ROVVER® 5.0

Pipeline Video Inspection Systems

Maintenance & Operation Manual

Version 8/20/03

Everest VIT INC.
COMPLETELY FOCUSED ON REMOTE IMAGING.™

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www.everestvit.com

We at Everest VIT, Inc. would like to congratulate you on your purchase of the ROVVER, Robotic Inspection Camera. You'll find that the ROVVER, is a durable, low maintenance, high quality product. It is an extremely versatile camera for which you will find many applications.

The Maintenance & Operation manual will be a great help in setting up and comprehending the system. If you should have any questions, please feel free to give a member of our staff a call.

Everest VIT, Inc. would like to thank you for giving us the opportunity to do business with you. We believe that you'll be quite satisfied with your purchase decision. If we can be of service in any other regard we'd be glad to help, just give us a call 800-979-2497 or 973-448-0077.

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INTRODUCTION

This robotic crawler was developed as a result of the market's need for a rugged, cost-effective and easy-to-use inspection tool for remote viewing. The system is field proven and as a result is durable and requires little maintenance.

- ROVVER, is line of robotic crawlers that are capable of inspecting pipes from 2 " to 60 ".
- The CCD Camera Head and all electronics are packaged in a compact 2 " diameter stainless steel casing. This camera is rugged and dependable, with many hours of proven field service.
- The illumination ring of the camera employs of long-life and super-bright LEDs, which can be controlled via the pendant control.
- The camera casing and crawler consist of stainless steel components with o-ring seals, which seal the camera and crawler up to 1 ATm, ! bar or a depth of 33 feet of water. ROVVER,'s sealing method makes it easy for the user to replace the front camera windshield or a lamp in the illumination ring.
- The control unit is a rack mount casing with all controls separated and easily upgraded and replaced.
- The optional ROVVER 400crawler, with an overall length of only 8-", has two motors, which allows it to navigate through in 4 " ID pipe.
- The optional ROVVER 600crawler, with an overall length of only 12-", has two motors, which allows it to navigate through 6 " ID pipe.
- The optional ROVVER 900crawler, with an overall length of only 21-", has two motors, which allows it to navigate through 9 " ID pipe.

The following Maintenance & Operation Manual will explain in detail the adjustments and features of ROVVER. If you have any questions please feel free to call Everest VIT, Inc. at 800-979-2497 or 973-448-0077 where a representative will be pleased to help you.

SYSTEM CONFIGURATIONS

The ROVVER can be ordered in many configurations, and with different accessories.

ROVVER, Systems Includes the Following:

- Crawler / Transporter (ROVVER 200, 400, 600 or 900)
- Forward View or pan and tilt color camera
- Cable reel (manual or automatic up to 200 meters / 665 feet of cable)
- Camera Control Unit with pendant control and data display card
- Auxiliary lights
- Tool Kit
- Pressurization kit
- Wheel Kit
- Shipping Cases
- nstruction Manual

Optional Accessories:

- Grease, magnetic and larger wheel options
- Additional lighting options
- Extended Cable Lengths
- Storage and transport options (vehicles, boxes)
- Database software and hardware options

Warnings: Read Carefully!

WARNING: Do not connect or disconnect any cable with the power turned on.

- Always disconnect main power plug before connecting or disconnecting any camera and/or accessory cables.
- Be sure to use a clean power supply such as a new generator or pure sine wave inverter. Power surges can blow fuses and cause damage to the cable reel power supply.
- Camera accessories like the auxiliary lights, crawler connector, and camera connector must be treated very carefully. Pay attention to the cleanliness and fit of the connector keyway. Do not force connectors together. All protective covers should be placed on the connectors when not in use.
- The control unit should not be exposed to moisture, heat, dust, or shock. The area around the ventilation openings of the control unit must always be free of obstructions or heat damage to the control unit may result.
- The control unit and the cable drum are not protected against water spray.
- When using the crawler without the auxiliary lights, ensure that the auxiliary light socket cap is placed on the auxiliary light socket.
- To prolong the life of the cable avoid dragging the camera cable over sharp corners and edges. The cable should slide freely behind the crawler. Always use upper and lower manhole/pipeline cable tools.
- Do not continuously over-volt the lights. (The LED indicator next to the light adjustment knob will illuminate red if the lights are being over-volted) This allows for more lighting but will decrease the life of the LEDs.
- When operating the crawler, avoid switching directly from Forward to Reverse and vice-versa under full speed. This spares the mechanical components and the motors from unnecessary wear.
- The distance encoder as well as the cable guiding mechanics should always be kept clean and operating smoothly. A soiled measuring wheel at the distance counter could lead to a large error in distance measurement. In colder climates, be sure ice is not on the cable, use a towel to wipe down the cable upon retrieval.
- Before the turning off the system make sure that the light and speed regulators control knobs are turned to their “off” position.

Connections:

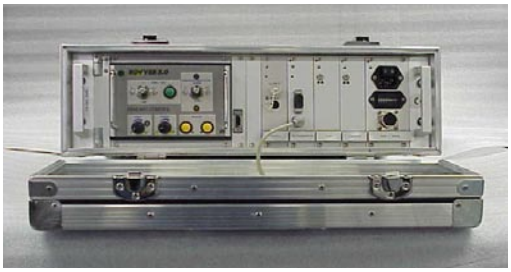
1. Connect the cable drum to the camera control unit with the supplied patch cable.
2. Connect the video output on the control unit to the video input on the monitor.
3. Connect the camera cable to the back of the crawler or the camera.
4. Connect the keyboard to the camera control unit.
5. Connect the power cables for the camera control unit, cable reel and monitor.

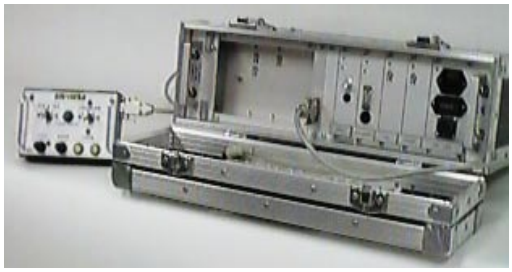
SYSTEM OVERVIEW

Before connecting system cables, make sure all controls are set to the “off” position. Connect the cable drum to the control unit, the camera to the camera cable and the power cable to the control unit. When all cables are connected, the power cable may be plugged into the power source and the main power switch may be turned on.

Power Switch:	Turns system ON (I) and OFF (O).
Power Connector:	110V power socket (220V optional), any standard computer power cable may be used.
Cable Drum:	High-quality MIL-spec receptacle for cable to connect to control unit connector and cable drum.
Video Output:	Allows output to a video monitor and/or recorder via a BNC connector.
Keyboard:	Connect to enter and edit data on-screen, plugs into Text generator card on control unit. Data is displayed on video screen.
Text Generator:	Allows users to overlay text, time, and date over video, which can be displayed on screen and recorded.
Pendant:	System controls can be used seated in the control unit or as a hand held unit. See ‘Using the Pendant Control’ section for more information.

USING THE PENDANT CONTROL



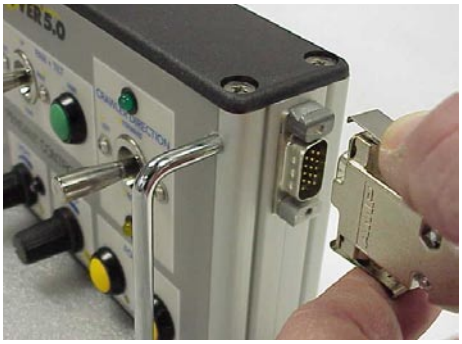


The Pendant Control may be used either seated in the control unit, or removed from the control unit and used with the pendant cable.

Pendant Removal:

1. Turn off the control unit.
2. Open the hinged door on the left side of the control unit.
3. Grasping thr right pendant handle, slide the pendant to the left toward the door.
4. Lift the pendant out of its dock evenly and allow the hinged door close.

Pendant Cable Attachment:



1. Attach the male end of the cable to the 15-pin connector adjacent to the pendant dock.
2. Attach the female connector to the right side of the pendant.
3. Plug in the control unit and turn on.

USING THE PENDANT CONTROL CONT'D

Pendant Docking:

1. Turn off and unplug the control unit.
2. Unplug pendant cable at both ends.
3. Open the hinged door on the left side of the control unit.
4. Grasping thr right pendant handle, place the pendant into the dock as far left as possible.
5. Once the pendant is fully in the dock, slide it to the right to engage and allow the hinged door close.

DESCRIPTION of PENDANT FUNCTIONS

Pictured above is the Pendant Control for the standard ROVVER system. With it you can operate ether the axial or pan & tilt camera and control models 200, 400 or 600 crawlers.

DESCRIPTION of PENDANT FUNCTIONS CONT'D

Power LED: Green LED, when lit, indicates that there is power to the pendant.

Pan & Tilt Control: Joystick controls movement of camera head when using pan & tilt camera.

Home Function: Returns the pan & tilt camera head to the level, forward viewing position.

Light Control: Allows operator to vary the intensity of both the camera lights and the auxiliary lights (when using a crawler).

Over-volt LED: A Red LED adjacent to the lamp control knob indicates when the lamps in the camera head and in the crawler are receiving excess power. This excess power may be used for brief periods of time for increased light output, but continued use will result in shortened LED and lamp life. If the LED is illuminated, turn the knob counter-clockwise until the LED goes off to reduce the power to the lamps.

Speed Control: Allows operator to vary the speed at which the crawler moves.

Focus Buttons: The camera head is equipped with a continuous focus mechanism. The lens does not have any mechanical stop; it will cycle from close focus to far focus and back continuously.

Forward/ Reverse: Indicator remains lit to show the current direction of crawler travel. A Green LED indicates travel in the forward direction. A Yellow LED is lit when the crawler is set to travel in reverse.

Crawler Steering: Joystick allows the operator to control the crawlers direction of travel; forward, reverse, left and right.

DESCRIPTION of PENDANT FUNCTIONS CONT'D

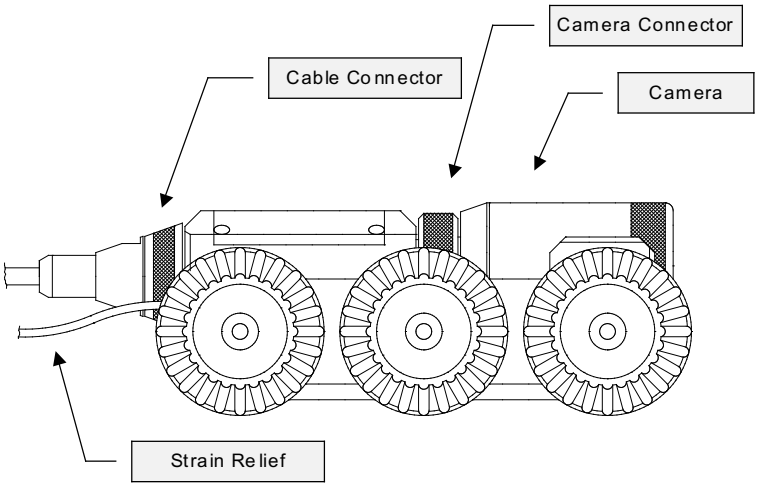
The pendant for the ROVVER 900 (pictured below) has the same functions just mentioned plus additional functions. Though the layout is different, the functions still operate in much the same fashion.

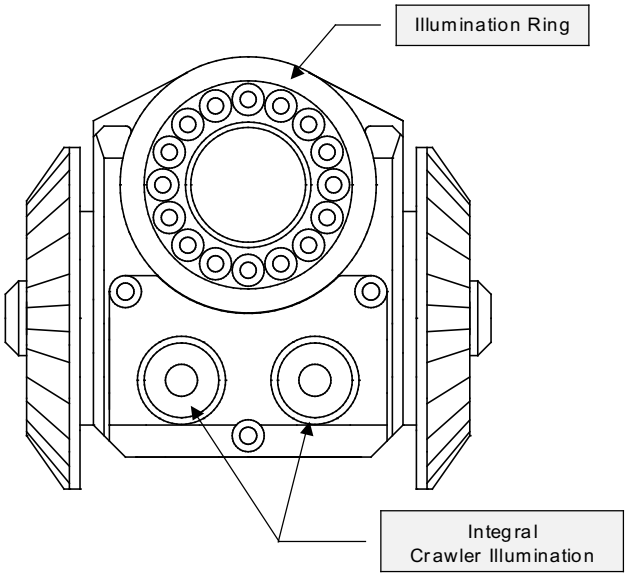
Lift Control: The ROVVER 900 comes with a riser which can lift the standard axial or pan & tilt camera to provide a centered view of any large diameter pipe. The lift can be stopped at any point by releasing the 'RAISE' or 'LOWER' button.

Clutch On/Off: The drive mechanism on the 900 can be electronically disengaged, by pressing the button, to allow for the crawler to be easily moved. A Green LED, in the center of the button, is lit when the clutch is engaged or On.

Aux. Light Control: The lights on the 900 crawler are controlled independently from the cameras' lights.

CRAWLER OVERVIEW





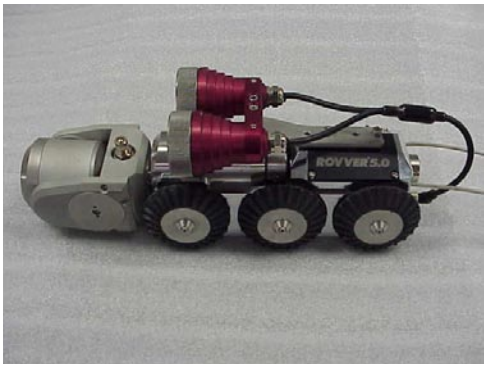
CRAWLER OVERVIEW, CONT'D

Cable Connector:	Connector for crawler or camera head. When operating the system without the crawler, the connector attaches directly to the camera head. Guide the connector very carefully and align the large key with the large slot until seated. Tighten the connector only with the original T-key. The plug must lock positively.
Camera Connector:	For connecting the camera into the crawler. When installing the camera into the camera bed, position the key of the connector at the top and tighten with the original T-key tool. The connector must lock positively.
Strain Relief:	The strain relief protects the connector on the end of the camera cable when the cable is pulled. The strain relief on the camera cable fits into a receptacle on the strain relief wires on the crawler. Ensure that the strain relief on the camera cable is positioned so that when the camera cable is pulled, the camera cable does not pull on the connector.
Illumination Ring:	Consists of an LED ring that can be replaced if necessary.
Integrated Crawler Illumination:	Supplies better illumination for inspecting pipes when using the forward view camera. These lamps have a long lifetime, but can be replaced in the field (see Lamp replacement)

USING THE AUXILIARY LIGHTS WITH THE ROVVER 400 CRAWLER

The auxiliary light module attaches to the top of the crawler with two (2) M4x10mm cap screws. Ensure that these two screws are securely tightened before deploying the crawler.

The light module's electrical connection consists of a cable, which connects to the light socket on the back of the crawler. When the light module is not used, ensure that the light socket cap is installed on the empty light socket, preventing water damage to the crawler electronics.

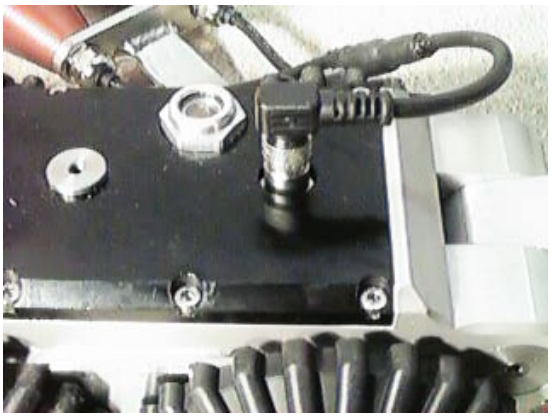


4" Crawler with Auxiliary Lights

Electrical Connection

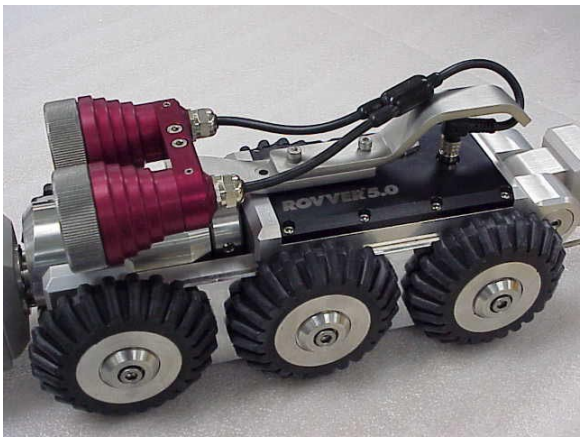
USING THE AUXILIARY LIGHTS WITH ROVVER 600 CRAWLER

Using a 17m open-end wrench, remove the connector protection cap and store in toolbox. Align the three (3) pin auxiliary light connector with the crawler auxiliary connector. The auxiliary light wire should face rearward. Thread the connectors together, until nut is seated and secure, see the following:



USING THE AUXILIARY LIGHTS WITH ROVVER 600 CRAWLER CONT'D

The auxiliary light module attaches to the top of the 6" ROVVER with two (2) M4x16mm screws. Place a lock washer on each screw and insert them through the connector guard first, then through the auxiliary light and into the crawler, see the following:



USING THE AUXILIARY LIGHT HINGE WITH THE ROVVER 400 CRAWLER

To attach the auxiliary light hinge:

1. Using the M4 x 6mm flat head screws, attach the long arm of the light hinge bracket to the top of the crawler. (The hinge will be towards the rear and the notch on the long arm will fit over the mounts on the top of the crawler)
2. Using the M4 x 10mm socket head screws and flat washers, attach the auxiliary light module to the short arm of the light hinge bracket.
3. Plug the auxiliary light module connector into the rear of the crawler.

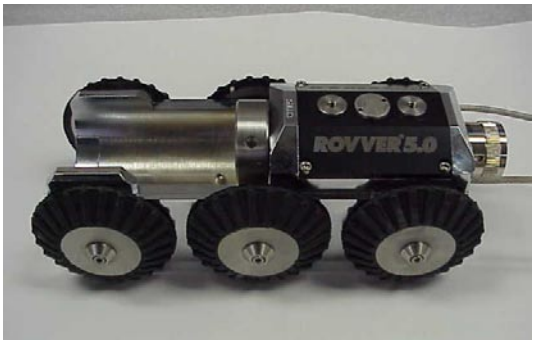
NOTE: The auxiliary light hinge is not designed for use with the tank tracks.

USING THE ROVVER 400 WITH THE MAGNETIC WHEELS

Remove the M3 x 8mm socket head screws, cone shaped disks, and ring lock washers holding the small wheels to the crawler. Remove the small wheels and replace with the magnetic wheels. Re-attach using M3 x 12mm socket head screws, cone shaped disks, and ring lock washers. Loctite® 222 all screws holding the wheels onto the crawler.

USING THE ROVVER 400 IN 4" PIPE CONFIGURATION

This is the standard configuration for the 400 crawler. Using six (6) small wheels, six M3 x 8 socket head screws with ring lock washers, and cone shaped disks. Loctite 222 all screws holding the wheels onto the crawler.

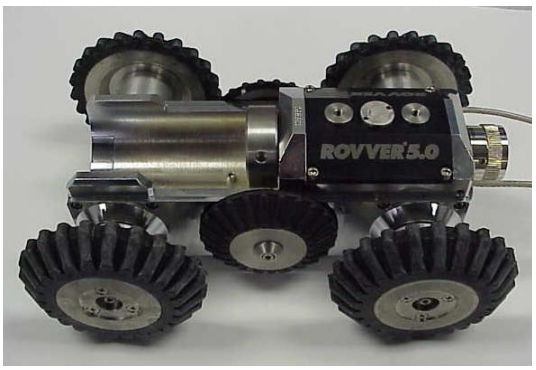


USING THE ROVVER 400 IN 6" PIPE CONFIGURATION

Remove the M3 x 8 socket head screws, cone shaped disks, and ring lock washers holding the front and rear small wheels to the crawler. Remove the four small wheels and replace them with four (4) large diameter wheels. The two small middle wheels can be used in conjunction with the large wheels, this is useful in helping the crawler pass over some obstacles.

Attach the wheels using M3 x 16 socket head screws and ring lock washers (Loctite all screws holding the wheels onto the crawler).

6–" Pipe Configuration



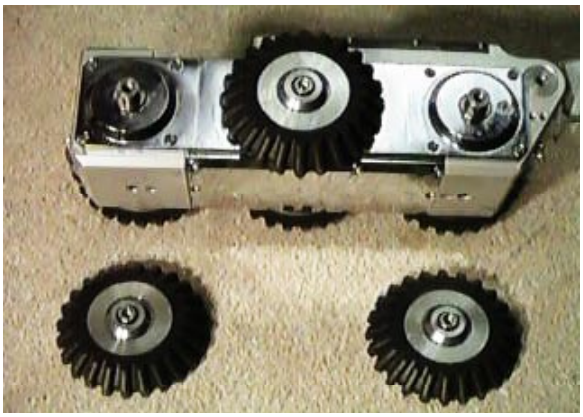
8–" Pipe Configuration

USING THE ROVVER 400 IN 8" PIPE CONFIGURATION

For the extended large diameter wheels (optional), use M3 x 30 socket head screws and ring lock washers. The four extended large wheels can also used in conjunction with the two small middle wheels to help the crawler pass over some obstacles.

USING THE ROVVER 600 IN 6" PIPE CONFIGURATION

Remove any larger wheels installed on the crawler. Slide the six- (6) standard (3.5") wheels onto their axles. Use an M6 x 12 screw, lock washer and Hub washer to attach each wheel to its axle.



USING THE ROVVER 600 IN 8" PIPE CONFIGURATION

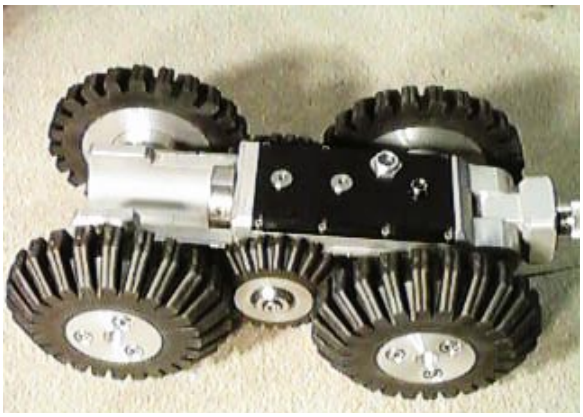
Remove the two front and two rear wheels. Slide the intermediate wheels (4.5") onto the axles. Insert the M6 x 20mm screw with lock washer into the axle and tighten on all four intermediate wheels. Refer to picture below:

Model	Available Wheel Sets	
	Diameter	Size
200	1.5”	Small
	2.5”	Large
400	2.5”	Small
	3.75”	Large Narrow
	3.75”	Large Wide
600	3.5”	Small
	4.5”	Medium
	5.5”	Large
900	4.5”	Small
	5.5”	Medium
	8.0”	Large

Optional Features	
Model	Features
400	Magnetic Wheels
600	On the 4.5” and 5.5” wheels extenders attach to the ends of the axles moving either set of wheels out from the body to stabilize and center the crawler
900	On the 4.5” and 5.5” same as the 600

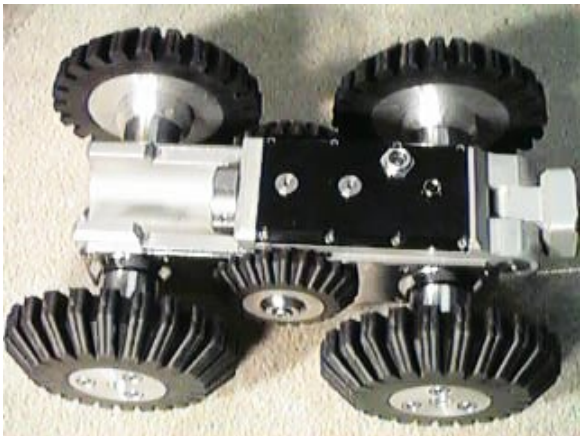
USING THE ROVVER 600 IN 10” PIPE CONFIGURATION

Remove the two front and two rear wheels. Place a large diameter wheel (5 _”) on each of the four front & rear axles. Insert a M6 x 20mm screw with lock washer and hub washer into the axle and tighten on all four-diameter wheels. See the following:



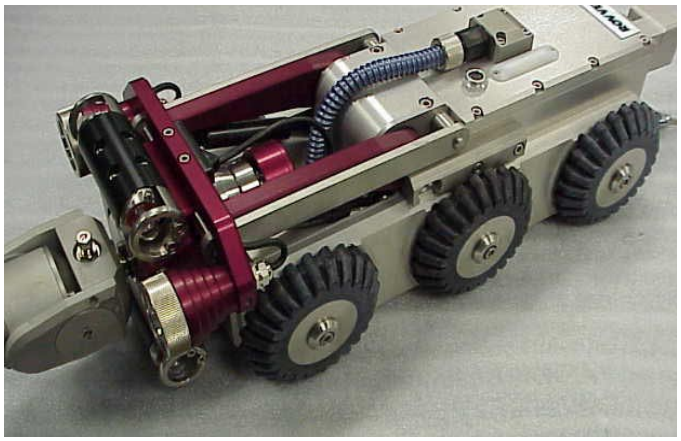
USING THE ROVVER 600 IN 12" PIPE CONFIGURATION AND LARGER

Remove the two front and two rear wheels. Place an axle extender on each of the four front & rear axles. Place four large diameter wheels on the axle extenders. Insert the M6 x 40mm screw with lock washer and hub washer into the axle and tighten on all four extended large wheels. See the following:



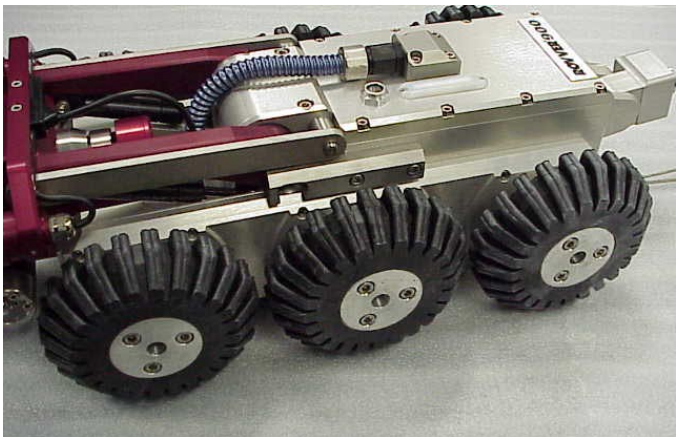
USING THE ROVVER 900 IN 9" PIPE CONFIGURATION

Remove any larger wheels installed on the crawler. Slide the six (6) standard (4.50") wheels onto their axles. Use an M6 x 12 screw, lock washer and Hub washer to attach each wheel to its axle.



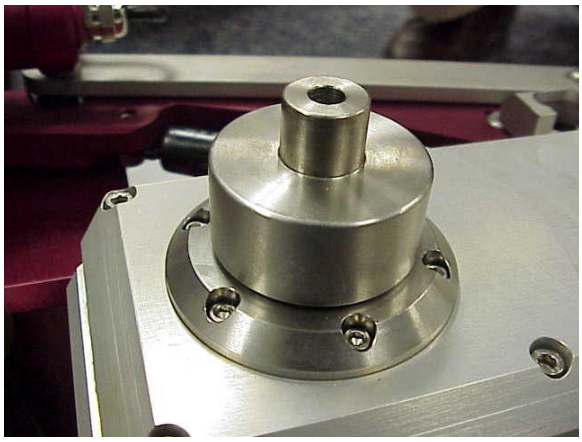
USING THE ROVVER 900 IN 10" PIPE CONFIGURATION AND LARGER

Remove any wheels installed on the crawler. Slide the six (6) medium (5.5") wheels onto their axles. Use an M6 x 12 screw and lock washer to attach each wheel to its axle.



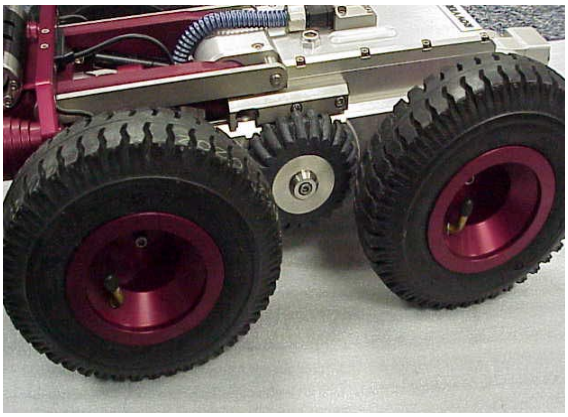
USING THE ROVVER 900 IN 12" PIPE CONFIGURATION AND LARGER

Remove any wheels installed on the crawler. Slide a wheel extender (shown below) onto each axle. Then slide a medium (5.5") size wheel onto the extender. Use an M6 x 30-screw and lock washer to secure each wheel to its axle.



USING THE ROVVER 900 IN 14" PIPE CONFIGURATION AND LARGER

Remove any wheels installed on the crawler. Take two of the small wheels, and put one on each middle axle, secure with an M6 x 12 screw, lock washer and Hub washer. Mount the four large (8") diameter wheels on the remaining axles. Insert an M6 x 35mm screw with lock washer into the axle and tighten. Do this on all four large wheels. See the following:



The four large wheels are used in conjunction with the two small middle wheels to help the crawler pass over obstacles and debris.

PAN AND TILT CAMERA

Pan and Tilt camera attaches easily and allows inspections of laterals, headers, confined spaces, and other areas where you need to look up or to the side.

INSTALLATION
Follow these steps to install the pan and tilt camera

Pan and Tilt Mechanism:

1. Turn system power off.
2. Remove axial camera from crawler if installed.
3. Slide pan and tilt's body into camera receptacle on the crawler.
4. Tighten connector ring one-quarter turn with T-handle tool.

OPERATION:

The joystick, mounted on the pendant, controls the Pan and Tilt mechanism:

- Up and Down to Tilt
- Left and Right to Pan.
- Lights and focus are controlled in the same manner as the axial camera.

NOTE:

Do not operate the pan and tilt if it's free movement is obstructed.

Do not drop or strike the pan and tilt mechanism.

PRESSURE TESTING THE PAN AND TILT MODULE

The pan and tilt mechanism is waterproof to 60 feet or 2 atmospheres. To pressure test the camera head, pressurize the unit with dry gas (instrument air, nitrogen or argon) to no more than 10 psig using the auto-tire type pressure valve on top of the unit. Be sure to replace the valve cover and submerge the unit completely in water and check for air bubbles escaping from any of the joints. As a safety precaution, the pan & tilt head may be operated with an internal purge pressure to reduce the risk of water ingress. An Indicator LED is mounted on the cylindrical section of the pan & tilt and when the unit is powered on indicates the internal pressure via its display status as listed in the chart below.

LED Color	Pressure
Blinking Red	less than 5 psig
Green	5-10 psig
Steady Red	greater than 10 psig

PRESSURE TESTING ROVVER 600 & 900 CRAWLER

The ROVVER 600 and 900 is waterproof to 60 feet or 2 atmospheres. To pressure test the crawler, pressurize the unit with dry gas (instrument air, nitrogen or argon) to no more than 10 psig using the auto-tire type pressure valve on rear of the unit. Submerge the unit completely in water and check for air bubbles escaping from any of the joints. Be sure to replace the valve cover when the test is completed. As a safety precaution, the crawler may be operated with an internal purge pressure to reduce the risk of water ingress. An Indicator LED is mounted on the top of the crawler, when the unit has power, the LED indicates the status of the internal pressure as shown in the chart above.

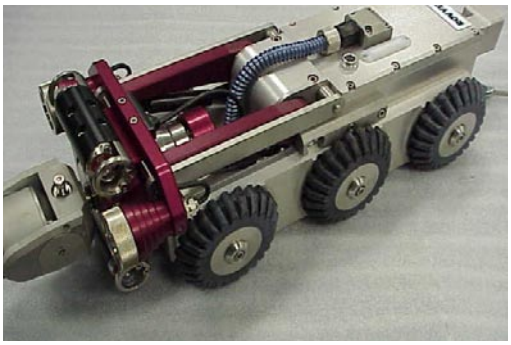
Air valve at the rear of the crawler

LED Indicator

ROVVER 400

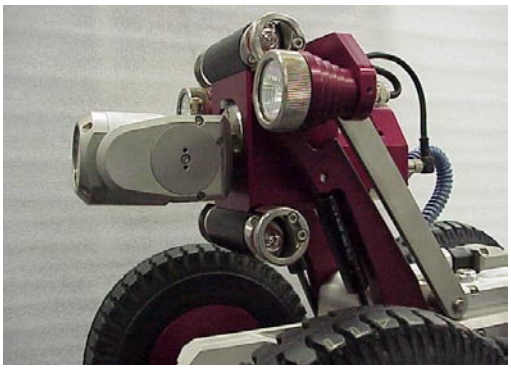
The ROVVER 400 is factory tested to 60 feet or 2 atmospheres. Due to its' design it is not easily pressure tested in the field. The ROVVER 400 should be returned to the Everest VIT. Service Center for pressure testing.

ROVVER 900 LIFT PLATFORM



ROVVER 900 with lift in the down position

For optimum large-diameter (24" to 60-") pipe inspection, the ROVVER 900's pendant-controlled lift platform adjusts the camera height from 6-" to 12-" (when using large wheels on crawler). The axial and pan & tilt camera can be used with the ROVVER 900. Utilizing the lift the camera can be centered in the pipe for optimum viewing.



Lift shown in the raised position

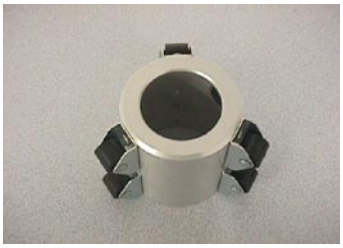
The lift contains 80 Watts of variable lighting, which is also controlled from the pendant. There are four 10watt-halogen lamps, two on the bottom of the lift and two on top. Mounted on each side of the lift are 20watt-halogen lamps of the same design as the auxiliary lighting on the ROVVER 400 & 600. In addition, the operator has use of the cameras' own LED lighting.

USING THE CENTERING DEVICES

When using the axial camera in the push camera configuration, the camera head should be used in conjunction with a centering device and push poles. Slide the centering device over the camera and tighten the set-screws on the side of the centering device.

The push pole adapter attaches to the back of the camera with two Phillips head screws. Ensure that the Phillips head screws and the set-screw are tight before deploying the camera.

Small Centering Device to be used in a 3" ID pipe



Medium Centering Device to be used in a 4" ID pipe

Large Centering Device to be used in a 6" ID pipe

The only maintenance the centering devices require is regular cleaning and an occasional lubrication of the roller wheels on the side of the centering device. Any silicone base liquid or spray lubricant will work well on the centering device.

CONNECTING PUSH POLE ADAPTOR TO AXIAL CAMERA

Connect cable to camera head and slide adaptor over cable connector. Line up in grooved positions on camera.

Install the two (2) Phillips head screws into camera head through the adaptor.

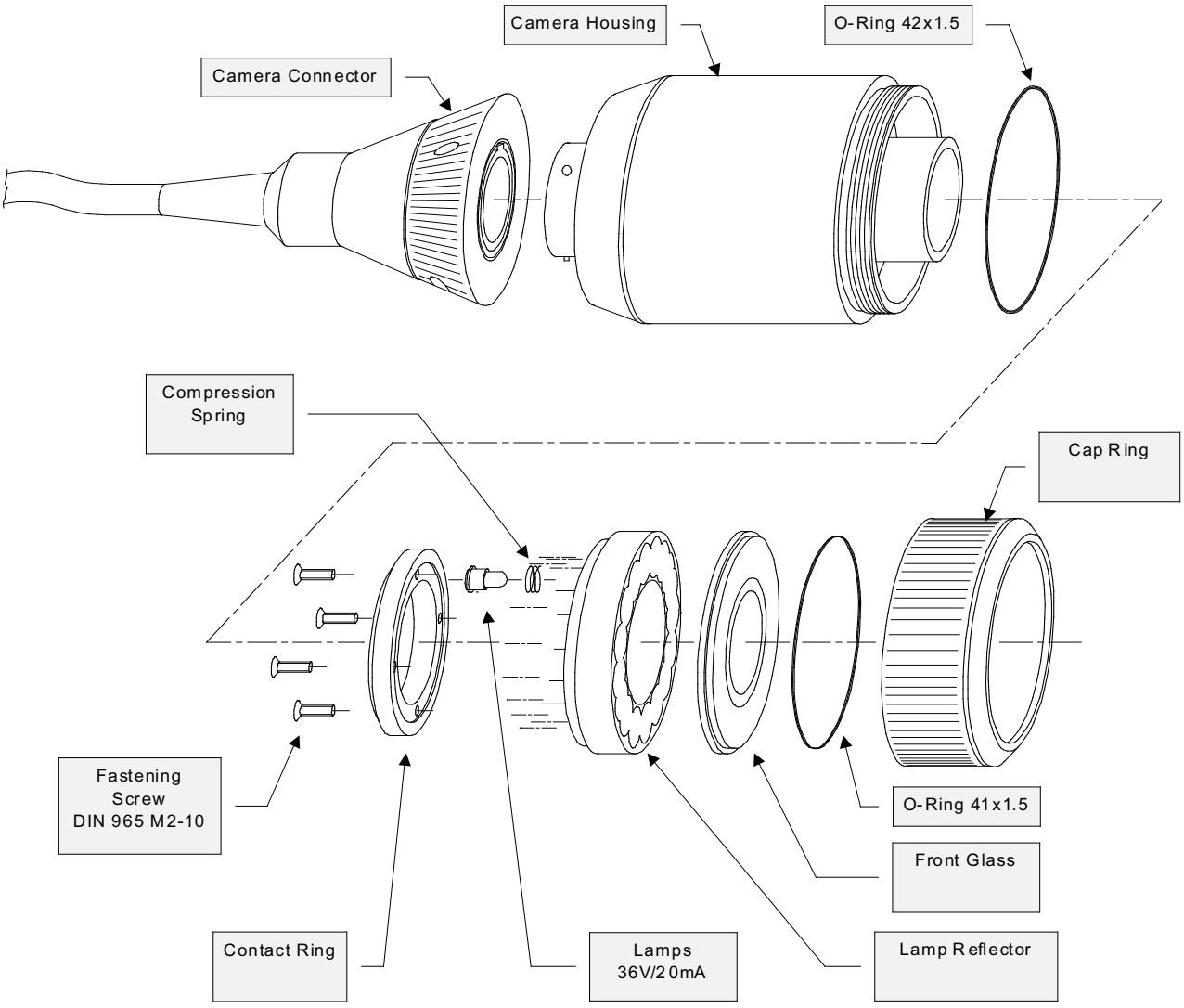
MAINTENANCE

Pay attention to the following points about the maintenance and care of the system. When replacing non-functioning parts, use only original equipment replacement parts from the Everest VIT. The use of non-original parts could lead to unpredictable performance.

1. Connectable parts of the system like the auxiliary light connector, crawler connector, and camera connector should be handled very carefully. Pay special attention to the cleanliness and fit of the connector keyways. Do not forcefully join connector jacks and receptacles.
2. All of the connectable parts with o-ring seals for waterproofing must be kept well lubricated with o-ring grease. Lubricate all o-rings after use in damp environments.
3. Replace damaged or failed parts with only original parts from Everest VIT.
4. When changing crawler wheels, do not forget to use split-ring lock washers.
5. The connector for the auxiliary lights should be protected with the original protective cap while not in use.
6. All soiled parts of the camera should be cleansed only with warm water. Do not use a power-washer, compressed air, or chemical-cleaning agents.
7. Keep the wheel axle and the wheel free of debris. When changing the wheels, clean and lubricate the mounting area.
8. Always keep the distance encoder mechanics and the measuring wheel clean. The cable guide mechanics should be lubricated after use.
9. Examine all electrical cables for insulation damage periodically. Defective cables must be replaced immediately.
10. The control unit and the cable drum are not protected against water spray and therefore should not be cleaned with a power washer or other spray cleaning devices.

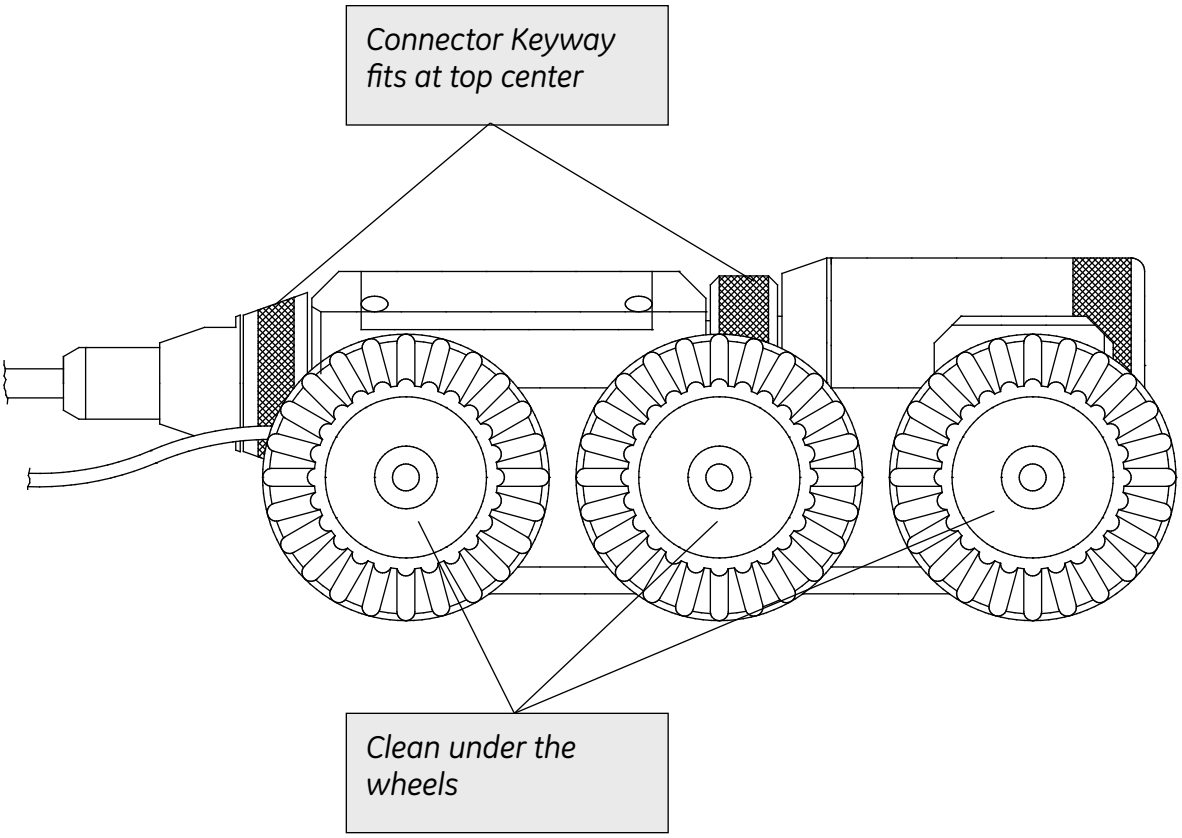
MAINTENANCE, CONT'D

The camera head is shown below in an exploded view. The parts labeled with a part number which can be used to order spare parts.



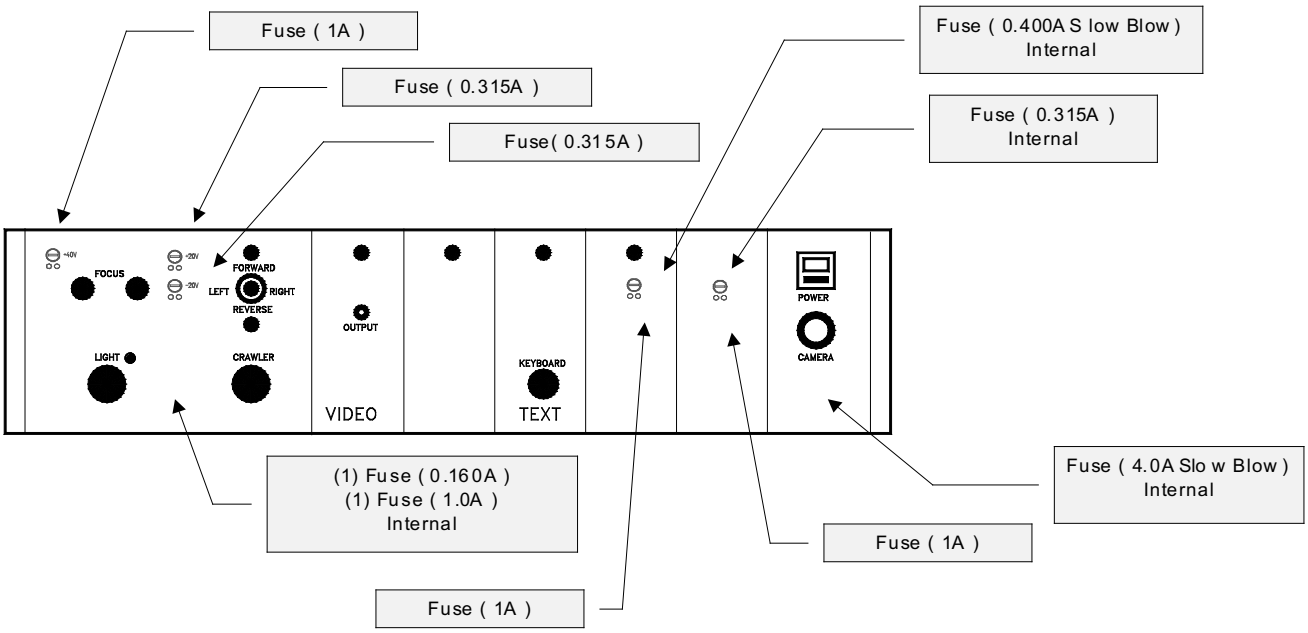
MAINTENANCE, CONT'D

The crawler is maintenance-free and should be cleaned after each deployment. Do not clean with a power washer or similar cleaning device. Pay special attention to the cleanliness of the connector keyways and that no debris accumulates under the wheels.



MAINTENANCE, CONT'D

Fuse Replacement:



All of the fuses on the control unit have a green and a red LED underneath the fuse. The green LED should always be lit. If the red LED is lit, replace the fuse. If neither LED nor both LED's are lit, consult an Everest VIT technician.

There are five internal fuses in the ROVVER Control Unit. Please consult the Everest VIT factory if one of these fuses is suspect. Do not attempt to repair these fuses without consulting the factory.

LAMP AND WINDOW REPLACEMENT

*** Refer to the drawing in the MAINTENANCE section of this manual**

Camera Head Lamp:

1. Unscrew cap ring.
2. Remove lamp reflector.
3. Loosen the 4 contact ring-fastening screws and remove the contact ring.
4. Remove and replace burnt out lamps. Pay attention to the compression spring(s) so that they are not lost.
5. Replace contact ring and tighten screws.
6. Replace lamp reflector into camera body.
7. When tightening the cap ring, make sure the front camera window and the o-ring seat properly (see drawing).

Camera Window:

1. Unscrew the Cap Ring.
2. Remove the O-ring.
3. Replace the Window.
4. Install a new O-ring.
5. Reinstall Cap Ring.

Auxiliary Lamps:

1. Unscrew window assembly and remove.
2. Pull lamp straight out of socket and replace.
3. Replace o-ring with a new o-ring.
4. Reinstall window assembly.

400 & 600 Crawler Lamps:

The Crawler Lamps, located on the front of the 400 & 600 crawlers, should be replaced only by an Everest VIT technician in order to ensure the water-resistant seal remains intact.

LAMP AND WINDOW REPLACEMENT, CONT'D

900 Crawler Lamps:

20 Watt Auxiliary Lamps:
The two Auxiliary Halogen Lamps, one mounted on each side of the lift, can be replaced by following the "Auxiliary Lamps" instructions found on the previous page.

10 Watt Lamp Array:
The four (4) crawler lamps which are mounted two (2) on each side of the lift can be replaced by following the instructions below:

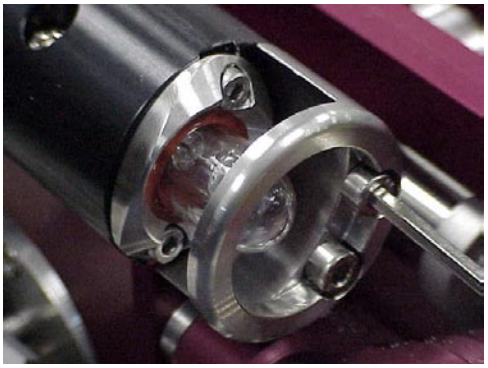


fig.1

fig.2

1. Using a 3mm hex key, unscrew the two (2) socket head screws holding the Lamp Guard (fig.1) in place and remove the guard.
2. Using a 2.5mm hex key, remove the two- (2) screws that secure the lamp housing to the lift assembly. Then pull the housing away from the lamp socket.

   Note: if the glass globe on the housing is broken return it for repair or order replacement housing, as the crawler will no longer be watertight.
3. The bulb is now exposed (fig.3) and can be replaced. Then reassemble the parts following the above steps in reverse order.

fig.3

ROVVER, TROUBLE-SHOOTING CHART

PROBLEM	CAUSE	REMEDY
Unit will not turn on (Indicator LED's are not on)	Not plugged in Blown fuse	Plug into good outlet Replace Fuse
Indicator LED's are on but picture is colored or snowy	Cable reel not connected	Connect cable reel
	Broken wire in camera cable	Send to Everest VIT for servic
	Bad contact in slip-ring	Send to Everest VIT for service
	Bad contact in the cable connector	Send to Everest VIT for service
Indicator LED's are on but there is no picture	Video output not connected properly	Check cabling to monitor
Camera works but the lights are out	Lamp intensity down	Turn up lamp intensity
	Lamps are blown	Replace lamps
	Broken Wire in Cable	Send to Everest VIT for service
	Fuse in Light Power Module is blown	Replace Fuse
Fog on the inside of the camera window	Moisture in the camera head	Dismantle and dry out camera head. Replace o-rings
Poor quality image	Window is dirty	Clean window
	Window is scratched	Replace window

SPARE / REPLACEMENT PARTS

NOTE: Whenever ordering spare parts note the model & serial number with your order.

Part #	Item
3000-1000	Rovver 400 Crawler
3000-1010	Rovver 600 Crawler
3020-5055	Camera Control Unit
3000-4010	Shipping Containers, set of four (4)
3010-1100	Pendant, 12’ patch cable
3000-6021	T - Camera Attachment Tool
3000-6020	Allen Wrench Multi-Tool
3000-6030	Spanner Wrench
3020-5010	150m Cable Reel with Cable
3010-1021	Narrow Large Diameter Wheels (4) for ROVVER 400
3010-1022	Wide Large Diameter Wheels (4) for ROVVER 400
3010-1030	Right Angle Mirror
3010-1040	Centering Device Kit
3010-1041	Centering Device, 4”
3010-1042	Centering Device, 5”
3010-1043	Centering Device, 6”
3010-1051	Protective Cap for 3-PinAuxiliary Light Jack Plug
3010-1060	Pan and Tilt
3010-1096	ROVVER 500 Fuse Set
3010-3000	Auxiliary Lights
3010-4000	Text Generator
3020-1000	Camera Window and O-Ring
3020-1040	ROVVER 400 Short, Med, and Long Wheel Bolts
3020-1041	ROVVER 600 Wheel Bolt Set
3020-1042	ROVVER 600 Double Wheel Bolt Kit
3020-1050	ROVVER 400/600 Auxiliary Light Bolts
3020-1060	Spare Push Pole Adapter Bolts
3020-3001	Auxiliary Light Halogen Lamps 24v/20w
3020-3011	ROVVER 600 24V 20W Internal Crawler Lamp
3020-3060	Camera Head Light Bulbs With Springs
3020-3050	ROVVER Axial Camera Head
3000-3060	Camera Head Electronic Module
3010-1044	Push Pole Adapter

Part #	Item
3010-1080	ROVVER 400 Magnetic Wheels
3000-8000	ROVVER 600 Inclinometer
3010-1020	ROVVER 400 Standard Wheel Set (6)
3020-1041	ROVVER 600 Wheel Bolt Set
3000-1020	ROVVER 600 Standard Wheels (6)
3000-1021	ROVVER 600 Large Wheels (4)
3000-1022	ROVVER 600 Wheel Extensions (4)
3000-1023	ROVVER 600 Intermediate Wheels (4)

SPECIFICATIONS

Camera (400, 600, 900):

Camera casing:	Impact and abrasion resistant V2A steel
Dimensions:	2 " Diameter x 2 15/16" Length
Image sensor:	CCD, 440.000 pixels
Sensitivity:	3 Lux
Resolution:	460 lines horizontal
Lens:	f=4mm, ƒ1.2, focusable

Control Unit:

Dimensions:	Length 20 ", Width 9 ", Height 13 "
Weight:	25 lbs.
Electrical Supply:	110VAC/60 Hz

Cable Drum (400, 600, 900):

Cable:	1/3-" diameter, very flexible
Drum:	Slip-ring cable drum
Weight:	30.8 lbs.

Auxiliary Illumination:

Lamp type:	Halogen, 2 x 20 watts, dichroic reflector

200 Crawler:

Dimensions:	Length 6.75 " overall, Width 1.65 ", Height 1.36 "
Material:	Nickel-plated brass
Drive:	2 x 3Watt D.C. motors, 4-wheel drive
Camera:	0.95" black & white / 1.18" color
Lighting:	LED
Cable:	100 Meters, 5mm dia.

400 Crawler:

Dimensions:	Length 8 " overall, Width 3 5/8 ", Height 3 1/8 "
Weight	9.9 lbs.
Material:	Brass, nickel plated, Aluminum
Drive:	2 x 20Watt D.C. motors, 6 -wheel drive, steerable

600 Crawler:

Dimensions:	Length 12 " overall, Width 4 3/4'", Height 3 3/4 "
Weight	16 lbs.
Material:	Brass, nickel plated, Stainless Steel, Aluminum
Drive:	2 x 20Watt D.C. motors, 6 -wheel drive, steerable

900 Crawler:

Dimensions:	Length 21" overall, Width 8 ", Height 6 1/2 " (w/small wheels).
Weight	51 lbs.
Material:	Brass, nickel plated, Stainless Steel, Aluminum
Drive:	2 x 40Watt D.C. motors, 6-wheel drive, steerable

WARRANTY

Everest VIT, Inc. (Everest VIT) guarantees this product to be free from defects in materials and manufacturing. Everest VIT's obligation under this Warranty shall be limited to the repair or exchange of any part or parts thereof which may prove to be defective under normal use and service within 1 year from the date of original purchase and which our examination, at our facility, shall disclose, to our satisfaction, to be defective. This Warranty is expressly in lieu of all other warranties, express or implied, including the warranties of merchantability and fitness for use and of all other obligations or liabilities on our parts, and we neither assume nor authorize any other person to assume for us, any other liability in connection with the sale of Visual Inspection Technologies' equipment. This Warranty shall not apply to any equipment which has been subject to accident, negligence, alteration, abuse, unauthorized repair, improper storage, or other misuse. This Warranty applies only to the original purchaser and cannot be assigned or transferred to any third party without express written consent of Everest VIT. The warranty does not apply to expendable items or normal wear and tear or failure due to overheating or radiation exposure.

Additionally, Everest VIT assumes no responsibility, either expressed or implied, regarding the improper usage of this equipment or interpretation of test data derived from this product. Everest VIT's responsibility and obligations, in all cases, are limited strictly to the repair and/or replacement cost as outlined above.

This warranty shall be governed by the laws of the State of New Jersey.

Note: In the event that the equipment cannot be returned to Everest VIT, for whatever reason, the customer agrees to pay for all travel and living expenses incurred to have a Everes VIT representative evaluate, assess or affect a field warranty repair.

Steps for Warranty Assessment:

1. Call Everest VIT at 888-332-3848 and state that you are calling regarding a warranty issue.
2. After receiving a return authorization number (RA#) ship the Product to:

Service Manager - RA#
Everest VIT, Inc.
199 US Hwy. 206
Flanders, NJ 07836-9114

Everest VIT is not responsible for shipping costs.

3. After receiving the product, Everest VIT's Product Manager will contact you to discuss the warranty claim.

TEXT GENERATOR

I. Operating the Text Generator

A. General Description

B. Functional Description

1. Help Menu
2. Date and Time
3. Status Bar
4. Videotape Counter, Distance Counter and Event Counter
5. Text Lines
6. Speed-Text
7. Overlay-Page Storage
8. Display, Language and Keyboard Settings
9. Miscellaneous Functions
10. Help for Text Entry/Editing

C. Function Keys (keyboard)

A. General Description

The Text Generator permits superimposing of text and positioning data to the active video display. 25 lines with 40 characters each can be displayed on the screen.

Four status bars, three on top and one at the bottom of the screen are available to freely display selectable text.

Tool positioning data (such as pan and tilt, tool position, etc.), distance counter, date & time, videotape counter, and snap-shot (frame) counter can be arbitrarily placed on the active screen.

A maximum of 270 different text lines (e.g. frequently used comments or component data) can be stored in memory and recalled for display using 5-digit alpha numerical or 2-digit numerical code.

Text (or data) can be displayed in either black or white with the choice of reverse video or transparent text highlighting.

The system can store up to five complete overlay-pages.

A multi-language help menu provides descriptions of the individual system functions.

B. Functional Description

1. Help Menu

The [F1] function key calls the Help Menu, which provides an overview of the system functions and the settings for display, language, and function key assignments:

Help

Date	
Time	
Meter Counter	(footage counter)
Video Counter	(videotape position)
Display Control	(display settings)
Measuring Values	(Inclination)
Counter (Foto/Stroke)	(event counter)
Headline	(status bar)
Short keys	(text lines)
Speed Text	
Saved pages	
Arrow Keys (Choose help menu)	(↑ or ↓ for selection)
Return (Activates help page)	(↵ to confirm)
ESC	(Cancel)

The up or down [↑ ↓] arrow keys are used to select the function and confirmed with the enter key [Enter] to display the item.

When calling the Help Menu using the [Alt F1] function key, the most recent item will be displayed. The [ESC] key is used to return to the standard display mode.

2. Date and Time

The [F9] function key is used to toggle on/off the date display. To change the date use the [Shift & F9] function key. The appropriate separators (. or -) have to be entered from the keyboard when editing or setting the date. To position the date on the active screen, use the [Ctrl & F9] function key and manipulate the date to the desired location with the [←, ↑, ↓, →] arrow keys.

To change the time display use the same procedure as above, but instead of the [F9] key, the [F8] function key is used.

The new entry is saved with the [Enter] key or discarded using the [ESC] key. If discarded, the previous content of the status bar will remain unchanged.

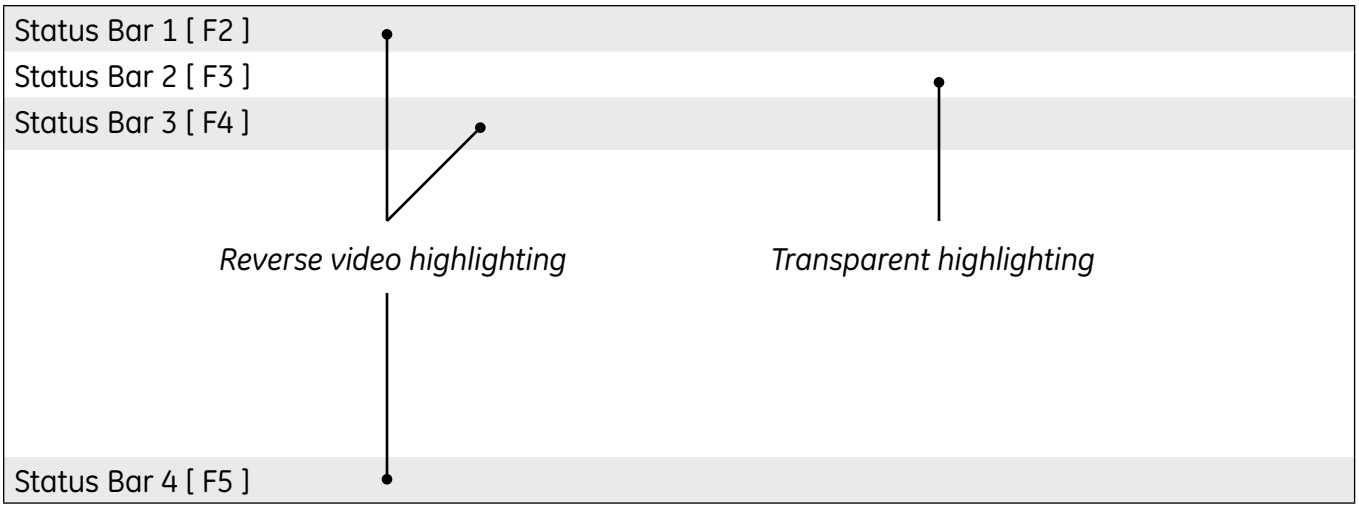
The following date and time formats can be selected with the [F12] function key:

Date	Time	
DD.MM.YYYY	HH:MM:SS	
MM.DD.YYYY	HH:MM	(24 hr. -display)
YYYY-MM-DD	HH:MMa	(12 hr. - display)

3. Status Bars

Status bars provide the user with the option to freely display selectable text in three lines at the top of the screen and one line at the bottom of the screen with a maximum of 38 characters or digits per line. The [F2], [F3], [F4], and [F5] keys are used to individually toggle the status bar(s) display on or off.

Screen positions of the status bars:



The content of the status bar(s) can be edited by simultaneously pressing the [Shift] key and function key of the corresponding status bar (e.g. [Shift & F2] for status bar #1). The cursor moves to the first character (or digit) of the selected status bar line (the status bar has to be activated).

The new entry is saved with the [Enter] key or discarded using the [ESC] key. If discarded, the previous content of the status bar will remain unchanged.

Pressing the [Alt] key and the corresponding (status bar) function key simultaneously toggles between reverse video and transparent highlighting.

4. Videotape Counter, Distance Counter and Event Counter

The [F6] function key toggles the videotape counter on or off. In combination with the [Shift] key and the [F6] keys, the videotape counter can be set to a pre-assigned value. To position the videotape counter on the screen use the [Ctrl] and [F6] function keys simultaneously, and move the counter to the desired location with the arrow [←, ↑, ↓, →] keys. Pressing the [Alt] and [F6] function keys simultaneously starts or stops the videotape counter.

The [F7] function key toggles the distance counter on or off. The [Alt N] key resets the distance counter to 0 (zero). Using the [Shift] and the [F7] keys, the distance counter can be set to a pre-assigned value. To position the distance counter on the screen use the [Ctrl] and [F7] function keys simultaneously, and move the counter to the desired location with the arrow [←, ↑, ↓, →] keys.

The event counter is activated or deactivated using the [F11] function key. With the [Shift] and the [F11] keys, the event counter can be set to a pre-assigned value and can be reset to 0 (zero) using the [Alt] and [F11] function keys at once. To position the event counter on the screen use the [Ctrl] and [F11] function keys simultaneously, and move the counter to the desired location with the arrow [←, ↑, ↓, →] keys.

All new entries are saved with the [Enter] key or discarded using the [ESC] key. If discarded, the previous content of the counter display will remain unchanged.

The following counter formats are available by invoking the [F12] function key:

Date	Time	Event Counter
HH:MM:SS	000.00m	0
HH:MM:SS:FF		0000.0
		0.0
		0000.00
		0.00
		00000

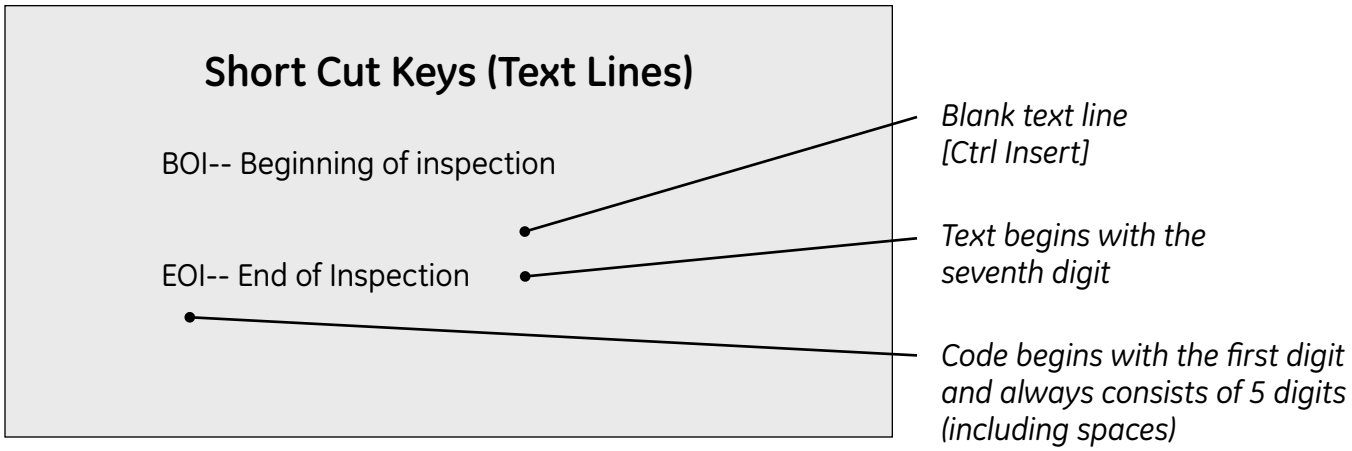
5. Text Lines

A maximum of 250 text lines (single-line) with up to 34 characters each are available. Complete text lines are assigned to 5-digit codes and can be restored by just entering the appropriate code. The [Shift & F10] key combination lists all previously stored text lines and permits entering of new text or editing of existing text. Cursor positions are controlled using [Page Up] and/or [Page Down] function keys.

The first 5 digits (or any character, including spaces) of the text line represent the code assigned to the text and at a space between code and the following text.

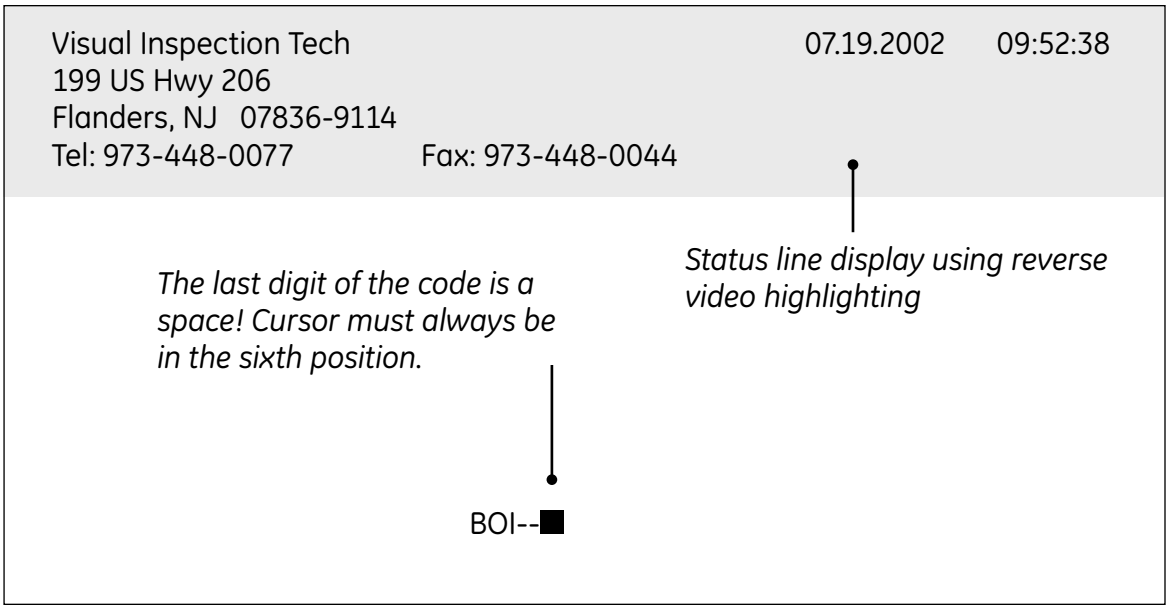
Pressing [Ctrl] and [Delete] function keys at the same time deletes the text line at the current cursor position. Using the [Ctrl] and [Insert] function keys inserts a blank line at the current cursor position. All text commands are executed using the [Esc] function key.

The figure below depicts the text line display function [Shift & F10]:

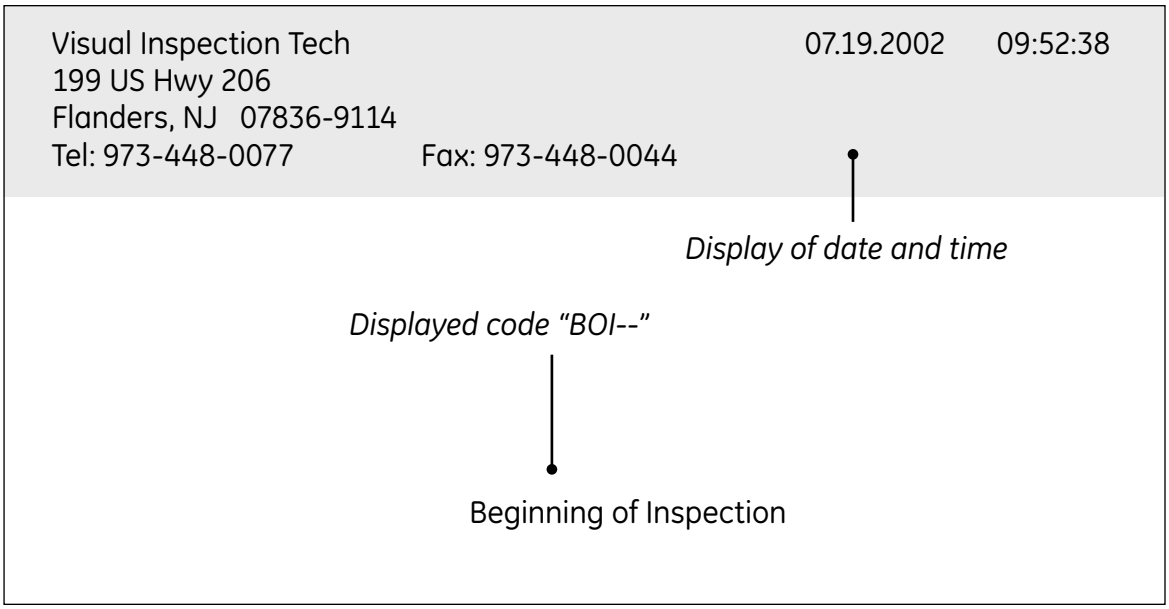


To recall a stored text line, the cursor is positioned in the desired location on the screen using the arrow [←, ↑, ↓, →] keys and typing the 5-digit code associated with the text line to be displayed. Pressing the [Alt & F10] key combination displays the code (including spaces) at the insert position.

The following figure shows an example for code HA--_ (the underscore _ represents one space):



Executing the text display command with the [Ctrl & F10] function keys will show the decoded text line at the cursor position as depicted in the figure below:



6. Speed Text

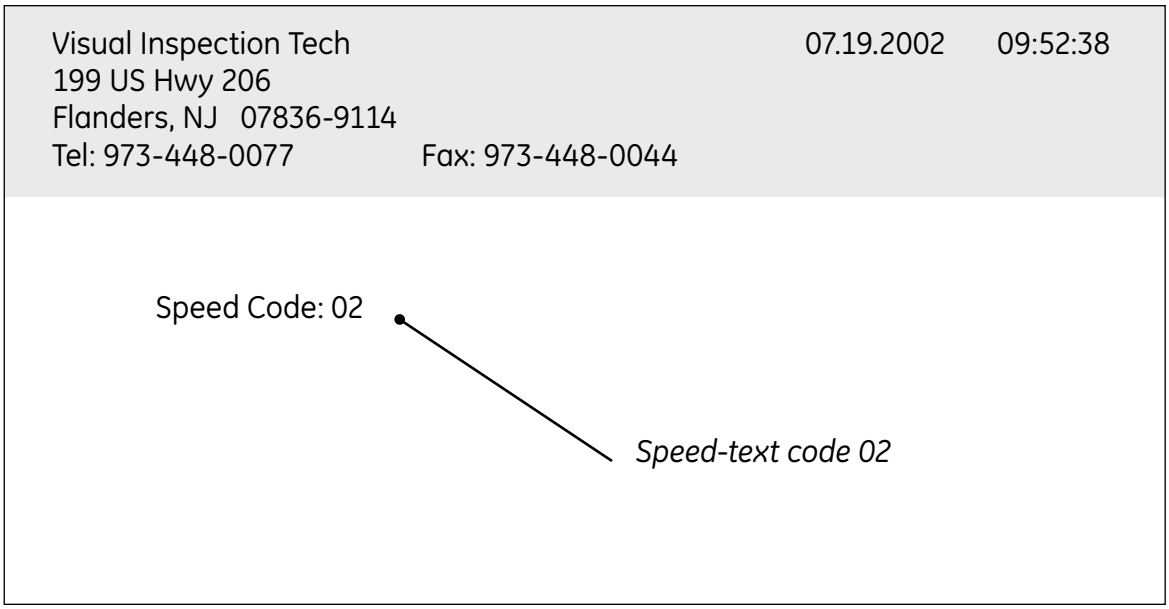
Up to 20 speed-text lines (single-line) with maximal 37 characters can be stored and recalled using a 2-digit alpha-numerical code. A listing of stored and blank speed-text lines is displayed on the screen when the [F10] function key is pressed. The Up and Down [↑, ↓] arrow keys are used to move to the selected code number (insertion point) for entering or editing of the speed-text line. To save the new or edited text the [Esc] function key is pressed.

Listing of the speed-text function [F10]:

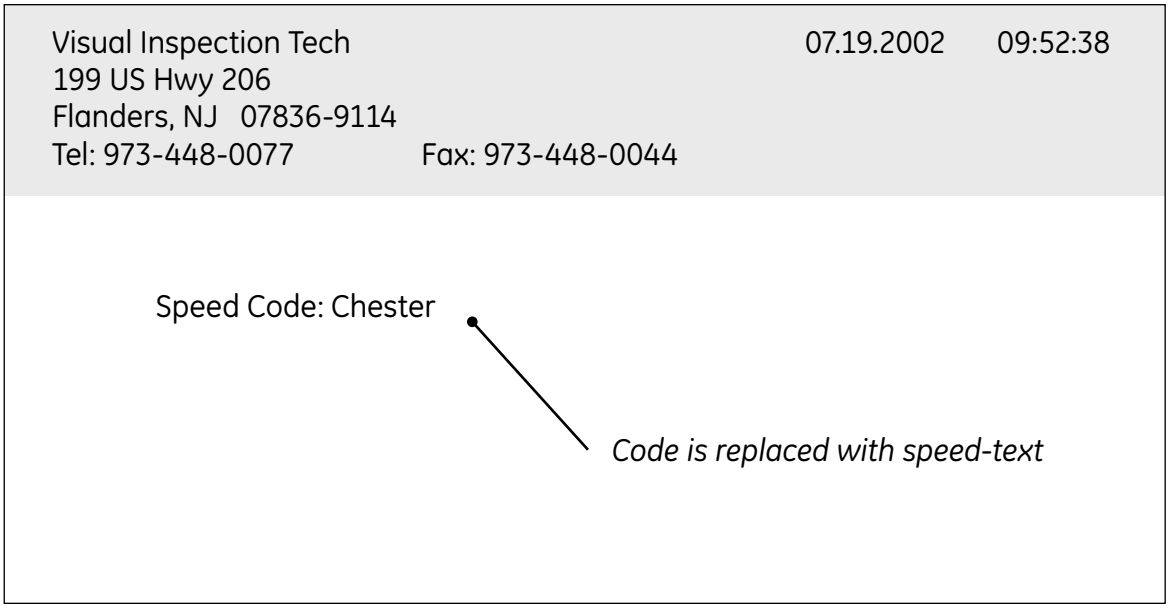
(Speed-Text)

01 Flanders
02 Chester
03 Roxbury
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20

To position the speed-text on the active screen display, the cursor is moved to the desired location using the arrow [←, ↑, ↓, →] function keys. Entering the 2-digit speed-text code and [Ctrl & F10] function keys displays the selected speed-text on the screen as shown in the figure on top of the next page.



After executing the [Ctrl & F10] function keys the code is replaced with the assigned speed-text as displayed in the figure below:



7. Overlay-Page Storage

The system can store and re-display a maximum of five overlay-pages. Individual overlay-pages are employed to display frequently used screen templates assigned to characters A through E. To store a particular screen overlay to memory use the [Alt] function key along with the character key (A - E). To recall a stored overlay-page press the [Ctrl] function key and the character key (A - E) of the desired overlay page.

8. Display, Language and Keyboard Settings

To change the date, time, and counter formats, menu language and keyboard layout, the Settings Menu is called using the [F12] function key. The Up and Down [↑, ↓] arrow keys are used to position the cursor to the selection. Pressing the spacebar displays the systems format options as described in the previous sections. The format for the positioning data of the four axis encoders (ADC 1 through ADC 4) can be determined individually for each ADC encoder.

(Settings)

Date Format : DD.MM.YYYY
Time Format : HH:MM:SS
Meter Format : -999.99m

A/D Converter 1: -9999
A/D Converter 2: -9999
A/D Converter 3: -9999
A/D Converter 4: -9999

Video Counter: HH:MM:SS:FF	(videotape counter)
Counter1 Format: 00000	(event counter)
Country: USA	(language)
Keyboard: USA	(keyboard layout)
Arrow up, Arrow down, Change bar	(↑ or ↓ for selection)
Change with space bar	

Changes to the settings are stored in system memory using the [Enter] key or discarded with the [ESC] function key. If discarded, the previously stored formats remain unchanged.

9. Miscellaneous Functions

Text Display On/Off
The text display on the active video screen is turned on by pressing the [Ctrl & Esc] function keys simultaneously. Pressing the [Ctrl & O] keys turns the text display off.

Character Color (black/white)
Using the [Ctrl & I] keys toggles to white characters on black highlight or black characters on white highlight (reverse video).

Screen Erase
Using the [Esc] function key blanks the current video screen. Status bars, date and time, positioning data and counters remain in memory.

Cursor Position Storage
A cursor position at any screen location can be stored to memory using the [Ctrl & S] key. After a "screen erase" the cursor always appears in the stored position.

Cursor On/Off
The cursor display can be toggled on or off by pressing the [Ctrl & X] keys at the same time.

10. Help for Text Entry/Editing

Text in the status bars, text lines, speed-text, and screen text can be entered or edited using either the insert or the overwrite mode. To toggle between insert or overwrite mode the [Insert] function key is used.

In the insert mode an entered character (or digit) is inserted at the cursor position moving characters to the right of the current cursor position. In the overwrite mode the character at the cursor position is replaced by the new character (or digit). During direct screen text entry, the system defaults to overwrite mode following a line break.

Pressing the [Delete] function key erases the character at the current cursor position and shifts all following characters one space to the left. The [Backspace] function key erases the character to the left of the cursor and shifts all following characters one space to the left.

The cursor position is controlled using the arrow [←, ↑, ↓, →] keys. When the cursor reaches the edge of the screen (top or bottom, right or left) it will automatically wrap to the opposite (i.e. when passing the top edge of the screen the cursor will immediately appear at the bottom edge of the screen). This allows for a fast maneuvering of the cursor within the screen display. For the fast positioning of the cursor to the top or bottom of the screen the [Page Up] and [Page Down] function keys are used.

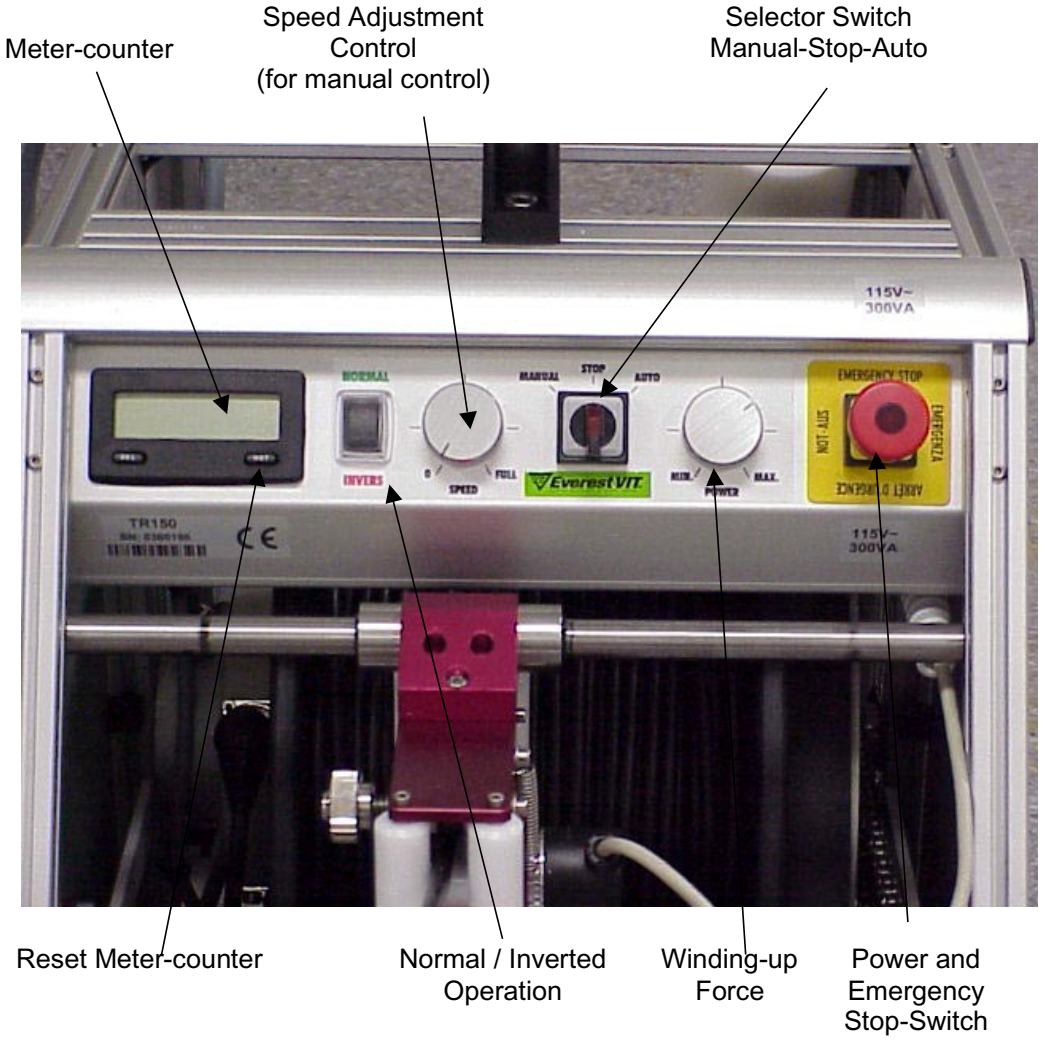
C. Function Keys (keyboard)

[F1]	Call Setup Menu
[F2]	Toggle On/Off - Status Bar 1
[F3]	Toggle On/Off - Status Bar 2
[F4]	Toggle On/Off - Status Bar 3
[F5]	Toggle On/Off - Status Bar 4
[F6]	Toggle On/Off - Videotape Counter
[F7]	Toggle On/Off - Distance Counter
[F8]	Toggle On/Off - Time
[F9]	Toggle On/Off - Date
[F10]	Entering / Editing / Listing - Speed-Text
[F11]	Toggle On/Off - Counter
[F12]	Call Display, Language, and Keyboard Settings Menu
[Shift & F2]	Editing - Status Bar 1
[Shift & F3]	Editing - Status Bar 2
[Shift & F4]	Editing - Status Bar 3
[Shift & F5]	Editing - Status Bar 4
[Shift & F6]	Reset - Videotape counter
[Shift & F7]	Reset - Distance counter
[Shift & F8]	Reset - Time
[Shift & F9]	Reset - Date
[Shift & F10]	Entering / Editing / Listing Text-Lines
[Shift & F11]	Reset - Event Counter
[Alt & F1]	Display recent help page
[Alt & F2]	Toggle reverse video/ transparent - Status Bar 1
[Alt & F3]	Toggle reverse video/ transparent - Status Bar 2
[Alt & F4]	Toggle reverse video/ transparent - Status Bar 3
[Alt & F5]	Toggle reverse video/ transparent - Status Bar 4
[Alt & F6]	Start/Stop - Videotape counter
[Alt & F10]	Replace Text Line code with stored text
[Alt & F12]	Display Firmware Version (Program Version)
[Alt & A]	Store Display - Overlay-Page A
[Alt & B]	Store Display - Overlay-Page B
[Alt & C]	Store Display - Overlay-Page C
[Alt & D]	Store Display - Overlay-Page D
[Alt & E]	Store Display - Overlay-Page E
[Alt & N]	Reset Distance counter to 0

[Ctrl & F6]	Placement - Videotape counter
[Ctrl & F7]	Placement - Distance counter
[Ctrl & F8]	Placement - Time Display
[Ctrl & F9]	Placement - Date Display
[Ctrl & F10]	Recall - Speed-Text (following speed-code)
[Ctrl & F11]	Placement - Event Counter
[Ctrl & Esc]	Display Text
[Ctrl & Insert]	Insert blank line (Text-Line mode)
[Ctrl & Delete]	Delete line (Text-Line mode)
[Ctrl & A]	Recall - Overlay-Page A
[Ctrl & B]	Recall - Overlay-Page B
[Ctrl & C]	Recall - Overlay-Page C
[Ctrl & D]	Recall - Overlay-Page D
[Ctrl & E]	Recall - Overlay-Page E
[Ctrl & I]	Toggle Character Color (black-white/white-black)
[Ctrl & O]	Blank text display
[Ctrl & S]	Store current cursor position
[Ctrl & X]	Toggle cursor display On/Off
[Page Up]	Cursor placement on first line
[Page Down]	Cursor placement on last line
[Home]	Cursor placement to first column
[End]	Cursor placement to last column
[Insert]	Toggle Insert/Overwrite mode
[Delete]	Erase character at current cursor location
[Backspace]	Erase character left to current cursor location
[Esc]	Blank screen or exiting current menu
[Enter]	Confirmation of data entry and/or position
[Arrow Keys]	Cursor movements on the screen

Motorized Cable Reel TR 150

CONTROL UNIT

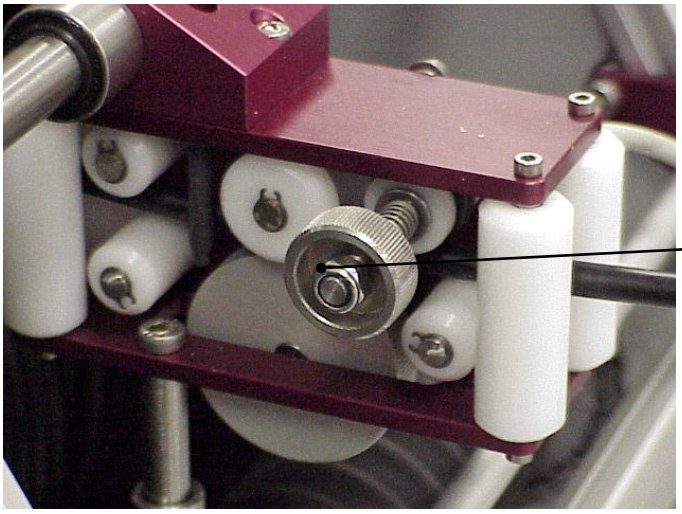


Metercounter: The button <RST> resents the meter-counter to zero.
The button <SEL> has no function.
Normal Operation: The crawler moves forward, the cable reel repels.
Inverted Operation: The crawler moves in reverse, the cable reel retracts **(not needed)**
Winding-up Force: The winding-up force should be adjusted so that the cable has tension.
Speed Adjustment: Using this knob you can adjust the winding-up speed during manual operation.

Selector Switch: If on **automatic** the cable reel repels, when the crawler is going forward until the cable loop interrupts the beam of the photo cell. The cable reel retracts, when the crawler is going in reverse. The speed adjustment knob has no function in automatic mode. The power adjustment should be in the full clockwise position. The built-in LED in the selector switch will blink. If on manual the cable reel retracts. With the speed adjustment knob, you can adjust the retracting speed. The LED on the selector switch is on all the time.

Emergency Switch: When the red LED is illuminated the reel is ready for operation.

BRAKE



The brake of the reel should be adjusted in such a way, that the cable does not wind down itself at deep man holes. On turning clockwise, the brake power increases.
The reel must be positioned horizontally. If the reel is placed under an angle of 10 degrees, the unit in inclination sensor switches off the reel. The control LED of the emergency switch is off; if the angle is less than 10 degrees the reel will be switched on again. Never retract the cable completely; in that case it retracts counter-clockwise.

DOWN-HOLE GUIDE PULLEY

Always use the down-hole guide pulley or acceptable alternative like a tiger tail to avoid cable damage. Before connecting the connector to the crawler / camera, put the cable through the down-hole guide pulley or similar device.

PHOTO ELECTRIC SENSORS

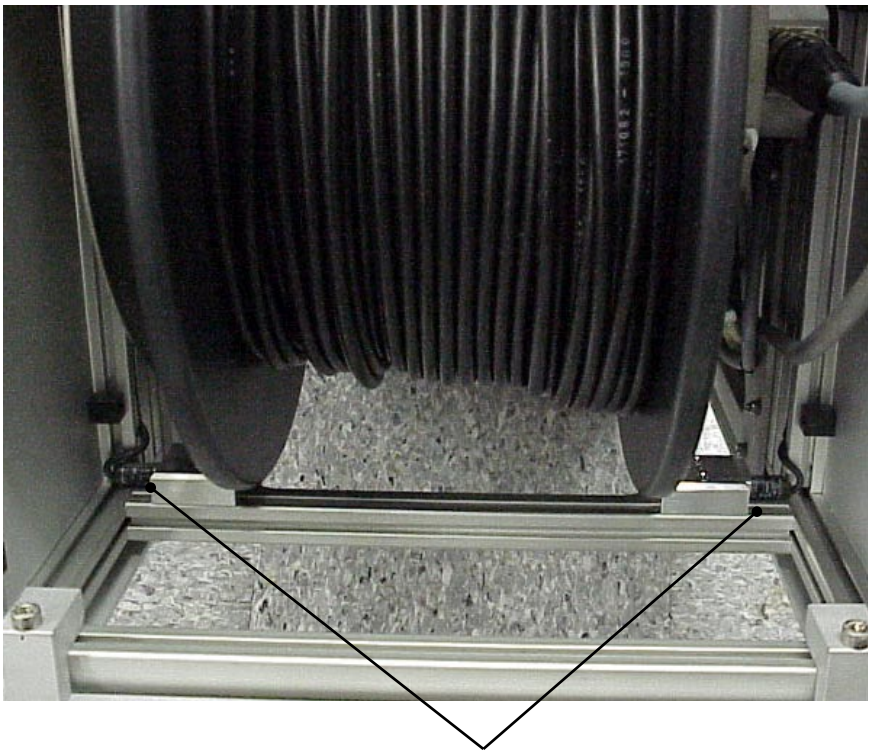
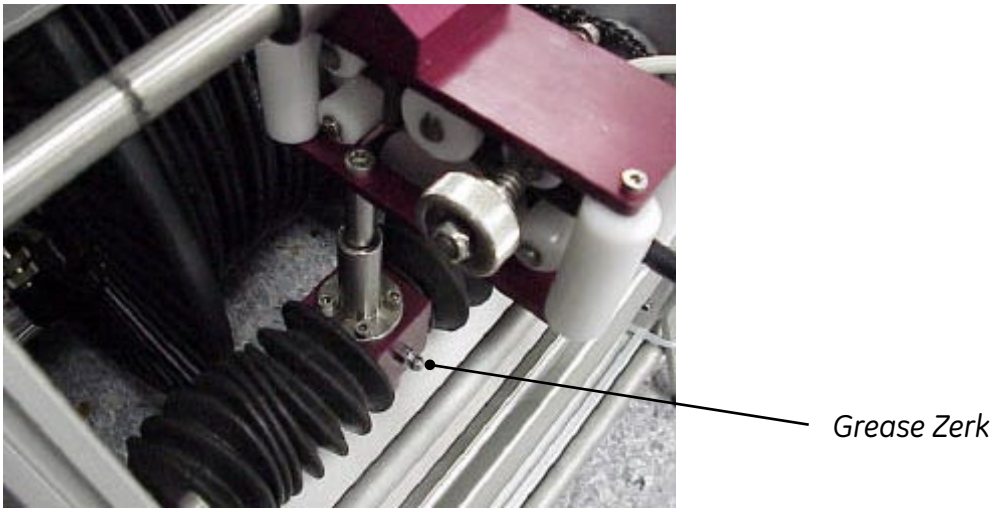


Photo Sensors

Photo electric sensors LED's:
Green - in operation
Yellow – interrupted

GREASE



Grease Zerk

Grease fitting at the force winding axle.

MAINTENANCE

- Please read the following points about the maintenance and care of the system. When replacing parts, use only original replacement parts from Everest VIT. The use of non-original parts could lead to unpredictable performance and void warrenty.
- After finishing any job replace the connector protector plug on the end of the cable.
- If there is a power failure you can rewind the reel manually with the crankhandle.
- Connectable parts of the system like the auxiliary light connector, crawler connector, camera connector should be handled very carefully. Do not forcefully join connector jacks and recepacles.
- All of the connectable parts with an o-ring seal for water-proofing must be kept well lubricated using o-ring grease. When needed, lubricate all o-rings after use.
- Replace damaged or failed parts with only original parts from Everest VIT.
- When changing crawler wheels use split-ring lock washers.
- The connector for the auxiliary lights should be protected with the protective cap while not in use.
- All soiled parts of the camera should be cleaned only in with warm water. Do not use high-Pressure
- compressed air or chemical detergents to clean.
- Keep the mounting of the wheel axle and the wheel free of debris. When changing the wheels, clean and lubricate the mounting area.
- Always keep the meter counter mechanics and the measuring wheel clean. The cable guidance mechanics should be lubricated after use.
- Examine all electrical cables for insulation damage periodically. Defective cables must be replaced immediately.
- The control unit and the cable reel are not protected against water spray and therefore-not allowed to be cleaned with water or other spray cleaning devices.