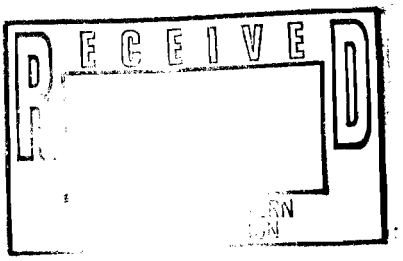
Impact Environmental
a division of impact environmental consulting, inc.
1 Village Plaza
Kings Park, New York 11754
516.269.8800 telephone
516. 269.1599 facsimile

Remote Survey

Focussed Remedial Investigation/Feasibility Study

July 15, 1999



Conducted at:

Site No. 1-30-043S
299 Main Street
Westbury, New York

Client:

2632 Realty Development Corp.
Westbury, New York

User:

New York State Department of Environmental Conservation
Division of Environmental Remediation
50 Wolf Road
Albany, New York

Remote Survey

Focussed Remedial Investigation/Feasibility Study

July 15, 1999

Conducted at:

Site No. 1-30-043S
299 Main Street
Westbury, New York

Client:

2632 Realty Development Corp.
Westbury, New York

User:

New York State Department of Environmental Conservation
Division of Environmental Remediation
50 Wolf Road
Albany, New York

TABLE OF CONTENTS

REPORT HOLDER	NUMBER OF REPORTS ISSUED
NYSDEC Bureau of Eastern Remedial Action	1
NYSDEC Division of Environmental Remediation	4
NYSDEC Bureau of Environmental Exposure Investigation	2
NYSDEC Region 1, Office of the Commissioner	1
NYSDEC, Division of Environmental Enforcement	1
2632 Realty Development Corp.	1
Rivken, Radler & Kremer	1
Impact Environmental Consulting, Inc. Corporate Records	1

1.0 Purpose & Scope

This investigation was performed to identify the presence of any exterior routes or mechanisms that would function through design or default to allow for the release or injection of hazardous substances to the subsurface soil of the site located at 299 Main Street, Westbury, New York, herein identified as the subject property.

The investigative protocols used for this assessment were based upon the following documents: 1) United States Environmental Protection Agency's A Compendium of Superfund Field Operations Methods; and 2) the Geophysical Survey Systems, Inc. SIR System-2 Operation Manual.

- **Site Description**
- **Survey, Sampling and Analysis Plan**
- **Presentation of Imagery**
- **Evaluation of Results**

Presented herein are the results of the Focussed Remedial Investigation/Feasibility Study Remote Survey conducted by Impact Environmental Consulting, Inc. on the subject property [see ***Plate #1:*** *Project Location Map, Wesbury, New York*]. The subject property is identified by the New York State Department of Environmental Conservation as Number 1-30-043S.

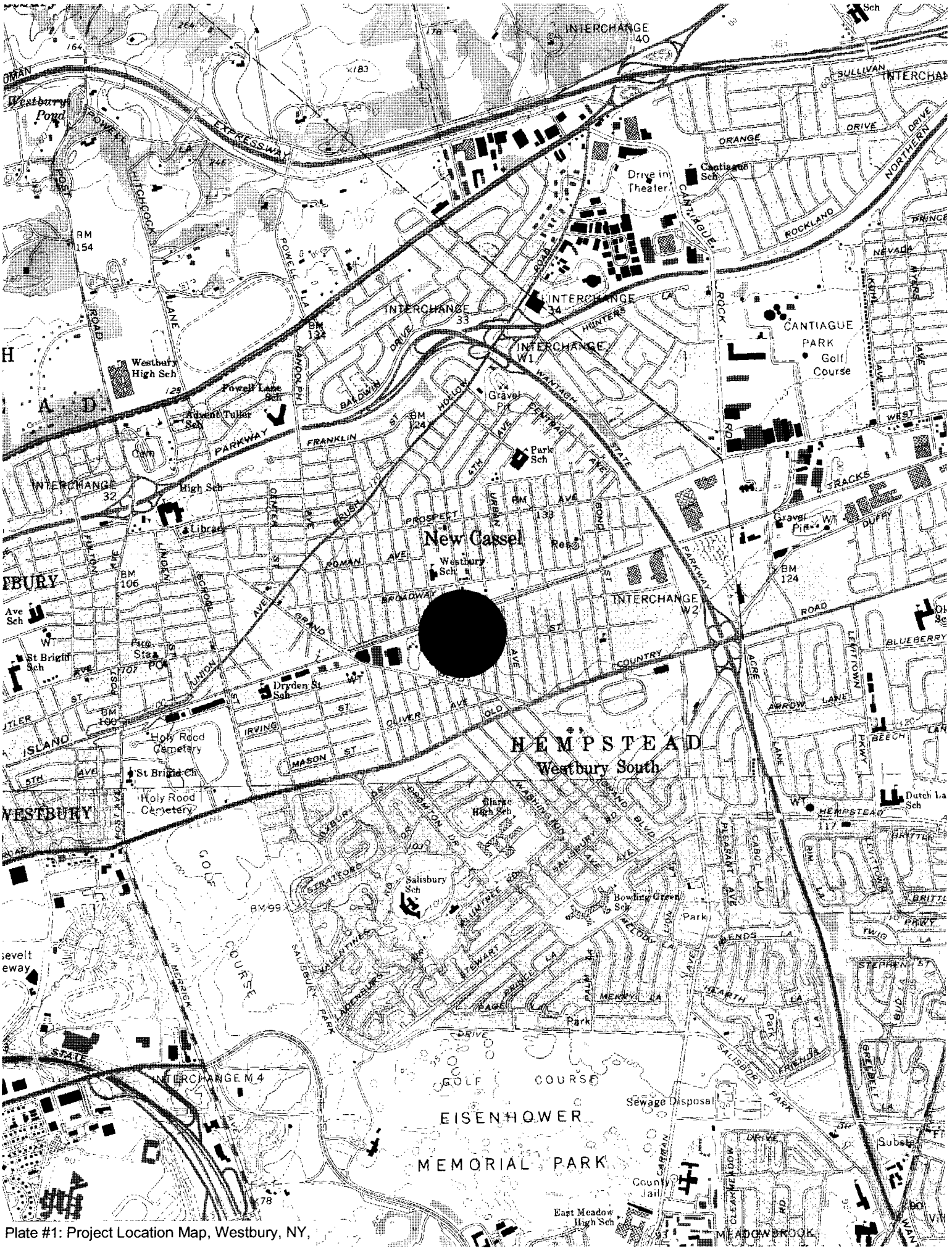


Plate #1: Project Location Map, Westbury, NY,

2.0 Site Description

2.1 Topography

The areal extent of the subject property was approximately 25,000 square feet. The subject property contained one single-story, masonry building with an approximate footprint of 11,500 square feet. The surface area of the subject property consisted of asphalt parking areas, concrete walkways, and exposed soil. The subject property exhibited low topographic relief (less than three percent slopes).

2.2 Site History

The subject property was initially developed sometime between 1950 and 1962 and consists of a garage with a number of bays and office space. Island Transportation Company (ITC) a truck transit company formerly utilized the property. ITC used trichloroethylene (TCE) to wash asphalt residues from its trucks prior to 1980. A Nassau County Department of Health (NCDH) inspection in 1978 recorded the storage of 2,841 pounds of TCE at the subject property. Additionally, the inspection identified the presence of oil staining in a storage area. In 1979 the NCDH discovered that ITC was discharging wastewater from its truck cleaning operations to the adjacent street.

A subsequent operator of the subject property, Sam-Ton Towing and Salvage (STS) was sited by the United States Environmental Protection Agency in 1990 for operating an unpermitted Class V Underground Injection Well (UIW). On November 2, 1993 a fire occurred at STS and at least seven drums of unknown contents spilled during fire suppression activities.

Currently, the subject property is utilized as an automobile body shop. Currently, there are no known on-site routes or mechanisms for the migration of contaminants to the subsurface soil at the subject property.

3.0 Survey Plan

A survey plan was designed to identify any routes or mechanisms for the migration of contaminants released at the subject property. Potential routes and mechanisms included underground storage tanks, underground injection wells, sub-grade storage vaults and buried portable storage containers (drums). The survey was performed with a ground penetrating radar (GPR) unit.

3.1 Remote Survey

A remote survey of the exterior of the subject property was performed during the week of June 21, 1999. An interpretation of GPR imagery obtained from the subject property exhibited three anomalous features consistent with that of underground storage tanks. Another set of anomalous features was identified to be associated with a sanitary waste disposal system. One anomalous feature identified from the scans yielded imagery that could not be interpreted with respect to construction or function. Each of the features is discussed in detail below and mapped on Plate #2: GPR Scan Map, Westbury, New York. References contained within each discussion pertain to GPR image files that are presented in section 4.0 of this report.

The three underground storage tanks (USTs) were located adjacent to the north side of the building (see Scan Files 250, 269 and 345). The orientation of two of the USTs appeared to be such that their long axis ran parallel to the building (east-west). The long axis of the third UST ran perpendicular to the building. Based on the apparent tank dimensions, their individual capacities were estimated at being between one and three-thousand gallons.

The sanitary waste disposal system appeared to include a conduit leading away from a former septic tank in a northwestern direction to a former cesspool (see Scan File 530). Scans performed in the area of the septic tank and cesspool failed to identify an overflow pool(s) for the cesspool. The imagery in these areas exhibited no anomalies, suggesting that the area contains undisturbed fill media (see Scan File 276 and 277). The former cesspool was identified to have been modified to facilitate the connection of the building to the public sewer system.

The unidentified anomaly was situated immediately north of the building near the former fuel dispenser island (see Scan File 291). The feature appears too small to represent a UST. It could represent metallic apparatus associated with the pump system.

Garden Street

Files 563, 565, 568, 569

Awning

One Story Masonry Building

Files 554, 557, 558, 559

Files 548 & 546

Main Street

Hopper Street

storage container

suspected sanitary leaching cesspool

sanitary cleanout

ASTs in bermed enclosure

Files 250 & 269

Files 291 & 292

276, 277, 278

502, 504, 506, 516, 517, 519, 522, 513, 514, 515, 509, 507, 530, 537

478, 475, 477, 473, 458, 459, 455, 456, 440, 442, 436, 438, 412, 415, 405, 410, 388, 389, 386, 387, 351, 353, 349, 350, 242, 246, 239, 240

488, 485, 479, 473, 465, 461, 486, 467, 463, 464, 453, 452, 451, 449, 448, 446, 429, 428, 426, 423, 421, 418, 404, 401, 399, 390, 393, 392, 354, 332, 330, 328, 345, 326, 306, 303, 305, 298

NORTH

i.e.

Impact Environmental

a division of impact environmental consulting, inc.

1 Village Plaza
Kings Park, New York 11754
516.269.8800 TELEPHONE
516.269.1599 FACSIMILE

98-335

Plate 2: GPR Scan Map

New Cassel, New York

Legend:

- groundwater probe node
- soil probe node
- monitoring well

scale: 1" = 20'

3.1.1 GPR Procedures

The GPR system consists of a radar control unit, control cable and a transducer (antenna). The control unit transmits a trigger pulse at a normal repetition rate of 50 KHz. The trigger pulse is sent to the transmitter electronics in the transducer via the control cable. The transmitter electronics amplify the trigger pulses into bipolar pulses that are radiated to the subsurface. The transformed pulses vary in shape and frequency according to the transducer used. In the subsurface, variations of the signal occur at boundaries where there is a dielectric contrast (void, steel, soil type, etc.). Signal reflections travel back to the control unit represented as color graphic images for interpolation. This system is capable of transmitting electromagnetic energy in the frequency range of 16MHz to 2000MHz.

A qualified Impact Environmental Consulting, Inc. technician specified a coordinate system on the planimetric surface of the subject property to map any subsurface dielectric anomalies detected on the premises. The operator used knowledge of the subsurface soil composition to calibrate the SIR-2 system to site specific conditions. Factor settings such as range, gain, number of gain points, and scans per unit, were modified to yield the most accurate data to describe the subsurface conditions.

Upon finding an anomaly, a more spatially specific coordinate system was plotted over the area to determine its size, shape and orientation. The data collected during the survey was reviewed by the operator and compared against past experience, technical judgment and prior site knowledge to classify the anomalies.

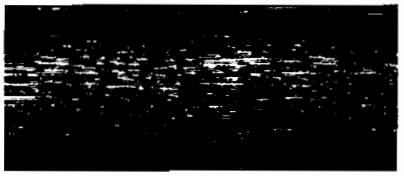
4.0 Presentation of Imagery

The following index identifies the GPR Scan Files and their respective interpretations. Following the index are printed graphic files downloaded from the GPR.

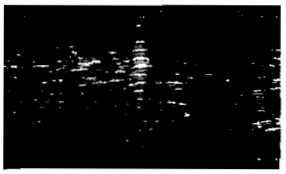
Scan File Code	Interpretation of Image	Reasons for Interpretation
276	No anomalies	No dielectric change
277	No anomalies	No dielectric change
530	Conduit	Parabolic curve, low radius
250	UST	Parabolic curve
269	UST	Parabolic curve
291	Unknown anomaly	-
345	UST	Parabolic curve

File 276

File 277



File 530



File 250

File 269

File 291

File 345

5.0 Evaluation of Results

Five features were identified to exist in the subsurface of the subject property. Each of these features has the potential to impact the environmental quality of the subject property by providing a means for the contamination of saturated and unsaturated subsurface soil with hazardous substances. Therefore, each of these features will have to be further investigated in future Focussed Remedial Investigation/Focussed Feasibility Study activities. Said activities will be proposed in an addendum to the approved Work Plan.

IMPACT ENVIRONMENTAL CONSULTING, INC.

Richard S. Parrish, *P.G., C.E.I.*
Senior Geologist

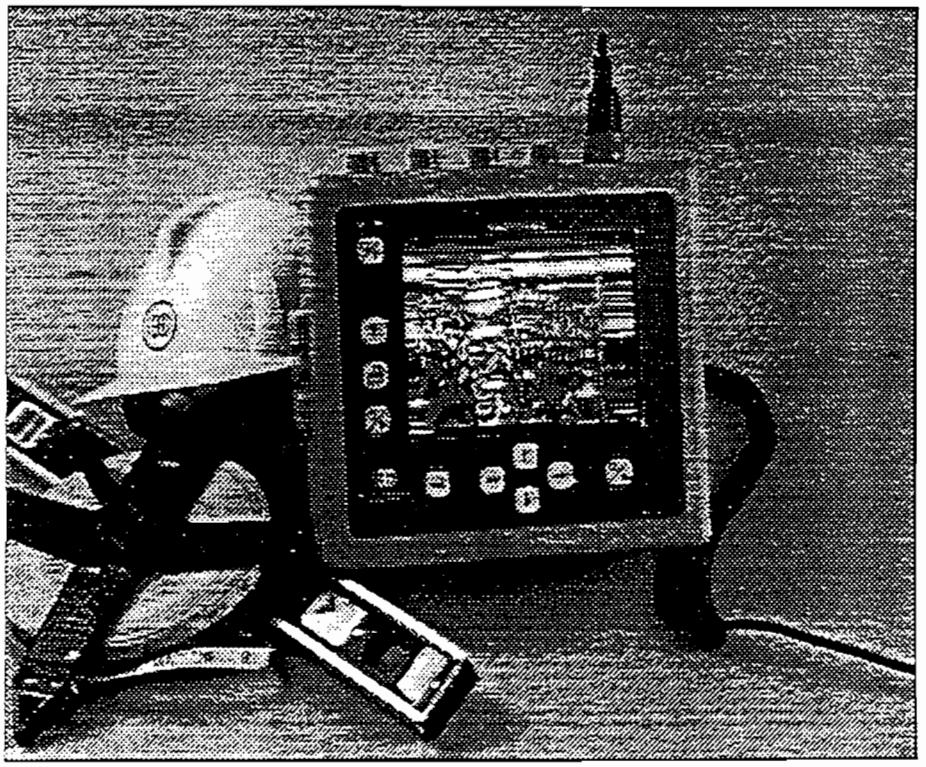
Keith Franzen
Engineer

APPENDIX A

SIR-2 Operation Manual

SIR® SYSTEM-2

OPERATION MANUAL



Rev A - May, 1996

Geophysical Survey Systems, Inc.
13 Klein Drive, P.O. Box 97
North Salem, NH 03073-0097
Phone: (603) 893-1109 / FAX: (603) 889-3984 / E-mail: gssisales@aol.com

Manual #MN72-140A

How to Use This Manual

This manual is designed for both experienced and novice users of Subsurface Interface Radar (SIR) System-2. We recommend that all users read the entire manual.

This manual contains an index and glossary of terms for quick reference. On-screen help has also been provided for you. To access this help section while operating the SIR-2, press the *Help* key (?) and an on-screen help menu will appear.

The following captions will help the SIR-2 user focus on key points in this manual:

NOTE:

This section will highlight important messages that point out the SIR-2's key features to help the user.

⚠ CAUTION:

This section will highlight important messages to help the user avoid processing pitfalls or fatal errors that could crash the system or result in the loss of data.

About this Manual

Certain conventions are used in this manual where they refer to commands, functions and menus.

- MENU NAMES will appear in small capital letters.
- Tools and Functions will appear with initial capital letters.
- **Commands** you choose from the menus will appear in bold with the first letter capitalized.
- *Keys* on the keyboard will appear in italics.
- *Buttons* and *Icons* will also appear in italics.

NOTE:

This manual assumes that you will have a SIR-2 available and in operation when reading this manual.

Help can be obtained on any command by pressing the *Help* (?) key for context-sensitive help and then the *Enter* (↵) key for general help.

CHAPTER 1: INTRODUCTION

1.1 Unpacking Your System

Thank you for purchasing a GSSI SIR® System-2 (from now on referred to as SIR-2). A packing list is included with your shipment that identifies all of the items that are in your order. You should check your shipment against the packing list upon receipt of your shipment. If you find an item is missing or damaged during shipment, please call or fax your sales representative immediately so that we can correct the problem.

Your SIR-2 contains the following items:

1 - Digital Control Unit (DC-2)
1 - Antenna control cable
1 - DC Power cable (SIR-2 power connector on one end and a cigarette lighter plug on the other end)
1 - Power Connector Adapter (Cigarette lighter socket on one end and a GSSI three pin power connector on the other end)
1 - ~~Upgrade adapter cable (keyboard and serial port cable)~~ > N/A BJ 12/11/96
1 - ~~Serial null modem cable (9 pin to 9 pin cable)~~
1 - DC-2 padded carrying case, with sunshade
1 - SIR System-2 Operation Manual
1 - PC operating system software, MS-DOS

If you purchased some the following available optional items they will also be included:

Portable Battery Kit
DPU-5400 Thermal Printer

1.2 General Description

The SIR-2 is a lightweight, portable, single channel general purpose ground penetrating radar system. The various components of the DC-2 control unit are briefly described below.

The major external components of the control unit are the keypad, video screen, connector panel and indicator lights. The keypad consists of 10 keys which are used to control operation of the unit. The VGA liquid crystal display (LCD) video screen provides real-time or playback viewing of the data. There are five connectors located on the SIR-2. The connector labeled BATTERY connects to the power supply. The connector labeled ANTENNA connects to a GSSI antenna. The PARALLEL connector is used to connect a thermal printer or to transfer data to a computer. The MULTIFUNCTION connector will connect to the upgrade adapter cable or optional Model 25 multifunction box. The XMIT connector provides a fiber optic transmit trigger output for the Model 3200 Multiple Low Frequency (MLF) antenna. The red and green indicator lights, located above the power switch, indicate power supply to the unit. The amber light on the upper right to indicate hard disk activity.

should shut down the system as soon as possible and replace or recharge your power source.

RED LIGHT - When the system is turned on the red light will illuminate.

The battery charger supplied by GSSI with the SIR-2 (if ordered with your system) has two lights on the front panel. One is a power indicator light which illuminates when input power is applied to the unit. The other is a "fast-charge" light which will illuminate only during the initial or "fast-charge" phase of battery recharge. When this light goes out, it does not mean that the battery is fully charged, only that the initial or high-current draw phase of the recharge has finished. To ensure that the battery is fully charged, leave it connected to the charger for at least 8 hours.

Note: When using a GSSI high or very high powered transmitter (Models 775, 776, 777 or 778) with the SIR-2 you should use the GSSI Model 570 fiber-optic trigger between the transmitting and receiving antennas. The SIR-2 does not have sufficient power to drive the high power pulse amplifiers at a satisfactory repetition rate when a coaxial cable is connecting the transmitting and receiving antennas.

1.4 Operating Environment

The SIR-2 is designed to operate from 0°C (32°F) to 40°C (104°F). The unit is environmentally sealed and can be used in dusty or humid environments. Though the system is designed to withstand occasional exposure to water it should not be deliberately subjected to rain or immersed in water. A heat-sink plate is located in the bottom of the system and used to regulate the internal temperature of the unit, and air must be free to circulate around it. Therefore, the system should not be operated while inside the carrying and storage pack .

The video screen is a color active-matrix liquid crystal display (LCD) covered by a polarizing screen to improve viewing in bright light. A velcro attachable sun shade is also included with your system. However, even with the polarizing screen, the data can be difficult to view in bright sunlight. Turning the system so that the screen does not directly face the sun and using the sun shade will make the data easier to view. Sometimes it will be necessary to completely shade the unit in order to see the image on the screen.

NOTE:

The SIR-2 is designed to operate from 0°C (32°F) to 40°C (104°F). The SIR-2 control unit can operate in dusty, humid or foggy environments but it should not be deliberately subjected to direct rain or immersed in water.

Turning the system so that the screen does not directly face the sun and using the sun shade will make the data easier to view in bright sunlight.

The screen on the SIR-2 is plastic and susceptible to scratching. Reasonable care should be exercised in protecting the screen from sharp objects which may scratch it. Do not use

CHAPTER 2: BASICS OF SYSTEM OPERATION

2.1 Hardware Connections

Only two simple connections need to be made before you can start the system.

1. The male end of the antenna control cable should be connected to the antenna connector on the SIR-2 control unit. The 11-pin connector at the other end of the control cable should be connected to a GSSI antenna. Because the control cable connector on the SIR-2 is different, older GSSI antenna cables will not connect directly to the control unit. You will need to connect the antenna cable provided with your SIR-2 system to the control unit and connect older GSSI antenna cables to that cable by connecting a cable adapter between the two cables.

NOTE:

If you are going to playback data, it is preferable not to connect the antenna to the SIR-2 before powering ON the system.

2. The male end of the DC power cable should be connected to the battery connector on the control unit.

The following connections are for optional items:

a) If a thermal printer is to be used, the male end of the thermal printer cable should be connected to the parallel connector of the control unit and the other end should be connected to the printer. See Chapter 6 for details on using thermal printers.

⚠ CAUTION:

If you connect a printer to the SIR-2, the printer must be powered ON before the SIR-2.

b) If a survey wheel is to be used, connect the survey wheel to the antenna.

After all other connections have been made connect the power cable to the power source. If the battery voltage is adequate, the green light above the power button will become illuminated and remain illuminated. If the battery voltage is low, the green light will flash. If the green light is flashing, you should correct the low voltage problem before starting the system.

- If an antenna is not connected to the system and you choose **Previous Setup,** the system will enter the PLAYBACK SETUP MENU block. See Chapter 5 for a description of the PLAYBACK SETUP MENU block. If you accidentally choose **Stored Setups**, press *Enter* ↵ and then **Cancel**. The system will then enter the PLAYBACK SETUP MENU BLOCK.

Once in the COLLECT SETUP MENU block, data coming from the antenna will show on the top left ¾ of the screen, and oscilloscope display of the data in the top right ¼ of the screen and the bottom portion of the screen will show the COLLECT SETUP MENU block. Note that the data being acquired at this time is only displayed to the screen and it is **not** saved on disk.

Review the remainder of Chapter 2 for a general description of how to use the system, then go to Chapter 3 for system data collection parameters setup.

2.2.1 System Startup for the SIR-2P

When the SIR-2P is turned on and goes through its boot routine, you will see a small window near the top of the screen that says: 1 or F1 Run SIR-2; 2 or F2, WIN95/RADAN. If you take no action for 30 seconds, the system will default to SIR-2 mode. When it boots into the SIR-2 mode, you will be given a choice of two modes of operation at the top screen: press **Run** for Automatic operation or press **Enter** for Standard operation.

Once in SIR-2 mode, if you want to switch to the Windows95 (WIN 95) mode you must turn the system OFF and reboot, then select option 2, **WIN95/RADAN**.

In WIN95 mode the system acts like a normal computer with the Windows 95 operating system. From here, you can launch RADAN or any other software that has been pre-loaded. To turn the system OFF in WIN95 mode, hold the power switch down for at least 8 seconds.

If you connect the SIR-2P to a network through the ethernet connection, the password to use is "sir2p".

2.3 Using The HELP Key To Get Help

Highlight any menu command and then press the ?(*Help*) ? key to get help on that command. Press the *Help* ? key and then the *Enter* ↵ key to get general help on the system. Help for some commands is longer than one screen, and in these cases use the *Down* ↓ arrow key to obtain the additional screens of help.

NOTE:

General system help can be obtained by pressing the *Help* ? key and then the *Enter* ↵ key. If at any time you are unsure of the current system parameter settings press the *Collect/Playback* % key until the system parameters screen appears.

2.5 Navigating Through The User Menus

2.5.1 The Major Menu Blocks

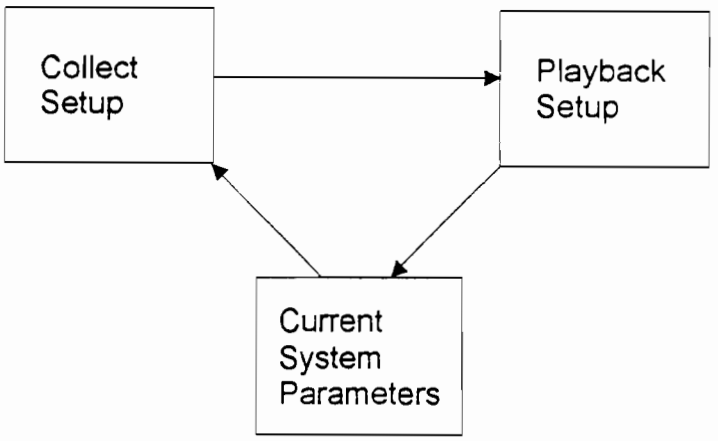
The SIR-2 has 4 major MENU blocks:

- COLLECT SETUP
- PLAYBACK SETUP
- PLAYBACK DATA
- COLLECT DATA

The system will identify which block is active by a message appearing in the lower portion of the menu block.

SETUP MENU BLOCKS

When the system is first turned ON, it is in Setup Mode. When in the SETUP MAJOR MENU block, pressing the *Collect/Playback* button cycles through the major menu blocks; COLLECT SETUP and PLAYBACK SETUP, and the Current System Parameters screen (Figure 2-1).



Cycling through the major menu blocks when in Setup Mode
by repeatedly pressing the *Collect/Playback* key
FIGURE 2-1

COLLECT DATA AND PLAYBACK DATA MENU BLOCKS

To put the system in Data Mode, press the *Run/Standby* key. This will start the system collecting data (**Note: By default the data will be stored in RAM. It will only be stored on the hard disk if you turn disk output ON. See Section 3.2.3**). In the Data Mode, pressing the *Collect/Playback* button cycles through the major menu blocks; COLLECT DATA and PLAYBACK DATA, the current system parameters screen and then the COLLECT SETUP MENU BLOCK (Figure 2-2).

- The middle columns consist of two types of system parameters: those whose values appear in a box and can be changed via the toggle switch method and those whose values can be changed by a parameter change box. When a parameter from these columns is highlighted and then the *Enter* ↵ key is pressed, one of two things will happen: If it is a toggle switch parameter, the value of the parameter will change each time *Enter* ↵ is pressed; if the parameter requires a wide range of values a parameter change box will appear as a third column. The *Up* ↑ and *Down* ↓ keys will be used to increment/ decrement value of the parameter by the step size; the *Left* ← and *Right* → keys will allow you to select step size. The *Enter* ↵ key will set the selected value of that parameter.

NOTE:

Throughout the remainder of the manual when the expression "select a command" is used, it means move the highlight bar to illuminate that command and then press the *Enter* ↵ key. This will select (i.e., activate) that command.

Let's look at some examples of using the menus.

1) PLAYBACK SETUP menu block, if you highlight the **Files** command from the leftmost column a list of commands will appear in a second column.

2 Now, using the *Arrow* ← ↑ ↓ → keys move to the second column and highlight the **Compress** command. A third column containing two compression commands appear, **Method** and **Do Compress**.

3) Finally, if you move the highlight bar to the **Method** command and press the *Enter* ↵ key three times slowly. Notice that this changes the type of compression method.

4) In the COLLECT SETUP MENU block move the highlight bar to the **Setup** command and then to the **Range** command. Notice that a parameter change box appears to the right. Move the highlight bar to the **Parameter Change** box to change the value of the range. Then press the *Enter* ↵ key to register the change.

2.6 Recalling Preset Files To Automatically Set The System For Data Acquisition

When the system is first turned ON or after switching antennas, the system can be easily set for data acquisition by selecting the operating parameters setup file that is most appropriate for the selected antenna and job. This is done using the **Recall Setup** command accessed from the **Setup** command in the COLLECT SETUP MENU block or the PLAYBACK SETUP MENU block. This command is next to the bottom of the second column of commands.

CHAPTER 3: SYSTEM SETUP FOR DATA COLLECTION

3.1 Simple (Quick) System Setup For Data Collection

After loading the appropriate system operating parameters setup file (see Appendix A for a description of the setup files), the following few parameters should be checked to ensure that they are optimal for your specific site.

The system should be in the COLLECT SETUP menu block.

1) Check the **Range** (i.e., depth) of viewing.

This is done by moving the highlight bar up to the Range parameter. The appropriate range value is calculated by the following formula:

RANGE VALUE = Maximum Depth of Interest * T * 1.5

Where T is the two-way travel time of the subsurface materials at your site. For a table of two-way travel time values see the discussion of range in Section 3.2.2. After the range value is changed, the system will automatically find the position of the ground surface reflection and place it at the top of the data screen. It will also readjust the gains (the message "servo in progress, please wait" will appear, and the speaker will emit a "clicking" sound while this is occurring).

2) Check the position of the ground surface reflection.

Normally, the surface reflection will appear in the color bar at the top of the O-scope data display. Occasionally the system will misidentify a different reflection for the ground surface reflection. (It is especially prone to do this with the horn antennas, 1000 MHz antenna, 3200 MLF antenna, bistatic 100 MHz and the bistatic 300 MHz antenna.) In this case, the real surface reflection will occur before the top of the signal (as displayed in the O-scope display). Move the highlight bar down until the **Position** command is highlighted and press the *Enter* ↵ key to change position to Manual Mode. Move to the parameter change box and use the *Down* ↓ arrow to decrease the position value by 5ns if the range is less than 20ns, by 10ns if the range is between 20ns and 100ns and by 50ns if the range is greater than 100ns. (Note that when changing the position value the system will often round off values.) Before you change the position value you should note the original value. Press the *Enter* ↵ key to implement the position change.

After changing the position value, you will observe one of two things:

1) If the oscilloscope display shows the data is flat (no signal) at the top and a strong surface reflection appears further down, the system correctly found the surface reflection. Move the highlight bar to the **Parameter Change** box again and set the position value back to the original number before you changed it.

2) If the data is not flat at the top of the record the wrong surface position was found. You should keep manually decreasing the surface position by increments of 5 or 10ns

3.2 Complete Description Of Collect Setup Menu Block

SETUP

When this command is highlighted, a set of system data collection parameters that can be set appears in the second column. The commands that will appear in the second column are: Setup Mode, Run Mode, Range, Gain, Position, Filters, Scan, Save Setup, Recall Setup, and Show Setup.

SETUP MODE

This parameter determines how the system parameters will be set. There are two setup modes: Automatic and Manual. The mode is changed by pressing the *Enter* ↵ key.

When the Setup Mode is set to **Automatic,** the system will automatically find the ground surface reflection and place it at the top of the screen, set the filters, gains, scan speed and data resolution. It will not automatically set the range. The range used will be that which is set prior to putting the system in Automatic Mode. After automatic setup the user can manually change any system settings.

When the Setup Mode is set to **Manual,** the user can manually set all system parameters to the desired settings.

> ⚠ **CAUTION:**
>
> When the Setup Mode is set to **Auto**, the Gain Position, Filters and Scan Parameters will be hidden.

3.2.1 Setting The Data Acquisition Method

RUN MODE

This parameter informs the system how the field survey will be conducted. There are three methods of data acquisition: Cont (continuous), Point and SW (survey wheel). The system Run Mode is changed using the *Enter* ↵ key.

CONTINUOUS DATA COLLECTION METHOD

When the Run Mode is set to **Cont** (Continuous), the system is continuously transmitting signals into the ground and recording data. The advantages of this mode are that a continuous profile of the subsurface is generated and it is the most rapid data collection method.

SURVEY WHEEL CONTROLLED DATA COLLECTION METHOD

When the Run Mode is set to **SW** (Survey Wheel), a third column of survey wheel data collection parameters appears. In this mode data collection is controlled by a survey wheel attached to the antenna. All lines will then have the same horizontal scaling. This mode is preferable for surveys which require precise line locations.

1) Choose a survey wheel calibration line that is at least 50% as long as your maximum survey line. Enter the distance of the survey calibration line in the distance parameter.
2) Select the survey units either meters or feet.
3) Set the antenna at the beginning of your survey calibration line with the middle of the antenna on the beginning of the line.
4) Activate the **Autocalibrate** function by pressing the *Enter* ↵ key and then the *Run/Standby* key.
5) Move the antenna over the survey calibration line very slowly (less than 0.5meters (1.5ft) per second), until the middle of the antenna reaches the end of the survey calibration line.
6) When finished calibrating, press the *Run/Standby* key to end the calibration.
7) Your survey wheel is now calibrated and ready for use.

UNITS

Use the *Enter* ↵ key to select the survey units **Meters** or **Feet**.

DISTANCE

Enter the distance of the survey wheel calibration line. The distance should be at least 50% of the longest line in the survey to be performed.

TICK/UNIT

If you know the number of electronic ticks per meter or feet that your survey wheel will send to the SIR-2 system, you can enter the number here. With this number it is not required to calibrate the survey wheel. We strongly recommend using the Autocalibrate function instead of entering a tick/unit value, because ground conditions change and when the system is Autocalibrated it will take this into account to some extent.

DISCRETE DATA POINT DATA COLLECTION METHOD

When the Run Mode is set to **Point,** the parameter Stat Stack appears in the third column. When in Point Mode, data is collected a predetermined number of scans per survey station (i.e., every time the *Run/Standby* key is pressed another number of scans are collected). This mode is useful in rough terrain where continuous data collection is impossible and in areas where the signal is very weak at deep depths and maximum signal enhancement is required. When using Point Mode, it is recommended that Wiggle Display Mode be used.

Be aware that the display shows a simulated stack while in Collect Setup. The system shows the actual stack when switched to Run Mode and you start acquiring data.

STAT STACK

In order to improve signal-to-noise in Point Mode, it is advantageous to stack (i.e., average) several input scans into one output scan at each station. The Stat Stack parameter allows you to set the number of scans that will be averaged. The value is typically set to 32, and the range is from 1 to 32768 in binary steps. Thus, when the value is set to 32 at each station, 32 scans will enter the system from the antenna and be summed

Material	T (ns/meters)	T (ns/feet)
Air	6.5	2
Ice	13	4
Snow	8	2.5
Water	59	18
Asphalt	14	4.5
Dry concrete	15	4.5
Wet concrete	23	7
Dry sands	13	4
Wet sands	25.5	7.5
Saturated sands	33	10
Dry sand & gravel	15.5	4.5
Frozen sand & gravel	14.5	4.5
Dry loamy/clayey soils	10.5	3
Dry mineral/sandy soils	16	5
Organic soils	52.5	16
Wet sandy soils	32	9.5
Frozen soil/permafrost	16	5
Tills	22	6.5
Peats	51.5	15.5
Wet clay	34	10.5
Dry clay	13	4
Dry granite	14.5	4.5
Wet granite	16.5	5
Wet basalt	19	6
Volcanic ash	23.5	7
Potash ore	15.	4.5
Dry bauxite	33	10
Syenite porphyry	16	5
Travertine	18.5	5.5
Coal	14	4
Dry limestone	15.5	4.5
Wet limestone	18.5	5.5
Wet sandstone	16	5
Dry salt	16	5

Approximate two-way travel time values of various materials

TABLE 1

NOTE:

When manually adjusting the gain curve, if the gains are set correctly, the largest signals (reflections) in the oscilloscope display should be 75% the width of the display and the data screen should show mostly (60% to 80%) red, orange and yellow reflections. The colors described above are based on color table 2. If you use a different color table the correct gain colors will be different.

GAIN POINTS

The number of gain points can be set from 1 to 8, and is normally set between 3 and 5. You may want to use fewer gain points (2 or 3) for shallow scans (5-15ns) made with our high-frequency, high resolution antennas for detecting steel reinforcing bars or mesh in concrete. Conversely, you may want to use more gain points (6 or 8) to allow greater adjustment flexibility when doing deep investigations (200-1000+ns).

POSITION

This parameter controls the vertical position of the surface reflection in the data viewing window. The surface reflection is the place in time where the radar pulse leaves the antenna, and enters the subsurface. It can therefore be considered to be "time zero", and its position should be at the top of the scan. When **Position** is set to Auto Mode, the system will attempt to identify the surface reflection and place it at the top of the data viewing window. The surface reflection is always a very strong reflection. The gain parameter should be set to **Auto** when using the Auto Position.

Note that the ability of the system to correctly identify the surface reflection depends upon the antenna selected and the ground conditions. It is important to check that the system has correctly identified the surface reflection. This is done by manually moving the scan down the viewing window by decreasing the range by a few nanoseconds. If the Auto Position has correctly identified the surface reflection, these data should be a nearly flat line (no signal) at the top of the scan above the surface reflection as you move the scan down the viewing window. If, as the scan is moved down the viewing window, more data appears above, then the Auto Position has not found the surface reflection. You should continue to move the scan down the window until the data becomes a nearly flat line at the top of the screen. The large reflection just below the flat data zone will be the surface reflection. The gain should be set to **Manual** when manually adjusting the scan position.

To manually move the data scan up or down in the window, set Position to **Manual**. A fourth column will appear which will allow you to move the scan. The Step parameter controls how much the scan is moved up and down and is changed using the *Right* → and *Left* ← arrow keys. Use the *Up* ↑ arrow key (increase time in ns) to move the data scan up in the window, and use the *Down* ↓ arrow key (decrease time in ns) to move the data scan down in the window. Gain should be set to **Manual** when manually adjusting the position. When using Manual signal position, keep the gains at a minimum when searching for the transmit pulse.

surveys this filter should be set no greater than 5. If you are looking for very small objects in the near subsurface (like wire mesh reinforcing in concrete), you should turn this filter off by setting it to zero. For subsurface layer mapping, the value of this parameter may be increased but is normally less than 20.

HOR BKGR RM

The Hor Bkgr RM (horizontal background removal) filter is used to improve the recognition of small targets and dipping reflectors.

This process filters the data horizontally by removing horizontal noise bands and reflecting layers. This filter **SHOULD NOT** be used in Data Collection Mode because it removes the surface reflection and any other real horizontal reflections.

When this parameter is highlighted, a fourth column appears. The input value is number of **Scans.** This is an IIR (infinite impulse response) running average subtraction filter. The filter works by taking an average of the data and subtracting the average from each scan. The smaller the selected filter value the more effect the filter has.

This filter is best used in playback when looking for point targets and there are significant horizontal noise bands. Use the *Cursor* to measure the width in terms of the number of scans of the largest point target and set the Hor Bkgr RM filter to this value. The filter will remove all horizontal banding that is equal to or longer than the set value of this parameter, provided there is no change in amplitude or depth of these horizontal signals.

SCAN

This menu item sets the parameters of the data scans. These parameters are samples/ scan, bits/sample and scans/second. **Scan** can be set to **Auto** (automatic) or **Manual** using the *Enter* ↵ key.

When in Auto Mode, the parameters are automatically set by the system. The samples/ scan will be set to 512, the bits/sample to 8 and the scans/second to 32, unless factory setups have been chose. In this case, the samples/scan and bits/sample may differ.

When in Manual Mode, the parameters, samples/scan, bits/sample and scans/second appear in the third column. The user can now manually set these parameters.

SAMP/SCAN

This parameter sets the number of data samples in a vertical scan. When it is highlighted, a fourth column appears which allows you to change the value of the parameter. The samp/scan can be set to 128, 256, 512, 1024, or 2048.

This value is normally set to 512 samples/scan which is the best value for most applications. However, for each antenna frequency there is a maximum value that the range should be set when recording 512 samples/scan and occasionally you may wish to set the range beyond this value. In this case you must increase the samples/scan to a higher value, otherwise your data will be under-sampled or aliased (i.e., resolution will be lost).

This maximum permissible range when recording 512 samples/scan is calculated by the following formula:

SAMPLESSCAN SETTING	SCANS/SECOND CHOICES
128	16,24,32,48,64
256	16,24,32,48
512	16,24,32
1024	16,24
2048	16

The normal setting is 32 scans/second. When surveying on foot at approximately 1 meter (3 feet) per second, a setting of 32 scans/second will result in a data scan about every 3 cm (1 inch) along the ground surface. If you wish to increase your scan density, you should walk slower. For example, a walking pace of 60 cm (2 feet) per second will result in a data scan approximately every 2 cm (1 inch) along the ground surface.

Often for large scale surveys (i.e., bedrock mapping), a coarser horizontal sampling is desired (ex. scans every 20 cm (8 inch)). In such cases, the scans/second value can be lowered to 24 or 16. This will result in smaller files, saving disk space and speeding up data transfer and post-processing.

Sometimes surveys are done pulling antennas with a vehicle at a higher rate of speed (ex. 2-5 meters (6-15 ft) per second). If a setting of 32 scans/second does not provide adequate horizontal sampling, you may increase the scans/second setting to 48 or 64. Note that scans/second settings of 48 and 64 are generally only available when the samples/scan are set to 128 or 256.

3.2.3 Setup Of Disk, Printer And Display Output Parameters

OUTPUT

When this command is highlighted, the Output Setup commands appear in the second column.

Pressing the *Enter* ↵ key when **Output** is highlighted will have no effect.

DISK

The hard drive storage device can be operated by highlighting the word **Disk** in the menu in the second row and toggling the **Disk On** or **Off** with the *Enter* ↵ key. If **Disk On** is selected, data will be stored to the hard disk, and the message "Out:D" will appear in the lower right corner of the screen. Each filename consists of the word FILE + a number (ex. FILE8), where the number increments for each file saved.

PRINT

This function turns the print output ON or OFF by using the *Enter* ↵ key. When it is turned ON, a third column of printer control commands appears. If the printer is not connected and turned ON, there will be a long delay (about a minute) when this parameter is selected.

PRINTER

Use this command to select the printer you will be using to print the data. The *Enter* ↵ key is used to toggle between the two selections, the GS-608P and the DPU5400.

The Linescan color display is the best display for most applications, especially good for identifying buried point targets (ex. drums, voids, pipes). The Linescan grayscale display is a good display to identify buried pipes. The Linescan color or gray shade displays are also good for displaying geologic layering. You should try different Linescan color and grayscale displays of the same data sets to determine which displays help you best with the interpretation.

Wiggle displays are sometimes better for interpreting layering in stratigraphic or geological surveys over long distances.

Oscilloscope display allows viewing of a single radar trace in detail.

LINESCAN DISPLAY PARAMETERS

COLOR TABLE

This parameter sets the Color (or gray scale) Table to be used to display the data. There are 15 possible Color Tables from which to choose. The *Enter* ↵ key is used to change the Color Table by toggling through the choices. The active Color Table is shown in the upper right hand corner of the SIR-2 screen, above the oscilloscope display.

Each Color Table consists of 16 colors, eight colors to represent positive amplitudes and eight colors to represent negative amplitudes. Each data point in a scan is represented by a color or gray shade depending upon its value. For example, using Color Table 2 low amplitude data values will show as black, high positive amplitudes as white and high negative amplitudes as gray. Thus, each scan results in a vertical line of colored (or gray shaded) dots on the SIR-2 screen. As each scan is collected by the system, the screen fills with vertical colored (or grayscale) lines to generate a profile image of the subsurface.

The Linescan color display is a good display for most applications, but it is especially good to identify buried point targets (ex. drums, voids, pipes). The Linescan grayscale display is a good display to identify buried pipes.

COLOR XFORM

This parameter sets the Color Xform (i.e., Transform) to be used to display the data. There are 8 possible Color Transforms from which to choose. The *Enter* ↵ key is used to change the transform. The active Color Transform is shown in the upper right hand corner of the SIR-2 screen.

The Color Transform determines whether the color scale applied to the radar signal's amplitude is linear, logarithmic, or exponential. This function can also be used to de-emphasize certain features. For example, in a logarithmic display, all low amplitude signals are assigned into a "compressed" lower color range, and the range of high amplitude signals is extended. If white represents a high amplitude signal, then there will be more white area for a given data set than a linear transform. Transforms 2 and 3 are used to emphasize weak reflections, and Transforms 4 and 5 are used to emphasize high amplitude reflections.

During system setup you should always use Color Xform 1, **which is linear**. Though not required, we recommend using Color Xform 1 when collecting data.

WIGGLE AND O-SCOPE DISPLAY PARAMETERS

SCALE

The scaling parameter defines the number of vertical lines used to represent each wiggle. The larger the scale value, the larger the wiggle representation.

In O-Scope Mode, the scaling parameter defines the section of the amplitude scale observed. When Scale is 1, the full amplitude scale is shown. When Scale is 2, only the bottom 50% of the amplitude scale is shown. When Scale is 3, only the bottom 30% of the amplitude scale is shown, etc. Increasing the Scale parameter allows one to progressively zoom in on the scan.

HOR SCALE

This parameter controls the Horizontal Scale labeling when in O-Scope Display Mode. The Horizontal Scale can be set to Time, Depth or None. If **None,** no horizontal scale will be printed in the Wiggle Mode, but a time scale will be printed in O-Scope Mode. If set to **Time,** the horizontal scale will be two-way travel time in nanoseconds.

If set to **Depth,** the horizontal scale will be in meters below the surface. Note that the depth scale is only approximate, based on the ASSUMED dielectric constant of the subsurface. See the DIEL parameter help for details.

SPACE

The spacing parameter sets how many vertical lines to move before printing the next wiggle. The higher the spacing value, the larger the spacing between wiggles.

STACK

The stacking refers to the number of incoming scans to stack for printing and display. This stacking does not apply to the recorded data. For example, a stack=4 will stack incoming scans into one (1) output scan for printing and display.

SKIP

Skip refers to the number of scans to skip for printing and display. This will have no effect on the scans recorded. For example, a skip=1 will skip every other scan for printing and display. A skip of 2 will print a scan, skip two scans and print the next scan.

3.3 Saving The System Parameter Settings For Future Use

After setting up the system operating parameters, you may wish to save the setting for future use. This is done by using the **Save Setup** command accessed from the **Setup** command in the COLLECT SETUP MENU block or the PLAYBACK SETUP MENU block. This command is at the bottom of the second column of commands.

SAVE SETUP

This command allows you to save all of the current system settings into a setup file. This file can then be recalled any time in the future and the system will be set to the current

CHAPTER 4: DATA COLLECTION

4.1 Preparing For Data Collection

After setting the operating system parameters, either automatically (see Sections 2.6 and 3.1) or manually (see Chapter 3), you are ready to collect data. As a reminder, we have listed below three critical parameters that you should verify:

- Is the **Disk Output** set to ON?
- Have you selected the correct Run Mode, either **Cont** (continuous), **SW** (survey wheel) or **Point** (point collection)? If you are using a survey wheel, has it been calibrated?
- If you are going to print data real-time, have you selected the correct printer and set **Print** to ON?

The COLLECT DATA MENU block is entered by pressing the *Run/Standby* key. What you see on the screen will depend upon the Run Mode you set.

- If the Run Mode is set to **Cont** (continuous), the system will begin collecting data and it will show across the screen. The file and scan number will appear in the lower right corner of the screen.
- If the Run Mode is set to **SW** (survey wheel), a scan will appear on the left end of the screen and the rest of the screen will remain blank until you begin to move the antenna/survey wheel.
- If the Run Mode is set to **Point** (point collection), a scan will appear on the left end of the screen. The rest of the screen will remain blank until you press the *Run/Standby* key or the marker to begin collect the next data point or survey station.

Section 4.2 describes continuous data acquisition and the parameters in the COLLECT DATA MENU block.

Section 4.3 will describe operation in the survey wheel controlled method and Section 4.4 will describe operation with the discrete data point method.

NOTE:

All users should read section 4.2.

4.2 Continuous Data Collection Method

The antenna is pulled continuously across the ground and the SIR-2 collects data at the number of scans per second selected. The data collection rate is independent of the speed at which the antenna is pulled. The resulting subsurface profile is referenced to a ground

2D GRID

This function is not operational at this time.

When 2d Grid is operational, this parameter is the line number that will be entered into the file header for the next line of data to be acquired.

STARTP

When 2d Grid is operational, this parameter is the Y coordinate value for the starting point of the line.

ENDP

When 2d Grid is operational, this parameter is the Y coordinate for the ending point of the line.

MARK INTVL

When 2d Grid is operational, this parameter is the Y coordinate interval between marker (survey grid) locations along the line.

STEP

For the parameter shown in the box above, this is the increment that will be used when changing the value of the parameter.

After the desired value of the parameter is set, press the *Enter* ↵ key to register that value in the system.

SELECT BLOCK

This command is used to select a block of data for printing or saving to disk. The block of data selected can be more than one screen size. When this command is selected, the command menu will disappear from the screen and a vertical line (cursor) will appear in the middle of the screen. Move the cursor using the *Right* → and *Left* ← arrow keys until it is on the first (leftmost) scan of the block of data you want to select. Press the *Down* ↓ arrow key to select the beginning of the block. Now, using the *Right* → arrow key, move the cursor until it is on the last (furthest to the right) scan of the block of data you wish to select. As you move the cursor, a cross-hatched diagonal highlighted area will appear over the data that will be selected. Press the *Up* ↑ arrow key to complete the selection. Press the *Print* 🖶 key to print the selected data block. Press *Enter* ↵ and then select **Dump To File** to save the selected block in a file. If **Disk On** is selected, data will be stored to the file with name FILENAME+L (a letter A-Z will be appended to the original file name), otherwise a file name with a number greater than the last file number recorded will be created. Press the *Enter* ↵ key to exit the **Select Block** function.

DUMP TO FILE

This command enables you to save a selected block to a separate data file. After a block of data has been selected, highlight the **Dump To File** command and press *Enter* ↵.

that station. Continue this collection technique until the end of the survey line. To stop collecting data at the end of a survey line press the *Run/Standby* key and hold for 2 seconds at the last station. This will close the file and the system will be ready for the next survey line.

NOTE:

The antenna marker switch cannot be used to close the data file at the end of a line in point mode. You must use the *Run/Standby* key to close the file in this mode. This is done by holding the *Run/Standby* key depressed for 2 seconds at the last station on the line.

CHAPTER 5: DATA PLAYBACK AND REVIEW

Selection of files to playback and setup of system display, processing and output during playback are done in the PLAYBACK SETUP MENU block. Playback of data already collected and stored on the disk is done via the PLAYBACK DATA MENU block.

5.1 Playback Setup Menu Block

This block is entered when the system is powered ON without an antenna, or from the PLAYBACK DATA MENU block by entering the **Setup** command. It is entered from the COLLECT SETUP MENU block by pressing the *Collect/Playback* key.

5.1.1 Setup For Processing Of Playback Data

During playback, Gains, Horizontal Filters and Vertical Filters can be applied to the data to improve interpretation.

SETUP

When this command is highlighted, a set of playback processing parameters that can be set appears in the second column. The commands that will appear in the second column are; **Processing, Play All, Save Setup, Recall Setup,** and **Show Setup.**

Pressing the *Enter* key when **Setup** is highlighted will have no effect.

When **Processing** is highlighted, the following options appear in a menu box to the right:

GAIN

This function is used to apply an additional gain constant to the data files as they are played back to the system or transferred to a computer. You can apply this gain if the data acquired is too low in amplitude and difficult to interpret.

Activating this function will cause a parameter setup box to appear to the right. Use this box to adjust the value of the gain to be applied.

When setting the values of the gain, the *Up* arrow is used to increase the value of the parameter and the *Down* arrow is used to decrease the value of the parameter. The *Right* and *Left* arrows are used to increase or decrease the increment when setting the gain values. The gain values are in units of decibels (dB). Every 6 decibel increase is equivalent to doubling the amplitude of all points in the signal.

SHOW SETUP

Displays the current system setup parameters.

5.1.2 Data Display And Printing During Playback

There are three types of displays available during playback, Linescan, Wiggle and O-Scope. These displays can be printed during playback on the DPU-5400 (Seiko Model DPU5400 4" thermal plotter) or the GS-608P (OYO Model GS-608P 8" thermal plotter).

OUTPUT

When this command is highlighted, the output setup commands appear in the second column. Pressing the *Enter* ↵ key when **Output** is highlighted will have no effect.

PRINT

This function turns the print output ON or OFF by pressing the *Enter* ↵ key. When it is turned ON, a third column of printer control commands appears.

DISK

Disk ON writes the playback file to the hard drive and appends a letter to the filename each time the file is saved.

XFER

See Section 7.3.1.

PRINTER

Use this command to select the printer you will be using to print the data. The *Enter* ↵ key is used to toggle between two selections, the OYO Model GS-608P 8" thermal plotter, and the Seiko Model DPU5400 4" thermal plotter. Make sure the printer cable is connected and the printer turned ON before selecting the printer.

The maximum real-time scan rate when printing is 32 scans/sec.

HORIZONTAL ZOOM

This parameter stretches the data printout in the horizontal direction. The possible values are 1, 2, 3, or 4 and the *Enter* ↵ key is used to change the value.

A value of 1 means that each scan of a data file is printed as one scan on the printer. A value of 2 means that each scan of a file is output as 2 duplicate scans on the printer. A value of 3 means that each scan of file is output as 3 scans on the printer and a value of 4 means 4 scans are printed for each scan in a data file.

When in Linescan Mode the DPU5400 and the GS-608P print 200 and 203 scans per inch respectively. The SIR-2 video display displays 94 scans per inch. The Horizontal Zoom setting of 2 will give the best match between the aspect ratio of the video screen and that of the printout.

ORIENTATION

This parameter controls the orientation of the data as it is printed on the paper. The orientation can be Normal or Flipped and is changed by pressing the *Enter* ↵ key.

data with multiple colors, with Color Xform 5, which emphasizes the high data amplitudes and will decrease the amount of color representing the data.

During system setup you should always use Color Xform 1 (linear). We also recommend using Color Xform 1 when collecting data.

During data playback Color Xform 2 is useful when viewing low amplitude regions and Color Xform 4 is useful when the objective is to see only high amplitude targets (i.e., metal, or voids).

VERT SCALE

This parameter controls the vertical scale labeling. The vertical scale can be set to Time, Depth or None. If **None** is selected, no vertical scale will be printed. If set to **Time,** the vertical scale will show two-way travel time in nanoseconds.

If set to **Depth,** the vertical scale will display meters below the surface. Note that the depth scale is only approximate, and based on an *assumed* dielectric constant value for the subsurface. See the Diel parameter help for details.

DIEL

This parameter is the value of dielectric constant used to convert two-way travel time to depth. The value can range from 1 to 81 or more and varies greatly with electrical and physical properties of the subsurface materials. Note: The default dielectric value for a depth scale is 1. Be sure to select an appropriate dielectric value before collecting/playing back data.

WARNING: Dielectric constant values for various materials and the resulting depth scales are only approximations. For a description of methods for estimating the dielectric constant of the subsurface at your site, see your training notes.

Approximate dielectric constants for various common materials follow:

SPACE

The spacing parameter determines how many vertical line spaces to skip before printing the next wiggle. The higher the spacing value, the larger the spacing between wiggles. This function will have the effect of lengthening a radar profile.

STACK

Stacking refers to the number of incoming scans to stack (add) for print and display purposes only. Stacking does not apply to the recorded data. For example, setting Stack = 4 will stack 4 incoming scans into one (1) output scan for printing and display. This function will have the effect of shortening a radar profile.

SKIP

Skip refers to the number of scans to skip for print or display purposes only. This will have no effect on recorded data. For example, a Skip = 1 will skip every other scan for printing and display. A Skip of 2 will print (display) a scan, skip two scans and print (display) the next scan. This function will have the effect of shortening a radar profile.

5.1.3 Selecting Files For Playback

Activate the **Files** command and then from the second column choose **Select** or **Select All** (the **Select All** command is at the bottom of the second column). The **Select** command allows you to choose individual files or groups of files to playback. This is accomplished by highlighting the file or files you want to playback with the cursor, and then pressing the *Enter* ↵ key. This action will place a box around the file(s) you have selected, and the SIR-2 will play them back when the *Run/Standby* is pressed. The first time the *Run/Standby* key is pressed, the file header will be displayed. The second time the *Run/Standby* key is pressed, the file will play back. If the file is longer than one screen, you can scroll back and forth through the file using the *Right* → and *Left* ← arrow keys. The **Select All** command will select all files on the disk for playback.

5.2 Playback Data Menu Block

This block is entered from the COLLECT DATA MENU block by pressing the *Collect/ Playback* key. It is entered from the PLAYBACK SETUP MENU block by pressing the *Run/Standby* key.

REVIEWING THE CURRENT DATA FILE BY SCROLLING

If the current data file size is greater than one screen, the data file (up to the limit of system memory) can be reviewed using the SIR-2 scroll capability. Press the *Run/Standby* key to put the system in Standby. Use the *Right* → arrow key to view data to the left of the current data screen and use the *Left* ← arrow to view data to the right of the current data screen.

the cursor until it is on the last (right-most) scan of the block of data you wish to print. As you move the cursor, a cross-hatched diagonal highlight box will appear over the data that you select. Press the *Up* ↑ arrow key to input the end of the block you are interested in. Press the *Print* key to print the selected data block, or use the **Dump To File** command to save the selected block into its own file. If **Disk On** is selected, data will be stored to the file with name FILENAME+L (a letter A-Z will be appended to the original file name), otherwise a new file name with one higher number than the last file name will be created. Press the *Enter* ↵ key to exit the **Select Block** function.

DUMP TO FILE

This command enables you to save a selected block to a separate data file. After a block of data has been selected, highlight the **Dump To File** command and press *Enter* ↵.

DROP MENU

This command will cause the command menu to disappear, allowing the bottom of the data to be viewed.

GO TO SETUP

When the system is in the Collect Data Mode, selecting this command will put the system in the collect setup mode. When the system is in the Playback Data Mode, selecting this command will put the system in the Playback Setup Mode.