Summary of Test Results
in accord with FCC Rules Part 15 and C63.4-1992

Equipment Model:	SNT00408
Transmitter Tested to C63.4-1992 Section:	FCC Rules 15.231
Field Strength at a distance of 3 meters:	5623 uV/Mtr (-0.3 dB below limit) @ 310 MHz
Peak to Average Ratio:	13.9 dB - Fixed Duty Cycle
Test Conditions:	Radiated (Sections 11 & 13)
Transmitter:	
Transmitter Frequency:	310 MHz Nominal (Factory Tuned Only)
Bandwidth (20 dB down)	< 0.010% of Center Freq.
Frequency Tolerance:	N/A (Nominal +/- 1.0 MHz)
Frequency Stability:	N/A (Nominal +/- 2.0 MHz)
Transmitter Spurious at 3 meters: (Worst Harmonic)	335 uV/Mtr (- 4.8 dB below limit)
Frequency:	1240 MHz
Momentary Operation (Yes/No)	Yes
Holdover time after manual release:	0.0 seconds
Duration of transmission after activation:	30 seconds maximum 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.: /s/ Date: October 30, 2000

STATEMENT OF ATTESTATION

Model: MCT-1/H Remote Control Transmitter

FCC ID: EF4 SNT00408

The equipment under test is a low powered remote control transmitter used with the HomeLink 310 MHz series of remote control receivers. 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 Corporation, 2055 Corte Del Nogal, Carlsbad, California. 92009.

Certified by:

/s/ October 30, 2000

_____ _____

John W. Kuivinen, P.E. Date

Regulatory Compliance Engineer

REPORT OF MEASUREMENTS

LINEAR CORPORATION
FCC ID: EF4 SNT00408
Model : MCT-1/H 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, 1999 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 C63.4-1992, 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 dated January 27, 1998 is on file with the commission and a Letter of Acceptance dated March 13, 1998 (File 31040/SIT) is a portion of the Commission's records.

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

/s/ October 20, 2000

_____ _____

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

TESTING INSTRUMENTATION AND EQUIPMENT LIST

SPECTRUM ANALYZERS:

H.P.	HP8562A	1KHz to 22GHz		
	S/N 2913A03742		Calibrated	4/00
			Due	4/01

ANTENNAS:

(2)	Ailtech DM105A T1		20-200 MHz		Tuned Dipole
	S/N 93412-105 and 93412-114		Calibrated 4/00	Due:	4/01
(2)	Ailtech DM105A T2		140-400 MHz	Tuned Dipole	
	S/N 93413-113 and 93413-117		Calibrated 4/00	Due:	4/01
(2)	Ailtech DM105A T3		400-1000 MHz	Tuned Dipole	
	S/N 93413-105 and 93414-111		Calibrated 4/00	Due	4/01
(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 - 99O MHz	
	S/N A4229590	Calibrated	4/00
		Due	4/01
Solar Electronics Line Impedance Stabilization Network, Type			
	8012-50-R-24-BNC	Calibrated:	4/00
	S/N 8379585	Due:	4/01
HP 8447D	Broadband preamplifier, 0.1-1300 MHz		
	S/N 2443A03660	Calibrated: 4/00	
		Due: 4/01	
Mini-Circuits	ZFL-2000 broadband preamplifier, 10-3000 MHz		
	S/N Lin 001	Calibrated: 4/00	
		Due: 4/01	

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: 4/00
Due: 4/01

(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, C63.4-1992 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 Corporation, 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

Transmitter Duty Cycle Calculations and Time Domain Information

MCT-1/H Data Format

This transmitter sends a fixed data word that is used to program a HomeLink receiver. The duty cycle is computed based on binary-coded pulse width type A1D modulation. Data pulses are either a 900 uSec (=0) and 1800 uSec (=1) pulses in any 2700 uSec data pulse time window.

Modulation rate is fixed at 137 bits per second.

During transmission, the transmitter sequentially emits a group of 11 pulses in the form of an AM modulated pulse-keyed carrier. A data word consists of synchronization bit, 10 data bits and an interword gap.

DUTY CYCLE ANALYSIS (Single Data Word):

Description	Total Time	"On" Time
Synchronization	3.6 mS	0.900 mS
Fixed Sequence	36 mS	15.3 mS
Inter Word Pause	40.4 mS	0 Sec.
Total Transmission	80 mSec	16.2 Sec

In compliance with FCC Rules 15.35(c), the following duty cycle factor is used for all field strength calculations. One data word duration of 80 mS time window is selected for the on to off time calculations.

$$\frac{16.2\text{ E-3 on time}}{80\text{ E-3 total time}} = 0.20$$ On time to FCC reference limit

20 log (0.20) = -13.9 dB Duty Cycle Ratio