RF 15E "CE" APPROVAL FILE
FROM: DAVE BETTS
DATE: October 20, 2004

CE regulations allow for self-certification when there is reasonable technical basis for doing so.

The RF 15E is built using the same components, the same processor, the same board and display, and the same housing as the PMAX15X. The PMAX15X passed CE testing (EN50081-1: 1992 and EN50082-1: 1997) in December of 2003 (Retlif Test Report R-10134, December 4, 2003). The RF receiver uses the same components in the same location as the RF 10E which passed ETSI EN 300 220-3 V1.1.1(2000-09), ETSI EN 301 489-3 V1.4.1(2002-08) and R&TTE 99/5/EC (Retlif Test Reports R-9915-1, -2, -3, July 2003)

The same microprocessor, operating at the same speed, is used in both products. The software used in the RF 15E is essentially the same code as used in PMAX15X.

Based on this information we certify that the RF15E meets CE requirements.

Dave Betts
R&D Manager
Techsonic Industries Inc.

RETLIF TESTING LABORATORIES
795 Marconi Avenue
Ronkonkoma, NY 11779

CERTIFICATE OF CONFORMANCE
FCC Part 15, Subpart B
Industry Canada, ICES-003

December, 2003

Issued to: Techsonic Industries
5 Hummingbird Lane
Eufaula, Alabama 36027

Reference: Retlif Report Number R-10134

RETLIF TESTING LABORATORIES hereby acknowledges that compliance testing in accordance with the below listed standards was performed on a representative sample of the equipment listed below. RETLIF TESTING LABORATORIES further acknowledges that the test sample listed below was found to be in compliance with these standards.
This certificate is hereby issued to the above-named grantee and is valid only for the equipment identified below.

Manufacturer:	Techsonic Industries 5 Hummingbird Lane Eufaula, Alabama 36027
Equipment Tested:	Fishfinder
Model Number:	PMAX 15
Brand Name:	Humminbird
Equipment Type:	Digital Device
Equipment Class:	B
Authorization:	Verification

Note(s): 1) See attached report R-10134 for details and/or conditions pertaining to this certificate.
2) Conforms to the requirements of:
FCC:
Para. 15.109(a) for Radiated Emissions, 30 MHz to 1GHz
IC:
Section 5.5, Radiated Emissions, 30 MHz to 1 GHz

CERTIFICATE OF CONFORMANCE EUROPEAN COMMUNITY COUNCIL DIRECTIVE 89/336/EEC

Issued By: ***RETLIF TESTING LABORATORIES***
795 Marconi Avenue
Ronkonkoma, NY 11779

Date of Issue: December, 2003

Issued To: Techsonic Industries
5 Hummingbird Lane
Eufaula, Alabama 36027

Reference: Retlif Report Number R-10134

RETLIF TESTING LABORATORIES *hereby acknowledges that compliance testing in accordance with the below listed standards was performed on a representative sample of the equipment listed below.* ***RETLIF TESTING LABORATORIES*** *further acknowledges that the test sample listed below was found to be in compliance with these standards.*
This certificate is hereby issued to the above named grantee and is valid only for the equipment identified below.

Manufacturer:	Techsonic Industries
Equipment Tested:	Fishfinder
Model Number:	PMAX 15
Brand Name:	Humminbird
Product Type:	Generic Light Industrial

Note(s): 1) See attached report R-10134 for details and/or conditions pertaining to this certificate.
2) Conforms to the emissions requirements of: EN 61000-6-3; 2001

EN 55011:1998	Group 2, Class B, Radiated Emissions, 150 kHz to 30 MHz
EN 55022:1998	Class B, Radiated Emissions, 30 MHz to 1GHz

3) Conforms to the immunity requirements of EN 610006-1; 2001:

EN 61000-4-2:1995	Electrostatic Discharge
EN 61000-4-3:1997	Radiated Immunity
EN 61000-4-4:1995	EFT/Burst, Power and I/O Leads
EN 61000-4-6:1996	Conducted Immunity, Power and I/O Leads

Retlif Testing Laboratories

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WASHINGTON
REGULATORY OFFICE
703-533-1614 Fax 703-533-1612

December 12, 2003

Techsonic Industries
5 Humminbird Lane
Eufaula, Alabama 36027

Attention: Mr. Dave Betts

Dear Sir:

Enclosed you will find the Retlif Testing Laboratories Test Report R-10134 which covers the EMC testing of your Fishfinder, Model PMAX 15. This testing was performed and test report generated in accordance with your Purchase Order Number 343011.

Thank you for the opportunity to be of service to you. Should you have any questions regarding the enclosed report please feel free to contact me.

Very truly yours,

RETLIF TESTING LABORATORIES

M. White

Michelle White
Administrative Coordinator
mwhite@retlif.com
nyemclab@retlif.com

Enc. (as stated)

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REGULATORY OFFICE
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EMC TEST REPORT
ON
Techsonic Industries
Fishfinder
Model PMAX 15

CUSTOMER NAME: Fishfinder

CUSTOMER P.O.: 343011

DATE OF REPORT: December 4, 2003

TEST REPORT NO.: R-10134

TEST START DATE: November 7, 2003

TEST FINISH DATE: November 17, 2003

TEST TECHNICIANS: N. Dragotta, T. J. Schneider

TEST ENGINEER: T. J. Schneider

SUPERVISOR: R. J. Reitz

REPORT PREPARED BY: M. White

GOVERNMENT SOURCE INSPECTION: Not Applicable

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Table of Contents

Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Thomas J. Schneider
EMC Test Engineer

Richard Reitz
Laboratory Manager

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Non-warranty Provision
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Test Program Summary

Job Number:	R-10134
Customer:	Techsonic Industries
P.O. Number:	343011
Test Sample:	Fishfinder
Model Number:	PMAX 15

Test Specifications:
The tests outlined in the table below were performed in accordance with the requirements of EN 55011:1998, EN 55022:1998, EN 61000-6-1:2001and EN 61000-6-3:2001.

Mode of Operation:
The Fishfinder was powered by 12 VDC, with Depth Transducer in a 3' Column of water, showing the following readings on the display; Depth: 3', Temperature: 72°F. All setting were defaulted to "Auto" mode.

Susceptibility Criteria:
Any change or loss of displayed information or any change in depth greater than +/- 1 foot was considered as a sign susceptibility.

Test Methods:
The following table lists the test methods that were performed on the Fishfinder and the corresponding test results:

Paragraph	Standard	Test Method	Results
6.1	EN 55011 and EN 55022	Radiated Emissions, Class B	Complied
6.2	EN 61000-4-2	Electrostatic Discharge	Complied
6.3	EN 61000-4-3	Radiated Immunity	Complied*
6.4	EN 61000-4-4	Electrical Fast Transient/Burst, Power and I/O Leads	Complied
6.5	EN 61000-4-6	Conducted Immunity, Power and I/O Leads	Complied*

*After the modifications described in paragraph 4.4 here were preformed, the Fishfinder was found to comply.

Revision History

Revision	Date	Pages Affected

Administrative Data

Retlif Testing Laboratories Test Report Number: R-10134

Test Specification: EN 55011
EN 61000-6-1:2001
EN 61000-6-3:1998

Customer: Techsonic Industries
5 Humminbird Lane
Eufaula, Alabama 36027

Test Sample: Fishfinder
Model Number: PMAX 15

Applicable Documents: See Paragraph 2.0

Classification: Not Classified

Testing Dates: November 7, 2003 to November 17, 2003

Date of Report: December 4, 2003

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1.0 Scope

The purpose of this testing program was to determine the compliance of a Fishfinder, Fishfinder Model PMAX 15, manufactured by Humminbird, as described in paragraphs 4.0 and 5.0 of this report, to the emissions and immunity requirements of European Community Council Directive 89/336/EEC, the EMC Directive.

2.0 Applicable Documents

The following documents form a part of this test report to the extent specified herein:

RCM-001	- Retlif Testing Laboratories, Calibration Manual.
RQM-001	- Retlif Testing Laboratories, Quality Assurance Manual.
ANSI/NCSL Z-540:	- Calibration Laboratories and Measuring and Test Equipment - General Requirements.
MIL-STD-45662A	- Calibration System Requirements.
EN 61000-6-1:2001	- Electromagnetic Compatibility - Generic Standards - Immunity for Residential, Commercial and Light - Industrial Environments.
EN 61000-6-3:2001	- Electromagnetic Compatibility - Generic Standards - Emission for Residential, Commercial and Light - Industrial Environments.
EN 55011:1998	- Specification for Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical (ISM) Equipment.
EN 55022:1998	- Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
EN 61000-4-2:1995	- Electrostatic discharge immunity test.
EN 61000-4-3:1997	- Radiated, radio frequency, electromagnetic field immunity test.
EN 61000-4-4:1995	- Electrical fast transient burst immunity test.
EN 61000-4-6:1996	- Conducted disturbances induced by radio frequency fields, immunity test.

3.0 General Requirements

3.1 Test Environment

All testing was performed at Retlif Testing Laboratories facility. Each test method was performed in the environment specified within the test standard. Where the test environment deviated from that specified, it is noted in the applicable test method.

3.1.1 Shielded Enclosures

All testing which required the use of a shielded enclosure was performed in a solid steel, double wall, modular type. The attenuation characteristics of the enclosure were in accordance with MIL-STD-285. All input power lines to the enclosure were filtered utilizing filters manufactured in accordance with MIL-F-15733F and tested in accordance with MIL-STD-220A. The walls of the enclosure were treated with a combination of carbon impregnated foam and ferrite tile. for EN 61000-4-3 and the floor between the Fishfinder and test antenna was treated with tile and the enclosure met the field uniformity requirements contained therein.

3.1.2 Radiated Emissions

3.1.2.1 Preliminary

Preliminary radiated emissions measurements were performed in a shielded enclosure.

3.1.2.2 Formal

Formal radiated emissions testing was performed on an open area test site (OATS). The test site measured 12M x 20M and was covered with a conducting ground plane constructed of one quarter inch ground cloth. The equipment under test was placed in an RF transparent enclosure on top of a 1.2 Diameter, flush mounted, metallic turntable. An 80 cm high non-metallic table was mounted to the turntable for placement of portable equipment. The test site met the test site attenuation requirements specified in CISPR 16 throughout the range of measurement frequencies.

3.2 Test Instrumentation

A listing of all test instrumentation utilized is contained within each applicable test method. These listings indicate the model, manufacturer, frequency range, last calibration date and calibration due date of all instrumentation utilized. All instrumentation utilized was calibrated prior to use in accordance with the procedures set forth in Retlif Testing Laboratories standard manuals RCM-001 and RQM-001 that are in accordance with the requirements of ANSI/NCSL Z-540.

3.3 Detector Function

For the radiated emissions testing described herein a Quasi-Peak detector function was utilized as specified in CISPR16.

4.0 Test Sample Description

4.1 General

The test sample was a Fishfinder, Fishfinder Model PMAX 15, manufactured by Humminbird. The test sample was powered by 12 VDC. The Fishfinder measured 11cm x x14cm x 6cm and weighed 0.7kg. The Fishfinder consisted of the following:

Description	Manufacturer	Model No.	Part No.
Fishfinder	Techsonic	PMAX 15	N/A
Depth Transducer	Techsonic	XHS 9 20T	440278-1
Temperature Transducer	Techsonic	TSW	730000-1

4.2 Port Configurations and Input/output Cables

During testing the power and I/O ports of the Fishfinder were configured as follows:

Cable From	Length	S/U[1]	Cable Type	Cable Routed to
Fishfinder, Power Input	1m	U	2-Conductor Power	12 VDC Battery
Fishfinder, Depth Input	6m	S	Multi-Conductor Signal Power	Dual Beam Transducer
Fishfinder, Temperature Input	6m	U	Multi-Conductor Signal Power	Speed, Temperature Transducer

[1]Shielded or Unshielded

All ports not listed were unterminated

4.3 Leads Tested

The following leads of the Fishfinder's AC Adapter were tested during the course of this testing program as specified in each applicable test method:

Power Input Leads:

- 12 VDC Hot
- 12 VDC Return
- Both

Input / Output Leads:

- Depth Transducer Cable
- Temperature, Speed Cable

4.4 Modifications Made to Test Sample

The following modifications were made to the Fishfinder during the course of this testing program:

Radiated Immunity

Software change to disable (change to outputs) temperature A-D inputs during sonar receive.

Conducted Immunity

Improved circuit grounds in microprocessor area.

5.0 Test Sample Parameters

5.1 Mode of Operation

During all testing of the Fishfinder was powered by 12 VDC, with Depth Transducer in a 3' Column of water, showing the following readings on the display; Depth: 3', Temperature: 72°F. All setting were defaulted to "Auto" mode.

5.1.1 Support Equipment

The Fishfinder utilized a 12 VDC Battery as support equipment for this testing program.

5.2 Performance Criteria

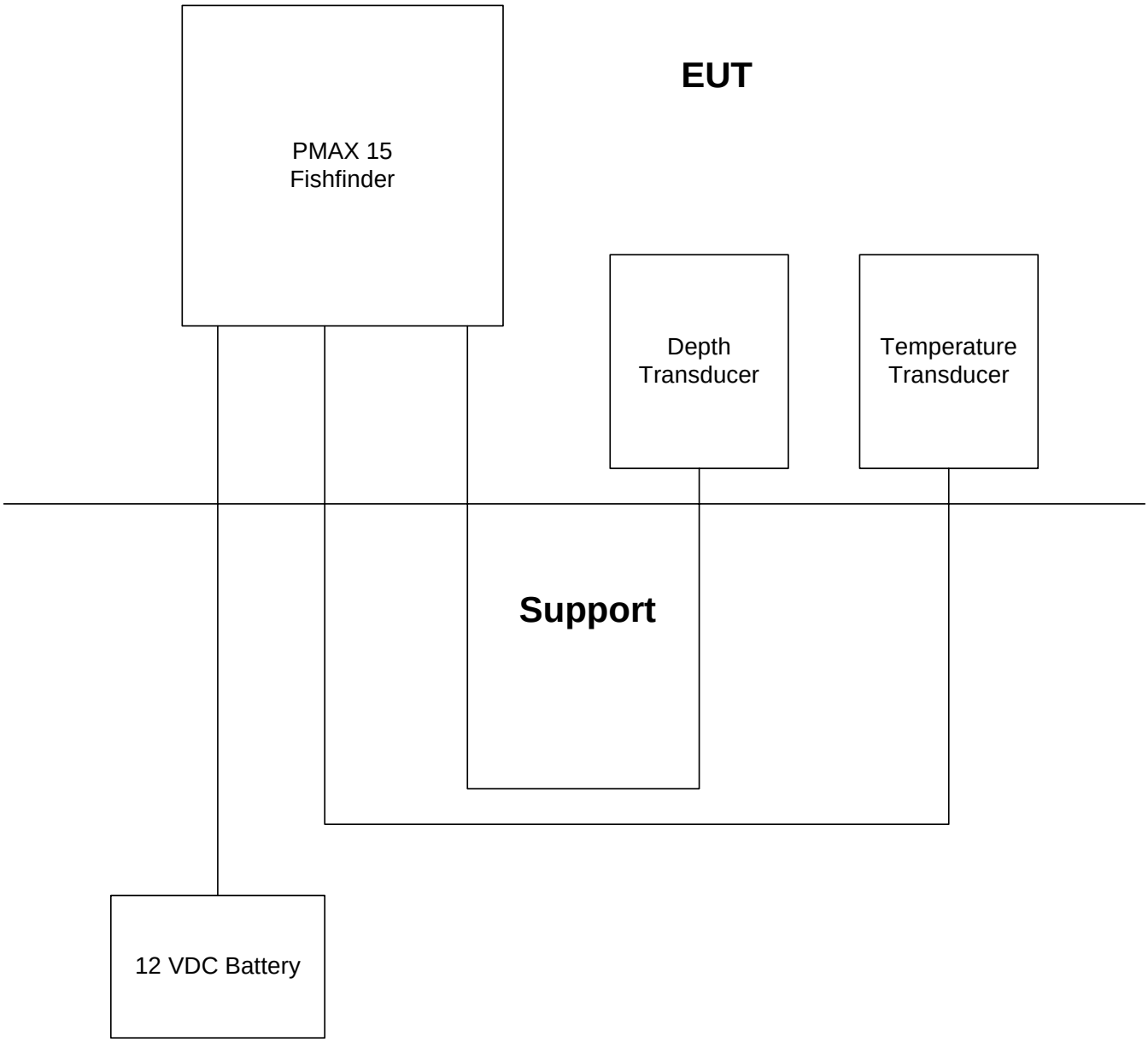
During all immunity testing, the Fishfinder was monitored for any change or loss of displayed information or any change in depth greater than +/- 1 foot was considered as a sign susceptibility.
The following performance criteria, as outlined in EN 61000-6-1, were used to determine compliance:

EN 61000-4-2:1995	- Performance Criteria B
EN 61000-4-3:1997	- Performance Criteria A
EN 61000-4-4:1995	- Performance Criteria B
EN 61000-4-6:1996	- Performance Criteria A

Performance Criteria A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Figure 1
Test Sample Block Diagram



6.0 Test Methods Performed and Test Results

Test Method Summary

The tests outlined in the table below were performed in accordance with the requirements of EN 55011:1998, EN 61000-6-1, EN 61000-6-3.

Paragraph	Standard	Test Method	Results
6.1	EN 55011 and EN 55022	Radiated Emissions, Class B	Complied
6.2	EN 61000-4-2	Electrostatic Discharge	Complied
6.3	EN 61000-4-3	Radiated Immunity	Complied*
6.4	EN 61000-4-4	Electrical Fast Transient/Burst, Power and I/O Leads	Complied
6.5	EN 61000-4-6	Conducted Immunity, Power and I/O Leads	Complied*

*After the modifications described in paragraph 4.4 here were preformed, the Fishfinder was found to comply.

See individual test methods contained in paragraphs 6.1 through 6.5 of this test report for a full description of the test procedures utilized and the results obtained.

6.1 Radiated Emissions, EN 55022 and EN 55011, 150 kHz to 1 GHz

Purpose
The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the Fishfinder via radiation from the enclosure and connected cabling in the frequency range of 150 kHz to 1 GHz.

Test Limits
The limits shown in the table below were used to determine compliance of the Fishfinder to the radiated emissions requirements on EN 55011 and EN 55022:

Frequency Range	**Class B** Quasi-Peak Limits @ 3 Meters
150.0 MHz to 30.0 MHz	39 - 3 dBµA/m*
30.0 MHz to 230 MHz	40.5 dBµV/m
230 MHz to 1 GHz	47.5 dBµV/m

*Limit specified at 10M.

Test Setup
The Fishfinder was configured as shown in the attached photograph and detailed in Paragraph 4.2 herein. This configuration was based on the test setup shown in Retlif Testing Laboratories Drawing No. CISPR22-RE. The Fishfinder was placed on an 80 cm high wooden test stand above the ground plane of the shielded enclosure for preliminary measurements and the OATS (Open Area Test Site) for final measurements. The rear of the Fishfinder, including support peripherals, was aligned and flush with the rear of the test stand. The test stand was placed directly on the flush mounted turntable. The turntable positions were relative to the Fishfinder as follows: When facing the Fishfinder the front is at 0°, the rear is at 180°, and the left side is at 270°. The test stand was situated such that the boundary of the Fishfinder was located 3 meters from the measuring antenna. The Fishfinder was arranged on the test stand as specified in Paragraph 4.2 herein. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the Fishfinder. Excess interface cable length was draped over the back edge of the test stand. Draped cables closer than 40 cm to the conducting ground plane were bundled in the center in a serpentine fashion using 40 cm lengths to maintain a 40 cm height above the ground plane. The AC power cables of the Fishfinder and non-EUT equipment did not require bundling. The AC power cables were draped over the rear edge of the test stand and routed down to the AC mains outlet located on top of the turntable. Excess power cable length was left on the surface of the turntable. The antenna was located a distance of 3 meters from the envelope of the Fishfinder. The antenna was connected via coaxial cable to a broadband pre-amplifier, which in turn was connected to a spectrum analyzer and/or a CISPR compliant receiver located in the measurement equipment room. The spectrum analyzer display for each frequency range was recorded on a graphics plotter.

Test Procedure
With the test instrumentation and the Fishfinder configured as stated above, the following steps were performed:

1. The Fishfinder was arranged with cables terminated as specified in Paragraph 4.2 herein.
2. The spectrum analyzer was configured to display the frequency range of 30 MHz to 80 MHz.
3. With the test antenna horizontally polarized, the Fishfinder cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the Fishfinder was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. Once the configuration, both cabling and operating mode, which produced maximum emissions was determined the Fishfinder was maintained in this configuration for the duration of testing.

Test Procedure (contd.)

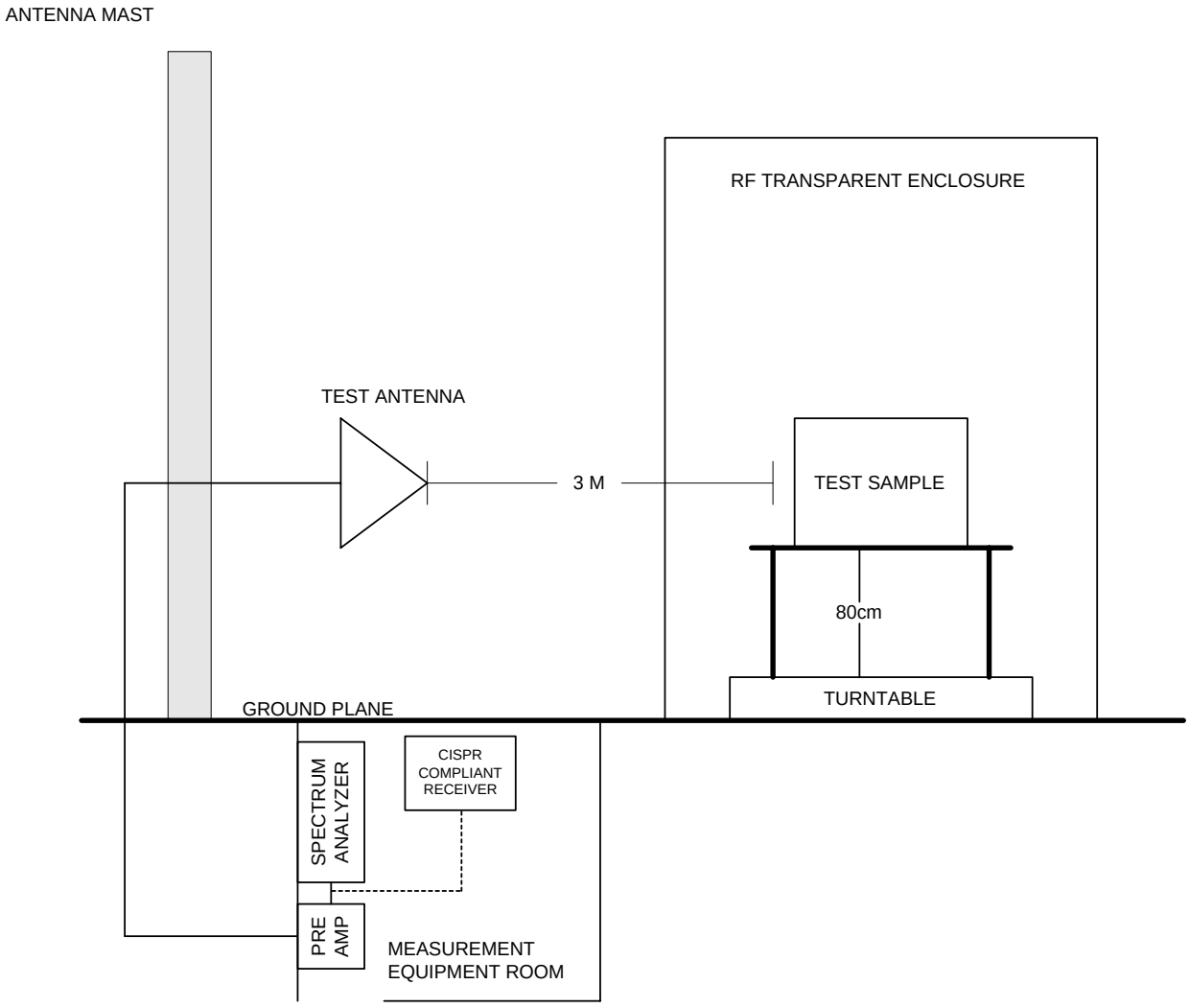
6. A max hold spectrum analyzer trace, trace A, was obtained with the Fishfinder operating.
7. The Fishfinder was powered off and a max hold spectrum analyzer trace, trace B, was obtained to denote the ambient interference levels.
8. The two obtained traces were analyzed in order to determine which recorded emissions were produced by the Fishfinder.
9. At each frequency upon which an emission was determined to be from the Fishfinder the following steps were performed in order to further maximize the observed emissions:
    a. The test antenna height was varied from 1 to 4 meters.
    b. The test antenna polarization was varied from vertical to horizontal.
    c. The Fishfinder was rotated 360° about its vertical axis.
10. The test antenna RF cable was connected to the CISPR compliant receiver.
11. For all emissions found to be within 20 dB of the specified limit, the following was recorded on the x-y plot:
    a. Frequency of emission
    b. Quasi-Peak detector receiver meter reading.
    c. Correction factor consisting of antenna factor, cable loss and pre-amp gain.
    d. Test antenna height and polarization.
    e. Turntable position.
12. Steps 6through 11 above were repeated for the following frequency ranges: 80 to 130 MHz, 130 to 200 MHz, 200 to 500 MHz, 500 t0 750 MHz and 750 MHz to GHz.
13. The Biconilog antenna was replaced with the loop antenna mounted on a one (1) meter high tripod.
14. The spectrum analyzer was configured to display the frequency range of 150 kHz to 30 MHz.
15. Steps 6 through 11 were repeated with the loop antenna mounted on a one (1) meter high tripod.

Test Results

The Fishfinder was found to comply with the requirements specified for this method. No emissions which exceeded the specified Class B limits of EN 55022 and 55011 were observed. See the following single data sheet for a full presentation of the results obtained.

Test Setup Photograph
Radiated Emissions

Figure RCISPR22-RE
General Test Setup Radiated Emissions



EQUIPMENT LIST

EN55022 Radiated Emissions, Class B, 30 MHz to 1 GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	10/01/2003	10/01/2006
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	06/12/2003	06/12/2004
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	07/23/2003	01/23/2004
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/05/2003	03/05/2004
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	07/23/2003	01/23/2004
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/12/2003	06/12/2004
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	07/24/2003	07/24/2004
767	Biconilog	EMCO	26 - 2000 MHz	3142B	09/04/2003	09/04/2004

Test Method:	EN55011 and EN55022 Radiated Emissions, Class B, 150kHz to 1GHz		
Customer:	Techsonic Industries Inc.	**Job No.**	R-10134
Test Sample:	Fish Finder		
Model No.:	Pmax15	**Serial No.**	N/A
Operating Mode	Powered by 12VDC, sensing the temperature, depth and speed transducers.		
Test Specification	EN55022;1998, ITE-Radio disturbance characteristics- Limits and methods of measurement		
Technician:	R. Hull	**Date:**	November 10, 2003

Notes: Test Distance: 3 Meters Temp: 6.0°C Humidity: 37.0%
Detector: Quasi-Peak, Extrapolation Factor= 1/D (-10.5 dB)

Test Freq.	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Extrapolated Reading	**Limit**
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/M	dBuV/M	dBuV/M
0.15							*39
|							*
|							*
30.00							*3
30.00							30
|							|
|							|
|							|
|							|
114.3	V / 1.0	270	25.0	5.6	30.6	20.1	|
146.6	V / 1.0	270	23.0	5.7	28.7	18.2	|
|							|
|							|
|							|
|							|
|							|
230.00							30
230.00							37
|							|
|							|
|							|
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|							|
|							|
|							|
|							|
1000.00							37

The EUT was scanned from 150 kHz to 1 GHz.
The emissions observed from the EUT do not exceed the specified limits.
All emissions not recorded were more than 20 dB below the specified limit.
*=For the range of 150 kHz to 30 MHz the test limit was in dBuA/M

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Retlif Testing Laboratories

Retlif Job Number R-10134

6.2 Electrostatic Discharge, EN 61000-4-2

Purpose
The purpose of this test method was to determine the ability of the Fishfinder to withstand electrostatic discharges applied directly to the Fishfinder and those applied to objects adjacent to the Fishfinder.

Test Parameters
The critical parameters of the electrostatic discharge generator and the applied voltage waveform are shown below:

Air:

Discharge Voltage:	8.0kV
Discharge Polarity:	Positive/Negative
Discharge Rate:	1 PPS
Rise Time:	0.7 to 1 nanosecond
Pulse Duration:	20 nanoseconds
Storage Capacitor:	150 picofarads
Discharge Resistor:	330 Ohms

Contact:

Discharge Voltage:	4.0kV
Discharge Polarity:	Positive/Negative
Discharge Rate:	1 PPS
Rise Time:	0.7 to 1 nanosecond
Pulse Duration:	20 nanoseconds
Storage Capacitor:	150 picofarads
Discharge Resistor:	330 Ohms

Test Setup
The test instrumentation and Fishfinder were configured as shown in the attached photographs and detailed in Paragraph 4.2 herein. This configuration was based upon the general test setup shown in Retlif Testing Laboratories Drawing Number REN61000-4-2 and the requirements of EN 61000-4-2. The Fishfinder was placed on an 80 cm high wooden test stand above the test enclosure floor. The Fishfinder was placed on an insulating support 0.5 mm in thickness. The insulating support was placed on a horizontal coupling plane. The horizontal coupling plane was bonded to the earth reference plane by means of a ground strap with two 470 kOhm series resistors, one at either end. The vertical coupling plane was connected to the ground reference plane in the same manner. The Fishfinder was configured above the horizontal coupling plane as specified above.

Test Point Determination
The ESD generator was set to the continuous discharge mode. With the Fishfinder configured as stated above, all surfaces of the equipment were probed at a discharge rate of approximately 1 PPS in order to determine areas on the equipment which were susceptible. After this probing and/or an engineering evaluation the test points the test points specified on the following data sheets on the Fishfinder were selected for formal testing.

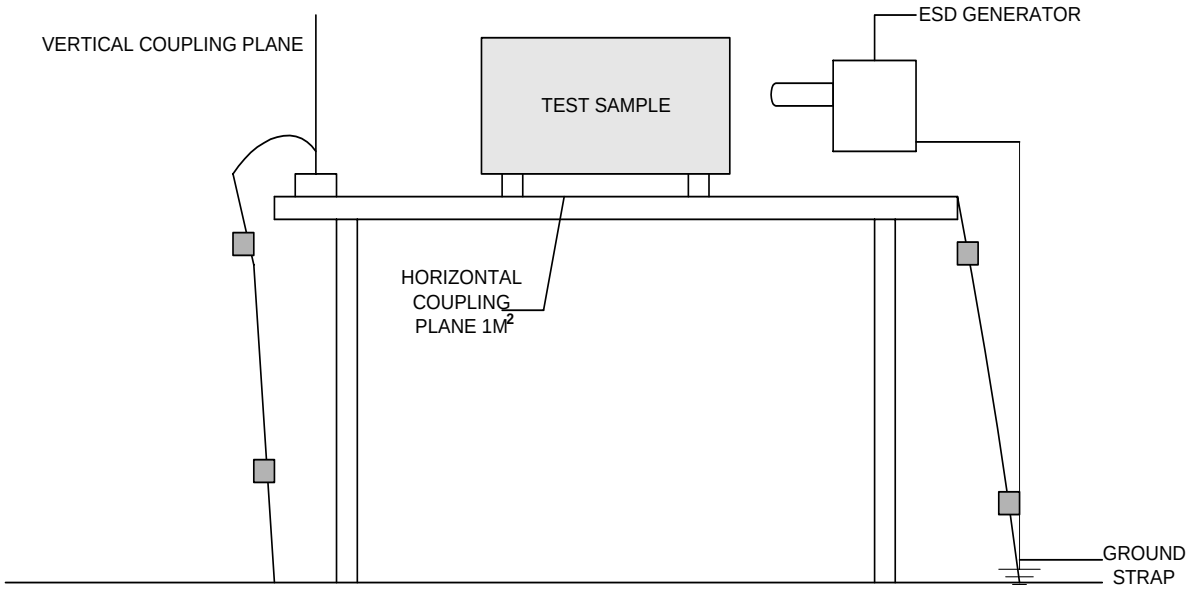
Test Procedure
With the Fishfinder and test instrumentation configured as stated above, the following steps were performed:

1. The ESD generator was configured to apply 2 kV contact discharges.
2. 10 positive contact discharges were then applied to each test point indicated in the contact discharge test points indicated on the following data sheet at a repetition rate of 1.0 PPS.
3. The ESD generator was configured to apply negative discharges and step 2 was repeated.
4. The output of the ESD generator was increased to 4 kV and steps 2 and 3 were repeated.
5. The ESD generator was then configured to apply 2 kV air discharges.
6. 10 positive air discharges were then applied to each test point indicated in the contact discharge test points indicated on the following data sheet at a repetition rate of 1.0 PPS.
7. The ESD generator was configured to apply negative discharges and step 6 was repeated.
8. The output of the ESD generator was increased to 4 kV and steps 6 and 7 were repeated.
9. The output of the ESD generator was then increased to 8 kV and steps 6 and 7 were repeated.

Test Results
The Fishfinder complied with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance criteria B when subjected to the electrostatic discharges specified above. See the following two data sheets for a complete presentation of the results obtained.

Test Setup Photographs
Electrostatic Discharge

Figure R61000-4-2
General Test Setup Electrostatic Discharge



NOTE: TEST SAMPLE AND VERTICAL COUPLING PLANE PLACED ON 0.5MM INSULATED SUPPORTS

= 470kOHMS

EQUIPMENT LIST

EN61000-4-2; 1995 Electrostatic Discharge

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
323	Power Supply	Electro	0 - 32 vdc	NFB	8/1/2003	8/1/2004
553	ESD Gun	Schaffner	N/A	NSG-435	3/15/2003	3/15/2004

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	**IEC 61000-4-2:1995, Electrostatic Discharge**		
CUSTOMER:	Techsonic Industries	JOB No.:	R-10134
TEST SAMPLE:	Fishfinder		
MODEL No.:	PMAX 15	SERIAL No.:	Unit 2B
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments.	PARAGRAPH:	Table 1; section 1.3
OPERATING MODE:	Powered on and displaying temperature, depth and boottom information.		
TECHNICIAN:	N. Dragotta	DATE:	November 12, 2003
LEAD TESTED:	O		
NOTES:	The EUT was subjected to ten positive 2kV, & 4kV direct contact discharges at a rate of 1 pps at each of the test points listed below. Temperature: 23° C Humidity: 36%		

Repetition Rate	Threshold	Level	Test Point
PPS	kV		
1.0	----------	2.0 / 4.0	Fishfinder Display: (rear) -Mounting screws (4)
			Temperature/Speed Transducer: -Rear plate
			-Mounting screws (2 front)
			Horizontal Coupling Plane, -Front side of EUT
			-Left side of EUT
			-Right side of EUT
			-Rear side of EUT
			Vertical Coupling Plane, -Front side of EUT
			-Left side of EUT
V	V	V	-Right side of EUT
1.0	----------	2.0 / 4.0	-Rear side of EUT
			The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by Performance Criteria B of EN 61000-6-1;2001, as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

CONFIDENTIAL

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	**IEC 61000-4-2:1995, Electrostatic Discharge**		
CUSTOMER:	Techsonic Industries	JOB No.:	R-10134
TEST SAMPLE:	Fishfinder		
MODEL No.:	PMAX 15	SERIAL No.:	Unit 2B
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments.	PARAGRAPH:	Table 1; section 1.3
OPERATING MODE:	Powered on and displaying temperature, depth and boottom information.		
TECHNICIAN:	N. Dragotta	DATE:	November 12, 2003
LEAD TESTED:			
NOTES:	The EUT was subjected to ten positive 2kV, 4kV, 8kV direct air discharges at a rate of 1 pps at each of the test points listed below. Temperature: 23° C Humidity: 36%		

Repetition Rate	Threshold	Level	Test Point
PPS	kV		
1.0	----------------	2.0 / 4.0 / 8.0	Fishfinder Display: (front) -Display sindow; inside seams (4)
|	|	|	Outer seams (4)
|	|	|	-Buttons; Power
|	|	|	Left scroll
|	|	|	Right scroll
|	|	|	-Seam bwtween front and rear cover panels
|	|	|	(rear) -Connectors; Power input
|	|	|	Depth Transducer
|	|	|	Temperature/Speed Transducer
|	|	|	
|	|	|	Depth Transducer: -Base
|	|	|	-Cable input
|	|	|	
|	|	|	Temperature/Speed Transducer: -Wheel
V	V	V	-Base
1.0	----------------	2.0 / 4.0 / 8.0	-Cable input
			The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by Performance Criteria B of EN 61000-6-1;2001, as defined by the manufacturer.

CONFIDENTIAL

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

6.3 Radiated Immunity, EN 61000-4-3

Purpose
The purpose of this test method was to determine if the Fishfinder was so constructed as to have an adequate level of intrinsic immunity to radiated electromagnetic fields in the frequency range of 80 MHz to 1000 MHz, enabling the Fishfinder to operate as intended.

Test Parameters
The critical parameters of the applied electromagnetic field are as shown below:

Frequency Range	80 to 1000 MHz
Field Strength	3 V/M
Modulation	1kHz, 80%, AM
Test Distance	2 Meters
Polarization of Applied Field	Horizontal & Vertical

Test Setup
The test instrumentation and Fishfinder were configured as shown in the attached photographs and detailed in Paragraph 4.2 herein. This configuration was based upon the general test setup shown in Retlif Testing Laboratories Drawing Number R61000-4-3 and the requirements of EN 61000-4-3. The Fishfinder was placed on an 80 cm high wooden test stand above the test enclosure floor. The cabling of the Fishfinder was routed to the edge of the 1.5 by 1 meter test stand top, then directly to the enclosure floor. If necessary, lossy ferrite tubes were placed around the Input/Output cables prior to entering the support room, in order to absorb RF. The field strength generating antenna was placed at a distance of two meters from the periphery of the Fishfinder and the associated cabling. An RF signal generator was connected to the input of the RF power amplifier. The output of the RF power amplifier was connected to an RF coupler which in turn was connected to the test antenna. A power meter was connected to the forward power port of the RF coupler. The RF signal generator and power meter were connected to an automation computer in order to maintain the required field strength during testing. The test enclosure ceiling, walls and portions of the floor were treated with a mixture of ferrite tile and carbon impregnated foam absorber. Prior to testing, the field was calibrated as specified in paragraph 6.2 of EN61000-4-3;1997. A uniform area, 1.5 M x 1.5 M, 80 cm above the ground plane, was established. Sixteen (16) evenly spaced calibration points were assigned within the 1.5 M x 1.5 M grid. The field was calibrated in both the Vertical and Horizontal polarizations in one percent steps in the frequency range of 80 MHz to 1000 MHz. The field was considered uniform if 12 of 16 points (75%) were within - 0dB to + 6 dB of nominal. Additionally, three percent of the frequencies were allowed to be within - 0 dB to + 10 dB of nominal. The following seven frequencies were found to be within this three percent window for the vertical polarization: 97.62 MHz, 98.59 MHz, 99.58 MHz, 100.57 MHz, 101.58 MHz & 102.59 MHz, for the horizontal polarization: 136.92 MHz. All other frequencies met the - 0 dB to + 6 dB criteria.

Test Procedure
With the Fishfinder configured as described above, the following steps were performed:

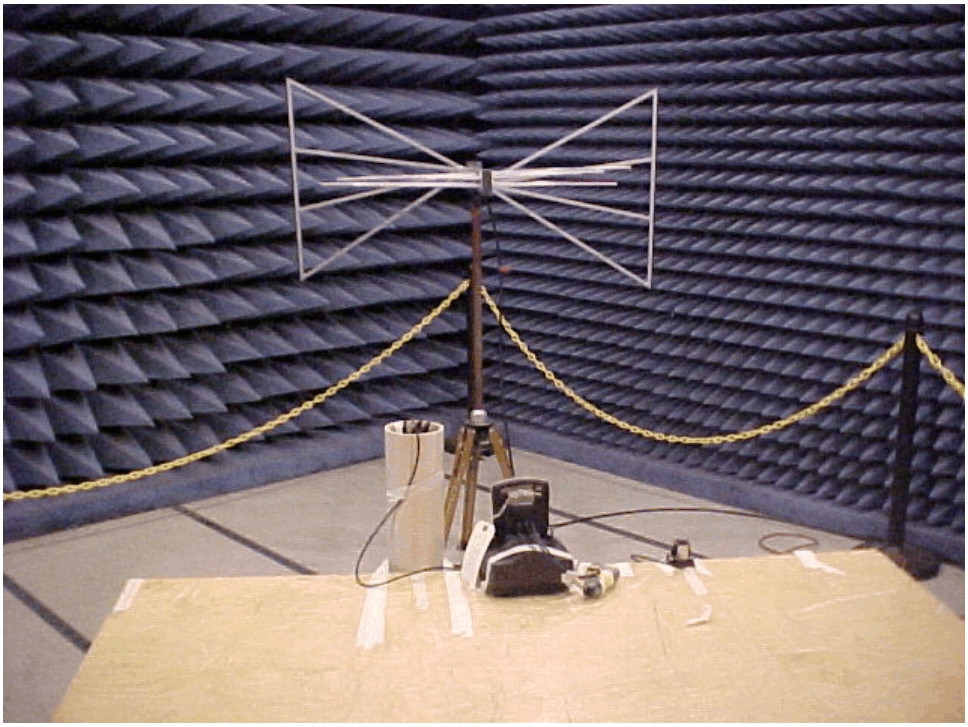
1. The biconilog test antenna was horizontally polarized facing the front of the Fishfinder.
2. The signal generator was adjusted for a frequency of 80 MHz and 80 % AM 1 kHz modulation.
3. The output level of the generator was increased until the power meter measured 3 V/M.
4. The automation computer was programmed to incrementally sweep the frequency range of 80 to 1000 MHz in step sizes not exceeding 1% of the fundamental.
5. The field strength, as measured on the power meter, was continuously adjusted as necessary by the automation computer to maintain the test level at 3 V/M utilizing the power meter readings obtained during calibration.

Test Procedure (contd.)

6. The Fishfinder was continuously monitored for degradation or malfunction as specified in paragraph 5.2.
7. The biconilog antenna was vertically polarized and steps 2 through 6 were repeated.
8 . Steps 1 through 7 were repeated on each of the rear, top and bottom sides of the test sample.

Test Results

After the modifications described in paragraph 4.4 herein were performed, the Fishfinder complied with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance Criteria A when subjected to the radiated electromagnetic energy specified above. See the following single data sheet for a complete presentation of test results.



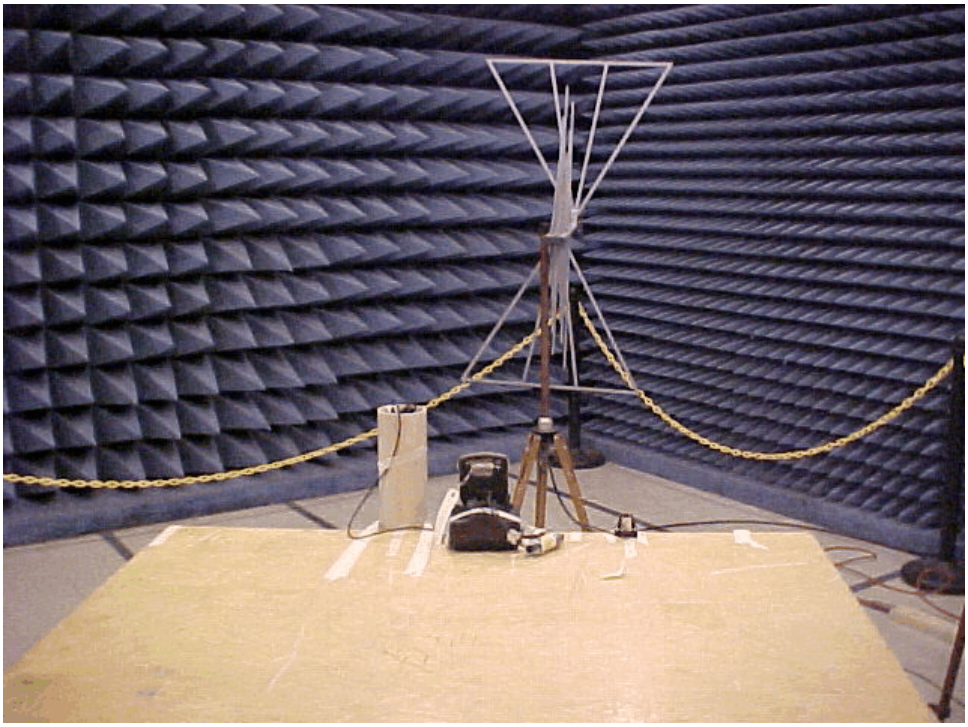
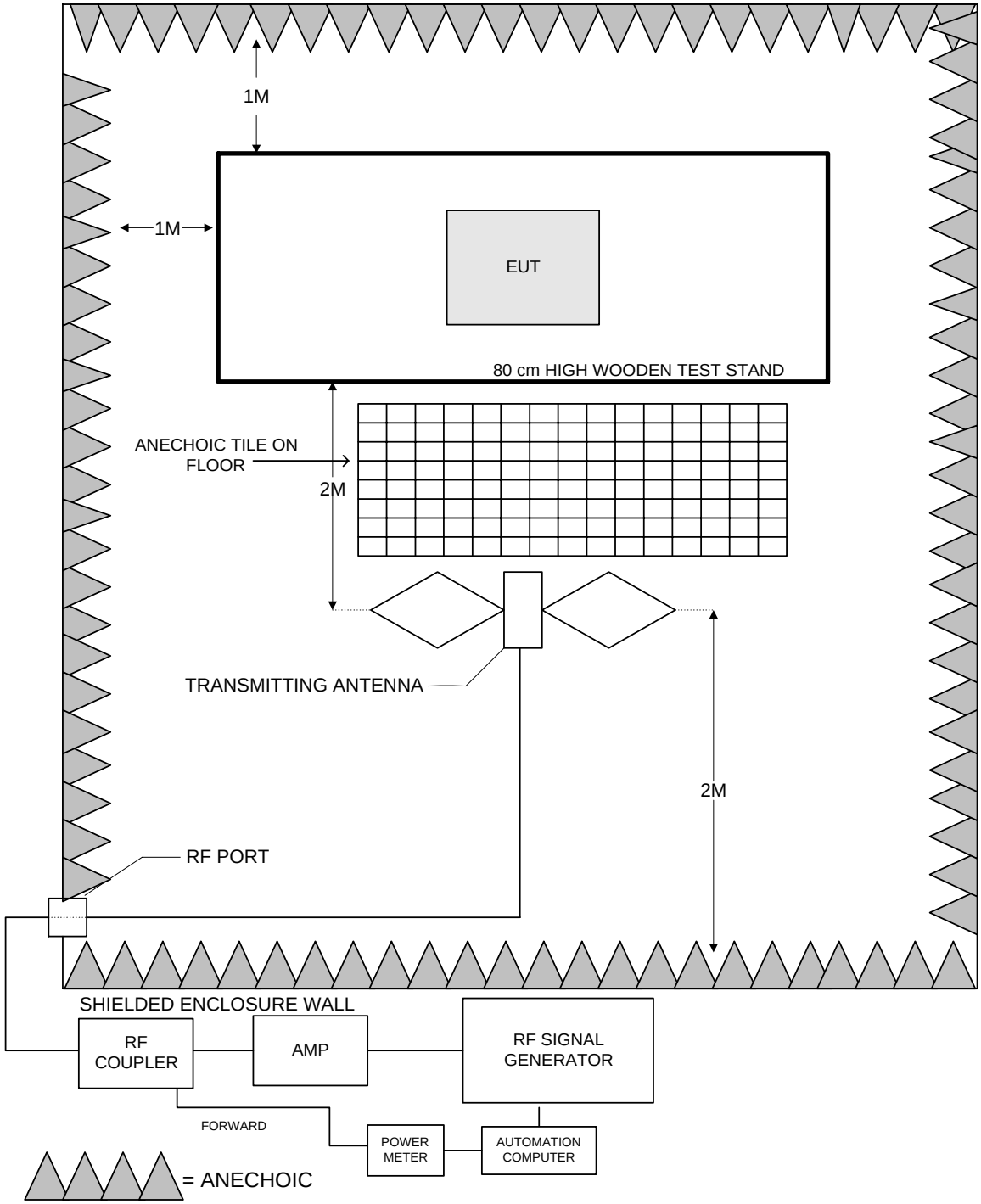


Figure R61000-4-3
Radiated Immunity



EQUIPMENT LIST

EN61000-4-3, Radiated Immunity, 80 MHz to 1 GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
224	Shielded Enc. (24x20x12)	Universal Shielding	100dB, 14kHz -	1	3/31/2003	3/31/2004
224B	Shielded Enc. (8x8x12)	Universal Shielding	100dB, 14kHz -	1B	3/31/2003	3/31/2004
323	Power Supply	Electro	0 - 32 vdc	NFB	8/1/2003	8/1/2004
648	Power Meter	Boonton Electronics	10 kHz - 100 GHz	4232A	1/8/2003	1/8/2004
649	Power Sensor	Boonton Electronics	10 kHz - 8 GHz	51011-EMC	11/25/2002	11/25/2003
651	High Power Dir Coupler	Werlatone Inc.	.01-1000 MHz/200W	C5571	10/28/2003	10/28/2004
709	Automation Computer	ECS.Inc.	150 MHz Pentium	11779023		
742	Amplifier	Amplifier Research	80 - 1000 MHz/250W	250W1000	2/8/2003	2/8/2004
762	AM/FM Signal Generator	Marconi Instru.	10 kHz - 1.2 GHz	2023	7/29/2003	7/29/2004
767	Biconilog	EMCO	26 - 2000 MHz	3142B	9/4/2003	9/4/2004

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	**IEC 61000-4-3: 1997, Radiated Immunity (80 MHz to 1000 MHz)**
CUSTOMER:	Techsonic Industries — JOB No.: R-10134
TEST SAMPLE:	Fishfinder
MODEL No.:	PMAX 15 — SERIAL No.: 3A
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for Residential, Commercial, and Light-Industrial Environments — PARAGRAPH: Table 1; section 1.2
OPERATING MODE:	Powered on and displaying temperature, depth and bottom information.
TECHNICIAN:	R. Hull/T. Schneider — DATE: November 17, 2003
LEAD TESTED:	ć
NOTES:	The indicated frequency range was stepped at a maximum rate of 1% of the fundamental frequency. The front and Rear faces of the EUT were tested facing the test antenna. Temperture: 26 ° C. Humidity: 37%

Test Frequency	Limit	Threshold	Antenna Polarization	Modulation
MHz	Volts/meter			
80	3	----------	Vertical and Horizontal	1 kHz AM, 80%
V	V	V	V	V
1000	3	----------	Vertical and Horizontal	1 kHz AM, 80%

The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by Performance Criteria A of EN 61000-6-1, as specified by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

6.4 Electrical Fast Transient / Burst, EN 61000-4-4

Purpose
The purpose of this test method was to determine if the Fishfinder was so constructed as to have an adequate level of intrinsic immunity to electrical fast transient bursts applied to input power and signal & control leads, enabling the Fishfinder sample to operate as intended.

Test Parameters
The critical parameters of the electrical fast transient/burst generator and the applied waveform are shown below:

Transient Voltage:	Power Input Leads: 0.5 kV I/O Leads: 0.25 kV, 0.5 kV
Transient Polarity:	Positive and Negative
Repetition Rate:	5 kHz
Rise Time of Pulse:	5 ns $\pm$ 30%
Pulse Duration:	50 ns $\pm$ 30%
Burst Period:	300 ms
Burst Duration:	15 ms

The above parameters were verified prior to testing.

Leads Tested
The following leads of the Fishfinder were tested separately in order to demonstrate compliance:

Power Input Leads:
- 12 VDC Hot
- 12 VDC Return
- Both

Input / Output Leads:
- Depth Transducer Cable
- Temperature, Speed Cable

Test Setup
The test instrumentation and Fishfinder were configured as shown in the attached photographs and detailed in Paragraph 4.2 herein. This configuration was based upon the general test setup shown in Retlif Testing Laboratories Drawing Numbers R61000-4-4/P and R61000-4-4IO and the requirements of EN 61000-4-4. The Fishfinder was placed on an 80 cm high wooden test stand above the test enclosure floor. The test stand was situated such that it was at least 50 cm from the enclosure wall. The cabling of the Fishfinder was routed to the edge of the 1.5 by 1 meter test stand top, then directly to the enclosure floor. Power leads were routed through the internal coupler of the transient generator. Each I/O cable was routed individually, through the capacitive coupling clamp.

Test Procedure
After verification of the transient generator output parameters, the following steps were performed:

1. The AC input of the Fishfinder was routed through the coupling/decoupling network of the transient generator.
2. The transient generator was configured to apply 500 volt transients.
3. Positive 500 volt transients were applied to the DC leads in the coupling modes specified on the test data sheets for a period of 1 minute for each mode.
4. The Fishfinder was continuously monitored for malfunction or degradation as specified in Paragraph 5.2 herein.
5. The transient generator was configured to apply negative transient and steps 3 and 4 were repeated.
6. The first I/O Cable to be tested was then placed in the capacitive coupling clamp.
7. The transient generator output was connected to the clamp, at the side nearest the Fishfinder.

Test Procedure (contd.)

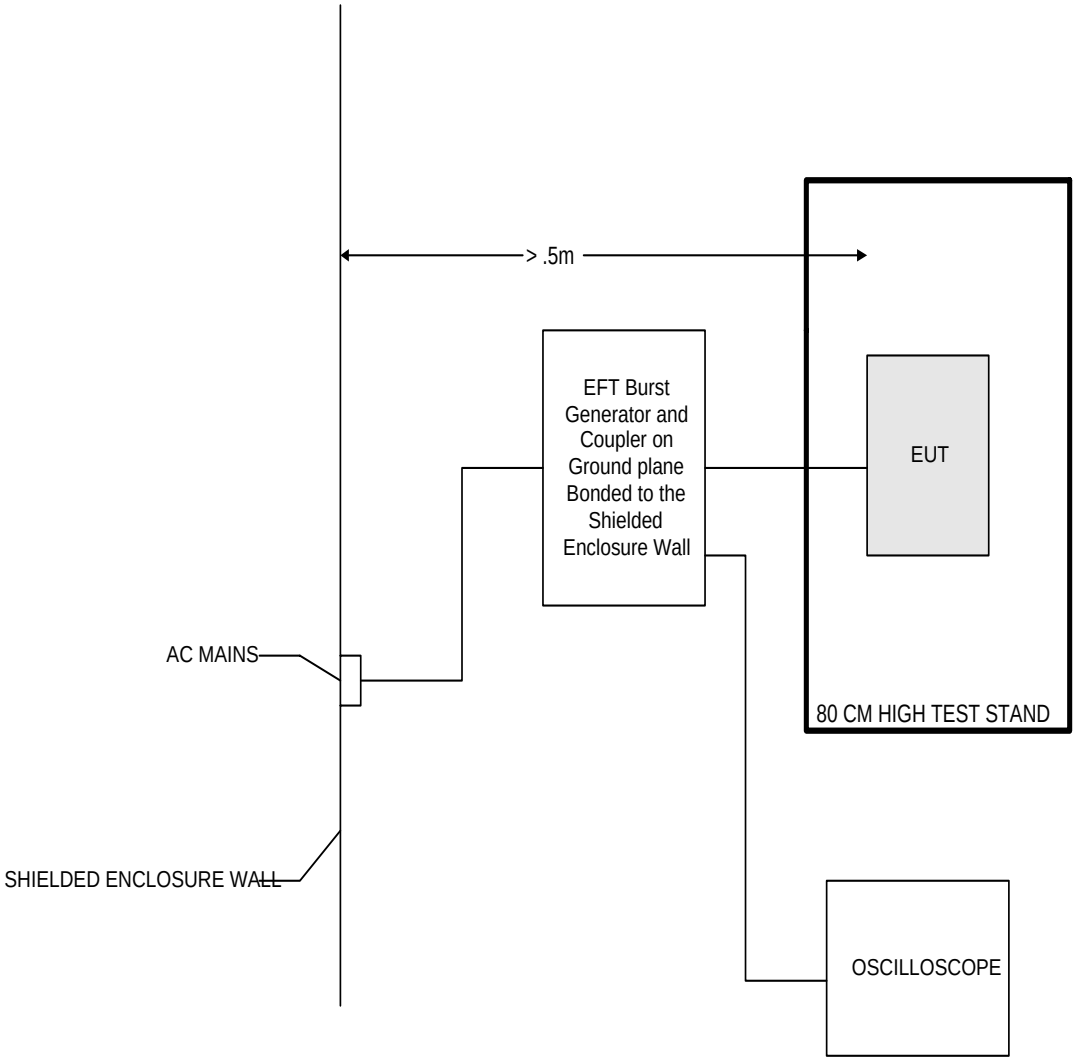
8. The transient generator was configured to apply 250 volt transients.
9. Steps 3 through 5 were then repeated for the I/O Cable.
10. The test voltage was then increased to 500 volts and Step 9 was repeated.
11. Steps 7 through 10 were repeated for each additional I/O cable subjected to this requirement.

Test Results

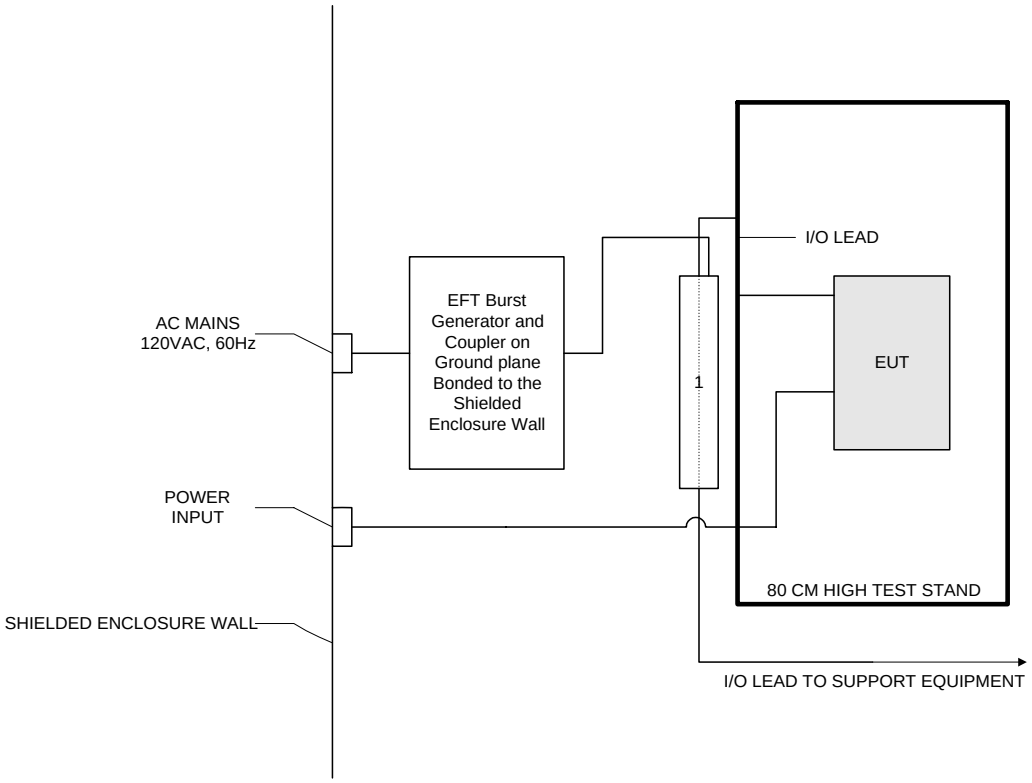
The Fishfinder complied with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance Criteria B when subjected to the electrical fast transients/bursts specified above. See the following five data sheets for a full presentation of the results obtained.

Test Setup Photographs
Electrical Fast Transient/Burst

General Setup Drawing - R61000-4-4P
Electrical Fast Transient Burst, Power Leads



General Setup Drawing - R61000-4-4IO
Electrical Fast Transient Burst, I/O Leads



1 = CAPACITIVE COUPLING CLAMP

EQUIPMENT LIST

EN61000-4-4; 1995 Electrical Fast Transients

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
027	Oscilloscope	Tektronix	DC - 500 MHz	2440	5/22/2003	5/22/2004
323	Power Supply	Electro	0 - 32 vdc	NFB	8/1/2003	8/1/2004
424	Graphics Plotter	Hewlett Packard	N/A	7470A	3/15/2003	3/15/2004
467	EFT/Burst Generator	Schaffner	0 - 4.4 KV	NSG 2025-4	11/25/2002	11/25/2003
467A	200 Watt Attenuator	Bird Electronics	Dc to 500 MHz,60dB	8325	11/19/2002	11/19/2003
468	Capac. Coupling Clamp	Retlif	N/A	RTLCC-01	4/8/2003	4/8/2004

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	**IEC 61000-4-4:1995, Electrical Fast Transients**		
CUSTOMER:	Techsonic Industries	JOB No.:	R-10134
TEST SAMPLE:	Fishfinder		
MODEL No.:	PMAX 15	SERIAL No.:	Unit 2B
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments.	PARAGRAPH:	Table 3; section 3.3
OPERATING MODE:	Powered on and displaying temperature, depth and boottom information.		
TECHNICIAN:	N. Dragotta	DATE:	November 12, 2003
LEAD TESTED:	Power Leads: +12 VDC Power to Fishfinder		
NOTES:	The EUT was subjected to EFT bursts applied to the power leads. The EFT bursts had a burst period of 300ms and a burst duration of 15ms. Temperature: 24° C. Humidity: 36%		

Test Frequency	Threshold	Limit	Test Lead(s)	Test Duration	Polarity
kHz	Volts		Hot/Neutral/Ground	Minutes	+ / -
5.0	----------	250 / 500	+12 VDC Hot	1.0	+
"	"	"	12 VDC Return	"	+
"	"	"	Both	"	+
"	"	"		"	
"	"	"		"	
"	"	"	+12 VDC Hot	"	-
V	V	V	12 VDC Return	V	-
5.0	----------	250 / 500	Both	1.0	-

The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by performance criteria B of EN 61000-6-1; 2001, as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD: **IEC 61000-4-4:1995, Electrical Fast Transients**

CUSTOMER: Techsonic Industries JOB No.: R-10134

TEST SAMPLE: Fishfinder

MODEL No.: PMAX 15 SERIAL No.: Unit 2B

TEST SPECIFICATION: EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments. PARAGRAPH: Table 2; section 2.2

OPERATING MODE: Powered on and displaying temperature, depth and boottom information.

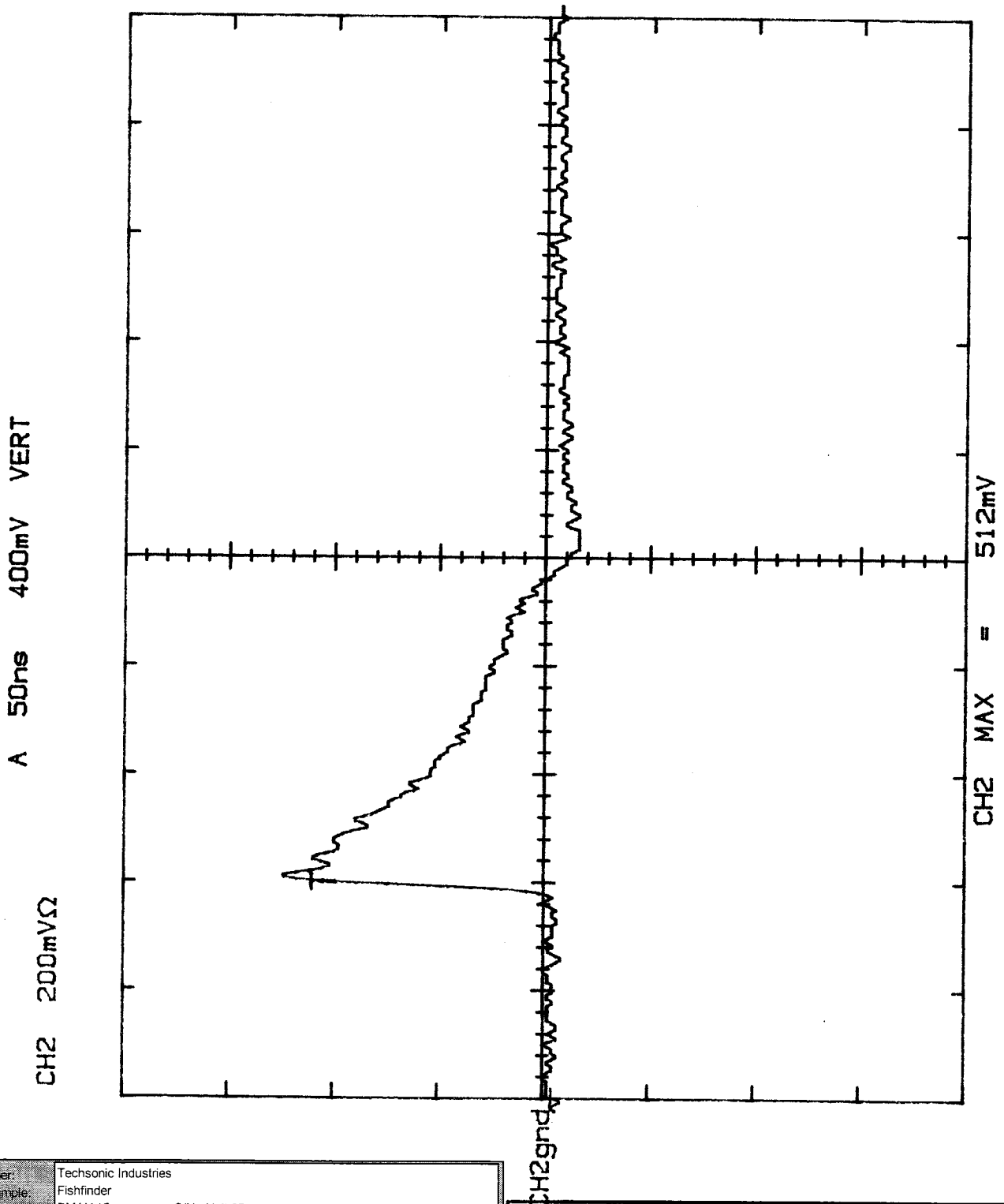
TECHNICIAN: N. Dragotta DATE: November 12, 2003

LEAD TESTED: Input/Output Leads - See below

NOTES: The EUT was subjected to EFT bursts applied to the input / output leads. The EFT bursts had a burst period of 300ms and a burst duration of 15ms. Temperature: 24°C. Humidity: 36%

Test Frequency	Threshold	Limit	Test Lead(s)	Test Duration	Polarity
kHz	Volts			Minutes	+ / -
5.0	-------------------	250 / 500	Depth Transducer Cable	1.0	+
|	|	|		|	
|	|	|	Temperature/Speed Cable	|	-
|	|	|		|	
|	|	|		|	
|	|	|	Depth Transducer Cable	|	+
V	V	V		V	
5.0	-------------------	250 / 500	Temperature/Speed Cable	1.0	-
			The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by performance criteria B of EN 61000-6-1; 2001, as defined by the manufacturer.		

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.



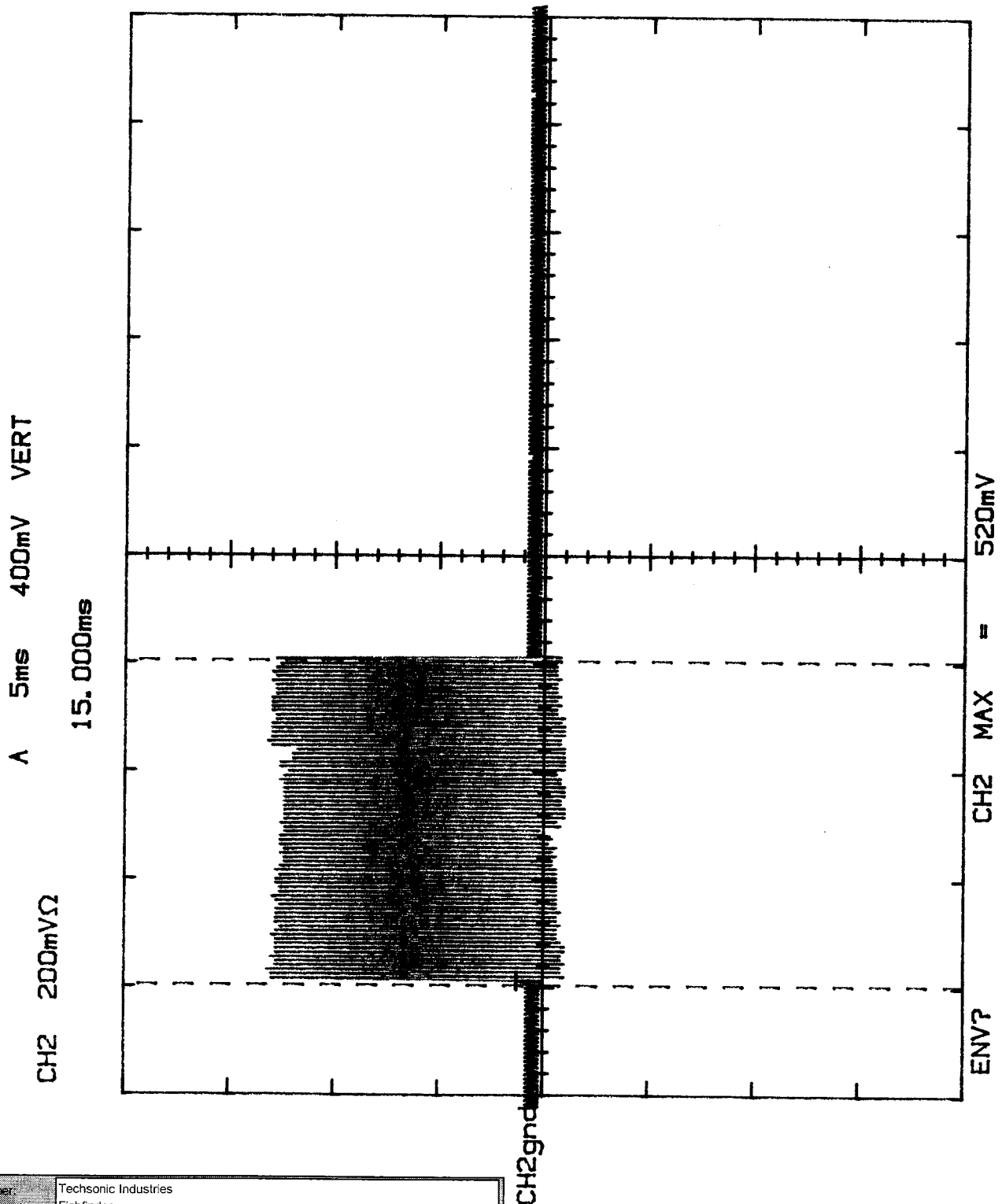
CONFIDENTIAL

Customer:	Techsonic Industries
Test Sample:	Fishfinder
Model No.:	PMAX 15 S/N: Unit 2B
Test Method:	IEC 61000-4-4:1995, Electrical Fast Transients
Notes:	Impulse amplitude verification into a 50 ohm load with 59.49 dB attenuation in line.

Date: November 12, 2003 Tech: N. Dragotta Sheet 1 of 3

Retlif Testing Laboratories

Report No. R-10134



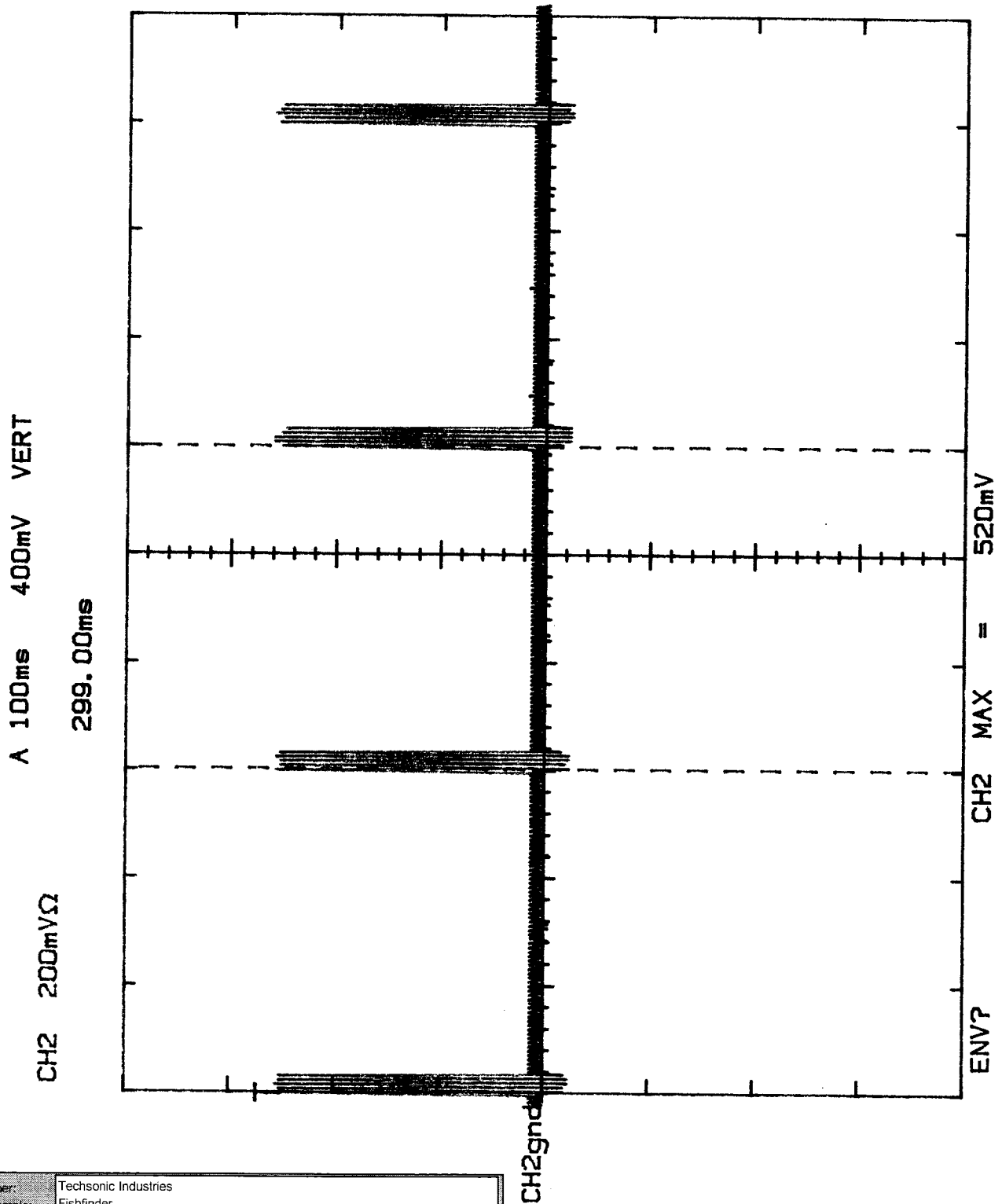
CONFIDENTIAL

Customer:	Techsonic Industries
Test Sample:	Fishfinder
Model No.:	PMAX 15 S/N: Unit 2B
Test Method:	IEC 61000-4-4:1995, Electrical Fast Transients
Notes:	15 ms burst duration verification into a 50 ohm load with 59.49 dB attenuation in line.

Date: November 12, 2003 Tech: N. Dragotta Sheet 2 of 3

Retlif Testing Laboratories

Report No. R-10134



CONFIDENTIAL

Customer:	Techsonic Industries
Test Sample:	Fishfinder
Model No.:	PMAX 15 S/N: Unit 2B
Test Method:	IEC 61000-4-4:1995, Electrical Fast Transients
Notes:	300 ms burst period verification into a 50 ohm load with 59.49 dB attenuation in line.

Date: November 12, 2003 Tech: N. Dragotta Sheet 3 of 3

Retlif Testing Laboratories

Report No. R-10134

6.5 Conducted Immunity, EN 61000-4-6, 0.15 to 80 MHz

Purpose
The purpose of this test method was to determine if the Fishfinder was so constructed as to have an adequate level of intrinsic immunity to radio frequency electromagnetic energy injected into input power and I/O leads in the frequency range of 0.15 to 80 MHz, enabling the Fishfinder to operate as intended.

Test Parameters
The critical parameters of the applied electromagnetic energy for testing the power input leads were as shown below:

Frequency Range:	0.15 to 80 MHz
Applied Signal Level:	3 Vrms
Modulation:	1 kHz, 80%, AM
Injection Method:	Power Input Leads - Coupling Decoupling Network (CDN) I/O Leads - Direct Injection

Leads Tested
The following leads of the Fishfinder were tested in order to demonstrate compliance:

Power Input Leads:	Input / Output Leads:
- 12 VDC Hot	- Depth Transducer Cable
- 12 VDC Return	- Temperature, Speed Cable
- Both	

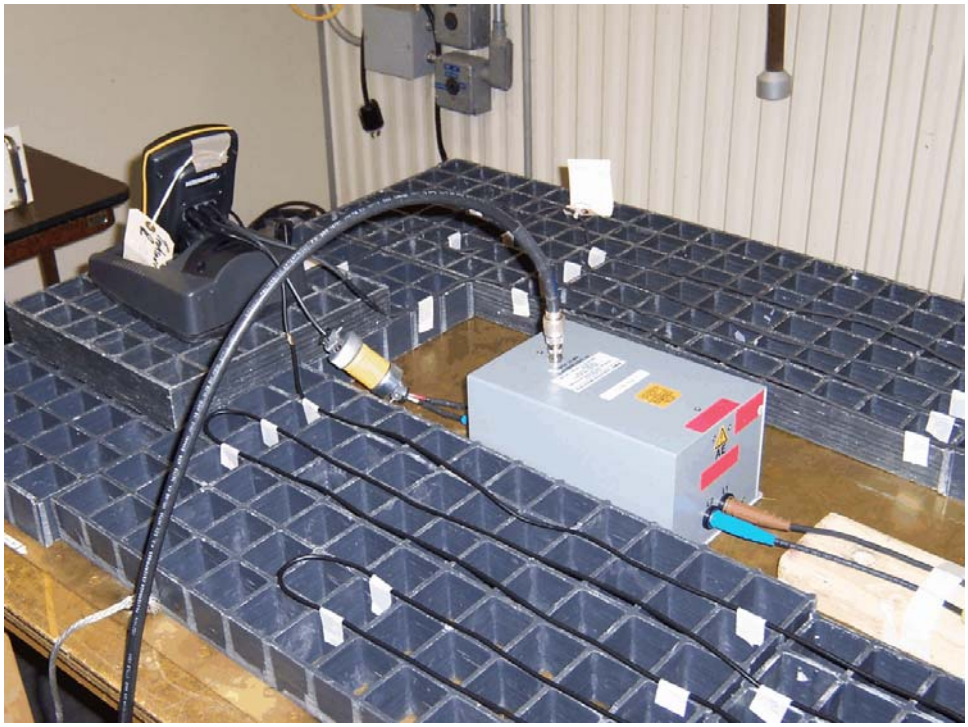
Test Setup
The test instrumentation and Fishfinder were configured as shown in the attached photographs and detailed in Paragraph 4.2 herein. This configuration was based upon the general test setup shown in Retlif Testing Laboratories Drawing Numbers R61000-4-6/P and R61000-4-6/IO and the requirements of EN 61000-4-6. The Fishfinder was placed on 10 cm high insulating supports above a ground reference plane. A coupling / decoupling network was placed in the power input lead under test. All power and I/O leads were supported 5 cm above the ground reference. The signal generator was connected to the RF power amplifier which in turn, was connected to the injection device. A directional coupler was placed between the injection device and RF amplifier in order to monitor the level applied to the Fishfinder.

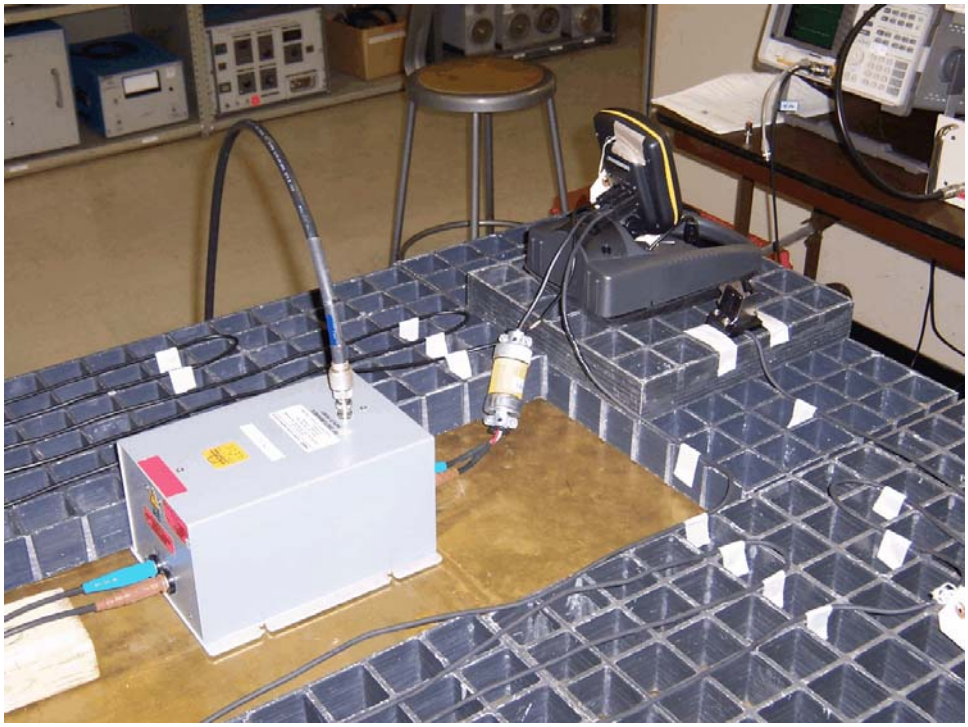
Test Procedure
With the test instrumentation and Fishfinder configured as stated above, the following steps were performed:

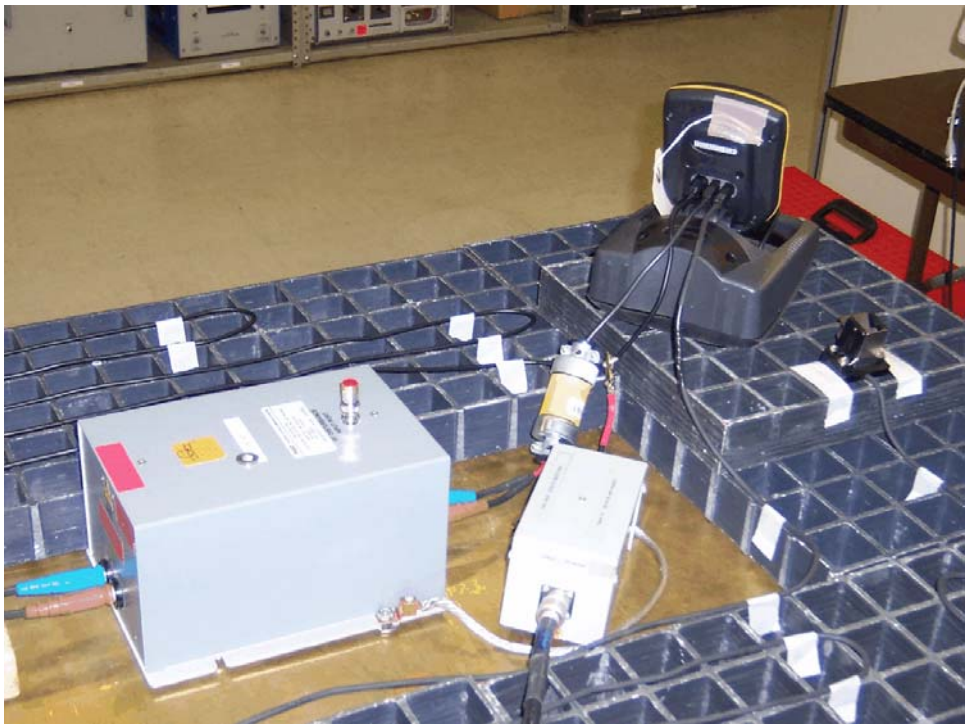
1. The Fishfinder was arranged with its cables terminated as specified in Paragraph 4.2 herein.
2. The injection device was connected to the lead under test.
3. The output of the directional coupler was connected to the injection device for the lead under test.
4. The Fishfinder was placed in the operating mode described in Paragraph 5.1 herein.
5. The signal generator was set for a frequency of 150 kHz and the level was adjusted for 3 Vrms.
6. The signal was then amplitude modulated 80% by a 1 kHz sine wave.
7. The frequency range was incrementally swept from 150 kHz to 80 MHz, while maintaining the required forward power to the injection network.
8. The Fishfinder was continuously monitored as described in Paragraph 5.2 herein.
9. Steps 2 through 8 were repeated for each lead subjected to this requirement.

Test Results
After the modifications described in paragraph 4.4 herein were performed, the Fishfinder complied with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance Criteria A when the input power leads and I/O leads were subjected to the conducted electromagnetic energy specified above. See the following three data sheets for a complete presentation of test results.

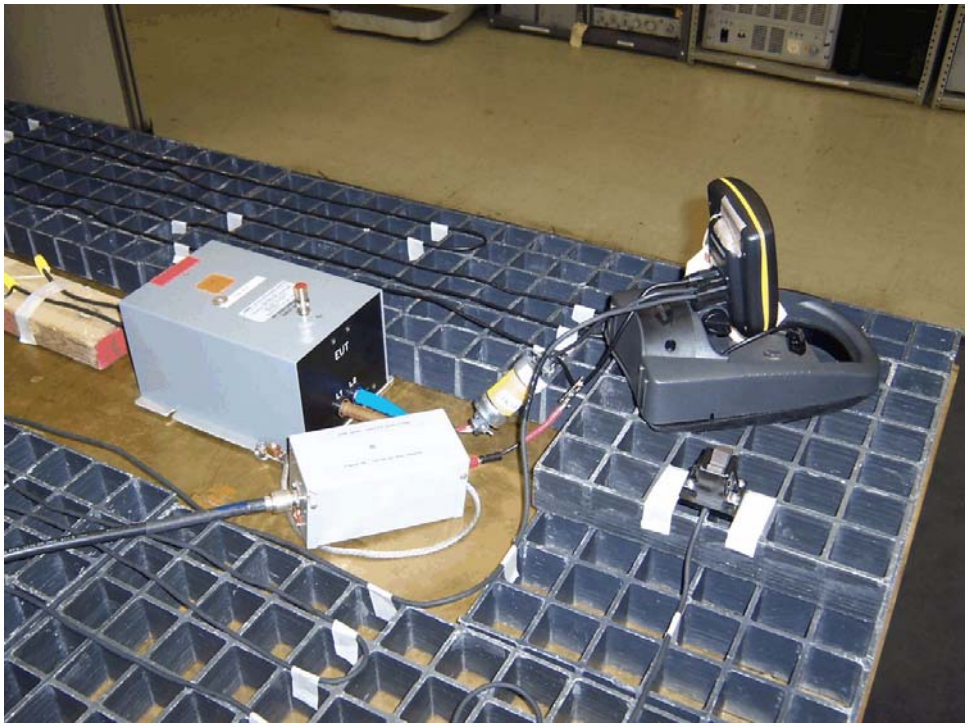
Test Setup Photographs
Conducted Immunity

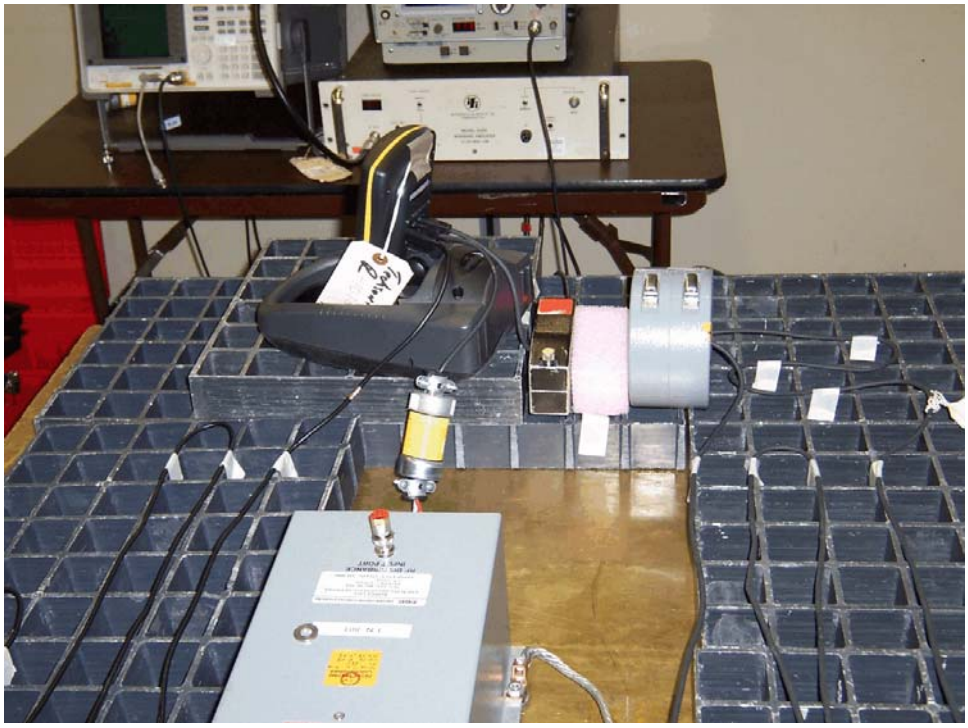




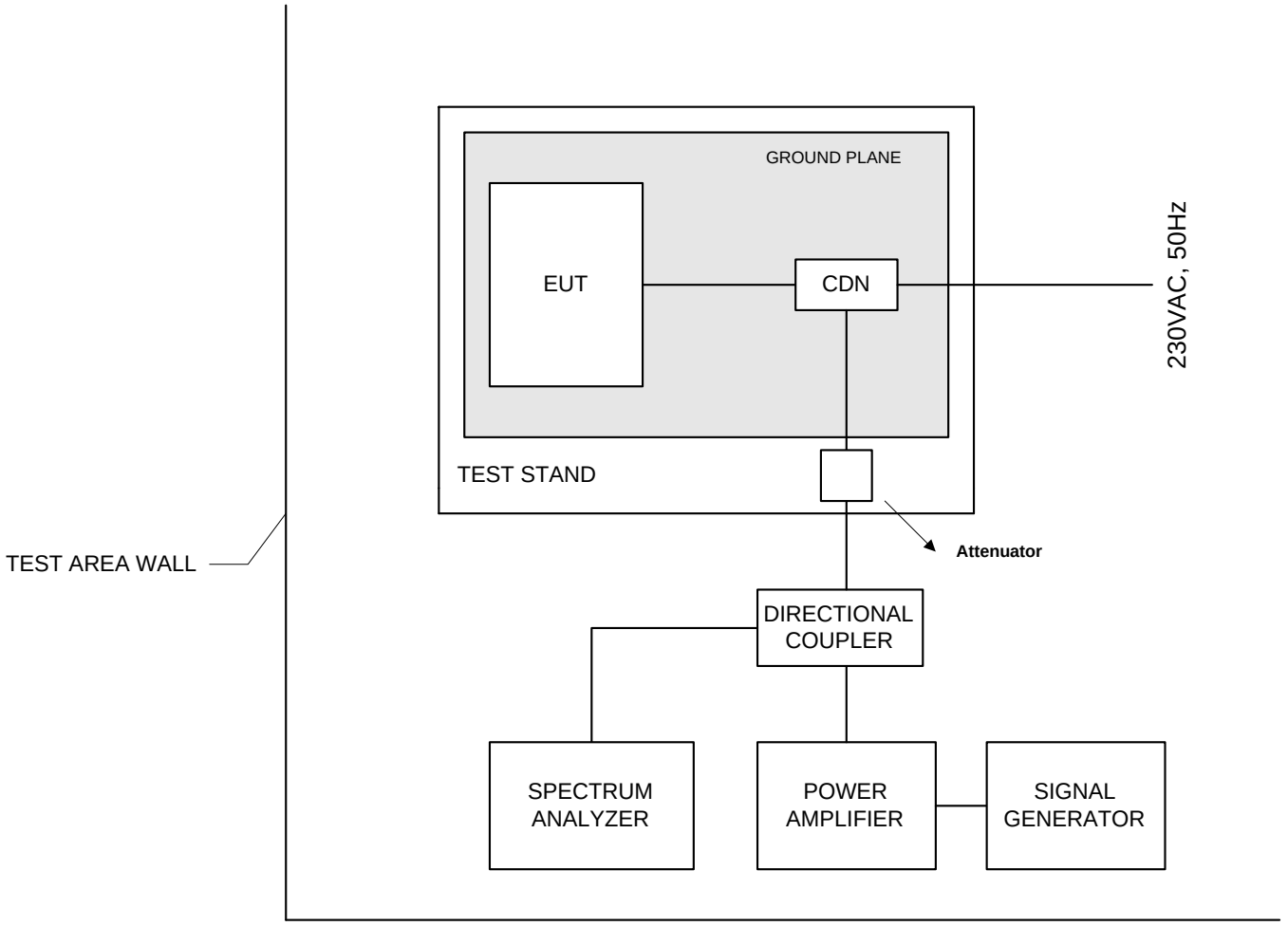


Test Setup Photographs
Conducted Immunity

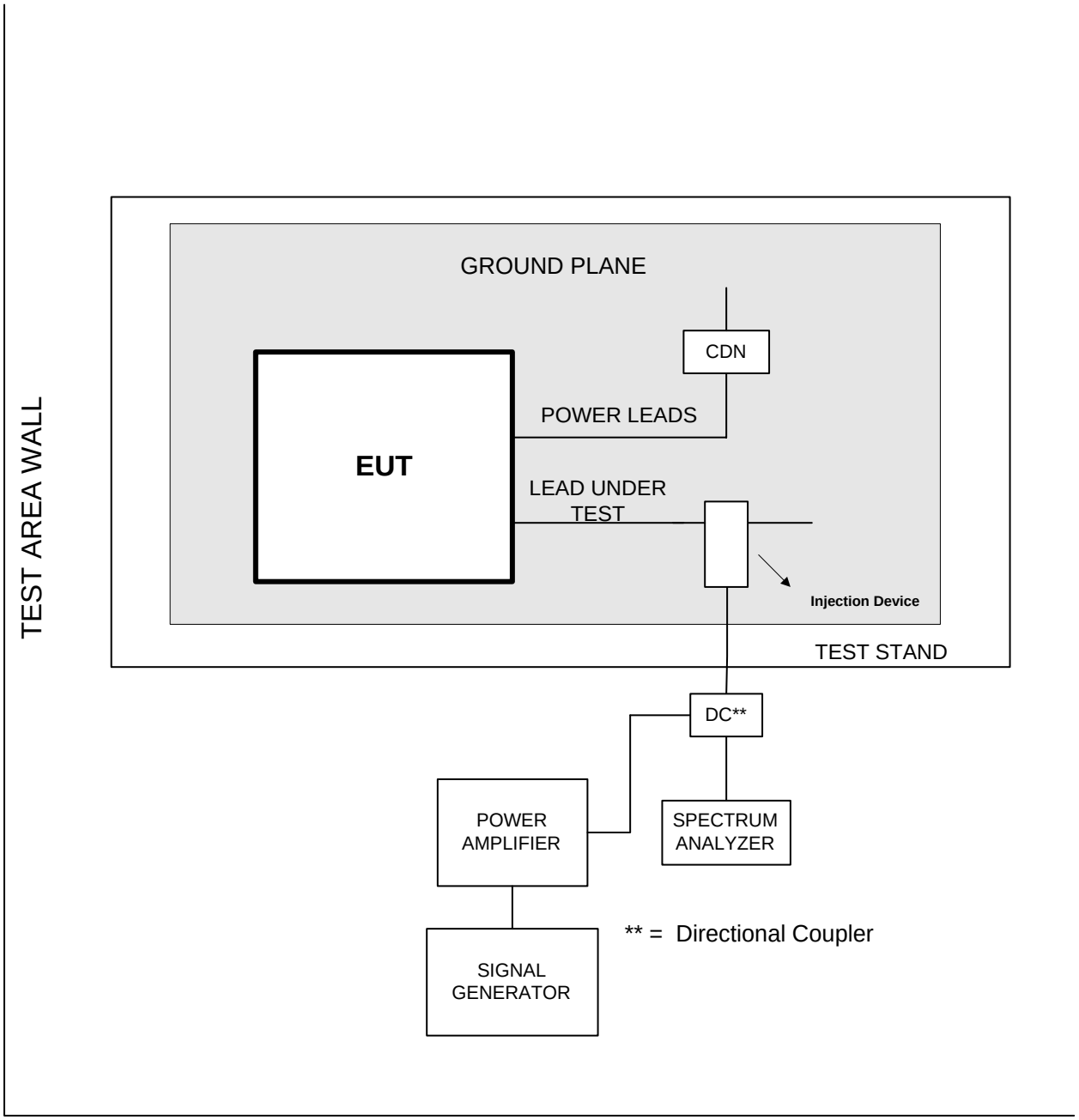




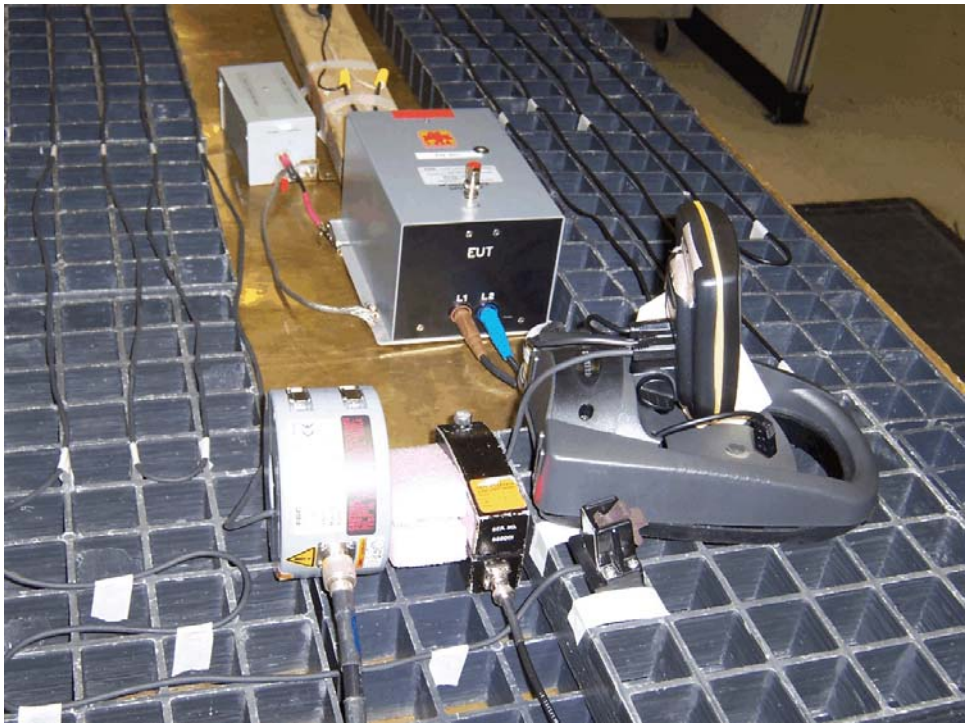
General Setup Drawing - R61000-4-6/P
Conducted Immunity, Power Leads



General Setup Drawing - R61000-4-6/IO
Conducted Immunity, I/O Leads



Test Setup Photographs
Conducted Immunity



EQUIPMENT LIST

EN61000-4-6; 1996 Conducted Disturbances Induced by Radio-Frequency Fields (150 kHz to 80 MHz)

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
043	Spectrum Analyzer	Electro-Metrics	10 kHz - 1 GHz	ESA - 1000	1/15/2003	1/15/2004
333	Attenuator	Narda	DC - 11 GHz	768-10	7/28/2003	7/28/2004
518	Current Probe	Solar Electronics	10 kHz - 500 MHz	9123-1	2/6/2003	2/6/2004
530	AM/FM Signal Generator	Marconi Instru.	10 kHz - 1.2 GHz	2023	4/22/2003	4/22/2004
573	50-150 ohm Adapter	Retlif	N/A	ENV 50141	6/10/2003	6/10/2004
651A	High Power Dir Coupler	Werlatone Inc.	.01-1000 MHz/200W	C5571	3/4/2003	3/4/2004
652	L.P. Filter	Retlif	100 MHz	LPF-RTL	12/27/2002	12/27/2003
7016	EMC Analyzer	Hewlett Packard	9kHz - 1.8GHz	8591EM	7/1/2003	7/1/2004
748	Amplifier	IFI	.01 - 250 MHz/15W	5300	8/14/2003	8/14/2004
801	Coupling Decoupling	FCC	150 kHz - 230 MHz	FCC-801-M2-50A	6/10/2003	6/10/2004
854	Bulk Current Injection	FCC	10 kHz - 400 MHz	F-120-6A	7/25/2003	7/25/2004

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	**IEC 61000-4-6; 1996 Conducted Disturbances Inducted by Radio Frequency Fields Retest, 150 kHz to 80 MHz**		
CUSTOMER:	Techsonic Industries	JOB No.:	R-10134
TEST SAMPLE:	Fishfinder		
MODEL No.:	PMAX 15	SERIAL No.:	Unit 2B
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments.	PARAGRAPH:	Table 3; section 3.1
OPERATING MODE:	Powered on and displaying temperature, depth and boottom information.		
TECHNICIAN:	N. Dragotta	DATE:	November 12, 2003
LEAD TESTED:	Power Leads: +12 VDC Power to Fishfinder		
NOTES:	Injection Method: Coupling-Decoupling Network (CDN) Temperature: 24° C. Humidity: 37%		

Test Frequency	Threshold	Limit	Modulation
MHz	Volts		
0.150	----------	3	1 kHz AM, 80%
V	V	V	V
80.0	----------	3	1 kHz AM, 80%

The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by Performance Criteria A of EN 61000-6-1;2001, as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	IEC 61000-4-6; 1996 **Conducted Disturbances Inducted by Radio Frequency Fields Retest, 150 kHz to 80 MHz**
CUSTOMER:	Techsonic Industries
JOB No.:	R-10134
TEST SAMPLE:	Fishfinder
MODEL No.:	PMAX 15
SERIAL No.:	Unit 2B
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments. PARAGRAPH: Table 2; section 2.1
OPERATING MODE:	Powered on and displaying temperature, depth and boottom information.
TECHNICIAN:	N. Dragotta
DATE:	November 12, 2003
LEAD TESTED:	I/O LEADS: Depth Transducer Cable
NOTES:	INJECTION METHOD: DIRECT Temperature: 24° C. Humidity: 37%

TEST FREQUENCY	THRESHOLD	LIMIT	MODULATION
MHz	Volts		
0.150	----------------	3.0	1 kHz AM, 80%
V	V	V	V
80.0	---------------	3.0	1 kHz AM, 80%
			The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by Performance Criteria A of EN 61000-6-1;2001, as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

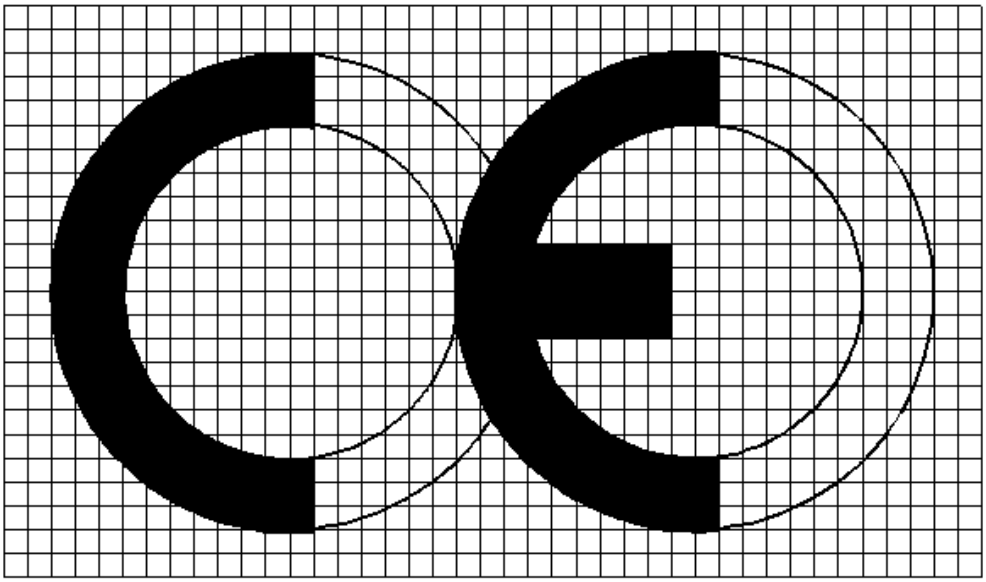
TEST METHOD:	**IEC 61000-4-6; 1996 Conducted Disturbances Inducted by Radio Frequency Fields Retest, 150 kHz to 80 MHz**
CUSTOMER:	Techsonic Industries
JOB No.:	R-10134
TEST SAMPLE:	Fishfinder
MODEL No.:	PMAX 15
SERIAL No.:	Unit 2B
TEST SPECIFICATION:	EN 61000-6-1; 2001 Electromagnetic Compatibility (EMC) - Part 6-1: Generic Standards - Immunity for residential, commercial, and light-industrial environments. PARAGRAPH: Table 2; section 2.1
OPERATING MODE:	Powered on and displaying temperature, depth and boottom information.
TECHNICIAN:	N. Dragotta
DATE:	November 12, 2003
LEAD TESTED:	I/O LEADS: Temperature/Speed Cable
NOTES:	INJECTION METHOD: CURRENT CLAMP Temperature: 24° C. Humidity: 37% Vemf = 3 VOLTS R = 150 OHMS I(limit) = 3 volts / 150 OHMS = 20 mA

TEST FREQUENCY	THRESHOLD	LIMIT	MODULATION
MHz	milliamps		
0.150	----------------	20	1 kHz AM, 80%
|	|	|	|
V	V	V	V
80.0	---------------	20	1 kHz AM, 80%
			The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by Performance Criteria A of EN 61000-6-1;2001, as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

Appendix A
Labeling Information

CE MARKING AS REQUIRED BY
THE EMC DIRECTIVE



THE CE MARKING AS REQUIRED BY COUNCIL DIRECTIVE 89/336/EEC, THE EMC DIRECTIVE, AMENDED BY COUNCIL DIRECTIVE 93/68/EEC

Genera

l Marking Requirements

The EMC Directive does not require that a date be placed with the mark. The CE Marking can be placed in any one of the following locations:

a) on the device
b) on the packaging
c) in the instruction manual
d) on the warranty/guarantee certificate

The CE marking shall have a height of not less than 5 mm and shall maintain the proportions shown above.

NOTES:

1) By placing the CE marking on a product, the manufacturer is stating that the device complies with ALL applicable EC directives. The test report in which this information is contained shows compliance of the device to the requirements of the EMC directive only, other directives may or may not be applicable at this time.
2) The information shown above is valid as of the issue date of the test report in which it is contained.

Appendix B
Declaration of Conformity

CONTENTS OF THE DECLARATION OF
CONFORMITY AS REQUIRED BY
THE EMC DIRECTIVE

The EC Declaration of Conformity must contain the following information:

- A description of the apparatus to which it applies.

- Reference to the specifications under which conformity is declared , and where appropriate, to the national measures implemented to ensure the conformity of the apparatus with the provisions of the Directive. (The specifications under which conformity may be declared are located on the Certificate of Conformance issued with the test report in which this information is contained.)

- Identification of the signatory empowered to bind the manufacturer or his authorized representative.

NOTES:

1) A Declaration of Conformity must be issued for each Directive for which conformance is claimed.

2) The Declaration of Conformity must be on file at the point of entry into the European Community.

3) The information shown above is valid as of the issue date of the test report in which it is contained.

Appendix C
Sample Declaration of Conformity

DECLARATION OF CONFORMITY

APPLICATION OF COUNCIL DIRECTIVE(S):

ISSUED BY:

DATE OF ISSUE:

TYPE OF EQUIPMENT:

BRANDNAME:

MODEL NUMBER:

STANDARDS TO WHICH CONFORMITY IS DECLARED:

MANUFACTURER (IF NOT ISSUING AGENT):

I, THE UNDERSIGNED, HEREBY DECLARE THAT THE EQUIPMENT SPECIFIED ABOVE CONFORMS TO THE DIRECTIVE(S) AND STANDARD(S) AS SPECIFIED.

SIGNATURE

PRINT NAME

TITLE

PLEASE NOTE THAT THIS INFORMATION IS PROVIDED AS A GUIDE AND YOU, OR YOUR MANUFACTURER, ARE CAUTIONED THAT SPECIFIC REQUIREMENTS ARE CONTAINED WITHIN EACH DIRECTIVE.

Retlif Testing Laboratories

795 Marconi Avenue, Ronkonkoma, NY 11779
631-737-1500 - Fax: 631-737-1497

BRANCH LABORATORIES
101 New Boston Road
Goffstown, NH 03045
603-497-4600 Fax 603-497-5281

WASHINGTON
REGULATORY OFFICE
703-533-1614 Fax 703-533-1612

July 9, 2003

Techsonic Industries, Inc.
108 Maple Lane
Eufaula, AL 36027

Attention: Mr. Dave Betts

Reference: Radio and Telecommunication Terminal Equipment (99/5/EC) Directive Technical File
Techsonic Humminbird Smartcast Wireless Fishfinder

Dear Sir:

Please find attached the referenced Technical File for Article 3 1.(a) of the referenced Directive. The file documents the recommended construction required to comply with the above mentioned Directive. It is advised that Techsonic review the file for accuracy and assure they comply with all descriptions herein.

See attached Special Considerations page.

Retlif Testing Laboratories Job Number R-9915-1. This testing was performed and Technical File generated against your Purchase Order Number 331782.

Thank you for the opportunity to be of service to you. Should you have any questions regarding the enclosed results or the actual testing of your sample, please do not hesitate to contact me.

Sincerely,

Retlif Testing Laboratories

M. White

Michelle White
Administrative Coordinator
nyemclab@retlif.com

Enc. (as stated)

CONFIDENTIAL

SPECIAL CONSIDERATIONS

TECHSONIC HUMMINBIRD SMARTCAST WIRELESS FISHFINDER

1. Lithium battery used according to specification. Manufacturer declares that it is not a short circuit hazard. Water Ingress not a problem.

2. Operating temperatures are lower than material ratings involved.

3. Recommend use of 94V rated pcb and enclosure materials.

NATS Corp.

North American Technical Services Corp.
30 Northport Road
Sound Beach, New York 11789-1734

Tel: 631-744-0059
Website: www.natscorp.com
Fax: 631-744-0192

Engineering, Regulatory and Consulting Services
Product Development, Process Management
International Compliance and Testing

RADIO AND TELECOMMUNICATION TERMINAL EQUIPMENT DIRECTIVE 99/5/EC

TECHNICAL FILE

FOR ARTICLE 3, ESSENTIAL REQUIREMENT 1.(a)

TECHSONIC INDUSTRIES, INC.
HUMMINBIRD SMARTCAST WIRELESS FISHFINDER

CONFIDENTIAL

Prepared for:

Techsonic Industries, Inc.
108 Maple Lane
Eufaula, AL 36027

Prepared By:

NATS Corp.
30 Northport Road
Sound Beach, NY 11789

The manufacturer hereby declares that it will take all measures necessary in order that the manufacturing process shall ensure compliance of the manufactured products with the technical documentation referred to in this file and with the requirements of the R and TTE DIRECTIVE that apply to it.

Place _____ Signature _____

Date _____ Full Name _____

Position _____

(dv:retlif\techsonic:wd)
ret-3051-ce

Technical File

Techsonic Industries, Inc.
Humminbird Smartcast Wireless Fishfinders

Table of Contents

TECHNICAL FILE DESCRIPTION

This Technical File provides documented evidence of R and TTE Directive (99/5/EC), Article 3, Essential Requirement 1.(a). Article 3, 1.(a) requires that equipment covered by the Directive comply with Low Voltage Directive (73/23/EEC), with no voltage limit applying.

The manufacturer intends that the following record describes the construction of the electrical equipment listed under TRADE NAMES AND MODELS. All critical design elements relating to Low Voltage Directive Essential Requirement (Annex I) compliance is documented herein.

This technical file shall be maintained on Community territory at the disposal of national authorities for inspection purposes for a period ending at least 10 years after the last product has been manufactured. Where neither the manufacturer or authorized representative is established within the Community, this obligation is the responsibility of the person who places the equipment on the Community market.

DECLARATION OF CONFORMITY

A sample of a Declaration of Conformity is included herein. The Declaration of Conformity shall accompany import papers into the European Union. A copy shall also accompany each product.

CE MARKING

The CE Marking shall be affixed by the manufacturer or his authorized representative established in the Community, and must appear in a visible, legible and indelible form on the device or its packaging, where practicable and appropriate, and on the instructions for use. Where applicable, the CE marking must also appear on the sales packaging.

A drawing is included in the Technical File.

CONFORMITY ASSESSMENT

The manufacturer shall take all measures necessary so that the process ensures compliance of the manufactured products with the technical documentation of this technical file and with the Essential Requirements of the Low Voltage Directive. Product changes shall be evaluated for continued compliance with the Low Voltage Directive Essential Requirements.

TRADE NAMES AND MODELS (PART 1)

This part contains all trade name and model designations contained in the file.

TECHNICAL DESCRIPTION OF PRODUCTS (PART 2)

The General Product Description is a generic product description including the product intended uses.

General Construction Details describes aspects of the product construction critical to the product's compliance with the Low Voltage Directive Essential Requirements.

List of Critical Components describes those components, electrical or mechanical and not described in the General Construction Details, that are considered critical to the products compliance with the Low Voltage Directive Essential Requirements. The component is described with the requirement critical to Directive compliance listed.

Technical Documentation such as mechanical drawings and schematics are provided in this part.

LABELING (PART 3)

A Product Labeling specification is provided, showing markings that are contained on the product, both internal and external to address the Low Voltage Directive Essential Requirements Annex I.

The Instructions for Use are contained in this part.

LOW VOLTAGE DIRECTIVE 73/23/EEC ANNEX I ANALYSIS (PART 4)

Part 4 contains a clause by clause analysis of Annex I. For each clause, the manufacturer declares either conformity, non-conformity, action required, resolved or not applicable, along with the reason for the Declaration. For each applicable clause the standard or alternate rational adopted to meet the Essential Requirement is described.

Details of the Type Tests conducted to prove compliance with the Low Voltage Directive Annex I are contained in Part 4.

Please Note: The Declaration of Conformity should be used when shipping referenced electrical equipment to European customers. The form can be printed on letterhead or used as prepared. The European importer and their address should be entered on the form. The serial numbers are entered as a range of numbers identifying the specific shipment quantity. The Declaration form needs to be signed when completed.

* * *

Declaration of Conformity

Application of Council Directive(s)	99/5/EC
Referenced standards or specifications	EN60950 +
Manufacturer's Name	Techsonic Industries, Inc.
Manufacturer's Address	108 Maple Lane Eufaula, AL 36027
Authorized Representative	
Authorized Representative's Address	
Type of Equipment	Wireless Fishfinder
Model No.	Humminbird Smartcast
Serial No.	
Year of Manufacture	

+ Standard refers to Article 3, Essential Requirement 1.(a) only. Other standards required for conformity shall be included.

I, the undersigned, hereby declare that the equipment specified above

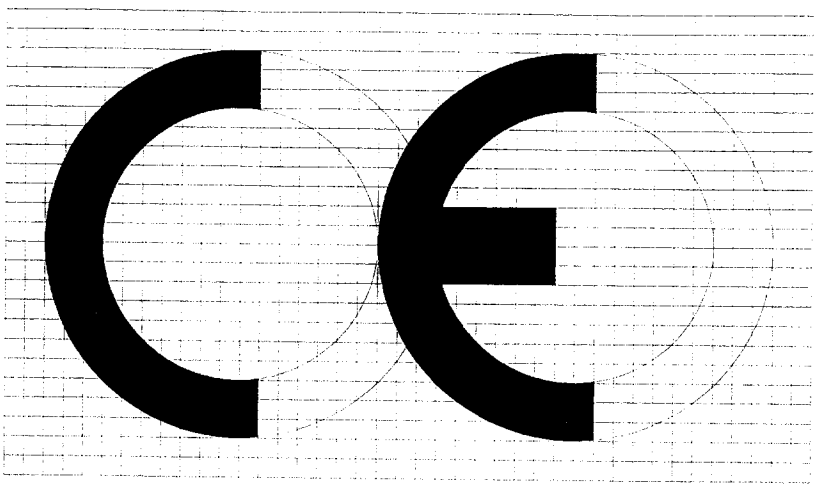
conforms to the above Directive(s)

Place _____ Signature _____

Date _____ Full Name _____

Position _____

CE MARKING



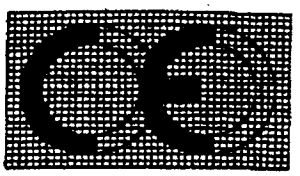
THE CE MARKING AS REQUIRED BY COUNCIL DIRECTIVE
99/05/EC ANNEX VII

REFER TO ATTACHED 4-1 FOR GENERAL MARKING REQUIREMENTS

ANNEX VII

MARKING OF EQUIPMENT REFERRED TO IN ARTICLE 12(1)

1. The CE conformity marking must consist of the initials 'CE' taking the following form:



If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.

2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.

3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.

4. The CE marking must be affixed visibly, legibly and indelibly.

5. The equipment class identifier must take a form to be decided by the Commission in accordance with the procedure laid down in Article 14.

Where appropriate it must include an element intended to provide information to the user that the apparatus makes use of radio frequency bands where their use is not harmonised throughout the Community.

It must have the same height as the initials 'CE'.

PART 1

TRADE NAMES AND MODELS

The following trade names and model numbers are covered by this Technical File. Differences between models do not affect the design characteristics relating to compliance with the Essential Requirements (Annex I) of the LOW VOLTAGE DIRECTIVE unless otherwise documented.

Trade Name: Techsonic Industries, Inc.

Model Number(s): Humminbird Smartcast

PART 2

TECHNICAL DESCRIPTION

General Product Description

General Construction Details

List of Critical Components

Technical Documentation (Schematics, Etc.)

The listings and descriptions contained in Part 2 are considered critical to the equipment's compliance with the Annex I Essential Requirements of the LOW VOLTAGE DIRECTIVE. Any change to the listings and/or descriptions shall be evaluated to assure continued compliance with the Directive.

GENERAL PRODUCT DESCRIPTION

The product covered by this Technical File is a wireless fishfinder. The Remote Sonar Sensor (RSS) attaches to the end of the fishing line and is cast into the water as you would a normal float or lure. The SmartCast system uses sonar technology to send sound waves from the RSS into the water. The returned "echoes" are transmitted with wireless technology to the display unit and plotted on the LCD. An underwater world is created including the depth of underwater objects such as the bottom, fish and structures.

The system is composed of a buoyant station having a sonar transmitter, a sonar receiver, a sonar to electric signal transducer and a radio transmitter all controlled by a shore station microprocessor. The buoyant station microprocessor is programmed to generate sync pulses and to transmit both the sync and transduced sonar echo returns to the shore station. The shore station microprocessor is programmed to display only those echo signals received after a sync pulse. Echoes can be fish, structure or bottom information along with a digital depth of the water.

GENERAL CONSTRUCTION DETAILS

1. Mechanical Assembly - Components such as switches, fuseholders, connectors, wiring terminals and display lamps are reliably mounted and prevented from shifting or rotation by lockwashers, starwashers or the mounting format.

2. Corrosion Protection - All ferrous metal parts are suitably protected against corrosion by painting, plating or the equivalent.

3. Internal Wiring and Connections - Internal wiring is reliably routed away from sharp parts. All internal wire is rated for the applicable voltage and temperature and is of an acceptable gauge based on current. There are no connections that only rely on solder.

   Where crimp connectors are used, they are of the redundant crimp type.

4. Current Carrying Parts - All current carrying parts in primary circuitry are silver, copper or copper based alloy.

5. Protection Against Direct Contact with Live Parts – There are no uninsulated live parts which pose a potential shock hazard.

6. Insulation / Creepage Clearances -

   Inherent component spacings are in accordance with applicable component standards. No other spacings are critical than those found within certified components. Components of note:

   - Not Applicable

7. Colors of Indicator Lights

   Not Applicable

LIST OF CRITICAL COMPONENTS

(Component Specification Sheets Follow This Page)

COMPONENT NAME	DESCRIPTION	CERTIFICATION
Smartcast RSS - Lithium Battery	3V (Panasonic CR2032)	UL, Specification
Printed Circuit Board		94V-1, or V-0
Receiver Plastic Enclosure	ABS	94V-1, or V-0, Specification

TECHNICAL DOCUMENTATION

The following is considered a part of this technical file:

DOCUMENT NUMBER	REVISION/DATE	DESCRIPTION
		User Instructions
		Lithium Battery Spec
413188	A 07/11/02	Schematic Receiver RF10 Control Head (433Mhz)
413187	A 01/30/02	Schematic Diagram RF40 A/B Tansducer PCB 433 Mhz
405629-4	E 04/23/03	Guppy Bobber PCB
413187	- 06/17/03	Bill of Materials
188-5_A.mat	- 06/17/03	Bill of Materials
		Block Diagram Oscillator Frequencies
405367-5	E 03/04/03	PCB Layout

Subj: **FW: Article 3.1 (a) Safety Requirements**
Date: 6/25/03 8:59:15 AM Eastern Daylight Time
From: nyemclab@retlif.com
To: natscorp@aol.com
File: **Panasonic_Lithium_CR2032_CR2320.zip** (104619 bytes) DL Time (26400 bps): < 1 minute
Sent from the Internet (Details)

Rich,

Attached is the additional information needed for Article 3.1 (a) Safety Requirements for Techsonic.

Regards,
Michelle White
Administrative Coordinator
631-737-1500, ext. 10
RETLIF Testing Laboratories
Visit our Web site...www.retlif.com

-----Original Message-----
From: Dave Betts [mailto:dave.betts@techsonic.com]
Sent: Tuesday, June 24, 2003 9:51 AM
To: Michelle White; Mark Gibson
Subject: Re: Article 3.1 (a) Safety Requirements

The lithium battery used in the smartcast RSS (green bobber) is a Panasonic CR2032 manganese dioxide coin cell battery. It provides about 220 milli amp hours of capacity and is assembled into the unit at our factory. It is ***not*** user replaceable. This type of coin cell (watch) battery does not present a short circuit hazard due to it high internal impedance. The battery can be shorted with ***no*** noticeable heat experienced. (just did it to make sure).

The two half's of the RSS are ultrasonically welded together so that water ingress is not a problem. Even if water (fresh or salt) got into the unit it would not provide a safety hazard. Also a discharged manganese dioxide lithium battery can also be disposed of as non- hazardous waste.

The data sheets are attached. If there any questions please call or E-mail.

Dave Betts

Products by Chemistry
Environmental
Transportation/MSDS
Catalog Request
About OEM Batteries
What's New
Contact Us
Distributors/Pack Assy.

Alkaline
Carbon Zinc
Lithium
Lithium Ion
Nickel Cadmium
Nickel Metal Hydride
VRLA 6V & 12V
VRLA Modular

LITHIUM - Coin Type

Coin type lithium batteries are high energy, high reliability ba variety of applications. The full 3 volts in these high energy d is about twice that of conventional dry batteries.

Panasonic coin type lithium batteries are available in two types: poly-carbonmonofluoride lithium batteries (BR series) for uses that require extended reliability and safety, and manganese dioxide lithium batteries (CR series) for uses that require high voltage and strong load pulse characteristics.

BR & CR Coin

Features:

- High voltage of 3 volts - twice that of conventional dry batt
- Extremely small self-discharge for long service and shelf l
- A wide operational temperature range
- Compact and lightweight; extremely high energy density
- Very safe (poly-carbonmonofluoride lithium)
- Extremely strong load pulse characteristics (manganese
- Operating temperature range:
  BR Coin Cells: -30°C ~ +80°C
  CR Coin Cells: -30°C ~ +60°C

Applications:

- Calculators
- Cameras
- Compact, low power consuming cordless applications
- Electronic translators
- Electronic watches (digital and analog)
- Memory back-up in all types of devices (with tab terminal

Downloads:

Note: To view these documents you need the Adobe Acroba application installed on your system. If you need this applica download it at www.adobe.com.

- Available Tab Configurations and Dimensions for BR an CR Type Coin Cells in PDF Format - 242KB

Technical Data - Table 1 - (CF)n/LI: Poly-Carbon Monofluoride (BR)

Model No.	Electrical Characteristics (20°C)				Recommended Drain	Dimen	
	JIS	IEC	Nominal Voltage (V)	*Nominal Capacity (mAh)	Continuous (mA)	Diameter (mm)	H (
BR1216	---	---	3	25	0.03	12.5	
BR1220	---	---	3	35	0.03	12.5	
BR1225	---	BR1225	3	48	0.03	12.5	
BR1616	---	---	3	48	0.03	16.0	
BR1632	---	---	3	120	0.03	16.0	
BR2016	---	BR2016	3	75	0.03	20.0	
BR2020	---	BR2020	3	100	0.03	20.0	
BR2032	---	---	3	190	0.03	20.0	
BR2320	---	BR2320	3	110	0.03	23.0	
BR2325	---	BR2325	3	165	0.03	23.0	
BR2330	---	---	3	255	0.03	23.0	
BR3032	---	BR3032	3	500	0.03	30.0	

* Nominal capacity shown is based on standard drain and cut off voltage down to 2.0V at 20°

Technical Data - Table 2 - MnO_2/LI:Manganese Dioxide (CR)

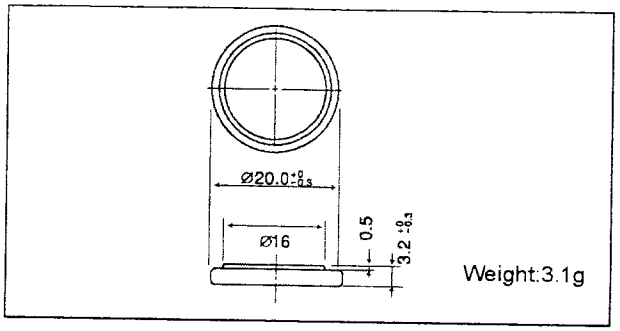
Model No.	Electrical Characteristics (20°C)				Recommended Drain	Dime	
	JIS	IEC	Nominal Voltage (V)	*Nominal Capacity (mAh)	Continuous (mA)	Diameter (mm)	
CR1025	CR1025	CR1025	3	30	0.10	10.0	
CR1216	CR1216	CR1216	3	25	0.10	12.5	
CR1220	CR1220	CR1220	3	35	0.10	12.5	
CR1612	---	---	3	40	0.10	16.0	
CR1616	CR1616	CR1616	3	55	0.10	16.0	
CR1620	---	CR1620	3	75	0.10	16.0	
CR1632	---	---	3	125	0.10	16.0	
CR2012	CR2012	CR2012	3	55	0.10	20.0	
CR2016	CR2016	CR2016	3	90	0.10	20.0	
CR2025	CR2025	CR2025	3	165	0.20	20.0	
CR2032	CR2032	CR2032	3	220	0.20	20.0	
CR2320	CR2320	CR2320	3	130	0.20	23.0	
CR2330	CR2330	CR2330	3	265	0.20	23.0	
CR2354	---	CR2354	3	560	0.20	23.0	
CR2412	---	---	3	100	0.20	24.5	
CR2450	---	CR2450	3	620	0.20	24.5	
CR2477	---	---	3	1000	0.20	24.5	
CR3032	---	CR3032	3	500	0.20	30.0	

* Nominal capacity shown is based on standard drain and cut off voltage down to 2.0V at 20°
Note: Cells are available in assorted tab configurations.
Consult your local regional office for additional information.

Manganese Dioxide Lithium Coin Batteries: Individual Specifications

CR2032

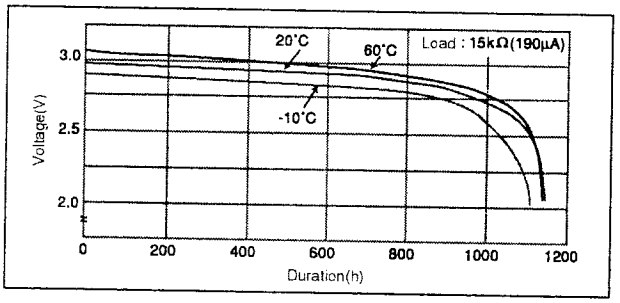
■ Dimensions(mm)



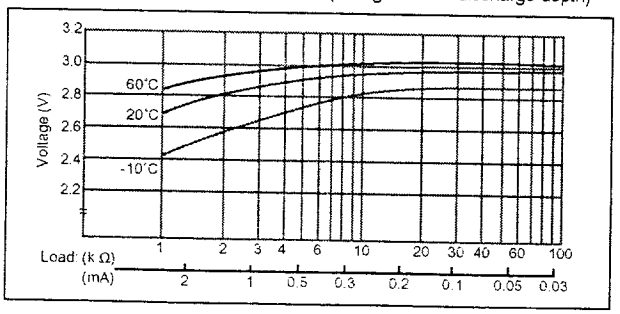
■ Specification

Nominal voltage (V)	3
Nominal capacity (mAh)	220
Continuous standard load (mA)	0.2
Operating temperature (C)	-30 ~ +60

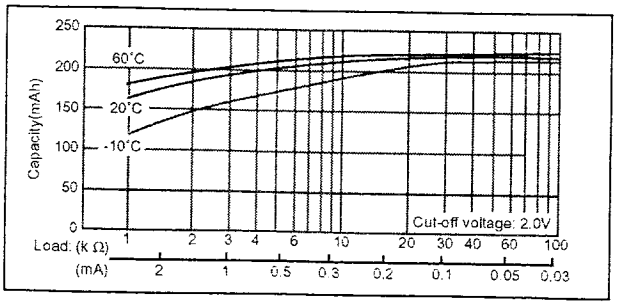
■ Temperature Characteristics



■ Operating voltage vs. load resistance (voltage at 50% discharge depth)

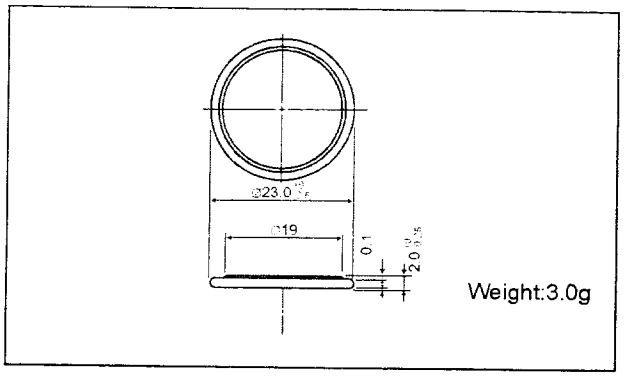


■ Capacity vs. load resistance



CR2320

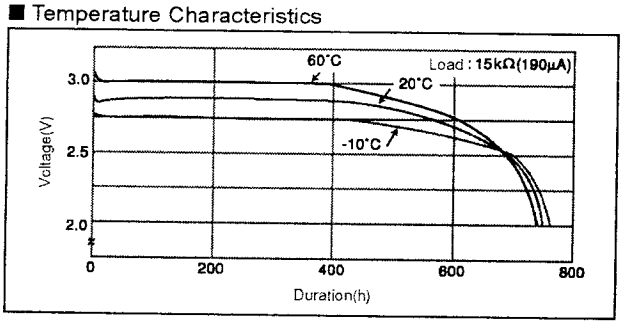
■ Dimensions(mm)



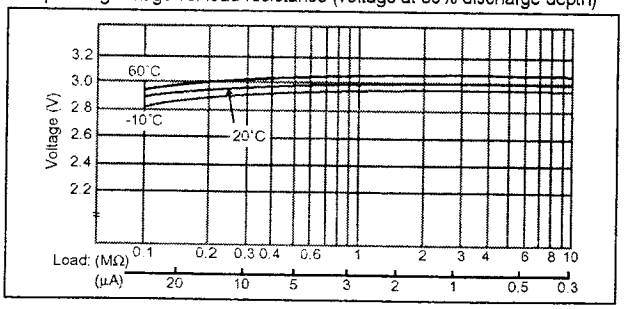
■ Specification

Nominal voltage (V)	3
Nominal capacity (mAh)	130
Continuous standard load (mA)	0.2
Operating temperature (C)	-30 ~ +60

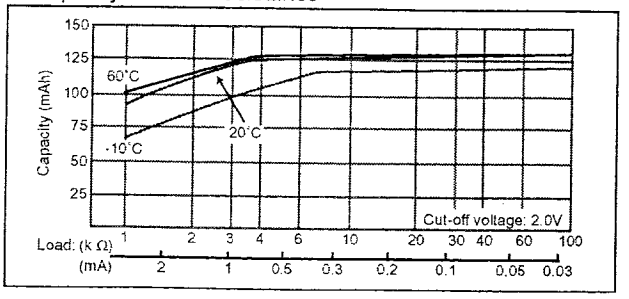
■ Temperature Characteristics



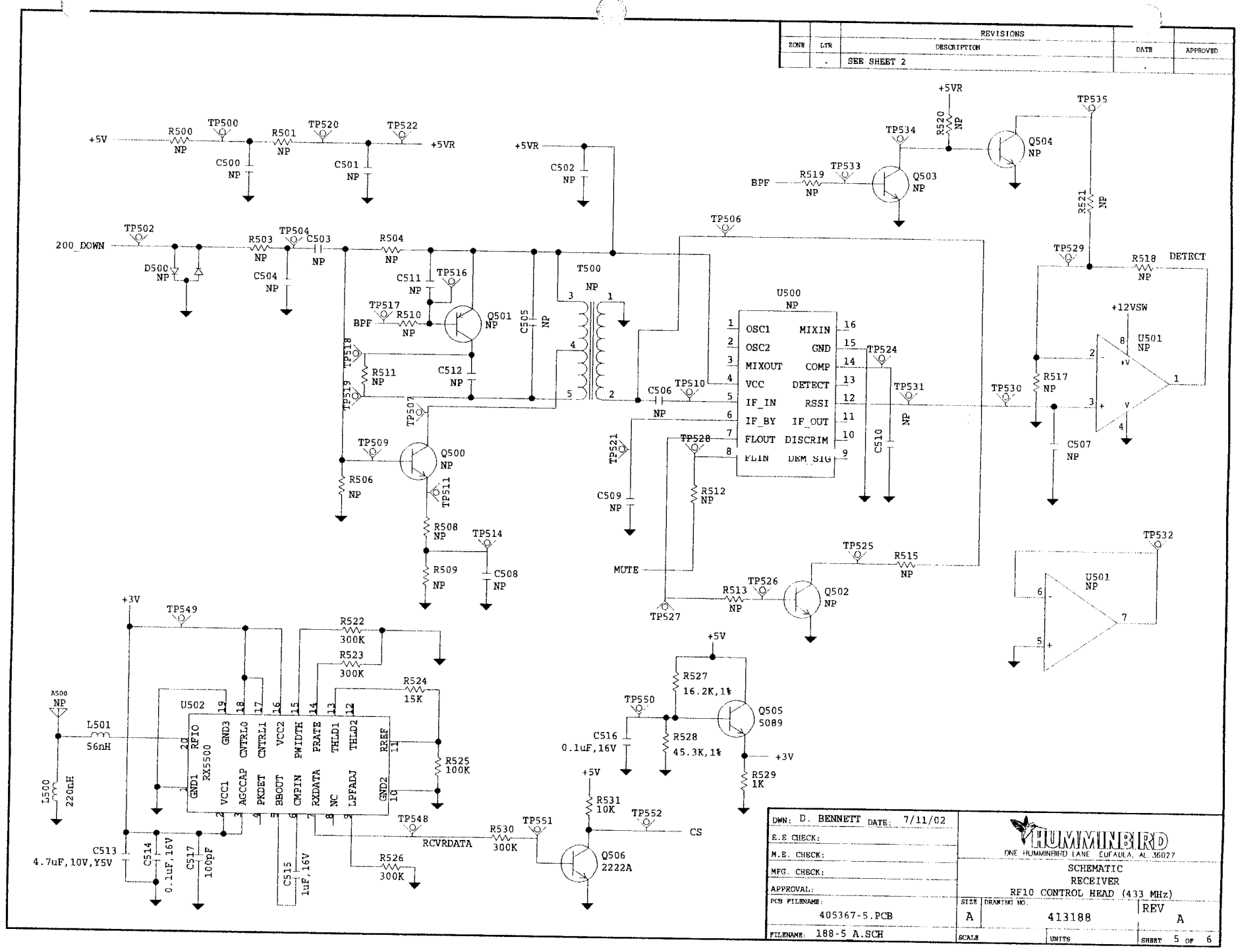
■ Operating voltage vs. load resistance (voltage at 50% discharge depth)



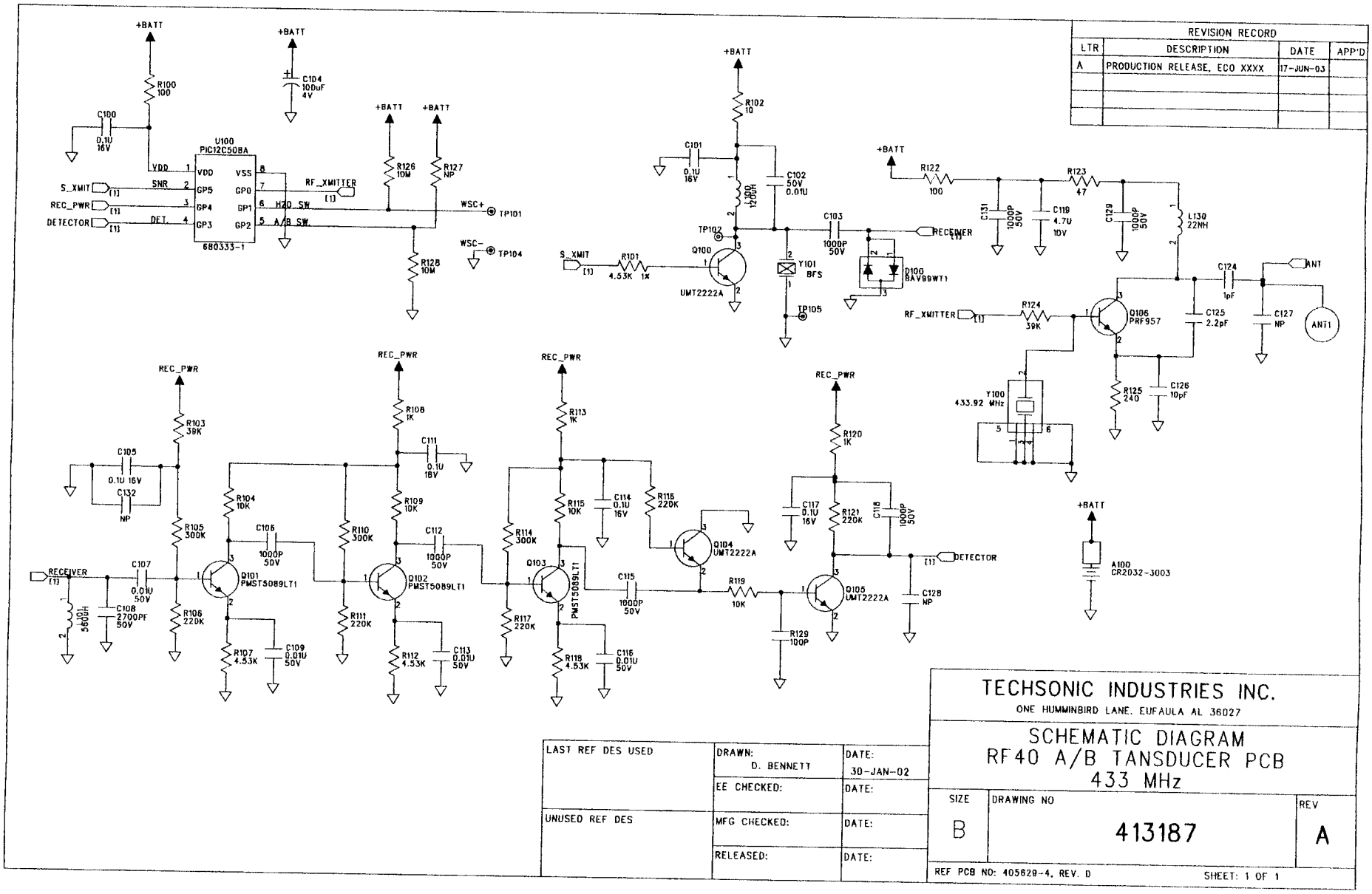
■ Capacity vs. load resistance



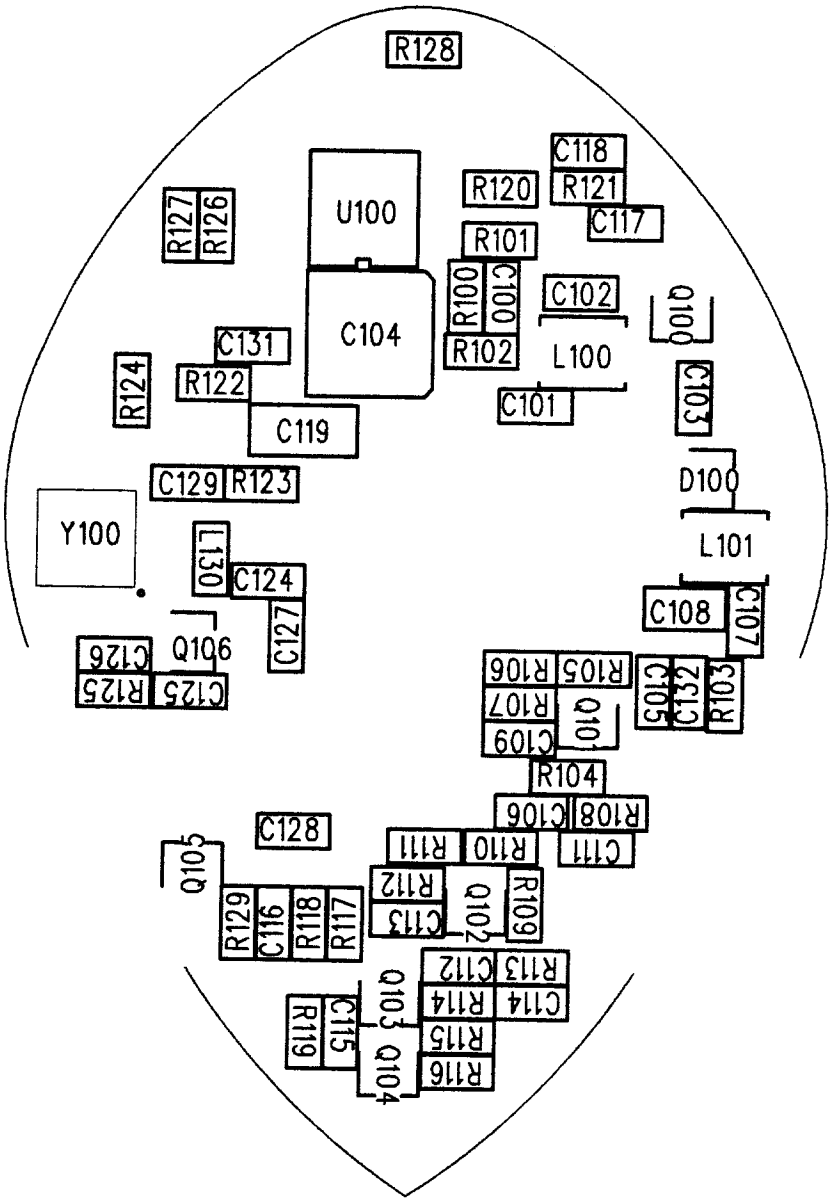
CONFIDENTIAL



CONFIDENTIAL



LAYER 1- COMPONENT SIDE ARTWORK



PROPRIETARY INFO
TECHSONIC INDUSTRIES INC.

CONFIDENTIAL

GUPPY BOBBER PCB; 405629-4, REV. E

23-APR-2003

405629_E.pcb - Tue Jun 17 11:00:14 2003

Bill Of Materials for 413187_A.sch on Tue Jun 17 10:53:21 2003

PART NO.	DESCRIPTION	VALUE	REF-DES.	QTY.
405609-1	ANTENNA INT. XDUCER	TBD	ANT1	1
430015-1	HOLDER, BATTERY, COIN CELL, CR2032-3003	CR2032-3003	A100	1
440255-1	XDUCER, BFS BOBBER	BFS	Y101	1
640023-1	RESONATOR, SAW, 433.92 MHz	433.92 MHz	Y100	1
660027-1	DIODE SOT-323 SWITCHING DUAL	BAV99WT1	D100	1
662046-1	XSTR SOT-323 BIPOLAR NPN	UMT2222A	Q100 Q104-105	3
662072-1	XSTR SOT-323 BIPOLAR NPN	PMST5089LT1	Q101-103	3
662074-1	XSTR UHF WIDEBAND SOT-323	PRF957	Q106	1
664007-010	CAPACITOR, 5%, 50V, 0603	1pF	C124	1
664007-022	CAPACITOR, 5%, 50V, 0603	2.2pF	C125	1
664007-100	CAPACITOR, 5%, 50V, 0603	10pF	C126	1
664007-NP	CAP CER 0603	NP	C127	1
664026-475	CAP CER 1206 Y5V 10V +80/-20%	4.7U	C119	1
664027-104	CAP CER 0603 X7R 16V 10%	0.1U	C100-101 C105 C111 C114 C117	6
664027-NP	CAP CER 0603 X7R 16V 10%	NP	C132	1
664032-101	CAP CER 0603 X7R 50V 10%	100P	R129	1
664032-102	CAP CER 0603 X7R 50V 10%	1000P	C103 C106 C112 C115 C118 C129 C131	7
664032-103	CAP CER 0603 X7R 50V 10%	0.01U	C102 C107 C109 C113 C116	5
664035-272	CAP CER 0805 COG 50V 5%	2700PF	C108	1
664064-NP	CAP CER 0603 NPO 50V +/-.25P	NP	C128	1
664097-107	CAP ALUM. ELEC 5.3 4V 20%	100uF	C104	1
668004-4533	RES FILM 0603 62mW 1%	4.53K	R101 R107 R112 R118	4
668007-100	RES FILM 0603 62mW 5%	10	R102	1
668007-101	RES FILM 0603 62mW 5%	100	R100 R122	2
668007-102	RES FILM 0603 62mW 5%	1K	R108 R113 R120	3
668007-103	RES FILM 0603 62mW 5%	10K	R104 R109 R115 R119	4
668007-106	RES FILM 0603 62mW 5%	10M	R126 R128	2
668007-224	RES FILM 0603 62mW 5%	220K	R106 R111 R116-117 R121	5
668007-241	RES FILM 0603 62mW 5%	240	R125	1
668007-304	RES FILM 0603 62mW 5%	300K	R105 R110 R114	3
668007-393	RES FILM 0603 62mW 5%	39K	R103 R124	2
668007-470	RES FILM 0603 62mW 5%	47	R123	1
668007-NP	RES 0603 NOT PLACED	NP	R127	1
670030-121	IND 1210 WWF 5%	120uH	L100	1
670030-561	IND LQH32* 5% 1210	560uH	L101	1
670057-220	IND 0603 WWF 10%	22NH	L130	1
680333-1	IC, MICRO, CMOS, 8-BIT, SO-8 (208mil)	PIC12C508A	U100	1
TP-.8/.4-TH	TEST POINT VIA .80/.40 THRU		TP102 TP105	2

RU
TP-3.8/2.05 TEST POINT VIA 3.8/2.05 THRU TP101 TP104 2
-THRU

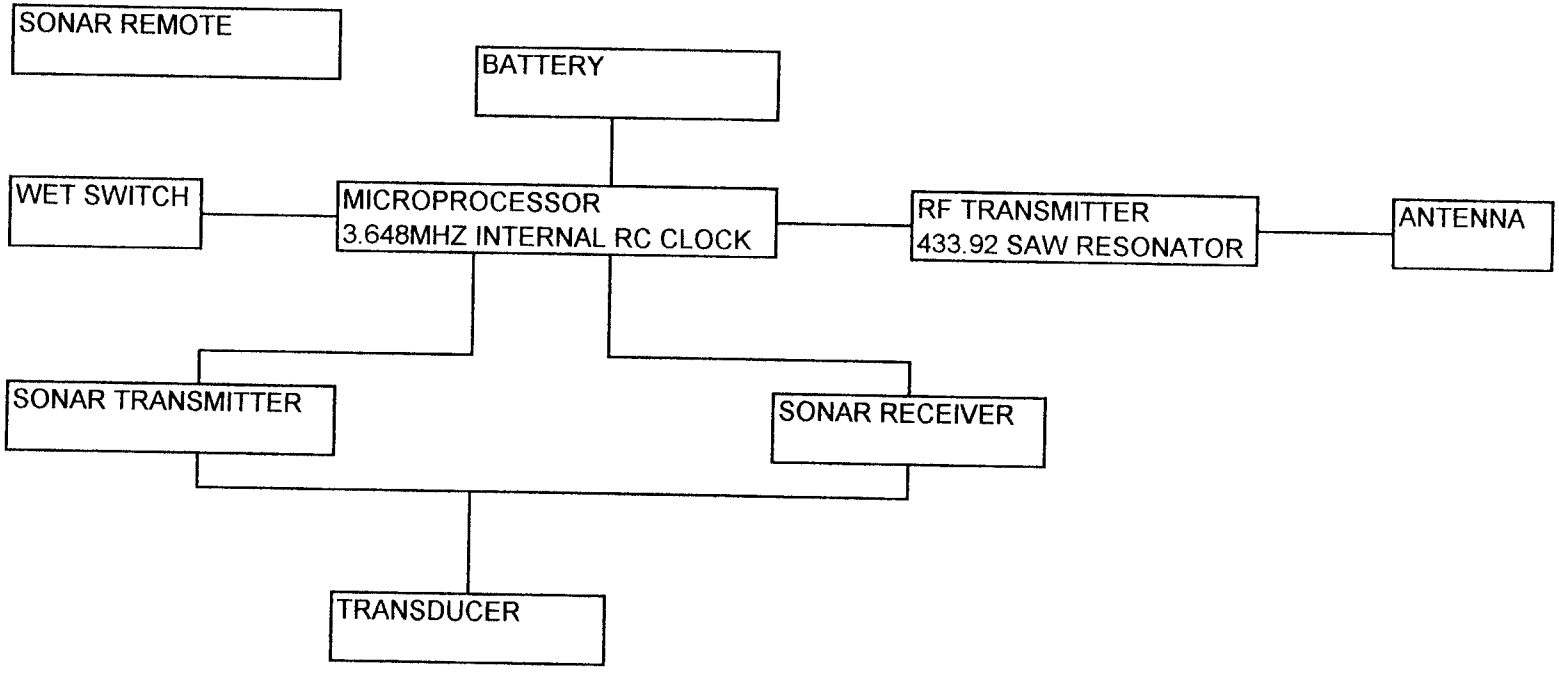
Input File Name: 188-5_A.mat
* Output File Name: 188-5_A.BOM
* Date: 17/6/2003
* Time: 12:8:16
*

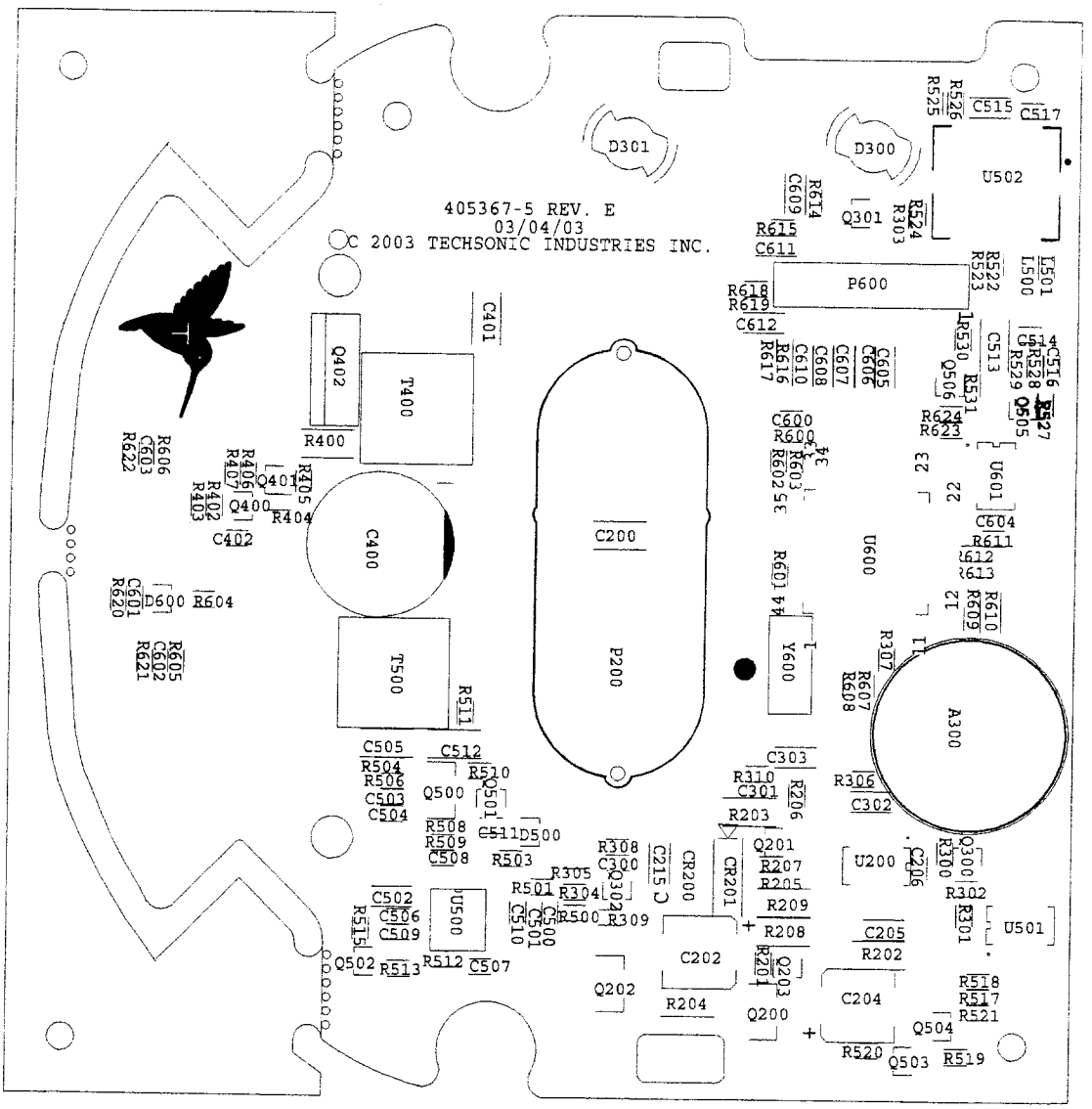
****

PART #	DESCRIPTION	REFERENCE DES	QUAN
662046-1	TRANSISTOR, UMT2222A	Q506	1
662072-1	TRANSISTOR,PMBT5089,SOT323	Q505	1
664007-101	CAPACITOR,100PF,50V,5%,COG	C517	1
664026-475	CAPACITOR, 4.7UF,10V,20%	C513	1
664027-104	CAPACITOR, 0.1UF, 16V,10%	C514 C516	2
664068-105	CAP.,1UF,16V,10%,X7R,0805	C515	1
668004-1624	RES,16.2K OHM 1/16W,1%,0603	R527	1
668004-4534	RES,45.3K OHM 1/16W,1%,0603	R528	1
668007-102	RES, 1K OHM 1/16W,5%,0603	R529	1
668007-103	RES, 10K OHM 1/16W,5%,0603	R531	1
668007-104	RES, 100K OHM 1/16W,5%,0603	R525	1
668007-153	RES, 15K OHM 1/16W,5%,0603	R524	1
668007-304	RES, 300K OHM 1/16W,5%,0603	R522 R523 R526 R530	4
670056-221	IND, 220NH, LQW2BHNR22J01	L500	1
670057-56	IND, 56NH, LQG18HN56NJ00	L501	1
680358-1	IC, RECEIVER, 433.92MHZ, RX550U502		1
NP	CAP 1206 NOT PLACED	C505 C512	2
NP	CAP 0603 NOT PLACED	C500 C501 C503 C504 C506 C507 C508 C509 C510 C511	10
NP	TRANSISTOR NOT PLACED	Q501 Q502 Q503 Q504	4
NP	CAP 0805 NOT PLACED	C502	1
NP	ANTENNA, FOR REFERENCE ONLY	A500	1
NP	DIODE SOT323 NOT PLACED	D500	1
NP	RES 0603 NOT PLACED	R500 R501 R503 R504 R506 R508 R509 R510	17

		R511 R512 R513 R515 R517 R518 R519 R520 R521		
NP	TRANSFORMER, NOT PLACED	T500	1	
NP	IC, NOT PLACED	U501	1	
NP	IC, BA4116FV, NOT PLACED	U500	1	
NP	TRANSISTOR NOT PLACED	Q500	1	

BLOCK DIAGRAM SHOWING OSCILLATOR FREQUENCIES





PART 3

LABELING

(IDENTIFICATION, MARKING AND DOCUMENTS)

Part 3 contains the Product Specification for Product Labeling and Instructions for Use

PRODUCT LABELING

MARKINGS

The following Markings are required to be applied to the product in a reliable fashion.

Item 1: Manufacturer's name, and model number.

Example, "Humminbird Smartcast"

INSTRUCTIONS FOR USE

Instructions For Use is considered a part of this Technical File and includes the following:

Item 1: Operation Instructions

Item 2: Description of all input and output connections

Item 3: Description of control functions

Item 4: Description of operation sequences

Item 5: Connection/disconnection of detachable parts and accessories

Item 6: Description of cleaning, preventive maintenance and inspection to be performed by operator

Item 7: Installation

Item 8: Language

The documentation shall be in a language agreed upon between customer and supplier. If no language is specified an official CENELEC language shall be used.

Item 9: Technical Specification

- Battery requirements

Thank You!

331994-1_A

Thank you for purchasing a SmartCast wireless fishfinder from Humminbird, Americas #1 Manufacturer of quality consumer marine electronics.

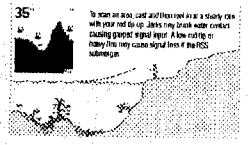
With this purchase you should have:

- One Remote Sonar Sensor - RSS™ - Channel A
- SmartCast Portable Base and Display
- Hardware
- SmartCast Operations Manual.

If any of these components are missing or are not included, please contact our Customer Resource Center at 1 334-687-0503.

Using the SmartCast

The SmartCast is a first-of-its-kind wireless fishfinder that is incredibly easy to use. Simply attach the Remote Sonar Sensor (RSS) to the end of your fishing line and cast it into the water as you would a normal float or lure. Then power on the SmartCast Base display and you are ready to fish. The SmartCast system uses sonar technology to send sound waves from the RSS into the water. The returned "echoes" are transmitted with wireless technology to the display unit and plotted on the LCD. New information appears on the right. As this information moves to the left a very accurate picture of the underwater world is created, including the depth of underwater objects such as the bottom, fish, and structures.



Operational Modes

The RSS can be used in two distinct ways:

Sonar Graph: The RSS can be used to create a sonar graph of the bottom. Cast the RSS into the water beyond an area of interest. Retrieving the RSS slowly and steadily will produce a screen detailing structure, fish and bottom detail. Rhythmic wave action and rocking may cause the display of a rippled bottom.

Stationary Plastic The RSS can be used as a float in a stationary location to monitor the area below, giving you a live update as fish approach your bait.

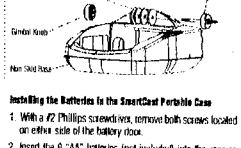
SmartCast Portable Case Assembly

The following step-by-step procedures for portable case assembly tasks must be performed in order.

1. Attaching the control head
2. Installing the batteries

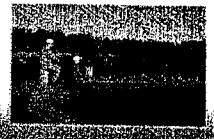
Attaching the Control Head

1. Remove the thumb knob bolt, gimbal knob, and rubber washers from the headware box.
2. Place the rubber washers between the control head's swivel knuckle and the arms from the portable case. Make sure that the control head screen is facing the case cavity and away from the battery compartment.
3. Slide the pivot bolt through the side with the smaller hole (-) and screw the gimbal knob onto it using only 2 3 turns. The gimbal knob may have two alignment pins that will seat into holes in the case arm holding the SmartCast control head. Make sure these pins are seated and then tighten the assembly to a snug tension.

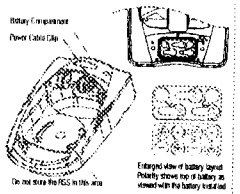


Installing the Batteries in the SmartCast Portable Case

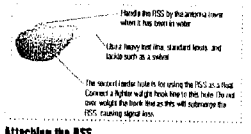
1. With a #2 Phillips screwdriver, remove both screws located on either side of the battery door.
2. Insert the 8 "AA" batteries (not included) into the case as shown on the diagram inside the battery compartment.



3. Before reattaching the battery door, make sure the silicon gasket is still in place. It should be just above the plastic, and completely in the gasket channel. Make sure that the gasket is clean of debris.



4. Reattach the battery door to the case using a #2 Phillips screwdriver. Partially insert one screw and then the other. Fully seat the screws. Hand tighten only; please do not use power tools. Finally, plug in the power cable to the RF-10.
5. Under normal use you should expect the life of the batteries to last from 50 hours with the LCD backlight(s) on, to 120 hours with the backlight(s) off.



Attaching the RSS

The line coming from your reel can be tied off to the front hole in the RSS. If you wish to also use the RSS as a conventional float, use the second hole to attach your hook using a lighter weight line. A snag will break the lighter line if you have to break free. Slip line techniques are not recommended because of the higher risk of losing the RSS. If you do use the slip line method, use a lighter weight line after the lower stop, enabling retrieval of the RSS if the lower line with hook breaks away.

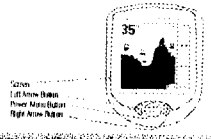
RSS Power

The Remote Sonar Sensor (RSS) has a separate, non-replaceable Lithium battery that has a shelf life of three years and will last for approximately 400 hours of in-water use. Discard the used RSS in compliance with local laws as you would any electronic component or battery.

The RSS has contacts that perceive when the device is immersed in the water. These contacts turn on the Sonar Transmitter/Receiver and begin transmitting the sonar information via RF to the display. The RSS automatically stops using power a few seconds after being pulled out of the water.

Powering ON and OFF

To turn on the display, press and release the POWER-MENU button. Press and hold POWER-MENU until the display unit shuts down to power off.



Start-Up in Fishing Mode

After pushing the POWER-MENU button to turn on the unit, you will see the Start-Up screen.

The Start-Up screen will disappear automatically after two seconds have passed, without further action from you. In Fishing mode, the screen will either display Waiting for Sonar or Received Sonar.

When you have powered on the unit and have cast the RSS into the water, returned sonar data will start to be displayed on the LCD. See Understanding the On-Screen Images for more information.

Start-Up in Simulator Mode

After pushing the POWER-MENU button to turn on the unit, and the Start-Up screen is displayed, quickly press the Right Cursor Button to enter Simulator mode. Once you are in Simulator mode, the screen will show Simulate, and after two seconds, the screen will start to display simulated data. To exit Simulator mode, you must power down the unit.

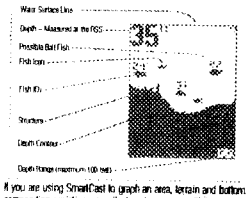
Start-Up in Set-Up Mode

Your RF10 comes with a Set-Up mode to allow you to choose the units of depth (Meters, Feet or Fathoms). After pushing the POWER-MENU button to turn on the unit, and the Start-Up screen is displayed, quickly press the Right Cursor Button twice to enter Set-Up mode.

Within a few seconds, the screen will change to display the Units menu, which defaults to Feet or Meters, depending on your model number. By pressing the Right Cursor Button, you can choose Feet, Meters or Fathoms. You must power down the unit to save your selection, then power it back on again to enter normal Fishing mode.

Understanding the On-Screen Images

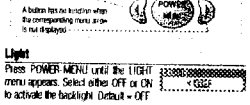
The SmartCast displays received underwater sonar information in an easy to understand format. The top of the display corresponds to the water surface, and the bottom of the display corresponds to the selected Depth Range (see Depth Range). The display varies as the area under the RSS changes. Reeling in the RSS at a slow and steady rate will allow you to graph the bottom for structure, detail and fish. Digital readouts provide precise information for bottom contour, depth and fish locations below the RSS.



If you are using SmartCast to graph an area, terrain and bottom composition variations are displayed on-screen. Fish and bait fish are displayed when detected. Underwater conditions vary greatly, so some experience and interpretation is needed to realize all the benefits of the SmartCast – use the picture above as a guide to the most common conditions and practice using the SmartCast over known bottom types.

Menu Features

A simple menu system accesses the adjustable features of the SmartCast. To activate the menu system, press the POWER-MENU button, the first time you do this after power up, the Sensitivity menu will appear. Once the SmartCast has been powered on, pressing the POWER-MENU button will display the last menu viewed. Press POWER-MENU repeatedly to access other SmartCast menu choices, one at a time. When a menu choice is on the display, use the RIGHT and LEFT Cursor buttons to adjust the menu settings. Menus are automatically removed from the screen after several seconds.



Light

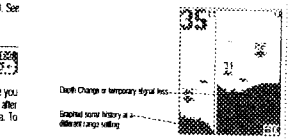
Press POWER-MENU until the LIGHT menu appears. Select either OFF or ON to activate the backlight. Default = OFF.

Sensitivity

Press POWER-MENU until the Sensitivity menu appears. Select a higher number to show smaller sonar returns on-screen or a lower number to remove clutter from the screen. Adjusting Sensitivity also affects how sonar returns not attached to the bottom are identified as Fish ID Symbols. Larger returns will be shown as fish at a lower setting. Increasing Sensitivity selects smaller returns to be identified as fish. Sensitivity settings range from 1 to 5. Default = 3.

Depth Range

Press POWER-MENU until the Depth Range menu appears. Select AUTO to have the SmartCast automatically set the Depth Range. Select 10,15, 20, 30, 60 or 100 feet to set a manual depth range. The locks the depth range to a specific setting. Default = AUTO.



Depth Scale changes or signal loss will cause lines with increasing detail and/or abrupt changes in the graphed bottom. When the Depth range is set to AUTO, the depth is set to keep the bottom in the lower third of the screen. The screen image jump shown here is due to an automatic change in depth. New returns graphed at a different scale will not match up with the historic data already graphed at a higher or lower scale. Vertical lines can also occur as the radio signal from the RSS is lost and then regained in tough water conditions.

Channel

Press POWER-MENU until the CHANNEL menu appears. Select either A or B to match your RSS. See Channel A and B RSS Units. Default = Channel A.

Bottom Black

Press POWER-MENU until the BOTTOM BLACK menu appears. Select OFF to gain bottom hardness information by viewing second returns. For a high contrast display that is easy to view from a distance, leave the view setting on Bottom Black. Default = ON.

Fish Alarm

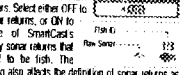
Press POWER-MENU until the FISH ALARM menu appears. Select OFF for no Fish alarm, or one of the following symbols to set the alarm point and turn it on. Default = OFF.

- Alarms on big fish only
- Alarms on big and medium fish only
- Alarms on all fish

Fish ID+ must be set to ON for Fish Alarm to work.

Fish ID+

Press POWER-MENU until the FISH ID+ menu appears. Select either OFF to view "raw" sonar returns, or ON to take advantage of SmartCast's ability to identify sonar returns that are determined to be fish. The sensitivity setting also affects the definition of sonar returns as fish (see Sensitivity). Some fish symbols will show the depth of the fish above the fish symbol. Fish Alarm does not sound if Fish ID+ is turned off. Default = ON.



Channel A and B RSS Units

There are two versions of the RSS that are available at your local tackle dealer, major outdoor retailers, or at the website **www.humminbird.com**: Channel A and Channel B.

The Channel A RSS unit (RF40A) comes standard with your SmartCast product. You also have the option to purchase additional Channel A or Channel B RSS. When using the A or B version of the RSS, make sure to select the appropriate channel in the CHANNEL menu.

The A&B Channel Option gives you the flexibility to use a different type of RSS than the one you are currently using if another angler is using a SmartCast product within 100 feet of your SmartCast. If you have a Channel B RSS, you will need to set the channel to B each time you power up the SmartCast. Two Channel A or two Channel B RSS units in the water within 100 feet of the display will cause RF interference that prevents the product from functioning properly, resulting in fluctuating depth readings and excessive clutter on the screen. If you use a Channel B RSS while another angler is using an Channel A RSS or vice versa, the interference will be reduced but not completely eliminated.

Maintenance

Your SmartCast is designed to provide years of trouble-free operation with virtually no maintenance. Follow these simple procedures to ensure your SmartCast continues to deliver top performance.

After using the RSS in salt water, wipe the affected surfaces with a cloth dampened with fresh water. The RSS Wet Switch™ pins must be rinsed with fresh water after exposure to salt water to prevent corrosion.

If the SmartCast comes into contact with salt spray, wipe the affected surfaces with a cloth dampened with fresh water. When cleaning the LCD protective lens, use a chamois and non-abrasive, mild cleaner. Do not wipe while dirt or grease is on the lens. Be careful to avoid scratching the lens. Do not use a chemical glass cleaner on the lens, as this may cause it to crack.

If your RSS remains out of the water for a long period of time, it may take some time to wet it when returned to the water. Small air bubbles can cling to the surface of the RSS and interfere with proper operation. Wipe the face of the RSS with a wet cloth to remove them.

If sonar performance becomes weak (i.e., there are bottom gaps or "0" depth readings) the bottom of the RSS needs to be cleaned with a drop or two of a 5 to 10 percent solution of liquid dishwashing detergent and water. Use approximately one tablespoon detergent to 8 ounces of water to remove oils from the face of the RSS, then wipe with a damp cloth.

Never leave the SmartCast product in a closed car or trunk - the extremely high temperatures generated in hot weather can damage the electronics.

Replacement Battery Power Cables

You will not have to install the battery power cable before first use, but may need to replace it should it become corroded after prolonged usage in a marine environment. Order replacement cables at **www.humminbird.com**.

Troubleshooting

Do not attempt to repair the SmartCast or RSS yourself. There are no user serviceable parts inside, and special tools and techniques are required for assembly to ensure the waterproof integrity of the housings. Repairs should be performed only by authorized Humminbird technicians.

Many requests for repair received by Humminbird involve units that do not actually need repair. These units are returned "no problem found." If you have a problem with your SmartCast, use the following troubleshooting guide before calling the Customer Resource Center or sending your unit in for repair.

1. The SmartCast loses signal.

If the SmartCast is not able to get an RF signal from the RSS, the display will stop updating (the screen will freeze) and the SmartCast screen will be displayed after several seconds. Whenever reception is lost or the RSS changes from the water for more than a few seconds, the SmartCast screen will be displayed until the RSS is placed back in the water and reception is regained.

- The SmartCast system is a line-of-sight wireless product. If objects are placed between the RSS and the SmartCast, the reception may be lost.
- The SmartCast depth range is 2 to 100 feet (0.6 to 30 meters). Erratic readings may occur in water that is shallower than 2 feet. In addition, because of the nature of sonar, this product is not intended for use in swimming pools or small enclosed bodies of water.
- Reeling the RSS too fast can cause loss of signal and the screen will freeze.
- Check the buoyant balance between the RSS and your tackle; over 0.2 ounce will submerge the RSS, causing signal loss.
- The SmartCast may not obtain its maximum RF distance of 100 feet unless the water is smooth. Waves or chop may reduce the RF range significantly.

2. Nothing happens when I turn the SmartCast on.

Check the power cable connection at both ends. Check the power connection to the SmartCast. It is possible to force the power cable connector into the cable holder incorrectly. If the connector is reversed, the unit will not work. Examine the contacts on the back of the unit to ensure there is no corrosion. Confirm that your batteries are good and properly installed.

3. When in very shallow water, I get gaps in the bottom reading and inconsistent digital depth indication.

The SmartCast will work reliably in water 2 feet (0.6 meters) or deeper. The depth is measured from the RSS' A transmitter (RSS) to receiver (SmartCast) distance of greater than 100' may cause intermittent screen display. Excessively rough water may cause the RSS to submerge, again losing contact.

4. The screen begins to fade out, images are not as sharp as normal.

Check the battery voltage. The SmartCast will not operate on voltages below 8 VDC. Use 1.5 volt alkaline "AA" batteries.

If this doesn't help, replace the battery. After replacing the battery, if the unit still has a faded screen, remove the battery again and re-install.

5. The display shows many black dots at high sensitivity settings.

You are seeing noise or interference caused by one of several sources. Noise can be caused by other electronic devices. Turn off any nearby electronics and see if the problem goes away. Other sonar devices or any electronic device operating in the 916 mHz range (433 mHz range for European models) could cause interference with your SmartCast.

6. The display shows fluctuating depth readings and excessive clutter, including vertical bars that may be drawn on top of fish icons.

The SmartCast system comes with the capability to receive separate signals from Channel A RSS or a Channel B RSS. Two A or B type RSS units used simultaneously, as well as one A and one B-type RSS unit used simultaneously, can cause RF interference between each other.

7. The screen jumps and the bottom has an abrupt change; sometimes a vertical line is missing or a black line from top to bottom is displayed.

This screen image jump is due to an automatic change in depth. New returns graphed at a different scale will not match up with the historic data already graphed at a higher or lower scale. Vertical lines can also occur as the radio signal from the RSS is lost and then regained in rough water conditions.

Technonic Industries' 1-Year Limited Warranty

We warrant to the original retail purchaser that Technonic Industries products have been manufactured free from defects in materials and workmanship. This warranty is effective for one year from the date of original retail purchase, excepting that where Technonic Industries products are used commercially or in any rental or other income producing activity, then this warranty is limited to ninety days from the date of original purchase for mechanical and electrical products.

We will provide replacement product without charge for any Technonic Industries product not covered by this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such products were purchased, or in us at the appropriate address, in any such case, Technonic Industries products found to be defective and covered by this warranty will be replaced or repaired at Technonic Industries option, and returned to the customer.

Technonic Industries' sole responsibility under this warranty is limited to the repair or replacement of product which is, in Technonic Industries opinion, defective. Technonic Industries is not responsible for charges connected with the removal of such product or reinstallation of replacement or repaired parts.

We will have no obligations under this warranty for any product which has been:

- improperly installed;
- used in an installation other than as recommended in our installation or operation instructions or specifications;
- damaged or has failed due to an accident or abnormal operation including racing, misuse or alterations outside our factory;
- repaired or modified by entities other than Technonic Industries;
- used on an engine/boat combination where the engine horsepower exceeds the rating established by the boat manufacturer;
- used with other product(s) which, in Technonic Industries opinion, are incompatible with the Technonic Industries product.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES ON THE PART OF TECHSONIC INDUSTRIES AND WILL BE THE CUSTOMER'S EXCLUSIVE REMEDY EXCEPT FOR ANY APPLICABLE IMPLIED WARRANTIES UNDER STATE LAW WHICH ARE HEREBY LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL PURCHASE. IN NO EVENT WILL TECHSONIC INDUSTRIES BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY RELATING TO THE PRODUCTS.

Some states do not allow limitations on an implied warranty or the exclusion of incidental or consequential damages, so the above exclusions may not apply to you. You may also have other rights which vary from state to state.

You must contact our Customer Resource Center to receive a repair authorization number before sending your SmartCast or RSS to our factory for service. This authorization number should be included on the shipping label when returned to our factory. In addition, a letter describing the problem you are experiencing, along with your name, address and daytime telephone number must be included, so that we can contact you about your repair if necessary.

International Purchases

A separate warranty is provided by international distributors for units purchased outside the United States. This warranty is included by your local distributor and this distributor maintains local service for your unit. Warranties are only valid in the area of intended distribution. Units purchased in the United States or Canada must be returned to our factory in the United States for service.

SERVICE POLICY

This Service Policy is valid in the United States only. This applies to Humminbird units returned to our factory in Eufaula, Alabama, and is subject to change without notice.

All repair work is performed by factory-trained technicians to meet exacting factory specifications. Factory serviced units go through the same rigorous testing and quality control inspection as new production units.

Even though you'll probably never need to take advantage of our incredible service guarantee, it's good to know that we back our units this well. We do it because you deserve the best. We will make every effort to repair your unit within three working days from the receipt of your unit. This does not include shipping time to and from our factory. Units received on Friday are usually shipped by Wednesday, units received Monday are usually shipped by Thursday, etc.

We reserve the right to deem any product unserviceable when replacement parts are no longer reasonably available or impossible to obtain.

After the original warranty period, a standard flat rate service charge will be assessed for each repair (physical damage and missing parts are not included). Please call our Customer Resource Center to verify the service charge for your unit.

If charges are not prepaid, the unit will be returned C.O.D. If you are experiencing problems related to bottom or depth readings, please send your RSS (Remote Sonar Sensor) along with your SmartCast Portable base and display when sending for repair.

FCC ID RESPECT

Techsonic Industries

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.

Contact Humminbird

Your Humminbird accessory is designed for trouble-free operation and is backed by a one year warranty. If you have any questions, contact our

Humminbird Customer Resource Center:

By Telephone
(Monday - Friday 8:00 a.m. to 4:30 p.m. Central Standard Time):
334-687-0503

By e-mail
(typically we respond to your e-mail within three business days): custserv@techsonic.com

For direct shipping, our address is:
Techsonic Industries, Inc.
Service Department
108 Maple Lane
Eufaula, AL 36027 USA

HUMMINBIRD

SPECIFICATIONS

SMARTCAST
WIRELESS FISHFINDERS

Merci !

Merci d'avoir choisi le détecteur de poissons sans fil SmartCast de Humminbird, premier fabricant américain en électronique grand public de qualité spécialisé en systèmes marins.

Cet achat se compose des éléments suivants :

- Un capteur sonar à distance (Remote Sonar Sensor - RSS) Canal A
- Une base et afficheur portable SmartCast
- La quincaillerie
- Ce guide d'utilisation du SmartCast

Si l'un de ces éléments est manquant ou non inclus, contactez votre Centre de ressources pour la clientèle au 1-334-687-3003.

Utilisation du SmartCast

Premier détecteur de poissons sans fil de sa catégorie, le SmartCast est d'une extrême simplicité d'utilisation. Fixez simplement le RSS à l'extrémité de votre ligne et lancez le dans l'eau comme un leurre ou un hameçon classique. Mettez ensuite sous tension l'afficheur de base SmartCast et vous êtes prêt à pêcher. Le système SmartCast utilise la technologie sonar pour transmettre dans l'eau les ondes sonores issues du RSS. Les échos renvoyés sont tracés sur l'écran LCD. Les nouvelles informations s'affichent sur la droite. A mesure que ces informations se déplacent vers la gauche, une image très précise du monde subaquatique se dessine comme la profondeur d'objets subaquatiques comme le fond, les poissons et les structures.

Modes de fonctionnement

Vous pouvez utiliser le RSS de deux manières :

Relevé sonar : Le RSS peut servir à créer un relevé sonar du fond. Lancez le RSS dans l'eau au-delà de la zone qui vous intéresse. Il va répéter le RSS lentement et sans à-coups, vous obtiendrez un affichage créant les structures, les poissons et les détails du fond. L'ondulation régulière des vagues et le tangage peuvent produire un fond irrégulier.

Fixation du RSS

Vous pouvez fixer la ligne qui vient de votre moulinet au trou avant du capteur RSS. Si vous souhaitez vous servir également du RSS comme d'un flotteur classique, utilisez le second trou pour fixer l'hameçon avec un bas de ligne plus fin. Une secousse suffira pour casser la ligne fine et vous libérer si vous êtes accroché. Les techniques de flotteur coulissant sont déconseillées car elles augmentent le risque de perdre le RSS. Si vous les utilisez, prévoyez un fil plus fin après la nuitée inférieure, pour pouvoir récupérer le RSS si le bas de ligne portant l'hameçon se casse.

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Flotteur fixe : Vous pouvez utiliser le RSS comme un flotteur fixe pour observer la zone au-dessous, pour savoir en temps réel quand le poisson s'approche de l'appât.

Installation de la mallette de transport SmartCast

Les procédures étape par étape pour l'installation de la mallette de transport doivent être effectuées dans l'ordre établi ci-dessous :

1. Installation de la tête de commande
2. Insertion des piles

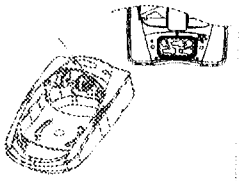
Installation de la tête de commande

1. Retirez le boulon à oreilles, la suspension à la cantine et les rondelles en plastique du socle à quincaillerie.
2. Placez les rondelles en plastique entre le joint d'articulation de la tête de commande et les bras de la mallette de transport. Assurez-vous que l'écran de la tête de commande fait face au centre de la mallette, à l'opposé du compartiment à piles.
3. Faites glisser le boulon pivot par le côté avec le trou de taille inférieure (¼") et vissez-y la suspension à la cantine avec 2 à 3 tours seulement. La suspension à la cantine peut avoir deux chevilles de positionnement qui devraient s'insérer dans le trou de la mallette supportant la tête de commande SmartCast. Assurez-vous que ces chevilles de positionnement sont insérées correctement et serrez l'ensemble jusqu'à la tension nécessaire.

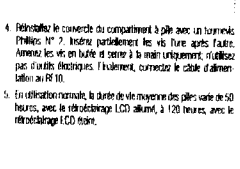
Installation des piles dans la mallette portable SmartCast

1. Retirez les deux vis situées de chaque côté du couvercle du compartiment à pile avec un tournevis Phillips N° 2.
2. Insérez les 8 piles AA (fournies séparément) dans le compartiment selon le diagramme à l'intérieur du compartiment à piles.

3. Avant de remettre le couvercle du compartiment à pile, vérifiez que le joint d'étanchéité en silicone est toujours en place. Il devrait se trouver directement au dessus du plastique, entièrement dans la rainure. Vérifiez que le joint est exempt de poussière.



4. Réinstallez le couvercle du compartiment à pile avec un tournevis Phillips N° 2. Insérez partiellement les vis fixes après l'autre. Amenez les vis en butée et serrez à la main uniquement, n'utilisez pas d'outils électriques. Finalement, connectez le câble d'alimentation au RF10.
5. En utilisation normale, la durée de vie moyenne des piles varie de 50 heures, avec le rétroéclairage LCD allumé, à 120 heures, avec le rétroéclairage LCD éteint.



Mise en marche et arrêt de l'affichage

Pour allumer l'écran, tenez enfoncé et relâchez le bouton MARCHE-MENU jusqu'à ce que vous entendiez un bip, puis relâcher le bouton. Pour éteindre l'écran, tenez le même bouton enfoncé jusqu'à ce que l'affichage de l'appareil s'éteigne.

Démarrage en mode Pêche

Après avoir mis l'appareil sous tension en appuyant sur le bouton MARCHE-MENU, vous obtenez l'écran de démarrage.

Cet écran disparaît automatiquement au bout de deux secondes, sans intervention de votre part. Dans le mode Pêche, l'écran affichera soit En Attente du sonar (Waiting for Sonar) ou soit Sonar reçu (Received Sonar).

Après avoir mis en marche l'appareil et lancé le RSS dans l'eau, les données de sonar renvoyées commencent à s'afficher sur l'écran LCD. Pour plus d'information, consulter la section Interprétation des images affichées.

Démarrage en mode Simulateur

Après avoir appuyé sur le bouton MARCHE-MENU pour allumer l'appareil, quand l'écran de démarrage est affiché, appuyez rapidement sur le bouton de curseur droit pour activer le mode Simulateur. Dans ce mode, l'écran affiche Simuler (Simulate) et commence à afficher les données simulées au bout de deux secondes. Pour quitter le mode Simulateur, éteignez l'appareil.

Démarrage en mode Configuration

Votre RF10 comprend un mode de Configuration qui vous permet de choisir les unités de profondeur (Mètres, Pieds, Brasses). Après avoir appuyé sur le bouton MARCHE-MENU pour allumer l'appareil, quand l'écran de démarrage est affiché, appuyez rapidement sur le bouton de curseur droit deux fois pour activer le mode Simulateur.

En quelques secondes, l'écran changera pour afficher le menu des Unités qui reviendra par défaut au Pieds ou Mètres, selon le numéro de votre modèle. En appuyant sur le bouton de curseur droit, vous pouvez choisir Pieds, Mètres ou Brasses. Vous devez éteindre l'appareil pour sauvegarder votre sélection et ensuite la rallumer pour obtenir le mode de Pêche normal.

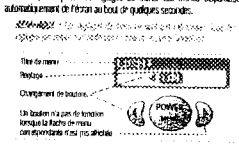
Interprétation des images affichées

Le SmartCast affiche les informations subaquatiques reçues par le sonar, dans un format simple à comprendre. Le haut de l'affichage correspond à la surface de l'eau et la partie inférieure à l'échelle de profondeur sélectionnée (voir Echelle de profondeur). L'affichage varie quand la zone située sous le RSS change. En récupérant le RSS lentement et sans à-coups, l'écran reflète les structures, les poissons et les détails du fond. L'affichage numérique fournit des informations précises sur le contour du fond, la profondeur et les zones de poissons sous le RSS.

Si vous utilisez le SmartCast pour représenter une zone graphiquement, les variations de terrain et de composition du fond s'affichent à l'écran. Les poissons et les poissons appâts s'affichent lorsqu'ils sont détectés. Les conditions subaquatiques varient considérablement, et il faut une certaine expérience et une interprétation pour comprendre tous les avantages du SmartCast. Utilisez l'image ci-dessus comme guide des conditions les plus courantes et reportez-vous à utiliser le SmartCast avec des types de fond connus.

Fonctions du menu

Un système de menus très simple permet d'accéder aux réglages de l'affichage du SmartCast. Pour activer le système de menus, appuyez sur le bouton MARCHE-MENU, la première fois que vous appuyez sur ce bouton après la mise sous tension, le menu Sensibilité apparaît. Une fois l'appareil sous tension, une pression sur le bouton MARCHE-MENU affiche le dernier menu visualisé. Appuyez plusieurs fois sur MARCHE-MENU pour accéder aux autres options de menu SmartCast (une par une). Lorsqu'une option de menu est affichée, utilisez les boutons de déplacement du curseur DROITE et GAUCHE pour ajuster les réglages de menu. Les menus disparaissent automatiquement de l'écran au bout de quelques secondes.



Éclairage

Appuyez sur MARCHE-MENU jusqu'à ce que le menu ECLAIRAGE (LIGHT) apparaisse. Sélectionnez DESACTIVE (OFF) ou ACTIVE (ON) pour mettre en marche ou éteindre le rétroéclairage. Par défaut = OFF

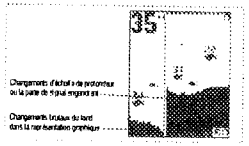
Sensibilité

Appuyez sur MARCHE-MENU jusqu'à ce que le menu Sensibilité (Sensitivity) apparaisse. Sélectionnez un nombre plus élevé pour afficher des retours sonar plus faibles ou sélectionnez un nombre inférieur pour éliminer les interférences de l'écran. Le réglage de la sensibilité affecte également la manière dont les retours sonar non liés au fond sont identifiés sous la forme de symboles d'identification de poissons. Des retours plus importants s'affichent sous la forme de poissons à un réglage inférieur.

L'augmentation de la sensibilité sélectionne de plus petits retours identifiés comme des poissons. La plage des réglages de sensibilité va de 1 à 5. Valeur implicite = 3

Échelle de profondeur

Appuyez sur MARCHE-MENU jusqu'à ce que le menu Echelle de profondeur (Depth Range) apparaisse. Sélectionnez AUTO pour que le SmartCast définisse automatiquement l'échelle de profondeur. Sélectionnez 3, 4, 50, 6, 9, 18 ou 30 mètres (10, 15, 20, 30, 60 ou 100 pi) pour définir une échelle de profondeur manuelle. L'échelle de profondeur est alors verrouillée sur un réglage spécifique. Réglage implicite = AUTO



Les changements d'échelle de profondeur ou la perte de signal engendrent des lignes avec des détails remarquants et/ou des changements brutaux du fond dans la représentation graphique. Lorsque l'échelle de profondeur est réglée sur AUTO, la profondeur est définie pour maintenir le fond dans le tiers inférieur de l'écran. Le seul dommage affiché ici est dû à un changement automatique de la profondeur. Les nouveaux retours représentés à une échelle différente ne correspondront pas aux données historiques déjà tracées à une échelle supérieure ou inférieure. Des lignes verticales peuvent également apparaître lorsque le signal radio du RSS est perdu, puis rétabli dans une eau agitée.

Canal

Appuyez sur MARCHE-MENU jusqu'à ce que le menu CANAL (CHANNEL) apparaisse. Sélectionnez A ou B selon votre système RSS. Voir Appareils RSS A et B. Valeur implicite = Canal A

Fond Noir

Appuyez sur MARCHE-MENU jusqu'à ce que le menu Fond Noir (Bottom Black) apparaisse. Sélectionnez DESACTIVE (OFF) pour obtenir les données de dureté du fond en affichant les retours secondaires.

Pour un affichage à contraste élevé qui est facile à lire, même à distance, laissez le réglage d'affichage sur Fond Noir (Bottom Black). Par défaut = ON

Alarme de poisson

Appuyez sur MARCHE-MENU jusqu'à ce que le menu ALARME DE POISSON (FISH ALARM) apparaisse. Sélectionnez DES-ACTIVE (OFF) pour désactiver les alarmes de poissons, ou l'une des icônes suivantes pour régler le niveau de l'alarme à l'activer. Par défaut = OFF

- Alarmes seulement pour les poissons de grande taille.
- Alarmes seulement pour les poissons de grande taille et de taille moyenne.
- Alarmes pour tous les poissons.

L'identification du poisson

Appuyez sur MARCHE-MENU jusqu'à ce que le menu IDENTIFICATION DU POISSON (FISH ID-) apparaisse. Sélectionnez DES-ACTIVE (OFF) pour visualiser les retours sonar " bruts " ou ACTIVE (ON) pour bénéficier de la capacité du système SmartCast à identifier les retours sonar correspondant à des poissons. Le réglage de sensibilité affecte également l'identification des retours sonar comme étant des poissons (voir Sensibilité). Certaines lectures de poissons indiquent la profondeur du poisson au-dessus de l'écho. L'alarme de poisson ne sonne pas si l'identification du poisson est désactivée. Valeur implicite = ACTIVE (ON)

Unités RSS canal A et B

Deux versions du RSS sont proposées chez les détaillants d'articles de pêche, les magasins d'équipement de plein air et sur le site **www.humminbird.com** : Canal A et Canal B.

L'appareil RSS Canal A (RF40A) est fourni en standard avec votre produit SmartCast. Vous pouvez également acheter un RSS canal A ou B supplémentaire. Lorsque vous utilisez la version A ou B du RSS, assurez-vous que le canal approprié est sélectionné dans le menu CANAL (CHANNEL).

L'option Canal A & B est destinée à vous permettre de choisir facilement un canal différent si un autre pêcheur utilise un produit SmartCast dans un rayon de 30 mètres de votre affichage. Deux appareils RSS Canal A ou deux appareils RSS Canal B immergés dans un rayon de 30 mètres de l'affichage provoquent des interférences RF qui empêchent le produit de fonctionner correctement, provoquant ainsi une fluctuation des lectures de profondeur et des parasites à l'écran. Si vous utilisez un RSS Canal B et qu'un autre pêcheur utilise un RSS Canal A ou inversement, les interférences seront réduites mais pas complètement éliminées.

Entretien

Votre système SmartCast est conçu pour fonctionner correctement pendant des années sans pratiquement aucun entretien. Suivez ces consignes simples pour que votre système SmartCast vous offre des performances optimales.

Après avoir utilisé le RSS dans l'eau salée, essuyez les surfaces concernées avec un linge humecté d'eau douce. Les broches Wet Switch du RSS/TM doivent être rincées à l'eau douce après voir été exposées à l'eau salée pour éviter la corrosion.

Si le SmartCast est en contact avec des embruns, essuyez les surfaces concernées avec un linge humecté d'eau douce. Lorsque vous nettoyez le verre protecteur de l'affichage LCD, utilisez une peau de chamois et un détergent doux non abrasif. N'essuyez pas tant qu'il reste de la poussière ou de la graisse sur le verre. Veillez à ne pas rayer le verre. N'utilisez pas de nettoyant chimique pour verre sur l'écran, car cela risquerait de le fendiller.

Si le RSS reste hors de l'eau pendant une période prolongée, il peut falloir un certain temps pour l'humidifier une fois remis dans l'eau. De petites bulles d'air peuvent se coller à la surface du RSS et gêner son fonctionnement. Ces bulles se dissipent rapidement, mais vous pouvez aussi essuyer la surface du RSS avec un linge humide.

Si la performance du sonar s'affaiblit (c'est-à-dire, s'il y a des trous dans la lecture du fond ou des lectures de profondeur de " 0 "), le dessous du RSS a besoin d'être nettoyé avec une ou deux gouttes d'une solution de 5 à 10 pour cent de détergent liquide pour vaisselle et d'eau. Utilisez environ une cuillerée à table de détergent et jusqu'à 237 millilitres (8 onces) pour enlever les huiles de la surface du RSS et ensuite essuyez avec un linge humide.

Ne laissez jamais le SmartCast dans une voiture ou un coffre : une température élevée peut endommager les composants électroniques.

Câbles d'alimentation des piles de remplacement

Vous n'aurez pas besoin d'installer le câble d'alimentation des piles lors de votre première utilisation, mais il peut s'avérer nécessaire de le remplacer s'il est sujet à la corrosion après une utilisation prolongée dans un milieu marin.

Commandez vos câbles de remplacement à **www.humminbird.com.**

Dépannage

Ne tentez pas de réparer vous-même le SmartCast ou le système RSS. L'appareil ne contient aucune pièce réparable par l'utilisateur, par ailleurs, des outils et des techniques spécifiques sont nécessaires pour garantir l'étanchéité des boîtiers. Les réparations doivent être effectuées exclusivement par des techniciens Humminbird agréés.

De nombreuses demandes de réparation reçues par Humminbird concernent des appareils qui ne nécessitent pas vraiment de réparation. Ces appareils sont renvoyés " sans problème détecté ". Si vous rencontrez un problème avec votre produit SmartCast, utilisez le guide de dépannage suivant avant de contacter le Centre de ressources référente ou d'envoyer l'appareil en réparation.

1. Le SmartCast perd le signal.

Si vous ne parvenez pas à obtenir un signal RF du RSS, l'affichage cessera de se mettre à jour (l'écran se figera) et l'écran du SmartCast s'affichera. Chaque fois que la réception s'interrompt ou que le RSS est sorti de l'eau pendant plus de quelques secondes, l'écran du SmartCast s'affiche jusqu'à ce que le RSS soit remis à l'eau et la réception rétablie.

- Le système SmartCast est un produit sans fil " à vue ". Si le RSS est séparé par des objets, notamment votre propre poignet, vous risquez de perdre la réception.
- L'échelle de profondeur du SmartCast va de 0,6 mètre à 30 mètres (2 à 100 pieds). Des lectures irrégulières peuvent se produire si la profondeur est inférieure à 60 cm (2 pieds). En outre, de par la nature du sonar, ce produit n'est pas prévu pour être utilisé en piscine ou dans de petites étendues d'eau fermées.
- Le fait de ramener le RSS trop vite peut entraîner la perte du signal et un écran figé.
- Vérifiez l'équilibre de flottaison entre le RSS et votre équipement de pêche; un poids supérieur à 5 grammes provoquera la submersion du RSS et la perte du signal.

2. Il ne se passe rien quand je mets le SmartCast sous tension.

Vérifiez les connexions du câble d'alimentation aux deux extrémités. Vérifiez la connexion du câble d'alimentation au SmartCast. Il est possible d'inverser le connecteur du câble d'alimentation dans son sens de manière incorrecte. Si le connecteur est inversé, l'appareil ne fonctionnera pas. Vérifiez que les contacts à l'arrière de l'appareil sont exempts de corrosion. Vérifiez que les piles fonctionnent et qu'elles sont installées correctement.

3. Quand la profondeur est très faible, j'obtiens des trous dans la lecture du fond et des indications de profondeur incohérentes.

Le SmartCast est faible avec une profondeur de 60 cm (2 pi) au minimum. La profondeur est mesurée à partir du RSS. Une distance entre le transmetteur (RSS) et le récepteur supérieure à 25 mètres (75 pieds) peut provoquer un affichage intermittent. Une eau très agitée peut provoquer la submersion du RSS et une nouvelle perte de contact.

Veillez à joindre le RSS si vous renvoyez l'appareil pour réparation.

4. L'écran commence à s'éteindre. Les images ne sont pas nettes et/ou pas d'affichage.

Vérifiez la tension des piles. Le SmartCast ne fonctionnera pas avec des tensions de moins de 8 VCC. Utilisez des piles alcalines AA 1,5 V.

Si cela ne résout pas le problème, remplacez la pile. Après avoir remplacé la pile, si l'appareil ne s'allume toujours pas correctement, retirez la de nouveau et remettez la en place.

5. L'affichage montre de nombreux points noirs aux réglages de sensibilité élevés.

Vous obtenez du " bruit " ou des interférences causés par l'une de plusieurs sources. Les parasites peuvent être provoqués par d'autres appareils électroniques. Éteignez tout appareil électronique proche et vérifiez si le problème disparaît. D'autres appareils sonar ou électroniques fonctionnant aux fréquences 915 mHz risquent de provoquer des interférences avec le SmartCast.

6. L'affichage montre des lectures de profondeur fluctuantes et un encombrement excessif, notamment des barres verticales sur les lectures de poisson.

Le système SmartCast possède la capacité de recevoir des signaux séparés d'un RSS Canal A ou Canal B. Deux appareils RSS de type A ou B utilisés simultanément ou un RSS de type A et un RSS de type B utilisés simultanément, peuvent provoquer entre eux des interférences de RF.

7. L'écran saute et la partie inférieure change brusquement; il manque parfois une ligne verticale ou une ligne noire apparaît de haut en bas.

Ce sont d'ordinaire ont été à un changement automatique de la profondeur. Les nouveaux retours représentés graphiquement avec une échelle différente ne correspondront pas aux données historiques déjà tracées à une échelle supérieure ou inférieure. Des lignes verticales peuvent également apparaître lorsque le signal radio du RSS est perdu, puis rétabli dans une eau agitée.

Technomic Industries - Garantie limitée de 1 an

Nous garantissons à l'acheteur au détail initial que les produits fabriqués par Technomic Industries sont exempts de défauts de matière et de fabrication. Cette garantie est en vigueur pour une durée de 1 an à partir de la date de l'achat initial, sauf dans le cas où les produits Technomic Industries font l'objet d'une utilisation commerciale, d'une location ou d'une autre activité source de revenus, cette garantie est alors limitée à quatre-vingt-dix jours à compter de la date d'achat initial pour les produits mécaniques et électroniques.

Nous remplacons gratuitement tout produit Technomic Industries non couvert par cette garantie, qui est renvoyé (port prépayé) pendant la période de garantie au revendeur auprès duquel ces produits ont été achetés, ou qui nous est retourné à l'adresse appropriée. Dans ce cas, les produits Technomic Industries qui sont effectivement défectueux et couverts par cette garantie seront remplacés ou réparés sans frais, à la discrétion de Technomic Industries, et renvoyés au client.

La seule responsabilité de Technomic Industries relativement à cette garantie se limite à réparer ou à remplacer un produit jugé défectueux par Technomic Industries. Technomic Industries n'est pas responsable des frais liés au retrait du produit ou à la réinstallation des pièces de rechange ou réparées.

Nous n'avons aucune obligation conformément à cette garantie, quant à un produit qui a été :

- incorrectement installé;
- utilisé dans une installation autre que celle recommandée dans nos instructions ou spécifications d'installation ou d'exploitation;
- endommagé ou à cessé de fonctionner par suite d'un accident ou d'une utilisation anormale, y compris la course, un mauvais emploi ou des modifications effectuées en dehors de notre usine;
- réparé ou modifié par une entité autre que Technomic Industries;
- utilisé sur un bateau à moteur dont la puissance excède l'estimation établie par le constructeur du bateau;
- utilisé avec d'autres produits qui, selon l'opinion de Technomic Industries, sont incompatibles avec le produit de Technomic Industries.

CETTE GARANTIE REMPLACE EXPRESSEMENT TOUTE AUTRE GARANTIE, OBLIGATION OU RESPONSABILITÉ DE LA PART DE Technomic Industries. ELLE CONSTITUE LE SEUL RECOURS DU CLIENT. EXCEPTION FAITE DE TOUTE GARANTIE APPLICABLE IMPLICITE EN VERTU D'UNE LOI PROVINCIALE (D'ETAT), LIMITÉE PAR LA PRÉSENTE À UNE DURÉE DE 1 AN À PARTIR DE LA DATE D'ACHAT INITIALE. Technomic Industries NE POURRA EN AUCUN CAS ÊTRE TENUE RESPONSABLE DE TOUT DOMMAGE ACCESSOIRE OU CONSÉCUTIF À L'INOBSERVATION D'UNE GARANTIE EXPRESSE OU IMPLICITE RELATIVE AUX PRODUITS.

Certains états n'autorisent pas de limitation sur une garantie implicite, ni l'exclusion de dommages accessoires ou consécutifs, les exclusions ci-dessus peuvent ne pas vous concerner. Vous pouvez également bénéficier d'autres droits, qui varient d'une province (d'un État) à une (ou) autre.

Vous devez contacter le Centre de ressources pour la clientèle pour renvoyer un numéro d'autorisation de réparation avant de renvoyer votre RSS SmartCast à notre usine pour dépannage. Ce numéro doit être inclus sur l'étiquette d'expédition lors du retour à notre usine. En outre, vous devez joindre une lettre décrivant le problème que vous rencontrez, ainsi que vos nom, adresse et numéro de téléphone (heures ouvrables), afin que nous puissions vous contacter pour la réparation, si nécessaire.

Achats internationaux

Une garantie séparée est fournie par les distributeurs internationaux pour les appareils achetés en dehors des États-Unis. Cette garantie est limitée par votre distributeur local et celui-ci gère la maintenance locale de votre appareil. Les garanties ne sont valables que dans la région de distribution prévue. Les appareils achetés aux États-Unis ou au Canada doivent être renvoyés à notre usine aux États-Unis pour dépannage.

POLITIQUE DE SERVICE APRÈS-VENTE

La politique de service après-vente n'est valable qu'aux États-Unis. Elle ne s'applique qu'aux produits Humminbird retournés à notre usine située à Eufaula, Alabama et est modifiable sans préavis.

Toutes les réparations sont effectuées en accord avec les spécifications rigoureuses de l'usine, par des techniciens formés en usine. Les appareils réparés en usine sont testés de la même façon et subissent les mêmes contrôles de qualité que les nouvelles unités en production. Vous n'aurez probablement jamais à utiliser notre remarquable publique de service après vente, mais il est plaisant de savoir que nous soutenons nos produits avec autant d'efficacité. Nous agissons ainsi parce que nous croyons que vous méritez ce qu'il y a de mieux. Nous ferons tout en notre pouvoir pour réparer votre appareil en deçà de trois jours ouvrables, à partir de la date de réception de l'appareil à notre usine. Ce délai ne comprend pas la durée du transport jusqu'à notre usine, ni de notre usine jusqu'à vous. Les appareils reçus le vendredi sont habituellement retournés le mercredi suivant, les appareils reçus le lundi sont habituellement retournés le jeudi, et ainsi de suite.

Nous nous réservons le droit de considérer un produit irréparable si les pièces de rechange sont discontinuées ou impossibles à obtenir.

À la fin de la période de garantie limitée, une évaluation des frais de service à tarif fixe régulier sera effectuée pour chaque appareil en réparation (dommages physiques et pièces manquantes non comprises). Contactez notre Centre de ressources pour la clientèle pour vérifier les frais de service concernant votre appareil.

Si les frais ne sont pas prépayés, l'appareil sera renvoyé contre remboursement. Si vous rencontrez des problèmes liés aux lectures du fond et de la profondeur, renvoyez le RSS (Remote Sonar Sensor) avec l'appareil lors de l'envoi pour réparation.

SMARTCAST
WIRELESS FISHFINDERS

PART 4

LOW VOLTAGE DIRECTIVE ANNEX I ANALYSIS
73/23/EEC

Part 4 contains the Compliance Rationale standards applied or alternate solutions adopted.

PART 4

Compliance Rationale;
Standards Applied
or Alternate Solutions Adopted

Follows This Page

SUMMARY OF EVALUATION; STANDARDS APPLIED OR ALTERNATE SOLUTIONS ADOPTED

The following standards have been applied in full or in part, to satisfy the Essential Requirements, Annex I safety objectives of the LOW VOLTAGE DIRECTIVE. Where harmonized standards have not been applied, the solutions adopted to satisfy the safety aspects of the Directive are described below.

Applied Standard(s):

EN60950 – European Harmonized Standard for Safety of Information Technology Equipment. Standard refers to Article 3, Essential Requirement 1.(a) only.

ANNEX I

SUMMARY OF EVALUATION STANDARDS APPLIED OR ALTERNATE SOLUTIONS ADOPTED

1. General conditions

a. The essential characteristics, the recognition and observance of which will ensure that electrical equipment will be used safely and in applications for which it was made, shall be marked on the equipment, or, if this is not possible, on an accompanying notice.	CONFORMITY	(X)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

Markings should be as shown in the Technical File.

b. The manufacturers or brand name or trade mark should be clearly printed on the electrical equipment or, where that is not possible, on the packaging.	CONFORMITY	(x)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

The Manufacturer's name or trademark and model designation is marked on the system enclosure as well as the origin location of manufacturer.

c. The electrical equipment, together with its component parts should be made in such a way as to ensure that it can be safely and properly assembled and connected.	CONFORMITY	(x)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

During Low Voltage Directive testing, the unit was installed in accordance with the installation instructions and was safely operated.

d. The electrical equipment should be so designed and manufactured as to ensure that protection against the hazards set out in points 2 and 3 of this Annex is assured providing that the equipment is used in applications for which it was made and is adequately maintained.	CONFORMITY	(X)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

2. Protection against hazards arising from the electrical equipment

Measures of a technical nature should be prescribed in accordance with point 1, in order to ensure:

a. that persons and domestic animals are adequately protected against danger of physical injury or other harm which might be caused by electrical contact direct or indirect;	CONFORMITY	(x)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

There are no live parts representing a shock hazard.

b. that temperatures, arcs or radiation which would cause a danger, are not produced;	CONFORMITY	(x)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

A temperature test was conducted in accordance with EN60950. Measured temperatures did not exceed the ratings of the materials in question

c. that persons, domestic animals and property are adequately protected against non-electrical dangers caused by the electrical equipment which are revealed by experience;	CONFORMITY	(x)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

There are no non-electrical dangers revealed by experience. The unit does not have moving parts that may be accessible to the user. The unit is not used to support mechanical loads. The unit does not contain hazardous materials. There are no parts of the system under pressure. The unit does not emit ionizing radiation. The unit does not emit laser radiation.

d. that the insulation must be suitable for foreseeable conditions.	CONFORMITY	(x)
	NON-CONFORMITY ACTION REQUIRED RESOLVED	( ) ( ) ( )
	NOT APPLICABLE	( )

3. **Protection against hazards which may be caused by external influences on the electrical equipment**

Technical measures are to be laid down in accordance with Point 1, in order to ensure:

a. that the electrical equipment meets the expected mechanical requirements in such a way that persons, domestic animals and property are not endangered;	CONFORMITY	(x)
	NON-CONFORMITY	( )
	ACTION REQUIRED	( )
	RESOLVED	( )
	NOT APPLICABLE	( )

The thickness of the enclosure is considered sufficient to withstand the mechanical abuses expected during the lifetime of the product.

b. that the electrical equipment shall be resistant to non-mechanical influences in expected environmental conditions, in such a way that persons, domestic animals and property are not endangered;	CONFORMITY	(x)
	NON-CONFORMITY	( )
	ACTION REQUIRED	( )
	RESOLVED	( )
	NOT APPLICABLE	( )

c. that the electrical equipment shall not endanger persons, domestic animals and property in foreseeable conditions of overload.	CONFORMITY	(x)
	NON-CONFORMITY	( )
	ACTION REQUIRED	( )
	RESOLVED	( )
	NOT APPLICABLE	( )

UL Recognized lithium battery is non-user replaceable.

PART 4

Type Tests

Follow This Page

TEST SUMMARY

The test(s) outlined in the table below was performed in accordance with the requirements of the applicable standard:

SPECIFIED TEST	RESULTS
Temperature Test	Pass

1.0 TEMPERATURE TEST:

METHOD

The sample was mounted as intended in normal service connected to a 220V, 50/60 Hz source of supply and operated until thermal equilibrium. Temperatures were with thermocouples placed at the locations noted below and recorded using a suitably calibrated temperature meter.

THERMOCOUPLE LOCATION	MAXIMUM TEMPERATURE, °C
Room Ambient	21.2°C
Display	22.4°C
Lithium Battery	21.9°C

Retlif Testing Laboratories
795 Marconi Avenue, Ronkonkoma, NY 11779
631-737-1500 - Fax: 631-737-1497

BRANCH LABORATORIES
101 New Boston Road
Goffstown, NH 03045
603-497-4600 Fax 603-497-5281

WASHINGTON
REGULATORY OFFICE
703-533-1614 Fax 703-533-1612

MEMBER ACIL

ETSI EN 301 489-3 V1.4.1(2002-08) Test Report
On
Techsonic Industries
433.92 MHz Transmitter and Receiver
(Smartcast)

CUSTOMER NAME: Techsonic Industries

CUSTOMER P.O.: 331782

DATE OF REPORT: July 7, 2003

TEST REPORT NO.: R-9915-2

TEST START DATE: May 21, 2003

TEST FINISH DATE: June 30, 2003

TEST TECHNICIAN: N. Dragotta, J. Kabacinski, J. Latimore

TEST ENGINEER: T. Schneider

SUPERVISOR: R. J. Reitz

REPORT PREPARED BY: M. White

GOVERNMENT SOURCE INSPECTION: Not Applicable

CONFIDENTIAL

Table of Contents

Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Thomas J. Schneider
EMC Test Engineer

Richard Reitz
Laboratory Manager

CONFIDENTIAL

NON-WARRANTY PROVISION
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

NON-ENDORSEMENT
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Revision History

Revision	Date	Pages Affected

Administrative Data

Retlif Testing Laboratories Test Report Number:	R-9915-2
Test Specification:	ETSI-EN 301 489-3: V1.4.1 (2002-08)
Customer:	Techsonic Industries
	5 Humminbird Lane
	Eufala, AL 36027
Test Sample:	433.92 MHz Transmitter and Receiver (Smartcast)
	Transmitter: Model Number, RF40E, Serial Number e
	Receiver: Model Number RF10E, Serial Number 1
Applicable Documents:	See Paragraph 2.0
Classification:	Not Classified
Testing Dates:	May 21, 2003 to June 30, 2003
Date of Report:	July 7, 2003

1.0 Scope

The purpose of this testing program was to determine the compliance of a 433.92 MHz Transmitter and Receiver (Smartcast), manufactured by Techsonic Industries, as described in paragraphs 4.0 and 5.0 of this report, to the emissions and immunity requirements of ETSI-EN 301 489-3: V1.4.1 (2002-08), in accordance with article 3.1(b) of Directive 1999/5/EC, the R&TTE Directive.

2.0 Applicable Documents

The following documents form a part of this test report to the extent specified herein:

RCM-001	- Retlif Testing Laboratories, Calibration Manual.
RQM-001	- Retlif Testing Laboratories, Quality Assurance Manual.
ANSI/NCSL Z-540	- Calibration Laboratories and Measuring and Test Equipment - General Requirements.
MIL-STD-45662A	- Calibration System Requirements.
ETSI-EN 301 489-3 V1.4.1 (2002-08):	- Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services; Part 1: Common Technical Requirements.
EN 55022:1998	- Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
EN 61000-4-2:1995	- Electrostatic discharge immunity test.
EN 61000-4-3:1997	- Radiated, radio frequency, electromagnetic field immunity test.

3.0 General Requirements

3.1 Test Environment

All testing was performed at Retlif Testing Laboratories facility. Each test method was performed in the environment specified within the test standard. Where the test environment deviated from that specified, it is noted in the applicable test method.

3.1.1 Shielded Enclosures

All testing which required the use of a shielded enclosure was performed in a solid steel, double wall, modular type. The attenuation characteristics of the enclosure were in accordance with MIL-STD-285. All input power lines to the enclosure were filtered utilizing filters manufactured in accordance with MIL-F-15733F and tested in accordance with MIL-STD-220A. The enclosure was equipped with a 0.63 mm brass sheet with an minimum area of 4 square meters, with the minimum dimension no less than 90 cm. The ground planes were continuously bonded to the enclosure wall with a DC bonding resistance of less than 2.5 milliohms. Test methods requiring anechoic treatment were performed in a room treated with a combination of pyramidal carbon impregnated foam absorber and ferrite tile.

3.1.2 Conducted Emissions

Not applicable.

3.1.3 Radiated Emissions

3.1.3.1 Preliminary

Preliminary radiated emissions measurements were performed in a shielded enclosure.

3.1.3.2 Formal

Formal radiated emissions testing was performed on an open area test site (OATS). The test site measured 12M x 20M and was covered with a conducting ground plane constructed of one quarter inch ground cloth. The equipment under test was placed in an RF transparent enclosure on top of a 1.2 Diameter, flush mounted, metallic turntable. An 80 cm high non-metallic table was mounted to the turntable for placement of portable equipment. The test site met the test site attenuation requirements specified in CISPR 16 throughout the range of measurement frequencies.

3.2 Test Instrumentation

A listing of all test instrumentation utilized is contained within each applicable test method. These listings indicate the model, manufacturer, frequency range, last calibration date and calibration due date of all instrumentation utilized. All instrumentation utilized was calibrated prior to use in accordance with the procedures set forth in Retlif Testing Laboratories standard manuals RCM-001 and RQM-001 which are in accordance with the requirements of ANSI/NCSL Z-540.

3.3 Detector Function

For the radiated emissions testing described herein a Quasi-Peak detector function was utilized as specified in EN 55022:1998.

4.0 Test Sample Description

4.1 General

The test sample was a 433.92 MHz Transmitter and Receiver (Smartcast), manufactured by Techsonic Industries. The test sample was powered by internal DC Batteries. The 433.92 MHz Transmitter and Receiver (Smartcast) measured, weighed and consisted of the following:

Description	Manufacturer	Model No.	Serial No.	Measurements
433.92 MHz Transmitter	Techsonic	RF40E	1	7cm x 5cm x 4cm, weight approximately 0.1kg
433.92 MHz Receiver	Techsonic	RF10E	e	24cm x 16cm x 16cm, weight 0.4

4.2 Port Configurations and Input/output Cables

Not applicable.

4.3 Leads Tested

Not applicable.

4.4 Modifications Made to Test Sample

The following modifications were made to the 433.92 MHz Transmitter and Receiver (Smartcast) during the course of this testing program:

EN 61000-4-3, Radiated Susceptibility

The software for the 433.92 MHz Receiver, Model RF10E was updated to set the "too many returns" algorithm from 25 to 60 (decimal). This algorithm prevents the display from scrolling if too many RF returns are detected.

5.0 Test Sample Parameters

5.1 Mode of Operation

During all testing of the 433.92 MHz Transmitter and Receiver the mode of operation was as follows:

Emissions

433.92 MHz Transmitter was continuously transmitting at 433.92 MHz.
433.92 MHz Receiver was continuously receiving at 433.92 MHz.

Immunity

433.92 MHz Transmitter was continuously transmitting at 433.92 MHz and in Stand By mode (out of water).
433.92 MHz Receiver was continuously receiving at 433.92 MHz.

5.1.1 Support Equipment

The 433.92 MHz Transmitter and Receiver (Smartcast) utilized no support equipment in order to achieve the above operating state during the course of this testing program.

5.2 Performance Criteria

During all immunity testing, the EUT was monitored for any interruption, loss or corruption of sent and received data from the transducer (433.92 MHz Transmitter).
The following performance criteria, as outlined in ETSI-EN 301 489-3: V1.4.1 (2002-08), were used to determine compliance with the requirements:

EN 61000-4-2:1995	- Paragraph 9.3.3
EN 61000-4-3:1997	- Paragraph 9.2.3

EN 61000-4-2:1995:
For transmitters the performance criteria for transient phenomena for transmitter shall apply (see clause 6 of the relevant part of EN 301 489 dealing with the particular type of radio equipment). For receivers the performance criteria for transient phenomena for receivers shall apply (see clause 6 of the relevant part of EN 301 489 dealing with the particular type of radio equipment). For ancillary equipment the pass/failure criteria supplied by the manufacturer (see clause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

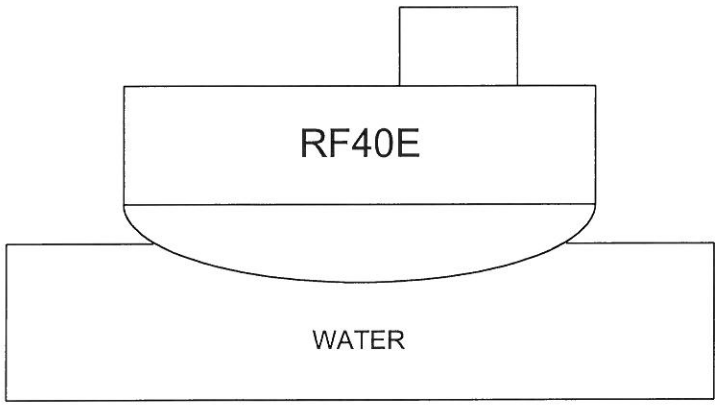
EN 61000-4-3:1997:
For transmitters the performance criteria for continuous phenomena for transmitters shall apply (see clause 6 of the relevant part of EN 301 489 dealing with the particular type of radio equipment). For receivers the performance criteria for continuous phenomena for receivers shall apply (see clause 6 of the relevant part of EN 301 489 dealing with the particular type of radio equipment). For ancillary equipment the pass/failure criteria supplied by the manufacturer (see clause 6.4) shall apply, unless the ancillary equipment is tested in connection with a receiver or transmitter in which case the corresponding performance criteria above shall apply.

5.2.1 Monitoring Equipment

The 433.92 MHz Transmitter and Receiver (Smartcast) was visually monitored via the Receiver's LCD Display by test personnel.

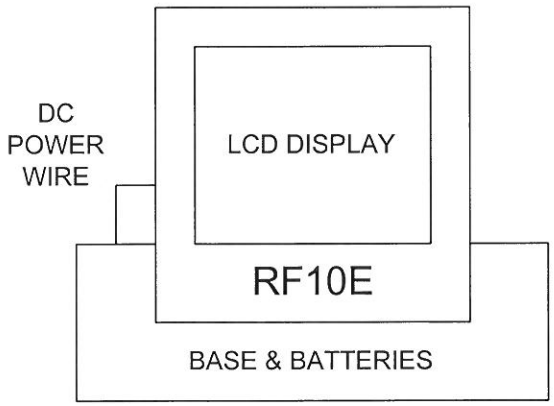
Figure 1 - Test Sample Block Diagram

433.92 MHz TRANSMITTER BLOCK DIAGRAM



TRANSMITTER SUPPORT EQUIPMENT:

433.92 MHz RECEIVER BLOCK DIAGRAM



RECEIVER SUPPORT EQUIPMENT:

6.0 Test Methods Performed and Test Results

6.1 Test Method Summary

The tests outlined in the table below were performed in accordance with the requirements of ETSI EN 300 386:2001-09:

Paragraph	Standard	Test Method	Results
6.2	EN 55022	Radiated Emissions, Class B	Complied
6.3	EN 61000-4-2	Electrostatic Discharge	Complied
6.4	EN 61000-4-3	Radiated Immunity	Complied*

*After the modifications described in paragraph 4.4 herein were performed.

See individual test methods contained in paragraphs 6.2 through 6.4 of this test report for a full description of the test procedures utilized and the results obtained.

6.2 Radiated Emissions, EN 55022, Class B, 30 MHz TO 1 GHz

Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the 433.92 MHz Transmitter and Receiver (Smartcast) via radiation from the enclosure and connected cabling in the frequency range of 30 MHz to 1 GHz.

Test Limits

The limits shown in the table below were used to determine compliance of the 433.92 MHz Transmitter and Receiver (Smartcast) to the radiated emissions requirements on EN 55022 and CISPR11:

Frequency Range	**Class B** Quasi-peak Limits [dB (μV/M)], @ 10 Meters
30.0MHz to 230.0MHz	30.0
230.0MHz to 1000.0MHz	37.0

Test Setup

The 433.92 MHz Transmitter and Receiver (Smartcast) was configured as shown in the attached photograph and detailed in Paragraph 4.2 herein. This configuration was based on the test setup shown in Retlif Testing Laboratories Drawing No. CISPR22-RE. The 433.92 MHz Transmitter and Receiver (Smartcast) was placed on an 80 cm high wooden test stand above the ground plane of the shielded enclosure for preliminary measurements and the OATS (Open Area Test Site) for final measurements. The rear of the 433.92 MHz Transmitter and Receiver (Smartcast), including support peripherals, was aligned and flush with the rear of the test stand. The test stand was placed directly on the flush mounted turntable. The turntable positions were relative to the 433.92 MHz Transmitter and Receiver (Smartcast) as follows:
When facing the 433.92 MHz Transmitter and Receiver (Smartcast) Name the front is at 0°, the rear is at 180°, and the left side is at 270°. The test stand was situated such that the boundary of the 433.92 MHz Transmitter and Receiver (Smartcast) was located 10 meters from the measuring antenna. The 433.92 MHz Transmitter and Receiver (Smartcast) was arranged on the test stand as specified in Paragraph 4.2 herein. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the 433.92 MHz Transmitter and Receiver (Smartcast).
Excess interface cable length was draped over the back edge of the test stand. Draped cables closer than 40 cm to the conducting ground plane were bundled in the center in a serpentine fashion using 40 cm lengths to maintain a 40cm height above the ground plane.
The AC power cables of the 433.92 MHz Transmitter and Receiver (Smartcast) and non-EUT equipment did not require bundling. The AC power cables were draped over the rear edge of the test stand and routed down to the AC mains outlet located on top of the turntable. Excess power cable length was left on the surface of the turntable.
The antenna was located a distance of 3 Meters from the envelope of the 433.92 MHz Transmitter and Receiver (Smartcast). The antenna was connected via coaxial cable to a broadband pre-amplifier, which in turn was connected to a spectrum analyzer and/or CISPR compliant receiver located in the measurement equipment room. The spectrum analyzer display for each frequency range was recorded on a graphics plotter.

Test Procedure

With the test instrumentation and the 433.92 MHz Transmitter and Receiver (Smartcast) configured as stated above, the following steps were performed:

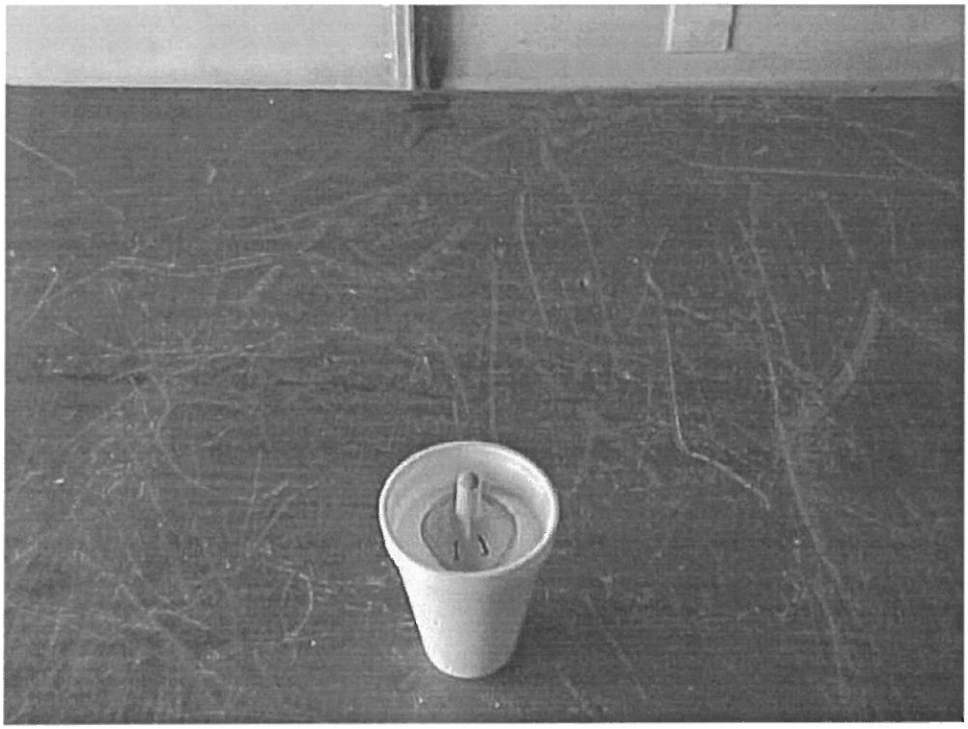
1. The 433.92 MHz Transmitter and Receiver (Smartcast) was arranged with cables terminated as specified in Paragraph 4.2 herein.
2. The spectrum analyzer was configured to display the frequency range of 30 MHz to 80 MHz.
3. With the test antenna horizontally polarized, the 433.92 MHz Transmitter and Receiver (Smartcast) cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the 433.92 MHz Transmitter and Receiver (Smartcast) was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.

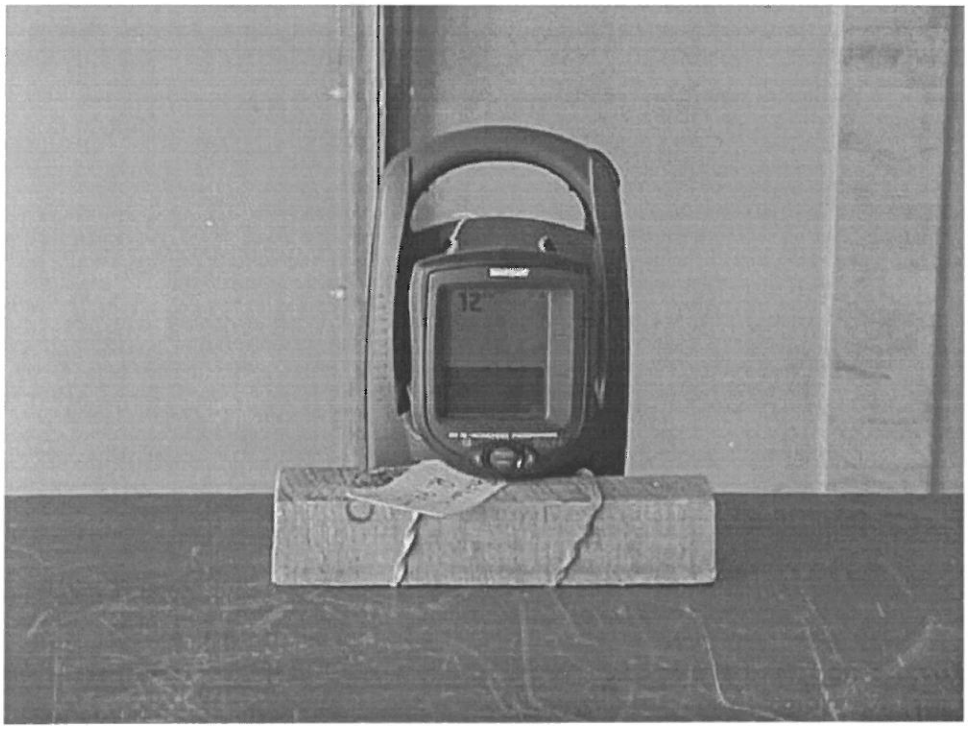
Test Procedure (con't.)

5. Once the configuration, both cabling and operating mode, which produced maximum emissions was determined the 433.92 MHz Transmitter and Receiver (Smartcast) was maintained in this configuration for the duration of testing.
6. A max hold spectrum analyzer trace, trace A, was obtained with the 433.92 MHz Transmitter and Receiver (Smartcast) operating.
7. The 433.92 MHz Transmitter and Receiver (Smartcast) was powered off and a max hold spectrum analyzer trace, trace B, was obtained to denote the ambient interference levels.
8. The two obtained traces were analyzed in order to determine which recorded emissions were produced by the 433.92 MHz Transmitter and Receiver (Smartcast).
9. At each frequency upon which an emission was determined to be from the 433.92 MHz Transmitter and Receiver (Smartcast) the following steps were performed in order to further maximize the observed emissions:
    a. The test antenna height was varied from 1 to 4 meters.
    b. The test antenna polarization was varied from vertical to horizontal.
    c. The Test Sample Name was rotated 360° about its vertical axis.
10. The test antenna RF cable was connected to the CISPR compliant receiver.
11. For all emissions found to be within 20 dB of the specified limit, the following was recorded on the x-y plot:
    a. Frequency of emission
    b. Quasi-Peak detector receiver meter reading.
    c. Correction factor consisting of antenna factor, cable loss and pre-amp gain.
    d. Test antenna height and polarization.
    e. Turntable position.
12. Steps 6 through 11 above were repeated for the following frequency ranges: 80 to 130 MHz, 130 to 200 MHz, 200 to 500 MHz, 500 to 750 MHz and 750 MHz to 1 GHz.

Test Results

The 433.92 MHz Transmitter and Receiver (Smartcast) was found to comply with the requirements specified for this method. No emissions which exceeded the specified Class B Limits of EN 55022 were observed. See the following two data sheets for a full presentation of the results obtained. The fundamental transmit frequency (433.92 MHz) and second harmonic (867.84 MHz) of the transmitter were exempt from the emissions requirements and are covered under the requirements of ETSI EN 300 220-3 under Retlif Test report #R-9915-3





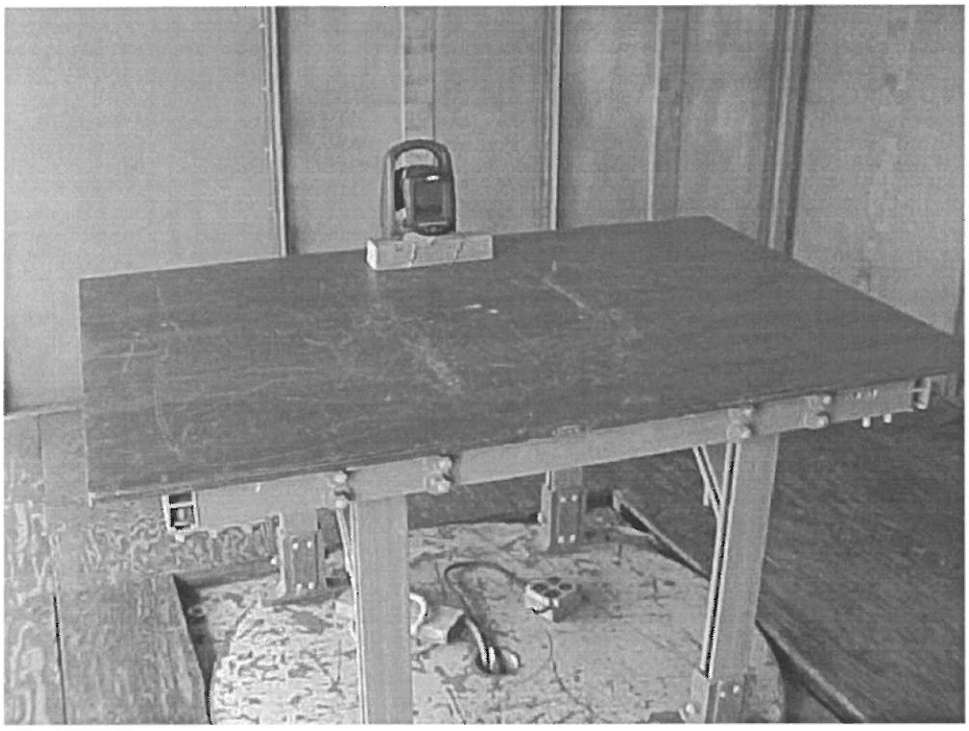
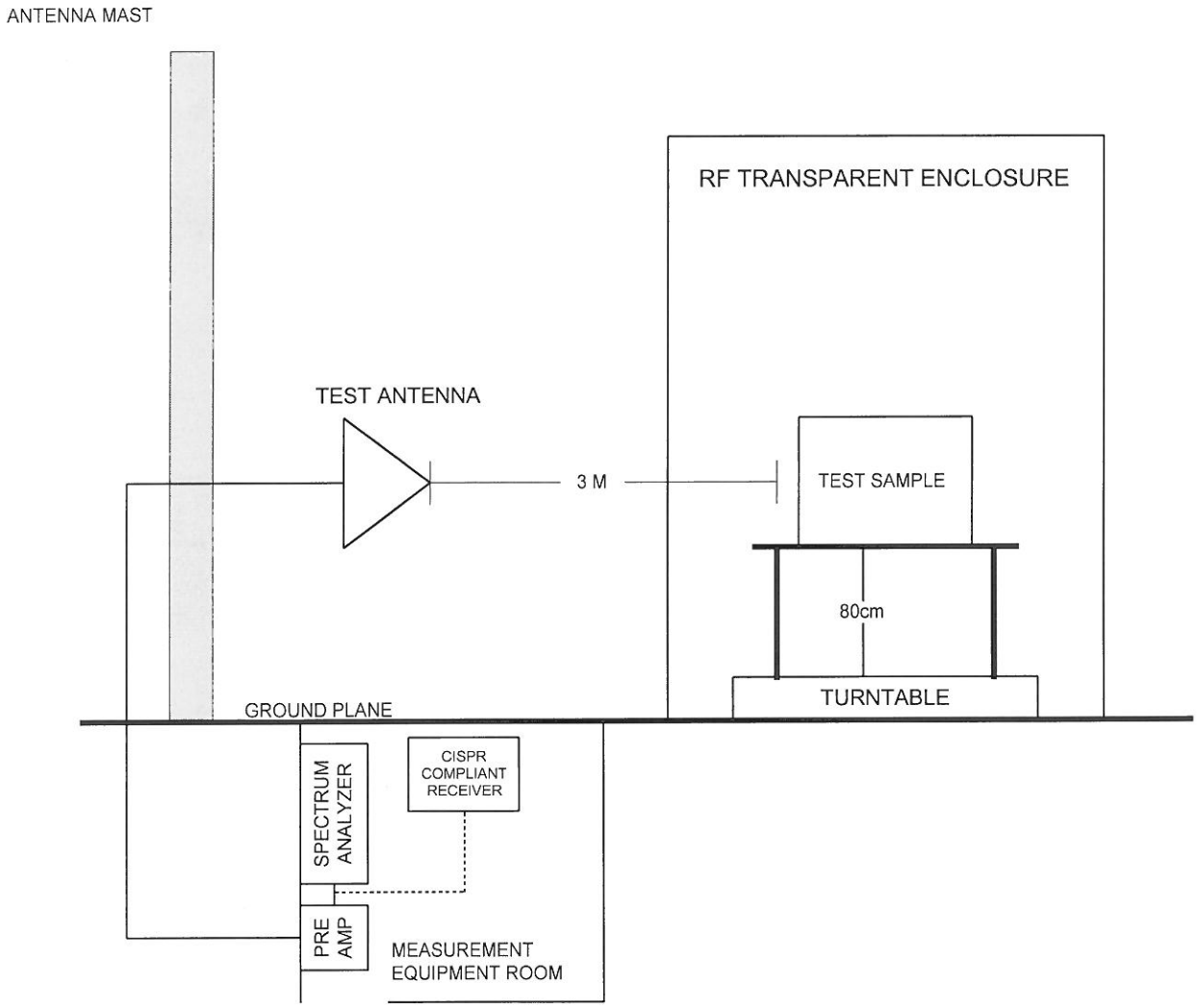


Figure RCISPR22-RE - General Test Setup Radiated Emissions



Equipment List

EN55022 Class B Radiated Emissions, Transmitter

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	09/20/2000	09/20/2003
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	06/11/2002	06/11/2003
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	01/23/2003	07/23/2003
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/05/2003	03/05/2004
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	01/23/2003	07/23/2003
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/11/2002	06/11/2003
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	08/23/2002	08/23/2003
767	Biconilog	EMCO	26 - 2000 MHz	3142B	09/03/2002	09/03/2003

Test Method:	EN55022 Radiated Emissions, Class B, 30 MHz to 1 GHz		
Customer:	Techsonic Industries	**Job No.**	R-9915-2
Test Sample:	433.92MHz Transmitter (Smartcast)		
Model No.:	RF40E	**Serial No.**	1
Operating Mode	Continuously transmitting a pulsed 433.92MHz signal.		
Test Specification	ETSI EN 301 489, Electromagnetic compatibility and Radio spectrum Matters (ERM);		
Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for			
Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz.			
Technician:	J. Kabacinski	**Date:**	May 22nd, 2003
Notes:	Test Distance: 3 Meters	Temp: 12.0°C	Humidity: 90.0%
	Detector: Quasi-Peak	All readings extrapolated to 10 Meters via 1/D	

Test Freq.	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	10 Meter Converted Reading	**10 Meter Limit**
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/M	dBuV/M	dBuV/M
30							30
I							I
I							I
I							I
I							I
I							I
I							I
I							I
230							30
230							37
I							I
I							I
I							I
I							I
I							I
I							I
432.95	V / 1.0	23	22	+13.4	35.4	*24.9	I
434.89	V / 1.0	23	22	+13.4	35.4	*24.9	I
I							I
I							I
I							I
I							I
I							I
I							I
I							I
I							I
1000							37

The frequency range was scanned from 30 MHz to 1 GHz.

The emissions observed from the EUT do not exceed the specified limits.

All emissions not recorded were more than 10dB below the specified limit.

*Band-edge measurements (tuned approximately 100kHz from band-edges)

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Retlif Testing Laboratories

Retlif Job Number R-9915-2

Equipment List

EN55022 Class B Radiated Emissions, Receiver

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/11/02	6/11/03
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	1/23/03	7/23/03
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	3/5/03	3/5/04
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	1/23/03	7/23/03
160	Function Generator	Hewlett Packard	.0005 Hz - 5 MHz	3310A	1/3/03	1/3/04
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/11/02	6/11/03
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	9/20/02	9/20/03
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	8/23/02	8/23/03
762	AM/FM Signal Generator	Marconi Instru.	10 kHz - 1.2 GHz	2023	7/29/02	7/29/03
767	Biconilog	EMCO	26 - 2000 MHz	3142B	9/3/02	9/3/03

Test Method:	EN55022 Radiated Emissions, Class B, 30 MHz to 1 GHz		
Customer:	Techsonic Industries	**Job No.**	R-9915-2
Test Sample:	433.92 MHz Receiver (Smartcast)		
Model No.:	RF10E	**Serial No.**	e
Operating Mode	Continuously receiving a 433.92 MHz signal, pulse modulated with 100Hz at 50% duty cycle		
Test Specification	ETSI EN 301 489, Electromagnetic compatibility and Radio spectrum Matters (ERM);		
Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for			
Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz.			
Technician:	J. Kabacinski	**Date:**	May 27th, 2003
Notes:	Test Distance: 3 Meters	Temp: 23.0°C	Humidity: 52.0%
	Detector: Quasi-Peak	All readings extrapolated to 10 Meters via 1/D	

Test Freq.	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	10 Meter Converted Reading	**10 Meter Limit**
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/M	dBuV/M	dBuV/M
30							30
|							|
|							|
|							|
183.5	V / 1.0	180	10	8.1	18.1	7.6	|
|							|
|							|
|							|
230							30
230							37
|							|
|							|
|							|
|							|
|							|
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|							|
|							|
1000							37

The frequency range was scanned from 30 MHz to 1 GHz.
The emissions observed from the EUT do not exceed the specified limits.
The EUT was pre-scanned at a test distance of 1 Meter.
All emissions not recorded were more than 10dB below the specified limit.

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Retlif Testing Laboratories

Retlif Job Number R-9915-2

6.3 Electrostatic Discharge, EN 61000-4-2

Purpose

The purpose of this test method was to determine the ability of the 433.92 MHz Transmitter and Receiver (Smartcast) to withstand electrostatic discharges applied directly to the 433.92 MHz Transmitter and Receiver (Smartcast) and those applied to objects adjacent to the 433.92 MHz Transmitter and Receiver (Smartcast).

Test Parameters

The critical parameters of the electrostatic discharge generator and the applied voltage waveform are shown below:

Air:

Discharge Voltage:	2.0kV, 4.0kV, 8.0kV
Discharge Polarity:	Positive/Negative
Discharge Rate:	1 PPS
Rise Time:	0.7 to 1 nanosecond
Pulse Duration:	20 nanoseconds
Storage Capacitor:	150 picofarads
Discharge Resistor:	330 Ohms

Contact:

Discharge Voltage:	2.0 kV, 4.0kV
Discharge Polarity:	Positive/Negative
Discharge Rate:	1 PPS
Rise Time:	0.7 to 1 nanosecond
Pulse Duration:	20 nanoseconds
Storage Capacitor:	150 picofarads
Discharge Resistor:	330 Ohms

Test Setup

The test instrumentation and 433.92 MHz Transmitter and Receiver (Smartcast) were configured as shown in the attached photographs and detailed in Paragraph 4.2 herein. This configuration was based upon the general test setup shown in Retlif Testing Laboratories Drawing Number REN61000-4-2 and the requirements of EN 61000-4-2. The 433.92 MHz Transmitter and Receiver (Smartcast) was placed on an 80 cm high wooden test stand above the test enclosure floor. The 433.92 MHz Transmitter and Receiver (Smartcast) was placed on an insulating support 0.5 mm in thickness. The insulating support was placed on a horizontal coupling plane. The horizontal coupling plane was bonded to the earth reference plane by means of a ground strap with two 470 kOhm series resistors, one at either end. The vertical coupling plane was connected to the ground reference plane in the same manner. The 433.92 MHz Transmitter and Receiver (Smartcast) was configured above the horizontal coupling plane as specified above.

Test Point Determination

The ESD generator was set to the continuous discharge mode. With the 433.92 MHz Transmitter and Receiver (Smartcast) configured as stated above, all surfaces of the equipment were probed at a discharge rate of approximately 1 PPS in order to determine areas on the equipment which were susceptible. After this probing and/or an engineering evaluation the test points the test points specified on the following data sheets on the 433.92 MHz Transmitter and Receiver (Smartcast) were selected for formal testing.

Test Procedure

With the 433.92 MHz Transmitter and Receiver (Smartcast) and test instrumentation configured as stated above, the following steps were performed:

1. The ESD generator was configured to apply 2 kV contact discharges.
2. 10 positive contact discharges were then applied to each test point indicated in the contact discharge test points indicated on the following data sheet at a repetition rate of 1.0 PPS.

Test Procedure (con't.)

3. The ESD generator was configured to apply negative discharges and step 2 was repeated.
4. The output of the ESD generator was increased to 4 kV and steps 2 and 3 were repeated.
5. The ESD generator was then configured to apply 2 kV air discharges.
6. 10 positive air discharges were then applied to each test point indicated in the contact discharge test points indicated on the following data sheet at a repetition rate of 1.0 PPS.
7. The ESD generator was configured to apply negative discharges and step 6 was repeated.
8. The output of the ESD generator was increased to 4 kV and steps 6 and 7 were repeated.
9. The output of the ESD generator was then increased to 8 kV and steps 6 and 7 were repeated.

Test Results

The 433.92 MHz Transmitter and Receiver (Smartcast) complied with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance criteria specified in paragraph 9.3.3 of ETSI EN 301-489-3 when subjected to the electrostatic discharges specified above.

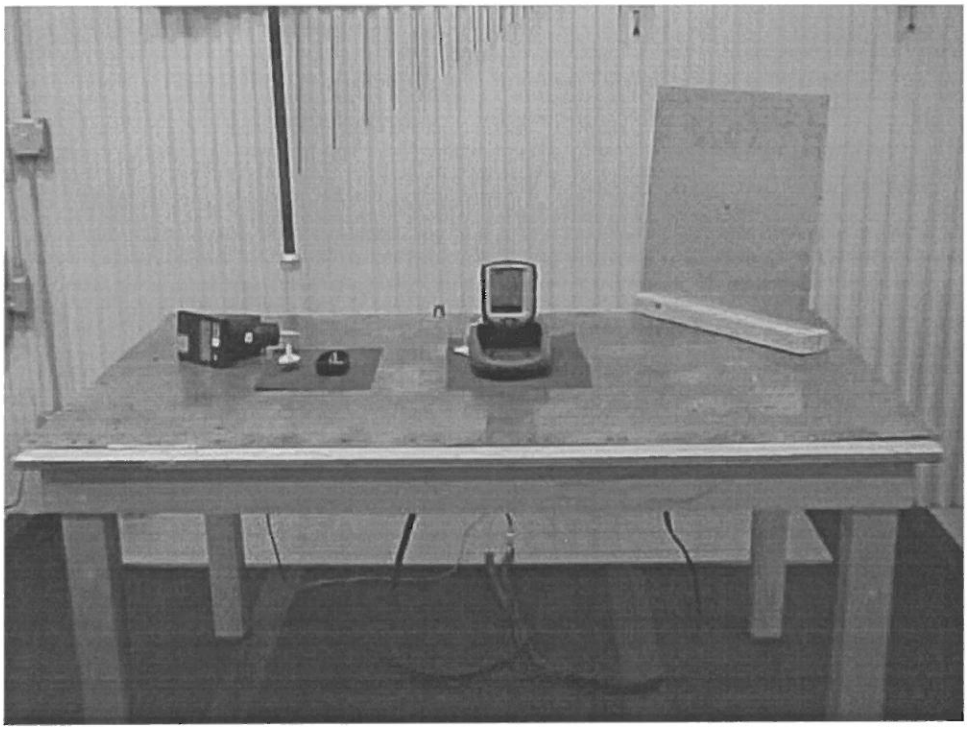
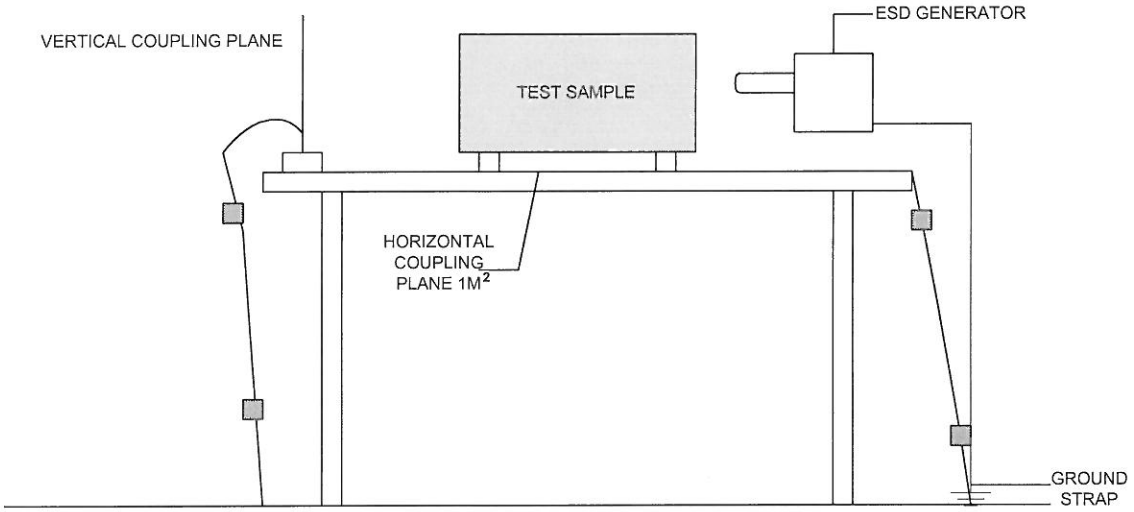


Figure R61000-4-2 - General Test Setup Electrostatic Discharge



NOTE: TEST SAMPLE AND VERTICAL COUPLING PLANE PLACED ON 0.5MM INSULATED SUPPORTS

= 470kOHMS

Equipment List

EN61000-4-2; 1995 Electrostatic Discharge

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
553	ESD Gun	Schaffner	N/A	NSG-435	3/15/2003	3/15/2004

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	EN 61000-4-2:1995, **Electrostatic Discharge**		
CUSTOMER:	Techsonic	JOB No.:	R-9915-2
TEST SAMPLE:	433.92 MHz Transmitter and Reciever (Smartcast)		
MODEL No.:	Tx: RF40E / Rx: RF10E	SERIAL No.:	Tx: 1 / Rx: e
TEST SPECIFICATION:	ETSI EN 301 489-3 V1.4.1 (2002-08) Electromagnetic Compatibility and Radio Spectrum Matters (ERM);EMC Standard for radio equip. & Services; Part 3: Short Rrange Devices between 9kHz and 40 GHz	PARAGRAPH:	9.3
OPERATING MODE:	Continuously recieving at 433.92 MHz		
TECHNICIAN:	N. Dragotta	DATE:	June 30, 2003
NOTES:	The EUT was subjected to ten positive 2kV, & 4kV direct contact discharges at a rate of 1 pps at each of the test points listed below. Temperature: 21° C Humidity: 45%		

Repetition Rate	Threshold	Level	Test Point
PPS	kV		
1.0	----------	2.0 / 4.0	Fishfinder:
|	|	|	Receuver: (rear) -Cover mounting screws (4)
|	|	|	
|	|	|	Base: -Battery compartment mounting screws (2)
|	|	|	
|	|	|	Transmitter: -Power contacts (2)
|	|	|	
|	|	|	Horizontal Coupling Plane, -Front side of EUT
|	|	|	-Left side of EUT
|	|	|	-Right side of EUT
|	|	|	-Rear side of EUT
|	|	|	
|	|	|	Vertical Coupling Plane, -Front side of EUT
|	|	|	-Left side of EUT
V	V	V	-Right side of EUT
1.0	----------	2.0 / 4.0	-Rear side of EUT
			The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by performance criteria of paragraph 9.3.3 of ETSI EN 301 489 V1.4.1 (2002-08), as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	**EN 61000-4-2:1995, Electrostatic Discharge**
CUSTOMER:	Techsonic
JOB No.:	R-9915-2
TEST SAMPLE:	433.92 MHz Transmitter and Reciever (Smartcast)
MODEL No.:	Tx: RF40E / Rx: RF10E
SERIAL No.:	Tx: 1 / Rx: e
TEST SPECIFICATION:	ETSI EN 301 489-3 V1.4.1 (2002-08) Electromagnetic Compatibility and Radio Spectrum Matters (ERM);EMC Standard for radio equip. & Services; Part 3: Short Rrange Devices between 9kHz and 40 GHz PARAGRAPH: 9.3
OPERATING MODE:	Continuously recieving at 433.92 MHz
TECHNICIAN:	N. Dragotta
DATE:	June 30, 2003
NOTES:	The EUT was subjected to ten positive 2kV, & 4kV direct air discharges at a rate of 1 pps at each of the test points listed below. Temperature: 21° C Humidity: 45%

Repetition Rate	Threshold	Level	Test Point		
PPS	kV				
1.0	-------------------	2.0 / 4.0	Fishfinder:		
|	|	|	Receiver:		-Cover seam (4 sides)
|	|	|		(front)	-Display panel seam; inner (4 sides)
|	|	|			outer (4 sides)
|	|	|			-Buttons; Power/Menu
|	|	|			Scroll up
|	|	|			Scroll down
|	|	|		(rear)	-Power input connector
|	|	|			
|	|	|	Base:		-Swivel lock knob
|	|	|			-Battery compartment seam
V	V	V			
1.0	-------------------	2.0 / 4.0	Transmitter:		-Cover seam

The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by performance criteria of paragraph 9.3.3 of ETSI EN 301 489 V1.4.1 (2002-08), as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

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6.4 Radiated Immunity, EN 61000-4-3

Purpose

The purpose of this test method was to determine if the 433.92 MHz Transmitter and Receiver (Smartcast) was so constructed as to have an adequate level of intrinsic immunity to radiated electromagnetic fields in the frequency range of 80 to 1000 MHz, enabling the 433.92 MHz Transmitter and Receiver (Smartcast) to operate as intended.

Test Parameters

The critical parameters of the applied electromagnetic field are as shown below:

Frequency Range	80 to 1000 MHz	1.4 GHz to 2.0 GHz
Field Strength	3 V/M	3 V/M
Modulation	1kHz, 80%, AM	1kHz, 80%, AM
Test Distance	2 Meters	1 Meter
Polarization of Applied Field	Horizontal & Vertical	Horizontal & Vertical

Test Setup

The test instrumentation and 433.92 MHz Transmitter and Receiver (Smartcast) were configured as shown in the attached photographs and detailed in Paragraph 4.2 herein. This configuration was based upon the general test setup shown in Retlif Testing Laboratories Drawing Number R61000-4-3 and the requirements of EN 61000-4-3. The 433.92 MHz Transmitter and Receiver (Smartcast) was placed on an 80 cm high wooden test stand above the test enclosure floor. The cabling of the 433.92 MHz Transmitter and Receiver (Smartcast) was routed to the edge of the 1.5 by 1 meter test stand top, then directly to the enclosure floor. If necessary, lossy ferrite tubes were placed around the Input/Output cables prior to entering the support room, in order to absorb RF. The field strength generating antenna was placed at a distance of two meters from the periphery of the 433.92 MHz Transmitter and Receiver (Smartcast) and the associated cabling. An RF signal generator was connected to the input of the RF power amplifier. The output of the RF power amplifier was connected to an RF coupler which in turn was connected to the test antenna. A power meter was connected to the forward power port of the RF coupler. The RF signal generator and power meter were connected to an automation computer in order to maintain the required field strength during testing.

The test enclosure ceiling, walls and portions of the floor were treated with a mixture of ferrite tile and carbon impregnated foam absorber.

Prior to testing, the field was calibrated as specified in paragraph 6.2 of EN61000-4-3;1997. A uniform area, 1.5 M x 1.5 M, 80 cm above the ground plane, was established. Sixteen (16) evenly spaced calibration points were assigned within the 1.5 M x 1.5 M grid. The field was calibrated in both the Vertical and Horizontal polarizations in one percent steps in the frequency range of 80 MHz to 1000 MHz. The field was considered uniform if 12 of 16 points (75%) were within - 0dB to + 6 dB of nominal. Additionally, three percent of the frequencies were allowed to be within - 0 dB to + 10 dB of nominal. The following seven frequencies were found to be within this three percent window for the vertical polarization: 97.62 MHz, 98.59 MHz, 99.58 MHz, 100.57 MHz, 101.58 MHz & 102.59 MHz, for the horizontal polarization: 136.92 MHz. All other frequencies met the - 0 dB to + 6 dB criteria.

Test Procedure

With the 433.92 MHz Transmitter and Receiver (Smartcast) configured as described above, the following steps were performed:

1. The biconilog test antenna was horizontally polarized facing the front of the 433.92 MHz Transmitter and Receiver (Smartcast).
2. The signal generator was adjusted for a frequency of 80 MHz and 80 % AM 1 kHz modulation.
3. The output level of the generator was increased until the power meter measured 3 V/M.
4. The automation computer was programmed to incrementally sweep the frequency range of 80 to 1000 MHz in step sizes not exceeding 1% of the fundamental.

Test Procedure (con't.)

5. The field strength, as measured on the power meter, was continuously adjusted as necessary by the automation computer to maintain the test level at 3 V/M utilizing the power meter readings obtained during calibration.
6. The 433.92 MHz Transmitter and Receiver (Smartcast) was continuously monitored for degradation or malfunction as specified in paragraph 5.2.
7. The biconilog antenna was vertically polarized and steps 2 through 6 were repeated.
8. Steps 1 through 7 were repeated for the 1.4 GHz to 2.0 GHz range with the double ridge guide antenna at 3 V/M.
9. Steps 1 through 8 were repeated on each of the rear, left and right sides of the test sample.

Test Results

Throughout the test range, it was observed that the device indicated a "fish alarm" and the display showed fish on the screen. However, this was deemed to be an acceptable response by the manufacturer. The frequency range of 419 MHz to 449MHz was considered to be the exclusion band (434 MHz +/- 15 MHz). Any responses which were experienced within this band were not considered as sign of susceptibility.

After the modifications described in paragraph 4.4 herein were performed, the 433.92 MHz Transmitter and Receiver (Smartcast) complied with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance criteria specified in paragraph 9.2.3 of ETSI EN 301-489-3 when subjected to the radiated electromagnetic energy specified above. See the following two data sheets for a complete presentation of test results.

Test Setup Photographs
Radiated Immunity

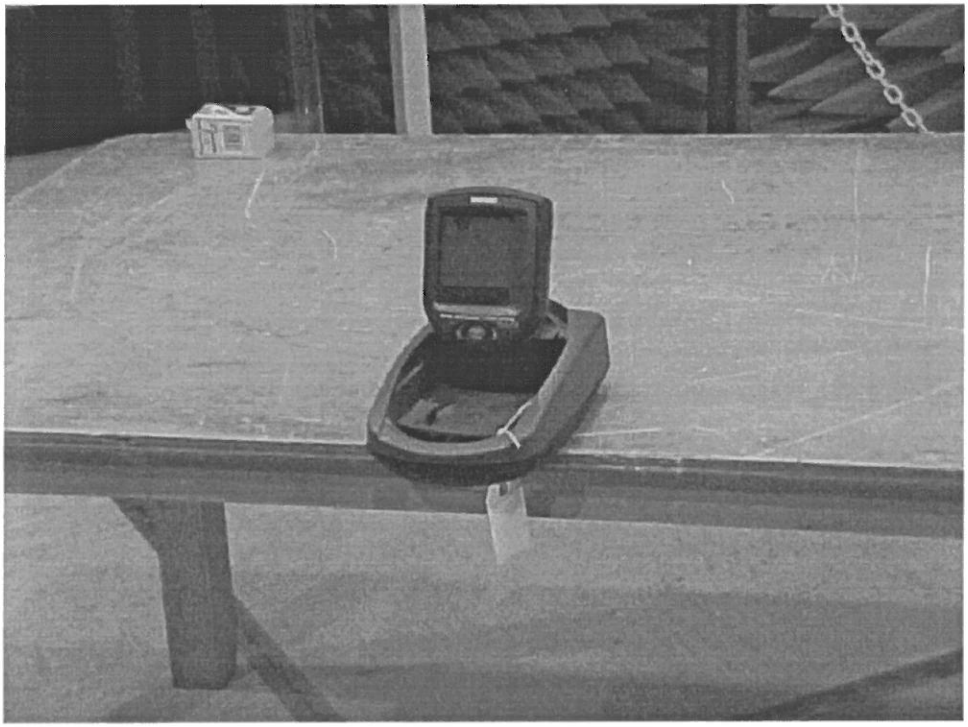
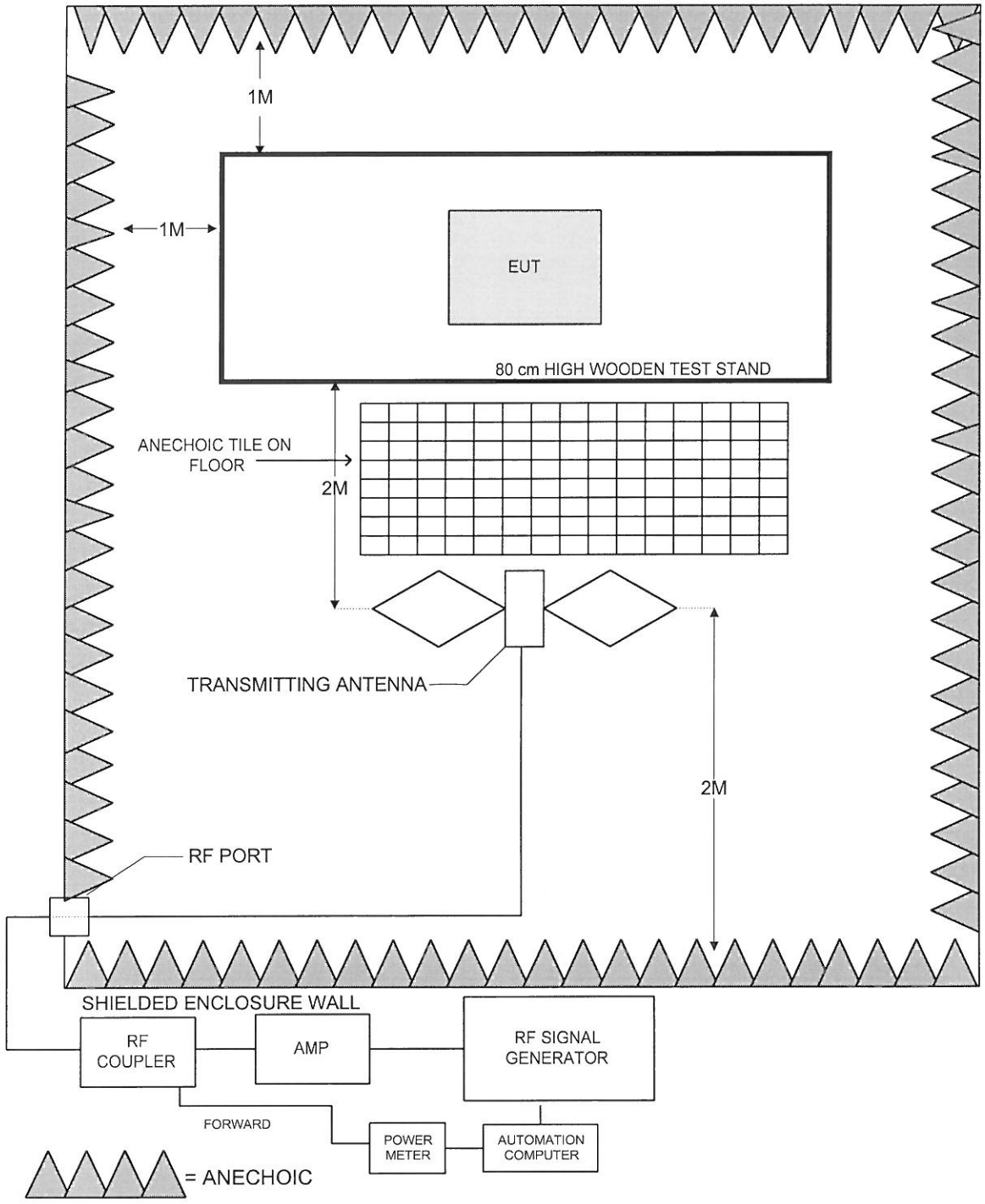


Figure R61000-4-3 - Radiated Immunity



Equipment List

EN61000-4-2; 1997, Radiated Susceptibility 80MHz to 1GHz, 1.4 GHz to 2 GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
128	Double Ridged Guide	Electro-Mechanics	1 GHz - 18 GHz	3105	6/13/2003	6/13/2004
224	Shielded Enc. (24x20x12)	Universal Shielding	100dB, 14kHz -	1	3/31/2003	3/31/2004
224A	Shielded Enc. (8x12x12)	Universal Shielding	100dB, 14kHz -	1A	3/31/2003	3/31/2004
224B	Shielded Enc. (8x8x12)	Universal Shielding	100dB, 14kHz -	1B	3/31/2003	3/31/2004
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	9/20/2002	9/20/2003
536	Isotropic Field Monitor	Amplifier Research	10 kHz - 100 GHz	FP2000	3/10/2003	3/10/2004
574	AM/FM Signal Generator	Marconi Instru.	9 kHz - 2.4 GHz	2024	7/22/2002	7/22/2003
648	Power Meter	Boonton Electronics	10 kHz - 100 GHz	4232A	1/8/2003	1/8/2004
649	Power Sensor	Boonton Electronics	10 kHz - 8 GHz	51011-EMC	11/25/2002	11/25/2003
651A	High Power Dir Coupler	Werlatone Inc.	.01-1000 MHz/200W	C5571	3/4/2003	3/4/2004
709	Automation Computer	ECS.Inc.	150 MHz Pentium	11779023		
711	Microwave Sweeper	Gigatronics	500 MHz - 20 GHz	GT9000S/.5-20	10/17/2002	10/17/2003
742	Amplifier	Amplifier Research	80 - 1000 MHz/250W	250W1000	2/8/2003	2/8/2004
750	High Field Camera	ASM Products	Video Camera	HFC-200	3/31/2003	3/31/2004
794	Isotropic Field Probe	Amplifier Research	80 MHz - 40 GHz	FP2080	4/29	

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	EN 61000-4-3: 1997, Radiated Immunity Retest (80 MHz to 1000 MHz)		
CUSTOMER:	Techsonic	JOB No.:	R-9915-2
TEST SAMPLE:	433.92 MHz Reciever (Smartcast)		
MODEL No.:	Tx: RF40E / Rx: RF10E	SERIAL No.:	Tx: 1 / Rx: e
TEST SPECIFICATION:	ETSI EN 301 489-3 V1.4.1 (2002-08) Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility standard for radio equipment and services.	PARAGRAPH:	9.1
OPERATING MODE:	Continuously recieving a simulated transmission at 433.92 MHz		
TECHNICIAN:	T. Schneider	DATE:	June 19, 2003
NOTES:	The indicated frequency range was stepped at a maximum rate of 1% of the fundamental frequency. The front & rear sides of the EUT were tested facing the test antenna. Temperture: 24° C. Humidity: 44%		

Test Frequency	Threshold	Limit	Antenna Polarization	Modulation
MHz	Volts/meter			
80.0	----------	3	Vertical & Horizontal	1 kHz AM, 80%
V	V	V	V	V
1,000	----------	3	Vertical & Horizontal	1 kHz AM, 80%

The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by performance criteria of paragraph 9.2.3 of ETSI EN 301 489 V1.4.1 (2002-08), as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

RETLIF TESTING LABORATORIES

SUSCEPTIBILITY TEST DATA SHEET

TEST METHOD:	EN 61000-4-3: 1997, Radiated Immunity Retest (80 MHz to 1000 MHz)		
CUSTOMER:	Techsonic	JOB No.:	R-9915-2
TEST SAMPLE:	433.92 MHz Reciever (Smartcast)		
MODEL No.:	Tx: RF40E / Rx: RF10E	SERIAL No.:	Tx: 1 / Rx: e
TEST SPECIFICATION:	ETSI EN 301 489-3 V1.4.1 (2002-08) Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility standard for radio equipment and services. PARAGRAPH: 9.1		
OPERATING MODE:	Continuously recieving a simulated transmission at 433.92 MHz		
TECHNICIAN:	N. Dragotta	DATE:	June 30, 2003
NOTES:	The indicated frequency range was stepped at a maximum rate of 1% of the fundamental frequency. The front & rear sides of the EUT were tested facing the test antenna. Temperture: 21° C. Humidity: 47%		

Test Frequency	Threshold	Limit	Antenna Polarization	Modulation
GHz	Volts/meter			
1.4	----------	3	Vertical & Horizontal	1 kHz AM, 80%
V	V	V	V	V
2.0	----------	3	Vertical & Horizontal	1 kHz AM, 80%

The test sample did not exhibit any malfunction or degradation of performance beyond the tolerances specified by performance criteria of paragraph 9.2.3 of ETSI EN 301 489 V1.4.1 (2002-08), as defined by the manufacturer.

NOTE - All frequencies within the range of the test were scanned for malfunction or degradation of performance.

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MEMBER ACIL

ETSI EN 300 220-3 V1.1.1(2000-09) TEST REPORT ON **Techsonic Industries 433.92 MHz Transmitter and Receiver (Smartcast)**

CONFIDENTIAL

CUSTOMER NAME:	Techsonic Industries
CUSTOMER P.O.:	331782
DATE OF REPORT:	June 10, 2003
TEST REPORT NUMBER:	R-9915-3
TEST START DATE:	May 22, 2003
TEST FINISH DATE:	June 6, 2003
TEST TECHNICIAN:	J. Kabacinski
TEST ENGINEER:	T. Schneider
REPORT WRITTEN BY:	M. White
SUPERVISOR:	R. Reitz
GOVERNMENT SOURCE INSPECTION:	Not Applicable

Table of Contents

Certification and Signatures

We certify that this report is a true report of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Thomas J. Schneider
EMC Test Engineer
NVLAP Approved Signatory

Richard Reitz
Laboratory Manager
NVLAP Approved Signatory

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NON-WARRANTY PROVISION
The testing services have been performed, findings obtained, and reports prepared in accordance with generally accepted testing laboratory principles and practices. This warranty is in lieu of all other warranties, either express or implied.

NON-ENDORSEMENT
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement, or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

Administrative Data

Retlif Testing Laboratories Test Report No.: R-9915-3

Test Specification: ETSI EN 300 220-3 V1.1.1(2000-09):1995

Customer: Techsonic Industries
5 Humminbird Lane
Eufaula, AL 36027

Test Sample: 433.92 MHz Transmitter and Receiver (Smartcast)

Applicable Documents: See Paragraph 2.0

Testing Dates: May 22, 2003 to June 6, 2003

Date of Report: June 10, 2003

CONFIDENTIAL

1.0 Scope

This test report documents the methods used in measuring the emissions produced by a 433.92 MHz Transmitter and Receiver (Smartcast), manufactured by Techsonic Industries. This report further serves to fully record the details of the sample tested including all interconnecting cables and support equipment. The objective of this test report is to demonstrate compliance of the 433.92 MHz Transmitter and Receiver (Smartcast) to the requirements for a short range device as outlined in ETSI EN 300 220-3 V1.1.1(2000-09).

2.0 Applicable Documents

The following documents form a part of this test report to the extent specified herein:

RCM001	- Retlif Testing Laboratories Calibration Manual.
RQM001	- Retlif Testing Laboratories Quality Assurance Manual.
ANSI/NCSL Z-540	- Calibration Laboratories and Measuring and Test Equipment - General Requirements.
MIL-STD-45662A	- Calibration System Requirements.
ETSI EN 300 220-1 V1.3.1 (2000-09)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods.
ETSI EN 300 220-3 V1.1.1 (2000-09)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 3: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive.

3.0 General Requirements

3.1 Test Environment

All testing was performed according to each methods individual requirements. Each test method outlined herein describes the individual environment in which testing was performed. Both the conducted and radiated emissions tests described herein were performed by Retlif Testing Laboratories which is a NIST/NVLAP accredited facility. All radiated emissions testing was performed on a CISPR Compliant Open Area Test Site (OATS).

3.1.1 Radiated Emissions

3.1.1.1 Preliminary

Preliminary radiated measurements were performed in a shielded enclosure.

3.1.2.2 Formal

Formal radiated emissions testing was performed on an open area test site (OATS). The test site measured 12 m x 20 m and was covered with a conducting ground plane constructed of one quarter inch ground cloth. The equipment under test was placed in an RF transparent enclosure on top of a 1.2 meter diameter, flush mounted, metallic turntable. The test site met the test site attenuation requirements specified in CISPR 16:1997 throughout the range of measurement frequencies.

3.2 Test Instrumentation

All test equipment utilized in determining compliance with the requirements specified herein was calibrated prior to use in accordance with the procedures and standards set forth in Retlif Testing Laboratories standard manuals RCM001, RQM001 and in ANSI/NCSL Z-540. See each test method for a full listing of test equipment utilized.

3.2.1 Grounding of Measuring Instrument

Interference measuring instruments were physically grounded with only one connection. When an antenna was used, the measuring instrument was connected to ground with only the power ground cord (green wire).

3.2.2 Measurement Accuracy

The accuracy of all measurements was as follows:

Frequency Accuracy: +/- 2% Amplitude Accuracy: +/- 2 dB

Temperature Accuracy: ± 2°C

3.3 Emissions Testing

3.3.1 Ambient Interference Levels

Ambient interference levels were at least 6 dB below the specified limit for conducted emissions. For radiated emissions, the ambient levels were verified. If the ambient was within 6 dB of the specified limit the following procedure was performed:

1. The device was pre-screened in a shielded enclosure to determine its spectral content.
2. When measuring on OATS, if the ambient interference level was less than 6 dB below the limit, the measurement antenna was moved closer to the equipment under test. The measurement was then taken and measurement was extrapolated out to the desired test distance using a 1/D extrapolation factor.

3.3.2 Detector Function

For the conducted and radiated emissions testing described herein a Peak detector or Quasi-Peak function was utilized as specified in ETSI EN 300 220-3 V1.1.1(2000-09).

3.3.3 Measurement Frequencies

The entire frequency range for each applicable test method was scanned. All frequencies with emissions within 20 dB of the specified limit were recorded.

4.0 Test Sample Description

4.1 General

The EUT was a 433.92 MHz Transmitter and Receiver (Smartcast), manufactured by Techsonic Industries. The 433.92 MHz Transmitter was powered by 3 VDC derived from a lithium battery and the Receiver was powered by 12 VDC derived from 8 "AA" batteries. The 433.92 MHz Transmitter and Receiver (Smartcast) measured, weighed and consisted of the following:

Description	Manufacturer	Model No.	Serial No.	Measurements
433.92 MHz Transmitter	Techsonic	RF40E	1	7cm x 5cm x 4cm, weight 0.1
433.92 MHz Ash Receiver	Techsonic	RF10E	e	24cm x 16cm x 15cm, weight 0.4

4.2 Port Configurations and Input/output Cables

Not applicable.

4.3 Modifications

No modifications were made to the 433.92 MHz Transmitter and Receiver (Smartcast) during the course of this testing program in order to ensure its compliance.

5.0 Test Sample Parameters

5.1 Mode of Operation

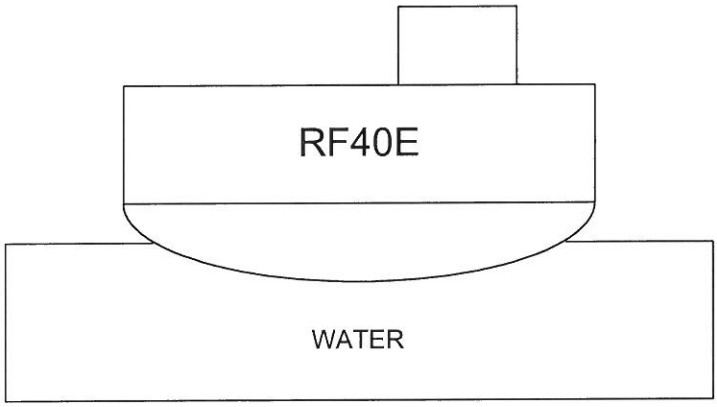
During testing, the Transmitter was continuously transmitting as specified in each applicable test method. During testing, the Receiver was continuously receiving a 100 Hz, Square Wave, 50% Duty Cycle pulsed signal from a signal generator in order to lock up the Ash Receiver.

5.1.1 Support Equipment

The 433.92 MHz Transmitter and Receiver (Smartcast) utilized no support equipment in order to achieve the above operating state during the course of this testing program.

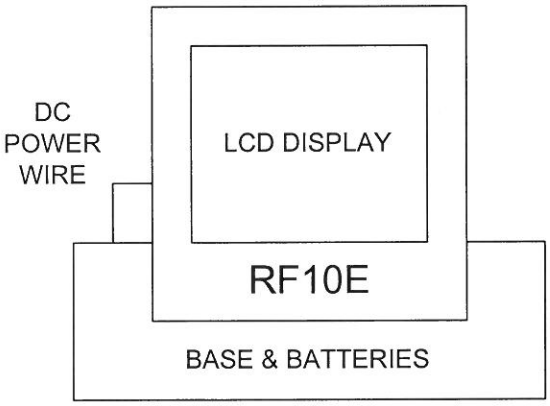
Figure 1
Block Diagram

433.92 MHz TRANSMITTER BLOCK DIAGRAM



TRANSMITTER SUPPORT EQUIPMENT:

433.92 MHz RECEIVER BLOCK DIAGRAM



RECEIVER SUPPORT EQUIPMENT:

6.0 Test Methods Performed

6.1 Test Method Summary

The tests outlined in the table below were performed in accordance with the requirements of ETSI EN 300 220-3 V1.1.1(2000-09):1995:

Retlif Paragraph	ETSI Paragraph	Test Method	Frequency Range	Results
6.2	4.1.1	Frequency Error, Transmitter	433.050 MHz- 434.070 MHz	Complied
6.3	4.1.3	Effective Radiated Power (ERP), Fundamental and Spurious Radiation (EIRP), Emissions, Transmitter	433.050 MHz - 434.790 MHz	Complied
6.4	4.1.9	Frequency Stability, Transmitter	433.050 MHz - 434.070 MHz	Complied
6.5	4.1.10	Duty Cycle	N/A	N/A
6.6	4.2.1	Spurious Radiation, (EIRP), Receiver	25 MHz - 4.33 GHz	Complied

See individual test methods contained in paragraphs 6.2 through 6.6 of this test report for a full description of the test procedures utilized and the results obtained.

6.2 Frequency Error Under Normal and Extreme Conditions, 433.050 MHz To 434.070 MHz, Transmitter

Purpose
The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the 433.92 MHz Transmitter (Smartcast) in the allowed frequency band of 433.050 MHz- 434.070 MHz at normal and extreme test conditions.

Test Limits
The parameters shown in the table below were used to determine 433.92 MHz Transmitter (Smartcast) compliance.

Frequency Error Limit: ± 100 ppm of Highest Frequency in Band = 100 ppm of 434.070 MHz = ± 43.4 kHz.

Test Extremes

Temperature	Battery Voltage
-10°C	3.0 VDC (Normal)
+55°C	2.55 VDC (85% Battery)
	2.40 VDC (Manufacturer's declared Battery end point)

Test Setup
The 433.92 MHz Transmitter (Smartcast) was configured as shown in the attached photograph. This configuration was based on the test setup shown in Retlif Testing Laboratories Drawing No. R15107A-CE. The test sample was placed in a temperature chamber and connected to a spectrum analyzer via an RF Probe. With the test sample configured as stated above the following was performed:

1. The temperature chamber was lowered to lowest test extreme of -10°C with the EUT battery set at normal level (3.0 VDC).
2. The spectrum analyzer was adjusted so that it displayed at least 1 MHz below the lowest frequency and 1 MHz above the highest frequency of the assigned frequency band of 433.050 MHz to 434.070 MHz.
3. The spectrum analyzer was used to record the center transmit frequency.
4. Steps 2 and 3 were repeated with the EUT Battery set at 85% (2.55 VDC).
5. Steps 2 through 4 were repeated with the EUT Battery set to 2.4 VDC (Battery end point).
6. Steps 2 through 5 were repeated with the temperature adjusted to ambient conditions (23°C).
7. Steps 2 through 5 were repeated with the temperature adjusted to the highest extreme (+55°C).

Test Results
The Frequency Error limits specified in ETSI EN 300 220-3 were not exceeded and the 433.92 MHz Transmitter (Smartcast) was found to comply with the requirements specified for this method. See the following single data sheet for a full presentation of the results obtained.

Test Photograph
Frequency Error Under Normal and Extreme Conditions

Equipment List

Paragraph 4.1.1 Frequency Error Under Normal and Extreme Conditions

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
159	Frequency Counter	Leader	10 Hz - 1 GHz	LDC-825	9/13/02	9/13/03
520D	Digital Multimeter	Wavetek	N/A	DM25XT	10/14/02	10/14/03
696	DC Power Supply	BK Precision	30V/3A	1730	8/2/02	8/2/03
7016	EMC Analyzer	Hewlett Packard	9kHz - 1.8GHz	8591EM	5/25/03	6/25/03
810	Temperature Chamber	Tenney Engineering	-40 to 100 deg C	T5S-5	10/14/02	10/14/03

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

TEST METHOD: **Frequency Error Under Normal and Extreme Conditions**

CUSTOMER: Techsonic Industries JOB No.: R-9915-3

TEST SAMPLE: 433.92 MHz Transmitter (Smartcast)

MODEL No.: RF40E SERIAL No.: CW

TEST SPECIFICATION: ETSI EN 300 220-3 V1.1.1 (2000-09) Electromagnetic compatibility and Radio spectrum matters(ERM); Short Range Devices(SRD); Radio Equipment to be used in the 25 MHz to 1000 MHz. . . Part 3 PARAGRAPH: 4.1.1

OPERATING MODE: Transmitter continuously transmitting a 433.9 MHz Continuous Wave signal.

TECHNICIAN: T. Schneider DATE: June 5, 2003

NOTES: Deviation Limit is +/- 100 Parts Per Million (PPM) of the maximum frequency of the assigned band (434.070 MHz) for wideband equipment; Limit = +/- 43.407 kHz

Test Voltage	Test Temperature	Test Condition	Transmitter Center Frequency	Frequency Deviation		Deviation Limit		Test Result
VDC	°C	Normal/Extreme	MHz	kHz		kHz		Pass/Fail
						+/- 43.4		
3.00	23.0	Normal T & Normal V	433.9608	0.0		|		Pass
2.55*	23.0	Normal T & Low V	433.9597	-1.1		|		Pass
2.40**	23.0	Normal T & Low V	433.9593	-1.5		|		Pass
3.00	-10.0	Extreme Low T & Normal V	433.9426	-18.2		|		Pass
2.55*	-10.0	Extreme Low T & Low V	433.9416	-19.2		|		Pass
2.40**	-10.0	Extreme Low T & Low V	433.9408	-20.0		|		Pass
3.00	+55.0	Extreme High T & Normal V	433.9356	-25.2		|		Pass
2.55*	+55.0	Extreme High T & Low V	433.9388	-22.0		|		Pass
2.40**	+55.0	Extreme High T & Low V	433.9403	-20.5		V +/- 43.4		Pass

*= This value is 0.85 multiplied by the nominal battery voltage (3.0 VDC) for lithium type batteries

**= Lower extreme battery voltage as declared by the manufacturer

CONFIDENTIAL

6.3 Effective Radiated Power, Fundamental and Spurious Case, Transmitter

Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the 433.92 MHz Transmitter (Smartcast) via radiation from the antenna, the enclosure and connected cabling in the frequency range of 150 kHz to 4 GHz.

Test Limits

The limits shown in the table below were used to determine 433.92 MHz Transmitter (Smartcast) compliance:

Paragraph 4.1.3: **Fundamental Emissions**

Transmit Frequency	Limit
433.050 MHz to 434.790 MHz	10 milliwatts

Paragraph 4.1.8: **Spurious Emissions**

State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies below 1,000 MHz	Frequencies above 1,000 MHz
Operating	4 nW	250 nW	1μW

Test Setup

The 433.92 MHz Transmitter (Smartcast) was configured as shown in the attached photograph. This configuration was based on the test setup shown in Retlif Testing Laboratories Drawing No. R15109A-RE. The test sample was placed on an 1.5 m high wooden test stand above the ground plane of the shielded enclosure for preliminary measurements and the FCC listed OATS for final measurements. The rear of the test sample, including peripherals, was aligned and flush with the rear of the test stand. The test stand was placed directly on the flush mounted turn table. The turn table positions were relative to the test sample as follows: When facing the 433.92 MHz Transmitter (Smartcast) the front is at 0°, the rear is at 180°, and the left side is at 270°. The test stand was situated such that the boundary of the test sample was located 3 meters from the measuring antenna.

The 433.92 MHz Transmitter (Smartcast) was arranged on the test stand in accordance with the manufacturers instructions. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the test sample. Excess interface cable length was draped over the back edge of the test stand.

If any draped cable extended closer than 40 cm to the conducting ground plane, the excess was bundled in the center in a serpentine fashion using 40 cm lengths to maintain the 40 cm height. If the cable(s) could not be bundled due to bulk, length, or stiffness, they were draped over the back edge of test stand unbundled, but in such a way that all portions of the interface cable remained at least 40 cm from the horizontal conducting ground plane. The AC power cable(s) were draped over the rear edge of the test stand and routed down to the AC mains.

Test Procedure

With the test instrumentation and the 433.92 MHz Transmitter (Smartcast) was configured as stated above, the following steps were performed in accordance with ETSI EN 300 220-3(2001-09):

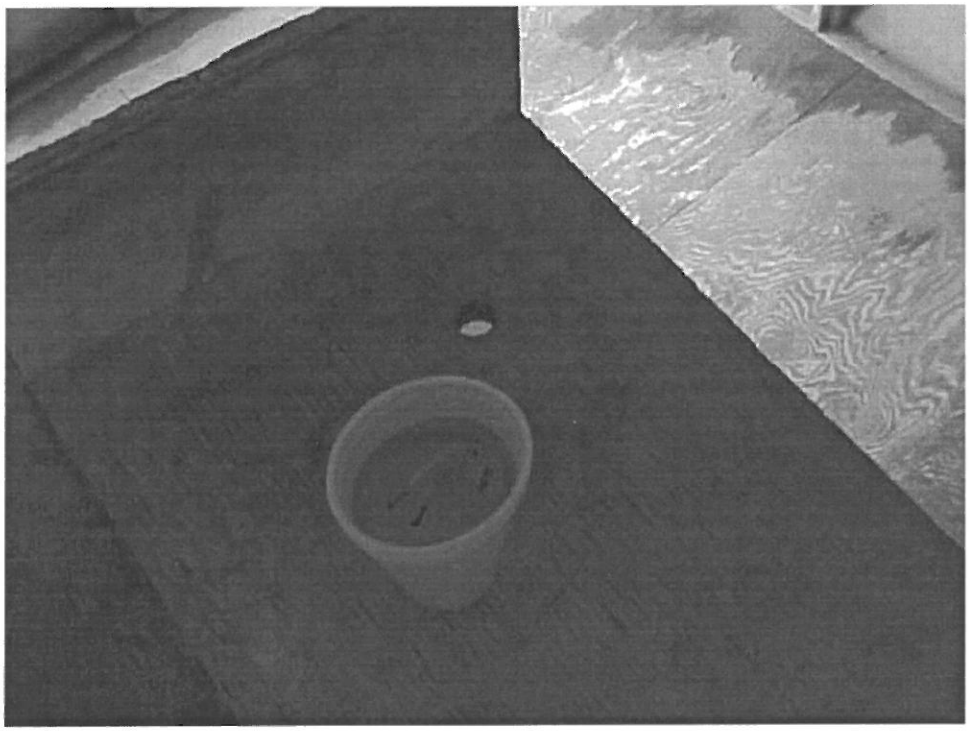
1. The 433.92 MHz Transmitter (Smartcast) was arranged with cables terminated as specified in Paragraph 4.2 herein.
2. The spectrum analyzer was configured to display the frequency of 433.92 MHz.
3. With the test antenna vertically polarized, the 433.92 MHz Transmitter (Smartcast) cabling was relocated in order to maximize the radiated emissions.

Test Procedure (con't.)

4. The operating mode of the 433.92 MHz Transmitter (Smartcast) was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. Once the configuration, both cabling and operating mode, which produced maximum emissions was determined the 433.92 MHz Transmitter (Smartcast) was maintained in this configuration for the duration of testing.
6. A max hold spectrum analyzer trace, trace A, was obtained with the 433.92 MHz Transmitter (Smartcast) operating.
7. The 433.92 MHz Transmitter (Smartcast) was powered off and a max hold spectrum analyzer trace, trace B, was obtained to denote the ambient interference levels.
8. The two obtained traces were analyzed in order to determine which recorded emissions were produced by the 433.92 MHz Transmitter (Smartcast).
9. At each frequency upon which an emission was determined to be from the 433.92 MHz Transmitter (Smartcast) the following steps were performed in order to further maximize the observed emissions:
    a. The test antenna height was varied from 1 to 4 meters.
    b. The test antenna polarization was varied from vertical to horizontal.
    c. The 433.92 MHz Transmitter (Smartcast) was rotated 360° about its vertical axis.
10. The test antenna RF cable was connected to the CISPR compliant receiver.
11. For all emissions found to be within 20 dB of the specified limit, the following was recorded on the x-y plot:
    a. Frequency of emission
    b. Peak detector receiver meter reading.
    c. Correction factor consisting of antenna factor, cable loss and pre-amp gain.
    d. Test antenna height and polarization.
    e. Turntable position.
12. For each emission which was measured in steps 3 through 11 above, the following was performed:
    a. The 433.92 MHz Transmitter (Smartcast) was replaced by a signal generator and dipole antenna.
    b. Steps 9 through 11 were repeated.
    c. Once maximized the signal generator level was changed until the meter reading matched that of the 433.92 MHz Transmitter (Smartcast).
    d. The output of the signal generator was recorded.
    e. The level obtained in step d adjusted for any antenna gain/loss.
    f. The effective radiated power was considered to be the result in step e above.
12. Steps 6 through 11 above were repeated for the following frequency ranges: 150 kHz to 25 MHz, 25 MHz to 80 MHz, 80 to 130 MHz, 130 to 200 MHz, 200 to 500 MHz, 500 to 750 MHz, 750 MHz to 1 GHz, 1 GHz to 2 GHz and 2 to GHz to 4.34.

Test Results

No emissions which exceeded the specified Effective Radiated Power limits were observed and the 433.92 MHz Transmitter (Smartcast) was found to comply with the requirements specified for this method. See the following two data sheets for a full presentation of the results obtained.



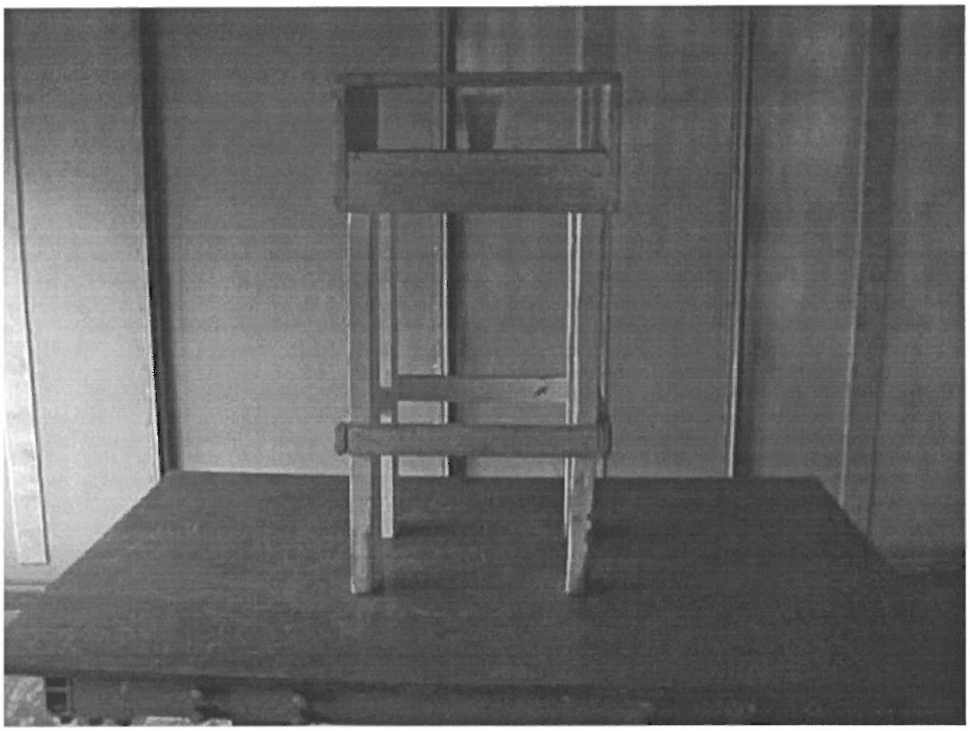
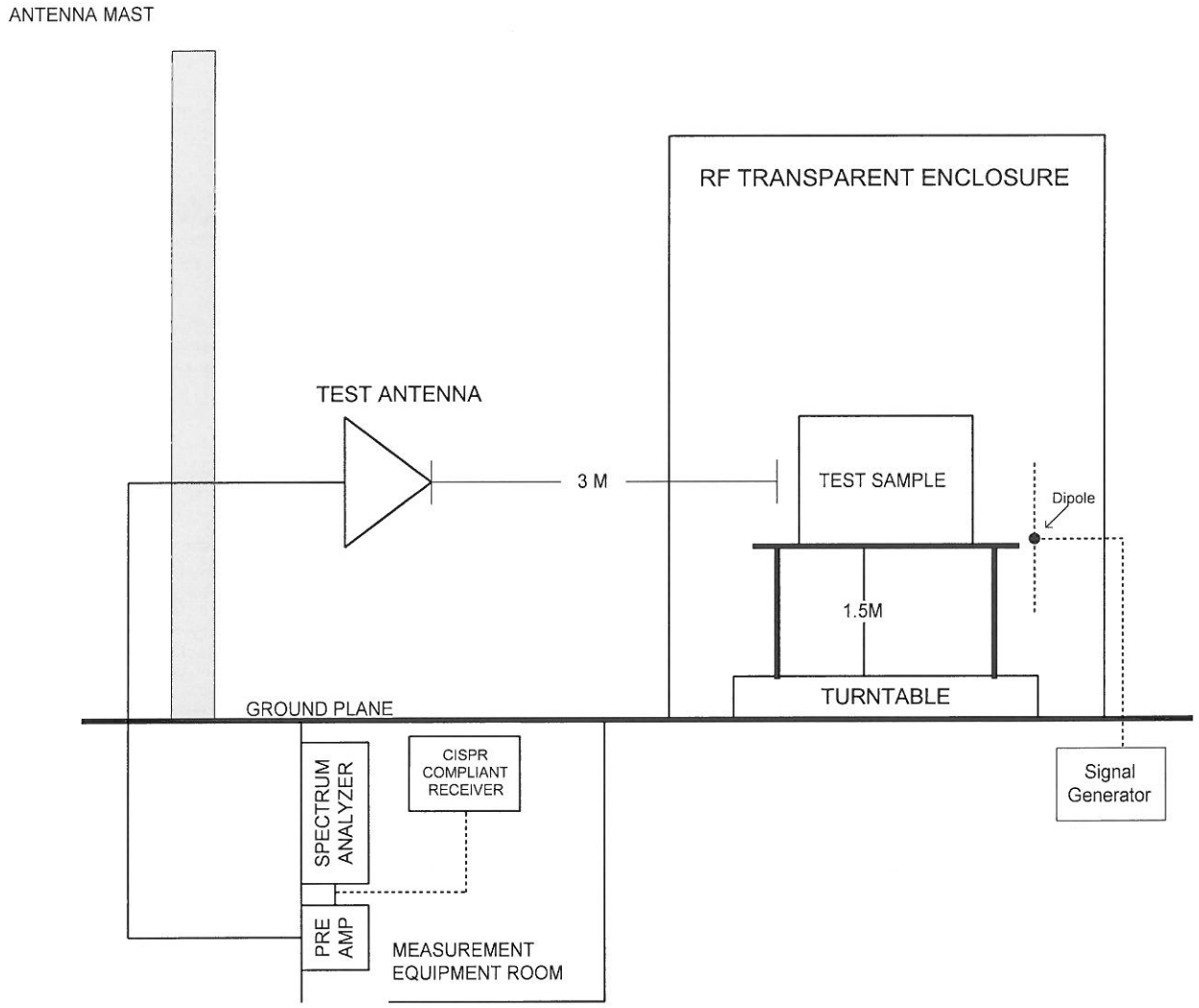


Figure R15109A-RE
Radiated Emissions



Equipment List

ETSI EN 300 220-3 V1.1.1 Paragraph 4.1.3 Effective Radiated Power

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	9/20/00	9/20/03
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dBb	BPA-1000	6/11/02	6/11/03
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	1/23/03	7/23/03
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	3/5/03	3/5/04
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	1/23/03	7/23/03
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/11/02	6/11/03
385	Sweep Oscillator	Hewlett Packard	1.0 - 18.0 GHz	8620C	3/31/03	3/31/04
385A	Signal Generator	Hewlett Packard	2.0 - 18.6 GHz	86290B	3/31/03	3/31/04
385B	Signal Generator	Hewlett Packard	.01 - 2.4 GHz	86222B	3/31/03	3/31/04
451A	Tuned Dipole Antenna	Empire Devices	30 - 140 MHz	DM-105-T1	8/8/00	8/8/03
451B	Tuned Dipole Antenna	Empire Devices	140 - 400 MHz	DM-105-T2	8/8/00	8/8/03
451C	Tuned Dipole Antenna	Empire Devices	400 - 1000 MHz	DM-105-T3	8/8/00	8/8/03
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	8/23/02	8/23/03
654	Attenuator	Weinschel		AF117A-69-11	3/13/03	3/13/04
767	Biconilog	EMCO	26 - 2000 MHz	3142B	9/3/02	9/3/03

Test Method:	ETSI EN 300 220-3 V1.1.1, Paragraph 4.1.3 Effective Radiated Power		
Customer:	Techsonic Industries	**Job No.**	9915-3
Test Sample:	433.92 MHz Transmitter (Smartcast)		
Model Number:	RF40E	**Serial No.**	1
Operating Mode:	Continuously transmitting a pulsed 433.92 MHz signal.		
Technician:	J. Kabacinski	**Date:**	May 22nd, 2003
Test Distance:	3 Meters	**Temperature:**	12.0°C
Detector Function:	Peak	**Humidity:**	90.0%

Frequency	Antenna Position	Orientation	Meter Readings	Signal Generator	Gain Above Isotropic	ERP	Converted Readings	Limit
MHz	(V/H)/Meters	Degrees	dBµV	dBm	dBi	dBm	mW	mW
433.9	V / 2.0	90	87.9	-10.2	+2.2	-8.0	0.160	10
433.9	H / 1.8	248	74.1	-26.2	+2.2	-24.0	0.004	10

	The EUT was placed on a tabletop, and the radiated output level was measured with a biconilog antenna.
	After the level was maximized, the EUT was replaced with a dipole antenna and a signal generator.
	The level of the generator was raised until it matched the recorded from the EUT and this plus the antenna gain
	was considered the output power.

Test Method:	ETSI EN 300 220-3 V1.1.1 Paragraph 4.1.8 Spurious Emissions 150kHz – 4GHz		
Customer:	Techsonic Industries	**Job No.**	R-9915-3
Test Sample:	433.92 MHz Transmitter (Smartcast)		
Model Number:	RF40E	**Serial No.**	1
Operating Mode:	Continuously transmitting a pulsed 433.92 MHz signal.		
Technician:	J. Kabacinski	**Date:**	May 22nd, 2003
Test Distance:	3 Meters	**Temperature:** 12.0°C	
Detector Function:	Peak	**Humidity:** 90.0%	

Frequency	Antenna Position	Orientation	Meter Readings	Signal Generator	Gain Above Isotropic	ERP	Converted Readings	**Limits
MHz	(V/H)/Meters	Degrees	dBµV	dBm	dBi	dBm	nW	nW
0.15								250
867.8	V / 1.0	135	48.0	-42.5	+2.2	-40.3	93.0	
867.8	H / 1.1	248	39.0	-49.5	+2.2	-47.3	19.0	
1000								250
1000								1000
1301.8	V / 1.5	225	47.5	-62.0	+7.32	-54.7	3.4	
1301.8	H / 1.0	293	51.5	-57.0	+7.32	-49.7	10.7	
1735.7	V / 1.0	248	44.9	-62.0	+8.8	-53.2	4.8	
1735.7	H / 1.0	270	46.0	-62.0	+8.8	-53.2	4.8	
2169.6	V / 1.1	45	53.9	-52.0	+9.4	-40.6	*87.1	
2169.6	H / 1.0	180	43.0	-51.0	+9.4	-41.6	*69.2	
2603.5	V / 1.0	180	43.0	-51.0	+9.6	-41.4	*72.4	
2603.5	H / 1.0	180	43.0	-51.0	+9.6	-41.4	*72.4	
3037.4	V / 1.0	180	44.0	-51.0	+9.4	-41.6	*69.2	
3037.4	H / 1.0	180	44.0	-51.0	+9.4	-41.6	*69.2	
3471.4	V / 1.0	180	42.0	-51.0	+9.5	-41.5	*70.8	
3471.4	H / 1.0	180	42.0	-51.0	+9.5	-41.5	*70.8	
3905.3	V / 1.0	180	41.0	-51.0	+9.5	-41.5	*70.8	
3905.3	H / 1.0	180	41.0	-51.0	+9.5	-41.5	*70.8	
4000								1000

	The EUT was placed on a tabletop, and the radiated output level was measured with a receiving antenna.
	After the level was maximized, the EUT was replaced with a transmitting antenna and a signal generator.
	The level of the generator was raised until it matched the recorded from the EUT and this plus the antenna gain
	was considered the output power.
	* Noise floor measurement (minimum system sensitivity)
	** See ETSI EN 300 220-1 V1.3.1 Table 13 for exclusion band limits.

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6.4 Frequency Stability Under Low Voltage Conditions, 433.050 MHz To 434.070 MHz, Transmitter

Purpose
The purpose of this test was to determine the stability of the transmitters center frequency in the allowed frequency band of 433.050 MHz to 434.070 MHz under low battery conditions.

Test Limits
The limits shown in the table below were used to determine 433.92 MHz Transmitter (Smartcast) compliance:

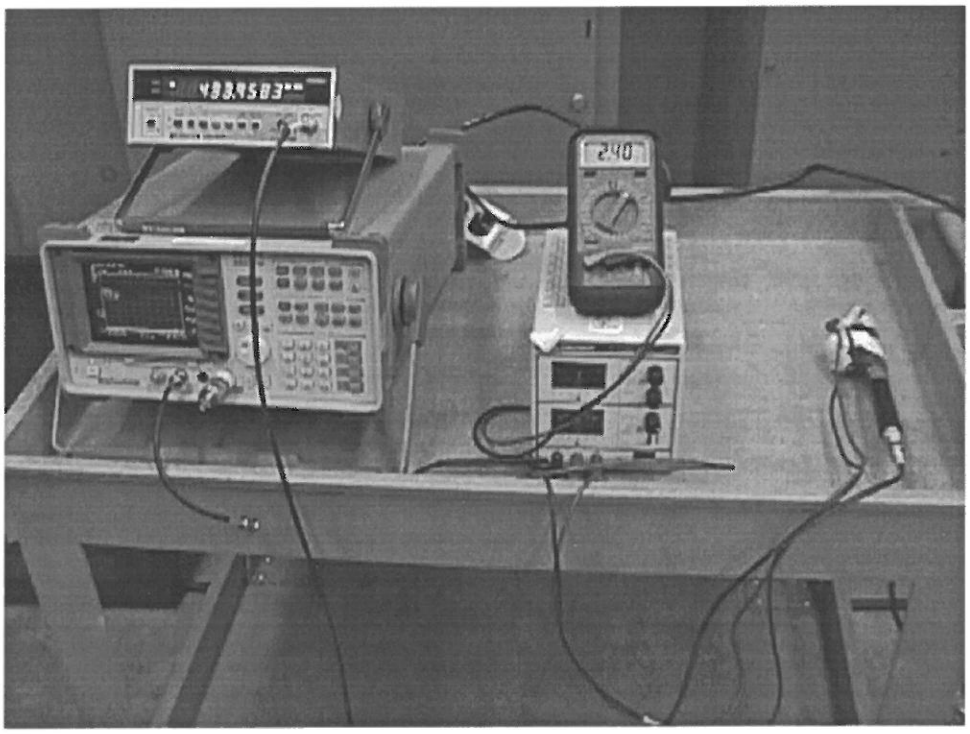
Temperature	Battery Voltage
+23°C	3.0 VDC (Normal)
+23°C	2.55 VDC (85% Battery)
+23°C	2.40 VDC (Manufacturers declared Battery end Point)

Test Setup
The 433.92 MHz Transmitter (Smartcast) was configured as shown in the attached photograph. This configuration was based on the test setup shown in Retlif Testing Laboratories Drawing No. R15107A-CE. The test sample was placed in a temperature chamber and connected to a spectrum analyzer via an RF Probe. With the test sample configured as stated above the following was performed:

1. The spectrum analyzer was adjusted so that it displayed at least 1 MHz below the lowest frequency and 1 MHz above the highest frequency of the assigned frequency band of 433.050 MHz to 434.070 MHz.
2. The spectrum analyzer was used to record the center transmit frequency.
3. Steps 1 and 2 were repeated with the EUT Battery set at 85% (2.55 VDC).
4. Steps 1 through 3 were repeated with the EUT Battery set to 2.4 VDC (Battery end point).

Test Results
No emissions which exceeded the specified ETSI EN 300 220-3 Frequency Stability limits were observed and the 433.92 MHz Transmitter (Smartcast) was found to comply with the requirements specified for this method. See the following single data sheet for a full presentation of the results obtained.

Test Photograph
Frequency Stability Under Low Voltage Conditions



Equipment List

Paragraph 4.1.9 Frequency Stability Under Low Voltage Conditions

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
159	Frequency Counter	Leader	10 Hz - 1 GHz	LDC-825	9/13/02	9/13/03
520D	Digital Multimeter	Wavetek	N/A	DM25XT	10/14/02	10/14/03
696	DC Power Supply	BK Precision	30V/3A	1730	8/2/02	8/2/03
7016	EMC Analyzer	Hewlett Packard	9kHz - 1.8GHz	8591EM	5/25/03	6/25/03

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

TEST METHOD:	**Frequency Stability Under Low Voltage Conditions**
CUSTOMER:	Techsonic Industries — JOB No.: R-9915-3
TEST SAMPLE:	433.92 MHz Transmitter (Smartcast)
MODEL No.:	RF40E — SERIAL No.: CW
TEST SPECIFICATION:	ETSI EN 300 220-3 V1.1.1 (2000-09) Electromagnetic compatibility and Radio spectrum matters(ERM); Short Range Devices(SRD); Radio Equipment to be used in the 25 MHz to 1000 MHz. . . Part 3 PARAGRAPH: 4.1.9
OPERATING MODE:	Transmitter continuously transmitting a 433.9 MHz Continuous Wave signal.
TECHNICIAN:	T. Schneider — DATE: June 5, 2003
NOTES:	Deviation Limit is +/- 100 Parts Per Million (PPM) of the maximum frequency of the assigned band (434.070 MHz) for wideband equipment; Limit = +/- 43.407 kHz

Test Voltage		Transmitter Center Frequency		Frequency Deviation		Deviation Limit		Test Result
VDC		MHz		kHz		kHz		Pass/Fail
						+/- 43.4		
3.00		433.9608		0.0		|		Pass
						|		
2.55*		433.9597		-1.1		|		Pass
						V		
2.40**		433.9593		-1.5		+/- 43.4		Pass

*= Thisvalue is 0.85 multiplied by the nominal battery voltage (3.0 VDC) for lithium type batteries

**= Lower extreme battery voltage as declared by the manufacturer

6.5 Duty Cycle Determination

Purpose
The purpose of this test was to determine the duty cycle of the device and duty cycle class as outlined in paragraph 7.4 of ETSI EN 300 220-1(2001-09).

Test Limits
The limits shown in the table below were used to determine duty cycle class of the 433.92 MHz Transmitter (Smartcast). The duty cycle class was determined over a one hour period.

Duty Cycle Class	Duty Cycle Ratio
1	≤0.1%
2	≤1.0%
3	≤10.0%
4	≤100%

Test Setup
The 433.92 MHz Transmitter (Smartcast) was configured as shown in the figure 2. The test samples RF output was coupled to the RF input of a spectrum analyzer via a 50 ohm coaxial cable. With the test sample configured as stated above, the following was performed:

1. A 50 ohm coaxial cable was connected to the spectrum analyzer's video output.
2. The video output of the spectrum analyzer was connected to the input of an oscilloscope.
3. The 433.92 MHz Transmitter (Smartcast) was powered on and set to transit a continuous data stream.
4. The spectrum analyzer's center frequency was adjusted to match the transmitter's center frequency.
5. The spectrum analyzer's span was set to 0 Hz.
6. The transmitter's pulse train was viewed and recorded on the spectrum analyzer.

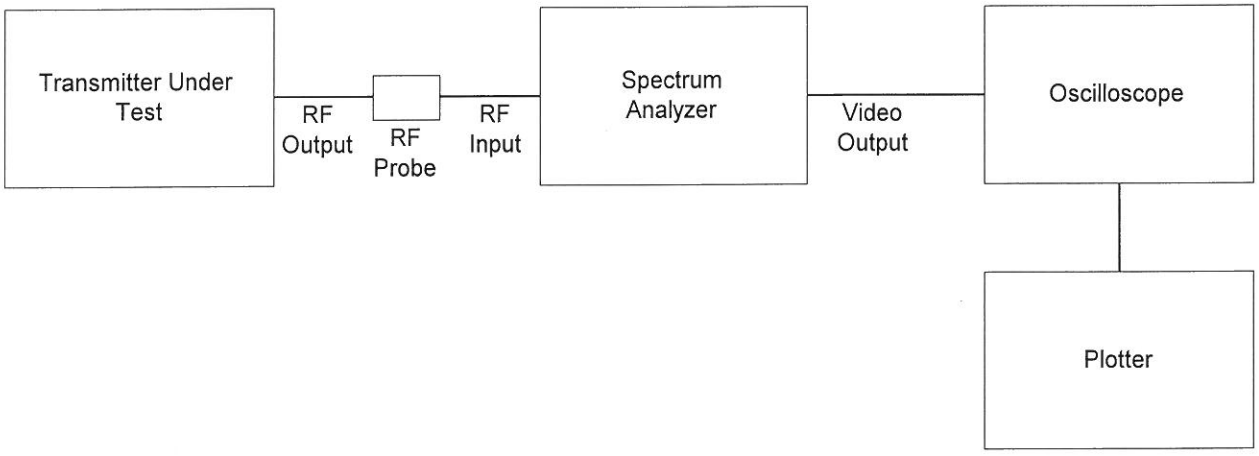
Duty Cycle

Period:	250ms
Pulse Train:	(1) 5ms pulse = 5.00
	(5) 0.30mSec pulses = 1.50
	(1) 0.25 mSec pulse = 0.25
	6.75 mSec On Time

Duty Cycle = $\frac{6.75}{2.50}$ = 0.027 = 2.7%)

Test Result
The 433.92 MHz Transmitter's (Smartcast) Duty Cycle was measured to be 2.7%. Therefore, the 433.92 MHz Transmitter (Smartcast) has a Class 3 Duty Cycle Class.

Figure 2
Duty Cycle Determination Test Setup Diagram

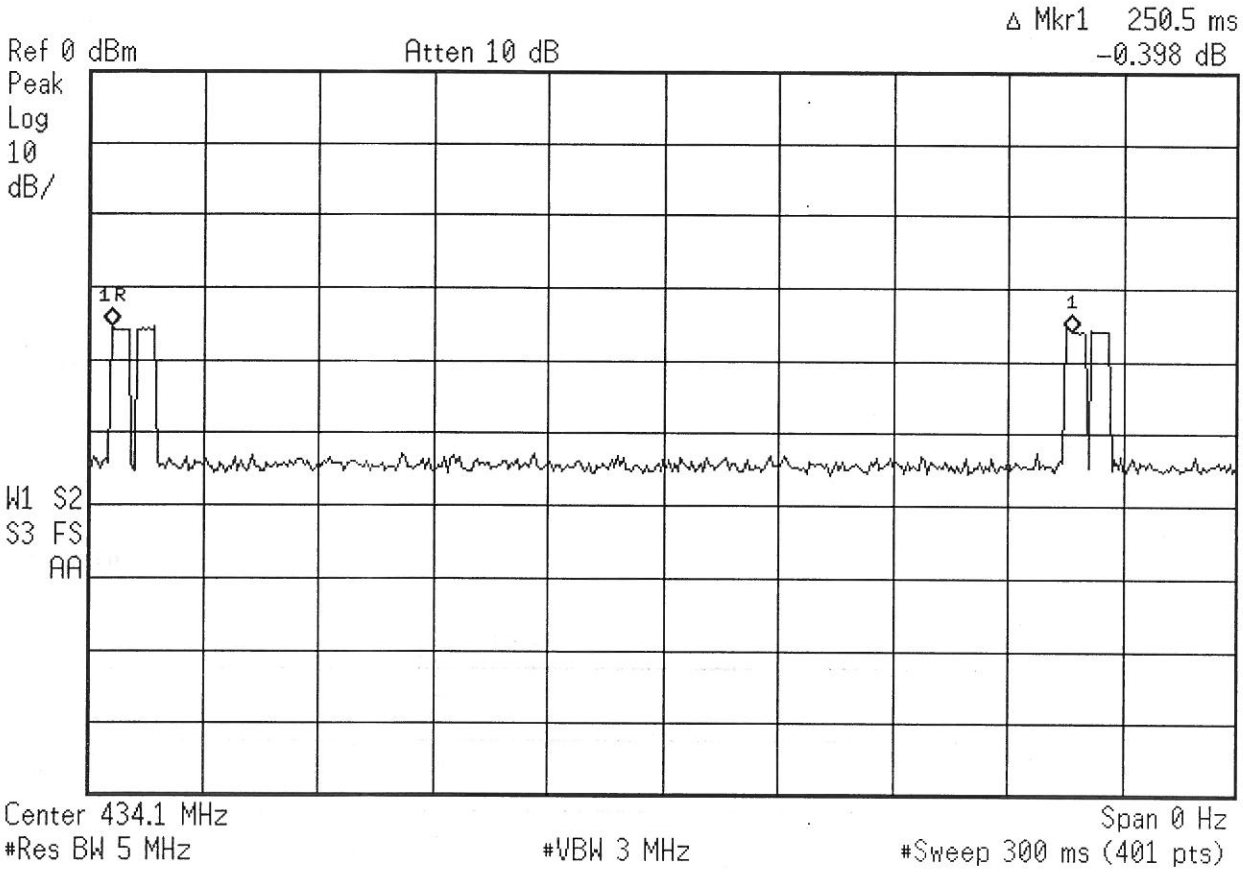


Equipment List

Paragraph 4.1.10 Duty Cycle

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
763	Spectrum Analyzer	Agilent	30 Hz - 13.2 GHz	E4405B	7/26/02	7/26/03

Agilent



CONFIDENTIAL

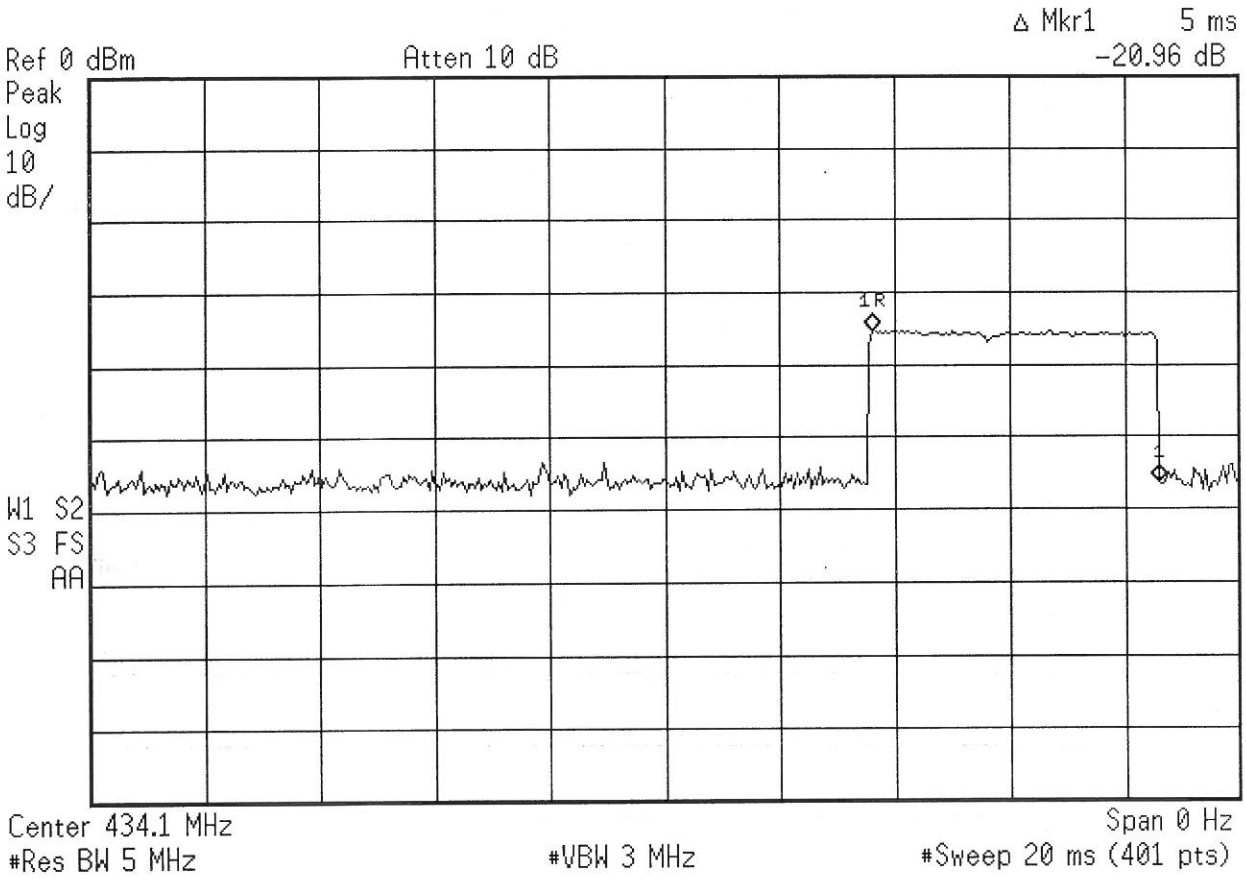
Customer:	Techsonic Industries
Test Sample:	433.9 MHz Transmitter (Smartcast)
Model No.:	RF40E
Test Method:	Paragraph 4.1.10 Duty Cycle
Notes:	Transmitter period measurement= 250 mSec

Date: June 6, 2003 Tech: T. Schneider Sheet 1 of 5

Retlif Testing Laboratories

Report No. R-9915-3

Agilent



CONFIDENTIAL

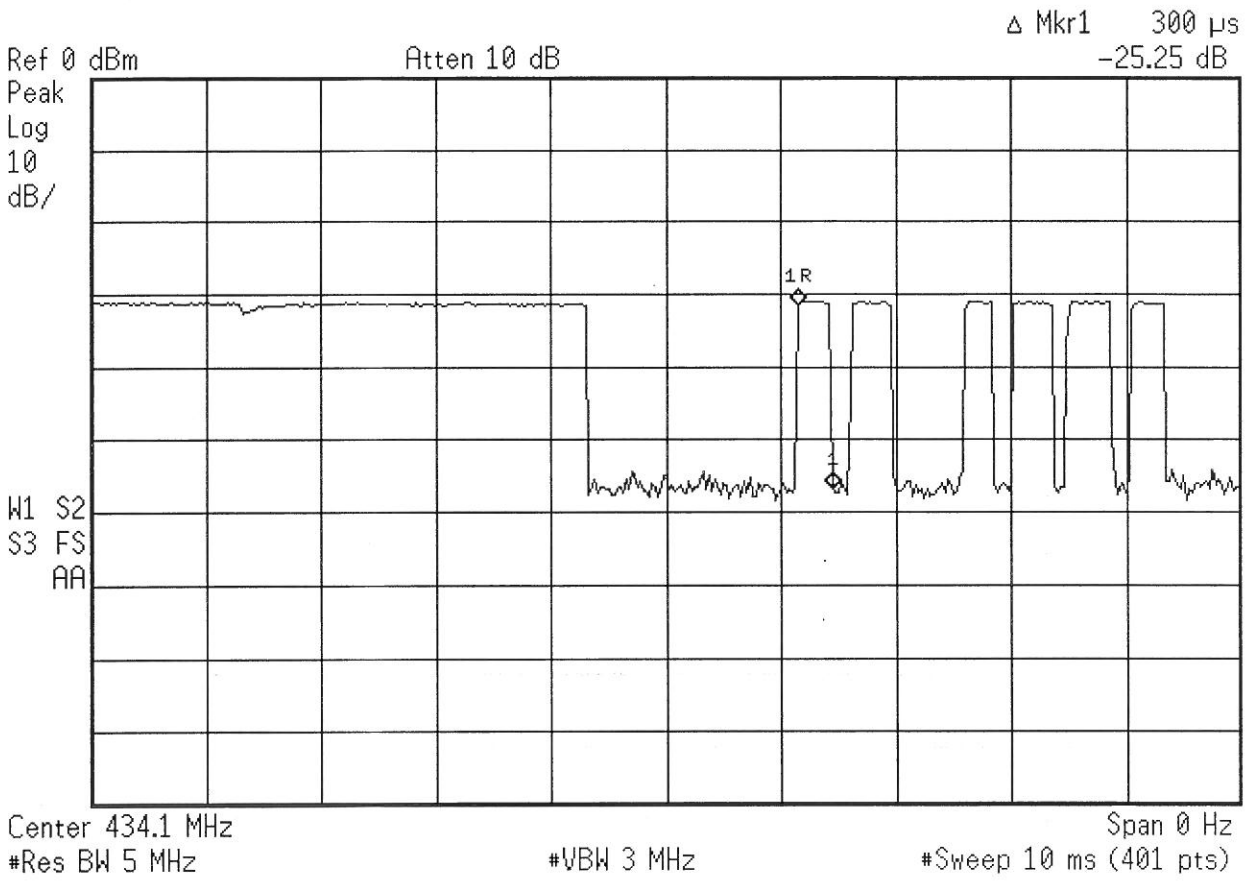
Customer:	Techsonic Industries
Test Sample:	433.9 MHz Transmitter (Smartcast)
Model No.:	RF40E
Test Method:	Paragraph 4.1.10 Duty Cycle
Notes:	Transmitter large pulse measurement=5.0 mSec

Date: June 6, 2003 Tech: T. Schneider Sheet 2 of 5

Retlif Testing Laboratories

Report No. R-9915-3

Agilent



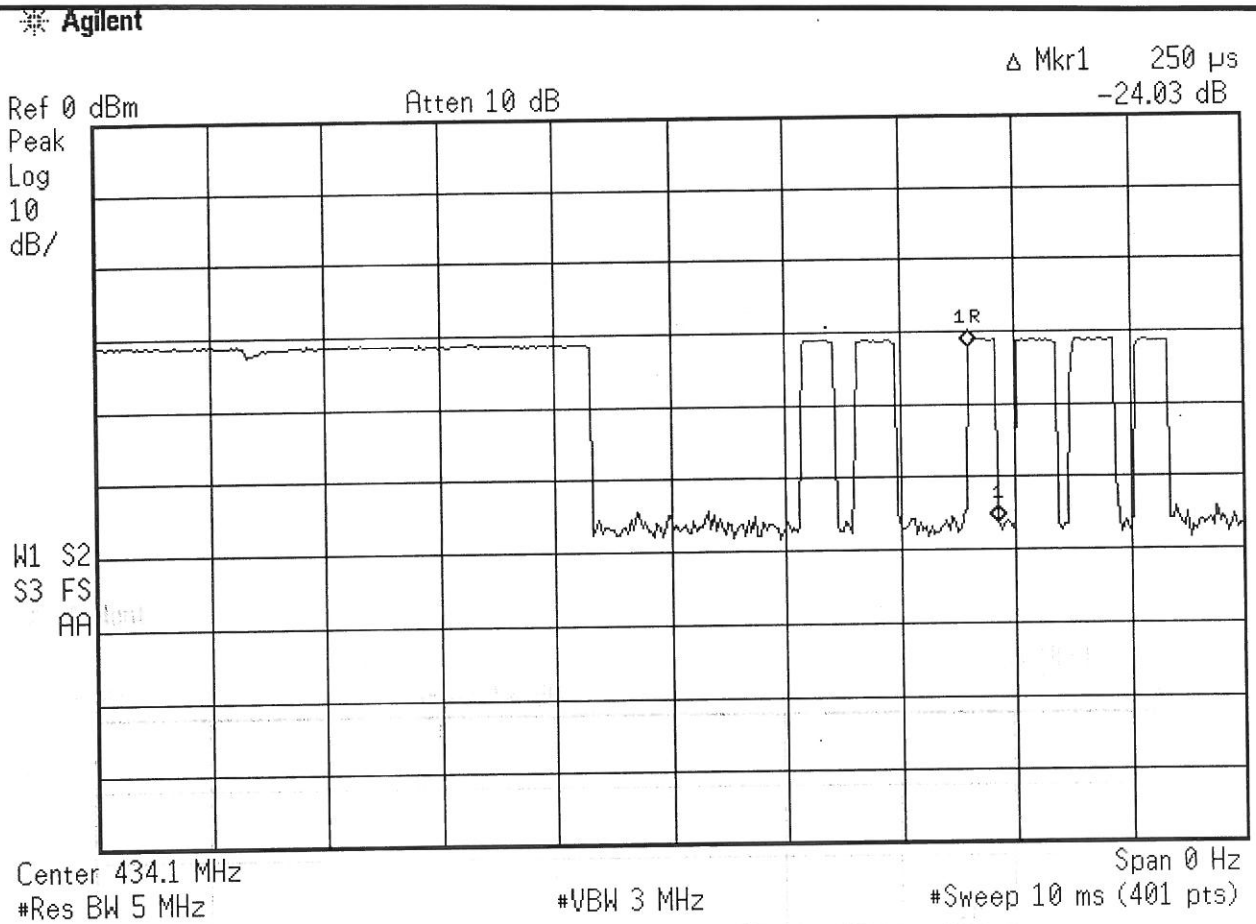
CONFIDENTIAL

Customer:	Techsonic Industries
Test Sample:	433.9 MHz Transmitter (Smartcast)
Model No.:	RF40E
Test Method:	Paragraph 4.1.10 Duty Cycle
Notes:	Transmitter small pulse measurement= 0.3 mSec x 5= 1.5 mSec

Date: June 6, 2003 Tech: T. Schneider Sheet 3 of 5

Retlif Testing Laboratories

Report No. R-9915-3



CONFIDENTIAL

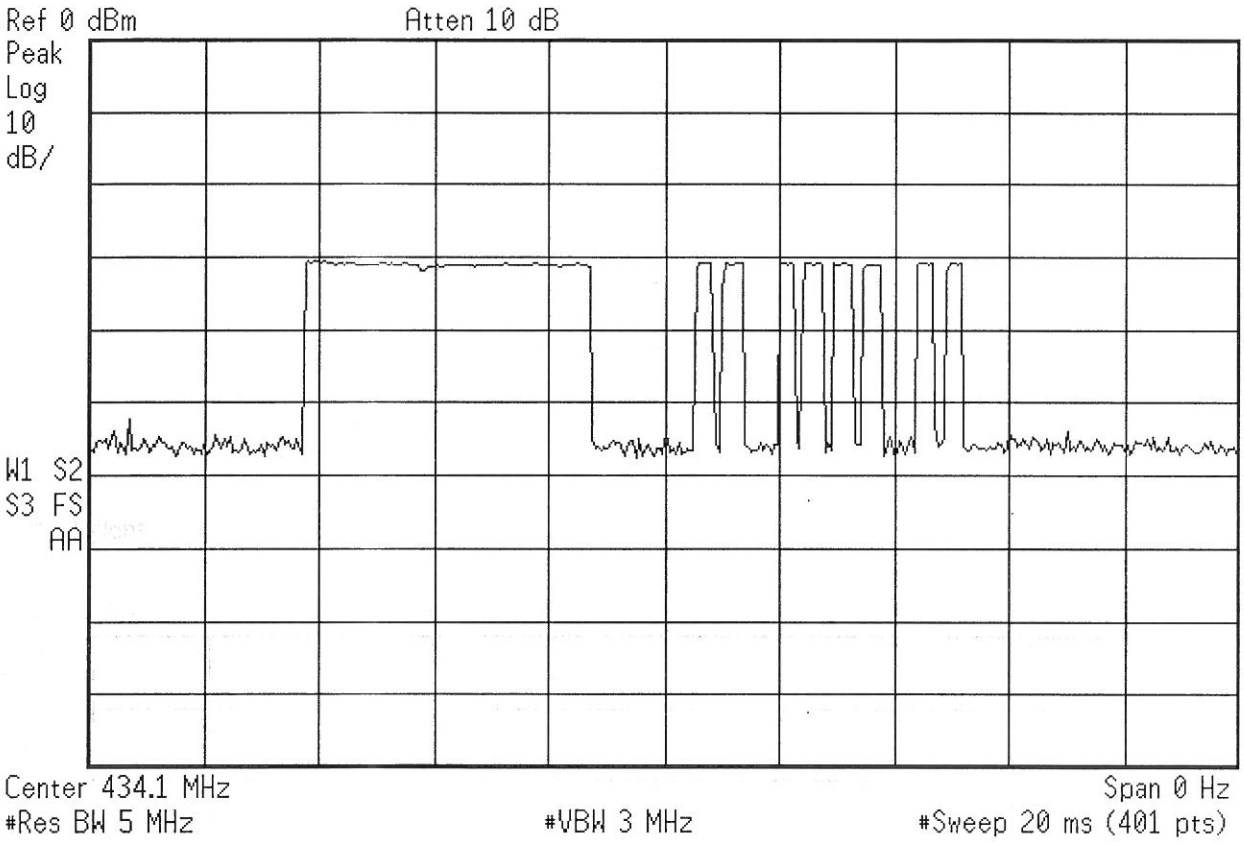
Customer:	Techsonic Industries
Test Sample:	433.9 MHz Transmitter (Smartcast)
Model No.:	RF40E
Test Method:	Paragraph 4.1.10 Duty Cycle
Notes:	Transmitter smallest pulse measurement= 0.25 mSec x 16= 0.25 mSec

Date: June 6, 2003 Tech: T. Schneider Sheet 4 of 5

Retlif Testing Laboratories

Report No. R-9915-3

Agilent



CONFIDENTIAL

Customer:	Techsonic Industries
Test Sample:	433.9 MHz Transmitter (Smartcast)
Model No.:	RF40E
Test Method:	Paragraph 4.1.10 Duty Cycle
Notes:	Transmitter, Entire pulse on time= (1 x 5.0) + (5 x 0.3) + (1 x 0.25)=6.75 mSec Duty Cycle= on time/ period= 6.75/250=0.27= 2.7 %= Class 3 (<10%)

Date: June 6, 2003 Tech: T. Schneider Sheet 5 of 5

Retlif Testing Laboratories

Report No. R-9915-3

6.6 Radiated Emissions (EIRP), 25 MHz To 4.33 GHz, Receiver

Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the 433.92 MHz Receiver (Smartcast) via radiation from the enclosure and connected cabling in the frequency range of 25 MHz to 4.33 GHz.

Test Limits

The limits shown in the table below were used to determine 433.92 MHz Receiver (Smartcast) compliance:

Frequency Range	Nanowatts
25 MHz - 1000 MHz	2.0
1 GHz - 25 GHz	20.0

Test Setup

The 433.92 MHz Receiver (Smartcast) was configured as shown in the attached photograph. This configuration was based on the test setup shown in Retlif Testing Laboratories Drawing No. R15109A-RE. The test sample was placed on an 1.5 m high wooden test stand above the ground plane of the shielded enclosure for preliminary measurements and the FCC listed OATS for final measurements. The rear of the test sample, including peripherals, was aligned and flush with the rear of the test stand. The test stand was placed directly on the flush mounted turn table. The turn table positions were relative to the test sample as follows: When facing the 433.92 MHz Receiver (Smartcast) the front is at 0°, the rear is at 180°, and the left side is at 270°. The test stand was situated such that the boundary of the test sample was located 3 meters from the measuring antenna.

The 433.92 MHz Receiver (Smartcast) was arranged on the test stand in accordance with the manufacturers instructions. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the test sample. Excess interface cable length was draped over the back edge of the test stand.

If any draped cable extended closer than 40 cm to the conducting ground plane, the excess was bundled in the center in a serpentine fashion using 40 cm lengths to maintain the 40 cm height. If the cable(s) could not be bundled due to bulk, length, or stiffness, they were draped over the back edge of test stand unbundled, but in such a way that all portions of the interface cable remained at least 40 cm from the horizontal conducting ground plane. The AC power cable(s) were draped over the rear edge of the test stand and routed down to the AC mains.

Test Procedure

With the test instrumentation and the 433.92 MHz Receiver (Smartcast) configured as stated above, the following steps were performed in accordance with ETSI EN 300 220-3 V1.1.1(2000-09):

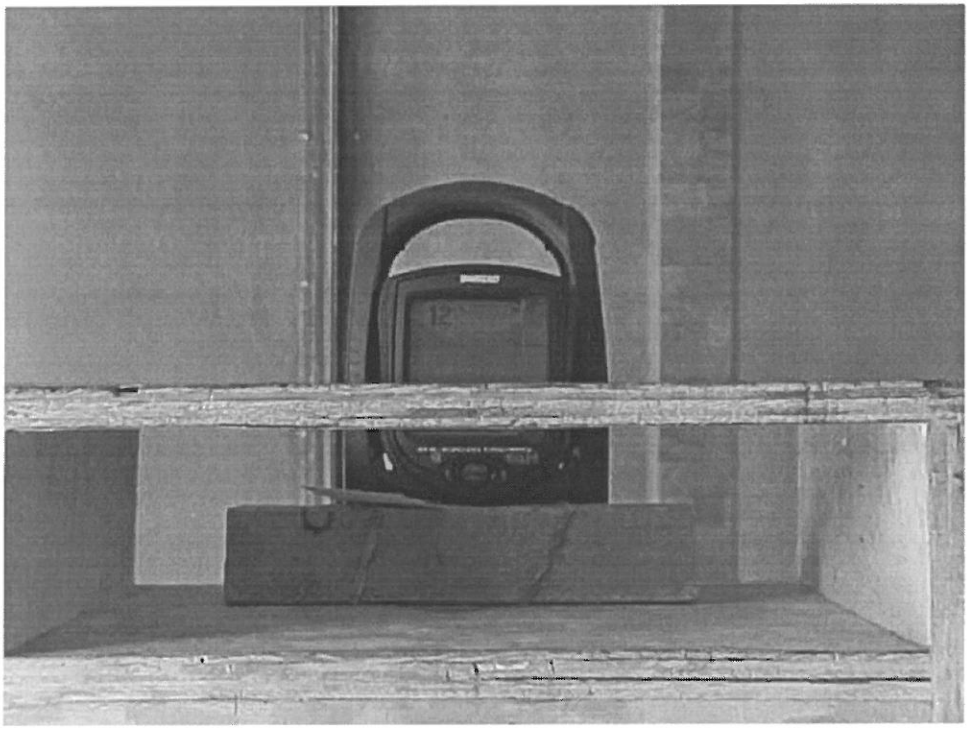
1. The 433.92 MHz Receiver (Smartcast) was arranged with cables terminated as specified in Paragraph 4.2 herein.
2. The spectrum analyzer was configured to display the frequency range of 25 to 80 MHz.
3. With the test antenna vertically polarized, the 433.92 MHz Receiver (Smartcast) cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the 433.92 MHz Receiver (Smartcast) was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. Once the configuration, both cabling and operating mode, which produced maximum emissions was determined the 433.92 MHz Receiver (Smartcast) was maintained in this configuration for the duration of testing.

Test Procedure (con't.)

6. A max hold spectrum analyzer trace, trace A, was obtained with the 433.92 MHz Receiver (Smartcast) operating.
7. The 433.92 MHz Receiver (Smartcast) was powered off and a max hold spectrum analyzer trace, trace B, was obtained to denote the ambient interference levels.
8. The two obtained traces were analyzed in order to determine which recorded emissions were produced by the 433.92 MHz Receiver (Smartcast).
9. At each frequency upon which an emission was determined to be from the 433.92 MHz Receiver (Smartcast) the following steps were performed in order to further maximize the observed emissions:
    a. The test antenna height was varied from 1 to 4 meters.
    b. The test antenna polarization was varied from vertical to horizontal.
    c. The 433.92 MHz Receiver (Smartcast) was rotated 360° about its vertical axis.
10. The test antenna RF cable was connected to the CISPR compliant receiver.
11. For all emissions found to be within 20 dB of the specified limit, the following was recorded on the x-y plot:
    a. Frequency of emission
    b. Peak detector receiver meter reading.
    c. Correction factor consisting of antenna factor, cable loss and pre-amp gain.
    d. Test antenna height and polarization.
    e. Turntable position.
12. For each emission which was measured in steps 3 through 11 above, the following was performed.
    a. The 433.92 MHz Receiver (Smartcast) was replaced by a signal generator and dipole antenna.
    b. Steps 9 through 11 were repeated.
    c. Once maximized the signal generator level changed until the meter reading matched that of the 433.92 MHz Receiver (Smartcast).
    d. The output of the signal generator was recorded.
    e. The level obtained in step d adjusted for any antenna gain./loss.
    f. The effective radiated power was considered to be the result in step e above.
13. Steps 6 through 11 above were repeated for the following frequency ranges: 80 to 130 MHz, 130 to 200 MHz, 200 to 500 MHz, 500 to 750 MHz and 750 MHz to 1 GHz, 1 GHz to 2 GHz and 2 GHz to 4.33 GHz.

Test Results

No emissions which exceeded the specified Effective Radiated Power limits were observed and the 433.92 MHz Receiver (Smartcast) was found to comply with the requirements specified for this method. See the following single data sheet for a full presentation of the results obtained.



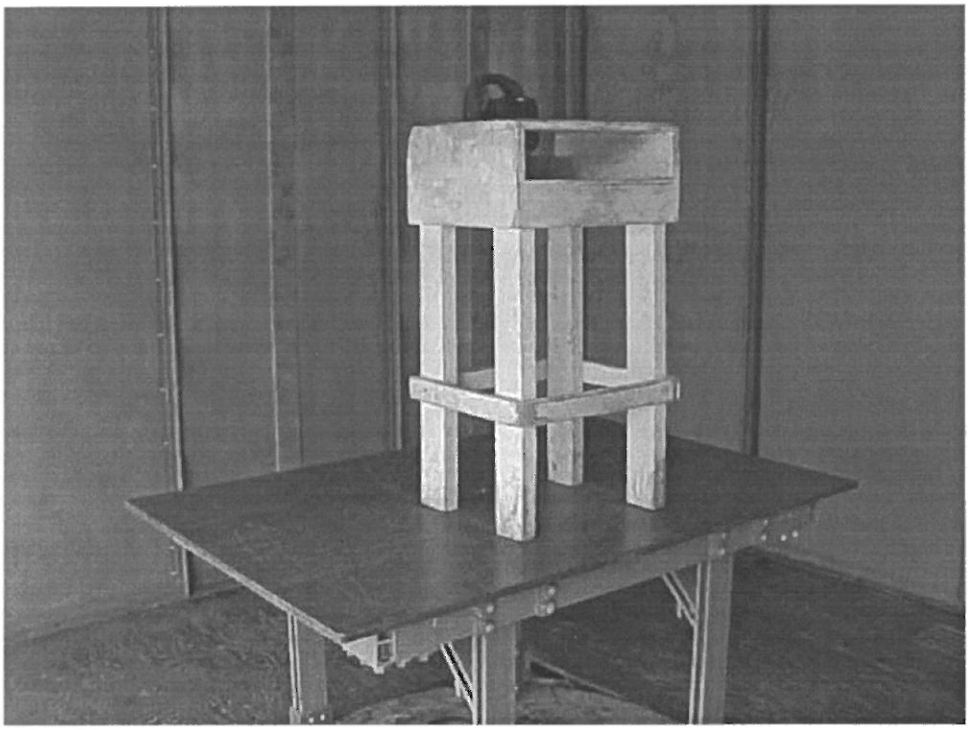
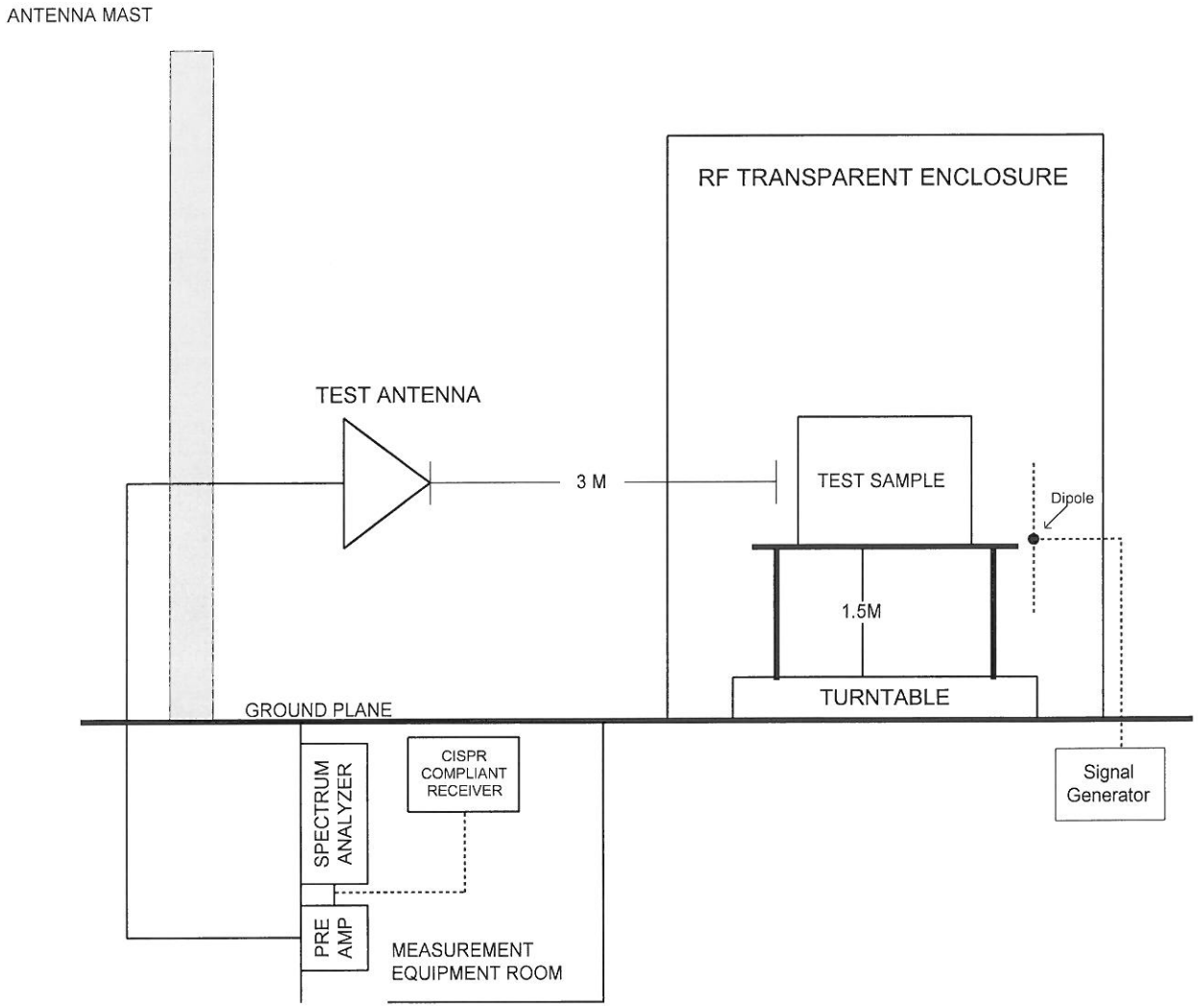


Figure R15109A-RE
Radiated Emissions



Equipment List

ETSI EN 300 220-3 V1.1.1 Paragraph 4.2.1 Spurious Radiations

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	09/20/2000	09/20/2003
128	Double Ridged Guide	Electro-Mechanics	1 GHz - 18 GHz	3105	06/07/2002	06/07/2003
128C	Double Ridge Guide	Eaton Corporation	1 GHz - 18 GHz	96001		
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	06/11/2002	06/11/2003
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	01/23/2003	07/23/2003
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/05/2003	03/05/2004
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	01/23/2003	07/23/2003
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/11/2002	06/11/2003
451A	Tuned Dipole Antenna	Empire Devices	30 - 140 MHz	DM-105-T1	08/08/2000	08/08/2003
451B	Tuned Dipole Antenna	Empire Devices	140 - 400 MHz	DM-105-T2	08/08/2000	08/08/2003
451C	Tuned Dipole Antenna	Empire Devices	400 - 1000 MHz	DM-105-T3	08/08/2000	08/08/2003
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	09/20/2002	09/20/2003
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	07/11/2002	07/11/2003
574	AM/FM Signal Generator	Marconi Instru.	9 kHz - 2.4 GHz	2024	07/22/2002	07/22/2003
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	08/23/2002	08/23/2003
767	Biconilog	EMCO	26 - 2000 MHz	3142B	09/03/2002	09/03/2003

Test Method:	ETSI EN 300 220-3 V1.1.1 Paragraph 4.2.1 Spurious Radiations		
Customer:	Techsonic Industries	**Job No.**	R-9915-3
Test Sample:	433.92 MHz ASH Receiver (Smartcast)		
Model Number:	RF10E	**Serial No.**	e
Operating Mode:	Continuously receiving a 433.92 MHz, with a 100 Hz 50% duty cycle pulse-modulated signal.		
Technician:	J. Kabacinski	**Date:**	May 29th, 2003
Test Distance:	3 Meters	**Temperature:** 23.0°C	
Detector Function:	Peak	**Humidity:** 52.0%	

Frequency	Antenna Position	Orientation	Meter Readings	Signal Generator	Gain Above Isotropic	ERP	Converted Readings	Limit
MHz	(V/H)/Meters	Degrees	dBµV	dBm	dBi	dBm	nW	nW
25								2
183.5	V / 1.8	90	35.4	-71.2	+2.2	-69.0	0.1	
183.5	H / 3.0	90	32.7	-74.3	+2.2	-72.1	0.1	
1000								2
1000								20
4000								20

	The EUT was placed on a tabletop, and the radiated output level was measured with a biconilog antenna.
	After the level was maximized, the EUT was replaced with a tuned dipole antenna and a signal generator.
	The level of the generator was raised until it matched the recorded from the EUT and this plus the antenna gain
	was considered the output power.

CONFIDENTIAL

Appendix A
Operators Guide

Thank You!

531534-1_A

Thank you for purchasing a SmartCast wireless fishfinder from Humminbird, America's #1 Manufacturer of quality consumer marine electronics.

With this purchase you should have:

- One Remote Sonar Sensor - RSS™ - Channel A
- SmartCast Portable Base and Display
- Hardware
- SmartCast Operations Manual

If any of these components are missing or are not included, please contact our Customer Resource Center at 1-334-687-0503.

Using the SmartCast

The SmartCast is a first-of-its-kind wireless fishfinder that is incredibly easy to use. Simply attach the Remote Sonar Sensor (RSS) to the end of your fishing line and cast it into the water as you would a normal float or lure. Then power on the SmartCast Base display and you are ready to fish. The SmartCast system uses sonar technology to send sound waves from the RSS into the water. The returned "echoes" are transmitted with wireless technology to the display unit and plotted on the LCD. New information appears on the right. As this information moves to the left a very accurate picture of the underwater world is created, including the depth of underwater objects such as the bottom, fish, and structures.

***WARNING!** The electronic parts in the Remote Sonar Sensor (RSS) are made to withstand use when casting into water. Because shock from abrupt contact with rocks can damage your RSS, we recommend using your RSS in water deeper than 1 foot only.*

Operational Modes

The RSS can be used in two distinct ways.

Sonar Graph: The RSS can be used to create a sonar graph of the bottom. Cast the RSS into the water beyond an area of interest. Retrieving the RSS slowly and steadily will produce a screen detailing structure, fish and bottom detail. Rhythmic wave action and rocking may cause the display of a rippled bottom.

Stationary Float: The RSS can be used as a float in a stationary location to monitor the area below, giving you a live update as fish approach your bait.

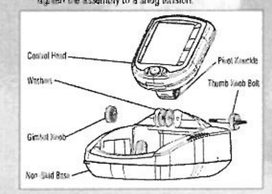
SmartCast Portable Case Assembly

The following step-by-step procedures for portable case assembly tasks must be performed in order:

1. Attaching the control head
2. Installing the batteries

Attaching the Control Head

1. Remove the thumb knob bolt, gimbal knob, and rubber washers from the hardware bag.
2. Place the rubber washers between the control head's pivot knuckle and the arms from the portable case. Make sure that the control head screen is facing the case cavity and away from the battery compartment.
3. Slide the pivot bolt through the side with the smaller hole (¼") and screw the gimbal knob onto it using only 2-3 turns. The gimbal knob may have two alignment pins that will seat into holes in the case arm holding the SmartCast control head. Make sure these pins are seated and then tighten the assembly to a snug tension.



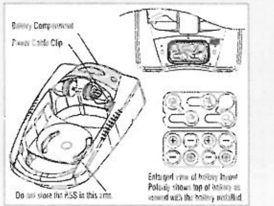
Installing the Batteries in the SmartCast Portable Case

1. With a #2 Phillips screwdriver, remove both screws located on either side of the battery door.
2. Insert the 8 "AA" batteries (not included) into the case as shown on the diagram inside the battery compartment.

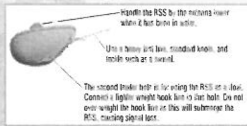
***NOTE:** It is recommended that only high-quality 1.5 volt alkaline batteries be used.*

SMARTCAST
WIRELESS FISHFINDERS

3. Before reattaching the battery door, make sure the silicon gasket is still in place. It should be just above the plastic, and completely in the gasket channel. Make sure that the gasket is clean of debris.



4. Reattach the battery door to the case using a #2 Phillips screwdriver. Partially insert one screw and then the other. Fully seat the screws. Hand tighten only; please do not use power tools. Finally, plug in the power cable to the RF10.
5. Under normal use you should expect the life of the batteries to last from 50 hours with the LCD backlight(s) on, to 120 hours with the backlight(s) off.



Attaching the RSS

The line coming from your reel can be tied off to the front hole in the RSS. If you wish to also use the RSS as a conventional float, use the second hole to attach your hook using a lighter weight line. A snag will break the lighter line if you have to break free. Slip line techniques are not recommended because of the higher risk of losing the RSS. If you do use the slip line method, use a lighter weight line after the lower stop, enabling retrieval of the RSS if the lower line with hook breaks away.

CAUTION: You will increase the possibility of breaking your line if you use light test pound line on your reel. The RSS is positively buoyant (is buoyant under its own weight plus 0.2 ounces of bait and weight.) The maximum amount of weight for any attachment to the RSS is approximately 0.2 ounces (5.67 grams), and includes the combined weight of any hook, line, weight, swivel/snap swivel and bait that is attached to the RSS. The RSS itself weighs 1 ounce, and therefore light test line might break.

Store the RSS in a dry, non-metallic container, such as a tackle box, in a separate compartment, and isolated from any metallic devices.

***WARNING!** The bottom of the RSS should not be hammered during sonar operation, as this may cause physical discomfort and may result in personal injury in the form of tissue damage. Handle the RSS only by the antenna tower when it has been in the water.*

***WARNING!** The RSS (Remote Sonar Sensor) is not intended for use by children younger than 6 years old without adult supervision as the RSS may represent a choking hazard to small children.*

***WARNING!** Handling and/or opening this unit may result in exposure to lead, in the form of solder.*

RSS Power

The Remote Sonar Sensor (RSS) has a separate, non-replaceable Lithium battery that has a shelf life of three years and will last for approximately 400 hours of in-water use. Discard the used RSS in compliance with local laws as you would any electronic component or battery.

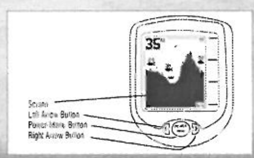
The RSS has contacts that perceive when the device is immersed in the water. These contacts turn on the Sonar Transmitter/Receiver and begin transmitting the sonar information via RF to the display. The RSS automatically stops using power a few seconds after being pulled out of the water.

***WARNING!** Do not place the RSS in a wet area when not in use as this will turn on the RSS and shorten its usable life. Store the RSS in a dry area when not in use to conserve power. Never place the RSS in a wet area of a boat or on a metal surface that could accidentally power it on.*

***NOTE:** If the RSS was used in salt water, rinse it with fresh water before storing it.*

Powering ON and OFF

To turn on the display, press and release the POWER-MENU button. Press and hold POWER-MENU until the display unit shuts down to power off.



Start-Up in Fishing Mode

START-UP MODE ◄ START-UP ►

After pushing the POWER-MENU button to turn on the unit, you will see the Start-Up screen.

The Start-Up screen will disappear automatically after two seconds have passed, without further action from you. In Fishing mode, the screen will either display Waiting for Sonar or Received Sonar.

When you have powered on the unit and have cast the RSS into the water, returned sonar data will start to be displayed on the LCD. See Understanding the On-Screen Images for more information.

Start-Up in Simulator Mode

START-UP MODE ◄ SIMULATOR ►

After pushing the POWER-MENU button to turn on the unit, and the (Start-Up screen is displayed, quickly press the Right Cursor Button to enter Simulator mode. Once you are in Simulator mode, the screen will show Simulate, and after two seconds, the screen will start to display simulated data. To exit Simulator mode, you must power down the unit.

Start-Up in Set-Up Mode

START-UP MODE ◄ SET-UP

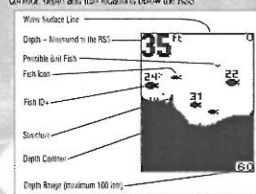
Your RF10 comes with a Set-Up mode to allow you to choose the units of depth (Meters, Feet or Fathoms). After pushing the POWER-MENU button to turn on the unit, and the Start-Up screen is displayed, quickly press the Right Cursor Button twice to enter Set-Up mode.

UNITS FEET ►

Within a few seconds, the screen will change to display the Units menu, which defaults to Feet or Meters, depending on your model number. By pressing the Right Cursor Button, you can choose Feet, Meters or Fathoms. You must power down the unit to save your selection, then power it back on again to enter normal Fishing mode.

Understanding the On-Screen Images

The SmartCast displays received underwater sonar information in an easy to understand format. The top of the display corresponds to the water surface, and the bottom of the display corresponds to the selected Depth Range (see Depth Range). The display varies as the area under the RSS changes. Reeling in the RSS at a slow and steady rate will allow you to graph the bottom for structure, detail and fish. Digital readouts provide precise information for bottom contour, depth and fish locations below the RSS.

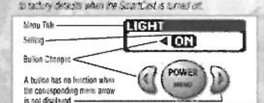


If you are using SmartCast to graph an area, terrain and bottom composition variations are displayed on-screen. Fish and bait fish are displayed when detected. Underwater conditions vary greatly, so some experience and interpretation is needed to realize all the benefits of the SmartCast – use the picture above as a guide to the most common conditions and practice using the SmartCast over known bottom types.

Menu Features

A simple menu system accesses the adjustable features of the SmartCast. To activate the menu system, press the POWER-MENU button; the first time you do this after power up, the Sensitivity menu will appear. Once the SmartCast has been powered on, pressing the POWER-MENU button will display the last menu viewed. Press POWER-MENU repeatedly to access other SmartCast menu choices, one at a time. When a menu choice is on the display, use the RIGHT and LEFT Cursor buttons to adjust the menu settings. Menus are automatically removed from the screen after several seconds.

***NOTE:** Menu settings are not saved in memory. All settings return to factory defaults when the SmartCast is turned off.*



Light

LIGHT ◄ ON

Press POWER-MENU until the LIGHT menu appears. Select either OFF or ON to activate the backlight. Default = OFF

***NOTE:** Continuous backlight operation significantly decreases the SmartCast's battery life by as much as 50%.*

Sensitivity

SENSITIVITY 3

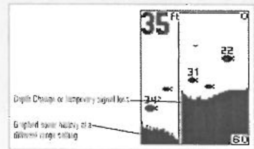
Press POWER-MENU until the Sensitivity menu appears. Select a higher number to show smaller sonar returns on-screen, or a lower number to remove clutter from the screen. Adjusting Sensitivity also affects how sonar returns not attached to the bottom are identified as Fish ID Symbols. Larger returns will be shown as fish at a lower setting. Increasing Sensitivity selects smaller returns to be identified as fish. Sensitivity settings range from 1 to 5. Default = 3

Depth Range

DEPTH RANGE ◄ 60 Ft ►

Press POWER-MENU until the Depth Range menu appears. Select AUTO to have the SmartCast automatically set the Depth Range. Select 10, 15, 20, 30, 60 or 100 feet to set a manual depth range. This locks the depth range to a specific setting. Default = AUTO

***NOTE:** In manual operation, if the water depth is greater than the depth range setting, the bottom will not be visible on-screen. Select AUTO to return to automatic operation.*



Depth Scale changes or signal loss will cause lines with missing detail and/or abrupt changes in the graphed bottom. When the Depth range is set to AUTO, the depth is set to keep the bottom in the lower third of the screen. The screen image jump shown here is due to an automatic change in depth. New returns graphed at a different scale will not match up with the historic data already graphed at a higher or lower scale. Vertical lines can also occur as the radio signal from the RSS is lost and then regained in rough water conditions.

Channel

CHANNEL A ►

Press POWER-MENU until the CHANNEL menu appears. Select either A or B to match your RSS. See Channel A and B RSS Units. Default = Channel A

Bottom Black

BOTTOM BLACK ◄ ON

Press POWER-MENU until the BOTTOM BLACK menu appears. Select OFF to gain bottom hardness information by viewing second returns. For a high contrast display that is easy to view from a distance, leave the view setting on Bottom Black. Default = ON

Fish Alarm

FISH ALARM

Press POWER-MENU until the FISH ALARM menu appears. Select OFF for no fish alarm, or one of the following symbols to set the alarm point and turn it on. Default = OFF

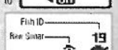
- Alarms on big fish only
- Alarms on big and medium fish only
- Alarms on all fish

Fish ID+ must be set to ON for Fish Alarm to work.

Fish ID+

FISH ID+ ◄ ON

Press POWER-MENU until the FISH ID+ menu appears. Select either OFF to view "raw" sonar returns, or ON to take advantage of SmartCast's ability to identify sonar returns that are determined to be fish. The sensitivity setting also affects the definition of sonar returns as fish (see Sensitivity). Some fish symbols will show the depth of the fish above the fish symbol. Fish Alarm does not sound if Fish ID+ is turned off. Default = ON



Channel A and B RSS Units

There are two versions of the RSS that are available at your local tackle dealer, major outdoor retailers, or at the website **www.humminbird.com**: Channel A and Channel B.

The Channel A RSS unit (RF40A) comes standard with your SmartCast product. You also have the option to purchase additional Channel A or Channel B RSS. When using the A or B version of the RSS, make sure to select the appropriate channel in the CHANNEL menu.

The A&B Channel Option gives you the flexibility to use a different type of RSS than the one you are currently using if another angler is using a SmartCast product within 100 feet of your SmartCast. If you have a Channel B RSS, you will need to set the channel to B each time you power up the SmartCast. Two Channel A or two Channel B RSS units in the water within 100 feet of the display will cause RF interference that prevents the product from functioning properly, resulting in fluctuating depth readings and excessive clutter on the screen. If you use a Channel B RSS while another angler is using an Channel A RSS or vice versa, the interference will be reduced but not completely eliminated.

***NOTE:** RSS units, regardless of Channel, either in close proximity to each other or to other sonar devices (closer than 40 feet) can also experience or cause sonar interference, which may result in erratic depth readings.*

Maintenance

Your SmartCast is designed to provide years of trouble-free operation with virtually no maintenance. Follow these simple procedures to ensure your SmartCast continues to deliver top performance.

After using the RSS in salt water, wipe the affected surfaces with a cloth dampened with fresh water. The RSS Wet Switch™ pins must be rinsed with fresh water after exposure to salt water to prevent corrosion.

If the SmartCast comes into contact with salt spray, wipe the affected surfaces with a cloth dampened with fresh water. When cleaning the LCD protective lens, use a chamois and non-abrasive, mild cleaner. Do not wipe while dirt or grease is on the lens. Be careful to avoid scratching the lens. Do not use a chemical glass cleaner on the lens, as this may cause it to crack.

If your RSS remains out of the water for a long period of time, it may take some time to wet it when returned to the water. Small air bubbles can cling to the surface of the RSS and interfere with proper operation. Wipe the face of the RSS with a wet cloth to remove them.

> If sonar performance becomes weak (i.e., there are bottom gaps or "0" depth readings) the bottom of the RSS needs to be cleaned with a drop or two of a 5 to 10 percent solution of liquid dishwashing detergent and water. Use approximately one tablespoon detergent to 8 ounces of water to remove oils from the face of the RSS, then wipe with a damp cloth.

Never leave the SmartCast product in a closed car or trunk - the extremely high temperatures generated in hot weather can damage the electronics.

Replacement Battery Power Cables

You will not have to install the battery power cable before first use, but may need to replace it should it become corroded after prolonged usage in a marine environment. Order replacement cables at **www.humminbird.com**

Troubleshooting

Do not attempt to repair the SmartCast or RSS yourself. There are no user serviceable parts inside, and special tools and techniques are required for assembly to ensure the waterproof integrity of the housings. Repairs should be performed only by authorized Humminbird technicians.

Many requests for repair received by Humminbird involve units that do not actually need repair. These units are returned "no problem found." If you have a problem with your SmartCast, use the following troubleshooting guide before calling the Customer Resource Center or sending your unit in for repair.

***NOTE:** Retrieving the RSS too rapidly, or the repetitive rocking motion of rough water, can result in loss or distortion of the bottom picture. This will cause intermittent screen display. For best bottom detail, perform a smooth and slow retrieve with consistent speed and the rod tip up (holding the rod tip low or using a heavy line may cause the RSS to submerge and momentarily lose radio contact). The RSS has a maximum forward range of 100 feet (30 meters). If the unit is cast or drifts more than 100 feet away from the receiver, the signal may be intermittent or lost. Raising the SmartCast slightly above ground level will also increase signal reception.*

1. The SmartCast loses signal.

If the SmartCast is not able to get an RF signal from the RSS, the display will stop updating (the screen will freeze) and the SmartCast screen will be displayed after several seconds. Whenever reception is lost or the RSS emerges from the water for more than a few seconds, the SmartCast screen will be displayed until the RSS is placed back in the water and reception is regained.

- The SmartCast system is a line-of-sight wireless product. If objects are placed between the RSS and the SmartCast, the reception may be lost.
- The SmartCast depth range is 2 to 100 feet (0.6 to 30 meters). Erratic readings may occur in water that is shallower than 2 feet. In addition, because of the nature of sonar, this product is not intended for use in swimming pools or small enclosed bodies of water.
- Reeling the RSS too fast can cause loss of signal and the screen will freeze.
- Check the buoyant balance between the RSS and your tackle; over 0.2 ounce will submerge the RSS, causing signal loss.
- The SmartCast may not obtain its maximum RF distance of 100 feet unless the water is smooth. Waves or chop may reduce the RF range significantly.

2. Nothing happens when I turn the SmartCast on.

Check the power cable connection at both ends. Check the power connection to the SmartCast. It is possible to force the power cable connector into the cable holder incorrectly. If the connector is reversed, the unit will not work. Examine the contacts on the back of the unit to ensure there is no corrosion. Confirm that your batteries are good and properly installed.

3. When in very shallow water, I get gaps in the bottom reading and inconsistent digital depth indication.

The SmartCast will work reliably in water 2 feet (0.6 meters) or deeper. The depth is measured from the RSS. A transmitter (RSS) to receiver (SmartCast) distance of greater than 100' may cause intermittent screen display. Excessively rough water may cause the RSS to submerge, again losing contact.

Be sure to include the RSS if returning the unit for repair.

4. The screen begins to fade out. Images are not as sharp as normal.

Check the battery voltage. The SmartCast will not operate on voltages below 8 VDC. Use 1.5 volt alkaline "AA" batteries.

If this doesn't help, replace the battery. After replacing the battery, if the unit still has a faded screen, remove the battery again and re-install.

5. The display shows many black dots at high sensitivity settings.

You are seeing noise or interference caused by one of several sources. Noise can be caused by other electronic devices. Turn off any nearby electronics and see if the problem goes away. Other sonar devices or any electronic device operating in the 916 mHz range (433 mHz range for European models) could cause interference with your SmartCast.

6. The display shows fluctuating depth readings and excessive clutter, including vertical bars that may be drawn on top of fish icons.

The SmartCast system comes with the capability to receive separate signals from Channel A RSS or a Channel B RSS. Two A- or B-type RSS units used simultaneously, as well as one A- and one B-type RSS unit used simultaneously, can cause RF interference between each other.

7. The screen jumps and the bottom has an abrupt change; sometimes a vertical line is missing or a black line from top to bottom is displayed.

This screen image jump is due to an automatic change in depth. New returns graphed at a different scale will not match up with the historic data already graphed at a higher or lower scale. Vertical lines can also occur as the radio signal from the RSS is lost and then regained in rough water conditions.

Techsonic Industries' 1-Year Limited Warranty

We warrant to the original retail purchaser that Techsonic Industries products have been manufactured free from defects in materials and workmanship. This warranty is effective for one year from the date of original retail purchase, excepting that where Techsonic Industries products are used commercially or in any rental or other income producing activity, then this warranty is limited to ninety days from the date of original purchase for mechanical and electrical products.

We will provide replacement product without charge for any Techsonic Industries product not covered by this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such products were purchased, or to us at the appropriate address. In any such case, Techsonic Industries products found to be defective and covered by this warranty will be replaced or repaired at Techsonic Industries' option, and returned to the customer.

Techsonic Industries' sole responsibility under this warranty is limited to the repair or replacement of product which is, in Techsonic Industries' opinion, defective. Techsonic Industries is not responsible for charges connected with the removal of such product or reinstallation of replacement or repaired parts.

We will have no obligations under this warranty for any product which has been:

- improperly installed;
- used in an installation other than as recommended in our installation or operation instructions or specifications;
- damaged or has failed due to an accident or abnormal operation including racing, misuse or alterations outside our factory;
- repaired or modified by entities other than Techsonic Industries;
- used on an engine/boat combination where the engine horsepower exceeds the rating established by the boat manufacturer;
- used with other product(s) which, in Techsonic Industries' opinion, are incompatible with the Techsonic Industries product.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES ON THE PART OF TECHSONIC INDUSTRIES AND WILL BE THE CUSTOMER'S EXCLUSIVE REMEDY EXCEPT FOR ANY APPLICABLE IMPLIED WARRANTIES UNDER STATE LAW WHICH ARE HEREBY LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL PURCHASE. IN NO EVENT WILL TECHSONIC INDUSTRIES BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY RELATING TO THE PRODUCTS.

Some states do not allow limitations on an implied warranty, or the exclusion of incidental or consequential damages, so the above exclusions may not apply to you. You may also have other rights which vary from state to state.

You must contact our Customer Resource Center to receive a repair authorization number before sending your SmartCast or RSS to our factory for service. This authorization number should be included on the shipping label when returned to our factory. In addition, a letter describing the problem you are experiencing, along with your name, address and daytime telephone number must be included, so that we can contact you about your repair if necessary.

International Purchases

A separate warranty is provided by international distributors for units purchased outside the United States. This warranty is included by your local distributor and this distributor maintains local service for your unit. Warranties are only valid in the area of intended distribution. Units purchased in the United States or Canada must be returned to our factory in the United States for service.

***WARNING!** This product is approved for use only in the United States, Canada and Australia. Use in any other country may violate local communications regulations.*

SERVICE POLICY

This Service Policy is valid in the United States only. This applies to Humminbird units returned to our factory in Eufaula, Alabama, and is subject to change without notice.

All repair work is performed by factory-trained technicians to meet exacting factory specifications. Factory serviced units go through the same rigorous testing and quality control inspection as new production units.

Even though you'll probably never need to take advantage of our incredible service guarantee, it's good to know that we back our units this well. We do it because you deserve the best. We will make every effort to repair your unit within three working days from the receipt of your unit. This does not include shipping time to and from our factory. Units received on Friday are usually shipped by Wednesday, units received Monday are usually shipped by Thursday, etc.

We reserve the right to deem any product unserviceable when replacement parts are no longer reasonably available or impossible to obtain.

After the original warranty period, a standard flat rate service charge will be assessed for each repair (physical damage and missing parts are not included). Please call our Customer Resource Center to verify the service charge for your unit.

If charges are not prepaid, the unit will be returned C.O.D. If you are experiencing problems related to bottom or depth readings, please send your RSS (Remote Sonar Sensor) along with your SmartCast Portable base and display when sending for repair.

***WARNING!** Disassembly and repair of this electronic unit should only be performed by authorized service personnel. Any modification of the serial number or attempt to repair the original equipment or accessories by unauthorized individuals will void the warranty.*

> **FCC ID: ICLSMC1**
>
> **Techsonic Industries**
>
> 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.
>
> ***CAUTION:** Changes or modifications not expressly approved by Techsonic Industries could void the user's authority to operate the device.*

Contact Humminbird

Your Humminbird accessory is designed for trouble-free operation and is backed by a one year warranty.
If you have any questions, contact our

Humminbird Customer Resource Center:

By Telephone
(Monday - Friday 8:00 a.m. to 4:30 p.m. Central Standard Time):
334-687-0503

By e-mail
(typically we respond to your e-mail within three business days): custserv@techsonic.com

For direct shipping, our address is:
Techsonic Industries, Inc.
Service Department
108 Maple Lane
Eufaula, AL 36027 USA

HUMMINBIRD.

SPECIFICATIONS

Power Requirement	Eight AA 1.5 Volt Alkaline batteries (not included); One non-replaceable Lithium RSS Battery
Display Type	STN
Depth Capability	2 - 100 feet (0.6 - 30 meters)
Sonar Coverage	90° @ -10 dB*
Sonar Operating Frequency	115 kHz
Operational Wireless Frequency	916.5 mHz (433.92 mHz for European models)
Operational Range	100 feet (30 meters)
CE Approval	European models are CE-approved.

*Area of bottom coverage equals twice the current depth

WARNING! *This product contains lead, a chemical known to the State of California to cause cancer and birth defects and other reproductive harm.*

CONFIDENTIAL

Merci !

Merci d'avoir choisi le détecteur de poissons sans fil SmartCast de Humminbird, premier fabricant américain en électronique grand public de qualité spécialisé en systèmes marins.

Cet achat se compose des éléments suivants :

- Un capteur sonar à distance (Remote Sonar Sensor - RSS) - Canal A
- Une base et affichage portable SmartCast
- La quincaillerie
- Le guide d'utilisation du SmartCast

Si l'un de ces éléments est manquant ou non inclus, contactez notre Centre de ressources pour la clientèle au 1-334-687-0503.

Utilisation du SmartCast

Premier détecteur de poissons sans fil de sa catégorie, le SmartCast est d'une extrême simplicité d'utilisation. Fixez simplement le RSS à l'extrémité de votre ligne et lancez-le dans l'eau comme un flotteur ou un leurre classique. Mettez ensuite sous tension l'affichage de base SmartCast et vous êtes prêt à pêcher. Le système SmartCast utilise la technologie sonar pour transmettre dans l'eau les ondes sonores issues du RSS. Les échos renvoyés sont tracés sur l'écran LCD. Les nouvelles informations s'affichent sur la droite. A mesure que ces informations se déplacent vers la gauche, une image très précise du monde subaquatique se dessine comme la profondeur d'objets subaquatiques comme le fond, les poissons et les structures.

AVERTISSEMENT ! *Les composants électroniques du RSS sont faits pour supporter une utilisation dans l'eau. Du fait que des chocs liés à un contact brusque avec des pierres peuvent endommager votre capteur RSS, nous vous recommandons d'utiliser celui-ci dans une eau dont la profondeur atteint au minimum 50 cm.*

Modes de fonctionnement

Vous pouvez utiliser le RSS de deux manières :

Relevé sonar : Le RSS peut servir à créer un relevé sonar du fond. Lancez le RSS dans l'eau au-delà de la zone qui vous intéresse. En récupérant le RSS lentement et sans à-coups, vous obtiendrez un affichage reflétant les structures, les poissons et les détails du fond. L'ondulation régulière des vagues et le tangage peuvent produire un fond ridé.

Flotteur fixe : Vous pouvez utiliser le RSS comme un flotteur fixe pour observer la zone au-dessous, pour savoir en temps réel quand le poisson s'approche de l'appât.

Installation de la mallette de transport SmartCast

Les procédures étape par étape pour l'installation de la mallette de transport doivent être effectuées dans l'ordre établi ci-dessous :

1. Installation de la tête de commande
2. Insertion des piles.

Installation de la tête de commande

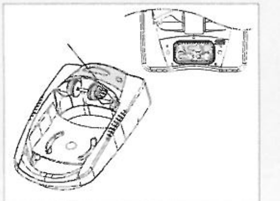
1. Retirez le boulon à oreilles, la suspension à la cardan et les rondelles en plastique du sac à quincaillerie.
2. Placez les rondelles en plastique entre le joint d'articulation de la tête de commande et les bras de la mallette de transport. Assurez-vous que l'écran de la tête de commande fait face au creux de la mallette, à l'opposé du compartiment à piles.
3. Faites glisser le boulon pivot par le côté avec le trou de taille (intérieure (¼") et vissez-y la suspension à la cardan avec 2 à 3 tours seulement. La suspension à la cardan peut avoir deux chevilles de positionnement qui devraient s'insérer dans le bras de la mallette supportant la tête de commande SmartCast. Assurez-vous que ces chevilles de positionnement sont insérées correctement et serrez l'ensemble jusqu'à la tension nécessaire.

Installation des piles dans la mallette portable SmartCast

1. Retirez les deux vis situées de chaque côté du couvercle du compartiment à pile avec un tournevis Philips N° 2.
2. Insérez les 8 piles AA (vendues séparément) dans le compartiment selon le diagramme à l'intérieur du compartiment à piles.

REMARQUE : *Nous vous recommandons de n'utiliser que des piles alcalines de 1,5 V de qualité supérieure.*

3. Avant de remettre le couvercle du compartiment à pile, vérifiez que le joint d'étanchéité en silicone est toujours en place. Il devrait se trouver directement au-dessus du plastique, entièrement dans la rainure. Vérifiez que le joint est exempt de poussière.



4. Réinstallez le couvercle du compartiment à pile avec un tournevis Philips N° 2. Insérez partiellement les vis l'une après l'autre. Amenez les vis en butée et serrez à la main uniquement, n'utilisez pas d'outils électriques. Finalement, connectez le câble d'alimentation au RF10.
5. En utilisation normale, la durée de vie moyenne des piles varie de 50 heures, avec le rétroéclairage LCD allumé, à 120 heures, avec le rétroéclairage LCD éteint.

Fixation du RSS

Vous pouvez fixer la ligne qui vient de votre moulinet au trou avant du capteur RSS. Si vous souhaitez vous servir également du RSS comme d'un flotteur classique, utilisez le second trou pour fixer l'hameçon avec un bas de ligne plus fin. Une secousse suffira pour casser la ligne fine et vous libérer si vous êtes accroché. Les techniques de flotteur coulissant sont déconseillées car elles augmentent le risque de perdre le RSS. Si vous les utilisez, prévoyez un fil plus fin après la butée inférieure, pour pouvoir récupérer le RSS si le bas de ligne portant l'hameçon se casse.

MISE EN GARDE : *[illegible]*

[illegible]

AVERTISSEMENT ! *[illegible]*

AVERTISSEMENT ! *[illegible]*

AVERTISSEMENT ! *[illegible]*

Alimentation du RSS

Le RSS contient une pile au lithium indépendante, non remplaçable, dont la durée de vie hors utilisation est de trois ans et l'autonomie dans l'eau de 400 heures environ. Débarrassez-vous du RSS usagé conformément aux réglementations locales, comme pour tout autre composant électronique ou pile. Le RSS comporte des contacts qui détectent quand l'appareil est immergé. Ces contacts mettent sous tension le transmetteur/récepteur sonar et commencent à transmettre les informations à l'affichage par radiofréquences. Le RSS s'arrête automatiquement quelques secondes après avoir été retiré de l'eau.

AVERTISSEMENT ! *[illegible]*

REMARQUE : *[illegible]*

Mise en marche et arrêt de l'affichage

Pour allumer l'écran, tenez enfoncé et relâchez le bouton MARCHE-MENU jusqu'à ce que vous entendiez un bip, puis relâchez le bouton. Pour éteindre l'écran, tenez le même bouton enfoncé jusqu'à ce que l'affichage de l'appareil s'éteigne.

Démarrage en mode Pêche

START-UP MODE / START-UP

Après avoir mis l'appareil sous tension en appuyant sur le bouton MARCHE-MENU, vous obtenez l'écran de démarrage.

Cet écran disparaît automatiquement au bout de deux secondes, sans intervention de votre part. Dans le mode Pêche, l'écran affichera soit En Attente du sonar (Waiting for Sonar) ou soit Sonar reçu (Received Sonar).

Après avoir mis en marche l'appareil et lancé le RSS dans l'eau, les données de sonar renvoyées commencent à s'afficher sur l'écran LCD. Pour plus d'information, consultez la section Interprétation des images affichées.

Démarrage en mode Simulateur

START-UP MODE / SIMULATOR

Après avoir appuyé sur le bouton MARCHE-MENU pour allumer l'appareil, quand l'écran de démarrage est affiché, appuyez rapidement sur le bouton de curseur droit pour activer le mode Simulateur. Dans ce mode, l'écran affiche Simuler (Simulate) et commence à afficher les données simulées au bout de deux secondes. Pour quitter le mode Simulateur, éteignez l'appareil.

Démarrage en mode Configuration

START-UP MODE / SET-UP

Votre RF10 comprend un mode de Configuration qui vous permet de choisir les unités de profondeur (Mètres, Pieds, Brasses). Après avoir appuyé sur le bouton MARCHE-MENU pour allumer l'appareil, quand l'écran de démarrage est affiché, appuyez rapidement sur le bouton de curseur droit deux fois pour activer le mode Simulateur.

UNITS / FEET

En quelques secondes, l'écran changera pour afficher le menu des Unités qui reviendra par défaut au Pieds ou Mètres, selon le numéro de votre modèle. En appuyant sur le bouton de curseur droit, vous pouvez choisir Pieds, Mètres ou Brasses. Vous devez éteindre l'appareil pour sauvegarder votre sélection et ensuite le rallumer pour obtenir le mode de Pêche normal.

Interprétation des images affichées

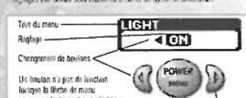
Le SmartCast affiche les informations subaquatiques reçues par le sonar, dans un format simple à comprendre. Le haut de l'affichage correspond à la surface de l'eau et la partie inférieure à l'échelle de profondeur sélectionnée (voir Échelle de profondeur). L'affichage varie quand la zone située sous le RSS change. En récupérant le RSS lentement et sans à-coups, l'écran reflète les structures, les poissons et les détails du fond. L'affichage numérique fournit des informations précises sur le couleur du fond, la profondeur et les zones de poissons sous le RSS.

Si vous utilisez le SmartCast pour représenter une zone graphiquement, les variations de terrain et de composition du fond s'affichent à l'écran. Les poissons et les poissons appâts s'affichent lorsqu'ils sont détectés. Les conditions subaquatiques varient considérablement, et il faut une certaine expérience et une interprétation pour comprendre tous les avantages du SmartCast - Utilisez l'image ci-dessus comme guide des conditions les plus courantes et exercez-vous à utiliser le SmartCast avec des types de fond connus.

Fonctions de menu

Un système de menus très simple permet d'accéder aux réglages de l'affichage du SmartCast. Pour activer le système de menus, appuyez sur le bouton MARCHE-MENU, la première fois que vous appuyez sur ce bouton après la mise sous tension, le menu Sensibilité apparaît. Une fois l'appareil sous tension, une pression sur le bouton MARCHE-MENU affiche le dernier menu visualisé. Appuyez plusieurs fois sur MARCHE-MENU pour accéder aux autres options de menu SmartCast (une par une). Lorsqu'une option de menu est affichée, utilisez les boutons de déplacement de curseur DROIT et GAUCHE pour ajuster les réglages de menu. Les menus disparaissent automatiquement de l'écran au bout de quelques secondes.

REMARQUE : *Les réglages de menu ne sont pas mémorisés. Tous les réglages par défaut sont restaurés à l'arrêt du système SmartCast.*



Éclairage

LIGHT / ON

Appuyez sur MARCHE-MENU jusqu'à ce que le menu ÉCLAIRAGE (LIGHT) apparaisse. Sélectionnez DÉSACTIVÉ (OFF) ou ACTIVÉ (ON) pour mettre en marche ou éteindre le rétroéclairage. Par défaut = OFF

REMARQUE : *L'utilisation prolongée et continue du rétroéclairage peut réduire la durée de vie de la pile du SmartCast jusqu'à 60 %.*

Sensibilité

SENSITIVITY

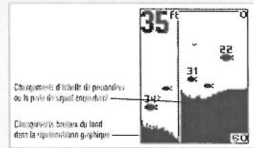
Appuyez sur MARCHE-MENU jusqu'à ce que le menu Sensibilité (Sensitivity) apparaisse. Sélectionnez un nombre plus élevé pour afficher des retours sonar plus faibles ou sélectionnez un nombre inférieur pour éliminer les interférences de l'écran. Le réglage de la sensibilité affecte également la manière dont les retours sonar non liés au fond sont identifiés sous la forme de symboles d'identification de poissons. Des retours plus importants s'afficheront sous la forme de poissons à un réglage inférieur. L'augmentation de la sensibilité sélectionne de plus petits retours identifiés comme des poissons. La plage des réglages de sensibilité va de 1 à 5. Valeur implicite = 3

Échelle de profondeur

DEPTH RANGE / 60 ft

Appuyez sur MARCHE-MENU jusqu'à ce que le menu Échelle de profondeur (Depth Range) apparaisse. Sélectionnez AUTO pour que le SmartCast définisse automatiquement l'échelle de profondeur. Sélectionnez 3, 4.50, 6, 9, 18 ou 30 mètres (10, 15, 20, 30, 60 ou 100 pi) pour définir une échelle de profondeur manuelle. L'échelle de profondeur est alors verrouillée sur un réglage spécifique. Réglage implicite = AUTO

REMARQUE : *En fonctionnement manuel, si la profondeur de l'eau est supérieure au réglage d'échelle de profondeur, le fond n'est pas visible à l'écran. Sélectionnez AUTO pour revenir au fonctionnement automatique.*



Les changements d'échelle de profondeur ou la perte de signal engendrent des lignes avec des détails manquants et/ou des changements brutaux du fond dans la représentation graphique. Lorsque l'échelle de profondeur est réglée sur AUTO, la profondeur est définie pour maintenir le fond dans le tiers inférieur de l'écran. Le saut d'image affiché ici est dû à un changement automatique de la profondeur. Les nouveaux retours représentés à une échelle différente ne correspondront pas aux données historiques déjà tracées à une échelle supérieure ou inférieure. Des lignes verticales peuvent également apparaître lorsque le signal radio du RSS est perdu, puis rétabli dans une eau agitée.

Canal

CHANNEL / A

Appuyez sur MARCHE-MENU jusqu'à ce que le menu CANAL (CHANNEL) apparaisse. Sélectionnez A ou B selon votre système RSS. Voir Appareils RSS A et B. Valeur implicite = Canal A

Fond Noir

BOTTOM BLACK / ON

Appuyez sur MARCHE-MENU jusqu'à ce que le menu Fond Noir (Bottom Black) apparaisse. Sélectionnez DÉSACTIVÉ (OFF) pour obtenir les données de dureté du fond en affichant les retours secondaires.

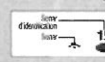
Pour un affichage à contraste élevé qui est facile à lire, même à distance, utilisez le réglage d'affichage sur Fond Noir (Bottom Black). Par défaut = ON

Alarme de poisson

FISH ALARM

Appuyez sur MARCHE-MENU jusqu'à ce que le menu ALARME DE POISSON (FISH ALARM) apparaisse. Sélectionnez DÉS-ACTIVÉE (OFF) pour désactiver les alarmes de poissons, ou l'une des icônes suivantes pour régler le niveau de l'alarme et l'activer. Par défaut = OFF

- Alarmes seulement pour les poissons de grande taille.
- Alarmes seulement pour les poissons de grande taille et de taille moyenne.
- Alarmes pour tous les poissons.



L'identification du poisson (Fish ID+) doit être définie sur ACTIVÉE (ON) pour que l'alarme de poisson fonctionne.

L'identification du poisson

FISH ID+ / ON

Appuyez sur MARCHE-MENU jusqu'à ce que le menu IDENTIFICATION DU POISSON (FISH ID+) apparaisse. Sélectionnez DÉS-ACTIVÉ (OFF) pour visualiser les retours sonar " bruts " ou ACTIVÉ (ON) pour bénéficier de la capacité du système SmartCast à identifier les retours sonar correspondant à des poissons. Le réglage de sensibilité affecte également l'identification des retours sonar comme étant des poissons (voir Sensibilité). Certaines icônes de poissons indiquent la profondeur du poisson au-dessus de l'icône. L'alarme de poisson ne sonne pas si l'identification du poisson est désactivée. Valeur implicite = ACTIVÉE (ON)

Unités RSS canal A et B

Deux versions du RSS sont proposées chez les détaillants d'articles de pêche, les magasins d'équipement de plein air et sur le site **www.humminbird.com** : Canal A et Canal B.

L'appareil RSS Canal A (RF10A) est fourni en standard avec votre produit SmartCast. Vous pouvez également acheter un RSS canal A ou B supplémentaire. Lorsque vous utilisez la version A ou B du RSS, assurez-vous que le canal approprié est sélectionné dans le menu CANAL (CHANNEL).

L'option Canal A & B est destinée à vous permettre de choisir facilement un canal différent si un autre pêcheur utilise un produit SmartCast dans un rayon de 30 mètres de votre affichage. Deux appareils RSS Canal A ou deux appareils RSS Canal B immergés dans un rayon de 30 mètres de l'affichage provoquent des interférences RF qui empêchent le produit de fonctionner correctement, provoquant ainsi une fluctuation des lectures de profondeur et des parasites à l'écran. Si vous utilisez un RSS Canal B et qu'un autre pêcheur utilise un RSS Canal A ou inversement, les interférences seront réduites mais pas complètement éliminées.

REMARQUE : *[illegible]*

Entretien

Votre système SmartCast est conçu pour fonctionner correctement pendant des années sans pratiquement aucun entretien. Suivez ces consignes simples pour que votre système SmartCast vous offre des performances optimales.

Après avoir utilisé le RSS dans l'eau salée, essuyez les surfaces concernées avec un linge humide d'eau douce. Les broches Wet Switch du RSSTM doivent être rincées à l'eau douce après voir été exposées à l'eau salée pour éviter la corrosion.

Si le SmartCast est en contact avec des embruns, essuyez les surfaces concernées avec un linge humide d'eau douce. Lorsque vous nettoyez le verre protecteur de l'affichage LCD, utilisez une peau de chamois et un détergent doux non abrasif. N'essuyez pas tant qu'il reste de la poussière ou de la graisse sur le verre. Veillez à ne pas rayer le verre. N'utilisez pas de nettoyant chimique pour verre sur l'écran, car cela risquerait de le fendiller.

Si le RSS reste hors de l'eau pendant une période prolongée, il peut lui en falloir un certain temps pour s'humidifier une fois remis dans l'eau. De petites bulles d'air peuvent se coller à la surface du RSS et gêner son fonctionnement. Ces bulles se dissipent rapidement, mais vous pouvez aussi essuyer la surface du RSS avec un linge humide.

Si la performance du sonar s'affaiblit (c'est-à-dire, s'il y a des trous dans la lecture du fond ou des lectures de profondeur de " 0 ") le dessous du RSS a besoin d'être nettoyé avec une ou deux gouttes d'une solution de 5 à 10 pour cent de détergent liquide pour vaisselle et d'eau. Utilisez environ une cuillerée à table de détergent et jusqu'à 237 millilitres (8 onces) d'eau pour enlever les huiles de la surface du RSS et ensuite essuyez avec un tissu humide.

Ne laissez jamais le SmartCast dans une voiture ou un coffre : une température élevée peut endommager les composants électroniques.

Câbles d'alimentation des piles de remplacement

Vous n'aurez pas besoin d'installer le câble d'alimentation des piles lors de votre première utilisation, mais il peut s'avérer nécessaire de le remplacer s'il est sujet à la corrosion après une utilisation prolongée dans un milieu marin.

Commandez vos câbles de remplacement à **www.humminbird.com**.

Dépannage

Ne tentez pas de réparer vous-même le SmartCast ou le système RSS. L'appareil ne contient aucune pièce réparable par l'utilisateur, par ailleurs des outils et des techniques spécifiques sont nécessaires pour garantir l'étanchéité des boîtiers. Les réparations doivent être effectuées exclusivement par des techniciens Humminbird agréés.

De nombreuses demandes de réparation reçues par Humminbird concernent des appareils qui ne nécessitent pas vraiment de réparation. Ces appareils sont renvoyés " sans problème détecté ". Si vous rencontrez un problème avec votre produit SmartCast, utilisez le guide de dépannage suivant avant de contacter le Centre de ressources clientèle ou d'envoyer l'appareil en réparation.

REMARQUE : *[illegible]*

1. Le SmartCast perd le signal.

Si vous ne parvenez pas à obtenir un signal RF du RSS, l'affichage cessera de se mettre à jour (l'écran se figera) et l'écran du SmartCast s'affichera. Chaque fois que la réception s'interrompt ou que le RSS est sorti de l'eau pendant plus de quelques secondes, l'écran du SmartCast s'affiche jusqu'à ce que le RSS soit remis à l'eau et la réception rétablie.

- Le système SmartCast est un produit sans fil " à vue ". Si le RSS est séparé par des objets, notamment votre propre poignet, vous risquez de perdre la réception.
- L'échelle de profondeur du SmartCast va de 0,6 mètre à 30 mètres (2 à 100 pieds). Des lectures irrégulières peuvent se produire si la profondeur est inférieure à 60 cm (2 pieds). En outre, de par la nature du sonar, ce produit n'est pas prévu pour être utilisé en piscine ou dans de petites étendues d'eau fermées.
- Le fait de ramener le RSS trop vite peut entraîner la perte du signal et un écran figé.
- Vérifiez l'équilibre de flottaison entre le RSS et votre équipement de pêche; un poids supérieur à 6 grammes provoquera la submersion du RSS et la perte du signal.

2. Il ne se passe rien quand je mets le SmartCast sous tension.

Vérifiez les connexions du câble d'alimentation aux deux extrémités. Vérifiez la connexion du câble d'alimentation au SmartCast. Il est possible d'insérer le connecteur du câble d'alimentation dans son socle de manière incorrecte. Si le connecteur est inversé, l'appareil ne fonctionnera pas. Vérifiez que les contacts à l'arrière de l'appareil sont exempts de corrosion. Vérifiez que les piles fonctionnent et qu'elles sont installées correctement.

3. Quand la profondeur est très faible, j'obtiens des trous dans la lecture du fond et des indications de profondeur incohérentes.

Le SmartCast est fiable avec une profondeur de 60 cm (2 pi) au minimum. La profondeur est mesurée à partir du RSS. Une distance entre le transmetteur (RSS) et le récepteur supérieure à 25 mètres (75 pieds) peut provoquer un affichage intermittent. Une eau très agitée peut provoquer la submersion du RSS et une nouvelle perte de contact.

Veillez à joindre le RSS si vous renvoyez l'appareil pour réparation.

4. L'écran commence à s'affaiblir. Les images ne sont pas aussi nettes que d'habitude.

Vérifiez la tension des piles. Le SmartCast ne fonctionnera pas avec des tensions de moins de 8 VCC. Utilisez des piles alcalines AA 1,5 V.

Si cela ne résout pas le problème, remplacez la pile. Après avoir remplacé la pile, si l'appareil ne s'allume toujours pas correctement, retirez la de nouveau et remettez la en place.

5. L'affichage montre de nombreux points noirs aux réglages de sensibilité élevés.

Vous obtenez du " bruit " ou des interférences causées par l'une de plusieurs sources. Les parasites peuvent être provoqués par d'autres appareils électroniques. Éteignez tout appareil électronique proche et vérifiez si le problème disparaît. D'autres appareils sonar ou électroniques fonctionnant aux fréquences 915 mHz risquent de provoquer des interférences avec le SmartCast.

6. L'affichage montre des lectures de profondeur fluctuantes et un encombrement excessif, notamment des barres verticales sur les icônes de poisson.

Le système SmartCast possède la capacité de recevoir des signaux séparés d'un RSS Canal A ou Canal B. Deux appareils RSS de type A ou B utilisés simultanément ou un RSS de type A et un RSS de type B utilisés simultanément, peuvent provoquer entre eux des interférences de RF.

7. L'écran saute et la partie inférieure change brusquement; il manque parfois une ligne verticale ou une ligne noire apparaît de haut en bas.

Ce saut d'image est dû à un changement automatique de la profondeur. Les nouveaux retours représentés graphiquement avec une échelle différente ne correspondront pas aux données historiques déjà tracées à une échelle supérieure ou inférieure. Des lignes verticales peuvent également apparaître lorsque le signal radio du RSS est perdu, puis rétabli dans une eau agitée.

Techsonic Industries - Garantie limitée de 1 an

Nous garantissons à l'acheteur au détail initial que les produits fabriqués par Techsonic Industries sont exempts de défauts de matière et de fabrication. Cette garantie est en vigueur pour une durée de 1 an à partir de la date de l'achat initial, sauf dans le cas où les produits Techsonic Industries font l'objet d'une utilisation commerciale, d'une location ou d'une autre activité source de revenus; cette garantie est alors limitée à quatre-vingt dix jours à compter de la date d'achat initial pour les produits mécaniques et électriques.

Nous remplaçons gratuitement tout produit Techsonic Industries non couvert par cette garantie, qui est renvoyé (port prépayé) pendant la période de garantie au revendeur auprès duquel ces produits ont été achetés, ou qui nous est retourné à l'adresse appropriée. Dans ce cas, les produits Techsonic Industries qui sont effectivement défectueux et couverts par cette garantie seront remplacés ou réparés sans frais, à la discrétion de Techsonic Industries, et renvoyés au client.

La seule responsabilité de Techsonic Industries relativement à cette garantie se limite à réparer ou à remplacer un produit jugé défectueux par Techsonic Industries. Techsonic Industries n'est pas responsable des frais liés au retrait du produit ou à la réinstallation des pièces de rechange ou réparées.

Nous n'avons aucune obligation conformément à cette garantie, quant à un produit qui a été :

- incorrectement installé,
- utilisé dans une installation autre que celle recommandée dans nos instructions ou spécifications d'installation ou d'exploitation;
- endommagé ou a cessé de fonctionner par suite d'un accident ou d'une utilisation anormale, y compris la course, un mauvais emploi ou des modifications effectuées en dehors de notre usine;
- réparé ou modifié par une entité autre que Techsonic Industries;
- utilisé sur un bateau à moteur dont la puissance excède l'estimation établie par le constructeur du bateau;
- utilisé avec d'autres produits qui, selon l'opinion de Techsonic Industries, sont incompatibles avec le produit de Techsonic Industries.

CETTE GARANTIE REMPLACE EXPRESSÉMENT TOUTE AUTRE GARANTIE, OBLIGATION OU RESPONSABILITÉ DE LA PART DE Techsonic Industries, ET CONSTITUE LE SEUL RECOURS DU CLIENT, EXCEPTION FAITE DE TOUTE GARANTIE APPLICABLE IMPLICITE EN VERTU D'UNE LOI PROVINCIALE (D'ÉTAT), LIMITÉE PAR LA PRÉSENTE À UNE DURÉE DE 1 AN À PARTIR DE LA DATE D'ACHAT INITIALE. Techsonic Industries NE POURRA EN AUCUN CAS ÊTRE TENUE RESPONSABLE DE TOUT DOMMAGE ACCESSOIRE OU CONSÉCUTIF À L'INOBSERVATION D'UNE GARANTIE EXPRESSE OU IMPLICITE RELATIVE AUX PRODUITS.

Certains états n'autorisant pas de limitation sur une garantie implicite, ni l'exclusion de dommages accessoires ou consécutifs, les exclusions ci-dessus peuvent ne pas vous concerner. Vous pouvez également bénéficier d'autres droits, qui varient d'une province (d'un État) à une (un) autre.

Vous devez contacter le Centre de ressources pour la clientèle pour recevoir un numéro d'autorisation de réparation avant de renvoyer votre RSS SmartCast à notre usine pour dépannage. Ce numéro doit être inclus sur l'étiquette d'expédition lors du retour à notre usine. En outre, vous devez joindre une lettre décrivant le problème que vous rencontrez, ainsi que vos nom, adresse et numéro de téléphone (heures ouvrables), afin que nous puissions vous contacter pour la réparation, si nécessaire.

Achats internationaux

Une garantie séparée est fournie par les distributeurs internationaux pour les appareils achetés en dehors des États-Unis. Cette garantie est fournie par votre distributeur local et celui-ci gère la maintenance locale de votre appareil. Les garanties ne sont valables que dans la région de distribution prévue. Les appareils achetés aux États-Unis ou au Canada doivent être renvoyés à notre usine aux États-Unis pour dépannage.

AVERTISSEMENT ! *[illegible]*

POLITIQUE DE SERVICE APRÈS-VENTE

La politique de service après-vente n'est valable qu'aux États-Unis. Elle ne s'applique qu'aux produits Humminbird retournés à notre usine située à Eufaula, Alabama et est modifiable sans préavis.

Toutes les réparations sont effectuées en accord avec les spécifications rigoureuses de l'usine, par des techniciens formés en usine. Les appareils réparés en usine sont testés de la même façon et subissent les mêmes contrôles de qualité que les nouvelles unités en production. Vous n'aurez probablement jamais à utiliser notre remarquable politique de service après-vente, mais il est plaisant de savoir que nous soutenons nos produits avec autant d'efficacité. Nous agissons ainsi parce que nous croyons que vous méritez ce qu'il y a de mieux. Nous ferons tout en notre pouvoir pour réparer votre appareil en deçà de trois jours ouvrables, à partir de la date de réception de l'appareil à notre usine. Ce délai ne comprend pas la durée du transport jusqu'à notre usine, ni de notre usine jusqu'à vous. Les appareils reçus le vendredi sont habituellement retournés le mercredi suivant, les appareils reçus le lundi sont habituellement retournés le jeudi, et ainsi de suite.

Nous nous réservons le droit de considérer un produit irréparable si les pièces de rechange sont discontinuées ou impossibles à obtenir.

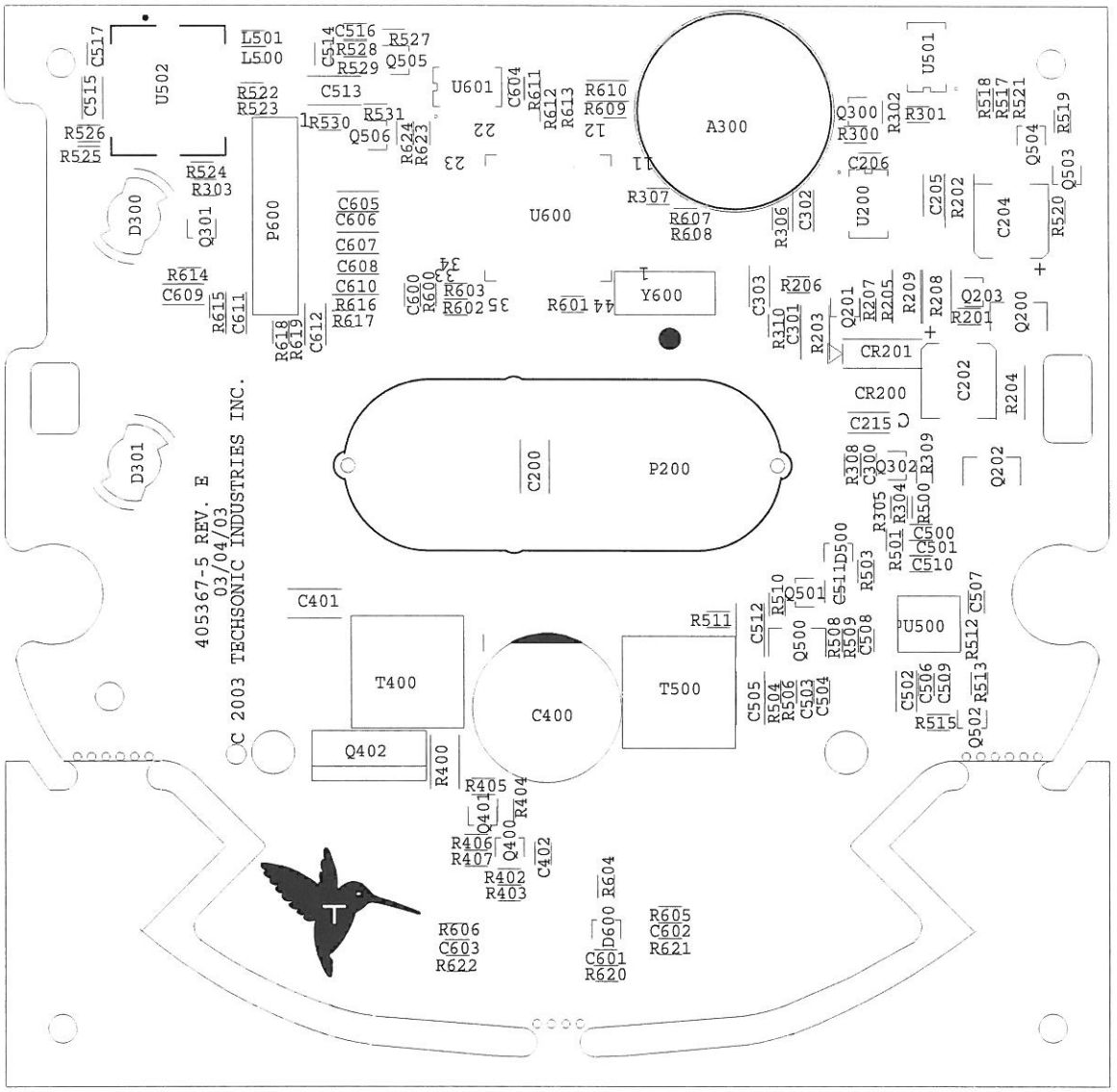
A la fin de la période de garantie initiale, une évaluation des frais de service à tarif fixe régulier sera effectuée pour chaque appareil en réparation (dommages physiques et pièces manquantes non compris). Contactez notre Centre de ressources pour la clientèle pour vérifier les frais de service concernant votre appareil.

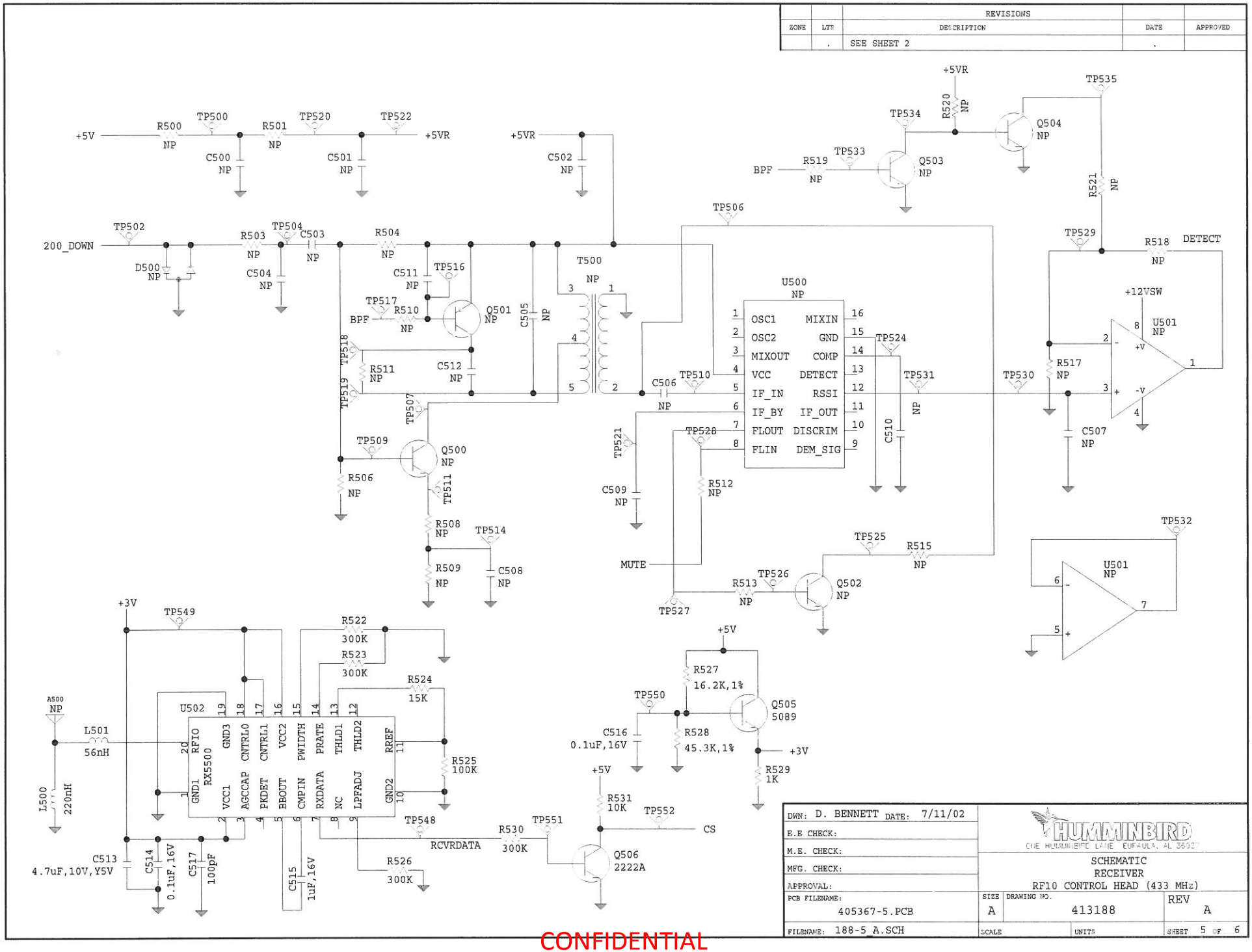
Si les frais ne sont pas prépayés, l'appareil sera renvoyé contre remboursement. Si vous rencontrez des problèmes liés aux lectures du fond et de la profondeur, renvoyez le RSS (Remote Sonar Sensor) avec l'appareil lors de l'envoi pour réparation.

AVERTISSEMENT ! *La réparation et/ou le démontage de cet appareil électronique doit être effectué uniquement par un personnel d'entretien autorisé. Toute modification du numéro de série et/ou réparation par un personnel non autorisé entraînera l'annulation de la garantie.*

SMARTCAST
WIRELESS FISHFINDERS

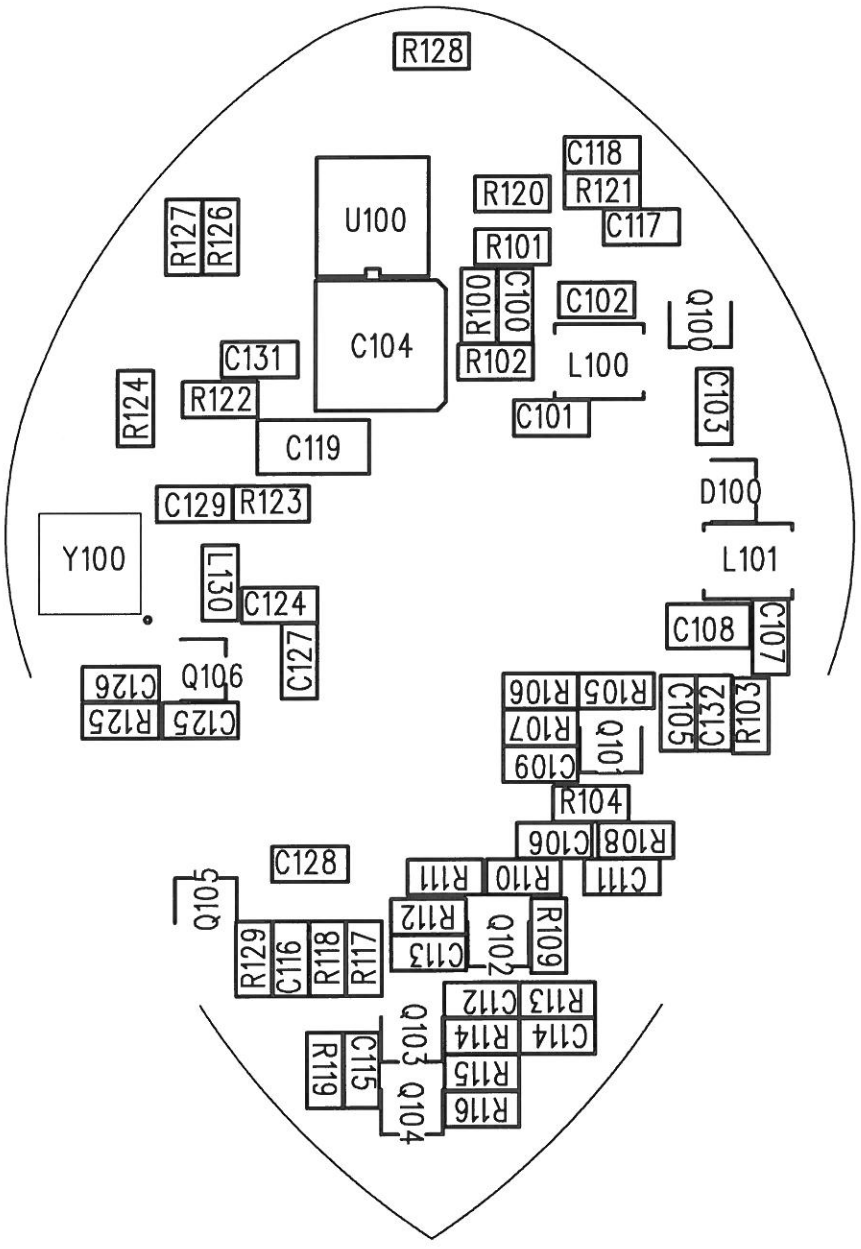
Appendix B
Schematic/Parts List/Block Diagram/Theory of Operation





CONFIDENTIAL

LAYER 1- COMPONENT SIDE ARTWORK



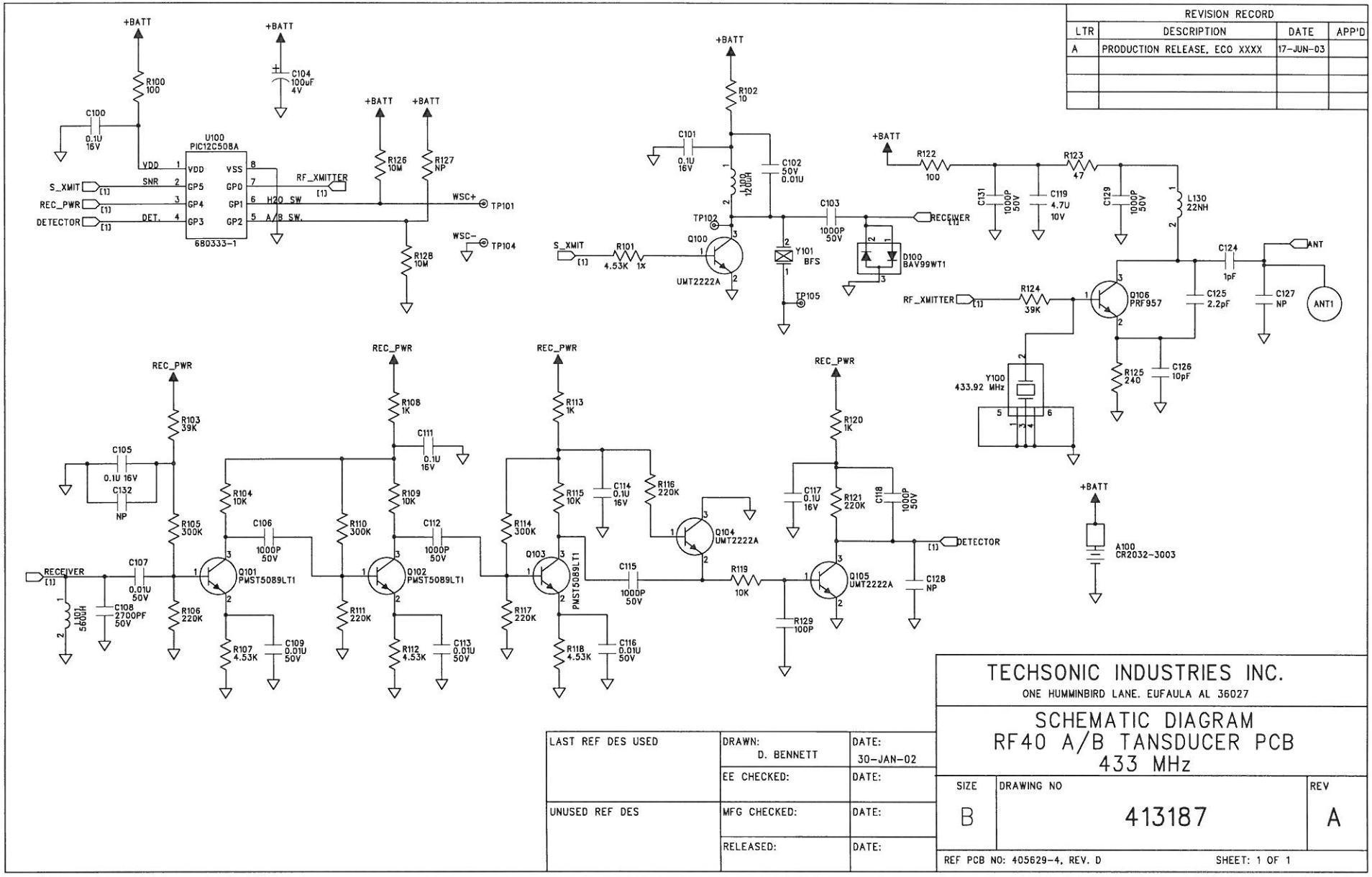
PROPRIETARY INFO
TECHSONIC INDUSTRIES INC.

CONFIDENTIAL

GUPPY BOBBER PCB; 405629-4, REV. E

23-APR-2003

405629_E.pcb - Tue Jun 17 11:00:14 2003



Bill Of Materials for 413187_A.sch on Tue Jun 17 10:53:21 2003

PART NO.	DESCRIPTION	VALUE	REF-DES.	QTY.
405609-1	ANTENNA INT. XDUCER	TBD	ANT1	1
430015-1	HOLDER, BATTERY, COIN CELL, CR2032-3003	CR2032-3003	A100	1
440255-1	XDUCER, BFS BOBBER	BFS	Y101	1
640023-1	RESONATOR, SAW, 433.92 MHz	433.92 MHz	Y100	1
660027-1	DIODE SOT-323 SWITCHING DUAL	BAV99WT1	D100	1
662046-1	XSTR SOT-323 BIPOLAR NPN	UMT2222A	Q100 Q104-105	3
662072-1	XSTR SOT-323 BIPOLAR NPN	PMST5089LT1	Q101-103	3
662074-1	XSTR UHF WIDEBAND SOT-323	PRF957	Q106	1
664007-010	CAPACITOR, 5%, 50V, 0603	1pF	C124	1
664007-022	CAPACITOR, 5%, 50V, 0603	2.2pF	C125	1
664007-100	CAPACITOR, 5%, 50V, 0603	10pF	C126	1
664007-NP	CAP CER 0603	NP	C127	1
664026-475	CAP CER 1206 Y5V 10V +80/-20%	4.7U	C119	1
664027-104	CAP CER 0603 X7R 16V 10%	0.1U	C100-101 C105 C111 C114 C117	6
664027-NP	CAP CER 0603 X7R 16V 10%	NP	C132	1
664032-101	CAP CER 0603 X7R 50V 10%	100P	R129	1
664032-102	CAP CER 0603 X7R 50V 10%	1000P	C103 C106 C112 C115 C118 C129 C131	7
664032-103	CAP CER 0603 X7R 50V 10%	0.01U	C102 C107 C109 C113 C116	5
664035-272	CAP CER 0805 COG 50V 5%	2700PF	C108	1
664064-NP	CAP CER 0603 NPO 50V +/-.25P	NP	C128	1
664097-107	CAP ALUM. ELEC 5.3 4V 20%	100uF	C104	1
668004-4533	RES FILM 0603 62mW 1%	4.53K	R101 R107 R112 R118	4
668007-100	RES FILM 0603 62mW 5%	10	R102	1
668007-101	RES FILM 0603 62mW 5%	100	R100 R122	2
668007-102	RES FILM 0603 62mW 5%	1K	R108 R113 R120	3
668007-103	RES FILM 0603 62mW 5%	10K	R104 R109 R115 R119	4
668007-106	RES FILM 0603 62mW 5%	10M	R126 R128	2
668007-224	RES FILM 0603 62mW 5%	220K	R106 R111 R116-117 R121	5
668007-241	RES FILM 0603 62mW 5%	240	R125	1
668007-304	RES FILM 0603 62mW 5%	300K	R105 R110 R114	3
668007-393	RES FILM 0603 62mW 5%	39K	R103 R124	2
668007-470	RES FILM 0603 62mW 5%	47	R123	1
668007-NP	RES 0603 NOT PLACED	NP	R127	1
670030-121	IND 1210 WWF 5%	120uH	L100	1
670030-561	IND LQH32* 5% 1210	560uH	L101	1
670057-220	IND 0603 WWF 10%	22NH	L130	1
680333-1	IC, MICRO, CMOS, 8-BIT, SO-8 (208mil)	PIC12C508A	U100	1
TP-.8/.4-TH	TEST POINT VIA .80/.40 THRU		TP102 TP105	2

RU
TP-3.8/2.05 TEST POINT VIA 3.8/2.05 THRU TP101 TP104 2
-THRU

Input File Name: 188-5_A.mat
* Output File Name: 188-5_A.BOM
* Date: 17/6/2003
* Time: 12:8:16
*
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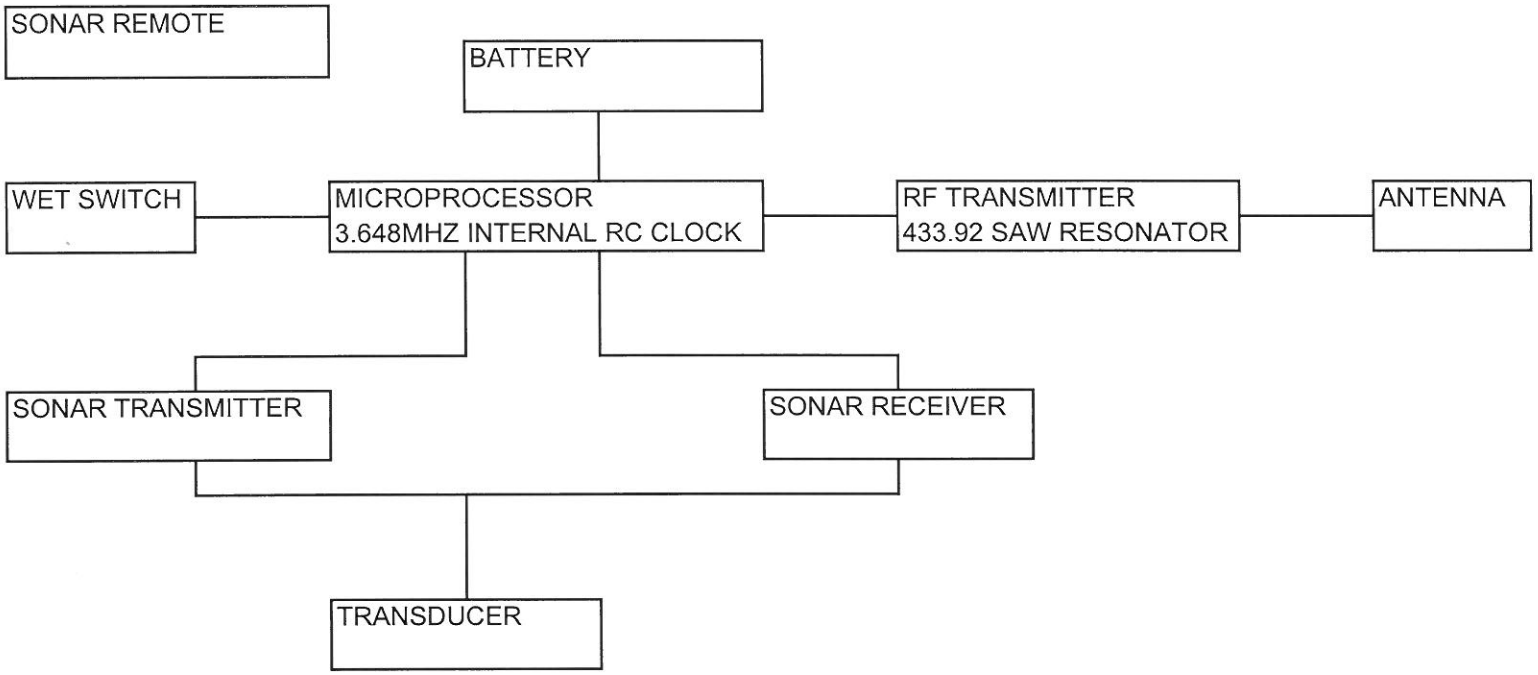
PART #	DESCRIPTION	REFERENCE DES	QUAN
662046-1	TRANSISTOR, UMT2222A	Q506	1
662072-1	TRANSISTOR,PMBT5089,SOT323	Q505	1
664007-101	CAPACITOR,100PF,50V,5%,COG	C517	1
664026-475	CAPACITOR, 4.7UF,10V,20%	C513	1
664027-104	CAPACITOR, 0.1UF, 16V,10%	C514 C516	2
664068-105	CAP.,1UF,16V,10%,X7R,0805	C515	1
668004-1624	RES,16.2K OHM 1/16W,1%,0603	R527	1
668004-4534	RES,45.3K OHM 1/16W,1%,0603	R528	1
668007-102	RES, 1K OHM 1/16W,5%,0603	R529	1
668007-103	RES, 10K OHM 1/16W,5%,0603	R531	1
668007-104	RES, 100K OHM 1/16W,5%,0603	R525	1
668007-153	RES, 15K OHM 1/16W,5%,0603	R524	1
668007-304	RES, 300K OHM 1/16W,5%,0603	R522 R523 R526 R530	4
670056-221	IND, 220NH, LQW2BHNR22J01	L500	1
670057-56	IND, 56NH, LQG18HN56NJ00	L501	1
680358-1	IC, RECEIVER, 433.92MHZ, RX550U502		1
NP	CAP 1206 NOT PLACED	C505 C512	2
NP	CAP 0603 NOT PLACED	C500 C501 C503 C504 C506 C507 C508 C509 C510 C511	10
NP	TRANSISTOR NOT PLACED	Q501 Q502 Q503 Q504	4
NP	CAP 0805 NOT PLACED	C502	1
NP	ANTENNA, FOR REFERENCE ONLY	A500	1
NP	DIODE SOT323 NOT PLACED	D500	1
NP	RES 0603 NOT PLACED	R500 R501 R503 R504 R506 R508 R509 R510	17

		R511 R512 R513 R515 R517 R518 R519 R520 R521	
NP	TRANSFORMER, NOT PLACED	T500	1
NP	IC, NOT PLACED	U501	1
NP	IC, BA4116FV, NOT PLACED	U500	1
NP	TRANSISTOR NOT PLACED	Q500	1

BLOCK DIAGRAM SHOWING OSCILLATOR FREQUENCIES



Smartcast Theory of Operation

The system is composed of a buoyant station having a sonar transmitter, a sonar receiver, a sonar to electric signal transducer and a radio transmitter all controlled by a microprocessor; and a shore station that has a radio receiver and signal display controlled by a shore station microprocessor. The buoyant station microprocessor is programmed to generate sync pulses and to transmit both the sync pulses and transduced sonar echo returns to the shore station. The shore station microprocessor is programmed to display only those echo signals received after a sync pulse. Echoes can be fish, structure or bottom information along with a digital depth of the water.

Appendix C
Photographs (Transmitter and Receiver)