MS-260

OPERATOR AND MAINTENANCE MANUAL
SPARE PARTS LISTS INCLUDED

SERIAL NUMBER : 1160964 & UP

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MOTREC INTERNATIONAL

LIMITED WARRANTY

EFFECTIVE ON ORDERS RECEIVED STARTING JANUARY1st.

3-YEAR LIMITED WARRANTY ON AC PRODUCTS, STOCK CHASER AND TRAILERS
2-YEAR LIMITED WARRANTY ON DC PRODUCTS AND OTHER MOTREC PRODUCTS

Motrec warrants to the original purchaser that its products are free from defects in parts and workmanship.

STARTING DATE OF WARRANTY. The present terms and conditions of the Motrec Limited Warranty apply to new Motrec products only and do not replace any pre-existing warranty. The warranty period is effective from the date the purchaser registers the product, provided it is registered within thirty (30) days of reception and in conformity with Motrec's registration process.

REGISTRATION. IMPORTANT: AS A PURCHASER OF A MOTREC PRODUCT, IT IS IMPORTANT THAT YOUR PRODUCT BE REGISTERED UNDER YOUR NAME AS REQUIRED BY MOTREC'S PRODUCT REGISTRATION PROCEDURE. PLEASE ASK YOUR MOTREC DEALER TO REGISTER YOUR PRODUCT. MOTREC'S LIMITED WARRANTY WILL BECOME EFFECTIVE AT THE TIME OF PRODUCT REGISTRATION. IF YOU FAIL TO REGISTER YOUR PRODUCT WITHIN THE THIRTY (30) DAYS, THE WARRANTY WILL NOT BE APPLICABLE. IF YOU PURCHASED THE PRODUCT DIRECTLY FROM MOTREC AND NOT FROM A MOTREC DEALER, YOU MUST REGISTER YOUR PRODUCT FOLLOWING THE INSTRUCTIONS BELOW (CLAUSE 3)

https://www.motrec.com/registration/

DEFECTS. Subject to the terms and conditions described below, parts, components or accessories installed on the product by Motrec which fail under normal usage within the warranty period, and that are proven to be defective, will be repaired or replaced without charge for parts or labor unless stated otherwise herein. This is Motrec's sole liability under this Warranty. The warranty excludes items described in (Clause 6). Motrec reserves the right to require that all parts or components claimed to be defective be returned for inspection and verification of defect. The purchaser is responsible for any and all shipping fees of any and all parts or components that it alleges to be defective. In the event the part is still under warranty and confirmed defective after inspection by Motrec, freight would be credited.

WARRANTY SERVICES. All warranty services must be rendered by authorized Motrec distributors and approved in writing by Motrec prior to initiating any repairs or adjustments. Motrec parts must also be used when performing the warranty otherwise the warranty will be voided. All approved warranty services will be paid for based on standard rates established by Motrec. Rather than replace or repair parts or components, Motrec may, at its discretion, replace the product or refund a prorated amount of its purchase price (based on service time, wear and tear) upon return of the defective product.

AUTHORIZATION PROCESS. No product shall be returned to Motrec without its prior authorization. All warranty claims must be disclosed to Motrec or its authorized distributor as soon as the purchaser is aware of a suspected defect or any event susceptible to give rise to a claim under the Motrec Limited Warranty. All claims must be processed through an authorized Motrec distributor using the warranty claim procedure approved by Motrec.

THE ABOVE TERMS AND CONDITIONS REPRESENT THE ONLY REPRESENTATIONS MADE BY MOTREC IN RELATION TO ITS PRODUCTS. MOTREC DOES NOT PROVIDE ANY OTHER PARTICULAR WARRANTY TO THE USER OF ITS PRODUCTS. MOTREC DOES NOT MAKE ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATION WITH RESPECT TO ANY RESULT, PERFORMANCE OR DURABILITY EXPECTED FROM THE USE OF ANY OF ITS PRODUCTS. MOTREC EXCLUDES AND DECLINES ANY OTHER WARRANTY OF SUITABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, WOULD THEY BE PROVIDED BY LAW, BY CONTRACT OR OTHERWISE.

PRODUCT MODIFICATIONS ARE PROHIBITED. Motrec prohibits and disclaims any and all liability for any modification made to the product, including but not limited to, modifications that are susceptible to alter the weight distribution and stability of the product, increase its speed or affect its safety. Such modifications can cause serious personal injury or property damage for which Motrec disclaims and excludes any and all responsibility. It is the purchaser's responsibility to ensure that any technicians servicing the product are properly trained as required by OSHA (Occupational Safety and Health Administration: https://www.osha.gov/) and ANSI-B56 (American National Standards Institute: https://webstore. ansi.org/default.aspx). Service technicians shall read, understand and follow the instructions in the Motrec Owner's Manual before servicing the product. Only qualified and authorized personnel shall be permitted to maintain, repair, adjust and inspect the product.

TRAINING. It is the purchaser's responsibility to ensure that the driver or any person operating, using, maintaining or handling the product (or its accessories) is properly trained and instructed on the product's safety features and operation, including its stability. Operators shall read, understand and follow the safety and operating instructions in the Motrec Owner's Manual before driving the vehicle. Operators shall not be permitted to operate the product unless a complete and adequate training has been provided by the purchaser. Driving an electrical vehicle constitutes a hazard. The driver is responsible for the control of the product while driving and must always evaluate all unusual or particular situations that he or she may encounter while driving. The driver assumes the inherent hazards related to this activity. Motrec products are designed for off-road use only.

EXCLUSION OF LIABILITY. Motrec disclaims any liability for incidental or consequential damages, including, but not limited to, personal injury or property damage arising from misuse of the product, lack of maintenance or any defect in the vehicle.

UNDER NO CIRCUMSTANCE WILL MOTREC BE LIABLE FOR ANY DAMAGE, WHETHER DIRECT, INDIRECT OR OTHERWISE, RESULTING FROM THE USE OF ITS PRODUCTS, EVEN IF MOTREC OR ONE OF ITS REPRESENTATIVES WAS AWARE OF THE POSSIBILITY OF SUCH DAMAGE. ANY LIABILITY FOR LATENT DEFECT IS LIMITED TO THE PRICE OF THE PRODUCT.

1. Definitions

"Product": the complete vehicle manufactured and/or assembled by Motrec, including its parts, components and accessories installed by Motrec. **"Purchaser"**: The party in whose name the product is originally registered at the time of purchase pursuant to the product registration procedure maintained by Motrec at that time, either: (a) the party to whom Motrec sold the product, if that party purchased the product for its own use, or (b) the customer of a Motrec dealer, who bought the product directly from such dealer.

2. Warranty Period

Your Motrec product using the AC technology is covered by the Motrec Limited Warranty for a period of three (3) years or 3,000 hours of use, whichever comes first. This period of three (3) years starts on the date the product is registered, as mentioned hereinabove. This coverage does not apply to wearable parts, normal use or abusive usage of the product.

Your Motrec stock chaser is covered by the Motrec Limited Warranty for a period of three (3) years or 3,000 hours of use, whichever comes first. This period of three (3) years starts on the date the product is registered, as mentioned hereinabove. This coverage does not apply to wearable parts, normal use or abusive usage of the product.

Your Motrec trailer is covered by the Motrec Limited Warranty for a period of three (3) years. This period of three (3) years starts on the date the product is registered, as mentioned hereinabove. This coverage does not apply to wearable parts, normal use or abusive usage of the product.

Your Motrec product using DC or other technology is covered by the Motrec Limited Warranty for a period of two (2) years or 2,000 hours of use, whichever comes first. This period of two (2) years starts on the date the product is registered, as mentioned hereinabove. This coverage does not apply to wearable parts, normal use or abusive usage of the product.

3. Warranty Registration

The warranty registration must be completed within thirty (30) days of purchase of the product. If registration is not completed within this time, the warranty will be voided. If you purchased the product from a Motrec dealer, please make sure the dealer has completed the registration. If you purchased the product directly from Motrec, please make sure to go to this link (https://www.motrec.com/registration/) and register your vehicle. In case of registration problems, please contact your Motrec representative.

4. Maintenance

Motrec requires that scheduled maintenance be performed at the times shown in the Owner's Manual (Refer to the "Preventive Maintenance Schedule"). If this scheduled maintenance is not done and the product fails as a result of a failure to properly maintain it, repairs will not be covered under any warranty.

5. Warranty will be void if:

- The product has been modified in any manner not approved in writing by Motrec
- The product has been overloaded beyond its rated capacity
- The product's maximum speed has been increased
- The product's motor controller parameters have been tampered without Motrec's authorization
- The product has been used abusively (including, but not limited to: improper use; twisted, bent, misaligned front or rear axles; any signs of abusive use)
- The product has been involved in an accident
- The product has been transferred to a second owner without Motrec's authorization
- The product has been used in extreme environments (including, but not limited to: freezers, excessive moisture areas, corrosive environments, etc.)
- The product has had its serial number modified or altered
- The product has been repaired with non-Motrec parts without Motrec's authorization
- The preventive maintenance schedule was not followed as specified in the Motrec Owner's Manual

6. The following items are not covered by the Motrec limited warranty:

- Batteries, charger, wheels (which are covered by warranties from manufacturers)
- Internal combustion engines (which are covered by warranties from manufacturers)
- Wearable parts (diodes & fuses, filters & spark plugs, lubricants, seals, switch, horn, tires, wheel bearings, seats, brake pads and shoes)
- Tear and wear resulting from normal use
- Adjustments, including field set-up
- Damage or defects caused by using non-Motrec parts, components or accessories
- Shipping damage caused by the freight carrier
- Shipping fees for warranty parts (if proven not admissible, refer to Defects section)
- Travel fees for technical support and repair

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INSTRUCTIONS

SAFETY WARNINGS FOR OPERATORS

- FAILURE TO OBEY THE FOLLOWING SAFETY RULES MAY RESULT IN SEVERE INJURY.
- It is the responsibility of the owner of this vehicle to train operators to ensure that they understand the operating characteristics of this vehicle, including training in vehicle stability, and obey the following safety rules and guidelines. Owner shall comply with OSHA and ANSI/ITSDF B56.8 & B56.9 Standards for vehicle use, safety rules, operator training and certification. Do not drive this vehicle unless you are a qualified operator.
- Do not drive this vehicle under the influence of drugs or alcohol.
- Do not drive this vehicle on public roads and highways. This vehicle is designed to be driven in buildings.
- The electrical system of this vehicle will make sparks which can ignite inflammable materials. Never use the vehicle in hazardous areas where there are inflammable materials, explosive dust or fumes in the air.
- Have your vehicle inspected regularly by trained personnel, and cease operation if a malfunction occurs.
- Do not open battery compartment to prevent battery explosion, acid splashing, severe damage to eyes or skin.
- Do not open motor compartment. Keep clear from moving, rotating(wheels, sheaves, etc) or lifting parts.
- Never carry more passengers than number allowed for this vehicle. Wait until all occupants are seated and holding on before moving. Always keep all body parts inside vehicle. Keep both hands on steering wheel.
- Do not exceed the vehicle cargo load capacity and gross trailing weight capacity, rated for flat hard even surface. Different operating conditions such as loose terrain or ramps reduce vehicle capacity.
- Avoid loose, unbalanced or top-heavy loads to keep a good stability and prevent overturn. Do not load cargo that can fall off the vehicle. Do not carry cargo that is longer, wider or higher than this vehicle.
- Always depress slowly the accelerator for smooth acceleration. Avoid stunt driving or horseplay.
- Avoid sharp turns, always slow down before turning, to prevent vehicle overturn or trailer jack knife. Vehicle is more sensitive to overturn and jack knife when traveling on inclines or when carrying a heavy load.
- Always drive straight up and down the face of an incline, never across the face, to prevent overturn and trailer jack knife. Drive slower and start applying brakes sooner on inclines to adjust for longer stopping distance.
- Use extra care and drive slowly in reverse, in congested areas or on wet or slippery ground.
- Keep to the right under normal conditions. Maintain a safe distance from all objects.
- Slow down and sound the horn when approaching a corner or other blind intersections.
- Before leaving the vehicle, park on a level ground flat surface, turn off all switches, set the forward/reverse switch to neutral, set the parking brake, remove the key. Do not park the vehicle on an incline.
- Before battery charging, park the vehicle in a well ventilated area set for. Do not operate it when charging. To interrupt a charging cycle, disconnect the AC plug; disconnecting the DC plug or a battery terminal, or operating the vehicle, could damage the charger and produce a spark, battery explosion and acid splashing.
- Use another driver to steer this vehicle while it is towed. Be sure the driver uses brakes when you slow or stop the towing vehicle. Do not exceed 5 MPH or carry any passenger while towing this vehicle.

OPERATING INSTRUCTIONS

It is the responsibility of the owner of this vehicle to ensure that the operator understands the operating characteristics of this vehicle, and obeys the safety instructions in this manual and ANSI/ITSDF B56.8 & 9 Standards. Do not drive this vehicle unless you are a certified operator as required by OSHA.

BEFORE TURNING ON KEYSWITCH

Set to neutral, check treadle operation, check for visible damage.

AFTER TURNING ON KEYSWITCH

Check safety devices: foot switch, reverse alarm, motion beeper, strobe light, and all other safety devices.

BATTERIES & CHARGER

Never open the battery compartment unless you have received proper training for battery maintenance.
Batteries emit explosive hydrogen gas that can be ignited by a spark or loose terminal. Battery acid causes severe damage to eyes or skin. Flush the contaminated area immediately with water.
Park the vehicle in a well ventilated area for battery charging. Most battery chargers come with an electronic control that starts when the charger is plugged and stop when the battery is fully charged. To interrupt the charging cycle, disconnect the AC-plug, do not disconnect the DC plug.

BATTERY DISCHARGE INDICATOR

The green light moves from right to left as batteries are being discharged. When the green light is at the last left position, the batteries must be recharged. A flashing light warns the operator that further discharging will damage batteries.

EMERGENCY SAFETY DEVICE

The emergency push button or battery disconnect handle, when present, should only be used in case of emergency. Use the key switch for normal ON/OFF control.

KEYSWITCH

Turn the key switch clockwise for on position. Always turn off all switches, set the F/R selector in neutral, remove the key before leaving the vehicle.

LIGHTS

Depress the front portion of the rocker switch to turn on the lights.

HORN

Depress the horn button on the steering column or dash board.

F/R SWITCH

Three positions with neutral at center. Depress the front portion of the rocker switch for forward direction. Depress the rear portion of the rocker switch for reverse direction. Always set the switch to neutral, turn off all switches, remove the key before leaving the vehicle.

LEFT FOOTSWITCH (OPTION) & TREADLE

The treadle is used to control both the speed and brake. It is designed for right foot operation only. Before operation, make sure that you have a stable and safe position, with your left foot positioned on the left side of operator compartment. Depress slowly the front part of the treadle to speed the vehicle up and release it to slow down. Depress the rear part of the treadle with your right heel to stop. The left footswitch must be depressed before the key switch is turn on.

MAINTENANCE

SAFETY WARNINGS FOR SERVICE TECHNICIANS

FAILURE TO OBEY THE FOLLOWING SAFETY RULES MAIN RESULT IN SEVERE INJURY.

Owner shall comply with OSHA and ANSI/ITSDF B56.8 & B56.9 Standards for vehicle maintenance.

Only qualified and authorized personnel shall be permitted to maintain, repair, adjust and inspect carriers, vehicles, tractors, and batteries.

Before any maintenance work, park the vehicle on flat level surface, turn off all switches, remove key, lift wheels off the ground and secure with jack stands of adequate capacity. Don't connect charger.

Keep clear from moving parts such as tires, sheaves and motor.

Follow the maintenance instructions applicable to the type of repair, maintenance, or service.

Always wear a face shield and gloves when working around batteries.

Before opening the battery compartment, disconnect the charger, turn off all switches and remove the key. Batteries emit highly explosive gases which greatly increase when charging; do not disturb connections or produce sparks around batteries to avoid a battery explosion and acid splashing. Battery acid causes severe damage to eyes or skin. Flush contaminated area immediately with water.

Use insulated tools to avoid sparks that can cause battery explosion and acid splashing.

Use two counteracting tools, double-wrench technique, when disconnecting or tightening terminals on the battery and the speed controller to avoid cracking the terminal or battery post welds.

Before cleaning or replacing a battery, charger, speed controller, contactor, relay, diode, or any other component in the power circuit, always disconnect the charger, turn off all switches, remove the key, wear a face shield and gloves, identify battery polarity and disconnect battery leads, discharge the capacitor in the controller with a 10 ohms, 25 W resistor for a few seconds across B+ and B-.

After cleaning, the power must not be reapplied until terminal areas are thoroughly dry.

On EE-Rated vehicles make sure that the control box is sealed, the static strap makes good contact with the ground, the motor is sealed by bands, the cable protectors are properly installed.

Keep cables and wires clear from mechanical and rubbing action. Make sure that cable insulation is free from cutting or visible damage. Make sure that EE-Rated cable protectors are properly installed.

Before replacing a fuse or circuit breaker, identify the cause of failure and repair.

Programmable controllers must be programmed using the parameter settings in this service manual, before connecting the motor, to avoid sudden vehicle movement and accident.

Do not try to increase motor speed by changing parameter settings in the speed controller; it can cause accident and severe damage to the motor.

SEPEX speed controls are protected by a diode in the power circuit to filter inductive loads in the event of a sudden power interrupt. Some speed controllers require a diode to filter inductive loads on the KSI input. Removing the diodes will cause the speed control failure.

Before resuming maintenance operations, inspect safety warnings stickers and replace any if damage is found and part of the text can't be read.

Check decals and labels, see "DECAL AND LABELS" page.

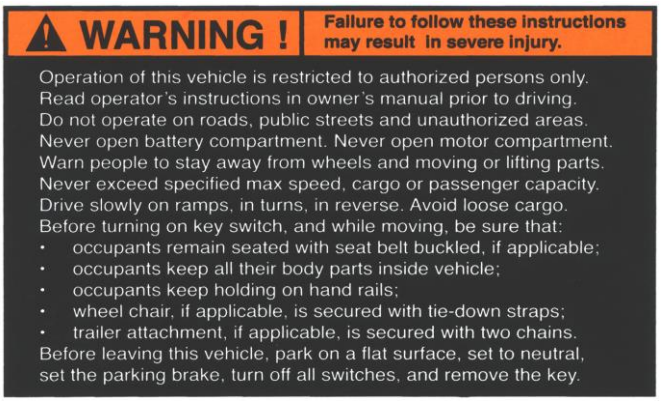
DECALS AND LABELS

! CAUTION !

The images included in this section depict the decals/markings installed on the vehicle. It is of the utmost importance that theses decals/markings remain unaltered and readable. Else, the sticker or the part baring the marking has to be replaced.

Dashboard security warning label:
5100000002

General security warning label:
5100000001

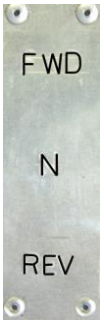


When an emergency push button is installed, this label is required (located under push button): # 3109800006

When a disconnect handle is installed, this label is required (located in front of handle):
4800012J

Respectively, key switch markings, forward/reverse selector markings and light switch marking:

266211



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PREVENTIVE MAINTENANCE SCHEDULE

FOR MODELS WITH DC DRIVE

! WARNING!

Maintenance operations must be made by properly trained service technicians.

- Keep clear from moving parts such as tires, sheaves and motor.
- Batteries contain Sulphur acid that can cause severe burns on skin or eyes.
- When working around batteries, wear acid proof protective equipment: face shield and gloves.
- Use electrically insulated tools to avoid sparks that can cause battery explosion.
- Before any maintenance work, park the vehicle on a flat level surface, turn off all switches, remove the key, lift the wheels off the ground and secure with jack stands of adequate capacity, identify and disconnect battery leads. Don't connect the charger.

	ESTIMATED TIME (MINUTES)						
DESCRIPTION PERIOD	**SHIFT**	**WEEK**	**250H**	**500H**	**1000 H**	**2000 H**	**CHECK**
Check for visible damage	**1**						
Examine floor around and beneath unit for signs of differential and brake fluid leaks.	**1**						
Turn steering, check for hard steering, excessive free play, or unusual sound when turning.	**1**						
Check accelerator for free & smooth movement.	**1**						
Check reverse alarm, horn, strobe light.	**1**						
Check brake pedal travel and parking brake for secure hold. Start slowly and check service brake.		**1**					
Check tire pressure, see pressure rating on tire		**1**					
Check & fill batteries (add distilled water to cover plates. Fill to recommended level after batteries have been fully charged.)		**15**					
Check deadman switch and static strap (min 2`` contact with the floor)			**1**				
Check warning decal & marking			**1**				
Clean battery with water			**1**				
Check master cylinder fluid level (DOT 3)			**1**				
Check brake pedal travel			**1**				
Turn front wheels straight, check steering play			**1**				
Check parking brake, requires 30-40 lbs. force to apply			**1**				
Check brake lines for leaks			**1**				
Check drive for leaks			**1**				
Inspect steering suspension linkages			**1**				
Inspect the frame for damage			**1**				
Check pedal & master cylinder linkages for wear			**1**				

		ESTIMATED TIME (MINUTES)					
DESCRIPTION PERIOD	**SHIFT**	**WEEK**	**250H**	**500H**	**1000 H**	**2000 H**	**CHECK**
Adjust belt 10 lbs force to produce 1/8 deflexion							
Inspect rear wheel bearings for play				**3**			
Inspect front wheel bearings and kingpins for play				**3**			
Inspect rear brake lining for wear 1/16" (2 mm) minimum lining thickness.				**3**			
Check service brake linings and linkages for wear				**12**			
Check parking brake linings and linkages for wear				**5**			
Check power circuit connections				**5**			
Check motor bushes for wear (brushes must exceed holder)				**25**			
Check motor brushes & commutator				**5**			
Check accelerator pot and switch adjustment -1/8" (3 mm) travel to activate micro-switch; -0 to 50 ohms when micro-switch activated; -4500 to 5500 ohms with pedal down.				**10**			
Lubricate the vehicle				**5**			
Change differential oil (SAE 30)				**15**			
Check and tighten all electrical connections					**15**		
Tighten all nuts and bolts					**15**		
Clean & repack front Wheel Bearing					**15**		
Flush the hydraulic brake system (DOT 3), if appl.						**60**	
Replace differential oil seals & wheel bearings.						**90**	
TOTAL TIME (MINUTES)	**5**	**17**	**12**	**91**	**60**	**150**	

Date: _____ Hour Meter Reading: _____

Inspected By: _____ Unit Number: _____

Any deficiencies found during inspection must be corrected before the unit is returned to service.

PDF available for printing (contact manufacturer)

ACCELERATOR

GEAR

- Remove the cover.
- Backlash between gears must be reduced to a minimum by sliding holder; use locktite 262 to lock the three screws.
- When the plastic gear is fully depressed a small backlash must remain between the gears.
- When the plastic gear is released its rear portion must not exceed the pedal case.

MICRO-SWITCH

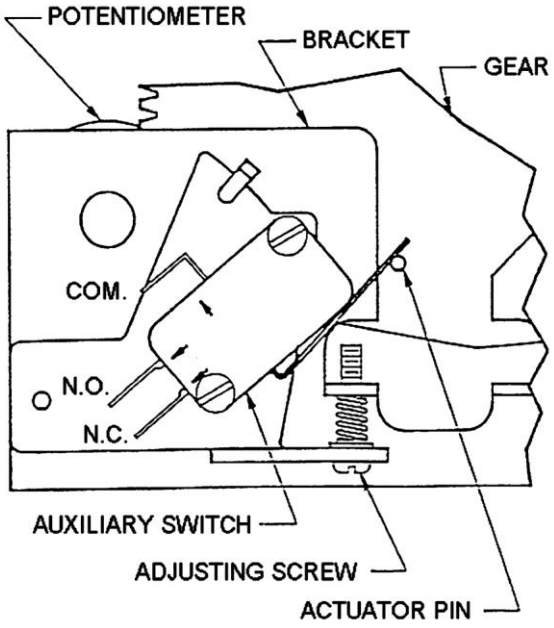
The micro-switch must deactivate the on/off solenoid when the accelerator is released; turn the adjusting screw (shown on figure below) to adjust the micro-switch height.

POT

- Remove the terminals 2 and 3 on PMC to measure resistance signal.
- When the micro-switch is activated the signal must be less than 50 ohms. When the front portion of the pedal is fully depressed the signal must be more than 4600 ohms.
- To modify the resistance, turn the adjusting screw to change the micro-switch height (see figure below).

Proceed with the same verifications after the accelerator cover is on and then connect terminals 2 and 3.

AUXILIARY SWITCH IS WIRED N.O. WITH BLUE LEAD TO COM. & ORANGE LEAD TO N.O. CIRCUIT. THE GREEN LEAD IS GROUNDED. AUXILIARY SWITCH IS SHOWN WITH THE TREADLE IN THE UP POSITION. SWITCH WILL ACTUATE AT BEGINNING OF TREADLE STROKE. SYMBOLS COM., N.O. & N.C. ARE TERMINAL MARKINGS, AS MARKED ON SWITCH.



FOOT PEDAL FP-6 MAINTENANCE GUIDELINES

FEATURES -

- FP 6 is designed for IP rating 64
  - It can work in dusty atmosphere.
  - It has sealing against splashing and spraying water from all side.
  - We do not recommend low pressure or high pressure washing.

SPECIFICATIONS -

- Pedal high point is pedal free condition
- 1st Microswitch Setting ;
  a) First micro switch should operate at 3º ± 1º (i.e. between 2º to 4º) from free condition
- Pot setting
  a) Operate pedal slowly; find reading at which first Microswitch operates.
  b) Pot resistance reading across pot low and wiper (i.e. black and white) must be within 100Ω to 400Ω.
- 2nd Micro switch setting
  a) 2nd micro switch should operate between 4600 Ω and *pot max* resistance, across *pot low and wiper* (i.e. black and white)

INSTALLATION PROCEDURE

Terminology - ***"Pot low", "wiper" and "pot high"*** are pot terminals. (Black, white and red cables respectively) "***Pot max resistance***" is the resistance value across pot low and pot high. (Black and Red cables)

1. MICRO SWITCHES AND POT SETTING

For Foot Pedal FP-6, use pot low and wiper (black and white) for setting micro switches.

- Set Pedal at free condition.
- Adjust pedal at 3° deflection. Set first micro switch to operate about set deflection.
- Adjust pot resistance from high valve to get (100 to 400Ω) across *pot low and wiper* (i.e. black and white).
- Set 2nd micro switch between 4600 Ω and *pot max* resistance.

CHECK LIST / CAUTION

- Pedal angle must be within 30 +/- 3 degree. Check freeness of pedal.
- Select 'resistance' measurement range in as per requirement on the Multi meter. Minimum resistance between pot low and wiper must be less than 10 ohms. Pot Max Resistance (between pot low and pot high) must be within 4500 to 5500 ohms.
- Confirm that micro switch settings are as per specifications.
- Measure the resistance between each of the seven wires and the housing of the Foot Pedal. It should measure "Infinity"
- Visually check the insulating sleeves are put around the soldered side of all seven cables, and that the sleeves are firmly in place.

YEARLY MAINTENANCE

- Remove cover of Pedal.
- Apply 3 to 5 drops oil on pedal return spring.
- Apply 2 drops oil in the slot of front bush.
- Do not apply oil on shaft from outside. It is of no use, due to sealing on the shaft.
    i. Oil Specification
    ii. 20W Motor Oil (Or 3 in one motor oil)
    iii. 20 stand for weight of motor oil.
    iv. W Stands for winter grade.

E-260/262/266 MECHANICAL DRUM BRAKES

REPLACING THE BRAKE SHOES

Raise the vehicle until the rear tires clear the floor and secure with two jack stands;

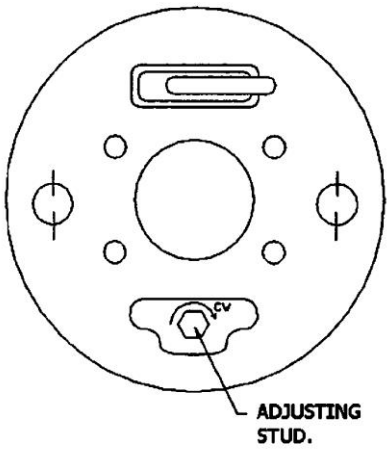
Remove wheels and drums. Check drums for visible damage. Check brake shoes for wear; if brake linings are thicker than 1/16" (2mm), reassemble drums and wheels; if not:

- remove shoes, springs, adjusting screw assembly;
- check brake lever for wear and replace if there is play in the pin;
- disassemble, clean, apply Hi-Temp grease and install the adjusting screw and brake lever;
- install new linings and new springs, install drums and wheels;
- for self-adjusting brakes, pump the brake pedal to automatically adjust the brake shoes;
- adjust pulling rods to have the rear portion of the treadle ¼ inch lower than floor, fig C
- both pulling rods must have equal length;
- make a road test.

MANUALLY ADJUSTED DRUM BRAKES, Old Design.

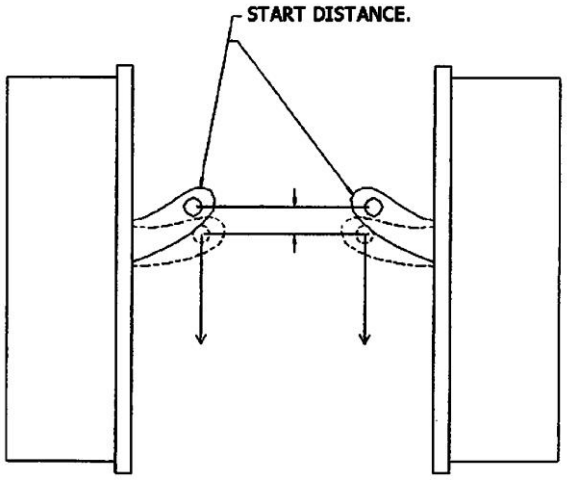
Before adjustment, check the brake levers on the inboard side of the brake backing plates. The brake levers must be equally pulled (see figure A). Adjust pulling rods if necessary. The brake shoes are adjusted by turning the stud (17mm key) located on the inboard side of the brake backing plate (see figure B). Turning the stud clockwise will reduce the drum to shoe clearance. Properly adjusted shoes will equally brake the rear wheels.

Figure B



Brake plate and adjusting screw

Figure A



Equal distance for brake levers

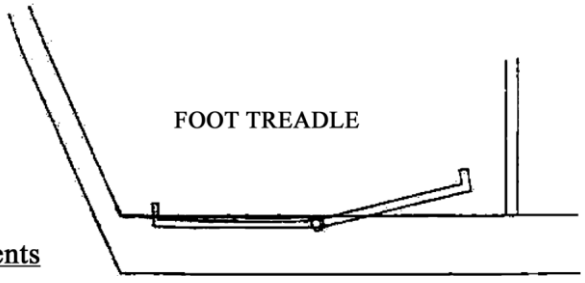


Figure C
Control treadle adjustments

BATTERY MAINTENANCE

! WARNING !

- It is the responsibility of the owner of this vehicle to ensure that the service technicians are properly trained, read and obey the safety rules and guidelines in this manual (ANSI B56).
- Maintenance operations must be made by properly trained service technicians only.
- Before any maintenance work, park the vehicle on a flat level surface, turn off all the switches, set to neutral, remove the key, lift the wheels off the ground and secure with jack stands of adequate capacity.
- Keep charger disconnected while doing any maintenance work.
- Always wear a face shield and scarf when working around batteries.
- Battery emits highly explosive gases; do not produce sparks to avoid battery explosion and acid splashing. Battery acid causes severe damage to eyes or skin. Flush contaminated area immediately with water.
- Use insulated tools to avoid sparks that can cause battery explosion and acid splashing.
- Use two counteracting tools, double-wrench technique, when disconnecting or tightening battery posts.
- Before cleaning or replacing a battery, discharge the capacitor in the controller with a 10 ohms, 25 W resistor for a few seconds across B+ and B-, identify battery polarity and disconnect battery leads.
- After cleaning, the power must not be reapplied until terminal areas are thoroughly dry.

BATTERY LEADS AND CONNECTORS

Check for loose connections, damaged cables, acid spill, loose terminal posts, quarterly.

BATTERY POST CORROSION

If corrosion is present on battery posts, remove the cable connectors, use a wire brush to remove particles, and then clean them with a cloth that has been moistened with ammonia.

ELECTROLYTE LEVEL

Does not apply to sealed battery.

- Disconnect battery connectors on roll-out or lift-out installations.
- Make sure the battery roll-out tray is provided with stops before rolling out.
- Fill with distilled water.
- Daily charged batteries normally require watering once a week. Under watering leads to a shortened battery life. Over watering leads to battery corrosion. Be careful not to overfill any cell to avoid electrolyte to be forced out while charging.
- Fill each cell to plate level with distillated or de-ionized water, before battery charging. When the battery is charged, the fluid expands and can seep out if overfilled. Refill each cell after full charge, when the fluid has expanded to its maximum level.
- Reinstall battery caps before charging.

BATTERY MOUNTING

A loose battery increases damaging effects of vibrations and is more prone to short out.

BATTERY DISCHARGE LIMIT

Discharging below a 20% state of charge cuts down the battery life and the number of cycles available. At 20% state of charge, specific gravity of 6V battery should be 1180; and 1220 for industrial battery.

CHARGING AREA

- Always charge battery in a well ventilated area set for and approved for charging.
- Never leave a charger connected for more than 20 hours.

FREQUENCY OF CHARGE

- When a battery is discharged to its 20% state of charge, it is best to charge immediately.
- Batteries require a low current equalization charge (min 4 hours) at least every week, to equalize battery cells, improve battery performance and life in number of cycles.
- Never leave a charger connected for more than 20 hours.

STORAGE

- Keep the battery from getting cold, it would loose its capacity.
- Let the battery warm up before charging.
- Charge batteries in “stored” vehicles every month.

DEFECTIVE BATTERY

Check specific gravity of each cell; if a cell is shorted, voltage drop may occur only when there is current.

BATTERY CHARGER

! WARNING !

Always unplug the AC and DC electrical cords before attempting any repairs to the charger.

CHARGER DOES NOT TURN ON:

- Dc cord of portable chargers must be disconnected from batteries after every charge to restart.
- Check dc fuse links;
- Check battery voltage at the battery connector;
- Check ac outlet and cord set;
- Replace electronic control;

RELAY CLOSES AND TRANSFORMER HUMS BUT AMMETER DOES NOT REGISTER:

- Check dc fuse links;
- Check the continuity of the dc output cord, ammeter, diodes and all connections in the dc circuit;
- Check diodes;
- Check capacitor(rapidely increasing resistance);

SINGLE CHARGER FUSE BLOWS:

- Disconnect and check diodes;

BOTH FUSE LINKS BLOW:

- Check the battery pack and battery connector polarity;
- Disconnect and check diodes.

CHARGER OUTPUT IS LOW:

- Disconnect and check diodes;
- Can be caused by a transformer failure.

AMMETER READS 30 AMPS FOR MORE THAN 30 MINUTES:

- Check the battery pack;

CHARGER DOES NOT TURN OFF:

- Check specific gravity in each battery cell;
- As much as 16 hours may be required to properly charge heavely discharged new or cold batteries;
- Replace electronic control.

AC LINE FUSE OR CIRCUIT BREAKER BLOWS:

- Check ac cordset;
- Check ac line fuse rating;
- Replace electronic control;
- Can be caused by a transformer failure.

ELECTRICAL TROUBLESHOOTING

! WARNING !

Maintenance work must be performed by trained service technicians only.

It is the responsibility of the owner of this vehicle to ensure that the services technicians are properly trained, understand and obey the safety rules and guidelines (ANSI B56).

All service technicians must read and understand the maintenance warning section in this manual.

! WARNING !

Before any maintenance work, park the vehicle on a flat level surface, turn off all switches, remove the key, lift the wheels off the ground, secure with jack stands of adequate capacity, disconnect charger.

Always wear safety glasses.

Batteries emit highly explosive gases that can be ignited by a spark. Before disconnecting a high current terminal, turn off all switches, disconnect battery charger, disconnect batteries.

Keep clear from moving parts such as tires, sheaves and motor.

PMC SELF DIAGNOSTIC

If your PMC comes with a status led, use the flashing code to help troubleshooting.

BATTERY VOLTAGE

Make sure batteries are securely connected. Measure voltage between + and - terminals. We will call this value B+ or full battery voltage.

ACCESSORIES NOT WORKING

- Check the fuses on the batteries and the DC/DC converter.
- Check voltage across + and – terminals on the battery gage; if not B+, check wiring.
- Turn the key switch ON, check voltage between output terminal on the key switch and the - terminal on the battery gage; if not B+, replace the key switch.
- Check voltage across DC/DC converter output terminals; if not 12-Volt, replace the converter.
- Depress the accessory switch, check voltage across accessory terminals. If not 12-Volt, replace the switch. If 12-Volt, replace the accessory.

FORWARD ONLY

On a SEPEX motor control, check the reverse signal input on the controller.
On a series wound motor control, a bad reverse contactor is the most probable cause of the problem. Switch to reverse and check voltage on the reverse control wire. If not B+, replace the F/R switch. If B+, turn off the key switch, disconnect batteries, disconnect power terminals on the F/R contactors, check the resistance across N.C. power terminals of the reverse contactor. If not 0 ohm, change the reverse contactor. If 0 ohms, switch to forward and check the resistance across the forward N.O. power terminals. If not 0 ohms, change the forward contactor.

REVERSE ONLY

On a SEPEX motor control, check the forward signal input on the controller.
On a series wound motor control, a bad forward contactor is the most probable cause of the problem. Switch to forward and check the voltage on the forward control wire. If not B+, replace the F/R switch. If B+, turn off the key switch, disconnect batteries, disconnect power terminals on the F/R contactors, check the resistance across N.C. power terminals of the forward contactor. If not 0 ohm, change the forward contactor. If 0 ohms, switch to reverse and check the resistance across the reverse N.O. power terminals. If not 0 ohms, change the reverse contactor.

TRAVEL AT REDUCED SPEED

Check batteries.

Turn off all switches and disconnect charger. Wear face shield and gloves. Do not disturb any battery connection to avoid sparks. Check the specific gravity of each cell. Cold batteries, highly discharged batteries or dead cells are the most frequent causes of reduced travel speed.

Check potentiometer.

Turn off the key switch, disconnect potentiometer terminals. Check the resistance between terminals.

Other causes of lower speed:
- dragging brakes;
- cold temperature (higher differential oil viscosity).

INTERMITTENT OPERATION

A bad potentiometer is the most probable cause of the following:
- acceleration is not constant;
- maximum speed is erratic;
- sudden stop after a bump or shock;
- erratic starts, requiring several pedal cycles.

A bad F/R contactor is also a probable cause of the following:
- sudden stop after a bump or shock;
- would not start to move at times.

Erratic starts could also be the cause of a misadjusted potentiometer or micro-switch; the pot signal must be less than 50 ohms when the micro-switch turns on.

PMC has an HPD safety feature that prevents the vehicle from moving if the accelerator pedal is depressed before the key switch is ON and seat switch is activated.

PMC may also have an SRO safety feature that prevents the vehicle from moving if the F/R switch is activated before turning on the key switch and activating the seat switch.

The vehicle stops on a steep and long ramp or while towing a heavy load: the circuit breaker has open to prevent motor overheating and will reset automatically after one minute. The PMC is also equipped with an internal thermal protection that cutback the current until the PMC has cooled down.

NO MOTION

Make sure that the PMC surface is clean and dry; check the terminal areas. Dust Particles or acid contamination, can create current leaks and cause a PMC malfunction.

Check F/R switch

Turn on the key switch and set to forward. Check voltage between the forward terminal and the – terminal on the battery gage, check voltage between the reverse terminal and the – terminal on the battery gage; if both B+, replace the F/R switch.

Check switches and wiring

Disconnect control terminals on the PMC and check all control signals. If a switch pin does not read B+, check wiring or replace the switch.

Check potentiometer

Turn the key switch to OFF, disconnect potentiometer terminals. Check the resistance across terminals: if not within the recommended limits, adjust or replace the potentiometer. Check for shorts between potentiometer wires and vehicle frame; resistance should read at least 1 megohm.

Check main contactor or solenoid

Check voltage across power terminals; if not B+, check circuit breaker or replace the solenoid.
Turn to on the key switch and activate the seat switch. Check voltage across the coil terminals; if not B+, check wiring and interlock switches. Check resistance across power terminals; if not 0 ohms, replace the solenoid.

Check circuit breaker and SEPEX DIODE

Before replacing the circuit breaker, check for shorts in the power circuit and check the SEPEX diode in the power circuit using a diode tester. If no such instrument is at hand, use an ohmmeter: the reading should be weak in one direction and strong in the other way.
Check the resistance across the circuit breaker. If not 0 ohms, replace the circuit breaker.

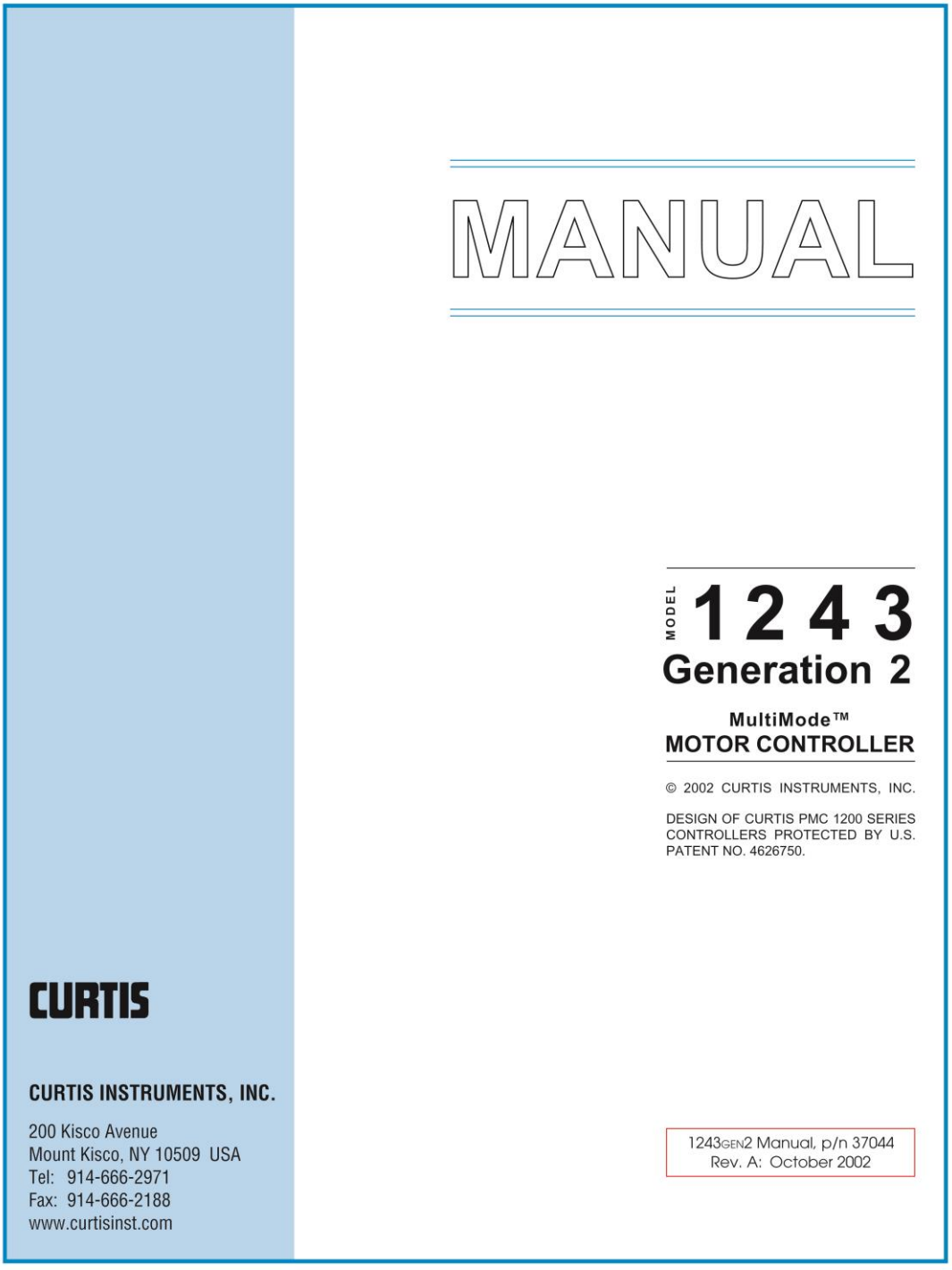
Check PMC

First disconnect battery B+ and B-, then PMC B+ and M-. Check the internal diode between B+ and M- terminals using a diode tester. If no such instrument is at hand, use an ohmmeter: the reading should be weak in one direction and strong in the other way. If the internal diode is defective, the PMC must be replaced.

Check the Motor

First disconnect battery B+ and B-, disconnect power terminals and check the motor armature and field for opens.

CURTIS SPEED CONTROLLER 1243


MANUAL
MODEL
1243
Generation 2
MultiMode™
MOTOR CONTROLLER
© 2002 CURTIS INSTRUMENTS, INC.
DESIGN OF CURTIS PMC 1200 SERIES CONTROLLERS PROTECTED BY U.S. PATENT NO. 4626750.
CURTIS
CURTIS INSTRUMENTS, INC.
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Mount Kisco, NY 10509 USA
Tel: 914-666-2971
Fax: 914-666-2188
www.curtisinst.com
1243GEN2 Manual, p/n 37044
Rev. A: October 2002

WIRING : STANDARD CONFIGURATION

for the M8 bolts. The maximum bolt insertion depth below the surface of the bus bar is 1.3 cm (1/2"). Bolt shafts exceeding this length may damage the controller. The torque applied to the bolts should not exceed 16.3 N·m (12 ft-lbs).

Two 1/4" quick connect terminals (**S1** and **S2**) are provided for the connections to the motor field winding.

WIRING: Standard Configuration

Figure 3 shows the typical wiring configuration for most applications. **For walkie applications** the interlock switch is typically activated by the tiller, and an emergency reverse switch on the tiller handle provides the emergency reverse signal.

For rider applications the interlock switch is typically a seat switch or a foot switch, and there is no emergency reverse.

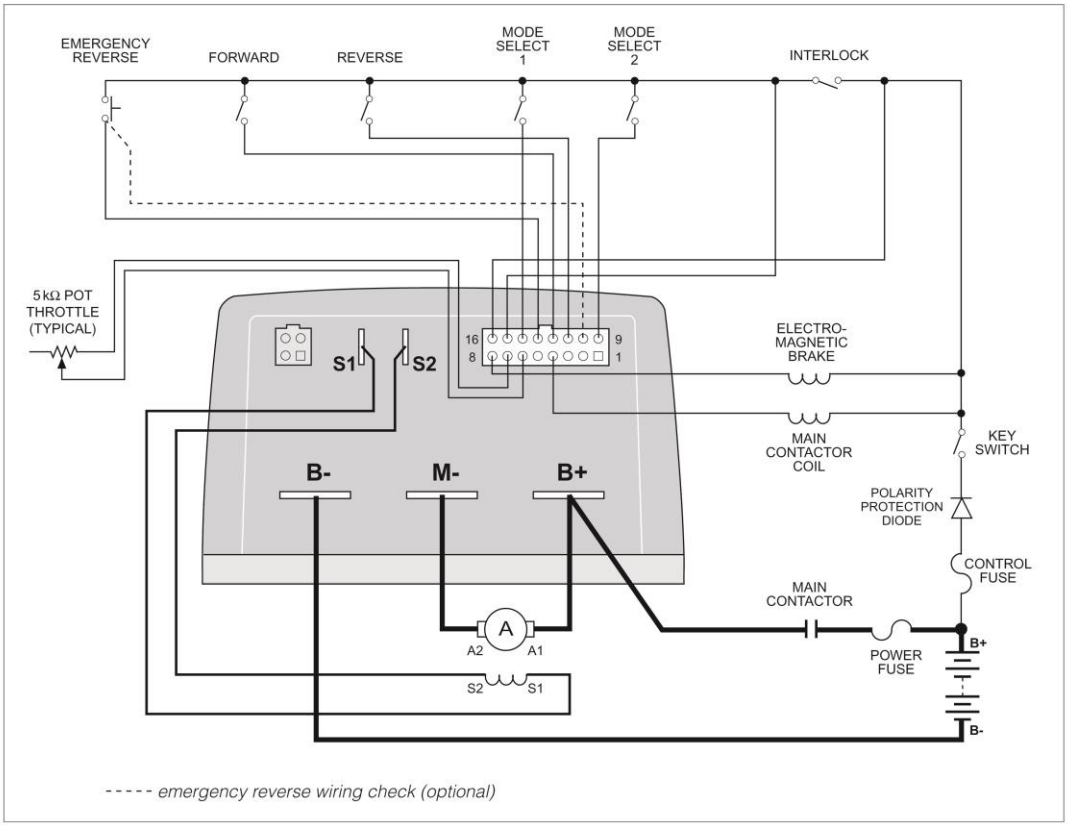


Fig. 3 *Standard wiring configuration, Curtis 1243GEN2 controller.*

DIAGNOSTICS AND TROUBLESHOOTING

7

DIAGNOSTICS AND TROUBLESHOOTING

The 1243GEN2 controller provides diagnostics information to assist technicians in troubleshooting drive system problems. The diagnostics information can be obtained by observing the appropriate display on the handheld programmer, the fault message displayed on the Spyglass gauge, the fault codes issued by the Status LED, or the fault display driven by the controller's fault outputs (Fault 1 and Fault 2). Refer to the troubleshooting chart (Table 7) for suggestions covering a wide range of possible faults.

PROGRAMMER DIAGNOSTICS

The handheld programmer presents complete diagnostic information in plain language. Faults are displayed in the System Faults Menu, and the status of the controller inputs/outputs is displayed in the Monitor Menu.

Accessing the programmer's Fault History Menu provides a list of the faults that have occurred since the fault history file was last cleared. Checking (and clearing) the fault history file is recommended each time the vehicle is brought in for maintenance.

For information on 1311 programmer operation, see Appendix B. If you are using the older 1307 programmer, refer to existing documentation.

SPYGLASS DIAGNOSTICS

The eight-character LCD on the Spyglass displays a continuous sequence of hourmeter, battery state-of-charge, and fault messages.

Fault messages are displayed using the same codes that are flashed by the LED (see Table 8). For example, the LED flashes 3,2 for a welded main contactor:

□□□ □□	□□□ □□	□□□ □□
(3 , 2)	(3 , 2)	(3 , 2)

and the corresponding Spyglass message is:

```
CODE 32
```

When a fault message is being displayed, the red Fault LED (labeled with a wrench symbol) flashes to catch the operator's attention.

The LCD also displays a warning when either service timer expires. The service warning is not considered a fault and the red Fault LED does not flash. The word `SERVICE` is displayed for about 20 seconds on each key-on, after the hourmeter is displayed.

The Spyglass is available in 3-LED and 6-LED models; see Figure 21.

TROUBLESHOOTING CHART

Table 7 TROUBLESHOOTING CHART

LED CODE	PROGRAMMER LCD DISPLAY	FAULT CATEGORY	POSSIBLE CAUSE	FAULT CLEARANCE
0,1	NO KNOWN FAULTS	0	n/a	n/a
1,1	CURRENT SHUNT FAULT	1	1. Abnormal vehicle operation causing high current spikes. 2. Current sensor out of range. 3. Controller failure.	Cycle KSI. If problem persists, replace controller.
1,2	HW FAILSAFE	1	1. Noisy environment. 2. Self-test or watchdog fault. 3. Controller failure.	Cycle KSI. If problem persists, replace controller.
1,3	M- SHORTED	1	1. Internal or external short of M- to B-. 2. Incorrect motor wiring. 3. Controller failure.	Check wiring; cycle KSI. If problem persists, replace controller.
1,4	SRO	3	1. Improper sequence of KSI, interlock, and direction inputs. 2. Interlock or direction switch circuit open. 3. Sequencing delay too short. 4. Wrong SRO or throttle type selected. 5. Misadjusted throttle pot.	Follow proper sequence; adjust throttle if necessary; adjust programmable parameters if necessary.
2,1	THROTTLE WIPER HI	1	1. Throttle input wire open or shorted to B+. 2. Defective throttle pot. 3. Wrong throttle type selected.	When Throttle Wiper High input returns to valid range.
2,2	EMR REV WIRING	1	1. Emergency reverse wire or check wire open.	Re-apply emergency reverse or cycle interlock.
2,3	HPD	3	1. Improper sequence of KSI, interlock, and throttle inputs. 2. Misadjusted throttle pot. 3. Sequencing delay too short. 3. Wrong HPD or throttle type selected. 5. Misadjusted throttle pot.	Follow proper sequence; adjust throttle if necessary; adjust programmable parameters if necessary.
	SRVC TOTAL	3	1. Total maintenance timer expired.	Reset with programmer.
	SRVC TRAC	3	1. Traction maintenance timer expired.	Reset with programmer.
	TOTAL DISABLED	3	1. Total disable timer expired.	Reset with programmer.
	TRAC DISABLED	3	1. Traction disable timer expired.	Reset with programmer.
2,4	THROTTLE WIPER LO	1	1. Throttle pot wire open or shorted to B+. 2. Wrong throttle type selected. 3. Defective throttle pot.	When Throttle Wiper Low input returns to valid range.
3,1	FIELD SHORT	1	1. Main contactor coil shorted. 2. Field winding shorted to B+ or B-. 3. Field resistance too low.	Check contactor coil and field winding; cycle KSI.
3,2	MAIN CONT WELDED	1	1. Main contactor stuck closed. 2. Main contactor driver shorted.	Check wiring and contactor; cycle KSI.
3,3	FIELD OPEN	1	1. Field winding connection open. 2. Field winding open.	Check wiring and cycle KSI.
3,4	MISSING CONTACTOR	1	1. Main contactor coil open. 2. Main contactor missing. 3. Wire to main contactor open.	Check wiring and cycle KSI.

Table 7 TROUBLESHOOTING CHART, *cont'd*

LED CODE	PROGRAMMER LCD DISPLAY	FAULT CATEGORY	POSSIBLE CAUSE	FAULT CLEARANCE
4,1	LOW BATTERY VOLTAGE	2	1. Battery voltage < undervoltage cutback. 2. Corroded battery terminal. 3. Loose battery or controller terminal.	When voltage rises above undervoltage cutoff point.
4,2	OVERVOLTAGE	2	1. Battery voltage >overvoltage shutdown. limit. 2. Vehicle operating with charger attached.	When voltage falls below overvoltage cutoff point.
4,3	THERMAL CUTBACK	2	1. Temperature >85°C or < -25°C. 2. Excessive load on vehicle. 3. Improper mounting of controller.	Clears when heatsink temperature returns to within acceptable range.
4,4	ANTI-TIEDOWN	3	1. Mode switches shorted to B+. 2. Mode Select 1 "tied down" to select Mode 2 or Mode 4 permanently.	Release Mode Select 1.
	MOTOR HOT	3	1. Field resistance > motor hot setpoint.	When resistance < setpoint.
	MOTOR WARM	3	1. Field resistance > motor warm setpoint.	When resistance < setpoint.

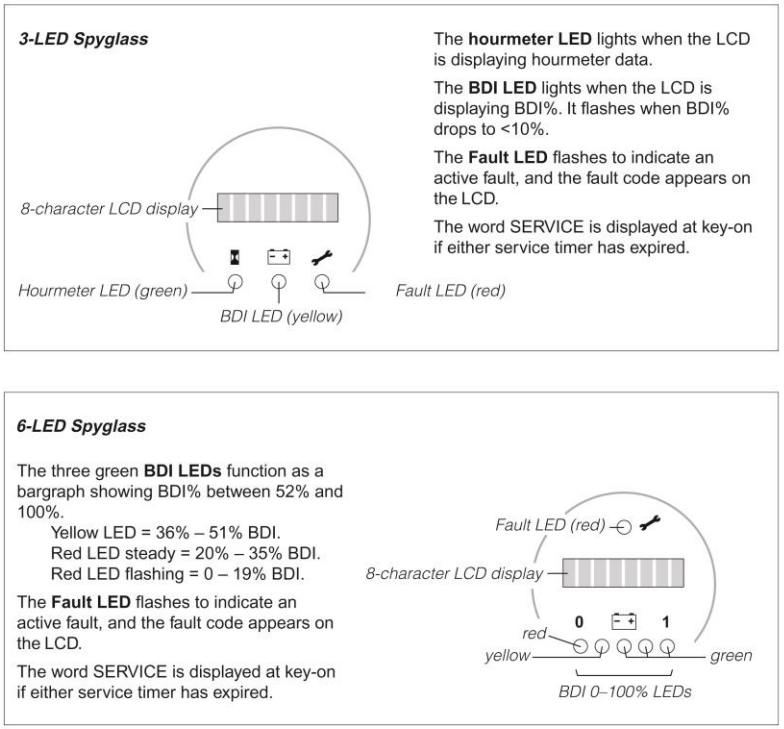
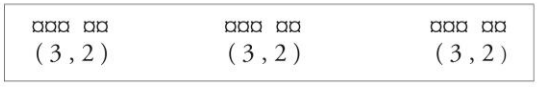


Fig. 21 *Curtis 840 Spyglass, 3-LED and 6-LED models.*

LED DIAGNOSTICS

STATUS LED DIAGNOSTICS

A Status LED is built into the 1243GEN2 controller. It is visible through a window in the label on top of the controller. This Status LED displays fault codes when there is a problem with the controller or with the inputs to the controller. During normal operation, with no faults present, the Status LED flashes steadily on and off. If the controller detects a fault, a 2-digit fault identification code is flashed continuously until the fault is corrected. For example, code "3,2"—main contactor welded—appears as:



The codes are listed in Table 8.

Table 8 STATUS LED FAULT CODES

LED CODES		EXPLANATION
LED off	▬▬▬	no power or defective controller
solid on	▭	controller or microprocessor fault
0,1	■ ¤	controller operational; no faults
1,1	¤ ¤	current sensor error
1,2	¤ ¤¤	hardware failsafe fault
1,3	¤ ¤¤¤	M- fault or motor output short
1,4	¤ ¤¤¤¤	static return to off (SRO)
2,1	¤¤ ¤	throttle wiper high
2,2	¤¤ ¤¤	emergency reverse circuit check fault
2,3	¤¤ ¤¤¤	high pedal disable (HPD), or expired timer
2,4	¤¤ ¤¤¤¤	throttle wiper low
3,1	¤¤¤ ¤	contactor driver overcurrent or field winding short
3,2	¤¤¤ ¤¤	main contactor welded
3,3	¤¤¤ ¤¤¤	field winding open
3,4	¤¤¤ ¤¤¤¤	missing contactor
4,1	¤¤¤¤ ¤	low battery voltage
4,2	¤¤¤¤ ¤¤	overvoltage
4,3	¤¤¤¤ ¤¤¤	thermal cutback, due to over/under temp
4,4	¤¤¤¤ ¤¤¤¤	anti-tiedown fault, or overheated motor

Note: Only one fault is indicated at a time, and faults are not queued up. Refer to the troubleshooting chart (Table 7) for suggestions about possible causes of the various faults. Operational faults—such as a fault in SRO sequencing—are cleared by cycling the interlock switch or keyswitch.

PROGRAMMING PARAMETERS – E-262

! WARNING !

The owner of this vehicle shall ensure that the service technicians are qualified, properly trained and obey the safety rules and guidelines in OSHA and ANSI B56 regulations, and in this manual.

Before installing and/or programming the PMC, park the vehicle on a flat level surface, lift the wheels off the ground and secure with jack stands of adequate capacity. Don't connect charger.

Programmable controllers must be programmed using the parameter settings in this service manual, before connecting the motor, to avoid sudden vehicle movement and accident.

Do not try to increase motor speed by changing parameter settings in the speed controller; it can cause accident and severe damage to the motor.

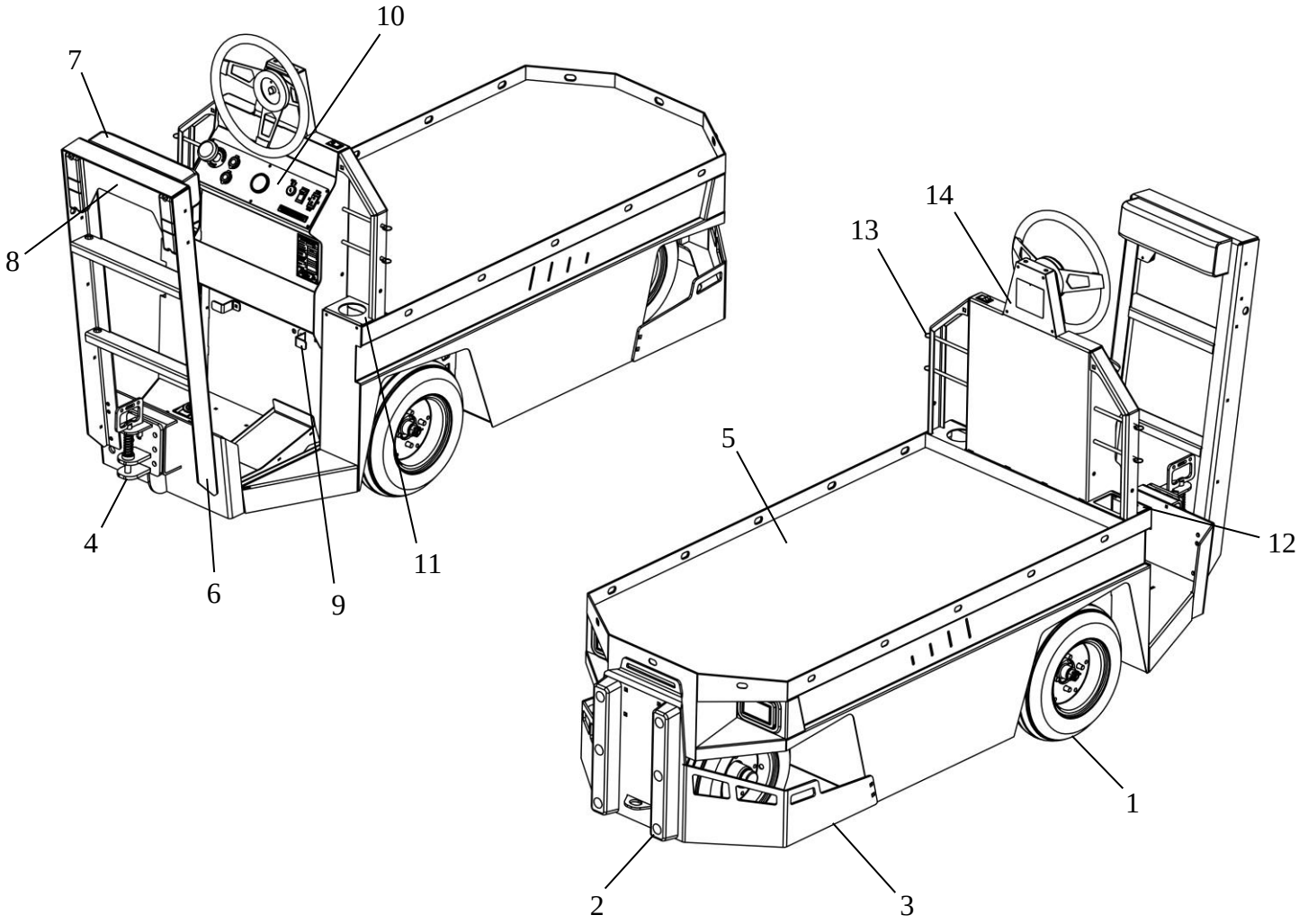
VOLTAGE	NOMINAL BATTERY VOLTAGE, IN VOLTS	2
M1 DRIVE C/L	MODE 1 DRIVE CURRENT LIMIT, IN AMPS	250
M2 DRIVE C/L	MODE 2 DRIVE CURRENT LIMIT, IN AMPS	250
M3 DRIVE C/L	MODE 3 DRIVE CURRENT LIMIT, IN AMPS	250
M4 DRIVE C/L	MODE 4 DRIVE CURRENT LIMIT, IN AMPS	250
M1 BRAKE C/L	MODE 1 BRAKING CURRENT LIMIT, IN AMPS	100
M2 BRAKE C/L	MODE 2 BRAKING CURRENT LIMIT, IN AMPS	100
M3 BRAKE C/L	MODE 3 BRAKING CURRENT LIMIT, IN AMPS	100
M4 BRAKE C/L	MODE 4 BRAKING CURRENT LIMIT, IN AMPS	100
M1 ACCEL RATE	MODE 1 ACCELERATION RATE, IN SEC.	3
M2ACCEL RATE	MODE 2 ACCELERATION RATE, IN SEC.	3
M3 ACCEL RATE	MODE 3 ACCELERATION RATE, IN SEC.	3
M4 ACCEL RATE	MODE 4 ACCELERATION RATE, IN SEC.	3
M1 DECEL RATE	MODE 1 DECELERATION RATE, IN SEC.	3.4
M2 DECEL RATE	MODE 2 DECELERATION RATE, IN SEC.	3.4
M3 DECEL RATE	MODE 3 DECELERATION RATE, IN SEC.	3.4
M4 DECEL RATE	MODE 4 DECELERATION RATE, IN SEC.	3.4
THROTTLE DECEL	THROTTLE DECEL, IN SEC.	0.3
M1 BRAKE RATE	MODE 1 BRAKING RATE, IN SEC.	2
M2 BRAKE RATE	MODE 2 BRAKING RATE, IN SEC.	2
M3 BRAKE RATE	MODE 3 BRAKING RATE, IN SEC.	2
M4 BRAKE RATE	MODE 4 BRAKING RATE, IN SEC.	2
INT BRAKE RATE	INT BRAKE RATE, IN SEC.	2
QUICK START	QUICK START THROTTLE FACTOR	1
TAPER RATE	Regen brak. Decrease rate when apporch. 0spd, 1/32s	20
M1 MAX FWD SPD	MODE 1 MAX. FWD SPEED, AS % PWM OUTPUT	40
M2 MAX FWD SPD	MODE 2 MAX. FWD SPEED, AS % PWM OUTPUT	72
M3 MAX FWD SPD	MODE 3 MAX. FWD SPEED, AS % PWM OUTPUT	86
M4 MAX FWD SPD	MODE 4 MAX. FWD SPEED, AS % PWM OUTPUT	100
M1 MAX REV SPD	MODE 1 MAX. REV SPEED, AS % PWM OUTPUT	40
M2MAX REV SPD	MODE 2 MAX. REV SPEED, AS % PWM OUTPUT	40
M3 MAX REV SPD	MODE 3 MAX. REV SPEED, AS % PWM OUTPUT	40
M4 MAX REV SPD	MODE 4 MAX. REV SPEED, AS % PWM OUTPUT	40
CREEP SPEED	CREEP SPEED, AS % PWM OUTPUT	0
THROTTLE TYPE	THROTTLE TYPE	3
THRO. DEADBAND	Thr. Neutral deadband % of 5kohms pot	6
THROTTLE MAX	Thr. Input req`d for 100%PWM %5kohm pot	90
THRTL MAP	THROTTLE MAP, AS %	30
FIELD MIN	MIN. FIELD CURRENT, IN AMPS	8
FIELD MAX	MAX. FIELD CURRENT, IN AMPS	20
FIELD MAP START	Arm. current at wich FIELD MAP takes effect, amps	70
FIELD MAP	Field winding current, as % armature current	50
CURRENT RATIO	CURRENT RATIO:FACTOR OF 1, 2, 4 OR 8	1
M1 RESTRAINT	MODE 1 RAMP RESTRAINT: 1 TO 10	8
M2 RESTRAINT	MODE 2 RAMP RESTRAINT: 1 TO 10	8
M3 RESTRAINT	MODE 3 RAMP RESTRAINT: 1 TO 10	8
M4 RESTRAINT	MODE 4 RAMP RESTRAINT: 1 TO 10	8
LOAD COMP	LOAD COMPENSATION: 0 TO 25	0

HPD	HIGH PEDAL DISABLE (HPD) TYPE	1
SRO	STATIC RETURN TO OFF (SRO) TYPE	1
SEQUENCING DLY	SEQUENCING DELAY, IN SEC.	1
MAIN CONT INTR	MAIN CONTACTOR INTERLOCK: ON OR OFF	ON
MAIN OPEN DELAY	MAIN CONTACTOR DROPOUT DELAY, IN SEC.	1
CONT DIAG	CONT DIAG, ON OR OFF	ON
AUX TYPE	AUXILIARY TYPE, 0 TO 5	0
AUX DELAY	AUXILIARY DRIVER DROPOUT DELAY, IN SEC.	0.0
EMR REV C/L	EMERGENCY REVERSE CURRENT LIMIT, IN AMPS	50.0
EMR REV CHECK	EMERGENCY REV. WIRING CHECK : ON OR OFF	OFF
EMR DIR INTR	EMR DIR INTR: ON OR OFF	OFF
VARIABLE BRAKE	VARIABLE BRAKE : ON OR OFF	OFF
ANTI-TIEDOWN	ANTI-TIEDOWN: ON OR OFF	OFF
POT LOW FAULT	POT LOW FAULT: ON OR OFF	ON
FULL VOLTS	FULL VOLTS: 174 TO 211	204
EMPTY VOLTS	EMPTY VOLTS : 0 TO 211	174
RESET VOLTS	RESET VOLTS: 174 TO 300	210
BATTERY ADJUST	BATTERY ADJUST : 0.1 TO 20.0	20
BDI LOCKOUT	BDI LOCKOUT : ON OR OFF	OFF
BDI DISABLE	BDI DISABLE: ON OF OFF	OFF
ADJ HRS LOW	ADJ HRS LOW: 0 TO 99	0
ADJ HRS MID	ADJ HRS MID: 0 TO 99	0
ADJ HRS HIGH	ADJ HRS HIGH: 0 TO 99	0
SET TOTAL HRS	SET TOTAL HRS: ON OR OFF	OFF
SET TRAC HRS	SET TRAC HRS: ON OR OFF	OFF
HOURMETER TYPE	HOURMETER TYPE: ON OR OFF	OFF
SRVC TOTAL HRS	SRVC TOTAL HRS: 0.0 TO 50.0	0.0
SRVC TRAC HRS	SRVC TRAC HRS: 0.0 TO 50.0	0.0
SRVC TOTAL	SRVC TOTAL : ON OR OFF	OFF
SRVC TRAC	SRVC TRAC: ON OR OFF	OFF
DIS TOTAL HRS	DIS TOTAL HRS: 0 TO 250	0
DIS TRAC HRS	DIS TRAC HRS: 0 TO 250	0
TRAC FAULT SPD	TRAC FAULT SPEED: 0 TO 100	100
BDI LIMIT SPD	BDI LIMIT SPEED: 0 TO 100	100
WARM SPD	WARM SPEED : 0 TO 100	100
MOT WARM	MOT WARM X 10 m : 10 TO 250	250
MOT HOT	MOT HOT X 10 m : 10 TO 250	250
MOTOR COMP	MOTOR COMP: ON OR OFF	OFF
MAX REV REGEN	MAX REV REGEN : 100 TO 300	100
MAX FWD REGEN	MAX FWD REGEN: 100 TO 300	100
MIN REV REGEN	MIN REV REGEN: 100 TO 300	25
MIN FWD REGEN	MIN FWD REGEN: 100 TO 300	25
MAX LOAD VOLTS	MAX LOAD VOLTS: 0.2 TO 5.5	0.2
MIN LOAD VOLTS	MIN LOAD VOLTS: 0.2 TO 5.0	0.2
INT BRAKE DLY	INT BRAKE DLY : 0.0 TO 8.0	0.0
FAULT CODE	ON OR OFF	ON
EMR BRAKE PWM	EMR BRAKE PWM : ON OR OFF	OFF
FIELD CHECK	FIELD CHECK: ON OR OFF	ON
PUMP METER	PUMP METER : ON OR OFF	OFF

6 MPH MAX : disconnect wire MODE-1-A (PIN 14)

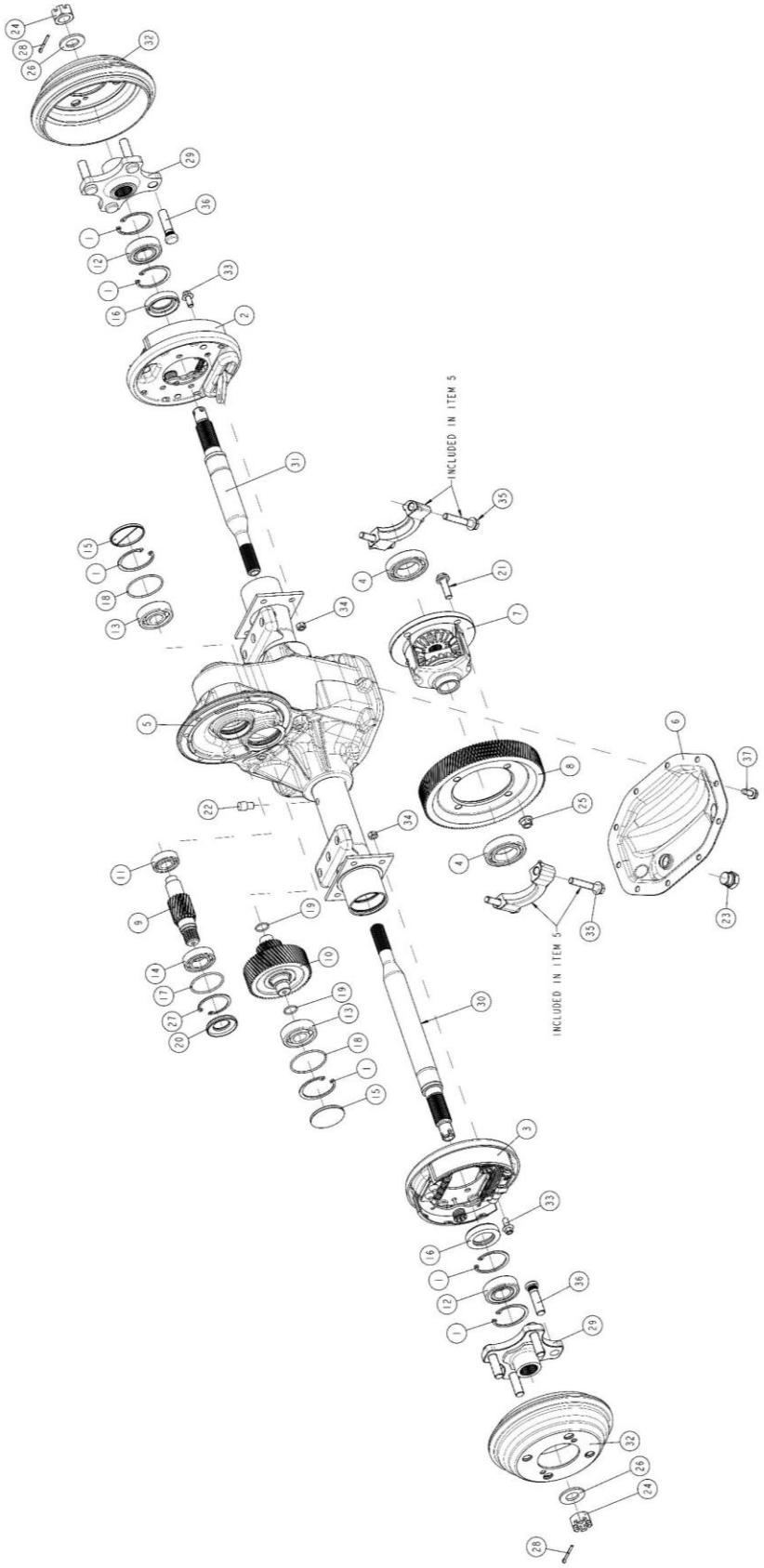
SPARE PARTS

BODY



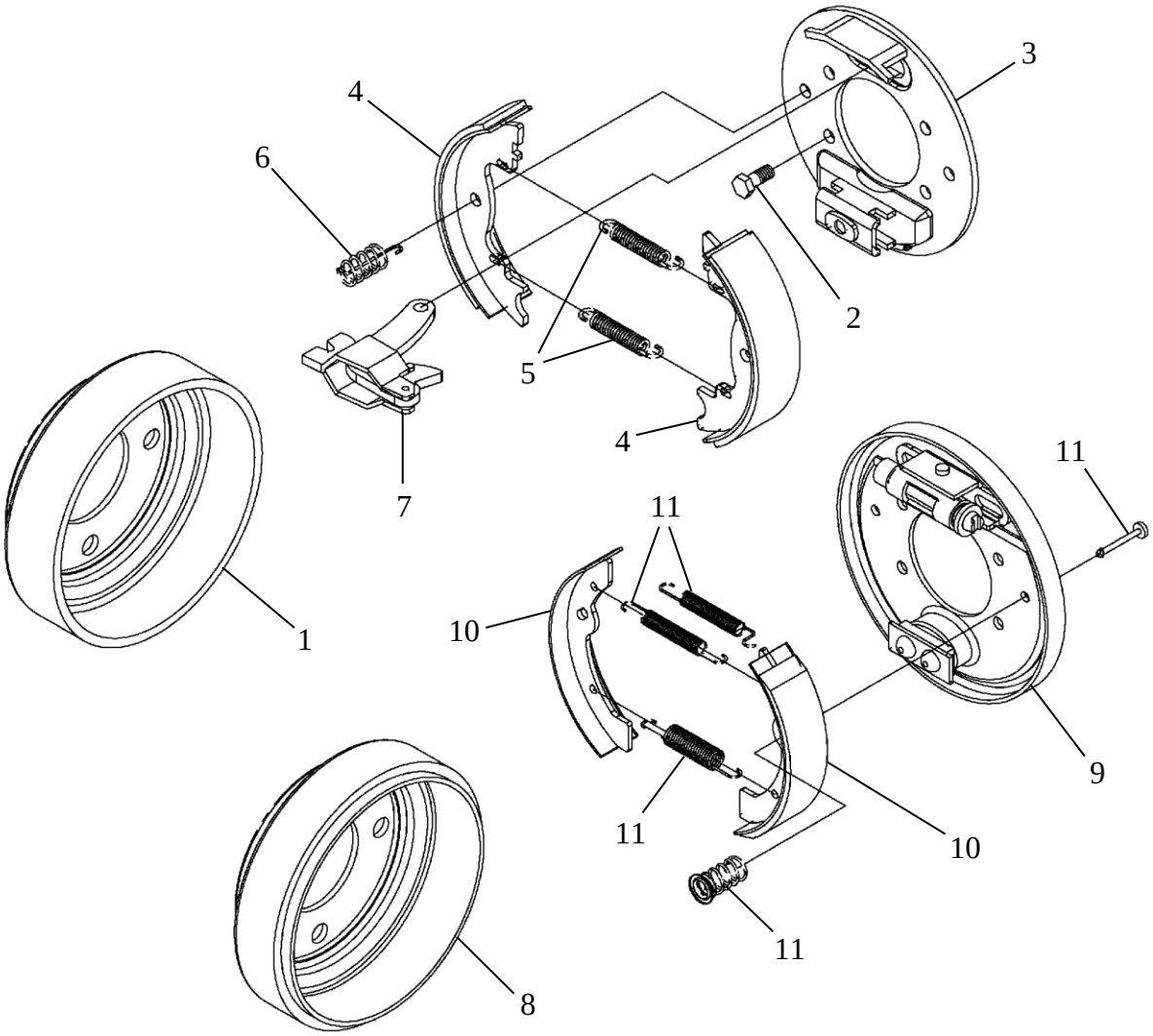
REF.	*PART NO.*	*DESCRIPTION*
1	2223240019	4.80X8 LRC SPORT TRAIL, 4 HOLES
2	2311000006	RUBBER BUMPER
3	2314262001	FRONT BUMPER
4	2320000007	CLEVIS HITCH
5	2332262002	PLYWOOD DECK
6	2343260053	BACKREST FRAME
7	2382260001	BACKREST CUSHION
8	2392262002	BRACKET, REAR TAIL/BRAKE LIGHT
9	2399000003	BRACKET, CHARGER CORD
10	2500262003	PLATE, DASH BOARD
11	2819262002	RIGHT CUP HOLDER
12	2819262003	LEFT CUP HOLDER
13	2930000052	QUICK PIN
14	6390260043	COVER, CATHEDRAL

DIFFERENTIAL DANA



REF.	*PART NO.*	*QTY*	*DESCRIPTION*
1	840293	6	RING, RETAINING, INTERNAL, 2.06 BORE
2	4171017	1	BRAKE ASSEMBLY, 160 MM X 30 MM, LEFT
3	4171018	1	BRAKE ASSEMBLY, 160 MM X 30 MM, RIGHT
4	002HD111	2	BEARING, BALL, SINGLE ROW, 6007
5	012CH427X	1	HOUSING, AXLE. SERVICE
6	012CV121-3	1	COVER, CARRIER, REAR, FINISH
7	2117300001	1	ASSEMBLY, DIFFERENTIAL CASE, HEAVY DUTY
8	012GS375	1	GEAR, HELICAL, OUTPUT, FINISH, 116T
9	2116300007	1	GEAR, INPUT, FINISH, 16.99 RATIO, ELECTRIC
10	012GZ155X	1	ASSEMBLY, SHAFT AND GEAR, INTERMEDIATE, FINISH
11	2102300002	1	BEARING, BALL, SINGLE ROW, 6203
12	012HD106	2	BEARING, BALL, SINGLE ROW, 6205-2RS
13	012HD155	2	BEARING, BALL, SINGLE ROW, 6304
14	012HD164	1	BEARING, BALL, SINGLE ROW, 6005
15	012HG157	2	PLUG, END CAP
16	012HH107	2	SEAL, OIL, 1.218 SHAFT, 2.000 BORE
17	2104300002	1	O-RING, 1.831 X 0.099
18	012HH149	2	O-RING, 2.05 X 0.098
19	012HH150	2	O-RING, 0.669 X 0.079
20	012HH153	1	SEAL, OIL, 0.948 SHAFT, 1.850 BORE
21	012HM129	4	BOLT, FLANGE HEAD, 3/8-24 X 1.25
22	2179000005	1	VENT
23	2179300005	1	PLUG, HEX HEAD, 3/4-16 STRAIGHT THREAD
24	012HN123	2	NUT, CASTLE, 3/4-16UNF
25	2179000004	4	NUT, FLANGE, LOCK, 3/8-24
26	012HN157	2	WASHER, HARDENED, 0.77 X 1.50 X 0.12
27	2179300002	1	RING, RETAINING, INTERNAL, 1.875 BORE
28	012HR138	2	PIN, COTTER, 1/8 X 1.25
29	012HU185X	2	ASSE,BLY, HUB, WHEEL
30	012SR189-11	1	SHAFT, AXLE, FINSHED
31	012SR-189-12	1	SHAFT, AXLE, FINSHED
32	012WA135	2	BRAKE DRUM, FINISH, HEAVY DUTY
33	2179242001	8	SCREW, FLANGE HEAD, M8-1.25 X 16MM
34	2179242002	8	NUT, LOCK, M8-1.25
35	2179300001	4	BOLT, HEX HEAD, 3/8-16 X 2.25
36	527A3-3	8	BOLT, WHEEL, 1/2-20 X 1.875
37	2179300006	10	SCREW, SELF-THREADING, 5/16-18 X 0.725

MECHANICAL DRUM BRAKES



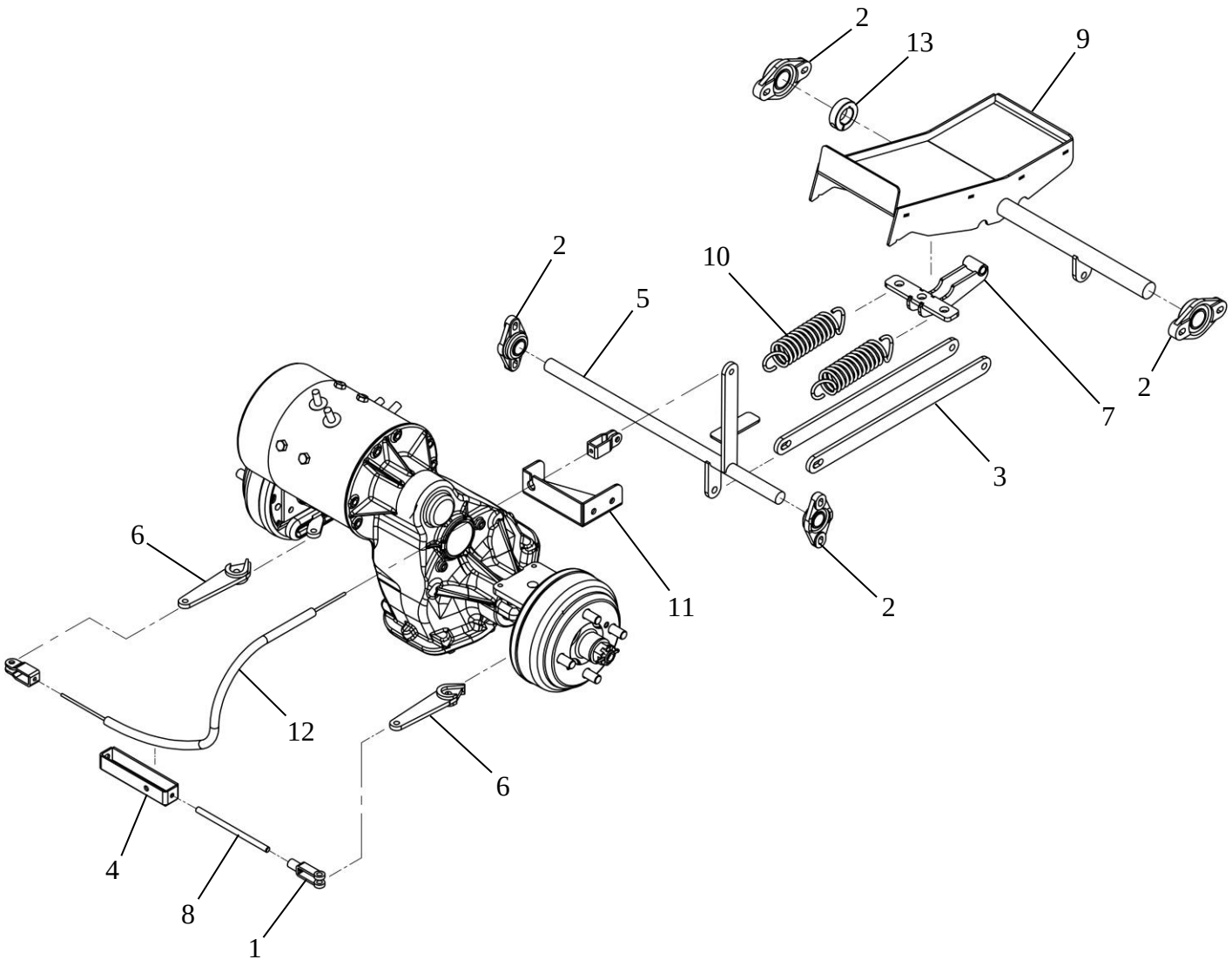
MANUAL ADJUSTEMENT, OLD

REF.	*PART NO*	*DESCRIPTION*
1	242051	DRUM
2		BOLT, 5/16-NC X 3/4
3	242841	BACK PLATE
4	242842	BRAKE SHOE
5	242844	EXT. SPRING
6	242845	HOLD SPRING
7	242846	LEVER

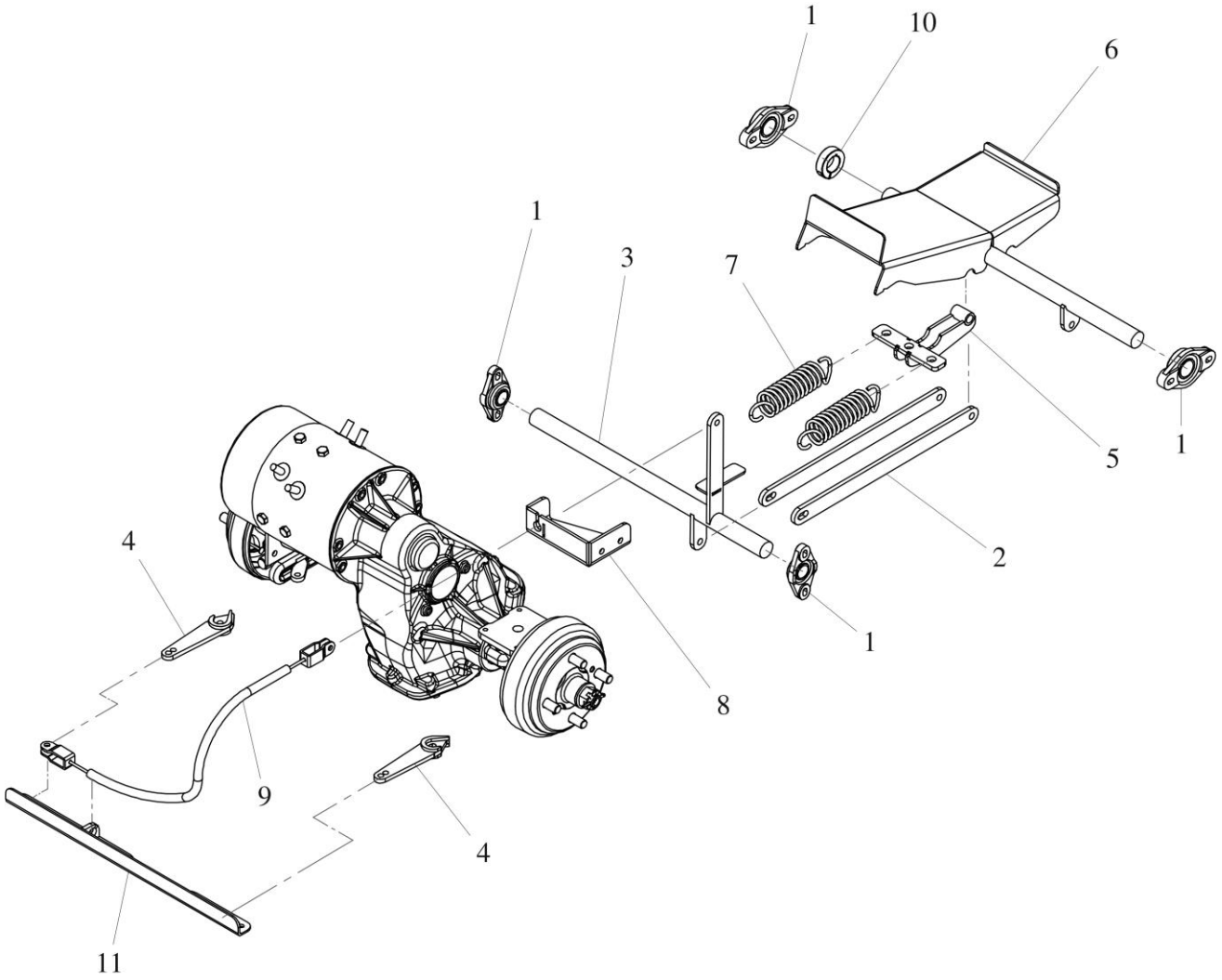
SELF ADJUSTEMENT, NEW SERIAL NUMBER 0707070 & +

REF.	*PART NO*	*DESCRIPTION*
8	2123242001	DRUM 4-BOLT
	2123240001	DRUM 5-BOLT
9	2413002	BACKING PLATE LH
	2413010	BACKING PLATE RH
10	2413003	BRAKE SHOE
11	2413004	SPRING KIT (5)

BRAKE CONTROLS

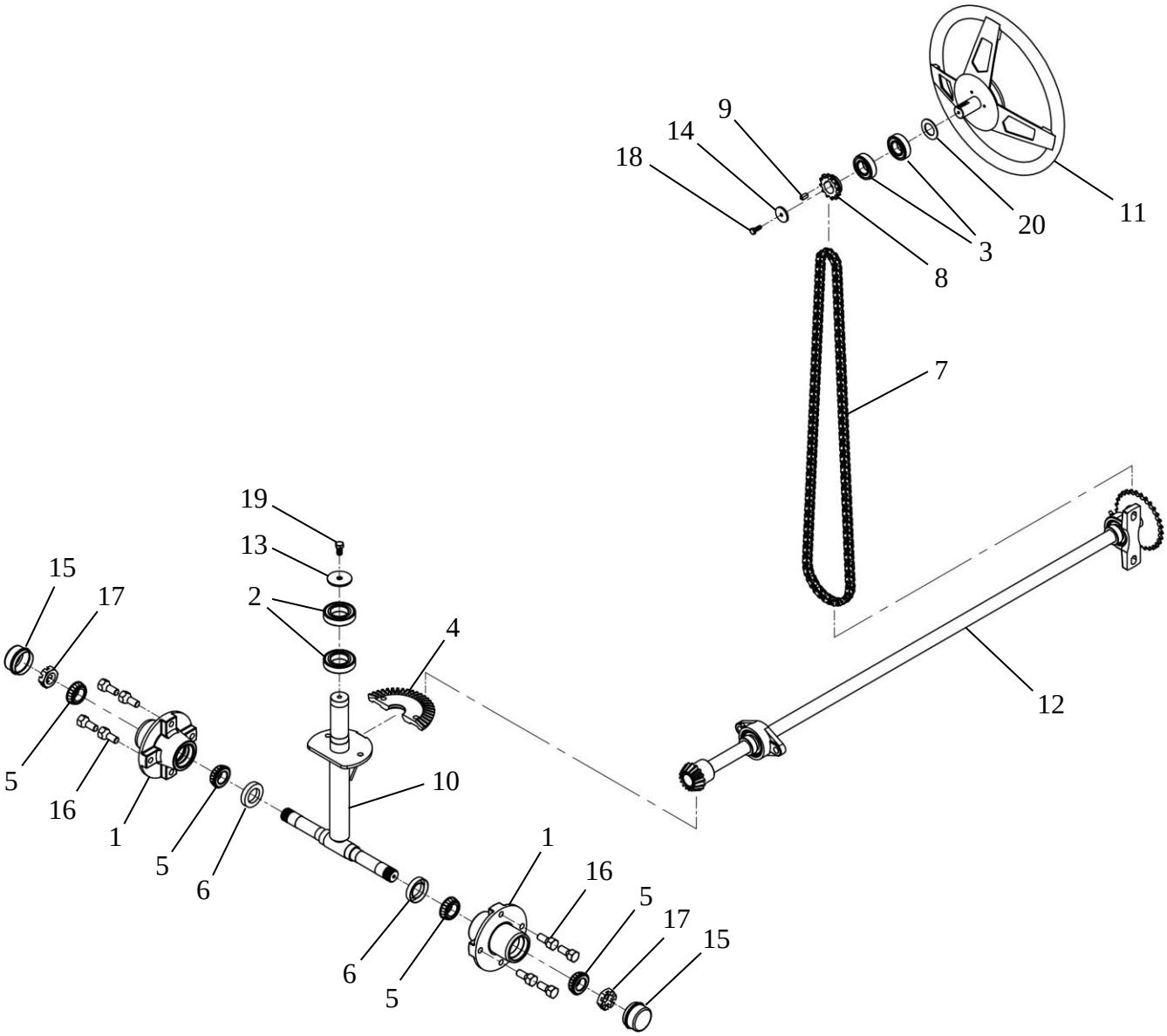


REF.	*PART NO.*	*DESCRIPTION*
1	2716005	5/16-NF YOKE
2	2106016001	PLASTIC FLANGE BEARING, 1 DIA
3	2130262010	DRAW BAR
4	2130800001	HANDBRAKE CABLE PULLER
5	2131262006	FRONT PIVOT
6	2131262008	BRAKE LEVER
7	2132262014	HOLDER, PEDAL SPRINGS
	2100060808-RF	RED BUSHING ø1/2 X 1/2
8	———	THREADED ROD 5/16-NF
9	2142262018	TREADLE
10	2190000008	SPRING
11	2399262012	SUPPORT BRAKE CABLE
12	2129262003	BRAKE CABLE ASSEMBLY
13	2915016001	ONE PIECE CLAMP-ON SHAFT



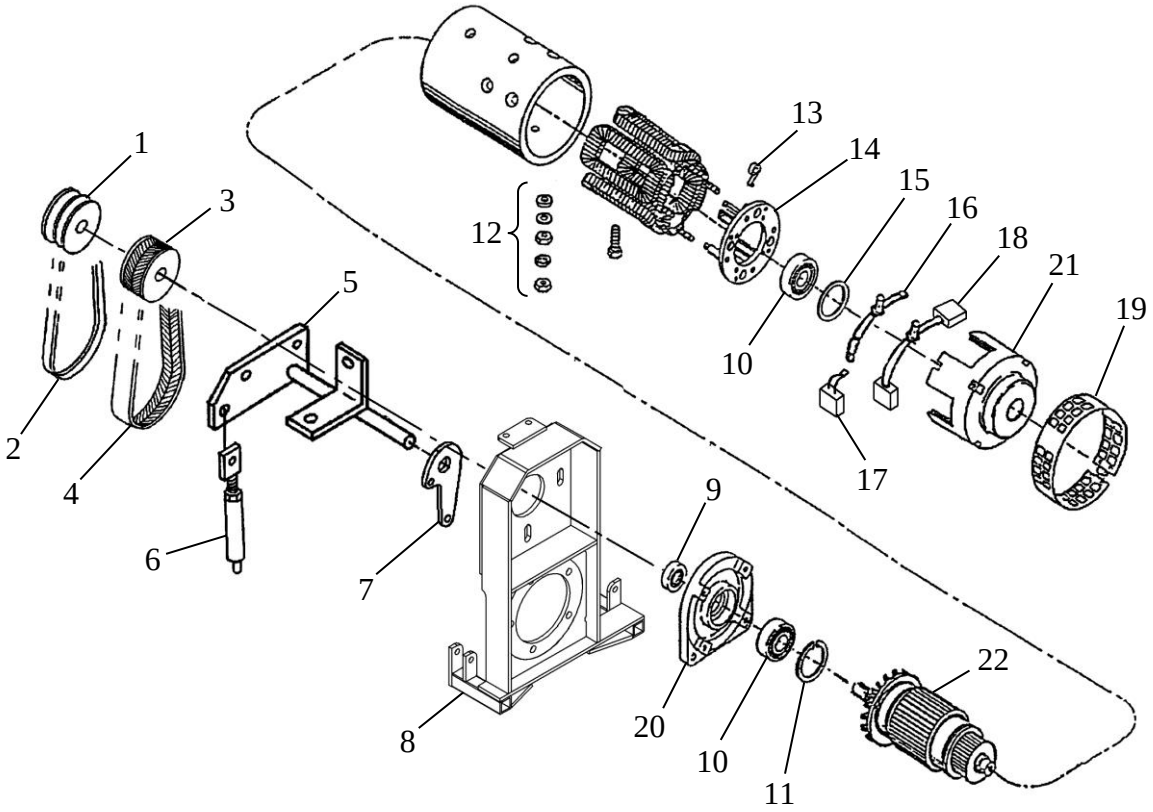
REF.	*PART NO.*	*DESCRIPTION*
1	2106016001	PLASTIC FLANGE BEARING, 1 DIA
2	2130262010	DRAW BAR
3	2131262012	FRONT PIVOT
4	2131262008	BRAKE LEVER
5	2132262014	HOLDER, PEDAL SPRINGS
	2100060808-RF	RED BUSHING ø1/2 X 1/2
6	2142262018	TREADLE
7	2190000008	SPRING
8	2399262012	SUPPORT BRAKE CABLE
9	2129262003	BRAKE CABLE ASSEMBLY
10	2915016001	ONE PIECE CLAMP-ON SHAFT
11	2130260009	BRAKE SYSTEM

STEERING ASSEMBLY



REF.	*PART NO.*	*DESCRIPTION*	*REF.*	*PART NO.*	*DESCRIPTION*
1	241004	HUB, 4 BOLT	**11**	2208260001	STEERING WHEEL
2	241406	BALL BEARING	**12**	2209260001	SHAFT ASSEMBLY
3	261403	BALL BEARING	**13**	2219260002	WASHER
4	261407	FRONT STEERING GEAR	**14**	2219260003	WASHER
5	2103300008	TAPER BEARING	**15**	2229300001	DUST CAP
6	2104300005	OIL SEAL	**16**	2910000025	WHEEL BOLT
7	2110262001	CHAIN	**17**	2910300002	CASTELLATED NUT
8	2111260003	SPROCKET	**18**	———	BOLT 1/4NC X 3/4
9	2118360002	KEY 1/4	**19**	———	BOLT 3/8NC X 3/4
10	2203260012	SPINDLE	**20**	———	SHIM 1/16

MOTOR AND DRIVE



COMMON PARTS

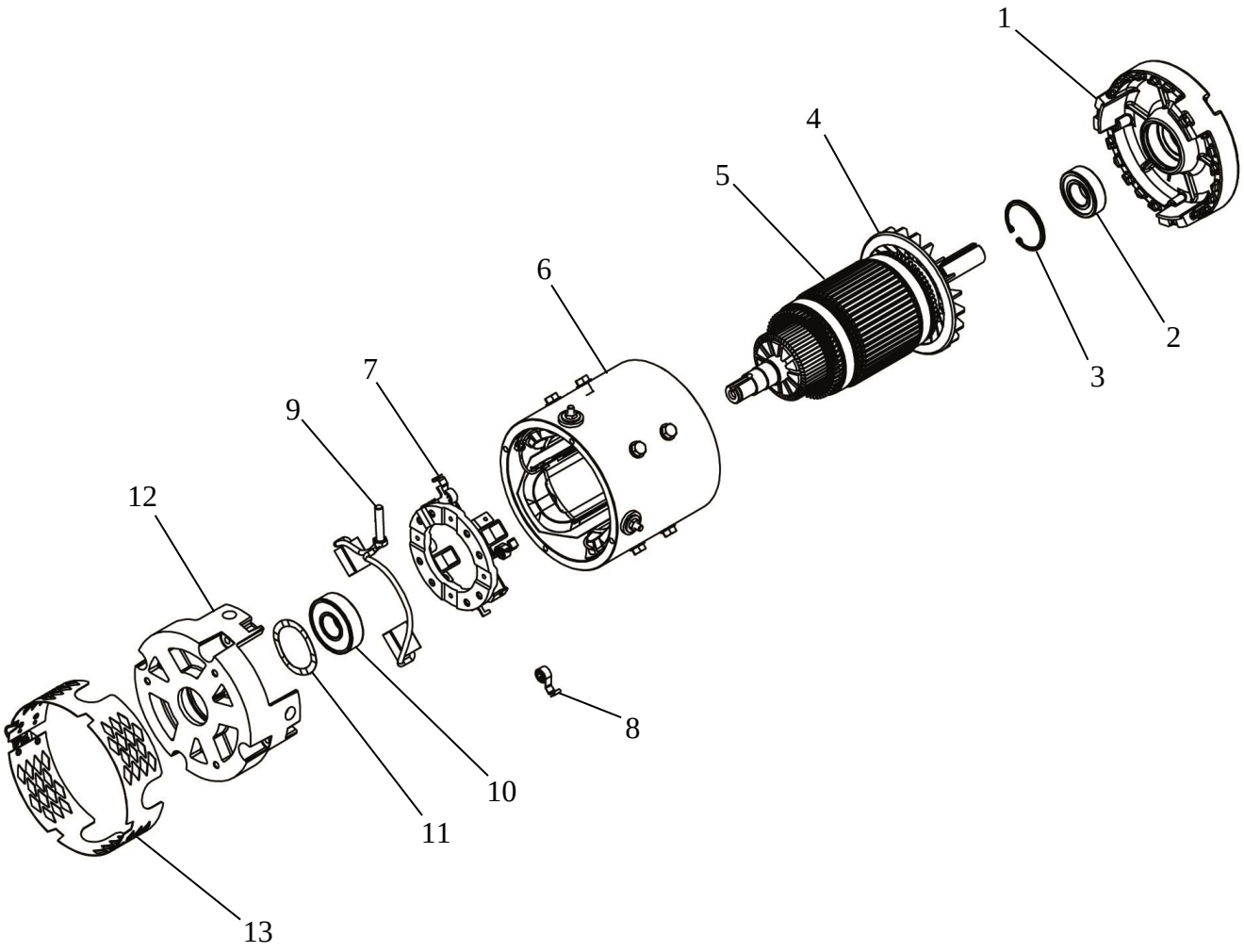
REF	*DESCRIPTION*	*PART NO*	*REF*	*DESCRIPTION*	*PART NO*
1	PULLEY	262424	**8**	MOTOR BASE, FORD	Contact manuf.
2	V BELT	242431		BELT TENSIONER	2156000012
3	PULLEY	3651001	**9**	SEAL	484001
4	BELT, EAGLE	3651002	**10**	BEARING	484003
5	MOTOR BASE, GM	Contact manuf.	**11**	SNAP RING	484004
6	BELT TENSIONER, LONG	2156000001	**12**	NUT WASHER PACK	484006
	BELT TENSIONER, SHORT	2156000007	**15**	WAVY WASHER	484013
7	PIVOT	2155000001	**19**	HEADBAND	484015
				EE HEADBAND KIT	A91-107A

SPECIFIC

REF	*DESCRIPTION*	*A89*	*B98*	*A00*	*D00 SEPEX*	*DC3 SEPEX*	*DD4 SEPEX*	*D&D SEPEX*
	MOTOR ASS'Y	484000	204050	2450002*	2450003*	3112210001*	3112230001	3112248001
13	BRUSH SPRING	484010	484010	2450006	2450006	2450006	2450006	
14	BRUSH PLATE	484011	484011	2450007	2450007	2450007	2450007	
16	LEAD ASSY.	484017	484017	N/A	N/A	N/A	N/A	
17	BRUSH	484009	484009	N/A	N/A	N/A	N/A	
18	LEAD AND BRUSH ASSY.	N/A	N/A	3112210004	3112210004	3112210004	3112210004	
20	DRIVE ENDHEAD	484002	484002	484002	484002	484002	N/A	
21	COMMUTATOR ENDHEAD	484014	484014	2450009	2450009	2450009	3112230003	
22	ARMATURE & FAN ASSY	484005	484005	2450004	2450004	3112210002	3112230002	
	FAN	484016	484016	484016	484016	484016	N/A	

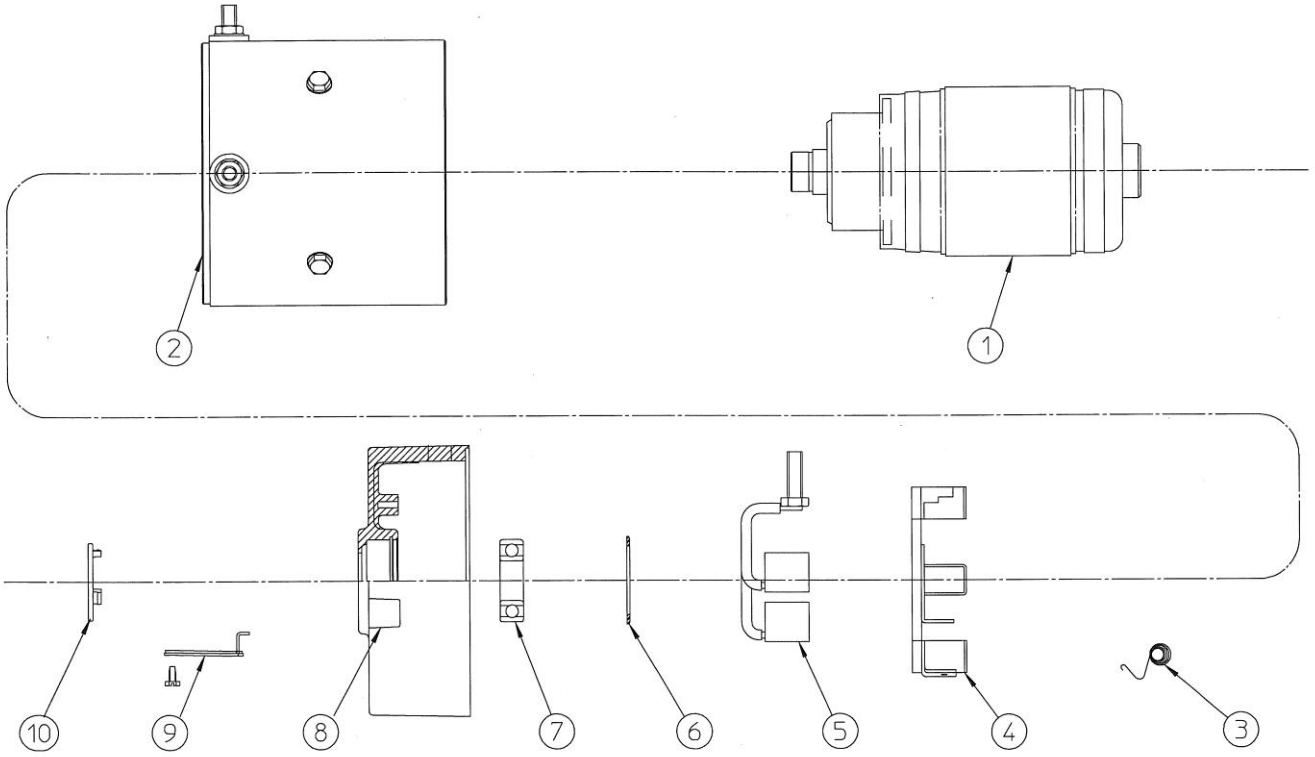
* WHEN EQUIPPED WITH ELECTROMAGNETIC BRAKE, PLEASE CONTACT THE MANUFACTURER.

SEPEX MOTOR DD3-4011A MAGNETIC BRAKE AND DRIVE



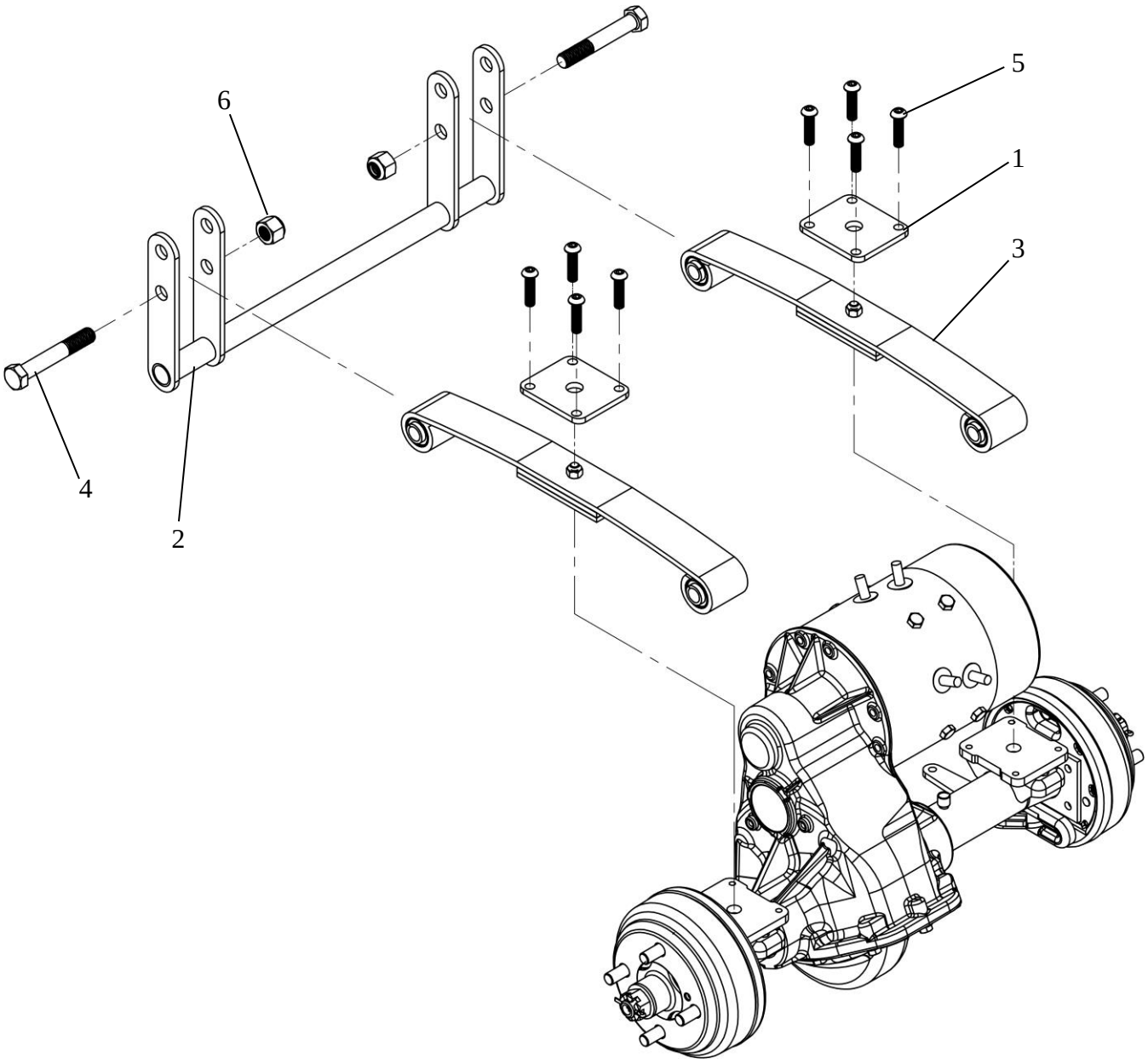
REF.	*PART NO.*	*DESCRIPTION*
1	484002	DRIVE END HEAD
2	484003	BEARING
3	484004	RETAINING RING
4	484016	FAN
5	3112236005	ARMATURE & FAN ASSEMBLY
6	3112236006	FRAME & FIELD ASSEMBLY
7	484011	BRUSH BOX ASSEMBLY (WITH SPRINGS)
8	484010	BRUSH SPRING
9	3112210004	BRUSH LEAD & TERMINAL SERVICE KIT
10	2102236001	BEARING
11	3112236008	WAVY WASHER
12	3112236009	COMMUTATOR END HEAD
13	484015	HEADBAND ASSEMBLY

SEPEX MOTOR DD4-4005, KIT No. 3112230001



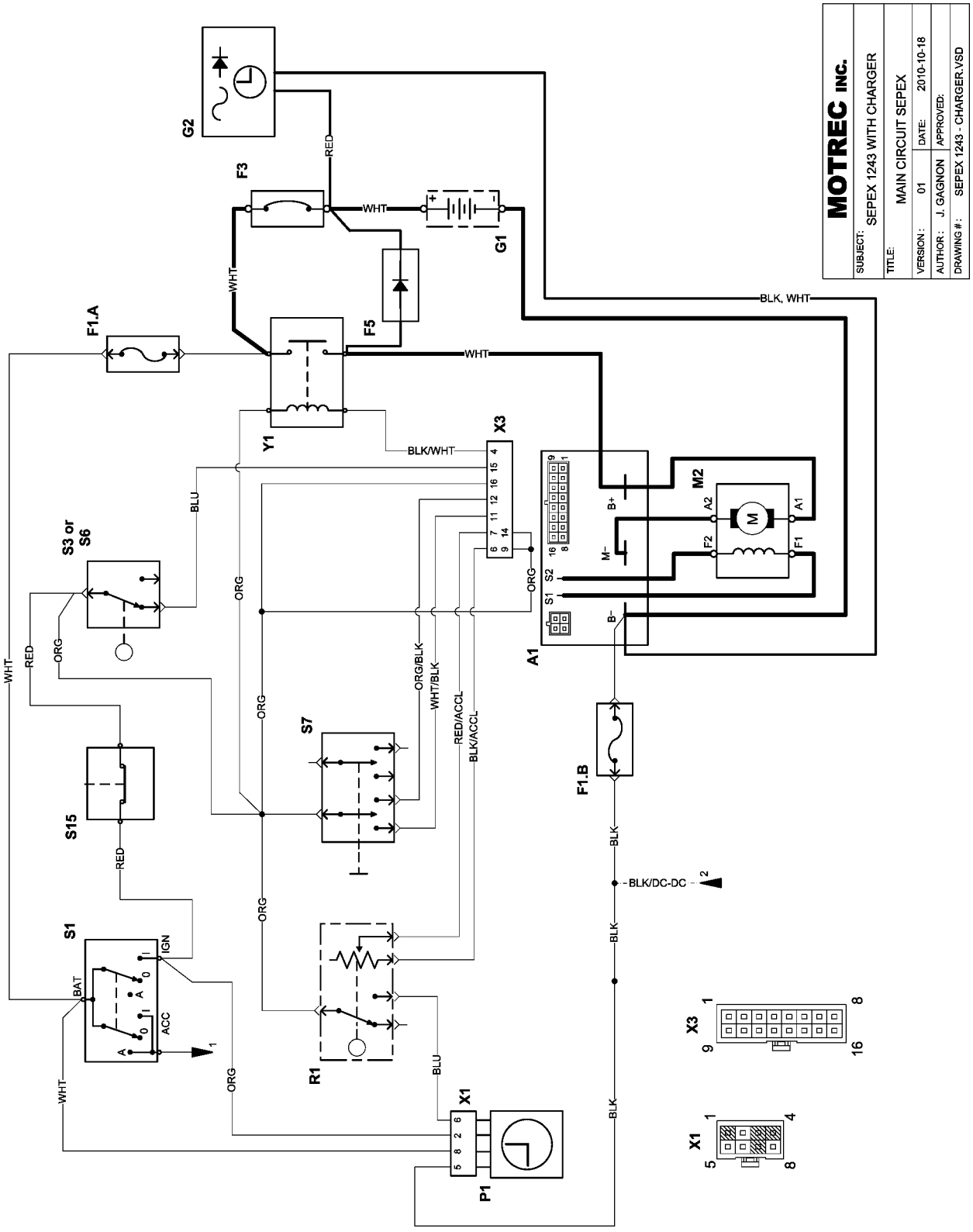
ITEM No.	PART No.	DESCRIPTION
1	**3112230002**	**ARMATURE**
2	**3112230004**	**FRAME & FIELD ASSEMBLY**
3	**2450006**	**BRUSH SPRING**
4	**2450007**	**BRUSH BOX ASSEMBLY**
5	**3112210004**	**BRUSH ASSEMBLY KIT**
6	**484004**	**RETAINING RING**
7	**484003**	**BEARING**
8	**3112230003**	**COMMUTATOR END HEAD**
9	**3112230005**	**COVER PLATE ASSEMBLY**
10	**2450010**	**HOLE PLUG**

REAR SUSPENSION

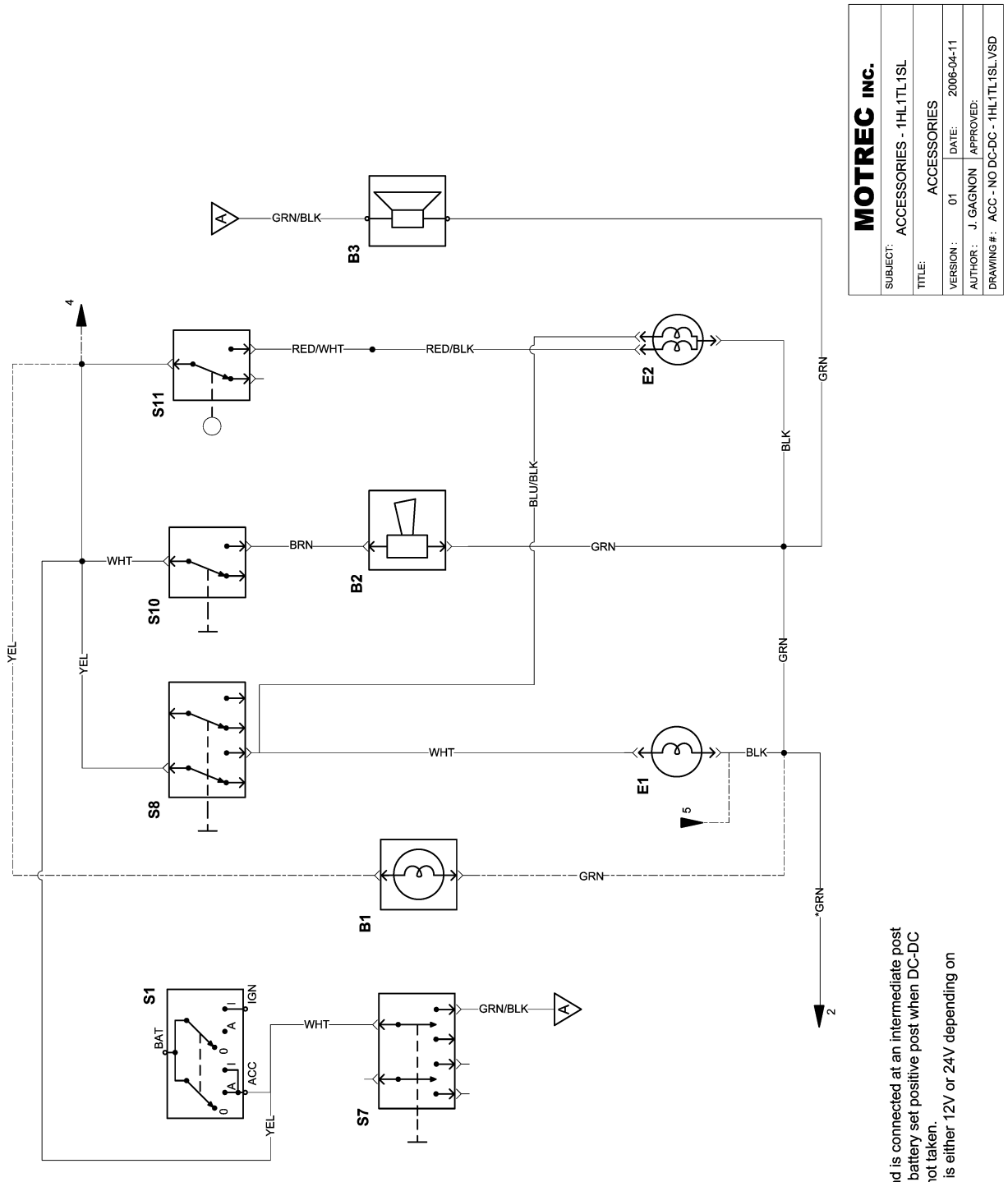


REF.	*PART NO.*	*DESCRIPTION*
1	2185270001	PLATE
2	2189260001	STABILIZER BAR
3	2192270002	LEAF SPRING
4	————	BOLT 5/8-NC X 4
5	————	BUTTON HEAD 3/8NF X 1 1/2
6	————	NYLON NUT 5/8-NC

ELECTRICAL DIAGRAM – SEPEX MAIN CIRCUIT
DIAGRAMME ÉLECTRIQUE – CIRCUIT PRINCIPAL SEPEX



ACCESSORIES – NO DC/DC CONVERTER
ACCESSOIRES – SANS CONVERTISSEUR DC/DC



* Accessories ground is connected at an intermediate post relative to vehicule battery set positive post when DC-DC converter option is not taken.
The relative voltage is either 12V or 24V depending on accessories

PARTS LIST AC

NO	DESIGNATION	REF
A5	CURTIS AC CONTROL. 36-48V, 350A - 1234	3105236001
	CURTIS AC CONTROL. 36-48V, 350A – 1232SE	3105236008
	CURTIS AC CONTROL. CONNECTOR	3105800001-C
	CURTIS AC CONTROL. CONNECTOR PINS	3105800001-P
B1	STROBELIGHT	*
B2	HORN	*
B3	REVERSE / MOTION ALARM	*
E1	HEADLIGHT	*
E2	TAIL / BRAKE / TURN / BACKUP LIGHT	*
E5	SAFETY BLUE LIGHT	3111000063
F14	FUSE, ANN 250A	3118224001
	FUSE HOLDER BUSS 4164	3118224002
G1	BATTERY	CALL FACTORY
G2	BATTERY CHARGER	**
G3	USB CHARGER SOCKET	3119000083
G4	12V, 10A MAX SOCKET	3119000082
K3	FLASHER RELAY	3127000002
K6	RELAY 24VDC SPST 280 STYLE, FOR BRIC	3127024001
M4	WIPER MOTOR	*
M7	CAB HEATER	*
M14	CAB FAN	*
M16	AC MOTOR 36-48VAC FAN COOLED	3112248005
	AC MOTOR 36-48VAC ENCLOSED (EE)	3112248003
P3	LCD DISPLAY CURTIS	3108000006
	DISPLAY CONNECTOR	3119000062
	DISPLAY CONNECTOR PINS	3130000019
R1	ACCELERATOR, VERTICAL MOUNT	3062001C
S1	SEALED KEY SWITCH 2 POSITION	3109000046
	SEALED IGNITION SWITCH WITHOUT KEY 2 POS	3109000047
	KEY ONLY FOR SEALED KEY SWITCH	3109000046K
	AUTOMOTIVE CONNECTOR 6 PIN PLUD WEDGE	ASCAW6S
	AUTOMOTIVE CONNECTOR PLUG 6 WAYS	AT06-6S
	AUTOMOTIVE CONNECTOR TERMINAL 16-18	AT62-16-0122-L
S3	SEAT SWITCH, KIT	2392240003
	SEAT SWITCH, MICRO-SWITCH	3109100002
	SEAT SWITCH, SEAT MOUNTED (MICHIGAN)	3109000003
	CONNECTOR	3109000004
	SEAT SWITCH, SEAT MOUNTED (GRAMMER)	2205002SW
S6	FOOT SWITCH	1269003
S7	FOWARD/REVERSE SELECTOR, ROCKER TYPE	*
S8	LIGHT SWITCH, ROCKER TYPE	*
S10	HORN BUTTON	*
S11	BRAKE SWITCH	*
	HYDRAULIC BRAKE LIGHT SWITCH	2374001
S13	TURN SIGNAL SWITCH	*
S15	EMERGENCY PUSH BUTTON	3109800012
	EMERGENCY PUSH BUTTON, LABEL	3109800006
S16	UP/DOWN SWITCH	*
S25	WIPER SWITCH	*
S26	HEATER SWITCH	*
S44	MAGNETIC SWITCH FOR PARKING BRAKE LEVER	3109000037

S45	COMBINED MAIN CONTACTOR AND MANUAL DISCONNECT SWITCH	3104224001
S46	INCHING SWITCH	*
U1	DC-DC CONVERTER	*
X34	PROGRAMMATION CONNECTOR	3119000063
	PROGRAMMATION CONNECTOR PINS	3130800001
X35	ENCODER CONNECTOR – VEHICLE PART	3119000048
	ENCODER CONNECTOR PINS – VEHICLE PART	3119000052
	ENCODER CONNECTOR – MOTOR PART	3119000049
	ENCODER CONNECTOR PINS – MOTOR PART	3119000053
	ENCODER CONNECTOR SEAL	3119000051
	ENCODER CONNECTOR LOCK	3119000050
X36	THERMAL SENSOR CONNECTOR – VEHICLE PART	3119000045
	THERMAL SENSOR CONNECTOR PINS – VEHICLE PART	3119000052
	THERMAL SENSOR CONNECTOR – MOTOR PART	3119000049
	THERMAL SENSOR CONNECTOR PINS – MOTOR PART	3119000053
	THERMAL SENSOR CONNECTOR SEAL	3119000051
	THERMAL SENSOR CONNECTOR LOCK	3119000047
Y3	ELECTROMAGNETIC BRAKE	3129000023

* Consult Motrec Illustrated parts

** Consult Motrec chargers

PARTS LIST

NO	DESIGNATION	REF	QTY
A1	SEPEX SPEED CONTROL, 24-36V, 300A	1243-4320	
A2	SEPEX SPEED CONTROL, 24-36V, 400A	1244-4451	
	SEPEX SPEED CONTROL, 36-48V, 400A	1244-5461	
	SEPEX SPEED CONTROL, 36-48V, 600A	1244-5651	
	SEPEX SPEED CONTROL, 36-80V, 600A	1244-6651	
A3	SERIES SPEED CONTROL, 24-36V, 400A	367013	
	SERIES SPEED CONTROL, 36-48V, 350A	487013	
	SERIES SPEED CONTROL, 24-36V, 275A	367010	
A4	SERIES SPEED CONTROL, 24-36V, 350A	1205X-4401	
	SERIES SPEED CONTROL, 36-48V, 350A	1205X-5301	
A5	CURTIS AC CONTROL. 36-48V, 350A	3105236001	
	CURTIS AC CONTROL. CONNECTOR	3105800001-C	
	CURTIS AC CONTROL. CONNECTOR PINS	3105800001-P	
B1	STROBELIGHT	*	
B2	HORN	*	
B3	REVERSE ALARM	*	
B4	MOTION BEEPER	*	
B5	BRAKING BRAKE ALARM	3100000001	
B6	WARNING BUZZER	3100480001	
B7	WARNING BUZZER	3100000007	
B8	RADIO JVC KD-40 WITH 2 AUX INPUT + USB	3114000002	
B9	SPEAKER OMAGE INT-EXT BLACK 5-1/4	3114000005	
E1	HEADLIGHT	*	
E2	TAIL/BRAKE LIGHT	*	
E3	AMBER FRONT LIGHT	*	
E4	BACKUP LIGHT	*	
E5	TAIL/BRAKE/TURN LIGHT - RIGHT	3111800001	
E6	TAIL/BRAKE/TURN LIGHT - LEFT	3111800002	
E7	DOME LIGHT	3669006	
E8	LOW BRAKE OIL LIGHT	3126000001	
F1	FUSE, 15A	246108K	
F2	CIRCUIT BREAKER, 50A	3107000001	
F3	CIRCUIT BREAKER, 150A	3107000002	
F4	DIODE	367012	
F5	DIODE BRIDGE	3669027	
F6	FUSE, 30A	4890028	
F7	FUSE, 300A	3118224003	
	FUSE BASE	3118224002	
F8	8 FUSES BASE	3118000005	
F9	FUSE, 10A	3069019F	
	FUSE HOLDER	246108	
F10	MAXI BLADE FUSE 30A	3118501005	
F11	FUSE, 1A		
F12	FUSE, 20A	3118000006	
F13	FUSE, 6A	3118000004	
F14	FUSE, ANN 250A	3118224001	
	FUSE HOLDER BUSS 4164	3118224002	
G1	BATTERY		
G2	BATTERY CHARGER		
G3	BATTERY (OPTIONAL)		
H1	PILOT LIGHT	*	

K1	FLASHER RELAY (INCANDESCENT)	3069004	
K2	110 VAC RELAY	366213	
	RELAY BASE	246216	
	RELAY RETAINING CLIP	246216C	
K3	FLASHER RELAY	3127000002	
K4	12V MULTIFUNCTION TIMER RELAY 11 PIN	3127662001	
	11 PIN RELAY BASE	3128662001	
K5	RELAY 24VDC SPDT 20A/10A	3127240001	
M1 (E-12)	PERMANENT MAGNET MOTOR, 1/3HP	112406	
(E-100)	PERMANENT MAGNET MOTOR, 1/2HP	124002	
M2	SEPEX MOTOR		
M3	SERIES MOTOR		
M4	WIPER MOTOR	*	
M5	WIPER MOTOR (ADJUSTABLE SPEED)	3113880001	
M6	24 VDC MOTOR – PUMP	204050	
M7	CAB HEATER	*	
M8	48 VDC MOTOR – PUMP	4160266001	
M9	IN-LINE BLOWER	3129480004	
M10	COOLING FAN CONTROL – 12V	3129224001	
M11	COOLING FAN CONTROL – 24V	3129224003	
M12	COOLING FAN MOTOR – 12V	3129224004	
M13	FAN	Call factory	
M14	CAB FAN	*	
M15	COOLING FAN MOTOR	3129124002	
M16	AC MOTOR 36-48VAC FAN COOLED	3112248005	
P1	INDICATOR (BDI), HOUR METER	*	
P2	INDACATOR, HOUR METER 72-80V	802RB7280	
P3	LCD DISPLAY CURTIS	3108000006	
	DISPLAY CONNECTOR	3119000062	
	DISPLAY CONNECTOR PINS	3130000019	
R1	HANDLE ACCELERATOR	3125012001	
	ACCELERATOR (STANDING DRIVER)	367004	
	MICROSWITCH	367005	
	POTENTIOMETER	367008	
	SPRING	2662001	
	ACCELERATOR (SITTING DRIVER)	2142100001	
	MICROSWITCH	3109100001	
	POTENTIOMETER	367003	
	PLASTIC GEAR	367015	
	SPRING	2462008	
	ACCELERATOR, VERTICAL MOUNT	3062001C	
	POTENTIOMETER	367008	
	SPRING	2262004C	
	MICROSWITCH	2262001C	
	LEVER	2262003C	
R4	RESISTANCE, 250 OHMS	367014	
R5	RESISTANCE, 5 KOHMS	2869003	
S1	KEY SWITCH	246205	
	SEALED KEY SWITCH 2 POSITION	3109000046	
	SEALED IGNITION SWITCH WITHOUT KEY 2 POS	3109000047	
	KEY ONLY FOR SEALED KEY SWITCH	3109000046K	
	AUTOMOTIVE CONNECTOR 6 PIN PLUD WEDGE	ASCAW6S	
	AUTOMOTIVE CONNECTOR PLUG 6 WAYS	AT06-6S	
	AUTOMOTIVE CONNECTOR TERMINAL 16-18	AT62-16-0122-L	
S2	DPDT KEY SWITCH	3109000023	

	DPDT KEY SWITCH BASE	3109000017	
	N.O. CONTACT	3109000016	
	N.F. CONTACT	3109000018	
S3	SEAT SWITCH, KIT	2392240003	
	SEAT SWITCH, MICRO-SWITCH	3109100002	
	SEAT SWITCH, SEAT MOUNTED (MICHIGAN)	3109000003	
	CONNECTOR	3109000004	
	SEAT SWITCH, SEAT MOUNTED (GRAMMER)	2205002SW	
S6	FOOT SWITCH	1269003	
S7	FOWARD/REVERSE SELECTOR, ROCKER TYPE	266211	
	FOWARD/REVERSE SELECTOR, COLUMN	436212	
	FORWARD/REVERSE SELECTOR, TILT/TEL COLUMN	366212	
S8	LIGHT SWITCH, ROCKER TYPE	1269004	
	LIGHT SWITCH, PUSH/PULL	486002	
S9	HIGH/LOW HEADLIGHT SWITCH	3109300002	
S10	HORN BUTTON	*	
	HORN BUTTON, COLUMN MOUNT	*	
	HORN BUTTON, TILT/TEL COLUMN	*	
	HORN BUTTON, FLOOR MOUNT	246220	
S11	BRAKE LIGHT SWITCH (STANDING DRIVER)	3109100002	
S12	SEAL BRAKE LIGHT SWITCH (SITTING DRIVER)	3109000043	
	HYDRAULIC BRAKE LIGHT SWITCH	2374001	
S13	FLASHER SWITCH	*	
S14	PARKING BRAKE SWITCH	3109100002	
S15	EMERGENCY PUSH BUTTON	3109800012	
	EMERGENCY PUSH BUTTON, LABEL	3109800006	
S16	UP/DOWN SWITCH	3109266001	
S17	HYDRAULIC PRESSURE SWITCH	3674005	
S18	STAB LOCK SWITCH	3109000029	
S19	EMERGENCY PUSH BUTTON, 250A	3109000005	
	MAINTENANCE SWITCH	3109000022	
	LOCK-OUT MAINTENANCE SWITCH	3109000030	
S20	EMERGENCY PUSH BUTTON	4869012	
S21	EMERGENCY PUSH BUTTON W CASE	3109000008	
S22	TOGGLE SWITCH 2P2T	3109000013	
S23	PRESSURE SWITCH NC	4874001	
S24	HIGH/LOW SELECTOR	55017	
S25	WIPERSWITCH, ADJUST SPEED	3109300005	
S26	HEATER SWITCH	3109300003	
S27	GREEN SWITCH (FORWARD)	3109124005	
S28	GREEN SWITCH (FAST)	3109124005	
S29	GREEN SWITCH (REVERSE)	3109124005	
S30	RED SWITCH (BRAKE)	3109124007	
S31	BLACK SWITCH (HORN)	3109124006	
S32	SIREN/RADIO	3114000001	
S33	SIREN (SPEAKER)	3115000001	
S34	LOW BRAKE OIL SWITCH	2125300003	
S35	TOGGLE SWITCH, ON/OFF	55017	
	ON/OFF PLATE, TOGGLE SWITCH	2469011	
S36	LEG LOCK SWITCH	3109000014	
S37	BATTERY DISCONNECT SWITCH	3109000022	
	LOCK-OUT LEVER	3109000030	
S38	PROGRAMMABLE KEY PAD	3129000003	
S39	PUSH BUTTON WARNING BUZZER	3109000036	

S40	SEALED PUSH BUTTON	3109000024	
	GREEN CAP FOR PUSH BUTTON	3109000025	
	RED CAP FOR PUSH BUTTON	3109000035	
	YELLOW CAP FOR PUSH BUTTON	3109000026	
	SPLASH GUARD FOR PUSH BUTTON	3109000027	
S41	ROTARY SELECTOR 3 POS	3109800015	
S42	LIMIT SWITCH DPDT NO W ADJ ROLLER	3109000038	
S43	SWITCH MAT	3109662003	
S44	MAGNETIC SWITCH FOR PARKING BRAKE LEVER	3109000037	
S45	SINGLE POLE ON/OFF MANUAL DISCONNECT 200A	3104224001	
U1	DC-DC CONVERTER	*	
V1	INVERTER/CHARGER 110VAC, 2400W	**	
X1	HOUR METER CONNECTOR		
X2	SPEED CONTROL CONNECTOR – 1244-XXXX		
X3	SPEED CONTROL CONNECTOR – 1243-XXXX		
X4	SPEED CONTROL CONNECTOR – 1205X-XXXX		
X5	BATTERY CHARGER CONNECTOR		
X6	BLUE CONNECTOR SB-50	SB-50B	
X7	GRAY CONNECTOR SB-50	SB-50G	
X8	RED CONNECTOR SB-50	SB-50R	
X9	YELLOW CONNECTOR SB-50	SB-50Y	
X10	BLUE CONNECTOR SB-175	SB-175B	
X11	GRAY CONNECTOR SB-175	SB-175G	
X12	RED CONNECTOR SB-175	SB-175R	
X13	YELLOW CONNECTOR SB-175	SB-175Y	
X14	BLUE CONNECTOR SBX-175	SBX-175B	
X15	GRAY CONNECTOR SBX-175	SBX-175G	
X16	RED CONNECTOR SBX-175	SBX-175R	
X17	YELLOW CONNECTOR SBX-175	SBX-175Y	
X18	BLUE CONNECTOR SB-350	SB-175B	
X19	GRAY CONNECTOR SB-350	SB-175G	
X20	RED CONNECTOR SB-350	SB-175R	
X21	YELLOW CONNECTOR SB-350	SB-175Y	
X22	BLUE CONNECTOR SBX-350	SBX-350B	
X23	GRAY CONNECTOR SBX-350	SBX-350G	
X24	RED CONNECTOR SBX-350	SBX-350R	
X25	YELLOW CONNECTOR SBX-350	SBX-350Y	
X26	CONNECTOR – 6 POSITIONS – MALE	4869038	
X27	CONNECTOR – 6 POSITIONS – FEMALE	4869039	
X28	MOUNT RECEPTACLE, 125V – 20A	3119480008	
	WEATHERPROOF BOX	3119480006	
	CONNECTOR BOX	3119480007	
	WEATHERPROOF COVER	3119480005	
X29	PVC GROUNDING PLUG, YELLOW	80003	
X30	TRAILER CONNECTOR – 7 POLE - MALE	3119480009	
X31	TRAILER CONNECTOR – 7 POLE - FEMALE	3119480010	
X32	TRAILER CONNECTOR – 9 POLE - FEMALE	3119480035	
X33	TRAILER CONNECTOR – 9 POLE - MALE	3119480036	
	MOUNTING BRACKET – TRAILER CONNECTOR	3119480003B	
X34	PROGRAMMATION CONNECTOR	3119000063	
	PROGRAMMATION CONNECTOR PINS	3130800001	
X35	ENCODER CONNECTOR – VEHICLE PART	3119000048	
	ENCODER CONNECTOR PINS – VEHICLE PART	3119000052	
	ENCODER CONNECTOR – MOTOR PART	3119000049	

	ENCODER CONNECTOR PINS – MOTOR PART	3119000053	
	ENCODER CONNECTOR SEAL	3119000051	
	ENCODER CONNECTOR LOCK	3119000050	
X36	THERMAL SENSOR CONNECTOR – VEHICLE PART	3119000045	
	THERMAL SENSOR CONNECTOR PINS – VEHICLE PART	3119000052	
	THERMAL SENSOR CONNECTOR – MOTOR PART	3119000049	
	THERMAL SENSOR CONNECTOR PINS – MOTOR PART	3119000053	
	THERMAL SENSOR CONNECTOR SEAL	3119000051	
	THERMAL SENSOR CONNECTOR LOCK	3119000047	
Y1	MAIN CONTACTOR – 24V	246111	
	HEAVY DUTY MAIN CONTACTOR – 24V	246112	
	HEAVY DUTY MAIN CONTACTOR – 24V	GE800AH205X0	
	MAIN CONTACTOR – 36V	3104236001	
	MAIN CONTACTOR – 48V	486222	
	HEAVY DUTY MAIN CONTACTOR – 48V	GE800AH208X0	
Y2	F/R CONTACTOR – 24V	246230	
	F/R CONTACTOR – 36V	366217	
	F/R CONTACTOR – 48V	486217	
Y3	ELECTROMAGNETIC BRAKE	3129000023	
Y4	ACCESSORIES SOLENOID – 36V	366215	
Y7	HYDROSTATIC MANIFOLD		
Y8	REVERSE CONTACTOR , 36-48V, 150A	436217	
Y9	FORWARD CONTACTOR , 36-48V, 150A	436218	
Y10	HEATER SOLENOID	246101	
Y11	ELECTROMAGNTIC BRAKE	Call Factory	
Y12	PUMP H.D. SOLENOID	486222	
Y13	DOWN VALVE	4170266001	
Y14	CONTACTOR – 24V	2469010	
Y15	PUMP CONTACTOR – 24V	246112	
Y16	STAB/UNSTAB SOLENOID	4874015	
Y17	DOWN VALVE SOLENOID	4874003	
Y18	UP VALVE SOLENOID	4874002	
Y19	LEVEL INTERLOCK SOLENOID	246230	
Y20	LEVEL SENSOR	3129480001	
Y21	INVERTER SOLENOID	486222	
Y22	RELAY 48V DPDT 10A	3127248002	
Y23	HYDRAULIC VALVE SOLENOID	*	
	F/R BUSSBARS	3119000008	
	STATIC STRAP	2450001	
Y24	POWER STEERING VALVE 48V	4170000003	
Y25	12V SOLENOID	4170480004	
Y26	HYDRAULIC VALVE SOLENOID 2W3P	4170480007	
Y27	RELAY 24V DPDT 10A	3127224001	
Y28	RELAY 12V	3069010	
Y29	RELAY 24V SPDT 40A	3127224002	
Y30	LEVEL SENSOR ELECTRONIC		

* Consult Motrec Illustrated parts

** Consult Motrec chargers

LISTE DE PIÈCES

NO.	DÉSIGNATION	RÉF.	QTÉ
A1	CONTRÔLEUR SEPEX, 24-36V, 300A	1243-4320	
A2	CONTRÔLEUR SEPEX, 24-36V, 400A	1244-4451	
	CONTRÔLEUR SEPEX, 36-48V, 400A	1244-5461	
	CONTRÔLEUR SEPEX, 36-48V, 600A	1244-5651	
	CONTRÔLEUR SEPEX, 36-80V, 600A	1244-6651	
A3	CONTRÔLEUR PMC, 24-36V, 400A	367013	
	CONTRÔLEUR PMC, 36-48V, 350A	487013	
	CONTRÔLEUR PMC, 24-36V, 275A	367010	
A4	CONTRÔLEUR PMC, 24-36V, 350A	1205X-4401	
	CONTRÔLEUR PMC, 36-48V, 350A	1205X-5301	
A5	CONTRÔLEUR CURTIS AC, 36-48V, 350A	3105236001	
	CONNECTEUR DE CONTROLEUR CURTIS AC	3105800001-C	
	TERMINAL DE CONNECTEUR DE CONTROLEUR CURTIS AC	3105800001-P	
B1	STROBOSCOPE	*	
B2	KLAXON	*	
B3	ALARME DE RECUL	*	
B4	ALARME DE MOUVEMENT	*	
B5	ALARME, FREIN STATIONNEMENT	3100000001	
B6	ALARME SONORE	3100480001	
B7	ALARME SONORE	3100000007	
B8	RADIO JVC KD-40 WITH 2 AUX INPUT + USB	3114000002	
B9	SPEAKER OMAGE INT-EXT BLACK 5-1/4	3114000005	
E1	LUMIÈRE AVANT	*	
E2	LUMIÈRE ARRIÈRE	*	
E3	LUMIÈRE DE CLIGNOTANTS, AMBRE	*	
E4	LUMIÈRE DE RECUL	*	
E5	LUMIÈRE ARRIÈRE AVEC CLIGNOTANT – DROITE	3111800001	
E6	LUMIÈRE ARRIÈRE AVEC CLIGNOTANT – GAUCHE	3111800002	
E7	PLAFONNIER	3669006	
E8	LUMIÈRE DE NIVEAU D'HUILE BAS	3126000001	
F1	FUSIBLE, 15A	246108K	
F2	RELAIS, 50A	3107000001	
F3	RELAIS, 150A	3107000002	
F4	DIODE	367012	
F5	PONT DIODE	3669027	
F6	FUSIBLE, 30A	4890028	
F7	FUSIBLE, 300A	3118224003	
	BASE DE FUSIBLE 300A	3118224002	
F8	8 BASE DE FUSIBLE	3118000005	
F9	FUSIBLE, 10A	3069019F	
	PORTE FUSIBLE	246108	
F10	FUSIBLE MAXI 30A	3118501005	
F11	FUSIBLE, 1A		
F12	FUSIBLE, 20A	3118000006	
F13	FUSIBLE, 6A	3118000004	
F14	FUSIBLE, ANN 250A	3118224001	
	PORTE FUSIBLE BUSS 4164	3118224002	
G1	BATTERIE		
G2	CHARGEUR À BATTERIE		
G3	BATTERIE (OPTIONNEL)		
H1	LAMPE TÉMOIN ROUGE	*	

K1	RELAIS DE CLIGNOTANT (INCANDESCENT)	3069004	
K2	RELAIS 110 VAC	366213	
	BASE DE RELAIS	246216	
	BROCHE DE SOUTIEN	246216C	
K3	RELAIS DE CLIGNOTANT (LED)	3127000002	
K4	RELAIS MULTIFONCTION DELAIS 12V, 11 BROCHES	3127662001	
	BASE DE RELAIS 11 BROCHES	3128662001	
K5	RELAIS 24VDC SPDT 20A/10A	3127240001	
M1 (E-12)	MOTEUR À AIMANT PERMANENT, 1/3HP	112406	
(E-100)	MOTEUR À AIMANT PERMANENT, 1/2HP	124002	
M2	MOTEUR, SEPEX		
M3	MOTEUR, SERIES		
M4	MOTEUR D'ESSUIE-GLACE	*	
M5	MOTEUR D'ESSUIE-GLACE (VITESSE AJUSTABLE)	3113880001	
M6	MOTEUR/POMPE, 24 VDC	204050	
M7	CHAUFFERETTE DE CABINE	*	
M8	MOTEUR/POMPE, 48 VDC	4160266001	
M9	VENTILATEUR AXIAL	3129480004	
M10	VENTILATEUR POUR CONTRÔLE – 12V	3129224001	
M11	VENTILATEUR POUR CONTRÔLE – 24V	3129224003	
M12	VENTILATEUR POUR MOTEUR – 12V	3129224004	
M13	VENTILATEUR	Appeler Manufacturier	
M14	VENTILATEUR DE CABINE	*	
M15	VENTILATEUR POUR MOTEUR	3129124002	
M16	MOTEUR AC 36-48VAC AVEC FANNE	3112248005	
P1	INDICATEUR (BDI), COMPTEUR D'HEURE	*	
P2	INDICATEUR, COMPTEUR D'HEURE 72-80V	802RB7280	
P3	ECRAN ACL CURTIS	3108000006	
	CONNECTEUR D'ÉCRAN ACL	3119000062	
	TERMINAL DU CONNECTEUR D'ÉCRAN ACL	3130000019	
R1	ACCÉLÉRATEUR SUR POIGNÉE	3125012001	
	ACCÉLÉRATEUR (CONDUCTEUR DEBOUT)	367004	
	MICRO-INTERRUPTEUR	367005	
	POTENTIOMÈTRE	367008	
	RESSORT	2662001	
	ACCÉLÉRATEUR (CONDUCTEUR ASSIS)	2142100001	
	MICRO-INTERRUPTEUR	3109100001	
	POTENTIOMÈTRE	367003	
	ENGRENAGE DE PLASTIQUE	367015	
	RESSORT	2462008	
	ACCÉLÉRATEUR, VERTICAL	3062001C	
	POTENTIOMÈTRE	367008	
	RESSORT	2262004C	
	MICRO-INTERRRUPTEUR	2262001C	
	LEVIER	2262003C	
R4	RESISTANCE, 250 OHMS	367014	
R5	RESISTANCE, 5 KOHMS	2869003	
S1	CLÉ DE CONTACT	246205	
	CLÉ DE CONTACT SCELLÉ, 2 POSITION	3109000046	
	INTERRUPTEUR DÉMARRAGE SANS CLÉ SCELLÉ 2 POS.	3109000047	
	CLÉ SEULEMENT, POUR CLÉ DE CONTACT SCELLÉ, 2 POS.	3109000046K	
	CONNECTEUR AUTOMOBILE MÂLE 6 BROCHES	ASCAW6S	
	CONNECTEUR AUTOMOBILE MÂLE 6 POSITION	AT06-6S	
	CONNECTEUR AUTOMOBILE TERMINAL 16-18	AT62-16-0122-L	

S2	SÉLECTEUR À CLÉ, DPDT	3109000023	
	SÉLECTEUR À CLÉ, DPDT, BASE	3109000017	
	CONTACT, N.O.	3109000016	
	CONTACT, N.F.	3109000018	
S3	INTERRUPTEUR DE SIÈGE, KIT	2392240003	
	INTERRUPTEUR DE SIÈGE, MICRO-INTERRUPTEUR	3109100002	
	INTERRUPTEUR DE SIÈGE, MONTÉ DANS SIÈGE (MICHIGAN)	3109000003	
	CONNECTEUR	3109000004	
	INTERRUPTEUR DE SIÈGE, MONTÉ DANS SIÈGE (GRAMMER)	2205002SW	
S6	INTERRUPTEUR AU PIED	1269003	
S7	SÉLECTEUR A/R À BASCULE	266211	
	SÉLECTEUR A/R À BASCULE, MONTÉ SUR COLONNE	436212	
	SÉLECTEUR A/R À BASCULE, COLONNE INCLINABLE	366212	
S8	INTERRUPTEUR DE LUMIÈRE À BASCULE	1269004	
	INTERRUPTEUR DE LUMIÈRE, POUSSER ET TIRER	486002	
S9	INTERRUPTEUR DE LUMIÈRE, HAUTE OU BASSE	3109300002	
S10	INTERRUPTEUR DE KLAXON	*	
	INTERRUPTEUR DE KLAXON, MONTÉ SUR COLONNE	*	
	INTERRUPTEUR DE KLAXON, COLONNE INCINABLE	*	
	INTERRUPTEUR DE KLAXON AU PIED	246220	
S11	INTERRUPTEUR DE FREIN (CONDUCTEUR DEBOUT)	3109100002	
S12	INTERRUPTEUR DE FREIN (CONDUCTEUR ASSIS)	3109000043	
	INTERRUPTEUR DE FREIN HYDRAULIQUE	2374001	
S13	COMMUTATEUR DE CLIGNOTANT	*	
S14	INTERRUPTEUR DE FREIN, FREIN STATIONNEMENT	3109100002	
S15	BOUTON POUSSOIR D'URGENCE	3109800012	
	ÉTIQUETTE DU BOUTON POUSSOIR D'URGENCE	3109800006	
S16	INTERRUPTEUR DE MONTÉE OU DESCENTE	3109266001	
S17	INTERRUPTEUR DE PRESSION	3674005	
S18	INTERRUPTEUR POUR BARRURE DE STABILISATEUR	3109000029	
S19	BOUTON POUSSOIR D'URGENCE, 250A	3109000005	
	INTERRUPTEUR POUR MAINTENANCE	3109000022	
	BARRURE D'INTERRUPTEUR DE MAINTENANCE	3109000030	
S20	BOUTON POUSSOIR D'URGENCE	4869012	
S21	BOUTON POUSSOIR D'URGENCE AVEC BOÎTIER	3109000008	
S22	INTERRUPTEUR À BASCULE 2P2T	3109000013	
S23	INTERRUPTEUR DE PRESSION, N.F.	4874001	
S24	INTERRUPTEUR DE LUMIÈRE, HAUTE OU BASSE	55017	
S25	INTERRUPTEUR D'ESSUIE-GLACE, VITESSE ADJUSTABLE	3109300005	
S26	INTERRUPTEUR DE CHAUFFERETTE	3109300003	
S27	INTERRUPTEUR VERT (AVANT)	3109124005	
S28	INTERRUPTEUR VERT (RAPIDE)	3109124005	
S29	INTERRUPTEUR VERT (RECUL)	3109124005	
S30	INTERRUPTEUR ROUGE (FREIN)	3109124007	
S31	INTERRUPTEUR VERT (KLAXON)	3109124006	
S32	SIRÈNE/RADIO	3114000001	
S33	SIRÈNE (HAUT PARLEUR)	3115000001	
S34	INTERRUPTEUR DE NIVEAU D'HUILE BAS	2125300003	
S35	INTERRUPTEUR À BASCULE, ON/OFF	55017	
	PLAQUE ON/OFF, INTERRUPTEUR À BASCULE	2469011	
S36	INTERRUPTEUR POUR PATTES DE STABILISATEUR	3109000014	
S37	INTERRUPTEUR DE MAINTENANCE – COUPE BATTERIES	3109000022	
	LEVIER POUR CADENAS	3109000030	
S38	SERRURE PROGRAMMABLE	3129000003	
S39	BOUTON POUSSOIR POUR ALARME SONORE	3109000036	

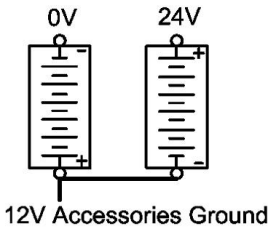
S40	BOUTON POUSSOIR SCELLÉ	3109000024	
	BOUTON VERT	3109000025	
	BOUTON ROUGE	3109000035	
	BOUTON JAUNE	3109000026	
	PROTECTEUR DE BOUTON	3109000027	
S41	SELECTEUR ROTATIF 3 POS	3109800015	
S42	INTERRUPTEUR NO/NC AVEC LEVIER AJUSTABLE	3109000038	
S43	MATELAS DE DÉTECTION	3109662003	
S44	INTERRUPTEUR MAGNÉTIQUE DE FREIN DE STATIONNEMENT	3109000037	
S45	BOUTON D'URGENCE ET CONTACTEUR COMBINÉ, 200A	3104224001	
U1	CONVERTISSEUR DC-DC	*	
V1	CHARGEUR 110VAC, 2400W	**	
X1	CONNECTEUR, INDICATEUR		
X2	CONNECTEUR, CONTRÔLEUR – 1244-XXXX		
X3	CONNECTEUR, CONTRÔLEUR – 1243-XXXX		
X4	CONNECTEUR, CONTRÔLEUR – 1205X-XXXX		
X5	CONNECTEUR, CHARGEUR À BATTERIE		
X6	CONNECTEUR BLEU, SB-50	SB-50B	
X7	CONNECTEUR GRIS, SB-50	SB-50G	
X8	CONNECTEUR ROUGE, SB-50	SB-50R	
X9	CONNECTEUR JAUNE, SB-50	SB-50Y	
X10	CONNECTEUR BLEU, SB-175	SB-175B	
X11	CONNECTEUR GRIS, SB-175	SB-175G	
X12	CONNECTEUR ROUGE, SB-175	SB-175R	
X13	CONNECTEUR JAUNE, SB-175	SB-175Y	
X14	CONNECTEUR BLEU, SBX-175	SBX-175B	
X15	CONNECTEUR GRIS, SBX-175	SBX-175G	
X16	CONNECTEUR ROUGE, SBX-175	SBX-175R	
X17	CONNECTEUR JAUNE, SBX-175	SBX-175Y	
X18	CONNECTEUR BLEU, SB-350	SB-175B	
X19	CONNECTEUR GRIS, SB-350	SB-175G	
X20	CONNECTEUR ROUGE, SB-350	SB-175R	
X21	CONNECTEUR JAUNE, SB-350	SB-175Y	
X22	CONNECTEUR BLEU, SBX-350	SBX-350B	
X23	CONNECTEUR GRIS, SBX-350	SBX-350G	
X24	CONNECTEUR ROUGE, SBX-350	SBX-350R	
X25	CONNECTEUR JAUNE, SBX-350	SBX-350Y	
X26	CONNECTEUR – 6 POSITIONS - MALE	4869038	
X27	CONNECTEUR – 6 POSITIONS - FEMALE	4869039	
X28	PRISE FEMELLE, 125V – 20A	3118480008	
	BOÎTIER ÉTANCHE	3119480006	
	CONNECTEUR POUR BOÎTIER	3119480007	
	COUVERCLE ÉTANCHE	3119480005	
X29	PRISE MALE - JAUNE, 125V – 15A	80003	
X30	CONNECTEUR DE REMORQUE – 7 FILS - MALE	3119480009	
X31	CONNECTEUR DE REMORQUE – 7 FILS - FEMALE	3119480010	
X32	CONNECTEUR DE REMORQUE – 9 POLE - FEMALE	3119480035	
X33	CONNECTEUR DE REMORQUE – 9 POLE - MALE	3119480036	
	SUPPORT DE MONTAGE – CONNECTEUR DE REMORQUE	3119480003B	
X34	CONNECTEUR DE PROGRAMMATION	3119000063	
	TERMINAL DU CONNECTEUR DE PROGRAMMATION	3130800001	
X35	CONNECTEUR DE L'ENCODEUR – PARTIE VEHICULE	3119000048	
	TERMINAL DU CONNECTEUR DE L'ENCODEUR – PARTIE VEHICULE	3119000052	

	CONNECTEUR DE L'ENCODEUR – PARTIE MOTEUR	3119000049	
	TERMINAL DU CONNECTEUR DE L'ENCODEUR – PARTIE MOTEUR	3119000053	
	JOINT D'ETANCHÉITÉ DU CONNECTEUR DE L'ENCODEUR	3119000051	
	BARRURE DU CONNECTEUR DE L'ENCODEUR	3119000050	
X36	CONNECTEUR DE LA SONDE THERMIQUE – PARTIE VEHICULE	3119000045	
	TERMINAL DU CONNECTEUR DE LA SONDE THERMIQUE – PARTIE VEHICULE	3119000052	
	CONNECTEUR DE LA SONDE THERMIQUE – PARTIE MOTEUR	3119000049	
	TERMINAL DU CONNECTEUR DE LA SONDE THERMIQUE – PARTIE MOTEUR	3119000053	
	JOINT D'ETANCHÉITÉ DU CONNECTEUR DE LA SONDE THERMIQUE	3119000051	
	BARRURE DU CONNECTEUR DE LA SONDE THERMIQUE	3119000047	
Y1	CONTACTEUR PRINCIPAL – 24V	246111	
	CONTACTEUR PRINCIPAL, SERVICE INTENSIF – 24V	246112	
	CONTACTEUR PRINCIPAL, SERVICE INTENSIF – 24V	GE800AH205X0	
	CONTACTEUR PRINCIPAL – 36V	3104236001	
	CONTACTEUR PRINCIPAL – 48V	486222	
	CONTACTEUR PRINCIPAL, SERVICE INTENSIF – 48V	GE800AH208X0	
Y2	CONTACTEUR A/R – 24V	246230	
	CONTACTEUR A/R – 36V	366217	
	CONTACTEUR A/R – 48V	486217	
Y3	FREIN ÉLECTROMAGNETIQUE	3129000023	
Y4	ACCESSOIRS SOLÉNOÏDE – 36V	366215	
Y7	TUBULURE HYDROSTATIQUE		
Y8	CONTACTEUR, 36-48V, 150A, RECUL	436217	
Y9	CONTACTEUR, 36-48V, 150A, AVANT	436218	
Y10	SOLÉNOÏDE, CHAUFFERETTE	246101	
Y11	FREIN ÉLECTROMAGNETIQUE	Appeler Manufacturier	
Y12	SOLÉNOÏDE, SERVICE INTENSIF, POUR POMPE	486222	
Y13	VALVE DESCENTE	4170266001	
Y14	CONTACTEUR - 24V	2469010	
Y15	CONTACTEUR – 24V, POMPE	246112	
Y16	SOLÉNOÏDE, STAB/DÉSTAB	4874015	
Y17	SOLÉNOÏDE, DESCENTE	4874003	
Y18	SOLÉNOÏDE, MONTÉE	4874002	
Y19	SOLÉNOÏDE, SENSEUR DE NIVEAU	246230	
Y20	SENSEUR DE NIVEAU	3129480001	
Y21	SOLÉNOÏDE INVERSEUR	486222	
Y22	RELAIS 48V DPDT 10A	3127248002	
Y23	SOLÉNOÏDE POUR VALVE HYDRAULIQUE	*	
	BARRE DE CONNECTION A/R	3119000008	
	BANDE ANTISTATIQUE	2450001	
Y24	VALVE DE DIRECTION 48V	4170000003	
Y25	SOLENOIDE 12V	4170480004	
Y26	SOLENOIDE DE VALVE HYDRAULIQUE 2W3P	4170480007	
Y27	RELAIS 24V DPDT 10A	3127224001	
Y28	RELAIS 12V	3069010	
Y29	RELAIS 24V SPDT 40A	3127224002	
Y30	DETECTEUR DE NIVEAU ELECTRONIQUE		

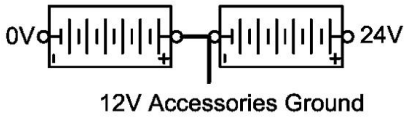
* Consultez la page des pièces illustrées Motrec.** Consultez la page des chargeurs Motrec.

BATTERY CONFIGURATIONS - 24V
CONFIGURATIONS DES BATTERIES – 24V

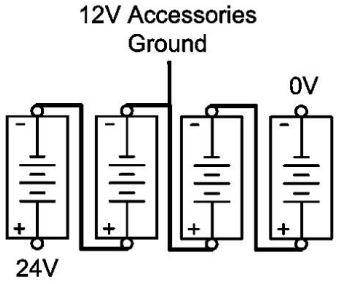
E-12



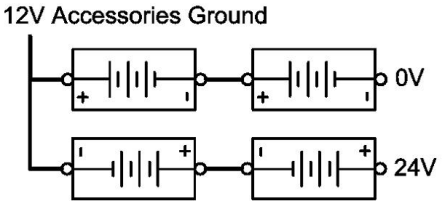
E-100



E-250EE
E-260
E-262
E-270
E-272



E-240
E-242
E-242 HD
E-250
E-250HD



DELTA-Q HF CHARGER

1

4

2

3

5

* NOT ILLUSTRATED

NO	*DESCRIPTION*	*PART NO* BUILT-IN	PORTABLE WITH SB-50	PORTABLE WITH SB-350
1	24V CHARGER (U.S. BATTERY)	3102240002	3102240009	3102240013
	24V CHARGER (LIFELINE BATTERY)	3102240003	3102240010	3102240014
	24V CHARGER (GEL 180AH BATTERY)	3102240004	3102240011	3102240015
	24V CHARGER (27TM BATTERY)	3102240005	3102240012	3102240016
	36V CHARGER (U.S. BATTERY)	3102302010	-	3102302007
	36V CHARGER (LIFELINE BATTERY)	3102302002	3102302005	3102302008
	36V CHARGER (GEL 180AH BATTRY)	3102302003	3102302006	3102302009
	48V CHARGER (U.S. BATTERY)	3102480011	-	3102480008
	48V CHARGER (LIFELINE BATTERY)	3102480003	3102480006	3102480009
	48V CHARGER (GEL 180AH BATTERY)	3102480004	3102480007	3102480010
	72V CHARGER (U.S. BATTERY)	3102720001		
2	CONNECTOR C13	3119000011		
*	PORTABLE CHARGER AC CORD		3120000001	3120000001
*	BUILT-IN CHARGER AC CORD	3120000002		
*	CORDSET, YELLOW PLUG & SB-50G		3120000003	
3	SOCKET 120VAC MALE FLANGE MOUNT	3119700001		
4	36V CHARGER (TPPL BATTERY)	3102360002	-	
	48V CHARGER (TPPL BATTERY)	3102480012		
5	CORD (12in) NEMA 5-15P TO IEC C13	3131314012		

QuiQ™ HF/PFC Battery Charger

Product Manual for:
QuiQ 912-24xx / 36xx / 48xx / 72xx

delta-q TECHNOLOGIES
Unit 3 – 5250 Grimmer St.
Burnaby, BC, Canada V5H 2H2
Tel: 604.327.8244 Fax: 604.327.8246
www.delta-q.com

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety, operating, and installation instructions – read before using charger.

Battery Safety Information

Warning: Use charger only on battery systems with an algorithm selected that is appropriate to the specific battery type. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal operation. Keep sparks, flames, and smoking materials away from batteries. Provide adequate ventilation during charging. Never charge a frozen battery. Study all battery manufacturers' specific precautions such as recommended rates of charge and removing or not removing cell caps while charging.

Electrical Safety Information

Danger: Risk of electric shock. Connect charger power cord to an outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded outlet is required to reduce risk of electric shock – do not use ground adapters or modify plug. Do not touch uninsulated portion of output connector or uninsulated battery terminal. Disconnect the AC supply before making or breaking the connections to the battery while charging. Do not open or disassemble charger. Do not operate charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way – refer all repair work to qualified personnel. Not for use by children.

INFORMATIONS IMPORTANTES DE SÉCURITÉ

Conserver ces instructions. Ce manuel contient des instructions importantes concernant la sécurité et le fonctionnement.

Information de Sécurité de la Batterie

Attention: Utiliser seulement sur les batteries 72V avec un algorithme approprié au type spécifique de batterie – voire le manuel. D´autres types de batteries pourraient éclater et causer des blessures ou dommages. Les batteries peuvent produire des gaz explosives en service normal. Ne jamais fumer près de la batterie et éviter toute étincelle ou flame nue à proximité de ces derniers. Fournisser la bonne ventilation lors du chargement. Ne jamais charger une batterie gelée. Prendre connaissance des mesures de précaution spécifiées par le fabricant de la batterie, p. ex., vérifier s´il faut enlever les bouchons des cellules lors du chargement de la batterie, et les taux de chargement recommandés.

Information de Sécurité Électrique

Danger: Risque de chocs électriques. Ne pas toucher les parties non isolées du connecteur de sortie ou les bornes non isolées de la batterie. Toujours connecter le chargeur à une prise de courant mise à la terre. Ne pas ouvrir ni desassembler le chargeur – referer toute reparations aux personnes qualifiés. Pas à l´usage des enfants.

Operating Instructions

1. Always use a grounded outlet. When using an extension cord, avoid excessive voltage drops by using a grounded 3-wire 12 AWG cord.
2. The charger will automatically turn on and go through a short LED indicator self-test (Models 912-xx0x will flash all LED's in an up-down sequence and Models 912-xx1x will alternatively flash its LED RED-GREEN) for two seconds. If the charger is connected to battery pack, a trickle current will be applied until a minimum voltage is reached. If the charger is used in an off-board application and the charger is waiting to be plugged into a battery pack, the charging algorithm number will be displayed for 11 seconds (see "Check / Change Charging Algorithm") before ultimately displaying an under-voltage fault (fault disappears when plugged into battery pack).
3. Once a minimum battery voltage is detected, the charger will enter the bulk charging constant-current stage. Models 912-xx0x will display the current to the battery on the bargraph and Model 912-xx1x will flash its LED GREEN off more than on to indicate <80% charge status. The length of charge time will vary by how large and how depleted the battery pack is, the input voltage (the higher, the better), and ambient temperatures (the lower, the better). If the input AC voltage is low (below 104VAC), then the charging power will be reduced to avoid high input currents (Models 912-xx0x 'AC' LED and Models 912-xx1x single LED both flash YELLOW). If the ambient temperature is too high, then the charging power will also be reduced to maintain a maximum internal temperature (Models 912-xx0x bargraph flashes and Models 912-xx1x single LED flashes YELLOW).
4. When the battery is at approximately 80% state of charge, the bulk stage has completed and an >80% charge indication is given (Models 912-xx0x turn on the '80%' LED and Models 912-xx1x will flash its LED GREEN on more than off). In the next phase known as the absorption or constant-voltage phase, the last 20% of charge is then returned to the battery. The charging could be terminated at this point if the vehicle requires immediate usage, however, it is highly recommended to wait until 100% charge indication is given to ensure maximum battery capacity and life.
5. A low current "finish-charge" phase is next applied to return and maintain maximum battery capacity (Models 912-xx0x will flash the '100%' LED).
6. When Models 912-xx0x '100%' LED or Models 912-xx1x single LED is continuously GREEN, the batteries are completely charged. The charger may now be unplugged from AC power (always pull on plug and not cord to reduce risk of damage to the cord). If left plugged in, the charger will automatically restart a complete charge cycle if the battery pack voltage drops below a minimum voltage or 30 days has elapsed.
7. If a fault occurred anytime during charging, a fault indication is given by flashing RED with a code corresponding to the error. There are several possible conditions that generate errors. Some errors are serious and require human intervention to first resolve the problem and then to reset the charger by interrupting AC power for at least 15 seconds. Others may be simply transient and will automatically recover when the fault condition is eliminated. To indicate which error occurred, a fault indication will flash RED a number of times, pause, and then repeat.
   [1 FLASH] Battery Voltage High: auto-recover
   [2 FLASH] Battery Voltage Low: auto-recover
   [3 FLASH] Charge Timeout: the charge did not complete in the allowed time. This may indicate a problem with the battery pack (voltage not attaining the required level), or that the charger output was reduced due to high ambient temperatures.
   [4 FLASH] Check Battery: the battery pack could not be trickle charged up to the minimum level required for the charge to be started. This may indicate that one or more cells in the battery pack are shorted or damaged.
   [5 FLASH] Over-Temperature: auto-recover. Charger has shutdown due to high internal temperature which typically indicates there is not sufficient airflow for cooling – see Installation Instructions 1). Charger will restart and charge to completion if temperature comes within accepted limits.
   [6 FLASH] QuiQ Fault: an internal fault has been detected. If Fault 6 is again displayed after interrupting AC power for at least 15 seconds, the charger must be brought to a qualified service depot.

Maintenance Instructions

1. For flooded lead-acid batteries, regularly check water levels of each battery cell after charging and add distilled water as required to level specified by battery manufacturer. Follow the maintenance and safety instructions recommended by the battery manufacturer.
2. Make sure charger connections to battery terminals are tight and clean.
3. Do not expose charger to oil, dirt, mud or to direct heavy water spraying when cleaning vehicle.

See flip side for **Product Specifications** and **Installation Instructions** for qualified personnel.

Specifications

DC Output – see Operating Instructions

QuiQ Model: 912-	24xx	36xx	48xx	72xx
Voltage-nom (V)	24	36	48	72
Voltage-max (V)	33.6	50.4	67.2	100
Current-max (A)	25	21	18	12
Battery Type	Specific to selected algorithm			
Reverse Polarity	Electronic protection – auto-reset			
Short Circuit	Electronic current limit			

AC Input

All models	
Voltage-max (Vrms)	85 – 265
Frequency (Hz)	45 - 65
Current-max (Arms)	12A @ 104VAC (reduced 20%<104V)
Current – nominal (Arms)	10A @ 120VAC / 5A @ 230VAC
AC Power Factor	>0.98 at nominal input current

Operation

Charger Model: 912-	xx0x (10 LED)	xx1x (1 LED)
AC ON	Solid YELLOW	LED Active
AC LOW	Flash YELLOW	Flash YELLOW
Thermal Cutback	Flash Bargraph	Flash YELLOW
<80% Charge Indicator	-	Short Flash GREEN
>80% Charge Indicator	Solid YELLOW	Long Flash GREEN
100% Charge Indicator	Solid GREEN	Solid GREEN
Fault Indicator	Flash RED	Flash RED
DC Ammeter	LED Bargraph	-
Bat Temp Compensation	Automatic	Optional
Maintenance Mode	Auto-restart if V<2.1Vpc or 30 days elapse	

Mechanical

All models	
Dimensions	28.0 x 24.5 x 11.0 cm (11 x 9.7 x 4.3")
Weight	<5 kg (<11 lbs) w/ standard output cord
Environmental	Enclosure: IP46
Operating Temperature	-30°C to +50°C (-22°F to 122°F), derated above 30°C, below 0°C
Storage Temperature	-40°C to +70°C (-40°F to 158°F)
AC input connector	IEC320/C14 (require ≥1.8m localized cord)
DC output connector	OEM specific w/ 12AWG wire

Regulatory

Safety	
EN 60335-1/2-29	Safety of Appliances/ Battery Chargers
UL2202	EV Charging System Equipment
UL1564 2nd Edition	Industrial Battery Charger
CSA-C22.2 No. 107.2	Battery Chargers- Industrial
Emissions	
FCC Part 15/ICES 003	Unintentional Radiators Class A
EN 55011	Radio disturbance characteristics (Class A)
EN 61000-3-2	Limits for harmonic current emissions
EN 61000-3-3	Limits of voltage fluctuations and flicker
Immunity	
EN 61000-4-2	Electrostatic discharge immunity
EN 61000-4-3	Radiated, radio-frequency, EMF immunity
EN 61000-4-4	Electrical fast transient/burst immunity
EN 61000-4-5	Surge immunity
EN 61000-4-6	Conducted Immunity
EN 61000-4-11	Voltage variations immunity

Installation Instructions

WARNING: The output of chargers with greater than 48V may pose an energy and/or shock hazard under normal use. These units must be installed in the host equipment in such a manner that the output cable and battery connections are only accessible with the use of a tool by qualified personnel.

1) Determine Mounting Location:
While its sealed nature allows the charger to be mounted virtually anywhere, the choice of mounting location and orientation is extremely important. For optimum performance and shortest charge times, mount the charger in an area with adequate ventilation. The charger should also be mounted in an area that will be relatively free of oil, dirt, mud, or dust since accumulations within the fins of the charger will reduce their heat-dissipating qualities. Optimal cooling also occurs when the charger is mounted on a horizontal surface with the fins vertical. More airflow from below the charger will help cool the fins, so mounting above open areas or areas with cut-outs for airflow is desirable. Contact Delta-Q for information on other mounting orientations. As the charger may get hot in operation, the charger must be installed such that risk of contact by people is reduced. The charger's AC plug must be located at least 18" above the floor/ ground surface and the status display must be visible to the user.

2) Mounting Procedure:
Mount the charger by the mounting plate using appropriate fasteners (i.e. 1/4" or M6 with locking hardware). For UL2202 compliance, a 12AWG green bonding wire with ring terminals must be attached from the bonding stud located on the front of the charger (identified by ⏚) to the vehicle frame. The vehicle connection must be made using corrosion resistant hardware (e.g., a #10 stainless steel machine screw with at least two threads of engagement and, if required, a paint piercing washer).

3) DC Battery Connection Procedure:
a) The green wire outputs battery voltage when the charger is not plugged into AC to provide an interlock function – see Fig. 1. **If used, a user-supplied 1A fast-blow external fuse must be installed inline to prevent damage. Shorting or drawing more than 1A may damage charger and void the warranty.**
b) Securely fasten the black ring terminal from the charger to the negative terminal ("-", "NEG", NEGATIVE") of the battery pack.
c) Check that the correct charge algorithm is being used – refer to section 4). Securely fasten the red ring terminal to the positive terminal ("+", "POS", "POSITIVE") of the battery pack.

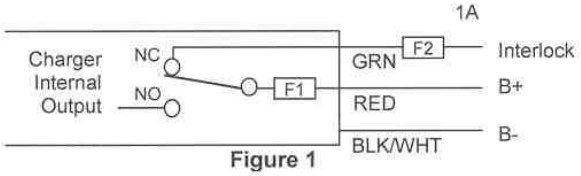


Figure 1

4) Check / Change Charging Algorithm:
The charger comes pre-loaded with algorithms for batteries as detailed in Table 1. If your specific battery model is not listed, please contact Delta-Q.
Each time AC power is applied with the battery pack NOT connected, the charger enters an algorithm select/display mode for approximately 11 seconds. During this time, the current Algorithm # is indicated on the '80%' LED (Models 912-xx0x) or on the single LED (Models 912-xx1x). A single digit Algorithm # is indicated by the number of blinks separated by a pause. A two digit Algorithm # is indicated by the number of blinks for the first digit followed by a short pause, then the number of blinks for the second digit followed by a longer pause.
To check / change the charging algorithm:
a) Disconnect the charger positive connector from battery pack. Apply AC power and after the LED test, the Algorithm # will display for 11 seconds.
b) To change algorithm, touch positive connector during the 11 second display period to the battery pack's positive terminal for 3 seconds and then remove – the Algorithm # will advance after 3 seconds. Repeat until desired Algorithm # is displayed. A 30 second timeout is extended for every increment. Incrementing beyond the last Algorithm moves back to the first Algorithm. After desired Algorithm # is displayed, touch the charger connector to the battery positive until the output relay is heard to click (~10 seconds) – algorithm is now in permanent memory.
c) Remove AC power from the charger and reconnect the charger positive connector to the battery pack. It is highly recommended to check a newly changed algorithm by repeating step 4) above.

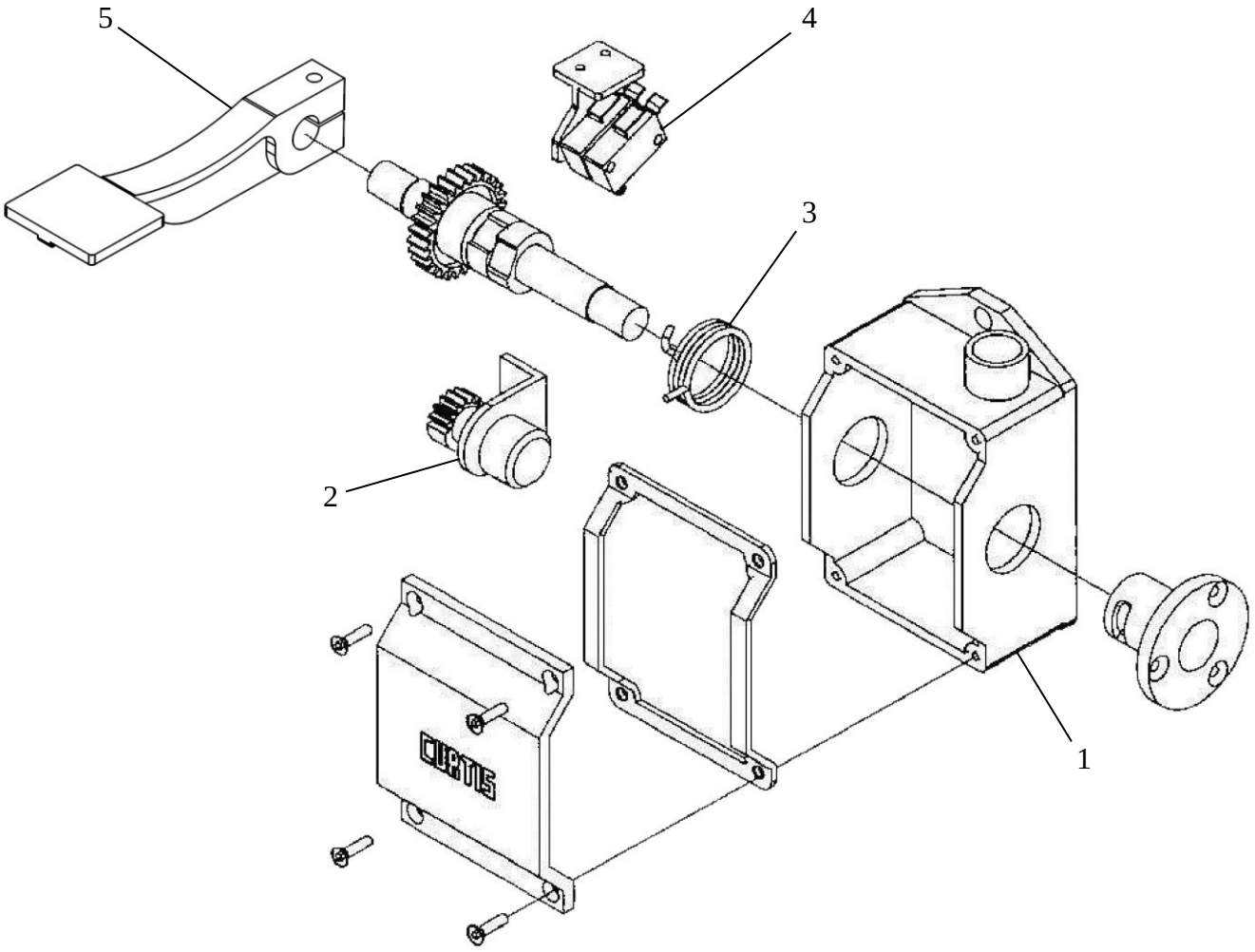
Alg #	Battery Type
35	Concorde 2xxAh AGM
27	Crown CR325 dv/dt
26	Deka 8GGC2 Gel
11	generic flooded CP dv/dt
8	Concorde 1xxAh AGM
7	Trojan J305 dV/dt
6	DEKA 8G31 Gel
5	Trojan 30XHS
4	US Battery US2200
1	Trojan T-105

Table 1.

Product warranty is two years - please contact dealer of original equipment for warranty service.

Note: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

CURTIS FOOT PEDAL



REF.	*PART NO.*	*DESCRIPTION*
1	2149262001	ACCELERATOR CURTIS MODIFIED
2	367008	POTENTIOMETER
3	2262004C	SPRING
4	2262001C	MICRO-SWITCH
5	———	LEVER MODIFIED

MOTREC ILLUSTRATED ACCESSORIES

Strobe light, pole mount
Amber 12-80V: 3116000002
Red 12-80V: 2469001
Blue 12-80V: 3690008

Strobe light, cab mount
Amber 12-48V: 3116250001
Red 12-48V: 3069026
Blue 12-48V: 3069014
Amber 72-80V:3116720001
Red 72-80V: 3116720002
Blue 72-80V: 3116720003

Amber turn lamp
12V: 3111000022
Bulb 12V: 3069021
Multi-LED amber turn lamp
Round Light: 3111000010
Grommet: 3111000008
Plug: 3119000009

Amber turn lamp 2”
12V : 3111330002

Amber turn lamp 2” LED white background
12V : 3111330003

Red Tail/Turn/Rev light
12V: 3111000002

Red Tail/Brake light
Grommet: 3269001
Plug: 246012A
12V : 2469021
24V : 2469022

Red Tail/Brake light
** Model EE **
Assembly: 3111000030
Housing: 3111000027
Plug: 3111000029
12V : 3111000028

Red Tail/Brake light
Housing: 3111000041
Red Tail/Brake light
Housing LED: 3111000044
Bulb 12V: 3117240001
Bulb 12V LED: 3117000010

Multi-LED Red Tail/Brake
Light: 3111000006
Grommet: 3111000008
Plug: 3119000009

Red Tail/Brake light
12V: 386002

Red Tail/Turn LED light
12-24V: 3111000037

Red Tail/Turn LED light
12-24V: 3111000037

Clear lamp Incandescent
12V: 3111000039
Clear lamp LED 12V: 3111000042
Bulb incandescent 12V : 1269008
Bulb 12V LED: 3117000001

Oval lamp
12V: 3111330001

LED Headlight
12V: 3111000036

Headlight
Left: 3111480003
Right: 3111480004
Bulb H/L: 3111480006
Bulb Turn: 3111480008
Bulb Mark: 3111480007

Headlight
Left: 3111480003
Right: 3111480004
Bulb H/L: 3117480001
Bulb Turn: 3117480003
Bulb Mark: 3117480002

Multi-LED Back-up
Light: 3111000007
Strobe light: 3111000013
Grommet: 3111000008
Plug: 3119000009

Back-up lamp
Grommet: 3269001
12V: 3669012
24V: 3669012A

Pedestal head lamp
12V: 3111240001
Bulb 12V: 2569001B
Bulb 24V: 2169001B

Pedestal head lamp - LED
12-48V: 3111000034

Headlamp 12V:3111250007

Headlamp
12V: 3111300001
Bulb 12V: 3111300002

Analog Voltmeter

12V :	3069007
24V :	2469002
36-48V :	3669002

HOBBS Gauge

24V:	2469026
36V:	3069038
48V:	4869037

DC-DC converter, 10A

12-48V:	3069019

DC-DC Converter, 25A

12-48V:	3124000002
72-80V:	3124880001

DC-DC Converter, 300W

24V:	3124224001
36-48V:	3124280001
72-80V:	3124880001

CONNECTOR:3124280002

Wiper motor

12V:	3113000001
24V:	486211

Wiper arm 2800000001

Wiper blade

14” Blade:	2800000002
18” Blade:	2800000003

Pantograph wiper arm 246233A

Pantograph wiper blade 246233

Limit switch 3109000029

Cab heater

12V:	3103300001
36V:	3669008
48V:	4869020

12V Dome light 3669006

12V Fan 3669013

Back-up alarm or
Motion beeper

12-48V :	3100000001
72-80V :	3105720001

12-24V Adjustable ECCO: 3100000002

12-48V Adjustable PRECO: 3100000004

Red Pilot light

12V:	246212
Bulb 12V:	246212B

Horn

12V:	246003
24V:	246013

Horn button VIP 2208224002

Horn button, column mount 3109000011

Horn button, dash mount 266210

Horn button 3109250001

Turn signal switch 246050

BATTERY DISCHARGE INDICATOR (HOBBS)

This indicator monitors :
- the residual capacity of batteries;
- operating hours;
- status of service down counter.

The residual capacity of the battery is monitored via an 8-LED bar display. When the left red LED lights, the batteries must be charged to avoid damage. The LED display starts flashing as a pre-warning signal. The lower voltage limit is adjustable via potentiometer “M” on the rear.

A	B	C	D	E	F	G	H	I	J	K
1,57	1,63	1,68	1,73	1,78	1,82	1,84	1,86	1,89	1,91	1,93

In order to activate a new adjustment, the unit has to be reset :
- 2.35V/cell reset voltage with battery remaining in vehicle;
- 2,09V/cell reset voltage after battery has been disconnected.

To maintain a good battery performance, it is recommended to limit the discharging to 80% of the battery capacity. The recommended setting for 6V batteries is F and the recommended setting for an industrial battery is K.

An internal relay can prevent over discharging and damaging the batteries. The relay can be wired to cut off the reverse direction, or energize an N.C. relay and alarm.
Turning off and on the vehicle will override the protection for 30 sec.

The current status (remaining operating hours before maintenance) of the service down counter is indicated for a period of 5 seconds after the key switch is turned on. When it is down to 0, the display flashes. After the maintenance, reset the counter: depress the button “R” on the rear. The service counter is factory programmable only.

24V UNIT #: 2469026
36V UNIT #: 3069038
48V UNIT #: 4869037

2- Orange, key switch
3- Relay +
4- Relay -
5- Black, battery –
6- Blue, hour counter
8- White, battery +