

FCC PART 15, SUBPART C TEST METHOD: ANSI C63.4-1992

for

REMOTE TRANSMITTER

Model: TX-1

Prepared for

PENNTEK INSTRUMENTS 14 PEACE DRIVE LEWISTOWN, PENNSYLVANIA 17044

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DATE: JANUARY 2, 1999

| REPORT | | REPORT | APPENDICES TOTAL | | | | TOTAL |
|--------|----|--------|------------------|---|----|---|-------|
| | | BODY | A | В | C | D | |
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GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: Remote Transmitter

Model: TX-1 S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: Penntek Instruments

14 Peace Drive

Lewistown, Pennsylvania 17044

Test Date: January 11, 1999

Test Specifications: EMI requirements

FCC Title 47, Part 15 Subpart C, Sections 15.205 and 15.231

Test Procedure: ANSI C63.4: 1992

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

| TEST | DESCRIPTION | RESULTS |
|------|--|---|
| 1 | Conducted RF Emissions, 450 kHz - 30 MHz | This test was not performed because the EUT runs off a nine volt battery only and cannot be powered by any device that runs off of the AC public mains. |
| 2 | Radiated RF Emissions, 10 kHz - 4200 MHz | Complies with FCC Title 47, Part 15 Subpart C, sections 15.205 and 15.231 |
| 3 | -20 dB Bandwidth of the Fundamental | Complies with FCC Title 47, Part 15 Subpart C, section 15.231 |

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Remote Transmitter Model: TX-1. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, sections 15.205, and 15.231.





2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Penntek Instruments

John Dillon Engineer

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer Scott McCutchan Lab Manager

2.4 Date Test Sample was Received

The test sample was received on December 22, 1998

2.5 Disposition of the Test Sample

The test sample was returned to Penntek Instruments on December 30, 1998.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF Radio Frequency

EMI Electromagnetic Interference EUT Equipment Under Test

P/N Part Number S/N Serial Number HP Hewlett Packard

ITE Information Technology Equipment

CML Corrected Meter Limit

LISN Line Impedance Stabilization Network



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3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

| SPEC | TITLE |
|---|---|
| FCC Title 47, Part 15, Subpart C. | FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators. |
| ANSI C63.4 1992 | Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz. |



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The Remote Transmitter Model: TX-1 (EUT) was tested as a stand alone unit and tested in three different orthogonal axis. The EUT was continuously transmitting during the test. The antenna and connector on the PCB have a reverse SMA connector.

Final radiated data was taken in the mode above.





4.1.1 Cable Construction and Termination

There were no cables attached to the EUT





5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

| EQUIPMENT | MANUFACTURER | MODEL | SERIAL | FCC ID |
|-------------|--------------|--------|--------|----------|
| | | NUMBER | NUMBER | |
| REMOTE | PENNTEK | TX-1 | N/A | C6M418TX |
| TRANSMITTER | INSTRUMENTS | | | |
| (EUT) | | | | |





5.2 EMI Test Equipment

| EQUIPMENT TYPE | MANU- FACTURER | MODEL NUMBER | SERIAL NUMBER | CAL. DATE | CAL. DUE DATE |
|----------------------|---------------------|-----------------|------------------|---------------|------------------|
| Spectrum Analyzer | Hewlett Packard | 8566B | 3638A08784 | Nov. 16, 1998 | May 16, 1999 |
| Preamplifier | Com Power | PA-102 | 1017 | Feb. 16, 1998 | Feb. 16, 1999 |
| Quasi-Peak Adapter | Hewlett Packard | 85650A | 3303A01688 | June 23, 1998 | June 23, 1999 |
| RF Attenuator | Com-Power | A-410 | 1602 | Nov. 25, 1998 | Nov. 25, 1999 |
| LISN | Com Power | LI-200 | 1764 | Jan. 3, 1998 | Jan. 3, 1999 |
| LISN | Com Power | LI-200 | 1771 | Jan. 3, 1998 | Jan. 3, 1999 |
| LISN | Com Power | LI-200 | 1775 | Jan. 3, 1998 | Jan. 3, 1999 |
| LISN | Com Power | LI-200 | 1780 | Jan. 3, 1998 | Jan. 3, 1999 |
| Biconical Antenna | Com Power | AB-100 | 1548 | Oct. 15, 1998 | Oct. 15, 1999 |
| Log Periodic Antenna | Com Power | AL-100 | 1117 | Oct. 15, 1998 | Oct. 15, 1999 |
| Antenna Mast | Com Power | AM-100 | N/A | N/A | N/A |
| Turntable | Com Power | TT-100 | N/A | N/A | N/A |
| Computer | Hewlett Packard | HP98561A | 2522A05178 | N/A | N/A |
| Printer | Hewlett Packard | 2225A | 2925S33268 | N/A | N/A |
| Plotter | Hewlett Packard | 7440A | 8726K38417 | N/A | N/A |
| Microwave Amplifier | Com-Power | PA-122 | 25321 | Oct. 13, 1998 | Oct. 13, 1999 |
| Horn Antenna | Antenna Research | DRG-118/A | 1053 | Dec. 8, 1995 | N/A |
| Loop Antenna | Com-Power | AL-130 | 25309 | Feb. 5, 1998 | Feb. 5, 1999 |



6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.





7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Com Power Microwave Amplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets. The measurement bandwidths and transducers used for the radiated emissions test were:

| FREQUENCY RANGE | EFFECTIVE MEASUREMENT BANDWIDTH | TRANSDUCER |
|-------------------|---------------------------------------|----------------------|
| 10 kHz to 150 kHz | 200 Hz | Active Loop Antenna |
| 150 kHz to 30 MHz | 9 kHz | Active Loop Antenna |
| 30 MHz to 300 MHz | 120 kHz | Biconical Antenna |
| 300 MHz to 1 GHz | 120 kHz | Log Periodic Antenna |
| above 1 GHz | 1 MHz | Horn Antenna |

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data.

7.2 Bandwidth of the Fundamental

The -20~dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the transmitter. A plot of the -20~dB bandwidth is in Appendix D.





8. CONCLUSIONS

The Remote Transmitter Model: TX-1 meets all of the specification limits defined in FCC Title 47, Part 15, Subpart C, sections 15.205 and 15.231.





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APPENDIX A

MODIFICATIONS TO THE EUT



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MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

| 3 A | 1. | C. | . • | | |
|------|--------------|-------------|--------|------|--|
| 1.71 | αd_1 | †1 0 | 21 t 1 | one | |
| 111 | oui | ш | au | ons: | |

No modifications were made to the EUT.



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APPENDIX B

ADDITIONAL MODELS COVERED UNDER THIS REPORT



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ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Remote Transmitter Model: TX-1 S/N: N/A

There were no additional models covered under this report.



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APPENDIX C

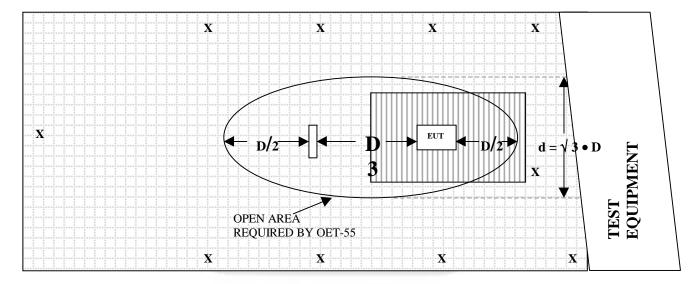
DIAGRAMS, CHARTS AND PHOTOS



OPEN LAND > 15 METERS

FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE

OPEN LAND > 15 METERS

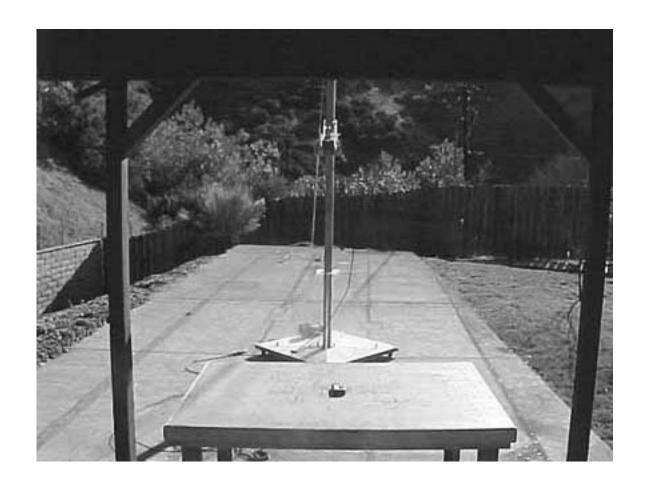


OPEN LAND > 15 METERS

X = GROUND RODS = GROUND SCREEN

D = TEST DISTANCE (meters) = WOOD COVER



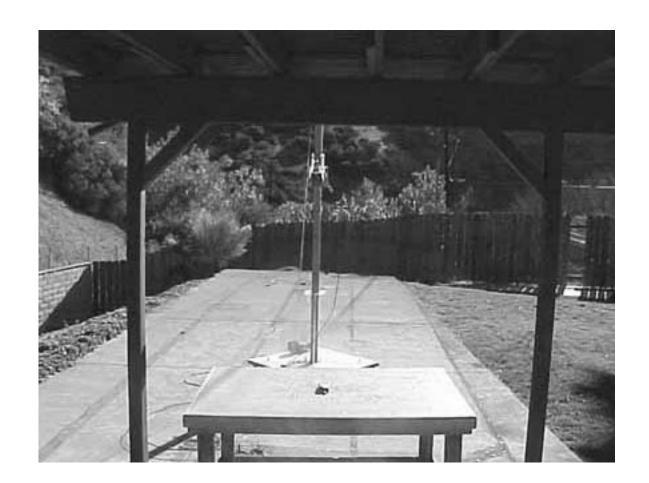


FRONT VIEW

PENNTEK INSTRUMENTS
REMOTE TRANSMITTER
Model: TX-1
FCC SUBPART C - RADIATED EMISSIONS – 1-11-99

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

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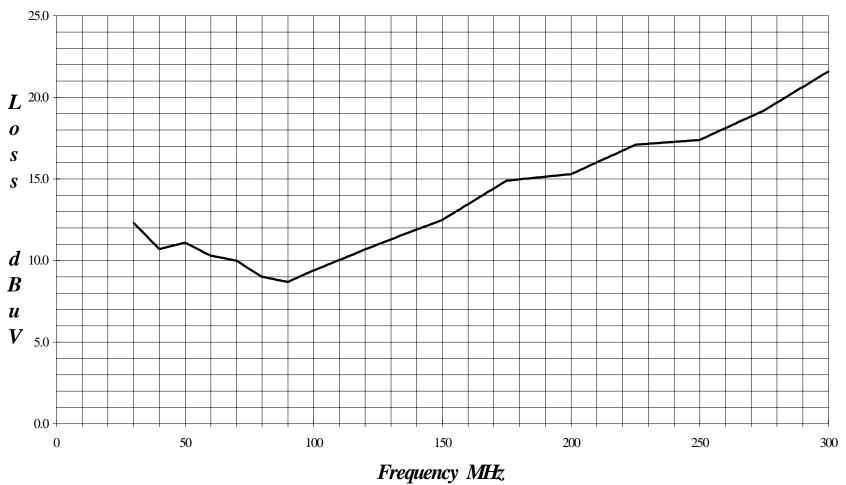


REAR VIEW

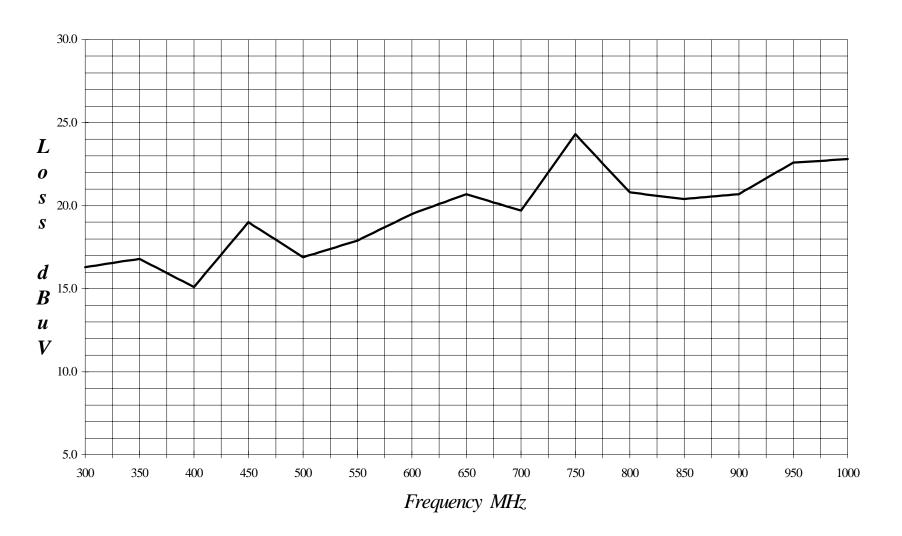
PENNTEK INSTRUMENTS
REMOTE TRANSMITTER
Model: TX-1
FCC SUBPART C - RADIATED EMISSIONS – 1-11-99

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

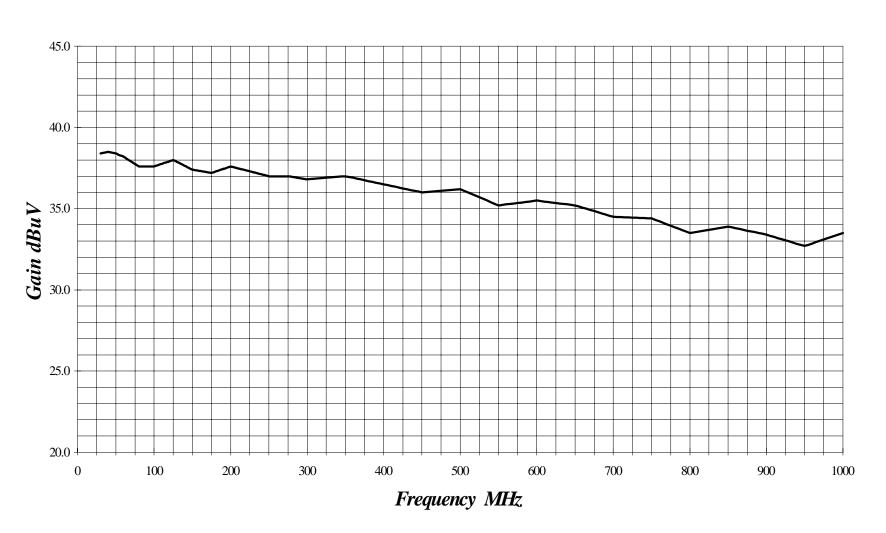
LAB ''D'' BICONICAL ANTENNA AB-100 S/N 01548



LAB "D" LOG PERIODIC ANTENNA AL-100 S/N 01117



PREAMPLIFIER EFFECTIVE GAIN AT 3 METERS PA-102 S/N: 1017



COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 25132

CALIBRATION DATE: OCTOBER 13, 1998

| FREQUENCY (GHz) | FACTOR | FREQUENCY (GHz) | FACTOR |
|--------------------|--------------------|-----------------|--------------------|
| 1.0 | (dB) 33.7 | 8.0 | (dB) 32.9 |
| 1.1 | 33.5 | 8.5 | 32.7 |
| | | | |
| 1.2 | 33.5 | 9.0 | 33.2 |
| 1.3 | 33.6 | 9.5 | 33.7 |
| 1.4 | 33.5 | 10.0 | 34.6 |
| 1.5 | 33.0 | 10.5 | 32.7 |
| 1.6 | 33.4 | 11.0 | 30.8 |
| 1.7 | 33.5 | 11.5 | 32.1 |
| 1.8 | 33.6 | 12.0 | 31.7 |
| 1.9 | 33.5 | 12.5 | 32.9 |
| 2.0 | 33.9 | 13.0 | 27.8 |
| 2.5 | 33.9 | 13.5 | 30.7 |
| 3.0 | 33.6 | 14.0 | 30.4 |
| 3.5 | 33.5 | 14.5 | 31.7 |
| 4.0 | 33.4 | 15.0 | 32.2 |
| 4.5 | 32.9 | 15.5 | 34.0 |
| 5.0 | 32.4 | 16.0 | 31.6 |
| 5.5 | 32.7 | 16.5 | 32.7 |
| 6.0 | 33.6 | 17.0 | 31.7 |
| 6.5 | 32.5 | 17.5 | 31.2 |
| 7.0 | 33.0 | 18.0 | 30.2 |
| 7.5 | 33.7 | | |



E-FIELD ANTENNA FACTOR CALIBRATION

E(dB V/m) = Vo(dB V) + AFE(dB/m)

Model number: DRG-118/A

| Frequency | AFE | Gain |
|-----------|--------------|------|
| GHz | dB/m | dBi |
| 4 | 00.3 | 8.0 |
| 1 | 22.3 | |
| 2 | 26.7 | 9.5 |
| 3 | 2 9.7 | 10.1 |
| 4 | 29.5 | 12.8 |
| 5 | 32.3 | 12.0 |
| 6 | 32.4 | 13.4 |
| 7 | 36.1 | 11.0 |
| 8 | 37.4 | 10.9 |
| 9 | 36.8 | 12.5 |
| 10 | 39 .5 | 10.7 |
| 11 | 39 .6 | 11.5 |
| 12 | 39 .8 | 12.0 |
| 13 | 39.7 | 12.8 |
| 14 | 41.8 | 11.3 |
| 15 | 41.9 | 11.9 |
| 16 | 38.1 | 16.3 |
| 17 | 41.0 | 13.9 |
| 18 | 46.5 | 8.9 |

Calibrated By

Serial number: 1053 Job number: 96-092

Remarks: 3 meter calibration Standards: LPD-118/A, TE-1000

Temperature: 72° F Humidity: 56 % Traceability: A01887

Date: December 08, 1995



ΔA :

| | (714) 587-9800 | |
|--|---------------------|---|
| | Antenna Calibration | |
| Antenna Type: Model: Serial Number: Calibration Date: | | Loop Antenna AL-130 25309 275/98 |
| Frequency MHz | Magnetic (dR/m) | Electric dB/m |
| 0.01 | -40.5 | 11.0 |
| 0.01 | -41.6 | 9.9 |
| 0.02 0.03 | -41.6 | 11.5 |
| 0.03 | -40.3 | 11.2 |
| 0.05 | -41.6 | 9.9 |
| 0.06 | -41.1 | 10.4 |
| 0.07 | -41.3 | 10.2 |
| 0.08 | -41.6 | 9.9 |
| 0.09 | -41.7 | 9.8 |
| 0.1 | -41.8 | 9.7 |
| 0.2 | -44.0 | 7.5 |
| 0.3 | -41.6 | 9.9 |
| 0.4 | -41.7 | 9.8 |
| 0.5 | -41.7 | 9.8 |
| 0.6 | -41.5 | 10.0 |
| 0.7 | -41.5 | 10.0 |
| 0.8 | -41.6 | 9.9 |
| 0.9 | -41.6 | 9.9 |
| 1 | -41.1 | 10.4 |
| 2 | -40.7 | 10.8 |
| 3 | -40.7 | 10.8 |
| 4 | -40.9 | 10.6 |
| 5 | -40.1 | 11.4 |
| 66 | -40.0 | 11.5 |
| 7 | -40.3 | 11.2 |
| 8 | -39.8 | 11.7 |
| 9 | -38.8 | 12.7 |
| 10 | -40.8 | 10.7 |
| 12 | -41.4 | 10.1 |
| 14 | -41.4 | 10.1 |
| 15 | -40.9 | 10.6 |
| 16 | -40.8 | 10.7 10.0 |
| 18 | -41.5 -41.5 | 10.0 |
| 20 25 | 41.2 | 10.3 |
| 30 | 41.4 | 10.1 |
| | 771.7 | 40.4 |

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APPENDIX D

DATA SHEETS





RADIATED EMISSIONS (FCC SUBPART C, SECTION 15.231)

| COMEANN FOXPRO EUT REMOTE TRANSMITTER MODEL TX-1 | DATE 1/11/99 |
|--|---|
| EUT REMOTE TRANSMITTER | ANTENNAS LOG PERIODIC AND HORN POLARIZATION SEE BELOW |
| MODEL TX-1 | PGLARIZATION SEE BELOW |
| DUTY CYCLE 48% = 6.3 dB AVERAGE DROP EUT MODE TRANSMITTING AT 418 MHz | TEST DISTANCE 3 METERS LAB D |
| EUT MODE TRANSMITTING AT 418 MHz | LAB D |

| Frequency | Fred. | Average or | Amenda | Azimuth | Distance | Artierna | Cable | Amplifier | *Corrected | | Spec | Comments |
|-------------|----------|---------------|-----------|------------|-----------|-----------|------------|-------------|------------|-------|-----------|----------|
| | Proting | Quan-Prais | Height | | Partet | Pactor | Lose | COURT | Resimg | ** | Limit | |
| MHz | (dBuv) | (dBuV) | (melers) | (degrees) | (db) | (4B) | (883) | (48) | (dBavm) | (48) | (d8uV/83) | |
| | | NA POLARI | | 225 | | 44.5 | - | | | | | |
| 418.05 | 93.5 | 87.2 | 2.0 | 225 | 0.0 | 16.5 | 2.1 | 38.4 | 67.4 | -12.8 | 80.2 | X Axis |
| 418.05 | 104.1 | 97.8 | 1.5 | 180 | 0.0 | 16.5 | 2.1 | 38.4 | 78.0 | -2.2 | 80.2 | Y Axis |
| 418.05 | 95.6 | 89.3 | 2.5 | 0 | 0.0 | 16.5 | 2.1 | 38.4 | 69.5 | -10.7 | 80.2 | Z Axis |
| | | ENNA POL | | | | | | | | | | |
| 418.05 | 103.4 | 97.1 | 1.0 | 90 | 0.0 | 16.5 | 2.1 | 38.4 | 77.3 | -2.9 | 80.2 | X Axis |
| 418.05 | 93.3 | 87.0 | 1.0 | 0 | 0.0 | 16.5 | 2.1 | 38.4 | 67.2 | -13.0 | 80.2 | Y Axis |
| 418.05 | 103.2 | 96.9 | 1.0 | 270 | 0.0 | 16.5 | 2.1 | 38.4 | 77.1 | -3.1 | 80.2 | Z Axis |
| | | NA POLARI | , | | | | | | | | | |
| 836.10 | 55.6 | 49.3 | 1.0 | 90 | 0.0 | 20.5 | 4.2 | 38.0 | 36.0 | -24.2 | 60.2 | X Axis |
| 836.10 | 66.8 | 60.5 | 2.0 | 0 | 0.0 | 20.5 | 4.2 | 38.0 | 47.2 | -13.0 | 60.2 | Y Axis |
| 836.10 | 56.7 | 50.4 | 1.0 | 90 | 0.0 | 20.5 | 4.2 | 38.0 | 37.1 | -23.1 | 60.2 | Z Axis |
| HORIZON | TAL ANT | ENNA POLA | ARIZATIO | N | | | | | | | | |
| 836.10 | 64.5 | 58.2 | 1.0 | 180 | 0.0 | 20.5 | 4.2 | 38.0 | 44.9 | -15.3 | 60.2 | X Axis |
| 836.10 | 51.8 | 45.5 | 1.0 | 90 | 0.0 | 20.5 | 4.2 | 38.0 | 32.2 | -28.0 | 60.2 | Y Axis |
| 836.10 | 60.0 | 53.7 | 1.5 | 90 | 0.0 | 20.5 | 4.2 | 38.0 | 40.4 | -19.8 | 60.2 | Z Axis |
| VERTICA | L ANTEN | NA POLARI | ZATION | | | | | | | • | | |
| 1254.15 | 46.9 | 40.6 | 1.5 | 180 | 0.0 | 22.3 | 4.2 | 33.6 | 33.5 | -26.7 | 60.2 | X Axis |
| 1254.15 | 44.9 | 38.6 | 2.0 | 0 | 0.0 | 22.3 | 4.2 | 33.6 | 31.5 | -28.7 | 60.2 | Y Axis |
| 1254.15 | 45.7 | 39.4 | 2.0 | 90 | 0.0 | 22.3 | 4.2 | 33.6 | 32.3 | -27.9 | 60.2 | Z Axis |
| HORIZON | TAL ANT | ENNA POLA | ARIZATIO | N | | | | | | | | |
| 1254.15 | 45.1 | 38.8 | 1.0 | 0 | 0.0 | 22.3 | 4.2 | 33.6 | 31.7 | -28.5 | 60.2 | X Axis |
| 1254.15 | 45.4 | 39.1 | 1.0 | 0 | 0.0 | 22.3 | 4.2 | 33.6 | 32.0 | -28.2 | 60.2 | Y Axis |
| 1254.15 | 46.3 | 40.0 | 1.0 | 180 | 0.0 | 22.3 | 4.2 | 33.6 | 32.9 | -27.3 | 60.2 | Z Axis |
| VERTICA | L ANTEN | NA POLARI | ZATION | | | | | | | | | |
| 1672.20 | 46.2 | 39.9 | 2.0 | 270 | 0.0 | 24.5 | 5.5 | 33.5 | 36.4 | -17.6 | 54.0 | X Axis |
| 1672.20 | 46.2 | 39.9 | 1.5 | 90 | 0.0 | 24.5 | 5.5 | 33.5 | 36.4 | -17.6 | 54.0 | Y Axis |
| 1672.20 | 44.4 | 38.1 | 2.0 | 90 | 0.0 | 24.5 | 5,5 | 33.5 | 34.6 | -19.4 | 54.0 | Z Axis |
| HORIZON | TAL ANT | ENNA POLA | ARIZATIO | N | | | | | | | | |
| 1672.20 | 44.8 | 38.5 | 2.0 | 270 | 0.0 | 24.5 | 5.5 | 33.5 | 35.0 | -19.0 | 54.0 | X Axis |
| 1672.20 | 47.0 | 40.7 | 2.5 | 180 | 0.0 | 24.5 | 5.5 | 33.5 | 37.2 | -16.8 | 54.0 | Y Axis |
| 1672.20 | 46.3 | 40.0 | 3.0 | 90 | 0.0 | 24.5 | 5.5 | 33.5 | 36.5 | -17.5 | 54.0 | Z Axis |
| | ···· | | | | | | | | | | | |
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| | CORRECTE | D READING = N | METER REA | DING + ANT | RNNA RACT | OR + CARL | I OSS - AM | PLIFIER GAI | N | | | |

CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN
 DELTA = SPEC LIMIT - CORRECTED READING



RADIATED EMISSIONS

| COMPANY FOXPRO EUT REMOTE TRANSMITTER MOBEL TX-1 DUTY CYCLE 48% = 6.3 dB AVERAGE DROP EUTSIODE TRANSMITTING AT 418 MHz | DATE 1/11/99 |
|--|--------------------------------------|
| EUT REMOTE TRANSMITTER | ANTENNAS HORN |
| MODEL TX-1 | ANTENNAS HORN POLARIZATION SEE BELOW |
| DUTY CYCLE 48% = 6.3 dB AVERAGE DROP | TEST DISTANCE 3 METERS |
| EUT MODE TRANSMITTING AT 418 MHz | TEST DISTANCE 3 METERS LAB D |

| Proquency | Year | Average | Antema | Azimuth | Distance | Antemat | Cable | Amphiler | Corrected | Delta | Sper | Comments |
|---------------|----------|--|--|--|--|------------|------------|--------------|-----------|-------|-----------|----------|
| . troiforthe. | Programs | Quasi-Peak | Height | ***** | Partet | Pactor | Loss | CONS | Resting | ** | Limit | |
| MH2 | (dBuV) | (dBuV) | (Harters) | (degrees) | (db) | (dB) | (86) | (48) | (dBaV/m) | (48) | (dBuV/ss) | |
| VERTICA | | NA POLARI | ZATION | | | | | | | | | |
| 2090.25 | 50.0 | 43.7 | 3.0 | 90 | 0.0 | 26.7 | 4.8 | 33.9 | 41.3 | -18.9 | 60.2 | X Axis |
| 2090.25 | 50.2 | 43.9 | 3.0 | 90 | 0.0 | 26.7 | 4.8 | 33.9 | 41.5 | -18.7 | 60.2 | Y Axis |
| 2090.25 | 52.2 | 45.9 | 2.0 | 180 | 0.0 | 26.7 | 4.8 | 33.9 | 43.5 | -16.7 | 60.2 | Z Axis |
| HORIZON | TAL AN | TENNA POL | ARIZATIO | N | | | | | | | | |
| 2090.25 | 48.7 | 42.4 | 2.5 | 180 | 0.0 | 26.7 | 4.8 | 33.9 | 40.0 | -20.2 | 60.2 | X Axis |
| 2090.25 | 50.3 | 44.0 | 2.5 | 180 | 0.0 | 26.7 | 4.8 | 33.9 | 41.6 | -18.6 | 60.2 | Y Axis |
| 2090.25 | 47.5 | 41.2 | 1.0 | 90 | 0.0 | 26.7 | 4.8 | 33.9 | 38.8 | -21.4 | 60.2 | Z Axis |
| VERTICA | L ANTEN | NA POLARI | ZATION | | | | | | | | | |
| 2508.25 | 42.8 | 36.5 | 2.0 | 90 | 0.0 | 28.2 | 5.5 | 33.9 | 36.3 | -23.9 | 60.2 | X Axis |
| 2508.25 | 42.9 | 36.6 | 1.0 | 90 | 0.0 | 28.2 | 5.5 | 33.9 | 36.4 | -23.8 | 60.2 | Y Axis |
| 2508.25 | 42.6 | 36.3 | 3.0 | 180 | 0.0 | 28.2 | 5.5 | 33.9 | 36.1 | -24.1 | 60.2 | Z Axis |
| HORIZON | NTAL AN | TENNA POL | ARIZATIO | N | | | | | | | | |
| 2508.25 | 42.1 | 35.8 | 1.0 | 0 | 0.0 | 28.2 | 5.5 | 33.9 | 35.6 | -24.6 | 60.2 | X Axis |
| 2508.25 | 44.1 | 37.8 | 1.5 | 270 | 0.0 | 28.2 | 5.5 | 33.9 | 37.6 | -22.6 | 60.2 | Y Axis |
| 2508.25 | 43.6 | 37.3 | 1.0 | 90 | 0.0 | 28.2 | 5.5 | 33.9 | 37.1 | -23.1 | 60.2 | Z Axis |
| VERTICA | L ANTEN | NA POLARI | ZATION | | | | | | | | | |
| 2926.30 | 41.6 | 35.3 | 1.0 | 90 | 0.0 | 29.7 | 6.4 | 33.6 | 37.8 | -22.4 | 60.2 | X Axis |
| 2926.30 | 41.0 | 34.7 | 1.5 | 90 | 0.0 | 29.7 | 6.4 | 33.6 | 37.2 | -23.0 | 60.2 | Y Axis |
| 2926.30 | 39.9 | 33.6 | 1.0 | 180 | 0.0 | 29.7 | 6.4 | 33.6 | 36.1 | -24.1 | 60.2 | Z Axis |
| HORIZON | NTAL AN | TENNA POL | ARIZATIO | N | | | | | | | | |
| 2926,30 | 41.6 | 35.3 | 1.5 | 270 | 0.0 | 29.7 | 6.4 | 33.6 | 37.8 | -22.4 | 60.2 | X Axis |
| 2926.30 | 40.8 | 34.5 | 1.0 | 90 | 0.0 | 29.7 | 6.4 | 33.6 | 37.0 | -23.2 | 60.2 | Y Axis |
| 2926.30 | 41.7 | 35.4 | 1.5 | 270 | 0.0 | 29.7 | 6.4 | 33.6 | 37.9 | -22.3 | 60.2 | Z Axis |
| | | NA POLARI | ZATION | | | | | | | | | |
| 3344.35 | 41.6 | 35.3 | 2.0 | 90 | 0.0 | 29.6 | 6.9 | 33.5 | 38.3 | -21.9 | 60.2 | X Axis |
| 3344.35 | 41.4 | 35.1 | 2.0 | 0 | 0.0 | 29.6 | 6.9 | 33.5 | 38.1 | -22.1 | 60.2 | Y Axis |
| 3344.35 | 40.0 | 33.7 | 2.0 | 90 | 0.0 | 29.6 | 6.9 | 33.5 | 36.7 | -23.5 | 60.2 | Z Axis |
| | | TENNA POL | | N | | | | | | | | |
| 3344.35 | 40.4 | 34.1 | 1.5 | 90 | 0.0 | 29.6 | 6.9 | 33.5 | 37.1 | -23.1 | 60.2 | X Axis |
| 3344.35 | 44.5 | 38.2 | 1.5 | 270 | 0.0 | 29.6 | 6.9 | 33.5 | 41.2 | -19.0 | 60.2 | Y Axis |
| 3344.35 | 44.2 | 37.9 | 2.0 | 90 | 0.0 | 29.6 | 6.9 | 33.5 | 40.9 | -19.3 | 60.2 | Z Axis |
| 3544.55 | 17.2 | 2.70 | | | | · · · | | | | | | |
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| | | ED READING = | A ADMINIO DE A | DING LAN | CENTAL EAC | TOP + CADI | FLOSS - AN | API IFIER GA | IN | | | |

CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN
 DELTA = SPEC LIMIT - CORRECTED READING



RADIATED EMISSIONS

| COMPANY FOXPRO | DATE 1/11/99 |
|-------------------------------------|---|
| EDT REMOTE TRANSMITTER | ANTENNAS HORN |
| ESI REMOTE TRANSMITTEN | POLARIZATION SEE BELOW |
| MODEL IX-I | TEST DISTANCE 3 METERS |
| BUTYCYCLE 48% = 6.3 dB AVERAGE DROP | TAR D |
| EUT NODE TRANSMITTING AT 418 MHz | *************************************** |

| | | | ******************************* | 00000000000000000000000000000000000000 | 000000000000000000000000000000000000000 | 2000000000000000 | ****** | ************ | *Corrected | Delta | Spec | Cenments |
|-----------|--|----------------------|---------------------------------|--|---|------------------|---------------|----------------|------------|----------|----------------|---------------|
| stedneten | 99 al | Average or | Aptema | Azimuth | Distance Factor | Amenas Pactor | Loss | - 194 1 | Resimg | 4.0 | Limet | |
| MHz | Resting (dBuV) | Quaer-Peak (dBuV) | Height (meters) | (degrees) | (dB) | (dB) | (88) | (48) | (dBuVin) | (dB) | (dBuV/88) | |
| | | NA POLARI | | | | | | | | | | |
| 3762.40 | 40.4 | 34.1 | 2.0 | 180 | 0.0 | 29.5 | 8.2 | 33.4 | 38.4 | -15.6 | 54.0 | X Axis |
| 3762.40 | 40.1 | 33.8 | 1.0 | 180 | 0.0 | 29.5 | 8.2 | 33.4 | 38.1 | -15.9 | 54.0 | Y Axis |
| 3762.40 | 38.8 | 32.5 | 2.0 | 90 | 0.0 | 29.5 | 8.2 | 33.4 | 36.8 | -17.2 | 54.0 | Z Axis |
| 10DIZON | TAL ANT | ENNA POL | | ON . | | | | | | | | |
| 3762.40 | 37.7 | 31.4 | 1.0 | 270 | 0.0 | 29.5 | 8.2 | 33.4 | 35.7 | -18.3 | 54.0 | X Axis |
| 3762.40 | 39.8 | 33.5 | 1.0 | 270 | 0.0 | 29.5 | 8.2 | 33.4 | 37.8 | -16.2 | 54.0 | Y Axis |
| 3762.40 | 40.2 | 33.9 | 1.0 | 90 | 0.0 | 29.5 | 8.2 | 33.4 | 38.2 | -15.8 | 54.0 | Z Axis |
| VERTICA | | NA POLARI | ZATION | | | | <u> </u> | | | | | 77 A - 4 - |
| 4180.41 | 40.4 | 34.1 | 2.0 | 90 | 0.0 | 29.5 | 8.2 | 33.4 | 38.4 | -15.6 | 54.0 | X Axis |
| 4180.41 | 36.0 | 29.7 | 2.5 | 90 | 0.0 | 29.5 | 8.2 | 33.4 | 34.0 | -20.0 | 54.0 | Y Axis |
| 4180.41 | 40.0 | 33.7 | 1.5 | 90 | 0.0 | 29.5 | 8.2 | 33.4 | 38.0 | -16.0 | 54.0 | Z Axis |
| | | ENNA POL | ARIZATIO | ON | | | | | | | _ | W A . d |
| 4180.41 | 36.6 | 30.3 | 1.0 | 180 | 0.0 | 29.5 | 8.2 | 33.4 | 34.6 | -19.4 | 54.0 | X Axis |
| 4180.41 | 39.2 | 32.9 | 1.0 | 180 | 0.0 | 29.5 | 8.2 | 33.4 | 37.2 | -16.8 | 54.0 | Y Axis Z Axis |
| 4180.41 | 37.6 | 31.3 | 2.0 | 90 | 0.0 | 29.5 | 8.2 | 33.4 | 35.6 | -18.4 | 54.0 | Z AXIS |
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CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN
 DELTA = SPEC LIMIT - CORRECTED READING



RADIATED EMISSIONS

| COMPANY NAME: PENNTER INSTRUM | DATE: 12-22-98 |
|---|-------------------------------------|
| EUT: REMOTE TRANSMITTER | |
| EUT MODEL: TX-/ | _LOCATION: BREA SILVERADO AGOURA |
| SPECIFICATION: FCC SUBPART C CLASS: | TEST DISTANCE: 3 M LAB: 0 |
| ANTENNA: LOOP BICONICAL LOG | HORN POLARIZATION: VERT HORIZ |
| \blacksquare QUALIFICATION \square ENGINEERING \square MFG. | AUDIT ENGINEER: KYLE F. |
| NOTES: CPURIOUS EMISSION | DW C |

| Frequency (GHz) | Peak Reading (dBuV) | Average Reading (dBuV) | Antenna Height (meters) | Azimuth (degrees) | Delta * (dB) | Corrected Limit (dBuV) | Comments |
|-----------------|---------------------------|------------------------------|-------------------------------|-------------------|--------------|------------------------------|----------|
| · | | | | | | | |
| | | NO | SPURS | IOUS C | MISSI | ONS | |
| | | FOUND | BET | MEEN | 10 KHZ | ANO | |
| | | 4500 | | In | | POLARIZA | T100 |
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* DELTA = METER READING - CORRECTED LIMIT

BREA (714) 579-0500

SILVERADO (714) 589-0700

AGOURA (818) 597-0600

