



# **COLUMBIA**



## **2017**

### **Model SU5-S/L-2**

### **Summit Utilitruck**

# **Owner and Operator Manual**

## Preface

Welcome, and congratulations on your choice of vehicle from Columbia! Your vehicle has been manufactured in full compliance with all applicable American National Standards Institute (ANSI) standards. Your safe use and operation of your vehicle is important to us. Any alteration of your Columbia vehicle that results in the vehicle being in noncompliance with applicable ANSI standards is strictly prohibited. Columbia is not responsible or liable for any damage that results from any such alteration, and all warranties for any such altered vehicles are null and void.

Personal Transport Vehicles (PTV) are not designed for over-the-road use. They do not conform to Federal Motor Vehicle Safety Standards or EPA regulations, and are not equipped for operation on public streets, roads, or highways.

Low Speed Vehicles (LSV) commonly referred to as NEV or Neighborhood Electric Vehicles meet the requirements of the National Highway Traffic & Safety Administration (NHTSA) as stated in the Code of Federal Regulations, Title 49, Part 571, Standard 500, Low Speed Vehicles.

To the best knowledge of Columbia the material contained herein is accurate as of the date this publication was approved for printing. Columbia is not liable for errors in this manual or for incidental or consequential damages that result from the use of the material in this manual. Columbia reserves the right to change specifications, equipment or designs at any time without notice and without incurring obligation.

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DATE	DESCRIPTION	BY
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This manual provides important safety information, operating instructions, model specifications and maintenance instructions for electric vehicles. It should be read completely before attempting to drive or service the vehicle. Failure to follow the instructions in this manual could result in property damage, severe personal injury, or death.

The information in this manual is limited to care and maintenance information only. Information covering repairs is provided in detailed service manuals available from Columbia Dealers. Such major repairs require the attention of a skilled technician and the use of special tools and equipment. Your Columbia Dealer has the facilities, experience and genuine Columbia vehicle parts and accessories to properly service Columbia vehicles.

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## SAFETY MESSAGES

Safety messages and other information in this manual are preceded by the words **DANGER**, **WARNING**, **CAUTION** or **NOTICE**. They are printed in bold face, and are very important. We recommend you take special notice of this information.

### **▲ DANGER**

**Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.**

### **▲ WARNING**

**Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

### **▲ CAUTION**

**Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**

**NOTICE:** Notices are messages not related to personal injury. They will provide key information to prevent property damage and to assure procedures are more easily understood or implemented.

## VEHICLE IDENTIFICATION NUMBER – PERSONAL TRANSPORT VEHICLES (PTV)

Each PTV vehicle contains a unique Vehicle Identification Number (VIN) label. The VIN describes facts and features of the vehicle and contains thirteen (13) digits. Figure 1-1 is an example of a VIN label. VIN labels can be found in several locations on the vehicle. One location will be on the top of the dash panel on the driver's side or under the steering wheel cover as shown in Figure 1-2. Access to this location is by removing the three screws holding the cover in place. A nameplate is also located in the front hood compartment and has important information such as model, vehicle weights and rated capacity (load, operator and passenger) as shown in Figure 1-3. Do not exceed this rated capacity.

Columbia ParCar Corp.  
SU5-L  
S5LG4-BVN0100  
Made in the U.S.A.

Figure 1-1



Figure 1-2



Figure 1-3

## VIN MATRIX Personal Transport Vehicle (PVT)

<b>Digit 1 thru 3 = Abbreviation (Model)</b>	S7S (Short), S7L (Long)
<b>Digit 4 = Power System</b>	G = AC Drive, Induction Motor
<b>Digit 5 = System Voltage</b>	4 = 48V (8 – 6V)
	M = AGM (8 -6V)
<b>Digit 6 = VIN Spacer</b>	- = Standard
	# = Special Product
<b>Digit 7= Controller Amperage</b>	2 = 275 Amp
	B = 450 Amp
	D = 650 amp
<b>Digit 8 = Brake System</b>	V/R = HD F/R Hydraulic
<b>Digit 9 = Build Year</b>	R = 2017, S = 2018, etc.
<b>Digit 10 Thru 13 – Build Sequence</b>	ie...1234

**VEHICLE IDENTIFICATION NUMBER LOW SPEED VEHICLES (LSV)**

The VIN is printed on a white label, affixed to the top of the dash and affixed to the steering wheel under the steering wheel cover (Figure 1-2). The VIN is also noted on the LSV Vin Label (Figure 1-3) affixed to the bottom of the front hood area.

<p>MFD BY: COLUMBIA PARCAR CORP  REEDSBURG, WI 53959, USA  DATE MFD: / MM/YY  GVWR: KG (LBS)  GAWR: FRONT - KG (LBS)  GAWR: REAR - KG (LBS)  TIRE SIZE: / (SIZE SPEC)  COLD INF. PRESSURE (FRONT &amp; REAR)  KPA (PSI)  RIMS: X  MAXIMUM LOAD: KG (LBS)  OCCUPANTS: (FRONT REAR)  THIS VEHICLE CONFORMS TO ALL  APPLICABLE FEDERAL MOTOR VEHICLE  SAFETY STANDARDS IN EFFECT ON THE  DATE OF MANUFACTURE SHOWN ABOVE.  <b>VIN:</b>  TYPE: LOW SPEED VEHICLE</p>
--

**VIN MATRIX low Speed Vehicle (LSV)**

<b>Digit 1 thru 3:</b>	5FC = CPC Manufacturer Identification
<b>Digit 4: Line</b>	L = Low Speed Vehicle
<b>Digit 5: Series</b>	L = Utilitruck
<b>Digit 6: Body Type</b>	2 = 2 Person 4 = 4 person
<b>Digit 7: Engine Type</b>	8 = AC Power System
<b>Digit 8: Restraint</b>	A = Type 1 Seat Belt Assembly B = Type 2 Seat Belt Assembly (3 Point)
<b>Digit 9: Check Digit</b>	Calculated per 49CFR 565.4
<b>Digit 10: Model Year</b>	H = 2017 J = 2018
<b>Digit 11: Plant Location</b>	1 = Reedsburg
<b>Digit 12-17: Sequential Numbers</b>	00001 - 009999

## VEHICLE SPECIFICATIONS

ITEM	SPECIFICATION
Battery Type: Deep Cycle	48 Volt: 8 - 6 volt, heavy duty, 225 Ah minimum.
Brakes	Spring applied, auto-adjusting hydraulic drum on rear wheels, front disc, electric motor parking brake.
Charger	Built in, micro-processor control, fully sealed, anti-drive away interlock, 100-230 V AC, 50/60 Hz.
Directional Control	Rotary directional switch with FL (forward low), FH (forward high), R (reverse) and N (neutral).
Drive	Direct coupled to oil bath, helical geared.
Motor	5 KW or 8 KW AC Brushless.
Rear Axle	10.37:1 or 16.77:1 helical gear reduction with integral differential.
Speed Controller	Programmable, solid state, reduced speed reverse with diagnostic interface and display panel.
Steering	Automotive type rack and pinion.
Tire PSI	32 psi

**NOTICE: Always provide the complete VIN when contacting your dealer for technical assistance or maintenance and repair parts.**

For your own personal reference, fill in the VIN in the space provided below:

---

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## GETTING STARTED

For personal safety before operating the vehicle, it is the operator's responsibility to read, understand and follow the basic rules of operation and maintenance instructions in this manual. If you are responsible for the use of the vehicle, it is your responsibility to inform the person or persons using the vehicle about the following basic rules of operation for their personal safety.

It is Columbia specific recommendation that the following warnings must be observed at all times. Not all are repeated throughout this manual, but the recommendations included must be observed whenever these subjects (vehicle operation hazards, battery hazards, etc.) are encountered.

Please be a safe operator. Electric vehicles are only as safe as the person who is at the controls. If accidents are to be prevented, operators must accept their full measure of responsibility. While the designer, the manufacturer, the dealer and the safety engineer can help minimize the possibility of an accident, their combined efforts can be erased by a single careless act.

## SAFETY GUIDELINES

**Observe the following guidelines for safe operation.**

- Define where vehicles may be driven.
- Define who should be allowed to drive the vehicle.
- Instruct first-time drivers.
- Maintain vehicles in a safe driving condition.
- Enforce safe-driving rules.

## VEHICLE SAFETY STATEMENTS

### **⚠ DANGER**

**This vehicle will not provide protection from lightning, flying objects, or other storm related hazards. If driving the vehicle in a storm, leave the vehicle and take shelter as per safety guidelines for your location.**

**Any modifications or changes to the vehicle that affect the stability, steering or result in increased speed beyond factory specifications could result in vehicle damage, severe personnel injury or death.**

### **⚠ CAUTION**

**When replacement parts are required, use only genuine Columbia vehicle parts.**

**No modifications or additions, which affect the mechanical or electrical integrity and the safe operation of the unit, shall be made without the written approval of the manufacturer. If in doubt about any modification, contact your local Columbia Dealer or Columbia Customer Service.**



**⚠ WARNING**

For personal safety and to maintain stability and control, operate this vehicle under these conditions only. Failure to comply with these warnings may result in bodily injury and property damage. These basic rules of operation, combined with courtesy and common sense, will help make driving your Columbia vehicle a safe and pleasant experience.

All vehicles should only be operated from the driver's side by authorized persons.

Never exceed the capacity ratings of the vehicle. Exceeding these limits may endanger occupants.

Personal injury may result if body parts (arms, head, and legs) are not kept inside vehicle while moving. Do not start moving until all occupants are seated. Remain seated and hold on while vehicle is in motion.

Before leaving your seat, completely stop vehicle and engage parking brake. If vehicle is to be left unattended, turn keyswitch to "OFF" and remove key.

Do not use accelerator to hold vehicle on an incline, instead use service brake pedal.

Make sure directional switch is in position for the desired direction of travel before depressing the accelerator. Do not change the directional switch while vehicle is moving.

Drive slowly in turns and up or down grades. Do not make turns on steep hills or inclines.

Do not operate while under the influence of alcohol or drugs.

Personal Transportation Vehicles are not Federal or State DOT approved and are not equipped to be operated on public roads or highways.

To avoid the risk of injury or vehicle damage, operate at maximum speed only on smooth flat surfaces.

Allow additional stopping distance when traveling at higher speeds.

Follow all procedures exactly and observe all safety messages stated in this manual.

Working on vehicles without following proper procedures and using proper equipment may result in vehicle damage or personal injury.

Do not attempt to service hot motor or components. Failure to observe this warning could result in severe burns.

Always wear safety glasses or approved eye protection while servicing vehicle.

Failure to maintain vehicle properly could result in decreased vehicle performance, reliability or cause severe personal injury.

## **IMPORTANT FIRST STEP**

Upon initial delivery, it is very important that the battery pack is properly charged. This is required if the vehicle is to be stored for later use or is to be used immediately.

- Check that the batteries are not damaged or leaking and that connections are tight.

**NOTICE: The following information does NOT apply to sealed batteries.**

- Remove the battery vent caps and inspect each cell for proper electrolyte level. The battery manifold assemblies on vehicles with a single point watering system will require a ¼ counterclockwise turn to be removed for this inspection.
- If the electrolyte level is below the plates add only enough water to cover the plates.

**NOTICE: Do not overfill a cell. Electrolyte expands and can overflow during charging.**

- With the electrolyte level correct, use the on board charger to charge the batteries. Charging is complete when the remote LED is steady green.
- Vehicles without a single point watering system, after charging, refill cells to below the bottom of each cell vent.
- Vehicles with a single point watering system will require completion of 4 to 5 charge cycles before watering.

**NOTICE: If the vehicle is not going to be used the charger can remain connected to an AC source. It has the capability to test and recharge the battery pack during storage.**

## **INSPECTING THE VEHICLE**

After battery charging, perform an inspection of the vehicle to ensure that it is in safe proper working order.

Examine the contents of all packages and accessories that may have come in separate packages with this vehicle. Make sure everything listed on the packing slip is there. Items should not be broken or damaged.

Examine any visible wiring for obvious signs of damage. Check that all connections are secure.

Inspect the tires for obvious wear or damage. Check for proper tire inflation (32 psi recommended). Make sure that all wheel lugs are secure.

Check the body, seats, trim and other external parts for obvious damage. Look for body damage, jagged edges etc. that may cause personal injury.

Operate each of the following controls before turning on the power keyswitch.

- Accelerator Pedal for smooth operation.
- Braking Pedal, assure presence of a firm pedal with minimal travel.
- Check steering for responsiveness and minimal play.
- Key can only be removed when keyswitch is in the "OFF" position.

**NOTICE: Each control should operate smoothly and easily without sticking or requiring excessive effort.**

Check that the directional selector operates properly, the horn works and the warning buzzer sounds in reverse.

If vehicle has just been delivered, report any physical damage or missing items to the shipping company or your local Columbia Dealer.

Report any battery or service issue problems to the individual(s) responsible for correction and/or repair or contact your local Columbia Dealer for service.

**▲ DANGER**

**If any problems are found, do not operate vehicle until repairs are made. Failure to make necessary repairs could result in fire, severe personal injury, property damage or death. Consult your local Columbia Dealer for professional service.**

## VEHICLE CONTROLS

### KEYSWITCH

This is a five position automotive type switch and is located on the right side of the steering column. The first key position is OFF and is marked S. The second is an accessory position marked A which is not used. The third position is not marked and is not a key stop. It is not used. The fourth position marked M is the ON and powers up the vehicle. The last position marked D is not used. If the key is rotated to this position the vehicle power will be reset.

Turning the keyswitch to OFF is highly recommended whenever vehicle is not in use. Always remove the key out from the keyswitch when leaving the vehicle.



### DIRECTION SELECTOR

Selector is located between the seats. In the middle position the vehicle's direction signal is turned OFF or in neutral. Turning the selector to the right from the middle position moves the vehicle in forward direction (high & low speeds). Turning the direction selector to the left moves the vehicle in the reverse direction. A warning buzzer sounds when in reverse.



## TURN SIGNAL/LIGHTS/HORN SWITCH

The horn is activated by pushing in the button at the lever (A.). Moving lever up or down will activate the turn signals. A green light on the dash will flash indicating the turning direction. The headlights and taillights are activated by a three position selector (B). OFF is the bottom position, middle activates the parking and tail lights, and the upper position activates the headlights. High and low beams are selected by pulling back on the lever.



## WINDSHIELD WIPER/WASHER

Wiper switch is located on the right side of the steering console. Wipers have four up positions:

- 3 High Speed
- 2 Slow Speed
- 1 Off
- 0 Off



Pulling lever towards you activates the washer fluid. Pushing the switch down activates a “quick” wipe. The fluid reservoir is located under the front hood.



**NOTICE:** To avoid scratching the windshield always apply fluid before engaging wiper.

## PARKING BRAKE

This vehicle is equipped with an automated electric motor parking brake. The vehicle’s electronic controller will engage the motor brake when the accelerator is released and there is no movement signal generated by the motor for at least 2 seconds. When pressing the accelerator to begin movement, the motor brake will automatically disengage.

If leaving the vehicle unattended, turn off power and remove the key. The motor brake will automatically engage.

**NOTE:** The Tow/Run switch **MUST** be in the RUN position for the motor brake to function. The switch is located on top of the controller box.





## STEERING WHEEL

The steering wheel controls the path of the vehicle exactly the same as a conventional automobile wheel.



## HAZARD WARNING SWITCH

The hazard warning toggle switch is located on the top of the steering column.

## FUSE BLOCK - 12V ELECTRICAL CIRCUIT

A fuse block protecting the 12V electrical circuits of the vehicle is located under the hood. This system runs the accessories (wiper/washer, dome, etc.). The fuse block has a snap off cover for access to the fuses.



**NOTICE:** If fuses continue to blow and require replacement, have your Columbia Dealer check the electrical circuit.

12 Volt Fuse Descriptions			
#	Amps	Color	Circuit
H	N/A	N/A	Trailer Option
G	5A	Orange	Dome Lamp
F	1A	Gray	Parking Brake Light
E	5A	Orange	Speed Sensor
D	15A	Blue	Lighting
C	5A	Orange	Display Panel
B	10A	Red	Wiper/Washer
A	10A	Red	12V Acc. Outlet

## FUSE BLOCK - 48V ELECTRICAL CIRCUIT

A fuse block protecting the 48V electrical circuits (horn, etc.) of the vehicle is located attached to the top of the controller box assembly. The fuse block has a snap off cover for access to the fuses.



**NOTICE:** If fuses continue to blow and require replacement, have your Columbia Dealer check the electrical circuit.

48 Volt Fuse Descriptions			
#	Amps	Color	Circuit
*	1A	Gray	Key Switch
A	5A	Orange	Strobe
B	5A	Orange	Horn
C	5A	Orange	L.A.D.
D	10A	Red	Controller
E	10A	Red	DC Converter #1
F	10A	Red	DC Converter #2

### TILT BED (If equipped)

The tilt bed has a remote control for raising and lowering. If maintenance or repair is required, disconnect the actuators.



### SECOND SEAT (If equipped)

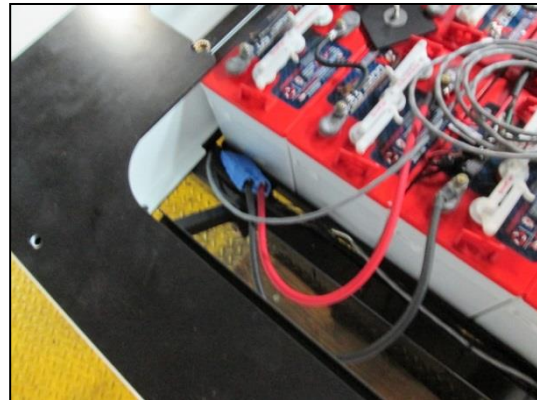
These seats can be raised or lowered to increase rear deck space.

**NOTICE:** If the vehicle is equipped with side rails they must be lowered before raising or lowering the second seat.



### BATTERY ACCESS

Batteries are located beneath the front seats. Before performing vehicle service, power down the vehicle with key, and remove power from electrical system by disconnecting the main B+ terminal from the battery pack, or by using the optional blue quick disconnect if equipped as shown between the battery pack and the controller assembly.



### IMPORTANT INFORMATION

The type of battery used in a Columbia vehicle has a service requirement which is quite different from that of an automotive battery.

The electric vehicle battery supplies all of the power to drive the vehicle. During operation the power stored in the batteries is expended. While the amperage drain rate can vary greatly depending on the type of service, the duration of use and the number of "starts" and "stops" made during a day, the batteries nevertheless progress through each duty cycle from "fully charged" to an almost depleted state.

This type of service is known as "deep cycle" service and electric vehicle batteries are specifically designed to handle this type of service. Proper performance of your Columbia vehicle can only be obtained from specified deep cycle, electric vehicle batteries.

**PLEASE REVIEW IMPORTANT DANGER, AND WARNING STATEMENTS WHEN WORKING AROUND BATTERIES AND CHARGING SYSTEMS!**

## MULTI-FUNCTION CLEARVIEW DISPLAY PANEL

### BATTERY LEVEL INDICATOR:

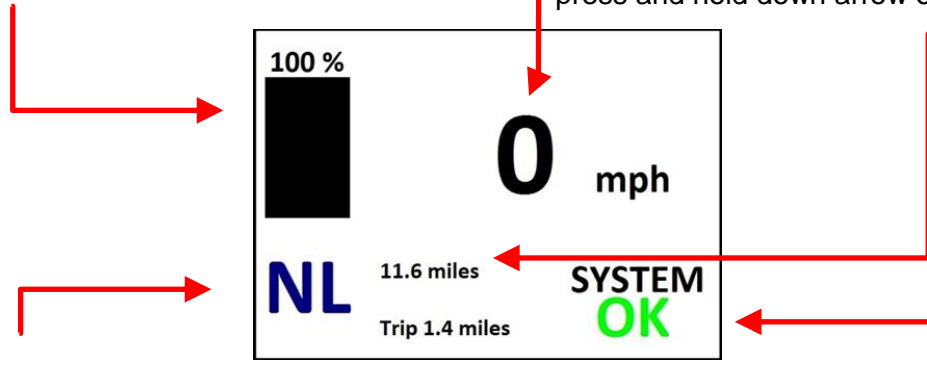
When fully charged, the battery level is shown as a bar graph in the upper left section of the display, with the level indicated as a percentage of available charge. **NOTE: If the display indicates 20% or less, you must immediately charge batteries or vehicle operation will cease and permanent battery damage could occur.**

### SPEEDOMETER:

The center area of the display will indicate speed in Miles Per Hour. Speed is calculated from signals sent from the motor to the controller

### ODOMETER:

The lower center area shows total miles operated and per trip. To reset trip odometer press and hold down arrow on display panel.



### DIRECTION OF TRAVEL:

The selected position of the direction knob is indicated in the lower left section of the display.

**RL** = Reverse Low allows vehicle to operate in reverse direction at slower speed than forward.

**NL** = Neutral

**FL** = Forward Low allows vehicle to operate in forward direction, with maximum speed of 25mph, yet with reduced power to operate in an energy efficient mode. This mode is suitable for everyday operation on fairly flat terrain.

**FH** = Forward High allows vehicle to operate in forward direction, with maximum speed of 25mph, and with full power available. This mode is suitable for operation where some terrain grades are present requiring additional power to maintain speed and throttle responsiveness.

### SYSTEM STATUS MONITOR:

The vehicle controller monitors the status of the vehicle and indicates if there is a fault which may affect vehicle performance.

**OK** = System has passed initial checks and is ready for operation.

**!** = A black exclamation point indicates a system check has detected a minor fault. (ie...overheated or low battery). Vehicle will operate in performance cutback mode.

**!** = A yellow exclamation point indicates a system check has an intermediate fault. This can often be cleared by resetting the condition. (ie.... Throttle pressed prior to selecting direction or parking brake engaged while pressing throttle to move vehicle.)

**!** = A red exclamation point indicates a system check has detected a major fault. Vehicle will not operate until key is recycled and fault is no longer detected.

### DASH PANEL

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SU5-S/L  
Page 14



Located on the dash, this panel contains the left and right green turn signal indicators and the Clearview AC display. This display will show the battery state of charge as a percentage of full charge, the system status, the operating speed, odometer, and direction selected.



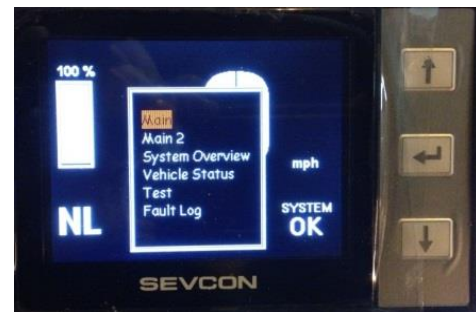
### INITIAL BOOT SEQUENCE

At power on, the display will perform a self-test and load the controller data. You will see the Columbia logo indicating the system is preparing for operation.



### DISPLAY AS STATUS MONITOR

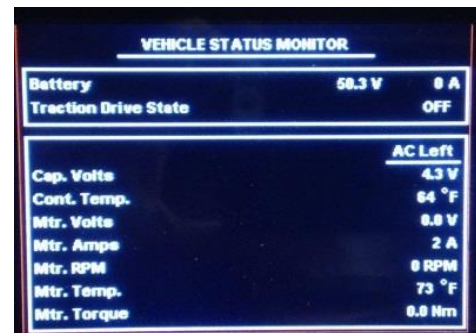
In addition to standard operations, the display can also be utilized as a vehicle monitoring system. By pressing and holding the right center "Enter" button, a menu will appear with access to vehicle data, status and fault codes, should any be present. To toggle through the menu system, use the "Up" or "Down" arrows. To return to the previous screen, press and hold the right center "Enter" button again



The Main 2 Menu will show the key "on" hours, the hours the motor has been used, the current, speed in RPM's if operating, the battery current draw during operation and the percentage the throttle pedal is depressed. This information is helpful in the event of any operational concerns



The Vehicle Status Monitor selection displays the current state of vehicle data collected at the controller



## MULTI-FUNCTION SMARTVIEW DISPLAY PANEL

### DASH PANEL

Located on the dash, this panel contains the left and right green turn signal indicators and the Smartview AC display. This display will show the battery state of charge as a percentage of full charge, the system status fault codes, and the hours on the vehicle.

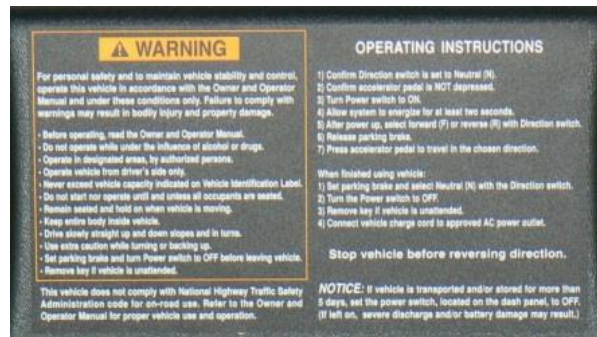


For assistance with possible fault codes, see troubleshooting section of this manual.

### WARNINGS & OPERATING INSTRUCTIONS

#### LABEL

Read this information carefully before operating the vehicle. Promptly request replacement label if removed or damaged.



### DRIVING THE VEHICLE

- Complete the following PRE-OPERATION CHECKLIST.
- Fasten seat belts (if vehicle is so equipped).
- Insert key in power keyswitch, press brake pedal firmly, and turn key to "ON" position.
- Switch the direction selector to the direction of desired travel.
- Slowly press accelerator pedal to obtain desired vehicle speed.
- To slow or stop vehicle, remove foot from accelerator and press brake pedal.

## PRE-OPERATION CHECKLIST

### ⚠ CAUTION

**Should any item malfunction or need adjustment, do not operate vehicle until the problem has been corrected.**

ITEM	PROCEDURE
Batteries	Fully charged or adequately charged to provide power for duration of operations.
	The AC cord is disconnected from the vehicle.
	Electrolyte level in each cell covers the top of cell plates. (Does not apply to sealed batteries)
	Batteries are secure and free of corrosion.
	All terminals and connections are tight. Torque connections to 100 in. lbs.
Tire Pressure	32 psi
Lights, Horn and Reverse Buzzer	Head, tail and brake lights illuminate.
	Press horn button to sound horn.
Brakes	Brake pedal has firm pedal pressure with minimal travel.
Steering	Responsiveness and the absence of excessive free play.
Cargo	Load is secure, balanced and not top heavy.
Obstacles	Path of intended travel is free from obstructions.
Seat Belts	If equipped, driver and passenger are secured by seatbelts before moving vehicle.
Labels	All warning and operation labels in place.
Accelerator	Check for smooth operation.
Tow/Run	Make sure TOW/RUN switch is in the RUN position.

## BATTERY INSPECTION & MAINTENANCE

### **⚠ DANGER**

Battery acid is poisonous and can cause severe burns. Avoid contact with skin, eyes, or clothing.

#### **ANTIDOTES:**

**EXTERNAL:** Flush with water. Call a physician immediately.

**INTERNAL:** Drink large quantities of milk or water. Follow with milk of magnesia or vegetable oil. Call a physician immediately.

**EYES:** Flush with water for fifteen minutes. Call physician immediately.

### **⚠ DANGER**

Always remove key and disconnect battery pack before servicing or repairing the vehicle. See BATTERY DISCONNECT METHOD.

Always wear full-face shield when working on or near batteries.

All batteries used in electric vehicles can explode! Batteries produce explosive hydrogen gas at all times, especially, during charging or discharging. Ventilate area when charging batteries.

Do not attempt to charge a battery if it is frozen, or if the case is bulged excessively. Frozen batteries can explode! Properly dispose of the battery.

Do not smoke around batteries. Keep sparks and flames away from batteries and the charging area. Use care to prevent an accidental arc which could cause an explosion. Use only approved insulated tools, remove jewelry such as rings, watches, chains etc. and place an insulating material (wood, plastic, rubber etc.) over all battery connections.

Never add acid to a battery.

### **⚠ WARNING**

To reduce the risk of electrical shock or injury:

Do not use an ungrounded two to three-prong adapter to connect the charger to a two-prong outlet or extension cord.

The battery charger must be properly grounded. Use a three prong No. 12 AWG heavy duty power cord no more than 50 feet long.

Locate all cords so that they will not be stepped on, tripped on, or otherwise damaged. Immediately replace worn, cut, or damaged power cords or wires.

Do not connect the power cord near fuels, grain dust, solvents, thinners, or other flammables. The spark can ignite flammable materials and vapors

## **BATTERY INSPECTION & MAINTENANCE (Continued)**

**NOTICE:** Automotive batteries should never be used for "deep cycle" application, as their useful life will be very short.

Damaged or corroded battery terminals should be replaced or cleaned as necessary. Failure to do so may cause overheating during operation. Torque connections to 100 in. lbs.

Do not attempt to recharge batteries with a charger not designed for your vehicle.

Only trained technicians should service the charger. Contact your Columbia Dealer for assistance.

**NOTICE:** Install surge arrestors on incoming AC power lines. Surge arrestors will help protect electrical/electronic components in the charger and vehicle from all but direct or "close proximity" lightning strikes.

1. Be sure battery hold downs are properly tightened. A loose hold down may allow the battery to become damaged from vibration or jarring. A hold down that is too tight may buckle or crack the battery case.
2. Weekly inspect battery posts, clamps and cables for breakage, loose connections and corrosion. Replace any that are damaged. Batteries and connections must be clean and dry. Torque connections to 100 in. lbs.
3. Weekly an equalization charge is to be applied to the battery pack. This process balances the electrical charge in the battery pack and will extend battery life. The following procedure is used to complete this.
  - Charge the battery pack allowing the charger to go to green 100% charge.
  - Once the green LED lights unplug the power cord.
  - Wait approximately 30 seconds. Reconnect the power cord and allow the charger to complete a second charge cycle.
  - If the vehicle is not to be used, leave power cord connected. The on-board charger can test and recharge as needed.

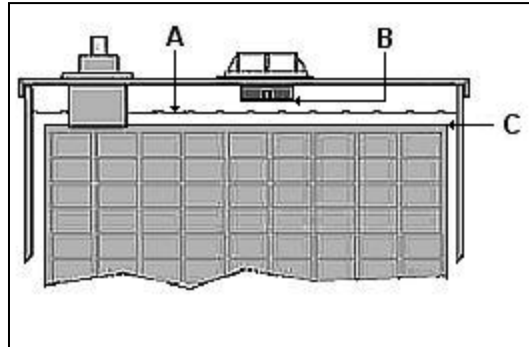


## **BATTERY CLEANING**

Acid-soaked debris on the battery terminal connections will cause current leakage, reduces battery efficiency, and battery life.

Hose wash battery terminal connections periodically with clean low-pressure water to keep them free of acid spillage, dirt, and other debris. Do not hose wash electronic controllers, switches, solenoids and other electrical control devices. Cover as necessary to prevent splashing. Clean battery terminal connections with baking soda (sodium bicarbonate) and water solution. Mix 5 teaspoons baking soda per quart of water. Use a stiff bristle brush, rinse with clean water and dry with a clean cloth. Torque connections to 100 in. lbs

**NOTICE: The following information does NOT apply to sealed batteries.**



1. Check the electrolyte level on new batteries before they are put into service, and, at a minimum, once a week thereafter. Water use increases as batteries age. If the vehicle is equipped with a Single Point Battery Watering System see the information on this in this section.
2. Never allow the electrolyte level (A) to fall below the top of the plates (C). If the plates are exposed, add only enough to cover the plates before charging.
3. After batteries are fully charged, fill cells to just below the bottom of the cell vents (B), approximately 1/8" to 1/4". Electrolyte level should not touch the bottom of the cell vents.
4. Do not overfill batteries. Electrolyte expands and can overflow during charging. Water added to replace the spillage dilutes the electrolyte and reduces its specific gravity.
5. Use only distilled water. Vehicle batteries may use up to 16 quarts of water during their useful life and non-distilled water may contain harmful minerals which will have a cumulative adverse effect on battery performance and life.
6. Check to see that battery cap vent holes are clear. Plugged vent holes will not permit gas to escape from the cell and could result in battery damage. Check that all vent caps are tightly in place. Do not allow water or cleaning solution to enter cap vent holes.

**NOTICE: Follow local ordinances and codes for proper disposal of battery cleaning waste.**

## **CONDITIONS WHICH AFFECT CHARGING**

Always schedule enough charging time so the charger attains the 100% level. Charging time is affected by age and battery condition, state of discharge, electrolyte temperature, AC line voltage, and other variables. Correct charging methods extend battery life and vehicle range between charges. If vehicle is used only occasionally, a refresher charge should be given prior to using.

New batteries need up to four hours more charging than “mature” batteries. Before the first use, completely charge new batteries. Charging time will vary based on conditions noted above but will probably be 12 hours.

Limit new batteries use between charges for the first 25 – 50 cycles. New batteries have less capacity than seasoned batteries. New batteries should not be discharged more the 20 – 30% before recharging. This will prevent premature battery failure.

Battery efficiency is affected by temperature. If the temperature of the outside air and/or batteries is below 60° F, battery capacity is reduced. Batteries will require more frequent and longer charge periods in early spring, fall and winter.

As batteries age, they finish charge at progressively higher charge rates and tend to use more distilled water. At this point in battery age, charger will automatically begin reducing charge time.

Batteries found defective must be replaced. All batteries in a vehicle should be matched according to age, capacity and brand.

## **BATTERY CHARGING**

All current production Columbia 24/36/48 volt electric vehicles are built with a solid state on-board, fully automatic high-frequency, programmable battery charger as standard equipment. This switch mode industrial battery charger features advanced charge and termination algorithms designed to optimize both daily battery capacity and overall battery life. The charger is convection cooled with no moving parts, sealed, and designed to provide maximum reliability. The universal AC input enables the charger to be used with a wide range of AC voltages and frequencies, and the charger includes high efficiency and power factor.

The charger was factory-configured with a battery profile intended for use with batteries specified to be installed in the vehicle at time of original sale. In the event you change battery types, size or manufacturer, please contact your dealer as you may require a different programming configuration.

The charge status can be found on the charger as well as on a remote LED assembly. This LED assembly and descriptive label is located near the charger receptacle.



## **CHARGER OPERATING INSTRUCTIONS**

The charger has an AC input rating of 100-230 volts, 50-60 hertz, single-phase. The charger has an AC operating range of 90-264 volts, 45-65 hertz. Below 100 volts, the charger may reduce output power.

The charger must be grounded to reduce the risk of electric shock and is equipped with an IEC inlet having an equipment-grounding conductor and a grounding socket. The installed AC power cord must be plugged into an outlet that is properly installed and grounded in accordance with all applicable electrical codes and ordinances. Connect the supplied power cord to the vehicle charger receptacle and to a properly grounded wall outlet with a minimum of 15 Amp capacity.

**DANGER: NEVER ALTER THE AC POWER CORD OR PLUG PROVIDED. IMPROPER CONNECTION CAN RESULT IN A RISK OF ELECTRIC SHOCK.**

If an extension cord is necessary, it must be a 3-conductor, No. 12 AWG minimum, heavy-duty cord with ground. It must also be in good electrical condition and as short as possible, 50 ft (15m) maximum. Make sure that the pins on the plug of the extension cord are the same number, size, and shape as the AC power cord plug on the charger. The use of an improper extension cord could result in a risk of fire or electrical shock.

Locate all cords so that they will not be stepped on, tripped over, or otherwise subjected to damage, stress, or accidentally disconnected.

**CAUTION: VERIFY THAT THE AC POWER CORD IS FULLY ENGAGED IN THE INLET AND CANNOT BE PULLED LOOSE BEFORE USING THE CHARGER.**

**DANGER: RISK OF ELECTRIC SHOCK! CONNECT THE AC SUPPLY CORD DIRECTLY TO A GROUNDED, 3-WIRE OUTLET. DO NOT TOUCH UNINSULATED PORTION OF DC OUTPUT TERMINALS OR BATTERY TERMINALS. REPLACE DEFECTIVE CORDS, WIRES, OR CONNECTORS IMMEDIATELY.**



**WARNING: LEAD-ACID BATTERIES GENERATE EXPLOSIVE GAS. CHARGE ONLY IN WELL VENTILATED AREAS. TO PREVENT ARCING OR BURNING NEAR BATTERIES, DO NOT DISCONNECT THE DC CHARGING CONNECTOR(S) FROM THE BATTERIES WHEN THE CHARGER IS OPERATING. IF THE CHARGE CYCLE MUST BE INTERRUPTED, UNPLUG THE AC POWER CORD BEFORE DISCONNECTING THE DC OUTPUT CONNECTOR(S) FROM THE BATTERIES. KEEP SPARKS, FLAME, AND SMOKING MATERIALS AWAY FROM BATTERIES. TO REDUCE THE RISK OF FIRE, DO NOT USE THE CHARGER NEAR FLAMMABLE MATERIALS OR VAPORS.**

## **CHARGER OPERATING INSTRUCTIONS (Continued)**

1. Ensure that the vehicle/equipment that the charger is mounted on is turned off.
2. Connect the charger AC power cord to an appropriate AC outlet. The charger will start automatically, which is indicated by the Charge Status (yellow) LED beginning to blink slowly.
3. If the charger must be disconnected from the battery while a charge cycle is in progress, disconnect the AC power cord from the AC outlet. Do not disconnect the charger DC output connector/plug from the battery while a charge cycle is in progress.
4. The charge cycle 80% point is indicated by the Charge Status (yellow) LED beginning to blink quickly.
5. The Finish charge cycle phase is indicated by the solid illumination of the Charge Status (yellow) LED. Not all charge profiles include a Finish phase.
6. An extended Balance/Equalize charge cycle phase is indicated by the Charge Complete (green) LED beginning to blink quickly. Not all charge profiles include a Balance/Equalize phase.
7. The charger automatically terminates the charge cycle when a battery reaches full charge, which is indicated by [1] the solid illumination of the Charge Complete (green) LED or [2] the Charge Complete (green) LED beginning to blink slowly indicating a post-charge phase. The required charge time is affected by numerous factors, including battery amp-hour capacity, depth of discharge, battery temperature, and battery age/usage.
8. Disconnect the charger AC power cord from the outlet before operating the vehicle/equipment.

## **VEHICLE LOCKOUT CONTROL (CHARGER SAFETY INTERLOCK)**

The charger is configured with a lockout/interlock control signal to prevent vehicle/equipment operation while the charger is in use. If the charger was factory-configured for on-board use, the lockout control signal will be active while AC power is applied to the charger.

**NOTICE: If the batteries are excessively discharged, the charger will not be able to charge the complete set of batteries. The remote LED will be flashing red (see Red Light Charger Error Codes). It will then be necessary to follow the Special Charging for Excessively Discharged Batteries.**

## CHARGER LED INDICATORS

The charger includes three (3) LEDs to indicate charger status and fault information. The functionality of the LEDs is outlined below. If the charger is equipped with a remote LED assembly, this assembly also includes three (3) LEDs with identical functionality.

### YELLOW

Indicates charge cycle status. See descriptions of the possible states.

### GREEN

Indicates when a charge cycle completes successfully, when an extended Equalize charge cycle phase is active, or when a post-charge float phase is active. See descriptions of the possible states.

Yellow LED	Green LED	Description
Slow Blink	Off	Bulk/Start charge cycle phase.
Fast Blink	Off	Absorption charge cycle phase. (Great than 80% charged)
Solid On	Off	Finishing charge cycle phase.
Off	Fast Blink	Equalize charge cycle phase.
Off	Solid On	Charge cycle complete.
Off	Slow Blink	Charge cycle complete. Float charge cycle active.

### RED

Indicates when a charger or battery fault has occurred. See descriptions.

	Red LED	Yellow LED	Green LED	Description
CHARGER CONDITIONS	Slow Blink	1	1	DC has been disconnected but charger still plugged in
	Slow Blink	0	1	Over Temp – Cycle will restart when temperature decreases.
	Slow Blink	1	0	LOW DC – Battery voltage too low to begin cycle. Check batteries and connections.
	Slow Blink	0	0	No AC – Power was lost during cycle. Cycle will restart when power returns.
	Slow Blink	1	Slow Blink	INTERNAL FAULT – Contact Columbia.
	Slow Blink	Slow Blink	0	INTERNAL FAULT – Contact Columbia.
	Slow Blink	Slow Blink	1	INTERNAL FAULT – Contact Columbia.
	Fast Blink	N/A	N/A	INTERNAL FAULT – Contact Columbia. Unit is still able to charge.
BATTERY CONDITIONS	1	0	0	PHASE – A fault condition occurred during a cycle. (Most commonly maximum time in one phase).
	1	0	Slow Blink	MAX DC – Maximum voltage has been reached.
	1	0	1	MIN DC – Minimum voltage was not met after a specified time from the start of cycle.
	1	Slow Blink	0	MAX AMP – Maximum amp-hour for overall cycle met.
	1	Slow Blink	Slow Blink	MAX TIME – Maximum time for overall cycle was met.

## EXCESSIVELY DISCHARGED BATTERIES

**NOTICE: Your Columbia Dealer will have the equipment and experience to perform the following battery inspections**

The charger will not charge dead batteries. First establish that none of the batteries have an internal fault or bad cell. If a battery has remained too long in a discharged state (i.e. 2-4 volts each), it may be internally damaged and not capable of accepting a charge and must be replaced.

If the electrolyte Specific Gravity is low (less than 1.1098 SG) or individual battery voltage is less than 5.25 volts for three cells (10.5 volts for six cells), recharge each battery with an ordinary automotive style trickle charger at a rate of 3 to 6 amps.

It is not necessary to disconnect the battery cables, as the alligator style clips can be connected to each positive and negative battery post. Follow specific charger instructions.

### **⚠ DANGER**

**To prevent a spark from igniting the gas emitted from the batteries, always disconnect the charger AC power cord first when moving the positive/negative alligator clips.**

Be sure to charge all of the batteries in the set. Each battery may require two to three hours of charging to bring it back to serviceable condition. After all batteries have been individually charged, remove the automotive charger and restart charging with the on-board charger. It may require several 8-12 hour cycles to bring severely discharged batteries back to 100% charged condition. If again the charger has the RED FAULT LED flashing there is a problem with one or more of the batteries.

## TIPS FOR PROLONGING BATTERY LIFE

**NOTICE: A common misconception is Deep Cycle Batteries develop a memory, lose capacity, or must be discharged until the BDI warning flashes and then recharged. Deep Cycle Wet Lead Acid Batteries are not like cell phone NiCad Batteries. Deep Cycle Batteries benefit from frequent charging and being maintained at as close as possible to a 100% state of charge. Plugging in the on-board charger overnight or when the vehicle is not in use for 3-5 or more days is encouraged.**

## **PROPER CARE OF DEEP-CYCLE LEAD-ACID MOTIVE POWER BATTERIES**

Motive power battery packs are subjected to severe deep-cycle duty on a daily basis. Although these batteries are designed to withstand such duty, the following precautions must be observed to obtain good performance and maximum cycle life.

**CAUTION: ALWAYS WEAR PROTECTIVE EYE SHIELDS AND CLOTHING WHEN WORKING WITH BATTERIES. BATTERIES CONTAIN ACIDS WHICH CAN CAUSE BODILY HARM. DO NOT PUT WRENCHES OR OTHER METAL OBJECTS ACROSS THE BATTERY TERMINAL OR BATTERY TOP. ARCING OR EXPLOSION OF THE BATTERY CAN RESULT.**

1. When installing new batteries, be sure the polarity of each battery and the overall battery pack is correct. Otherwise, battery and/or charger damage can result.
2. New batteries should be given a full charge before their first use because it is difficult to know how long the batteries have been stored.
3. New batteries and older batteries that have been in storage are not capable of their rated output until they have been discharged and charged a number of times. Consult the manufacturer of your batteries for more information.
4. **DO NOT EXCESSIVELY DISCHARGE THE BATTERIES.** Excessive discharge can cause polarity reversal of individual cells resulting in complete failure shortly thereafter.
5. Maintain the proper electrolyte level of wet (flooded) batteries by adding water when necessary. Distilled or deionized water is best for battery life. Never allow the electrolyte level to fall below the top of the battery plates. Electrolyte levels lower during discharge and rise during charge. Therefore, to prevent the overflow of electrolyte when charging, it is mandatory that water be added to cells **AFTER** they have been fully charged – do not overfill. Old batteries require more frequent additions of water than new batteries.
6. Hard crystalline sulfates form when batteries in storage are not maintained in a charged active state. Internal self discharge can bring about the start of this condition in as little as three days in warm temperatures. Batteries not maintained and allowed to sit in storage will self discharge, sulfate and lose capacity. Repeated charging without using the batteries between charges can recover some of the lost power, range, and life, but some permanent loss should be expected.
7. Cold batteries require more time to fully charge. When the temperature falls below 65°F, the batteries should be placed on charge as soon after use as possible.
8. The tops of batteries and battery hold downs must be kept clean and dry at all times to prevent excessive self discharge and the flow of current between the battery posts and frame. Electrolyte spilled on batteries never dries or evaporates.
9. All connections to batteries must be maintained clean and tight. Due to heating and discharge rates, bolted connections loosen over time. Re-tighten the connections twice yearly to the torques specified by the battery manufacturers.
10. Follow all operating instructions, cautions, and warnings as specified in this manual, on the charger, in the battery manuals, and in the vehicle manuals.

## **BATTERY REMOVAL & INSTALLATION**

- Remove battery negative (-) cables and then battery positive (+) cables.
- Remove battery hold down.
- Remove batteries from vehicle.
- To install batteries, reverse the removal procedure with the negative (-) cables being attached last. Torque connections to 100 in. lbs.

## **SINGLE POINT BATTERY WATERING SYSTEM (If equipped)**

**NOTICE: The following information does NOT apply to sealed batteries**

This is a single point watering system for maintaining a sufficient electrolyte level in the batteries.

**NOTICE: Do not operate this system on brand new batteries. See FIRST STEP for the initial check on the electrolyte level of new batteries. Complete 4 to 5 charge cycles before using the system.**

**System is to be used only after fully charging the batteries and batteries are warm.**

The fill tube assembly which is used for adding water to the battery pack consists of a fill tube, one end having a filter screen, the other having a female coupler and a rubber squeeze bulb.

Check the battery pack water level weekly by:

- Inserting the fill tube filter end in an approved water supply.
- Attaching the female coupler to the battery pack male coupler. Squeeze the rubber ball until firm which indicates that filling is complete. Immediately disconnect the couplers by depressing the push button on the female coupler. If the water supply is left connected after the filling process is finished it could lead to an overflow.



## MAINTENANCE GUIDELINES

To ensure that the vehicle is kept in a safe and correct operating condition, it must be inspected and maintained on a regular basis. Proper lubrication, electrical control adjustments, safety feature checks, etc. performed at recommended intervals will help prevent damage or failure of the unit while providing optimum performance.

Follow the guidelines below to assure proper maintenance.

- Before starting any repairs or maintenance, immobilize the vehicle by turning the power keyswitch off and removing the key.
- Block the chassis with jack stands before working under a raised vehicle.
- Do not use flammable fluids for cleaning parts.
- Work in a properly ventilated work area.
- Regularly inspect and maintain in safe working condition the brakes, steering mechanisms, speed and directional control mechanisms, warning devices, guards and safety devices.
- Keep the vehicle in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.

## BRAKE SYSTEM

Adjustments/repairs to the brakes are to be completed by a trained qualified technician at your Columbia Dealer.

## BRAKE FLUID MAINTENANCE

Check the brake fluid in the master cylinder periodically (under normal conditions, every 3 months). The master cylinder is located under the front hood. Use DOT 3 Motor Vehicle Brake fluid. Maintain fluid level within 1/4" of master cylinder filler opening.

## TIRE CARE

See for recommended tire pressure on vehicle label in front storage area. Improper inflation will shorten the life of your tires and will adversely affect performance.

**NOTICE: Replacement tires must be the same size as original equipment. Increased tire load ratings are permissible but tire rating does not increase the rated load carrying capacity of the vehicle.**

## WHEEL & TIRE REMOVAL/INSTALLATION

Place blocks ahead of and behind the wheels that will remain on ground. Slightly loosen lug nuts. Place a jack under the side of the vehicle in contact with the frame. Raise vehicle and remove lug nuts and wheels. To install, tighten the lug nuts evenly in a star pattern until the nuts are all seated and torque to 65 ft. lbs. (88.1 N.m). Recheck lug nut torque with the vehicle on the ground.

**NOTICE: The wheel may be bent if not torqued in a crossing pattern. This will cause the wheel to wobble.**



## CLEANING

Wash underside to remove all dirt and debris. Do not direct high pressure water at the controller, speed switches, or tops of the batteries.

Wash body and seat with a mild detergent. Do not use abrasives (bodies are painted). Frequent washings with mild soap will preserve the finish of your vehicle. For stubborn and imbedded dirt, a soft bristle brush may be used. Tar, asphalt, creosote and the like should be removed immediately to prevent staining of paint.

*NOTICE:* Do not use harsh detergents, abrasives or cleaning solvents that contain ammonia, aromatic solvents or alkaline material to clean cab.

### MAINTENANCE SCHEDULE - OWNER/OPERATOR

Item	Operation	Weekly	Monthly	Semi-Annual
<b>Tires</b>	Lug nuts tight.		*	
	Check tire pressure, wear, damage. dented rims.		*	
<b>Electrical</b>	Check battery electrolyte level.	*		
	Apply equalization charge to the battery pack.	*		
	As required, clean battery terminals and wash cases.	*		
	Check the general condition of the electrical system (connections, frayed/broken cables).		*	
<b>Brakes</b>	Check pedal travel & service brake operation.		*	
<b>Body and Frame</b>	Inspect for loose hardware (bolts & nuts).	*		
	Clean body and seats, Wash as needed.	*		
<b>Lube</b>	Visually check suspension and differential for leakage.		*	

### MAINTENANCE SCHEDULE QUALIFIED TECHNICIAN

It is recommended that the following be performed by a trained qualified technician or your Columbia Dealer.

Item	Operation	Quarterly	Semi-Annual	Annual
<b>Tires</b>	Front wheel alignment .		*	
<b>Electrical</b>	Test batteries.		*	
	Inspect motor condition and operation.			*
<b>Brakes</b>	Check brakes, clean, adjust, replace if needed.		*	
	Check brake fluid (when equipped)	*		
<b>Lube</b>	Check differential fluid level.			*
	Grease fittings.		*	
<b>Wheel</b>	Check wheel axle nuts for tightness & torque.		*	
	When equipped,- wheel bearings, repack, replace if needed			*

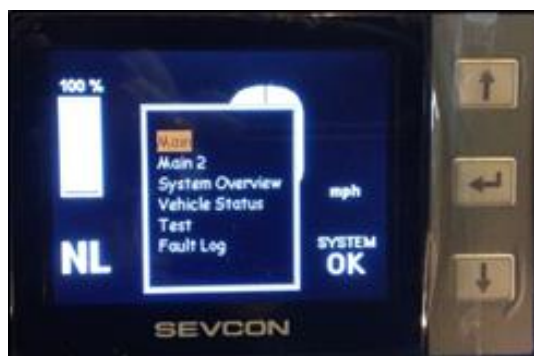
## VEHICLE TROUBLESHOOTING

PROBLEM	CHECK
Will not move	Tow/Run switch is in RUN position. Power keyswitch on. Direction Selector in desired direction. Keyswitch for loose wires or faulty switch.
	Batteries for loose terminals, corrosion, electrolyte level or state of charge.
	Motor for loose, damaged or disconnected wires.
Will not move with power keyswitch on and the direction selector is in the desired direction	See Controller Troubleshooting below.
Runs slow	Batteries for loose terminals, corrosion, electrolyte level or state of charge.
	Brakes dragging
	Under inflated or flat tires.
	Wheels for binding, do not spin freely.
If these test procedures do not resolve your vehicle problem, contact your Columbia Dealer for service.	

## CONTROLLER TROUBLESHOOTING

### CLEARVIEW DISPLAY

The AC Drive controller sends fault codes to the Multi-Function Display. For codes above the potential exclamation point in lieu of the SYSTEM OK message, or general assistance with these codes, consult the service manual or your local authorized dealer. Fault codes are stored in memory and can not be erased.



### SMARTVIEW

The AC Drive controller sends fault codes to the Multi-Function Display. For code definition, or general assistance with these codes see below or consult the service manual



## SMARTVIEW FAULT CODES

Level	Display	Message	Description	Recommended Action
1	F15006	No Motor Speed Signal	No speed feedback from motor	Check encoder wiring and speed measurement signal
1	F16002	Safety Case 1	Throttle appears to be stuck. This fault will clear if throttle starts to work again.	Check throttle wiring and installation.
1	F16003	Safety Case 2	Throttle appears to be stuck. This fault will latch and can only be cleared by repairing the throttle and recycling power.	Check throttle wiring and installation.
1	F17001	BDI Warning	BDI remaining charge is less than BDI Warning level	Charge battery
1	F17002	BDI Cutout	BDI remaining charge is less than BDI Cutout level	Charge battery
1	F17003	Low Battery Cut	Battery voltage is less than Under Voltage limit for longer than the protection delay	Charge battery
1	F17004	High Battery Cut	Battery voltage is greater than Over Voltage limit for longer than the protection delay	Charge battery
1	F17005	High Capacitor Cut	Capacitor voltage is greater than Over Voltage limit for longer than the protection delay	Charge battery
1	F17006	Vbat below rated min	Battery voltage is less than rated minimum voltage for controller for longer than 1s. NOTE: This fault is sometimes seen at power down.	Charge battery
1	F17007	Vbat above rated max	Battery voltage is greater than rated maximum voltage for controller for longer than 1s.	Charge battery
1	F17008	Vcap above rated max	Capacitor voltage is greater than rated maximum voltage for controller for longer than 1s.	Charge battery
1	F17009	Motor in low voltage cutback	Motor control has entered low voltage cutback region.	Charge battery
1	F17010	Motor in high voltage cutback	Motor control has entered high voltage cutback region.	Charge battery
1	F18001	Device too cold	Low heatsink temperature has reduced power to motor	Allow controller to warm up to normal operating temperature.

**SMARTVIEW FAULT CODES (Continued)**

1	F18002	Device too hot	High heatsink temperature has reduced power to motor	Allow controller to cool down to normal operating temperature.
1	F18003	Motor in thermal cutback	High measured or estimated motor temperature has reduced power to motor	Allow motor to cool down to normal operating temperature.
1	F18004	Motor too cold	Low Measured temperature has reached -30deg	Check motor thermistor connection or allow motor to warm up.
1	F11101	Encoder Alignment Warning	Encoder is not aligned properly.	Ensure encoder offset is correctly set or re-align encoder
2	F22001	Parking Brake Switch Fault	Valid direction selected with parking brake engaged while attempting acceleration.	Release parking brake
2	F22002	Two Direction Fault	Both the forward and reverse switches have been active simultaneously for greater than 200 ms.	Check vehicle wiring and reset switches
2	F22003	SRO Fault	FS1 active for user configurable delay without a direction selected.	Deselect FS1
2	F22004	Sequence Fault	Any drive switch active at power up.	Deselect all drive switches
2	F22005	FS1 Recycle Fault	FS1 active after a direction change and FS1 recycle function enabled	Deselect FS1
2	F25001	Motor Overspeed		
2	F25002	PST Fault	An issue has occurred with the PST unit	Check PST unit
2	F26001	Throttle Fault	Throttle value is greater than 20% at power up.	Release throttle
2	F27002	Entering Cutback	Controller has entered thermal or voltage cutback region	Check for temperature or voltage cutback condition and take appropriate action
2	F28001	Cutback	Thermal or voltage cutback factors have reduced below user defined levels.	Check for temperature or voltage cutback condition and take appropriate action
3	F35002	Motor Open Circuit Fault	Motor terminal is open circuit or disconnected from controller	Check motor wiring. Check controller condition
3	F35003	No Motor Speed Signal	No speed feedback from motor	Check encoder wiring and speed measurement signal
3	F37003	Power Supply Critical	Battery voltage has dropped below critical level	Check controller voltage supply

## TOWING WITH THIS VEHICLE AS LEAD VEHICLE

**NOTICE:** If equipped with proper hitch and towing equipment observe these safety rules:

When using this vehicle as a tow vehicle to pull trailers or a properly equipped other vehicle, observe the following:

- The maximum tongue weight on this vehicle is limited to 350 pounds
- Secure vehicle to the trailer following trailer manufacturer's instruction.
- The maximum towing capacity of this vehicle is 1500 pounds for a trailer without additional electric brakes.
- The maximum towing capacity of this vehicle is 3500 pounds for a trailer equipped with operational electric brakes.
- The towing capacities are reduced by the weight of any load carried on vehicle.

## TOWING THIS VEHICLE IF NON-OPERATIONAL

**NOTICE:** This vehicle may be towed with the following precautions:

- T** Turn off key.
- O** Occupants and or cargo must be unloaded.
- W** Walk around vehicle to inspect for any loose or dragging items.
  - I** Inspect lift mechanism or tow straps/chains for secure fit.
- N** No power to controller – TOW/RUN switch in TOW position.
- G** Go no faster than 5 mph while towing vehicle.

**IMPORTANT NOTE:** For vehicles equipped with the optional larger 8KW motor, the motor brake must be manually released. From under vehicle, rotate knob on brake rod counterclockwise until fully extended. Failure to release motor brake will cause damage to motor, axle, wheels and possibly controller. Rotate knob clockwise until fully engaged to reactivate motor brake prior to vehicle operation.

## TRANSPORTING THIS VEHICLE

**NOTICE:** To transport this vehicle behind an auto or truck on an approved trailer.

When trailering your vehicle over long distances or on the highway observe the following:

- Use trailers specifically designed to carry your Columbia vehicle that meets all federal, state and local requirements.
- Secure vehicle to the trailer following trailer manufacturer's instruction.
- The key should be removed from the vehicle, the motor brake engaged, and the wheels blocked.
- On vehicles equipped with high or wide additions or accessories be certain they are secured properly to prevent loss or damage while trailering.
- Windshields and/or sun tops may also need to be removed to prevent damage or loss.

## BATTERY PREPARATION FOR VEHICLE STORAGE

Before storage make sure batteries are fully charged, for non-sealed batteries make sure the electrolyte is full in all cells. Clean the batteries and connections as described earlier.

The charger has the capability to test and recharge batteries during storage. Leave the batteries connected and the charger plugged into a reliable AC source.

### Storage Mode Operation

1. Storage Mode is designed to keep your battery maintained during storage periods that last a few weeks to several months at a time.
2. Depending on the battery type, a storage charge can be a continuous float or a periodic charge mode.
3. Do NOT disconnect the charger from the battery or from the AC power while your machine is not being used. Disconnecting and reconnecting the charger from the batteries or AC power may start a charge cycle, but disconnection disrupts the storage mode so optimum battery maintenance is not achieved.
4. After several months of storage your batteries should be serviced and the charger reset by disconnecting the the AC power (disconnect AC for a minimum of 10 minutes) before continuing another storage season.

If the charger is not used the batteries will "self-discharge" during storage and recharging will be necessary. Below is the recommended frequency for recharging.

STORAGE TEMPERATURE	CHARGE AT
Below 4° C (40° F)	Every 6 months
4° C - 16° C (40° - 60° F)	Every 2 months
Above 16° C (60° F)	Once a month

The voltage or specific gravity (FLA Batteries Only) of the electrolyte should be checked every 6 to 8 weeks using a voltmeter or hydrometer.

After charging, disconnect the batteries.

**NOTICE: Batteries in a low state of charge will freeze at higher temperatures than fully charged batteries. Do not attempt to charge a battery that is frozen or if battery case is excessively bulged. Properly dispose of battery, because frozen batteries can explode.**

The table below indicates freezing points of batteries at different specific gravities.

SPECIFIC GRAVITY	FREEZE POINT °F/°C
1.260	-70/-57
1.230	-39/-38
1.200	-16/-26
1.117	-2/-19
1.110	+17/-8



## **VEHICLE PREPARATION FOR STORAGE**

Store the vehicle in a cool place.

Maintain tire pressure at recommended PSI.

Continue quarterly lubrication during extended storage period.

Clean vehicle body, seats, battery compartment and vehicle underside.

Block wheels to prevent movement.

**NOTICE: Make sure power keyswitch is in the OFF position.**

## **RETURNING VEHICLE TO SERVICE**

- If necessary, connect the battery pack and fully recharge batteries.
- Check tire pressure and readjust if necessary.
- Perform Pre-Operational Checklist.

For vehicles with a single point watering system:

- After the batteries have been fully charged, connect the system to its water supply for 3-5 seconds then disconnect regardless of whether or not the batteries are completely full.
- Return the vehicle to its regular service.
- Place the vehicle back into its regular watering schedule (waiting at least 1 week until next watering).



## LIMITED WARRANTY STATEMENT

We warrant to the original consumer purchaser or lessee that our Passenger Vehicle will be free from defects in factory materials and workmanship under normal use and service in a non-commercial application for the period stated below from date of purchase subject to the terms, provisions and exclusions contained herein.

1. Lifetime – Frame:

A lifetime vehicle warranty on the frame. Damage due to rust, corrosion or abuse is specifically excluded.

2. 5 Years - Rhino-Tuff<sup>sm</sup> Body Panels:

A five (5) year vehicle warranty of the Rhino-Tuff front, mid & rear body panels. Damage due to accident or collision is specifically excluded.

3. 24 months – Parts and Labor on Components:

Columbia warrants parts and labor to repair defective components for twenty-four (24) months from date of purchase, subject to the following terms and conditions.

4. Excluded Components:

Batteries and tires are excluded from this warranty as they are warranted by their respective manufacturers. Your authorized Columbia dealer will assist in processing these warranties, if necessary. Consequential damage caused by defective batteries or tires are also excluded from this warranty.

5. Additional Conditions:

Columbia will warrant all Columbia replacement parts provided under this warranty. All Columbia parts replaced under warranty become the property of Columbia and, if requested by Columbia, must be returned to the factory for inspection.

(a) Any other expense incurred in obtaining warranty repairs, including transportation and labor, are the responsibility of the purchaser, unless otherwise stated in this warranty.

(b) To qualify for warranty coverage, the selling dealer must complete the warranty registration form online within ten (10) days after purchase or lease. If this information is not on file with Columbia, purchaser must provide proof of date of purchase with any warranty claim.

(c) To obtain warranty service, you must return your vehicle during the warranty period to any authorized Columbia vehicle repair facility. Dealers are able to provide service during their normal business hours and within a reasonable time. Further information regarding warranty service may be obtained from Columbia by writing our Customer Service Department at: Columbia, 1115 Commercial Ave., Reedsburg, WI 53959.

(d) Any subsequent changes, updates or improvements in vehicle design and equipment shall not apply to vehicles previously manufactured or purchased.

6. This Warranty Shall Not Apply to Damage or Cost Caused By:

(a) Failure to operate, maintain and service vehicle, as specified in the applicable Owner's Manual.

(b) Abuse, misuse, neglect, accident, collision and operation at other than specified design speed or rated capacity.

(c) Alteration or repair outside of factory specifications, including damage caused by unauthorized installation of after-market options or accessories.

(d) Use of components, including fluids or batteries, not specified in the applicable Owner's Manual, or avoidable with the proper use of specified Columbia components, including oil or batteries.

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## **LIMITED WARRANTY STATEMENT (Continued)**

- (e) Fading, deterioration or weathering of seats, fabric enclosures, floor mats, bag racks, bag straps, body parts, paint or chrome caused by ordinary wear and tear or exposure.
- (f) Charges incurred to transport any vehicle to and from an authorized dealer for warranty service, and or travel charges incurred by an authorized dealer to or from the vehicle location to perform warranty service.

7. **Warranty Does Not Apply To:**

Normal maintenance shown in the Owner's Manual which the purchaser is expected to perform including, but not limited to, brake adjustment, battery maintenance (cleaning, maintaining proper fluid levels and battery charge), lubricant replacement in differential assemblies, tune up components and wear items such as bearings, brake pads and brake shoes are not covered by this warranty.

8. **Use of Non-Genuine Parts:**

Columbia dealers are independently owned and operated, and may sell products other than those provided by Columbia. Therefore, you should understand that COLUMBIA IS NOT, AND CANNOT, BE RESPONSIBLE FOR THE QUALITY, SUITABILITY OR SAFETY OF ANY NON-GENUINE COLUMBIA PART, ACCESSORY OR DESIGN MODIFICATION, INCLUDING LABOR, WHICH MAY BE SOLD AND/OR INSTALLED BY DEALERS OR DAMAGE CAUSED THEREBY.

9. **Sole Remedy, No Other Warranty:**

The purchaser and Columbia expressly agree that the remedy of replacement or repair of the defective vehicle or component thereof, is the exclusive and sole remedy of the purchaser. Columbia makes no other representation or warranty of any kind, and no representative, employee, distributor or dealer of Columbia has the authority to make or imply any representation, promise or agreement which in any way varies from the terms of this warranty.

THERE ARE NO OTHER EXPRESS WARRANTIES ON YOUR VEHICLE BEYOND THOSE SET FORTH HEREIN AND NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS. TO THE FULLEST EXTENT ALLOWED BY LAW, COLUMBIA AND ITS DEALERS SHALL NOT BE LIABLE FOR LOSS OF USE, INCONVENIENCE, LOST TIME, COMMERCIAL LOSS OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES OR ECONOMIC LOSS.

10. **Vehicles Sold Outside of the United States:**

In the case of vehicles sold outside the U.S.A., defective parts must be returned to the selling dealer and transportation charges prepaid by the purchaser. The dealer will then replace all parts which his inspection shall show to be defective under the warranty. Columbia assumes no liability for the dealer's labor charges, if any, or any other expenses. For further information concerning export, please contact Columbia, 1115 Commercial Ave., Reedsburg, WI 53959 U.S.A. Attn: Customer Service Department, (800) 222-4653.

11. **State Specific Rights:**

Some states do not allow the exclusion or limitation of incidental, consequential or other damages, or limitation on how long an implied warranty lasts, so the above limitations and exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**RECORD OF SERVICE HISTORY**

Date	Dealer	Concern	Repair
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**DEALER INFORMATION**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City/State: \_\_\_\_\_

Sales #: \_\_\_\_\_

Service #: \_\_\_\_\_





# **COLUMBIA**

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**COLUMBIA**



**TOMBERLIN**



**PARCAR**



**ELITE**

SU5-S/L