



SAFETY WARNINGS / PRECAUTIONS

KEEP THIS MANUAL - DO NOT LOSE

THIS MANUAL IS PART OF THE **TROGLO** SYSTEM AND MUST BE RETAINED FOR THE LIFE OF THE PRODUCT. PASS ON TO SUBSEQUENT OWNERS. Ensure any amendments are incorporated with this document.



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



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.



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



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 affect the safety of the product.



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



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 39 for additional details)



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Chapter 1

IDENTIFICATION

1.1. Product Brand

This user manual describes the proper safety precautions, setup and use of the **TROGLO** 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 **TROGLO** product complies with the essential requirements and other relevant provisions of the following European Union directives:

CE

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 **TROGLO** 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 TROGLO System

This section outlines the product specifications of the base **TROGLO** system. When the base system is used together with compatible components or child products , the product specifications of the base system may be superseded.

Welcome to your new Crawler System. This manual covers all variations from the Manual Reel and Small wheel sets right up to the large configurations with Wheel Extensions, Pneumatic Wheel sets, Elevator and Large Lighthead.

Your new system is entirely battery-powered with no lethal voltages anywhere in the system. The Main Cable has a maximum of 5V present and it is safe to touch any of the connectors.

The **TROGLO** System is based around a single Crawler Body, to which accessories can be added to allow survey of pipes from 4" to 39" centred (100mm -1000mm).

The Reel can be Manual or Automatic, they are both similar in appearance with the addition of a motor and gearbox hidden within the hub on the Auto Reel option. Apart from this, the rest of the system is identical, there are no separate controls for the reel, it is automatically controlled using the Crawler direction controls. The Auto Reel will keep the cable in tension at all times to reduce the possibility of damage or tangles.

Your complete system is fully waterproof. The Reel, Display Unit, Keyboard and Power Cell are waterproof to IP67. The Crawler and accessories are waterproof to IP68, 11-Bar (150 psi) and operate correctly at that pressure.

The Crawler, Wheel Extensions, Elevator, Batteries, Main Cable and Large Lighthead can be pressurised to 50 psi from the rear connector on the Crawler. A loss of pressure is shown on-screen for peace of mind that your system is in good order.

Please read this Manual in its entirety before first operation.

2.2. Saftey symbols

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





symbol

General warning

Shock hazard caution 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.

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.

2.3. 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.

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SYSTEM COMPONENTS

3.1. Base System Components

3.1.1. TROGLO Crawler EPS064

The **TROGLO** system is based around a single Crawler Body, to which accessories can be added to allow survey of pipes from 4" to 39" centred (100mm -1000mm). Variations include the Manual Reel and Small wheel sets, as well as the large configurations with Wheel Extensions, Pneumatic Wheel sets, Elevator and Large Lighthead. The Reel can be Manual or Automatic, they are similar in appearance with the addition of a motor and gearbox hidden within the hub on the Auto Reel option. The Auto Reel will keep the cable in tension at all times to reduce the possibility of damage or tangles.



Fig. 1 - Standard Crawler Body



Fig. 2 - Contents and Placement



Fig. 3 - Contents and Placement

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3.1.2. Standard Wheel Sets EPS231/EPS037/EPS036

Various wheelsets are available for the **TROGLO**, the Standard wheel set contains a 4" set, a 6" set, and a 8" set.





Fig. 6 - 8' Wheel Set

Fig. 4 - 4" Wheel Set



Fig. 5 - 6" Wheel Set

3.1.3. T812 Camera Head EPA006-



Fig. 7 - Camera Head

3.1.4. Battery EPS045

The battery is compatible with the crawler body and will power the **TROGLO** system for hours at a time.



Fig. 8 - Battery

3.1.5. Chargers EPA019/EPA018-N



Fig. 9 - DC Charger



Fig. 10 - AC Charger

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3.1.6. Tools

Several tools are included for various scanner and accessory adjustments. *(see "Tools" on page 13 for additional details)*

3.1.7. Cases

Depends on the configuration selected at the time of purchase. THis determines the type and amount of cases included with the system.







Fig. 13 - Large Crawler Option - Case Contents



Fig. 14 - Large Crawler Option - Case Contents





Fig. 15 - Large Crawler Option - Case Contents



Fig. 16 - Large Crawler Option - Case Contents



Fig. 17 - Large Crawler Option - Case Contents

- 3.2. Compatible Components
 - 3.2.1. Large Battery Pack EPS042



Fig. 18 - Large Battery Pack

3.2.2. Large Lighthead EPS040

3.2.3. Large Pneumatic Wheels EPS032

3.2.4. Small Pneumatic Wheels EPS035



Fig. 19 - Large Lighthead





Fig. 21 - Small Pneumatic Wheels



3.2.5. Wheel Extensions EPS033



Fig. 22 - Small Pneumatic Wheels



3.3. Tools

3.2.6. Elevator

EPS024

3.3.1. Wheel Removal Tool EZ939

3.3.2. Lifting Device EPA016-

3.3.3. Pressure Pump EPA017





Fig. 24 - Wheel Removal Tool



Fig. 25 - Lifting Device



Fig. 26 -Pressure Pump

PREPARATION FOR USE

4.1. TROGLO Configurations

4.1.1. Elevator



Fig. 27 - Elevator



Fig. 28 - Elevator on crawler body

The Elevator is supplied with tiewraps to hold it in the compressed position. Do not cut these until the elevator is fitted to the Crawler. The Elevator is only balanced with the Pan & Tilt Camera and Large Lighthead fitted.

Remove the Lighthead and camera from the crawler and then place the Elevator over the crawler body as shown.



Fig. 29 - Tightening Elevator collar

Tighten the collar as shown, making sure that the Elevator stays aligned and the two Elevator Allen Bolts do not interfere with the fitting—lift these by hand to ensure they do not impede the movement backwards.



WARNING! POSSIBILITY OF INJURY.

The Elevator has a scissor action, keep fingers away from the lifting arms and always use protective gloves when lifting, fitting or moving.



Fit the Lighthead from the front ensuring that the screws do not impede fitting, once pushed back into position tighten the two Allen Bolts.



Fig. 30 - Fitting Lighthead

Fit the Pan & Tilt camera head as shown to the right by turning clockwise. Ensure that the threads are aligned, the head should fit easily. If there is any resistance rotate the head anti-clockwise and re-align.



Fig. 31 - Fitting Camera

Cut the tie-wraps and lift the Elevator by hand. Tighten the two screws as shown to the right. Refit the large battery, pressurise the crawler to 50psi and ensure that the pressure is retained.



Fig. 32 - Elevator Screws

Chapter 5

OPERATION

5.1. Auto/Manual Reel



Fig. 33 - Manual Cable Reel



Fig. 34 - Manual Cable Reel





Fig. 35 - Auto Reel Control Handle

5.1.1. Auto Reel Control Handle

The Control Handle is operated by pulling outwards (towards the operator) and then moved upwards or downwards to select operation. The handle can then be released when the operation has been selected. This is best performed with the left hand with the thumb braced against the legend plate or the frame tube, the handle is designed with a strong spring so that the handle cannot be inadvertently moved.

In normal operation the handle is left in the AUTO position.



WARNING! The Reel can provide a lot of power and care should be taken that the crawler cable is not snagged as this may damage the cable. The Reel can realise a pull of around 12 kg (26.6 lbs) so also ensure that the reel cannot be pulled.

5.1.2. Auto

This is the setting used for normal operation. The cable can be pulled from the reel by hand or by the crawler. The reel is designed to provide a small amount of tension in the cable, if the cable is pulled the reel will pay out cable, if released the cable will return to the reel. Auto works with or without the crawler so that cable can be pulled from the reel without the crawler connected, the cable can then be connected to the crawler when in place and the survey can start. There are no voltages or power in the cable and it is safe to handle.

The cable reel will release cable when the crawler is moving forwards always keeping a small amount of tension. It is the crawler that pulls the cable, the reel uses its motor to keep in synchronisation with the crawler. The longer the forward button is pressed the faster the crawler will move, press stop to halt the crawler.

In reverse the Reel will initially tension the cable - as the cable can be at its full extent of 300M the reel provides around 11 Kg of force so make sure the Reel cannot be pulled towards the manhole. At this point the crawler will turn its motors OFF so it does not run over the cable. After the cable is tensioned the Reel will change to a lower pull-force of around 5Kg, After a few seconds the crawler will switch on its motors and start reversing.

In normal use (including transportation between sites) the reel can remain in Auto.

5.1.2.1 Tension

This mode allows the crawler to reverse under its own power and should be used carefully ensuring the crawler does not run over the cable. This mode can be used when the crawler needs to be manoeuvred, for instance if the crawler is blocked by an obstruction when retrieving. This allows the crawler to power itself over obstruction. In all other circumstances leave the reel in AUTO.

5.1.2.2 Reel Lock and Manual Rewind

This position is used to lock the reel for transportation and for manually rewinding the cable after the crawler has been removed or if the crawler battery is exhausted. With the handle released in the Reel LOCK position the motor brakes are automatically applied. When the handle is lifted upwards from Reel Lock cable will be rewound onto the reel. The further the handle is lifted away from the Reel LOCK position the faster the reel will rotate.

Manual Rewind can be used if the crawler has exhausted it's power and needs to be retrieved to replace the battery.



5.1.2.3 Additional Information on the Auto-Reel Operation

To successfully return the crawler to the Reel we use a combination of Auto-Reel power and Crawler power. This ensures that the main cable is always under tension but additionally allows the Crawler to steer when in reverse. We also use methods to reduce both Crawler and Auto-Reel current consumption allowing a long mission time. In FORWARD the Auto-Reel provides a small amount of cable tension to ensure the cable does not become untidy on the reel. In Reverse the Auto-Reel uses a number of operating modes to return the cable and Crawler using the minimum Crawler and Auto-Reel power. When REVERSE is selected from the keyboard the reel will go through three stages within a few seconds as below:

- **1.** The Cable is put under tension of around 11Kg, the Crawler selects its reversing camera but inhibits its motors
- **2.** The Cable tension is reduced to 5Kg, the Crawler's motors are inhibited so it cannot run-over the cable
- **3.** The Crawler's motors are switched ON and it will start reversing at the speed set from the keyboard. The Auto-Reel provides 5Kg of pull at all speeds.

The reversing action shown above ensures the cable is always protected and power consumption is reduced to an absolute minimum. It also allows the system to be used where the inspection is made on low-friction surfaces without dragging the crawler at excessive speeds allowing a successful inspection to be performed.

During operation of the Crawler and Cable Reel it is imperative that the Cable Reel is anchored so that it cannot be pulled into a culvert. Both the Crawler and the Auto Cable Reel can provide high torque and this may be enough to pull the Cable Reel along a slippery surface.

Always ensure that the Cable Reel is anchored before use.

5.2. Fitting Extensions and Lighthead



The Wheel Extensions, Large Battery and Lighthead are options to allow surveying larger pipe sizes. The wheels are fitted to the extensions first:

- Lay Wheel Extensions so that the wheel axles are upwards
- Carefully align wheels and fit with locking bolts using the supplied wheel tool. These do not have to be fitted with too much force and will lock into place
- Lay the crawler on its side so that three axles are upwards
- Align the Extensions with the outer axles and rotate the wheels so that the axles insert correctly
- Fit the ratchet handle to the wheel tool and tighten the single central bolt ensuring that the extensions are fully inserted onto the axles
- Repeat for the other extension
- Position the crawler upright
- Remove any battery fitted to the crawler
- Fit the large Lighthead using the two captive Allen bolts, do not fully tighten until the large battery is inserted
- Slide the Large Battery into position, tighten lighthead bolt



5.3. Battery

Charging Batteries

Before use it is best practice to charge the two batteries (three batteries with the Large Crawler system) supplied with the Standard Tractor System. You can use either the mains charger (shown below) or the DC charger. Connect the charger to the battery before connecting the mains or DC supply. The charger connector is fitted by aligning the two screws to the two apertures in the battery and turning clockwise with the 'T' marking uppermost—it will only fit in one orientation. The LED on the charger shows the state of charge. RED means that the charger is putting energy into the battery. When the battery is fully charged the LED will change to GREEN. If the LED does not show at all something is wrong—check the mains or DC supply.



Fig. 37 - Status LED

Fitting and Releasing the Crawler Batteries

The battery packs slide from the rear onto the crawler body—to release a battery from the crawler body first lift the release button and then push the battery backwards from the front as shown below whilst holding the release button upwards. Slide the battery fully backwards until released from the crawler body.



Fig. 38 - Battery Fitting

Before fitting the charged battery ensure that the connector on the crawler and battery are free from debris and dampness. Slide the battery through from the rear and smartly snap the battery forwards to fully mate—ensure that the battery cannot be pushed backwards to ensure it is correctly fitted.



Fig. 39 - Battery Fitting



5.4. Locking Wheel Fittings



Fig. 40 - Rachet Ring

Each wheel is fitted with a ratchet lock, this stops the wheel bolts from working loose during operation. It is important that the wheel bolts are not forced anticlockwise or the ratchet may suffer damage. To remove a wheel only the wheel-removal tool must be used, do not use a standard wrench as this will damage the ratchet ring.



Fig. 41 - Wheel Fitting

To fit a wheel turn the wheel bolt clockwise until the ratchet can be felt engaging, then apply a small amount of force to fully engage the wheel bolt.

To remove a wheel firstly push the wheel removal tool towards the bolt until the ratchet ring is depressed, then turn anti-clockwise. Do not force the wheel bolt otherwise the ratchet ring will be damaged.



Fig. 42 - Wheel Fitting



5.5. Pressurizing the Crawler

The crawler must be pressurised before use this pressure is monitored by the control unit—if the pressure drops to low levels a flashing 'P' will appear onscreen. Ensure both the pump and crawler rear connector is clear of debris and dampness before pressurising. Connect pump to rear connector of the crawler and pump to achieve a pressure of 2 BAR to 3.5 BAR (30—45 psi). Remove the pump from the rear connector. The crawler is now ready to be used.



Fig. 43 - Pump Type 1

Fig. 44 - Pump Type 2

The crawler will lose pressure slowly during operation, this is normal as air continually pressurises the main cable along the full 300M length. A sudden loss of pressure indicates that the main cable has been damaged. The pressure can be checked during operation by pressing the 'D' key (DATA). This will show useful information as shown below.

If the pressure is low a warning is shown at the bottom of the screen. If the 'D' key has not been pressed a flashing 'P' will appear in its place indicating a dangerously low pressure.



Fig. 45 - Pressure Reading

5.6. Connecting the Crawler to the Reel



Fig. 46 - Connecting Crawler To Reel

NOTE: Ensure that the cable termination and crawler connector in clean and free from moisture before connection.

Once the crawler has been pressurized it can be connected to the cable reel. There is no additional strain-relief required.

The Cable Reel can be now be switched ON at the GREEN HUB BUTTON. The front crawler lights will illuminate and the Pan & Tilt camera will initialise until it is upright and the lens is pointing forwards.



Fig. 47 - Connecting Crawler to Reel

NOTE: Ensure that Auto-Reel Control Handle is set to AUTO



5.7. Lowering/Raising the Crawler



Fig. 49 - Lifting Device Ready

It is simple to lift the crawler, but the correct orientation of the lowering device is required. The pictures above show the lowering claw—to GRAB the crawler the claw must be in the READY position. To get it into the ready position dangle the claw and give the rope a slight tug upwards, this will close the claw, ready for grabbing the crawler.

Fig. 50 - Lifiting Device Released



Fig. 48 - Lifting Device Ready

Have the claw in the READY position and then carefully lower it over the battery flutes—if you do this correctly the claw will grab onto the crawler. If the claw releases tug the rope to get it back into the READY position. Once the claw is locked on the battery you can lift the crawler safely. As soon as the crawler is placed on the ground the claw will release.



5.8. Crawler/Auto Reel Controls



The crawler (and Auto-Reel if fitted) speed and direction is controlled by these five buttons on the keyboard. It is important to familiarise yourself with the operation of these.

The most important button is STOP, the button is raised to ensure that the correct button is pressed. No matter what the crawler is doing the STOP button will stop it moving. Ensure the AUTO-Reel is set to AUTO.

5.8.1. Forward Operation

To start the crawler moving forwards press the STOP button followed by the FORWARDS button, the longer the forward button is pressed the faster the crawler will travel. You can reduce the speed by pressing the REVERSE button. While the crawler is moving forwards you can press the LEFT or RIGHT buttons to steer the crawler. When steering LEFT the crawler will reduce the power to the left wheels, when turning RIGHT the crawler will reduce the power to the right wheels. To get the crawler to turn on the spot, press STOP and then press LEFT or RIGHT—the crawler will perform a multi-point turn on the spot. It uses this routine to stop digging a hole and to reduce battery drain. After all operations press the STOP button to halt any movement.



5.8.2. Reversing Camera

The forward and rear cameras and lighting is automatically controlled by the crawler controls. To enable the FRONT camera press FORWARD and then STOP To enable the REAR camera and lights press REVERSE and then STOP.

5.8.3. Reversing

To operate in REVERSE press STOP and then REVERSE, the rear camera picture will be displayed and the rear lights will be switched ON. The crawler will start moving slowly.

NOTE: Ensure that the crawler does not run over the cable by manually reeling the cable from the cable reel using the pull-out handle. If an auto reel is it use it will bodily pull the crawler in reverse, but the operator is still responsible for ensuring the cable is not overrun.

- ► In REVERSE the speed can be INCREASED by pressing the REVERSE key
- ▶ In REVERSE the speed can be REDUCED by pressing the FORWARD key
- ▶ In REVERSE the direction is controlled by the LEFT and RIGHT keys
- Press STOP to halt the crawler

5.8.4. Sonde

The crawler has an in-built 32.768KHz sonde which is normally OFF to preserve power. To switch the sonde ON press the button shown.

To switch the sonde OFF press the button shown.



OFF PAN & TILT GENTRE Fig. 52 - Sonde

NOTE: The OFF button is shared with the 'Centre Pan & Tilt Camera' control.

ON

5.9. Camera Operation

5.9.1. Start Recording (Optional)



Fig. 53 - Textwriters

Display Text

1) The Textwriter starts with the Rod Counter, Time & Date and the Text from Page 1 displayed.

2) Use the keys shown here to hide or display the Rod Counter, Time & Date and the Text

Display Rod Counter

Fig. 54 - Rod Counter, Time and Date, Text



Fig. 55 - DVR Ready

3) After 5 seconds from switch-on the 'DVR READY' message shows that.





4) Press RECORD (YES) to start a recording.



Fig. 57 - Flashing LED

5) Ensure the LED is flashing to show a successful recording.



Fig. 58 - Stop Recording

6) Press STOP (NO) to stop the recording when finished.

5.9.2. Camera Controls



Fig. 59 - Rod Counter, Time and Date, Text

Standard Operation

When the T812 is fitted to Crawler System and the system switched ON, the Pan & Tilt camera will perform a short calibration routine. During the calibration routine the Tilt mechanism will turn and the picture will rotate on the T804 screen as the internal picture sensor rotates. After a few seconds the main rotate mechanism will adjust the camera to an upright position, the pan mechanism will face forward and the picture will auto-upright. The camera is now ready for use.

When operating the camera using the keyboard, the camera can be set to view straight-ahead and the Focus pre-set to 6"- infinity by pressing the 'Centre' button on the keyboard as shown on the next page. Always use this button after operating the camera pan, tilt and focus controls.



The picture below shows the Pan & Tilt camera head controls. Practice controlling the camera head with the right-most four controls for PAN and ROTATE until the operation becomes second nature.

The left most button points the camera head directly forwards with the picture fully upright and the focus is set to the 6" to Infinity setting. This button is very useful if orientation has been lost and a starting position is needed.



Fig. 60 - Pan and Tilt

The picture is automatically kept upright while panning and tilting, this is called 'Human Perspective View' as it mimics how a human would view a pipe.

The crawler automatically steers back to the bottom of the pipe but it is important to ensure the crawler is operating at the bottom of the pipe rather than traversing the wall by short presses on the LEFT of RIGHT buttons.

5.9.2.1 Borehole mode

Pressing the button shown to the right puts the T812 camera into Borehole mode. This switches OFF the Human Perspective View and allows the operator to rotate the video picture using the ZOOM keys. Press CENTRE to enable Human Perspective View.



Fig. 61 - Borehole Mode

5.9.2.2 Maintaining your T812 camera

After completing a survey check the LED and lens windows for debris remove any debris with a soft cloth. Adjust the pan position so that the windows face the camera body. This will protect the windows during transit to the next survey. Do not use any solvents to clean T812 camera as they may damage the camera seals and remove lubricating greases.

5.9.3. Elevator Controls



Fig. 62 - Elevator Controls

The Elevator is adjusted using the ZOOM buttons as seen above. Press CENTRE first to ensure the camera is facing forwards and then use DOWN to reduce the height of the Elevator and use UP to raise the Elevator. The Elevator can also be manually adjusted by lifting or lowering.

5.9.4. T804 SD-CARD DVR - SPECIFICATIONS

Recording Resolution	D1 High Definition
Recording Type	MPEG4 (ASF)
Snapshot	JPEG (VGA)
Maximum Card Size	32GB
Card Usage	1GB - 1.5GB per Hour
Bitrate	Variable
SD Card Type	HDSD
Environmental	Waterproof to IP67



5.10. Lower Status Bar

Below is the standard status information shown at the bottom of the screen when the crawler is connected and the system switched ON:



Fig. 63 - Lower Status Bar

Reel BATTERY

Remaining power in the Power Cell clipped to the reel. If the Power Cell battery becomes exhausted this symbol will be replaced with a flashing 'B' symbol showing that the battery needs charging or replacing

PAN & TILT VIEW DIRECTION

This indicates where the Pan & Tilt camera head is pointing. The left symbol is a view from behind, the above picture shows that the camera is pointing straight forwards. The right symbol shows a view from the top of the camera head, the picture above shows that the camera is pointing straight forwards. See T812 Operators Manual for further information.

CRAWLER BATTERY:

Remaining power in the crawler battery. If the battery becomes exhausted this symbol will be replaced with a flashing 'T' symbol showing that the battery needs charging or replacing. If the battery level drops below 13V (see next page) the crawler speed will be reduced to conserve power. As the battery becomes exhausted the crawler speed will reduce to a crawl—at this point the crawler should be returned to the reel.

5.11. Inclinometer and Data

Pressing 'D' (DATA) on the keyboard will display further information as shown below:



The current speed of the tractor wheels. For extended battery life keep the crawler speed low, the survey will be more detailed and the battery will enable the crawler to be used for extended periods.

VOLTAGE

True Crawler Battery Voltage. A fully charged battery will show over 16V, as the battery becomes exhausted and the battery voltage drops to 13V the crawler speed is automatically reduced to conserve power. To enable full speed again, press STOP, this will reset the speed limit.

CURRENT

True Crawler Current demand on the Crawler battery. This is useful for checking how much load is being put on the crawler. If the current exceeds 3A the crawler will reduce wheel speed and may momentarily stop the drive. To enable full speed again, press STOP, this will reset the speed limit. In normal use at the full extent of 300M the expected current should be around 2A. If the current exceeds this then the cable is likely to be snagged and causing excessive drag.

INTERNAL PRESSURE

Internal Crawler air pressure. When the pressure is over 10psi this will show 'MAX PSI'. If the 'PRESSURE LOW' warning is shown retrieve the crawler and re-pressurise to 3 BAR.



INCLINOMETER

This shows the attitude of the crawler with the arrow indicating uphill or downhill when travelling forwards. This is for indication only and is calibrated at the factory with no wheels fitted. Only valid when the crawler is stopped.

As wheels may be slightly different diameters the inclinometer is for indication only and cannot be used for determining fall in a survey.

MAINTENANCE

6.1. Safety Precautions Before Maintenance



Crawler

To ensure a long life from the Crawler always ensure that all connectors are clean and free from moisture.

Camera Windows and Lenses

It is important that these are not rubbed with dirty cloths as this may scratch the surface and affect the picture quality. For cleaning the windows use water to clear any debris and then clean dry with a microfibre cloth.

Batteries

Do not drop the batteries or subject them to any form of moisture. Ensure that the mating surfaces are clean and free from debris before fitting them to the crawler.

Main Cable

Do not allow the cable to become kinked or damaged by sharp surfaces. Always ensure that when the crawler is retrieved the cable neatly winds onto the cable reel without any loose winds. If the cable becomes tangled release the cable from the cable guide and unreel the cable until the uneven coils are found and released.



Fig. 66 - Downhole Roller

NOTE: Alwasy use the Down-Hole Roller (accecory) or a tiger tail to protect the cable from the edge of the entry point.



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 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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