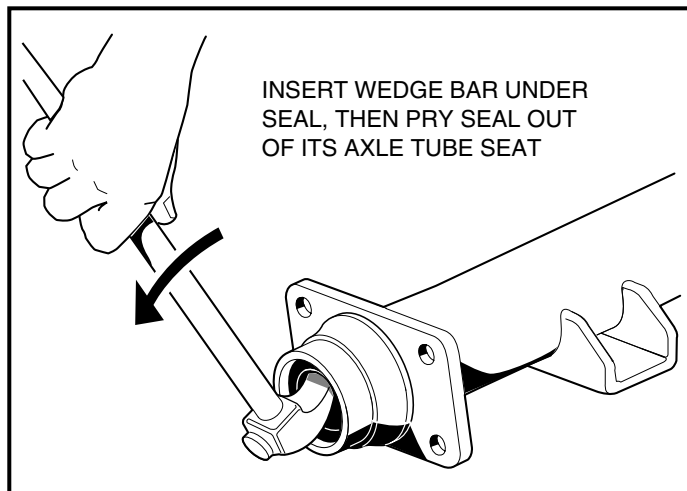


FIGURE 10-5

5. Use a 16 inch (40 cm) rolling wedge bar (**Figure 10-4**) to remove the oil seal. Insert the wedge bar under the seal and pry it out (**Figure 10-5**).

### **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 that the bearing (71) and collar (73) (**Figure 10-6**) have not slipped and are still seated against the shoulder on the axle shaft.
7. Inspect the bearing. If the bearing is damaged or worn, replace it.

## AXLE BEARING

### Removing the Axle Bearing

1. Remove the retaining ring (74), then place a bearing puller wedge attachment (Club Car Part No. 1012812) on the axle shaft between the wheel mounting flange and the bearing.

### **CAUTION**

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

2. Press the bearing (71) and collar (73) (**Figure 10-6**) off together (**See Figure 10-7, Page 40**).

### **NOTE**

- IT MAY BE NECESSARY TO HEAT THE COLLAR TO REMOVE IT.

### Installing the Axle Bearing

1. If it was removed, install the retaining ring (70) on the axle shaft (67 or 68) (**Figure 10-6**).
2. Apply two drops of Loctite® 271 to the inside of the collar. See CAUTION at top of page 39.

## ⚠ CAUTION

- APPLY LOCTITE 271 TO THE INSIDE OF THE COLLAR ONLY, NOT TO THE 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 FIT PROPERLY.

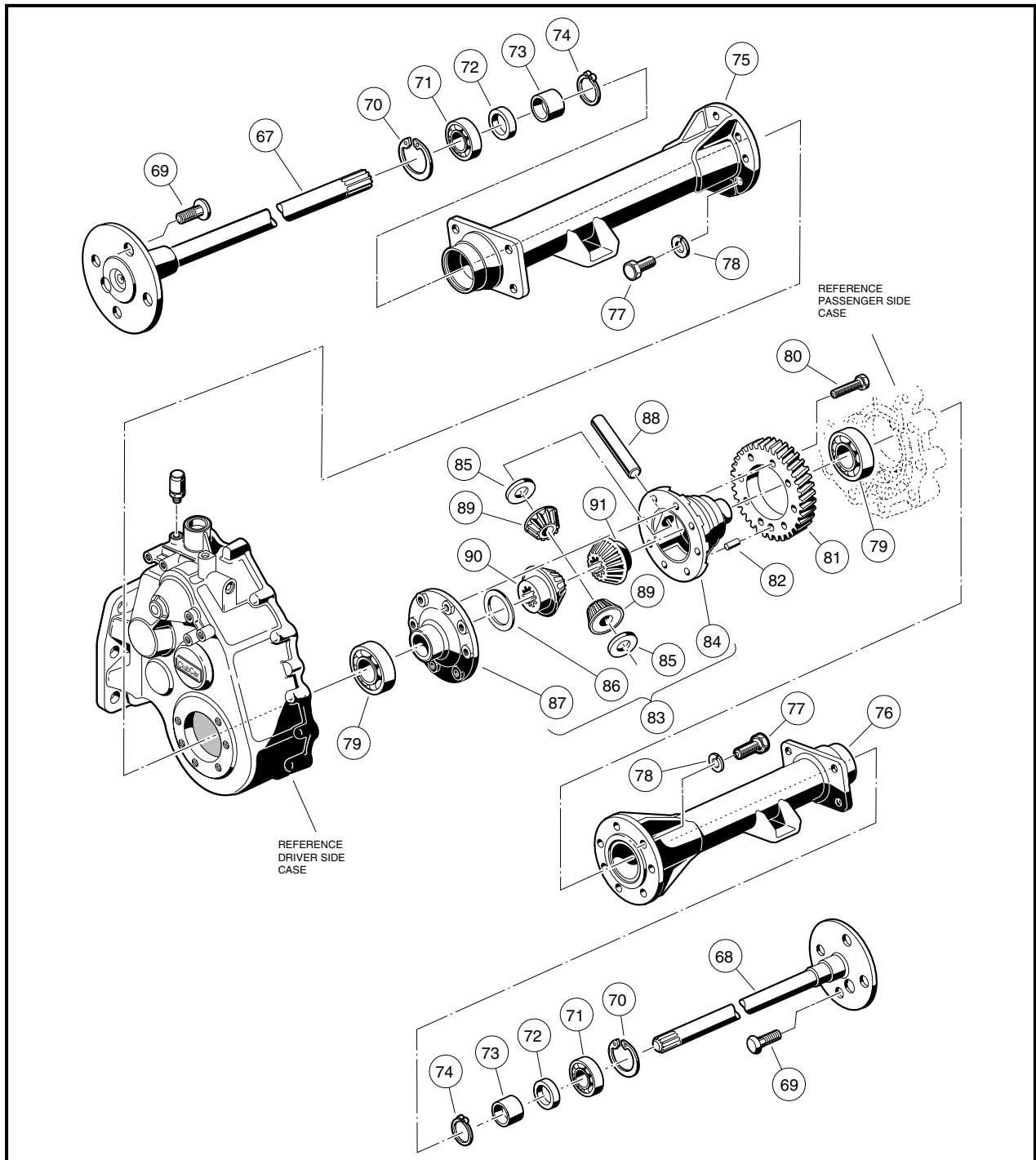


FIGURE 10-6

**Installing the Axle Bearing, Continued:**

- Place a *new* (sealed) bearing (71) and collar (73) on the shaft (67 or 68) (**Figure 10-6, Page 39**).

**CAUTION**

- IF THE BEARING WAS REMOVED FROM THE SHAFT, REPLACE IT WITH A NEW ONE.
- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE AXLE SHAFT IN STEP 4. THIS COULD DAMAGE THE AXLE SHAFT WHEN THE BEARING AND COLLAR ARE PRESSED ON.

- Place the bearing puller wedge attachment against the collar and press both the bearing and collar on, then install the retaining ring (74).

**INSTALLING THE AXLE SHAFT**

- Clean the bearing and seal seats in the axle tube (75 or 76) (**Figure 10-6, Page 39**).
- Place a new seal (72) (**Figure 10-6**) in the axle tube with seal lip facing away from the bearing. Use an axle seal tool (Club Car Part No. 1014162) to press it in until it seats firmly in position (**Figure 10-8**).

**NOTE**

- THE NEW SEAL CAN BE INSTALLED BY TAPPING THE AXLE SEAL TOOL WITH A MALLET.

- 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.
- Using snap ring pliers, install the retaining ring (70) (**Figure 10-6**) in the axle tube (**See Figure 10-9**).
- Place a 1/4" to 3/8" (6 to 10 mm) diameter rod against the retaining ring and tap lightly at four to five locations to insure that it is properly seated.

**WARNING**

- BE SURE THAT 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.

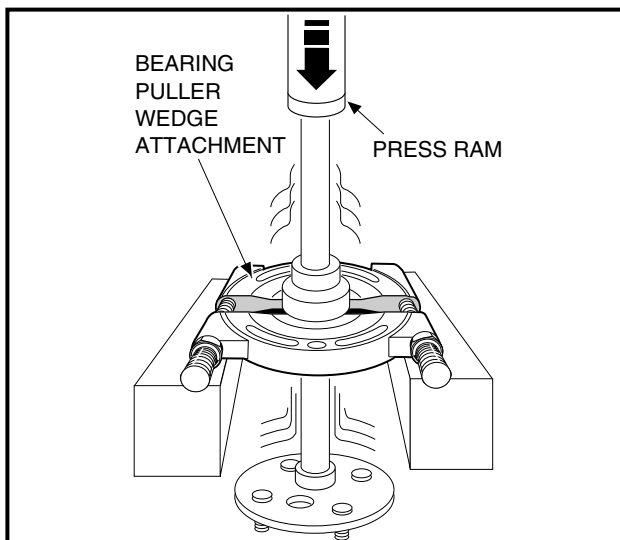


FIGURE 10-7

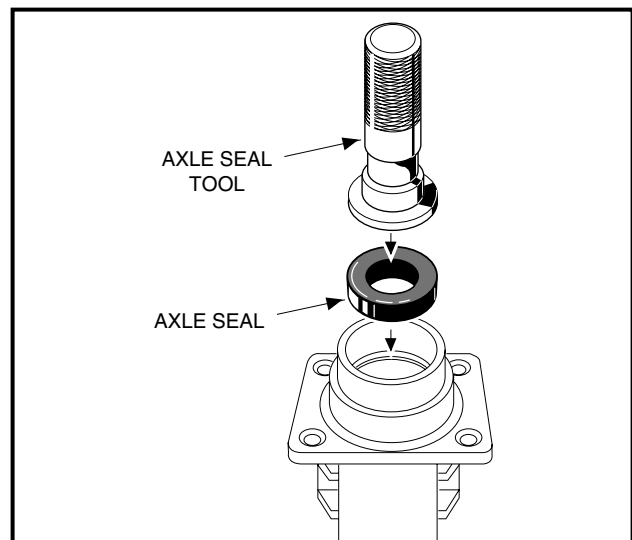


FIGURE 10-8



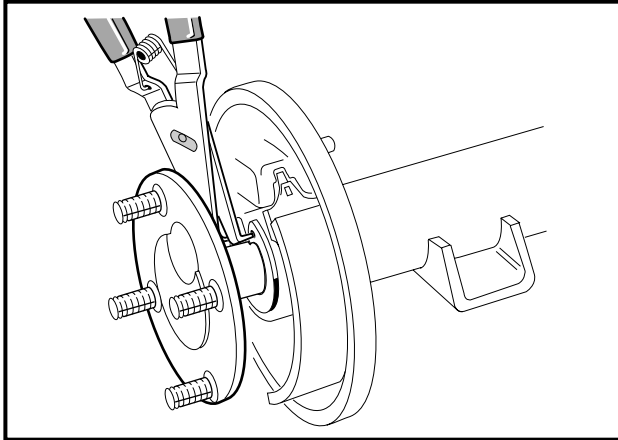


FIGURE 10-9

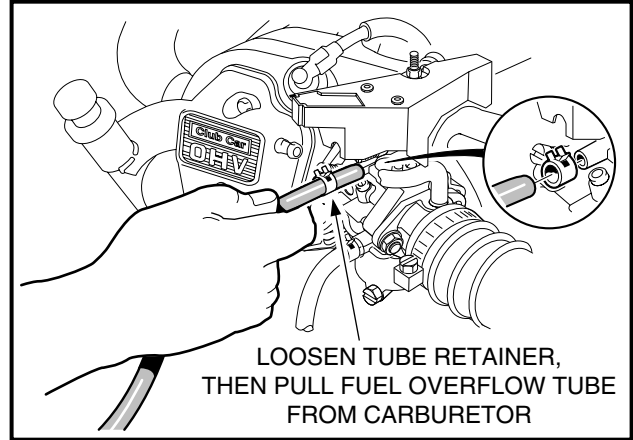


FIGURE 10-10

## REMOVING THE UNITIZED TRANSAXLE

### ⚠ WARNING

- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT THE BATTERY CABLES, NEGATIVE FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.
- LIFT ONLY ONE END OF A VEHICLE AT A TIME. BEFORE LIFTING, LOCK THE BRAKES AND CHOCK THE WHEELS THAT REMAIN ON THE FLOOR. USE A 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.

1. Disconnect the battery cables, negative (-) first. See WARNING above.
2. Detach all wires, hoses, etc. connecting the powertrain to the vehicle.
  - 2.1. Use pliers to expand the hose clamp, and then disconnect the carburetor overflow tube from the carburetor (**Figure 10-10**).
  - 2.2. Using a 5/16" nut driver, disconnect the air intake hose from the carburetor (**Figure 10-11**)
  - 2.3. Use pliers to expand hose clamp, then disconnect impulse line from fuel pump (**Figure 10-12**).

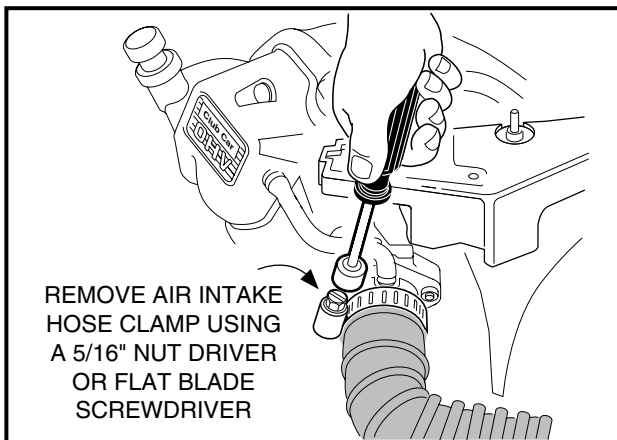


FIGURE 10-11

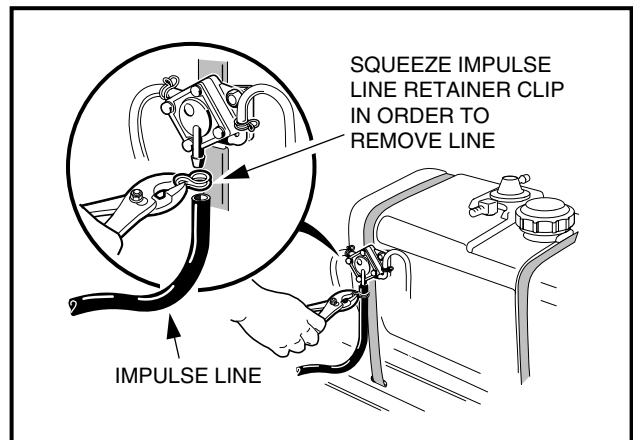


FIGURE 10-12

## Removing the Unitized Transaxle, Continued:

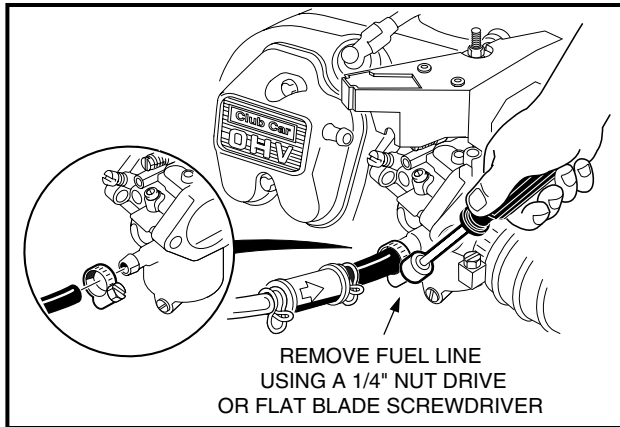


FIGURE 10-13

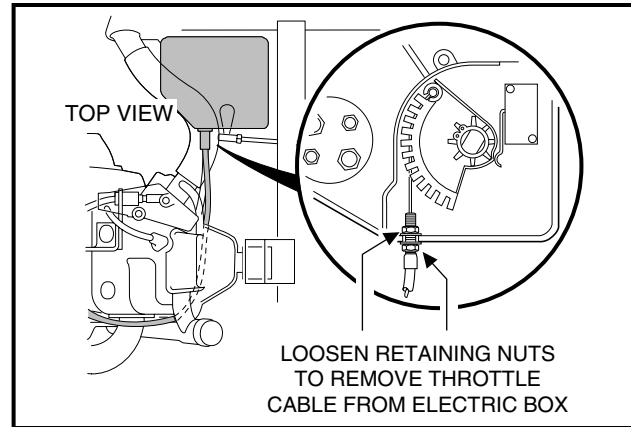


FIGURE 10-14

- 2.4. Use a 1/4" nut driver to loosen the hose clamp and then disconnect the fuel line from the carburetor (**Figure 10-13**). To prevent spilling of fuel, the disconnected end of the line can be pushed onto the impulse nipple of the fuel pump.
- 2.5. Use a 5/16" nut driver to remove the cover from the electrical component box. Then, using a 10 mm wrench, loosen the hardware securing the accelerator cable to the box. Disconnect the cable from the actuator cam and remove it from the box (**Figure 10-14**).
- 2.6. Using a 10 mm wrench, detach the ground cable from the oil filler tube mounting bracket on the engine cylinder head (**Figure 10-15**).
- 2.7. Use an 17 mm wrench to loosen the nuts securing the shifter cable to the shifter cable mounting bracket. Then disconnect the shifter cable rod end from the shifter arm on the unitized transaxle and remove the cable from the cable mounting bracket (**Figure 10-16**).
- 2.8. Mark for proper reconnection and then disconnect the 6 gauge white wire (F2 post), 6 gauge black ground wire (A2 post), and 16 gauge yellow DF wire from starter/generator (**Figure 10-17**).
- 2.9. Disconnect the engine oil level sending unit wire (18 gauge yellow) from the sending unit located on the engine, beneath the starter/generator (**Figure 10-18**).
- 2.10. Disconnect the engine kill switch wire (18 gauge white/black stripe) from the bullet connector at the lower right front of the engine (**Figure 10-19**).
- 2.11. Cut away the wire ties securing the kill switch wire at the lower right front of the engine (below the exhaust header), the wire harness at the governor cable bracket, and the wire harness to the motor mount beneath the muffler.

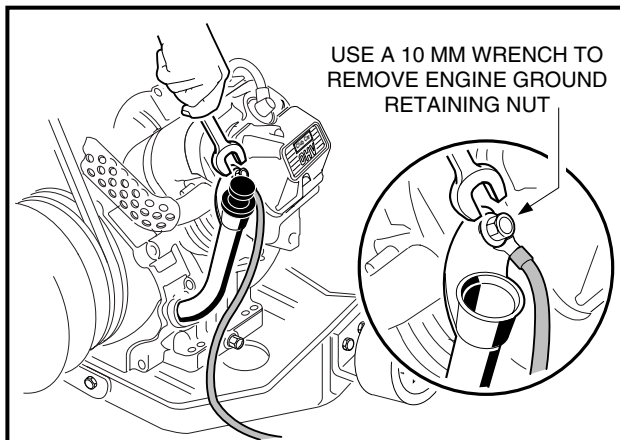


FIGURE 10-15

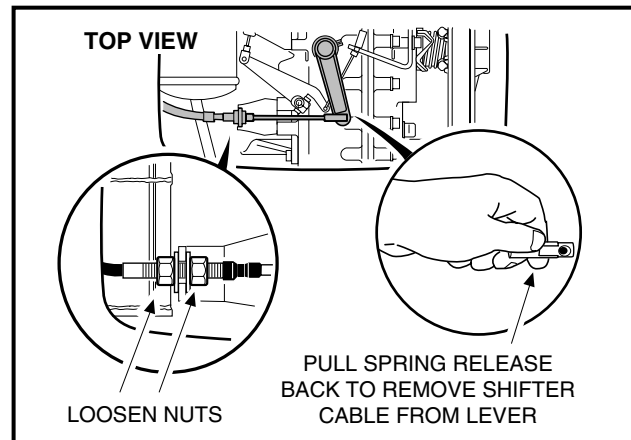


FIGURE 10-16

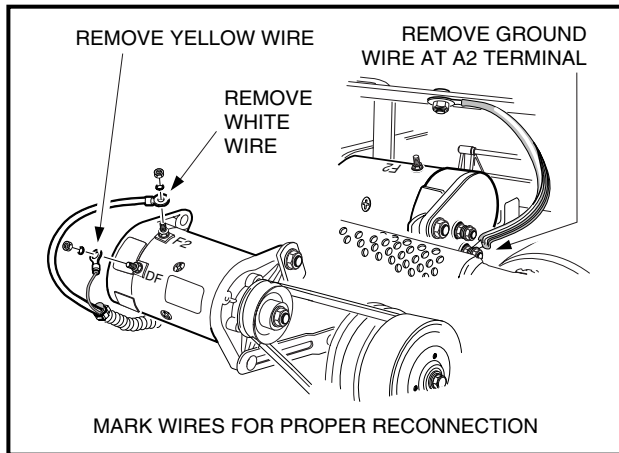


FIGURE 10-17

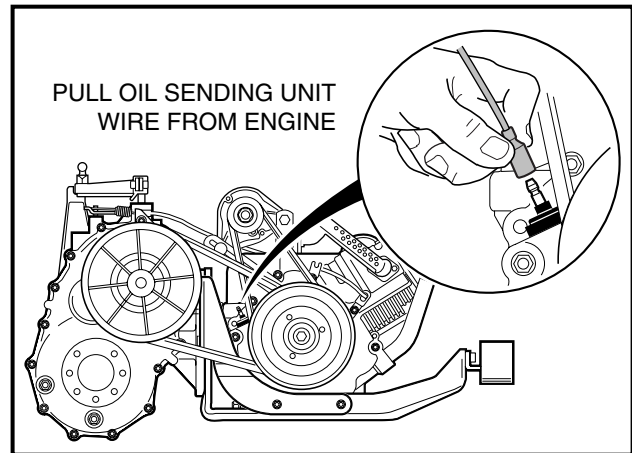


FIGURE 10-18

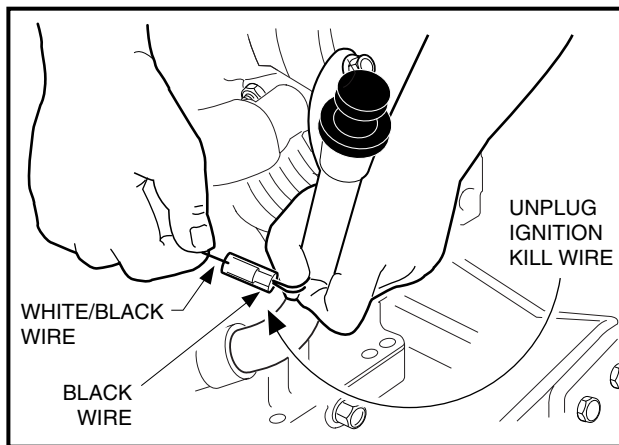


FIGURE 10-19

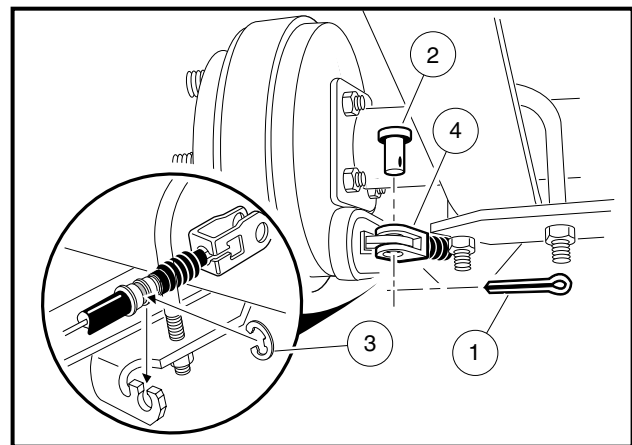


FIGURE 10-20

3. Disconnect the brake cables.

3.1. Remove the cotter pins (1), brake cable clevis pins (2), and cable retaining ("E") clips (3) (**Figure 10-20**).

3.2. Remove the cable from the cable support bracket (**Figure 10-20**).

4. Remove only the *lower* shock mounting hardware from both rear shocks (**Figure 10-21, Page 44**).

5. Position a floorjack under the trailer hitch bracket in the frame as shown (**Figure 10-22, Page 44**). See WARNING below.

## **⚠ 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 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.

6. Raise the vehicle just enough to relieve tension from the leaf springs, then remove the bolts securing the leaf springs to the shackles (**Figure 10-23, Page 44**).

7. Remove the bolts securing the leaf springs to their front mounts (**Figure 10-24, Page 44**).

## Removing the Transaxle, Continued:

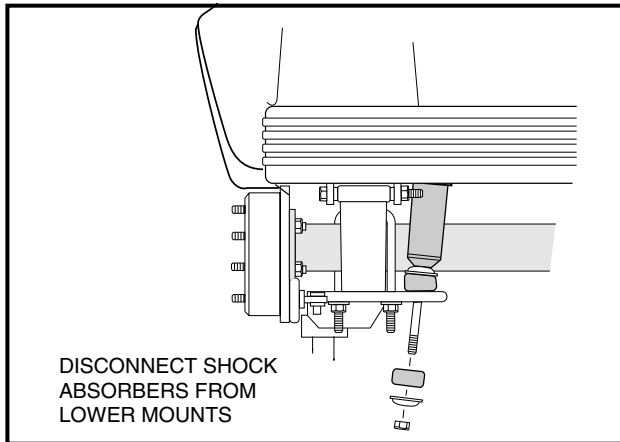


FIGURE 10-21

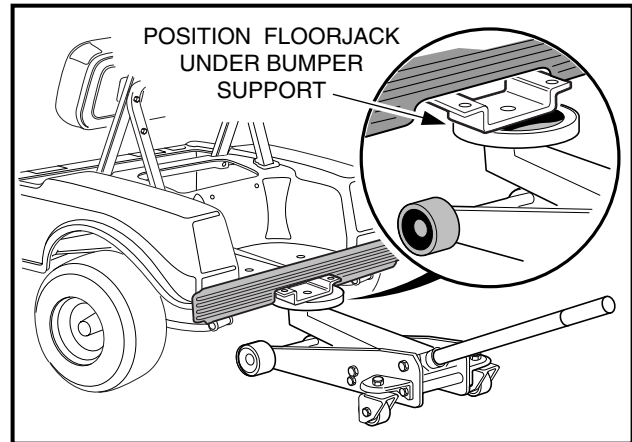


FIGURE 10-22

8. Continue raising the vehicle until the rear bumper is higher than the top of the unitized transmission (high enough to allow the transaxle and engine to be rolled under it and out of the vehicle) (**Figure 10-25**).
9. Position jackstands, adjusted to support the vehicle at this height, under the frame cross-member between the leaf-spring mounts and side stringers, just forward of each rear wheel. Lower the floorjack to allow the jackstands to support the vehicle (**Figure 10-26**).
10. Pull the floorjack from beneath the vehicle and move it away.
11. Lift the snubber out of the snubber bracket in the vehicle frame and lower it to the floor (**Figure 10-27**). Now the powertrain should be completely disconnected from the vehicle and resting on the floor.
12. Grasp the ends of the leaf-springs at the rear of the vehicle and roll the powertrain out from under the vehicle (**Figure 10-28**).
13. Place blocks under the engine mounting plate so that they will completely support the engine and keep it *level to the floor* (**Figure 10-29, Page 46**). See NOTE below.

### NOTE

- PLACE THE BLOCKS SO THAT THEY WILL SUPPORT THE ENGINE WHEN THE UNITIZED TRANSAXLE IS DETACHED AND MOVED AWAY FROM IT IN THE FOLLOWING STEPS.

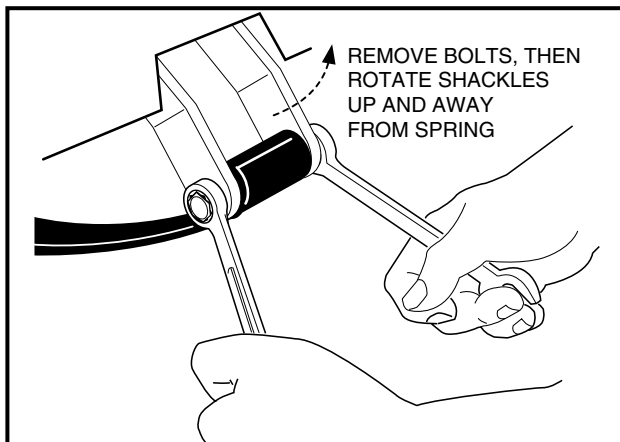


FIGURE 10-23

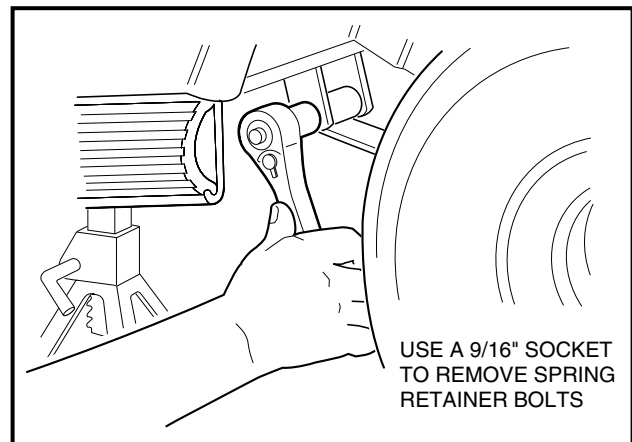


FIGURE 10-24

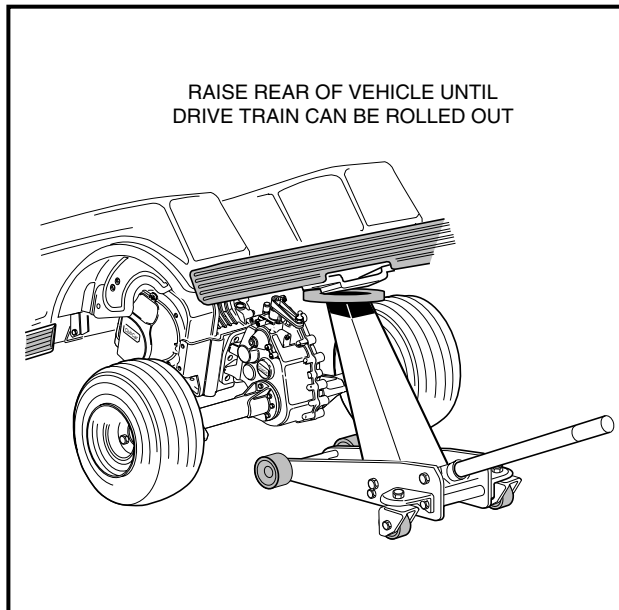


FIGURE 10-25

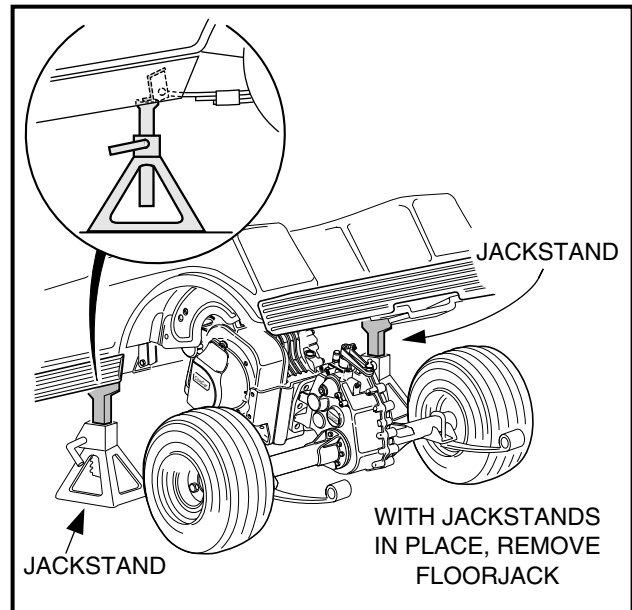


FIGURE 10-26

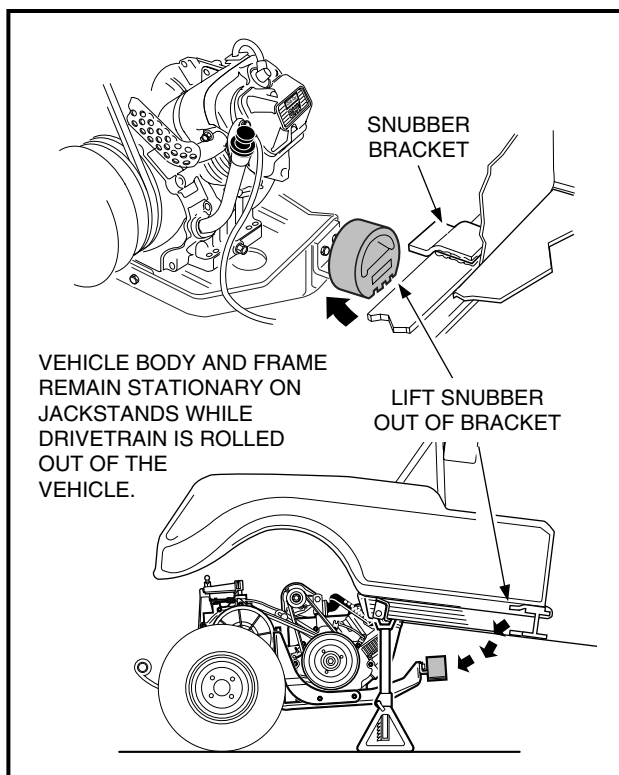


FIGURE 10-27

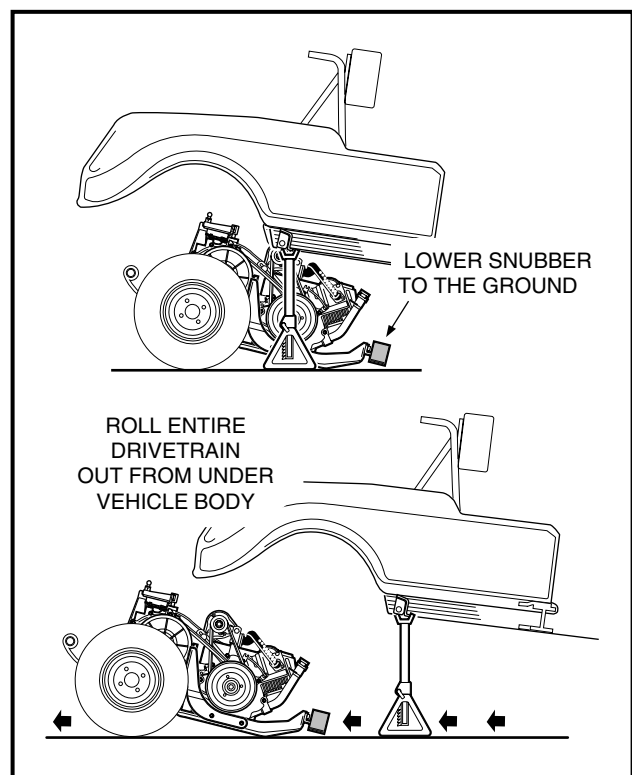


FIGURE 10-28

14. Remove the drive belt.

14.1. Grasp the belt midway between the drive clutch and driven clutch and pull up forcefully on the belt to force the driven clutch sheaves apart. Then roll the belt counterclockwise while pulling it off of the driven clutch (**Figure 10-30, Page 46**).

15. Use a 1/2" wrench to remove the driven clutch retaining bolt and then remove the driven clutch from the unitized transaxle (**Figure 10-31, Page 46**).

## Removing the Transaxle, Continued:

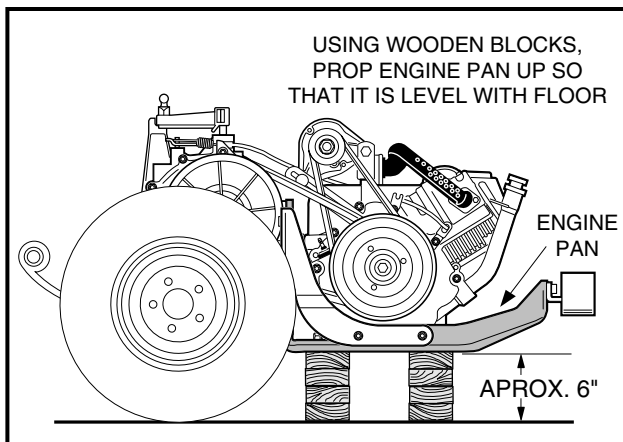


FIGURE 10-29

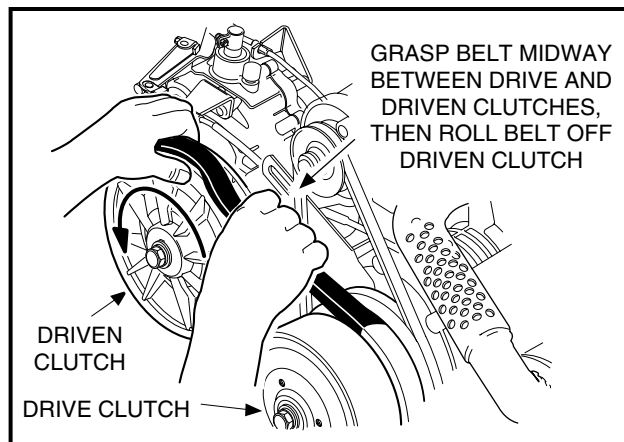


FIGURE 10-30

16. Use a 7/16" wrench to loosen the governor arm retaining bolt, then remove the governor arm from the shaft (**Figure 10-32**). See NOTE below.

### NOTE

- THE GOVERNOR CABLE AND THE ACCELERATOR CABLE REMAIN ATTACHED TO THE GOVERNOR ARM.

17. Use a 3/8" socket to remove the screws securing the governor cable bracket to the transaxle (**Figure 10-33**).
18. Use a 3/8" socket to remove the screws securing the accelerator cable bracket to the transaxle (**Figure 10-34**).
19. Remove the six bolts mounting the unitized transaxle to the engine.
- 19.1. Use two 14 mm wrenches to remove the two top transaxle mounting bolts (one at each upper corner of the transaxle mounting plate) as shown (**Figure 10-35**).
- 19.2. Remove the two bottom transaxle mounting bolts in the same way the top ones were removed (**Figure 10-35**).
- 19.3. Use one 14 mm wrench to remove the two middle transaxle mounting nuts as shown (**Figure 10-35**).
20. Remove the leaf springs, wheels, and brake assemblies from the transaxle.

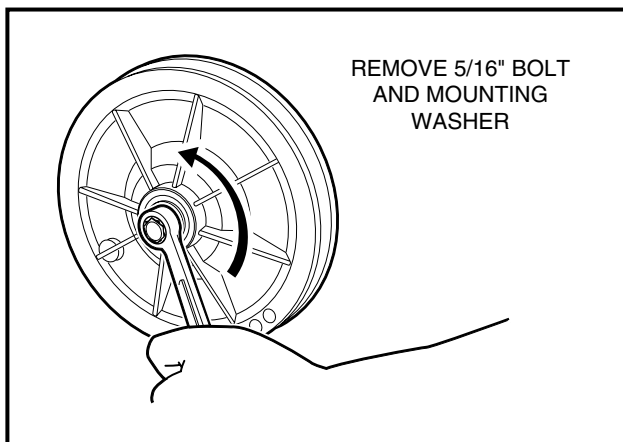


FIGURE 10-31

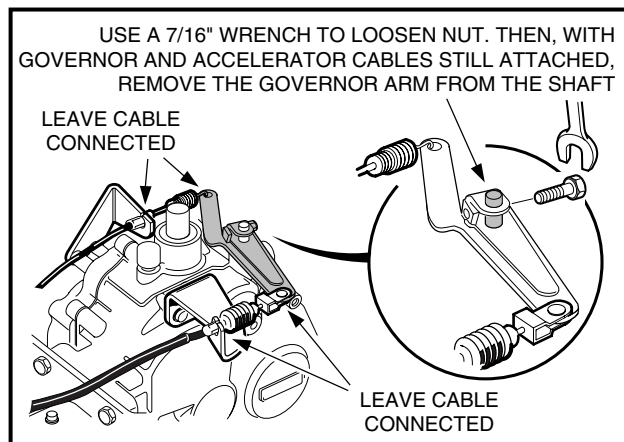


FIGURE 10-32



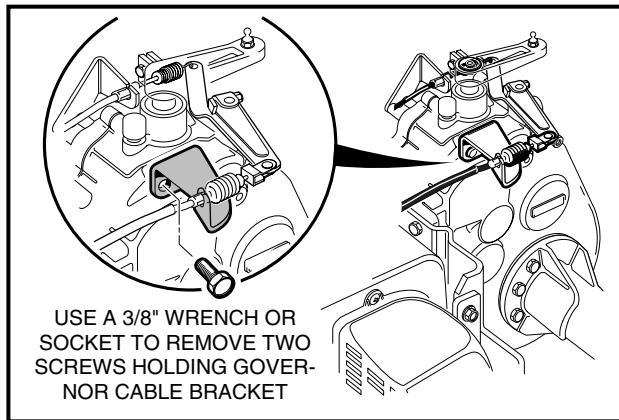


FIGURE 10-33

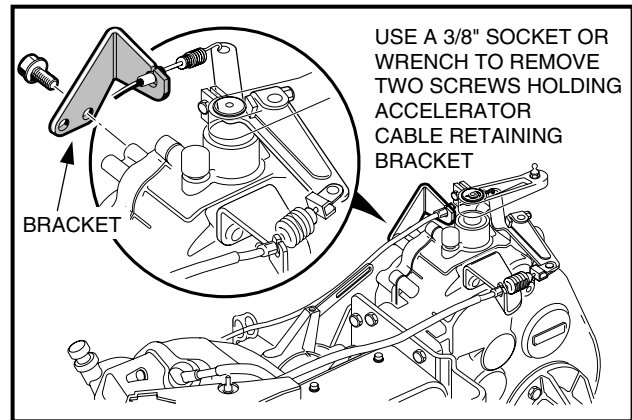


FIGURE 10-34

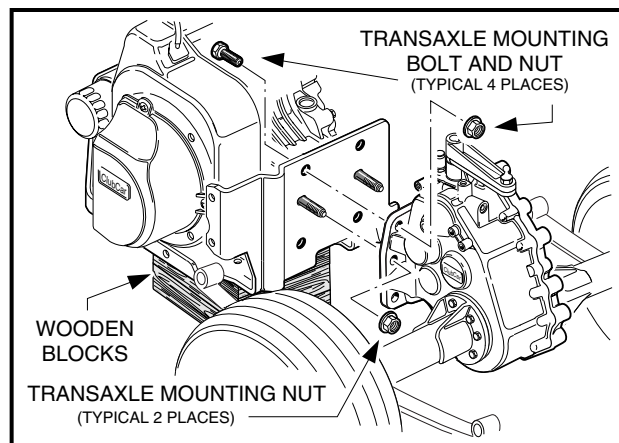


FIGURE 10-35

## UNITIZED TRANSAXLE DISASSEMBLY

1. Remove the drain plug and gasket. Drain and dispose of the oil properly (**Figure 10-2, Page 36**).
2. Using 90° internal snap ring pliers, remove the internal retaining rings (74) (**Figure 10-6, Page 39**) from the axle tubes (**See Figure 10-3, Page 37**).
3. Pull the axles (67 and 68) out of the axle tubes (**Figure 10-6, Page 39**).
4. Using a 17mm wrench or socket, remove seven bolts (77) (with lock washers) mounting each axle tube to the transaxle casing (**Figure 10-6, Page 39**). Then remove the axle tubes from the transaxle casing.

### NOTE

- IT MAY BE NECESSARY TO TAP THE AXLE TUBE WITH A **RUBBER** Mallet to break it free from the transaxle casing.

5. Using a 12 mm wrench or socket, remove the fifteen bolts (27) that hold the transaxle housing together (**Figure 10-36, Page 48**).
6. Pull the housing apart, making sure that all gear assemblies inside the transaxle stay together in one (either) side of the casing. See **CAUTION** below and **NOTE** at top of page 48.

### CAUTION

- TO PREVENT DAMAGE TO THE MATING SEAL SURFACES OF THE CASING, USE CARE WHEN SEPARATING THE HALVES.

## Unitized Transaxle Disassembly, Continued:

**NOTE**

- TO SEPARATE THE SECTIONS, IT MAY BE NECESSARY TO TAP LIGHTLY WITH A **RUBBER Mallet** ON THE SPLINE OF THE INPUT PINION.

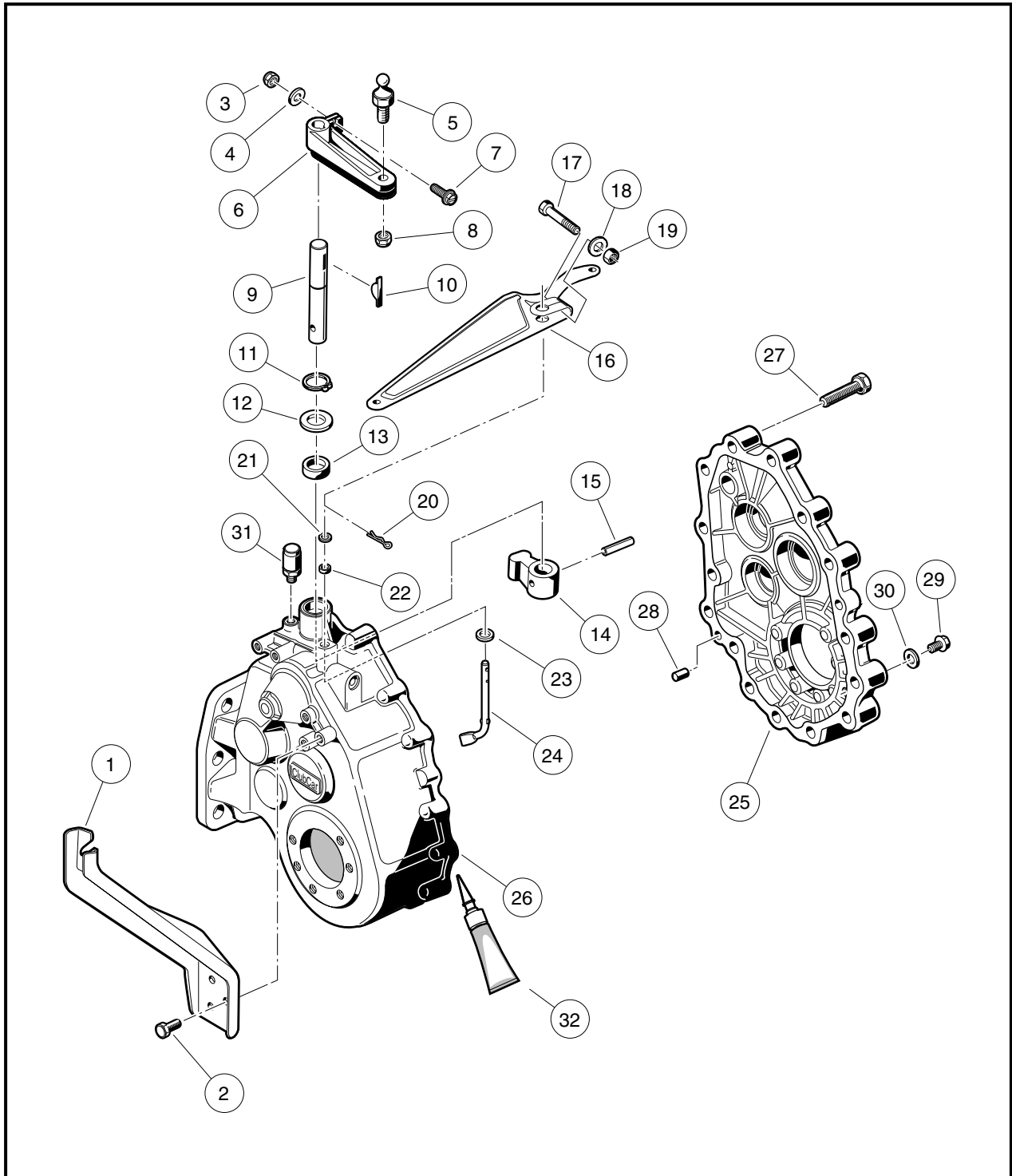


FIGURE 10-36



7. Turn the case section containing the gearing on edge as shown (**Figure 10-37**). While holding it in this position, gently rock all of the gear assemblies to loosen them slightly in their seating.

### ⚠ CAUTION

- TO PREVENT DAMAGE TO THE GEARS, USE EXTREME CARE WHEN HANDLING THEM.

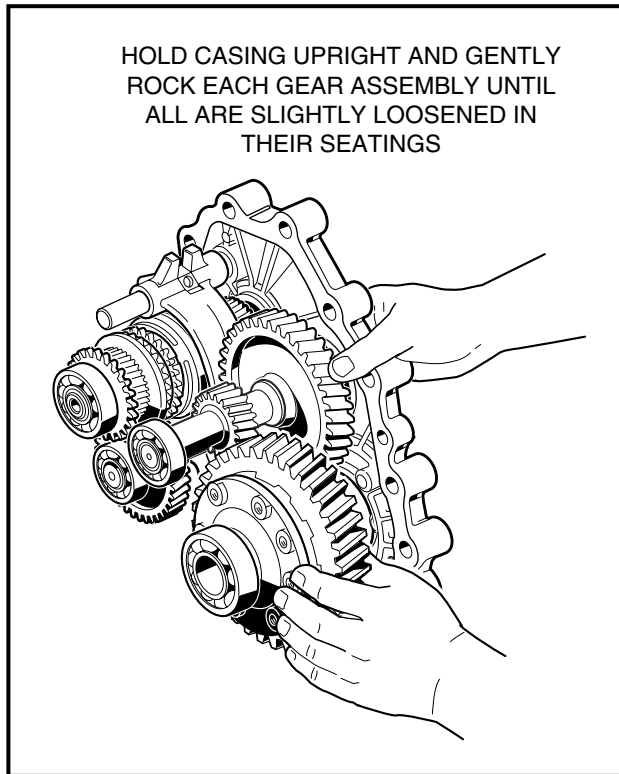


FIGURE 10-37

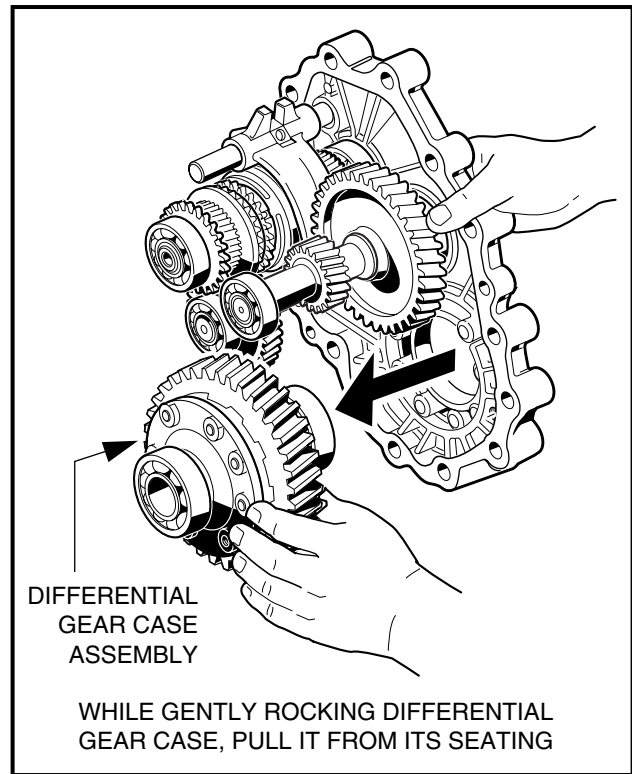


FIGURE 10-38

8. When all of the gear assemblies are slightly loosened, remove the differential gear case assembly by gently rocking it while pulling it from the casing (**Figure 10-38**).
9. Continue to rock and loosen the remaining gear assemblies until the intermediate gear assembly can be removed from the casing (**Figure 10-39, Page 50**). Then remove the idler shaft assembly.
10. Remove the synchronizer gear assembly and shift fork assembly as a unit from the casing (**Figure 10-39, Page 50**).
11. Use a seal puller (Club Car Part No. 1012809) or rolling wedge bar to remove the input shaft oil seal from the casing (**Figure 10-40, Page 50**).
12. Remove the oil flow guide (**Figure 10-41, Page 50**) from the casing.
13. Remove the shifter shaft (**Figure 10-41, Page 50**) from the casing.
- 13.1. Use snap ring pliers to remove the shaft retaining ring (11) on the outside of the casing as shown (**Figure 10-36**).
- 13.2. Remove the flat washer (12) from the shaft on the outside of the casing as shown (**Figure 10-36**), then remove the shifter shaft by pushing it through the casing wall toward the interior of the transaxle.
- 13.3. Use a seal puller to remove the shifter shaft oil seal (13) from the casing (**Figure 10-36**).
14. Use a 14 mm open end wrench to remove the breather (31) from the casing (**Figure 10-36**).
15. Remove the governor assembly from the casing.
- 15.1. Remove the cotter pin (20) and flat washer (21) from the pivot arm (**Figure 10-36**).

### Unitized Transaxle Disassembly, Continued:

- 15.2. Remove the pivot arm by pulling it through the wall to the interior of the casing.
- 15.3. Use a small chisel or similar pointed instrument to pry the pivot arm oil seal (22) (**Figure 10-36, Page 48**) out of the casing (**See Figure 10-42**).
- 15.4. Remove the governor gear assembly (63 and 64) and flat washer (62) (**Figure 10-43, Page 53**) by lightly tapping the gear shaft through the casing wall, from the outside, with a hammer and drift (**See Figure 10-44, Page 54**).

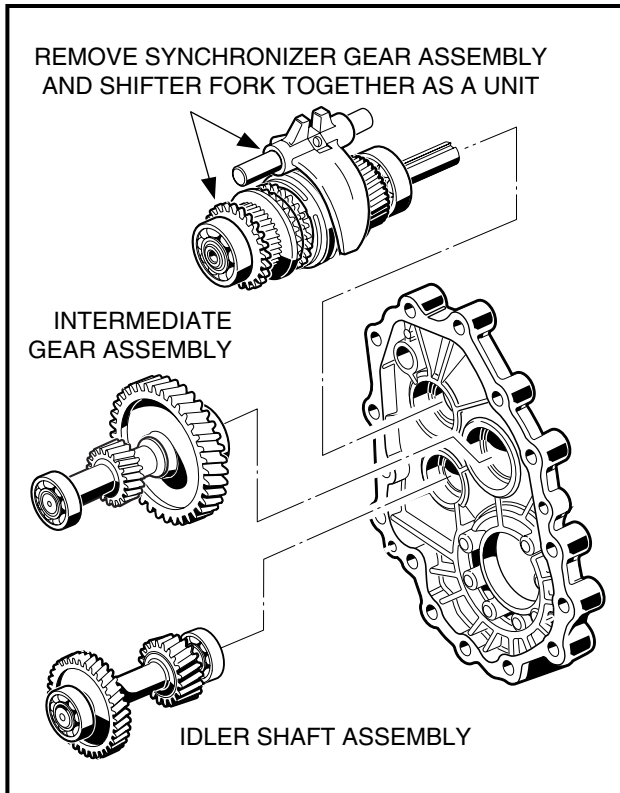


FIGURE 10-39

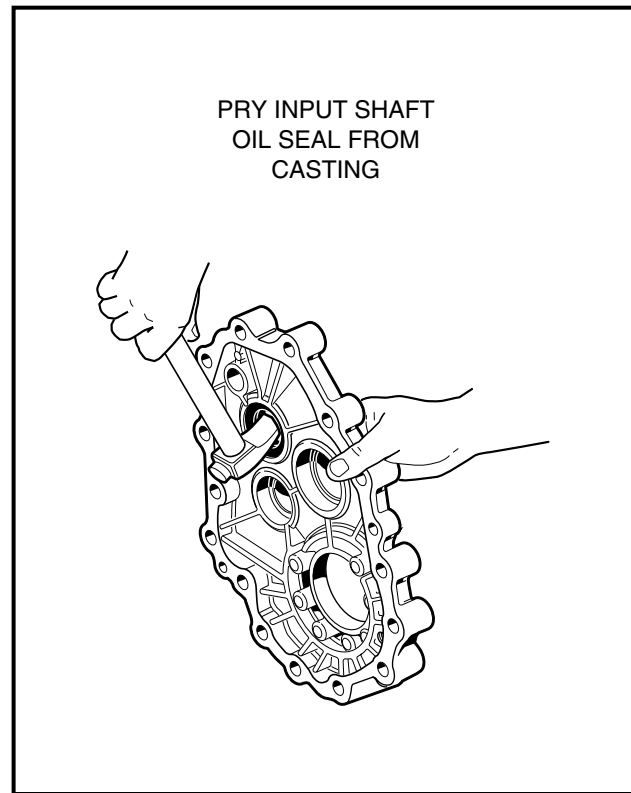


FIGURE 10-40

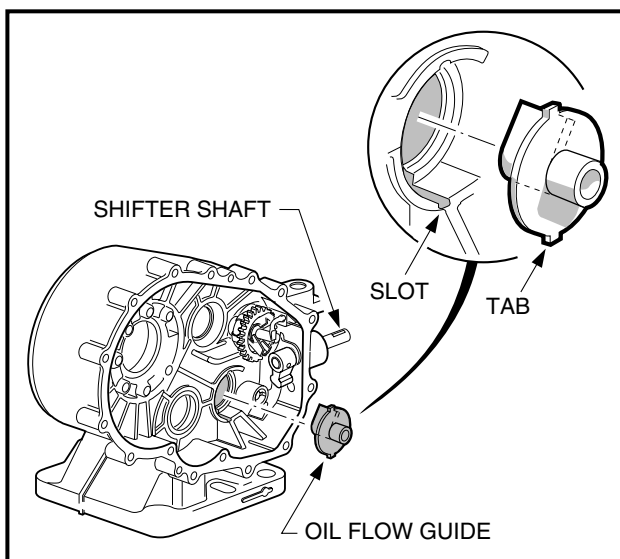


FIGURE 10-41

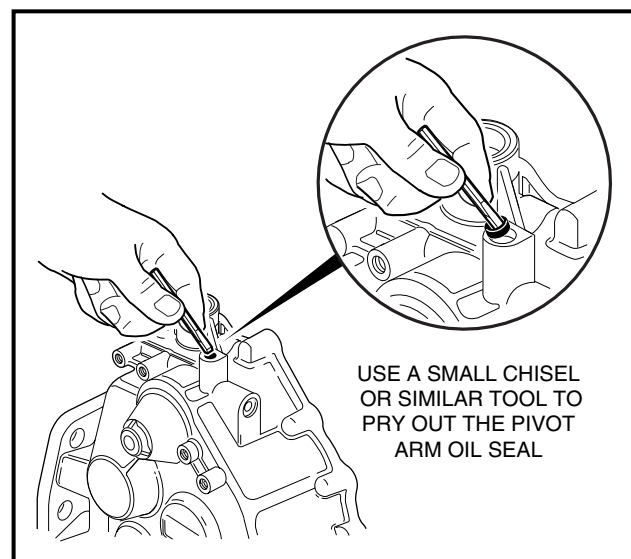


FIGURE 10-42

## COMPONENT DISASSEMBLY

10

G

### DISASSEMBLE THE GOVERNOR GEAR

#### NOTE

- IT IS NECESSARY TO DISASSEMBLE THE GOVERNOR GEAR ASSEMBLY IN ORDER TO REINSTALL IT INTO THE TRANSAXLE CASING.

1. Secure the governor gear assembly in a vise as shown (**Figure 10-45, Page 54**).
2. Use two small screwdrivers to pry the gear and fly-weight off of the shaft as shown (**Figure 10-45**).

### DISASSEMBLE THE DIFFERENTIAL GEAR CASE ASSEMBLY

#### ⚠ CAUTION

- MARK PARTS FOR IDENTIFICATION AS THEY ARE DISASSEMBLED. PARTS MUST BE REASSEMBLED IN THEIR ORIGINAL LOCATIONS AND ORIENTATIONS.

1. Use a 12mm wrench or socket to remove eight ring gear retaining bolts (80) (**Figure 10-6, Page 39**), then remove the ring gear from the assembly. It may be necessary to tap the ring gear off with a *wooden or rubber* mallet (**Figure 10-46, Page 54**). See NOTE below.

#### NOTE

- BECAUSE LOCTITE® WAS APPLIED TO THE BOLTS WHEN THE DIFFERENTIAL GEAR CASE WAS ASSEMBLED, IT MAY BE NECESSARY TO PLACE THE ASSEMBLY IN A VISE WHEN REMOVING THE BOLTS.

2. Pull the cover (87) and thrust plate (86) from the differential gear carrier case (**Figure 10-6, Page 39**).
3. Remove the differential gear (90) from the differential gear carrier case (**Figure 10-6, Page 39**).
4. Remove the differential pin (88) (**Figure 10-6, Page 39**) by pushing it through from one side (**See Figure 10-47, Page 55**). Remove the two differential idler gears (89) and two idler gear thrust plates (85) (**Figure 10-6, Page 39**) as the pin is driven through.

#### NOTE

- IT MAY BE NECESSARY TO DRIVE THE DIFFERENTIAL PIN OUT WITH HAMMER AND PUNCH.

5. Remove the differential gear (91) from the carrier case (**Figure 10-6, Page 39**).
6. If the bearings (79) are to be removed, place a bearing puller wedge attachment (Club Car Part No. 1012812) between the bearing and carrier casing (84) and press the bearing off as shown (**Figure 10-48, Page 55**). Repeat the process for the carrier cover (87) (**Figure 10-6, Page 39**).

#### ⚠ CAUTION

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

### DISASSEMBLE THE SHIFTER FORK ASSEMBLY

1. Push the shift rod (33) out of the shift fork (34) (**Figure 10-43, Page 53**).
2. Shake the shift fork to remove the spring (35) and ball (36) (**Figure 10-43**).

## DISASSEMBLE THE SYNCHRONIZER GEAR ASSEMBLY

### ⚠ CAUTION

- MARK PARTS FOR IDENTIFICATION AS THEY ARE DISASSEMBLED. PARTS MUST BE REASSEMBLED IN THEIR ORIGINAL LOCATIONS AND ORIENTATIONS.

1. Place a bearing puller wedge attachment (Club Car Part No. 1012812) between the bearing (38) and spur (governor drive) gear (40) (**Figure 10-43, Page 53**), then press the bearing off the input shaft as shown (**Figure 10-49, Page 9-55**). See CAUTION above.

### ⚠ CAUTION

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

2. Pull the spring (Belleville) washer (39), spur gear (40), dowel pin (50), thrust plate (41), input gear assembly (42), large needle bearing (43), small needle bearing (44), synchronizer ring (45), and thrust plate (41) from the input shaft (**Figure 10-43, Page 53**).
3. Place a bearing puller wedge attachment (Club Car Part No. 1012812) between the bearing (54) and input gear assembly (52) (**Figure 10-43**), then press the bearing off the input shaft as shown (**Figure 10-50, Page 55**).

### ⚠ CAUTION

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

4. Pull the spring (Belleville) washer (39), thrust washer (53), input gear assembly (52), two needle bearings 43 and 44, thrust plate (41), and synchronizer ring (45) from the input shaft (**Figure 10-43**).
5. Use a small flat-blade screwdriver to remove two synchronizer springs (snap rings) (46) (**Figure 10-43**), and then slide the synchronizer clutch hub (49) (**Figure 10-43**) from the input shaft (51).

### NOTE

- THERE ARE THREE SYNCHRONIZER INSERTS (48) SET INTO SLOTS IN THE SYNCHRONIZER SLEEVE (47) (**Figure 10-43**). THESE MAY FALL FREE WHEN THE SYNCHRONIZER CLUTCH HUB (49) IS REMOVED. TAKE CARE TO NOT LOSE THESE INSERTS.

6. Remove the three synchronizer inserts (48) (**Figure 10-43**) from the synchronizer sleeve.
7. Press the synchronizer sleeve (47) from the input shaft (**Figure 10-43**).

## DISASSEMBLE THE INTERMEDIATE GEAR ASSEMBLY

1. Place a bearing puller wedge attachment (Club Car Part No. 1012812) between the bearing (38) and shaft/gear (56) (**Figure 10-43**), then press bearing off the shaft as shown (**Figure 10-51, Page 56**).

### ⚠ CAUTION

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

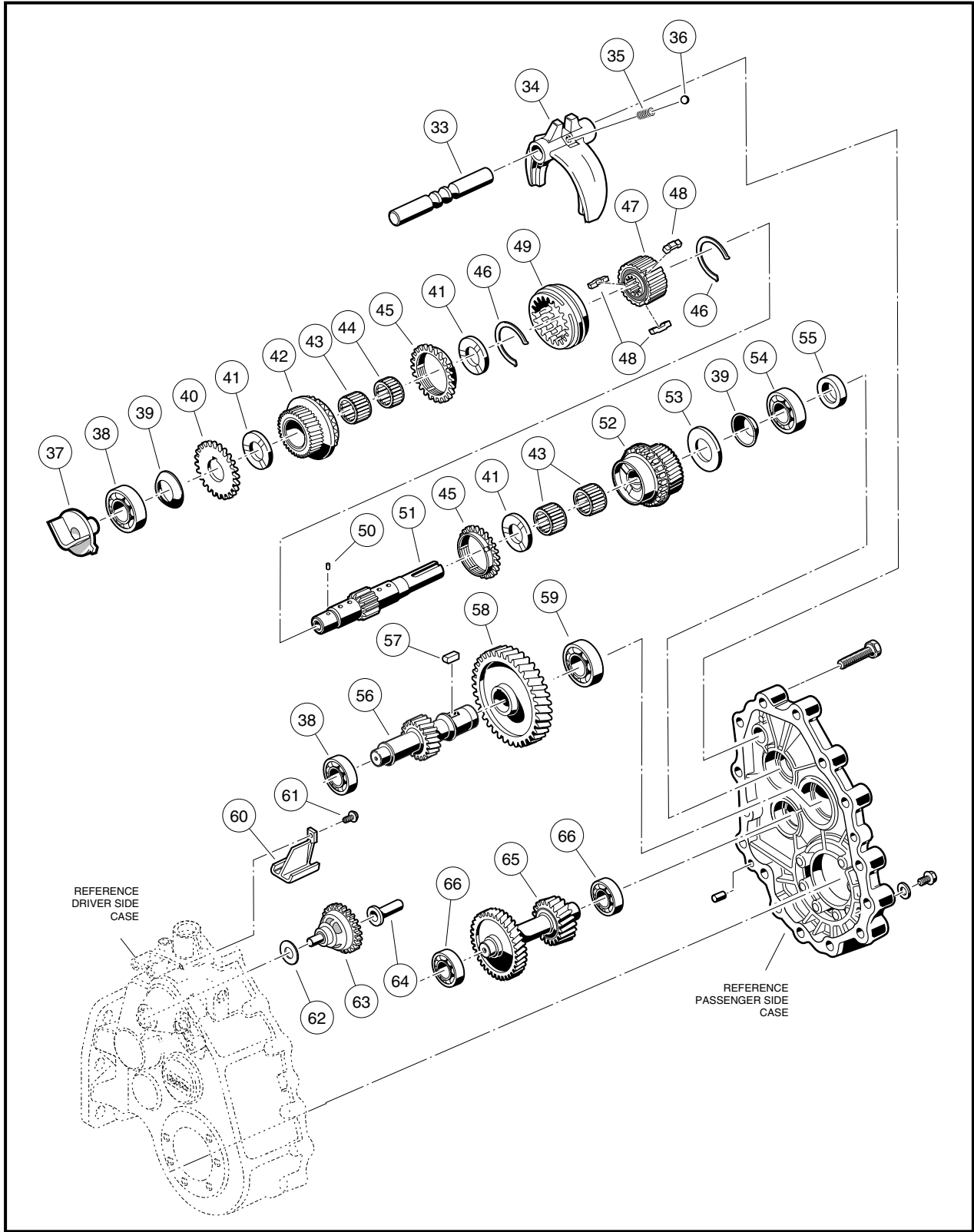


FIGURE 10-43

- 2. Place the bearing puller wedge attachment under the bearing (59) and press the bearing from the shaft (Figure 10-43). See CAUTION at bottom of page 52.
- 3. Press the gear (58) from the shaft (56), then remove the key (57) (Figure 10-43).

## Component Disassembly, Continued:

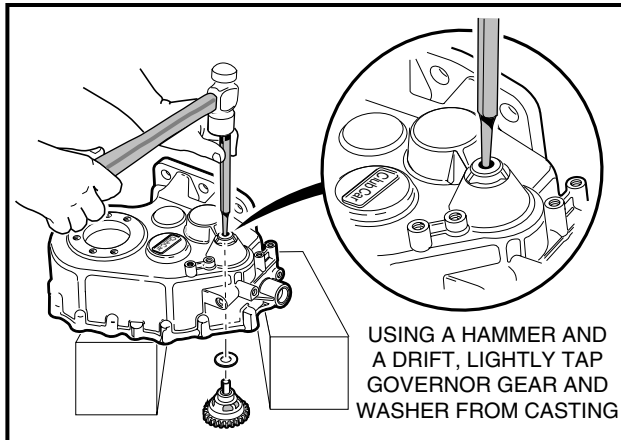


FIGURE 10-44

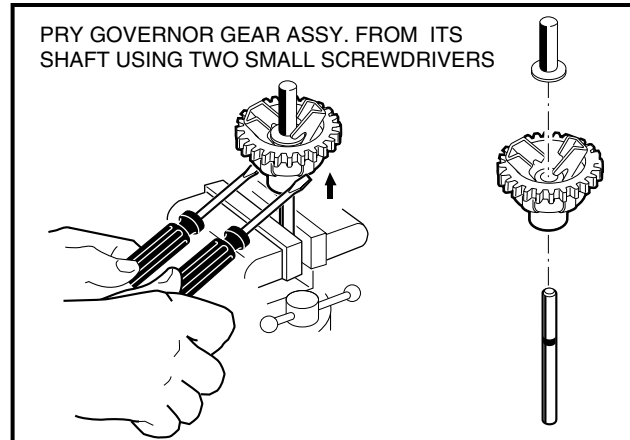


FIGURE 10-45

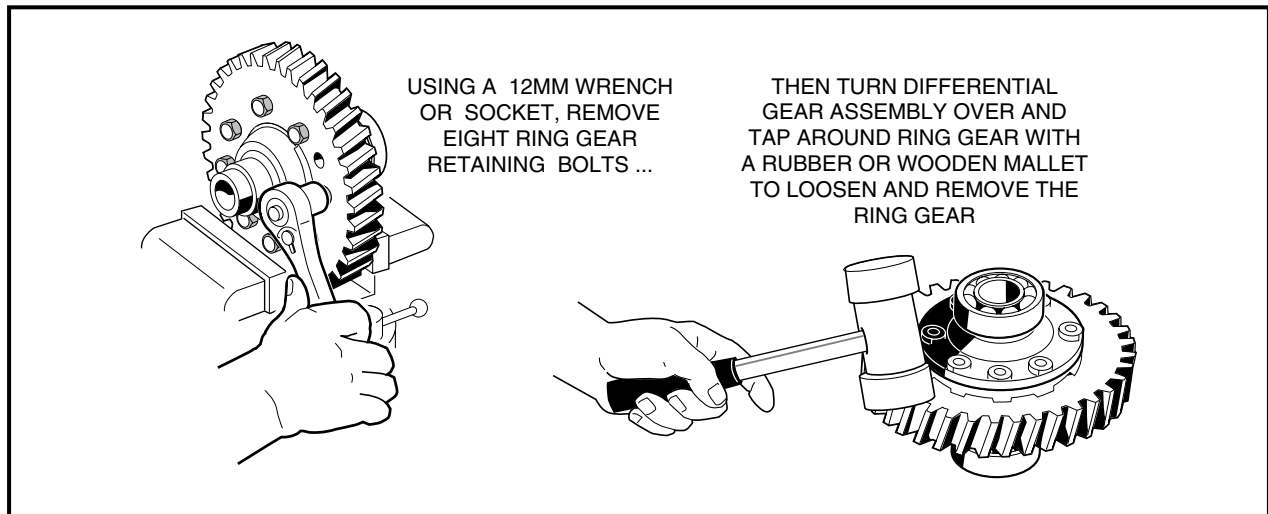


FIGURE 10-46

**DISASSEMBLE THE IDLER SHAFT ASSEMBLY**

1. Place a bearing puller wedge attachment (Club Car Part No. 1012812) between the bearing (66) (**Figure 10-43, Page 53**) and the small gear on the idler shaft, then press the bearing off the shaft as shown (**Figure 10-52, Page 56**).

**CAUTION**

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

2. Place a bearing puller wedge attachment (Club Car Part No. 1012812) between the bearing and the larger gear on the idler shaft, then press the bearing off the shaft as shown (**Figure 10-53, Page 56**).

**CAUTION**

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

## INSPECT UNITIZED TRANSAXLE COMPONENTS

1. Clean all of the component parts of the transaxle in a high flash-point solvent and then dry them. Inspect all components for excessive wear or damage.
2. Inspect all bearings by spinning them by hand. Check the bearings for excessive axial (A) and radial (B) play (**Figure 10-54, Page 56**). Replace bearings if they do not spin smoothly, if they are noisy, or if they have excessive play. Replace bearings if they are rusted, worn, cracked, pitted, or discolored.
3. Gears should be inspected for tooth surface damage or fractures.
4. Synchronizer ring teeth should be inspected for severe wear, fractures, or other damage.
5. Using a feeler gauge, measure the distance X at several points around the assembly. The synchro ring should be replaced when X is .020 inch (0.51 millimeter) or less (**Figure 10-55, Page 57**).

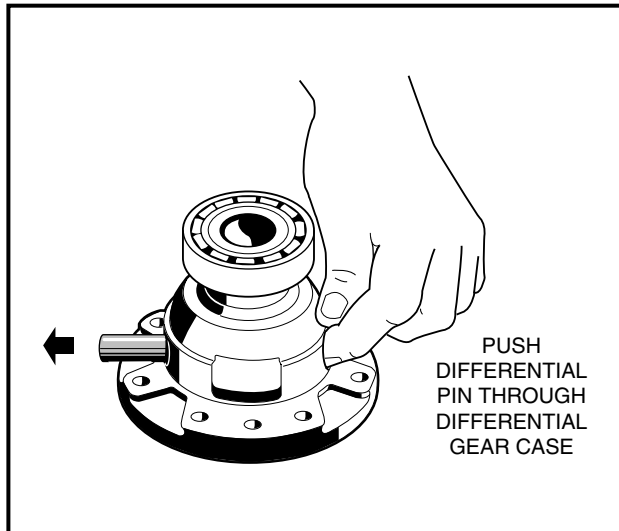


FIGURE 10-47

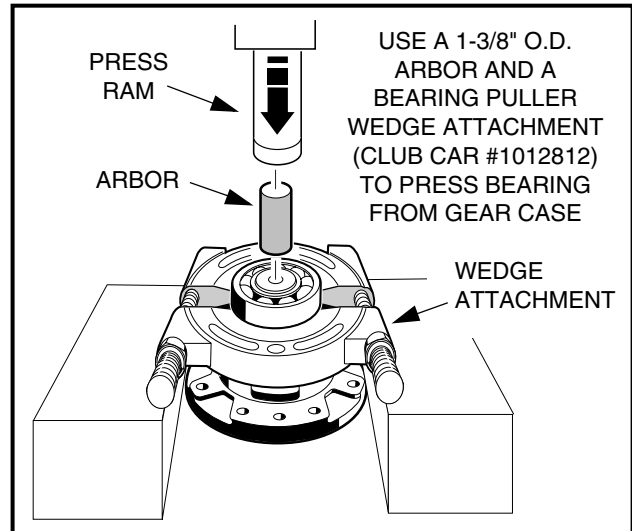


FIGURE 10-48

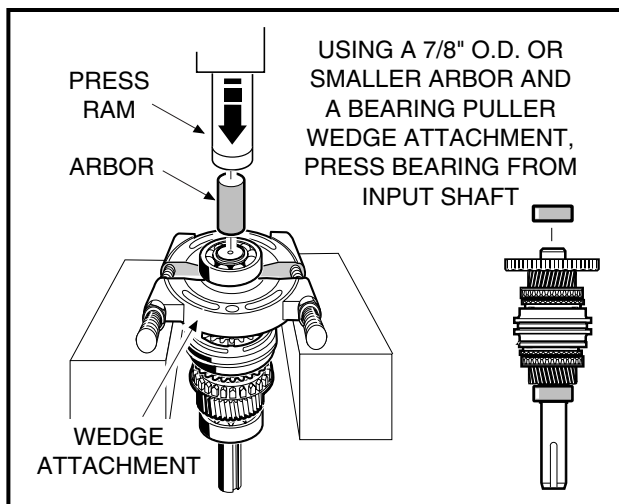


FIGURE 10-49

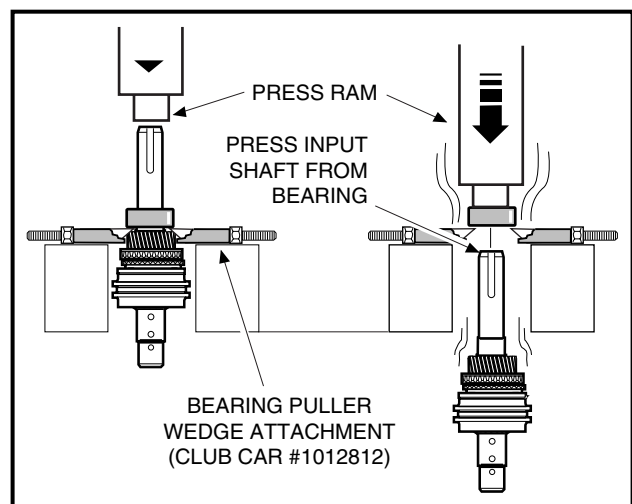


FIGURE 10-50

## COMPONENT ASSEMBLY

### IDLER SHAFT ASSEMBLY

1. Press a new bearing (66) (**Figure 10-43, Page 53**) onto each end of the idler shaft (**See Figure 10-56, Page 57**). **See CAUTION at the top of page 56.**

## ⚠ CAUTION

- APPLY PRESSURE AGAINST THE INNER RACE OF THE BEARING ONLY. APPLYING PRESSURE ANYWHERE ELSE WILL DAMAGE THE BEARING.

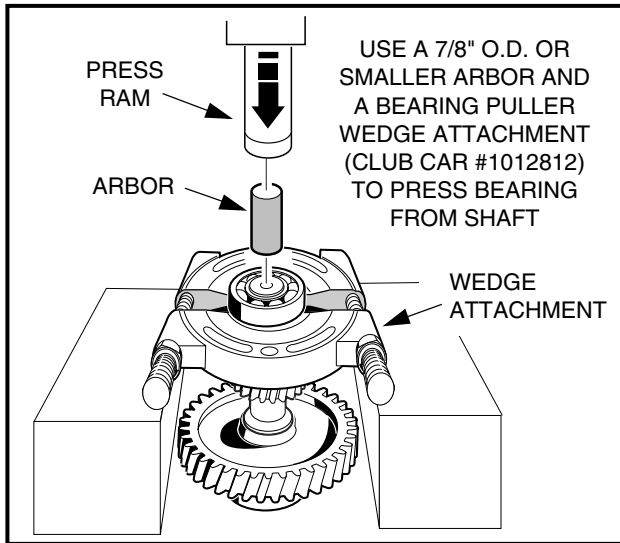


FIGURE 10-51

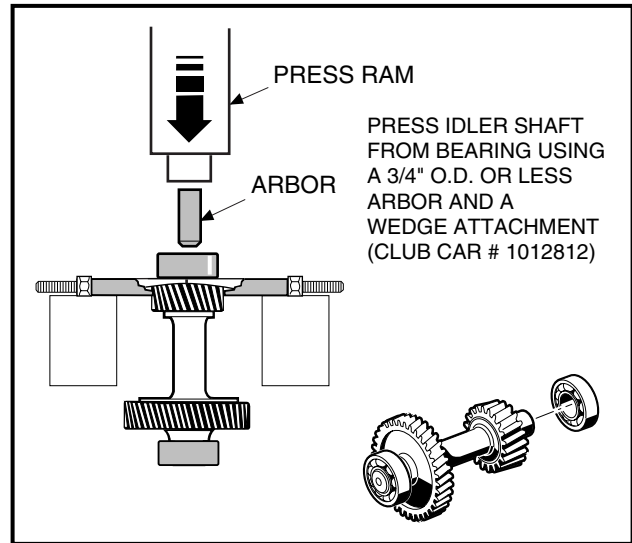


FIGURE 10-52

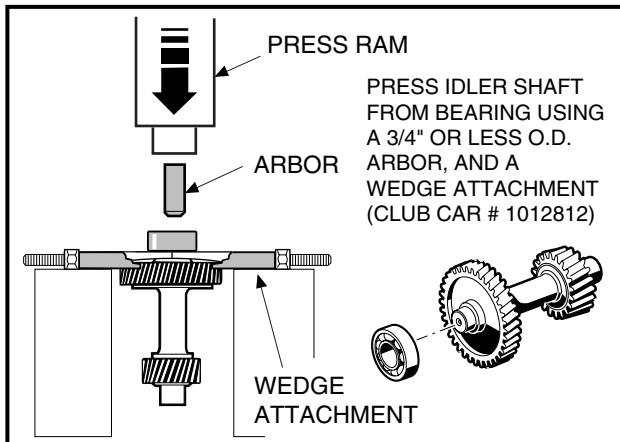


FIGURE 10-53

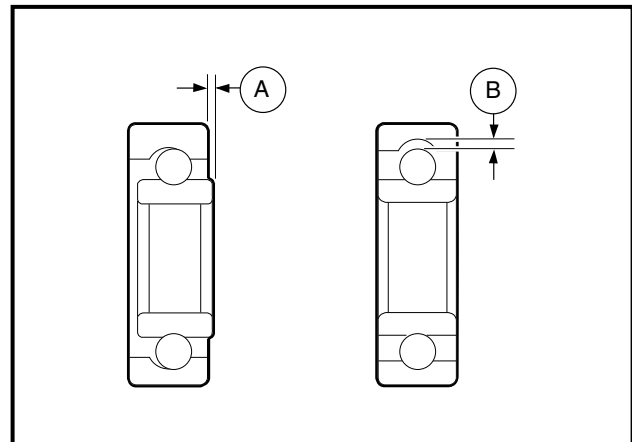


FIGURE 10-54

## INTERMEDIATE GEAR ASSEMBLY

1. If the gear (58) was removed from the shaft, install the key (57) into the slot and then position the gear on the shaft with keyway properly aligned with key (**Figure 10-43, Page 53**). Press the gear into place on the key.
2. Press the bearing (59) onto the end of the shaft next to the large gear that was installed in step one (**Figure 10-43**). See CAUTION below.

## ⚠ CAUTION

- APPLY PRESSURE AGAINST THE INNER RACE OF THE BEARING ONLY. APPLYING PRESSURE ANYWHERE ELSE WILL DAMAGE THE BEARING.

3. Press a new bearing (38) onto the other end of the shaft (**Figure 10-43, Page 53**).



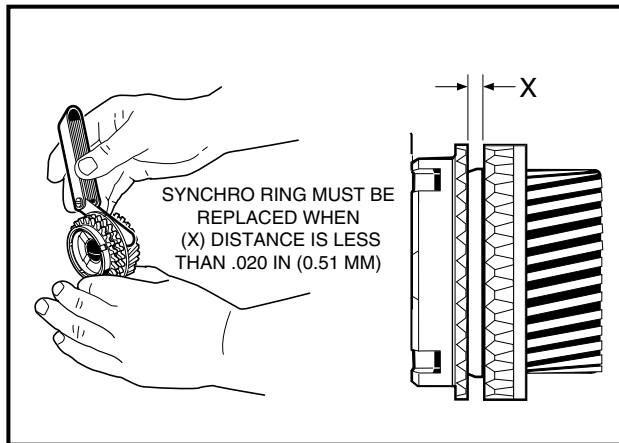


FIGURE 10-55

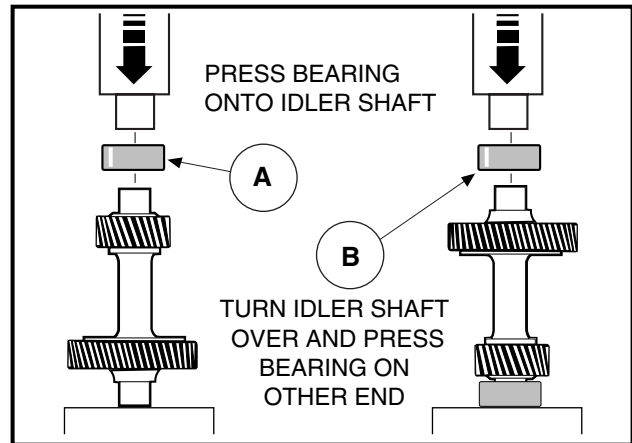


FIGURE 10-56

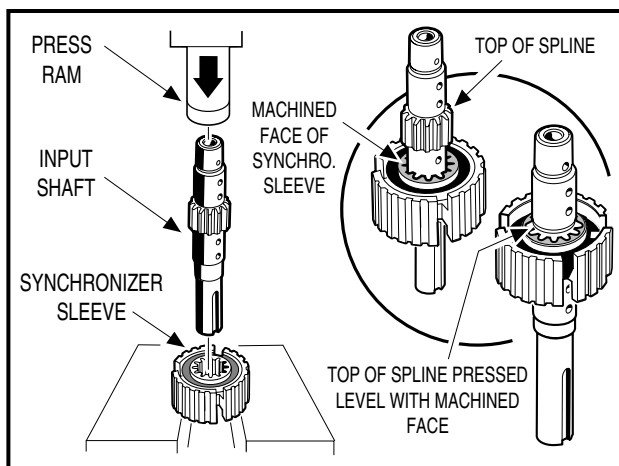


FIGURE 10-57

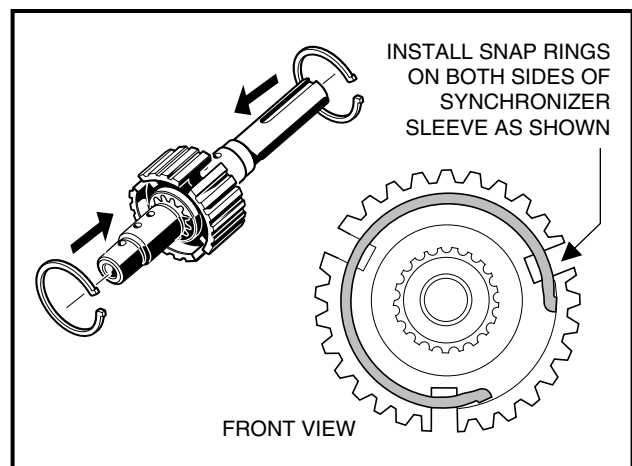


FIGURE 10-58

## SYNCHRONIZER GEAR ASSEMBLY

1. Press the synchronizer sleeve (47) (**Figure 10-43, Page 53**) onto the splines of the input shaft. No particular orientation of the sleeve is necessary, but toward the short end of the shaft, the machined circular face surrounding the ends of the internal splines in the sleeve must be flush with the machined lip of the shaft at the ends of the shaft splines (**See Figure 10-57**).
2. Install the snap rings (46) (**Figure 10-43, Page 53**) in the sleeve as shown (**Figure 10-58**).

### NOTE

- MAKE SURE THAT THE ENDS OF THE SNAP RINGS ARE POSITIONED BETWEEN THE SYNCHRONIZER INSERT SLOTS.

3. Install the three synchronizer inserts (48) into the slots in the sleeve as shown (**Figure 10-43, Page 53**). Make sure the notched surfaces of the inserts are facing outward as shown (**Figure 10-59**).
4. Install the synchronizer clutch hub (49) (**Figure 10-43**) onto the synchronizer sleeve. Make sure that the gear end of the hub is oriented toward the long end of the input shaft as shown (**Figure 10-60, Page 58**).
5. On the long end of the shaft, install the synchronizer ring (45) (**Figure 10-43, Page 53**) with the smooth collar of the ring towards the clutch hub. Make sure that the three notches in the collar mate with the synchronizer inserts in the synchronizer sleeve as shown (**Figure 10-61, Page 58**).

**Synchronizer Gear Assembly, Continued:**

6. Install the thrust washer (41) and two bearings (43) as shown (**Figure 10-43, Page 53**).
7. Install the input gear assembly (52), with the smooth collar toward the synchronizer ring as shown (**Figure 10-43**). The input gear should seat in the synchronizer ring.
8. Install the thrust washer (53) and then the spring (Belleville) washer (39). The spring washer should be oriented with the raised center toward the end of the shaft (**Figure 10-43, Page 53**).
9. Press a new bearing (54) onto the shaft until it seats (**Figure 10-43**). Make sure the input gear turns freely.

**CAUTION**

- APPLY PRESSURE AGAINST THE INNER RACE OF THE BEARING ONLY. APPLYING PRESSURE ANYWHERE ELSE WILL DAMAGE THE BEARING.

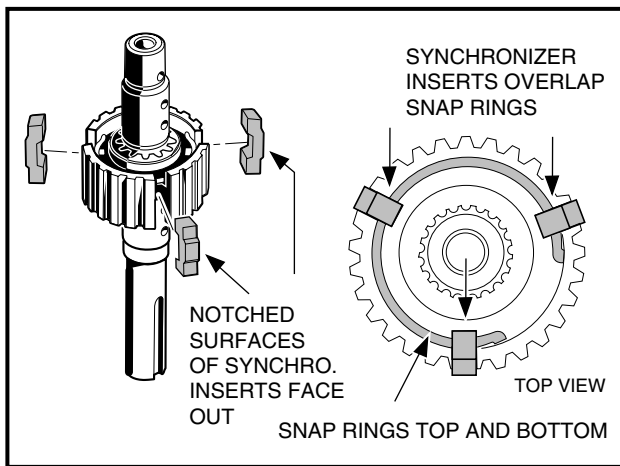


FIGURE 10-59

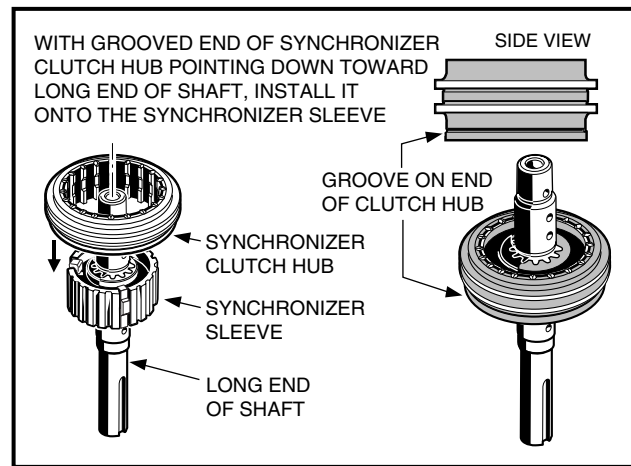


FIGURE 10-60

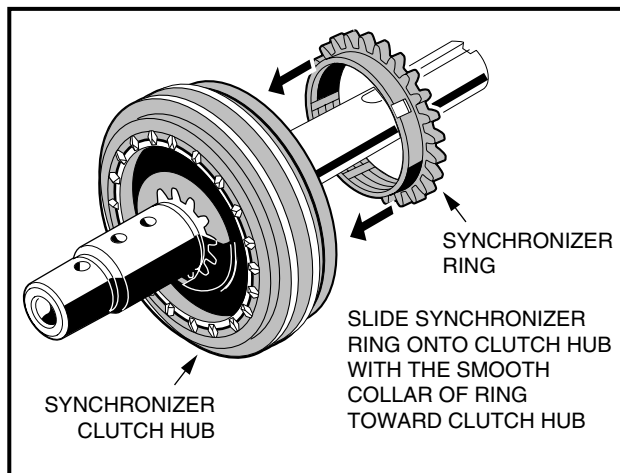


FIGURE 10-61

10. On the other end of the input shaft, install the thrust washer (41), and the synchronizer ring (45). The smooth collar of the synchronizer ring should be oriented toward the clutch hub, and the notches in it should mate with the synchronizer inserts as shown (**Figure 10-43, Page 53**).
11. Install the narrow bearing (44), wide bearing (45), and input gear (42) onto the shaft. The smooth collar of the input gear should be oriented toward the synchronizer ring as shown (**Figure 10-43**). The gear should seat inside the ring.

12. Install thrust plate (41) onto the shaft, and the dowel pin (50) into the shaft as shown (**Figure 10-43**).
13. Install the spur (governor drive) gear (40) onto the shaft with either side down. Mate the notch in the gear with the dowel pin as shown (**Figure 10-43, Page 53**).
14. Install the spring (Belleville) washer (39) onto shaft with the raised center toward the end of the shaft.
15. Press a new bearing (38) onto the end of the shaft until it seats (**Figure 10-43**). Make sure that the input gears turn freely.

### ⚠ CAUTION

- APPLY PRESSURE AGAINST THE INNER RACE OF THE BEARING ONLY. APPLYING PRESSURE ANYWHERE ELSE WILL DAMAGE THE BEARING.

## SHIFTER FORK ASSEMBLY

1. Install the spring (35) and ball (36) into the shift fork (34) as shown (**Figure 10-43, Page 53**).
2. Use a very small phillips-head screwdriver to depress the ball and spring while inserting shift rod (33) into the shift fork. Remove screwdriver when the shift rod is inserted far enough for it to depress the ball and spring, then continue to insert rod until the ball is positioned in the middle detent on the rod.

## DIFFERENTIAL GEAR CASE ASSEMBLY

1. If the bearings (79) were removed, press new ones onto the differential gear carrier case (84) and carrier case cover (87) (**Figure 10-6, Page 39**).

### ⚠ CAUTION

- APPLY PRESSURE AGAINST THE INNER RACE OF THE BEARING ONLY. APPLYING PRESSURE ANYWHERE ELSE WILL DAMAGE THE BEARING.

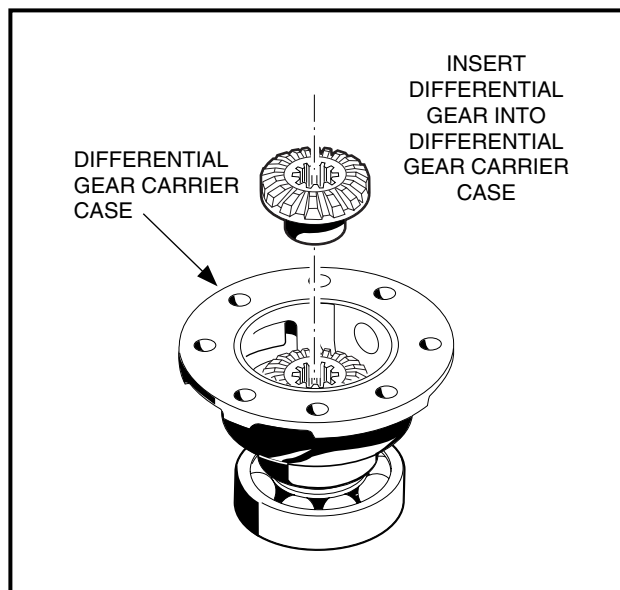


FIGURE 10-62

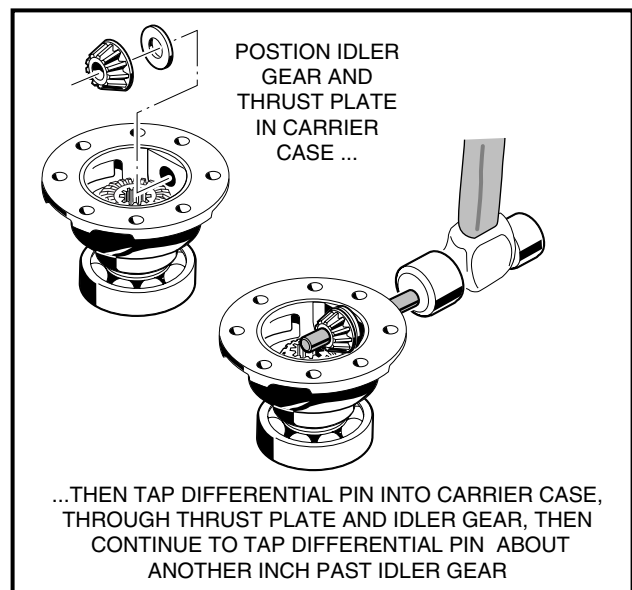


FIGURE 10-63

2. Install differential gear (91) into the carrier case (84) (**Figure 10-6, Page 39**) as shown (**Figure 10-62**).
3. Start the differential pin (88) (**Figure 10-6**) into the carrier case by lightly tapping it in with a hammer as shown. Before the pin enters the inside of the carrier case, position the thrust plate (85) and idler gear (89) (**Figure 10-6, Page 39**) in the case and then continue tapping the pin through the thrust plate and idler gear as shown (**Figure 10-63**).

## Differential Gear Case Assembly, Continued:

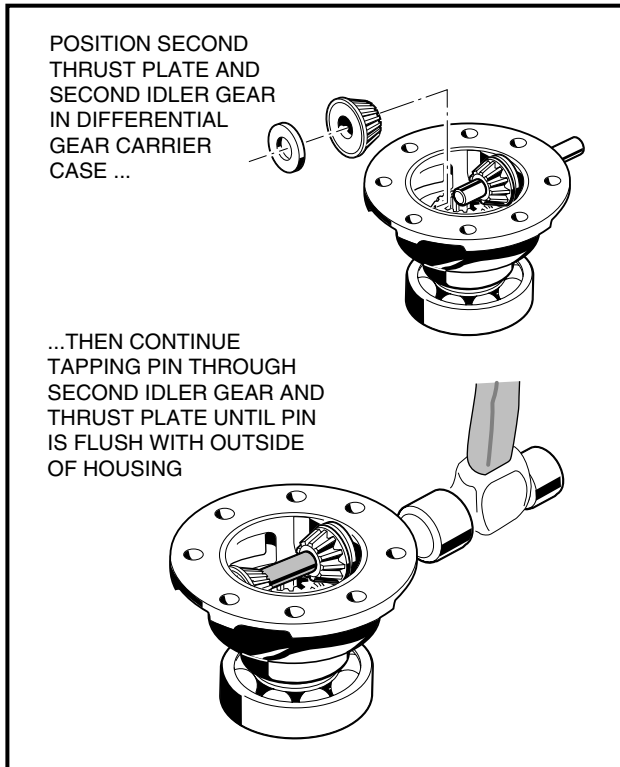


FIGURE 10-64

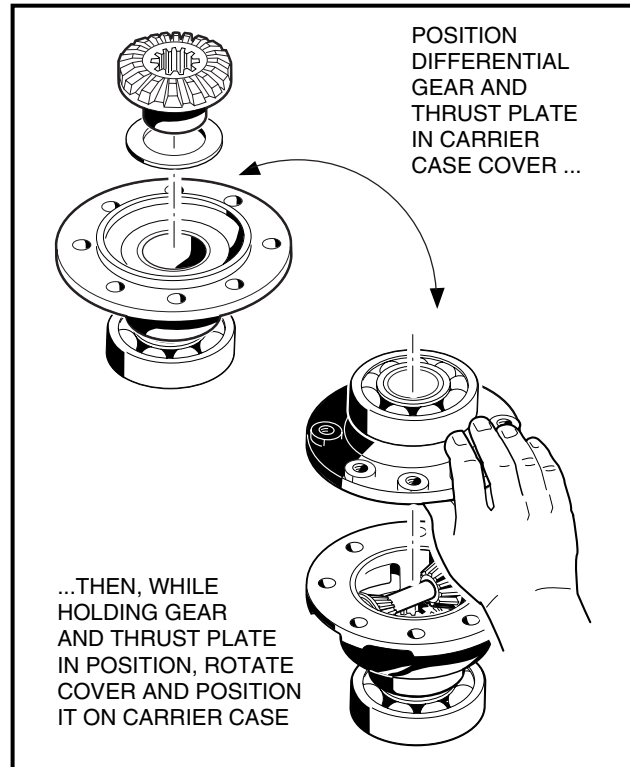


FIGURE 10-65

4. Position the other thrust plate (85) and idler gear (89) (**Figure 10-6, Page 39**) in the carrier case as shown (**Figure 10-64**), and then continue to drive the pin through them and the wall of the carrier case until the ends of the pin are flush with the sides of the carrier case (**Figure 10-64**).
5. Install the thrust plate (86) and idler gear (90) into the carrier case cover (87) (**Figure 10-6, Page 39**) as shown (**Figure 10-65**). Then, while holding the thrust plate and idler gear in place, position the carrier case cover on the carrier case as shown (**Figure 10-65**).
6. Position the ring gear (81) (**Figure 10-6, Page 39**) on the carrier case, visually aligning the dowel hole in the ring gear with the pin in the carrier. Then, using a wooden mallet, tap the ring gear into place on the dowel pin as shown (**Figure 10-66**).
7. Apply Loctite® 277 on the threads of the eight mounting bolts and install them through the ring gear, carrier case, and into the carrier case cover. Then tighten the bolts to 16-20 ft.lbs. (21.7/27.1 N-m) in the sequence shown (**Figure 10-67**).

## GOVERNOR GEAR ASSEMBLY

The governor gear is not assembled independently from the unitized transaxle casing. The gear shaft is installed into the casing and then the rest of the assembly is installed on the shaft. Proceed with unitized transaxle assembly.

## UNITIZED TRANSAXLE ASSEMBLY

1. Make sure that both parts of the casing are clean and free of any contaminants. Make sure that the machined mating surfaces are free of residue, and are not scored or damaged in any way.
2. Press two new oil seals (13 and 22) (**Figure 10-36, Page 48**) into the left (driver) side casing, and one new oil seal (55) (**Figure 10-43, Page 53**) into the right (passenger) side casing (**See Figure 10-68, Page 62**).

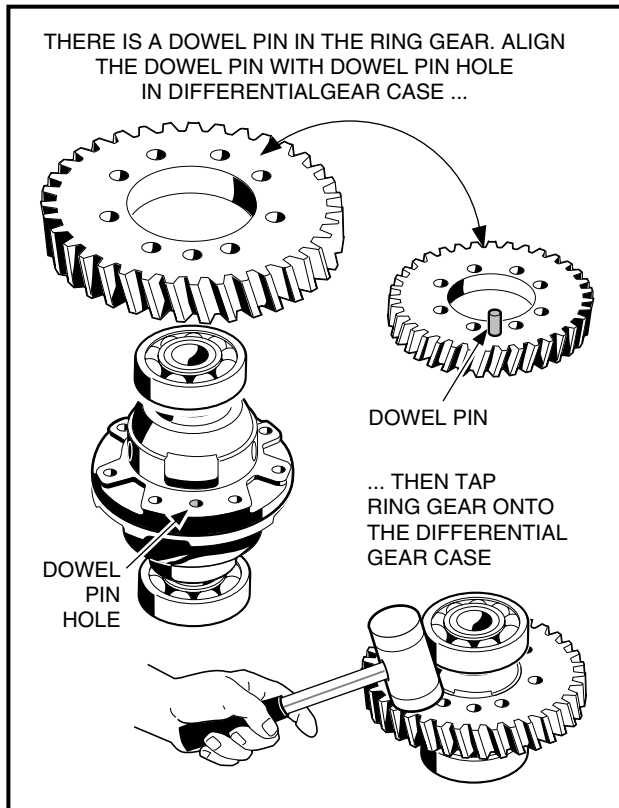


FIGURE 10-66

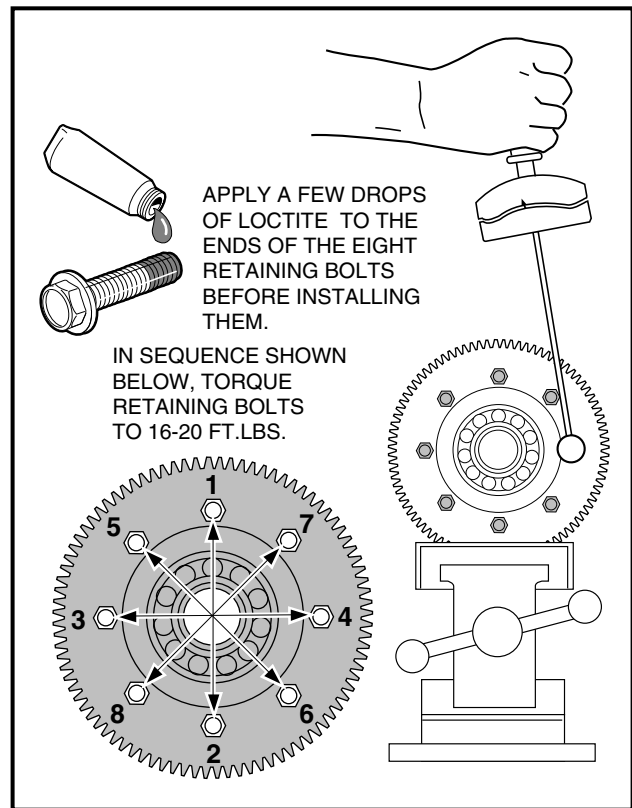


FIGURE 10-67

3. Position the governor gear shaft installation tool (Club Car Part No. 1019331-01) over the shaft bore in the inside of the left (driver) side casing and insert the governor gear shaft into the tool, long end (from the groove) first, as shown (**Figure 10-69, Page 62**). Make sure the shaft is started into the bore and then, using a light hammer, carefully tap the governor gear shaft into bore until the end on which you are tapping is flush with the end of the tool.
4. Install the washer, and then the governor gear and sleeve together, onto the governor shaft (**Figure 10-70, Page 62**). Make sure the sleeve is properly positioned within the flyweight brackets of the gear as shown (**Figure 10-71, Page 62**), and then push them onto the shaft until the gear snaps into the groove on the shaft.
5. Position the interior washer on the pivot arm, then install the pivot arm and washer into the left (driver) side casing as shown (**Figure 10-72, Page 63**). Then install the exterior washer and cotter pin on the pivot arm outside the casing as shown (**Figure 10-72, Page 63**).
6. Install the shifter shaft into the left (driver) side casing as shown (**Figure 10-73, Page 63**). Then install the washer and retaining ring on the shifter shaft outside of the casing (**Figure 10-73**).
7. Install the gear assemblies into the left (driver) side casing.
  - 7.1. Stand the left side casing on the mounting plate, then install the differential gear case assembly as shown (**Figure 10-74, Page 64**). Do not seat the assembly in the bore, but insert it just far enough that it will not fall out.
  - 7.2. Install the idler shaft assembly into the casing as shown. Do not seat the assembly in the bore, but insert far enough that it will not fall out. No gears mesh at this time (**Figure 10-75, Page 64**).
  - 7.3. Place a drop of Cyanoacrylate adhesive (Super Glue) in each of the oil guide slots in the casing. Then install the guide with the baffle toward the casing wall as shown (**Figure 10-76, Page 64**). Make sure that the two tabs on the guide are positioned in the slots in the casing.

## Unitized Transaxle Assembly, Continued:

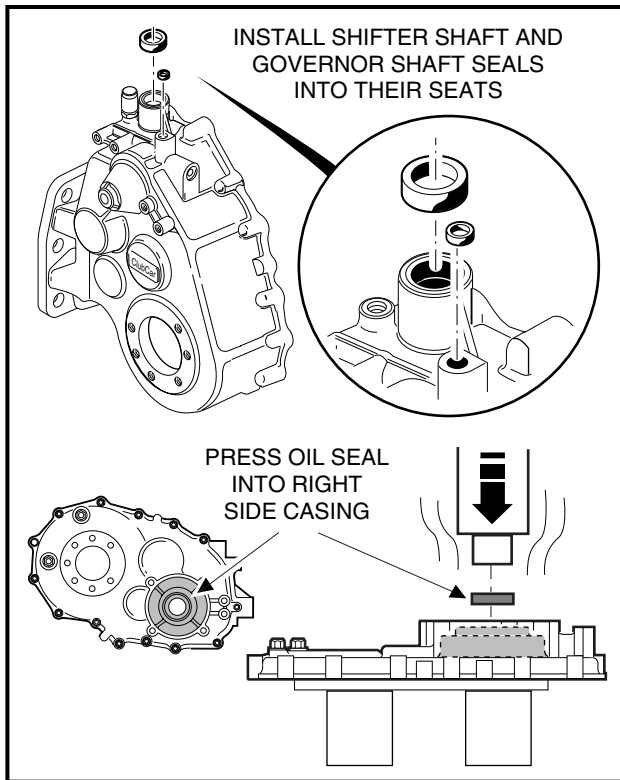


FIGURE 10-68

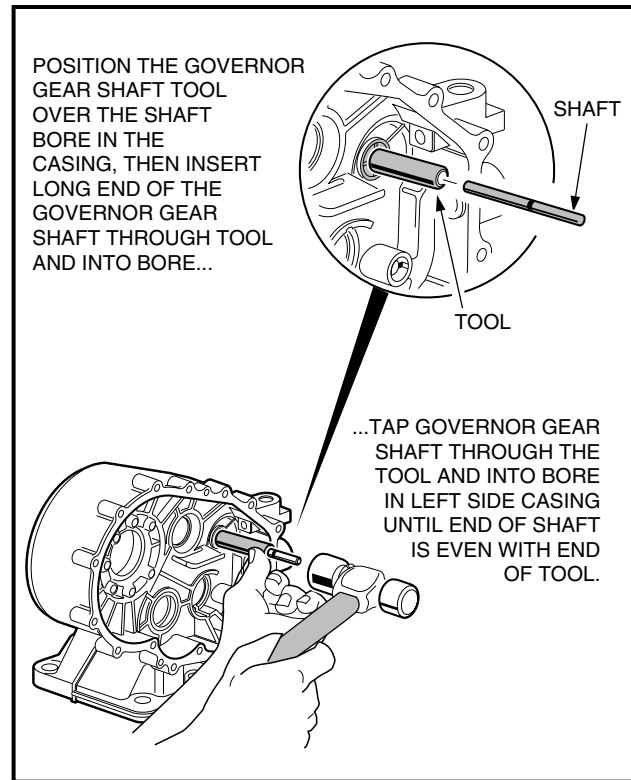


FIGURE 10-69

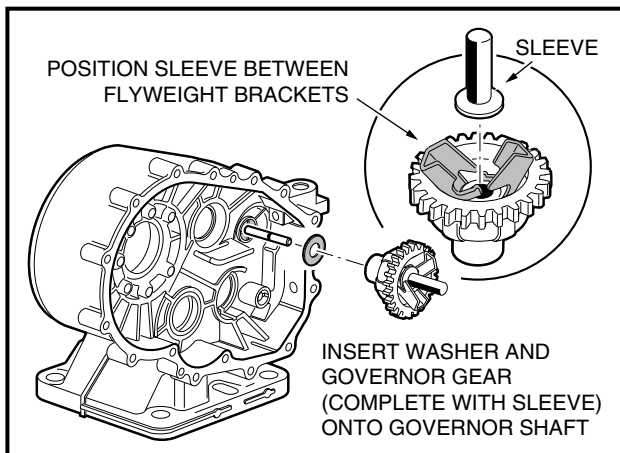


FIGURE 10-70

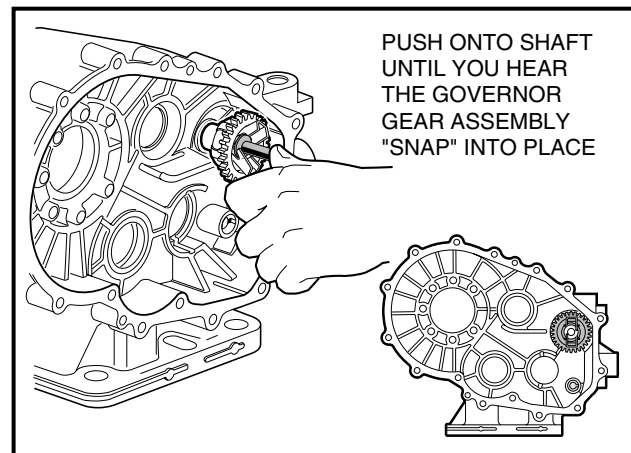


FIGURE 10-71

- 7.4. Position the shifter fork assembly on the synchronizer gear assembly as shown, and install them together, bearing end first, into the bore containing the guide (**Figure 10-77, Page 64**). Do not seat the assembly, but make sure that the spur gear (40) is meshed with the governor gear (63) (**Figure 10-43, Page 53**), and that the shifter lever (14) (**Figure 10-36, Page 48**) is positioned in the bracket on the shifter fork (**See Figure 10-78, Page 65**).
- 7.5. Install the intermediate gear assembly into the casing as shown (**Figure 10-79, Page 65**). Do not seat the assembly into the bore, but make sure that the ring gear meshes with the input drive gear (52) (**Figure 10-43, Page 53**) on the synchronizer gear assembly, and with the small gear on the idler shaft (65) (**Figure 10-43, Page 53**).
- 7.6. As a group, while keeping the gears meshed, work all of the gear assemblies into the bores until

they are seated. When all of the assemblies are correctly seated, the outside edges of the input drive gear (52) and the intermediate gear (58) (See Figure 10-43, Page 53) should be flush (in the same plane) as shown (Figure 10-80, Page 65). Also, the outside surfaces of the idler gear bearing, the intermediate gear bearing, and the differential gear bearing should be flush (Figure 10-80, Page 65).

### ⚠ CAUTION

- IF THE EDGES OF THE INPUT DRIVE GEAR AND INTERMEDIATE GEAR ARE NOT FLUSH, THEN THE OIL GUIDE (37) (FIGURE 10-43, PAGE 53) MAY NOT BE PROPERLY POSITIONED IN THE BORE.

8. Make sure that the mating surfaces of the left and right sides of the casing are clean and free of oil, grease, or residue of any kind; and that they are not scored or damaged in any way.
9. Then apply a continuous bead of Three Bond No. 1215 sealant to the mating surface, around the complete profile of the right (passenger) side casing (See Figure 10-81, Page 65). See CAUTION below.

### ⚠ CAUTION

- USE ONLY THREE BOND NO. 1215 SEALANT TO SEAL CASING. DO NOT USE A SUBSTITUTE.
- IF THE TWO SIDES OF THE CASING CANNOT BE EASILY CLOSED OR DO NOT MAKE COMPLETE CONTACT, DO NOT FORCE THEM TOGETHER. CHECK THAT ALL INTERNAL COMPONENTS ARE PROPERLY SEATED AND THEN TRY AGAIN.

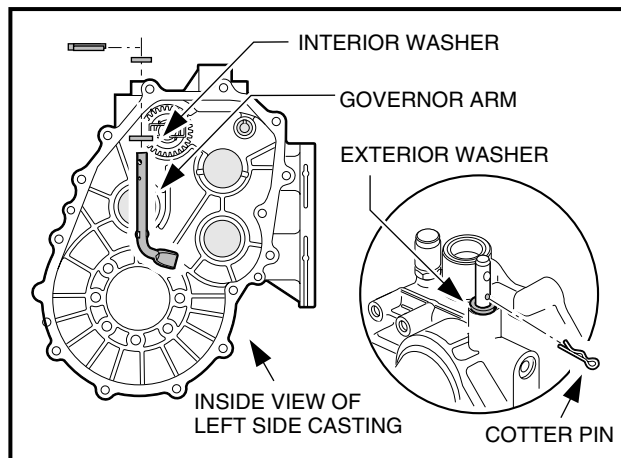


FIGURE 10-72

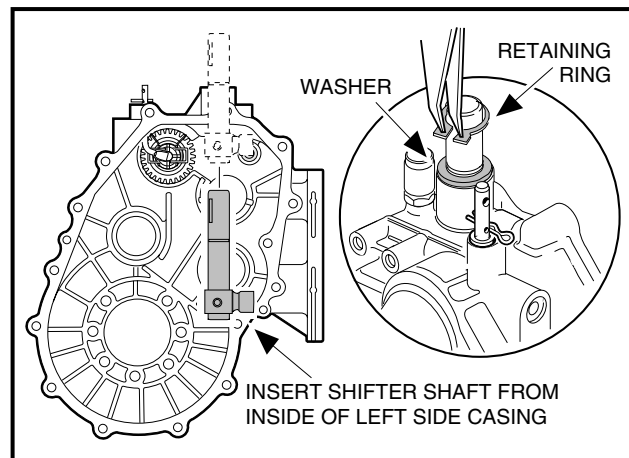


FIGURE 10-73

10. Install and thread to finger tight the fifteen bolts (27) (Figure 10-36, Page 48) that secure the left and right sides of the casing together. Then, in sequence shown, tighten the bolts to 15-18 ft.lbs. (20.3/24.4 N-m) (See Figure 10-82, Page 66).
11. Install the axle tubes (75 and 76) on the transaxle casing (Figure 10-6, Page 39).
  - 11.1. Make sure that the mating surfaces of the axle tubes and the transaxle casing are clean and free of oil, grease, or residue of any kind.
  - 11.2. Apply a continuous bead of Three Bond No. 1215 around the opening on the mating surface of the right side axle tube as shown (Figure 10-83, Page 66). Then position the axle tube on the right side of the transaxle casing as shown and install eight mounting bolts (77) with lock washers (78) (Figure 10-6, Page 39) finger tight. In the sequence shown, tighten the bolts to 33-39 ft.lbs. (40.7/48.7 N-m) (Figure 10-84, Page 66).



Unitized Transaxle Assembly, Continued:

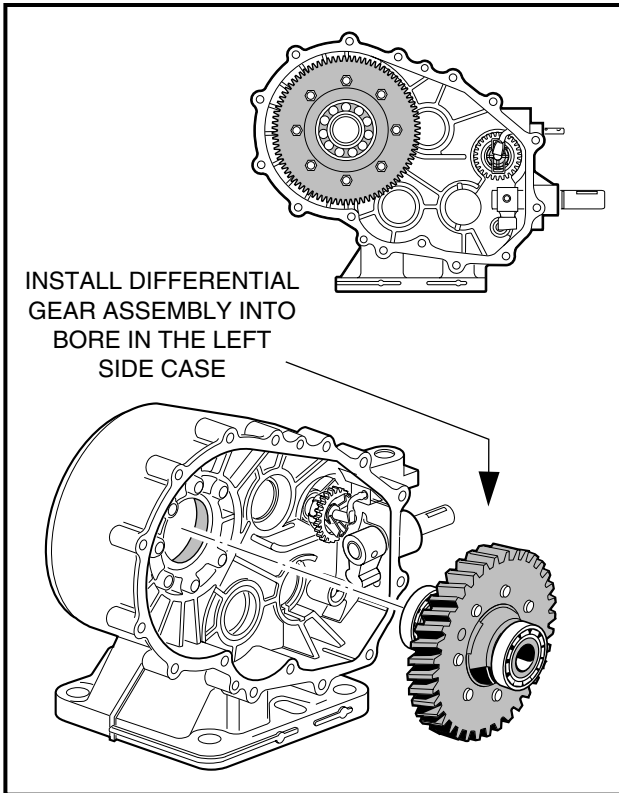


FIGURE 10-74

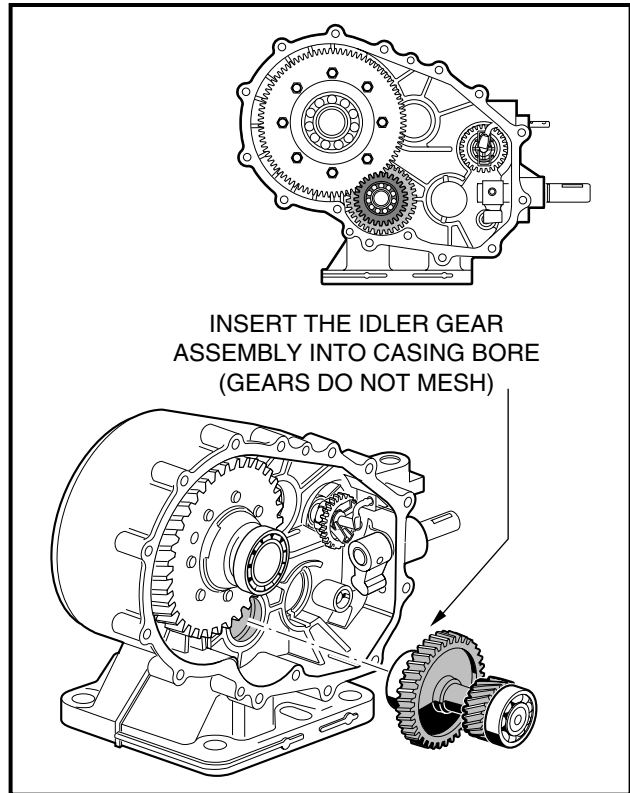


FIGURE 10-75

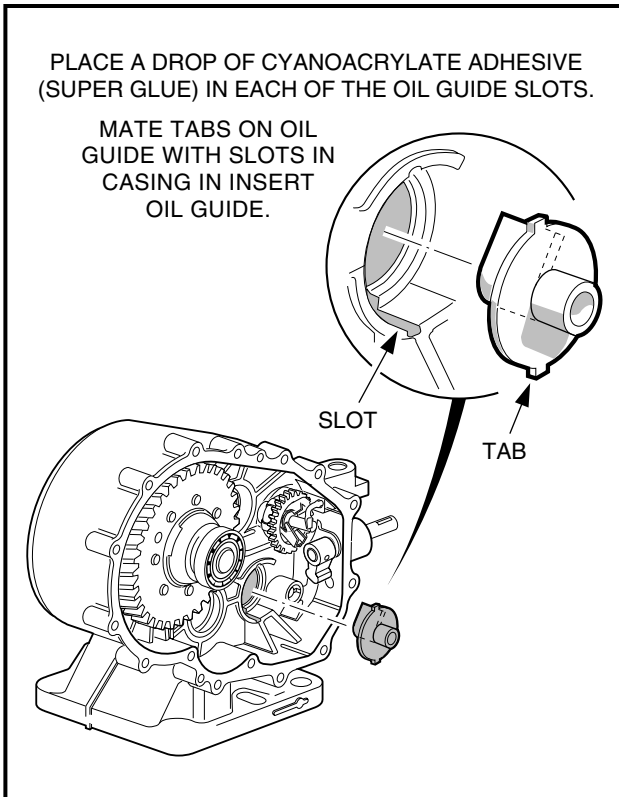


FIGURE 10-76

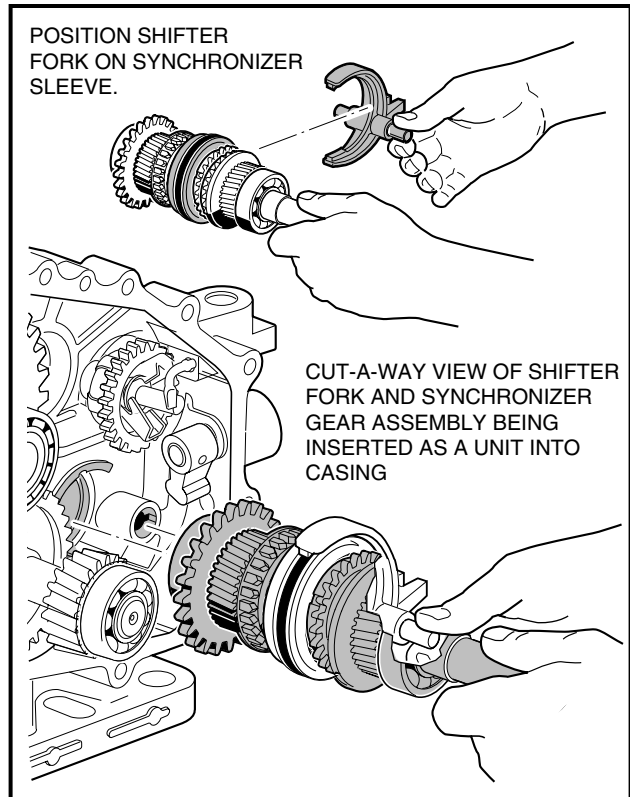
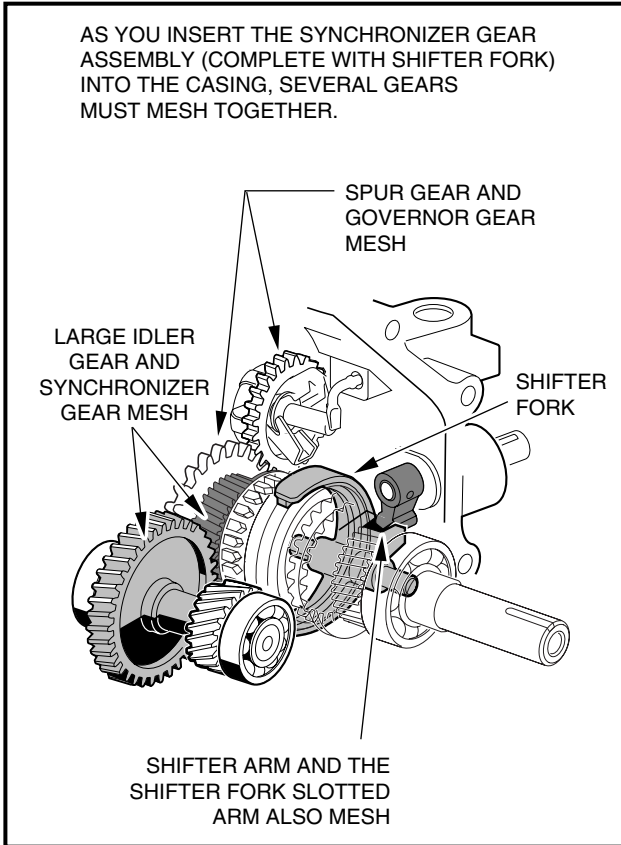
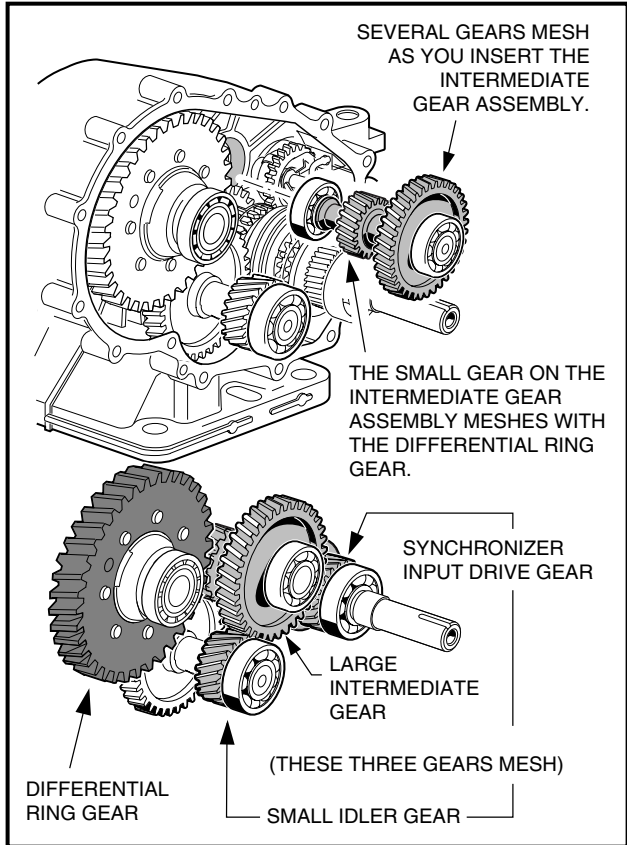


FIGURE 10-77

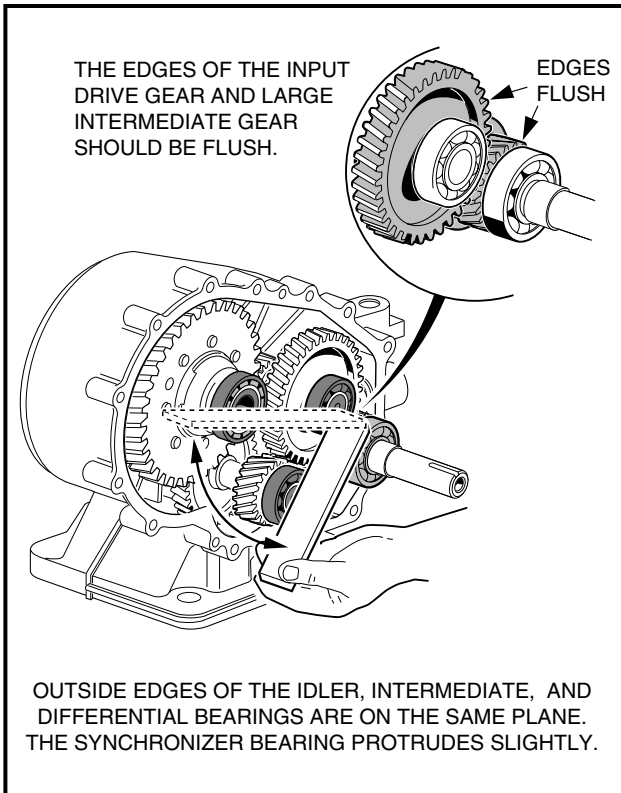




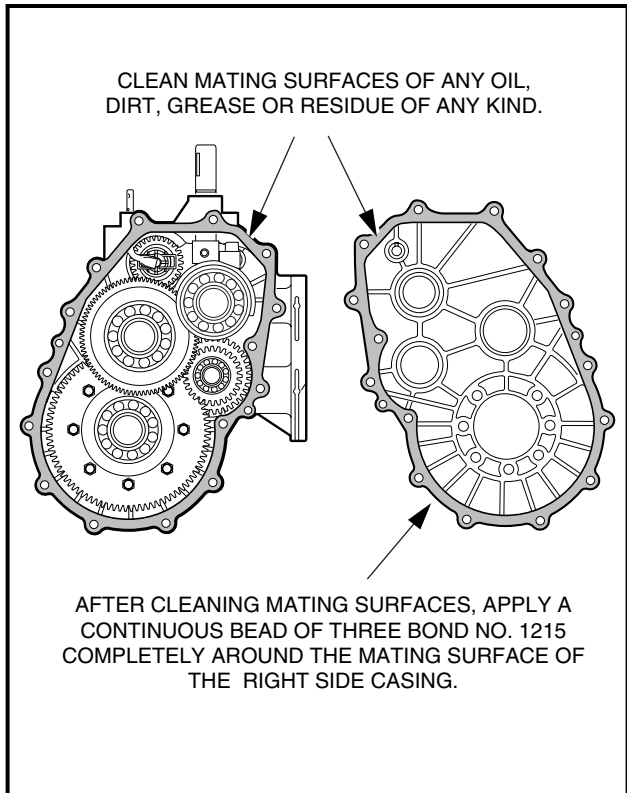
**FIGURE 10-78**



**FIGURE 10-79**



**FIGURE 10-80**



**FIGURE 10-81**

**Unitized Transaxle Assembly, Continued:**

11.3. Duplicate step 11.2 for the left side axle tube.

11.4. Install the right axle shaft (68) in the right axle tube (76) (**Figure 10-6, Page 39**). Using snap ring pliers, install the retaining ring as shown (**Figure 10-85**). See WARNING below.

**⚠ WARNING**

- BE SURE THAT 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.

11.5. Install the left axle shaft (67) in the left axle tube (75) (**Figure 10-6, Page 39**). Using snap ring pliers, install the retaining ring as shown (**Figure 10-85**). See WARNING above.

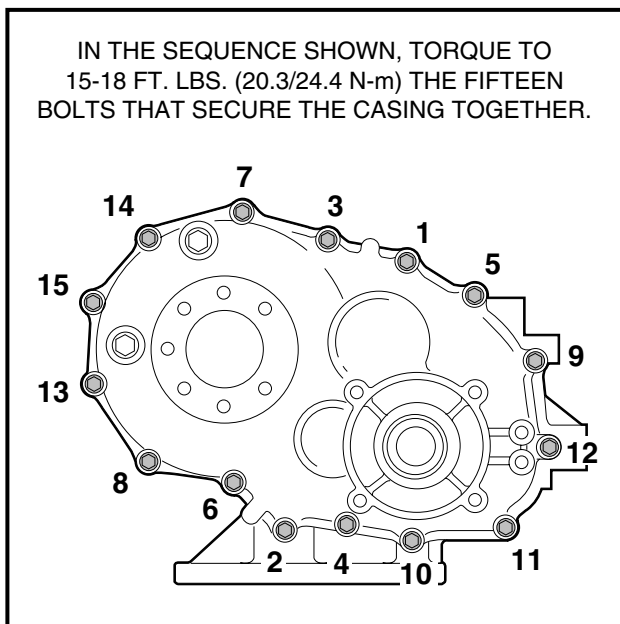


FIGURE 10-82

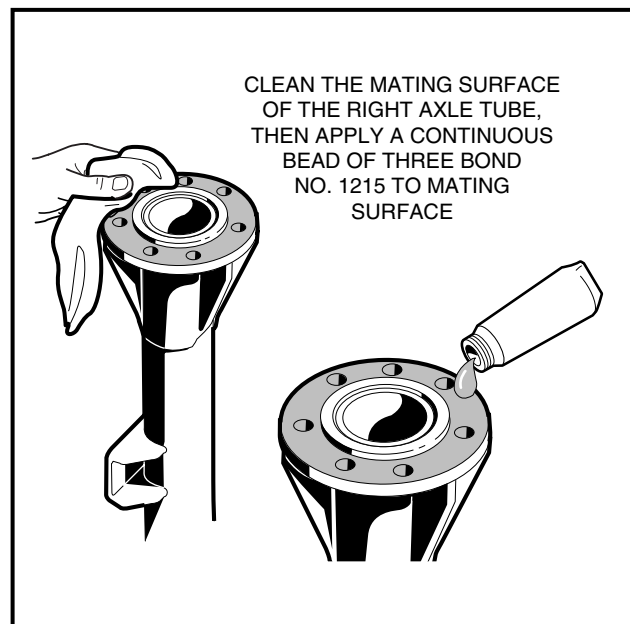


FIGURE 10-83

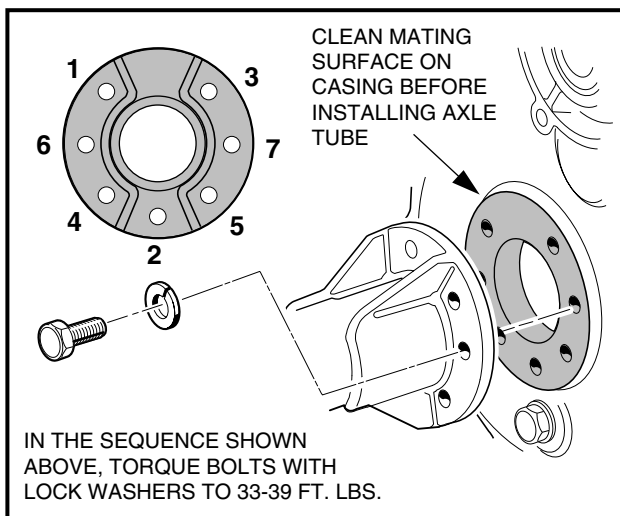


FIGURE 10-84

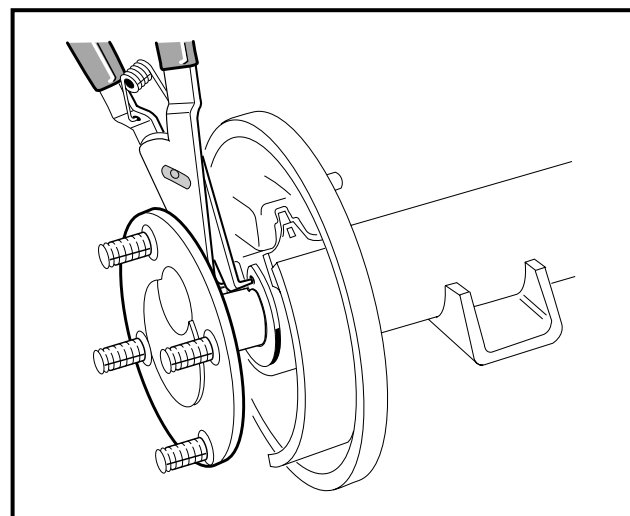


FIGURE 10-85

# UNITIZED TRANSAXLE INSTALLATION

10

G

1. Install the brake assemblies, wheels, and leaf springs on the transaxle.
2. Position the transaxle mounting plate on the two mounting studs at the rear of the engine, and then install the two mounting nuts (**Figure 10-86**). Use a 14 mm wrench.
3. Install the remaining four mounting bolts and four nuts (one bolt and nut at each corner of the mounting plate). Use two 14 mm wrenches to tighten them.
4. Torque the four corner nuts (with bolts) to 27-33 ft.lbs. (36.6/44.7 N-m). Torque the two center nuts (on the studs) to 15-18 ft.lbs. (20.3/24.4 N-m).
5. Install the accelerator cable bracket on transaxle casing. Use a 3/8" socket to install the mounting screws (**Figure 10-87**).
6. Install the governor cable bracket on transaxle casing. Use a 3/8" socket to install the mounting screws (**Figure 10-88**).
7. Install governor arm on governor shaft (**Figure 10-89**). Use a 7/16" wrench to tighten the retaining bolt.
8. Install the key onto the input shaft (**Figure 10-90, Page 68**).
9. Position the driven clutch on the transaxle and install the washer (yellow side facing out) and mounting bolt (**Figure 10-90**). Use a 1/2" wrench to tighten the mounting bolt to 12-14 ft.lbs. (16.3/19 N-m).
10. Install the drive belt (**See Torque Converter, Section 16, Page 16-4 in Maintenance Manual**).
11. Remove the blocks from under the engine and roll the drive train into position under the vehicle. Then lift the front of the drive train and place the snubber into the snubber bracket in the vehicle frame (**Figure 10-91, Page 68**).

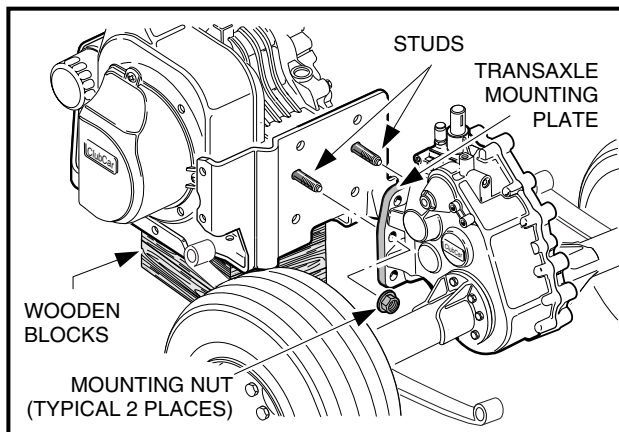


FIGURE 10-86

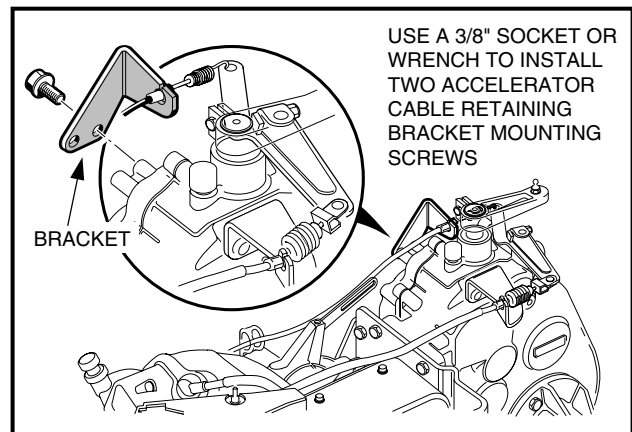


FIGURE 10-87

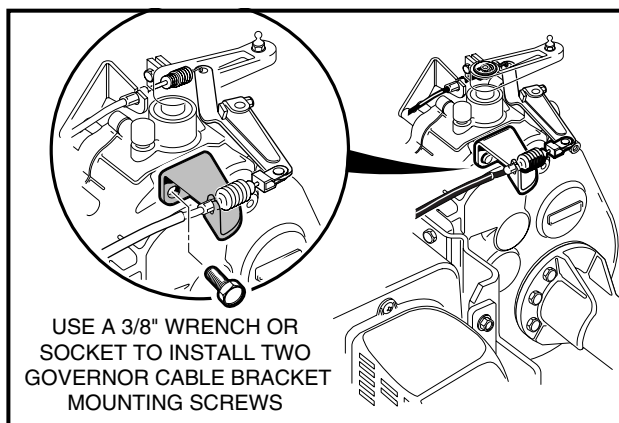


FIGURE 10-88

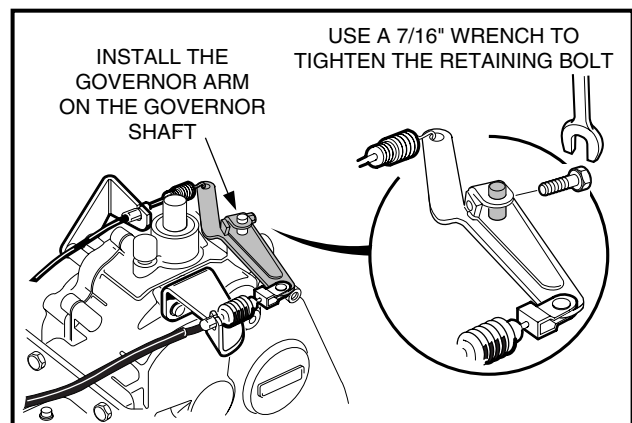


FIGURE 10-89

## Unitized Transaxle Installation, Continued:

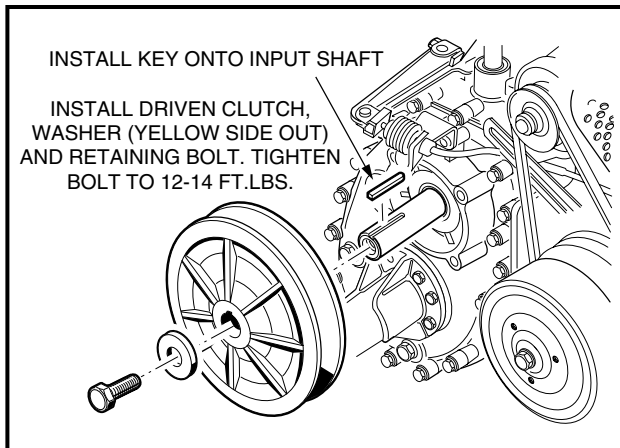


FIGURE 10-90

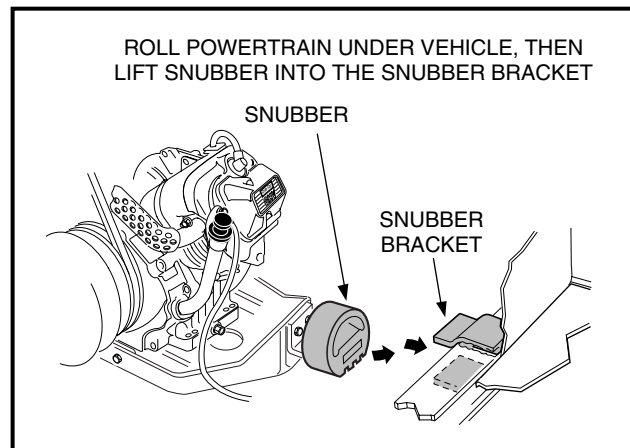


FIGURE 10-91

12. Position the floorjack under the trailer hitch bracket and raise the jack high enough to support the vehicle. Make sure the vehicle is stable on the jack, then remove the jackstands.
13. After the jackstands are removed, lower the vehicle to approximately its normal height. Then position the leaf springs in the front spring mounts and install the bolts, washers, and nuts (**Figure 10-92**).
14. Using the floorjack, adjust vehicle height to position the leaf springs for mounting in the shackles. Then install the mounting bolts, washers, and nuts (**Figure 10-93**).
15. Position shocks in the shock mounts and install cushions, mounting washers and nuts (**Figure 10-94**).
16. Connect the brake cables (**See Page 147**).

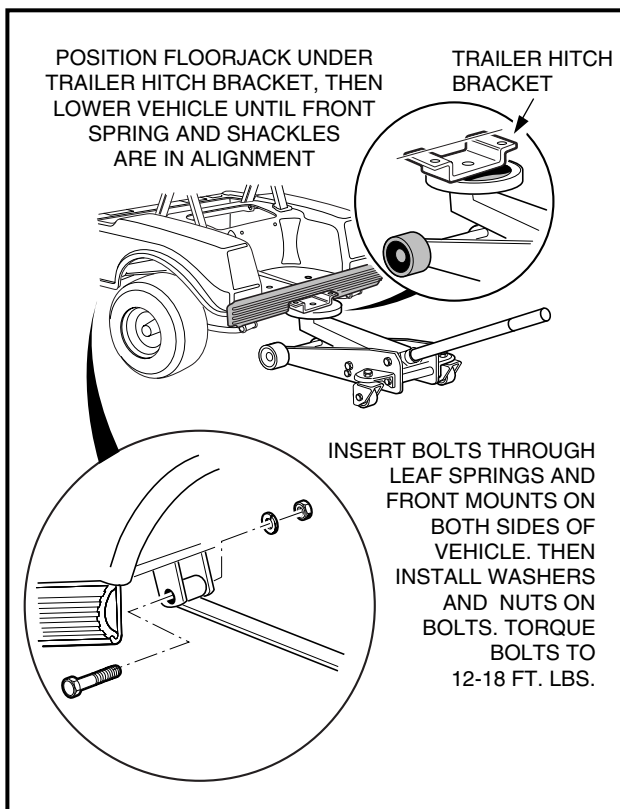


FIGURE 10-92

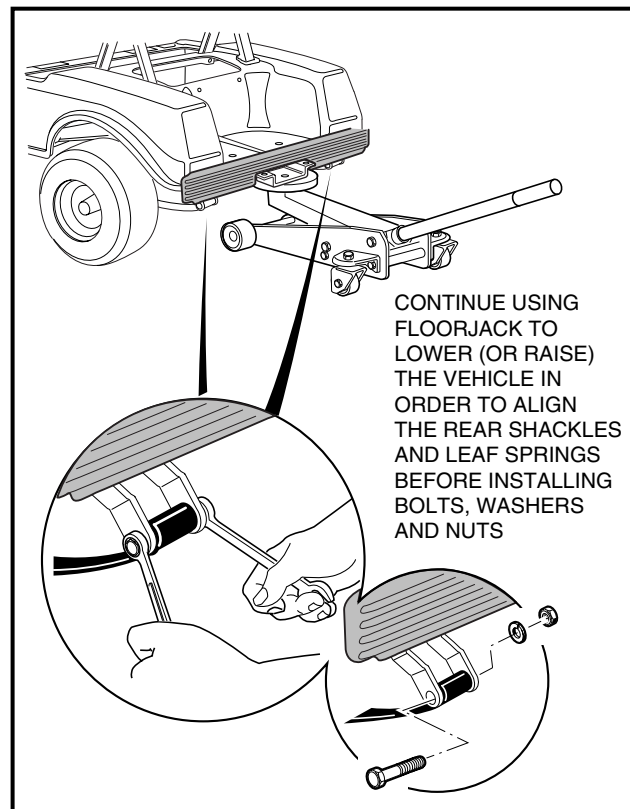


FIGURE 10-93

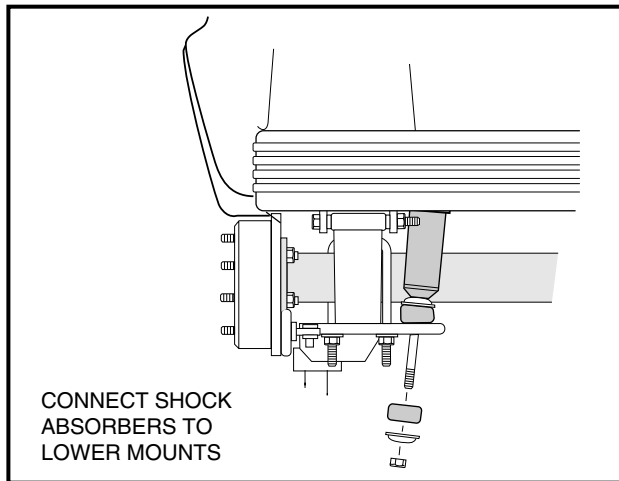


FIGURE 10-94

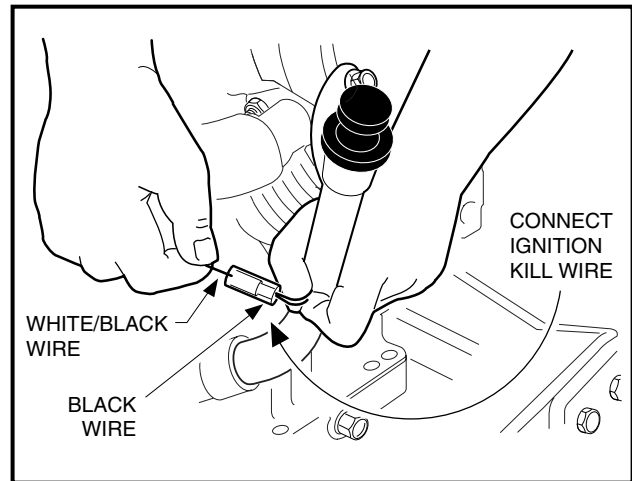


FIGURE 10-95

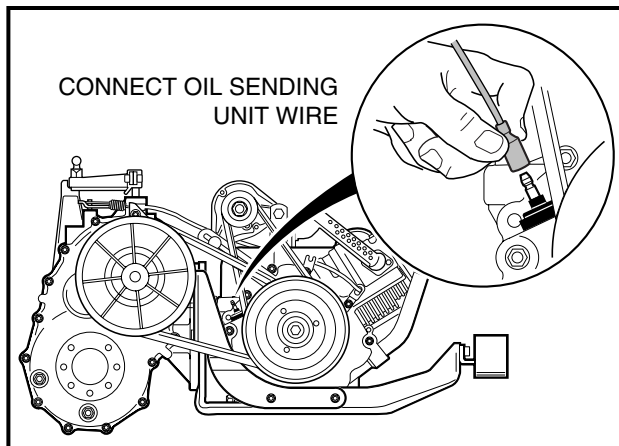


FIGURE 10-96

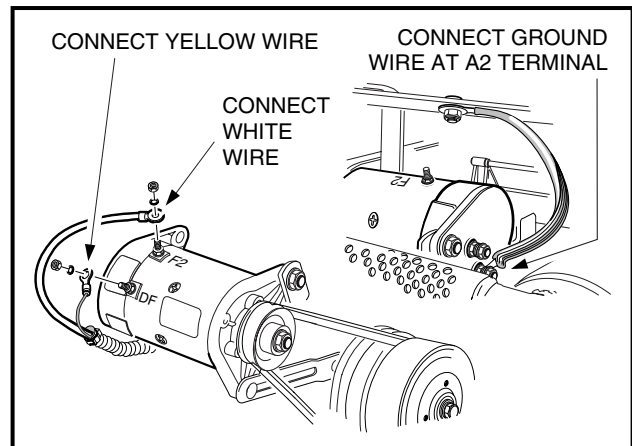


FIGURE 10-97

17. Connect the engine kill switch wire (18 gauge white/black stripe) to the bullet connector at the lower right front of the engine (**Figure 10-95**).
18. Connect the engine oil level sending unit wire (18 gauge yellow) to the sending unit located on the engine, beneath the muffler (**Figure 10-96**).
19. Connect 6 gauge white wire to the F2 post, the 6 gauge black ground wire to the A2 post, and the 16 gauge yellow wire to the DF post on the starter/generator (**Figure 10-97**).
20. Position the shifter cable in the shifter cable mounting bracket on the transaxle and use two 11/16" wrenches to tighten the mounting nuts. Then connect the shifter cable rod end to the shifter arm (**Figure 10-98, Page 70**).
21. Attach the ground cable to the mounting screw on the oil filler tube mounting bracket on the engine cylinder head (**Figure 10-99, Page 70**). Tighten with a 10 mm wrench.
22. Connect the accelerator cable to the actuator cam in the electrical box. Then position the accelerator cable in the mounting slot in the wall of the electrical box and tighten the mounting nuts using a 10 mm wrench (**Figure 10-100, Page 70**). Install the electrical box cover and tighten the mounting screw.
23. Pull the fuel line from the outlet nipple of the fuel pump and connect it to the carburetor, then use a 1/4" nut driver to secure the hose clamp (**Figure 10-101, Page 70**).
24. Connect the impulse line to the fuel pump and secure it with the hose clamp (**Figure 10-102, Page 70**).
25. Connect the air intake hose to the carburetor and secure the hose clamp (**Figure 10-103**).
26. Connect the overflow tube to the carburetor and secure it with the hose clamp (**Figure 10-104**).



**Unitized Transaxle Installation, Continued:**

27. Install the drain plug and tighten to 21 ft.lbs. (28.5 N-m).
28. Fill transaxle with 27 oz. (.8 liter) of 80-90 WT. API Class GL3 or 80-90 WT. AGMA Class EP gear lube.
29. Install and tighten the level indicator hole plug to 21 ft.lbs. (28.5 N-m).
30. Connect the battery cables, positive first. Connect the spark plug wire.

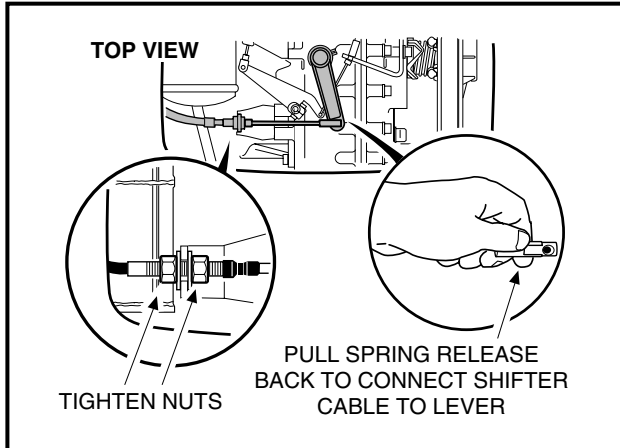


FIGURE 10-98

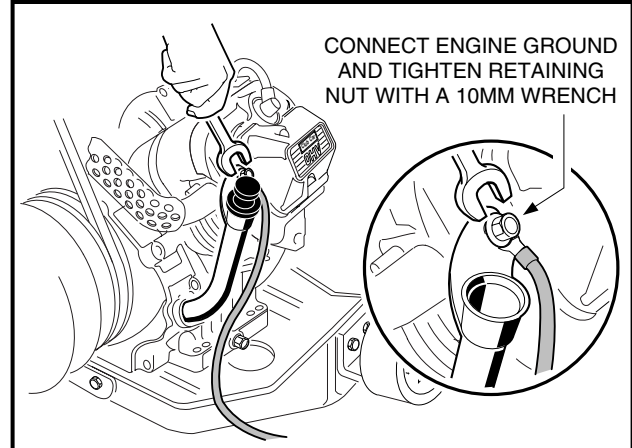


FIGURE 10-99

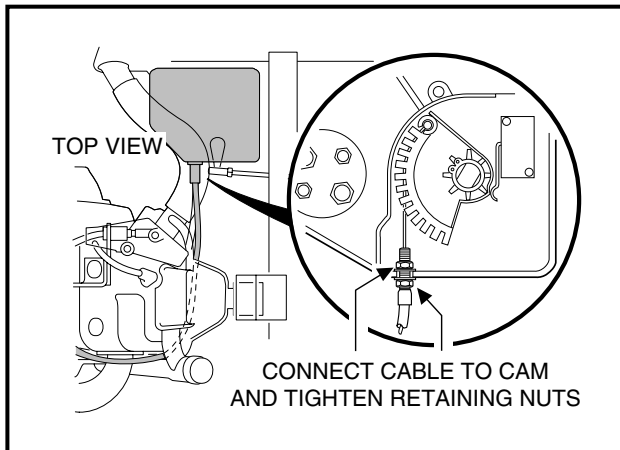


FIGURE 10-100

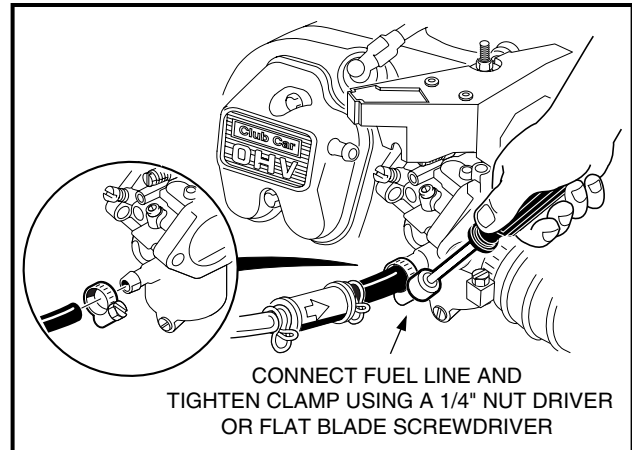


FIGURE 10-101

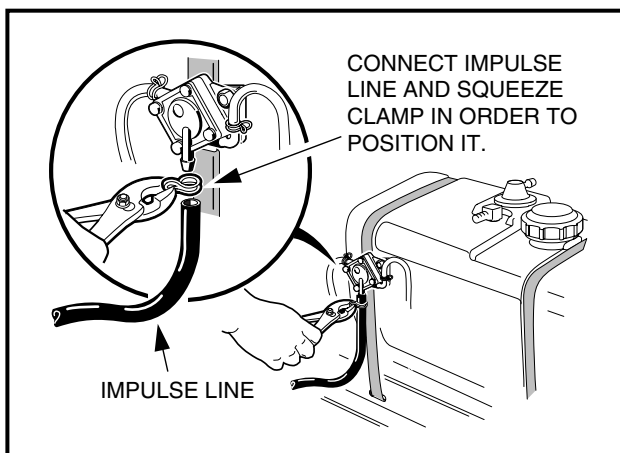


FIGURE 10-102

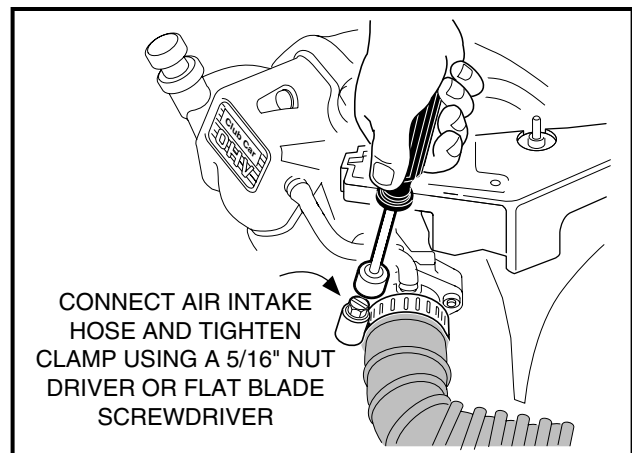


FIGURE 10-103

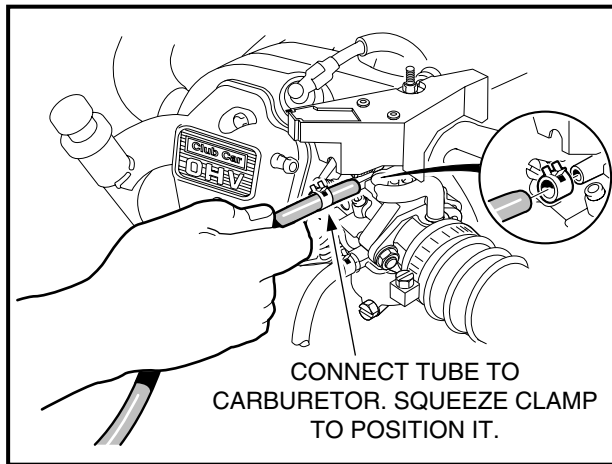


FIGURE 10-104

## FORWARD AND REVERSE SHIFTER CABLE

If the forward and reverse shifter cable is jammed or is damaged in any way, it must be replaced.

### **⚠ WARNING**

- WHEN MAKING TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE KEY.
  - DO NOT ATTEMPT TO SERVICE HOT ENGINE OR EXHAUST.
  - DISCONNECT BATTERY AS SHOWN (FIGURE 12-1, PAGE 82).
  - REMOVE SPARK PLUG WIRE.
- CLEAN FORWARD AND REVERSE SHIFTER CABLE CONNECTIONS BEFORE DISASSEMBLY.
- SEE SAFETY WARNINGS, PAGES 1 AND 2.

## REMOVAL OF THE FORWARD AND REVERSE SHIFTER CABLE (FIGURE 10-107)

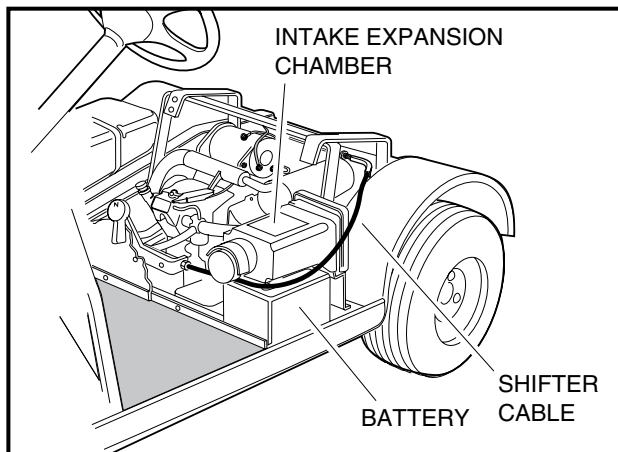


FIGURE 10-105

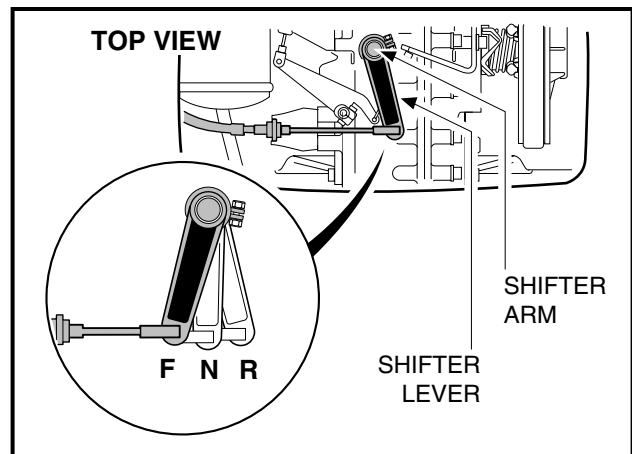


FIGURE 10-106

1. Remove the ball joint socket (2) from the forward and reverse shifter assembly ball stud (3) (Figure 10-107, Page 72).

**Removal of the Forward and Reverse Shifter Cable, Continued:**

2. Remove the ball joint socket (20) from the shifter arm ball stud (19) on the transaxle (**Figure 10-107**).
3. Loosen the retaining nuts (22) on both ends of the cable (**Figure 10-107**).
4. Remove cable from the vehicle.

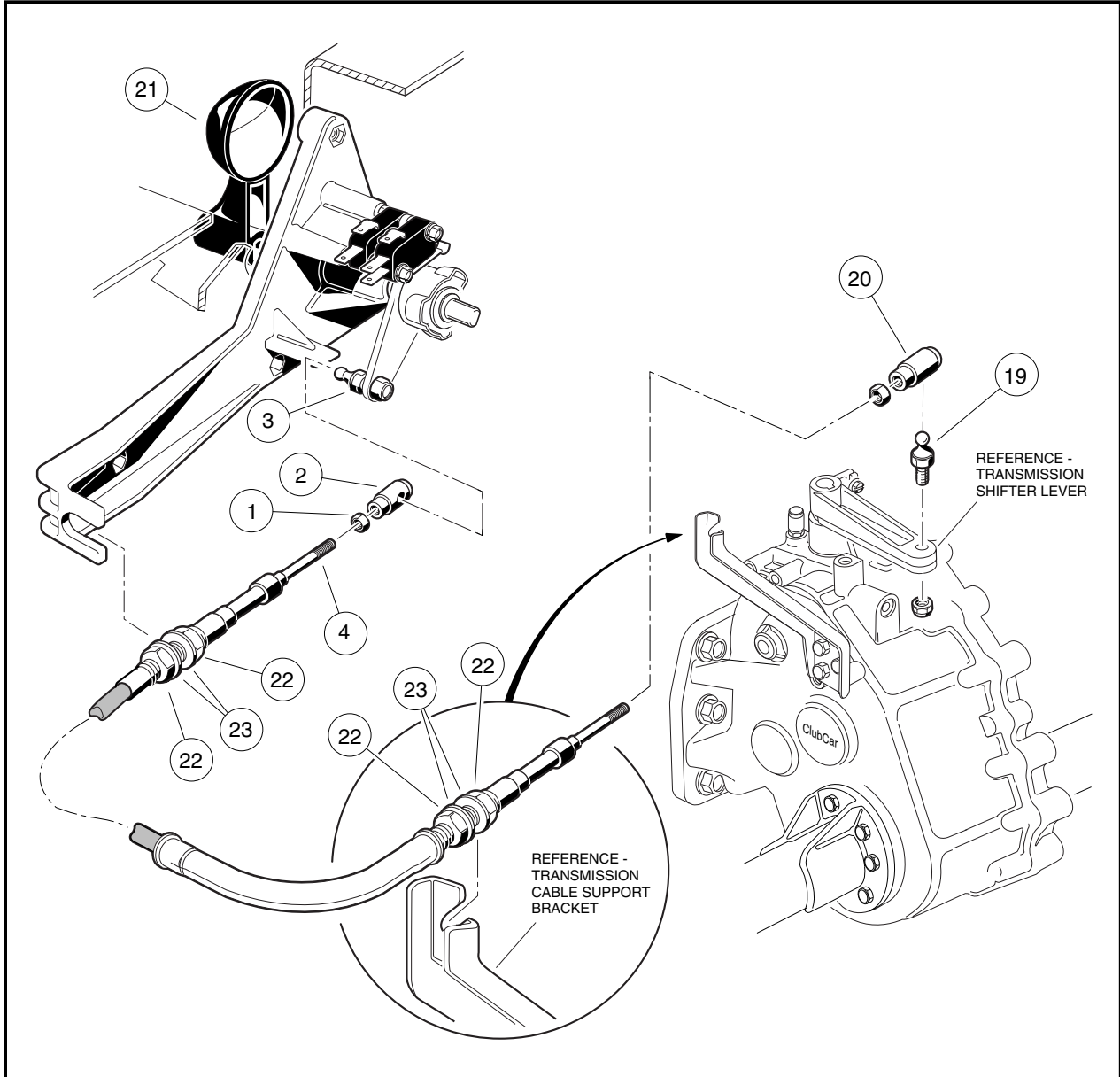


FIGURE 10-107

**INSTALLATION OF THE FORWARD AND REVERSE SHIFTER CABLE**

1. From the forward and reverse switch, route the cable toward the driver side of the vehicle so that it lies against the side of the front body and runs between the battery and intake expansion chamber, turns 90°, runs over the fender and then turns again in front of the rear post of the body support to connect with the shifter arm on the transaxle (**Figure 10-105, Page 71**).
2. Secure the cable with retaining nut (22) and washer (23) on each side of the shifter cable support bracket at the transaxle (**Figure 10-107**).



3. Secure the cable with retaining nut (22) and washer (23) on each side of the shifter cable support bracket at the forward and reverse assembly (**Figure 10-107**).
4. Install the ball joint socket (20) on the shifter lever ball stud (19) on the transaxle (**Figure 10-107**).
5. Install the ball joint socket (2) on the forward and reverse shifter assembly ball stud (3) (**Figure 10-107**).

### ADJUSTMENT OF THE FORWARD AND REVERSE SHIFTER CABLE

With the shifter lever of the transmission in the neutral position (**Figure 10-106, Page 71**), the forward and reverse handle (21) (**Figure 10-107**) should be straight up. For minor adjustments, the nut (1) may be loosened and the ball joint (2) rotated in the proper direction to get proper adjustment (**Figure 10-107**).

#### CAUTION

- BE SURE THREADS OF CABLE ARE ENGAGED IN BALL JOINT AT LEAST .25 INCH (6.35 MILLIMETERS). IF BALL JOINT COMES LOOSE FROM THE CABLE, THE FORWARD AND REVERSE SHIFTER WILL NOT OPERATE PROPERLY.

For major adjustments, the cable retaining nuts (22) (**Figure 10-107**) must be loosened and adjusted. When the cable is properly adjusted, with the forward and reverse handle (21) (**Figure 10-107**) in the neutral position, the shift lever of the transmission will be in the neutral position (**Figure 10-106, Page 71**).

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**G**

# SECTION 11 - TROUBLESHOOTING THE GASOLINE VEHICLE

Your Club Car DS vehicle will operate for a longer period of time without repairs if it is given proper care and preventive maintenance. The following check list will be helpful in identifying operating difficulties should they occur. The check list includes the symptom, probable causes, and suggested checks to make. The procedures used in making these checks can be found in the sections of the Service Manual that are referred to.

## WARNING

- ONLY TRAINED MECHANICS 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 AND REVERSE LEVER 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 A 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 UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, OR OTHER METAL COMPONENT.

## TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSES	REFER TO
Engine does not start easily.	1. Spark plug is partially fouled or in poor condition	Section 13 - Engine
	2. Spark plug wire is damaged	Section 13 - Engine
	3. Loose wire connection at igniter unit	Section 12 - Gasoline Vehicle Electrical System

Troubleshooting Guide Continued on Next Page.

SYMPTOM	POSSIBLE CAUSES	REFER TO
<b>Engine does not start easily, continued:</b>	4. Igniter failed	Section 12 - Gasoline Vehicle Electrical System
	5. Low cylinder compression	Section 13 - Engine
	6. Water or dirt in the fuel system and/or carburetor; dirty or clogged fuel filter	Section 14 - Fuel System
	7. Carburetor improperly adjusted	Section 14 - Fuel System
	8. Starter/generator belt is slipping	Section 12 - Gasoline Vehicle Electrical System
<b>Engine starts but does not run smoothly.</b>	1. Spark plug is fouled or in poor condition	Section 13 - Engine
	2. Spark plug wire is damaged	Section 13 - Engine
	3. Igniter failed	Section 12 - Gasoline Vehicle Electrical System
	4. Water or dirt in the fuel system and/or carburetor; dirty or clogged fuel filter	Section 14 - Fuel System
	5. Fuel pump malfunction, fuel pressure to engine too low	Section 14 - Fuel System
<b>Engine turns but fails to start.</b>	1. Fuel tank is empty	Section 14 - Fuel System
	2. Fuel line or filters clogged	Section 14 - Fuel System
	3. Fouled spark plug	Section 13 - Engine
	4. Spark plug wire damaged	Section 13 - Engine
	5. Loose wire connection at igniter	Section 12 - Gasoline Vehicle Electrical System
	6. Igniter failed	Section 12 - Gasoline Vehicle Electrical System
	7. Engine flooded with fuel as result of over-choking	Section 3 - General Information
	8. Kill circuit grounded	Section 12 - Gasoline Vehicle Electrical System
	9. Fuel pump malfunction or failure	Section 14 - Fuel System
<b>Engine overheats.</b>	1. Fan screen is partially blocked or plugged	Section 13 - Engine
	2. Improper governor adjustment	Section 14 - Fuel System
	3. Carburetor is too lean, check main jet size	Section 14 - Fuel System
<b>Engine pre-ignites.</b>	1. Excessive carbon deposits on piston head or in combustion chamber	Section 13 - Engine
	2. Spark plug heat range is incorrect for the engine	Section 13 - Engine
	3. Unsuitable or contaminated fuel	Section 14 - Fuel System

SYMPTOM	POSSIBLE CAUSES	REFER TO
<b>Loss of engine power.</b>	1. Exhaust valve is restricted with carbon deposit	Section 13 - Engine
	2. Muffler or exhaust pipe restricted with carbon or other substance	Section 15 - Exhaust System
	3. Igniter failed	Section 12 - Gasoline Vehicle Electrical System
	4. Air filter is dirty or clogged	Section 14 - Fuel System
	5. Governor is improperly adjusted	Section 14 - Fuel System
	6. Throttle linkage out of adjustment	Section 14 - Fuel System
	7. Low cylinder compression	Section 13 - Engine
	8. Spark plug failed	Section 13 - Engine
	9. Restricted fuel flow	Section 14 - Fuel System
	10. Torque converter is not backshifting properly	Section 16 - Torque Converter
<b>Spark plug fouls repeatedly.</b>	1. Incorrect plug	Section 13 - Engine
	2. Spark plug wire is damaged	Section 13 - Engine
	3. Unsuitable fuel, or incorrect (rich) fuel mixture	Section 14 - Fuel System
	4. Igniter failed	Section 12 - Gasoline Vehicle Electrical System
	5. Dirt entering combustion chamber	Section 14 - Fuel System
	6. Rings worn out, low cylinder pressure	Section 13 - Engine
<b>Carburetor floods.</b>	1. Inlet valve or seat is leaking, dirty, worn, or damaged	Section 14 - Fuel System
	2. Float is damaged or filled with gasoline	Section 14 - Fuel System
	3. Carburetor vent is clogged	Section 14 - Fuel System
<b>Starter fails to operate.</b>	1. Neutral lock-out cam is in the wrong position	Section 12 - Gasoline Vehicle Electrical System - Neutral lock-out circuit
	2. Fuse is blown	Section 12 - Gasoline Vehicle Electrical System - Starter circuit
	3. Battery is dead	Section 12 - Gasoline Vehicle Electrical System
	4. Starter control circuit is not operating	Section 12 - Gasoline Vehicle Electrical System - Starter circuit
	5. Starter/generator failed	Section 12 - Gasoline Vehicle Electrical System - Starter/generator
<b>Troubleshooting Guide Continued on Next Page.</b>		

SYMPTOM	POSSIBLE CAUSES	REFER TO
<b>Starter fails to operate, continued:</b>	6. Starter solenoid failed	Section 12 - Gasoline Vehicle Electrical System - Starter circuit
	7. Accelerator limit switch failed	Section 12 - Gasoline Vehicle Electrical System - Starter circuit
	8. Key switch failed	Section 12 - Gasoline Vehicle Electrical System - Starter circuit
	9. Neutral lock-out limit switch failed	Section 12 - Gasoline Vehicle Electrical System - Neutral lock-out circuit
	10. Loose or broken wire in starter/generator circuit	Section 12 - Gasoline Vehicle Electrical System - Starter/generator
<b>Starter/generator does not charge battery.</b>	1. Loose or broken wire in the starter/generator circuit	Section 12 - Gasoline Vehicle Electrical System - Starter/generator
	2. Generator field coil is shorted	Section 12 - Gasoline Vehicle Electrical System - Starter/generator
	3. Brushes are worn or commutator is dirty	Section 12 - Gasoline Vehicle Electrical System - Starter/generator
	4. Starter/generator belt is loose or slipping	Section 12 - Gasoline Vehicle Electrical System - Starter/generator
	5. Voltage regulator failed	Section 12 - Gasoline Vehicle Electrical System - Generator circuit
	6. Battery failed	Section 12 - Gasoline Vehicle Electrical System
<b>Transmission does not engage or disengage smoothly.</b>	1. Transmission shifter linkage is binding or is out of adjustment	Section 10 - Unitized Transaxle, in this supplement.
	2. Insufficient (low) level of lubricant, or wrong type of lubricant in transaxle	Section 10 - Unitized Transaxle, in this supplement.
	3. Internal gears are damaged or worn	Section 10 - Unitized Transaxle, in this supplement.
	4. Synchronizer rings are worn, damaged or jammed	Section 10 - Unitized Transaxle, in this supplement.
<b>Excessive vehicle vibration.</b>	1. Engine mounting nuts or bolts are loose	Section 13 - Engine
	2. Defective or worn engine mounts	Section 13 - Engine
	3. Rubber snubber on engine mounting plate is worn or damaged	Section 13 - Engine
	4. Misaligned muffler mounting clamp	Section 15 - Exhaust System
	5. Damaged drive belt or starter belt	Section 16 - Torque Converter
	6. Damaged drive clutch	Section 16 - Torque Converter

SYMPTOM	POSSIBLE CAUSES	REFER TO
<b>Excessive vehicle vibration, continued:</b>	7. Damaged driven clutch	Section 16 - Torque Converter
	8. Damaged starter/generator pulley	Section 12 - Gasoline Vehicle Electrical System - Starter/Generator
	9. Misaligned clutches	Section 16 - Torque Converter
	10. RPM setting is incorrect	Section 14 - Fuel System
<b>Torque converter does not shift smoothly.</b>	1. Drive belt is worn, cracked, glazed, or frayed	Section 16 - Torque Converter
	2. Drive clutch malfunction	Section 16 - Torque Converter
	3. Driven clutch malfunction	Section 16 - Torque Converter
	4. Governor is sticking	Section 10 - Unitized Transaxle
<b>Engine won't stop running.</b>	1. Kill circuit wire is disconnected from the igniter	Section 12 - Gasoline Vehicle Electrical System

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# SECTION 12 - ELECTRICAL SYSTEM

## GASOLINE VEHICLES

This section supersedes Section 12 in the 1995-1996 DS Maintenance and Service Manual.

### DANGER

- **GASOLINE VAPORS - FLAMMABLE - DO NOT SMOKE! KEEP SPARKS, FLAMES, CIGARETTES AWAY. TOOLS, WIRES AND METAL OBJECTS CAN CAUSE SPARKS WHEN “SHORTED” ACROSS A BATTERY. INSULATED TOOLS SHOULD BE USED. EXTREME CARE SHOULD BE TAKEN WHEN DISCONNECTING OR CONNECTING BATTERY. WHEN WIRES ARE DISCONNECTED, BE SURE TO KEEP THEM AWAY FROM BATTERY POSTS AND OTHER WIRES. SERVICE ONLY IN WELL-VENTILATED AREAS.**
- **DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.**

### WARNING

- ONLY TRAINED MECHANICS 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 BATTERY.
- TURN KEY SWITCH OFF, PLACE FORWARD AND REVERSE LEVER 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 BATTERY OR ELECTRICAL CONNECTIONS.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, ENGINE MOUNTING PLATE, OR OTHER METAL COMPONENT.
- HOT! - DO NOT ATTEMPT TO SERVICE HOT ENGINE OR EXHAUST. CAN CAUSE SEVERE BURNS. ALWAYS ALLOW ENGINE AND EXHAUST TO COOL PRIOR TO SERVICING.
- LIFT ONLY ONE END OF A 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 UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST AS SHOWN (**FIGURE 12-1, PAGE 82**).
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.

## Electrical System - Gasoline Vehicles, Continued:

### ⚠ CAUTION

- BEFORE REMOVAL AND DISASSEMBLY, CLEAN THE ENGINE. ANY DIRT ENTERING THE ENGINE, CARBURETOR, OR OTHER PARTS WILL WORK AS AN ABRASIVE AND SHORTEN THE LIFE OF THE ENGINE. FOR THE SAME REASON, BEFORE INSTALLING A NEW PART, CLEAN OFF ANY DUST OR METAL FILINGS.

## GENERAL INFORMATION

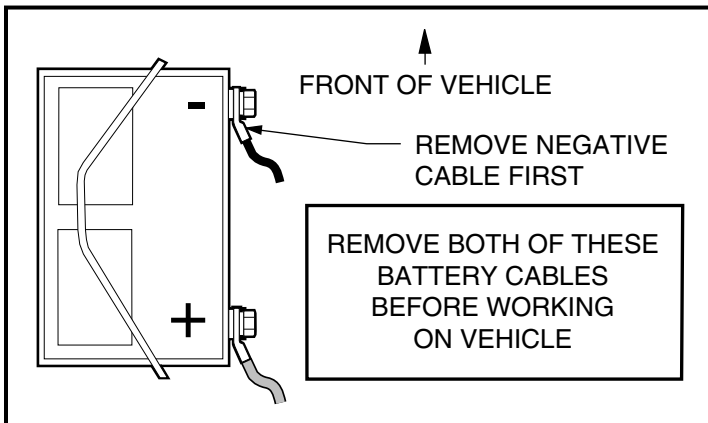


FIGURE 12-1

The electrical system on the DS Gasoline is a 12 volt DC negative ground to frame system. The electrical system consists of seven readily-identifiable circuits. They are:

- Starter Circuit
- Generator Circuit
- Engine Ignition Circuit
- Engine Kill Circuit
- Reverse Buzzer Circuit
- Low Oil Warning Circuit
- Neutral Lock-out Circuit

Recognizing and understanding the function of each of these circuits will help to quickly isolate the source of an electrical problem.

## FE 290 GASOLINE VEHICLE ELECTRICAL CIRCUIT (FIGURE 12-2)

### THE STARTER CIRCUIT (FIGURE 12-3, PAGE 84)

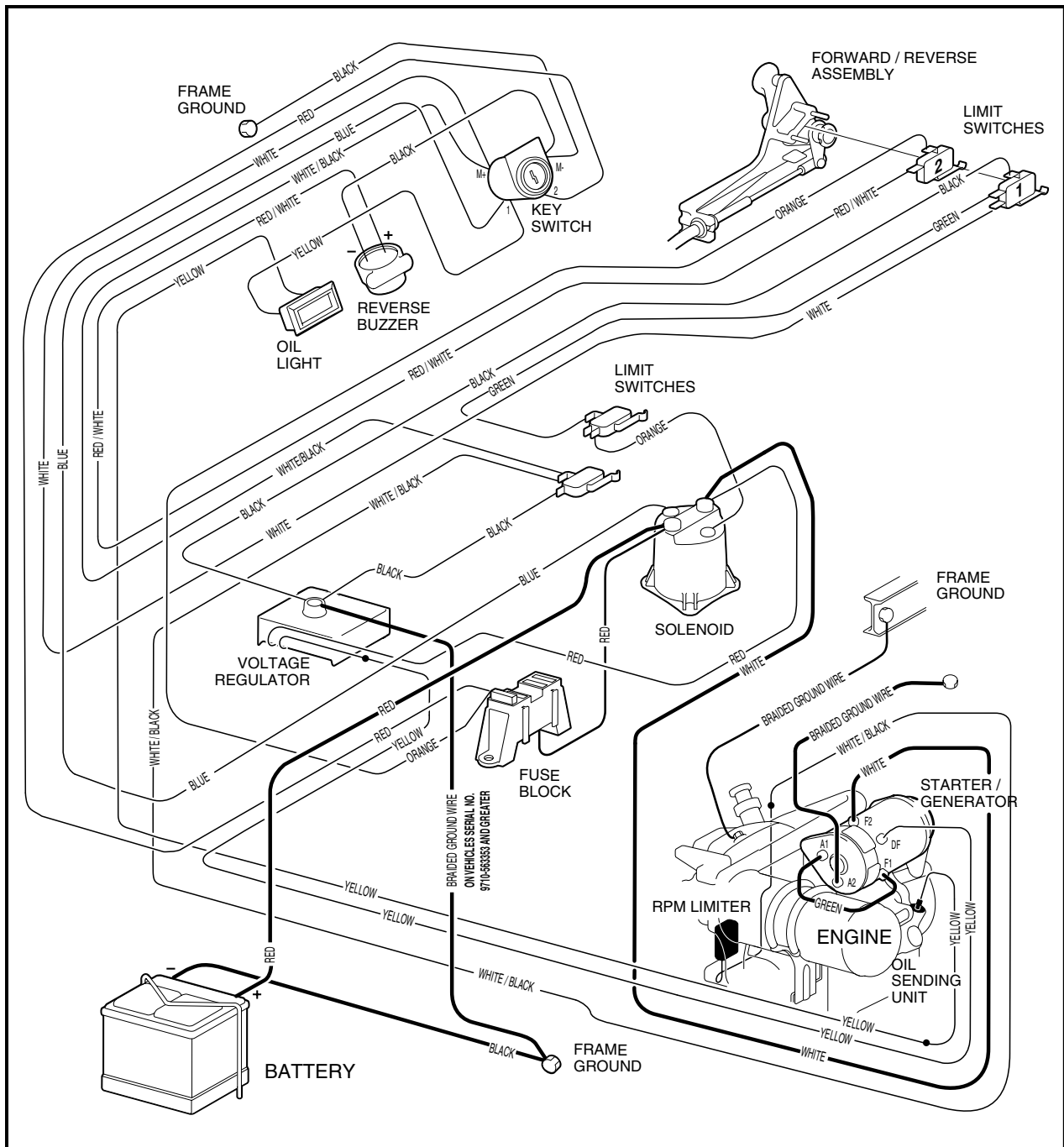
#### NOTE

- THE STARTER CIRCUIT IS COMPLETELY INDEPENDENT OF THE IGNITION CIRCUIT. THE BATTERY DOES NOT SUPPLY POWER FOR IGNITION. THE BATTERY SUPPLIES POWER TO THE STARTER WHICH IN TURN STARTS THE ENGINE COMPONENTS ROTATING. ONCE THE ENGINE IS RUNNING, THE IGNITION CIRCUIT SUPPLIES POWER TO THE SPARK PLUG (**SEE ENGINE IGNITION CIRCUIT, PAGE 84**).

The starter circuit consists of a twelve-volt battery, fuse, key switch, accelerator starter limit switch, neutral lock-out limit switch, solenoid, starter, and connecting wires.

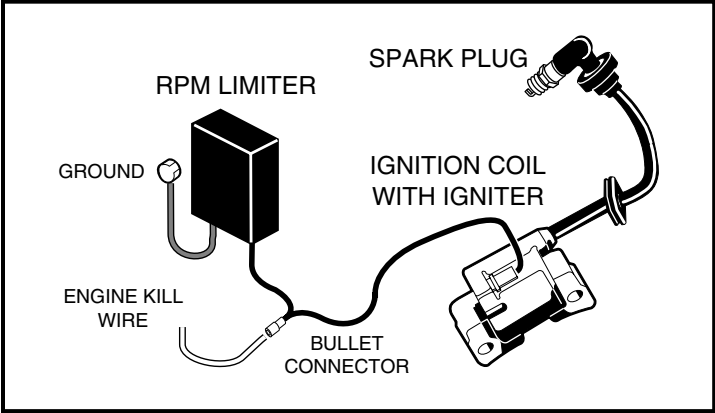
The battery is the source of power for the system. The fuse provides protection to the solenoid activating circuit.

The starter circuit is activated when the key switch is turned to the ON position, the accelerator pedal is depressed and the forward and reverse lever is placed in forward or reverse position, thus actuating the neutral lock-out limit switch (**See Neutral Lock-out Circuit, Page 86**). Electrical current is then supplied to the solenoid, which completes the circuit between the positive post of the battery and the F2 post of the starter. The starter then turns and cranks the engine through belt-driven pulleys.



**FIGURE 12-2**

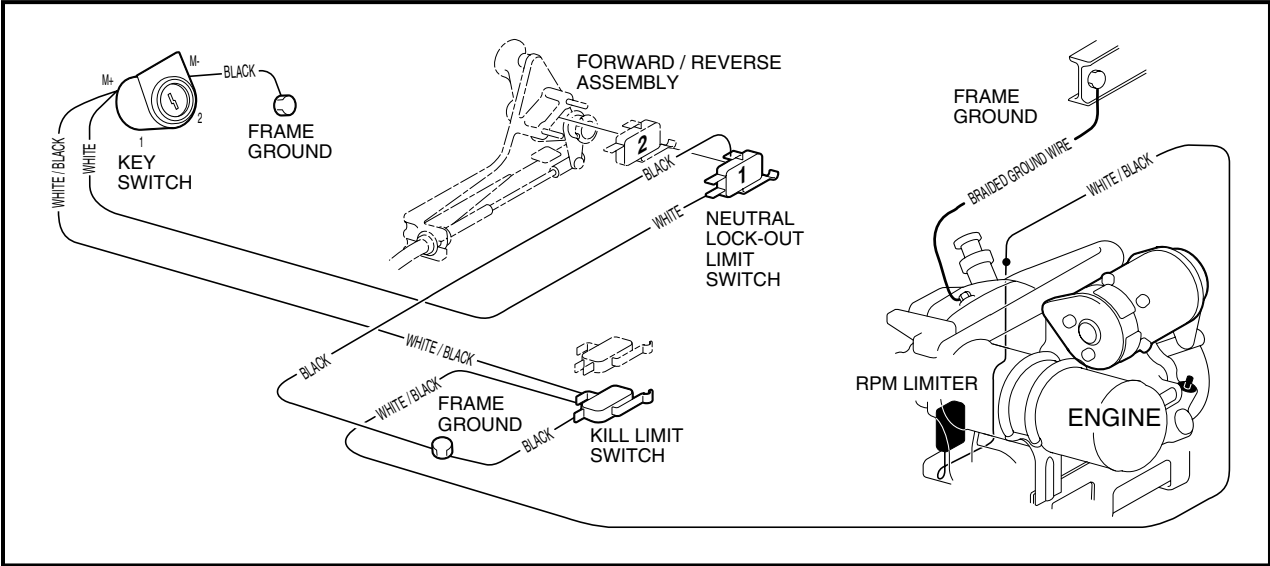




**FIGURE 12-5**

**ENGINE KILL CIRCUIT (FIGURE 12-6)**

The exciter coil in the ignition coil supplies electrical power for the spark plug, therefore the proper way to stop the engine is to run this electrical power to ground, by-passing the spark plug. The engine kill circuit consists of the key switch, a kill limit switch that is activated by the accelerator pedal, a neutral lock-out limit switch that is activated by a cam located on the back of the forward and reverse assembly, and connecting wires. The engine can be stopped by releasing the accelerator pedal, by turning the key switch to the OFF position, or by shifting the forward and reverse assembly to neutral.



**FIGURE 12-6**

**REVERSE BUZZER CIRCUIT (FIGURE 12-7, PAGE 86)**

The reverse buzzer is a safety warning device that sounds when the vehicle is in reverse. Its functions are to remind the operator not to leave the vehicle in reverse and to warn anyone in the area that the vehicle is in reverse.

The reverse buzzer circuit consists of a reverse buzzer, reverse buzzer limit switch, key switch, the fuse block, and connecting wires.

The battery supplies power through the fuse block and is controlled by the reverse buzzer limit switch that is activated by a cam located on the back of the forward and reverse assembly. When the forward and reverse lever is placed in reverse, a cam depresses the reverse limit switch, closing the circuit. The reverse buzzer sounds.

## LOW OIL WARNING CIRCUIT (FIGURE 12-8)

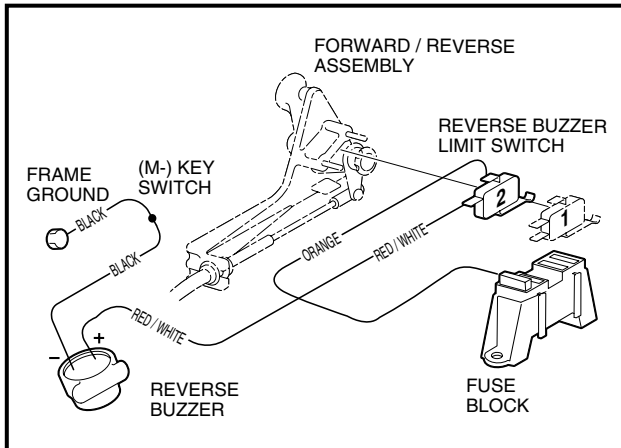


FIGURE 12-7

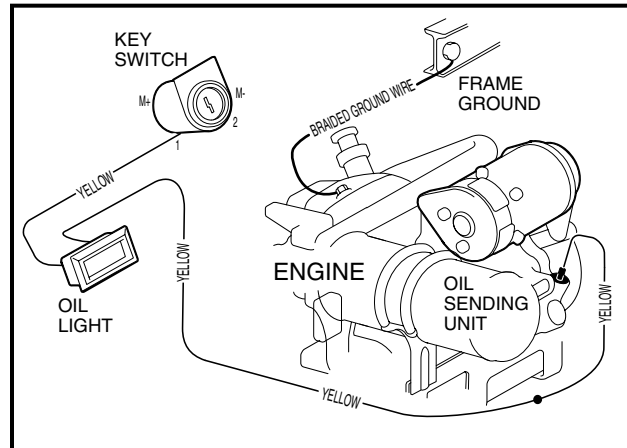


FIGURE 12-8

The low oil warning circuit consists of an oil sending unit in the engine, a dash mounted oil light, and connecting wires.

The light picks up power from the key switch when the key switch is turned to the ON position. When the oil level in the crankcase is low, the oil sending unit closes the circuit to the ground and illuminates the oil light.

## NEUTRAL LOCK-OUT CIRCUIT (FIGURE 12-9)

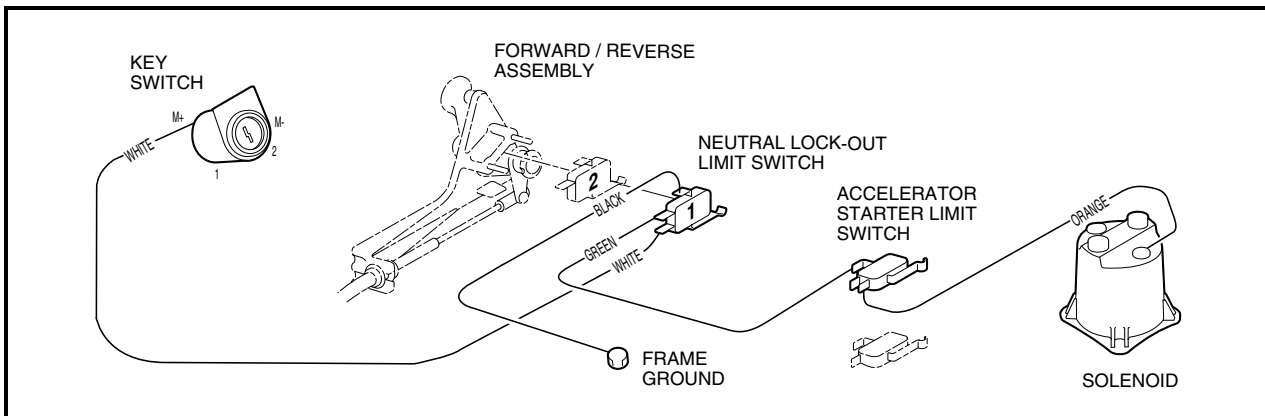


FIGURE 12-9

The neutral lock-out circuit prevents the operator from starting the vehicle in neutral. Also, if the vehicle is started in forward or reverse and then shifted to neutral, the engine automatically stops running.

The neutral lock-out circuit consists of a limit switch that is located on the forward and reverse assembly and is activated by a neutral-lock-out cam, a limit switch that is located in the electrical component box and is activated by the accelerator pedal, and the connecting wires.

The neutral lock-out cam is a feature included for the convenience of the trained and experienced mechanic.

If the neutral lock-out cam is pulled out approximately 3/8 inch (10 millimeters) and rotated one-half turn until it snaps back into place, the vehicle will be in the SERVICE position (**Figure 12-10**). This allows the mechanic to run the engine in neutral for certain maintenance procedures. With the cam in the SERVICE position, the engine will start in neutral. If the forward and reverse switch is shifted to either the forward or reverse position, the engine will stop running.

To put the vehicle back in the OPERATE position, pull the cam out approximately 3/8 inch (10 millimeters) and rotate one-half turn until it snaps back into place (**Figure 12-11**).

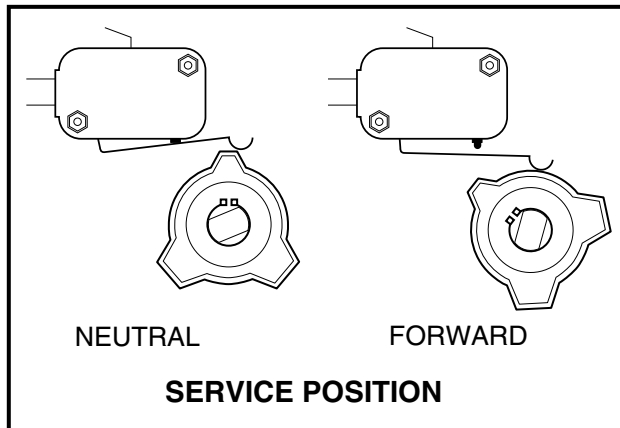


FIGURE 12-10

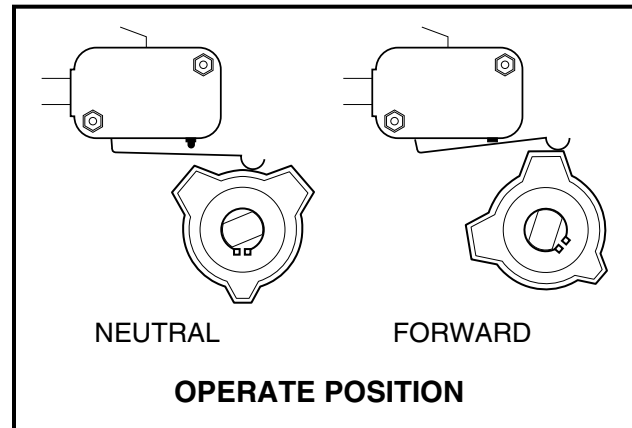


FIGURE 12-11

## CIRCUIT TESTING

### **⚠ DANGER**

- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

### **⚠ 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.
- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

Before testing the electrical circuits to determine the source of an electrical problem, test the vehicle battery to determine whether or not it is the source of the problem. A hydrometer, multimeter, and 160 ampere load tester will be required.

### **Testing the Vehicle Battery**

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check for loose or corroded battery terminal connections. Clean, tighten, and replace connections as necessary.
3. Take hydrometer readings of all six cells. If there is a 50 (or more) point difference between any two cells, recharge the battery and then check the specific gravity again. If there is still a 50 point difference, replace the battery.

### Testing the Vehicle Battery, Continued:

- Place the red (+) probe of a multimeter, set at Volts - DC, 20 volt range, on the positive (+) post and place the black (-) probe on the negative (-) post of the battery and take a voltage reading. If it shows less than 12.4 volts, or if the lowest specific gravity reading from Step 3 is less than 1.225, recharge the battery. If battery voltage is greater than 12.4 volts and specific gravity is greater than 1.225, the problem is not with the battery. If the battery does not reach 12.4 volts, or if the specific gravity of a cell is still less than 1.225 after charging, replace the battery. **See NOTE below.**

### NOTE

- A FULLY CHARGED BATTERY THAT IS IN GOOD CONDITION SHOULD HAVE A SPECIFIC GRAVITY OF AT LEAST 1.225 IN ALL CELLS, AND THE DIFFERENCE IN THE SPECIFIC GRAVITY OF ANY TWO CELLS SHOULD BE **LESS** THAN 50 POINTS. OPEN CIRCUIT VOLTAGE SHOULD BE AT LEAST 12.4 VOLTS.

- Connect a 160 ampere load tester to the battery.
- After 15 seconds, read the voltage and then disconnect the load tester from the battery. If the voltage reading is below the required minimum (**See Load Test, Page 130**), replace the battery.
- If the battery is found to be good, or if the electrical problem continues after the battery has been replaced with a good one, test the electrical circuits.

### TESTING THE STARTER CIRCUIT AND THE GENERATOR CIRCUIT

Use the chart below (**Figure 12-12**) as a starting point for troubleshooting problems with the starter and generator circuits.

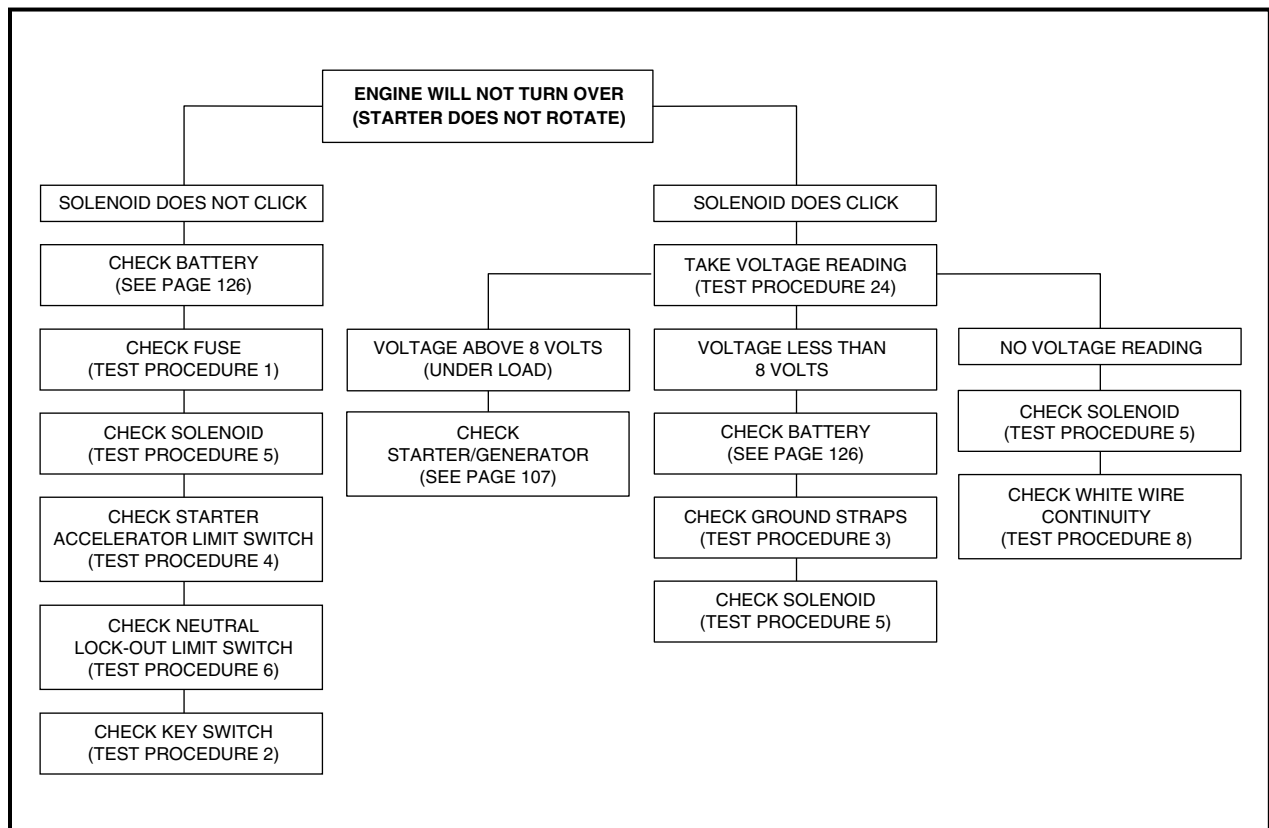


FIGURE 12-12



**⚠ DANGER**

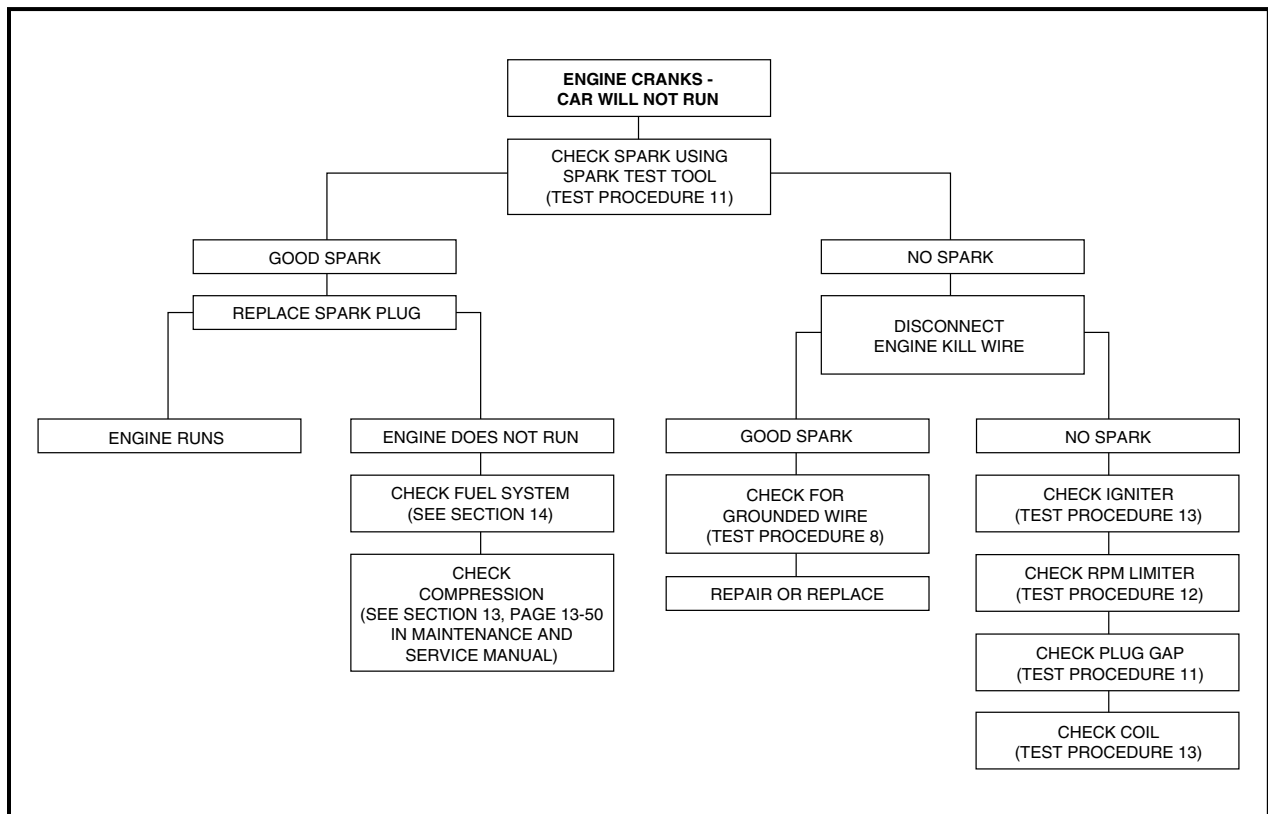
- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

**⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

**TESTING THE ENGINE IGNITION CIRCUIT**

Use the chart below (**Figure 12-13**) as a starting point for troubleshooting problems with the engine ignition circuit.



**FIGURE 12-13**

**TESTING THE ENGINE KILL CIRCUIT**

Use the chart on page 90 (**Figure 12-14**) and the chart on page 91 (**Figure 12-15**) as starting points for troubleshooting problems with the engine kill circuit. **See DANGER and WARNING at top of page 90.**

## Circuit Testing, Continued:

**⚠ DANGER**

- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

**⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

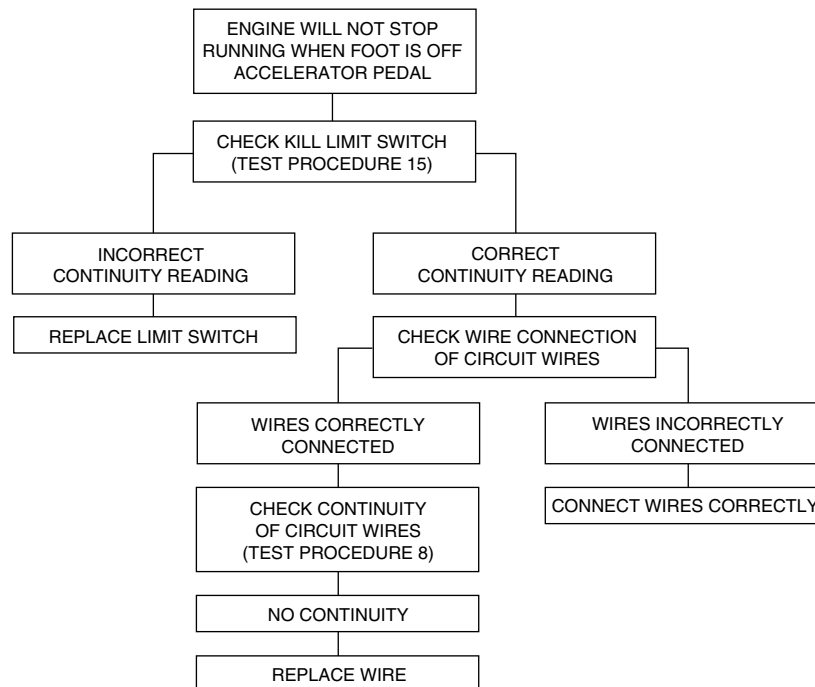
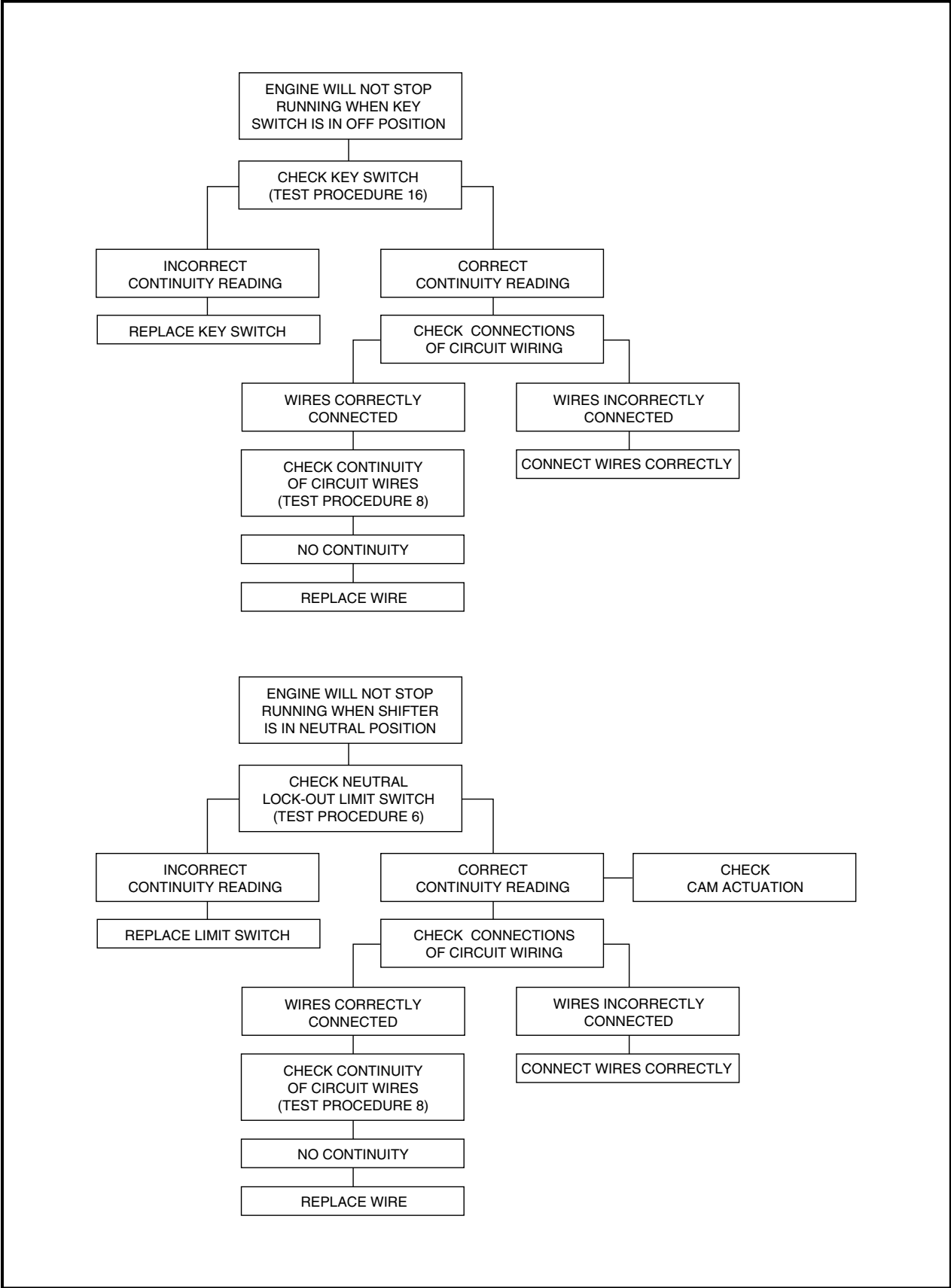


FIGURE 12-14



**FIGURE 12-15**

**⚠ DANGER**

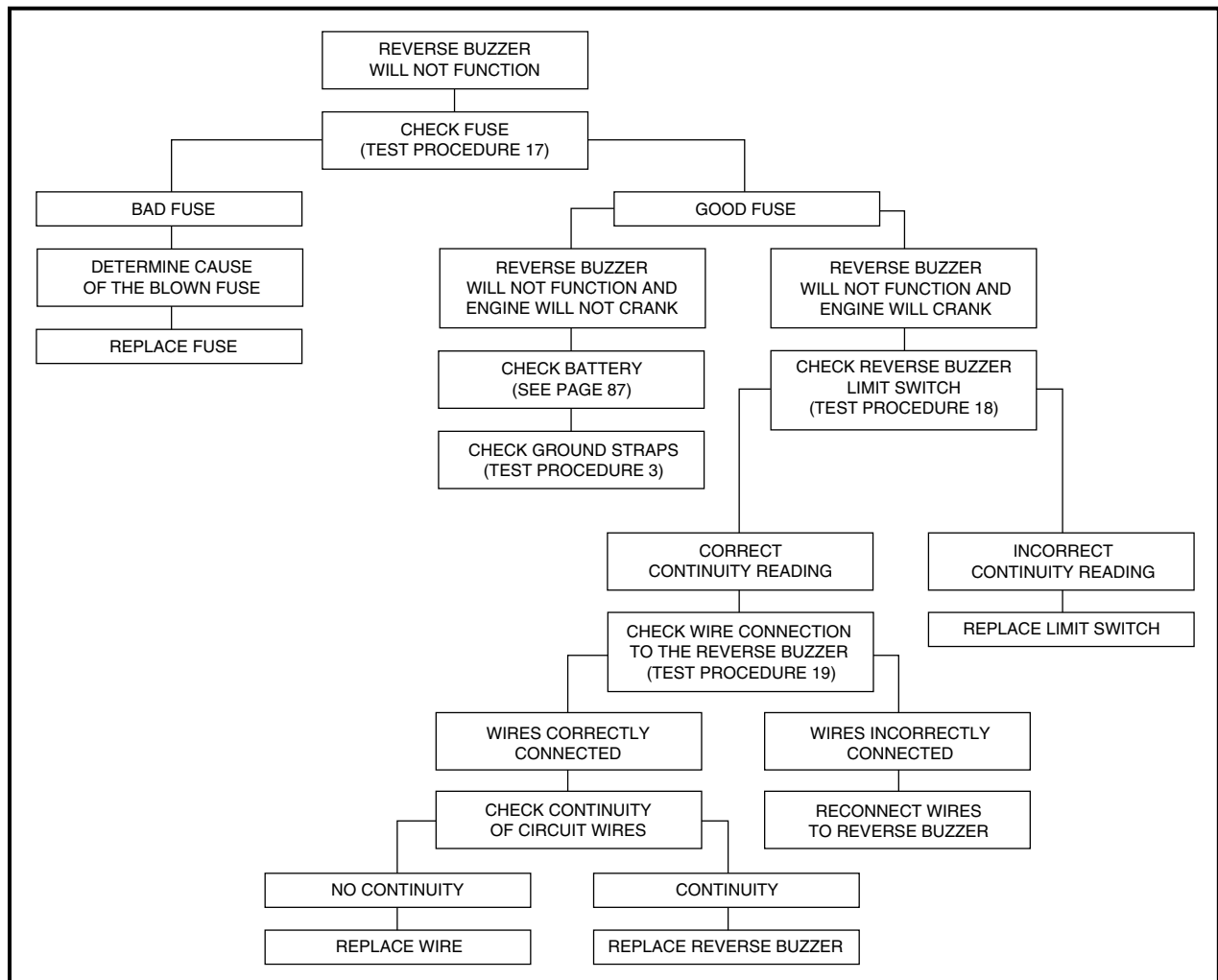
- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

**⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

**TESTING THE REVERSE BUZZER CIRCUIT**

Use the chart below (**Figure 12-16**) as a starting point for troubleshooting the reverse buzzer circuit.

**FIGURE 12-16**

## TESTING THE LOW OIL WARNING CIRCUIT

Use the chart below (Figure 12-17) as a starting point for troubleshooting the low oil warning circuit.

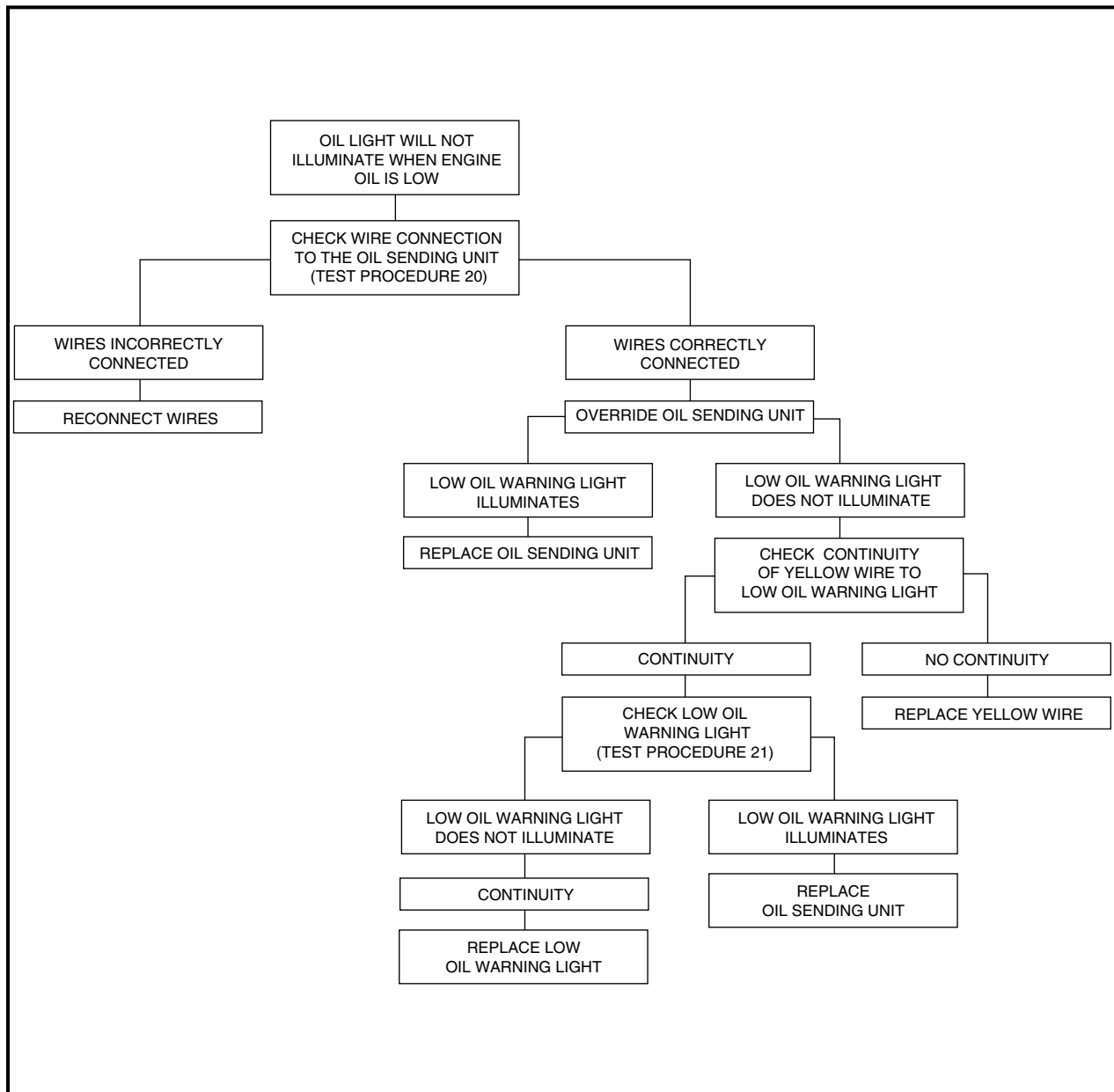


FIGURE 12-17

## TESTING THE NEUTRAL LOCK-OUT CIRCUIT

Use the chart on page 94 (Figure 12-18) as a starting point for troubleshooting the neutral lock-out circuit. See DANGER below and WARNING at the top of page 94.

### **⚠ DANGER**

- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

## Circuit Testing, Continued:

**⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

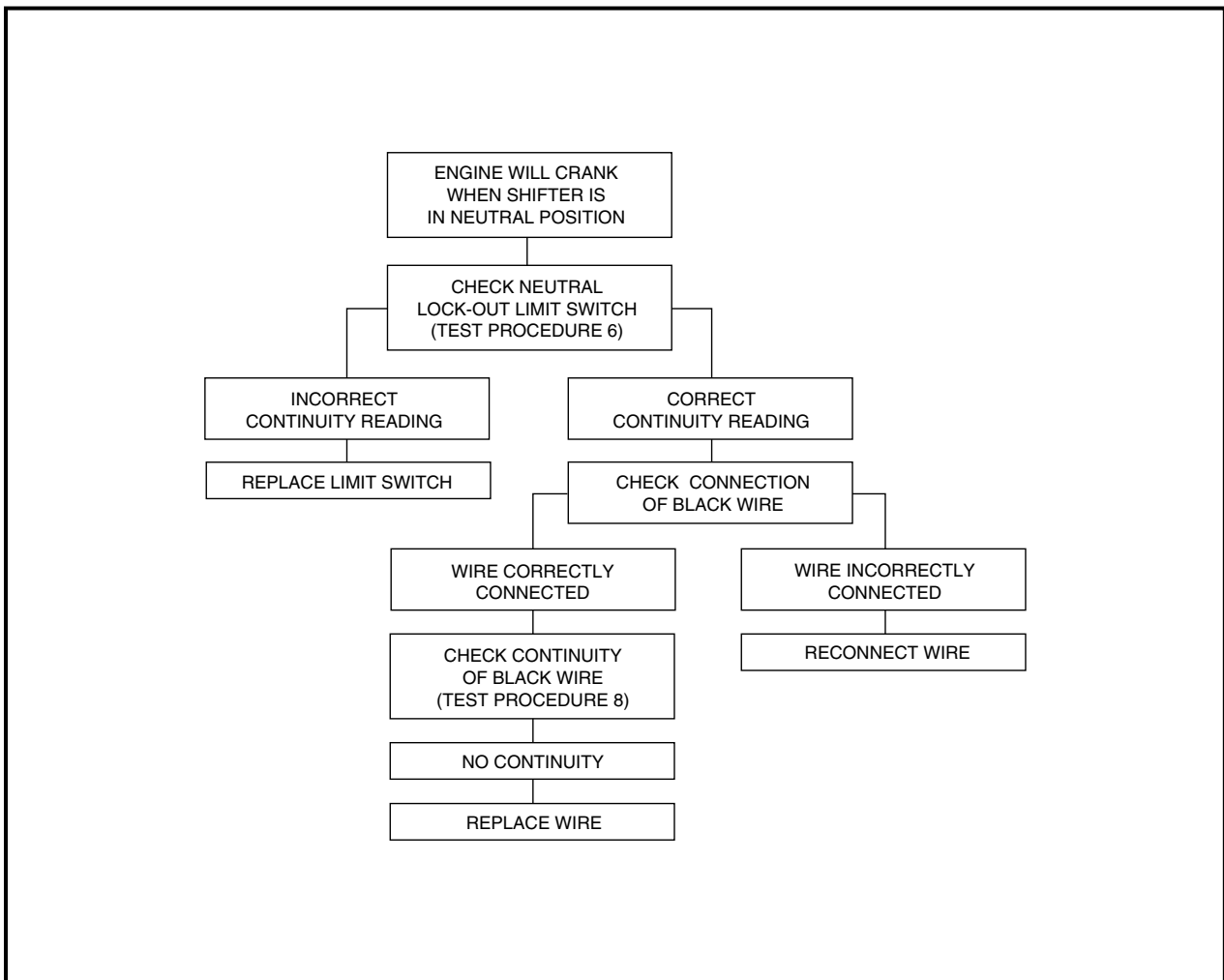


FIGURE 12-18

**TEST PROCEDURES****Test Procedure 1 - Fuse:**

The fuse (red 10 amp) is located in the electrical component box (**Figure 12-2, Page 83**).

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.

2. Check that the wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
3. Remove the fuse. Using a multimeter set on ohms ( $\Omega$ ), place the red (+) probe on one terminal of the fuse and place the black (-) probe on the other terminal of the fuse. The reading should be continuity. If the reading is incorrect, check circuit to determine what caused the fuse to blow and make necessary repairs. Then replace the fuse with a new 10 amp fuse.

### Test Procedure 2 - Key Switch (Starter Circuit):

#### WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the center dash assembly (**See Removing the Key Switch, Page 119**).
3. Check that the wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
4. Using a multimeter set on ohms ( $\Omega$ ), place the red (+) probe on the M+ terminal of the key switch, and place the black (-) probe on the M- terminal. With the key switch turned OFF, the reading should be continuity. With the key switch turned ON, the reading should be no continuity. If the readings are incorrect, replace the key switch.
5. Place the red (+) probe of the multimeter on the No. 2 terminal of the key switch and place the black (-) probe on the No. 1 terminal. Insert the key and turn the switch to ON. The reading should be continuity. With the key switch turned OFF, the reading should be no continuity. If the readings are incorrect, replace the key switch (**Figure 12-19, Page 96**).

### Test Procedure 3 - Ground Straps:

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Set the multimeter to ohms ( $\Omega$ ). Place the red (+) probe on the (A2) terminal of the starter/generator and place the black (-) probe on the frame of the vehicle. The reading should be continuity. If the reading is incorrect, clean and tighten wire connections. If the connections are okay, repair or replace the wire (**See Figure 12-57, Page 133**).
3. Place the red (+) probe of the multimeter on the ground strap terminal end located on the oil filler bracket on the engine. Place the black (-) probe on the frame of the vehicle. The reading should be continuity. If the reading is incorrect, clean and tighten wire connections. If the connections are good and the reading is incorrect, repair or replace the wire (**See Figure 12-58, Page 133**).
4. Open the electrical component box. Place the red (+) probe of the multimeter on the nut on top of the voltage regulator, and place the black (-) probe on the frame of the vehicle (**See Figure 12-59, Page 134**). The reading should be continuity. If the reading is incorrect, check and tighten the bolt and nut that hold the voltage regulator and the ground wire (to frame) to the electrical component box.

### Test Procedure 3 - Ground Straps, Continued:

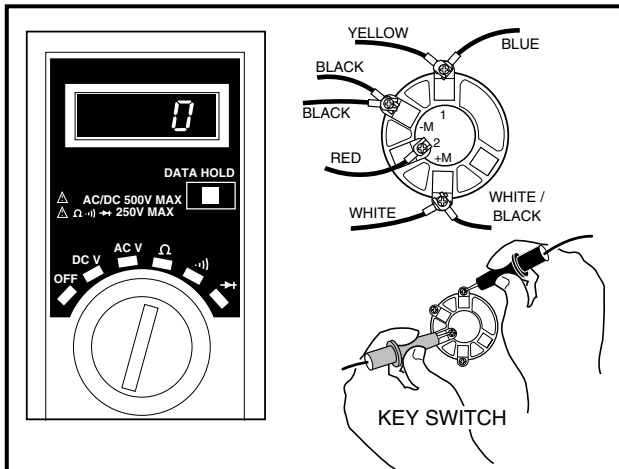


FIGURE 12-19

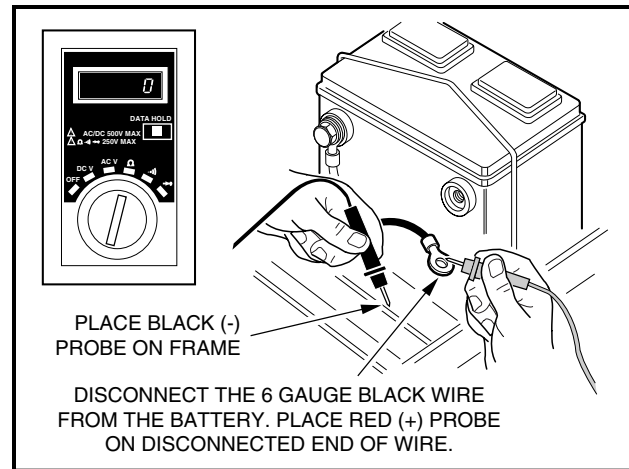


FIGURE 12-20

5. Check the 6 gauge black wire that connects the negative post of the battery to the frame. The frame connection should be clean and tight. Visual inspection of the connection on the frame is very difficult. The best check for tightness is to pull on the black wire. If the wire moves at the connection end, disassemble the frame connection, clean off the bolt, ring terminal, and nut. Then reinstall the frame connection.
6. Set the multimeter to ohms ( $\Omega$ ). Place the red (+) probe on the unconnected end of the 6 gauge black wire, and place the black (-) probe on the frame of the vehicle. The reading should be continuity. If the reading is incorrect, check that terminals connections are clean and tight. If the connections are good and the reading is incorrect, repair or replace the wire (**Figure 12-20**).

### Test Procedure 4 - Accelerator Starter Limit Switch:

#### ⚠ WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

The accelerator starter limit switch is the top switch located in the electrical component box. There are an 18 gauge green wire and an 18 gauge orange wire connected to this limit switch.

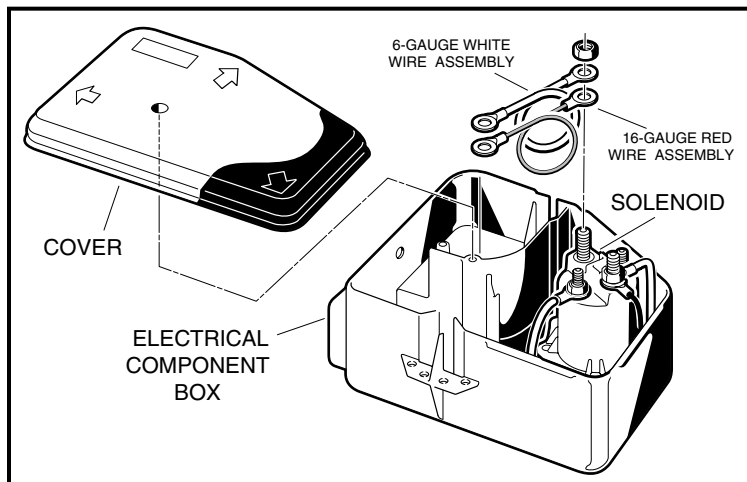
1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check for proper wiring and tight connections (**Figure 12-3, Page 84**).
3. Set the multimeter to ohms ( $\Omega$ ). Place the red (+) probe on the common (COM) terminal (green wire) of the limit switch and place the black (-) probe on the normally closed (NC) terminal (orange wire) of the limit switch.
4. Make sure the battery is disconnected. With the key switch in the OFF position, the forward and reverse



lever in NEUTRAL, and the accelerator pedal in the UP position, the reading should be no continuity. With the accelerator pedal depressed, the reading should be continuity. If readings are incorrect, replace the switch.

### Test Procedure 5 - Solenoid:

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the electrical component box cover.
3. Check that the wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
4. Set a multimeter to ohms ( $\Omega$ ). Place the red (+) probe on one of the small posts of the solenoid and place the black (-) probe on the other small post. The reading should be 14 to 16 ohms. If the reading is not within limits, replace the solenoid.
5. Disconnect the black (-) battery cable from the battery. Do not allow the cable to touch the frame or other components of the vehicle.
6. Remove the 6 gauge white wire and the 16 gauge red wire from the large post of the solenoid. Do not allow the wires to touch the frame or other components of the vehicle (**Figure 12-21**).
7. Set the multimeter to ohms ( $\Omega$ ). Connect the red (+) probe to one of the large posts of the solenoid and connect the black (-) probe to the other large post (**Figure 12-22, Page 98**).



**FIGURE 12-21**

8. Connect the black (-) cable to the battery negative post.
9. Place the forward and reverse lever in NEUTRAL, and place the neutral lock-out cam in the SERVICE position. Turn the key switch to the ON position. With the accelerator in the up position, the reading on the multimeter should be **no** continuity. Depress the accelerator pedal and listen for the solenoid “click”. There should be continuity. If either reading is incorrect, replace the solenoid.
10. With the forward and reverse lever still in NEUTRAL, and the neutral lock-out cam in the SERVICE position, set the multimeter to DC volts (DC V) and place the red (+) probe on the large post that does *not* have wires connected to it. Place the black (-) probe on the frame of the vehicle. Turn key switch to ON position, depress accelerator pedal, and listen for solenoid “click”. The meter should read full battery voltage. If the reading is incorrect, replace the solenoid (**Figure 12-23, Page 98**).
11. Disconnect the 6 gauge black wire from the negative post of the battery before reconnecting the wires to the solenoid.

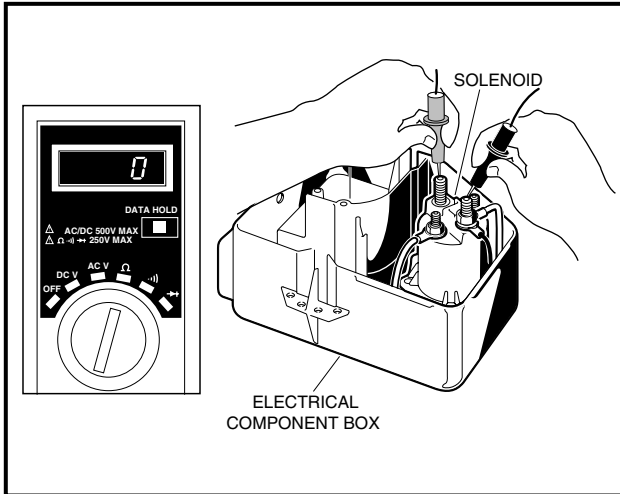


FIGURE 12-22

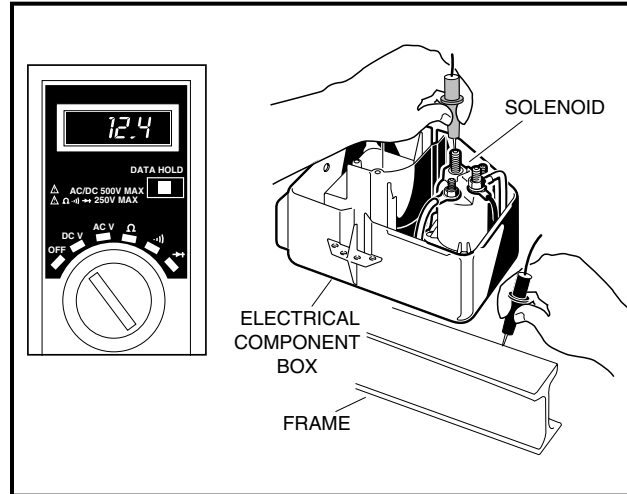


FIGURE 12-23

### Test Procedure 6 - Cam-Activated Neutral Lock-out Limit Switch:

This switch is located on the forward and reverse switch assembly. There are a black wire, a green wire, and a white wire connected to this limit switch.

#### ⚠ WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (FIGURE 12-1, PAGE 82).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

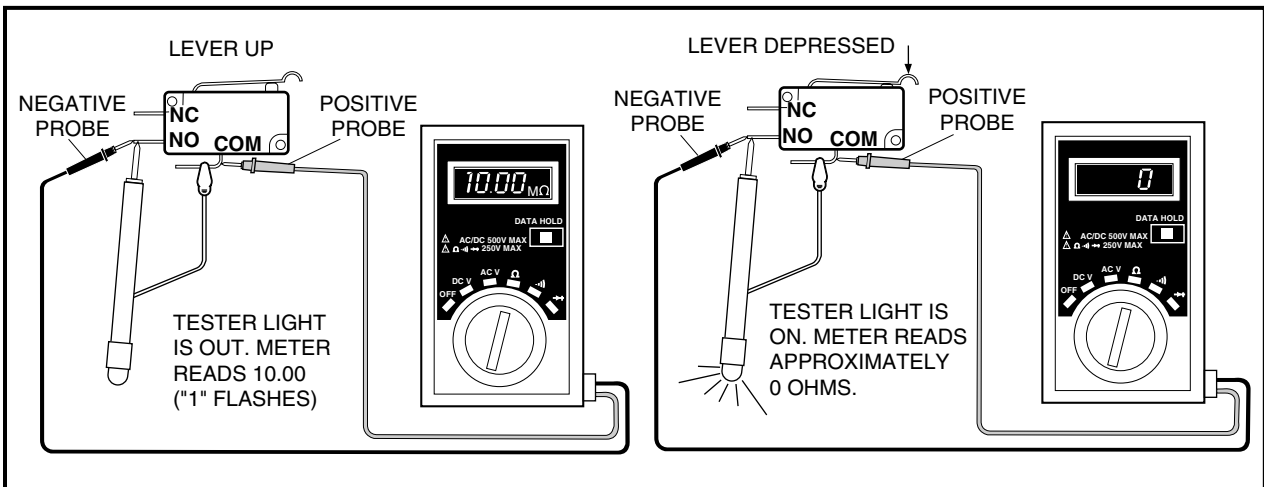


FIGURE 12-24

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.

2. Check for proper wiring and tight connections.
3. Place the red (+) probe of the multimeter on the common (COM) terminal of the limit switch. Place the black (-) probe on the normally open (NO) terminal of the limit switch. Without the lever depressed, the reading should be no continuity. Depress the lever, and the reading should be continuity. If either reading is incorrect, replace the limit switch (**Figure 12-24**).
4. Check to be sure the lobes on the cam are depressing the neutral lock-out limit switch as the forward and reverse lever is being shifted. The limit switch should make an audible “click” as it is depressed. If it does not, check for wear on the cam lobes. Be sure the cam snaps fully back into place. If the cam lobes still do not activate the limit switch, replace the cam.

### Test Procedure 7 - Starter/Generator (Starter Function) (Figure 12-25, Page 100):

#### WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check that wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
3. Disconnect the wires from all the terminals on the starter/generator. Then place the black (-) probe of a multimeter, set to ohms ( $\Omega$ ), on the starter/generator housing (scratch through the paint to insure a good ground). While holding the black probe against the housing, place the red (+) probe (one at a time) on the A1, A2, F1, F2 and DF terminals respectively (**Figure 12-25, Page 100**). The readings should be *no* continuity. If the readings are incorrect, the starter/generator will need to be removed from the vehicle and disassembled by a qualified technician (**See Removal of the Starter/Generator, Page 107**).  
 An incorrect reading from A1 or A2 terminal indicates three possible problems: 1) a grounded A1 or A2 terminal, 2) a grounded wire in the brush area, or 3) a grounded armature/commutator.  
 If the F1 or F2 reading is incorrect, it indicates a possible grounded F1 or F2 terminal or a grounded field coil.  
 If the DF reading is incorrect, it indicates a possible grounded DF terminal or a grounded field coil.
4. Disconnect the ground wire from the A2 terminal and the green wire from the A1 terminal on the starter/generator. Using a multimeter set to ohms ( $\Omega$ ), place the red (+) probe on the A1 terminal and the black (-) probe on the A2 terminal. 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 maybe the cause. The starter/generator will need to be removed from the vehicle and disassembled by a qualified technician (**See Removal of the Starter/Generator, Page 107**).
5. Disconnect the green wire from the F1 terminal and the white wire from the F2 terminal on the starter/generator. Using a multimeter set on ohms ( $\Omega$ ), place the red (+) probe on the F1 terminal and the black (-) probe on the F2 terminal. The reading should be continuity.  
 If the reading is incorrect, a possible open field coil or bad connections at terminals may be the cause. The starter/generator will need to be removed from the vehicle and disassembled by a qualified technician (**See Removal of the Starter/Generator, Page 107**).

**Test Procedure 7, Continued:**

6. Disconnect the yellow wire from the DF terminal and the green wire from the F1 terminal on the starter/generator. Using a multimeter set on ohms ( $\Omega$ ), place the red (+) probe on the DF terminal and the black (-) probe on the F1 terminal. The reading should be between 4.5 to 5.5 ohms ( $\Omega$ ). If the reading is incorrect, a possible grounded DF terminal and/or grounded field coil may be the cause. The starter/generator will need to be removed from the vehicle and disassembled by a qualified technician (See **Removal of the Starter/Generator, Page 107**).

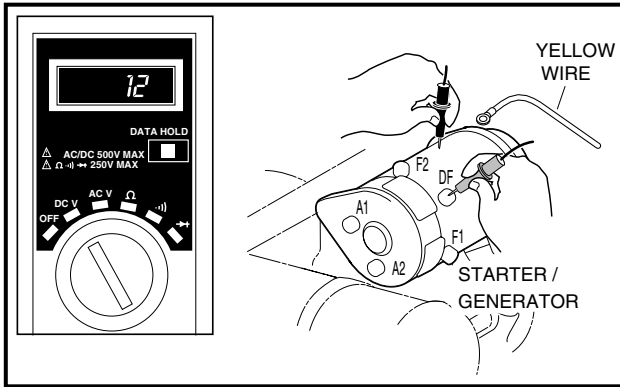


FIGURE 12-25

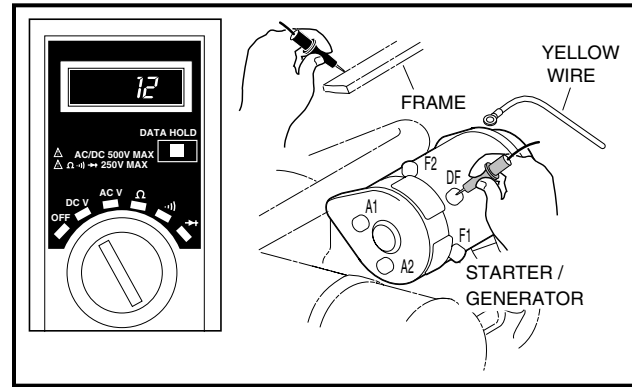


FIGURE 12-26

**Test Procedure 8 - Wire Continuity:**

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. To test a wire for continuity, disconnect either end from the electrical component it is attached to.
3. Set the multimeter to ohms ( $\Omega$ ) and place the red (+) probe on the terminal at one end of the wire. Place the black (-) probe on the other terminal end of the wire. The reading should be continuity. If the reading is incorrect, repair or replace the wire.

**Test Procedure 9 - Starter/Generator (Generator Function) (Figure 12-26):****⚠ DANGER**

- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

**NOTE**

- LEAVE THE BATTERY CONNECTED WHILE PERFORMING TEST PROCEDURE 9.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check that wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
3. Disconnect the yellow wire from the DF terminal on the starter/generator. Cover the connector on the yellow wire to make sure the yellow wire will not short to ground. Then, using a jumper wire, ground the DF terminal to the A2 terminal. Using a multimeter set to Volts DC (20v range), place the red (+) probe on the positive (+) post of the battery, and place the black (-) probe on the negative (-) post. Turn the key switch to the ON position, and depress the accelerator to start the engine. Run the engine at full governed speed. The reading should show voltage rising on the meter. If voltage rises, see Test Procedure 10 - Voltage Regulator. If the voltage does not rise, see Starter/Generator Repair, Pages 107-116.
4. Reconnect the yellow wire to the (DF) terminal on the starter/generator.

## Test Procedure 10 - Voltage Regulator:

### **⚠ DANGER**

- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

### **NOTE**

- LEAVE THE BATTERY CONNECTED WHILE PERFORMING TEST PROCEDURE 10.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check that the wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
3. Start the engine and check engine-governed RPM. The reading should be between 2670-2730 RPM. If it is not, adjust the accelerator cable at the electrical component box (**See Fuel System, Section 14**).
4. With the battery in good condition and fully charged, and with proper ventilation, run the engine for several minutes to bring the voltage regulator to operating temperature, then release the accelerator pedal to stop the engine. Using a multimeter set to DC volt (DCV), place the red (+) probe on the large post of the solenoid with the red wire from the voltage regulator attached. Place the black (-) probe on the negative (-) post of battery. Depress the accelerator to start the engine, and run it at full governed speed. If the reading is between 14.7 and 15.3 volts, the regulator is good. If the reading is lower than 14.7 volts but rising steadily, check battery condition (**See Hydrometer Test, Page 128**). If the reading is lower than 14.7 volts and not rising, and the starter/generator is good; or if the reading is over 15.3 volts and continues to rise, replace voltage regulator (**Figure 12-27**).

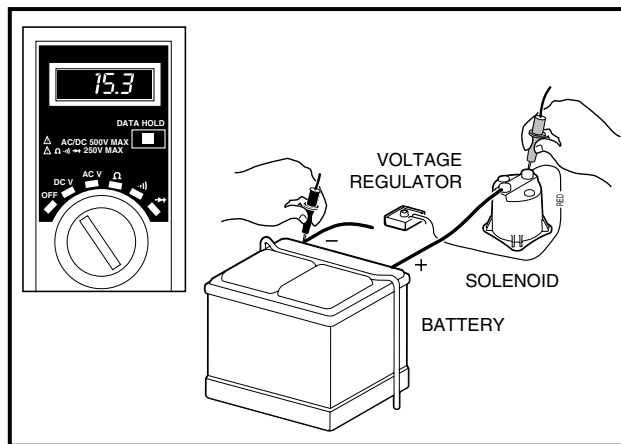


FIGURE 12-27

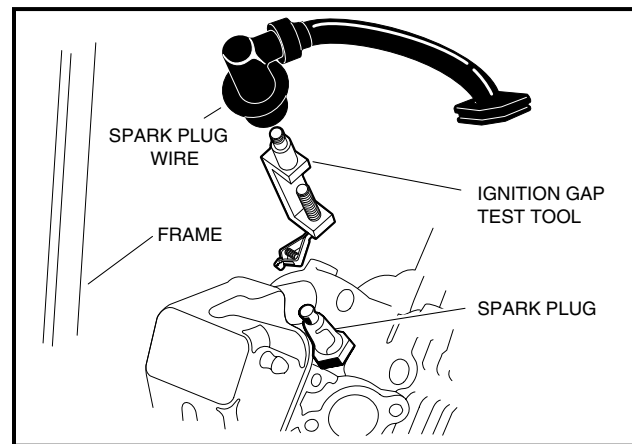


FIGURE 12-28

## Test Procedure 11 - Ignition Spark:

### **NOTE**

- LEAVE THE BATTERY CONNECTED WHILE PERFORMING TEST PROCEDURE 11.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.

**Test Procedure 11 - Ignition Spark, Continued:**

2. Remove the plug wire from the spark plug. Using an ignition spark gap test tool (Thexton 404® or equivalent), check for correct spark (**Figure 12-28, Page 101**).
  - 2.1. Adjust the tester probes to approximately 18,000 volts (18 Kv) setting. Connect the tester to the spark plug wire, and connect the alligator clip to the frame.
  - 2.2. Turn the key switch to the ON position and crank the engine by depressing the accelerator. There should be a strong blue spark between the probes of the spark gap tester. If there is no spark, or if the spark is a faint yellow or white color, test components of the ignition circuit.
3. If the spark gap tester tool indicates a strong blue spark, it is possible the spark plug has failed internally. Replace the spark plug with a new part and test the engine for proper operation.

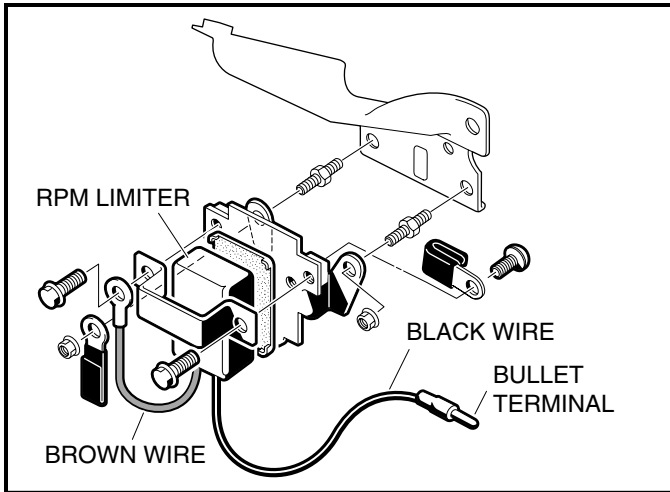


FIGURE 12-29

**Test Procedure 12 - RPM Limiter (Figure 12-29):**

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Disconnect the bullet terminal. Using a multimeter set on ohms ( $\Omega$ ), place the red (+) probe on the brown ground wire and place the black (-) probe on the black wire bullet connector. The reading should be continuity. If the reading is not correct, replace the RPM Limiter.
3. This test will find 90% of bad RPM Limiters. Some of them may bench test okay but fail under a load due to heat while operating. Another method of testing is to replace the RPM Limiter and then run the engine. If the engine runs properly, keep the new RPM Limiter in the circuit.

**Test Procedure 13 - Ignition Coil and Igniter:****⚠ DANGER**

- DO NOT OPERATE GASOLINE VEHICLE IN AN ENCLOSED AREA WITHOUT PROPER VENTILATION. ENGINE PRODUCES CARBON MONOXIDE WHICH IS AN ODORLESS, DEADLY POISON.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Using a multimeter set on ohms ( $\Omega$ ), measure the primary coil resistance. Place the black (-) probe of the meter on the primary wire terminal connector (1), and place the red (+) probe on the core (2) (**Figure 12-30**).
3. If the resistance is not within 0.6 - 1.4 ohms ( $\Omega$ ), replace the coil.

## ⚠ WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

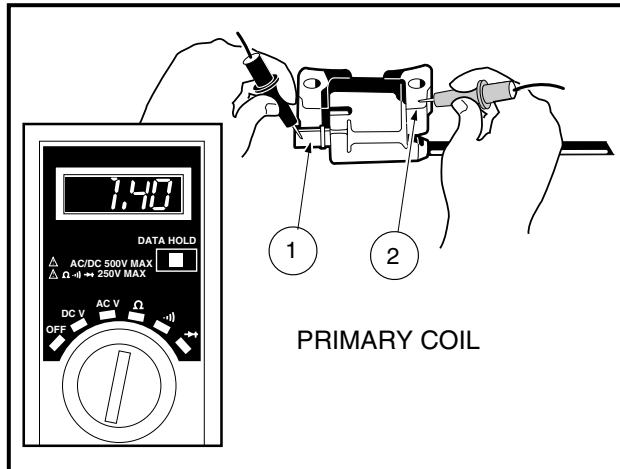


FIGURE 12-30

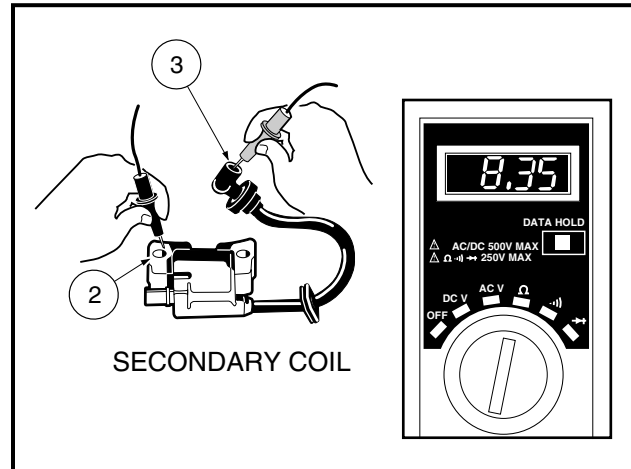


FIGURE 12-31

- Using a multimeter set on ohms ( $\Omega$ ), measure the secondary coil resistance. Place the red (+) probe of the meter on the plug lead (3) and place the black (-) probe on the primary wire terminal connector (2) (**Figure 12-31**).
- If the resistance is not within 6.0 - 11.0 k ohms ( $\Omega$ ), replace the coil.
- The first five steps will find 90% of the bad coils. Some coils may bench test okay but fail under a load due to heat while operating. Another method of testing is to replace the coil and then run the engine. If the engine runs properly, keep the new coil in the circuit.

## NOTE

- BECAUSE THE IGNITER IS LOCATED WITHIN THE COIL HOUSING AND IS IN PARALLEL WITH THE COIL, IT CANNOT BE TESTED SEPARATELY. HOWEVER, IF THE RPM LIMITER (TEST PROCEDURE 12) IS GOOD AND THERE IS NO CURRENT TO THE SPARK PLUG LEAD, IT CAN BE ASSUMED THAT EITHER THE COIL OR THE IGNITER IS BAD. IN EITHER CASE, THE COIL ASSEMBLY MUST BE REPLACED.

### Test Procedure 14 - Disconnected Kill Wire:

- Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
- Remove the spark plug wire from the spark plug. Using an ignition spark-gap test tool (Thexton 404® or equivalent), check for correct spark to plug. Adjust the tester probes to approximately to 18,000 volts (18 Kv) setting. Connect the tester to the spark plug wire, and connect the alligator clip to the top of the spark plug (**Figure 12-28, Page 101**).

**Test Procedure 14 - Disconnected Kill Wire, Continued:**

3. Disconnect engine-kill white/black wire at bullet connector located by the RPM limiter (**Figure 12-32**).
4. With the neutral lock-out cam placed in the SERVICE position and the wheels chocked, connect the 6 gauge red wire to the positive post on the battery, then connect the 6 gauge black wire to the negative post. Turn the key switch to the ON position. In a well-ventilated area, depress the accelerator to start the engine.
5. If there is a strong blue spark across the spark gap tester tool and the engine begins to run, test the engine kill circuit for a shorted wire or other failed components in the engine kill circuit (**See Testing the Engine Kill Circuit, Page 89**). **See Warning below.**

**⚠ WARNING**

- WHEN THE WHITE/BLACK ENGINE KILL WIRE IS DISCONNECTED, THE ENGINE WILL NOT STOP RUNNING AFTER THE ACCELERATOR PEDAL IS RELEASED. IT WILL BE NECESSARY TO DEPRESS AND HOLD THE CHOKE COVER CLOSED UNTIL THE ENGINE STOPS RUNNING.

6. If there is no spark, or the spark is a faint yellow or white color, test the ignition circuit components.

**Test Procedure 15 - Kill Limit Switch:**

The kill limit switch is located inside the electrical component box. The accelerator kill switch is the lower of the two limit switches and has a white/black wire and black wire connected to it.

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check for proper wiring and tight connections.

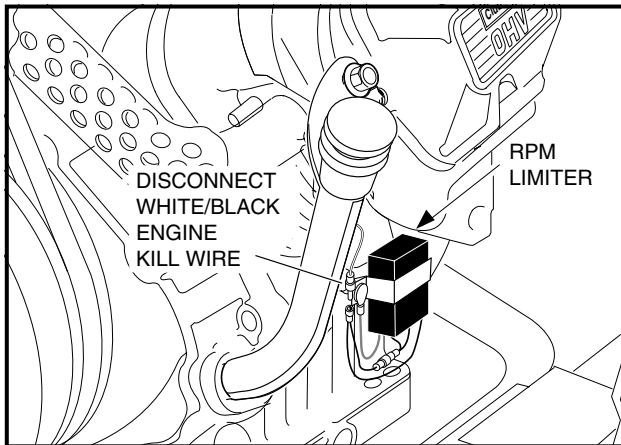


FIGURE 12-32

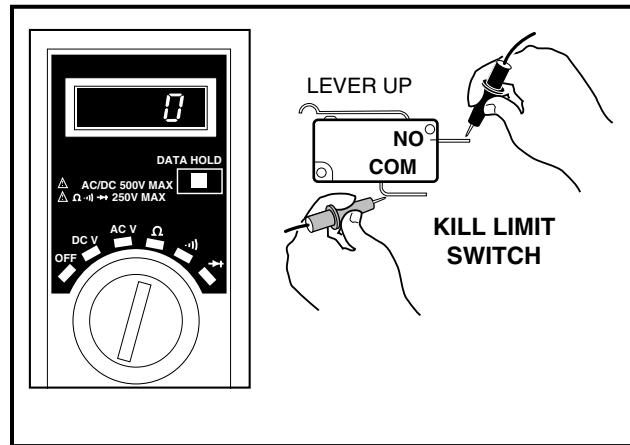


FIGURE 12-33

3. Place the red (+) probe of the multimeter on the common (COM) terminal (white/black wire) of the limit switch. Place the black (-) probe on the normally open (NO) terminal (black wire) of the limit switch. Without the lever depressed, the reading should be no continuity. Depress the lever, and the reading should be continuity. If either reading is incorrect, replace the limit switch (**Figure 12-33**).

**Test Procedure 16 - Key Switch:**

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the center dash assembly (**See Removing the Key Switch, Page 119**).
3. Check that the wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
4. Place the red (+) probe of the multimeter on the (M+) terminal of the key switch and the black (-) probe



on the (M-) terminal. With the key switch turned OFF, the reading should be continuity. With the key switch turned ON, the reading should be no continuity. If either reading is incorrect, replace the key switch.

### Test Procedure 17 - Fuse:

The fuse (red 10 amp) is located in the electrical component box (**See Removing the Fuse, Page 120**).

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the cover on the electrical component box.
3. Check that wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
4. Remove the fuse. Using a multimeter set on ohms ( $\Omega$ ), place the red (+) probe on one fuse terminal and the black (-) probe on the other fuse terminal. The reading should be continuity. If the reading is incorrect, determine what caused the fuse to blow and replace it with a new one of proper load rating.

### Test Procedure 18 - Reverse Buzzer Limit Switch:

Limit switch is located on the forward and reverse assembly; red/white and orange wires are connected to it (**Figure 12-7, Page 86**).

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. If buzzer does not function and engine also does not start, see Testing the Vehicle Battery, Page 87.
3. If the engine will start but the reverse buzzer does not function, move the forward and reverse lever to reverse and listen for an audible "click" from the limit switch. If there is no "click", check the switch for proper alignment and switch arm movement.
4. If the switch is being activated but the buzzer does not function, place the red (+) probe of the multimeter on one terminal and the black(-) probe on the other terminal of the limit switch. Without the lever depressed, the reading should be no continuity. Depress the lever and the reading should be continuity. If either reading is incorrect, replace the limit switch.

### Test Procedure 19 - Reverse Buzzer:

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the center dash assembly (**See Removing the Reverse Warning Buzzer, Page 124**).
3. Check for proper wiring and tight connections. Using a multimeter, check for continuity through each wire that connects to the reverse buzzer (**See Figure 12-7, Page 86**). If the buzzer will not function when properly wired, replace the buzzer.

### Test Procedure 20 - Oil Sending Unit:

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Check that the wire is connected correctly and is tight. If it is not, rewire or tighten as necessary (**Figure 12-8, Page 86**).
3. Disconnect the wire from the cord connector on the back of the engine that goes to the oil sending unit. Using an alligator clip jumper wire, connect the wire to the frame. Turn the key switch ON, closing the circuit. The oil light should illuminate. If not, check the yellow wire for continuity. If there is no continuity, replace the wire. If the wire tests okay then check the oil light (**See Test Procedure 21**). If the oil light does illuminate with the jumper wire, the oil sending unit needs to be replaced (**See Crankcase Cover Removal, Section 13, Page 13-24 in the Maintenance and Service Manual**).

### Test Procedure 21 - Oil Warning Light:

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the center dash assembly (**See Removing the Oil Warning Light, Page 125**).

**Test Procedure 21 - Oil Warning Light, Continued:**

3. Check that the wires are connected correctly and are tight. If they are not, rewire or tighten as necessary (**Figure 12-8, Page 86**).
4. Disconnect the yellow wire (to the oil sending unit) from the terminal on the oil light. Using an alligator clip jumper wire, connect the terminal to the frame of the vehicle. Connect the red (+) battery cable to the positive (+) post of the battery, then attach the black (-) cable to the negative (-) post of the battery.
5. Turn the key switch ON. The oil light should illuminate. If it does not, check continuity of the yellow wire that runs from the key switch to the oil light. If there is no continuity, replace the wire. Then test the key switch (**See Test Procedure 2**). If the yellow wire and the key switch test okay, then replace the oil light.

**Test Procedure 22 - Key Switch (Engine Kill Circuit):**

1. Place the neutral lock-out cam in the SERVICE position, put the forward and reverse lever in the NEUTRAL position, and chock the wheels.
2. Remove the center dash assembly (**See Removing the Key Switch, Page 115**).
3. Check that wires are connected correctly and are tight. If they are not, rewire or tighten as necessary.
4. Insert the key and turn the switch to ON. Place the red (+) probe of the multimeter on the No. 2 terminal and the black (-) probe on the No. 1 terminal of the key switch. The reading should be continuity. If the reading is incorrect, replace the key switch (**Figure 12-34**).

**Test Procedure 23 - Neutral Lock-out Cam:**

Check to be sure the lobes on the cam are depressing the neutral lock-out limit switch lever as the forward and reverse lever is being shifted. The limit switch should make an audible “click” as it is depressed. If it does not, check for wear on the cam lobes. Be sure the cam has snapped fully back into place. If the cam lobes still do not actuate the limit switch, replace the cam.

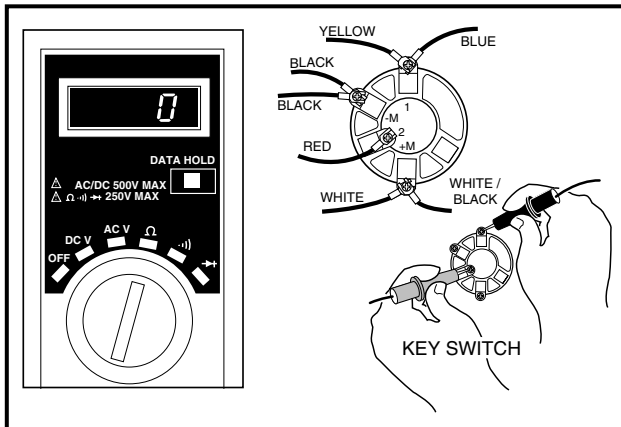


FIGURE 12-34

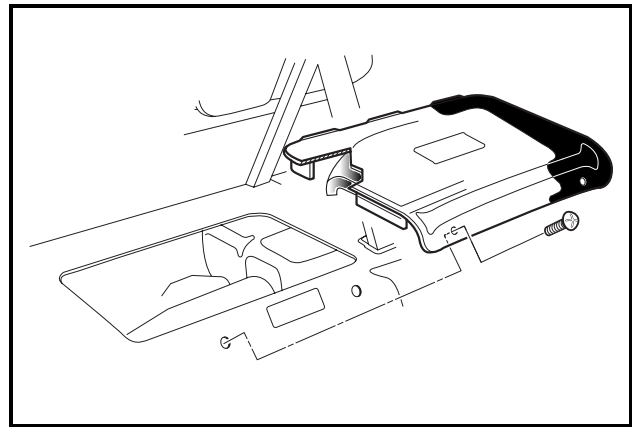


FIGURE 12-35

**Test Procedure 24 - Battery Test (Under Load):****NOTE**

- LEAVE THE BATTERY CONNECTED WHILE PERFORMING TEST PROCEDURE 24.

1. Place the neutral lockout cam in the SERVICE position, put the forward and reverse switch in NEUTRAL, and chock the wheels.
2. Set a multimeter to volts and place the red (+) probe on the F2 (white wire) terminal on the starter/generator. Place the black (-) probe on the negative terminal post on the battery.

3. Turn the key switch to the ON position, leave the forward and reverse switch in the neutral position and depress the accelerator pedal (with the accelerator pedal depressed the battery is under load). If the voltage reading is over 8 volts, check the starter/generator (**See Starter/Generator below, Pages 107-116**). If the reading is below 8 volts, check the battery (**See page 126**). If the reading is zero, there may be no continuity across the large posts of the solenoid (**See Test Procedure 5**).
4. If all of the test results are good, there may be a broken or damaged white 6 gauge wire from the solenoid to the starter/generator (**See Test Procedure 8**).

## ELECTRICAL SYSTEM COMPONENTS

### STARTER/GENERATOR

#### Removal of the Starter/Generator

1. Remove access panel from the body (**Figure 12-35**).
2. Disconnect the wires from the starter/generator (1). Mark wires before disconnecting. Loosen the pivot nuts (7) and bolts (5) (**Figure 12-36**).
3. Remove the mounting/adjustment nut (12), washer (9) and bolt (11). Lower the starter/generator and slip the belt (4) off the pulley (10) (**Figure 12-36**). See NOTE below.

#### NOTE

- SEE FIGURE 12-36 BELOW. ON SOME EARLY 1997 VEHICLES, THE BOLT (5) WAS INSERTED FROM INSIDE THE BRACKET (2), AND A NUT AND LOCK WASHER (INSTALLED OUTSIDE THE BRACKET) WERE USED INSTEAD OF THE LOCK NUT (7).

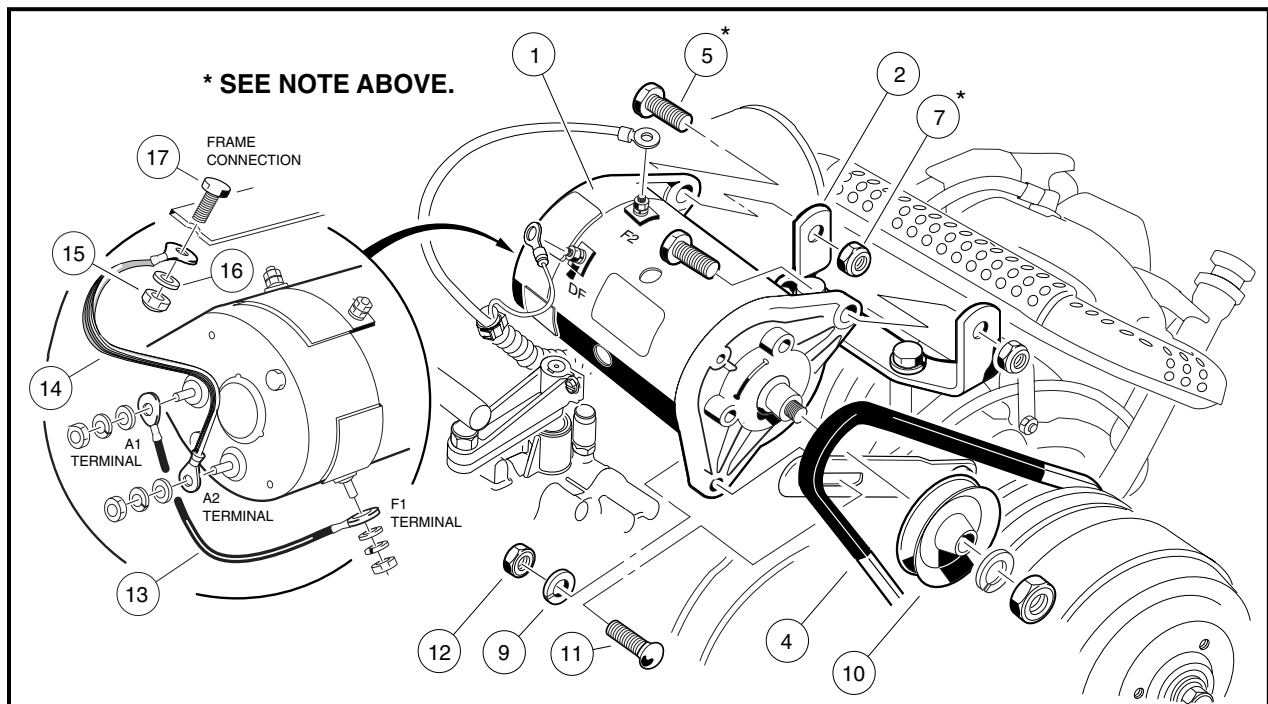


FIGURE 12-36

4. Support the starter/generator so that when the pivot bolts are removed the starter/generator will not fall to the ground. Remove the two pivot nuts (7), lockwashers (6) (if present), and bolts (5) from the mounting bracket.
5. Remove the starter/generator up through the access opening.

## Disassembly of the Starter/Generator to Service the Brushes

1. Remove the two bolts (20) and washers (21 and 22) and pull commutator end cover (23) free of starter housing (24) (**Figure 12-37**). See NOTE below.

### NOTE

- IF THE BRUSHES ARE NOT REMOVED, CONTACT BETWEEN THE BRUSHES AND COMMUTATOR AS THE COMMUTATOR END COVER IS BEING REMOVED OR INSTALLED COULD POSSIBLY DAMAGE THE BRUSHES. LIFT THE BRUSH SPRINGS OUT OF THE NOTCHES IN THE BRUSHES AND PULL THE BRUSHES BACK FROM THE CENTER OF THE COMMUTATOR END COVER. THE SPRINGS WILL REST ON THE SIDES OF THE BRUSHES AND HELP PREVENT THEM FROM SLIDING TOWARDS THE CENTER (**FIGURE 12-41, PAGE 110**).

2. Remove brush covers (29 and 30), screws (25) and lockwashers (26), brush springs (28), and brushes (27) (**Figure 12-39**) See Note below.

### NOTE

- CLEAN AND INSPECT THE ARMATURE/COMMUTATOR AND THE BEARINGS (**SEE DISASSEMBLY OF STARTER/GENERATOR TO SERVICE THE ARMATURE/ COMMUTATOR, PAGE 110**).

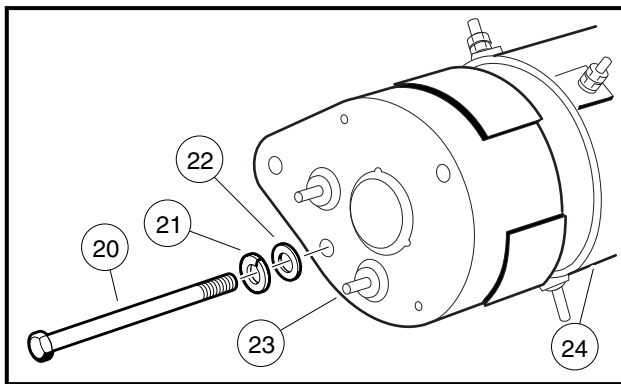


FIGURE 12-37

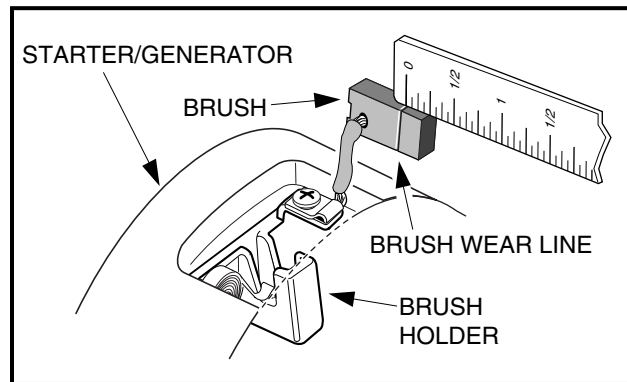


FIGURE 12-38

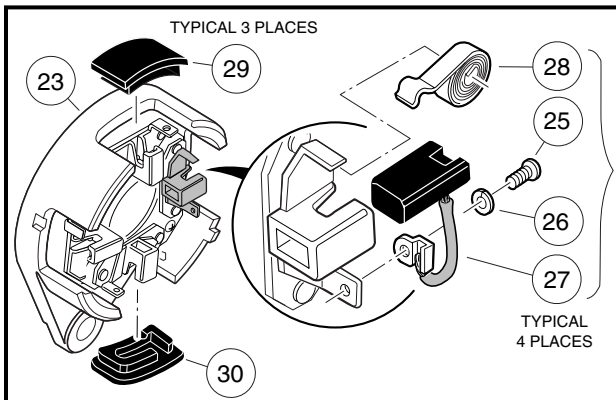


FIGURE 12-39

## Cleaning, Inspection, and Replacement of Brushes

1. Visually inspect brushes. Replace brushes which are cracked or severely chipped.
2. There is a wear line on the side of the brush. If the end of the brush is within 1/16 inch (1.6 millimeters) of the wear line, replace all four brushes (**Figure 12-38**).

## Cleaning, Inspection, and Replacement of Brush Springs

12

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### ⚠ CAUTION

- WHEN CHECKING BRUSH SPRING TENSION, DO NOT PUSH SPRINGS BEYOND THE POINT THEY WOULD NORMALLY BE IF THERE WERE NEW BRUSHES INSTALLED. EXERTING EXCESSIVE FORCE OR PUSHING BRUSH SPRINGS BEYOND THEIR NORMAL RESTING POINT WILL DAMAGE SPRINGS.

1. Visually inspect springs. Replace all four springs if any spring is discolored from heat (straw or bluish in color).
2. Install the four brushes (27) into their holders and insert the four brush springs (28) (**Figure 12-39**). Using a spring scale, test brush spring tension. If the any spring has a tension less than 24 ounces, replace all four springs (**Figure 12-40**) See **Caution** above.

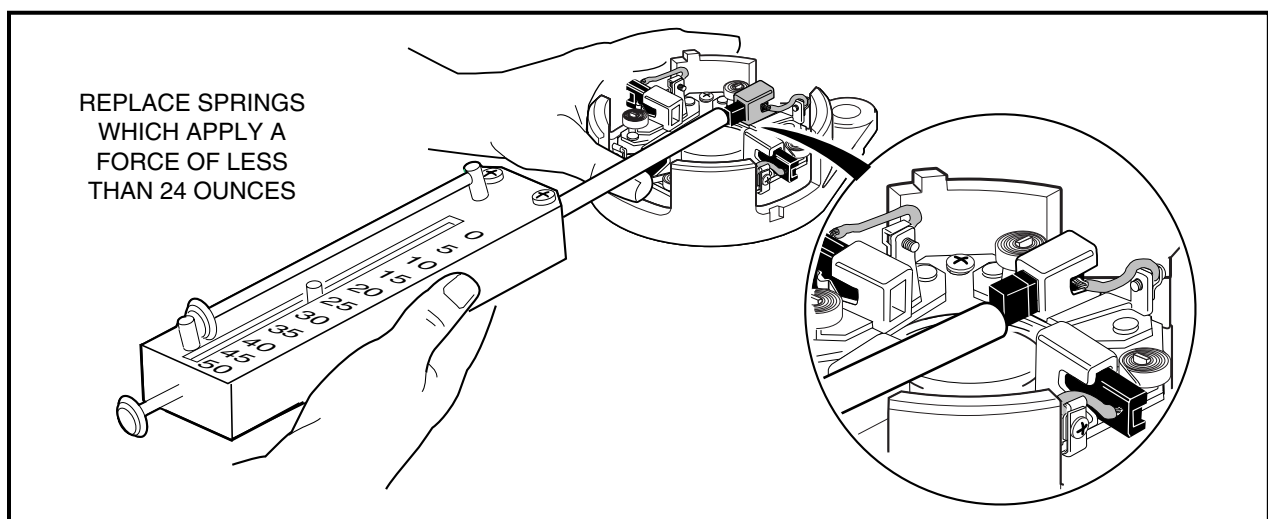


FIGURE 12-40

## Assembly of the Starter/Generator

### ⚠ WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

1. Connect the brush wires to the holders using the four lockwashers (26) and four screws (25), making sure the crossover leads are connected also. Apply 26-35 in.lbs. (2.9/3.9 N-m) of torque to the screws (**Figure 12-39**).
2. To prevent contact between the brushes and commutator as the commutator is installed, and possible damage to the brushes, lift the brush springs out of the notches in the brushes and pull the brushes back from the center of the commutator end cover. The springs will rest on the sides of the brushes and help prevent them from sliding towards the center of the cover (**Figure 12-41, Page 110**).

### Assembly of the Starter/Generator, Continued:

3. Install the commutator end cover (23) onto the armature shaft. Align the locating pin with the pin hole in the cover. Install the two M6 x 180mm screws (20) and tighten to 95-104 in.lbs. (10.6/11.6 N-m) (**Figure 12-37, Page 108**).
4. Install the brushes into the holders. Place springs into the notches in the brushes. Install the brush cover (30) that has the drain hole in it next to the A2 terminal. Install the remaining three brush covers (29) in the openings in the commutator end cover (23) (**Figure 12-39, Page 108**).

### Disassembly of the Starter/Generator to Service the Armature/Commutator

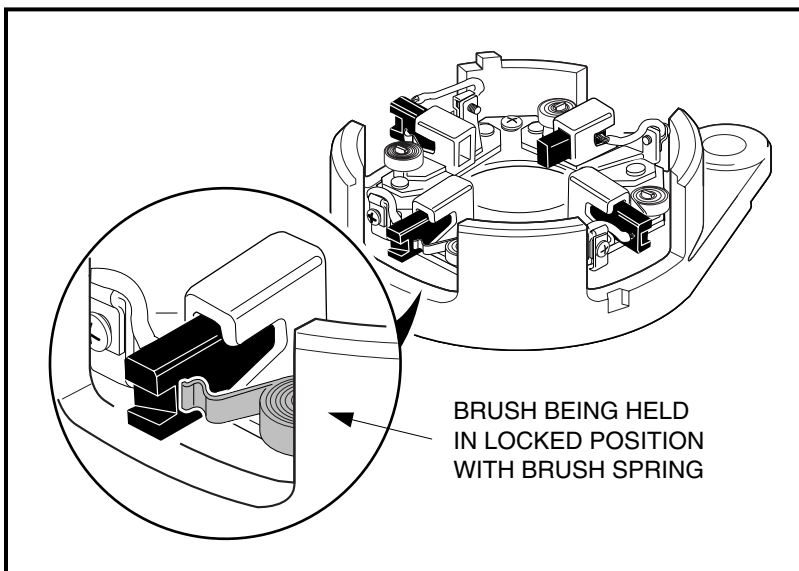
1. Remove two bolts (20) and washers (21 and 22), and pull commutator end cover (23) free of the starter housing (24) (**Figure 12-37, Page 108**). See **WARNING** and **NOTE** below.

#### **⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

#### **NOTE**

- IF THE BRUSHES ARE NOT REMOVED, CONTACT BETWEEN THE BRUSHES AND COMMUTATOR AS THE COMMUTATOR END COVER IS BEING REMOVED OR INSTALLED, COULD POSSIBLY DAMAGE THE BRUSHES. LIFT THE BRUSH SPRINGS OUT OF THE NOTCHES IN THE BRUSHES AND PULL THE BRUSHES BACK FROM THE CENTER OF THE COMMUTATOR END COVER. THE SPRINGS WILL REST ON THE SIDES OF THE BRUSHES AND HELP PREVENT THEM FROM SLIDING TOWARDS THE CENTER OF THE COVER (**FIGURE 12-41**).



**FIGURE 12-41**

### Disassembly of the Starter/Generator to Service Armature/Commutator, Continued:

- To separate armature (33) from output end cover (36), remove nut (41), lockwasher (40), pulley (39), shaft key (34), spacer (37), and bearing retainer screws (43) (**Figure 12-42**).

### Clean and Inspect the Bearings

- Using a clean cloth, wipe the carbon dust off of the two bearings. Inspect bearings by spinning them by hand and checking for both axial (A) and radial (B) play (**Figure 12-43**).
- Replace the bearing if it is noisy, does not spin smoothly, or has excessive play. Check the bearings and replace if rusted, worn, cracked, or if there is an abnormal color change in the metal of the bearing. Bearings should be replaced if there is extreme wear or pitting on the balls or on the rolling surfaces. Do not remove the bearings unless they are to be replaced.

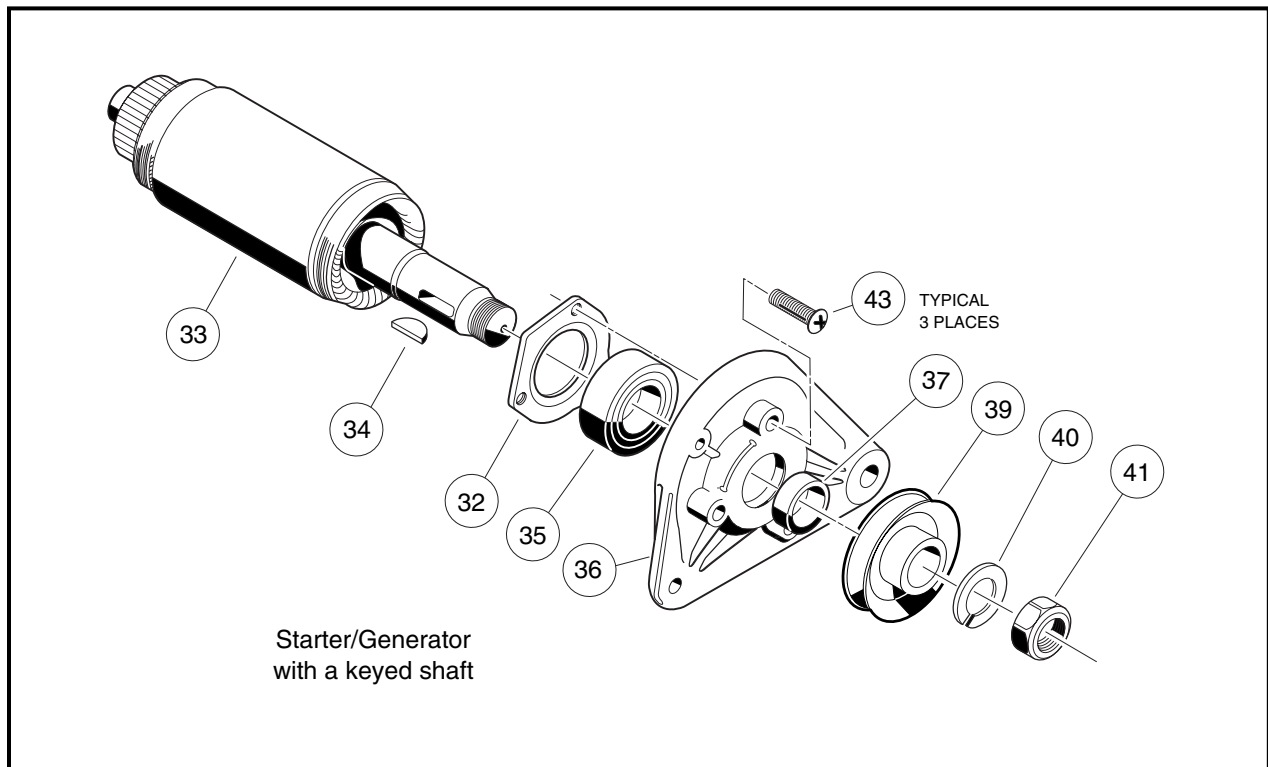


FIGURE 12-42

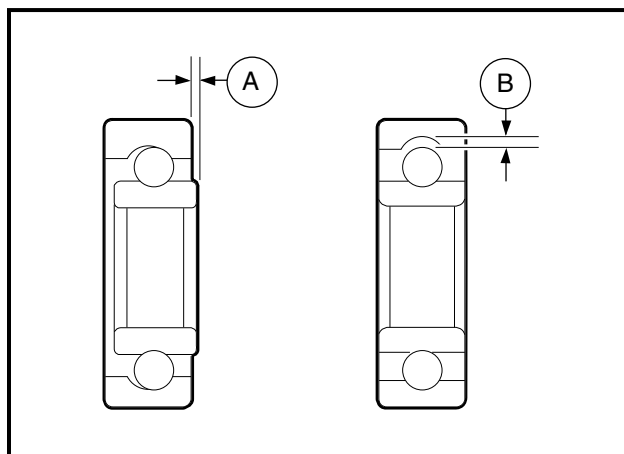


FIGURE 12-43

## Removing the Bearings

### ⚠ CAUTION

- DO NOT TIGHTEN THE BEARING PULLER WEDGE ATTACHMENT AGAINST THE ARMATURE SHAFT. THE SHAFT COULD BE DAMAGED WHEN PRESSING THE BEARING OFF.

1. Place the wedge attachment tool (Club Car Part No. 1012812) between the bearing and the armature. Make sure the wedge attachment tool is supporting the inner race of the bearing but is not contacting the armature shaft. If a press is not available, secure a bearing puller (Club Car Part No. 1012811) to the wedge attachment tool and pull the bearing off of the end of the armature shaft. Support the armature so that it will not drop when the bearing is removed (**Figure 12-44**).
2. Discard the bearings.
3. Slide the bearing retainer (32) off of the output end of the shaft (**Figure 12-42, Page 111**).

## Removing the Field Coils

1. Remove the retaining nut from each field coil terminal and slide the insulator out of the slots in the housing. Remove the four pole piece screws from the housing. Remove the four pole pieces from inside the housing. Remove the field coils from the inside of the housing (**Figure 12-45**). **See NOTE below.**

### NOTE

- DO NOT REMOVE THE INSULATORS OR THE FIELD COILS UNLESS ELECTRICAL TEST INDICATES THAT IT IS NECESSARY (**FIGURE 12-45**). SEE TEST PROCEDURE NO. 7, PAGE 99.

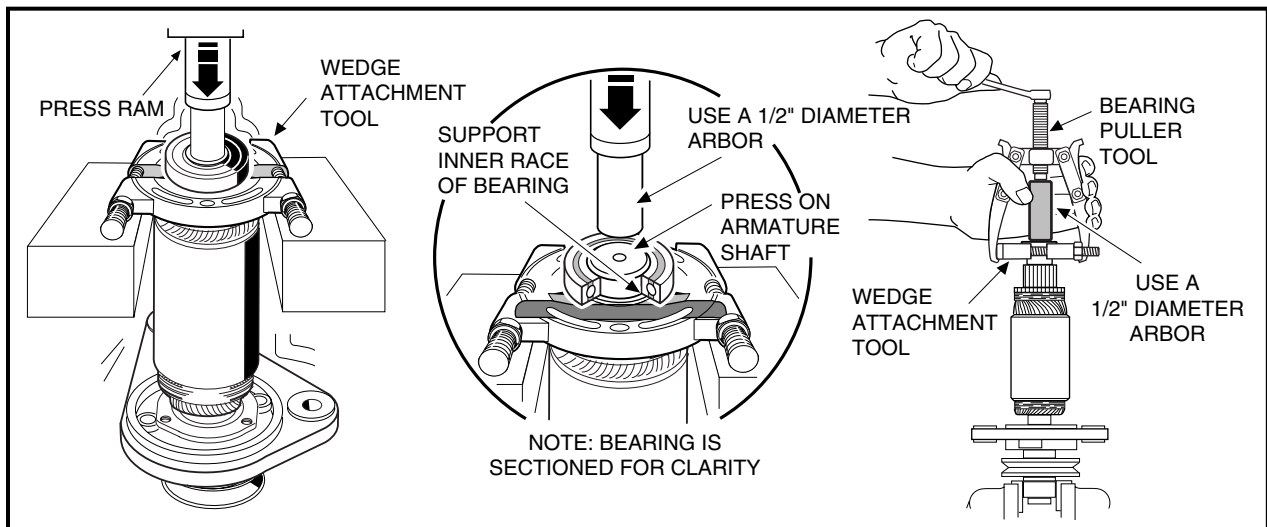


FIGURE 12-44

## Visual Inspection of Armature

Obvious defects can be seen by examining the armature. If an armature has frayed or charred insulation, broken wires or thrown solder, it is obvious without testing that it should be replaced. Faults seen during the visual inspection can aid in diagnosing the original cause of the failure. Items to look for are listed below.

- Burned, charred, or cracked insulation.
- Improperly cured varnish.
- Thrown solder.



- Flared armature windings.
- Worn, burned, or glazed commutator.
- Loose or raised commutator bars.
- Bruised or damaged armature core laminations.
- Worn armature bearing or shaft.
- Dirty or oily commutator.

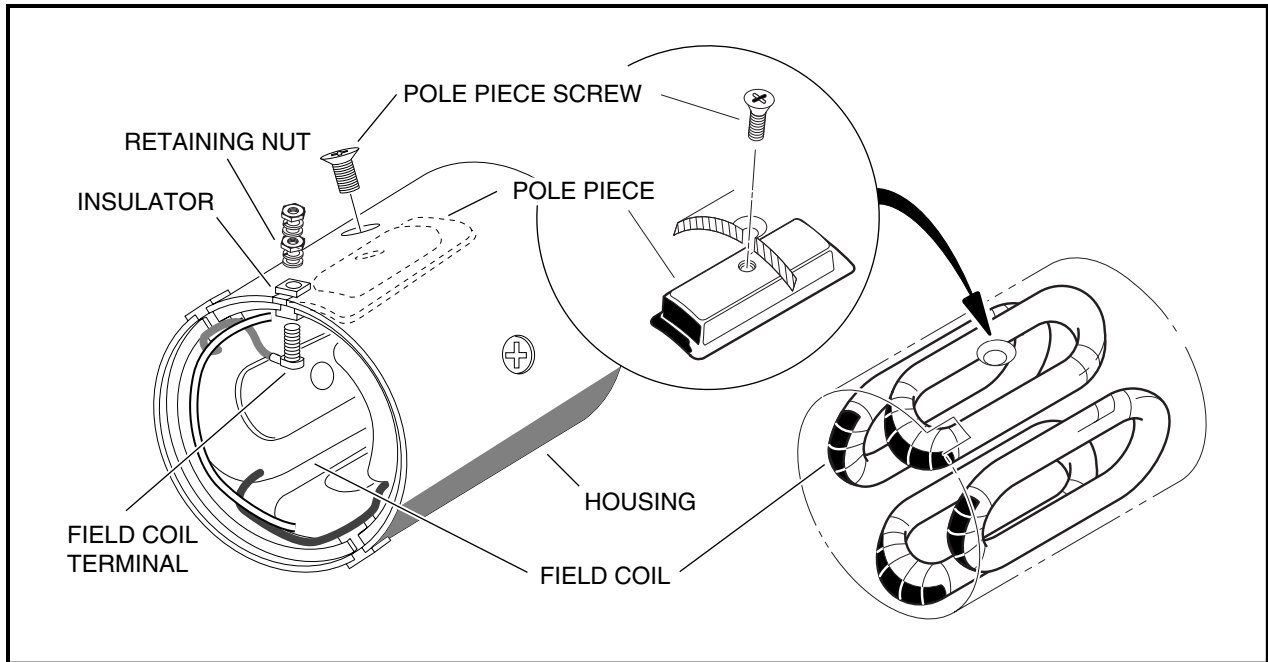


FIGURE 12-45

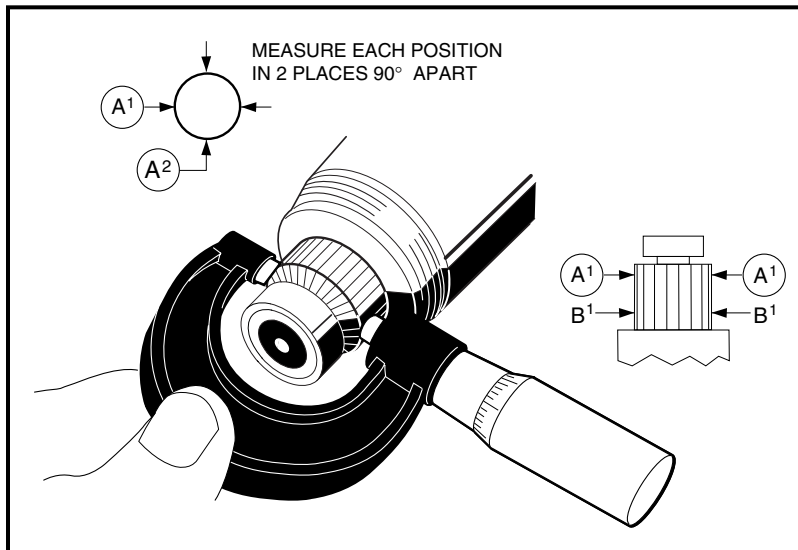


FIGURE 12-46

### Cleaning, Inspection, and Replacement of the Commutator

1. Clean the carbon dust, dirt and oil from the commutator. Visually inspect the commutator for worn, burned or glazed areas. Check for loose or raised commutator bars. Slight roughness of the commutator can be polished away with 400 or finer sandpaper (**See Caution at the top of page 114**).

## Cleaning, Inspection, and Replacement of the Commutator, Continued:

### ⚠ CAUTION

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

2. Using a micrometer, measure the outside diameter at two points along the commutator. If the commutator outside diameter is less than 1.535 inches (39 millimeters), replace the armature and bearings (**Figure 12-46, Page 113**).

### Armature Ground Test

### ⚠ CAUTION

- DO NOT SUBMERGE ARMATURE IN SOLVENT.

Using a multimeter set on ohms ( $\Omega$ ), place the positive probe on the commutator bars and the negative probe on the armature core. The reading should be no continuity. If the reading is incorrect, replace the armature and the two bearings (**Figure 12-47**). See **WARNING** and **NOTE** below.

### NOTE

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

### Visual Inspection of Field Coils

If the insulation on the field coils appears blackened or charred, the serviceability of the coils is questionable. Burned or scorched coil insulation indicates the motor has overheated due to overloads or grounded or shorted coil windings. Be sure the insulators are tight in the housing.

### Reworking the Starter/Generator

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

ITEM	SERVICE LIMIT
Commutator diameter (minimum)	1.535 inches (39 millimeters)
Concentric with armature shaft within	.002 inch (0.051 millimeter)
Limit depth of cut when machining commutator	.007 inch (0.2 millimeter)
If undercut of segment insulator is less than .016 (0.406 millimeter), then it should be undercut to	.031 inch (0.8 millimeter)
Dielectric strength	500 VAC for one minute
Armature insulation resistance	0.2M $\Omega$ at 500 VDC
Starter field coil resistance	0.006-0.01 $\Omega$
Generator field coil resistance	4.5-5.5 $\Omega$

## Assembly of the Starter/Generator

- Place the field coil inside of the housing. The two insulators that look the same fit into the slots next to the F1 and F2 markings on the outside of the housing. The insulator that looks different slides into the slot next to the DF marking. After the insulators are seated in the slots, install the threaded terminals through the wire connectors and then through the insulators. Install a flat washer and a lockwasher onto each threaded terminal (on the outside of the housing). Use a nut to secure the washers and insulator to the housing. Tighten nuts to 43-52 in.lbs. (4.8/5.9 N-m) (**Figure 12-45, Page 113**).

### ⚠ CAUTION

- ROUTE THE FIELD TERMINAL WIRES SO THAT THEY WILL NOT CONTACT THE ARMATURE.

- Install the four pole pieces into the housing. Use the four screws to secure pole pieces to the inside of the housing to retain the field wires. Tighten screws to 9 ft.lbs. (12 N-m) (**Figure 12-45, Page 113**).

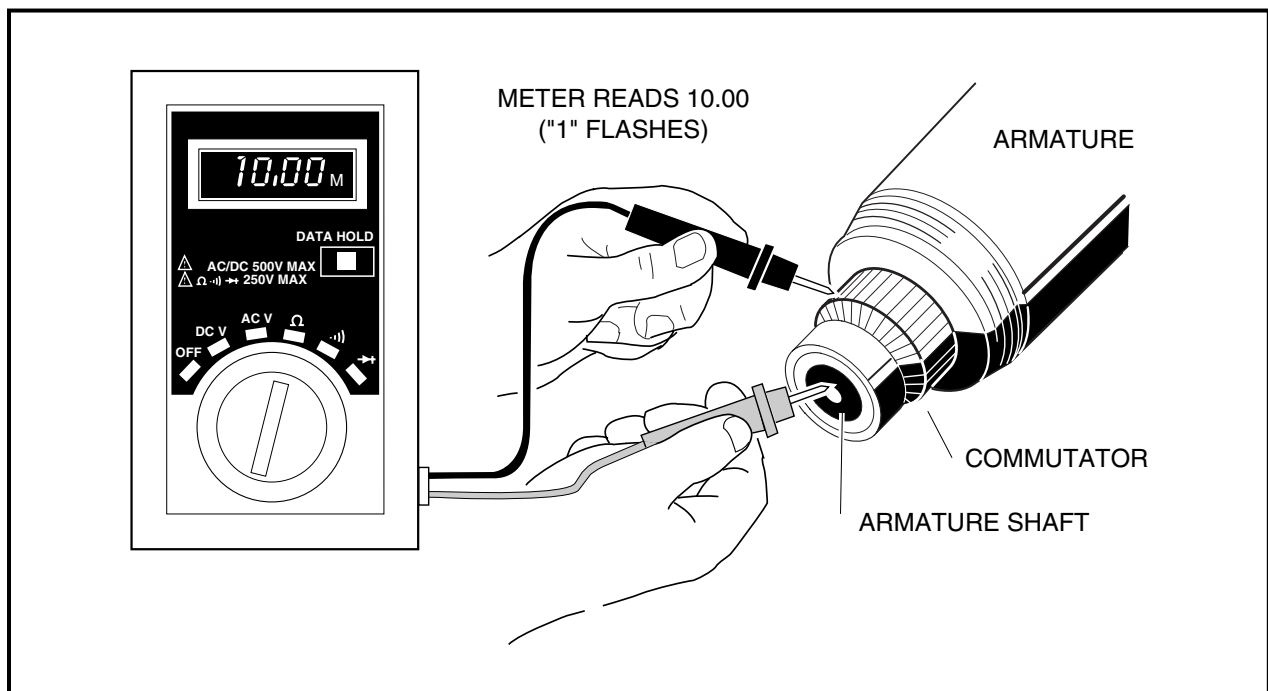


FIGURE 12-47

- Slide the bearing retainer onto the output end of the armature shaft (33) so that it will hold the outside of the bearing (35) only. Press a new ball bearing (35) onto the output end of the armature (**Figure 12-42, Page 111**). Press a new ball bearing onto the commutator end of the armature shaft.

### ⚠ CAUTION

- TO PREVENT DAMAGE TO THE RETAINER USE CARE WHILE PRESSING NEW BEARING ON TO THE OUTPUT END OF THE SHAFT.
- PRESS AGAINST THE INNER RACE OF THE NEW BEARING UNTIL IT IS FULLY SEATED.

- Install the output end cover (36) into the armature. Secure the bearing retainer (32) to the cover using the three M5 x 18mm screws (43). Tighten the screws to 35-43 in.lbs. (3.9/4.8 N-m) (**Figure 12-42, Page 111**).

**Starter/Generator Assembly, Continued:**

- Slide the housing with field coils over the armature. Use the locating pin to align housing to the cover.

**NOTE**

- THE TERMINAL INSULATORS SHOULD BE ON THE COMMUTATOR END OF THE HOUSING.

- To prevent contact between brushes and commutator as the commutator cover is installed, and possible damage to the brushes, lift the brush springs out of the notches in the brushes and pull the brushes back from the center of the commutator end cover. The springs will rest on the sides of the brushes and help prevent them from sliding towards the center of the cover (**Figure 12-41, Page 110**).
- Install the commutator end cover (23) onto the armature shaft. Align the locating pin with the pin hole in the cover. Install the two M6 x 180mm screws (20) and tighten them to 95-104 in.lbs. (10.6/11.6 N-m) (**Figure 12-37, Page 108**).
- Install the brushes into the holders. Place springs into the notches in the brushes. Install the brush cover (30) that has the drain hole in it next to the A2 terminal. Install the remaining three brush covers (29) in the openings in the commutator end cover (23) (**Figure 12-39, Page 108**).
- Slide the spacer (37) onto the end of the shaft. Insert the shaft key (34) into the shaft. Install the belt pulley (39) onto the shaft, then install the the lockwasher (40) and M14 nut (41). Tighten the nut to 25-30 ft. lbs. (34/41 N-m) of torque (**Figure 12-42, Page 111**).

**Installing the Starter/Generator (Figure 12-48)****⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

- Install the two 3/8 hex head pivot screws (5) into the mounting bracket with the heads of the screws facing towards the driver side of the vehicle. Position the starter/generator in the mounting bracket so that the screws will go through the bracket before going through the starter/generator. Install a lockwasher (6) (early 1997 vehicles only) and 3/8 nut (7) onto each screw. Tighten the screws and nuts to finger tight (**Figure 12-48**).
- Install the adjustment screw (11) through the adjusting bracket (4) and then through the starter/generator. Install a lockwasher (9) and 5/16 nut (12) onto the end of the adjustment screw (11). Tighten to finger tight (**Figure 12-48**).
- Install the belt (3) then tighten the mounting screws (**See Belt Adjustments on next page**).
- Connect the yellow wire from the voltage regulator to the DF terminal on the starter/generator (**Figure 12-2, Page 83**). Install a flat washer, lockwasher, and nut onto the terminal. Torque the nut to 26-35 in.lbs. (3.0/4.0 N-m).
- Install the white wire from the solenoid to the F2 terminal on the starter/generator. Install the black wire from the frame to the A2 terminal on the starter/generator. Install the green wire from the F1 to the A1 terminal on the starter/generator (**Figure 12-2, Page 83**). Install a flat washer, lockwasher, and nut onto each terminal. Torque the nuts to 43-52 in.lbs. (4.8/5.9 N-m).
- Reinstall the access panel (**Figure 12-35, Page 106**).
- Install the seat on the rear body.

## BELT ADJUSTMENTS

Belt tension should be checked periodically. If the starter/generator slips when starter motor operates, adjust belt to correct tension.

### Belt Tension Adjustment

1. Remove the access panel from the rear body (**Figure 12-35, Page 106**).
2. Make sure the two pivoting screws (5) on the mounting bracket are finger tight. The adjustment screw (11) and nut (12) are to be finger tight also (**Figure 12-48**).

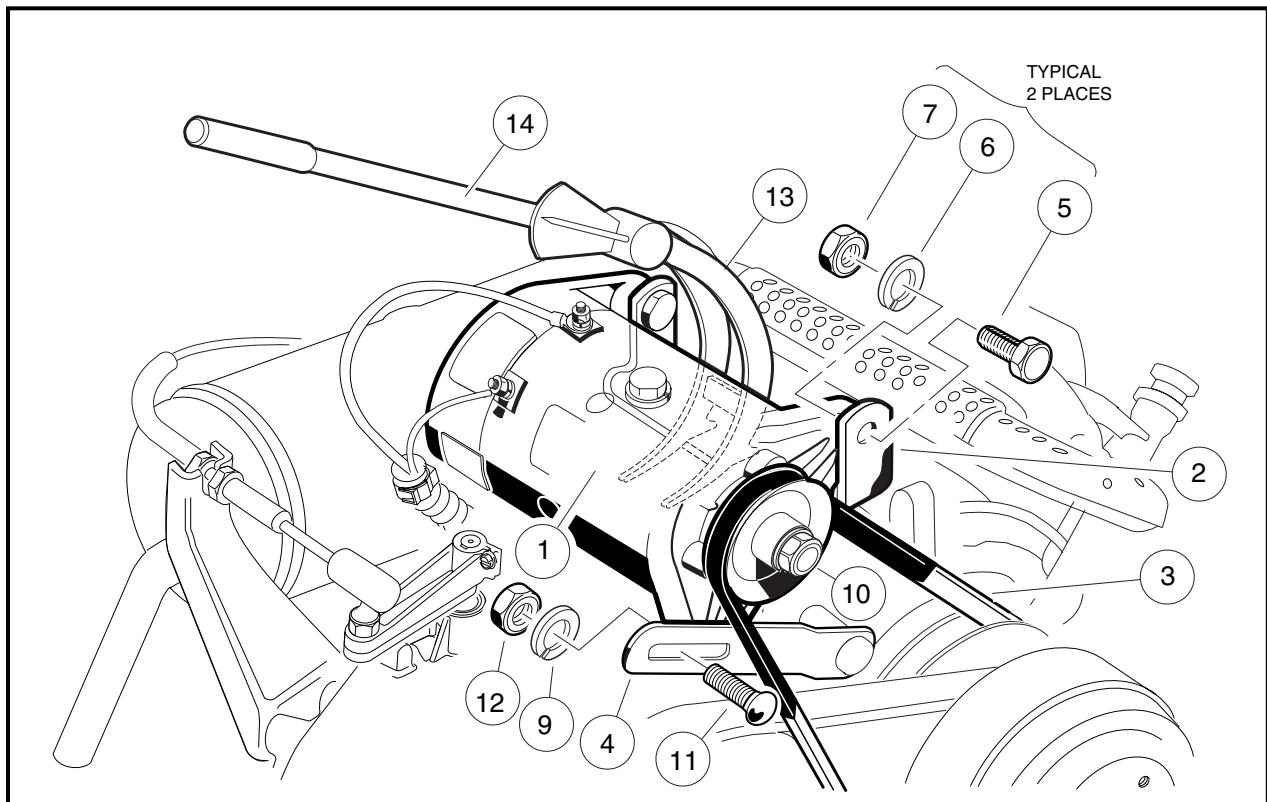


FIGURE 12-48

3. Push the starter down so it is at the lowest part of its adjustment travel. With the starter belt fully in place around the drive clutch pulley (this pulley is the one closest the crankcase cover on the engine), install the starter belt (3) around the pulley (10) on the end of the starter/generator (1). Place the tension tool (13) (Club Car Part No. 1016867) between the starter/generator and the starter/generator mounting bracket (2) so that the tension tool will lift up the starter/generator.
4. Install a standard 1/2 inch (12.7 millimeters) drive torque wrench (14) into the tension tool (13). Through the access opening in the rear body, position the wrench and tension tool as shown (**Figure 12-48**). Pull up on the wrench and tension tool until 70 ft. lbs. (95 N-m) of torque has been applied for a new belt. Apply only 40 ft. lbs. (54 N-m) for a previously used belt.
5. Tighten the adjustment nut (12) to 12 ft. lbs. (16 N-m) of torque. Tighten the two pivot screws (5) and torque nuts (7) to 21-25 ft. lbs. (28.5/34 N-m) (**Figure 12-48**) (**See CAUTION below and NOTE at top of Page 118**).

### **CAUTION**

- REMOVE TENSION TOOL BEFORE STARTING ENGINE.

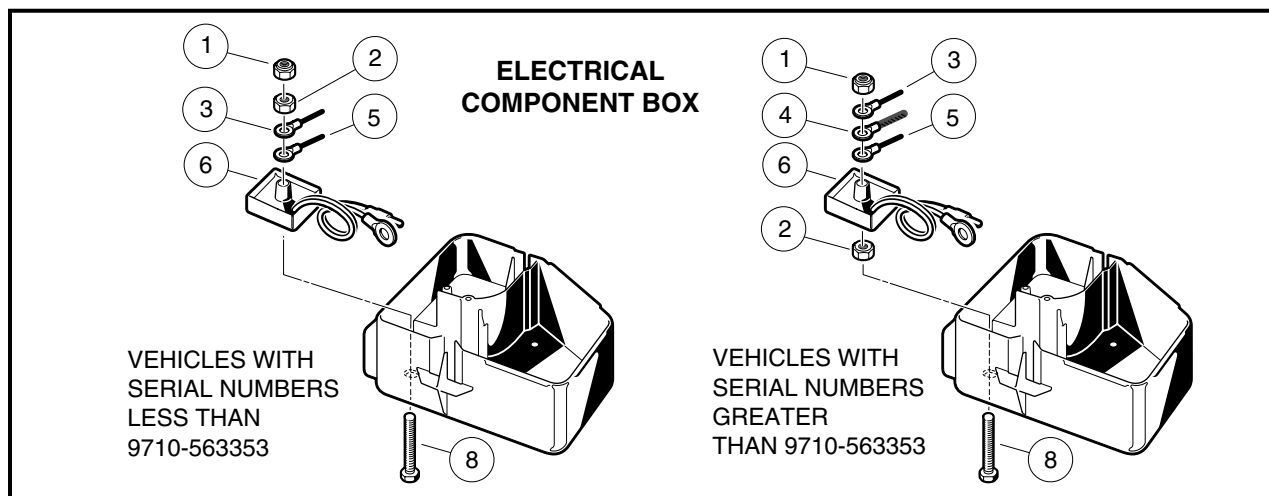
**Belt Tension Adjustment, Continued:****NOTE**

- IF A BURROUGHS GAUGE IS USED, TENSION SHOULD BE ADJUSTED TO 120 LBS. FOR A NEW BELT OR 80-100 LBS FOR A PREVIOUSLY USED BELT.

6. Reinstall the access panel (**Figure 12-35, Page 106**).

**VOLTAGE REGULATOR****Removing the Voltage Regulator (Figure 12-49)****⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

**FIGURE 12-49**

1. Remove the seat from the rear body.
2. Disconnect battery cables as shown (**Figure 12-1, Page 82**).
3. Remove the electrical component box cover.
4. Remove locknut (1) (and jam nut (2) on vehicles prior to serial number 9710-563353) from the regulator mounting screw (8) (**Figure 12-49**).
5. Disconnect the red wire from the solenoid and unplug the yellow wire from wire harness.
6. Remove 18 gauge black wires (3 and 5) (and braided ground wire (4) on vehicles serial number 9710-563353 and later) (**Figure 12-49**).
7. Remove regulator (6).

**Installing the Voltage Regulator (FIGURE 12-49)**

1. Place the voltage regulator (6) into the electrical component box, with the 1/4 inch screw (8) through the regulator.

2. Connect regulator red wire to solenoid, and plug in yellow wire to the harness.
3. Install black wire (3) and black wire (5) (and braided ground wire (4) on vehicles serial number 9710-563353 and greater) on regulator mounting screw (8) (**Figure 12-49**).
4. Install jam nut (2) (only on vehicles prior to serial number 9710-563353) and tighten to 6 ft.lbs. (8 N-m) of torque. Install the nylon lock hex nut (1) and tighten to 6 ft. lbs. (8 N-m) of torque (**Figure 12-49**).
5. Install snap-on electrical component box cover. Be sure to firmly press down all corners. Install screw.
6. Connect battery cables, positive (+) cable first.
7. Place forward and reverse assembly in neutral position, and place the neutral lock-out cam in the service position. Start the engine and check regulator for proper functioning as described under voltage regulator testing (**See Test Procedure 10, Page 101**).

## KEY SWITCH

### Removing the Key Switch

1. Disconnect battery cables as shown (**Figure 12-1, Page 82**).
2. Remove the plastic cap covering the screw on each side of the center dash.
3. Loosen (but do not remove) the screw on each side of the center dash panel.
4. Insert screwdriver at the top center of the dash between dash and cowl brace. Gently pry center dash out slightly from under edge of cowl brace.
5. Pull center dash out approximately one inch from the frame and then bend the top right corner of the center dash inward while pulling the top of the panel out and down.

### NOTE

- BENDING THE TOP RIGHT CORNER OF THE CENTER DASH INWARD WHILE REMOVING IT WILL PREVENT THE CONTACTS ON THE REAR OF THE KEY SWITCH FROM TOUCHING THE METAL FRAME AROUND THE DASH.

6. Slide center dash panel up the steering column by snapping out the top and then rotating the panel out and up. There is sufficient slack in the wiring to allow for this.
7. Disconnect the wires from the key switch. Do not allow wires to touch.
8. Remove the key switch:
  - 8.1. Remove the cover over the key switch with a small, flat-blade screwdriver.
  - 8.2. Remove key switch from the dash by holding the key switch and turning the nut on the outside of the dash with a one-inch socket wrench. Remove the keyed washer with key switch.

### Testing the Key Switch:

See Test Procedure 16, Page 104.

### Installing the Key Switch:

Reconnect wires to key switch (**See Figure 12-2, Page 83**). Coat the connectors with Battery Protector Spray (Club Car Part No. 1014305) to ward off corrosion. Reverse removal procedures to install key switch in the dash. Be sure that key switch terminals cannot touch the frame and that panel is properly seated and snapped in place.

## SOLENOID

### Removing the Solenoid

1. Remove seat from body.
2. Disconnect battery wires as shown (**Figure 12-1, Page 82**).

**Removing the Solenoid, Continued:****⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

3. Remove electrical component box cover (**Figure 12-50**).
4. Disconnect all the wires from the solenoid (**Figure 12-2, Page 83**).
5. Remove the two screws that secure the solenoid in place.
6. Remove the solenoid.

**Installing the Solenoid**

1. Position the solenoid in the electrical component box and install the two mounting screws. Tighten the screws to 12-18 in.lbs. (1.36/1.7 N-m).
2. Connect the 6 gauge white wire and the 16 gauge red wire from the voltage regulator on the large post on the solenoid. Connect the 6 gauge red wire and the 10 gauge red wire from the fuse block on the other large post on the solenoid. Install the retaining nuts and tighten to 55-65 in.lbs. (6.2/7.35 N-m) (**Figure 12-2, Page 83**).
3. Connect the 18 gauge blue wire from the key switch to the small post on the solenoid. Connect the 18 gauge orange wire from the accelerator starter limit switch to the other small post on the solenoid. Install the retaining nuts and tighten to 18-25 in.lbs. (2.0/2.8 N-m) (**Figure 12-2, Page 83**).
4. Install the snap-on electrical box cover by firmly pressing down on all corners and install the screw. Reconnect the battery wires.
5. Install the seat on the rear body.

**FUSE****Removing the Fuse**

1. Remove seat from body.
2. Disconnect battery wires as shown (**Figure 12-1, Page 82**).
3. Remove electrical component box cover.
4. Remove the fuse from the fuse block.

**Installing the Fuse**

1. Install the fuse. Use a 10 amp fuse only.

**⚠ WARNING**

- IF THE FUSE IS BLOWN, DETERMINE THE CAUSE OF THE FAILURE AND MAKE NECESSARY REPAIRS BEFORE INSTALLING A NEW FUSE. USE 10 AMP FUSES ONLY; IF A FUSE WITH A HIGHER AMP RATING IS USED, DAMAGE TO THE VEHICLE ELECTRICAL SYSTEM MAY OCCUR.

2. Install the snap-on electrical box cover by firmly pressing down on all corners and install the screw. Reconnect the battery wires.
3. Install the seat on the rear body.



## ACCELERATOR STARTER LIMIT SWITCH

### Removing the Accelerator Starter Limit Switch (Figure 12-50)

1. Remove seat from body.
2. Disconnect battery wires as shown (Figure 12-1, Page 82).
3. Remove electrical component box cover (1).
4. Disconnect the green wire and the orange wire from the accelerator starter limit switch (11).
5. Remove the two nuts (9) and washers (10) that secure the accelerator limit switch in place.
6. Remove the accelerator starter limit switch.

### Installing the Accelerator Starter Limit Switch (Figure 12-50)

1. Install the accelerator starter limit switch (11) onto the two screws (16) and secure the switch in place using the two washers (10) and the two nuts (9). Torque to 5 in.lbs. (0.6 N-m).

#### **⚠ WARNING**

- DO NOT OVER-TIGHTEN THE RETAINING NUTS. IF THE NUTS ARE OVER-TORQUED, LIMIT SWITCHES COULD BE DAMAGED.

2. Connect green wire to common (COM) terminal and the orange wire to the normally closed (NC) terminal of the accelerator starter limit switch (Figure 12-2, Page 83).
3. Depress the accelerator pedal to make sure that the switch is being actuated when the pedal is released.
4. Connect battery cables, positive cable first.
5. Install the seat on the rear body.

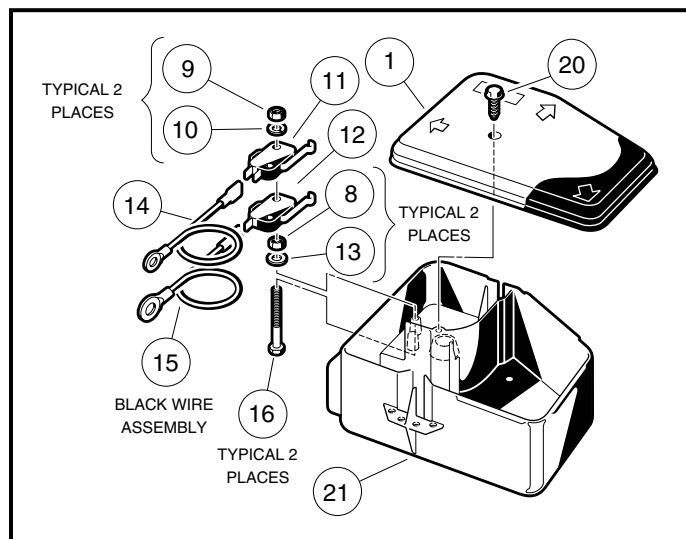


FIGURE 12-50

## KILL LIMIT SWITCH

### Removing the Kill Limit Switch (Figure 12-50)

1. Remove seat from body.
2. Disconnect battery wires as shown (Figure 12-1, Page 82).
3. Remove electrical component box cover (1).

**Removing the Kill Limit Switch, Continued:****⚠ WARNING**

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

4. Remove the two nuts (9) and washers (10) that secure the accelerator starter limit switch (11). Do not disconnect the wires.
5. Disconnect the two white/black wires and the black wire from the kill limit switch (12).
6. Remove the kill limit switch (12).

**Installing the Kill Limit Switch (Figure 12-50, Page 121)**

1. Install the kill limit switch (12) onto the two screws (16).
2. Connect the two white/black wires to the common (COM) terminal and the black wire to the normally open (NO) terminal of the kill limit switch (12).
3. Install the accelerator starter limit switch (11) onto the two screws (16). Secure the switch in place using the two washers (10) and the two nuts (9). Torque to 5 in.lbs. (0.6 N-m).

**⚠ WARNING**

- DO NOT OVER-TIGHTEN THE RETAINING NUTS. IF THE NUTS ARE OVER-TORQUED, LIMIT SWITCHES COULD BE DAMAGED.

4. Depress and release the accelerator pedal to make sure that both switches are being actuated when the pedal is released.
5. Connect battery cables, positive cable first.
6. Install the seat on the rear body.

**NEUTRAL LOCK-OUT LIMIT SWITCH****Removing the Neutral Lock-out Limit Switch (Figure 12-51)**

1. Remove seat from rear body.
2. Disconnect the battery wires as shown (**Figure 12-1, Page 82**).
3. Disconnect the green, white and black wires from the neutral lock-out limit switch (5) located on the back of the forward and reverse assembly.
4. Remove the two nuts (2) and washers (6) from the neutral lock-out limit switch (5) and slide the neutral lock-out limit switch off the screws.

**Installing the Neutral Lock-out Limit Switch (Figure 12-51)**

1. Install the neutral lock-out limit switch (5) and install the two washers (6) and the two nuts (2). Torque to 5 in.lbs. (0.6 N-m). Place the forward and reverse lever in REVERSE position to make sure that both switches are actuated. See WARNING at top of Page 123.

## ⚠ WARNING

- DO NOT OVER-TIGHTEN THE RETAINING NUTS. IF THE NUTS ARE OVER-TORQUED, LIMIT SWITCHES COULD BE DAMAGED.

2. Connect the black wire to common (COM) terminal, the green wire to the normally open (NO) terminal and the white wire to the normally closed (NC) terminal of the neutral lock-out limit switch.
3. Connect battery cables, positive cable first.
4. Place the forward and reverse lever in the NEUTRAL position. The neutral lock-out cam should be in the OPERATE position. Make sure everyone is clear of the moving parts of the vehicle. Turn the key switch to the ON position. The engine should not crank when depressing the accelerator. If the engine does crank, turn off the key switch, and re-adjust the shift linkage.

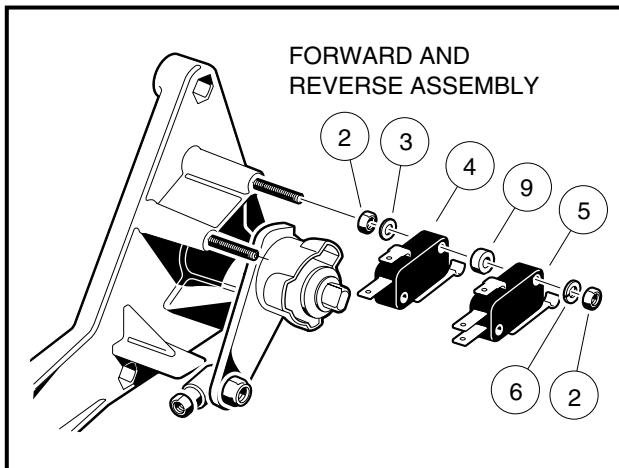


FIGURE 12-51

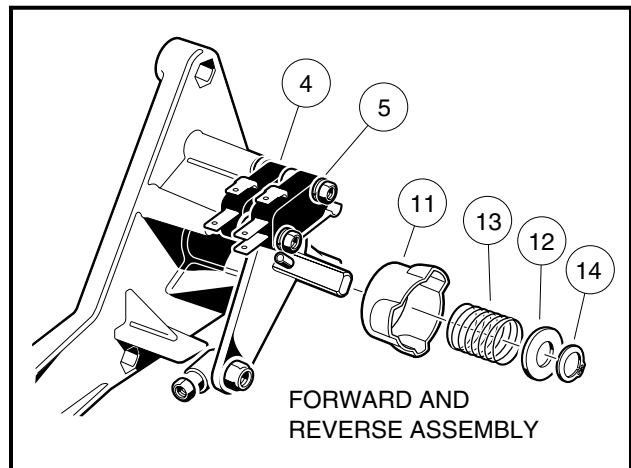


FIGURE 12-52

5. Install the seat on the rear body.
6. Test drive the vehicle in both forward and reverse for proper operation.

## NEUTRAL LOCK-OUT CAM

If the cam lobes have worn to the point where they will no longer actuate the neutral lock-out limit switch, the cam must be replaced.

## ⚠ WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (FIGURE 12-1, PAGE 82).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

## Removing the Neutral Lock-out Cam (Figure 12-52):

1. Remove the seat from the rear body.
2. Disconnect the battery wires as shown (Figure 12-1, Page 82).

**Removing the Neutral Lock-out Cam, Continued:**

3. Remove the external snap ring (14).
4. Remove the plastic washer (12) and the spring (13).
5. Remove the cam (11).

**Installing the Neutral Lock-out Cam (Figure 12-52):**

1. Install the cam (11).
2. Install the spring (13) and the plastic washer (12).
3. Install the external snap ring (14) onto the shaft.
4. Be sure the snap ring is installed in the groove on the shaft.
5. Connect battery cables, positive cable first.
6. Install the seat on the rear body.

**REVERSE WARNING BUZZER****Removing the Reverse Warning Buzzer (Figure 12-53)**

1. Disconnect the battery cables as shown (**Figure 12-1, Page 82**).
2. Remove the plastic cap covering the screw on each side of the center dash.
3. Loosen (but do not remove) the screw on each side of the center dash panel.
4. Insert screwdriver at the top center of the dash between dash and cowl brace. Gently pry center dash out slightly from under edge of cowl brace.
5. Pull center dash out approximately one inch from the frame and then bend the top right corner of the center dash inward while pulling the top of the panel out and down (**See NOTE below**).

**NOTE**

- BENDING THE TOP RIGHT CORNER OF THE CENTER DASH INWARD WHILE REMOVING IT WILL PREVENT THE CONTACTS ON THE REAR OF THE KEY SWITCH FROM TOUCHING THE METAL FRAME AROUND THE DASH.

6. Slide center dash panel up the steering column by snapping out the top and then rotating the panel out and up. There is sufficient slack in the wiring to allow for this.
7. Disconnect the wires from the reverse warning buzzer. Do not allow wires to touch (**Figure 12-53**).
8. Remove the two mounting screws (3) that secure the buzzer to the center dash (**Figure 12-53**).

**Testing the Reverse Warning Buzzer**

See Test Procedure 19, Page 105.

**Installing the Reverse Warning Buzzer (Figure 12-53)**

1. Install the two screws through the buzzer bracket tabs and tighten to a torque of 3-4 in.lbs. (0.35/0.45 N-m).
2. Connect black wire from key switch to the negative (-) terminal on the buzzer.
3. Connect the red/white wire from the wire harness to the positive (+) terminal on the buzzer.
4. Reverse removal procedures to reinstall the center dash in the vehicle. Be sure that the key switch terminals cannot touch the frame and that the panel is properly seated and snapped in place.

**REVERSE BUZZER LIMIT SWITCH****Removing the Reverse Buzzer Limit Switch (Figure 12-51, Page 123)**

1. Remove seat from the rear body.

2. Disconnect the battery wires as shown (**Figure 12-1, Page 82**).
3. Disconnect the orange and red/white wires from the reverse buzzer limit switch (4) located on the back of the forward and reverse assembly.
4. Remove the two nuts (2) and washers (6) from the neutral lock-out limit switch (5) and slide the neutral lock-out limit switch off the screws. Do not disconnect the wires.
5. Remove the two spacers (9) from the reverse buzzer limit switch (4) and slide the reverse buzzer limit switch off the screws.

### Installing the Reverse Buzzer Limit Switch (Figure 12-51, Page 123)

1. Install the reverse buzzer limit switch (4), and then install the two spacers (9) up against the limit switch.
2. Install neutral lock-out limit switch (5) and install two washers (6) and two nuts (2). Torque to 5 in.lbs. (0.6 N-m). Place the forward and reverse lever in reverse to make sure that both switches are actuated.
3. Connect the orange wire to common (COM) terminal and the red/white wire to the normally open (NO) terminal of the reverse buzzer limit switch (4).
4. Connect battery cables, positive cable first.
5. Turn the key switch to the ON position. Shift the forward and reverse lever to the reverse position. The buzzer should sound.
6. Install the seat on the rear body.

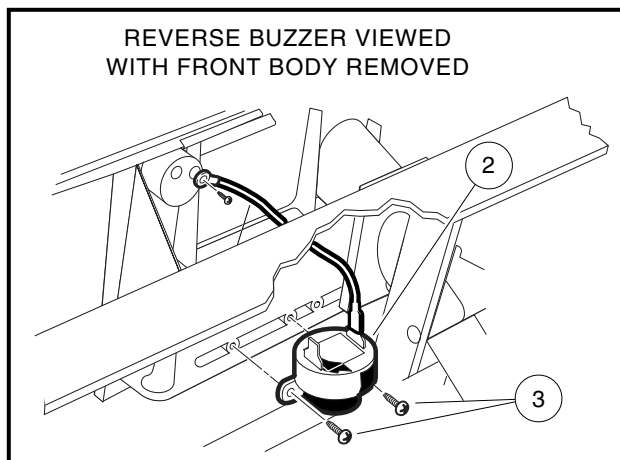


FIGURE 12-53

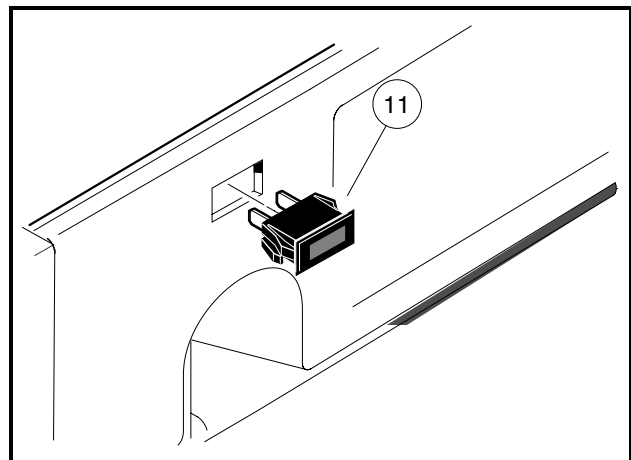


FIGURE 12-54

## OIL WARNING LIGHT

### Removing the Oil Warning Light (Figure 12-54)

1. Disconnect the battery wires as shown (**Figure 12-1, Page 82**).
2. Remove the plastic cap covering the screw on each side of the center dash.
3. Loosen (but do not remove) the screw on each side of the center dash panel.
4. Insert screwdriver at the top center of the dash between dash and cowl brace. Gently pry center dash out slightly from under edge of cowl brace.
5. Pull center dash out approximately one inch from the frame and then bend the top right corner of the center dash inward while pulling the top of the panel out and down.

### NOTE

- BENDING THE TOP RIGHT CORNER OF THE CENTER DASH INWARD WHILE REMOVING IT WILL PREVENT THE CONTACTS ON THE REAR OF THE KEY SWITCH FROM TOUCHING THE METAL FRAME AROUND THE DASH.

**Removing the Oil Warning Light, Continued:**

6. Slide center dash panel up the steering column by snapping out the top and then rotating the panel out and up. There is sufficient slack in the wiring to allow for this.
7. Disconnect the wires from the oil warning light (11). Do not allow wires to touch.
8. Depress the two retaining tabs and remove the light from the center dash.

**Testing the Oil Warning Light**

See Test Procedure 21, Page 105.

**Installing the Oil Warning Light (Figure 12-54)**

1. Push a new unit into hole in dash until plastic locks engage dash.
2. Connect yellow wire from the key switch and yellow wire from the oil sending unit to the oil light (11).
3. Reinstall the center dash in reverse order of removal. Be sure that key switch terminals cannot touch the frame and that panel is properly seated and snapped in place.
4. Connect battery cables, positive cable first.
5. Install the seat on the rear body.

**BATTERY****⚠ DANGER**

- **WEAR A FULL FACE SHIELD WHEN WORKING AROUND A BATTERY BECAUSE OF THE DANGER OF AN EXPLODING BATTERY.**
- **BATTERY-EXPLOSIVE GASES. KEEP SPARKS, FLAMES, CIGARETTES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR EYE PROTECTION WHEN WORKING ON OR NEAR BATTERY. FOR ADDED PROTECTION, COVER TOP OF THE BATTERY WHEN SERVICING THE VEHICLE.**
- **BATTERY-POISON/DANGER. CONTAINS ACID-CAUSES SEVERE BURNS- AVOID CONTACT WITH SKIN, EYES, OR CLOTHING.**
  - **EXTERNAL: FLUSH WITH WATER. CALL PHYSICIAN IMMEDIATELY.**
  - **INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL PHYSICIAN IMMEDIATELY.**
  - **EYES: FLUSH WITH WATER FOR 15 MINUTES. CALL PHYSICIAN IMMEDIATELY.**

**⚠ WARNING**

- **WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:**
  - **WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.**
  - **REMOVE THE KEY.**
  - **PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.**
  - **DISCONNECT THE BATTERY AS SHOWN (FIGURE 12-1, PAGE 82).**
- **FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.**
- **SEE THE SAFETY WARNINGS ON PAGE 81.**

**General Information**

1. The DS gasoline vehicle is equipped with a 12-volt, low maintenance battery. When replacing the battery in a Club Car gasoline-powered vehicle, the new battery must be the same size as the original.

- Club Car recommends a group 70, side-post battery (Club Car Part No. 1012328), with a 460 cold-cranking amp rating and a reserve capacity of 85 minutes. The group 70 classification indicates battery size (8 1/4 inches W x 6 1/2 inches D x 7 1/4 inches H). It is important to use the proper size to ensure that the battery hold-down will fit correctly and will properly secure the battery in the vehicle frame.

## Preventive Maintenance

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

- Any corrosion build-up on or around the battery should be removed immediately. Post connections should be clean and tight. Any frayed or worn wires should be replaced. After battery cables have been connected, coat connectors with Battery Protector Spray (Club Car Part No. 1014305) to ward off future corrosion.
- The battery should be kept clean and dry to prevent self-discharge. Any dirt, grime or acid spillage should be removed. Wash the battery with a bristle brush using water and bicarbonate of soda (baking soda-1 cup per gallon). Rinse with water. Do not allow solution to enter battery through the vent cap holes **(See Self-Discharge below)**.
- Maintain proper water level **(See Water Level below, and Figure 12-55, Page 129)**.
- Check battery periodically to see that it is in a full state of charge **(See Battery Charging, Page 131)**.
- Keep battery hold-down brackets tight **(See Vibration Damage, Page 128)**.

## Self-Discharge

- Dirt and battery acid can provide a path for a small current draw that can slowly discharge the battery. To prevent self-discharge, the battery 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 battery will discharge. In hotter climates, therefore, the battery should be checked more often. When storing the battery, keep in a cool place **(See Battery Storage, Page 132)**.

## Water Level

Add water only after charging unless the water is below the level of the plates. Filling a battery 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 the battery capacity and corrodes the metal parts around it.

The water level should be checked weekly to be sure water is at its proper level **(Figure 12-55, Page 129)**. Never allow the water level to fall below the tops of the plates because this will cause the exposed part of the plate to become permanently inactive. Check the water level more frequently in hot weather or when the battery becomes old.

## Mineral Content

For the longest battery life, distilled water should be used in the battery. However, if tap water is to be used, contact your local water department to be sure the mineral contents are below the levels listed in the table.

IMPURITY	ALLOWABLE CONTENT IN PARTS PER MILLION
SUSPENDED MATTER	TRACE
TOTAL SOLIDS	100.0
CALCIUM AND MAGNESIUM OXIDES	40.0
IRON	5.0
AMMONIA	8.0
ORGANIC MATTER	50.0
CHART CONTINUED ON PAGE 128.	

**Mineral Content, Continued:**

IMPURITY	ALLOWABLE CONTENT IN PARTS PER MILLION
NITRATES	10.0
NITRITES	5.0
CHLORIDE	5.0

**NOTE**

- Contact your local water department for mineral content analysis.

**Vibration Damage**

The battery hold-down should always be tight enough to keep the battery from bouncing. Battery life may be severely shortened if the battery hold-down is too loose. Excessive vibration 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.

The battery hold-down 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.

Inspect the hold-down bracket for rust, corrosion or damage. If both ends of the bracket cannot be fastened securely to the main frame, replace it with a new stainless steel battery hold-down, (Club Car Part No. 1013882), stainless steel flat washers (Club Car Part No. 1011964), and stainless steel nylon insert locknuts (Club Car Part No. 1015068).

**HYDROMETER TEST**

A hydrometer measures the specific gravity. The higher the specific gravity, the higher the state of charge of the battery. A fully charged battery should read between 1.250 and 1.280 at 80°F. Never add acid to the battery to obtain a higher specific gravity (**Figure 12-56**).

**Performing the Hydrometer Test****⚠ DANGER**

- **WEAR A FULL FACE SHIELD WHEN WORKING AROUND A BATTERY BECAUSE OF THE DANGER OF AN EXPLODING BATTERY.**
- **BATTERY-EXPLOSIVE GASES. KEEP SPARKS, FLAMES, CIGARETTES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR EYE PROTECTION WHEN WORKING ON OR NEAR BATTERY. FOR ADDED PROTECTION, COVER TOP OF THE BATTERY WHEN SERVICING THE VEHICLE.**
- **BATTERY-POISON/DANGER. CONTAINS ACID-CAUSES SEVERE BURNS- AVOID CONTACT WITH SKIN, EYES, OR CLOTHING.**
  - **EXTERNAL: FLUSH WITH WATER. CALL PHYSICIAN IMMEDIATELY.**
  - **INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL PHYSICIAN IMMEDIATELY.**
  - **EYES: FLUSH WITH WATER FOR 15 MINUTES. CALL PHYSICIAN IMMEDIATELY.**



## ⚠ WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

## ⚠ CAUTION

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

1. Be sure that the battery has sufficient water to cover the plates by approximately .5 inch (12.7 millimeters) and is fully charged prior to beginning the test. If water must be added, recharge the battery 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 one of the center cells.
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 that 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, insuring that 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 12-56**).
7. Record the reading.
8. Return the electrolyte to the cell from which it was taken.
9. Repeat steps 2-8 on all cells.

### Hydrometer Calibration

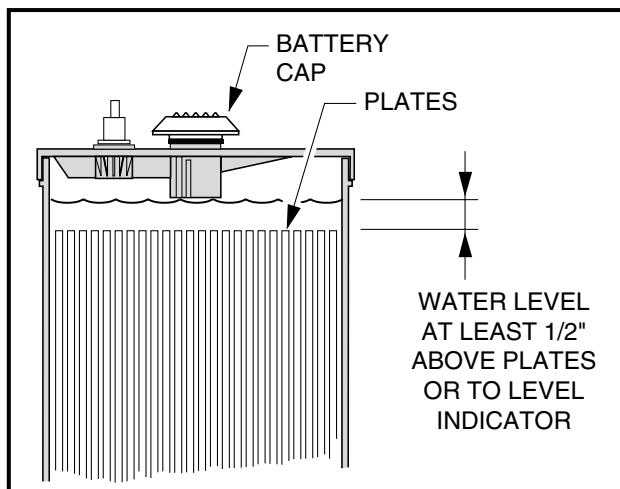


FIGURE 12-55

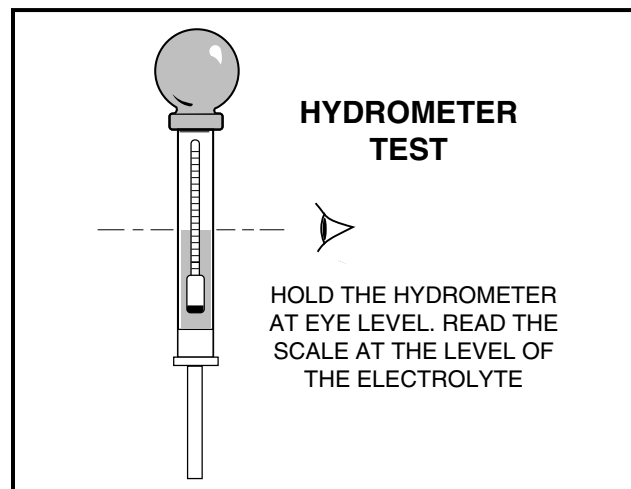


FIGURE 12-56

**Hydrometer Calibration, Continued:**

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.

**Interpreting 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 should be replaced (**See Caution on page 129**).

**VOLTAGE TEST**

See **Testing the Battery, Page 87**.

**Load Test**

- Using a 160 ampere load tester, connect the load tester to the battery posts.
- Read the battery voltage after the load tester has been on the battery for 15 seconds. Compare the battery's voltage reading with the table below. Make sure you have the correct ambient temperature.

IF TEMPERATURE IS	MINIMUM VOLTAGE REQUIRED IS
70°F (20°C and above)	9.6V
60°F (16°C)	9.5V
50°F (10°C)	9.4V
40°F (4°C)	9.3V
30°F (-1°C)	9.1V
20°F (-7°C)	8.9V
10°F (-12°C)	8.7V
0°F (-18°C)	8.5V

**REMOVING THE BATTERY**

- Remove the seat from the rear body.
- Disconnect the air hose that is clamped to the carburetor. Remove the retention strap and lift the intake expansion chamber out of the vehicle. Make sure the O-ring is kept with the intake expansion chamber.
- Disconnect the battery wires as shown (**Figure 12-1, Page 82**).
- Remove the two locknuts and washers and lift the hold-down off of the battery.
- Use a battery strap to lift the battery out of the vehicle (**See DANGER and WARNING on Page 131**).

**⚠ DANGER**

- WEAR A FULL-FACE SHIELD WHEN WORKING AROUND A BATTERY BECAUSE OF THE DANGER OF AN EXPLODING BATTERY.
- BATTERY-EXPLOSIVE GASES. KEEP SPARKS, FLAMES, CIGARETTES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR EYE PROTECTION WHEN WORKING ON OR NEAR BATTERY. FOR ADDED PROTECTION, COVER TOP OF THE BATTERY WHEN SERVICING THE VEHICLE.
- BATTERY-POISON/DANGER. CONTAINS ACID-CAUSES SEVERE BURNS- AVOID CONTACT WITH SKIN, EYES, OR CLOTHING.
  - EXTERNAL: FLUSH WITH WATER. CALL PHYSICIAN IMMEDIATELY.
  - INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL PHYSICIAN IMMEDIATELY.
  - EYES: FLUSH WITH WATER FOR 15 MINUTES. CALL PHYSICIAN IMMEDIATELY.

**⚠ WARNING**

- KEEP THE BATTERY IN AN UPRIGHT POSITION TO PREVENT ELECTROLYTE LEAKAGE. TIPPING THE 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 THE BATTERY. THE BATTERY ACID COULD CAUSE SEVERE PERSONAL INJURY WHEN ACCIDENTALLY COMING IN CONTACT WITH THE SKIN OR EYES, OR COULD DAMAGE CLOTHING.

**CHARGING THE BATTERY**

1. Charge the battery using an automotive type 12-volt battery charger. Follow all warnings and procedures supplied by the battery charger manufacturer.
2. Attach the positive charger cable (+) to the positive (+) post on the battery.
3. Attach the negative charger cable (-) to the negative (-) post on the battery.
4. The battery may be charged with a slow charge (3-10 amps) or a fast charge (20-30 amps). Charge until the specific gravity reaches 1.250 (**See WARNING below**).

**⚠ WARNING**

- IF THE BATTERY CASE FEELS HOT (APPROXIMATELY 125° F OR MORE) AND/OR EMITS GASES AND/OR FLUID BOILS FROM VENTS, STOP CHARGING AT ONCE. FAILURE TO STOP CHARGING BATTERY WHEN THESE CONDITIONS ARE PRESENT COULD RESULT IN AN EXPLOSION, PERSONAL INJURY AND/OR DAMAGE TO THE BATTERY. DO NOT DISCONNECT THE D.C. LEADS FROM BATTERY WHEN THE CHARGER IS ON. THE RESULTING ARCING BETWEEN THE D.C. LEADS AND BATTERY POST COULD CAUSE AN EXPLOSION.
- IF THE CHARGER MUST BE STOPPED, DISCONNECT THE AC SUPPLY CORD FROM THE WALL OUTLET BEFORE DISCONNECTING THE D.C. LEADS FROM THE BATTERY. ALLOW THE BATTERY TO COOL TO ROOM TEMPERATURE AND RESUME CHARGING BATTERY AT A LOWER AMP RATE.

## INSTALLING THE BATTERY

### DANGER

- WEAR A FULL-FACE SHIELD WHEN WORKING AROUND A BATTERY BECAUSE OF THE DANGER OF AN EXPLODING BATTERY.
- BATTERY-EXPLOSIVE GASES. KEEP SPARKS, FLAMES, CIGARETTES AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE. ALWAYS WEAR EYE PROTECTION WHEN WORKING ON OR NEAR BATTERY. FOR ADDED PROTECTION, COVER TOP OF THE BATTERY WHEN SERVICING THE VEHICLE.
- BATTERY-POISON/DANGER. CONTAINS ACID-CAUSES SEVERE BURNS- AVOID CONTACT WITH SKIN, EYES, OR CLOTHING.
  - EXTERNAL: FLUSH WITH WATER. CALL PHYSICIAN IMMEDIATELY.
  - INTERNAL: DRINK LARGE QUANTITIES OF MILK OR WATER. FOLLOW WITH MILK OF MAGNESIA OR VEGETABLE OIL. CALL PHYSICIAN IMMEDIATELY.
  - EYES: FLUSH WITH WATER FOR 15 MINUTES. CALL PHYSICIAN IMMEDIATELY.

### WARNING

- WHEN MAKING ELECTRICAL TESTS OR REPAIRS, ALWAYS:
  - WEAR SAFETY GLASSES OR APPROVED EYE PROTECTION.
  - REMOVE THE KEY.
  - PUT THE FORWARD AND REVERSE SWITCH IN NEUTRAL.
  - DISCONNECT THE BATTERY AS SHOWN (**FIGURE 12-1, PAGE 82**).
- FOLLOW ALL PROCEDURES EXACTLY AS INSTRUCTED.
- SEE THE SAFETY WARNINGS ON PAGE 81.

1. Place the battery into the vehicle. Make sure the battery posts are facing the engine.
2. Secure the battery to the vehicle with the hold-down, washers and the two locknuts. Tighten both nuts finger tight, then torque to 14-20 in lbs. (1.6/2.3 N-m).
3. Connect battery cables, positive cable first. Tighten the posts to 9-10 ft. lbs. (12/13 N-m) of torque.
4. Reinstall the intake expansion chamber.
5. Install the seat on the rear body.

## BATTERY STORAGE

1. Keep the battery clean and free of corrosion as outlined in Preventive Maintenance, Page 12-47 in the Maintenance and Service Manual.
2. The battery cables should be disconnected before battery is connected to the charger. The battery can be left in the vehicle while charging.
3. Fully charge the battery prior to storage.
4. Store in a cool area. The colder the area in which the battery is stored, the less the battery will self-discharge. A battery stored at 0°F will discharge very little over a four-month period. A battery stored at 80°F will have to be recharged every few weeks.
5. Check the state of charge periodically. A battery that is discharged and left in a cold environment can freeze and crack. If the specific gravity drops below 1.220, the battery should be recharged. See WARNING at top of Page 133.

**⚠ WARNING**

- IF THE BATTERY IS FROZEN OR THE CONTAINER IS BULGED, DISCARD BATTERY. A FROZEN BATTERY CAN EXPLODE.

6. The frequency of recharging required will depend on the temperature of the storage area, but it is recommended that the battery 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 that the area be heated to at least 60°F prior to charge. The battery will not charge effectively in cold temperatures for the same reasons that it does not discharge as rapidly in cold temperatures.

**JUMP-STARTING THE BATTERY**

The vehicle is equipped with a starter/generator. The generator is not designed to charge a dead battery. If the vehicle battery has become discharged, it must be charged using a properly-rated automotive type charger.

**⚠ WARNING**

- DO NOT JUMP-START A VEHICLE WITH A DEAD BATTERY USING ANOTHER BATTERY AND JUMPER CABLES.

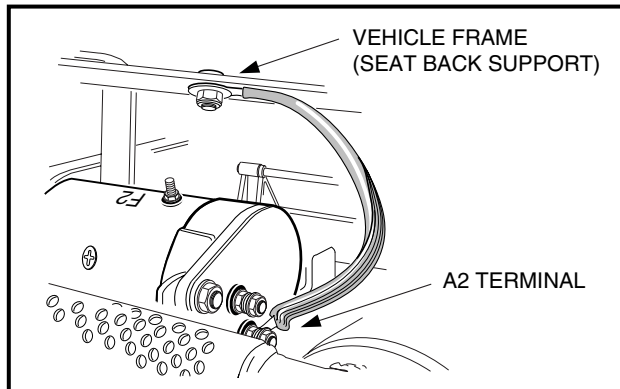
**GROUND STRAPS**

FIGURE 12-57

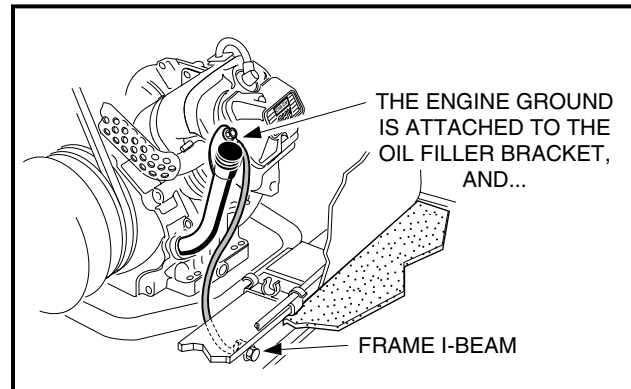


FIGURE 12-58

**⚠ WARNING**

- IF GROUND STRAPS ARE NOT SECURELY CONNECTED TO FRAME AND IN THE PROPER ORIENTATION, A POTENTIAL FIRE HAZARD WILL EXIST. BE SURE ALL GROUND CONNECTIONS ARE SECURELY CONNECTED AT ALL TIMES.

There are three ground straps on the DS Gasoline which ground the electrical system to the frame.

1. One of the straps is attached to the A2 terminal of the starter/generator and to the frame seat support (**Figure 12-57**).
2. The engine ground is attached to the oil filler bracket on the engine and to the frame (**Figure 12-58**).
3. A third ground plate is in the bottom of the electrical component box where the bolt secures the voltage regulator to the box. The other end of this ground plate attaches through the side of the electrical box and is bolted into the frame (**Figure 12-59**) (**See NOTE at top of Page 134**). Be sure all these ground straps are securely connected at both ends of each strap.

## Ground Straps, Continued:

**NOTE**

- VEHICLES SERIAL NUMBER 9710-563353 AND GREATER DO NOT HAVE A GROUND PLATE UNDER THE VOLTAGE REGULATOR IN THE ELECTRICAL COMPONENT BOX. INSTEAD, A BRAIDED GROUND WIRE ATTACHES TO THE VOLTAGE REGULATOR MOUNTING BOLT AND GROUNDS TO THE VEHICLE FRAME AT THE SAME PLACE AS THE BATTERY GROUND.

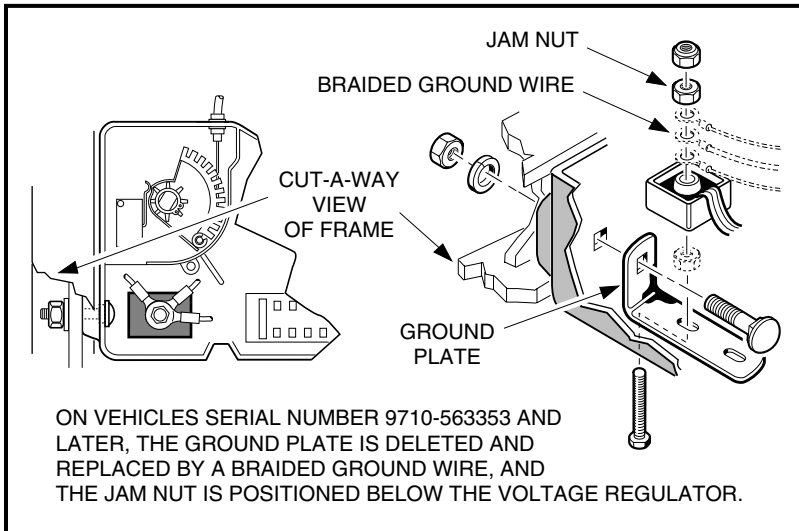


FIGURE 12-59

# SECTION 13 - FE 290 ENGINE

## GENERAL INFORMATION

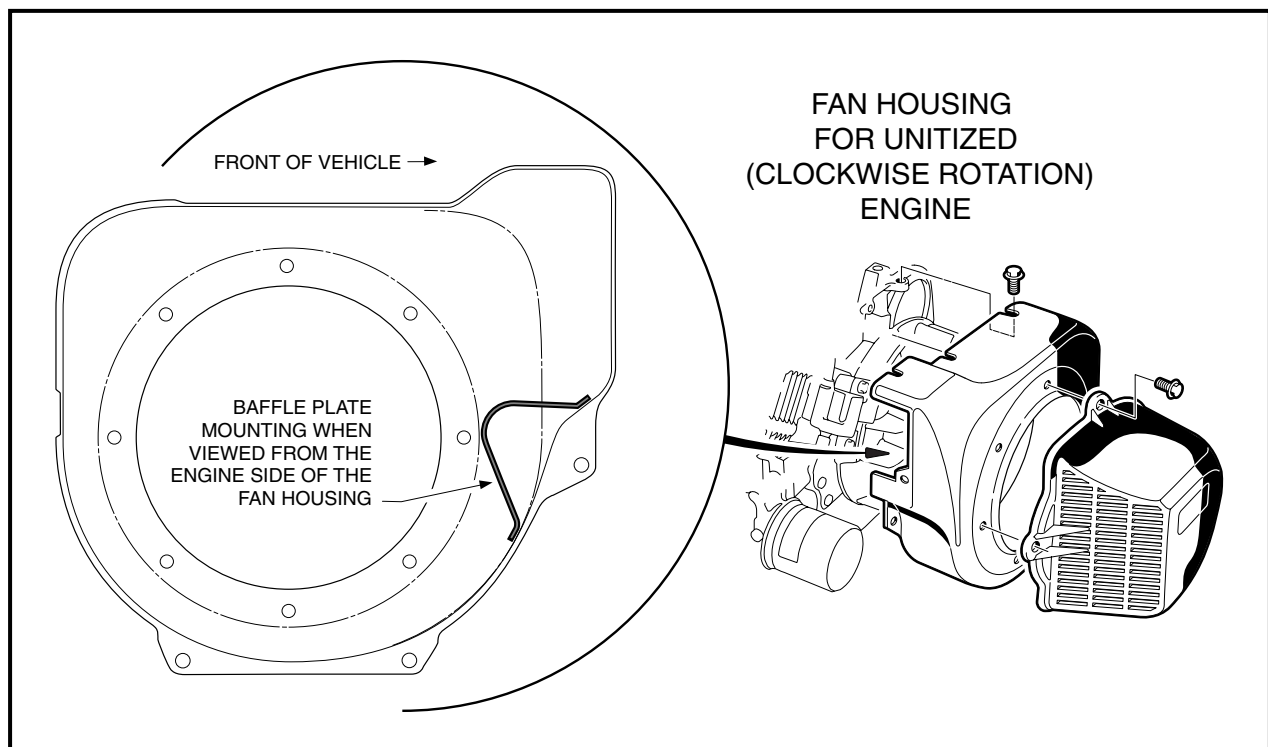
With the incorporation of the unitized transaxle on 1997 vehicles, engine rotation changed from counterclockwise to clockwise. Although the change in engine rotation does not change service procedures in the Maintenance and Service Manual, a number of engine parts were changed. So that the parts for clockwise rotation engines will not be confused with parts for counterclockwise engines, clockwise rotation parts have been marked as described below. These descriptions and illustrations **do not** correspond with descriptions and illustrations in the Maintenance and Service Manual:

### NOTE

- ENGINE ROTATION (CLOCKWISE OR COUNTERCLOCKWISE) IS AS VIEWED FROM THE CLUTCH SIDE OF THE ENGINE.

#### **Fan Housing:**

The baffle plate inside the fan housing for a clockwise engine is located on the right side of the inside surface of the housing as shown below.



1997 FE 290 FAN HOUSING

#### **Fan:**

The fan for a clockwise engine is grey in color and marked with an arrow pointing **counterclockwise** as shown on page 136 (fan for counterclockwise engine is black and marked with an arrow pointing clockwise).

#### **Flywheel:**

The flywheel for a clockwise engine is marked with an arrow pointing **counterclockwise** and also with the number MF3481, as shown on page 136.

General Information, Continued:

**Camshaft:**

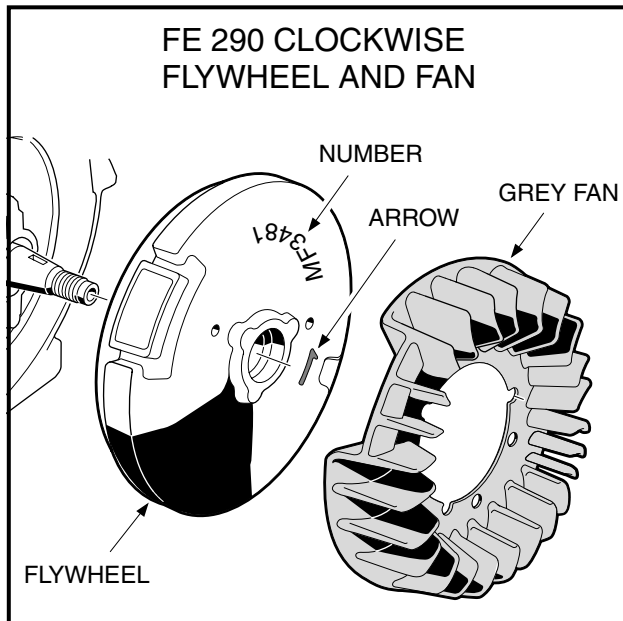
The lobes on the clockwise camshaft are arranged to operate in clockwise direction, and the shaft between the lobes is marked with a **B** as shown below.

**Crankshaft:**

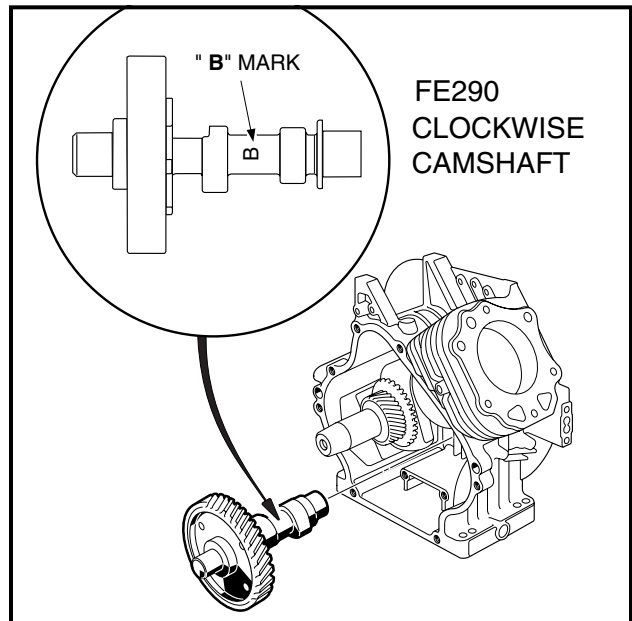
The crankshaft for a clockwise engine has left-hand threads at the clutch mounting hole, and there is a machined groove in the outside diameter of the counterweight as shown below.

**Crankcase:**

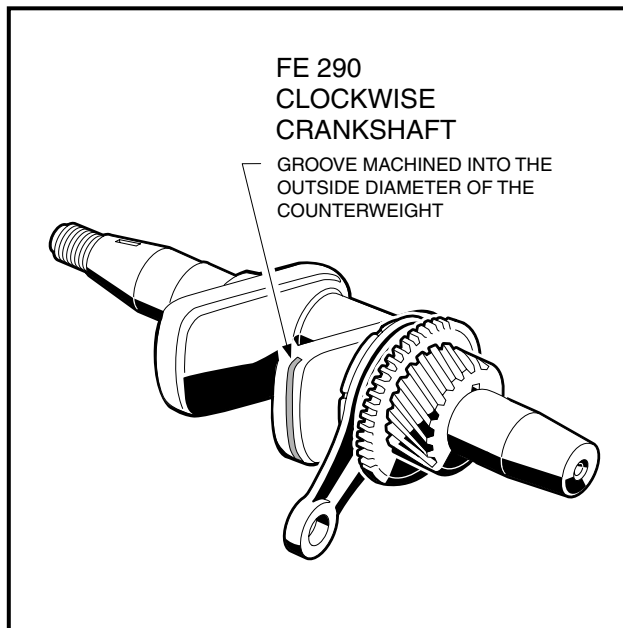
Oil pump oil passages in the clockwise crankcase are different from those in the counterclockwise case. The clockwise case has an **R** stamped into the oil pump cavity as shown below.



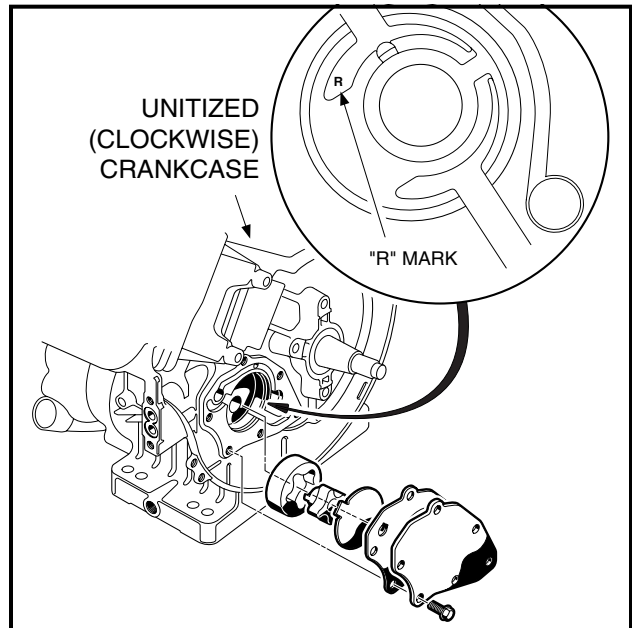
1997 FE 290 FLYWHEEL AND FAN



1997 FE 290 CAMSHAFT



1997 FE 290 CRANKSHAFT



1997 FE 290 CRANKCASE



## ENGINE MOUNTING PLATE

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13-18

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*On page 13-7 in the 1995-1996 Maintenance and Service Manual, the reference changes as follows:*

**See Rear Suspension - Gasoline Vehicle, Section 18 in the 1997 Maintenance and Service supplement.**

### INSTALLATION OF REMAINING ENGINE COMPONENTS

*On page 13-22 in the 1995-1996 Maintenance and Service Manual, step 7 under the heading above changes as follows:*

7. Install the spark plug and thread it in until finger tight, then tighten the plug to 20 ft. lbs. (27 N-m).

### ENGINE REMOVAL

*Because the 1997 engine has only one drain plug, step 15 on page 13-24 in the 1995-1996 Maintenance and Service Manual, under the heading above changes as follows:*

15. Remove the crankcase oil drain plug and filler tube. Tip the engine slightly to allow the oil to drain from the crankcase. Dispose of oil properly.

### ENGINE ASSEMBLY

*Because the 1997 engine has only one drain plug, the NOTE under step 18 on page 13-47 in the 1995-1996 Maintenance and Service Manual, under the heading above changes as follows:*

<b>NOTE</b>
• DRAIN PLUG IS TO BE TIGHTENED TO 18 - 25 FT. LBS. (24/34 N-M) OF TORQUE.



## SECTION 14 - FUEL SYSTEM

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### CARBURETOR

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*The last paragraph under the heading above, on page 14-4 in the 1995-1996 Maintenance and Service Manual should read as follows:*

For elevations above 3000 feet, main jets other than standard operate more effectively. Therefore, the following chart lists the elevation ratings for various jet sizes. No adjustment is required for the pilot jet. *If the vehicle runs roughly at low speeds*, turn the pilot screw (8) (**Figure 14-4**) out until the vehicle runs smoothly. Usually, not more than one turn of the screw is necessary.

**See Maintenance and Service Manual Page 14-4 for Figure 14-4 and chart.**

### PROCEDURE FOR CHANGING MAIN JET

*The governor guard (6) used previously and shown in the 1995-1996 Maintenance and Service Manual in Figure 14-6 on Page 14-6, is replaced on the 1997 engine by the new governor guard (6) shown in the illustration at the top of page 138.*

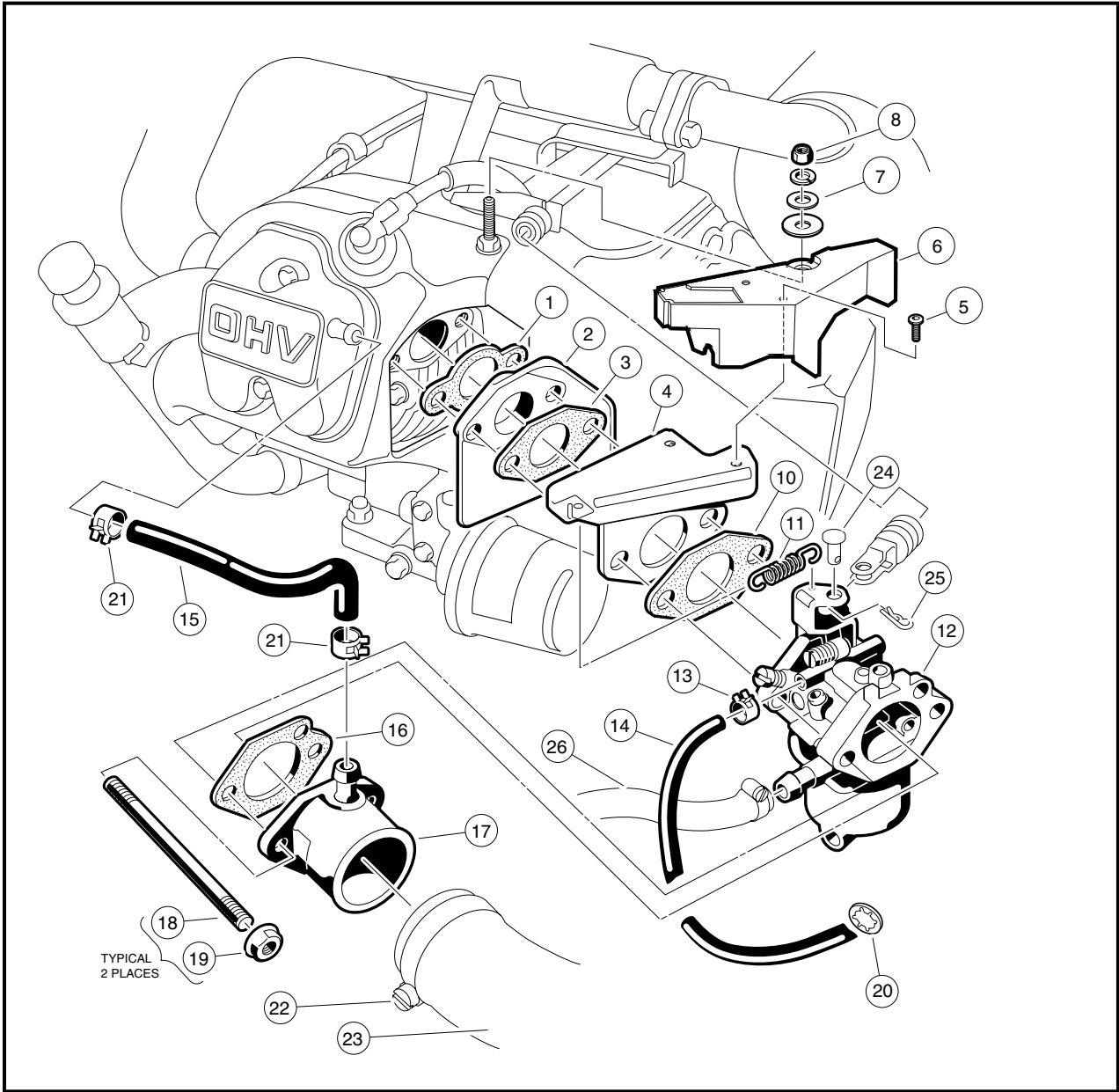


FIGURE 14-6

## ACCELERATOR ROD

### Accelerator Rod Removal

On page 14-9 in the 1995-1996 DS Maintenance and Service Manual, under the sub-heading above, Figure 14-8 shows the previous accelerator pedal configuration as well as the current one. The revised Figure 14-8 at the top of page 139 shows only the current pedal configuration.

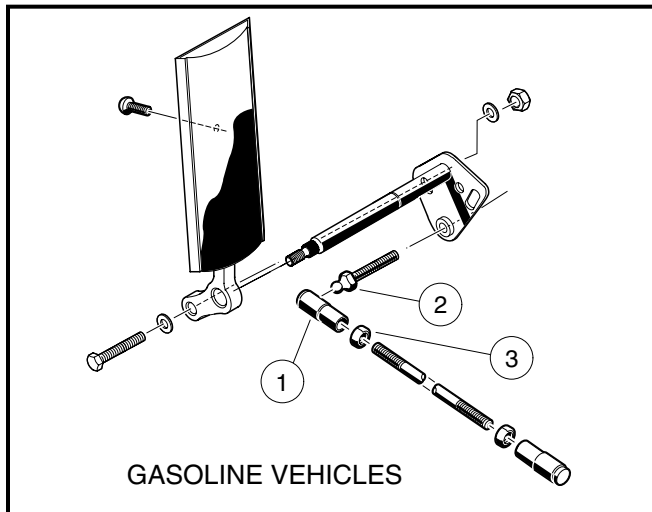


FIGURE 14-8

## GOVERNOR CABLE

The mounting of the governor and accelerator cables shown in the 1995-1996 Maintenance and Service Manual in Figure 14-11 on Page 14-12 was changed with incorporation of the unitized transaxle on 1997 vehicles. The following instructions under the headings GOVERNOR CABLE and ACCELERATOR CABLE supersede those in the 1995-1996 Maintenance and Service Manual on pages 14-11 through 14-13.

### ⚠ WARNING

- ONLY TRAINED MECHANICS 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 AND REVERSE LEVER 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.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, ENGINE MOUNTING PLATE, OR OTHER METAL COMPONENT.
- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.

## Removing the Governor Cable

1. Remove the seat from the vehicle.
2. Remove the governor guard (6) (**Figure 14-6**).
3. Remove the spring cotter (25) and clevis pin (24) at the carburetor throttle bracket (**Figure 14-6, Page 138**).

**Removing the Governor Cable, Continued:**

4. Remove the “E” ring (7) at the governor cable engine bracket (11), and governor cable transmission bracket (10) **(Figure 14-11)**.
5. Remove the spring cotter (9) and clevis pin (8) at the rear governor lever arm **(Figure 14-11)**.
6. Remove the cable (2) **(Figure 14-11)**.

**Governor Cable Installation and Adjustment**

1. Install the cable onto the governor cable transmission bracket (10) and the engine bracket (11) and attach an “E” ring (7) at each end **(Figure 14-11)**.
2. Install the clevis pin (8) and spring cotter (9) through the clevis and carburetor throttle at the carburetor **(Figure 14-11)**.
3. Install the clevis pin (8) and spring cotter (9) through the rear clevis and governor lever arm.
4. With the governor lever arm loose on the governor shaft, use a flat blade screwdriver to turn the governor arm shaft counterclockwise until it stops. Then pull the governor lever arm rearward until the carburetor throttle is in the “wide open throttle” (WOT) position.
5. While holding the arm and shaft in the fully counterclockwise position, tighten the governor arm lever nut to 36 in.lbs. (4.0 N-m).
6. Check governed speed adjustment as instructed on Page 14-14 in the Maintenance & Service Manual.

**ACCELERATOR CABLE****⚠ WARNING**

- ONLY TRAINED MECHANICS 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 AND REVERSE LEVER 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.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRICAL WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, ENGINE MOUNTING PLATE, OR OTHER METAL COMPONENT.
- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.

**Accelerator Cable Removal**

1. Remove the seat from the vehicle.
2. Remove the electrical box cover and loosen the cable housing retaining nuts **(See Figure 14-9, Page 14-10 in the Maintenance and Service Manual)**.

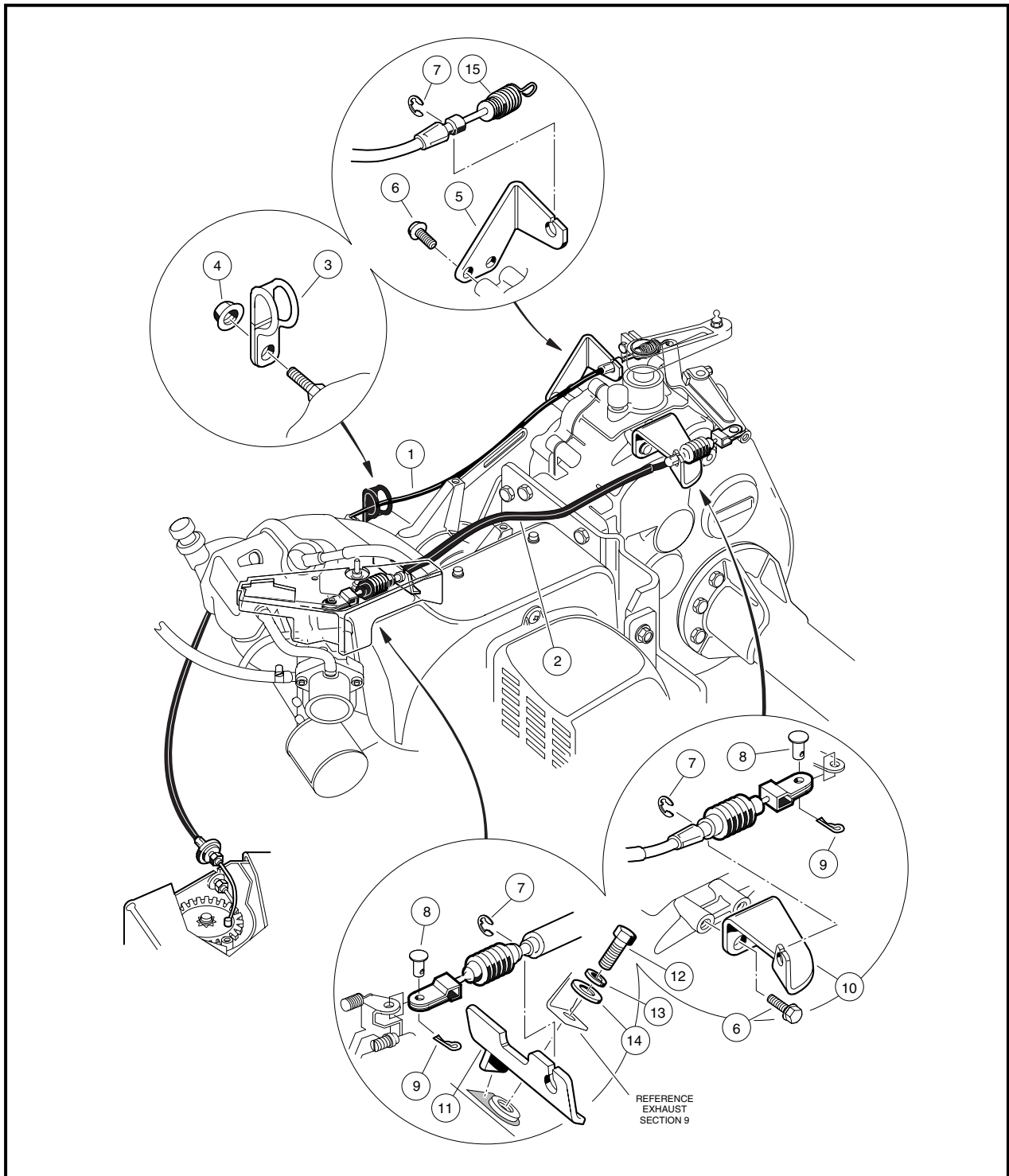


FIGURE 14-11

3. Disconnect the cable (1) (Figure 14-11) from the cam in the electrical box (See Figure 14-9, Page 14-10 in the Maintenance and Service Manual).
4. Remove the “E” ring (7) on the spring end of the cable at the accelerator cable bracket (5) (Figure 14-11). Pull the cable housing out of the bracket.
5. Disconnect the spring (15) from the engine governor arm by rotating it counterclockwise one-half turn. Remove the cable assembly from the vehicle (Figure 14-11).

## Accelerator Cable Installation

1. Connect the cable to the cam in the electrical box.
2. Insert the cable housing into the mounting slot in the wall of the electrical box, with approximately the same number of threads visible between the jam nuts as are visible from the nut inside the box to the end of the cable housing (**Figure 14-9, Page 14-10 in the manual**). Tighten the nuts finger tight.
3. Connect the spring (15) to the engine governor arm (**Figure 14-11, Page 141**).
4. Install the cable in the accelerator cable bracket and secure it with the "E" ring (7) (**Figure 14-11**).
5. Before tightening the cable housing retaining nuts, make sure the governed speed adjustment is correct. See Engine RPM Adjustment on Page 14-14 in the Maintenance and Service Manual.
6. Install the electrical box cover. **See WARNINGS below.**

### WARNING

BECAUSE THE ENGINE MUST BE RUN TO CONDUCT TESTS AND MAKE ADJUSTMENTS, THE FOLLOWING SAFETY PROCEDURES MUST BE STRICTLY FOLLOWED. FAILURE TO DO SO COULD RESULT IN DAMAGE TO THE VEHICLE OR PERSONAL INJURY.

- ONLY TRAINED TECHNICIANS SHOULD REPAIR OR SERVICE THIS VEHICLE. ANYONE DOING EVEN SIMPLE REPAIRS OR SERVICE SHOULD FOLLOW THE CORRECT PROCEDURES AND HEED THE WARNINGS IN THIS AND ALL APPLICABLE PUBLICATIONS.
- ALWAYS WEAR APPROVED EYE PROTECTION WHEN SERVICING THIS VEHICLE.
- CHOCK BOTH THE FRONT AND REAR WHEELS TO PREVENT VEHICLE MOVEMENT.
- HOT!! AVOID TOUCHING THE ENGINE AND EXHAUST WHEN WORKING ON THE VEHICLE. A HOT ENGINE OR EXHAUST CAN CAUSE SEVERE BURNS.
- MOVING PARTS! KEEP HANDS, CLOTHING, AND ALL OTHER OBJECTS AWAY FROM MOVING PARTS. DO NOT WEAR JEWELRY OR LOOSE CLOTHING.

## SECTION 15 - EXHAUST SYSTEM

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See 1995 - 1996 DS Maintenance and Service Manual, Club Car Part Number 1019051-01.

## SECTION 16 - TORQUE CONVERTER

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### GENERAL INFORMATION

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*With the incorporation of the unitized transaxle on 1997 vehicles, the engine (and therefore the torque converter assembly) rotates clockwise. Because of this, the take-up springs (part of item 10) in the drive clutch, shown in Figure 16-5 on page 16-7 in the 1995-1996 DS Maintenance and Service Manual, are now positioned on the opposite sides of the clutch cover (1) ribs. Also, the drive buttons (7) in the driven clutch, shown in Figure 16-16 on page 16-13 in the 1995-1996 DS Maintenance and Service Manual, are now opposite their former positions. The following illustrations and instructions supersede those in the 1995-1996 DS Maintenance and Service Manual:*

# DRIVE CLUTCH DISASSEMBLY

13-18

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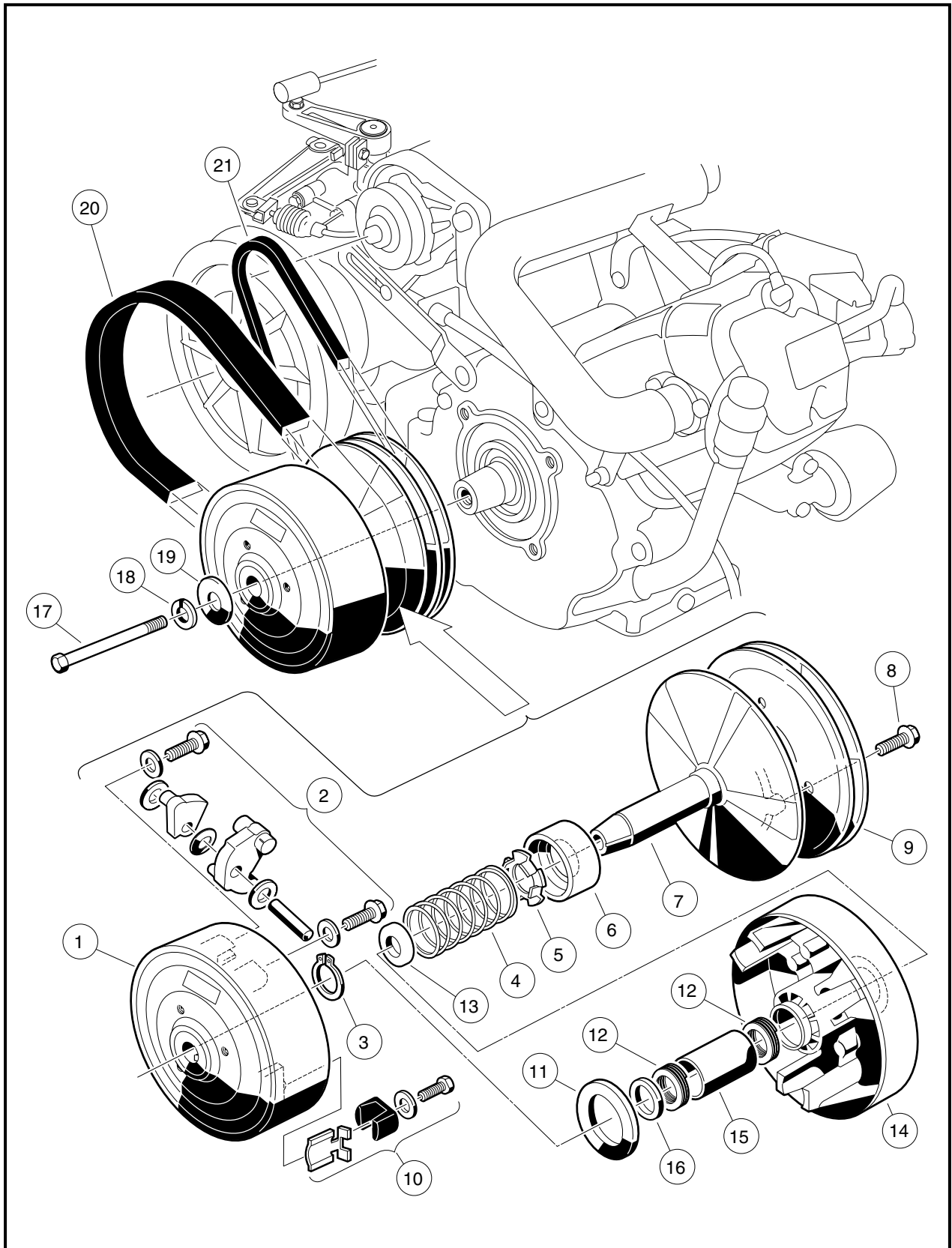
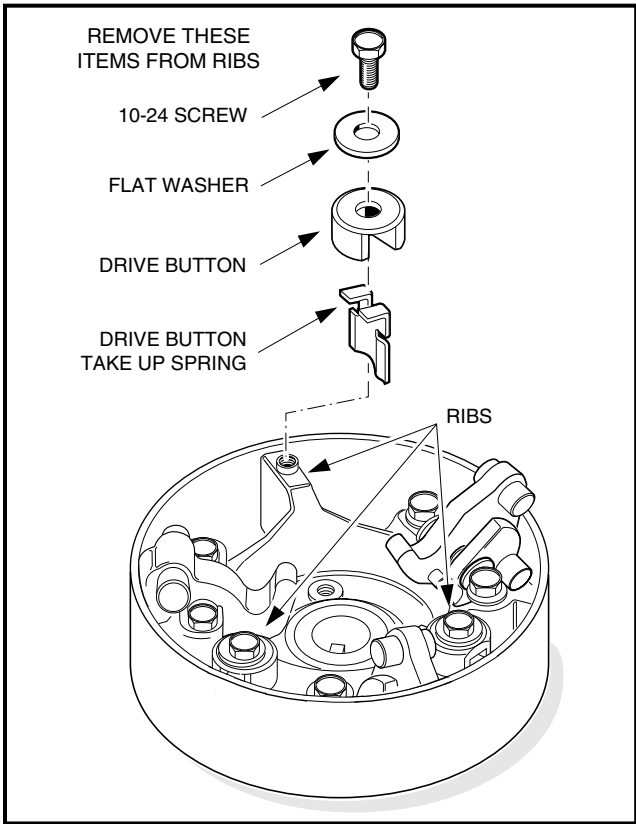


FIGURE 16-5

**13-18**

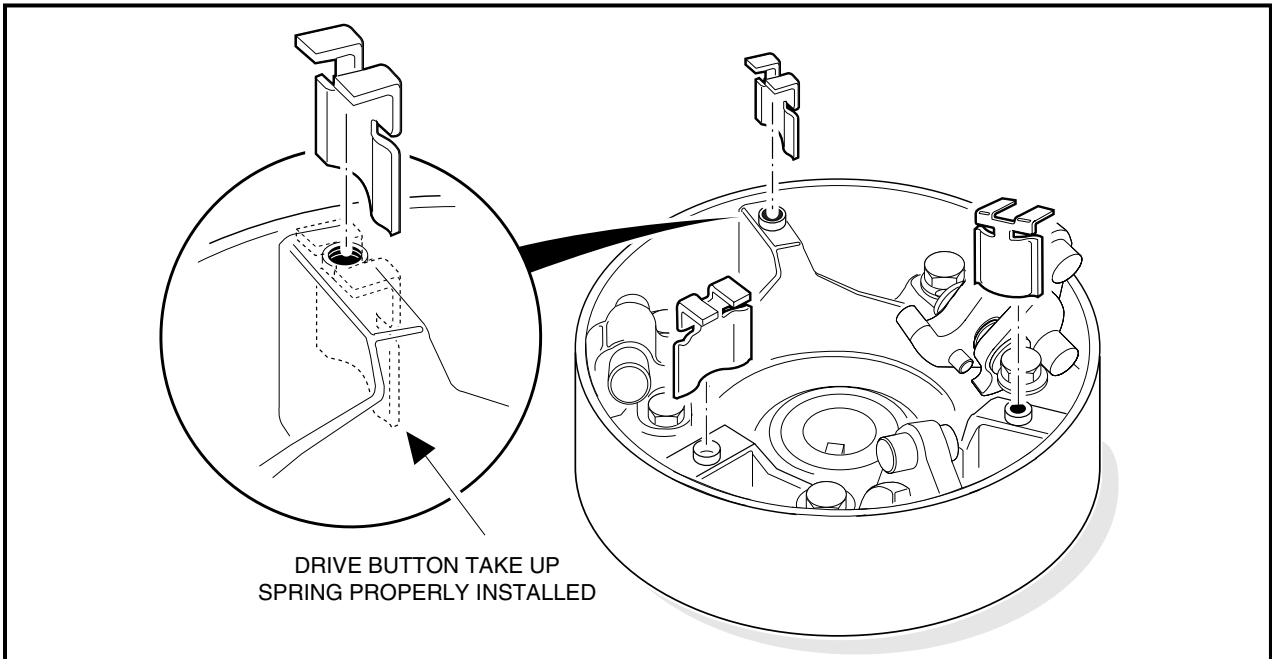
**G**

**Drive Clutch Disassembly, Continued:**



**FIGURE 16-8**

**DRIVE CLUTCH ASSEMBLY**



**FIGURE 16-15**



Step 13 on page 16-12 in the 1995-1996 Maintenance and Service Manual, under the heading *DRIVE CLUTCH ASSEMBLY*, changes as follows:

13-18

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13. Install the three drive button take-up springs (10) (**Figure 16-5, Page 143**) on the ribs of the clutch cover. The springs must be installed on the *right* sides of the button mounting posts (when looking into the interior of the clutch cover, with the rib at the 12 o'clock position) as shown (**See Figure 16-15**).

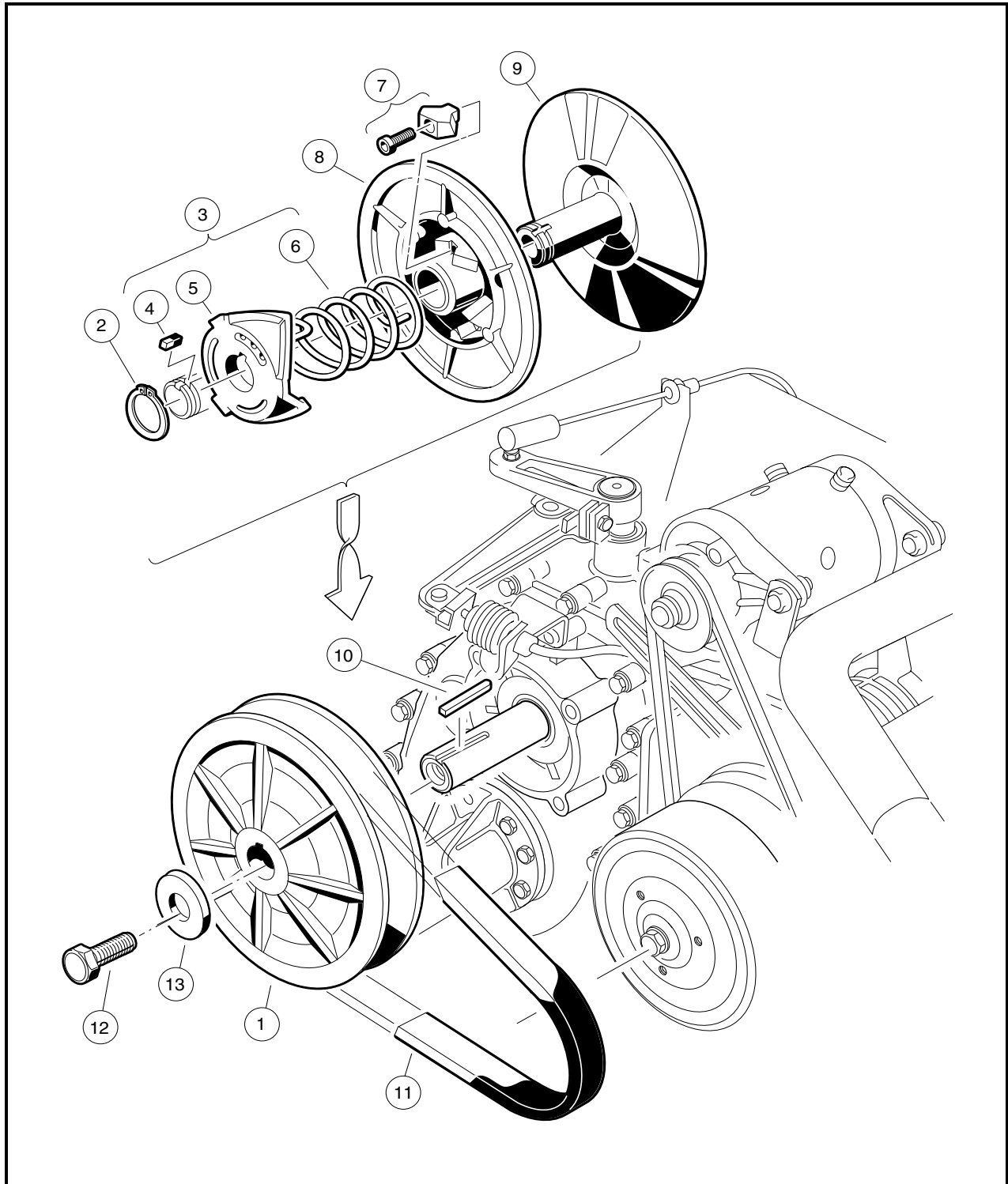


FIGURE 16-16

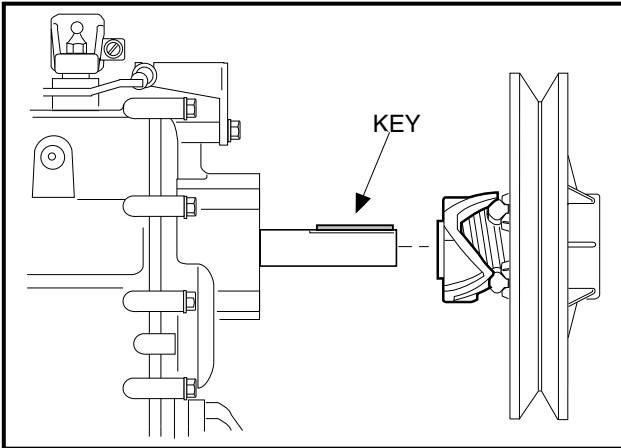


FIGURE 16-18

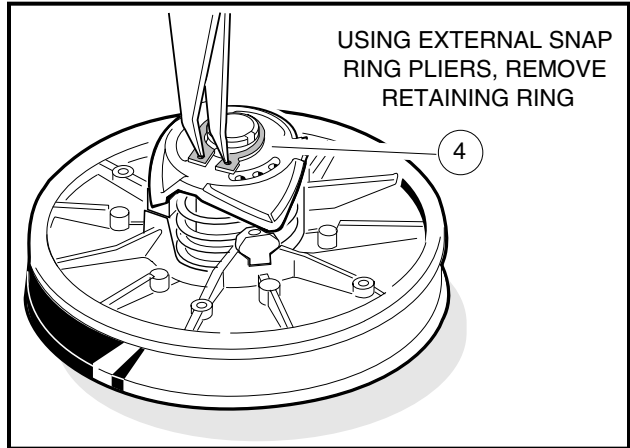


FIGURE 16-19

**ASSEMBLY OF THE DRIVEN CLUTCH**

Step 6 on page 16-16 in the 1995-1996 Maintenance and Service Manual, under the heading ASSEMBLY OF THE DRIVEN CLUTCH, changes as follows:

- 6. Place the clutch assembly in a press and position the cam press tool (Club Car Part No. 1018091-01) on the cam as shown (Figure 16-21, this supplement). Hold the fixed face assembly and rotate the moveable face assembly (1) one third of a turn clockwise, then press the cam (2) onto the fixed face assembly.

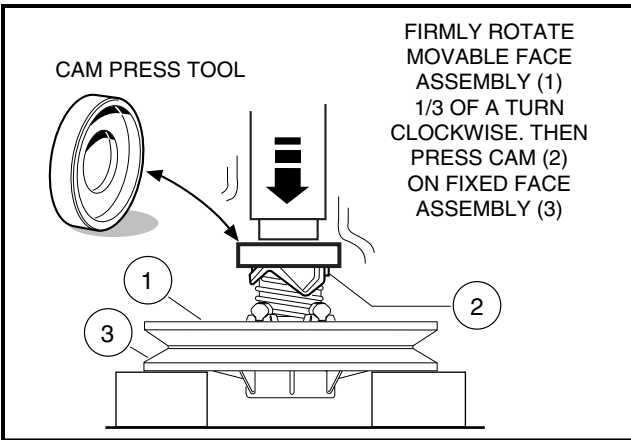


FIGURE 16-21

## SECTION 17 - TRANSMISSION

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*Because the unitized transaxle, which takes the place of both the transaxle and transmission used on earlier gasoline vehicles, was incorporated in 1997 DS gasoline vehicles, Section 17 (and Section 9) in the 1995-1996 DS Maintenance and Service Manual are superseded by Section 10 in this supplement.*

## SECTION 18 - REAR SUSPENSION, GASOLINE VEHICLE

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*This section supersedes Section 18 in the 1995-1996 Maintenance and Service Manual.*

### GENERAL INFORMATION

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The rear suspension of the DS gasoline vehicle is completely independent. It consists of two mono-leaf springs controlled by two shock absorbers mounted between the springs and the vehicle frame. The engine is mounted on a plate that is bolted to the transaxle. A snubber, mounted on the front of the engine mounting plate and contained by brackets on the vehicle frame, controls engine mounting plate motion.

#### 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 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 AND REVERSE LEVER 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.
- MOVING PARTS! - DO NOT ATTEMPT TO SERVICE THE VEHICLE WHILE IT IS RUNNING.
- HOT! - DO NOT ATTEMPT TO SERVICE HOT MOTOR, RESISTORS, ENGINE, OR EXHAUST SYSTEM. FAILURE TO HEED THIS WARNING COULD RESULT IN SEVERE BURNS.
- LIFT ONLY ONE END OF A 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.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRIC WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, OR OTHER METAL COMPONENT.
- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE; ALWAYS, BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.

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INSPECTING AND REMOVING SHOCK ABSORBERS

1. Check shock absorbers (7) for fluid leakage at the point where the shaft enters the shock absorber body. Replace leaking shock absorbers (Figure 18-1).
2. To remove a shock absorber, remove the nut (5), cup washer (9) and rubber bushing (10) from the stem at the top of the shock absorber (Figure 18-1).

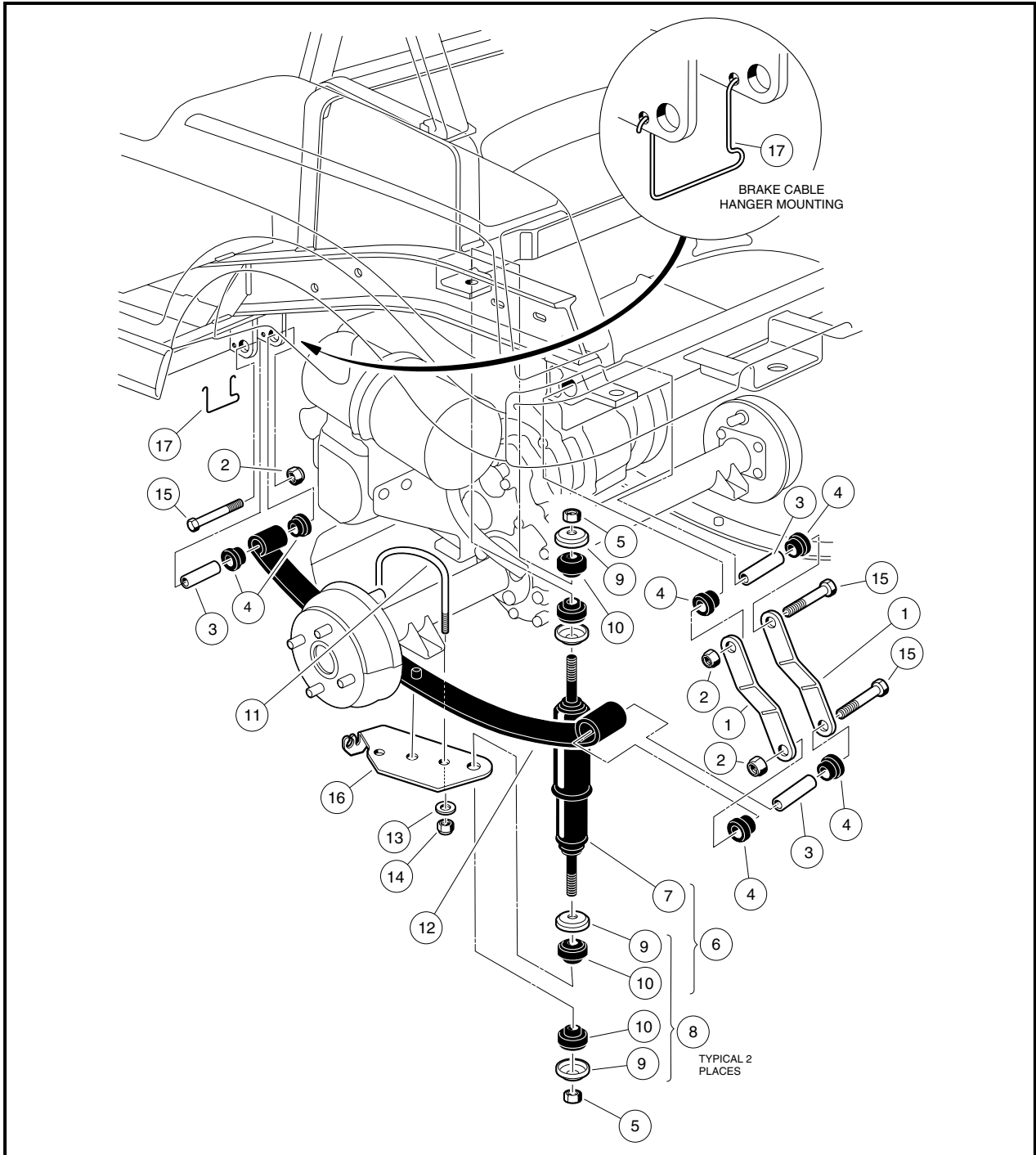


FIGURE 18-1

3. Remove the nut (5), cup washer (9), and rubber bushing (10) from lower mounting stem (**Figure 18-1**).
4. Compress the shock absorber to remove it.

## INSTALLING SHOCK ABSORBERS

1. To install, reverse the removal procedure.
2. On the upper and lower shock absorber mounting stems, tighten the nuts until the rubber bushing expands to the size of the cup washer.

## MONO-LEAF SPRINGS

### REMOVING THE MONO-LEAF SPRINGS

1. Place chocks at the front wheels and lift the rear of the vehicle with a chain hoist or floor jack. 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 18-2**). See WARNING below.

### **⚠ WARNING**

- LIFT ONLY ONE END OF A 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.

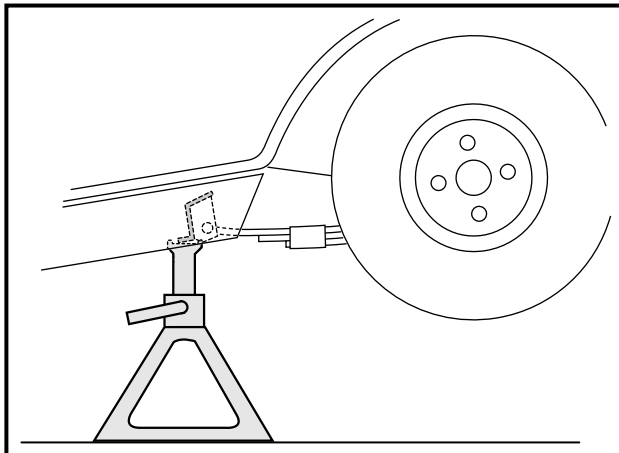


FIGURE 18-2

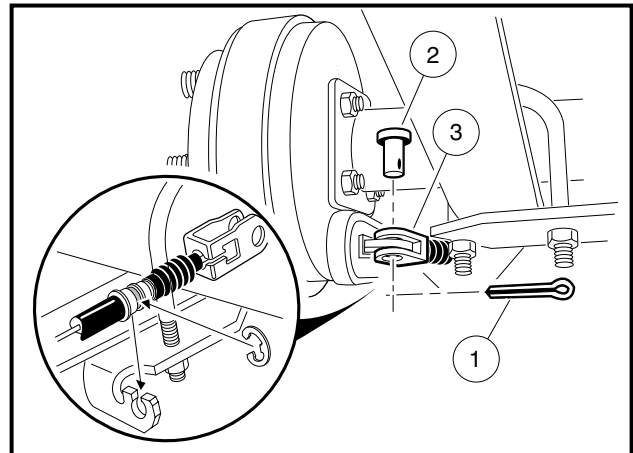


FIGURE 18-3

2. Place a floorjack under the transaxle differential casing to support (but not lift) the drivetrain. Raise it just enough to relieve tension on the shock absorbers without compressing them.
3. Remove the tire and wheel assembly on the side from which the spring is to be removed.
4. Remove the cotter pin (1) and the clevis pin (2) at the brake lever and brake cable connection and pull the clevis (3) away from the lever (**Figure 18-3**). Detach the brake cable from the shock mount bracket (16) (**Figure 18-1**).
5. Remove the nut (5), cup washer (9), and rubber bushing (10) from the lower mounting stem of the shock absorber (**Figure 18-1**).
6. Remove the nuts (14), lock washers (13), and the U-bolt (11) securing the spring to the transaxle (**Figure 18-1**). Remove the shock mount bracket and the U-bolt.

**Removing the Mono-leaf Springs, Continued:**

7. Remove the bolt (15) and nut (2) attaching the rear spring to the shackle (1) (**Figure 18-1, Page 148**).
8. Remove the nut (2) and bolt (15) attaching the front of the spring to the vehicle frame (**Figure 18-1, Page 148**) and remove the spring.
9. Inspect the bushings (4) and spacers (3) in the spring eyes and replace them if they are worn or damaged (**Figure 18-1, Page 148**).

**INSTALLING THE MONO-LEAF SPRINGS**

1. To install the springs, reverse the removal procedure. See CAUTION below.

**⚠ CAUTION**

- WHEN POSITIONING THE SPRING ON THE TRANSAXLE, BE SURE TO INSERT THE LOCATING BOLT ON THE SPRING IN THE LOCATING HOLE IN THE TRANSAXLE SADDLE.

2. Tighten the nuts on the U-bolts to 31-38 ft.lbs. (42/51.5 N-m).

**THE SNUBBER****⚠ WARNING**

- ONLY TRAINED MECHANICS 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 AND REVERSE LEVER 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.
- FRAME GROUND - DO NOT ALLOW WRENCH OR OTHER METAL OBJECTS TO CONTACT FRAME WHEN DISCONNECTING BATTERY CABLES OR OTHER ELECTRICAL WIRING. NEVER ALLOW A POSITIVE WIRE TO TOUCH THE VEHICLE FRAME, ENGINE, ENGINE MOUNTING PLATE, OR OTHER METAL COMPONENT.
- TO AVOID UNINTENTIONAL STARTING OF THE VEHICLE, ALWAYS BEFORE SERVICING:
  - DISCONNECT BATTERY CABLES, NEGATIVE (-) FIRST.
  - DISCONNECT THE SPARK PLUG WIRE FROM THE SPARK PLUG.

**REMOVING THE SNUBBER**

1. Support the drive train with blocks under the engine mounting plate so that the snubber is raised slightly and does not rest on the vehicle frame.
2. Use a 1/2" wrench and 1/2" socket to remove the two bolts (12) and two nuts (13) securing the snubber bracket to the engine mounting plate (**Figure 18-4**), then remove the snubber and bracket from the vehicle.
3. Pull the snubber from the bracket and replace it with a new one.



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## **SECTION 19A - ELECTRICAL SYSTEM, V-GLIDE 36 VOLT VEHICLE**

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*See Section 19A of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 19B - ELECTRICAL COMPONENTS, V-GLIDE 36 VOLT VEHICLE**

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*See Section 19B of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 20A - ELECTRICAL SYSTEM, POWERDRIVE SYSTEM 48 VEHICLE**

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*See Section 20A of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 20B - ELECTRICAL COMPONENTS, POWERDRIVE SYSTEM 48 VEHICLE**

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*See Section 20B of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 21A - ELECTRICAL SYSTEM, POWERDRIVE PLUS VEHICLE**

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*See Section 21A of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 21B - ELECTRICAL COMPONENTS, POWERDRIVE PLUS VEHICLE**

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*See Section 21B of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 22 - BATTERIES**

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*See Section 22 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 23A - ACCU-POWER BATTERY CHARGER**

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*See Section 23A of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 23B - POWERDRIVE BATTERY CHARGER**

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*See Section 23B of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 24 - MOTOR**

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*See Section 24 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*

## **SECTION 25 - TRANSAXLE, ELECTRIC VEHICLE**

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*For electric vehicles only, see Section 9 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01. Disregard information pertaining to gasoline vehicles.*

## **SECTION 26 - REAR SUSPENSION, ELECTRIC VEHICLE**

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*See Section 25 of the 1995 - 1996 Maintenance and Service Manual, Club Car Part Number 1019051-01.*



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