

OPERATION AND MAINTENANCE MANUAL WITH PARTS LIST

MODEL: B 2-48
SERIAL No.: 102562 through 102350
MANUAL No.: MB-248-05
Ver: A 5/99

****IMPORTANT****

READ AND FOLLOW INSTRUCTIONS GIVEN IN SAFETY AND
OPERATIONS SECTIONS, AND THOSE SECTIONS RELATED TO
YOUR SERVICE AND REPAIR RESPONSIBILITIES.

***TAYLOR-DUNN* MFG. CO.**

Commercial and Industrial Vehicles Since 1949

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INTRODUCTION



SECTION 1

ABOUT THIS MANUAL

This manual provides you with information you need to safely operate and maintain this vehicle.

We assume that those who will perform maintenance or repair operations are trained vehicle service technicians capable of performing minor and major repairs and qualified to use the tools required.

We also assume that they have or will attend a training program designed to familiarize them with the safe operation and use of this particular vehicle.

This manual contains the following major sections:

SECTION 1: INTRODUCTION

Contains information about how to use this manual, a description of the B 2-48, how to do an incoming inspection and vehicle specifications.

SECTION 2: VEHICLE OPERATION

Provides safety rules and guidelines describes the driver training program and explains the operation of each control on the B 2-48.

SECTION 3: MAINTENANCE PROCEDURES

Contains a scheduled maintenance checklist lubrication diagram troubleshooting guide recommended spare parts list, and detailed maintenance procedures.

SECTION 4: SERVICE PROCEDURES

Contains service procedures in for each assembly found in the B 2-48. Each major heading contains procedures organized in logical order.

SECTION 5: ILLUSTRATED PARTS

Includes an illustration and parts list for each assembly that has replaceable parts for the B 2-48.

NOTATIONAL CONVENTIONS

The following types of notations are used throughout this manual:

WARNING

A warning alerts you of something that may cause injury to yourself or others. Be sure you exercise special care and follow any instructions provided in a warning message.

CAUTION

A caution informs you of something that may cause damage to the vehicle. Be sure you exercise special care and follow any instructions provided in a caution message.



A note provides additional information about a subject.

VEHICLE DESCRIPTION

This manual applies to vehicles with serial numbers starting at 102562.

The B 2-48 is designed to be driven on smooth surfaces in and around industrial plants, nurseries, institutions, motels, mobile home parks and resorts.

This vehicle is not designed to be driven on public highways. The B 2--48 is built to order. It is available in speeds ranging from 7 mph to 15 mph. This is the approximate speed at which the truck travels on a level surface with no load. Do not exceed this speed. Exceeding this speed may result in steering difficulty, motor damage, and/or loss of control. It is not designed to be towed more than 5 mph.

The vehicle can handle a total payload (incl. cargo, optional equipment, passengers and driver) of up to 3000 pounds (4000 pounds optional). Various options are available to enable you to customize the vehicle to suit your particular needs (consult your Taylor-Dunn salesperson or representative for current options).

This vehicle conforms to requirements for Type E vehicles as described in O.S.H.A. Standard Section 1910.178 (Powered Industrial Trucks) and with all applicable portions of the American National Standard for Personnel and Burden Carriers (ANSI B56.8).

The model and serial number for this vehicle are imprinted on a decal located under the passenger seat and stamped in a main frame rail directly below the front left (driver side) corner of the deck board or on the main frame tube under the driver seat.

STANDARD SPECIFICATIONS B 2-48

ITEM	SPECIFICATION
Standard dimensions	307L x 114W x 114H Centimeters
	121L x 45W x 45H Inches
	Bed size 75 1/4 x 41 1/4 Inches
Dry weight	637 kg
	1,405 lbs
Turning radius	350 centimeters
	138 Inches
Transmission	Power Traction chain primary reduction. Automotive differential secondary reduction.
Brakes	Front hydraulic disk (optional)
	Rear hydraulic disk (standard)
Motor	DC series wound, 10hp @ 1350 rpm
Tires	5.70 x 8 Load range B (standard)
Tire pressure	50 psi max.
Maximum load	3000 lbs (2268 kg) including driver, passengers and optional equipment (standard)
Battery	6 ea. 6 volt 217 AH lead acid (36 volt system)

TAKING DELIVERY OF YOUR VEHICLE

THIS VEHICLE SHOULD BE INSPECTED IMMEDIATELY AFTER DELIVERY. Use the following guidelines to make sure there are no obvious problems.

INSPECTING THE VEHICLE

Examine the contents of all packages and accessories that may have come in separate packages with this vehicle. Make sure everything listed on the packing slip is there. Nothing should look broken or damaged.

Examine any visible wiring for obvious signs of damage. Check that all connections are secure.

Check that battery connections are tight and all cells are filled.

Inspect the tires for obvious wear or damage. Check the tire pressure. Make sure that all wheel lugs are secure.

Check the body, seats, windshield (optional), trim and other external parts for obvious damage.

CHECKING THE CONTROLS

Operate each of the following controls before turning on the key switch:

- ♦ Accelerator pedal
- ♦ Brake pedal
- ♦ Forward - reverse selector lever
- ♦ Parking brake
- ♦ Steering wheel
- ♦ Horn
- ♦ Lights

Each control should operate smoothly and easily without sticking or requiring undue effort.

WHAT TO DO IF YOU FIND A PROBLEM

If you find a problem with this vehicle you must immediately file a claim with the carrier. The claim must be filed within 48 hours of receiving this vehicle. Forward a copy of the damage claim to your Taylor-Dunn dealer.

⚠ WARNING

Do not repair modify or adjust any part of this vehicle unless you are authorized to do so. Incorrect repairs may result in injury to yourself and others and cause the invalidation of your warranty.

SECTION 1



OPERATING GUIDELINES



SAFETY RULES AND GUIDELINES

It is the responsibility of the owner of this vehicle to assure that the operator understands the various controls and operating characteristics of this vehicle and obeys the following safety rules and guidelines (extracted from the American National Standards Institute Personnel and Burden Carriers ANSI B56.8).

This vehicle is designed to be driven over smooth surfaces in and around places such as warehouses, nurseries, motels, parks, and resorts. Before you drive this vehicle please observe the following safety rules and guidelines:

WARNING

This vehicle is not designed to be driven on public highways. The drive is built to order. It is available in speeds ranging from 7 mph to 15 mph. This is the speed at which the truck travels on a level surface with no load. Do not exceed this speed. Exceeding this speed may result in steering difficulty, motor damage, and/or loss of control. It is not designed to be towed more than 5 mph.

- ♦ Do not drive this vehicle unless you are a qualified and trained operator.
- ♦ Keep all body parts (head, arms', legs') inside this vehicle while it is moving.
- ♦ Drive slowly when making a turn especially if the ground is wet slippery or when driving on an incline.
- ♦ This vehicle may overturn easily if turned sharply when driving at high speeds, especially when on an incline.
- ♦ Drive only on level surfaces or on surfaces having an incline of no more than 10% (5.6 degrees.).
- ♦ Do not drive over loose objects, holes or bumps.
- ♦ Observe all traffic regulations and speed limits (12 mph max.).
- ♦ Keep to the right under normal conditions.
- ♦ Maintain a safe distance from all objects.
- ♦ Keep the vehicle under control at all times.
- ♦ Yield right of way to pedestrians, ambulances, fire trucks, or other vehicles in emergency situations.
- ♦ Do not overtake another vehicle at intersections, blind spots, or other dangerous locations.
- ♦ Keep a clear view ahead at all times.

DRIVER TRAINING PROGRAM

The owner of this vehicle shall conduct an Operator Training program for all those who will be operating this vehicle. The training program shall not be condensed for those claiming to have previous vehicle operation experience. Successful completion of the Operator Training program shall be required for all personnel who operate this vehicle.

The Operator Training program shall include the following:

- ♦ Operation of this vehicle under circumstances normally associated with your particular environment.
- ♦ Emphasis on the safety of cargo and personnel.
- ♦ All safety rules contained within this manual.
- ♦ Proper operation of all vehicle controls.
- ♦ A vehicle operation and driving test.

DRIVER QUALIFICATIONS.

Only those who have successfully completed the Operator Training program are authorized to drive this vehicle. Operators must possess the visual auditory physical and mental ability to safely operate this vehicle as specified in the American National Standards Institute Controlled Personnel and Burden Carriers ANSI B56.8.

The following are minimum requirements necessary to qualify as an operator of this vehicle:

- ♦ Demonstrate a working knowledge of each control.
- ♦ Understand all safety rules and guidelines as presented in this manual.
- ♦ Know how to properly load and unload cargo.
- ♦ Know how to properly park this vehicle.
- ♦ Recognize an improperly maintained vehicle.
- ♦ Demonstrate ability to handle this vehicle in all conditions. .

VEHICLE CONTROLS

The following describes the use of each control on this vehicle.

NOTE *Some controls are optional equipment and may not be installed on this vehicle.*

KEY SWITCH /STARTER

A key switch located on the right side of the instrument panel starts the vehicle. Rotate the key clockwise to turn the vehicle on counter-clockwise to turn the vehicle off.

⚠ WARNING

The key switch should be in the off position whenever the operator leaves the driver's seat.

This switch is also designed to secure and disable the vehicle. You can remove the key **ONLY** when the key switch is in the OFF position.

SEAT INTERLOCK SWITCH (OPTIONAL)

A switch located under the driver's seat disables the vehicle when the driver leaves the seat. The driver must be seated for the vehicle to operate.

This is an added safety feature and should never be bypassed.

FORWARD-REVERSE SWITCH

The forward-reverse rocker switch, located on the dash, determines the direction of travel (forward or reverse) of the vehicle. Push the top of the switch to make the vehicle go forward. Push the bottom of the switch to go in reverse.

⚠ CAUTION

DO NOT SHIFT from forward to reverse or vice-versa while the vehicle is in motion. Make sure the vehicle is completely stopped before shifting.

⚠ WARNING

The Forward-Reverse switch has a neutral position. The Forward-Reverse switch should be in the neutral position with the park brake set whenever the operator leaves the driver's seat.

ACCELERATOR PEDAL

The accelerator pedal, located to the right of the brake pedal, controls the speed of the vehicle and is designed for right foot operation. It operates the same way as the accelerator pedal in an automobile and controls the vehicle's speed.

Depress the pedal to speed the vehicle up. Release the pedal to slow down.

NOTE *The foot brake pedal will need to be used to slow this vehicle on a down grade.*

STEERING

The steering wheel and steering system is an automotive type. To turn right, turn the steering wheel to the right (clockwise). To turn left, turn the steering wheel to the left (counter clockwise).

FOOT BRAKE PEDAL

The foot brake pedal located to the right of the steering column is for operation with the right foot only. It works the same as the brake in an automobile. Applying pressure to the brake pedal slows the vehicle according to the amount of pressure you apply. Removing your foot from the pedal releases the braking action.

PARK BRAKE LEVER

The park brake is actuated with a hand lever located on the floorboard to the right of the accelerator pedal. To set the park brake pull the lever back until it locks. To release the park push the lever all the way forward.



Do not operate the vehicle with the parking brake applied. Severe motor/control damage will result.

HORN BUTTON

The horn button is located on the right side of the dash panel. Depress the button to sound the horn, release it to turn it off.

INSTRUMENT PANEL

The headlight switch is located of the left side of the instrument panel. An accessory switch, if any, is adjacent and to the right of it.

HOURLY METER (OPTIONAL)

The hour meter is located to the right of the battery status indicator. This tracks the number of hours the vehicle has been in operation.

BATTERY STATUS INDICATOR

The battery status indicator is located to the right of the accessory switch.. The normal operating range is in the green zone. The vehicle needs charging if it is in the yellow zone to the left. If it is in the red zone to the left the vehicle should be taken out of service immediately to be charged

Driving

- ♦ Slow down and sound the horn when approaching a corner or other blind intersection.
- ♦ No horseplay or dangerous driving.
- ♦ Do not drive this vehicle in hazardous areas unless this vehicle is approved and labeled for such operation.
- ♦ Immediately report any accident or vehicle problem to your supervisor.

Loading and Unloading

- ♦ Do not load cargo that can easily fall off this vehicle.
- ♦ Do not exceed the cargo load capacity of this vehicle.
- ♦ Do not carry more than the maximum number of passengers allowed for this vehicle.
- ♦ Be extra careful when handling cargo that is longer, wider or higher than this vehicle.

Parking

- ♦ Set the parking brake and place shift lever in neutral before leaving the vehicle.
- ♦ If you will be away from this vehicle turn off the key switch, remove the key and take the key with you.
- ♦ If you park this vehicle on an incline block the wheels.
- ♦ Do not block fire aisles, fire equipment or stairways.

Towing

- ♦ To tow this vehicle attach a tow strap to the front bumper tow bar and place the forward/reverse shift lever in the neutral position.
- ♦ Use another driver to steer this vehicle while it is being towed; be sure the driver uses the brakes when the towing vehicle slows or stops..

⚠ WARNING

Do not exceed 5 MPH or carry any passengers while towing this vehicle.

Storing and returning to service

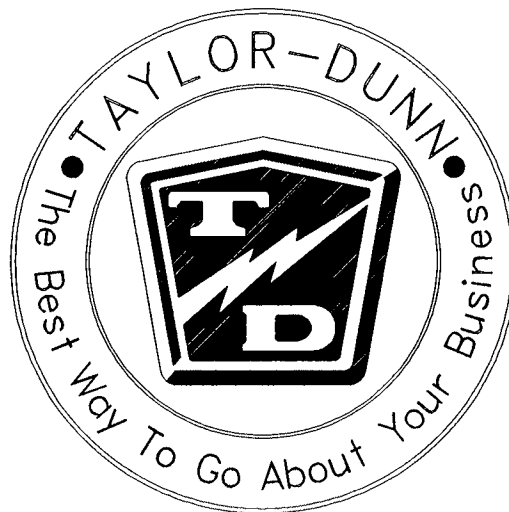
- ♦ Do not store batteries in a discharged condition. Fill, charge and clean batteries fully before putting in storage
- ♦ Lube all grease fittings.
- ♦ Spray all exposed metal surfaces with a light oil.

- ♦ Clean and dry all exposed electrical connections.
- ♦ Inflate tires to proper pressure and then block them off the ground.
- ♦ If stored for a prolonged period the batteries should be charged as follows;

Storage temperature	Charge
Below 40° F	Every 6 months
40° - 60° F	Every 2 months
Above 60° F	Once a month

RETURNING TO SERVICE

- ♦ Check state of charge of batteries and charge if nessesary.
- ♦ Perform **ALL** maintenance checks in the periodic check list in section 3.
- ♦ Test drive before putting into normal service.



SCHEDULED MAINTENANCE AND SERVICE PROCEDURES



SECTION 3

This section explains how to perform the scheduled maintenance procedures. Use the Maintenance Checklist to determine how often you should perform each procedure. Vehicle maintenance or repairs should only be performed by a qualified mechanic.

This section contains the following:

- ◆ Maintenance guidelines.
- ◆ Maintenance checklist.
- ◆ Lubrication chart.
- ◆ Troubleshooting guide.
- ◆ Recommended spare parts list.
- ◆ Detailed maintenance procedures.

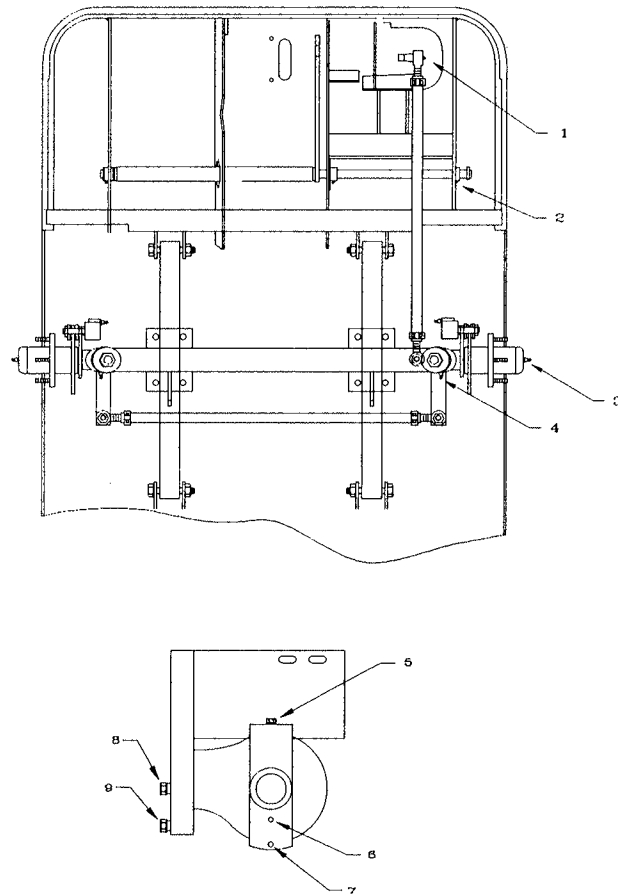
MAINTENANCE GUIDELINES

- ◆ Allow only qualified and authorized personnel to maintain repair adjust and inspect the vehicle.
- ◆ Before starting any repairs or maintenance immobilize the vehicle by turning the key switch off, removing the key and setting the park brake.
- ◆ Disconnect both of the main battery leads before working on or disconnecting any electrical component or wire.
- ◆ Block the chassis with jack stands before working under a raised vehicle.
- ◆ Conduct vehicle performance checks in an authorized area where safe clearance exists.
- ◆ Before starting the vehicle follow the recommended safety procedures in Section 2, "Vehicle Operation."
- ◆ Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check level or leakage of battery electrolyte. Do not use open pans of fuel or flammable fluids for cleaning parts.
- ◆ Ventilate the work area properly.
- ◆ Regularly inspect and maintain in a safe working condition, brakes, steering mechanisms, speed and directional control mechanisms, warning devices, lights, governors, guards and safety devices.
- ◆ Inspect and maintain battery limit switches, protective devices, electrical conductors and connections in conformance with Taylor-Dunn's recommended procedures.
- ◆ Keep the vehicle in clean condition to minimize fire hazards and facilitate detection of loose or defective parts.

SECTION 3

PERIODIC MAINTENANCE CHECKLIST					
Maintenance Item	Weekly (20 hrs)	Monthly (80 hrs)	Quarterly (250 hrs)	Semi-yearly (500 hrs)	Yearly (1000 hrs)
Check tire condition and air pressure	X				
Check and fill batteries (use distilled water only)	X				
Check foot brake system. Adjust if necessary		X			
Check steering for play. Adjust as necessary		X			
Check brake cables		X			
Check steering spline coupling set screw.		X			
Lubricate all Zerk fittings			X		
Lubricate all moving parts without Zerk fittings (use all-purpose oil)			X		
Clean and tighten all wire connections			X		
Wash batteries with water (use soda if necessary)			X		
Check brake lining for wear. Adjust as necessary				X	
Check and adjust front wheel bearings				X	
Check rear axle oil				X	
Change rear axle oil					X
Check nuts and bolts, particularly engine and drive train					X
Clean and re-pack front wheel bearings (use wheel bearing grease).					X
Check motor brushes					X

LUBRICATION CHART



#	Description	Locations	Lubricant type
1	Steering ball joints	4	General purpose grease
2	Brake pedal linkage	3	General purpose grease
3	Front wheel bearings	2	General purpose grease
4	King pin	2	General purpose grease
5	Drive fill plug	1	SAE 140 API GL-5 hypoid gear oil
6	Drive level plug	1	
7	Drive drain plug	1	
8	Chain case fill/level plug	1	SAE 140 API GL-5 hypoid gear oil
9	Chain case drain plug	1	

TROUBLESHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE*
Steering pulls in one direction	Front end out of alignment
	Low tire air pressure
Hard steering	Dry lube points in steer linkage
	Damaged king pin/Ball joint
	Low tire air pressure
Excessive steering play	Worn ball joints
	Mis-adjusted or worn steer gear
	Loose steering linkage
Lack of power or slow operation	Brake dragging
	Parking brake dragging
	Worn drive gears
	Front end out of alignment
	Defective speed control
Abnormal noise	Worn Drive gears or bearings
	Worn axle bearing (front or rear)
	Loose wheel lug nuts
	Motor bearings worn
Oil leak in rear wheel bearing area	Wheel bearing and/or gasket failed
	Drive overfilled
Brake pedal soft or spongy	Air in brake lines
Brake pedal low	Brake worn (1/16" wear limit)
	Brake fluid low
	Brakes out of adjustment
Braking power low	Brakes worn (1/16" wear limit)
	Brake shoes/pads contaminated with fluid
	Brake pedal linkage binding
	Brakes out of adjustment
	Air in brake lines
* Probable causes are to be used as a guide only. They are not all inclusive of the problems that can result with the symptom indicated	



BRAKES



⚠ CAUTION

Do not drive the vehicle if any worn or broken part is detected in any part of the brake system. The cause of the damage must be repaired immediately.

The brake system is a 2 wheel hydraulic disc brakes (front brakes optional). Hydraulic disc brakes are not adjustable and only require periodic inspection to insure that they are in good operating condition.

Rear brake pads

REPLACING THE BRAKE PADS

1. Raise the rear end and support it.

⚠ WARNING

Always use jack stands when supporting the vehicle.

2. Remove the rear wheel.
3. Remove the two 1/4" caliper retaining bolts.

NOTE *At this point there is nothing retaining the brake cylinder. Do not let it hang by the brakes hose.*

4. Inspect the spacers for wear and replace as necessary.
5. Replace the spacer bushings.
6. Re-assemble the brake in reverse order.

⚠ WARNING

The 1/4" gr. 8 lock nuts for the brake body bolts must be replaced.

- A) Tighten the new retaining bolt lock nuts to 11 ft lbs.
7. Test drive

Front brake pads (optional)

The front brake rotors are an integral part of the front hub. If the rotors are damaged or worn the front hub must be replaced.

REPLACING THE BRAKE PADS

1. Raise the front end and support it.

⚠ WARNING

Always use jack stands when supporting the vehicle.

2. Remove the front wheels.
3. Remove the two 1/4" caliper retaining bolts.

NOTE *At this point there is nothing retaining the brake cylinder. Do not let it hang by the brakes hose.*

4. Inspect the spacers for wear and replace as necessary.
5. Replace the spacer bushings.
6. Re-assemble the brake in reverse order.

⚠ WARNING

The 1/4" gr. 8 lock nuts for the brake body bolts must be replaced.

- A) Tighten the new retaining bolt lock nuts to 11 ft lbs.
7. Test drive.

Repairing the brake body

1. Remove the brake body. Refer to replacing the brake pads.
2. Carefully remove the two pistons. Rubber boots and o-rings.

CAUTION

The pistons are very brittle and break easily.

3. Clean and dry the brake body completely.

CAUTION

Make sure there are not contaminants left in the brake body.

4. Inspect the interior of the brake body. If any damage or wear is found it must be replaced.
5. Re-assemble the brake body using clean DOT 5-brake fluid as a lubricant.



Use tool #41-350-13 to install the rubber boots.

6. Install the brake body.

WARNING

The 1/4" gr. 8 lock nuts for the brake body bolts must be replaced.

- A.) Tighten the new retaining bolt lock nuts to 11ft lbs.
7. Bleed the brakes.
 8. Test drive.

Parking Brake

PRIMARY ADJUSTMENT

1. Block the wheels.
2. Release the parking brake.
3. Turn the park brake handle clockwise to until the brake holds. There should be no drag when released.

SECONDARY ADJUSTMENT

1. Block the wheels.
2. Release the parking brake.
3. Back off the primary adjustment (previous section.)
4. Loosen the jam nut 1/2" brake band bolt.
5. Tighten the brake band bolt as necessary. There should be not drag on the brake band.
6. Tighten the jam nut.



It will be necessary to readjust the primary parking brake adjustment.

Parking Brake Cable

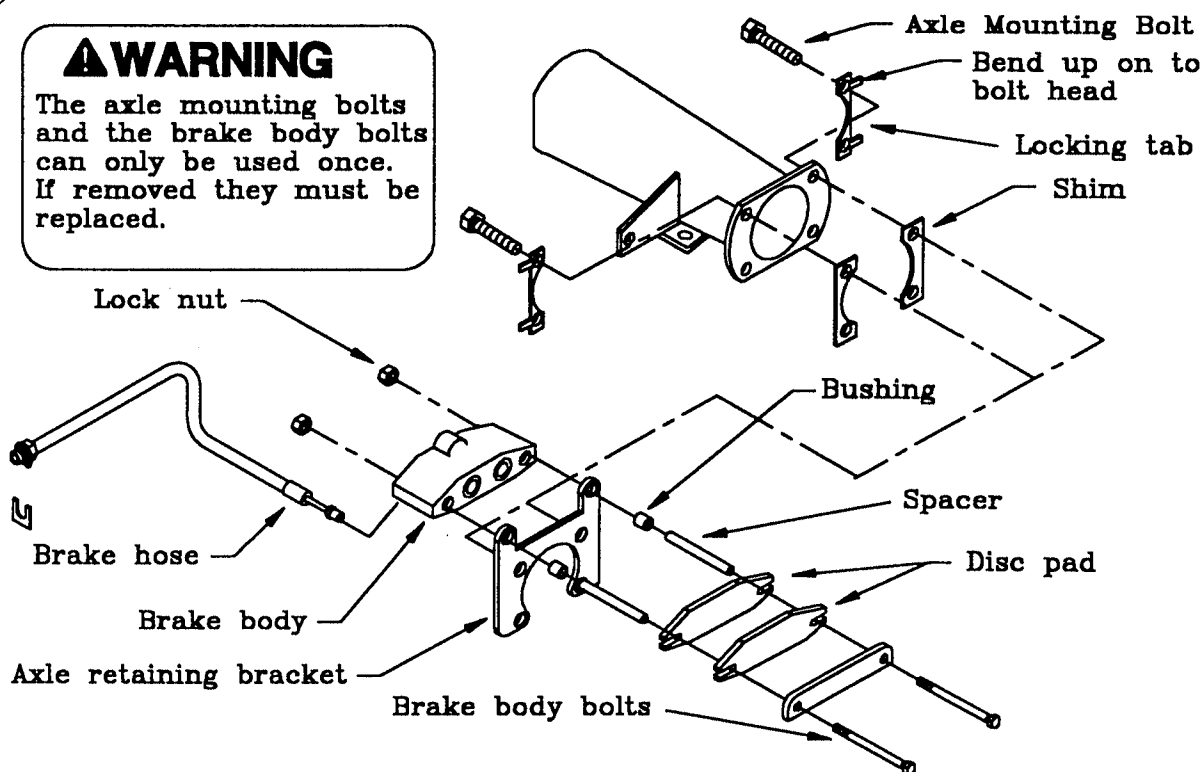
Visually inspect the brake cable for signs of wear or cracks. Visually inspect the end connections for broken wire strands.

WARNING

Replace any worn or damaged cables immediately.

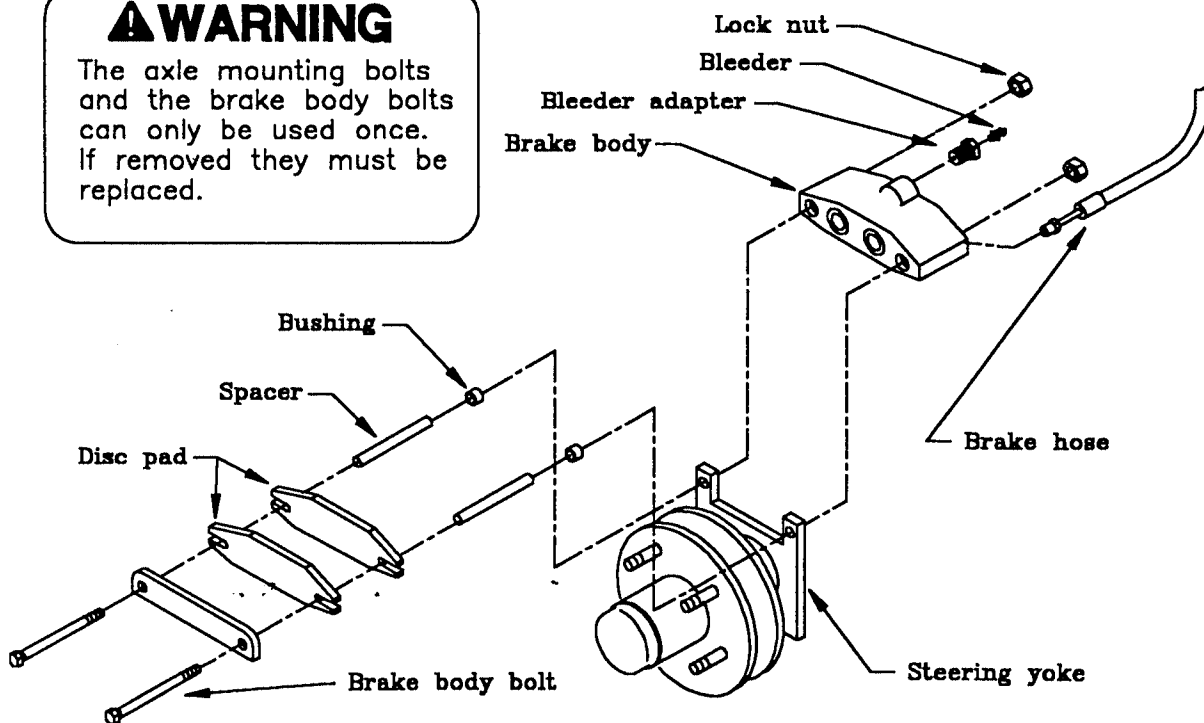
⚠ WARNING

The axle mounting bolts and the brake body bolts can only be used once. If removed they must be replaced.



⚠ WARNING

The axle mounting bolts and the brake body bolts can only be used once. If removed they must be replaced.



FRONT AXLE/STEERING



Removal

1. Disconnect the batteries.
2. Lift the front end and support with jack stands.
3. Block the rear wheels to prevent the truck from rolling.
4. Remove both front wheels.
5. Disconnect the brake hoses from the disc brake bodies (if equipped).

CAUTION

Brake fluid will drip from the open brake lines.

6. Remove the drag link from the left (driver) side steering yoke.
7. Remove the u-bolts holding the axle to the springs.

CAUTION

Support the axle with additional stands or tie it up to the frame to prevent it from falling.

8. Remove the lower bolts from the rear front spring hangers.
9. Remove the axle from the truck.

Installation

1. Install in reverse order.
2. Tighten spring hanger snugly but still allowing the spring to pivot.
3. Tighten the drag link ball joint to 40-45 ft. lbs.
4. Bleed the front brakes and check for leaks.

Aligning the Front End

Caster and camber are set at the factory and do not require adjustment.

1. Raise the front end of the vehicle and support with jack stands.
2. Center the steering.
3. With a piece of chalk mark a line around the center of both tires by holding the chalk against the tire while turning the wheel.
4. Loosen the ball joint clamps at each end of the tie rod so the adjusting sleeve can be turned.
5. Lower front end back on the ground.
6. With the wheels in the straight forward direction measure the distance between chalk lines at the front and the rear of the tires.
7. Adjust the tie rod sleeve until the distance from mark to mark across the front of the tires is the same as the distance from mark to mark across the rear.
8. Tighten the ball joint clamp nuts securely.

Centering the steering

1. Remove the pitman arm from the steering gear.
2. Align the front wheels straight ahead and tie or clamp in position..
3. Center the steering gear.
 - A) Turn the gear all the way to the left.
 - B) Turn back three turns and tie off so it can not move.
4. Install the pitman arm while keeping the front wheels in the straight ahead position. Tighten nut to 70 ft lbs.
5. Remove and center the steering wheel on the steering shaft while keeping the front wheels in the straight ahead position.
6. Install the steering wheel nut and cap.

Repair

Steering yoke/bushings

1. Remove the bearing cap, spindle nut and the wheel/hub assembly.

CAUTION

Catch the outer bearing as it falls out.

2. Remove the drag link and tie rod from the yoke (only if the yoke is to be replaced).
3. Remove the king pin nut.
4. Remove the yoke from the axle.
5. Clean and replace as necessary, bearings, bushings, thrust washers.

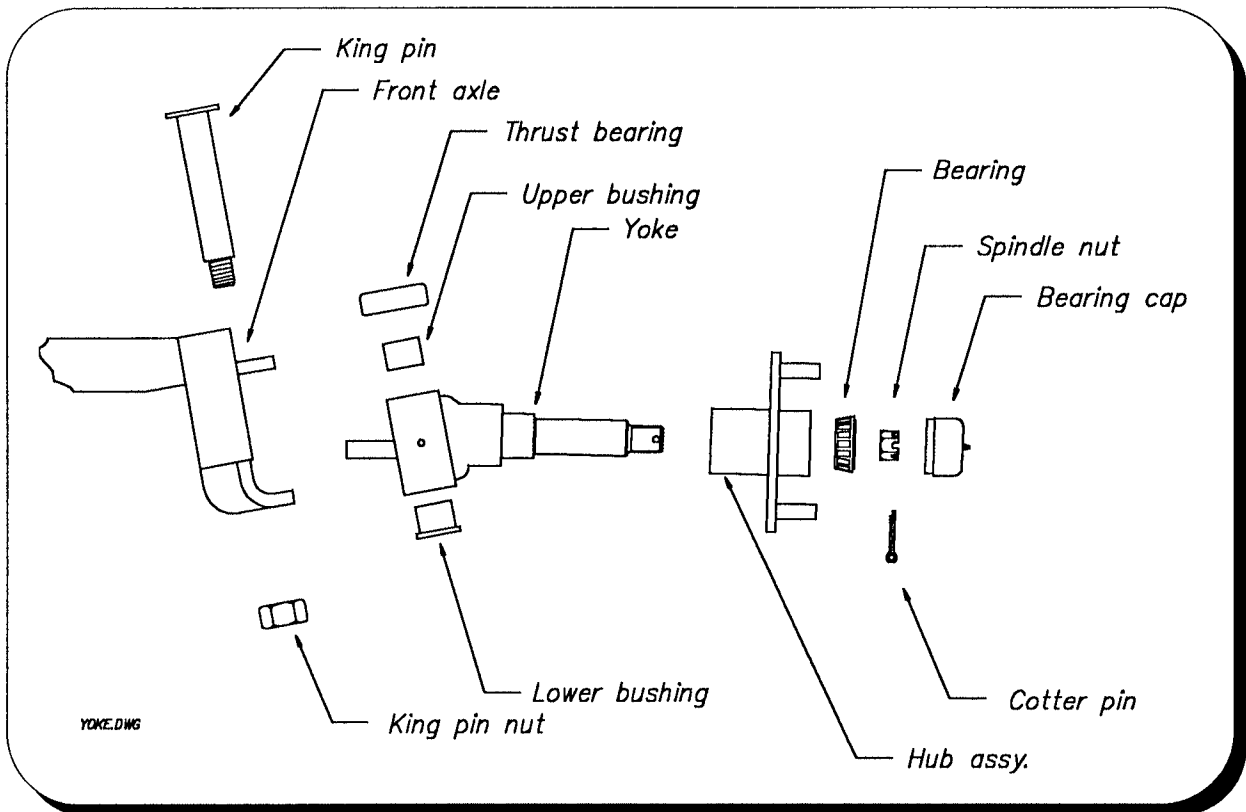
If the bushings are replaced they must broached or reamed to 0.880 +0/-.001 after they are pressed into the axle.

6. Install in reverse order.
7. Clean and pack the thrust bearing with grease.

CAUTION

The thrust bearing must be orientated correctly. See figure below.

8. Tighten the king pin nut completely against the shoulder of the king pin.
9. Tighten the drag link ball joint nut (if it was removed) to 40-45 ft. lbs. Use a **NEW** cotter pin.
10. Install the front wheel.
 - A) Tighten spindle nut to 30 ft. lbs. to seat bearings.
 - B) Back off spindle nut to the next slot on the nut and install a **NEW** cotter pin.
11. Install the bearing cap.



Wheel bearings

1. Remove the tire/wheel assembly.
2. Remove the bearing cap and spindle nut.
3. Remove the hub from the spindle.

CAUTION

Catch the outer bearing as it falls out.

4. Clean ALL grease from the inside of the hub and bearings.
5. Inspect and replace the races and bearings as a set as necessary.

CAUTION

It is recommended to replace both left and right side wheel bearings at the same time.

6. Assemble in reverse order. Use a new grease seal.
 - A) Pack inner and outer bearings with grease.
 - B) Tighten the spindle nut to 30 ft. lbs. while rotating the hub to seat bearings.
 - C) Back off spindle nut to the next slot on the nut and install a **NEW** cotter pin.
7. Install the bearing cap.

Ball joints

CAUTION

It is recommended to replace all the ball joints as a set.

1. Loosen the ball joint clamp. Note its position on the sleeve.
2. Remove the ball joint nut, and then remove the ball joint using a pickle fork.
3. Count the number of turns while removing the ball joint from the drag link or tie rod.

4. Lightly lubricate the threads on the new ball joint and install into the drag link or tie rod counting the same number of turns as when removed.
5. Install the ball joint into the steering arm and tighten nut to 40-45 ft, lbs. Use a **NEW** cotter pin.
6. Lube the new ball joint.
7. Realign the front wheels.
8. Tighten the ball joint clamps securely.

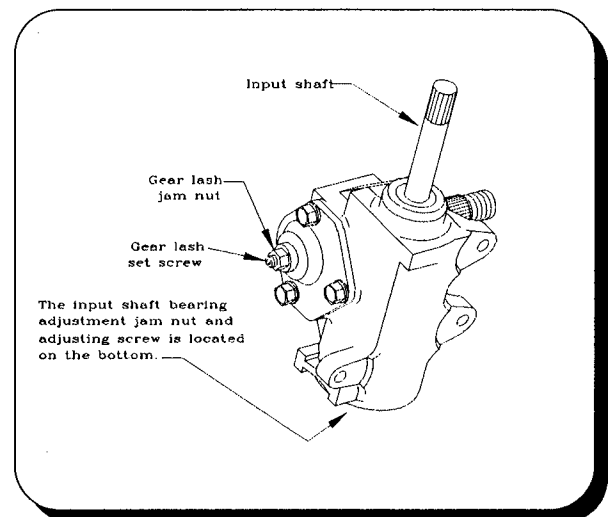
CAUTION

Make sure the clamps are in there original position noted in step 1. Turn the steering all the way from left to right to make sure there is no interference.

Steering gear adjustment

End play

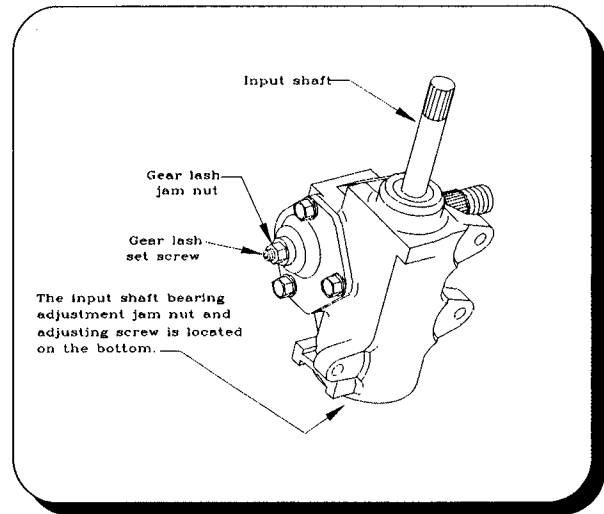
1. Loosen the input shaft bearing adjustment jam nut.



2. Tighten the adjusting nut so that there is no end play or wobble in the input shaft.
3. Tighten the jam nut.

Gear lash

1. Remove the pitman arm. Note its position.
2. Loosen the jam nut for the gear lash set screw.
3. Tighten the set screw so that there is a slight drag when the steering gear passes through the center of its travel (about 3 turns from lock).
4. Tighten the jam nut. Do not allow the set screw to turn while tightening.
5. Install the pitman arm in its original position. Tighten to 70 ft. lbs.





DRIVE AXLE



Power Traction Assembly

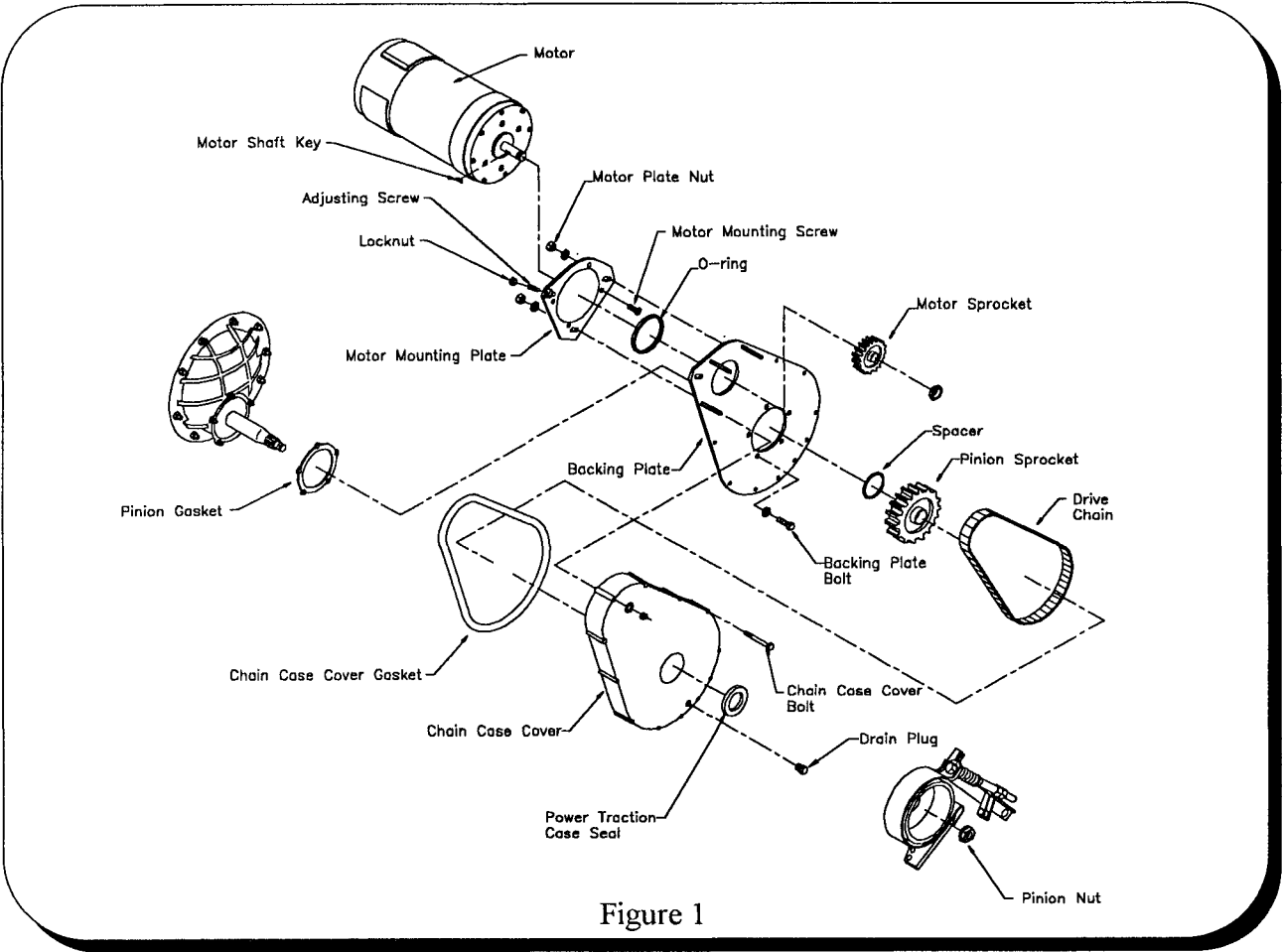


Figure 1

Drive Chain Adjustment

- 1. Disconnect the main positive and negative battery cables.
- 2. Set the parking brake.
- 3. Place a drip pan under the chain case to catch any oil that may spill.
- 4. Loosen the three motor mounting plate nuts to let the motor mounting plate move freely.
- 5. Loosen the chain adjusting screw jam nut.
- 6. Turn the chain adjusting screw so that the ends of the motor fan blades have 1/8" to 1/4" free play.
- 7. Tighten the three motor mounting plate nuts.

- 8. Tighten the adjusting screw lock nut while preventing the adjusting screw from turning.
- 9. Reconnect the main battery leads.

NOTE If the top of the adjusting screw is close to the jam nut (1/16") it is time to replace the drive chain.

Chain adjustment schedule	
Interval	Period
First	100 hours
Second	200 hours
Following	Every 400 hours

Motor Removal

1. Disconnect batteries
2. Disconnect all power leads to the motor.
3. Support the motor with a hoist and strap of sufficient capacity.
4. Remove the chain adjusting screw
5. Remove the three motor mounting nuts and washers.
6. Remove the motor by lifting the back end of the motor and rotating the motor clockwise, which will move the adjusting tab off of the flat on the chain case plate. The motor with the mounting plate attached should be able to slide out from under the chain.

CAUTION

Do not move the vehicle at this time as this may cause the chain to become jammed inside the chain case cover.

Motor Installation

1. Clean all mounting surfaces on the motor and mounting plates.
2. Make sure the o-ring is seated correctly in the motor mounting plate.
3. With a wire formed in to a hook, tie the chain up to the upper slot on the backing plate.
4. Install the motor on to the chain case backing plate and slip the sprocket under the chain.

NOTE *The chain must be properly seated on the large sprocket for proper installation to the motor sprocket.*

5. Install a mounting nut holding the motor mounting plate and motor to the chain case backing plate and leave loose.
6. With the chain loosely on the upper sprocket, remove any wire used to support the chain.

CAUTION

Do not allow the wire to break. If the wire breaks the chain case must be disassembled to get it out.

7. Move the vehicle slightly. The motor armature should rotate. If the armature does not rotate, then the chain is not seated properly.
8. Install the remaining hardware onto the mounting studs and finger tighten.
9. Adjust the chain tension as instructed in 'Drive Chain Adjustment' in this section.

NOTE *If the chain is not seated properly the motor will not be able to turn after the mounting nuts are tightened.*

Power Traction

1. Disconnect the batteries
2. Remove the drain plug and drain the oil from the chain case.
3. Remove the brake band assembly.
4. Remove the pinion nut and brake drum from the pinion shaft.
5. Remove the remaining bolts and nuts holding the cover to the backing plate, and remove the chain case cover.
6. Loosen the chain adjusting screw completely.
7. Remove the chain, pinion sprocket, and spacers from the pinion shaft. Note the spacer position and location for re-assembly.
8. Remove the chain from the motor sprocket and remove the motor.
9. Replace as necessary, chain, sprockets.
10. Assemble in reverse order. Use new gaskets and pinion seal.

11. Insert a centering tool (Taylor-Dunn # 41-532-01) on to the chain case cover to center the power traction case seal.

CAUTION

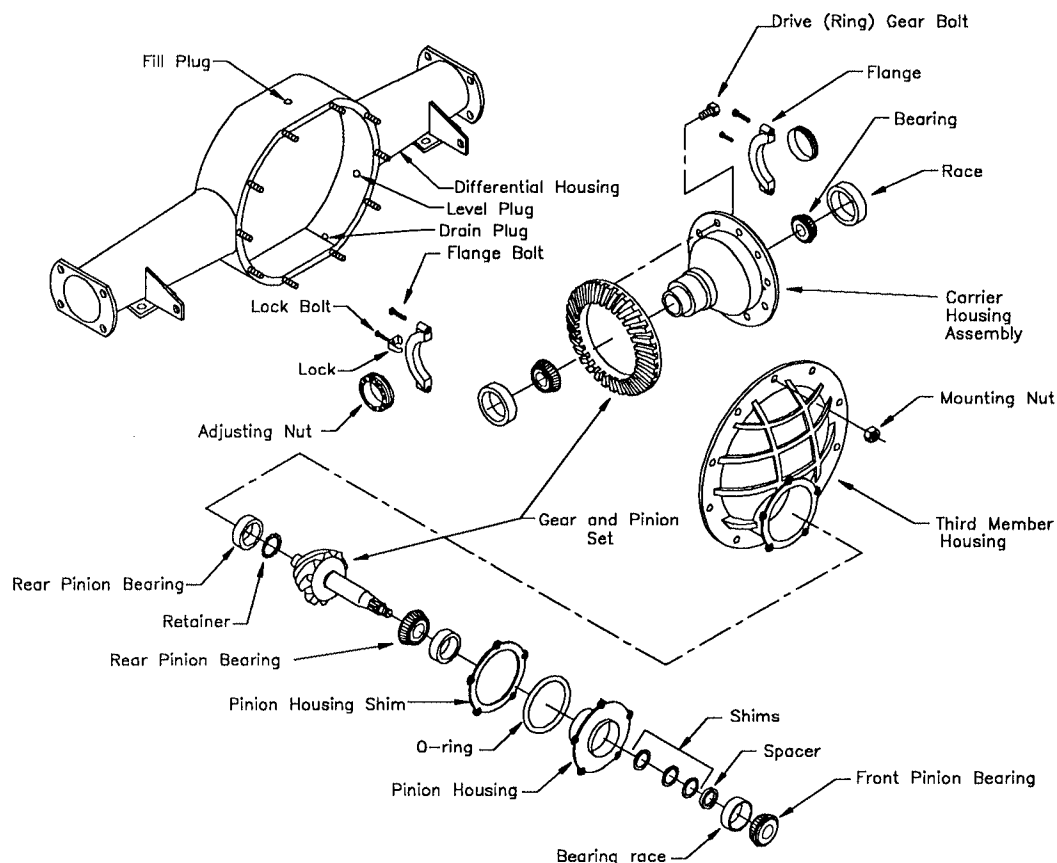
If the chain case is not centered correctly oil will leak on to the parking brake.

12. install the old pinion nut, tighten to 100 ft-lbs.
13. Install the brake band assembly.
14. Tighten the chain case cover mounting bolts to 20 ft-lbs torque.
15. Remove the old pinion nut and install a new pinion nut, tighten to 175 ft-lbs.
16. Adjust the chain tension as instructed in 'Drive Chain Adjustment' in this section.
17. Fill the chain case with oil.

Differential Service and Repair

NOTE *It is not necessary to remove the entire drive assembly from the vehicle to perform this procedure. It is also not necessary to remove the axles from the differential housing. The housing is shown without the axles for clarity.*

1. Raise the drive wheels and support with jack stands.
2. Drain the oil from the Power Traction chain case and drive.
3. Remove the motor and Power Traction assemblies.
4. Remove the rear wheels and brakes.
5. Using a slide hammer, remove the axles about 4" from the drive housing.
6. Remove the 3rd member mounting nuts and remove the 3rd member from the drive housing.



7. Remove the carrier bearing flanges and the carrier assembly from the housing.
8. Remove the pinion housing assembly from the 3rd member.

CAUTION

Do not loose the shims!

9. Replace as necessary, bearings/races and gears.
10. Assemble in reverse order.
 - A) Pre-lube all bearings and gears during assembly.
 - B) Cross tighten ring gear bolts to 72 ft. lbs.
 - C) If the pinion bearings or gears are replaced the drive must be re-shimed (see next section).
 - D) Use new seals.

Adjust the backlash as follows

1. Install the correctly shimmed pinion gear housing and pinion gear.
2. Temporarily install the drive sprocket and brake drum. Torque the pinion nut to 100 ft. lbs.
3. Tighten the carrier bearing cap bolts to 15 ft. lbs.
4. Position the carrier assembly against the pinion gear and turn the adjusting nuts to contact the carrier bearings.
5. Loosen the adjusting nut on the toothed side of the ring gear slightly.
6. Tighten the other nut so that there is no gear backlash but not so tight as to cause binding.
7. Tighten the adjusting nut on the tooth side of the ring gear so that there is .008 to .012 backlash.
8. Tighten the carrier bearing cap bolts to 40-55 ft. lbs.

Re-shimming pinion bearings

1. Remove the pinion housing from the 3rd member.
2. Install the drive gear and brake drum (or equivalent spacer) on to the pinion shaft and tighten to 100 ft. lbs.
3. The pinion gear should turn freely with zero radial play.

CAUTION

Do not rotate bearings when dry, they must have a lubricant or they will be damaged.

4. Add or remove shims as necessary.

Selecting pinion housing Shims

Shims are available from 0.005" to 0.021" thickness in increments of 0.001" to correctly position the pinion gear. The standard shim is 0.015" thick.

The following numbering system is used on pinions to indicate the amount you must add to or subtract from the standard shim. Locate the number on the flat surface on the small shaft end of the pinion gear. Match the number with the shim required for proper mating of the ring and pinion gears.

Pinion numbering system	
If number is	Add shim as follows
+0	No adjustment
+1	Add .001 shim
+2	Add .002
+3	Add .003
+4	Add .004
+5	Add .005
-1	Subtract .001 shim
-2	Subtract .002
-3	Subtract .003
-4	Subtract .004
-5	Subtract .005

Differential Oil

1. Place a drain pan under drive that can hold 3 quarts.
2. Remove the differential and chain case drain plugs.
3. Replace the drain plugs and remove the differential fill and level plugs.
4. Install oil into the differential through the filler hole until the oil starts to come out of the level hole (about 2 quarts).
5. Install the level plug.
6. Add an additional 1/2 quart (for chain case, it will be pumped in from the differential).
7. Install the remaining plugs

Rear Axle and Bearing Replacement

1. Raise the drive wheels and support with jack stands
2. Remove the rear wheel.
3. Remove the brake assembly.

⚠ CAUTION

Do not let the brake assembly hang by the brake hose.

4. Using a slide hammer, remove the axle from the housing.

5. Press the retainer ring and bearing from the axle shaft.
6. Press a new bearing and retainer ring onto the axle.

⚠ WARNING

Do not reuse the old bearing retainer

7. Remove and replace the oil seal and/or gaskets from the housing.
8. Install in reverse order.
 - A) Use new locking tabs on brake bolts.
 - B) Tighten the brake bolts to 35-40 ft. lbs.

⚠ WARNING

Failure to properly bend up the locking tabs could cause the mounting bolts to loosen and result in brake failure.

DRIVE MOTOR



Dis-assembly

1. Remove the motor from the chain case.
2. Remove the key(s) from the shaft(s).
3. Remove the front bell housing.
4. Pull the armature out from the motor housing.
5. Remove the rear bell housing.

Replacing the brushes

1. Remove the Brush covers.
2. Remove the brush wire from the brush holder.
3. Pull the brush straight out from the brush holder.

NOTE → *Hold the spring so it does not snap back down into the holder.*

4. Install in reverse order.

NOTE → **MINIMUM BRUSH LENGTH**
 70-054-00 MOTOR- .50".
 70-061-00 MOTOR- .75".
 70-057-10 MOTOR- .80".
It is recommended to replace the brushes as a set.

Inspecting the armature

1. If any solder has been thrown from the armature the motor must be replaced.

NOTE → *Check the inside of the motor housing around the commutator for bits of solder.*

2. If the commutator is grooved it must be cut on a lathe.

3. Measure the undercut on the commutator.

A) If less than .025" then the mica must be undercut. See diagram.

4. Measure the commutator diameter. If out of spec' the armature is worn out and the motor must be replaced.

A) 70-054-00 MOTOR-2.75".

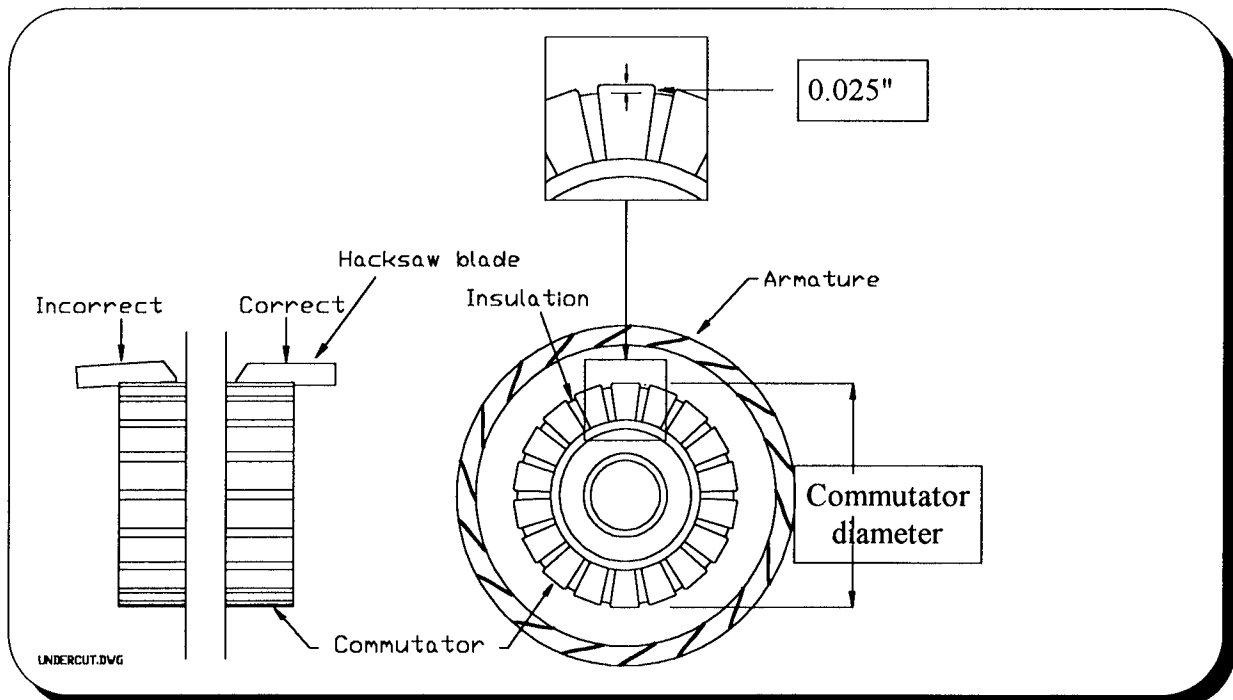
70-061-00 MOTOR-3.109".

70-057-10 MOTOR-2.625".

5. Spin the bearings by hand.

A) If any vibration or roughness is felt they must be replaced.

NOTE → *It will require a press to replace the bearings.*



BATTERIES/TIRES



Battery

⚠ WARNING

Battery electrolyte is poisonous and dangerous. It contains sulfuric acid. Avoid contact with skin eyes or clothing. Wear rubber gloves and safety glasses while servicing batteries. DO NOT INGEST!!

Batteries produce an explosive gas when charging. DO NOT SMOKE, produce an open flame or spark while checking or servicing a battery.

Cleaning

1. Dry dirt can be readily blown off with low pressure air or brushed off.
2. Wetness or wet dirt on the covers indicates battery acid. Using a nonmetallic brush with flexible bristles wash it off with a strong solution of baking soda and hot water (1 lb. of soda to gallon of water). Continue until all fizzling stops which indicates that the acid has been neutralized. Then rinse thoroughly with clear water. DO NOT get any of the solution into the battery cells.

Servicing

1. Check the electrolyte level in all batteries. If low fill with distilled water up to the correct level (see diagram).

⚠ CAUTION

Do not overfill the battery. An over-filled battery may leak acid.

2. Clean the battery (see above).
3. Clean the cell posts connectors and battery box with water.

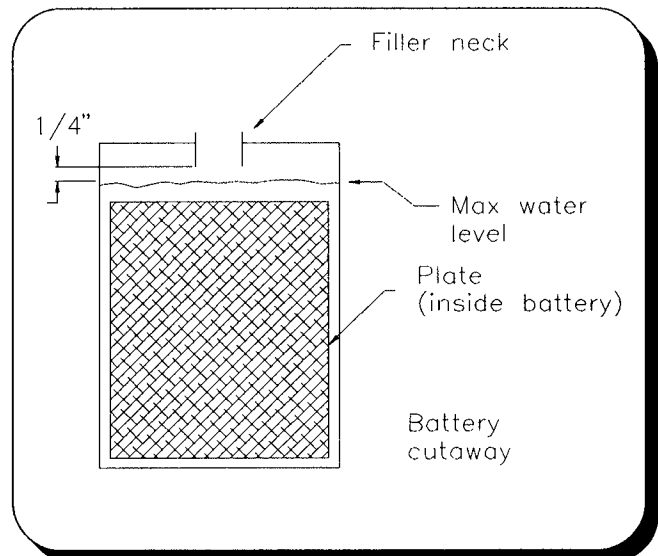
Charging

⚠ WARNING

Explosive mixtures of hydrogen gas are present within battery cells at all times. Do not work with or charge battery in an area where open flames (including gas furnace or water heater pilots), sparks, cigarettes or any other source of combustion are present. Always provide ample ventilation in rooms where batteries are being charged.

To charge the battery do the following:

1. Check the electrolyte level. If low, fill with distilled water up to the correct level (see diagram).
2. Park the vehicle in an approved area for charging and plug the charger in.
3. Allow the charger to cycle completely before unplugging.



BATTERY STORAGE

The following pointers will help extend the life of the battery when storing your vehicle for the winter season:

- ♦ Clean and check the electrolyte level and charge level of the battery. Do not store a battery low in electrolyte or in a low state of charge.
- ♦ Recharge a battery not in use every 1 to 2 months.
- ♦ If possible store the vehicle in a cool dry place.
- ♦ If the batteries are removed from the vehicle do not place them directly on the ground, concrete or solid metal surface. It is recommended to store them on a wooden pallet or equivalent.

Tires

1. Check the tires for nicks or grooves and replace if necessary.
2. Ensure that the tire is properly seated on the rim.
3. Ensure that all the lug nuts are installed and secure.
4. Check the air pressure in the tires and inflate if necessary to the pressure specified.

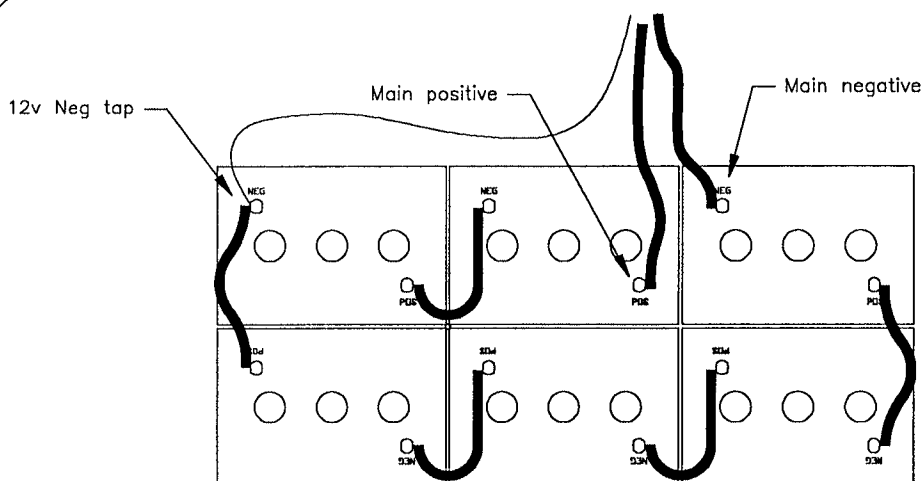
TIRE CARE

1. Refer to the chart below to determine the correct tire pressure for your needs.

CAUTION

Avoid over-inflating or under-inflating tires as both these conditions cause increased tire wear.

TIRE INFLATION CHART						
Tire size	Type	Part number	Load range	Ply rating	PSI (MAX.)	Max. load/tire (lbs)
5.70-8	Highway tread	10-081-00	B	4	60	915
5.70-8	Highway tread	Special order	C	6	90	1,160
8.50-8	Highway tread	10-093-00	B	4	22	915





ELECTRICAL SYSTEM



ELECTRICAL TROUBLESHOOTING

TOOLS NEEDED: Volt-OHM meter
Test light (voltage equal to MAX battery voltage)
9//16" comb. wrench
1//2" comb. wrench
62-027-31 test harness

- *All voltage tests done referenced to battery negative unless otherwise specified.*
- *Battery volts = full voltage available at batteries at time of test.*
- *All tests key switch on. Safety switches (if equipped) on.*
- *This test procedure must be performed in the order it was written. If you start in the middle or skip sections you may not get the proper results.*
- *When "BATTERY volts" is specified it indicates the current full voltage available at the batteries*

⚠ WARNING

DURING ALL TESTS -

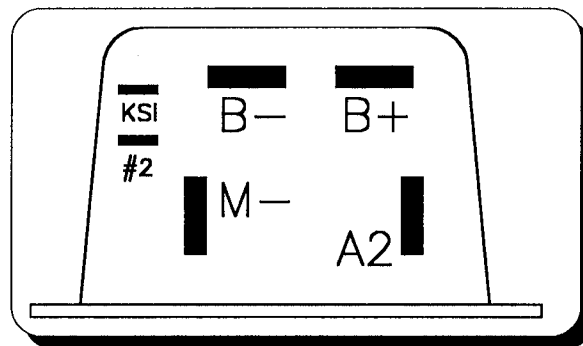
BOTH DRIVE WHEELS JACKED UP OFF THE GROUND, SUPPORTED BY JACK STANDS WITH FRONT WHEELS BLOCKED.

After any repairs are made completely test vehicle BEFORE lowering to ground.

START: IF THE TRUCK RUNS IN ONLY ONE DIRECTION THEN GO TO SOLENOIDS

➤ **CONTROL WIRES AT PMC**

1. With the Accelerator pedal depressed to engage MS1 only (creep speed) and the directional switch in gear (forward or reverse).
 - A) Test volts at PIN #2 on the PMC. If not 6-6.5 v. then GO TO ACCELERATOR MODULE.
 - B) Test volts at PIN "KSI" on the PMC. If not BATTERY volts then GO TO KSI.
2. With the accelerator pedal fully depressed.
 - A) Test volts at PIN #2 on the PMC. If not 11-11.5 v. then GO TO ACCELERATOR MODULE.



PMC

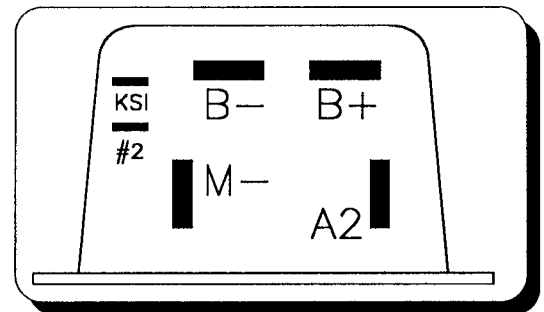
➤ POWER WIRING

➤ **NOTE:** *All tests in this section is with the resistor at the ISO solenoid disconnected. Reconnect the resistor when done with this section.*

1. With the accelerator pedal depressed to engage MS1 only (creep speed).
 - A) Test volts from BATTERY NEG to "B+" on the PMC. If not BATTERY volts then GO TO SOLENOIDS
 - B) Test volts from "B+" on the PMC to "B-" on the PMC. If not BATTERY volts then check the wire and connections from BATTERY NEG to "B-" on the PMC. **>STOP**
 - C) Using ohm meter (R*10), check the ISO resistor. If not 250 ohms replace resistor.

➤ **NOTE:** *A defective resistor causes intermittent operation of control.*

2. Reconnect the resistor.
3. With the accelerator pedal depressed fully.
 - A) Test volts from "M-" on the PMC to "B+" on the PMC. If not BATTERY volts then the PMC is bad. **>STOP**
 - B) Connect the test light across MOTOR S1-S2 terminals. If the light is ON then the field is open. **>STOP**
 - C) Connect the test light across MOTOR A1-A2 terminals. If the light is ON then the armature is open. **>STOP**



GO TO SOLENOIDS

➤ ACCELERATOR MODULE (MAGNETIC OR SOLID STATE ONLY)

➤ **Note:** *These tests are done at the accelerator using the 62-027-31 test harness.*

1. With the accelerator pedal depressed to engage MS1 only (creep speed).
 - A) Test volts at PIN #4. If not BATTERY volts then GO TO KSI
 - B) Test volts from PIN #4(+) to PIN #9(-). If not BATTERY volts then check the wire (pin #9 to circuit breaker), circuit breaker. **>STOP**
 - C) Test volts at PIN #2. If not 6-6.5 v. then the accelerator module is bad. **>STOP**
 - D) Test volts at PIN #5. If not BATTERY volts then the accelerator module is bad. **>STOP**

➤ **NOTE:** *A broken return spring will cause no output at PIN #5.*

2. With the accelerator pedal fully depressed.
 - A) Test volts at PIN #2. If not 11-11.5 v. then the accelerator module may need adjusting or is bad. **>STOP**
 - B) If volts at MODULE (PIN #2) are good but at PMC (PIN #2) are bad then check the wire in pin #2 from the module to the PMC. **>STOP**

➤ **NOTE:** *Some models route wire #2 through a seat switch.*

➤ KSI

1. Check the KEY switch and/or safety interlock switches (if equipped) for continuity.
 - A) Some models route the key switch through the F&R switch
 - B) Check control wiring. **>STOP**

SECTION 3

➤ SOLENOIDS

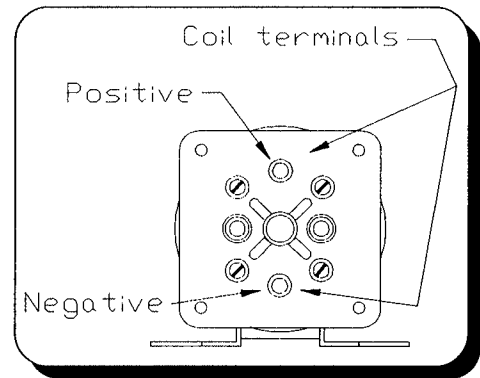
1. Using ohm meter (R*10), check the ISO resistor. If not 250 ohms replace the resistor.

➤ **NOTE: A defective resistor causes intermittent operation of control.**

If FORWARD only then GO TO FORWARD ONLY

If REVERSE only then GO TO REVERSE ONLY

2. Place the directional switch in neutral.
3. If the ISO solenoid clicks when the accelerator pedal is depressed then GO TO ISO
4. Test volts from BATTERY positive to the ISO coil negative.
 - A) If not BATTERY volts then check the negative control wiring and the circuit breaker. >STOP
5. With the accelerator pedal fully depressed.
 - A) Test volts across the ISO coil. If not BATTERY volts then check the wiring, MS1, safety switches, KEY switch. >STOP
 - B) Test volts across the ISO coil. If BATTERY volts then the ISO coil is bad. >STOP



ISO

1. Connect the test light across the ISO power contacts and depress the accelerator pedal fully.
 - A) If the light is on then the ISO solenoid is bad. >STOP
 - B) If the light is off then check the power wiring to the batteries and to the PMC for opens. >STOP

FORWARD ONLY

1. Place the directional switch in NEUTRAL.
2. Depress the accelerator pedal. Move the directional switch to reverse.
 - A) If the REVERSE solenoid clicks then GO TO forward contacts.
 - B) Check volts from BATTERY positive to the negative coil terminal on the REVERSE solenoid. If not BATTERY volts then check the solenoid bus bar connections. >STOP
 - C) Check the voltage across the REVERSE solenoid coil.
 - 1) If BATTERY volts then the REVERSE solenoid is bad. >STOP
 - 2) If not BATTERY volts, check the control wiring, directional switch. >STOP

FORWARD CONTACTS

Connect the test light across the normally closed contacts of the FORWARD SOLENOID

1. Depress the accelerator pedal fully.
 - A) If the light is on then the FORWARD solenoid is bad. >STOP

Connect the test light across the normally open contacts of the REVERSE SOLENOID

2. Depress the accelerator pedal fully.

A) If the light is on then the REVERSE solenoid is bad. **>STOP**
 If the light did not come on then check all power wiring for opens. **>STOP**

REVERSE ONLY

Place the directional switch in NEUTRAL.

1. Depress the accelerator pedal. Move the directional switch to FORWARD.
 - A) If the FORWARD solenoid clicks then GO TO Reverse Contacts
 - B) Check volts from BATTERY positive to the negative coil terminal on the FORWARD solenoid. If not BATTERY volts then check the solenoid bus bar connections. **>STOP**
 - C) Check voltage across FORWARD solenoid coil.
 - 1) If BATTERY volts then the FORWARD solenoid is bad. **>STOP**
 - 2) If not BATTERY volts then check the wiring, directional switch. **>STOP**

REVERSE CONTACTS

Connect the test light across the normally closed contacts of the REVERSE SOLENOID

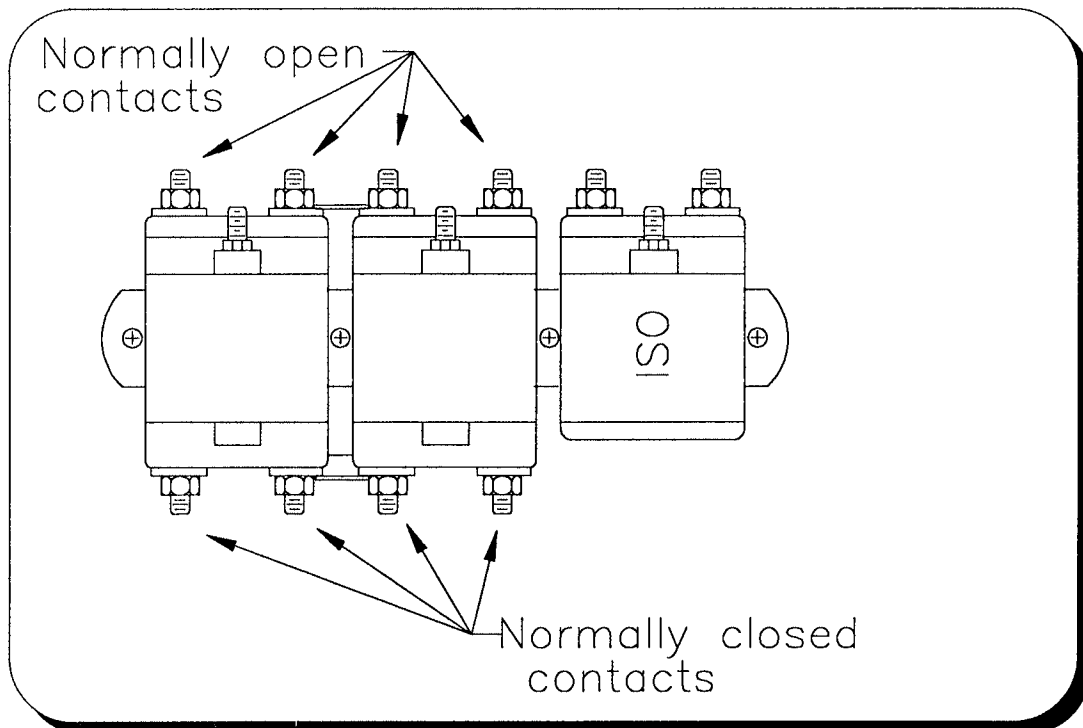
1. Depress the accelerator pedal fully.
 - A) If the light is on then the REVERSE solenoid is bad. **>STOP**

Connect the test light across the normally open contacts of the FORWARD SOLENOID

2. Depress the accelerator pedal fully.
 - A) If the light is on then the FORWARD solenoid is bad. **>STOP**

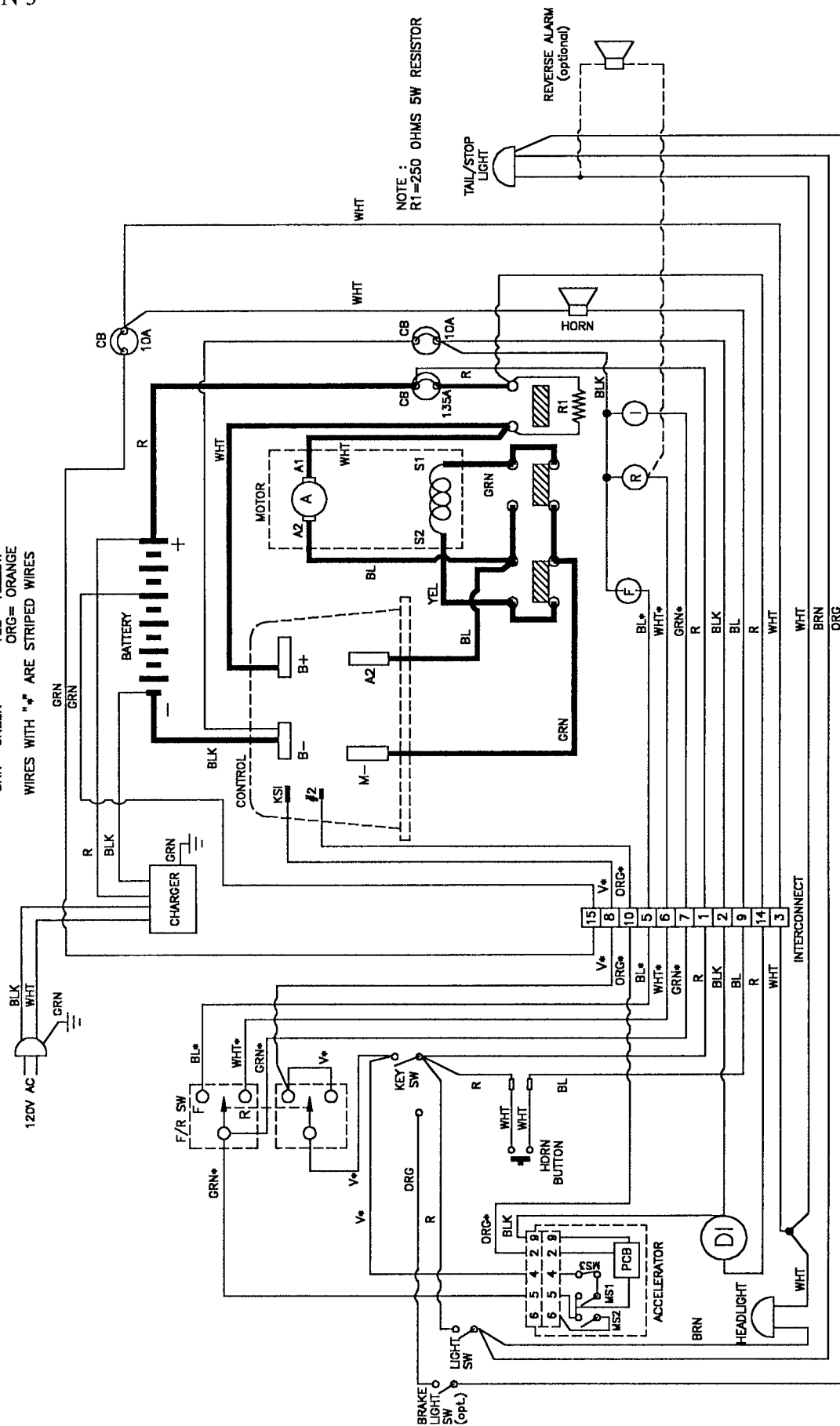
If light DID NOT come on then check all power wiring for opens. **>STOP**

If you reached this point without a solution then you may have an unanticipated problem or have made an error during testing.



SECTION 3

BLK= BLACK
 BL= BLUE
 BRN= BROWN
 GRN= GREEN
 R = RED
 V = VIOLET
 WHT= WHITE
 YEL= YELLOW
 ORG= ORANGE
 WIRES WITH "*" ARE STRIPED WIRES
 I = ISOLATOR
 F = FORWARD
 R = REVERSE
 CB = CIRCUIT BREAKER



CHARGING SYSTEM



LESTER CHARGER TROUBLESHOOTING

MODEL 7460 TYPE 36LC25-8ET (STANDARD)

⚠ WARNING

HIGH VOLTAGE and HIGH DC CURRENT. If you do not understand any part of these tests, refer testing to a qualified electrical mechanic.

⚠ WARNING

Prevent the truck from moving. Before performing maintenance on any vehicle, disconnect the batteries, set the parking brake and block the wheels

1. Disconnect the charger from the AC and DC source.
2. If this is a built in charger then remove the charger from the truck.
3. Remove the charger cover.

⚠ WARNING

High voltage may be stored in the capacitor. Discharge the capacitor with an insulated screwdriver before proceeding. Do not touch the screwdriver blade while discharging the capacitor.

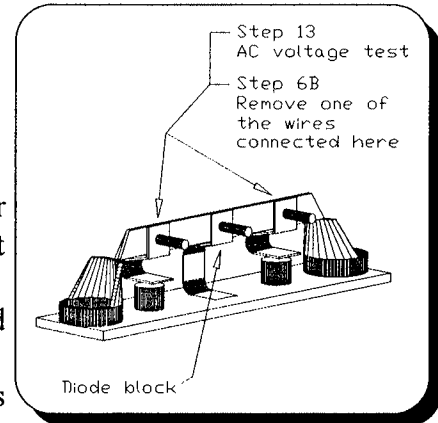
4. Inspect all internal wiring and repair as necessary.
5. Inspect the fuse link and replace if bad.
6. Test diodes.
 - A) Use a VOM set at R x 100 ohms scale.
 - B) Remove one lead from one diode (Fig. 1)
 - C) Connect test leads across one diode. Meter should either deflect to right side of scale or not at all.
 - D) Reverse polarity on diode test leads. You should get the opposite reading of the previous test.
 - E) If you get the same reading in both polarities then the diode is bad.
 - F) Repeat the test on the other diode.

➤ ***NOTE: It is recommended to replace the diodes as a set.***

- G) Reconnect the lead removed in step 6B to the diode.
7. Test the capacitor.
 - A) Use an analog VOM set at its highest ohms scale. Preferably R x 10000.

⚠ WARNING

High voltage may be stored in the capacitor. Discharge the capacitor with an insulated screwdriver. Do not touch screwdriver blade while discharging capacitor.



B) Disconnect one lead from the capacitor.

C) Connect the test leads across the capacitor.

The needle should deflect to low ohms reading and then slowly return to infinity (left side of scale). If the needle stays on low ohms reading or does not deflect at all then the capacitor is bad.

➤ **NOTE: Check the capacitor in both polarities**

D) Reconnect the lead removed in step 7B.

8. Reconnect the DC source only.

9. Measure DC voltage from the diode block (+) (Fig 1) to the fuse assembly (-).

A) If you do not get battery voltage then the the wiring to the battery is bad.

10. If the charger is equipped with an ammeter then check the continuity across the meter.

A) If you do not get 0 ohms then the meter is bad.

⚠ WARNING

Electrical shock hazard! After next step there will be un-insulated high voltage in the charger.

11. Reconnect the AC source.

⚠ WARNING

The charger must be grounded! The Green wire from the AC cord must be electrically attached to the charger cabinet.

⚠ WARNING

Repairs to house wiring must be done by a qualified electrician.

A) Measure AC input voltage at 1/4" spade connectors on timer (Fig. 2, Terminals 1 and 2).

B) If not at approximate charger AC voltage listed on the charger spec plate, then AC input is bad.

Possible problems;

A) Wiring to AC cord.

B) AC cord or plug.

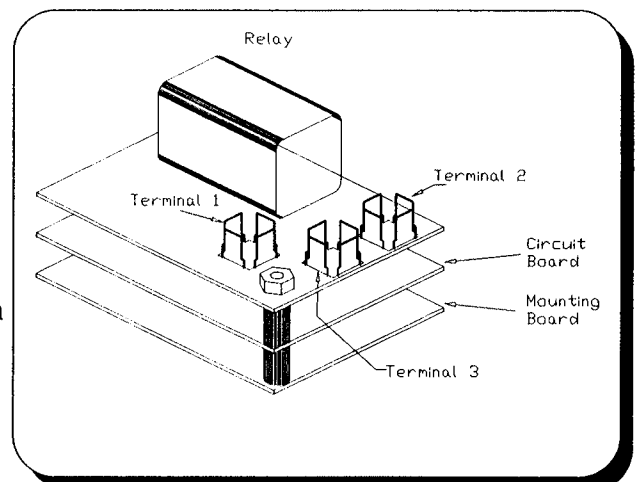
C) House wiring or circuit breaker. To test, plug a known to be good light into the wall receptacle.

12. Measure AC output voltage at timer (Fig. 2 terminals 2 and 3).

A) If it is not the same as the input voltage then the timer is bad.

13. Measure AC voltage at diodes (Fig 1).

A) If not 79-90 vac then the transformer is bad.





ILLUSTRATED PARTS LIST

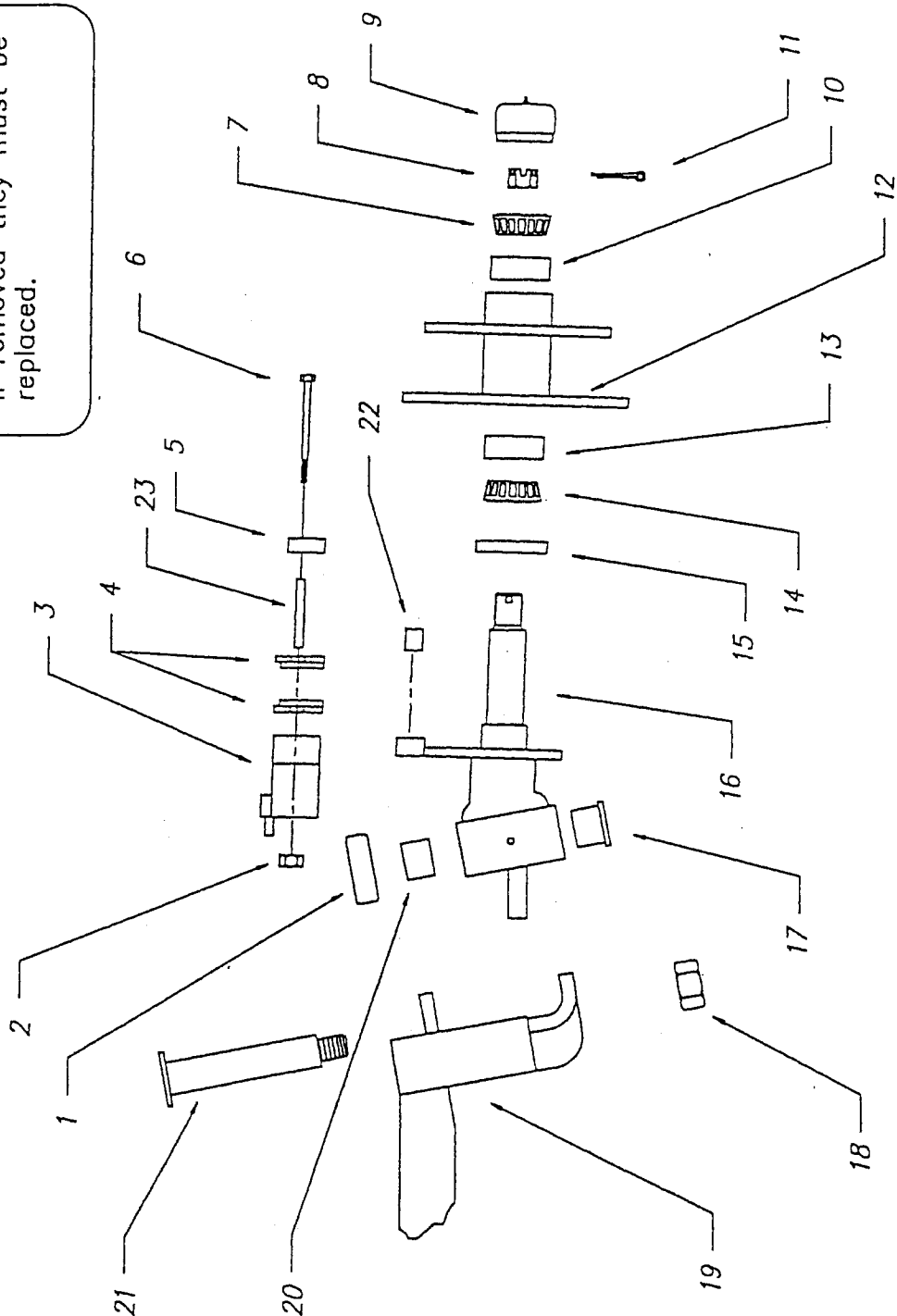


FRONT AXLE

WARNING

The brake body bolt nuts can only be used once. If removed they must be replaced.

NOTE: Front disc brakes are optional and are shown for parts reference only.

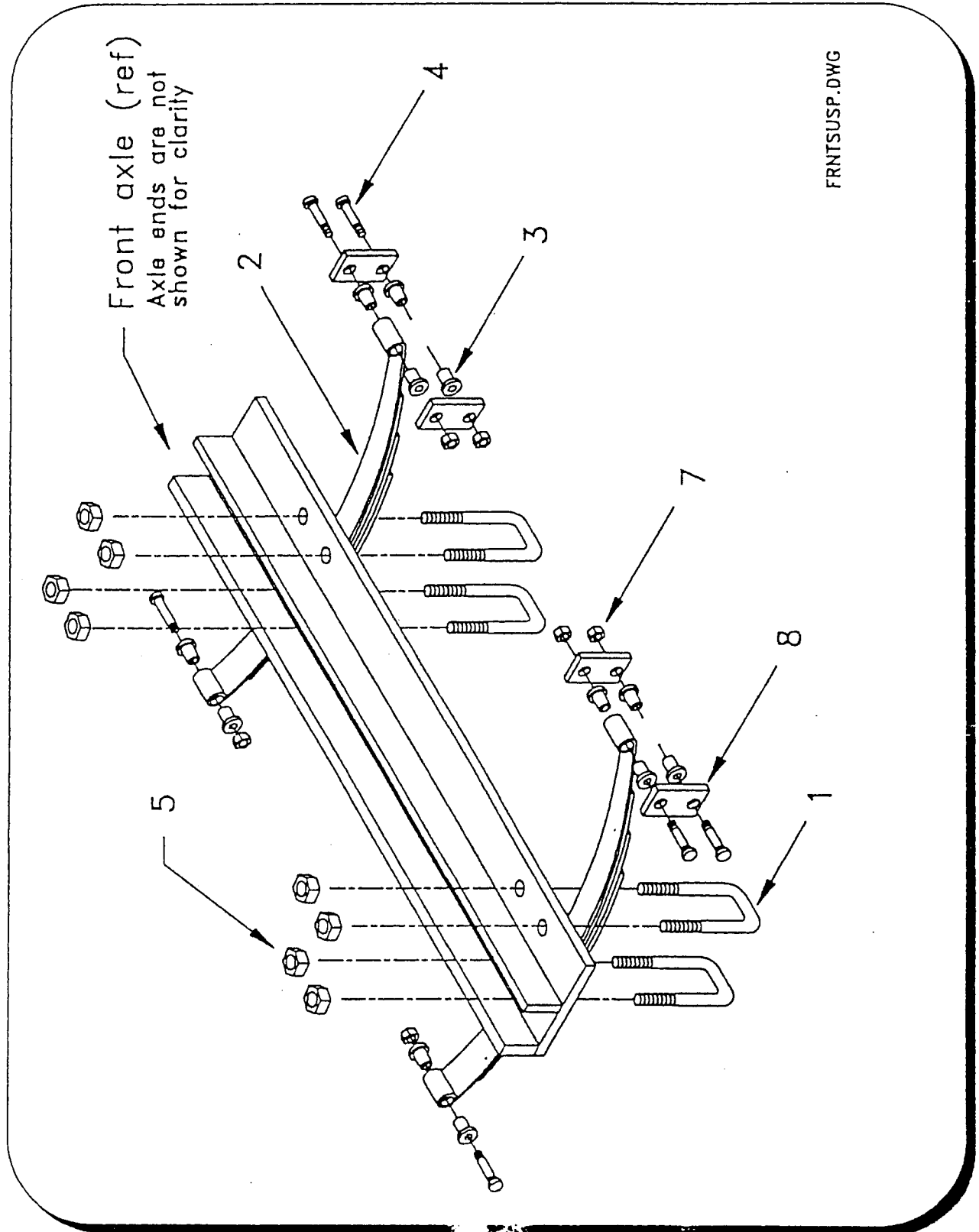


FRONT AXLE			
Item #	Part #	Description	QTY
1	80-309-00	Thrust bearing	2
2*	88-069-82	1/4 grade 8 nut **DO NOT REUSE**	4
3*	41-350-71	Brake body assembly	2
4*	41-348-70	Brake pads	4
5*	41-350-51	Disc pad backing plate	2
6*	88-067-19	Brake body bolt (grade 8)	4
7	80-017-00	Outer bearing	2
8	88-159-85	Spindle nut	2
9	92-104-00	Bearing cap	2
10	80-103-00	Outer race	2
11	88-527-14	Cotter pin	2
12	12-158-10	Rotor and hub (rotor not available separately)	2
13	80-103-00	Inner race	2
14	80-017-00	Inner bearing	2
15	45-338-00	Grease seal	2
16*	14-248-97	Left side yoke	1
16A	14-099-98	Left side yoke <i>Spindle, Left</i>	1
16*	14-248-98	Right side yoke	1
16A	14-099-99	Right side yoke (no brake) <i>Spindle, right</i>	1
17	32-200-00	Lower king pin bushing	2
18*	88-289-81	King pin lock nut	2
18A	88-279-81	King pin lock nut (no brake)	2
19*	15-049-51	Front axle beam	1
19A	15-049-00	Front axle beam	1
20	32-204-00	Upper king pin bushing	2
21	21-009-00	King pin	2
22	32-240-40	Brake spacer bushing	4
23*	41-348-52	Brake spacer	4
* - These parts are used on trucks equipped with front disc brakes (optional)			

Part #	Description	QTY
18-041-00	Adjustment sleeve	1
86-501-98	Ball joint	1
86-501-99	Ball joint	1
86-510-00	Ball joint clamp	2

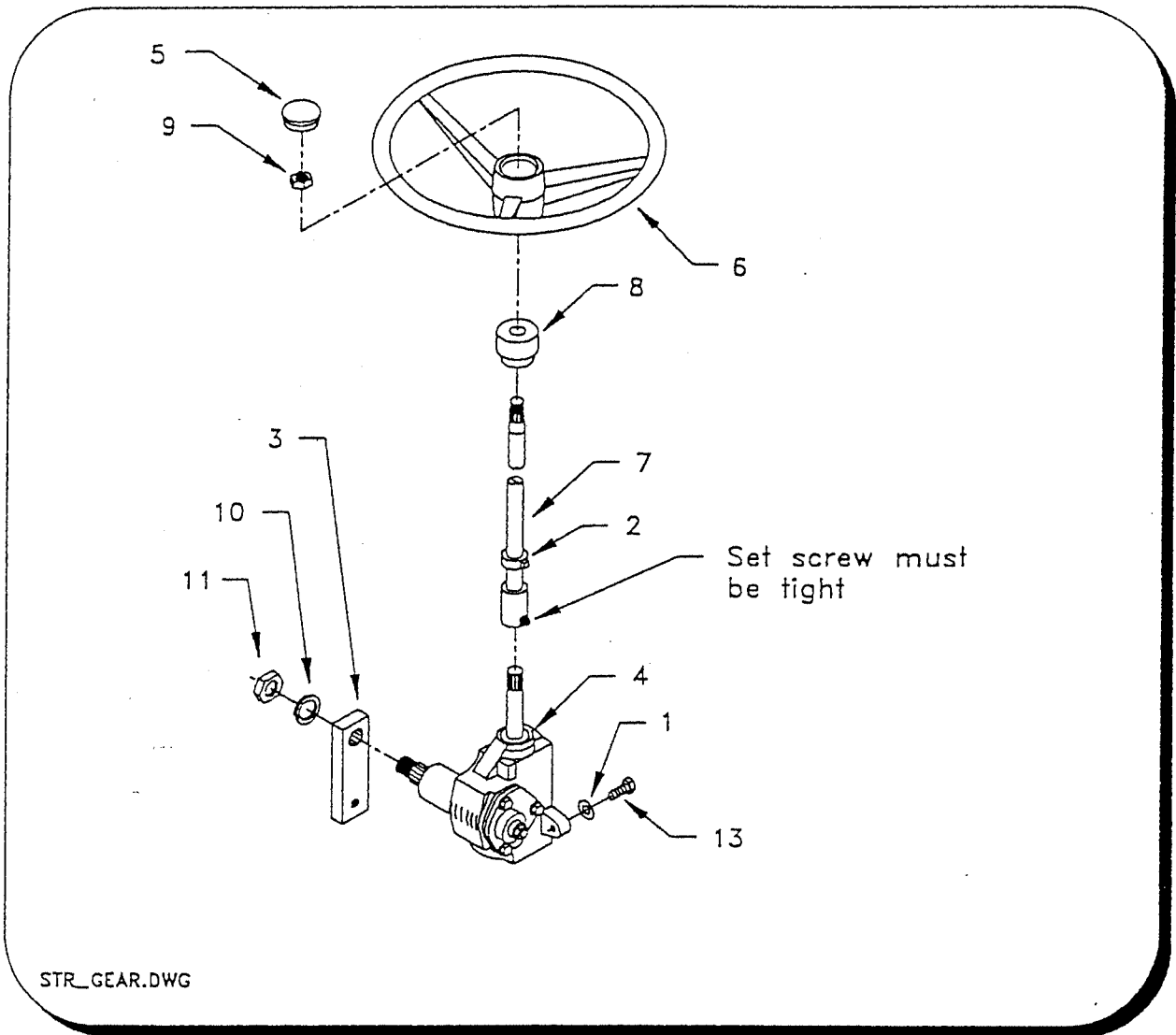
The sleeve is also available as an assembly, part number 18-041-10

FRONT SUSPENSION

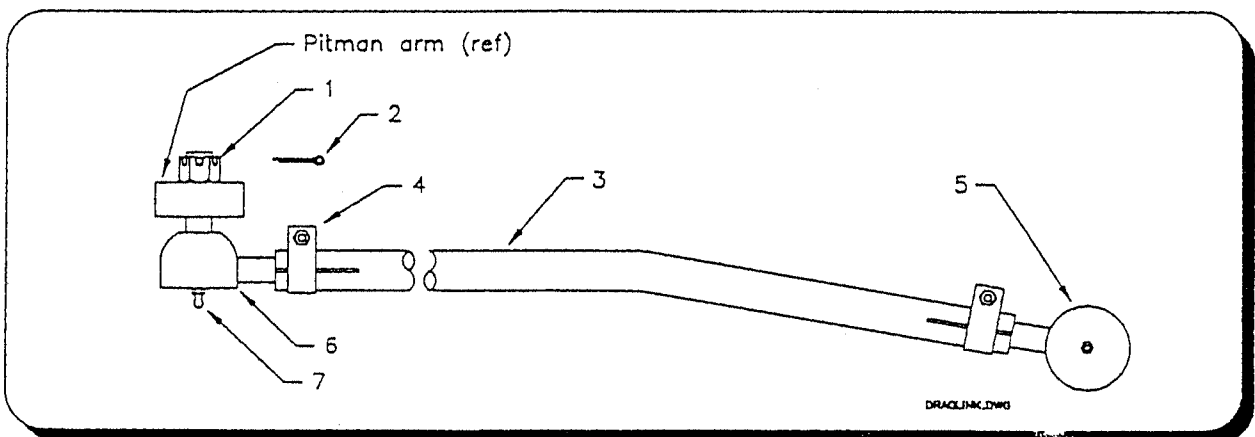


FRONT SUSPENSION			
Item #	Part #	Description	QTY
1	96-103-00	U-Bolt	4
2	85-498-00	Leaf Spring	2
3	32-214-50	Spring bushing	12
4	96-240-00	Shackle bolt	6
5	88-149-81	1/2 NC lock nut	8
7	88-149-81	1/2 NC lock nut	6
8	16-872-00	Spring shackle	4
Not shown	13-957-11	Tire/wheel assy, 18 x 5 x 14, solid extra cushion	2

STEERING GEAR

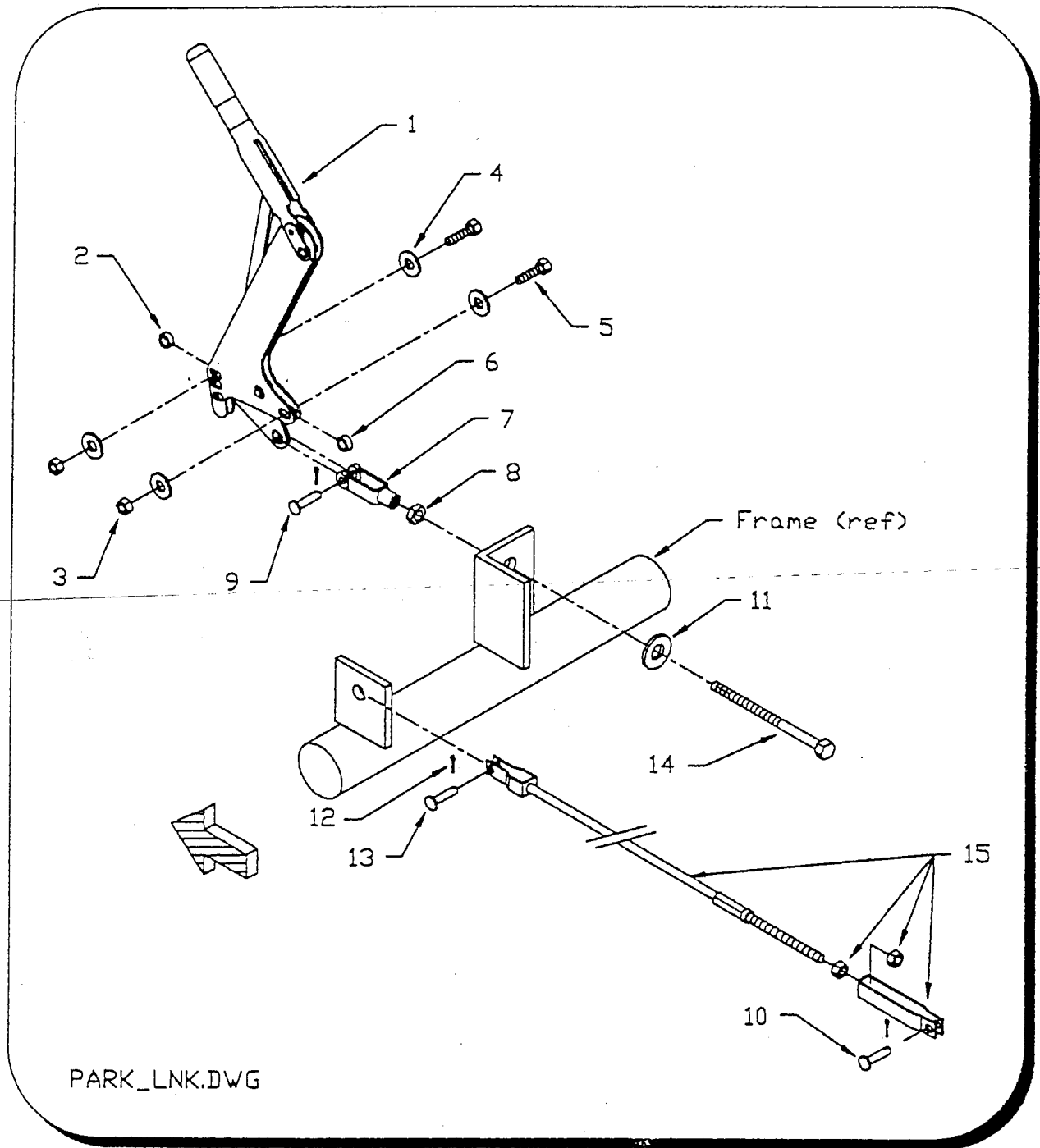


DRAG LINK



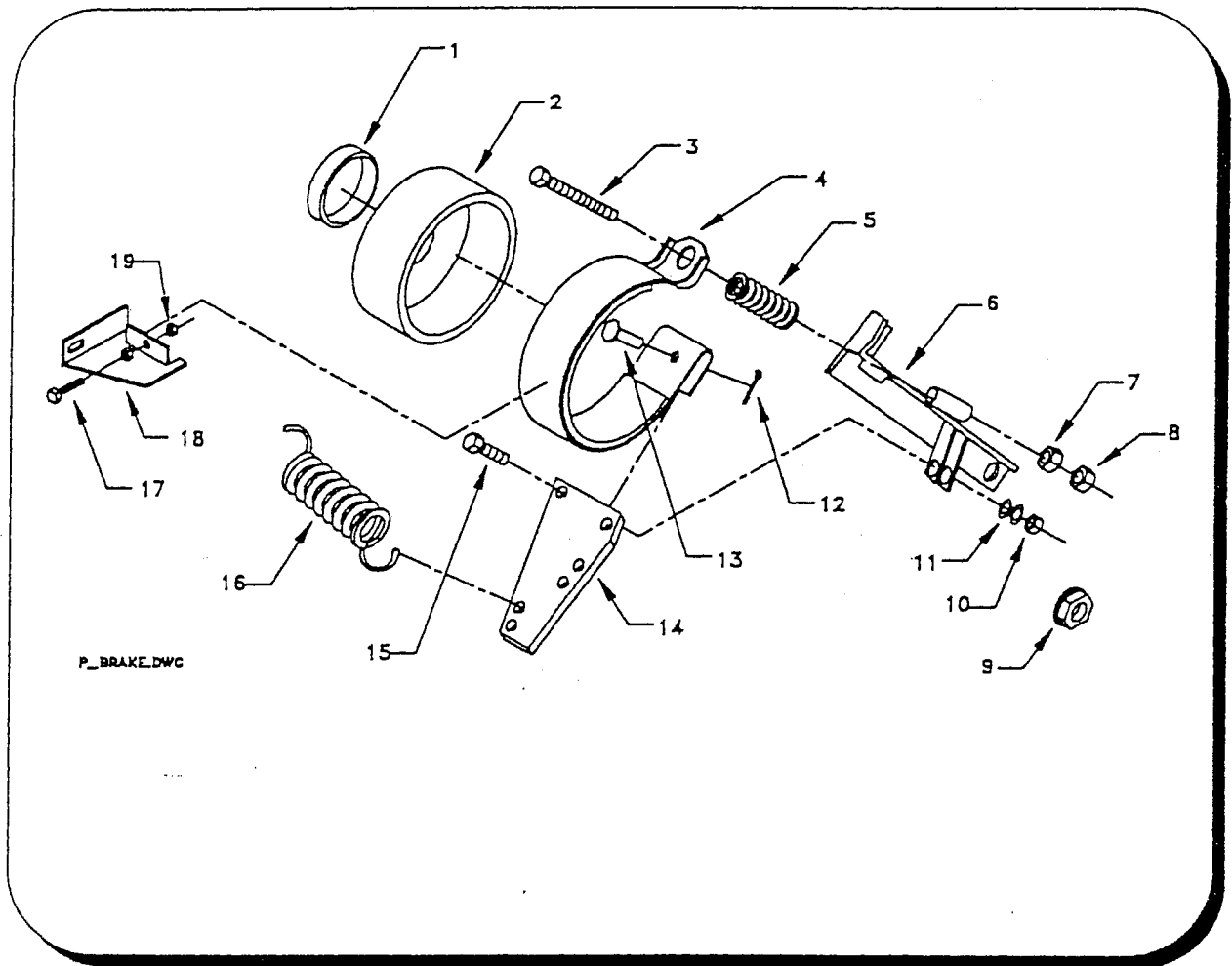
STEERING GEAR			
ITEM #	PART #	DESCRIPTION	QTY
1	88-128-62	7/16 split lock washer	3
2	17-110-00	Collar	1
3	18-104-00	Pitman arm	1
4	18-308-21	Steering gear	1
5	19-011-25	Steering wheel cap	1
6	19-011-20	Steering wheel	1
7	20-031-35	Steering shaft	1
8	32-248-10	Upper steering shaft bushing	1
9	88-159-82	1/2 NF jam nut	1
10	88-268-62	7/8 split lock washer	1
11	88-279-82	7/8 NF jam nut	1
13	88-120-15	7/16 x 1 NC hex bolt	3
DRAG LINK			
1	88-159-85	Castle nut	2
2	88-527-11	Cotter pin	2
3	18-057-11	Drag link	1
4	86-510-00	Ball joint clamp	2
5	86-501-99	Ball joint w/grease fitting (RH)	1
6	86-501-98	Ball joint w/grease fitting (LH)	1
7	87-074-00	Grease fitting	2

PARKING BRAKE LINKAGE



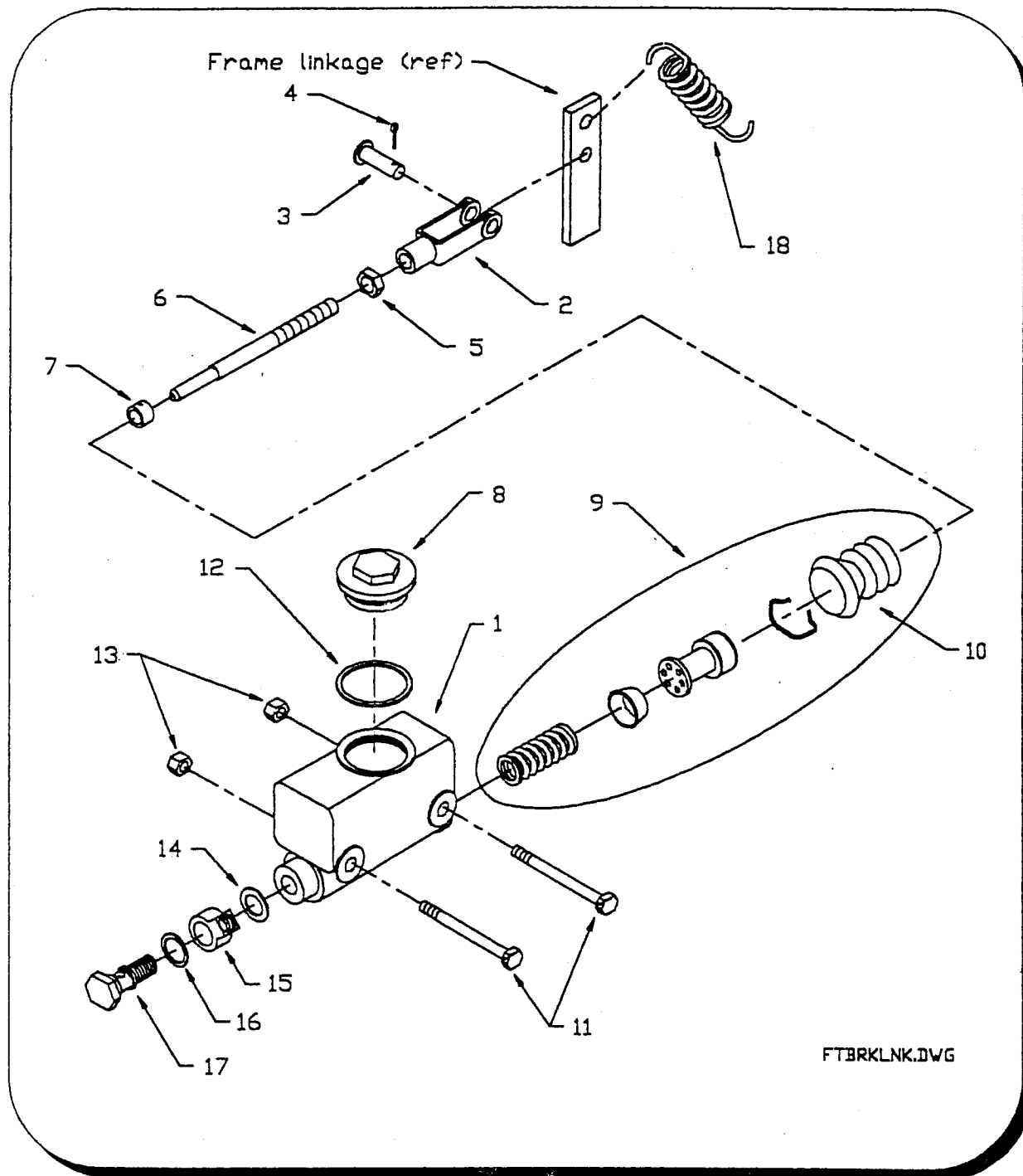
PARKING BRAKE LINKAGE			
ITEM #	PART #	DESCRIPTION	QTY
1	51-340-00	Park brake lever	1
2	-----	Spacer (part of #1)	
3	88-089-81	5/16 NC Hex lock nut	2
4	88-088-61	5/16 SAE flat washer	4
5	88-080-16	5/16 x 2 NC Hex bolt	2
6	-----	Spacer (part of #1)	
7	96-762-00	3/8 Clevis	1
8	88-119-80	3/8 NF hex nut	1
9	96-773-10	5/16 x 1 1/8 Clevis pin	1
10	96-773-00	5/16 x 1 Clevis pin	1
11	88-108-60	3/8 Cut flat washer (QTY spaced as required)	
12	88-527-11	Cotter pin	3
13	96-773-00	5/16 x 1 Clevis pin	1
14	88-111-28	3/8 NF hex bolt	1
15	96-821-00	Park brake cable assembly	1

PARKING BRAKE



PARKING BRAKE			
1	45-331-00	Pinion seal	1
2	41-532-00	Brake drum	1
3	96-245-10	Brake adjusting bolt	1
4	41-661-60	Brake band kit (incl. 3, 5, 7, 8, 9, 12, 13)	1
5	85-060-20	Spring	1
6	41-370-10	Mounting bracket	1
7	88-159-82	1/2 NF hex jam nut	1
8	88-159-84	1/2 NF lock nut	1
9	97-250-00	Pinion nut	1
10	88-109-81	3/8 NC lock nut	1
11	88-108-61	3/8 Flat washer	2
12	88-517-11	Cotter pin	1
13	96-771-00	Clevis pin	1
14	50-656-00	Brake arm	1
15	88-101-13	3/8 NC grade 5 hex bolt	1
16	85-270-00	Return spring	1
17	88-080-13	5/16 x 1 1/4 hex bolt	2
18	41-371-10	Alignment bracket	2
19	88-089-91	5/16 NC hex jam nut	4

FOOT BRAKE LINKAGE

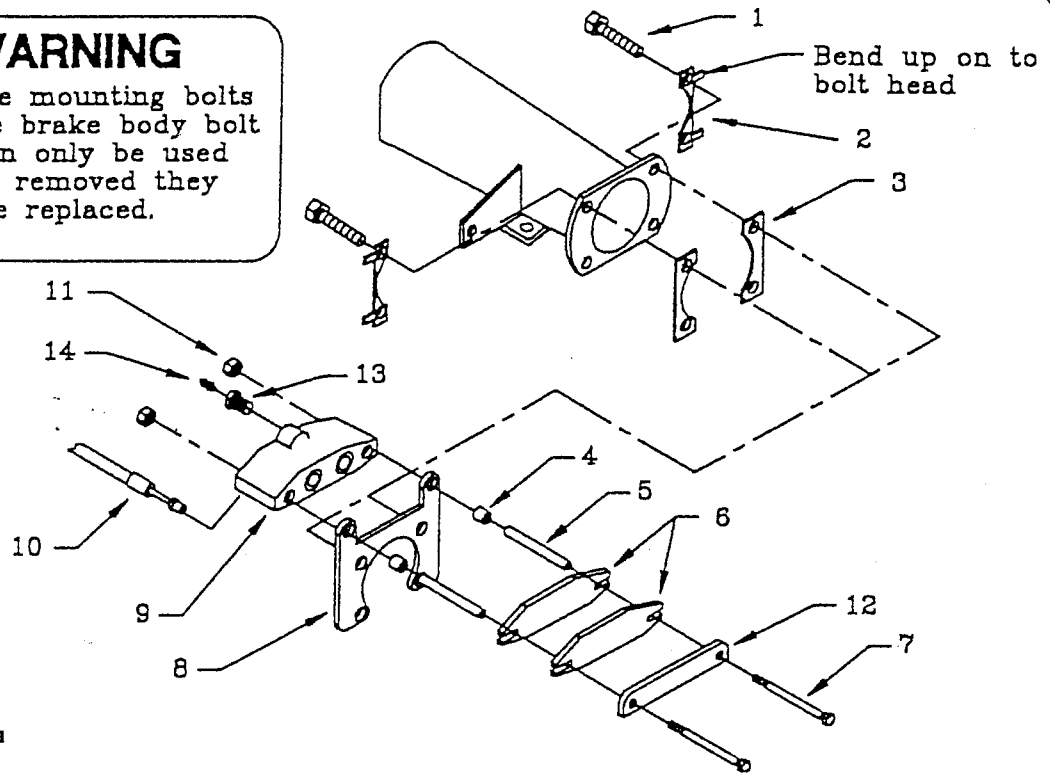


FOOT BRAKE LINKAGE			
ITEM #	PART #	DESCRIPTION	QTY
1	99-510-02	Master cylinder (incl. parts 8, 9, 12)	1
2	96-762-00	Clevis	1
3	96-772-00	Clevis pin	1
4	88-527-11	Cotter pin	1
5	88-119-80	3/8 NF nut	1
6	50-009-00	Push rod	1
7	17-104-00	Collar	1
8	99-510-52	Master cylinder cap	1
9	99-510-61	Rebuild kit	1
10	99-510-51	Rubber boot	1
11	88-101-20	3/8 NC Hex bolt	2
12	99-510-53	Cap gasket	1
13	88-109-81	Hex lock nut	2
14	99-572-00	Copper gasket	1
15	99-566-00	Straight fitting	1
15A	99-565-00	Y-Fitting (front disc brake only, optional)	1
16	99-571-00	Copper gasket	1
17	99-579-00	Master cylinder fitting	1
18	85-250-00	Spring	1

REAR BRAKES

⚠ WARNING

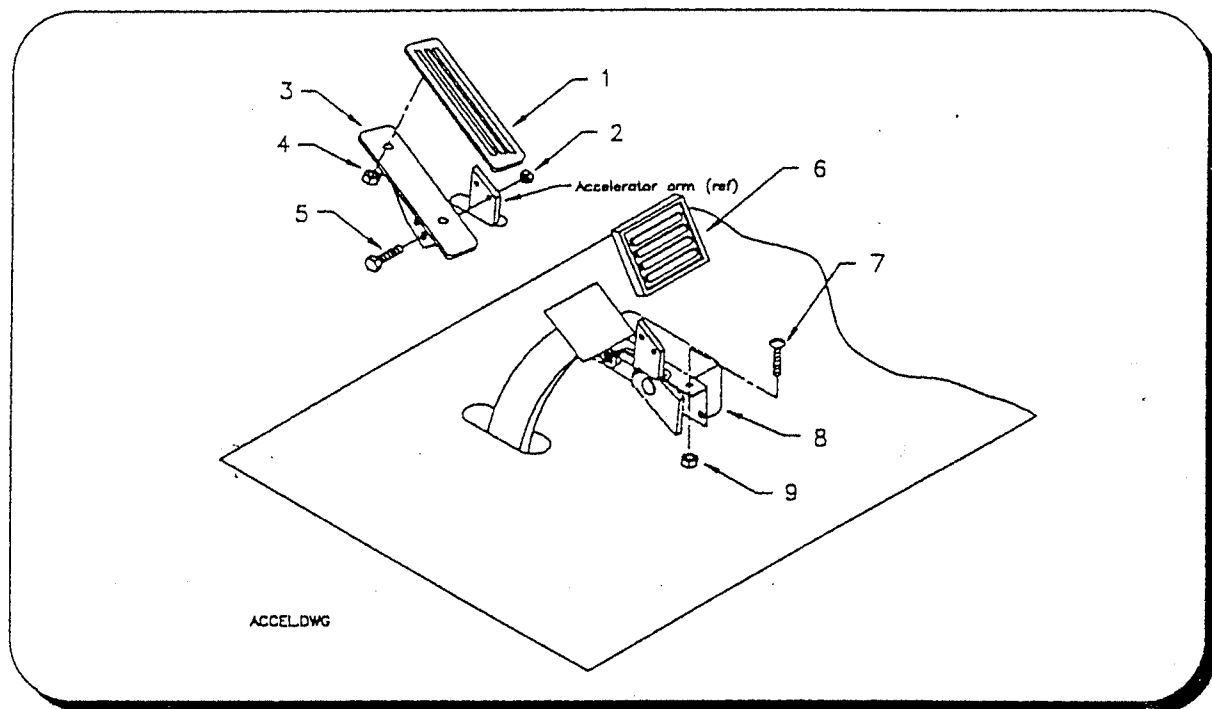
The axle mounting bolts and the brake body bolt nuts can only be used once. If removed they must be replaced.



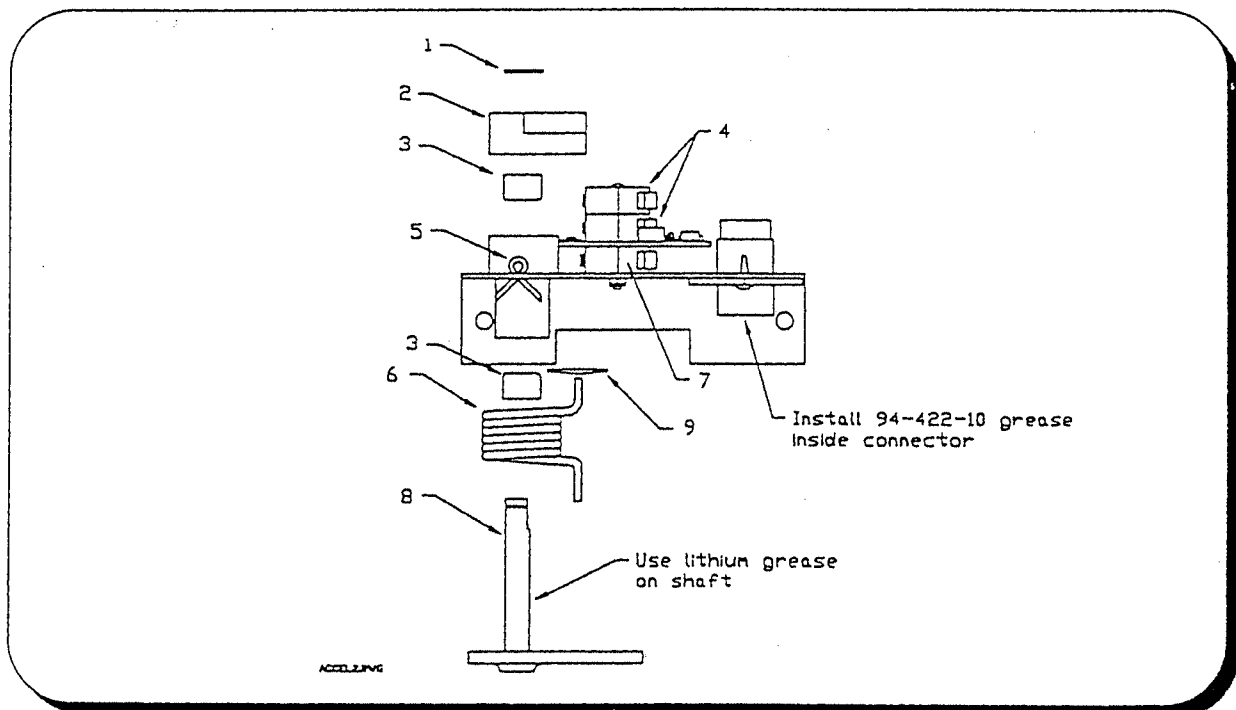
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REAR BRAKES			
ITEM #	PART #	DESCRIPTION	QTY
1	96-327-00	Axle mounting bolt	8
2	41-350-05	Locking tab	4
3	41-961-01	Spacer	4
4	32-240-40	Bushing	4
5	41-348-52	Spacer	4
6	41-348-70	Brake pad	4
7	88-067-21	Brake body bolt	4
8	41-350-08	Axle retaining bracket	2
9	41-350-468	Brake body (left)	1
9	41-350-468	Brake body (right)	1
10	99-580-20	Brake hose	2
11	88-069-82	Brake body nut (grade 8) DO NOT REUSE!	4
12	41-350-51	Brake pad backing plate	2
13	99-588-01	Bleeder fitting	2
14	99-588-00	Bleeder valve	2
NOT SHOWN	41-350-66	Brake body rebuild kit	

ACCELERATOR/BRAKE PEDAL

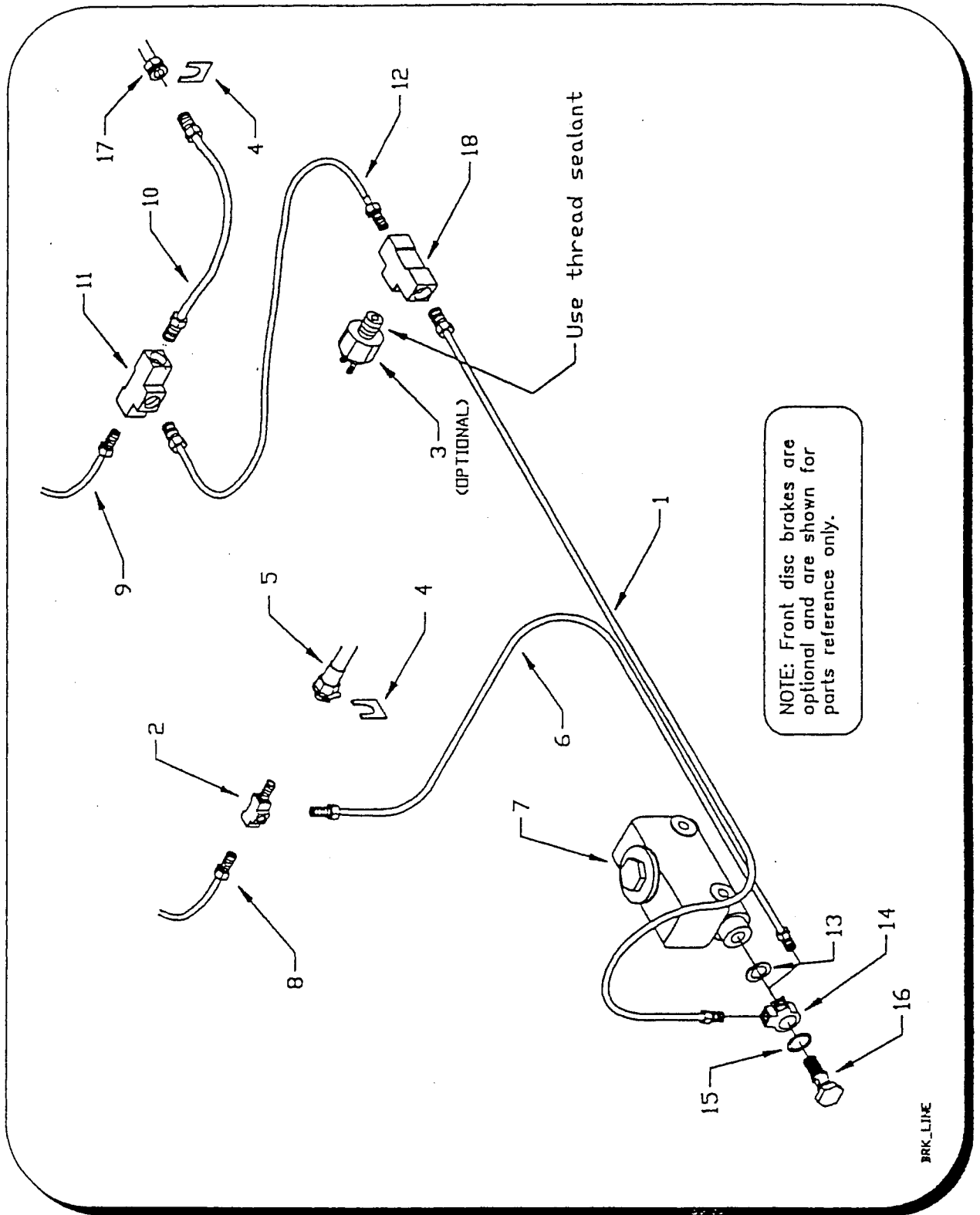


ACCELERATOR MODULE



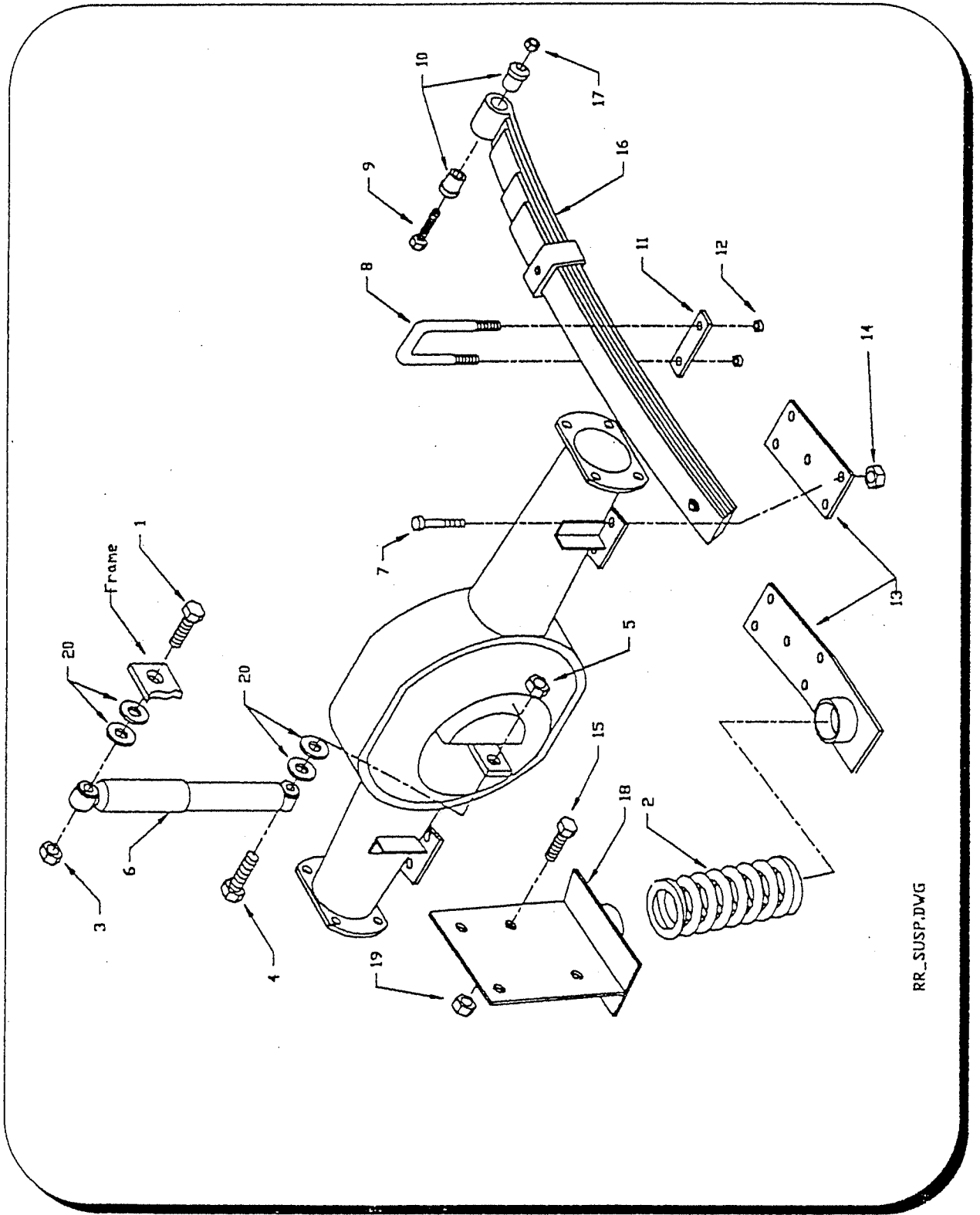
ACCELERATOR/BRAKE PEDALS			
ITEM #	PART #	DESCRIPTION	QTY
1	98-254-00	Accelerator pedal pad	1
2	88-069-81	1/4 NC lock nut	2
3	98-254-25	Accelerator mounting plate	1
4	88-069-81	1/4 NC lock nut	2
5	88-060-11	1/4 x 1" Hex bolt	2
6	98-200-00	Brake pedal pad	1
7	88-065-08	1/4 x 5/8" Truss head screw	2
8a	62-031-00	48 volt Accelerator module	1
8b	62-033-00	36 volt Accelerator module	1
9	88-069-81	1/4 NC lock nut	2
ACCELERATOR MODULE (62-033-00)			
1	88-840-08	External circlip	1
2	62-033-05	Cam with magnet	1
3	32-215-50	Bushing	2
4	71-127-01	Switch	2
5	88-507-06	Cotter pin	1
6	85-352-38	Torsion spring	1
7	71-127-05	Switch	1
8	62-033-11	Rotor shaft	1
	94-422-10	Silicon grease	

BRAKE LINES AND HOSES



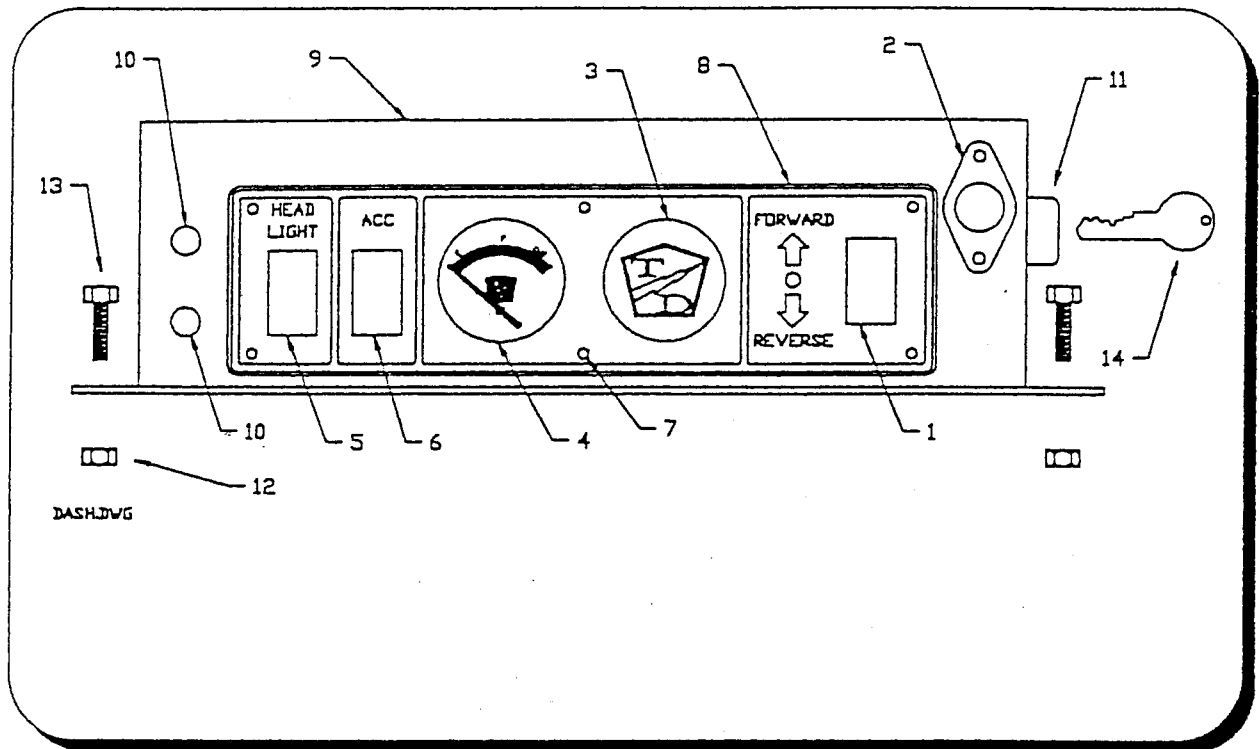
BRAKE LINES AND HOSES			
ITEM #	PART #	DESCRIPTION	QTY
1	99-609-51	Brake line	1
2	99-575-10	T-Fitting (front brakes only)	2
3	71-110-00	Brake light switch (optional)	1
4	99-576-00	Hose retaining clip	4
5	99-580-10	Front brake hose (optional)	2
6	99-608-56	Brake line (optional)	1
7	99-510-02	Master cylinder	1
8	99-606-51	Brake line (front right, optional)	1
9	99-604-56	Brake line (rear right)	1
10	99-604-57	Brake line (rear left)	1
11	99-564-00	T-Fitting	1
12	99-608-51	Brake line	1
13	99-572-00	Copper washer	1
14	99-565-00	Y-Fitting (used with front brakes only)	1
15	99-571-00	Copper washer	1
16	99-579-00	Master cylinder fitting	1
17	99-580-20	Rear brake hose	2
18	99-575-10	T-Fitting (brake light switch, optional)	1

REAR SUSPENSION



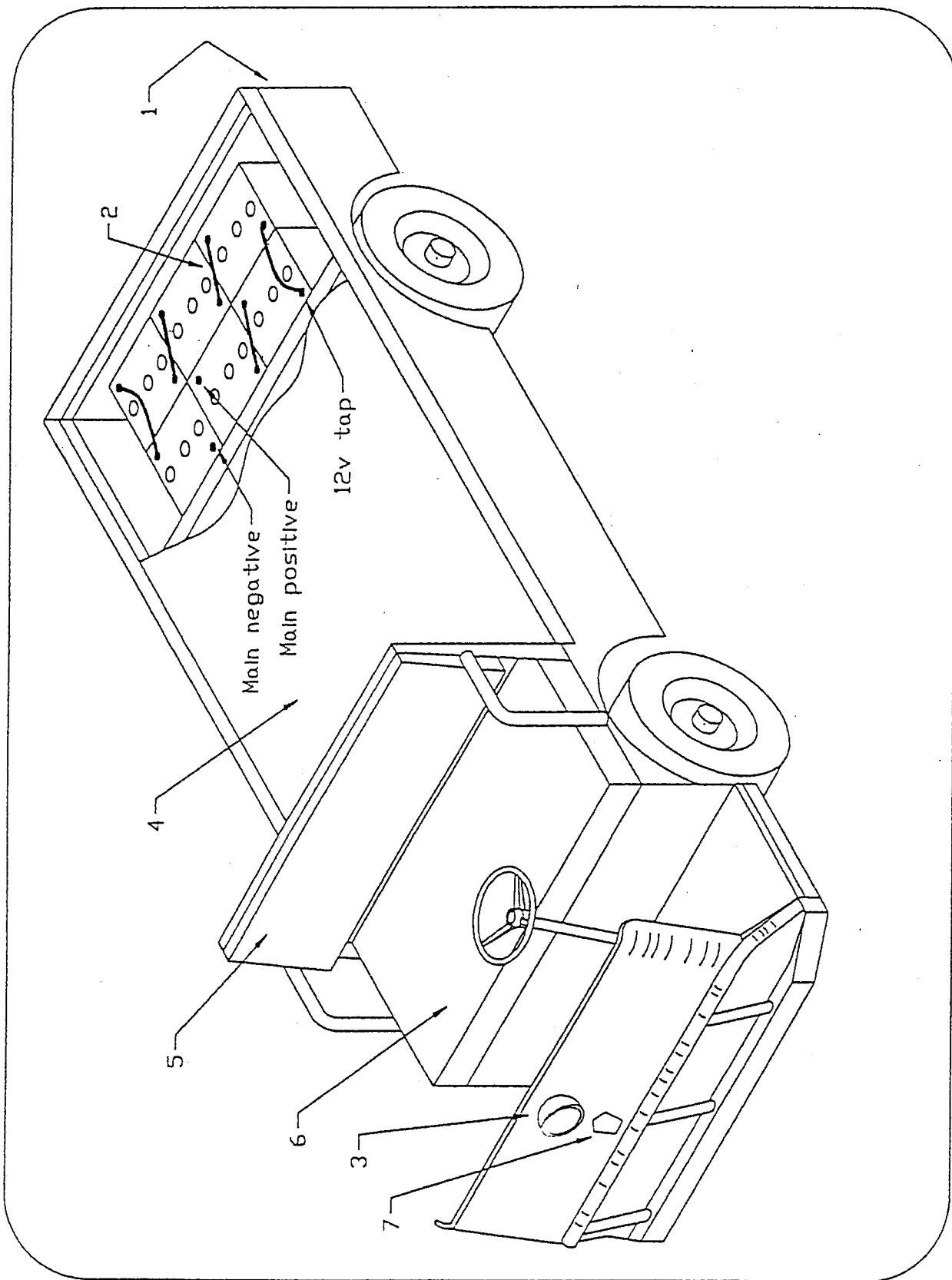
REAR SUSPENSION			
ITEM #	PART #	DESCRIPTION	QTY
1	88-180-18	5/8 x 1 1/2 Hex bolt	1
2	85-180-10	Coil spring (optional)	1
3	88-189-81	5/8 NC nylock hex nut	2
4	88-180-18	5/8 x 1 1/2 Hex bolt	1
5	88-189-81	5/8 NC nylock hex nut	1
6	86-000-00	Shock	2
7	88-101-18	3/8 x 2 1/2 Bolt	8
8	96-103-00	U-bolt	2
9	96-240-00	1/2 NC x 4 Bolt	2
10	32-214-50	Bushing	4
11	50-460-00	Shackle plate	2
12	88-149-81	1/2 NC Lock nut	4
13	16-861-00	Spring plate	2
13A	16-864-00	Spring plate (overload spring, optional)	2
14	88-109-82	3/8 NC Lock nut, grade C	8
15	88-100-14	3/8 x 1 1/2 Hex bolt (optional)	6
16	85-510-15	Leaf spring	2
17	88-149-81	Lock nut	2
18	16-859-00	Upper spring plate (optional)	2
19	88-109-81	3/8 NC Lock nut (optional)	6
20	88-188-61	5/8 SAE flat washer	4

Instrument panel



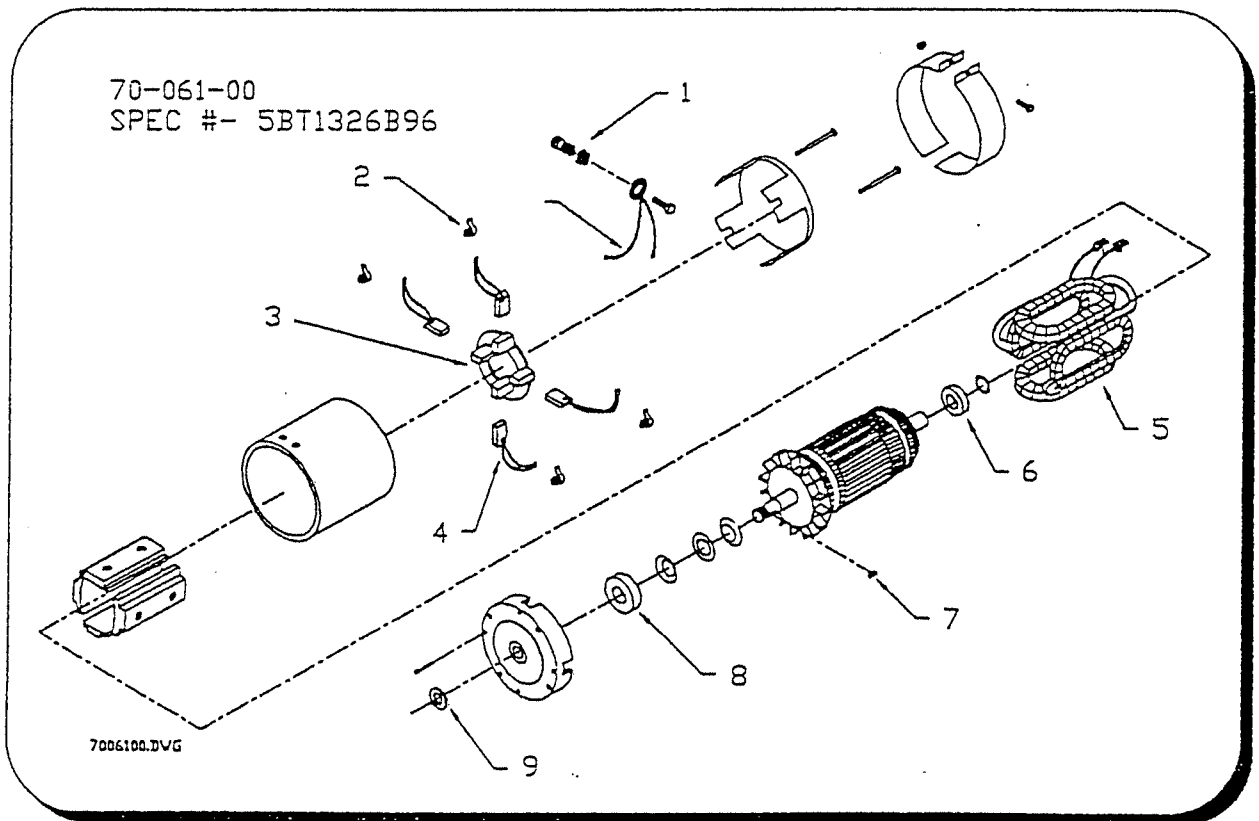
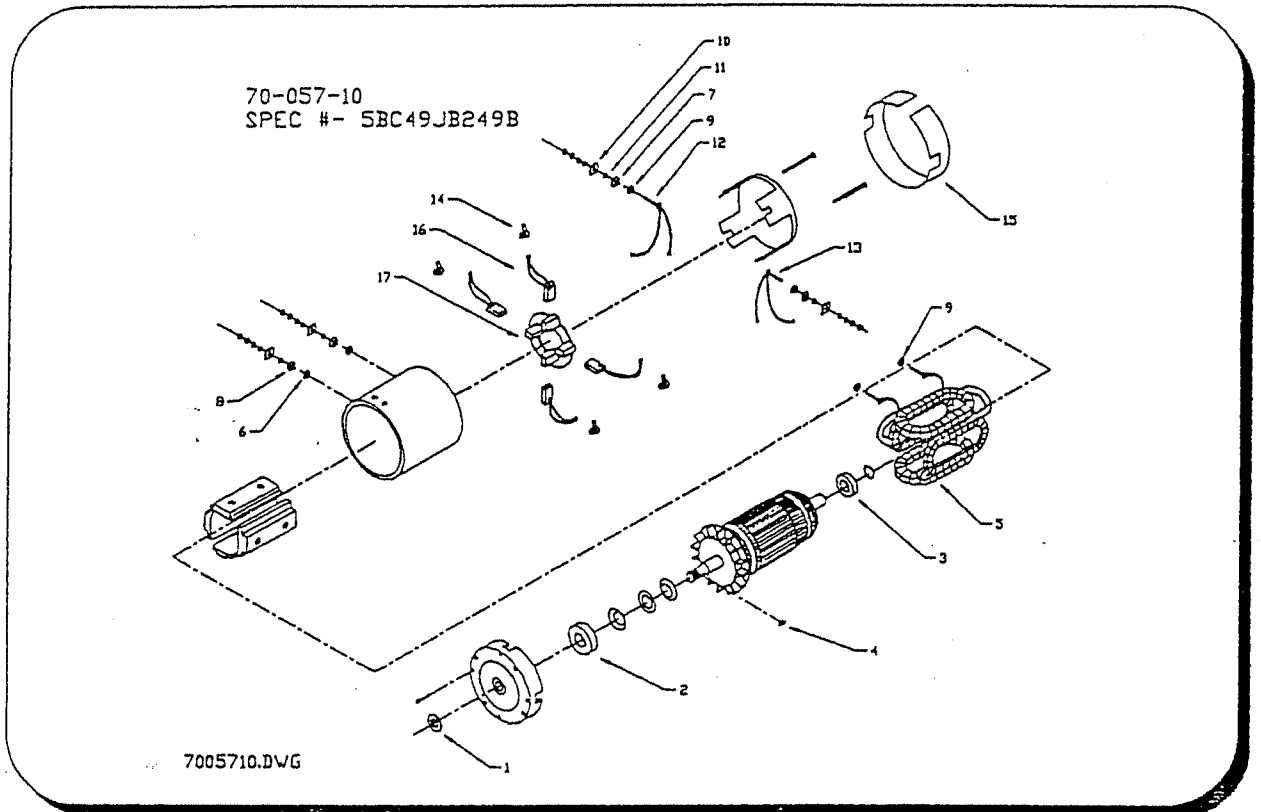
INSTRUMENT PANEL			
ITEM #	PART #	DESCRIPTION	QTY
1	71-039-00	F&R switch	1
2	71-501-00	Horn button	3
3	74-000-00	Hour meter (optional)	1
4	74-009-00	Battery status indicator	1
5	71-039-10	Switch	1
6	71-039-20	Hole plug (may contain optional switches)	1
7	88-817-07	Sheet metal screw	6
8	94-304-10	Instrument panel	1
9	01-200-75	Console	1
10	95-913-00	Hole plug (may contain optional switches)	2
11	71-120-00	Key switch	1
12	88-069-81	1/4 Nut	2
13	88-065-08	1/4 x 5/8 Phillips head bolt	2
14	71-120-80	Keys, set	1

FRAME



FRAME			
ITEM #	PART #	DESCRIPTION	QTY
1	72-022-00	Tail light (w/pigtail and grommet)	1
2	75-231-00	Battery jumper	5
3	72-005-00	Headlight	1
4	90-444-00	Deckboard (standard)	1
5	90-140-00	Seat back cushion	1
6	90-149-00	Seat bottom cushion	1
7	94-201-00	T/D emblem	1
NOT SHOWN	88-567-91	T/D emblem fasteners	3
	88-837-09	Seat back screws	6
	50-243-10	Battery hold down rod	3
	50-250-00	Bat-lok	3

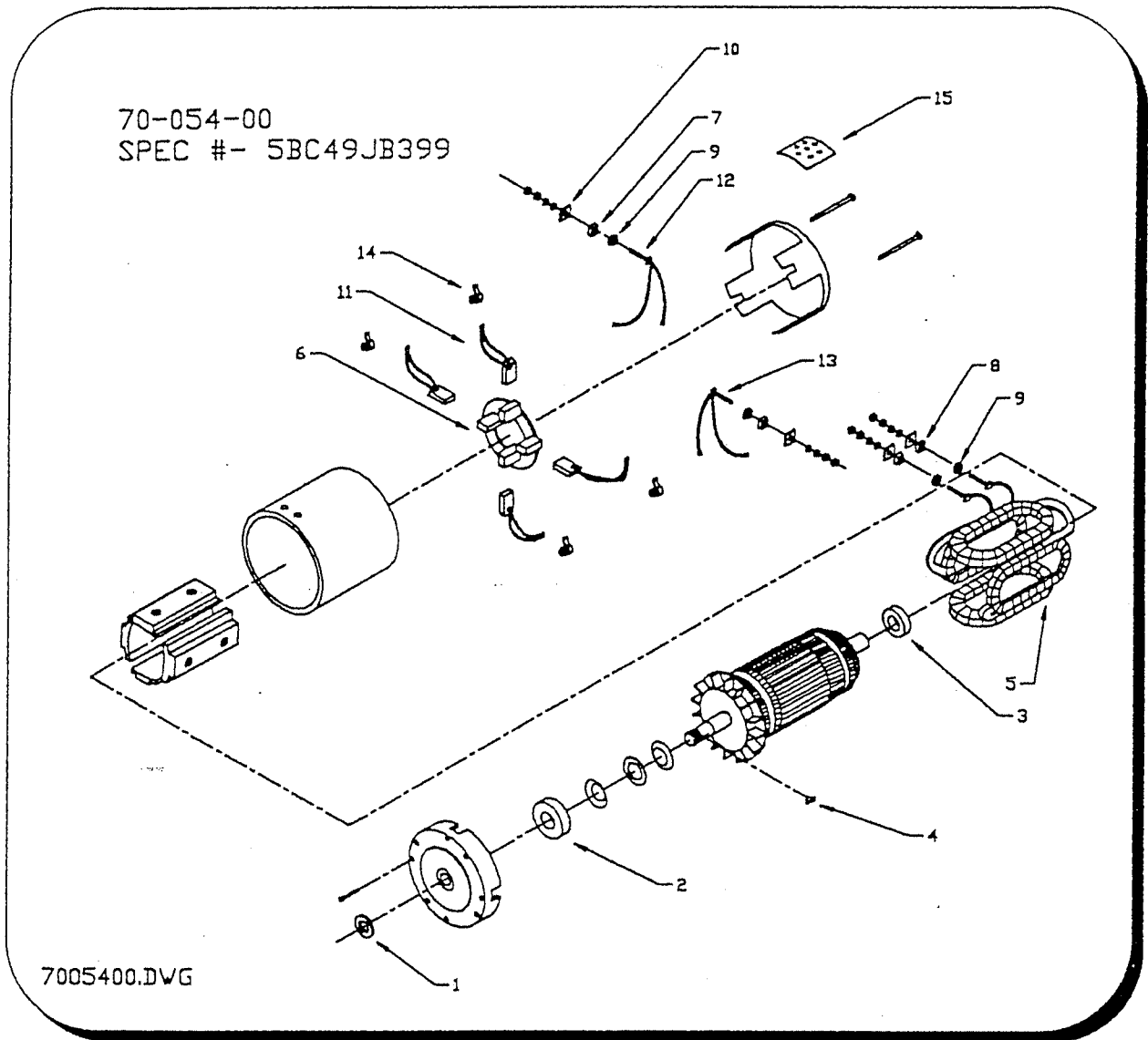
MOTORS



MOTOR (70-057-10) GE SBC49JB249B (optional)			
Item #	Part #	Description	Qty
1	45-508-00	Seal	1
2	80-504-00	Bearing	1
3	80-214-00	Bearing	1
4	97-100-00	Woodruff key	1
5	70-209-00	Field coil set	1
6	98-623-00	Insulator bushing	2
7	98-622-00	Insulator bushing	2
8	97-179-00	Fiber washer	2
9	97-178-00	Fiber washer	4
10	97-177-00	Fiber washer	2
11	70-251-00	Gasket	4
12	70-198-00	Crossover w/terminal	1
13	70-198-01	Crossover w/terminal	1
14	85-413-30	Brush spring	4
15	30-804-10	Brush cover	1
16	70-108-00	Brush	4
17	70-176-00	Brush holder	1

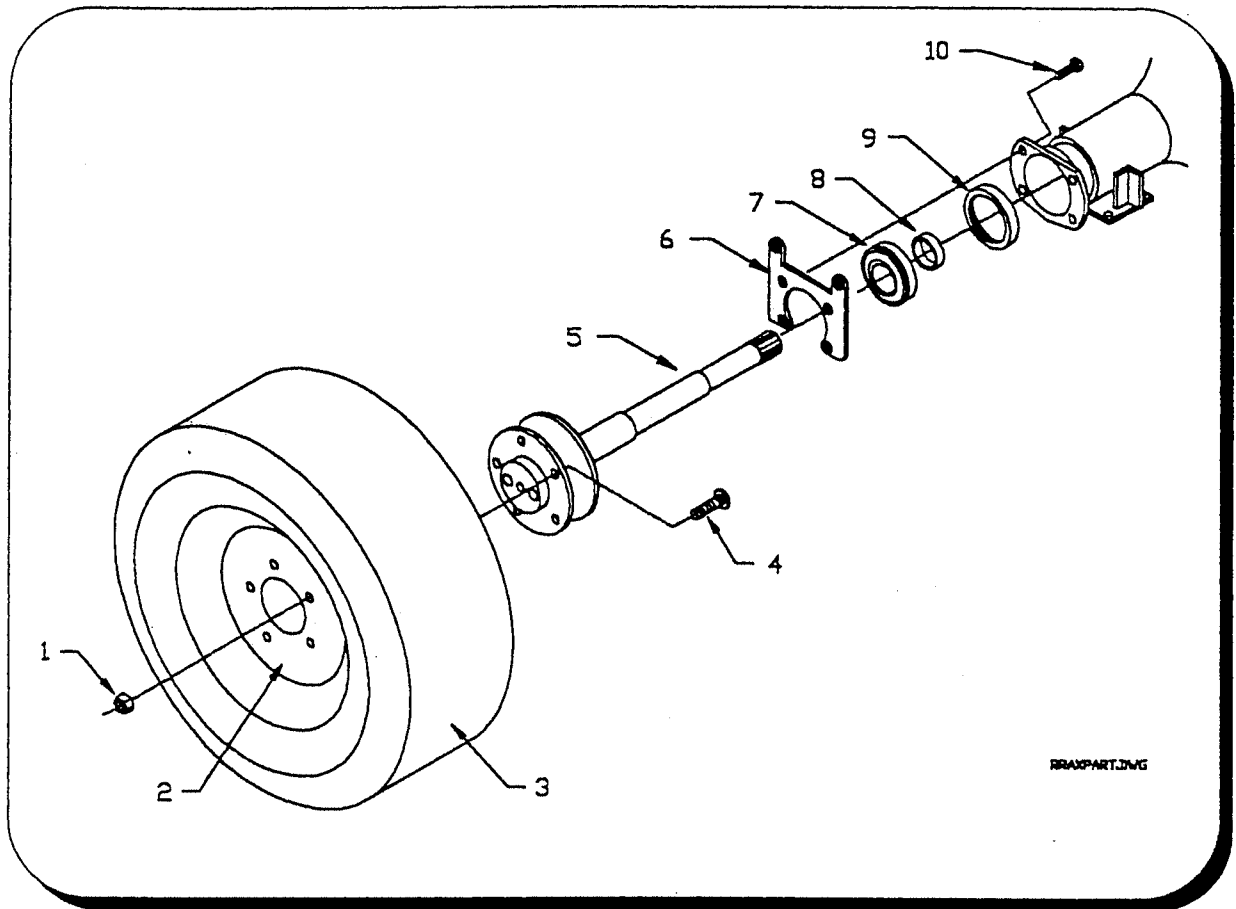
MOTOR (70-061-00) SBT1326B96 (optional)			
Item #	Part #	Description	Qty
1	70-210-64	Insulator	4
2	85-398-00	Brush spring	8
3	70-171-00	Brush holder	1
4	70-112-00	Brush (duel set)	4
5	*	Field coil	1
6	80-504-00	Rear bearing	1
7	97-100-00	Key	1
8	80-206-00	Front bearing	1
9	45-507-00	Seal	1
* not available at time of printing			

Section 4



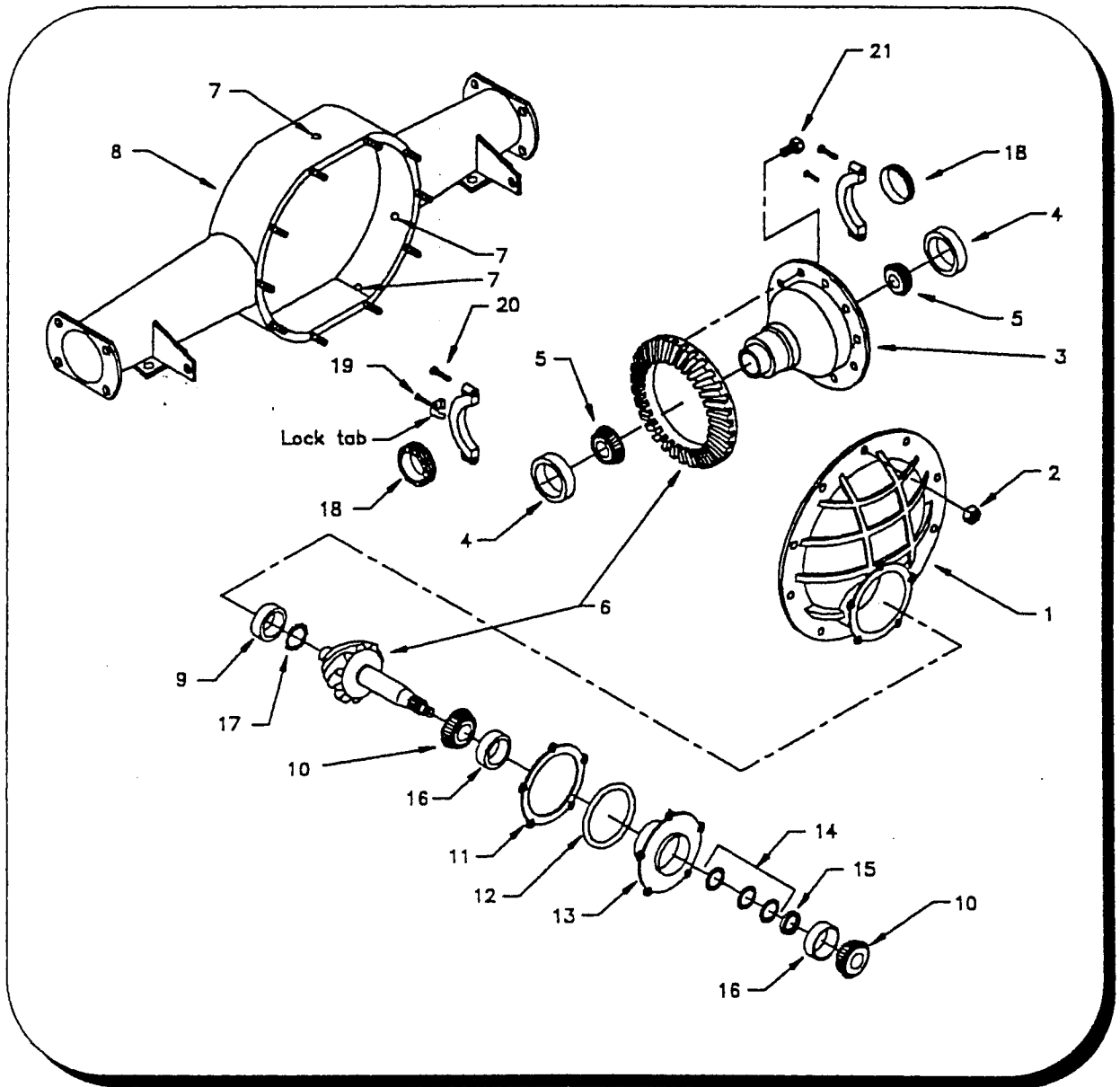
MOTOR (70-054-00) GE SBC49JB399 (STANDARD)			
Item #	Part #	Description	Qty
1	45-508-00	Seal	1
2	80-504-00	Bearing	1
3	80-200-00	Bearing	1
4	97-100-00	Woodruff key	1
5	70-203-10	Field coil set	1
6	70-188-00	Brush holder	1
7	98-622-00	Insulator bushing	2
8	98-623-00	Insulator bushing	2
9	97-178-00	Fiber washer	4
10	97-179-00	Fiber washer	2
11	70-105-00	Brush	4
12	70-195-10	Crossover w/terminal	1
13	70-195-10	Crossover w/terminal	1
14	85-412-00	Brush spring	4
15	30-802-00	Brush cover	4

REAR AXLE



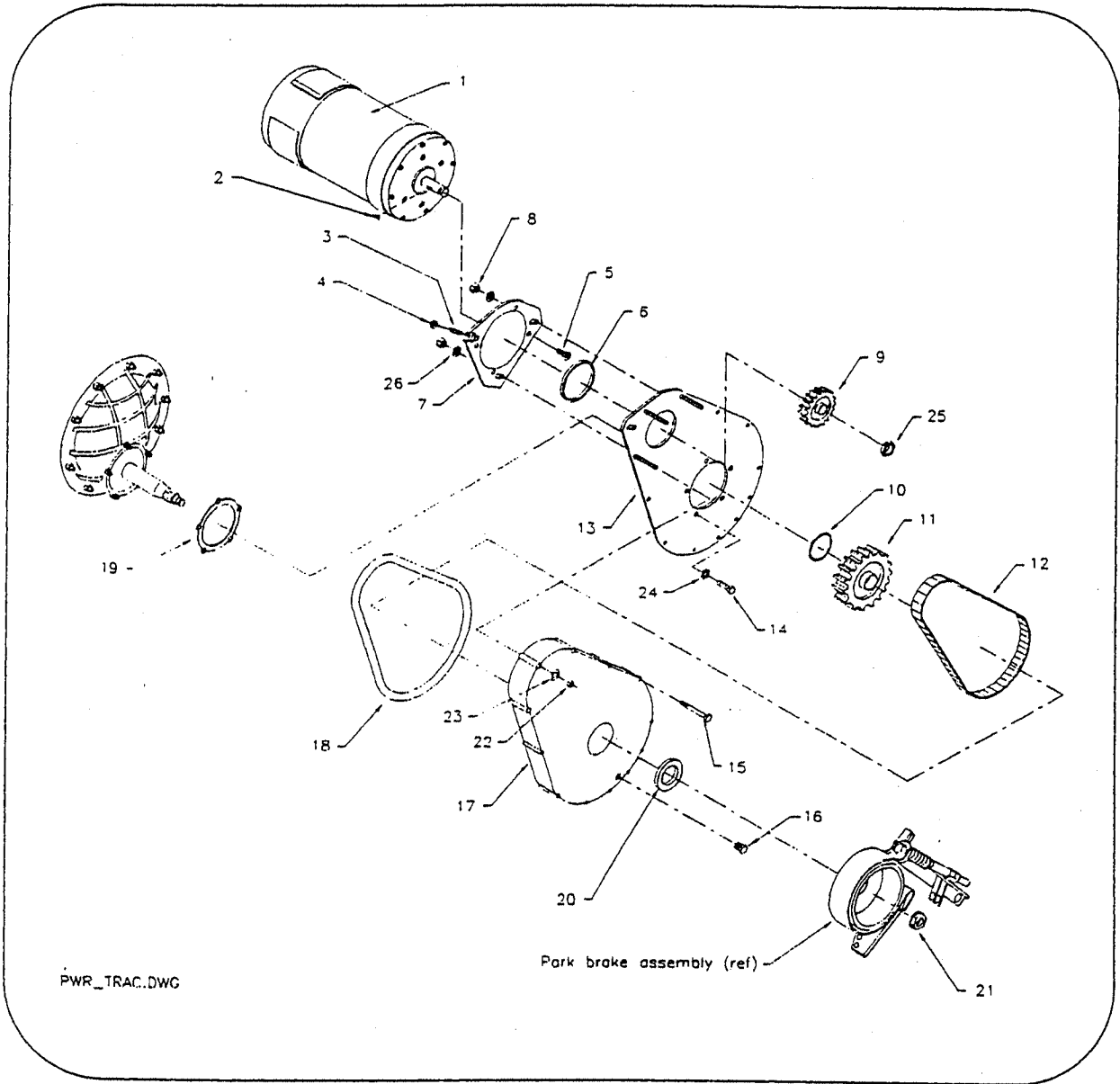
REAR AXLE			
Item #	Part #	Description	Qty
1	97-236-00	Wheel nut	10
2	12-055-10	Wheel	2
3	10-062-00	Tire, 18 x 5 x 14 smoth (standard)	2
	13-957-11	Tire/wheel assembly (#2 and 3)	2
4	96-329-10	Wheel stud	10
5	41-152-00	Rear axle	2
6	41-350-08	Axle retaining bracket	2
7	80-503-00	Bearing	2
8	32-515-00	Bearing retainer	2
9	45-301-00	Seal	2
10	96-330-20	Axle mounting bolt	8

3rd MEMBER



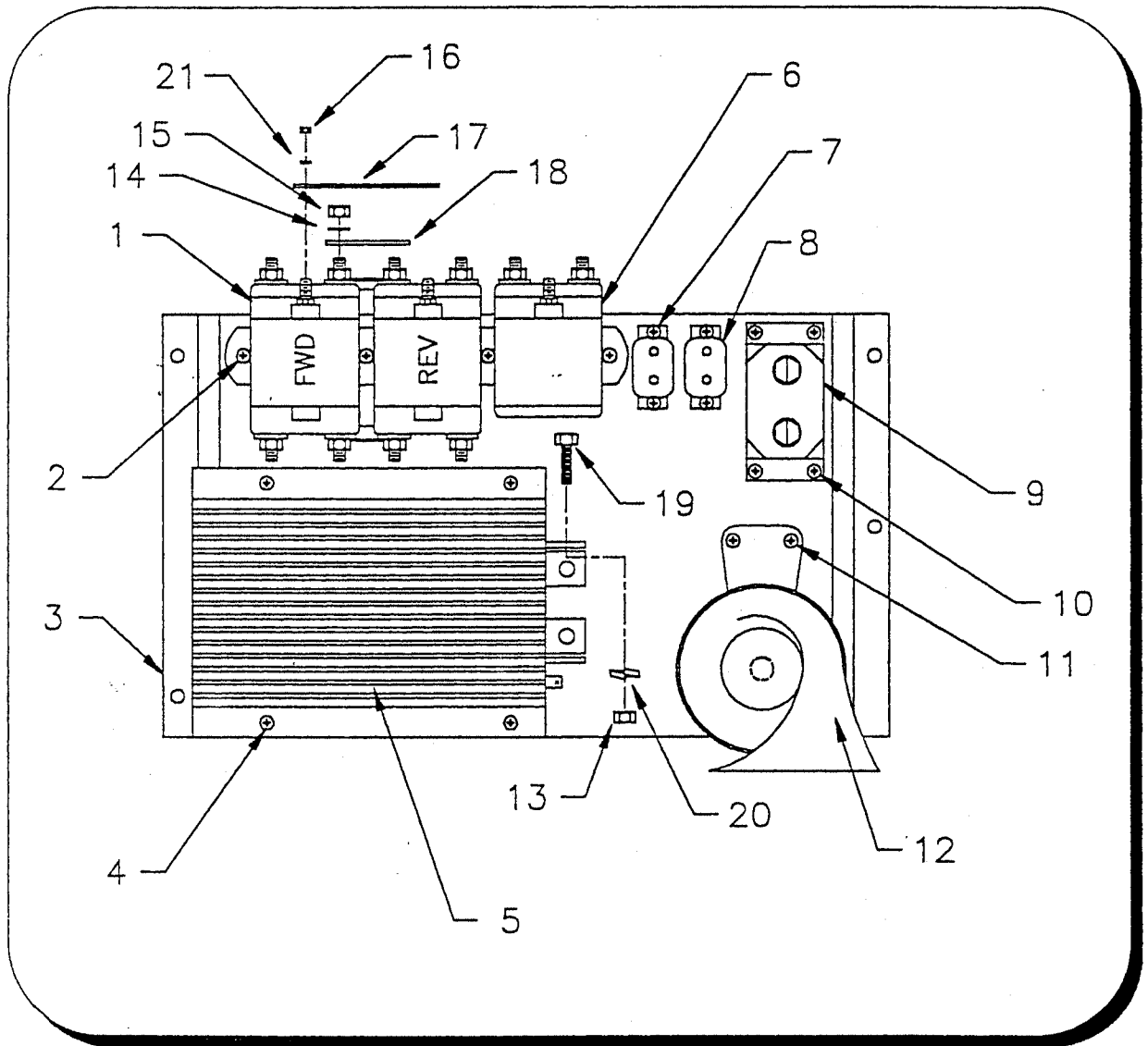
3rd MEMBER			
1	41-709-00	3rd member housing (Small carrier bearing, 1.628 ID)	1
1	41-710-00	3rd member housing (Large carrier bearing, 1.784 ID)	1
2	88-119-80	3/8 NF nut	14
3	41-712-00	Differential assembly (Small carrier bearing 1.628 ID)	1
3	41-713-00	Differential assembly (Large carrier bearing 1.784 ID)	1
4	80-127-00	Carrier bearing race (80-511-00 bearing))	2
4	80-128-00	Carrier bearing race (80-512-00 bearing)	2
4	80-129-00	Carrier bearing race (80-513-00 bearing)	2
5	80-511-00	Carrier bearing (Small carrier bearing 1.628 ID)	2
5	80-512-00	Carrier bearing (Large carrier bearing 1.784 ID)	2
5	80-513-00	Carrier bearing (LM 102949, 1.7812 ID)	2
6	31-239-00	Ring and pinion gear set (5.43)	1
7	41-997-00	Oil plugs (1/8 pipe plug)	3
8	41-291-32	Rear end housing	1
9	80-555-00	Rear pinion bearing	1
10	80-554-00	Front pinion bearings	2
11	41-711-00	Pinion housing shim	1
12	80-702-00	O-ring	1
13	44-340-90	Pinion housing (w/races)	1
14	16-419-00	.002 Shim (as required)	
14	16-420-00	.010 Shim (as required)	
14	16-411-00	.005 Shim (as required)	
15	16-415-00	Spacer	1
16	80-125-00	Pinion bearing race	2
17	41-714-00	Pinion bearing retainer	1
18	41-707-00	Diff. bearing adj. nut (80-511-00 bearing)	2
18	41-707-50	Diff. bearing adj. nut (80-512-00 bearing)	2
18	41-708-50	Diff. bearing adj. nut (80-513-00 bearing)	2
19	88-080-04	5/16 x 3/8 NC Hex bolt	2
20	88-140-16	1/2 x 2 Hex bolt	2
21	96-243-00	7/16 x 7/8 Hex bolt (locking head)	10

POWER TRACTION



POWER TRACTION			
1	70-061-00	Motor Spec # 5BT132B96 (optional)	1
1	70-057-10	Motor Spec # 5BC49JB249B (optional)	1
1	70-054-00	Motor Spec # 5BC49JB2399 (standard)	1
2	97-100-00	Woodruff key	1
3	88-087-11	Chain adjusting screw	1
4	88-069-80	5/16 NC hex nut	1
5	88-103-09	Motor mounting screw	4
6	80-703-00	O-ring	1
7	70-454-00	Motor mounting plate	1
8	88-109-87	3/8 KEPS nut (integral lockwasher)	3
9	30-070-00	15T double motor sprocket	0 or 1
9	30-081-00	14T Single motor sprocket	0 or 1
9	30-080-00	15T Single motor sprocket	0 or 1
9	30-082-00	17T Single motor sprocket	0 or 1
10	16-415-00	Spacer	1
11	30-070-10	81T double pinion sprocket	0 or 1
11	30-070-11	60T double pinion sprocket	0 or 1
11	30-093-00	81T Single pinion sprocket	0 or 1
11	30-092-00	59T Single pinion sprocket	0 or 1
12	30-320-11	Drive chain, 15-81 tooth double sprockets	0 or 1
12	30-320-11	Drive chain, 15-60 tooth double sprockets	0 or 1
12	30-506-20	Drive chain, 15-42 tooth single sprockets	0 or 1
12	30-507-20	Drive chain, 15-59 tooth single sprockets	0 or 1
12	30-508-20	Drive chain, 15-81 tooth single sprockets	0 or 1
13	44-352-53	Backing plate	1
14	88-101-13	3/8 x 1 1/4 NC hex bolt	5
15	88-080-20	5/16 x 3 NC hex bolt	9
16	41-989-00	Drain and fill plugs	2
17	43-201-11	Chain cover	1
18	45-002-00	Chain case gasket	1
19	45-021-00	Backing plate gasket	1
20	45-331-00	Pinion seal	1
21	97-250-00	Pinion nut	1
22	88-089-81	5/16 NC lock nut	12
23	88-088-61	5/16 SAE flat washer	3
24	88-108-63	Internal tooth lock washer	5
25	88-239-82	Motor nut	1
26	88-109-61	3/8 SAE Flat washer	3

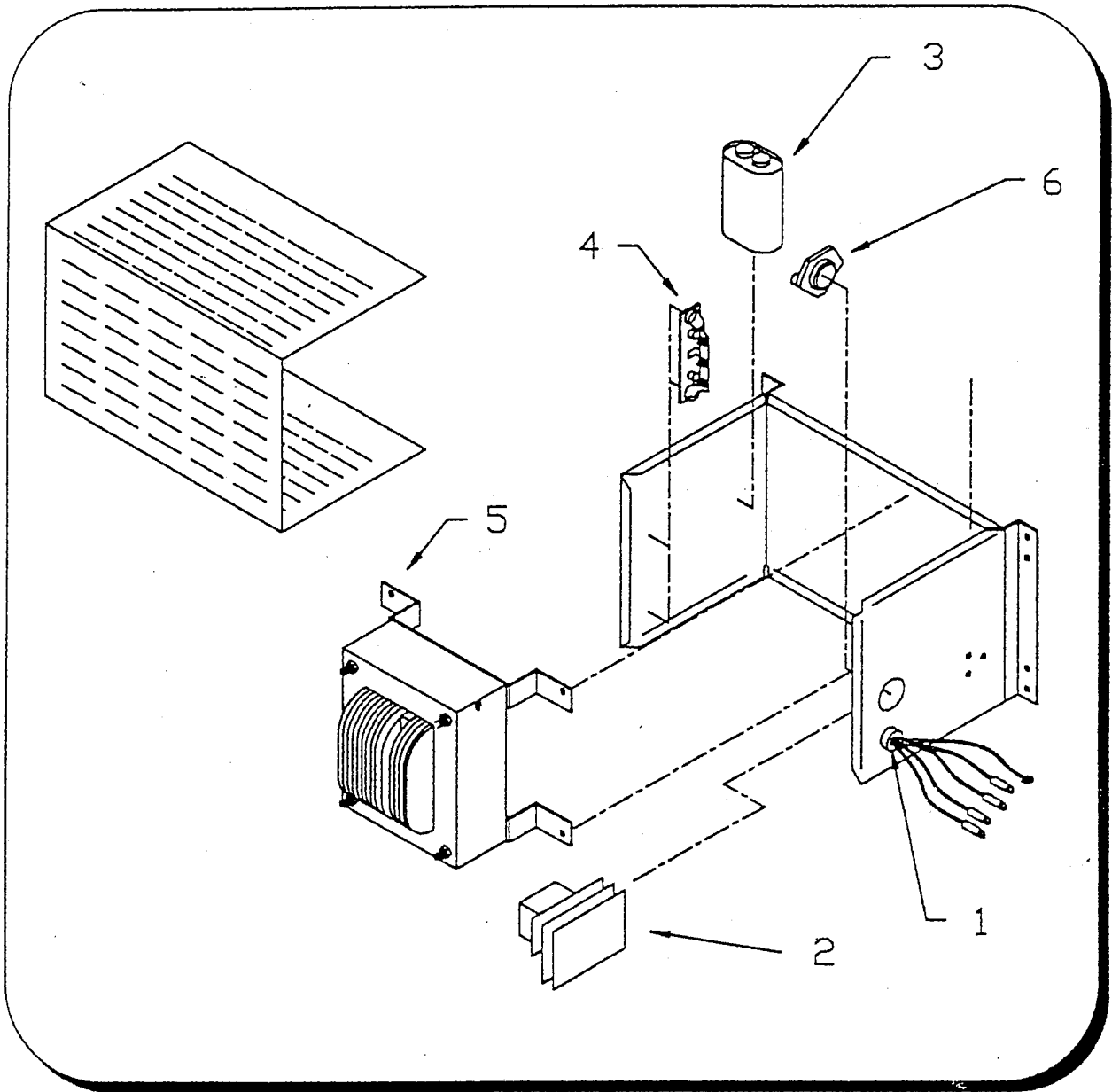
CONTROL PANEL



CONTROL PANEL			
ITEM#	PART #	DESCRIPTION	QTY
1	72-501-39	Forward or reverse Solenoid	2
2	88-838-06	#14 x 1/2 Sheet metal screw	4
3	01-534-80	Mounting plate	1
4	88-838-06	#14 x 1/2 Sheet metal screw	4
5	62-205-00	PMC speed control	1
6	72-501-38	ISO Solenoid	1
7	88-818-06	#8 x 1/2 Sheet meetal screw	4
8	79-840-00	Circuit breaker	2
9	79-844-20	200A circuit breaker	1
10	88-818-06	#8 x 1/2 Sheet meetal screw	2
11	88-838-06	#14 x 1/2 Sheet metal screw	2
12	73-004-20	Horn	1
13	88-089-80	5/16 NC hex nut	4
14	88-088-63	5/16 Internal tooth lock washer	10
15	88-099-91	5/16 NF jam nut	10
16	88-049-80	10-32 hex nut	6
17	61-838-42	Buss bar	2
18	61-838-41	Buss bar	2
19	88-080-11	5/16 Hex bolt	4
20	88-088-62	5/16 Split lockwasher	4
21	88-048-62	#10 Split lock washer	6
NOT SHOWN	75-149-26	Power harness	1
	75-148-25	Control harness	1

62-016-00 Control Panel Assy
75-148-29 Main Harness

CHARGER



CHARGER (36LC25-SET), standard			
ITEM#	PART #	DESCRIPTION	QTY
	79-305-05	Complete charger	1
1	79-530-00	Bushing	1
2	79-805-67	Timer assembly	1
3	79-902-00	Capacitor	1
4	79-749-13	Diode assembly	1
5	79-644-13	Transformer	1
6	79-831-00	Fuse	1
NOT SHOWN	79-575-30	AC cord	1
	79-511-00	Cord holder	1
	79-530-00	AC cord bushing	1
	76-200-00	Replacement AC plug	

CHARGER (36LC40-8ET), optional			
ITEM#	PART #	DESCRIPTION	QTY
	79-305-20	Complete charger	1
1	79-530-00	Bushing	1
2	79-805-67	Timer assembly	1
3	79-902-00	Capacitor	1
4	79-749-10	Diode assembly	1
5	Special order	Transformer	1
6	79-831-11	Fuse	1
NOT SHOWN	79-575-30	AC cord	1
	79-511-00	Cord holder	1
	79-530-00	AC cord bushing	1
	76-200-00	Replacement AC plug	

Section 4

ELECTRICAL SYSTEM (FRAME)		
PART #	DESCRIPTION	QTY
71-120-00	Key switch	1
71-110-00	Brake light switch	1
71-039-10	Light switch	1
71-039-00	Forward and reverse switch	1
71-501-00	Horn button	1
72-148-29	Truck control harness	1
72-072-00	Headlight bulb	2
94-005-00	Headlight assembly	1
72-051-00	Front turn signal bulb (optional)	2
72-022-00	Tail/stop light (w/rubber gasket and pigtail)	2
74-000-00	Hour meter (optional)	1
74-009-00	Battery status indicator	1
71-900-05	Signal flasher (optional)	1
71-141-20	Turn signal switch (optional)	1

3 WHEEL FRONT AXLE/STEERING SUPPLEMENT



Removal

1. Disconnect the batteries.
2. Lift the front end and support with jack stands.
3. Block the rear wheels to prevent the truck from rolling.

CAUTION

The front wheel and spacers will fall off the axle when it is removed.

4. Remove the front axle
5. Remove the ball joint from the fork assembly.

CAUTION

SUPPORT THE FORK. After the next step the fork will not be retained in the fork collar.

6. Remove the bearing cap and fork nut.
7. Remove the fork out from the bottom of the truck..

Installation

1. Install in reverse order.
2. Tighten the fork nut so that there is no play in the fork bearings.
3. Tighten the front axle nuts so that when the wheel is spun it comes to a stop in one revolution.
4. Tighten the ball joint to 40-45 ft. lbs.

Centering the steering

1. Loosen the ball joint clamps on the upper tie rod.
2. Adjust the upper tie rod so that the upper arm on the idler arm weldment is parallel to the ball joint mounting tab on the fork.
3. Tighten the ball joint clamps

4. Remove the drag link ball joint from the pitman arm.
5. Center the pitman arm on the steering gear (see **Centering the steering** in section 3, page 26 of 4 wheel manual).
6. Position the front fork straight ahead and tie it off so it can not move.
7. Center the steering wheel and tie off so it can not move.
8. Adjust the drag link so that it can be installed back into the pitman arm without binding.
9. Tighten the ball joint to 40-45 ft. lbs.
10. Tighten the ball joint clamps securely.

Repair

Wheel bearings

1. See section 3 , page 28.

Steering gear adjustment

1. See section 3, page 28.

Fork yoke bearings

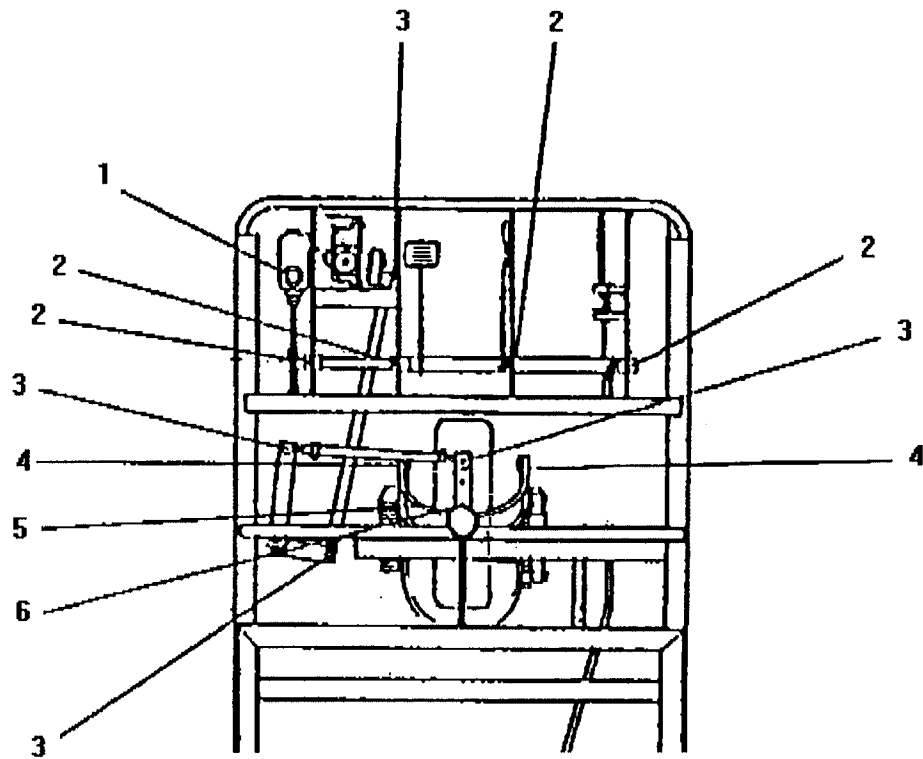
1. Remove the front fork.
2. Clean ALL grease from the inside of the hub and bearings.
3. Inspect and replace the races and bearings as a set as necessary.

CAUTION

It is recommended to replace both upper and lower bearings at the same time.

4. See installation (above) to reassemble.

LUBRICATION CHART



Item #	Description	Type of grease
1	Master cylinder (optional)	DOT 5 brake fluid
2	Chassis grease fitting	General purpose grease
3	Ball joints	General purpose grease
4	Fork pivot	General purpose grease
5	Front wheel hub bearings	General purpose grease
6	Fork bearings	General purpose grease


ITEM #	PART #	DESCRIPTION	QTY
12	86-501-98	Ball joint (left)	2
12	86-501-98	Ball joint (right)	2
13	87-074-00	Grease fitting	3
14	86-510-00	Ball joint clamp assembly	4
15	88-159-85	Ball joint nut	4
16	88-527-11	Cotter pin	4
17	50-034-00	Idler arm rod	1
18	18-057-11	Drag link	1
19	32-215-00	Bushing	2
20	88-148-61	1/2" SAE flat washer	3
21	18-084-50	Idler arm weldment	1
22	88-149-80	1/2 NC hex nut	1
23	88-149-81	1/2 NC hex lock nut	1
26	18-035-00	Tie rod	1
27	14-024-10	Front fork	1
29	45-307-00	Dust seal	2
30	88-228-60	3/4 Cut washer	1
31	80-011-00	Bearing	2
32	80-102-00	Bearing race	2
33	88-229-81	3/4 NC lock nut	1
34	92-105-00	Bearing cap	1
35	85-150-00	Fork spring	2
36	86-000-00	Front shock	1
37	88-188-61	5/8 SAE flat washer	2
38	88-189-81	5/8 NC lock nut	2
39	16-043-00	Wheel spacer	2
40	15-030-00	Front axle	1
41	45-308-00	Axle seal	2
42	80-015-00	Front wheel bearing	2
43	80-105-00	Bearing race	2
44	12-120-00	Hub (with bearings, races, seals)	1
46	87-050-00	Grease fitting	1

**EV-1 SCR CONTROL
SUPPLEMENT**

M O D U L E S E T T I N G S B Y V E H I C L E

VEHICLE	MOTOR	HP @ 36	24V	BATT VOLT			CONT MODULE		CONTACTOR PANEL		EV-1 SCR CONTROL		MODULE SETTINGS		FW	FW	
MODEL	2/1.5	3.5/2.25	5/3.5	24	36	48	EV-1A	EV-1B	75A	150A	CREEP	C/A	C/L	IA	DO	PLUG	PU DO
B 2-48	X			X			X		X		7	3	9	7	2-1/2	7-1/2	5 5
B 2-48		X		X					X		6	5	9	3	3	7	5 5
B 2-54			X	X				X		X	6	4.5	9	4	2.5	5	5 5
B 2-56			X	X				X		X	6	5	9	5	3.5	5	5 4
E 4-51		X			X		X		X		8	3	9	7	3	4	5 5
E 4-53			X		X			X		X	7	5	9	5	3.8	5	5 5
E 4-53		X		X	X		X		X		6	5	9	3	3	5	5 5
E 4-57			X	X	X			X		X	7	5	9	5	3.8	5	5 5
E 4-57		X		X	X		X		X		6	5	9	3	3	5	5 5
P 2-49			X		X			X		X	5.5	5	9	5	3.8	4.4	5 5
P 2-50			X		X			X		X	5.5	5	9	5	3.8	4.4	5 5

GENERAL ELECTRIC SERVICE INFORMATION BULLETIN

 GENERAL ELECTRIC	EV-1™ SCR CONTROL	SERVICE INFORMATION	
		EV-1 Card Damage	
		Subject _____	
		80-1	5/14/80
		Number _____	Date _____

As the number of EV-1 controls in use grows, so do the variety of application and maintenance procedures. This letter will list five specific situations which could cause damage to the EV-1 oscillator card. In all of these cases, the card should be replaced, the symptom confirmed and the cause eliminated.

1. Inadvertently apply battery positive to the R6 terminal of the oscillator card with the 1A switch open. This can easily be done by incorrect wiring of the 1A switch versus the start switch. This will cause internal damage to the card.

The SYMPTOM that would surface in this case is the bypass (1A) function will not operate.

2. Inadvertently apply battery positive to R4 or R5 or R6 terminals of the oscillator card with the 1A switch closed and/or the accelerator pot in the top speed position (min. ohms). This will cause internal damage to the card or the 15 amp control fuse will blow.

The SYMPTOM that will surface is the 1A/FW contactors pick up when the key switch is closed. If the control fuse opened, then the control will be inoperative.

3. Apply hi-pot voltage (500-1300 volts AC) with as low as 20 milliamps current draw to L3 on the EV-1 oscillator card. This is accomplished by Hi-Potting the vehicle with the oscillator plugged in and an existing short in the control circuit or the truck frame. Realize, that any short to frame in any of the control switches or wiring will cause this problem if the vehicle is Hi-Potted.

Certain components on the card will be damaged and also possibly the 5REC, 2REC, 1REC and 3REC.

The SYMPTOM in the case of damage to the 1, 2 or 5 REC's will be no output to the PMT driver and, therefore, no pickup of the Forward and Reverse contactor. If the 3REC is damaged, the power fuse should blow.

Should this situation occur (after Hi-Potting), the short should be eliminated. EV-1 controls are rated to withstand hi-pot voltages of 1300 volts A.C. The truck (or control) may be hi-potted without damage to the control, if the attached procedure on hi-potting is followed.

4. Forgetting to connect the 14 pin connector in the rear of the oscillator card and applying power will damage certain card components.

The SYMPTOM in this case will be no 1A function.

™Trademark of General Electric Company

The information contained herein is intended to assist truck users and dealers in the servicing of SCR control furnished by the General Electric Company. It does not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, the matter should be referred to the truck manufacturer through his normal service channels, not directly to General Electric Company.

5. Probably the most common of these five situations, plugging a working battery charger into the control and closing the key switch will damage the EV-1 card through terminal L3.

The SYMPTOM in this case is that the truck will not run and in many cases, the situation will be obvious as much smoke and fumes will be evident.

If the truck doesn't run with no visual evidence of card damage, confirm this situation by checking voltage at card terminal R1 (with respect to battery negative) and the key switch closed: Damage caused by a battery charger will cause a reading of 0 volts at this point.

The portion of the card damaged in this case is the power supply.

Other printed circuit cards such as the Battery Discharge Indicator can be damaged also.

Attached find a sketch of a suggested modification that can be made in order to prevent plugging the charger into the control.

It should be noted that all five of these conditions may invalidate warranty considerations.

Cosmo Mirra
Cosmo Mirra

Joe Nash/cm
Joe Nash

/gm

Tennis



EV-1 HIGH POTTING PRECAUTIONS

A. Protect the SCR panel components from ground fault paths by the following procedure:

- 1) Short all five SCR power terminals together; A1-NEG-A2-T2-POS
- 2) Short capacitor terminals together
- 3) Remove main control card and accessory cards

NOTE: It is important to remember that the practice of shorting SCR terminals/ capacitor and removing oscillator card is done to protect electronic components should a hi-pot failure exist anywhere on the truck.

B. Hi-pot positive and negative to frame using a hi-pot tester with 15 milliamps or better current capacity.

Hi-pot current draw can be broken down in three paths:

- 1) 3.5 to 5 MA is the typical draw for EV-1 SCR panel. The larger the panel size, the greater the current draw.
- 2) Current draw in a traction motor normally is in the 4 to 5 MA range.
- 3) The remainder of truck will make up the rest of current draw.

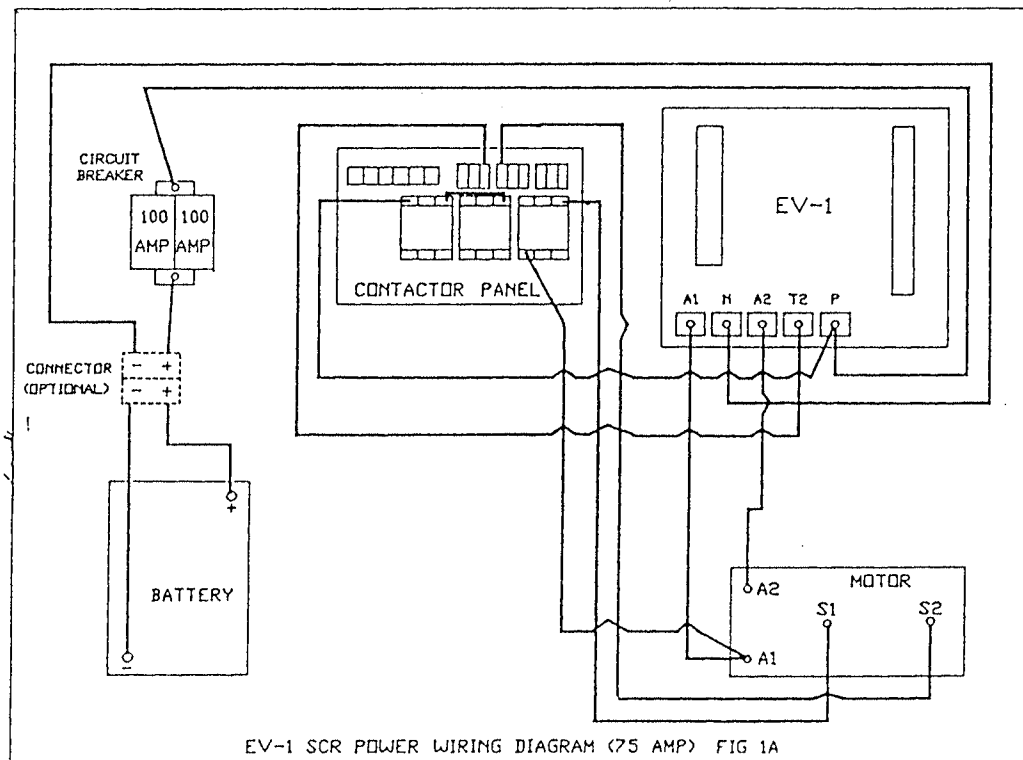
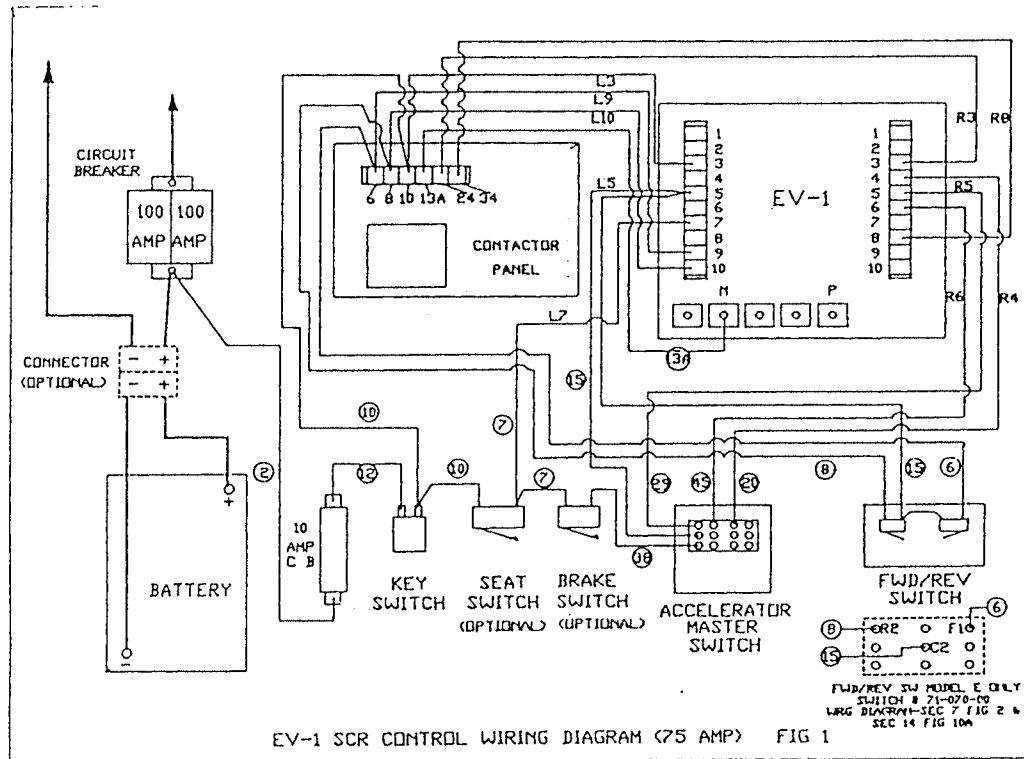
Clear any faults and continue testing until circuit will hold up hi-pot voltage in test B above.

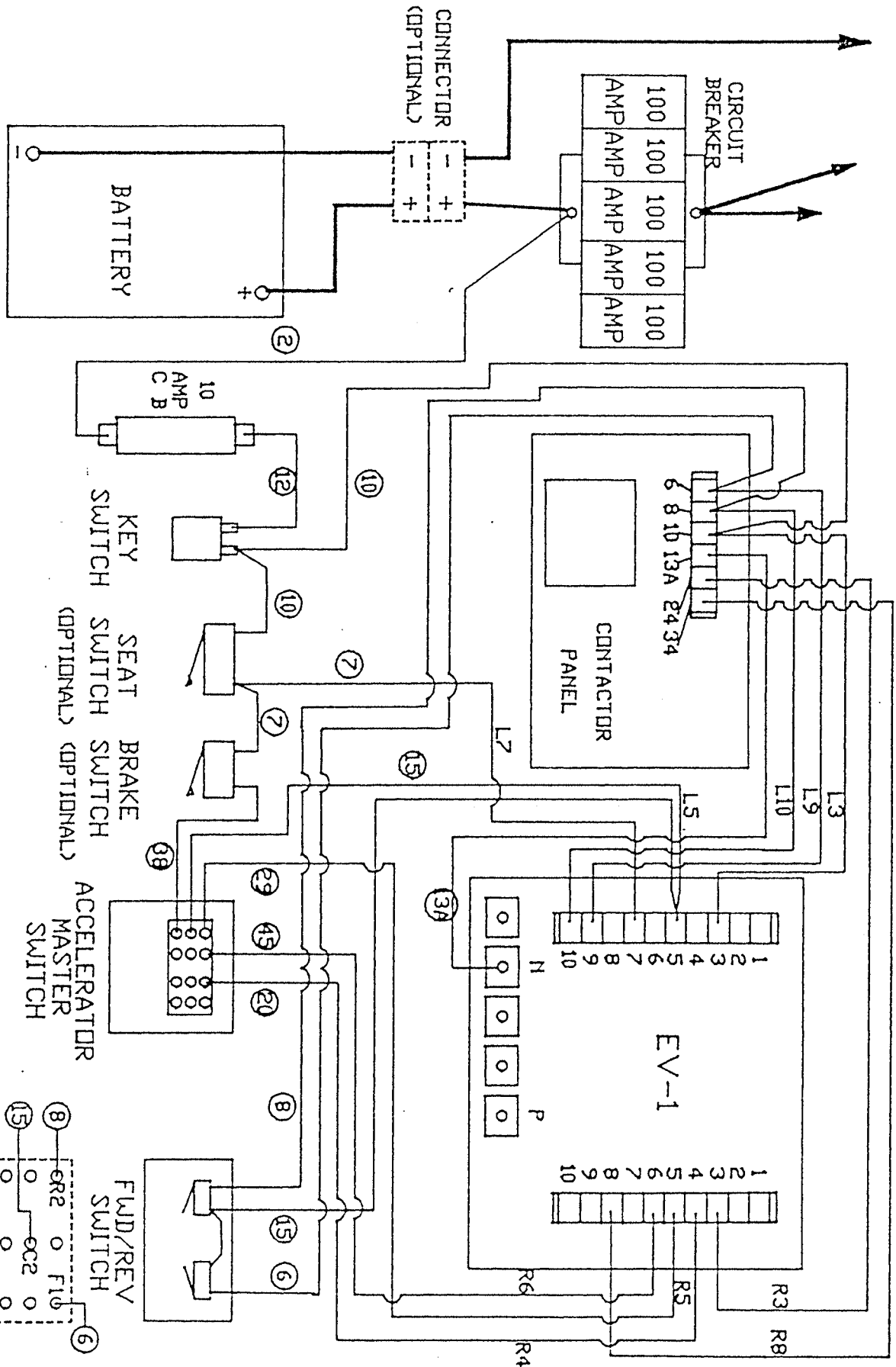
C. This procedure is suitable for preparation for the U.L. dielectric test.

D. Warranty is voided unless this procedure is followed.

<p>SKJMD82179 -A1</p> <p>CONT ON SHEET FL. SH NO. 1</p>	<p>TITLE</p> <p>FIRST MADE FOR</p>	<p>CONT ON SHEET FL. SH NO. 1</p>
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>CABLES TO BATTERY CHARGER</p> <p>ANDERSON PLUG</p> <p>SEE SKETCH A</p> <p>2.5 INCH LONG 1/4 INCH DIA. H.W.D. QTY 2</p> </div> <div style="width: 45%; text-align: right;"> <p>REVISION</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 100px;"> <div style="width: 45%;"> <p>ANDERSON PLUG</p> <p>CABLES TO CONTROL</p> </div> <div style="width: 45%; text-align: right;"> <p>TRUCK FRAME</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 100px;"> <div style="width: 45%;"> <p>LOCATIONS TO MATCH ANDERSON PLUG (CLEARANCE FOR 1/4")</p> <p>1.00</p> <p>4.00</p> <p>1.00</p> <p>SKETCH A</p> </div> <div style="width: 45%; text-align: right;"> <p>ANY NON-CONDUCTING MATERIAL (IE) WOOD, PLASTIC PRESSED FIBER, ETC.</p> </div> </div>		
<p>MADE BY DYCE M DUNBAR</p> <p>ISSUED</p>	<p>APPROVALS</p> <p><i>[Signature]</i></p>	<p>INDUSTRIAL CONTROL</p> <p>DIY OR DEPT.</p> <p>SKJMD82179 -A1</p>

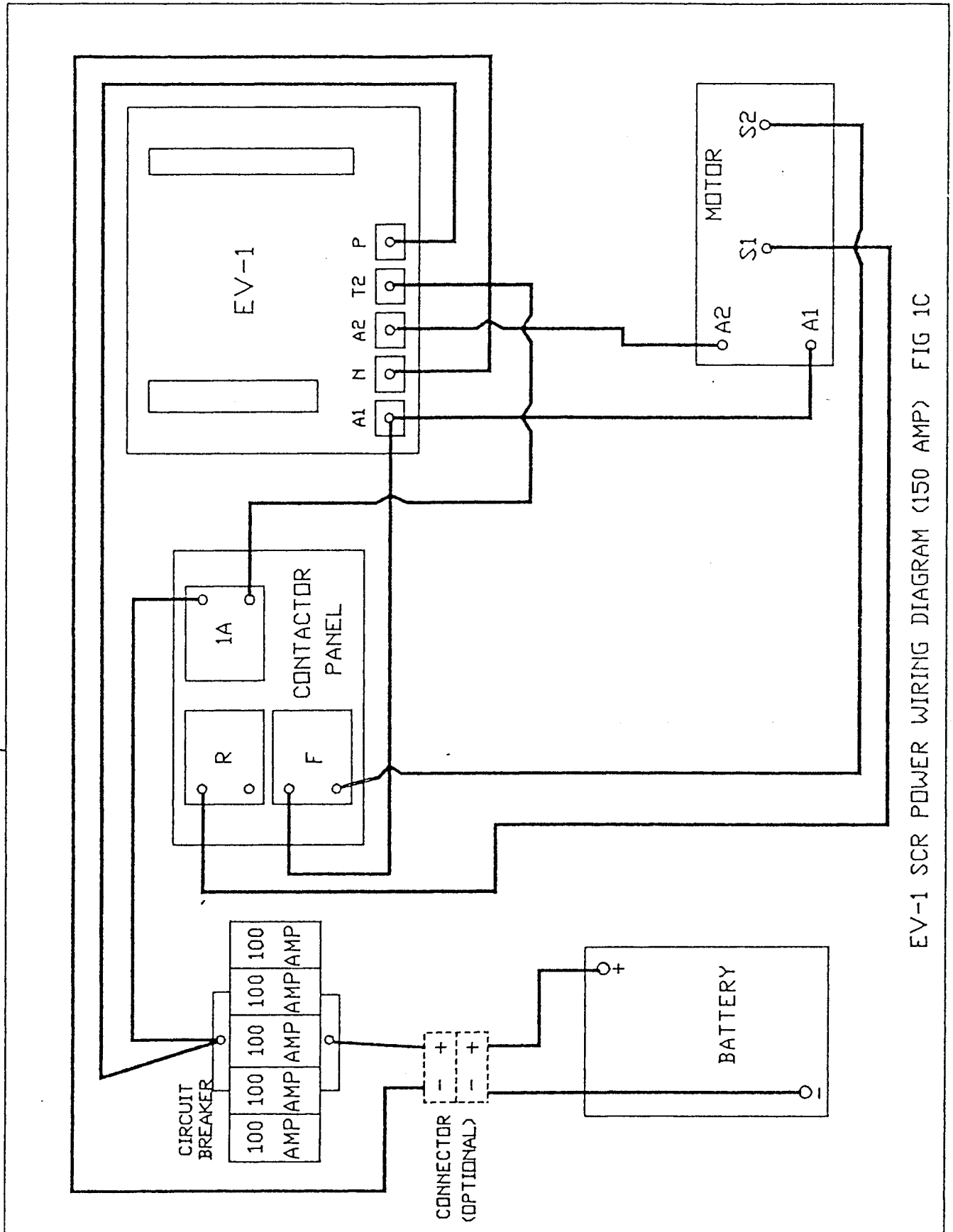
WIRING DIAGRAMS





EV-1 SCR CONTROL WIRING DIAGRAM (150 AMP) FIG 1B

FWD/REV SW MODEL E ONLY
SWITCH # 71-070-00
WIRING DIAGRAM-SEC 7 FIG 2
SEC 14 FIG 10A



EV-1 SCR POWER WIRING DIAGRAM (150 AMP) FIG 1C

DISCHARGE
INDICATOR

HEAD
LIGHT

HORN

HOUR
METER

CIRCUIT BREAKERS

100 AMP	100 AMP	100 AMP	100 AMP	100 AMP	100 AMP
---------	---------	---------	---------	---------	---------

10
AMP

LIGHT SW
HORN
BUTTON

12 V
NEG

12 V

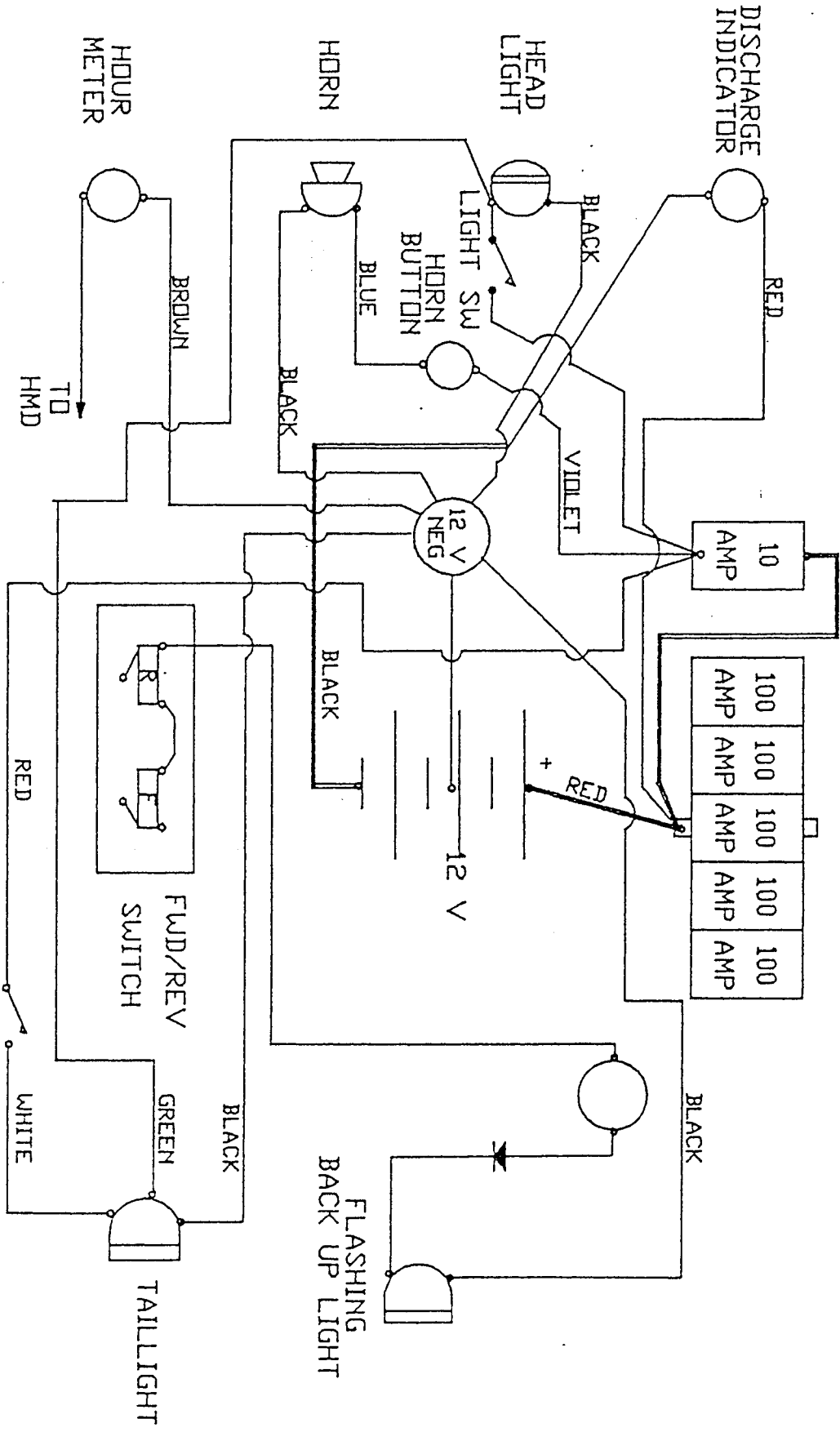
FLASHING
BACK UP LIGHT

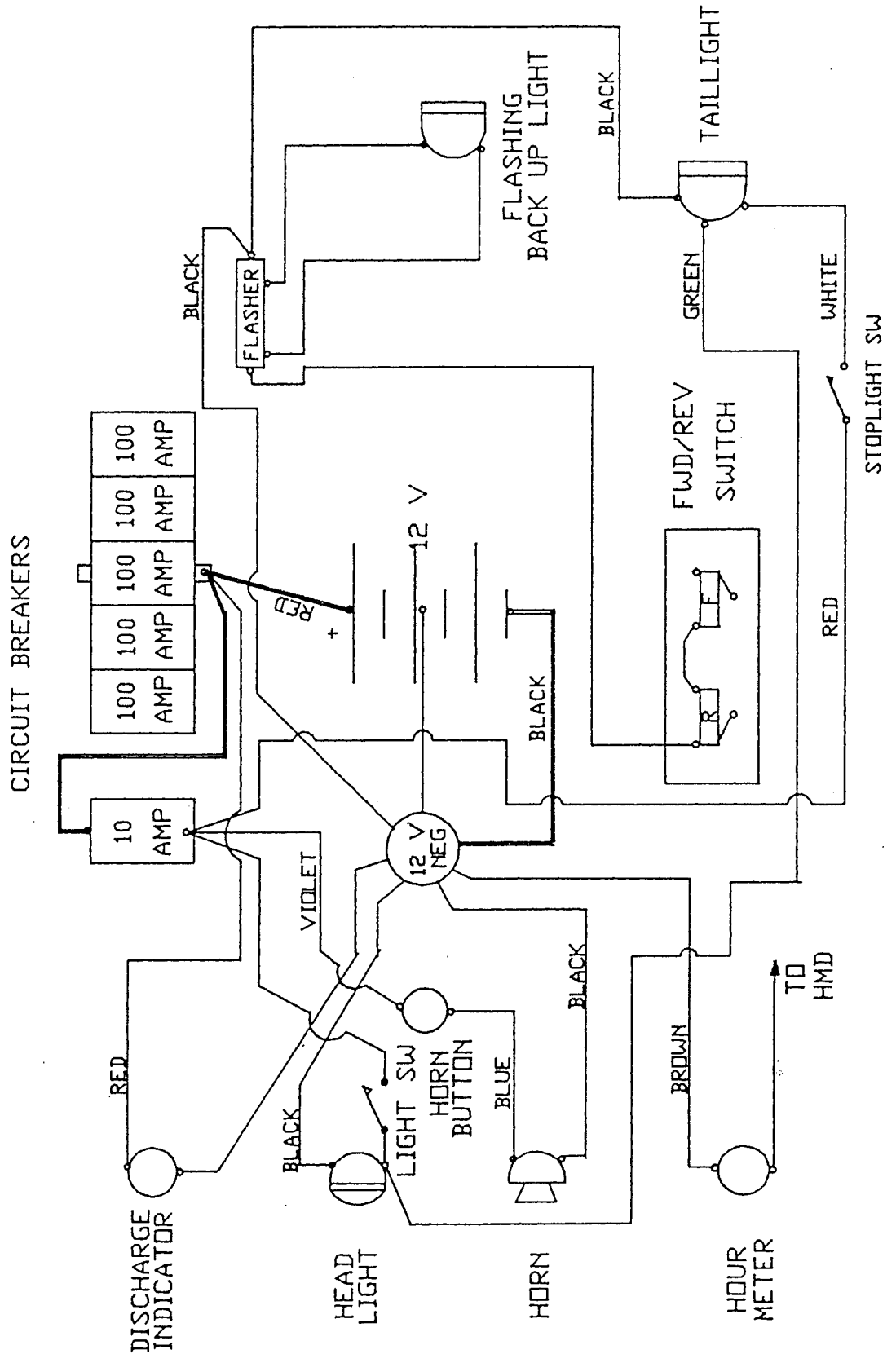
FWD/REV
SWITCH

TAILLIGHT

STOPLIGHT SW

12 V ACCESSORY SYSTEM WITH POWER GREATER THAN 12 V





12 V ACCESSORY SYSTEM WITH 12 V POWER SYSTEM

SERVICE AND ADJUSTMENT
EV-1 FORWARD/REVERSE SWITCH
REFER TO FIGURE 3

CAUTION: Whenever service work is to be conducted on the switch or any part of the vehicle wiring system, disconnect the positive lead at the battery or unplug power leads on vehicles so equipped.

REPLACEMENT OF MICROSWITCH

1. Remove (1) screw from center of handle and hub assembly. Remove handle and hub assembly from cover.
2. Remove (2) screws attaching cover to frame. Remove cover from frame.
3. Carefully note the position of wires and mark their respective locations.
4. Remove switch terminal screws and wires.
5. Remove (2) screws attaching switch to frame assembly.
6. Install new switch, replacing screws and wires in reverse order. Switch position retaining screws should be snug, not tight, for the moment.
7. With switch roller riding on top of cam lobe, insure that .010" clearance exist between roller arms and switch body, and tighten switch retaining screws.
8. Insure that replaced switch operates correctly in "NC" and "NO" positions.
9. Check adjoining switch for correct adjustment.
10. Replace cover and handle assembly in reverse order.
11. Check for proper operation.

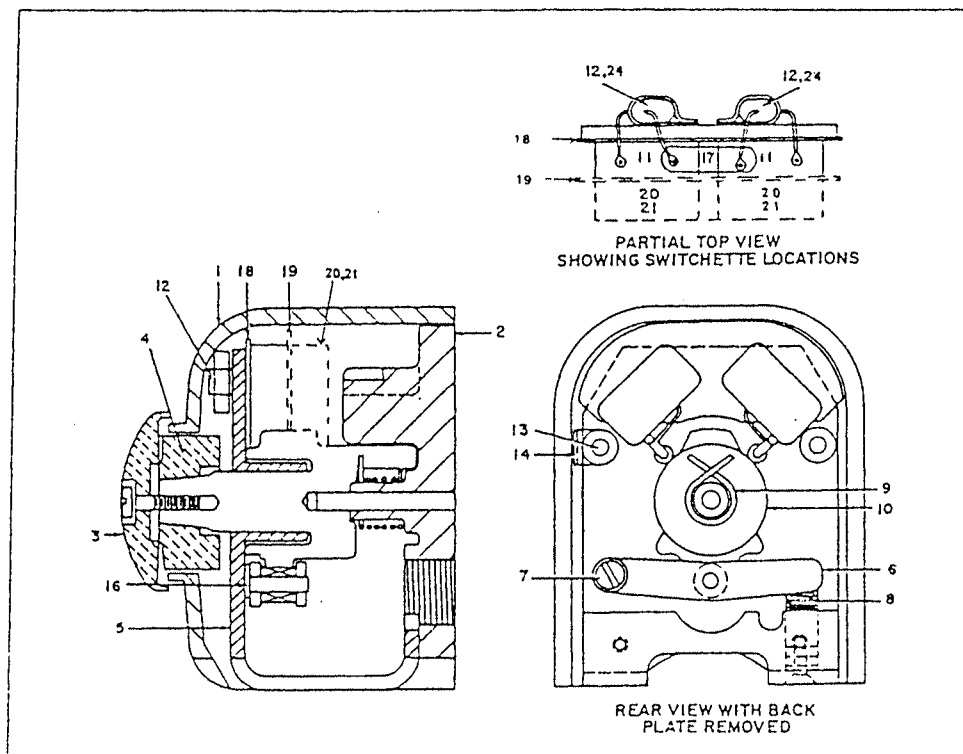


FIGURE 3

FORWARD / REVERSE SWITCH
EV-1 SCR CONTROL
REFER TO FIGURE 3

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY.
3-0	71-091-00	FORWARD/REVERSE SWITCH	1
3-1	71-091-51	COVER	1
3-2	71-091-52	BACK PLATE	1
3-3	71-091-53	HANDLE AND HUB	1
3-4	71-091-54	STOP	1
3-6	71-091-56	CAM FOLLOWER	1
3-7	71-091-57	SPACER	1
3-8	71-091-58	SPRING FOR CAM FOLLOWER	1
3-10	71-091-59	STAR WHEEL CAM	1
3-11	71-091-60	SWITCH, FORWARD & REVERSE	2
3-12	71-091-61	CAPACITOR ASSEMBLY	2
3-13	71-091-62	SPACER	2
3-14	71-091-63	WIRE CLIP	1
3-16	71-091-65	WASHER	1
3-17	71-091-66	JUMPER	1
3-18	71-091-67	INSULATION	1
3-19	71-091-68	INSULATION (OPTIONAL)	1
3-20	71-091-60	SWITCH (OPTIONAL), FOR SPECIAL ORDER ACCESS.	1
3-21	71-091-70	SWITCH (OPTIONAL), FOR SPECIAL ORDER ACCESS.	1
NOT SHOWN	71-091-71	STEERING COLUMN MOUNTING CLAMP	1
3-24	71-091-72	CAPACITOR CLAMP	2

NOTE: Standard hardware items listed below are not normally stocked by Taylor-Dunn but can be purchased locally.

SCREWS

10-32, 5/8" FLAT HEAD	4-40, 1/4" PAN HEAD
4-40, 3/4" PAN HEAD	4-40, 1-1/4" PAN HEAD
4-40, 1-3/4 PAN HEAD	6-32, 3/4" PAN HEAD
8-32, 3/4" PAN HEAD	8/32, 7/8" PAN HEAD
10-32, 1/2" PAN HEAD	10-32, 2-1/2" PAN HEAD

LOCK WASHERS

PLAIN WASHERS

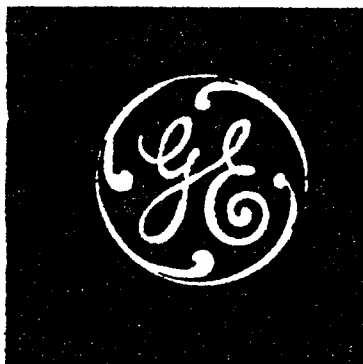
NUTS

FOR #4 SCREW
FOR #8 SCREW

FOR #4 SCREW
FOR #8 SCREW

4-40 HEX
10-32 HEX

ACCELERATOR SWITCH, GE SUPPLEMENT, FIGURE 4, PARTS LIST



INSTRUCTIONS

GEH.4470A

EV-1* SCR CONTROL ACCELERATOR SWITCH IC4485ACC1

Before any adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, JACK WHEELS OFF FLOOR, DISCONNECT THE BATTERY AND DISCHARGE CAPACITOR(S).

DESCRIPTION

The IC4485ACC1 is a family of accelerator master switches that may be either foot-operated through a pedal and linkage system or hand-operated by a suitable handle arrangement. This master switch offers a wide variety of options so that it may be customized to fit the user requirements. The master switch contains a switchette which closes at the beginning of travel to energize the control circuit, a switchette at the end of travel to bypass the control for maximum speed and torque, and a unique unidirectional potentiometer to vary the speed in between. The potentiometer is controlled by mechanical linkage to turn in only one direction so that it is independent of handle movement. This feature simplifies the setting of the potentiometer to provide consistent performance in both directions.

A single molded cam is used for the foot-operated CW and CCW forms. Direction of rotation can be changed in the field by changing the position of the start switchette and relocating the OFF-position stop.

A different molded cam is used for the hand-operated forms.

INSTALLATION

A conduit plate can be located on either side. The four mounting holes are symmetrical relative to the shaft; only three need be used.

When an external linkage is used, a separate external return spring is required. Any external linkage that can be operated forcibly should also have an external mechanical stop.

* Trademark of General Electric Company

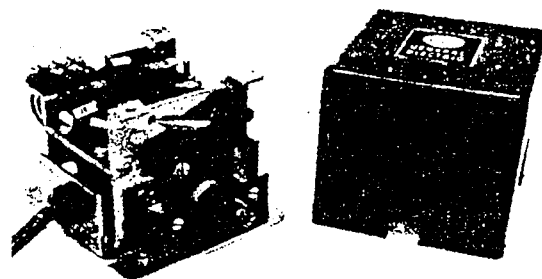


Fig. 1. IC4485ACC1 master switch with cover removed

TABLE 1
CURRENT RATING OF SWITCHETTES

Voltage Inductive	Current- Amperes	
	Make and Break	Carry
6	10.0	10
12	6.0	10
18	4.0	10
24	3.5	10
30	3.0	10
36	2.5	10
48	2.0	10
72	1.0	10

The ratings in Table 1 are for single circuits (i. e., normally open contact only). Voltages above 72 require capacitor-type filters, in accordance with factory recommendations.

MAINTENANCE

Oil-less bearings are used on both ends of the main operating shaft and thus eliminate the need for any lubrication of the switch.

GEH-4470, EV-1* Accelerator Switch

SWITCHETTE ADJUSTMENT



Fig. 2. Switchette adjustment, view from shaft end

Unlock locknut (see Fig. 2) and turn screw CW to make the normally open switchette close at less travel. The start switch should close at 5 to 8 degrees and reset at a minimum of 1-degree travel from the OFF position. The 1A switch should close at 26 to 29 degrees and reset at a minimum of 22 degrees travel from the OFF position. Total travel is 30 degrees.

POTENTIOMETER ADJUSTMENT

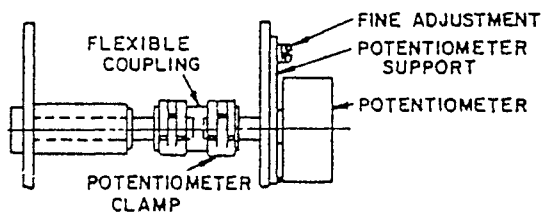


Fig. 3. Potentiometer and clamps

To remove the potentiometer, remove the wires from the terminal board, loosen the clamps on the flexible coupling with duck-bill pliers, and move both clamps to the left (see Fig. 3). Remove the potentiometer and its support by removing the two "fine-adjustment" screws. Retain the potentiometer support.

To replace, mount the new potentiometer on the support, locating the tab in the hole of the support, and secure with the lockwasher and nut. With an ohmmeter on the potentiometer terminals (R x 100 scale), turn the shaft clockwise until the point where the resistance starts to reduce below the level (4800- to 6000-ohm) portion of the curve (see Fig. 4). This corresponds to the START position.

6000-4800 OHMS

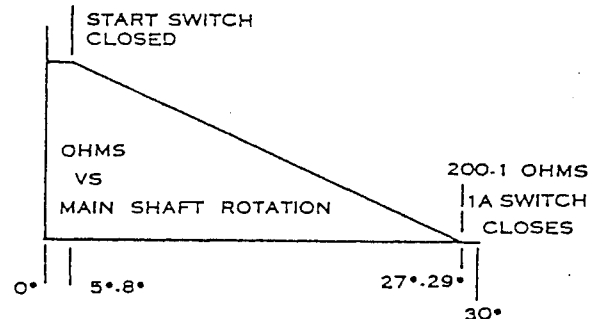


Fig. 4. Potentiometer resistance curve

With the potentiometer clamp moved to the left and the master switch in the START position, line up the potentiometer shaft with the flexible coupling and center the fine-adjustment slots with the fine-adjustment tapped holes. Push the potentiometer until the support is against the frame. Assemble, but do not tighten, the fine-adjustment screws. Release the coupling clamp with duck-bill pliers and slide the clamp into position.

Rotate the master switch shaft until the START switchette operates (a slight click at about 7 degrees). The ohmmeter should be 4800 to 6000 ohms. Continue rotating the shaft until the 1A switchette operates (a slight click at about 28 degrees). The ohmmeter should be less than 200 ohms and remain above 1 ohm, when the shaft is rotated fully.

If the ohms are too low when the start switch closes, loosen the fine-adjustment screws and rotate the potentiometer support CCW.

If the ohms are too high when the 1A switch closes, loosen the fine-adjustment screws and rotate the potentiometer support CW.

If the fine adjustment is not enough to bring the resistance values within limits, return the master switch to the OFF position, release the potentiometer clamp with duck-bill pliers, and turn the potentiometer shaft with needle-nose pliers a slight amount. (Clockwise from shaft end of potentiometer to reduce ohms.) Recheck resistances at START and 1A and use fine adjustment as described previously if necessary.

Check that coupling clamps are in position and the fine-adjustment screws are tight.

* Trademark of General Electric Company

EV-1* Accelerator Switch, GEH-4470

**FIELD MODIFICATION OF
FOOT-OPERATED SWITCH**

If the direction of rotation of a foot-operated switch needs to be changed, the location of the OFF-position stop, the switchette and the cam must be changed. (See Figs. 5 and 6 and Table 2.)

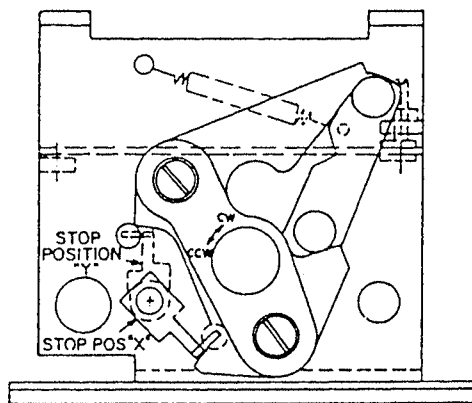


Fig. 5. OFF-position stop

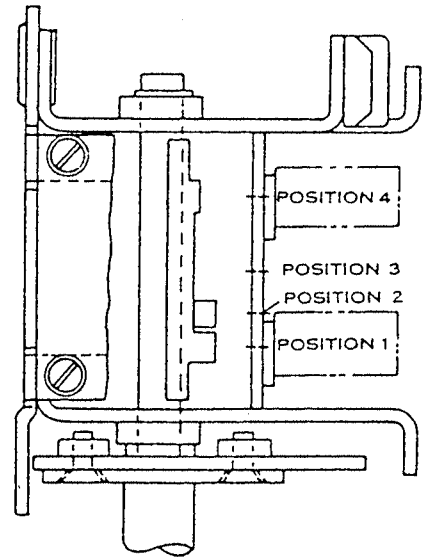


Fig. 6. Switchette position

TABLE 2
OFF-POSITION STOP AND SWITCHETTE POSITION

Switch Rotation	Switchette Position (See Fig. 6)		Stop Position (See Fig. 5)	Use Cam
	Start	1A		
CW	2	4	Y	194B8333P1
CCW	3	4	X	171B3172P1
CW and CCW	1 and 3	4	Stop not used	171B3172P1

* Trademark of General Electric Company

ACCELERATOR SWITCH EV-1 SCR
REFER TO FIGURE 4

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY.
4-0	61-912-00	ACCELERATOR SWITCH COMPLETE	1
4-1	61-912-51	SWITCH ASSEMBLY	2
4-5	61-912-55	SCREW, ADJUSTING FOR SWITCH	2
4-5A	88-049-80	NUT, HEX 10-32	2
4-6	61-912-57	STOP	1
4-7	61-912-58	CAM	1
4-8	61-912-59	CAM SHIFT ASSEMBLY	1
4-9	61-912-60	POTENTIOMETER OPERATING ARM & SHAFT	1
4-10	61-912-61	SPRING, RETURN	1
4-11	61-912-62	TERMINAL BOARD	1
4-12	61-912-63	SWITCH SUPPORT BASE	1
4-13	61-912-64	POTENTIOMETER 5K, WITH MOUNTING BRACKET	1
NOT SHOWN	61-912-65	WIRING HARNESS COMPLETE WITH 12 POINT PLUG	1
NOT SHOWN	61-912-66	HOSE	1
NOT SHOWN	61-912-67	CLAMPS, HOSE	2
NOT SHOWN	61-912-68	COVER	1
NOT SHOWN	61-912-69	PLATE, COVER	1
NOT SHOWN	61-912-70	PLUG, RUBBER (FITS IN COVER PLATE)	1
4-19	61-912-71	SHAFT ASSEMBLY	1
<u>NOTE:</u>		The standard hardware items listed below are not normally stocked by Taylor-Dunn but can be purchased locally.	

SCREW WITH SPRING LOCK WASHER

SCREWS

6-32, 1/2" PAN HEAD
8-32, 3/8" PAN HEAD
8-32, 1/2" PAN HEAD

6-32, 3/8" FLAT HEAD
10-32, 1/2" FLAT HEAD

PLAIN WASHERS

RETAINING RINGS

FLAT HEAD LOCK WASHER

#6 SCREW
#8 SCREW
#10 SCREW

EXTERNAL "E" RING FOR 1/4" DIA. SHAFT
EXTERNAL "E" RING FOR 3/8" DIA. SHAFT

10-32 SCREW

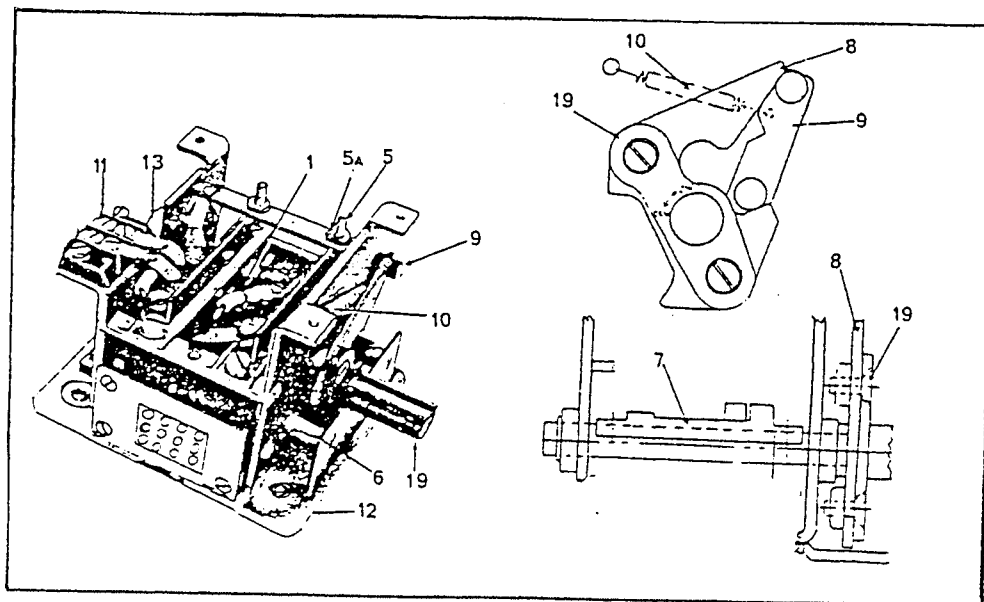


FIGURE 4

CONTACTORS PANELS - 75 AMP



INSTRUCTIONS

GEH-3099A

75-AMPERE ELECTRIC-VEHICLE CONTROL CONTACTORS

IC2800-M601, -M610, -M611

Before any adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, the POWER SUPPLY MUST BE DISCONNECTED.

GENERAL

These d-c contactors are designed for 36-volt maximum, intermittent-duty operation, such as found in battery-powered lift trucks and golf-cart services. The shunt-operating coils are rated for 50-percent time-on intermittent duty. The contactors are self-contained units suitable for mounting on the vertical surfaces of either metal or insulated bases. All terminals and mounting holes are accessible from the front of the device.

TABLE I
IDENTIFICATION

Nomenclature IC2800	Power Circuits
-M601	1-NC
-M610	1-NO
-M611	1-NO - 1-NC (DPDT)

TABLE II
CURRENT RATINGS OF POWER CONTACTS

Amperes	Duty Cycle Percent Time-on	Maximum Time-on
50	100*	Continuous*
75	50	5 Minutes
250	5	30 Seconds
500†	2	5 Seconds

* For continuous applications, the operating coil must be de-rated or a holding resistor must be inserted in series with the operating coil.

† The maximum interrupting rating of these contactors is 300 amperes at 36 volts with an inductive load such as a motor.

ARCING CLEARANCES

During installation, it is important that certain minimum clearance be maintained between the contactor and other surrounding components. See Fig. 3.

CONNECTIONS

As a rule, the normally open power connections and the coil terminal connections are at the top of the contactor, with the normally closed power connections at the bottom. (See Figs. 1 and 2). Certain special forms have other configurations. A quick visual check can be made as shown in Fig. 2.

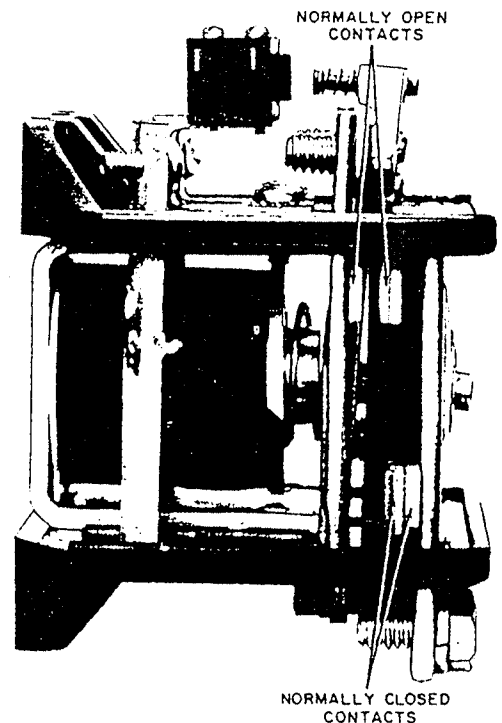


Fig. 1. IC2800-M611 contactor for electric-vehicle applications.

Forms of the IC2800-M611 (DPDT) are available with a tie between one of the normally open stationary contacts and one of the normally closed

GEH-3099A, 75-ampere Electric-vehicle Control Contactors

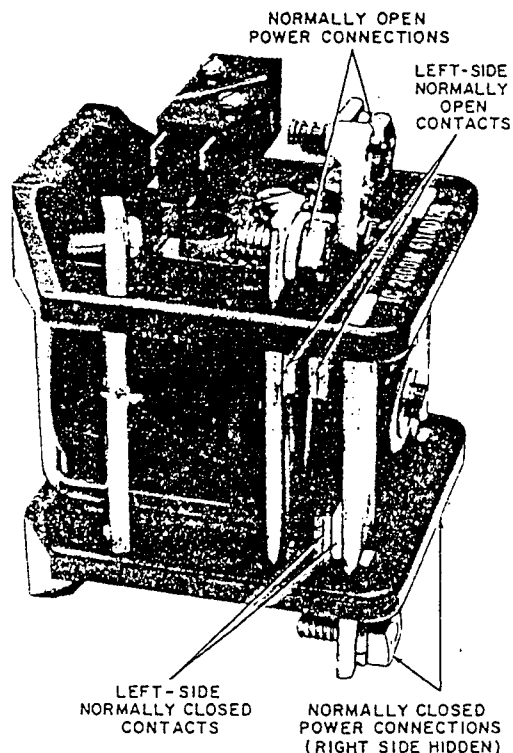


Fig. 2. IC2800-M611 contactor with CR1070C143C3 interlock.

stationary contacts. This tie or common connection is available either on the left or the right side of the contactor. A typical application of these contactors is as a reversing pair.

The power connections are 1/4 - 20 screws, which should be tightened to 45 to 60 inch-pounds (5.1 to 6.8 newton meters [N·m]). It is recommended that this tightening be done with a screw driver, spin tight, or a socket on a shaft extension. If a wrench is used, take care that the head or body of the wrench does not come in contact with the molded side plate (see Fig. 4). That is, do not use the molded side plate as a pivot point.

VOLTAGE SPIKE SUPPRESSION

When these contactors are used in conjunction with static control, it is often necessary to suppress the voltage spike which results when coil current is interrupted. This is done to prevent damage to static components such as silicon controlled rectifiers, transistors, etc.

Use only those voltage spike suppressors which are factory specified and supplied by the truck manufacturer.

When connecting the suppressors across the coil, polarity must be maintained in accordance with Fig. 5.

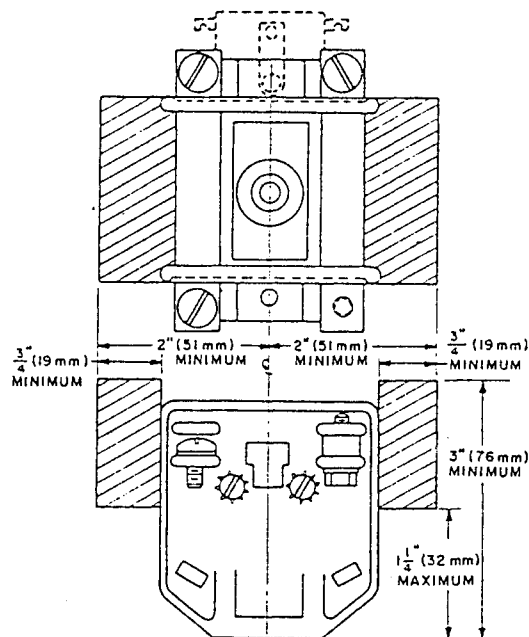


Fig. 3. Installation clearances. For proper operation the shaded area should be free of any obstructions.

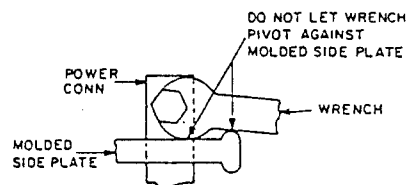


Fig. 4. Proper use of a wrench when tightening power contacts.

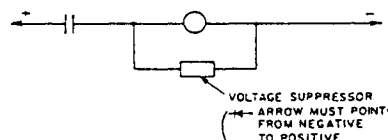


Fig. 5. Polarity maintenance.

MAINTENANCE AND ADJUSTMENTS

The following information is intended to assist during periods of normal maintenance and to provide checks to determine if the contactors are in proper operating condition.

As these devices are adjusted, inspected, and tested at the factory, they should not normally require further adjustments. However, any time a part has been replaced, the following checks should be made.

75-ampere Electric-vehicle Control Contactors, GEH-3099A

POWER CONTACTS

In normal operation, the contacts will become blackened, discolored, and roughened. This will not interfere with proper operation and cleaning is not necessary. The contacts should be replaced before the silver-alloy contact facing is completely eroded through to the backing material, or before the wipe is reduced to zero. The silver alloy may transfer from one contact and cause buildup on the mating contact. This can be expected under certain conditions and does not require contact dressing or filing. When replacing only one contact of a mating pair, remove any high peaks or beads of material on the contact that is not replaced.

POWER CONTACTS ADJUSTMENTS

With the contactor mounted or held in its normal operating position (see Fig. 3), check the contact wipes and gaps. These checks are most easily made with small rods or drills of a diameter equal to the dimensions given below. These contactors are double break (two sets of contacts per circuit) and the gaps must be measured on both sets of contacts.

Normally open gap - 0.050 inches (1.27 mm)
minimum each side

Normally closed gap - 0.050 inches (1.27 mm)
minimum each side

Normally open wipe - 0.040 inches (1.0 mm)
minimum

Normally closed wipe - no check

NOTE: The normally open wipe measurement given is with new contacts and will decrease as the contacts wear.

Figures 6 and 7 show de-energized and energized positions, and where to measure.

The only means of adjusting to obtain these measurements is by moving the side plates in or out on the frame. If adjustment is necessary, make sure that the side plates are relatively square with respect to each other and with the U-frame. Re-check the electrical interlock adjustments and, if necessary, re-adjust per the section on Electrical Interlocks in this instruction publication.

REPLACEMENT OF PARTS

It is necessary to disassemble these devices in order to replace any part except the electrical interlock or its operator. For this reason, you may

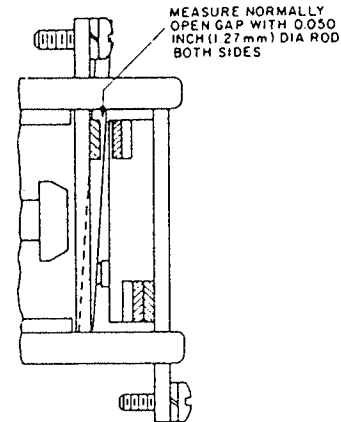


Fig. 6. Contactor in de-energized position.

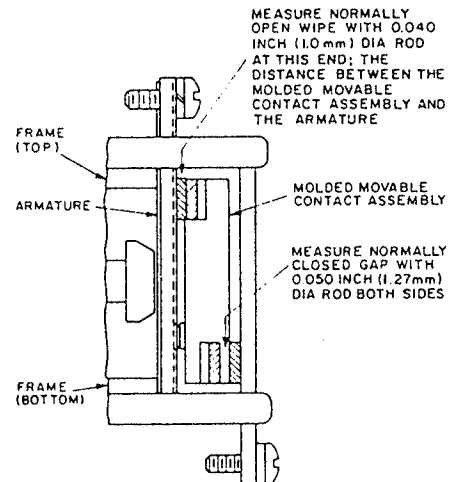


Fig. 7. Contactor in energized position with armature firmly seated against the frame at top and bottom.

find it to your advantage to replace the entire contactor whenever a complete set of contacts or a new coil is needed. However, if you desire to replace a part, use the following procedures:

1. Disconnect the contactor and remove it from the vehicle.

2. To replace the coil, first unsolder the coil leads from the coil terminal strips; then remove the screws which fasten the molded side plates to the frame.

3. Now, slide the frame and coil out from between the molded side plates. If the core does not have a head, it is now possible to remove the coil without disassembling the core and the frame. If

GEH-3099A, 75-ampere Electric-vehicle Control Contactors

the core does have a head, you must remove the screw which holds the core to the frame. It may be necessary to hold the core with a pair of pliers.

4. Replace the coil, and reassemble the core to the frame. Be sure the special conical lockwasher is in place and that the screw is tightened.

5. Slide the frame and coil assembly back between the molded side plates with the armature spring positioned as shown in Fig. 8.

6. Replace the screws in the side plates, making sure the stationary contacts and the coil terminal strips are positioned in their respective slots in the side plates.

7. Check the power contact gaps and wipes per the Power Contact Adjustments section of this instruction publication. Also, check the electrical interlock and, if necessary, readjust per the section on Electrical Interlock Adjustments in this instruction publication. Make sure the armature spring is properly seated as shown in Fig. 8.

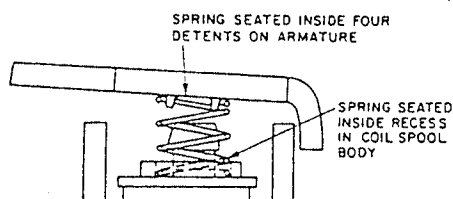


Fig. 8. Outline drawing of armature spring.

8. The side plates can be moved by the amount the holes are larger than the screws. Try to align the side plates as squarely as possible with the frame.

9. To replace a worn contact or set of contacts, first disconnect the contactor and remove it from the vehicle.

a. Remove the bottom molded side plate. Note that by leaving the top molded side plate attached to the frame, the normally open contact adjustments and the electrical interlock adjustments will not be changed.

b. Replace the worn contacts and reassemble the contactor, taking care that the stationary contact strips, the coil terminal strips, and the armature tongues are all properly positioned in their respective slots in the side plates. Make sure the armature spring is positioned as shown in Fig. 8.

c. Check the contact gaps and wipes and the electrical interlock adjustments and if necessary, re-adjust per the applicable sections in this instruction publication.

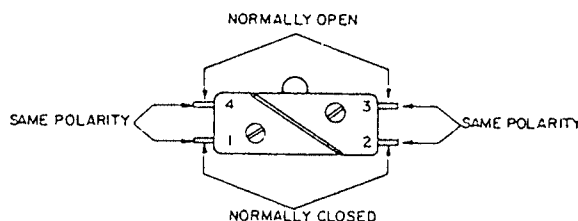


Fig. 9. CR1070C143C3 interlock connections.

ELECTRICAL INTERLOCKS

An auxiliary snap-action electrical interlock can be mounted on most forms of these contactors (see Fig. 1). This electrical interlock has one normally open pole and one normally closed pole. It must be adjusted to operate in the following manner.

1. With a 0.010-inch (0.25 mm) thick shim or rod between the armature and the U-frame at the top, the interlock must operate when the coil is energized or when the armature is manually operated.

2. With an 0.030-inch (0.76 mm) thick shim or rod, using the same procedure, the interlock should not operate. The interlock mounting bracket has slotted mounting holes and can be moved in or out to obtain these requirements. If it is necessary to do this, recheck the contact adjustments per this instruction publication.

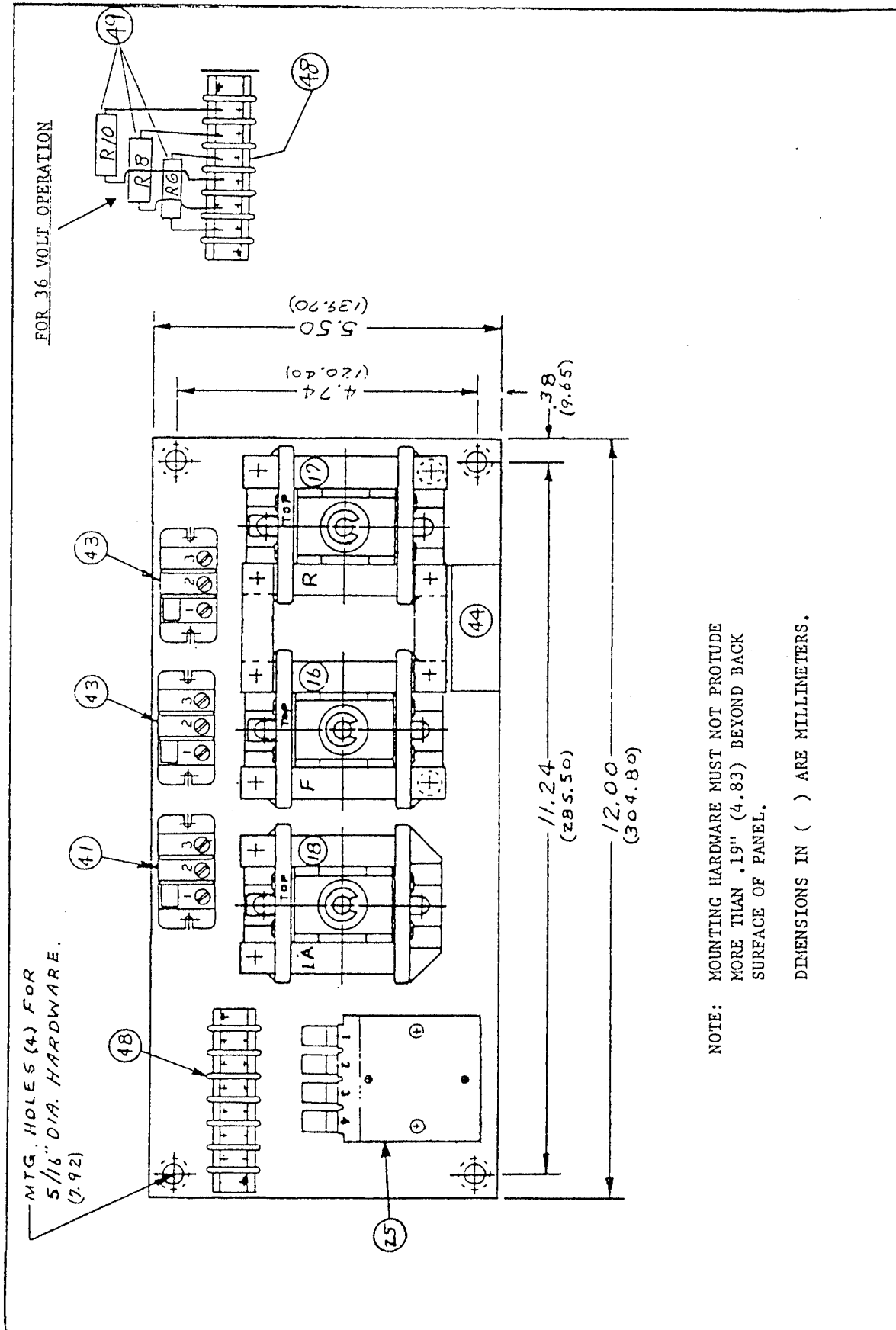
TABLE III
INTERLOCK RATINGS (RECOMMENDED)

Voltage Inductive	Current-Amperes	
	Make and Break	Carry
6	10.0	10
12	6.0	10
18	4.0	10
24	3.5	10
30	3.0	10
36	2.5	10

Ordinarily, any one circuit will control two of the coils used in these contactors. Coils may be connected either in series or parallel.

RENEWAL PARTS

When ordering renewal parts, address the nearest General Electric Company sales office, specify the quantity required, and give the catalog number or describe the required parts in detail. Give the complete nameplate rating of the equipment.



NO.	DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
TOL. FRAC. +	DEC. +				
SCALE	NONE				
DRAWN BY	J.B.				
DATE	2-2-77				

FIGURE 5

EV-1 SCR 75 ANP-24/36VOLT CONTACTOR PANEL

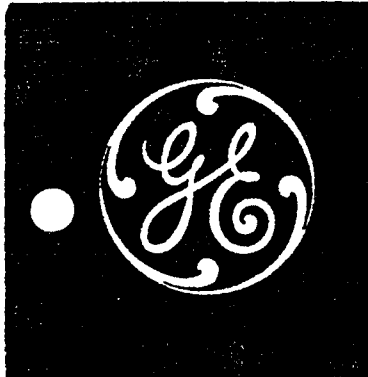
TAYLOR DUNN MFG. CO.
2114 West Ball Rd.
Anaheim, Calif.

EV-1 SCR 75 AMP CONTACTOR PANEL
REFER TO FIGURE 5

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY.
5-0	71-306-00	CONTACTOR PANEL ASSEMBLY (75 AMP/24 VOLT COIL)	1
5-16	71-306-51	CONTACTOR, FWD., SINGLE POLE, DOUBLE THROW	1
5-17	71-306-52	CONTACTOR, REV., SINGLE POLE, DOUBLE THROW	1
5-18	71-306-52	CONTACTOR, 1A BY-PASS, SINGLE POLE, SINGLE THROW	1
5-25	71-305-54	CONTACTOR DRIVER	2
5-25	79-731-00	HOUR METER DIODE BLOCK (OPTIONAL)	1
5-41	71-306-53	FILTER BLOCK, 1A	1
5-43	71-306-54	FILTER BLOCK, FORWARD/REVERSE	2
5-44	71-305-55	NAME PLATE (SPECIAL ORDER ITEM)	1
5-48	79-864-00	TERMINAL BOARD (6 POSITION)	2
5-49	78-306-55	RESISTOR (FOR 36 VOLT USE)	3

*** MOUNTING HARDWARE OBTAINED THROUGH LOCAL PURCHASE

150- AND 300- AMPERE ELECTRIC VEHICLE CONTROL CONTACTORS



INSTRUCTIONS

GEH-4469

150- AND 300-AMPERE ELECTRIC-VEHICLE CONTROL CONTACTORS

IC4482-CTR A700, A800 SERIES

Before any adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, DISCONNECT THE BATTERY, DISCHARGE CAPACITOR(S), AND JACK WHEELS OFF FLOOR.

DESCRIPTION

GENERAL

These d-c contactors are designed for low-voltage, intermittent-duty operation such as found in battery truck service.

PURPOSE OF INSTRUCTIONS

The purpose of these instructions is to instruct the user on proper care and maintenance to obtain satisfactory service from these devices. The manufacturer of the electric vehicle has tested and applied these contactors according to the requirements of his vehicle. No modifications or changes should be made in the layout, physical arrangement or electrical connections without his permission.

MOUNTING

These contactors are designed to mount on a vertical surface or on a horizontal surface.

DISASSEMBLY AND ASSEMBLY

Two main categories of these contactors are available. The single-pole normally open types, and the single-pole double-throw types which have one normally open and one normally closed contact (Fig. 1). The assembly and disassembly of these devices will be covered individually.

Single-pole, Double-throw Type
(One Normally Open and One Normally Closed Contact)

DISASSEMBLY

(Refer to Fig. 2, page 2 for exploded view and parts index).

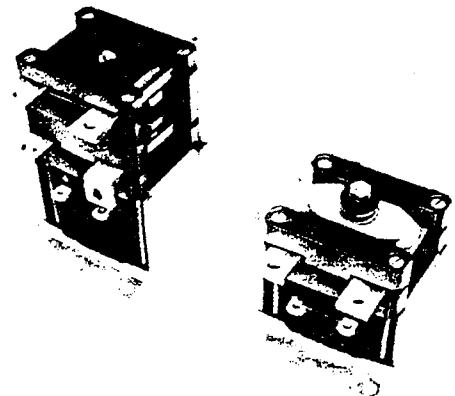


Fig. 1. Right - Single-pole, single-throw type
(one normally open contact)
Left - Single-pole, double-throw type
(one normally open and one normally closed contact)

1. Remove all electrical connections and remove the contactor from the vehicle for easier servicing.
2. Loosen the four long bolts in each corner, remove the top contact retainer, and the long bolts.
3. Remove the two top stationary normally closed contacts.
4. Remove the two contact spacers.
5. Remove the two bottom stationary contacts.
6. Remove armature and movable-contact assembly.
7. Remove magnet frame and coil from base.
8. Loosen and remove the 10-32 nut from the armature and movable-contact assembly using a 3/8-inch socket or nut driver. Note the order in which the parts are removed from the stud.

The information contained herein is intended to assist truck users and dealers in the servicing of control furnished by the General Electric Company. It does not purport to cover all details or variations in equipment or provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the truck manufacturer through his normal service channels, not directly to General Electric Company.

GEH-4469, 150- and 300-Ampere Electric-vehicle Control Contactors

PARTS INDEX

1. Long bolt with #8 lock washer
2. Top contact retainer
3. Top stationary contact
4. Contact spacer
5. Bottom stationary contact
6. Armature and movable-contact assembly
 - a. 10-32 nut
 - b. No. 10 lock washer
 - c. No. 10 flat washer
 - d. Movable-contact carrier
 - e. Shim
 - f. Movable contact
 - g. Spring cup (snaps into 6f)
 - h. Contact spring
 - i. Bottom stationary-contact support
 - j. Armature
 - k. Spiral return spring
7. Magnet frame
8. Coil
9. Base
10. Bus connector

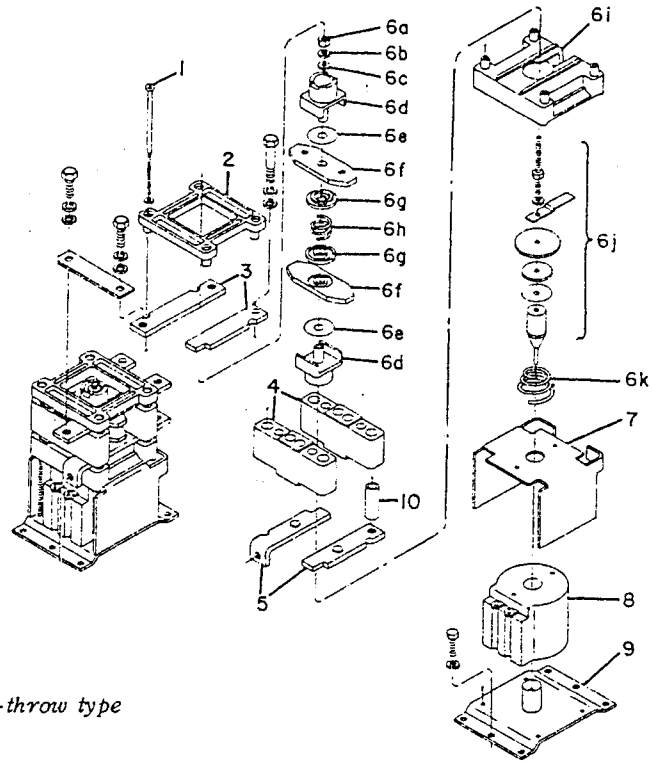


Fig. 2. Assembly of single-pole, double-throw type

PARTS INDEX

1. Long bolt with #8 lock washer
2. Contact spacer
3. Stationary contacts
4. Armature and movable-contact assembly
 - a. 10-32 nut
 - b. No. 10 lock washer
 - c. No. 10 flat washer
 - d. Contact spring retainer
 - e. Contact spring
 - f. Movable contact
 - g. Shim
 - h. Movable-contact carrier
 - i. Stationary-contact support
 - j. Armature
 - k. Spiral return spring
5. Magnet frame
6. Coil
7. Base

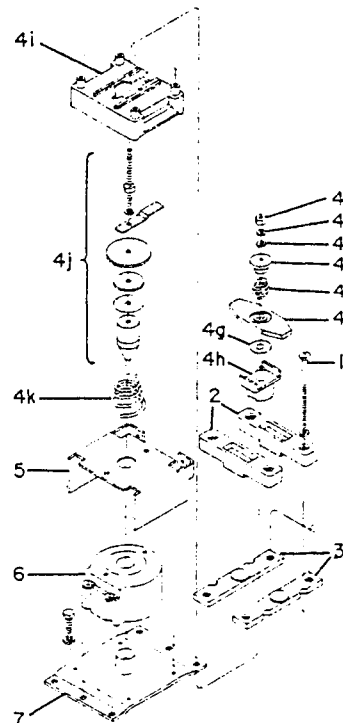


Fig. 3. Assembly of single-pole, single-throw type

ASSEMBLY

(Refer to Fig. 2, page 2 for exploded view and parts index).

Before assembly, all parts should be cleaned, inspected for wear and replaced if required. Assembly is performed in reverse order from disassembly with the following precautions required:

1. Force the small end of the spiral spring over the small diameter on the armature assembly. See Fig. 4, page 3.
2. Reassemble the armature parts 6a to 6k and tighten the 10-32 nut to 14 to 18 inch-pounds torque (1.6 to 2.0 Newton meters).
3. Locate the projections on the magnet frame in the indentations on top of the coil with frame oriented as in Fig. 2.
4. Add the armature and moveable-contact assembly.
5. Properly seat the stationary contacts in the slots of the molded stationary contact support and add the two contact spacers.
6. Add the two top stationary contacts and top contact retainer. Insert bus connector before proceeding to Step 7.
7. Tighten the four long bolts in a uniform manner using a diagonal tightening sequence. Tighten the bolts with 14 to 18 inch-pounds torque (1.6 to 2.0 Newton meters).

DISASSEMBLY AND ASSEMBLY

Single-pole, Single-throw Type
(One Normally Open Contact)

DISASSEMBLY

(Refer to Fig. 3, page 2 for exploded view and parts index).

1. Remove all electrical connections and remove the contactor from the vehicle for easier servicing.
2. Loosen the four long bolts in each corner and remove the two contact spacers.
3. Remove the two stationary contacts.
4. Remove armature and movable-contact assembly.
5. Remove magnet frame and coil from the base.

6. Loosen and remove the 10-32 nut from the armature and movable contact assembly using a 3/8-inch socket or nut driver. Note the order in which the parts are removed from the stud. See Fig. 3, page 2.

ASSEMBLY

(Refer to Fig. 3, page 2 for exploded view and parts index).

Before assembly all parts should be cleaned and inspected for wear and replaced if required. The assembly is performed in the reverse order from the disassembly with the following precautions required:

1. Force the small end of the spiral spring over the small diameter on the armature assembly. See Fig. 4, page 3.
2. Reassemble the armature parts 4a to 4k and tighten the 10-32 nut to 14 to 18 inch-pounds torque (1.6 to 2.0 Newton meters).
3. Locate the projections on the magnet frame in the indentations on top of the coil with frame oriented as in Fig. 3.
4. Add the armature and moveable-contact assembly.
5. Properly seat the stationary contacts in the slots of the molded stationary-contact support and add the two contact spacers.
6. Tighten the four long bolts with 14 to 18 inch-pounds torque (1.6 to 2.0 Newton meters).

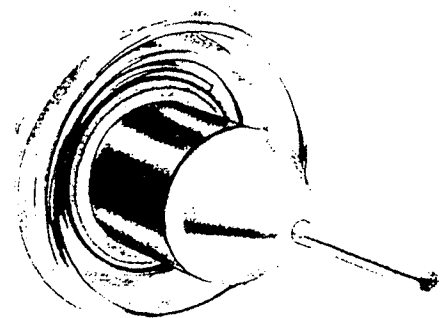


Fig. 4. Spiral spring attached to small diameter on cone head

150- and 300-Ampere Electric-vehicle Control Contactors, GEH-4469

AUXILIARY CONTACTS

Auxiliary contacts or electrical interlocks are available for the contactors as shown mounted on the contactor in Fig. 5. The auxiliary contact block is operated by de-energizing the contactor. Figures 6 and 7, page 4, illustrate the operations.

To obtain proper operation of the contact block, the gap between the auxiliary contact operator and the button on the contact block should be as shown in Fig. 7. This gap can be obtained by loosening the adjustment screws and moving the interlock support. The slots in the support permit this adjustment. The screws should be retightened to 14 to 18 inch-pounds torque (1.6 to 2.0 Newton meters).

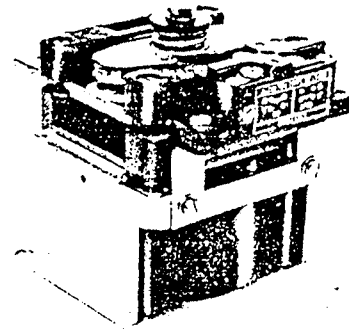


Fig. 5. Contactor with an auxiliary contact

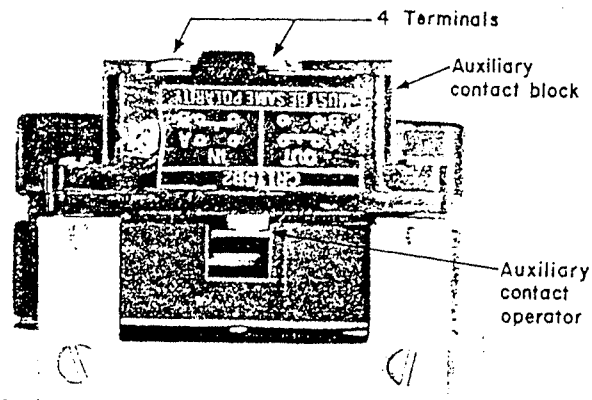


Fig. 6. Auxiliary contact shown in the operated position by the de-energized contactor

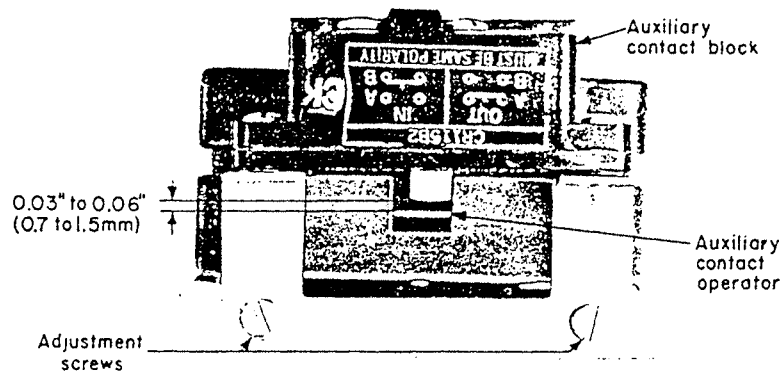


Fig. 7. Auxiliary contact shown in the normal position by the energized contactor

GEH-4469, 150- and 300-Ampere Electric-vehicle Control Contactors

Maintenance And Inspection Of Parts

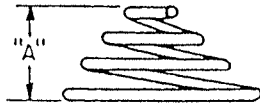
CONTACTS

Contacts must be replaced before they have worn through contact button to the base copper material.

SPIRAL RETURN SPRING

The free length should be between the limits shown in the table and should be replaced if it shows signs of corrosion.

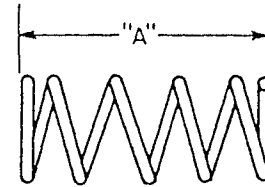
Contactor	Free Length "A" In inches (mm)
700, 710	0.73 to 0.79 (18.5 to 20.1)
701, 711, 712, 801, 702, 802, 811, 812 }	0.67 to 0.73 (17.3 to 18.5)
800, 810	0.80 to 1.00 (20.3 to 25.5)



CONTACT SPRING

The free length should be between the limits shown in the table and should be replaced if it shows signs of having been overheated or of corrosion.

Contactor	Free Length "A" In inches (mm)
700, 701, 711, 712, 801, 702, 802, 811, 812 }	0.38 to 0.40 (9.6 to 10)
800, 810	0.37 to 0.39 (9.4 to 9.9)



COILS

CAUTION: The coils have voltage suppression cast integral with the coil. If a test voltage is applied in the wrong direction or if the coil is connected backwards, permanent damage may result. Observe the polarity mark on the coil during maintenance.

If the contactor fails to operate, measure the voltage being applied to the coil terminals. The coils on the contactor have been designed to actuate the contactor on reduced battery voltage and with approximately three volts drop in the electronic circuit so that all contactors should operate at or below 65 percent of rated battery voltage. Replace the coil if the contactor does not operate to the full stroke on 65-percent voltage or if the coil shows signs of being overheated.

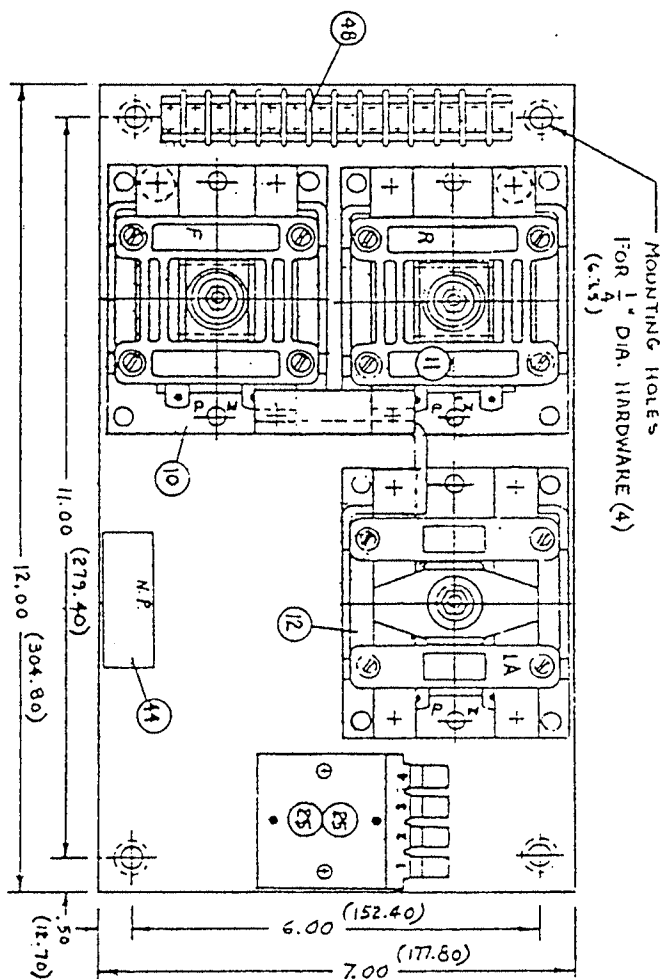
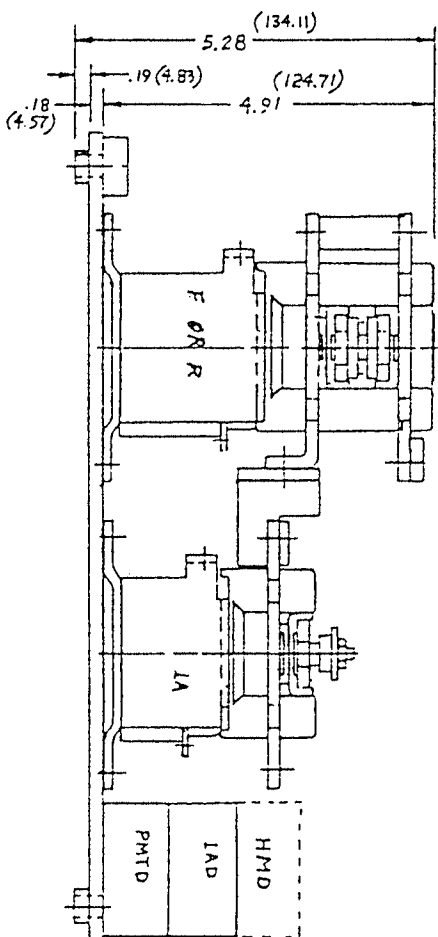
RENEWAL PARTS

Only factory specified parts should be used. These parts should be obtained from the truck manufacturer through his normal service channels.

NO.	DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
TOL. FRAC. \pm	DEC. \pm				
SCALE	NONE				
DRAWN BY	J.B.				
DATE	2-2-77				

FIGURE 6

EV-1 SCR 150 AMP-24/36/48VOLT CONTACTOR PANEL

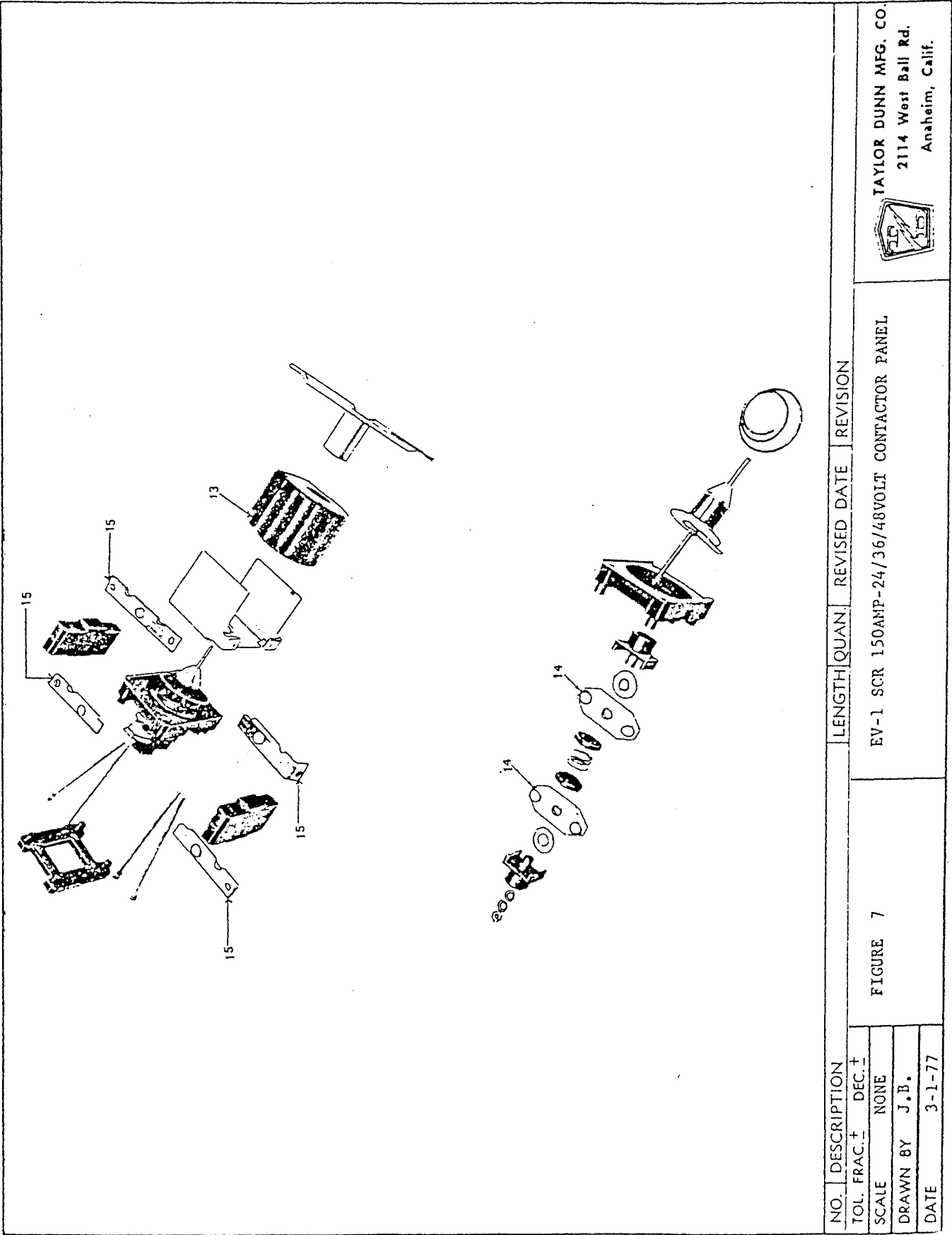


NOTE: MOUNTING HARDWARE MUST NOT PROTRUDE MORE THAN .19" (4.91) BEYOND BACK OF PANEL.

DIMENSIONS IN () ARE MILLIMETERS.



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NO.		DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
TOL. FRAC.		DEC. ±	EV-1 SCR 150AMP-24/36/48VOLT CONTACTOR PANEL			
SCALE		NONE				
DRAWN BY		J.B.				
DATE		3-1-77				

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Anaheim, Calif.

FIGURE 7

EV-1 SCR 150 CONTACTOR CONTROL
REFER TO FIGURE 6

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY.
6-0	71-305-00	CONTACTOR PANEL ASSEMBLY	1
6-10	71-305-70	CONTACTOR, FWD., SINGLE POLE, DOUBLE THROW	1
6-11	71-305-80	CONTACTOR, REV., SINGLE POLE, DOUBLE THROW	1
6-12	71-305-90	CONTACTOR, 1A., SINGLE POLE, SINGLE THROW	1
6-25	71-305-54	CONTACTOR DRIVER	2
NOT SHOWN	79-731-00	HOUR METER DIODE BLOCK (OPTIONAL)	1
6-44	71-305-55	NAMEPLATE (SPECIAL ORDER ITEM)	1
6-48	71-305-56	TERMINAL BOARD, 12 POSITION	1
REFER TO FIGURE 7 FOR CONTACTOR PARTS			
FWD/REV	CONTACTOR COMMON PARTS (EXCEPT AS NOTED):		
7-13	71-305-71	COIL, 36/48 VOLT, FWD/REV CONTACTORS	2
7-13	71-305-72	COIL, 24 VOLT, FWD/REV CONTACTORS (OPTIONAL)	2
7-14	71-305-73	MOVING TIP ASSEMBLY, FWD/REV CONTACTORS	2
NOT SHOWN	71-305-79	SPACER, FWD/REV CONTACTORS	2
NOT SHOWN	71-305-78	MOUNTING BOLT, SPACER, FWD/REV CONTACTORS	2
FORWARD CONTACTOR:			
7-15	71-305-74	TERMINAL, L.H. TOP, FWD CONTACTOR	1
7-15	71-305-75	TERMINAL, R.H. TOP, FWD CONTACTOR	1
7-15	71-305-76	TERMINAL, L.H. BOTTOM, FWD CONTACTOR	1
7-15	71-305-77	TERMINAL, R.H. BOTTOM, FWD CONTACTOR	1
REVERSE CONTACTOR:			
7-15	71-305-75	TERMINAL, L.H. TOP, REV CONTACTOR	1
7-15	71-305-81	TERMINAL, R.H. TOP, REV CONTACTOR	1
7-15	71-305-82	TERMINAL, L.H. BOTTOM, REV CONTACTOR	1
7-15	71-305-83	TERMINAL, R.H. BOTTOM, REV CONTACTOR	1
1A CONTACTOR:			
7-13	71-305-91	COIL, 36/48 VOLT, 1A CONTACTOR	1
7-13	71-305-92	COIL, 24 VOLT, 1A CONTACTOR (OPTIONAL)	1
7-15	71-305-93	TERMINAL, L.H., 1A CONTACTOR	1
8-15	71-305-94	TERMINAL, R.H., 1A CONTACTOR	1
8-14	71-305-95	MOVING TIP ASSEMBLY, FWD/REV CONTACTOR	1

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EV-1 CONTROL MODULES - A & B

REFER TO FIGURE 8

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY. REQ.	
			A	B
	62-002-00	EV-1 SCR CONTROL MODULE - A	1	
	62-011-00	EV-1 SCR CONTROL MODULE - B		1
8-3	62-002-53	RECTIFIER ASSEMBLY (1 REC)	1	
8-3	62-011-51	RECTIFIER ASSEMBLY (1 REC)		1
8-4	62-002-54	RECTIFIER ASSEMBLY (2 REC)	1	
8-4	62-011-52	RECTIFIER ASSEMBLY (2 REC)		1
8-5	62-002-54	RECTIFIER ASSEMBLY (5 REC)	1	1
8-7	62-002-56	RECTIFIER ASSEMBLY (3 REC)	1	
8-7	62-011-53	RECTIFIER ASSEMBLY (3 REC)		1
8-8	62-002-56	RECTIFIER ASSEMBLY (4 REC)	1	
8-8	62-011-54	RECTIFIER ASSEMBLY (4 REC)		1
8-9	62-002-58	TERMINAL BLOCK ASSEMBLY	1	1
8-11	62-002-59	SHUNT ASSEMBLY	1	
8-11	62-011-55	SHUNT ASSEMBLY		1
8-12, 12A	62-002-60	CAPACITOR	1	1
8-13	62-002-61	TRANSFORMER	1	
8-13	62-01-56	TRANSFORMER		1
8-14	62-002-62	CAPACITOR, COMMUTATING 200 VOLT	1	1
8-15	62-002-63	SNUBBER ASSEMBLY	2	2
8-16	62-002-64	THERMAL PROTECTOR	1	1
8-17	62-002-65	CONTROL TERMINAL BLOCK	1	1
8-18	62-002-66	COVER, TERMINAL BLOCK	1	1
8-25	62-002-67	SUPPORT, CARD BOX (LEFT HAND)	1	1
8-26	62-002-68	SUPPORT, CARD BOX (RIGHT HAND)	1	1
8-29	62-002-69	BUS	2	2
8-30	62-002-70	RESISTOR	1	1
8-31	62-002-51	CARD ASSEMBLY W/FLD. WEAKENING, SERIAL #IC3645OSCLC3	1	1
8-32	62-002-52	CARD ASSEMBLY W/O FLD. WEAKENING SERIAL #IC3645OSCC1D3	1	1
	94-422-00	GREASE, HEAT SINK	1	1

SUGGESTED SPARE PARTS LIST

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY 1-20 UNITS
REFER TO FIGURE 1, FORWARD/REVERSE SWITCH			
1-3	71-091-53	HANDLE AND HUB ASSEMBLY	1
1-1	71-091-51	COVER	1
1-8	71-091-58	SPRING, CAM FOLLOWER	1
1-11	71-091-60	SWITCH, FORWARD AND REVERSE	2
1-12	71-091-61	CAPACITOR ASSEMBLY	2
NOT SHOWN	71-091-71	MOUNTING CLAMP, STEERING COLUMN	1
REFER TO FIGURE 4, ACCELERATOR SWITCH			
4-1	61-912-51	SWITCH ASSEMBLY	2
4-10	61-912-61	SPRING, RETURN	2
4-13	61-912-64	POTENTIOMETER 5K, W/MOUNTING CLAMP	1
4-8	61-912-59	CAM SHAFT ASSEMBLY	1
NOT SHOWN	61-912-68	COVER	1
NOT SHOWN	61-912-66	HOSE	4
NOT SHOWN	61-912-67	CLAMP, HOSE	4
REFER TO FIGURE 5, 75A/24V CONTACTOR PANEL			
5-16	71-306-51	CONTACTOR, FWD, SINGLE POLE, DOUBLE THROW	1
5-17	71-306-58	CONTACTOR, REV, SINGLE POLE, DOUBLE THROW	1
5-18	71-306-52	CONTACTOR, 1A BY-PASS, SIN. POLE, SIN. THROW	1
5-49	78-306-00	RESISTOR	2
5-41	71-306-53	FILTER BLOCK, 1A	2
5-43	71-306-54	FILTER BLOCK, FWD/REV	2
REFER TP FIGURE 6 & 7, 150A-36/48V CONTACTOR PANEL			
6-10	71-305-70	CONTACTOR, FWD, SINGLE POLE, DOUBLE THROW	1
6-11	71-305-80	CONTACTOR, REV, SINGLE POLE, DOUBLE THROW	1
6-12	71-305-90	CONTACTOR, 1A, SINGLE POLE, DOUBLE THROW	1
6-25	71-305-54	CONTACTOR DRIVER	2
7-13	71-305-71	COIL, 36/48V., FWD/REV CONTACTORS	1
7-14	71-305-73	MOVING TIP ASSEMBLY, FWD/REV CONTACTORS	1
7-15	71-305-74	TERMINAL, L.H. TOP, FWD CONTACTOR	1
7-15	71-305-75	TERMINAL, R.H. TOP, FWD CONTACTOR	1
7-15	71-305-76	TERMINAL, L.H. BOTTOM, FWD CONTACTOR	1
7-15	71-305-77	TERMINAL, R.H. BOTTOM, FWD CONTACTOR	1
7-14	71-305-92	COIL, 24VOLT, 1A CONTACTOR	1
7-15	71-305-81	TERMINAL, R.H TOP, REVERSE CONTACTOR	1
7-15	71-305-82	TERMINAL, L.H. BOTTOM, REV CONTACTOR	1
7-15	71-305-83	TERMINAL, R.H. BOTTOM, REV CONTACTOR	1
7-13	71-305-91	COIL, 36/48, 1A CONTACTOR	1
7-15	71-305-93	TERMINAL, L.H., 1A CONTACTOR	1
7-15	71-305-94	TERMINAL, R.H., 1A CONTACTOR	1
7-14	71-305-95	MOVING TIP ASSEMBLY, 1A CONTACTOR	1
NOT SHOWN	71-305-61	KIT, 24 VOLT CONVERSION FOR 150 AMP CONTACTOR PANEL	1 (OPT)

REFER TO FIGURE 8, MODELS "A & B" CONTROL MODULES

FIG. I.D.	T-D PART NO.	DESCRIPTION	A	B
8-3	62-002-53	RECTIFIER ASSEMBLY, (1 REC)	1	
8-3	62-011-51	RECTIFIER ASSEMBLY, (1 REC)		1
8-4	62-002-54	RECTIFIER ASSEMBLY, (2 REC)	1	
8-4	62-011-52	RECTIFIER ASSEMBLY, (2 REC)		1
8-7	62-002-56	RECTIFIER ASSEMBLY, (3 REC)	1	
8-7	62-011-53	RECTIFIER ASSEMBLY, (3 REC)		1
8-11	62-002-59	SHUNT ASSEMBLY,	1	
8-8	62-011-54	RECTIFIER ASSEMBLY, (4 REC)		1
8-11	62-011-55	SHUNT ASSEMBLY		1
8-12, 12A	62-002-60	CAPACITOR	1	1
8-13	62-002-61	TRANSFORMER	1	
8-13	62-011-56	TRANSFORMER		1
8-14	62-002-62	CAPACITOR, COMMUTATING 200 VOLT	1	1
8-15	62-002-63	SNUBBER ASSEMBLY	2	2
8-16	62-002-64	THERMAL PROTECTOR	1	1
8-17	62-002-65	CONTROL TERMINAL BLOCK	1	1
8-18	62-002-66	COVER, TERMINAL BLOCK	1	1
8-25	62-002-67	SUPPORT, CARD BOX (LEFT HAND)	1	1
8-26	62-002-68	SUPPORT, CARD BOX (RIGHT HAND)	1	1
8-30	62-002-70	RESISTOR	1	1
8-31	62-002-51	CARD ASSEMBLY W/FIELD WEAKENING, SERIAL IC36450SC1C3	1	1
8-32	62-002-52	CARD ASSEMBLY W/O FIELD WEAKENING SERIAL IC36450SCC1D3	1	1
	94-422-00	GREASE, HEAT SINK		