

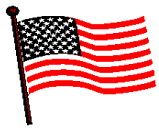


Design and Manufacture of Video Pipeline Inspection Systems
A full Service Company
www.rstechserv.com

MINI TRACTOR STANDARD

Model 32-3000

OPERATIONS MANUAL



Made in the USA



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Product Overview

MIGHTY MINI TRACTOR, STANDARD



The RST Mini Tractor is a four-wheel drive inspection vehicle developed for 4-inch lines. It has an adjustable (manual) camera mounting for central viewing in lines up to 12 inches with an optional set of tires. The Mini Tractor is designed to transport R.S.T. 1300 series cameras. It can be supplied with a dedicated camera or with a dual-purpose camera used with the R.S.T. Push Cable System. The Push Cable Cameras already in field need on a minor factory modification to allow use of the Mini Tractor to transport them. The camera can be used with either device.

The compact, easy to use unit is adaptable for use in sanitary sewer, storm sewer, and water main pipelines 4 inch to 10 inches (by using the optional larger tires). The weight of the Mini Tractor can be adjusted to improve traction if needed. Using Sincon cable, the unit travels three-speed in forward, with freewheel for practical operation. The auxiliary control box or the hand held control box and the Controller Power Supply control the Mini Tractor.

For optimum performance, the Mini Tractor must be clean and properly maintained.

The Mini Tractor should be setup to the proper width adjustment for the diameter pipe being inspected. Operate transport with the flow. Water flow should be minimal.

The pipeline should be clean as possible.

Technical Specifications

MINI TRACTOR

PERFORMANCE INFORMATION	
Minimum Pipeline Size	4-inches
Maximum Pipeline Size	10-inches to 12-inches
Range	Up to 500-feet (depending on pipeline conditions)
Nominal Pulling Force	50 pounds with optimum traction
Speed	Up to 25-feet per minute with 2-1/2-inch tires
Power Requirement	90 to 120 Volts from Camera Cable
Motor Type	Permanent Magnet
Drive System	4-Wheel Drive with 3 speed changes
Drive Type	Internal Gear and Chain with freewheel
Tire Size	2-1/2-inch High Traction Tires are standard issue
Camera Mount	Cantilevered Sleeve
Lighting System	Internal Camera Lights
PHYSICAL INFORMATION	
Length	15-inches
Width	3-1/4-inches
Height	3-inches
Weight	14-pounds, no camera, with 2-1/2- inch wheels 16-pounds with camera, with 2-1/2- inch wheels 18-pounds, no camera, with 3-1/2- inch wheels 20-pounds with camera, with 3-1/2- inch wheels

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.

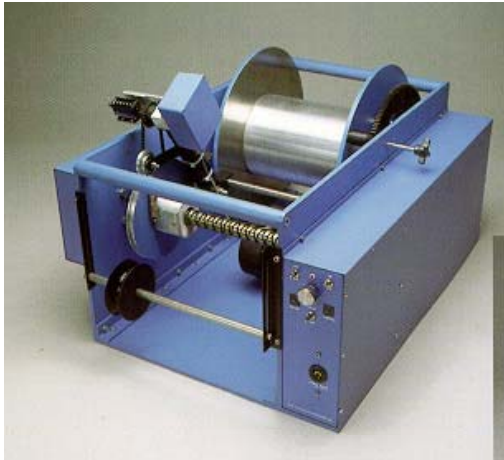
Inspect all transport, camera, lighting cables, and bridles before and after each use. Replace any broken, worn or frayed bridles or cables.



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.

Equipment Compatibility

The R.S. Technical Service Mini Tractor is designed for use with mainline vehicle mounted systems as well as Portable Mainline systems. This transport requires the use of a power unit, control box, cable reel and camera.



It may be possible for the RST Mini Tractor to operate with other brands of inspection equipment. Contact your dealer or RST for possible applications.

Accessory Kits for Mini Tractor

The RST Mini Tractor generally comes with the following accessories:

840-30967 KIT, ACCESSORIES, MINI TRACTOR

1	701-30543	BOX, TOOL, PLASTIC, W/TRAY	1.0 EA.
2	701-15593	BAG, PLASTIC, 2.5 X 3, 4 MIL 1000/CS	1.0 EA.
3	316-16857	WASHER, FLT, #6, .438OD, .040T SS	5.0 EA.
4	301-12007	MSCR, PAN, PHH, 6-32X.37 SS	5.0 EA.
5	301-11653	MSCR, PAN, PHH, 6-32X.25 SS	5.0 EA.
6	560-16073	ADPTR, CBL, 10", TNCf > 3PIN MALE PIGTAIL	1.0 EA.
7	867-30925	ASSY, WHEEL, HEX DRIVE, W/3.5" KNOBBY TIRE, MINI TRACTOR V2	4.0 EA.
8	867-30926	ASSY, CBL, 3 PIN MALE (SCREW-ON) - 3 PIN FEM (PUSH-ON) PIGTAIL	1.0 EA.

Options

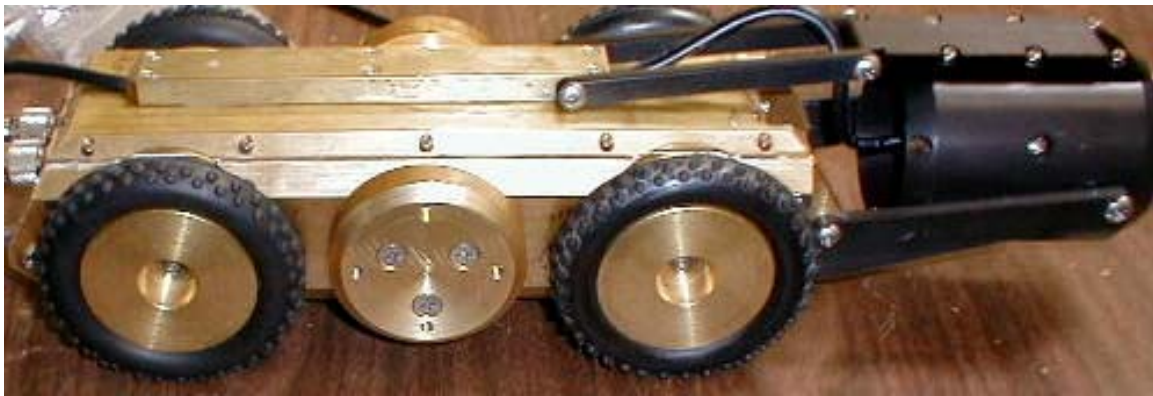
A Dedicated Color Mini Camera

A Dual Purpose Color Mini Camera that can be used with a Push Cable Reel.

Alternative Tire types

Alternative Cable types

Addition bolt on weight.



Placement of Inspection Truck

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.

Pull camera/tractor far enough into pipeline to clear the bridle or cable grip.

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.

Set up down-hole poles, shoes and manhole roller.

Reset the footage counter.

Release the drag brake on the cable reel.

Set cable reel in the free wheel.



Keep enough room to work around the opening while carrying the equipment.

Placing the equipment into the line

Follow cable grip, bridle and pig tail instructions.

Re-check the pipeline size and extension adjustments.

Do not let cable “loop” at the location where it enters pipeline.

Use guide poles with hook to keep the Mini Tractor stable as it enters pipeline.



Caution: Maintain control of equipment while loading and unloading into manhole.

Most equipment damage occurs when camera is lowered into hole.

Pull camera/Mini Tractor far enough into pipeline to clear the bridle or cable grip.

Set the cable guide.

Use double roller and/or single rollers, for protecting the cable and allowing it to slide down the hole without drag on the line.

Use enough poles to clear top of the manhole by 2 feet



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

Operation 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 operator's manual for starting. Verify that the voltage and frequency indicators on the controller power supply are in the green 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 fluctuate into the red zones, 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.

Mini Tractor Operation

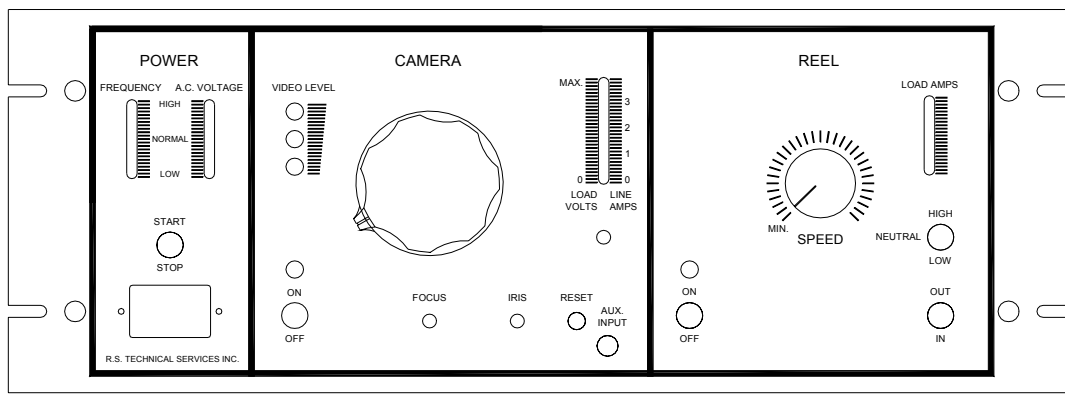
Ensure that the Camera ON/OFF switch is in the **OFF** position before connecting camera to tractor unit, or auxiliary control box to the Controller Power Supply.

Set the LIGHT INTENSITY control to “**MINIMUM**”, or full counter clockwise position.

Set the REEL SPEED control to the ‘**MINIMUM**’, or full counter clockwise.

When power is applied to the controller power supply the Frequency and Voltage indicators will be in the normal range.

Controller Power Supply



1. Camera control on the Controller Power Supply

The adjustable camera power supply provides a nominal 120V DC to the camera, transporter and other down-hole inspection equipment. This section has video processing circuitry which extracts the video transmitted by the under ground camera into a NTSC video format. Also incorporated in to the controller is an audio microphone preamplifier, which provides audio for a VCR.

The Camera ON/OFF switch controls the camera power supply. Above the switch is a green LED to indicate that the camera power supply is **on**.

The Camera POWER control knob adjusts the output Voltage of the power supply. This control adjusts the light intensity of the remote camera. This also can adjust speed of the transporter unit. Increase **power** control knob until a red bar appears on the screen. Decrease **power** knob until red bar just leaves the screen. Camera and transporter power does not increase after red bar limit appears on the screen.



OVER-VOLTAGE
INDICATOR BAR
SHOWN ON A
MONITOR
SCREEN



Caution: *Do not operate equipment with the over limit red bar on screen.*

To engage Mini Tractor in forward gear, turn on Controller Power Supply, and press “**Tractor/ Low Speed**” on Auxiliary Control Box.

To change speed of Mini Tractor, press “**Tractor/ Med.**” or “**Tractor / High Speed**” on Auxiliary control box. **Always start the Mini Tractor in the “Tractor / Low Speed”.**

Increase speed of Mini Tractor with **camera power** knob on Controller Power Supply.

Increase **camera power** until the red bar appears on monitor screen and reverse power until red bar just leaves the screen.

Reduce power before coming to a stop.

To stop Mini Tractor, press “**Stop**” button on Auxiliary control box.

The Mini Tractor has an automatic “disengage” feature that allows for the freewheeling retrieval. To disengage the Mini Tractor, momentarily reverse the direction of Mini Tractor. This will disengage the drive mechanism and allow the Mini Tractor to be pulled out of the pipeline in “freewheel” by the cable reel.

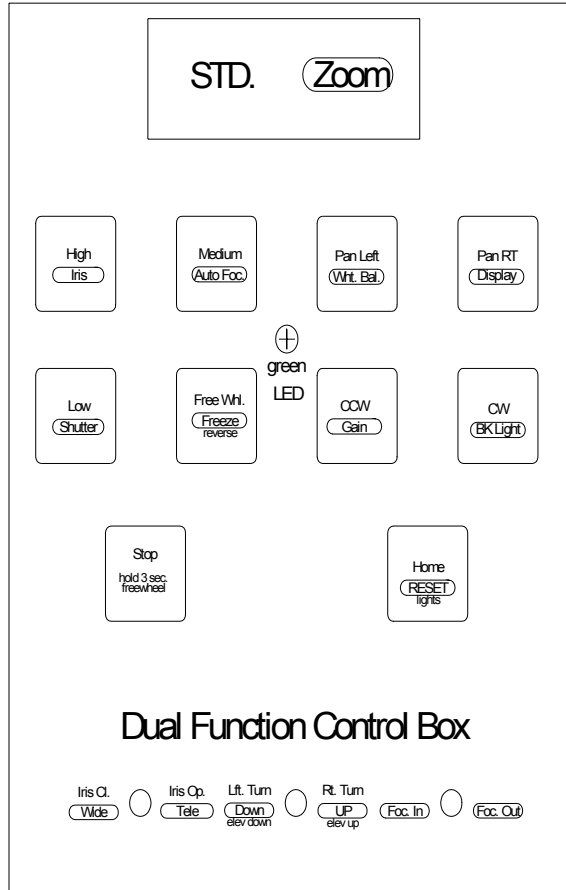
To “free wheel” Mini Tractor when traveling forward, press “**Stop**” on Auxiliary control box.

Press “**Free Wheel**” on Auxiliary control box.

Pull the Sincon Cable and Mini Tractor back using cable reel with Mini Tractor in free wheel.

When the Mini Tractor is traveling in “free wheel” be careful of offsets in pipe.

Auxiliary Control Box



Button function: Mini Tractor Controls

High	(tractor)	high speed in tractor mode
Medium	(tractor)	medium speed in tractor mode
Low	(tractor)	low speed in tractor mode
Free Whl./ reverse	(tractor)	free wheel tractor/ reverse tractor
Stop	(tractor)	all stop (tractor)/ hold three seconds for freewheel

Pipeline Inspection Run

Start the VCR.

Record condition of manhole.

Recording inside pipeline may have to be started before the footage is set.

Run Mini Tractor / camera through pipeline slowly enough to spot defects.

Do not force Mini Tractor /camera past any large amount of debris.

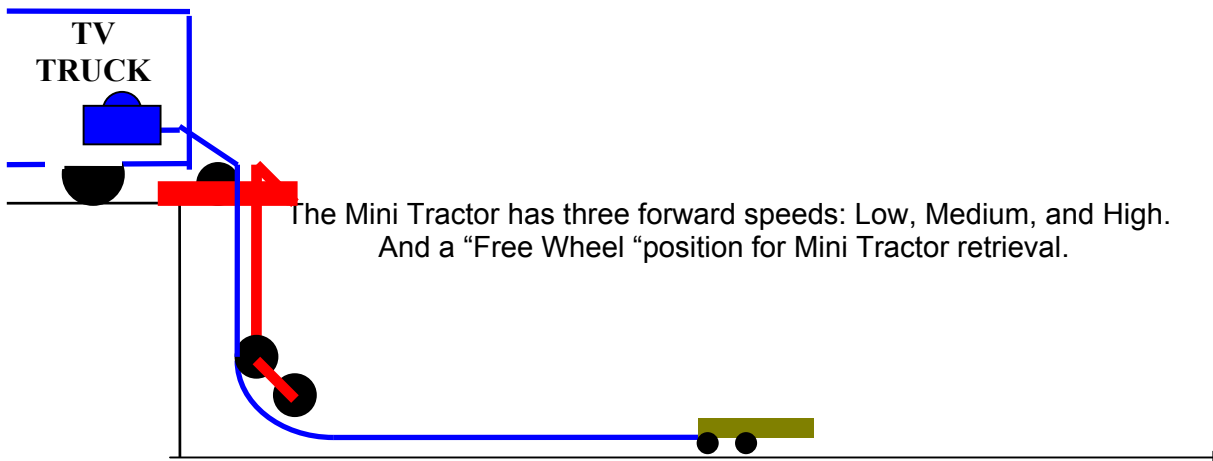
Beware of large root masses.

Use extra caution around severe offset joints or protruding laterals.

Take notes when passing obstacles or severe offset joints, protruding laterals.

The Mini Tractor will be passing these on the way back.

Inspection with the Mini Tractor



Maintenance

Each time the Mini Tractor is removed from the pipeline the entire assembly should be washed cleaned.

Inspect Mini Tractor tires and axles seals for damage. Replace if necessary.

Inspect the power cable, bridle, and connector to make sure they have not been damaged.

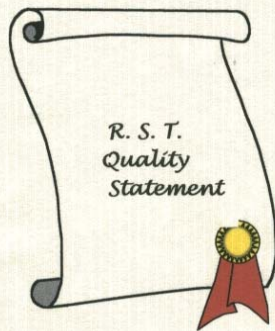
Inspect the camera clamps, and mounting hardware.

Inspect bridle, rails, and pigtail connections.

Inspect the camera and its operations

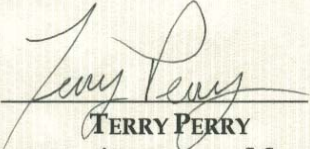


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A Full Service Company
SALES SERVICE PARTS



EACH PIECE OF R.S. TECHNICAL SERVICES, INC. MANUFACTURED EQUIPMENT IS SUBJECT TO STRICT STANDARDS OF QUALITY AND WORKMANSHIP ESTABLISHED BY OUR ENGINEERING AND QUALITY ASSURANCE DEPARTMENTS.

THROUGH A SYSTEMATIC INSPECTION PROGRAM, THE QUALITY ASSURANCE INSPECTION PROCEDURES ENSURE THAT ALL THE EQUIPMENT AND PARTS MEET OR EXCEED THOSE STANDARDS.


TERRY PERRY
QUALITY ASSURANCE MANAGER



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LIMITED WARRANTY POLICY

R.S. Technical Services, Inc. (RST) warrants all items of our manufacture for defects in materials and / or workmanship for one (1) year from date of receipt by the Customer. (unless otherwise stated)

This policy is limited to items manufactured by RST. i.e. Camera, Reels, Controllers, Data Displays, Winches and Tractor Transport Vehicles.

In the event of any malfunction or failure of the equipment, the customer is required to request authorization from RST to return defective parts or components by calling the RST toll-free number- **1-800-767-1974** and requesting an MRA number. (see Figs. 1 & 1A for an example of the form.)

The returned parts or components shall include a packing list, part identity, and the reason for the return of the part.

Freight costs are the responsibility of the Customer unless otherwise agreed to by RST.

All in warranty equipment in need of repair shall be shipped to:

R.S.Technical Services, Inc.	or	R.S.Technical Service, Inc
1327 Clegg St.		292 Midland Trail
Petaluma, CA 94954		Mt. Sterling, KY 40353

RST shall at our option, repair or replace any defective part or component in our service facility, or ship the customer a replacement component or part.

The customer shall return the defective part or component within ten (10) working days after receipt of the replacement for credit.

Not covered by this policy are expendable or wear-out items i.e. light bulbs, drive belts, cable connectors.

The generator, monitors, VCRs and air conditioner shall be covered by the Manufacturer's warranty and any services shall be referred to each Manufacturer's service organization.

No warranty shall be applicable to malfunctions due to damage, neglect, wear, misuse, or improper handling or repairs to any part of the equipment.

Improper repairs are deemed to be repairs made by persons other than factory authorized personnel or repairs not made in accordance with and covered by the manufacturer's service manuals, or repairs utilizing parts or materials not equal to those furnished by the manufacturer.

NOTE: Any un-authorized repairs of any RST equipment will invalidate the warranty.

The responsibility of R.S.Technical Services is set forth above.

RST shall not be liable for any consequential or incidental damages to persons or property resulting from use of or any breach of warranty expressed or implied, to this (these) products.



MERCHANDISE RETURN AUTHORIZATION (MRA) POLICY

A completed Merchandise Return Authorization (MRA) form **MUST** accompany all equipment sent in for repair or parts returned for replacement or credit.

If equipment or parts are received by R.S. Technical Services, Inc. (R.S.T.), without an MRA form (or with a partially completed form), the equipment or parts will be held until an MRA form is received.

Call your Dealer or the R.S.T. Customer Service Department, whichever is appropriate, to obtain an MRA number.

The MRA form must contain all of the following information:

MRA Number

Date

Business name

Shipping address

Billing address

Serial Number(s) of the equipment

Contact name

Telephone number of contact person

Fax number of contact person

PO number

Estimate requirements

Detailed description of problem(s)

If returning parts, indicate whether a warranty replacement or a credit is expected.

Provide the number of the invoice to be credited, model and serial numbers of the equipment being sent in for repairs.

ESTIMATE REQUIRED

If a customer has requested an estimate before the equipment is repaired, an estimate will be prepared as soon as possible. A Customer Service representative will then contact the customer to provide the estimate and obtain approval to proceed with the repair. Upon acceptance of the estimate, R.S.T. will repair the equipment. If the estimate is not accepted within 30 days, the equipment will be returned to the customer in the same condition in which it was received.

COD TERMS

If a customer is on COD terms, Customer Service will contact them to provide the cost of the repair or parts (including tax, freight and handling charges) and advise them the equipment or parts will be shipped COD.

Upon receiving approval from the customer to proceed with the repair, R.S.T. will repair the equipment. If the customer decides not to have the equipment repaired, the equipment will be returned to the customer in the same condition in which it was received.

PARTS RETURN POLICY

R.S.T. will issue a full refund, (except freight), on parts returned within 90-days of the date of purchase with the provision that the parts were returned in new condition.

By completing the MRA form as indicated above, repairs and issuance of credits will be expedited, and loaners will become more available to customers.



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**THE FOLLOWING MRA FORM AND INSTRUCTIONS
ARE PROVIDED FOR YOUR CONVENIENCE**

MAKE COPIES OF THE FORM FOR YOUR USE.

FILL OUT THE FORM COMPLETELY AND OBTAIN AN MRA NUMBER

MAKE A COPY OF THE COMPLETED FORM FOR YOUR RECORDS

INCLUDE THE ORIGINAL WITH THE EQUIPMENT OR PART (S) THAT ARE BEING RETURNED.



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Merchandise Return Authorization (MRA)

Date _____

MRA #

R.S. Technical Services, Inc.

Customer Service Telephone: 1.800.801.1199

1327 Clegg Street, Petaluma, CA 94954

Customer Service Fax: 1.707.769.8806

SECTION I

Company Name _____

Shipping Address _____

City, State, Zip _____

Contact: _____ Telephone No: _____
Fax No: _____

SECTION II

If your merchandise **IS NOT** covered by warranty,
please check the appropriate box.

Expedite, no P.O. required

OR

Expedite, use P. O. #: _____

OR

Estimate required

Serial number(s) _____

SECTION III

What merchandise are you returning? _____

Why are you returning this merchandise? (Be specific. If more space is required, use the back of this page)

All merchandise sent in for repair, replacement or credit MUST be accompanied by a completed MRA form including the MRA number assigned by either R.S.T. or your Dealer.

If you are returning parts for credit, please indicate the invoice number to be credited. This will expedite issuance of the credit.