OPERATION

AND

MAINTENANCE MANUAL

WITH

PARTS LIST

MODEL:	SC1-59, AN1-71, AN1-70
SERIAL NO:	91245-98508
MANUAL NO:	MA-159-04

IMPORTANT

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

TAYLOR-DUNN®
Commercial and Industrial Vehicles Since 1949

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IMPORTANT INFORMATION

This vehicle conforms to applicable portions of ANSI B56.8 (American National Standard Personnel and Burden Carriers). This manual is designed for use by Vehicle Operators and Service Personnel alike. Throughout the manual, there are various **WARNINGS, CAUTIONS, and NOTICES** which must be carefully read to help reduce the possiblitiy of personal injury. Maintenance personnel must understand that if a service procedure or method is used that is not recommended by Taylor-Dunn, it then becomes the personal responsibility of the person performing the work to first satisfy himself that neither his safety, the safety of others, or the safety of the vehicle will be endangered. ANSI B56.8 applies to only those vehicles with Serial Numbers dated after July 31, 1982.

Definitions of the three terms are as follows:

WARNING - There is a potential for injury to yourself and others.

CAUTION - There is a potential for damage to the vehicle.

NOTE - Specific information clarifying or giving the reason for a particular maintenance or service procedure.

Before operating your Taylor-Dunn vehicle, it is your responsibility to read, understand and follow the safety and operating instructions contained in this manual to help ensure your safety and comfort. If this car is to be used for rental purposes, it is your responsibility to explain to the operator about the various controls and vehicle operating characteristics. Equally important is the operators need to know the basic rules required for safe operation of the vehicle in day to day usage. Sections 5 and 6 of ANSI B56.8 have been inserted in Section 3 page 3 of this manual for your specific operating guidelines.

1. Vehicle is to be operated only by qualified persons and only in designated areas.
2. Vehicle will not be started until all occupants are seated.
3. Occupants must remain seated while vehicle is in motion.
4. Arms, legs and feet must be kept inside while vehicle is in motion.
5. Slow down making a turn.
6. Drive slowly straight up and down inclines.
7. Set parking brake before leaving vehicle.
8. Forward/Reverse lever must be in the correct position for direction of travel desired.

WARNING: FAILURE TO COMPLY WITH ABOVE INSTRUCTIONS COULD RESULT IN INJURY TO THE VEHICLE OCCUPANTS, BYSTANDERS AND TO PROPERTY.

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INSPECTION, SAFETY AND INTRODUCTION
ARRIVAL INSPECTION CHECKLIST

Visual Inspection should be made to determine that the truck has remained in good condition during transit. If any damage is found, the details should be noted on the delivery receipt immediately. After delivery the truck should be most carefully checked for HIDDEN DAMAGE. Any concealed damage not noted on the delivery receipt should be reported, in writing, to the delivering carrier within 48 hours.

The following checklist has been prepared to aid you during arrival and inspection of your vehicle.

A. Open all packages and examine any accessories which may be shipped detached from vehicle.

B. Examine wiring for visible evidence of damage. Check all connections to insure that none have loosened during transit.

C. Check all battery connections and electrolyte level in each cell.

D. Inspect battery charger in accordance with manufacturers installation instructions.

E. Check tires for damage and proper inflation. check wheel lugs to insure they are tight.

F. If vehicle is equipped with hydraulic brakes, check hydraulic lines for evidence of damage.

G. Check brake fluid level in master cylinder.

H. Examine entire vehicle for damage such as dents or cracks.

I. Check operation of controls to see that they are working freely.

Upon completion of the Visual Inspection, an operational test should be made after a thorough review of Sections 1, 2 and 3.

NOTE: Occasionally you may receive a "Power Traction" equipped vehicle with the oil level below the oil level point. This is a perfectly normal situation and it is not harmful to the unit. It occurs during vehicle transit when oil drains from the chain case into the drive axle housing. A short period of normal operation will restore the chain case oil level to the proper point. To hurry the process, drive the vehicle in reverse for a few minutes then proceed with normal operation.

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INSPECTION, SAFETY AND INTRODUCTION (continued)
SAFETY

The safe and satisfactory use of any vehicle is a responsibility shared by many persons.

As the manufacturer, we feel that it is our responsibility to emphasize vehicle characteristics and make safety recommendations regarding those characteristics. That is the primary purpose of this portion of the manual.

Persons who operate this vehicle need to be aware of, and to observe, the safe driving rules established in their locality, and need also to be aware of the vehicle operating characteristics and safety recommendations of the manufacturer, to assist them in exercising the judgement necessary to prevent injury to themselves or to others.

IMPORTANT: Persons who service and maintain the vehicle need to be aware of how their activities relate to safe vehicle operation, and of potential hazards involved in the service and maintainance processes, to assist them in applying sensible judgement to those processes.

STEERING: This vehicle has a very small minimum turning radius, and low ratio steering leverage.

CAUTION: These characteristics, so desirable for maneuverability at slow speeds, require that great care be exercised at high speeds to avoid turning so sharply that one or more wheels lose contact with the ground, or that the vehicle is caused to overturn. Be especially careful while traveling on an incline. Avoid sharp turns, even at slow speeds.

SPEED: This vehicle is designed to attain its maximum safe operating speed on level ground. That speed can easily be exceeded when traveling down hill. If this is allowed to occur, vehicle stability and braking performance become unpredictable. **CAUTION: DO NOT exceed, under any circumstances, the maximum design speed of the vehicle.**

CONTROLS: Bring the vehicle to a complete standstill before operating the forward/reverse switch to change direction of travel. Operation of this control while the vehicle is in motion can result in complete loss of power. DO NOT use the accelerator to hold the vehicle at a standstill on an incline. Use only the brakes to hold the vehicle at rest while on a hill. **CAUTION: Intentional/unintentional mis-use of controls could result in an accident.**

BRAKES: The brake system relies on contact of rear tires with the ground for effectiveness. As tire to ground contact is reduced, braking effect is reduced. While driving, the operator must consider terrain, speed and steering maneuvers to prevent tires from losing contact with the ground, with consequent reduction of braking action.

MAINTENANCE: Many operating characteristics relate to maintenance in ways which are not readily obvious. Those maintenance characteristics most closely related to vehicle operating safety are indicated in Section 3 & 4.
CAUTION: Also to be considered is the safety of personnel who perform service and maintenance duties. Two characteristics need special emphasis.

1. This electric vehicle does not "idle" noisily, is never "out of gear", and is set into motion whenever the battery to the motor circuit is closed, intentionally or otherwise. Whenever practical, disconnect battery leads to avoid unintentional starting of the motor during servicing or maintenance.
2. Batteries emit gasses which can be explosive, especially while they are being charged. Personnel who are involved with servicing vehicles, or maintaining vehicles, need to be made familiar with this hazard. A detailed explanation is contained in Section 8.

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INSPECTION, SAFETY AND INTRODUCTION continued

SAFETY

CAUTION:

1. **When performing maintenance on any part of the vehicle electrical system, disconnect main battery leads, place forward/reverse switch in neutral. Remove key from keylock in dash panel.**
2. **Never replace a circuit fuse with one having a higher rating than the original equipment fuse. Fuses have been selected to provide full circuit protection for all operating conditions. A FUSE WILL ONLY BLOW DUE TO A SHORT CIRCUIT. Therefore, always locate and correct the cause of short-circuit before replacing a blown fuse. Using a fuse of higher rating is an UNSAFE PRACTICE and could cause serious damage to equipment.**

INTRODUCTION

GENERAL: The Taylor-Dunn SC 1-59, AN 1-70 and AN 1-71 are special purpose vehicles designed for use on smooth surfaces in and around industrial plants, warehouses, nurseries and greenhouses. They are used primarily for stock chasing and order picking of heavy parts, pallets and containerized pallets etc. All models are controlled from the rear by a stand-up operator.

CAUTION: These vehicles are not designed to be driven on public highways.

DRIVE CONFIGURATION		LOAD CAPACITY RATING		
MAXIMUM SPEED	MOTOR RATING	SOLID CUSHION TIRES	PNEUMATIC TIRES 6 PLY LR-C	4 PLY LR-B
8.0 MPH	4.5 HP	3,000 LBS.	2,200 LBS.	1,500 LBS.
5.5 MPH	6.7 HP	2.600 LBS.	2,200 LBS.	1,500 LBS.
8.0 MPH	6.7 HP	1,500 LBS	1,500 LBS.	1,500 LBS.
4.5 MPH	4.5 HP	1,000 LBS.	1,000 LBS	1,000 LBS.

CAUTION: Speeds or loads in excess of rated capacity may adversely affect vehicle stability and/or steering control and could result in an accident. In addition motor windings may be damaged even though the motor circuit is not engaged.

MODEL NUMBER:
The following model numbers are covered by this manual:
Models SC 1-59, AN 1-70 and AN 1-71 starting with Serial Number 83806.

SERIAL NUMBER:
The serial number is stamped on the upper surface of the angle frame member which supports the rear of the deck board, approximately six inches from the left side. The model and serial numbers are on a name plate riveted to the console panel situated forward of the operator's platform.

REPLACEMENT PARTS:
Replacement parts may be purchased directly from your local authorized Taylor Dunn dealer. See Section 19 for procedure.

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TAYLOR-DUNN LIMITED 90 DAY WARRANTY

TAYLOR-DUNN MANUFACTURING COMPANY (TDMC), warrants each new Taylor-Dunn vehicle for ninety (90) days according to the following terms:

This warranty provides coverage for the original retail purchaser only and becomes effective on the date of the original retail purchase.

Any part of the Taylor-Dunn vehicle manufactured or supplied by TDMC and found in the reasonable judgment of TDMC to be defective in material or workmanship will be repaired and/or replaced at the business location of an authorized Taylor-Dunn distributor only without charge for parts and labor. The Taylor-Dunn vehicle (including any defective part) must be delivered to an authorized Taylor-Dunn distributor within the warranty period.

All costs of a service call regarding warranty-related repairs and/or replacements on the Taylor-Dunn vehicle at the owner's location, the labor performed by the distributor at the owner's location, all costs of delivering the Taylor-Dunn vehicle to the distributor for warranty work and the costs of returning the Taylor-Dunn vehicle back to the owner after repair or replacement will be paid for by the owner. Proof of purchase will be required by the authorized Taylor-Dunn distributor to substantiate any warranty claim. All warranty work must be performed by an authorized Taylor-Dunn distributor.

TDMC does not provide a warranty related to SCR's, tires, batteries, chargers, or other parts not of their manufacture as such parts are usually warranted separately by their respective manufacturers.

This warranty does not include service items subject to normal wear such as brake linings, seals, belts, light bulbs and fuses.

This warranty does not provide coverage for any Taylor-Dunn vehicle that has been subject to misuse, neglect, negligence, accident, or operated in any way contrary to the operating or maintenance instructions as specified in the TDMC operator's manual. The warranty does not apply to any Taylor-Dunn vehicle that has been altered or modified so as to adversely affect the vehicle's operation, performance or durability or that has been altered or modified so as to change its intended use. In addition, the warranty does not extend to repairs made necessary by normal wear, or by the use of parts or accessories which in the reasonable judgment of TDMC are either incompatible with the Taylor-Dunn vehicle or adversely affect its operation, performance or durability.

Repairs or replacements qualifying under this warranty will be performed by an authorized Taylor-Dunn distributor following delivery of the vehicle to the distributor's place of business. TDMC's responsibility in respect to claims is limited to making the required repairs or replacements. No claim of breach of warranty shall be cause for cancellation of the contract of sale of any Taylor-Dunn vehicle.

TDMC assumes no liability or responsibility for loss of use of the Taylor-Dunn vehicle, loss of time, inconvenience, or other damage, consequential or otherwise, including, but not limited to, all costs for delivering the Taylor-Dunn vehicle to the distributor and all costs of returning the vehicle back to the owner, mechanic's travel time, telephone or telegram charges, trailering or towing charges, rental of a like vehicle during the time warranty repairs are being performed, travel, lodging, loss or damage to personal property, or loss of revenue.

TDMC reserves the right to change or improve the design of any vehicle without assuming any obligation to modify any TDMC vehicle previously manufactured.

All implied warranties are limited in duration to the ninety (90) day warranty period. Accordingly, any such implied warranties including merchantability, fitness for a particular purpose, or otherwise, are disclaimed in their entirety after the expiration of the ninety (90) day warranty period. TDMC's obligation under this warranty is absolutely and exclusively limited to the repair or replacement of defective parts, and TDMC does not assume, or does not authorize anyone to assume for them, any other obligation.

This warranty applies to all TDMC vehicles sold in the United States.

WARRANTY SERVICE

To make a claim under warranty, contact an authorized Taylor-Dunn distributor immediately upon realizing a problem exists. We recommend having the warranty work performed by the distributor who originally sold you the vehicle; however, warranty work can be obtained from any authorized Taylor-Dunn distributor. Remember, your Taylor-Dunn vehicle must be delivered to an authorized distributor within the warranty period, and all warranty work must be performed only by an authorized Taylor-Dunn distributor. Your proof of purchase will be required by the dealer to verify any warranty claim.

Examples of Items Not Covered by Warranty

Provisions of the warranty will not apply to:

Normal service requirements occurring during the warranty period, such as adjustment and cleaning or wear of a drive belt, drive chain, brake or rheostat.

Normal service work over and above the repair and replacement of defective parts. Vehicles subject to misuse, neglect, negligence, or accident.

Vehicles that have been altered or modified so as to adversely affect their operation, performance or durability or to change their intended use.

Repairs made necessary by the use of parts or accessories which are either incompatible with the vehicle or adversely affect its operation, performance or durability.

Vehicles not operated or maintained in accordance with the instructions in the Taylor-Dunn Operator's Manual.

Periodic checking, lubricating the vehicle or service check-up.

All costs of delivering the vehicle to the distributor and all costs of returning the vehicle back to the owner, mechanic's travel time, trailering or towing charges, or rental of a like vehicle during the time warranty repairs are being performed.

This warranty applies only to the original retail purchaser. Second-owner or subsequently owned vehicles are not covered under the warranty.

Owner's Obligation and Responsibility

Normal maintenance service and replacement of service items are the responsibility of the owner and as such are not considered defects in material or workmanship with the terms of this warranty. Individual operating habits and usage may contribute extensively to the need for maintenance service.

Consult with your authorized Taylor-Dunn distributor for advice on proper maintenance and care of your vehicle. Proper maintenance and care will be very helpful in keeping your overall operating costs at a minimum.

To assure warranty coverage, it is the owner's responsibility to maintain all components in proper adjustment and to service the vehicle as specified in the Taylor-Dunn Vehicle Operator's Manual. It is the owner's responsibility to provide proper lubrication for all components and provide correct recommended battery maintenance, to maintain the battery liquid level and charge as specified, as well as maintain the correct pressure in the tires of the vehicle.

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OPERATING INSTRUCTIONS

The controls on your Taylor-Dunn vehicle have been designed and located for convenience of operation and efficient performance. Before driving your vehicle for the first time, familiarize yourself with each of the controls. Read the following instructions and with power OFF, operate each control.

STEERING
The steering wheel and steering system is similar to automotive types. Turn the steering wheel to the right (clockwise) for a right turn and left (counterclockwise) for a left turn.

STEERING-TILLER TYPE
To turn right, move the tiller to the right, to turn left, move the tiller to the left.

KEY LOCK
Your vehicle is equipped with a keyed lock located on the instrument panel. It is designed to lock the switch in the neutral position only. The key will remove from the lock in the locked position (neutral) only.

BRAKE AND ACCELERATOR
The foot treadle is a combination brake and accelerator control. It is pivoted near the center so that application of heel pressure to the rear of the treadle applies braking action, while application of toe pressure to the front of the treadle releases the brakes and controls the amount of power delivered to the motor. Full power is achieved when the front of the treadle is depressed as far as it is allowed to travel, and minimum power is achieved when the front of the treadle is partially depressed. intermediate speeds occur between those two positions.

Spring pressure holds the treadle in the braked position when no foot pressure is applied. This provides automatic braking when the vehicle is parked and left unattended.

FORWARD-REVERSE SWITCH
The forward-reverse switch is located on the console, to the right of the driver. To travel forward, move the operating handle to the position marked "FORWARD". To travel rearward, move the operating handle to the position marked "REVERSE".

FORWARD-REVERSE SWITCH (PWR-TRON II)
The forward-reverse switch is located on a separate panel with the key lock. It is a rocker type switch. Depressing the upper part moves the vehicle forward. Depressing the lower part moves the vehicle in reverse.

CAUTION: The forward-reverse switch serves the same purpose as the transmission in your automobile. Treat it with the same respect and care. DO NOT SHIFT from forward to reverse or vice-versa while the vehicle is in motion, especially near top speed, this causes great strain to your entire vehicle and will eventually cause severe damage, complete loss of power and could cause an accident.

HORN BUTTON
The horn button is located to the right of the steering wheel on the Model SC, and on the console for Model AN when so equipped. Depressing button will cause the horn to sound. Releasing button will immediately silence horn.

LIGHT SWITCH
The light switch that controls headlamps and taillamps is located in the control console. It is labeled for On-Off positions.

BATTERY CHARGER
Refer to SECTION 9 for proper instructions to operated your battery charger.

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OPERATING INSTRUCTIONS continued

SPECIAL ACCESSORIES:
Refer to the appropriate section of this manual for separate operating instructions pertaining to any special feature or accessory your vehicle may have.

OPERATING YOUR VEHICLE

To put your vehicle into operation, unlock forward-reverse switch by turning key lock counterclockwise. Select direction you wish to travel by moving handle of forward-reverse switch into position. Slowly depress treadle until vehicle is moving at the desired speed, controlling direction of travel by using the steering wheel or tiller. Stop the vehicle by applying heel pressure to the rear of the treadle.

For greatest efficiency it is recommended that you travel at the fastest speed that you can safely maintain. You will find that your vehicle will consume almost as much current at low speed as it does at higher speeds. Therefore, while it is important to avoid taking any unnecessary risk, traveling at the faster speed will deliver more miles per battery charge than continual use in the lower speed range.

CAUTION: To hold vehicle at a standstill on a hill or incline, use the brake, depressing the rear of the treadle with heel pressure. DO NOT hold vehicle at a standstill by applying motor power. Frequent or continued stalling of the motor will damage the motor and other electrical devices. Continued "stalled" condition as described will damage motor and electrical controls. Use your foot brake to hold the vehicle on a hill safely.

CAUTION: When you leave your vehicle, it is best to always place forward/reverse switch in neutral position lock and remove key. The parking brake is automatically set when the operator steps off the treadle.

Drive safely and enjoy your Taylor-Dunn vehicle.

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OPERATING RESPONSIBILITIES
AMERICAL NATIONAL STANDARD PERSONNEL AND BURDEN CARRIERS
ANSI B 56.8-1988

5 OPERATING SAFETY RULES AND PRACTICES

5.1 Personnel and Burden Carrier Operator Qualifications

5.1.1 Only persons who are trained in the proper operation of the carrier shall be authorized to operate the carrier. Operators shall be qualified as to visual, auditory, physical, and mental ability to safely operate the equipment according to Section 5 and all other applicable parts of this Standard.

5.2 Personnel and Burden Carrier Operators' Training

5.2.1 The user shall conduct an operators' training program.

5.2.2 Successful completion of the operators' training program shall be required by the user before operation of the carrier. The program shall be presented in its entirety to all new operators and not condensed for those claiming previous experience.

5.2.3 The user should include in the operators' training program the following:

(a) instructional material provided by the manufacturer;

(b) emphasis on safety of passengers, material loads, carrier operator, and other employees;

(c) general safety rules contained within this Standard and the additional specific rules determined by the user in accordance with this Standard, and why they were formulated;

(d) introduction of equipment, control locations and functions, and explanation of how they work when used properly and when used improperly; and surface conditions, grade, and other conditions of the environment in which the carrier is operated;

(e) operational performance tests and evaluations during, and at completion of the program.

5.3 Personnel and Burden Carrier Operator Responsibility

5.3.1 Operators shall abide by the following safety rules and practices in paras. 5.4, 5.5, 5.6, and 5.7.

5.4 General

5.4.1 Safeguard the pedestrians at all times. Do not drive carrier in a manner that would endanger anyone.

5.4.2 Riding on the carrier by persons other than the operator is authorized only on personnel seat(s) provided by the manufacturer. All parts of the body shall remain within the plan view outline of the carrier.

5.4.3 When a carrier is to be left unattended, stop carrier, apply the parking brake, stop the engine or turn off power, turn off the control or ignition circuit, and remove the key if provided. Block the wheels if machine is on an incline.

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OPERATING RESPONSIBILITIES continued
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5.4.4 A carrier is considered unattended when the operator is 25 ft. (7.6 m) or more from the carrier which remains in his view, or whenever the operator leaves the carrier and it is not within his view. When the operator is dismounted and within 25 ft. (7.6 m) of the carrier still in his view, he still must have controls neutralized, and parking brake(s) set to prevent movement.

5.4.5 Maintain a safe distance from the edge of ramps and platforms.

5.4.6 Use only approved carriers in hazardous locations, as defined in the appropriate safety standards.

5.4.7 Report all accidents involving personnel, building structures, and equipment.

5.4.8 Operators shall not add to, or modify,the carrier.

5.4.9 Carriers shall not be parked or left unattended such that they block or obstruct fire aisles, access to stairways, or fire equipment.

5.5 Traveling

5.5.1 Observe all traffic regulations, including authorized plant speed limits. Under normal traffic conditions keep to the right. Maintain a safe distance, based on speed of travel, from the carrier or vehicle ahead; and keep the Personnel and Burden Carrier under control at all times.

5.5.2 Yield the right of way to pedestrians, ambulances, fire trucks, or other carriers or vehicles in emergency situations.

5.5.3 Do not pass another carrier or vehicle traveling in the same direction at intersections, blind spots, or at other dangerous locations.

5.5.4 Keep a clear view of the path of travel, observe other traffic and personnel, and maintain a safe clearance.

5.5.5 Slow down and sound the audible warning device at cross aisles and other locations where visibility is obstructed.

5.5.6 Ascend or descend grades slowly.

5.5.7 Avoid turning, if possible, and use extreme caution on grades, ramps, or inclines; normally travel straight up and down.

5.5.8 Under all travel conditions the carrier shall be operated at a speed that will permit it to be brought to a stop in a safe manner.

5.5.9 Make starts, stops, turns, or direction reversals in a smooth manner so as not to shift the load, endanger passengers, or overturn the carrier.

5.5.10 Do not indulge in dangerous activities, such as stunt driving or horseplay.

5.5.11 Slow down when approaching, or on, wet or slippery surfaces.

5.5.12 Do not drive carrier onto any elevator unless specifically authorized to do so. Approach elevators slowly, and then enter squarely after the elevator car is properly leveled. Once on the elevator, neutralize the controls, shut off power, and set brakes. It is advisable that all other personnel leave the elevator before a carrier is allowed to enter or leave.

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5.5.13 Avoid running over loose objects, potholes and bumps.

5.5.14 To negotiate turns, reduce speed to improve stability, then turn hand steering wheel or tiller in a smooth sweeping motion.

5.6 Loading

5.6.1 Handle only stable and safely arranged loads. When handling off-center loads which cannot be centered, operate with extra caution.

5.6.2 Handle only loads within the capacity of the carrier as specified on the nameplate.

5.6.3 Handle loads exceeding the dimensions used to establish carrier capacity with extra caution. Stability and maneuverability may be adversely affected.

5.7 Operator Care of Personnel and Burden Carriers

5.7.1 At the beginning of each shift during which the carrier will be used, the operator shall check the carrier condition and inspect the tires, warning devices, lights, battery, controller, brakes, and steering mechanism. If the carrier is found to be in need of repair, or in any way unsafe, or contributes to an unsafe condition, the matter shall be reported immediately to the designated authority, and the carrier shall not be operated until it has been restored to safe operating condition.

5.7.2 If, during operating the carrier becomes unsafe in any way, the matter shall be reported immediately to the designated authority, and carrier shall not be operated until it has been restored to safe operating condition.

5.7.3 Do not make repairs or adjustments unless specifically authorized to do so.

5.7.4 The engine shall be stopped and the operator shall leave the carrier while refueling.

5.7.5 Spillage of oil or fuel shall be carefully and completely absorbed or evaporated and fuel tank cap replaced before starting engine.

5.7.6 Do not operate a carrier with a leak in the fuel system or battery(s).

5.7.7 Do not use open flames for checking electrolyte level in storage batteries or liquid level in fuel tanks.

6 MAINTENANCE PRACTICES

6.1 Introduction

6.1.1 Carriers may become hazardous if maintenance is neglected. Therefore, maintenance facilities, trained personnel, and procedures shall be provided. Such facilities may be on or off the premises.

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OPERATING RESPONSIBILITIES continued
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6.2 Maintenance Procedures

6.2.1 Maintenance and inspection of all carriers shall be performed in conformance with the manufacture's recommendations and th following practices.

(a) A scheduled preventive maintenance, lubrication, and inspection system shall be followed.
(b)Only qualified and authorized personnel shall be permitted to maintain, repair, adjust, and inspect carriers.
(c)Before undertaking maintenance or repair, follow the manufacturer's recommendations for immobilizing the carrier.
(d) Block chassis before working under it.
(e)Before disconnecting any part of the engine fuel system of a gasoline or diesel powered carrier with gravity feed fuel systems, be sure shutoff valve is closed, and run engine until fuel system is depleted and engine stops running.
(f)Before disconnecting any part of the fuel system of LP gas powered carriers, close the LP gas cylinder valve and run the engine until fuel in the system is depleted and the engine stops running.
(g) Operation to check performance of the Personnel and Burden Carrier shall be conducted in an authorized area where safe clearance exists.

6.2 Maintenance Procedures continued

(h)Before starting to operate the carrier, follow the manufacturer's instructions and recommended procedures.
(i) 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 fuel, battery electrolyte, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
(j) Properly ventilate the work area.
(k)Handle LP gas cylinders with care. Physical damage, such as dents, scrapes, or gouges, may dangerously weaken the tank and make it unsafe for use.
(l) Brakes, steering mechanisms, speed and directional control mechanisms, warning devices, lights, governors, guards, and safety devices shall be inspected regularly and maintained in a safe operating condition.
(m)Special carriers or devices designed and approved for hazardous areas operation shall be inspected to ensure that maintenance preserves the original approved safe operating features.
(n)Fuel systems shall be checked for leaks and condition of parts. If a leak is found, action shall be taken to prevent the use of the carrier until the leak has been eliminated.
(o)The carrier manufacturer's capacity, operation and maintenance instruction plates, tags or decals shall be maintained in legible condition.
(p) Batteries, motors, speed and directional controllers, limit switches, protective devices, electrical conductors, and connections shall be inspected and maintained in conformance with manufacturer's recommended procedures.
(q) Carriers shall be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.
(r) Modifications and additions which affect capacity and safe machine operation shall not be performed by the customer or user without manufacturer's prior written authorization; where authorized modifications have been made, the user shall ensure that capacity, operation, warning, and maintenance instruction plates, tags, or decals are changed accordingly.
(s)Care shall be taken to ensure that all replacement parts are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment.

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MAINTENANCE GUIDE CHECKLIST

This checklist is provided for your convenience as a guide for servicing your vehicle. If followed you will enjoy a good running and trouble free unit. It has been set up for average normal use. More frequent service is recommended for extreme or heavy usage. If desired your Taylor-Dunn dealer will gladly perform these services for you as he has expert service men in the field for this purpose. Do not hesitate to call your Service Manger if any questions arise.

CAUTION: When performing maintenance on any part of the electrical system, turn key to off position and remove from switch, disconnect main battery leads and place Forward/Reverse switch in neutral.

MAINTENANCE	REFER SECTION	EVERY WEEK	EVERY MONTH	EVERY 3 MONTHS	EVERY YEAR
Check and fill batteries. If necessary fill with distilled water only.	8	X	X	X	X
Check Tire pressure	10	X	X	X	X
Adjust Motor Mount & Chain (Refer to chart Section 11).	11		X	X	X
Lubricate all Zerk Fittings.	5			X	X
Lubricate all moving parts without Zerk Fittings. Use all purpose engine oil.	5			X	X
Wash off batteries with water (Use soda if necessary)	7			X	X
Check all wire connections. Be sure they are all clean and tight.	13,14			X	X
Check hydraulic brake system for leaks also check brake fluid level in master cylinder.	12			X	X
Check rear axle differential oil	5,11				X
* Check brake system, adjust as necessary	11		X	X	X
Check drive axle oil level (Refer to lubrication diagram)	4				X
* Lubricate front wheel bearings (2 zerk fittings)	5				X
* Check brake lining for wear	11			X	X
Drain differential and refill with SAE 30 oil (refer to Lubrication diagram)	5,11				

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MAINTENANCE GUIDE CHECKLIST continued

MAINTENANCE	REFER SECTION	EVERY WEEK	EVERY MONTH	EVERY 3 MONTHS	EVERY YEAR
Repack front wheel bearings (Use wheel bearing grease)	5,1Ø				X
Lubricate steering gear box	5				X
* Check and adjust front wheel bearings	1Ø			X	X
* Examine battery terminal connections. Clean and tighten as necessary, but not while batteries are being charged.	8	X	X	X	X
* Clean off all dirt and grease on and between power bars and J-hook. Apply lube to sliding contact area with electrically non-conductive applicator. Use T-D grease 94-421-ØØ or a quality hi-temp grease with a 5ØØ degree Farenheit min. drop pt.	16	X	X	X	X
* Check rheostat adjustment.	16	X	X	X	X
* Wash off batteries with water, (Use soda if necessary) Check all wire connections. Be sure they are all clean and tight, but not while batteries are being charged.	8		X	X	X

CAUTION: Never bend the brake anchor bolt. Any bending of the bolt may result in unexpected failure of the bolt and complete loss of drive line braking action.

* Items related to safety recommendations.

SECTION 5
Page 1

LUBRICATION DIAGRAM
Figure 1

	No. of Grease Points.
A. PRESSURE GUN GREASE	
1. Front Wheel Hub	1
2. Front Wheel Spindle	1
3. Control Pivot Points	5
4. Rheostat Bar (See Note Below)	
5. Pillow Blocks (Steering)	2 or 3
6. Steering Gears (Lubricate by Hand)	1
B. LIGHT OIL	
10. Clevis Pins (Mechanical Linkage)	5
11. Chain - Steering	
C. "POWER TRACTOR" USE SAE 30 OIL	

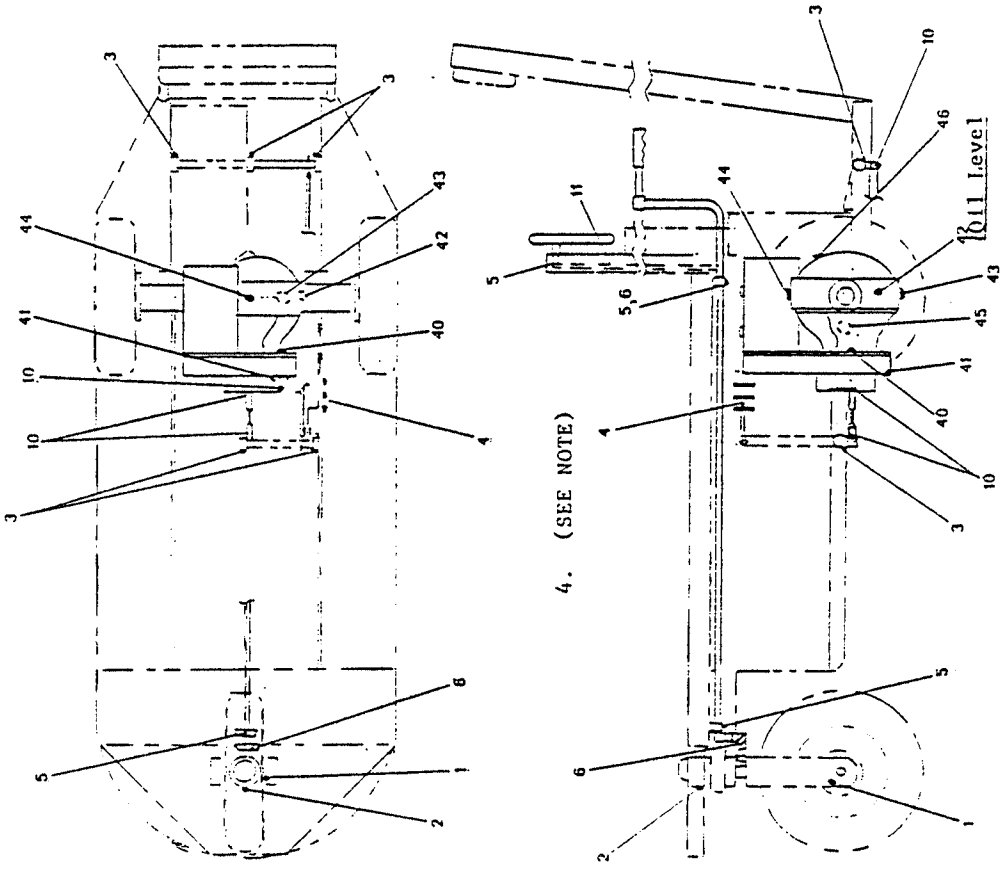
Proper oil level check at Plug 42.

TO CHANGE OIL - USE 2 QTS.

a. Remove Drain Plugs 41 & 43
b. Remove Level Plugs 40, 42 & Fill Plug 44.
c. Drain Oil & Replace 41 & 43
d. Add Oil by 44 to Level of 42
e. Add Oil by 40 to Level of 40
f. Replace Plugs
NOTE: 45 & 46 Not Used This Configuration.

NOTE: Plug 40 added for ease in refilling gear case to proper level. Gear case oil level is maintained by recirculation from differential during operation.

NOTE: Rheostat Bar. Apply lube to sliding contact area with electrically non-conductive applicator. Use T-D Grease 96-421-00 or a quality Hi-Temp Grease with a 500° F. Min. Drop point.



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Page 1

*TROUBLE SHOOTING PROCEDURES

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1. Steering:		
a) Hard Steering	1. Low tire pressure	Inflate to recommended pressure
b) Sloppy or loose	2. Loose wheel bearing	Adjust
2. Brakes:		
a) Soft brakes	1. Check for worn lining	Adjust or replace when 1/16 or less of lining left
	2. Alignment of brake shoes	Realign
	3. Oil on brake lining	Find oil source and correct, wash brake band
	4. Dirt on brake lining	Clean
	5. Bind in linkage	Loosen or realign
	6. Weak spring	Replace
	7. Air in hydraulic brake	Bleed brakes
	8. Bad seals in brake	Replace
b) No Brakes	1. Broken shoe	Replace
	2. Broken Connection in linkage	Replace
	3. Broken axle	Replace
	4. Break in hydraulic line	Repair
	5. Seal failure in brake cylinder	Replace
3. Drive axle		
a) No power	1. Disconnect batteries for recharging	Recharge or replace
	2. Check motor brushes for contact	Clean or replace
	3. Check for loose wire	Tighten or replace
	4. Check continuity through motor	Repair or replace
b) Lack of power or slow operation	1. Dragging brake	Re-adjust
	2. Tight front wheel bearing	Re-adjust
	3. Loose connection in wiring	Tighten
	4. Partially burned out motor or thrown lead	Replace or Re-solder
	5. Weak batteries	Replace
	6. Bind or drag on differential	Repair
c) Thump or grinding	1. Motor bearing	Replace
	2. Loose motor on base	Tighten & adjust
	3. Worn sprockets	Replace sprocket and chain
	4. Defective bearing in differential	Replace
	5. Defective gears in differential	Replace
	6. Slack drive chain	Adjust (See Sec. 11)

SECTION 6
Page 2

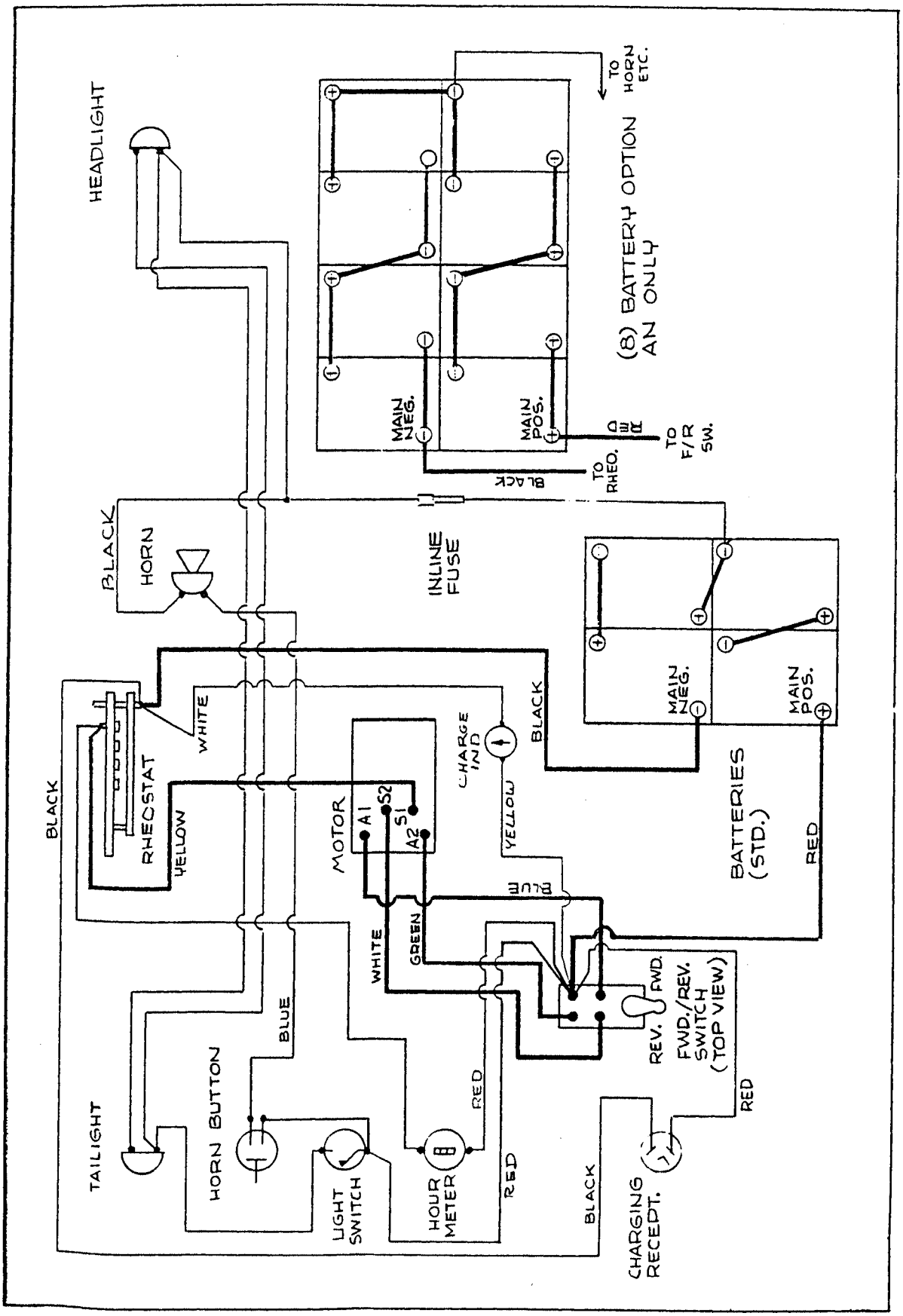
TROUBLE SHOOTING PROCEDURES

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
4. Power System:		
a) No power to motor in forward or reverse	1. Batteries discharged or defective	Recharge or replace batteries
	2. Forward-reverse switch maladjusted or worn	Adjust or repair forward-reverse contacts
	3. Motor brushes not contacting armature	Adjust or replace
	4. Loose or broken wire	Tighten or replace wire
	5. Motor defective	Replace or repair motor
	6. Check rheostat for contact	Adjust or replace bars (see section 16)
b) Erratic Operation	1. Batteries discharged	Recharge batteries
	2. Forward-reverse switch maladjusted or worn	Adjust or repair forward-reverse contacts
	3. Loose wire or wires	Tighten
	4. Motor brushes worn	Replace brushes

* **NOTE:** See Section 15 for PWR-TRON II Trouble Shooting

SECTION 7
Page 1

SLIDING BAR RHEOSTAT (SEE SECTION 16)
WIRING DIAGRAM (harness, 75-031-00)
Figure 2



SECTION 8
Page 1

IMPORTANT FACTS ON BATTERIES AND CHARGERS

To determine whether or not a battery is properly charged, a measuring device known as hydrometer is used. A hydrometer measures the specific gravity of a liquid and a battery hydrometer is graduated to measure the specific gravity of battery electrolyte. The electrolyte in your battery becomes heavier as it is charged, therefore, a higher specific gravity reading indicates a higher charge condition of your battery. The specific gravity reading will range from 1100 for a completely discharged battery to 1260 for a fully charged battery. No amount of overcharging will raise the specific gravity above 1260 on the electric vehicle type of battery. Both overcharging and undercharging can cause a premature failure of a battery. Overcharging destroys the positive plates. Consistent undercharging causes a buckling of the plates.

Do not discard a good battery as being defective because its specific gravity does not show an increase immediately upon applying a charge. Many good batteries require a charging period as long as three hours before they show any increase in the specific gravity. Do not charge a battery if the electrolyte temperature could rise above 120 degrees F. This could damage both battery and charger. As a rule of thumb, the electrolyte temperature during normal charging will rise about 25 degrees above the temperature in the charging area.

Failure to keep the battery electrolyte to the proper level will result in a crumbling (abnormal sulfation) of the plates and cause failure of the battery. Distilled water must be added to the battery regularly to make up for the loss due to evaporation. Prior to charging, the electrolyte level should cover the battery plates. Fill the battery to the proper level only after it has been fully charged.

BATTERIES, INSPECTION

WARNING - HAZARD OF EXPLOSIVE GAS MIXTURE

Batteries being charged or discharged will give off hydrogen gas. If this gas is concentrated it can cause an explosion. Concentrations of gas may remain for several hours if ventilation is not provided. DO NOT have any fire in the vicinity and do not tamper with circuits that might cause sparking while charging or discharging batteries.

INSPECTION OF BATTERIES AND ASSOCIATED CIRCUITS

An inspection of batteries and associated circuits is required to assure that the batteries are being properly charged. For this inspection we recommend the use of a hydrometer and a continuity tester.

1. Verify that all connections within the unit to be charged are clean and right.

2. Check each battery for loose terminal posts.

3. Test for continuity between all battery terminals and the charging receptacle.

4. Verify that the top of each battery is free of moisture, grease and acid film, which may cause terminal corrosion and current leakage.

5. After the battery has been recharged, test each individual cell in each battery with the hydrometer to verify that all specific gravity readings are within 10 points of each other.

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Page 2

IMPORTANT FACTS ON BATTERIES AND CHARGERS continued

BATTERIES, INSPECTION continued

6. Using the hydrometer, pull out acid from a cell and then vigorously expel the acid back into the cell to cause a violent stirring action. Immediately draw out another sample of acid and visually inspect it to see if it contains a brownish sedimednt (indicates positive plates are deteriorated).

7. When testing battery condition with hydrometer, always return electrolyte solution to the same cell from which it was removed. DO NOT MIX electrolyte from one cell to another.

MAINTENANCE PROCEDURES
BATTERIES

WARNING: Lead acid batteries continuously emit highly explosive gases. Flame or sparks must be kept away from the batteries at all times.

This emission is greatly increased during the charging process. Any area in which charging batteries are confined must be well ventilated, and flame or sparks must be kept out of the charging area and away from ventilator openings. DO NOT disturb battery connections while batteries are being charged.

The lead acid battery (or batteries) will furnish all power required by your vehicle. Two types are generally employed. The electric vehicle type battery pack, commonly used, can be expected to have a life of approximately 2 years, or 350 to 400 cycles. One cycle is the discharging and charging of the battery within proper limits. The heavy duty industrial type of battery has a life of approximately 7-1/2 years, or 1800 cycles, with appropriate use and care.

It cannot be over emphasized how important good maintenance procedures and judicious care of your batteries will affect their useful life. It is therefore recommended that a comprehensive maintenance program be established and adhered to throughout the life of your vehicle. A 5 point program is outlined below to assist you in understanding and establishing good battery care.

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Page 3

MAINTENANCE PROCEDURES
BATTERIES

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It can not be over emphasized how important good maintenance procedures and careful care of your batteries will affect their useful life. It is therefore recommended that a comprehensive maintenance program be established and adhered to throughout the life of your vehicle. A 5 point program is outlined below to assist you in understanding and establishing good battery care.

1. CORRECT CHARGING

Poor charging practices are responsible for more short battery life than any one other item. The charging equipment must be properly maintained and adjusted to give a charge which the battery will accept with maximum efficiency. Two things are involved in correct charging. These are the charging rate in amperes and the termination of the charge at the correct time. No amount of overcharging will increase the battery capacity or raise the specific gravity above its full charged condition.

Overcharging will reduce battery life. Undercharging will cause poor vehicle performance, and shorten the life of all electrical components, including the batteries. Refer to Section 8 for proper methods to determine charge condition.

2. DISCHARGING - CAPACITY

Batteries are commonly rated in ampere hours at the six hour discharge rate to final voltage of 1.75 per cell. They will deliver additional capacity in an emergency, but should not be required to do so regularly. The best way to avoid discharging is to prepare a rigid schedule for charging batteries which will insure against their being discharged beyond the limits of their capability.

3. WATERING

Water must be replaced from time to time. The frequency and quantity depends upon the watering space above the plates and the amount of gassing which the batterty does on charge. Only approved or distilled water should be added to the battery. Water should be added after hydrometer or voltmeter readings have been taken. The liquid level within the battery raises as the gassing occurs. Thus filling after charging minimizes over-filling. However, the water level should cover the plates prior to charging.

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Page 4

MAINTENANCE PROCEDURES, BATTERIES, continued

4. CLEANING

Batteries pick up various kinds of dirt and dust, depending on their surroundings and the type of service they are subject to. This is usually dry dirt, which can be blown off with low pressure air or brushed off. However, if cells are overfilled and electrolyte collects on the covers, the top of the battery becomes wet and stays wet, since the acid in the electrolyte does not evaporate. This moist surface in combination with certain kinds of dirt becomes electrically conductive and permits stray currents to flow externally over the top of the battery. These currents cause corrosion of cell posts, nuts, connectors and steel trays, which eventually become troublesome and expensive to repair.

When wet dirt accumulates on top of the battery, remove it by washing the battery with a strong solution of baking soda and hot water (1 lb. soda to 1/2 gallon of water). A convenient brush to use is one having flexible bristles like an old paint brush. Continue the application of the soda solution until all fizzing stops, which indicates that the acid has been neutralized. Then rinse thoroughly with clear water.

Wet covers can be indication of overfilling, leaky seals at posts and covers or of excessive gassing during charge. When observed the cause should be determined and the abusive conditons corrected.

5. RECORDS

A battery record system is recommended for all vehicles. It is considered essential for large operations, and where minimum battery operating cost is desired. A properly supervised record system can be made to detect and call attention to such operating irregularities as:

a. Overcharging, b. Undercharging, c. Overdischarging, d. Excessive Water Consumption, e. Cleanliness, f. Worn Out Batteries, g. Excessive Current Consumption on Trucks

It is not advisable to allow a battery to stand for a long period of time in a low state of charge. Doing so subjects the battery to excessive plate erosion and in cold conditions the battery will freeze at a much higher temperature. For example, a fully charged battery will not freeze at temperatures near 60 degrees below zero. Yet a battery in a very low state of charge may freeze at temperatures around 10 to 15 degrees above zero.

A battery not in use maintains small amounts of chemical action which slowly tends to dissipate the charged condition. It is wise to re-charge a battery not in use every 1 to 2 months. If possible, store the battery in a cool place as the self discharge rate is increased with warmer temperatures.

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BATTERY MAINTENANCE RECORD VEHICLE NO.

Battery No.	Cell No.	Date			Date			Date		
		Water OK or Low	Gravity Before Charge	Gravity After Charge	Water OK or Low	Gravity Before Charge	Gravity After Charge	Water OK or Low	Gravity Before Charge	Gravity After Charge
1	1									
	2									
	3									
2	1									
	2									
	3									
3	1									
	2									
	3									
4	1									
	2									
	3									
5	1									
	2									
	3									
6	1									
	2									
	3									

1. **CAUTION: Batteries emit explosive gases. During normal operation the con centration of these gases is rarely sufficient to be considered dangerous unless flame or sparks occur in the battery compartment close to the vent holes in the battery caps. It is important that this not be allowed to occur at anytime. <u>During the charging process, emissions are greatly increased</u>. Any area in which charging batteries are confined must be well ventilated, and flame, sparks or lighted cigarettes must be kept out of the charging area and away from ventilator openings associated with the charging area. Battery connections must not be disturbed while batteries are being charged.**
2. Do not fill an uncharged battery. Bring water level up to just cover the plates, and complete filling after battery is fully charged. Use distilled water. Fill only to level indicated on battery.
3. Batteries which require unusually frequent watering may indicate overcharging. Review charging practices and/or adjustment of transformer taps in charger.
4. Gravity should be kept between 1175 (30% charged) and 1290 (100% charged), and gravity readings of all cells should be within 10 point range. When they are not, an equalizing charge should be applied. Refer to information under "Charging Time Chart" in Charger Handbook.
5. Periodically check for loose terminal posts or loose connections to terminal posts, <u>but not while batteries are being charged</u>.
6. Keep tops of batteries clean, and free of moisture, grease, and acid films. Any of these can cause current leakage.
7. Keep weekly (or oftener) record as shown in sample chart, for a new vehicle or when charging results seem unsatisfactory, until satisfactory charging continues for a four week period, then keep record on a monthly basis.

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BATTERIES AND CHARGER

T-D PART NO.	DESCRIPTION	QTY. REQ.
74-009-10	CHARGE INDICATOR (24 VOLT)	1
75-235-08	BATTERY JUMPER #6 WIRE (10-1/4 IN LONG)	5
76-003-00	CHARGING PLUG, 2 PRONG (OPTIONAL)	1
76-013-00	CHARGING RECEPTACLE, 2 PRONG (OPTIONAL)	1
77-031-00	6 VOLT, 190 A.H. BATTERY	4
77-042-00	6 VOLT, 217 A.H. BATTERY	4
77-047-00	6 VOLT, 244 A.H. BATTERY	4
77-048-00	6 VOLT, 250 A.H. BATTERY	4
77-200-00	HYDROMETER	1
77-201-00	BATTERY FILLER	1
50-243-00	HOLD DOWN	2
50-250-00	BATTERY, BAT-LOK	1
79-301-05	CHARGER, 24 VOLT, 25 AMP LESTRONIC 2, 115V/60HZ BI	1

SECTION 9
Page 1

CHARGER MAINTENANCE, SERVICE AND ADJUSTMENT
TAYLOR-DUNN / LESTRONIC II BATTERY CHARGER

CAUTION

THIS CHARGER IS FOR USE ONLY ON A BATTERY SYSTEMS OF THE TYPE AND CAPACITY SPECIFIED ON THE CHARGER NAMEPLATE. USE OTHERWISE WILL DAMAGE CHARGER AND/OR BATTERIES.

Due to the electrical characteristics of this charger, it is possible to improperly hook up batteries and not blow the fuses when charging. When installing batteries, be sure polarity is correct. With a DC voltmeter, check terminal voltage and polarity at the car receptacle.

CAUTION

When working near capacitor terminals be sure charger is turned off. With charger "on" transformer capacitor voltage is approximately 640 volts. Use care. Before performing service, disconnect AC and DC leads. Discharge capacitor before servicing.

LESTRONIC II BATTERY CHARGERS

The all new automatic Lestronic chargers eliminate over and undercharging for new, old or defective batteries, whether hot or cold. Precise charging is achieved by patented Electronic Timer, utilizing state of the art integrated circuits.

Charger turns on automatically by simply connecting D.C. cord to batteries. The ammeter indicates charge rate. The charge rate tapers gradually to a finish rate of 3 to 7 amps. The Electronic Timer monitors the rate of voltage change during the charge period. When this rate levels off, the charger automatically shuts off.

OPERATION OF LESTRONIC II BATTERY CHARGERS

INTRODUCTION

The Lestronic II battery charger is a highly reliable, line compensating unit. When used according to instructions, the Lestronic II will tend to lengthen battery life with less frequent additions of water.

INITIAL INSTALLATION:

Circuit breaker or fuse protection in the AC line to which the charger (is to be plugged should allow at least 15 amps per charger). When it is necessary to use an AC extension cord to the charger, use a three conductor cord with ground, and keep as short as possible. Instructions printed on the cover of the charger are for daily reference.

NORMAL OPERATION

The state of discharge of the batteries will be slightly different every time they are put on charge, but the Lestronic II varies automatically the initial charge rates, and taper of charge rate over the charge period. Thus momentary initial charge rate will vary from 18-30 amps, dropping quickly to a lower value, and then tapering gradually over the charge period to a finish rate of 3-7 amps. The specific gravity will not rise to full charge until the cells have been equalized. The normal charging with the ammeter needle in the green shaded area is important to achieve equalization of all battery cells, every time the batteries are charged. Since the taper of the charging rate (in amps, as indicated by the ammeter needle) is controlled by the rising voltage of the batteries being charged, proper performance of the charger and resulting good battery life is dependent upon the following factors:

1. An adequate AC line to handle the power required (see "Initial Installation").

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CHARGER MAINTENANCE, SERVICE AND ADJUSTMENT
TAYLOR-DUNN / LESTRONIC II BATTERY CHARGER

OPERATION OF LESTRONIC II BATTERY CHARGERS continued

NORMAL OPERATION continued

2. All cells of the batteries must be good, rising to approximately 2.5 DC volts per cell while still on charge or near the end of a charging period. When in doubt, check each cell with a single voltmeter while still on charge. If a low reading is obtained; check the low cells with a temperature corrected hydrometer. NOTE: Hydrometer float must be thoroughly clean to obtain accurate specific readings.

3. Connect D.C. plug to vehicle receptacle (portable). All electrical connections of the vehicle must be clean and tight.

4. The Charger turns on automatically by simply connecting the output cord to the batteries. The charge rate, indicated on the ammeter, tapers gradually to a finish rate of 3 to 7 amps.
   The electronic timer monitors the rate of voltage rise during the charge period. When the rate levels off, Lestronic II shuts off, it does not come back on periodically. The measurement of the rate of voltage rise, rather than the actual battery voltage, has proven to be an extremely accurate method of determining full charge, regardless of battery condition. This patented circuitry makes all Lestronic chargers unique from other automatic chargers.

Commercial cars should be charged after use each day, or as charge becomes low as indicated by hydrometer or voltmeter test.

The necessity of adding water more frequently than two or three weeks, and/or hot battery cases at the end of the charging cycle, indicates the finish rate is too high, due to one or both of the following:

1. One or more bad cells in the batteries.

2. Batteries are starting to age to a point where hours of charge should be reduced gradually to obtain prolonged battery life.

STORAGE

Charger may be left connected to the batteries and should be turned on once a month. In extremely cold conditions it may be necessary to charge more frequently. Check with your battery manufacturer. After each charge cycle the charger should be checked to ensure that it has turned off.

PROPER CARE OF MOTIVE POWER BATTERIES

NEW BATTERIES

1. Brand new batteries should be given a charge before their first use, because it is difficult to know how long vehicle batteries have been in storage without a charge since new.

2. Limit use of brand new batteries between charges for first 5 cycles. New batteries and older batteries which have been in storage are not capable of their rated output until they have been discharged and charged a number of times.
3. During the first month of new batteries, particularly when night-time temperatures are below 6ØF, give them an extra charge once a week. The ampere-hours of energy that batteries can deliver and their charge acceptance varies direct battery temperature.

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Page 3

CHARGER MAINTENANCE, SERVICE AND ADJUSTMENT
TAYLOR-DUNN / LESTRONIC II BATTERY CHARGER

PROPER CARE OF MOTIVE POWER BATTERIES continued

NEW BATTERIES

4. All cells in a set of batteries do not react identically to the same discharge and charge current. In a normal 12 hours charge the last 3 to 5 hours at low finish charge rate equalize the cells for better battery life.

VERIFY BATTERIES ARE CHARGED

1. Turn on the time first thing in the morning and check to see if charger ammeter needle jumps smartly to 15 amps or more and then tapers into the 1-4 amps area within 15 minutes. This will provide a very simple means of verifying that the batteries were truely charged the night before. It also shows aging batteries whose finish charge rate will not taper into the ammeter 1-4 amps area.

2. Add water carefully to proper level in cells as required after they have been fully charged. Do not fill them so high that they bubble over while charging. New batteries require very little additional water, whereas very old batteries may need additional water two or three times a week. Water (electrolyte) level in battery cells settles when batteries are discharged and rises during charge. The probability of overfilling can be reduced by adding water when batteries are fully charged.

PREVENTIVE MAINTENANCE

1. When night air temperatures fall below 65 degrees F, batteries charged in unheated areas should be placed on charge as soon after use as possible. Under such condition charge once a week in the early afternoon will improve state of charge and battery life.

2. Keep tops of batteries and battery hold-downs clean and dry. Tops of batteries and battery hold-downs must be kept clean at all times to prevent voltage leakage and flow of current between the batteries and the vehicle frame.

WARNING

LEAD ACID BATTERIES CONTINUOUSLY EMIT HIGHLY EXPLOSIVE GASES. DURING NORMAL VEHICLE OPERATION THE CONCENTRATION OF THESE GASES IS A POTENTIAL HAZARD TO BE CONSIDERED DANGEROUS WHEN FLAME OR SPARKS OCCUR IN THE BATTERY COMPARTEMNENT CLOSE TO THE VENT HOLES IN THE BATTERY CAPS. IT IS IMPORTANT THAT THIS NOT BE ALLOWED TO OCCUR AT ANY TIME. LIGHTED CIGARETTES MUST NOT BE BROUGHT CLOSE TO THE BATTERY COMPARTMENT.

DURING THE CHARGING PROCESS, EMISSIONS ARE GREATLY INCREASED.

ANY AREA IN WHICH CHARGING BATTERIES ARE CONFINED MUST BE WELL VENTILATED, AND FLAME, SPARKS, OR LIGHTED CIGARETTES MUST BE KEPT OUT OF THE CHARGING AREA AND AWAY FROM VENTILATOR OPENINGS ASSOCIATED WITH THE CHARGING AREA. BATTERY CONNECTIONS MUST NOT BE DISTURBED WHILE BATTERIES ARE BEING CHARGED.

NOTE: Please refer to your Taylor-Dunn vehicle maintenance manual for a more detailed description on battery maintenance.

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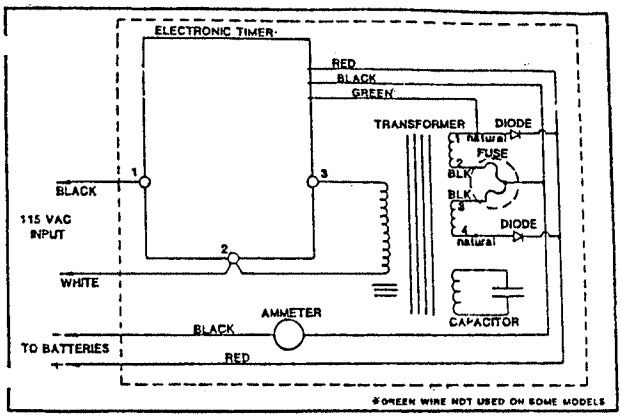
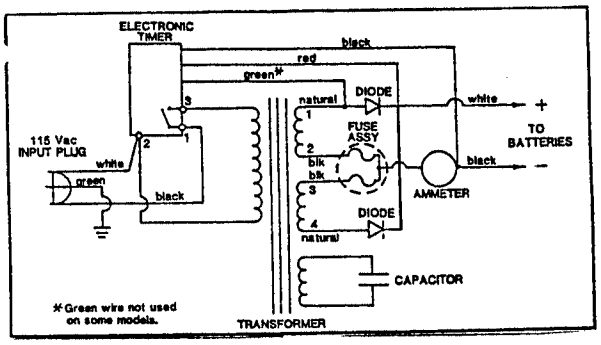
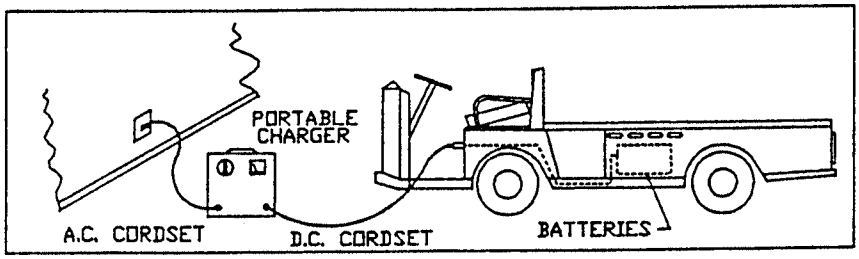
SCHEMATICS, LESTER CHARGERS



TYPICAL BUILT-IN ELECTRONIC TIMER CHARGER
(LESTRONIC II)



TYPICAL PORTABLE ELECTRONIC TIMER CHARGER (LESTRONIC II)



TYPICAL DIAGRAM DURING CHARGING

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MALFUNCTIONS SYMPTOMS AND THEIR REMEDIES

1. The Lester charger is designed with as few parts as possible. Since each component can be tested individually, trouble shooting is a simple task. The following is a list of symptoms with their associated test procedures and remedies.

NO TRANSFORMER HUM AND AMMETER DOES NOT REGISTER

In the event no hum is detected from the transformer, check the AC cord to be sure it is securely plugged into a live AC oulet. When three-prong to two-prong adapters are used, they tend to work loose giving a poor connection. If the cord connection is secure and still no hum is noticed, a continuity test of the AC circuit is necessary. Turn the timer to "ON" and, with a suitable continuity tester, check circuit across the AC plug prongs (Figure 1). CIRCUIT SHOULD BE COMPLETE. If not complete, individually check the AC cord, timer, primary transformer coil, and all connections.

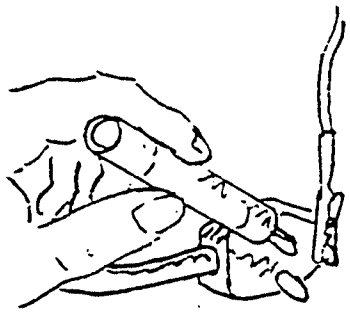

FIGURE 1

TRANSFORMER HUMS BUT NO AMMETER INDICATION

Inspect the DC plug connection to the vehicle receptacle and also check to ensure that the batteries are connected properly to the receptacle. If there is still no ammeter indication, a continuity test of the charger DC circuit must be performed. Turn the timer to "OFF" and disconnect the AC and *DC plugs. Perform the following tests, using a low voltage tester, to check the continuity of the DC circuit.

* For built-ins, disconnect AC plug and DC leads to battery to isolate charger.

(a) Connect tester clip to negative (-) blade and probe to positive (+) blade (Figure 2). CIRCUIT SHOULD BE COMPLETE. If not complete, first check the DC fuse link. If one or both fuses have blown, the link will be broken and usually the clear plastic fuse cover will be discolored. Refer to "Fuse Link Blowing" for test procedures. If fuses are good, individually check the fuse connections, DC cord, and diode connections (each may be checked with the continuity test light).

NOTE: On built-in charger the red lead is (+) and black lead is (-) on DC output.

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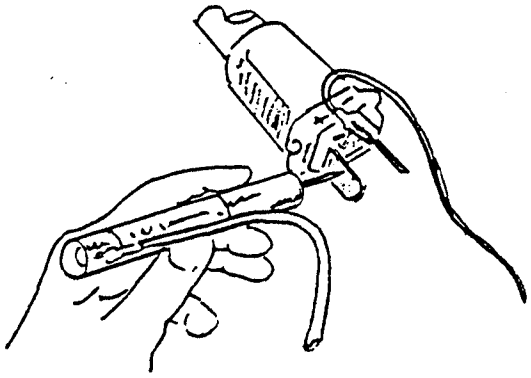
MALFUNCTION SYMPTOMS AND THEIR REMEDIES continued



Typical plug. Check same polarity on other plugs.

FIGURE 2
D.C. PLUG CHECK FOR PORTABLE CHARGERS ONLY

(b) If the circuit in Figure 2 is complete, reverse test tight leads as shown in Figure 3. CIRCUIT SHOULD NOT BE COMPLETE. If circuit is complete, check DC cord for a "short" between the two wires. More probably, one or both diodes have "shorted". Refer to "Fuse Link Blowing" part (b) for continuity test of diodes.

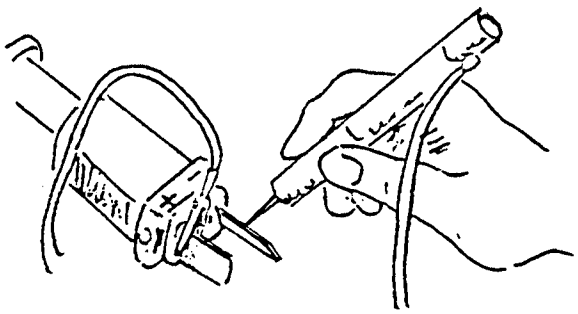


FIGURE 3
D.C. PLUG CHECK FOR PORTABLE CHARGERS ONLY

CAUTION: Discharge capacitor before proceeding with (c).

(c) If (a) Figure 2 and (b) Figure 3 check good, assume the capacitor is shorted. Remove one wire from a capacitor terminal and place continuity tester clip to one terminal and probe to other. If circuit is complete, capacitor is "shorted" and must be replaced.

CHARGER DC FUSE LINK(S) BLOWS
This condition is caused by:

(a) Reverse polarity between charger and batteries, such as incorrect installation of batteries, wiring of DC receptacle or charger plug.

(b) A short circuit failure of one or both diodes. First disconnect one diode. Using a low voltage continuity tester check each diode as shown in Figure 4. Then reverse the tester leads and check each diode again. If the diode conducts current in both directions the diode is shorted and must be replaced. Replace either the entire heat-sink assembly or the defective diode. When replacing a single diode be sure the new diode is pressed squarely into the hole and does not extend beyond the rear surface of the heat-sink plate.

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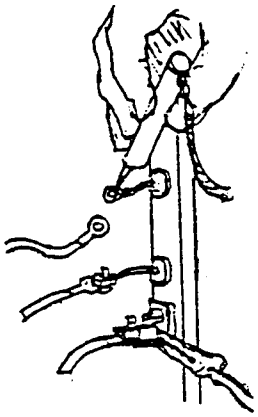

FIGURE 4

(c) If (a) and (b) fail to reveal the malfunction, check wiring of both charger and vehicle against their respective wiring diagrams.

CHARGER OUTPUT IS LOW

The most probable cause is one diode shorting and blowing one fuse. Refer to "Fuse Link Blowing" part (b) to check the diodes. If a diode is shorted both the heat sink and fuse assemblies must be replaced.

CHARGER DOES NOT TURN OFF

This is due to an inoperative timer board assembly. In this case replace timer assembly.

CHARGER DOES NOT TURN ON

At the timer board assembly "short" terminals No. 1 and No. 3. If charger turns on, this means you have inoperative timer assembly. Replace timer.

AC LINE FUSE OR CIRCUIT BREAKER BLOWS

If this occurs when charger is turned on without being plugged into the vehicle, the AC cord, timer motor coil, or the transformer may be shorted. To check the AC cord, ensure that the timer is "OFF" and connect the continuity tester across the AC plug prongs. If circuit is complete the AC cord is shorted and must be replaced. To check the time motor coil, disconnect the white timer motor wire and connect continuity tester to the motor coil leads. If the lamp glows, the coil is shorted. To test the transformer, disconnect secondary leads #1 and #4. If the AC fuse or breaker still blows, the transformer is shorted internally and must be replaced.

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LESTER PARTS LIST

RECOMMENDED REPLACEMENT PARTS

Taylor-Dunn Part No.	79-300-95	79-300-90 PORTABLE
Lester Model No.	24LC25-3T12 230/50 7670	24LC25-3T12 230/50 8875
TRANSFORMER/RECTIFIER ASSEMBLY, COMPLETE		
Transformer	79-644-13	79-644-12
Capacitor	79-902-00	79-902-10
Heat Sink Assy. with diodes	79-749-11	79-749-00
Diode Replacement	79-745-10	79-745-10
Fuse Assembly	79-831-00	79-831-10
CONTROL CONSOLE ASSEMBLY		
Bushing, for Cordsets	79-530-00	79-530-00
Housing	79-599-10	
Timer	79-805-11	79-805-11
Ammeter	79-851-10	79-851-10
Cordset, A.C.	79-575-20	79-575-20
Cordset, D.C.		79-566-10

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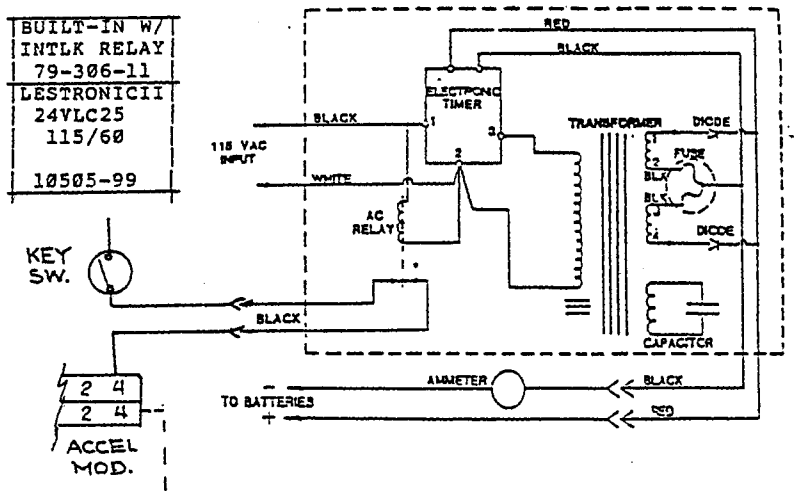
LESTER PARTS LIST

RECOMMENDED REPLACEMENT PARTS

Taylor-Dunn Part No.	BUILT-IN W/ INTLK RELAY 79-306-11	PORTABLE 79-301-00 *79-301-05	PORTABLE 79-302-10 *79-302-15
Lester Model No.	LESTRONICII 24VLC25 115/60 10505-99	PORTABLE LESTRONIC II 24LC25 115/60 *BUILT-IN	LESTRONIC II 24VLC40 115/60 *BUILT-IN
TRANSFORMER/RECTIFIER ASSEMBLY			
Transformer			
Capacitor	79-902-00	PORT & BLT IN 79-902-00	PORT & BLT-IN 79-902-00
Heat Sink Assy. with Diodes	79-749-11	79-749-00 79-749-11	79-749-10
Diode Replacement	79-745-10	PORT & BLT IN 79-745-10	PORT & BLT-IN 79-745-11
Fuse Assembly	79-831-00	PORT & BLT IN 79-831-00	PORT & BLT-IN 79-831-10
CONTROL CONSOLE ASSEMBLY	INTLK RELAY 79-809-00		
Bushing, for Cordsets	79-530-00	79-530-00	79-531-00
Housing			
Timer	79-805-66	79-805-64 *79-805-66	BUILT-IN *79-805-66
Ammeter	79-851-10	79-851-10	79-852-00
Cordset, A.C.	79-575-10	79-575-10	79-575-10



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RECOMMENDED SPARE PARTS

COMPONENTS	SPARES FOR VEHICLES	
	1 - 20	20 or MORE
TRANSFORMERS	1	2
CAPACITORS	1	2
AMMETERS	1	2
HEAT SINK ASSEMBLY	1	2
DIODES	2	4
FUSE ASSEMBLY	2	4
CORDSET A.C.	2	4
CORDSET D.C.	2	4
PLUG D. C.	2	4
HOUSING, CONTROL CONSOLE	1	2
TIMER, BOARD ELECTRONIC	1	2

SECTION 1Ø
Page 1

MAINTENANCE PROCEDURES FRONT AXLE, FORK, STEERING AND TIRES
REFER TO FIGURE 3

GENERAL

Your front wheel assembly consists of a ruggedly designed fork mounted on a 3/4 inch axle and turns on two roller bearings. Grease fittings are provided at bearing points for proper lubrication.

The steering linkage consists of a steering wheel, or tiller, and bearing mounted shaft, in combination with half-gears permanently fixed to the fork and steering shaft. Steering wheel equipped vehicles use a roller chain and sprockets to gain mechanical advantage for smooth easy steering. Occasional adjustment of chain tension will be required for steering-wheel vehicles, as outlined in this section of the manual.

Periodic lubrication of the steering system is essential, as described in sections 4 and 5, for reliable and trouble-free steering.

TIRE CARE

Tire pressure is governed by how you want your vehicle to ride and the terrain upon which it is most commonly used.

Slightly lower pressure will assist traction on soft terrain without undue wear.

The chart listed below will assist you to determine the correct tire pressure for your needs. The higher range of perssure is recommended for heavy loads.

TIRE SIZE	TYPE	LOAD RANGE	PLY RATING	MAX. COLD PSL	MAX LOAD POUNDS
4.8Ø X 8	STEELGUARD	C	6	1ØØ	123Ø
4.8Ø X 8	HWY. TREAD	B	4	7Ø	1ØØØ
5.7Ø X 8	HWY. TREAD	B	4	55	117Ø

CAUTION: Do not overinflate tires. This will promote increased wear. Under inflated tires on hard surfaces also promotes undue wear and should be avoided.

ADJUSTMENT OF WHEEL BEARINGS

1. Adjust wheel bearings by holding 1 axle nut and tightening the other until drag is felt on wheel. Then back off nut approximately 1/4 turn. Wheel should turn free but not have excess play in bearings.

REMOVAL OF WHEEL AND AXLE ASSEMBLY

1. Remove 1 axle nut by holding nut on one end of axle and unscrewing nut on opposite end.
2. Slide axle from fork and wheel, being careful to catch spacers and wheel as they come free.
3. Wheel bearings may be flushed, cleaned and repacked without removing from hub, unless, damaged or embedded with foreign material.
4. To remove wheel bearings and seals:
   A. Pull seals from hub.
   B. Remove taper roller bearings.
   C. If necessary, press bearing races from hub with suitable press or with flat punch by hitting back and forth one side or other.

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Page 2

MAINTENANCE PROCEDURES FRONT AXLE, FORK, STEERING AND TIRES
REFER TO FIGURE 3

RE-ASSEMBLY OF WHEEL AND AXLE

1. Press bearing races into hub with suitable press, taking care that they are seated against stops within the hub.
2. Generously lubricate wheel bearings with wheel bearing grease and insert into bearing races.
3. Press or tap seals into place. (Proper position is when face of seal is flush with hub). **NOTE: It is recommended that new seals be installed whenever bearings are removed from wheel hub, or whenever seals are worn or damaged.** Worn or damaged seals allow dirt and foreign matter to enter wheel bearings, shortening bearing life.
4. Install wheel and hub assembly into fork by starting axle through one side of fork, inserting 1 spacer then sliding axle through wheel bearings. Insert other spacer and slide axle through remainder of wheel assembly.
5. Install locknut.
6. Adjust wheel bearings as outlined above.
7. Wheel hub has 2 zerk fittings for grease lubrication.

ADJUSTMENT OF FORK SPINDLE BEARINGS

1. Adjust by tightening nut until drag is felt on spindle bearings. Loosen about 1/4 turn or until spindle rotates free but does not have any play in bearings. **NOTE: Any excessive play in spindle bearings can lead to bearing failure due to shock effect when vehicle encounters bumps or uneven terrain.**

REMOVAL OF FORK AND SPINDLE

1. Using a hoist or suitable jack, elevate the front of the vehicle.
2. Remove dust cap.
3. Remove lock nut and washer from spindle.
4. Slide fork and spindle out of housing.
5. Remove bearings, dust seals, and spacers.
6. A puller is required to remove races from housing.

RE-ASSEMBLY OF FORK AND SPINDLE

1. Bearing races may be pressed into position by using a 1/2" x 6" bolt. Place a disc or bar of suitable size over bolt, then one bearing racer, pass this assembly through housing. Place other bearing race, a suitable disc or bar and then the nut. Tightening the nut and bolt will draw the two bearing races into position without damage.
2. Generously pack bearings with wheel bvearing grease. Assemble one dust seal and bearing in lower part of housingf. Refer to Figure 3 for proper location.
3. Place spacers on spindle, and slide spindle through bearing haousing, engaging gear teeth on fork with teeth on steering shaft.
4. Install washer and nut to spindle, and adjust bearing tension as described in preceding subsection.
5. Install dust cap.

ADJUSTMENT OF STEERING CHAIN TENSION

1. Remove steering chain cover.
2. Remove locking wires from chain tightener.
3. With wrench turn center of turnbuckle type tightener drawing the chain taut with slight tension. DO NOT apply excessive tension to chain as undue bearing and chain wear will result.
4. Replace locking wire on tightener, and replace chain cover.

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Page 3

MAINTENANCE PROCEDURES FRONT AXLE, FORK, STEERING AND TIRES
REFER TO FIGURE 3

REMOVE AND REPLACE STEERING CHAIN AND STEERING WHEEL

1. Remove steering chain cover.
2. Remove locking wire from turnbuckle, and relieve chain tension by turning center of turnbuckle.
3. Remove chain master link, and remove chain from sprockets. Note relative position of turnbuckle to sprocket for proper reassembly.
4. Pry retaining ring from groove on forward end of steering wheel shaft, and remove ring from shaft.
5. Remove steering wheel and sprocket assembly.
6. Replace in reverse order of removal. When assembling turnbuckle, road wheelo and steering wheel should be in straight ahead position, and turnbuckle approximately mid-way between upper and lower sprocket.
7. Adjust steering chain tension as described in preceding subsection.

REMOVE AND REPLACE STEERING SHAFT - TILLER STEERING

1. Lossen tiller handle set screw and remove tiller handle.
2. Loosen set screw in steering shaft collar (just forward of rear pillow block), so that collar is free to move on shaft.
3. Remove fork from vehicle as described in preceding subsection.
4. Remove front steering shaft pillow block from under side of frame, and remove lower half of rear steering shaft pillow block.
5. Slide loose steering shaft rearward until half gear is free of frame, then slide shaft forward and upward to remove from vheicle.
6. Replace in reverse order of removal. When tightening set screw in shaft locking collar, half gears must be in full engagement, and collar must be snug against forward end of rear pillow block to prevent rearward motion of steering shaft when under load.

REMOVE AND REPLACE STEERING SHAFT

1. Remove steering chain as outlined in preceding subsection titled "Remove and Replace Steering Chain..." steps 1 through 3.
2. Loosen set screw in steering shaft collar (just forward of rear pillow block) so that collar is free to move on shaft.
3. Remove fork from vehicle as described in preceding subsection.
4. Remove front steering shaft pillow block from under side of frame, and remove lowwer half of rear steering shaft pillow block.
5. Slide loose steering shaft rearward until half gear is free of frame, then slide shaft forward and upward to remove vehicle.
6. Replace in reverse order of removal. When tightening shaft locking collar, half gears must be in full engagement, and collar must be snug against forward end of rear pillow block to prevent rearward motion of steering shaft when under load. Adjust steering chain tension as described in preceding subsection.

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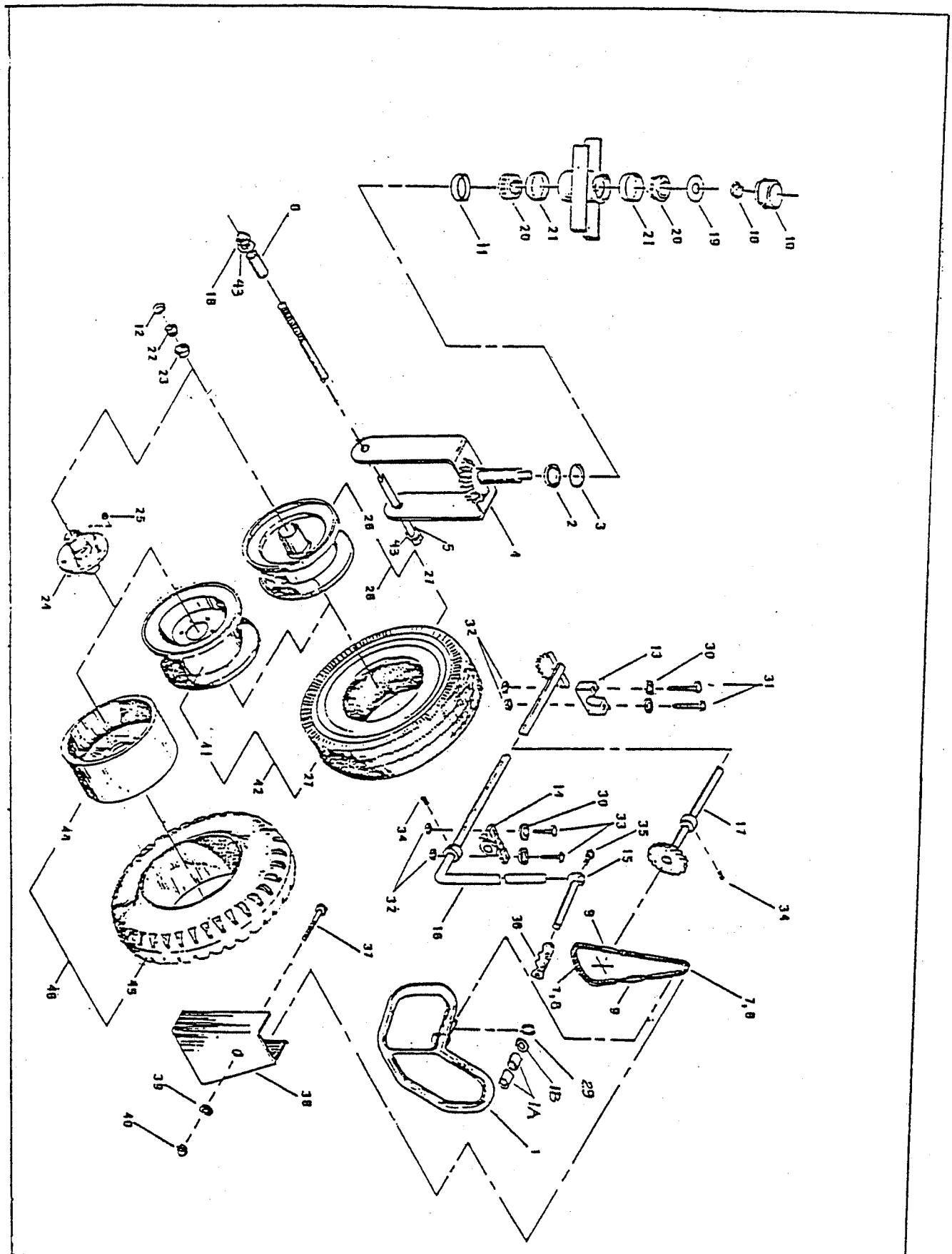
SC 1-59 & AN FRONT FORK, WHEELS AND STEERING
FIGURE 3



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FRONT FORK, WHEELS AND STEERING
REFER TO FIGURE 3

FIG.I.D.	PART NO.	DESCRIPTION	QTY.
1	19-008-00	CLOVERLEAF STEERING WHEEL, SHAFT & SPROCKEY ASSY.	1 OR Ø
1A	32-032-10	BUSHING, 3/4 INCH I.D.	2
1B	88-048-63	WASHER, 1 INCH X .755 X .030 THICK	1
2	16-400-00	SPACER, FRONT FORK - .125 THICK	1
3	16-410-00	SPACER, FRONT FORK - .020 THICK	1
4	14-030-10	FRONT FORK, SINGLE	1
4	14-032-10	FRONT FORK, DUAL 15-010-00	1
5	~~88-220-32~~	BOLT, 3/4-10 NC X 8-1/2 LONG HEX HEAD CAP, GR. 5	1
5	15-011-00	FRONT AXLE, 3/4 DIA. X 16-1/4" LONG (DUAL)	1
6	16-010-00	WHEEL SPACER, 3/4 I.D. X 1-1/4 LONG	4 OR 2
7	30-223-00	CHAIN, #40 SINGLE STRAND ROLLER 39 PITCH LONG	2 OR Ø
8	30-400-00	LINK MASTER FOR #40 CHAIN	4 OR Ø
9	96-900-00	TURNBUCKLE, STEERING CHAIN	2 OR Ø
10	92-105-00	DUST CAP	1
11	45-307-00	OIL SEAL - FOR 1-1/4" BEARINGS	1
12	45-308-00	OIL SEAL - FOR 3/4" BEARINGS	2
13	84-020-00	PILLOW BLOCK, 3/4" STEEL	1
14	84-001-00	PILLOW BLOCK, 3/4 SPLIT WITH FITTING	1
15	95-500-00	HANDLE FOR TILLER STEERING	1 OR Ø
16	20-026-10	SHAFT, STEERING TILLER	1 OR Ø
17	20-051-10	SHAFT, VERTICAL STEERING - 42-7/8" BED	1 OR Ø
17	20-053-10	SHAFT, VERTICAL STEERING - 50-7/8" BED	1 OR Ø
17	20-054-10	SHAFT, VERTICAL STEERING - W/HALF GEAR	1 OR Ø
18	88-229-81	3/4 N.C. LOCKNUT	2
19	88-228-60	3/4 CUT WASHER	1
20	80-011-00	1-1/4 I.D. TAPERED ROLLER BEARING	2
21	80-102-00	TAPERED BEARING RACE FOR 1-1/4 I.D. BEARING	2
22	80-015-00	3/4 TAPERED I.D. ROLLER BEARING	2
23	80-105-00	TAPERED BEARING RACCE FOR 3/4 I.D. BEARING	2
24	12-120-00	WHEEL HUB WITH 3/4" ROLLER BEARING AND OIL SEALS, 4" LONG, WITH FIVE HOLES ON 4-1/2" BOLT CIRCLE	Ø OR 1
25	97-236-00	LUG NUT, 1/2" TAPERED	Ø OR 1
26	10-075-00	TIRE, 4.80 X 8, LOAD RANGE B, SUPER RIB, TUBELESS	Ø OR 1
27	10-078-00	TIRE, 4.80 X 8, 6 PLY, STL GUARD, TUBE TYPE	Ø OR 1
27	10-082-00	TIRE, 5.70 X 8, LOAD RANGE B, EX. GRIP, TUBE TYPE	Ø OR 1
—	11-030-00	TUBE, FOR 4.80 X 8 TIRE	Ø OR 1
—	11-040-00	TUBE, FOR 5.70 X 8 TIRE	Ø OR 1
28	13-576-00	TIRE, WHEEL, AND 4" HUB, WITH 4.80 X 8 LOAD RANGE B, TUBELESS SUPER RIB TIRE, AND 3/4" TAPERED ROLLER BEARING	Ø OR 1
29	88-840-09	EXTERNAL SNAP RING FOR 3/4" SHAFT	Ø OR 1
30	88-088-60	5/16 WASHER	4
31	88-080-15	5/16 X 2 N.C. HEX HEAD CAP SCREW	2
32	88-089-81	5/16 N.C. LOCKNUT	4
33	88-080-13	5/16 X 1-1/4 N.C. HEX HEAD CAP SCREW	2
34	88-067-06	1/4 X 1/2 N.C. SOCKET SET SCREW	1
35	88-087-09	5/16 X 3/4 SQUARE HEAD SET SCREW	1 OR Ø
36	98-350-00	HAND GRIP	1 OR Ø
37	88-060-20	1/4 X 3 N.C. HEX HEAD CAP SCREW	1 OR Ø
38	30-702-00	CHAIN GUARD - STEERING	1 OR Ø
39	88-068-62	1/4 N.C. LOCK WASHER	1 OR Ø
40	88-069-83	1/4 N.C. BRASS ACORN NUT	1 OR Ø
41	12-012-00	WHEEL, DEMOUNTABLE, FOR 4.80 X 8 OR 5.70 X 8 TUBELESS TIRE, FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	Ø OR 1
42	13-734-00	TIRE AND DEMOUNTABLE WHEEL, 4.80 X 8, TUBELESS SUPER RIB, FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	Ø OR 1

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FRONT FORK, WHEELS AND STEERING
REFER TO FIGURE 3

FIG.I.D.	PART NO.	DESCRIPTION	QTY.
42	13-734-10	TIRE AND DEMOUNTABLE WHEEL, 4.80 X 8, FOAM FILLED, SUPER RIB, FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	0 OR 1
42	13-735-00	TIRE AND DEMOUNTABLE WHEEL, 4.80 X 8, TUBELESS KNOBBY, FIVE 1/2" HOLES ON 4-1/2 INCH BOLT CIRCLE	0 OR 1
42	13-739-00	TIRE, TUBE AND DEMOUNTABLE SPLIT RIM WHEEL, 4.80 X 8 6 PLY STEELGUARD TIRE WITH 5 HOLES 1/2 INCH ON 4-1/2 INCH BOLT CIRCLE	
42	13-742-00	TIRE AND DEMOUNTABLE WHEEL 5.70 X 8 TUBELESS SUPER RIB WITH FIVE 1/2" HOLES ON 4-1/2 BOLT CIRCLE	0 OR 1
42	13-742-10	TIRE AND DEMOUNTABLE WHEEL, 5.70 X 8 FOAM FILLED, SUPER RIB WITH FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	0 OR 1
42	13-744-00	TIRE, TUBE AND DEMOUNTABLE WHEEL, 5.70 X 8, EXTRA GRIP TIRE WITH FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	0 OR 1
43	88-228-61	WASHER, 3/4 INCH SAE	2
44	12-050-00	WHEEL FOR 16 X 4 X 12-1/8 AND 18 X 5 X 12-1/8 SOLID CUSHION, DEMOUNTABLE, CAST IRON, FIVE 1/2 1/2" HOLES ON 4-1/2" BOLT CIRCLE	0 OR 1
45	10-250-00	TIRE, SOLID CUSHION, SMOOTH, 16 X 4 X 12-1/8	0 OR 1
45	10-261-00	TIRE, SOLID EXTRA CUSHION, ALL SERVICE, 16-1/4 X 4 X 11-1/4	0 OR 1
46	13-952-10	TIRE AND DEMOUNTABLE CAST IRON WHEEL #12-050-00, WITH 16 X 4 X 12-1/8 SILID CUSHION SMOOTH TIRE AND FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	0 OR 1
46	13-594-10	TIRE AND DEMOUNTABLE CAST IRON WHEEL #12-054-00 WITH 16-1/4 X 4 X 11-1/4 SOLID EXTRA CUSHION ALL SERVICE TIRE AND FIVE 1/2" HOLES ON 4-1/2" BOLT CIRCLE	0 OR 1
47	88-048-63	WASHER, STEEL	1
48	32-032-10	BUSHING, 3/4, OIL IMPREG	1

SECTION 11
Page 1

MAINTENANCE PROCEDURES "POWER TRACTION" REAR AXLE MOTOR AND BRAKES
FIGURE 5

Your "Power Traction" direct drive assembly is a highly efficient unit. Great care was taken in its design to promote long life with a minimum of maintenance. It employs an automotive type differential unit which operates within an enclosed housing. The gears, bearings etc. are lubricated from within by oil which when maintained at its proper level insures complete coverage of all moving parts. This oil level should be checked on a regular basis as outlined in the Maintenance Guide (Section 4) of this manual. If the oil level is allowed to drop below normal limits serious damage to the differential and drive unit result.

An adjustable motor mount has been provided to extend normal chain life. Refer to Section 11 for proper adjustment procedures. It is important to adhere to the adjustment schedule included in this section. Failure to do so will seriously affect normal chain life.

The electric motor will provide many hours of trouble free service. It is provided with sealed ball bearings which are pre-lubricated for their lifetime.

Periodically, the motor brushes should be inspected and cleaned. The carbon dust and dirt should be blown out of motor. When brushes are worn they should be replaced. Approximately 3000 hours operating life may be expected from a new set of brushes. To determine when to replace worn brushes, proceed as follows:

1. For motors equipped with brushes having end pigtails and side hooks, replace brush when hook is within 1/16 inch from bottom of hook slot.
2. For motors equipped with brushes having side pigtails only, replace brush when pigtail is within 1/16 inch from bottom of pigtail slot.

Inspect commutator for roughness or undue wear as arcing and shortened brush life will result from this condition.

Check wiring terminals for cleanliness and tightness. A loose connection will cause burning of the respective terminal and can induce motor failure. DO NOT PERFORM THIS MAINTENANCE WHILE BATTERIES ARE BEING CHARGED.

Refer to Maintenance Guide (Section 4) and Service and Adjustment (Section 11) for further recommendations on motor care.

The mechanical brake assembly located on the differential pinion shaft will require a periodic inspection for lining wear and consequently periodic adjustment. Refer to Service and Adjustment Section 11 of this manual for proper procedures.

A few drops of oil on the clevis pin and pivot pins of the mechanical linkage is recommended on a monthly basis. Great care must be taken that no oil is allowed to contact the brake band or drum as it will seriously impair the braking ability. If the braking surfaces become oily or contaminated for any reason it will be necessary to remove the brake band and clean all parts thoroughly. Refer to the appropriate section of this manual for the correct procedure to follow.

A periodic tightening of all bolts and nuts, especially those which fasten the drive to the chassis, should be made, BUT NOT WHILE BATTERIES ARE BEING CHARGED.

SECTION 11
Page 2

SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

CAUTION: BEFORE PERFORMING SERVICE AND ADJUSTMENTS, DISCONNECT BATTERY LEADS FROM MAIN POSITIVE AND MAIN NEGATIVE TERMINALS.

ADJUSTMENT OF BRAKE BAND TO COMPENSATE FOR NORMAL LINING WEAR

IMPORTANT NOTE: Observe position of Speed Control J-Hook and brake lever arm when treadle is depressed to "Full-On" position. The J-Hook must be centered on the high speed power bar with plus or minus 1/8 inch, and simutaneously the brake lever arm must contact the gear case cover, preventing further, forward travel of the J-Hook. If this condition does not exist, then it will be necessary to adjust the brake rod as described in the next subsection.

If J-Hook and brake lever arm are positioned as described, it will not be necessary to change brake rod adjustment.

1. Tighten nut or brake band anchor bolt sufficiently so that full vehicle braking force is applied when the rear edge of the J-Hook is 1/4 to 1/2 inch forward of the rear edge of the neutral bar.

2. Check brake release. Operate the treadle through its full stroke several times, then position the treadle so that the J-Hook is just starting to make contact with the first speed power bar. In this position the brake band should not contact the brake drum. Should drag occur, loosen the brake band anchor bolt nut sufficiently until drag is just eliminated as the J-Hook starts to contact the first speed power bar.

3. Adjust brake band centering screw to bring band as close to drum as possible without causing brake drag. If band is too far from drum, brake will grab in the forward direction.

CAUTION: NEVER BEND the brake band anchor bolt. Any bending of the bolt may result in unexpected failure of the bolt and complete loss of Drive Line braking action.

ADJUSTMENT OF BRAKE ROD AND J-HOOK TRAVEL (REFER TO FIGURES 5 AND 7)

1. Loosen nut or threaded rod which joins clevises attached to brake lever arm and to brake arm of mechanical control linkage.
2. Remove clevis pin from brake lever arm.
3. Remove mechanical control linkage return spring.
4. Position and hold J-Hook in alignment with high speed power bar, and position and hold brake lever arm against gear case cover.
5. With J-Hook and brake lever arm in position described in Step 4, adjust threaded brake rod in clevises so that clevis holes line up with proper hole in brake lever arm, and install clevis pin and cotter pin.
6. Tighten nut on threaded rod against clevis.
7. Reassemble mechanical linkage return spring.
8. Adjust brake band as outlined in preceding subsection.
9. With power disconnected, or with forward-reverse switch in "OFF" position, operate the treadle through its full stroke several times, and observe the action of the J-Hook and brake band. Readjust, if necessary, the brake rod and/or brake band to accommodate to the slack in mechanical control linkage, until speed control and braking action are as described in the preceding subsection.

SECTION 11
Page 3

SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

REMOVE AND REPLACE BRAKE ASSEMBLY AND DRUM

1. Disconnect main negative and positive battery leads to prevent accidental engagement of power while servicing vehicle.
2. Remove mechanical linkage return spring.
3. Remove cotter pin and clevis pin which secure brake rod to brake lever arm.
4. Remove four bolts holding brake mounting assembly, and remove brake band centering screw bracket. Slide brake assembly off drum.
5. Band and drum may now be cleaned, inspected, and if necessary parts may be replaced as needed.
6. Brake band lining is bonded to the band for long dependable service. When it wears to approximately 1/16 inch thickness the band should be replaced.
7. If the brake drum is glazed or scored, it should be removed and turned. It is recommended that a brake drum that has been severely scored, damaged or less than 5.850 diameter, should be replaced with a new drum. To remove drum, remove pinion shaft nut and washer. Slide drum from pinion shaft.
8. Inspect seal in gear case cover. If worn or damaged. replace with new one. It is recommended that new seal be pre-soaked in light oil for several hours before installation. Use small amount of oil resistant sealer on seal opening in cover when pressing seal into place.
9. Re-assemble drum and spacer (see Section 11, Page 7, item 4) on pinion shaft.
10. Replace brake assembly in the reverse order from which it was removed.
11. Replace mechanical linkage return spring.
12. Adjust brake band as outlined on previous page.

ADJUSTMENT OF DRIVE CHAIN TENSION

1. Disconnect main negative and positive battery leads to prevent accidental engagement of power while servicing vehicle.
2. Tighten three motor mount nuts.
3. Loosen and unscrew each nut exactly one full turn.
   NOTE: This procedure is very important: If the nuts are too loose or too tight, an error will result in the final adjustment which will seriously reduce life of the chain.
4. Loosen adjusting set screw locknut. Using standard socket set screw wrench turn set screw clockwise until tight. (If torque wrench is available tighten to 80 inch pound torque). Without a torque wrench bear in mind that a standard socket set screw wrench is approximately 4 inches long. 7An average person will only be able to develop the required torque necessary if he tightens it as far as possible with his hands and does not use any extended handle on the wrench.
5. After developing the required torque, unscrew the adjusting screw exactly 2-1/2 turns. It is also very important to be exact on this adjustment.
6. Tighten locknut. DO NOT allow adjusting screw to move while tightening locknut.
7. Be certain that motor has moved all the way back and adjusting screw is in contact with back plate. If necessary tap motor lightly to assure this condition.
8. Tighten three motor mount nuts securely.

Perform this adjustment procedure regularly as listed below to assure long and trouble free life from your "Power Traction" drive.

SCHEDULED ADJUSTMENT	AFTER	COMMENTS
1st Adjustment	1 month	New unit or after installing new chain
2nd Adjustment	3 months	Normal running conditions
3rd Adjustment	6 months	Normal running conditions
Thereafter	Every 6 months	Normal running conditions

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SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

REMOVE MOTOR

1. Disconnect main negative and positive battery leads to prevent accidental engagement of power while servicing unit.
2. Drain oil from gear case by removing drain plug.
3. Identify motor leads for proper connection when reassembling. Remove motor leads.
4. Remove mechanical linkage return spring.
5. Remove brake rod clevis from brake lever arm.
6. Operate brake lever arm to lock pinion shaft while loosening pinion shaft nut.
7. Remove brake band centering bracket, brake assembly brackets, and brake band from gear case cover.
8. Remove pinion shaft nut and washer, and slide brake drum from pinion shaft.
9. Remove remaining bolts and nuts from front of gear case cover. Remove gear case cover.
10. Remove the three nuts and washers which fasten motor to backplate. Disengage chain from motor sprocket. Remove motor, motor mounting plate, and sprocket assembly. Remove "O" ring.
11. For information on maintenance of motor, refer to subsection titled "Motor Maintenance" and "Motor Disassembly and Reassembly".
12. If a new motor is to be installed in place of the old motor, remove motor mounting plate from old motor. Also remove shaft nut, washer, sprocket, key and spacers. Note location of motor terminals relative to mounting plate to assure proper positioning of mounting plate when assembling it to motor.

INSTALL MOTOR

1. If installing new motor, clean motor surface and install motor mounting plate to motor with four flat-head cap screws. Tighten screws to 30 foot pound torque, and stake head in place with center punch.
2. If installing new motor, or if motor sprocket has been removed in order to repair motor, assemble spacers, key, sprocket, washer, and shaft nut to motor shaft., Tighten shaft nut to 75 foot pound torque.
3. Place "O" ring in motor mounting plate opening, and attach motor and mounting plate assembly to back plate with three nuts and washers. Engage chain with sprocket and tighten nuts.
   NOTE: Chain Tension Adjustment is covered in a later step.
4. If seal in gear case cover is worn or damaged, install a new seal. It is recommended that the new seal be pre-soaked in light oil for several hours before installation. When pressing new seal into cover, use a small amount of oil resistant sealer on seal opening in cover.
5. Install gear case cover to backplate and pinion shaft. Assemble, but do not tighten, retaining bolts and nuts.
6. Place centering tool 41-532-50, (for centering pinion shaft seal to brake drum hub) on pinion shaft and into seal retainer.
   NOTE: If centering tool is not available, slide brake drum unto pinion shaft and into seal. Install pinion shaft washer and nut and tighten to 100 ffoot pound torque. Position gear case cover so that seal pressure is uniform around hub of brake drum. Tighten gear case cover retaining bolts and nuts. Omit steps 7 through 10.
7. Install pinion shaft washer and nut, and tighten to 100 foot pound torque.
8. Tighten gear case cover tetaining bolts and nuts.
9. Remove pinion shaft nut and washer, and remove centering tool.
10. Install brake drum, washer, and pinion shaft nut. Tighten nut to 100 foot pound torque.
11. Install brake band, brake assembly brackets, and brake band centering bracket to gear case cover and tighten retaining bolts.
12. Adjust drive chain tension as described in preceding subsection.
13. Reconnect brake rod and brake lever arm with clevis pin and cotter pin.

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Page 5

SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

14. Install mechanical linkage return spring.
15. Adjust brake band as described previously in this section.
16. Fill gear case with oil. Refer to Lubrication Diagram.
17. Connect motor leads as follows: IMPORTANT!!
    A. Check that each motor terminal stud nut is tightened securely but not over-tightened as this could bend or twist the terminal post and cause an electrical short within the motor.
    B. Install motor leads on correct motor terminals post.
    C. Install a second nut on each terminal post and finger tighten.
    D. To avoid bending, twisting or breaking-off a terminal post, use a thin pattern 9/16 inch wrench to hold the bottom nut from moving while tightening the top nut. Carefully tighten the top nut so as to make a good connection between the terminal post and motor lead.
18. Connect battery leads.

MOTOR MAINTENANCE - GENERAL

Maintenance of electric motors should be referred to personnel with appropriate experience and equipment. Procedures covering maintenance of brushes, bearings, and commutator are covered in the following sections. Should it be necessary to order replacement parts, include complete motor name plate data with order.

MOTOR MAINTENANCE - BRUSH INSPECTION AND REPLACEMENT

1. Remove cover, exposing brush assemblies. Lift brush from holder for inspection.
2. If brushes are worn to less that 1/2 inch length, remove, and install new brushes. Use fine sand paper to "seat in" new brushes to commutator.
3. Check operation of each brush to assure that brush slides freely and does not bind in holder.
4. Replace cover.

MOTOR DISASSEMBLY AND REASSEMBLY

1. Remove motor from vehicle as described in appropriate subsection.
2. Determine if witness marks on end bell and stator housing are present. If not, mark end bell and housing to assure proper relation of brushes and commutator when reassembling.
3. Remove cover, exposing brush assemblies. Lift brushes from brush holders.
4. Remove bolts holding end bells and remove end bell and rotor. (Pull from shaft extension end). Take care not to damage any coils or armature wires when handling motor parts.
5. Press or pull old bearings off by using bearing press or bearing puller. Do not damage shaft while removing bearings.
6. Install new bearings onto shaft by gentle pressure or tapping with proper tool on inner race only. Bearing will be damaged if pressed or driven by outer race or seals.
7. On "Power Traction" model, replace motor seal in shaft extension end bell housing.
8. If the commutator is worn or "burned" it should be turned, the mica undercut, and the commutator polished.
9. Oil bearing housing lightly to aid in re-assembly.
10. Re-assemble motor taking care that all parts are kept clean.
11. Install brushes and seat in with fine sand paper.
12. Check operation of each brush to assure that brush slides freely in holder.
13. Replace cover.

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SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

DISASSEMBLE AND REASSEMBLE PRIMARY DRIVE

1. Perform step 1 through 1Ø in subsection titled "Remove Motor".
2. Remove chain, pinion sprocket, and spacers from pinion shaft. Note spacer locations for proper reassembly.
3. If axle or differential maintenance requiring further disassembly is required, remove back plate and gasket by removing the five bolts which retain backplate to differential carrier. Refer to subsection which covers axle and differential disassembly and reassembly.
4. To reassemble, install back plate and gasket to differential carrier with five bolts. Use gasket sealer. Tighten bolts to 5Ø foot pound torque.
5. Perform steps 3 through 18 in subsection entitled "Install Motor".

REMOVE AND INSTALL REAR WHEEL BEARINGS

1. Disconnect main negative and main positive bvattery leads to prevent accidental engagement of power while servicing vehicle.
2. Remove wheel and tire assembly.
3. Remove four bolts which attach axle retainer plate and spacer. Pull axle from housing.
4. Remove bearing gasket. Pull bearing retainer ring and bearing from axle shaft. Leaver axle retainer plate and spacer on axle shaft.
5. Press new bearing to shoulder on axle shaft. Press bearing retainer ring into position on axle shaft.
6. Install new gasket over bearing retainer ring.
7. Install axle into axle housing and differential assembly.
8. Install axle retainer plate and spacer to axle housing with four bolts.
9. Install wheel and tire assembly.
10. Reconnect battery lead.

REMOVE AND INSTALL REAR AXLE AND DRIVE ASSEMBLY

1. Disconnect main positive and main negative battery leads to prevent accidental engagement of power while servicing vehicle.
2. Clearly mark motor leads to ensure proper location when re-assembling.
3. Remove motor leads.
4. Remove mechanical control linkage return spring.
5. Remove clevis pin which connects brake rod to brake lever arm.
6. Remove four bolts and nuts which attach axle housing to chassis.
7. Remove axle and drive assembly from chassis.
8. Install axle and drive assembly in reverse order of removal. Adjust brakes as outlined in appropriate subsection before connecting battery leads.

DISASSEMBLY OF REAR AXLE AND DIFFERENTIAL ASSEMBLY

1. Remove rear axle and drive assembly from chassis and remove primary drive and brake components, as described in appropriate subsections.
2. Remove bolts on each end holding axle retainer and pull both axles.
3. Remove nuts around differential carrier housing and remove carrier from axle housing.
4. Mark one differential bearing cap and bearing support to ensure proper assembly. Remove adjusting nut locks, bearing caps and adjusting nuts. Lift differential out of carrier.
5. Remove drive gear from differential case.
6. Drive out differential pinion shaft retainer and separate the differential pinion shaft and remove gears and thrust washer.
7. Remove drive pinion retainer from carrier. Remove "O" ring from retainer.
8. Remove pinion locating shim. Measure shim thickness with micrometer.
9. If the drive pinion pilot bearing is to be replaced, drive the pilot end and bearing retainer out at the same time. When installing, drive the bearing in until it bottoms. Install a new retainer with the concave side up.

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SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

DISASSEMBLY OF REAR AXLE AND DIFFERENTIAL ASSEMBLY continued

10. Press the pinion shaft out of front bearing cone and remove spacer.
11. Remove pinion bearing cone.
12. Do not remove pinion bearing cups from retainer unless they are worn or damaged. The flange and pilot are machined by locating on these cups after they are installed in the bores. If new cups are to be installed, make sure they are seated in the retainer by trying to insert a .0015 inch feeler gauge between cup and bottom of bore.

REASSEMBLY OF REAR AXLE AND DIFFERENTIAL ASSEMBLY

1. Differentail Case: Place a side gear and thrust washer in the differential case bore. LUBRICATE ALL PARTS LIBERALLY WITH AXLE BUBRICANT DURING ASSEMBLY. With a soft faced hammer, drive pinion shaft into case only far enought to retain a pinion thrust washer and pinion gear. Place the second pinion and thrust washer in position. Drive the pinion shaft into place. Be careful to line up pinion shaft retainer holes. Place second side gear and thrust washer in position and install differential case cover. Install retainer. A pinion or axle shaft spline can be inserted in side gear spline to check for free rotation of differential gears. Insert two 7/16 inch X 2 inch bolts through differentail flange and thread them three or four turns into the drive gear as a guide in aligning the drive gear bolt holes. Press or tap the drive gear into position. Install and tighten the drive gear bolts evenly and alternately across the gear to 60-65 pound foot torque.
2. If the differential bearings have been removed, use a suitable press to install them.
3. Install pinion gear bearing cone on the pinion shaft. Install spacer with shims on the shaft. Place the bearing retainer on the pinion shaft, and install the front bearing cone. Lubricate both bearings with differential oil.
4. Place spacers, sprocket, and brake drum on pinion shaft spline. Apply Permatex to base of washer nut, Tighten washer nut to 100 foot pound torque. Stake nut in two places. **NOTE: The bearing should spin freely without end play. If it is too tight or too loose, adjust by using shims.**
5. Shim Selection: Manufacturing tolerances in the pinion bore dimensions and in the best operating postion of the gears make an adjustment shim necessary. This shim is placed between the pinion retainer and the carrier, Figure 5. An increase in the thickness of the shim moves the pinion away from the drive gear. Manufacturing objectives are to make axles requiring a .0015 inch shim and if a new assembly is being built, a .0015 inch shim should be used for a tentative build-up. Shims are available in .010 inch to .021 inch thicknesses in steps of .001 inches. Pinions and drive gears are marked, when matched, with the same number. Following the number on the pinion is a minus (-) or (+) followed by a number. If the pinion is marked "-1" it indicates that a shim .001 inches thinner than a standard shim for this carrier is required, a minus number means the pinion should be be moved closed to the drive gear and a thinner shim is required. A plus number means the pinion should be moved farther from the drive gear and a thicker shim is required. A pinion marked zero (0) is a standard pinion. To select a shim, measure the original shim with a micrometer. Note the dimensional mark on the original pinion. Compare the mark on the original pinion with the mark on the new pinion to determine how the original shim should be modified. For example, if the original shim is .015 inches and the original pinion is marked " -1", the new pinion requires a +1 shim. Therefore, the new pinion requires a .002 inch thicker shim, and a .017 inch shim should be used. If the new pinion is marked the same as the old pinion, no shim change is required.

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SERVICE AND ADJUSTMENTS
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

REASSEMBLE OF REAR AXLE AND DIFFERENTIAL ASSEMBLY continued

6. After the proper selection of shims, insert "Ø" ring seal and pinion retainer assembly into differential carrier. Tighten 5 retainer bolts to 5Ø pound foot torque.
7. Install differential case, bearing cups, adjusting nuts, and bearing caps being sure that each cap is located in the same position from which it was removed. (Use marks as guide.)
8. ADJUST bearing nuts so that differential case will be free to revolve. It is very important that there will be no bearing play or looseness, as this will in time lead to gear noise and wear. Gear backlash must be set at the same times to a tolerance of .ØØ5 inches to .ØØ9 inches.
9. Install nut locks.
10. Install differential carrier assembly in axle housing using new gasket and gasket sealer.
11. Install axles, bearing retainers, and gaskets.
    NOTE: Axles are equipped with special sealed bearings. Should there be evidence of seal leakage, it is recommended that the bearing be replaced. It is also recommended that gasket located between bearing and bearing seat in axle housing be replaced at the same time. Refer to Figure 5.
12. Remove pinion shaft nut, washer, spacers, brake drum, and sprocket. Remove five bolts from pinion bearing retainer. Install primary drive components as described is subsection entitled "Disassemble and Reassemble Primary Drive."
13. Fill housing with oil. Refer to Section 5, Figure 1.

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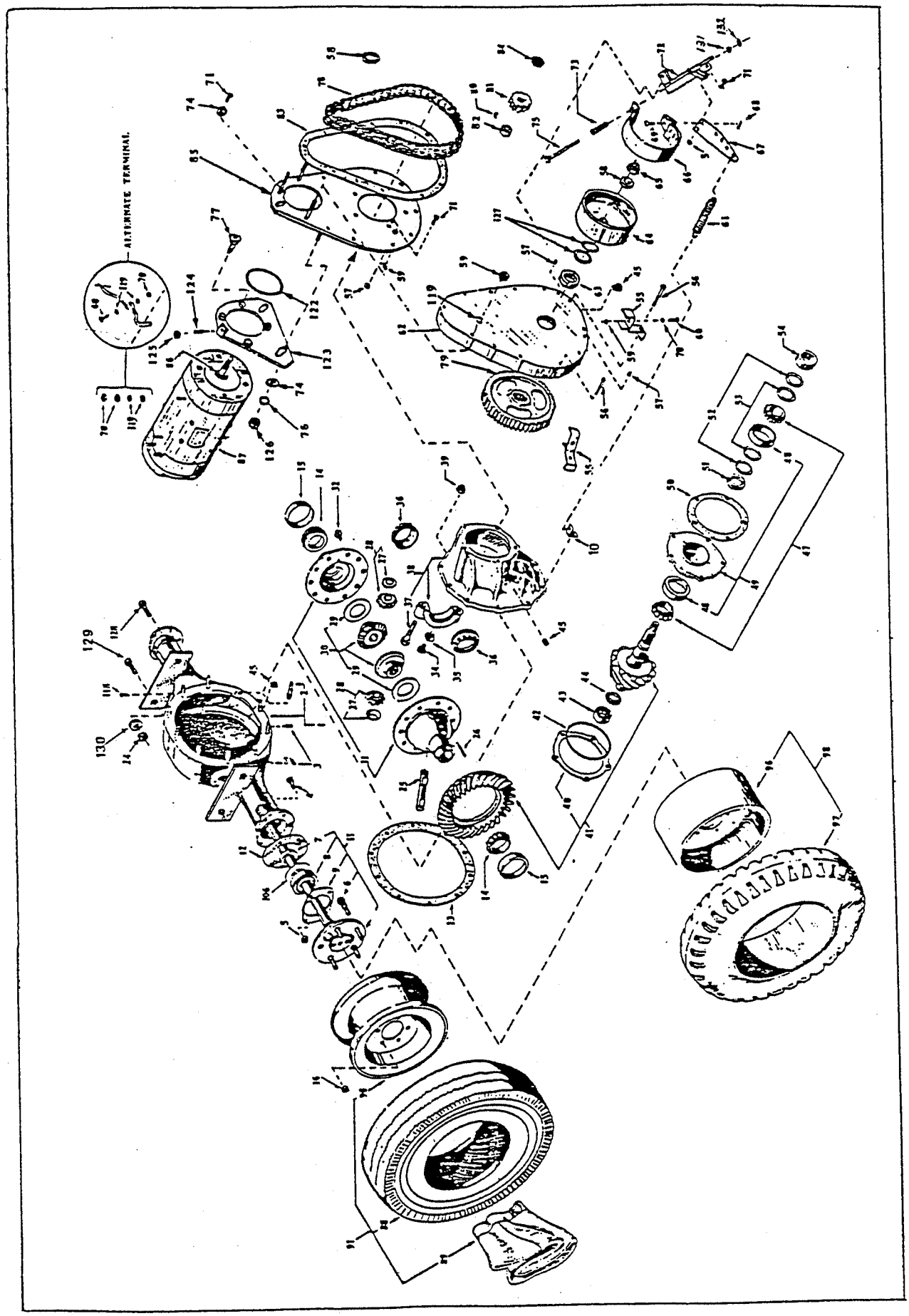
REAR AXLE, MOTOR AND BRAKES
Figure 5



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POWER TRACTION DRIVE AXLE
FIGURE 5

FIG.I.D.	T-D PART NO	DESCRIPTION	QTY.
1	41-290-00	HOUSING REAR AXLE WITH BOLTS	1
2	96-330-00	BOLT-DIFFERENTIAL CARRIER TO HOUSING	10
3	41-997-00	DRAIN AND LEVEL PLUG (1/8 INCH PIPE)	2
4	88-100-11	HEX HEAD CAP SCREW 3/8 ICNH X 1 INCH N.C.	8
5	88-109-81	LOCK NUT 3/8 INCH N.C. (HEX)	10
6	96-331-00	BOLT - 1/2 INCH N.F. (SPECIAL) REAL HUB	10
7	32-509-00	RETAINER RING REAR AXLE BEARING	2
8	80-505-00	REAR AXLE BALL BEARING	2
9	32-511-00	RETAINER PLATE REAR AXLE	2
10	91-509-00	SPRING CLIP, REAR AXLE	2
11	41-163-10	AXLE ASSEMBLY WITH AXLE RETAINER RING, RETAINER PLATE, BEARING GASKET AND OIL SEAL	1
11	41-162-10	AXLE ASSEMBLY WITH AXLE, RETAINER RING, RETAINER PLATE, BEARING, GASKET AND OIL SEAL	1
13	45-042-00	GASKET (HOUSING TO DIFFERENTIAL CARRIER)	1
14	80-511-00	TAPERED ROLLER BEARING - CARRIER (SMALL 1.628 I.D.)	2
15	80-127-00	TAPERED BEARING RACE - CARRIER (SMALL)	2
16	97-236-00	NUT 1/2" N.F. (LUG)	10
24	88-149-81	LOCK NUT 1/2 INCH N.C. (HEX)	3 OR 4
24	41-700-00	DIFFERENTIAL PINION SHAFT	1
26	41-701-00	PIN	1
27	41-702-00	THRUST WASHER - DIFFERENTIAL PINION SHAFT	2
28	41-703-00	DIFFERENTIAL SHAFT PINION KIT (TWO DIFFERENTIAL GEARS AMD TWO THRUST WASHERS)	1
29	41-704-00	THRUST WASHER - DIFFERENTIAL SIDE GEAR	2
30	41-705-00	DIFFERENTIAL SIDE GEAR KIT (TWO DIFFERENTIAL SIDE GEARS AND TWO THRUST WASHERS	1
31	41-712-00	DIFFERENTIAL SIDE GEAR CASE ASSEMBLY (SMALL CARRIER BEARINGS 1.628 INCH I.D.	1 1
32	88-130-10	HEX HEAD CAP SCREW 7/16 INCH X 7/8 INCH N.F.	10
34	88-080-04	HEX HEAD CAP SCREW 5/16 INCH X 3/8 INCH N.C.	2
35	41-706-00	DIFFERENTIAL BEARING ADJUSTMENT LOCK NUT	2
36	41-707-00	NUT-DIFFERENTIAL BEARING ADJUSTMENT 3-1/8 INCHES - 16 THREAD (FOR SMALL CARRIER BEARING 1.628 INCH I.D.)	2
38	41-709-00	DIFFERENTIAL CARRIER ASSEMBLY (FOR SMALL CARRIER BEARINGS 1.628 INCH I.D.)	1
39	88-119-80	NUT - 3/8 INCH N.F. (HEX)	14
40	41-711-00	SHIM - DRIVE PINION BEARING	1 TO 3
41	31-235-00	RING AND PINION GEAR SET 2.75 RATIO	1
41	31-237-00	RING AND PINION GEAR SET 3.25 RATIO	1
41	31-239-00	RING AND PINION GEAR SET 5.43 RATIO	1
42	80-702-00	"O" RING - DRIVE PINION BEARING RETAINER	1
43	80-555-00	BALL BEARING - REAR, PINION PILOT	1
44	41-714-00	DRIVING PINING PILOT BEARING RETAINER	1
45	41-996-00	PLUG - (LEVEL) 1/2" WITH RECESSED TOP	1 OR 3
47	80-554-00	TAPERED ROLLER BEARING - PINION SHAFT	2
48	80-125-00	TAPERED BEARING RACE - PINION SHAFT	2
49	44-340-90	PINION BEARING CASE ASSEMBLY AND BEARING RACES	1
50	45-021-00	GASKET GEAR CASE TO PINION BEARING ASSEMBLY	1
51	16-415-00	SPACER PINION SHAFT (.440 INCH THICK)	1
52	16-410-00	SPACER PINION SHAFT (.020 INCH THICK)	2 TO 6
53	16-411-00	SPACER PINION SHAFT (.005 INCH THICK)	2 TO 6
54	16-414-00	SPACER PINION SHAFT (.440 INCH THICK)	1
54	16-417-00	SPACER PINION SHAFT (.340 INCH THICK)	1
55	41-371-00	BRAKE ALIGNMENT BRACKET	2

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POWER TRACTION DRIVE AXLE
FIGURE 5

FIG.I.D.	T-D PART NO	DESCRIPTION	QTY.
56	88-080-20	HEX HEAD CAP SCREW 5/16 INCH X 3 INCH N.C.	9
57	41-989-00	PLUG (FILLER LEVEL AND DRAIN) 1/4 INCH N.P.T.	2
58	94-400-01	PERMATEX (APPLY WITH TUBE)	1
59	88-089-81	LOCK NUT 5/16 INCH N.C. (HEX)	14
60	88-080-11	HEX HEAD CAP SCREW 5/16 INCH X 1 N.C.	2
61	85-270-00	EXTENSION SPRING, 1-1/4 O.D. X 4-3/8 LONG	1
62	43-201-11	GEAR CASE COVER W/OIL SEAL	1
63	45-331-00	OIL SEAL - GEAR CASE TO PINION	1
64	41-532-00	BRAKE DRUM (SPLINED)	1
65	97-250-00	NUT W/INT WASHER, PINION 3/4 INCH 20 EXTRA FINE THREAD	1
66	41-661-68	KIT, FULL BRAKE BAND FOR 6 INCH DRUM, DRIVE SHAFT BRAKE	1
67	50-656-00	BRAKE LEVER ARM	1
68	88-517-11	COTTER PIN 3/32 INCH X 1 INCH	1
69	96-771-00	CLEVIS PIN 3/8 X 3/4 INCH FACE TO HOLE	1
70	88-089-80	NUT - 5/16 INCH N.C. (HEX)	10
71	88-100-13	HEX HEAD CAP SCREW 3/8 INCH X 1-1/4 INCH N.C.	7
72	41-372-10	BRAKE MOUNTING BRACKET	1
73	85-060-10	COMPRESSION SPRING 3\4 O.D. X 2-1/2 INCH LONG	1
74	88-108-60	WASHER 3/8 INCH FLAT CUT	3
75	96-245-10	HEX HEAD CAP SCREW 1/2 INCH X 5 N.F.	1
76	88-108-62	LOCK WASHER 3/8	7
77	88-103-09	FLAT HEAD SOCKET CAP SCREW 3/8 INCH X 3/4 INCH N.C.	4
78	30-506-00	CHAIN - 36 LINKS (FOR 42 TOOTH SPROCKET)	1
78	30-507-20	CHAIN - 41 LINKS (FOR 59 TOOTH SPROCKET)	1
78	30-508-20	CHAIN - 48 LINKS (FOR 81 TOOTH SPROCKET)	
79	30-091-00	SPROCKET - 42 TOOTH WITH SPLINED HUB	1
79	30-092-00	SPROCKET - 59 TOOTH WITH SPLINED HUB	1
79	30-093-00	SPROCKET - 81 TOOTH WITH SPLINED HUB	1
80	97-100-00	WOODRUFF KEY - 3/16 INCH	1
81	30-080-00	SPROCKET - 15 TOOTH X 3/4 INCH BORE	1
81	30-081-00	SPROCKET, 14 TOOTH X 3/4 INCH BORE	1
82	17-110-10	SHAFT COLLAR - 3/4 INCH WITH KEYWAY	1
83	45-002-00	GASKET - GEAR CASE COVER	1
84	88-239-82	JAM NUT - 3/4 N.F. (HEX)	1
85	44-352-53	GEAR CASE BACK PLATE (ANGLE MOTOR MOUNT) ADJUSTABLE	1
86	45-506-00	OIL SEAL (G.E. MOTOR) SEE SECTION 12	1
87	70-049-00	MOTOR, 4.5/6.0 H.P., 24/36 VOLT 1800/2800 R.P.M.	1
87	70-054-00	MOTOR, 6.7/10 H.P., 24/36 VOLT 1800/2800 R.P.M.	1
87	70-054-30	MOTOR, PRESTOLITE, 6.7/10 HP 24/36 VOLT 1800/2800 R.P.M.	1
	NOTE: REFER TO SECTION 10 FOR TIRE/WHEEL INFORMATION		
106	45-044-00	GASKET, REAR AXLE BEARING	2
118	88-527-11	COTTER PIN 1/8 X 1 (AXLE VENT)	1
119	88-088-61	WASHER 5/16 SAE	11
122	80-703-00	"O" RING MOTOR MOUNT SEAL	1
123	70-454-00	MOTOR MOUNT PLATE	1
124	88-067-11	SOCKET SET SCREW 1/4 N.C. X 1	1
125	88-069-80	NUT, 1/4 N.C. HEX	1

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POWER TRACTION DRIVE AXLE
FIGURE 5

FIG.I.D.	T-D PART NO	DESCRIPTION	QTY.
126	88-109-80	NUT, 3/8 N.C. HEX	3
127	16-400-00	SPACER, 1-1/4 I.D. X .125 THICK	Ø - 1 OR 2
128	88-140-14	HEX HEAD CAP SCREW 1/2 X 1-1/2 N.C.	2
129	88-140-20	HEX HEAD CAP SCREW 1/2 X 3 N.C.	2
130	88-148-62	1/2 LOCKWASHER	4
131	88-159-84	LOCKNUT, 1/2 -20 NF	1
132	88-159-82	JAM NUT, 1/2 -20 NF	1

SECTION 12
Page 1

MOTOR MAINTENANCE, SERVICE AND ADJUSTMENT
ELECTRIC MOTORS - FIGURE 5M

Detailed service procedures covering maintenance of bearing brushes and commutator are covered in this section. DO NOT PERFORM THIS PROCEDURE WHILE BATTERIES ARE BEING CHARGED.

Maintenance of electric motors should be referred to personnel with experience and equipment. Should it be necessary for you to order replacement parts for your motor, IT IS NECESSARY TO INCLUDE COMPLETE NAMEPLATE DATA WITH ORDER.

MOTOR MAINTENANCE - BRUSH INSPECTION AND REPLACEMENT

1. Remove cover, exposing brush assemblies. Lift brush from holder for inspection.
2. If brushes are worn, remove, install new brushes. Use fine sandpaper to "seat in" new brushes to commutator. To determine when to replace worn brushes, proceed as follows:
   a. For motors equipped with brushes having end pigtails and side hooks, replace brush when hook is within 1/16" from bottom of hook slot.
   b. For motors equipped with brushes having side pigtails only, replace brush when pigtail is within 1/16" from bottom of pigtail slot.

   NOTE: When one brush is replaced in a motor, it is considered good maintenance practive to replace all brushes.
3. Check operation of each brush to assure that brush slides freely and does not bind in holder.
4. Replace cover.

MOTOR DISASSEMBLY AND REASSEMBLY

1. Remove motor from vehicle as described in Section 11.
2. Determine if witness marks on end bell and stator housing are present. If not, mark end bell and housing to assure proper relation of brushes and commutator when reassembling.
3. Remove cover, exposing brush assemblies. Lift brushes from brush holder.
4. Remove bolts holding end bells and remove end bell and rotor. (Pull from shaft extension end). Take care not to damage any coils or armature wires when handling motor parts.
5. Press or pull old bearings off by using bearing press or bearing puller. Do not damage shaft while removing bearings.
6. Install new bearings onto shaft by gentle pressure or tapping with proper tool on inner race only. Bearing will be damaged if pressed or driven by outer race or seals.
7. If the commutator is worn or "burned" it should be turned, the mica undercut and the commutator polished.
8. Oil bearing housing lightly to aid in reassembly.
9. Reassemble motor taking care that all parts are kept clean.
10. Install brushes and "seat in" with fine sandpaper.1
11. Check operation of each brush to assure that brush slides freely in holder.
12. Replace cover.
13. Reassemble to vehicle as described in preceding subsection.

NOTE: If motor terminal studs were removed for inspection, refer to Section 11 for correct procedure to avoid damaging this.

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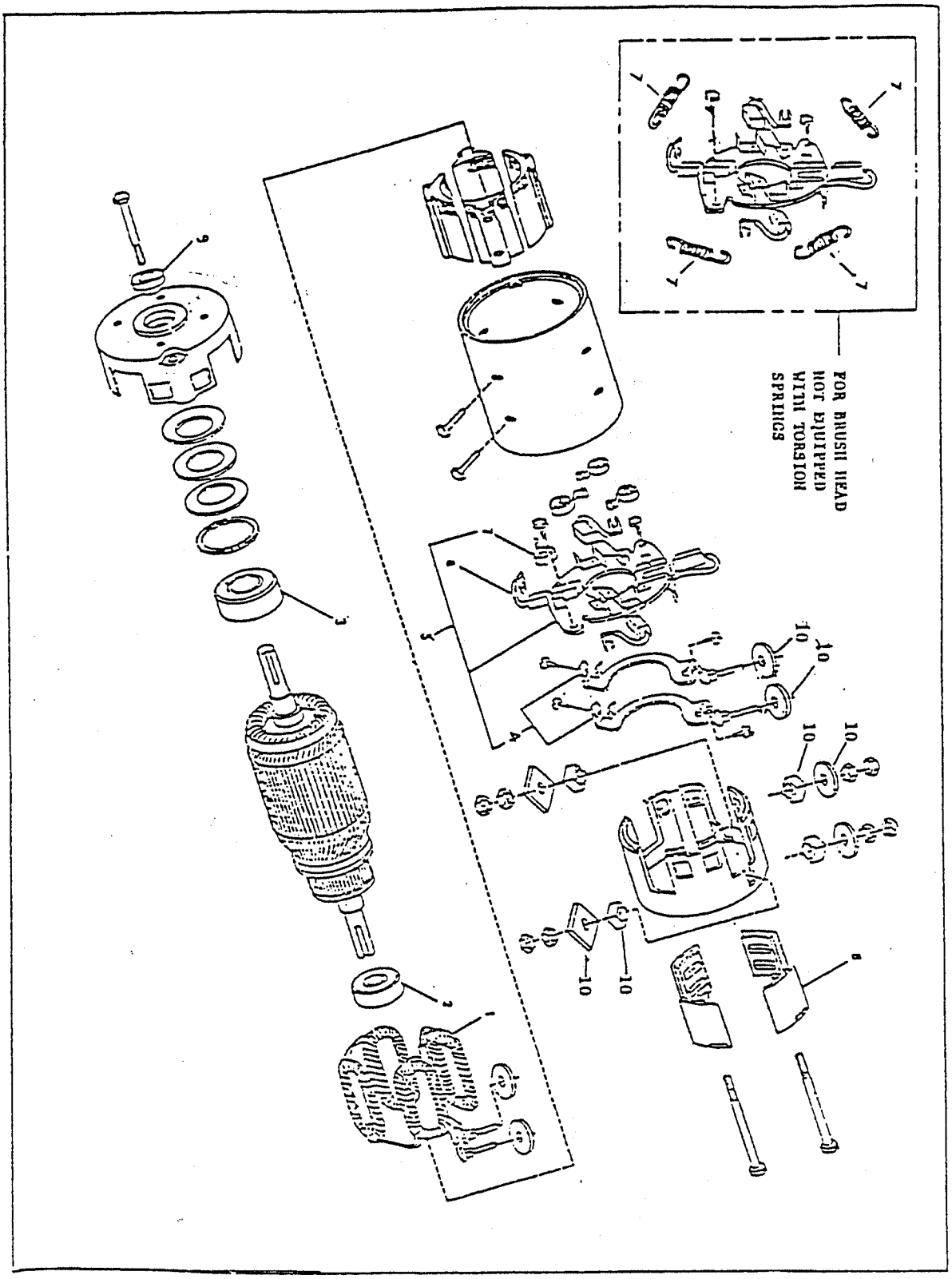
Page 2

G.E. MOTOR PARTS
FIGURE 5M



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Page 3

ELECTRIC MOTORS
REFER TO FIGURE 5M

For B.C. Motor replacement parts, IT IS NECESSARY TO INCLUDE COMPLETE MOTOR NAME PLATE DATA WITH THE ORDER.

FIG.	I.D.	T-D PART NO.	DESCRIPTION	QTY.
Replacement parts for G.E. motor 5BC48JB550 and 5BC48JB582				
1		70-201-00	FIELD COIL SET (NOT USED ON G.E. MOTOR 5BC48JB582)	1
1		70-202-00	FIELD COIL SET (FOR G.E. MOTOR 5BC48JB582)	1
2		80-200-00	BALL BEARING - COMMUTATOR END	1
3		80-504-00	BALL BEARING - PULLEY END	1
4		70-195-00	SET OF TWO ARMATURE TERMINAL & BRUSH PAIR CONNECTORS, NOT USED ON MOTOR 5BC48JB550 WITH SUFFIX LETTER "C" OR "D". TWO REQUIRED PER MOTOR (INCLUDED IN 70-188-00)	2
4		70-196-00	ARMATURE TERMINAL AND BRUSH PAIR CONNNECTOR, USED ONLY WITH MOTOR 5BC48JB550 WITH SUFFIX LETTER "C" OR "D". TWO REQUIRED PER MOTOR (INCLUDED 70-184-00).	2
5		70-184-00	BRUSH HOLDER, WITHOUT BRUSHES, INCLUDING BRUSH SPRINGS, ARMATURE TERMINAL & BRUSH PAIR CONNECTORS. USED ONLY ON MOTOR 5BC48JB550 WITH SUFFIX LETTER "C" OR "D".	1
5		70-188-00	BRUSH HOLDER, WITHOUT BRUSHES, INCLUDING BRUSH SPRINGS, ARMATURE TERMINAL & BRUSH PAIR CONNECTORS NOT USED ON MOTOR 5BC48JB550 WITH SUFFIX LETTER "C" OR "D".	1
6		70-101-00	MOTOR BRUSH	4
7		85-412-00	BRUSH SPRING, TORSION	4
8		30-801-00	BRUSH INSPECTION COVER	4
9		45-506-00	OIL SEAL	1
10		70-210-62	MOTOR TERMINALS INSULATOR KIT	1
Replacement Parts for G.E. Motor 5B6A8JB726				
1		70-204-00	FIELD COIL SET	1
2		80-209-00	BALL BEARING, COMMUTATOR END	1
3		80-504-00	BALL BEARING, PULLEY END	1
5		70-172-00	BRUSH HOLDER ASSEMBLY WITH BRUSH SPRINGS BUT WITHOUT BRUSHES	1
7		85-412-00	SPRING BRUSH	4
		70-104-00	ARMATURE TERMINAL & BRUSH PAIR CONNECTOR	2
9		45-506-00	OIL SEAL	1

Brush Measurement Procedure for 726 Motor
With new brushes, A 1/16" inch drill rod can be inserted approximately .76 inches into brush measurement holes. Brushes should be replaced when rod can be inserted 1.56 inch into hole. This leaves approximately 1/8 inch allowable wear remaining.

Replacement Parts for G.E. Motor 5BC49JB399				
1		70-203-00	FIELD COIL SET	1
2		80-200-00	BALL BEARING, COMMUTATOR END	1
3		80-504-00	BALL BEARING, PULLEY END	1
4		70-195-00	ARMATURE TERMINAL TO BRUSH	2
5		70-188-00	BRUSH HOLDER ASSEMBLY	1
6		70-101-00	MOTOR BRUSH	4
7		85-412-00	BRUSH EXTENSION SPRING	4
8		30-802-00	BRUSH INSPECTION COVER	4
9		45-506-00	OIL SEAL	1
10		70-210-62	MOTOR TERMINALS INSULATOR KIT	1

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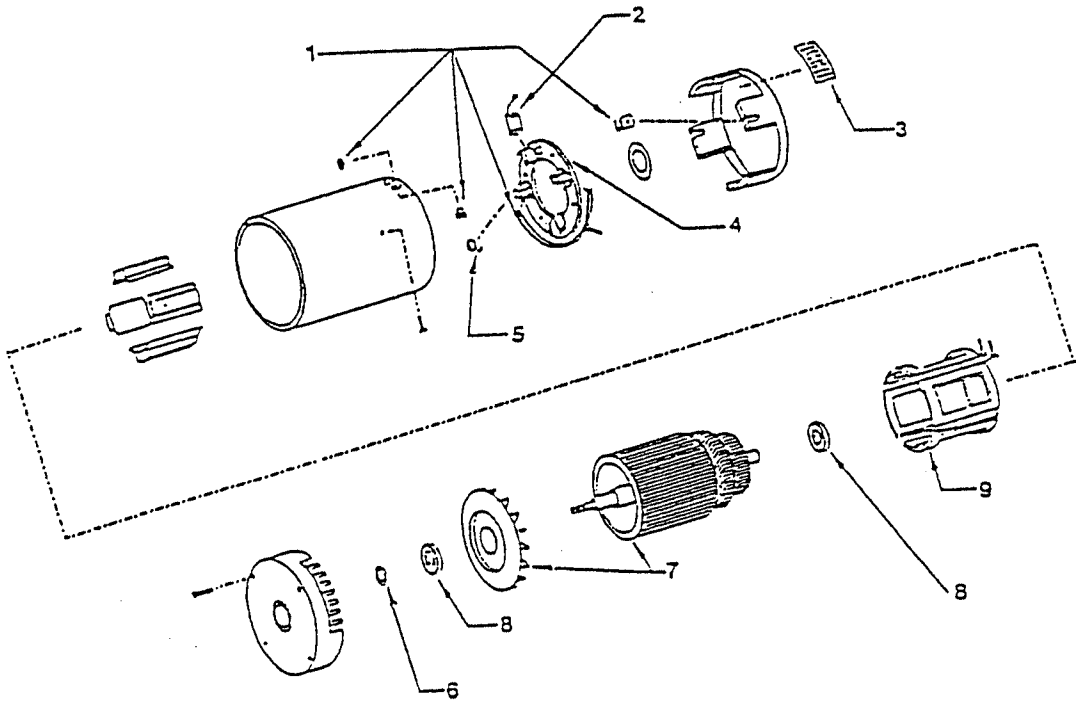

D.C. MOTOR
PRESTOLITE

ITEM NO.	T-D PART NO.	DESCRIPTION	QTY.
	70-054-30	D.C. MOTOR 6.7 HP AT 24 VOLT PRESTOLITE MVB 4001	
1	70-210-65	KIT TERM STUD	4
2	70-105-10	BRUSH 10 HP PRESTOLITE	4
3	30-802-20	COVER, BRUSH INSPECTION	4
4	70-188-10	ASSEMBLY, BRUSH HOLDER W/O BRUSHES OR SPRINGS	1
5	85-412-10	SPRING, BRUSH, PRESTOLITE	4
6	45-508-20	SEAL, PRESTOLITE	1
7	70-054-31	ARMATURE, W/FAN, PRESTOLITE	1
8	80-504-20	BEARING, BALL, COMMUTATOR AND PULLEY	2
9	70-203-20	FIELD COILS (SET)	1

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Page 1

MAINTENANCE PROCEDURES
FIGURE 7 **MECHANICAL CONTROL LINKAGE**

The mechanical control linkage operates the various controls and mechanisms located throughout your vehicle.

The speed control and braking systems are inter-connected, both being operated by movement of the treadle, which transmits motion to brake and speed control systems by means of a rigid strap, causing rotation of the speed control arm and brake arm. Connections of the moving parts are made with clevis pins.

The system is returned to a "brake on - speed control off" position by means of a spring which is anchored to the frame at one end, and to the speed control arm at its other end.

All wear points should be lubricated as outlined in Sections 4 and 5, Maintenance Guide and Lubrication Diagram. Proper attention in this area will assure trouble free operation and minimal maintenance expense.

For service and adjustments of the systems operated by the control linkage refer to this section and also to the following sections:
Section 11 - Adjustment of Brake Rod and J-Hook
Section 16 - Adjustment of Speed Control J-Hook Pressure

REPLACE TREADLE TO CONTROL ARM CONNECTING BAR

NOTE: The treadle to control arm connecting bar will not normally require replacement during the life of the vehicle. However, should it become excessively worn through lack of lubrication at wear points, or become accidentally damaged or destroyed, replacement could become necessary. The replacement part supplied by the factory will have a hole at one end only, and will require that the hole at the other end be drilled at time of installation to the vehicle. The position of the drilled hole must be carefully located in accordance with the following instructions.

1. Disconnect main positive and negative battery terminals to prevent accidental power engagement during servicing.
2. Install new connecting bar to treadle arm with clevis pin and cotter pin, leaving it free at the forward end.
3. Position and hold the speed control arm so that the speed control J-Hook is in full contact with the high speed power bar.
4. Position and hold the speed control arm so that the speed control J-Hook is in full contact with the high speed power bar.
5. With the speed control J-Hook and treadle positioned as indicated in steps 3 and 4, place the front end of the bar in proper relation to the speed control arm, and match drill a 3/8 diameter hole in the connecting bar to mate with the holes at the bottom of the speed control arm.
6. Install front end of connecting bar to speed control arm, using a clevis pin and cotter pin.
7. Lubricate clevis pins at both ends of connecting bar.

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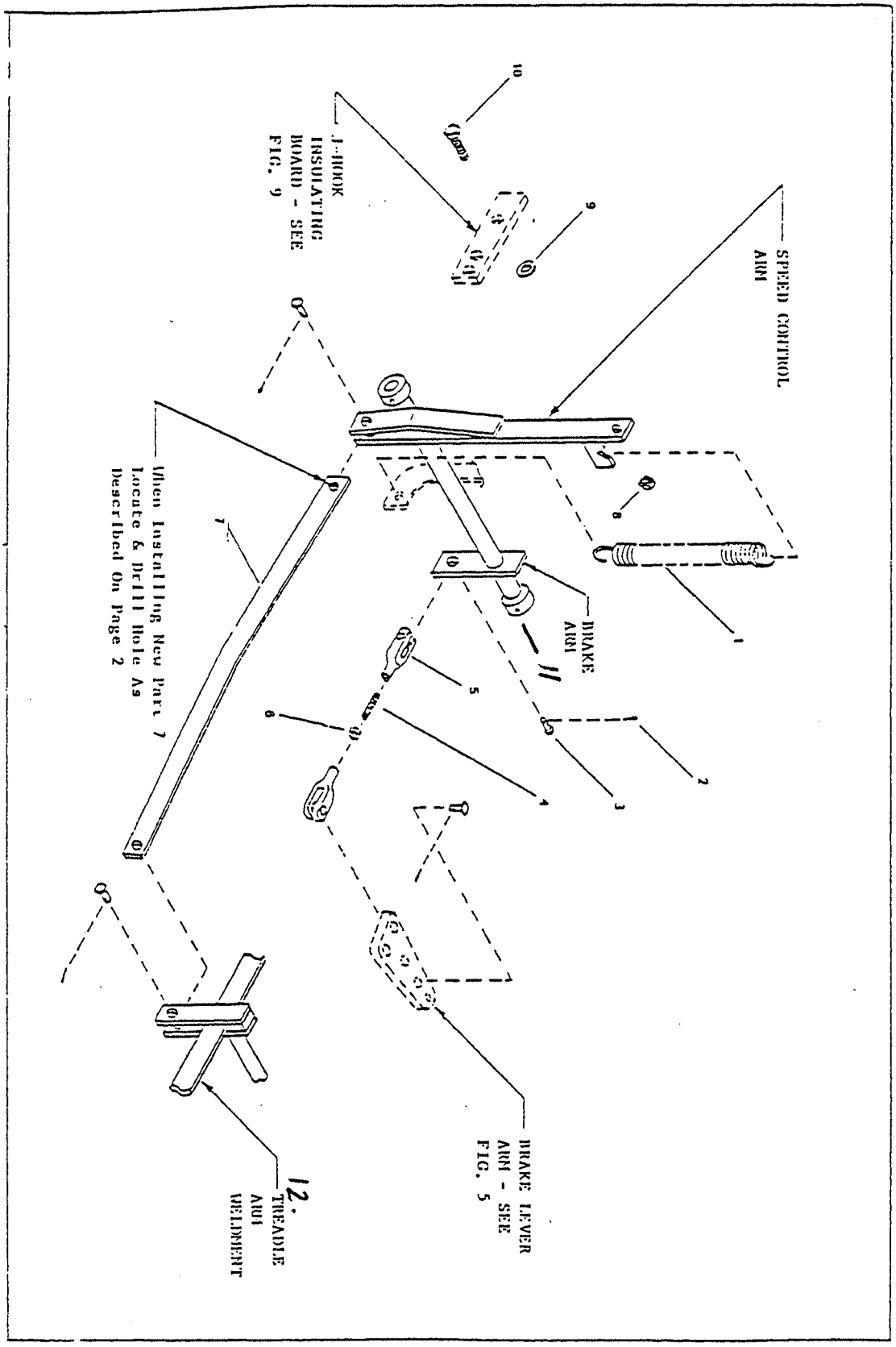
MECHANICAL CONTROL LINKAGE
FIGURE 7



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MECHANICAL CONTROL LINKAGE
FIGURE 7

FIG.I.D.	T-D PART	DESCRIPTION	QTY.
1	85-280-00	SPRING EXTENSION 1-3/8 O.D. X 7-3/4 LONG	1
2	88-517-11	COTTER PIN, STEEL, 3/32 X 1	4
3	96-772-00	PIN, CLEVIS 3/8 X 1	4
4	50-028-00	THREAD ROD, 3/8 N.F., 1-1/2 LONG	1
5	96-762-00	CLEVIS, CAST 3/8	2
6	88-119-80	3/8 NF HEX HEAD NUT	1
7	50-429-00	CONNECTING BAR, 30-1/2 LONG	1
8	88-109-81	3/8 NC LOCKNUT	1
9	88-108-61	3/8 SAE WASHER	1
10	88-100-13	3/8 X 1-1/4 NC HEX HEAD SCREW	1
11	00-150-04	Control Linkage	
12	98-254-61	Treadle Arm Weldment	

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Page 1

MAINTENANCE PROCEDURES - FORWARD/REVERSE SWITCH
FIGURE 8

The forward/reverse switch on your vehicle serves the same purpose as does the transmission in your automobile. It should be treated with the same respect, for abusive treatment will not only shorten its life, but will seriously effect the life of the motor, drive gears and differential.

DO NOT SHIFT POSITION OF SWITCH FROM FORWARD TO REVERSE OR VICE-VERSA WHILE VEHICLE IS IN MOTION.

It will require very little maintenance if properly used. Every month check contact fingers and rotor contacts for cleanliness and to insure that they are making snug and even contact. If they show evidence of abnormal pitting or burning they should be replaced.

Refer to Service and Adjustment in this section for replacement procedures.

It is recommended that an occasional small quantity of lubricant be placed on the cam and cam follower of the switch. Refer to figure 8.

An occasional application of powdered graphite or similar key lock lubricant will keep your key and lock in good working order.

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

REMOVAL, DISASSEMBLY AND REASSEMBLY OF SWITCH

1. Remove handle screw in center of handle and then remove handle and spacer.
2. Remove 2 screws in center of face plate, this will release switch unit from frame. Then lift switch clear of frame noting that the end plate will be free to lift off of switch.
3. Remove cover.
4. If you wish to remove contact fingers or finger-boards at this time, then it will be necessary to follow steps 5,6,8 and 9. If you will only be servicing the rotor assembly it will not be necxessary to remove wires.
5. Note position of wires and mark their respective locations to insure that they will be properly placed on reassembly.
6. Remove 4 wires from switch terminals and slide out of switch housing.
7. Pull cam follower away from cam on rotor and lift rotor assembly from switch housing.
8. If you wish to replace finger-boards at this time, tap them out of their slots in the direction of the handle end of switch taking care to catch thre wedges as they come free of the frame.
9. Install new finger board in the rfeverse manner outlined in step 8, noting that notch on end of board is located on handle end of switch. Tap wedges into place to lock finger boards to frame.
10. Inspect cam and spring. If necessary replace with new parts.
11. Remove nut on end of rotor shaft and disassemble spacers and rotor contacts. **NOTE: It is very important to to observe the position of each part as you remove it from rotor shaft to insure its proper reassembly. The rotor contacts look similar but are actually a pØair consisting of a left and a right contact.**
12. Reassemble rotor parts on rotor shaft in their proper order and lock into place by tightening 1/4 inch nut at end of shaft. Use care in tightening nut as undue strain could shear the locking ring on opposite end of shaft.
13. Install rotor assembly into frame moving cam follower enough to allow cam to set in position.
    NOTE: It will ease the rotor installation if you will place it in neutral position, i.e. the contacts will be free from finger contacts and the low side of cam will enghage cam follower.

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Page 2

MAINTENANCE PROCEDURES - FORWARD/REVERSE SWITCH
FIGURE 8

REMOVAL, DISASSEMBLY AND REASSEMBLY OF SWITCH continued

14. Install wires onto their respective terminals and tighten securely.
15. Replace cover.
16. Replace end plate and slide switch unit back into place against face plate.
17. Replace 2 screws. It may be necessazry to exert sufficient pressure and joggle switch unit into alignment with screw holes as cam spring tends to hold the switch out of position. A simple method to align the face plate and switch frame together, is to slip a medium size nail or ice pick into one hole through both pieces. Align second hole, insert screw, and tighten. Remove nail or ice pick from first hole and install screw and tighten.
18. Replace spacer and handle and tighten into position with center screw.

REPLACEMENT OF CONTACT FINGERS ONLY

1. Remove cover. **NOTE: On some vehicles it will be necessary to remove switch from mounting plate to gain access to cover.**
2. If you will be removing more than one finger at a time, it is recommended that you note the position of the wires and mark their respective locations.
3. Remove terminal nut and wire.
4. Remove nut holding finger to finger-board and remove finger.
5. Install new finger and replace nuts and wires in the reverse order to which they were removed.

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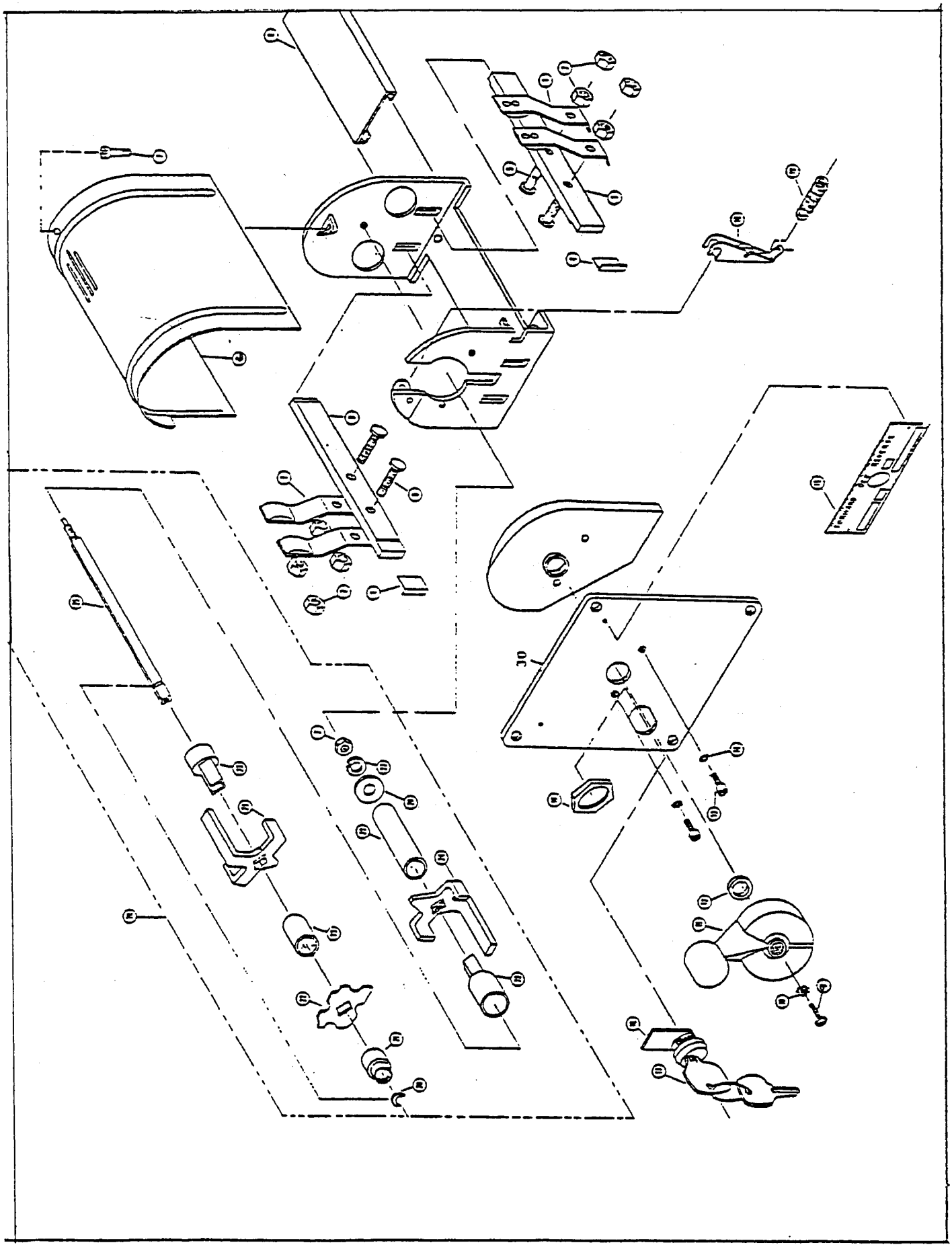
FOWARD/REVERSE SWITCH
FIGURE 8



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FORWARD REVERSE SWITCH - FIGURE 8

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY.
0	71-040-00	FORWARD AND REVERSE SWITCH COMPLETE (4 FINGERS)	1
1	71-040-60	SWITCH FINGER - SILVER PLATED WITH 1/4 INCH HOLE	4
2	88-079-80	NUT 1/4 INCH NF (HEX)	9
3	71-040-61	FINGER BOARD WITH 1/4 INCH HOLES	2
4	71-040-69	FINGER BOARD WEDGE	2
5	71-040-71	BOLT-FINGER MOUNTING (1/4 INCH NF X 7/8 INCH SPEC)	4
6	71-040-65	SWITCH COVER	1
7	71-040-73	COVER SCREW (10-32 X 1/2 INCH FILISTER HEAD)	1
8	71-040-70	RUBBER INSULATOR STRIP	1
9	88-025-06	SCREW 8-32 X 1/2 INCH TRUSS HEAD	1
10	88-028-64	WASHER 8-32 (EXTERNAL STAR LOCK)	1
11	71-040-62	SWITCH HANDLE - M,ETAL (RED COLOR)	1
12	71-040-59	SPACER WASHER	1
13	71-040-72	FACE STOP BOLT (10-32 X 3/8 SPEC.)	2
14	88-048-62	LOCK WASHER 10-32	2
15	94-305-00	FPRWARD/REVERSE SWITCHPLATE	1
16	71-040-55	LOCK ASSEMBLY WITH TWO KEYS	1
16	71-040-87	TUBULAR LOCK ASSEMBLY WITH TWO KEYS	1
17	71-040-74	KEY ONLY (GIVE NO OF LOCK OR VEHICLE SERIAL NO.	2
18	71-040-53	CAM	1
19	71-040-54	SPRING - CAM	1
20	71-040-75	SNAP RING - 1/4 INCH	1
21	71-040-68	BUSHING	1
22	71-040-67	CAM INDEX	1
23	71-040-66	PLASTIC SPACER SET (SOLD ONLY AS SET OF 4 PIECES)	1
24	71-040-58	ROTOR CONTACTS (SET OF 2, 1 RIGHT AND 1 LEFT)	1
25	71-040-64	ROTOR SHAFT (ONLY)	1
26	88-068-61	WASHER, SAE	1
27	88-068-62	LOCK WASHER 1/4 INCH	1
28	71-040-52	ROTOR ASSEMBLY	1
30	71-040-82	FACE PLATE	1
	71-040-76	KIT CONVERSION TO SIX FINGER SWITCH	1
SWITCH HANDLE PARTS			
9	71-040-80	EXTENSION ROD 8-32 X 6-1/2 INCHES LONG	1
9	71-040-78	EXTENSION TUBE 11/16 OD X 5-1/2 INCHES LONG	1
11	71-040-77	SWITCH POSITION INDICATOR	1
	71-040-79	BRACKET - EXTENSION SUPPORT	1
	88-029-80	NUT 8-32 (HEX)	1

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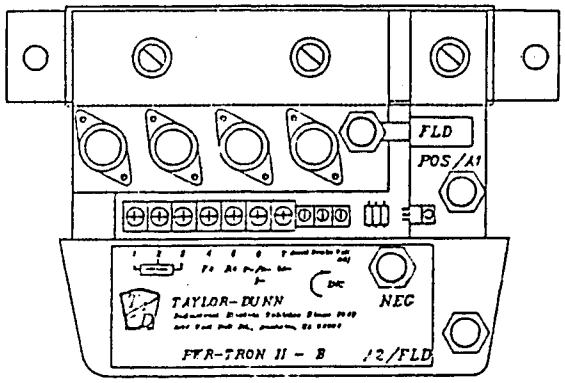
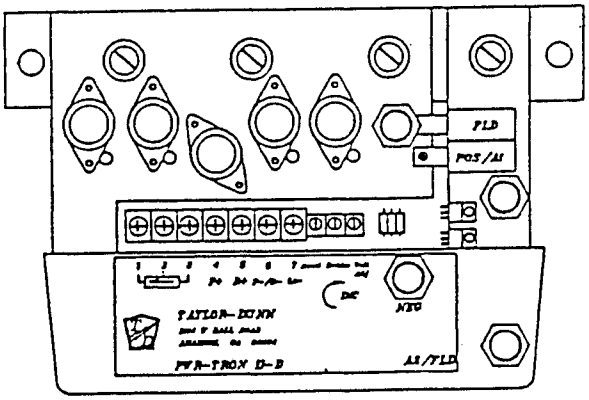
PWR-TRON II INTRODUCTION

The PWR-TRON II is developed and available only from Taylor-Dunn and is warranted for one full year. Modifications to the control unit, drive or power system will void the warranty.



PT 220 (STD FOR SC 1-59)

24 VOLTS
RECOMMENDED FOR
USE UP TO 6.7
HP MOTORS
(INTERMITTENT)



PT 290

24 OR 36 VOLTS
RECOMMENDED FOR USE
UP TO 10 HP MOTORS
(INTERMITTENT)

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PWR-TRON II ELECTRIC VEHICLE CONTROL

INTRODUCTION

PWR-TRON II transistorized control is a solid state voltage regulator designed specifically for use on electric vehicles. Its essential function is to regulate the power fed from battery to motor so as to provide full control of the vehicle speed under all operating conditions.

The PWR-TRON II unit is connected in between the motor and the battery. Power fed to the motor is regulated by switching the motor on and off at high speed. By adjusting the ON time with respect to the OFF time the average voltage applied to the motor can be varied. This switching is done using power transistors.

FEATURES

Current Limit - Cold current limit is 180 A, for type A, 220 A for type B and 290 A for type D.

Thermal Roll-Back - Continuous overloading will reduce the current limit progressively above 150 degrees F (65 degrees C).

Acceleration Limit - Built in acceleration ramp to prevent jack-rabbit starts (can be factory set for various applications, or may be adjustable).

Automatic Plug Braking - Built in plugging control to give smooth reversals and prevent operator injury or equipment damage with inadvertent direction changes (plugging level can be set for various applications or may be adjustable).

Bypass Enables and Time Delay - Built in circuitry give on-demand bypass (1A) facility and plugging hold-off.

Special Feature - Faulty transistor detection helps prevent vehicle runaway or dangerous starts.

Add-on Protection - Supression diodes for the Forward/Reverse and By-pass Contactor Coils are incorporated in the PWR-TRON II unit. If the vehicle has other contactors for power steering, pumps, etc., these coils must also be suppressed by fitting a diode across them.

The PWR-TRON II unit may have a number of adjustments enabling a control to be custom set for a particular installation. The adjustments do not override any of the safety functions, hence the control unit will not be damaged by incorrect setting of the following functions:

Acceleration - The rate of acceleration can be preset by means of the ACCEL trimpot on the logic. This cannot be overridden by rapid depression of the accelerator.

Brake - The brake control adjusts the deceleration rate in the plug braking mode. This trimmer has most effect in the high speed braking region. The braking effect at very low speeds and about the truck direction change is non-adjustable.

Volts Adjust/Low Speed - This trimmer is used to adjust for different supply voltages and when incorrectly set, will cause a delay between the operation of the accelerator and the movement of the vehicle and may cause instability during plug braking mode.

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PWR-TRON II

GENERAL

The PWR-TRON unit is readily accessible under the deckboard. The PWR-TRON unit performs two functions; forward-reverse and acceleration via mechanical linkage to the foot pedal. You will notice the PWR-TRON unit is a transistorized supply that regulates the voltage fed from the battery through the accelerator module to provide the necessary signal to the motor. This gives the operator full control of the vehicle at all speeds and braking under all conditions.

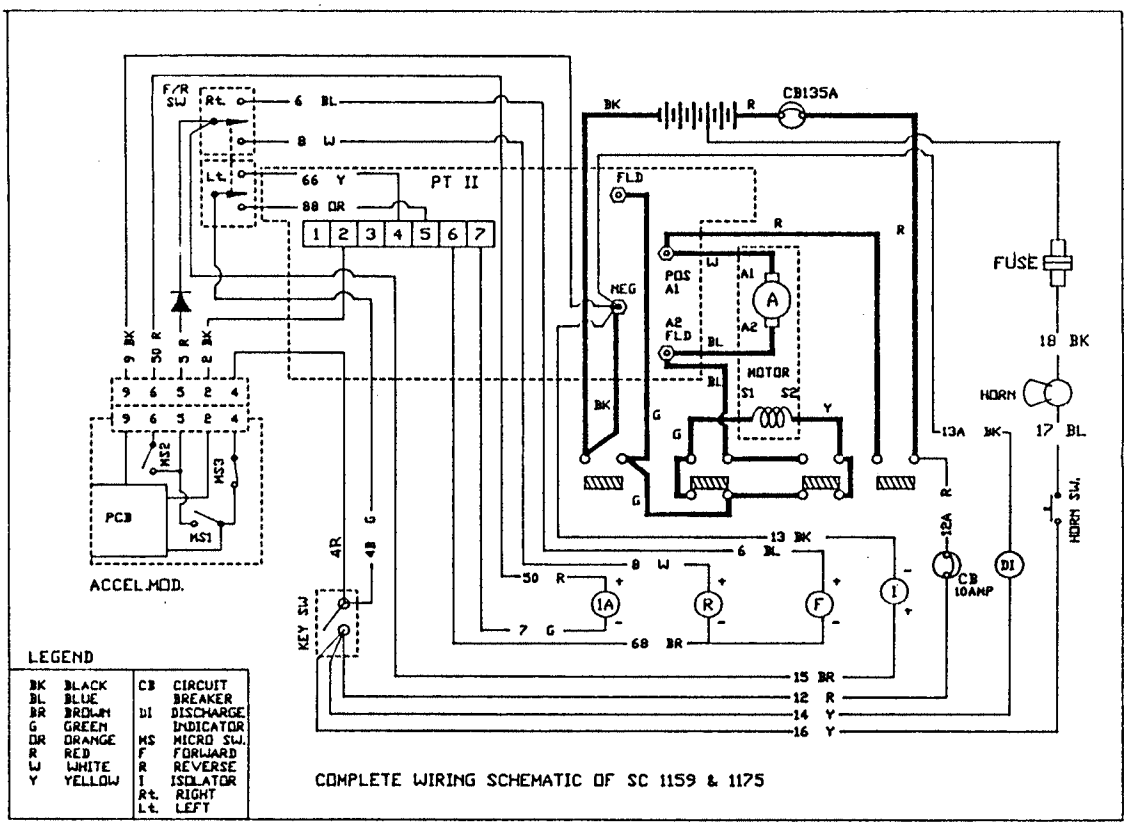

FIGURE 1

CIRCUITRY AND OPERATION

There are two circuits included in the operation of the PWR-TRON II, the control circuit and the power circuit.

The control circuit (light gauge wire) includes key switch, micro switch, MS-1; activated by the accelerator module, the PWR-TRON solid state controller, forward-reverse switch and solenoid panel.
The power circuit (heavy gauge wire) includes the batteries, forward reverse switch and motor.
The two circuits operate as follows: (See wiring schematic)
Circuits are the same for PT220 and PT290.

CONTROL CIRCUIT (See figure 1, Shown in light lines) Wire Harness 75-146-15

Forward Operation. 1) Turn key to "ON" position and move forward-reverse switch to forward position. 2) As the accelerator is depressed, a cam, MS1 closes providing a current path to the forward solenoid coil and closing forward contact on the forward-reverse solenoids. 3) The magnetic sensor on the PCB board will increase the PWR-TRON signal voltage moving vehicle forward.

Reverse Operation. 1) Turn key to "ON" position and move forward reverse switch to reverse position. 2) As the accelerator is depressed, a cam MS1 closes providing a current path to the reverse solenoid coil and closing reverse contact on the forward-reverse solenoid. 3) The magnetic sensor on the PCB board will increase the PWR-Tron signal voltage moving vehicle in reverse.

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PWR-TRON II

POWER CIRCUIT (See Figure 1) WIRE HARNESS 75-147-15

Forward operation. When the control circuit is energized and the solenoid contacts are closed current flow is then channeled through the PWR-TRON II and then to the power wiring. Motor speed is controlled by voltage output from the PWR-TRON II PCB board.

Reverse operation. The same circuit is used as forward operation except the forward-reverse switch is moved to reverse current flow through the motor.

OPERATING YOUR PWR-TRON II

To put your vehicle into operation, turn ignition key to "ON". Select direction you wish to travel by moving forward/reverse switch to desired position. Release parking brake, slowly depress accelerator pedal until vehicle is moving at desired speed.

You will notice your vehicle has a smooth transition form start to high speed operation. This is a built-in characteristic of the PWR-TRON II speed control, avoiding "jack-rabbit" starts.

"Plug braking" is an additional feature of the PWR-TRON. It is not necessary to come to a complete stop before reversing the vehicle. It is only necessary to reverse the vehicle while it is in motion and accelerator is fully depressed. The vehicle will automatically slow to an immediate stop and reverse itself to full acceleration. "Plug braking" should be done in an obstruction free area until the operator gets the feel for this maneuver. This maneuver does no damage to the PWR-TRON II. It is recommended when starting the vehicle to be sure to always turn ignition key on first then select direction of travel with the forward-reverse switch, before depressing the accelerator pedal.

PWR-TRON II PREVENTIVE MAINTENANCE

WARNING: BEFORE WORKING ON THE PWR-TRON UNITS OR ANY PART OF THE VEHICLE SYSTEM, DISCONNECT BOTH THE MAIN POSITIVE AND NEGATIVE BATTERY LEADS. PLACE THE FORWARD-REVERSE LEVER IN NEUTRAL, TURN OFF AND REMOVE KEY. ALWAYS SET PARKING BRAKE.

* No regular maintenance is required.

Be sure ignition key is on before depressing accelerator pedal. DO NOT depress pedal then turn on key. This is unsafe operation.

CAUTION:

Do not steam clean or spray with water.

Make sure all wire conntection are secure.

There are three modules as part of this system, solenoid panel, accelerator module and PWR-TRON II module. These are all easily removable for replacement and service.

Only qualified service personnel should perform any replacement, adjustments or servicing of the PWR-TRON II module, solenoid panel or the accelerator module. This will avoid the possibility of voiding your warranty on the PWR-TRON 220 and 290.

When returning vehicle to pre-service configuration make certain batteries are properly connected to avoid damage.

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PWR-TRON II PREVENTIVE MAINTENANCE

1. REPAIR OR REPLACEMENT OF INDIVIDUAL COMPONENTS

If replacement of semi-conductors, i.e. transistors or diodes becomes necessary, the following points must be rigidly adhered. The serviceman is advised that in the event of uncertainty over repair procedures, it is better to change the complete control unit, rather than risk further damage with an improper repair.

(a) Transistors - These are available as a factory approved spare consisting of a matched set of transistors. Only factory approved spares must be used. **Replacement of individual transistors invalidates warranty.**

(b) Insulation - The insulation material (fibreglass reinforced teflon) must be kept absolutely clean. The electrical isolation between heatsink and baseplate must be checked with an Ohm meter after assembly. Check that the resistance is greater that 1 Megohm (1,000,000 Ohms).

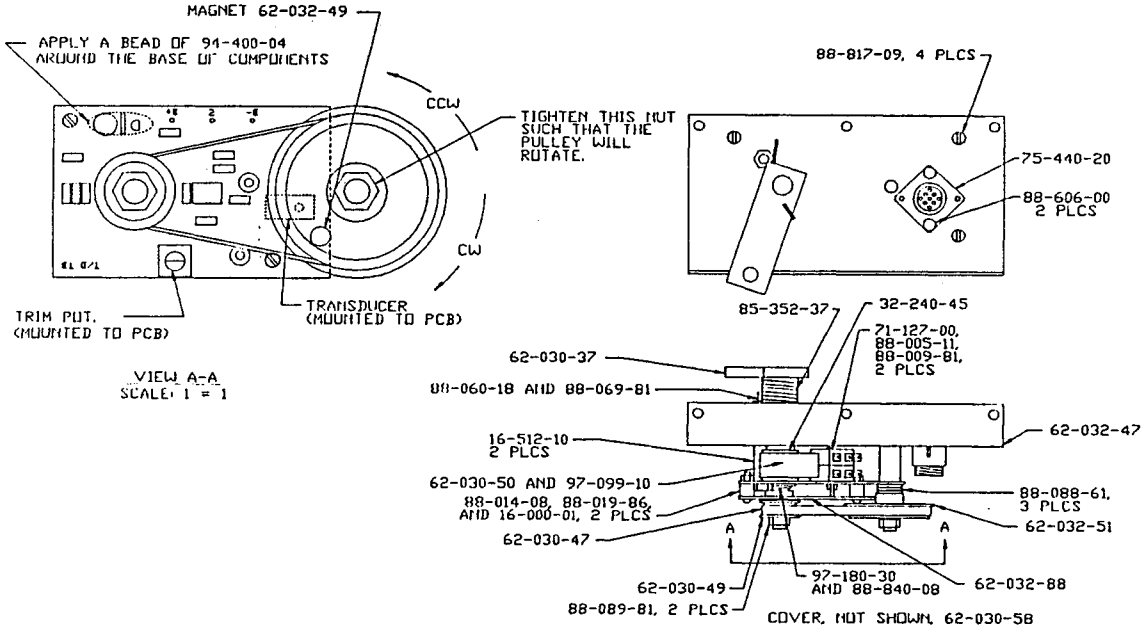
(c) Wiring - The positions of all wires and lugs should be noted and marked prior to removal so that there is no confusion on re-assembly.

(d) Component Polarity - Transistors can be damaged by quite modest currents incorrectly applied and are destroyed by reverse currents. If replacing transistors ensure that polarity is correct.

(e) Connections - Check all connections for tightness on completion.

(f) Final Checks - Prior to the first switch on, **check battery polarity.** Use test light to ensure safety.

* **NOTE:** **Any controllers that will be used in ambient temperature above 104 degrees F or 40 degrees C should be brought to the attention of the truck manufacturer.**



ACCELERATOR MODULE
FIGURE 2

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ACCELERATOR MODULE

GENERAL FEATURES

This item is a solid state module, factory adjusted. The accelerator mounts directly to the accelerator pedal eliminating the need for any intermediate linkage. Should it become necessary to adjust the solid state accelerator, remove the accelerator from the vehicle.

Double Check Battery Polarity Severe damage will result if the battery polarity is reversed.

It is always good practice to use the test light (part number 62-Ø27-ØØ) in series with the motor, prior to initial turn on. This will indicate any abnormalities in the control. Install the light in series with the single power lead going to the transistor heatsink (labeled FLD) on the PWR-TRON II.

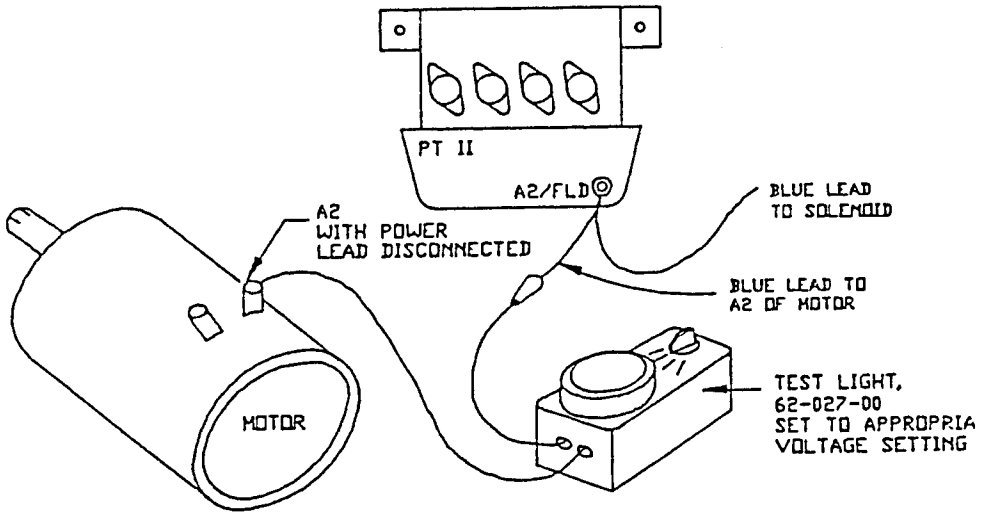

Figure 3

CONTINUITY AND POWER CHECK

NOTE: VEHICLE DRIVE WHEELS MUST BE JACKED UP OFF THE FLOOR FOR THE FOLLOWING TEST.

CAUTION: THIS IS A FACTORY CHECKOUT PROCEDURE AND SHOULD ONLY BE MADE BY A QUALIFIED MECHANIC.

After the PWR-TRON II system has been installed, a preliminary power check is required, prior to fine tuning of the PWR-TRON. The vehicle should be ready for basic operation at this time.

Lift blue lead at A2 (refer to Figure 1) and place test light in series with A2 and field pole on PWR-TRON II. Place forward/reverse switch in forward. Initiate accelerator slowly, light should come up to maximum brilliance at full acceleration. Repeat same step for reverse. If problems are encountered, see "Trouble Shooting" in this section. Also check acceleration rate by quickly depressing accelerator full. Light should come to full brilliance in 3 seconds. **(CAUTION, do not perform plugging with light attached).**

When both steps are completed satisfactorily, place vehicle on floor, prepared for operation and fine tuning of the PWR-TRON II unit. Proceed to the page on "Trimpot Adjustment".

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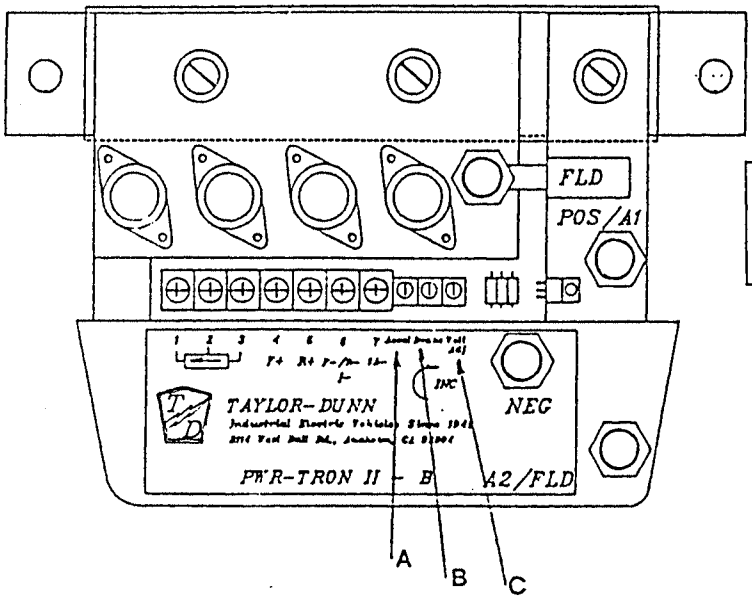
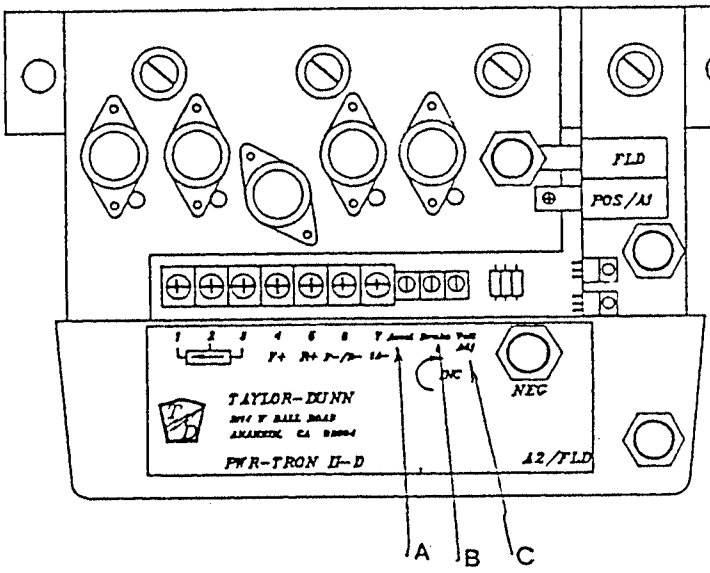
PT 220



PT 290



PWR-TRON II TRIMPOT ADJUSTMENTS

A. ACCELERATOR - Turn full direction of arrow

B. BRAKE - Turn full opposite direction of arrow to start. Turn up 1/4 in direction of arrow.

CREEP - Adjust trimpot so motor whines but does not turn when accelerator switch is first closed.

AFTER ALL POTS HAVE BEEN FINAL ADJUSTED, COAT POTS WITH WHITE SILICONE SEALANT.

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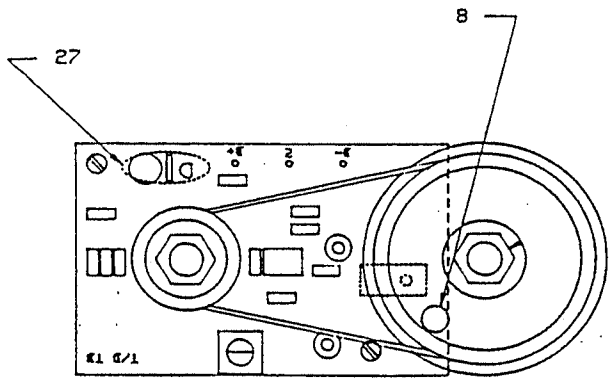
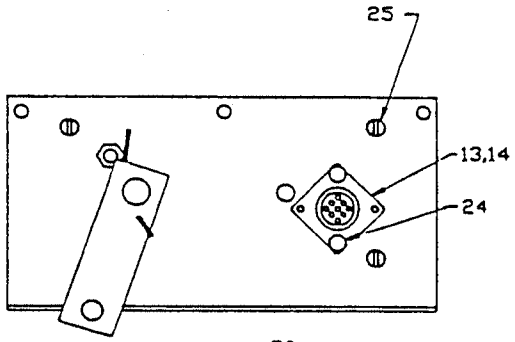
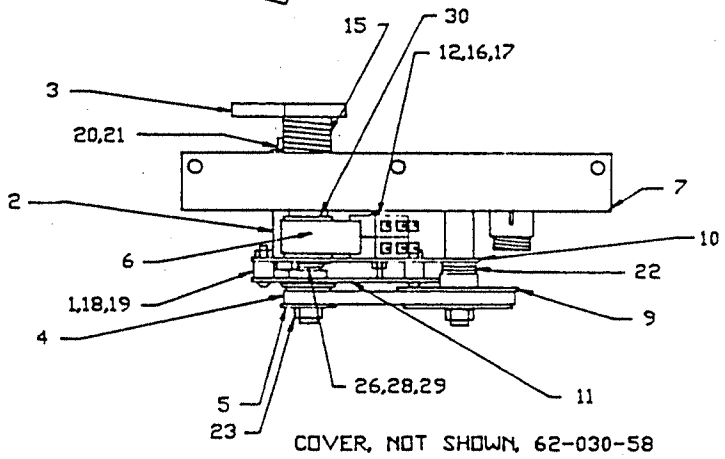




WIRE HARNESS (NOT SHOWN) 75-140-01

COLOR	FROM	TO
WHITE	PCB PAD No.2	RECEPTICAL POSITION No.2
RED	MS No.1 COMMON	RECEPTICAL POSITION No.4
ORANGE	MS No.2 COMMON	PCB PAD B+
ORANGE	MS No.1 N. OPEN	RECEPTICAL POSITION No.5
ORANGE	MS No.1 N. OPEN	MS No.2 COMMON
BLUE	MS No.2 N. CLOSED	RECEPTICAL POSITION No.6
BLACK	PCB PAD B-	RECEPTICAL POSITION No.9



COVER, NOT SHOWN, 62-030-58

ACCELERATOR, MAGNETIC (COVER NOT SHOWN) 62-032-18

FIG ID	T-D PART	DESCRIPTION	QTY.
1.	16-000-01	SPACER, 5/32 ID X .295 LONG	2
2.	16-512-10	SPACER, .257 ID X .405 OD X .900	2
3.	62-030-37	ROTOR, ACCELERATOR MODULE	1
4.	62-030-47	BELT, 126T, .080 PITCH	1
5.	62-030-49	PULLEY, 32T, .080 PITCH	1
6.	62-030-50	CAM 11 INCH ROD, TWO MICRO SWITCHES	1
	62-030-58	COVER, ACCELERATOR MODULE (NOT SHOWN)	1
7.	62-032-47	ASSEMBLY BACKING PLATE, MAGNETIC A	1
8.	62-032-49	MAGNET, 1/4 DIAMETER X 3/8 LONG	1
9.	62-032-51	PULLEY, 80T, .08 PITCH, DRILLED	1
10.	62-032-55	PLATE, SUPPORT, PCBLID STATE	1
11.	62-032-88	PCB, MAGNETIC ACCELERATOR, TB W/C	1
12.	71-127-00	SWITCH, SNAP ACTION MINIATURE	2
13.	75-440-20	RECEPTACLE, SQUARE FLANGE, 9	1
14.	75-440-22	SEAL, RECEPTACLE, 9 POS. AMP	1
15.	85-352-37	SPRING, TORSION, .840 ID X .800 LENGTH	1
16.	88-005-11	4-40 X 1-1/4 TRUSS HEAD SCREW	2
17.	88-009-81	4-40 LOCKNUT	2
18.	88-014-08	6-32 X 5/8 ROUND HEAD SCREW	2
19.	88-019-86	6-32 LOCKNUT-FIBRE INSERT	2
20.	88-060-18	1/4 X 2-1/2 NC HEX HEAD SCREW	1
21.	88-069-81	1/4 NC LOCKNUT	1
22.	88-088-61	5/16 SAE WASHER	3
23.	88-089-81	5/16 NC LOCKNUT	2
24.	88-606-00	CLIP, CANOE, .125 X .16 GRIP	2
25.	88-817-09	#8 X 3/4 PAN HEAD METAL SCREW	4
26.	88-840-08	RING SNAP 1/2 EXT	1
27.	94-400-04	RTVS, FOR PCB, 2.8 OZ TUBE	.05
28.	97-099-10	KEY, WOODRUFF 1/8 X 1/2	1
29.	97-180-30	WASHER, NYLON 1/2 ID X .031 THICK	1
30.	32-240-45	BUSHING, 1/2 ID X 7/8	1

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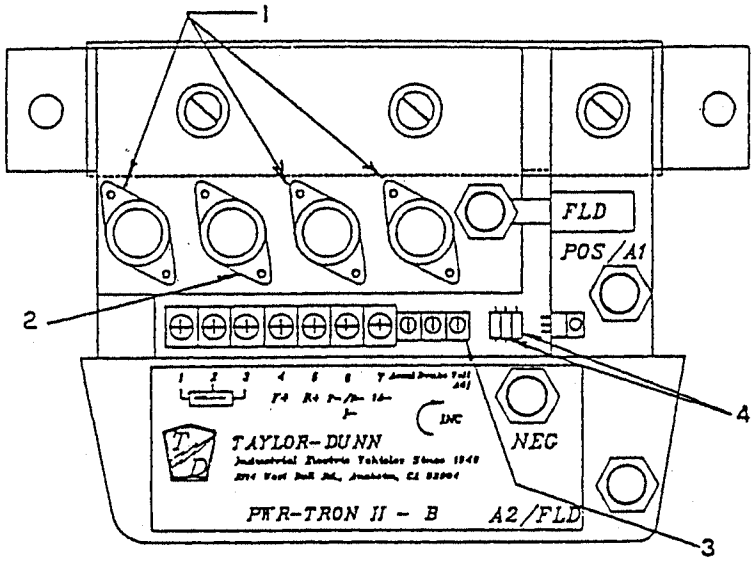

PARTS LIST

PWR-TRON II MODEL 220 PART NO. 62-020-00

FIG. ID	T-D PART	DESCRIPTION	QTY.
1	62-022-32	POWER TRANSISTORS (3)	1 (SET)
2	62-022-31	DRIVER TRANSISTOR	1
3	69-020-30	TRIMPOT, 20K OHM (3/8 SQUARE)	3
4	69-056-92	RESISTOR, 5.6 OHM, 1/2 WATT (2)	1 (SET)

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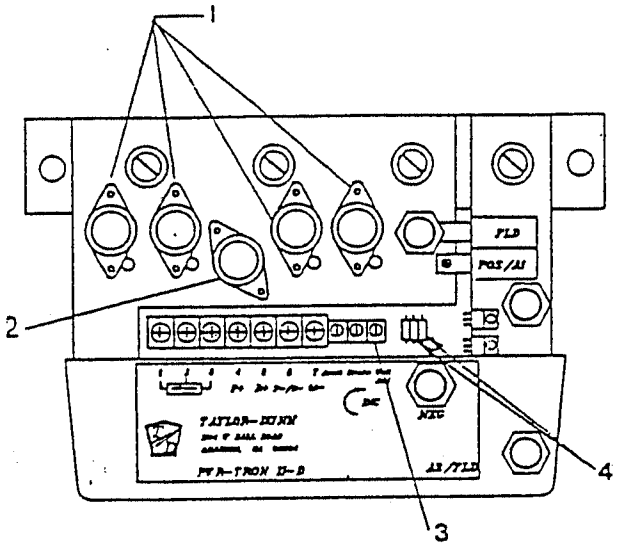

PARTS LIST

PWR-TRON II MODEL 290, PART NO. 62-029-00

FIG. ID	T-D PART	DESCRIPTION	QTY.
1	62-029-32	POWER TRANSISTORS (4)	1 (SET)
2	62-029-31	DRIVER TRANSISTOR	1
3	69-029-31	TRIMPOT, 20 K OHM (3/8 SQUARE)	3
4	69-056-92	RESISTOR, 5.6 OHM 1/2 WAT (2)	1 (SET)

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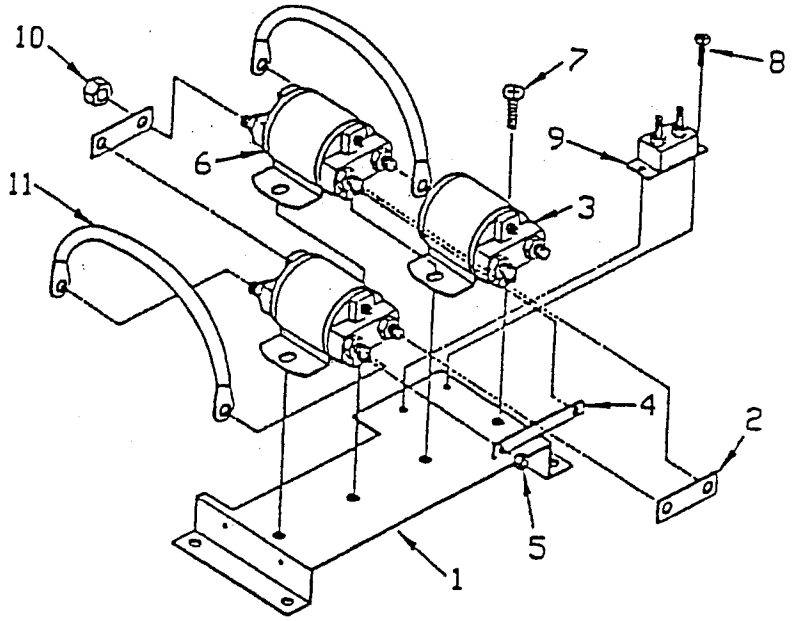

24 VOLT SOLENOID PANEL ASSEMBLY
PART NO. 72-560-02

FIG.ID	T-D PART	DESCRIPTION	QTY.
1	72-560-50	PANEL, SOLENOID MOUNTING PLATE	1
2	61-838-51	BUSS BAR 5/8 X 1-3/8 HC	2
3	72-501-24	SOLENOID, SPST, 24 VOLT, 100 AMP	1
4	61-838-50	BUS-BAR, CU 3/8 X 2-1/2 HC	1
5	88-049-80	10-32 HEX NUT	4
6	72-501-25	SOLENOID, 24 SPDT, 100 AMP	2
7	88-838-06	#14 X 1/2 PAN HEAD SCREW TYPE A THREAD	4
8	88-818-06	#8 X 1/2 PAN HEAD SCREW TYPE B THREAD	2
9	79-840-00	CIRCUIT BREAKER, 10 AMP, AUTO	1
10	88-089-91	5/16 NC HEX HEAD JAM NUT	9
11	75-235-20	JUMPER, 4 GAUGE, 4-1/4 LONG	2
		#10 LOCK WASHER (NOT SHOWN)	4
**	72-501-24	SOLENOID, 1 REQUIRED, IS USED (NOT ON PANEL) FOR 1A BYPASS	

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TROUBLE SHOOTING

Before proceeding with any trouble shooting, read the manual; understand the basic principles of operation and be familiar with component testing and replacement procedures. The PWR-TRON II controller, when operating correctly, will emit a clear whistle, the frequency of which is related to the frequency of the ON/OFF chopper action. The pulsing of the equipment is too fast to measure with conventional equipment and the following fault procedure is based on the use of simple tools.

TOOLS AND EQUIPMENT REQUIRED

(a) Test light, part number 62-Ø27-ØØ

(b) Clip leads.

(c) Multimeter

PHYSICAL INSPECTION

Check controller for physical damage, loose or broken wiring, evidence of component overheating, etc. Pay particular attention to adjustment of accelerator switch and potentiometer operation.

Prior to touching any electrical components **DISCONNECT BATTERY AND CONNECT LIGHT BULB IN SERIES WITH MOTOR ARMATURE.**

Reconnect battery as needed for carrying out any specific tests.

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TROUBLE SHOOTING

	SYMPTOM	POSSIBLE CAUSE
1.	Vehicle will not reach full speed	Check that the accelerator is set up correctly and the voltage swing at logic pin 2 is correct (6.3 volts to 11 volts)
		Check acceleration setting on PWR-TRON II.
2.	Vibration or roughness when braking	Incorrectly adjusted BRAKE TRIMPOT. See Trimpot Adjust in this section.
3.	Weak and uneven braking forward and reverse.	Incorrectly adjusted BRAKE TRIMPOT. See Trimpot Adjust in this section.
4.	Very strong braking	Incorrectly adjusted BRAKE TRIMPOT. See Trimpot Adjust in this section.
		Armature and Field connections interchanged.
		Armature and Field cables not independently routed back to controller.
5.	Strong braking on freshly charged battery	BRAKE TRIMPOT set too high.
6.	Delay between operation of accelerator and motion of vehicle	CREEP TRIMPOT not set properly.
7.	Vehicle accelerates when key switch is on. No accelerator movement is necessary	CREEP TRIMPOT not set properly.
		Accelerator stop rest (mono directional) /center off rest position (Bi-directional) or linkages not correctly set up.
		Microswitch in accelerator not adjusted correctly.

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TROUBLE SHOOTING

LOW OR NO MOTOR TORQUE

NO TEST VOLTAGES, FIRST PLACE TEST LIGHT IN SERIES WITH THE MOTOR.

	SYMPTOM	POSSIBLE CAUSE
1.	Solenoids do not operate. No voltage at solenoid coils.	Check power and control fuses. Replace if defective.
		Check for power at both sides of key switch.
		Check for power at both sides of direction switch.
		Check for power at both sides of brake switch.
		Check for flat or reversed battery.
	If there is voltage at requested solenoid coil.	Check that there is no short between S2 (FIELD) and NEG, e.g. shorted transistor.
		Check that battery voltage is reaching terminals 4 (Forward), 5 (Reverse) as relevant.
2.	Solenoid close. No power and no transistor whistle when speed is wound up.	Check circuit breaker. Battery voltage should appear at both ends of fuse.
		Check battery volts.
		Check accelerator circuit and operation of speed pot - To do this, place test light in series with the armature and wind the speed up and down with accelerator pedal. The voltage at logic terminal 2 should move from 6.3 volts to 11 volts. If it stays at 6.3 volts the fault is in the accelerator wiring. If voltage stays high, accelerator may be bad or it has lost negative lead to battery.
		Check motor circuit. If the voltage at S2 (FIELD) terminal is lower than B+ then examine the motor circuit for worn brushes, sticking brushes, loose cable connections, etc. Also low voltage may indicate loss across contactor (solenoid) tips. Check resistance.
3.	Solenoids close, little or no power. High frequency whistle.	Check motor circuit for short circuits.
		Check for loose connections.
		Check for interchanged armature and field connections.
4.	Solenoids close. Vehicle accelerates to full speed but lacks power.	Check battery voltage under load. Check voltage on transistor heatsink, S2. If low to full speed but lacks power (approx. 2 volts) when accelerating, check motor circuit. If high, check for loose connections.

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TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE
FULL MOTOR TORQUE AVAILABLE - GENERAL FAULTS	
TO TEST VOLTAGES, FIRST PLACE TEST LIGHT IN SERIES WITH ARMATURE.	
1. Solenoid closes and full speed.	Check accelerator circuit and voltage at pin 2. Should swing from 6.3 to 11 Volts with depression of accelerator.
2. Unequal braking in either direction, or unequal power in each direction.	Misadjusted motor brushes. Rotate brush gear to give equal braking in each direction. Dirty or burned direction solenoid contacts.

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TROUBLE SHOOTING

STANDARD LOGIC VOLTAGES MEASURED WITH RESPECT TO B-

TO TEST VOLTAGES, FIRST PLACE LIGHT BULB IN SERIES WITH ARMATURE.

LOGIC TERMINAL

NUMBER	DESCRIPTION	CONDITION	VOLTAGE*
1.	Speed Pot Reference	Key switch open	OV
		Key switch and solenoid closed	~11V
2.	Speed Pot Signal	Key switch open	OV
		Key and solenoid closed, slow speed	~ 6.3 V
		Key and solenoid closed, fast speed	~11V
3.	Speed Pot Reference	Key switch open	OV
		Key switch and solenoid closed	6V
4.	Forward Solenoid Coil Positive	Key switch closed, forward selected	B+
		Key switch closed, reverse selected	~OV
5.	Reverse Solenoid Coil Positive	Key switch closed, reverse selected	B+
		Key switch closed, forward selected	~OV
6.	Forward/Reverse Solenoid Coil Negative	Key switch closed, direction not selected	~OV
		Key switch closed, direction selected.	
		For <.5 sec., brief rise to	~7V
		After .5 sec., falls back to	~Ø
		Key switch closed, direction selected. Faulty transistor	B+
7.	Bypass Solenoid Coil Negative	Key switch & direction solenoid closed. Bypass requested	~OV
		Key switch & direction requested solenoid closed. ** Bypass requested before 3 secs.	B+
		after 3 secs.	~OV
NEG.	Battery Negative	All	O
POS/A1	Battery Positive	After key switch & solenoid closed	B+
A2/FLD	Armature & Forward/Reverse Solenoid Normally Closed	Key switch & solenoid closed - Vehicle at rest	B+
		Key switch & solenoid closed - Vehicle at full speed	~2V
FLD	Field, i.e. Forward/Reverse Solenoid Normally Open	Key switch open	OV
		Key switch closed and solenoid open	B+

*B+ = Battery Positive - Voltages are measured with respect to Battery Negative.

** = This delay is set by Acceleration Trimpot.

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PWR-TRON II

SC 1-59 SUGGESTED SPARE PARTS LIST

T-D PART NO.	DESCRIPTION	NO. OF CARTS 1-20	21-50	50-UP
62-022-00	PT 220 SPEED CONTROLLER	1	1	2
62-022-31	DRIVER TRANSISTOR	1	2	4
62-022-32	POWER TRANSISTOR SET	1	2	4
62-029-00	PT 290 SPEED CONTROLLER	1	1	2
62-029-31	DRIVER TRANSISTOR	1	2	4
62-029-32	POWER TRANSISTOR SET	1	2	4
72-560-02	24 VOLT SOLENOID PANEL ASSY	1	1	2
72-501-24	SOLENOID, SPST 24V 100 A	1	1	2
72-501-25	SOLENOID, SPDT 24V 100 A	2	2	4
75-235-20	JUMPER, 4 GA 4-1/4 INCH LONG	1	1	2
61-838-50	BUS-BAR 3/8 X 2-1/2	1	1	2
61-838-51	BUS BAR 5/8 X 1-3/8	1	1	2
62-032-18	ACCELERATOR, (MAGNETIC)	1	1	2
62-030-58	COVER, ACCELERATOR	0	0	1
75-146-15	CONTROL HARNESS	0	0	1
75-147-15	POWER HARNESS	0	0	1

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Page 1

MAINTENANCE PROCEDURES RHEOSTAT SPEED CONTROL
FIGURE 9

The rheostat controls the speed of your vehicle through the use od coils of nichrome resistance wire. With this type of resistance control, you use approximately the same amount of power from batteries in low speed as you do in high speed. The flat copper bars and a movable J-Hook are the major parts in the rheostat. With proper adjustment and lubrication the rheostat will give many months of trouble free use. When J-Hook is worn ot 1/8 inch thickness, replace J-Hook and power bars.

It is recommended that all terminal connections be checked and tightened at least once a month. If a terminal bolt or wire becomes loose,k sufficient heat will be generated to cause permanent damage to the connection. Care should also be taken at each inspection to ensure that proper contact is maintained between J-Hook and power bars.

J-Hook and accelerator linkage should work freely allowing return spring to always return J-Hook to neutral bar when accelerator is released.

The speed control and braking systems are both operated from a single treadle, and must be closely coordinated in their operating adjustments.

Refer to Section 11 for adjustment of J-Hook traven and brake rod length. Other adjustments to the rheostat are outliined in this section of the manual.

CLEANING AND LUBRICATION

CAUTION: Before servicing the speed control switch or any part of the electrical system, disconnect both main battery leads, place forward/reverse switch in nuetral, turn key off and remove from switch. Set parking brake.

CLEANING PROCEDURE:

The following procedure should be done monthly or sooner depending upon the build-up of contaminants in the switch area.

Clean off all grease and contaminants from space in and around power bars and J-Hook assembly by steam cleaning, if available. (Take extrfeme caution not to let the metal steam cleaning nozzel contact the switch components.) If preferred, use an electrically non-conductive tool such as a wooden stick, piece of plastic, rag, cotton swab, etc. to do the cleaning. It is very important to remove the contaminated grease that is lodged between the power bars as it can cause shorting between the bars and result in unpredictable vehicle operation.

CAUTION: Never use a flammable agent to clean switch components or any part of the electrical system.

LUBRICATION PROCEDURE:

Apply a small amount of electrically non-conductive grease (no graphite grease, etc.) such as Taylor-Dunn greazse 94-421-ØØ to power bars and J-Hook contact areas. This can be done with a soft non-metalic paint brush, stick, piece of plastic or any object that is composed of non-metalic material.

Refer to Section 5 for further details.

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MAINTENANCE PROCEDURES RHEOSTAT SPEED CONTROL
FIGURE 9

ADJUSTMENT OF J-HOOK PRESSURE BAR
CAUTION: Whenever service work is to be performed on the electrical system, disconnect the battery by unplugging power leads.

1. Disconnect J-Hook insulating board from speed control irm and slide J-Hook near the anchor bolt at neutral bar end. Anchor bolt is held in position by 2 nuts. Loosen 1 nut and adjust the other until J-Hook may be moved with a minimum of effort but not allowed to "jiggle" freely. At the opposite end of the pressure bar, adjust the spring pressure to maintain snug contact between J-Hook and power bars. Too musch spring pressure will tend to make the J-Hook bomd amd stick. Too little pressure will promote poor contact, causing burning and pitting to occur. Re-connect insulating board to speed control arm and check operation of switch. J-Hook should slide smoothly with very little noise. If noticeable clincking noises occur as J-Hook passes over power bars, it is usually indicative of poor J-Hook alignment. If necessary, bend or twist connecting strap until J-Hook contacts power bars in a flat and smooth manner.

CAUTION: Every time adjustments are made to rheostat switch, always check the operation of the treadle. The J-Hook MUST return completely to neutral bar when treadle is released from any position. Lubricate as outlined in Section 5.

REPLACEMENT OF J-HOOK
1. With power disconnected, remove 2 bolts attaching J-Hook to connecting strap.
2. Slide J-Hook to full position and open pressure bar by pulling against spring pressure.
3. Roll J-Hook out from between presssure bar and power bars.
4. Replace J-Hook following reverse procedure.

REPLACEMENT OF RHEOSTAT SWITCH
1. Note location of wires connected to switch and mark accordingly, to insure their return to original location of re-assemble.
2. Remove wires at respective terminals.
3. Remove bolts connecting J-Hook insulator to operating link.
4. Remove 3 bolts holding switch to bracket and remove switch.
5. Replace switch in the reverse manner to which it was removed.
6. Check and adjust J-Hook pressure bar as outlined above. Check and adjust J-Hook travel and brfake rod length as outlined in Section 11.

REPLACEMENT OF POWER BARS
1. With power disconnected, remove terminal bolt and holding bolts.
2. Slide bar out of rheostat.
3. Clean switch thoroughly and install new bar.

NOTE: Power bars tend to wear at the same rate, except when 1 bar may become excessively burned because of poor contact. When replacing with new power bard, it is important that all bars bne fo the smae thickness. Binding and sticking will occur when bars are not of uniform thickness.

It is recommended that power bars be replaced as a set rather than individually to avoid the above condition.

Minor high points may be removed with a fileto produce smooth switching action.

4. Follow adjustment procedures previously outlined.

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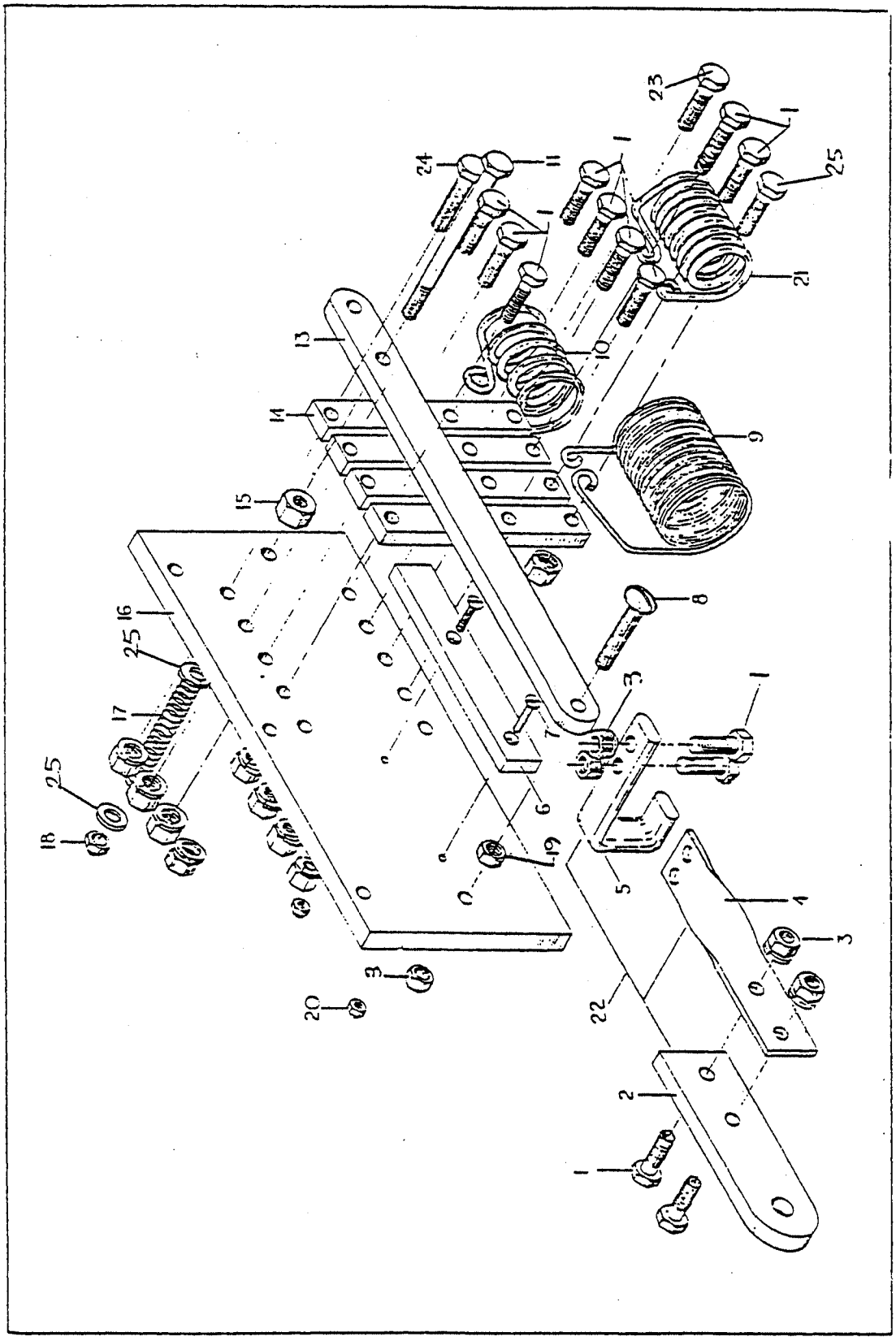
Page 3

SPEED CONTROL RHEOSTAT
FIGURE 9



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SPEED CONTROL RHEOSTAT - FOUR SPEED
REFER TO FIGURE 9

FIG. I.D. #	T-D PART #	DESCRIPTION	QTY
9-0	61-837-25	Four speed rheostat assy not incl. J-hook	1
9-1	88-060-11	1/4 x 1 NC bolt	13
9-2	61-834-00	Insulating board	1
9-3	88-069-81	1/4 Nut, Keps	17
9-4	61-833-00	J-Hook twisted strap	1
9-5	61-832-00	J-Hook	1
9-6	61-835-14	Neutral bar	1
9-7	88-026-10	Truss head screw 8-32 x 7/8	2
9-8	88-065-13	Truss head screw, 1/4 x 1-1/4	1
9-9	78-212-55	Resistor coil, #9 wire	1
9-10	78-212-57	Resistor coil, #5 wire	1
9-11	88-060-22	1/4 x 3-1/2 bolt	1
9-13	61-836-00	Pressure bar	1
9-14	61-831-00	Power bar	4
9-15	88-109-80	3/8 nut	1
9-16	61-837-00	Mounting board	1
9-17	85-034-00	Spring	1
9-18	88-069-81	1/4 NC lock nut	1
9-19	88-069-80	1/4 NC nut	1
9-20	88-029-86	8-32 lock nut	2
9-21	78-212-56	Resistor coil, #6 wire	1
9-22	61-832-10	J-Hook assy. Incl parts 9-5, 9-4, 9-2	
9-23	88-060-09	1/4 x 3/4 bolt	2
9-24	88-060-14	1/4 x 1-1/2 NC bolt	1
9-25	88-068-60	1/4 Cut flat washer	2

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Page 1

MAINTENANCE PROCEDURES
GENERAL ELECTRICAL SYSTEM

Your electrical system has been installed with care, utilizing quality materials for safe trouble free service. Proper fuses have been located where necessary to prevent unsafe overloads and protedct the wiring from being damaged from short circuits.

Little care will be required, except for an occasional visual inspection for loose connections or some unusual condition causing the insulation to be rubbed off on a wire.

Normal replacement parts such as light bulbs, fuses, flasher etc. have been arranged for simple changing by plug in devices or conviently located terminals.

CAUTION: **A blown fuse is usually indicative of a short circuit or faulty device. Care should be exercised to remove the faulty condition before replacing fuse. DO NOT place larger capacity fuses or "jumpers" to overcome the condition as werious wiring damage can occur.**

Refer to the following sections for more detailed information on the main power and electrical components:

Section 7 - Wiring Diagram

Section 8 - Batteries

Section 9 - Charger

Section 12 - D.C. Motor

Section 14 - Forward/Reverse Switch

Section 15 - PWR-TRON II Speed Control

Section 16 - Speed Control and Main Power Switching

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SUGGESTED SPARE PARTS

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY. 1-20 VEH.
REFER TO FIGURE 3 - FRONT FORK, WHEELS AND STEERING			
8	88-229-81	3/4 N.C. LOCKNUT	3
23	30-400-00	MASTER LINK FOR #40 CHAIN	2
25	96-900-00	TURNBUCKLE, STEERING CHAIN	2
30	45-308-00	SEAL FOR 3/4" BEARINGS	2
31	80-015-00	3/4 I.D. ROLLER BEARING	2
	11-030-00	TUBE FOR 4.80 X 8 TIRE	1
36	13-739-00	TIRE, TUBE & DEMOUNTABLE SPLIT-RIM WHEEL, 4.80 X 8, 6 PLY STEELGUARD TIRE WITH 5 HOLES 1/2 INCH ON 4-1/2 INCH BOLT CIRCLE	1
REFER TO FIGURE 5 - REAR AXLE, MOTOR AND BRAKES			
3	41-997-00	DRAIN AND LEVEL PLUG (1/8 INCH PIPE)	1
11	41-163-20	AXLE ASSEMBLY, W/AXLE, RETAINER RING AND PLATE, BEARING, GASKET AND OIL SEAL, 13-1/4 INCH LENGTH	1
11	41-162-20	AXLE ASSEMBLY, WITH AXLE, RETAINER RING AND PLATE BEARING, GASKET AND OIL SEAL, 10-13/16 INCH LENGTH	1
13	45-042-00	GASKET (HOUSING TO DIFFERENTIAL CARRIER)	1
42	80-702-00	"O" RING - DRIVE PINION BEARING RETAINER	1
45	41-996-00	PLUG - (LEVEL) 1/2 INCH WITH RECESSED TOP	1
50	45-021-00	GASKET GEAR CASE TO PINION ASSEMBLY	1
57	41-989-00	PLUG (FILLER LEVEL & DRAIN) 1/4 INCH N.P.T.	1
63	45-331-00	OIL SEAL - GEAR CASE TO PINION	2
64	41-532-00	BRAKE DRUM (SPLINED)	1
66	41-661-61	FULL BRAKE BAND FOR 6 INCH DRUM	1
73	85-060-00	COMPRESSION SPRING 5/8 INCH O.D. X 2-1/2 INCH LONG	1
83	45-002-00	GASKET - GEAR CASE COVER	1
87	70-049-00	MOTOR 4.5/6 H.P. 24/36 VOLT 1800/2800 R.P.M.	1
87	70-054-00	MOTOR 6.7/10 H.P. 24/36 VOLT 1800/2800 R.P.M.	1
	70-054-30	MOTOR, 6.7/10 HP 24/36 VOLT 1800/2800	4
106	45-044-00	GASKET - REAR AXLE BEARING	2
122	80-703-00	"O" RING MOTOR MOUNT SEAL	1
124	88-067-11	SOCKET SCREW 1/4 INCH NC X 1	1
REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGER			
1	85-280-00	EXTENSION SPRING, 1-3/8 O.D. X 7-3/4 LONG	2
2	88-517-11	3/32 X 1 STEEL COTTER PIN	4
3	96-772-00	CLEVIS PIN 3/8 X 1 INCH	2
4	50-028-00	3/8 N.F. THREADED ROD, 1-1/2 INCHES LONG	2
5	96-762-00	CAST CLEVIS 3/8	1
REFER TO FIGURE 8 - FORWARD/REVERSE SWITCH			
1	71-040-60	SWITCH FINGER - SILVER PLATED WITH 1/4 INCH HOLE	4
5	71-040-71	BOLT-FINGER MOUNTING (1/4 INCH NF X 7/8 INCH SPEC.)	4
11	71-040-62	SWITCH HANDLE - METAL (RED COLOR)	1
19	71-040-54	SPRING - CAM	1
28	71-040-52	ROTOR ASSEMBLY	1

SECTION 18
Page 2

SUGGESTED SPARE PARTS LIST

FIG. I.D.	T-D PART NO.	DESCRIPTION	QTY. 1-20 VEH.
REFER TO FIGURE 9 - SPEED CONTROL RHEOSTAT			
2	61-834-00	INSULATING BOARD FOR J-HOOK - 2 HOLE PATTERN	1
5	61-832-00	SLIDING J-HOOK BAR	1
9	78-212-55	RESISTOR COIL (#9 WIRE - 10 TURNS)	1
10	78-212-56	RESISTOR COIL (#6 WIRE - 9 TURNS)	2
13	61-836-00	PRESSURE BAR	1
14	61-831-00	POWER BAR	4
17	85-034-00	SPRING - COMPRESSION 7/16 INCH O.D. X 2 INCHES LONG	1
21	78-212-57	RESISTOR COIL (#5 WIRE - 6 TURNS)	1
REFER TO GENERAL ELECTRICAL - SECTION 17			
	71-100-00	LIGHT SWITCH	1
	72-072-00	4 INCH SEALED BEAM HEADLIGHT BULB (12 VOLT)	1
	72-022-00	STOP AND TAILLIGHT FIXTURE, 4 INCH RUBBER MOUNT (12 VOLT)	2
	71-501-00	HORN BUTTON	1
	75-231-00	JUMPER CABLE - 8 INCHES LONG	4
	78-010-00	SECONDARY FUSE AND HOLDER (INLINE TYPE)	1
	79-823-00	FUSE - BUSS TYPE 20 AMP	5
REFER TO BATTERIES AND CHARGER - SECTIONS 8 AND 9			
	76-012-00	CHARGINE RECEPTACLE, 30 AMP, 3 PRONG	1
	77-200-00	HYDROMETER	1
	77-201-00	BATTERY FILLER	1

SECTION 19
Page 1

PARTS ORDERING PROCEDURE

Parts may be purchased from your local authorized Taylor-Dunn Dealer. When ordering parts, be sure to specify the full Taylor-Dunn part number, description of part and quantity of parts required. You will find a complete listing of parts numbers and descriptions in this manual. When ordering parts for the drive motor, also include the specifications found on the motor name plate. Be sure to give complete shipping and billing address on all orders. Example:

1 - PART NO. 86-501-98 BALL JOINT (LEFT HAND THREAD)
1 - SET OF 4 - PART 70-101-00 MOTOR BRUSHES FOR G.E. MOTOR 3-1/2 H.P., 24 VOLT, SPECIFICATION NO. 5BC49JB399

Above parts are for model SC 1-59, SERIAL NUMBER XXXXX

Parts ordered under warranty must be placed with your authorized Taylor-Dunn dealer. Be sure to include original invoice number, date of shipment of vehicle and vehicle serial number.

NOTE: On contracts with national federal government agencies, Defense general supply agency and United States Post Office Department, orders for all warranty parts must be placed directly with the Taylor-Dunn factory in Anaheim, California.

Taylor-Dunn Manufacturing Company
2114 West Ball Road
Anaheim, California 92804

Phone: 714-956-4040
Telex: 65-5393

SECTION 2Ø
Page 1

MAINTENANCE PROCEDURES
BODY AND TRIM PARTS

Your vehicle has been finished with several coats of durable baked on enamel.

It will require the same care as you would give your automobile. The chrome trim is also resistant to corrosion and will require an occasional cleaning.

It is recommended that your vbehicle be washed with a mild soap and warm water. For long life a good automotive type of wax will extend the life of the finish and maintain lasting beauty.

For identification of body and trim parts available for repair and replacement, refer to the following pages in this section.

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Page 2

BODY AND TRIM PARTS
FIGURE 11 SC 1-59, AN 1-70, AN 1-71

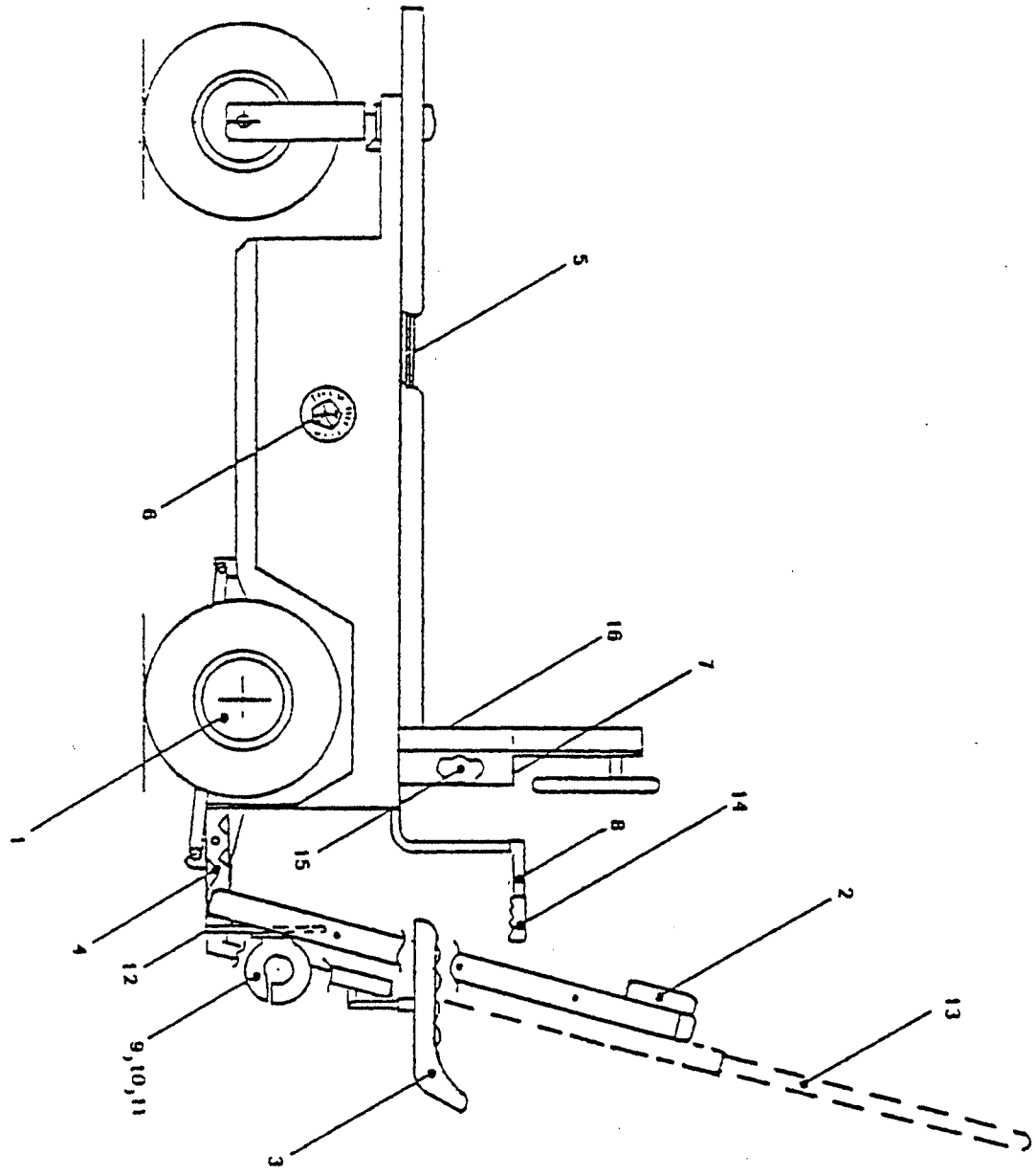

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FIG.	I.D.	T-D PART NO.	DESCRIPTION	QTY.
1		92-000-00	WHEEL COVER - CHROME	2
2		90-000-00	BACKREST - 6 X 16-3/4 (BLACK) MODEL SC ONLY	1
3		90-160-00	CUSHIONED TRACTOR SEAT & SHAFT, MODEL AN ONLY	1
4		90-210-00	SEAT HOLDER (TRACTOR SEAT BOLT-ON), MODEL AN 1-70 ONLY	1
5		90-403-00	DECKBOARD WITH INSTRUCTIONS - 1/2 PLYWOOD 28-3/4 x 47-1/4	1
5		90-406-00	DECKBOARD WITH INSTRUCTIONS - 1/2 PLYWOOD 30-3/4 X 53-1/2	1
6		94-301-00	TAYLOR-DUNN DECAL	1
7		94-305-00	FORWARD/REVERSE SWITCH PLATE	1
8		95-500-00	HANDLE, TILLER STEERING WITHOUG HAND GRIP	1
9		97-804-00	HITCH, PINTLE TYPE, PAINTED	1
10		97-808-00	HITCH AUTOMATIC COUPLING	1
11		97-811-00	HITCH, 1-7/8 INCH, BALL ONLY	1
12		97-812-00	MOUNTING BRACKET FOR PINTLE HITCH, MODEL AN 1-70 ONLY	1
13		97-813-00	DETACHABLE 4 STEP LADDER, MODEL SC 1-59 ONLY	1
14		98-350-00	HAND GRIP, 3/4 INCH I.D. X 4-1/2 LONG	1
15		30-702-00	CHAIN GUARD, MODEL SC ONLY	1
16		71-599-00	SWITCH CONSOLE COVER, MODEL SC ONLY	1
16		71-608-00	SWITCH COVER, MODEL AN ONLY	1
			BODY AND TRIM PARTS NOT ILLUSTRATED	
		94-313-00	DECAL, BATTERY WARNING	1
		94-373-00	DATA PLATE, VEHCILE	1
		94-378-00	DATA PLATE, BATTERY BOX	1
		95-952-XX	PAINT (1) QUART CAN, SPECIFY COLOR	1
		95-953-XX	PAINT (1) GALLON, SPECIFY COLOR	1
		95-954-XX	PAINT SPRAY CAN, STANDARD COLORS (16 OUNCE)	1
		77-864-00	STRAP, BATTERY HOLD DOWN - 14-1/8 LONG	2
		77-865-00	STRAP, BATTERY HOLD DOWN - 22-1/2 LONG	2
		77-866-00	STRAP, BATTERY HOLD DOWN - 28-1/2 LONG	2
		77-975-00	LIFT-OUT BATTERY BOX FOR 2 BATTERIES (170 AH AND 217 AH BOX ONLY)	1
		50-235-00	1/4 INCH BATTERY ROD - 21-3/4 LONG, WITH BEND	1
		50-236-00	1/4 INCH BATTERY ROD - 8 LONG, WITH BEND	2
		50-237-00	1/4 INCH BATTERY ROD - 24-1/2 INCH LONG, WITH BEND	2
		79-511-00	CORD HOLDER FOR BUILT IN CHARGER	
			ATTACHING HARDWARD USED WITH FIGURE INDICATED	
7		88-727-06	5/32 DIAMETER X 1/2 ALUMINIUM POP RIVET	4
8		88-067-07	1/4 X 1/2 N.C. SQUARE HEAD SET	
16,2		88-837-09	#14 X 3/4 PHILLIPS PAN HEAD SCREW	2,4
9,10,11		88-140-13	1/2 X 1-1/4 N.C. HEX HEAD CAP SCREW	4
9,10,11		88-148-62	1/2 LOCK WASHER	4
9,10,11		88-149-80	1/2 N.C. HEX HEAD NUT	4
13'		88-082-11	5/16 X 1 CARRIAGE BOLT	8
13		88-088-62	5/16 LOCK WASHER	8
13		88-089-80	5/16 N.C. HEX HEAD NUT	8