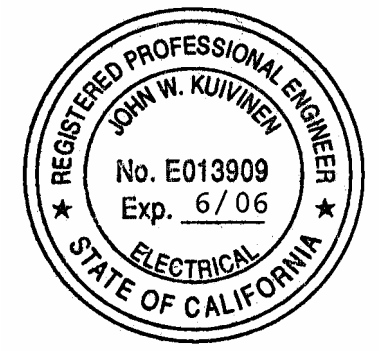
SUMMARY OF TEST RESULTS
IN ACCORD WITH FCC RULES PART 15 AND C63.4-2001

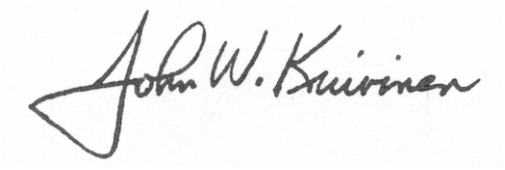
Equipment Model:	ACP00931
Transmitter Tested to C63.4-1992 Section:	FCC Rules 15.231
Field Strength at a distance of 3 meters:	4270 uV/Mtr (- -5.9 dB below limit) @ 372.5 MHz
Peak to Average Ratio:	12.7 dB - Worst Case Duty Cycle
Test Conditions:	Radiated (Sections 11 & 13)
Transmitter:	
Transmitter Frequency:	372.5 MHz Nominal (Factory Tuned Only)
Bandwidth (20 dB down)	< 0.020% of Center Freq.
Frequency Tolerance:	N/A (Nominal +/- 0.125 MHz)
Frequency Stability:	N/A (Nominal +/- 0.125 MHz)
Transmitter Spurious at 3 meters: (Worst Harmonic)	575 uV/Mtr (- 3.3 dB below limit)
Frequency:	1490 MHz
Momentary Operation (Yes/No)	Yes
Holdover time after manual release:	0 seconds
Duration of transmission after activation:	30 seconds on any single manual activation

Attestation:

The radio apparatus identified in the application has been subject to all the applicable test conditions specified in FCC Rules Part 15 and all of the requirements of the Standard have been met.

Regulatory Compliance Engineer





John W. Kuivinen, P.E. _____ Date: November 30, 2004

Radio Standard Specification

Low Power Communication Devices
C63.4-2001 and FCC Rules Part 15

1.0 General:

1.2, Exclusions to TV Broadcast Freq.	Complies

2.0 Related Documents:

Reference Documents for Application:	CFR 47, FCC Rules Part 15

3.0 Test Equipment:

Supply Voltage:	Fresh GP-23 12 volt alkaline battery
Test Equipment List	See Section 6
Signal Detector:	Peak with 12.7 dB, peak to average conversion.

4.0 Certification and Test Results:

Summary of Results per	See Page 1 of this Report

5.0 General Technical Requirements:

5.1 Testing Methods:	Peak Signal pulse width modulated A1D signal.
5.1 Reference Standard:	C63.4-2001 (FCC Procedure)
5.2 Modulation:	Pulse Position, A1D, AM Modulation
5.3 Type of Antenna:	Integral to Transmitter PCB
5.4 External Controls:	Single Push Button No user serviceable parts except for replacement of batteries.
5.5 Accessories:	NONE
5.6 TX Bandwidth:	<0.020 % (See Section 8)
5.7 Equipment Labels:	See Section 2
5.8 Manual Disclaimer:	See attached draft copy of manual
5.9 Usage Restrictions:	Digital Pulse Code Only

6.0 Transmitter Characteristics and Tests:

6.1 Momentary Operated Devices:	Complies
6.1(a) Types of Signals:	Manual Push to Transmit
6.1(a) Automatic Activation:	N/A
6.1(a) Five Second Max. upon release:	Complies
6.1(b) Maximum Field Strength:	372.5 MHz = 8450 uV/mtr at 3 meters.
6.1(c) Bandwidth (20 dB down)	<0.020 % Complies
6.1(d) Frequency Stability	N/A per regulations +/- 0.125 MHz Maximum Error
6.1(e) Reduced Field Strength	N/A
6.2 Non-Momentary Operated Devices:	N/A
6.2.1 Frequency Bands:	Refer to Table 1
6.3 Restricted Bands:	Complies
6.5 Pulsed Operation:	Complies (12.7 dB Peak/Average) See Section 8
6.6 Wireline Conducted Emissions:	N/A
7.0 Receivers	N/A
8.0 Self Certification:	N/A
9.0 AC Wireline Conducted Emissions:	N/A
10.0 Terminated Measurement Method:	N/A
11.0 Radiated Measurement Method:	See Section 8
11.1 Measuring Distance:	Complies
11.2 Open Field Test Site:	Complies, C63.4-2001
11.3 Equipment Test Platform:	See Section 8
11.4 Measurement Method:	Complies, See Section 8
12.0 DC Power Consumption Methods:	N/A
13.0 Near Field Measurement for < 30 MHz:	N/A
14.0 Test Report Submission:	See Attached

STATEMENT OF ATTESTATION

Model: WT-31 Remote Control Transmitter

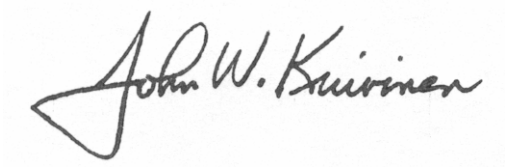
FCC ID: EF4 ACP00931

The equipment under test is a low powered remote control transmitter used with the Linear series of 372.5 MHz rolling code RWR gate control receivers and Wayne Dalton Rolling Code garage door operators. It is designed to send one of three possible channels of pulse width encoded RF signal to the receiver when the selected button is manually pressed. No supervisory signals or low battery functions are provided by this transmitter.

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis.

I further certify that the necessary measurements were made by Linear LLC, 2055 Corte Del Nogal, Carlsbad, California. 92009.

Certified by:



_____

John W. Kuivinen, P.E.
Regulatory Compliance Engineer

November 30, 2004
Date

REPORT OF MEASUREMENTS

LINEAR LLC
FCC ID: EF4 ACP00931
Model : WT-31 Remote Control Transmitter

The enclosed documents reflect the requirements contained generally within the code of Federal Regulations, Title 47, Parts 2 and 15 as most recently published October 1, 2003 and all other applicable revisions made by the Commission since that time.

The specific rule sections for which the enclosed documents demonstrate compliance or rely upon to demonstrate compliance with the Commission's application and technical standards are as follows:

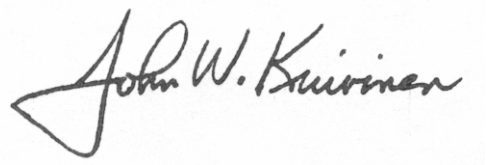
15.201-15.207, 15.231, Subpart C, Intentional Radiators.

Test Procedure C63.4-2001, Section 13, Measurement of Intentional Radiators was used for the testing of this device.

In accord with Section 2.948 of the Commission's Rules, a Test Site submittal is on file with the commission and a Letter of Acceptance dated March 19, 2004 (File 90767) is a portion of the Commission's records.

A test site submittal is on file with Industry Canada. The Industry Canada file number is 46405-1078, submission 101286. Dated June 9, 2004.

All of the information contained within this documentation is true, correct, and complete to the best of my knowledge.



_____
John W. Kuivinen, P.E.
Regulatory Compliance Engineer

November 30, 2004
Date

TESTING INSTRUMENTATION AND EQUIPMENT LIST

SPECTRUM ANALYZERS:

H.P.	HP8562A	1KHz to 22GHz		
	S/N 2913A03742		Calibrated	02/04
			Due	02/05

ANTENNAS:

(2)	Ailtech DM105A T1		20-200 MHz		Tuned Dipole
	S/N 93412-105 and 93412-114		Calibrated 3/04	Due:	3/05
(2)	Ailtech DM105A T2		140-400 MHz	Tuned Dipole	
	S/N 93413-113 and 93413-117		Calibrated 3/04	Due:	3/05
(2)	Ailtech DM105A T3		400-1000 MHz	Tuned Dipole	
	S/N 93413-105 and 93414-111		Calibrated 3/04	Due	3/05
(2)	AH Systems	SAS-200/511	1-12.4 GHz		Log Periodic
	S/N 118 and 124, P/Ns 2069				
(1)	AH Systems	SAS-200/540	20-330 MHz		Biconical
	S/N 367	P/N 2052			

INSTRUMENTATION:

H.P.	HP8656B RF Generator	100 KHz - 990 MHz	
	S/N A4229590	Calibrated	3/04
		Due	3/05
Solar Electronics Line Impedance Stabilization Network, Type			
	8012-50-R-24-BNC	Calibrated:	3/04
	S/N 8379585	Due:	3/05
HP 8447D	Broadband preamplifier, 0.1-1300 MHz		
	S/N 2443A03660	Calibrated: 3/04	
		Due: 3/05	
Mini-Circuits	ZFL-2000 broadband preamplifier, 10-3000 MHz		
	S/N Lin 001	Calibrated: 3/04	
		Due: 3/05	

ACCESSORIES:

(2) Ailtech Rulers calibrated in MHz
4 Meter ABS Antenna Mast and Trolley
Tektronix C5C Scope Camera
Eighty Centimeter Tall, Motorized Wooden Turntable
BNC to BNC Cables - as-required

(2)	25' RG-214/U Low-loss Coaxial Cable	
	S/N- LIN001 & LIN002	Calibrated: 3/04
		Due: 3/05

(2) 3' RG-55/U Low-loss Coaxial Cable, calibarated as part of the preamplifiers. Automatically taken into account when used with the above itemized range preamplifiers.

MEASUREMENT OF RADIO FREQUENCY EMISSION
OF CONTROL AND SECURITY ALARM DEVICES
FCC RULES PART 15, C63.4-2001 TEST PROCEDURE

I. INTRODUCTION

As part of a continuing series of quality control tests to ensure compliance with all applicable Rules and Regulations, this enclosure details the test procedures for certain radio control devices. Testing was performed at a test site located on the property of Linear LLC, 2055 Corte del Nogal, Carlsbad, California 92009.

II. MEASUREMENT FACILITY DESCRIPTION

The test facility is a specially prepared area adequately combining the desirability of an interference free location with the convenience of nearby 120 volt power outlets, thus completely eliminating the incidence of inverter hash, so often a problem with field measurements.

III. DESCRIPTION OF SUPPORTING STRUCTURES

For Measuring Equipment - The antenna is supported on a trolley that can be raised and lowered on a mast by means of remote control to any level between 1 meter and 4 meters above the ground. For measurements at 3 meters, an antenna height (center of dipole) of about 1 meter generally yields the greatest field strength. For measurements at 1 meter, an antenna height equal to the device under test generally yields the greatest field strength. Usually, horizontal polarization yields the greatest field strength for both 1 and 3 meter measurements.

For Equipment Under Test (EUT): The equipment to be tested is supported by a wooden turntable at a height of eighty centimeters. A two axis swivel at the top of the turntable permits the unit under test to be manually oriented in the position of maximum received signal strength. The turntable can be rotated by remote control.

Test Configuration - All transmitters were located eighty centimeters above ground, at a distance of three meters from the antenna. They were each oriented for maximum radiation by rotating the turntable. The antenna was then moved vertically along the mast for optimum reception in both horizontal and vertical planes. Where no emissions were found, the antenna was also moved to one meter distance to improve system sensitivity.

All receivers were located eighty centimeters above ground, at a distance of three meters from the antenna. They were each oriented for maximum radiation by rotating the turntable. The antenna was then moved vertically along the mast for optimum reception in both horizontal and vertical planes. Generally, emissions were very close to the observed spectrum analyzer noise floor, making accurate measurement difficult because of the analyzer detector's characteristic of adding signal and noise. To better observe and measure emissions well above the noise floor, the antenna was moved in to one meter. This provides a theoretical 9.54 dB improvement in received field strength, but a possible shift from far field to near field antenna characteristics may introduce an unknown error in measurement.

All transmitters and receivers tested are typical of production units.

A Hewlett-Packard spectrum analyzer consisting of an 8562A mainframe is used for the field strength meter. A set of Ailtech DM-105 series dipoles are used for the receiving antennas up to 1 GHz. An A.H. Systems model SAS-200/511 log periodic antenna is used from 1 to 5 GHz. Since the published antenna factor includes the small amount of balun loss, this factor is not included in the equations for correcting measured values. The cable loss is added to the raw data. For measurements up to 1 GHz, a Hewlett-Packard 8447D broadband RF preamplifier is inserted between the antenna cable and spectrum analyzer input to ensure adequate system sensitivity while measuring.

From 1 GHz to 3 GHz, a Mini-Circuits ZFL-2000 broadband RF preamplifier is used instead of the HP 8447D. In many cases, the antenna is moved in to a distance of 1 meter to enhance test range sensitivity after the 3 meter data is observed. A theoretical 9.54dB improvement is realized. Please see Excel data spreadsheet for details. For a particular device and frequency, the EUT to antenna distance is specified in the Report of Measurements.

Correction of Measured Values - The spectrum analyzer calibration is in units of dBm absolute. Published antenna factor, measured cable loss and preamplifier gain are in units of dB. All equipment is referenced to a 50 ohm characteristic impedance; therefore, any impedance terms will factor out of any calculations. Also, balun loss is included in the antenna factor, so this term will not appear in any calculation.

To obtain field strength, the reference (50 ohm system) 1 uV = 0 dBuV = -107 dBm is used.

For a given frequency: antenna factor, cable loss, preamplifier gain (if used) and a 9.54 dB gain factor (3 meters to 1 meter field strength conversion) when required are factored into the spectrum analyzer reading, resulting in a field strength in units of dBm.

Field strength reading (dBm) + 107 dB = dBuV, using 0 dBuV = 1 uV/meter at a specified distance as reference.

All of the equipment was calibrated to NBS-traceable factory specifications prior to the date of measurement.

IV **MEASUREMENT PROCEDURE**

Transmitters

1. Set the DIP-switch rockers of the transmitter (if needed) to all ON, jam the button in the ON position, and place the transmitter on the test stand.

2. Tune the antenna (if required).

3. Tune the spectrum analyzer.

4. Adjust the antenna height and polarization for peak field strength.

5. Rotate the turntable to orient the transmitter for the highest reading.

6. Record the observed peak emission.

7. Record the screen image (if required).

Spectrum Analyzer Control Settings:

Tuning:	As required
Bandwidth	100 KHz for Field Strength,
Scan Width:	100 KHz/div (may be different when tuning or adjusting display for photographs)
Input Attenuator:	10 dB
Scan Time:	50 msec sweep
Reference Level:	0 dBm
Display Mode:	Log 10 dB/division
Video Filter:	OFF
Scan Mode:	Internal
Scan Trigger:	Auto

Receivers

1. Place receiver on test stand, apply power.

2. Tune the antenna to the operating frequency to be measured.

3. Tune the spectrum analyzer.

4. Cohere the Receiver (Superregenerative Receivers Only)

   Tune the RF Generator to the center frequency of the superregenerative receiver under test. Apply a signal level of -20 dBm at a distance of approximately two meters. Use an Ailtech antenna of the correct tuned frequency to radiate the cohering signal. Vary the signal frequency to insure that the maximum spurious emissions are recorded.

   While radiating a signal, monitor the output levels at the analyzer looking for the largest peak from the unintentional radiator's spurious output.

   Record the highest levels near the center frequency but be careful not to record the signal generator as an emission from the receiver.

5. Record the Emission Levels

   Retune the antenna to the exact frequency of measurement. Adjust the antenna height and polarization for peak field strength. Rotate the turntable to orient the receiver for maximum emissions and record the frequency and level on the Report of Measurements.

   Record an image of spectrum analyzer display for the Report of Measurements, if required.

Spectrum Analyzer Control Settings:

Tuning:	As required
Bandwidth:	100 KHz
Scan Width:	100 KHz/div (may be different when tuning or adjusting display for photographs)
Input Attenuator:	10 dB
Scan Time:	50 msec sweep
IF Mode:	Log 10 dB/division
Reference Level:	-10 dBm
Video Filter:	OFF
Scan Mode:	Internal
Scan Trigger:	Auto

LINEAR LLC
FCC ID: EF4 ACP00931

Report of Measurements

Applications for control,security alarm,door opener or remote switch

Description: 372.5 MHz transmitter Code Hopping Microchip HCS201

DATE: November 10, 2004

ITEM TESTED: Code Hopping Transmitter
MANUFACTURER: Linear Corporation
TRADE NAME:
PRODUCT ID: EF4 ACP00931, Sample No. 1

DISTANCE AT WHICH MEASURED: 3 meters, DUT 0.8 meter above ground
REFERENCE: 15.231(a,b,c)
MEASUREMENT PROCEDURE: IEEE-Intentional Radiators C63.4-2001

RADIATION: per 15.205

A	B	C		D		E	G	H	I	J	K	L	M	N	O	P	Q
Tuned Frequency MHz	Emission Frequency MHz	Ambient Level dBm		FCC Limit dBm		Meter Reading dBm	Antenna Factor dB	Cable Loss dB	Amp Gain dB	Dist Fac dB	Duty Cycle dB	Field Strength dBm/mtr	Field Strength dBuV/mtr	uV/M	FCC Limit uV/M	dB:FCC	FREQ. MHz
372.50	372.50	-96.70		-10.06		-16.0	20.3	1.3	27.3	0.00	12.7	-34.40	72.60	4265.80	8450.00	-5.94	372.50
	745.00	-88.10		-38.66		-48.0	27.4	2.0	26.5	0.00	12.7	-57.80	49.20	288.40	845.00	-9.34	745.00
	1117.50	-83.00		-43.76		-50.1	26.3	2.5	20.8	0.00	12.7	-54.80	52.20	407.38	845.00	-6.34	1117.50
	1490.00	-79.70		-47.06		-50.4	28.5	2.9	20.1	0.00	12.7	-51.80	55.20	575.44	845.00	-3.34	1490.00
	1862.50	-77.80		-48.96		-56.2	30.2	3.3	20.3	0.00	12.7	-55.70	51.30	367.28	845.00	-7.24	1862.50
	2235.00	-72.80		-53.96		-65.3	31.2	3.5	16.5	0.00	12.7	-59.80	47.20	229.09	845.00	-11.34	2235.00
	2607.50	-83.54	*	-49.72	*	-78.5	32.0	4.0	12.5	9.54	12.7	-77.24	29.76	30.76	845.00	-28.78	2607.50
	2980.00	-82.24	*	-63.52	*	#N/A	33.0	4.3	0.0	9.54	12.7	#N/A	#N/A	#N/A	845.00	#N/A	2980.00
	3352.50	-81.14	*	-64.62	*	#N/A	33.7	4.7	0.0	9.54	12.7	#N/A	#N/A	#N/A	845.00	#N/A	3352.50
	3725.00	-80.04	*	-65.72	*	#N/A	34.5	5.0	0.0	9.54	12.7	#N/A	#N/A	#N/A	845.00	#N/A	3725.00

The spectrum was searched from 25 MHz to 4 GHz
No other emissions were observed except those shown on this page.

* NOTE: 1 meter measurement corrected to 3 meters

15.107(d) Conducted Emissions Not Applicable- Battery Powered

TESTED BY

DATE

John M Kuwana

ENGINEER

Nov. 24, 2004

DATE

FILE NAME: ACP931_X1.XLS

DISK NAME: FCC DATA

DURATION OF RF TRANSMISSIONS

WT-31

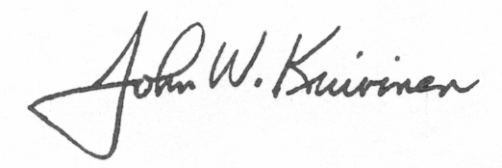
REMOTE REMOTE CONTROL TRANSMITTER

These transmitters are manually activated. They are used only for remote control of a garage door or gate system. As such they may be operated continuously by the user (FCC Rules 15.231(a)(4)).

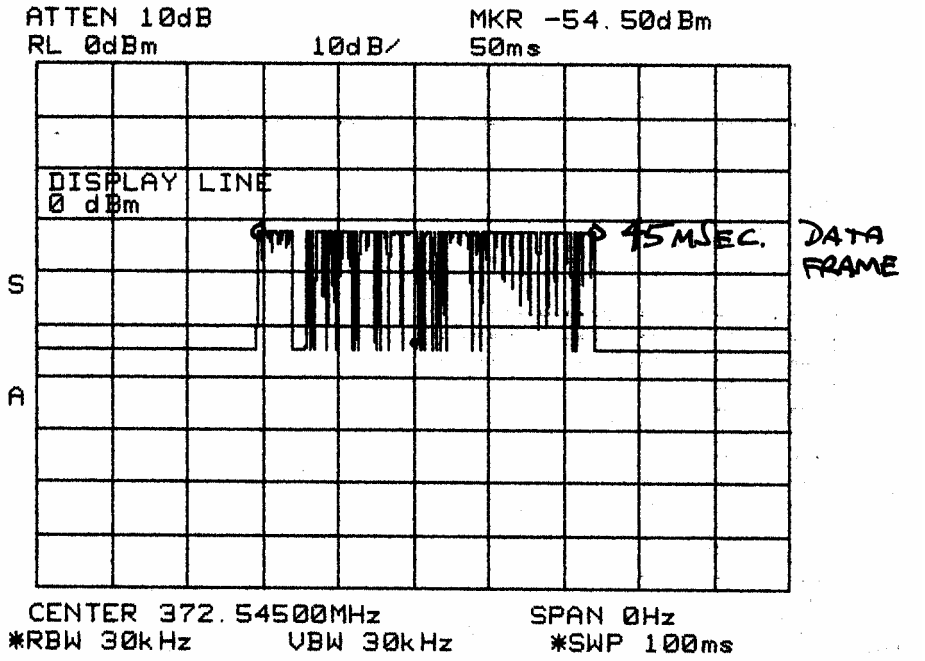
The transmitter encoder IC has an internal clock that limits transmissions to no longer than 30 seconds, even if the push button is held down. Only after the button is released and the pressed again may another transmission cycle begin.

Power will be removed from the RF exciter immediately after the release of the manual push button. The unit will then cease transmission. FCC Rules 15.231 (a)(1) allows no longer than 5 seconds upon the release of a manually activated transmitter.

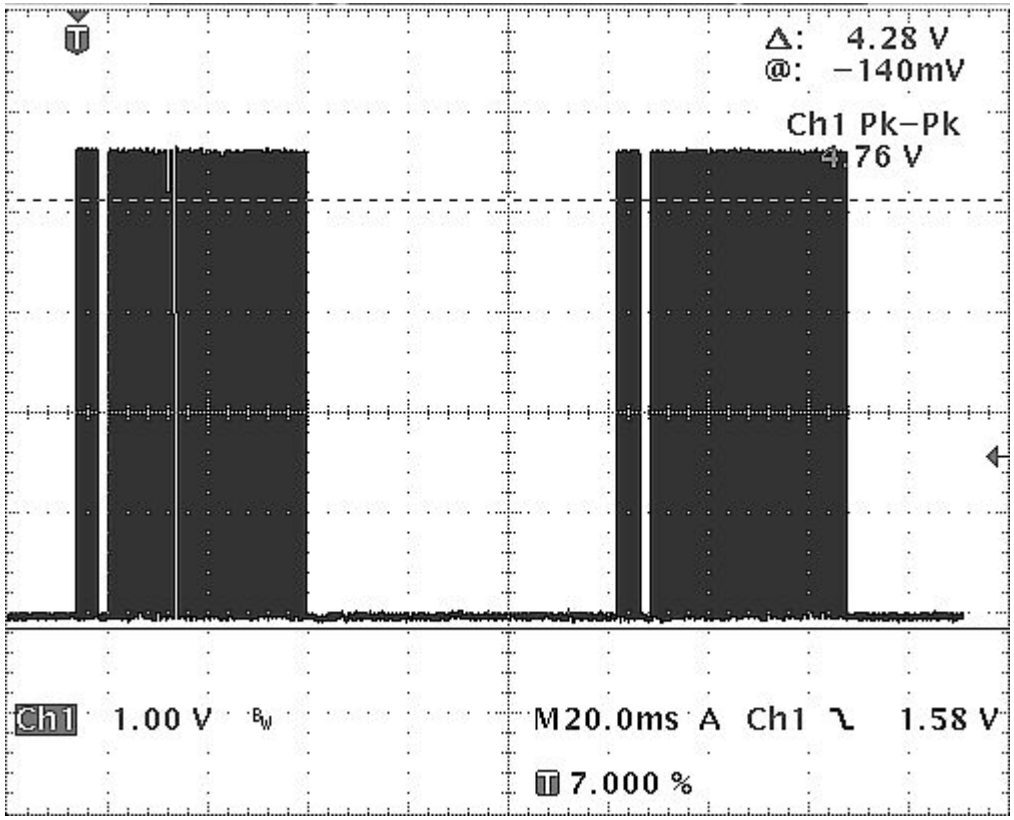
Signed:



John W. Kuivinen, P.E.
Regulatory Compliance Engineer



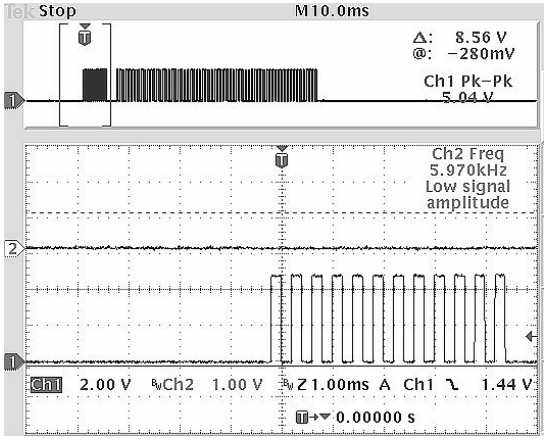
Zero span Spectrum Analyzer Photograph – Unable to Distringuish Data pulses. Used Tektronix TDS 3032 oscilloscope with disk recording feature for data squence.



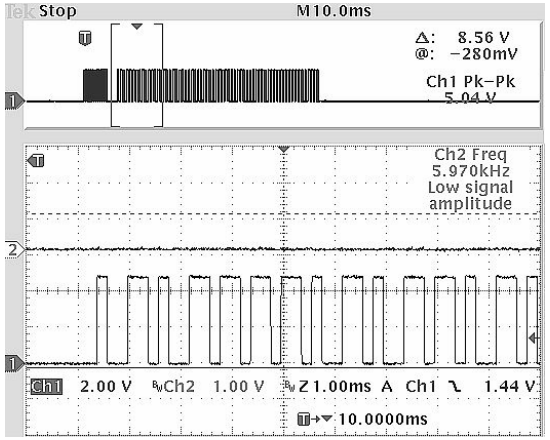
Rolling Code Format – WT-31
Interword Timing, 62 mSec.

Total Data Word length = 110 mSec.

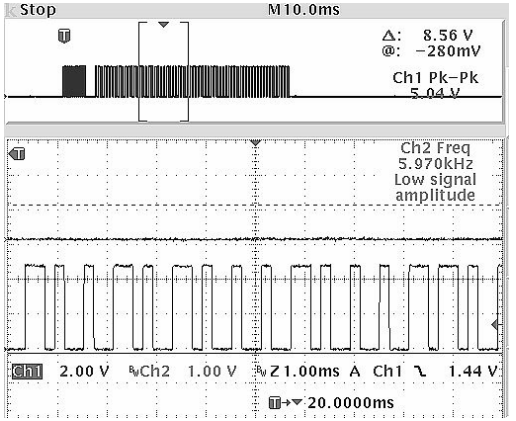
20 mSec. / Division for Timing Diagram



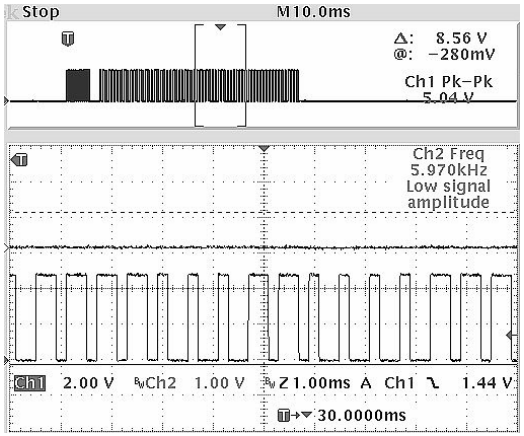
PREAMBLE, 50% DUTY

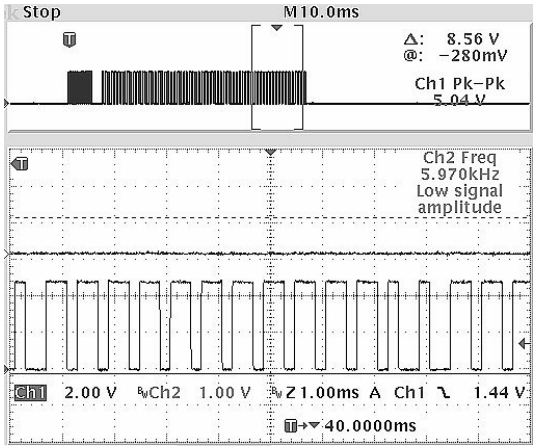


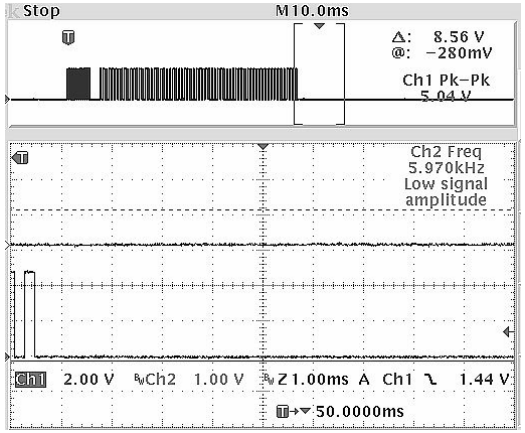
PREAMBLE = 4.8 mSec., GAP = 2



DATA WORD, 1 = 200 uSec, 0 = 400





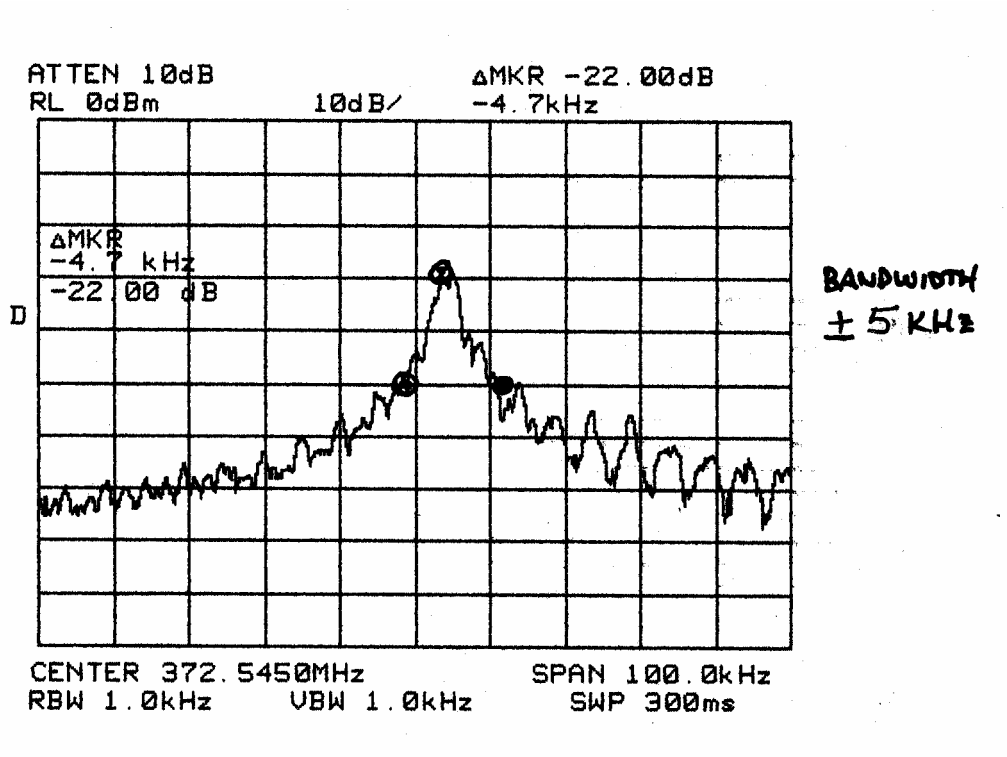


29 “Ones” X 200 uSec. = 5.8 mSec + 37 “Zeroes” X 400 uSec. = 14.8 mSec = Total Data On Time of 20.6 mSec.

GAP BETWEEN WORDS = 62

ROLLING CODE DATA STREAM, DUTY CYCLE ---- ON TIMES = Preamble 2.4 mSec + Data 20.6 mSec. = 23 mSec. ---- Total Time of Data Stream from First Data Pulse = 48 mSec + 60 mSec interword gap. NOTE: FCC Rules limit duty cycle calculations to 100 mSec.

23 mSec / 100 mSec. = 0.23 FCC Duty Cycle = 20 log (0.23) = -12.7 dB



DEVICE: WT-31 Remote Control Transmitter

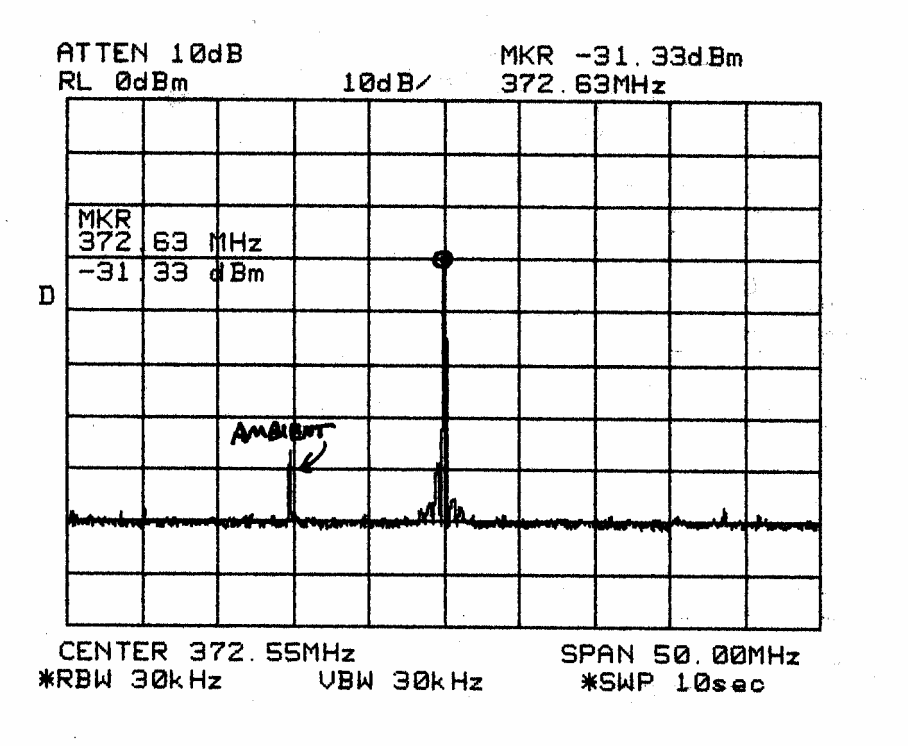
PHOTOGRAPH: Occupied Bandwidth

CONDITIONS: Transmitter Fundamental. A1D Modulation - Pulse Position Modulation. SAW Resonator Frequency Determining Element.

SPECTRUM ANALYZER CONTROL SETTINGS

CENTER FREQUENCY:	372.5 MHz	INPUT ATTENUATION:	-10 dB
SCAN WIDTH:	10 KHz / Div.	PREAMPLIFIER GAIN:	0 dB
SCAN TIME:	0.3 Sec.	LOG REF. LEVEL:	0 dBm
RF BANDWIDTH:	1.0 KHz		
ANTENNA:	6" Whip Ant. at Analyzer Input	TUNED TO:	N/A
ANTENNA DISTANCE:	0.1 Meters	ANTENNA HEIGHT:	N/A
SYSTEM NOISE FLOOR:	N/A		

NOTES: Per 15.231(c), Occupied Bandwidth (20 dB down) is less than +/- 10 KHz. This is less than 0.020% of the center frequency. FCC Rules, 15.231(c) devices must be less than 0.25% of center frequency. This device therefore complies with 15.231(c).



DEVICE: WT-31 Remote Control Transmitter

PHOTOGRAPH: Transmitter Spurious Emissions +/-25 MHz of the tuned center frequency.

CONDITIONS: Transmitter Fundamental. A1D Modulation, SAW Resonator Frequency Determining Element. Peak hold on spectrum analyzer. Minimum of twenty five sweeps on peak hold.

SPECTRUM ANALYZER CONTROL SETTINGS

CENTER FREQUENCY: 372.5 MHz INPUT ATTENUATION: -10 dB

SCAN WIDTH: 50 MHz PREAMPLIFIER GAIN: 0 dB

SCAN TIME: 10 Sec. LOG REF. LEVEL: 0 dBm

RF BANDWIDTH: 30 KHz

ANTENNA: 6" Whip Antenna on Analyzer Input TUNED TO: N/A

ANTENNA DISTANCE: 0.1 Meters ANTENNA HEIGHT: N/A

SYSTEM NOISE FLOOR: N/A

No emissions occur outside of the of the rated center freq. except for harmonic spurious signals.

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