COLUMBIA

Payloader

Owner and Operator Manual

Columbia Vehicle Group, Inc.
A Nordic Group Company | Business Ventures Since 1947

COLUMBIA TOMBERLIN

PN 712037-010

Preface

Welcome, and congratulations on your choice of vehicle from Columbia Vehicle Group! Your vehicle has been designed and manufactured to conform to applicable sections of ANSI B56.8. 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 Vehicle Group 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.

These vehicles 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.

To the best knowledge of Columbia Vehicle Group, the material contained herein is accurate as of the date this publication was approved for printing. Columbia Vehicle Group 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 Vehicle Group reserves the right to change specifications, equipment or designs at any time without notice and without incurring obligation.

CHANGE HISTORY		
DATE	**DESCRIPTION**	**BY**

This manual provides important safety information, operating instructions, model specifications and maintenance instructions for Payloader vehicles.

The information in this manual is limited to care and maintenance information only. Information covering repairs and technical service is provided in detailed service manuals available from Columbia Dealers. These activities 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 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 DESCRIPTION

The Payloader is a single operator vehicle involving sit-down operation, with capacity for one additional passenger, or three additional passengers if equipped with the second seat option. This vehicle is designed to be driven on smooth surfaces in and around industrial plants, warehousing, institutions, motels, mobile home parks, and resorts.

This vehicle is not designed to be driven on public highways. It is designed to conform to requirements for Type E vehicles as described in O.S.H.A. Standard Section 1910.178 (Powered Industrial Trucks) and with all applicable portions of the American National Standard for Personnel and Burden Carriers (ANSI B56.8 1993 Part III).

VEHICLE IDENTIFICATION NUMBER (VIN)

Each vehicle is assigned a unique Vehicle Identification Number (VIN). The VIN describes facts and features of the vehicle and contains thirteen (13) digits. The VIN can be found in two locations.

The VIN is recorded on the vehicle nameplate which is located to the left side of the steering column from the operator's position.

The VIN is also stamped on the metal cross bar located under the front seat platform on the operator's side.

The nameplate also has other important information such as vehicle weights and capacity. Do not exceed this capacity. This rated capacity includes cargo and operator.

To ensure prompt service when repairs or adjustments are required, your Columbia Dealer must have the VIN.

***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:

_____

VIN MATRIX – 13 DIGIT VIN

Digit 1 thru 3 = Abbreviation (Model)	B2S (BC2-L)
	B3L (BC3-L)
	B4L (BC4-L)
Digit 4 = Power System	E = DC Drive
	G = AC Drive, Induction Motor
Digit 5 = System Voltage	3 = 36V
	4 = 48V (8 – 6V)
Digit 6 = VIN Spacer	- = normal
	# = Special Product
Digit 7= Controller Amperage	3 = 300 Amp
	A = 350 Amp
	4 = 400 Amp
	B = 450 Amp
	5 = 500 Amp
Digit 8 = Axle/Brake System	Y = Rear Hydraulic
	X = Front & Rear Hydraulic
	W = HD Rear Hydraulic
	V = HD F&R Hydraulic
	U = M18 Rear Hydraulic
	T = M18 F&R Hydraulic
Digit 9 = Build Year	Q = 2016, R = 2017, S = 2018, etc.
Digit 10 Thru 13 - Sequence	1234

VEHICLE SPECIFICATIONS

MODELS	BC2-L	BC3-L	BC4-L
Passenger Capacity	2 (4 if equipped with second seat option)		
Turning Curb to Curb (in)	264		
Turning Intersecting Aisle (in)	92		
Ground Clearance (in)	4.3		
Overall Length (in)	120.25		
Overall Width (in)	46		
Overall Height (in)	48.5		
Wheelbase (in)	65		
Maximum Speed (mph)	14	13	12
Bed Size L x W (in)	76 x 45		
Curb Weight (lbs)	1690	1720	1850
Payload Capacity (lbs)	2400	3200	4200
Towing Capacity (lbs)	1500/3500		
GVWR (lbs)	4090	4920	6050
Range (miles)	30		
BC2 Tires	5.7-8 8 ply, 50 psi 5.7-8 8 ply, Foam Filled 5.0-8 Solid 18.5 x 8.5-8 6 ply 35 psi 5.0-8 Solid Non-marking 145R12 LRE 50 psi 5.7 x 8 LRC Pneumatic Non-marking 50 psi		
BC3 Tires	5.7-8 8 ply, 50 psi 5.0-8 Solid 18.5 x 8.5-8 6 ply 35 psi 5.0-145R12 LRE 50 psi 8 Solid Non-marking 5.7 x 8 LRC Pneumatic Non-marking 50 psi		
BC4 Tires	5.0-8 10 ply, 50 psi 5.0-8 Solid 18.5 x 8.5-8 6 ply 35 psi 5.0-8 Solid Non-marking		

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 Vehicle Group's 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-operating 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 Vehicle Group Customer Service.

⚠WARNING

Only trained service professionals should repair or service this vehicle. Persons doing even simple repairs or maintenance should have working knowledge and experience in general electrical and mechanical repair.

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.

Moving parts hazard! When operating any vehicle in a stationary position, avoid components which could snag clothing or cause severe injury to body parts. A running vehicle must be worked on with the greatest care.

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

Always wear safety glasses or approved eye protection while performing vehicle maintenance.

This vehicle is not Federal or State DOT approved and is not equipped to be operated on public roads or highways.

Do not exceed the rated vehicle speed. Exceeding this speed may result in steering difficulty, motor damage, and/or loss of control and injury.

Never exceed the capacity ratings of the vehicle. Exceeding these limits may endanger occupant or cause vehicle damage.

Completely stop vehicle before stepping off.

If vehicle is to be left unattended, turn keyswitch to "OFF" and remove key.

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

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

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.

Do not drive this vehicle in hazardous areas unless this vehicle is approved and labeled for such operation.

ADDITIONAL OPERATION SAFETY CONCERNS

It is recommended that the operator and owner or renter of this vehicle comply with the OSHA requirements as stated in the Code of Federal Regulations, Section 29, 1910.178, Powered Industrial Truck Training Standard and the ANSI requirements as stated in Personnel and Burden Carriers ANSI B56.8.

As a minimum every operator should, in addition to the above requirements found in the standards noted above:

- Demonstrate a working knowledge of each control.
- Understand all safety rules and guidelines as presented in this manual.
- Know how to properly load and unload cargo.
- Know how to properly park the vehicle.
- Recognize an improperly maintained vehicle.
- Demonstrate ability to handle the vehicle in all conditions.

Every owner or renter of this vehicle must, at a minimum:

- Define where the vehicles should and should not be driven and utilized.
- Ensure all proper warnings as to driving hazards are properly displayed and visible.
- Install safety signage concerning hills, speed bumps, ramps, turns, blind crossings, intersections, etc.
- Define who should and who should not drive the vehicles.
- Enforce safe driving and operating rules.
- Provide driver training for first time operators and review safe operating recommendations regularly.
- Maintain vehicles in a safe operating condition and maintain a schedule for daily, weekly, monthly, quarterly, semi-annually and annual vehicle inspections.
- Determine who, when, and how should pre-operation inspections be conducted.
- Notify operators what should be done if an unsafe condition or operating problem is discovered.

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.

INSPECTING THE VEHICLE

Upon receipt of vehicle, perform a pre-delivery inspection of the vehicle. Also, before using the vehicle, there are checks that must be performed to ensure that it is in safe proper working order.

NOTICE: **Vehicle should be inspected immediately after delivery. Use the following guidelines to make sure there are no obvious problems.**

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. Check that battery connections are tight and all cells are filled to above plates. Check for damaged or leaking batteries.

Inspect the tires for obvious wear or damage. Check for proper tire inflation. Refer to manufactures recommendation imprinted on tire sidewall. Make sure that all wheel lugs are secure.

Check the body and other 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 and Brake Pedals
- Parking Brake
- Steering Wheel

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

Check that the horn sounds and that the key can only be removed when keyswitch is in the "OFF" position.

WHAT TO DO IF YOU HAVE A PROBLEM

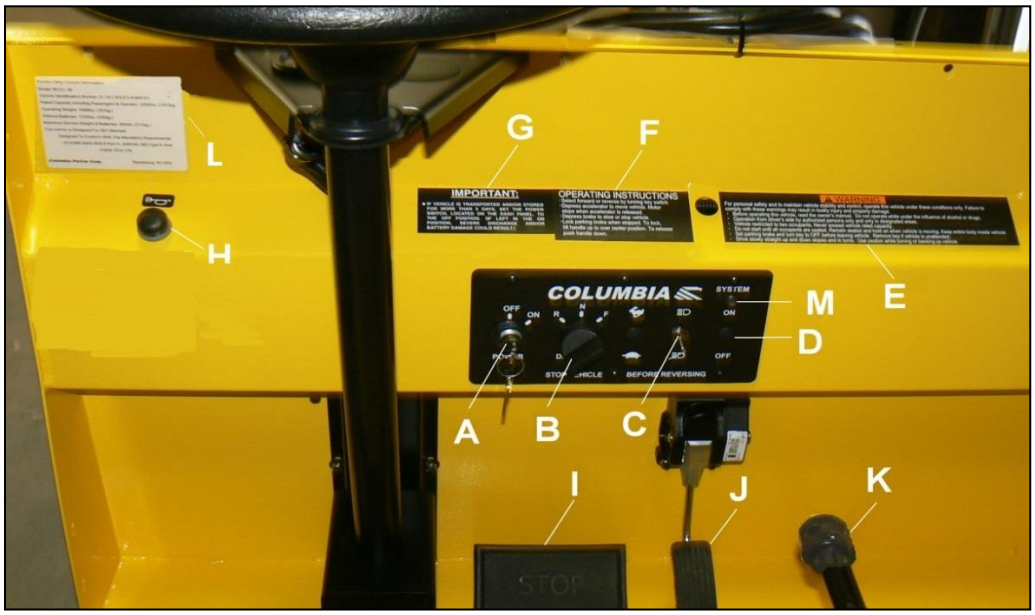
If vehicle has just been delivered, report any physical damage or missing items to the shipping company and your local Columbia Dealer.

Report any 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



(A) KEYSWITCH
With the power keyswitch in the "OFF" position, the Traction System is powered down. This conserves battery energy by reducing the power draw when vehicle is not in use. Turning the power keyswitch to OFF is highly recommended whenever vehicle is not in use. Always take the key out of the keyswitch when leaving the vehicle.

(B) DIRECTION SWITCH
When the direction selector is in the vertical position, the vehicle's direction signal is turned OFF or in neutral (N).
Turn direction selector to the right from vertical position to move the vehicle in forward (F) direction. Turn direction selector to the left from vertical position to move the vehicle in reverse (R) direction. A warning buzzer sounds when in reverse.

(C) LIGHT SWITCH
If equipped, the light switch is a two position switch. Move switch up to activate headlamp and tail lamp and down to run off.

(D) ACCESSORY SWITCH MOUNT
A switch for auxiliary equipment may be located in this position.

(E/F/G) LABELS
Warnings (E), Operating Instructions (F) and Information (G) labels must be read carefully before operating the vehicle. Promptly replace if removed or damaged. Contact Columbia ParCar for replacements.

(H) HORN SWITCH
Press button to sound the horn. Some vehicles can be equipped with a floor mounted horn switch which is located to the left of the steering column.

(I) BRAKE PEDAL
To operate vehicle brakes, press brake pedal. Pressing the brake pedal also activates brake lights.

***NOTICE*: Never rest your foot on brake pedal while operating the vehicle. This wears brake pads, creates drag and causes excess battery discharge.**

(J) ACCELERATOR PEDAL
The accelerator pedal controls the speed of the vehicle in the same manner as a conventional automobile. The pedal must be fully released when changing directions.

VEHICLE CONTROLS (Continued)

(K) PARKING BRAKE
All Payloader models are equipped with a parking brake lever. To operate, pull up and back to engage; push forward and down to disengage. The vehicle may be equipped with a parking brake interrupt switch, which stops the unit from operation if the brake is not released, and helps to prevent premature brake pad wear and potential damage to the motor and controller.

***NOTICE*: Do not operate the vehicle with the hand parking brake applied. Damage to the vehicle could result.**

(L) VIN LABEL
VIN label which provides important date for service and operating limitations.

(M) SYSTEM STATUS LIGHT
Vehicle will be equipped with an additional green System Status LED light located on the dash. With the power keyswitch in the "ON" position, the controller is powered up and this light should display a steady green light. If this green status light is not lit or is flashing refer to CONTROLLER TROUBLESHOOTING.

VEHICLE GAUGES (DC Drive Vehicles only)

BATTERY STATE OF CHARGE METER

This meter will display the battery state of charge. Located on the left side of the support panel in front of the steering wheel.

It is an analog gauge meter with an indicating needle and a colored background. It is a continuously reading meter. At rest with fully charged batteries the meter should read in the right white region.

When accelerating quickly, the needle will move to the left green region near the very far left red region. This is normal. If the needle continues past the green region into the very far left red region, it indicates that the batteries need recharging as soon as possible to avoid a shut-down of the vehicle.

When decreasing speed, the needle will move to the right as electrical energy is being "regenerated" back into the batteries.

***NOTICE:* At 80% discharge, you must immediately charge batteries or vehicle operation will cease and permanent battery damage could occur.**

HOUR METER

If equipped, the hour meter indicates the total number of hours the vehicle has been operating. Hour meter is mounted on the right side of the support panel in front of the steering wheel.

VEHICLE GAUGES (AC Drive Vehicles only)

MULTI-FUNCTION CLEARVIEW DISPLAY PANEL

BATTERY LEVEL INDICATOR:

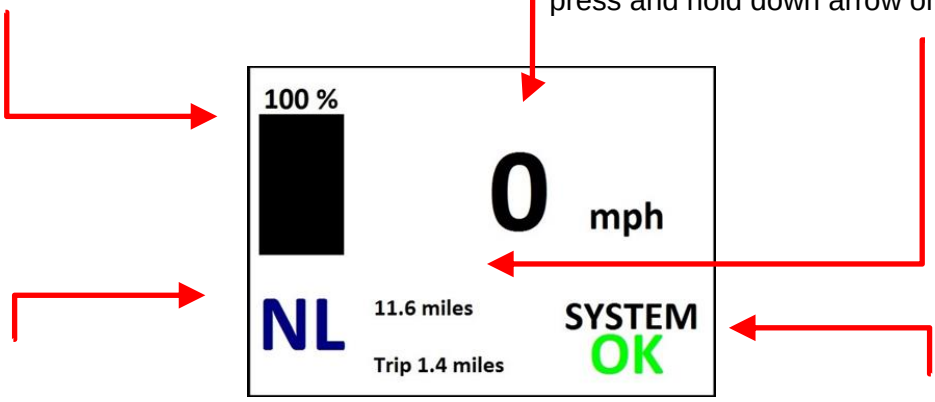
When fully charged, the battery level is shown as a bar graph in the upper left section of the display, with the level indicated as a percentage of available charge. ***NOTE:*** **If the display indicates 20% or less, you must immediately charge batteries or vehicle operation will cease and permanent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

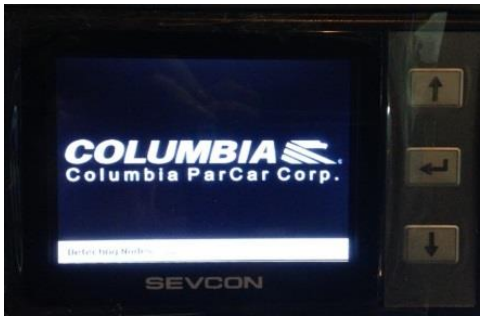
! = A red exclamation point indicates a system check has detected a major fault. Vehicle will not operate until key is recycled and fault is no longer detected.

DASH PANEL

Located on the support panel in front of the steering wheel. this panel contains 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, hours 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 ParCar Corp logo indicating the system is preparing for operation.

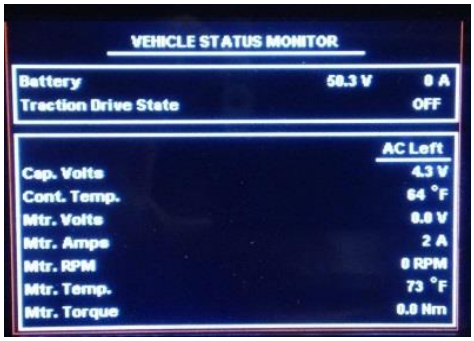


DISPLAY AS STATUS MONITOR

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



VEHICLE GAUGES (AC Drive Vehicles only)
MULTI-FUNCTION SMARTVIEW DISPLAY PANEL

DASH PANEL

Located on the support panel in front of the steering wheel. this panel contains 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.

OPTION CONTROLS

TURN SIGNAL/HAZARD SWITCH

If equipped, the turn signal/hazard warning switch is located on the steering column below the steering wheel. When lever is moved upward right turn signal turns on. When lever is moved downward left turn signal turns on. To turn off a signal move indicator lever back to center position. To operate the hazard warning lights, pull outward on hazard bar. Moving the signal indicator lever to either of the turn signal positions will turn off the hazard lights.

WIPER SWITCH

If equipped, the wiper switch is a 2 position toggle switch located on the wiper motor. When turning wiper to the off position, it auto-parks to the right side of the windshield.

CAB HEATER

The optional cab heater is equipped with a three position toggle switch. The CENTER position is off. To activate the heater and fan, move the switch to the UP position. To activate the fan only place the switch in the DOWN position.

NOTICE: If the toggle switch is in the Fan/Heat position and no heat is occurring a circuit reset may be required On a side panel there is a 3/8” hole. Unplug heater. Inside is a reset tab. Using a non-conductive device push, the tab to reset the circuit breaker.

OPTIONAL EQUIPMENT

ROLL OUT BATTERIES (IF EQUIPPED)

⚠WARNING

Before battery tray is removed check that the direction selector is in the neutral position, the power keyswitch is in the "Off" position and the keys are removed.

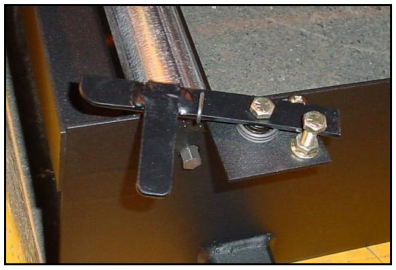
Remove the rear deckboard and open the battery compartment door. Disconnect the battery connector from the charger connector.

Position battery connector in a location that will prevent pinching or damage to the cables as the battery tray is moved.

Move the jack w/tray under the vehicle frame so that it is centered on the compartment door and under the vehicle frame.

Raise the jack so that the tabs extending on the tray are behind the vehicle frame. The tabs will prevent movement of the tray as the battery pack is rolled out.

Roll the battery pack out until it is secured by the catch mechanism on the tray.



Lower the jack and move to an appropriate area for charging.

Reverse the procedure to install a charged battery pack.

TILTBED (IF EQUIPPED)

Loading:

- The vehicle must be stationary and on level ground when being loaded.
- Do not load the vehicle using large machines (front end loaders, etc.). The load floor is made of aluminum and cannot withstand the force of objects being unloaded by large machines.
- The load must be in compliance with the payload as well as the weight distribution authorized per axle.
- The weight of the payload must be centered on the load floor and not exceed the height of the side panels (if equipped).

Raising & Lowering

***NOTICE*: Never place objects (tools, etc.) under the load bed outside of the storage compartment when bed is lowered. Damage to electrical, mechanical or hydraulic components could occur.**

- To raise the load bed (for unloading); press the up button (A).
- To lower the load bed, press the down button (B).

If maintenance or repair is required, disconnect the actuators.

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. If vehicle is equipped with a Single Point Battery Watering System see later section.
	Batteries secure and free of corrosion. All terminals and connections are tight.
	Battery tray and door (if equipped) are secure.
Tire Pressure	See Vehicle Specifications for recommended tire pressure.
Lights, Horn and Reverse Buzzer	Turn lights on and make sure they illuminate.
	Press horn button to sound horn.
	Reverse buzzer sounds. (Operator seat must be occupied.)
Brakes	Brake pedal has firm pedal pressure with minimal travel.
	Parking brake has proper engagement and release.
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.
Labels	All warning and operation labels in place.
Accelerator	Check for smooth operation.

VEHICLE OPERATING INSTRUCTIONS

DRIVING THE VEHICLE

- Do not operate vehicle unless you are a qualified and trained operator.
- Keep the vehicle under control at all times.
- Drive only on level surfaces or on surfaces having an incline of no more than 10%.
- Drive slowly when making a turn, especially if the ground is wet, slippery or when driving on an incline.
- Do not drive this vehicle in hazardous areas unless this vehicle is approved and labeled for such operation.
- Do not drive over loose objects, holes or bumps.
- Observe all traffic regulations and speed limits.
- Keep to the right of traffic under normal conditions.
- Maintain a safe distance from all objects and other vehicles.
- Yield right of way to pedestrians, ambulances, fire trucks or other vehicles in emergencies.
- Do not overtake another vehicle at intersections, blind spots or other dangerous locations.
- Keep a clear view ahead at all times. Slow and sound the horn when approaching a corner or other blind intersection.
- Immediately report any accident or vehicle problem to your supervisor.
- Do not load cargo that can easily fall off this vehicle.
- Do not exceed the cargo load capacity of this vehicle.

***NOTICE*:**
This vehicle is equipped with an operator presence interlock seat switch. Operator must be present in the driver seat for the vehicle to operate. A reset of the power system is required if an operator leaves the seat while the accelerator foot pedal is depressed.

ELECTRICAL SYSTEM

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 STATEMENTS WHEN WORKING NEAR BATTERIES AND CHARGING SYSTEMS!

⚠ 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

***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.**

BATTERY INSPECTION & MAINTENANCE

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.

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

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.

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

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

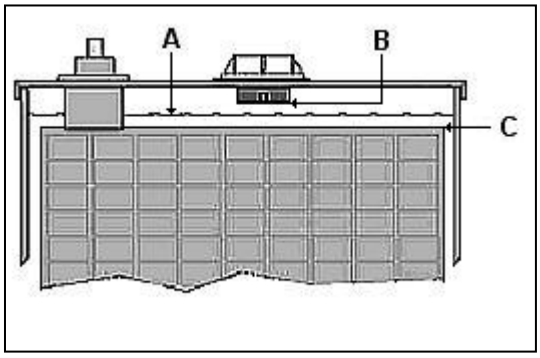
Only trained technicians should service the on-board charger. Contact your Columbia Dealer for assistance.

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.

BATTERY CLEANING (Continued)

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 60º 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

Connect the supplied power cord to the vehicle charger receptacle and to a properly grounded 120 volt AC supply minimum 20 amp circuit wall outlet. Charger start and charge time is automatic. The receptacle is located directly beneath the key switch on the right side of the console.

Charger start and charge time is automatic. The remote LED will be flashing short green. If this LED is not lit check the AC connection and the AC source fuse or breaker. If this fails to correct the problem, contact your Columbia Dealer for assistance.

Charger will automatically turn on and conduct a short self-test and battery pack test. The LED will flash in sequence and then a trickle current will be applied to batteries until a minimum voltage is reached.

If the batteries meet the minimum voltage requirements of the charger, signifying they are serviceable (chargeable), the charger enters the bulk charging (higher amperage-constant current) stage. The remote LED will be flashing short green.

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.**

When the charger has completed approximately 80% state of charge the remote LED will flash long green as the last 20% of charge is returned to the batteries in the second phase (constant voltage phase).

NOTICE: **You can terminate charging at this point if necessary. The vehicle can be used, but completing the charge cycle is highly recommended.**

A Green LED continuously lit indicates the batteries are completely charged. The charger may now be unplugged from the AC source. If the batteries will not be used for a length of time, check monthly for the charge level. It is also acceptable to leave the charger plugged in. The charger has the capability to test and recharge if necessary.

Repeated “Short Charging”, leaving the charge short of 100% will shorten operating cycle distance and reduce battery life.

A fault occurring while charging causes the remote LED to flash with a code relaying the error. Some errors may require repair by a qualified technician and others may be simply transient and will automatically recover when the fault condition is eliminated and the charger cycled by disconnecting the AC source for a minimum of 11 seconds.

NOTICE: **A Yellow (Amber) flashing remote LED indicates the thermostatic control has limited the charger output due to ambient temperature conditions. It is still charging, but at a reduced rate.**

RED LIGHT CHARGER ERROR CODES

1 FLASH = Battery Voltage High: Auto-recover. May be temporary condition, or wrong charger installed, i.e. 36 volt charger on 48 volt battery pack.

2 FLASH = Battery Voltage Low: Auto-recover. Confirm each individual batteries minimum voltage with a voltmeter. Two or more 6 volt batteries register less than 5.85 volts, or accumulative total pack voltage has been discharged to less than 20% remaining. Vehicle operation will cease until batteries are recharged.

3 FLASH = Charge Timeout: The charging did not complete in allowed time, 12-14 hours. This may indicate a battery problem, or that the charger output was reduced due to high ambient temperatures. Disconnect AC supply, confirm sufficient ventilation, allow cool down time, and restart charger.

NOTICE: **If the charger is exhibiting a 3 flash fault and it has been determined that the cause was not due to ventilation or high ambient temperature, the following procedure may restore the battery pack to normal operation.**

1. **Battery posts and terminals must be clean and free of corrosion.**
2. **For non-sealed batteries, check that electrolyte level just covers plates.**
3. **Plug in charger for at least a 16 hour charge.**
4. **Drive the vehicle for less than half the distance normally driven.**
5. **Repeat the above steps until the charger goes green 100% charge on a 16 hour charge.**

4 FLASH = Check Battery: The batteries could not be trickle charged up to a minimum level to start charger. This may be the result of badly discharged batteries, or one (or more) damaged cells. See EXCESSIVELY DISCHARGED BATTERIES.

5 FLASH = Over-Temperature: The charger shutdown due to high internal temperature. May require reset (AC unplugged) and cool down to restart charging cycle. This fault may indicate inadequate cooling airflow or high ambient air temperatures. Check for debris or blockage at cooling fins. Move the vehicle to a cooler, well ventilated area, or adjust time of day when charging.

6 FLASH = Charger Fault: A fault was detected either in the batteries or in the charger. The batteries must be tested to ensure there is no damage to one or more cells. If the batteries are found to be good, the charger may need to be replaced by a qualified technician.

A STEADY RED FAULT LED confirms an internal electrical fault of the charger and requires charger replacement and return.

REMOTE LED CHARGER CODES

STEADY GREEN = Battery pack is = 100% charged.

SHORT GREEN FLASH = Battery pack is =< 80% charged.

LONG GREEN FLASH = Battery pack is => 80% charged.

SHORT AMBER FLASH = Battery pack is =< 80% charged, high internal charger temperature.

LONG AMBER FLASH = Battery pack is => 80% charged, high internal charger temperature.

RED FLASH = Charger detected a fault, see codes listed above.

CHECK / CHANGE CHARGING ALGORITHM

The charger has been programmed for use with the Columbia supplied batteries and contains algorithms for use with different batteries. Table A details these battery models.

TABLE A	
ALGORITHM	**BATTERY TYPE**
126	Full River 100Ah AGM
125	Full River 200Ah AGM
72	Generic 250-335 Ah Flooded Constant power dv/dt
43	Discovery AGM
42	Discover AGM 80 – 150 Ah
11	Generic 200-255 Ah Flooded Constant power dv/dt
5	Trojan 30XHS
4	US 2200, US 145 (Standard)
1	Trojan Flooded

***NOTICE*: For maximum battery life the correct algorithm must be used.**
If your battery model is not listed in Table A, contact Columbia Vehicle Group for further information

Each time AC power is applied with the battery pack NOT connected, the charger enters an algorithm select/display mode for approximately 11 seconds. This will be displayed on the remote LED.

During this time, the current algorithm # is indicated on the LED light. A single digit algorithm # is indicated by the number of blinks separated by a pause. A two digit algorithm # is indicated by the number of blinks for the first digit followed by a short pause, then the number of blinks for the second digit followed by a longer pause.

To check/change the charging algorithm:

Disconnect the charger positive connector from battery pack. Apply AC power and after the LED test, the algorithm # will be displayed for 11 seconds.

To change the algorithm, touch the positive connector during the 11 second display period to the battery pack's positive terminal for 3 seconds and then remove. The algorithm **#** will advance after 3 seconds. Repeat until the desired algorithm # is displayed. A 30 second timeout is extended for every increment. Incrementing beyond the last algorithm moves back to the first algorithm. After the desired algorithm # is displayed touch the charger connector to the battery positive until the output relay is heard to click (~ 10 seconds). The algorithm is now in permanent memory.

Remove AC power from the charger and reconnect the charger positive connector to the battery pack. It is highly recommended to check a newly changed algorithm by repeating the above steps.

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.

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.

CHARGING BATTERIES OUTSIDE VEHICLE

When a vehicle contains optional roll-out battery racks, the batteries are charged by a portable charger that is plugged into the batteries after they have been rolled out onto an appropriate battery stand.

***NOTICE:* Do not cover the charger cabinet or cooling fins with clothing, blankets, or other material. Fins provide ventilation and prevent overheating.**

Do not disassemble the charger. There are no serviceable components.

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.**

- Recharge batteries as soon as they become 20% or more discharged (less than 1.238 sp. gr.).
- Make it a regular habit to plug in the charger when the vehicle is not in use. Batteries may be recharged if vehicle has been driven 15 minutes or more since the previous charge.
- Make sure your electrical outlet is operational.
- Never go below 20% state of charge (or 80% discharged) without recharging immediately. Allow 14 – 16 hours of charging.
- Batteries will provide a longer life if not deeply discharged. Batteries that are regularly deeply discharged will require more work by the charger and will have a shorter life.
- For non-sealed batteries, make it a regular habit to check (and water) your batteries after charging. Always add water after charging. This will reduce the chance for overflow due to expanding water.
- Weekly equalize the battery pack.
- If the vehicle is not operated daily the Power keyswitch should be turned off. This will power down the traction control system and reduces power loss on the batteries.
- Batteries in storage may self discharge and should be recharged when the specific gravity falls below 1.238 sp. gr. or individual battery voltage is less than 5.25 volts for three cells (10.5 volts for six cells).

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.

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 overfill.

MAINTENANCE SCHEDULE - OWNER/OPERATOR

Item	Operation	Weekly	Monthly	Semi-annual
Tires	Lug nuts tight.		*	
	Check tire pressure, wear, damage, dented rims.		*	
Electrical	Check electrolyte level.	*		
	Apply equalization charge to the battery pack.	*		
	Clean battery terminals and wash cases.	*		
	Check the general condition of the electrical system (connections, frayed/broken cables, etc.).		*	
Brakes	Pedal & park brake operation.		*	
Body and Frame	Inspect for loose hardware (bolts & nuts, etc.).	*		
	Clean body and seats, Wash as needed.	*		
	Wash engine/motor compartment and undercarriage.	*		
Lube	Visual check for differential leak.		*	
	Oil movement points (body hinges, brake mechanisms and linkage, leaf spring bushings etc.)			*
Single Point Watering System	Add water per applicable section.	*		
	Check condition of tubing, couplers. Secure & leak free.		*	
	Clean filter screen.			*

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
Tires	Front wheel alignment and camber.		*	
Electrical	Test batteries.		*	
	Inspect motor condition and operation.			*
Brakes	Check brake pads, clean & adjust brakes.		*	
	Check brake fluid.	*		
Lube	Check differential fluid level.			*
	Grease fittings.		*	
	Grease steering gear.			*
Wheel	Check wheel axle nuts for tightness & torque.		*	
	When equipped,- wheel bearings, repack, replace if needed			*
Accelerator	Check micro switch adjustment (If equipped)		*	

MAINTENANCE GUIDELINES

To ensure that the Payloader is kept in a safe and correct operating condition, the vehicle 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.

⚠WARNING

No modifications or additions, which affect the mechanical or electrical integrity and the safe operation of the vehicle shall be made without the written approval of the manufacturer.

If such modifications are approved, the capacity, operation, and maintenance instruction markings shall be changed accordingly.

In no case shall the safety factors be reduced below those specified in this manual or the manufacturers design factors, whichever is greater.

To perform many of the maintenance items detailed in the following pages, it will be necessary to remove either one or both of the vehicle deckboards.

Handlifts have been incorporated into the deckboards to ease the removal operation. Care should be exercised while removing deckboards.

Follow the guidelines below to assure proper maintenance of your Payloader.

- Allow only trained maintenance personnel to maintain, repair, and inspect the vehicle.
- Before starting any repairs or maintenance, immobilize the vehicle by turning the power keyswitch off, removing the key and setting the park brake.
- Disconnect both of the main battery pack leads before working on or disconnecting any electrical component or wire.
- Block the chassis with jack stands before working under a raised vehicle.
- Conduct vehicle performance checks in an authorized area where a safe clearance exists.
- Before starting the vehicle, follow the recommended safety procedures.
- Avoid fire hazards and have fire protection equipment present in the work area.
- 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

BRAKE FLUID MAINTENANCE

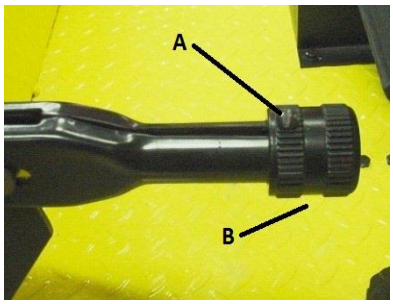
Check the brake fluid in the master cylinder periodically (under normal conditions, every 3 months). The master cylinder is located under the front deckboard and seat assembly. Use DOT 3 Motor Vehicle Brake Fluid. Maintain fluid level within 1/4" of master cylinder filler opening.

SERVICE BRAKES

Brakes are self aligning and require no adjustment. They should however be checked for wear every 6 months.

PARKING BRAKE ADJUSTMENT

As the brake pads wear thinner, the parking brake must be adjusted to preserve proper parking brake operation. Be very cautious when performing this adjustment or doing any work on your brakes. The parking brake adjustment is made to hold the vehicle, load capacity and driver on 15% grade for 15 minutes (ASME B56.8).



To adjust the parking brake, loosen the lock screw (A) on the parking brake knob (B).

Rotate the knob clockwise to loosen brake or counter clockwise to tighten braking.

TIRE CARE

Improper inflation will shorten the life of your tires and will adversely affect performance. For proper tire inflation refer to vehicle specifications.

WHEEL & TIRE REMOVAL/REPLACEMENT

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 just ahead of the rear wheel or behind the front wheel so it will come in contact with the frame. Raise the vehicle until the tire clears the ground. Place jack stands under unibody for safety. 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. Recheck lug nut torque with the vehicle on the ground.

NOTICE: **The lug nuts must be lightly tightened in a star pattern, then torqued in a crossing pattern or the wheel may be bent, causing it to wobble.**

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

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 cab (if equipped), body, and seats 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.

LUBRICATION

DIFFERENTIAL

The differential should be checked upon receipt and monthly for leakage. Contact your Columbia Dealer for fluid replacement.

STEERING GEAR

Check yearly; add grease as required (Molub-Alloy #0 or equivalent).

NOTICE: **This will require replacing the steering cover gasket. Part Number 83113-02.**

PIVOT POINTS WITH GREASE FITTINGS

There are 6 lubrication points with grease fittings on the front end of the vehicle — one on each of the four tie rod ends and one on each side of the front axle (kingpin pivot). Under normal conditions, these points should be greased every 6 months with chassis lube

VEHICLE TROUBLESHOOTING

PROBLEM	CHECK
Will not move	Keyswitch on. Keyswitch is in desired direction. Keyswitch for loose wires or faulty switch.
	Batteries for loose terminals, corrosion, electrolyte level or state of charge.
	Motor for loose wires, open circuits.
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

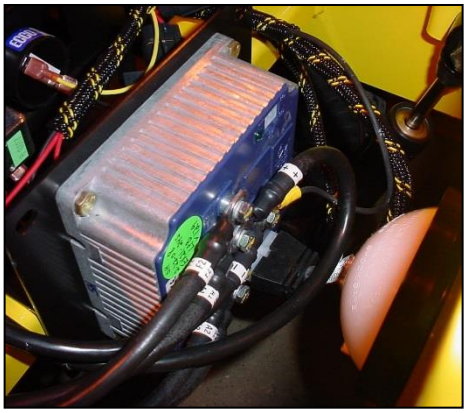
DC DRIVE VEHICLES ONLY

The controller is located under the rear deck next to the axle. The controller has a green LED diagnostic light which is a good tool to indicate a fault in the electrical system. The vehicle is also equipped with a dash System Status LED, it functions the same as the controller LED.

It is essential to observe the flashing pattern (number of blinks followed by a pause) of the LED light any time the vehicle is not operating as expected. The number of blinks is very useful for your servicing dealer to accurately and quickly diagnose any faults that exist.

However, two of the flash codes may indicate an operation fault, and likely do not require component changes or dealer service.

A “2 Flash fault” may indicate a start-up sequence fault. This is caused when the vehicle direction selector is not in the neutral position when the power keyswitch is turned on. Steps to take to possibly clear this fault are:



- Set the parking brake.
- Turn vehicle power keyswitch to OFF.
- Set direction selector to N – Neutral.
- Ensure the accelerator pedal is at its resting (up) position.
- Turn vehicle power keyswitch to ON.
- Select the desired direction on the direction selector.
- Release parking brake and depress accelerator.

A "7 flash fault" may indicate that the battery voltage is too high or too low for the vehicle power system. Voltage too high occurs when rapidly descending hills with a vehicle equipped with the ACE*plus* Regenerative braking system. The electrical system creates current which causes a spike in battery voltage.

To prevent this, always travel at a safe, prudent speed when driving on declines, especially with freshly charged batteries. To possibly clear this fault turn the power keyswitch to OFF and back to ON. If there is still a “7 flash fault”, the battery voltage may be low. Check and charge batteries or replace batteries.

CONTROLLER TROUBLESHOOTING

AC DRIVE VEHICLES ONLY

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

The AC Drive controller sends fault codes to a Multi-Function Display as seen below. For codes above operator level, or general assistance with these codes, consult the service manual or your local authorized dealer.

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.

If the on-board 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 4^0 C (40^0 F)	Every 6 months
4^0 C - 16^0 C (40^0 – 60^0 F)	Every 2 months
Above 16^0 C (60^0 F)	Once a month

The voltage or specific gravity 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 ^{0}F/^{0}C
1.260	-70/-57
1.230	-39/-38
1.200	-16/-26
1.117	-2/-19
1.110	+17/-8

Notice: **Specific gravity readings are at 80^0 F. Values need adjustment for electrolyte temperature. Reduce .004 for every 10^0 F below 80^0 F. Increase by that amount for every 10^0 F above**

Quarterly during storage check water levels for non-sealed batteries.

VEHICLE PREPARATION FOR STORAGE

Store the vehicle in a cool place.

Maintain tire pressure at recommended PSI.

Grease suspension and continue quarterly lubrication during storage period.

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

Do not engage park brake. 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).

TOWING & TRANSPORTING

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 600 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 parking brake, service brake, or wheel chocks should be in place**.**
G Go no faster than 5 mph while towing vehicle.

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 ParCar 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 parking brake firmly locked, 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.

RECORD OF SERVICE HISTORY

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

DEALER INFORMATION

Name: _____

Address: _____

City/State: _____

Sales #: _____

Service #: _____

ADDITIONAL NOTES

VEHICLE WARRANTY

We warrant to the original consumer purchaser or lessee that our electric Industrial and Commercial vehicles as well as our electric passenger vehicles used in an industrial or commercial application / environment will be free from defects in factory materials and workmanship under normal use and service for the period stated below from date of sale subject to the terms and provisions contained herein.

1. 12 MONTHS – PARTS AND LABOR ON COMPONENTS:

Columbia ParCar Corp. (Columbia) warrants parts and labor to repair defective components both on electric Industrial and Commercial vehicles for twelve (12) months from date of purchase, subject to the following terms and conditions.

2. 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.

3. 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, you and the selling dealer must complete the warranty registration process 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 calling (800) 222-4653 or by writing our Customer Service Department, Columbia Vehicle Group, 1115 Commercial Ave., Reedsburg, WI 53959.
(d) Any subsequent changes in vehicle design and equipment shall not apply to vehicles previously manufactured or purchased.

4. 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.
(d) Use of components, including lubricant or batteries, not specified in the applicable Owner's Manual, or avoidable with the proper use of specified Columbia components.
(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. Travel charges incurred by an authorized dealer to or from the vehicle location to perform warranty service.

5. WARRANTY DOES NOT APPLY TO:

Normal maintenance shown in the Owner's Manual which the purchaser is expected to perform or arrange for including, but not limited to, brake adjustment, battery maintenance (cleaning, maintaining proper fluid levels and battery charge), lubricant replacement in differential assemblies. Wear items such as brake shoes, brake pads, bearings, etc… are also not warrantable.

6. 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.

7. 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, INCONVIENCE, LOST TIME, COMERCIAL LOSS OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES OR ECOMOMIC LOSS.

8. 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 Vehicle Group, 1115 Commercial Ave., Reedsburg, WI 53959 U.S.A. Attn: Customer Service Department, (608) 524-8888. FAX (608) 524-8380.

9. 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.

COLUMBIA

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(800) 222-4653 • Web:
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