

OPERATION AND MAINTENANCE MANUAL WITH PARTS LIST

MODEL:	SC 1-75, 1-76
SERIAL NO. :	40472 - 84336
YEAR:	1977 - 1986
MANUAL NO. :	MD-175-00

- IMPORTANT -

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



TAYLOR-DUNN

Commercial and Industrial Vehicles Since 1949

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IMPORTANT INFORMATION

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

Definitions of the three terms are as follows:

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

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

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

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

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

The safe and satisfactory use of any vehicle is a responsibility shared by many persons. As the manufacturer, we feel that it is our responsibility to emphasize vehicle characteristics and make safety recommendations regarding those characteristics. That is the primary purpose of this portion of the manual.

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

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

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

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

SPEED This vehicle is designed to attain its maximum safe operating speed on level ground. That speed can easily be exceeded when traveling down-hill. If this is allowed to occur, vehicle stability and braking performance become unpredictable. Do not exceed, under any conditions, the maximum speed the vehicle can obtain on level ground.

CONTROLS Bring the vehicle to a complete standstill before operating the forward/reverse switch to change direction of travel. Operation of this control while the vehicle is in motion can result in complete loss of power.

Do not use the accelerator to hold the vehicle at a standstill on an incline. This can cause complete power loss. Use only the brakes to hold the vehicle at rest while on a hill.

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

MAINTENANCE Many operating characteristics relate to maintenance in ways which are not readily obvious. Those maintenance characteristics most closely related to vehicle operating safety are indicated on 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: Intentional or unintentional mis-use of controls could result in an accident.

INSPECTION, SAFETY AND INTRODUCTION

INTRODUCTION

GENERAL

The Taylor-Dunn 1175SC and 1176SC are special purpose vehicles designed for use on smooth surfaces in and around industrial plants. They are used primarily for stock chasing and order picking of heavy parts, pallets and containerized pallets, etc. Both models are controlled from the rear by a stand-up operator.

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

DRIVE CONFIGURATION		LOAD CAPACITY RATING		
MAX. SPEED	MOTOR RATING	SOLID CUSHION	PNEUMATIC	TIRES
		TIRES	6-PLY LR-C	4-PLY LR-B
5.5 M.P.H.	2.25 H.P.	3,000 LBS.	2,200 LBS.	1,500 LBS.
6.5 M.P.H.	2.25 H.P.	2,600 LBS.	2,200 LBS.	1,500 LBS.
8.0 M.P.H.	2.25 H.P.	1,500 LBS.	1,500 LBS.	1,500 LBS.
8.0 M.P.H.	1.5 H.P.	1,000 LBS.	1,000 LBS.	1,000 LBS.

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

MODEL NUMBER

The following model numbers are covered by this manual:
Models 1175SC and 1176SC starting with Serial Number 40742.

SERIAL NUMBER

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

REPLACEMENT PARTS

Replacement parts may be purchased directly from your local authorized Taylor-Dunn Dealer. See Section H for further details.

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 WHEEL

The steering wheel and steering system are 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 AND ACCELERATOR

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

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

FORWARD-REVERSE SWITCH

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

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.

HORN BUTTON

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

LIGHT SWITCH

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

BATTERY CHARGER

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

SPECIAL ACCESSORIES

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

OPERATING YOUR VEHICLE

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

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

CAUTION: To hold vehicle at a standstill on a hill or incline, use the brake, depressing the rear of the treadle with heel pressure. DO NOT hold vehicle at a standstill by applying motor power. Frequent or continued stalling of the motor will damage the motor and other electrical devices.

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

Drive safely and enjoy your Taylor-Dunn vehicle.

TAYLOR-DUNN LIMITED 90 DAY WARRANTY

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

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

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

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

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

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

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

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

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

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

All implied warranties are limited in duration to the ninety (90) day warranty period. Accordingly, any such implied warranties

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

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

WARRANTY SERVICE

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

Examples of Items Not Covered by Warranty

Provisions of the warranty will not apply to:

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

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

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

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

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

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

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

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

Owner's Obligation and Responsibility

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

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

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

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 you 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.

MAINTENANCE SERVICE	REFER SECTION	EVERY WEEK	EVERY MONTH	EVERY 3 MONTHS	EVERY YEAR
Check & record specific gravity & water level of each cell. Fill, as necessary, using distilled water. (see chart in Section J8)	J8	X	X	X	X
* Examine battery terminal connections. Clean and tighten as necessary, <u>but</u> <u>Not while batteries are being charged</u>	J8	X	X	X	X
* Clean off all dirt and grease on and between power bars and J Hook. Lube sliding contact area w/T-D Grease 94-421-00 or a quality hi-temp.Grease (500°Min. Melt Point).	J6 & E	X	X	X	X
* Check rheostat adjustment	J6	X	X	X	X
* Check tire pressure.	J1	X	X	X	X
Adjust Motor Mount & Chain	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		X	X	X
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, <u>but</u> <u>not while batteries are being charged</u> .		X	X	X	
Check brake lining for wear. Adjust or replace as necessary.	J2		X	X	X
Check drive axle oil level. (Refer to Lubrication Diagram).	J2 & E		X	X	X
* Items related to Safety Recommendations.					

CAUTION: Before performing maintenance on any part of the vehicle electrical system, disconnect both main battery leads, place forward/reverse switch in neutral, turn key to off and remove from switch. Set parking brake.

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

<u>MAINTENANCE SERVICE</u>	<u>REFER SECTION</u>	<u>EVERY WEEK</u>	<u>EVERY MONTH</u>	<u>EVERY 3 MONTHS</u>	<u>EVERY YEAR</u>
Check, clean, forward-reverse switch.	J5		X	X	X
Check motor brushes. Blow out carbon dust. (Replace if necessary.)	J2			X	X
* Check and adjust front wheel bearings and	J1			X	X
Drain differential and refill with SAE 30 oil. (Refer to Lubrication Diagram).	J2 & E				3 YRS.
Repack front wheel bearings and (Use wheel bearing grease).	J1 & E				X

* Items related to Safety Recommendations.

A. PRESSURE GUN GREASE

1. Front Wheel Hub 2
2. Steering Fork Bearings 2
3. Control Pivot Points 7
- * 4. Rheostat Bars (Lube by hand) 1
5. Pillow Blocks (Steering) 4
6. Steering Sleeves 3

B. LIGHT OIL

10. Clevis Pins (Mech. Linkage) 3
11. Chain (Steering)

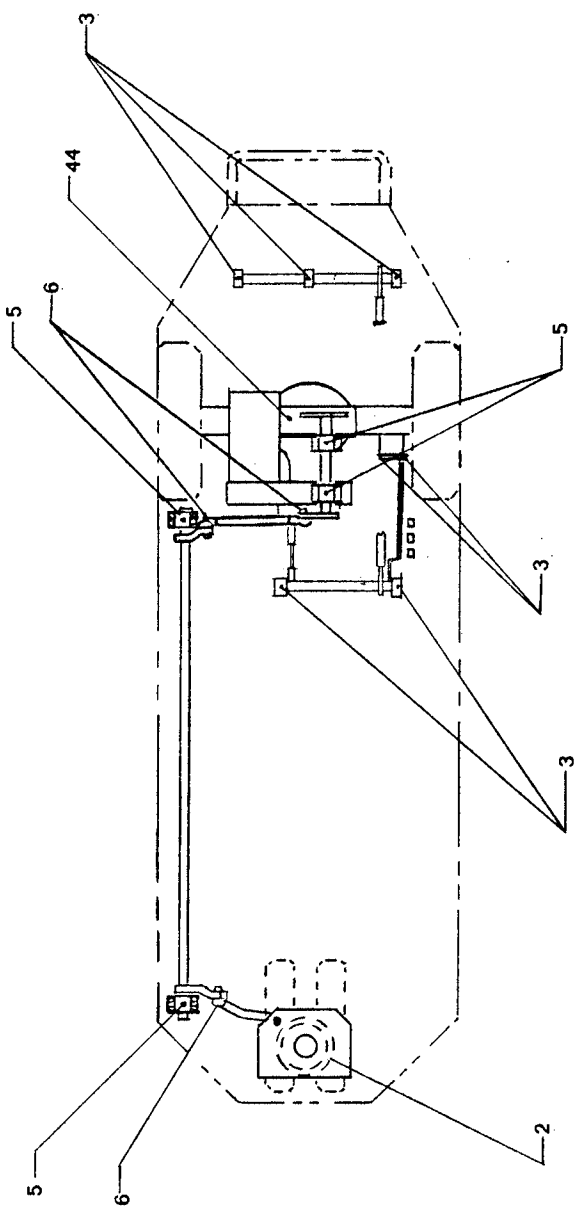
C. "POWER TRACTION" (Use SAE 30 Oil)
Proper oil level check at plug 42

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.

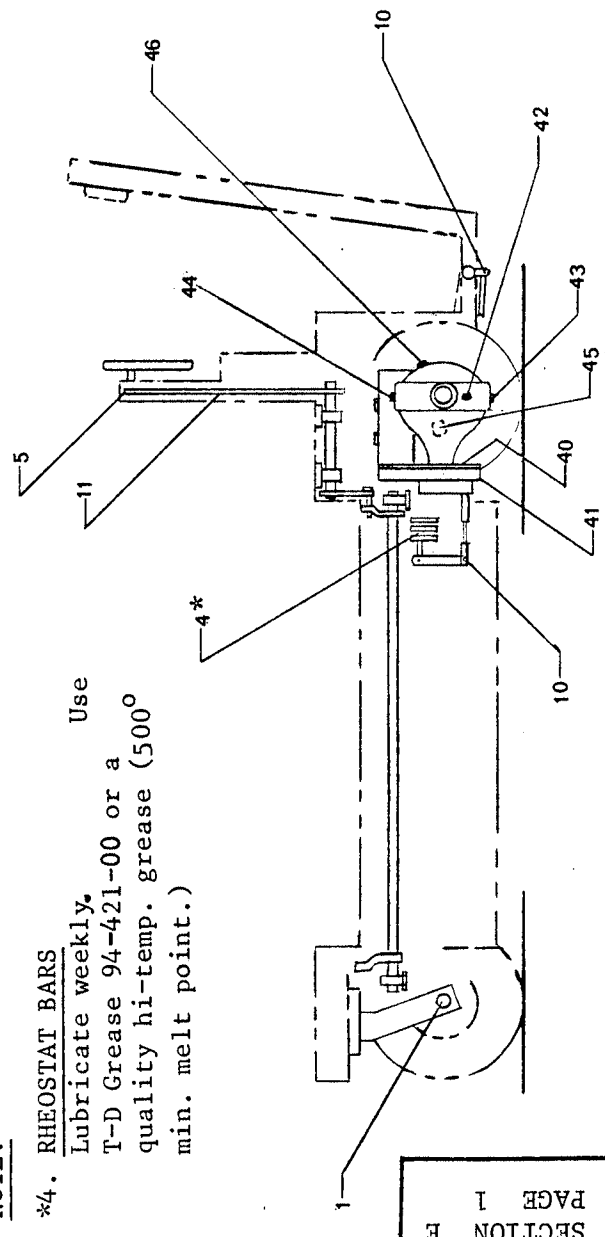
NOTE: Plug 40 added for ease in refilling gear case to proper level. Gear case oil level is maintained by recirculation from differential during operation.



NOTE:

*4. RHEOSTAT BARS

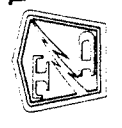
Lubricate weekly. Use T-D Grease 94-421-00 or a quality hi-temp. grease (500° min. melt point.)



NO.	DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
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TOL. FRAC. +	DEC. +
SCALE	NONE
DRAWN BY	J.M.
DATE	7-21-81

FIGURE 1
SECTION E
LUBRICATION DIAGRAM
MODELS 1175SC & 1176SC



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 1/16 or less of lining left.
	2. Alignment of brake shoes	Realign.
	3. Oil on brake lining	Find oil source and correct, wash brake band.
	4. Dirt on brake lining	Clean
	5. Bind in linkage	Loosen or realign
	6. Weak spring	Replace
	7. Air in hydraulic brake 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	Repair or 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"> 1. Resistor coil burned open 2. Resistor shorted together 3. Poorly adjusted rheostat 4. Badly worn J-Hook 5. Dirt between power bars causing shorts 	<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"> 1. Dirt shorting out neutral bar 2. Check rheostat adjustment 3. Short in wiring circuit 4. Burned forward-reverse switch 	<p>Clean, readjust or replace bars Correct Replace</p>
(e) Lack of power or slow operation	<ol style="list-style-type: none"> 1. Dragging brake 2. Tight front wheel bearings 3. Rheostat not making contact on high speed bar 4. Loose connection in wiring 5. Partially burned out motor or thrown lead 6. Weak batteries 7. Bind or drag on differential 	<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"> 1. Motor bearing 2. Loose motor on base 3. Worn sprockets 4. Defective bearing in differential 5. Defective gears in differential 6. Slack Drive Chain 	<p>Replace Tighten & Adjust Replace sprocket and chain Replace Replace Adjust (Refer Section J2)</p>

PARTS ORDERING PROCEDURE

Parts may be purchased from your local authorized Taylor-Dunn Dealer

When ordering parts, be sure to specify the complete model no. and serial no. 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 No. 86-501-98 Ball Joint (Left Hand Thread)

1 - Set of 4 - Part No. 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 No. 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 W. Ball Road
Anaheim, California 92804
Phone: 714-956-4040
Telex: 65-5393

SUGGESTED SPARE PARTS LIST

FIG I.D. NO.	T-D PART NO.	DESCRIPTION	QUANTITY FOR 1-20 VEHICLES
<u>Refer to Figure 3 - Front Fork, Wheels & Steering</u>			
3-8	88-229-81	3/4 N.C. Locknut	3
3-23	30-400-00	Master Link for #40 Chain	2
3-25	96-900-00	Turnbuckle, Steering Chain	2
3-30	45-308-00	Seal for 3/4" Bearings	2
3-31	80-015-00	3/4" I.D. Roller Bearing	2
----	11-030-00	Tube for 4.80 X 8 Tire	1
3-36	13-739-00	Tire, Tube & Demountable Split-Rim Wheel, 4.80X8 6 Ply Steelguard Tire With 5 Holes 1/2" on 4-1/2" Bolt Circle	1
<u>Refer to Figure 5 - Rear Axle, Motor & Brakes</u>			
5-3	41-997-00	Drain & Level Plug (1/8" Pipe)	1
5-11	41-165-11	Axle Assembly, W/ Axle, Retainer Ring & Plate, Bearing, Gasket & Oil Seal, 13-1/4" Length	1
5-11	41-167-11	Axle Assembly, W/ Axle, Retainer Ring & Plate, Bearing, Gasket & Oil Seal, 15-5/8" Length	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 Ass,y.	1
5-57	41-989-00	Plug (Filler Level & Drain) 1/4" 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	41-661-61	Full Brake Band for 6" Drum	1
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
5-87	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
----	70-101-00	Motor Brush - G.E. Motor	4
5-106	45-044-00	Gasket - Rear Axle Bearing	2

SUGGESTED SPARE PARTS LIST (Cont'd.)

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QUANTITY FOR 1-20 VEHICLES
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Refer to Figure 5 - Rear Axle, Motor, & Brakes (Cont'd.)

5-122	80-703-00	"O" Ring Motor Mount Seal	1
5-124	88-067-11	Socket Screw 1/4" N.C. X 1"	1

Refer to Figure 7 - Mechanical Control Linkage

7-1	85-280-00	Extension Spring, 1-3/8 O.D. X 7-3/4 Long	2
7-2	88-517-11	3/32 X 1 Steel Cotter Pin	4
7-3	96-772-00	Clevis Pin 3/8 X 1"	2
7-4	50-028-00	3/8 N.F. Threaded Rod, 1-1/2 Inches Long	2
7-5	96-762-00	Cast Clevis 3/8	1

Refer to Figure 8 - Forward-Reverse Switch

8-1	71-040-60	Switch Finger - Silver Plated with 1/4" Hole	4
8-5	71-040-71	Bolt-Finger Mounting (1/4" NF X 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

Refer to Figure 9 - Speed Control Rheostat

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	78-212-55	Resistor Coil (#9 Wire-10 Turns)	1
9-10	78-212-56	Resistor Coil (#6 Wire-9 Turns)	2
9-13	61-836-00	Pressure Bar	1
9-14	61-831-00	Power Bar	4
9-17	85-034-00	Spring - Compression 7/16" O.D. X 2" Long	1
9-21	78-212-57	Resistor Coil (#5 Wire-6 Turns)	1

Refer to General Electrical - Section J7

71-100-00	Light Switch	1
72-072-00	4" Sealed Beam Headlight Bulb (12 Volt)	1
72-022-00	Stop & Taillight Fixture, 4" Rubber Mount (12 Volt)	2
71-501-00	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

SUGGESTED SPARE PARTS LIST (Cont'd.)

<u>T-D PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY FOR 1-20 VEHICLES</u>
<u>Refer to Batteries & Charger - Section J8</u>		
76-012-00	Charging Receptacle, 30 AMP, 3 Prong	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

GENERAL

The front wheel assembly consist of a dual wheel steering fork which rotates on a 5-1/2" diameter thrust bearing and tapered roller bearing. The front wheels are mounted on a single 3/4" diameter axle. Each wheel rotates on a set of two roller bearings.

The steering linkage consist of a steering wheel, roller chain and sprockets, bearing mounted transfer shafts and bearing mounted steering shaft. The roller chain and sprockets are used to gain mechanical advantage for smooth easy steering. Occasional adjustment of chain tension will be required, as outlined in this Section of the Manual. Periodic lubrication of steering system is essential as described in Sections D and E, for reliable trouble-free steering.

TIRE CARE

16 X 4 X 12-1/8 Solid Cushion Smooth Tires require only an occasional inspection for overall satisfactory condition.

Pneumatic tire pressure is governed by load, vehicle speed and terrain over which the vehicle most commonly travels.

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

The chart below will assist in determining the correct tire pressure for your needs.

Tire Size	Type	Load Range	Ply Rating	Max. Cold PSL	Max Load Pounds
4.80 X 8	Steelguard	C	6	100	1230
4.80 X 8	Hwy. Tread	B	4	70	1000

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

Removal of Wheel & Axle Assembly

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

Re-Assembly of Wheel and Axle

1. Press bearing races into hub with suitable press, taking care that they are seated against stops within the hub.
2. Generously lubricate wheel bearings with wheel bearing grease and insert into bearing races.
3. Press or tap seals into place. (Proper position is when face of seal is flush with 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. Install wheel and hub assembly into fork by starting axle through one side of fork, inserting 1 spacer then sliding axle through wheel bearings. Insert other spacer and slide axle through remainder of wheel assembly.
5. Install locknut.
6. Adjust wheel bearings as outlined above.
7. Wheel hub has 2 zerk fittings for grease lubrication.

Adjustment of Steering Fork Bearings

1. Elevate front of vehicle using suitable hoist or jack.
2. Remove locknut from steering sleeve at steering fork.
3. Adjust steering fork bearings by tightening nut on king bolt until drag is felt when turning steering fork. Loosen nut on king bolt until steering fork rotates freely, approximately 1/16 turn. Bearings should not have any play when adjusted.

NOTE: Any excessive play in bearings can lead to bearing failure due to shock effect when vehicle encounters bumps or uneven terrain.
4. Replace steering sleeve back on steering fork, tighten nut and secure with cotter pin.

Removal of Steering Fork

1. Elevate front of vehicle using a suitable hoist or jack.
2. Remove lock nut from steering sleeve and swing clear of fork.
3. Remove lock nut from steering fork king bolt.
4. Remove steering fork from king bolt taking care not to drop thrust bearing or tapered roller bearing on ground.

Re-Assembly of Steering Fork

1. Generously pack both bearings with wheel bearing grease.
2. Carefully replace thrust bearing in steering fork and slide fork into place over king bolt.
3. Slide tapered roller bearing into position over king bolt.

Adjustment of Steering Chain Tension

1. Remove steering chain cover. (Access to bolt securing chain cover can be obtained from inside walk-along control box for models so equipped).
2. Remove locking wires from both steering chain turnbuckles.
3. If steering wheel is not centered with front wheels straight ahead, proceed as described in sub-section that follows.
4. If steering wheel is centered with front wheel straight ahead, adjust chain tension by tightening each turnbuckle an equal amount, to draw chain taut with slight tension while being careful not to disturb position of steering wheel.

NOTE: Do not apply excessive tension to chain as undue bearing and chain wear will result.

5. Replace locking wires on turnbuckles and replace chain cover.

Complete Steering System Adjustment Procedure

1. Adjust front steering sleeve (front wheel well) as short as possible.
2. Place clamp opening at top of sleeve. Insert bolt through sleeve from front to rear and secure with slotted hex nut and cotter pin.
3. Turn fork full left against "stop".
4. Align jack shaft so that lever points toward steering shaft arm.
5. Adjust steering sleeve so that all slack is removed from steering system. Insure that steering fork is firmly against left turnstop during adjustment. When properly adjusted, jack shaft lever will not strike frame in either direction however, the fork must contact both left and right stops at full left or right turn of steering wheel. Check that the jack shaft sprocket (chain installed), is approximately 1/4 to 1/2 inch from motor case to insure correct steering chain alignment between sprockets. When steering is full right against the stop, check for 1/2" minimum clearance between jack shaft lever and rheostat assembly.
6. To center steering wheel, align front wheels straight ahead. Loosen chain turnbuckle on same side that steering wheel is turned (low side). Tighten turnbuckle on high side to center wheel. When wheel is centered, tighten each turnbuckle, as appropriate, to draw chains taut with slight tension while being careful not to disturb position of steering wheel.
NOTE: Do not apply excessive tension to chain as undue bearing and chain wear will result.
7. Re-check steering system for unrestricted travel of all steering components.
8. Replace locking wires and check all steering components are tight.

Remove and Replace Steering Chain and Steering Wheel

1. Remove steering chain cover. (Access to bolt securing chain cover can be obtained from inside walk-along control box, for models so equipped).
2. Remove locking wire from one turnbuckle and relieve chain tension by turning center of turnbuckle.
3. Remove chain master link and remove chain from sprockets. Note position of turnbuckle relative to sprocket for proper reassembly.
4. Pry retaining ring from groove on forward end of steering wheel shaft and remove ring from shaft.
5. Remove steering wheel and sprocket assembly.
6. Replace components in reverse order of removal. When assembling turnbuckle, front wheels and steering wheels should be centered and turnbuckles in approximate original position mid-way between sprockets.
7. Adjust steering chain tension as described in preceeding sub-section.

Remove and Replace Steering Shaft

1. Disconnect front and rear steering sleeves at steering shaft.
2. Remove two nuts and bolts from steering shaft pillow blocks and loosen set screws.
3. Remove front pillow block from steering shaft.
4. Slide steering shaft forward out of rear pillow block and remove through opening in front wheel well.
5. Replace steering shaft and associated parts in reverse order.
6. Re-check all connections for security.

NO. DESCRIPTION
TOL. FRAC. + DEC. +
SCALE VE
DRAWN BY A.

FIGURE 3
SECTION J1

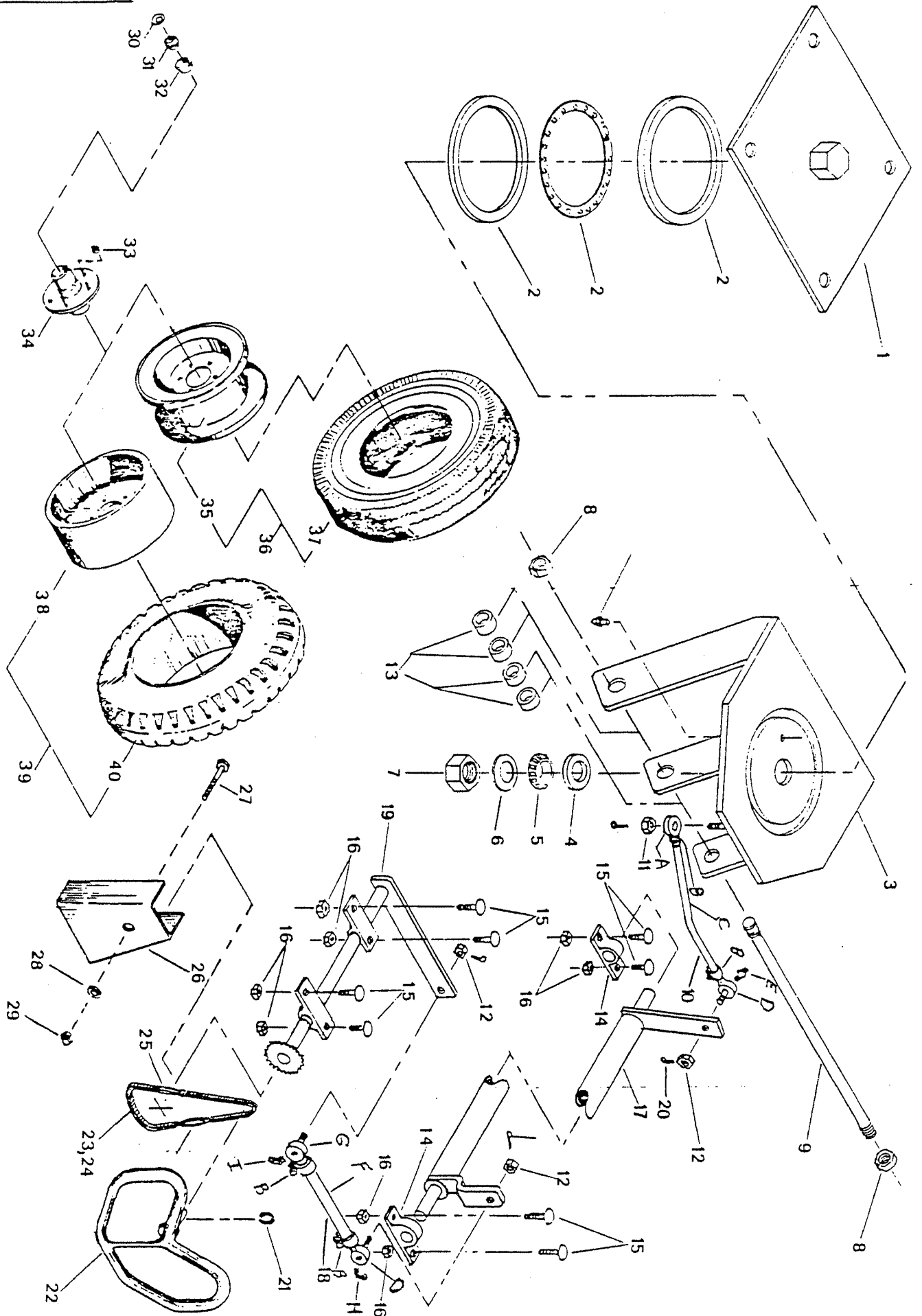
LENGTH QUAN. REVISED DATE REVISION

FRONT WORK, WHEELS & STEERING

1175SC & 1176SC



TAYLOR MACHINE CO.
211 1st Ball Rd.



FRONT FORK, WHEELS AND STEERINGREFER TO FIGURE 3

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
3-1	14-319-00	Caster Plate, Upper Front Fork	1
3-2	80-308-00	Thrust Bearing, 5.25 I.D.	1
3-3	14-086-00	Front Fork, Dual Wheel	1
3-4	80-102-00	Tapered Bearing Race for 1-1/4 I.D. Bearing	1
3-5	80-011-00	Tapered Bearing, 1-1/4 I.D.	1
3-6	16-410-00	Spacer, .020 Thick	1
3-7	88-389-86	1-1/4 NC Flexnut, Plated	1
3-8	88-229-81	Locknut, 3/4 NC	1
3-9	15-011-00	Front Axle, 3/4 OD x 16-1/4 Long	1
3-10	18-036-10	Steering Sleeve Assy., 10"	1
3-10A	86-521-98	Rod End - Spherical - Left	1
3-10B	86-510-00	Ball Joint Clamp	4
3-10C	18-036-00	Steering Sleeve, 10" w/Bend	1
3-10D	86-501-99	Ball Joint, Right Hand	2
3-10E	87-074-00	Grease Fitting 1/4-28 Straight	1
3-11	88-189-81	Lock Nut 5/8 NC	1
3-12	88-159-85	Nut, 1/2-20 NF Slotted Hex	3
3-13	16-307-00	Spacer, 1/2 Plated	4
3-14	84-004-00	Pillow Block	2
3-15	88-102-15	Carriage Bolt, 3/8 x 1-3/4 NC	8
3-16	88-109-87	Fastite Nut 3/8	8
3-17	20-151-10	Steering Shaft, 69" Wheel Base	1
3-17	20-151-11	Steering Shaft, 48" Wheel Base	1
3-17	20-151-12	Steering Shaft, 80" Wheel Base	1
3-17	20-151-13	Steering Shaft, 105" Wheel Base	1
3-18	18-028-10	Steering Adjustment Sleeve Assy., 7-1/2	1
3-18F	18-028-00	Steering Adjustment Sleeve, 7-1/2	1
3-18G	86-501-98	Ball Joint, Left Hand	1
3-18H	87-050-00	Grease Fitting, 1/4-28, 90° Angle	1
3-18I	87-076-00	Grease Fitting, 1/4-28, 45° Angle	1
3-19	20-147-00	Steering Jack-Shaft	1
3-20	88-527-11	Cotter Pin, 1/8 x 1	1
3-21	88-840-09	External Snap Ring for 3/4 Shaft	1
3-22	19-008-00	Cloverleaf Steering Whl., Shaft & Sprocket Assy.	1
3-23	30-223-00	Chain #40, 39 Pitches	1
3-23	30-258-00	Chain #40, 47 Pitches	1
3-24	30-400-00	Link Master for #40 Chain	1
3-25	96-900-00	Turnbuckle, Steering Chain	2
3-26	30-702-00	Chain Guard	1
3-27	88-060-20	1/4 x 3 NC Hex Head Cap Screw	1

FRONT FORK, WHEELS AND STEERINGREFER TO FIGURE 3

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
3-28	88-068-62	1/4 NC Lock Washer	1
3-29	88-069-83	1/4 NC Brass Acorn Nut *	1
3-30	45-308-00	Oil Seal For 3/4 Bearing	1
3-31	80-015-00	3/4 I.D. Tapered Roller Bearing	1
3-32	80-105-00	Tapered Bearing Race for 3/4 I.D. Bearing	1
3-33	97-236-00	1/2 Lug Nut, Tapered	5
3-34	12-120-00	Wheel Hub w/ 3/4 Roller Bearing & Oil Seals, 4 Long, W/5 Holes on 4-1/2" Bolt Circle	1
3-35	12-012-00	Wheel, Demountable for 4.80 x 8/5.70 x 8 Tubeless Tire, 5 Holes 1/2" on 4-1/2" Circle	1
3-36	13-734-00	Tire & Demountable Wheel, 4.80 x 8, 4 Ply Tubeless 5 holes 1/2" on 4-1/2" Bolt Circle	1
3-36	13-738-00	Tire Tube & Demountable Wheel, 4.80 x 8, 6 Ply Steelguard Tire W/5 Holes 1/2" on 4-1/2" Bolt Circle	1
3-36	13-739-00	Tire, Tube & Demountable Split Rim Wheel, 4.80 x 8 6 Ply Steelguard Tire W/5 Holes 1/2" on 4-1/2" Bolt Circle	1
3-37	10-075-00	Tire, 4.80 x 8 Load Range B Highway Tread, Tubeless	1
3-37	11-030-00	Tube, 4.80 x 8, Straight Valve Stem	1
3-38	12-050-00	Wheel, For 16 x 4 x 12-1/8 Solid Cushion, Demountable Cast Iron Wheel, Five 1/2" Holes On 4-1/2" Bolt Circle	1
3-38	12-054-00	Wheel for 15 x 3-1/2 x 11-14 Solid Cushion Demountable, Cast Iron, Five 1/2" Holes on 4-1/2" Bolt Circle	1
3-39	13-952-10	Tire & Demountable Cast Iron Wheel #12-050-00 with 16 x 4 x 12-1/8 Solid Cushion Smooth tire and five 1/2" holes on 4-1/2" Bolt Circle	1
3-39	13-951-10	Tire & Demountable Cast Iron Wheel #12-054-00 with 15 x 3-1/2 x 11-1/4 Solid Cushion Smooth Tire & Five 1/2" Holes on 4-1/2" Bolt Circle	1
3-40	10-250-00	Tire, Solid Cushion, Smooth, 16 x 4 x 12-1/8	1
3-40	10-255-00	Tire, Solid Cushion, Smooth, 15 x 3-1/2 x 11-1/4	1
3-41	87-073-00	Grease Fitting, 45° Degree - 3/16 Drive	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 3 for proper adjustment procedures. It is important to adhere to the adjustment schedule included on Page 4. Failure to do so will seriously affect normal chain life.

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

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

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

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

Check wiring terminals for cleanliness and tightness. A loose connection will cause burning of the respective terminal and can induce motor failure. DO NO PERFORM THIS MAINTENANCE WHILE BATTERIES ARE BEING CHARGED.

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.

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

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

CAUTION: Before performing Service and Adjustments, Disconnect Battery Leads from main positive and main negative terminals.

Adjustment of Brake Band to Compensate for Normal Lining Wear

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

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

1. Tighten nut or brake band anchor bolt sufficiently so that full vehicle braking force is applied when the rear edge of the J-Hook is 1/4 to 1/2 inch forward of the rear edge of the neutral bar.
2. Check brake release. Operate the treadle through its full stroke several times, then position the treadle so that the J-Hook is just starting to make contact with the first speed power bar. In this position the brake band should not contact the brake drum. Should drag occur, loosen the brake band anchor bolt nut sufficiently until drag is just eliminated as the J-Hook starts to contact the first speed power bar.
3. Adjust brake band centering screw to bring band as close to drum as possible without causing brake drag. If band is too far from drum, brake will grab in the forward direction.

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

Adjustment of Brake Rod and J-Hook Travel (Refer to Figures 5 & 7)

1. Loosen nut or threaded rod which joins clevises attached to brake lever arm and to brake arm of mechanical control linkage.
2. Remove clevis pin from brake lever arm.
3. Remove mechanical control linkage return spring.
4. Position and hold J-Hook in alignment with high speed power bar, and position and hold brake lever arm against gear case cover.
5. With J-Hook and brake lever arm in position described in Step 4, adjust threaded brake rod in clevises so that clevis holes line up with proper hole in brake lever arm, and install clevis pin and cotter pin.
6. Tighten nut on threaded rod against clevis.
7. Reassemble mechanical linkage return spring.
8. Adjust brake band as outlined in preceding subsection.

Adjustment of Brake Rod and J-Hook Travel (Cont'd.)

9. With power disconnected, or with forward-reverse switch in "OFF" position, operate the treadle through its full stroke several times, and observe the action of the J-Hook and brake band. Readjust, if necessary, the brake rod and/or brake band to accomodate to the slack in mechanical control linkage, until speed control and braking action are as described in the preceding Subsection.

Remove and Replace Brake Assembly and Drum

1. Disconnect main negative and positive battery leads to prevent accidental engagement of power while servicing vehicle.
2. Remove mechanical linkage return spring.
3. Remove cotter pin and clevis pin which secure brake rod to brake lever arm.
4. Remove four bolts holding brake mounting assembly, and remove brake band centering screw bracket. Slide brake assembly off drum.
5. Band and drum may now be cleaned, inspected, and if necessary parts may be replaced as needed.
6. Brake band lining is bonded to the band for long dependable service. When it wears to approximately 1/16" thickness the band should be replaced.
7. 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. To remove drum, remove pinion shaft nut and washer. Slide drum from pinion shaft.
8. Inspect seal in gear case cover. If worn or damaged, replace with new one. It is recommended that new seal be pre-soaked in light oil for several hours before installation. Use small amount of oil resistant sealer on seal opening in cover when pressing seal into place.
9. Re-assemble drum and spacer on pinion shaft. Tighten to 100 lb. ft. torque.
10. Replace brake assembly in the reverse order from which it was removed.
11. Replace mechanical linkage return spring.
12. Adjust brake band as outlined on Page 2.

Adjustment of Drive Chain Tension

1. Disconnect main negative and positive battery leads to prevent accidental engagement of power while servicing vehicle.
2. Tighten three motor mount nuts.
3. Loosen and unscrew each nut exactly one full turn.
Note: This procedure is very important for if the nuts are too loose or too tight an error will result in the final adjustment which will seriously reduce life of th chain.
4. Loosen adjusting set screw locknut. Using standard socket set screw wrench turn set screw clockwise until tight. (If torque wrench is available tighten to 80 inch lb. 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.

Adjustment of Drive Chain Tension (Cont'd.)

5. After developing the required torque, unscrew the adjusting screw exactly 2-1/2 turns. It is also very important to be exact on this adjustment.
6. Tighten locknut. DO NOT allow adjusting screw to move while tightening locknut.
7. Be certain that motor has moved all the way back and adjusting screw is in contact with back plate. If necessary tap motor lightly to assure this condition.
8. Tighten three motor mount nuts securely.

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

Scheduled Adjustment	After	Comments
1st Adjustment	1 Month	New unit or after installing new chain
2nd Adjustment	3 Months	Normal running conditions
3rd Adjustment	6 Months	Normal running conditions
Thereafter	Every 6 Mo.	Normal running conditions

Remove Motor

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

Install Motor

1. If installing new motor, clean motor surface and install motor mounting plate to motor with four flat-head cap screws. Tighten screws to 30 ft. lb. torque, and stake head in place with center punch.
2. If installing new motor, or if motor sprocket has been removed in order to repair motor, assemble spacers, key, sprocket, washer, and shaft nut to motor shaft. Tighten shaft nut to 75 ft. lb. torque.
3. Place "o" ring in motor mounting plate opening, and attach motor and mounting plate assembly to back plate with three nuts and washers. Engage chain with sprocket and tighten nuts.
Note: Chain Tension Adjustment is covered in a later step.
4. If seal in gear case cover is worn or damaged, install a new seal. It is recommended that the new seal be pre-soaked in light oil for several hours before installation. When pressing new seal into cover, use a small amount of oil resistant sealer on seal opening in cover.
5. Install gear case cover to backplate and pinion shaft. Assemble, but do not tighten, retaining bolts and nuts.
6. Place centering tool 41-532-50, (for centering pinion shaft seal to brake drum hub) on pinion shaft and into seal retainer.
Note: If centering tool is not available, slide brake drum onto pinion shaft and into seal. Install pinion shaft washer and nut and tighten to 100 ft. lb. torque. Position gear case cover so that seal pressure is uniform around hub of brake drum. Tighten gear case cover retaining bolts and nuts. Omit Steps 7 through 10.
7. Install pinion shaft washer and nut, and tighten to 100 ft. lb. torque.
8. Tighten gear case cover retaining bolts and nuts.
9. Remove pinion shaft nut and washer, and remove centering tool.
10. Install brake drum, washer, and pinion shaft nut. Tighten nut to 100 ft. lb. torque.
11. Install brake band, brake assembly brackets, and brake band centering bracket to gear case cover and tighten retaining bolts.
12. Adjust drive chain tension as described in preceding subsection.
13. Reconnect brake rod and brake lever arm with clevis pin and cotter pin.
14. Install mechanical linkage return spring.
15. Adjust brake band as described on Page 2 of this Section of Manual.
16. Fill gear case with oil. Refer to Lube Diagram in Section E.
17. Connect motor leads as follows: (Important!!)
 - a) Check that each motor terminal stud nut is tightened securely but not over-tightened as this could bend or twist the terminal post and cause an electrical short within the motor.
 - b) Install motor leads on correct motor terminals post.
 - c) Install a second nut on each terminal post and finger tighten.
 - d) To avoid bending, twisting or breaking-off a terminal post, use a thin pattern 9/16" wrench to hold the bottom nut from moving while tightening the top nut. Carefully tighten the top nut so as to make a good connection between the terminal post and motor lead.
18. Connect battery leads.

Motor Maintenance - General

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

Motor Maintenance - Brush Inspection and Replacement

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

Motor Disassembly and Reassembly

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

Disassemble and Reassemble Primary Drive

1. Perform Steps 1 through 10 in Subsection titled "Remove Motor".
2. Remove chain, pinion sprocket, and spacers from pinion shaft. Note spacer locations for proper reassembly.
3. If axle or differential maintenance requiring further disassembly is required, remove back plate and gasket by removing the five bolts which retain back-plate to differential carrier. Refer to Subsection which covers axle and differential disassembly and reassembly.
4. To reassemble, install back plate and gasket to differential carrier with five bolts. Use gasket sealer. Tighten bolts to 50 ft. lb. torque.
5. Perform Steps 3 through 18 in Subsection titled "Install Motor".

Remove and Install Rear Wheel Bearings

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

Remove and Install Rear Axle and Drive Assembly

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

Disassembly of Rear Axle and Differential Assembly

1. Remove rear axle and drive assembly from chassis, and remove primary drive and brake components, as described in appropriate Subsections.
2. Remove bolts on each end holding axle retainer and pull both axles.
3. Remove nuts around differential carrier housing and remove carrier from axle housing.
4. Mark one differential bearing cap and bearing support to insure proper assembly. Remove adjusting nut locks, bearing caps, and adjusting nuts. Lift differential out of carrier.
5. Remove drive gear from differential case.
6. Drive out differential pinion shaft retainer and separate the differential pinion shaft and remove gears and thrust washer.
7. Remove drive pinion retainer from carrier. Remove O-Ring from retainer.
8. Remove pinion locating shim. Measure shim thickness with micrometer.

Disassembly of Rear Axle and Differential Assembly (Cont'd.)

9. If the drive pinion pilot bearing is to be replaced, drive the pilot end and bearing retainer out at the same time. When installing, drive the bearing in until it bottoms. Install a new retainer with the concave side up.
10. Press the pinion shaft out of front bearing cone and remove spacer.
11. Remove pinion bearing cone.
12. Do not remove pinion bearing cups from retainer unless they are worn or damaged. The flange and pilot are machined by locating on these cups after they are installed in the bores. If new cups are to be installed, make sure they are seated in the retainer by trying to insert a .0015" feeler gauge between cup and bottom of bore.

Reassembly of Rear Axle and Differential Assembly

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. 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. Lubricate both bearings with differential oil.
4. Place spacers, sprocket, and brake drum on pinion shaft spline. Assemble washer and shaft nut, and tighten to 100 ft. lb. torque.
Note: The bearing should spin freely without end play. If it is too tight or too loose, adjust by using shims.
5. Shim Selection: Manufacturing tolerances in the pinion bore dimensions and in the best operating position of the gears make an adjustment shim necessary. This shim is placed between the pinion retainer and the carrier, Figure 5. An increase in the thickness of the shim moves the pinion away from the drive gear. Manufacturing objectives are to make axles requiring a .0015" 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.

Reassembly of Rear Axle and Differential Assembly (Cont'd.)

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 retainer bolts will have to be removed later for installation of primary drive and brake components.

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 times to a tolerance of .005" to .009".

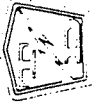
Note: It will be necessary to release some of the cap bolt tension in order to allow the bearing to move while making the adjustments. If the caps are too loose an error will result when trying to set backlash and bearing clearance. Therefore double check your setting after the cap bolts have been tightened. If necessary make corrections in your settings until 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, bearing retainers, and gaskets.

Note: Axles are equipped with special sealed bearings. Should there be evidence of seal leakage, it is recommended that the bearing be replaced. It is also recommended that gasket located between bearing and bearing seat in axle housing be replaced at the same time. Refer to Figure 5.

12. Remove pinion shaft nut, washer, spacers, brake drum, and sprocket. Remove five bolts from pinion bearing retainer. Install primary drive components as described in Subsection titled "Disassemble and Reassemble Primary Drive".
13. Fill housing with oil. Refer to Section E, Figure 1.

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Anaheim, Calif.



REAR AXLE, MOTOR AND BRAKES
1175SC & 1176SC

FIGURE 5
SECTION J2

LENGTH | QUAN. | REVISED DATE | REVISION

NO.	DESCRIPTION
TOL. FRAC. + DEC. -	
SCALE	NONE
DRAWN BY	J.M.
DATE	4-28-77

SECTION J2
PAGE 10

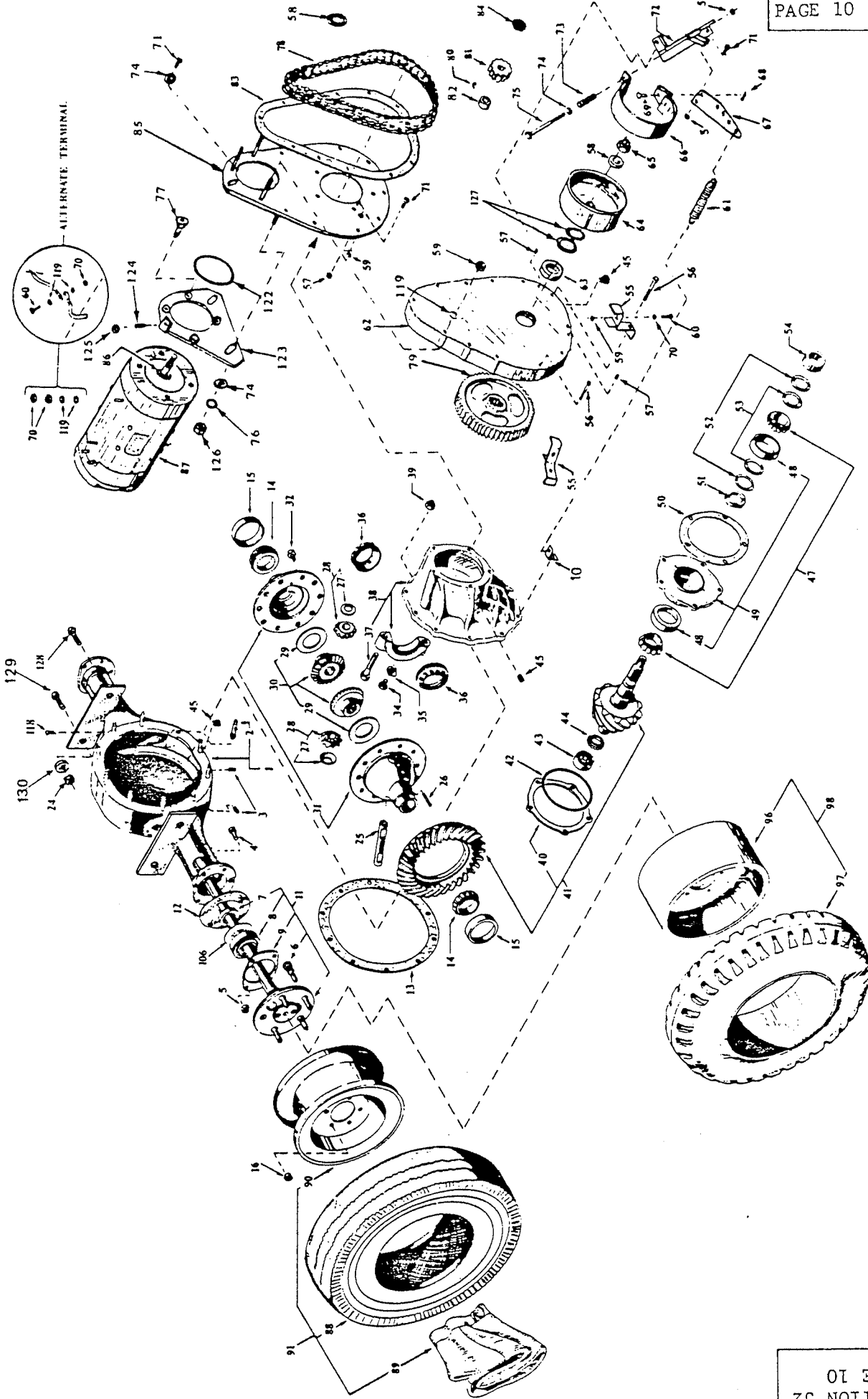


FIGURE 5
POWER TRACTION DRIVE AXLE

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-1	41-290-00	Housing Rear Axle With Bolts	1
5-2	96-330-00	Bolt-Differential Carrier To Housing	10
5-3	41-997-00	Drain And Level Plug (1/8" Pipe)	2
5-4	88-100-11	Hex Head Cap Screw 3/8" X 1" N.C.	8
5-5	88-109-81	Lock Nut 3/8" N.C. (Hex)	10
5-6	96-331-00	Bolt - 1/2" N.F. (Special) Rear Hub	10
5-7	32-515-00	Retainer Ring Rear Axle Bearing	2
5-8	80-503-00	Rear Axle Ball Bearing	2
5-9	32-514-00	Retainer Plate Rear Axle	2
5-10	91-509-00	Spring Clip, Rear Axle	1
5-11	41-165-11	Axle Ass'y. W/Axle, Retainer Ring, Retainer Plate, Bearing Gasket and Oil Seal	1
5-11	41-167-11	Axle Ass'y. W/ Axle, Retainer Ring, Retainer Plate, Bearing, Gasket And Oil Seal	1
5-13	45-042-00	Gasket (Housing To Differential Carrier)	1
5-14	80-511-00	Tapered Roller Bearing - Carrier (Small 1.628 I.D.)	2
5-14	80-512-00	Tapered Roller Bearing - Carrier (Large 1.784 I.D.)	2
5-15	80-127-00	Tapered Bearing Race - Carrier (Small)	2
5-15	80-128-00	Tapered Bearing Race - Carrier (Large)	2
5-16	97-236-00	Nut 1/2" N.F. (Lug)	10
5-24	88-149-81	Lock Nut 1/2" N.C. (Hex)	3 Or 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 Gears And Two Thrust Washers)	1
5-31	41-712-00	Differential Gear Case Assembly (Small Carrier Bearings 1.628" I.D.)	1
5-31	41-713-00	Differential Gear Case Assembly (Large Carrier Bearings 1.784" I.D.)	1
5-32	88-130-10	Hex Head Cap Screw 7/16" X 7/8" N.F.	10

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY. REQ.
5-34	88-080-04	Hex Head Cap Screw 5/16" x 3/8" N.C.	2
5-35	41-706-00	Differential Bearing Adjustment Nut Lock	2
5-36	41-707-00	Nut-Differential Bearing Adjustment 3-1/8" - 16 Thread (For Small Carrier Bearing 1.628" I.D.)	2
5-36	41-708-00	Nut-Differential Bearing Adjustment 3-5/16" - 16 Thread (For Large Carrier Bearing 1.784" I.D.)	2
5-38	41-709-00	Differential Carrier Assembly (For Small Carrier Bearings 1.628" I.D.)	1
5-38	41-710-00	Differential Carrier Assembly (For Large Carrier Bearings 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
5-31	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			
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
5-42	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
5-47	80-554-00	Tapered Roller Bearing - Pinion Shaft	2
5-48	80-125-00	Tapered Bearing Race - Pinion Shaft	2
5-49	44-340-90	Pinion Bearing Case Assembly & Bearing Races	1
5-50	45-021-00	Gasket Gear Cast to Pinion Bearing Assembly	1
5-51	16-415-00	Spacer Pinion Shaft (.440" Thick)	1
5-52	16-410-00	Spacer Pinion Shaft (.020" Thick)	2 to 6
5-53	16-411-00	Spacer Pinion Shaft (.005" Thick)	2 to 6
5-54	16-414-00	Spacer Pinion Shaft (.440" Thick)	1
5-54	16-417-00	Spacer Pinion Shaft (.340" Thick)	1
5-55	41-371-00	Brake Alignment Bracket	1
5-56	88-080-20	Hex Head Cap Screw 5/16" x 3" N.C.	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 O.D. x 4-3/8 Long	1

IG. 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	41-661-61	Full Brake Band For 6" Drum, 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	88-100-13	Hex Head Cap Screw 3/8" X 1-1/4" N.C.	7
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" N.C.	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	30-092-00	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
5-86	45-506-00	Oil Seal (G.E. Motor)	1
5-87	70-049-00	Motor, 1.5/2.0 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

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
<u>MOTOR COMPONENTS NOT ILLUSTRATED</u>			
	70-101-00	Brushes	4
	70-188-00	Brush Head Assembly Without Brushes	1
	85-412-00	Brush Torsion Spring	4
	80-504-00	Ball Bearing, Shaft End	1
	80-200-00	Ball Bearing, Commutator End	1
	70-049-51	Armature Terminal Stud Assembly (Set of two)	1
	30-801-00	Brush Inspection Cover (1.5 H.P. Motor Only)	1
<u>NOTE:</u> Refer to Section J1 for tire/wheel information			
5-106	45-044-00	Gasket, Rear Axle Bearing	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 1/4 N.C. X 1	1
5-125	88-069-80	Nut, 1/4 N.C. Hex	1
5-126	88-109-80	Nut, 3/8 N.C. Hex	3
5-127	16-400-00	Spacer, 1-1/4 I.D. X .125 Thick	0 - 1 Or 2
5-128	88-140-14	Hex Head Cap Screw 1/2 X 1-1/2 N.C.	2
5-129	88-140-20	Hex Head Cap Screw 1/2 X 3 N.C.	2
5-130	88-148-62	1/2 Lockwasher	4

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.

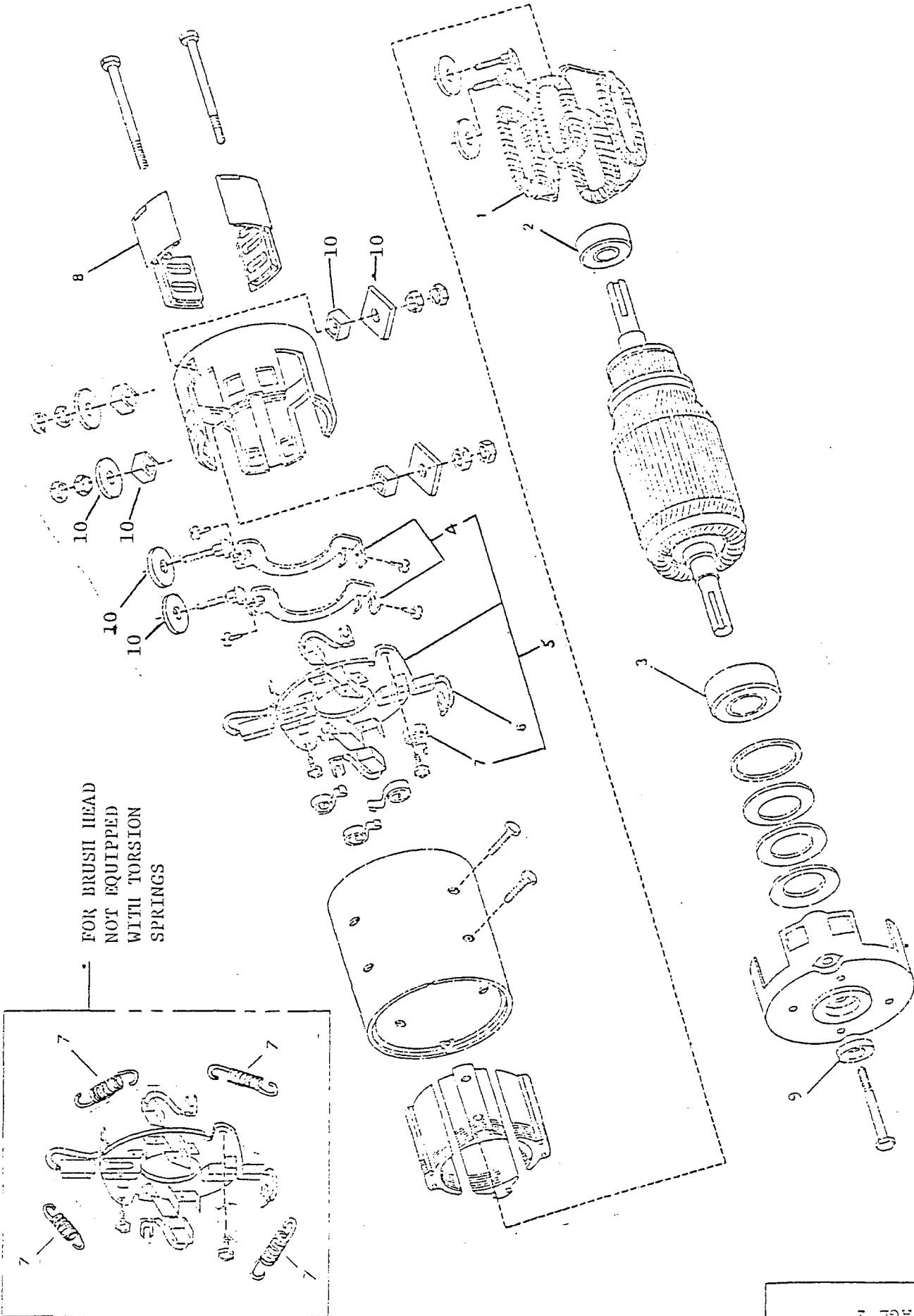
NOTE: When one brush is replaced in a motor, it is considered good maintenance practice to replace all brushes.

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, P. 5, item 17 for correct procedure to avoid damaging studs.



MOTOR PARTS - G.E. MOTORS

FIGURE 5M
SECTION J2M

TAYLOR DUNN MFG. CO.
2114 West Ball Rd.
Ar im, Calif.

DRAWN BY R.B.
DATE 4-1-

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 5B6A8JB726			
	70-204-00	Field Coil Set	1
	80-209-00	Ball Bearing, Commutator End	1
	80-504-00	Ball Bearing, Pulley End	1
	70-172-00	Brush Holder Assy. <u>With</u> Brush Springs But <u>Without</u> Brushes	1
	85-412-00	Spring, Brush	4
	70-104-00	Armature Terminal & Brush Pair Connector	2
	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.

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			
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

FIG. I.D.	T-D PART		
NO.	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

MAINTENANCE PROCEDURES

REFER TO FIGURE 7

MECHANICAL CONTROL LINKAGE

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

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

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

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

For service and adjustments of the systems operated by the control linkage refer to this Section and also to the following Sections:

Section J2 - Adjustment of Brake Rod and J-Hook

Section J6 - Adjustment of Speed Control J-Hook Pressure

SERVICE AND ADJUSTMENTS

REFER TO FIGURE 7 - MECHANICAL CONTROL LINKAGE

Replace Treadle to Control Arm Connecting Bar

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

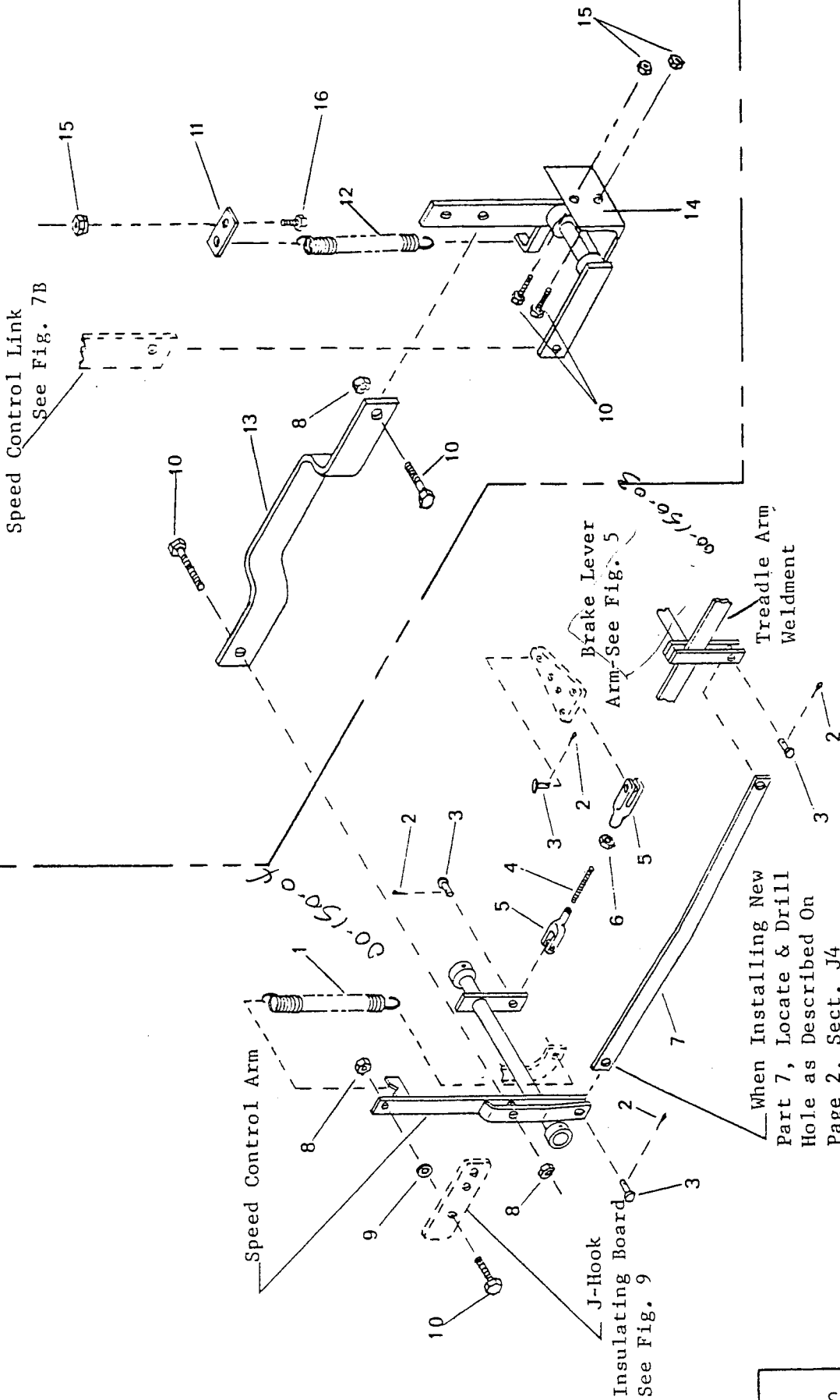
1. Disconnect main positive and negative battery terminals to prevent accidental power engagement during servicing.
2. Install new connecting bar to treadle arm with clevis pin and cotter pin, leaving it free at the forward end.
3. Position and hold the speed control arm so that the speed control J-Hook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

Adjustment Of Optional Walk-Along Control

NOTE: Adjustment of walk- along controls should be made after all other control linkage adjustments have been completed.

1. Adjust clevis on accelerator link so that the control handle moves freely throughout the full operating range of the treadle.

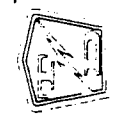
-OPTIONAL WALK-ALONG CONTROL-



SECTION J4
PAGE 3

LENGTH | QUAN. | REVISED DATE | REVISION

MECHANICAL CONTROL LINKAGE
1175SC



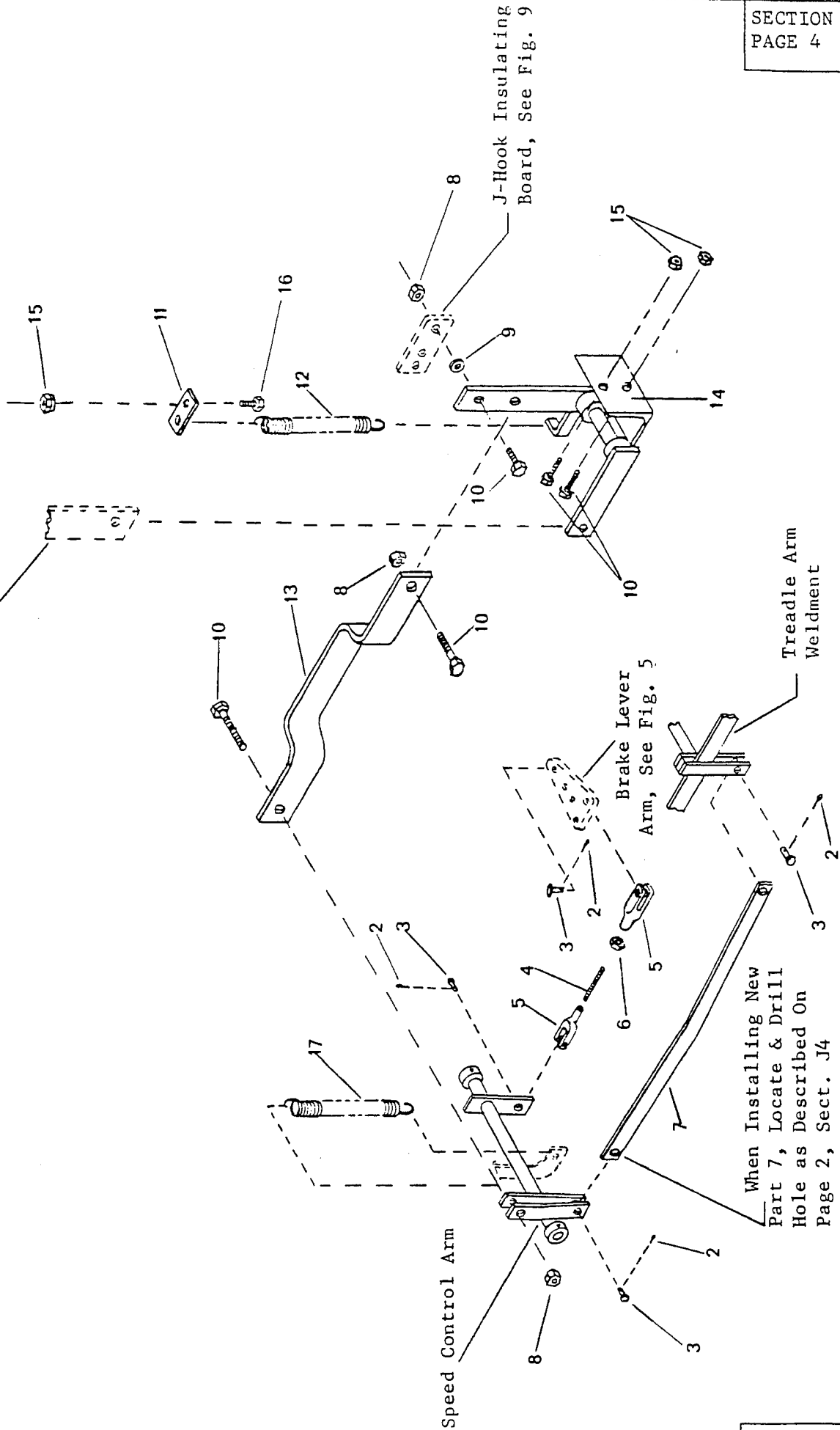
TAYLOR DUNN MFG. CO.
2114 West Ball Rd.
Anaheim, Calif.

FIGURE 7
SECTION J4

NO.	DESCRIPTION
1	OL. FRAC. + DEC. +
2	SCALE NONE
3	DRAWN BY J M.
4	DATE 5-5

PAGE 3

Optional Walk-Along Control-Speed Control Link, See Fig. 7B



SECTION J4
PAGE 4

SECTION J4
PAGE 4

NO.	DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
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TOL. FRAC. + DEC. +	
SCALE NONE	
DESIGNED BY T M	

FIGURE 7A
SECTION J4

MECHANICAL CONTROL LINKAGE
1176SC

TAYLOR DUNN MFG. CO.
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MECHANICAL CONTROL LINKAGE

REFER TO FIGURE 7 & 7A

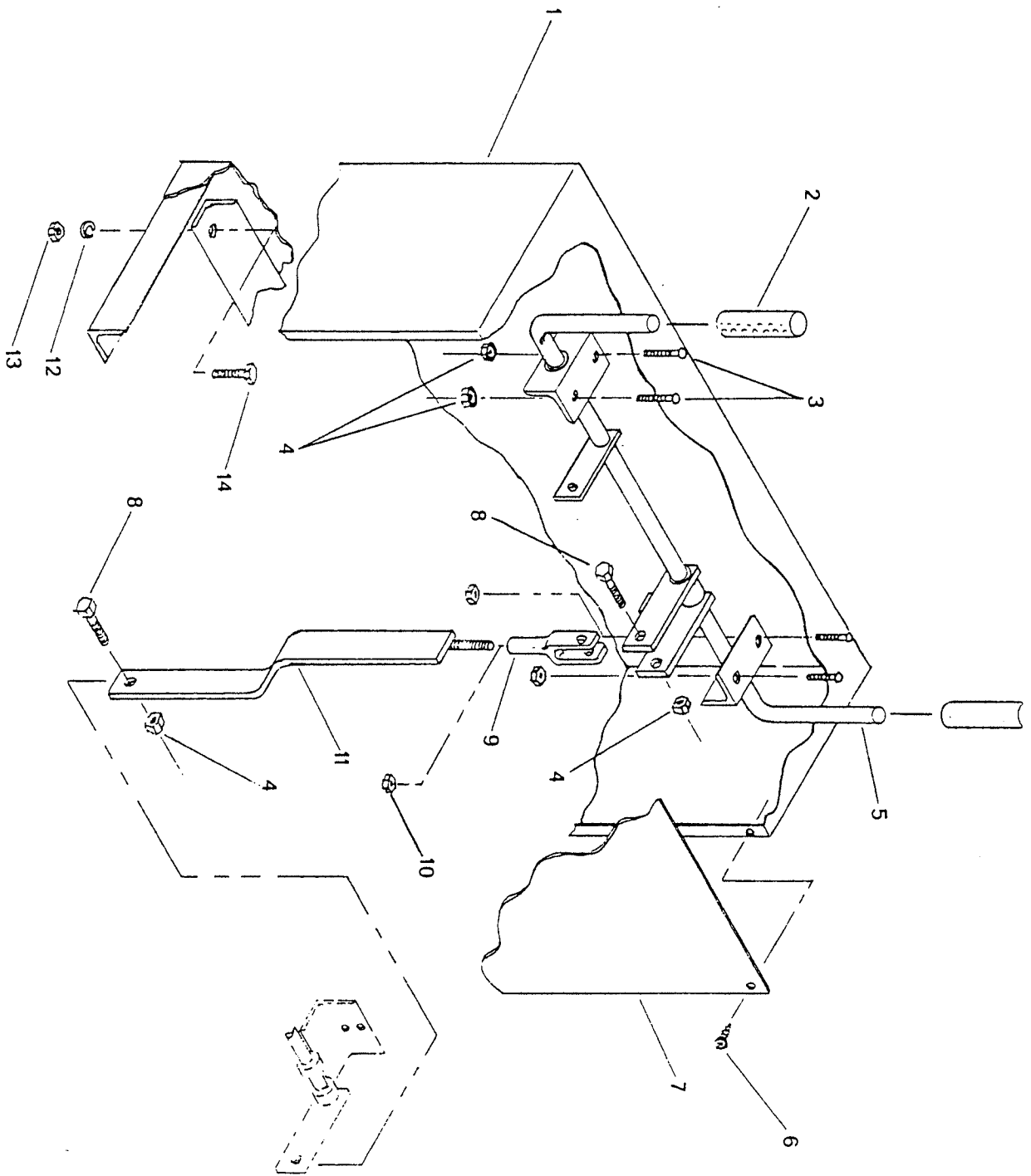
FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY
7-1	85-280-00	Spring Extension 1-3/8 X 7-3/4 Long	1
7-2	88-517-11	Cotter Pin 3/32 X 1	5
7-3	96-772-00	Pin, Clevis 3/8 X 1	4
7-4	50-028-00	Thread Rod, 3/8 N.F., 1-1/2 Long	1
7-5	96-762-00	Clevis, Cast 3/8	2
7-6	88-119-80	3/8 NF Hex Head Nut	1
7-7	50-429-00	Connecting Bar, 30-1/2 Long	1
7-8	88-109-81	3/8 NC Locknut	3
7-9	88-108-61	3/8 SAE Washer	1
7-10	88-100-13	3/8 X 1-1/4 NC Hex Head Screw	5
7-11	85-490-00	Spring Tab	1
7-12	85-290-00	Spring Extension, 1-1/4 OD X 4-3/8 Long	1
7-13	50-644-22	Connecting Bar	1
7-14	50-644-21	Speed Control Shaft Assembly	1
7-15	88-109-87	3/8 Fastite Nut	3
7-16	88-102-15	3/8 X 1-3/4 NC Carriage Bolt	1
7-17	85-270-00	Spring Extension, 1-1/4 X 4-3/8 Long	1

NO.	DESCRIPTION
TOL. FRAC. ±	DEC. ±
SCALE	NONE
DRAWN BY	J.M.
DATE	7-28-77

FIGURE 7B
SECTION J4

LENGTH	QUAN.	REVISED DATE	REVISION
OPTIONAL WALK-ALONG CONTROL			
1175SC & 1176SC			

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



Speed Control
Shaft Ass'y.
See Figure 7A/7B

OPTIONAL WALK-ALONG CONTROL

REFER TO FIGURE 7B

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
7B-1	50-644-20	Console, Walk-Along	1
7B-2	98-350-00	Hand Grip, 3/4 X 4-1/2 Long	2
7B-3	88-102-11	3/8 X 1 NC Carriage Bolt	4
7B-4	88-109-87	3/8 NC Fastite Nut	5
7B-5	50-644-00	Handle Assembly, Walk-Along	1
7B-6	88-837-09	#14 X 3/4 Pan Head Sheet Metal Screw	6
7B-7	50-644-24	Cover, Walk-Along Console	1
7B-8	88-101-18	3/8 X 2-1/2 NC Hex Head Cap Screw, Heat Treated	2
7B-9	96-762-00	Clevis, Cast 3/8	1
7B-10	88-109-80	3/8 NC Hex Head Nut	1
7B-11	50-644-23	Speed Control Link	1
7B-12	88-068-62	1/4 Lock Washer	6
7B-13	88-069-80	1/4 NC Hex Head Nut	6
7B-14	88-060-11	1/4 X 1 NC Hex Head Cap Screw	6

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.

SERVICE AND ADJUSTMENT
REFER TO FIGURE 8
FORWARD-REVERSE SWITCH

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

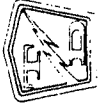
REMOVAL, DIS-ASSEMBLY AND RE-ASSEMBLY OF SWITCH

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 as they come free of the 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 it's proper re-assembly. The rotor contacts look similar but are actually a pair consisting of a left and a 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.



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

FIGURE 8
SECTION J5

NO.	DESCRIPTION
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TOL.	FRAC.	DEC.
1	1	1
2	2	2
3	3	3
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5	5	5
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SCALE NONE

DRAWN BY REA

DATE 9-13-69

LENGTH	QUAN.	REVISED DATE	REVISION
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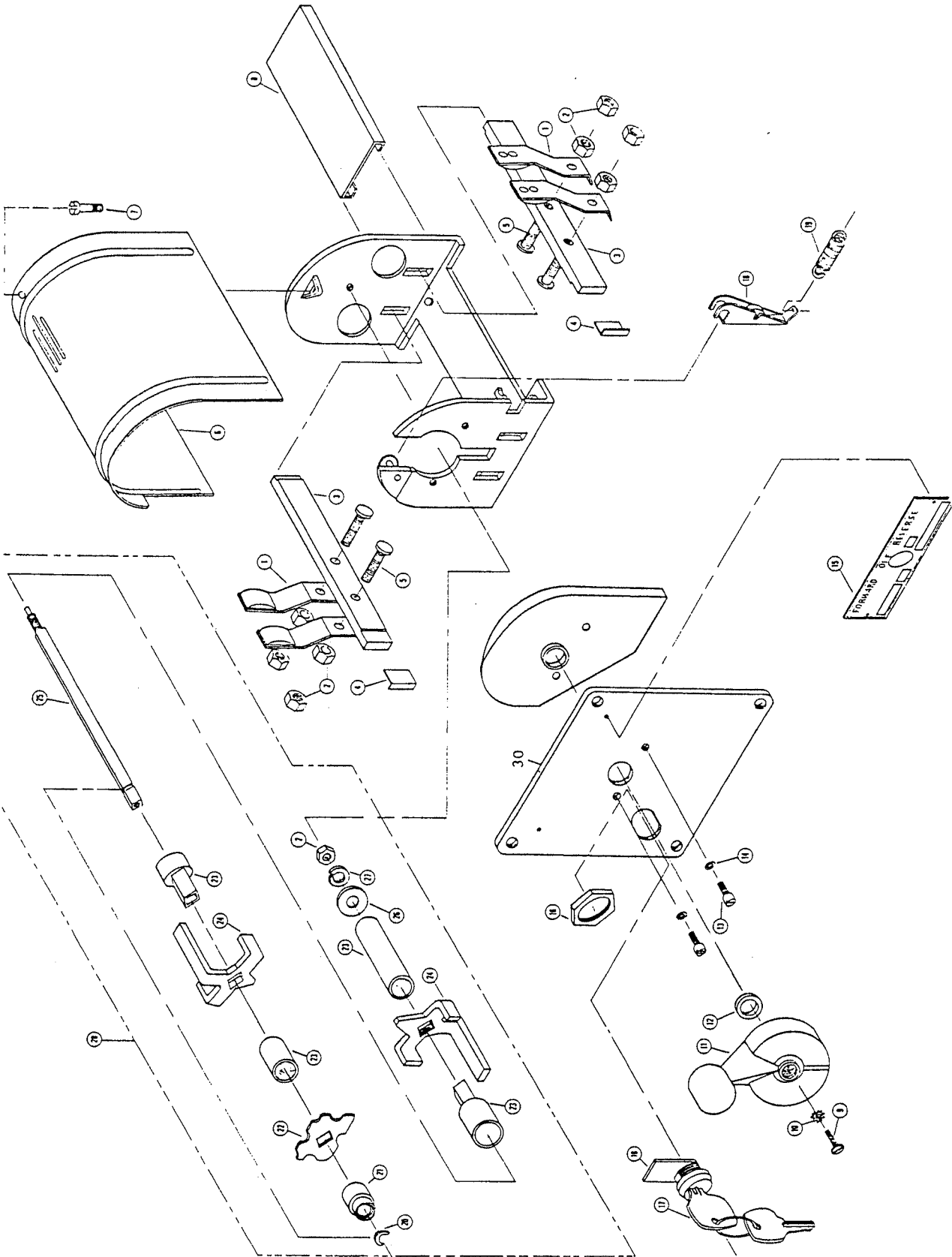


FIGURE NO. 8
GROUP 8 FORWARD AND REVERSE SWITCH

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 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 flat copper bars and a movable J-Hook are the major parts in the rheostat. With proper adjustment and lubrication the rheostat will give many months of trouble free use. When J-Hook is worn to 1/8" thickness, replace J-Hook and power bars.

It is recommended that all terminal connections be checked and tightened at least once a month. If a terminal bolt or wire becomes loose, 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.

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

Refer to Section J2, Page 2, for adjustment of J-Hook travel and brake rod length. Other adjustments to the rheostat are outlined in this section of the manual.

Cleaning & Lubrication

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

Cleaning Procedure:

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

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

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

GENERAL ELECTRICAL PARTS

T-D PART NO.	DESCRIPTION	QTY. REQ.
71-100-00	Light Switch	1
71-501-00	Horn Button	1
72-005-00	Chrome Headlight Fixture with 4" Sealed Beam Bulb	1
72-022-00	Stop & Taillight Fixture, 4" Rubber Mount, 12 Volt	1
72-051-00	Turn Light Fixture, 12 Volt, Amber, 4" Rubber Mt.	2
72-072-00	4" Sealed Beam Headlight Bulb, 12 Volt	1
73-004-00	Horn, 12 Volt	1
74-000-00	Hour Meter	1
74-005-00	Charge Indicator, 12 Volt	1
75-033-00	Wiring Harness for Power & Charging Receptacle	1
75-231-00	Battery Jumper #6 Wire, 8" Long	
78-010-00	Secondary Fuse & Holder, Inline Type	
79-823-00	Fuse - Buss Type 20 Amp	
74-009-10	Charge Indicator (24V)	1

4. Remove 3 bolts holding switch to bracket and remove switch.
5. Replace switch in the reverse manner to which it was removed.
6. Check and adjust J-Hook pressure bar as outlined above; check and adjust J-Hook travel and brake rod length as outlined on Page 2, Section J2.

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.

NO. DESCRIPTION

TOL. FRAC. + DEC. +

SCALE

DRAWN BY

DATE 1-11-75

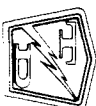
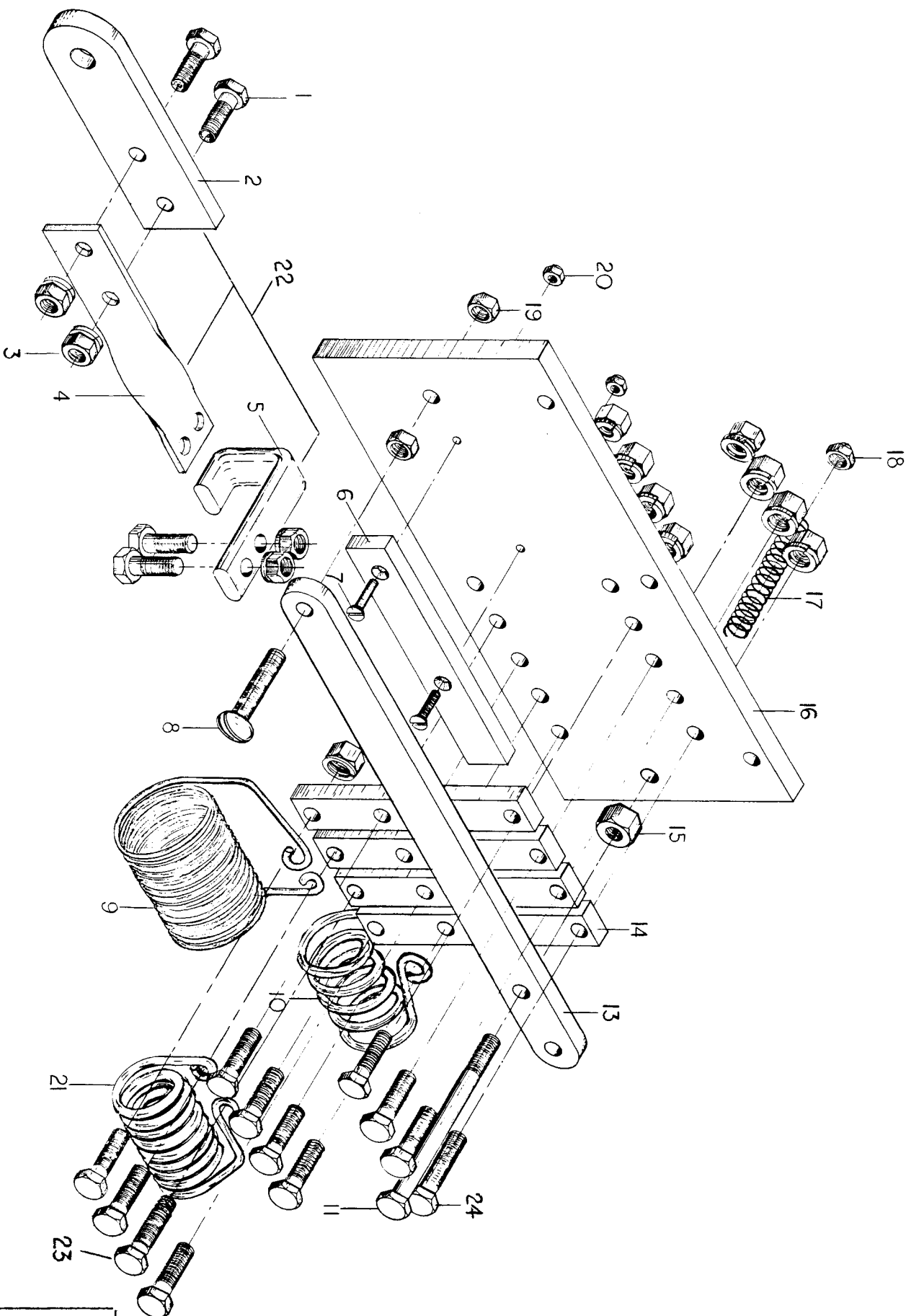
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FIGURE 9

SECTION J6

SPEED CONTROL RHEOSTAT

FOUR SPEED



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

FIGURE 9 - SPEED CONTROL RHEOSTAT - FOUR SPEED

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
9-0	61-837-25	Four Speed Sliding Bar Rheostat Assembly With 78-212-55, 71-212-56, 71-212-57 Coils, Less J-Hook Assembly.	1
9-1	88-060-11	1/4 X 1 N.C. Hex Head Cap Screw	14
9-2	61-834-00	Insulating Board	1
9-3	88-069-87	1/4 N.C. Fastite	16
9-4	61-833-00	J-Hook Twisted Strap	1
9-5	61-832-00	Sliding J-Hook Bar	1
9-6	61-835-14	Neutral Bar - 4 Speed	1
9-7	88-026-09	8-32 X 3/4 Flat Head Slot Screw	2
9-8	88-065-13	1/4 X 1-1/4 N.C. Truss Head Machine Screw	1
9-9	78-212-55	Resistor Coil, #9 Wire	1
9-10	78-212-56	Resistor Coil, #6 Wire	1
9-11	88-060-22	1/4 X 3-1/2 N.C. Hex Head Cap Screw	1
9-13	61-836-00	Pressure Bar	1
9-14	61-831-00	Power Bar	4
9-15	88-109-80	3/8 N.C. Hex Head Nut	1
9-16	61-837-00	Mounting Board	1
9-17	85-034-00	Spring, Compression - 7/16 O.D. X 2" Long	1
9-18	88-069-86	1/4 N.C. Flexlock Nut	1
9-19	88-069-80	1/4 N.C. Hex Head Nut	1
9-20	88-029-86	8-32 Flexlock Nut	2
9-21	78-212-57	Resistor Coil, #5 Wire	1
9-22	61-832-10	Sliding J-Hook Assembly/61-832-00, 61-833-00, & 61-834-00 (For Model 1175SC Only)	1
9-23	88-060-13	1/4 X 1-1/4 N.C. Hex Head Cap Screw	1
9-24	88-060-14	1/4 X 1-1/2 N.C. Hex Head Cap Screw	1
9-23	61-832-12	Sliding J-Hook Assembly, 61-832-00, 61-833-00 and 61-834-00 (For 1176SC Only)	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
71-501-00	Horn Button	1
72-005-00	Chrome Headlight Fixture with 4" Sealed Beam Bulb	1
72-022-00	Stop & Taillight Fixture, 4" Rubber Mount, 12 Volt	1
72-051-00	Turn Light Fixture, 12 Volt, Amber, 4" Rubber Mt.	2
72-072-00	4" Sealed Beam Headlight Bulb, 12 Volt	1
73-004-00	Horn, 12 Volt	1
74-000-00	Hour Meter	1
74-005-00	Charge Indicator, 12 Volt	1
75-033-00	Wiring Harness for Power & Charging Receptacle	1
75-231-00	Battery Jumper #6 Wire, 8" Long	
78-010-00	Secondary Fuse & Holder, Inline Type	
79-823-00	Fuse - Buss Type 20 Amp	
74-009-10	Charge Indicator (24V)	1

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.

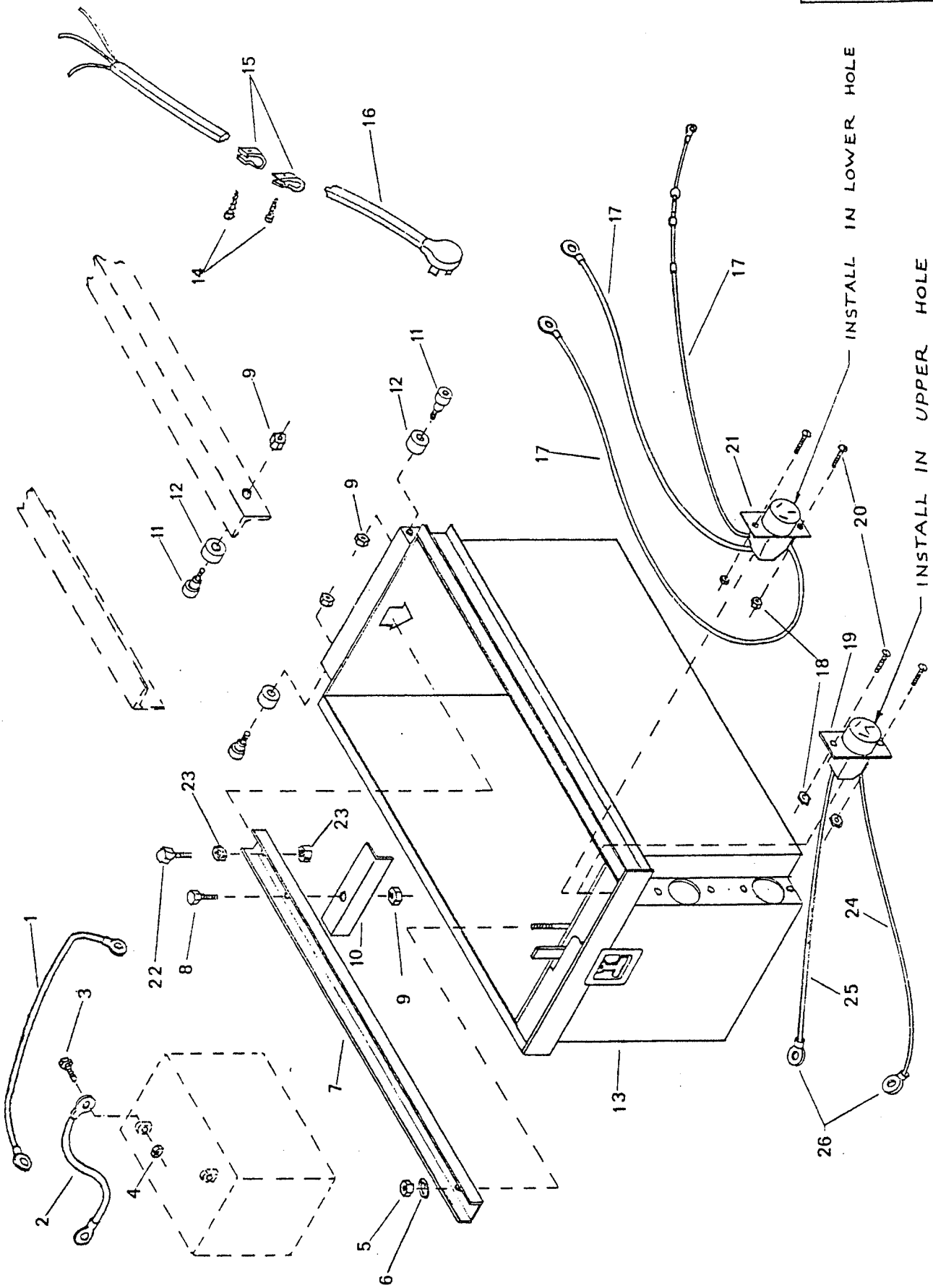
A battery not in use maintains small amounts of chemical action which slowly tends to dissipate the charged condition. It is wise to re-charge a battery not in use every 1 to 2 months. If possible store the battery in a cool place, as the self discharge rate is increased with warmer temperatures.

VEHICLE NO.

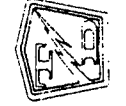
BATTERY MAINTENANCE RECORD

Battery No.	Cell No.	Date			Date			Date			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	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.



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



OPTIONAL ROLL-OUT BATTERY BOX

FIGURE 10
SECTION J8

LENGTH | QUAN. | REVISED DATE | REVISION

NO. DESCRIPTION

TOL. FRAC. + DEC. -

SCALE NONE

DRAWN BY J.M.

DATE 30-80

OPTIONAL ROLL-OUT BATTERY BOX

REFER TO FIGURE 10

FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY
3B-1	75-234-00	Battery Jumper, 18-1/4"	1
3B-2	75-231-00	Battery Jumper, 10-1/4"	2
3B-3	88-080-11	5/16 X 1 NC Hex Head Cap Screw	8
3B-4	88-089-80	5/16 NC Hex Head Nut	8
3B-5	88-069-87	1/4 NC Fastite Nut	1
3B-6	88-068-60	1/4 Cut Washer	1
3B-7	77-870-00	Battery Hold-Down Chanel for Roll-Out Battery Box	1
3B-8	88-100-13	3/8 X 1-1/4 NC Hex Head Bolt	1
3B-9	88-109-87	3/8 NC Fastite Nut	9
3B-10	77-903-00	Battery Hold-Down Angle for Roll-Out Battery Box	1
3B-11	96-301-10	1/2 X 1/2 Shoulder Screw	8
3B-12	30-172-00	Roller, Battery Box	8
3B-13	77-979-10	Kit, Roll-Out Battery Box with Wiring, Hold Downs, Hardware, and Receptacle, Less Batteries. Specify Paint Color.	
3B-14	88-737-09	3/16 X 1 Aluminum Rivet	2
3B-15	96-631-00	Clamp, Rubber Lined 3/4 I.D.	2
3B-16	75-240-12	3 Prong Plug & Cord, Roll-Out Batt. Box	1
3B-17	75-125-00	Wire Harness, Power & Accessory for Roll- Out Battery Box	1
3B-18	88-029-86	8/32 Flexlock Nut	4
3B-19	76-012-00	Charging Recpt, 3-Prong, 30-AMP	1
3B-20	88-025-06	8/32 X 1/2 Truss Head Machine Screw	4
3B-21	75-241-00	3 Prong Receptacle, Roll-Out Batt. Box	1
-----	77-981-00	Dolly, Battery Box, for Roll-Out Batt. Box	
3B-22	88-100-20	3/8 X 3 NC Hex Head Bolt	1
3B-23	88-109-80	3/8 Hex Head Nut	3
3B-24	75-208-00	#8 Wire, Black X 1.5 Ft.	1
3B-25	75-208-10	#8 Wire, Red X .83 Ft.	1
3B-26	75-408-54	#8 Lug, 5/16 Dia. Hole	2

BATTERIES AND CHARGERS

T-D PART NO.	DESCRIPTION	QTY
77-200-00	Hydrometer	1
77-201-00	Battery Filler	1
79-245-00	Charger, 24Volt, 45 Amp	1
76-012-00	Charging Receptacle, 30 Amp, 3 Prong	1

NOTE: For Charger Components, See Pages 13 & 14

MODEL 1175SC

77-970-50	Lift-Out Battery Box for Four 217 A.H. Batteries, <u>Box Only</u> , Painted Black.
77-854-00	Battery Hold-Down Strap for Lift-Out Battery Box
77-245-00	Power Cord for Lift-Out Battery Box With 3 Pole Connector
77-978-50	Guide, Bolt-In, for Lift-Out Battery Box
76-004-00	3 Pole Connector for Lift-Out Battery Box
76-005-00	Mounting Bracket for 3 Pole Connector
79-568-12	Charging Adapter for Lift-Out Battery Box. For Use <u>Only</u> When Battery Box is Out of Vehicle
77-042-00	Battery 6 Volt, 217 A.H.
77-048-00	Battery 6 Volt, 217 A.H.
77-981-00	Dolly, Battery Box, for Roll-Out Battery Box

MODEL 1176SC

77-978-00	Bolt-In Battery Box for Eight 110 A.H. Batteries	1
76-999-00	Battery, 6 Volt, 110 A.H.	8
50-242-00	Battery Rod, 31-1/2" Long	3
75-231-00	Battery Jumper, 8" Long	11

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	A-C	Battery	D-C	D-C
Portable	Built-in	Volts	Amp	Amp Hours*	Volts	Amp
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 charger to rain or other adverse weather conditions. The charger may be suspended overhead by placing the handle in a suitable support. 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. Inside the charger there is a terminal board with input tap settings for 105 v, 110 v, 115 v, 120 v, and 125 v. The charger should be set on the input tap nearest your voltage. This terminal board is normally reached through an access panel in the back or top of the charger. On some built-in models it is necessary to remove the cabinet cover. On chargers with a "T" prefix in the model number, an external "HI, MED, LO" switch is provided to make these adjustments. The "HI" setting is for 105 v, "MED" for 115 v, and "LO" is for 125 v. The output voltage of the charger will vary with the input tap setting. A plate on the charger has "General Instructions" showing an "open" circuit output voltage (not connected to the battery) for that particular model. When connected to the correct a-c tap, the "open" circuit output voltage should measure approximately that value shown. Once properly installed and adjusted, the charger needs no further adjustment.

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.
4. 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 the "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 input tap 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	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 terminal board.

5. If the transformer hums, proceed as follows:
 - 5.1 Remove A-C 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 D-C 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 transformer.
 - 5.5 Check for continuity across the two terminals of the meter. If no continuity exists, the meter is open. Replace meter.
 - 5.6 If all indications to this point are normal, test the entire D-C output circuitry for continuity by progressing from the positive D-C output prong to the negative D-C output prong in incremental test sections, checking each connection for open circuits and poor connections

A-C LINE FUSES BLOW

6. With unit unplugged and timer turned ON, check for continuity between each input prong of the A-C 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 A-C 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 D-C 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 terminals.

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 the actuating voltage.

10.5 Turn the charger 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 a battery hydrometer is graduated to measure the specific gravity of battery electrolyte. The electrolyte in your battery becomes heavier as it is charged, therefore, a higher specific gravity reading indicates a higher charge condition of your battery. The specific gravity reading will range from 1.100 for a completely discharged battery to 1.260 for a fully charged battery. No amount of overcharging will raise the specific gravity above 1.260 on the electric vehicle type of battery. Both overcharging and undercharging can cause a premature failure of a battery. Overcharging destroys the positive plates. Consistent undercharging causes a buckling of the plates.

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

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

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.

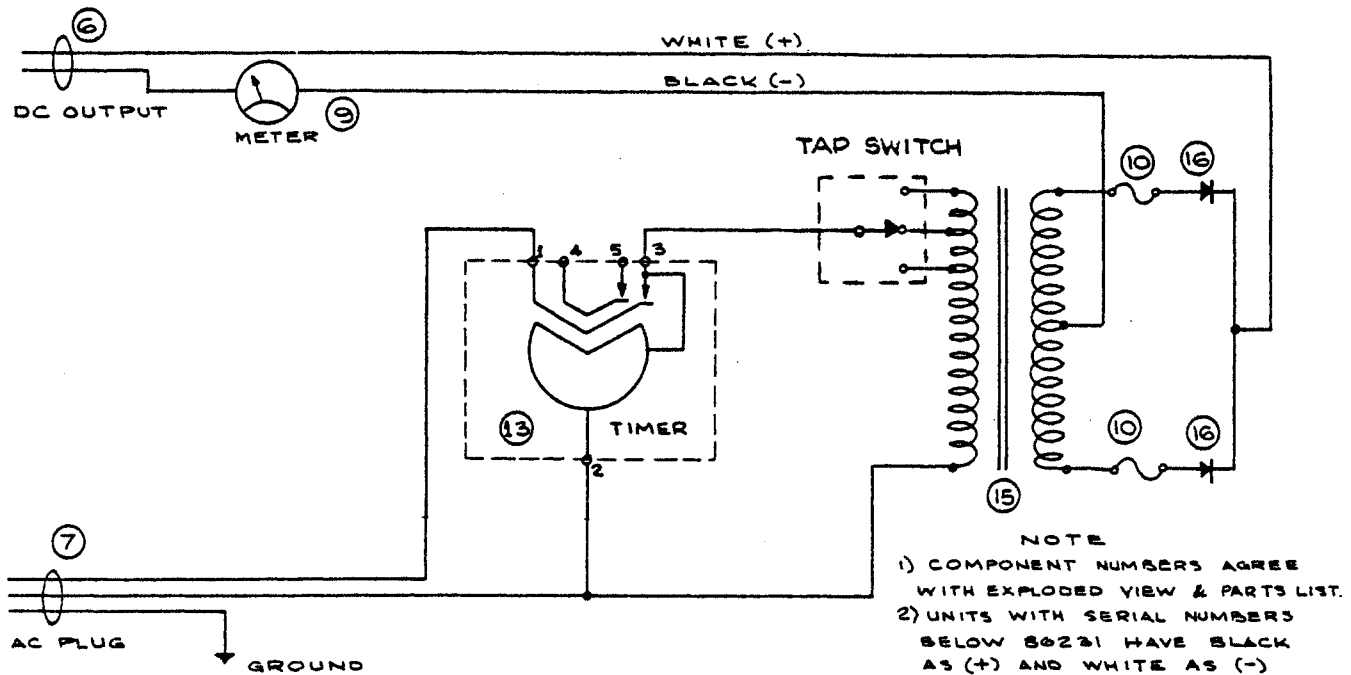
INSPECTION OF BATTERIES AND ASSOCIATED CIRCUITS

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.

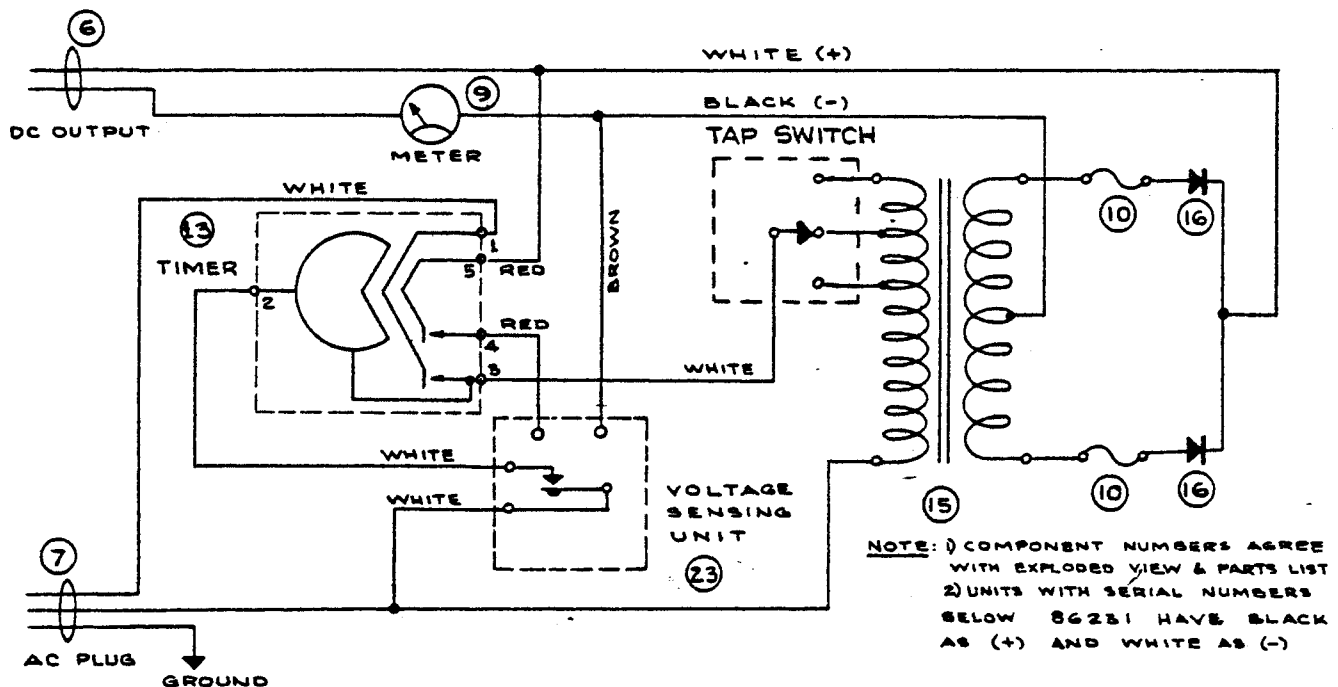
1. Verify that all connections within the unit to be charged are clean and right.
2. Check each battery for loose terminal posts.
3. Test for continuity between all battery terminals and the charging receptacle.
4. Verify that the top of each battery is free of moisture, grease and acid film, which may 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 expel the acid back into the cell to cause a violent stirring action. Immediately draw out another sample of acid and visually inspect it to see if it contains a brownish sediment (indicates positive plates are deteriorated).
7. When testing battery condition with hydrometer, always return electrolyte solution to the same cell from which it was removed. DO NOT MIX electrolyte from one cell to another.

CIRCUIT DIAGRAMS

SERIES "A" & "T" CHARGERS



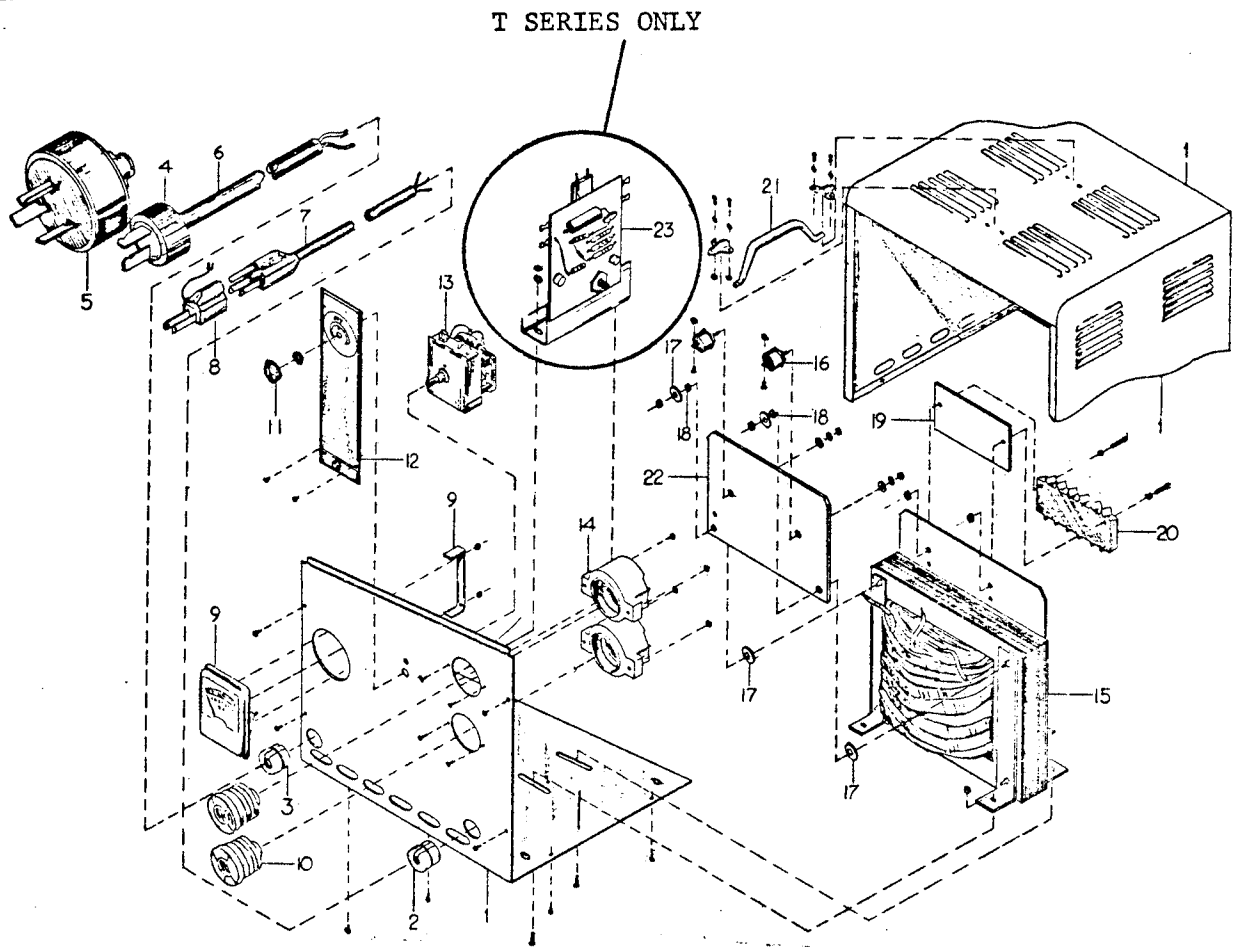
CHRISTIE SERIES "A" BATTERY CHARGERS



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

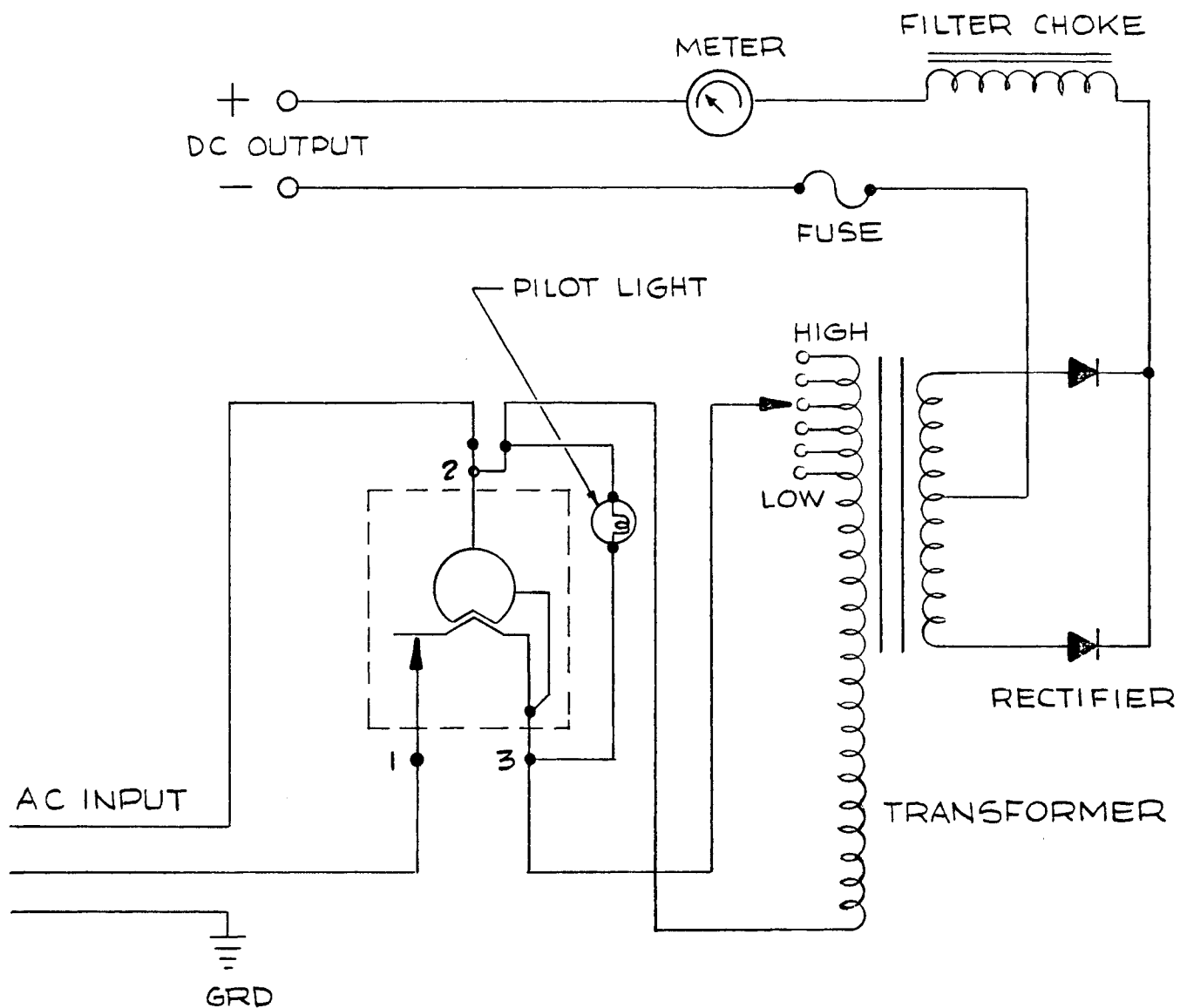
1. Connect the AC input to the proper power source.
2. Connect the DC output plug to the batteries to be charged.
NOTE: Check the output plug for the correct polarity.
3. Turn on the charger by setting the timer control knob to the desired charging time.
4. Verify that the pilot light illuminates and 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



MAINTENANCE PROCEDURES

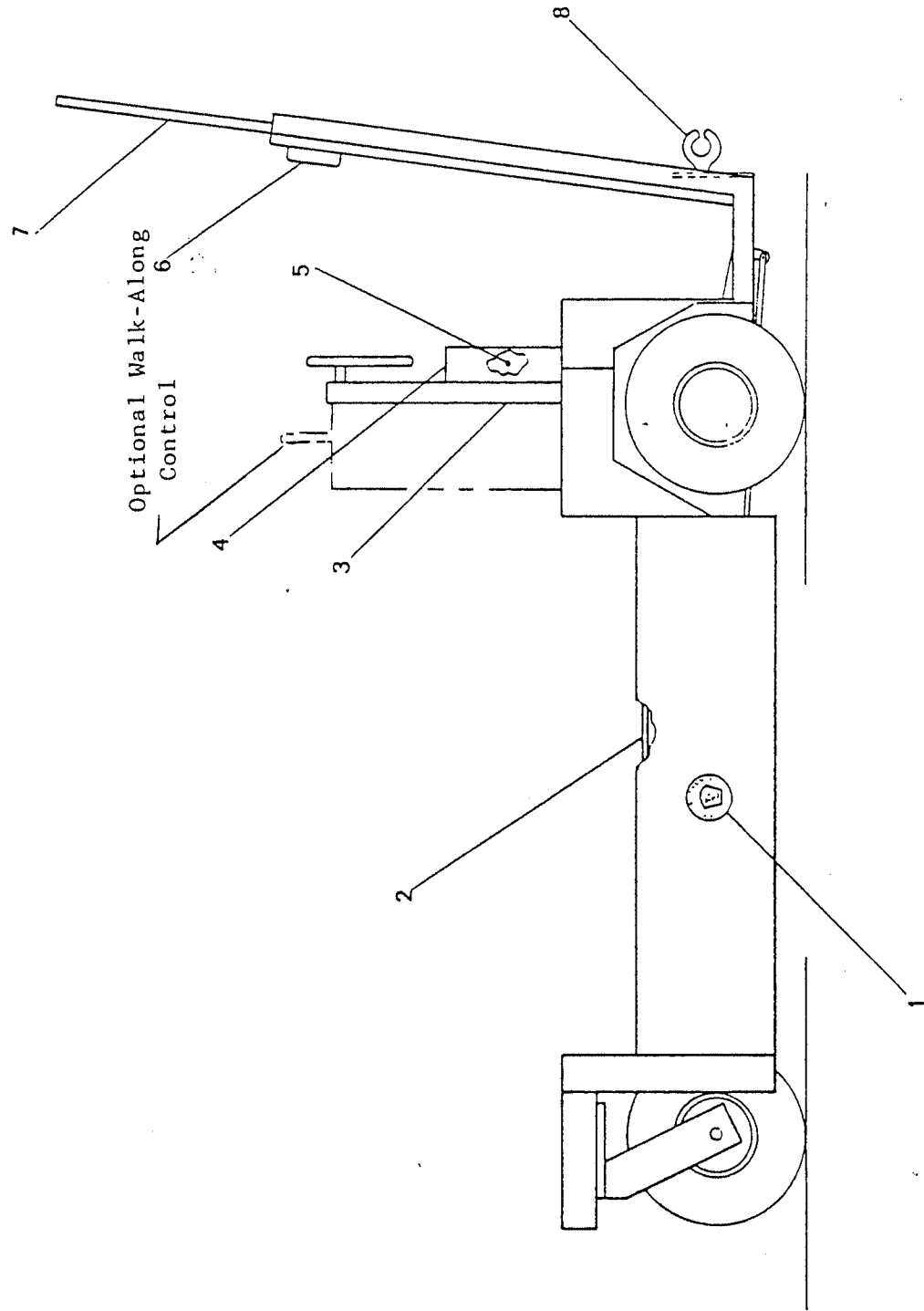
BODY AND TRIM

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.
heim, Calif.

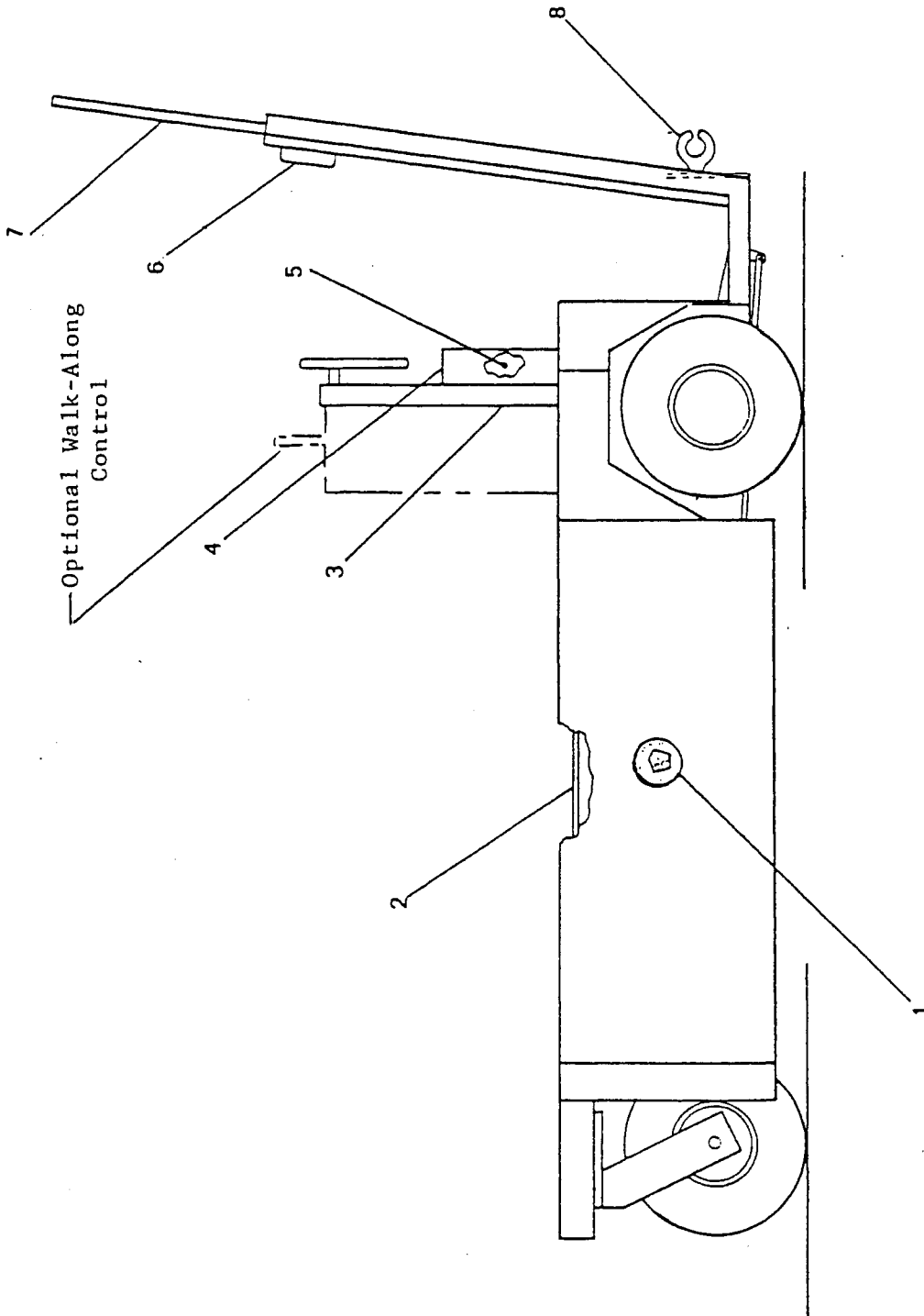
BODY AND TRIM PARTS
1176SC


FIGURE 11
SECTION J9

LENGTH | QUAN. | REVISED DATE | REVISION

SECTION J9
PAGE 2

NO.	DESCRIPTION
TOL. FRAC.	DEC.
SCALE	NONE
DRAWN P.	J.M.
DATE	4-28-77



NO.		DESCRIPTION	LENGTH	QUAN.	REVISED DATE	REVISION
TOL. FRAC. \pm		DEC. \pm				
SCALE		NONE				
DRAWN BY		J.M.				
DATE		1-77				
FIGURE 11A SECTION J9			BODY AND TRIM PARTS 1175SC			 TAYLOR DUNN MFG. CO. 2114 West Ball Rd. Anaheim, Calif.

BODY & TRIM PARTS
REFER TO FIGURE 11 & 11A

FIG I.D. NO.	T-D PART NO.	DESCRIPTION	QTY.
-----------------	-----------------	-------------	------

NOTE: The parts listed below are common to 1175SC & 1176SC except where identified separately.

1	94-301-00	Taylor-Dunn Decal	1
2	90-457-10	Deckboard 13-1/8" X 30-5/8". Used on Model 1176SC with 69", 80" & 105" Wheelbase Without Optional Walk-Along Control	
2	90-459-10	Deckboard 30-1/2" X 39-1/4". Used on Model 1176SC with 105" Wheelbase	
2	90-458-10	Deckboard 30-1/2" X 42-3/4". Used on Model 1176SC with 105" Wheelbase & Model 1175SC 48" or 105" Wheelbase	
2	90-460-10	Deckboard 30-1/2" X 46". Used on Model 1176SC with 69" Wheelbase	
2	90-461-10	Deckboard 30-1/2" X 57". Used on Model 1176SC with 80" Wheelbase & Model 1175SC with 105" Wheelbase	
2	90-462-10	Deckboard 30-1/2" X 63-3/4". Used on Model 1175SC with 69" Wheelbase	
2	90-463-10	Deckboard 30-1/2" X 74-3/4". Used on Model 1175SC with 80" Wheelbase	
3	71-599-00	Switch Console Cover	1
4	94-305-00	Forward/Reverse Plate	1
5	30-702-00	Chain Guard	1
6	90-000-00	Backrest - 6 X 16-3/4 (Black)	1
7	97-813-00	Detachable 4 Step Ladder	1
8	97-804-00	Hitch, Pintle Type	1
8	97-808-00	Hitch, Automatic Coupling	1

PARTS NOT ILLUSTRATED

94-313-00	Decal, Battery Warning	1
94-330-00	Nameplate, Motor	1
94-371-00	Serial Number Plate, Serialized	1
94-373-00	Data Plate, Vehicle	1
94-378-00	Data Plate, Battery Box	1

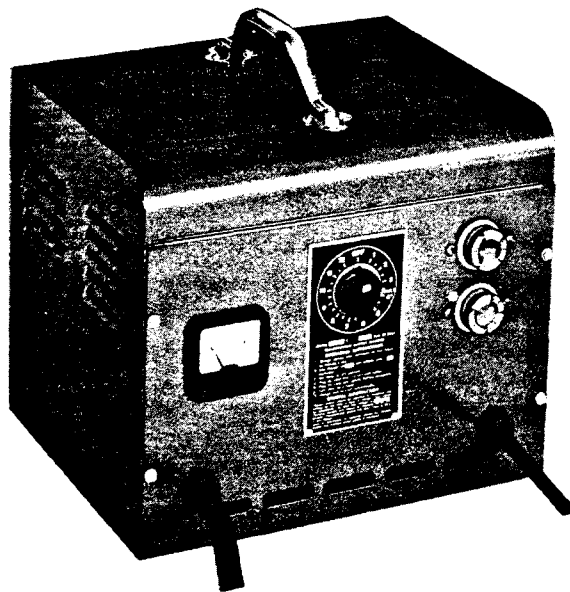
FIG. I.D. NO.	T-D PART NO.	DESCRIPTION	QTY
	95-952-XX	Paint (1) Quart Can, Specify Color	
	95-953-XX	Paint (1) Gallon, Specify Color	
	95-954-XX	Paint Spray Can, Standard Colors (16 Oz.)	
	95-955-XX	Paint Touch-Up Kit, Standard Colors	

ATTACHING HARDWARE

(Used With Fig. I.D. No. Indicated)

4	88-727-06	5/32 Diameter X 1/2 Aluminium Pop Rivet	4
3,6	88-837-09	#14 X 3/4 Phillips Pan Head Screw	2, 4
8	88-140-13	1/2 X 1-1/4 N.C. Hex Head Cap Screw	4
8	88-148-62	1/2 Lock Washer	4
8	88-149-80	1/2 N.C. Hex Head Nut	4
7	88-082-11	5/16 X 1 Carriage Bolt	8
7	88-088-62	5/16 Lock Washer	8
7	88-089-80	5/16 N.C. Hex Head Nut	8

OPERATING & SERVICING HANDBOOK



SINCE 1929
CHRISTIE
ELECTRIC CORP.

SERIES "L" BATTERY CHARGERS

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.

<u>Model</u>	<u>Vac</u>
1225	180
2425	180
3625	280

- 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.

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.

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.

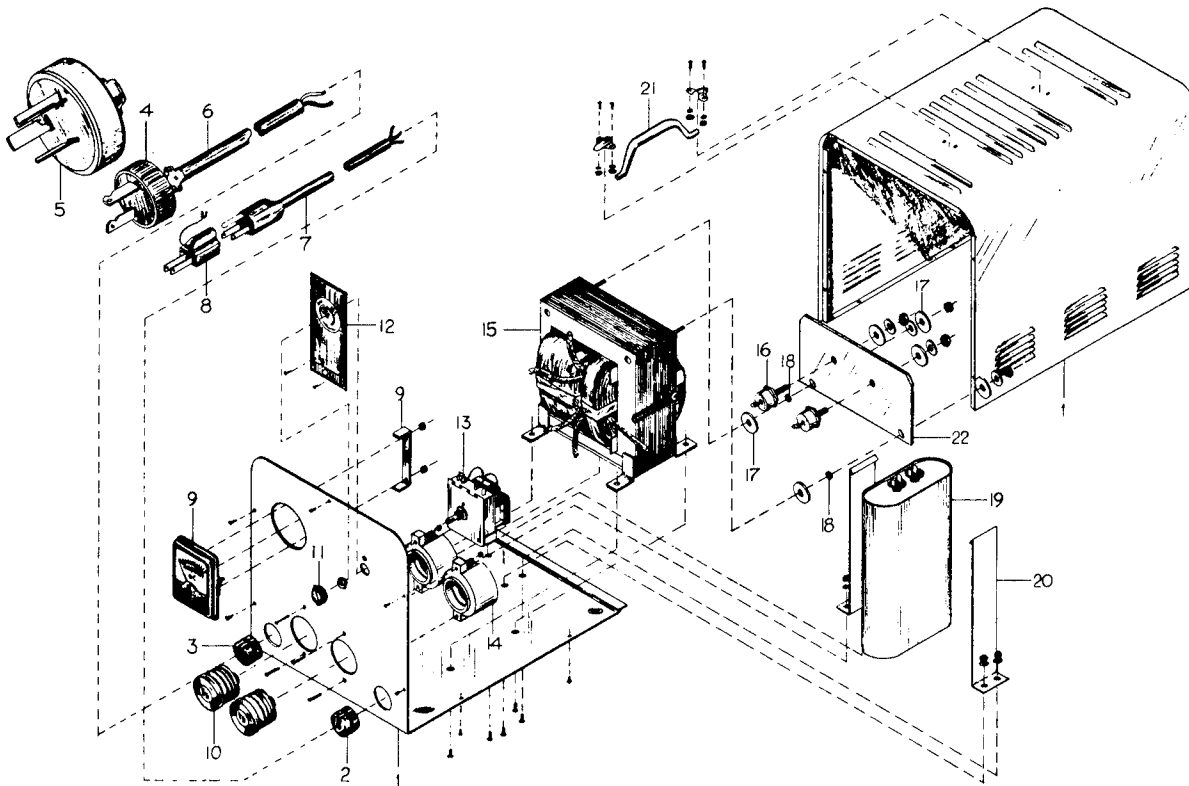
OUTPUT FUSES BLOW

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.

CHRISTIE BATTERY CHARGER REFERENCE CHART

Model		AC Volts	AC Amp	Battery* Amp Hours	DC Volts	DC Amp
Portable	Built-in					
1225L	1225LC	115	4	130/220	12	25
1240L	1240LC	115	5	170/250	12	40
2425L	2425LC 2425LB	115	7	130/220	24	25
2440L	2440LC	115	12	170/250	24	40
3625L	3625LC	115	12	130/220	36	25
3640L	3640LC	115	18	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.

SINCE 1929
CHRISTIE
ELECTRIC CORP.

CHARGER MAINTENANCE, SERVICE AND ADJUSTMENT

TAYLOR-DUNN / LESTER-MATIC
BATTERY CHARGER

Line voltage compensation achieved by flux oscillator circuit applied to battery chargers by Lester in 1962 for high reliability "Minute Man" missile standby applications. Compensates automatically for AC supply voltage variations 105-128 volts. Supply voltage variation $\pm 10\%$ from 117 volts = $\pm 1\%$ maximum battery voltage variation, decreasing to $\pm 1/2\%$ at finish rate with constant electrolyte temperature. No taps or rate controls to set.

Automatic taper of charge rate for superior battery life through good equalization of cells and low water use rate.

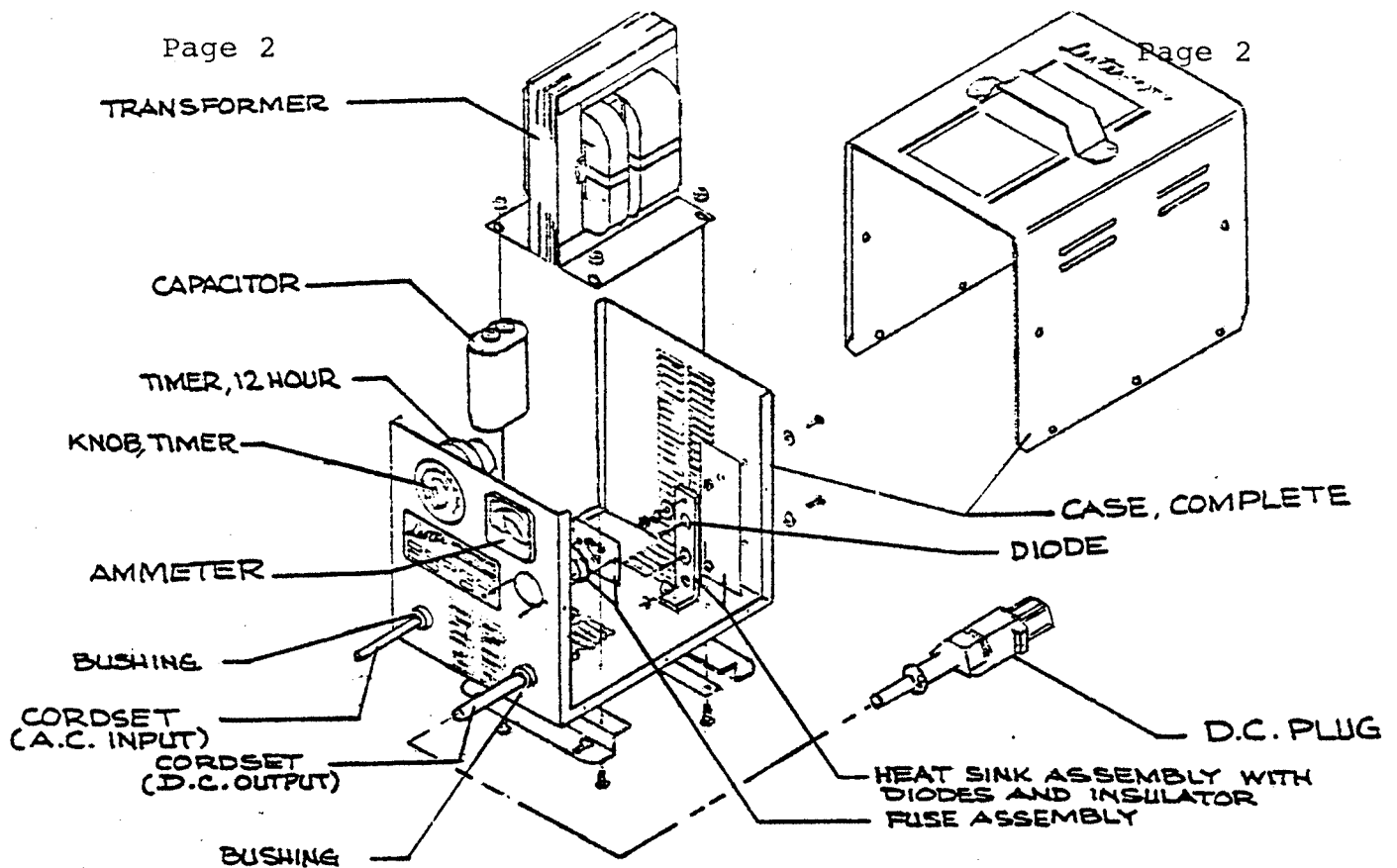
Silicon diodes with inherent surge protection operated at a conservative percentage of their rating.

Convection cooled design for maximum reliability and minimum maintenance.

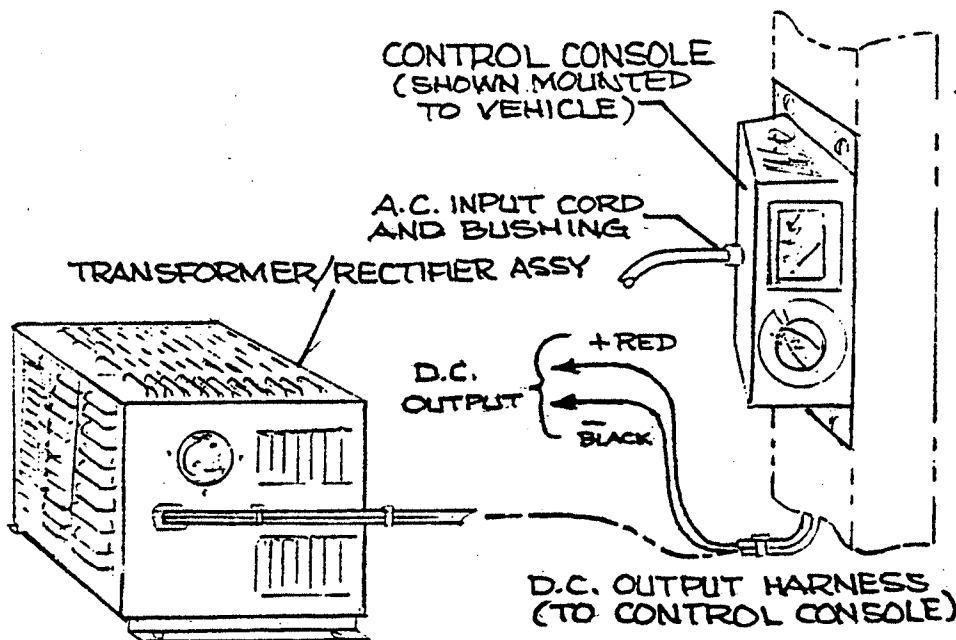
LESTRONIC II BATTERY CHARGERS

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

Charger turns on automatically by simply connecting D.C. cord to batteries. The ammeter indicates charge rate. The charge rate tapers gradually to a finish rate of 5 to 10 amps. The Electronic Timer monitors the rate of voltage change during the charge period. When this rate levels off, the charger automatically shuts off.



PORTABLE LESTER CHARGER
(TYPICAL) FOR COMPONENT IDENTIFICATION
SEE PARTS LIST FOR PORTABLE CHARGERS



NOTE: HAS SAME BASIC PARTS AS PORTABLE.

NOTE: CONTROL CONSOLE CONSISTS OF:
A.C. CORD AND BUSHING,
AMMETER,
12-HOUR TIMER
AND TIMER KNOB
THE TRANSFORMER RECTIFIER ASSY CONSISTS OF:
FUSE ASSY, HEAT SINK ASSY WITH DIODE AND INSULATOR,
D.C. HARNESS AND BUSHING,
CAPACITOR AND TRANSFORMER

BUILT-IN LESTER CHARGER
(TYPICAL) FOR COMPONENT IDENTIFICATION
SEE PARTS LIST FOR BUILT-IN CHARGERS

OPERATION OF "LESTER MATIC" BATTERY CHARGERS

INTRODUCTION

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

INITIAL INSTALLATION:

Circuit breaker or fuse protection in the AC line to which the charger is to be plugged should allow at least 15 amps per charger. When it is necessary to use an AC extension cord to the charger, use a three conductor No. 12 AWG cord with ground, and keep as short as possible. Instructions printed on the cover of the charger are for daily reference.

NORMAL OPERATION

The state of discharge of the batteries will be slightly different every time they are put on charge, but the Lester-Matic varies automatically the initial charge rates, and taper of charge rate over the charge period. Thus momentary initial charge rate will vary from 18-30 amps, dropping quickly to a lower value, and then tapering gradually over the charge period to a finish rate of 1-4 amps (in the green shaded area of the ammeter dial) for the last 1-3 hours. When batteries are slightly discharged, the ammeter needle will be in the green shaded area for 7-8 hours, but the specific gravity will not rise to full charge until the cells have been equalized. The normal charging with the ammeter needle in the green shaded area is important to achieve equalization of all battery cells, every time the batteries are charged. Since the taper of the charging rate (in amps, as indicated by the ammeter needle) is controlled by the rising voltage of the batteries being charged, proper performance of the charger and resulting good battery life is dependent upon the following factors:

1. An adequate AC line to handle the power required (see "Initial Installation").
2. All cells of the batteries must be good, rising to approximately 2.5 DC volts per cell while still on charge or near the end of a 12-hour charging period. When in doubt, check each cell with a single voltmeter while still on charge. If a low reading is obtained; check the low cells with a temperature corrected hydrometer. NOTE: Hydrometer float must be thoroughly clean to obtain accurate specific readings.

OPERATION OF "LESTER-MATIC" BATTERY CHARGERS continued

3. All electrical connections of the vehicle must be clean and tight.
4. Batteries should be charged just enough to bring them to full charge because overcharging is harmful. The state of charge can be tested accurately in each cell with a hydrometer or cell tester (voltmeter), but to simplify maintaining a fleet of cars, which normally require charging at least once a day, the following "CHARGING TIME CHARTS" can be used for daily charging. Set timer knob to desired charging time shown in chart. Charger shuts off automatically at end of set period.

CHARGING TIME CHART

GOLF CAR USE	CHARGING TIME
9 Holes or Less	7 Hours
18 Holes or More	12 Hours
COMMERCIAL USE	
Less than 1 Hour	7 Hours
More than 1 Hour	12 Hours

If a golf car is used only occasionally, it is recommended that a several refresher charge be given prior to using the car.

Commercial cars, not used in golf course operation, should be charged after use each day, or as charge becomes low as indicated by hydrometer or voltmeter test.

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

1. One or more bad cells in the batteries.
2. Batteries are starting to age to a point where hours of charge should be reduced gradually to obtain prolonged battery life.

STORAGE

Charger may be left connected to the batteries and should be turned on for the 12-hour period once a month. In extremely cold conditions it may be necessary to charge more frequently. Check with your battery manufacturer. After each charge cycle the charger should be checked to ensure

OPERATION OF "LESTER-MATIC" BATTERY CHARGERS continued

STORAGE continued

that it has turned off. Severe overcharging and possible damage to the batteries could result if the charger remains on for prolonged periods of time.

CAUTION

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

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

CAUTION

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

STEP BY STEP OPERATING PROCEDURES

1. Provide adequate ventilation for both batteries and charger. The convection-cooled Lester-Matic requires an unobstructed flow of cooling air for proper operation.
2. Connect DC plug (portable unit) to vehicle receptacle.
3. Turn timer to "ON" for well discharged batteries or to 7" for lightly discharged batteries. Charger shuts off automatically at end of set period.
4. To determine approximate full charge at start of days use, turn timer knob to 1". Drop of ammeter needle to 1-4 amps in 15 minutes or less indicates full charge.
5. ALWAYS TURN TIMER TO "OFF" BEFORE DISCONNECTING CHARGER FROM BATTERIES.

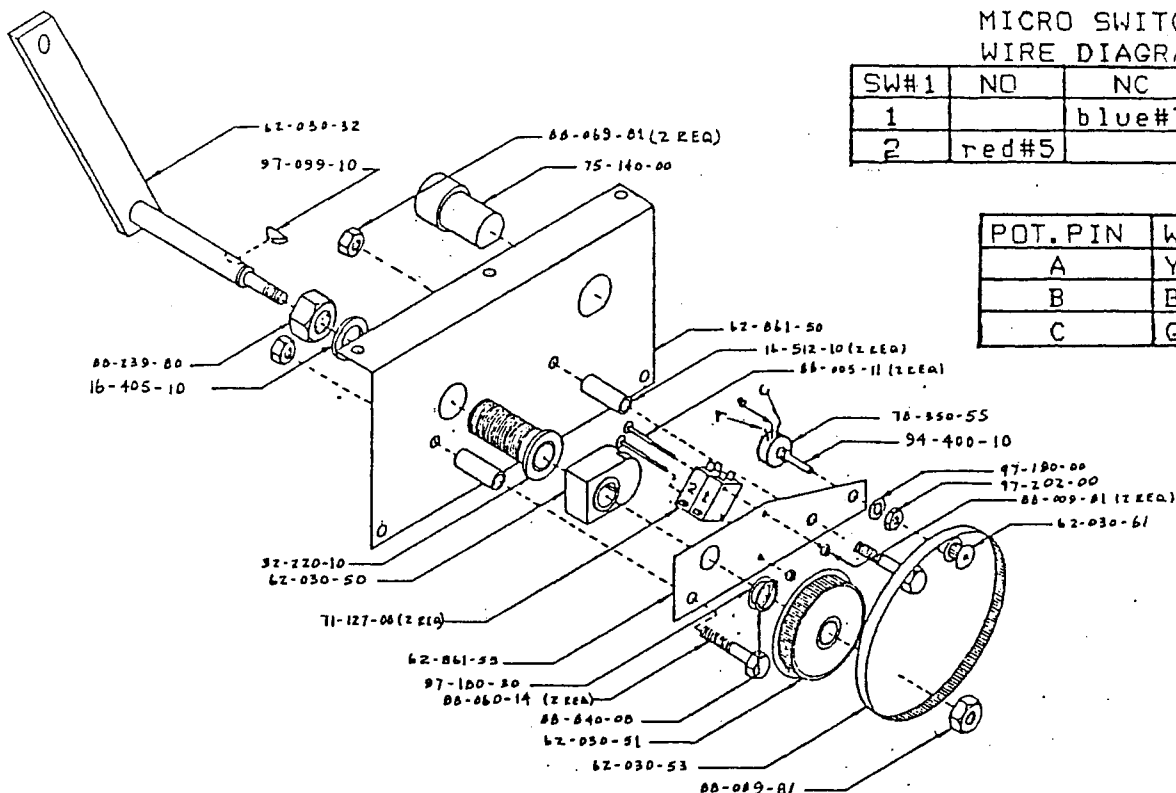
POWER CARE OF MOTIVE POWER BATTERIES

NEW BATTERIES

1. Brand new batteries should be given a 12 hour charge before their first use, because it is difficult to know how long vehicle batteries have been in storage without a charge since new.
2. Limit use of brand new batteries between charges for first 5 cycles. New batteries and older batteries which have been in storage are not capable of their rated output until they have been discharged and charged a number of times.
3. During the first month of new batteries, particularly when night-time temperatures are below 60 F, give them an extra 12 hour charge once a week. The ampere-hours of energy that batteries can deliver and their charge acceptance varies directly with battery temperature.
4. All batteries that still taper down into the 1-4 amps area of the ammeter toward end of charge should be given the full 12 hours of charge. All cells in a set of batteries do not react identically to the same discharge and charge current. In a normal 12 hours charge the last 3 to 5 hours at low finish charge rate equalize the cells for better battery life.
5. When batteries age to the point where charge rate no longer tapers into the 1-4 amps area of the ammeter, reduce the hours of charge progressively to 10 hours, 8 hours, and finally down to 6 hours near the end of useful life. As batteries age, their on-charge voltage at end of charge period drops progressively, thereby causing a high finish charge rate in amperes and resultant higher water use rates.

VERIFY BATTERIES ARE CHARGED

1. Turn on the time first thing in the morning and check to see if charger ammeter needle jumps smartly to 15 amps or more and then tapers into the 1-4 amps area within 15 minutes. This will provide a very simple means of verifying that the batteries were truly charged the night before. It also shows aging batteries whose finish charge rate will not taper into the ammeter 1-4 amps area.
2. Add water carefully to proper level in cells as required after they have been fully charged. Do not fill them so high that they bubble over while charging. New batteries require very little additional water, whereas very old batteries may need additional water two or three times a week. Water

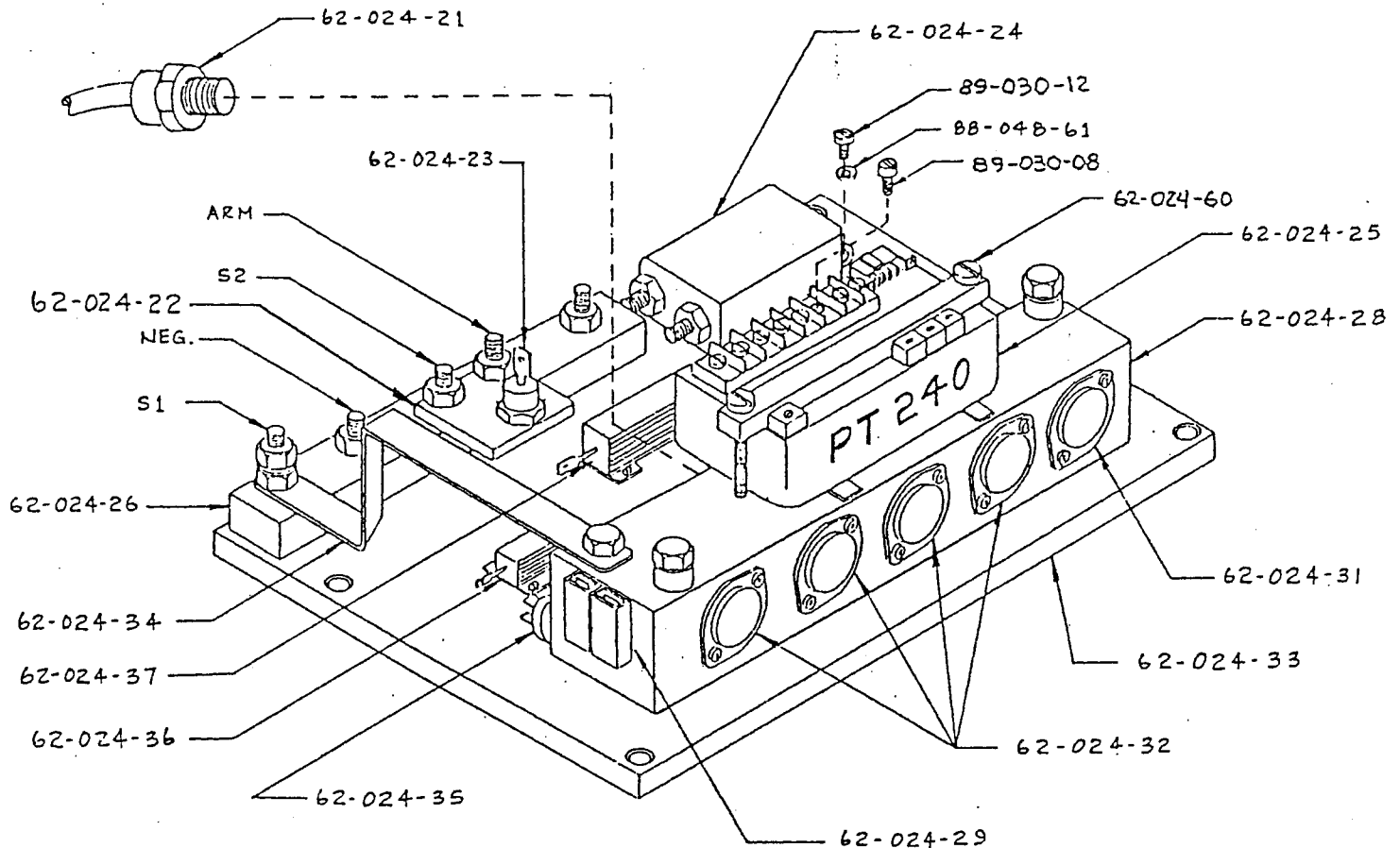
MICRO SWITCH
WIRE DIAGRAM

SW#1	NO	NC	COM
1		blue#7	blue#6
2	red#5		red #4

POT. PIN	WIRE #
A	YELLOW #1
B	BLACK #2
C	GREEN #3

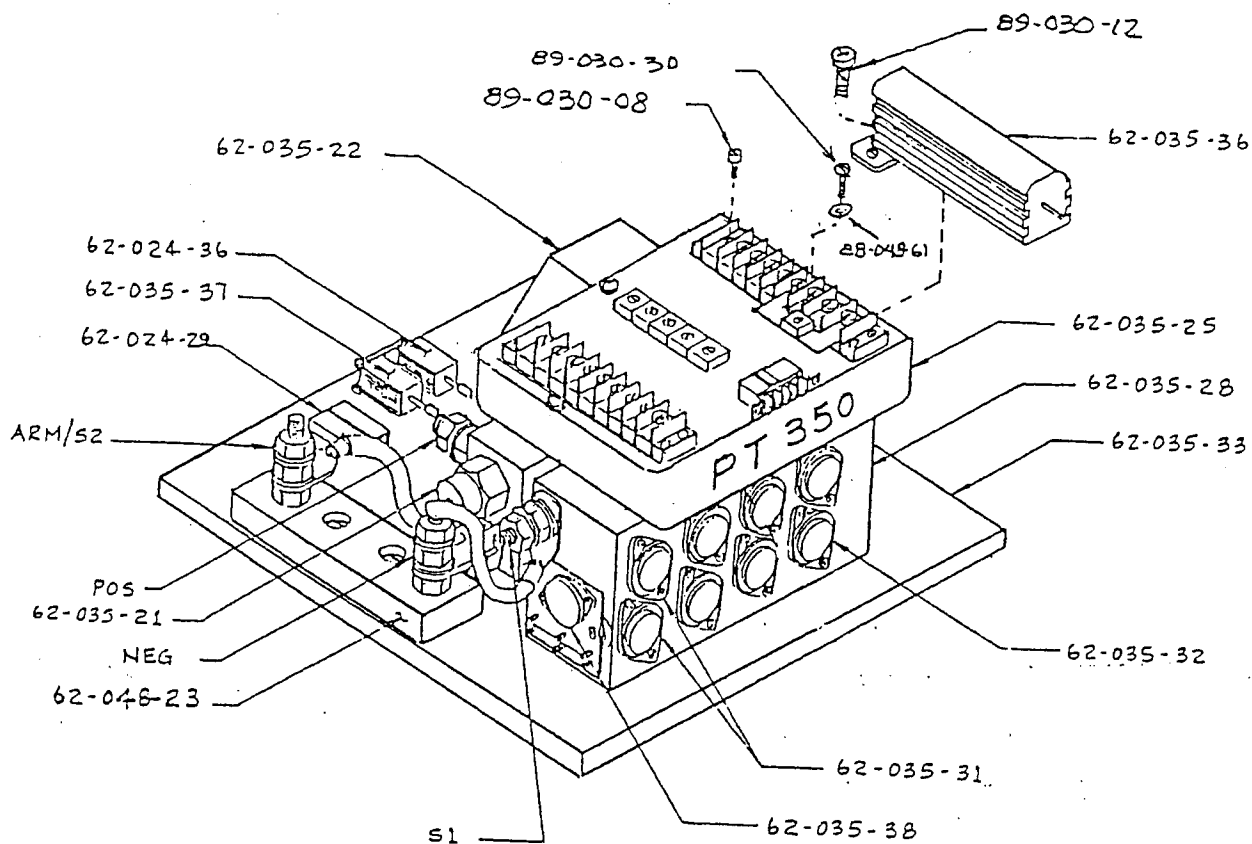
ACCELERATOR MODULE (COVER NOT SHOWN) 62-030-12
(TYPICAL) MODEL 1248B, ITEM 10 CHANGES
FROM VEHICLE TO VEHICLE

FIG. NO.	PART NO.	DESCRIPTION	QTY.
1	62-861-55	Plate, Pot. Mtg. Accel Module	1
2	71-127-00	Switch, Micro	2
3	88-055-11	Screw, 4-40 X 1-1/4 Truss Hd.	2
4	78-350-55	Potentiometer	1
5	97-190-00	Washer, Potentiometer	1
6	97-202-00	Nut, Potentiometer	1
7	88-009-81	Washer, 4-40 Lock	2
8	62-030-61	Sprocket 18T .0800	1
9	32-220-10	Bushing, 1/2 ID, Brass	1
*10	62-030-32	Rotor, Accel. Module (1248B)	1
11	97-099-10	Key, Woodruff	1
12	88-239-80	Nut, 3/4 NF Hx. Hd. Nut	1
13	88-229-62	Washer, 3/4 Lock	1
14	62-861-50	Plate, Backing, Accel. Module	1
15	62-030-50	Cam, Micro Sw. 1 In. Rad.	1
16	16-512-10	Spacer, 1/4 ID X 29/32 St. Tubing	2
17	88-060-14	Screw, 1/4 X 1-1/2	2
18	88-069-81	Nut, 1/4 Lock	2
19	75-140-00	Harness, Accel. Module	1
20	97-180-30	Washer, 1/2 In ID X 1/32 Thk.	1
21	88-840-08	Ring, Snap 1/2 Ext. Fleet Pk.	1
22	62-030-51	Sprocket, 80T .0800	1
23	62-030-53	Belt, .0800 12 In 150 T	1
24	88-088-62	Nut, 5/16 NC, Lock	1
	62-030-58	Cover (Not Shown)	1
*	62-030-34	Rotor, Accel. Module (Model C)	1
*	62-030-35	Rotor, Accel. Module (Model E)	1
*	62-030-31	Rotor, Accel. Module (374 R)	1
*	62-030-44	Rotor, Accel. Module (R 3-80)	1
*	62-030-33	Rotor, Accel. Module (B 2-10	1
*	62-030-36	Rotor, Accel. Module (SS 5-34)	1
*	62-030-37	Rotor, Accel. Module (Model SC)	1



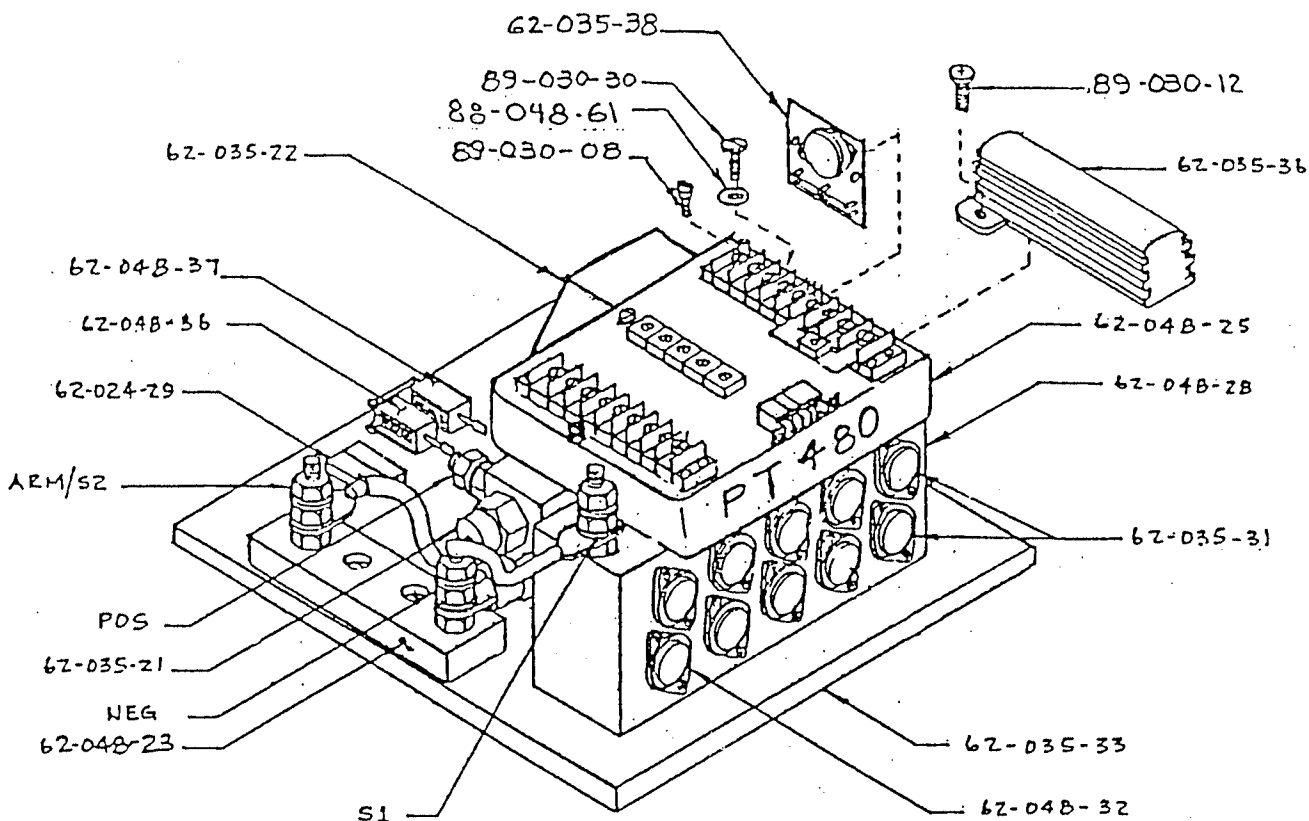
PT240 SPEED CONTROLLER AND PARTS LIST
(PT240 TYPICAL FOR ALL 24 & 36 VOLT VEHICLES)

PART NO.	DESCRIPTION	QTY.
62-024-21	Diode, Flywheel	1
62-024-22	Heat Sink, Diode, Plugging	1
62-024-23	Diode, Plugging	1
62-024-24	Capacitor	1
62-024-25	Logic Unit	1
62-024-28	Transistor Block	1
62-024-31	Transistor Driver	1
62-024-32	Transistor Power	(set) 4
62-024-33	Base, PT240	1
62-024-29	Switch Key (24V & 36V)	1
62-024-35	Switch, Thermal	1
62-024-36	Resistor, 70 OHM	1
62-024-37	Resistor, 1/2 OHM	1
62-024-34	Bar, Buss	1
62-024-26	Block, Terminal	1
89-030-12	Screw, 3 MM x 12 MM	7
89-030-08	Screw, 3 MM x 8 MM	10
62-024-60	Kit, Logic Bar & 2 Screws	2
88-048-61	Washer, # 10 SAE	7



PWR-TRON 350 SPEED CONTROLLER, 24/36 VOLTS

<u>PART NO.</u>	<u>PT350</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
62-035-21		Diode, Flywheel	1
62-035-21		Diode, Plugging	1
62-035-22		Capacitor	1
62-035-25		Logic Unit	1
62-035-28		Block, Transistor	1
62-035-33		Base Plate	1
62-035-32		Transistors, Power (set of 6)	1
62-035-31		Transistors, Driver	2
62-035-38		Transistor Assy. Driver, Driver	1
62-048-23		Block Terminal	1
62-024-29		Key Switch	1
62-024-36		Resistor, 10 W 70 OHM	1
62-035-36		Resistor, 50 W .5 OHM	1
62-035-37		Resistor, 10 W 18 OHM	1
89-030-08		Screw, 3 MM x 8 MM	25
89-030-12		Screw, 3 MM x 12 MM	10
88-048-61		Washer, # 10 SAE	3
89-030-30		Screw, 3 MM x 30 MM	3



PWR-TRON 480 SPEED CONTROLLER, 48 VOLTS

<u>PART</u>	<u>NO.</u>	<u>PT480</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
62-035-21			Diode, Flywheel	1
62-035-21			Diode, Plugging	1
62-035-22			Capacitor, Filter with Nuts	1
62-048-25			Logic Unit	1
62-048-28			Block, Transistor	1
62-048-32			Transistor, Power (set of 8)	1
62-035-31			Transistor, Driver	2
62-035-38			Transistor Assembly Driver/Driver	1
62-035-33			Plate, Base	1
62-048-23			Block, Terminal	1
62-049-29			Input, Key Switch	1
62-035-36			Resistor, 50 W .5 OHM	1
62-048-36			Resistor, 10 W 150 OHM	1
62-048-37			Resistor, 10 W 1K5 OHM	1
89-030-08			Screw, 3 MM x 8 MM	25
88-030-12			Screw, 3 MM x 12 MM	10
89-030-30			Screw, 3 MM x 30 MM	3
88-048-61			Washer #10 SAE	3

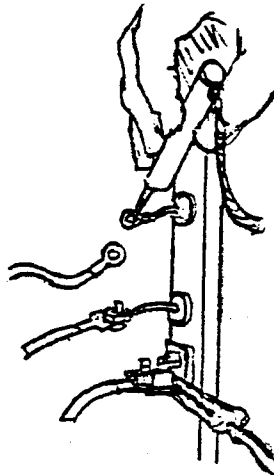


FIGURE 4

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

CHARGER OUTPUT IS LOW

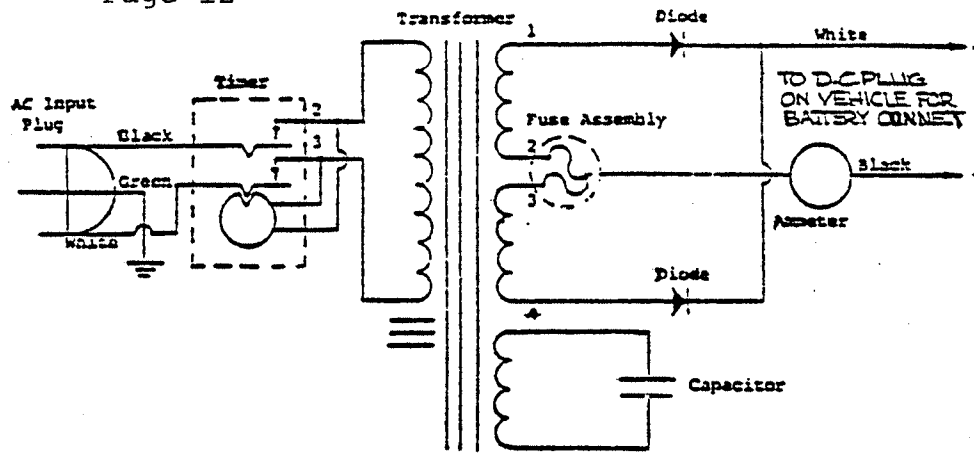
The most probable cause is one diode shorting and blowing one fuse. Refer to "Fuse Link Blowing" part (b) to check the diodes. If a diode is shorted both the heat sink and fuse assemblies must be replaced.

CHARGER DOES NOT TURN OFF

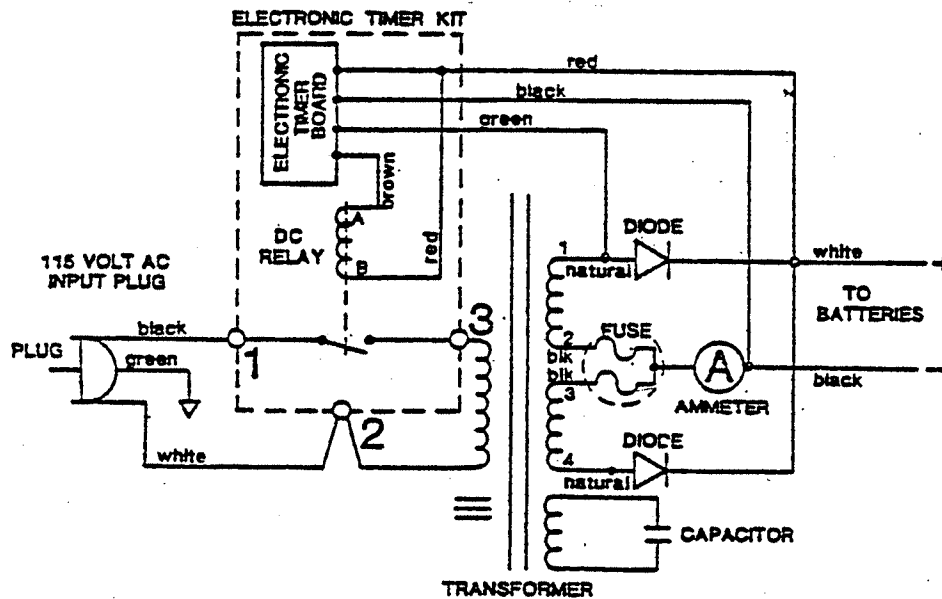
In models equipped with timers, this is due to an inoperative timer. In this case replace timer assembly.

AC LINE FUSE OR CIRCUIT BREAKER BLOWS

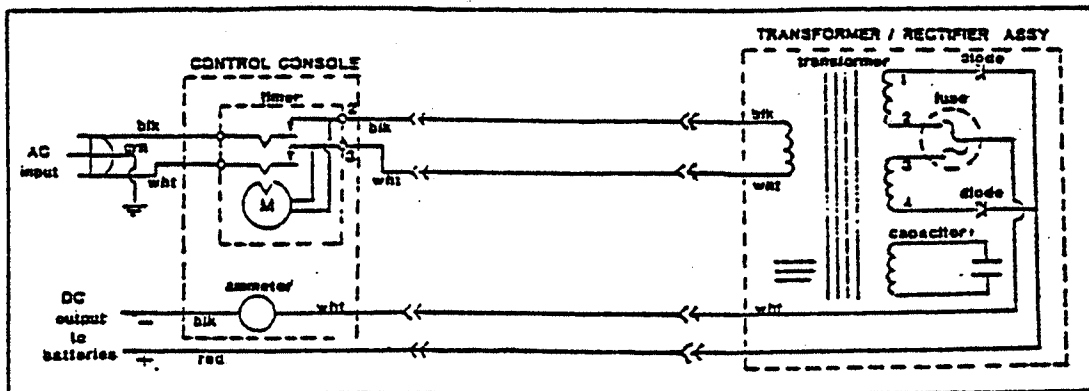
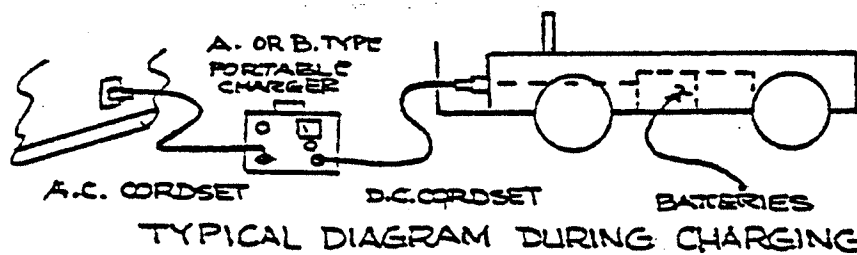
If this occurs when charger is turned on without being plugged into the vehicle, the AC cord, timer motor coil, or the transformer may be shorted. To check the AC cord, ensure that the time of "OFF" and connect the continuity tester across the AC plug prongs. If circuit is complete the AC cord is shorted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



A. TYPICAL PORTABLE CHARGER



B. TYPICAL PORTABLE ELECTRONIC TIMER CHARGER (ELECTRONIC II)



SCHEMATIC, LESTER CHARGER
TYPICAL FOR ALL BUILT-IN CHARGERS

RECOMMENDED REPLACEMENT PARTS

TAYLOR-DUNN PART NO.	PORTABLE 79-300-00	BUILT-IN 79-300-05	PORTABLE 79-301-00	BUILT-IN 79-301-05
LESTER MODEL NUMBER	24LC25T12 115/60 8824	24LC25-3T12 115/60 7675	PORTABLE LESTRONIC II 9510 24LC25 115/60	LESTRONIC II 24LC25 115/60 7210
TRANSFORMER/RECTIFIER ASSEMBLY, COMPLETE				
TRANSFORMER	79-644-10	79-644-10	79-644-11	
CAPACITOR	79-902-00	79-902-00	79-902-00	79-902-00
AMMETER	79-851-10	79-851-10		
TIMER	79-805-00	79-805-11	79-805-64	79-805-64
KNOB, TIMER	79-806-00	79-806-00		
HEAT SINK ASSEMBLY w/diodes	79-749-10	79-749-11	N/A	N/A
DIODE REPLACEMENT	79-745-10	79-745-10	79-745-10	79-745-10
FUSE ASSEMBLY	79-831-00	79-831-00	79-831-00	79-831-00
CORDSET, A.C.	79-575-10	79-575-10		
CORDSET, D.C.	79-566-10			
BUSHING FOR CORDSET A.C.	79-530-00	79-530-00		
BUSHING FOR CORDSET D.C.	79-530-00	79-530-00		
PLUG, D.C. REPLACEMENT	76-003-00			

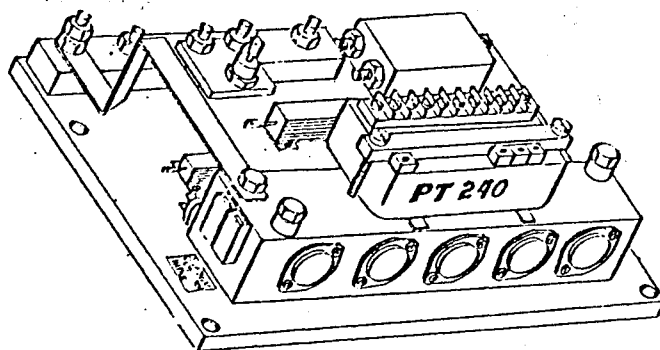
PWR-TRON 240, 350 & 480

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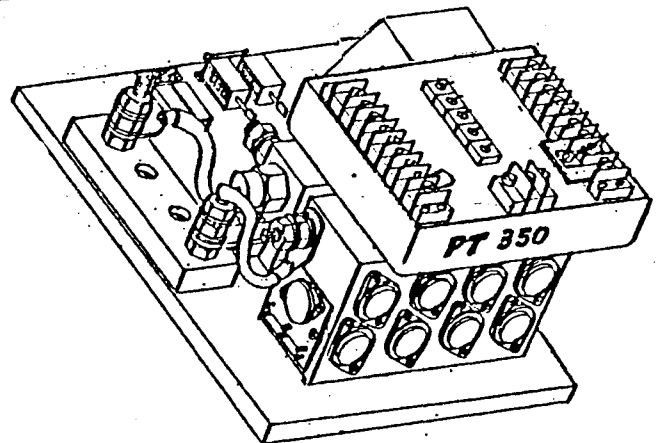
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INTRODUCTION

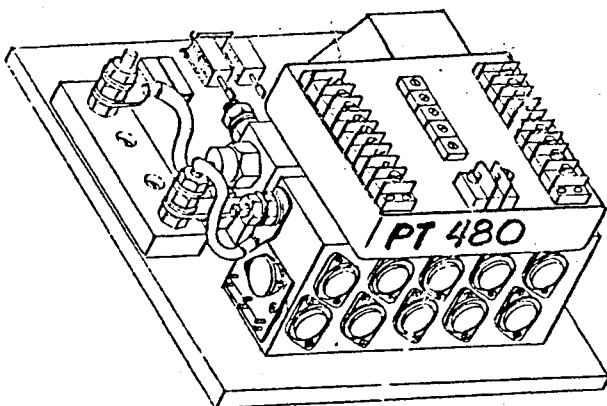
This supplement has been prepared for the purpose of familiarizing the owner with the operational features of the Taylor-Dunn PWR-TRON solid state speed controls. The PWR-TRON 240, 350 and 480 is developed and available only from Taylor-Dunn and is warranted for one full year. Modifications to the control unit, drive or power system will void the warranty.



24 OR 36 VOLTS
RECOMMENDED FOR
USE UP TO 6 HP
MOTORS
(INTERMITTENT)



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



48 VOLTS ONLY

PWR-TRON 240, 350 AND 480

GENERAL

The PWR-TRON unit is readily accessible when the seat on Model R's is raised, or in other models, under the deck board. The PWR-TRON unit performs two functions; forward-reverse and acceleration via mechanical linkage to the foot pedal. You will notice the PWT-TRON unit is a transistorized supply that regulates the voltage fed from the battery through the accelerator module to provide the necessary signal to the motor. This gives the operator full control of the vehicle at all speeds and braking under all conditions.

FEATURES

Some of the inherent advantages over conventional (resistor type) speed controls are:

1. Increased range; 30% (mileage may vary).
2. Positive current limit; increases motor and battery life.
3. No maintenance to PWR-TRON required.
4. Power matched to motor; providing maximum power output during towing or hauling.
5. Thermal protection to prevent over heating and damage to PWR-TRON.
6. Unit is protected from incorrect battery hookup.
7. "Low" battery protection through solenoid drop out.
8. "Built-in" motor short protection; prevents run away currents and high temperatures, should a motor short occur.
9. Controlled acceleration for smooth starting; no more jack rabbit starts.
10. Plug braking; while accelerator is fully depressed, reverse direction switch, vehicle will automatically slow down, then accelerate in reversed direction. Note, by letting up on the accelerator then re-accelerating, a smoother control will be achieved.
11. Modular construction provides simplicity in trouble shooting, parts replacement and servicing in the field.
12. Each unit has a thermocouple that shuts off power at 160 degrees F which is the operational limit of the PWR-TRON. The unit automatically resets when it has cooled to approximately 130 degrees F.

PWR-TRON 240, 350 & 480

* CIRCUITS AND OPERATION

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

The control circuit (light gauge wire) includes key switch, micro-switch, MS-1, potentiometer; R1, activated by the accelerator arm on back of accelerator module, the PWR-TRON solid state controller, forward reverse switch and solenoid panel.

The power circuit (heavy gauge wire) includes the batteries, forward reverse switch and motor.

The two circuits operate as follows: (refer to Fig.1)

CONTROL CIRCUIT (see Fig. 2)

Forward operation. Turn key switch to "ON" position and forward-reverse switch to forward position, MS-1 is closed providing a current path to the forward solenoid coil and closing forward contact on the forward-reverse switch. As the accelerator is depressed, the potentiometer, R1, will increase the current, moving the vehicle forward.

Reverse operation. Turn key switch to "ON" position and forward-reverse switch to reverse position, MS-1 is closed providing a current path to the reverse solenoid coil and closing the reverse contact on the forward-reverse switch. As the accelerator is depressed, the potentiometer, R1, will increase the voltage, moving the vehicle in reverse.

POWER CIRCUIT (see Fig. 3)

Forward operation . When the control circuit is energized and the solenoid contacts are closed, the current flow is then channeled through the PWR-TRON and then to the power wiring. Motor speed is controlled by voltage output from the PWR-TRON. The PWR-TRON is varied by the potentiometer, R1, in the control circuit.

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

* Circuits of Figures 1, 2 and 3 are the same for PT240, PT350 and PT480.

OPERATING YOUR PWR-TRON 240, 350 AND 480 EQUIPPED VEHICLE

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

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

"Plug braking" is an additional feature of the PWR-TRON. It is not necessary to come to a complete stop before reversing the vehicle. It is only necessary to reverse the vehicle while it is in motion and accelerator is fully depressed. The vehicle will automatically slow to an immediate stop and reverse itself to full acceleration. "Plug braking" should be done in an obstruction free area until the operator gets the feel for this maneuver. This maneuver does not damage the PWR-TRON. It is recommended when starting the vehicle to be sure to always turn ignition key on first then select direction of travel with the forward reverse switch, before depressing the accelerator pedal.

PWR-TRON 240, 350 & 480 PREVENTIVE MAINTENANCE

WARNING

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

No regular maintenance is required.

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

CAUTION

Do not steam clean or spray with water.

Make sure all wire connections are secure.

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

Only qualified service personnel should perform any replacement, adjustments or servicing of the PWR-TRON module, solenoid panel or the accelerator module. This will avoid the possibility of voiding your warranty on the PWR-TRON 240, 350 or 480.

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

ACCELERATOR MODULES PT240, 350 AND 480

GENERAL FEATURES

All accelerator modules parts list are identical for all vehicles except for the rotor. This difference is noted on the following drawings and parts list. The orientation of the accelerator are is shown mounted in the "OFF" position for all vehicles. All parts lists figures are identified in order of assembly. Whenever a re-assembly is necessary a potentiometer check is required before adding pulleys and belts.

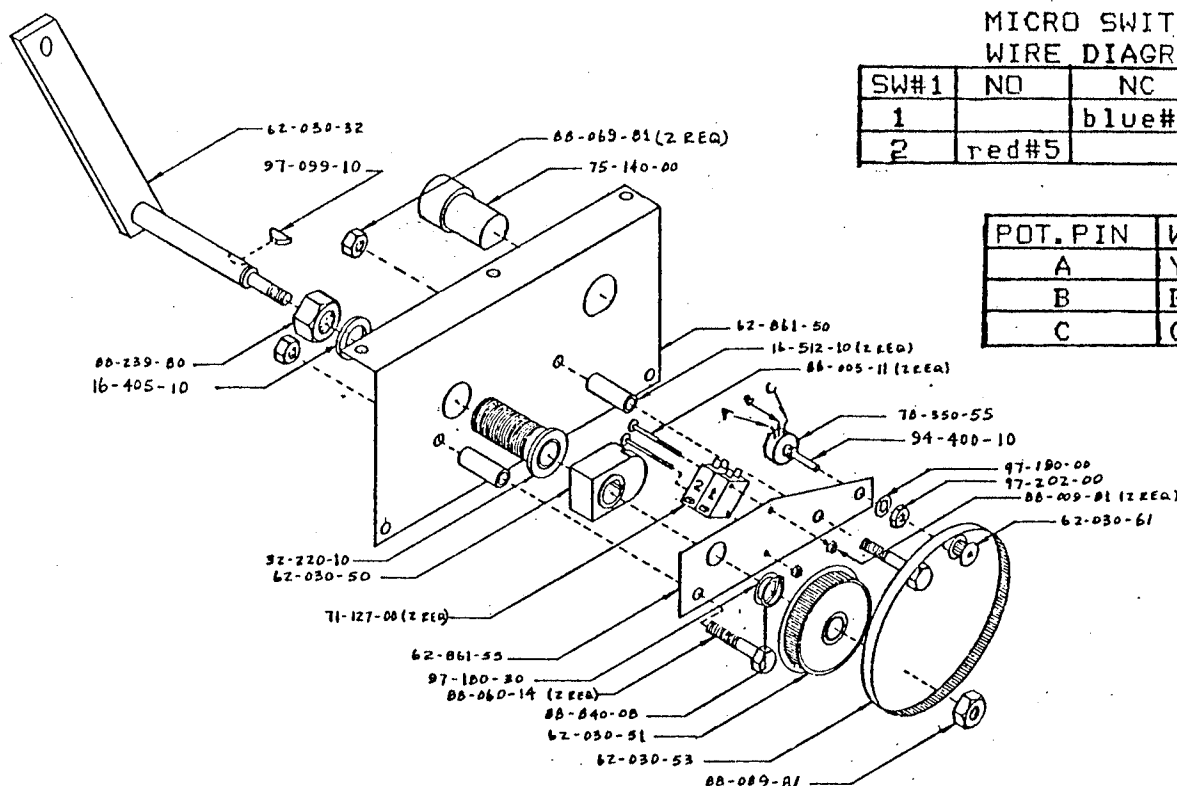
MICRO-SWITCH CHECK

Using a VOM, with micro-switch in "ON" position. Red wires should read Zero OHMS and OFF position will read infinity.

PAGE 7
MICRO SWITCH
WIRE DIAGRAM

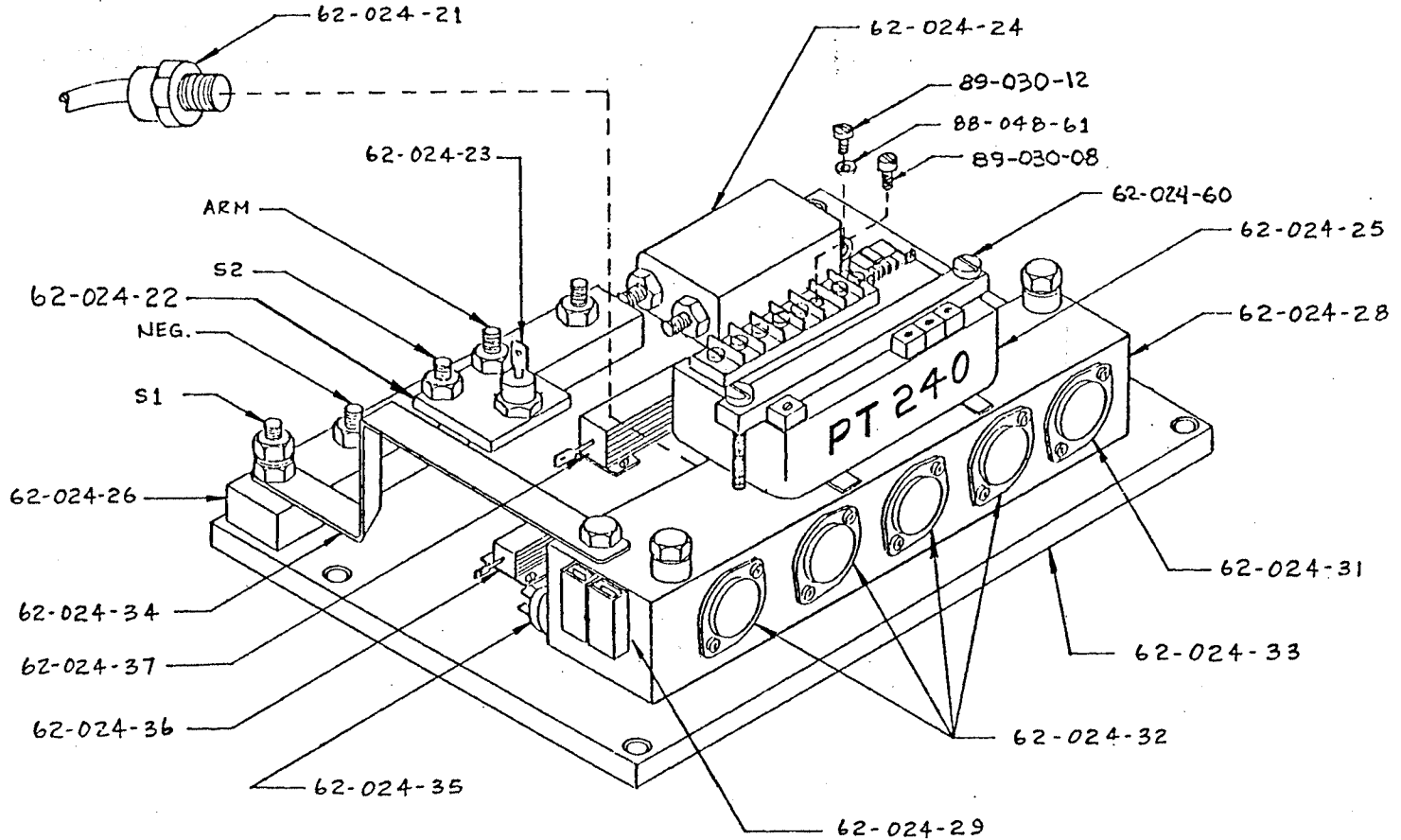
SW#1	NO	NC	COM
1		blue#7	blue#6
2	red#5		red #4

POT. PIN	WIRE #
A	YELLOW #1
B	BLACK #2
C	GREEN #3



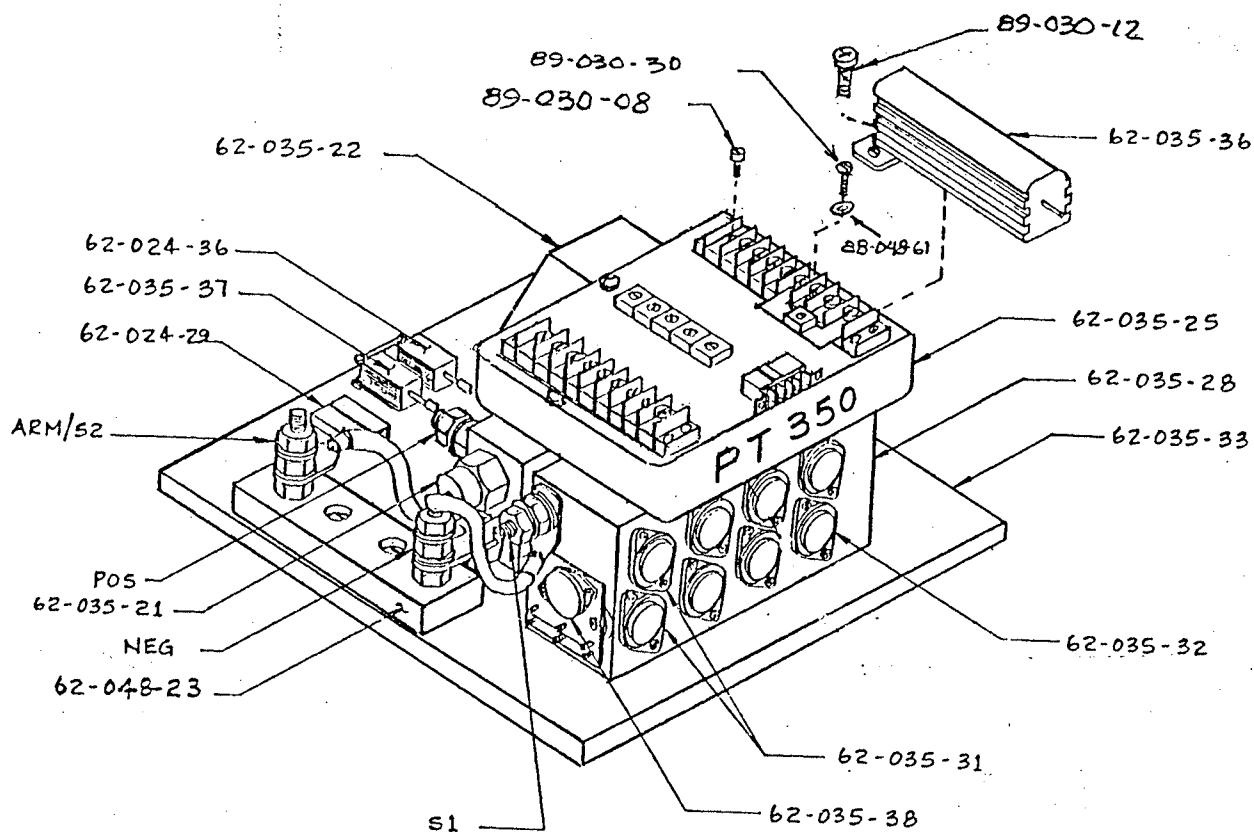
ACCELERATOR MODULE (COVER NOT SHOWN) 62-030-12
(TYPICAL) MODEL 1248B, ITEM 10 CHANGES
FROM VEHICLE TO VEHICLE

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5	97-190-00	Washer, Potentiometer	1
6	97-202-00	Nut, Potentiometer	1
7	88-009-81	Washer, 4-40 Lock	2
8	62-030-61	Sprocket 18T .0800	1
9	32-220-10	Bushing, 1/2 ID, Brass	1
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13	88-229-62	Washer, 3/4 Lock	1
14	62-861-50	Plate, Backing, Accel. Module	1
15	62-030-50	Cam, Micro Sw. 1 In. Rad.	1
16	16-512-10	Spacer, 1/4 ID X 29/32 St. Tubing	2
17	88-060-14	Screw, 1/4 X 1-1/2	2
18	88-069-81	Nut, 1/4 Lock	2
19	75-140-00	Harness, Accel. Module	1
20	97-180-30	Washer, 1/2 In ID X 1/32 Thk.	1
21	88-840-08	Ring, Snap 1/2 Ext. Fleet Pk.	1
22	62-030-51	Sprocket, 80T .0800	1
23	62-030-53	Belt, .0800 12 In 150 T	1
24	88-088-62	Nut, 5/16 NC, Lock	1
	62-030-58	Cover (Not Shown)	1
*	62-030-34	Rotor, Accel. Module (Model C)	1
*	62-030-35	Rotor, Accel. Module (Model E)	1
*	62-030-31	Rotor, Accel. Module (374 R)	1
*	62-030-44	Rotor, Accel. Module (R 3-80)	1
*	62-030-33	Rotor, Accel. Module (B 2-10)	1
*	62-030-36	Rotor, Accel. Module (SS 5-34)	1
*	62-030-37	Rotor, Accel. Module (Model SC)	1



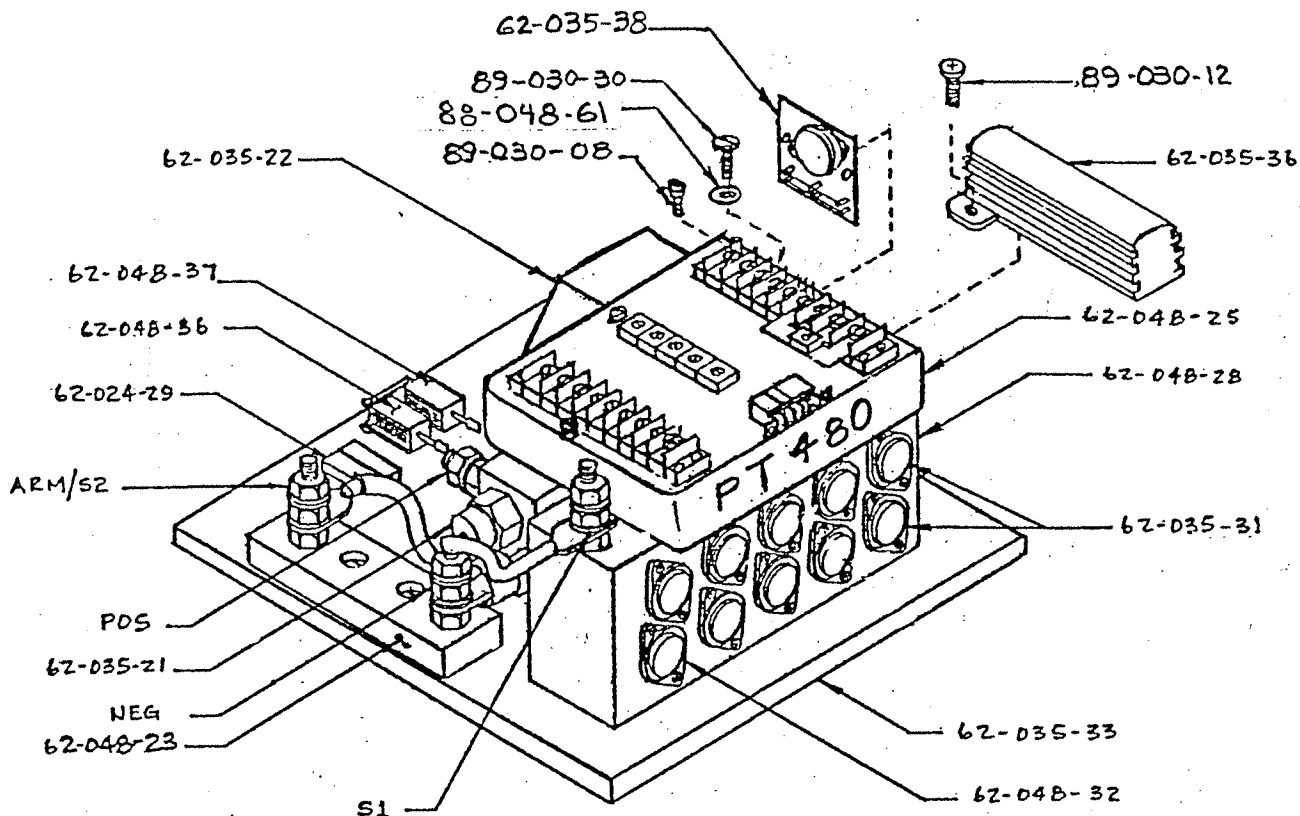
PT240 SPEED CONTROLLER AND PARTS LIST
(PT240 TYPICAL FOR ALL 24 & 36 VOLT VEHICLES)

PART NO.	DESCRIPTION	QTY.
62-024-21	Diode, Flywheel	1
62-024-22	Heat Sink, Diode, Plugging	1
62-024-23	Diode, Plugging	1
62-024-24	Capacitor	1
62-024-25	Logic Unit	1
62-024-28	Transistor Block	1
62-024-31	Transistor Driver	1
62-024-32	Transistor Power	(set) 4
62-024-33	Base, PT240	1
62-024-29	Switch Key (24V & 36V)	1
62-024-35	Switch, Thermal	1
62-024-36	Resistor, 70 OHM	1
62-024-37	Resistor, 1/2 OHM	1
62-024-34	Bar, Buss	1
62-024-26	Block, Terminal	1
89-030-12	Screw, 3 MM x 12 MM	7
89-030-08	Screw, 3 MM x 8 MM	10
62-024-60	Kit, Logic Bar & 2 Screws	2
88-048-61	Washer, # 10 SAE	7



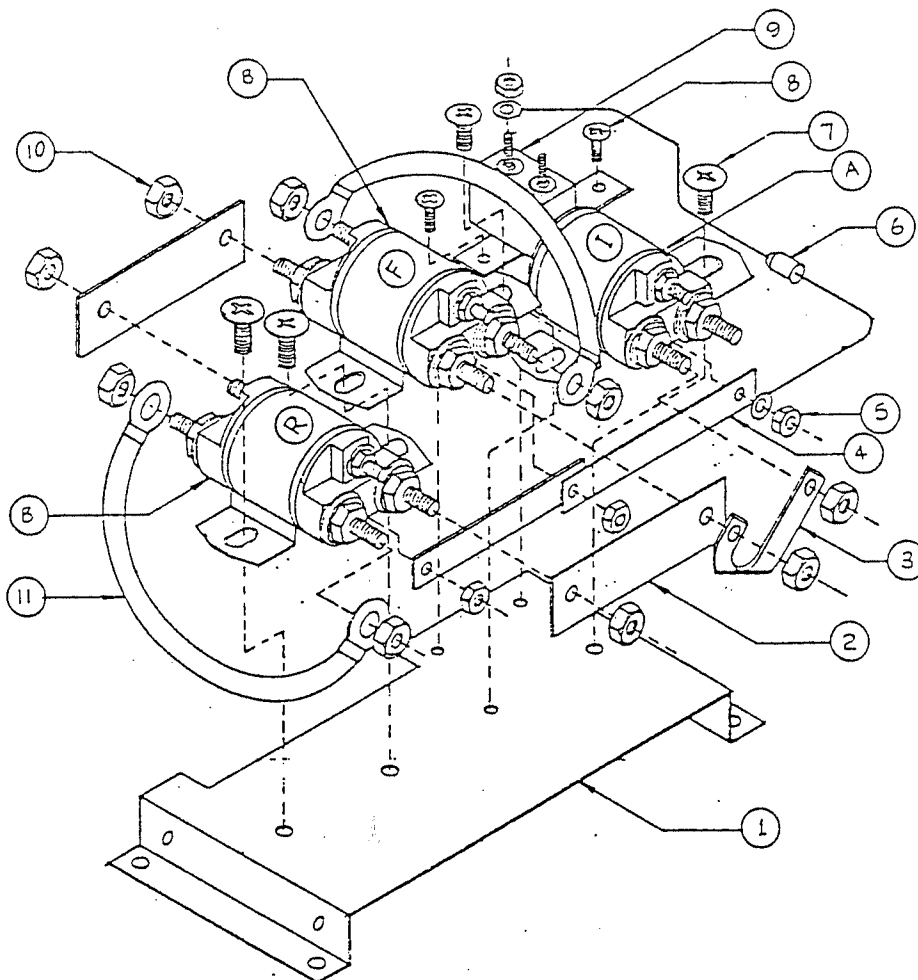
PWR-TRON 350 SPEED CONTROLLER, 24/36 VOLTS

<u>PART NO.</u>	<u>PT350</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
62-035-21		Diode, Flywheel	1
62-035-21		Diode, Plugging	1
62-035-22		Capacitor	1
62-035-25		Logic Unit	1
62-035-28		Block, Transistor	1
62-035-33		Base Plate	1
62-035-32		Transistors, Power (set of 6)	1
62-035-31		Transistors, Driver	2
62-035-38		Transistor Assy. Driver, Driver	1
62-048-23		Block Terminal	1
62-024-29		Key Switch	1
62-024-36		Resistor, 10 W 70 OHM	1
62-035-36		Resistor, 50 W .5 OHM	1
62-035-37		Resistor, 10 W 18 OHM	1
89-030-08		Screw, 3 MM x 8 MM	25
89-030-12		Screw, 3 MM x 12 MM	10
88-048-61		Washer, # 10 SAE	3
89-030-30		Screw, 3 MM x 30 MM	3



PWR-TRON 480 SPEED CONTROLLER, 48 VOLTS

<u>PART NO.</u>	<u>PT480</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
62-035-21		Diode, Flywheel	1
62-035-21		Diode, Plugging	1
62-035-22		Capacitor, Filter with Nuts	1
62-048-25		Logic Unit	1
62-048-28		Block, Transistor	1
62-048-32		Transistor, Power (set of 8)	1
62-035-31		Transistor, Driver	2
62-035-38		Transistor Assembly Driver/Driver	1
62-035-33		Plate, Base	1
62-048-23		Block, Terminal	1
62-049-29		Input, Key Switch	1
62-035-36		Resistor, 50 W .5 OHM	1
62-048-36		Resistor, 10 W 150 OHM	1
62-048-37		Resistor, 10 W 1K5 OHM	1
89-030-08		Screw, 3 MM x 8 MM	25
89-030-12		Screw, 3 MM x 12 MM	10
89-030-30		Screw, 3 MM x 30 MM	3
88-048-61		Washer #10 SAE	3



*SOLENOID PANEL ASSEMBLIES

72-560-00, 24V PANEL ASS'Y

72-560-10, 36V PANEL ASS'Y

A) 72-501-24 SOLENOID, SPST 24V

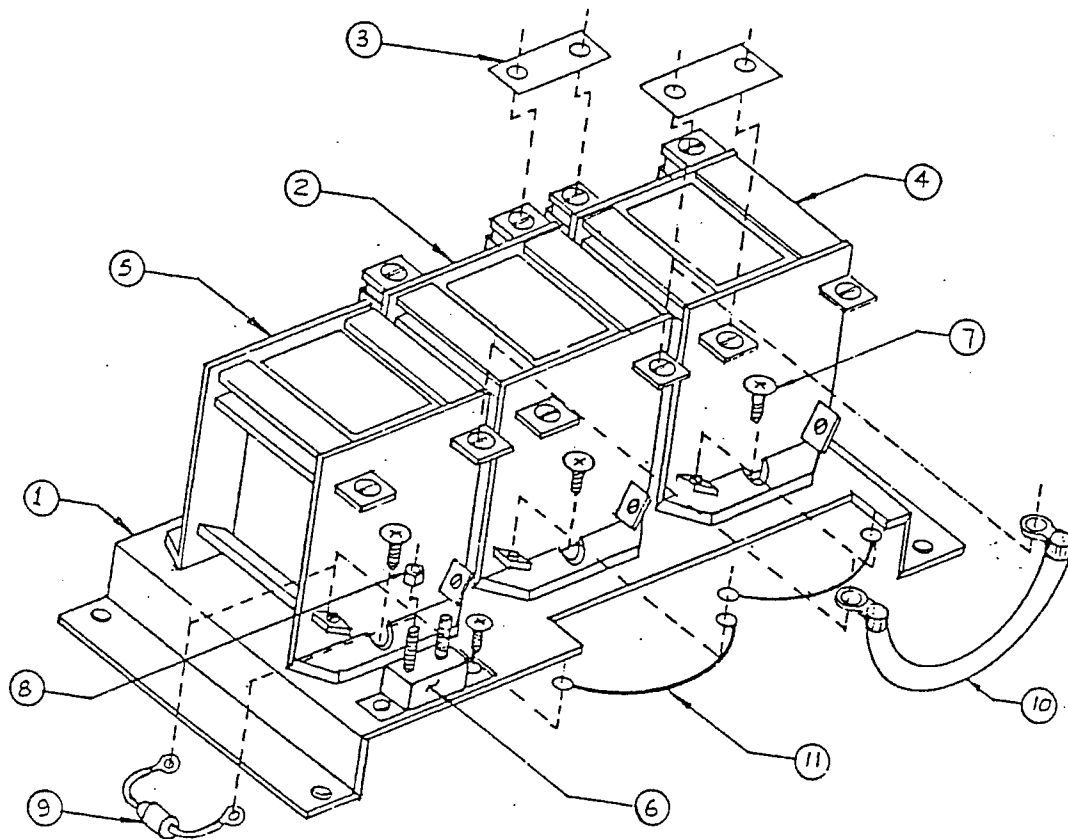
A) 72-501-36 SOLENOID, SPST 36V

B) 72-501-25 SOLENOID, SPDT 24V

B) 72-501-37 SOLENOID, SPDT 36V

*THE SOLENOID PANEL ASSY IS TYPICAL FOR
PT240 AND PT350 AND ARE INTERCHANGEABLE
DEPENDING ON VOLTAGE REQUIREMENTS

<u>FIG NO.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
1.	72-560-50	Panel, Solenoid Mtg	1
2.	61-838-51	Bar, Buss 2 X 5/8 CU	2
3.	61-838-20	Buss, Curved	1
4.	61-838-50	Bar, Buss 3 X 3/8 CU	2
5.	88-048-62	Nut	4
6.	75-224-10	Jumper, 5-1/4 IN, 18GA, W/Diode	1
7.	88-838-06	Screw, #14 X 1/2 Pan Head Sheet Metal	4
8.	88-818-06	Screw, #8 X 1/2 Pan Head Sheet Metal	2
9.	79-840-00	Circuit Breaker, 10 AMP	1
10.	88-089-91	Nut, Hex Jam, 5/16NC, Thin	9
11.	75-235-20	Jumper, Red, 4-1/4, 4 GA	2
	72-560-51	Cover, Solenoid Panel (Not Shown)	1



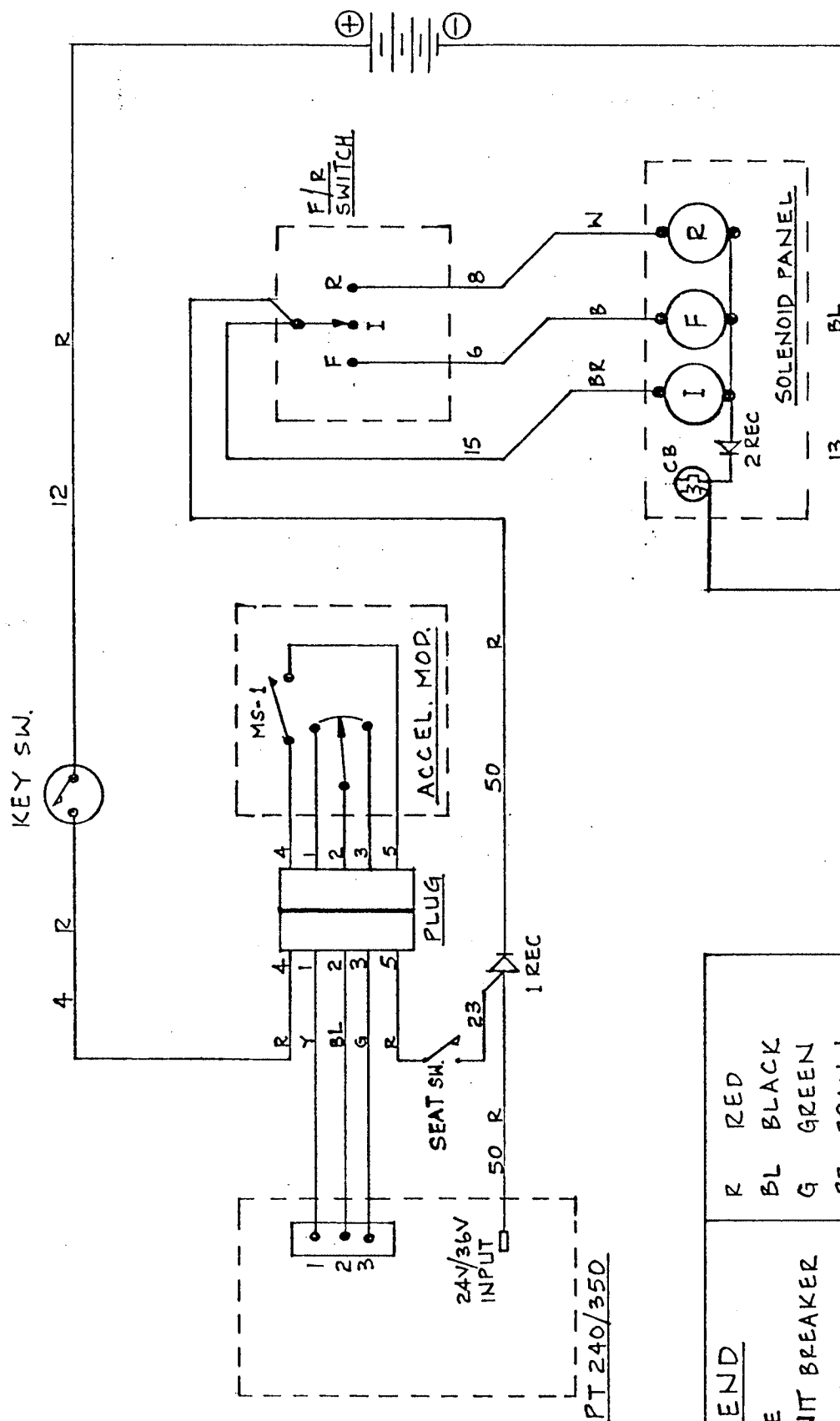
CONTACTOR PANEL ASSEMBLY 48V (72-560-20)
(FOR USE WITH PT 480 ONLY)

FIG. NO.	PART NO.	DESCRIPTION	QTY.
1	72-560-52	Panel, Contactor Mtg.	1
2	71-306-71	Contactor, Rev. 75 AMP 48V SPDT	1
3	61-838-52	Buss Bar, Copper, 1/2 X 1	2
4	71-306-70	Contactor, FWD. 75 AMP 48V DPST	1
5	71-306-72	Contactor, ISO. 75 AMP 48V SPST	1
6	79-840-00	Circuit Breaker, 10 AMP Auto	1
7	88-818-06	Screw, 8 X 1/2 Pan Hd. Type B Thd.	8
8	88-049-80	Nut, 10-32 Hex	2
9	75-224-15	Jumper, With Diode	1
10	75-235-11	Jumper, 4 Ga. 2-1/2 In. Long	1
11	75-224-20	Jumper, 3 Inch 18 Ga. Black	2

NOTE: ① ALL CONTROL WIRING 18 GA.
② ALL POWER WIRING 4 GA.

PWR-TRON 240/350 COMBINED CIRCUIT
DIAGRAM WIRING SCHEMATIC. FIGURE 1.

LEGEND	
REC DIODE	Y YELLOW
HM HOUR METER	B BLUE
DI DISCHARGE INDICATOR	W WHITE
CB CIRCUIT BREAKER	G GREEN
I ISOLATOR	BL BLACK
F FORWARD	R RED
R REVERSE	BR BROWN



PWR-TRON 240/350 CONTROL SCHEMATIC FIG. 2

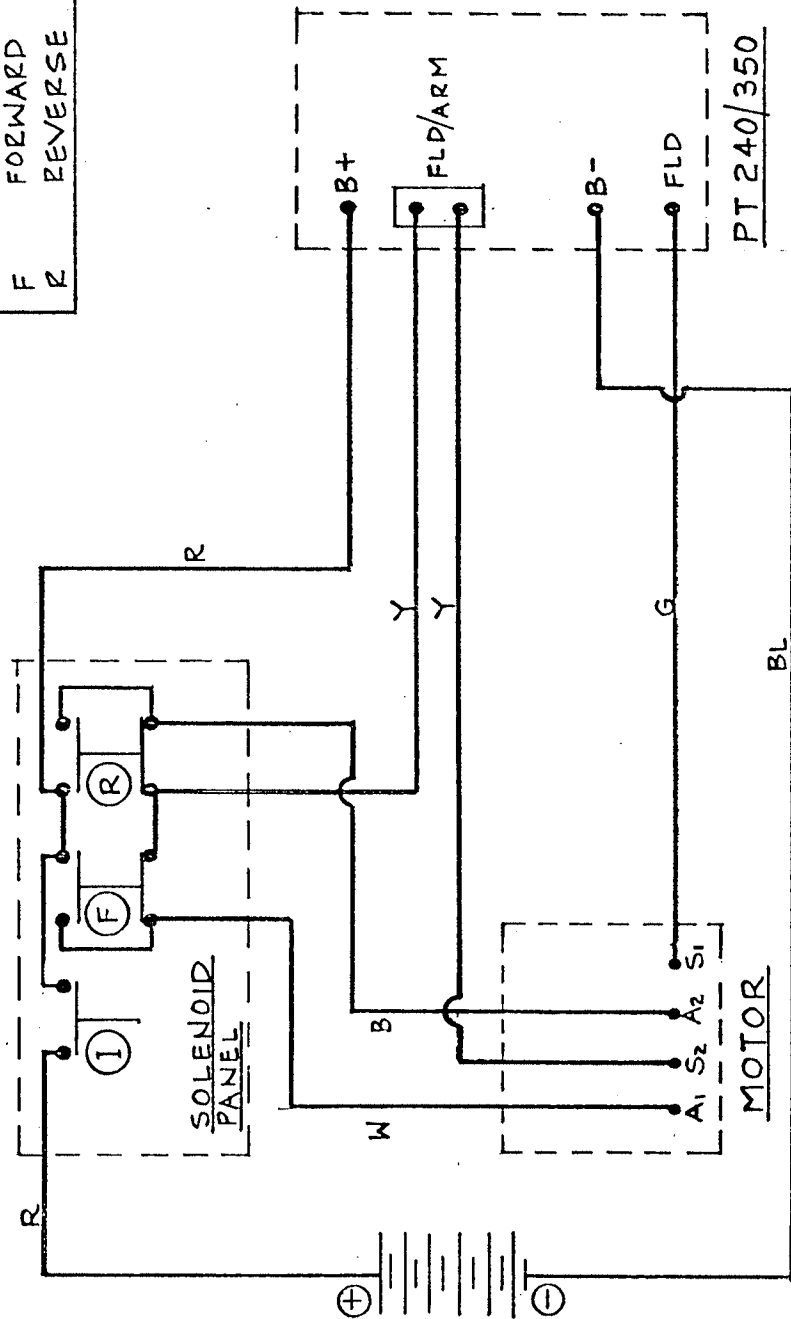
LEGEND		
REC	DIODE	R RED
CB	CIRCUIT BREAKER	BL BLACK
I	ISOLATOR	G GREEN
F	FORWARD	BR BROWN
R	REVERSE	Y YELLOW
		W WHITE



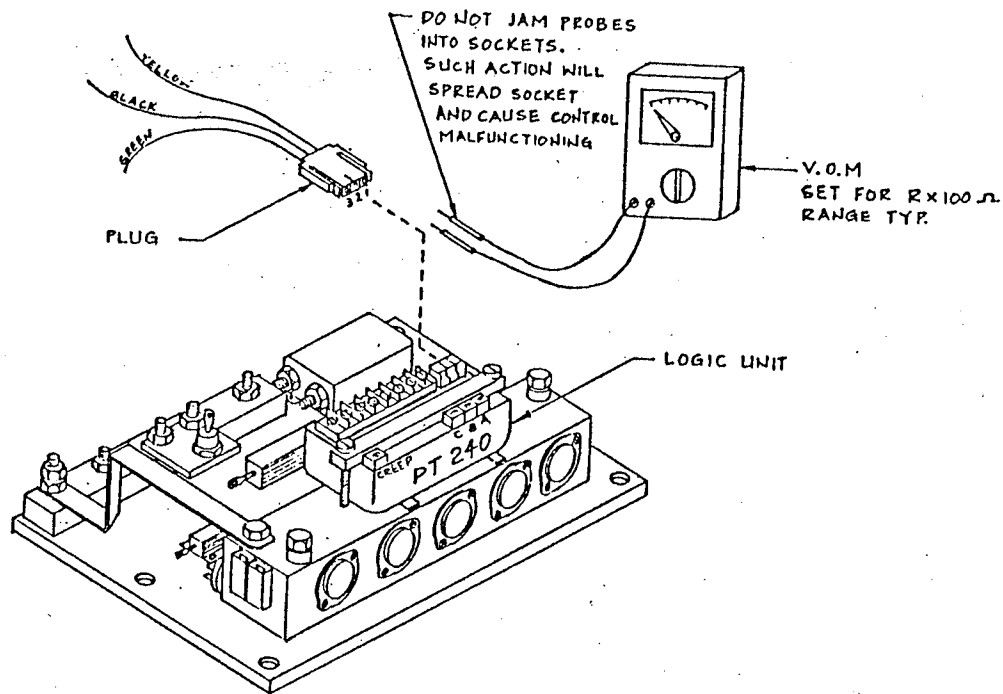
PWR-TRON 240/350 CONTROL SCHEMATIC

LEGEND	
REC	DIODE
CB	CIRCUIT BREAKER
I	ISOLATOR
F	FORWARD
R	REVERSE
R	RED
BL	BLACK
G	GREEN
BR	BROWN
Y	YELLOW
W	WHITE

B+	BATTERY POS.	R	RED
B-	BATTERY NEG.	BL	BLACK
FLD	FIELD	B	BLUE
ARM	ARMATURE	Y	YELLOW
I	ISOLATOR	G	GREEN
F	FORWARD	W	WHITE
R	REVERSE		



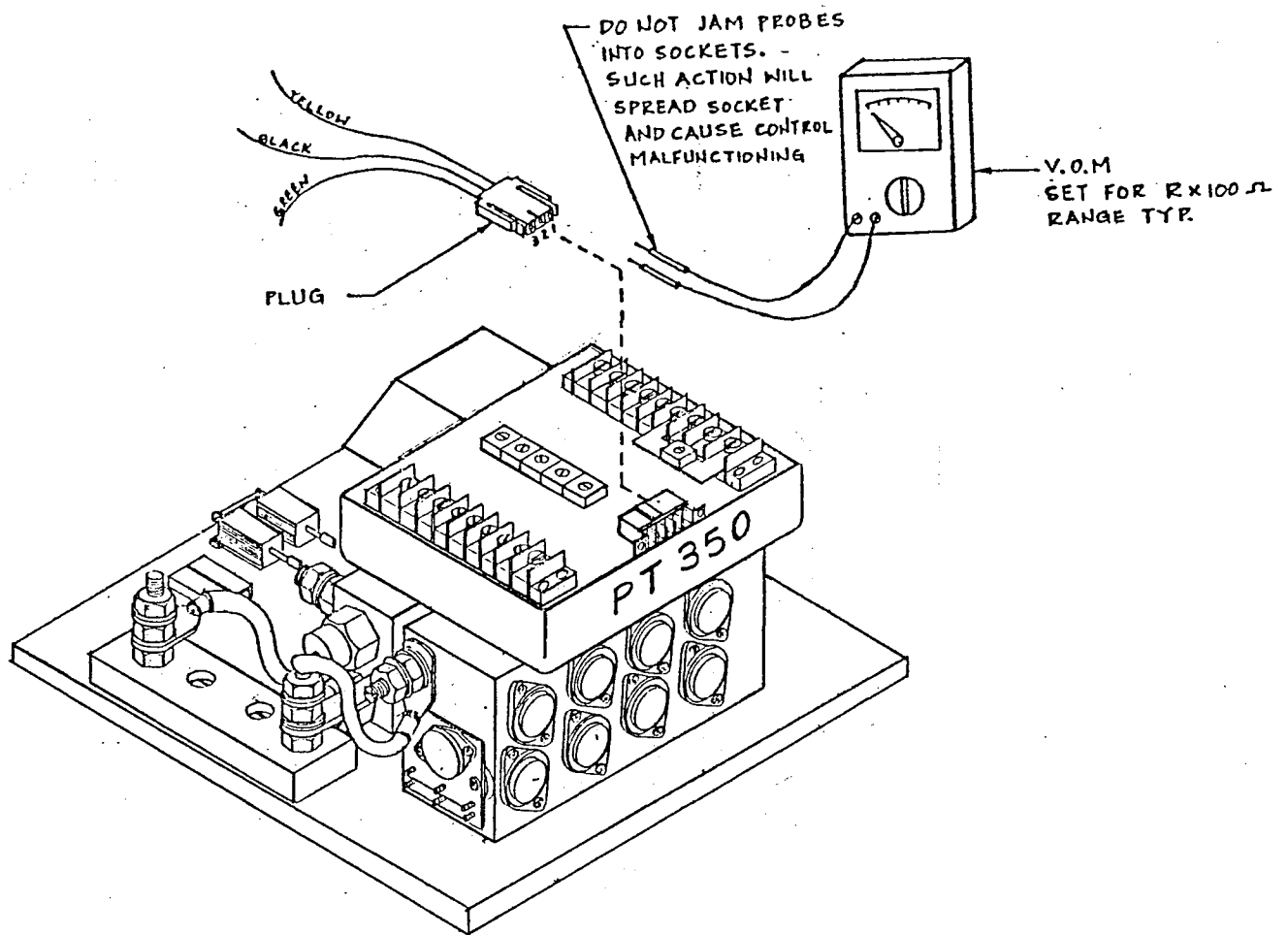
PWR-TRON 240/350 POWER SCHEMATIC



PWR-TRON 240 24/36 VOLTS

POTENTIOMETER CHECK & ACCELERATOR LINKAGE ADJUSTMENT

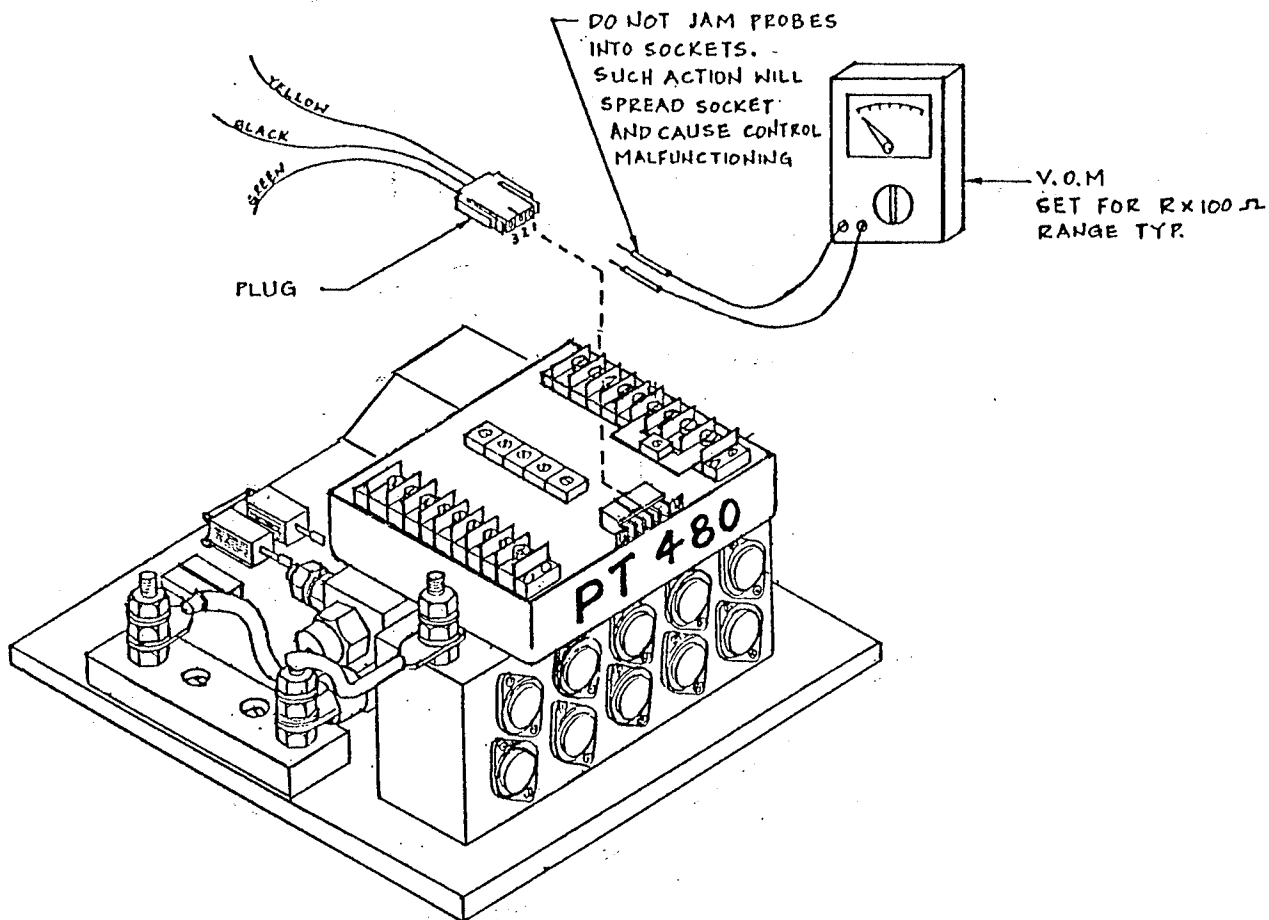
1. Disconnect plug (with yellow, black and green wires) at PWR-TRON logic.
2. Read 4K to 5K ohm on V.O.M. between sockets 1 and 2 (yellow and black wires) with accelerator pedal in off position.
3. With accelerator pedal full depressed, read 0 - 300 ohm on V.O.M. between sockets 1 and 2 (yellow and black wires). Adjust the accelerator pedal stop and/or accelerator linkage to achieve the above readings.
 - * DO NOT rely on return stop inside the accelerator module. It is only a safety feature, not designed for constant foot/pedal return pounding.
4. Reconnect plug to PWR-TRON 240 logic unit.



PWR-TRON 350 24/36 VOLTS

POTENTIOMETER CHECK & ACCELERATOR LINKAGE ADJUSTMENT

1. Disconnect plug (with yellow, black and green wires) at PWR-TRON logic unit.
 2. Read 4K to 5K ohm on V.O.M. between sockets 1 and 2 (yellow and black wires) with accelerator pedal in off position.
 3. With accelerator pedal fully depressed, read 0 - 300 ohm on V.O.M. between sockets 1 and 2 (yellow and black wires). Adjust the accelerator pedal stop and/or accelerator linkage to achieve the above readings.
- * DO NOT rely on return stop inside the accelerator module. It is only a safety feature, not designed for constant foot/pedal return pounding.
4. Reconnect plug to PWR-TRON 350 logic unit.



PWR-TRON 480 .48 VOLTS

POTENTIOMETER CHECK & ACCELERATOR LINKAGE ADJUSTMENT

1. Disconnect plug (with yellow, black and green wires) at PWR-TRON logic unit.
2. Read 4K to 5K ohm on V.O.M. between sockets 1 and 2 (yellow and black wires) with accelerator pedal in off position.
3. With accelerator pedal fully depressed, read 0 - 300 ohm on V.O.M. between sockets 1 and 2 (yellow and black wires). Adjust the accelerator pedal stop and /or accelerator linkage to achieve the above readings.
 * DO NOT rely on return stop inside the accelerator module. It is only a safety feature, not designed for constant foot/pedal return pounding.
4. Reconnect plug to PWR-TRON 480 logic unit.

CONTINUITY AND POWER CHECK

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

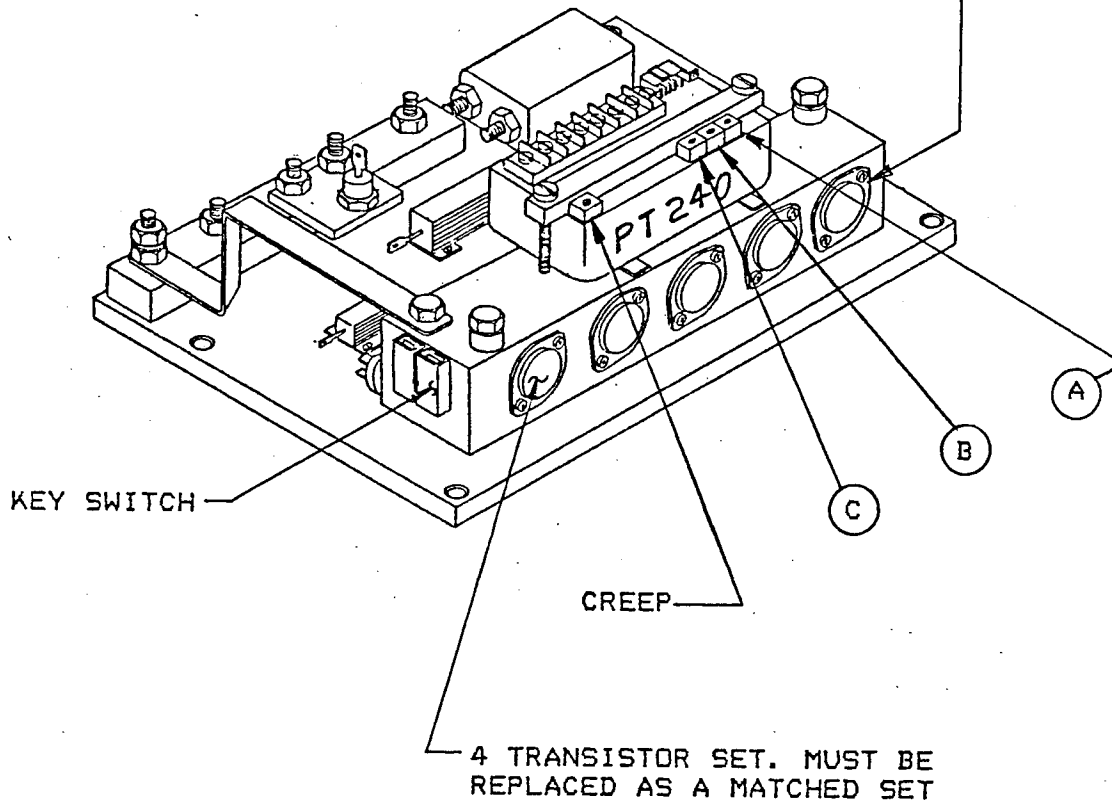
CAUTION: THIS IS A FACTORY CHECKOUT PROCEDURE AND SHOULD ONLY BE MADE BY A QUALIFIED MECHANIC.

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

Lift green lead at S1 (refer to combined circuit diagram) and place a light (24, 36 or 48V) in series with S1 and field pole on PWR-TRON. Place forward/reverse switch in forward. Initiate accelerator slowly, light should come up to maximum brilliance at full acceleration. Repeat same step for reverse. If problems are encountered, see "Trouble Shooting" section. Also check acceleration rate by quickly depressing accelerator full. Light should come to full brilliance in 3 seconds. (Caution, do not perform plugging with light attached.

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

DRIVER TRANSISTOR (AMPLIFIER
FOR TRANSISTOR SET) APPLY
SILICONE SEALANT AROUND EDGE



PWR-TRON 240 TRIMPOT ADJUSTMENTS

PERFORM ALL TRIMPOT ADJUSTMENTS IN ORDER SHOWN

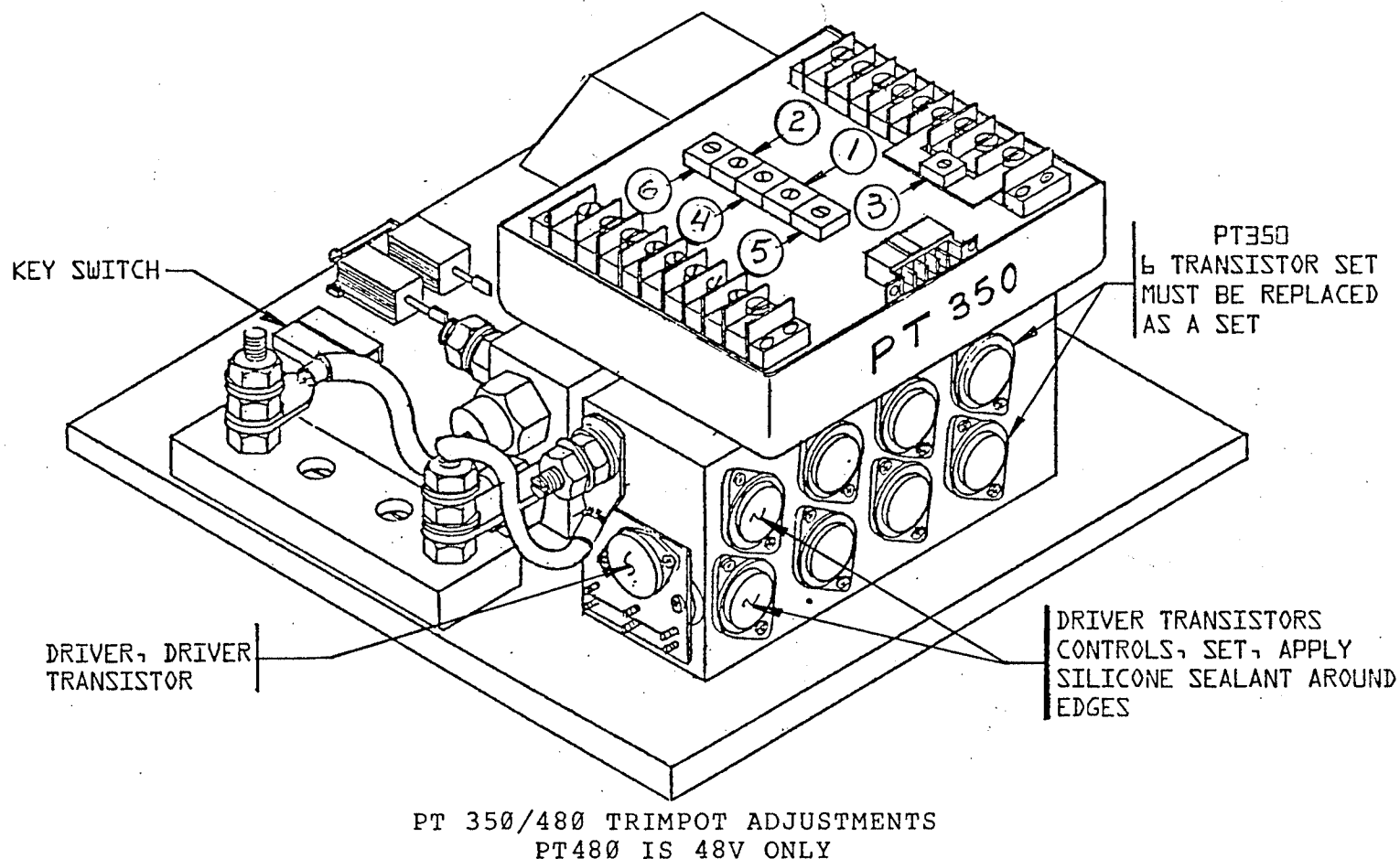
A. ACCELERATOR - Turn full direction of arrow

B. Plugging - Turn full opposite direction of arrow to start.
Turn up 1/8 in direction of arrow

C. CURRENT LIMITER - Turn full direction of arrow

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

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



Perform all trimpot adjustments in the order shown. All braking is done last.

1. CURRENT LIMITER - Turn full direction of arrow
2. ACCELERATOR - Turn full direction of arrow
3. MAX BRAKE - Turn full opposite direction of arrow
4. BRAKE - Turn full opposite direction of arrow to start. Turn up 1/8 in direction of arrow
5. VOLTS ADJ. - Adjust trimpot so "solenoid clicks" on and motor whines when accelerator switch is first closed
6. LOW SPEED MAX - Option feature, no adjustment required

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

TROUBLE SHOOTING (USE COMBINED CIRCUIT FOR CORRECTIVE ACTION)

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
1. Vehicle goes forward does not move in reverse	Motor to solenoid wired wrong or bad solenoid	(See combined circuit) B neg from CB may be wired to field on PWR-TRON. Wire to B neg. if required, replace reverse solenoid.
2. Vehicle goes Rev/Fwd instead of Fwd/Rev	Wires reversed at Fwd/Rev switch	Route white wire from Fwd switch to motor. A1 and blue wire from reverse switch to motor, A2
3. Vehicle does not accelerate properly, full on, when checked with light	Solenoid GND connected to field input (green)	(see combined circuit) move to B neg. (same action as item no. 1
4. Catastrophic transistor failure during plugging	Motor/bat. lead to pos. (B+) on control omitted or mis-connected	(see combined circuit) * Replace transistor re-wire B+
5. Vehicle operates then stops. Motor whine present. <u>WARNING: Do not operate. Release accelerator immediately.</u> Continued operation could cause logic damage.	Plugging diode failure; 1. Yellow leads not properly connected. 2. Motor leads over 5' long 3. Incorrect diode	Route yellow leads to field terminal on PWR-TRON unit. Check plugging diode. Replace if necessary
6. Vehicle does not give smooth acceleration when viewed with test light.	Check accelerator module Potentiometer wired in-correctly. (yellow, black green)	Reroute yellow, black, and green wires per combined circuit diagram.
7. Test light indicates acceleration but turns off at full speed.	Cam reversed on accelerator module	Remove accelerator module. Remove accelerator arm/shaft, re-install cam. correctly
8. No output from control	Batteries <u>not</u> connected or improperly connected Key switch input not connected/key-off micro switch not connected (no solenoids on)	First, check key is on. Make certain trim-pot has not been turned too far. (into "overtravel" area)

TROUBLE SHOOTING (CONTINUED)
(USE COMBINED CIRCUIT FOR CORRECTIVE ACTION)

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
9. No apparent output motor whines.	Grade or load is too great. Motor armature or field short.	See item 1. One direction missing, same action as item no. 1.
10. Vehicles "growls" during acceleration	PWR-TRON B+ to reverse solenoid (red lead) wired wrong.	(See combined circuit) Red lead from B+ tied to outside post. Rewire red lead to reverse terminal post as on reverse solenoid.
11. Vehicle shudders and shakes	Battery voltage too low	Check batteries re-charge as necessary
12. Vehicle stalls, sits and whines	Bad accelerator pot or due to pulley turning free on pot shaft.	Apply "Super Glue" to pulley. If pot is O.K. and pulley is not loose on shaft, then adjust plugging pot 1/4 turn.

* Transistors must be replaced as matched sets: See respective page for speed controller.

SUGGESTED SPARE PARTS LIST
PWR-TRON SPEED CONTROLLER SYSTEM

T-D PART NO.	DESCRIPTION	QTY. NO. OF CARTS		
		REQ. 1-20	21-50	50-UP
62-024-00	PT-240 Speed Controller	1	1	2
62-024-21	Flywheel Diode	1	2	4
62-024-23	Plugging Diode	1	2	4
62-024-31	Drive Transistor	1	2	4
62-024-32	Power Transistor	1(set)	2	4
62-024-22	Capacitor	1	1	2
62-024-35	Thermal Switch	1	1	2
62-024-36	Resistor, 70 OHM 10W	1	1	2
62-024-37	Resistor, 1/2 OHM 25W	1	1	2
62-024-10	Cover PT-240	1	2	4
72-501-24	Solenoid SPST 24V	1	1	2
72-501-25	Solenoid SPDT 24V	2	2	4
72-501-36	Solenoid SPST 36V	1	1	2
72-501-37	Solenoid SPDT 36V	2	2	4
79-840-00	Circuit Breaker	1	1	2
61-838-20	Buss, Curved	1	1	2
75-235-11	Jumper, 2 In x 4 Ga. Red.	1	1	2
75-235-20	Jumper, 4-1/4 In X 4 Ga. Red	2	2	4
75-224-10	Jumper, 18 Ga w/diode	1	2	4
72-560-51	Cover, Solenoid Panel	1	2	4
62-030-11	Accel Module (R 3-74)	1	1	2
62-030-12	Accel Module (1248 B)	1	1	2
62-030-13	Accel Module (B 2-10)	1	1	2
62-030-14	Accel Module (R 3-80)	1	1	2
62-030-31	Rotor Accel Module (R 3-74)	1	1	2
62-030-32	Rotor, Accel Module (1248B)	1	1	2
62-030-33	Rotor, Accel Module (B 2-10)	1	1	2
62-030-44	Rotor, Accel Module (R 3-80)	1	1	2
62-030-58	Cover, Accel Module	1	2	4
62-035-00	PT350 Speed Controller	1	1	2
62-035-21	Flywheel Diode	1	2	4
62-035-21	Plugging Diode	1	2	4
62-035-31	Driver Transistors	1	2	4
62-035-32	Power Transistors	1 (set)	2	4
62-035-24	Capacitor	1	1	2
62-035-10	Cover, PT350	1	2	4
62-035-38	Driver, Driver Transistor	1	2	4
62-048-00	PT480 Speed Controller	1	1	2
62-048-31	Driver Transistors	1	2	4
62-048-32	Power Transistors	1	2	4
62-048-36	Resistor 150 OHM 10W	1	1	2
62-048-37	Resistor 1K5 OHM 10W	1	1	2
62-048-38	Driver, Drivr Transistor	1	2	4
72-560-20	Contacto Panel Assembly	1	1	2
71-306-70	Contacto, Fwd. 75A 48V DPST	1	1	2
71-306-71	Contacto, Rev. 75A 48V SPDT	1	1	2
71-306-72	Contacto, Iso. 75A 48V SPST	1	1	2