

## TABLE OF CONTENTS LIST

APPLICANT: TAC SYSTEMS INC.  
FCC ID: I32TA-7410

### TEST REPORT:

PAGE 1.....GENERAL INFORMATION & TECHNICAL DESCRIPTION  
PAGE 2.....TECHNICAL DESCRIPTION CONT'D AND MODULATION CHARAC.  
PAGE 3.....OCCUPIED BANDWIDTH DATA  
PAGE 4.....SPURIOUS EMISSIONS & METHOD OF MEASUREMENT  
PAGE 5.....RADIATED SPURIOUS EMISSIONS  
PAGE 6.....METHOD OF MEASURING RADIATED SPURIOUS EMISSIONS  
PAGE 7.....FREQUENCY STABILITY  
PAGE 8.....TEST EQUIPMENT LIST

### EXHIBIT CONTAINING:

EXHIBIT 1.....FAA LETTER  
EXHIBIT 2.....FCC ID LABEL SAMPLE  
EXHIBIT 3.....FCC ID LABEL LOCATION  
EXHIBIT 4.....EXTERNAL PHOTO FRONT VIEW  
EXHIBIT 5.....EXTERNAL PHOTO REAR VIEW  
EXHIBIT 6A.....INTERNAL PHOTO COMPONENT -EXCITER/MODULATOR  
EXHIBIT 6B.....INTERNAL PHOTO COMPONENT -POWER AMPLIFIER 10W  
EXHIBIT 7.....INTERNAL PHOTO COPPER SIDE -EXCITER/MODULATOR  
EXHIBIT 8.....BLOCK DIAGRAM  
EXHIBIT 9.....CIRCUIT DIAGRAM RF BOARD-1 of 3  
EXHIBIT 10.....CIRCUIT DIAGRAM RF BOARD-2 of 3  
EXHIBIT 11.....CIRCUIT DIAGRAM RF BOARD-3 of 3  
EXHIBIT 12.....CIRCUIT DIAGRAM SYNTHESIZER UNIT  
EXHIBIT 13.....CIRCUIT DIAGRAM LF BOARD-1 of 3  
EXHIBIT 14.....CIRCUIT DIAGRAM LF BOARD-2 of 3  
EXHIBIT 15.....CIRCUIT DIAGRAM LF BOARD-3 of 3  
EXHIBIT 16A.....ANTENNA NOTICE & INSTALLATION INSTRUCTIONS  
EXHIBIT 16B-C.....SYSTEM DESCRIPTION  
EXHIBIT 17A-I.....FUNCTIONAL DESCRIPTION  
EXHIBIT 18A-R.....OPERATING INSTRUCTIONS  
EXHIBIT 19.....TUNING PROCEDURE  
EXHIBIT 20A-F.....TECHNICAL DESCRIPTION  
EXHIBIT 21.....AUDIO FREQUENCY RESPONSE PLOT  
EXHIBIT 22.....MODULATION LIMITING PLOT - 300 Hz  
EXHIBIT 23.....MODULATION LIMITING PLOT - 1000 Hz  
EXHIBIT 24.....MODUALTION LIMITING PLOT - 3000 Hz  
EXHIBIT 25A-25B...OCCUPIED BANDWIDTH PLOTS

APPLICANT : TAC SYSTEMS INC.  
FCC ID : I32TA-7410  
DATE : 22 May 2000  
REPORT # : T:\CUS\T\TAC\TAC160U0\160U0.RPT  
TABLE OF CONTENTS

GENERAL INFORMATION REQUIRED  
FOR TYPE ACCEPTANCE

2.1033(c)(1)(2) TAC SYSTEMS INC. will sell their FCC ID: I32TA-7410 in quantity, for use under FCC RULES PART 87, AERONAUTICAL GROUND STATION. This UUT has an antenna connector.

TAC SYSTEMS INC.  
PO Box 705  
Coconut Grove, Florida 33222-0705

2.1033(c)(3) Instruction book. The instruction manual is included as Exhibit # 18A-18R.

2.1033(c)(4) TECHNICAL DESCRIPTION  
(4) Type of Emission: 6K00A3E

ALLOWED AUTHORIZED BANDWIDTH = 25KHz.

Frequency Range: Part 87: 118-137MHz,  
TEST FREQ = 127.000MHz.

(5) Power Range and Controls: The output of this UNIT is NOT adjustable.

(6)(7) Maximum Output Power Rating: 10.0 Watt average power into 50 ohms resistive load.

(8) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY  
27.0VDC  
Vce = 27.0Volts  
Ice = 1.54A.

(9) Tune-up procedure. The tune-up procedure is given as Exhibit # 19

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as Exhibit #: 9-15. The block diagram is also included as Exhibit #: 8.

2.1033(c)(11) The equipment identification is shown as Exhibit No. 2.

2.1033(c)(12) Photographs of the equipment are shown as Exhibits No. 4-7.

2.1033(c)(13) Equipment employing Digital modulation.

TECHNICAL DESCRIPTION CONT'D

2.1033(c)(14) The data required by 2.1046 through 2.1057 follows;

2.1046 Limiting Power:

There is no provision for limiting power, the design limits the power to 10Watts. There is NO provision for reducing the power.

2.1047 Modulation Characteristics:

The transmitter audio circuitry is contained in the audio processing board and is controlled by that assembly dependent upon which combination of modulation. The audio frequency response is attached as Exhibit #21 and the modulation limiting plots are attached as Exhibits #22-24. The audio frequency response was measured in accordance with TIA/EIA Specification 603 Paragraph 2.2.6.

87.141 AUDIO LOW PASS FILTER

The audio low pass filter is not required in this unit.

APPLICANT : TAC SYSTEMS INC.  
FCC ID : I32TA-7410  
REPORT # : T:\CUS\T\TAC\TAC160U0\160U0.RPT  
PAGE # : 2

APPLICANT : TAC SYSTEMS INC.

FCC ID : I32TA-7410

#### OCCUPIED BANDWIDTH

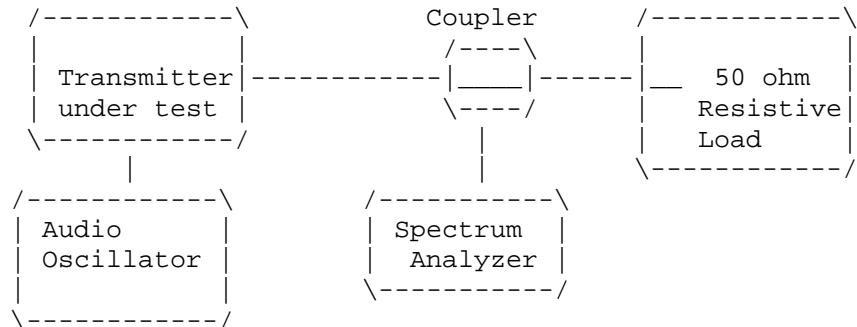
2.1049                    Occupied bandwidth:

Data in the plots shows that frequencies removed from the assigned frequency by more than 50%(12.5KHz) up to and including 100% percent of the authorized bandwidth the attenuation must be at least 25dB. When the frequency is removed from the assigned frequency by more than 100% up to and including 250% of the authorized bandwidth the attenuation must be at least 35dB. When the frequency is removed from the assigned frequency by more than 250% of the authorized bandwidth the attenuation must be at least  $43 + \log pY$  dB. The plots show the transmitter modulated with 2500 Hz(the highest modulation frequency), adjusted for 50% modulation plus 16dB. The spectrum analyzer was set with the unmodulated carrier at the top of the screen. The test procedure diagram and occupied bandwidth plots follow.

Microphone transmitter

Test procedure diagram

#### OCCUPIED BANDWIDTH MEASUREMENT



APPLICANT: TAC SYSTEMS INC.

FCC ID: I32TA-7410

DATE: 22 May 2000

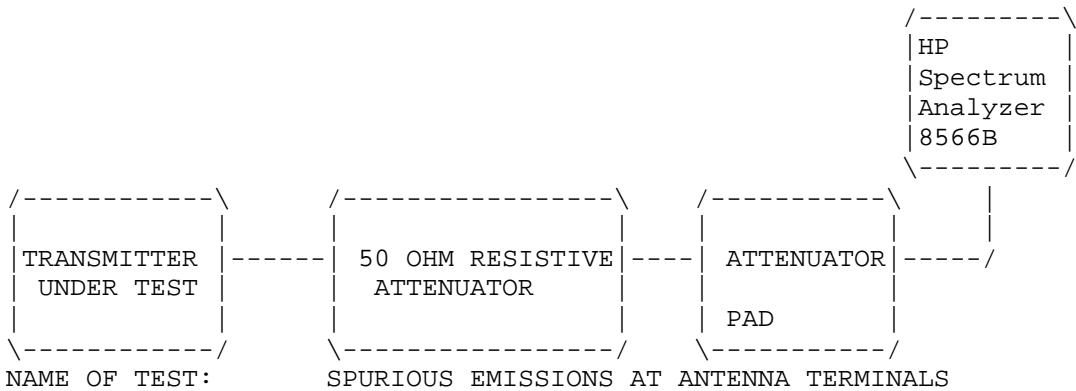
REPORT #: T:\CUS\T\TAC\TAC160U0\160U0.RPT

PAGE #: 3

SPURIOUS EMISSIONS AND METHOD OF MEASUREMENT

2.1051 Spurious emissions at antenna terminals (conducted): Data on the following page shows the level of conducted spurious responses. The carrier was modulated 90% using a 2500Hz tone. The spectrum was scanned from 30 to at least the 10th harmonic of the fundamental.

Method of Measuring Conducted Spurious Emissions



REQUIREMENTS: Emissions must be  $43 + 10\log(P_o)$  dB below the mean power output of the transmitter.

$$43 + 10 \log(10) = 53.0 \text{dB}$$

EMISSION FREQUENCY MHz	dB BELOW CARRIER
118.025	00.00
236.05	-68.40
354.07	-64.30
472.10	-99.60
590.12	-79.70
708.15	-98.60
826.14	-92.40
944.21	-101.60
1062.24	-100.10
1180.31	-105.70

METHOD OF MEASUREMENT: The procedure used was TIA/EIA 603. The spectrum was scanned from 30 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: TAC SYSTEMS INC.  
 FCC ID: I32TA-7410  
 DATE: 22 May 2000  
 REPORT #: T:\CUS\T\TAC\TAC160U0\160U0.RPT  
 PAGE #: 4

APPLICANT : TAC SYSTEMS INC.

FCC ID : I32TA-7410

RADIATED SPURIOUS EMISSIONS

2.1053 Field strength of spurious emissions:

The tabulated Data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the 10th harmonic of the fundamental. This test was conducted per TIA/EIA 603.

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be  $43 + 10\log(P_o)$  dB below the mean power output of the transmitter.

$$43 + 10 \log(10.0) = 53 \text{ dB}$$

EMISSION FREQUENCY MHz	RELATIVE ATTENUATION db
118.03	0.00
236.06	-64.71
346.00	62.05
472.10	-64.62
590.10	-69.16
708.10	-67.31
826.20	-68.57
944.20	-71.73
1180.30	-78.42

METHOD OF MEASUREMENT: The procedure used was Tested in accordance with TIA/EIA 603 paragraph 2.2.12. The spectrum was scanned from 30.000 to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer, an Eaton model 94455-1 Biconical Antenna, a ElectroMetrics antennas models TDA, TDS-25-1, TDS-25-2. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45 Newberry, Florida 32669.

APPLICANT: TAC SYSTEMS INC.

FCC ID: I32TA-7410

DATE: 22 May 2000

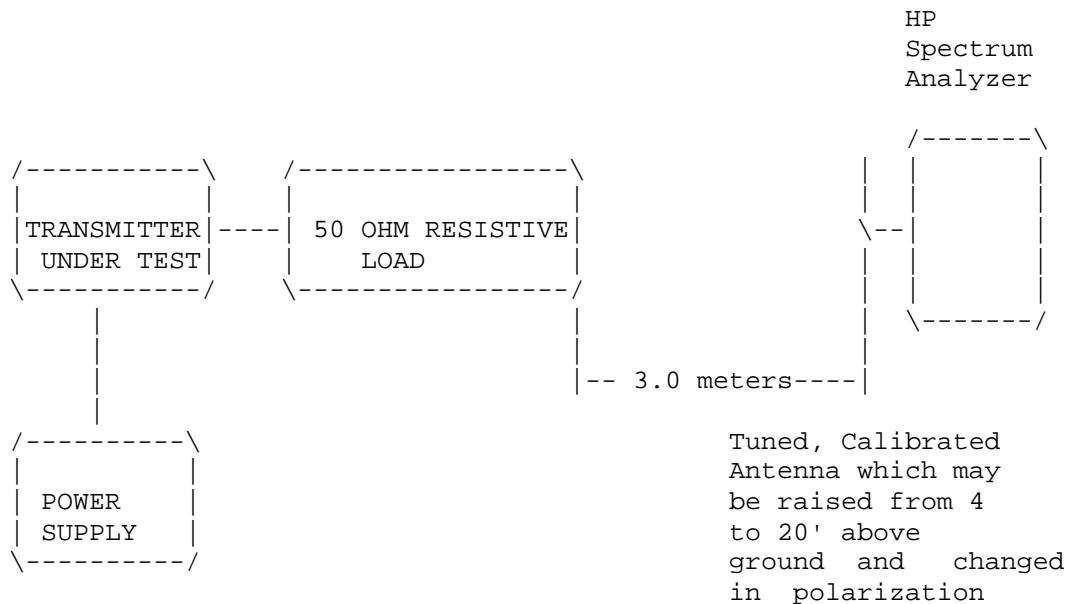
REPORT #: T:\CUS\T\TAC\TAC160U0\160U0.RPT

PAGE #: 5

APPLICANT : TAC SYSTEMS INC.

FCCID : I32TA-7410

Method of Measuring Radiated Spurious Emissions



Equipment placed 4' above ground  
on a rotatable platform.

APPLICANT: TAC SYSTEMS INC.  
FCC ID: I32TA-7410  
DATE: 22 May 2000  
REPORT #: T:\CUS\T\TAC\TAC160U0\160U0.RPT  
PAGE #: 6

APPLICANT : TAC SYSTEMS INC.

FCC ID : I32TA-7410  
2.1055 Frequency stability:  
87.133

Temperature and voltage tests were performed to verify that the frequency remains within the .0020%,(20 ppm)(87.133) specification limit.

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.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 118.02505 MHz

TEMPERATURE C	FREQUENCY MHZ	PPM
REFERENCE	118.025 000	00.00
-30	118.025 985	+ 8.35
-20	118.025 927	+ 7.85
-10	118.025 893	+ 5.90
0	118.025 697	+ 5.91
+10	118.025 486	+ 4.12
+20	118.025 368	+ 3.12
+30	118.025 326	+ 2.76
+40	118.025 428	+ 3.63
+50	118.025 667	+ 5.65
25c -15% Supply Voltage 22.95 VDC	118.025 350	+ 2.96
25c +15% Supply Voltage 31.05VDC	118.025 390	+ 3.30

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was + 8.35 to +2.76 ppm. The maximum frequency variation over the voltage range was +3.30 ppm.

APPLICANT: TAC SYSTEMS INC.

FCC ID: I32TA-7410

DATE: 22 May 2000

REPORT #: T:\CUS\T\TAC\TAC160U0\160U0.RPT

PAGE #: 7

APPLICANT : TAC SYSTEMS INC.

FCC ID : I32TA-7410

TEST EQUIPMENT LIST

1. X\_Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/  
preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter  
HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02,  
S/N 3008A00372 Cal. 10/17/99
2. X\_Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3. X\_Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
4. X\_Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180,  
1-18 GHz, S/N 2319 Cal. 4/27/99
5.  Horn 40-60GHz: ATM Part #19-443-6R
6.  Line Impedance Stabilization Network: Electro-Metrics Model  
ANS-25/2, S/N 2604 Cal. 2/9/00
7. X\_Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
8. X\_Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99
9.  Peak Power Meter: HP Model 8900C, S/N 2131A00545 Cal 7/19/99
10. X\_Open Area Test Site #1-3meters Cal. 12/22/99
11.  Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
12.  Signal Generator: HP 8614A, S/N 2015A07428 Cal. 5/29/99
13.  Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N  
9706-1211 Cal. 6/23/97
14.  Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153  
Cal. 11/24/99
15.  AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
16.  Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
17.  Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
18.  Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99

APPLICANT: TAC SYSTEMS INC.

FCC ID: I32TA-7410

DATE: 22 May 2000

REPORT #: T:\CUS\T\TAC\TAC160U0\160U0.RPT

PAGE #: 8