MOTREC

TA-364

OPERATOR AND MAINTENANCE MANUAL
SPARE PARTS LISTS INCLUDED

SERIAL NUMBER : 1050704 & UP

Printed in Canada

One Year Limited Warranty

Effective April 25, 2005, Motrec International Inc. (MOTREC) hereby warrants to the Original Retail Purchaser (Owner) that any of its vehicles shall be free from any defect in materials for a period of 90 DAYS while in the possession of such Original Retail Purchaser. This warranty IS NOT TRANSFERABLE to any subsequent Buyer.

The warranty period is extended to one year or one thousand (1,000) hours, which ever first occurs, on the electric motor, differential (parts that bathe in oil) and the electronic speed controller. MOTREC makes no warranty or representation with respect to the internal combustion engine, tires and batteries, since their respective manufacturers cover such parts. Accessories (light, gage, horn, etc), electrical contacts (switch, solenoid, contactor, relay), diodes & fuses, belts & pulleys, filters & spark plugs, lubricants, brake linings & shoes, brake drums & discs, seals, seats, trim and other items subject to wear are not included in this warranty; nor is any item that in MOTREC sole opinion, shows evidence of neglect, misuse, abuse, collision or alteration.

This warranty shall not apply to normal maintenance requirements as described in the User Manual, and to damages during shipment. The latter is the carrier's responsibility. No compensation will be allowed for delays.

To initiate warranty coverage on any MOTREC vehicle, the Dealer must complete and return the “Sales/Installation Report” to MOTREC within 30 days after delivery to the Original Retail Purchaser; or within 90 days after the delivery date to the Dealer, which ever occurs first. Failure to follow these procedures will result in considering the warranty coverage effective as of the shipment date from the factory.

The defective vehicle must be returned, at the Owner's expense, to an authorised MOTREC Dealer within 30 days after failure. The Owner will not be charged for parts and labour required for warranty repairs, which must be performed by an authorised MOTREC Dealer only. The vehicle will be returned at the owner’s expense. The Warranty Claim Forms must be completed and returned with the defective part(s) to MOTREC within 30 days after repair was done. No compensation will be allowed for damages caused by vehicle downtime.

It is the responsibility of the owner of the vehicle to make sure that the driver is properly trained and instructed in the safety features and operation of the vehicle, including vehicle stability, as required by OSHA and ANSI-B56. Operators shall read, understand and follow the safety and operating instructions in MOTREC Manual before driving the vehicle. Operators shall not be permitted to drive the vehicle unless a complete and adequate training has been provided. Driving a vehicle constitutes a hazard. The driver is responsible for the control of the vehicle while driving and must always evaluate and care for all peculiar situations that he or she may meet while driving. The driver assumes the inherent hazards related to this activity. The vehicle is designed for off-road use only. MOTREC disclaims any liability for incidental or consequential damages, to include, but not be limited to, personal injury or property damage arising from vehicle misuse, lack of maintenance or any defect in the vehicle.

It is the responsibility of the Owner of the vehicle to make sure that the service technicians are properly trained as required by OSHA and ANSI-B56. Service technicians shall read, understand and follow instructions in the MOTREC manual before servicing the vehicle. Only qualified and authorized personnel shall be permitted to maintain, repair, adjust and inspect the vehicle.

MOTREC prohibits, and disclaims responsibility for, any vehicle modification altering the weight distribution and stability, increasing the speed or affecting the safety of the vehicle. Such modifications can cause serious personal injury or property damage for which MOTREC disclaims any responsibility.

For Owners that are located outside North America, the warranty period starts the date of shipment from the factory, and the defective parts must be returned at the Owner's expense to MOTREC prior to warranty 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 for visible damage.

AFTER TURNING ON KEYSWITCH

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

BATTERIES

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.

BATTERY DISCHARGE INDICATOR

The green light moves from right to left as batteries are being discharged. When the green light is at the last position on the left the batteries must be recharged. A flashing light warns the operator that further discharge will damage batteries. See HOBBS indicator instructions

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 to neutral and remove the key before leaving the vehicle.

HORN

Depress the horn button on the steering column.

F/R SWITCH

The forward/neutral/reverse switch, with neutral at center, is located on the steering column. Set F/R switch to neutral before turning ignition key on. Turn lever forwards for forward direction and turn lever backwards for reverse direction. Always set switch to neutral, turn off all switches and remove the key before leaving the vehicle.

ACCELERATOR PEDAL

This tractor has a three-speed control. Depress gradually the pedal to move at desired speed.

EMERGENCY & PARKING BRAKE

The parking brake is automatically applied when the accelerator pedal is released and the tractor has completely stopped. The emergency brake is applied by releasing the left footswitch or the seat switch. Minimize the use of the emergency brake to avoid premature wear of the parking brake linings.
Never park the tractor on an incline.

SERVICE BRAKE

The electric service brake will be applied automatically when the accelerator pedal is released.
Release the pedal half way to get a moderate brake rate. Release the pedal completely for maximum brake rate.
If the emergency brake is not required, keep the left foot switch depressed.

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.

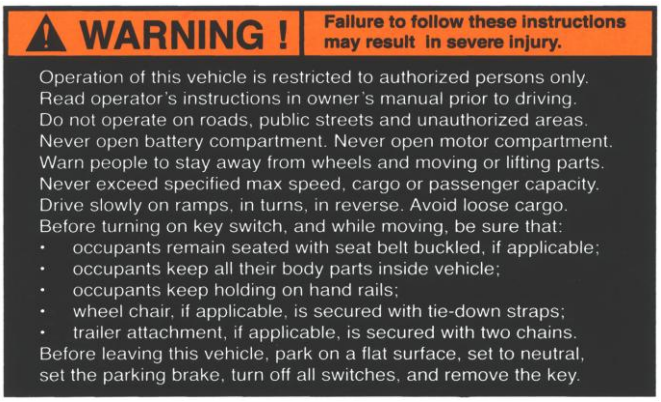
DECALS AND LABELS

! 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

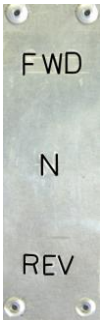


When an emergency push button is installed, this label is required (located under push button): # 3109800006

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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PERIODIC MAINTENANCE CHECKLIST

! WARNING !

Maintenance operations must be made by properly trained service technicians.

- Keep clear from moving parts such as tires, sheaves and motor.
- Check for all EE protections, when applicable, and keep cables and wires clear from mechanical and rubbing action
- 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.

CHECK/PERFORM — PERIOD HOURS	DAY	WEEK 20	MONTH 50	QUART. 200	YEAR 1000	2 YEARS 2000
MECHANICAL DAMAGE, OIL LEAKS	X					
REVERSE ALARM, DEADMAN SWITCH	X					
STATIC STRAP, min 2" contact with ground	X					
TIRE PRESSURE, pressure rating on tire		X				
WARNING DECALS & MARKINGS			X			
STEERING FOR PLAY			X			
ACCELERATOR ADJUSTMENT The first slower speed is activated when the accelerator pedal is depressed of ½ inch, the middle speed is activated at the middle of the accelerator pedal stroke and the fastest speed is activated when the accelerator pedal is at ½ inch from floor.			X			
BRAKE OPERATION The current in each electric motor should not be over 40A when the tractor is moving without load.			X			
POWERSTEERING OIL (ISO VG46) LEVEL			X			
CLEAN/TIGHTEN WIRE TERMINALS				X		
WASH BATTERY TOP WITH WATER				X		
MOTOR BRUSHES FOR WEAR -brushes must exceed holders				X		
STEERING ASSEMBLY, as instructed				X		
BRAKE LININGS FOR WEAR 1/16" (1.5 mm) minimum lining thickness.				X		
LUBRICATE brake pedal pivots, steering column, ball joints and kingpins.				X		
OIL LEAKS Power steering, motor reducer and planetary wheel drive				X		
OIL (SAE 30) LEVEL IN MOTOR REDUCER Before adding oil, check for leaks. Oil level must not be lower than ½ inch below plug hole.				X		
OIL (80W90) LEVEL IN PLANETARY WHEEL DRIVE, as instructed				X		
FRONT WHEEL BEARINGS PLAY				X		
TIGHTEN NUTS/BOLTS, electric terminals; drive; steering; brakes; suspension; body.				X		
REPLACE MOTOR REDUCER OIL (SAE 30) See previous instruction to verify oil level.					X	
REPLACE PLANETARY WHEEL DRIVE OIL (80W90), See previous instruction to verify oil level.					X	
CLEAN AND RE-PACK FRONT HUBS					X	
SERVICE MOTOR REDUCER, replace oil seals, bearings, oil (SAE 30)						X

OIL GRADE CHART

Vehicle system	Oil grade
Motor reducer	SAE30
Planetary wheel drive	80W90
Power steering	ISO VG46

FRONT AXLE AND STEERING

! CAUTION !

Before maintenance, turn off all switches, set to neutral, set parking brake, remove the key, and raise the front end of the vehicle supporting it with two jack stands of adequate capacity

STEERING INSPECTION

– Check tire inflation pressure, suspension components, tie rods straightness, tie rod ends play (wear), play (wear) in wheel bearings, kingpins and bushings.

REPLACING & ADJUSTING THE STEERING GEAR

– Remove the pitman arm;
– The steering box makes 6.5 turns, center the steering gear (3.25 turns from either side);
– Align the front wheel straight. Install the pitman arm.

TOE-IN ADJUSTEMENT

– With the wheels in straight forward direction, measure the inside (left to right) distance between the front tires, at the front and rear of the tires;
– Turn the rear tie rod until the distances are equal and tighten the two lock nuts on the tie rod.

REMOVING & GREASING OF FRONT HUBS, required once-a-year

– Remove dust cap and cutter pin, unscrew nut, remove hub;
– Inspect bearings and races for wear and replace worn bearings;
– Replace the seal;
– Pack the hub with wheel bearing grease and re-assemble.

ADJUSTING FRONT HUBS

– Tighten spindle nut to 30 ft-lb to seat the bearing and back off the nut to the next slot;
– Install a new cutter pin and the dust cap.

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.

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.

TA-364 TOWING INSTRUCTIONS

DISENGAGING WHEEL DRIVE

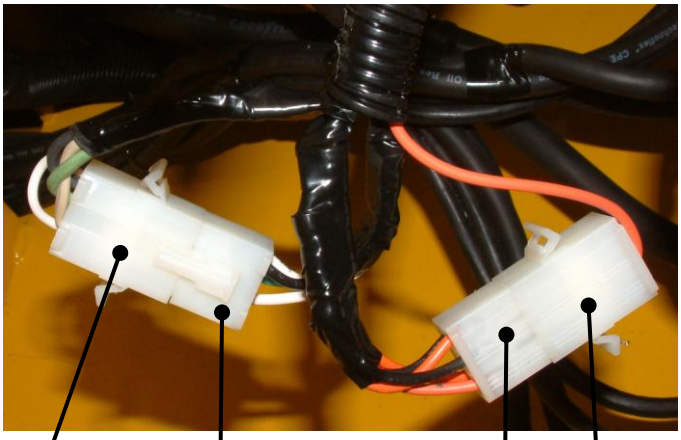
The best way to tow the vehicle is to disengage the planetary wheel drive. This prevents to over rev the drive system. See "Wheel Drive Instructions" section for details.

DISENGAGING ELECTROMAGNETIC BRAKES

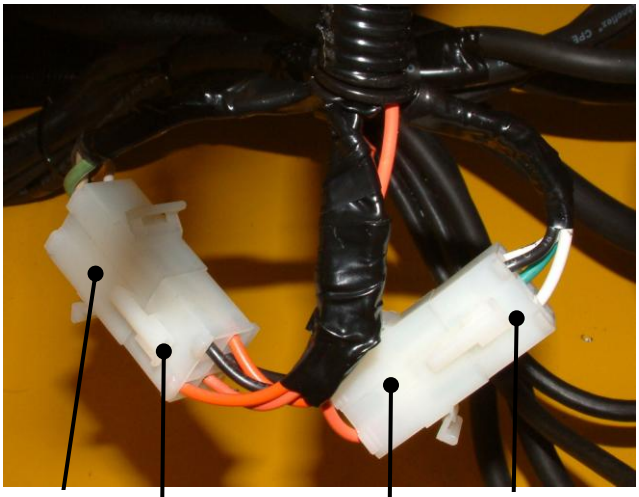
It's possible to tow the vehicle without disengaging the planetary wheel drive. To do it, the electromagnetic brakes must be activated by switching the white connectors located under the dashboard. See pictures below. Turn the key on to activate the electromagnetic brakes.

! WARNING ! Always tow the vehicle under its maximum speed. Towing at a higher speed will cause damage to the drive system.

VEHICLE UTILISATION MODE



TOWING MODE

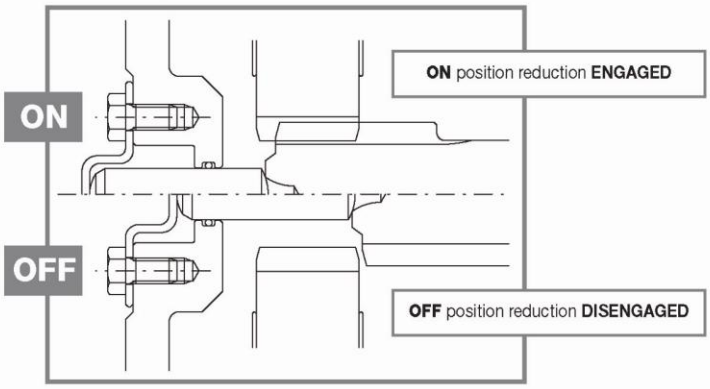


WHEEL DRIVE INSTRUCTIONS

DISENGAGEMENT

The **RRTD** range of wheel gears does not have the disengagement device fitted as a standard feature.
All the **RRWD** range of wheel gears are fitted with the disengagement device except for some ratios (given in the single data sheets) that do not permit its use.
Only the dual stage versions of the **RRM** range of wheel gears have a disengagement device.

Standard disengagement activation diagram:



MAINTENANCE

Ordinary maintenance should be carried out by qualified personnel in accordance with the methods and times programmed by the manufacturer.
The components should be mounted and dismounted only with suitable equipment.
Always and only use genuine ***Reggiana Riduttori*** spare parts, to guarantee total reliability and safety.

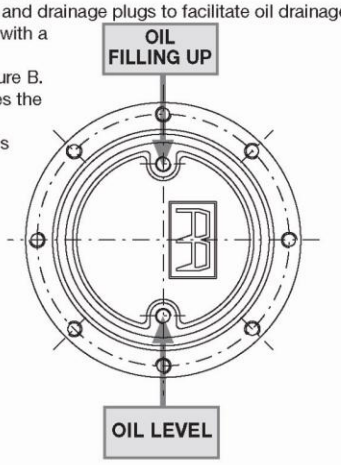
⚠ ***IMPORTANT: observe all the safety conditions during maintenance jobs.***

Ordinary maintenance

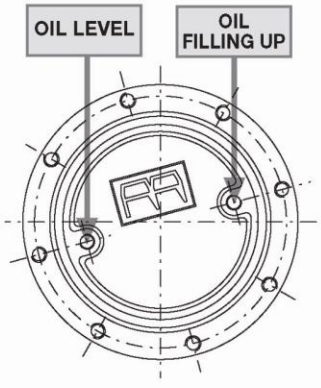
RRTD, **RRWD** and **RRM** wheel gears do not require ordinary maintenance, except for changing the oil periodically at the frequencies indicated in the **LUBRICATION** paragraph.
Only a periodical check of the level of the oil and the state of the seals is necessary.
Should an increase of oil be found when the level is being checked, this is an indication that there is a probable blow-by in the hydraulic motor, or in the internal multiple-disc brake (if used). In either case contact the ***Reggiana Riduttori*** assistance service.

Oil change

Change the lubricant oil according to the intervals described in the paragraph "Lubrication", as follows:
- Position the wheel as shown in figure A.
- Unscrew and remove the filling up and drainage plugs to facilitate oil drainage.
- Wash the inside of the wheel gear with a specific detergent.
- Position the wheel as shown in figure B.
- Fill up with oil until the level reaches the drainage hole.
- Close the plugs, replacing the seals each time.



A: OIL DRAINAGE POSITION



B: OIL FILLING UP POSITION

TROUBLESHOOTING

Should an anomaly occur during operation of the wheel gear consult the following table. If the problem persists, contact the closest "***Reggiana Riduttori*** assistance centre".

ANOMALY	POSSIBLE CAUSE	SOLUTION
Oil leakage from the seals	1) Hardening of the seals due to prolonged storing	1) Clean the area and check for leakage after a few days
	2) Seals damaged or worn	2) Contact an Assistance Centre
	3) Too much lubricant	3) Check oil level
Vibrations and/or excessive noise	1) Wheel gear not installed correctly	1) Check the fixing
	2) Internal anomaly	2) Contact an Assistance Centre
	3) Bearings badly lubricated or faulty	3) Contact an Assistance Centre
	4) Dented or chipped teeth	4) Contact an Assistance Centre
The stationing disc brake fails to disengage	1) Lack of pressure in the braking circuit	1) Check the brake connection
	2) Discs stuck due to the period of stationing	2) Apply pressure to the brake and turn the wheel by turning the motor on
	3) Brake seals faulty	3) Contact an Assistance Centre
Stationing disc brake does not block	1) Residual pressure in the circuit	1) Check hydraulic circuit
	2) Discs worn	2) Contact an Assistance Centre
With motor activated the wheel gear does not rotate	1) Incorrect mounting of motor	1) Check coupling between motor and wheel gear
	2) Brakes blocked	2) Check the braking system
	3) Internal anomaly	3) Contact an Assistance Centre
	4) Wheel gear disengaged	4) See the DISENGAGE paragraph
Over-heating	1) Either too much or too little oil	1) Check the oil level
	2) Unsuitable lubricant	2) Check the type and condition of the lubricant
	3) Bearings badly lubricated or faulty	3) Contact an Assistance Centre
	4) Multiple-disc brake not opening completely	4) Check brake opening pressure
	5) High thermal power	5) Contact an Assistance Centre
Service brake not braking	1) No oil in the hydraulic circuit	1) Check for leaks and add oil
	2) Shoes of the drum brake are worn	2) Change the shoes of the drum brake
	3) Air in the brake circuit	3) Bleed the braking circuit
Brake pedal goes right down	1) Not much oil in the hydraulic circuit	1) Check for leaks and add oil
	2) Air in the brake circuit	2) Bleed the braking circuit

CURTIS SPEED CONTROLLER 1244

MANUAL

CURTIS PMC

MODEL **1244**

MultiMode™
MOTOR CONTROLLER

1244 Manual, p/n 16958
Rev. B: January 2001

CURTIS

CURTIS PMC

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1244 Manual
p/n 16958, Rev. B: January 2001

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WIRING : STANDARD CONFIGURATION

WIRING: Standard Configuration

Figure 3 shows the typical wiring configuration for most applications. The interlock switch is typically a seat switch, tiller switch, or foot switch.

Standard Power Wiring

Motor armature winding is straightforward, with the armature's A1 connection going to the controller's B+ bus bar and the armature's A2 connection going to the controller's M- bus bar.

The motor's field connections (**F1** and **F2**) to the controller are less obvious. The direction of vehicle travel with the forward direction selected will depend on

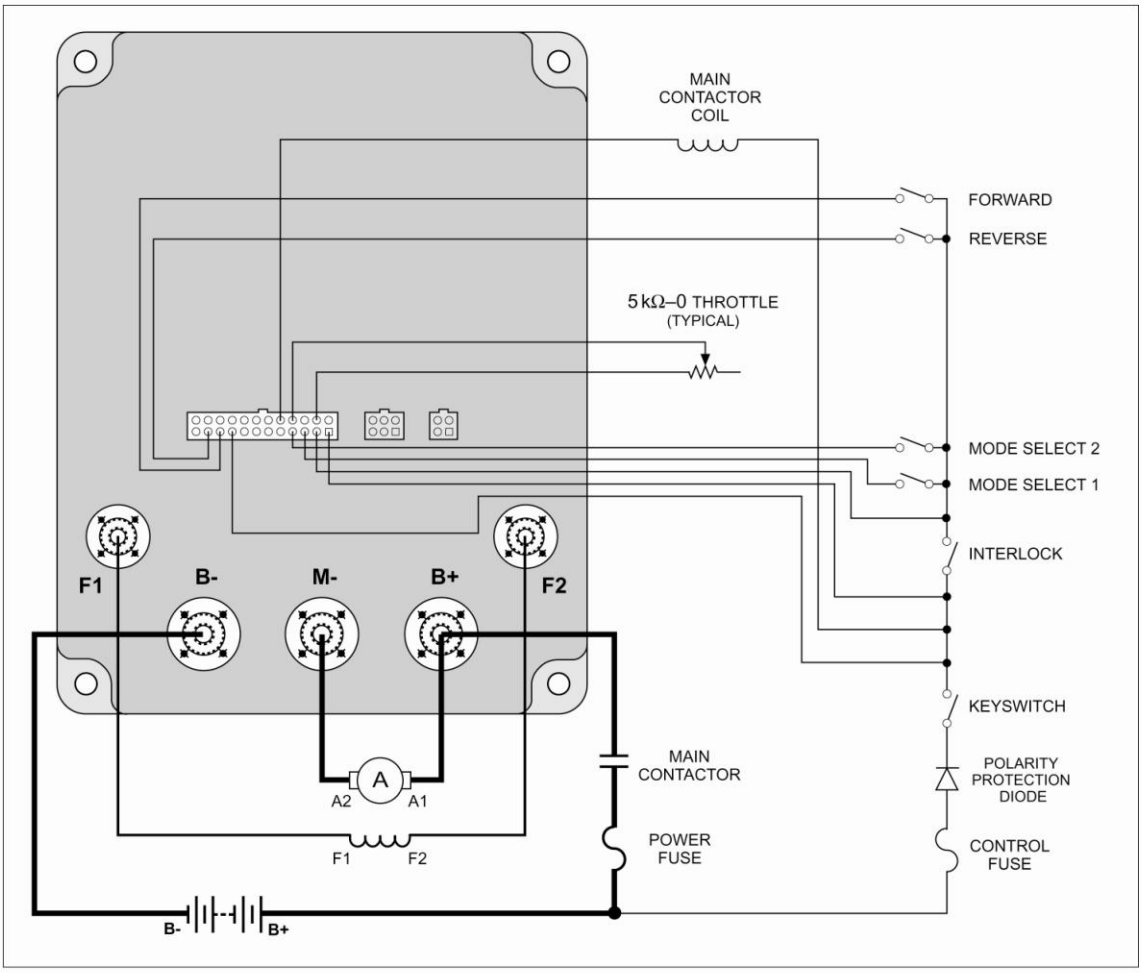


Fig. 3 *Standard wiring configuration, Curtis PMC 1244 controller.*

DIAGNOSTICS AND TROUBLESHOOTING

8

DIAGNOSTICS AND TROUBLESHOOTING

The 1244 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 codes issued by the Status LED, or the fault display driven by the controller's Fault 1 and Fault 2 outputs. Refer to the troubleshooting chart (Table 5) for suggestions covering a wide range of possible faults.

PROGRAMMER DIAGNOSTICS

The programmer presents complete diagnostic information in plain language. Faults are displayed in the Diagnostic Menu (see column 2 in the troubleshooting chart), and the status of the controller inputs/outputs is displayed in the Test Menu.

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

The following 4-step process is recommended for diagnosing and troubleshooting an inoperative vehicle: (1) visually inspect the vehicle for obvious problems; (2) diagnose the problem, using the programmer; (3) test the circuitry with the programmer; and (4) correct the problem. Repeat the last three steps as necessary until the vehicle is operational.

Example: A vehicle that does not operate in "forward" is brought in for repair.

STEP 1: Examine the vehicle and its wiring for any obvious problems, such as broken wires or loose connections.

STEP 2: Connect the programmer, select the Diagnostics Menu, and read the displayed fault information. In this example, the display shows "No Known Faults," indicating that the controller has not detected anything out of the norm.

STEP 3: Select the Test Menu, and observe the status of the inputs and outputs in the forward direction. In this example, the display shows that the forward switch did not close when "forward" was selected, which means the problem is either in the forward switch or the switch wiring.

STEP 4: Check or replace the forward switch and wiring and repeat the test. If the programmer shows the forward switch closing and the vehicle now drives normally, the problem has been corrected.

TROUBLESHOOTING CHART

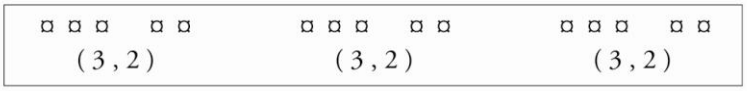
Table 5 TROUBLESHOOTING CHART

LED CODE	PROGRAMMER LCD DISPLAY	FAULT CATEGORY	EXPLANATION	POSSIBLE CAUSE
1,2	HW FAILSAFE1-2-3	1	self-test or watchdog fault	1. Controller defective.
1,3	M- SHORTED	1	internal M- short to B-	1. Controller defective.
	FIELD OPEN	1	field winding fault	1. Motor field wiring loose. 2. Motor field winding open.
	ARM SENSOR	1	armature current sensor fault	1. Controller defective.
	FLD SENSOR	1	field current sensor fault	1. Controller defective.
2,1	THROTTLE FAULT 1	1	wiper signal out of range	1. Throttle input wire open. 2. Throttle input wire shorted to B+ or B-.
	THROTTLE FAULT 2	1	pot low fault	1. Throttle pot defective. 2. Wrong throttle type selected.
2,2	SRO	3	SRO fault	1. Improper sequence of KSI, interlock, and direction inputs. 2. Wrong SRO type selected. 3. Interlock or direction switch circuit open. 4. Sequencing delay too short.
2,3	HPD	3	HPD fault	1. Improper seq. of direction and throttle inputs. 2. Wrong HPD type selected. 3. Misadjusted throttle pot. 4. Sequencing delay too short.
2,4	BB WIRING CHECK	1	emergency reverse wiring fault	1. Emergency reverse wire open. 2. Emergency reverse check wire open.
3,1	CONT DRVR OC	1	cont. driver output overcurrent	1. Contactor coil shorted.
3,2	MAIN CONT WELDED	1	welded main contactor	1. Main contactor stuck closed. 2. Main contactor driver shorted.
3,3	PRECHARGE FAULT	1	internal voltage too low at startup	1. Controller defective. 2. External short, or leakage path to B- on external B+ connection.
3,4	MISSING CONTACTOR	1	missing contactor	1. Any contactor coil open or not connected.
	MAIN CONT DNC	1	main contactor did not close	1. Main contactor missing or wire to coil open.
4,1	LOW BATTERY VOLTAGE	2	low battery voltage	1. Battery voltage <undervoltage cutback limit. 2. Corroded battery terminal. 3. Loose battery or controller terminal.
4,2	OVERVOLTAGE	2	overvoltage	1. Battery voltage >overvoltage shutdown limit. 2. Vehicle operating with charger attached. 3. Battery disconnected during regen braking.
4,3	THERMAL CUTBACK	2	over-/under-temp. cutback	1. Temperature >85°C or < -25°C. 2. Excessive load on vehicle. 3. Improper mounting of controller. 4. Operation in extreme environments.
4,4	ANTI-TIEDOWN	3	Mode 2 or Mode 4 selected at startup	1. Mode switches shorted to B+. 2. Mode switches "tied down" to select Mode 2 or Mode 4 permanently.

LED DIAGNOSTICS

LED DIAGNOSTICS

A Status LED is built into the 1244 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"—welded main contactor—appears as:



The codes are listed in Table 6.

Table 6 STATUS LED FAULT CODES

LED CODES		EXPLANATION
LED off *solid on*	▬ ▭	no power or defective controller controller or microprocessor fault
0,1	■ ¤	controller operational; no faults
1,1	¤ ¤	[not used]
1,2	¤ ¤¤	hardware failsafe fault
1,3	¤ ¤¤¤	M-, current sensor, or motor fault
1,4	¤ ¤¤¤¤	[not used]
2,1	¤¤ ¤	throttle fault
2,2	¤¤ ¤¤	static return to off (SRO) fault
2,3	¤¤ ¤¤¤	high pedal disable (HPD) fault
2,4	¤¤ ¤¤¤¤	emergency reverse circuit check fault
3,1	¤¤¤ ¤	contactor driver overcurrent
3,2	¤¤¤ ¤¤	welded main contactor
3,3	¤¤¤ ¤¤¤	precharge fault
3,4	¤¤¤ ¤¤¤¤	missing contactor, or main cont. did not close
4,1	¤¤¤¤ ¤	low battery voltage
4,2	¤¤¤¤ ¤¤	overvoltage
4,3	¤¤¤¤ ¤¤¤	thermal cutback, due to over/under temp.
4,4	¤¤¤¤ ¤¤¤¤	anti-tiedown fault

NOTE: Only one fault is indicated at a time, and faults are not queued up. Refer to the troubleshooting chart (Table 5) for suggestions about possible causes of the various faults.

PROGRAMMING PARAMETERS –TA-364

! 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.

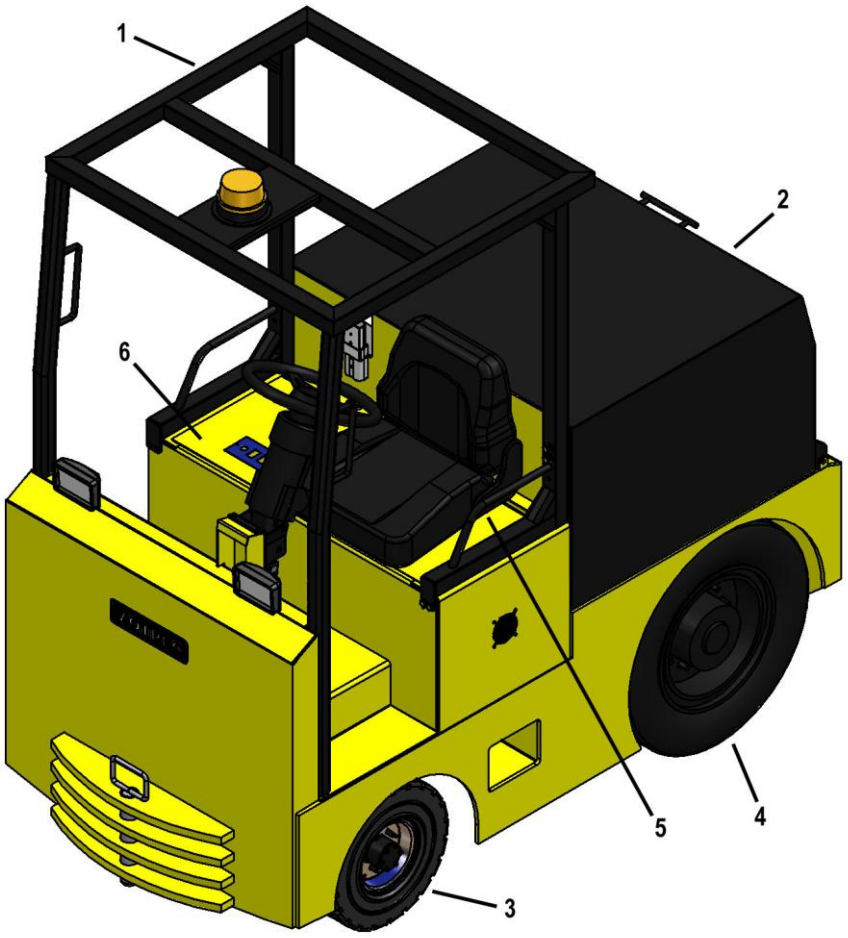
VOLTAGE	NOMINAL BATTERY VOLTAGE, IN VOLTS	4
M1 DRIVE C/L	MODE 1 DRIVE CURRENT LIMIT, IN AMPS	280
M2 DRIVE C/L	MODE 2 DRIVE CURRENT LIMIT, IN AMPS	280
M3 DRIVE C/L	MODE 3 DRIVE CURRENT LIMIT, IN AMPS	280
M4 DRIVE C/L	MODE 4 DRIVE CURRENT LIMIT, IN AMPS	280
M1 BRAKE C/L	MODE 1 BRAKING CURRENT LIMIT, IN AMPS	300
M2 BRAKE C/L	MODE 2 BRAKING CURRENT LIMIT, IN AMPS	300
M3 BRAKE C/L	MODE 3 BRAKING CURRENT LIMIT, IN AMPS	300
M4 BRAKE C/L	MODE 4 BRAKING CURRENT LIMIT, IN AMPS	300
M1 THRT BRK %	MODE 1 THROT. BRAKING, AS % OF BRAKE C/L	100
M2 THRT BRK %	MODE 2 THROT. BRAKING, AS % OF BRAKE C/L	100
M3 THRT BRK %	MODE 3 THROT. BRAKING, AS % OF BRAKE C/L	100
M4 THRT BRK %	MODE 4 THROT. BRAKING, AS % OF BRAKE C/L	100
M1 ACCEL RATE	MODE 1 ACCELERATION RATE, IN SEC.	0.5
M2 ACCEL RATE	MODE 2 ACCELERATION RATE, IN SEC.	2
M3 ACCEL RATE	MODE 3 ACCELERATION RATE, IN SEC.	2
M4 ACCEL RATE	MODE 4 ACCELERATION RATE, IN SEC.	2
DECEL RATE	DECELERATION RATE, IN SEC.	0.1
M1 BRAKE RATE	MODE 1 BRAKING RATE, IN SEC.	0.1
M2 BRAKE RATE	MODE 2 BRAKING RATE, IN SEC.	0.5
M3 BRAKE RATE	MODE 3 BRAKING RATE, IN SEC.	0.5
M4 BRAKE RATE	MODE 4 BRAKING RATE, IN SEC.	0.5
QUICK START	QUICK START THROTTLE FACTOR	4
TAPER RATE	Regen brak. Decrease rate when apporch. 0spd, 1/32s	32
M1 MAX SPEED	MODE 1 MAX. SPEED, AS % PWM OUTPUT	20
M2 MAX SPEED	MODE 2 MAX. SPEED, AS % PWM OUTPUT	50
M3 MAX SPEED	MODE 3 MAX. SPEED, AS % PWM OUTPUT	50
M4 MAX SPEED	MODE 4 MAX. SPEED, AS % PWM OUTPUT	100
M1 CREEP SPEED	MODE 1 CREEP SPEED, AS % PWM OUTPUT	0
M2 CREEP SPEED	MODE 2 CREEP SPEED, AS % PWM OUTPUT	0
M3 CREEP SPEED	MODE 3 CREEP SPEED, AS % PWM OUTPUT	0
M4 CREEP SPEED	MODE 4 CREEP SPEED, AS % PWM OUTPUT	0
REGEN SPEED	Min. speed for regen braking, as % of vehicle speed	0
CTRL MODE	CONTROL MODE	1
THROTTLE TYPE	THROTTLE TYPE	1

THRO. DEADBAND	Thr. Neutral deadband % of 5kohms pot	6
THROTTLE MAX	Thr. Input req`d for 100%PWM %5kohm pot	90
M1 THRTL MAP	MODE 1 THROTTLE MAP, AS %	30
M2 THRTL MAP	MODE 2 THROTTLE MAP, AS %	30
M3 THRTL MAP	MODE 3 THROTTLE MAP, AS %	30
M4 THRTL MAP	MODE 4 THROTTLE MAP, AS %	30
FIELD MIN	MIN. FIELD CURRENT, IN AMPS	5.0
FIELD MAX	MAX. FIELD CURRENT, IN AMPS	28
FIELD MAP START	Armature current at wich FIELD MAP takes effect, amps	70
FIELD MAP	Field Winding Current, as % of Armature Current	50
CURRENT RATIO	CURRENT RATIO:FACTOR OF 1, 2, 4 OR 8	1
RESTRAINT	RAMP RESTRAINT: 1 TO 10	1
LOAD COMP	LOAD COMPENSATION: 0 TO 25	0
HPD	HIGH PEDAL DISABLE (HPD) TYPE	0
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
WELD CHECK	MAIN CONTACTOR WELD CHECK: ON OR OFF	ON
MAIN CHECK	MAIN COIL OPEN CHECK: ON OR OFF	ON
AUX ENABLE	AUXILIARY ENABLE: ON OR OFF	OFF
EM BRAKE	ELECTROMAGNETIC BRAKE ON OR OFF	ON
AUX DELAY	AUXILIARY DRIVER DROPOUT DELAY, IN SEC.	0
AUX CHECK	AUXILIARY COIL OPEN CHECK: ON OR OFF	OFF
EM BRAKE DELAY	ELECTROMAGNETIC BRAKE DELAY, IN SEC.	1
EM BRAKE CHECK	ELECTROMAG. BRAKE OPEN CHECK: ON OR OFF	ON
REV DRVR CHECK	REVERSE SIGNAL OPEN CHECK: ON OR OFF	OFF
CONT PULL IN	CONTACTOR COIL PULL-IN VOLTAGE, AS %	50
CONT HOLDING	CONTACTOR HOLDING VOLTAGE, AS %	50
EMR REV ENABLE	EMERGENCY REVERSE FUNCTION : ON OR OFF	OFF
EMR REV C/L	EMERGENCY REVERSE CURRENT LIMIT, IN AMPS	50
EMR REC CHECK	EMERGENCY REV. WIRING CHECK : ON OR OFF	OFF
ANTI-TIEDOWN	ANTI-TIEDOWN: ON OR OFF	OFF
FAULT CODE	ON OR OFF	ON
PEDAL INTERLOCK	THREADLE, PB-6, CHECK WIRING	ON
PRECHARGE	ON OR OFF	ON

#REF: 1244-0510401

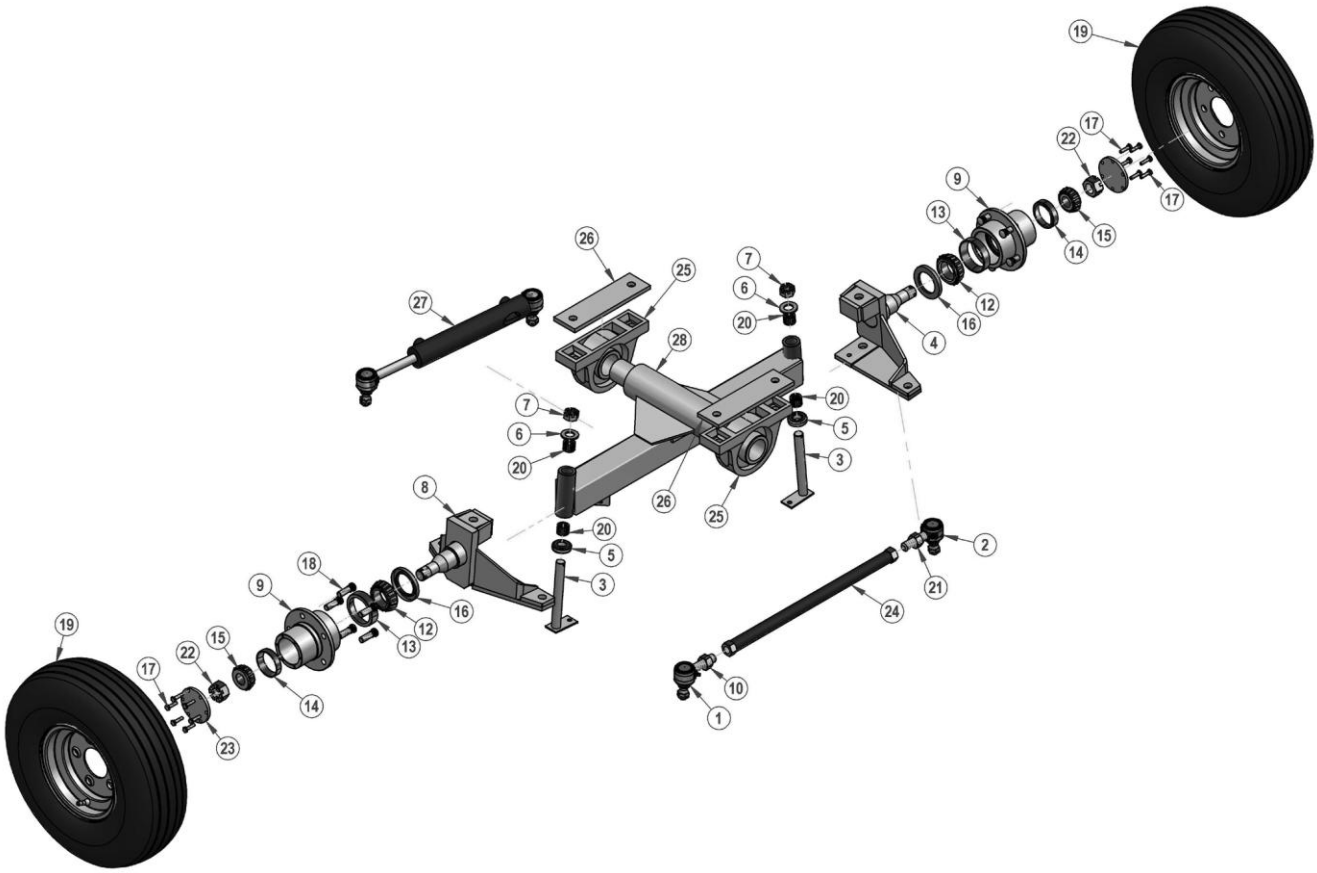
SPARE PARTS

BODY



REF.	*PART NO*	*DESCRIPTION*
1	2363364001	ROPS
2	2331364002	BATTERY COVER 23.5 INCH HIGH
	2331364012	BATTERY COVER 31 INCH HIGH
	2339364001	HANDLELOCK
	2191240002	SPRING
3	2223360004B	5-BOLT SOLID RUBBER WHEEL
4	2223364003	7.00X15X6 SOLID RUBBER WHEEL
5	2385224001	GRAMMER SEAT
	366216	GRAMMER SEAT SWITCH
	2380364004	SEAT PLATE
	2380364005	HINGE
	2199000001	LIFT-N-LATCH GAS SPRING
	2199000002	KNEE-CAP SUPPORT
6	2500250002	DASH PLATE
	2380364003	ELECTRICAL COMPARTMENT COVER
	2380364005	HINGE
	2199000001	LIFT-N-LATCH GAS SPRING
	2199000002	KNEE-CAP SUPPORT

FRONT AXLE

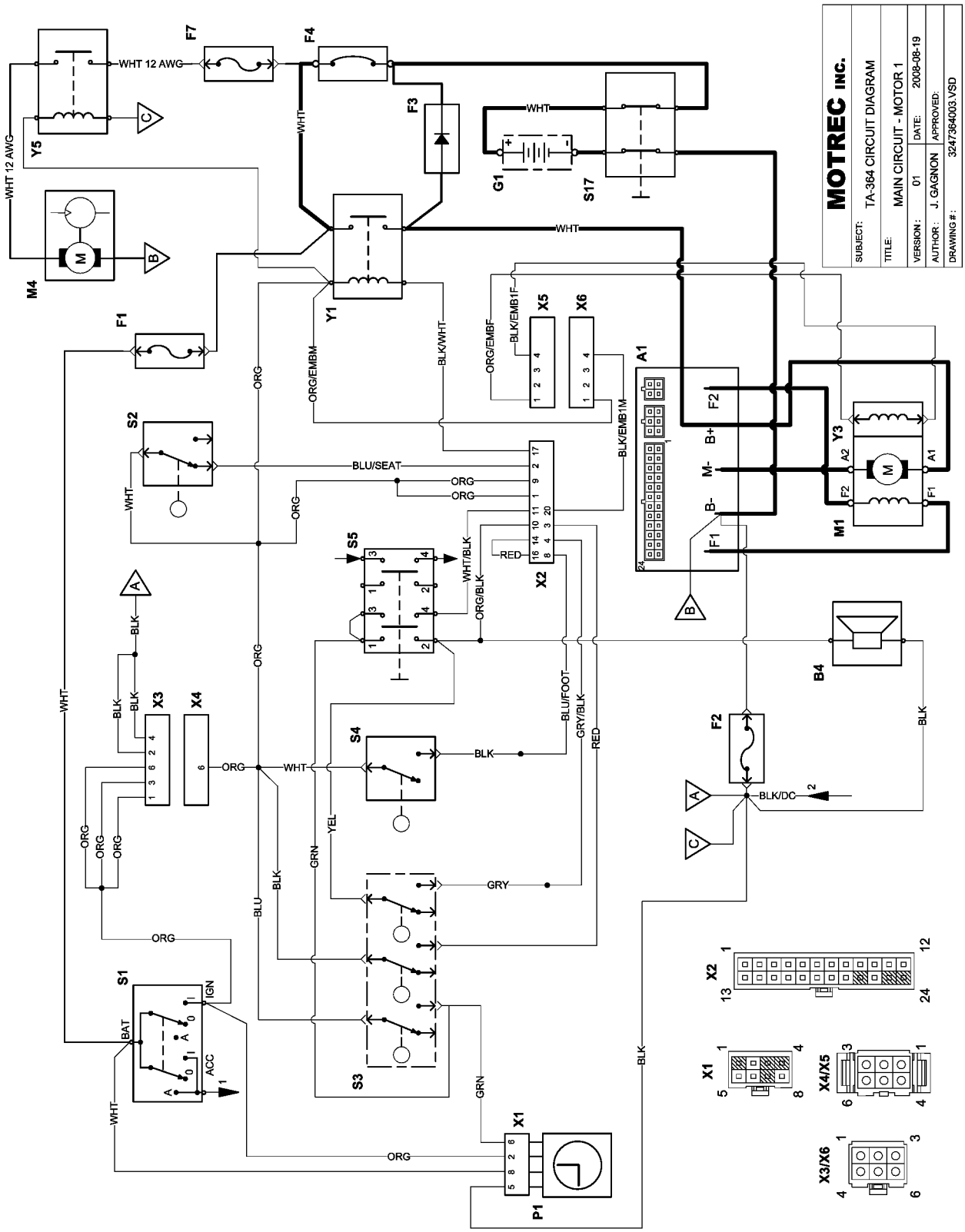


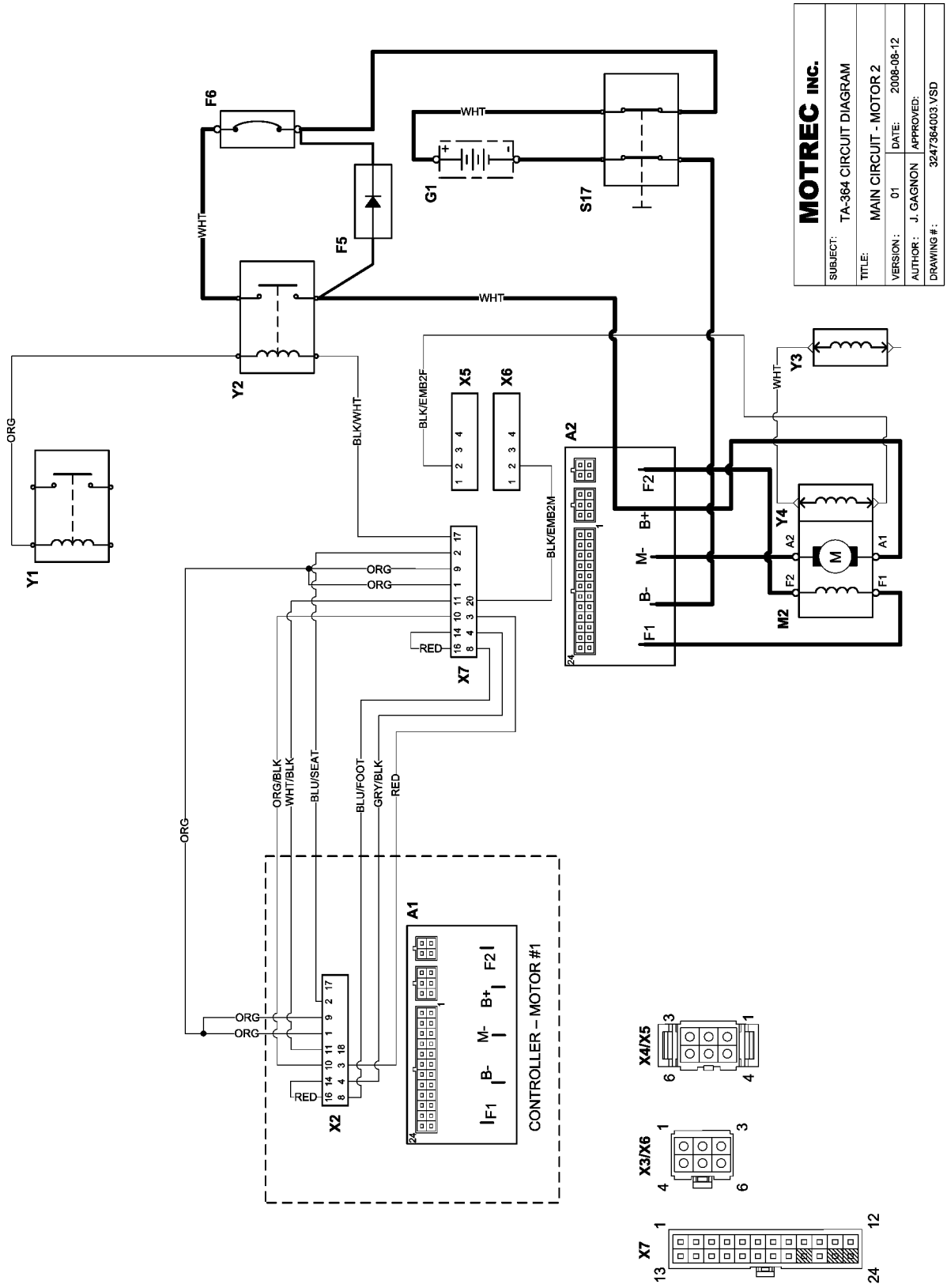
REF.	*No. PIÈCE*	*DESCRIPTION*
1	2207000002	RIGHT ROD END
2	2207000001	LEFT ROD END
3	*	HEAVY DUTY KING PIN
4	*	RIGHT SPINDLE
5	*	THRUST BEARING
6	*	BRASS FLAT WASHER
7	*	CASTELLATED NUT
8	*	LEFT SPINDLE
9	2224364001	HUB
10	2910000006	RIGHT HAND NUT
11	*	AXLE BEAM
12	2103364003	CONE – INTERNAL BEARING.
13	2103364004	CUP – INTERNAL BEARING
14	2103364002	CUP – EXTERNAL BEARING
15	2103364001	CONE – EXTERNAL BEARING
16	2104364001	CR SEAL
17	-	BOLT - COVER
18	2910000001	WHEEL STUD
19	2223360004B	RIB 500X8, SOLID SOFT RUBBER
20	*	NEEDLE BEARING
21	2910000005	LEFT HAND NUT

REF.	*No. PIÈCE*	*DESCRIPTION*
22	*	NUT - HUB
23	2229364002	HUB COVER
24	*	TIE ROD
25	2105364001	PILLOW BLOCK
26	*	SPACER
27	4130448001	STEERING HYDRAULIC CYLINDER

* Contact manufacturer

ELECTRICAL DIAGRAM – VEHICLE SCHEMATIC

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DATE: 2008-08-12
AUTHOR: J. GAGNON
APPROVED:
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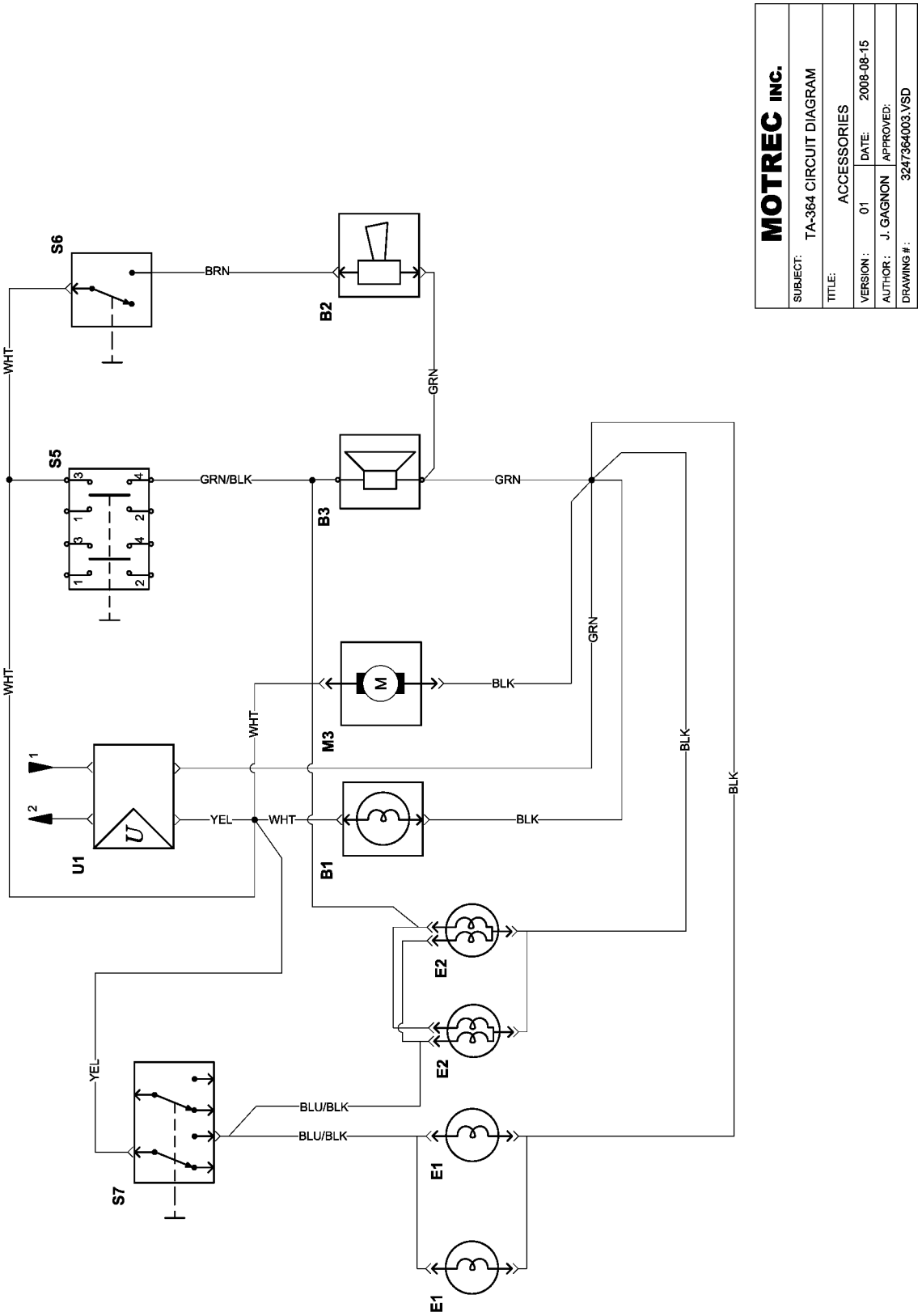
F6
F5
G1
S17
WHT
Y2
Y1
Y3
Y4
M2
X5
X6
X7
X2
A1
A2
BLK/EMB2F
BLK/EMB2M
BLK/WHT
ORG
RED
ORG/BLK
WHT/BLK
BLU/SEAT
BLU/FOOT
GRY/BLK
B+
M-
B-
F1
F2
A2
A1
M
CONTROLLER – MOTOR #1
X4/X5
X3/X6
X7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TITLE: ACCESSORIES
VERSION : 01
DATE: 2008-08-15
AUTHOR : J. GAGNON
APPROVED:
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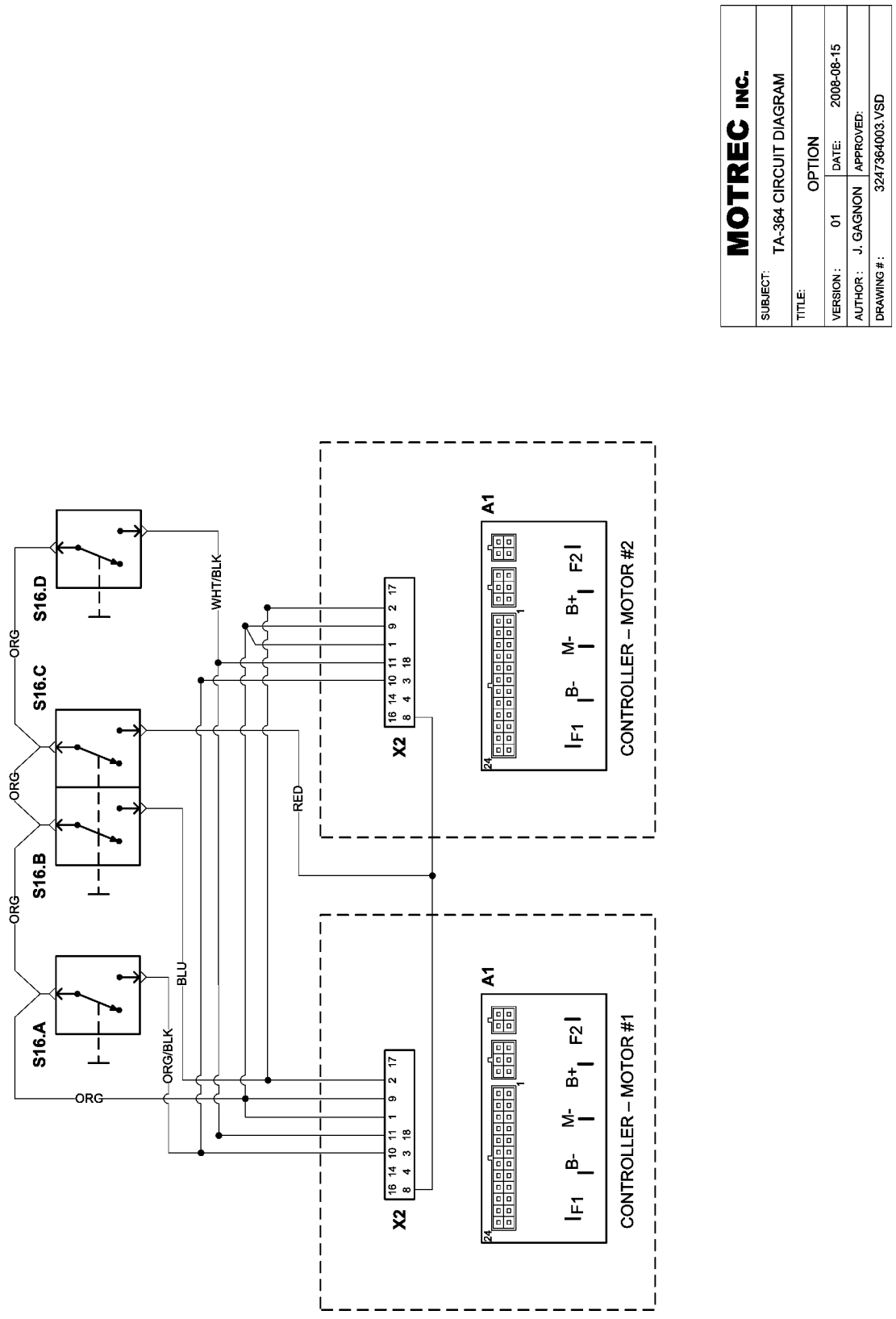
S6
S5
S7
U1
B1
B2
B3
M3
E1
E2
BRN
GRN
GRN/BLK
WHT
YEL
BLK
BLU/BLK

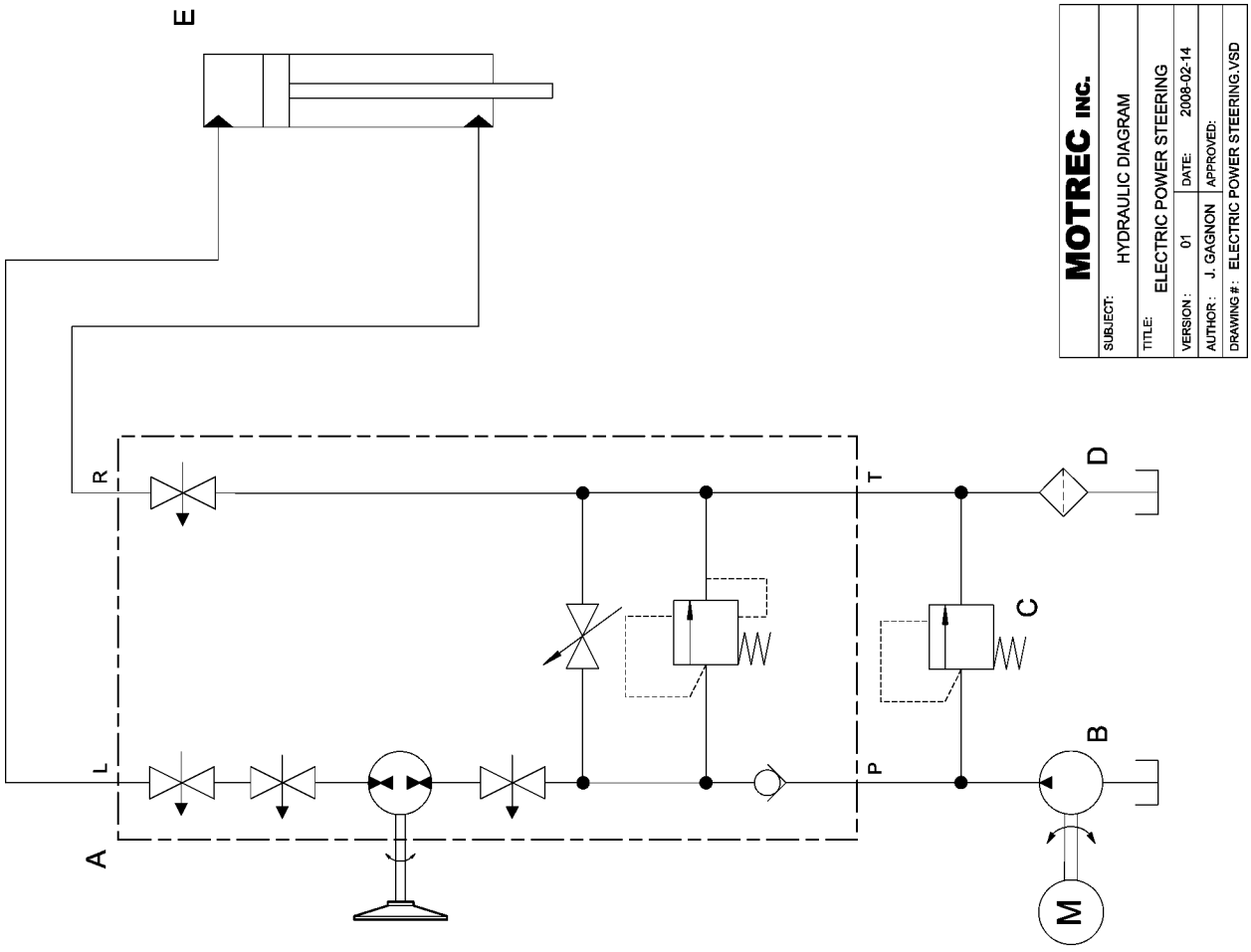

MOTREC INC.
SUBJECT: TA-364 CIRCUIT DIAGRAM
TITLE: OPTION
VERSION : 01
DATE: 2008-08-15
AUTHOR : J. GAGNON
APPROVED:
DRAWING # : 3247364003.VSD
S16.A
S16.B
S16.C
S16.D
ORG
ORG/BLK
BLU
WHT/BLK
RED
X2
A1
F1
B-
M-
B+
F2
CONTROLLER – MOTOR #1
CONTROLLER – MOTOR #2

PARTS LIST

NO	DESIGNATION	REF	QTY
A1, A2	SEPEX SPEED CONTROL	1244-5461	2
B1	STROBELIGHT	*	1
B2	HORN	*	1
B3	REVERSE ALARM	*	1
B4	MOTION ALARM	*	1
E1	HEADLIGHT	*	1
E2	TAIL/BRAKE LIGHT	3111000002	2
F1, F2	FUSE, 15A	246108K	2
F3, F5	DIODE BRIDGE	3669027	2
F4, F6	CIRCUIT BREAKER, 150A	3107000002	2
F7	MAXI BLADE FUSE 30A	3118501005	1
	MAXI FUSE HOLDER	3118501006	1
	DUST CAP FOR FUSE HOLDER	3118501007	1
G1	BATTERY		
M1, M2	SEPEX MOTOR		2
M3	COOLING FAN – 12V	3129224001	1
M4	PUMP MOTOR	3112448001	1
P1	HOUR METER, BATTERY GAUGE	*	1
S1	KEY SWITCH	246205	1
S2	SEAT SWITCH, MICRO-SWITCH	3109100002	1
	SEAT SWITCH, SEAT MOUNTED	366216	1
S3	ACCELERATOR	2142100001	1
	MICROSWITCH	367002	3
	SPRING	2462008	1
S4	FOOT SWITCH	3109124001	1
S5	F/R SELECTOR - COLUMN	436212	1
	F/R SELECTOR - TILT/TEL COLUMN	366212	1
	F/R SELECTOR – ROCKER TYPE	266211	1
S6	HORN BUTTON, TILT/TEL COLUMN	*	1
S7	LIGHT SWITCH, ROCKER TYPE	*	1
S16.A	NO CONTACT WITH BASE	3109800003	1
	GREEN PUSH BUTTON	3109800013	1
S16.B-C	2 NO CONTACTS WITH BASE	3109800009	1
	BLACK PUSH BUTTON	3109800016	1
S16.D	NO CONTACT WITH BASE	3109800003	1
	GREEN PUSH BUTTON	3109800013	1
S17	EMERGENCY PUSH BUTTON	3109364001	1
	EMERGENCY STOP LABEL	3109800006	1
U1	DC-DC CONVERTER	*	1
X1	HOUR METER CONNECTOR		1
X2, X7	SPEED CONTROL CONNECTOR		2
X3, X6	WHITE CONNECTOR		2
X4, X5	WHITE CONNECTOR		2
Y1, Y2	MAIN CONTACTOR	246112	2
Y3, Y4	ELECTROMAGNETIC BRAKE	2316024	2
Y5	PUMP CONTACTOR	486222	1

* Consult Motrec illustrated parts

HYDRAULIC DIAGRAM



PARTS LIST

NO	DESCRIPTION	REF	QTÉ
A	HYDRAULIC UNIT – STEERING	4190448001	1
B	POWER STEERING PUMP	4160448013	1
C	RELIEF VALVE	*	1
D	FILTER	*	1
E	STEERING CYLINDER	4130448001	1

* Contact manufacturer

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: 3111000009

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: 3069012R
Bulb 12V: 3117240001

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

Clear lamp
12V: 3069012
Bulb 12V: 1269008

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

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

Turn signal switch
246050

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

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

Red Tail/Brake light
12V: 386002

Red Tail/Turn/Rev light
12V: 3111000002

Horn button VIP
2208224002

Horn button, column mount
3109000011

Horn button, dash mount
266210

Horn button 3109250001

Horn
12V: 246003
24V: 246013

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

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

12V Dome light 3669006

12V Fan 3669013

Limit switch
3109000029

Headlamp 12V:3111250007

Headlamp
12V: 3111300001
Bulb 12V: 3111300002

Red Pilot light
12V: 246212
Bulb 12V: 246212B

Back-up alarm or
Motion beeper
12-48V : 3100000001
72-80V : 3105720001

12-24V Adjustable ECCO:
3100000002

12-48V Adjustable PRECO:
3100000004

CONVERTER INSTALLATION

Installation and Trouble Shooting Guide
SY1200-25

The SY1200-25 is a state of the art DC-DC converter. There are many new features, and special care is required to install this unit properly. If you have problems with the operation of this unit please check the installation procedures for help.

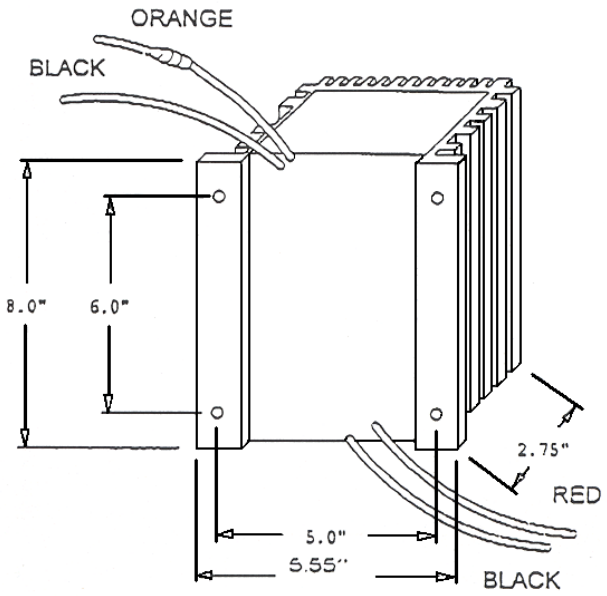
The **ORANGE** wire is the **INPUT POSITIVE>**

The **BLACK** wire near the orange wire is the **INPUT NEGATIVE>**

The RED wire is the **OUTPUT POSITIVE.**

The **BLACK** wire near the red wire is the **OUTPUT NEGATIVE.**

NOTE: Use the correct black wire for input and output. Do not connect the black wires together. (The black wires are common however, due to the high currents developed in this unit it is necessary to maintain proper electron flow to reduce noise.)



The converter must be mounted on a metal surface for proper heat dissipation. A vertical mounting position is best to maximize the convection process. The unit will shut down thermally under high currents if not properly mounted.

This unit is equipped with digital logic capabilities. The input voltage is monitored to determine acceptability. If the input voltage is below the MIN or above the MAX limits the SY1200-25 will NOT turn on.

The fuse in this unit has no determining factors as to the current carrying capabilities of the converter. The fuse serves only one purpose, and that is to remove the unit from your power source in the event of a failure. The SY1200-25 has a very advanced control section, and will determine when to open the fuse. An open fuse will mean, that a problem had occurred, that does not mean that the problem still exists, or that the problem has gone away.

<<DO NOT increase or by'pass the fuse. USE ONLY A FUSE RATED AT 250V 20A>>

Potential reasons for an open fuse are as follows: (1) The output voltage rises above 18 VDC. This problem can occur when an inductive load is removed or applied at high currents. This is a noise spike and the converter will shut down if it can not suppress the spike. (2) Reverse polarity on the input or output. (3) A chaos condition where the output becomes unstable. (4) Excessive noise or spikes on the input.

Mount this unit as close to the highest current load as possible. (This unit uses true switching techniques to step down the input voltages. The higher the input voltage the lower the input current for a 25 AMP load. The high currents are on the output of the converter.) Use 14 gauge wire for the input up to 5 feet. Use 12 gauge wire for up to 10 feet. Increase the wire gauge for each additional 5 feet of wire. NEVER use less than a 10 gauge wire on the output. If the wire length exceeds 5 feet use 8 gauge wire. IMPORTANT: Use a crimp type of connector to attach the wire to the converter. DO NOT twist the wires together. A poor connection will not only allow the converter to operate poorly, but at 25 amps the connection WILL GET HOT AND BURN IN TWO.

WARNING: THE CHASSIS IS ISOLATED FOR HIGH VOLTAGE APPLICATIONS. DO NOT USE THE CHASSIS FOR GROUND.

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.

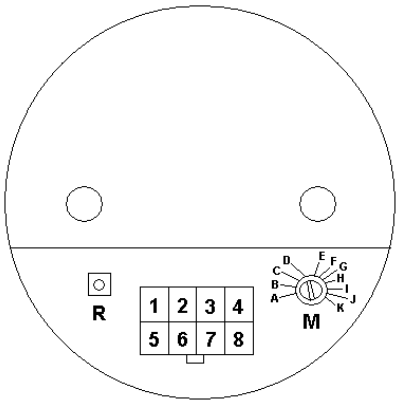
To maintain a good battery performance, it is recommended to limit the discharging to 80% of the battery capacity. The recommended setting for 6V batteries is F and the recommended setting for an industrial battery is K.

An internal relay can prevent overdischarging 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.

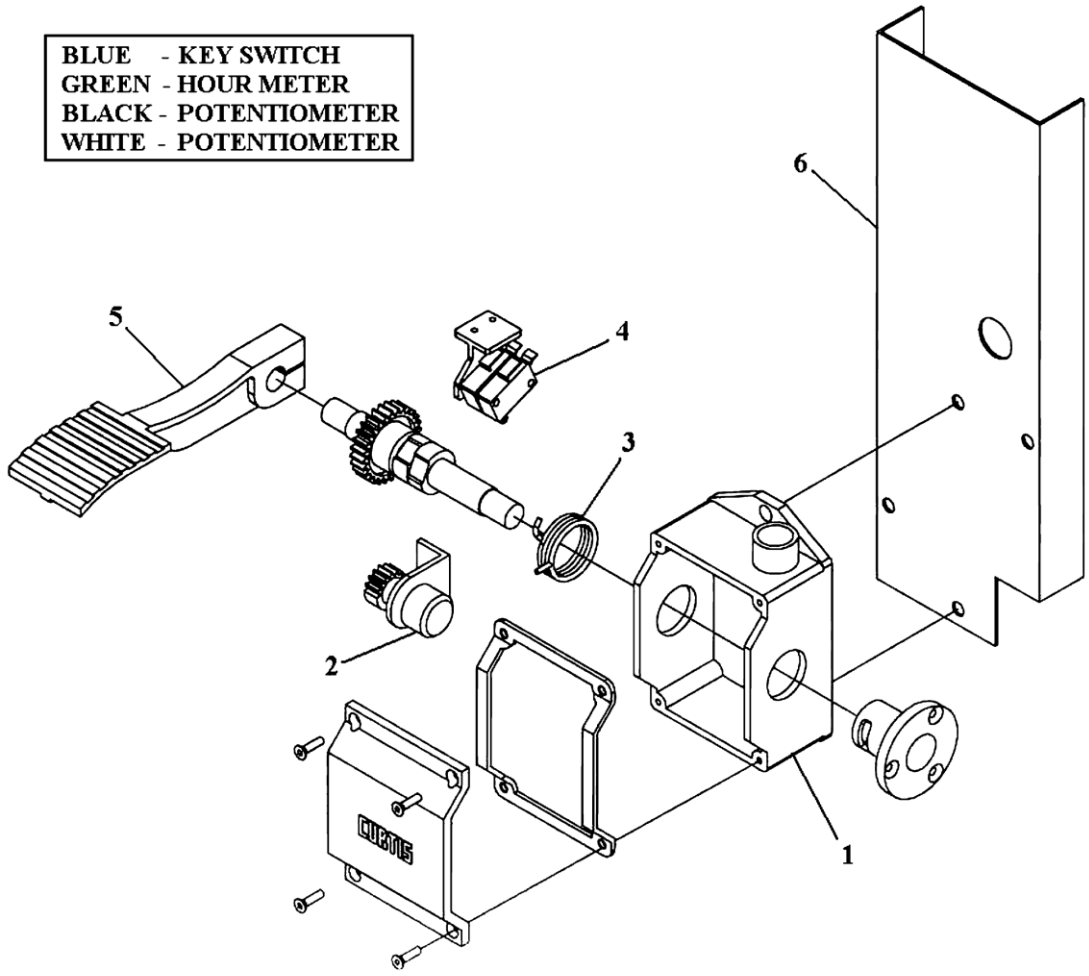
The current status (remaining operating hours before maintenance) of the service down counter is indicated for a period of 5 seconds after the key switch is turned on. When it is down to 0, the display flashes. After the maintenance, reset the counter: depress the button “R” on the rear. The service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



CURTIS FOOT PEDAL



REF.	*PART. NO*	*DESCRIPTION*
1	***3062001C***	***ACCELERATOR CURTIS***
2	***367008***	***POTENTIOMETER***
3	***2262004C***	***SPRING***
4	***2262001C***	***MICRO-SWITCH***
5	***2262003C***	***LEVER***
6	***3662002***	***CABLE PROTECTOR***

RESP : ***CLAUDE L***	MODEL(E) : **E-320/360/480/500**
NO : ***321A320001***	*SER :* ***1018799*** *TO/À :* ***1019973***