

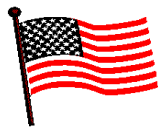
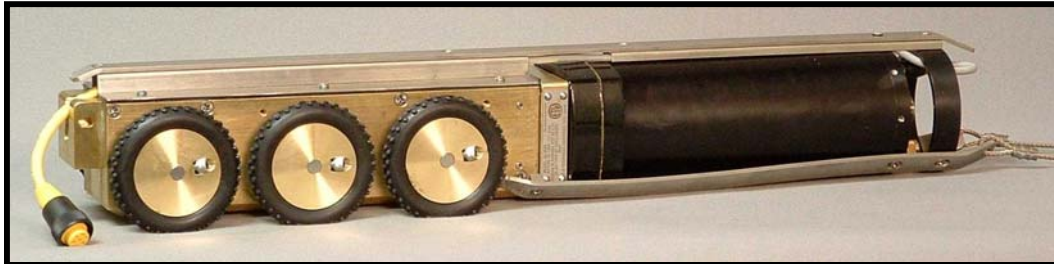


Design and Manufacture of Video Pipeline Inspection Systems  
A Full Service Company  
[www.rstechserv.com](http://www.rstechserv.com)

# Mainline Tractor Transport Vehicle

Model 32-2020

## OPERATIONS MANUAL



Made in the USA

# IMPORTANT SAFETY NOTICE

## Fire Safety Conditional Approvals.

A fire safety conditional approval must be issued by an appropriate licensed electrical engineer for use of this sewer camera in areas of a sewer that have been demonstrated by testing and monitoring not to fall under the “Fire Safety Approval” requirement in Section 2540.2 of Title 8 of the California Code of Regulations. Testing and monitoring will be considered by the California Division of Occupational Safety and Health, to be sufficient for this purpose if all measurements indicate that the sewer atmosphere is below 10% of the lower explosive limit (LEL) and if the user meets all of the following additional conditions:

- (1) Before each use, inspects cable and electrical equipment for damage or wear that could compromise safety;
- (2) Test operates the sewer camera and associated electrical equipment in a dry location away from any potential exposure to hazardous conditions to determine whether the equipment functions normally and without any problems, such as sparking, loose connections, or other similar safety problems;
- (3) Tests for the existence of a hazardous atmosphere at the opening of the sewer access point using a multi-gas tester, and before energizing the equipment, conducts a test of the sewer atmosphere at the access point estimated to be closest to the end point of the camera work;
- (4) Provides continuous monitoring in the alarm mode at the access point from which the work is performed at all times while the sewer inspection camera is energized in the sewer;
- (5) De-energizes all electrical equipment and uses mechanical ventilation if a measurement exceeding 10% of the LEL is obtained; and

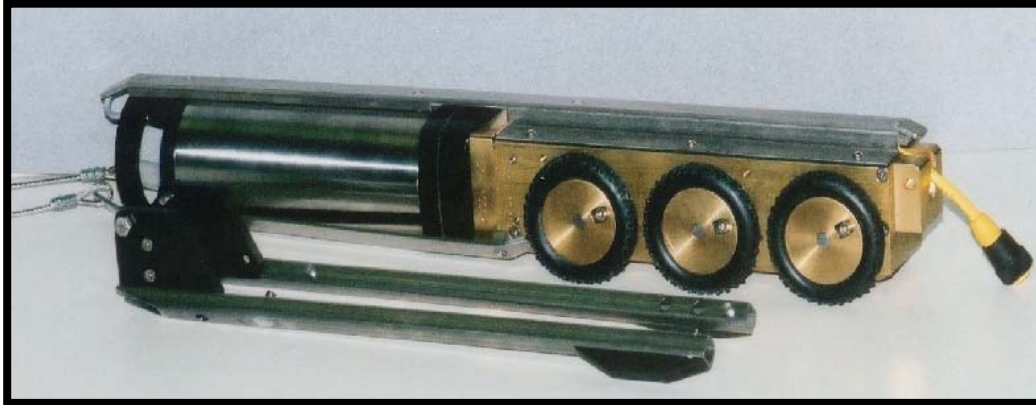
Discontinues use of all electrical equipment if the sewer environment cannot be maintained below 10% of the LEL..

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# Product Overview



The RST Main Line Tractor is a six-wheel drive camera transporter designed to carry the OEII and OEIII series cameras using R.S. Technical Service single conductor cable. The foldable tractor is adaptable for use in sanitary sewer, storm sewer, and fresh water pipelines 6" to 24" with use of axle extensions and balloon carriage assembly. Main Line Tractor travels in three-speed forward, one speed reverse with freewheel for practical operation. An auxiliary control box or the hand held control box and the Controller Power Supply control operate the Main Line Tractor.

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

The tractor should be set up to the proper width adjustment for the diameter pipe being inspected. Operate tractor with the flow. The pipeline should be clean as possible. Water flow should be minimal.

Due to some uniquely challenging locations, it may be necessary to operate in difficult situations, which can reduce the efficiency of the equipment.

# Technical Specifications

Minimum pipe size: 6".

Maximum pipe size: 24".

Maximum distance: 1500 to 2000 feet. (Depending on cable and line conditions)

Speeds: 3 forward, up to 48-feet per minute  
(80-feet per minute balloon tires)  
1 reverse. (Low speed only)  
Stop/hold.  
Free wheel rapid retrieval.

Power: 70 to 120VDC from camera cable.  
Internal auto limiting @ 2 AMPS.

Motor type: 1/8 horsepower high torque motor.

Drive type: Internal gear train

Length: 16.5"

Width: 4.8" w/ standard wheels

Height: 4"

Weight: 46 pounds

## SAFETY LISTING

The Main Line Tractor, Model 32-2020, has been listed by ETL as conforming to the following standards.

Standard for Safety of Power Units other than Class 2  
(ANSI/UL 1012, 6<sup>th</sup> Edition, 1996)

Standard for Safety of General Use Power Supplies-Industrial Products  
(CAN/CSA C22.2 No. 107.1-95)

# 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.

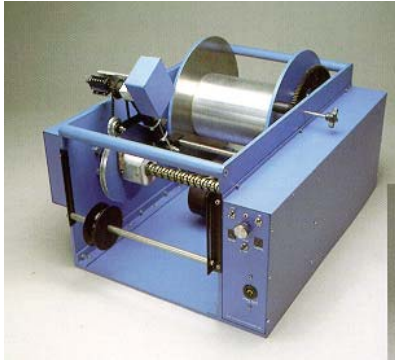
Inspect all transport, camera, lighting cables, and bridles before and after each use. Replace any broken, worn or frayed bridles or cables.



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 RST main line 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.



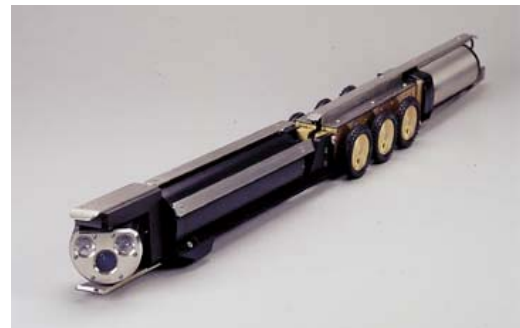
RST Mainline Reels



RST Portable Reels



RST Omni Eye III Zoom



RST Omni II Zoom

# Accessories

The RST main line tractor generally comes with the following accessories:  
TRACTOR MAINTENANCE AND EXTENSIONS KIT part number  
**840-10765.**

## ***TRACTOR MAINTENANCE AND EXTENSIONS KIT P/N 840-10765***

### **To include:**

Qty: 6, 1-inch tire extensions  
P/N 407-11484

Qty: 6, 1-3/4-inch tire extensions  
P/N 407-11366

Qty: 6, 3-3/4-inch tire extensions  
P/N 407-11425

Qty: 28, MSCR, SHCS  
1/4-20x1/2-inch stainless steel  
(used to secure tire to axle or extension)  
P/N 301-10651

Qty: 2, 3/16-inch allen wrenches  
P/N 634-10642  
(used to secure screw that holds tire)

Qty: 1, 1/4-inch long arm allen wrench  
P/N 634-10937  
(used on tractor cradle bolts)

Qty: 1, Wheel drive axle with gear pin and clip  
P/N 805-19449

Qty: 1, 6-oz jar semi-fluid utility grease  
P/N 630-12577

Qty: 1, Replacement knobby tire for standard hub  
P/N 443-15618



# Options



**\*Some options not available with this unit**



Tractor mounting brackets for trucks, part #451-19106.

# 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.**

# 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.

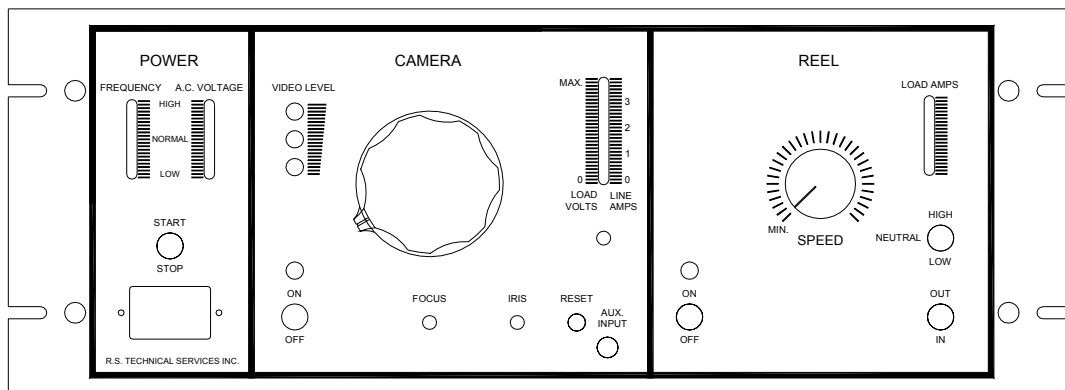
# Tractor Operation

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.



## 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 adjusts speeds 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 tractor in forward gear, turn on Controller Power Supply, and press **“Tractor/ Low Speed”** on Auxiliary Control Box.

To change speed of tractor, press **“Tractor/ Med.”** or **“Tractor / High Speed”** on Auxiliary control box.

**Always start the tractor in the “Tractor / Low Speed”.**

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

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

Reduce power before coming to a stop.

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

To engage tractor in reverse, press **“Free Wheel”** on Auxiliary control box. The tractor has one reverse speed.

**Do not back over the Sincon Cable.**

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

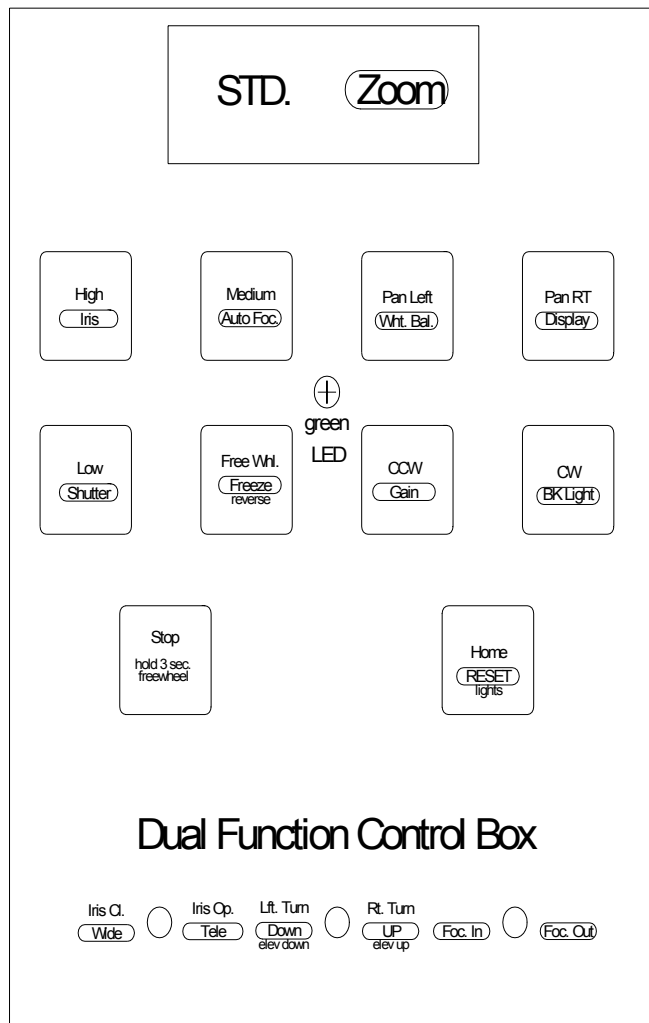
Pull the Sincon Cable and tractor back using cable reel with tractor in free wheel.

To “free wheel” tractor when traveling forward, press **“Stop”** on Auxiliary control box. **Note: The tractor must go into reverse, and then be stopped, to enable tractor to free wheel.**

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

When the tractor starts to move in reverse, press **“Stop”** on Auxiliary control box.

If tractor is traveling in reverse and you want the tractor to “free wheel”, press **“Stop”** on Auxiliary control box.



## Auxiliary Control Box

### Button function: 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 tractor/ camera through pipeline slowly enough to spot defects.

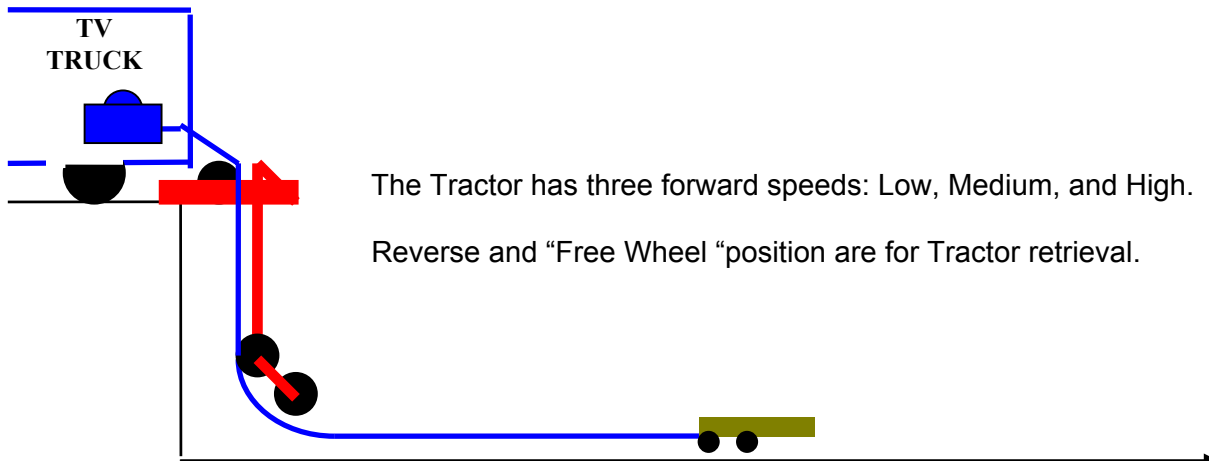
Do not force tractor/camera past any large amount of debris.

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 tractor will be passing these on the way back.

## Inspection with Tractor



# 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. Replace if necessary.

Inspect the power cable, and watertight connectors for damage.

Inspect bridle, skids, top rails and hardware.

Wipe down and store the cable, camera and tractor.



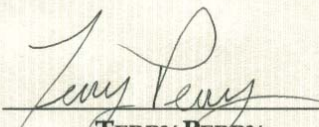


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**EACH PIECE OF R.S. TECHNICAL SERVICES, INC. MANUFACTURED EQUIPMENT IS SUBJECT TO STRICT STANDARDS OF QUALITY AND WORKMANSHIP ESTABLISHED BY OUR ENGINEERING AND QUALITY ASSURANCE DEPARTMENTS.**

**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**



Design and Manufacture of Video Pipeline Inspection Systems  
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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) years 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 of 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.  
1327 Clegg St.  
Petaluma, CA 94954

OR

R.S.Technical Service, Inc  
292 Midland Trail  
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

All equipment sent in for repair or parts returned for replacement or credit MUST be accompanied by a completed Merchandise Return Authorization (MRA) form.

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 either 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

Customer Service Fax: 1.707.769.8806

1327 Clegg Street, Petaluma, CA 94954

**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.