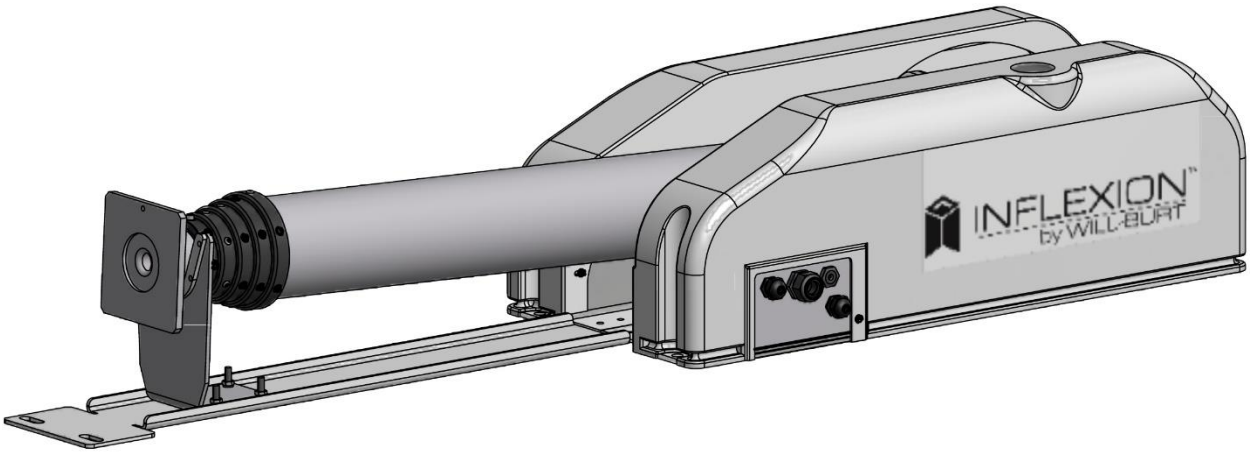
WILL-BURT

INFLEXION™

INFLEXION™ OPERATOR'S MANUAL



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Original Instructions

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INNOVATION ELEVATED®

Warranty

Will-Burt warrants its Inflexion™ masts to be free from defects in material and workmanship for a period of two (2) years, with such time period running from the date of shipment by Will-Burt. Will-Burt shall not be responsible for any damage resulting to or caused by its products by reason of failure to properly install, maintain or store the product; use of the product in a manner inconsistent with its design; unauthorized service, alteration of products, neglect, abuse, accident, or acts of God. This warranty does not extend to any component parts not manufactured by Will-Burt; provided, however, Will-Burt's warranty herein shall not limit any warranties by manufacturers of component parts which extend to the buyer.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, AND NO REPRESENTATIONS, GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, A WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT ARE MADE BY WILL-BURT IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY ON BEHALF OF WILL-BURT.

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THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF WILL-BURT WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR OTHERWISE, SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION, ANY PRODUCT OR PART FOUND BY WILL-BURT TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. WILL-BURT SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL, OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

Document History

Document Numbers	Dates	Remarks
TP-4976401-00	November 12, 2013	Initial Release
TP-4976401-A	December 3, 2013	Updated warranty page
TP-4976401-B	January 6, 2014	Clarify power requirements (section 1.6), emergency stow procedure (section 3.2)
TP-4976401-C	October 1, 2018	Updated the Cover Image and Figure 1-1
TP-4976401-D	January 26, 2022	Updated General Mast Operation info
TP-4976401-E	December 15, 2022	Updated entire manual to current WB format and updated info.
TP-4976401-F	September 10, 2024	Added 1.0 model info.
TP-4976401-07	September 19, 2024	Added 1.8 model info.
TP-4976401-08	October 10, 2024	Updated HHRC Installation Info

Table of Contents

Table of Figures

Table of Tables

Section 1 Safety Summary

This section describes safety instructions for the Inflexion™ that personnel must understand and apply throughout all product activities such as transportation, handling, installation, operation, maintenance, storage, disposal and troubleshooting. Read and understand this entire document, and contact The Will-Burt Company with any questions, before performing any procedure outlined in this document. Keep this document during the entire duration of use of the device. Pass this document along to trained and qualified end users.

1.1 Signal Word Definitions

⚠ DANGER

DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or equipment damage. It is also used to alert against unsafe practices.

1.2 Safety Instructions

⚠ DANGER

Electrocution Hazard! Contact with high voltage will result in death or serious injury. Observe general safety precautions for handling equipment using high voltage. Do not locate or operate mast near electrical lines, cables or other unwanted sources of electricity. Allow sufficient clearance on all sides of mast to allow for side sway. Do not operate mast during an electrical storm. Be certain electrical cables are undamaged and properly terminated. Do not touch live wires. Follow OSHA or other national safety regulations when working near energized power lines. Personnel working with or near high voltages should be familiar with methods of resuscitation.

⚠ DANGER

Disconnect Power for Service! Always disconnect all power sources following proper lock-out tag-out procedures before performing service, repair or test operations. Remove the tethered hand-held control where applicable for added protection during maintenance.

⚠ DANGER

Mast Tip Over Hazard! Mast tip over could result in death or serious injury. Before operation, be certain mounting structure is capable of resisting forces generated from all loading and environmental conditions, including, but not limited to, mast size and weight, payload and cable size and weight, payload sail area, wind speed, guy line arrangement, support bracket or roof line location, and base plate assembly. Do not operate in wind speed conditions exceeding the maximum rated wind speed. Do not operate on slopes exceeding the maximum deployment angle. Do not install a payload that exceeds the maximum payload lifting capacity of mast. Do not install a payload with the center of gravity offset from mast centerline exceeding the maximum allowed offset. Stand clear of mast and mast payload during operation. Be certain mast is level and secure before and during installation, operation, and maintenance.

⚠ DANGER

Falling Objects from Mast Hazard! Wear a protective hard hat when working on mast or situated near mast operating area while mast is extending, retracting or deployed in any position above the nested position. Improperly secured payload or mast components, ice formations, etc. could be dislodged from mast and fall. Be sure the payload is properly installed and secured.

⚠ DANGER

Relocation/Driving Hazard! Do not relocate the system during operation or while mast is extended to any height above the nested position or powered up. Do not move vehicle until mast has been securely nested and isolated from power. Power-up and operate mast only if the vehicle is stationary and securely parked with the parking brake properly applied. Do not put mast in service or operate without the vehicle interlock warning circuit or magnetic warning kit installed to provide confirmation mast is nested prior to moving the vehicle. Contact The Will-Burt Company Engineering for special on-the-move situations for military only use on specialized products.

⚠ DANGER

Burst Hazard! For pneumatically operated masts, do not operate without the over-pressure safety valve installed. Keep personnel clear of safety valve exhaust direction. Do not exceed the maximum rated pressure of mast. If the mast air pressure is not fully discharged prior to removing air hoses, a rapid release of air pressure will occur requiring hearing and eye protection.

⚠ WARNING

Payload Lifting Hazard - Intended Use! The mast is intended to lift a specific payload for lighting, surveillance or communication use only. Any other use without written consent is prohibited and could cause death or serious injury. Do not use mast to lift personnel. Do not exceed specified payload capacity. Large payload wind sail areas can reduce payload capacity. Consult The Will-Burt Company engineering.

⚠ WARNING

Read Operating Instructions! Read and observe the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed in the instructions, wrong installation or incorrect handling can seriously affect the safety of operators and machinery. Adhere to the safety instructions when carrying out any activity relating to the mast system.

⚠ WARNING

Trained Personnel Only! This product is intended for use by trained professionals only. It is not intended for general use by the public or untrained personnel. Handling, installation, operation and maintenance to be performed by trained and authorized personnel only. Only a properly trained and qualified certified electrician should perform electric installations and service.

⚠ WARNING

Erratic Mast Operation Impact Hazard! The mast should operate smoothly during extension and retraction. If erratic mast motion is observed during extension or retraction that results in impact loading between the tube and the tube collar (mechanical travel stop), cease use of the mast and contact The Will-Burt Company service department. Repeated operation with impact loading can damage tubes and lead to mast separation.

⚠ WARNING

Over-current Protection! Over-current protection or power switching by the installer on mast incoming power supply as specified in this document should be a type suitable to allow lock-out tag-out procedures for power disconnect.

⚠ WARNING

Safety Instruction - Explosion! For outdoor use only. Do not use in explosive areas or areas that have been classified as hazardous as defined in Article 500 of the National Electric Code or equivalent national standards. Do not use in the presence of flammable gases or liquids such as paint, gasoline or solvents. Do not use in areas of limited ventilation or where high ambient temperatures are present.

⚠ WARNING

Safety Equipment (PPE)! Proper personal protective equipment (PPE) like hard hats, gloves, and safety shoes shall be properly worn while working on mast or near the deployment area of mast. In addition, eye protection shall be worn during maintenance procedures. Follow national PPE guidelines in your area of operation.

⚠ WARNING

Pinch Point Hazard! Keep clear of moving parts like mast collars nesting. Be sure to stay clear of system during operation. Moving parts can crush and cut resulting in serious injury. The mast shall be mounted out of reach of the operator during operation.

⚠ WARNING

Crush Hazard – Mast Failure! Do not stand directly beneath mast or its payload. Be certain the payload is properly installed and secured.

⚠ WARNING

Entanglement Hazard! Tangled cables can cause equipment damage. Ensure payload cables, Nycoil®, trip lines, guy lines or other cables are not tangled and are free to pay out as mast is deployed. Cables that get tangled or snagged on mast or other objects can cause mast tubes to lurch upward suddenly when the cable is freed. This can cause damage to mast and lead to mast separation if repeatedly allowed to continue.

⚠ WARNING

Health and Safety Hazard while Cleaning! Solvent used to clean parts is potentially dangerous. Avoid inhalation of fumes and prolonged contact to skin.

⚠ WARNING

Fire Hazard Solvent! Cleaning solvent, used for maintenance, is flammable and can be explosive. Do not smoke near solvent. Use cleaning solvent in a well-ventilated area. Keep cleaning solvent away from ignition sources. Always store cleaning solvent in the proper marked container and in a proper location.

⚠ WARNING

Bright Light Radiation Hazard! For systems equipped with scene lighting or look-up lights, do not look directly into lights when they are illuminated. Temporary impairment or permanent vision damage could occur.

⚠ WARNING

Personnel Freezing/Burn Hazard! Make sure the lights are completely cool before attempting to clean the lens, replace bulbs or perform maintenance. Wear gloves to protect from contact with exposed metal that may be at extremes of hot and cold temperatures from sun or cold outdoor exposure.

⚠ WARNING

Extension Hazard - Obstruction! Extending mast into obstructions could result in death or serious injury and could render mast inoperable and partially extended. Before applying power and operating mast, be certain there is sufficient clearance above and to all sides of the expected location of the fully extended mast and payload. Keep all persons clear of mast and mast extension. Do not lean directly over mast. Locate the operator station such that the operator has a clear view of the operating space of mast and payload prior to deployment to avoid contact with overhead objects.

⚠ WARNING

Manual Retraction! For powered masts, make sure all power sources have been disconnected from the system prior to manually lowering mast to avoid unexpected start-up motion and/or damage to mast.

⚠ WARNING

Mast Lifting/Handling! Use extreme caution while lifting mast System and when mast System is suspended to avoid injury and equipment damage. Be certain mast is properly secured using at least two sling points at the center of gravity label. All operators should be aware of and follow the applicable local, regional, and national standards and codes of practice for slinging and transporting equipment. Never lift Mast System over people. Ensure lifting equipment including, but not limited to, lifting straps and hoist, are capable of handling the forces generated from lifting the system. Observe manufacturer instructions on lifting equipment.

⚠ WARNING

Remove Payload! For mast systems shipped with no payload (customer installed payloads), remove payload before performing maintenance on mast system. The Will-Burt Company installed devices can remain installed.

⚠ WARNING

Equipment Damage - Submerged! Do not submerge mast in liquid or operate the vehicle in a fording situation that would result in a submerged mast.

⚠ WARNING

Safety Instruction - Potential Air Contaminants! If internally mounted in a vehicle, air from mast and any accumulated water will discharge into the vehicle. Install appropriate drainage and venting.

⚠ WARNING

Fastener Vibration Hazard! Mast system and payload mounting hardware must include proper means to resist vibration loosening such as thread-locking compound, locking hardware, or equivalent. Use specified assembly torques appropriate for the fastener size.

⚠ CAUTION

Frozen Water Hazard! Water freezing inside mast may render mast inoperable and cause major equipment damage such as tube deformation. Ensure water is free to exit at the base of mast.

⚠ CAUTION

Safety Instruction - Guy Anchors! For masts using Guy Lines, verify the Guy Anchor point strength is adequate to support the Guy Line forces.

⚠ CAUTION

Lubrication! Do not lubricate the exterior of mast moving tubes. The lubricant will attract dust and other environmental contaminants into mast.

⚠ CAUTION

Equipment Damage - Forces! Before unloading the system, be certain the unloading region is capable of resisting forces generated from unloading the system including but not limited to system weight. Ensure the unloading region is level and has sufficient room and strength to hold the system. If the unloading region is incapable of meeting the requirements of the system, damage to the system and/or unloading region could occur.

⚠ CAUTION

Equipment Damage - Support Bracket! For masts using an upper support bracket, do not over-tighten mast support bracket. Over-tightening may damage the Base Tube causing mast tubes to stick.

⚠ CAUTION

Mast and Payload Access! The operator must provide safe means to access mast and payload during installation, removal and maintenance.

⚠ CAUTION

Tripping Hazard! Cables, trip lines, guy lines and guy anchors can be hard to see during and after installation. Any equipment posing trip hazards should be clearly marked.

⚠ CAUTION

Equipment Damage – Deviation! Deviation from standard operating conditions and procedures could cause system failure.

⚠ WARNING

Lifting Hazard! Manually lifting over 55 lb. (25 kg) is prohibited. In the UK, all lifting equipment must be thoroughly examined annually by a competent person according to the Lifting Operations and Lift Equipment Regulations 1998. Equivalent regulations exist in other EU states.

⚠ WARNING

Safety Instruction – Roof Access! If the mast will be mounted to a vehicle, the operator must provide a safe means to access the roof of the vehicle during installation.

⚠ WARNING

Safety Instruction – Remote Control! The equipment is subject to remote control and may be operated at any time. Persons working on the equipment should take appropriate precautions to ensure that any unexpected movement does not occur as this could lead to injury.

⚠ WARNING

Safety Instruction – Lightning! Lightning protection is not part of this system. A proper means of electrical grounding should be provided. Failure to observe this warning could result in death or serious injury.

⚠ WARNING

Safety Instruction – Operation! At all times prior to mast operation, ensure that transit tie-downs on the payload have been removed. During use, ensure that the operator has full view of the mast.

⚠ CAUTION

Safety Instruction – Operation! Lamps are extremely hot and should not come into contact with people or combustible and/or explosive materials. Do not operate if breakage occurs or unit is knocked over.

1.3 Symbols

The following are symbols that are used with the system and their meaning. Contact The Will-Burt Company with any questions before performing any procedure outlined in this manual.

This symbol indicates an electrocution hazard or hazardous voltage hazard. There is DC voltage present inside the mast and control box. Do not operate mast near electrical lines or during lightning events. Contact with high voltage will result in death or serious injury.

This symbol indicates a pinch point hazard. Keep fingers and hands clear of moving parts.

This symbol indicates a tip-over hazard. The mast must be properly supported during transport, installation, maintenance and operation. System tip-over could result in death or serious injury.

This symbol indicates a general warning. In this unit, this symbol indicates a frozen water hazard. Do not block the mast drain port at the base of the unit. Water must be permitted to exit the mast to avoid ice damage to the mast.

This symbol is used to remind users to read and understand the operator's manual before operating the Mast System. Failure to follow operating instructions could result in death or serious injury. Read and understand operator's manual before operating or installing the mast system.

This symbol indicates a hard hat is required when working under the mast operating area. Failure to wear a hard hat could result in death or serious injury.

This symbol indicates an electrical ground connection point.

This symbol is used to indicate the center of gravity (COG) of a fully nested mast.

Section 2 Introduction

This manual describes installation, operation, maintenance and troubleshooting procedures for the Inflexion™ masts. These procedures assume the use of standard catalog mast systems. Procedures and characteristics for systems customized to meet customer-specific needs may vary.

Review this manual in its entirety. Contact The Will-Burt Company with any questions before performing any procedure outlined in this manual. The views depicted in this manual are provided for clarification and are subject to change without notice. Views are not to scale.

The Inflexion™ mast:

- Is a transportable platform elevation system which serves as a platform for communications antennae, camera, and other payloads.
- The unit is designed for installation on any vehicle for the purpose of providing temporary communications, or surveillance. See Section 2.5 for identification of the major components of the Inflexion™ mast.

The following models are covered in these operating instructions:

- Inflexion™ 1.0
- Inflexion™ 1.8
- Inflexion™ 2.3
- Inflexion™ 3.0
- Inflexion™ 4.5
- Inflexion™ 6.0
- Inflexion™ 7.5

2.1 Safety Precautions

Refer to the Safety Summary for precautions to be observed while operating or servicing this equipment.

2.2 Intended Use

The Inflexion™ mast is intended for use by professionals in the fire/rescue/first responder/security industries. It is not intended for use by non-professionals. Do not use the mast to lift personnel. The mast system is intended to be installed on the roof or in a roof well of fire/rescue/first responder vehicles.

The Inflexion™ mast is intended to be used only when the vehicle is stationary and the vehicle parking brake is properly applied. Do not supply input supply voltage or operate the mast system when the vehicle is in motion. The mast shall remain in the powered-down, nested position during vehicle motion.

2.3 Power Requirements

DC power for the mast is supplied by the vehicle and customer-wired to the mast base board. The mast operates at 12 VDC, but will accept 24 VDC with the optional 24/12 converter. The DC cables should be 12 gauge (for 12V) and 16 gauge (for 24V). Long runs of cable can introduce power loss. There is a 35-40 amp inrush to the motor (depending on the length and gauge of the wires) that drops to 6-7 amps in 300mS. For long runs, it may be necessary to increase the wire gauge of the cables. If required, the vehicle-integrator is responsible for installing an ON/OFF switch to disconnect power from the unit. This switch should be in line with the positive power cable (from battery source). If using a separate power supply, it should have a 10 amp minimum.

2.4 Definitions

The following terms are used throughout this manual:

- **System:** refers to the entire mast system, controller, and other optional accessories like the optional Nycoil®
- **Hand-Held Remote Control (HHRC):** refers to the controller used to operate the mast
- **Payload:** refers to the object or equipment being extended by the mast to an operational height

2.4.1 Mast Position Definition

An actuator electrically tilts the mast from the stowed position to the 90° position. The mast is then pneumatically moved by air pressure to the extended position. The following positions (Figure 2-1) are used throughout this manual:

- **Stowed:** is the horizontal position in which the mast is firmly seated in the saddle. This position is sometimes referred to as the nested position.
- **90°:** is the position that the mast electrically goes to from the stowed position. At 90°, the mast has angled up, but no mast sections have risen. The mast remains retracted.
- **Extended:** is the partial or full raised position that the mast pneumatically goes after the 90° position. In the extended position, some or all of the mast sections have risen.

Figure 2-1 Mast Positions (Night Scan Mast Shown)

2.5 Mast Component Descriptions

The mast models normally mount to a vehicle roof and consist of a:

- Mast
- Base
- Saddle

The exact configuration of the mast may vary. For detailed information on the locations of components in your system, see the drawings that shipped with the system.

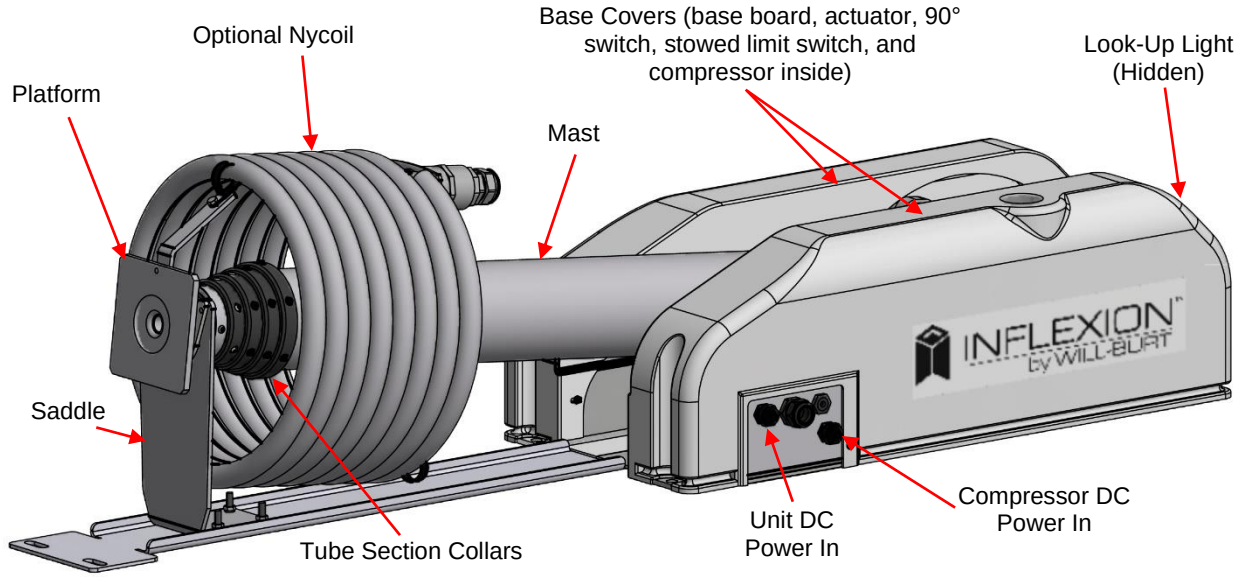

Figure 2-2 Major Components (Not to Scale) (Inflexion 4.5 Shown)

Mast: The mast consists of concentric tube sections that extend as air pressure is applied. These tubes are protected by low friction synthetic bearings. The exterior surfaces of the tubes are anodized and sealed for long life. The mast contains a coiled cord in the center for power and data. Optionally, an external Nycoil® may be included for accessory cables. The bottom of the mast connects to the actuator and the air compressor.

Magnetic Down Switch: The magnetic down switch is activated by a magnet in the mast top tube section. The position is factory set to indicate when the mast is fully retracted. Once activated, the mast is free to tilt back to the stowed position. See Section 6.6 for optional adjustment.

Saddle: The saddle supports the mast when nested for stable vehicle transit. The saddle position varies by model.

Look-Up Light: The Look-Up Light illuminates the operating space of the mast during any mast motion to allow the operator to identify and avoid contacting unwanted obstructions during operation.

Tilt Actuator: This actuator tilts the mast.

90° Limit Switch: This limit switch activates when the mast reaches the 90° vertical position. The mast is driven into a rubber pad under the mast. It is activated by a magnet located on the tilt mechanism. The limit switch is adjustable and set at the factory. See Section 6.5.2 for optional adjustment procedure.

Stowed Limit Switch: This limit switch activates when the mast reaches the horizontal stowed position. After this switch activates, the controller drives the mast into the saddle until a specified current limit is achieved for 0.5 seconds. This drives the mast into the saddle ensuring a tight fit for vehicle transport. The stowed limit switch is activated by a magnet located on the tilt mechanism. The switch location is adjustable and is factory set for a horizontal mounting surface. If the vehicle surface is not flat, this switch may need to be adjusted for proper stowing of the mast. See Section 6.5.3 for optional adjustment procedure.

Air Compressor: The air compressor supplies air to raise the mast when the operator presses the "Mast Up" button on the controller, after the mast electrically reaches the 90° position. There is no mast fully extended switch. Once full extension is reached, if the "Mast Up" button is not released, the maximum air pressure is reached and the blow-off valve opens. At this point, excess air is vented and the mast remains at the fully extended height.

Labels: Extra warning labels are provided to attach near the operator control station.

2.5.1 Remote Control

The mast Hand-Held Remote Control (HHRC) (Figure 2-3) has a momentary toggle switch and a cord that is wired into the base board. The HHRC can be used to extend and lower the mast.

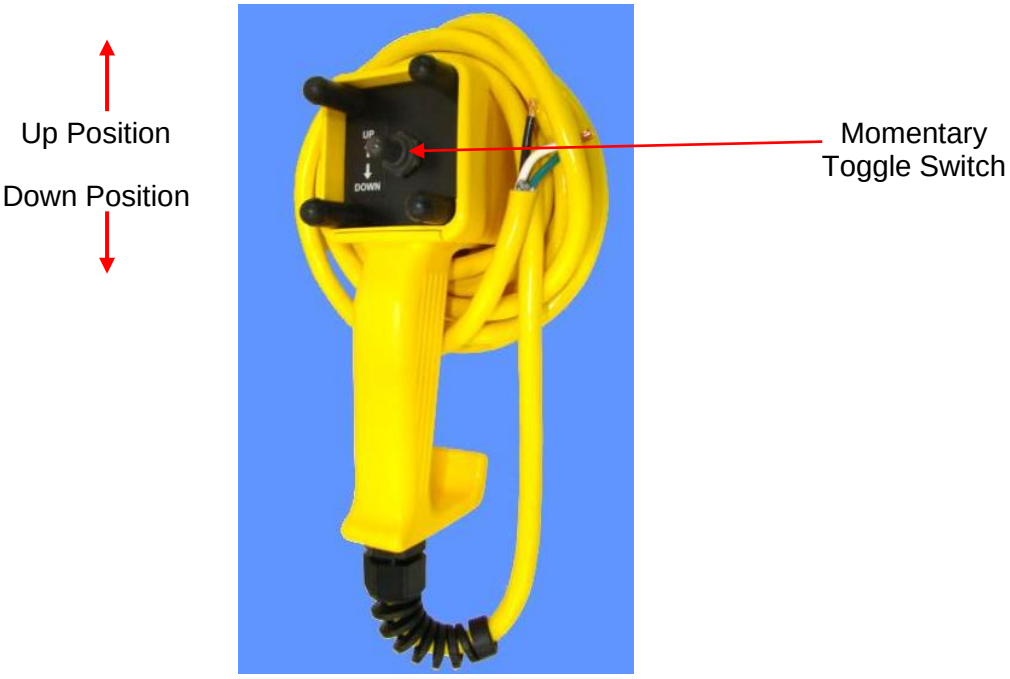

Figure 2-3 Hand-Held Remote Control (HHRC) (P/N 5246801)

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Section 3 Technical Data

Table 3-1 Specifications

Inflexion	1.0	1.8	2.3	3.0	4.5	6.0	7.5
Extended Height (ft / m)	3.16 / .96	5.3 / 1.62	6.6 / 2.0	9 / 2.7	14 / 4.2	19 / 5.8	24 / 7.3
System Weight Range (lb. / kg)	60 / 27.2	63 / 28.57	66 / 30	105 / 47	113 / 51	124 / 56	142 / 65
Stowed Dimensions (L x W x H) (ft / m)	3.45x1.27x.81 / 1.05x.38x.26	3.08x1.27x.8 / .94x.39x.24	3.6x1.3x.92 / 1.1x.4x.28	4.8x1.3x1 / 1.5x.4x.3	5.8x1.3x1 / 1.8x.4x.3	6.8x1.3x1 / 2.07x.4x.3	8x1.3x1 / 2.44x.4x.3
Maximum Payload Capacity	50 / 22	53 / 24	46 / 21	100 / 45	84 / 38	60 / 27	50 / 23
Mast Control System Input Voltage	12VDC - 24VDC						
Mast Control System Current	14A Max at 12VDC 10A Max at 24VDC						
Mast Operating Pressure (psi / bar)	N/A	20 / 1.4 Max into Mast [100 / 6.9 Max into Regulator]					
Number of Tubes	1	3		5			
Tube Diameter Range (in / mm)	3.5 (89)	3.5 to 2.5 (89 to 64)		5 to 3 (127 to 76)			
System Operating Temperature	-22 to 149 °F / -30 to 65 °C						
System Storage Temperature	-40 to 149 °F / -40 to 65 °C						
Maximum Deployment Angle	±10° (17.6% Grade)				±5° (9% Grade)		
Deployment Wind Speed (mph/km/h)	40 max / 64 Max						
Altitude Above Sea Level (ft / m)	15,000 / 4572 Max						
*Survival Wind Speed (mph /km/h)	140 / 225			124 / 199	94 / 151	76 / 122	64 / 102
Auto Deploy and Auto Stow®	No						
D-TEC Option Available	No						
Airborn Noise Emissions Per EN ISO 3744:2010	equivalent A-weighted sound pressure level at the operating position is less than 70 dB(A)						

*Maximum payload capacity assumes a payload center of gravity (1) foot above the top of the mast. Note that the added weight of a Nycoil will reduce the maximum payload capacity which can be affected by wind sail area. Consult the factory for more information.

**Data based upon:

- Payload center of gravity and sail area center of pressure are in line with mast centerline.
- Mast angle is 0° ±½° when extended.
- Payload coefficient of drag = 2.0.
- Center of pressure of 24 inches.
- A sail area of 1.25 ft.

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Section 4 Installation

This section describes the installation of the system and provides general procedures that must be followed to ensure a successful installation. Be sure to read and understand the entire installation procedure before you begin. Use care to follow all precautions (Section 1) while installing.

4.1 Mounting Location Requirements

The following factors must be included when selecting an appropriate mounting location:

1. Your system is designed to withstand adverse weather conditions, however it cannot be submerged in water. If the system is mounted in a well, provide adequate drainage. A minimum of four 1 inch (25 mm) diameter drain holes (one per corner) are recommended.
2. Ensure that the mast base and saddle are on a flat surface and in the same plane. The Stowed Limit Switch is set at the factory based on a level surface. If the system is not level, these switches may need adjusted as described in Section 6.5.
3. Be sure to mount the system out of reach of anyone who may be near the vehicle to allow the mast to be safely raised and lowered. The installed elevation of the bottom of the mast base shall be at least 2.7 meters (8.8 ft) above ground level to prevent reach of upper extremities during operation. Alternatively, lower elevations are permitted if the mast is properly guarded by the installer or offset towards the middle of the roof with reach limited by vehicle structure to prevent contact with the mast during operation.
4. It is important that both the base and the saddle be securely mounted to a sturdy roof or platform which will not overturn during operational loading of the mast. The surface must be reinforced to withstand the load at the different points on the mast that can be expected during operation as shown in (Figure 4-1). These are maximum load estimates placed downward and sometimes upward on the vehicle top by the mast.

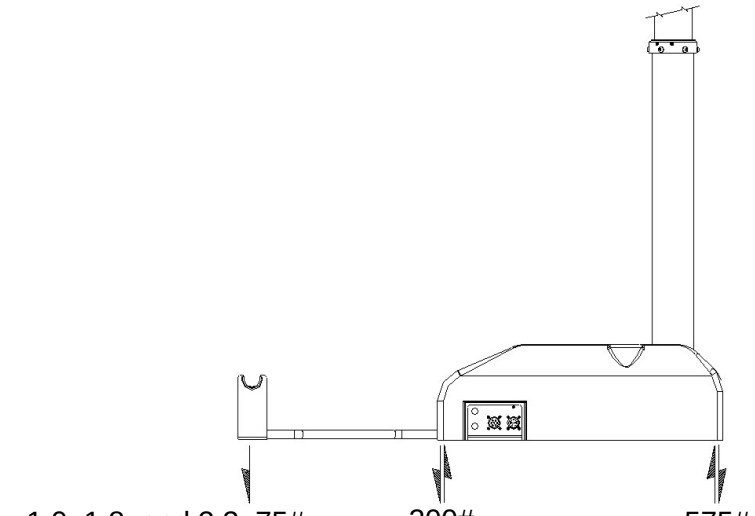


Figure 4-1 Reaction Loads on Mounting Structure

4.2 Recommended Installation Tools

Table 4-1 lists recommended tools and materials for installation.

Table 4-1 Recommended Installation Tools and Materials

Tools and Materials		
Safety Glasses	Safety Shoes	Safety Gloves
Nitrile or Vinyl Gloves	Hard Hat or Helmet	Hearing Protection
Wrenches	Screwdrivers	Multimeter (to verify power is turned off)
Torque Wrench	Wire Cutter/Stripper	Crimping Tool or Solder Set
Drill	Clean Shop Rags	½ inch or M12 Mounting Hardware (6 each)
Hoist (minimum 250 lb. capacity)		
*Depending on the national and local standards and codes of practice, and the environment, additional personal protective equipment may be necessary.		

4.3 Unpacking and Handling

Unpack and handle as follows:

1. Carefully remove all the small cartons from the large crate or carton.
2. Remove all the items from the small cartons.
3. Ensure all components are included and that the required tools are readily available. The components in the system shipment are shown in Table 4-2.

Table 4-2 Components in the System Ship

Base Assembly	DC Board Power Cable	Label Kit*	Controller
Wrench, HEX L-Key 6 mm**	Nycoil (Optional)	Operator's Manual	Drawings of your system to assist in the installation process
*The labels from the label kit can be applied where the operator deems appropriate in site of the operating station. **The 6 mm wrench is used to emergency stow the mast.			

4. Inspect for any shipping damage. If damage has occurred, notify the carrier.
5. Unbolt (for wooden crates) and remove any banding fixing the mast to the shipping crate or carton. Remove any banding fixing the mast.

6. Using a hoist, lift the unit from the shipping container by the base tube at the labeled center of gravity symbol (Figure 4-2) position. Lifting from locations other than those indicated could result in equipment damage. Use two point contact for slings to keep the load stable while moving.

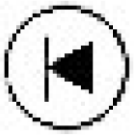


Figure 4-2 Center of Gravity Symbol

4.4 Attaching to Mounting Location

Physically attach the system as follows:

1. Reference Figure 4-3 and Figure 4-4 for standard mounting hole locations. These locations will vary based on which system you are using. Measure the hole locations to confirm or use the unit as a template to mark before drilling. Drill six Ø9/16 inch (or Ø14 mm) mounting holes into the vehicle mounting structure in the mounting locations. There are four holes for the base, and two holes for the saddle. Drill appropriate holes for cable installation and remove any sharp edges that might damage the cables.
2. Mounting hardware is supplied by the customer. Stainless steel or stronger bolts are recommended. It is up to the installer to ensure proper thread locking methods are used to keep the bolts from backing out due to vehicle vibration. Attach the base to the mounting surface in four locations using 9/16 inch bolts/washers. Torque all hardware as appropriate for its material and size. The two saddle bolts can be attached later when power is available since the mast has to be partially raised to insert the bolts. Adjust the location of the saddle if necessary so that the saddle flanges do not hang up on the payload when the unit is raised. There are (3) unplugged strain relief holes in the side of the base for cable entry.

Inflexion 1.0, 1.8, and 2.3

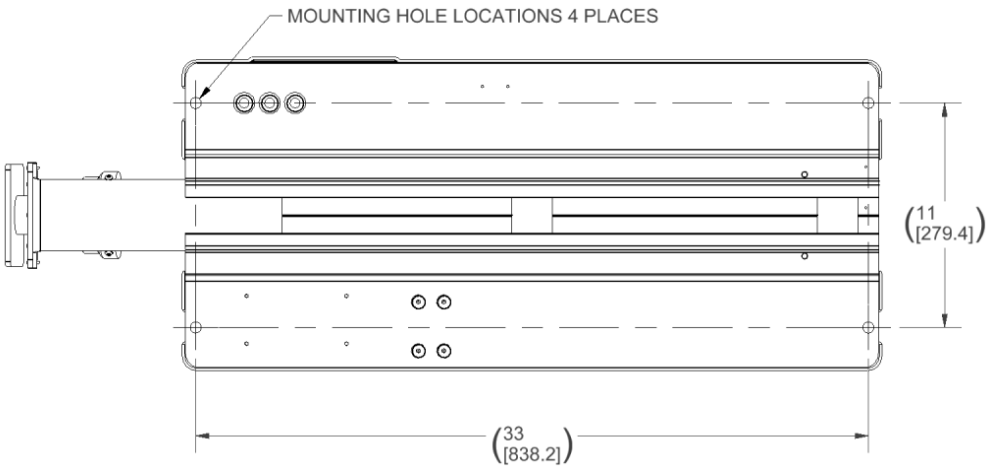
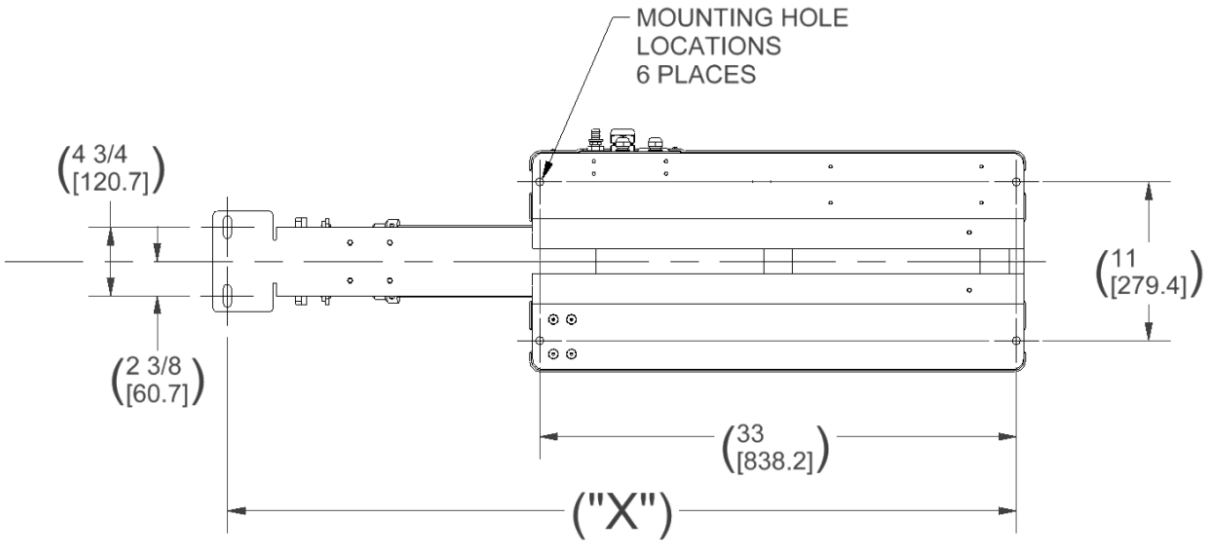


Figure 4-3 Installation Dimensions for 1.0, 1.8, and 2.3 Models

Inflexion 3.0, 4.5, 6.0, 7.5



Model	DIM "X" inch [mm]
3.0	54 5/8 [1387.48]
4.5	66 5/8 [1692.3]
6.0	79 7/8 [2028.8]
7.5	94 3/8 [2397.1]

Figure 4-4 Installation Dimensions for 3.0, 4.5, 6.0, and 7.5 Models

Note: The exact dimensions of your system will vary based on the components included. Refer to the drawings that ship with the mast for detailed information on the size of the base.

4.5 Connect DC Power to the Base

To connect DC power to the base:

1. From the customer supplied 12 VDC power supply, run the red and black 12V DC power wires through one of the strain reliefs in the side of the base. Ensure the cables are at least AWG 12 and no longer than 50 ft from the power supply to the base board.
2. Locate terminal block TB3.

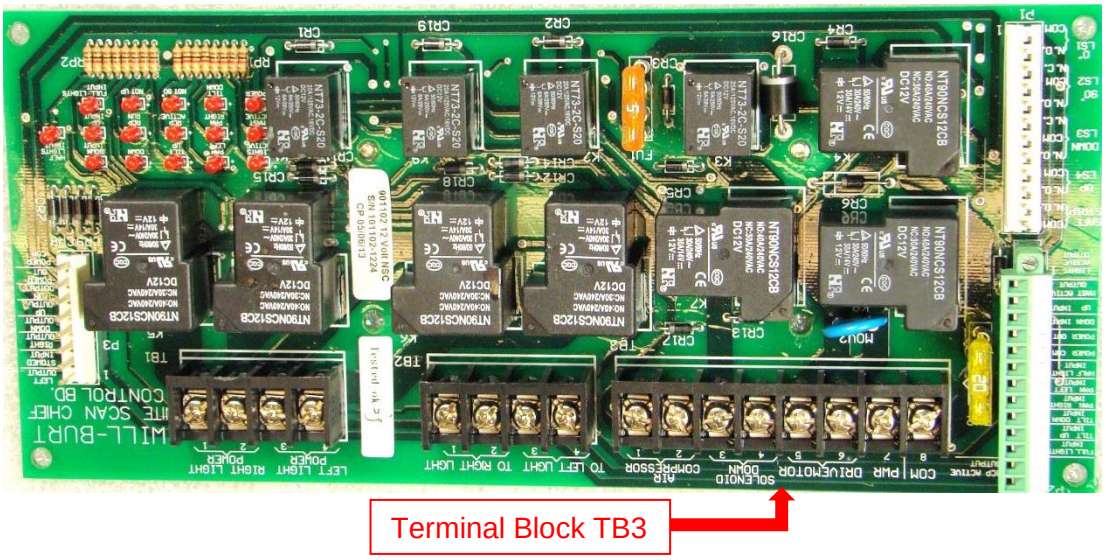


Figure 4-5 Terminal Block TB3

3. Connect the positive, red, 12 VDC cable to 7 PWR and connect the negative, black, cable to 8 COM.

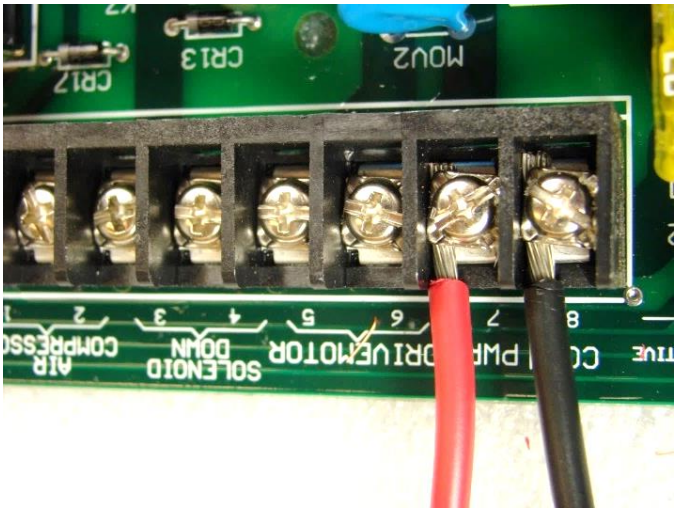


Figure 4-6 Connect Cables

4. The Hand-Held Remote Control (HHRC) will need to be wired as shown in Figure 4-6 to the green baseboard controller.

4.6 Mount the Payload

The exact installation procedures for payload will vary based on the customer-specific payload being used. For optimal performance, center the payload as best as possible. If the payload must be offset, offset the payload in-line with the keys. Contact The Will-Burt Company with any questions before performing any installation procedures.

In general, to attach the payload:

1. Ensure power to the system is off while installing the payload.
2. Carefully move the payload into position on the mounting plate. The mounting plate is 6" x 6" (15.24 cm x 15.24 cm) with no holes. The installer is expected to customize the bolt pattern as required.
3. Properly secure the payload to the mast. The mounting hardware must include proper means to resist vibration loosening, such as thread-locking compound or locking hardware. Torque all hardware as appropriate for its size and grade.

Note that it is the responsibility of the customer/integrator to properly secure the payload for vehicle travel.

4.7 Test the Installation

Review the Operation Section (Section 5) and the Safety Summary (Section 1) and observe all safety dangers, warnings, and cautions before proceeding to test the installation. If any part of the testing fails, check the LEDs on the base board as described in Section 7.

To test the installation, proceed as follows:

1. Reconnect power to the mast.
2. Check for proper clearance above the mast.
3. Press and hold the "Mast Up" button until the mast is fully deployed. The mast should raise to 90° then go fully deployed. There is no Auto-up feature.
4. Release the "Mast Up" button. Press and hold the "Mast Down" button. The mast should lower to 90° then stow and turn power off. There is no Auto-stow feature.

Note: Before delivery of a new system, the 90° and Mast Stowed (Near 0°) switches are set and tested for a flat surface. If the mounting surface is not flat, the 90° and Mast Stowed switches may need adjusted to function properly. If necessary, refer to Section 7.8 for details on adjusting the 90° and Mast Stowed (Near 0°) switches.

Section 5 Operation

This section describes the operation of the system. Be sure to read and understand the entire operation procedure and the Safety Summary (Section 1) before beginning operation.

5.1 Pre-Operation Check

Before operating the system:

- All operators read and understand the entire operation procedure and are properly trained. Ensure that all precautions are understood and followed (Section 1).
- Visually inspect the system for damage. If damage is apparent, do not use the system and have it serviced prior to use.
- Ensure all electrical cables are undamaged and properly terminated.
- Ensure the area is free of power lines or other overhead obstructions. The system location should be no closer than a horizontal distance equal to the extended height of the mast away from power lines.
- Check for and remove any objects that might obstruct motion of the mast, cause binding or hinder system function.
- When using a vehicle, ensure the vehicle is not moving and is on level terrain. Ensure the parking brake is engaged. Ensure the system and payload are properly installed.
- Remove any transit tie-downs on the payload.
- Ensure the system area is free of personnel.
- Ensure the operator has full view of the system during use.

5.2 Operation Equipment

Table 5-1 lists recommended equipment for operation.

Table 5-1 Equipment Recommended for Operation

Recommended Equipment			
Personal Protective*			
	Safety Glasses	Work Gloves	Nitrile or Vinyl Gloves
	Hearing Protection	Hard Hat or Helmet	Safety Shoes
*Depending on the national and local standards and codes of practice, and the environment, additional personal protective equipment may be necessary.			

5.3 Extend the Mast

To extend the mast:

1. Ensure power is properly connected to the mast.
2. Press and hold the “Mast Up” button on the Hand-Held Controller (HHRC). When the “Mast Up” button is pressed and held, the mast operates the DC powered actuator and drives the mast from the stowed position to the 90° position.

   Releasing the “Mast Up’ switch at any time stops mast motion. Note there is no Auto-Up feature to automatically raise the mast to 90°.
3. When at the 90° position, the 90° proximity switch detects the magnet in the actuator arm and stops further driving of the actuator. Press and hold the “Mast Up” switch to raise the mast until the mast is fully deployed.
4. Release the “Mast Up” switch when the mast is fully extended.

5.4 Lower the Mast

To lower the mast:

1. Ensure the payload is positioned to be stowed. There are no controls on the HHRC to pan or tilt the payload, so the payload may have to be manually positioned for stowing.
2. Press and hold the “Mast Down” button to release air from the mast. The mast will lower to the 90° position.
3. Once the 90° sensor is reached and the “Mast Down” switch is held down, the electric actuator lowers the mast to the stowed position in the saddle. When the stow switch is sensed, the actuator stops. The mast remains powered until power is manually disconnected.

5.5 Emergency Stow Without Power

In the event of power loss, the mast will vent and lower automatically but the mast will not return to its fully stowed horizontal position. If possible, this must be accomplished manually and must be done with extreme caution. It may be necessary to manually pan the payload so that when it is manually stowed, the payload does not make contact with the mounting surface or the saddle. Consult payload manufacturer to determine the best way to move the payload without power.

Note: Make sure all power has been disconnected from the mast prior to manually lowering mast.

To emergency stow the mast, proceed as follows:

1. Remove the base access cover.
2. Make sure all power has been disconnected from the system by turning all breakers to the "OFF" position.
3. Ensure your payload is secure and may by safely lowered.
4. Remove the right-side base cover.
5. Remove the 6mm Allen set screw on the end of the actuator cover (Figure 5-1).
6. Place a long 6mm Allen wrench into the hole to reach the 6mm Allen-head drive screw. A socket Allen wrench may be used but care must be taken not to damage the adjacent air compressor.
7. Turn the socket Allen wrench clockwise to lower the mast. Lower the mast until it seats firmly in the saddle.
8. Replace the 6mm Allen set screw.
9. Replace the right-side base cover.

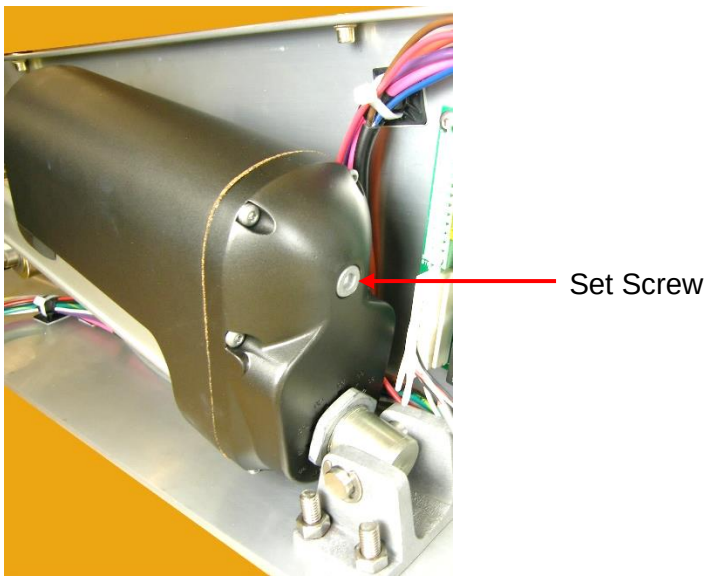


Figure 5-1 Emergency Stow Allen Screw Location

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Section 6 Maintenance

This section describes maintenance procedures required to keep the system operational. Use care to follow all precautions (Section 1) while performing these procedures.

6.1 Pre-Maintenance Check

Before performing maintenance procedures, ensure:

- All operators read and understand the entire maintenance procedure and are properly trained.
- The payload is removed prior to performing maintenance on the system.
- The system is level and secure.
- Ensure all power has been disconnected prior to performing maintenance.

6.2 Maintenance Equipment

Table 6-1 lists recommended equipment for maintenance.

Table 6-1 Equipment Recommended for Maintenance

Recommended Equipment			
Personal Protective*			
	Safety Glasses	Work Gloves	Nitrile or Vinyl Gloves
	Hearing Protection	Hard Hat or Helmet	Safety Shoes
*Depending on the national and local standards and codes of practice, and the environment, additional personal protective equipment may be necessary.			

6.3 Clean the System

The Will-Burt Company's pneumatic telescoping masts from come from the factory pre-lubricated and require no scheduled lubrication under normal operating conditions for the life of the product. In extremely harsh environmental conditions, cleaning and lubrication of the mast might be required.

Signs that cleaning and lubrication are needed can be:

- A noticeable gritty film on the exterior surfaces of the mast sections
- Erratic extension or retraction of the mast
- Noisy operation of the mast
- Sticking of one or more mast sections when mast is extending or retracting

To clean the system:

1. While at 90°, wipe down the base using a soft cloth or sponge and a mild solution of soapy water.
2. Wipe down the mast using a soft cloth or sponge and a mild solution of soapy water.

After cleaning the mast, if the mast is in extremely harsh environmental conditions, lubricate the mast with TMD Mast Lubricant (P/N: 900600). TMD Mast Lubricant is specifically formulated for cold weather use, but is also suitable for year around use. Regular winter maintenance and frequent use of TMD Mast Lubricant should significantly reduce the potential for mast freeze-ups.

To clean and lubricate the mast:

1. While at the 90° position, have one person press the "Mast Up" button to slowly pressurize the mast just enough to extend the desired mast section. A second person may have to hold down the larger mast section collars to ensure the desired tube extends. Release "Mast Up" button as soon as the desired mast section is fully exposed.
2. Wipe down the desired mast section using a non-abrasive cleanser or solvent such as lacquer thinner. Do not allow the cleaning fluid or solvent to run down inside the collar.
3. Inject approximately ½ oz. of TMD Mast Lubricant into the weep hole (drain) of the exposed mast section. The weep holes are located approximately 10" below the collar on each tube except the top tube.
4. Repeat steps 1-3 for the next larger mast section. Do not lubricate the exterior of the mast. This will cause the lubricant to attract dust and contaminants from the air.
5. Using the "Mast Down" button, lower the mast to 90°.
6. Wait several minutes to allow the lubricant to settle and spread around the wear ring and seal at the bottom of each mast section.
7. Using the "Mast Up" button, extend the mast one section at a time. For each section wipe off any excess lubricant which flows out the weep holes.

6.4 Periodic Maintenance

This section describes the systematic care and inspection of equipment to keep it in safe operating condition and to prevent breakdowns. If the system does not perform as required, see Section 7 for troubleshooting. If anything looks wrong and cannot be diagnosed and/or fixed, contact The Will-Burt Company. Table 6-2 provides a schedule of periodic inspections and procedures required to keep the mast system in safe operating condition.

Table 6-2 Periodic Inspections

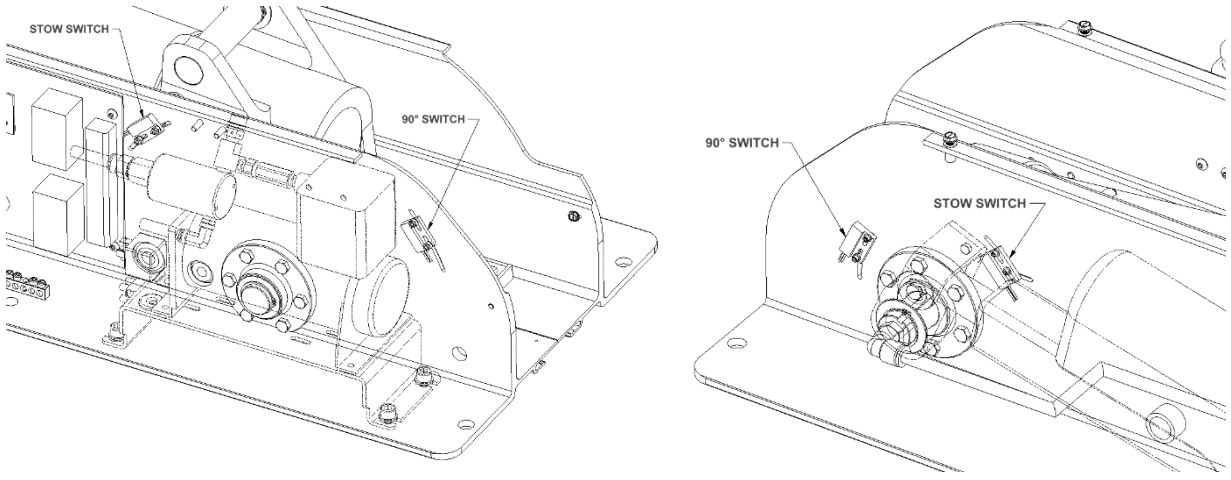
Frequency	Inspection	Action
As Needed; In salt water or sandy environments clean the mast every 3 months.	Inspect to ensure the mast system is kept clean and free from foreign material. Dirt, grease, oil, sand and debris may cover up a serious problem.	Clean the mast per the procedure in Section 6.3.
During Operation	Inspect for damage during operation.	If damage is apparent, do not use the mast, and have it serviced prior to use.
Monthly	Visually observe tube motion during extension and retraction to ensure the tubes move smoothly and do not cause excessive impact loads when each tube fully extends or retracts.	Clean and lubricate the mast per the procedure in Section 6.3. If the condition remains after lubrication, cease all mast use and contact Will-Burt Service immediately.
Monthly	Inspect for any damage to electric cables and pneumatic tubes.	Replace cables/tubes as required.
Monthly	Inspect the Look-Up Light lens for debris or dirty lens that prevent light from reaching the operating space.	Make sure the lens is cool and clean the lens with a mild cleaner and soft cloth.
Monthly	Inspect all hardware to ensure fasteners are not damaged, loosening, backing out or missing. Take special note of hardware keeping the payload mounted, mast collar bolts, and hardware used to mount the mast to the support structure.	Tighten or replace any loose, damaged or missing fasteners.
Every 6 Months (3 months in saltwater environment)	If the mast remains idle for long periods of time, operate to full extension at least once every six months (3 months in saltwater environment).	Exercise mast.

Every 6 Months	With the mast fully stowed, carefully lift up on the payload fixture (do not lift by the light fixtures). The payload fixture should not have any mechanical play allowing it to bounce when being transported on a vehicle.	If mechanical play is observed, adjust the mast stowed limit switch position to allow the payload fixture to drive tightly into the saddle according to (Section 6.5.3).
Every 6 Months	Extend the mast to the 90° position and make sure the mast is rigidly driven into the rubber pad below the mast. There should be no mast wobble observed when pulling on the base tube.	If the mast shows mechanical play, adjust the mast 90° limit switch according to (Section 6.5.2).

6.5 Adjusting the 90° and Mast Stowed Limit Switches

Before delivery of a new system, all switches are properly set and tested at the factory and normally no switch adjustment is necessary. However, if a switch needs adjusted, for example if the actuator was replaced or if the mounting surface is not flat, follow the steps outlined in this section to make the adjustment.

The proximity switches (Figure 6-1) are intended to stop the actuator when the mast is at 90° and when it is stowed. It senses the position of the mast as it rotates on the clevis assembly and signals the base circuit board to stop when the actuator is in the correct position.

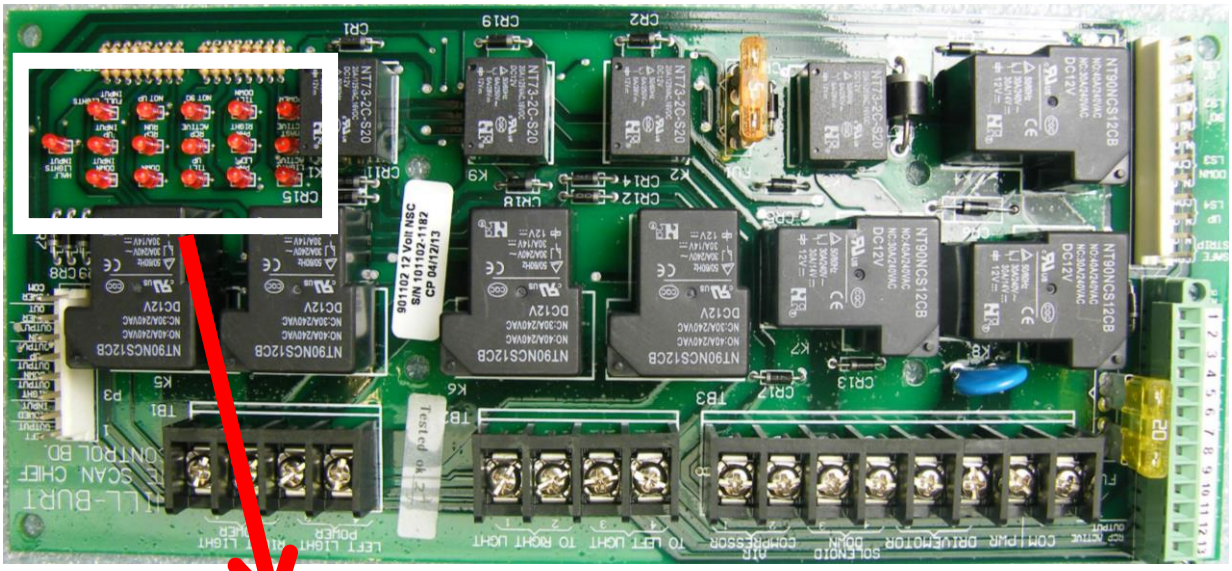


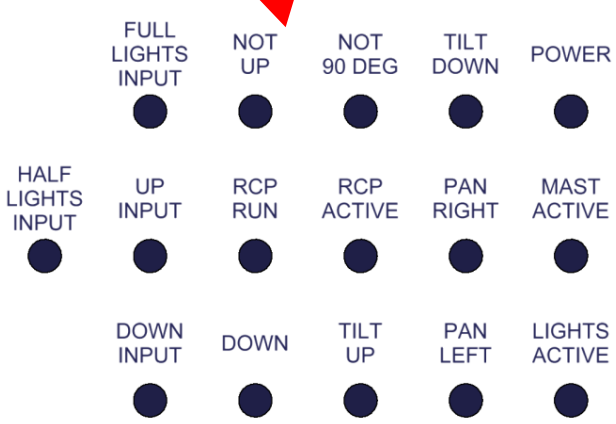
Nightscan Chief

Figure 6-1 Proximity Switches

6.5.1 Diagnostic LEDs on the Base PC Board

The PC Board mounted at the mast base has LED indicator lights useful for diagnostics for circuits. Figure 6-2 charts the LEDs to the various mast positions. These diagnostic LEDs can be used to help determine if an adjustment is necessary. They are also useful in assisting to determine when the switches have been properly adjusted.





LED	Definition
Power	12V is at the base board
Mast active	Mast is out of the saddle
Lights active	Mast is at 90º
Tilt Up or Down	Not Used
Pan Right or Left	Not Used
Not 90 Deg	Mast is not at 90º
RCP active	Not Used
Not up	Always lit when the mast is at 90º
RCP run	Not Used
Down	Not Used
Full lights	Not Used
Up input	Mast up key pressed
Down input	Mast down key pressed
Half lights	Not Used

Figure 6-2 Status LEDs on Base Board

6.5.2 Adjust the Mast 90° Limit Switch

The 90° switch (Figure 6-1) senses when the mast is at 90° by checking the position of the actuator. There is a magnet mounted to the actuator arm that triggers the limit switch. When the mast is being raised from the stowed position and the 90° switch is sensed, power to the actuator is removed. This allows the mast to remain at 90°. The mast will not extend and certain remote control functions will not function if the mast is not at 90°.

To adjust the 90° limit switch:

1. Make certain that the base is level.
2. Remove the base side cover to access the limit switches and base board.
3. Loosen the upper jam nut to lower the switch approximately 1/8 in.
4. Raise the mast to 90° by holding the "Mast Up" button until the mast is at 90°.
5. Check that the mast is at 90° by using a level, ensuring that the mast is square to the sheet metal side plate on the base. A value range of 89.5° to 90.5° is acceptable.
6. Raise the 90° switch until it senses the actuator. This is indicated by the status LED on the base circuit board (Figure 6-2).
7. Secure the switch in position using the upper and lower jam nuts.
8. Raise and lower the mast several times, checking that the mast is plumb each time, and adjust the switch if necessary. The mast should drive into the rubber pad slightly for stability.
9. Replace the base cover.

6.5.3 Adjust the Mast Stowed Limit Switch

The mast stowed (near 0°) switch (Figure 6-1) senses that the mast is in the saddle upon power-up, and when the mast is nearing the saddle during stowing. The circuit then looks for a pre-determined current rise (for a maximum of 0.5 seconds) to indicate a solid nesting before shutting off. This current monitoring allows the controls to drive the mast into the saddle to remove all mechanical play for vehicle transport. The limit switch is activated by a magnet located on the actuator arm.

To adjust the mast stowed switch:

1. Make certain that the base is level.
2. Remove the base side cover to access the limit switches and base board.
3. Raise the mast to gain access to the mast stowed switch.
4. Loosen the upper jam not to lower the switch approximately 1/8 in.
5. Raise the mast to 90° by holding the “Mast Up” button until the mast is at 90°.
6. Lower the mast to the stowed position by holding the "Mast Down" button until the mast is stowed. Immediately release the "Mast Down" button when the mast is stowed.
7. With the mast stowed, carefully grasp the payload and attempt to slowly lift the payload off the saddle. If the saddle is not snug into the saddle, repeat steps 4 through 6 until the mast is firmly in the saddle.
8. Secure the switch in position by tightening the upper and lower jam nuts.
9. Raise and lower the mast several times, checking that the mast stows each time, and adjust the switch if necessary. There should be no mechanical play between the mast and the saddle when properly stowed.
10. Replace the base cover.

6.6 Adjust the Mast Magnetic Down Switch

The mast magnetic down switch tells the control system the mast is fully retracted and allows the mast to tilt back to the stowed position. The magnetic down switch is band-clamped to the base tube. This switch senses a magnet in the top tube when the mast is at 90°, or stowed, but not extended. The magnet is located in a recess at the bottom of the top tube and is not visible from outside the tube. If the magnetic down switch is mis-adjusted, the mast may not stow from 90°. When adjusting the magnetic down switch, ensure that the mast is at 90° or stowed with all collars stacked and no gap between them.

Before delivery of a new system, all switches are properly set and tested and normally no switch adjustment is necessary. However, if an adjustment is required, adjust as follows:

1. Deploy the mast to some point between 0° and 90°.
2. Loosen the band-clamp that holds the magnetic down switch and lower the clamp to the bottom of the mast.

3. Remove the left base cover to expose the base PC board diagnostic LEDs (Figure 6-2).
4. Ensure the mast is fully nested (no gaps between collars). While observing the base board diagnostic "Mast Down" LED, slowly move the band-clamp up until the "Mast Down" LED lights up.
5. To test:
    a. Initiate the mast.
    b. Press the "Mast Down" button on the controller until the mast stows. If the mast does not stow, repeat steps 1 and 2 several more times or until the mast stows.
6. If repeated adjustments do not succeed, use a small piece of steel or iron filings to locate the magnet in the tube and move the banded magnetic switch to the magnet's location.
7. If the mast still will not stow, hold a separate magnet up to the banded magnetic switch. Press the "Mast Down" button and ensure that the mast begins to stow. Be careful not to pinch hands during mast movement.
8. If the mast stows while using the separate magnet, repeat the switch adjustment steps above until the switch senses the magnet.
9. If the mast does not stow using a separate magnet, check the wiring to the base board for loose or disconnected wires. See the wiring diagrams for the system. If the wiring is intact, replace the magnetic switch.

6.7 Long-Term Storage

When putting the system into long-term storage, ensure the:

- Mast is fully nested (Section 2.4.1).
- Mast is stored in a clean and dry environment.
- Mast is stored vertically when storing for more than six months with provisions to keep the mast from tipping over.
- Mast is extended and lowered every six months (Section 5).

6.8 System Disposal

Dispose of the mast in accordance with the national environmental regulations.

Section 7 Troubleshooting

This section describes system troubleshooting information. Please contact The Will-Burt Company if these guides do not solve the issue. Be sure to read and understand the entire operation procedure and the Safety Summary (Section 1) before beginning any maintenance or troubleshooting procedure.

Table 7-1 Troubleshooting Table

Symptom	Root Issue	Troubleshooting Sequence
Mast sticking during extension or retraction	Mast is dirty and/or requires lubrication	1) Clean and lubricate mast 2) If condition continues, mast requires overhaul
Mast leaks down when extended	Air leak in mast or compressor	Use a soapy water solution to pinpoint the leak. If the mast is leaking, it will require new seals. If the compressor is leaking at a fitting, remove the fitting, clean and reinstall using thread tape or sealant. Replace a faulty compressor
Erratic or noisy when raising to 90°	Bent or worn actuator or pivot shaft	Replace damaged component
Mast fails to fully nest in saddle and disconnects power	Binding of actuator or control erroneously sensed an increase in current	Check actuator or mast for binding. Replace actuator if binding or remove source of binding
Mast will not begin to lower from 90° position	Mast tube sections do not fully collapse to nested position	1) Extend and retract mast 2) Check tube sections for damage 3) Internal coil cord may be binding, contact The Will-Burt Company

Mast will not begin to lower from 90° position	Magnetic switch band-clamped to mast is misadjusted or is defective	1) Magnetic switch may be out of adjustment. This can be shown when the "NOT 90 DEG" status LED is not lighted. Loosen the clamp and slide the switch up and down the mast until contact is established (Section 6.6) 2) Check wiring 3) Replace defective magnetic switch
	"Mast Down" switch in remote operator station is defective	1) "Mast Down" switch may be defective or wiring may be loose. This can be indicated when the "DOWN INPUT" status LED does not light when the switch is activated. Check wiring 2) Replace defective Hand-Held Remote Control (HHRC)
Actuator is not functioning properly in the "UP" direction	Mast 90° limit switch is misadjusted or defective	1) Mast 90° limit switch may be out of adjustment. This can be shown when the "NOT 90 DEG" status LED is not lighted. Adjust the switch as necessary (Section 6.5.2) 2) Check wiring 3) Replace defective switch
	"Mast Up" switch in remote operator station is defective	1) "Mast Down" switch may be defective or wiring may be loose. This can be indicated when the ""UP INPUT" status LED does not light when the switch is activated. Check wiring 2) Replace defective Hand-Held Remote Control (HHRC)
Actuator is not functioning at all	Blown fuse FU1 or FU2 on circuit board	A blown fuse can be indicated when there are no status LEDs are lit on the control board. Replace the defective component
	Mast "UP/DOWN" switch in remote operator station is defective	1) A defective HHRC "UP/DOWN" switch can be indicated when neither the "UP INPUT" nor the "DOWN INPUT" status LEDs on the control board light when the corresponding switch is activated. Check wiring 2) Replace defective Hand-Held Remote Control (HHRC)
	Actuator is defective	Defective actuator will need replaced. Contact Will-Burt Customer Service