



TERAX

EN0070 Rev 00.4

Automated Track Crawler

 **JIREH**

SAFETY WARNINGS / PRECAUTIONS

KEEP THIS MANUAL – DO NOT LOSE

THIS MANUAL IS PART OF THE **TERAX** SYSTEM AND MUST BE RETAINED FOR THE LIFE OF THE PRODUCT. PASS ON TO SUBSEQUENT OWNERS.

Ensure any amendments are incorporated with this document.



WARNING! The **TERAX** is designed for a specific use. Using the **TERAX** outside of its intended use is dangerous. Failure to comply with the warnings, instructions, and specifications in this manual could result in **SEVERE INJURY** or **DEATH**. Read and understand this manual before using.



WARNING! FALLING OBJECT HAZARD. The area below a crawler must be kept clear at all times. A clearly marked **NO ENTRY ZONE** must be cordoned off directly below the area of crawler operation.

(see “Preparation for Safe Use” on page 29 for additional details)

WARNING! Do **NOT** operate or place crawler on a surface higher than 2 m (6 ft) without a proper tether held taut at all times.

(see “Tether Requirements and Attachment” on page 30 for additional details)



WARNING! ELECTRICAL CORDS CAN BE HAZARDOUS. Misuse can result in **FIRE** or **DEATH** by **ELECTRICAL SHOCK**. Inspect thoroughly before each use. Do **NOT** use if damaged. Do **NOT** use when wet. Keep away from water. Do **NOT** drive, drag or place objects over cord.



WARNING! Do **NOT** operate scanner in an explosive environment. Do **NOT** operate scanner in the presence of volatile substances.



WARNING! MAGNETIC MATERIAL. The magnet attached to the underside of the **TERAX Base** produces an extremely strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.



Tools, magnets and metal objects can cut, pinch or entrap hands and fingers. **HANDLE WITH CARE.**

People with pacemakers or ICD's must stay at least 75 cm (30 in) away.

WARNING! MAGNETIC MATERIAL. The handheld controller produces a strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.

People with pacemakers or ICD's must stay at least 10 cm (4 in) away.

WARNING! MAGNETIC MATERIAL. When the carrying case contains the crawler, a magnetic field exists outside the case which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.

People with pacemakers or ICD's must stay at least 10 cm (4 in) away from the carrying case when it contains the crawler.

WARNING! MAGNETIC MATERIAL. The installation/removal mat (see "Scanner Installation/Removal Mat Use" on page 54) contains magnetic material.

People with pacemakers or ICD's must stay at least 10 cm (4 in) away.



WARNING! LASER RADIATION. The battery powered optical guide contains a Class 1M laser. Do not view directly with optical instruments.



WARNING! If this product is to be used with any Child Products listed in (Chapter 4.3), be sure to read and comply with the warnings, instructions, and specifications in the Child Product's User Manual(s).



WARNING! DO NOT DISASSEMBLE. No user-serviceable parts. Disassembling any of the components in this product, beyond the instructions in this user manual, could void the regulatory certifications and/or effect the safety of the product.



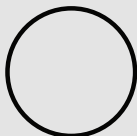
CAUTION! Pinch points exist with this product. Keep fingers and hands clear of pinch points.



CAUTION! Do **NOT** operate the **TERAX** crawler on an inspection surface which is electrically connected to a component that is being welded.



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connecting or disconnecting. Permanent damage to electronics could occur.



OFF. This symbol indicates the off button.



The **WEEE** symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

(see "Disposal" on page 90 for additional details)

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IDENTIFICATION

1.1. Product Brand

This user manual describes the proper safety precautions, setup and use of the **TERAX** system

1.2. Manufacturer

Distributor:

Manufacturer:

Jireh Industries Ltd.
53158 Range Road 224
Ardrossan, Alberta, Canada
T8E 2K
Phone: 780.922.4534
jireh.com

1.3. Compliance Declarations

1.3.1. ISED Emissions Compliance (Canada)

CAN ICES-003(A) / NMB-003(A)

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

1.3.2. FCC Suppliers Declaration of Conformity (United States)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RESPONSIBLE PARTY NAME:	Jireh Industries
ADDRESS:	2955 S Sam Houston Pkwy E Suite 300 Houston, Texas United States 77047
TELEPHONE:	832-564-0626

1.3.3. European Union CE Declarations

Jireh Industries hereby declares that the **TERAX** product complies with the essential requirements and other relevant provisions of the following European Union directives:



- 2014/30/EU EMC Directive
- 2014/35/EU Low Voltage Directive
- 2012/19/EU Directive on Waste Electrical and Electronic Equipment
- 2011/65/EU Directive on Restriction of Hazardous Substances (RoHS)

1.3.4. UKCA Declarations

Jireh Industries hereby declares that the **TERAX** product complies with the essential requirements and other relevant provisions of the following UK directives.



Title	Edition/Date of Issue
Electromagnetic Compatibility Regulations	2016
Electrical Equipment (Safety) Regulations	2016
Waste Electrical and Electronic Equipment Regulations	2013
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations	2012

PRODUCT SPECIFICATIONS

2.1. Base TERAX System Specifications

This section outlines the product specifications of the base system. When the base system is used together with compatible components (*Chapter 2.2*) or child products (*Chapter 2.3*), the product specifications of the base system may be superseded. See (see “Compatible Components Specifications” on page 10) and (see “Child Product Specifications” on page 12).

2.1.1. Intended Use



WARNING! FALLING OBJECT HAZARD.

The **TERAX** is intended for a specific use. Read and understand the intended and unintended use limits below. Using the **TERAX** outside of its intended use is dangerous and could result in **SEVERE INJURY** or **DEATH**.

The **TERAX** - Base Crawler’s primary purpose is to perform inspections of ferrous assets such as pipes, vessels, or storage tanks by moving an inspection tool over a ferrous surface. It is intended for industrial use only.

The **TERAX** - Internal Base Crawler is designed to operate inside pipes, for internal applications.

2.1.1.1 Operating Limits

2.1.1.1.1 TERAX Internal

Category	Parameter	Specification
Inspection Surface	Minimum ID, internal longitudinal driving	204 mm (8 in)
	Maximum surface temperature	50°C (122°F)
Scanner	Maximum umbilical length	60 m (200 ft)
	Maximum straight-driving pull <i>(performance may vary with surface condition)</i>	27 kg (60 lb) <i>(Umbilical and attachments are considered payload)</i>
	Attachments	Restricted to those listed in compatible components or child products

2.1.1.1.2 TERAX Base

Category	Parameter	Specification
Inspection Surface	Up-side-down orientation	Bare metal only
	Vertical orientation	0.5 mm (0.020 in)
	Horizontal, right-side-up orientation	1 mm (0.040 in)
	Condition	Clean, free of excess rust, scale, debris <i>(i.e. dirt, sand, etc.), ice, frost</i>
	Minimum thickness	3 mm (0.120 in)
	Minimum OD, external longitudinal driving	2133 mm (84 in)
	Minimum OD, external circumferential driving	1219 mm (48 in)
	Maximum surface temperature	50°C (122°F)

Scanner	Maximum umbilical length	60 m (200 ft)
	Maximum steerable payload (performance may vary with surface condition)	10 kg (23 lb) (Umbilical and attachments are considered payload)
	Attachments	Restricted to those listed in compatible components or child products.
	Orientation while driving at height >2 m (6 ft) on vertical surface	Umbilical strain relief to point downwards, or at worst, horizontal. It is not to point upwards.
	Required radial clearance on flat	103 mm (4.04 in)

2.1.1.2 Operating Environment

The TERAX is for use in dry industrial environments having ambient temperatures as shown below. It is NOT intended for use in explosive environments.

Category	Parameter	Specification
Environment	Minimum ambient temperature	-20°C (-4°F)
	Maximum ambient temperature	50°C (122°F)*

2.1.1.3 User

The TERAX is intended to be used by persons who have read and understand the user manual. The intended user is to be a person without limitations in the physical abilities of the upper and lower limbs, sight, hearing, or anyone with a pacemaker.

For operating at a height greater than 2 m (6 ft), the TERAX is intended to be used by two people:

1. a person who is trained in rigging and fall protection and is able to effectively apply the same safety principles to the crawler, and
2. a person who is trained to operate the TERAX

2.1.2. Unintended Use

The TERAX is NOT intended for:

- ▶ use outside of its intended use
- ▶ lifting/lowering objects or people (i.e. using the TERAX as a crane / elevator)
- ▶ driving into / over obstructions, excluding standard weld caps

- ▶ installation on a surface on which welding is actively occurring

In addition to the above points, for operating at a height greater than 2 m (6 in), the crawler is NOT intended for:

- ▶ operation without a proper tether system
- ▶ operating up-side-down
- ▶ operating while oriented such that the umbilical strain relief points upward (*front of the TERAX is lower than the umbilical connection*).

2.1.3. Dimensions and Weight

2.1.3.1 TERAX Internal

A Width: (<i>configured for Ø8 in</i>)	20.1 cm	7.9 in
B Depth:	34.9 cm	13.7 in
C Height:	16.1 cm	6.3 in
Weight:	7.3 kg	16.2 lb

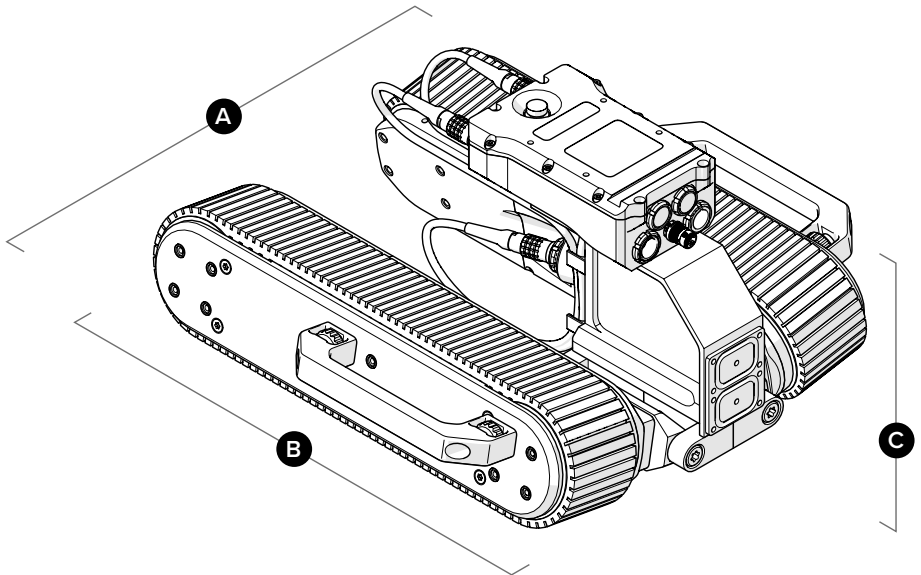


Fig. 1 - Internal crawler dimensions

2.1.3.2 TERAX Base

D Width:	31.2 cm	12.3 in
E Depth:	33.9 cm	13.3 in
F Height:	10.3 cm	4 in
Weight:	7.7 kg	17 lb

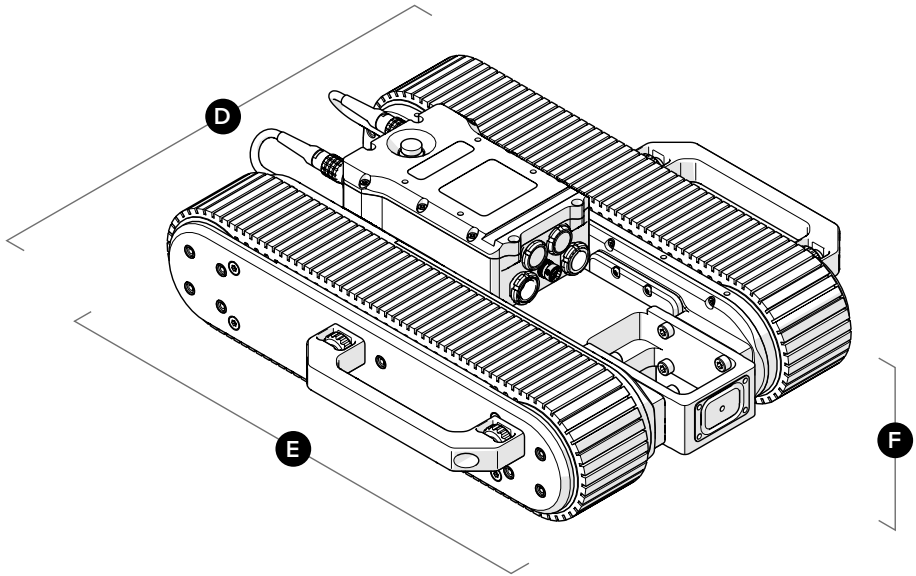


Fig. 2 - Base crawler dimensions

2.1.4. Power Requirements



WARNING! A reliable power source must be used to power the crawler. Connections must be secured to prevent accidental disconnection. Power failure may cause the crawler to freewheel down when operating in a vertical orientation. Portable generator usage is not recommended unless accompanied by the use of an uninterruptible power supply.



WARNING! When power is supplied from an AC power source, proper grounding of the power supply is important for safe operation. When a generator is used to supply power to the system (*not recommended*), the generator must be properly grounded (*refer to generator manual*).



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connection or disconnecting. Permanent damage to electronics could occur.



CAUTION! Power must be supplied from an approved Jireh power supply.

Power requirements: 100-240VAC, 50/60 Hz, 3.5A (AC Source) / 25-45VDC, 8.9A (Battery)

2.1.5. Environmental Sealing

Dust-tight, watertight (*not submersible*).

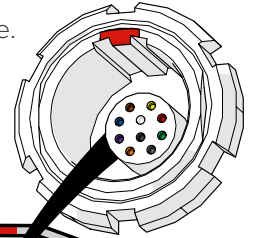
2.1.6. Performance Specifications

Category	Parameter	Specification
Crawler	Maximum speed	14 cm/sec (5.5 in/sec)
	Encoder resolution, motor	3913 counts/mm (99398 counts/in)

2.1.7. Encoder Interface Specifications

Output type: 4 channel quadrature 5VDC RS422 compatible.

Power: Power must be supplied to the interface.
5VDC +/-10% power limited to < 15w.



1	Enc B
2	Enc B'
3	Enc A
4	Enc A'
5	Aux Enc A'
6	Aux Enc A
7	Aux Enc B'
8	Aux Enc B
9	Enc +5V
10	Enc Com
H	Shield

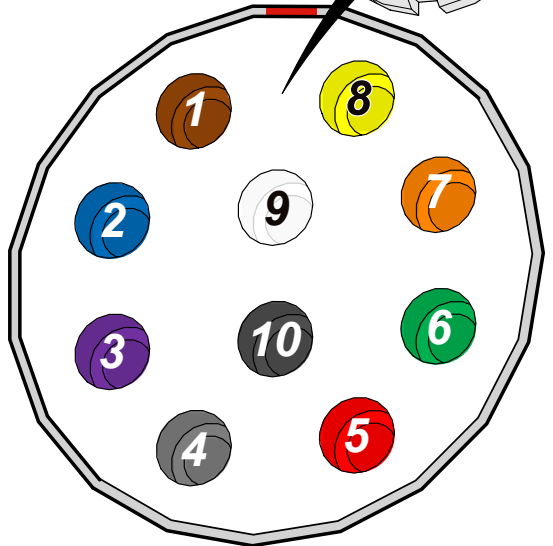


Fig. 3 - JIREH Industries pin out configuration

2.2. Compatible Components Specifications

The components listed in this section integrate with the base system to perform certain tasks. Their use may modify the product specifications (*i.e. intended use, power requirements, etc.*) from those of the base system. The specifications listed here supersede those of the base system. If no specifications are listed here, the specifications of the base system remain effective.

2.2.1. Preamp Bracket CES029-

2.2.1.1 Intended Use

The Preamp Bracket is intended to mount objects such as Preamps, splitters, etc. on a rack or dovetail bar that is mounted to the crawler. The mounted object is attached to the crawler with a lanyard or probe cables strong enough to prevent the object from falling, should the straps or screws that hold it to the bracket fail. Also, if the object is mounted with straps, it is to have smooth edges so as not to cut the straps.

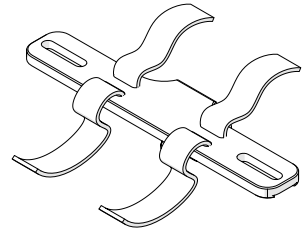


Fig. 4 - Preamp bracket

2.2.1.2 Operating Limits

Category	Parameter	Specification
Preamp Bracket	Maximum weight of mounted object	1.36 kg (3 lbs)
Scanner	Required radial clearance (circumferential driving)	Dependent on object mounted on Preamp Bracket

2.2.2. Battery Powered Optical Guide CXS080-

2.2.2.1 Intended Use

The Battery Powered Optical Guide is intended to provide a point of reference useful for guiding the crawler along a given path (i.e. a weld cap). It is intended to be mounted in the dovetail groove of any Probe Holder Frame or Frame Bar.

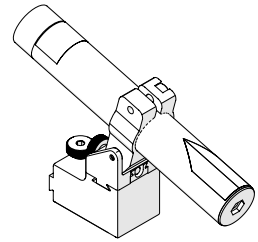


Fig. 5 - Battery powered optical guide

2.2.2.2 Operating Limits

Category	Parameter	Specification
Scanner	Required radial clearance	Dependent on mounted orientation of Optical Guide

2.2.2.3 Power Requirements

Power Requirements: 1 AA Battery

2.3. Child Product Specifications

The products listed in this section integrate with the base system to perform certain tasks. Their use may modify the product specifications (*i.e. intended use, power requirements, etc.*) from those of the base system. These products have a User Manual of their own, and shall be referred to for their product specifications as well as how their use modifies the product specifications of the base system.

2.3.1. Motorized Raster Arm CWG002-

The Motorized Raster arm is only compatible with the **TERAX** base crawler and not the **TERAX** internal crawler.

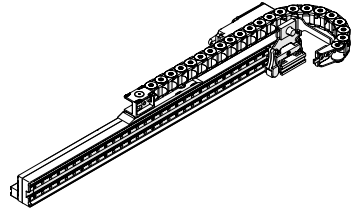


Fig. 6 - Motorized raster arm

2.3.2. Corrosion Actuated Probe Lift ENG007-

The Motorized Raster arm is only compatible with the **TERAX** base crawler and not the **TERAX** internal crawler.

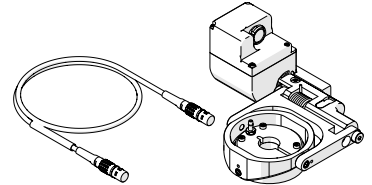


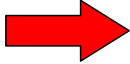
Fig. 7 - Corrosion actuated probe lift

DEFINITIONS

3.1. Definition of Symbols



Instructions to 'look here' or to 'see this part'.



Denotes movement. Instructing the user to carry out an action in a specified direction.



Indicates alignment axis



Alerts the user that the view has changed to a reverse angle

3.2. Definitions of Terms

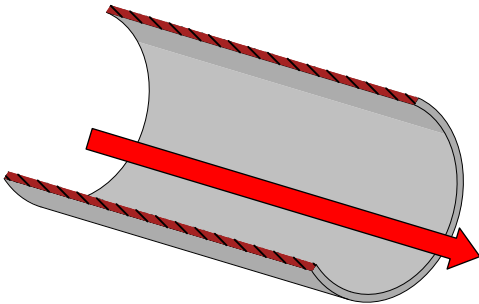


Fig. 8 - Internal scanning

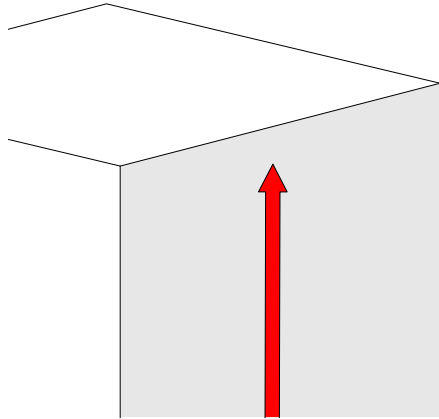


Fig. 9 - Flat/Tank scanning

Internal Scanning

The scanner travels through the interior of the pipe/tube (Fig. 8).

Flat/Tank Scanning

The direction of scan travel is lengthwise of the tank/surface (Fig. 9).

3.3. Safety Symbols

The following safety symbols might appear on the product and in this document. Read and understand their meaning below:



General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.



Shock hazard caution symbol

This symbol is used to alert the user to potential electric shock hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm.



Laser warning symbol

This symbol is used to alert the user to potential laser hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.

3.4. Safety Signal Words

The following safety signal words might appear in this document. Read and understand their meaning below:

DANGER!

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to will result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.

WARNING!

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.

CAUTION!

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

SYSTEM COMPONENTS

4.1. Base System Components

4.1.1. TERAX BASE Crawler ENG001-/ENG002-



WARNING! MAGNETIC MATERIAL.

The magnet attached to the underside of the **TERAX** produces an extremely strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics. People with pacemakers or ICD's must stay at least 75 cm (30 in) away.

The **TERAX** Base Crawler is a modular, motorized, and steerable scanner that carries various attachments for scanning and inspection applications internally in the pipe and on flat, ferrous surfaces. The **TERAX** can perform inspections inside circumferential or on longitudinal ferrous materials.

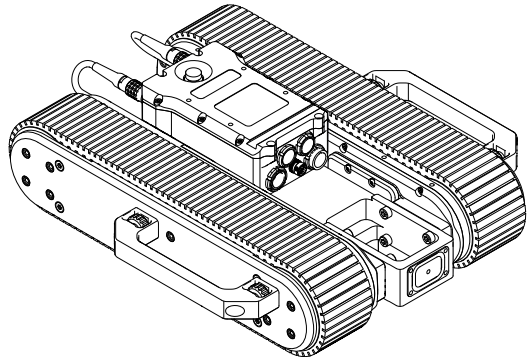


Fig. 10 - TERAX base (crawler)

The **TERAX** - Internal Base Crawler is designed to operate inside pipes for internal operations.

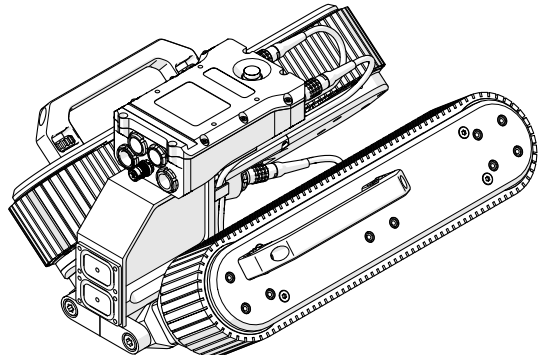


Fig. 11 - TERAX internal (crawler)

4.1.2. Auxiliary Connectors

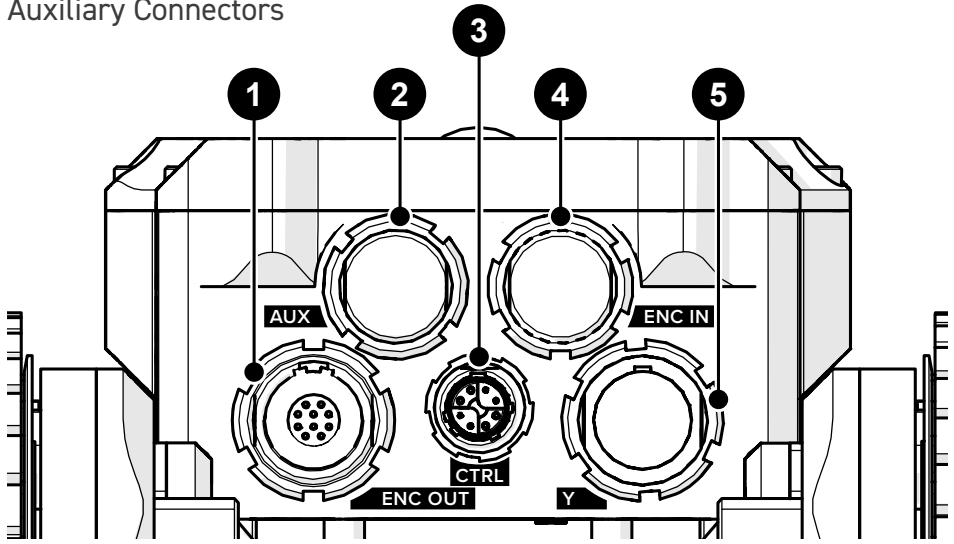


Fig. 12 - Auxiliary connector labels

1	ENC OUT	Encoder output connection.
2	AUX	Connection for an auxiliary device.
3	CTRL	Connection for RECON camera system.
4	ENC IN	Encoder input connection.
5	Y	Motorized module connection.

4.1.2.1 Off Button

The red button located on top of the **TERAX** provides an off button to the entire system. When pressed, all power to the **TERAX** system will disengage.

To restore system power, press the power button located on the system controller (see “System Controller” on page 17).

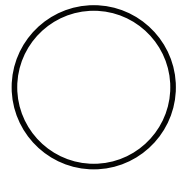


Fig. 13 - Off

NOTE: Terminating system power may cause the crawler to freewheel down when operating in a vertical orientation.

4.1.2.2 Encoder Signal Isolation

The umbilical contains a built-in circuit which buffers encoder signals in addition to providing isolation and protection to user instrumentation. The isolator requires 5VDC from the user’s instrument, and this is built into the supplied encoder cables.

4.1.3. System Controller ERA001-



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connection or disconnecting. Permanent damage to electronics could occur.



WARNING! There are no user serviceable components inside the system controller. Dangerous voltages can be present inside the case. Do NOT open. Return to manufacturer for repair.

The System Controller is an essential component that provides the **TERAX** with reliable power. It offers two power options, including a standard power supply that can be configured for various plug styles and is compatible with battery power (sold separately).

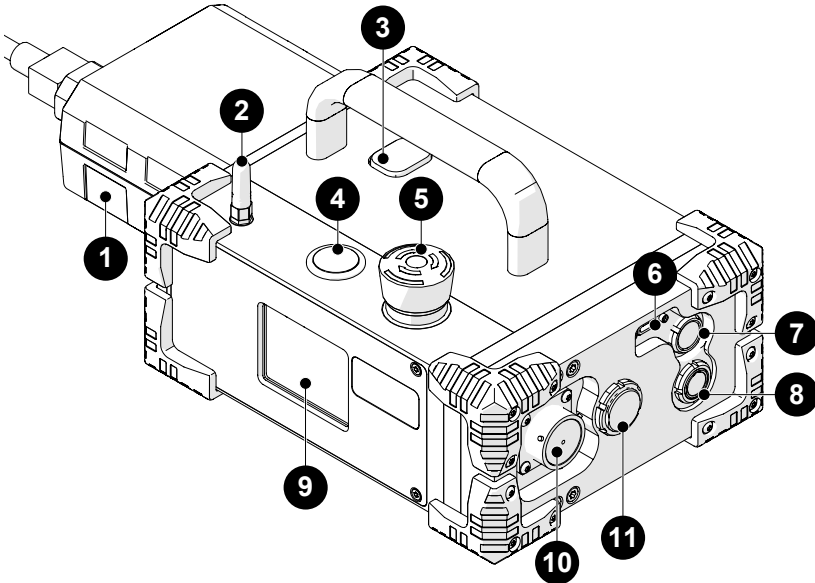


Fig. 14 - System controller

The system controller accepts 25-45VDC power from the AC/DC power supply or battery. Start/Stop logic and physical **ON** and **OFF** push-buttons are integrated into the system controller.

1	AC/DC power supply	Connect the plug from a properly grounded source. Use an IEC320 cord approved for AC/DC power supply.
2	ScanLink™ Bluetooth Antenna	Bluetooth antenna for ScanLink™ enabled instruments.”
3	Release button	Unlatch the AC/DC power supply or battery from the system controller.
4	Power button	Activate system power by pressing the silver button.
5	Off button	The red off button latches down when pressed. This off button shuts down the system. Twist the off button clockwise to return to the released position. This must be done before power can be activated.
6	ScanLink™ connector	Connection for ScanLink devices.
7	AUX socket	Connection for the auxiliary cable.
8	ENC OUT socket	Connection for the encoder cable.
9	Status LCD	System controller status display.
10	Scanner connector	Connection for the umbilical.
11	NET socket	Connection for network enabled controller adapter cables

In the event of a break in the stop circuit (*the stop circuit runs through the umbilical and the crawler's off button*), power will shut off.

4.1.3.1 AC/DC Power Supply



WARNING! ELECTRICAL CORDS CAN BE HAZARDOUS. Misuse can result in **FIRE** or **DEATH** by **ELECTRICAL SHOCK**. Inspect thoroughly before each use. Do **NOT** use if damaged. Do **NOT** use when wet. Keep away from water. Do **NOT** drive, drag or place objects over cord.

The **1** AC/DC power supply (*Fig. 14*) connects the system controller to a 100-240VAC, 50/60Hz grounded power source capable of supplying a minimum of 5 amps.

The safety of the system controller relies on the provision of a proper ground connection.

In environments with moisture present, a GFCI (*Ground Fault Circuit Interrupter*) must be used to ensure operator safety.

NOTE: *Some generators or DC-AC inverters may introduce significant levels of noise to the system. This may degrade overall system performance or reduce the system life expectancy. The use of generators or DC-AC inverters is not recommended and is used at the operator's risk.*

4.1.4. Umbilical, Ethernet UMA044-



WARNING! FALLING OBJECT HAZARD.

Ensure the umbilical can freely uncoil during operation and does not become snagged. If umbilical becomes snagged, the crawler may fall and **SEVERE INJURY** or **DEATH** could result.

The **TERAX** Umbilical is specifically designed to connect the crawler to the system controller, enabling uninterrupted power and data transmission during inspections.

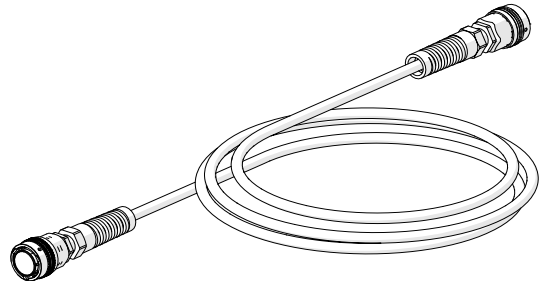


Fig. 15 - Umbilical, ethernet

4.1.5. Handheld Controller DMA006



WARNING! MAGNETIC MATERIAL. The handheld controller contains magnetic material. Those with pacemakers or ICD's must stay at least 10 cm (4 in) away.



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connection or disconnecting. Permanent damage to electronics could occur.



The Handheld Controller is used to control and adjust every aspect of your crawler's operation. The controller's color touch screen displays the operating system, complete with haptic feedback. The joysticks on the controller provide driving and steering control.

User settings and scan information are edited using the handheld controller. The handheld controller is connected to the system controller using the auxiliary cable.

The handheld controller utilizes a resistive touch screen. Care should be taken not to use sharp or gritty objects on the screen as the touch membrane can scratch. If the screen is damaged, all programmed functions can still be accessed using the D-pad.

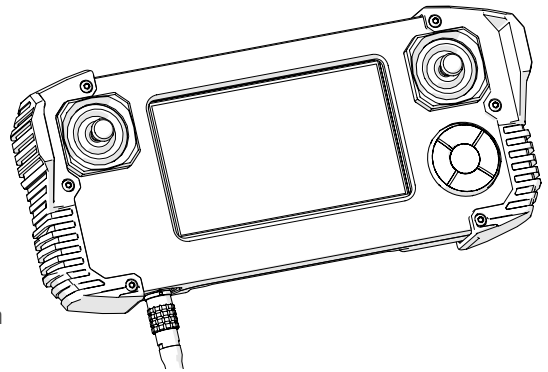


Fig. 16 - Handheld controller

NOTE: Do **NOT** connect the handheld controller while the system is activated.

4.1.6. Auxiliary Cable UMA017-

The auxiliary cable connects the handheld controller to the system controller. 36VDC and network signals are used in the cable.

Both auxiliary cable connectors are identical and interchangeable. The cable may be plugged into the 4-pin receptacle on the system controller.

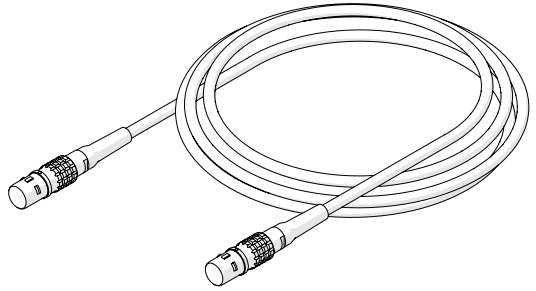


Fig. 17 - Auxiliary cable

4.1.7. J300 Encoder Cable UMA025-

The encoder cable connects the **TERAX** system to the user's instrument. This cable allows the transmission of two-axis position signals from the **TERAX** to the instrument. The encoder cable also provides 5VDC from the user's instrument to the encoder isolation circuitry.

Various encoder styles are available for various instruments.

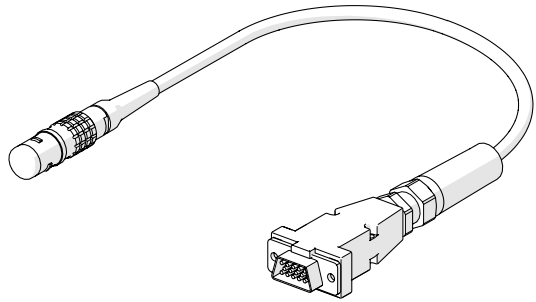


Fig. 18 - J300 Encoder cable

4.1.8. Installation/Removal Mat AAS061



WARNING! MAGNETIC MATERIAL. The installation/removal mat contains magnetic material. Those with pacemakers or ICD's must stay at least 10 cm (4 in) away.

The installation/removal mat is used to install and remove motorized magnetic scanners from the inspection surface. A motorized scanner can drive on/off the mat while the integrated magnets in the mat hold it firmly in place on the inspection surface. The scanner installation mat can be used on both round and flat surfaces.

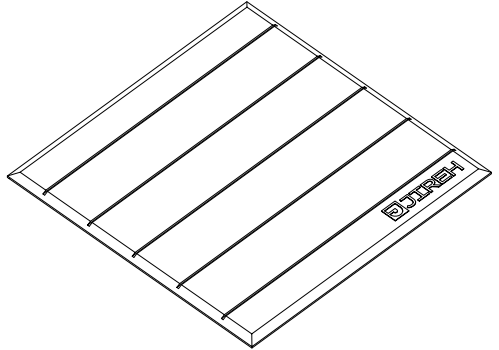


Fig. 19 - Installation/removal mat

4.1.9. Lifting Sling EA243

The lifting sling attaches to the crawler, providing an attachment point for tethers. When operating a **TERAX** at a height greater than 2 m (6 ft), the crawler **MUST** be tethered with a proper tether system to prevent the crawler from falling (see "No Entry Fall Zone" on page 29).

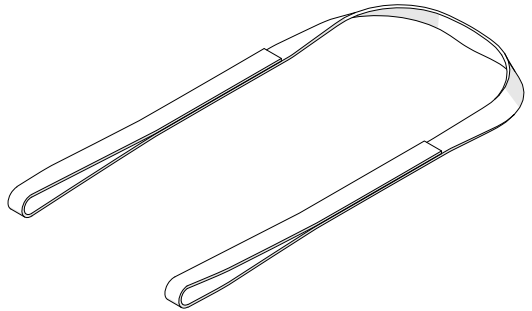


Fig. 20 - Lifting sling

4.1.10. Irrigation Kit CMG009-

The irrigation kit provides a variety of hoses, fittings, connectors, and splitters commonly used during non-destructive inspection.

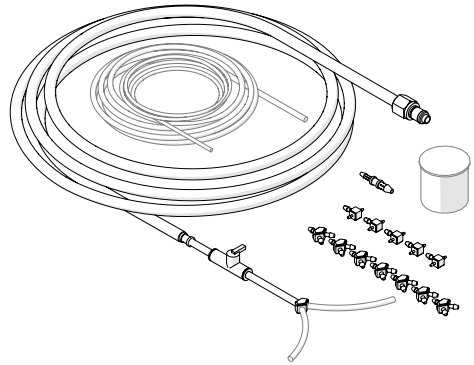


Fig. 21 - Irrigation kit

4.1.11. Cable Management, Dual Threaded Mount ENG003-

The cable management provides a means of protecting and organizing cables, tubes and hoses.

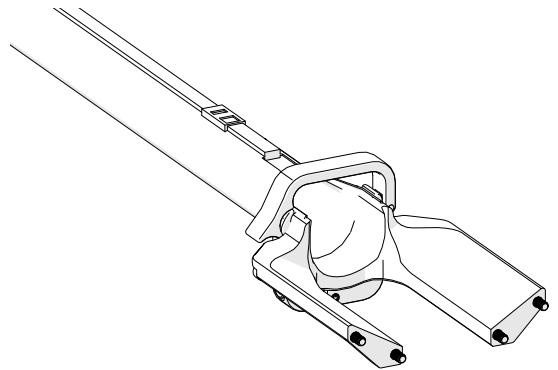


Fig. 22 - Cable management

4.1.12. Battery DVA001

The battery is compatible with the system controller and will power the **TERAX** system for hours at a time.

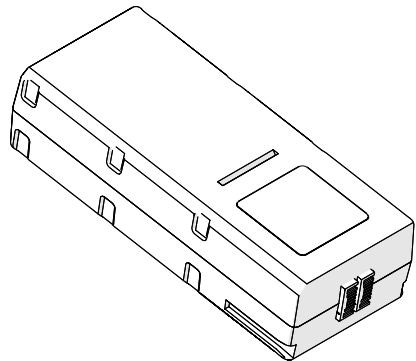


Fig. 23 - Battery

4.1.13. **Charger and Power Adapter DVG002-**

The charger provides power to JIREH batteries. The charger includes a power adapter and a user-selected power cable. Indicator lights display the current operation of the charger when in use.

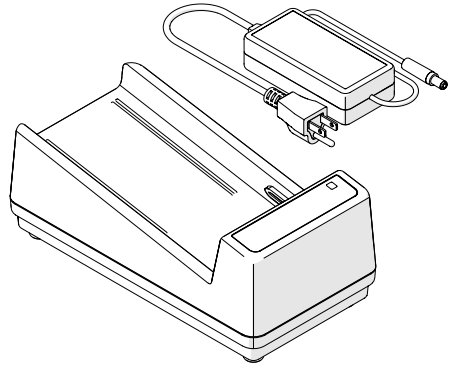


Fig. 24 - Charger and Power Adapter

4.1.14. **Tools**

Several tools are included for various scanner and accessory adjustments (see *"Included Tools"* on page 28 for additional details).

4.1.15. **Cases**

Depending on the configuration selected at the time of purchase. This will determine the types and number of cases included in the system.

4.2. Compatible Components

4.2.1. Corrosion Thickness Probe Holder PHS046- / PHS056-

The corrosion thickness probe holder is designed for use with the TERAX base crawler and carries various probes for the purpose of corrosion inspection and is available with either a flat or circumferentially curved wear plate.

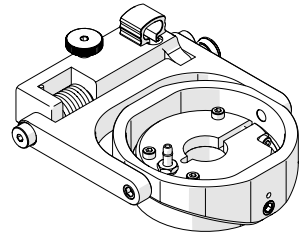


Fig. 25 - Corrosion thickness probe holder

4.2.2. Corrosion Thickness Probe Holder - Internal Curved Wear Plate PHG036-

The corrosion thickness probe holder is designed for use with the TERAX Internal crawler, securely carrying 0° corrosion probes during longitudinal pipe inspections.

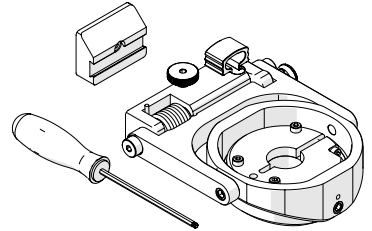


Fig. 26 - Corrosion thickness probe holder

4.2.3. Preamp Bracket CES029-

The preamp mounts to any dovetail groove. It is compatible with most standard preamps.

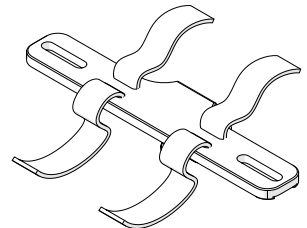


Fig. 27 - Preamp bracket

4.2.4. Double Pivot Raster Mount ENS016

The double pivot raster mount is designed to securely attach the motorized raster arm to the TERAX.

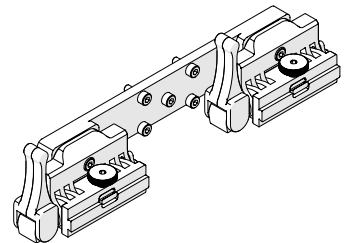


Fig. 28 - Double pivot raster mount

4.2.5. Battery Powered Optical Guide CXSO80

The battery powered optical guide provides a red colour point of reference useful for guiding scanners along a given path (*i.e. a weld*).

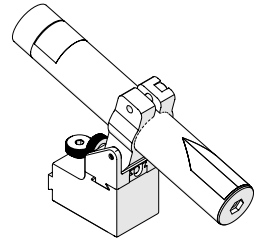


Fig. 29 - Battery powered optical guide

4.3. Child Products

4.3.1. Motorized Couplant Pump CMA015

The motorized couplant pump is a powered pumping unit that supplies couplant fluid to the scanning surface.

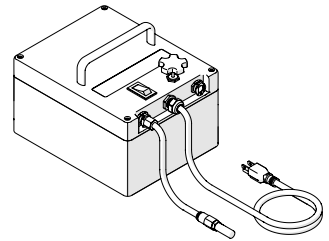


Fig. 30 - Motorized couplant pump

4.3.2. Motorized Raster Arm CWG002-

The motorized raster arm is available in various lengths and offers programmable speed and travel settings.

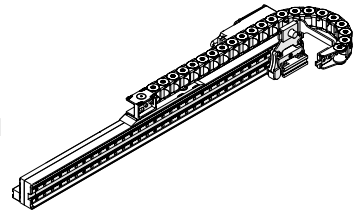


Fig. 31 - Motorized raster arm

4.3.3. TERAX Corrosion Actuated Probe Lift ENG007-

The TERAX corrosion actuated probe lift allows the probe to be lifted from the inspection surface, preserving the probe's life and allowing travel over small obstacles and large welds. The TERAX corrosion actuated probe lift is compatible with various probe styles and is available with either a flat or circumferentially curved wear plate.

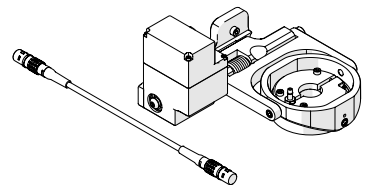


Fig. 32 - TERAX corrosion actuated probe lift

4.3.4. Preamp Kit CXG040-

The preamp is used to amplify the return signal from an ultrasonic transducer and improve the signal-to-noise ratio for transmission over long cables.

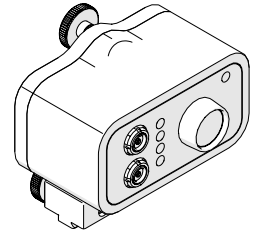


Fig. 33 - Preamp kit

4.3.5. Optical Guide CXG035

The optical guide mounts to any dovetail and provides a green colour point of reference useful for guiding scanners along a given path (*i.e. a weld*).

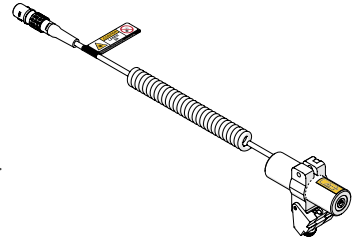


Fig. 34 - Optical guide

4.3.6. Tracker DRG001

The tracker is mounted atop any probe holder frame and uses advanced laser guidance to follow elevated profiles (*i.e. welds*).

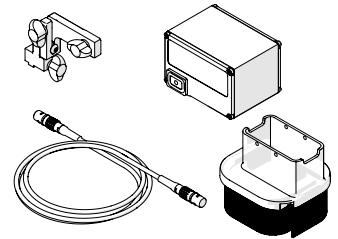


Fig. 35 - Tracker

4.3.7. Battery Kit DVG001-

The rechargeable battery provides portable power to the crawler and components (*i.e. motorized raster arm*).

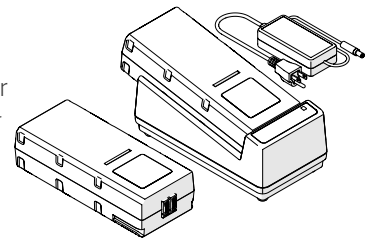


Fig. 36 - Battery

4.4. Tools

4.4.1. Included Tools

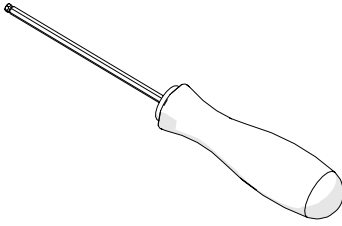


Fig. 37 - 3 mm hex driver

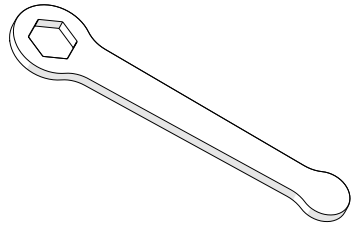


Fig. 38 - 3/8 in wrench

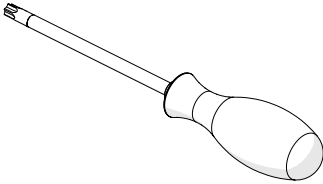


Fig. 39 - T45 driver

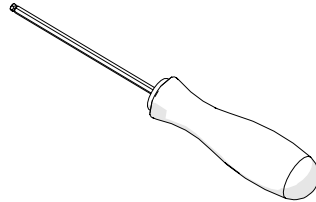


Fig. 40 - 2.5 mm hex driver

The included 3 mm hex driver (*Fig. 37*) is suitable for most typical adjustments within the **TERAX** system.

Also included in this kit is a 3/8 in wrench (*Fig. 38*), which is used to remove and install probe holder pivot buttons.

The T45 driver (*Fig. 39*) is used to adjust the track angle of the **TERAX** Internal.

The included 2.5 mm hex driver (*Fig. 39*) is used to install and remove probes from the corrosion thickness probe holder and **TERAX** corrosion actuated probe lift..

PREPARATION FOR USE

5.1. Preparation for Transportation



CAUTION! PINCH / CRUSH HAZARD. BE CAREFUL when passing the TERAX crawler through narrow ferrous (*magnetic*) openings, such as man-holes. The attached magnet can cause bodily harm if allowed to slam onto the walls of the opening.

5.2. Preparation for Safe Use

5.2.1. No Entry Fall Zone



WARNING! FALLING OBJECT HAZARD. The area below a crawler must be kept clear at all times. A clearly marked **NO ENTRY FALL ZONE** must be cordoned off directly below the area of crawler operation.

The area below a crawler must be kept clear at all times. A clearly marked **NO ENTRY FALL ZONE** must be cordoned off directly below the area of crawler operation, according to the dimensions shown in (Fig. 41).

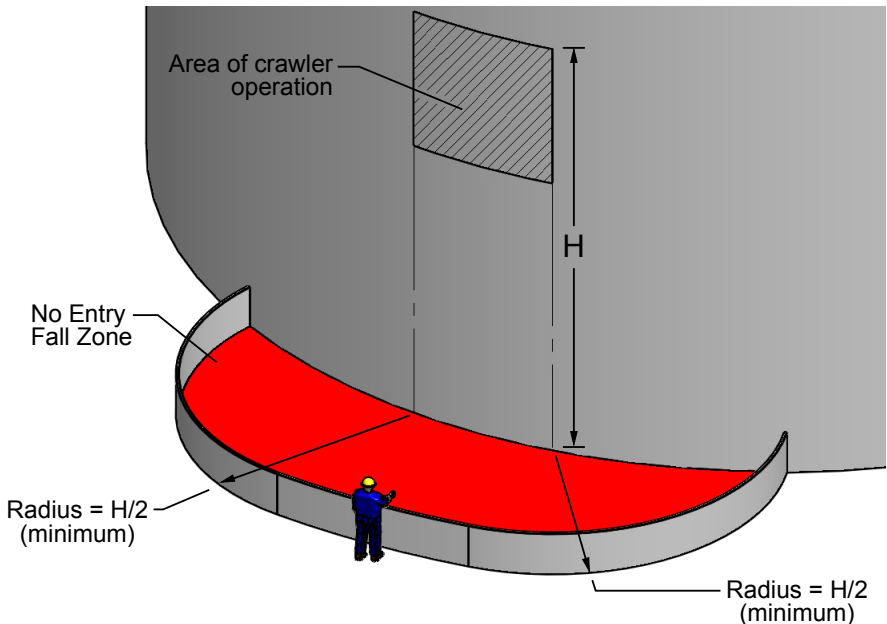


Fig. 41 - No entry fall zone

Example: If inspecting a tank that is 6 m (20 ft) tall, the No Entry Fall Zone radii must be no smaller than 3 m (10 ft) from the area below the area of crawler operation.

5.2.2. Tether Requirements and Attachment



WARNING! FALLING OBJECT HAZARD.

Failure to comply with the warnings, instructions, and specifications in this manual could result in **SEVERE INJURY** or **DEATH**.

WARNING! Do **NOT** operate or place crawler on a surface higher than 2 m (6 ft) without a proper tether held taut at all times.

WARNING! Hook the tether hook to the provided lifting sling **BEFORE** placing the crawler on the surface to be inspected (e.g. tank). **IMPORTANT:** Tether hook must have a safety latch to prevent accidental disconnection.

When used at a height greater than 2 m (6 ft), the **TERAX** crawler **MUST** be tethered with a proper tether system to prevent the crawler from falling. The tether system must:

- ▶ be capable of safely suspending the crawler from above in case the crawler detaches from the inspection surface;
- ▶ have sufficient capacity to catch and hold a 70 kg (150 lb) load;
- ▶ include a mechanism (i.e. *self retracting inertia reel fall arrester*) or a person to continuously take up the slack in the tether as the crawler moves;
- ▶ include a lifting hook with a safety latch to prevent accidental disconnection. The hook must be free of sharp edges that may cut or abrade the provided lifting sling.

Before placing the crawler on the surface to be inspected (e.g. tank), attach the provided lifting sling to the **TERAX** and then hook the tether hook to the lifting sling.



CAUTION! The overhead attachment point for the tether must be located as close as possible to a location directly above the crawler to minimize dangerous swinging of the crawler should it detach from the inspection surface.

5.2.3. Lifting Sling Setup



IMPORTANT! Carefully inspect the lifting sling for damage prior to each use. Ensure the tether hook does not have sharp edges that may cut the lifting sling.

Secure the lifting sling to the **TERAX** as indicated here:

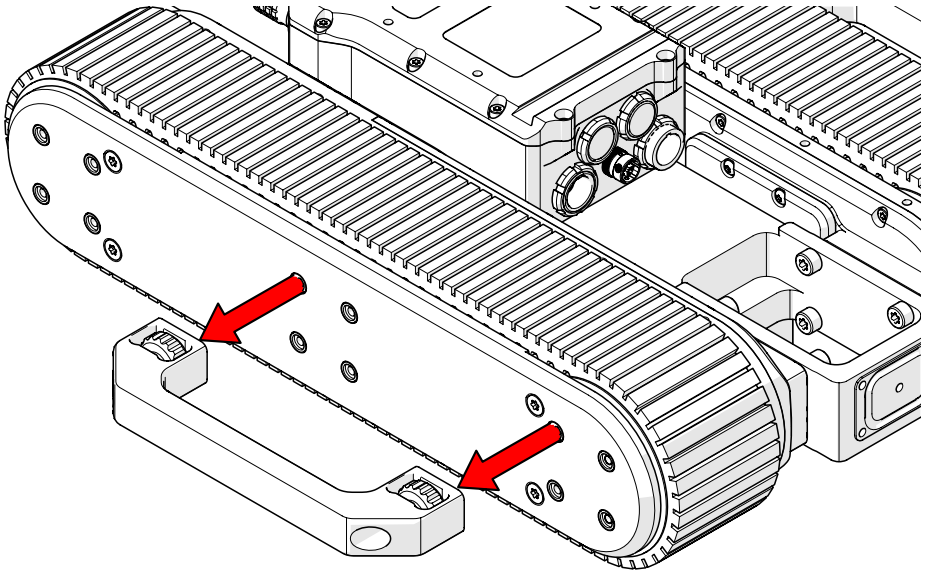


Fig. 42 - Remove handles on both sides

1. Remove both handles (Fig. 42) from the scanner (see "Handles" on page 40 for additional details).

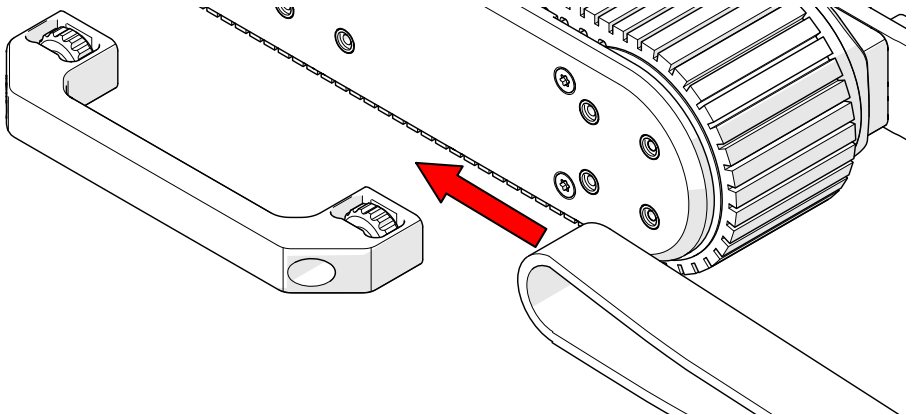


Fig. 43 - Hook sling between handle and scanner

2. Hook the sling between the handle and the scanner on both sides (Fig. 43).

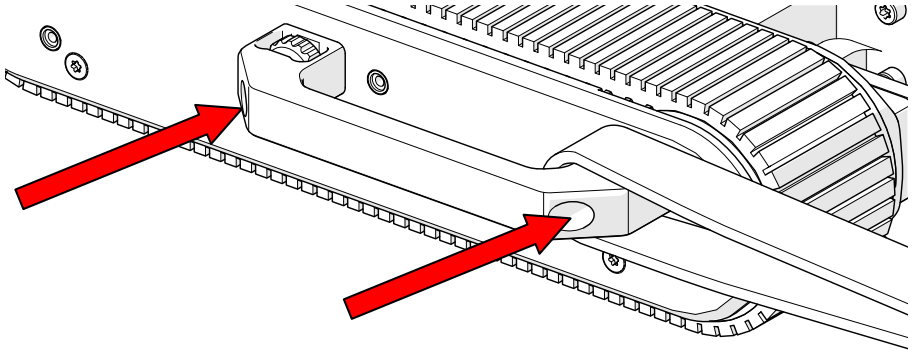


Fig. 44 - Align handle with screw holes

3. Reinstall the handles on both sides (Fig. 44).

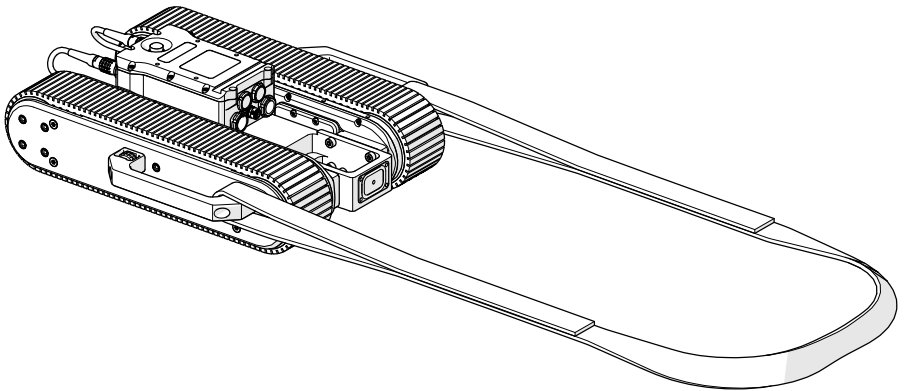


Fig. 45 - Correct sling position.

NOTE: Ensure the sling is attached correctly before operation (Fig. 45).

5.3. Preparation of Inspection Surface



WARNING! FALLING OBJECT HAZARD.

The inspection surface must adhere to the conditions outlined in sections “*Intended Use*” on page 3 and “*Operating Environment*” on page 5 of this manual.

- ▶ Remove build-up of scale, and other debris (i.e. dirt, ice) from surface on which the crawler is to drive. Excessive build-up will cause the crawler to lose magnetic attraction which may lead to track slippage or crawler detachment.
- ▶ Ensure that no obstructions (*other than standard butt welds*) or voids are in the drive path. Obstructions and voids could cause the crawler to fall if driven into or over.
- ▶ Ensure that there are no patches of non-ferrous material in the drive path of the crawler. If the crawler drives over a non-ferrous patch, it will lose magnetic attraction and will cause the crawler to fall.

5.4. System Connectivity

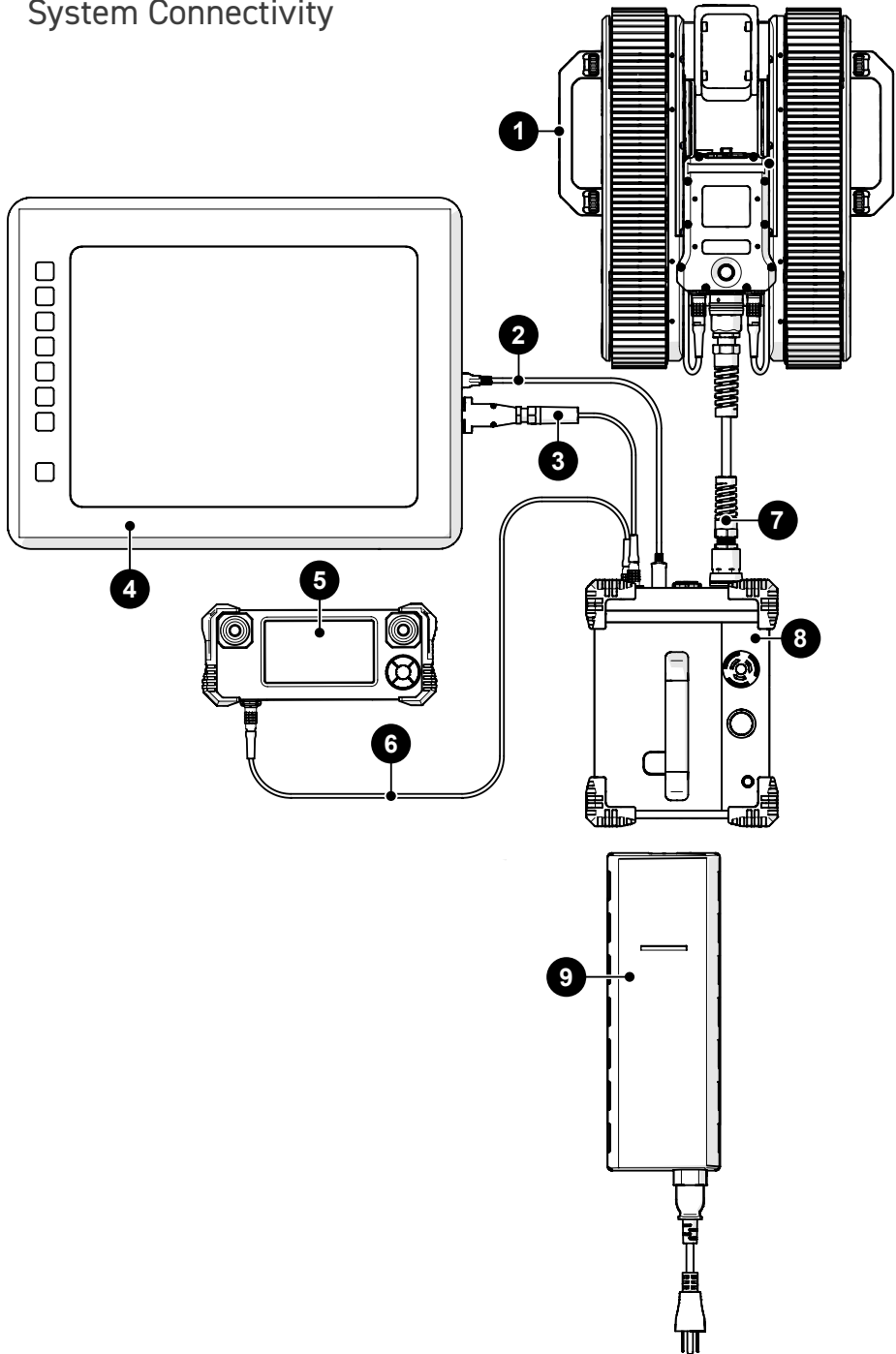


Fig. 46 - Standard crawler configuration

BOM ID	Description
1	TERAX crawler
2	ScanLink™ cable
3	Encoder cable
4	User instrument
5	Handheld controller
6	Auxiliary cable
7	Umbilical
8	System controller
9	AC/DC power supply

To configure the **TERAX** system for scanning, follow these steps:



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connecting or disconnecting. Permanent damage to electronics could occur.

1. Mount and connect the **7** umbilical to **1** the crawler.
2. Connect **7** umbilical to **8** system controller.
3. Connect **5** handheld controller to **8** system controller using the **6** auxiliary cable.
4. Connect **3** encoder cable from the **4** user's instrument to the **8** system controller.
5. Insert **9** AC/DC power supply into the **8** system controller.
6. (see "TERAX Configurations" on page 36) to set up a particular component.

5.5. TERAX Configurations

5.5.1. Crawler with Corrosion Actuated Probe Lift

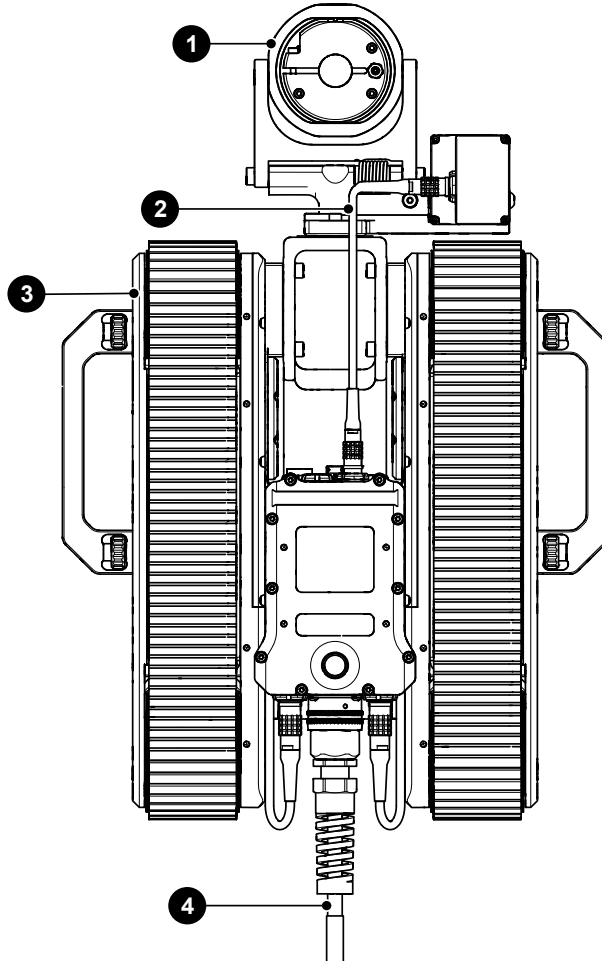


Fig. 47 - Standard TERAX configuration with corrosion actuated probe lift

BOM ID	Description
1	Corrosion Actuated Probe Lift
2	Auxiliary Cable
3	TERAX Crawler
4	Umbilical

To configure the **TERAX** system for corrosion scanning using the corrosion actuated probe lift, follow these steps:



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connecting or disconnecting. Permanent damage to electronics could occur.

1. Mount the **1** corrosion actuated probe lift to the **3** crawler .
2. Connect the **2** auxiliary cable to the **3** crawler's AUX port.

5.5.2. Crawler with Recon Camera

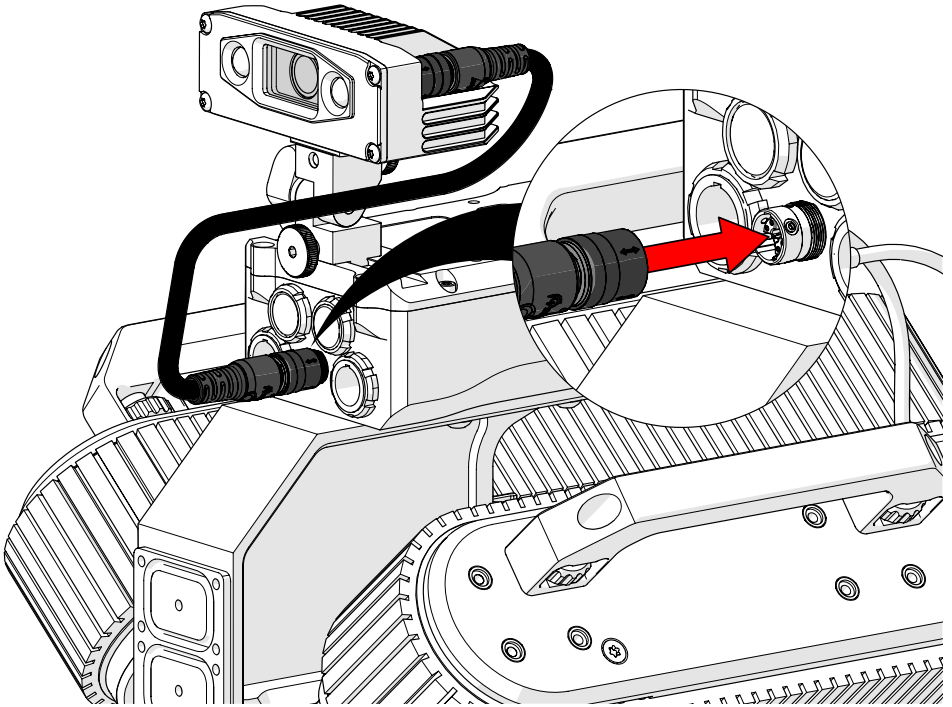


Fig. 48 - TERAX Internal with Recon mounted

To configure the **TERAX** system with the RECON. Refer to the RECON user manual.

5.6. Umbilical



WARNING! FALLING OBJECT HAZARD. or operating at heights greater than 2 m (6 ft), ensure the umbilical strain relief never points upwards as shown in (Fig. 52). The crawler could fall. **SEVERE INJURY** or **DEATH** could result.

To mount the umbilical to the crawler, follow these steps:

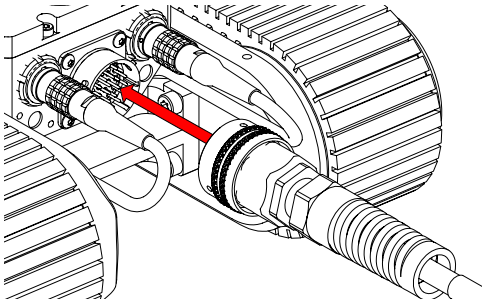


Fig. 49 - Align pins

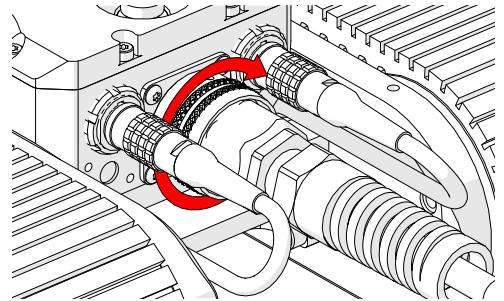


Fig. 50 - Twist to secure umbilical connection

1. Align the pins of the umbilical to the connector at the rear of the **TERAX** (Fig. 49).
2. Twist the umbilical's sleeve clockwise, locking the umbilical in place (Fig. 50).

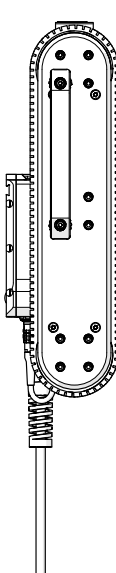


Fig. 51 - Correct use

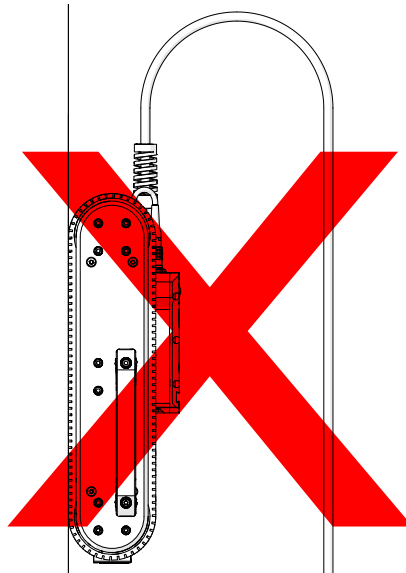


Fig. 52 - Incorrect use

3. Ensure the umbilical strain relief never points upwards during operation (Fig. 52).

5.7. Handles

The handles are removable to achieve a narrower footprint.

To remove the handles:

Turn the handle knobs counterclockwise (*Fig. 53*), and then pull the handle sideways to remove it from the drive module (*Fig. 54*)

To reinstall the handles, reverse these steps.

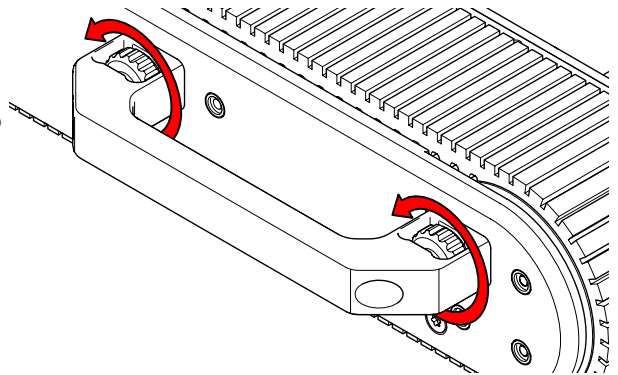


Fig. 53 - Turn both knobs counterclockwise

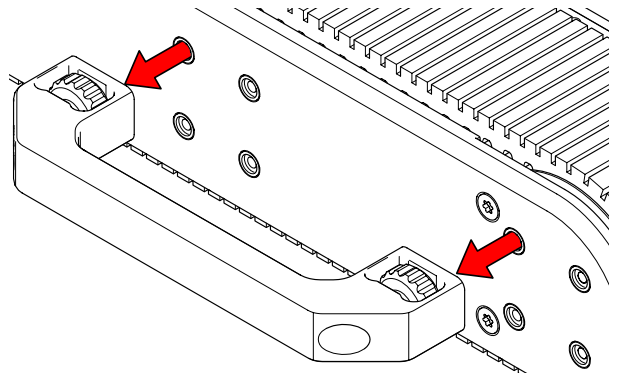


Fig. 54 - Remove handle

5.8. Handheld Controller



WARNING! MAGNETIC MATERIAL. The handheld controller produces a strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.



People with pacemakers or ICD's must stay at least 10 cm (4 in) away.



CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connection or disconnecting. Permanent damage to electronics could occur.



5.8.1. Magnetic Mounts

Magnetic mounts on the rear of the handheld controller assist in preventing the handheld controller from falling.

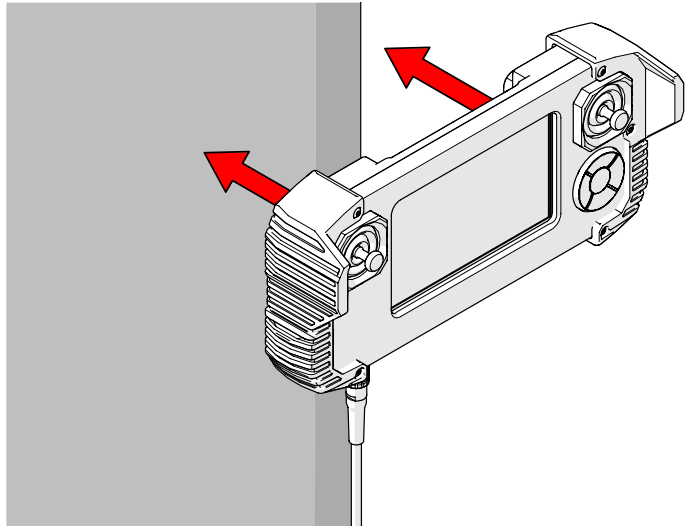


Fig. 55 - Mount to ferrous surfaces

5.9. Track Removal/Installation

5.9.1. Track Removal

Various track styles are available for different applications. To remove the tracks, follow these steps:

1. Remove the handle (see “Handles” on page 40 for additional details).

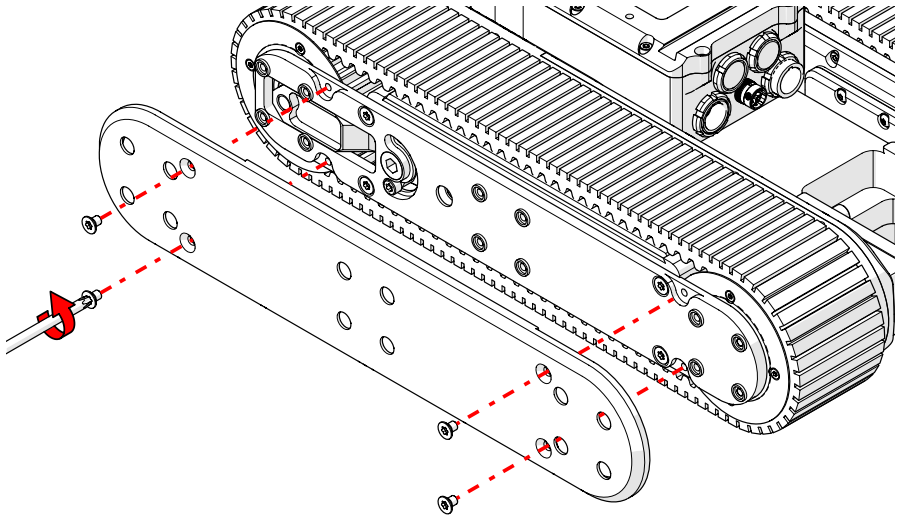


Fig. 56 - Remove outer cover of the track module

2. Using a T20 driver, detach the outer cover of the track module by removing the four screws (Fig. 56).

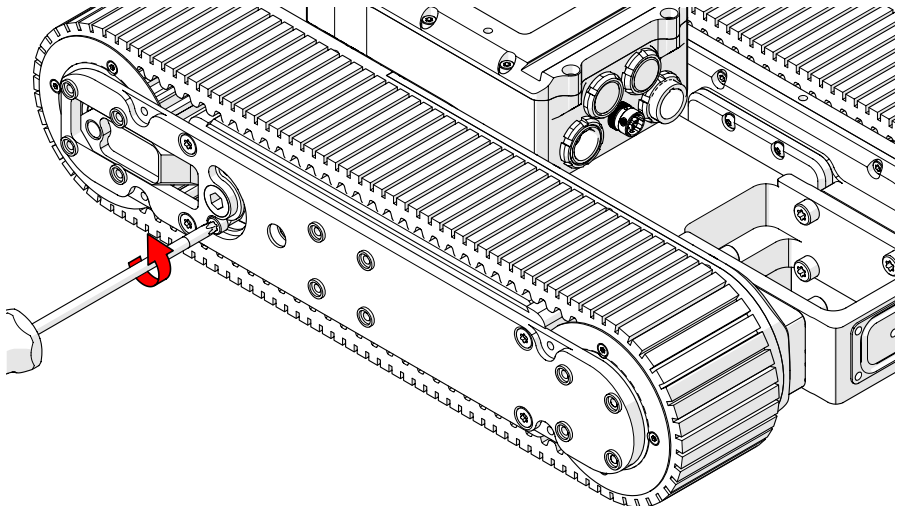


Fig. 57 - Loosen the belt tension holding screw

3. Loosen the belt tension holding screw with a T20 driver (Fig. 57).

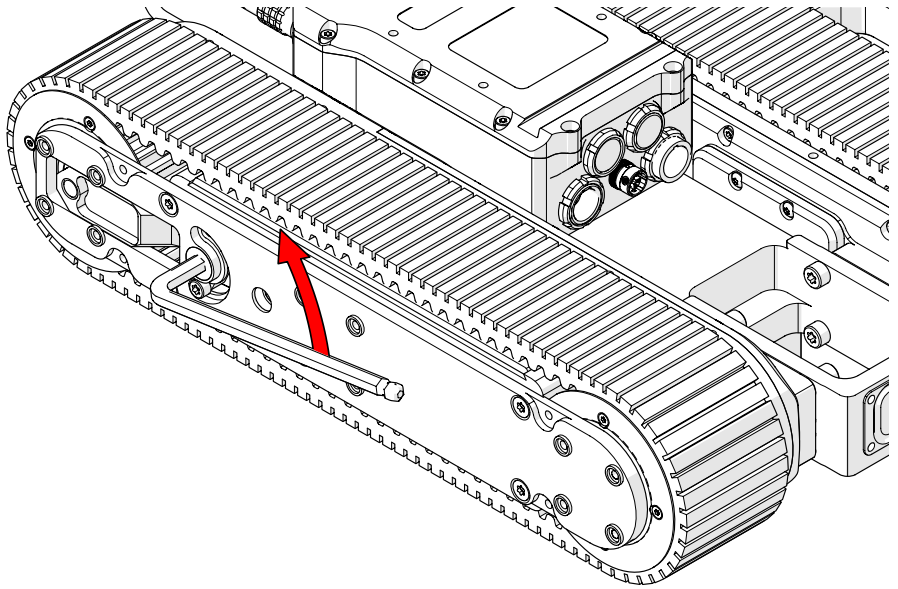


Fig. 58 - Loosen belt tensioning cam

4. Using a 6 mm hex tool, loosen the belt tensioning cam (Fig. 58).

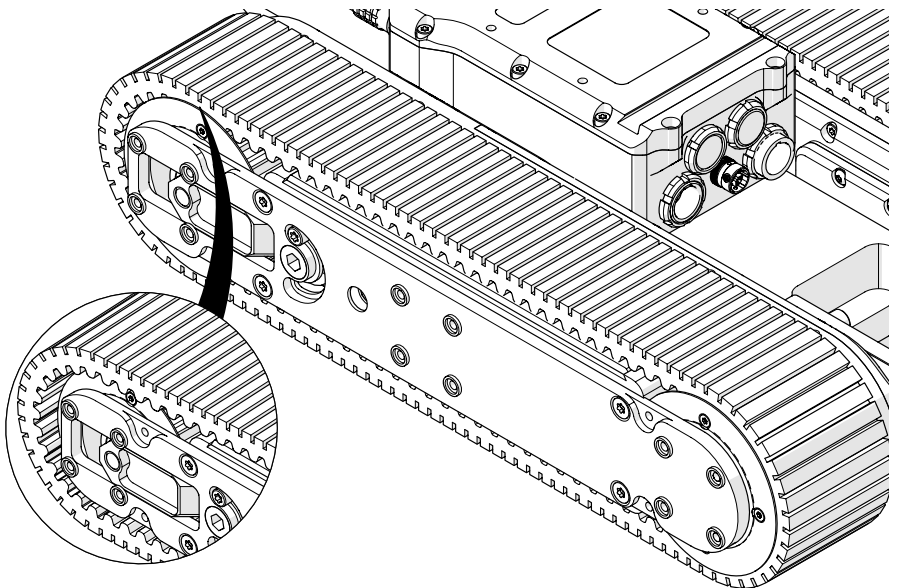


Fig. 59 - Remove the track from module

5. With the belt tensioning cam loose, the track can be removed from the module (Fig. 59).

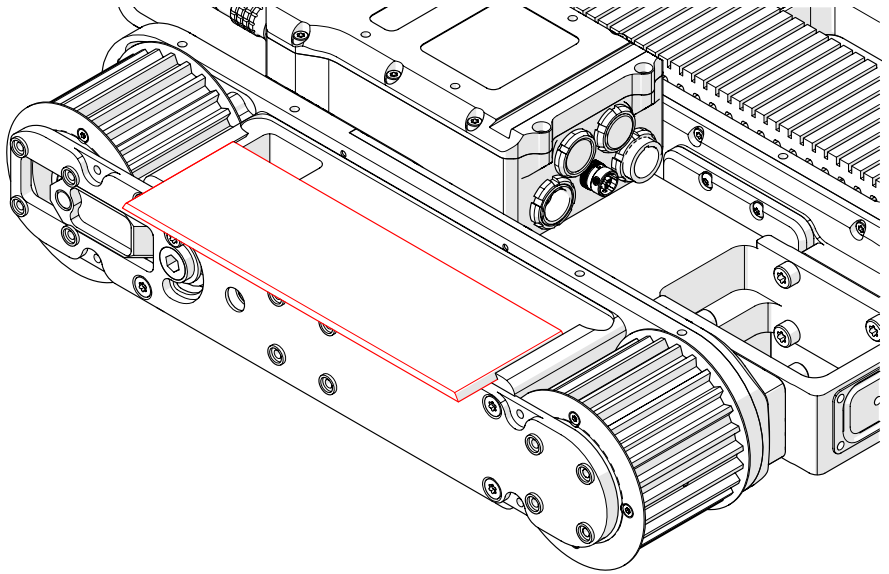


Fig. 60 - Ensure slider plate does not come out

6. Take care to ensure the slider plate does not fall from its groove (Fig. 60).
7. The slider plate can be replaced when worn.

5.9.2. Track Installation

1. Reverse the steps 4 and 3 from the preceding section.

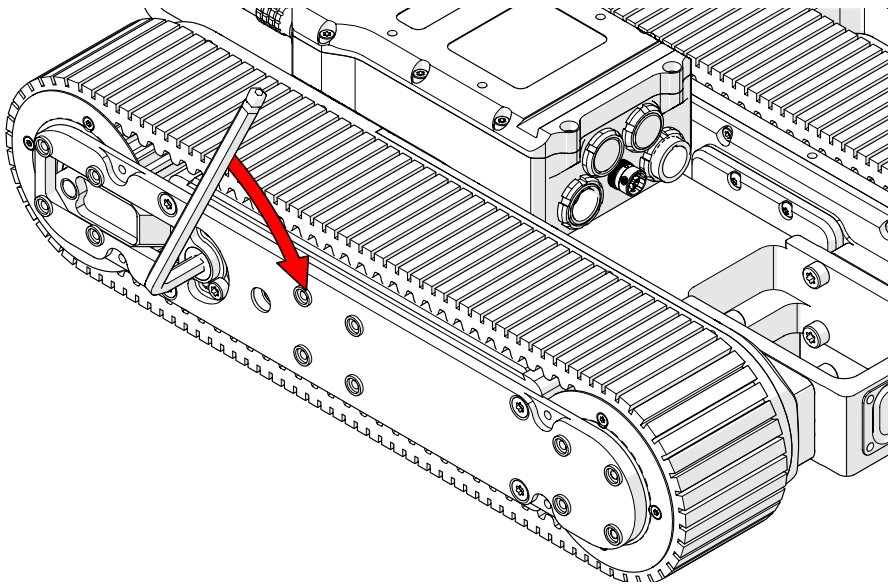


Fig. 61 - Tighten track with 6 mm hex tool

2. Using a 6 mm hex tool, tighten the belt gently until it is almost flat (Fig. 61).

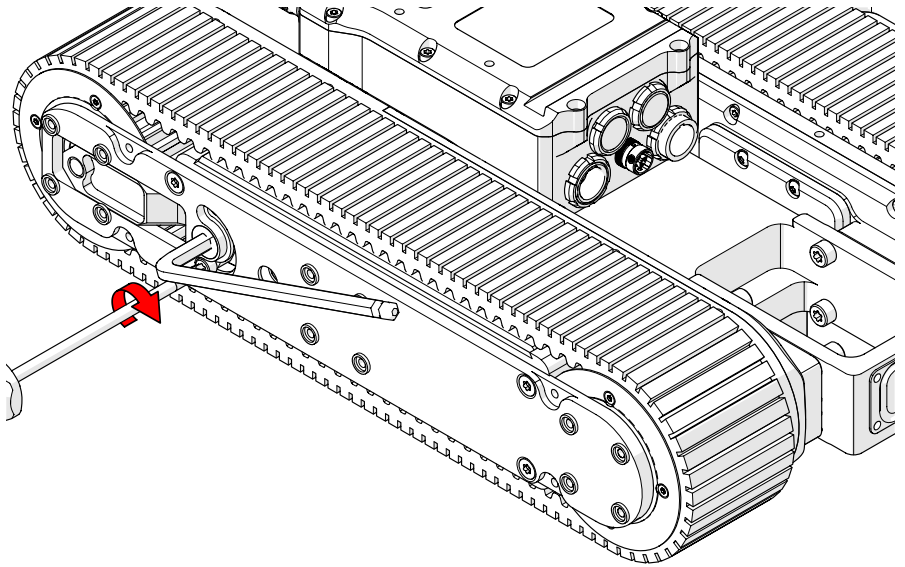


Fig. 62 - Tighten belt tension holding screw

3. Tighten the belt tension holding screw with a T20 driver (Fig. 62).

NOTE: Excessive force on the 6 mm driver to tighten the track is not required. Do not over tighten.

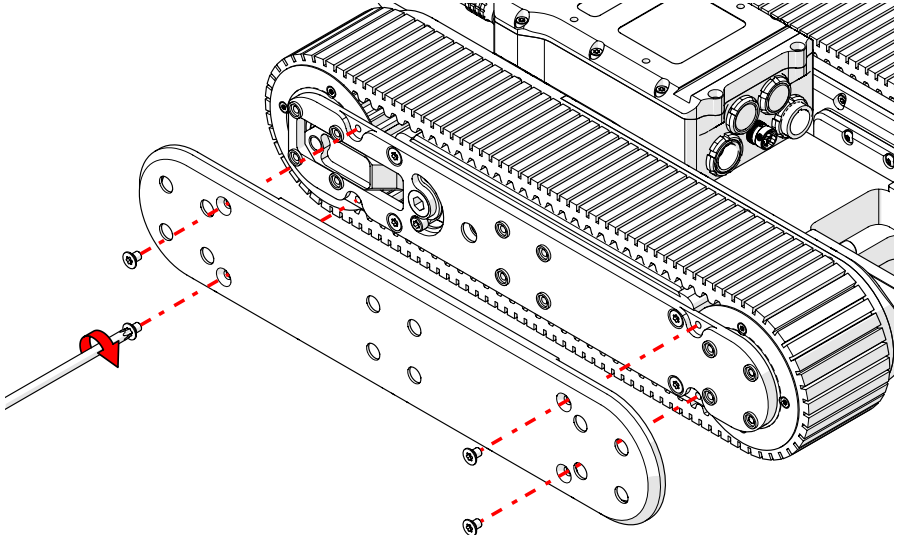


Fig. 63 - Tighten belt tension holding screw

4. Using a T20 driver, attach the outer cover of the track module with 4 screws (Fig. 63).

5.10. Accessories

5.10.1. Cable Management, Dual Threaded Mount

The cable management is offered in a variety of lengths and provides a means of bundling and protecting cables and hoses that connect to the scanner.

5.10.1.1 Clamp Setup for Cable Management

In the event the tube becomes disconnected from the cable management clamp, follow these instructions to reattach the tube and clamp.

1. Open the latch of the cable management.
2. Loosen clamp screw with included 3 mm hex wrench.

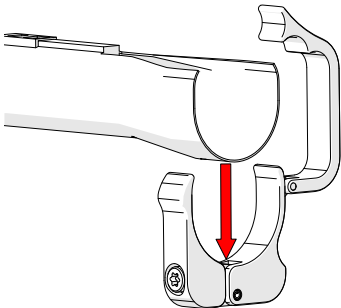


Fig. 64 - Insert tube into clamp

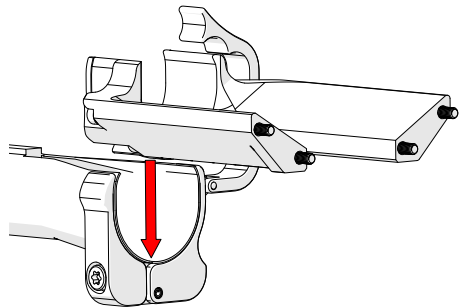


Fig. 65 - Slide mount into tube

3. Place the end of the tube inside of the clamp, ensuring that the tube is fitted evenly (Fig. 64).
4. Place the cable management mount on top of the tube, pinching the tube between the mount and clamp (Fig. 65).
5. Tighten 3 mm hex screw (Fig. 66).

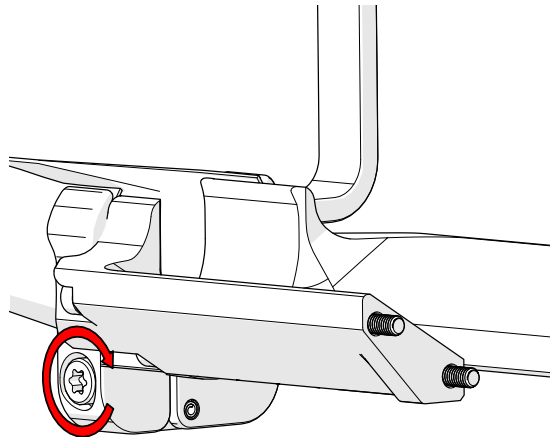


Fig. 66 - Tighten clamp screw

5.10.1.2 Clamp Setup

Follow these steps to attach cable management to scanner.

1. Attach cable management to the scanner using the included 2.5 mm hex driver.

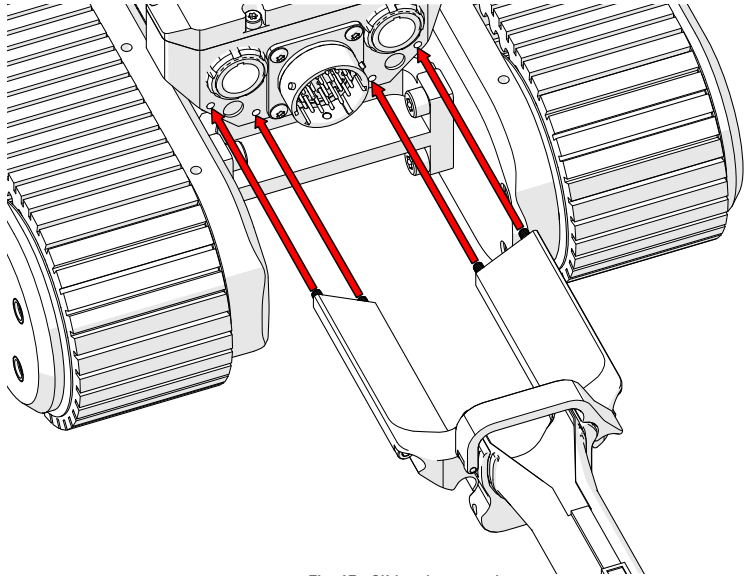


Fig. 67 - Slide tube around mount

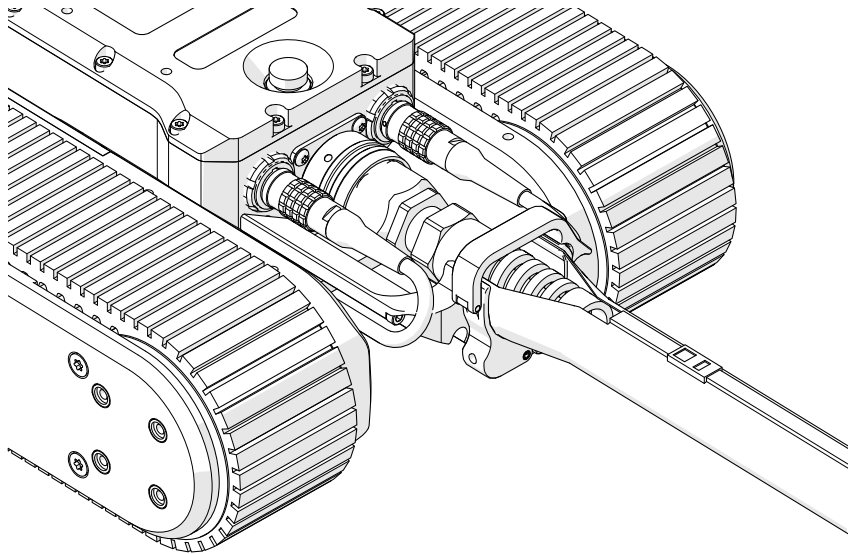


Fig. 68 - Properly attached cable management (with umbilical)

5.10.2. Corrosion Thickness Probe Holders

Various probe holders are compatible with the **TERAX**.

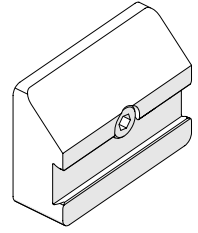


Fig. 69 - Crawler dovetail adapter

5.10.2.1 Corrosion Thickness Probe Holder Compatibility

The chart indicates probe holder and crawler compatibility as well as which probe holders require the crawler dovetail adapter (*Fig. 69*).

Probe Holder	Part Number	Compatible Crawler	Crawler Dovetail Adapter Required
Corrosion Thickness Probe Holder - Curved Wear Plate	PHS046-	TERAX Base Crawler, Circumferential applications ENG002-	Yes
Corrosion Thickness Probe Holder - Flat Wear Plate	PHS056-	TERAX Base Crawler, Flat surface applications ENG002-	Yes
Corrosion Thickness Probe Holder - Internal Curved Wear Plate	PHG036-	TERAX Internal Crawler, Internal longitudinal applications ENG001-	Yes
TERAX Corrosion Actuated Probe Lift	ENG007-	TERAX Base Crawler Flat surface applications ENG002-	No

5.10.2.2 Attaching Corrosion Thickness Probe Holder

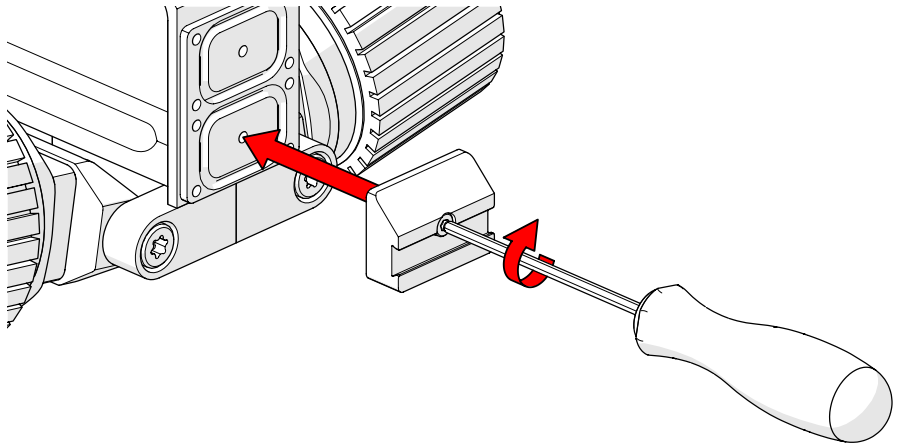


Fig. 70 - Attach the crawler dovetail adapter

1. Attach the crawler dovetail adapter to the front of the **TERAX** using the 3 mm hex driver (*Fig. 70*).

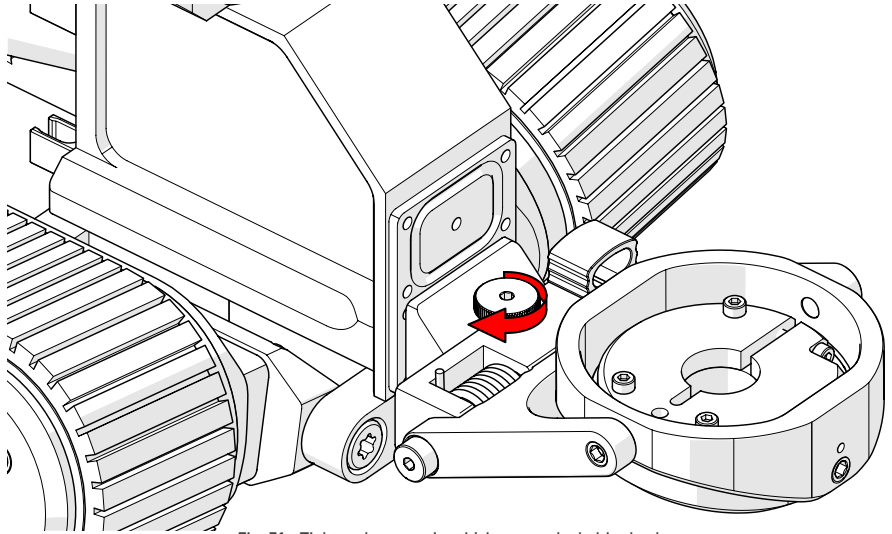


Fig. 71 - Tighten the corrosion thickness probe holder knob

2. Centre the corrosion thickness probe holder and tighten the corrosion thickness probe holder knob (Fig. 71).

5.10.3. Preamp Bracket

Compatible with most standard preamps, use screws or the velcro straps to attach a preamp to the preamp bracket.

Intended Use:

The preamp bracket is intended to mount objects (e.g. preamps, splitters, etc.) that:

- ▶ have a maximum weight of 1.36 kg (3 lb)
- ▶ are attached to the **TERAX** with a lanyard or probe cables strong enough to prevent the object from falling
- ▶ have smooth edges so as not to cut bracket's velcro strap

5.10.3.1 Mounting Preamp Bracket

The preamp bracket mounts to any dovetail groove.

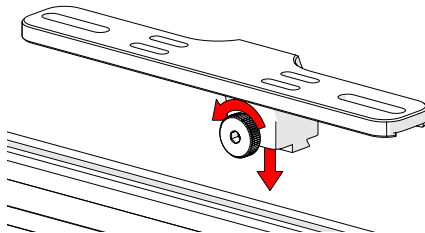


Fig. 72 - Loosen knob and mount to dovetail groove

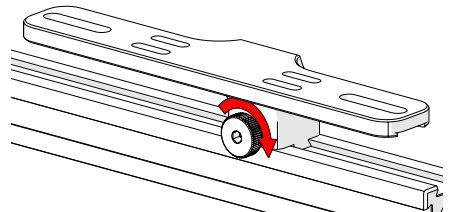


Fig. 73 - Tighten knob

1. Loosen the knob and align with the dovetail groove (Fig. 72).
2. Tighten the knob to lock the preamp bracket in place (Fig. 73).

5.10.3.2 Attaching Preamp with Screws

Use the adjustable screw mounting channel on the bottom of the bracket to attach a preamp (screws not included).

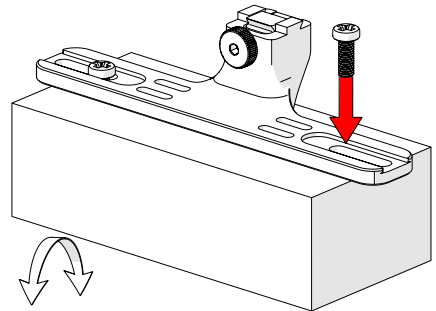


Fig. 74 - Attach preamp with screws

5.10.3.3 Attaching Preamp with Velcro Straps

To attach the preamp to the bracket using velcro straps, follow these steps:

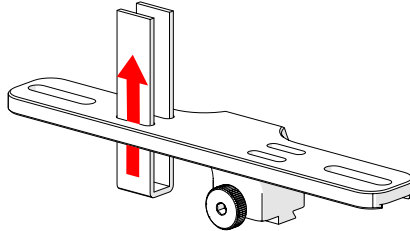


Fig. 75 - Insert velcro straps

1. Slide the velcro strap through the bracket's holes (Fig. 75).
2. Centre and place the preamp on the bracket wrapping the velcro around the preamp (Fig. 76).
3. Secure the preamp to the bracket attaching each side of the velcro (Fig. 77).

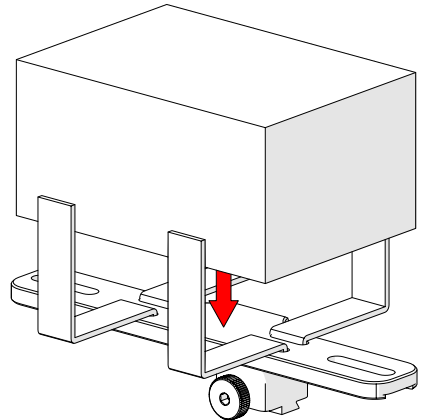


Fig. 76 - Place preamp and wrap velcro

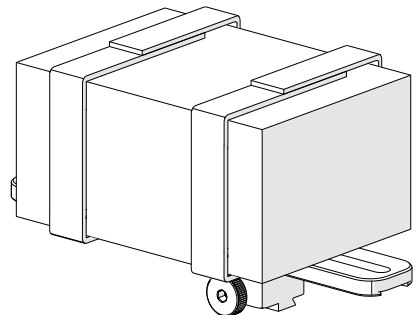


Fig. 77 - Velcro wrapped around preamp

OPERATION

6.1. System Startup

To activate the system, follow these steps:

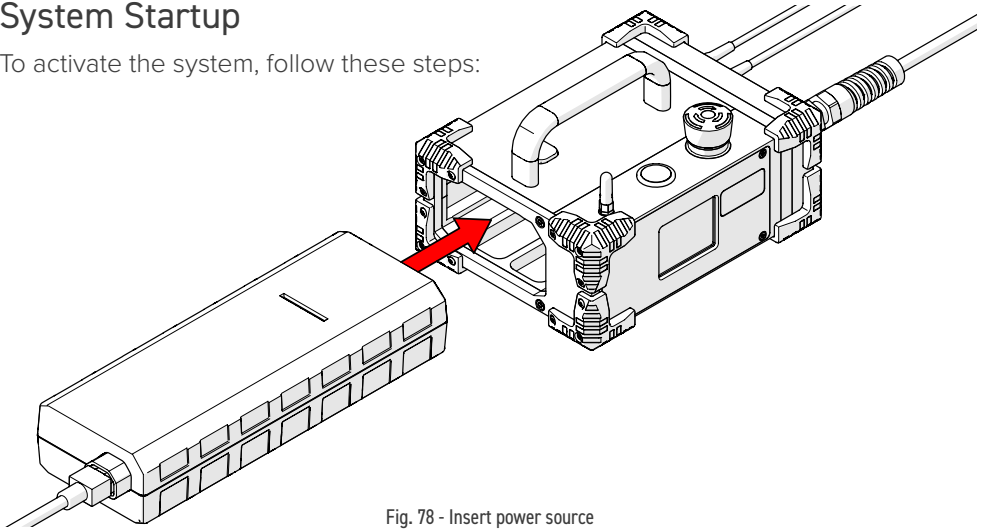


Fig. 78 - Insert power source

1. Insert the power source (Fig. 78) into the system controller dock.
2. Connect the components (see "TERAX Configurations" on page 36).

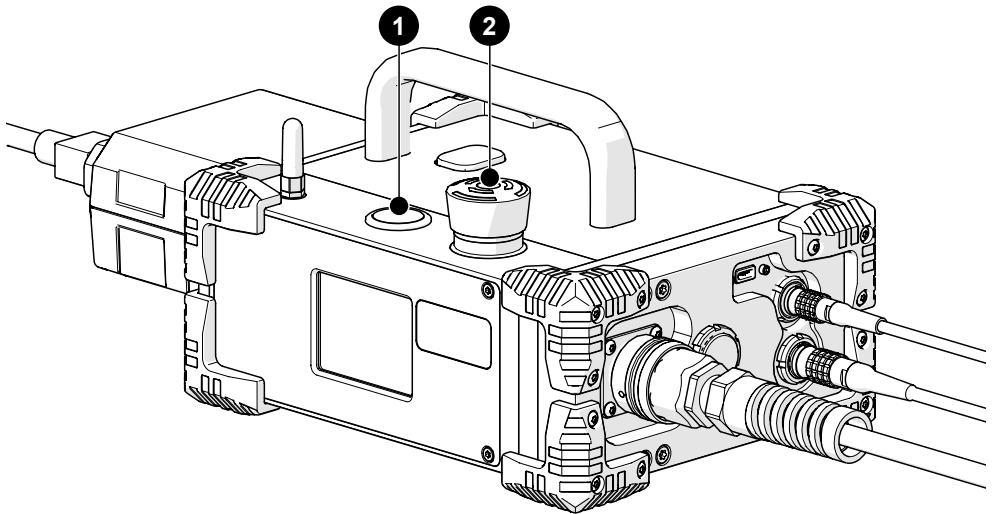


Fig. 79 - System controller

3. Locate the **2** red off push-button on the system controller. Rotate this button clockwise to unlatch (Fig. 79).
4. The **1** power button (Fig. 79) on the system controller activates the system.

NOTE: If the crawler is moving due to an external force when power is applied, the system will display a “Please Wait – Motor Moving” message until the movement stops. The crawler must be stationary for system initialization to be performed.



Fig. 80 - Handheld controller

5. A warning message will display on the handheld controller when power has been activated. Once the dangers of using the **TERAX** are recognized and understood by reading this user manual, touch **Ok** to acknowledge the warning (Fig. 80).



Fig. 81 - Falling object warning

6. A second warning message (Fig. 81) will display requesting assurance that a no-entry fall zone has been established (see “Preparation for Safe Use” on page 29) and tether requirements are met (see “Tether Requirements and Attachment” on page 30). Acknowledge this warning by touching **Yes**.

Once the system is initialized, the **Mode Select** screen will appear (see “Mode Select Screen” on page 59). The system is now ready for operation.

6.2. Placement of Crawler on Inspection Surface



WARNING! FALLING OBJECT HAZARD.

Read and understand the proper procedure for using the Installation/Removal Mat. If crawler installation is done at elevated heights, improper use may cause the crawler to fall and **SEVERE INJURY** or **DEATH** could result.



CAUTION! Do **NOT** handle crawler using the umbilical cable. Use the provided handles.



CAUTION! Do not place the crawler directly on the inspection surface. Use of the scanner installation/removal mat as a spacer between the tracks and the inspection surface is required during scanner placement. This is necessary to protect the electronic components within the crawler from damaging shock, should the crawler be slammed directly onto the inspection surface.



WARNING! MAGNETIC MATERIAL. The magnet attached to the underside of the TERAX produces an extremely strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.



Tools, magnets and metal objects can cut, pinch or entrap hands and fingers. **HANDLE WITH CARE.**

People with pacemakers or ICD's must stay at least 75 cm (30 in) away.

WARNING! MAGNETIC MATERIAL. The installation/removal mat contains magnetic material. Those with pacemakers or ICD's must stay at least 10 cm (4 in) away.

6.2.1. Scanner Installation/Removal Mat Use

To place the crawler on the inspection surface using a scanner installation mat, follow these steps:

NOTE: The manufacturer recommends two persons install the crawler on an inspection surface when using the scanner installation/removal mat. One person to place the crawler, and one person to operate the handheld controller.

1. Set the crawler to Jog Mode (see “Jog Mode” on page 59).

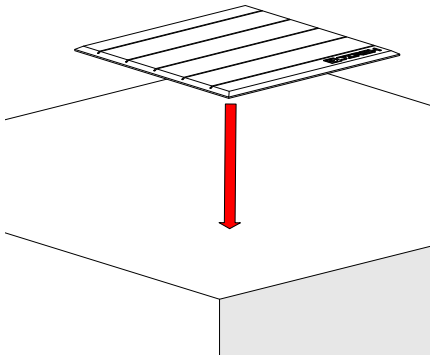


Fig. 83 - Attach mat to scanning surface

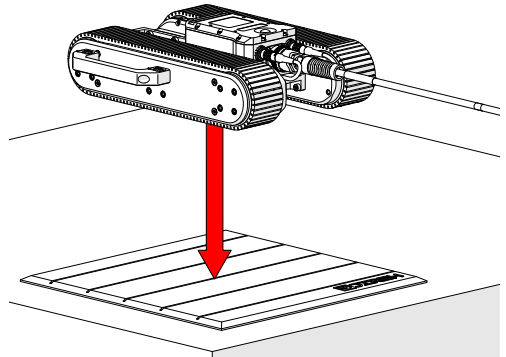


Fig. 82 - Lower crawler to mat

2. Place the installation/removal mat on the inspection surface (Fig. 83).
3. Place and hold the crawler on the installation/removal mat (Fig. 83).

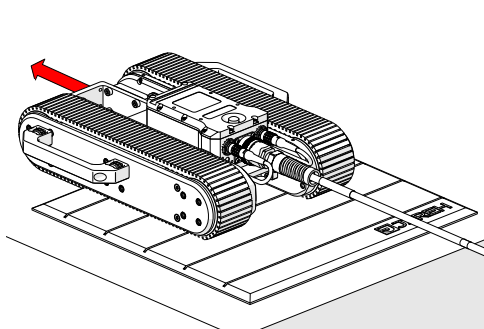


Fig. 84 - Drive crawler off the mat

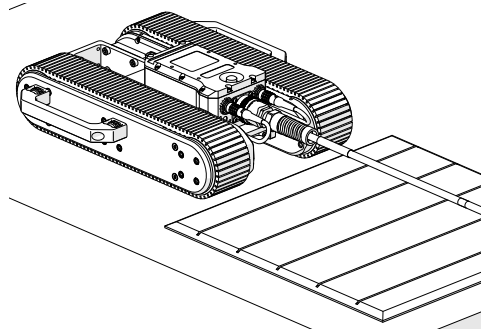


Fig. 85 - Magnetized to surface

NOTE: Do **NOT** let go of the crawler until instructed to do so below.

4. Ensure the tracks of the crawler are held firmly against the installation/removal mat. While holding the crawler, use **Jog Mode** (see “Jog Mode” on page 59) to carefully drive (Fig. 84) the crawler off the installation/removal mat and onto the inspection surface (Fig. 85).

5. Once the crawler is securely on the inspection surface, the user may let go of the crawler (Fig. 85).

TIP: Avoid the crawler slamming onto the inspection surface. This can occur when the tracks are not in contact with the installation/removal mat while the crawler is driven onto the inspection surface.

6. Remove the installation/removal mat from the inspection surface.

TIP: Circumstance may arise when only one person is available for placement of the crawler on an inspection surface. With the system power off, it is possible to place the crawler on the inspection/removal mat and manually push the crawler off the mat and onto the inspection surface.

6.2.2. Internal TERAX Crawler Setup

To configure the crawler for operation in a pipe, follow these steps:

1. Using the T45 driver, loosen the module pivot bolts (Fig. 86).

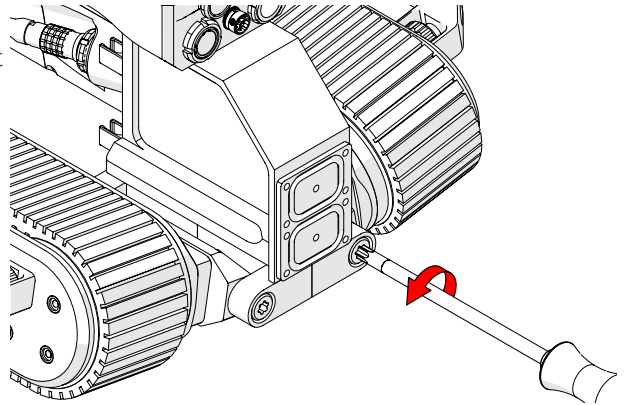


Fig. 86 - Loosen the module pivot bolts

2. Adjust crawler's track modules to the correct angle, matching that of pipe diameter (Fig. 87).
3. Tighten the track module's pivot bolts.

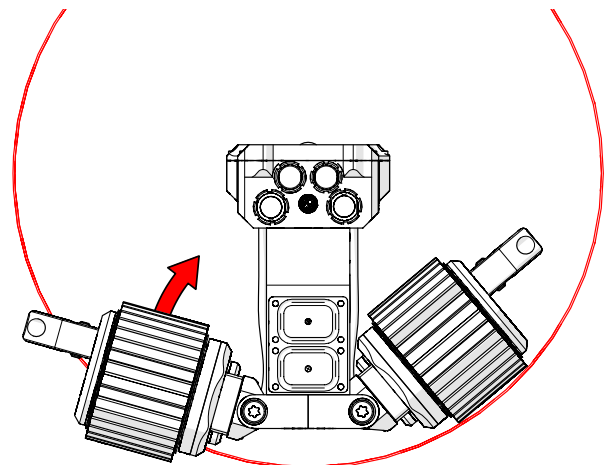


Fig. 87 - Adjust the angle of the modules to match pipe

4. Set the crawler to Jog Mode (see “Jog Mode” on page 59).
5. Place crawler inside the entrance to the pipe.

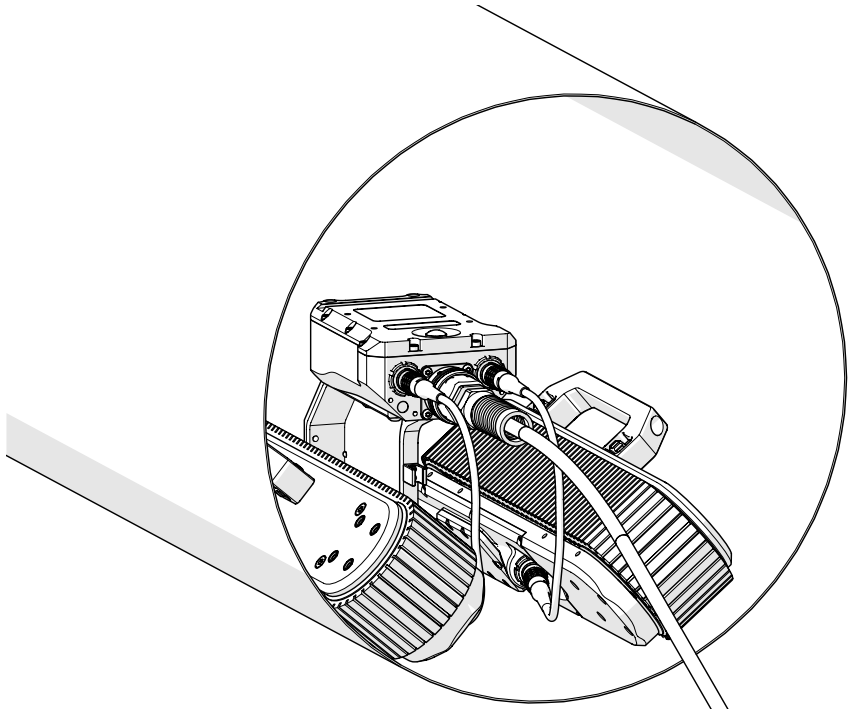


Fig. 88 - Place scanner inside of scan surface

6. Drive crawler into inspection surface (Fig. 88).

6.3. Operation

6.3.1. Handheld Controller Layout

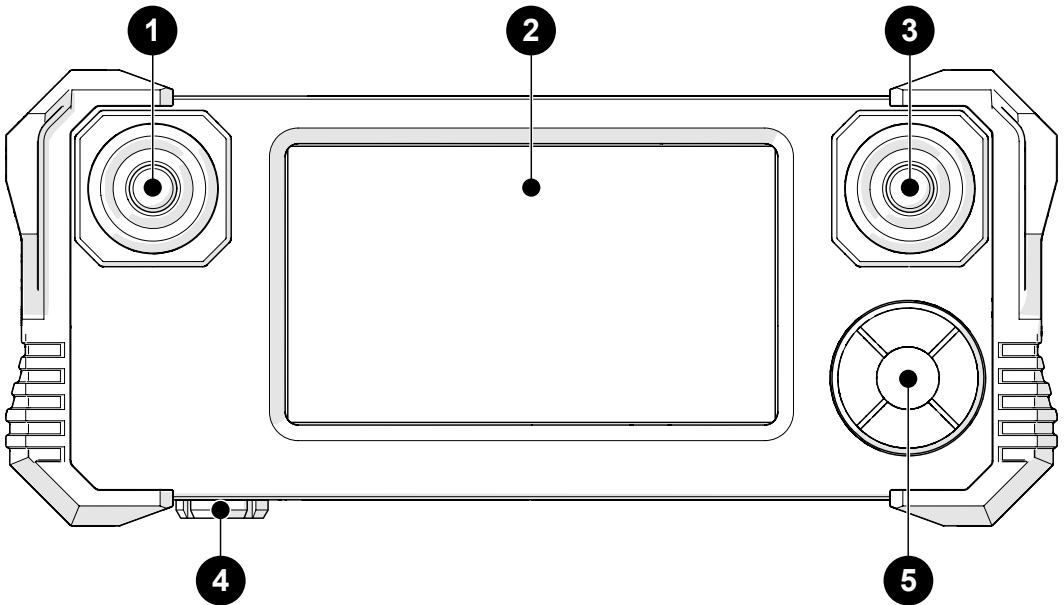


Fig. 89 - Handheld Controller

- | | | |
|----------|---------------------------|---|
| 1 | Fwd/Rev joystick | (see "Joysticks" on page 58) |
| 2 | Touchscreen | (see "Touchscreen" on page 58) |
| 3 | Steering/Raster joystick | (see "Joysticks" on page 58) |
| 4 | Auxiliary cable connector | Connection point for the auxiliary cable. |
| 5 | D-pad | A means of navigating the on-screen menus of the handheld controller. |

6.3.1.1 Touchscreen

The **2** handheld controller's touchscreen is the primary operator interface for the system (*Fig. 89*). Buttons are indicated on-screen with a red border.

6.3.1.2 D-pad

The **5** D-pad (*Fig. 89*) provides a redundant system control that may be utilized as an alternative to the touchscreen. A blinking box around a button indicates the D-pad selection. Pressing the outer buttons of the D-pad selects different buttons on-screen. Press the centre button of the D-pad to choose the button currently selected.

6.3.1.3 Joysticks

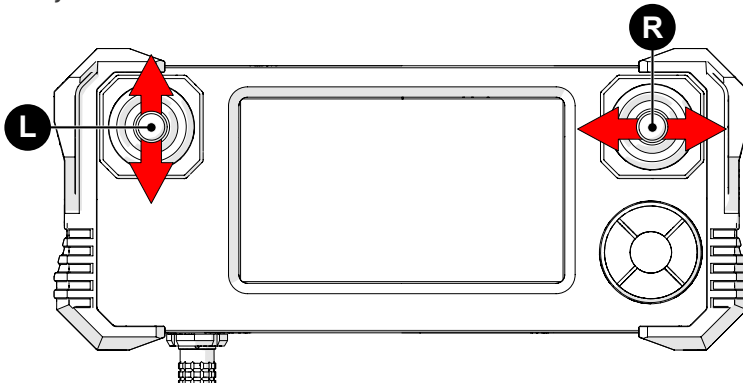


Fig. 90 - Handheld controller joysticks

The joysticks control system motion. The **L** left joystick controls the forward/reverse movement of the crawler. The **R** right joystick function is selected on screen. Functions include crawler steering or motorized raster arm movement (*Fig. 90*).

6.3.2. Mode Select Screen

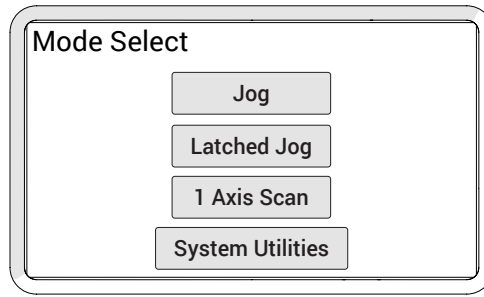


Fig. 91 - Mode select

The **Mode Select** screen offers four modes of operation for the system:

Jog Mode	(see "Jog Mode" on page 59)
Latched Jog Mode	(see "Latched Jog Mode" on page 61)
1 Axis Scan Mode	(see "1 Axis Scan Mode" on page 62)
System Utilities	(see "System Utilities Screen" on page 65)

6.3.3. Jog Mode

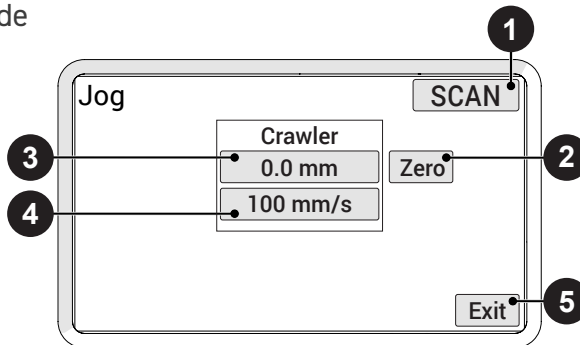


Fig. 92 - Button identification

Jog mode manually controls the system movement using the joysticks.

1 Scan/Rapid Button (Fig. 92)

Used to quickly switch between crawler speeds. The speed in either mode can be manually set to the user's preference. Rapid mode also changes the steering sensitivity according to the user settings.

TIP: Fine adjustments to speed and steering can be made in the User Settings (see "User Settings Screen" on page 66).

2 Zero Button

Sets the current position to zero for all modules.

3 Module Position Button(s)

Displays the current position of the crawler. Press to set the position to any value using the **Edit** screen. When a module position is modified, the position will be modified for all other system modes.

NOTE: This function only zeroes the number displayed on the handheld controller. It does not zero the position used in the data acquisition instrument.

4 Module Rate Button(s)

Displays the current maximum rate for the selected speed mode. Press to set the maximum rate using the **Edit** screen. The movement commanded by the joysticks will be limited to the indicated rate. When a rate is modified, the rate will be modified for all other system modes.

5 Exit Button

Exits the jog mode and returns to the **Mode Select** screen.

6 BiasOn/BiasOff button
(Fig. 93)

When the Steering Bias setting is non-zero, a button is displayed to allow steering bias for the right steering joystick to be turned on and off. (see "User Settings Screen" on page 66)

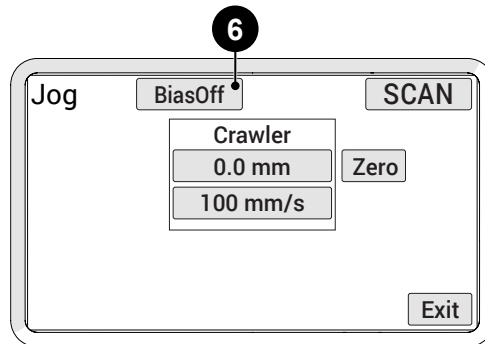


Fig. 93 - BiasOn/BiasOff button identification

6.3.4. Latched Jog Mode

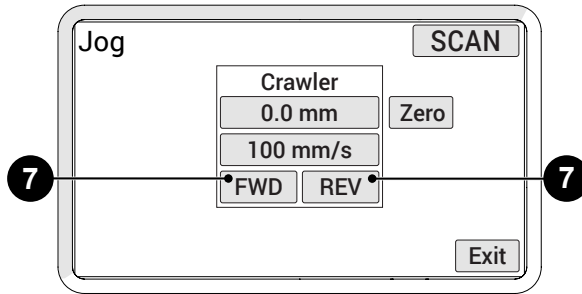


Fig. 94 - Latched jog mode

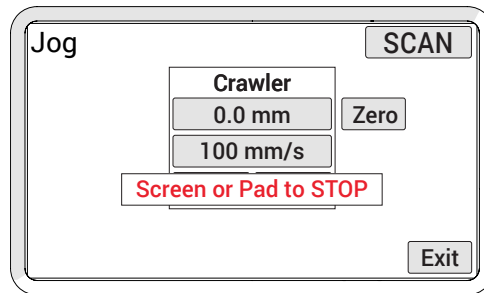


Fig. 95 - Latched jog stop screen

Identical to standard jog mode, latched jog mode adds forward or reverse crawler movement at the selected scan rate. This eliminates the need to manually hold the left joystick (see “Jog Mode” on page 59).

7 FWD & REV Buttons:

The **FWD** and **REV** buttons are located in the crawler tab. Press the **FWD** or **REV** button to drive the crawler at the current maximum scan rate. When the crawler is in motion, the steering joystick is still enabled. Touching the handheld controller screen or pressing the D-pad stops crawler movement.

NOTE: The **FWD** & **REV** Buttons will not be present in rapid mode.

6.3.5. 1 Axis Scan Mode

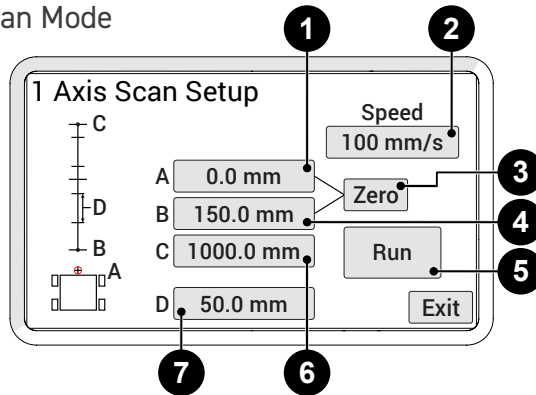


Fig. 96 - 1 Axis scan mode

1 Axis Scan mode drives the crawler in a straight line, stopping at programmed intervals.

1	Point A	The current encoder position of the crawler.
2	Speed Button	Access the User Settings screen to set the crawler's scan speed.
3	Zero Button	Set the numerical value for rows A and B to zero.
4	Point B	The start point of the scan travel. The system will move the scanner from the A point to this point at the start of a scan.
5	Run Button	Enables the 1 Axis Scan screen (see "1 Axis Scan Screen" on page 63).
6	Point C	The finish point of the overall scan travel.
7	Setting D	The distance the system will advance.

The **1 Axis Scan Setup** screen indicates the scan functions that may be entered. Each point and setting, **A**, **B**, **C**, **D**, corresponds to a coordinate entry button on the screen.

A typical scan begins at the **A** position and moves to the **B** position. Scanning begins at the **B** position and scans the distance of **D** until the **C** position is reached.

6.3.5.1 1 Axis Scan Screen

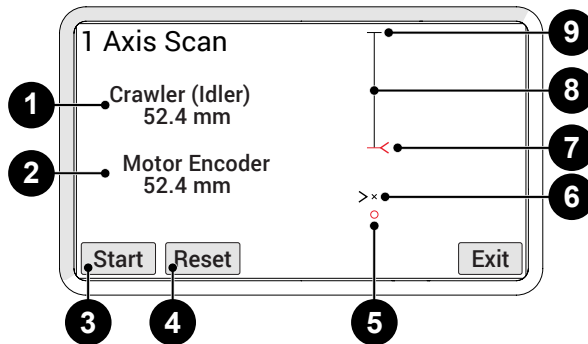


Fig. 97 - 1 Axis scan screen

The **1 Axis Scan** screen initiates and monitors the scan and advances the set distance. The initial scan screen is an approximation of a full view (*zoomed out*) of the entire scan path.

<p>1 Crawler (Motor) (Fig. 97)</p>	<p>The current encoder position of the crawler. If an idler encoder is available, it will also indicate the encoder selected (<i>Motor or Idler</i>) for crawler positioning as set in the User Settings (see “User Settings Screen” on page 66).</p>
<p>2 Idler Encoder</p>	<p>If an idler encoder is available, the position of the secondary encoder (<i>Motor or Idler</i>) is displayed for reference. This encoder is not used for positioning as per the User Settings but is only for reference (see “User Settings Screen” on page 66).</p>
<p>3 Start/Stop button</p>	<p>Start or stop the scan sequence. When a scan has been stopped while in progress, the start button resumes the scan.</p>
<p>4 Reset</p>	<p>Return the scanner to the A position. Press the start button to begin the scan sequence from the initial setting.</p>
<p>5 Scan location</p>	<p>Small red circle indicates the A position.</p>
<p>6 Scanner position</p>	<p>The blinking crosshair indicates the current scanner position.</p>
<p>7 Next scanner position</p>	<p>Where the scanner will travel to next.</p>

NOTE: The red indicator is always where the scanner will go next.

- 8 Summary screen A visual representation of the scan area.
- 9 End position The completed distance of programmed travel.

When Start is pressed the first time, the scanner will travel to point **B** and pause. The summary screen will show a closer view (*zoom in*) of the scan path.

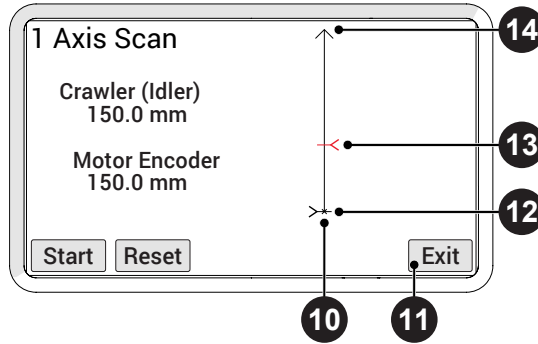


Fig. 98 - 1 Axis scan screen

- 10 Scanner location The current encoder position of the crawler.
- 11 Exit button Pressing **Exit** stops all scanning motion. When the scanner is not in the **A** position, a warning appears (*Fig. 99*). The warning alerts that the **A** position of the scanner will be changed to the current position.

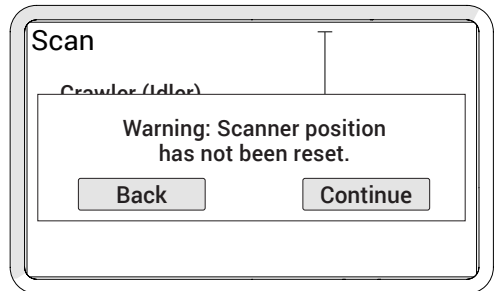


Fig. 99 - Exit warning

Press **Back** to return to the **1 Axis Scan** screen to reset the scanner and maintain original **A** position. Press **Continue** to exit to **1 Axis Scan Setup** screen.

- 12 Scanner position The blinking cross hair indicates the scanner position.

- 13 Next scanner position Where the scanner will travel to next.

NOTE: The red indicator is always where the scanner will go next.

- 14 End point

Arrow indicates travel will continue to advance. A straight line indicates the end of programmed travel.

6.3.6. System Utilities Screen

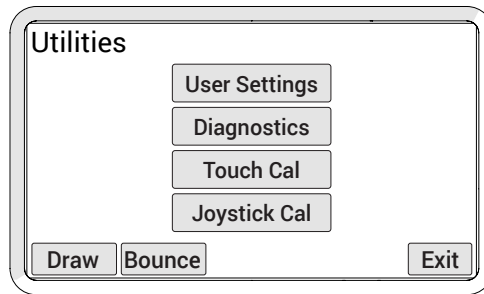


Fig. 100 - Utilities screen

The **Utilities** screen provides access to the setup, diagnostics and user preference settings.

User Settings Button

Access the **User Settings** screen allowing for various user preferences to be adjusted.

Diagnostics Button

Enters the **Diagnostic** screens to monitor system components and function.

Touch Cal Button

Used to initiate the **Touch Calibration** screen.

Joystick Cal Button

Used to enter the **Joystick Calibration** screen.

Draw Button

Enters mode used to test the touch screen accuracy and response.

6.3.6.1 User Settings Screen

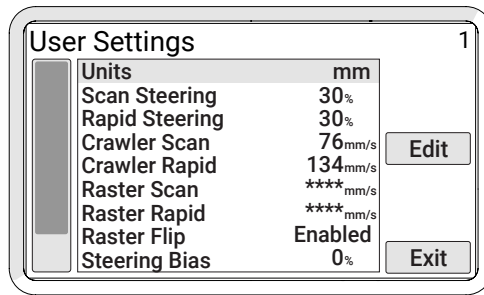


Fig. 101 - User settings screen

Allows a user to customize the system to their preferences.

The blinking highlighted box indicates the current selection. Use the D-pad or **Up** and **Down** buttons to select different settings.

Press **Edit** to enter the **Edit** screen to apply changes to the selected setting.

The **Exit** button directs to the **System Utilities** screen.

Title	Description
Units	Change the measurement units for display and user entry. When set to 0, units measure in inches. When set to 1, units measure in millimeters.
Scan Steering	Sets the steering limit maximum when using the jog mode scan setting. Lower values make the steering joystick less sensitive and more accurate, enabling better control following a guide or feature. Units are a percentage of the maximum system allowed.
Rapid Steering	Sets the steering limit maximum when using the Rapid setting within Jog mode. Recommended to be left at 100 to allow maximum crawler maneuverability.
Crawler Scan	Sets the crawler scan rate in the current units/second. This setting can also be changed through the Jog or Two Axis Scan Speed screens.
Crawler Rapid	Sets the crawler rapid rate in the current units/second. This setting can also be changed through the Jog screen.
Steering Bias	Sets a steering bias for the steering joystick, which may be turned on and off in jog mode. Setting this setting to anything other than 0 will show the bias button on the Jog screen. Steering bias allows the operator to set a fixed steering value when the steering joystick is in its neutral position.
Display Brightness	Sets the brightness of the display.

Scan by Idler Wheel

Enables the idler encoder for crawler positioning in 1 and 2 axis scan modes. In automatic scan modes, if an idler encoder is available, enabling it will reduce the actual crawler position error as the idler encoder is not affected by drive wheel slippage on the surface.

6.3.6.2 Diagnostics Screens

Several diagnostic screens allow various system functions to be monitored. Navigate to different diagnostic screens using the **PREV** and **NEXT** buttons. The **Exit** button returns to the **System Utilities** screen.

NOTE: *The diagnostic information requires an in-depth understanding of the underlying technologies and programming in the system. Not all functions and information is explained in this manual.*

6.3.6.3 Touch Calibration Screen



Fig. 102 - Touch calibration screen

This option allows calibration of the touch screen. Typically, this should not be necessary.

Touch the screen as the markers appear in the four corners of the screen.

TIP: *It is recommended that the markers be touched with a small object to enhance the touch position accuracy during calibration.*

The new calibration is stored immediately when the fourth marker is pressed. The calibration utility exits and return to the **System Utilities** screen. To abort the calibration, the system power may be turned off before the last marker is pressed.

6.3.6.4 Joystick Calibration Screen

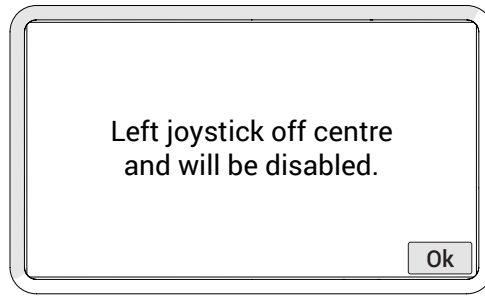


Fig. 103 - Joystick error

Typically joystick calibration is only necessary when an off-centre joystick error is detected upon startup (Fig. 103). Calibration may also be used when a joystick function does not appear to be properly centred.

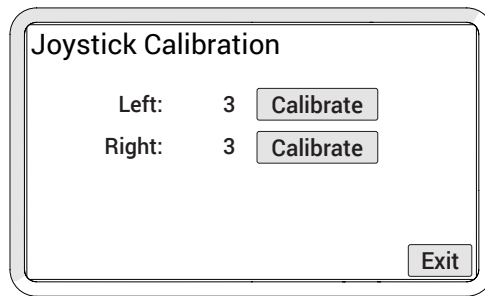


Fig. 104 - Joystick calibration screen

Current readings of the joysticks are displayed on the **Joystick Calibration** screen (Fig. 104). When the numbers are not near zero, press the **Calibrate** button to recalibrate to 0. The new calibration is stored when the **Exit** button is pressed.

6.3.6.5 Draw

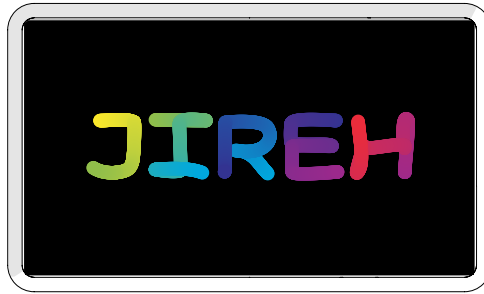


Fig. 105 - Draw utility

The draw utility may be used to test the function of the touchscreen. Exit the utility by pressing the D-pad.

MAINTENANCE

7.1. Safety Precautions Before Maintenance



WARNING! ELECTRICAL SHOCK

HAZARD. Disconnect the system controller when servicing the equipment. The system controller is powered even when the off push-button is latched in the off position.



WARNING! MAGNETIC MATERIAL.

The magnet attached to the underside of the **TERAX Base** crawler produces an extremely strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.



Tools, magnets and metal objects can cut, pinch or entrap hands and fingers. **HANDLE WITH CARE.**

Those with pacemakers or ICD's must stay at least 75 cm (30 in) away at all times.

7.2. Cleaning

General cleaning of components is important to keep your system working well. All components that have no wiring or cables are completely waterproof. Components can be washed with warm water, dish soap and a medium bristle brush.

Before using the scanner, ensure all connectors are free of water and moisture.

NOTE: All components with wiring, cables or electrical connections are splashproof. However, these components are **NOT** submersible.

NOTE: Never use strong solvents or abrasive materials to clean your scanner components.

7.3. Maintenance Schedule

The **TERAX** system must be maintained according to the following schedule:

Task	Frequency
<u>Inspect safety apparatus</u> This includes: <ul style="list-style-type: none">All components of the tether system. Replace damaged components as necessary.Lifting sling on crawler. If the lifting sling shows signs of damage (<i>e.g. cuts, abrasion, etc.</i>), do NOT use.	Every Use
<u>Clean the tracks</u> Debris may collect on the tracks. Remove this debris before every use.	Every Use
<u>Inspect cables and connectors</u> Inspect the umbilical cable, the auxiliary cable and the power cable for damage. Have any damaged cable repaired by a qualified person or replace the cable assembly as necessary. Inspect all connectors for damage or moisture. Straighten bent pins. Dry connectors before using.	Every Use
<u>General cleaning</u> Ensure that the scanner stays relatively clean by wiping off any excess dirt or other contaminants after every use.	Every Use

7.4. Track and Slider Plate Replacement

(see “Track Removal/Installation” on page 42 for additional details).

TROUBLESHOOTING

8.1. Startup Issues

Two messages are possible in the event of a startup issue: **Joystick Off Center** or **Checking Network**.

8.1.1. Joystick Off Center

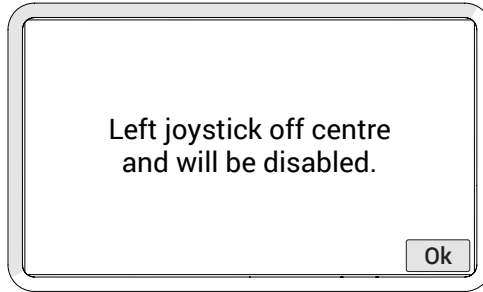


Fig. 106 - Joystick off centre screen

Upon system startup, the joystick positions are detected. When a joystick is detected outside the centre position, the **Joystick Off Center** screen displays, indicating the joystick will be disabled. Press **Ok** to continue system startup. All system functions will work normally with the exception of movements that require joystick operation.

Ensure the handheld controller’s joysticks are free of interference and reset the system power to enable joystick control.

If no interference of the joystick is present, the joystick calibration may need to be performed (see “Joystick Calibration Screen” on page 68)

8.1.2. Checking Network

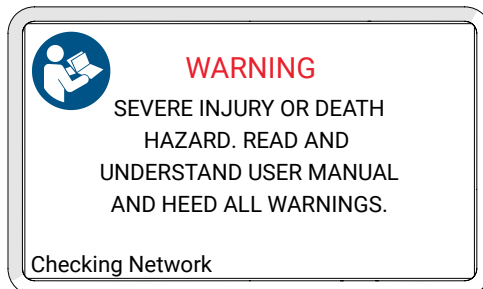


Fig. 107 - Checking network screen

During startup, the system initializes the communications to all the devices on

the network. If the network communication fails for any reason, the **Checking Network** message will appear and remain on screen.

Likely causes of this failure:

1. No devices connected to the network.
2. A problem with one of the devices.
3. Cable issue causing the entire network to fail.

Check the connections of the devices or try removing one device at a time from the system to isolate the problem device.

NOTE: Always turn off the system power before connecting or disconnecting any devices.

8.2. Startup Override

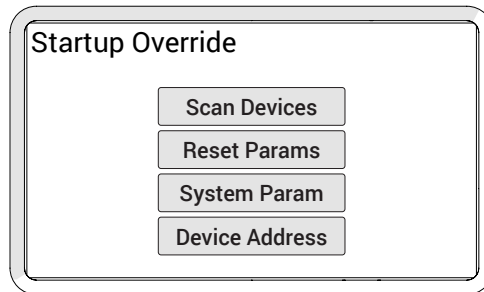


Fig. 108 - Startup override screen

A system maintenance mode may be accessed to correct system issues. Enter the maintenance mode by pressing the center of the handheld controller D-pad while system power is activated. Continue pressing the center of the D-pad until the **Startup Override** screen appears.

8.2.1. Scan Devices

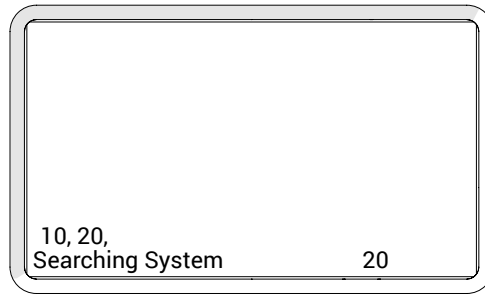


Fig. 109 - Searching System screen

This utility scans the system network for devices. All possible device addresses and speeds are scanned. As devices are found, the address of the devices is displayed. When the scanning is complete, power to the system must be cycled.

When a device is connected to the system but is not detected, this most likely indicates an internal device problem. Plug the suspect device into a different umbilical port and perform the scan again to confirm the device is faulty.

8.2.2. Reset Parameters

If the system parameters become corrupt or a change is made that prevents the system from functioning properly. All system parameters may be restored to their factory settings by selecting this option. When pressing the **Reset Params** button, the changes occur immediately. Power will need to be cycled for the reset to be complete.

8.2.3. System Parameters

System parameters are factory set to control a variety of functions. These parameters can not be modified. However, special circumstances may occur when modification of these parameters could be recommended by the manufacturer.

Instructions for making changes to the system parameters will only be provided when deemed necessary by the manufacturer.

8.2.4. Device Address

Each device type in the system is factory assigned a unique identifier. This option allows for these identifiers to be changed in the field. Instructions for making changes to the identifiers will only be provided when deemed necessary by the manufacturer.

8.3. Umbilical Troubleshooting

Troubleshooting by way of simple continuity checks through the umbilical is not effective due to the isolation circuit.

Static, spike and signal conditioning are built into the umbilical for the network signals. Power fuses are provided within the umbilical for the power distribution to the various receptacles. When troubleshooting, if a module is not functioning properly when plugged into a receptacle, it may be plugged into any other matching receptacle.

8.4. Additional Issues

Problem	Possible Cause	Solution
Handheld controller display does not activate	Input power requirements not met.	Ensure input power meets requirements. <i>(see "Power Requirements" on page 8)</i>
	Umbilical cable not properly connected.	Check umbilical cable connections at both ends. Ensure connectors are dry, clean and connector pins are not bent.
	TERAX system not activated.	Activate the TERAX system. <i>(see "System Startup" on page 51)</i>
	Damaged components in handheld controller, crawler, system controller or cabling.	Contact manufacturer. <i>(see "Jireh Industries Ltd." on page 1)</i>
Handheld controller display is activated, yet crawler does not drive	Handheld controller is not in correct mode for driving.	<i>(see "Mode Select Screen" on page 59 for additional details).</i>
	Damaged components in handheld controller, crawler, system controller or cabling.	Contact manufacturer. <i>(see "Jireh Industries Ltd." on page 1)</i>
Crawler does not drive and is unreachable	See possible causes for problem one.	See solutions for problem one. If the crawler is still unresponsive <i>(see "Retrieval of a Stranded Crawler" on page 77)</i>
Crawler does not steer properly	A drive module is dead	Contact manufacturer. <i>(see "Jireh Industries Ltd." on page 1)</i>
System is displaying "Please Wait – Motor Moving" when power is applied.	Crawler is moving when power is applied due to an external force <i>(gravity, etc.)</i> .	Manually stop the crawler movement. The crawler must be stationary for system initialization to be performed.

8.5. Retrieval of a Stranded Crawler



WARNING! FALLING OBJECT HAZARD.

The tether system must remain active while retrieving the crawler (*i.e. a mechanism or person must be continuously taking up the slack in the tether*).

Should the **TERAX** crawler become inoperative while out of reach, first attempt the solutions offered in this manual (*see “Troubleshooting” on page 72*)

If troubleshooting does not rectify the issue, it may be necessary to retrieve the crawler manually. To do so:

1. Press the off push-button. This will turn the crawler power off.

NOTE: *Under normal conditions, the crawler should stay at the position it was powered off at, unless it is under heavy load, in which case it may descend slowly.*

2. If the crawler stops descending due to some kind of impediment, use a ladder, man lift or scaffolding to retrieve the crawler.

NOTE: FALLING OBJECT HAZARD. *It is **CRUCIAL** that the tether system remains active while retrieving the crawler (*i.e. a mechanism or person must be continuously taking up slack in the tether*).*

8.6. Technical Support

For technical support, contact Jireh Industries (*see “Jireh Industries Ltd.” on page 1*).

SERVICE AND REPAIR



WARNING! ELECTRICAL SHOCK

HAZARD. Disconnect the system controller when servicing the equipment. The system controller is powered even when the off push-button is latched in the off position.



WARNING! MAGNETIC MATERIAL.

The magnet attached to the underside of the **TERAX** produces an extremely strong magnetic field which may cause failure or permanent damage to items such as watches, memory devices, CRT monitors, medical devices or other electronics.



Tools, magnets and metal objects can cut, pinch or entrap hands and fingers. **HANDLE WITH CARE.**

Those with pacemakers or ICD's must stay at least 75 cm (30 in) away at all times.



WARNING! DO NOT DISASSEMBLE.

No user-serviceable parts. Disassembling any of the components in this product, beyond the instructions in this user manual, could void the regulatory certifications and/or effect the safety of the product.

SPARE PARTS

To order accessories or replacement parts for your **TERAX** system.
 (contact Jireh Industries Ltd. on page 1)

NOTE: These drawings are for parts order. This is not a list of kit contents.

10.1. Base Crawler

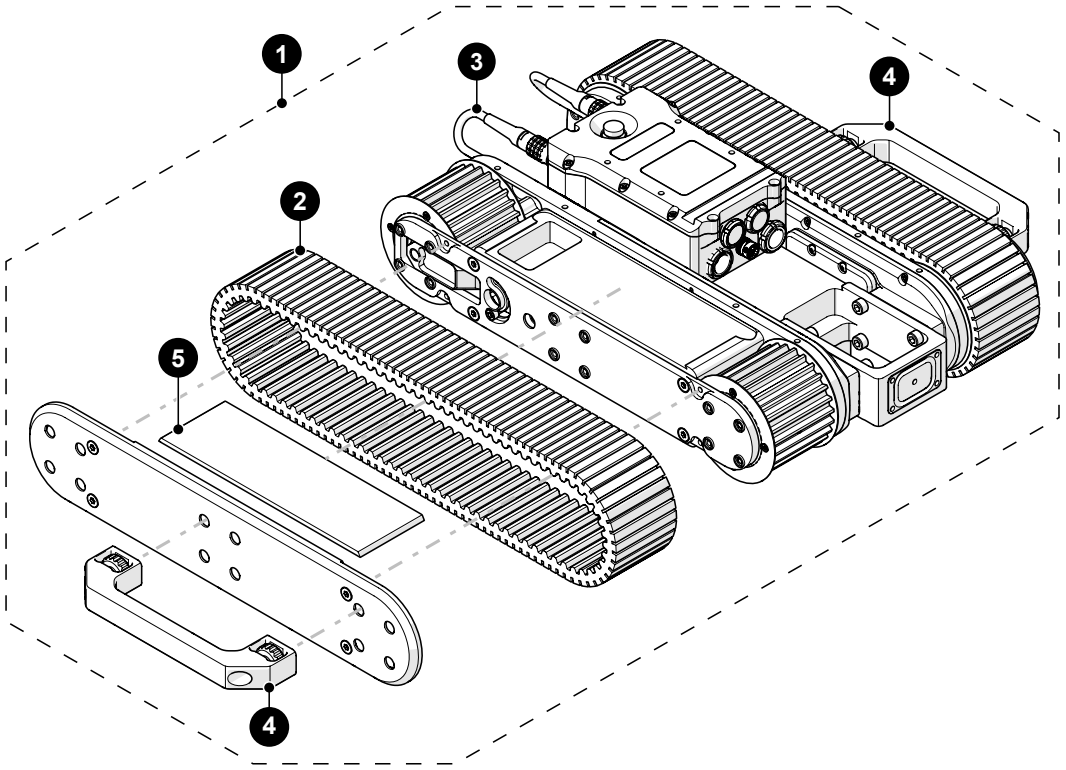


Fig. 110 - Base crawler parts

BOM ID	Part #	Description
1	ENA002	TERAX - Internal Base Crawler
2	EN0047	Drive Track
3	UMA020-0.55	Motor Pod Cable
4	ENS010	Handle, Threaded
5	EN0017	Slide Plate

10.2. Internal Base Crawler

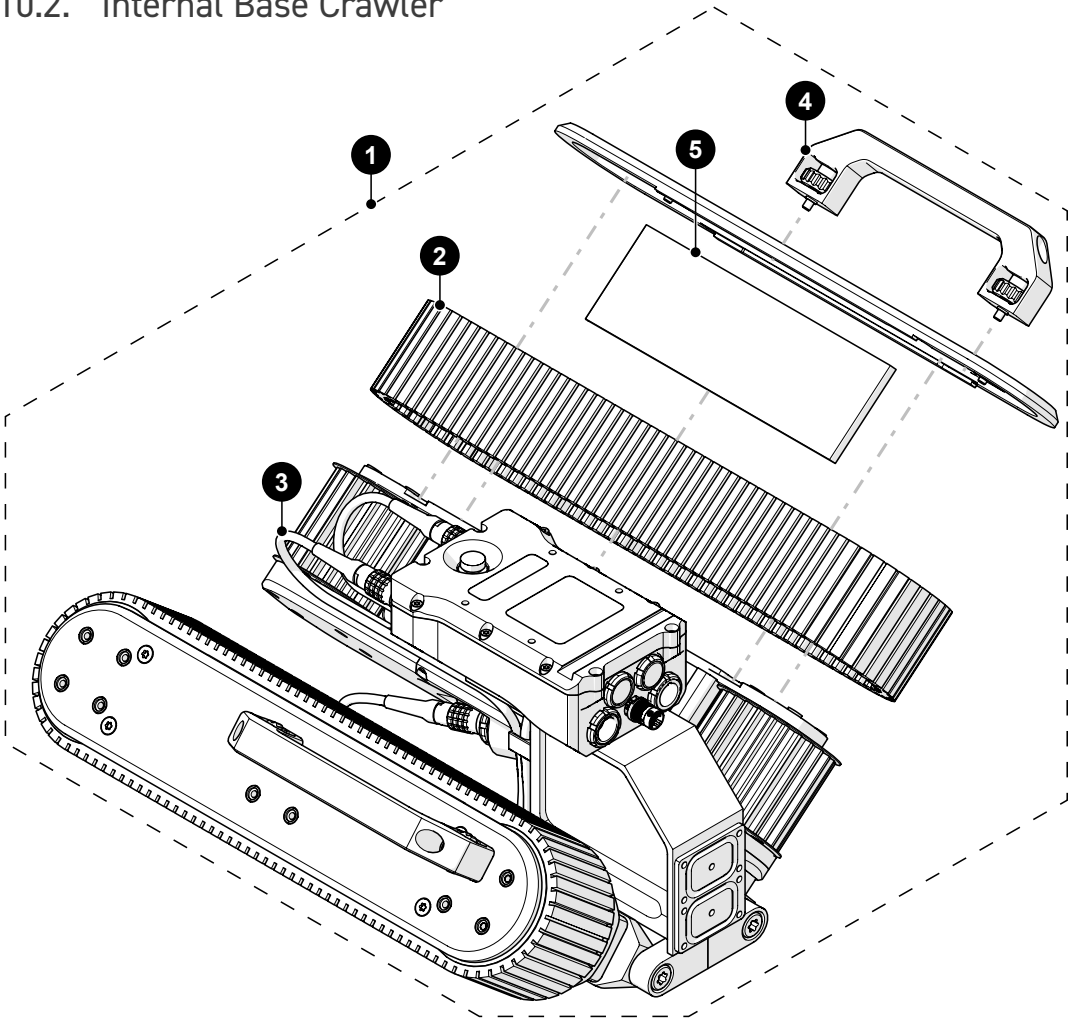


Fig. 111 - Internal crawler parts

BOM ID	Part #	Description
1	ENA001	TERAX - Internal Base Crawler
2	EN0047	Drive Track
3	UMA020-0.55	Motor Pod Cable
4	ENS010	Handle, Threaded
5	EN0017	Slide Plate

10.3. Kit Components

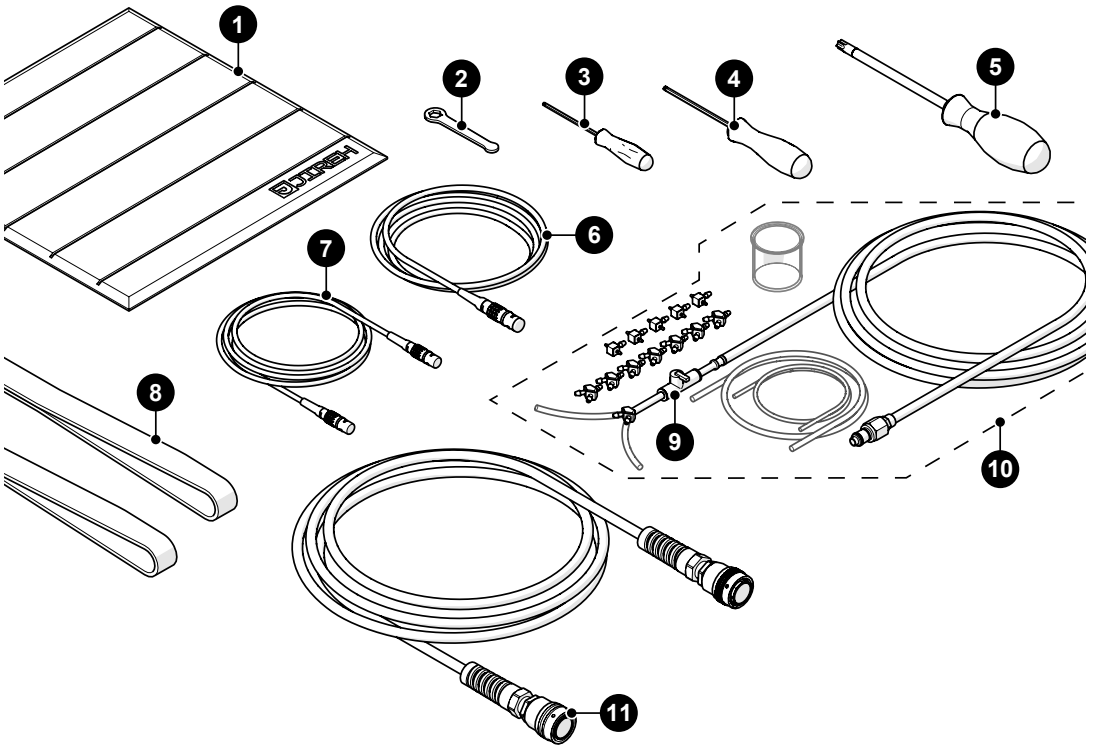


Fig. 112 - Kit components

BOM ID	Part #	Description
1	AAS061	Installation/removal mat
2	EA470	10 mm (3/8 in) wrench
3	EA599	2.5 mm (0.098 in) hex driver
4	EA414	3 mm (0.118 in) hex driver
5	EA627	T45 Driver
6	UMA025- <u> </u>	Encoder cable (see Encoder Connector Type)
7	UMA017-06	Auxiliary cable: 6 m (19.6 ft)
8	EA243	Sling
9	LA034	Irrigation Shutoff Valve
10	CMG009	Irrigation kit, 2-4 probe, large tube (various lengths available)
11	UMA044- <u> </u>	Umbilical, Ethernet (see Umbilical, Ethernet length)

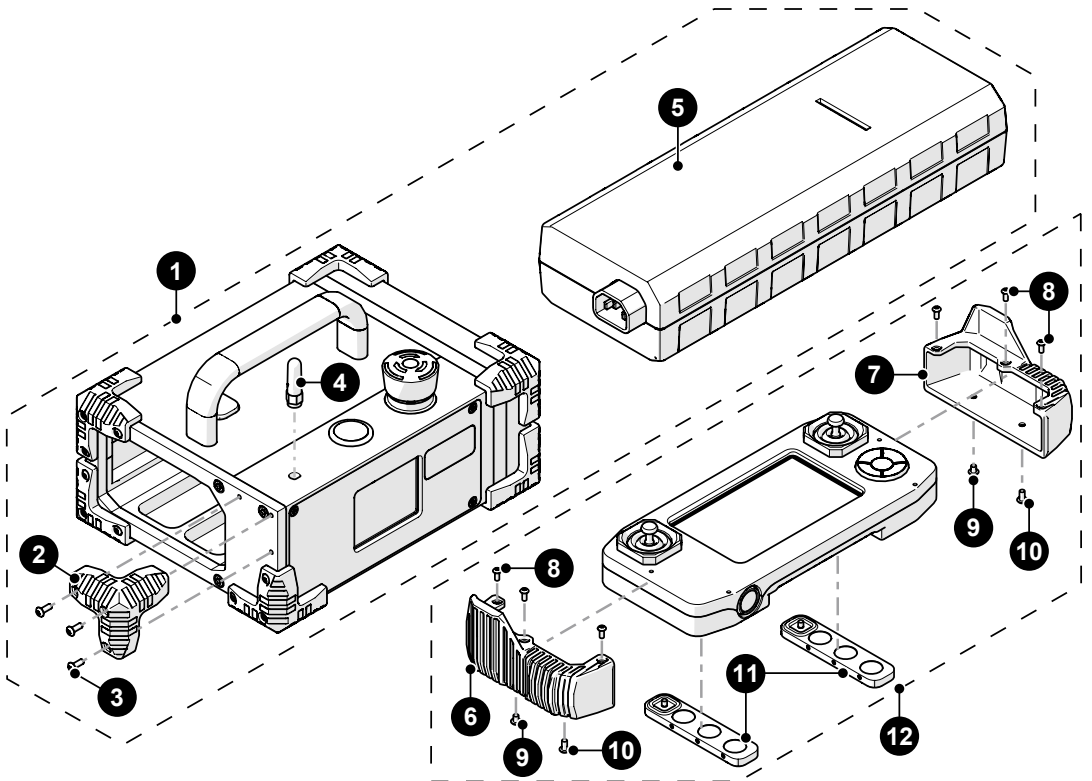


Fig. 113 - Kit components

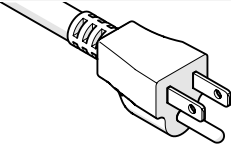
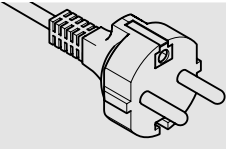
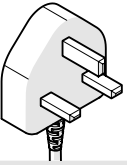
BOM ID	Part #	Description
1	ERA001_	System controller (see Power Cord Type)
2	DY0011	Rubber bumper
3	MD411-008	BHCS-TX, M3x0.5 X 8mm ISO 7380-1 A2
4	SU004	Antenna
5	CXS122	Power supply
6	DM0088-L	Handheld controller bumper (left)
7	DM0088-R	Handheld controller bumper (right)
8	MD409-006	BHCS-TX, M2.5x0.5 X 6mm ISO 7380-1 A2
9	MD411-004	BHCS-TX, M3x0.5 X 4mm ISO 7380-1 A2
10	MD411-006	BHCS-TX, M3x0.5 X 6mm ISO 7380-1 A2
11	DMS005	Handheld controller magnet holder
12	DMA006	Handheld controller

10.3.1. Encoder Connector Type

Connector Type	Company/Instrument	Connector Type	Company/Instrument
B	Olympus OmniScan MX Zetec Topaz	G	Sonotron Isonic 25xx
C	Olympus Focus LT Zetec Z-Scan Eddyfi Ectane 2	U	Sonatest Veo / Prisma
E	Olympus OmniScan SX/MX2/X3 M2M MANTIS/GEKKO LEMO	V	Pragma PAUT
F	TD (<i>Technology Design</i>)	AD	Sonatest Veo / Prisma - Single Axis

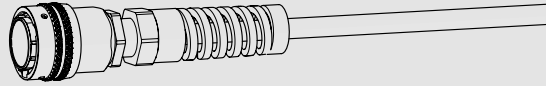
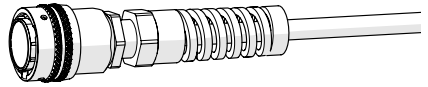
NOTE: Additional encoder connector types are available.
(contact Jireh Industries Ltd. on page 1)

10.3.2. Power Cord Type

Connector Type	Part #	Power Cord	
N	SL032	North American	
E	SL039	European	
U	SL059	United Kingdom	
Z		No Cord	

10.3.3. Umbilical, Ethernet Length

Length	Part #	Description
30	UMA044-30	30 m (98.4 ft)
60	UMA044-60	60 m (196.8 ft)



10.4. Cable Management, Dual Threaded Mount

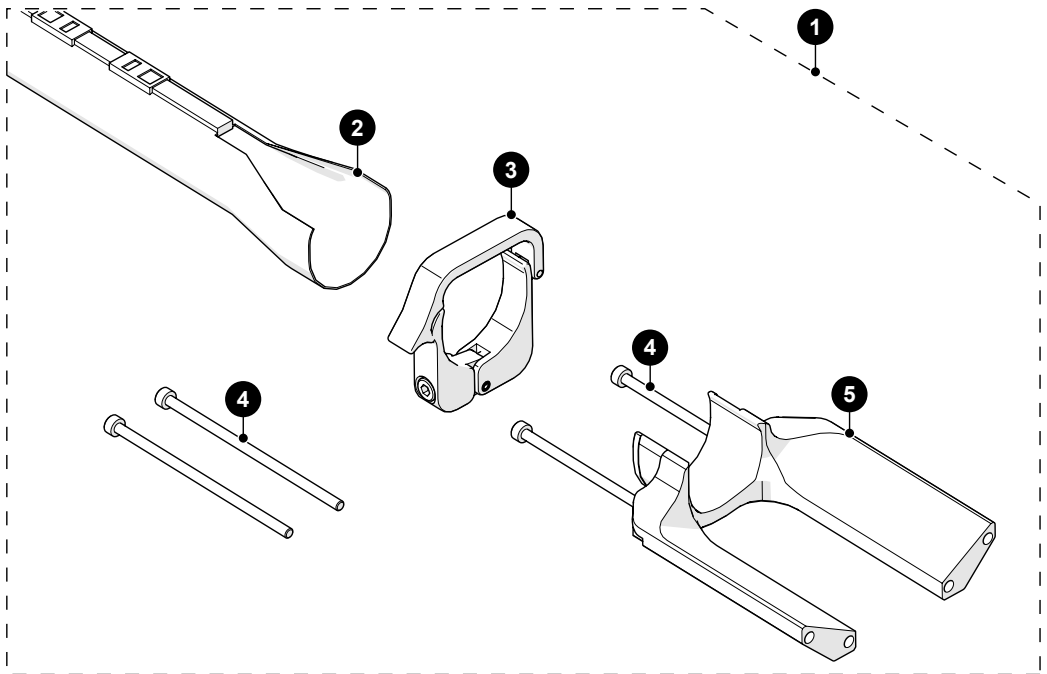
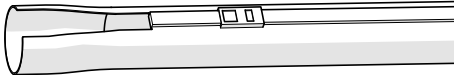
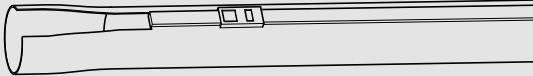


Fig. 114 - Cable management parts

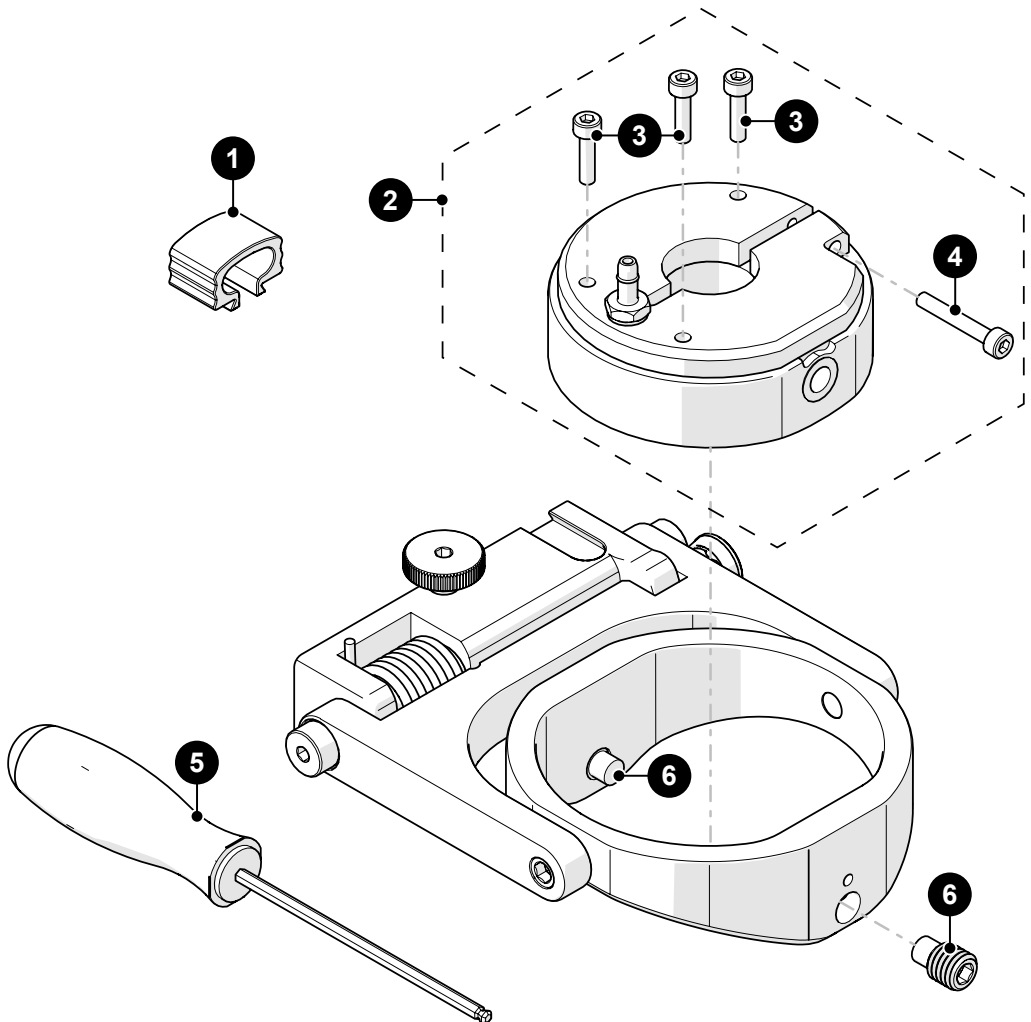
BOM ID	Part #	Description
1	ENG003-_	Cable Management, Dual Threaded Mount (see Cable Management Slewing, Length)
2		see Cable Management Slewing
3	DYS017	Cable Management Clamp, Large
4	MD049-070	SHCS, M3x0.5 X 70mm, SST
5	EN0031	Dual Threaded Mount

10.4.1. Cable Management Sleeving

Length	Part #	Description	
29.5	CX0147	29.5 m (96.8 ft)	
59.5	CX0509	59.5 m (195 ft)	

10.5. Probe Holders

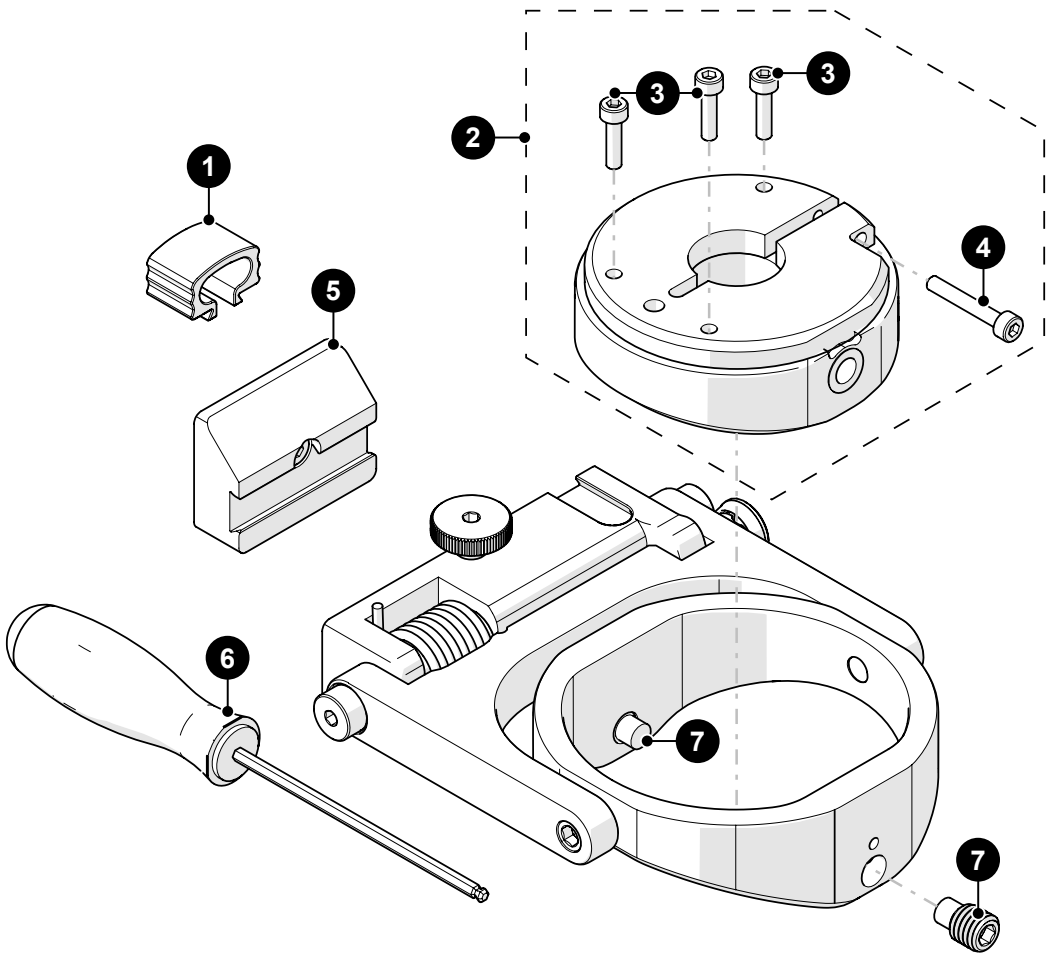
10.5.1. Corrosion Thickness Probe Holder



BOM ID	Part #	Description
1	BG0091	Cable Clip
2	<i>See Probe Holder Receptacle and Wear Plate</i>	
3	MD049-012	SHCS, M3x0.5 x 12 mm, SST
4	MD049-020	SHCS, M3x0.5 x 20 mm, SST
5	EA599	2.5 mm (0.098 in) Hex Driver
6	MA264	SHSS, M8 x 1.25 x 12 mm, dog point, SST

Fig. 115 - Corrosion thickness probe holder parts

10.5.2. Corrosion Thickness Probe Holder - Internal Curved Wear Plate



BOM ID	Part #	Description
1	BG0091	Cable Clip
2		<i>Internal Probe Holder Receptacle and Wear Plate</i>
3	MD049-012	SHCS, M3x0.5 x 12 mm, SST
4	MD049-020	SHCS, M3x0.5 x 20 mm, SST
5	DWS017	Crawler Dovetail Adapter
6	EA599	2.5 mm (0.098 in) Hex Driver
7	MA264	SHSS, M8 x 1.25 x 12 mm, dog point, SST

Fig. 116 - Corrosion thickness probe holder - internal curved wear plate parts

10.5.2.1 Probe Holder Receptacle and Wear Plate

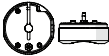
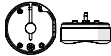







Part #	Wear Plate	Receptacle	Part #	Wear Plate	Receptacle
PHS066-A	Curved	9.53 mm (0.375 in) dia. 	PHS066-B	Curved	12.7 mm (0.5 in) dia. 
PHS066-C	Curved	19 mm (0.75 in) dia. 	PHS066-E	Curved	25.4 mm (1 in) 
PHS067-A	Flat	9.53 mm (0.375 in) dia. 	PHS067-B	Flat	12.7 mm (0.5 in) dia. 
PHS067-C	Flat	19 mm (0.75 in) dia. 	PHS067-D	Flat	Technisonic 
PHS067-E	Flat	25.4 mm (1 in) 			

Fig. 117 - Probe holder receptacle and wear plate selection

10.5.2.2 Internal Probe Holder Receptacle and Wear Plate

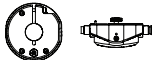

Part #	Wear Plate	Receptacle	Diameter	
PHS103-C-8	Curved	19 mm (0.75 in) dia.	8 in (203.2 mm)	
PHS103-C-12	Curved	19 mm (0.75 in) dia.	12 in (304.8 mm)	

Fig. 118 - Internal Probe holder receptacle and wear plate selection

10.6. Cases

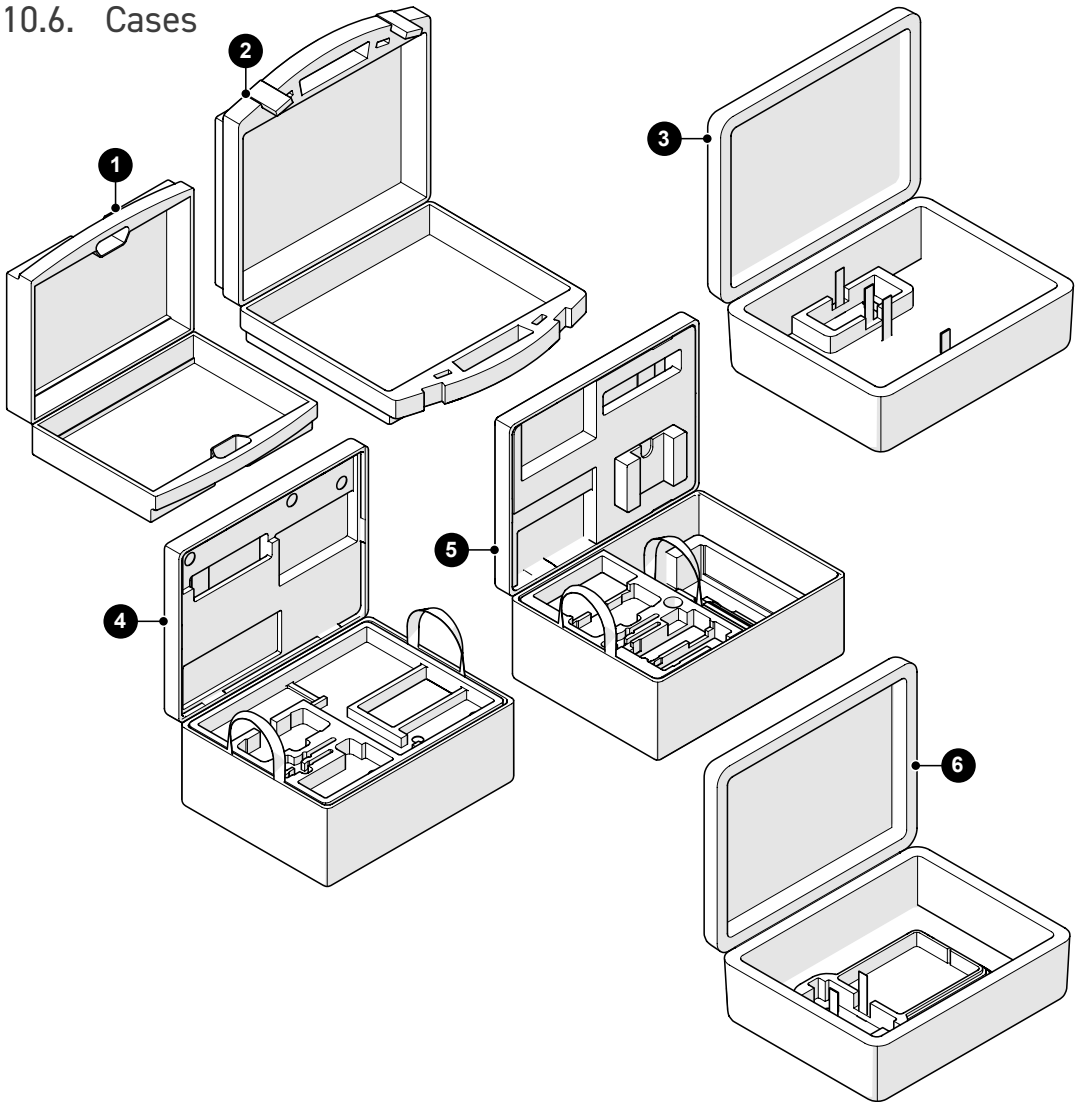


Fig. 119 - Cases

BOM ID	Part #	Description
1	EA421	Umbilical Case
2	EA610	Umbilical Case (<i>large</i>)
3	CXA023	Umbilical / Probe Holder Frame Case
4	ENA003	TERAX Base Crawler Case
5	ENA004	TERAX Internal Crawler Case
6	CMA016	Motorized Pump/Umbilical Case

DISPOSAL

WEEE Directive

In accordance with European Directive on Waste Electrical and Electronic Equipment (WEEE), this symbol indicated that the product must not be disposed of as unsorted municipal waste, but should be collected separately. Refer to Jireh Industries for return and/or collection systems available in your country



LIMITED WARRANTY

WARRANTY COVERAGE

Jireh Industries warranty obligations are limited to the terms set forth below: Jireh Industries Ltd. (“Jireh”) warrants this hardware product against defects in materials and workmanship for a period of THREE (3) YEARS from the original date of purchase. If a defect exists, at its option Jireh will (1) repair the product at no charge, using new or refurbished replacement parts, (2) exchange the product with a product that is new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product, or (3) refund the purchase price of the product. A replacement product/part assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes Jireh’s property. When a refund is given, your product becomes Jireh’s property.

OBTAINING WARRANTY SERVICE

To utilize Jireh’s warranty service you must ship the product, at your expense, to and from Jireh Industries. Before you deliver your product for warranty service you must phone Jireh and obtain an RMA number. This number will be used to process and track your product. Jireh is not responsible for any damage incurred during transit.

EXCLUSIONS AND LIMITATIONS

This Limited Warranty applies only to hardware products manufactured by or for Jireh Industries. This warranty does not apply: (a) to damage caused by accident, abuse, misuse, misapplication, or non-Jireh products; (b) to damage caused by service (including upgrades and expansions) performed by anyone who is not a Jireh Authorized Service Provider; (c) to a product or a part that has been modified without the written permission of Jireh.

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