

OPERATION AND MAINTENANCE MANUAL WITH PARTS LIST

MODEL : C 4-10
SERIAL NUMBER : 86757 - 91988
YEAR : 1988 - 1991
MANUAL NUMBER: MC-410-00

- IMPORTANT -

READ AND FOLLOW INSTRUCTIONS GIVEN
IN SAFETY & OPERATIONS 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 possibility 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 switch 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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MC-410-00

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.

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 maintenance 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.

INSPECTION, SAFETY AND INTRODUCTION (continued)

SAFETY

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 7.

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.

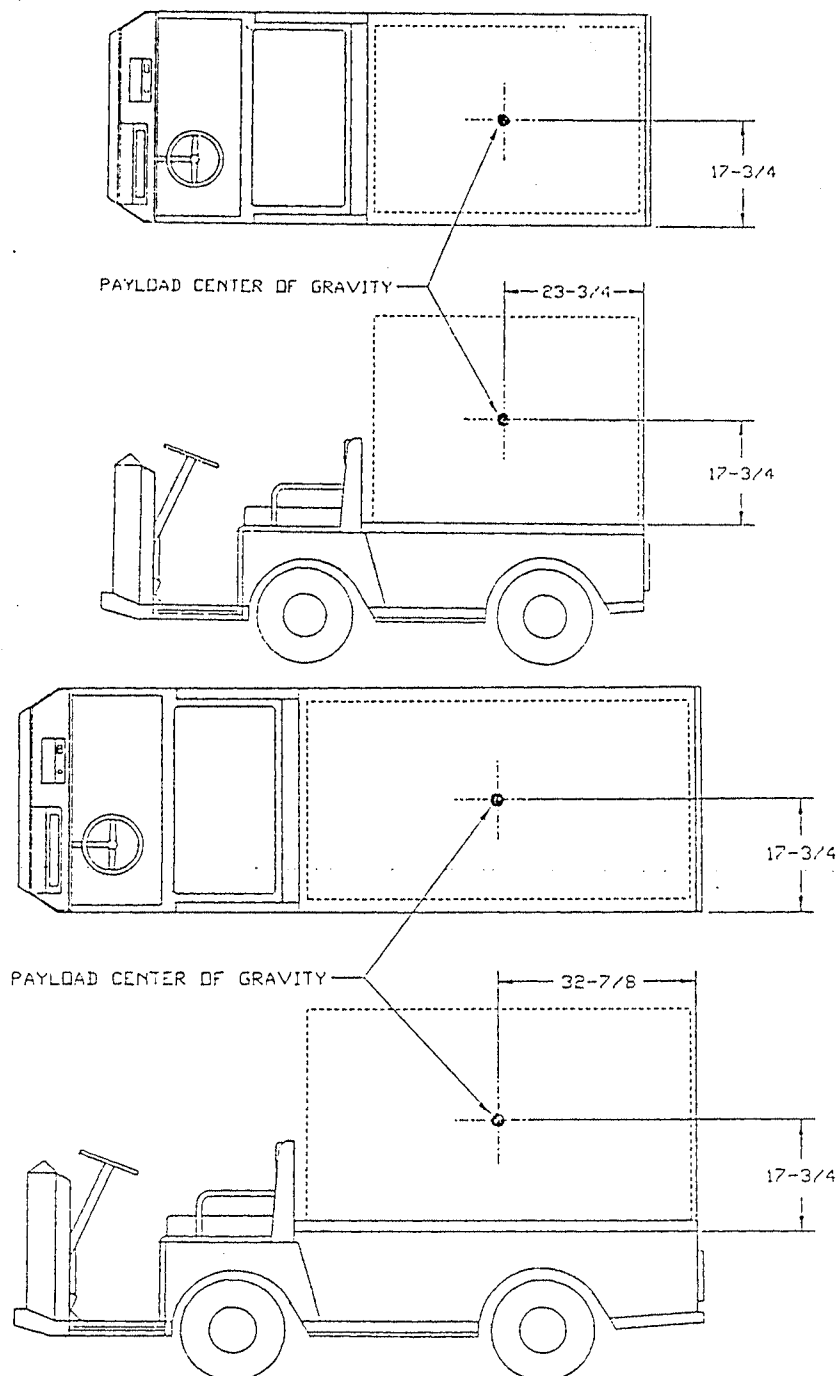
INSPECTION, SAFETY AND INTRODUCTION (continued)

INTRODUCTION

This vehicle is designed to be driven on smooth surfaces in and around industrial plants, nurseries, institutions, motels, mobile home parks and resorts. It is not designed to be driven on the public highways. It is not designed to go in excess of 15 mph on level surfaces or downhill. Speeds in excess of this may result in steering difficulty and possible loss of vehicle control. Vehicle is not designed to be towed in excess of 15 mph.

SERIAL NO.

The model number and serial number are on a decal attached to the cowl panel left of the steering column. In ordering parts or referring to your unit, please use these numbers. Replacement parts can be purchased directly from your local authorized dealer. This manual applies to model C 4-10 starting with serial number 86757.



C 4-10 PAYLOAD PROFILE FOR
VEHICLE CAPACITY RATING

C 4-10 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.

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.

SERVICE BRAKE (FOOT)

The brake pedal is designed and located for right foot operation. It is the pedal located to the left of the accelerator pedal. It functions the same as the brake pedal in your automobile. Depressing the pedal applies the braking action. The greater the effort applied to the pedal with your foot, the greater the braking action to your vehicle. Removing your foot from the pedal allows immediate release of the braking action to your vehicle.

FORWARD\REVERSE SWITCH

The forward/reverse switch is located on the instrument panel. It is a rocker type switch. Depressing the upper part places the vehicle in forward. Depressing the lower portion full downward places the vehicle in reverse. Center position is off. 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.

ACCELERATOR PEDAL

The accelerator pedal is located to the right of the brake pedal. It is designed for right foot operation similar to your automobile. Depressing the pedal turns the power on to the motor. It also controls the amount of power delivered to the motor. When driving your vehicle you will be able to feel full power when accelerator is fully depressed and minimum power when only partially depressed. You will have the same control of power in both directions of travel. Your forward/reverse switch determines the direction of travel and your accelerator pedal controls the speed.

HORN BUTTON

The horn button is located on the shelf to right of control panel. Depressing button sounds horn. Releasing button will immediately silence horn.

LIGHT SWITCH

The light switch that controls headlamps and taillamps is located in the instrument console.

OPERATING INSTRUCTIONS continued

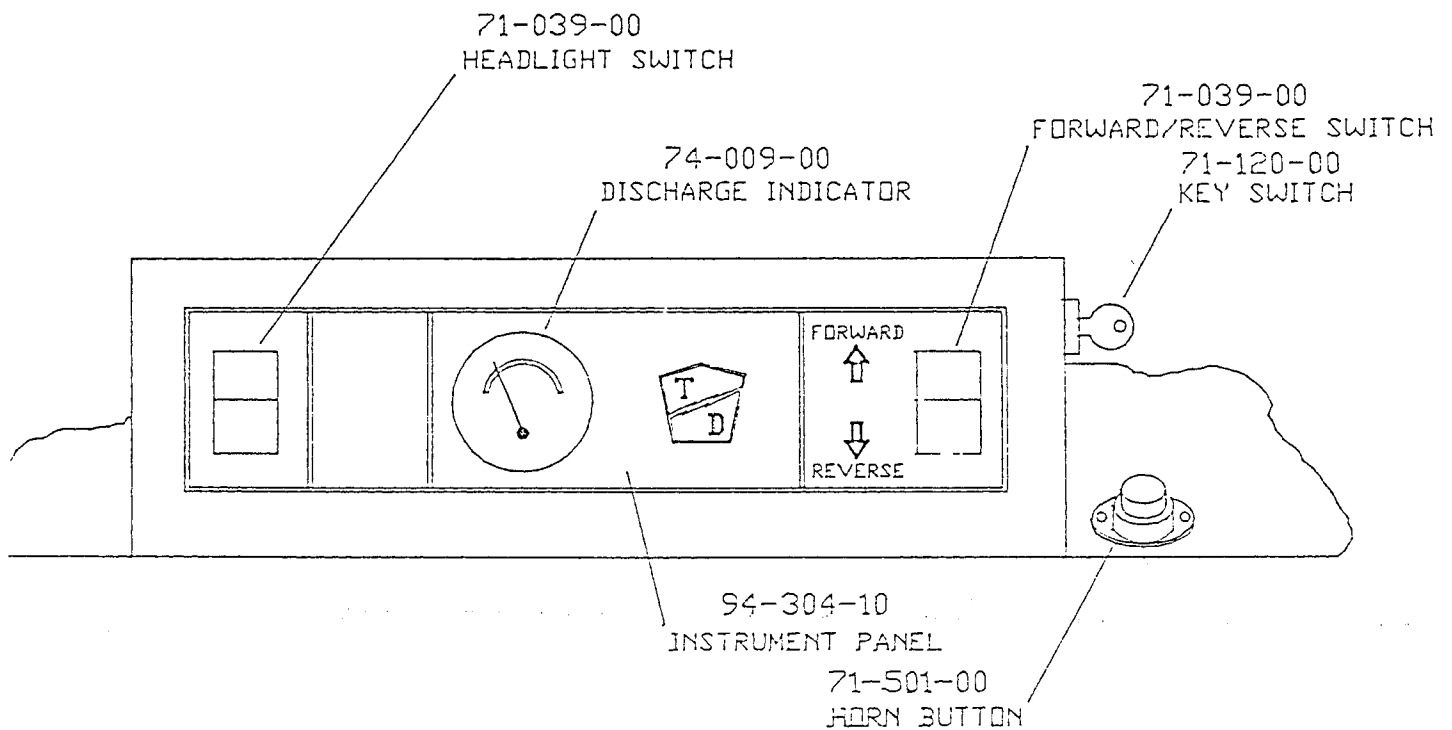
OPERATING YOUR VEHICLE

To put your vehicle into operation, sit on seat, turn key on (clockwise). Select direction you wish to travel by activating forward reverse switch then slowly depress accelerator pedal until vehicle is moving at the desired speed. Steer vehicle as required, utilizing the foot brake and accelerator to control your speed as desired.

CAUTION: DO NOT "hold" vehicle at a standstill on a hill or incline using accelerator only. 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 and remove key.

Drive safely and enjoy your Taylor-Dunn vehicle.



94-304-10
INSTRUMENT PANEL

OPERATING RESPONSIBILITIES
AMERICAN NATIONAL STANDARD PERSONNEL AND BURDEN CARRIERS
ANSI B 56.8-1981
SECTION 5
OPERATING RULES AND PRACTICES

501 OPERATOR QUALIFICATIONS

Only trained and authorized operators shall be permitted to operate a Personnel and Burden Carrier. Operators of Personnel and Burden Carriers 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.

502 PERSONNEL AND BURDEN CARRIER OPERATORS' TRAINING

(a) The carrier owner, lessee, or employee of the carrier operator shall conduct an operators' training program for the carrier operators.

(b) Successful completion of the operators' training program shall be required by the owner, lessee, or employer of the carrier operator before operation of the Personnel and Burden Carrier by any operator.

(c) An effective operator's training program should center around user company's policies, operating conditions, and their Personnel and Burden Carrier by any operator.

(d) Information on operator training is available from several sources, including carrier manufacturers.

(e) The carrier owner, lessee, or employer of the carrier operator should include in the operators' training program the following:

(1) Careful selection of the operators, considering physical qualifications, job attitude and aptitude.

(2) Emphasis on safety of stock, equipment operator, and other employees.

(3) General safety rules contained in this standard and the additional specific rules determined by the carrier owner, lessee, or employer of the carrier operator in accordance with this standard, and why they were formulated.

(4) Introduction of equipment, control locations and functions, and explanation of how they work when used properly and when used improperly; and ground and floor conditions, grade, and other conditions of the environment in which the Personnel and Burden Carrier is to be operated.

(5) Operational performance tests and evaluations during, and at completion of the program.

(6) Rules of the employer and any applicable labor contract governing and dealing with discipline of employees for violation of employer's rules, and including safety rules.

503 OPERATOR RESPONSIBILITY

Operators of Personnel and Burden Carriers shall abide by the following safety rules and practices in 504, 505, 506, and 507.

504 GENERAL

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

(b) Riding on the carrier by persons other than the operator is authorized only when personnel seat(s) are provided. Do not put any part of the body outside the outer perimeter of the carrier.

(c) When a Personnel or Burden Carrier is left unattended, stop carrier, place directional controls in neutral, apply the parking brake, stop the engine or turn off power, turn off the control or ignition circuit, remove the key if provided, and block the wheels if machine is on an incline.

OPERATING RESPONSIBILITIES continued
ANSI B56.8-1981

504 GENERAL continued

(d) A Personnel and Burden 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 of a Personnel and Burden Carrier is dismounted and within 25 ft. (7.6 m) of the carrier still in his view, he still must have controls neutralized, and brakes set to prevent movement.

(e) Maintain a safe distance from the edge of ramps and platforms.

(f) Use only approved Personnel and Burden Carriers in hazardous locations.

(g) Report all accidents involving personnel, building structures, and equipment.

(h) Operators shall not add to, or modify, the Personnel or Burden Carrier.

(i) Five aisles, access to stairways, and fire equipment shall be kept clear.

(j) Operators and personnel shall be warned of the hazards of long hair and loose clothing.

505 TRAVELING

(a) Observe all traffic regulations, including authorized plant speed limit. 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.

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

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

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

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

(f) Ascend or descend grades slowly.

(g) Use extra caution when operating on grades. Never turn on any grade, ramp, or incline; always travel straight up and down.

(h) 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.

(i) Make starts, stops, turns, or direction reversals in a smooth manner so as not to shift the load, overturn the carrier, or both.

(j) Do not indulge in stunt driving or horseplay.

(k) Slow down when approaching, or on, wet or slippery surfaces.

(l) Do not run 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.

(m) Avoid running over loose objects on the roadway surface.

(n) Prior to negotiating turns, reduce speed to a safe level, turning hand steering wheel or tiller in a smooth, sweeping motion.

506 LOADING

(a) Handle only stable or safely arranged loads. When handling off-center loads which cannot be centered, operate with extra caution.

(b) Handle only loads within the capacity of the Personnel and Burden Carrier as specified on the nameplate.

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

OPERATING RESPONSIBILITIES continued
ANSI B56.8-1981

507 OPERATOR CARE OF MACHINE

(a) At the beginning of each shift during which the Personnel and Burden 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.

(b) 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.

(c) Do not make repairs or adjustments unless specifically authorized to do so.

(d) The engine shall be stopped and the operator shall leave the carrier while refueling.

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

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

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

SECTION 6
MAINTENANCE PRACTICES

601 INTRODUCTION

Personnel and Burden Carriers may become hazardous if maintenance is neglected. Therefore, maintenance facilities, trained personnel, and procedures shall be provided.

602 MAINTENANCE PROCEDURES

(a) Maintenance and inspection of all Personnel and Burden Carriers shall be performed in conformance with the manufacturer's recommendations and the following practices.

(b) A scheduled preventive maintenance, lubrication, and inspection system shall be followed.

(c) Only qualified and authorized personnel shall be permitted to maintain, repair, adjust, and inspect Personnel and Burden Carriers.

(d) Before leaving the Personnel and Burden Carrier, stop carrier, place directional controls in neutral, apply the parking brake, stop the engine or turn off power, turn off the control or ignition circuit, and block the wheels if carrier is on an incline.

(e) Before undertaking maintenance or repair on carrier, raise drive wheels free of floor or disconnect battery, and use chocks or other positive carrier positioning devices.

(f) Block chassis before working under it.

(g) 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.

(h) Before disconnecting any part of the engine 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.

(i) Operation to check performance of the Personnel and Burden Carrier shall be conducted in an authorized area where safe clearance exists.

MAINTENANCE PRACTICES continued
ANSI B56.8-1981

602 MAINTENANCE PROCEDURES continued

- (j) Before starting to operate the carrier:
 - 1) Have operator in the operating position.
 - 2) Depress clutch (or brake pedal on automatic transmission and electric carriers).
 - 3) Place directional controls in neutral.
 - 4) Start engine or switch electric carrier to "on" position.
 - 5) Check functioning of directional speed controls, steering, warning devices steering, warning devices, and brakes.
- (k) 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, electrolyte, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
- (l) Properly ventilate work area.
- (m) Handle LP gas cylinders with care. Physical damage, such as dents, scrapes, or gauges, may dangerously weaken the tank and make it unsafe for use.
- (n) Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, guards, and safety devices shall be inspected regularly and maintained in a safe operating condition.
- (o) Special Personnel and Burden Carriers or devices designed and approved for hazardous area operation shall be inspected to ensure that maintenance preserves the original approved safe operating features.
- (p) Fuel systems shall be checked for leaks and condition of parts. Action shall be taken to prevent the use of the carrier until the leak has been corrected.
- (q) The Personnel and Burden Carrier manufacturer's capacity, operation and maintenance instruction plates, tags, or decals shall be maintained in legible condition.
- (r) Batteries, motors, controllers, limit switches, protective devices, electrical conductors, and connections shall be inspected and maintained in conformance with good practice.
- (s) Carriers shall be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.
- (t) 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.
- (u) Care shall be taken to assure that all replacement parts are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment.

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.	7		X	X	X
Check Tire pressure	10		X	X	X
Adjust Motor Mount & Chain (Refer to chart Section 10).	10		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
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				

MAINTENANCE GUIDE CHECKLIST continued

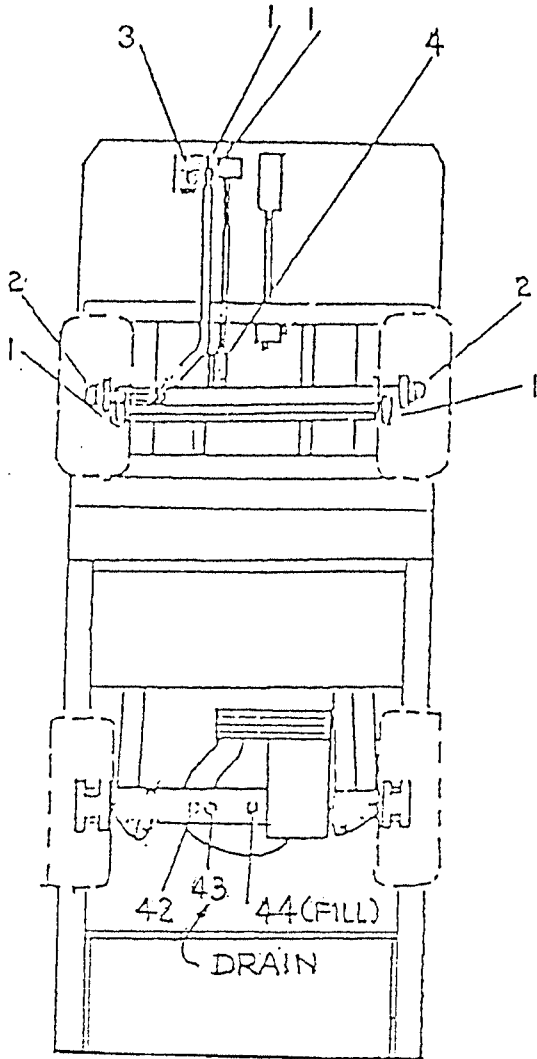
MAINTENANCE	REFER SECTION	EVERY WEEK	EVERY MONTH	EVERY 3 MONTHS	EVERY YEAR
Repack front wheel bearings (Use wheel bearing grease)	5,10				X
Lubricate steering gear box	5				X
* Check and adjust front wheel bearings	10			X	X

* Items related to safety recommendations.

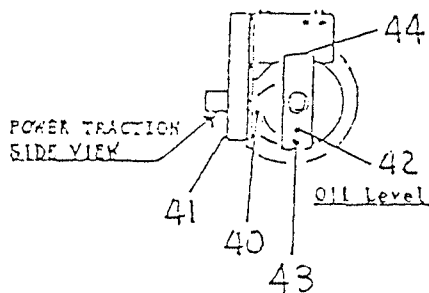
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Figure 1

LUBRICATION DIAGRAM



- | | | |
|---|---------------|------------------|
| A. <u>PRESSURE</u> | NO. OF | |
| <u>GUN GREASE</u> | <u>PLACES</u> | <u>FREQUENCY</u> |
| * 1. Ball Joints | 4 | 3 Months |
| * 2. Front Wheel Hub | 2 | 3 Months |
| * 3. Steering Gear Box | 1 | 1 Year |
| Fill to Grease Level | | |
| # 90 Gear Lube | | |
| B. 4. <u>BRAKE FLUID DOT #5 SILICONE</u> | | 1 Year |
| Master Cylinder | | |
| C. <u>SAE 30 OIL-AXLE & DIFFERENTIAL</u> | | |
| ** 42. Level Check | | (See Below) |
| *** <u>Change Oil - Power Traction</u> | | 3 Year |
| a. Remove Drain Plugs 41 & 43, | | |
| Level Plugs 40 & 42, Fill Plug 44 | | |
| b. Drain Oil, Replace 41 & 43 | | |
| c. Add Oil by 44 to level of 42 | | |
| d. Add Oil by 40 to 1/2 Inch below 40 | | |
| e. Replace 40, 42 and 44 | | |
| * Items related to safety recommendations | | |
| ** Check level whenever oil leakage is evident OR | | |
| *** After service work performed | | |
| D. <u>POWDERED GRAPHITE</u> | | |
| Key Lock | 1 | 1 Year |



TROUBLE SHOOTING PROCEDURES

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1. <u>Steering:</u>		
a) Hard Steering	1. Low tire pressure	Inflate to recommended pressure
b) Sloppy or loose	2. Loose wheel bearing	Adjust
2. <u>Brakes:</u>		
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. <u>Drive axle</u>		
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)

TROUBLE SHOOTING PROCEDURES

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
4. <u>Power System:</u>		
a) No power to motor in forward or reverse	1. Batteries discharged or defective 2. Forward-reverse switch maladjusted or worn 3. Motor brushes not con- tacting armature 4. Loose or broken wire 5. Motor defective	Recharge or replace batteries Adjust or repair forward-reverse contacts Adjust or replace Tighten or replace wire Replace or repair motor
b) Erratic Operation	1. Batteries discharged 2. Loose wire or wires 3. Motor brushes worn	Recharge batteries Tighten Replace brushes

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.

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 sediment (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.

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.

MAINTENANCE PROCEDURES, BATTERIES, continued

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 battery 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.

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:

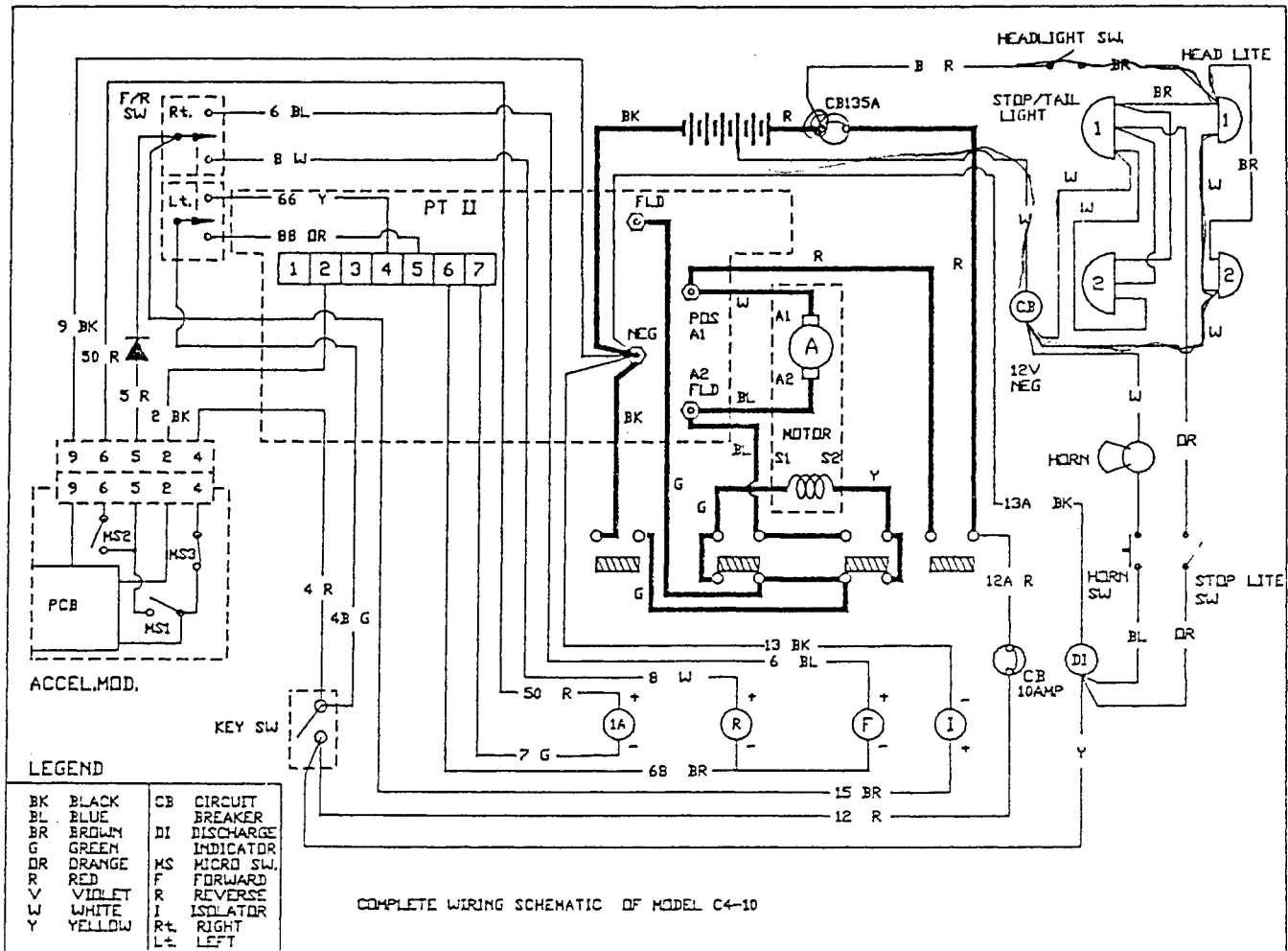
- a. Overcharging, b. Undercharging, c. Overdischarging, d. Excessive Water Consumption, e. Cleanliness, f. Worn Out Batteries, g. Excessive Current Consumption on Trucks

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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Figure 2



MAINTENANCE PROCEDURES
REFER TO SECTION 3
FRONT AXLE, STEERING AND TIRES

Your front axle and wheel assembly consists of an axle mounted on 2 leaf springs with automotive spindles, steering worm, and steering linkage. It has been designed for rugged dependable service with little maintenance requirements, other than lubrication and an occasional check of all nuts and bolts for tightness. Your wheels revolve on Timken Roller Bearings and the spindles are mounted with heavy kingpins.

Zerk type grease fittings have been provided to ensure proper amounts of lubricant reaching wear points.

It is recommended that you follow the maintenance guide and lubrication diagrams for normal maintenance of the assembly. They are located in Sections 4 and 5 of this manual.

The maintenance guide is set up for average use. If the vehicle is subject to long hours of running and heavy work loads the frequency of lubrication and service should be increased accordingly.

Refer to the service and adjustment page 3, Section 10 of this manual for guidance when performing major repairs and adjustments.

If your vehicle is equipped with 4 wheel hydraulic brakes, refer to the service and adjustment section of this manual under Hydraulic Brake Section 12 for their proper care and adjustments.

The steering worm gear box and steering linkage is similar to those used on autos. It requires very little attention. Refer to Section 10 for disassemble and reassemble Steering Worm Assembly.

Refer to Maintenance Guide and Lubrication diagrams, Sections 4 and 5 for normal care.

If service and adjustments are required, refer to appropriate section of this manual.

REMOVE AND INSTALL WHEEL HUB: ADJUST BEARINGS

1. Remove wheel cover
2. Remove dust cap
3. Remove cotter pin and unscrew spindle nut
4. Remove outer washer and bearing
5. Remove wheel, tire and hub assembly
6. Before re-assembly, thoroughly clean the bearings, spindle, and hub assembly. Inspect bearings for wear or damage. Examine inner seal. Replace damaged or worn parts.
7. Generously pack bearings with wheel bearing grease.
8. Reassemble in reverse order. Adjust wheel bearings before installing cotter pin.
9. Adjust wheel bearings by tightening spindle nut until bearing drag barely occurs, then back off spindle nut approximately 1/4 turn. Wheel should turn freely without noticeable bearing end play.
10. Install cotter pin, dust cap and wheel cover.
11. Wheel hub has one zerk fitting for periodic lubrication of bearing without disassembling hub. Refer to Lube Chart in Section 5.

SERVICE AND ADJUSTMENT continued
FRONT AXLE, STEERING AND TIRES

REMOVE AND INSTALL KING PINS AND BUSHINGS

1. Remove wheel and hub from spindle. See preceding subsection.
2. Remove ball joints from steering arms. Remove cotter pin and nut, rap stud sharply with soft hammer, or soft block and regular hammer, to loosen tapered stud from steering arm.
- 2a. Disconnect drag link ball joint at Pitman Arm, remove cotter pin and nut, rap stud sharply with soft hammer, or soft block and regular hammer, to loosen tapered stud from Pitman Arm.
3. Remove 7/8 lock nut which retains spindle and steering arm assembly to king pin.
4. Remove king pin from axle. If it is necessary to force the pin from the axle, use a soft rod, such as bronze or aluminum.
5. Remove spindle and steering arm assembly, and thrust bearing, from axle yoke.
6. Press bushings from spindle.
7. Thoroughly clean bushing housing and king pin before installing new bushings.
8. Press bushing into sleeve. If proper press is not available, most automotive supply houses and repair shops have capacity to perform this service.
9. Reassemble in reverse order. Lightly oil king pin and tap into place in axle. Where it is necessary to use force to assemble components, use a soft hammer or punch. When yoke and king pin are assembled to axle, drive king pin home to seat serrations into top yolk plate. Install nut to bearly touch lower yoke plate. DO NOT DRAW YOKE PLATES TOGETHER.
10. After reassembly, tighten ball joints securely. Lubricate bushings and king pin through grease fitting. Adjust wheel bearings as described in preceding subsection. Align front end as described in subsection titled "Align Front End: Adjust Toe-In".

ALIGN FRONT END: ADJUST TOE-IN

1. Caster and camber are set at the factory and do not require adjustment. To adjust toe-in, raise front end of vehicle off the ground.
2. With a pencil, make a mark around center of tread of tire by holding pencil point against tire while turning wheel. Mark both front tires.
3. Lower vehicle to ground. Loosen tie-rod sleeve clamps at each end of tie-rod so that adjusting sleeve can be turned.
4. With wheels in straight forward direction, measure the distance between pencil lines at the front of the tires, and the rear of the tires.
5. Adjust the tie-rod sleeve until the distance from mark to mark across the front of the tires is the same as the distance from mark to mark across the rear of the tires.
6. Tighten the adjusting sleeve clamp nuts securely, taking care to avoid changing the position of the adjusting sleeve.

REMOVE AND REPLACE BALL JOINT

1. Remove cotter pin and nut.
2. Loosen sleeve clamp.
3. Rap ball joint stud sharply with soft hammer or soft block and regular hammer to loosen tapered stud from steering arm.
4. Either measure position of ball joint or count number of threads exposed from sleeve. Remove ball joint by unscrewing from sleeve. Note that one end will be left hand thread and the opposite ball joint will be right hand thread.
5. Install new ball joint and position same as the one removed.
6. Install tapered stud in steering arm or Pitman Arm.

SERVICE AND ADJUSTMENT continued
FRONT AXLE, STEERING AND TIRES

REMOVE AND REPLACE BALL JOINT continued

7. Replace nut, tighten securely and replace cotter pin before tightening ball joint in Pitman arm. Make any necessary adjustments to coordinate (center) steering wheel when tires are aligned.
8. If ball joint replaced is part of the tie-rod, check toe-in and adjust if necessary - as described in subsection titled "Align Front End".
9. Tighten both sleeve clamps securely.
10. Lubricate ball joint through zerk fittings. Refer to Lube Chart in Section 5.

REMOVE AND REPLACE STEERING WORM ASSEMBLY

1. Pry steering wheel cap up to expose locknut.
2. Use wheel puller to remove steering wheel.
3. Remove steering arm with wheel puller.
4. Remove the 3 mounting bolts at bottom of steering assembly.
5. Remove U-bolt and lift out steering assembly.
6. Install steering gear with 3 mounting bolts.
7. Install U bolt.
8. Align wheels straight ahead.
9. Install steering wheel loosely. Center steering gear, turn full left return one and three quarters. Steering gear is now centered.
10. Install arm.
11. Center steering wheel and tighten nut.
12. Check that you will be able to turn the steering mechanism equally in both directions. If you cannot, it means the steering arm was not properly installed and it will be necessary to remove the arm and replace it in the proper position.
13. Lubricate steering worm through zerk fitting located on worm housing.

DISASSEMBLE AND REASSEMBLE STEERING WORM

Refer to Figure 4, Section 10

SERVICE AND ADJUSTMENT
FRONT AXLE, STEERING AND TIRES continued

TIRE CARE:

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

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.

TIRE INFLATION CHART							
TIRE LOAD RATING MAXIMUM				5 MPH	10MPH	15MPH	
TIRE SIZE	TYPE	EQUIVALENT LOAD RANGE	(COLD) INFLATION P.S.I.	MAXIMUM LOAD POUNDS			
4.80-8/400-8	HIGHWAY TREAD	A 2	35	640	505	470	
4.80-8/400-8	HIGHWAY TREAD	B 4	70	960	760	710	
4.80-8/400-8	STEELGUARD	C 6	100	1220	960	895	
5.70-8/500-8	HIGHWAY TREAD	B 4	60	1240	980	915	
5.70-8/500-8	HIGHWAY TREAD	C 6	90	1520	1240	1160	
5.70-8/500-8	STEELGUARD	D 8	100	1860	1470	1370	
16 X 6.50 X 8	TERRA TIRE	B 4	28		620		
18 X 8.50 X 8	TERRA TIRE	B 4	22		815		
18 X 9.50 X 8	TERRA TIRE	B 4	24		1040		

THE INFLATION AND LOAD RATINGS MOLDED ON HIGHWAY TREAD TIRES, PER FEDERAL STANDARD FMVSS-119, ARE FOR MAXIMUM HIGHWAY SPEEDS AND DO NOT APPLY TO THIS LOW SPEED VEHICLE.

TAYLOR-DUNN MANUFACTURING COMPANY

CAUTION: Do not over-inflate tires as this will promote increased wear. Under inflation especially on hard surfaces also promotes undue wear and should be avoided.

FRONT AXLE AND STEERING C 4-10

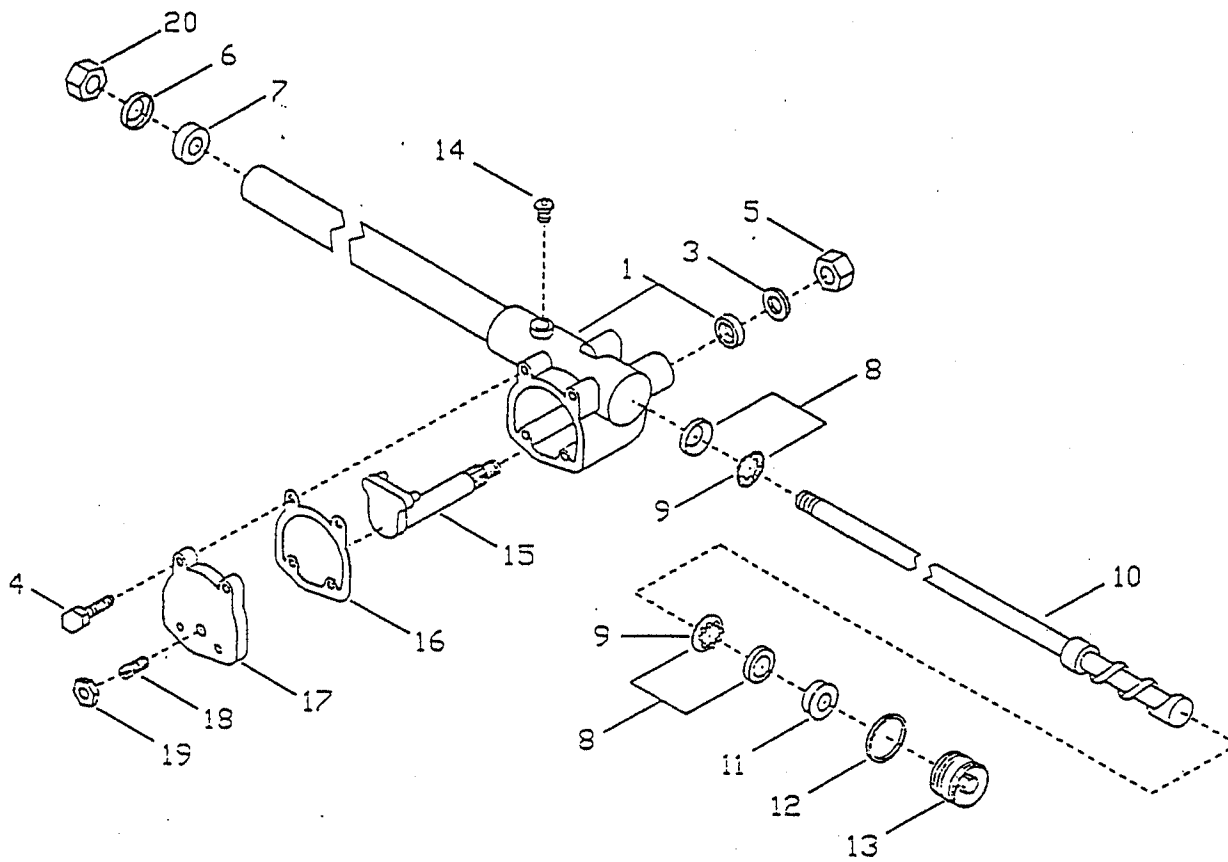
Figure 3

ID.NO.	PART NO.	DESCRIPTION	QTY.
1	18-311-10	Steering Gear, 26 In. Tube	1
2	19-011-25	Cover, Steering Wheel	1
3	88-199-82	5/8 NF Hex Jam Nut	1
4	18-111-10	Arm, Steering 5-3/4	1
5	19-011-20	Wheel, Steering	1
6	88-188-62	5/8 Lock Washer	1
7	88-199-81	5/8 NF Hex Nut	1
8	16-865-02	Plate, 1-3/4 Spring x 2 Sq. Axle	2
9	88-109-81	3/8 NC Locknut	8
10	21-020-00	King Pin	2
11	87-074-00	Grease Fittings	6
12	86-501-98	Ball Joint, Lt.	2
13	86-501-99	Ball Joint, Rt.	2
14	88-159-85	1/2-20 NF Hex, Slotted	1
15	88-527-11	Cotter Pin	5
16	86-510-00	Clamp, Ball Joint	4
17	18-057-11	Sleeve, Steering	1
18	18-041-00	Sleeve, Steering	1
19	15-410-00	Weldment, Axle, Front	1
20	85-512-00	Spring, Leaf, 1-3/4 Wide x 27-3/8 Eye to Eye	2
21	88-189-81	5/8 NC Locknut	2
22	15-210-10	Assembly, Front Axle	1
23	45-336-00	Oil Seal	2
24	80-017-00	Tapered Roller Bearing	2
25	80-103-00	Tapered Bearing Race	2
26	12-124-00	Front Hub	2
27	96-340-10	Lug Bolt	10
28	97-236-00	Lug Nut	10
29	88-228-61	3/4 Washer	2
30	96-123-00	U Bolt	4
31	92-104-00	Dust Cap	1
32	10-081-00	Tire, 5.70 x 8 Load Range B, Highway Tread	2
33	88-239-85	Nut, Slotted, 3/4 NF Hex	2
34	12-012-00	Wheel, 4.80, 5.70 x 8, 5 Hole, Tubeless (with 13-742-00)	2
35	13-742-00	Ass'y, Tire, Whl, 5.70 x 8 Load Range B, HT	2
36	16-870-10	Link-Plate, 2-1/4, Zinc Plated	4
37	96-248-00	Bolt-Shackle, 9/16 x 3	6
38	32-213-00	Bushing, Nylon	6
39	88-179-86	9/16-18 NF 2B, Locknut	6
40	14-210-88	Spindle, Weldment, Lt.	1
41	14-210-99	Spindle, Weldment, Rt.	1
42	97-180-55	Thrust Washer	4
43	87-077-00	Grease Fitting	1
44	32-240-55	Bushing	4
45	00-210-16	Mount Weldment, Steering Gear	1
46	96-124-02	U-bolt, Steering Column Shaft	1
47	88-069-81	5/16 NC Locknut	2
48	88-151-16	1/2 x 2 NF Hex Screw, Gr. 5	1
49	88-151-13	1/2 x 1-1/4 NF Hex Screw	1
50	88-159-82	1/2 NF Jam Nut	2

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Figure 4

STEERING WORM ASSEMBLY



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Figure 4

STEERING WORM ASSEMBLY
18-311-10

FIG. I.D.	PART NO.	DESCRIPTION	QTY.
1	18-311-79	Housing, with Seal & Column (45-350-00 Seal)	1
2	18-311-59	Oil Seal	1
3	88-188-62	5/8 Lock Washer	1
4	88-080-10	5/16 x 7/8 NC Hex Screw	4
5	88-199-80	5/8 NF Nut	2
6	97-200-00	Cover, Dust	1
7	18-311-55	Bearing, Column	1
8	18-311-56	Ball Cup Kit	2
9	18-311-53	Cup-Ball	2
10	18-311-51	Cam & Tube Assembly	1
11	41-972-00	End Plug	1
12	18-311-70	Seal	1
13	97-231-00	1-7/8 Lock Nut	1
14	87-077-00	Grease Fitting	1
15	18-311-78	Lever Shaft Assembly (Includes: 88-188-82 & 88-190-80)	1
16	18-311-58	Gasket	1
17	18-311-77	Side Cover	1
18	18-311-74	Adjusting Screw	1
19	88-159-82	1/2 NF Jam Nut	1
20	88-199-82	5/8 NF Hex Jam Nut	1

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MAINTENANCE, SERVICE AND PARTS

POWER TRACTION REFER TO FIGURE 5

Adjustment of Drive Chain Tension - Power Traction

1. CAUTION: Disconnect both main battery leads to prevent accidental engagement of power while servicing vehicle.
2. Tighten three motor mounts.
3. Loosen and unscrew each nut exactly one full turn.
NOTE: This procedure is very important, for if the nuts are too loose or too tight, and error will result in the final adjustment which will seriously reeduce the lift of the chain.
4. Loosen adjusting set screw lock nut. Using standard socket set screw wrench, turn set screw clockwise until tight. (If a torque wrench is available, tighten to 80" lbs. torque). Without a torque wrench, bear in mind that a standard socket set screw wrench is approximately 4" long. An 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	100 Hours	New unit or after installing new chain
2nd Adjustment	Next 150 Hours	Normal running conditions
3rd Adjustment	Next 250 Hours	Normal running conditions
Thereafter	Every 400 Hours	Normal running conditions

Removal of "Power Traction" Rear Axle & Drive Assembly From Chassis

1. CAUTION: Disconnect both main battery leads to prevent accidental engagement of power while servicing vehicle.
2. Clearly mark motor leads to ensure their proper location when re-assembling.
3. Remove motor leads.
4. Disconnect hydraulic brake line hoses.
5. Disconnect brake rods at calipers.
6. Remove Shackle Bolt clamp and nuts attaching spring to frame.
7. Remove axle and drive assembly from chassis.
8. Install axle and drive assembly in the reverse order of removal, taking care that support pads and bushing are in good condition (Replace if worn or damaged.)
9. Check brake adjustments as outlined in Section 11.
10. It will be necessary to bleed the air from brake system. Follow procedure outlined in Hydraulic Brake Section 11.

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MAINTENANCE, SERVICE AND PARTS continued

Disassembly of "Power Traction" Rear Axle

1. Remove unit from chassis (As previously outlined).
2. Remove wheels and drain oil from housing.
3. Remove nuts and bolts, and remove drive case cover.
4. Remove 3 nuts and washers and remove motor and mount plate. (If motor requires further service, refer to appropriate Section 11 of this manual).
5. Remove chain and pinion sprocket. Observe location of spacers on shaft. Refer to Figure 5 for their correct location.
6. Remove five bolts holding back plate and remove from carrier housing.
7. Disconnect hydraulic line.
8. Remove four bolts on each end holding axle retainer / brake holding plate and pull both axles.
9. Remove nuts around differential carrier housing and remove carrier from axle housing. (Note position of clip for proper reassembly of brake spring.)
10. Mark one differential bearing cap and bearing support to ensure proper assembly. Remove adjusting nut locks, bearing caps, and adjusting nuts.
11. Remove drive gear from differential case.
12. Drive out differential pinion shaft retainer and separate the differential pinion shaft and remove gears and thrust washers.
13. Remove drive pinion retainer from carrier, Remove O-ring from retainer.
14. Remove pinion locating shim. Measure shim thickness with micrometer.
15. 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.
16. Remove drive pinion retainer from carrier. Remove O-ring from retainer.
17. Press the pinion shaft out of front bearing cone and remove spacer.
18. Remove pinion bearing cone.
19. 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" feeler gauge between cup and bottom of bore.

Re-Assembly of Power Traction Rear Axle

1. Differential Case: Place a side gear and thrust washer in the differential case bore. LUBRICATE ALL PARTS LIBERALLY WITH AXLE LUBRICANT DURING ASSEMBLY. With a soft faced hammer, drive pinion shaft into case only far enough 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 inside gear spline to check for free rotation of differential gears. Insert two 7/16" x 2" bolts through differential 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 lb. ft. torque.
2. If the differential bearings have been removed, use a suitable press to install them.
3. Pinion and Retainer: Install pinion rear bearing cone on the pinion shaft. Install spacer with shims on shaft. Place the bearing retainer on the pinion shaft, and install the front bearing cone.

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MAINTENANCE, SERVICE AND PARTS

Re-Assembly of Power Traction Rear Axle

4. Lubricate both bearings with differential oil. Place spacers, sprocket and drum on spline with nut and washer and tighten to 100 lb. ft. torque.
NOTE: The bearing should spin free but have no play. If tight or loose, adjust with .005" and .019" shims.
5. Shim Selection: Manufacturing tolerances of the pinion bore dimensions for the best operating position of the gears, make a shim adjustment 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" shim. If a new assembly is being built, a .0015" shim should be used for a tentative build-up. Shims are available in .010" to .021" thicknesses in steps of .001". Pinions and drive gears are marked, when matched with the same number. Following the number on the pinion is a minus (-) or plus (+) followed by a number. If the pinion is marked "-1" it indicates that a shim .001" thinner than a standard shim for this carrier is required. A minus number means the pinion should be moved closer to the drive gear and a thinner than a standard shim for this carrier is required. A minus number means the pinion should be moved closer 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" and the original pinion is marked -1", the new pinion requires a +1 shim. Therefore, the new pinion requires a .002" thicker shim, and a .017" shim should be used. If the new pinion is marked the same as the old pinion, no shim change is required.
6. After the proper selection of shims, insert "O" ring seal and pinion retainer assembly into differential carrier. Tighten 5 retainer bolts to 50 lb. ft. torque. (Note: The 5 bolts will have to be removed later to install back plate assembly).
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 inevitably lead to gear noise and wear. Gear backlash must be set at the same time to a tolerance of .005" to .009". Note: It will be necessary to release some of the cap bolt tension in order to allow the bearing to move while making the adjustments. If the caps are too loose an error will result when trying to set backlash and bearing clearance. Therefore, double check your setting after the cap bolts have been tightened. If necessary, make corrections near settings until their specified tolerances are maintained after the cap bolts have been tightened.
9. Install nut locks.
10. Install differential carrier assembly in axle housing using new gasket and gasket sealer.
11. Install axles, brake assemblies, bearing retainers, and gaskets. Note: Axles are equipped with special sealed bearings. Should there be evidence of seal leakage, it is recommended that a new bearing and new bearing retainer ring be pressed onto the axle shaft, and a new gasket be installed between the bearing and bearing seat in the housing. Refer to figure 5.
12. Install gasket (use gasket sealer) and back plate assembly. Tighten 5 bolts to 50 lb. ft. torque.

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MAINTENANCE, SERVICE AND PARTS

Re-Assembly of Power Traction Rear Axle

13. Install spacer, sprockets and chain in the reverse order to which they were removed. Take care that 3/16" woodruff key is in proper position and all spacers are in original position. Tighten 3/4" motor shaft nut to 75 lb. ft. torque (if sprocket was removed from motor).
14. Install motor and motor mount plate with "O" ring. Do not tighten 3 nuts until final adjustment is made. Be sure motor terminals are located in the same position as when motor was remove.
15. Install pinion shaft washer and nut. Tighten to 100 ft. lb. torque.
16. Install gear case cover to back plate and pinion shaft. Assemble, but do not tighten, retaining bolts and nuts.
17. Tighten gear case cover retaining bolts and nuts.
18. Replace wheels and fill chain and differential housing with approximately 2 qts. SAE 30 oil.
19. Replace unit in chassis following steps 10 to 12 outlined in Section titled "Removal of Power Traction Rear Axle", page 2, Section 11.
20. Adjust motor mount plate (as outlined in Motor Adjustment Section following) to proper chain tension.

Adjustment of Motor Mount To Tension Chain

1. Tighten three motor mount nuts.
2. Loosen and unscrew each nut exactly one full turn.
Note: This procedure is very important for if the nuts are too loose or too tight an error will result in the final adjustment which will seriously effect the life of the chain.
3. Loosen adjusting set screw lock nut. Using standard socket set screw wrench, turn set screw clockwise until tight. (If a torque wrench is available, tighten to 80 inch lbs. torque.) Without a torque wrench bear in mind, that a standard socket set screw wrench is approximately 4" long. An 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.
4. 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.
5. Tighten locknut, DO NOT allow adjusting screw to move while tightening locknut.
6. 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.
7. 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	HOURS RUNNING	COMMENTS
1st Adjustment	0	New Unit or After Installing New Chain
2nd Adjustment	Next 100 Hrs	Normal Running Conditions
3rd Adjustment	Next 150 Hrs	Normal Running Conditions
4th Adjustment	Next 250 Hrs	Normal Running Conditions
Thereafter	Every 400 Hrs.	Normal Running Contitions

C 4-10
MAINTENANCE, SERVICE AND PARTS

Removal of Motor For Minor Repairs

1. **CAUTION:** Disconnect both main battery leads to prevent accidental engagement of power while servicing unit.
2. Drain oil from gear case by removing drain plug.
3. Remove all bolts and nuts around gear case cover.
4. Remove gear case cover.
5. Clearly mark motor leads to ensure their proper location when re-assembling. Remove motor leads.
6. Remove 3 nuts and washers and remove motor and mount plate.
7. When replacing motor, remove nut, washer, sprocket, and spacers, also remove motor mount plate. NOTE: Observe location of motor terminals in relation to motor mount plate.

Install Motor in "Power Traction" Drive

It is not necessary to remove motor mount plate when performing minor motor repairs. Therefore, follow step 1 only when replacing motor with new one.

1. Clean motor surface and install mounting plate with four flat head cap screws. Tighten to 30 lb. ft. torque. Stake head in place with centerpunch. NOTE: It is important to locate the motor mount plate in relation to the motor terminal so that the motor terminals will be in an accessible location when drive is completely assembled.
2. Place "O" ring into motor mount plate opening and attach motor and plate to back plate.
3. Re-assemble drive in the reverse order to that removed.
4. Adjust motor mount to obtain proper chain tension.
5. Refill gear case with SAE 30 oil.
6. CORRECT 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" 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.

Motor Repairs

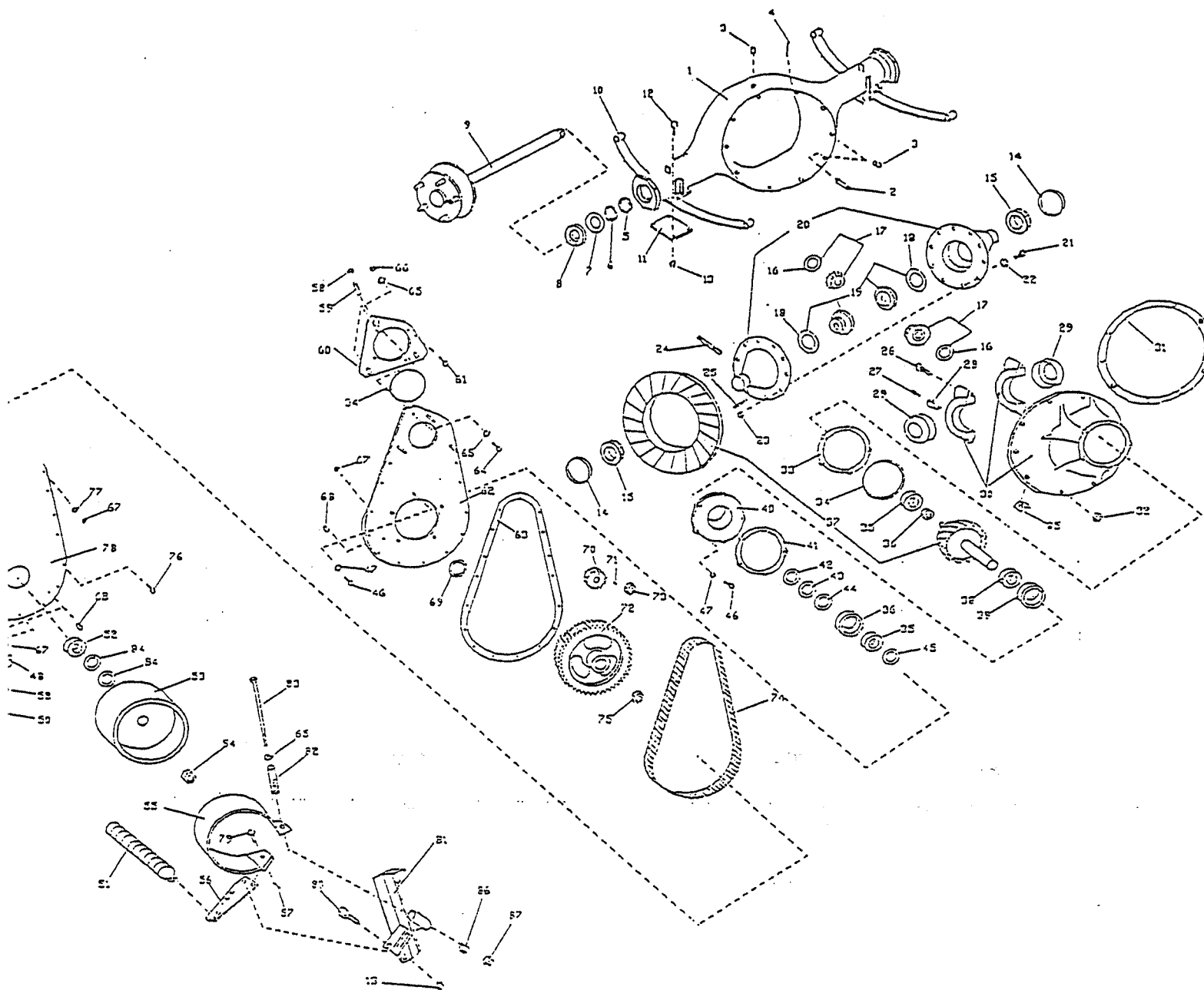
Unless the maintenance man is properly qualified, it is advisable that repair work be done at a qualified service station. When ordering replacement parts, give complete name plate data.

Disassembly of Motor (Refer to Section 12)

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Figure 5

REAR AXLE, POWER TRACTION AND BRAKE



C 4-10

FIGURE 5

REAR AXLE, POWER TRACTION AND BRAKE PARTS LIST

FIG I.D.	PART NO.	DESCRIPTION	QTY.
1	41-290-50	HOUSING, 25.25, F2, LRG BRG	1
2	96-330-00	BOLT, DIFFERENTIAL	10
3	41-997-00	PLUG, PIPE, 1/8	3
4	88-527-11	1/8 X 1 COTTER PIN	1
5	45-301-00	SEAL, OIL	1
6	32-515-00	RETAINER RING	2
7	45-044-00	GASKET	2
8	80-503-00	BEARING, AXLE	2
9	41-152-20	AXLE, 13-1/8, W/DISC, LRG BRG	1
	41-152-30	AXLE, 15-9/16, W/DISC, LRG BRG (PASSENGER SIDE)	1
10	85-513-10	SPRING, REAR, 4 LEAF	2
11	16-861-00	SPRING, PAD	2
12	88-101-18	3/8 X 2-1/2 NC HEX BOLT GRADE 5	8
13	88-109-81	3/8 NC LOCKNUT	10
14	80-127-00	RACE, BEARING, TAPERED	2
	80-128-00	RACE, BEARING, TAPERED	0 or 2
	80-129-00	RACE, BEARING	0 or 2
15	80-511-00	BEARING, TAPERED, ROLLER	2
	80-512-00	BEARING, TAPERED, ROLLER	0 or 2
	80-513-00	RACE, BEARING	0 or 2
16	41-702-00	THRUST WASHER	2
17	41-703-00	KIT, DIFFERENTIAL PINION GEAR	1 KIT
18	41-704-00	THRUST WASHER	2
19	41-705-00	KIT, DIFFERENTIAL SIDE GEAR	1 KIT
20	44-340-10	3RD MEMBER, 2.69/2.70/2.75/2.91	1
21	96-243-00	7/16 X 7/8 NF GRADE 5 BOLT	10
22	97-163-00	7/16 WASHER	10
23	88-139-80	7/16 NF NUT	10
24	41-700-00	SHAFT, DIFFERENTIAL PINION	1
25	41-701-00	TENSION PIN	1
26	88-140-16	1/2 X 2 NC HEX BOLT	4
27	88-080-09	5/16 X 3/4 NC HEX BOLT	2
28	41-706-00	NUTLOCK, DIFFERENTIAL BEARING ADJUST	2
29	41-707-00	NUT DIFFERENTIAL BEARING ADJUST	2
30	41-710-00	DIFFERENTIAL HOUSING	1
31	45-042-00	GASKET, DIFFERENTIAL HOUSING	1
32	88-119-80	3/8 NF NUT	10
33	41-711-00	SHIM, PINION	1
34	80-702-00	O-RING, PINION	1
35	80-553-00	BEARING, ROLLER, PINION	1
36	41-714-00	RETAINER, BEARING	1
37	31-235-00	RING AND PINION GEAR SET, 2.75 RATIO	1
38	80-554-00	BEARING, TAPERED ROLLER	2
39	80-125-00	BEARING RACE	2
40	44-340-90	PINION CASE ASSEMBLY	1
41	45-021-00	GASKET	1
42	16-415-00	SPACER, F2, .440 THICK	1
43	16-419-00	SPACER, F2, .002 THICK	2 to 6
44	16-411-00	SPACER, F2, .005 THICK	2 to 6
45	16-420-00	SPACER, F2, .010 THICK	2 to 6
46	88-101-13	3/8 X 1-1/4 GRADE 5 BOLT	5
47	88-108-63	3/8 INT TOOTH LOCK WASHER	5
48	41-371-00	BRAKE, ALIGNMENT BRACKET	2
49	94-400-01	PERMATEX (APPLY FROM TUBE)	
50	88-080-11	5/16 X 1 NC HEX BOLT	1

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FIGURE 5

REAR AXLE, POWER TRACTION AND BRAKE PARTS LIST

FIG I.D.	PART NO.	DESCRIPTION	QTY.
51	85-270-00	EXTENSION SPRING, 1-1/4 X 4-3/8	1
52	45-331-00	SEAL, OIL	1
53	41-532-00	BRAKE DRUM	1
54	97-250-00	NUT, WITH WASHER, 3/4 X F	1
55	41-661-00	FULL BRAKE BAND	1
56	50-656-00	BRAKE LEVER ARM	1
57	88-517-11	COTTER PIN	1
58	88-089-80	5/16 NC NUT	2
59	88-087-11	5/16 X 1 NC SOCKET SET SCREW	1
60	70-454-00	PLATE, MOTOR MOUNT	1
61	88-103-09	3/8 X 3/4 NC SOCKET FLAT SCREW	4
62	44-352-53	BACKING PLATE, CHAIN CASE	1
63	45-002-00	GASKET, GEAR CASE	1
64	88-101-13	3/8 X 1-1/4 NC, GRADE 5 BOLT	1
65	88-108-60	3/8 WASHER	5
66	88-109-87	3/8 KEPS NUT	3
67	88-089-81	5/16 NC LOCKNUT	14
68	41-989-00	DRAIN PLUG	3
69	16-418-00	SPACER, .140 THICK	1
70	30-080-00	SPROCKET, 15 TOOTH, 17/32 FACE	1
71	97-100-00	1/8 X 5/8 WOODRUFF KEY	1
72	30-093-00	SPROCKET, 81 TOOTH, 17/32 FACE	1
73	88-239-82	3/4 NF HEX JAM NUT	1
74	30-508-20	CHAIN, SSG	1
75	97-250-00	NUT, PINION, 3/4 X FINE	1
76	88-080-20	5/16 X 3 NC HEX BOLT	9
77	88-088-61	5/16 SAE WASHER	12
78	43-201-20	COVER, CHAIN CASE	1
79	96-771-00	CLEVIS, PIN, 3/8 X 3/4	1
80	88-100-13	3/8 X 1-1/4 NC HEX BOLT	1
81	41-372-10	BRAKE MOUNTING BRACKET	1
82	85-060-10	COMPRESSION SPRING, 11/16 X 2-1/2	1
83	96-245-10	BOLT, 1/2 X 5 NF GRADE 2	1
84	16-400-00	SPACER, .125 THICK	0, 1, or 2
85	91-509-00	SPRING CLIP	1
86	88-159-84	1/2 NF LOCKNUT	1
87	88-159-82	1/2 NF JAM NUT	1

MAINTENANCE PROCEDURES
HYDRAULIC DISC BRAKE SYSTEM

The hydraulic disc brake system consists of three primary sub-systems.

- 1) The master cylinder with fluid lines.
- 2) The mechanical control linkage, foot brake interconnections to the caliper assemblies.
- 3) The caliper assembly as it mounts to housing.

Each rear wheel is fitted with a hydraulic (calipers) disc brake assembly.

Refer to Maintenance Guide Section 4 and Lubrication Diagram Section 5 for proper lubrication and frequency of inspection.

Master cylinder fluid level should be checked monthly. Add fluid as needed to maintain level 3/8" to 1/2" from top of fill port. Use only approved hydraulic brake fluid, DOT #5, silicone. This fluid gives longer system life and reduces maintenance. It is perfect for hydraulic disc brakes.

A visual inspection of the hydraulic system is recommended on a monthly basis to detect any signs of leakage. Repairs should be made immediately if leakage is discovered.

A spongy action on brake pedal or a low engagement point on pedal usually indicates air entrapment.

SERVICE AND ADJUSTMENT
HYDRAULIC BRAKE SYSTEM

The loss of brake pedal action may be due to a defective master cylinder. It can usually be detected by signs of fluid leakage at master cylinder or by the action of the brake pedal. When foot pedal pressure is applied you will feel the brakes engage, yet, the pedal will continue to travel downward. A ruptured hydraulic line or a defective wheel cylinder will produce the same action. You can determine the cause by the location of brake fluid leakage. Adjust dead man brake at rear, on rods. NOT under seat. Under seat is initial factory setting requiring no changes.

MASTER CYLINDER REPAIR OR REPLACE

1. Remove cotter pin, clevis pin, and remove push rod. (It will slide out of master cylinder socket).
2. Disconnect hydraulic line at cylinder. (There will be 2 lines on 4 wheel brake system).
3. Remove 2 holding bolts and lift master cylinder out of chassis.
4. Cylinder should be thoroughly cleaned.
5. Remove boot and locking ring.
NOTE: Piston parts are under spring pressure, take care that they do not pop out when you remove lock ring.
6. Remove piston and cup assembly.
7. Inspect cylinder wall. If scoring or roughness is present it must be removed with a fine hone.
8. Taking care that all parts are kept clean, install new piston and assembly kit. A diagram is furnished with each kit. It is also recommended that parts are coated with a small amount of brake fluid prior to assembly.
9. Replace lock ring and boot.
10. Install cylinder in chassis in reverse order to which it was removed.
11. ADJUST push rod by loosening locknut and shortening or lengthening the rod so that when brake pedal is fully raised the push rod should be within 1/16" of contacting piston socket. A good way to be certain is to remove clevis pin. While lightly holding rod against socket (DO NOT PUSH HARD ENOUGH TO MOVE PISTON) observe the alignment of clevis and hole. When correct you will have to pull rod approximately 1/16" out of socket to insert clevis pin.

MAINTENANCE PROCEDURES continued
HYDRAULIC DISC BRAKE SYSTEM

MASTER CYLINDER REPAIR OR REPLACE continued

12. Tighten locknut and install cotter pin.
13. Fill master cylinder to top with DOT #5 brake fluid or, if available, attach brake bleeder tank to master cylinder.
14. When using bleeder tank, loosen air bleeder valve (located at each wheel cylinder), one at a time. Allow fluid to flow until air pockets and bubbles stop and a clear stream appears.

WHEN BLEEDER TANK IS NOT AVAILABLE

It is necessary to utilize 2 people to bleed brake system when bleeder tank is not available. One person will operate brake pedal and add fluid to master cylinder as needed. The other person will operate bleeder valves. While one person applies brake pedal pressure, loosen bleeder valve. Fluid and air will be forced out on the downward stroke of the pedal. The person operating pedal must hold it down at the end of its stroke while the other person closes bleeder valve. If pedal is raised while bleeder valve is open air will be drawn back into the system. By coordinating the movements of the 2 people, air will be bled out by each downward stroke of the pedal. It is wise to refill master cylinder after every 3 or 4 strokes to ensure against any air being drawn in because of the reservoir level being too low. Usually 2 to 4 strokes per wheel cylinder is sufficient to remove air from systems.

15. Allow vehicle to sit 15 minutes to stabilize. (Air bubbles can be trapped in silicone brake fluid and must be allowed to collect). Repeat step 2, one more time.
16. Remove brake bleeder tank if used. Fill master cylinder 3/8" to 1/2" of top and replace cover.

REMINDER: USE DOT #5 BRAKE FLUID

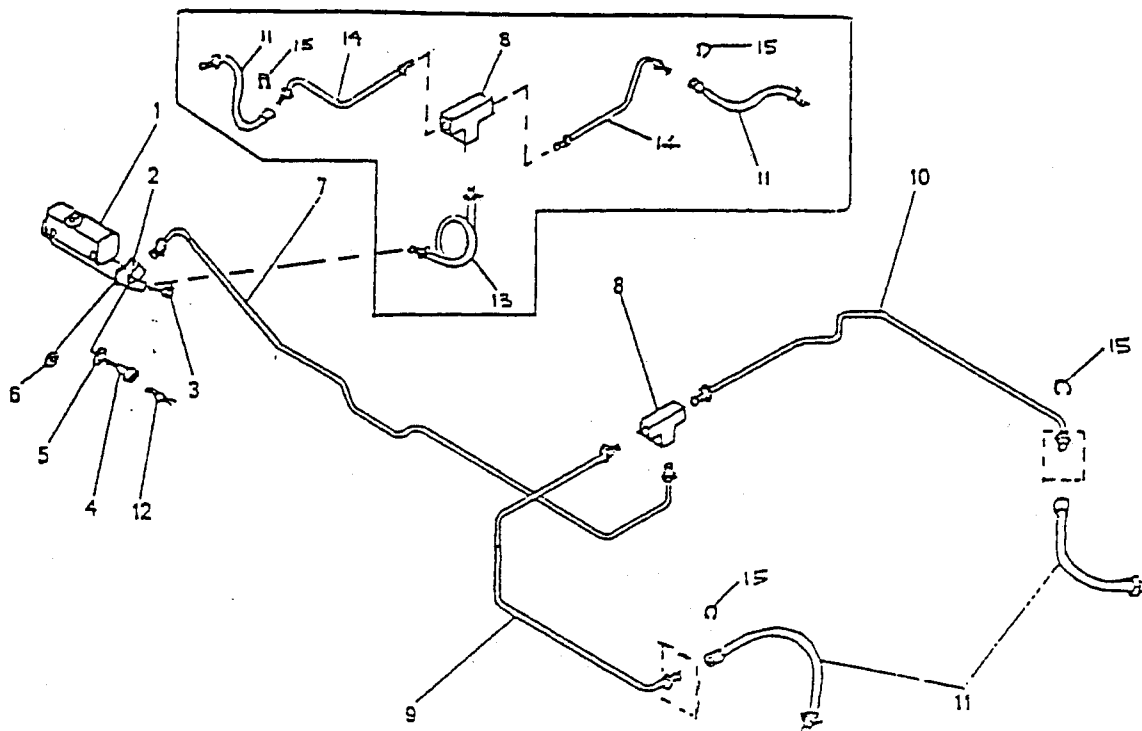


Figure 6

HYDRAULIC BRAKE SYSTEM

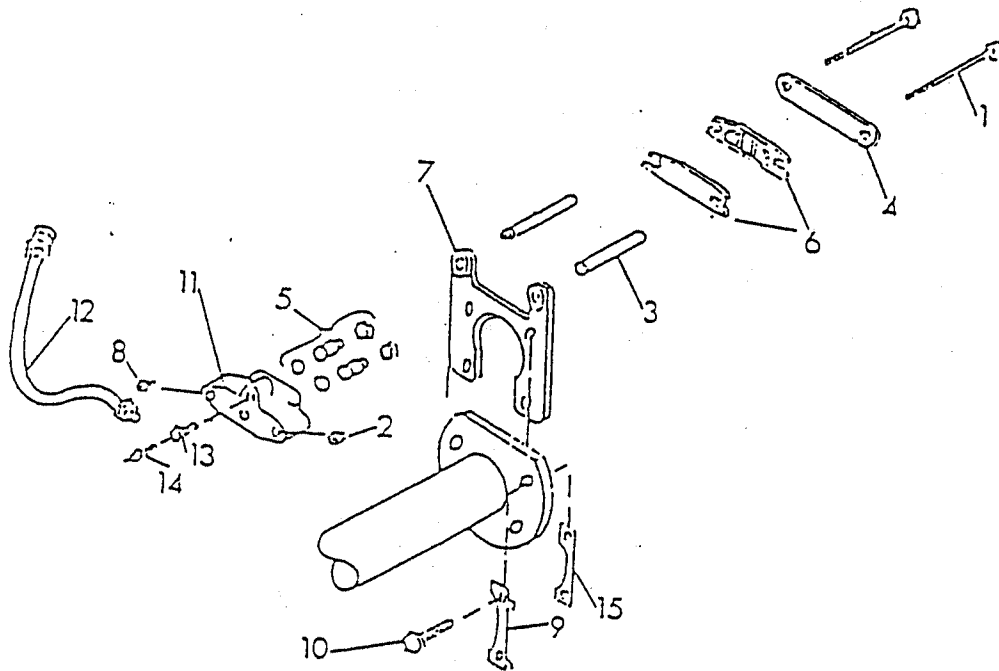
C 4-10

FIG. I.D.	PART NO.	DESCRIPTION	QTY.
6-1	99-510-01	Master cylinder	1
6-2	99-565-00	Y-Fitting	1
6-3	99-598-00	Fitting, 3/16 Tube Seat Plug (Not Needed With Front Hydraulic Disc Brakes)	1
6-4	99-578-00	Bolt for Stop Light	1
6-5	99-572-00	Washer, Wagner #PC603	1
6-6	99-571-00	Washer	1
6-7	99-606-53	Brake Line, Formed, 3/16 x 40	1
	99-605-60	Brake Line, Formed, 3/16 x 40 (For Tractor Only)	1
6-8	99-564-00	Union T, 3/16 Inv. Flare	1
6-9	99-605-57	Brake Line, Formed, Left	1
6-10	99-605-58	Brake Line, Formed, Right	1
6-11	99-580-20	Hydraulic Hose	2 or 4
6-12	71-110-00	Switch, Brake Light, Hyd.	1

FRONT HYDRAULIC DISC BRAKES (TRACTOR MODEL)

6-13	99-603-54	Line, Front Hydraulic Disc Brake	1
6-14	99-603-55	Line, Front Hydraulic Disc Brake	2
6-15	99-576-00	Clip, Wagner PC50358	2

C 4-10
HYDRAULIC DISC BRAKES
FIGURE NO. 7



C 4-10
HYDRAULIC DISC BRAKES
Figure 7

HYDRAULIC DISC BRAKE ASSEMBLY - 41-350-88 LEFT, 41-350-89 RIGHT

FIG I.D	PART NO.	DESCRIPTION	QTY.
1	88-067-21	1/4 NC 3-3/4 Hex Head Bolt, Gr. 8	4
2	88-069-82	Nut, Hex Lock, 1/4 NC HT	4
3	41-348-52	Spacer, Mech, Disc Brake	4
4	41-350-51	Plate, Secondary, Hydraulic Disc	2
5	41-350-66	Kit, Cylinder Repair	4
6	41-348-70	Pad, Disc Brake	4
7	41-350-03	Bracket, Hydraulic Disc Body Large Bearing	2
8	41-996-00	Plug, Hex Socket	2
9	41-350-05	Clip, 2 Hole W/Tab, Large Bearing	4
10	96-328-00	Bolt, 3/8 x 5/8 NC Spec. Hd., Grade 5	8
11	41-350-19	Body, Hydraulic Disc Brake, Right	1
	41-350-18	Body, Hydraulic Disc Brake, Left	1
12	99-580-20	Hydraulic Hose	2
13	99-588-00	Screw, Bleeder	2
14	99-858-01	Adapter, Threaded	2
15	41-961-01	Shim, Large Bearing	4

REPLACING BRAKE CYLINDER PARTS (CALIPER ASSEMBLY)

CAUTION: BLOCK VEHICLE WHEELS, PLACE FORWARD/REVERSE SWITCH IN NEUTRAL, TURN KEY TO OFF POSITION AND REMOVE FROM SWITCH. SET PARK BRAKE.

1. Remove wheel.
2. Disconnect park brake at park brake lever (Does not apply on C 4-10) on caliper assembly. (Figure A)
3. Disconnect Brake Line/hose at caliper, cap hose.
4. Bend down locking tabs on mounting bracket.
5. Remove mounting bolts.
6. Lift caliper assembly off vehicle.
7. It is only necessary to remove one bolt and spacer. (Figure B)
8. Remove pads. (Figure B)
9. Remove rubber boots.
10. Slide out pistons.

NOTE: QUANTITIES ARE FOR BOTH RIGHT AND LEFT ASSEMBLIES

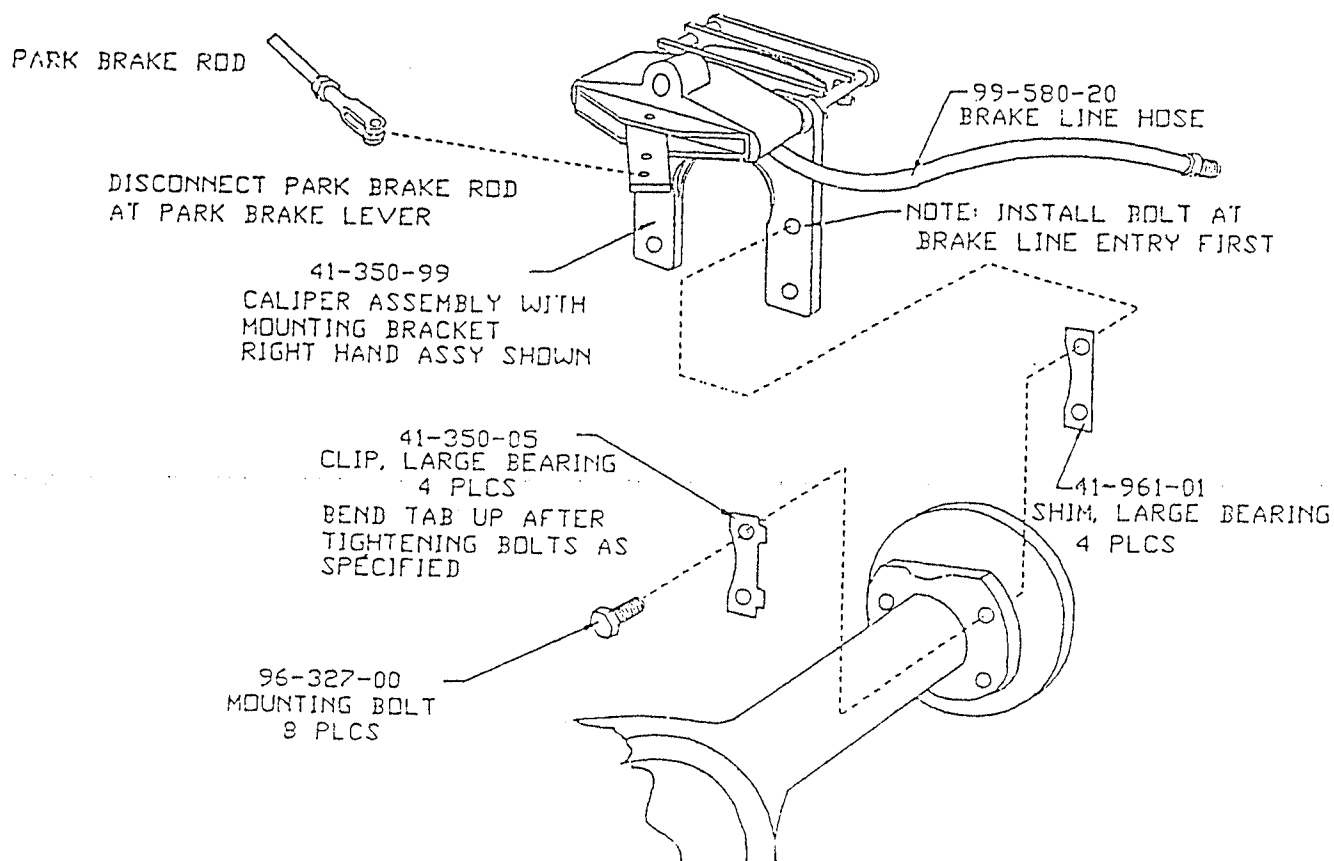


Figure A

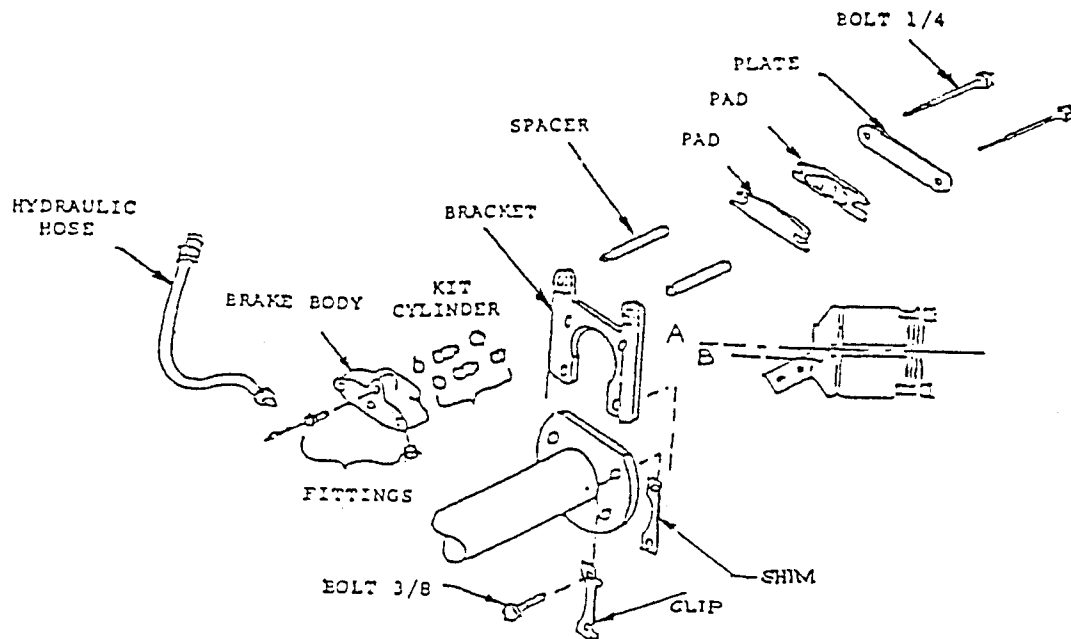


Figure B

11. Examine caliper housing for wear, pitting, particularly in 'O' ring groove. If badly worn, replace housing.
12. Replace individual parts, piston, 'O' ring and boot as required.
13. Re-assemble, installing brake stator, spacer and bolt. Tighten bolts to 12 foot pounds.
14. Remount caliper assembly in vehicle with new clips, (inside clip is spacer for bracket) on both sides of housing flange. Tighten clip mount bolts to 30 foot pound, bend clip tabs up to prevent loosening. Note orientation of caliper center line 'A' to park brake lever 'B' center line. Be sure friction material is facing the disc.
15. Rotate disc to be sure there is running clearance. Contact between the pad and disc is common.
16. Re-connect hydraulic lines and park brake cable.
17. Bleed brake system and adjust park brake. Bleed air from brake system. See Section 11, page 2.

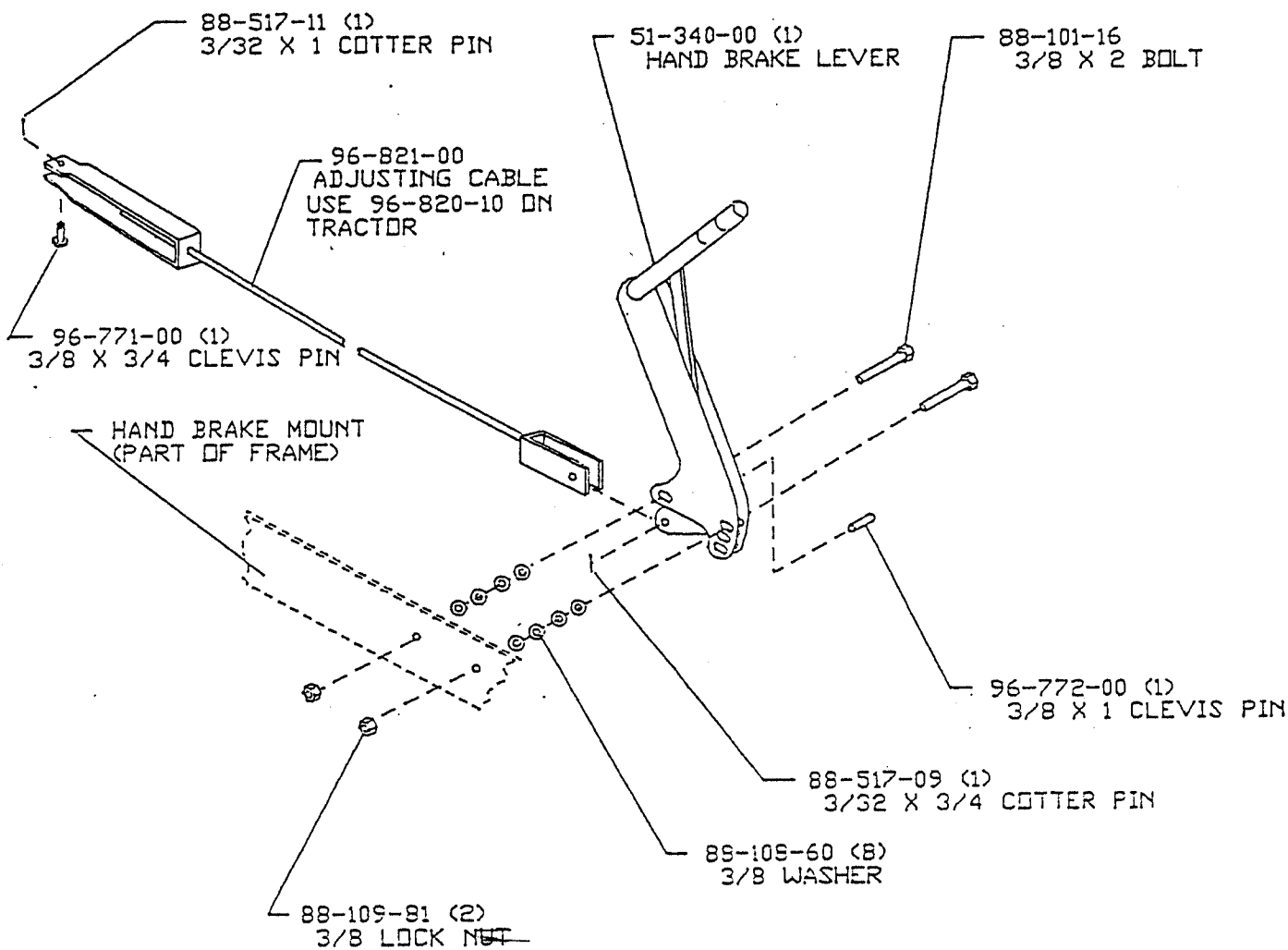
REPLACING BRAKE PADS (Reference Figure B)

NOTE: IT IS NOT NECESSARY TO DISCONNECT PARK BRAKE ROD TO REPLACE BRAKE PADS.

1. Examine caliper assembly for worn pads. If plates are close to disc and hydraulic pistons will be particularly extended than pad replacement is necessary.
2. Replace pads by retracting plate against pistons to allow for plate replacement. If pistons are difficult to retract, loosen bleeder valve, (allow fluid to escape) push plate and immediately re-tighten bleeder valve to avoid trapping air.
3. Remove one retainer bolt and spacer, remove both stator plates.
4. Replace both stator plates.
5. Re-install bolt and spacer, tighten to 12 foot pounds. Rotate disc to be sure there is running clearance. If not, install clips between (See Fig. 2 opposite page) housing end and bracket, spacing assembly outward.
6. Re-install wheel (repeat all steps for opposite wheel otherwise brake system will not balance).
7. Bleed brakes. See Section 11, page 2

C 4-10

PARK BRAKE LINKAGE



C 4-10
MOTOR MAINTENANCE, SERVICE AND ADJUSTMENT ELECTRIC MOTORS
REFER TO FIGURE ON PAGE 2

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 proper equipment. Should it be necessary for you to order replacement parts for your motor, IT IS NECESSARY TO INCLUDE COMPLETE NAMEPLATE DATA WITH ORDER.

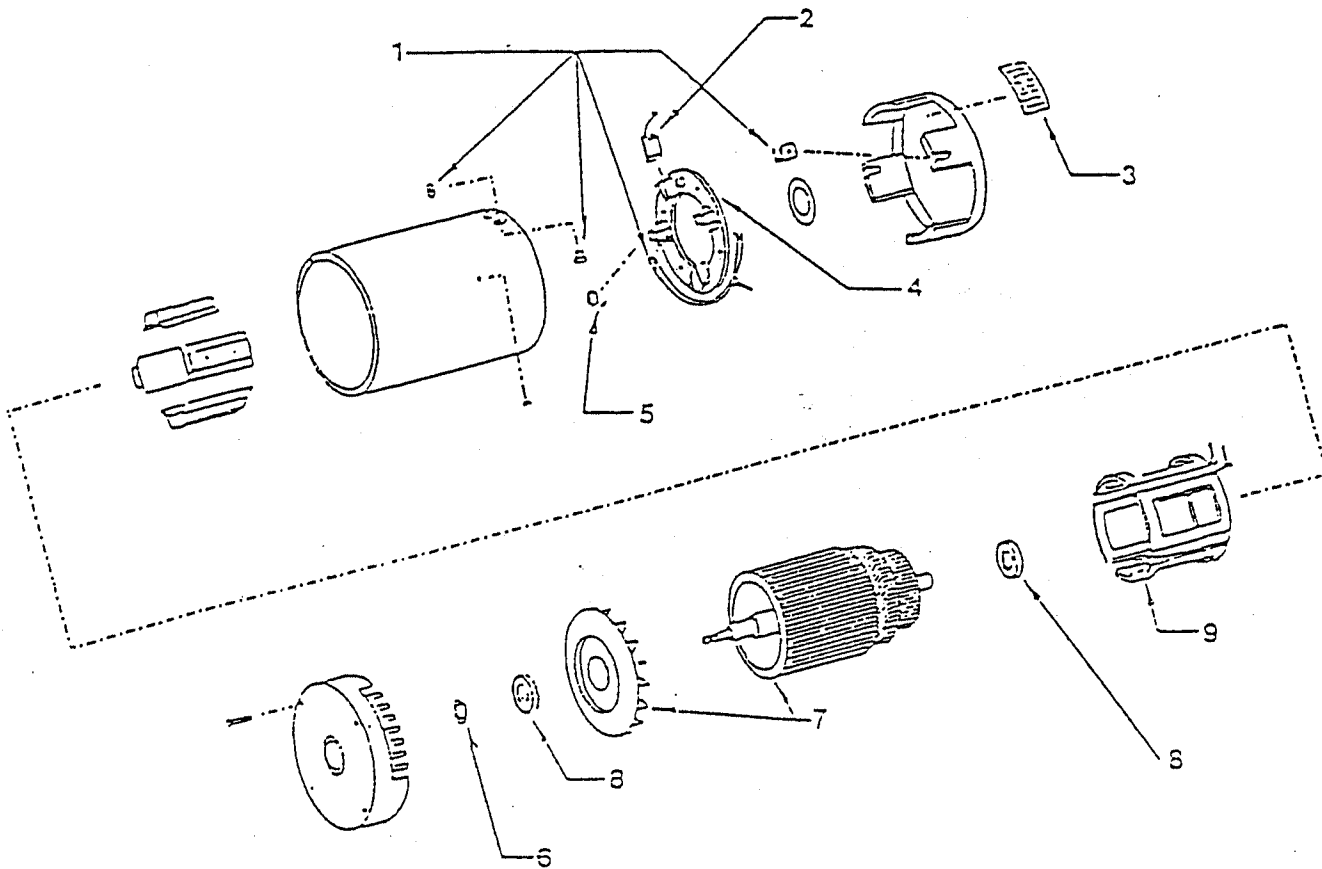
MOTOR MAINTENANCE - BRUSH INSPECTION AND REPLACEMENT

1. With new brushes, see note on G.E. drawing, page 2 Section 13.
2. If brushes are worn, remove motor from vehicle and remove motor end bell for access to brushes. Install new brushes. Use fine sandpaper to 'seat in' new brushes to commutator. To verify 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 practice to replace all brushes.
3. Check operation of each brush to assure that brush slides freely and does not bind in holder.
4. Replace motor end, reinstall in vehicle.

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 on to 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 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.
11. Check operation of each brush to assure that brush slides freely in holder.
12. Replace end bell.
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 studs.



D.C. MOTOR
C 4-10

ITEM NO.	PART NO.	DESCRIPTION	QTY.
	70-054-30	D.C. MOTOR 10 HP PRESTOLITE MVB4001	
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 10 HP PRESTOLITE	4
6	45-508-00	SEAL. 10HP, PRESTOLITE	4
7	70-054-31	ARMATURE, W/FAN 10 HP PRESTOLITE	1
8	80-504-20	BEARING, BALL, COMMUTATOR AND PULLEY	2
9	70-203-20	FIELD COIL (SET)	1

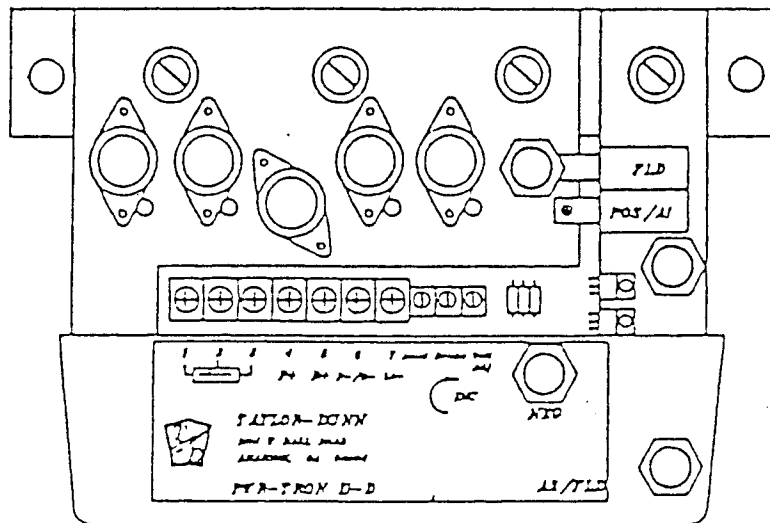
C 4-10
SUGGESTED SPARE PARTS LIST

T-D PART NO.	DESCRIPTION	QUANTITY OF 1 - 20 UNITS
13-742-00	Assembly, Tire, and Demountable Wheel, 5.70 x 8, 4 Ply, Super Rib Tire with 5 Holes on 4-1/2" bolt circle	1
-----	DC Electric Motor. See Section 12 for Part No. I.D. of Motor Supplied with Vehicle.	1
-----	Motor Brushes. See Section 12 for Part No. I.D. of Brushes Supplied with Vehicle	4
71-039-00	Switch, Light (Double Pole, Double Throw)	1
71-501-00	Horn Button	1
72-072-00	Headlight, sealed beam bulb 4" (12 volt)	1
85-250-00	Spring Extension 1-1/16" OD x 3-5/8", Brake Pedal Return	1
62-033-00	ACCELERATOR ASSEMBLY	1

NOTE: FOR PWR TRON II SPEED CONTROLLER SPARE PARTS SEE SECTION 14

C 4-10
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.



PWR-TRON II - D

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

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 feed 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.

C 4-10
PWR-TRON II ELECTRIC VEHICLE CONTROL

FEATURES

Current Limit - Cold current limit is 290A 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.

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 - Suppression 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. As protection to the motor and other electrical devices, the braking effect is kept low. The vehicle should be stopped using the service brake.

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.

GENERAL

The PWR-TRON unit is readily accessible under the deckboard. The PWR-TRON unit performs two functions; power control for speed and acceleration rate control for smooth operation. The PWR-TRON unit is a transistorized supply that regulates the voltage from the battery. An accelerator module provides a signal to the PWR-TRON proportional to the desired power output of the control. This gives the operator full control of the vehicle power and speed.

PWR-TRON II

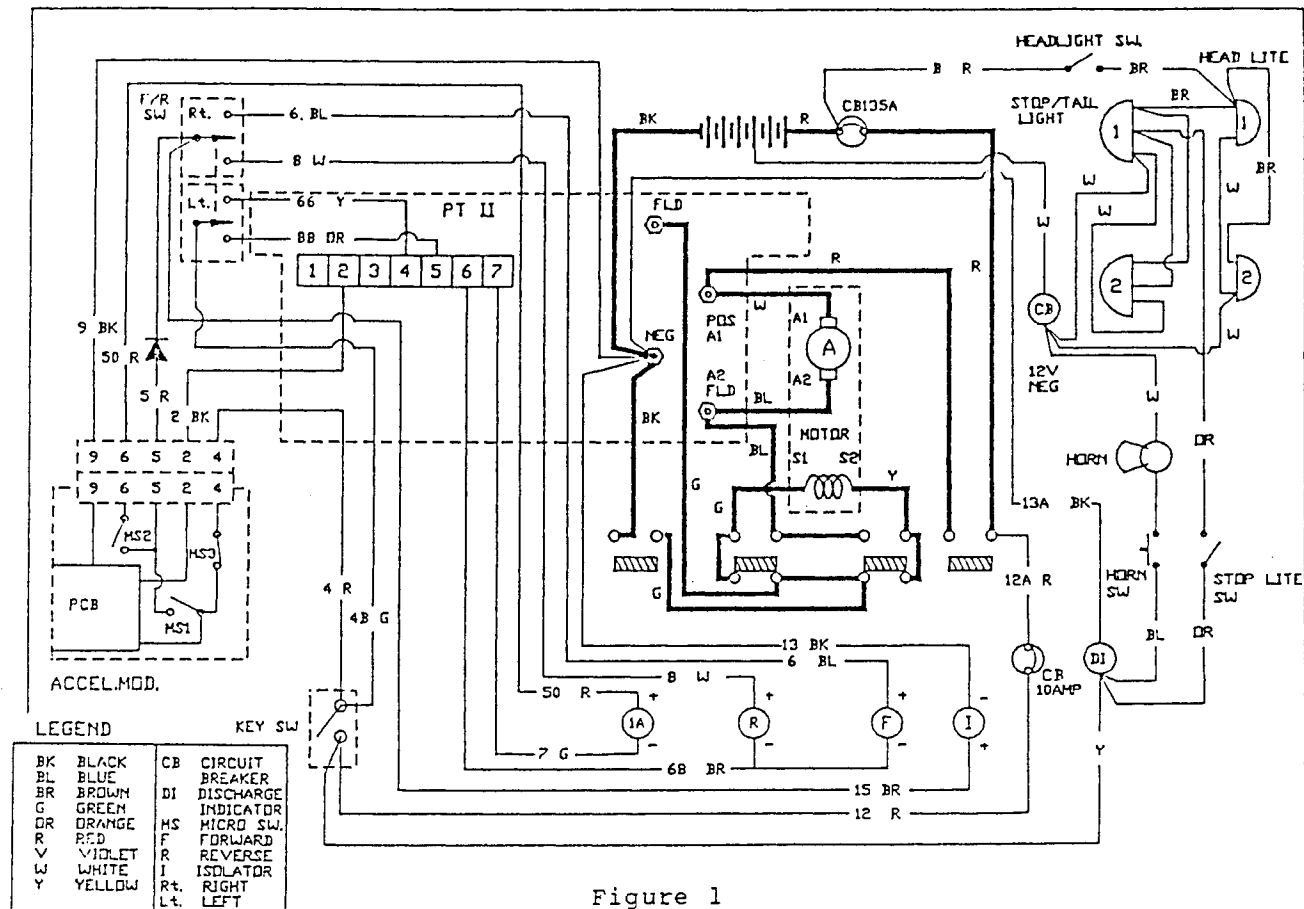


Figure 1

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, seat 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.

CONTROL CIRCUIT (See Figure 1, Shown in light lines) Control Harness 75-146-22. 75-146-32 is the control harness for tractor model C 4-10.

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 switch. 3) The magnetic sensor on the PCB board will increase the PWR-TRON signal voltage moving vehicle forward reverse operation. As the accelerator is depressed, a cam on the PCB board will increase the voltage, moving the 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 switch. 3) The magnetic sensor on the PCB board will increase the PWR-TRON signal voltage moving vehicle forward reverse operation. As the accelerator is depressed, a cam on the PCB board will increase the voltage, moving the vehicle in reverse.

PWR-TRON II

POWER CIRCUIT (See Figure 1, Shown in Heavy lines) Power Harness 75-147-22. 75-147-32 is power harness for tractor C 4-10.

Forward Operation. When the control circuit is energized and the isolator and forward 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.

Reverse Operation. The same circuit is used as forward operation except the reverse solenoids contact (not forward) is closed to reverse current flow through the motor.

When the accelerator is fully depressed, a microswitch (MS-2) is closed which activates the bypass solenoid (1A). This provides full battery potential to 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 from start to high speed operation. This is a built-in characteristic of the PWR-TRON II speed control, avoiding "jack-rabbit" starts.

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 connections 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

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

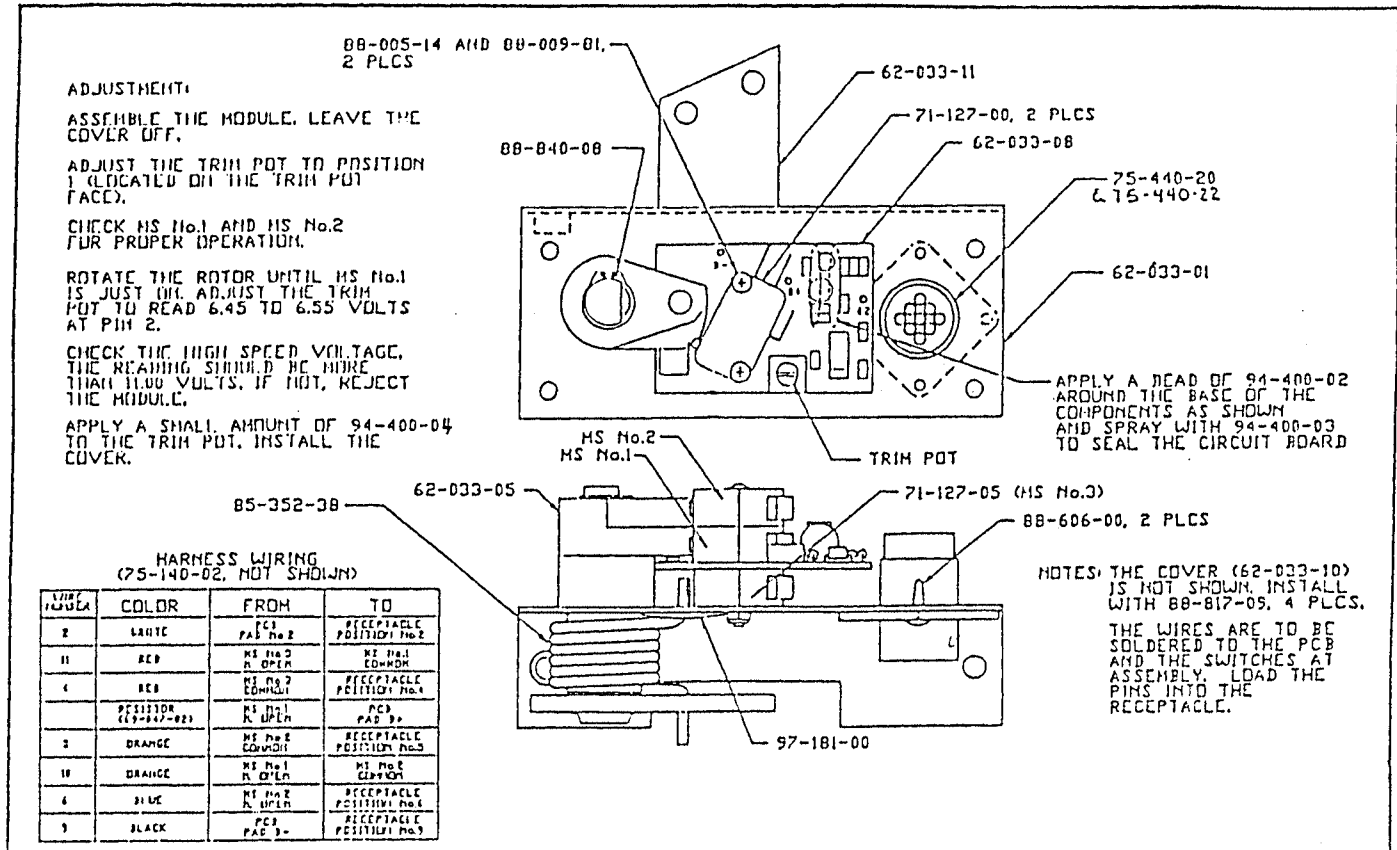
1. REPAIR OR REPLACEMENT OF INDIVIDUAL COMPONENTS

If replacement of semi-conductors, i.e. transistors 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 wire insulation material (fiberglass 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 than 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.

C 4-10
ACCELERATOR MODULE



ACCELERATOR MODULE
FIGURE 2

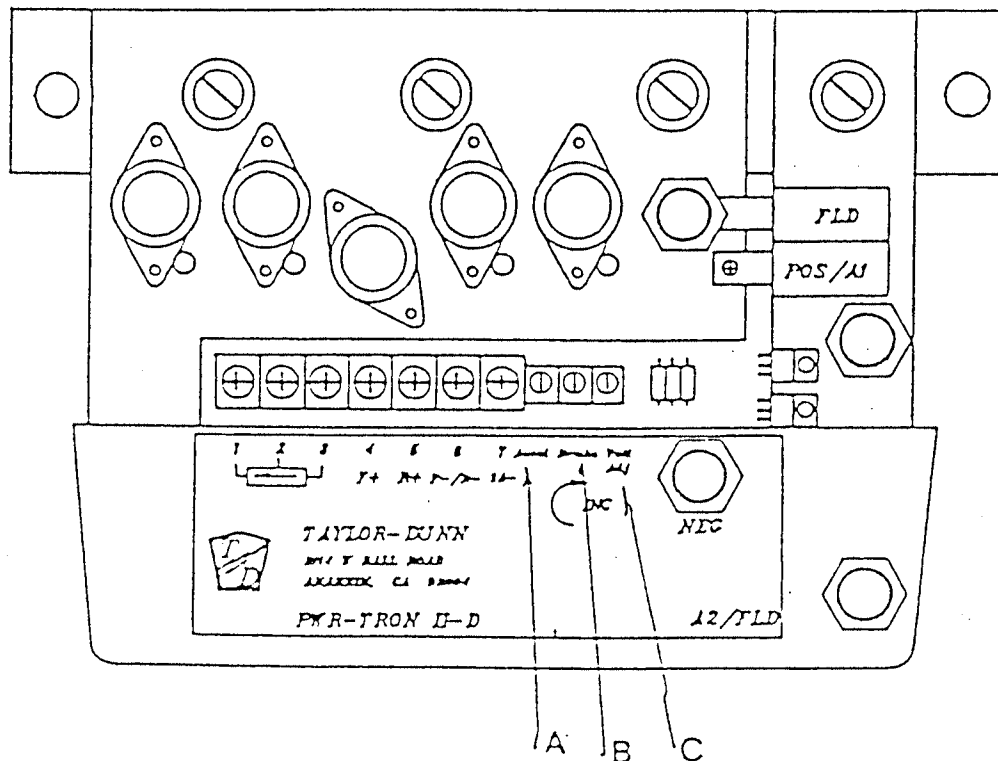
GENERAL FEATURES

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 62-027-00) in series with the motor, prior to initial turn on. This will indicate any abnormalities in the control.

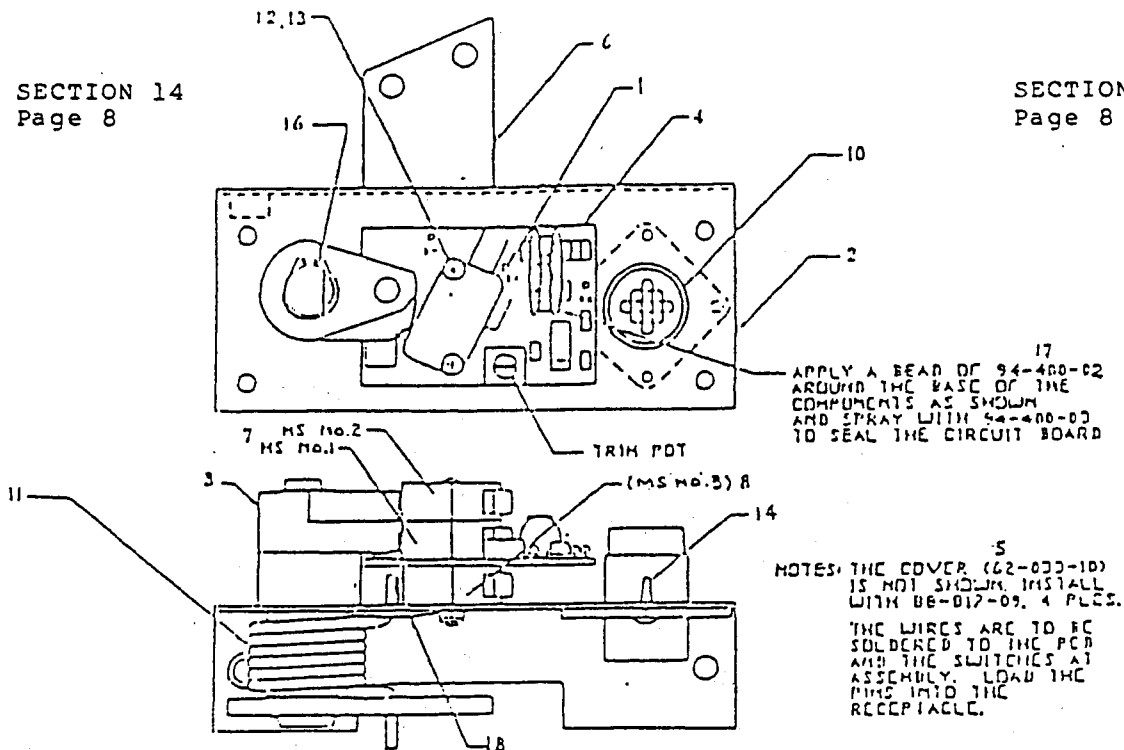
C 4-10



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

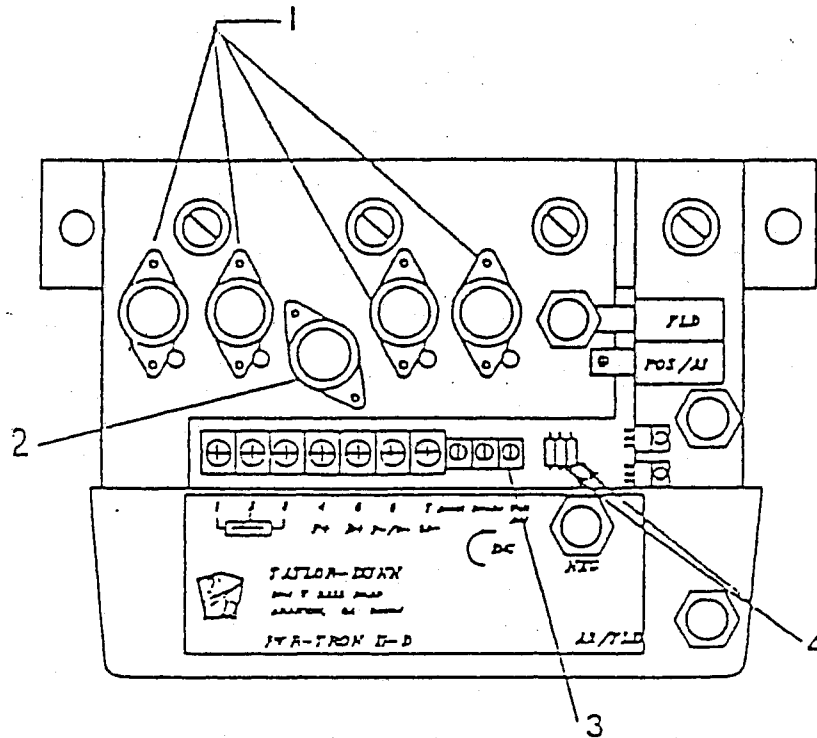
AFTER ALL POTS HAVE BEEN FINAL ADJUSTED, COAT POTS WITH WHITE SILICONE SEALANT.



ACCELERATOR (SOLID STATE) MODULE (COVER NOT SHOWN) 62-033-00
HARNESS WIRING - 9

WIRE NUMBER	COLOR	FROM	TO
2	WHITE	PCB PAD NO. 2	RECEPTACLE POSITION NO. 2
11	RED	MS NO. 3 N. OPEN	MS NO. 1 COMMON
4	RED	MS NO. 3 COMMON	RECEPTACLE POSITION NO. 4
	RESISTOR (69-047-01)	MS NO. 1 COMMON	PCB PAD B+
5	ORANGE	MS NO. 2 COMMON	RECEPTACLE POSITION NO. 5
10	ORANGE	MS NO. 1 N. OPEN	MS NO. 2 COMMON
6	BLUE	MS NO. 2 N. OPEN	RECEPTACLE POSITION NO. 6
9	BLACK	PCB PAD B-	RECEPTACLE POSITION NO. 9

FIG ID	T-D PART	DESCRIPTION	QTY.
1.	69-047-01	RESISTOR 47 OHMS, 1 WATT	1
2.	62-033-01	ASSEMBLY, BACKING PLATE	1
3.	62-033-05	ASSEMBLY, CAM W/MAGNET	1
4.	62-033-08	PCB WITH COMPONENTS	1
5.	62-033-10	COVER, SOLID STATE ACCELERATOR (NOT SHOWN)	1
6.	62-033-11	WELDMENT, ROTOR, SOLID STATE ACCELERATOR	1
7.	71-127-00	SW, SNAP ACTION MINIATURE	2
8.	71-127-05	SWT. SNAP ACTION, SHORT LEVER	1
9.	75-140-02	HARNESS, SOLID STATE ACCELERATOR	1
10.	75-440-20	RECEPTACLE, SQUARE FLANGE, 9	1
11.	85-352-38	SPRING, TORSION, SOLID STATE	1
12.	88-005-14	4-40 X 1-1/2 MACHINE SCREW	2
13.	88-009-81	4-40 LOCK NUT	2
14.	88-606-00	CLIP, CANOE, .125 X .16 GRIP	2
15.	88-817-09	#8 X 3/4 PAN HEAD SCREW (FOR COVER MOUNTING)	4
16.	88-840-08	RING SNAP 1/2 EXT	1
17.	94-400-02	SEALANT, SILICONE, BLACK	1
18.	97-181-00	WASHER, 22 GA SST .141 X .875	1



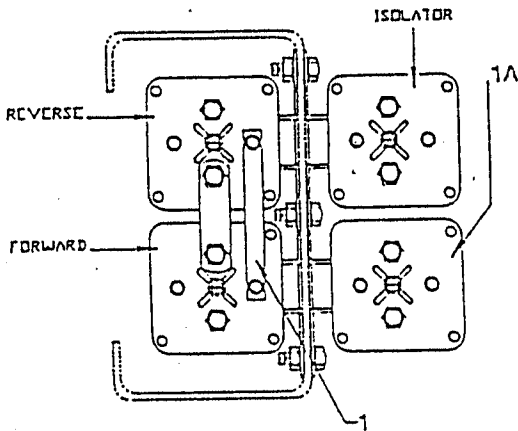
PARTS LIST

PWR-TRON II - D, PART NO. 62-029-00

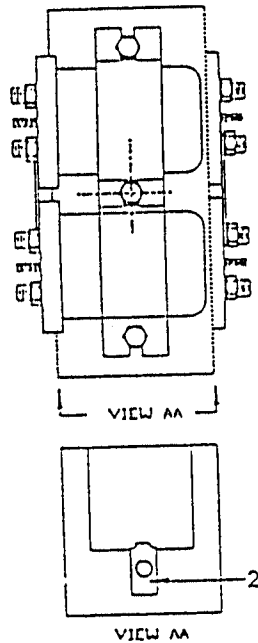
FIG.ID	T-D PART	DESCRIPTION	QTY.
1	62-029-32	POWER TRANSISTORS (4)	1 (SET)
2	62-029-31	DRIVER TRANSISTORS	1
3	69-029-31	TRIMPOT, 20 K OHM (3/8 SQUARE)	3
4	69-056-92	RESISTOR, 5.6 OHM 1/2 WATT (2)	1 (SET)

C 4-10

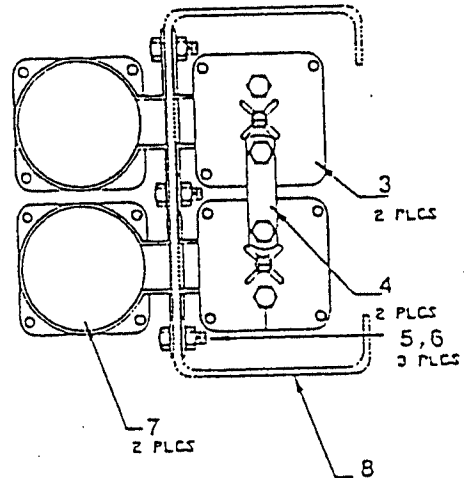
FRONT VIEW



TOP VIEW



BACK VIEW



36 VOLT SOLENOID PANEL ASSEMBLY

PART NO. 72-560-32

PARTS LIST

FIG.ID	T-D PART	DESCRIPTION	QTY.
1	61-838-32	BUS-BAR, 3/8 X 3-5/8	1
2	97-213-00	CLIP, 11/16 TINNEMAN	1
3	72-501-39	SOLENOID, SPDT 36 VOLT 200 AMP	2
4	61-838-30	BUS-BAR 5/8 X 2-1/2	2
5	88-060-11	1/4 X 1 NC HEX HEAD CAP SCREW	3
6	88-069-87	1/4 NC HEX HEAD KEPS NUT	3
7	72-501-38	SOLENOID, SPST 36 VOLT 200 AMP	2
8	72-560-53	PANEL, SEALED SOLENOID	1
*	75-235-25	JUMPER (A TO B) 6 GA., 5 INCHES LONG	1
*	75-235-29	JUMPER (C TO D) 6 GA., 9 INCHES LONG	1

* NOTE: JUMPERS NOT SHOWN

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PWR-TRON II
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 62-027-00
- (b) Clip leads.
- (c) Multimeter

PHYSICAL INSPECTION

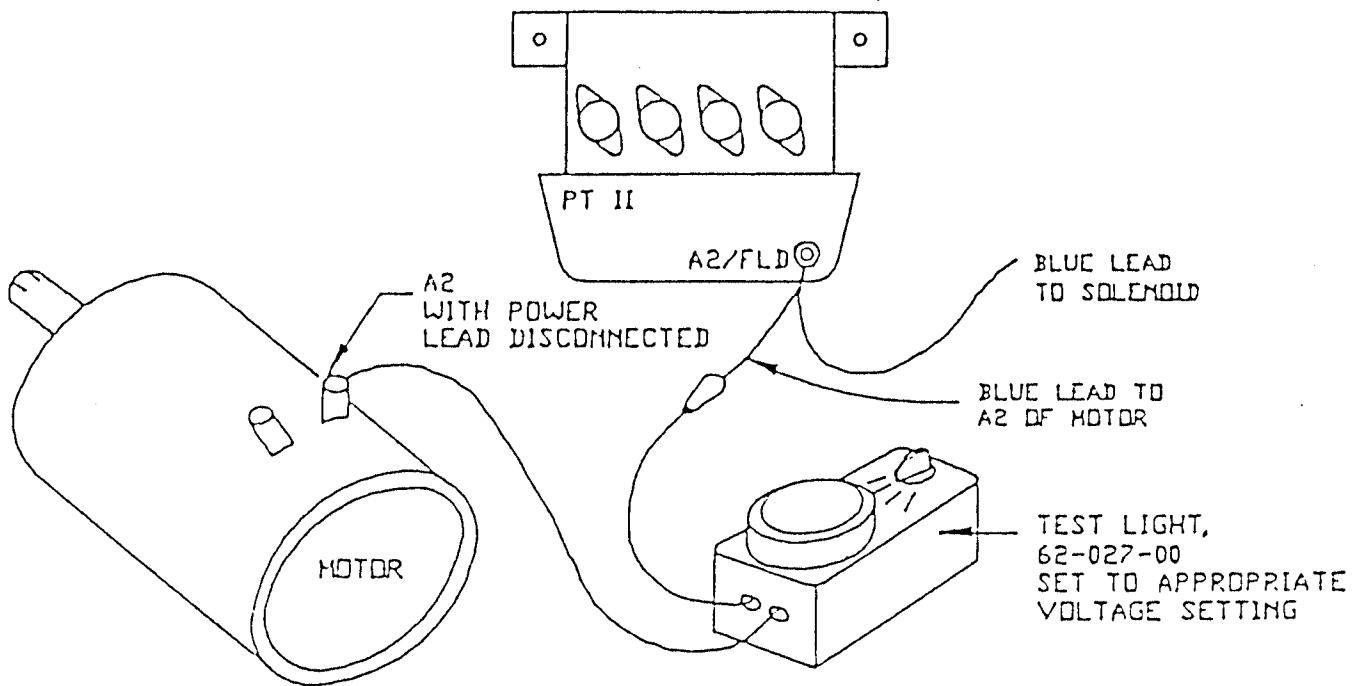
Check controller for physical damage, loose or broken wiring, evidence of component overheating, etc. Pay particular attention to adjustment of accelerator switch and potentiometer operation.

Prior to touching any electrical components **DISCONNECT BATTERY AND CONNECT TEST LIGHT IN SERIES WITH MOTOR ARMATURE.** (See Continuity & Power Check next page).

Reconnect battery as needed for carrying out any specific tests.

PWR-TRON II SCHEMATIC

C 4-10
PWR-TRON II



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 on motor (refer to Figure 1) and place test light in series with A2/FLD 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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PWR-TRON II
TROUBLE SHOOTING

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
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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PWR-TRON II
TROUBLE SHOOTING

LOW OR NO MOTOR TORQUE

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

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
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 FLD and NEG, e.g. shorted transistor, welded bypass contacts. 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 FLD 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, FLD. 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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PWR-TRON II
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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PWR-TRON II
TROUBLE SHOOTING

STANDARD LOGIC VOLTAGES MEASURED WITH RESPECT TO B-

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

LOGIC TERMINAL

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

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

* * = This delay is set by Acceleration Trimpot.

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SUGGESTED SPARE PARTS
PWR-TRON II SPEED CONTROLLER SYSTEM

T-D PART NO.	DESCRIPTION	1-20 QTY. REQ.	21 - 50 QTY. REQ.	50 - UP QTY. REQ.
62-029-00	PWR-TRON II - D	1	1	2
62-029-32	POWER TRANSISTORS (4)	1 SET	1 SET	2 SETS
69-029-31	DRIVER TRANSISTOR	1	1	2
69-029-31	TRIMPOT, 20 K OHM	3	3	6
69-056-92	RESISTOR, 5.6 OHM 1/2 W (2)	1 SET	1 SET	2 SETS
62-033-00	ACCELERATOR (SOLID STATE)	1	1	2
62-033-08	PCB W/COMPONENTS	1	1	2
62-033-10	COVER, ACCELERATOR	1	1	2
71-127-00	SWITCH, SNAP ACTION, MINIATURE	2	2	4
71-127-05	SWITCH, SNAP ACTION, SHORT LEVER	1	1	2
75-140-02	HARNESS, SOLID STATE ACCELERATOR	1	1	2
88-606-00	CLIP, CANOE .125 X .16 GRIP	2	2	4
94-400-02	SEALANT, SILICONE, BLACK	1	1	2
72-560-32	36 VOLT SOLENOID PANEL ASSEMBLY	1	1	2
61-838-32	BUS BAR, 3/8 X 3-5/8	1	1	2
61-838-30	BUS BAR, 5/8 X 2-1/2	2	2	4
72-501-38	SOLENOID, SPST 36 VOLT 200 AMP	2	2	4
72-501-39	SOLENOID, SPDT 36 VOLT 200 AMP	2	2	4
75-235-35	JUMPER (A TO B) 5 IN. LONG	1	1	2
75-235-29	JUMPER (C TO D) 9 IN. LONG	1	1	2

C 4-10
PARTS ORDERING PROCEDURE

Parts may be purchased from your local authorized Taylor-Dunn Dealer. When ordering parts, be sure to specify the complete model number and serial number of this unit. Also specify the full Taylor-Dunn part number, description of part and quantity of parts required. You will find a complete listing of part numbers and descriptions in the following pages of 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 number - 18-311-10 - Steering Gear Assembly

1- Set of 4 - Part Number - 75-105-10 - Brush,Prestolite Motor,
36 Volt

Above parts for Model C 4-10 vehicle, beginning with Serial Number 86757.

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

C 4-10
MAINTENANCE PROCEDURES
BODY AND TRIM

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 vehicle 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.

BODY AND TRIM

PART NO.	DESCRIPTION	QTY.
92-201-00	Mirror, 4 x 8	1
92-202-00	Mirror Bracket	1
94-201-10	Taylor-Dunn Nameplate 4 x 5	1
94-050-00	Lens, Light Front	2
72-072-00	Headlight, 4 In., 12 Volt, Seal Beam	2
95-952-00	Paint - 1 Qt. Can (Specify Color)	1
72-025-00	Tail Lights	2
98-757-00	Rubber Bumpers	2