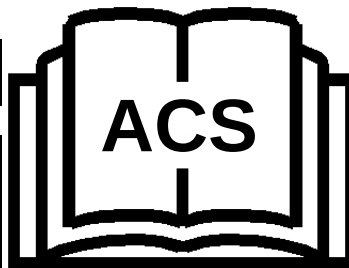


Vermeer®

Interragator® II
Ground Penetrating Radar (GPR) System

Operator's Manual



Interragator_II_o2_01
Serial No. 178 -
Order No. 105400T23
Cabled No. 105400T24

This device complies with part 15 of the FCC Rules:

Operation is subject to the following conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Operation of this device is restricted to law enforcement, fire and rescue officials, scientific research institutes, commercial mining companies, and construction companies. Operation by any other party is a violation of 47 U.S.C. § 301 and could subject the operator to serious legal penalties.

Coordination Requirements.

(a) UWB imaging systems require coordination through the FCC before the equipment may be used. The operator shall comply with any constraints on equipment usage resulting from this coordination.

(b) The users of UWB imaging devices shall supply detailed operational areas to the FCC Office of Engineering and Technology who shall coordinate this information with the Federal Government through the National Telecommunications and Information Administration. The information provided by the UWB operator shall include the name, address and other pertinent contact information of the user, the desired geographical area of operation, and the FCC ID number and other nomenclature of the UWB device. This material shall be submitted to the following address:

Frequency Coordination Branch., OET
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554
ATTN: UWB Coordination

(d) Users of authorized, coordinated UWB systems may transfer them to other qualified users and to different locations upon coordination of change of ownership or location to the FCC and coordination with existing authorized operations.

(e) The NTIA/FCC coordination report shall include any needed constraints that apply to day-to-day operations. Such constraints could specify prohibited areas of operations or areas located near authorized radio stations for which additional coordination is required before operation of the UWB equipment. If additional local coordination is required, a local coordination contact will be provided.

(f) The coordination of routine UWB operations shall not take longer than 15 business days from the receipt of the coordination request by NTIA. Special temporary operations may be handled with an expedited turn-around time when circumstances warrant. The operation of UWB systems in emergency situations involving the safety of life or property may occur without coordination provided a notification procedure, similar to that contained in CFR47 Section 2.405(a)-(e), is followed by the UWB equipment user.

INTRODUCTION

This manual contains operation instructions for the Interragator II Ground Penetrating Radar System. The instructions, illustrations, and specifications in this manual are based on the latest information available at time of publication. Your system may have product improvements and options not yet contained in this manual.

To provide a better view, certain photographs or illustrations in this manual may show the GPR system partially assembled. Never operate the system in this condition. Keep all shields in place.

Do not attempt any maintenance on the GPR system. If you encounter a problem that you do not understand or cannot solve, contact your Vermeer dealer.

A copy of this manual is supplied with each system. Keep this manual with the GPR system and available for reference at all times. Additional copies are available through your dealer. When ordering additional manuals, use the order number listed on the front cover and the quantity needed.

Vermeer Manufacturing Company reserves the right to make changes at any time without notice or obligation

VERMEER®, VERMEER® Logo, INTERRAGATOR®, and ATLAS BORE PLANNER® are trademarks of	Vermeer Manufacturing Company.
PANASONIC TOUGHBOOK is a trademark of	Matsushita Electric Industrial Co. Ltd.
MICROSOFT is a trademark of	Microsoft Corp.
SMART TWO + is a trademark of	Cadex Electronics Inc.
SEIKO is a trademark of	Seiko Instruments, Inc.
RADAN NT is a trademark of	Geophysical Survey Systems, Inc.
LAPLINK is a trademark of	Traveling Software, Inc.

This Used Equipment Registration form must be completely filled out and returned to Vermeer Manufacturing Company. This will enable Vermeer to send you safety/product information if necessary. Type or legibly print in English. **Send to Vermeer Mfg Co, Attn: Customer Data Center, PO Box 200, Pella, IA 50219, USA.** If the card has been removed, call 641-628-3141 or 800-829-0051. Be prepared to supply the model & serial number of your machine.

Vermeer Manufacturing Company Used Industrial Equipment Registration Form

☐ Check to request OPERATOR'S MANUAL	18 Model:	19 Serial No.:
--	------------------	-----------------------

Customer Type Information: (Which of the following best describes you as a customer?)

1a. Customer Type (check one): (also check 1b/1c for lined types*) ☐ A. <u>City/County/State</u> < < < ☐ B. Federal/Military ☐ C. Rental Center ☐ D. Golf Course ☐ E. <u>Contractor</u> < < < < ☐ F. <u>Utility Company</u> < < < < ☐ G. Nursery or Tree Growing	1b. * If City/County/State, indicate <u>primary</u> work performed (Please check one box) ☐ a. Electric ☐ c. Highway Department ☐ e. Parks and Recreation ☐ b. Streets and Sanitation ☐ d. Water / Sewer ☐ f. Landfill ☐ g. Other 1c. * If Contractor or Utility, indicate <u>primary</u> work performed (Please check one box) ☐ a. Electric ☐ j. Pipeline ☐ n. Golf Course Construction ☐ r. Land Cleaning ☐ d. Water/Sewer ☐ k. Irrigation ☐ . Roads ☐ s. General Trenching ☐ h. Landscaping ☐ l. Tree Service ☐ p. General Construction ☐ t. Boring ☐ i. Telephone ☐ m. Gas ☐ q. Waste Processing/Landfill ☐ u. CATV o v. Other
---	--

New Owner Information: (Please Print and Complete All Fields)

2	Contact Name:	12	Title:	21	Purchase Date:
3	Business Name:	13	National/Global Account? ☐ Yes		
4	Parent Company:	14	Business Phone: ()		
5	Address 1:	15	Home Phone: ()		
6	Address 2:	16	Fax: ()		
7	City:	8	County:	17	E-mail:
9	State (Province)/Region:	10	Postal Code:	11	Country:

Former Owner Information:

Attachment Information

Name:	25	Attachment #1:
Address:	26	Att #1 Serial #:
	27	Attachment #2:
City:	28	Att #2 Serial #:
Postal Code:	29	Trailer & Serial #:

Model

SN



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 56 PELLA, IOWA

POSTAGE WILL BE PAID BY ADDRESSEE

**Vermeer Mfg. Co.
Attn: Customer Data Center
Box 200
Pella, Iowa 50219-9986**



SERVICE

Do not attempt to service this system without the assistance of a Vermeer dealer. This is a complex machine which often involves complex service procedures.

There are also many components which are not user-serviceable. Do not attempt any service which you do not fully understand, nor any service that you cannot do accurately and safely without proper tools and equipment.

If you encounter a problem that you do not understand or cannot solve, contact your Vermeer dealer.

VERMEER NEW INDUSTRIAL EQUIPMENT LIMITED WARRANTY

(EFFECTIVE NOVEMBER 1, 1998)

WARRANTY PERIOD

12 Months / 1000 Hours

Vermeer Mfg. Co. (hereinafter "Vermeer") warrants each new Industrial product of Vermeer's manufacture to be free from defects in material and workmanship, under normal use and service for one (1) full year after initial purchase/retail sale or 1000 operating hours, whichever occurs first. This Limited Warranty shall apply only to complete machines of Vermeer's manufacture, parts are covered by a separate Limited Warranty. **EQUIPMENT AND ACCESSORIES NOT OF VERMEER'S MANUFACTURE ARE WARRANTED ONLY TO THE EXTENT OF THE ORIGINAL MANUFACTURER'S WARRANTY AND SUBJECT TO THEIR ALLOWANCE TO VERMEER ONLY IF FOUND TO BE DEFECTIVE BY SUCH MANUFACTURER.**

EXTENDED WARRANTY OPTIONS ARE AVAILABLE FOR PURCHASE.

WARRANTY TERMS

During the Limited Warranty period specified above, any defect in material or workmanship in any warranted item of Vermeer Industrial Equipment not excluded below shall be repaired or replaced at Vermeer's option without charge by any authorized independent Vermeer dealer. The warranty repair or replacement must be made by a Vermeer independent authorized dealer at the dealer's location. Vermeer will pay for replacement parts and such authorized dealer's labor in accordance with Vermeer's labor reimbursement policy. Vermeer reserves the right to supply remanufactured replacement parts as it deems appropriate.

RETAIL PURCHASER RESPONSIBILITY:

This Limited Warranty requires proper maintenance and periodic inspections of the Industrial Equipment as indicated in the Operator's Manual furnished with each new Industrial Equipment. The cost of routine or required maintenance and services is the responsibility of the retail purchaser. The retail purchaser is required to keep documented evidence that these services were performed.

This Vermeer New Industrial Equipment Limited Warranty may be subject to cancellation if the above requirements are not performed.

Vermeer Industrial Equipment with known failed or defective parts must be immediately removed from service.

EXCLUSIONS AND LIMITATIONS

The warranties contained herein shall **NOT APPLY TO:**

- 1) Any defect which was caused (in Vermeer's sole judgment) by other than normal use and service of the Industrial Equipment, or by any of the following: (i) accident (ii) misuse or negligence (iii) overloading (iv) lack of reasonable and proper maintenance (v) improper repair or installation (vi) unsuitable storage (vii) non-Vermeer approved alteration or modification (viii) natural calamities (ix) vandalism (x) parts or accessories installed on Industrial Equipment which were not manufactured or installed by Vermeer authorized dealers (xi) the elements (xii) collision or other accident.
- 2) Any Industrial Equipment whose identification numbers or marks have been altered or removed or whose hourmeter has been altered or tampered with.
- 3) Any Industrial Equipment which any of the required or recommended periodic inspection or services have been performed using parts not manufactured or supplied by Vermeer or meeting Vermeer Specifications including, but without limitation, engine tune-up parts, engine oil filters, air filters, hydraulic oil filters, and fuel filters.
- 4) New Industrial Equipment delivered to the retail purchaser in which the warranty registration has not been completed and returned to Vermeer within ten (10) days from the date of purchase.
- 5) Any defect which was caused (in Vermeer's sole judgment) by operation of the Industrial Equipment not abiding by standard operating procedures outlined in the Operator's Manual.
- 6) Engine, battery, and tire Limited Warranties and support are the responsibility of the respective product's manufacturer.

- 7) Transportation costs, if any, of transporting to the Vermeer dealer.
- 8) The travel time of the Vermeer dealer's service personnel to make a repair on the retail purchaser's site or other location.
- 9) In no event shall Vermeer's liability exceed the purchase price of the product.
- 10) Vermeer shall not be liable to any person under any circumstances for any incidental or consequential damages (including but not limited to, loss of profits, out of service time) occurring for any reason at any time.
- 11) Diagnostic and overtime labor premiums are not covered under this Limited Warranty Policy.
- 12) Depreciation damage caused by normal wear, lack of reasonable and proper maintenance, failure to follow operating instructions, misuse, lack of proper protection during storage.
- 13) Accessory systems and electronics not of Vermeer's manufacture are warranted only to the extent of such manufacturer's respective Limited Warranty, if any.
- 14) Down hole toolage is not covered under this warranty.
- 15) Wear items which are listed by product group below:

ENVIRONMENTAL: Belts, Chain, Wear Strips, Cutter Wheels, Pockets, Knives, Service Items, Shear Bar/Bed Knife, Sprockets, Brake Pads, Bolts/Torqued Parts, Wear Blocks, Hammermill Bearings, Discharge Conveyor Belts, Hoses, Clutches, Clutch Components, Hammers, Teeth, Blades, Oil Filters, Fuel Filters, Screens, Rods, Rotor Plates, Rollers

TRACK: Digging Chain, Base Plates, Cups, End Idler, Wear Plates/Track Frames, Flashings, Pins At Pivot Points, Sprockets, Teeth, Boom Wear Items, Track Chain, Conveyor Belts, Plastic Wear Strips, Pivot Rings

TRENCHLESS: Fan Belts, Lights On Light Kits, Wear Bars, Rollers, Tooling, Valve Seats, Track Guides, Track Chain, Track Sprockets, Drive Chuck, Earth Stakes, Water Hoses, Leaf Chain, Wear Blocks, Clamping Vise Parts, Packing Assemblies, Jaws, Water Swivels, Rod Loader Parts, Track Pads, Track Idlers, Rod

RUBBER TIRE: Bearings, End Rollers, Belts, Pins, Trench Cleaner, Tires, Bucket, Brake Pads, Clutches, Track Sprockets, Sprockets, Chains, Bushings, Booms, Rubber Shielding, Bucket Teeth, Plow Blades, Rock Wheel Teeth, Augers, Track Idlers

PARTS WARRANTY: Parts replaced in the warranty period will receive the balance of the first year New Industrial Equipment Limited Warranty, during the first (12) months or 1000 hours whichever comes first. Replacement parts after the original machine

warranty, are warranted to be free from defects of material for ninety (90) days or the part will be repaired or replaced, without labor coverage for removal or reinstallation.

EXCLUSIONS OF WARRANTIES: EXCEPT FOR THE WARRANTIES EXPRESSLY AND SPECIFICALLY MADE HEREIN, VERMEER MAKES NO OTHER WARRANTIES, AND ANY POSSIBLE LIABILITY OF VERMEER HEREUNDER IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. VERMEER RESERVES THE RIGHT TO MODIFY, ALTER AND IMPROVE ANY PRODUCT WITHOUT INCURRING ANY OBLIGATION TO REPLACE ANY PRODUCT PREVIOUSLY SOLD WITH SUCH MODIFICATION. NO PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY, OR TO ASSUME ANY ADDITIONAL OBLIGATION ON VERMEER'S BEHALF.

**MANUFACTURED BY:
VERMEER MANUFACTURING COMPANY**

**Copyright © 2002
1210 Vermeer Road East, P.O. Box 200
Pella, Iowa 50219-0200
All rights reserved.**

PATENTS

This machine may be covered by one or more of the following patents:

CA D 79,593	US Pat. #5,074,063	US Pat. #5,611,496	US Pat. #5,950,942	US Pat. #6,360,830
CC 95 914 404.5	US Pat. #5,088,532	US Pat. #5,657,803	US Pat. #6,014,996	US Pat. #6,367,564
CC ZL96195734.4	US Pat. #5,205,181	US Pat. #5,659,985	US Pat. #6,050,350	US Pat. #6,374,928
DE 696 11 846	US Pat. #5,219,380	US Pat. #5,687,807	US Pat. #6,109,367	US Pat. #6,382,330
DE Des. 96 006 85.4	US Pat. #5,237,888	US Pat. #5,692,548	US Pat. #6,119,376	US Pat. #6,389,360
EP 772,543	US Pat. #5,291,964	US Pat. #5,692,549	US Pat. #6,138,932	
EP 885,343	US Pat. #5,394,583	US Pat. #5,704,142	US Pat. #6,154,987	
GB 2,053,636	US Pat. #5,507,441	US Pat. #5,720,354	US Pat. #6,161,630	
HK 1015859	US Pat. #5,509,220	US Pat. #5,746,278	US Pat. #6,195,922	
RU 2,141,907	US Pat. #5,544,055	US Pat. #5,768,811	US Pat. #6,247,544	
RU 2,158,952	US Pat. #5,553,407	US Pat. #5,778,991	US Pat. #6,289,997	
RU 2,163,963	US Pat. #5,556,253	US Pat. #5,819,859	US Pat. #6,290,155	
RU 2,175,368	US Pat. #5,574,642	US Pat. #5,845,689	US Pat. #6,308,787	
US Des. Pat. #308,682	US Pat. #5,588,474	US Pat. #5,904,210	US Pat. #6,315,062	
US Des. Pat. #396,837	US Pat. #5,590,041	US Pat. #5,941,320	US Pat. #6,332,502	
US Pat. #4,848,423	US Pat. #5,607,280	US Pat. #5,944,121	US Pat. #6,357,537	
This machine may be covered by one or more of the following licensed patents:				
US Pat. #4,694,913	US Pat. #4,867,255	US Pat. #5,148,880		
US Pat. #4,858,704	US Pat. #4,953,638	US Pat. #5,799,740		

(Other U.S. and foreign patents pending.)

This page intentionally left blank.

Receiving and Delivery Report

DEALER PREP

Check or perform the following:

General

- ___ Check that all loose items are included with the system.
- ___ Ensure Operator's Manual is with the system.
- ___ Check for shipping damage or shortage.
- ___ Check decal condition.
- ___ Check all phases of operation.
- ___ Complete "Dealer/Customer Information," [page -ii](#)
- ___ Complete "Identification Number - Record," [page -ii](#).

DEALER/CUSTOMER INFORMATION

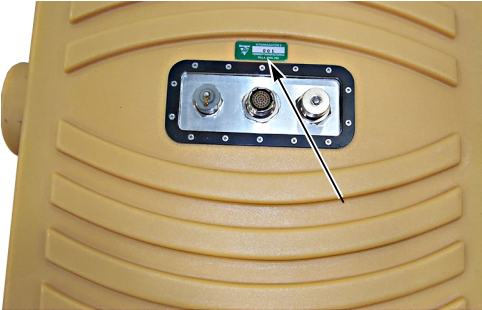
dealer:		owner:	
address:		address:	
city:		city:	
state/province:		state/province:	
zip/postal code:		zip/postal code:	
country:		country:	

IDENTIFICATION NUMBER - RECORD

Antenna

Model Number_____

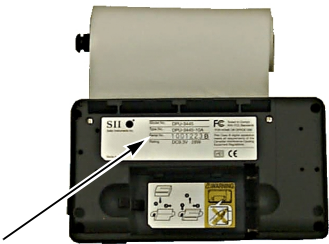
Serial Number_____



Thermal Printer

Model Number_____

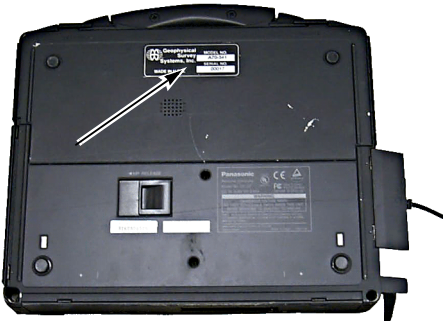
Serial Number_____



Interragator II GPR System

Model Number_____

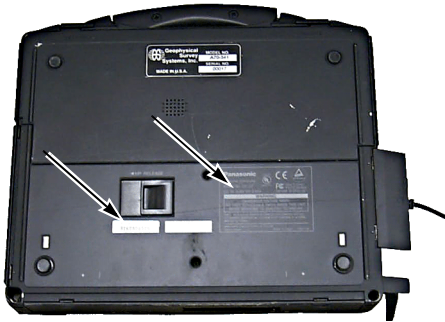
Serial Number_____



Panasonic Toughbook Computer

Model Number_____

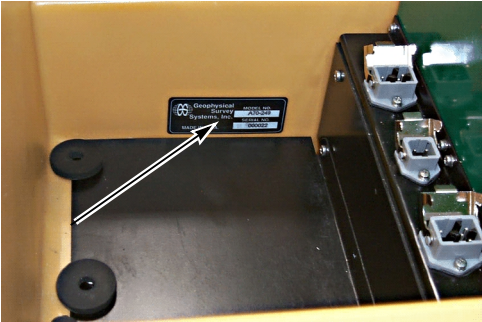
Serial Number_____



Cart

Model Number_____

Serial Number_____



DELIVERY

Check, perform, and review the following with the customer:

- ___ overview of how the system works
- ___ system safety

Bill of Materials

MATERIALS LIST

Item Number	Description of Part	Required
296250373	Interragator II GPR System (GPR200) w/ 300 MHz Antenna, Deployment Cart, and Toughbook Computer	1
286810001	Interragator II 300 MHz Antenna	1
286811001	Antenna Housing	1
296268529	Antenna Housing w/ Skid Plate Runners	1
286863001	Antenna Mounting Knobs (Locating Boss)	2
296250359	Skid Plate Runners Kit, plastic	1
286812001	Interragator II Deployment Cart Assembly	1
296268530	Deployment Cart Housing	1
296268531	Lower Control Cable	1
296268532	Battery/Connector Panel w/ 3-pin connectors	1
296268533	Control Cable Connector Plate, metal	1
286817001	Wheels; 20" diameter, solid core	2
286818001	Survey Wheel Encoder	1
296268534	Antenna Clamp (right side)	1
296268535	Antenna Clamp (left side)	1
286864001	Antenna Mounting Bracket, metal	2
286820001	Antenna Clamp Knobs	2
296250374	Battery Bracket in Storage Compartment	1
296250434	Counterweight, metal w/ Vermeer decal	1

Item Number	Description of Part	Required
142410001	Operator's Manual Box	1
296250436	Cart Handle Arms, fiberglass	2
296250437	Plunger Pins (for cart handle adjustment)	2
296268537	Storage Compartment Cover w/ hinge	1
286813001	Deployment Cart Handle	1
296250438	Handle Pins	2
286815001	Cable Ties, Velcro	4
296268541	Computer Mounting Plate Assembly incl. all brackets, cables, & electronic components	1
296268542	Computer Mounting Plate	1
296250363	DC-DC Converter for Toughbook computer incl. cables	1
296268543	DC-DC Converter Brackets	2
296268544	Front Retainer Bracket (left side)	1
296268545	Front Retainer Bracket (right side)	1
296268546	Thumb Screws for front retainer brackets	2
296268547	Computer Mounting Plate Stops (set of 2)	1
296268548	Support Brackets for mounting plate w/ screws (set of 2)	1
296268549	Interface Box w/ power & comm lights; incl. ethernet, power, and GPR data cabling	1
296268550	Ethernet Connector Cover w/ gasket & thumb screw	1
296268553	Panasonic CF-28 Toughbook Computer (Model # CF-28MCFGZDM)	1
296268554	CD-ROM Drive, Read-Write Capabilities	1
296250291	AC Power Supply	1
296268555	Battery for CF-28 Toughbook	1
296250366	Stylus Pen	3

Item Number	Description of Part	Required
296268556	Sunshade for CF-28 Toughbook	1
296250371	12 VDC "Smart" Battery	2
278519001	Battery Charger	1
296268558	Battery only; without wiring harness or pouch	1
296250441	Battery Wiring Harness w/ "smart" circuit	1
286869001	Auto Adapter / Inverter (400W, 2 outlet)	1
296268559	Battery Replacement Kit (battery only and inverter)	1
296250442	Connector (2-pin Hirschman, male)	1
296268560	Connector (3-pin Hirschman, male)	1
296268561	Adapter Cable for battery (5-pin to 3-pin)	1
296268562	Adapter Cable for battery (3-pin to 5-pin)	1
286861001	Seiko Thermal Printer Package (optional)	1
286829001	Seiko Thermal Printer	1
286830001	Seiko Printer Paper (box of 5 rolls)	1
286831001	Seiko AC Power Supply and cord	1
286832001	Seiko Serial Printer Cable	1
296268563	Printer Case w/ paper holder, canvas	1
286865001	Radan to Bitmap (RAD2BMP) Software (optional)	1
286833001	RADAN Data Processing Software - Main Module Only (optional)	1
296250444	RADAN Data Processing Software - Utility Locating Module (optional); must have Main Module also	1
296268567	Interragator II Operator's Manual (untethered); for systems with the Panasonic CF-28 Toughbook	1
296268568	Interragator II Operator's Manual (tethered); for systems with the Panasonic CF-28 Toughbook	1

This page intentionally left blank.

TABLE OF CONTENTS

Receiving and Delivery Report.	i	Soil Properties Summary.	15-10
Dealer Prep	i	Soil Parameters Summary	15-11
General	i		
Dealer/Customer Information	ii	System Assembly and Features	20-1
Identification Number - Record	ii	GPR System Components	20-1
Antenna	ii	GPR System Setup	20-2
Thermal Printer	iii	Battery Installation	20-7
Interragator II GPR System	iii	Hot-Swapping Batteries	20-8
Panasonic Toughbook Computer	iv	Computer Installation Setup	20-9
Cart	iv	Battery Charger and Batteries	20-12
Delivery	iv	Battery Charger	20-13
		Battery - Charging Procedure	20-15
Bill of Materials	v	System Computer Components	20-16
		Primary Processing Unit Battery	20-17
Safety Messages	10-1	Thermal Printer	20-18
		System Software	20-20
How the GPR System Works	15-1		
Intended Use	15-1	System Start-Up	25-1
General System Description	15-2	System Start-Up Procedure	25-1
Theory of Operation	15-3		
Soil Parameters Affecting GPR Data	15-6	System Controls	30-1
Electrical Conductivity	15-6	Main Menu Page	30-1
Dielectric Constant	15-6	Exit	30-1
Soil Parameters Affecting GPR Data	15-7	Project Information	30-1
Conductivity Map Of the United States	15-8	Data Collection	30-2

Data Playback	30-2
File Management	30-2
Help	30-2
Information - Software	30-3
Antenna Initialization - Controls	30-3
Soil Type	30-4
Background Removal Level Key	30-4
Decrement Depth Function	30-5
Increment Depth Function	30-5
Antenna Initialization	30-5
Go	30-6
File Information	30-6
Exit.	30-6
Data Collection and Playback - Controls	30-7
New File or Open.	30-7
Open a Second File (Split Screen Viewing)	30-8
Stop/Pause	30-8
Scroll Left.	30-8
Scroll Right	30-8
Display Color	30-9
Display Contrast	30-9
Zoom	30-10
Locate	30-10
Depth Calibration.	30-10
Antenna Initialization	30-10
File Information	30-11
Print Data.	30-11
Exit.	30-11

Survey Preparation	35-1
Plan the Survey	35-2
Data Collection.	40-1
Project Information.	40-7
Project Information - Enter	40-8
Data Collection Parameter Setup.	40-9
Background Removal Level	40-12
Survey Wheel Calibration.	40-14
Survey Wheel - Calibration Procedure	40-15
Subsurface Soil Parameters	40-17
Antenna Initialization	40-18
Basic Antenna Initialization - Procedure	40-19
Data Collection - Basic Procedure	40-21
Backup Cursor Feature	40-26
Backup Cursor Instructions.	40-27
Depth Calibration Procedure (for Collection and Playback)	40-28
Target Selection Procedure (for Collection and Playback)	40-30
Data Playback and Review	45-1
Data Playback - Basic Procedure	45-1
Depth Calibration	45-7
Target Selection	45-8
Split Screen Viewing	45-8
Print Results.	50-1
Other GPR System's Data Printing Options.	50-3
Basic Instructions.	50-3

File Management	55-1
Data File Transfer	55-1
File Deletion	55-2
Data Processing	60-1
Examples	65-1
Single Buried Pipe	65-1
Multiple Buried Utilities	65-1
Stacked Utilities	65-2
Utility in a Trench	65-2
Poorly Resolved Targets	65-3
Surveying Parallel to a Pipe	65-4
Mapping Geologic Features	65-5
Identifying GPR Data Limit	65-5
Ringing in GPR Record	65-6
Unexpected Ground Conditions	65-7
System Operation Guide	70-1
GPR System	70-1
Proper System Start-Up	70-1
GPR System Will Not Start	70-3
During System Assembly	70-3
During System Start-Up	70-4
Interragator II Software Program - Start	70-5
Antenna Communication - Re-Establish	70-6
System Lock-Up Response	70-6
System After Lock-Up (Worse Case) - Restart	70-7

System Software - Restore	70-7
Software Upgrades - Install	70-10
Getting Started	70-10
Software - Install	70-11
Antenna (300 MHz) - Upgrade	70-11
Software Upgrade - Final Check	70-11
Error Messages and Troubleshooting	70-12
Error Message "Radar Not Found"	70-12
Storage Card Not Found/Memory Is Full	70-12
File Open Error	70-13
Error Message 1064	70-13
Program Stops and Green "Power" Light Is Flashing	70-14
During Startup, Power and Communication Light	
Do Not Light Up	70-14
During Startup, Communication Light	
Does Not Light Up	70-15
Battery Light on CF-28 Toughbook is Red	70-16
Antenna (300 MHz)	70-16
Antenna Software Upgrade	70-16
Software Upgrade - Final Check	70-19
Antenna Waveform - Check	70-20
Antenna Housing - Replace	70-22
New Runner Skids - Install	70-26
Runner Skids - Replace	70-27
2-Wheel Deployment Cart Platform	70-28
Lower Control Cable - Repair/Replace	70-28
Battery/Connector Panel - Replace	70-28
Battery Board - Remove	70-29

Battery/Connector Board - Install/Replace	70-30
Hirschman (2-Pin Battery) Connector - Wire	70-30
Connector Cover and Bottom Plate - Install	70-31
Storage Compartment Cover - Replace	70-32
Cart Wheel - Replace	70-32
Survey Wheel Encoder - Replace.	70-33
Survey Wheel Encoder	70-33
Survey Wheel Encoder - Remove	70-34
Survey Wheel Encoder - Reassemble/Replace	70-34
System Batteries	70-36
Proper Use, Conditioning, and Storage	70-36
Battery - Retrain	70-36
Smart Battery Capability - Restore	70-37
System Battery - Replace.	70-38
Battery Connector (2-Pin or 3-Pin) - Replace.	70-40
Thermal Printer.	70-42
Error Messages and Troubleshooting.	70-42
Printer Does Not Turn ON	70-42
Printer Not Found	70-42
Printer Does Not Respond.	70-43
Printer Results Incoherent.	70-43
Printer Out of Paper.	70-44
Thermal Printer - Test.	70-44
Seiko Printer Baud Rate - Change	70-44
Paper - Install	70-47
GPR System Packing and Shipping Instructions	70-48
Container - Manufacturer Provided	70-48
Shipping Container - Rugged Plastic.	70-50

Freight Box - Large Vermeer.	70-53
--------------------------------------	-------

Glossary	75-1
---------------------------	-------------

Section 10: Safety Messages

General safety messages appear in this Safety Messages section. Specific safety messages are located in appropriate sections of the manual where a potential hazard may occur if the instructions or procedures are not followed.

A signal word “**DANGER**”, “**WARNING**”, or “**CAUTION**” is used with the safety alert symbol.

Safety signs with signal word “**DANGER**”, “**WARNING**”, or “**CAUTION**” are located near specific hazards.

DANGER Imminent hazards which, if not avoided, will result in serious personal injury or death.

WARNING Potential hazards or unsafe practices which, if not avoided, could result in serious personal injury or death.

CAUTION Potential hazards or unsafe practices which, if not avoided, could result in minor personal injury or product or property damage.

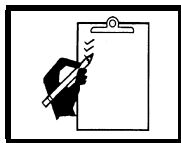
SAFETY SYMBOL EXPLANATION



This is the safety alert symbol. This symbol is used in combination with an exclamation mark or other symbols to alert you to the potential for bodily injury or death.



WARNING: Read Operator's Manual and safety signs before operating machine.



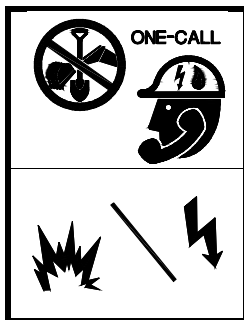
WARNING: Check machine before operating. Machine must be in good operating condition and all safety equipment installed and functioning properly.



WARNING: The accuracy of the data obtained by the Interragator II GPS system is highly dependent upon accurate data gathering, data input, and proper use of the software. The data is not intended to replace the need for future on-site utility locating, measuring, and verification procedures which are essential for accurate placement of new underground installations and avoidance of existing utilities. Do not use or rely upon this data for avoidance of underground utilities.



WARNING: Drilling into a gas line can cause serious injury or death from explosion or fire. Drilling into an electric line can result in electrocution. Looking at the laser light from fiber optic cables can cause eye damage. Utility services can be damaged causing service interruption. Do not use or rely upon this Interragator II GPS system for avoidance of underground utilities. OSHA CFR 29 1926.651 requires that the estimated location of underground utilities be determined prior to the bore. When the drilling operation approaches the estimated location, the exact location of the underground installations must be determined by safe and acceptable means.



WARNING: Always contact your local One-Call system before the start of your digging project. The Interragator II GPS system is intended to be used with other utility locating methods, such as the use of the One-Call system and potholing.

Electric shock or gas explosion can kill.

Before you start any digging project, don't forget to call the local One-Call system in your area and any utility company that does not subscribe to the One-Call system. For areas not represented by One-Call Systems International, contact the appropriate utilities company or national regulating authority to locate and mark the underground installations. If you don't call, you may have an accident or suffer injuries; cause interruption of services; damage the environment; or, experience job delays.

The One-Call representative will notify participating utility companies of your proposed digging activities. If you are in the U.S. or Canada, and do not know the number for the local One-Call representative in your area, dial the North American One-Call number, 1-888-258-0808, for this information. Utilities will then mark their underground facilities by using the following international marking code:

Red	Electric	Yellow	Gas, Oil, or Petroleum
Orange	Communication, Telephone, TV	Blue	Potable Water
Green/Brown	Sewer	White	Proposed Excavation
Pink	Surveying		



WARNING: Failure to follow any of the preceding safety instructions, or those that follow within this manual, could result in serious injury or death. This system is to be used only for those purposes for which it was intended, as explained in this Operator's Manual.