



## OPERATING INSTRUCTIONS—USA-CRAWLER



AUTO-DRUM + EXTENSIONS + ELEVATOR

# STANDARD CRAWLER - CONTENTS



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4 " Wheel set



6 " Wheel set



8 " Wheel set



Standard Battery x 2



DC Charger



AC Charger



Tractor Body



T812 Camera Head



Carry Case



Wheel Removal



Lifting Device



OR



Pressure Pump

## LARGE CRAWLER OPTION



Large Battery Pack



Large Lighthead



4 x Large Pneumatic Wheels

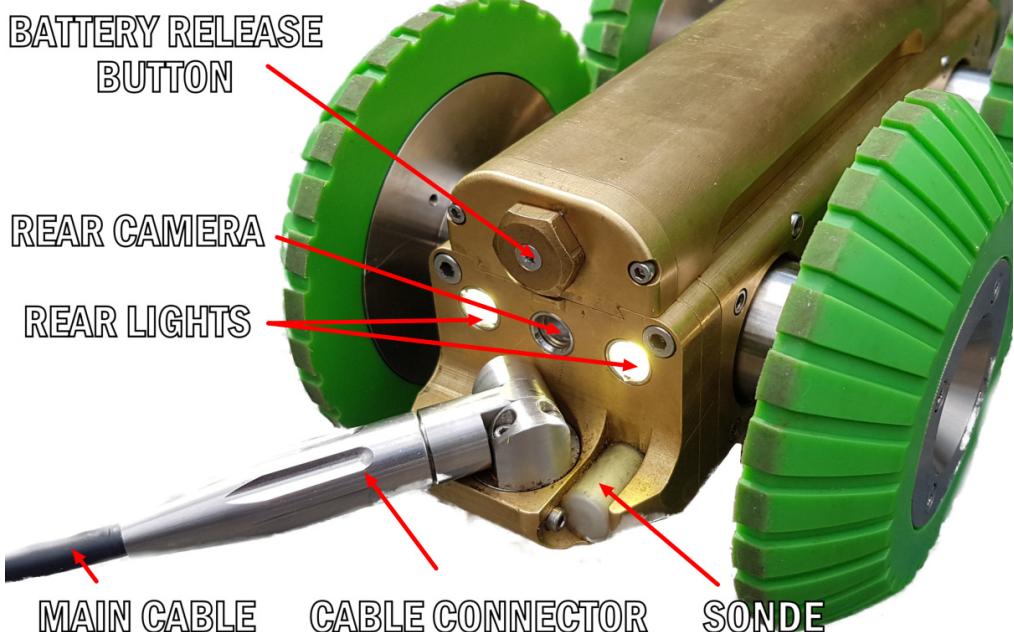
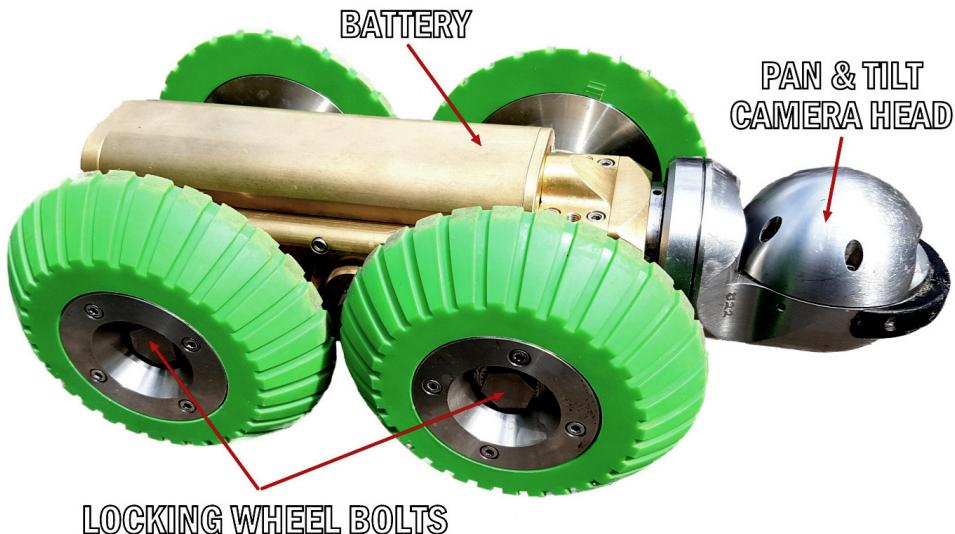


4 x Small Pneumatic Wheels

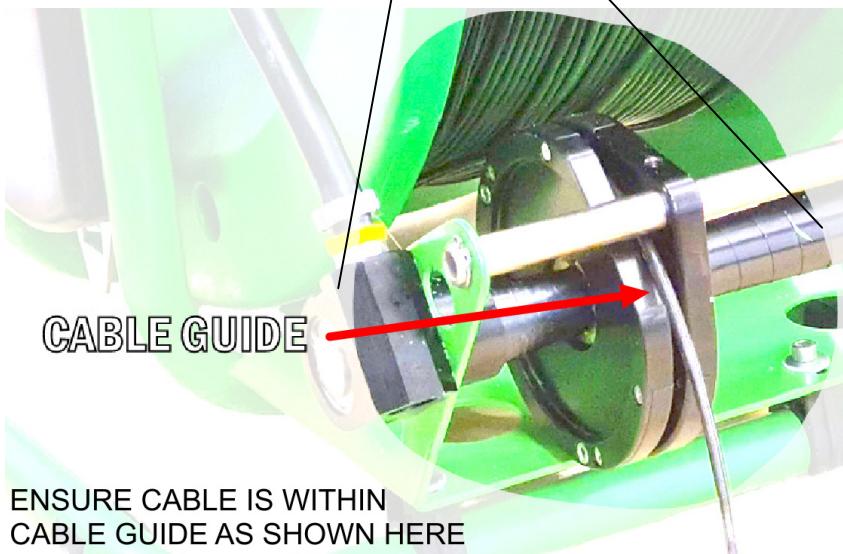
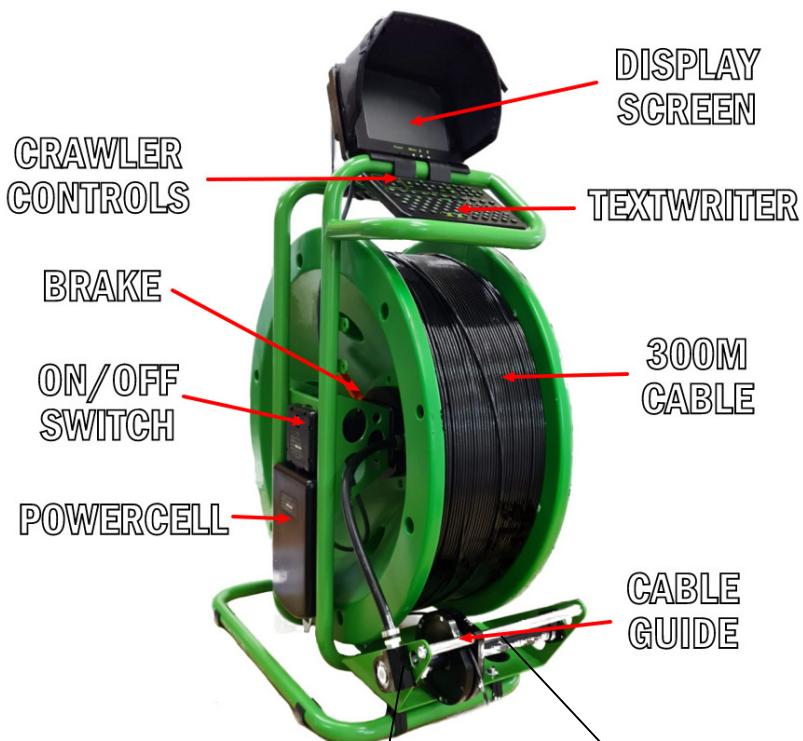


2 x Wheel Extensions

# THE CRAWLER



# THE MANUAL CABLE DRUM



ENSURE CABLE IS WITHIN  
CABLE GUIDE AS SHOWN HERE

# THE AUTO CABLE DRUM



## The Auto-Drum 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 Drum 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 Drum can realise a pull of around 12Kg so also ensure that the drum cannot be pulled towards a culvert.

# THE AUTO CABLE DRUM

## AUTO

***This is the setting used for normal operation.*** The cable can be pulled from the drum by hand or by the crawler. The drum is designed to provide a small amount of tension in the cable so that if it is released the cable will return to the drum. Auto works with or without the crawler so that cable can be pulled from the drum 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 drum 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 drum 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 Drum will pull the crawler back, in this mode the crawler disconnects its wheel drives to allow it to be pulled. The longer the ***reverse button*** is pressed the faster the crawler will move, press ***stop*** to halt the crawler. In ***reverse*** the drum can provide a lot of pulling force so ensure the drum is placed so that it cannot move or be pulled into a culvert.

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

## 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 drum in AUTO***

## DRUM LOCK and MANUAL REWIND

This position is used to lock the drum 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 DRUM LOCK position the motor brakes are automatically applied. When the handle is lifted upwards from Drum Lock cable will be rewound onto the drum. The further the handle is lifted away from the DRUM LOCK position the faster the drum will rotate.

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

# FITTING EXTENSIONS AND LIGHthead



## FITTING WHEEL EXTENSIONS, LARGE BATTERY 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 bolts

# PREPARING SYSTEM FOR USE

## Charging Batteries

Welcome to your T815 Tractor system. Please use these instructions together with the T804 User Manual for full information on control of the Textwriter, DVR and other features of the base unit.

Before use it is best practice to charge the two batteries 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.

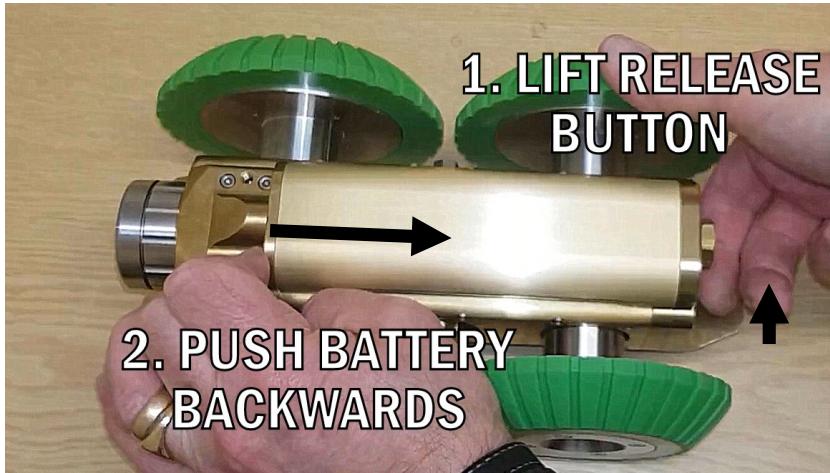
If the LED does not show at all something is wrong—check the mains or DC supply.



# CRAWLER BATTERY FITTING

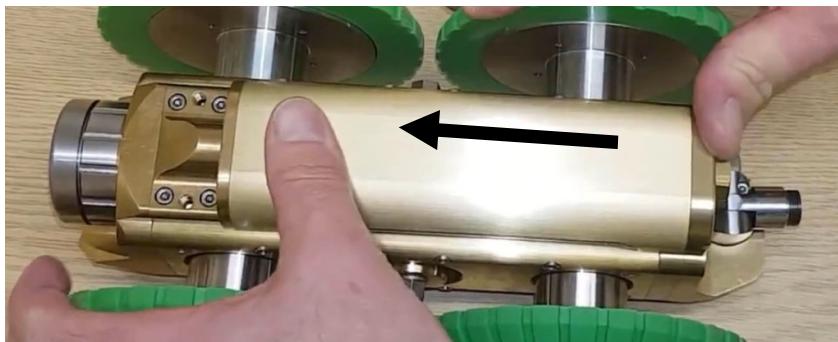
## Fitting and releasing the crawler batteries

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.



**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.



# LOCKING WHEEL FITTINGS

**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 anti-clockwise 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**.



**To fit a wheel** turn the wheel bolt clockwise until the ratchet can be felt engaging, then apply just a little 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**

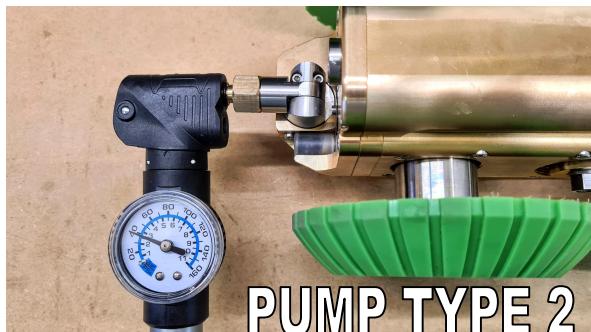
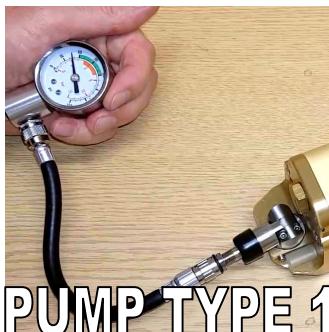


# PRESSURISE THE CRAWLER

**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 on-screen. **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 **2-3 BAR (30—45 psi)**.

Remove the pump from the rear connector. The crawler is now ready to be used.



**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.

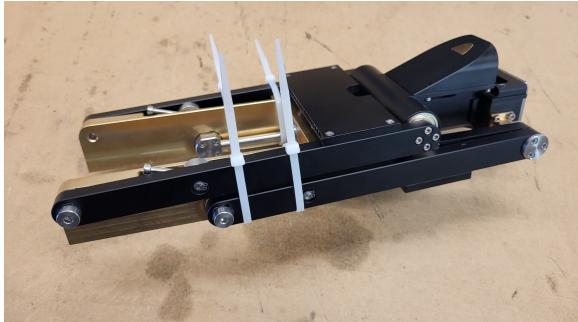
**The pressure can be checked during operation by pressing the 'D' key (DATA).** This will show useful information as shown below:

**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.



# ELEVATOR FITTING

**The Elevator** is supplied with tie-wraps 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



**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



# ELEVATOR FITTING

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



**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



**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



# CONNECT THE CRAWLER TO THE DRUM



## ENSURE THAT THE CABLE TERMINATION AND CRAWLER CONNECTOR IS CLEAN AND FREE FROM MOISTURE BEFORE CONNECTION

Once the crawler has been pressurised it can be connected to the cable drum. There is no additional strain-relief required as the main cable is exceptionally strong with Kevlar reinforcement.

The Cable Drum 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.

***Ensure that Auto-Drum Control Handle is set to AUTO***



# LOWERING AND RAISING THE CRAWLER



Lifting device RELEASED



Lifting device READY

**Practice with the lowering device—it is simple to lift the crawler but it takes a bit of practice to get it right.**

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—have a practice to get this operation to be second nature.



Get 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.

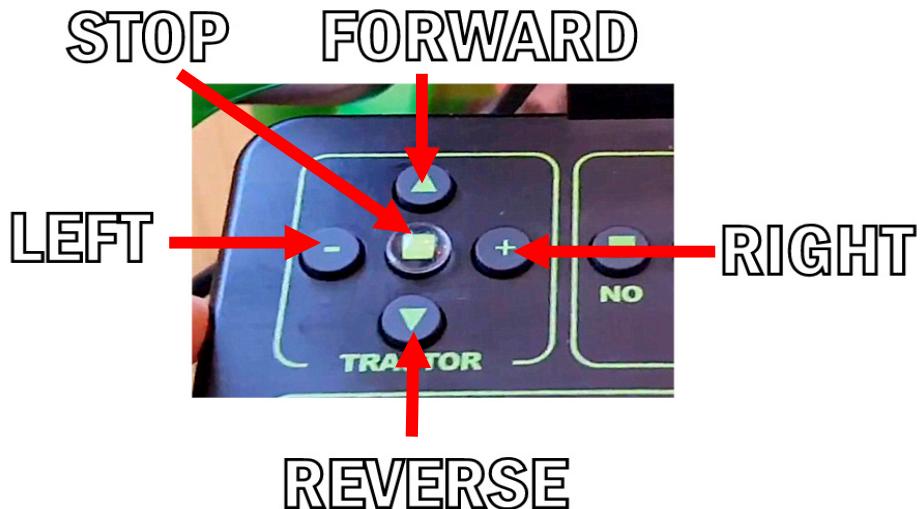
Once the claw is locked on the battery you can lift the crawler safely.

**As soon as the crawler is placed on the ground the claw will release.**



**NEVER RAISE THE CRAWLER OVER ANY PERSONELL  
IF THE LOWERING DEVICE FAILS THIS WILL CAUSE INJURY**

# THE CRAWLER/AUTO DRUM CONTROLS



The crawler (and Auto-Drum 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-DRUM is set to AUTO**

## 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

# 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

## 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.

**ENSURE THAT THE CRAWLER DOES NOT RUN OVER THE  
CABLE BY MANUALLY REELING THE CABLE FROM THE  
CABLE DRUM USING THE PULL-OUT HANDLE**

**IF AN AUTO-DRUM IS IN USE IT WILL BODILY PULL THE CRAWLER IN  
REVERSE BUT THE OPERATOR IS STILL RESPONSIBLE FOR ENSUR-  
ING THE CABLE IS NOT OVER-RUN**

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

## 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 below.

To switch the sonde OFF press the button shown below.

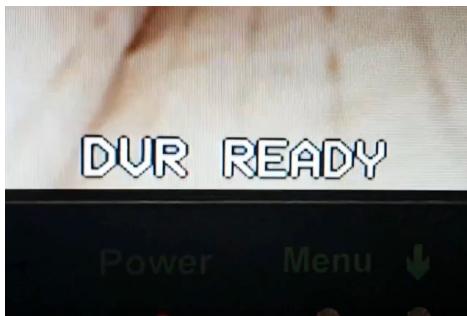


NOTE: The OFF button is shared with the 'Centre Pan & Tilt Camera' control

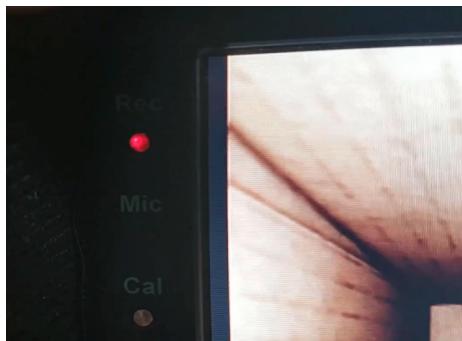
# START RECORDING (OPTIONAL)



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



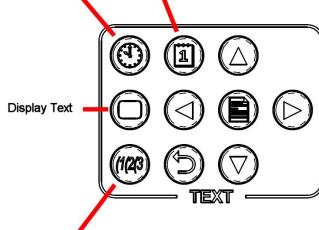
- 3) After 5 seconds from switch-on the 'DVR READY' message shows that



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

## TEXTWRITER CONTROL KEYS

Display TIME Display DATE



Display Rod Counter

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

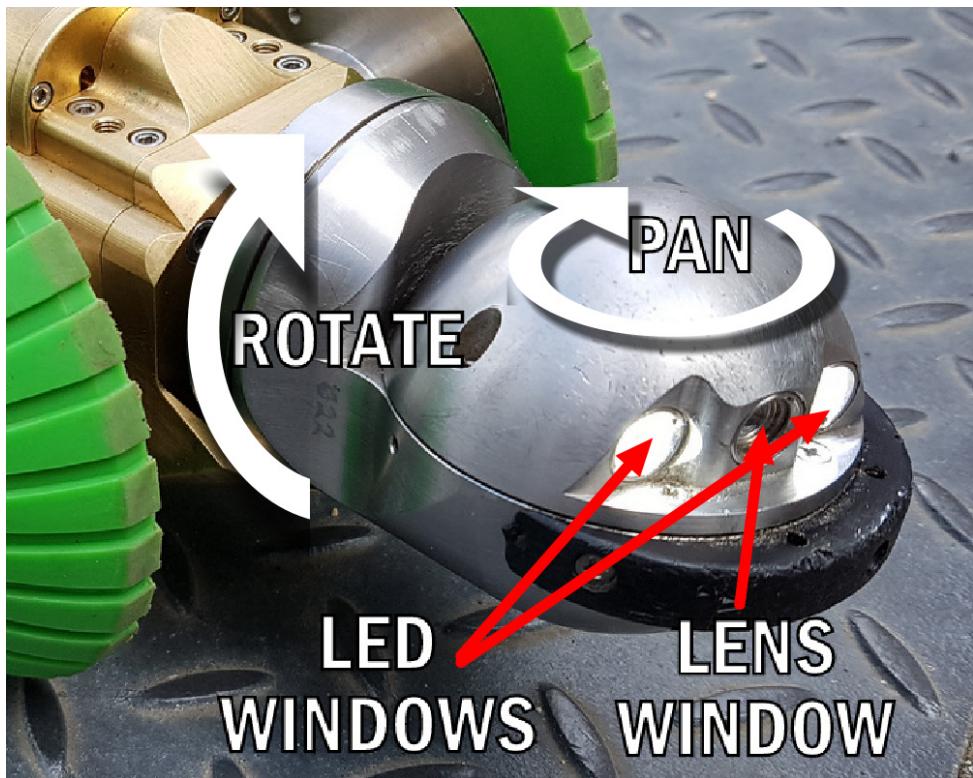


- 4) Press RECORD (YES) to start a recording



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

# CAMERA CONTROLS



## 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.

# PAN & TILT CAMERA CONTROLS

## Standard Operation Continued

The picture to the right show 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.**

The picture is automatically kept upright whilst 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.



**Borehole mode** Pressing the button shown above 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

## 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.

# 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.

## SD-CARD DVR - SPECIFICATIONS

Recording Resolution  
Recording Type  
Snapshot  
Maximum card size  
Card Usage  
Bitrate  
SD Card Type  
Environmental

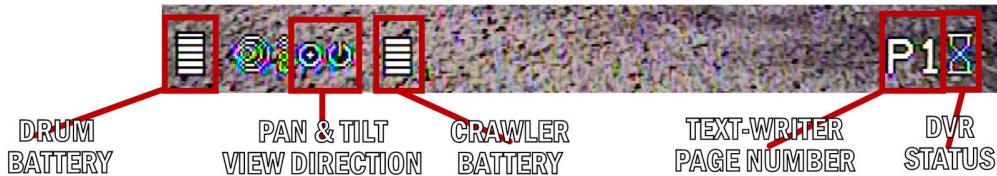
D1 High Definition  
MPEG4 (ASF)  
JPEG (VGA)  
32GB  
1GB - 1.5GB per Hour  
Variable  
HDSD  
Waterproof to IP67



# 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:

## NORMAL STATUS LINE



**DRUM BATTERY:** Remaining power in the Power Cell clipped to the drum. 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

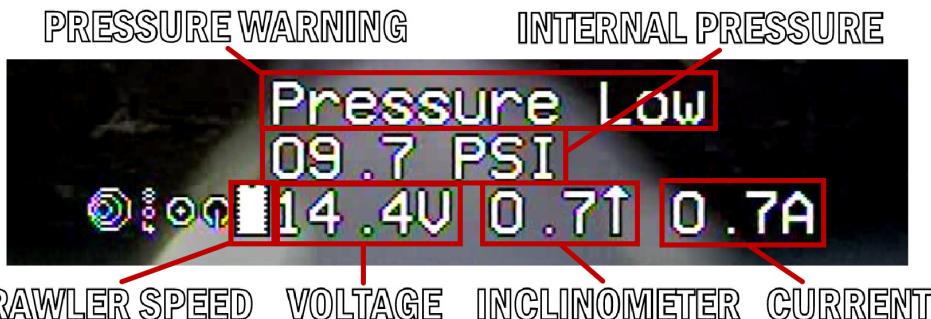
**CRAWLER BATTERY:** Remaining power in the crawler battery. If the battery becomes exhausted this symbol will be replaced with a flashing 'T' symbol showing that the battery needs charging or replacing. If the battery level drops below 13V (see next page) the crawler speed will be reduced to conserve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

**TEXT WRITER PAGE NUMBER:** See T804 Operators Manual

**DVR STATUS:** See T804 Operators Manual

# INCLINOMETER AND DATA

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



**CRAWLER SPEED:** 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

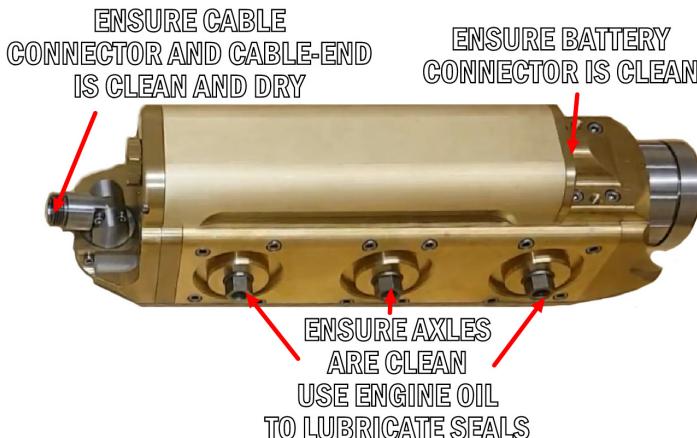
In normal use at the full extent of 300M the expected current should be around 2A. If the current exceeds this then the cable is likely to be snagged and causing excessive drag

**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**

# CRAWLER MAINTENANCE



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

For threads such as the cable connector and the pump connector firstly ensure that they are clean and then lightly oil them with light engine oil.

**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 drum 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.

**ALWAYS USE THE DOWN-HOLE ROLLER (ACCESSORY) OR A TIGER-TAIL TO PROTECT THE CABLE FROM THE EDGE OF THE ENTRY POINT**



# USA-CRAWLER RANGE



# USA-CRAWLER RANGE



The Picture above shows the **AUTO Cable Drum** assembly as supplied with 300M of high-strength 4mm cable, Lithium Ion Power Source, Display Unit, DVR and a High Power 3-Phase Motor/Gearbox with automatic operation via the standard keyboard. The Cable Drum is supplied ready to be used.