THE LIFTER

OPERATION AND MAINTENANCE MANUAL

ROCK MILLS
ENTERPRISES

1334 Valley Drive, Rock Valley IA 51247

Ph: 712-451-6550 Fax: 712-451-6551 www.rockmillsent.com

INTRODUCTION
READ CAREFULLY

This manual is provided to familiarize you with the operation of The Lifter, and to supply you with the information necessary for proper equipment maintenance.

It is the user's responsibility to maintain and operate The Lifter in a manner that will result in the safest working conditions possible.

In addition, it is also the use's responsibility to be aware of existing Federal, State and Local codes and regulation governing the safe use and maintenance of this product.

Warranty will be void on any part of The Lifter when subject to misuse due to overloading, abuse, lack of maintenance or unauthorized modifications. No warranty – verbal, written or implied – other than the official published Rock Mills Enterprises new machinery and equipment warranty will be valid with this unit.

Treat the equipment with respect and service it regularly. This will result in a safer working environment and longer equipment life.

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

THIS SYMBOL MEANS

- ATTENTION!
- BECOME ALERT!
- YOUR SAFETY IS INVOLVED!

SIGNAL WORDS:

Note the use of signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines:

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations typically for machine components that cannot be guarded for functional purposes.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

If you have questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer or Rock Mills Ent., 1334 Valley Drive, Rock Valley IA 51247. (Telephone) 712-451-6550 www.rockmillsent.com

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TECHNICAL BULLETIN
THE LIFTER PLUS

This Technical Bulletin is being issued to provide Lifter PLUS users with proper operating procedures to ensure effective, reliable field performance.

The Lifter PLUS operates off the vehicles 12 Volt DC electrical system.

- Continuous or extended daily periods of using The Lifter PLUS will draw down the battery output to below 12 Volts.
- Low voltage causes improper function of the unit's solenoids which may result in failure to operate.
- The vehicle must idle at sufficient engine RPM's to maintain proper voltage for the battery to recharge and support The Lifter PLUS power demands.
- When using the Manual Lifter Operation Switch, it MUST be released and returned to the neutral center position once The Lifter is fully extended or retracted. Continuing operation beyond this will cause electrical damage.

Solutions:

To reduce the risk of damage to your Lifter PLUS, follow these operating instructions:

Make sure your vehicle's battery and alternator are in good operating condition to support operation of The Lifter PLUS.

- Once the manhole cover is lifted and moved away from the hole, lower it to the ground and release the magnet. If energized, the magnet will continue to draw battery power.
- Allow the vehicle to run at sufficient engine RPM's to deliver power for the lift and battery recharge. In most situations, you will increase engines alternator output enough to regain the lost voltage as you move from location to location.

THE LIFTER

	Specifications	
	Standard	Plus
Lifter		
Weight	62 Lbs	62 Lbs
Length (With Camera & Magn	38 inches	38 inches
Power Unit		
2" Bore X 18" Stroke	Yes	Yes
Adhesion (metal to metal)	Yes	Yes
Pressure Square Inch	2,700 PSI	2,700 PSI
Pull Capacity	6,350,lbs	6,350 lbs
Push Capacity	8,475 lbs	8,475 lbs
Magnet		
Weight	47 lbs	49 lbs
Diameter with connector	8 Inches	8 Inches
Amps	8 Amps	**17 Amps**
Voltage	12 Volts	12 Volts
Working Capacity	2,500 lbs	**3,500 lbs**
Camera/Monitor (Option)	Yes	Yes
Color Camera - High Density Infra red LEDS	Yes	Yes
Heated with Audio Feed	Yes	Yes
Accepts up to 2 Cameras	Yes	Yes
High Resolution - Pixels	Yes	Yes
7" Inch Digital Screen	Yes	Yes
General Specs		
Voltage	12 Volts	12 Volts
Vehicle Receptical	2" Hitch	2" Hitch
Frame - Adjustable Height	Yes	Yes
Cylinder Stroke	18 Inches	18 Inches
Lifter WT w/o Magnet	62 lbs	62 lbs
Gloss Black Power Coating	Yes	Yes
Minimum Vehcile Capacity	1/2 T. - 1500	3/4 T. - 2500
Vehicle Battery Capacity	650 Amps	800 Amps
Remote - Waterproof	Yes	Yes
Optional		
Swing Arm	40 lbs	43 lbs
Grate Attachment	24 lbs	24 lbs

ROCK MILLS ENTERPRISES
1334 Valley Drive.
Rock Valley, Iowa 51247

Vehicle Compatibility Requirements

CAUTION

The Lifter operates with up to 3,000 lbs of lifting force. The Lifter must be attached to vehicles capable of supporting the expected forces applied during the process of removing and replacing manhole covers and grates. The Lifter should be attached to a minimum of a Class 3 trailer hitch. Any vehicle used to operate The Lifter must have frame, suspension systems and attachment points capable of supporting the lifting force and pulling capacity of the unit.

Rock Mills Enterprises assumes no liability for damage to any vehicle that is used with The Lifter that does not meet these minimum vehicle design specifications.

Rock Mills Enterprises

Training Instructions

The Lifter Camera & Monitor – Swing Arm – Grate Attachment

The Lifter and Camera are electrically mounted independently. The camera is live when the monitor is "powered "On". It is best practice to power the monitor "On" when approaching job site. When completed power "Off" the monitor. The camera has a night light feature, if at any time, it is necessary to locate a cover while dark. If there are multiple workers on the job site the camera also has an audio feed back function. If monitor is left powered "On" at the end of the day, it will continue to draw charge from your battery. Being independent The Lifter is "Off" when the remote is "Off". When powering up the Remote – hold the red power on button until the small light blinks on. Whenever the Remote is not in use you are to switch it "Off". Remember the Remote has only six functions 1. Power "On & Off " 2. Cylinder "Up & Down" 3. Magnet "On & Off". Comment: the magnet is mounted on a swievel bracket. Its purpose is to conform to the surface or contour of the road or street while adhering to the lifting process.

Your hand held **Remote.** We have provided a vehicle charger for your Remote which operates just like your phone. The charger is to be used in your power port of your vehicle. Under normal use your remote battery should be good for approximately three weeks – gave or take some days. The remote should not lay in your vehicle uncharged for a lengthy period of time. A lithium battery uncharged will lose it ability to retain a charge. The radio frequency of each Receiver and the Remote are paired. If for some reason it is desirable to have a second Remote you can order that additional Remote. However, it will need to be cloned to the same frequency of the first Receiver by performing a simple operation.

The **Lifter**. The Lifter is powered by your vehicle battery and connected to the Lifter's power unit by a "Anderson Connector". If for some reason you wish to disconnect the Lifter from the vehicle you will need to disconnect the connector. The magnet weight is approximately 50 lbs. and can be disconnect by lowering the magnet to the surface and removing the pin that goes through the magnet coupler,

the magnet and the guide rod. Using the remote lift the cylinder while replacing

the pin into the coupler and the guide rod. The Lifter can then be removed by pulling the pin at the receiver. By the way, the guide rod serves as an important function to the lifting process. The guide rod will keep the cover from rotating while being lifted. As it would normally do.

Very important!!!!!!!! After lifting a cover or grate use the tether rope to swing the device from the opening. After having done so **lower the cover or grate to the surface and turn the magnet off**. There is a timed reset that will automating do so if this is not performed by the operator. The longer you hold the weight the more power it draws from you vehicle battery. Tying the tether to the Swing Arm near the Lifter will ensure that the operator will not accidentally drop the weight and the possibility of causing injury.

The Grate Attachment. The grate attachment is intended to be used when lifting rectangular grates usually having large openings. The grate attachment is mounted to the Lifter by lowering the magnet to the surface and pull the pin from the coupler. Once the magnet is free from the Lifter you can remove the four bolts on the magnet bracket and slide the grate attachment between the magnet and the coupler bracket and tightening by using the longer bolts provided. Lower the cylinder and connect magnet to the Lifter. When lifting a grate have the Lifter in as close to the center of the grate as possible and hook the two hooks as far to the outside as possible. There are two chains provided one on each side of the grate. Proceed by hooking the chain to the attachment on the magnet. Remember the chains are not to lift the grate. The magnet will do that. However, if the grate slips or for some reason looses magnet grip the chains will keep it secure.

Reminder

NANO Series
Remote Battery

Our Remote is charged with a no-frills high performance (NANO) transmitter. The NANO is based on mini and mico radios with a lithium polymer rechargeable battery pack. The remote comes to you only partially charged. It is important that you charge the lithium battery upon arriving at your facility. (Charger Enclosed) Lithium batteries will maintain high performance and a long life when charged, but without being regularly charged they will loose their capability of holding a charge. It is recommended that, if in regular use, your remote be charged every 3 – 4 weeks. An idle battery will over a period of time lose it charge. A lithium battery, not charged, will not be covered on our one year warranty.

TABLE OF CONTENTS

Note: read the entire manual before installing or operating Lifter

Rock Mills Enterprises

The Lifter Plus

TW 500 /PL500 & TW 3000 / PL3000

Magnet Installation Instructions

When installing The Lifter Plus it is necessary to follow these instructions. When The Lifter has been installed into the vehicles hitch receiver and the electrical wires have been attached to the battery proceed as instructed:

1. **Place the magnet directly below cylinder with the curly cord on the back toward the vehicle.**

2. **Using the remote lower the cylinder approximately 6 inches above the magnet.**

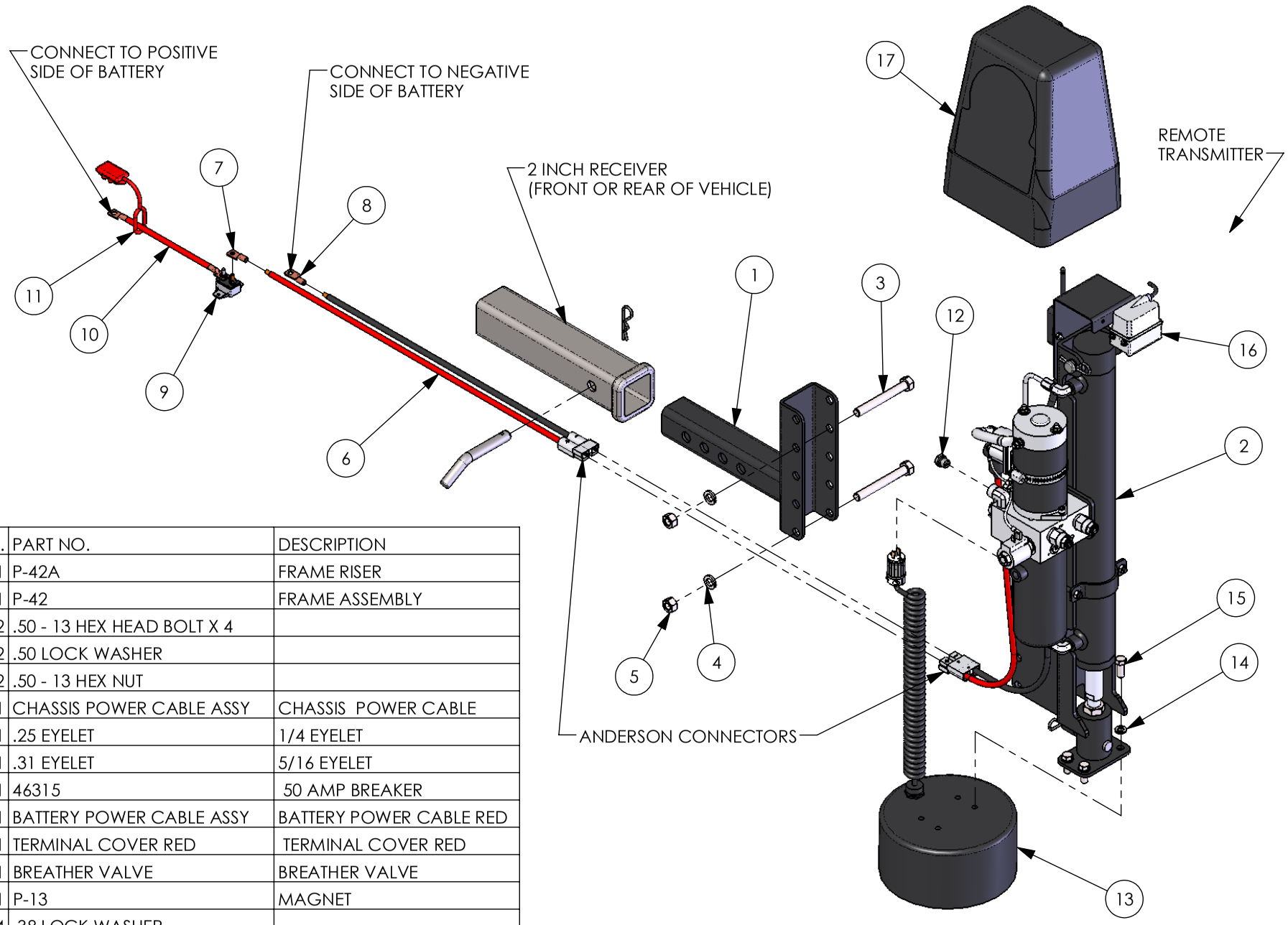
3. **Draw the curly cord through the back cavity of The Lifter and the base frame.**

4. **Slide the weather boot up on the upper cord.**

5. **Insert the male end (lower cord) to the female end (upper cord) and turn the lower connector ¼ turn to secure the connection.**

Lower weather boot over the connector.

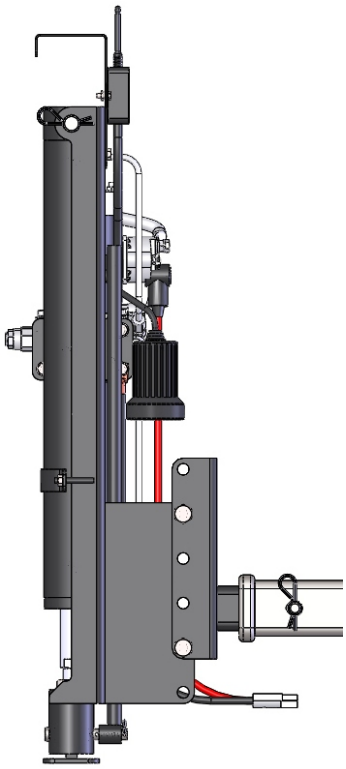
Using remote lower cylinder to magnet and re-insert pin connecting cylinder bracket, magnet and anti-rotation rod.



ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	P-42A	FRAME RISER
2	1	P-42	FRAME ASSEMBLY
3	2	.50 - 13 HEX HEAD BOLT X 4	
4	2	.50 LOCK WASHER	
5	2	.50 - 13 HEX NUT	
6	1	CHASSIS POWER CABLE ASSY	CHASSIS POWER CABLE
7	1	.25 EYELET	1/4 EYELET
8	1	.31 EYELET	5/16 EYELET
9	1	46315	50 AMP BREAKER
10	1	BATTERY POWER CABLE ASSY	BATTERY POWER CABLE RED
11	1	TERMINAL COVER RED	TERMINAL COVER RED
12	1	BREATHER VALVE	BREATHER VALVE
13	1	P-13	MAGNET
14	4	.38 LOCK WASHER	
15	4	.38-16 HEX BOLT X 1.00	
16	1	CC77	CAMERA ASSEMBLY
17	1	42-020	MOTOR COVER
18	1	MAGNET WIRE	

SECTION 1 – INSTALLATION

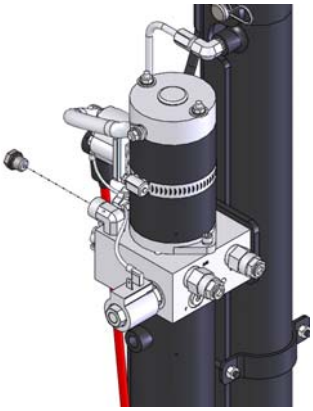
These instructions are intended as a guide to assist you with The Lifter installation. We cannot cover every make, model and year of truck manufactured worldwide, so these instructions will provide only general information.



1. Attach the frame riser (P-42A) to the frame (P-42), using the 2-½" bolts. Slide the lifter frame into the 2 inch receiver, pin or bolt into place. The lifter can be installed on the front or the rear of a vehicle.
    a. Frame Riser can be installed with long leg facing up or down depending on height requirements per vehicle's receiver.
    b. Approximate height from underside of battery mount to ground is 13 to 15 inches. Final height must be check after battery is installed,

2. Cut the wires (P-62A/B) to length needed to reach the battery and solder on supplied copper eyelets. Solder the 5/16" eyelet to the black wire and the ¼" eyelet to the red wire. Run the 6 ga red wire to one side of the 50 amp breaker; connect the battery lead to the positive side of the battery. Run the black wire to the negative side. Plug the Anderson connectors together from the vehicle to the lifter.

3. Remove plug from elbow fitting on manifold and insert breather valve (attached to The Lifter motor) before operating.



4. Place the magnet (P-10) below the cylinder and lower the rod down until the magnet attachment plate touches the magnet by using the remote transmitter (the transmitter must be turned on). Line up the four bolt holes and insert the bolts that attach the plate to the magnet. Connect the yellow cord (P-13) to the magnet.

5. When the magnet is in the raised position, make sure there is a minimum of 9 inches of clearance from the bottom of the magnet to the ground.

6. Mount the camera to the mounting bracket on the top of The Lifter frame. The camera should be aligned to view the magnet. Wire the camera cable and power harness per enclosed manufacturer's directions. Mount the monitor inside the cab where desired.

7. To attach motor cover, slide cover from top over motor (opening to frame). Remove the bolt on the right side of the frame and be sure to support the hydraulic motor. Place the motor cover in front of the motor mount, line up the holes, and re-bolt the cover to the frame. Move to the left side of the frame and remove the top bolt. Place the cover over motor mount, line up the holes and re-bolt. The cover is fairly flexible which will allow you to bolt one side at a time.

8. TEST ALL FUNCTIONS.

The Lifter is attached directly to the vehicle's 12V electrical system. Twenty (20) feet of power cable is included with The Lifter. The performance of The Lifter depends on the truck's electrical system. The use of low maintenance battery is not recommended. The recommended alternator and battery that will give the longest life with the most useful duty cycle is a 90 Amp alternator with a 200 minimum reserve, 700 cold cranking Amp battery. These specifications should be considered minimum. A typical power cable mounting and hookup is included in section 5.

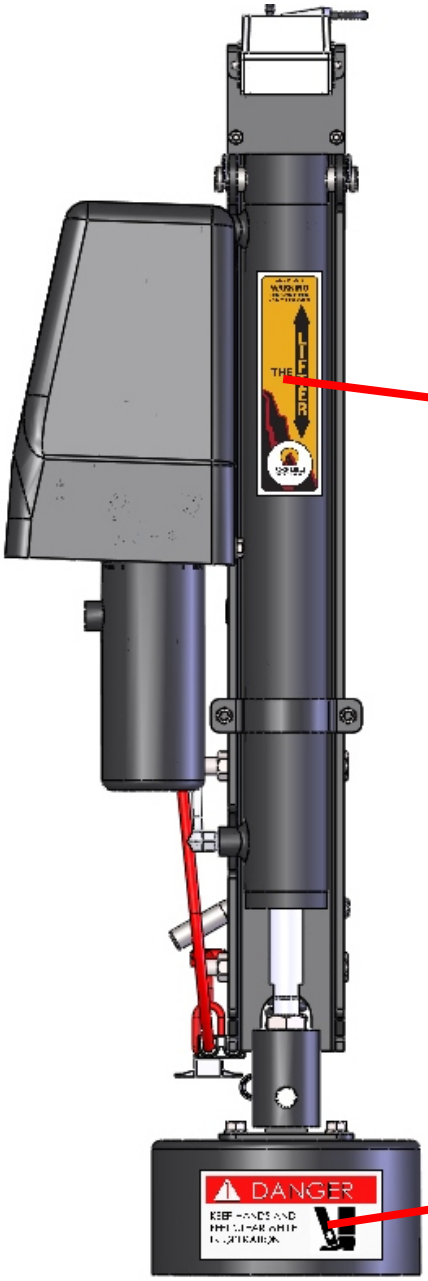
CAUTION: Your electric/hydraulic Lifter is equipped with an electric motor rated for intermittent duty only! Caution must be taken not to overheat the motor, which could cause permanent damage to internal windings.

Duty cycle will vary with the change of the load requirements and Amperage draw. Heavier loads causing higher amperage draw will cause faster motor heat-up and will require longer cool off periods.

Approximate duty cycle at no load would be 1 MINUTE ON and 2 MINUTES OFF. Full load conditions would be approximately 1 MINUTE ON and 5 MINUTES OFF. Climate conditions will affect duty cycle intervals

OPERATE THE LIFTER SAFELY

Manhole Covers and Grates are heavy and can cause serious injury if accidentally dropped. All personnel should stand at least three feet away from the outside of the manhole cover, grate or any other object being lifted. DO NOT at any time, have hands or feet under the manhole cover, grate or any other object being lifted.



SECTION 2 - OPERATION

1. Drive toward the manhole cover until it disappears from view. Turn on the monitor and watch for the cover as it appears on the screen. Position the magnet directly in the middle of the cover if possible or if the cover has tar on it, place the magnet where there is bare metal.

2. With the Remote Transmitter, lower the magnet onto the cover, using the Cylinder DOWN arrow button. Energize the Magnet using the Magnet ON button.

3. With the Remote Transmitter, raise the magnet with the cover all the way up, using the Cylinder UP arrow button and drive forward or backwards two or three feet. Make sure the cover is clear of the casting before moving.

4. With the Remote Transmitter, lower the magnet with the cover to the ground, using the Cylinder DOWN arrow button and using the magnet OFF button, release the cover.

   - Always return the Magnet to the up position to avoid the possibility of damage by moving the vehicle with the Magnet at ground level.
   - The manufacture recommends that the magnet not be on longer than 3 minutes at a time. The transmitter will shut off the magnet after 5 minutes of activity and is set to shut down completely after 15 minutes of inactivity to save the transmitter battery.

KEEP HANDS AND FEET CLEAR WHILE OPERATING THE LIFTER!

SPECIAL CONDITIONS

The Lifter motor has 3000 lbs of lift force with direct metal to metal contact. For best performance, The Lifter must have a clean metal contact surface on the manhole cover or drainage grate. The operator may at times encounter field conditions that will require attention for best results.

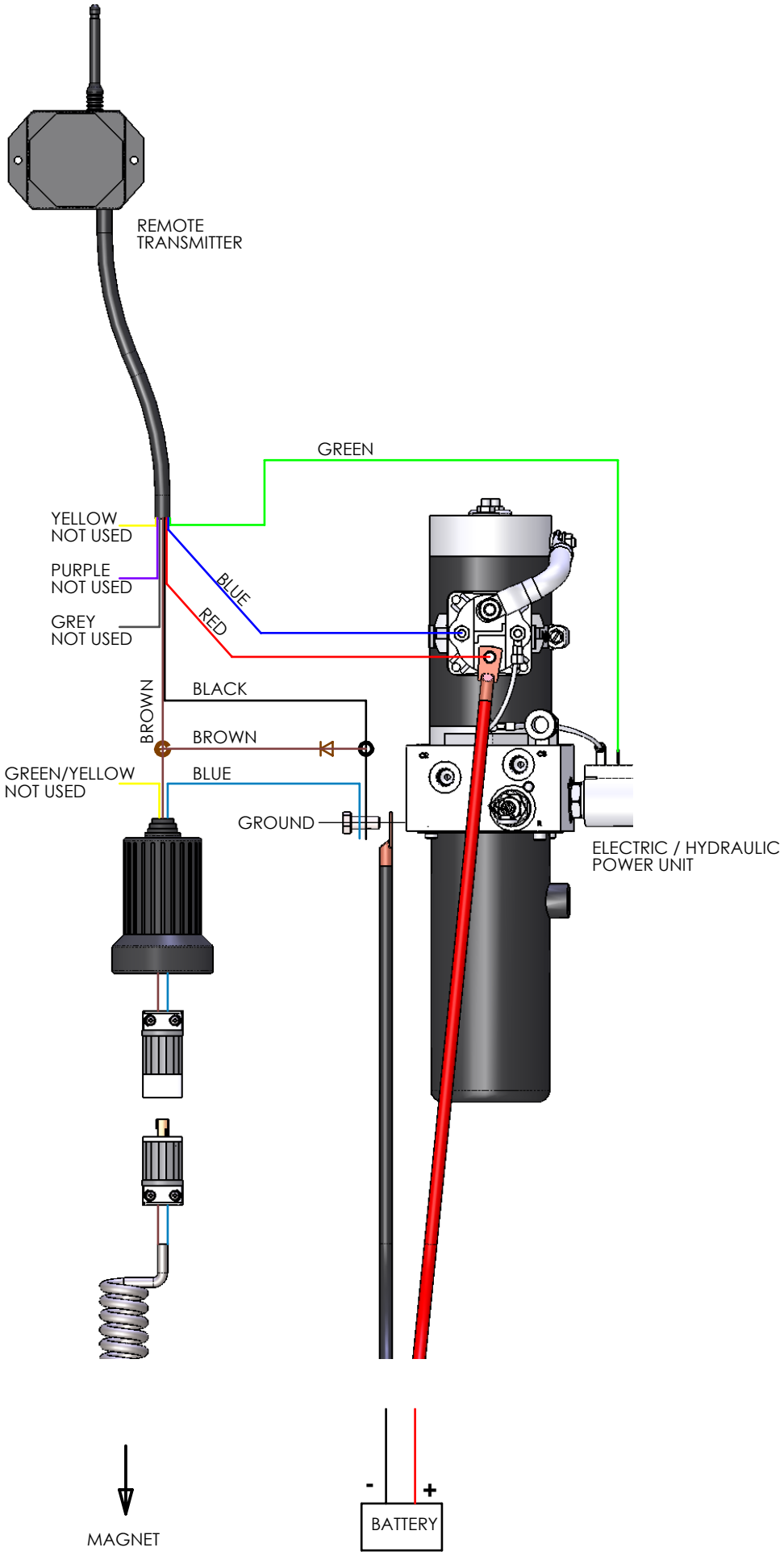
- DEBRIS ON MANHOLE COVER: If the cover is completely tarred over, the magnet cannot adhere to the cover. Clean off the cover as thoroughly as possible over the entire cover. Place the magnet over the cleanest area and engage The Lifter.

- ICE AND SNOW: Clean ice and snow off manhole cover and grates to allow solid metal to metal contact between the cover and the magnet. If the cover is resistant to removal, with light to moderate tension on the cover by The Lifter, strike the top of the cover or perimeter of the grate with moderate blows with a heavy mallet or sledge hammer. This will break the ice bond and the cover or grate should “pop off”. Caution: DO NOT strike grates in the grate area. It may damage the grate. Always strike along the perimeter of the grate frame with moderate blows.

- STUCK COVERS: At times, manhole covers and grates that have not been removed for long periods of time can be stuck in place. They can be bonded to the frame due to a variety of adhesive conditions. When this situation occurs, with light to moderate tension on the cover by The Lifter, strike the top of the cover or perimeter of the grate with a heavy mallet or sledge hammer as outlined under “Ice and Snow”. This will typically break the bond and the cover or grate should “pop off”.

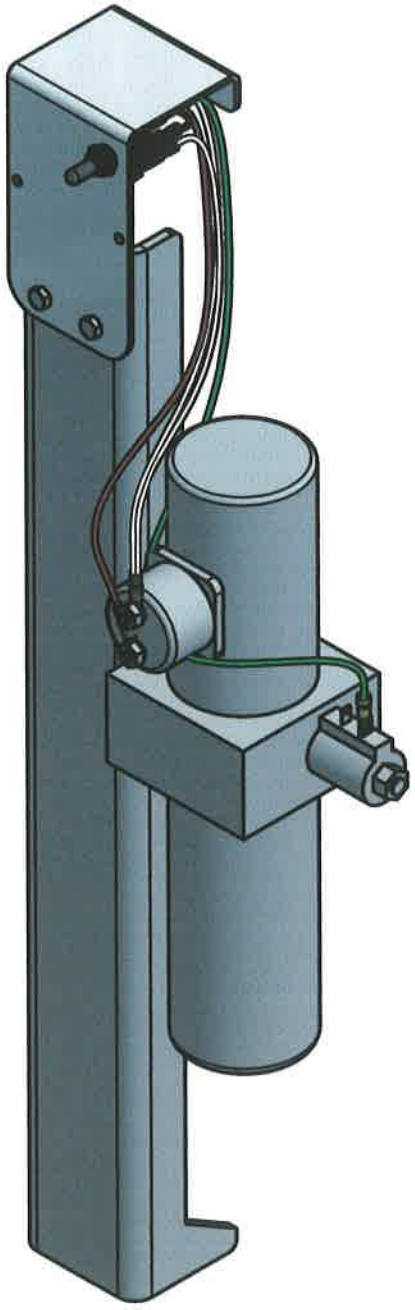
SECTION 3 – MAINTENANCE

1. Keep bottom of magnet clean, you may need to sand rust from bottom occasionally.
2. Keep camera lens clean, using soft cloth and glass cleaner
3. Watch hydraulic fluid level. With cylinder retracted, fill with hydraulic fluid until it comes out of the fill hole (use Automatic Transmision oil)
4. Wireless transmitter:
    a. Press and hold the power button on the transmitter until both LEDs turn on, then release. The green LED will flash rapidly when communication has been established with the receiver.
    b. The transmitter is designed with power savings feature which turns the transmitter off after 15 minutes if none of the switches are pressed.
    c. Plug the charging connector into the port at the top of the transmitter. Observe orientation and do not use force. A solid red LED indicates battery is charging. Once the internal battery is fully charged, the red LED will turn off and the green LED will turn on. A fully discharged unit will take up to 3 hours to recharge. Use only approved chargers. Transmitter will require charging every 20 – 30 days with constant use.
    d. The transmitter and receiver should have been matched at the factory. If matching is required, see instructions with the transmitter.


REMOTE
TRANSMITTER
GREEN
YELLOW
NOT USED
PURPLE
NOT USED
GREY
NOT USED
BLUE
RED
BROWN
BLACK
BROWN
GREEN/YELLOW
NOT USED
BLUE
GROUND
ELECTRIC / HYDRAULIC
POWER UNIT
MAGNET
-
+
BATTERY

Manual Lifter Operation Switch

(Toggle Switch)



MANUAL LIFTER OPERATION SWITCH

(Toggle Switch)

Purpose:

The Manual Lifter Operation Switch is installed to operate the power unit without the use of the external remote. The Toggle Switch to be installed is a Momentary Switch. There are three positions, On-Off-On. When pressed and released, the Toggle Switch is designed to return to the central off position.

Installation:

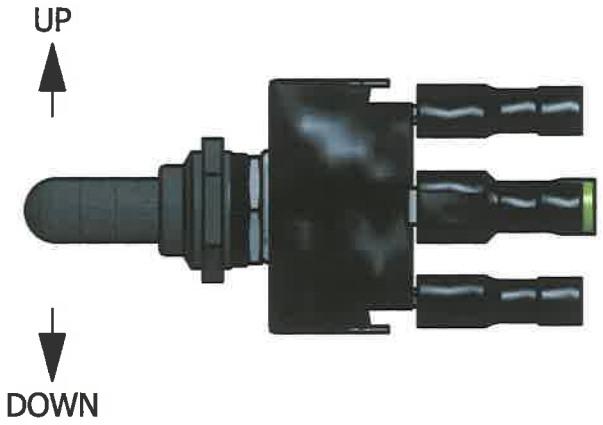
The Toggle Switch is mounted on the existing camera bracket toward the upper end of the Lifter. Please refer to drawings included for further assistance.

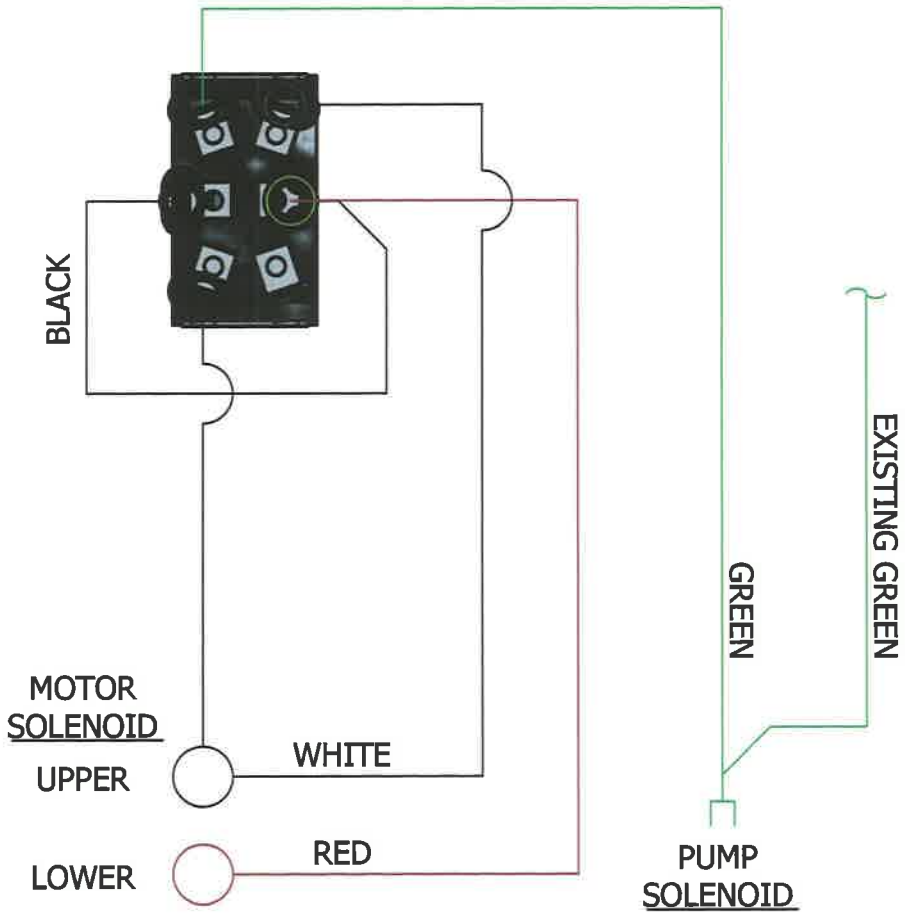
1. Unplug Anderson Electrical Connector from power source.
2. Drill and 1/2" hole in camera bracket. The hole must be a minimum of 7/8" from bracket top and approximately 5/8" from edge (edge closest to motor/pump assembly).
3. Remove Switch boot and nuts from the switch assembly. The boot is threaded onto the Toggle Switch.
4. Insert Toggle Switch into previously drilled hole with the unused pole on the bottom. This will orient the switch to the direction of travel.
5. Fasten the Toggle Switch to bracket with nuts provided and cover with boot previously removed.
6. Attach the following wires: (Refer to wiring schematic for further assistance)

Red: Remove nuts from lower stud on motor solenoid. Attach red wire with 5/16" ring and tighten nuts snugly (Do not over tighten).

White: Remove nuts from upper stud on motor solenoid. Attach both white wires with 5/16" rings and tighten nuts snugly (Do not over tighten).

Green: Locate existing green wire running from the Remote Transmitter to the Pump Solenoid. Cut off and discard existing connector. Be sure to maintain as much wire length as possible. Strip off approximately 3/8" from existing green wire. Twist both wire ends together securely. Slide both wires through the provided "shrink wrap covering." Fully insert wire ends into the provided Female Disconnect and crimp snugly. Be sure wires do not pull out. Return the new Female Disconnect onto the same pole on the Pump Solenoid. Slide the "shrink wrap covering" over the Disconnect and pole. Using a heat gun or hairdryer, warm the covering to form a tight protective layer as was previously in place.

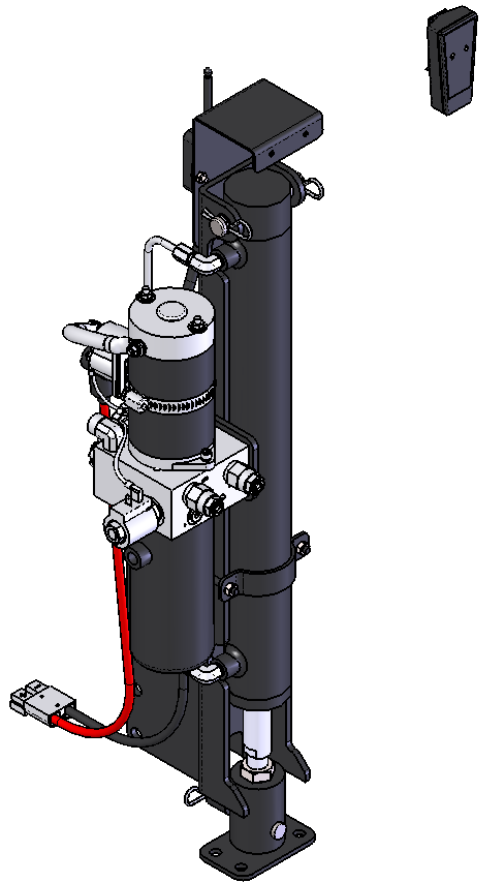


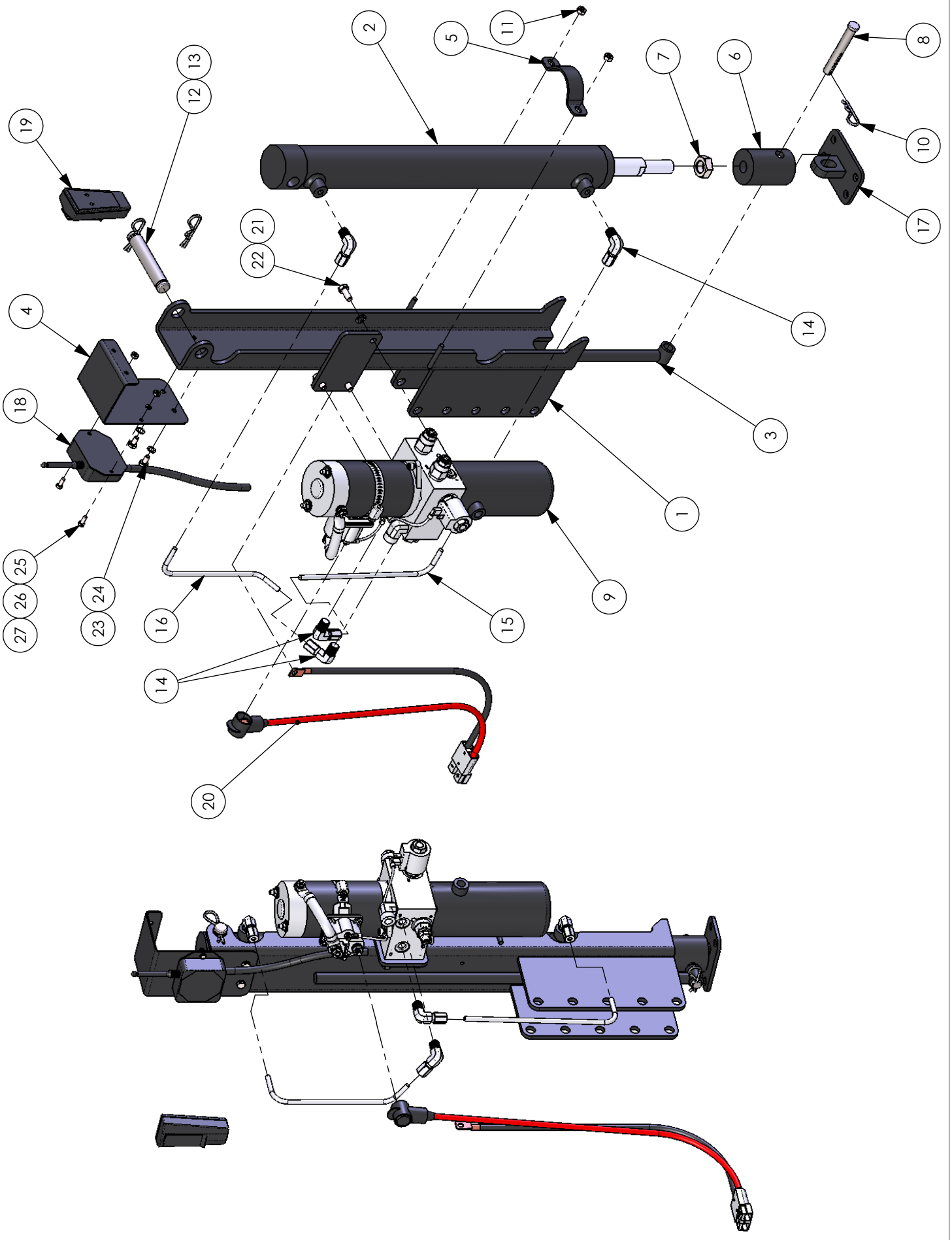


MANUAL LIFTER OPERATION SWITCH

(Toggle Switch Wiring Schematic)

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	AE0003-1	
2	1	2 X 18 CYLINDER	
3	1	AE0005-1	SIGHT ROD
4	1	AE1006	CAMERA MOUNT
5	1	AE1010	CYLINDER BRACKET
6	1	AE1011	CYLINDER SWIVEL BRKT MNT
7	1	HJNUT 0.7500-10-B-N	
8	1	MC98330A325	CLEVIS PIN
9	1	DC 3131	
10	1	MC98335A069	HAIR PIN
11	2	#10-24 HEX NUT	
12	1	PIN	CYLINDER PIN
13	2	MC98335A067	HAIR PIN
14	4	52215K457	
15	1	RETRACT HYD TUBE	RETRACT HYD TUBE
16	1	EXTEND HYD TUBE	EXTEND HYD TUBE
17	1	AE0007-1	MAGNET MOUNT
18	1	REMOTE CONTROL RECIEVER	REMOTE CONTROL RECIEVER
19	1	REMOTE CONTROL FAUB	REMOTE CONTROL FAUB
20	1	POWER CABLE ASSY	
21	3	Internal Tooth LW Type A-0.3125	
22	3	HFBOLT 0.3125-18x0.75x0.75-N	
23	2	Internal Tooth LW Type A-0.25	
24	2	HFBOLT 0.25-20x0.5x0.5-N	
25	2	IN-HHMS 0.19-24x0.5x0.5-N	
26	2	#10 LOCK WASHER	#10 SPRING LOCK WASHER
27	2	MSHXNUT 0.190-24-S-N	

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P/N: 3A2035B
KIT, MICRO PROGRAMMABLE, 4 FUNCTION
INCLUDING:
1 EA 3A2033B TRANSMITTER
1 EA 3A0914B RECEIVER

ERROR CODES

RECEIVER ERROR CODE CHART

ERROR CODE	PROBABLE CAUSE
1	RF COMMUNICATION PROBLEM
2	FAULTY CIRCUIT TO OUTPUT 1
3	FAULTY CIRCUIT TO OUTPUT 2
4	FAULTY CIRCUIT TO OUTPUT 3
5	FAULTY CIRCUIT TO OUTPUT 4

ERROR CODE NUMBER IS THE NUMBER OF RED LIGHT BLINKS BETWEEN EVERY PAUSE.

TRANSMITTER ERROR CODE CHART

ERROR CODE	PROBABLE CAUSE
1	LOW BATTERY
2	FAULTY CIRCUIT TO OUTPUT 1
3	FAULTY CIRCUIT TO OUTPUT 2
4	FAULTY CIRCUIT TO OUTPUT 3
5	FAULTY CIRCUIT TO OUTPUT 4

ERROR CODE NUMBER IS THE NUMBER OF RED LIGHT BLINKS BETWEEN EVERY PAUSE.

NOTE:
TO ELIMINATE ERROR CODES FOR UNUSED OUTPUTS, SEE OUTPUT CONFIGURATION MANUAL OR INSTALL A 1K OHM 1/4 WATT RESISTOR (P/N: 210-003-1001) AS LOAD TO GROUND.

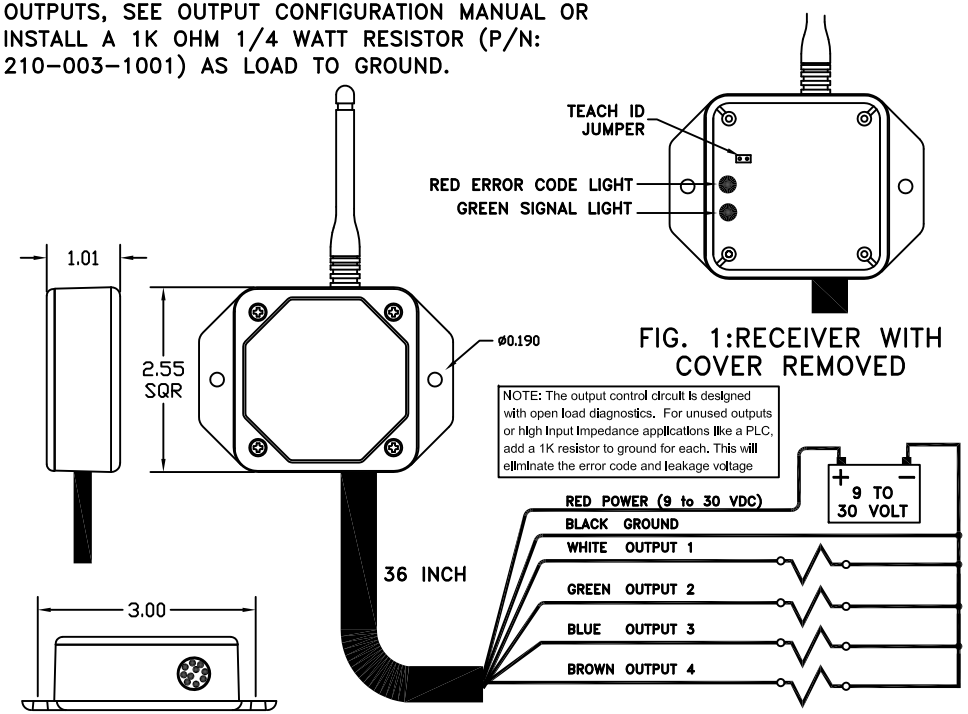
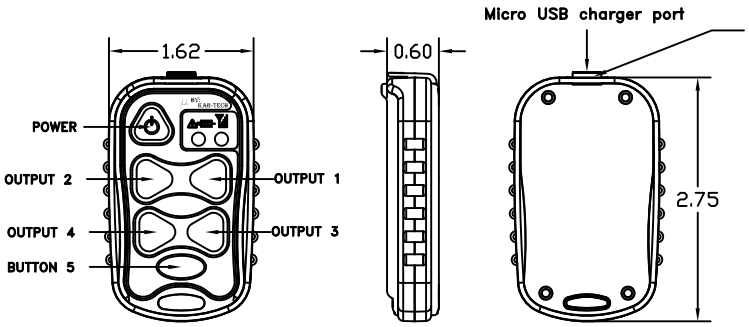


FIG. 1:RECEIVER WITH COVER REMOVED

P/N: 3A0914B
RECEIVER, 4 OUTPUT, PROGRAMMABLE



P/N: 3A2033B
TRANSMITTER, MICRO, 5 BUTTON

Only use approved chargers
MICRO WALL CHARGER/ 110-240VAC (B20172A)
MICRO CAR CHARGER/ 12-24VDC (B20173A)

OPERATION:
Press and hold the power button on the transmitter until both LEDs turn on, then release. The green LED will flash rapidly when communication has been established with the receiver. The LED flashes slowly if the receiver is off or there is no communication between the transmitter and receiver. Turn the receiver on and press the corresponding buttons on the transmitter keypad to turn on and off each of the outputs.

RECHARGING:
Plug the charging connector into the port at the top of the transmitter. Observe orientation and do not use force. A solid red LED indicates battery is charging. Once the internal battery is fully charged, the red LED will turn off and the green LED will turn on. A fully discharged unit will take up to 3 hours to recharge. Use only approved chargers.

INDICATOR LIGHTS:
The transmitter has two LED indicators, the red **BATTERY/DIAGNOSTIC** indicator and the green **TRANSMIT** indicator. The green **TRANSMIT** indicator flashes rapidly whenever there is communication between the transmitter and the receiver. The red **BATTERY/DIAGNOSTIC** indicator starts blinking once every second when the battery voltage is low and requires charging. It also blinks when there is a problem with the system in the form of an error code. Refer to the **ERROR CODE CHART** tables for more information.
Note: To check for low battery, turn the receiver off and leave the transmitter on. If the transmitter red LED continues to blink, the battery is low and requires charging. If the red LED blinks only when the receiver is on, count the number of blinks and refer to the ERROR CODE CHART tables for additional information.
Note: The red LED will stay on while charging and when the charge is completed the green LED will stay on.
Note: It will take longer to charge if the transmitter is on during charging.

TEACH ID CODE:
To synchronize a new transmitter and receiver together, refer to Fig. 1 and use the following procedure:
1. Remove receiver cover
2. Apply power to the receiver
3. Place a jumper across the TEACH ID jumper inside the receiver. Both green and red LEDs will toggle inside the receiver. Remove the jumper and store it on one pin
4. To get the transmitter into TEACH ID mode, press and hold the POWER button until both lights turns on, continue holding for 10 seconds until transmitter's green and red LEDs toggles.
5. Release the POWER button and wait for 1 second or until the green and red LEDs stop toggling and greenn light starts blinking rapidly.
6. Teach complete
7. Replace the cover on the receiver

OUTPUT CONFIGURATION PROGRAMMING:
The receiver is factory set to 4 momentary outputs. for output configuration, refer to Operation & Installation manual for instructions on programming receiver functionality

SPECIFICATIONS:
Electrical:
RF Transmit power (EIRP): 10 mW
RF Frequency: 902-928 MHz
Transmitter:
Power: Rechargeable 3.7V Lithium Polymer battery
Operation time with full charge: 30 to 40 hours continuous
Receiver:
Power: 9 to 30 Volts DC
Outputs: 5A max each (20A system max)
Environmental:
Transmitter: -20C to +60C
IP Rating: 66
Receiver: -40C to +85C
IP Rating: 69K
Vibration: 3G to 200Hz

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Changes or modifications not expressly approved by Kar-Tech will void the user's authority to operate the equipment.

KAR-TECH
Delafield, WI 53018

TITLE
SALES KIT, MICRO, PROGRAMMABLE, 4 FUNCTION

CAD DRAWING DO NOT REVISE MANUALLY

SCALE	DRAWN	DATE	CHECKED	APPROVED	DRAWING NO.
FULL	H.K.	03-30-11			3A-203-5-B-3 B

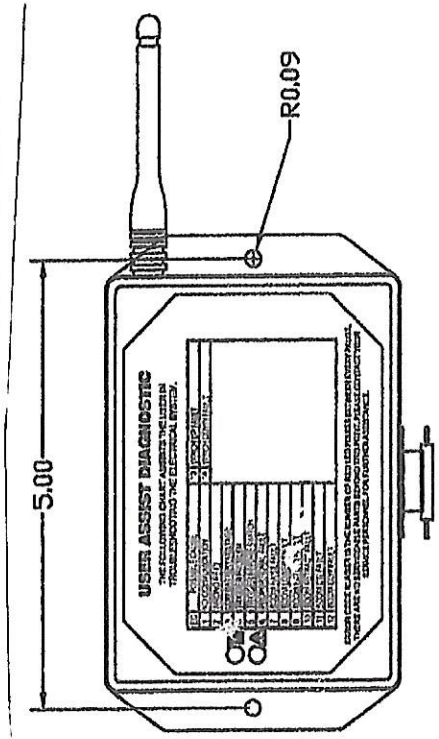
IMPLIED TOLERANCE	
XX	± .1
XXX	± .05
XXXX	± .005
FRACTIONAL	± 1/8
ANGULAR	± .5 deg

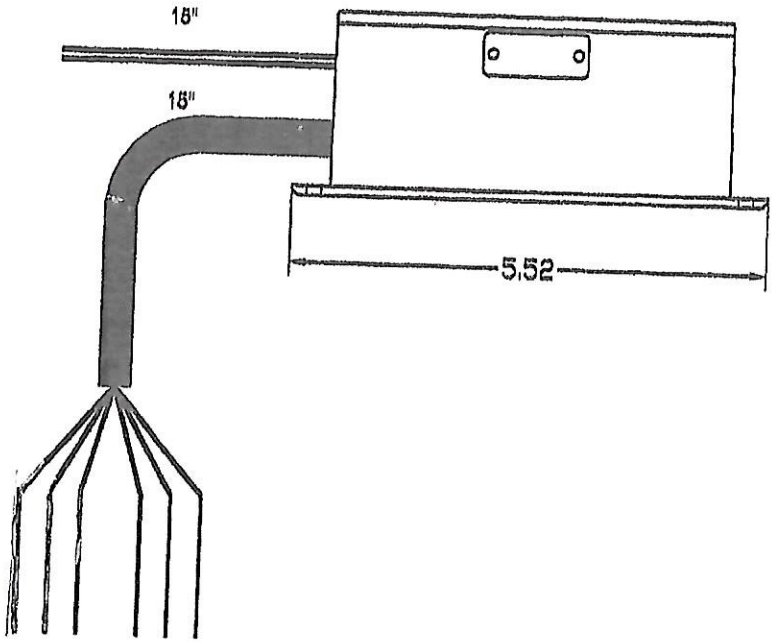
8GA WIRES

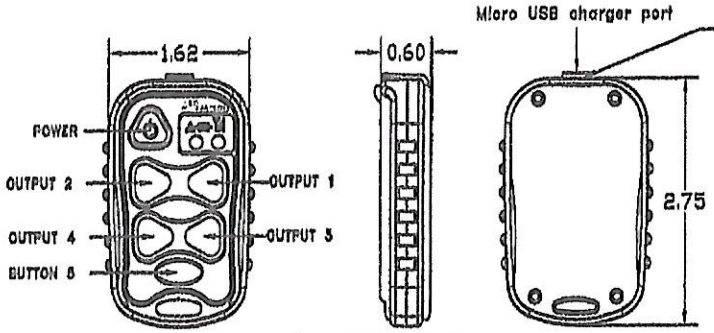
COLOR	DESCRIPTION
BLACK	MAGNET OUTPUT
RED	POWER 9-30V

18GA CABLE

COLOR	DESCRIPTION
BLACK	GROUND
BLUE	PUMP ON OUTPUT
ORANGE	DOWN CYLINDER OUTPUT
WHITE	CYLINDER UP INPUT
GREEN	CYLINDER DOWN INPUT
RED/BLACK	MAGNET ON INPUT







P/N: 3A2033B
TRANSMITTER, MICRO, 5 BUTTON

Only use approved chargers
MICRO WALL CHARGER/ 110-240VAC (B20172A)
MICRO CAR CHARGER/ 12-24VDC (B20173A)

OPERATION:
Press and hold the power button on the transmitter until both LEDs turn on, then release. The green LED will flash rapidly when communication has been established with the receiver. The LED flashes slowly if the receiver is off or there is no communication between the transmitter and receiver. Turn the receiver on and press the corresponding buttons on the transmitter keypad to turn on and off each of the outputs.

RECHARGING:
Plug the charging connector into the port at the top of the transmitter. Observe orientation and do not use force. A solid red LED indicates battery is charging. Once the internal battery is fully charged, the red LED will turn off and the green LED will turn on. A fully discharged unit will take up to 3 hours to recharge. Use only approved chargers.

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Note: To check for low battery, turn the receiver off and leave the transmitter on. If the transmitter red LED continues to blink, the battery is low and requires charging. If the red LED blinks only when the receiver is on, count the number of blinks and refer to the ERROR CODE CHART tables for additional information.

Note: The red LED will stay on while charging and when the charge is completed the green LED will stay on.

Note: It will take longer to charge if the transmitter is on during charging.

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To synchronize a new transmitter and receiver together, refer to Fig. 1 and use the following procedure:

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4. To get the transmitter into TEACH ID mode, press and hold the POWER button until both lights turns on, continue holding for 10 seconds until transmitter's green and red LEDs toggles.
5. Release the POWER button and wait for 1 second or until the green and red LEDs stop toggling and greenn light starts blinking rapidly.
6. Teach complete
7. Replace the cover on the receiver

OUTPUT CONFIGURATION PROGRAMMING:
The receiver is factory set to 4 momentary outputs. for output configuration, refer to Operation & Installation manual for instructions on programming receiver functionality

SPECIFICATIONS:
Electrical:
- RF Transmit power (EIRP): 10 mW
- RF Frequency: 902-928 MHz
- Transmitter:
  - Power: Rechargeable 3.7V Lithium Polymer battery
  - Operation time with full charge: 30 to 40 hours continuous
- Receiver:
  - Power: 9 to 30 Volts DC
  - Outputs: 5A max each (20A system max)

Environmental:
- Transmitter: -20C to +60C
  - IP Rating: 66
- Receiver: -40C to +85C
  - IP Rating: 69K
- Vibration: 3G to 200Hz

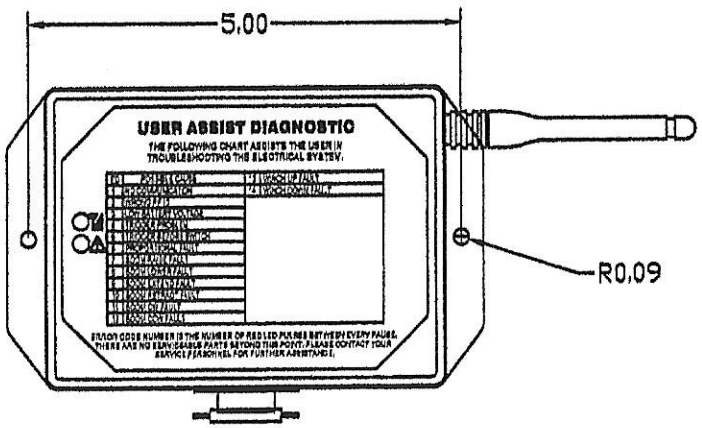
REF: ROCK HILLS

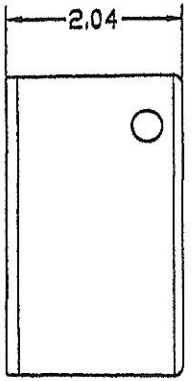
KAR-TECH Delafield, WI 53018					UNLESS OTHERWISE SPECIFIED: XX ± .1, XXX ± .05, XXXX ± .005, FRACTIONAL ± 1/8, ANGULAR ± .5 deg
TITLE: RECEIVER, VC 134, 30UT 3IN					
CAD DRAWING DO NOT REVISE MANUALLY					
SIZE: FULL	DWG NO: 3J	DATE: 04-19-16		APPROVED	DRAWING NO: 3A-107-9-A-2 C

TEACH ID CODE:

To synchronize a new transmitter and receiver together, use the following procedures:

1. Turn off both transmitter and receiver
2. To get the transmitter into TEACH ID mode, Press and hold the power button for 10 seconds. At this point, both lights will toggle on the transmitter
3. Release the POWER button and turn on the receiver
4. Green LED will blink on the receiver
5. Teach Complete



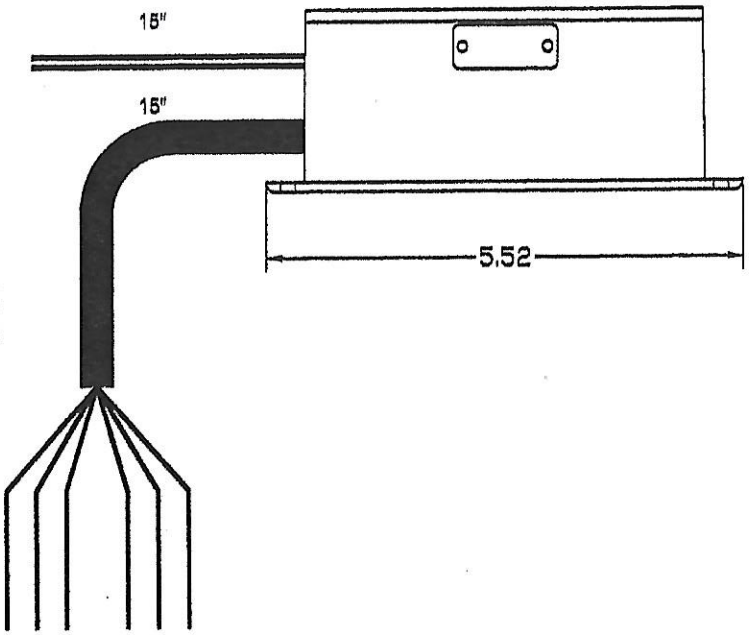


6GA WIRES

COLOR	DESCRIPTION
BLACK	MAGNET OUTPUT
RED	POWER 9-30V

18GA CABLE

COLOR	DESCRIPTION
BLACK	GROUND
BLUE	PUMP ON OUTPUT
ORANGE	DOWN CYLINDER OUTPUT
WHITE	CYLINDER UP INPUT
GREEN	CYLINDER DOWN INPUT
RED/BLACK	MAGNET ON INPUT



CUSTOMER APPROVAL

☐ YES
☐ NO (INDICATE CHANGES OR EXPLAIN)

APPROVED BY_____

DATE_____

PLEASE FAX TO (262)-646-9445

OR E-MAIL TO sales@kar-tech.com

IMPORTANT!

PLEASE INDICATE SYSTEM VOLTAGE
☐ 12V
☐ 24V

FOR PROPORTIONAL SYSTEMS PLEASE PROVIDE THE VALVE SPECIFICATIONS BELOW:

_____MIN
_____MAX
_____FREQUENCY
_____COIL RESISTANCE

☐ CURRENT-REGULATED
☐ VOLTAGE-REGULATED
☐ APITECH
☐ J1939 CAN

FINAL PINOUT OF RECEIVER OR CONTROL UNIT IS SUBJECT TO CHANGE

REF: ROCK HILLS

KAR-TECH
Delafield, WI 53018

RECEIVER, VC 134, 3OUT 3IN

CAD DRAWING DO NOT REVISE MANUALLY

SIZE	SCALE	DATE	DRAWN	APPVD	DRAWING NO.
FULL	NJ	04-19-16			3A-107-9-A-2

Rock Mills Enterprises

Camera / Monitor

Installation and Operations Instructions

Models included:

Camera:	eCAMRVC-16
Monitor:	eCAM7001

Mount camera on bracket located above the Lifter's cylinder – screws enclosed

Monitor may be mounted on vehicles dash or console

Wiring Connection Diagram is enclosed. This application will require only two wires. RED is power and BLACK is ground. Disregard other wires. 2 – 5/16 eyelets are enclosed and will be soldered to wires after determining appropriate length while connecting to appropriate source

Monitor cable will pass through vehicle's fire wall

Zip tie loose cables when installation is completed

Need support call Rearview (423-836-3179)
Email: kkrearviewsystems@tds.net

W A R N I N G

Monitor must be "powered off' at the end of each day. Failure to do so will draw down battery charge.

---

eCAM

HIGH PERFORMANCE / DEPENDABLE / DURABLE

eCAM7001K

2 YEAR WARRANTY

Monitor

Screen size: 7 Inch Digital LCD
Aspect Ratio: 16:9
Camera Inputs: 2
System: NTSC and PAL (Automatic Detection)
Resolution: 800 x R.G. B. x 480
Brightness 430cd/n2
Power Supply: 12-24V DC
Built-In Speaker
Heavy-duty Reverse Trigger
On Screen Display Menu
Adjustable: Contrast, Brightness and Color
Operating Temp: -4F to +158F

Camera

Image Sensor: Color
TV System: NTSC
IP Rating: IP68
Vibration Rating: 10G
Infra-Red Night Vision: 50 ft
Resolution: Super Sharp 700HD TV Lines
Power Consumption: DC 12V (+/- 10%)
Operation Temperature: -30F to +158F
Lens Angle (Deg.) 120 Degrees
Built-In Heater

Kit includes eCAM7001 Monitor, eCAMRVC-16 Camera, 66ft Camera Cable and installation hardware.

eCAM

HIGH PERFORMANCE / DEPENDABLE / DURABLE

eCAM7001K

2 YEAR WARRANTY

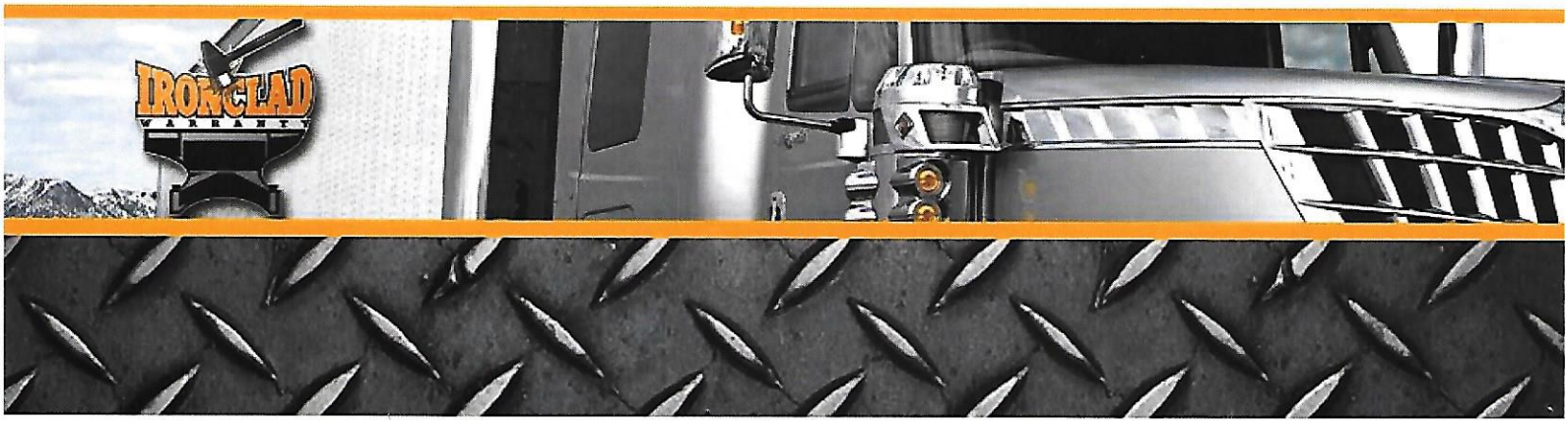
Monitor

Screen size: 7 Inch Digital LCD
Aspect Ratio:16:9
Camera Inputs: 2
System: NTSC and PAL (Automatic Detection)
Resolution: 800 x R.G.B. x 480
Brightness: 430cd/n2
Power Supply: 12-24V DC
Built-in Speaker
Heavy duty Reverse Trigger
On Screen Display Menu
Adjustable: Contrast, Brightness and Color
Operating Temp: -4F to +185F

Camera (Standard Built-in Heater)

Image Sensor: Color
TV System: NTSC
Waterproof: IP68
Vibration Rating: 10G
Infra-Red Night Vision: 50ft
Resolution:700 TV Lines
Power Consumption: DCV (9+/- 10%)
Operation Temperature: -4 to +158F
Lens Angle (Deg.) 120 Degrees

Kit includes: eCAM7001 Monitor eCAMRVC-16 Camera, 66ft Camera Cable and installation hardware.



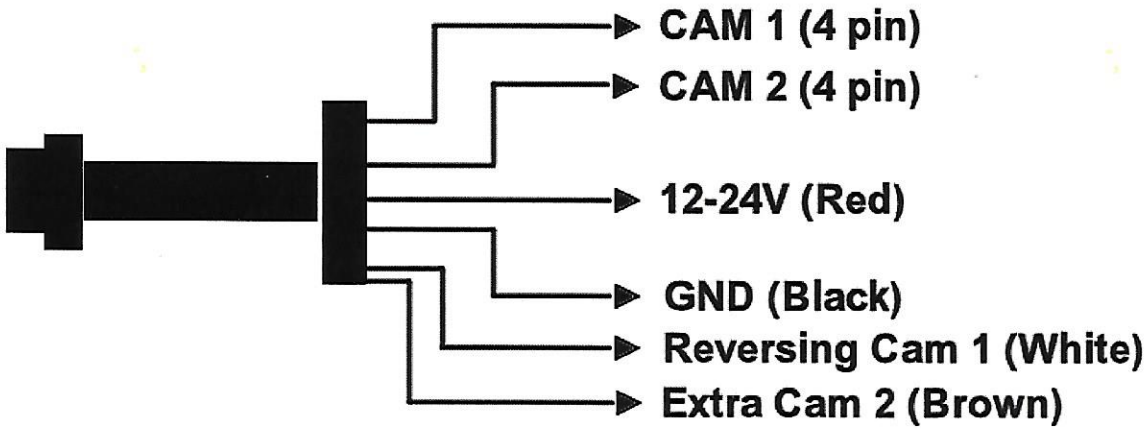
eCAM

HIGH PERFORMANCE / DEPENDABLE / DURABLE

Button Menu

1. Dimmer
2. Camera
3. Mirror/Normal
4. Day/Night
5. Power
6. Menu
7. Down
8. Up
9. Infra-Red Remote

Connection Diagram:

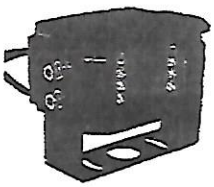


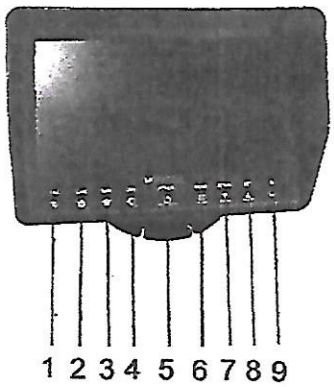
Installation suggestions:

Monitor should not be located in direct sunlight.

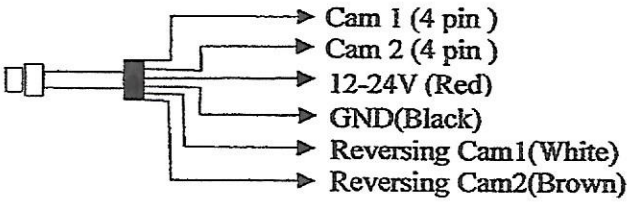
The white wire should be connected to 12V power source that is hot only when vehicle is placed in reverse. (Note: Do not connect to the Red wire as this will cause monitor to stay on all the time.) When the white wire receives power it will automaticlly turn on rear camera and monitor.

Please be sure all connections are tight to avoid moisture and corrosion of connectors. Shrink wrap if possible.





Connection Diagram:



Button Menu

1. Dimmer
2. Camera
3. Mirror/Normal
4. Day/Night
5. Power
6. Menu
7. Down
8. Up
9. IR Remote

Monitor Specification:

. Screen size: 7 inch new TFT panel
. Aspect Ratio: 16:9 image
. Input: 2-way video input with 2 reversing cable
. System: PAL and NTSC auto switching
. Resolution: 800 x R.G.B x480
. Brightness: 430cd/m2
. Power supply: 12-24V DC
. Built-in speaker
. Operation Temperature: -20℃~+70℃.RH95% Max
. Storage Temperature: -30℃~+80℃.RH95% Max

Cable Specification:

. 4P lock connector cable

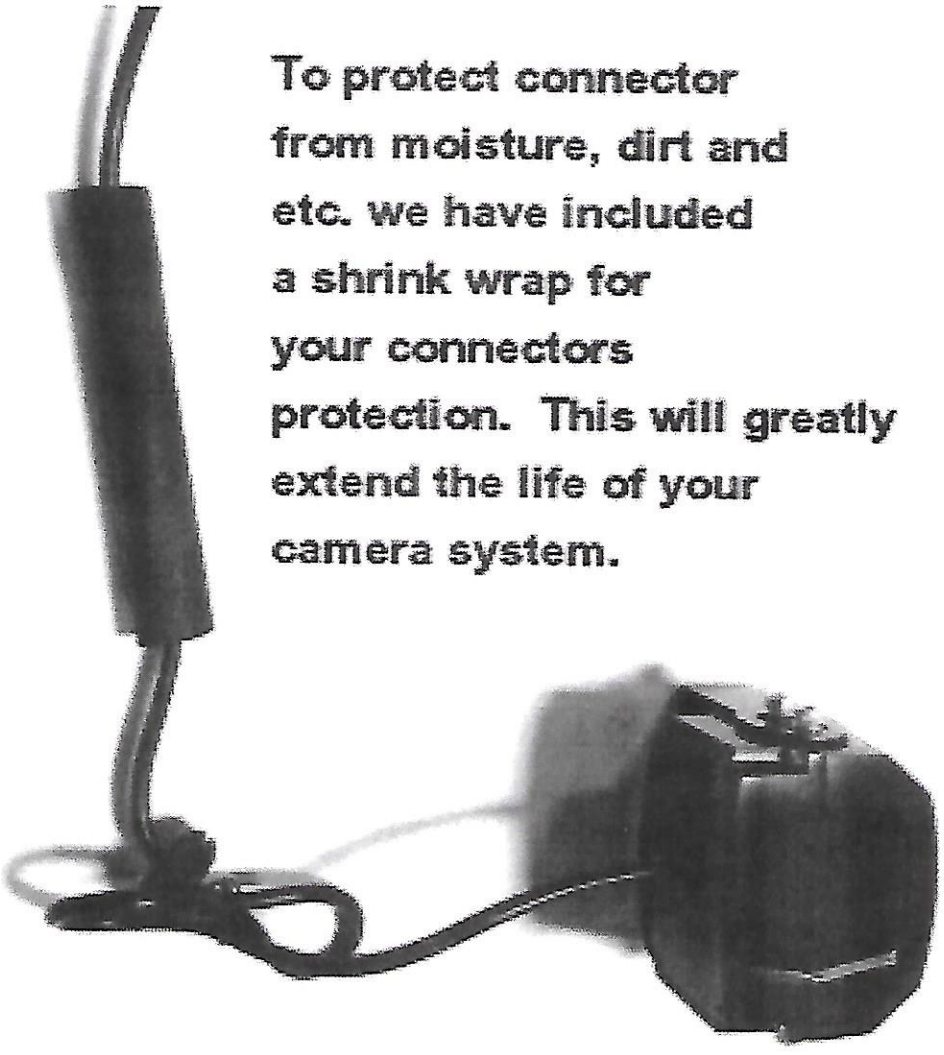
Accessories:

. 1pc Heat-shrink tube for camera connector

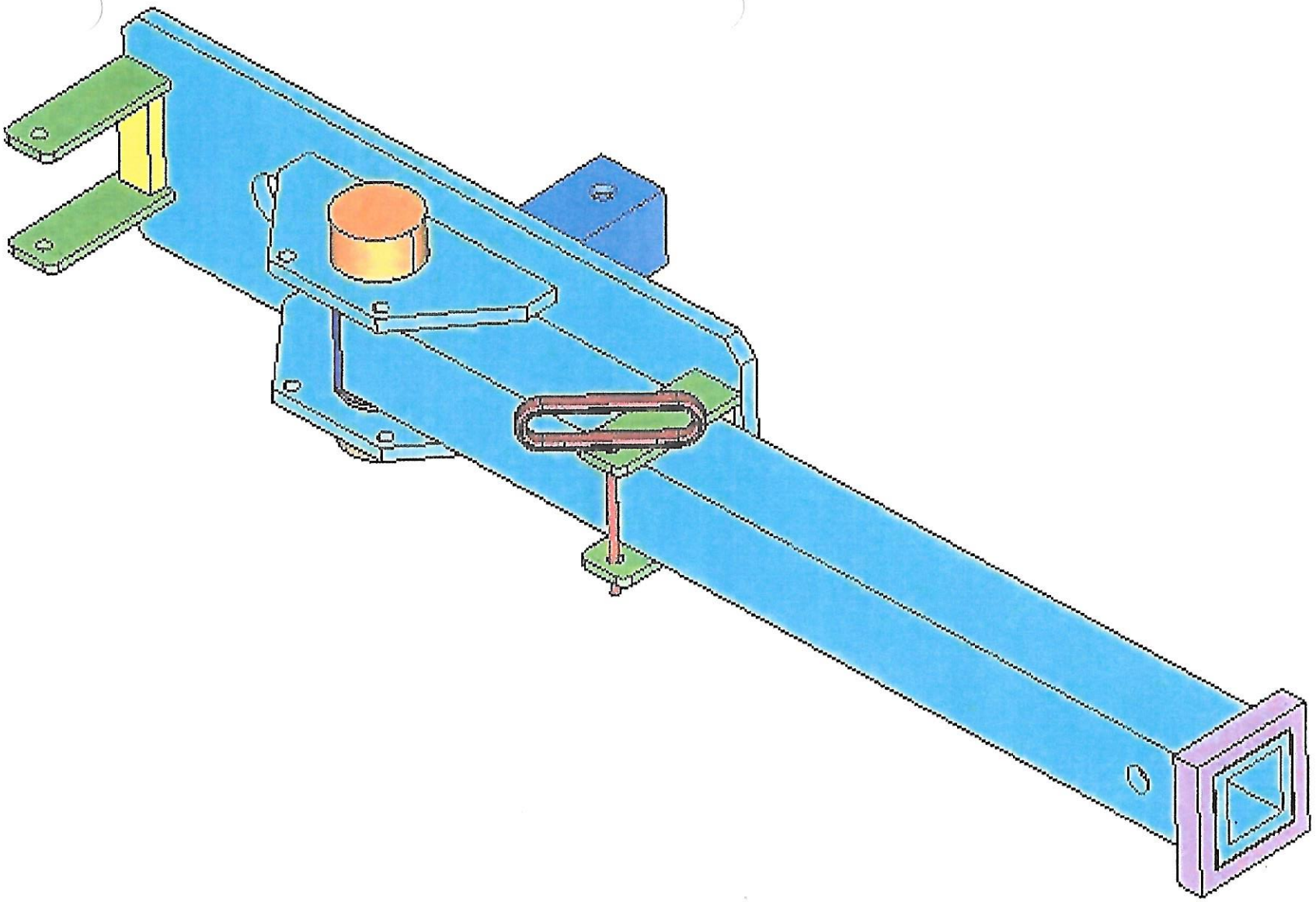
Camera Specification:

. Image Sensor : 1/3" CMOS
. TV System: NTSC/PAL
. IP Rating: IP 68
. Vibration Rate: 10G
. Night Vision function: available
. Audio function: available
. Effective Pixels: N: 510(H)×492(H) pixels
P: 500(H)×582(V) pixels
. Horizontal Resolution: 700 TV Line
. Video Output: 1.0vp-p, 75Ohm,
. Minimum Illumination: 0.1LUX/F1.2
. Built-in Lens: f: 2.8mm
. Power Consumption: DC 12V (+/-10%)
. Lens Angle (Deg.): 120°
. Operation Temperature: -20℃~+70℃.RH95% Max
. Storage Temperature: -30℃~+80℃.RH95% Max
. With heater

Slightly
snug connector
to compress
gasket.



To protect connector
from moisture, dirt and
etc. we have included
a shrink wrap for
your connectors
protection. This will greatly
extend the life of your
camera system.



SWING ARM ATTACHMENT

ROCK MILLS
ENTERPRISES
1007 20th Avenue
Rock Valley, IA 51247
712-451-6550 – www.rockmillsent.com

Swing Arm Attachment

Installation:

The Swing Arm can be installed wherever the 2" receiver is mounted and space provided.

1. Slide the Lifter into the Swing Arm's extended 2" receiver, pin or bolt into place.
2. Follow the wiring instructions provided with The Lifter.
3. Orange handle ball pins are provided to lock in closed position or in 90 degree position for operation.
4. Wrap the rope handle around The Lifter frame, running one end through the loop and drawing snug. Use the loop on the other end as a handle.
5. Test all functions...make adjustments as needed.

Operation:

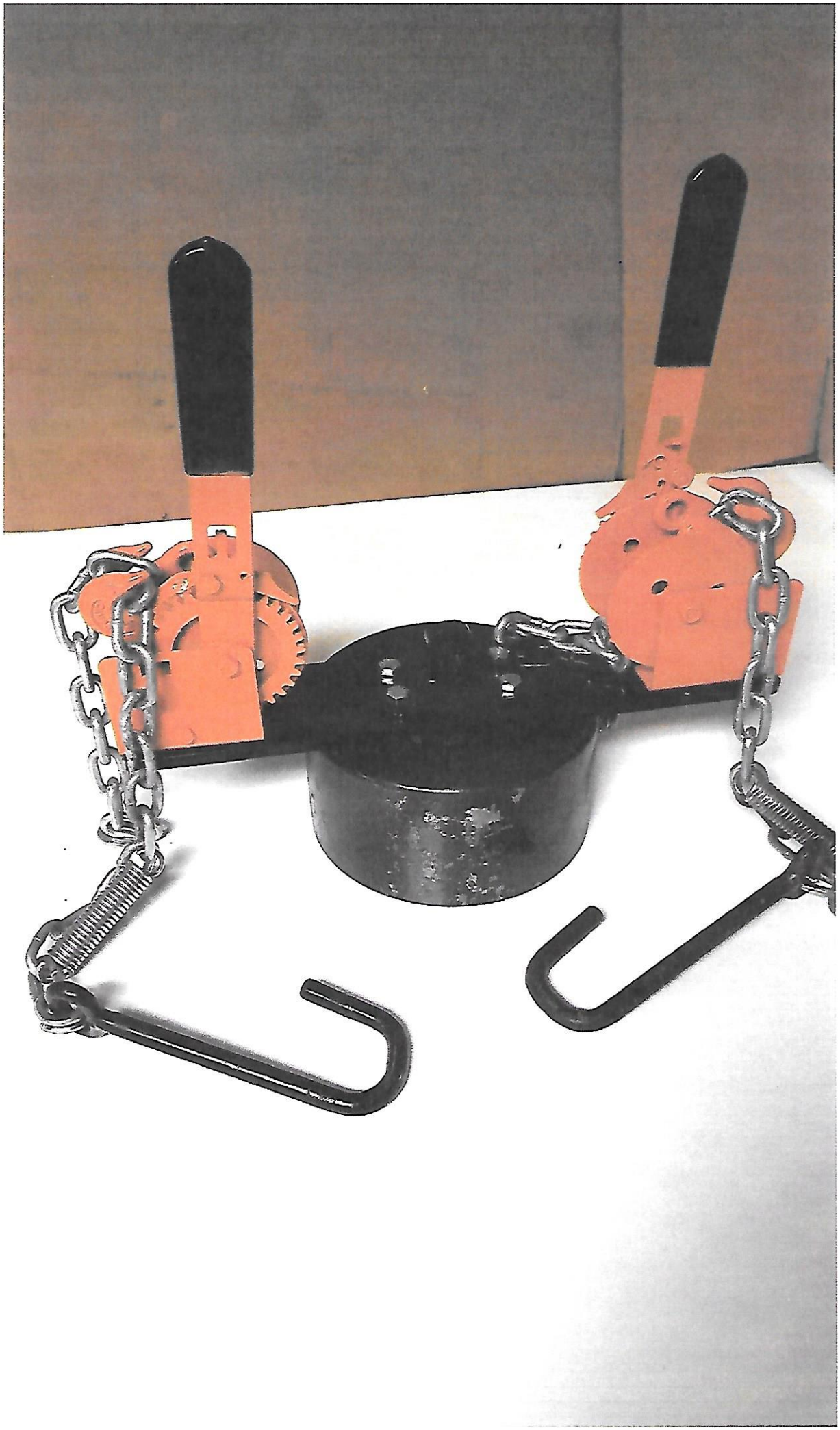
1. Remove the pin that holds the Swing Arm next to the vehicle.
2. Swing The Lifter out in position over the cover or grate (rope handle is to move the Swing Arm while keeping feet clear).
3. Lower the magnet, energize and lift cover just high enough to clear the casting and street.
4. Swing out of the way and lower the cover or grate.
5. When your work is done, lift the cover or grate and swing back into position and lower.
6. Lock the Swing Arm back into place with the pin to the vehicle before moving the vehicle.

Safety and Maintenance:

1. Keep hands and feet clear while in operation.
2. Grease fittings as needed (The Swing Arm will be greased at factory).

Tips:

1. If the vehicle was not moved, the cover or grate should swing right back into position.
2. When lowering the cover or grate, you can us a hook or your foot to guide, but be sure to keep your feet from under the cover or grate.
3. Be careful not to jar the cover or grate loose from the magnet when moving to position.



ROCK MILLS
ENTERPRISES
1007 20th Avenue
Rock Valley, IA 51247
712-451-6550 – www.rockmillsent.com

Grate Attachment

Installation:

1. Lower the magnet to surface level.
2. Remove the 4 bolts attaching the magnet to the cylinder.
3. Slide the Grate Attachment (handle facing forward) between cylinder and magnet matching the 4 bolt footprint.

Operation:

1. Approach the grate you desire to pull with "The Lifter" stopping at the center of the grate.
2. Lower the magnet to the grate.
3. Release the manual handle by pulling the spring loaded pin and move the handle as far to the right as possible.
4. Install the hooks on both side of the grate then bring the tail end of the chain and drape them into the slots.
5. Activate the magnet and proceed to pull the grate up.
6. Once the grate has cleared the surface, move the grate away from the opening – lower it to the surface and deactivate the magnet while preforming desired tasks.
7. To replace grate, activate the magnet and move it over the opening again. Lower the grate with "The Lifter" (deactivated) into the desired space. Remove the chains and keep them and the hooks inside the vehicle.
8. Congratulations – mission accomplished.

Comment: The purpose of the grate attachment is not to lift the grate. It is to provide stability, control and safety. Grates have less metal adhesion area for the magnet, hence; requiring extra precautions especially on uneven surfaces.

WARRANTY

Rock Mills Enterprises warrants to the initial purchaser of a new Lifter and Accessories, direct or from an authorized Lifter dealer, that the product and components thereof manufactured by Rock Mills Enterprises, are free from defects in material and workmanship at time of shipment. Rock Mills Enterprises further warrants to such purchaser that each new Lifter will perform properly without structural or operational failure if the product is assembled and mounted in accordance with The Lifter instruction and drawing and is maintained as described in the Owner's Manual.

WARRANTY PERIOD

The above warranty shall be effective for a period of one year on workmanship and materials from the date of delivery by The Lifter dealer to the initial purchaser.

PURCHASER'S REMEDIES

If a warranted Lifter component fails to conform to the above warranty during the one year warranty period, Rock Mills Enterprises will furnish the parts necessary to correct such failure, provided that Rock Mills Enterprises is notified, directly or through the selling representative, within 30 days of the discovery of the failure. All warranty submissions must include the original part in question, along with a properly filled out claim sheet, before a warranty award will be made. Rock Mills Enterprises will pay the common carrier freight expense of parts to and from the owner. Faster freight service is available, with the owner paying the difference in cost between common carrier and preferred method by owner. Freight of whole goods to or from Rock Mills Enterprises is at the owner's expense, regardless if they fall under the warranty or not. All warranty decisions will be final!

EXCLUSIONS

This warranty shall not apply to component parts or accessories of products not manufactured by Rock Mills Enterprises and which carry the warranty of the manufacturer thereof. Items of high wear and regular maintenance shall not be covered under this warranty. This warranty shall be void if any part or parts not manufactured by Rock Mills Enterprises are used either in maintaining or servicing of the products covered by this warranty. No warranty whatsoever is made on used secondhand, altered, or rebuilt machinery.

THE OWNERS WARRANTY REGISTRATION MUST BE RECEIVED BY ROCK MILLS ENTERPRISES OR AN AUTHORIZED ROCK MILLS ENTERPRISES DEALER WITHIN 30 DAY OF DELIVERY OR ALL WARRANTY IS NULL AND VOID.

THIS WARRANTY IS EXTENDED TO THE INITIAL PURCHASER MAY NOT BE REASSIGNED. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FOR A PARTICULAR PURPOSE AND ROCK MILLS ENTERPRISES NEITHER ASSUMES OR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE THEROF.

We reserve the right to make improvements to any of our products without notice of obligation regarding models previously sold.