

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

FCC Test Report

Product Name: VHF SYNTHESISED DATA TRANSCEIVER - TRANSMITTER PORTION

FCC ID: L9N-7085-VE

Applicant:

**AES CORPORATION
285 NEWBURY ST.
PEABODY, MASSACHUTTES 01960**

Date Receipt: NOVEMBER 5, 2003

Date Tested: NOVEMBER 26, 2003

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

TITLE PAGE

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

TABLE OF CONTENTS LIST

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

TEST REPORT:

PAGE 1.....	GENERAL INFORMATION & TECHNICAL DESCRIPTION
PAGE 2.....	TECHNICAL DESCRIPTION CONTINUED RF POWER OUTPUT
PAGE 3.....	MODULATION CHARACTERISTICS OCCUPIED BANDWIDTH
PAGE 4.....	OCCUPIED BANDWIDTH CONTINUED
PAGE 5-6.....	OCCUPIED BANDWIDTH PLOTS
PAGE 7.....	SPURIOUS EMISSIONS AT ANTENNA TERMINALS
PAGE 8.....	METHOD OF MEASURING SPURIOUS EMISSIONS AT ANTENNA TERMINALS
PAGE 9-11.....	FIELD STRENGTH OF SPURIOUS EMISSIONS
PAGE 12.....	METHOD OF MEASURING RADIATED SPURIOUS EMISSIONS
PAGE 13.....	FREQUENCY STABILITY
PAGE 14-15.....	TRANSIENT FREQUENCY BEHAVIOUR
PAGE 16-17.....	TRANSIENT FREQUENCY PLOTS
PAGE 18.....	MPE CALCULATION
PAGE 19-21.....	TEST EQUIPMENT LIST

EXHIBITS CONTAINING:

BLOCK DIAGRAM
SCHEMATIC
PARTS LIST
USERS MANUAL
LABEL SAMPLE
LABEL LOCATION
EXTERNAL PHOTOGRAPHS
INTERNAL PHOTOGRAPHS
TUNING PROCEDURE
OPERATIONAL DESCRIPTION
TEST SET UP PHOTOGRAPH

APPLICANT: AES CORPORATION
FCC ID: L9N-7085-VE
REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc
TABLE OF CONTENTS

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE

2.1033(c) (1) (2) AES CORPORATION will sell the FCC ID: L9N-7085-VE VHF transceiver in quantity, or use under FCC RULES PART 90.

2.1033(c) **TECHNICAL DESCRIPTION**

2.1033(c) (3) Instruction book. A draft copy of the instruction manual is included in the exhibits.

2.1033 (4) Type of Emission: 11K25F2D For 12.5 kHz
 6K0F2D For 6.25 kHz

For 12 kHz

$$B_n = 2M + 2DK$$

$$M = 9,600 \text{ Bits per second}$$

$$D = 825 \text{ Hz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(9600/2) + 2(825)(1) = 9600 + 1650 = 11250$$

$$\text{ALLOWED AUTHORIZED BANDWIDTH} = 11.25 \text{ kHz.}$$

For 6.25 kHz

$$B_n = 2M + 2DK$$

$$M = 4,800 \text{ Bits per second}$$

$$D = 600 \text{ Hz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(4800/2) + 2(600)(1) = 4800 + 1200 = 6000$$

$$\text{ALLOWED AUTHORIZED BANDWIDTH} = 6.0 \text{ kHz.}$$

90.209 (b) (5)

2.1033 (6) Frequency Range: 140 - 174 MHz

(7) Power Range and Controls: There are NO user Power controls.

(8) Maximum Output Power Rating:

(9) DC Voltages and Current into Final Amplifier:

POWER INPUT

FINAL AMPLIFIER ONLY

High

$$V_{ce} = 13.7 \text{ VDC}$$

$$I_{ce} = .660 \text{ A.}$$

$$P_{in} = 9.04 \text{ Watts}$$

Low

$$V_{ce} = 13.7 \text{ VDC}$$

$$I_{ce} = .470$$

$$P_{in} = 6.44 \text{ Watts}$$

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 1 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

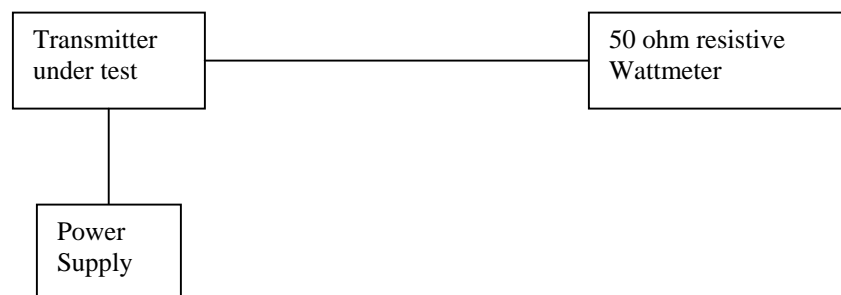
Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

- (10) Tune-up procedure. The tune-up procedure is given in the exhibits.
- 2.1033 (11) Complete Circuit Diagrams: The circuit diagram and block diagram are included in the exhibits.
- (12) Function of each electron tube or semiconductor device or other active circuit device: See the exhibits.
- (13) Instruction book. The instruction manual is included in the exhibits.
- (14) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description is included in the exhibits.
- 2.1033(c) (15) A photograph or drawing of the equipment identification label is shown in the exhibits.
- 2.1033(c) (16) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in the exhibits.
- 2.1033(c) (17) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses FSK to modulate the transmitter.
- 2.1033(c) (18) Data required for 2.1046 to 2.1057 See Below
- 2.1046(a) **RF power output**
RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage of 13.7 VDC, and the transmitter properly adjusted the RF output measures:
- | | | |
|------------------------|-----------------------|------------------------|
| 141: HIGH - 2.95 Watts | 155: HIGH - 5.5 Watts | 173: HIGH - 6.76 Watts |
| LOW - 0.60 Watts | LOW - 1.05 Watts | LOW - 1.62 Watts |

METHOD OF MEASURING RF POWER OUTPUT



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 2 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

- 2.1047(a) **Voice Modulation characteristics:**
NOT APPLICABLE, F2 type of emission.
- 2.1049 **Audio Low Pass Filter**
This UUT does not have a low pass filter.
- 2.1049 **Occupied bandwidth:**
90.210(d) Emission Mask D - 12.5 kHz channel bandwidth equipment.
For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:
- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
 - (2) On any frequency from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 ($f_d - 2.88$ kHz) dB.
 - (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
- 90.210(e) Emission Mask E - 6.25 kHz or less channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emissions must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:
- (1) On any frequency from the center of the authorized bandwidth f_0 : to 3.0 kHz removed from f_0 : Zero db.
 - (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least 30 + 16.67($f_d - 3$ kHz) or 55 + 10log(P) or 65 db, whichever is the lesser attenuation.
 - (3) On any frequency removed from the center of the authorized bandwidth by more the 4.6 kHz: At least 55 + 10log(P) or 65 db whichever is the lesser attenuation.

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 3 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

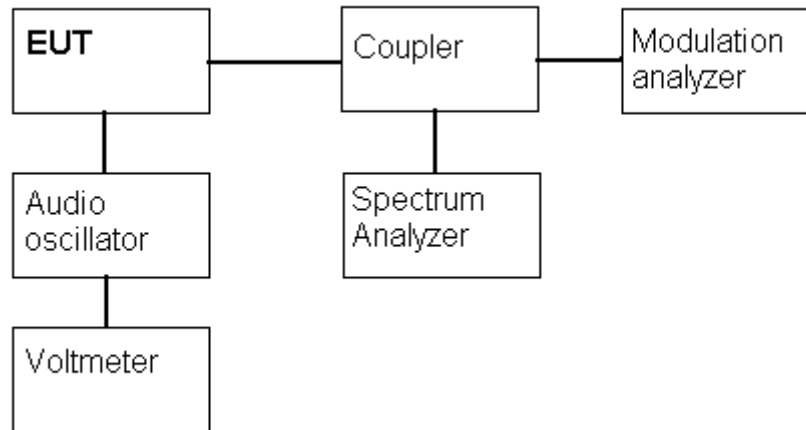
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

Radiotelephone Transmitter with Modulation Limiter

Test procedure: TIA/EIA-603 para 2.2.11, with the exception that various tones were used.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 4 of 21

TIMCO ENGINEERING INC.

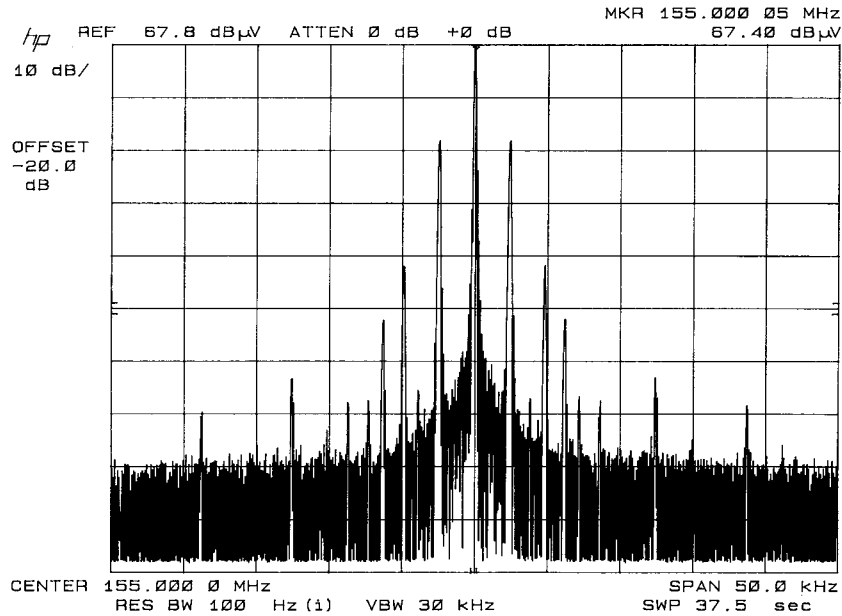
849 NW State Road 45

Newberry, Florida 32669

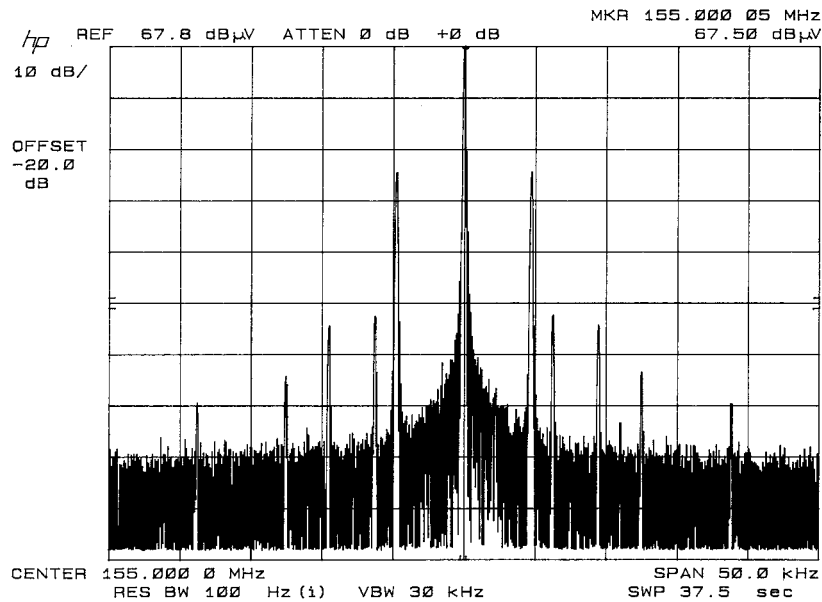
<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

OCCUPIED BANDWIDTH - 4800 Hz



OCCUPIED BANDWIDTH - 9600 Hz



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 5 of 21

TIMCO ENGINEERING INC.

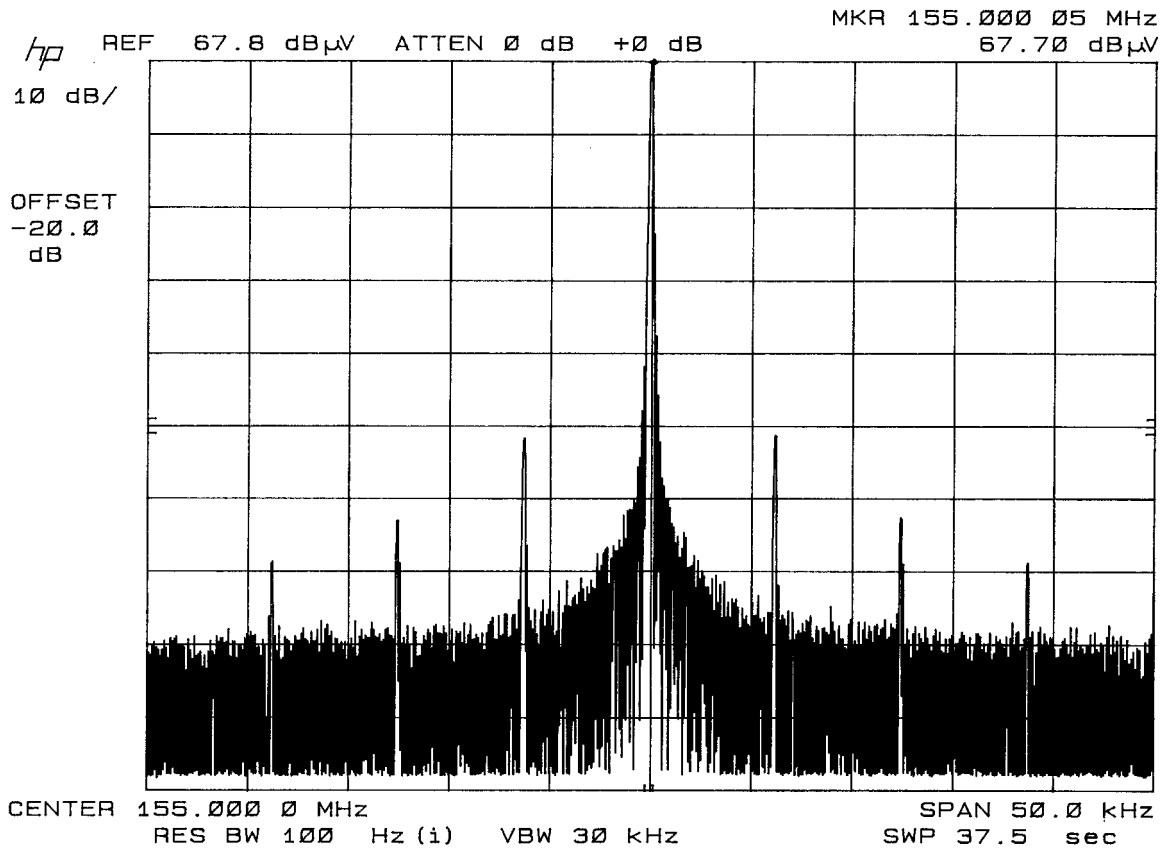
849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

OCCUPIED BANDWIDTH CW PLOT



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 6 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1051 Spurious emissions at antenna terminals (conducted):
 2.1052 Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

REQUIREMENTS: Emissions must be 55 +10log(Po) dB below the mean power output of the transmitter.

Low: $55 + 10\log(1.60) = 57.0$ dB

High: $55 + 10\log(6.76) = 63.3$ dB

EMISSION FREQUENCY MHz	dB BELOW CARRIER LOW POWER	dB BELOW CARRIER HIGH POWER
141	0.0	0.0
282	70.2	75.3
423	90.0	89.3
564	100.6	106.3
705	91.2	92.9
846	98.6	107.1
987	99.5	109.0
1128	99.6	105.3
1269	98.3	104.7
1410	88.7	96.0
155	0.0	0.0
310	75.5	78.1
465	95.1	88.4
620	95.5	98.6
775	89.3	87.6
930	105.1	106.4
1085	103.1	111.0
1240	69.1	104.3
1395	93.6	101.8
1550	89.0	85.0
173	0.0	0.0
346	78.1	82.6
519	100.9	90.7
692	90.8	88.8
865	101.0	102.0
1038	105.2	109.6
1211	102.0	108.2
1384	95.9	102.6
1557	79.9	91.6
1730	96.2	100.9

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 7 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

Method of Measuring Conducted Spurious Emissions



METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD without any exceptions. An audio generator was connected to the UUT through a dummy microphone circuit and the output of the transmitter connected to a standard load and from the standard load through a pre-selector filter of the spectrum analyzer. The spectrum was scanned from 400 kHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 8 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1053 **Field strength of spurious emissions:**

NAME OF TEST: RADIATED SPURIOUS EMISSIONS (141 MHz)

REQUIREMENTS: Emissions must be 55 +10log(Po) dB below the mean power output of the transmitter.

 Low: 55 + 10log(1.60) = 57.0 dB
 High: 55 + 10log(6.76) = 63.3 dB

TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
141.00	H	27.0	0	0	0.00
282.00	H	-57.1	0.00	-1.17	82.93
423.00	H	-58.0	0.00	-0.44	84.56
564.00	H	-66.5	0.00	-0.49	93.01
705.00	H	-53.7	0.00	0.09	80.79
846.00	H	-53.2	0.00	-1.06	79.14
987.00	H	-55.4	0.00	-1.55	80.85
1128.00	H	-61.8	1.03	3.46	91.23
1410.00	H	-59.0	1.08	4.59	89.51

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
141.00	H	33.8	0	0	0.00
282.00	H	-40.9	0.00	-1.17	73.53
423.00	H	-49.0	0.00	-0.44	82.36
564.00	H	-57.5	0.00	-0.49	90.81
705.00	H	-50.3	0.00	0.09	84.19
846.00	H	-51.3	0.00	-1.06	84.04
987.00	H	-57.7	0.00	-1.55	89.95
1128.00	H	-61.6	1.03	3.46	97.83
1269.00	H	-63.1	1.05	4.03	99.88
1410.00	H	-59.0	1.08	4.59	96.31

TIMCO ENGINEERING INC.

849 NW State Road 45
 Newberry, Florida 32669
 http://www.timcoengr.com
 888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1053 **Field strength of spurious emissions:**

NAME OF TEST: RADIATED SPURIOUS EMISSIONS (155 MHz)

REQUIREMENTS: Emissions must be 55 +10log(Po) dB below the mean power output of the transmitter.

 Low: 55 + 10log(1.60) = 57.0 dB
 High: 55 + 10log(6.76) = 63.3 dB

TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
155.00	H	27.2	0	0	0
310.00	H	-38.1	0	-1.25	64.05
465.00	H	-64.3	0	-0.51	90.99
620.00	H	-65.5	0	-0.29	92.41
775.00	H	-38.5	0	-0.95	64.75
930.00	H	-62.8	0	-0.91	89.09
1085.00	H	-60.7	1.02	3.29	90.17
1240.00	V	-62.3	1.05	3.91	92.36
1395.00	V	-62.8	1.08	4.53	93.45
1550.00	V	-55.6	0.11	4.98	87.67

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
155.00	H	35.4	0	0	0
310.00	H	-33.6	0	-1.25	67.75
465.00	H	-51.9	0	-0.51	86.79
620.00	H	-64.4	0	-0.29	99.51
775.00	H	-34.1	0	-0.95	68.55
930.00	H	-56.5	0	-0.91	90.99
1085.00	H	-59.5	1.02	3.29	97.17
1240.00	H	-57.9	1.05	3.91	96.16
1550.00	H	-59.3	0.11	4.98	99.57

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1053 **Field strength of spurious emissions:**

NAME OF TEST: RADIATED SPURIOUS EMISSIONS (173 MHz)

REQUIREMENTS: Emissions must be 55 +10log(Po) dB below the mean power output of the transmitter.

Low: 55 + 10log(1.60) = 57.0 dB
High: 55 + 10log(6.76) = 63.3 dB

TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
173.00	H	31.1	0	0	0
346.00	H	-51.8	0	-1.15	81.75
519.00	H	-47.6	0	-0.57	78.13
692.00	H	-56.6	0	0.12	87.82
865.00	H	-44.7	0	-0.83	74.97
1038.00	V	-62.1	1.01	3.1	95.29
1211.00	H	-57.9	1.04	3.79	91.75
1384.00	H	-61.9	1.08	4.49	96.41
1557.00	V	-54.1	1.11	4.98	89.07
1730.00	H	-60.3	1.15	5.09	95.34

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
173.00	H	37.7	0	0	0
346.00	H	-43.3	0	-1.15	79.85
519.00	H	-44.7	0	-0.57	81.83
692.00	H	-56.7	0	0.12	94.52
865.00	V	-53.2	0	-0.83	90.07
1038.00	V	-62.6	1.01	3.1	102.39
1211.00	H	-59.7	1.04	3.79	100.15
1384.00	H	-58.6	1.08	4.49	99.71
1557.00	H	-57.2	1.11	4.98	98.77
1730.00	H	-57.5	1.15	5.09	99.14

TIMCO ENGINEERING INC.

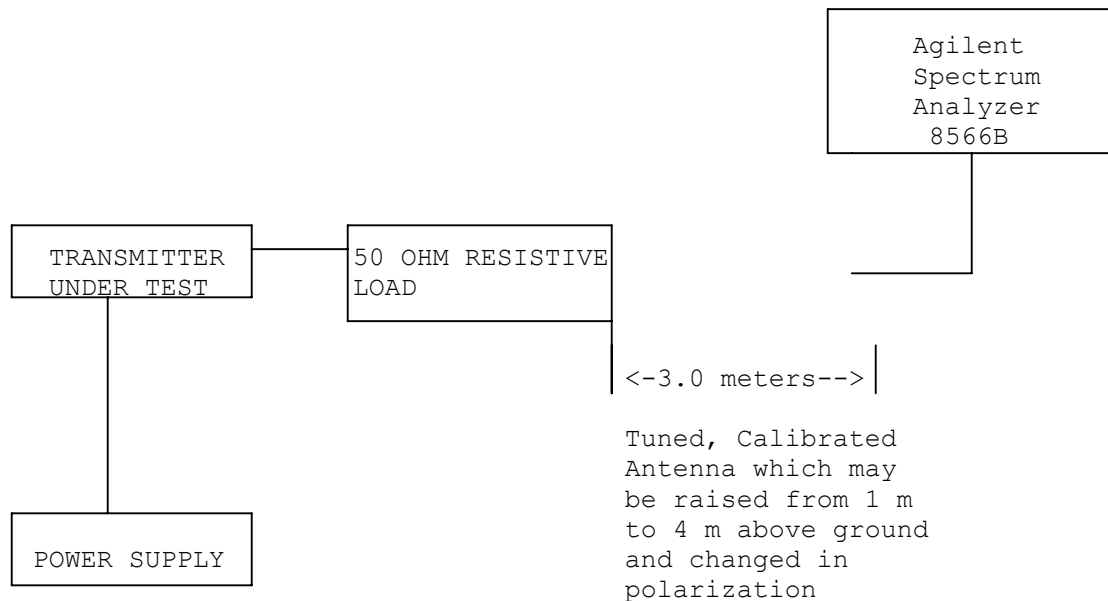
849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground on a rotatable platform.

METHOD OF MEASUREMENTS: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 12 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1055 Frequency stability:
90.213 (a) (1)

Temperature and voltage tests were performed to verify that the frequency remains within the specification limit, for 12.5kHz spacing and 6.25kHz spacing. Worse case condition is specified for mobile stations designed to operate with a 6.25 kHz channel bandwidth. Frequency stability is specified as 2.0ppm. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst-case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50 degrees C.

Readings were also taken at minus 15% of the battery voltage or 11.6 VDC, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 155.000 000 MHz

<u>TEMPERATURE °C</u>	<u>FREQUENCY MHz</u>	<u>PPM</u>
REFERENCE _____	155.000 000	00.0
-30 _____	155.000 129	+ 0.83
-20 _____	155.000 130	+ 0.84
-10 _____	155.000 083	+ 0.54
0 _____	155.000 044	+ 0.28
+10 _____	155.000 039	+ 0.25
+20 _____	155.000 174	+ 1.12
+30 _____	155.000 06	+ 0.39
+40 _____	155.000 04	+ 0.26
+50 _____	155.000 033	+ 0.21

-15% Battery End-Point VDC 155.000 159 + 1.03

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was +1.12 ppm.

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1055(a) (1) Frequency stability:
90.214 Transient Frequency Behavior

REQUIREMENTS: In the 150 - 174 MHz frequency band, transient frequencies must be within the maximum frequency difference limits during the time interval indicated below for 6.25 kHz and 12.5 kHz Channels:

Time Interval	Maximum Frequency	Portable Radios 450-500 MHz
t1	+12.5 kHz	10.0 ms
t2	+6.25 kHz	25.0 ms
t3,t4	+12.5 kHz	10.0 ms

TEST PROCEEDURE: TIA/EIA TS603 PARA 2.2.19, the levels were set as follows;

1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30 dB.
4. With the levels set as above the transient frequency behavior was observed & recorded.

TIMCO ENGINEERING INC.

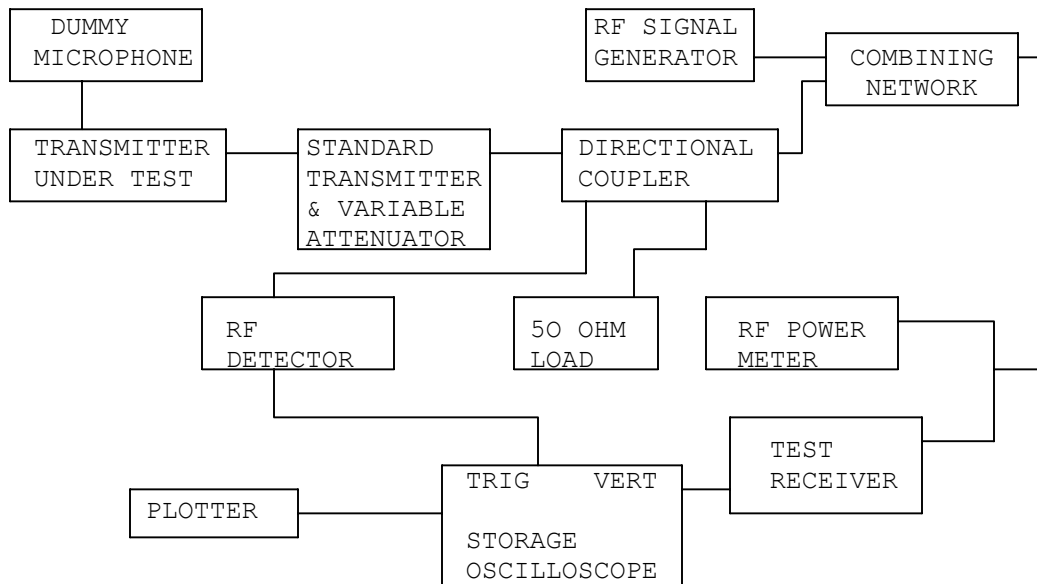
849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

2.1055 Frequency stability:
90.214 Transient Frequency Behavior
(Continued)



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 15 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

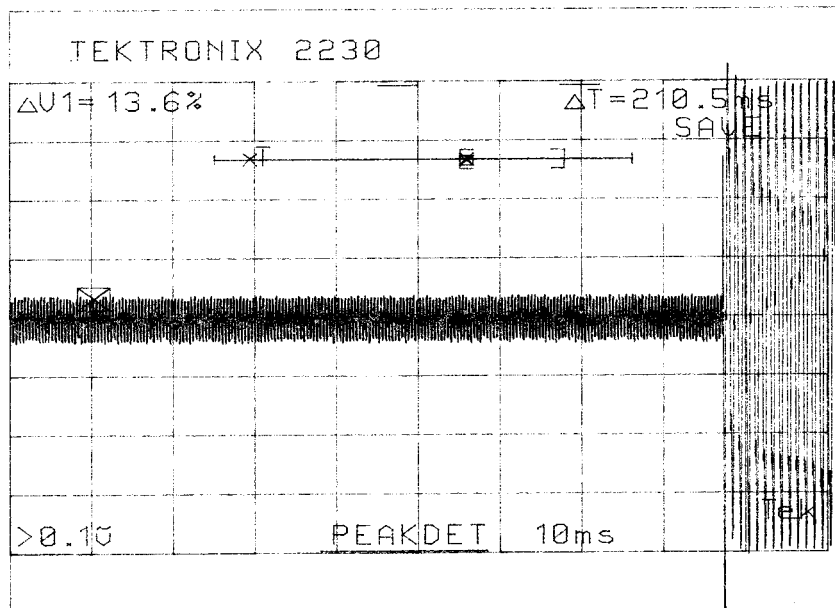
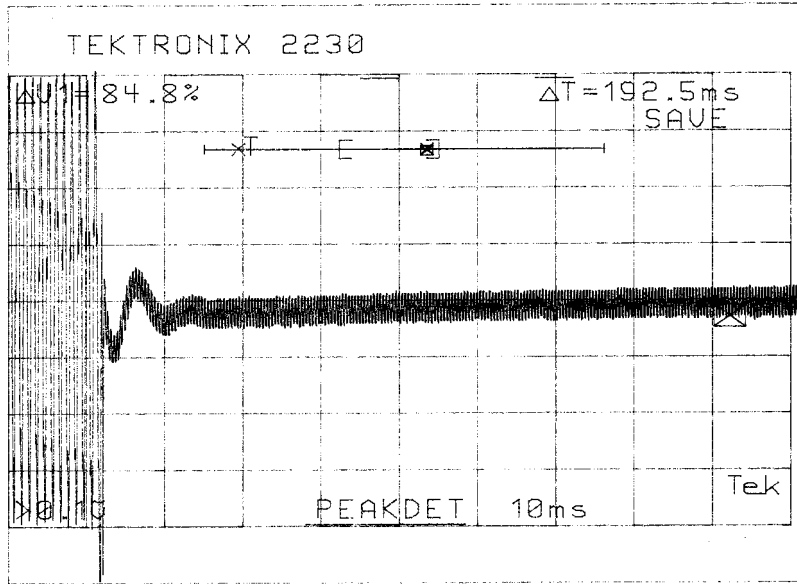
Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

TRANSIENT FREQUENCY GRAPH

6.25 kHz



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 16 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

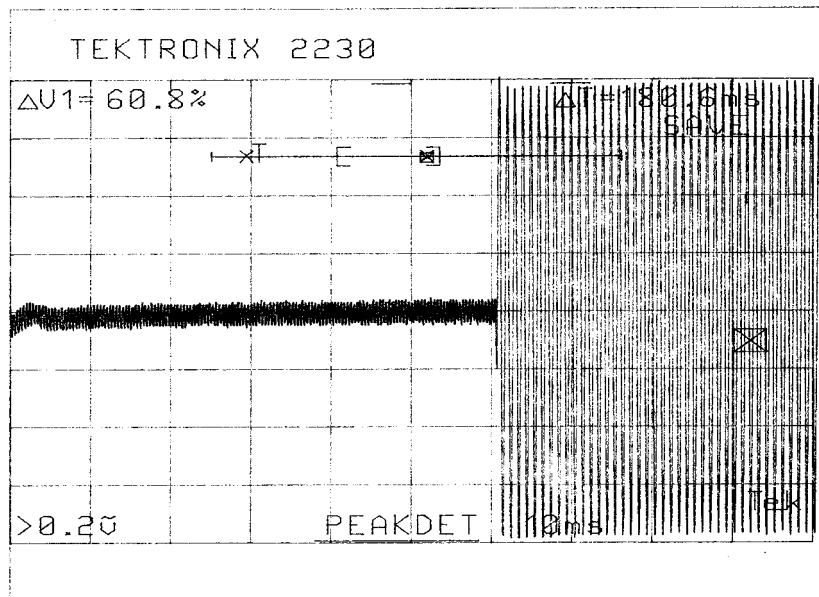
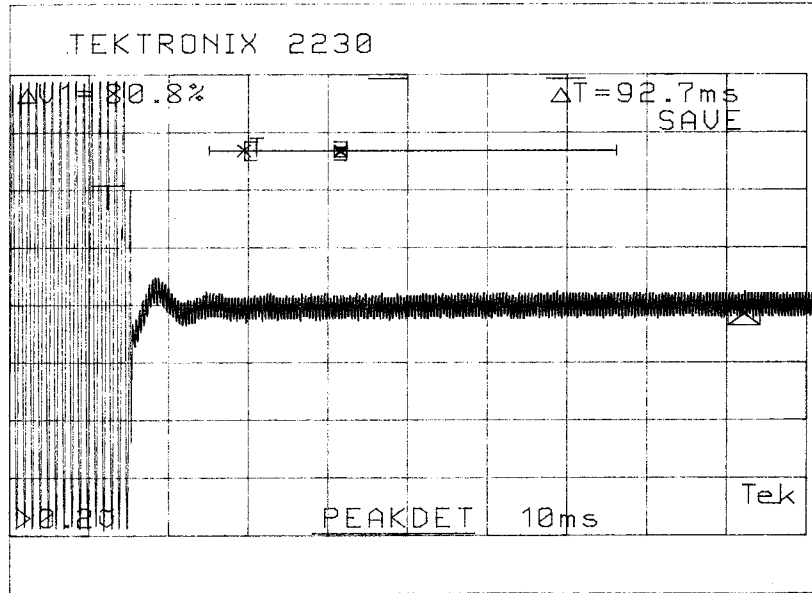
Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

TRANSIENT FREQUENCY GRAPH

12.5 kHz



APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 17 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: sid@timcoengr.com

MPE CALCULATION

Based on the following info:
Power Output of: 6.76 Watts
Duty cycle of: 50%
Antenna gain of : 0 dBd
An uncontrolled exposure environment

W := 6.76 power in Watts D := 1 Duty Factor in decimal % (1=100%)
E := 15 exposure time in minutes U := 30 (use 6 for controlled and 30 for uncontrolled)

$$W_{exp} := W \cdot D \cdot \left(\frac{E}{U} \right)$$

$$PC := \frac{E}{U}$$

PC = 0.5 percent on time

W_{exp} = 3.38 Watts

Po := 3380 mWatts dBd := 0. antenna gain f := 150 Frequency in MHz

G := dBd + 2.15 gain in dBi

Gn := $10^{\frac{G}{10}}$ gain numeric

S is 0.2 for uncontrolled exposure.

Gn = 1.641 S := 0.2

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}}$$

$$\text{Rinches} := \frac{R}{2.54}$$

R = 46.972 distance in centimeters
required for compliance

Rinches = 18.493

TIMCO ENGINEERING INC.

849 NW State Road 45
 Newberry, Florida 32669
 http://www.timcoengr.com
 888.472.2424 F 352.472.2030 email: sid@timcoengr.com

EMC Equipment List

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 12/22/99	12/22/02
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
	Receiver, Beige Tower Spectrum Analyzer (Tan)	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
	RF Preselector (Tan)	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
	Quasi-Peak Adapter (Tan)	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
X	Receiver, Blue Tower Spectrum Analyzer (Blue)	HP	8568B	2928A04729 2848A18049	CHAR 10/22/01	10/22/03
X	RF Preselector (Blue)	HP	85685A	2926A00983	CHAR 10/22/01	10/22/03
X	Quasi-Peak Adapter (Blue)	HP	85650A	2811A01279	CHAR 10/22/01	10/22/03
X	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
	Biconnical Antenna	Eaton	94455-1	1057	CHAR 3/15/00	3/15/02
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CHAR 10/16/01	10/16/03
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/04
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 11/24/00	11/24/03
	Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 12/19/01	12/19/03
	Horn Antenna	Electro-Metrics	EM-6961	6246	CAL 3/21/01	3/21/03

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/16/01	3/16/03
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	5/25/01
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 12/12/01	12/12/03
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/03
X	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
X	AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04
	Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
	Multimeter	Fluke	FLUKE-77-3	79510405	CAL 9/26/01	9/26/03
	Peak Power Meter	HP	8900C	2131A00545	CHAR 1/26/01	1/26/03
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/04
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
X	Temp/Humidity gauge	EXTech	44577F	E000901	CHAR 1/22/02	1/22/04
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/03
	Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 1/26/01	1/26/03
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/02

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 20 of 21

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
Signal Generator	HP	8640B	2308A21464	CAL 11/15/01	11/15/03
Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	2/1/03
BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/03
BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/03
BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/03
High Pas Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/03
Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/03
Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/03
Frequency Counter	HP	5385A	3242A07460	CHAR 12/11/01	12/11/03
Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/03
Egg Timer	Unk			CHAR 8/31/01	8/31/03
Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		2/1/02	2/1/04
Coaxial Cable #51	Insulated Wire Inc.	NPS 2251-2880	Timco #51	CHAR 1/23/02	1/23/04
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/04
Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/04

APPLICANT: AES CORPORATION

FCC ID: L9N-7085-VE

REPORT #: A\AES\1514AUT3\1514AUT3TestReport.doc

Page 21 of 21