

EXHIBIT 5

USER'S MANUAL



SeeGullTM

High-Speed Drive Test Scanning Receiver

User's Manual

***Release 0.1
October 12, 1998***

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1. Introduction

This document is a user's manual for the *SeeGull*™ high-speed drive test-scanning receiver. It is a part of a documentation package that describes DTI's *SeeGull* and *SeeGull-DX*™ products and related applications.

This manual is organized into the following sections:

- Section 1** *Introduction (this section)* – defines the purpose and presents an overview of the manual
- Section 2** *References Cited* – Standards and other technical documents referred to in the present manual.
- Section 3** *Applicability* – lists the models of the *SeeGull* receiver that are covered by the manual and also system options.
- Section 4** *General Description and Compliance Statement* - a general description of the *SeeGull* receiver and the agency approval notice.
- Section 5** *System Configuration* – describes the required system configuration for the *SeeGull* receiver, connections, and PC and software requirements.
- Section 6** *SeeGull Installation* – describes how to integrate *SeeGull* in the user's test system.
- Section 7** *Operation and Software Interface* – describes how to use the *SeeGull* receiver.
- Section 8** *Technical Specifications.*

- Appendix A** *Ordering Information*
- Appendix B** *Support* – provides contact information for customer support and future upgrades



2. References Cited

1. The SeeGull™ Radio Scanner Applications Programming Interface (API) Specification. Release 0.3. DTI, November 5, 1997.
2. InSite™ Drive Test Data Collection Tool User's Manual. Release 1.0. DTI, May 20, 1998.
3. SeeGull-DX™ User's Manual. DTI, October 1998.
4. SeeGull™ Radio Interface Specification. DTI, May 1998.

3. Applicability

The present manual covers the SeeGull™ receiver: The SeeGull-DX™ receiver is covered by another manual [3].

Each of the two models comes in several protocol versions listed in section 8 and Appendix A. The differences between the options concern the operating frequency range, bandwidth, modulation type and measurement features, and additional equipment, such as GPS receiver board. All options share same circuit boards (different for SeeGull and SeeGull-DX), but may have different parts and software installed.



4. General Description

FCC WARNING STATEMENT:

SeeGull FCC ID: N7F1998SG001

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two 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.

Agency Notice

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

SeeGull™ is a dual-conversion super heterodyne radio receiver that includes a DSP processor for signal demodulation, data acquisition, and control functions. It is intended for planning, installation, and maintenance of wireless cellular telephone networks, as a test tool for signal strength and modulation measurements.

For a more detailed description of the unit refer to the block diagram of Fig. 1.

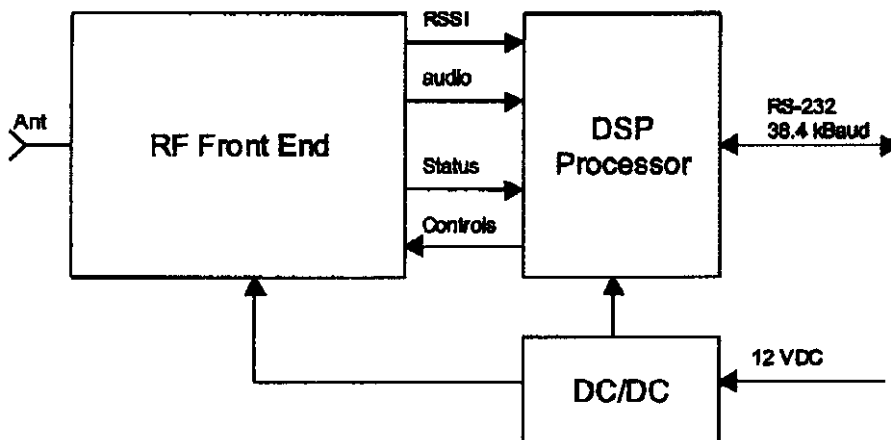


Fig. 1: Block diagram



The serial communication link allows the host (IBM PC, or a proprietary computer with an RS-232 interface) to control the operation of the scanner and receive the measurement results. If the host is an IBM PC or another Windows 95 computer, the application programmable interface (API) [1] included in the package makes writing the host software easy. An optional description (ICD) of the low-level serial protocol is available for non-PC applications.

A DC/DC converter on the signal board accepts a wide range of input DC voltages allowing operation from a car battery and wall AC/DC adapters.



5. System Requirements

Typical System

Depending on a user's requirements, various hardware and software components may be used in the scanning system along with the SeeGull™ scanner. However, in most cases, a typical configuration will include a host IBM or compatible PC connected to the scanner via a serial cable and running user's application software, which makes use of the DTI's API for communication with SeeGull™. This configuration is illustrated in Fig. 2.

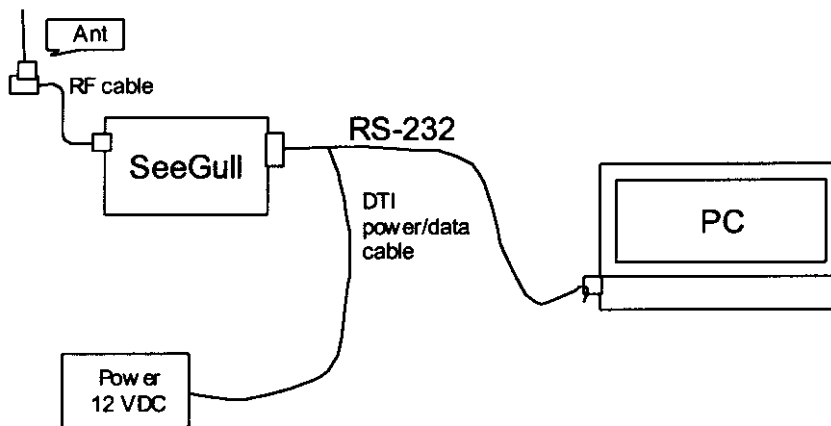


Fig. 2: Typical System Configuration

Antenna requirements:

3- dB dipole with a 50-Ohm impedance and SMA male connector at the end of the cable.

Power source requirements:

8 – 15 V DC; 0.5 A at 12 V. A car battery or another 12-V battery, or an AC/DC adapter.

PC requirements:

Pentium PC running Windows 95/98.

Software requirements:

Option 1:

User's proprietary software, if available, using the DTI API (included in the package) for communication with the scanner.

Option 2:



If a user does not have software written, an optional basic user interface program can be furnished by DTI ("InSite[™]"). See [2] for description. It allows basic control and data acquisition.

Other system configurations

In some cases, users connect SeeGull to computers other than IBM-compatible PCs. In this case, an optional low-level serial communication protocol information can be furnished with the scanner. That allows the user to write his or her own communication drivers.



6. Installation and Setup

There are 8 mounting holes on the side walls of the unit for mounting in the user's rack, as shown in the unit outline drawing of Fig. 3.

When installing the unit in a system enclosure, rack or case, good dissipation of heat should be provided to prevent the unit from overheating. As a rule, an unobstructed airflow by convection is needed and sufficient. The use of carefully designed thin-walled pouches for carrying the unit is allowed, but thorough testing of the temperature regime is highly recommended.

The following is how to connect the unit to the host PC and power source and begin collecting data:

1. Connect the antenna to the antenna SMA connector on the unit.
2. Connect the scanner to a PC serial port and the car cigarette lighter adapter using the DTI power/data cable. After the power is applied, the green LED on the unit lights up, after a short delay. If the light remains dark or blinks, the unit has failed the power-up test. Please consult the factory.
3. Install and start the PC program. If it is InSite[™], see [2] for specific instructions.
4. The system is ready and running.

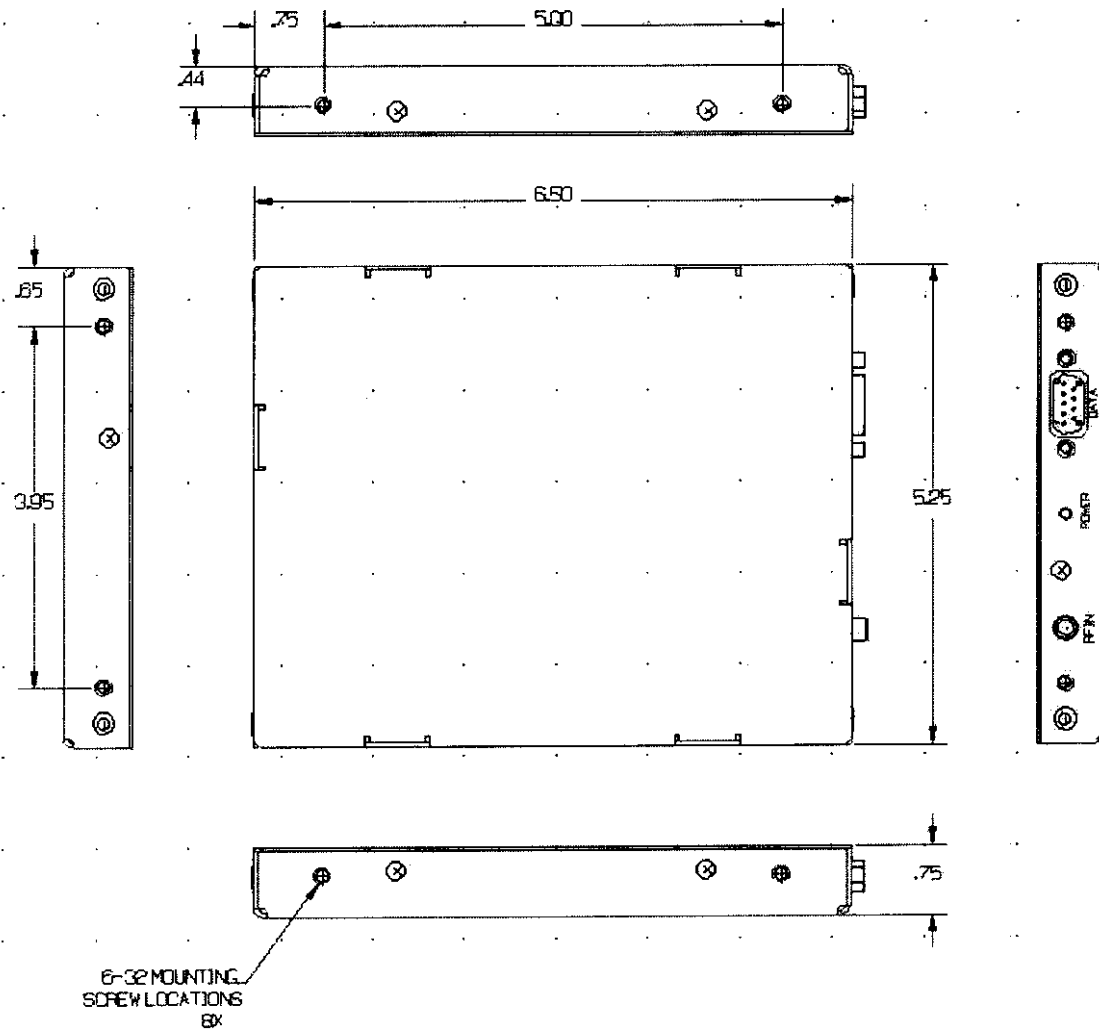


Fig. 3: SeeGull™ Mechanical Outline (for the outline of the units with the GPS option contact factory)



7. Operation and Maintenance

Calibration

SeeGull receivers are calibrated at the factory. The calibration data are stored in the internal non-volatile memory for each 1-dB step for the whole input signal dynamic range (see Technical Specification section later in this Manual). The calibration data are unaffected by a software upgrade process described later in this section. However, a re-calibration is **recommended every two years** in order to maintain the specified accuracy levels. Re-calibration is available as an optional service by DTI, or, in the case of large customers with many scanners in use, by the customer who is provided the necessary calibration software and a service manual by DTI.

Software Upgrades

SeeGull scanners store the application program in Flash memory, and accordingly the program can be upgraded. The upgrades may be needed to incorporate new features. Customers should contact the factory for the information on the available upgrades.

Operation: Controlling the Scanner and Acquiring Data

A unit is controlled, and the measurement data are received via the RS-232 communication link running at 38.4 kBaud. Depending on the PC software used to work with the unit, the following is applicable:

- If the user incorporates the scanner into their test system running Windows™: use the DTI application programming interface (API) described in [1].
- If the user uses the DTI's basic control program, InSite™, use the operating manual [2] for instructions.
- In case the user has a system that runs an OS other than Windows™, use the description of the serial interface and messages given in [4].



8. Technical Specification

The receiver parameters for all the versions of the SeeGull™ scanners are given in Table 1, the measurement specifications are in Table 2.

Table 1: SeeGull Radio Parameters

#	Parameter	EAAPS	NAMES	ETACS	IDEN	PAGING
Radio Interface Specifications						
1	Rx Band [Mhz]	869.04 - 893.97	869.03 - 893.98	917.0125 - 949.9875	851.0125 - 866.0125	917.0125 - 949.9875
2	Channel spacing [Khz]	30	10	25	25	6.25
3	Rx Sensitivity [dBm]	-116 @ 12 dB SINAD	-116 @ 12 dB SINAD	-116 @ 12 dB SINAD	-116 @ 12 dB SINAD	-116 @ 12 dB SINAD
4	Rx Intermod Attenuation [dB]	65	65	65	65	65
5	Rx Spurious Rejection [dB]	88	88	88	88	88
6	Adjacent Channel Desensitization [dB] typ.	50	43	45	48	35
7	Alternate Channel Desensitization [dB]	60	50	55	58	42
8	Internally Generated Spurious, [dBm] max	-116 except	-116 except	-116 except	-116 except	-116 except
9	# of spurious-affected channels, max	10	10	10	10	10
10	Conducted local oscillator [dBm]	-75	-75	-75	-75	-75
11	Frequency Stability in Temperature Range [ppm]	+/- 2.5	+/-1.0	+/- 2.5	+/- 2.5;	+/- 1.0
12	Antenna impedance [Ω]	50	50	50	50	50
13	Antenna connector	SMA	SMA	SMA	SMA	SMA



Table 2: Measurement Specification

#	Parameter	EAMPS	NAMPS	ETACS	IDEN	PAGING
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Measurement Specifications

14	Measurement Signal Range [dBm]	-116 to -30	-116 to -30	-116 to -30	-116 to -30	-116 to -30
15	Extended Measurement Range [dBm]	-120 to -20	-120 to -20	-120 to -20	-120 to -20	-120 to -20
16	Basic Accuracy ¹⁾ , max [dB]	+/- 1	+/- 1	+/- 1	+/- 1	+/- 1
17	Frequency Error in Rx Band [dB]	+/- 1	+/- 1	+/- 1	+/- 1	+/- 1
18	Temperature Error in Operating Range [dB]	+/- 1	+/- 1	+/- 1	+/- 1	+/- 1
19	Max Measurement Error with Option 1HA ⁴⁾ [dB]	+/- 1	+/- 1	+/- 1	+/- 1	+/- 1
20	Contiguous RSSI Scanning Rate [channels/sec] typ.	260	230	260	260	230
21	Non-Contiguous RSSI Scanning Rate [channels/sec] typ.	220	150	165	155	150

NOTES:

1. At 250 +/- 50; at calibration channel
2. Scanning rate is selectable based on required update rate and precision.
3. For more detailed data see SeeGull-CDMA Data Sheet
4. High Accuracy option guarantees +/- 1 dB measurement error in the temperature range for any channel.

Appendix A The SeeGull™ Support

For Customer Support, contact DTI:

Phone: (301) 515-0036
Fax: (301) 515-0037

Email: dtisupport@dynamatele.com

Appendix A.

EMC Test Equipment Calibration Information

Equipment	Serial Number	Date Calibrated	Calibration Due
Antenna Research Associates, Inc. Biconical Log Periodic Antenna LPB-2520 (Site 1)	044	6/5/98	6/5/99
Antenna Research Associates, Inc. Biconical Log Periodic Antenna LPB-2520A (Site 2)	1118	6/5/98	6/5/99
Antenna Research Associates, Inc. Horn Antenna DRG-118/A	1010	9/9/98	9/9/99
Boonton Modulation Meter 82AD/01A/S10/S13	167219	4/28/98	4/28/99
Dressler Coupling/Decoupling Network CDN-T2	9607004B	10/15/97	10/15/98
Dressler Coupling/Decoupling Network CDN-M2	9606003B	5/19/98	5/19/99
Dressler Coupling/Decoupling Network CDN-M3	9607013B	3/17/98	3/17/99
Dressler Coupling/Decoupling Network CDN-S1	9609002B	4/21/98	4/21/99
Dressler Coupling/Decoupling Network CDN-S9	9610003C	3/17/98	3/17/99
Dressler Coupling/Decoupling Network CDN-S25	9612001C	4/20/98	4/20/99
Electromechanics Company Model 3301B Active Rod Antenna	2428	4/14/98	4/14/99
Electromechanics Company Model 3104P Biconical Antenna	3192	6/5/98	6/5/99
Electromechanics Company Biconical Antenna Model 3110B	1078	6/5/98	6/5/99
Electromechanics Company Biconilog Antenna Model 3143	1184	11/9/95	N/A
Electromechanics Company Log Periodic Antenna Model 3146A	1129	6/5/98	6/5/99
Electromechanics Company Log Periodic Antenna Model 3146	1709	6/5/98	6/5/99
Electromechanics Company Field Probe Set Model 7122	9202-1094	10/6/98	10/6/99
Electromechanics Company 8116-50-TS-100-N	962509	9/4/98	9/4/99
Electromechanics Company 8116-50-TS-100-N	962510	9/4/98	9/4/99
Electromechanics Company 8116-50-TS-100-N	962507	9/4/98	9/4/99
Electromechanics Company 8116-50-TS-100-N	962508	9/4/98	9/4/99
ENI 50 Watt Power Amplifier: 550LA	9306311	N/A	N/A
Fischer Custom Communications EM Injection Clamp F-203I	266	3/17/98	3/17/99
Haefely PEFT Generator Model PEFT.1	081 979-10	7/01/98	7/01/99
Haefely PSD 25B Electrostatic Discharge Simulator	082597-35	9/29/98	9/29/99
Haefely PSURGE 6.1 Surge Generator with Haefely PHV 30.2 Hybrid Network. With 16.1 Coupling/Decoupling Network	083295-08	10/5/98	10/5/99
Hewlett-Packard Preamplifier: HP 8447D	2727A06203	5/21/98	5/21/99
Hewlett-Packard Preamplifier: HP 8449B	3008A00729	11/20/97	11/20/98
Hewlett-Packard Quasi-Peak Adapter: HP 85650A (Site 1)	2811A01283	8/5/98	8/5/99
Hewlett-Packard Quasi-Peak Adapter: HP 85650A (Site 2)	3303A01786	6/24/98	6/24/99
Hewlett-Packard RF Preselector: HP 85685A (Site 1)	2817A00744	8/5/98	8/5/99
Hewlett-Packard RF Preselector: HP 85685A (Site 2)	3221A01395	6/24/99	6/24/99
Hewlett-Packard Function Generator: 3312A	1432A12339	5/13/96	N/A
Hewlett-Packard Spectrum Analyzer: HP 8564E	3643A00657	7/21/98	7/21/99
Hewlett-Packard Spectrum Analyzer: HP 8568B (Site 2)	2926U07140	6/24/98	6/24/99
Hewlett-Packard Spectrum Analyzer: HP 8568B (Site 1)	2928A04750	8/5/98	8/5/99
Hewlett-Packard Spectrum Analyzer: HP 8593A	3009A00739	6/15/98	6/15/99
Hewlett-Packard Signal Generator: HP 8656B	2926U8140	9/9/98	9/9/99
Hewlett-Packard Signal Generator: HP 8648C	3347A00242	5/20/98	5/20/99
Instruments for Industry 100 Watt Amplifier: SMX100	2095-0896	N/A	N/A
Kalmus 100 Watt Amplifier: 757LCB-CE	8256-1	N/A	N/A
KeyTek ECAT System w/E411, E4552 and E501 Modules	9305232	12/8/97	12/8/98
KeyTek ESD Simulator: MZ-15/EC	9604310	4/28/98	4/28/99
Kikusui PCR 2000L AC Power Supply	15030820	7/8/98	7/8/99
Racal Dana Frequency Counter 1992 S/N:	2806	2/19/98	2/19/99
Solar Electronics Current Probe 9215-1N	935005	1/19/98	1/19/99
Solar Electronics LISN 8012-50-R-24-BNC	8379493	8/13/98	8/13/99
Solar Electronics LISN 8028-50-TS-24-BNC	N/A	8/13/98	8/13/99
Solar Electronics LISN 8028-50-TS-24-BNC	N/A	8/13/98	8/13/99
Tektronix Oscilloscope TDS-540	B0101162	4/22/98	4/22/99
Wandel & Goltermann E-Field Probe Model EMR-200	K-0024	6/15/98	6/15/99
WLL S1 Coupling Network	CN01	3/25/98	3/25/99