

# HandyScan from GSSI



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**Note:** Information in this manual is subject to change without notice. Please consult the manual updates supplied with your system and contact GSSI with any additional questions.

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## FCC NOTICES:

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 12<sup>th</sup> 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.

**NOTICE:** Use of this device as a wall imaging system is prohibited by FCC regulations.

## Introduction

HandyScan is a small-size, fully functional ground penetrating radar. It can instantly find the position and depth of metal and non-metal bars, pipes and cables. It works in natural and man-made non-conductive materials (concrete, rock, sand, brick, water, and ice). It can also locate voids and measure the thickness floors and other structural elements.

HandyScan allows the user to:

- **Collect** single lines of data (page 4) or grid data for plan viewing (page 8).
- **Review** data on screen, determine position and depth of features (page 5).
- **Print** data on the Seiko DPU-3445-20 printer supplied with the system (page 6).
- **Transfer** data to a PC in GSSI (\*.dzt) format for storage and processing in RADAN software (page 7).
- **Display** plan views (Depth Slices) of grid data on a PC screen (page 9).

## Specifications

Survey depth	20-30 cm
Max survey length	15 m
Size	21 x 15 x 14.5 cm
Weight	2.4 lbs
Display	LCD, B&W w/back lighting
Battery life	2 hours

## HandyScan Layout



**Screen** displays data or setup table.

**Battery status** is shown in the top right corner.

**Back Panel:** On/Off switch  
Serial port  
External power connector (9V)

## HandyScan Operation

1. Install a charged battery.
2. Turn power On (switch is located on the back panel).
3. Wait until data screen appears (about 15 sec).
4. Check battery indicator (top right corner of the screen).
5. If a low battery is indicated, turn system off and replace.

### Using Setup Table:

1. Press Set on the keypad to display setup table, then:
  - Up/down arrows to select a parameter,
  - Left/right arrows to change it.

Disp. Direction:	normal / invert
Disp. Mode	: B / AB
Amplitude	: abs / offset
X-axis	: distance / time
Depth	: ns / -3 to 3
Contrast	: (number)
Date/time	: 05/10/2001
Data_No.	: 1
Dist adj.	: +0 [0.00m]
Output	: printer / computer
Baud rate	: 57600
Default	: NO

## Data Collection

1. Press and hold Start (single beep).
2. Move unit forward.
3. Slow down if signal sounds when moving.
4. Press Mark when desired to insert marks in data.
5. Release Start to finish (double beep).

## Start/Kill Switch

The Start switch also has a deadman switch function. The FCC requires that when the operator stops interacting with the system for ten seconds, the transmitter is to be shut off. This will also close the data file that you have been acquiring. Thus you will need to keep the Start switch on the handle depressed at all times during data collection.

### **Note:**

- Pressing Start one more time will erase the data.
- Print the data or transfer them to a PC if you wish to keep the record before collecting the next line.
- The HandyScan can store 15 m (50 ft) of data. The unit will stop collecting data after this amount has been reached. You will need to start a new file to resume collecting data.
- The HandyScan displays axes in metric units only, but the same data can be later displayed using RADAN NT software on a PC in metric or English units.

## Data Review

1. Use right/left arrow keys to scroll data.
2. Optimize data display:
  - Press Gain until best display of features is achieved. Gain status is shown at bottom left (Gain can be used during collection as well).
  - Press PRCS, then up/down arrow to change processing method. PRCS method used is shown at bottom center.
  - Use Set to modify display setup (contrast, amplitude, depth scale, etc.).
3. Label targets:
  - Use arrow keys to move the cursors and locate targets. The cross-hair X (position) and Y (depth) are displayed in the top left corner.
  - Press Mark to label a target and display its X-Y along the right edge of screen (up to 7 targets).

**Note:** It is possible to transfer non-grid data to a PC and review them on the PC screen, taking advantage of a higher quality display and (if installed) processing capability of RADAN software. Please see Data Transfer (page 7) and RADAN manual for instructions on processing.




## Data Printout:

1. Install a charged battery in the printer.
2. Connect printer to the serial port (back panel) using the supplied cable and turn it On.
3. On setup screen, select Output to Printer.
4. Press Set to return to data screen
5. Press Print to print data.

**Note:** For more details see the User's Guide for Seiko Instruments printer model DPU-3445-20.

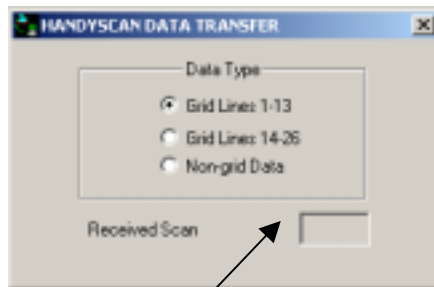
## Data Transfer to a PC

**Note:** The file Handyfer.exe must be present on the PC.

1. Connect Handyscan and PC using a 9-pin null modem cable.
2. Start Handyfer.exe  on the PC and select the appropriate data type (Grid Lines 1-13, 14-26 or Non-grid Data).

### On Handyscan:

1. On setup screen, select Output to computer (binary).
2. Set baud rate to 57600.
3. Press Set to return to data screen.
4. Press Print.



Displays scan # during transfer

When the data transfer is finished, PC will prompt you to save data.



## Collecting Grid Data

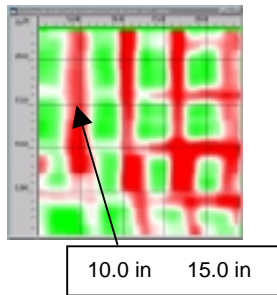
1. Secure the survey pad to the surface.
2. Start HandyScan as usual.
3. Make sure X-axis in setup table is set to distance.
4. Collect lines 1 to 13.
  - Press Start (double beep) and transfer the data to the PC (see Transfer above).
5. Collect lines 14 to 26.
  - Press Start (double beep) and transfer the data.
6. Save the grid file when prompted.

### Notes:

- Start each line in the cross-hatched area (before the yellow contour).
- Stay centered on the line.
- Press Mark at the end of each line.
- At the end of line 13 and 26:
  - Press Mark.
  - Then press Start (double beep) to end the file.

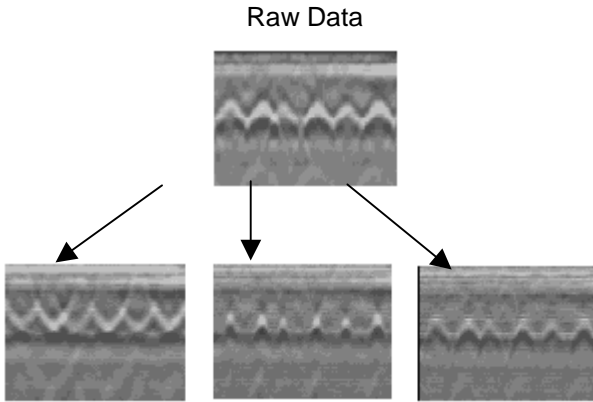
## Displaying Grid Data As Plan View

1. Complete grid data collection (above).
2. Open the grid file (\*.dzt) in RADAN.
3. Click on StructureScan Process button .
4. Process and save the file (change the Radar Wave Velocity and repeat, if necessary, see next page).
5. Click on Depth Slices button .
6. Select desired Maximum Depth.
7. Drag a corner of the plan view to enlarge.
8. Right-click and select Display Gain (and slice thickness, if desired).
9. View depth slices using the Slice Depth box.
10. Use mouse cursor to determine positions of targets (see below).  
Use this information to mark targets on the paper pad.
11. Print the plan view or copy to clipboard as appropriate.



### Radar Wave Velocity Adjustments

1. Automated processing includes Migration which removes hyperbolic reflections from the data. Migration requires Radar Wave Velocity to be set within  $\frac{1}{2}$  in/ns of the exact value.
2. The exact velocity is usually not known, thus trial-and-error is the best way to determine it:
  - After first processing, maximize Display Gain and see if the hyperbolas have collapsed into dots:



Velocity too high      Correct      Velocity too low

- Correct velocity – data can be viewed in Depth Slices
- Velocity too high or too low – process again, respectively decreasing or increasing velocity in  $\frac{1}{2}$  in/ns steps until image looks correct.