

# **OPERATION AND MAINTENANCE MANUAL WITH PARTS LIST**

**MODEL:** C4-32, C4-33, C4-38  
**SERIAL NO:** up to 76227  
**MANUAL NO:** MC-432-00

## **\*\*IMPORTANT\*\***

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



**TAYLOR-DUNN®**  
Commercial and Industrial Vehicles Since 1949

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- IMPORTANT INFORMATION -

This vehicle conforms to applicable portions of ANSI B56.8 (American National Standard Personnel and Burden Carriers). This manual is designed for use by Vehicle Operators and Service Personnel alike. Throughout the manual, there are various WARNINGS, CAUTIONS and NOTICES which must be carefully read to help reduce the 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.

Definitions of the three terms are as follows:

WARNING - There is a potential for injury to yourself or 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 B, 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 when making a turn.
6. Drive slowly straight up and down inclines.
7. Set parking brake before leaving vehicle.
8. Forward/Reverse lever must be in the correct position for direction of travel desired.

**WARNING:** Failure to comply with above instructions could result in injury to the vehicle occupants, bystanders and to property.

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INSPECTION, SAFETY, AND INTRODUCTION  
ARRIVAL INSPECTION CHECK LIST

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 their being 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 and review of the safety recommendations on Page 2 of SECTION A, an operational test should be made. Refer to operating instructions in SECTION B.

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

INSPECTION, SAFETY AND INTRODUCTION  
SAFETY

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 E, Page 1, and Section D Page 1 and Page 2

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 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 on Pages 1 and 3 of Section J8.

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.
3. Intentional or unintentional mis-use of controls could result in an accident.

INSPECTION, SAFETY AND INTRODUCTION  
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 difficulty in steering. It is not designed to be towed in excess of 15 mph.

Model No.

The following Model numbers are covered by this manual - 1432C, 1433C, 1438C.

Serial No.

The Serial Number of your unit is stamped into the angle frame member, under the deck board adjacent to rheostat. The model number and serial number are on a nameplate riveted to the dash panel steering support shelf forward 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.

### 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 (or clockwise) for a right turn and left (or counterclockwise) for a left turn.

#### KEY LOCK

Your vehicle is equipped with a keyed lock located on the corner of forward reverse switch. It is designed to lock the switch in the neutral position only. The key will remove from the lock in the locked position (Neutral) only.

#### BRAKE (HAND)

The hand parking brake is located in the right center of floor board. To engage hand brake, grasp top lever and pull towards rear all the way till hand lever stops. To release brake, push hand lever all the way forward.

#### BRAKE (FOOT)

The brake pedal is designed and located for right foot operation. It is the pedal located to the left of 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 to the right of the drivers seat. It is operated by the red handle. To place in forward position pull the red handle to the left towards the driver. To place in reverse position push the red handle to the right away from driver.

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. Shifting while in motion, especially near top speed, causes great strain to your entire vehicle and will eventually cause severe damage.

### 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 in 5 steps. When driving your vehicle you will be able to feel the 5 steps of power, with 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 in steering support shelf. Depressing button sounds horn. Releasing button will immediately silence horn.

### Light Switch

The light switch that controls headlamps and taillamps is located on the steering support shelf. It is labelled for On-Off positions.

### Battery Charger

Refer to Section J-8 for proper instructions to operate your battery charger.

## STANDARD OPTIONAL ACCESSORIES

### Windshield Wiper

On vehicles equipped with electric windshield wipers the control switch is located in the steering support shelf. It is labelled for On-Off position.

### Directional Signals

On vehicles equipped with directional turn signals the control is located on the steering column. Move the control lever in the direction you will be turning your steering wheel to signal the direction you intend to turn your vehicle. Indicating lamps are located within the twin signal control for your convenience.

The directional turn signal also serves as an emergency flasher control by pulling the control lever outward away from steering column when in neutral position.

### Special Accessories

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



OPERATING 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.

OPERATING RESPONSIBILITIES  
ANSI B56.8-1981

504 GENERAL continued

(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.

(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) Fire 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.

OPERATING RESPONSIBILITIES  
ANSI B56.8-1981

## 505 TRAVELING continued

(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.

## 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.

MAINTENANCE PRACTICES  
ANSI B56.8-1981

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.

(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.

MAINTENANCE PRACTICES  
ANSI B56.8-1981

## 602 MAINTENANCE PRECEDURES continued

(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 Manager if any questions arise.

CAUTION: When performing maintenance on any part of the electrical system, disconnect the main battery leads. Place forward/reverse switch in Neutral. Turn key off and remove from keylock.

MAINTENANCE SERVICE	REFER SECTION	EVERY WEEK	EVERY MONTH	EVERY 3 MONTHS	EVERY YEAR
Check and fill batteries. If necessary fill with distilled water only.	J8	X	X	X	X
Clean off all dirt and grease on and between power bars and J-Hook with a cloth, piece of wood or plastic ( <u>never use a metal object</u> ). Apply T-D grease 94-421-00 or a quality hi-temp grease with a 500 min. drop point. Apply grease with an electrically <u>nonconductive applicator</u> such as a small paint brush that does not have a metal band.	J6	X	X	X	X
Check rheostat adjustment.	J6	X	X	X	X
Check tire pressure.	J1	X	X	X	X
Adjust Motor Mount & Chain (Refer to Chart Section J2)	J2		X	X	X
Lubricate all Zerk Fittings.	E		X	X	X
Lubricate all moving parts without Zerk Fittings. Use all purpose engine oil.	E				
Wash off batteries with water, (Use soda if necessary).	J8		X	X	X
Check all wire connections. Be sure they are all clean and tight.			X	X	X
Check service and Adjust parking and manually operated brake.	J2		X	X	X

CAUTION: Never bend the brake band anchor bolt. Any bending of the bolt may result in unexpected failure of the bolt and complete loss of Drive Line braking Action.

MAINTENANCE GUIDE CHECKLIST

MAINTENANCE SERVICE	REFER SECTION	EVERY WEEK	EVERY MONTH	EVERY 3 MONTHS	EVERY YEAR
Check hydraulic brake system for leaks, also check brake fluid level in master cylinder.	J3		X	X	X
Check rear axle differential oil level (refer to lubrication diagram).	J2 & E		X	X	X
Check, clean, and adjust forward reverse switch.	J5		X	X	X
Check steering chain adjustment.	J1		X	X	X
Check motor brushes. Blow out carbon dust. (Replace if necessary).	J2			X	X
Check and adjust front wheel bearings and fork spindle bearings.	J1			X	X
Check brake lining for wear, adjust brake shoes (hydraulic)	J2 & J3			X	X
Drain differential and refill with SAE 30 oil (refer to lubrication diagram)	J2 & E				X
Repack front wheel bearing and front fork spindle bearings (use wheel bearing grease).	J1 & E				X

No. of  
Grease  
Points

A. PRESSURE GUN GREASE

1. Front Wheel Hub 1
2. Front Wheel Spindle 1
3. Accelerator Pivot 1
4. Brake Pivot 3
5. Rheostat Bar (See instructions P.1 Sect. D). 1
6. Rocker Arm Pivot 1
7. Jack Shaft 1
8. Steering Shaft 1

B. LIGHT OIL

10. Clevis Pins (Mechanical Linkage) 7
11. Chain - Steering

C. "POWER TRACTION" USE SAE 30 OIL

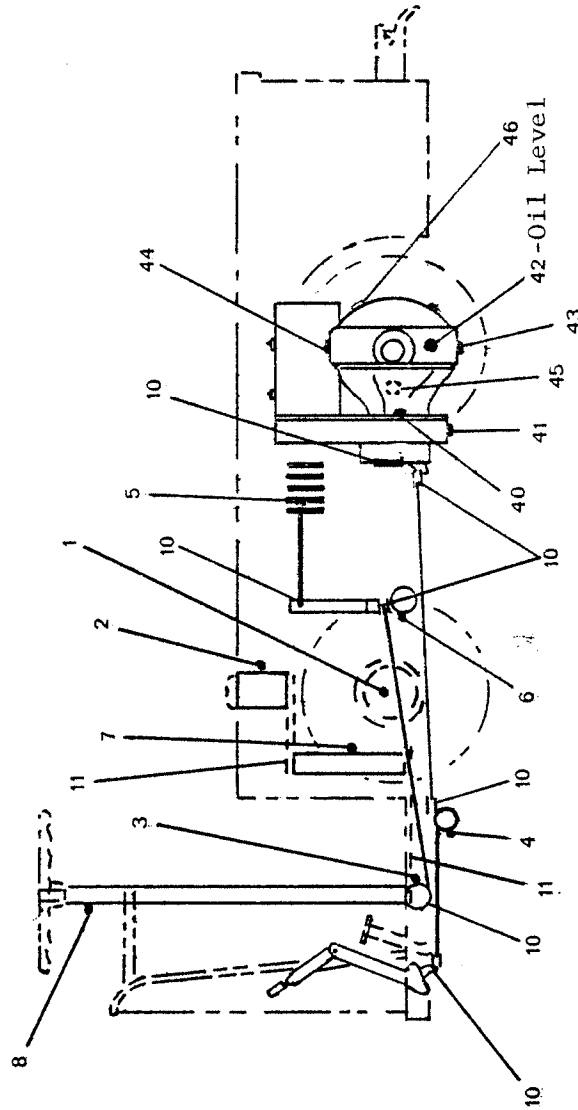
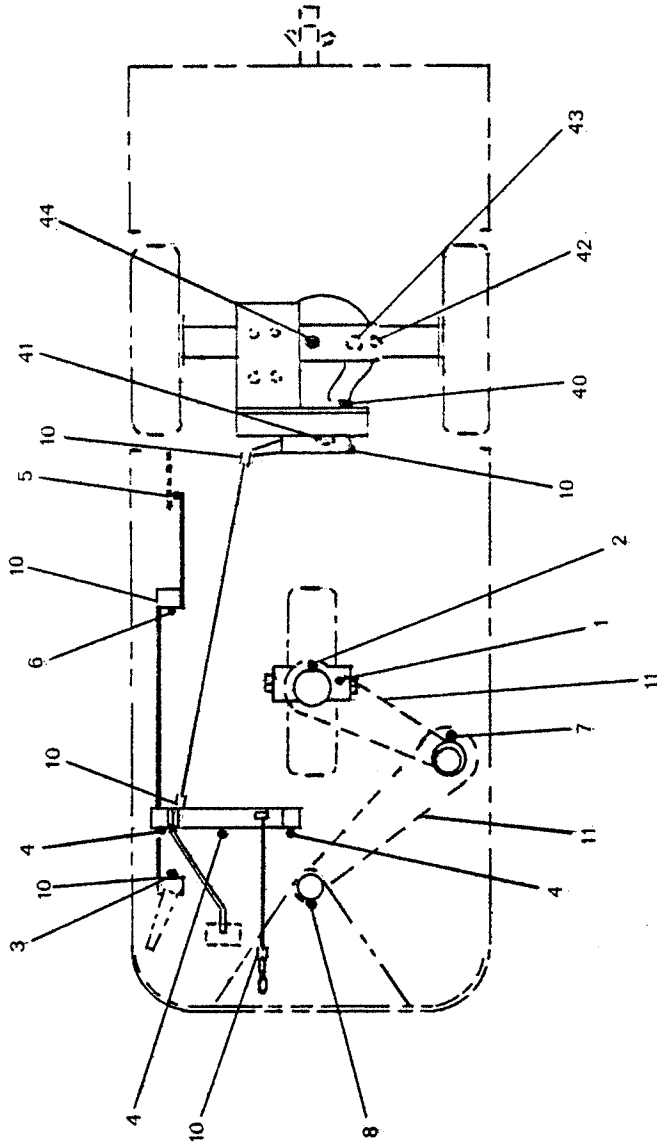
Proper Oil Level Check at Plug 42.

TO CHANGE OIL, USE 2 QTS.

- a. Remove Drain Plugs 41 & 43
- b. Remove Level Plugs 40, 42 & Fill Plug 44
- c. Drain Oil & Replace 41 & 43
- d. Add Oil by 44 to Level of 42
- e. Add Oil by 40 to Level of 40
- f. Replace Plugs

NOTE: 45 & 46 Not Used This Configuration.

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



SECTION E  
PAGE 1

NO. DESCRIPTION LENGTH QUAN. REVISED DATE REVISION

TOL. FRAC. DEC. +

SCALE NONE

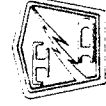
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DATE 7/15/81

FIGURE 1

SECTION E

"POWER TRACTION" LIBERATION DIAGRAM  
MOLDS 1452 - 1453 - 1454



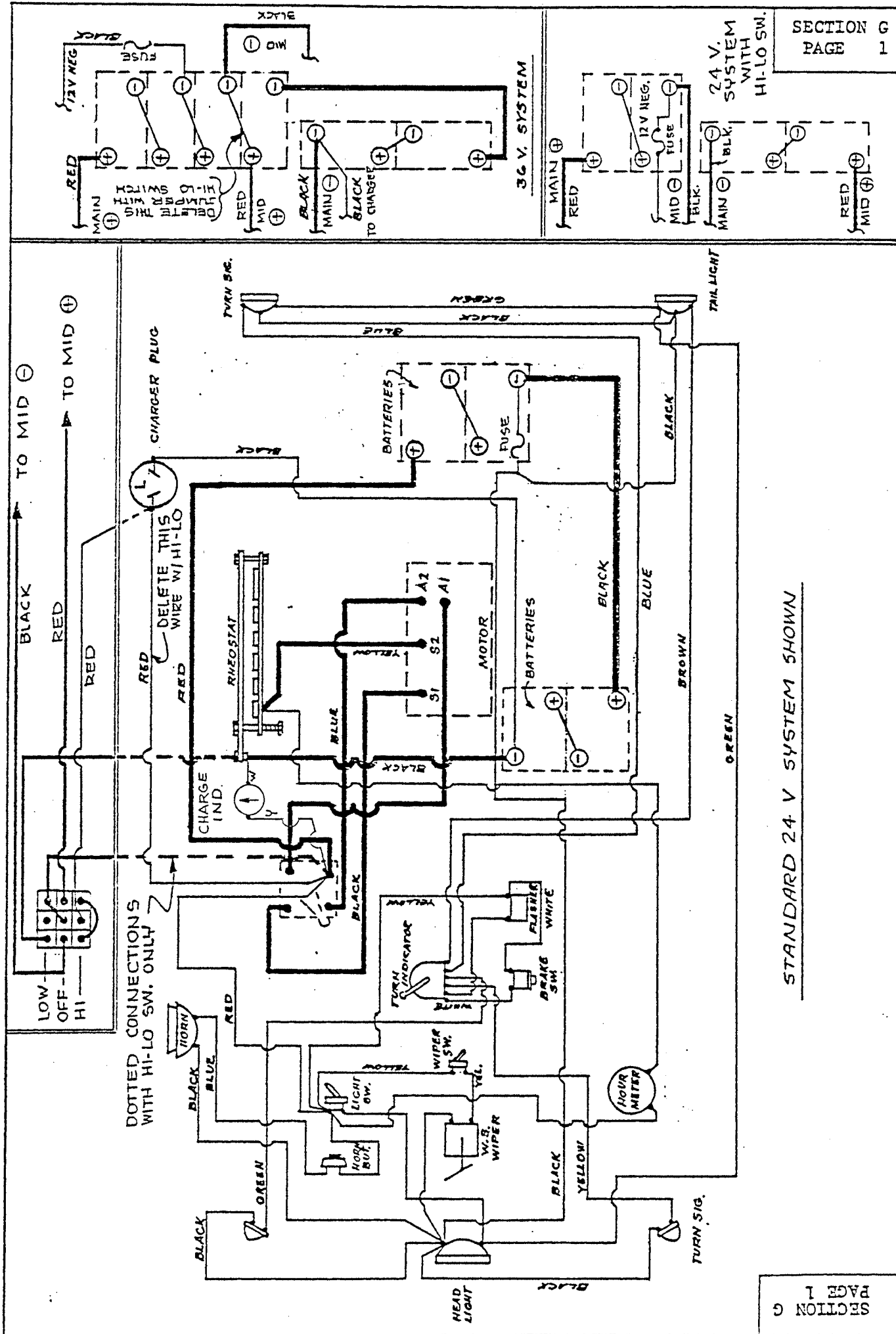
TAYLOR DUNN MFG. CO.  
2114 West Ball Rd.  
Anaheim, Calif.



TROUBLE SHOOTING PROCEDURES

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
1. <u>Steering:</u>		
(a) Pull in one direction	1. Check for bent fork	Replace or straighten
(b) Hard Steering	1. Bad or frozen bearing in fork spindle collar.	Replace
	2. Low tire pressure	Inflate to recommended pressure.
(c) Sloppy or loose steering.	1. Loose spindle bearing	Adjust.
	2. Loose wheel bearing	Adjust.
2. <u>Brakes:</u>		
(a) Soft brakes	1. check for worn lining	Adjust or replace when 1/8 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 lines.	Bleed brakes
(b) No brakes	8. Bad seals in brake cylinders	Replace
	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. Discharged batteries	Recharge or replace
	2. Check rheostat for contact	Adjust or replace bars
	3. Check motor brushes for contact	Clean or replace
	4. Poor contact on forward-reverse switch	Replace
	5. Check for loose wire	Tighten or replace
	6. Check continuity through motor	Repair or replace
(b) Erratic Operation	1. Rheostat making poor contact	Adjust or replace
	2. Motor brushes	Clean or replace
	3. Check motor commutator for burning or wear	Turn or replace
	4. Check for loose wiring	Tighten
	5. Badly worn drive sprockets or belts	Adjust or replace sprockets, chain and belts

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
(c) Jerky Starting	<ol style="list-style-type: none"> <li>1. Resistor coil burned open</li> <li>2. Resistor shorted together</li> <li>3. Poorly adjusted rheostat</li> <li>4. Badly worn J-Hook</li> <li>5. Dirt between power bars causing shorts</li> </ol>	<p>Replace Spread apart Re-adjust Replace J-Hook and bars Clean</p>
(d) Takes off in forward or reverse without accelerator depressed	<ol style="list-style-type: none"> <li>1. Dirt shorting out neutral bar</li> <li>2. Check rheostat adjustment</li> <li>3. Short in wiring circuit</li> <li>4. Burned forward-reverse switch</li> </ol>	<p>Clean, readjust or replace bars  Correct Replace</p>
(e) Lack of power or slow operation	<ol style="list-style-type: none"> <li>1. Dragging brake</li> <li>2. Tight front wheel bearings</li> <li>3. Rheostat not making contact on high speed bar</li> <li>4. Loose connection in wiring</li> <li>5. Partially burned out motor or thrown lead</li> <li>6. Weak batteries</li> <li>7. Bind or drag on differential</li> </ol>	<p>Re-adjust Re-adjust Re-adjust or replace bars. Tighten Replace or re-solder Replace Repair</p>
(f) Thump or grinding noise in drive axle	<ol style="list-style-type: none"> <li>1. Motor bearing</li> <li>2. Loose motor on base</li> <li>3. Worn sprockets</li> <li>4. Defective bearing in differential</li> <li>5. Defective gears in differential</li> <li>6. Slack Drive Chain</li> </ol>	<p>Replace Tighten &amp; Adjust Replace sprocket and chain Replace Replace Adjust (Refer Section J2)</p>



SECTION G  
PAGE 1

STANDARD 24 V SYSTEM SHOWN

NO.		DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
TOL. FRAC.	±	DEC. ±				
SCALE		AS SHOWN				
DRAWN BY		J. J. A.				

**FIGURE 2**

**WIRING DIAGRAM (GENERAL)**

MODEL C

**TAYLOR DUNN MFG. CO.**

2114 West Ball Rd.

Anshelm, Calif.

SECTION G  
PAGE 1

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 the 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 - 86-501-98 - Ball Joint (Left Hand Thread)
- 1 - Set of 4 - Part number - 70-124-00 - Motor brushes for Baldor Motor, 3½ H.P., 36 Volt, Specification No. 28-1408-11704

Above parts for model 1248B Truck, Serial Number 15039.

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

SUGGESTED SPARE PARTS LIST

I.D. NO.	T-D PART NO.	DESCRIPTION	QUANTITY OF 1-20 UNITS
<u>REFER TO FIGURE NO. 3 FRONT AXLE, FORK &amp; STEERING</u>			
3-4	80-400-00	Ball Bearing - 3/4"	2
3-6	97-100-00	Woodruff Key - 3/16"	4
3-7	87-071-00	Grease Fitting (3/16" Drive)	3
3-10	88-229-81	Lock Nut 3/4" N.C. (Hex)	2
3-11	30-400-00	Link - Master #40	4
3-12	96-900-00	Turnbuckle	2
3-25	87-074-00	Grease Fitting 1/2"-28 Straight	1
3-27	45-307-00	Grease Seal	1
3-31	45-308-00	Oil Seal (Front Wheel)	2
3-35	87-050-00	Grease Fitting 1/2" - 28 THD. (90°)	1
3-40	13-734-00	Tire & Wheel - 400 x 8 Four Ply Super Rib - Tubeless Tire (Five 1/2" Holes on 4 1/2" Bolt Circle	1
<u>REFER TO FIGURE NO. 5 POWER TRACTION DRIVE AXLE</u>			
5-3	41-997-00	Drain & Level Plug (1/8" Pipe)	1
5-11	41-163-10	Axle Assembly With Axle, Retainer Ring, Retainer Plate, & Bearing (14-1/8" Long) Left Side	1
5-11	41-162-10	Axle Assembly with Axle, Retainer Ring, Retainer Plate & Bearing (11-5/8" Long) Right Side	1
5-13	45-042-00	Gasket. (Housing to Differential Carrier)	1
5-42	80-702-00	"O" Ring - Drive Pinion Bearing Retainer	1
5-45	41-996-00	Plug - (Level) 1/2" With Recessed Top	1
5-50	45-021-00	Gasket Gear Case to Pinion Bearing Assembly	1
5-57	41-989-00	Plug (Filler Level & Drain) 1/2" N.P.T.	1
5-63	45-331-00	Oil Seal - Gear Case To Pinion	2
5-64	41-532-00	Brake Drum (Splined)	1
5-66	41-661-00	Full Brake Band For 6" Drum	2
5-73	85-060-00	Compression Spring 5/8" O.D. x 2 1/2" Long	1
5-83	45-002-00	Gasket - Gear Case Cover	1
5-86	45-503-00	Oil Seal (Baldor Motor)	1
5-86	45-506-00	Oil Seal (G.E. Motor)	1
5-87	70-049-00	Motor 1.5/2 H.P. 24/36 Volt 1800/2800 R.P.M.	1
5-87	70-054-00	Motor 2.25/3.5 H.P. 24/36 Volt 1800/2800 R.P.M.	1

SUGGESTED SPARE PARTS LIST

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QUANTITY 1-20 UNITS
5-87	70-126-00	Motor Brushes - Baldor Motor	8
5-87	70-101-00	Motor Brushes - G.E. Motor, 24 & 36 Volt	4
5-91	13-734-00	Tire & Wheel - 400 x 8 Four Ply Super Rib - Tubeless Tire (Five $\frac{1}{2}$ " Holes On $4\frac{1}{2}$ " Bolt Circle)	2
5-101	41-640-00	Brake Shoes 7" Internal Expanding (Set for 1 Wheel)	2 sets
5-106	45-044-00	Gasket - Rear Axle Bearing	2
5-122	80-703-00	"O" Ring Motor Mount Seal	1
5-124	88-067-11	Socket Set Screw $\frac{1}{4}$ " NC x 1"	1
<u>REFER TO FIGURE 6 HYDRAULIC BRAKE SYSTEM</u>			
6-1	99-510-51	Rubber Boot (Master Cylinder)	1
6-1	99-510-61	Kit - Master Cylinder Repair	1
6-2	99-571-00	Washer - Copper Small Hole	1
6-4	99-572-00	Washer - Copper Large Hole	1
6-9	99-506-61	Kit - Wheel Cylinder Repair	1
<u>REFER TO FIGURE NO. 7 MECHANICAL CONTROL LINKAGE</u>			
7-3	96-772-00	Clevis Pin $\frac{3}{8}$ x 1"	2
7-5	96-762-00	Cast Clevis $\frac{3}{8}$	1
7-6	88-527-11	Cotter Pin $\frac{1}{8}$ " x 1"	6
7-10	85-295-00	Spring - $\frac{9}{16}$ " O.D. x $4\frac{7}{8}$ Free Length	1
7-19	96-813-00	Adjustable Cable Assembly ( $31\frac{1}{4}$ to $28\frac{1}{4}$ )	1
7-21	85-270-00	Spring-Extension $1\frac{1}{4}$ " O.D. x $4\frac{3}{8}$ " Free Length	1
<u>REFER TO FIGURE NO 8 FORWARD AND REVERSE SWITCH</u>			
8-1	71-040-60	Switch Finger - Silver Plated With $\frac{1}{4}$ " Hole	4
8-5	71-040-71	Bolt-Finger Mounting ( $\frac{1}{4}$ " NF x $\frac{7}{8}$ " Spec.)	4
8-11	71-040-62	Switch Handle - Metal (Red Color)	1
8-19	71-040-54	Spring - Cam	1
8-28	71-040-52	Rotor Assembly	1
<u>REFER TO FIGURE NO. 9 SPEED CONTROL RHEOSTAT</u>			
9-2	61-834-00	Insulating Board for J-Hook-2 Hole Pattern	1
9-5	61-832-00	Sliding J-Hook Bar	1
9-9	78-212-51	Resistor Coil (#9 Wire 14 Turns)	1
9-10	78-212-52	Resistor Coil (#6 Wire 9 Turns)	2
9-11	78-212-53	Resistor Coil (#5 Wire 6 Turns)	1
9-13	61-836-00	Pressure Bar	1
9-14	61-831-00	Power Bar	3
9-17	85-034-00	Spring - Compression $\frac{7}{16}$ " OD x 2" Long	1

SUGGESTED SPARE PARTS LIST

PART #	DESCRIPTION	QUANTITY OF 1-29 UNITS
<u>REFER TO GENERAL ELECTRICAL SECTION J7</u>		
71-100-00	Light Switch	1
71-110-00	Brake Light Switch (Hydraulic Operated)	1
71-111-00	Brake Light Switch (Mechanical Operated)	1
72-072-00	4" Sealed Beam Headlight Bulb (12 Volt)	1
72-022-00	Stop & Taillight Fixture, 4" Rubber Mount (12 Volt)	2
71-900-00	Flasher (12 Volt)	1
71-501-00	Horn Button	1
75-231-00	Jumper Cable - 8" Long	4
78-010-00	Secondary Fuse & Holder (Inline Type)	1
79-823-00	Fuse - Buss Type 20 Amp	5
74-052-00	Windhsield Wiper Blade	1
<u>REFER TO BATTERY &amp; CHARGER SECTION J8</u>		
76-012-00	Charging Receptacle, 30 Amp, 3 Prong	1
76-020-00	Receptacle - Charging - Anderson Type SB6313	1
77-200-00	Hydrometer	1
77-201-00	Battery Filler	1
79-819-00	Fuse, 30 Amp - Screw Type	6

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

Your front wheel assembly consists of a ruggedly designed fork mounted with 2 Timken Roller Bearings. The front wheel is mounted on a 3/4" axle and turns on 2 Timken Roller Bearings. Grease fittings are provided at bearing points for proper lubrication.

The steering linkage consists of a steering wheel and shaft mounted on ball bearings. Mechanical advantage for smooth easy steering is obtained through roller chain and sprockets between the steering shaft, jack shaft, and fork for reliable trouble free steering. The roller chain will require an occasional adjustment for proper tension. Refer to Service and Adjustment instructions in this section of the manual.

Refer to maintenance guide and lubrication diagrams (sections D & E) for normal care of your front wheel and steering assembly.

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. The higher range of pressure is recommended for heavy loads:

4.80 x 8	4 Ply Tires	65 lbs.
4.80 x 8	6 Ply Tires (Steel Guard)	80 to 100 lbs.

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



SERVICE AND ADJUSTMENT  
REFER TO FIGURE 3  
FRONT AXLE, FORK, STEERING AND TIRES

Adjustment of Wheel Bearings

1. To adjust wheel bearings, loosen one outer nut, and turn adjacent inner nut until bearing drag barely occurs. Back off inner nut  $\frac{1}{4}$  turn, and tighten outer nut. Wheel should turn freely without noticeable end play.

Removal of Tire, Wheel, and Axle Assembly

1. Remove outer axle nuts and slide axle retaining clips free of fork.
2. Slide axle out of slots in fork, and remove axle, wheel, and tire assembly from fork.
3. Remove one inner lock nut and spacer from axle. Slide axle with remaining spacer and inner lock nut from wheel hub.
4. Tire may be changed or repaired without removing wheel from hub. To change wheel, remove 5 lug nuts which retain wheel to hub.
5. To remove wheel bearings and seals:
  - A. Pull seals from hub.
  - B. Remove taper roller bearings.
  - C. If necessary, press bearing races from hub with suitable press or with flat punch by hitting back and forth one side to other.

Re-Assembly and Adjustments of Tire, Wheel and Axle Assembly

1. Press bearing races into hub with suitable press, taking care that they are seated against stops within the hub.
2. Generously lubricate wheel bearings with wheel bearing grease and insert into bearing races.
3. Press or tap seals into place. (Proper position, is when face of seal is flush with end of hub) Note: It is recommended that new seals be installed whenever bearings are removed from wheel hub, or whenever seals are worn or damaged. Worn or damaged seals allow dirt and foreign matter to enter wheel bearings, shortening bearing life.
4. Insert axle into wheel hub, and assemble spacers and inner locknuts to axle, center axle and tighten locknuts.
5. Slide wheel and axle into fork. Assemble axle retaining clips to axle and fork. Install and tighten outer locknuts.
6. Adjust wheel bearings as described above.
7. Wheel hub has one zerck fitting for periodic bearing lubrication.

Adjustment of Fork Spindle Bearings

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

### Adjustment of Steering Chains

1. Remove locking wire from chain tightener.
2. With wrench turn center of turnbuckle type tightener drawing the chain taut with slight tension. Do Not apply excessive tension to chain as undue bearing and chain wear will result.
3. Replace locking wire on tightener.

### Removal of Fork & Spindle

1. Remove seat unit
2. Release chain tension
3. Remove chain master link, then remove chain. Note: Relative position of chain tightener to fork sprocket for reassembly.
4. Remove dust cap.
5. Remove lock nut on spindle end.
6. Slide fork and spindle out of housing.
7. Remove bearings and dust seals.
8. A puller is required to remove bearing races from housing.

### Re-Assembly of Fork & Spindle

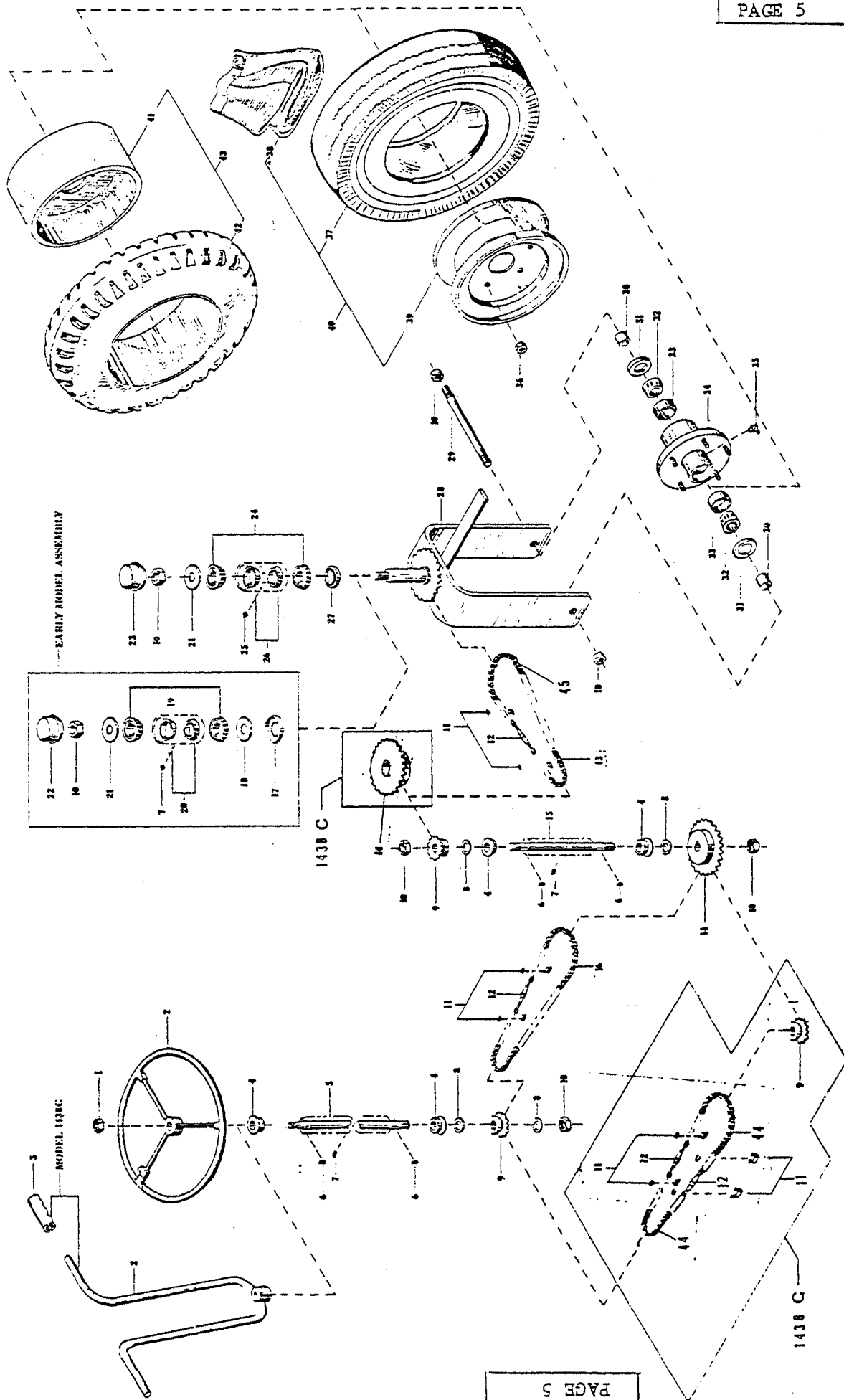
1. Bearing races may be pressed into position by using a 1/2" X 6" bolt. Place a disc or bar of suitable size over bolt then one bearing race, pass this assembly through housing. Place other bearing race, a suitable disc or bar and then the nut. Tightening the nut and bolt will draw the two bearing races into position without damage.
2. Generously pack bearings with wheel bearing grease. Assemble one dust seal and bearing in lower part of housing. Refer to figure 3 for proper location. Slide fork spindle through housing and insert upper bearing and washer.
3. Install spindle nut.
4. Adjust fork spindle bearings as previously outlined.
5. Replace dust cap on fork spindle housing.
6. Replace chain taking care to locate the chain tightener midway between the sprockets when wheel is in straightforward position. Note: Steering wheel should also be aligned in the normal straightforward position before placing chain on sprockets.
7. Adjust chain tension, removing all slack. Note: Excessive chain tension will tend to overload bearings in spindle and jack shaft. Chain should be taut for best steering control but not overstressed.

Adjustment of Steering Shaft & Jack Shaft Bearings

1. Adjustment is required only when steering shaft assemblies have been dismantled and reassembled.
2. Adjust free end play of each shaft from 1/64" to 1/16" by turning locknut located at each shaft end until desired results are obtained.

Replacement of Steering Sprockets or Bearings

1. Release chain tension
2. Remove chain master link, then remove chain (or chains). Note: Relative position of chain tightener to sprocket for proper re-assembly.
3. Remove one locknut from shaft end by holding nut on one end and unscrewing the nut on opposite end. Note: On steering column shaft the steering wheel bore is tapered and keyed.
4. Remove sprocket and woodruff key.
5. Slide jack shaft (or steering shaft) from assembly. Take care to note spacer location and when reassembling to return spacers to their original location.
6. Pull bearing from its seat in the end of the jack shaft housing (or steering column.).
7. Clean all parts thoroughly.
8. Tap or press in new bearings seating the flange against the housing.
9. Re-Assemble all parts in the reverse order to which they were removed, taking care to align steering wheel and fork as previously outlined.
10. Adjust shaft end play as described above.
11. Adjust chain tension as previously outlined.
12. Each assembly has a grease fitting for proper application of lubricants.



NO.	DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
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FIGURE 3 FRONT FORK & STEERING

TOL. FRAC. + DEC. -	SCALE	NOM.	DRAWN BY

FIGURE NO. 3  
FRONT AXLE STEERING & TIRES

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
3-1	88-199-92	Nut 5/8" N.F. (Hex Jam)	1
3-2	19-001-00	Steering Wheel	1
3-3	19-122-00	Handle Bar-Steering Model 1438C Only	1
3-4	80-400-00	Ball Bearing - 3/4"	4
3-5	20-010-00	Shaft-Steering 3/4" x 32½" With Taper	1
3-6	97-100-00	Woodruff Key - 3/16"	4
3-7	87-071-00	Grease Fitting (3/16" Drive)	2 or 3
3-8	16-405-00	Spacer 3/4" I.D. x 1/8 Thick	0 or 4
3-9	30-002-00	Sprocket 11T #40 Chain 3/4" Bore	2
3-10	88-229-81	Lock Nut 3/4" N.C. (Hex)	6
3-11	30-400-00	Link - Master #40	4 or 6
3-12	96-900-00	Turnbuckle	2 or 3
3-13	30-241-00	Chain - #40 - 29½" Long	1
3-14	30-005-00	Sprocket 22T #40 Chain 3/4" Bore	1
3-15	20-144-00	Shaft - Jack 3/4" x 13" Long	1
3-16	30-245-00	Chain - #40 - 36½" Long	1
3-17	80-704-00	Dust Ring for 1½" Bearing	1
3-18	80-804-00	Dust Washer for 1½" Bearing	1
3-19	80-010-00	Tapered Roller Bearing 1½" I.D.	2
3-20	80-100-00	Tapered Bearing Race	2
3-21	88-228-60	Washer 3/4" Flat	1
3-22	92-100-00	Dust Cap for 1½" Bearing	1
3-23	92-105-00	Dust Cap	1
3-24	80-011-00	Bearing - Tapered Roller 1½"	2
3-25	87-074-00	Grease Fitting ½"-28 Straight	1
3-26	80-102-00	Bearing Race for 1½" Tapered Bearing	2
3-27	45-307-00	Grease Seal	1
3-28	14-082-10	Fork	1
3-29	15-010-00	Axle Bolt 3/4" x 9½"	1
3-30	16-010-00	Spacer 3/4" I.D. x 1½" Long	2

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY REQ
3-31	45-308-00	Oil Seal (Front Wheel)	2
3-32	80-015-00	Tapered Roller Bearing 3/4" I.D.	2
3-33	80-105-00	Tapered Bearing Race For 3/4" I.D. Bearing	2
3-34	12-120-00	Wheel Hub	1
3-35	87-050-00	Grease Fitting 1/4" - 28 THD. (90°)	1
3-36	97-235-00	Lug Nut 7/16" Tapered	5
3-37	10-074-00	Tire, 400 x 8 Four Ply Super Rib	1
3-37	10-078-00	Tire, 400 x 8 Six Ply Steel Guard	1
3-37	10-075-00	Tire, 400 x 8 Four Ply Super Rib - Tubeless	1
3-38	13-989-00	Valve Stem For Tubeless Tires	1
3-38	11-030-00	Tube - 400 x 8	1
3-39	12-011-00	Wheel for 400 x 8 & 500 x 8 Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	1
3-39	12-012-00	Wheel For 400 x 8 Tubeless Tire (Five 1/2" Holes On 4 1/2" Bolt Circle)	1
3-40	13-731-00	Tire, Tube & Wheel 400 x 8 Four Ply Super Rib Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	1
3-40	13-738-00	Tire, Tube & Wheel 400 x 8 Six Ply Steel Guard Tire (Five 1/2" Hole on 4 1/2" Bolt Circle)	1
3-40	13-734-00	Tire & Wheel - 400 x 8 Four Ply Super Rib - Tubeless Tire (Five 1/2" Holes On 4 1/2" Bolt Circle)	1
3-41	12-054-00	Wheel For 16 1/2 x 11 1/2 Solid Cushion Tire (Five 1/2" Holes On 4 1/2" Bolt Circle)	1
3-41	12-050-00	Wheel For 16 x 4 x 12-1/8" Solid Cushion Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	1
3-42	10-261-00	Tire - Solid Extra Cushion All Service 16x4x11 1/2	1
3-42	10-250-00	Tire - Solid Cushion, Smooth 16x4x12-1/8"	1
3-43	13-954-10	Tire & Cast Iron Wheel 16 1/2 x 4 x 11 1/2 Solid Extra Cushion All Service Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	1
3-43	13-952-10	Tire Cast Iron Wheel 16 x 4 x 12-1/8 Solid Cushion Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	1
3-44	30-247-00	Chain - #40 - 16 1/2 Long (Model 1438C Only)	2
3-45	30-244-00	Chain - #40 - 32 1/2 Long (Model 1438C Only)	1

MAINTENANCE PROCEDURES

REFER TO FIGURE 5

"POWER TRACTION" REAR AXLE, MOTOR AND BRAKES

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

An adjustable motor mount has been provided to extend normal chain life. Refer to Section J2 Page 7 for proper adjustment procedures. It is important to adhere to the adjustment schedule included on Page 8. Failure to do so will seriously effect normal chain life.

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

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

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

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

Check wiring terminals for cleanliness and tightness. A loose connection will cause burning of the respective terminal and can induce motor failure.

Refer to Maintenance Guide (Section D) and Service and Adjustment (Section J2) for further recommendations on motor care.

The mechanical brake assembly located on the differential pinion shaft will require a periodic inspection for lining wear and consequently periodic adjustment. Refer to Service and Adjustment Section J2 of this manual for proper procedures.

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

If your vehicle is equipped with hydraulic brakes refer to Section J3 for their care and adjustment.

A periodic tightening of all bolts and nuts, especially the spring mounting "U" bolts should be made.

The normal life of the shock absorber unit is approximately 2 years.

SERVICE AND ADJUSTMENTS

REFER TO FIGURE 5

"POWER TRACTION" REAR AXLE, MOTOR AND BRAKES

Adjustment of Brake (Minor to Compensate for Normal Lining Wear. Important Note.

Observe position of Brake Lever Arm. It must be 1/16" to 1/4" from Gear Case Cover with brake pedal and hand brake fully released.

If brake lever arm is not in the correct position, due to improperly adjusted cables or brake rods, then it will be necessary to perform a complete major brake adjustment as itemized under next section "Adjustment of Brakes (Complete)".

Note: If brake lever arm is in the correct position as described above, it will not be necessary to touch cable or rod adjustments.

1. Adjust brake band anchor bolt and nut, tightening it until brake pedal travels approximately half way to floorboard engaging brake sufficiently to stop vehicle. Vehicles equipped with automatic (deadman) brake requires the treadle to operate the braking action within the last 1/4 of its stroke.
2. Adjust centering screws, centering band around drum to bring band as close to drum as possible without brake dragging. Lock centering screw. If band is too far from brake drum, brakes will grab in the forward direction.

CAUTION: Never bend the brake band anchor bolt. Any bending of the bolt may result in unexpected failure of the bolt and complete loss of Drive Line braking Action.

Adjustment of Brake (Complete Except for Automatic (Deadman) Brake Refer to Section J4

1. Loosen clevis and locknut on foot brake, cable (or rod) and adjust length to position brake lever arm 1/16" to 1/4" from gear case cover as described above. It may be necessary on vehicles equipped with other control cables such as handbrake cables to disconnect them so they will not interfere with this first important adjustment.

2. Adjust brake band as outlined in steps 1 and 2 above.

3. Adjust hand parking brake lever knob on end of handle, turning counterclockwise until it stops. Place lever in locked position. Then loosen clevis locknut on cable or rod on underside of parking brake lever and adjust cable or rod (by shortening) until brake band engages drum properly. Lock clevis nut.

NOTE: Brake band and brake cable must be adjusted first as outlined above.

4. Try completely releasing hand lever to be certain brake band is completely released. Additional brake holding power can be applied by turning knob on end of handle in clockwise direction.

NOTE: Turning knob in clockwise direction increases travel of brake cable but decreases leverage of brake lever. Therefore, if it is adjusted too far clockwise the lever will be difficult to operate. You compensate for this condition by shortening hand brake rod as outlined above. Caution: If you shorten rod too far, you will not allow the brake band to completely release. Obviously the ideal condition is midway between the two extremes described above.

5. If vehicle is equipped with hydraulic wheel brakes, refer to Section J3 for service and adjustment.
6. If vehicle is equipped with brake-accelerator lock, refer to Section J4 for service and adjustment.
7. If vehicle is equipped with Automatic (Deadman) brake, refer to Section J4 for service and adjustment.



Removal Of Brake Assembly And Drum

1. Remove cotter pin and clevis pin, disconnecting cable from brake lever arm, (Note location of clevis). Remove lever arm return spring.
2. Remove 4 bolts holding brake mounting assembly and slide assembly off drum.
3. Band and drum may now be cleaned, inspected, and if necessary parts may be replaced as needed.
4. Brake band lining is bonded to the band for long dependable service. When it wears to approximately 1/16" thickness the band should be replaced.
5. If the brake drum is scored, it should be removed and turned. It is recommended that a brake drum that has been severely scored or damaged should be replaced with a new drum.
6. Inspect seal in gear case cover. If worn or damaged, replace with new one. It is recommended that new seal be pre-soaked in light oil for several hours before installation. Use small amount of oil resistant sealer on seal opening in cover when pressing seal into place.
7. Re-assemble drum and spacer on pinion shaft. Tighten to 100 lb. ft. torque.
8. Replace brake assembly in the reverse order to which it was removed.
9. Adjust brake band and cables as outlined on page 2.

Removal Of "Power Traction" Rear Axle & Drive Assembly From Chassis.

1. Disconnect one battery lead to prevent accidental engagement of power while servicing unit.
  2. Clearly mark motor leads to insure their proper location when re-assembling.
  3. Remove motor leads.
  4. Pull clevis pin and disconnect brake cable from brake arm.
  5. Remove lower bolt from shock absorber. (Only vehicles equipped with shock absorbers).
  6. Disconnect hydraulic brake line at hose end. (Only vehicles equipped with hydraulic brakes.)
- Note: Steps 7 and 8 refer to vehicles with spring suspension.
7. Remove "U" Bolt clamp and nuts attaching spring to frame.
  8. Remove spring eye anchor bolts.
  9. Remove 4 bolts attaching power traction assembly to frame (Only on unsprung type vehicles).
  10. Remove axle and drive assembly from chassis.
  11. Install axle and drive assembly in the reverse order of removal, taking care that support pads and rubber bushings are in good condition. (Replace if worn or damaged).
  12. Check brake adjustments as previously outlined on page 2.
  13. On models equipped with hydraulic brakes, it will be necessary to bleed the air from brake system. Follow procedure outlined in Hydraulic Brake Section J3 of this manual.

Disassembly Of "Power Traction" Rear Axle

1. Remove unit from chassis. (As previously outlined)
2. Remove wheels and drain oil from housing.
3. Lock drive shaft brake by pulling brake lever. Remove pinion nut and pull off brake drum.
4. Remove four bolts and spring and lift off brake assembly.
5. Remove remaining nuts and bolts, and remove drive case cover.
6. Remove 3 nuts and washers and remove motor and mount plate. (If motor requires further service, refer to appropriate Section J2 of this manual.)
7. Remove chain and pinion sprocket. Observe location of spacers on shaft. Refer to Figure 5 for their correct location.
8. Remove five bolts holding back plate and remove from carrier housing.
9. On hydraulic brake models, remove brake drums, disconnect hydraulic line, remove brake shoe return springs (orange color) and remove wheel cylinders.
10. Remove four bolts on each end holding axle retainer (and brake backing plate on hydraulic brake models) and pull both axles.
11. Remove nuts around differential carrier housing and remove carrier from axle housing. (Note position of clip for proper reassembly of brake spring.)
12. Mark one differential bearing cap and bearing support to insure proper assembly. Remove adjusting nut locks, bearing caps, and adjusting nuts. Lift differential out of carrier.
13. Remove drive gear from differential case.
14. Drive out differential pinion shaft retainer and separate the differential pinion shaft and remove gears and thrust washers.
15. Remove drive pinion retainer from carrier. Remove O-ring from retainer.
16. Remove pinion locating shim. Measure shim thickness with micrometer.
17. 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.
18. Press the pinion shaft out of front bearing cone and remove spacer.
19. Remove pinion bearing cone.
20. 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 in side 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 the shaft. Place the bearing retainer on the pinion shaft, and install the front bearing cone.
4. Lubricate both bearings with differential oil. Place spacers, sprocket and brake 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 in the pinion bore dimensions and in the best operating position of the gears make an adjustment shim necessary. This shim is placed between the pinion retainer and the carrier, Fig. 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 and 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 (+) 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 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 in your settings until the 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 (on models with hydraulic brakes), 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. Remove pinion nut, spacers, brake drum, and sprocket. Remove 5 bolts from pinion bearing retainer.
13. Install gasket (use gasket sealer) and back plate assembly. Tighten 5 bolts to 50 lb. ft. torque.
14. Install spacers, 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).
15. 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 removed.
16. If seal is worn or damaged in gear case cover, replace with new seal. It is recommended that new seal be pre-soaked in light oil for several hours before installation. When pressing new seal into cover use small amount of oil resistant sealer on seal opening in cover.
17. Install cover gasket and cover.
18. Install brake drum and pinion nut. Tighten to 100 lb. ft. torque.
19. Install brake assembly in the reverse order to which it was removed.
20. Replace wheels and fill chain and differential housing with approximately 2 qts. SAE 30 oil.
21. Replace unit in chassis following steps 11 to 13 outlined in Section titled Removal Of "Power Traction" Rear Axle.
22. 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 2½ 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 "	100 Hrs.	Normal Running Conditions
3rd "	Next 150 Hrs.	" " "
4th "	Next 250 Hrs.	" " "
Thereafter	Every 400 Hrs.	" " "

### Removal Of Motor For Minor Repairs

1. Disconnect one battery lead to prevent accidental engagement of power while servicing unit.
2. Drain oil from gear case by removing drain plug.
3. Unhook brake spring.
4. Remove all bolts & nuts around gear case cover.
5. Remove brake band assembly with brake cables attached. Place assembly on floor under chassis.
6. Remove pinion nut, washer & brake drum.
7. Remove gear case cover.
8. Clearly mark motor leads to insure their proper location when re-assembling. Remove motor leads.
9. Remove 3 nuts & washers and remove motor & mount plate.
10. If 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 of removal.
4. Adjust motor mount to obtain proper chain tension.
5. Refill gear case with SAE 30 oil.
6. Connect Motor leads as follows: (IMPORTANT!!)
  - a) Check that each motor terminal stud nut is tightened securely but not over-tightened as this could bend or twist the terminal post and cause an electrical short within the motor.
  - b) Install motor leads on correct motor terminal 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

1. Remove cover, exposing brush assembly.
2. Lift brushes out of brush holder.
3. 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.
4. Press or pull old bearings off by using bearing press or bearing puller. Do not damage shaft while removing bearings.
5. Install new bearings onto shaft by gentle pressure or tapping with proper tool on inner race only. Bearing will be damaged if pressed or driven by outer race or seals.
6. On "Power Traction" Model, replace motor seal in shaft extension end bell housing.
7. If the commutator is worn or "burned" it should be turned, the mica undercut, and the commutator polished.
8. Oil bearing housing lightly to aid in re-assembly.
9. Re-assemble motor taking care that all parts are kept clean.
10. Install brushes and seat in with fine sand paper.
11. Be certain that brushes slide freely, and do not stick or bind in their holders.
12. Replace covers.



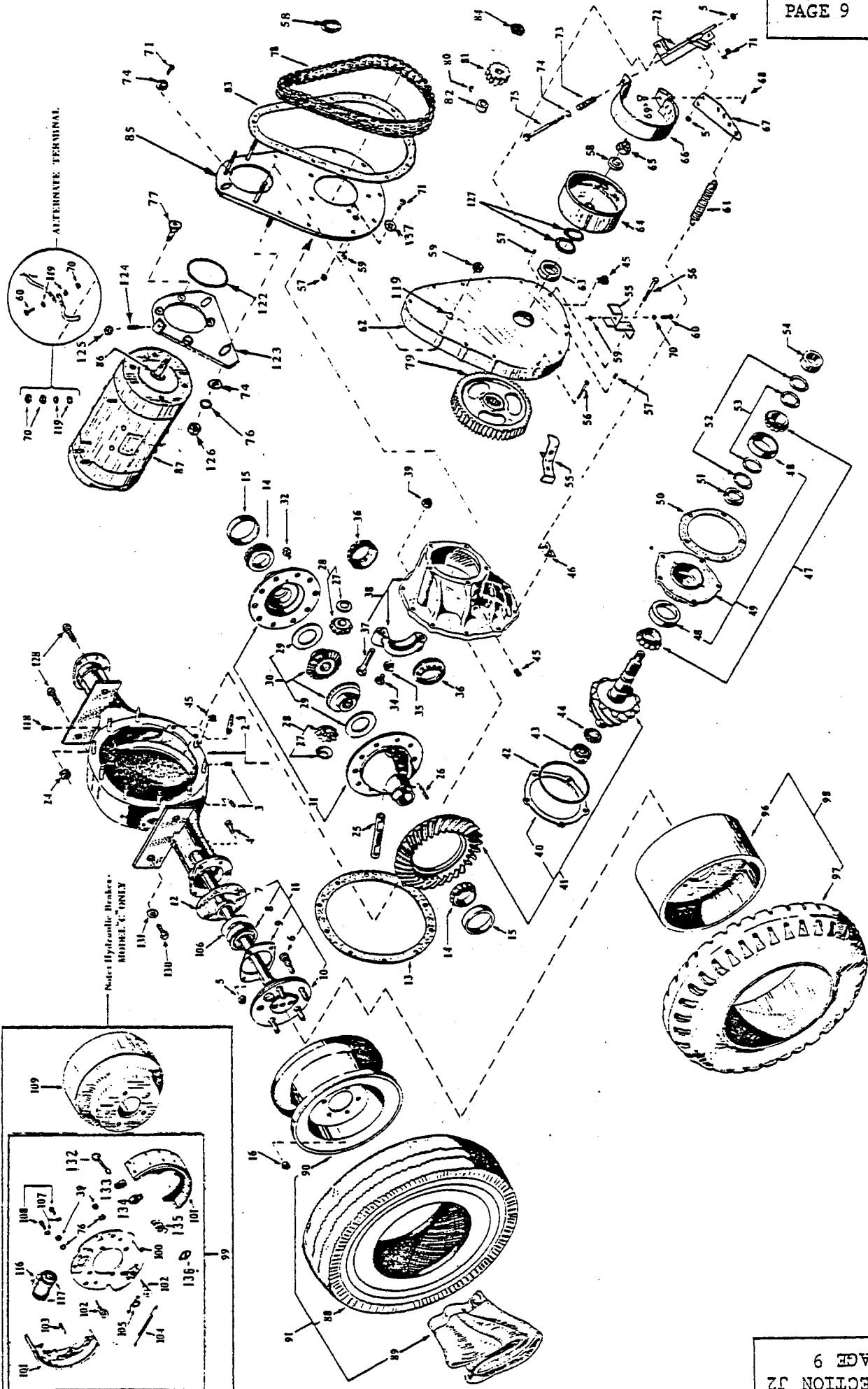
"POWER TRACTION" (UNSPRINTED)  
REAR AXLE, MOTOR & BRAKES

FIGURE 5  
SECTION J2

NO.	DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
					10-8-82

TOL. FRAC.	DEC. +
SCALE	NONE
DRAWN BY	REV. J
DATE	1-24-73

SECTION J2  
PAGE 9



POWER TRACTION DRIVE AXLE  
REFER TO FIGURE 5

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-1	41-290-00	Housing, Drive with Studs for 1.281 ID x 2.834 OD Drive Axle Ball Bearing 80-505-00	1
5-1	41-290-13	Housing, Drive with Studs for 1.530 ID x 3.150 OD Drive Axle Ball Bearing 80-503-00	1
5-2	96-330-00	Bolt Differential Carrier to Housing	10
5-3	41-997-00	Drain and Level Plug (1/8" Pipe)	
5-4	88-100-11	Screw, Hex Head Cap 3/8 x 1 NC. Use with 41-290-00 Drive Housing	0 or 8
5-4	88-120-11	Screw, Hex Head Cap 7/16 x 1 NC. Use with 41-290-13 Drive Housing	0 or 8
5-5	88-109-81	Nut, Lock 3/8 NC. Use with 41-290-00 Drive Housing	0 or 10
5-5	88-129-81	Nut, Lock 7/16 NC. Use With 41-290-13 Drive Housing	0 or 10
5-6	96-331-00	Bolt - 1/2" N.F. (Spec.) Rear Hub	10
5-7	32-509-00	Ring, Retainer for 80-505-00 Drive Axle Ball Bearing	2
5-7	32-515-00	Ring, Retainer for 80-503-00 Drive Axle Ball Bearing	2
5-8	80-505-00	Bearing, Ball, Drive Axle 1.281 ID x 2.834 OD for 41-290-00 Drive Housing	2
5-8	80-503-00	Bearing, Ball, Drive Axle 1.530 ID x 3.150 OD for 41-290-13 Drive Housing	2
5-9	32-511-00	Plate, Retainer, for use with Drive Axle Ball Bearing	2
5-9	32-514-00	Plate, Retainer, for use with 80-503-80 Drive Axle Ball Bearing	2
5-11	41-163-11	Assembly, Axle Shaft 13-1/8 Long, Axle Flange Face to Splined End, 28 Teeth on Spline, with 80-505-00 Bearing, 32-511-00 Retainer Plate, 32-509-00 Retainer Ring, 45-044-00 Gasket and Lug Nuts. Use with 41-290-00 Drive Housing	0 or 1
5-11	41-162-11	Assembly, Axle Shaft 10-11/16 Long, Axle Flange Face to Splined End, 28 Teeth on Spline, with 80-505-00 Bearing, 32-511-00 Retainer Plate, 32-509-00 Retainer Ring, 45-044-00 Gasket and Lug Nuts. Use with 41-290-00 Drive Housing	0 or 1
5-11	41-163-21	Assembly, Axle Shaft 13-1/4 Long, Axle Flange Face to Splined End, 28 Teeth on Spline, with 80-503-00 Bearing, 32-514-00 Retainer Plate, 32-514-00 Retainer Ring 45-045-00 Gasket, 45-301-00 Oil Seal and Lug Nuts. Use with 41-290-13 Drive Housing	0 or 1



FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-11	41-162-21	Assembly, Axle Shaft 10-13/16 Long, Axle Flange Face to Splined End, 28 Teeth on Spline with 80-503-00 Bearing, 32-514-00 Retainer Plate, 32-515-00 Retainer Ring, 45-045-00 Gasket, 45-301-00 Oil Seal and Lug Nuts. Use with 41-290-13 Drive Housing	0 or 1
(Not Shown)	45-301-00	Seal Oil Used with 41-163-21 and 41-162-21 Axles only.	0 or 1
5-12	32-512-00	Spacer Retainer used with 80-505-00 Axle Ball Bearing (Used only without Hydraulic Brakes)	1
5-13	45-042-00	Gasket (Housing to Differential Carrier)	1
5-14	80-511-00	Tapered Roller Bearing, LM 501349, I.D. 1.625. Use w/80-127-00 Bearing Race	2
5-14	80-512-00	Tapered Roller Bearing, LM 603049, I.D. 1.7812. Use w/80-128-00 Bearing Race	2
5-14	80-513-00	Tapered Roller Bearing, LM 102949, I.D. 1.7812. Use w/80-129-00 Bearing Race	2
5-15	80-127-00	Tapered Bearing Race, LM 501310, O.D. 2.891. Use w/Bearing 80-511-00	2
5-15	80-128-00	Tapered Bearing Race, LB 60311, O.D. 3.0625. Use w/Bearing 80-512-00	2
5-15	80-129-00	Tapered Bearing Race, LM 102910, O.D. 2.8910. Use w/Bearing 80-513-00	2
5-16	97-236-00	Nut, 1/2" N.F. (Lug)	10
5-24	97-236-00	Nut, 1/2" N.F. (Lug)	4
5-25	41-700-00	Differential Pinion Shaft	1
5-26	41-701-00	Pin	1
5-27	41-702-00	Thrust Washer - Differential Pinion Shaft	2
5-28	41-703-00	Differential Shaft Pinion Kit (Two Differential Gears and Two Thrust Washers)	1
5-29	41-704-00	Thrust Washer-Differential Side Gear	2
5-30	41-705-00	Differential Side Gear Kit (Two Differential Side Gear and Two Thrust Washers)	1
5-31	41-712-00	Differential Gear Case Assembly (Small Carrier Bearing 1.628" I.D.)	1
5-31	41-713-00	Differential Gear Case Assembly (Large Carrier Bearing 1.784" I.D.)	1
5-32	96-243-00	7/16 x 7/8 N.F. Hex Head Bolt	10
5-33		Intentionally Left Blank	
5-34	88-080-04	Hex Head Cap Screw 5/16" x 3/8" N.C.	2
5-35	41-706-00	Nut Lock, Differential Bearing Adjustment w/30° Angle Tab. Use w/41-707-00 or 41-708-00 Diff. Bearing Adjustment Nuts	2
5-35	41-706-50	Nut Lock, Differential Bearing Adjustment w/Right Angle Tab w/Last Bend 1/2" Long. Use w/41-707-50 Diff. Brg. Adjustment Nut	2
5-35	41-706-51	Nut Lock, Diff. Brg. Adjustment w/Right Angle Tab W/Last Bend 1/4" Long. Use w/41-708-50 Diff. Brg. Adj. Nut	2

POWER TRACTION DRIVE AXLE  
REFER TO FIGURE 5

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-36	41-707-00	Nut, Differential Bearing Adjustment, 2-15/16 OD 2 Oblong Locking Holes, Use LM 501349 Bearing	2
5-36	41-707-50	Nut, Differential Bearing Adjustment, 2-15/16 OD Round Locking Holes. Use LM 102949 Bearing	2
5-36	41-708-00	Nut, Differential Bearing Adjustment 3-1/8 OD Oblong Locking Holes. Use LM 603049 Bearing	2
5-36	41-708-50	Nut, Differential Bearing Adjustment 3-1/8 OD Round Locking Holes. Use LM 603049 Bearing	2
5-38	41-709-00	Differential Carrier Assembly (For Small Carrier Bearing 1.784" I.D.)	1
5-38	41-710-00	Differential Carrier Assy. (For Large Carrier Bearing 1.784" I.D.)	1
5-39	88-119-80	Nut, 3/8" N.F. (HEX)	14
5-40	41-711-00	Shim-Drive Pinion Bearing	1 to 3
5-41	31-235-00	Ring and Pinion Gear Set 2.75 Ratio	1
5-41	31-236-00	Ring and Pinion Gear Set 3.10 Ratio	1
5-41	31-237-00	Ring and Pinion Gear Set 3.25 Ratio	1
5-41	31-238-00	Ring and Pinion Gear Set 3.50 Ratio	1
5-41	31-239-00	Ring and Pinion Gear Set 5.43 Ratio	1
5-41	31-234-00	Ring and Pinion Gear Set 3.00 Ratio	1
5-42	80-702-00	"O" Ring-Drive Pinion Bearing Retainer	1
5-43	80-555-00	Ball Bearing-Rear, Pinion Pilot	1
5-44	41-714-00	Driving Pinion Pilot Bearing Retainer	1
5-45	41-996-00	Plug (Level) 1/2" with Recessed Top	1 or 3
5-46	91-509-00	Spring Clip	0 or 1
5-47	80-554-00	Tapered Roller Bearing-Pinion Shaft	2
5-48	80-125-00	Tapered Bearing Race-Pinion Shaft	2
5-49	41-715-10	Pinion Bearing Case Assy. & Bearing Races	1
5-50	45-021-00	Gasket Gear Case to Pinion Bearing Assy.	1
5-51	16-415-00	Spacer Pinion Shaft (.440" Thick)	1
5-52	16-410-00	Spacer Pinion Shaft (.018" Thick)	2 to 6
5-53	16-411-00	Spacer Pinion Shaft (.005" Thick)	2 to 6
5-54	16-414-00	Spacer Sprocket (.500" Thick)	1
5-54	16-417-00	Spacer Pinion Shaft (.340" Thick)	1
5-55	41-371-00	Brake Alignment Bracket	2
5-56	88-080-20	Hex Head Cap Screw 5/16" x 3" NC	9
5-57	41-989-00	Plug (Filler Level and Drain 1/4" N.P.T.)	2
5-58	88-228-61	Washer 3/4" S.A.E.	2
5-59	88-089-81	Lock Nut 5/16" N.C.(hex)	14
5-60	88-080-11	Hex Head Cap Screw 5/16" x 1" N.C.	2
5-61	85-270-00	Extension Spring 1-1/4" OD x 4-3/8" Free Length	0 or 1

FIGURE 5  
POWER TRACTION DRIVE AXLE

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-62	43-201-00	Gear Case Cover	1
5-63	45-331-00	Oil Seal-Gear Case To Pinion	1
5-64	41-532-00	Brake Drum (Splined)	1
5-65	97-250-00	Nut-Pinion 3/4"-20 Extra Fine Thread	1
5-66	41-661-00	Full Brake Band for 6" Drum	1
5-66	41-660-00	Brake Band (1/2 Band) For Drive Shaft Brake	1
5-67	50-656-00	Brake Lever Arm	1
5-68	88-517-11	Cotter Pin 3/32" x 1"	1
5-69	96-771-00	Clevis Pin 3/8" x 3/4" Face to Hole	1
5-70	88-089-80	Nut - 5/16" N.C. (Hex)	10
5-71	88-101-13	Hex Head Cap Screw 3/8" x 1 1/4" N.C., Grade 5	5
5-72	41-372-00	Brake Mounting Bracket	1
5-73	85-060-00	Compression Spring 5/8" O.D. x 2 1/2" Long	1
5-74	88-108-60	Washer 3/8" Flat Cut	4
5-75	88-100-24	Hex Head Cap Screw 3/8" x 4" N.C.	1
5-76	88-108-62	Lockwasher 3/8"	7
5-77	88-103-09	Flat Head Socket Cap Screw 3/8"x 3/4" NC	4
5-78	30-506-00	Chain-36 Links (For 42 Tooth Sprocket)	1
5-78	30-507-00	Chain-41 Links (For 59 Tooth Sprocket)	1
5-78	30-508-00	Chain-48 Links (For 81 Tooth Sprocket)	1
5-79	30-091-00	Sprocket-42 Tooth With Splined Hub	1
5-79	30-092--0	Sprocket-59 Tooth With Splined Hub	1
5-79	30-093-00	Sprocket-81 Tooth With Splined Hub	1
5-80	97-100-00	Woodruff Key - 3/16"	1
5-81	30-080-00	Sprocket-15 Tooth x 3/4" Bore	1
5-82	17-110-10	Shaft Collar-3/4" With Keyway	1
5-83	45-002-00	Gasket-Gear Case Cover	1
5-84	88-239-82	Jam Nut-3/4" N.F. (Hex)	1
5-85	44-352-53	Gear Case Back Plate (Angle Motor Mount) Adjustable	1
5-85	44-352-52	Gear Case Back Plate (Vertical Motor Mount) Adjustable	1
5-86 and 5-87		SEE SECTION J2M	

FIGURE 5  
POWER TRACTION DRIVE AXLE

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-88	10-074-00	Tire, 4.80 x 8, Four Ply Super Rib	2
5-88	10-078-00	Tire, 4.80 x 8, Six Ply Steel Guard	2
5-88	10-075-00	Tire, 4.80 x 8, Four Ply Super Rib-Tubeless	2
5-88	10-076-00	Tire, 4.80 x 8, Four Ply Knobby-Tubeless	2
5-89	13-989-00	Valve Stem for Tubeless Tire	2
5-89	11-030-00	Tube 4.80 x 8"	2
5-90	12-011-00	Wheel for 4.80x 8 & 500 x 8 Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-90	12-012-00	Wheel for 4.80x 8 Tubeless Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-91	13-731-00	Tire, Tube & Wheel, 4.80 x 8, Four Ply Super Rib Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-91	13-738-00	Tire, Tube & Wheel, 4.80 x 8, Six Ply Steel Guard Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-91	13-734-00	Tire & Wheel, 4.80 x 8, Four Ply Super Rib-Tubeless Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-96	12-054-00	Wheel for 16 1/2" x 11 1/2" Solid Cushion Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-96	12-050-00	Wheel for 16 x 4 x 12 1/8" or 17 x 4 1/2 x 12 1/8" Solid Cushion Tire. (Five 1/2" holes on 4 1/2" Bolt Circle)	2
5-97	10-261-00	Tire, Solid Xtra Cushion, All Service 16 1/2 x 4 x 11 1/2"	2
5-97	10-256-00	Tire, Solid Xtra Cushion, All Service 17 x 4 1/2 x 12 1/8"	2
5-97	10-250-00	Tire, Solid Cushion, Smooth 16 x 4 x 12 1/8" 12 1/8	2
5-98	13-954-10	Tire & Cast Iron Wheel 16 1/2 x 4 x 11 1/2" Solid Extra Cushion, All Service Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2
5-98	13-959-19	Tire Cast Iron Wheel 17 x 4 1/2 x 12 1/8" Solid Extra Cushion, All Service Tire (Five 1/2" Holes on 4 1/2" Bolt Circle)	2

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-98	13-952-10	Tire Cast Iron Wheel 16 X 4 X 12-1/8 Solid Cushion Tire (Five 1/2" Holes On 4 1/2" Bolt Circle)	2
5-99	41-346-98	Brake Backup Plate Assembly With Shoes (Left Side)	1
5-99	41-346-99	Brake Backup Plate Assembly With Shoes (Right Side)	1
5-100	41-346-10	Brake Backup Plate Only (Left Side)	1
5-100	41-346-11	Brake Backup Plate Only (Right Side)	1
5-101	41-640-00	Brake Shoes 7" Internal Expanding (Set For 1 Wheel)	2 Set
5-102	42-003-00	Brake Adjustment Cam (7" Hydraulic Brake)	4
5-103	85-207-00	Spring Extension 3/8" X 1-3/8" Free Length (Red)	4
5-104	85-208-00	Spring Extension 1/2" X 4 1/2" Free Length (Orange)	2
5-105	85-411-00	Spring Torsion 1 1/2" Diameter (Blue)	2
5-106	45-044-00	Gasket - Rear Axle Bearing	2
5-107	88-068-62	Washer - 1/2" Lock	4
5-108	88-060-06	Hex Head Cap Screw 1/2" X 1/2" N.C.	4
5-109	41-514-00	Brake Drum (7")	2
5-116	99-506-98	Wheel Cylinder (7" Brake - Left)	1
5-116	99-506-99	Wheel Cylinder (7" Brake - Right)	1
5-117	99-506-61	Wheel Cylinder Repair Kit (7" Brake)	2
5-118	88-527-11	Cotter Pin 1/8" X 1" (Axle Vent)	1
5-119	88-088-61	Washer 5/16" SAE	11
5-122	80-703-00	"O" Ring Motor Mount Seal	1
5-123	70-454-00	Motor Mount Plate	1
5-124	88-067-11	Socket Set Screw 1/2" NC X 1"	1
5-125	88-069-80	Nut 1/2" NC (Hex)	1
5-126	88-109-80	Nut 3/8" NC (Hex)	3
5-127	16-400-00	Spacer 1 1/2" I.D. X .125" Thick	0 - 1 Or 2
5-128	88-140-14	Hex Head Cap Screw 1/2" X 1 1/2" NC	3 Or 4
5-130	88-180-11	Hex Head Cap Screw 5/8 X 1 1/2" NC (Model E)	1
5-131	88-188-62	Lock Washer 5/8" (Model E)	1
5-132	41-695-00	Pin, Brake Shoe Anchor	4
5-133	41-697-00	Washer (Rubber) 7/16 O.D. x 1/8 I.D. x 3/32 Thick	4
5-134	88-068-61	Washer, 1/4 SAE	4
5-135	85-050-00	Spring, Compression, 1/2 O.D. x 1" Long (Fuschia)	4
5-136	41-696-00	Cup, Brake Shoe Anchor	4
5-137	88-108-63	Lockwasher, 3/8, Internal Tooth	5

MAINTENANCE PROCEDURES  
REFER TO FIGURE 6 AND 7  
HYDRAULIC BRAKE SYSTEM

Your hydraulic brake system consists of an automotive master cylinder operated by the brake foot pedal and control linkage.

Each rear wheel is fitted with a Bendix 7" brake assembly and rugged brake drum. On 4 wheel brake models the front wheels are similarly equipped.

Refer to Maintenance Guide Section D and Lubrication Diagram Section E 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.

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 or the need of shoe adjustment. Refer to Service and Adjustment Section J3 of this manual for proper procedures to follow.

SERVICE AND ADJUSTMENT  
REFER TO FIGURE 6 AND 7  
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.

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 cup 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.
12. Tighten locknut and install cotter pin.

BLEED AIR FROM BRAKE SYSTEM

Note: Anytime that any part of the hydraulic system is disconnected or replaced, it is necessary to bleed air from system.

If fluid level is allowed to fall too low in master cylinder reservoir, air will be pumped into system. Consequently the system will have to be bled to remove air. To bleed air from system, follow procedure outlined next.

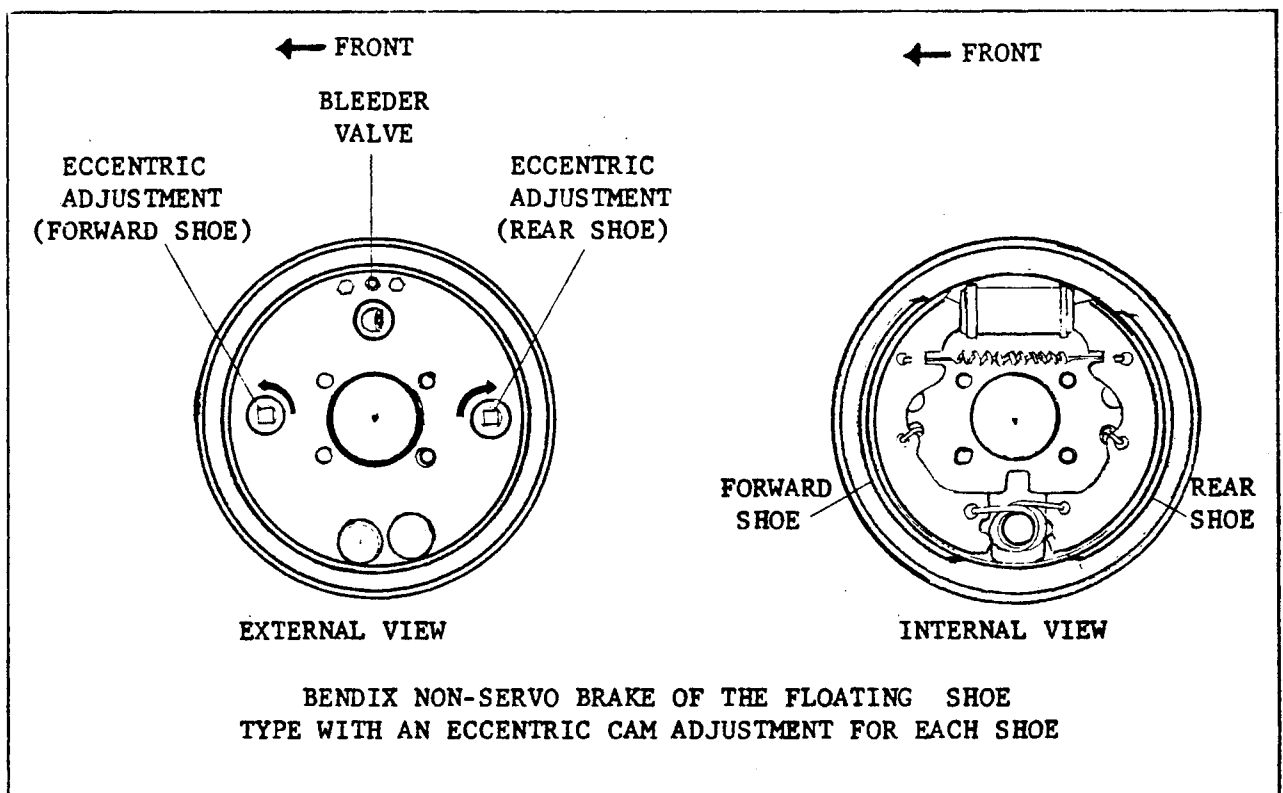
1. For best results brake shoes should be properly adjusted prior to bleeding system. (Refer to Adjustment Section J3 of this manual)
2. Fill master cylinder to top with approved brake fluid or, if available, attach brake bleeder tank to master cylinder.
3. When using bleeder tank, loosen air bleeder 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.
3. (Alternative) - 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 the brake pedal pressure, loosen bleeder valve. Fluid and air will be forced out on the downward stroke of the pedal. Person operating pedal must hold it down at the end of its stroke while the other person closes the 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 on each downward stroke of the pedal. It is wise to refill master cylinder after every 3 or 4 strokes to insure 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 system.
4. Remove brake bleeder tank if used. Fill master cylinder 3/8" to 1/2" of top and replace cover.

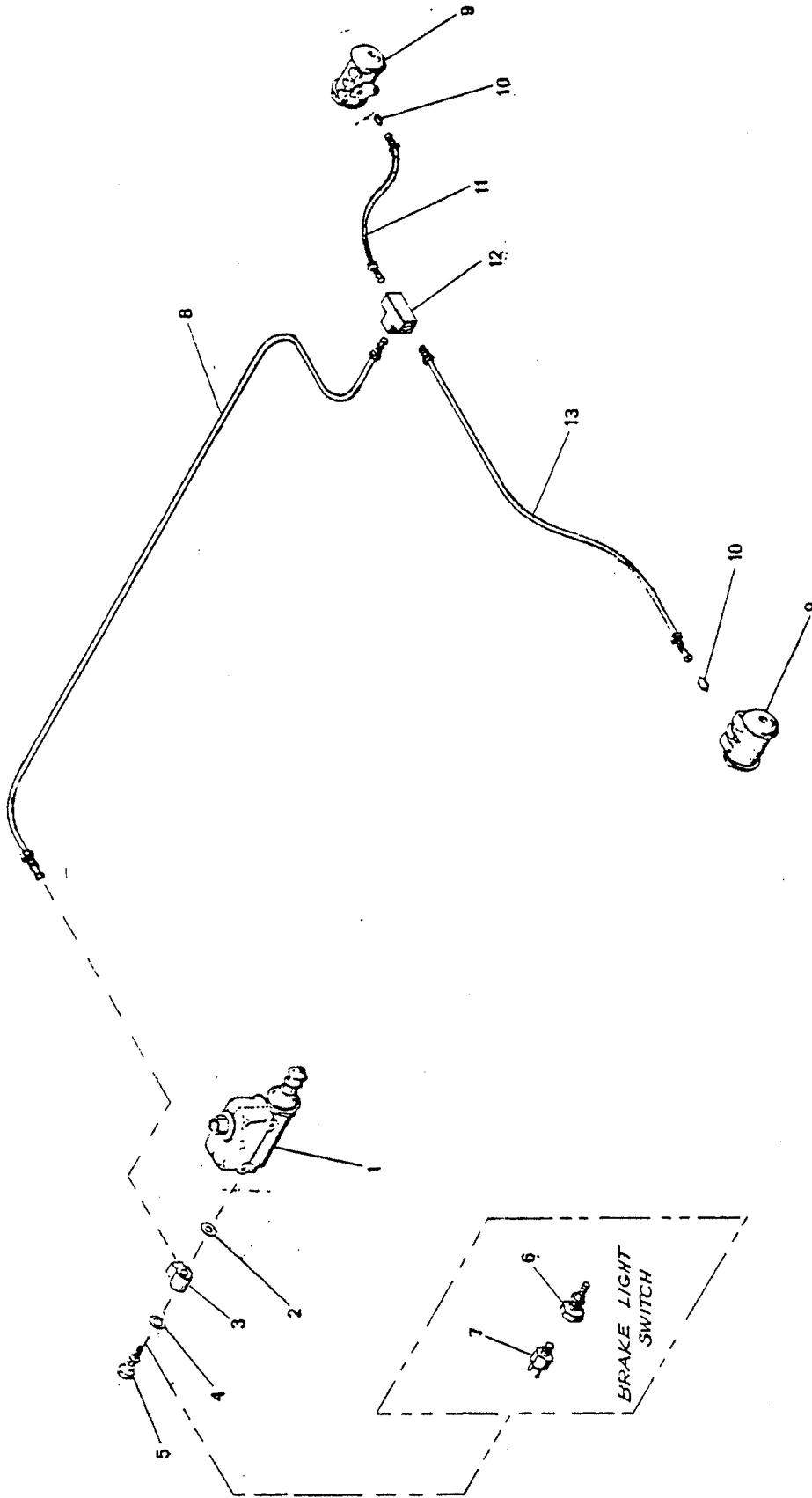
#### REPLACING WHEEL CYLINDERS OR BRAKE SHOES

1. Remove wheel lugs, wheel and brake drum.
2. Unhook springs, and remove brake shoes. (Refer to diagram) Brake shoes should be replaced when lining is worn to rivet heads.
3. To remove wheel cylinder, disconnect hydraulic line.
4. Remove 2 wheel cylinder bolts from backing plate and remove wheel cylinder.
5. If installing replacement kit, clean wheel cylinder thoroughly.
6. Remove dust caps and piston parts.
7. Examine cylinder walls. If scored or rough, remove fine hone.
8. Install new kit assembly.
9. Replace wheel cylinder and brake shoes in reverse order to which they were removed.
10. Replace brake drum. (If brake drum is badly scored, replace with new one)
11. Replace wheel.
12. ADJUST BRAKE SHOES and bleed hydraulic system.
  - A. Loosen both locknuts on eccentric adjusting studs. (Refer to Diagram)



- B. Turn forward shoe adjustment stud away from wheel cylinder (as indicated by arrows in diagram) until heavy drag is felt while revolving wheel. (Wheel must be raised clear of floor.)
- C. Then back off by turning adjustment stud in opposite direction slightly until wheel is just free of drag.
- D. Repeat procedure on rear brake shoe.
- E. Tighten locknuts, being careful to hold stud with wrench so as not to disturb adjustment.
- F. Depress brake pedal several times and check to be sure wheel still revolves free of drag and desired pedal travel is obtained.
- G. If wheel drags, repeat adjustments as previously outlined, until satisfactory results are obtained.
- H. If wheel (or wheels) are free of drag, but pedal has too much travel, check adjustments as previously outlined. If necessary, bleed hydraulic system.





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HYDRAULIC BRAKE SYSTEM

FIGURE 6

O. DESCRIPTION

QTY. FRAC. + DEC. -

DATE

DRAWN BY KFA

FIGURE NO. 6  
HYDRAULIC BRAKE SYSTEM

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
6-1	99-510-00	Master Cylinder	1
6-1	99-510-51	Rubber Boot (Master Cylinder)	1
6-1	99-510-61	Kit - Master Cylinder Repair	1
6-2	99-571-00	Washer - Copper Small Hole	1
6-3	99-566-00	Fitting - 3/16 Tube Single Outlet	1
6-4	99-572-00	Washer - Copper Large Hole	1
6-5	99-579-00	Bolt - Master Cylinder Fitting	1
6-6	99-578-00	Bolt - Master Cylinder Fitting for Brake Light	1
6-7	71-110-00	Switch - Brake Light ( Hydraulic)	1
6-8	99-608-54	Formed Steel Brake Line 3/16" x 60"	1
6-9	99-506-98	Wheel Cylinder (7" Brake Left)	1
6-9	99-506-99	Wheel Cylinder (7" Brake Right)	1
6-9	99-506-61	Kit - Wheel Cylinder Repair	1
6-10	99-574-00	Spacer Adaptor for Wheel Cylinder	2
6-11	99-600-51	Formed Steel Brake Line 3/16" x 6"	1
6-12	99-564-00	Tee Fitting	1
6-13	99-604-51	Formed Steel Brake Line 3/16" x 20"	1

MAINTENANCE PROCEDURES  
REFER TO FIGURE 7  
MECHANICAL CONTROL LINKAGE

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

The accelerator system consists of the operating pedal and pivot shaft assembly, the connecting rods and adjusters and the return spring. All wear points should be lubricated monthly for normal service. Refer to Maintenance Guide Section D and Lubrication Diagram Section E for proper application of lubricants.

The accelerator dashpot is a mechanical hydraulic device. It is designed to provide smooth acceleration and prevent sudden bursts of acceleration, especially on vehicles operating above 24 volts.

It is a standard feature on 36 Volt units and is available as an option on 24 Volt models. The dashpot device is an integral unit requiring very little service or adjustments throughout its life. Therefore, it is recommended that if it eventually does cease to function it should be replaced with a new unit as any attempt at rebuilding is not worth the effort.

The handbrake system consists of the hand operating lever, pivot shaft, connecting rod, and adjuster and the mechanical brake operating cable. (Note that on vehicles equipped with mechanical brakes only, this cable serves as the operating cable for the foot brake system as well.)

The footbrake system consists of the foot pedal, pivot shaft, brake operating cable as mentioned above, the return spring, and the master cylinder and push rod assembly on vehicles equipped with hydraulic brakes.

The automatic deadman brake system consists of the pivoted seat assembly. The operating cable or rods. The brake apply spring, adjustable tension device and its connecting linkage.

All wear points should be lubricated monthly. Refer to Maintenance Guide Section D and Lubrication Diagram Section E for proper application of lubricants.

For service and adjustments refer to the following sections:

Section J2 - For hand brake and mechanical brake service and adjustments.

Section J3 - For Master Cylinder and push rod adjustments and service.

Section J4 - For accelerator dashpot adjustments.

Section J6 - For accelerator service and adjustments.

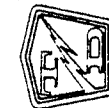
SERVICE AND ADJUSTMENTS  
REFER TO FIGURE 7  
MECHANICAL CONTROL LINKAGE

Adjustment of Accelerator Dashpot

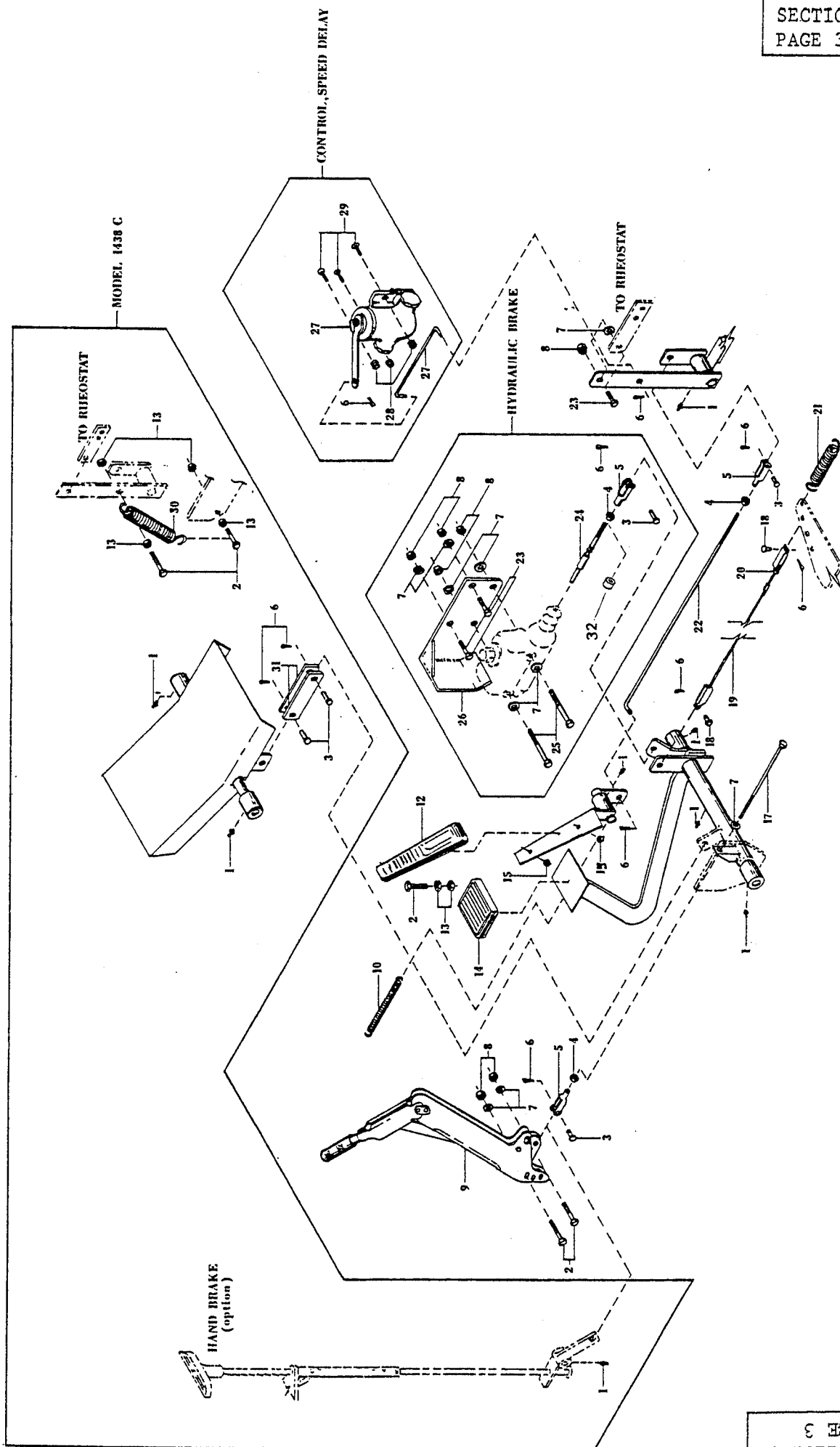
1. Adjust the thumb screw metering control located on dashpot body to retard the sudden depression of the accelerator pedal.
  2. Turning the control clockwise will increase the retarding effect.
  3. Turning the control counterclockwise will reduce the retarding effect and will allow more rapid movement of the accelerator pedal.
- Note: The dashpot is effective only when depressing accelerator pedal. The releasing of the pedal is not restricted in any way, thereby, power is turned off to the motor immediately when accelerator pedal is released.

Correct Position of Dashpot Control Arm

1. The dashpot control arm has a triangular hole which fits the triangular shaft protruding from the top of the unit. The arm is marked A-B&C. An arrow is located on the top of the shaft.
2. Place the point marked C in alignment with the arrowhead on the shaft whenever installing arm onto dashpot. The dashpot will only function properly when assembled in this position.



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SECTION J4  
PAGE 3

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FIGURE 7  
SECTION J4

MECHANICAL CONTROL LINKAGE  
MODEL C

FIGURE NO. 7  
MECHANICAL CONTROL LINKAGE

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
7-1	87-071-00	Grease Fitting 3/16" Drive Type (Straight)	5 or 7
7-2	88-100-14	Hex Head Cap Screw 3/8" x 1½ NC	2 or 3
7-3	96-772-00	Clevis Pin 3/8 x 1"	2 or 3
7-4	88-119-80	Nut 3/8" NF (Hex)	2 or 3
7-5	96-762-00	Cast Clevis 3/8	2 or 3
7-6	88-527-11	Cotter Pin 1/8" x 1"	5 or 8
7-7	88-108-60	Washer 3/8" Flat	6 to 12
7-8	88-109-81	Lock Nut 3/8 NC (Hex)	3 or 7
7-9	51-340-00	Hand Parking Brake Lever with Spacers	1
7-10	85-295-00	Spring - 9/16" O.D. x 4-7/8 Free Length	1
7-12	98-254-00	Accelerator Pad	1
7-13	88-109-80	Nut 3/8 NC (Hex)	2
7-14	98-200-00	Rubber Brake Pedal Pad	1
7-15	88-069-87	1/4 NC Fastite Nut	2
7-17	88-111-34	Hex Head Cap Screw 3/8 x 9" N.F.	1
7-18	96-771-00	Clevis Pin 3/8" x 3/4"	2
7-19	96-813-00	Adjustable Cable Assembly (31½ to 28½)	1
7-20	88-099-80	Nut 5/16 NF (Hex)	2
7-21	85-270-00	Spring-Extension 1½" O.D. x 4 3/8" Free Length	1
7-21	85-233-00	Spring-Extension 11/16" O.D. x 6½" Free Length (1438C Only)	1
7-22	50-123-00	Accelerator Rod 3/8 x 22½	1
7-22	50-123-10	Accelerator Rod 3/8 x 22½ With Pipe (Model 1438C Only)	1
7-23	88-100-13	Hex Head Cap Screw 3/8 x 1½ NC	1 or 3
7-24	50-009-00	Master Cylinder Push Rod 3/8 x 5 3/8	1
7-25	88-100-20	Hex Head Cap Screw 3/8 x 3" NC	2
7-26	99-515-00	Mounting Bracket, (Master Cylinder	1
7-27	53-005-10	Dash Pot Assembly For Speed Control	1
7-28	88-069-87	Nut ½" NC (Fastite	3
7-29	88-065-09	Truss Head Machine Screw ½ x 3/4 NC	3
7-30	85-280-00	Spring-Extension 1 3/8 O.D. x 7 3/4 Free Length	1
7-31	50-428-00	Brake Link	2

MAINTENANCE PROCEDURES  
Refer to Figure 8  
FORWARD-REVERSE SWITCH

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

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

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

Refer to Service and Adjustment Section J5 of this manual for replacement procedures.

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

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

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



SERVICE AND ADJUSTMENT  
FORWARD/REVERSE SWITCH  
REFER TO FIGURE 8

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

REMOVAL, DIS-ASSEMBLY AND RE-ASSEMBLY OF SWITCH

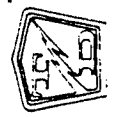
1. Remove handle screw in center of handle and then remove handle and spacer.
2. Remove 2 screws in center of face plate, this will release switch unit from frame. Then lift switch unit clear of frame noting that the end plate will be free to lift off of switch.
3. Remove cover.
4. If you wish to remove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

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

REPLACEMENT OF CONTACT FINGERS ONLY

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

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FORWARD - REVERSE SW,  
PART NO. 71-040-00

FIGURE 8  
SECTION J5

NO. DESCRIPTION  
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DATE 9-13-60

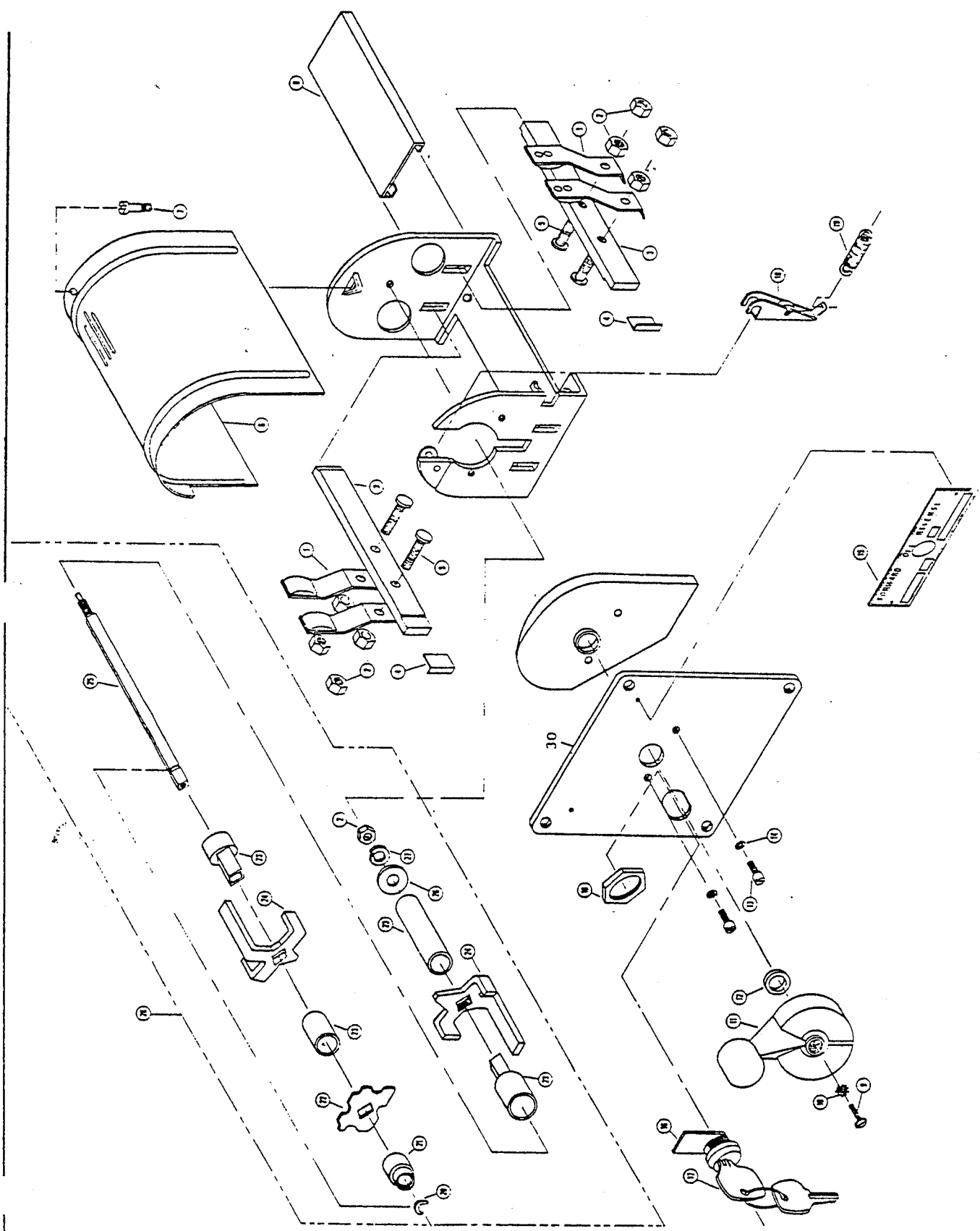


FIGURE NO. 8  
GROUP 8 FORWARD AND REVERSE SWITCH

FIG. I. D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
8-0	71-040-00	Forward & Reverse Switch Complete (4 Fingers)	1
8-1	71-040-60	Switch Finger - Silver Plated With 1/4" Hole	4
8-2	88-079-80	Nut 1/4" NF (Hex)	9
8-3	71-040-61	Finger Board With 1/4" Holes	2
8-4	71-040-69	Finger Board Wedge	2
8-5	71-040-71	Bolt-Finger Mounting (1/4" NF X 7/8" Spec.)	4
8-6	71-040-65	Switch Cover	1
8-7	71-040-73	Cover Screw (10-32 X 1/2" Filister Head)	1
8-8	71-040-70	Rubber Insulator Strip	1
8-9	88-025-06	Screw 8-32 X 1/2" Truss Head	1
8-10	88-028-64	Washer 8-32 (External Star Lock)	1
8-11	71-040-62	Switch Handle - Metal (Red Color)	1
8-12	71-040-59	Spacer Washer	1
8-13	71-040-72	Face Stop Bolt (10-32 X 3/8 Spec.)	2
8-14	88-048-62	Lock Washer 10-32	2
8-15	94-305-00	Forward-Reverse Switchplate	1
8-16	71-040-55	Lock Assembly With 2 Keys	1
8-16	71-040-87	Tubular Lock Assembly with two keys	1
8-17	71-040-74	Key Only (Give No. Of Lock Or Vehicle Ser. No.)	2
8-18	71-040-53	Cam	1
8-19	71-040-54	Spring - (Cam)	1
8-20	71-040-75	Snap Ring - 1/4"	1
8-21	71-040-68	Bushing	1
8-22	71-040-67	Cam Index	1
8-23	71-040-66	Plastic Spacer Set (Sold Only As Set Of 4 Pcs.)	1 Set
8-24	71-040-58	Rotor Contacts (Set Of 2-1 Right & 1 Left)	1 Set
8-25	71-040-64	Rotor Shaft (Only)	1
8-26	88-068-61	Washer SAE	1
8-27	88-068-62	Lock Washer 1/4"	1
8-28	71-040-52	Rotor Assembly	1
8-30	71-040-82	Face Plate	1
	71-040-76	Kit-Conversion to Six Finger Switch	1
<u>Switch Extension Handle Parts</u>			
8-9	71-040-80	Extension Rod-8-32 x 6 1/2" Long	1
8-9	71-040-78	Extension Tube-11/16 OD x 5 1/2" Long	1
8-11	71-040-77	Switch Position Indicator	1
	71-040-79	Bracket - Extension Support	1
	88-029-80	Nut 8-32 (Hex)	1

MAINTENANCE PROCEDURES  
REFER TO FIGURE 9  
RHEOSTAT 5 SPEED CONTROL

The rheostat, controls the speed of your vehicle through the use of coils of nichrome resistance wire. With this type of resistance control, you use approximately the same amount of power from batteries in low speed as you do in high speed. The 5 flat copper bars and a movable J-Hook are the major parts in the rheostat. With proper adjustment and lubrication the rheostat will give many months of trouble free use. It doesn't take much grease to do the job, but it should be done weekly. Monthly the space between bars should be cleaned with a piece of wood or plastic or steam cleaned if possible. When J-Hook is worn to 1/8" thickness, replace J-Hook and power bars.

Refer to Service and Adjustment Section J6 of this manual for proper adjustment and service procedures.

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

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

Refer to Lubrication Diagram Section E for proper lubrication.

Refer to Section J4 for accelerator dashpot adjustments.

CAUTION:

1. Whenever service work is to be performed on the electrical system disconnect the battery by unplugging power leads.
2. Never use a metal object or electrically conductive probe of any type to clean or to apply grease to speed control switch.

SERVICE AND ADJUSTMENT  
REFER TO FIGURE 9  
RHEOSTAT SPEED CONTROL

Caution: Whenever service work is to be performed on the electrical system disconnect the battery by unplugging power leads.

Adjustment of J-Hook Pressure Bar

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

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

Adjustment of J-Hook Travel

1. Adjust rheostat J-Hook travel by depressing accelerator pedal to floor and checking alignment of J-Hook with the 5th power bar. J-Hook and 5th power bar should be in exact alignment with full contact. If J-Hook does not line up properly adjust accelerator control rod length by loosening lock nut and removing cotter pin and clevis pin. If J-Hook does not travel far enough onto the 5th power bar, turn clevis to lengthen rod sufficiently for correct alignment. Adjust clevis in the opposite direction, shortening rod if J-Hook is traveling too far past the 5th power bar.

Note: Each 1/2 turn of clevis will move J-Hook position approximately 1/16".

Replacement of J-Hook

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

#### Replacement of Rheostat Switch

1. Note location of wires connected to switch and mark accordingly, to insure their return to original location on re-assembly.
2. Remove wires at respective terminals.
3. Remove bolts connecting J-Hook insulator to operating link.
4. Remove 3 bolts holding switch to bracket and remove switch.
5. Replace switch in the reverse manner to which it was removed.
6. Check and adjust rheostat switch as outlined above.

#### Replacement of Power Bars

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

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

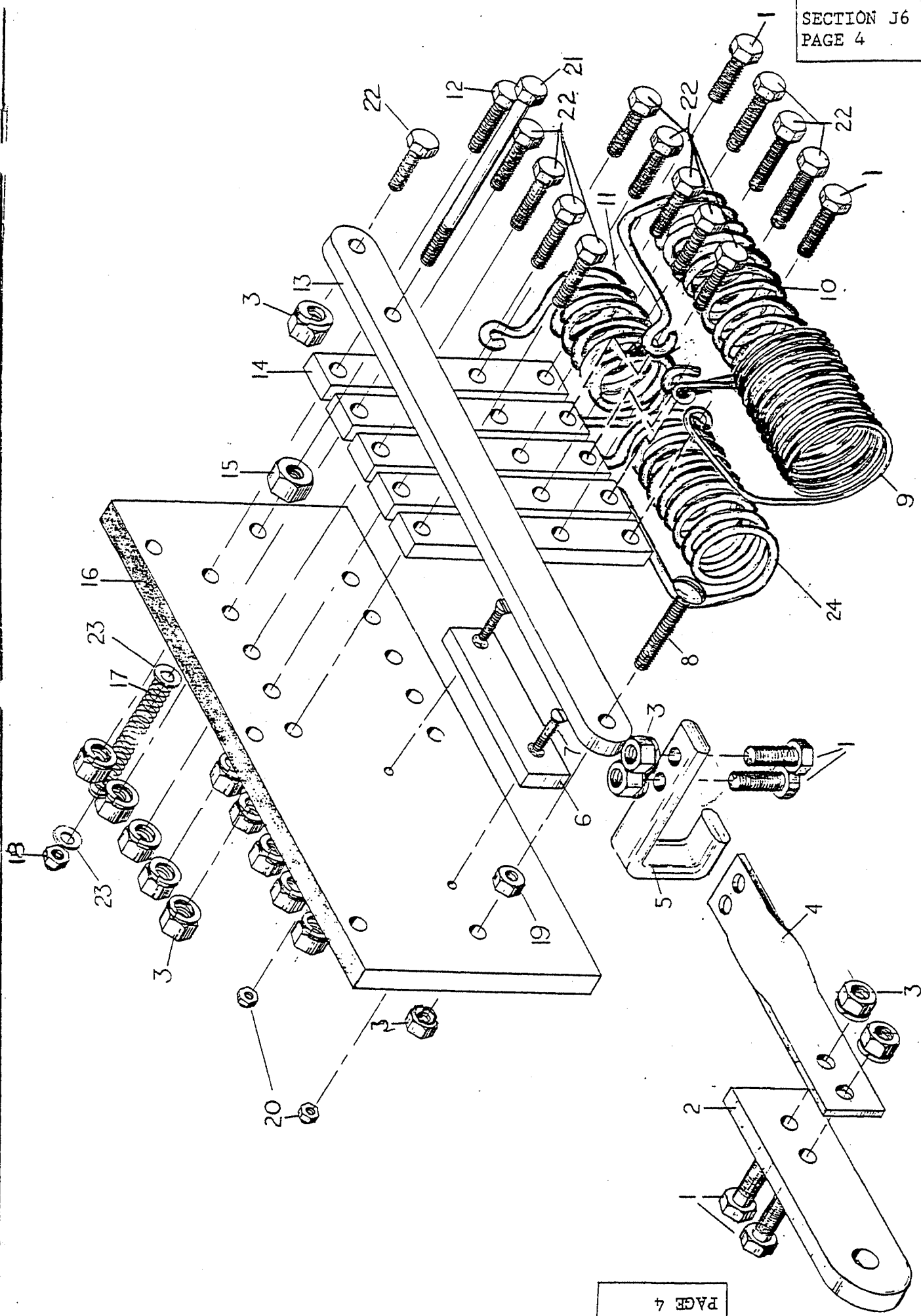
It is recommended that power bars be replaced as a set rather than individually to avoid the above condition.

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

4. Follow adjustment procedures previously outlined.

#### Adjustment of Dashpot Assembly

Refer to Section J4 and Figure 7



SECTION J6  
PAGE 4

SECTION J6  
PAGE 4

TOL. FRAC. + DEC. +		TAYLOR DUNN MFG. CO.	
SCALE	NONE	2114 West Ball Rd.	
DRAWN BY	B.B.	Shelton, Calif.	
DATE	11-15-82		

FIGURE 9  
SECTION 'J6

SPEED CONTROL RHEOSTAT  
5 SPEED



FIGURE NO.9  
GROUP 9 RHEOSTAT 5 SPEED CONTROL

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
9-0	61-832-10	Sliding Bar J-Hook Assembly	1
	61-837-15	Sliding Bar Reostat Assembly With Coils, less J-Hook Assembly	1
9-1	88-060-09	Hex Head Cap Screw 1/4" NC X 3/4"	4
9-2	61-834-00	Insulating Board	1
9-3	88-069-87	Fastite Nut 1/4" NC	21
9-4	61-833-00	J-Hook Twisted Strap (4-1/2" Long)	1
9-5	61-832-00	Sliding J-Hook Bar	1
9-6	61-835-15	Neutral Bar (5 Speed)	1
9-7	88-026-10	Flat Head Machine Screw 8-32 X 7/8"	2
9-8	88-065-14	Truss Head Machine Screw 1/4" NC X 1-1/2"	1
9-9	78-212-51	Resistor Coil (#9 Wire 10 Turns)	1
9-10	78-212-52	Resistor Coil (#6 Wire 9 Turns)	1
9-11	78-212-53	Resistor Coil (#5 Wire 6 Turns)	1
9-12	88-060-14	Hex Head Cap Screw (1/4" NC X 1-1/2") (Terminal Bolt)	1
9-13	61-836-00	Pressure Bar	1
9-14	61-831-00	Power Bar	5
9-15	88-109-80	Nut 3/8" NC (Hex)	1
9-16	61-837-00	Mounting Board	1
9-17	85-034-00	Spring - Compression 7/16" OD X 2"	1
9-18	88-069-81	Lock Nut 1/4" NC	1
9-19	88-069-80	Nut 1/4" NC (Hex)	1
9-20	88-029-86	Flexlock Nut 8-32	2
9-21	88-060-22	Hex Head Cap Screw 1/4" NC X 3-1/2"	1
9-22	88-060-11	Hex Head Cap Screw 1/4" NC X 1"	13
9-23	88-068-60	Washer 1/4" Flat	2
9-24	78-212-62	Resistor Coil (#8 Wire 8 Turns)	1

MAINTENANCE PROCEDURES  
GENERAL ELECTRICAL SYSTEM

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

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

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

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

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

- Section G - Wiring Diagram
- Section J2 - Motor
- Section J5 - Forward-Reverse Switch
- Section J6 - Speed Control And Main Power Switching
- Section J8 - Batteries And Charger

GENERAL ELECTRICAL PARTS

T-D PART NO.	DESCRIPTION	QTY. REQ.
71-100-00	Light Switch	1
71-110-00	Brake Light Switch (Hydraulic Operated)	1
71-111-00	Brake Light Switch (Mechanical Operated)	1
71-130-00	Micro Switch	1
71-141-00	Turn Indicator Switch, 7 Wire	1
71-603-00	Plate Switch Cover On-Off (Keyed Ign. Switch)	1
71-900-00	Flasher (12 Volt)	1
72-005-00	Chrome Headlight Fixture with 4" Sealed Beam Bulb	1
72-022-00	Stop & Taillight Fixture, 4" Rubber Mount (12 Volt)	2
72-051-00	Turn Light Fixture, (12 Volt) Amber, 4" Rubber Mount	2
72-072-00	4" sealed Beam Headlight Bulb (12 Volt)	1
74-000-00	Hour Meter	1
74-009-00	Charge Indicator (36 V)	1
74-009-10	Charge Indicator (24 V)	1
74-050-00	Windshield Wiper Motor	1
74-051-00	Windshield Wiper Arm	1
74-052-00	Windshield Wiper Blade	1
75-077-00	Wiring Harness for Power & Charging Receptacle	1
75-078-00	Wiring Harness for Lights & Horn	1
75-204-00	Wire #4 (Per Foot)	
75-208-00	Wire #8 (Per Foot)	
75-218-00	Wire #16 (Per Foot)	
75-231-00	Battery Jumper #6 Wire (10-1/2" Long)	4
75-404-53	Terminal Lug #4 Wire 1/4" Hole	
75-404-54	Terminal Lug #4 Wire 5/16" Hole	
75-408-52	Terminal Lug #8 Wire 3/16" Hole	
75-408-53	Terminal Lug #8 Wire 1/4" Hole	
75-418-51	Terminal Lug #16 Wire #6 Hole	
75-418-52	Terminal Lug #16 Wire 3/16" Hole	
75-418-53	Terminal Lug #16 Wire 1/4" Hole	
76-352-00	Receptacle - Flasher	1
78-010-00	Secondary Fuse & Holder (Inline Type)	1 to 3
79-823-00	Fuse - Buss Type 20 Amp	1 to 3

## 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, in appropriate use and with proper care.

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

#### 1. CORRECT CHARGING

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

Over charging will reduce battery life. Undercharging will cause poor vehicle performance, and shorten the life of all electrical components, including the batteries. Refer to Service and Adjustment, Section J8, for proper methods to determine charge condition.

#### 2. DISCHARGING - CAPACITY

Batteries are commonly rated in ampere hours at the six hour discharge rate to a 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 over discharging is to prepare a rigid schedule for charging batteries which will insure against their being discharged beyond the limits of their capacity.

#### 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 surrounding and the type of service they are subject to. This is usually dry dirt, which can readily 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 pound of 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 an 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 conditions 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 climate conditions the electrolyte will freeze at a much higher temperature. For example, a fully charged battery will not freeze at temperatures near 60° below zero. Yet a battery in a very low state of charge may freeze at temperatures around 10° to 15° 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.

VEHICLE NO.

BATTERY MAINTENANCE RECORD

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

- CAUTION:** Batteries emit explosive gases. During normal operation the concentration of these gases is rarely sufficient to be considered dangerous unless flame or sparks occur in the battery compartment close to the vent holes in the battery caps. It is important that this not be allowed to occur at any time. Lighted cigarettes must not be brought close to the battery compartment.  
During the charging process, emissions are greatly increased. Any area in which charging batteries are confined must be well ventilated, and flame, sparks, or lighted cigarettes must be kept out of the charging area and away from ventilator openings associated with the charging area. Battery connections must not be disturbed while batteries are being charged.
- Do not fill an uncharged battery. Bring water level up to just cover the plates, and complete filling after battery is fully charged. Use distilled water. Fill only to level indicated on battery.
- Batteries which require unusually frequent watering may indicate overcharging. Review charging practices and/or adjustment of transformer taps in charger.
- Gravity should be kept between 1175 (30% charged) and 1260 (100% charged), and gravity readings of all cells should be within a 10 point range. When they are not, an equalizing charge should be applied. Refer to information under "Charging Time Chart".
- Periodically check for loose terminal posts or loose connections to terminal posts, but not while batteries are being charged.
- Keep tops of batteries clean, and free of moisture, grease, and acid films. Any of these can cause current leakage.
- Keep weekly (or oftener) record as shown in above sample chart, for a new vehicle or when charging results seem unsatisfactory, until satisfactory charging continues for a four week period, then keep record on a monthly basis.

BATTERIES AND CHARGER

T-D PART NO.	DESCRIPTION	QTY. REQ.
SEE PARTS LIST IN CHARGER MANUALS		
76-012-00	Receptacle, Charging, 30 Amp, 3 Prong	1
76-020-00	Receptacle, Charging and plug, Anderson Type, 175 Amp SB #6313 - 175 Amp	1
		4 or 6
77-031-00	6 Volt, 190 A.H. Battery	4 or 6
77-042-00	6 Volt, 217 A.H. Battery	4 or 6
77-048-00	6 Volt, 250 A.H. Battery	4 or 6
77-200-00	Hydrometer	1
77-201-00	Battery Filler	1
79-320-00	Charger, 20 Amp/36 volt, Automatic, Transistorized(portable)	1
79-333-00	Charger, 30 Amp/36 volt Automatic, Transistorized (built-in)	1
79-337-00	Charger, 30 Amp/36 volt Automatic Transistorized (built-in)	1
79-345-00	Charger, 45 Amp/36 volt, Automatic, Industrial (portable) requires 244 or 250 Amp hr. batteries	1
79-227-00	Charger, 25 Amp/24 Volt, Line compensated (built-in)	1
79-228-00	Charger, 25 Amp/ 24 Volt, Line compensated (portable)	1

SERVICE AND ADJUSTMENTS  
BATTERY CHARGER

INTRODUCTION

This section describes the operation, trouble-shooting and repair of the CHRISTIE Series A and Series T Battery Chargers. They are designed for safe and efficient, daily recharging of batteries. Chargers may be furnished in a portable cabinet or of a type built-in to the vehicle.

SPECIFICATIONS

A SERIES

MODEL		A-C Volts	A-C Amp	Battery Amp Hours*	D-C Volts	D-C Amp
Portable	Built-in					
2420A	2420A-C/2420A-SS/2420AB	115	5	130/170	24	20
3620A	3620A-C/3620AB	115	9	130/170	36	20
	2410A	115	2.5	90	24	10

T SERIES

2420T	2420T-C	115	5	130/220	24	20
2430T	2430T-C/2430TB	115	7	170/250	24	30
3620T/T3620T	T3620TG/T3620T-C/T3620TB	115	9	130/220	36	20
3630T/T3630T	T3630TG/T3630T-C/T3630TB	115	10	170/250	36	30
4820T		115	10	130/220	48	20

\*Higher capacity batteries may be charged if longer than 12 hours recharge time is available.

CHARGING CHARACTERISTICS

Series A - This charger uses a constant potential method of recharging. This means that the charger output voltage is held relatively constant through the charge cycle. Since the rate of charge is a function of the difference between charger output voltage and battery voltage the charger output current is reduced by the increased voltage of the battery as it recharges. On a discharged battery the charger should start charging at near it's rated output and as the battery recharges the charge rate will be reduced until it reaches a final charge rate of approximately 2 to 3 amperes on a fully charged battery. The charging time is controlled by a timer which terminates the charge at the end of a preset time. Recommended minimum charging times are shown on the CHARGING TIME CHART.



Series T - This charger also uses a constant potential method for recharging, however, it is equipped with a voltage sensing device that activates the timer when the battery reaches 80% of full charge. The timer then times out the balance of the charge, normally 4 hours. The time required for the battery to reach the 80% level will vary with the capacity and state of charge of the battery. On a discharged battery, the charger will start charging at near it's rated output and it will reduce it's charging rate as the battery is recharged. The final charge rate on a charged battery will be approximately 6 to 10 amperes depending on the rating of the charger. A shorter recharge time is achieved by using this method. Protection from overcharging is provided by the voltage sensing device.

#### INSTALLATION

Portable models may be set on any suitable working surface so that there is access to the control panel. There should be at least six inches of clearance on each side and two inches on the top to allow free flow of air for cooling. Do not expose the charger to rain or other adverse weather conditions. There must be a separately fused, three-wire, single phase, 115 volt, 15 ampere power receptacle within reach of the A-C input cord of the charger. If the A-C input voltage at your location varies from the nominal 115 volts, it will be necessary to adjust the charger for proper operation. A Low-Med-High switch on the charger is designed to make the necessary adjustment convenient. This switch is located on the front panel of all portable models and on the charger portion of the built-in models with separate control console.

The "Med" setting is designed for those locations where the voltage is between 113 and 120 volts. If your input voltage is between 121 and 128 volts, set the switch in the "Low" position. This will reduce the output voltage to compensate for the high input voltage. If the input voltage at your location is between 105 and 112 volts, set the switch in the "High" position. This will raise the output voltage to compensate for low input voltage. For greater accuracy, the input voltage should be measured during the time of day when the battery chargers are normally in use.

If the output current as shown on the meter exceeds the rated output of the charger, set the switch to the next lowest position to avoid damage. Once set, it should not be necessary to change the switch position as long as the charger is used at the same location.

#### OPERATING INSTRUCTIONS

1. Verify that the output fuses are fully tightened.
2. Connect the D-C plug to the battery receptacle. Portable chargers are furnished with a polarized D-C plug that mates with a corresponding polarized receptacle in the vehicle to prevent improper connections to the battery. Built-in models are permanently connected to the batteries.
3. Connect the A-C plug to a suitable, grounded receptacle.  
A Series - Determine the minimum charging time (see CHARGING TIME CHART). Turn the charger on by setting the timer knob to the desired charging time.  
T Series - Turn the charger on by setting the timer knob to "START" position (4 hours). The voltage sensing unit will automatically start the timer when the battery reaches 80% of full charge.
5. Verify that the output meter indicates a charging current. If there is no charging current, see TROUBLE SHOOTING section. Never let the charger charge higher than it's rated output. If the charger is charging too high, check the batteries to be sure there are no defective cells or short circuits. See the instructions concerning tap switch setting under INSTALLATION section.

6. The timer control will turn off the charger (positive turn off feature) at the completion of the charge.
7. Disconnect the battery from the charger. On built-in models, disconnect the A-C cord.
8. Using a hydrometer, verify that the battery is properly charged.

#### CHARGING TIME CHART (A Series)

The following chart provides useful information for determining the minimum charging time needed to restore a battery to a full charge condition. In addition to normal charging, the cells of the batteries should be equalized twice each month. This is done by charging the batteries an additional seven (7) hours after a normal charge cycle. The current indications of the ammeter must be low during cell equalization.

<u>Specific Gravity Reading</u>	<u>Condition of Battery</u>	<u>Hours Needed to Charge</u>
1100	fully discharged	12
1125	10% charged	10
1150	20% charged	8
1175	30% charged	7
1200	60% charged	4
1225	75% charged	2
1250	95% charged	$\frac{1}{2}$
1260	fully charged	0

#### TROUBLE SHOOTING & REPAIR INSTRUCTIONS

##### LOW OR NO CHARGING CURRENT

1. Using a voltmeter, verify that the battery being charged has no open or dead cells. Check jumper cables between batteries for tight and clean connections, and also verify that the battery is not already fully charged.
2. Check the output fuses of the charger to make sure they are not loose or "blown."
3. Verify that the A-C receptacle has power by plugging in an electrical appliance. Using a voltmeter, check A-C input voltage at the receptacle. Taps are provided inside back panel of charger to adjust for input voltages from 105 to 125. Verify that charger is connected for correct voltage.
4. Turn the charger ON and verify that the transformer hums. If no hum is heard, proceed with step 4.1. If a hum exists, go to step 5.
  - 4.1 Remove A-C plug from power source.
  - 4.2 Remove the cabinet cover (1) to gain access to the interior of the charger.
  - 4.3 With the timer switch OFF, check for continuity between the two primary input leads of the transformer. If no continuity is found, replace the transformer. If continuity is found, proceed as follows:
  - 4.4 With the timer switch ON, check for continuity across the switch. On "T" Series chargers there are two switches - check both. If switch is open with the timer ON, replace the timer assembly.
  - 4.5 If all of the above checks indicate continuity, but the transformer does not hum, check for loose or broken leads between the A-C plug, the timer assembly and the tap switch or terminal board.

5. If the transformer hums, proceed as follows:
  - 5.1 Remove AC plug from power source.
  - 5.2 Check the two output fuses to insure they are good. Inspect the fuse holders for damage or a blackened appearance. (If the fuse holder is blackened, it indicates oxidation and should be replaced).
  - 5.3 Remove both output fuses. Check for continuity from the output side of both fuse holders to the positive side of the DC plug, connecting continuity indicator first in one direction and then the other of each. The indicator should show an open in one direction and continuity in the other. Continuity in both directions or no continuity in either direction indicates a bad diode. Replace the diode connected to that fuse holder.
  - 5.4 Check for continuity between the input side of one fuse holder and the input side of the other. If no continuity exists, the transformer secondary is open. Replace the transformer.
  - 5.5 Check for continuity across the two terminals of the meter. If no continuity exists, the meter is open. Replace the meter.
  - 5.6 If all indications to this point are normal, test the entire DC output circuitry for continuity by progressing from the DC output prong to the negative DC output prong in incremental test sections, checking each connection for open circuits and poor connections.

#### AC-LINE FUSES BLOW

6. With unit unplugged and timer turned on, check for continuity between each input prong of the AC plug and the ground prong. If continuity is found between either input prong and ground, a short circuit exists and must be found and removed. If all indications are open and the AC fuses are of sufficient rating for the charger, a shorted transformer is the most probable cause of this problem. Replace transformer.

#### OUTPUT FUSES BLOW

7. Verify that the circuit under charge is not shorted by disconnecting the charger and operating it disconnected.
8. If output fuses continue to blow, test the charger as per steps 5.1 through 5.6.

#### TIMER DOES NOT TURN UNIT OFF

9. Unplug charger. Check continuity of timer motor. If open, replace timer. If not, check timer switch contacts. If timer assembly is not defective, adjust Voltage Sensing Unit as per instructions in next paragraph ("T Series only).

#### VOLTAGE SENSING UNIT ADJUSTMENT PROCEDURE ("T SERIES)

NOTE: A DC voltmeter with the appropriate voltage range is required to perform the following adjustment.

10. The unit is assembled on a small panel inside the charger cabinet (see item 23, exploded diagram . Each unit has been carefully adjusted at the factory to actuate at the proper voltage; however, if it is desired to change the actuation voltage point, the following procedure should be followed:
  - 10.1 Connect the charger to a battery which is known to be fully charged.
  - 10.2 Observing polarity, connect the voltmeter across the battery terms.
  - 10.3 Turn the charger on. The voltage across the battery, as indicated by the voltmeter, will rise slowly. When the proper voltage (dependent upon the number of cells) is reached, the small relay in the voltage sensing unit will actuate. This can be detected since it generates an audible click.

- NOTE: The Voltage Sensing Unit should be set for 2.37 volts per cell. On a 24 volt system, the Voltage Sensing Unit should actuate at 28.4 volts. On a 36 volt system, the unit should actuate at 42.7 volts.
- 10.4 Turn the adjustment shaft on the Voltage Sensing Unit clockwise to raise the actuating voltage and counter-clockwise to lower voltage.
- 10.5 Turn the ON and OFF, as necessary, to raise and lower battery voltage, while repeating steps 10.3 and 10.4 until the desired actuation point is achieved.

#### IMPORTANT FACTS ON BATTERIES AND CHARGERS

To determine whether or not a battery is properly charged, a measuring device known as a hydrometer is used. A hydrometer measures the specific gravity of a liquid and 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 battery. Overcharging and undercharging can cause 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 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 up to the proper level will result in a crumbling (abnormal sulfation) of the plates and cause failure of the batt. 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.

#### 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.

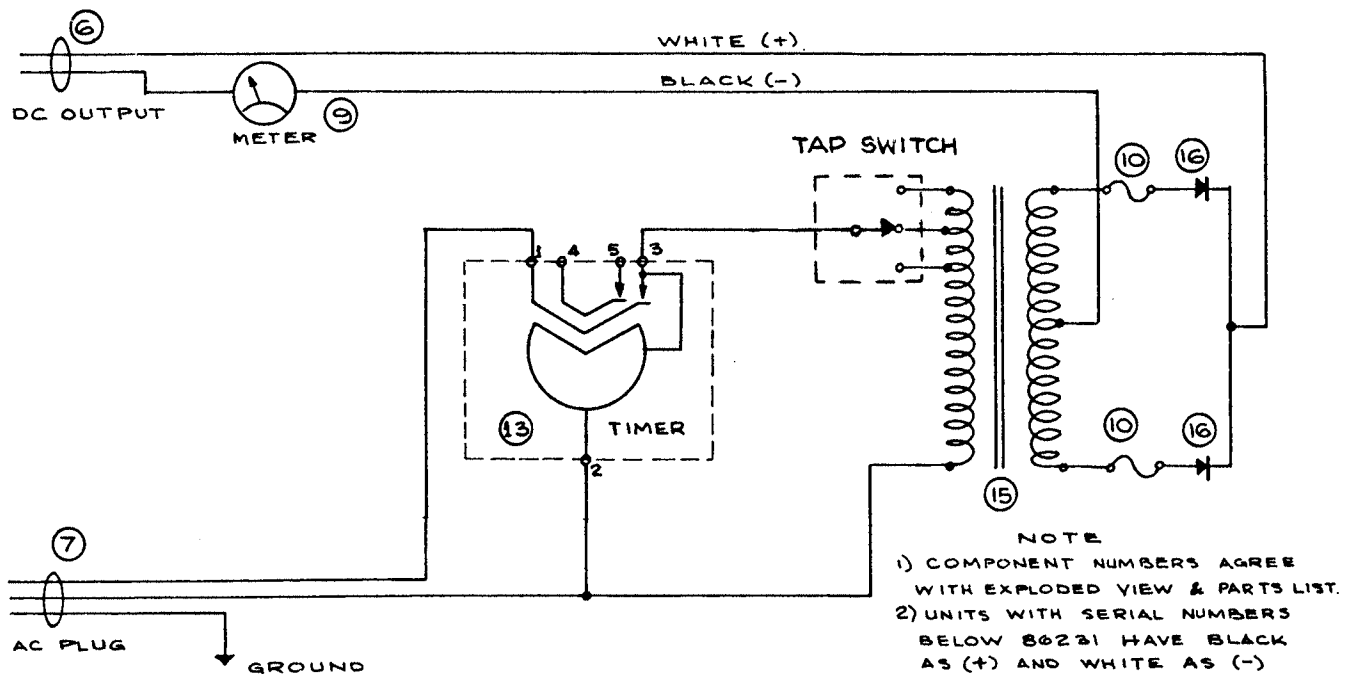
INSPECTION OF BATTERIES AND ASSOCIATED CIRCUITS

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.

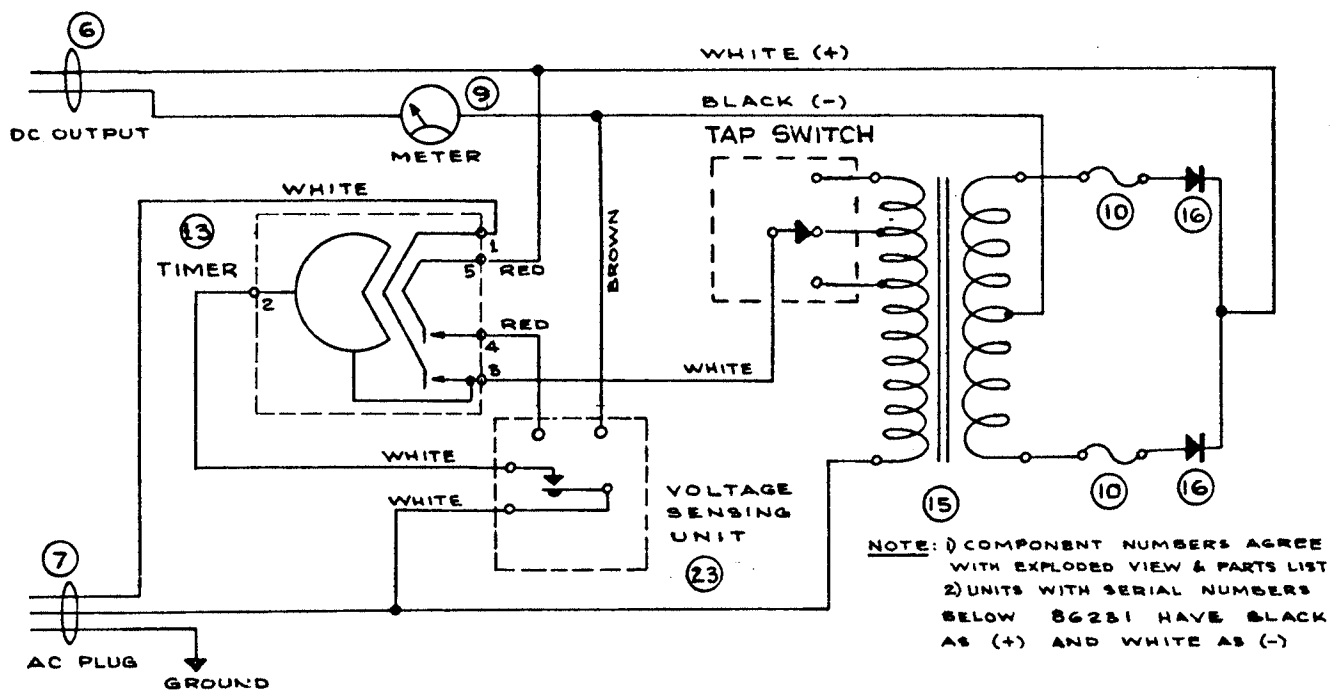
1. Verify that all connections within the unit to be charged are clean and right.
2. Check each battery for loose terminal posts.
3. Test for continuity between all battery terminals and the charging receptacle.
4. Verify that the top of each battery is free of moisture, grease and acid film, which may 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.
6. Using the hydrometer, pull out acid from a cell and then vigorously expell 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 a hydrometer, always return electorlyte solution to the same cell from which it was removed. DO NOT MIX electrolyte from one cell to another.

CIRCUIT DIAGRAMS

SERIES "A" & "T" CHARGERS



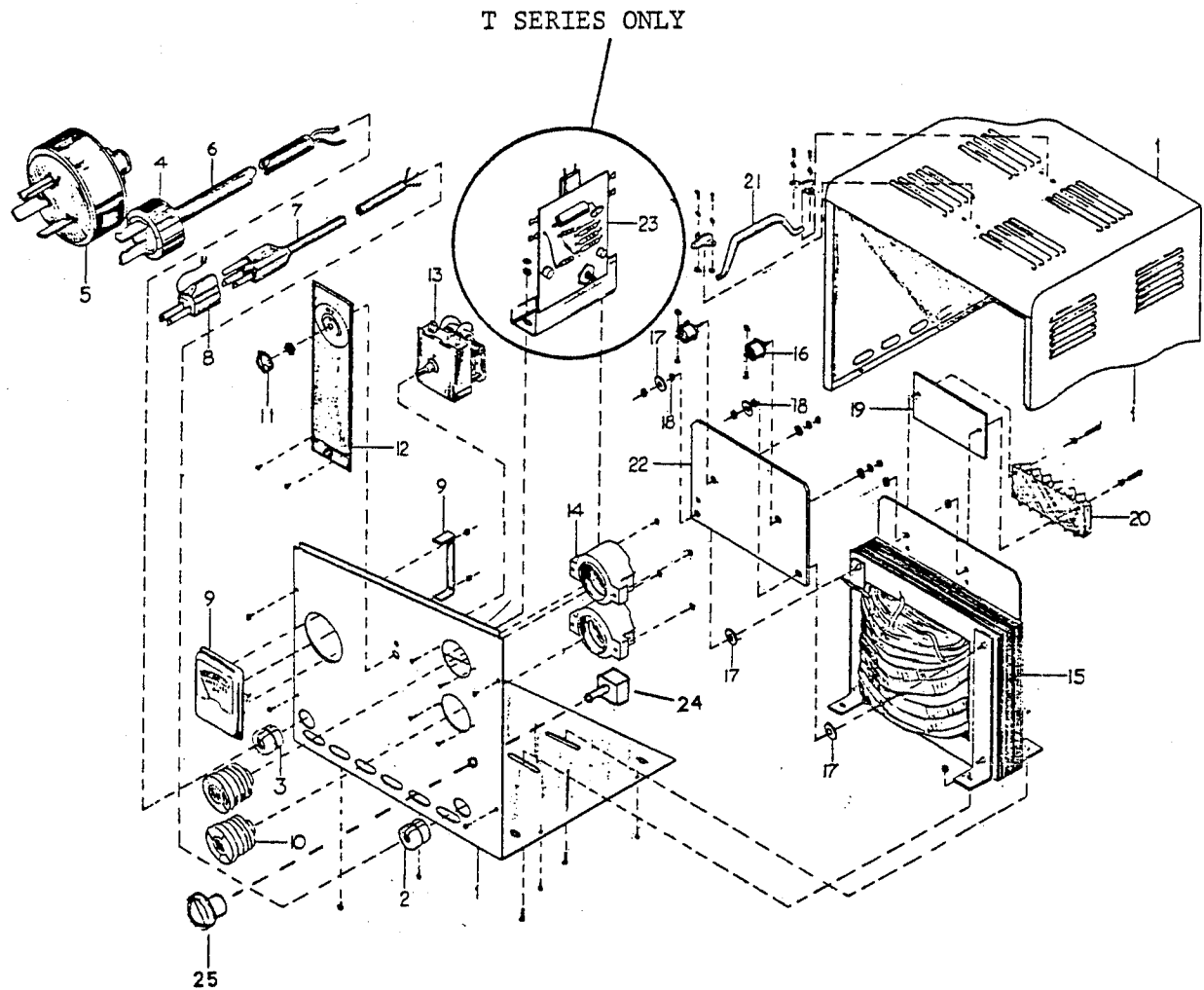
CHRISTIE SERIES "A" BATTERY CHARGERS



CHRISTIE SERIES "T" BATTERY CHARGERS

PART IDENTIFICATION  
SERIES "A" & "T" CHARGERS

EXPLODED DIAGRAM



Portable Cabinet Shown.

I.D. Numbers of Internal Components are Identical for Portable and Built In Charger.

PARTS LIST

<u>Item</u>	<u>Taylor-Dunn Part No.</u>	<u>Item</u>	<u>Taylor-Dunn Part No.</u>
1 Cabinet		15 Transformer, 24V/20A ("T" Series)	79-630-00
2 Bushing (A-C)	79-530-00	Transformer, 24V/20A ("A" Series)	79-606-00
3 Bushing (D-C)	79-531-00	Transformer, 24V/30A ("T" Series)	79-607-00
4 D-C Plug (2 prongs)	76-001-00	Transformer, 36V/20A ("T" Series)	79-613-00
5 D-C Plug (3 prongs)	76-002-00	Transformer, 36V/20A ("A" Series)	79-612-00
6 Output Cord (no plug)	79-560-00	Transformer, 36V/30A ("T" Series)	79-614-00
Output Cord w/molded plug	79-566-00	Transformer, 48V/20A ("T" Series)	79-620-00
7 A-C Cord and Plug (portable model)	79-570-00		
Molded A-C Assembly (built-in model)	79-575-00	16 Diode, 24/36V	79-720-00
Recessed Male Plug (built-in model)	76-251-00	Diode, 48V	79-724-00
8 Adapter	79-580-00	17 Washer Assembly, 3/4"	97-170-00
9 Ammeter (0-30 amp)	79-851-00	18 Washer Assembly, 3/8"	97-171-00
10 Fuse (30 amp)	79-819-00	19 Mounting Plate	94-325-00
11 Control Knob	79-803-00	20 Terminal Board	79-860-00
12 Instruction Plate	94-321-00	21 Handle Assembly	79-509-00
13 Timer Assembly, 12 hr. ("T" Series)	79-800-00	22 Heat Sink	79-742-00
Timer Assembly, 24 hr. ("A" Series)	79-801-00	23 Voltage Sensing Unit, 24V ("T" Series)	79-810-00
14 Fuse Holder	79-830-00	Voltage Sensing Unit, 36V ("T" Series)	79-811-00
		Voltage Sensing Unit, 48V ("T" Series)	79-812-00
		24 Tap Switch (Low-Med-High)	79-895-00
		25 Knob, (Low-Med-High)	79-896-00

When ordering parts, please specify both serial number and model of charger.



MODELS 2445 AND 3645  
OPERATING AND SERVICING DATA SHEET

INSPECTION AND INSTALLATION

Inspect the exterior of the shipping container for signs of rough handling during shipment.

Remove charger from the shipping container and inspect it for damage (cracked knob, etc.). CLAIMS FOR SHIPPING DAMAGE SHOULD IMMEDIATELY BE FILED WITH THE CARRIER.

The charger may be installed on any suitable working surface (bench or floor). Insure that there is clearance above and around the charger so as to allow free flow of air for cooling.

Remove the panel on back of cabinet to gain access to the terminal panel.

WARNING: Voltages hazardous to life exist at terminal panel when charger is turned on. Turn OFF the charger before making any of the following adjustments.

The adjustment for a charging voltage of 2.50 volts per cell should be made at this time. This is done by monitoring the DC output voltage with a voltmeter (0 to 50 volts) and setting the AC tap lead to the transformer terminal which gives the desired DC output voltage as indicated below. Move the tap connection to the right to increase the DC output voltage. Move the tap connection to the left to decrease the DC output voltage.

DC OUTPUT VOLTAGE SETTING CHART

<u>MODEL</u>	<u>DC OUTPUT VOLTS</u>
2445	30.0
3645	45.0

If a DC output plug is not furnished with the charger, attach a suitable polarized plug of adequate current capacity to the DC output leads (See NOTE in Step 2 below).

OPERATING INSTRUCTIONS

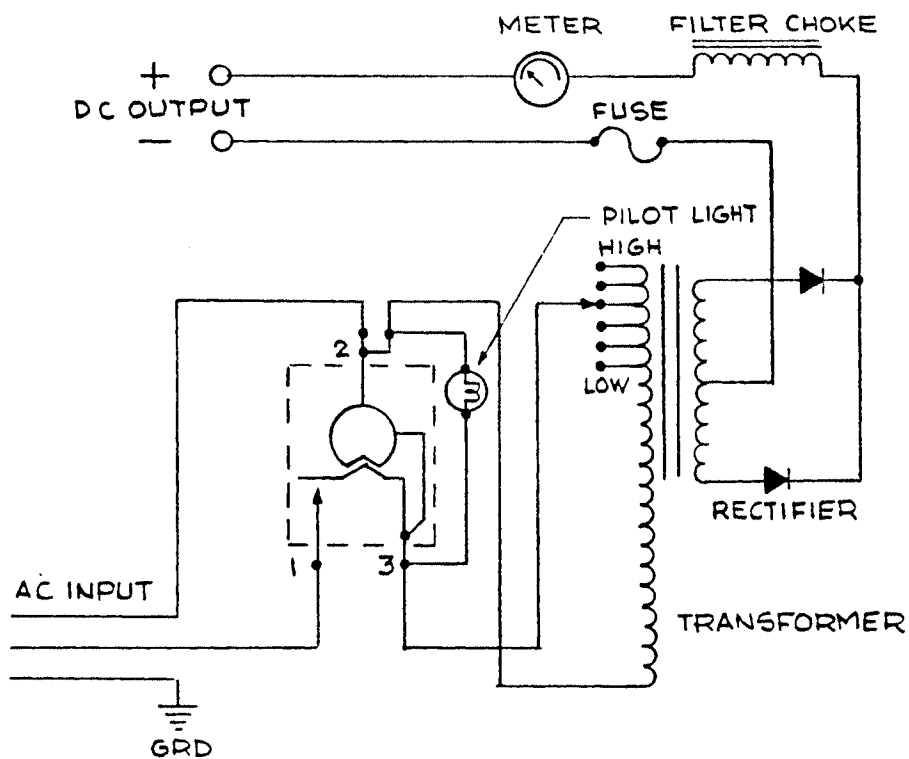
1. Connect the AC input to the proper power source.
2. Connect the DC output plug to the batteries to be charged.  
NOTE: Check the output plug for the correct polarity.
3. Turn on the charger by setting the timer control knob to the desired charging time.
4. Verify that the pilot light illuminates and that the output ammeter indicates a charging current.
5. The timer control will turn off the charger at the completion of the charge cycle.
6. Disconnect the charger DC plug from the batteries after the charger is turned off.
7. Using a hydrometer, verify that the batteries are properly charged.

PARTS LIST

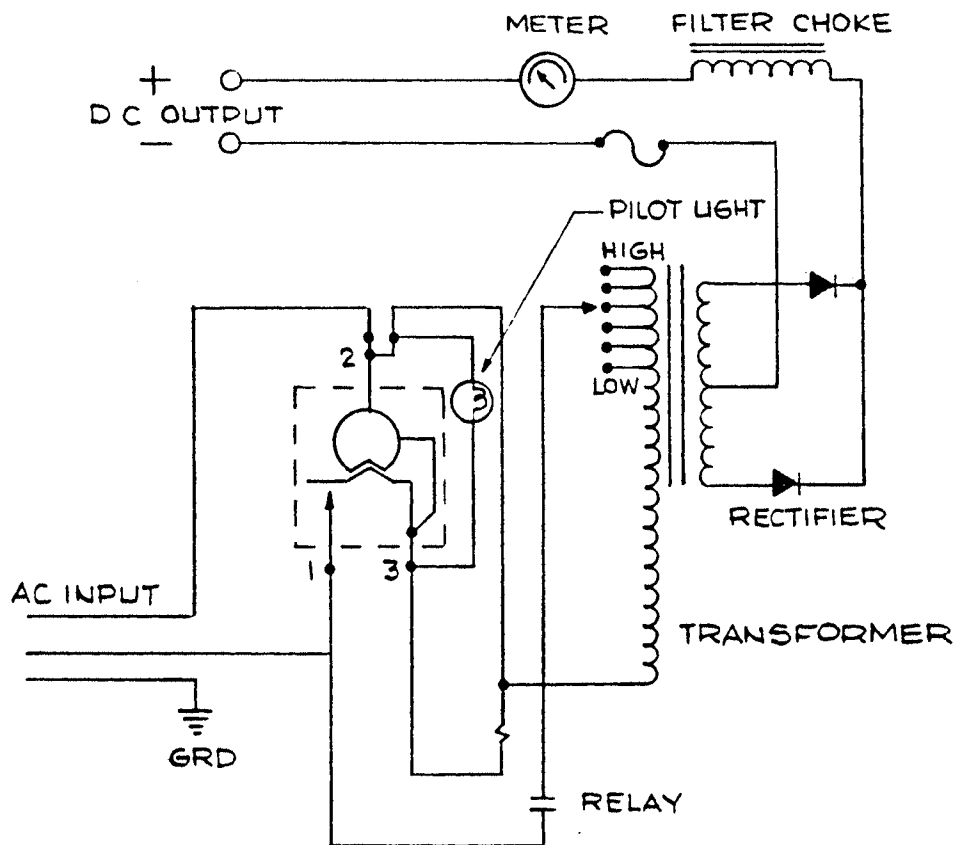
79-531-00 Bushing, AC	94-326-00 Timer Dial	79-714-00 Choke, 36V
79-530-00 Bushing, DC	72-095-00 Pilot Light	79-641-00 Transformer, 24V
79-567-00 Cord, DC	79-720-00 Diode	79-642-00 Transformer, 36V
79-573-00 Cord, AC	79-852-00 Ammeter	79-862-00 Terminal Panel
79-801-00 Timer	97-170-00 Insulator Washer (3/4")	79-826-00 Fuse (Link)
79-803-00 Control Knob	97-171-00 Insulator Washer (3/8")	71-304-00 Relay, 115V
	79-713-00 Choke, 24V	(3645 Only)

When ordering replacement parts, give model and serial number of charger. Specify wire size and number of wires required when ordering cords.

CIRCUIT DIAGRAM  
MODELS 2445 & 3645 CHARGERS



MODEL 2445



MODEL 3645

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.

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

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



BODY & TRIM PARTS  
MODEL C

FIGURE 10  
SECTION J9

LENGTH | QUAN. | REVISED DATE | REVISION

NO.	DESCRIPTION	TOL.	FRAC.	DEC.
	SCALE 1/8" = 1"			
	DRAWN BY J.P.A.			
	DATE 7-31-70			

SECTION J9  
PAGE 2

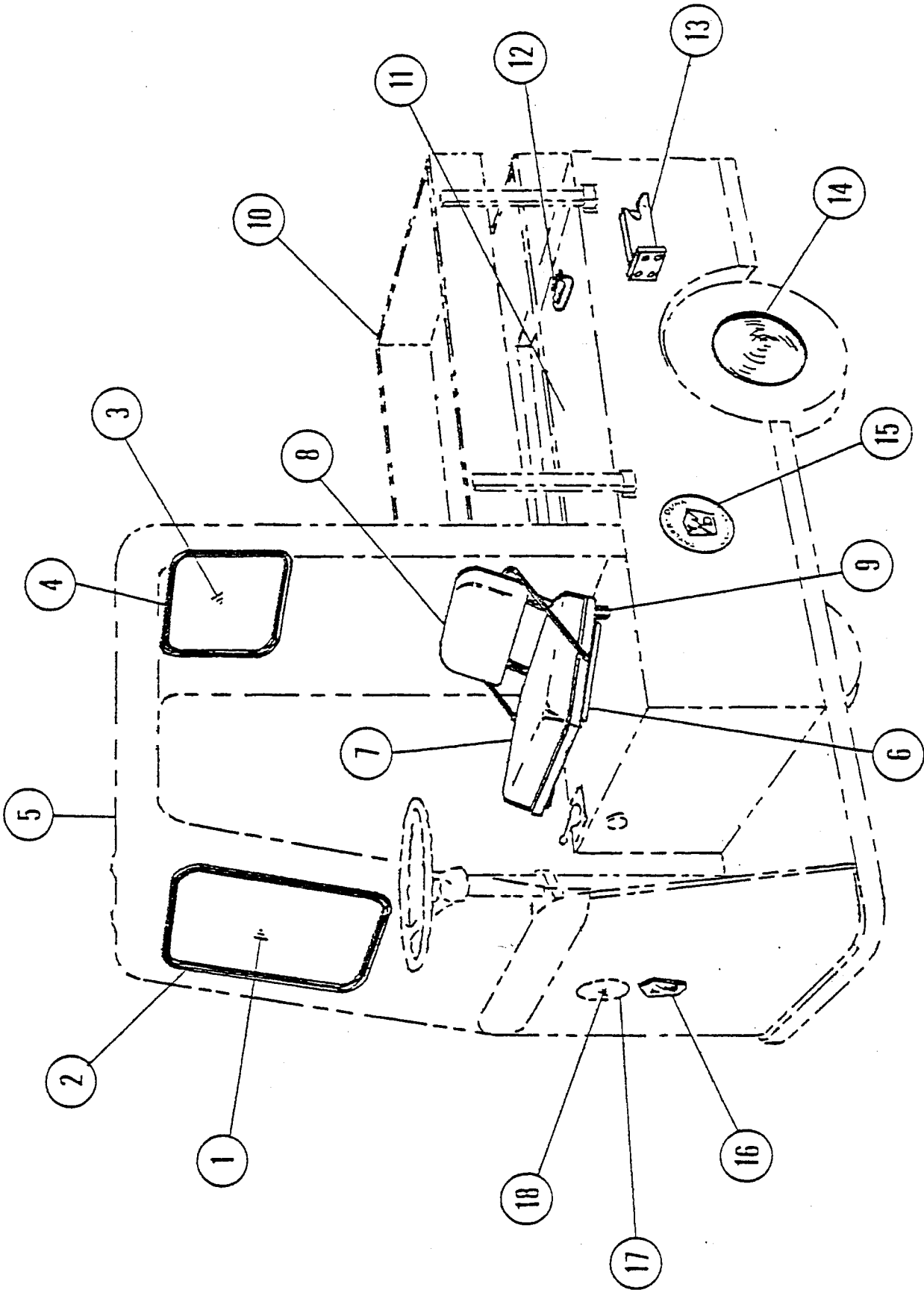


FIGURE NO. 10  
BODY & TRIM PARTS

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
10-1	90-811-00	Windshield, Safety Glass (19½ x 21½)	1
10-2	98-312-00	Window Channel, Front (79" Long)	1
10-3	90-851-00	Rear Window, Safety Glass (12 x 18)	1
10-4	98-314-00	Window Channel, Rear (57" Long)	1
10-5	91-005-00	Fiberglass Cab - Without Window Glass (White)	1
10-5	90-903-00	Side Curtains Less Steel Frame For Cab	1 Pr.
10-5	90-913-98	Side Curtains Steel Frame Less #91-802-00 Hge. L	1
10-5	90-913-99	Side Curtains Steel Frame Less #91-802-00 Hge. R	1
10-5	91-802-00	Hinge, Side Curtain Door Frame	4
10-5	97-313-51	Shaft - 5/16 Square NC Thread for Curtain Door Latch	2
10-5	97-313-52	Plate - Door Latch (Inner & Outer)	4
10-5	97-313-53	Handle - Door Latch (Inner & Outer)	4
	92-201-00	4 x 8 Mirror	1
	92-202-00	Mirror Bracket	1
	88-065-08	Truss Head Machine Screw 1/4 x 5/8 NC	
	88-068-62	Lock Washer ½"	
	88-069-87	Nut Fastite ½" NC	
	88-069-83	Nut Acorn ½" NC	
10-6	90-100-00	Jump Seat Frame (Less Cushions)	1
10-7	90-001-00	Seat Cushion	1
10-8	90-000-00	Seat Back Rest	1
10-9	90-100-51	Support Rod - Jump Seat Frame	2
	88-837-09	Pan Head Sheet Metal Screw # 14 x 3/4	8
	88-107-09	Square Head Set Screw 3/8 x 3/4 NC	0 or 6
10-10	90-550-10	Stake Sides & End Assembly (14" High Stakes-Without Cab)	1
10-10	90-550-11	Stake Sides & End Assembly (14" High Stakes-With Cab)	1
10-10	90-540-00	Stake Side, Side Gate Hook	4
10-10	90-543-00	1 1/2 x 3/4 Channel Stakes - 17" Long	6
10-10	90-547-00	1 1/2 x 3/4 Channel Stakes - 21" Long	6
10-10	90-546-00	1 1/2 x 3/4 Channel Stakes - 27" Long	6

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
10-10	90-548-00	1½ x 3/4 Channel Stakes - 39" Long	6
10-10	90-544-00	2" x 1" Stake Pockets	6
	88-065-13	Truss Head Machine Screw ½ x 1½ NC	44
	88-065-11	Truss Head Machine Screw ½ x 1" NC	24
10-11	90-420-00	Deck Board ½" Plywood, (29 3/8 x 48)	1
10-12	95-510-00	Deck Handle	1
10-13	97-804-00	Hitch-Pintle Type	1
10-13	97-808-00	Hitch-Automatic Coupling	1
10-13	88-140-14	Hex Head Cap Screw ½ x 1½ NC	4
10-13	88-148-62	Lock Washer ½"	4
10-13	88-149-80	Nut ½" NC (Hex)	4
	50-227-00	½" Battery Rod - 11½ Long Plus Bend	2 or 4
	50-236-00	½" Battery Rod - 8" Long Plus Bend	3
10-14	92-000-00	Chrome Wheel Cover 8" for 400 x 8 Wheel	2
10-15	94-301-00	Taylor-Dunn Decal	2
10-16	94-201-00	Taylor-Dunn Emblem	1
10-17	72-022-51	Rubber Ring	0 to 2
10-18	30-805-00	Plate, Light Hole Cover	0 to 2
	71-650-00	3" Red Reflector	1
	94-371-00	Serial Number Plate (Please state serial No.	1
	94-410-00	Seat Cleaner (1Quart) (Mixes 5 to 1 w/water	
	95-950-00	Paint - ½ Pt. Can (Specify Color)	
	95-951-00	Paint - 1 Pt. Can (Specify Color)	
	95-952-00	Paint - 1 Qt. Can (Specify Color)	

MOTOR MAINTENANCE, SERVICE AND ADJUSTMENT  
ELECTRIC MOTORS  
REFER TO FIGURE 5H

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

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

MOTOR MAINTENANCE - BRUSH INSPECTION AND REPLACEMENT

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

NOTE: When one brush is replaced in a motor, it is considered good maintenance practice to replace all brushes.

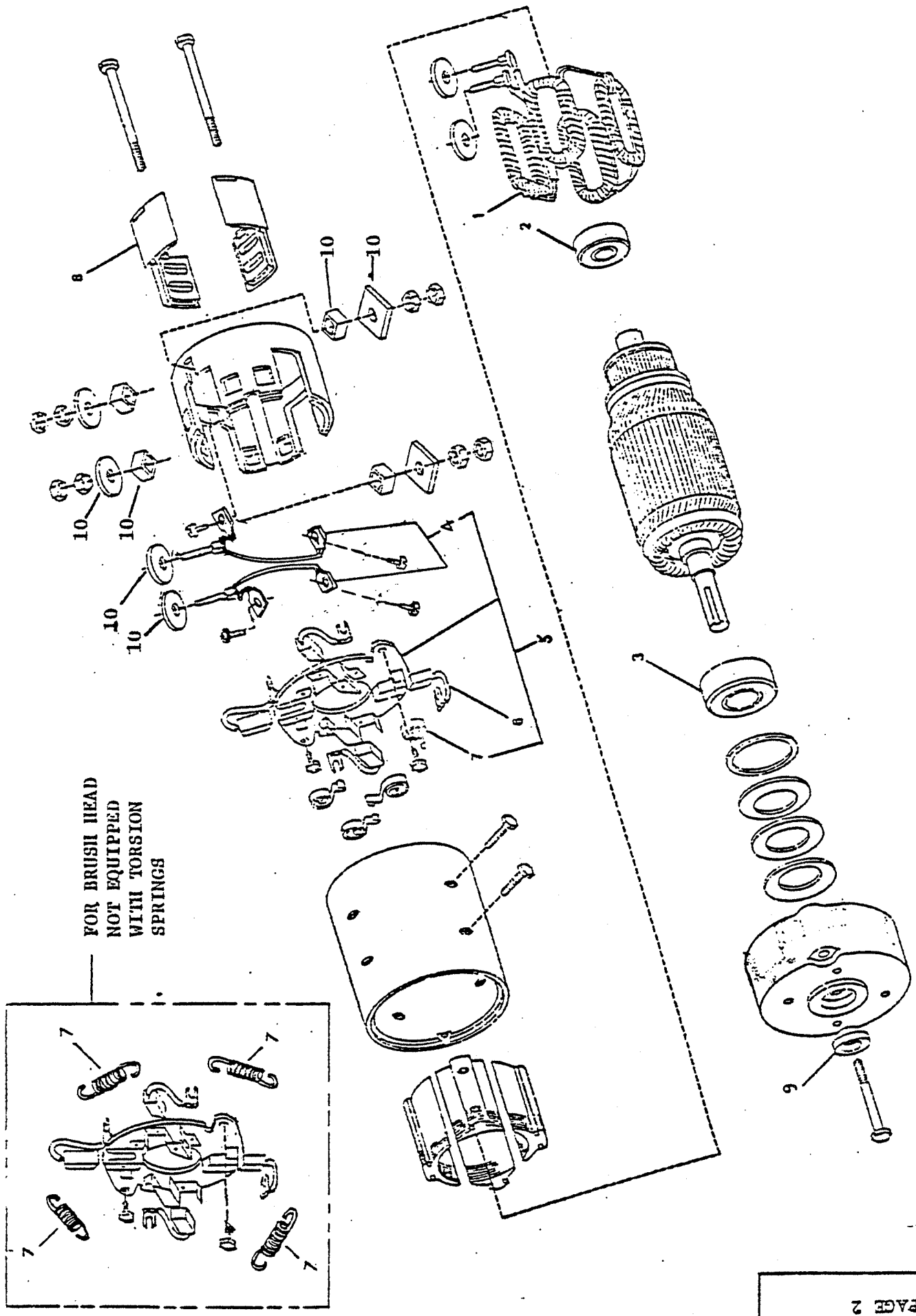
3. Check operation of each brush to assure that brush slides freely and does not bind in holder.
4. Replace cover.

MOTOR DISASSEMBLY AND REASSEMBLY

1. Remove motor from vehicle as described in section J2.
2. Determine if witness marks on end bell and stator housing are present. If not, mark end bell and housing to assure proper relation of brushes and commutator when reassembling.
3. Remove cover, exposing brush assemblies. Lift brushes from brush holder.
4. Remove bolts holding end bells and remove end bell and rotor. (Pull from shaft extension end). Take care not to damage any coils or armature wires when handling motor parts.
5. Press or pull old bearings off by using bearing press or bearing puller. Do not damage shaft while removing bearings.
6. Install new bearings onto shaft by gentle pressure or tapping with proper tool on inner race only. Bearing will be damaged if pressed or driven by outer race or seals.
7. If the commutator is worn or "burned" it should be turned, the mica undercut and the commutator polished.
8. Oil bearing housing lightly to aid in reassembly.
9. Reassemble motor taking care that all parts are kept clean.
10. Install brushes and "seat in" with fine sandpaper.
11. Check operation of each brush to assure that brush slides freely in holder.
12. Replace cover.
13. Reassemble to vehicle as described in preceding subsection.

NOTE: If motor terminal studs were removed for inspection, refer to section J2, Page 8, item 6, for correct procedure to avoid damaging studs.

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



MOTOR PARTS - G.E. MOTORS

FIGURE 5M  
SECTION J2M

DRAWN BY KM  
DATE 1-6-82



ELECTRIC MOTORS  
REFER TO FIGURE 5M

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

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
Replacement parts for G.E. Motor 5BC48JB503, 5BC48JB531, 5BC48JB550 and 5BC48JB582			
5M-1	70-201-00	Field Coil Set (not used on G.E. Motor 5BC48JB582)	1
5M-1	70-202-00	Field Coil Set (For G.E. Motor 5BC48JB582)	1
5M-2	80-200-00	Ball Bearing - Commutator End	1
5M-3	80-504-00	Ball Bearing - Pulley End	1
5M-4	70-195-00	Set of two armature terminal & brush pair connectors, <u>not used</u> on motor 5BC48JB550 with suffix letter "C" or "D". Two required per motor. (included in 70-188-00)	2
* 5M-4	70-196-00	Armature terminal & brush pair connector, <u>used only</u> with motor 5BC48JB550 with suffix letter "C" or "D". Two required per motor. (included in 70-184-00).	2
5M-5	70-184-00	Brush holder, without brushes, including brush springs, armature terminal & brush pair connectors. <u>Used only</u> on motor 5BC48JB550 with suffix letter "C" or "D".	1
5M-5	70-188-00	Brush holder, without brushes, including brush springs, armature terminal & brush pair connectors. <u>Not used</u> on motor 5BC48JB550 with suffix letter "C" or "D".	1
5M-6	70-101-00	Motor Brush	4
5M-7	85-412-00	Brush Spring, Torsion	4
5M-8	30-801-00	Brush Inspection Cover	4
5M-9	45-506-00	Oil Seal	1
5M-10	70-210-62	Motor Terminals Insulator Kit	1

Replacement parts for G.E. Motors 5BC48JB251 & 5BC48JB265

5M-2	80-200 -00	Ball Bearing, Commutator End	1
5M-3	80-504-00	Ball Bearing, Pulley End	1
5M-5	70-185-00	Brush Holder Assy.	1
5M-6	70-100-00	Motor Brush	4
5M-7	85-401-00	Brush Spring, Extension	4
5M-9	45-506-00	Oil Seal	1

Replacement Parts For G.E. Motor 5BC48JB726

5M-1	70-204-00	Field Coil Set	1
5M-2	80-209-00	Ball Bearing, Commutator End	1
5M-3	80-504-00	Ball Bearing, Pulley End	1
5M-5	70-172-00	Brush Holder Assy. <u>With</u> Brush Springs <u>But Without</u> Brushes	1
5M-7	85-412-00	Spring, Brush	4
5M-4	70-104-00	Armature Terminal & Brush Pair Connector	2
5M-9	45-506-00	Oil Seal	1

Brush Measurement Procedure For 726 Motor

With new brushes, A 1/16" drill rod can be inserted approximately .76" into brush measurement holes. Brushes should be replaced when rod can be inserted 1.56" into hole. This leaves approx. 1/8" allowable wear remaining.

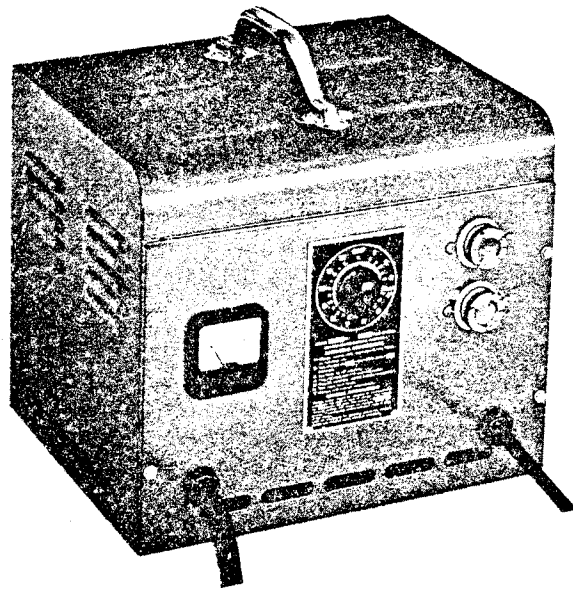
\* NOTE: This part replaces strap type 3 HP armature terminal and is 2-way interchangeable on 2 HP motors only.

FIG. I.D.

NO.	T-D PART NO.	DESCRIPTION	QTY.
Replacement Parts for G.E. Motor 5BC48JB67B & 5BC48JB114			
5M-2	80-205-00	Ball Bearing, Commutator End	1
5M-3	80-204-00	Ball Bearing, Pulley End	1
5M-6	70-100-00	Motor Brush Assy	4
5M-7	80-401-00	Brush Spring, Extension	4
Replacement Parts for T.D. Motor 388P3816 & Baldor 45-39W03, 45 39W16, 45-39W19			
5M-2	80-200-00	Ball Bearing, Commutator End	1
5M-3	80-504-00	Ball Bearing, Pulley End	1
5M-5	70-187-00	Brush Head Assy, Complete with Brushes	1
5M-6	70-101-00	Motor Brush	4
5M-8	30-803-00	Brush Inspection Cover	4
5M-9	45-506-00	Oil Seal	1
Replacement Parts for G.E. Motor 5BCG56EA17			
5M-2	80-201-00	Ball Bearing, Commutator End	1
5M-3	80-504-00	Ball Bearing, Pulley End	1
5M-5	70-189-00	Brush Holder Assy	1
5M-6	70-101-00	Motor Brush Assy	4
5M-7	85-412-00	Brush Torsion Spring	4
Replacement Parts for G.E. Motor 5BC49JB122			
5M-2	80-200-00	Ball Bearing, Commutator End	1
5M-3	80-504-00	Ball Bearing, Pulley End	1
5M-4	70-185-00	Brush Holder	1
5M-6	70-100-00	Motor Brush	4
5M-7	85-401-00	Brush Extension Spring	4
5M-9	45-506-00	Oil Seal	1
Replacement Parts for G.E. Motor 5BC49JB305 and *5BC49JB399			
5M-1	70-203-00	Field Coil Set	1
5M-2	80-200-00	Ball Bearing, Commutator End	1
5M-3	80-504-00	Ball Bearing, Pulley End	1
5M-4	70-195-00	Armature Terminal to Brush	2
5M-5	70-188-00	Brush Holder assembly	1
5M-6	70-101-00	Motor Brush	4
5M-7	85-412-00	Brush Extension Spring	4
5M-8	30-802-00	Brush Inspection Cover	4
* 5M-9	45-506-00	Oil Seal	1
5M-10	70-210-62	Motor Terminals Insulator Kit	1
* NOTE:	45-508-00	Oil Seal for 5BC49JB399 only	1

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
Replacement Parts for Taylor-Dunn Motor 388P381A			
5M-2	80-204-00	Ball Bearing, Commutator End	1
5M-3	80-205-00	Ball Bearing, Pulley End	1
5M-5	*70-187-00	Brush Head Assy. Complete with Brushes *Not supplied as original equipment on <u>A</u> series motor but must be used as replacement part.	1
5M-6	*70-102-00	Motor Brush with Wire Hook *Replacement part for original <u>A</u> series motor <u>NOT</u> converted to new brush head assy. 70-187-00.	4
5M-6	70-101-00	Motor Brush for <u>A</u> series motor converted to new brush head 70-187-00.	4
5M-7	*85-413-00	Brush Torsion Spring *Replacement part for original <u>A</u> series motor <u>Not</u> converted to new brush head assy. 70-187-00.	4
5M-9	45-506-00	Oil Seal	1
5M-8	30-802-00	Brush Inspection Cover	1

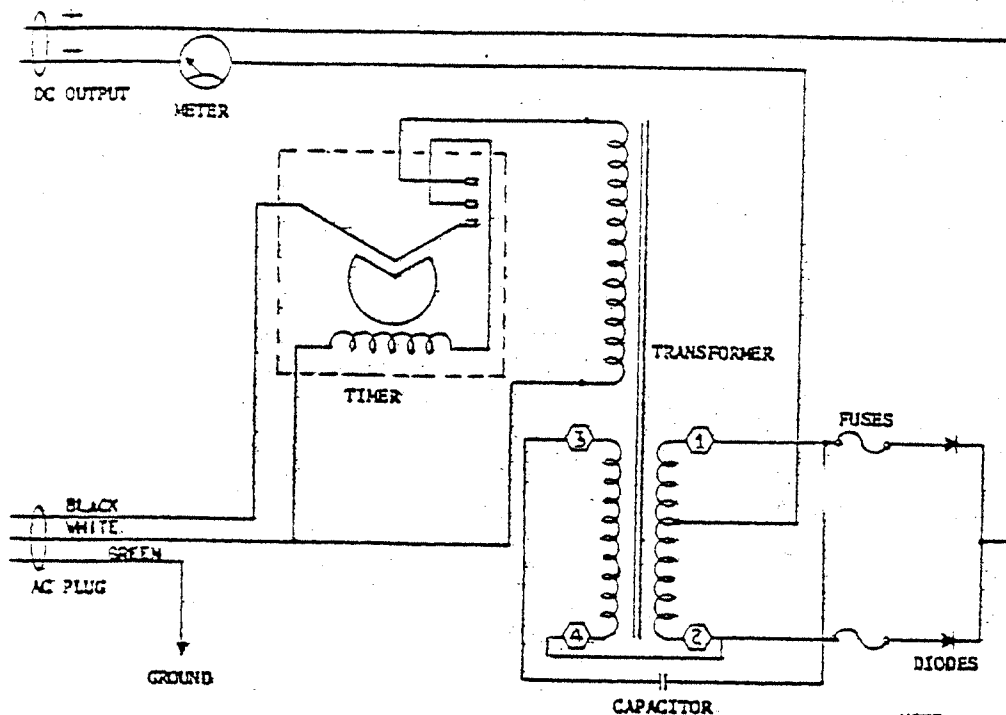
# OPERATING & SERVICING HANDBOOK



SINCE 1929  
**CHRISTIE**  
ELECTRIC CORP.

SERIES "L" BATTERY CHARGERS

Wiring Diagram Models 1225L, 2425L and 3625L  
(Separate appropriate diagram is furnished for other models)



NOTE  
1) Make voltage checks with capacitor disconnected.

Test Voltages (tp 1 & 2)

Model	Vac
1225	22
2425	42

Test Voltages (tp 3 & 4)

Model	Vac
1225	180
2425	180

NOTE:  
SCHEMATIC SHOWS DIAGRAM FOR TIMER MANUFACTURED BY MALLORY TIMERS AND USED ON CHGRS MANUFACTURED AFTER 4/1/76.

CHRISTIE SERIES "L" CHARGERS

- 4.5 If all of the foregoing checks indicate continuity, but the transformer does not hum, check for loose or broken leads between the AC plug, timer assembly, and terminal board.
5. If the transformer hums, proceed as follows:
  - 5.1 Check the output fuses to insure they are good. Inspect the fuse holders for damage or a blackened appearance. (If the fuse holder is blackened it indicates oxidation and should be replaced.)
  - 5.2 Remove the cabinet cover to gain access to the interior of the charger.
  - 5.3 Disconnect the capacitor or capacitors for the following test:
  - 5.4 Remove one of the output fuses. With the timer switch OFF, check for continuity across the DC output, connecting the continuity indicator first in one direction and then in the other. The indicator should show an open in one direction and continuity in the other
  - 5.5 Repeat step 5.4 interchanging the condition of the two output fuses.
  - 5.6 If the indications obtained in steps 5.4 and 5.5 are normal, the secondary of the transformer is shorted, and it should be replaced. If a short is measured in both directions in either step 5.4 or 5.5, the diode associated with the installed fuse is defective and should be replaced. If the indications in both directions in either step 5.4 or 5.5 are open, then the diode or transformer secondary may be open.
  - 5.7 To isolate the defective part with one of the output fuses installed, check for continuity between its fuse holder and both terminals of the output ammeter. If continuity exists between the fuse holder and one of the meter terminals but not the other, the meter and the shunt are defective and must be replaced.
  - 5.8 If continuity exists, repeat step 5.7 by interchanging fuses and connecting the continuity meter to the other fuse holder.
  - 5.9 If continuity does not exist in either step 5.7 or 5.8, the transformer secondary may be open. Check for continuity directly across the transformer secondary with both output fuses removed.
  - 5.10 If all indications to this point are normal, test the entire DC output circuitry for continuity by progressing from the +DC output terminal to the -DC terminal in incremental test sections, checking for open circuits and poor connections.
  - 5.11 Test the resonance transformer for continuity between test points (3) and (4). If open replace transformer.
  - 5.12 Test the resonance transformer under operating conditions by making the voltage measurements noted in the schematic diagram. Replace the transformer if these voltages are not normal.
  - 5.13 Remove one lead from capacitor. Check across capacitor for continuity. If continuity exists, replace capacitor.

AC LINE FUSES BLOW

6. With unit unplugged and timer turned ON, check for continuity between each input prong of the AC plug and the ground prong. If all indications are open, the transformer or timer is shorted. Operate the timer with the transformer disconnected to isolate the faulty item. If continuity is found, a short circuit exists and must be found and removed.

## INTRODUCTION

This handbook describes the installation, operation, trouble shooting, and repair of the CHRISTIE Series L portable and built-in battery chargers. These units are self-contained, fully automatic, ruggedized, commercial battery chargers, designed for operation on the normal electrical service. The output of the Series L charger is regulated by use of a resonance transformer. The built-in model is permanently mounted on the battery powered vehicle.

## SPECIFICATIONS

INPUT POWER	115 Volts; 60 Hz
OUTPUT VOLTAGE	12, 24 or 36 volts, DC
OUTPUT CURRENT	25 to 40 Amp
OUTPUT MONITOR	Ammeter
OUTPUT CONTROL	12 or 24 hour Automatic Timer
TRANSFORMER PROTECTION	D-C output fuses
PERSONNEL PROTECTION	Grounded cabinet (3rd wire)

## INSPECTION AND INSTALLATION

Inspect the exterior of the shipping container for visual signs of rough handling during shipment

Remove the charger from the shipping container and inspect the exterior of the unit for damage (broken glass, cracked knobs, etc.). CLAIMS FOR SHIPPING DAMAGE SHOULD BE FILED WITH THE CARRIER.

Install the charger on any suitable working surface so that there is free access to the front (control) panel and at least six (6) inches of free clearance on each side. There should be at least two (2) inches of clearance on the top of the charger. (The charger may be suspended overhead by the handle.) The clearance is required to allow proper flow of air through the side and top louvers for cooling.

There must be a separately fused, three-wire, single-phase, 115 volt, power receptacle sufficient rating (see A-C Amp in table on back page) within reach of the AC input cord of the charger.

## OPERATING INSTRUCTION.

1. Connect the AC plug to a suitable power receptacle.
2. Connect the DC plug to the battery receptacle (permanently connected on built-in models).

### NOTE

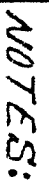
Check the output plug for the correct polarity.  
The WHITE or RED lead must be connected to the POSITIVE terminal  
The BLACK lead must be connected to the NEGATIVE terminal

3. Turn the charger ON by setting the timer to the desired charging time (See Charging Time Chart).
4. Verify that the OUTPUT METER indicates a charging current. (If it does not, see TROUBLE SHOOTING SECTION.)
5. The timer control will turn off the charger (positive turn-off feature) at the completion of the charge cycle.
6. Disconnect the battery from the charger (on built-in model disconnect the AC cord).
7. Using a hydrometer, verify that the battery has been properly charged.

## TROUBLE SHOOTING & REPAIR INSTRUCTIONS

### LOW OR NO CHARGING CURRENT

1. Verify that the battery being charged has no open or dead cells. Check jumper cables between batteries for tight and clean connections, and also verify that the battery is not already fully charged.
2. Check the output fuses of the charger.
3. Verify that the AC receptacle has power by plugging in an electrical appliance.
4. Turn the charger ON and verify that the transformer hums. If no hum is heard, proceed with step 4.1.
  - 4.1 Remove the cabinet cover to gain access to the interior of the charger.
  - 4.2 On larger chargers furnished with a power relay (see wiring diagram) verify that the relay actuates when charger is turned on. If relay does not close, check continuity across relay coil. Also check for burned or damaged relay contacts
  - 4.3 Disconnect the transformer primary leads from the timer assembly or power relay. Check for continuity between the primary input leads of the transformer on the terminal board. If no continuity is found, replace the transformer. If continuity is found proceed as follows:
  - 4.4 With the timer switch ON, check for continuity across the switch. If the switch is open with the timer on, replace the timer assembly.



3. REPLACE DC FUSE (40 AMP FUSE LINK) WITH T-D PART NO. 79-825-NO \$  
AC FUSE (15 AMP DUAL ELEMENT TUBE FUSE) WITH T-D PART NO. 79-813-00

DATE	3/13/78	BY	A	REV PER ECO/1777	5/1/78	BY	8
CHECKED	K. J. G. G. G.	BYM	ORIGINAL ISSUE	REVISION	DATE	DR.	APPD.
APP'D	G. J. G. G.	SCHEMATIC					
SUPPLEMENT	EU116392-1	2425LB					
USED ON		CHRISTIE ELECTRIC CORP. LOS ANGELES, CALIF. 90043					
SHEET / OF /		DWG. NO.		502675		REV. 8	

#### CHARGING TIME CHART

The following chart provides useful information for determining the minimum charging time needed to restore a battery to a full charge condition. In addition to normal charging, the cells of the batteries should be equalized twice each month. This is done by charging the batteries an additional seven (7) hours after a normal charge cycle. The current indications of the ammeter will be low during cell equalization.

<u>Specific Gravity Reading</u>	<u>Condition of Battery</u>	<u>Hours Needed* to Charge</u>
1100	fully discharged	12
1125	10% charged	10
1150	20% charged	8
1175	30% charged	7
1200	60% charged	4
1225	75% charged	2
1250	95% charged	1/2
1260	fully charged	0

\*Charging time will vary with the AH capacity of the battery.

#### INSPECTION OF BATTERIES AND ASSOCIATED CIRCUITS

An inspection of batteries and associated circuits is required often to assure that the batteries are capable of being fully charged. This inspection requires the use of a single-cell voltmeter, a hydrometer and a continuity tester.

1. Verify that all connections within the unit to be charged are clean and tight.
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 films which may cause a current leakage.
5. Test each individual cell in each battery after recharging with the hydrometer to verify that all specific gravity readings are within 10 points of one another.
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).

#### IMPORTANT FACTS ON BATTERIES AND CHARGERS

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 (3) hours before they show any increase in the specific gravity.

Do not charge a battery if the electrolyte temperature could rise above 120°F. This could damage both battery and charger. As a rule of thumb, the electrolyte temperature during normal charging is about 25°F above the local air temperature.

There are only two test methods to determine if a discharged battery is defective without applying a charge. These tests are given in steps 5 and 6 of the INSPECTION OF BATTERIES AND ASSOCIATED CIRCUITS. Voltage testing methods without fully charging or made while charging have no relationship to battery defectiveness.

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, especially during periods of high charging rates. Add water only to fully charged batteries.

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.



CHRISTIE BATTERY CHARGER REFERENCE CHART

Model		AC Volts	AC Amp	Battery* Amp Hours	DC Volts	DC Amp
Portable	Built-in					
1225L	1225LC	115	4	150/220	12	25
1240L	1240LC	115	5	170/250	12	40
2425L	2425LC 2425LB	115	7	150/220	24	25
2440L	2440LC	115	12	170/250	24	40
3625L	3625LC	115	12	150/220	36	25
3640L	3640LC	115	13	170/250	36	40

\*Higher capacity batteries may be charged if longer than 12 hours recharge time is available.  
Some units are furnished with 24 hr. timers for this purpose.

## WARRANTY

CHRISTIE ELECTRIC CORP. agrees to correct any defects in workmanship or material which may develop under proper and normal use by repair or replacement, F.O.B. Los Angeles, California, for a period of one year from date of purchase. The purchaser assumes full responsibility for proper installation and installation adjustments. Parts or equipment claimed defective must be returned to the factory, transportation prepaid, for inspection. If found defective, parts or equipment will be repaired or replaced and returned, transportation collect, to the purchaser. We undertake no responsibility for work done, or expense incurred in connection with repairs or replacements except on specific authority from Christie Electric Corp.

In no event does Christie Electric Corp. assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of these products. There are no warranties, either expressed or implied other than those provided herein.

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**CHRISTIE**  
ELECTRIC CORP.

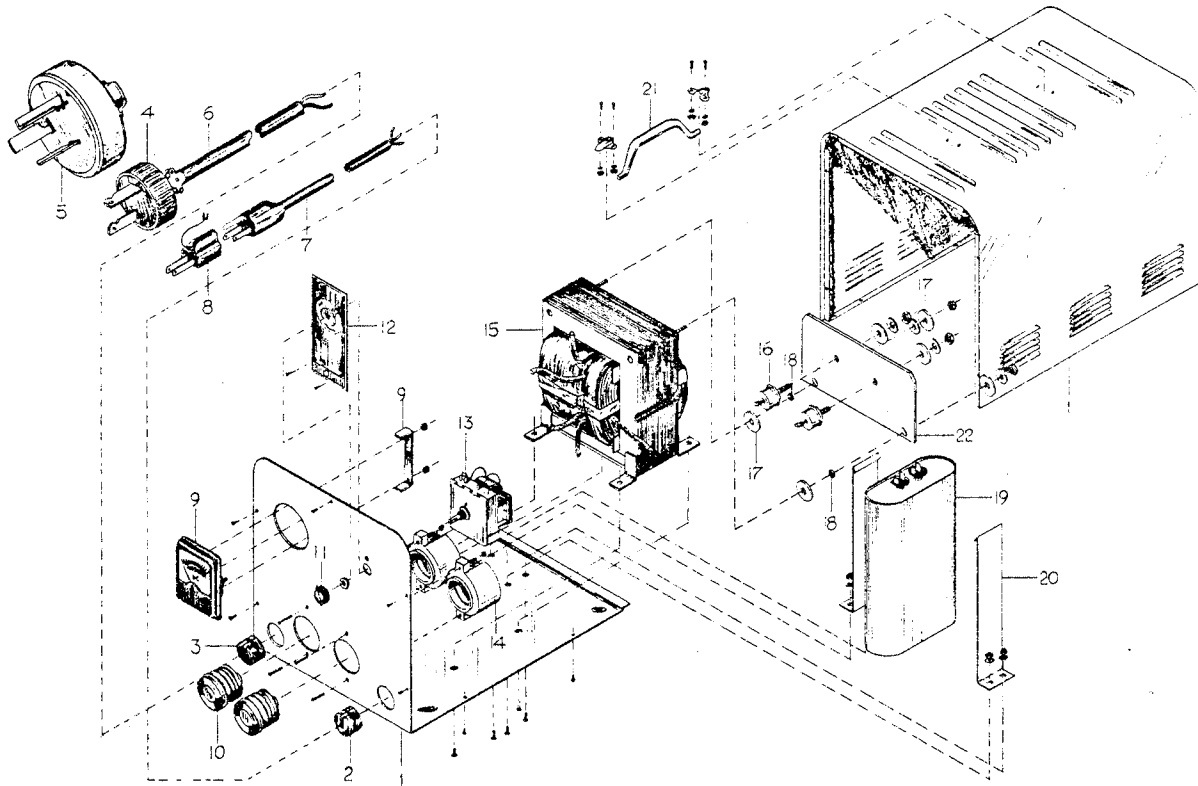
# OUTPUT FUSES BLOW

7. Verify that the circuit under charge is not shorted by disconnecting the charger and operating it disconnected.
8. If fuses continue to blow, test the charger as per steps 5.1 through 5.13.

## TIMER DOES NOT TURN UNIT OFF

9. Indicates that timer motor or switch is faulty. Replace timer assembly.

## EXPLODED DIAGRAM (Typical Charger)



## CHRISTIE SERIES "L" BATTERY CHARGERS

### PARTS LIST

Item	Item	Item
1 Portable Cabinet	9 Ammeter	18 Washer Assembly (3/8")
2 Bushing (AC)	10 Fuse	19 Capacitor
3 Bushing (DC)	11 Control knob	20 Bracket Set
4 DC Plug (2 prongs)	12 Timer Dial	21 Handle Assembly
5 DC Plug (3 prongs)	13 Timer Assembly (12 hr.)	22 Heat Sink
6 Output Cord	13 Timer Assembly (24 hr.)	
7 AC Cord and Plug (portable)	14 Fuse Holder	
7 Recessed Male Plug (built-in model)	15 Transformer	
8 Adaptor	16 Diode	
	17 Washer Assembly (3/4")	

When ordering parts, please specify both serial number and model.

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MANUAL NO. \_\_\_\_\_ SERIAL NO. \_\_\_\_\_ DATE: \_\_\_\_\_

\* AN ERROR(S) EXISTS ON THE FOLLOWING SECTION(S) AND PAGE(S) NO.

SECTION \_\_\_\_\_ PAGE NO. \_\_\_\_\_ LINE OR ITEM \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\* **EXAMPLE:** Section 13, Page 5, Item 5.  
PART NO. 41-350-55 KIT, CYLINDER REPAIR SHOULD BE PART NO.  
41-350-66.

MAIL TO: TAYLOR-DUNN  
ATTN: ENGINEERING  
2114 W. BALL ROAD  
ANAHEIM, CA 92804

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