**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ! BALTIMORE, MARYLAND 21230-3432 ! PHONE (410) 354-3300 ! FAX (410) 354-3313

February 7, 2003

Intech 21, Inc.
50 Glen Street
Glen Cove, NY 11542

Reference: 916.5 MHz Transceiver

Dear Ms. Zelmanovich:,

Enclosed is the EMC Test Report for the Intech 21, Inc. 916.5 MHz Transceiver . The Intech 21, Inc. 916.5 MHz Transceiver was tested to the requirements of the FCC Rules and Regulations, Section 15.249, of Title 47 of the CFR, for a Part 15 Transceiver.

Thank you for using the testing services of MET Laboratories. If you have any questions regarding these results or if MET can be of further assistance to you, please feel free to contact me. We appreciate your business and look forward to working with you again soon.

Kindest Regards,
MET LABORATORIES, INC.

Marianne T. Bosley
Documentation Department

Enclosures: (\Intech 21, Inc.\EMC11968-FCC249.rpt)

DOCTEM-23 Jan 02

**Electro-Magnetic Compatibility**
**Test Report**

for the

# 916.5 MHz Transceiver

**Tested Under**

FCC Part 15 Subpart C
Section 15.249
Title 47 of the CFR
for Intentional Radiators

## MET REPORT: **EMC11968-FCC**

February 7, 2003

**PREPARED FOR:**

Intech 21, Inc.
50 Glen Street
Glen Cove, NY 11542

**PREPARED BY:**

MET Laboratories, Inc.
914 West Patapsco Avenue
Baltimore, Maryland 21230-3432

# Electro-Magnetic Compatibility
# Test Report
for the

# 916.5 MHz Transceiver
## Tested Under

FCC Part 15 Subpart C
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for Intentional Radiators

MET REPORT: **EMC11968-FCC**

February 7, 2003

**PREPARED FOR:**

Intech 21, Inc.
50 Glen Street
Glen Cove, NY 11542

**Report Prepared By:**

Marianne T. Bosley
EMC ADMINISTRATOR

**Report Reviewed By:**

Hoosamuddin S. Bandukwala
EMC PROJECT ENGINEER

**Final Review By:**

CHRISTOPHER R. HARVEY
EMC LAB DIRECTOR

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15, Section 15.249, of the FCC Rules under normal use and maintenance.

Hoosamuddin S. Bandukwala
PROJECT ENGINEER

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# List of Terms and Abbreviations

| | |
|---|---|
| **AC** | **A**lternating **C**urrent |
| **Cal** | **Cal**ibration |
| ***d*** | **M**easurement **D**istance |
| **dB** | **D**eci**b**els |
| **dB$\mu$A** | **D**eci**b**els above one **micro**amp |
| **dB$\mu$V** | **D**eci**b**els above one **micro**volt |
| **dB$\mu$A/m** | **D**eci**b**els above one **micro**amp **per m**eter |
| **dB$\mu$V/m** | **D**eci**b**els above one **micro**volt **per m**eter |
| **DC** | **D**irect **C**urrent |
| **E** | **E**lectric Field |
| **DSL** | **D**igital **S**ubscriber **L**ine |
| **ESD** | **E**lectro**s**tatic **D**ischarge |
| **EUT** | **E**quipment **U**nder **T**est |
| ***f*** | **F**requency |
| **FCC** | **F**ederal **C**ommunications **C**ommission |
| **CISPR** | **C**omite **I**nternational **S**pecial des **P**erturbations **R**adioelectriques<br>(International Special Committee on Radio Interference) |
| **GRP** | **G**round **R**eference **P**lane |
| **H** | Magnetic Field |
| **HCP** | **H**orizontal **C**oupling **P**lane |
| **Hz** | **H**ert**z** |
| **IEC** | **I**nternational **E**lectrotechnical **C**ommission |
| **kHz** | **k**ilo**h**ert**z** |
| **kPa** | **k**ilo**pa**scal |
| **kV** | **k**ilo**v**olt |
| **LISN** | **L**ine **I**mpedance **S**tabilization **N**etwork |
| **MHz** | **M**ega**h**ertz |
| **$\mu$H** | **microh**enry |
| **$\mu$F** | **microf**arad |
| **$\mu$s** | **micros**econds |
| **NEBS** | **N**etwork **E**quipment-**B**uilding **S**ystem |
| **PRF** | **P**ulse **R**epetition **F**requency |
| **RF** | **R**adio **F**requency |
| **RMS** | **R**oot-**M**ean-**S**quare |
| **TWT** | **T**raveling **W**ave **T**ube |
| **V/m** | **V**olts **per m**eter |
| **VCP** | **V**ertical **C**oupling **P**lane |

# I. Executive Summary

# I. Executive Summary

## A. Purpose of Test

An EMC evaluation to determine compliance of the 916.5 MHz Transceiver with the requirements of Part 15, Section 15.249, was conducted. (All references are to the most current version of Title 47 of the Code of Federal Regulations in effect). In accordance with §2.1033, the following data is presented in support of the Certification of the 916.5 MHz Transceiver. Intech 21, Inc. should retain a copy of this document, and it should be kept on file for at least five years after the manufacturing of the Transceiver has been **permanently** discontinued.

## B. Executive Summary

The following tests were performed in accordance with Intech 21, Inc. Purchase Order Number 1834:

| Specifications | Description | Compliance |
|---|---|---|
| Title 47 of the CFR, Part 15, Subpart C, §15.207(a) | Electromagnetic Compatibility - Conducted Emissions for an Intentional Radiator | Complies |
| Title 47 of the CFR, Part 15, Subpart C, §15.209(a) | Electromagnetic Compatibility - Radiated Emissions for an Intentional Radiator | Complies |
| Title 47 of the CFR, Part 2, §2.1049 | Electromagnetic Compatibility - Occupied Bandwidth | Complies |
| Title 47 of the CFR, Part 15, Subpart C, §15.249(d) | Electromagnetic Compatibility - Peak and Average Measurement | Complies |

**Table 1. EUT Compliance**

The EUT, as supplied to MET Laboratories, complied with the requirements stated in this test report.

| References | Description |
|---|---|
| Purchase Order # 1834 | Intech 21, Inc. Purchase Order for the 916.5 Transceiver Testing |
| ANSI-C63.4:1992 | Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 Ghz |
| FCC 47CFR, Chapter 1, Part 2 | Title 47 Code of Federal Regulations Part 2 - Frequency Allocations and Radio Treaty Matters; General Rules and Regulations |
| FCC 47CFR, Chapter 1, Part 15 | Title 47 Code of Federal Regulations Part 15 - Radio Frequency Devices |

**Table 2. References**

# II. General

# II. General

## A. Test Site

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3432. Radiated Emissions measurements were performed inside of a Semi Anechoic Chamber. In accordance with §2.948(a)(2), a complete site description is filed with the Commission's Laboratory in Columbia, Maryland. MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0)

## B. Description of Test Sample

The EUT is a 916.5 MHz Transceiver for monitoring sensor signals, transmitting and retransmitting data within a wireless network.

## C. General Test Setup

There is only one configuration for this EUT: The EUT was connected to the 120 VAC AC mains with the AC-DC adaptor.

## D. Mode of Operation

The Intech 21, Inc. 916.5 Transceiver was configured in accordance with the manufacturer's instructions and was operated as follows for all testing contained in this report unless stated otherwise:

The EUT is simulating normal operation by continuous packet transmitting, and there is only one mode of operation for this EUT.

## II. General

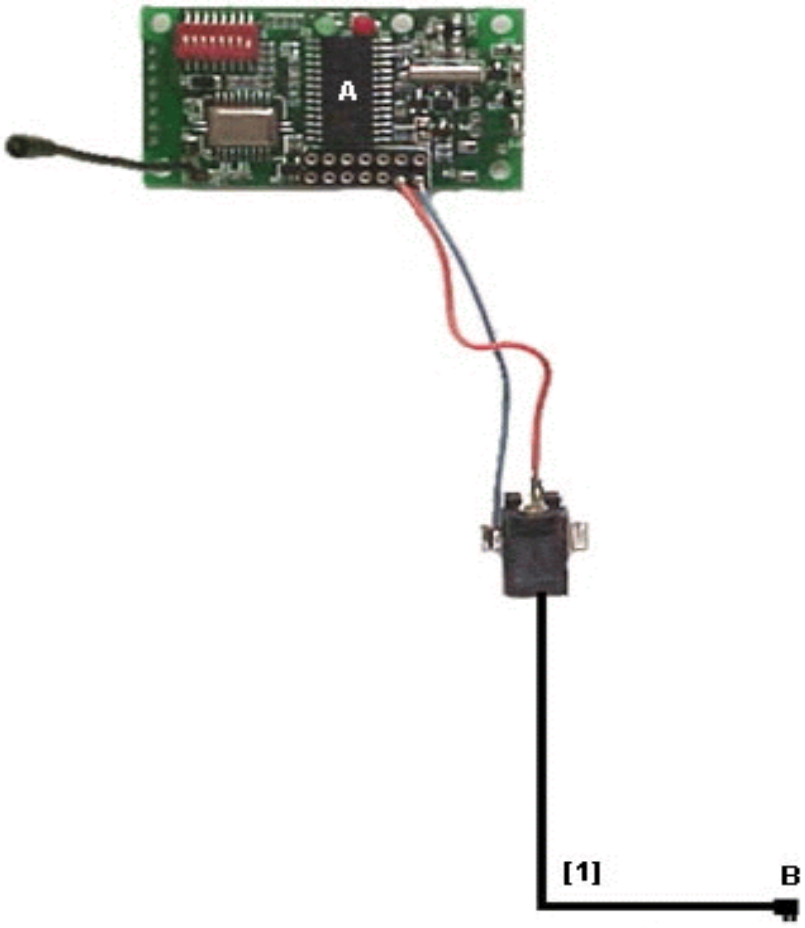



**Figure 1. Configuration**

# II. General

**EUT**

| Reference to Test Configuration | Description/ Nomenclature | Model # | Serial # | Revision |
|---|---|---|---|---|
| A | 916.5 MHz Transceiver | I21RU4 | N/A | N/A |

**Support Equipment**

| Reference to Test Configuration | Description/ Nomenclature | Model # | Serial # | Revision |
|---|---|---|---|---|
| B | AC-DC adaptor | Trisonic | TS-5300UL | N/A |

**E. Modifications**

No modifications were made during testing.

**F. Disposition of Test Sample:**

Intech 21, Inc.
50 Glen Street
Glen Cove, NY 11542

# III. Electromagnetic Compatibility Antenna Requirements

# III. Electromagnetic Compatibility Antenna Requirements

**A. §15.203 Evaluation Criteria:**

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

A. Antenna be permanently attached to the unit.
B. Antenna must use a unique type of connector to attach to the EUT.
C. Unit must be professionaly installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

**B. Results:**

The Intech 21, Inc. 916.5 Transceiver meets the criteria of this rule by virtue of having a permanently attached external antenna soldered onto the EUT and is not accessible by the user. The EUT is therefore compliant with §15.203.

# IV. Electromagnetic Compatibility Emissions Requirements

# IV. Electromagnetic Compatibility Emission Requirements

## A. §15.207 Conducted Emissions

**Requirements:** The EUT shall meet the limits shown below:

| Frequency Range (MHz) | Class B Limits Quasi-Peak (dB $\mu$V) |
|---|---|
| 0.45 - 30 | 48 |

**Table 3. Limits for Intentional Radiators from FCC Part 15 §15.207(a)**

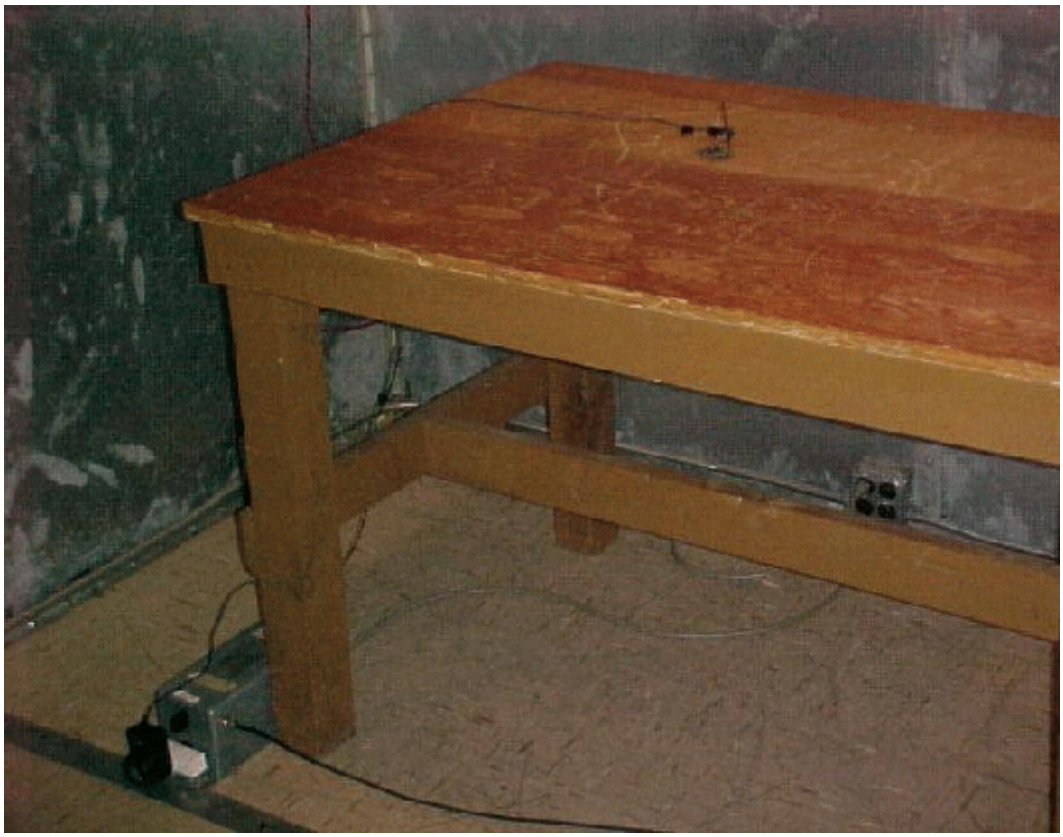
**Test Equipment:** Test equipment for FCC Part 15.207 Conducted Emissions is in Section VII of this report.

**Test Configurations:** The EUT was installed SETUP inside a shielded enclosure. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the shielded enclosure, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 O/50 $\mu$H Line Impedance Stabilization Network (LISN).

**Procedure:** The EMC receiver scanned the frequency range from 450 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with ANSI C63.4-1992 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 Ghz." The measurements were performed over the frequency range of 0.45 MHz to 30 MHz using a 50 O/50 $\mu$H LISN as the input transducer to an EMC/Field Intensity Meter. The tests were conducted in a RF shielded enclosure.

## IV. Electromagnetic Compatibility Emission Requirements

**Results:** The EUT is a module which gets powered from the end device it operates within. Therefore, these requirements do not apply to this EUT.



**Conducted Emissions Test Setup Photo**

## IV. Electromagnetic Compatibility Emission Requirements

**Subject:** Conducted Emissions - Voltage, Data Plot

**Port:** AC Power Phase

**Specification:** FCC Part 15 Subpart C, §15.207(a)

**Results:** Equipment meets the specifications of §15.207(a). Plot appears on following page.

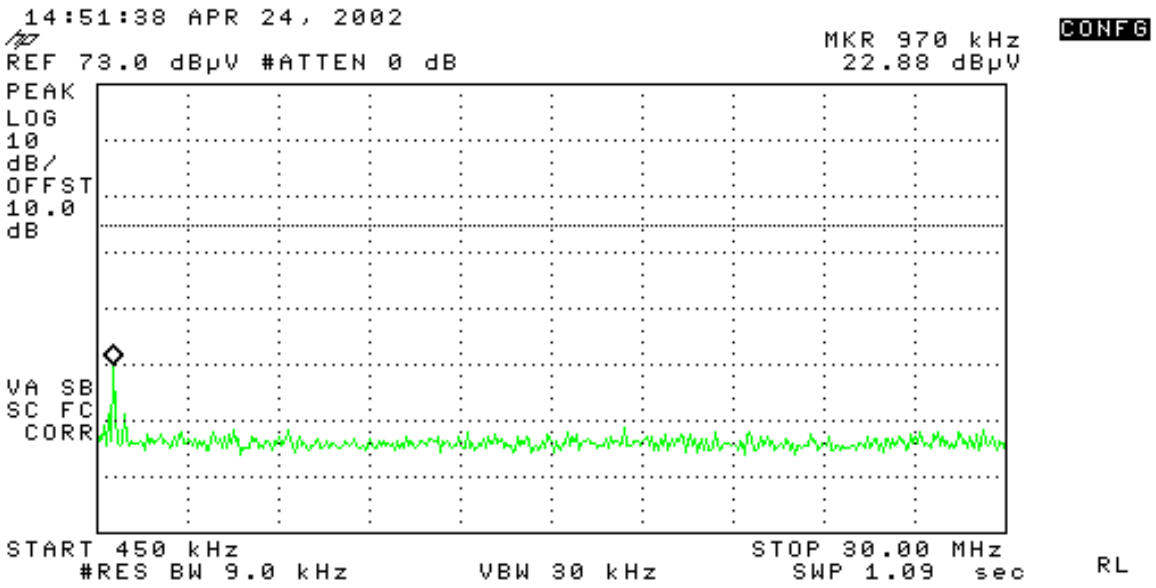
### SUMMARY - Worst Case Emissions

| Frequency (MHz) | QP Level (dBµV) | QP Limit (dBµV) | Margin (dB) |
|---|---|---|---|
| 0.86 | 11.51 | 48.00 | -36.49 |
| 1.01 | 25.16 | 48.00 | -22.84 |
| 1.09 | 15.71 | 48.00 | -32.29 |
| 1.99 | 11.98 | 48.00 | -36.02 |

**Test Engineer:** Hoosamuddin S. Bandukwala

**Test Date:** April/24/2002

## IV. Electromagnetic Compatibility Emission Requirements




**Conducted Emissions Phase Plot**

# IV. Electromagnetic Compatibility Emission Requirements

**Subject:** Conducted Emissions - Voltage, Data Plot

**Port:** AC Power Neutral

**Specification:** FCC Part 15 Subpart C, §15.207(a)

**Results:** Equipment meets the specifications of §15.207(a). Plot appears on following page.

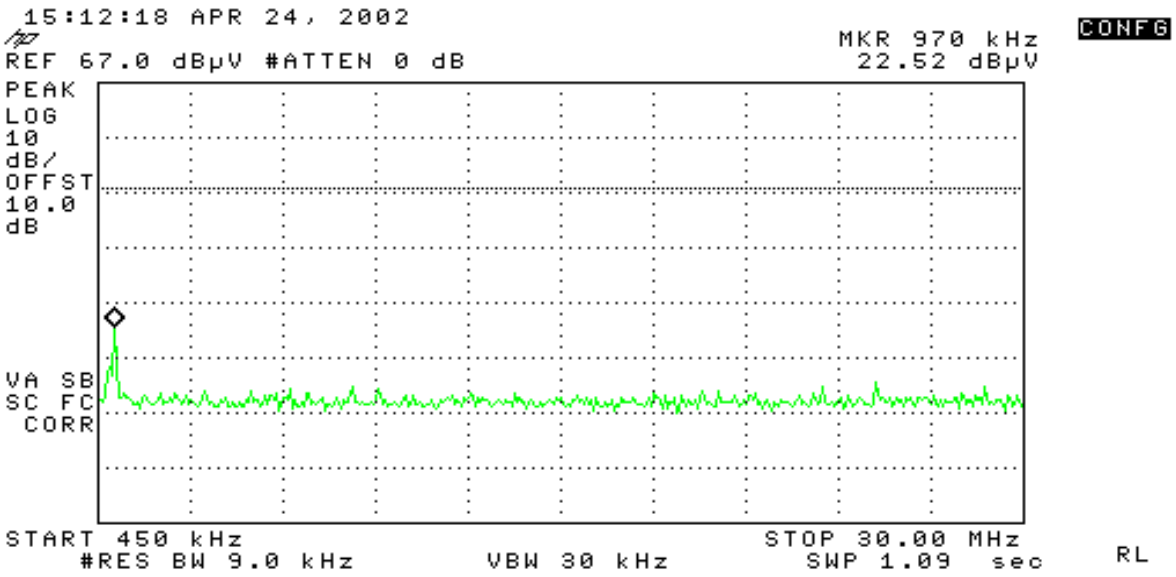
**SUMMARY - Worst Case Emissions**

| Frequency (MHz) | QP Level (dBµV) | QP Limit (dBµV) | Margin (dB) |
|---|---|---|---|
| 0.859 | 14.77 | 48.00 | -33.23 |
| 1.44 | 24.43 | 48.00 | -23.57 |
| 1.09 | 15.86 | 48.00 | -32.14 |
| 1.35 | 12.42 | 48.00 | -35.58 |

**Test Engineer:** Hoosamuddin S. Bandukwala

**Test Date:** April/24/2002

## IV. Electromagnetic Compatibility Emission Requirements




**Conducted Emissions Neutral Plot**

# IV. Electromagnetic Compatibility Emission Requirements

## B. §15.209 Radiated Emissions

**Requirements:** The EUT shall meet the limits shown below:

| Frequency (MHz) | Limit (dBµV) @ 3 m |
|---|---|
| 30 - 88 | 40 |
| 88 - 216 | 43.5 |
| 216 - 960 | 46 |
| Above 960 | 54 |

**Table 4. Limits for Intentional Radiators from FCC Part 15 § 15.209(a)**

**Test Equipment:** Test equipment for FCC Part 15 §15.209 Radiated Emissions is in Section VII of this report.

**Test Configurations:** The EUT was installed SETUP inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated measurements, the EUT was placed in a semi-anechoic chamber.

For frequencies from 30 MHz to 1 Ghz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth. For frequencies above 1 Ghz, peak measurements were made with a resolution bandwidth of 1 MHz and a video bandwidth of 1MHz.

For intentional radiators with a digital device portion which operates below 10 Ghz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the $10^{th}$ harmonic of the highest fundamental frequency or to 40 Ghz, whichever is lower.

# IV. Electromagnetic Compatibility Emission Requirements

**Photograph:**

**Figure 2:** **Test Setup Photo for Intentional Radiator - Radiated Emissions, Occupied Bandwidth, RF Power Output, and Peak and Average Measurements**

# IV. Electromagnetic Compatibility Emission Requirements

**Procedure:** For pre-scanning, the EMI receiver scanned the frequency range from 30 MHz to 10 Ghz, per §15.33(a)(4) to obtain an Emission profile of the EUT. For each point of measurement, the turntable was rotated, the positions of the interface cables were varied, and the antenna height was varied between 1 m and 4 m, in order to find the maximum radiated Emissions. Measurements were taken using this technique with the antenna in two polarizations: horizontal and vertical.

**Results:**

| FREQ. (GHZ) | EUT Azimuth (Degrees) | Antenna POL. (H/V) | Antenna HEIGHT (m) | Amplitude (dBuv) | A.C.F. (dB) (+) | Preamp/ Cable (dB) (-) | Distance Corr. (dB) (-) | Corrected Amplitude (dBuv) | Limit (dBuv) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.833 | 45 | H | 1 | 33.83 | 26.30 | 33.51 | 9.54 | 17.08 | 54.00 | -36.92 |
| 1.833 | 45 | V | 1 | 36.5 | 26.30 | 33.51 | 9.54 | 19.75 | 54.00 | -34.25 |
| 2.749 | 45 | H | 1 | 34.67 | 28.90 | 31.92 | 9.54 | 22.11 | 54.00 | -31.89 |
| 2.749 | 45 | V | 1 | 34.5 | 29.05 | 31.92 | 9.54 | 22.09 | 54.00 | -31.91 |
| 9.166 | 0 | H | 1 | 29.17 | 38.00 | 23.44 | 9.54 | 34.19 | 54.00 | -19.81 |
| 9.166 | 0 | V | 1 | 29.17 | 37.77 | 23.44 | 9.54 | 33.95 | 54.00 | -20.05 |

**Table 5. Radiated Emissions (Harmonics) Results**

The EUT complied with the Radiated Emissions limits of Section 15.209(a) and harmonics limits of §15.249(a). Frequencies above 2nd Harmonic were noise floor measurements. Beside the Fundamental there were no emissions found between 30MHz to 1GHz. Above frequencies were measured using peak detector.

**Test Engineer:** Hoosamuddin Bandukwala

**Test Date:** 8 March 2002

# IV. Electromagnetic Compatibility Emission Requirements

**Subject:** Radiated Emissions - (Fundamental) Electric Field Test Results

**Specification:** FCC Part 15 Subpart C, §15.249(a)

| Fundamental Frequency | Field Strength of Fundamental (millivolts/meter) | Field Strength of Fundamental (dBuv/m) | Field Strength of Harmonics (microvolts/meter) | Field Strength of Harmonics (dBuv/m) |
|---|---|---|---|---|
| 902-928 MHz | 50 | 94.0 | 500 | 54.0 |
| 2400-2483.5 MHz | 50 | 94.0 | 500 | 54.0 |
| 5725-5875 MHz | 50 | 94.0 | 500 | 54.0 |
| 24.0-24.25 GHz | 250 | 108.0 | 2500 | 68.0 |

**Table 6. Limits for Fundamental and Harmonics Radiated Emissions - Limits are specified at 3m distance as per §15.249(b)**

| FREQ. (MHZ) | EUT Azimuth (Degrees) | Antenna POL. (H/V) | Antenna HEIGHT (m) | Amplitude (dBuv) @3m | A.C.F. (dB) (+) | Cable Loss (dB) (+) | Distance Corr. (dB) (-) | Corrected Amplitude (dBuv)@3m | Limit (dBuv) @3m | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 916.5 | 62 | H | 1.54 | 66.28 | 20.70 | 5.10 | 0.00 | 92.08 | 94.00 | -1.92 |
| 916.5 | 206.9 | V | 1.05 | 69.11 | 21.82 | 5.10 | 0.00 | 96.03 | 94.00 | 2.03 |
| Above Measurementst are Peak | | | | | | | | | | |
| Measurements Below are made using Quasi Peak Detector | | | | | | | | | | |
| 916.5 | 10.9 | H | 1.58 | 61.46 | 20.70 | 5.10 | 0.00 | 87.26 | 94.00 | -6.74 |
| 916.5 | 268.3 | V | 1 | 66.37 | 21.82 | 5.10 | 0.00 | 93.29 | 94.00 | -0.71 |

**Table 7. FCC Intentional Radiators Fundamental Radiated Emissions Test Results**

* - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3dB below the specification limit. We recommend that every emission measured, have at least a 3dB margin to allow for deviations in the emission characteristics that may occur during the production process.

**Remarks:** Equipment meets the specifications of Section 15.209(a).

# V. Electromagnetic Compatibility Occupied Bandwidth Requirements

# V. Electromagnetic Compatibility Occupied Bandwidth Requirements

## A. § 2.1049 Occupied Bandwidth

**Requirements:** As required by §2.1049 of CFR 47, occupied bandwidth measurements were made on the 916.5 MHz Transceiver.

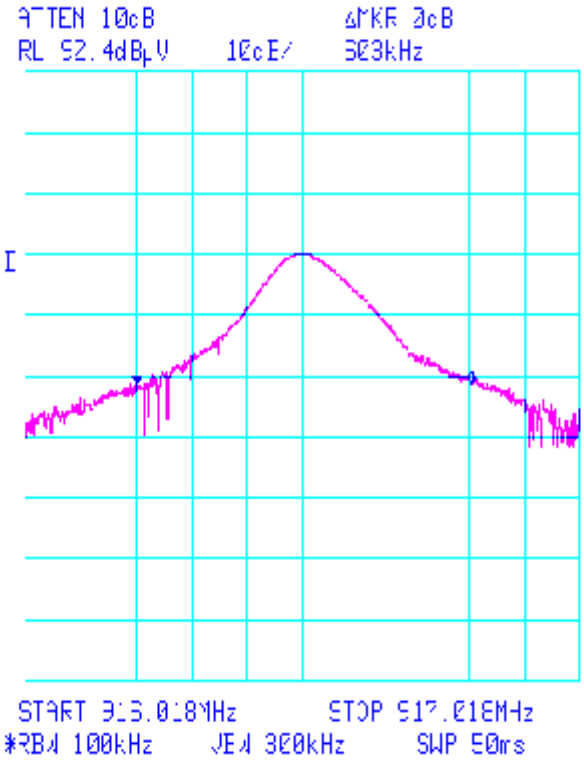
**Test Equipment:** Test equipment for FCC Pt. 2.1049 Occupied Bandwidth is in Section VII of this report.

**Test Configurations:** The EUT was installed SETUP inside a shielded enclosure. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the shielded enclosure, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 O/50 µH Line Impedance Stabilization Network (LISN).

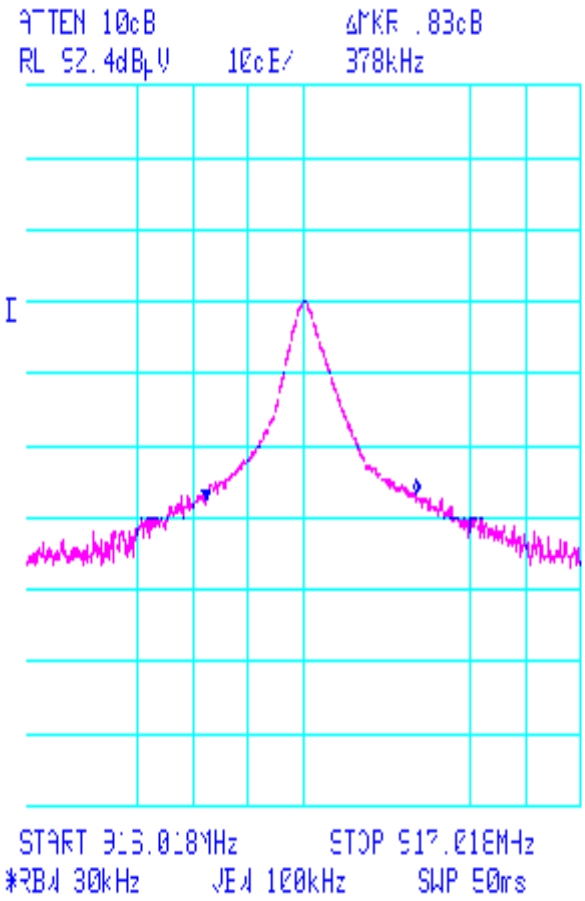
**Procedure:** The EUT was configured to transmit a continuous signal. Using a bandwidth of 30KHz, we determined the occupied bandwidth of the emission at the frequency within its operating range.

**Results:** Equipment complies with § 2.1049. The center frequency of the EUT is at 916.5 MHz which is well inside the 902 to 928 MHz band. Plots of the occupied bandwidth, as measured at the RF output port follow:

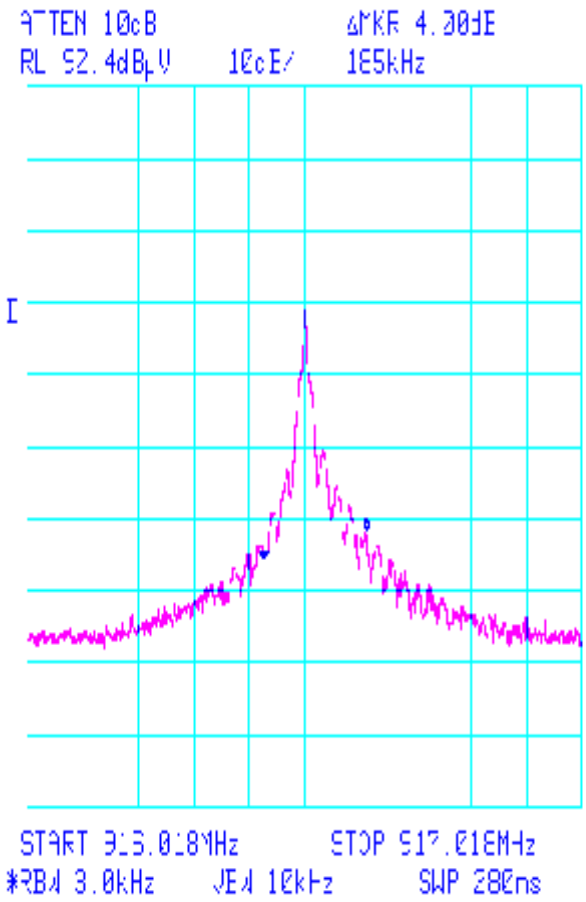
## V. Electromagnetic Compatibility Occupied Bandwidth Requirements



## V. Electromagnetic Compatibility Occupied Bandwidth Requirements



## V. Electromagnetic Compatibility Occupied Bandwidth Requirements



# VI. Electromagnetic Compatibility Peak and Average Measurement Requirements

# VI. Electromagnetic Compatibility Peak and Average Measurement Requirements

## A. §15.249(d) Peak and Average Measurement

**Requirements:** As required by §15.249(d) of CFR 47, *Peak and Average measurements* were made.

**Procedure:** Average readings when required, are taken by measuring the duty cycle of the EUT and subtracting the corresponding amount in dB from the measured peak readings according to the following formula:

Averaging factor in dB = 20 Log (duty cycle)

The time period over which the duty cycle is measured is 100 ms. The worst case (highest percentage on) duty cycle is used and described specifically in the results below. The duty cycle is measured by placing the spectrum analyzer in zero span mode.

**Results:** All peak measurements were found to be at least 20dB below the average limit therefore average measurement were not calculated using the duty cycle correction factor.

Sample Calculation for Duty Cycle:.

Pulse is transmitted every 521.8 ms in a period of 1sec. (Plot attached)

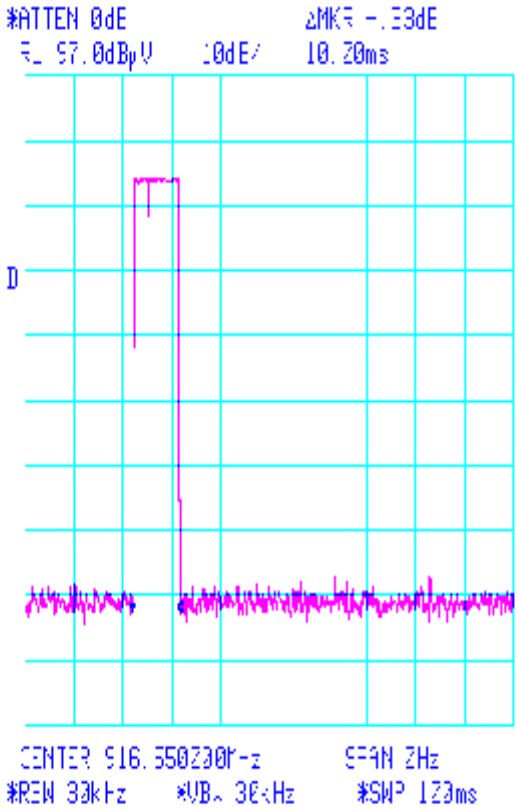
The pulse width is = 10ms (Plot attached)

So for 100ms the worst case duty cycle = 10% = 10/100 = 0.1

For an average measurement with a worst case peak = 96.03 dBuV = 60mV

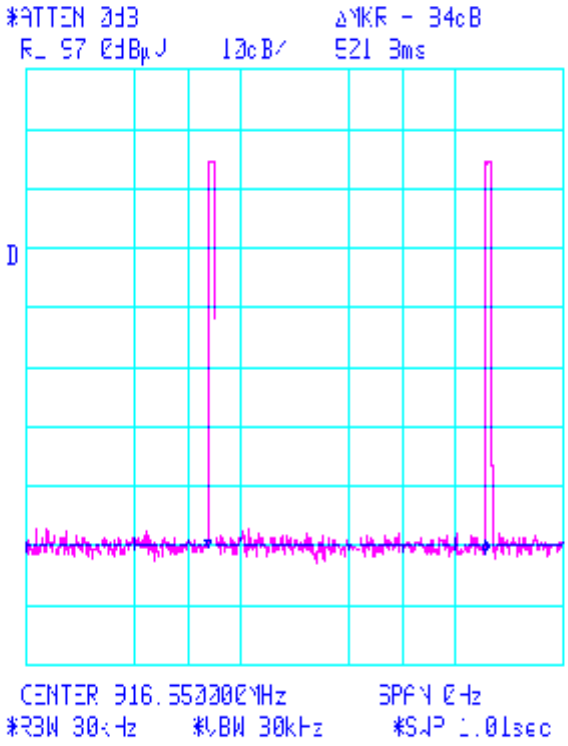
Therefore the average measurements = 60mV x 0.1 = 6mV = 75.5dBuV

## VI. Electromagnetic Compatibility Peak and Average Measurement Requirements




Pulse Width

## VI. Electromagnetic Compatibility Peak and Average Measurement Requirements




Duty Cycle

# VII. Test Equipment

## VII. Test Equipment

| Nomenclature | Manufacturer | Model # | Met Asset # | Cal Date | Cal Due |
|---|---|---|---|---|---|
| Receiver | Hewlett Packard | 8546A | 1T4302 | 08/11/01 | 08/11/02 |
| Antenna | Schaffner-Chases EMC | CBL6140A | 1T4303 | 08/02/99 | 03/25/02 |
| Antenna | EMCO | 3115A | 1T2665 | 03/03/02 | 03/03/03 |
| Test Room | Chamber # 1 | None | 1T4300 | 08/17/01 | 08/17/02 |
| Test Room | Chamber # 4 | None | 1T4214 | 08/23/01 | 08/23/02 |
| Spectrum Analyzer | Hewlett Packard | 8591E | 1T4192 | 09/25/01 | 09/25/02 |
| LISN | Solar Electronics | 8012-50-R-24-BNC | 1T4079 | 10/11/01 | 10/11/02 |
| Transient Limiter | Hewlett Packard | 11947A | 1T4295 | 04/24/01 | See Note1 |

**Table 8. Test Equipment List**

Note 1: Functionally Tested devices are verified during the time of test.

# VIII. Certification Label & User's Manual Information

# A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

**§ 2.801 Radio-frequency device defined.**

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

**§ 2.803 Marketing of radio frequency devices prior to equipment authorization.**

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

**The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:**

**§ 2.901 Basis and Purpose**

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is

to be operated.[1] In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, or the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant, whichever is applicable.

**§ 2.907 Certification.**

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

**§ 2.948 Description of measurement facilities.**

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

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[1]In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart C (of Part 15), which deals with intentional radiators.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

## B. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

**§ 15.19 Labeling requirements.**

(a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:

(ii Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(ii A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(ii All other devices shall bear the following statement in a conspicuous location on the device:

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.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent

location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

**§ 15.21 Information to user.**

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

**§ 15.105 Information to the user.**

(a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.