



## INUKTUN VERSATRAX 100™

## Table of Contents

About This Manual .....	5
Description .....	5
Specifications .....	6
Precautions .....	7
Certification .....	7
Safety .....	7
System Setup.....	10
Personnel Requirements .....	10
Working and Storage Environment .....	10
System Power .....	11
Power Requirements .....	11
Generators / Inverters .....	11
ICON Portable Controller Connection.....	11
Interface Box Connection.....	12
Vehicle and Tether Connection.....	13
Portable Reel Setup .....	14
Mini-Reel Setup.....	15
Tether Handling.....	16
Connector Handling .....	16
SubConn Connector: Lubrication and Cleaning.....	17
Impulse Connector: Lubrication and Cleaning .....	17
Vehicle Configuration .....	18
Parallel Configuration.....	18
Track Angle Adjustment .....	18
Camera Height Adjustment .....	19
Camera Height Extensions.....	20
Camera & Light Installation .....	21

Microtrac Mounting .....	23
Traction Weight Kit .....	24
Magnet Kit .....	25
Extended Parallel With Spectrum 90™ .....	28
Extended Parallel Chassis .....	28
Camera & Light Installation .....	29
Extended Traction Weight Kit.....	30
Extended Magnet Kit .....	31
Inline Configuration .....	32
Track Installation .....	32
100 mm (4 in) Configuration.....	33
125 mm (5 in) Configuration.....	34
150 mm (6 in) Configuration.....	35
Rear Camera .....	36
Front Sapphire™ Camera .....	37
Operation.....	38
Pre-Operations Check .....	38
Post-Operations Check.....	39
ICON™ & ICON™ RPT .....	40
Dealing With Obstacles.....	40
Troubleshooting .....	40
Camera Control Problems.....	40
Video Problems .....	41
Vehicle Problems .....	41
Reel Problems .....	42
Maintenance.....	43
Rinsing and Cleaning .....	43
Fuse Replacement.....	43
Microtrac™ Maintenance .....	44
Camera Maintenance.....	44

Tether Re-termination .....	44
Parts and Repairs .....	45
Ordering Parts/Customer Service .....	45
Warranty Repairs .....	46
Factory Returns to Canada .....	46
Product/System Drawing Package Availability .....	46
Limited Warranty Policy .....	47

## About This Manual

This manual has been prepared to assist you in the operation and maintenance of your Eddyfi Technologies' Inuktun equipment. Correct and prudent operation rests with the operator who must thoroughly understand the operation, maintenance, service and job requirements. The specifications and information in this manual are current at the time of printing.

This product is continually being updated and improved. Therefore, this manual endeavors to explain and define the functionality of the product. Furthermore, schematics or pictorials and detailed functionality may differ slightly from what is described in this manual.

Eddyfi Technologies reserves the right to change and/or amend these specifications at any time without notice. Information in this manual does not necessarily replace specific regulations, codes, standards, or requirements of others such as government or site regulations.

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## Description

The Inuktun Versatrax 100™ (VT100) system is an Inuktun Microtrac™ 4000 based vehicle used for navigating pipes of 100 – 300 mm (4 – 12 in) internal diameter with the camera centered. The track mechanism is further adjustable to very large diameters or flat surfaces.

The inspection system has been manufactured with the hazards and demands of pipe inspection in mind. A minimized vehicle profile provides maximum clearance for passage of service intrusions in the pipe. The vehicle employs marine technology for underwater operation down to a depth of 60 m (200 ft).

All Versatrax hardware can be used dry, underwater, or in dirty, muddy conditions. The rugged design ensures a long service life and helps protect the vehicle from damage during normal use.

Typical applications include inspection of:

- Sewer and storm drains
- Hydroelectric pipe and infrastructure
- Tanks and pressure vessels
- Oil and gas refineries and pipelines
- Pulp and paper mills

## Specifications

Min Vehicle Dimensions	Parallel		331 x 170 x 150 mm (13 x 7 x 6 in)
	Inline		848 x 100 x 100 mm (33 x 4 x in)
Vehicle Weight <sup>Error!</sup> <small>Bookmark not defined.</small>	Parallel		6.8 kg (15 lb)
	Inline		5.0 kg (11 lb)
Depth Rating			60 m (200 ft)
Pipe Size Range <sup>2</sup>	Parallel	Camera Centered	200 – 300 mm (8 – 12 in)
		Camera Centered with Extension	300 – 600 mm (12 – 24 in)
		Camera not Centered	600 mm (24 in) – Flat
	Inline	Camera Centered with Skids	100 – 150 mm (4 – 6 in)
Min Bend Radius <sup>3</sup>	Parallel		2D @ 200 mm (8 in)
	Inline		7D @ 100 mm (4 in)
Maximum Tether Length <sup>4</sup>			300 m (1,000 ft)
Tracks			2x Microtracs™ 4000
Camera	Front	Standard	Spectrum 45™
		Option	Sapphire™
		Option (Parallel Only)	Spectrum 90™
	Rear	Standard (Inline Only)	Onyx™
		Option (Parallel Only)	Sapphire™
Lights		(Parallel Only)	2x 801 Lights
Reel		Optional portable tether reel with payout encoder	
Parallel Chassis Optional Components			Magnet Kit
			Weight Kit – 3.6 kg (8 lb)
			Camera Extension Kit
Power Requirements			100 – 240 VAC 50/60Hz, 5A
Operating Temperature			0 – 50 °C (32 – 122 °F)
Storage Temperature			-20° – 60 °C (-4 – 140 °F)

<sup>1</sup> Weights may vary depending on optional components

<sup>2</sup> Specified pipe sizes are internal diameters

<sup>3</sup> As pipe size increases Min Bend Radius decreases

<sup>4</sup> Actual travel distance may be decreased depending on inspection geometry (traction and number of bends)

## Precautions



**IMPORTANT:** When configuring a 70V system, check to see if the tracks are compatible. Older versions of 4000 series Microtracs™ are not 70V compatible. Look for the Wide Input Voltage symbol **W** located on the side plate of the track indicating 70V compatibility.



## Certification

The Versatrax 100™ system is built in accordance with the Low Voltage Directive 2014/35/EU, Machinery Directive 2006/42/EC, and Electromagnetic Compatibility Directive 2014/30/EU.



## Safety

To use this product properly and safely, every user must first read these operating instructions and observe the safety instructions contained therein. Take care of these operating instructions and keep them in a place where they can be accessed by everyone. Untrained personnel should not handle or operate this equipment.



**CAUTION:** Failure to follow these safety instructions may result in injury or equipment damage.



**WARNING: Hazardous Voltage 36-70 VDC.** If the equipment is powered from a source other than an Eddyfi Inuktun provided controller, the power supplied to the product must have reinforced isolation from the mains with no reference to earth ground.










**CAUTION**  
Interaction with metallic objects may produce Pinch Hazards.  
Persons with Medical Implants  
KEEP BACK 12 inches.

**Strong Magnetic Field**

**WARNING: Magnetic Pinch Hazard** – The magnetic chassis is fitted with rare earth magnets. These magnets are very strong and create an immanent pinch hazard. Use caution when handling the magnets or vehicle near steel objects and tools, they may snap together unexpectedly.

**WARNING: Medical Hazard** – Operators with magnetically sensitive medical implants should be aware of and follow appropriate practices.

**WARNING: Electronic Device Interference** – Magnetically sensitive devices, including computer hard drives, cell phones, watches and credit cards may be

<p>disrupted or damaged by the magnetic field.</p> <p><b>Note:</b> Rare earth materials are mechanically weak, and magnetically very strong. They must therefore be handled very carefully to avoid damage.</p>		
	<p><b>Note:</b> To reduce risk of injury and damage to equipment, always store the Versatrax 100™ magnetic vehicle in its <b>magnetically shielded storage and shipping box</b> or store the magnets on a <b>steel plate</b> when not in use.</p>	
	<p><b>Note:</b> We strongly recommend using gloves when handling the vehicle to reduce magnetic pinching hazard.</p>	
	<p><b>Warning: Avoid Magnetic Slamming.</b> Extreme care must be taken when handling the vehicle, particularly when placing it onto a wall or into its storage box. Without taking heed of the sudden pull of the magnetic field onto surface, the Versatrax 100 magnetic option can be slammed down hard causing damage to the vehicle. Using a solid grip on the vehicle, we recommend touching down the vehicle by one end first and then pivoting flat.</p>	
	<p><b>WARNING: Intense Optical Radiation</b> - The Spectrum camera lights and 801 lights are extremely bright. Never look directly at the lights. Use a welding filter (shade #8 or higher) if inspecting the LEDs.</p>	

- **CAUTION: Class II Laser:** Do not intentionally stare into the beam. Typically, Class II relies on the blink reflex to limit exposure to no more than ¼-second. Intentionally staring into the beam can cause eye injury.
- When performing maintenance or functional checks of the lasers and camera lights, take precautions to protect nearby personnel from unintended exposure which could be temporarily blinding.
- Observe safe lifting practices. For storage and shipping, the Versatrax 100 system is packed in three parts: Controller, Vehicle and Tether. Each of the three components is either built or packed into a Pelican case with carrying handle. The heaviest case containing the tether and mini-reel is equipped with wheels and extending handle like a suitcase.
- Do not operate the system with damaged wires. A short circuit may damage the power system, telemetry system, cameras, or attached equipment. Exposed wires may also create a shock hazard.





- Disconnect the power source before servicing the product; otherwise, damage may result.
- Although designed for durability, the vehicle and its components or attached devices may suffer structural damage if dropped or impacted. A lifeline or fall arrest system should be used at all time when the vehicle is navigating on a vertical or inverted horizontal position. In addition, stepping on the tether may pull the vehicle off the wall causing it to fall and sustain physical damage.
- All personnel operating or maintaining this equipment must be trained and competent.
- Our equipment is used in many varied environments from hot/dry to confined spaces to deep underwater. Such diverse environment risks must be addressed by the operators who are trained to work in such surroundings. As such, the operator is responsible to determine safe site setup and appropriate personal protective equipment (PPE) for operation and maintenance of the equipment.



**WARNING: Spark Hazard** - Under no circumstances should this equipment be used in a potentially explosive atmosphere.



**WARNING: Trip Hazard** - Never stand on the tether. A snap load to the tether may pull it out from underneath you and cause you to fall. Standing on the tether may also damage its internal conductors, cause unnecessary wear, and decrease its life.



**WARNING: High Temperature** - The camera head and auxiliary lights may become extremely hot during operation. Allow a cool-down period before handling.



**WARNING: Falling Object** - A lifeline or fall arrest system should be used at all times when the vehicle is navigating on a vertical or inverted horizontal position. When the vehicle is climbing, never stand below the vehicle operations area.

## System Setup

### Personnel Requirements

Basic deployment of the VT100™ system may be performed by one person. Operations at more complex worksites may require two people, especially when the console location is removed from the point of deployment.

- **Console Operator:** This person is responsible for driving the vehicle, watching the pipe and making comments about the location and pipe condition. It is also the operator's responsibility to assess whether a pipe is in the appropriate condition for safe passage of the vehicle or if there is a risk of getting stuck. The operator may also assist in general site setup (cones, warning signs, etc.), vehicle maintenance and configuration.
- **Deployment / Tether Handler / Field Maintenance:** This person has several tasks including:
  - Configuring the vehicle for the current pipe
  - Lowering the vehicle in and out of the manhole
  - Watching the tether as the vehicle enters and exits the pipe
  - Operating the reel and winding the tether during recovery

Establish a good channel of communication between the operator and deployment personnel. Good communication can avoid accidents, damage to the equipment, and promotes efficiency and productivity. In particular, the person deploying the vehicle and watching the tether must be able to quickly tell the operator to stop the vehicle if something goes wrong. The operator should never turn on power or initiate movement without first communicating with the vehicle handler.

### Working and Storage Environment

The control system (ICON™ Portable Controller or Interface Box and Control computer) is to be used in a **dry, covered** environment only. These components are not waterproof. Keep all cords and cables away from water.

The **tether and vehicle** are depth rated to 60 m (200 ft) of water. The tether connector is a wet-mate type which may be wet when plugged in but cannot be plugged in underwater. Keep the tether connector capped with a dummy plug when not connected to the vehicle to help keep out dirt. The tracks are tolerant to sandy and muddy conditions, although this decreases seal life. The vehicle may also be operated in dry or dusty environments.

The portable reel is splash resistant only. Refer to the reel manual.

To maximize component life and minimize deployment time it is recommended that the vehicle and tether be cleaned after use and the entire system stored in a dry, dust free, location.

Refer to the Specifications section for operating and storage temperatures.

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## System Power

### Power Requirements

The VT100™ is operated through an ICON™ Portable Controller or Interface Box. The interface box provides power to the tether and vehicle.

**Power Input:** 100 – 240 VAC, 50 / 60 Hz, 5 A.

### Generators / Inverters

If powering the system from a generator or inverter, refer to that unit's operating manual for recommendations on continuous and peak load ratings. These power sources may apply a reduced output rating based on electrical load and environmental temperature. Remember to include the power needs of any other connected devices (external monitors, recording devices, lighting, etc.) when selecting a generator or inverter.

### ICON Portable Controller Connection

The ICON Portable Controller supplies power to the tether and vehicle. It provides a communication interface to the vehicle. It also provides video reception and distribution.

Refer to the Controller Setup section of the ICON Portable Controller User Manual for more information.

## Interface Box Connection

To set up an PC based control system with an Interface box, do the following;

Set-up:

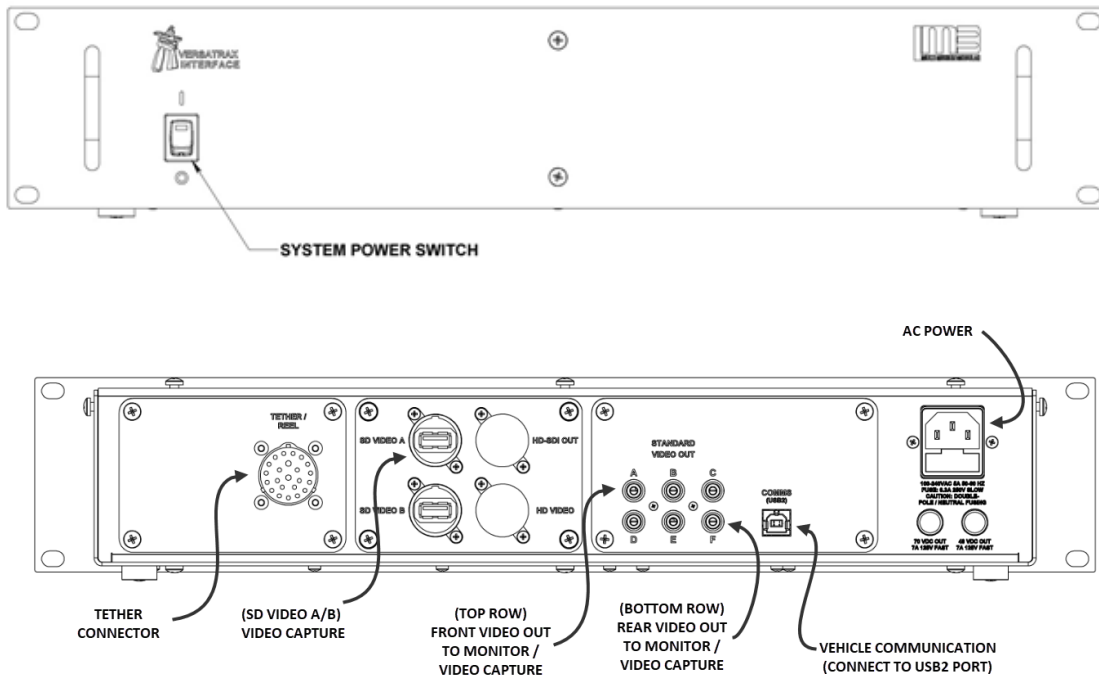
1. Connect the interface box to AC power using an equipment power cord.
2. Connect the tether (or reel deck cable).
3. Connect the communication port to the control computer using a USB cable.
4. Connect video equipment as needed (monitors, recording devices, etc).
  - a. Front camera: Top row RCA jacks A, B, C.
  - b. Rear camera: Bottom row RCA jacks D, E, F.

The interface box may be ordered with optional features such as video capture to USB or video format conversion. Additional connectors may be present on the rear center panel of the enclosure.

1. Connect SD Video A port to control computer using USB3 cable for front camera video capture.
2. Connect SD Video B port to control computer using USB3 cable for rear camera video capture.



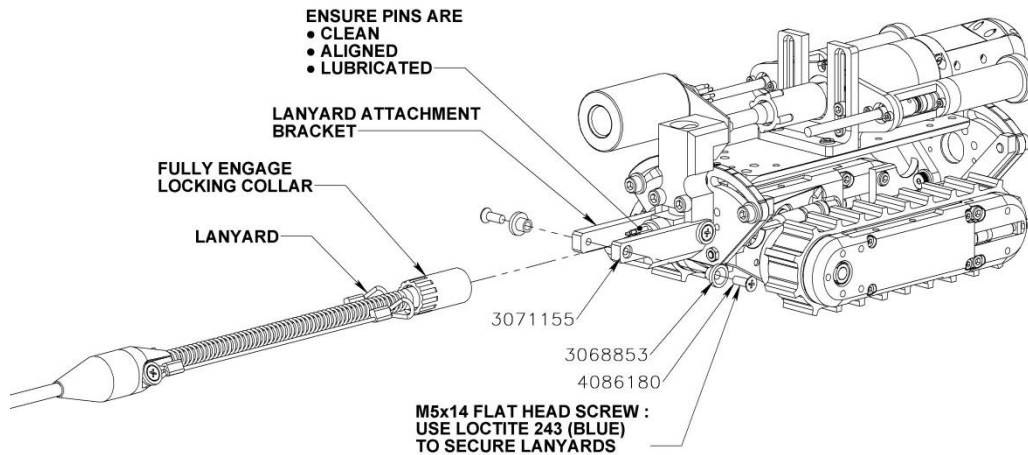
**IMPORTANT:** USB3 cables are required for video capture (SD VIDEO A / B) to maintain video quality.



## Vehicle and Tether Connection

It is important that the tether be properly connected to the vehicle; otherwise, system damage or loss of vehicle may result. The tether attachment procedure is the same for the parallel and in-line.

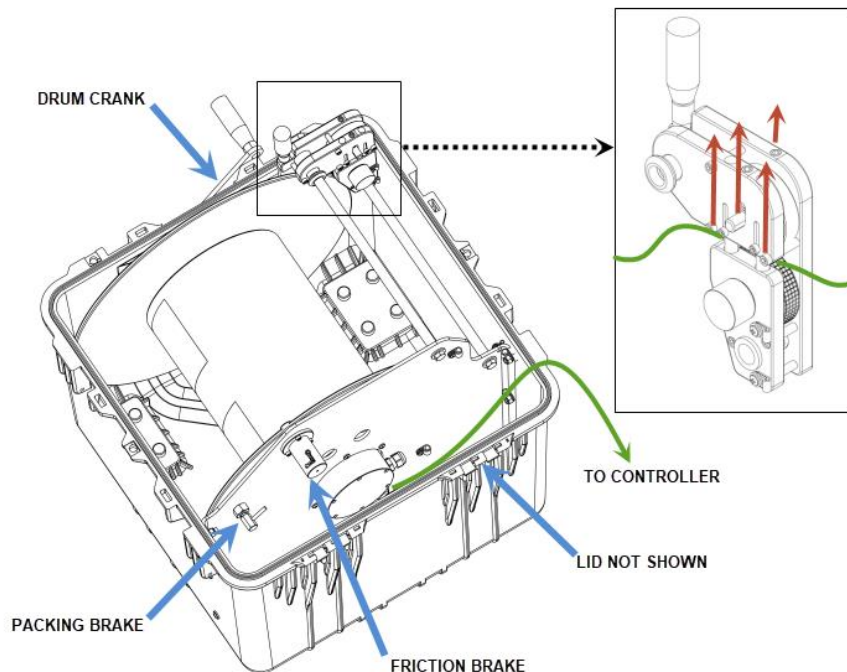
1. Confirm the connector pins on the vehicle and tether are clean and lightly lubricated with silicone grease (Molykote 111 or equivalent).
2. Visually line up the connector pins and push the connector all the way on.
3. Fully screw down and hand tighten the locking collar.
4. Secure the strain relief lanyards onto the vehicle using the tow cable clips illustrated below. Use Loctite 243 (blue) to secure the screws.
5. Confirm the lanyards are also secured to the tether splice block.



## Portable Reel Setup

If your system includes a portable reel, follow these steps to operate:

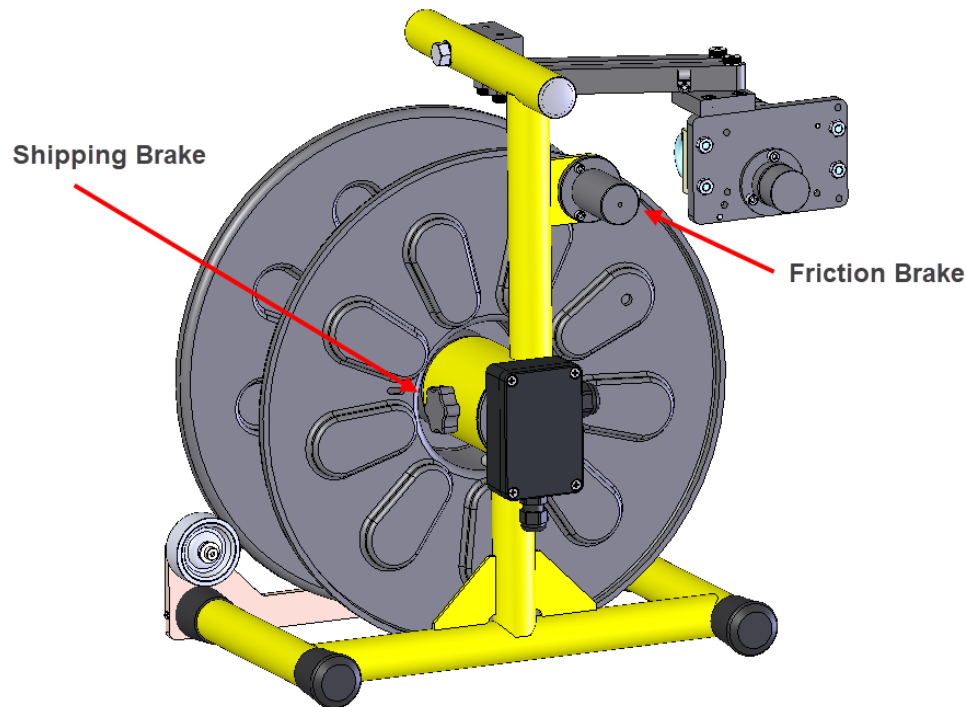
1. Remove the shipping cap from the front of the case and insert the crank handle.
2. Connect the deck cable from the reel to the controller.
3. Disengage the packing brake (pull back and turn on the locking pin).
4. Make sure the friction brake is **engaged** - disengaging the friction brake can result in slack tether resulting in potentially jamming the reel.
5. Unwind some tether and connect the tether to the vehicle.
6. Run the tether through the level wind as follows:
  - a. There is an access slot which must be opened by lifting up on the two exposed screw heads to raise the tether support shafts.
  - b. Pull up on both sides of the axle on the top wheel and slide the tether beneath it - failing to lift up on the wheel can scuff and damage the tether.
  - c. Make sure that the two wheels that sandwich the tether top and bottom in the level wind are tracking properly as the tether is paid out - this tells the controller how much tether the reel has unwound and how far your vehicle has travelled.



## Mini-Reel Setup

If your system includes a Mini-Reel, follow these steps to operate:

1. Remove the Mini-Reel from the shipping case.
2. Connect the deck cable from the reel to the Video Interface and Power Supply.
3. Connect the encoder deck cable from the reel to the Video Interface and Power Supply (if provided with Mini-Reel).
4. **Disengage** the shipping brake.
5. Make sure the friction brake is **engaged** – disengaging the friction brake can result in slack tether resulting in potentially jamming the reel.
6. Unwind some tether and connect the tether to the vehicle.



## Tether Handling

**The tether is one of the most important parts of the system.** It feeds power and control signals to the system and returns data to the controller. If the tether is damaged from improper use, poor handling or an accident, the system may become inoperable. This could lead to significant downtime, loss of production, and avoidable costly repairs. It is encouraged to stress the importance of the tether and its use to anyone operating or maintaining the system. For maximum tether life and reliability, we recommend the following tether handling tips.

- Do not step on the tether
- Do not drive over the tether
- Do not bend the tether beyond its minimum bend radius
- Do not kink the tether
- Do not snap load the tether
- Avoid loading the tether whenever possible
- Always use the cable grip strain relief if applicable to your system
- Regularly inspect the tether for damage
- Regularly clean the tether

**Note:** Protecting the conductors inside the tether is critical to the life and operation of the tether. Proper tether handling and care will result in extended tether life and system reliability.

## Connector Handling

Connectors are an essential part of system reliability. They should be properly maintained and cared for to ensure long life and reliability. It is recommended to follow these steps to help prevent damage and increase the life of connectors.

- Always put the cap back on the tether bulkhead when the tether is disconnected
- Always inspect the end of the connector prior to engaging
- Never plug in a dirty or damaged connector
- Visually align key-ways or locating pins prior to engaging the connector
- Always fully engage or tighten the connector
- Secure locking collars finger tight
- Install dummy plugs on unused connectors
- Disconnect by pulling straight, not on an angle
- Do not pull on the cable to disengage the connector



**IMPORTANT:** Never “Hot Plug” any connector, this will result in internal damage to the electronics. Power down the system prior to connecting the inspection system tether.

**Note:** Never use WD-40 or similar solvent-based fluids on connectors or crawlers. These will cause the rubber parts of the connector or crawler to soften and swell rendering them inoperable.

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### SubConn Connector: Lubrication and Cleaning

- Periodically apply Molykote 111 silicone grease or equivalent before mating connectors
- For dry mate connections, a layer of grease corresponding to 1/10 the socket depth should be applied to the female connector
- After greasing, fully mate the male and female connector and remove excess grease from the connector joint
- General cleaning and removal of sand or mud on a connector should be performed using a spray-based contact cleaner like isopropyl alcohol

### Impulse Connector: Lubrication and Cleaning

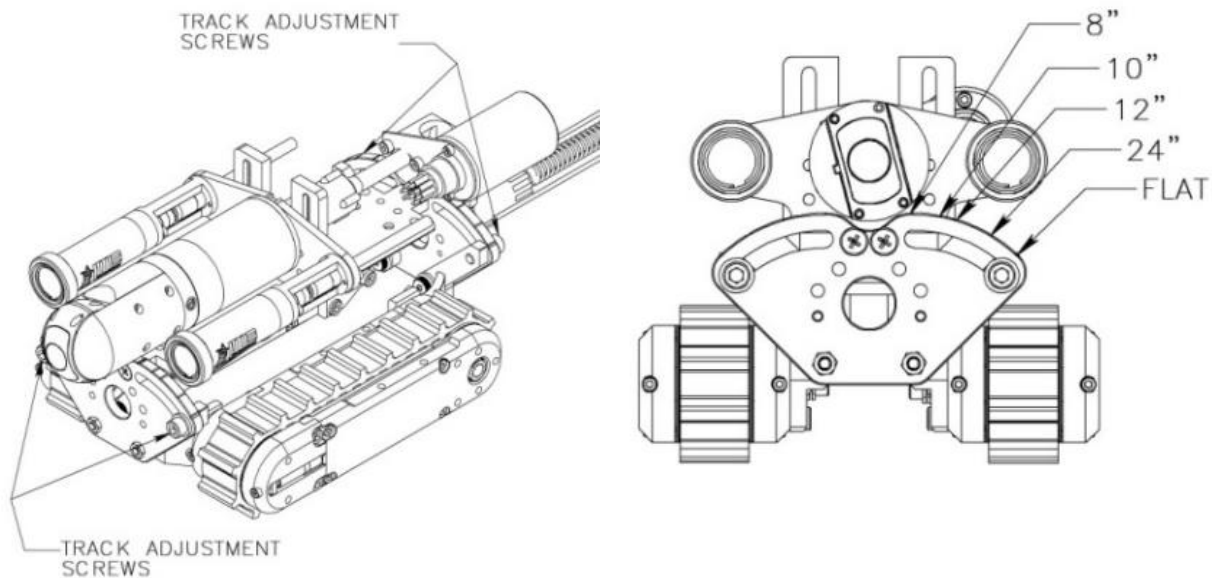
- Lubricate mating surfaces regularly with 3M Silicone spray or equivalent, DO NOT GREASE
- Lubricate O-rings with Molykote 111 or equivalent
- Use dust caps to protect connectors wherever possible
- Clean connectors with soap and fresh water, rinse out with alcohol and allow connector to air dry before using.

## Vehicle Configuration

### Parallel Configuration

#### Track Angle Adjustment

The parallel chassis' track angle may be continually adjusted from flat to 200 mm (8 in) ID pipe. To change the track angle, loosen the four M6 socket cap screws located in the end plate slots, move the track to its new angle, and retighten the screw. Indicator marks have been placed on the end plates for 200, 250, 300, and 600 mm (8, 10, 12, and 24 in) and FLAT configurations



## Camera Height Adjustment

Camera height is adjusted by loosening the four M5 SHCS in the camera slider, moving the camera to the required height and retightening the screws. In 305 mm (12 in) pipe, the upper adjustment screws are removed, and lower screws are placed at the top of the slot as illustrated below.

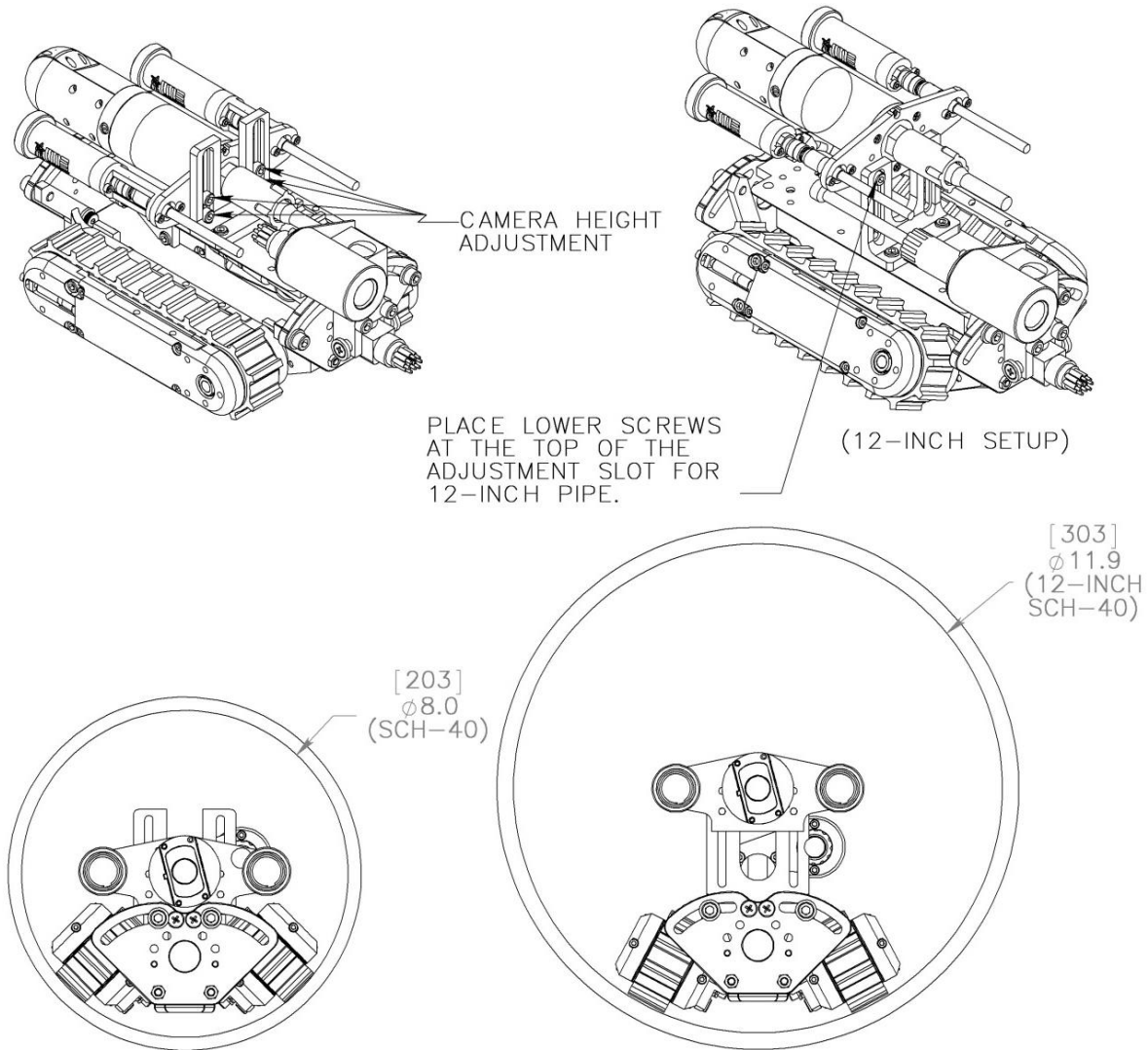
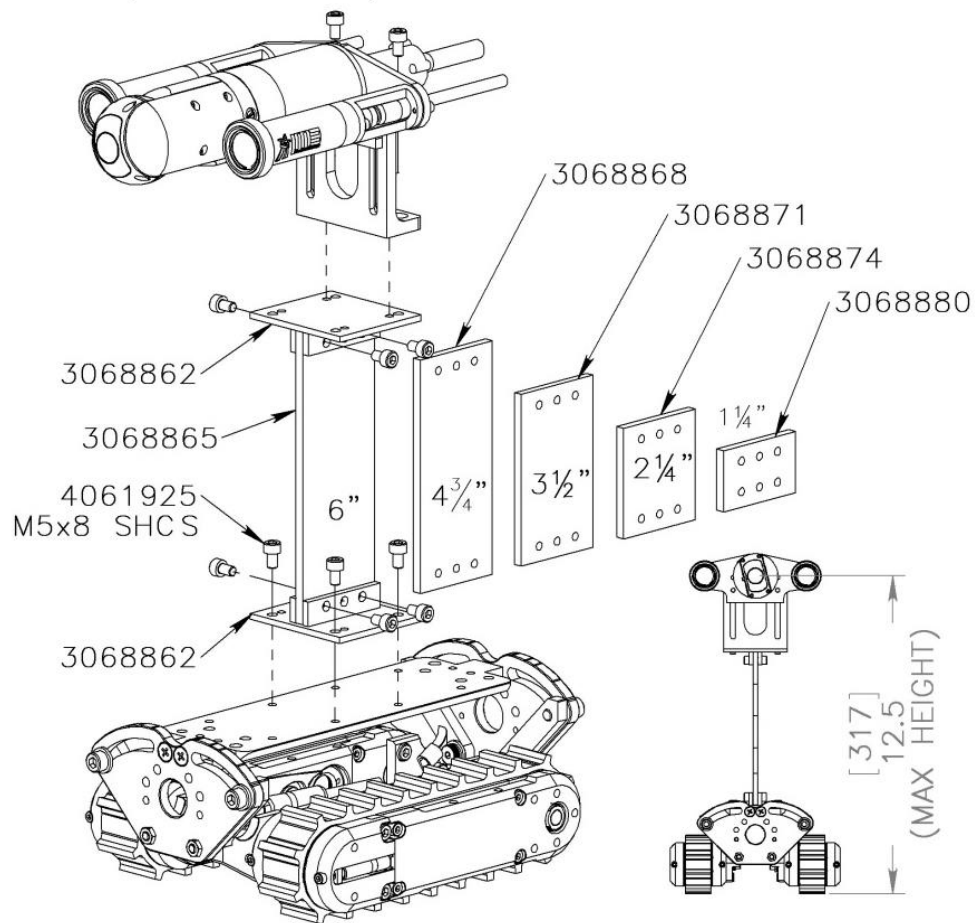


FIGURE 1: CAMERA HEIGHT ADJUSTMENT

## Camera Height Extensions

An optional height extension kit may be added to the parallel chassis to raise the camera by up to 150mm (6 in). Five brackets are included with the kit. Used in combination with the standard height adjustment, the kit allows for continuous adjustment to center the camera in pipe sizes from 300 – 600 mm (12 – 24 in).

### CAMERA EXTENSION KIT (3069627)



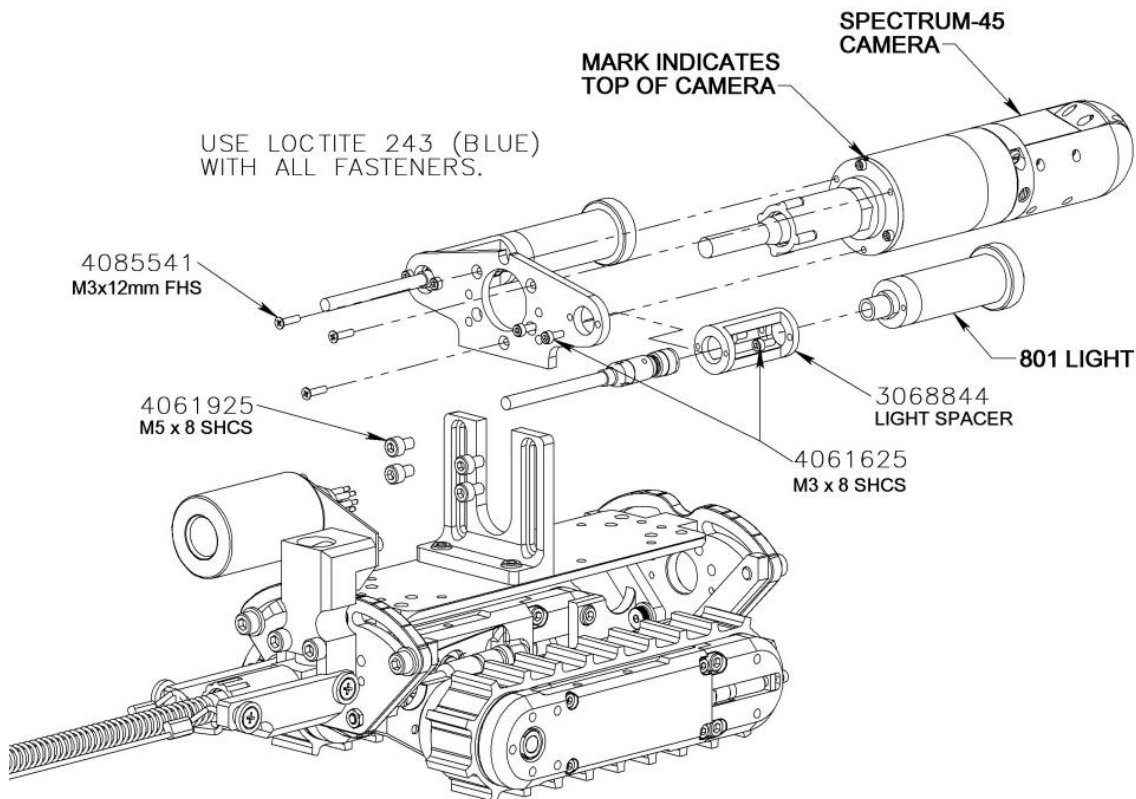
## Camera & Light Installation

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## Spectrum 45

The front Spectrum 45™ (SP45) camera is mounted to the vehicle using three M3 x 12 mm FHMS. There is a mark at the back of the camera which indicates the top for correct orientation.

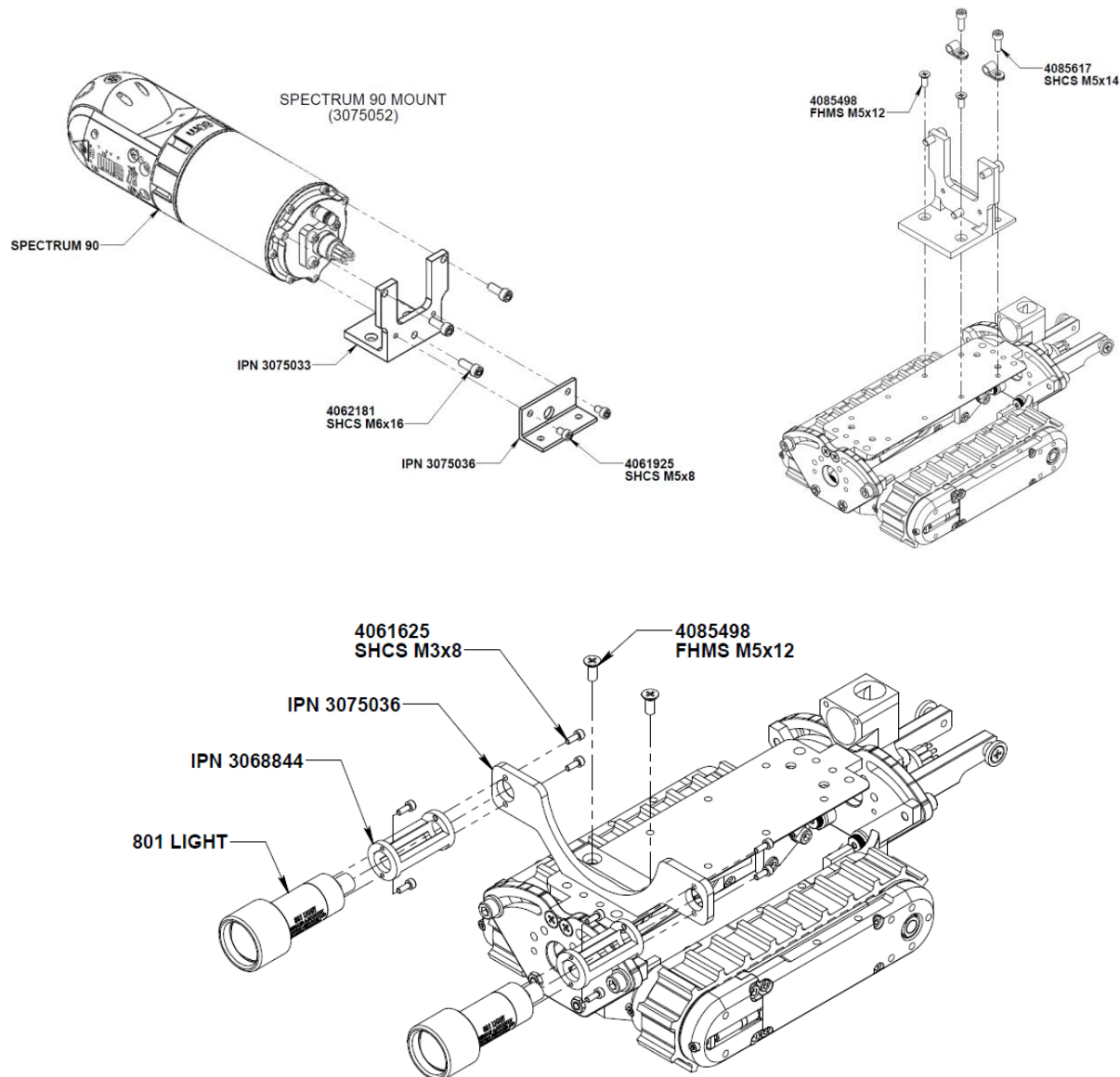
Additional lighting is provided by two 801 Lights, installed using two M3 x 8 mm SHCS. Spacers move the lights forward to beside the camera.



## Spectrum 90™

A Spectrum 90™ (SP90) can be installed as an upgrade from the standard SP45™ for this vehicle. Note: this requires a different harness as whip lengths will change.

**Note:** Installation of an SP90 may require the use of different fasteners when the system is equipped with a magnet tray. See the **Magnet Adjustment** section for more information.





## Microtrac Mounting

The Microtracs™ are removed or installed onto the vehicle using four M5 x 8 mm SHCS. The track whip connector must be fully mated (finger tight only), and the whip secured on place on the chassis using the provided P-clips.

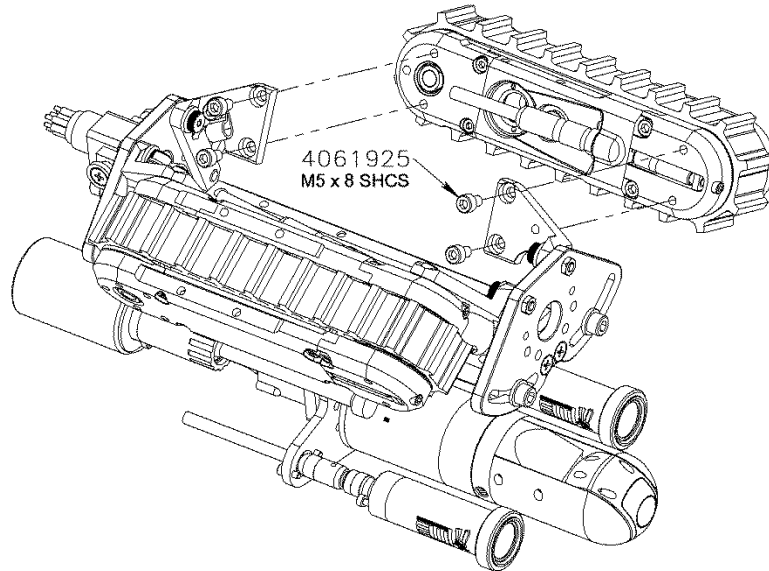


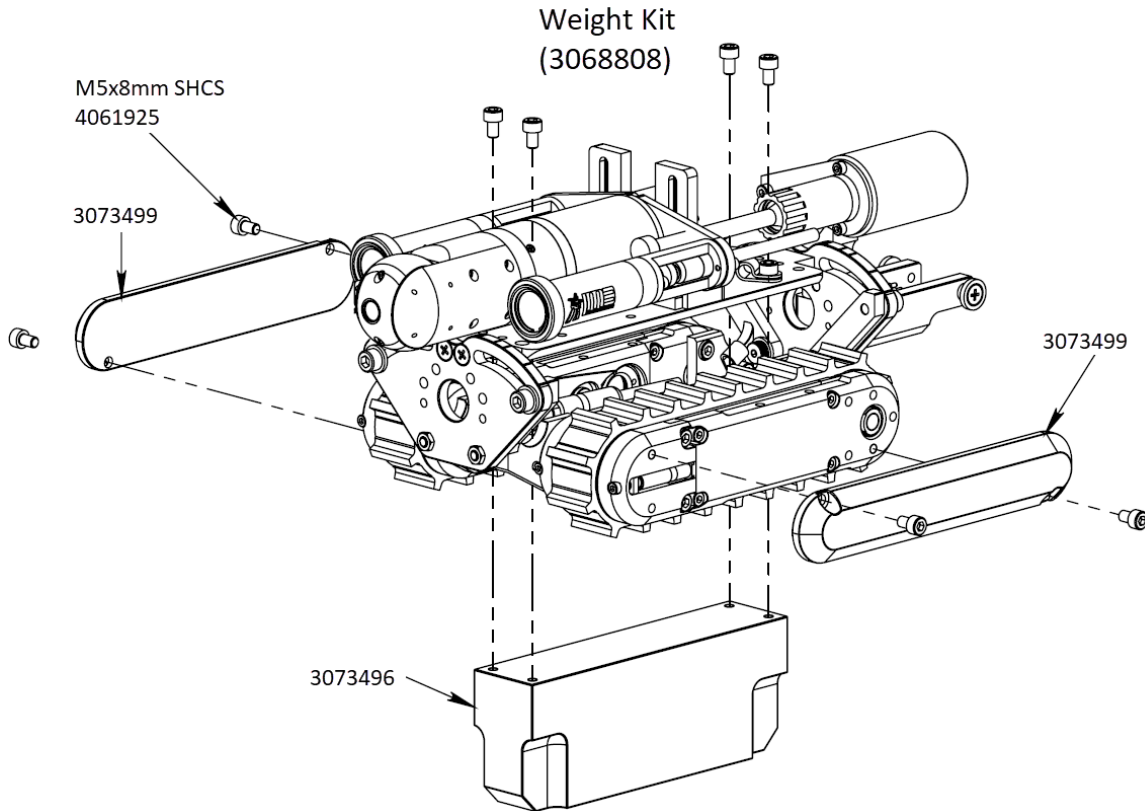
FIGURE 2: PARALLEL TRACK REMOVAL



**WARNING: Track Voltage Input** – Microtracs are supplied in two different voltage ranges: 36-48VDC, and 30-70 VDC. Verify your tracks have the correct voltage input range for your system. 48V rated tracks will be damaged if connected to a 70-Volt system. Wide input tracks are designated by a **W** symbol on the side plate.

## Traction Weight Kit

An optional weight kit may be added to the parallel vehicle to increase traction. The weight kit adds 3.9 kg (8.7 lb) to the parallel vehicle. Standard weights are powder painted steel but are also available in brass or stainless steel.

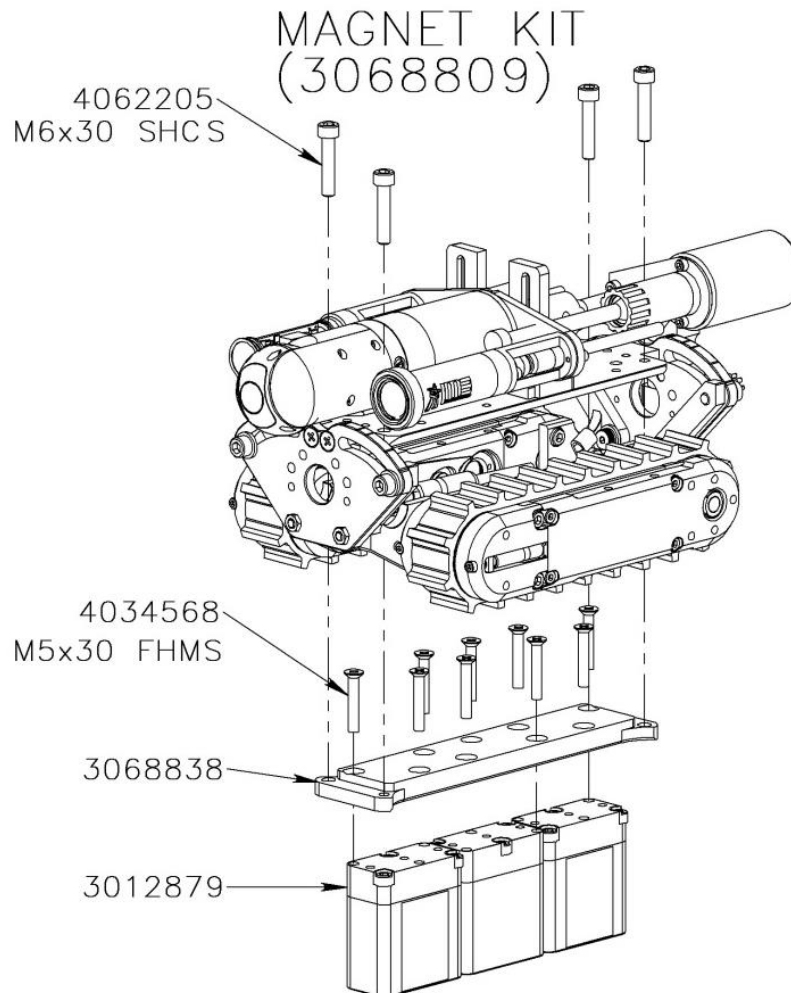




## Magnet Kit

A magnetic attachment can be added to the parallel chassis for better traction in steel pipes and on steel surfaces. The following subsections give detail on installation and adjustment of the magnet kit.

**Note:** Systems equipped with an SP90™ require different fasteners for mounting the magnet tray. These systems are supplied with M6 x 30 mm, M6 x 25 mm, and M6 x 20 mm SHCS.



### Magnet Kit Installation

To install the magnet kit, start with the vehicle in the flat configuration with the front camera whip disconnected, then, remove the harness by unscrewing the two M6 SHCS using a 5mm Allen key. Next, remove the four M5 FHMS that hold on the center bar by using a No. 1 Philipps screwdriver.

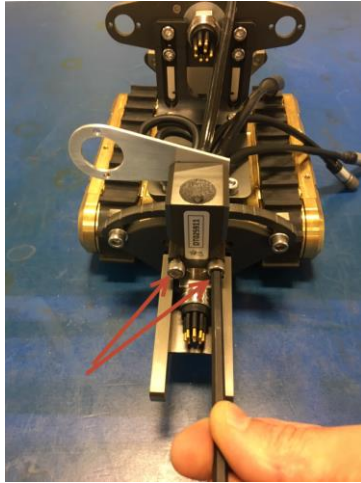


FIGURE 3: REMOVE HARNESS

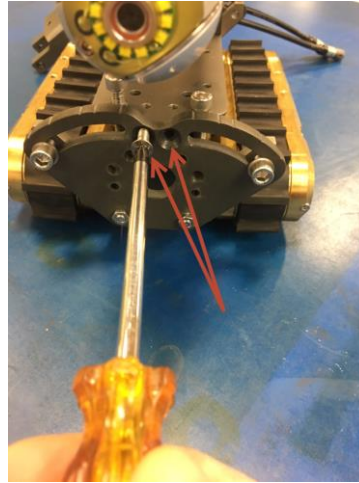


FIGURE 4: REMOVE CENTER BAR SCREWS

Finally, the center bar and camera mount can be lifted out of the chassis and the magnets installed to the center bar. See **Error! Reference source not found.** for assembly of the magnet plate and magnet boxes. Reassembly of the vehicle is the reverse of disassembly.

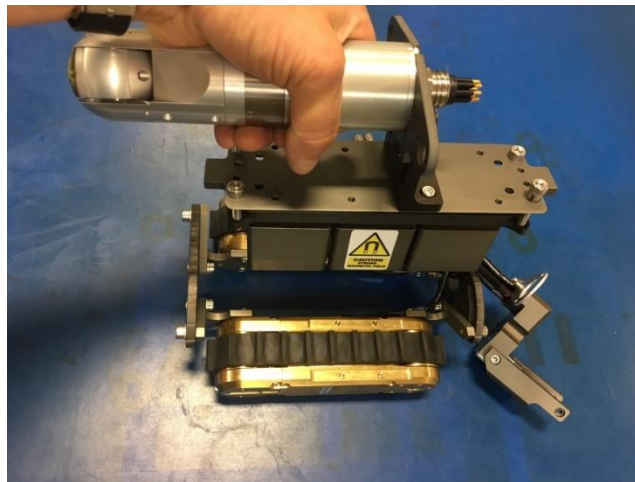


FIGURE 5: FRAME CENTER BAR REMOVAL

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## Magnet Adjustment

**Note:** The magnet tray is held by four M6 screws. Two screws are pulling up, and two screws are pushing down in an “X” arrangement. The screws that are pushing down (lock screws) are threaded through the chassis backplane. The screws that are pulling up (height adjustment screws) are threaded through the magnet tray. Using this method, small adjustments can be made to the tilt angle of the magnet tray as well as the height. To adjust the magnet height, loosen off the two locking screws. Then adjust the height using the height adjustment screws as required. Last, evenly snug down the locking screws. These do not require much torque – the magnet tray may easily be distorted if the locking screws are too tight. If the locking screws are not positioned evenly, the magnet tray will be crooked. Use Loctite 243 (blue) to hold the screws in place. Use low torque.

When adjusting the magnet tray, it is important to set it to an appropriate height. The proper setting for magnet height is a balance of three factors: required force, required ground clearance, and track loading. Generally, the magnets should be set as close to the wall surface as possible in order to yield the highest pulling force. However, if the magnets are set too close, the vehicle may stick itself to the surface it is driving on or the additional load may overload the tracks and immobilize the vehicle.

In the case that the vehicle will be operated on a vertical surface, special care should be taken to set the magnet height. The inherently higher danger of operating the vehicle on a vertical surface necessitates a higher margin of safety for the magnetic adhesion of the vehicle. Also, discontinuities on the surface, such as welds, may cause the vehicle to lose magnetic adhesion; therefore, inspections should not require the vehicle to navigate over such discontinuities if it is operating vertically.

**Note:** If the system is equipped with an SP90™, magnet tray mounting fasteners are to be replaced as required for clearance with the body of the camera. Longer fasteners are to be used when the magnet tray is adjusted to a lower position and shorter fasteners are to be used when the magnet tray is adjusted to a higher position.



**Warning: Pinch Hazard** – Rare earth magnets are very strong. Use caution when handling the magnets or vehicle near steel objects, they may snap together unexpectedly.

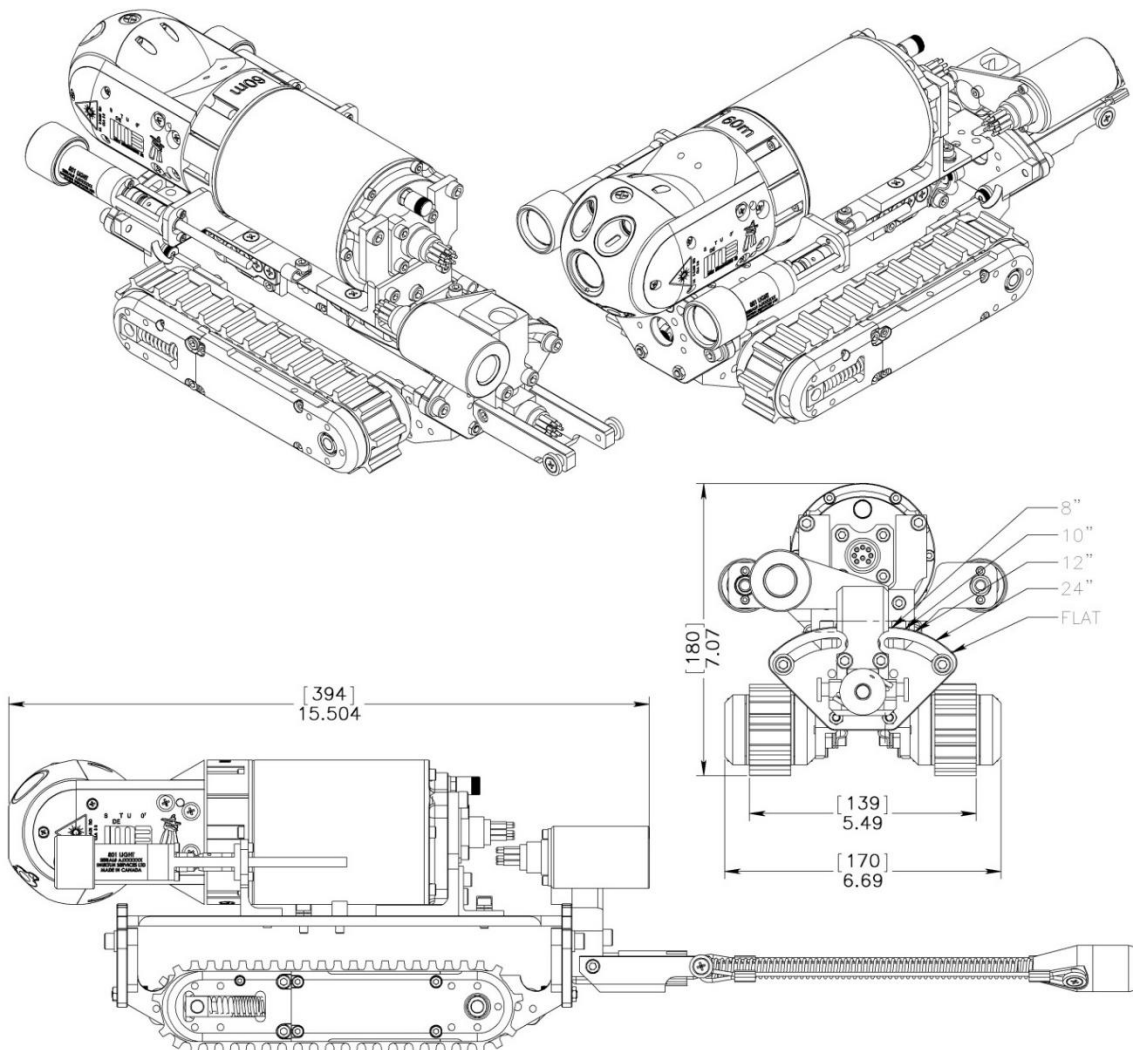


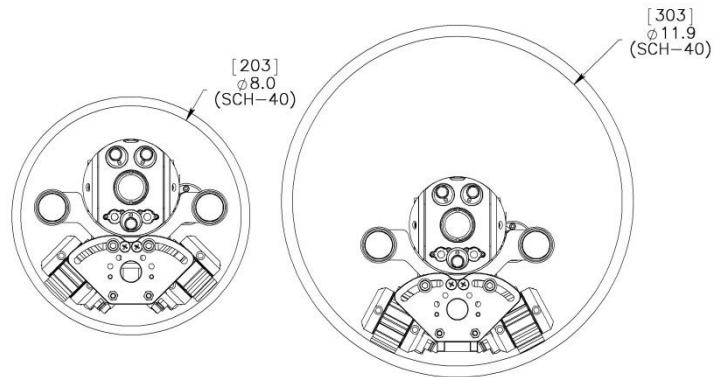
**Warning: Strong Magnets** – Operators with magnetically sensitive medical implants should be aware and follow appropriate practices. Care should also be exercised around other magnetically sensitive devices, including computer hard drives, cell phones, watches and credit cards.

## Extended Parallel With Spectrum 90™

## Extended Parallel Chassis

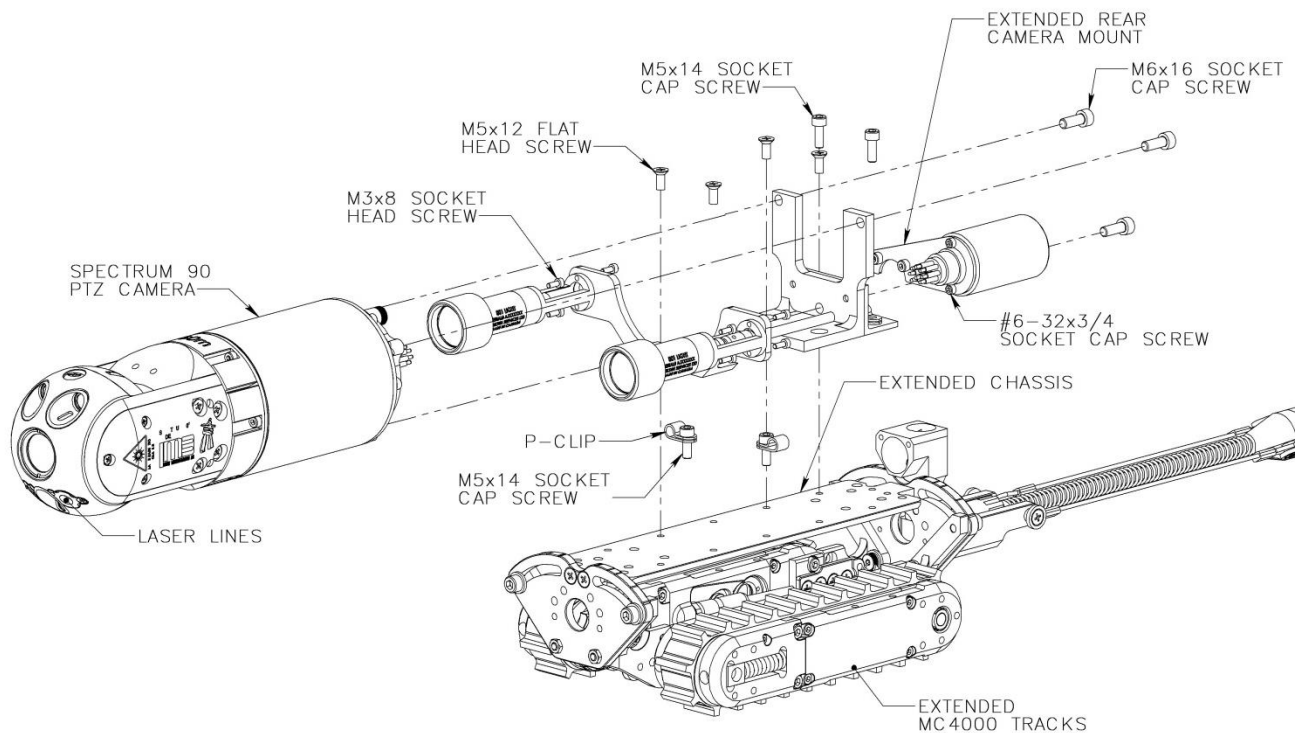
The extended parallel chassis uses extended Microtracs™ to accommodate additional weights and magnets, and to better accommodate the SP90 camera. Standard weight and magnet kits are incompatible with the extended chassis. With the SP90 camera installed, the minimum pipe size is 200 mm (8 in).





## Camera & Light Installation

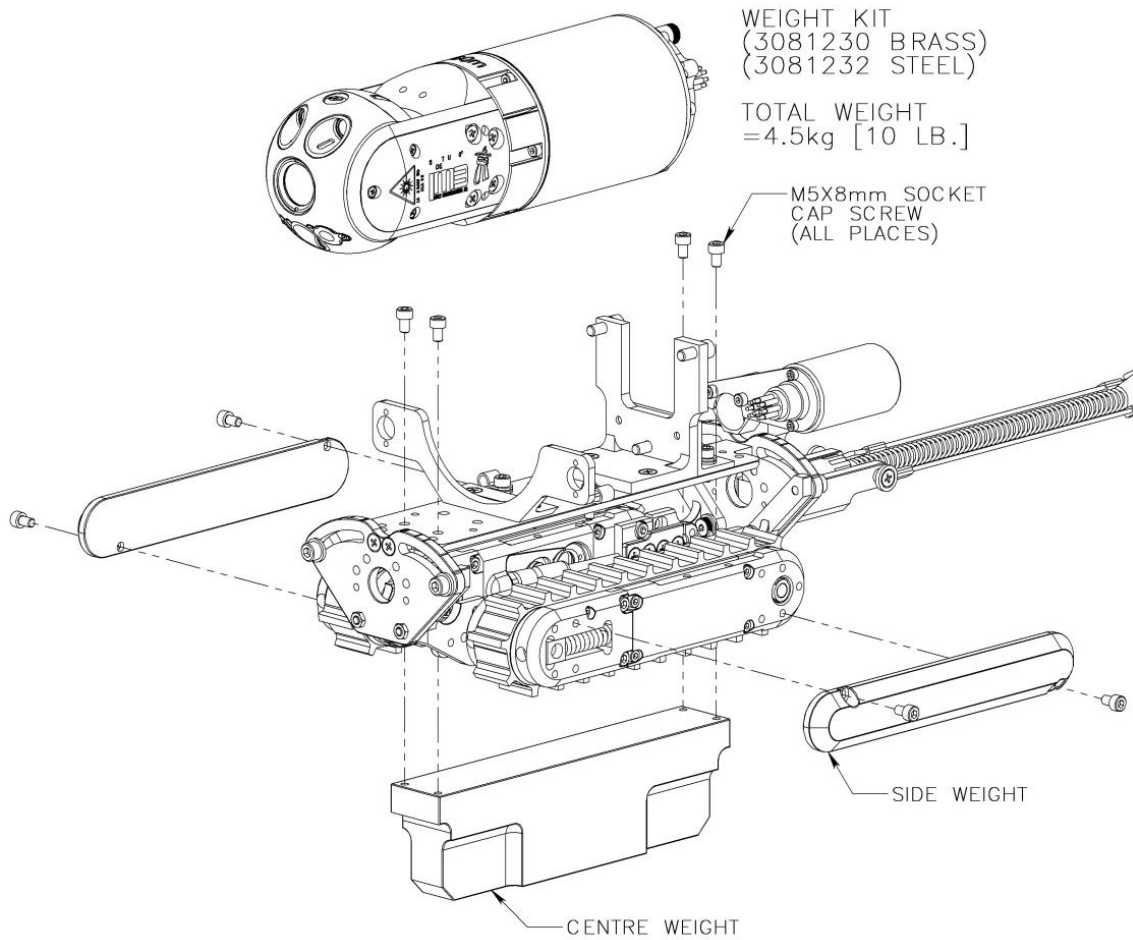
The front SP90™ camera is mounted to the vehicle using M6 x 16 mm SHCS. The camera is oriented with the Schrader valve on the back of the camera facing up. Additional lighting is provided by the two 801 Lights, installed using M3 x 8 mm SHCS. Spacers move the lights forward to beside the camera. The rear facing camera uses an extended mount (from the factory) to prevent cabling interference with the Spectrum 90 camera. Use Loctite 243 (blue) with all fasteners.





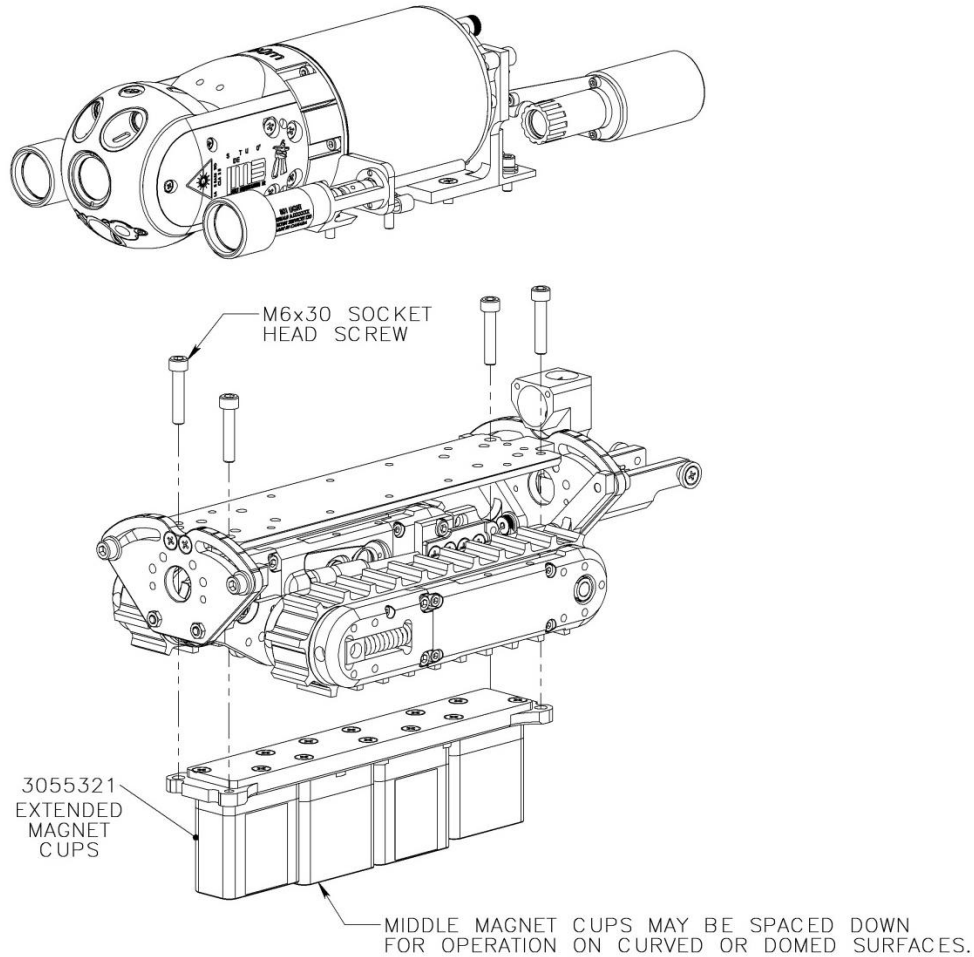
## Extended Traction Weight Kit

An optional extended weight kit may be added to the extended parallel vehicle to increase traction. The weight kit adds 4.5 kg (10 lb) to the parallel vehicle. Standard weights are painted steel but are also available in brass or stainless steel. Use Loctite 243 (blue) with all fasteners.



## Extended Magnet Kit

A 4-Cup magnetic attachment can be added to the extended parallel chassis for better traction in steel pipes and on steel surfaces. Installation and adjustment of the magnet kit follows the same procedure as the standard-length magnet kit described above. Use Loctite 243 (blue) with all fasteners.



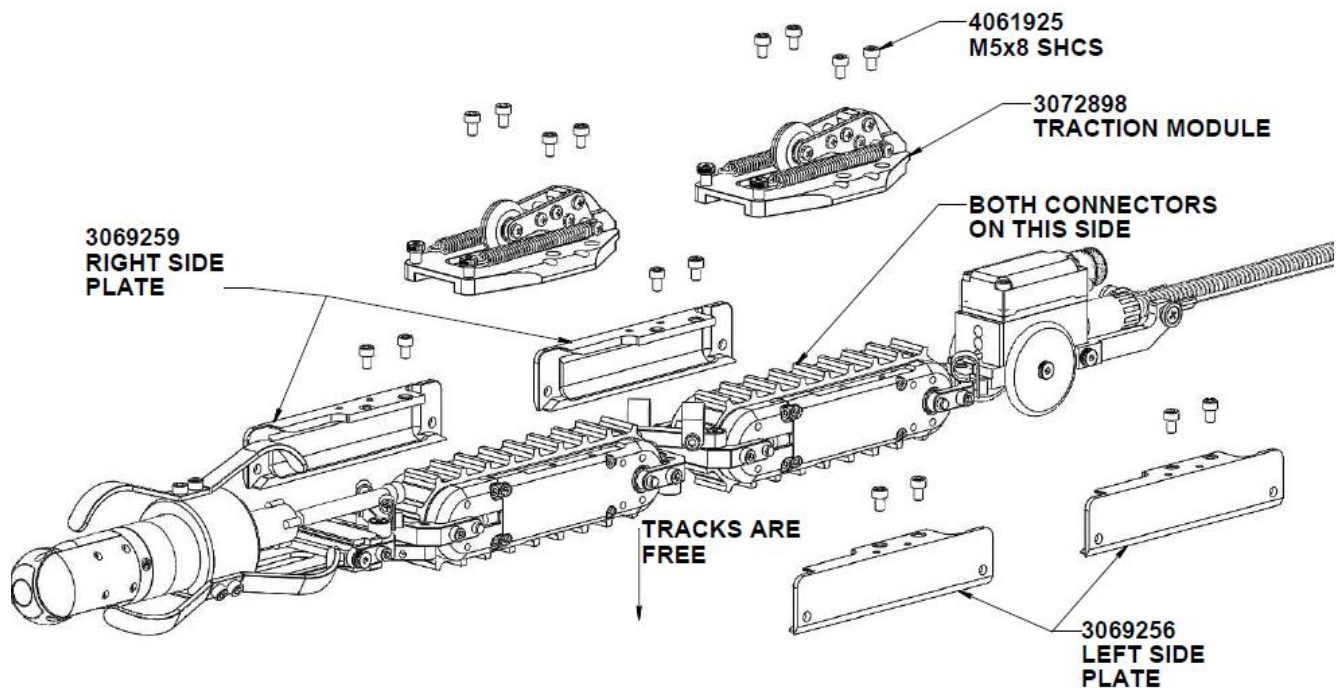
## Inline Configuration

### Track Installation

The inline VT100™ vehicle uses two sets of side plates and two sets of “X” hinges to connect the tracks. To begin assembly of the inline configuration, gather together the wiring harness, side plates, tracks, hinges, and screws. Line up the hinges and tracks as illustrated below. Note that the wiring harness remains strapped to the hinges. When disassembling the vehicle there is no need to remove the wiring from the hinges.

1. Connect the track electrical connectors. Both tracks are placed with the connectors on their right-hand side.
2. The hinges connect to the side plates, then the side plates to the tracks. First assemble the side plates into position with the hinge pivot pins sliding into the plate pivot holes. Then screw the side plates onto the tracks using M5 x 8 mm SHCS. Use Loctite 243 (blue) on all screws.

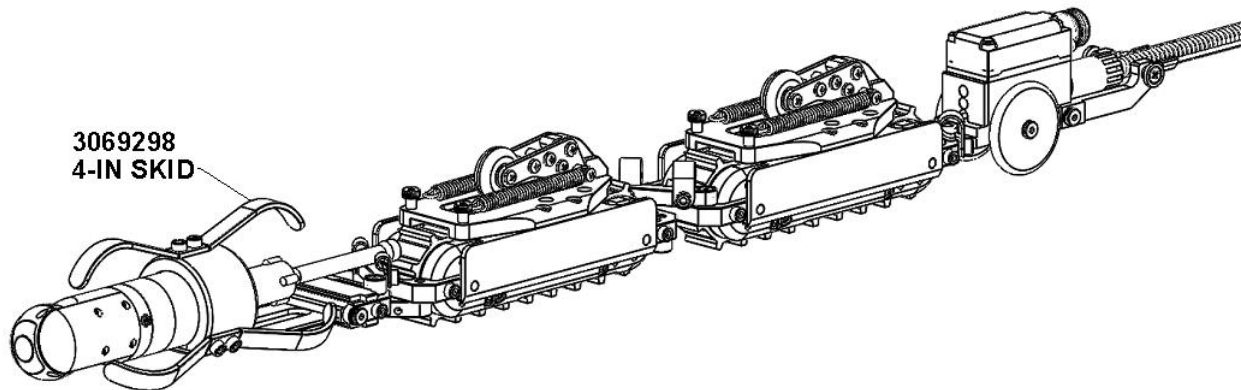
The vehicle is now ready to configure for the target pipe size.





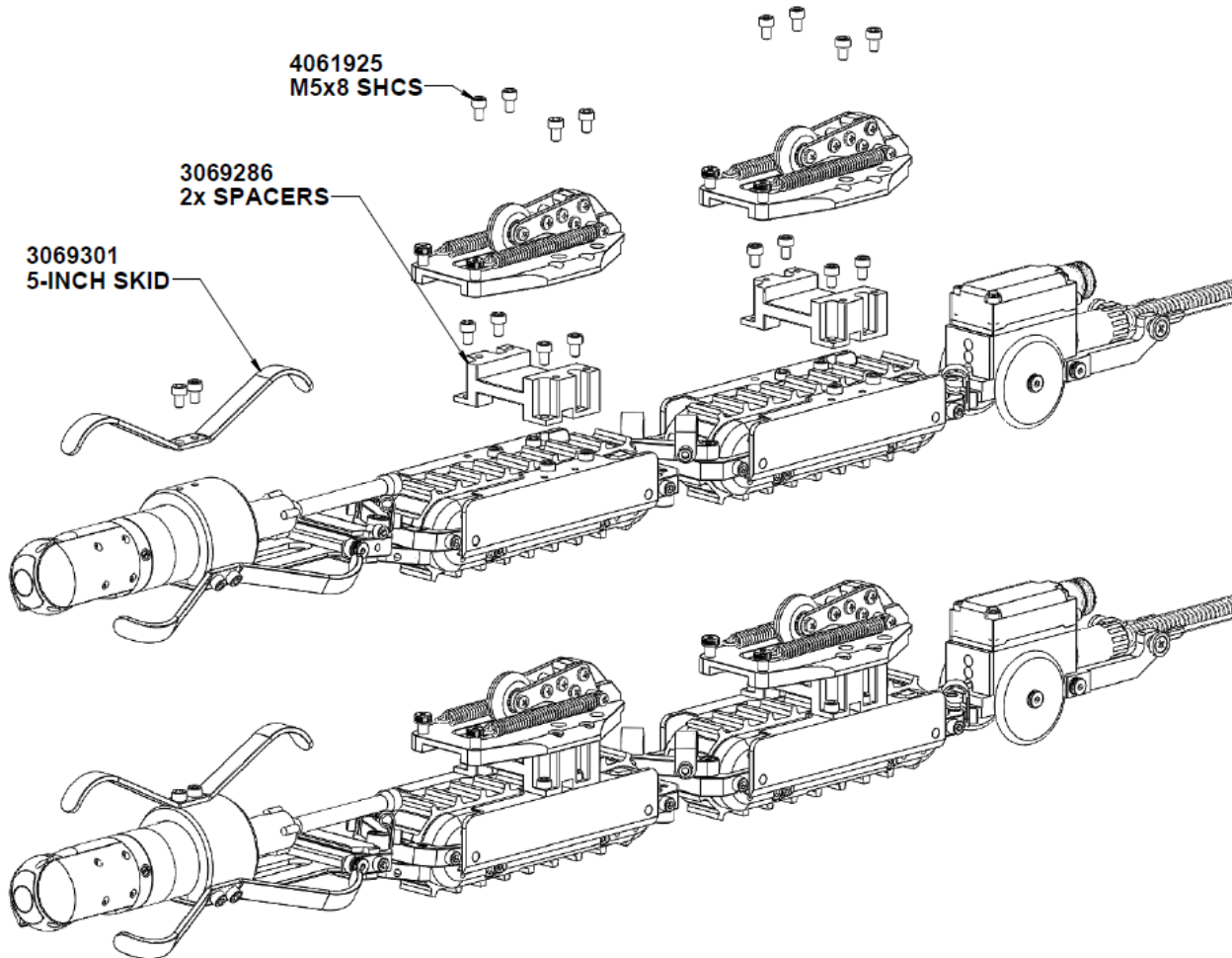
## 100 mm (4 in) Configuration

1. The 100 mm (4 in) in-line configuration uses the spring-loaded traction units (illustrated above) without spacers.
2. Install the 100 mm (4 in) skids around the camera (illustrated below). Use Loctite 243 (blue) with all fasteners.



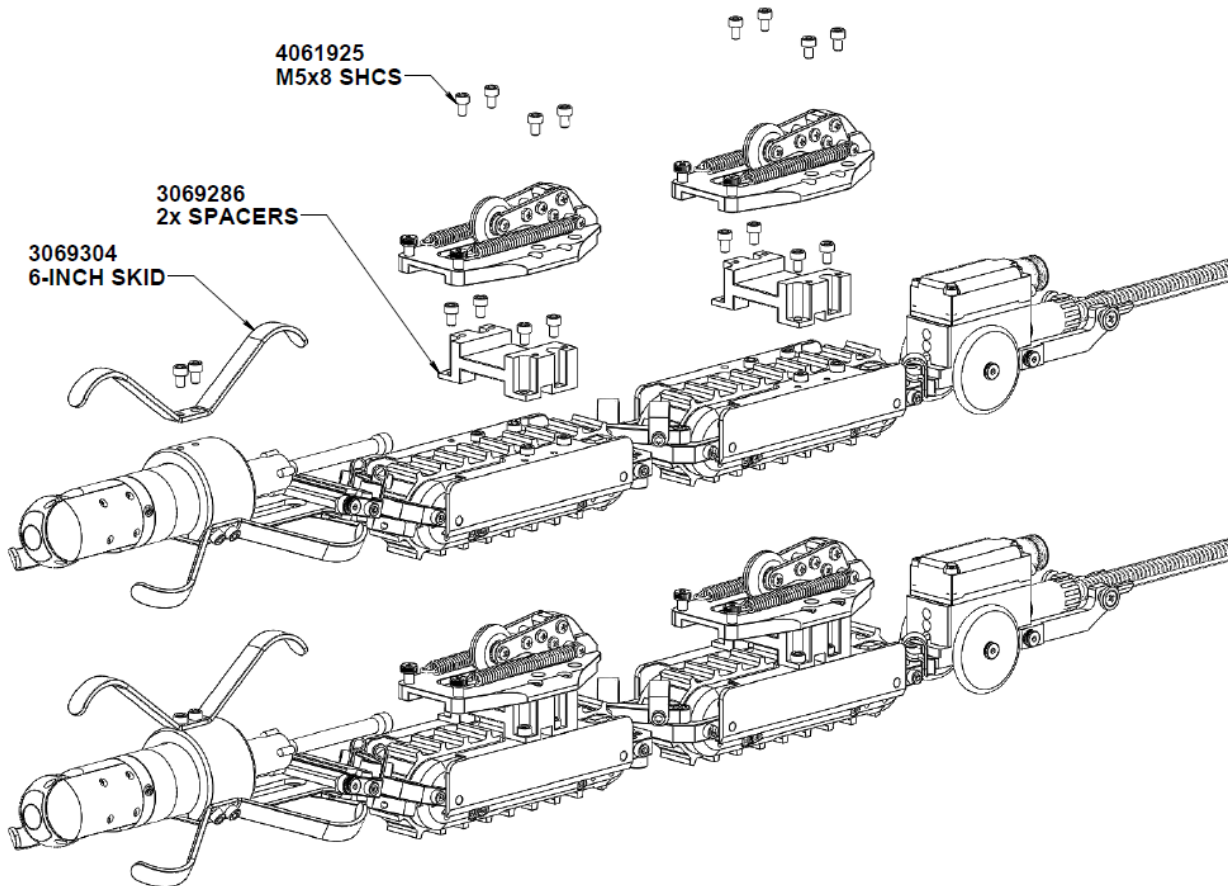
## 125 mm (5 in) Configuration

1. The 125 mm (5 in) in-line configuration uses the spring-loaded traction units (illustrated above) with one spacer.
2. Install the 125 mm (5 in) skids around the camera (illustrated below). Use Loctite 243 (blue) with all fasteners.



## 150 mm (6 in) Configuration

1. The 150 mm (6 in) in-line configuration uses the spring-loaded traction units (illustrated above) with two spacers.
2. Install the 150 mm (6 in) skids around the camera (illustrated below). Use Loctite 243 (blue) with all fasteners.



## Rear Camera

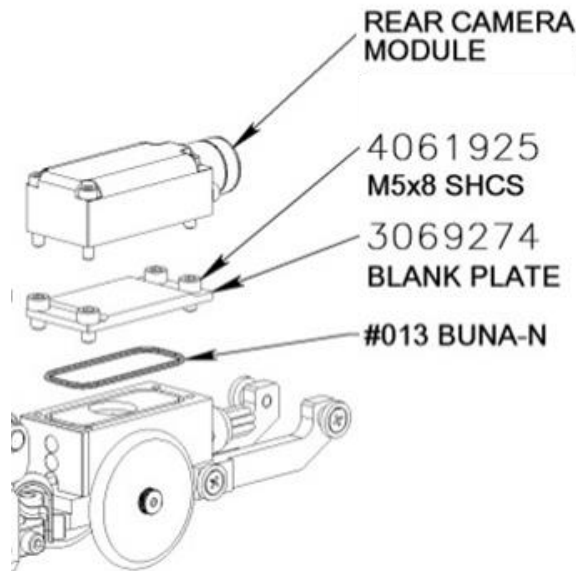
An optional rear camera may be installed on the in-line vehicle.

**No camera:** Install the blank plate as shown below. The wired camera connector will be stowed in the counter-bored hole under the lid.



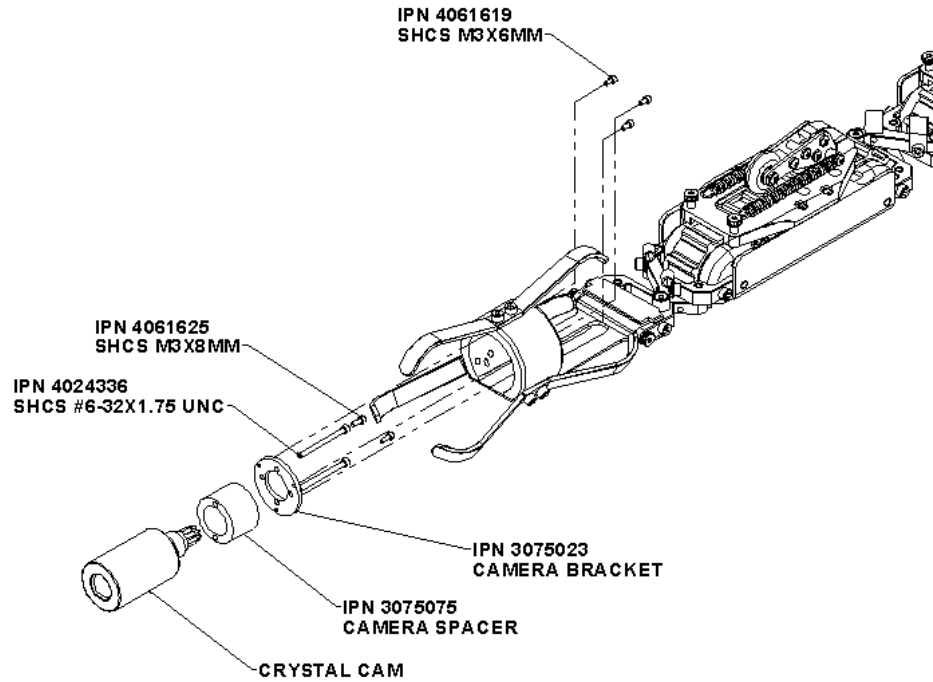
**IMPORTANT:** When reinstalling the camera or blanking plate, always inspect the O-ring and replace if damaged. Grease the O-ring with Molykote 111 before installation.

**Rear camera:** Remove the blank plate. Plug the camera connector wiring into the rear camera module. Screw the module in place, ensuring the O-ring is clean and fully seated in its groove. Camera modules come aligned from the factory. If further adjustment is required to level the image, slightly loosen the two screws holding on the camera lens and rotate until the image is level.



## Front Sapphire™ Camera

The inline vehicle can be configured with a Sapphire as its front camera. This requires a non-standard harness.



## Operation

### Pre-Operations Check

Before each deployment of the Versatrax 100™ system, ensure everything is completed on the following checklist.

- ☐ Check that the work area has been safely set up.
- ☐ Fall arrest is in place for vertical or inverted use.
- ☐ Check that the line voltage available at the worksite matches the equipment setup.
- ☐ Check that power and deck cable connections are correct.
- ☐ Check the vehicle for the following:
  - ☐ Check that the vehicle is in the correct configuration for the deployment.
  - ☐ Check the vehicle for mechanical damage to the chassis or cable harnesses which could affect its operation.
  - ☐ Ensure that all fasteners are in place and secure. In particular, check the fasteners holding on cameras, lights, tracks, and the harness block.
  - ☐ Visually inspect the vehicle and Microtracs™ to ensure that the moving parts are free of debris and functional. Make sure the track belt is free of debris and turns freely.
  - ☐ Check the tether and vehicle whips for damage.
  - ☐ Ensure camera, light, and laser ports are clean.
- ☐ Check the reel for the following:
  - ☐ Check that nothing will block movement of the level wind shuttle.
  - ☐ Check that the tether has no loose, dangling coils. Dangling coils can propagate as the drum rotates and have the potential to jump the drum. Take care of these before deploying the tether.
- ☐ Power up the system and check the following:
  - ☐ Check for sufficient SSD drive space for recording.
  - ☐ Check record directories are set.
  - ☐ Test video recording.
  - ☐ Test laser lines
  - ☐ Test auxiliary lights.
  - ☐ Test track control.
  - ☐ Test camera control.

## Post-Operations Check

A Post-Ops inspection should be carried out after every deployment using the following checklist:

- ☐ Inspect the tether for damage as it is reeled in.
- ☐ Visually inspect vehicle for entrained debris or mechanical damage.
- ☐ Test each function to ensure proper operation.
- ☐ Clean the system by hosing it down with water at regular line pressure. Do not pressure wash. The tracks may be cleaned off by hosing them down while running. If the system has been used in salt water, thoroughly rinse the vehicle with fresh water right away.



**CAUTION:** Do not use a pressure washer to clean the camera. Very high-pressure water can push past seals and flood the camera resulting in electrical damage or personal injuries.

- ☐ Take time to pack the system properly for transport away from the worksite.
- ☐ Store the system in a dry environment.

**Note:** Ensuring the Versatrax 100™ system is always stored in good working condition will minimize deployment time for future inspections.

## ICON™ & ICON™ RPT

Vehicle control and video recording are accomplished using ICON graphical interface controller software. Video playback and reporting are conducted through ICON RPT. **Manuals for these two software packages are included separately.** Controls for recording and snapshot functions are kept on-screen with the camera controls.

- ICON Manual – (Control Interface and Recording)
- ICON RPT Manual - (Reporting, Playback and Video Export)

## Dealing With Obstacles

The operator will invariably encounter a range of obstacles in a pipe. Each time the operator must decide if the vehicle can safely pass or if there is risk of getting stuck. Common obstacles include but are not limited to:

- Crushed pipe
- Sand
- Rocks, construction debris, random rubbish
- Roots
- Intersecting service pipes

The Versatrax™ vehicle naturally straddles the debris at the very bottom of a pipe. If the debris is high you may try installing the track extension brackets to give the chassis more clearance. Additionally, the inside track weights may be removed to increase center clearance.

If the operator is unsure about pipe navigability, he or she should consult with the site supervisor before moving forward.

## Troubleshooting

### Camera Control Problems

- Not all the auxiliary lights are on.
  - The ICON software allows the lights to be controlled independently. Ensure all lights are enabled. Refer to the ICON™ interface manual.
  - Inspect for blown LEDs.
- Warning: High Intensity. Do not look directly into the lights. Use a welding filter (shade #8) to observe the light elements.
- Camera pan or tilt does not function in one or both directions.
  - Check that the camera is not jammed.
  - If you can hear a motor running but see no movement, there is a mechanical or clutch problem inside the camera. Contact us.
- Camera is moving very slowly.
  - Check the pan & tilt speed in the camera control window. Refer to the ICON user interface manual.

Document: UMDT013103.docm	Revision: A13	Created by: KJB	Date: 15 Oct 2019	3070984-A13
Source Location: C:\ePDM\ISLEng\products\dt-versatrax100mkii\manuals\UMDT013103.docm				Page 40 of 47



## Video Problems

- No video (black or blue background)
  - Interface box is not turned on.
  - Video cables are not hooked up between interface box and computer.
  - Camera connector on vehicle is loose (turn power off first before plugging in camera).
  - Check that the camera harness whip is plugged into the correct socket on the telemetry can.
  - Check monitor input settings.
- Vehicle power is not on.
  - Check for problems with other video components between the computer and monitor.
  - Try a different monitor. Whole days have been spent on field maintenance trips only to discover a faulty monitor.
- Picture is very dark or very bright.
  - Check the light levels of both the camera and main lights.
- Intermittent picture.
  - Check and replace the video cables.
  - Check the monitor is working properly.
  - Check that the camera harness whip is fully plugged in.
  - Check for intermittent breaks in the camera harness cable.
  - Check the tether connectors at both controller and vehicle.
  - Check for tether or slip ring damage by testing tether continuity.
- Picture is blurry, will not focus, or has poor color.
  - This may be a dirty camera view port, or a narrow object lying in front of the view port.
  - Object may be too close to the camera.
- No Rear Video
  - Verify the video connection from the interface box to the computer.
  - This may be a dirty camera view port, or a narrow object lying in front of the view port.

## Vehicle Problems

- Vehicle won't steer or vehicle runs backward.
  - Tracks set to the wrong positions.
  - Track reverse setting incorrect in control software.
  - Node ID conflict between one or more devices on the vehicle.
- Tracks will not run.
  - Check the track current feedback (See ICON manual).
    - If current is at 100% and the vehicle doesn't move, then the tracks may be jammed. They could be wedged on an object or jammed with sand. Try reversing the tracks to clear debris. If a jam will not clear you will have to recover the vehicle by pulling it out with the tether.
    - If no current registers, then power or communication is not getting to the tracks. Check all the cable connections.
  - Try power cycling the system.
  - Inspect the vehicle wiring for damage.

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Source Location: C:\ePDM\ISLEng\products\dt-versatrax100mki\manuals\UMDT013103.docm				Page 41 of 47

- Check all the system connectors.
  - Try restarting ICON™
  - Listen for the track motors. If the motors run but the track doesn't turn there is a problem with the gearing or shaft pins.
  - Try changing tracks. (ICON will require a restart.)
- Track Raise will not move.
  - Check the linkage between the top linkage and the encoder feedback
  - Check the connector to the camera raise motor.
  - Try restarting ICON.

## Reel Problems

- Tether distance does not read correctly.
  - Check that the pressure wheel is pressing the tether against the payout sheave. If the tether is being pulled up from the sheave instead of down, it may be disengaged from the sheave.
  - Check that the units are set properly in the graphical overlay.
  - Recalibrate distance encoder.
  - Ensure that the correct COM port is selected in the control software.

## Maintenance

### Rinsing and Cleaning

After every mission check to see if the vehicle needs cleaning.

1. If the system has been used in salt water, thoroughly rinse the vehicle with fresh water prior to being stored away. Accelerated corrosion will result if the inspection system is not rinsed properly. Pay close attention to rinsing and cleaning the camera window, LED light dome and the spaces between moving parts and track belts.
2. Use an open hose or tap at regular water line pressure for rinsing. Do not pressure wash the equipment – water will be forced into the camera at these high pressures.
3. Avoid scratching the camera port. Use glass cleaner and a soft cloth to clean the port.



**CAUTION:** Do not use a pressure washer to clean the camera. Very high-pressure water can push past seals and flood the components resulting in electrical damage or personal injuries.

Periodically:

1. Use a damp cloth or spray cleaner for the power supply / controller box. The box must never be sprayed down or immersed in water. Unplug the controller before cleaning.
2. For general cleaning of the cameras and tracks, use a mild detergent.

### Fuse Replacement

The controller and power supply contain panel mount fuses for both AC and DC voltages. These fuses are for the safety of the operator(s) as well as to protect the equipment from damage. If a fuse blows, stop and look for possible causes. Causes might include cable damage, water incursion or improper connections. *See the controller manual for fuse replacement.*

Fuse values have been carefully selected for their application. Always replace the fuses with the same type and rating.



**Caution:** Disconnect the power source before checking or replacing fuses.

### Microtrac™ Maintenance

Refer to the Microtrac manual for Microtrac maintenance and servicing instructions.

### Camera Maintenance

Refer to the Spectrum 90™ or Spectrum 120HD™ manual for camera maintenance and servicing instructions.

### Tether Re-termination

Contact us if tether re-termination is required. Tether re-termination kits are also available. Detailed instructions and wiring diagrams will be included with the kit.

## Parts and Repairs

### Ordering Parts/Customer Service

Spare and/or replacement parts are available for your product and can be ordered directly from your local office.

When ordering parts always make sure to quote the sales order acknowledgement (SOA) number and/or the serial number of the system component in question.

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USA

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## Warranty Repairs

Warranty conditions are specified in the Warranty section. Should any conditions of the manufacturer's warranty be breached, the warranty may be considered void. All returned items must be sent prepaid to Eddyfi Technologies at the above address.

## Factory Returns to Canada

Some sub-assemblies of your Eddyfi Technologies product are not field-serviceable and may need to return to the factory for repair. Warranty claims must return to the factory for evaluation.

To return an item for evaluation or repair, first contact Eddyfi Technologies at our toll-free number or e-mail address. Eddyfi Technologies will supply a Return Merchandise Authorization (RMA) number with detailed shipping and customs instructions. Items shipped without an RMA number will be held at Eddyfi Technologies until the correct paperwork is completed. If cross-border shipments are not labelled as per the instructions, the items may be held by customs and issued additional fees.

All returned items must be sent prepaid unless other specific arrangements have been made.

When the product or system is being shipped anywhere by courier or shipping company, it must be packaged in the original packaging it was received in. This measure greatly reduces the consequences of rough handling and subsequent shipping damage.

Eddyfi Technologies cannot be held responsible for damages due to improper packaging. Shipping damage may have significant impact on repair turnaround times.

## Product/System Drawing Package Availability

Mechanical assembly and electrical wiring diagram drawing packages for your equipment are available in PDF format upon request. Printed copies may also be purchased from Eddyfi. Contact your local sales contact for more information.

Document: UMDT013103.docm	Revision: A13	Created by: KJB	Date: 15 Oct 2019	3070984-A13
Source Location: C:\ePDM\ISLEng\products\dt-versatrax100mkii\manuals\UMDT013103.docm				Page 46 of 47

## Limited Warranty Policy

Eddyfi Technologies will repair or replace, at its expense and at its option, any system or component, subject to the limitations and / or exclusions specified herein, which in normal use has proven to be defective in workmanship or material provided that, within one (1) year of the purchase date, the original purchaser returns the product prepaid, accompanied by proof of purchase, from a sales agent authorized by Eddyfi Technologies, and provides Eddyfi Technologies with reasonable opportunity to verify the alleged defect by inspection.

### Warranty Limitations and/or Exclusions:

1. This warranty does not apply to light bulbs.
2. Batteries, fuses, transistors, integrated circuit modules (IC's), voltage regulating devices and electrical plugs and / or connectors are warranted to be free from defects in material and workmanship for a period of ninety (90) days from the date of shipment to the original purchaser.
3. Any article purchased from, but not manufactured by, Eddyfi Technologies is sold with only such warranties as are made by the manufacturer therein. Eddyfi Technologies only warrants that it has title thereto, free of all liens or encumbrances.
4. This warranty does not apply to units which are damaged by connection to improperly wired AC receptacles.
5. Track belts, tethers, view ports and other components subject to wear through abrasion are warranted to be free from defects in material and workmanship for a period of ninety (90) days from the date of shipment to the original purchaser.
6. Any damage caused by failure to observe proper packing or to observe instructions for operation and maintenance as contained in the Instruction Manual furnished with the equipment, by accident in transit or elsewhere, will not be covered by the warranty.
7. Repairs are warranted for 90 days.

Eddyfi Technologies may require that certain components may be returned, prepaid, to a manufacturer's authorized station for inspection and repair or replacement.

Eddyfi Technologies will not be responsible for any asserted defect which has resulted from Acts of God, normal wear, misuse, abuse, improper configuration, repair, or alteration made, or specifically authorized by, anyone other than a representative of Eddyfi Technologies authorized to do so. The giving of, or failure to give, any advice or recommendation by Eddyfi Technologies shall not constitute any warranty by, or impose any liability on, Eddyfi Technologies.

The foregoing constitutes the sole and exclusive remedy of the purchaser and the exclusive liability of Eddyfi Technologies and is in lieu of any and all other warranties, express, implied or statutory as to merchantability, fitness for purpose sold, description, quality productiveness, or any other matter. Under no circumstances shall Eddyfi Technologies be liable for special, incidental or consequential damages, or for delay in performance of this warranty.

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