

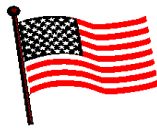


Design and Manufacture of Video Pipeline Inspection Systems
A Full Service Company
www.rstechserv.com

Steerable Storm Drain Tractor

Model 36-2000

INSTALLATION MANUAL



Made in USA

NOTICE

**THOROUGHLY READ THE INSTALL MANUAL
BEFORE OPERATING EQUIPMENT. SAFE OPERATION
AND TOP PERFORMANCE CAN BE OBTAINED ONLY
WITH PROPER OPERATION AND MAINTENANCE.**



Disclaimer

RS Technical Services Inc. has reviewed this manual thoroughly in order that it will be an easy to use guide to your 36-2000 Series Steerable Storm Drain Tractor.

All statements, technical information, and recommendations in this manual and any guides or related documents are believed reliable.

The accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the product described.

Your Steerable Storm Drain Tractor has been sold to you subject to the limited warranty set forth in the enclosed warranty statement.

RS Technical Services, Inc. reserves the right to make changes in the specifications of the product described in this manual at any time without notice and without obligation to notify any person of such changes.

Using Your Documentation

<u>Operation manual</u>	900-19931
<u>Install Manual</u>	900-32009

This manuals offer detailed information on how to operate your Steerable Storm Drain Tractor. This manual includes operation, field-replaceable parts and product specifications.

Read this manuals to master the basic operations and to know the specifications of the Steerable Storm Drain Tractor.

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Operator and Equipment Safety

It is important to be familiar with operations, maintenance, and safety issues when working with RST equipment.



Read the entire manual before operating the equipment.

To prevent personal injury or damage to equipment, **turn off Camera power**. When making electrical connections, width adjustments and when maintaining the tractor or camera, disconnect all power to the control station before servicing.

Inspect all transport, camera, lighting cables, and bridles before and after each use. Replace any broken, worn or frayed bridles or cables.



Always use care when near an open manhole, and when climbing in or out of a TV inspection vehicle. The tractor and camera assembly can be placed into the pipeline **without** personnel entering the manhole. Use proper lifting ropes, cranes and winches for lifting equipment in/out of pipes.

Caution: Watch out for people, power lines and traffic when handling the downhole pole

NEVER lift the tractor by the elevator assembly.(see photo on page 14)

System Power



CAUTION: NEVER HOOK UP OR DISCONNECT ANY EQUIPMENT WITH POWER TURNED ON!

The Inspection System requires a steady supply of 120VAC to operate properly. Before starting of the generator or connecting shore power, make sure that ALL equipment inside the vehicle has been turned OFF. Turn down the controls for camera power and cable reel speed. After all equipment has been checked, connect the shore power cord.

If a generator is to be used, allow the generator to warm up for a few minutes. Note: Diesel generators use a different control panel that is separate from the controller power supply. Refer to the appropriate generator operators manual for starting.

Verify that the voltage and frequency indicators on the controller power supply are in the green normal zone.



Caution: Before turning on any equipment, plug the keyboard into the data collection system. Plug the Auxiliary Control Box into the Auxiliary Control jack on the controller power supply.



Caution: If the voltage or frequency fluctuates into the red zones on the controller power supply, DO NOT turn on any of the equipment in the truck. Check shore power or the generator for proper operation, or have them checked by a qualified technician.



Caution: Route cords away from traffic or wet areas to avoid tripping on power cords.

Equipment Hookup

Attaching the watertight power cables (pigtail) and bridle assembly from the Mainline Cable Reel to the tractor:

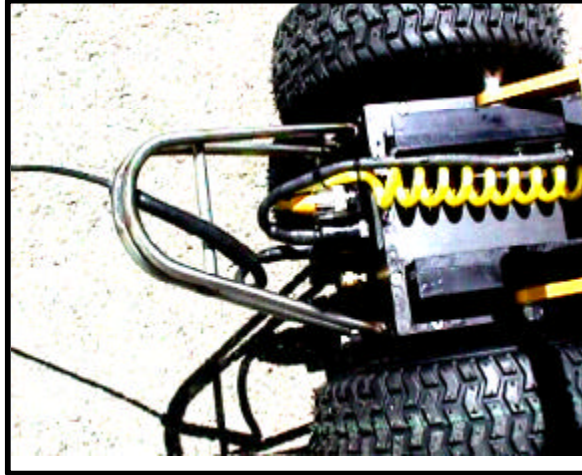


photo #1

Attaching the Tractor to the Cable Reel:

Feed the pigtail coming from the Mainline Cable Reel through the top of the cross bar of the tractor's lifting hook. This will lessen the chance that the cable will be run over by the tractor when operated in reverse gear.

If the tractor/camera combo is being set up in a vehicle:

DO NOT DRIVE THE TRACTOR UNTIL IT IS ON THE GROUND.

3-pin push-on pigtail: (older model)

Remove the bulkhead protector ring and inspect bulkhead connector for damage. The pins should be straight and clean, with no cracks in the housing. (Reference photo #1)

Inspect the pigtail for damage. The connector should be clean inside, with no torn rubber.

Slip the bulkhead protector ring over the pigtail with the threaded end facing the connector end of the pigtail.

Align the indexing bump on the pigtail, to the notch on the nut of the bulkhead connector. This allows the large socket inside the pigtail to line up with the large pin on bulkhead connector. Press pigtail onto the bulkhead connector. Do not twist the pigtail. Lightly pinch the boot area to allow any trapped air out of the pigtail. (detailed picture of pigtail, ring, bulkhead) If the pigtail connector needs to be lubricated to

make the connection fit more easily, spray a small amount of WD-40 or a comparable lubricant onto your finger and wipe it on the inside of the boot.

Install bulkhead protector ring to the bulkhead connector. Only thread the protector ring until it stops. **Do not over tighten**

With the pigtail installed, connect the swivel snap hook to the eyelet on the bridle. There should be no twist in the pigtail or the bridle. Refer to page 11.



To disconnect pigtail, turn off power, remove the bulkhead protector ring, and unplug the connector preferably using the pigtail removal tool.

Remember:

Excessive grease will attract dirt and moisture and may cause electrical arcing at the connector.

6-pin screw-on pigtail:

Make sure bulk head and pig tail sockets are clean before assembly.
Place tractor on flat surface.

Inspect bulkhead and pins for cracks and debris.

Locate indexing notch on sincon TV cable and align with indexing tab on bulkhead connector on tractor.

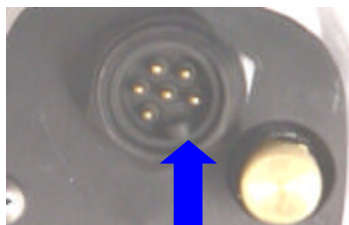
Align connectors and carefully tighten nut while gently rocking connector to seat for a watertight connection.

NOTE: DO NOT OVER TIGHTEN.

Follow instructions for adjusting cable grip on page 11

Turn on camera power. (If lights come on then equipment is connected correctly.)

Bulkhead connector



Indexing tab

Camera power cable



Indexing notch

Attaching the OE II Camera to the Tractor:

Make sure Camera and Tractor are clean before assembly.

With the tractor completely stopped:

Use the center toggle switch on the Auxiliary Control Box to raise the tractor elevator 3-to 4-inches to gain access to the camera mounting bolts.

Remove the wing nut keepers from the mounting hardware on the tractor elevator platform. (*Older units*)

NOTE: *The front mounting bolts and spacers are different lengths than the rear mounting bolts and spacers. (Older units)*

The longer mounting bolts and spacers are used to secure the **rear** of the camera to the platform. (*Older units*)

The shorter mounting bolts and spacers are used to secure the **front** of the camera to the platform. (*Older units*)

Place camera inside tractor cradle platform lining up mounting holes.

Start 2 screws in front mounting brackets by hand

Start 2 screws in rear mounting brackets by hand

Tighten front and rear screws using Allen wrench.(5/32" long arm)

NOTE: Always tightens front screws first.

Return cradle platform assembly to its original position.

Attach the power cable from the tractor to the bulkhead connector located at the back of the camera.(*view pigtails (page7) for instructions*)

Turn on the Camera Power.

The camera power switch is located at the bottom left of the camera section in the front of the Mainline Controller.

Increase the camera power by turning the Camera Light knob at the Mainline Controller to the *10 O'clock position* (If lights come on then equipment is connected correctly.)



Caution: Lower the elevator on the tractor all the way down by using the camera power control at the Mainline Controller before lowering into manhole.

Attaching the Omni Eye IIIZ Camera to the Tractor: Kit 840-17645

Make sure Camera and Tractor are clean before assembly.

With the tractor completely stopped:

Use the center toggle switch on the Auxiliary Control Box to raise the tractor elevator 3-to 4-inches to gain access to the camera mounting bolts.

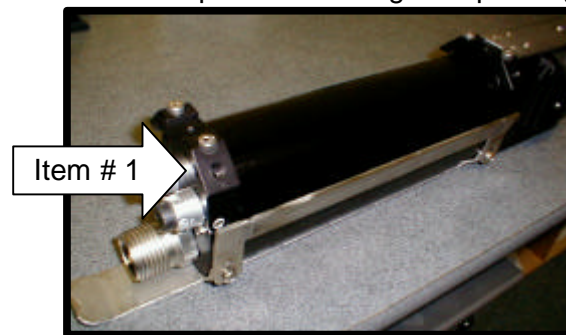
Remove the wing nut keepers from the mounting hardware on the tractor elevator platform. (*Older units*)

NOTE: *The front mounting bolts and spacers are different lengths than the rear mounting bolts and spacers. (Older units)*

The longer mounting bolts and spacers are used to secure the **rear** of the camera to the platform. (*Older units*)

The shorter mounting bolts and spacers are used to secure the **front** of the camera to the platform. (*Older units*)

Turn camera over on it's top with mounting hole pointing up.

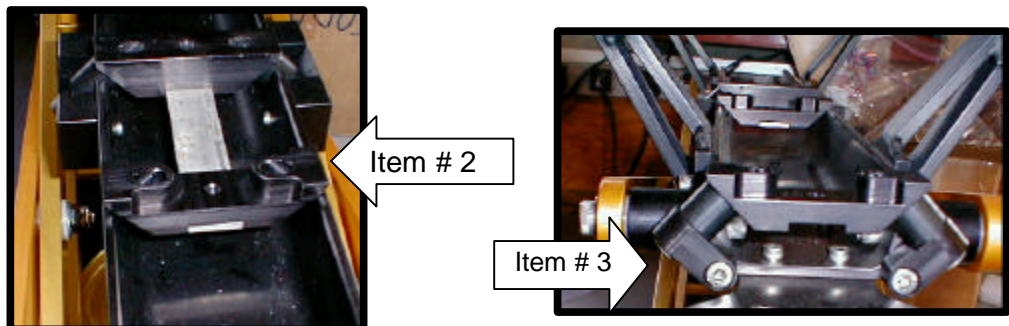


Bolt the two mounts (451-20619-21) (Item # 1) with notches, to the camera using the four- $\frac{1}{4}$ "-20x.75" SHCS (301-10887).

Place the strut (451-20293) (Item # 2) in rear mount and in the cross member (451-20623-21), screw it in place with two 10-32x1/2 screws (301-14029) and washers (318-14788).

Turn camera over to standard position.

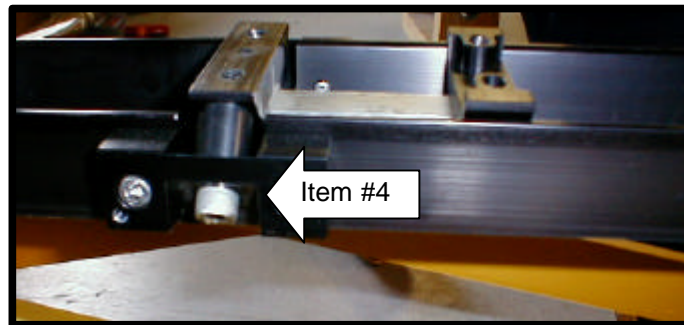
Place camera inside tractor cradle platform lining up mounting holes.



Start 2 screws in front mounting brackets by hand (Item # 3)

Start 2 screws in rear mounting brackets by hand (Item # 4)

Tighten front and rear screws using Allen wrench. (5/32" long arm)



NOTE: Always tightens front screws first.

Return cradle platform assembly to its original position.

Attach the power cable from the tractor to the bulkhead connector located at the back of the camera. (*View pigtails (page 13) for instructions.*)

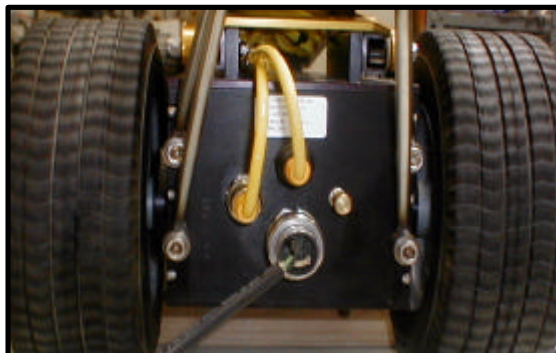
Turn on the Camera Power.

The camera power switch is located at the bottom left of the camera section in the front of the Mainline Controller.

Increase the camera power by turning the Camera Light knob at the Mainline Controller to the *10 O'clock position*. (If lights come on then everything's connected correctly.)



Caution: Lower the elevator on the tractor all the way down by using the camera power control at the Mainline Controller before lowering into manhole.



Attaching the Tractor to the Cable Reel:

Attaching the watertight power cables (pigtail) and bridle assembly from the Cable Reel to the tractor:



Feed the pigtail coming from the Cable Reel through the top of the cross bar of the tractor's lifting hook. This will lessen the chance that the cable will be run over by the tractor when operated in reverse gear.

If the tractor/camera combo is being set up in a vehicle:

DO NOT DRIVE THE TRACTOR UNTIL IT IS ON THE GROUND.

6-pin screw-on pigtail:

Make sure bulk head and pig tail sockets are clean before assembly.

Place tractor on flat surface.

Inspect bulkhead and pins for cracks and debris.

Locate indexing notch on sincon TV cable and align with indexing tab on bulkhead connector on tractor.

Align connectors and carefully tighten nut while gently rocking connector to seat for a watertight connection. **NOTE: DO NOT OVER TIGHTEN.**

Follow instructions for adjusting cable grip on page 13

Turn on camera supply. (If lights come on then equipment is connected correctly.)

If the tractor/camera combo is being set up in a vehicle:

DO NOT DRIVE THE TRACTOR UNTIL IT IS ON THE GROUND.

Bulkhead connector



Indexing tab

Camera power cable



Indexing notch

Attaching the Cable Grip to the Tractor:

Loosen the nuts on the cable grip.

Feed the pigtail coming from the Cable Reel through the top of the cross bar of the tractor's lifting hook. This will lessen the chance that the cable will be run over by the tractor when operated in reverse gear.

Check cable grip for proper adjustment. If adjustment is needed:

Clean out cap screws on cable grip as well as cable.

Loosen four cap screws on cable grip.

With the screws loose, it may be necessary to pop cable grip on a hard surface to separate halves from cable.

Slide cable grip to allow for proper slack. The cable grip should be adjusted to provide slack in the watertight connection, when bridle is tight. There should be enough slack to allow wire area to bend, but not enough to bend boot area when cable is raised at a 90-degree angle while loading and unloading equipment.

Tighten the bolts of the cable grip making certain the bolts are tightened in a cross-pattern. Upper left bolt, then lower right bolt, upper right bolt, then lower left bolt, and repeating as required to make certain that the cable is secure.



CAUTION! IMPROPER CABLE GRIP ADJUSTMENT CAUSES ROLLOVERS AND WATERTIGHT CONNECTION FAILURE!

Lowering camera/tractor into line

Locate the back of the truck so that the cable reel lines up in the direction of the pipeline to be inspected. Allow room to work around the opening while carrying the equipment.

Follow cable grip, bridle, and watertight connection instructions. Re-check the pipeline size and extension adjustments. Check all camera and tractor functions before proceeding. Lower elevator prior to putting in manhole.

Caution: Maintain control of equipment while lowering and lifting from manhole.



Most equipment damage occurs when inspection equipment is lowered into hole.

Caution: Watch out for people, power lines and traffic when handling the downhole poles.

NEVER lift the tractor by the elevator assembly.

ALWAYS make certain that the elevator is all the way *down* when placing it in or removing it from a pipeline or entranceway.

The elevator will not operate while the tractor is in powered motion.

However, the elevator can be raised or lowered while the tractor is being retrieved.

Put cable reel into “freewheel” and reel off enough cable so camera and tractor can be lowered into the bottom of the manhole. Place hook from the vehicle-mounted hoist/crane to the lifting hoop on rear of tractor.

NOTE: Use the RST skycrane or something comparable for lowering or raising from manhole.

Slowly lower the front of camera into manhole to clear manhole ring. Lower tractor and camera to the bottom of manhole facing camera in the direction of the pipeline to be inspected. When tractor and camera are resting on bottom of manhole, release the crane hook and remove it from the manhole.

Check all camera and tractor functions again before proceeding. Move tractor forward so the rear of the tractor and the cable connections are fully inside the pipe.

Install the down hole pole, double roller, and top manhole roller. The use of double roller and/or single roller is for protecting the cable and allowing it to slide down the hole without drag on the line.

Remove any slack from the cable and reset the footage counter.

Retrieval of the Equipment

Unloading the tractor from the pipeline:

Lower the elevator until it stops at the lowest position.
If the line is straight, shift the tractor into freewheel, and pull it backwards through the pipeline.

If there are turns in the pipeline, shift the tractor into reverse gear and drive it backwards through the pipeline while using the cable reel to retrieve the slack in the armored sincon cable. Use low speed while retrieving tractor.

Remove rollers and poles to make room to lift tractor and camera from manhole.

Back the tractor up to the pipeline opening or entranceway. Back tractor out of pipe into manhole so that front of tractor is clear of pipe.

Hook the crane cable or lifting rope to the lifting bracket at the rear of the tractor. Lift tractor and camera assembly from manhole using the crane cable. Use care when removing tractor from line, do not allow the elevator or tires to hang up on the step bars or other fixtures inside the manhole. Turn down light power on camera.

Wash down the tractor unit thoroughly over hole, insure that the seals are free of any debris. Wipe down and store the cable, camera and tractor in a dry area. If the tractor is to be stored in a vehicle, make certain that it is fully secured to the vehicle floor or wall to eliminate rolling.

Maintenance

Each time the tractor is removed from the pipeline, wash the entire assembly.

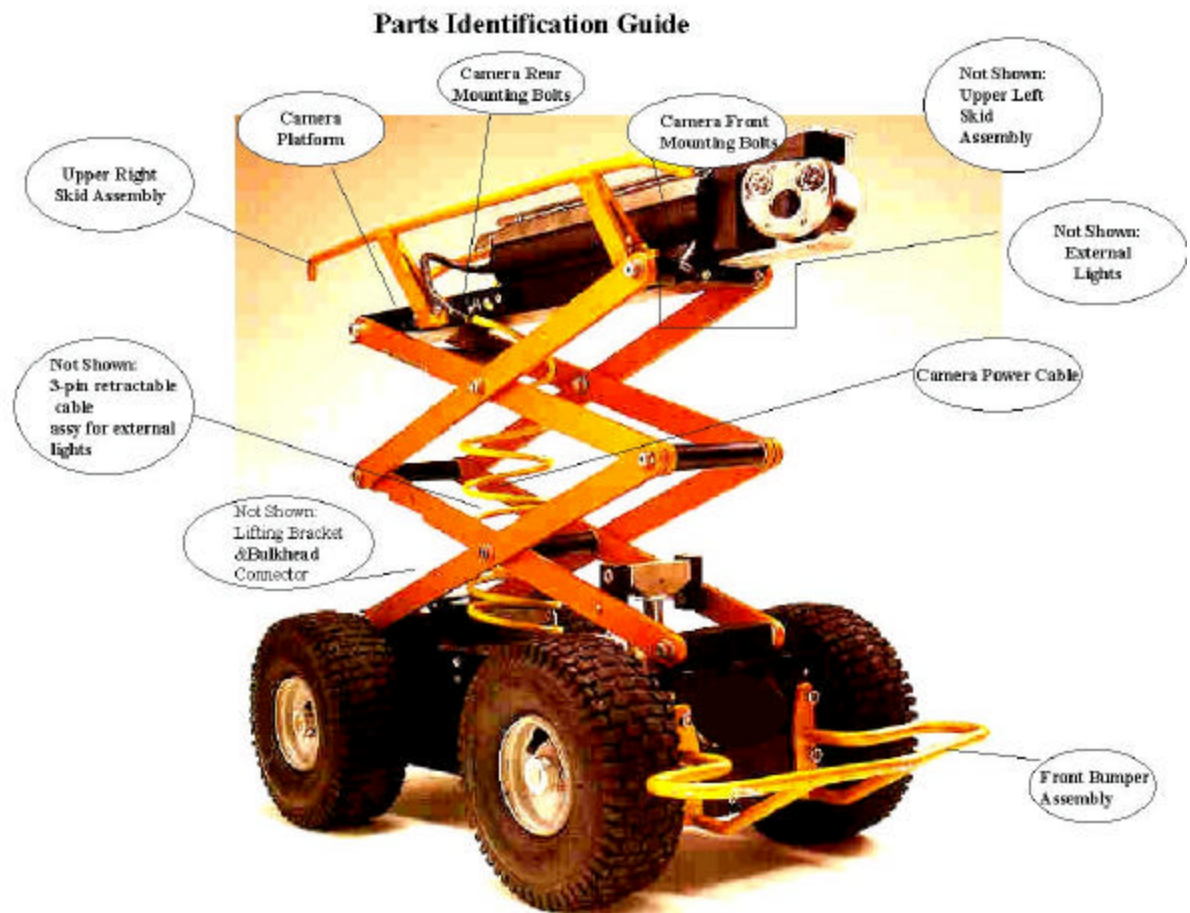
Inspect camera cradle and mounting hardware.

Inspect individual axles and tires for excessive wear or damage. Check for build up on the axles and inspect oil seals. Replace if necessary.

Inspect the power cables, watertight connectors, and lights for damage.

Inspect bridle, skids, top rails lifting hoop, front bumper and hardware.

Check all tractor functions.



FIELD REPLACEABLE PARTS

CABLES & CONNECTORS

Part Number	Description
448-11253	Cable Grip Assembly
557-19529	6-socket male plug (camera power connector)
557-17690	6-socket female plug (camera power connector)
557-19528	6-socket female pigtail
557-19175	3-socket female plug (external light power)
806-17896	3-pin push-on camera CBL assy (NCP)
806-31535	6 pin camera CBL. assy

LAMPS & HARDWARE

Part Number	Description
867-21567	2-halogen lamps kit with housing and wiring
541-20296	Replacement halogen lamp 12 Volts, 35W
549-12401	Quartz window
439-15675	O-ring, silicon,032
840-20622	Adaptor kit OEIII (sdt. with OEIII)
840-17645	Camera to tractor mounting hardware kit To include: Qty: 2, P/N 403-11778 spacer, camera mount, FRONT Qty: 2, P/N 305-21757 camera mount bolt front SS Qty: 2, P/N 403-11837 Spacer, camera mount, REAR Qty: 2, P/N 305-21758 camera mount bolt rear SS Qty:1,P/N 451-20293 strut,OE3 mount Qty:2,P/N 301-14029 MSCR,PAN,PHH103-32x.37

MECHANICAL PARTS & WHEELS

Part Number	Description
803-17819	<u>Front bumper assembly</u> To include mounting hardware: Qty: 4, P/N 301-15193 MSCR 3/16-16x3/4-inch socket head SS
807-17894-21	<u>Upper right skid assembly</u> To include mounting hardware: Qty: 4, P/N 301-10651 MSCR 1/4-20x1/2-inch socket head, SS
807-17895-21	<u>Upper left skid assembly</u> To include mounting hardware: Qty: 4 P/N 301-10651 MSCR 1/4-20x1/2-inch socket head, SS
867-14840	<u>Lifting bracket</u> To include mounting hardware: Qty: 4, P/N 301-13551 MSCR 3/8-16x1/2-inch socket head, SS
867-17906	<u>Wheel assembly</u> To include: Qty: 1, P/N 443-17905 pneumatic wheel 11-inch OD x 4-inches W (with inner tube installed P/N 443-19253) Qty: 1, P/N 800-10839 wheel/axle hub adapter Qty: 1, P/N 301-10887 MSCR, socket head, 1/4-20x3/4-inch, SS Qty: 1, P/N 301-11005 MSCR, socket head, 1/4-20x 5/8-inch, SS