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FCC ID: NR3PCRF2525  
REPORT NO.: T:\CUS\S\SYN\SYN462U9\SYN462V9.RPT  
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#### TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. The UUT was transmitting a test signal during the testing.

15.247(a)(1) CARRIER FREQUENCY SEPARATION & NUMBER OF CHANNELS: A portion of the signal was coupled into the spectrum analyzer. The UUT was made to hop its full range. The spectrum analyzer was set to view the frequency range from 902 to 928MHz and placed in the memory mode. A plot was then made of the display showing the number of channels, 63 and the separation of the channels, 290kHz. The 63 were spread over a frequency range of 18.64MHz. See exhibit 13.

15.247(a)(1)(i) CARRIER FREQUENCY DWELL TIME: A portion of the signal was coupled into the spectrum analyzer. The UUT was made to hop its full range. The spectrum analyzer was set to view the frequency range from 902 to 928MHz and the center of the HOPPING RANGE was centered on the Spectrum Analyzer. The SPAN was then set to ZERO(0) and the SWEEP TIME was set to 20 seconds. The by analyzing the plot of the total ON TIME of the UUT during the 20 Seconds it was determined the dwell time on any frequency was less than 0.4Seconds.

15.247(b)(2) POWER OUTPUT: The RF power output was measured at the antenna feed point by removing the permanent antenna and connecting the UUT to a peak power meter, HP Model No. 8900C.

15.247(c) ANTENNA CONDUCTED EMISSIONS: The RBW=100KHz, VBW =1.0MHz up to 1000MHz and RBW=1.0MHz & VBW=3.0MHz above 1.0GHz. The spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the UUT was 62.2Deg F with a humidity of 34.2%. The hopping was stopped at the low end, middle and high end of the band in order to test the radiated emissions. At frequencies above 1GHz the measurements were made at 1meter or less then converted to readings at 3 meters.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 74Deg F with a humidity of 54%.

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## TEST PROCEDURES CONTINUED

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

### Example:

Freq (MHz)	METER READING + ACF = FS
33	20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

## TEST EQUIPMENT

1. 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. Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
3. Signal Generator: HP 8614A, S/N 2015A07428 Cal. 5/29/99
4. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N 9706-1211 Cal. 6/23/97
5. Biconnical Antenna: Eaton Model 94455-1, S/N 1057
6. Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
7. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153 Cal. 11/24/99
8. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319 Cal. 4/27/99
9. Horn 40-60GHz: ATM Part #19-443-6R
10. Line Impedance Stabilization Network: Electro-Metrics Model FCC-25/2, S/N 2512 Cal. 11/18/99
11. Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604 Cal. 11/30/99
12. Line Impedance Stabilization Network: Electro-Metrics Model EM-7820, S/N 2682 Cal. 12/1/99
13. Line Impedance Stabilization Network: Electro-Metrics Model EM-7821, S/N 101 Cal. 12/1/99
14. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
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
19. Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99

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INTRODUCTION: GENERAL INFORMATION AND DATA

ANTENNA: The NR3PCRF2525 is manufactured with two(2) different antennas, one is a RUBBER DUCKY with less than 1dBi gain and the the second one is a co linear with 5.0dBi gain. Both antenna have a reverse TNC CONNECTOR.

PRODUCT DESCRIPTION The NR3PCRF2525 is a frequency hopping radio data system that sends information back to the base unit about fuel that has been dispensed. This UUT is intended to be used mounted on the fuel truck using either the co linear or the rubber ducky antenna. In the receive mode that signal comes on the antenna to the BPF and then to the LNA. From the LNA it goes to the mixer that operates over the range of 904-937MHz. The output of the 1st mixer is fed though a 10.7MHz amplifier and then a IF filter to the 2nd mixer. The 2nd IF is 455kHz and then to the discriminator. From the discriminator the demodulated signal goes to the data slicer and then to the MPU.

In the transmit mode the microprocessor receives the data from the data input. The output of the MPU drives a DAC which in turn drives a TCVCXO. The TCVCXO drives the PLL which feeds the power amplifier, the gain of the power amplifier is controlled by the MPU. From the Power amplifier the signal is fed through a LPF ant then to the BPF and then to the antenna.

The MPU provides the pseudorandom coding sequencing for the frequency hopping.

For test purposes a test program was operating during the test to put the UUT in its maximum power output mode.

The receiver portion of this UUT has been tested and approved under a Declaration of Conformity that included the Class A computer portion of this device.

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APPLICANT: SYN-TECH SYSTEMS, INC.  
FCC ID: NR3PCRF2525  
NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE  
RULES PART NUMBER: 15.207  
MINIMUM REQUIREMENTS:    FREQUENCY                    LEVEL  
                              \_\_\_MHz\_\_\_                    \_uV\_  
                              0.450-30                    250  
TEST PROCEDURE:        ANSI STANDARD C63.4-1992

THE HIGHEST EMISSION READ FOR LINE 1 WAS 204 uV @ 27.28MHz.

THE HIGHEST EMISSION READ FOR LINE 2 WAS 105 uV @ 27.10MHz.

THE ATTACHED GRAPHS, EXHIBIT 8 A & B, REPRESENT THE EMISSIONS READ FOR POWER LINE CONDUCTED FOR THIS DEVICE.

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

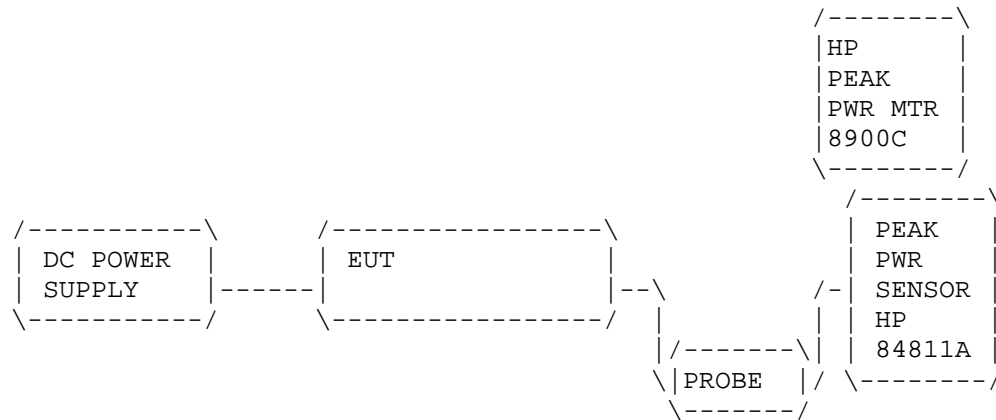
15.247(a)(1) CARRIER FREQUENCY SEPARATION & NUMBER OF CHANNELS:  
The number of channels was 63, and the 18.64MHz are shown in EXHIBIT 13. The channel separation was 290 is shown in EXHIBIT 9.

15.247(a)(1)(i) EXHIBITS 11 A & B show a total dwell time of 2X68 milliseconds within a ten(10) second period. This 136milliseconds is well below the required maximum of 0.4Seconds. EXHIBIT 10 shows the 20Db bandwidth of 240.

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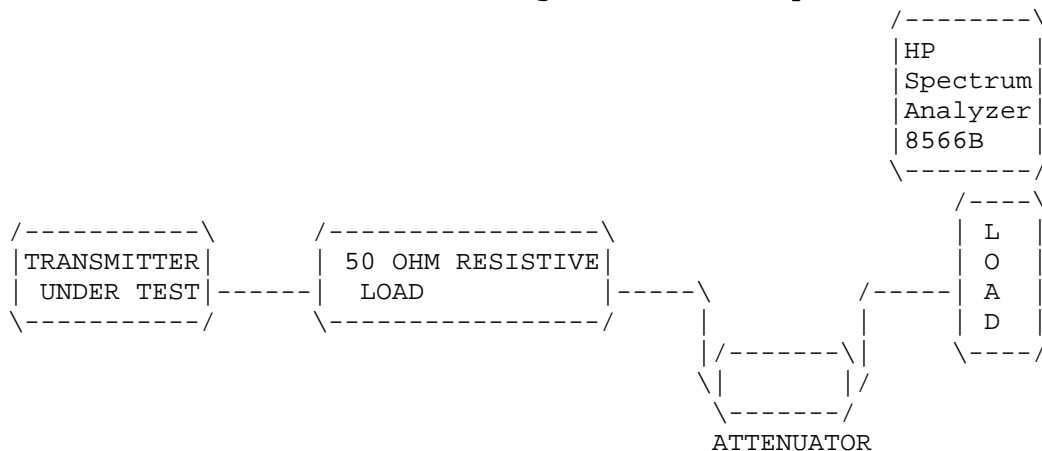
15.247(b)(2): POWER OUTPUT

MEASUREMENT: 380 mWATTS FCC Limit is 1.0Watt



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15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100KHz RBW.

EMISSION FREQUENCY MHz	dB BELOW CARRIER
906.00	0.0
1812.0	-63.7
2718.0	-72.4
3624.0	-84.9
4530.0	-86.3
5436.0	-94.1
6342.0	-99.0
915.0	0.0
1830.0	-56.4
2745.0	-75.3
3660.0	-85.8
4575.0	-87.9
5490.0	-91.5
6405.0	97.3
924.7	0.0
1849.4	-59.4
2774.1	-69.7
3698.8	-84.2
4623.5	-99.6

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

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APPLICANT: SYN-TECH SYSTEMS, INC.

FCC ID: NR3PCRF2525

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NUMBER: 15.247, 15.209

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	S15.209	
of Fundamental:	of Harmonics	30 - 88 MHz	40 dBuV/m @3M
		88 -216 MHz	43.5
902-928MHz		216 -960 MHz	46
127.38dBuV/m @3m	54 dBuV/m @3m	ABOVE 960 MHz	54dBuV/m

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 50 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

TEST RESULTS: This unit DOES meet the FCC requirements.

TEST DATA:

EMISSION FREQ. MHz	METER READING @ 3m dBuV	COAX LOSS dB	ACF dB	FIELD STRENGTH dBuV/m	FCC LIMIT dBuV/m	MARGIN dB	ANT ANT.
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Rubberducky

906.00	98.00	2.90	24.18	125.08	127.38	2.30	V
1812.00	36.10	1.00	27.25	64.35	20.0dBc105.08		V
2718.00R	10.10	1.14	29.80	41.03	54.00	12.97	V
915.00	97.70	2.90	24.14	124.74	127.38	2.64	V
1830.00	47.30	1.00	27.32	75.62	20.0dBc104.74		V
2745.00R	10.30	1.14	29.86	41.30	54.00	12.70	V
924.70	93.50	2.90	24.10	120.50	127.38	6.88	V
1849.40	42.70	1.01	27.40	71.11	20.0dBc100.50		V
2774.10R	10.40	1.15	29.94	41.48	54.00	12.52	V

Colinear Maxrad Model TRI-LINEAR P/N MUF-9025NGP(S) (gain =5dBi)

906.00	96.00	2.90	24.18	123.08	127.38	4.30	V
1812.00	43.20	1.00	27.25	71.45	20.0dBc103.08		V
2718.00R	10.30	1.14	29.80	41.23	54.00	12.77	V
915.00	95.70	2.90	24.14	122.74	127.38	4.64	V
1830.00	44.20	1.00	27.32	72.52	20.0dBc102.74		V
2745.00R	9.30	1.14	29.86	40.30	54.00	13.70	V
924.70	93.80	2.90	24.10	120.80	127.38	6.58	V
1849.40	42.50	1.01	27.40	70.91	20.0dBc100.80		V
2774.10R	10.30	1.15	29.94	41.38	54.00	12.62	V

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APPLICANT: SYN-TECH SYSTEMS, INC.

FCC ID: NR3PCRF2525

NAME OF TEST: RADIATION INTERFERENCE

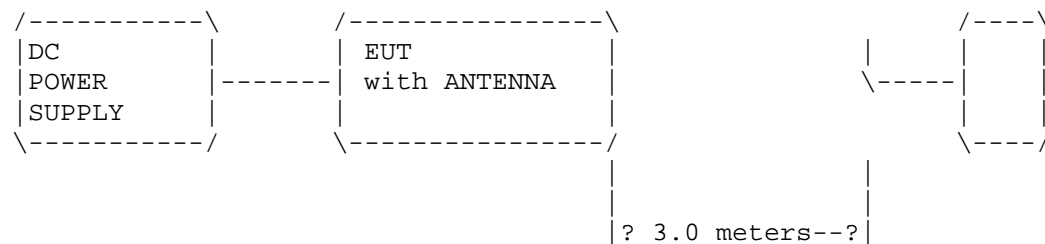
RULES PART NUMBER: 15.247, 15.209

TEST PROCEDURE: ANSI STANDARD C63.4-1992 as described on previous page.

2.993(a)(b) Continued Field strength of spurious emissions:

#### Method of Measuring Radiated Spurious Emissions

Hewlett Packard  
Spectrum  
Analyzer  
HP8566A



Tuned, Calibrated  
Antenna which may  
be raised from 4  
to 20' above ground  
and changed  
in polarization

Equipment placed 4' above ground  
on a rotatable platform.

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