



Helicopter Ground Handling

Since 1989

OWNER'S AND OPERATIONS MANUAL

Chopper Spotter, Inc.
15124 Business Parkway
Rosemount, Minnesota, 55068
United States of America

Website: www.chopperspotter.com

Email: info@chopperspotter.com

Phone: +1 608-537-2049

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ASSEMBLY

The Chopper Spotter assembly is quick and easy. Refer to the diagram below for correct assembly. Your parts include **(double for Model 4, except for the battery charger)**:

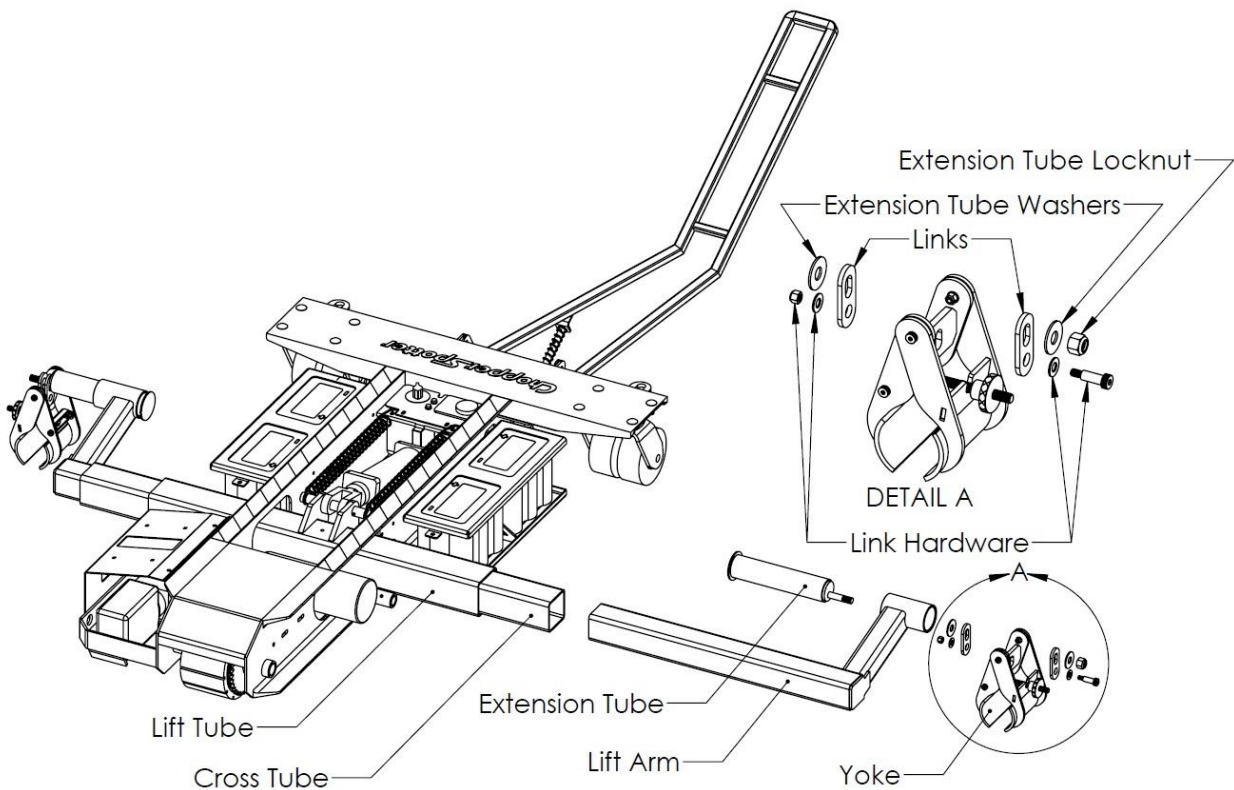
Crosstube: One 54 inch crosstube or 60 inch crosstube with heavy duty upgrade. Slide this square tube into the lift tube of the Chopper Spotter with the hole in the middle of the tube on one edge facing up. Slide the tube forward until the pin drops through both the lift tube and crosstube. See below.

Pair of Lift Arms: Pair of lift arms, a left and right. Slide each lift arm into the crosstube so that the round tube of the lift arm is pointed towards the casters and also pointed up. See below.

Two Extension Tubes: There are two extension tubes that slide through the round tube of the lift arms, the threaded rod facing away from the Chopper Spotter. See below.

Set of Yokes: You will have one or more sets of yokes based on what you've purchased. These may have a left and right pair, such as the yokes for an AS350, or they may be symmetrical, such as the universal yokes. Each yoke includes two links and holes on the yoke for adjustability based on your aircraft's balance points (except helicopters with a pin lifting mechanism). Having the additional weight of a FLIR camera, for example, may require you to adjust your links' positions on the yokes for optimal balancing. The links attach to the threaded part of the extension tube, and then tighten the nylock nut to secure. If you have purchased a Model 4, balancing will not be an issue. Simply put your helicopter specific yokes on the rear set of arms (towards the casters) and assemble the links on the furthest hole back of your yokes to cause the helicopter to lean forward when lifting. Install the universal yokes on the front set of arms and your Chopper Spotter is ready to use.

Charger: For international shipments, your charger will come uninstalled so that you may put the appropriate plug on the end for your country. Hardware is included in the charger cubby at the rear of the Chopper Spotter. Once you have attached your plug, simply connect the red wire to red wire and black to black in the charger cubby, slide the plug up through the slot in the master disconnect panel (you will have to remove the two ¼" - 20 screws), and bolt the charger down with the included hardware.



The regular lift arm and crosstube assembly is suitable for helicopter skids up to 114 inches (289 cm) wide and as narrow as 70 inches (178 cm) wide. Longer crosstubes are available for purchase. If you require the Chopper Spotter's arms to be shorter, then you must cut the crosstube equally on each end as well as each lift arm the same amount. This is also available to purchase from Chopper Spotter, or will be included with your purchase of a new Chopper Spotter if needed.

Maintain a minimum of 8 inches (20.32 cm) overlap when arms are in the extended position.



CHARGING

Take precautions when working around batteries. Thoroughly review the “Electrical Safety Precautions” section in this manual.

When charging with the on-board charger, turn MASTER SWITCH off. Check that the temporary label on top of the charger is marked with the profile setting that matches your battery type (AGM for new units and batteries provided by Chopper Spotter). Plug in the charger to begin charging. The charger will shut off automatically when the batteries are charged. The batteries will not achieve their full capacity until they have gone through a few charging cycles.

If the AC supply cord is unplugged, then plugged back in, the charge cycle will repeat itself. It is important to avoid this situation because the batteries will overcharge.

These chargers work very simply. Once connected and plugged into AC power, the LED will flash red for a few seconds, then turn steady red. When the cycle is 80% complete, it will turn yellow, and finally green when the cycle is complete. The LED will flicker green indicating that it is maintaining the charge. To discontinue charging, unplug AC power. Review the Battery Charger Troubleshooting section for any deviations from this.



Steady, or flickering
100% complete

After charging the batteries for the first time, use the Chopper Spotter until the batteries are discharged to about 30-50%. If the battery is completely discharged, the on-board charger may not sense enough voltage to start the charging cycle. If this happens, temporarily connect another charger to each battery to allow each to charge. Repeat this cycle twice to properly break-in the battery. Never leave the batteries fully discharged.

The following charging methods are recommended to insure long battery life. The batteries are designed for engine starting purposes, and are not recommended or warranted for use in deep cycle application.

Always use a voltage regulated charger, with voltage limits set as follows:

Alternator: 13.3 to 15.0 volts, no amperage limit

Battery Charger: 13.8 to 15.0 volts, 10 amps maximum approximately 6-12 hours

Rapid Recharge: Maximum voltage 15.6 volts (regulated), with no current limits, as long as battery temperature remains below 125 degrees F (51.7 degrees C). Charge until the current drops below one amp

Float Charge: 13.2 to 13.8 volts, 1 amp maximum current, time is indefinite at lower voltage

All limits must be strictly adhered to, and safety information followed:

- Always wear safety glasses when working with batteries
- Always use a voltage regulated battery charger with limits set to the above ratings.

Overcharging can cause the safety valves to open, and battery gases to escape, resulting in premature failure. **These gases are highly flammable.** You cannot replace water in sealed batteries that have been overcharged. Any battery that becomes very hot or makes a hissing sound while charging should be disconnected **IMMEDIATELY.**

Failure to fully charge a battery can result in diminished performance, and a reduction in capacity.

1. **DO NOT TRY TO FILL WITH ACID OR WATER, BATTERIES ARE SEALED AGM**
2. **Batteries are charged before shipping, but it is recommended that the batteries be charged overnight upon receipt of the unit**
3. **Battery information is included in the Chopper Spotter's Owner's Manual and online at www.optimabatteries.com**

The Chopper Spotter is equipped with a battery gauge on the Kar-Tech receiver mounted to the pump cover. If the batteries have just been charged, operate the Chopper Spotter for 2 to 4 minutes to remove the "surface charge" of the batteries. Else, the surface charge will dissipate if the batteries are allowed to stand for 10 hours or more. After extinguishing surface charge, allow the charge to normalize for at least 60 seconds.

You may leave your Chopper Spotter plugged in every night to charge. Refer to the following chart to determine recharge times:

Percent Charge	Charge Time
75%	5 Hours
50%	10 Hours
25%	15 Hours
0%	25 Hours

If the batteries are under 70°F (20°C), increase charging time by 10% for every 10°F (5°C) below 70°F. As the battery ages, its capacity decreases. The battery gauge may still show as fully charged, but you are effectively measuring a smaller tank. You will see this as a reduced amount of running time on an older battery. When you experience half of the original running time, the battery should be replaced. Contact Chopper Spotter for replacement batteries.

Below is a chart that indicates the percent charge of the batteries when using a voltage meter to monitor the batteries. We recommend disconnecting each **bank** (leaving the two red top batteries in series on one side) of the Chopper Spotter batteries for troubleshooting purposes. If you suspect there to be a problem with one of the batteries, fully charge the Chopper Spotter, run it for a minute to wipe out surface charge, let it sit for 5 minutes to normalize, and then measure each bank. If one or both of the banks read a considerably lower voltage than the other, then disconnect each battery to measure each battery **individually**. Cut the capacities in the chart below in half (25.5Vdc to 12.75Vdc, for example) to then isolate the battery that does not match the others.

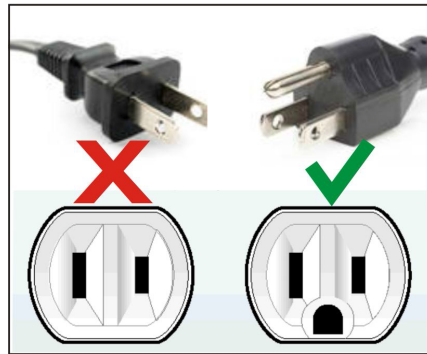
Percent Charge	Remaining Capacity
100%	25.5Vdc
85%	24.7Vdc
75%	24.62Vdc
50%	24.12Vdc
25%	23.36Vdc

SAFETY INFORMATION AC WIRING:

Before making AC connections, refer to the requirements on the charger ID label. If your charger is not equipped with an AC plug (as is the case on the 230 volt chargers), have a qualified electrician install one.

To reduce the risk of fire, use this charger only on branch circuits that are protected by a circuit breaker or fuse, and that are adequate to carry the power drawn by the charger. All wiring should be in accordance with the National Electric Code, ANSI/NFPA 70, and all local codes and ordinances.

This battery charger must be grounded to reduce the risk of electric shock. 117 volt chargers are equipped with a grounding type plug and 230 volt chargers are shipped without a plug. Have a qualified electrician install a properly grounded 3 wire plug. **DO NOT USE THIS CHARGER ON A TWO POLE UNGROUNDED OUTLET OR ATTEMPT TO BREAK OFF THE GROUND PRONG FOR USE ON A RECEPTACLE OR EXTENSION CORD NOT HAVING A GROUND.**



Use a three conductor extension cord no smaller than the size being used on the charger cord, and keep it as short as possible. The use of an improper extension cord could result in a risk of fire or electric shock. Locate all cords so that they will not be stepped on, tripped over, or otherwise subjected to damage or stress.

Do not over discharge batteries. Excessive discharge can cause polarity reversal of individual cells resulting in complete battery failure. Recharge batteries as soon as possible after a deep discharge, but not if they are warm. Allow a cooling period.

Do not charge batteries in excessively hot temperatures; wait until the cooler evening if possible.

BATTERY CHARGER TROUBLESHOOTING

It is highly unlikely that all four batteries are inoperable. If the batteries are discharged completely, the charger will not initiate charging when the battery is below approximately 9 volts. The modern “smart” battery charger, as is used on the Chopper Spotter, will not charge a completely discharged battery. The smart charger will need to be used after a constant current “dumb” charger begins the charging process. If a constant current charger is not available, a charged battery should be hooked up to the discharged battery parallel “plus to plus” “negative to negative” such as when starting a car. Then, the discharged battery will take a charge from the charged battery.

The “smart” charger can then be connected to both batteries, so that the discharged battery will charge. This is used so that the batteries recharge individually. Care must be taken to not let the batteries discharge completely. One way to ensure that your 12 volt battery charger is working properly is to hook it up to an individual battery, then compare voltage when the charger is ON, versus when the charger is OFF. If there is no increase in the voltage when the charger is ON, it is not working correctly, for those reasons expressed above.

IMPORTANT: DO NOT ALLOW THE BATTERIES TO DISCHARGE COMPLETELY. IF THE BATTERIES DISCHARGE COMPLETELY, FOLLOW INSTRUCTIONS ABOVE FOR RESOLUTION OF BATTERY ISSUES.

SYMPTOM	CAUSE	CORRECTIVE ACTION
When plugged into AC power the LED flashes red/green	Connected reverse to battery, or not connected to battery.	Correct polarity, or connect to battery.
	Break in DC cord, or connector.	Have a qualified person make repair or switch extension cords.
	Battery too dead to charge.	Replace battery or charge with other charger.
When plugged into AC power the LED does not come on.	No AC power.	Check circuit. Check extension cord for breaks or damage.

When I put a voltmeter across the output of the charger there is no power coming out when I plug it in.	The charger must be connected to a battery to turn on.	Connect to batteries.
When powered up, the LED flashes red/yellow.	Charger and battery voltage mismatch	Connect the charger to batteries with the same voltage rating.
When powered up the LED is a solid red with a yellow flash.	The battery is very low, and the charger is in a slow charge phase until the voltage rises to a safe level before regular charging.	Leave connected, and it may take additional hours. As long as the voltage rises a little bit, it should recover and fully charge. <i>Do not allow your batteries to deep discharge, it is the number one cause of premature battery failure.</i>
The charger blows its fuse, or branch circuit fuse/circuit breaker a short while after being plugged in.	One or more dead cells. Dip switch not set correctly.	Replace batteries. It is better to replace all batteries rather than mix new with old. This may be the case if you've replaced your battery with a different style battery. If shallow discharging, check that the dip switch is not set to standard or extended cycle. Contact Chopper Spotter for help.
After a full charge the LED is green with a yellow flash.	The batteries did not reach 80% charge in 12 hours, or did not reach minimum voltage and the charger timed out.	The charger is too small for the batteries. Batteries are beginning to age. Sometimes running a second cycle will achieve full charge, but battery replacement may be needed.

BATTERY GAUGE

The Chopper Spotter is equipped with a battery gauge on the Kar-Tech receiver mounted to the pump cover. If the batteries have just been charged, operate the Chopper Spotter for 2 to 4 minutes to remove the “surface charge” of the batteries. Else, the surface charge will dissipate if the batteries are allowed to stand for 10 hours or more. After extinguishing surface charge, allow the charge to normalize for at least 60 seconds.

You may leave your Chopper Spotter plugged in every night to charge. Refer to the following chart to determine recharge times:

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MOTOR CONTROLLER + WIRELESS HANDHELD CONTROLLER

DESCRIPTION

The YELLOW ROD REMOTE is a state of the art microprocessor based Radio Frequency (RF) control system. It will provide the operator the ability to wirelessly operate equipment. The operator is required to follow all OSHA and other applicable safety standards when operating the equipment. Do not use high power radio devices in close proximity.

The remote control system consists of: the radio transmitter, receiver, module, and associated optional equipment such as wiring harnesses and Gate interface tools. The transmitter (wireless handheld remote control) is equipped with push buttons and potentiometer (speed control) for the various functions. This unit runs on a 3.7V rechargeable battery.

The system's radio receiver has both PWM proportional outputs and ON/OFF outputs to accommodate the functions available on the transmitter. All outputs are current-sourcing. It also includes a port for wired (CAN) and RS-232 communication for system diagnostics.

OPERATION

Power must be applied to the receiver module for the system to work. Pressing the POWER button until the red and green LEDs appear will turn on the transmitter. Pressing and holding the POWER button until the LEDs stop toggling will turn off the transmitter. Pressing the POWER will turn off all outputs as a safety measure. If the transmitter goes out of range for more than 2 seconds, all outputs will turn off as a safety feature.

To operate a proportional output, press the switch of the desired function and turn the potentiometer (speed control) to the level desired. If at power up of the transmitter the potentiometer is not set to 0, the forward and reverse outputs will not turn on. **Turn the potentiometer first to zero then to desired level to turn on the outputs.**

If the receiver has an over current error, the receiver will go into Stiction mode. Stiction or Static Friction is the friction of a motor that is not turning. The motor needs to overcome this stiction in order to start turning. If the motor current reaches or surpasses the Stall Current, that motor's output will be pulsed. This pulsing is intended to free up the motor that is not moving. If set too low, the outputs will pulse unnecessarily, resulting in a rough ride. If the Stall current is set too high, the motor could stall even with 100% drive, get hot without moving, and drain the batteries.

Once the current drops below the Stall Current and no over current error is present, normal operation will resume.

To save battery life, the transmitter will turn off after 5 minutes if no functions are used. The user must press POWER at this point to restore transmitter operation. To change the sleep time, use the following procedure:

1. With the transmitter and receiver off, press and hold POWER and buttons FORWARD, REVERSE, and UP.
2. Keep holding until the green and red LEDs start blinking together slowly. Release buttons.
3. Press one of the following buttons for desired sleep time:
 - a. FORWARD - 5 minutes
 - b. REVERSE - 10 minutes
 - c. UP - 20 minutes
 - d. DOWN - 40 minutes
 - e. POWER - sleep time disabled

INDICATOR LEDs

The transmitter has two indicators, the red BATTERY indicator and the green TRANSMIT indicator. The green TRANSMIT indicator blinks rapidly (2x/second) whenever there is communication between the transmitter and the receiver. It will double-blink when no functions are used.

The red BATTERY indicator starts blinking once every second when the battery voltage is low and requires charging. Plug in the transmitter as soon as possible after seeing the low battery indicator. See BATTERY CHARGING below.

The receiver module can identify problems with the system in the form of an error code. Check the red indicator or display window on the receiver to diagnose system problems. Then, refer to the ERROR CODE CHART in this manual for explanation of the error codes. The green LED indicator will blink on the receiver during active operation. There are also three LEDs for battery level indication on the receiver.

TRANSMITTER AND RECEIVER SYNCHRONIZATION

Each radio remote system is designed to operate with a unique radio ID code and RF channel sequence. Each receiver is programmed to respond *only* to the transmitter with the correct ID code/RF channel sequence for which it is set. This feature allows multiple systems to work in close proximity to one another without interference.

In the event that a transmitter becomes damaged and a new one is needed, the receiver can be reprogrammed to respond to the new transmitter. To teach the ID code to the receiver, use the following procedure. ***Please note that if this procedure is interrupted before it has completed, the system may have intermittent operation:**

1. Turn the transmitter and receiver (Master Disconnect Switch) OFF
2. Press and hold the POWER button for more than 30 seconds. LEDs should blink at this point
3. Turn the Master Disconnect Switch ON and press any switch. Green LED will only start to blink on the transmitter
4. Teach complete

CLONING

Warning! This feature can pose a safety hazard for operators if both transmitters are used simultaneously! Use with caution! Occasionally, it is desirable to have more than one transmitter work with a single receiver. This is accomplished by a process called cloning. Cloning allows an additional transmitter (B) to have the same ID code as the original transmitter (A). If this feature is desired, use the following procedure:

1. Make sure transmitters and receiver are off
2. On transmitter A, press and hold the POWER button for more than 30 seconds. LEDs should blink at this point. Release the POWER button
3. On transmitter B, press and hold buttons FORWARD, DOWN, and POWER until the LEDs start to blink. Release buttons
4. Wait for a few seconds until the green LED only starts to blink on transmitter A and transmitter B
5. Turn off both transmitters
6. Synchronize one of the transmitters to the receiver

If the cloning feature has been invoked and is no longer desired, the ID code of one of the transmitters needs to be changed. This will unclone the transmitters. If this is desired, use the following procedure:

1. Turn receiver and transmitters OFF
2. Press and hold buttons DOWN, REVERSE, UP, and POWER until the LEDs start to toggle. Release buttons
3. Press any button again to select new ID
4. Unclosing complete
5. Use transmitter and receiver synchronization procedure above to link the uncloned transmitter to new receivers.

BATTERY CHARGING

The transmitter battery can be charged by plugging the AC wall charger or DC cigarette charger into the USB port. Red and green LED indicators on the top of the transmitter indicate the status of the charger: a red LED indicates the battery is charging and a green LED indicates that the battery is fully charged.

IMPORTANT TRANSMITTER BATTERY INFO. When the battery is new, the run-time of the transmitter will be shorter until it has gone through the drain/charge cycle several times. After this point, the unit's current drain should allow at least 20 hours of run-time before a recharge is needed.

The temperature that the transmitter is exposed to affects performance and useful life. It is strongly recommended you keep within the following limits (lower is better):

- A. Charging: -4 to +86°F (-20 to 30°C)
- B. Operating: -20 to +122°F (-28.8 to 50°C)
- C. Storing: -4 to +86°F (-20 to 30°C)

TROUBLESHOOTING

This next section provides basic operator level troubleshooting for the Kar-Tech transmitter/receivers. If, after following these instructions, the system still does not function, contact Chopper Spotter for further assistance. There are no user-serviceable parts inside the transmitter or the receiver. Return the units for service.

WARNING:

The transmitter (handheld controller) and receiver must be operated in compliance with all the applicable safety regulations, rules, and practices. Failure to follow required safety practices may result in death or serious injury.

Motor Controller Troubleshooting

PROBLEM	SOLUTION
No functions work	1. Verify transmitter power source – battery, CAN cable, external supply, etc 2. Verify that receiver control module power source is present at its input connector 3. Check for proper system ground 4. Check the receiver or control module LED status display for functionality or errors 5. Check to see if the receiver has sufficient cooling
Certain functions do not work	1. Check the wiring and connections from the receiver control module to the control module to the valve coil for the particular function that does not work 2. Check the receiver control module LED status display for possible fault or error indication 3. Check the electrical system 4. Check the hydraulic system 5. Check to see if the receiver has sufficient cooling
Functions operate intermittently	1. Check for loose connections at the valve coil 2. Check the receiver control module LED status display for functionality or errors 3. Check the receiver antenna for damage and possible obstructions 4. Check the hydraulic system 5. Check to see if the receiver has sufficient cooling

ERROR CODES

ERROR	PROBABLE CAUSE
EC01	RF COMMUNICATION ERROR
EC02	LOW SYSTEM VOLTAGE
EC03	FORWARD OUTPUT ERROR
EC04	REVERSE OUTPUT ERROR
EC05	UP OUTPUT ERROR
EC06	DOWN OUTPUT ERROR
EC07	ACTIVE OUTPUT ERROR
EC08	MOTOR SPEED POTENTIOMETER ERROR
EC09	MOTOR OVERCURRENT ERROR

ERROR CODE EXPLANATIONS

- 1 Transmitter is off
Transmitter went to sleep mode
Interference in RF communication link
- 2 System voltage is below 23.3V
- 3-7 Short or open load/coil on output
- 8 No voltage present on potentiometer in transmitter
- 9 Current at outputs is above rated current, receiver will go into Stiction mode

AUXILIARY POWER UNIT (APU)

Your Chopper Spotter is equipped with an auxiliary power receptacle. This feature includes heavy wiring allowing a high amperage for 24 volts (nominally 28 volts) auxiliary power uses. **It is extremely important to maintain the system to provide the proper voltage.** Many factors such as dirty terminals or connections, improperly charged batteries, and loose connections contribute to lowering the system voltage. When the voltage of a system decreases, the necessary power can only be provided by increasing the current. High current (amperage) can ruin motors, including starter motors on aircraft.

Always use the auxiliary power feature with caution!

Turn the master switch **OFF** when using the auxiliary power.

Observe the following precautions:

- Use the shortest cable as possible, with the proper gauge. Long cables or small gauge cables will decrease voltage. A 16 foot (5 meter) cable is available from Chopper Spotter.
- Keep the battery terminals clean. Dirty battery terminals will decrease the voltage of the system. Lower system voltages cause unusually high currents, which can damage the systems of the Chopper Spotter and the aircraft. Heat in the wires or connections indicates excessive current. Discontinue if heat is detected.
- The circuit is not fused. Ensure that the circuit in the aircraft is fused. Avoid very high current situations, and observe all safety precautions.
- Keep batteries charged, and the connections tight. **Do not use the APU if battery power is under 50%.**
- Check electrical connections for heat. A *hot* connection is a *dirty* or *loose* connection, and should be cleaned and/or tightened. If the APU is hot while in use, it is not making a good connection.

Third Terminal Connection

The third terminal, a small prong adjacent to the + (positive) terminal is not connected. Most systems require this terminal to be battery + positive to activate a relay on the aircraft to disconnect the aircraft battery when the APU is utilized. If you have purchased a power cable with the Chopper Spotter, the battery + connection is made internally to the third terminal, thus your aircraft will receive battery + on this terminal.

USING THE CHOPPER SPOTTER

The Chopper Spotter is a unique, patented machine that safely handles helicopters on pavement. It allows one person to quickly load and move a helicopter with ease and unmatched safety for the helicopter and operator.

The Chopper Spotter easily loads from the rear. Simply roll it under the aircraft and attach the two “yokes” to the wheel attachment points.

1. Take the remote control in hand.
2. Step back to the tail.
3. Press *UP*.

The helicopter balances as if it were on its regular wheels, and in some cases, much better. If you have a Model 4, you do not need to balance the helicopter.

Set speed control to zero, then set to desired speed and press *FWD* or *REV* on the handheld controller. The “*soft start*” electronic speed control gently moves the helicopter at any selected speed, up to 3 feet per second.

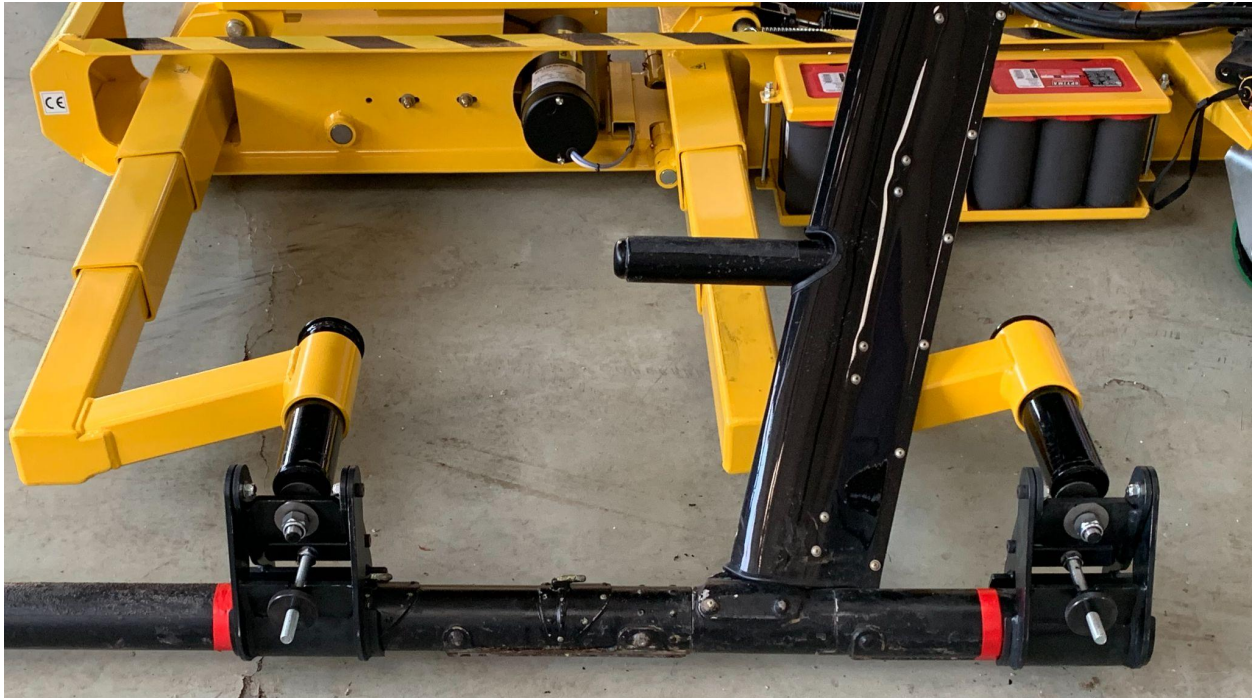
The handheld controller regulates the speed and direction. It also raises and lowers the helicopter. See next section for details.



GROUND HANDLING OPERATION

Ensure that all operators have read this material before operating the Chopper Spotter.

1. Turn the Master Disconnect switch on. You'll see the battery gauge LEDs light up on the Kar-Tech receiver. Then, press the power button on the transmitter (wireless handheld controller). You will see the colored indicator light next to the Master Disconnect switch has turned on. Set the speed control rheostat to zero, then up to desired speed.
2. Drive the Chopper Spotter under the rear of the helicopter, centering it with the center of the helicopter and the yokes lined up with the ground handling pick points. Try to position the casters pointed in line with the Chopper Spotter, parallel to the helicopter's skids. Note that the handle can be lowered to prevent interference with the helicopter or any equipment. Be sure to adjust the Chopper Spotter as needed to avoid touching the fuselage, antennas, or other equipment.
3. Pull out the yokes to the ground handling wheel attachment points. The extension tubes should be pulled out fully, and lift arms pulled out only as much as required to reach. Each lift arm should be pulled out an equal distance. Always maintain a minimum of 8 inches of each lift arm inside the crosstube. If longer crosstubes are required, we have these available for purchase.
4. Attach the yokes to the ground handling wheel attachments. Always ensure that both lift points are securely fastened. Every yoke has a pin or some other way of preventing the helicopter from slipping off the Chopper Spotter. **IF YOU HAVE A MODEL 4**, repeat this process with the front lift arms. Pull out the extension tube fully and the lift arm only as much as necessary. Attach the open universal yoke to the skid and tighten the knurled knob to secure. Tighten with your hand, and the weight of the helicopter will prevent it from loosening.
5. Ensure that the helicopter is balanced (**for Model E and Model MS**). Adjust balance point by changing the position of the links on the yokes using the holes in the spine of each yoke (if the yoke has a spine). **The Model 4 requires no balancing**. The center of gravity of the helicopter should be as centered between the Model 4's arms as possible. To achieve this, move the links on the helicopter specific yokes to the hole furthest in the rear of the spine on the yoke (essentially pushing the helicopter forward on the Chopper Spotter). This will cause the helicopter to tilt forward as you lift, and the front arms of the Chopper Spotter will catch and lift the helicopter. If you have a Model 4 with two sets of universal yokes, ensure that the center of balance is between the front and rear set of yokes (pictured below).



6. Step back to the tail boom. Grab the stinger or other suitable handle to stabilize pitch, while you lift the helicopter just high enough to prevent the skids from touching. **An inch or two is enough height in most cases. NEVER lift more than 12 inches.** If the Chopper Spotter is not properly centered or balanced, it should be realigned. When properly loaded and level, the helicopter should be balanced when lifted and easy for solo operation.
7. Start **slowly**. Pressing **FWD or REV** (Forward or Reverse) starts the acceleration cycle and the Chopper Spotter will gradually pick up speed. Releasing from the FWD or REV button starts the acceleration cycling over again. The speed can easily be changed while in motion. Like any vehicle without power steering, the Chopper Spotter is easiest to steer while in motion. **NEVER PUT UNDUE STRESS ON THE TAIL BOOM.** If the casters are pointed in the wrong direction, push FWD or REV to allow some motion, and allow the casters to swivel easily.
8. **Caution:** Never leave a helicopter in the raised position while unattended.

9. Always turn the Master Disconnect switch and transmitter OFF after using to prevent inadvertent operation.
10. Braking can be accomplished by switching directional control to the *opposite* direction.
11. Use caution when transitioning down inclines. Proceed slowly, and keep the skids close to the ground so that the helicopter can easily be lowered if abrupt stopping is needed.



TOWING THE CHOPPER SPOTTER

The Chopper Spotter can be towed with another vehicle, using the tie-down fixtures on the back of the Chopper Spotter. An operator must stabilize the pitch of the aircraft from the regular operating position at the end of the tail boom with the Model MS and Model E, and with all three models an operator must be present to steer.

IMPORTANT!

Never tow the Chopper Spotter without first disconnecting the leads under the motor cap. If it is necessary to tow, you must remove the cap (use a 7/16 wrench) and disconnect the red and blue wires from the motor. The motor will otherwise act as a generator and could irreversibly damage the batteries, the motor controller, or the motor itself.

MAINTENANCE

MAINTENANCE PRECAUTIONS

When performing any inspection or maintenance work, always exercise care to prevent injury to yourself and others or damage to the equipment. The following are general precautions, which should be closely followed in carrying out any maintenance.

-Never operate or test any function if any person is in an area where they could be injured by being hit or squeezed by hydraulic equipment on the Chopper Spotter or the load of the helicopter.

-Turn power off before connecting or disconnecting valve coils or other electrical loads.

Daily

*Maintain battery charge. It is safe to leave the Chopper Spotter plugged into the charger at the end of the day; simply turn the Master Disconnect Switch **OFF** and plug the unit in. The battery charger will not overcharge the Chopper Spotter, and will maintain its charge.

*Check for leaks in the hydraulic system and check for drips on the floor. Tighten or repair as needed. If the lifting arm does not lift high enough, check the hydraulic fluid level. Oil in the reservoir should be within a ½ inch (1 cm) of the top fill hole when the lift arms are down. Use SAE 10 (light) ISO 32 hydraulic fluid.

Monthly

*Inspect all lifting components to ensure that fasteners are tight.

*Check chain tension, and adjust as necessary. The chains need not be very tight. They can sag slightly, leaving about a ½ inch (1 cm) of play. If adjustment is necessary, adjust the transmission shaft to the drive wheel first (if #50 chain is loose). Then, adjust the motor chain by moving the motor (ask for instructions if needed). If only the smaller #35 chain needs to be tightened, then only adjust from the motor.

Every Six Months

*Make sure electrical connections are tight. *Observe important electrical safety precautions.*

*Use a quality bearing grease on the following components:

- Swivel casters, caster wheels, and the drive wheel
- The lift tube knuckles (two on the Model MS and Model E and four on the Model 4)
- The transmission shaft
- The ends of the hydraulic cylinder
- (For Model 4) The linkage that connects the front lift arms to the rear lift arms

*Clean and lightly oil the chains, and wipe off excess oil. Use SAE 20 non-detergent oil, or a lubricant designed for chain lubrication. The motor and hydraulic pump are permanently lubricated and require no maintenance.

*Extend the cylinder fully and hold for 2 seconds at it's top. This process will expel all collected oil in the cylinder.

HYDRAULIC SYSTEM

The hydraulic system consists of a 24 volt hydraulic pump, hoses, fitting, and welded hydraulic cylinder. Engaging the UP button activates a 24 volt solenoid that turns the pump on. Engaging the DOWN button activates the down solenoid, permitting gravity and springs to lower the lift arms. The DOWN valve is pressure compensated to lower any weight slowly.

The Chopper Spotters are all equipped with a MANUAL DOWN valve located on the hydraulic pump body. In the rare event of electrical or valve failure, the system pressure can be released by pushing on the manual down valve and turning counter clockwise. The valve will pump out a few millimeters and release. To close the valve, push in and turn clockwise. The valve turns very easily, **DO NOT FORCE THE VALVE**. There is a small pin inside that will be sheared if you force the valve.

If the lifting arm does not lift high enough, the hydraulic fluid is probably low. Add as needed.
FILL RESERVOIR ONLY WHEN THE ARM IS DOWN.

*Use very clean SAE 10 (lightweight ISO 32) non-foaming hydraulic fluid in all temperature conditions. Non Detergent SAE 10 motor oil can be used if the preferred fluid is unavailable.

Most hydraulic pump failures and valve malfunctions that aren't electrical are likely the cause of dirt and other foreign material getting into the system. When filling, use a funnel with a very fine mesh screen. Do not use a cloth strainer, as lint may be introduced into the system. The moving parts on the cylinder and lifting arm require a few drops of SAE 20 every six months, or more often in dusty conditions.

The inlet is fitted with a filter screen. To gain access to the filter screen, drain the reservoir of oil and remove the screws which attach the reservoir to the motor adapter. Carefully remove the inlet assembly and flush with a solvent.

If the system does not lower, the electrical pressure release valve may be "hanging up". First, ensure that the solenoid is magnetized when the down switch is engaged. If it is, remove the valve and clean it out with solvent and compressed air. Operate it outside of the pump housing to see if the plunger is moving.

IMPORTANT NOTE: The solenoids that control the hydraulic system are 24 volt switches. Be cautious when working on the system, as the volt short can produce dangerous sparks and cause serious burns.

ELECTRICAL SAFETY PRECAUTIONS

1. Working with batteries can be dangerous. Do not lay tools or anything metallic on or near the batteries in the event that falls and touches the terminals together, causing it to arc. Remove personal metallic items as well--rings, bracelets, necklaces, watches, etc. The batteries can weld jewelry to metal, thus causing severe burns.
2. Before any disassembly or inspection of the electrical system, begin by **TURNING OFF THE MASTER DISCONNECT SWITCH.**
3. The battery charger should be plugged into a properly grounded receptacle.
4. Always turn off the wireless transmitter (handheld controller) when not in use. Never leave the Chopper Spotter unattended while the drive system is activated. Note that the colored indicator light is **ON** when the drive system is activated.
5. Do not operate the Chopper Spotter while the battery charger is plugged in. This may result in drawing too much current from the charger, and will cause the battery charger fuse to blow.
6. NEVER short across a circuit to test it. Use a voltage indicator or multi-tester. If you need to bypass a relay (solenoid) to test it, disconnect the electronic controller first.
7. The electronic controller is highly sensitive to stray voltages. Check connections to prevent incorrect connections. Service should be performed only by a qualified service technician.

THE FRAME OF THE CHOPPER SPOTTER IS ELECTRICALLY NEUTRAL. Ensure that no electrical terminals or bare wires contact the frame or other metal parts in order to maintain electrical neutrality. Check wires for chafing and wrap with electrical tape if necessary.

