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June 23, 1999

Federal Communications Commission  
EQUIPMENT APPROVAL SERVICES  
PO Box 358315  
Pittsburgh, PA 15251-5315

Re: Request for Certification

Enclosed is an application, fee in the amount of \$940, and exhibits for Certification of a Remote Control Transmitter, Cat.No.61-2115, which is manufactured by Chamberlain for Radio Shack.

The final instruction sheet is not available at this time, so I have included a typical instruction sheet indicating the FCC statement and important information.

The FCC ID of this model, upon certification, will be AAO61-2115.

We would appreciate your prompt attention to the submittal.

Sincerely,  
THE CHAMBERLAIN GROUP, INC.

A handwritten signature in black ink that reads "Barbara P. Kelkhoff". The signature is written in a cursive, flowing style.

Barbara P. Kelkhoff  
Manager, Product Safety

**LIST OF EXHIBITS**  
**3 FUNCTION, REMOTE CONTROL TRANSMITTER**  
**Cat. No. 61-2115**

1. Expository Statement
2. Theory of Operation
3. Schematic
4. Photographs
5. FCC Label Drawing
6. Operating Instructions
7. Test Report

**EXPOSITORY STATEMENT**  
**3 FUNCTION, REMOTE CONTROL TRANSMITTER**  
**Cat. No. 61-2115**

1. Since the final instruction sheet is not available at this time, a typical draft version has been included. The instructions include statements required to assure compliance with the Commission's Rules; Part 15.
2. Labeling is in accordance with the Commission's labeling requirements, Parts 2 and 15, Section 15.19.
3. This transmitter is intended for use with the certified receivers of garage door and gate operator systems manufactured by Chamberlain<sup>®</sup>, Genie<sup>®</sup>, and Linear<sup>®</sup>.
4. The transmitter is equipped with an automatically releasing push-button switch. Transmission is terminated upon release of the push-button.
5. The Cat.No.61-2115 transmitter is factory set to 300, 310, and  $390 \pm 0.1\%$  MHz.. It is not intended to be readjusted in the field, and specific instructions prohibiting tampering are provided to the user.
6. Test data for Model RS321, which is identical to Cat. No. 61-2115, is part of this submission. No emissions were detected in the forbidden bands below 1.0 GHz.

Certified by:

*Barbara P. Kelkhoff*

Barbara P. Kelkhoff  
Manager, Product Safety

# UNIVERSAL TRANSMITTER CIRCUIT DESCRIPTION FOR CAT. NO. 61-2115

## I. Overview

The Universal Transmitter is a unique combination of circuits which attains compatibility with most garage door openers by means of a programmable micro controller with non-volatile memory and a radiating oscillator with frequency selectable by logic controlled pin diode switching.

## II. Detailed Description (Refer to Block Diagram and Schematic)

**RF Circuit** -The transmit oscillator actually generates the RF energy which conveys the code information to the receiver. Q1 is the active transistor element of the oscillator. Fixed capacitors C1-C5, tuning capacitors C6, C7, C16, and a PC Trace Inductive Radiating Element are the frequency-determining parts and are configured as a pi-network feedback circuit. L1 choke conveys battery power to the oscillator, and R1 provides base current to Q1 to turn the oscillator on and off in accordance with the code output from the micro controller. Pin diodes, D4 and D5, switch the tuning capacitors depending on the desired frequency (see Frequency Select Logic Table on Block Diagram). L3, L4, and L5 provide ac isolation between the logic and RF, and R2-R5 provide forward and reverse biasing for the pin diodes. C12 and C14 are dc blocking capacitors that provide an RF circuit short.

**Micro controller** - U1 is an 8-bit micro controller which in addition to program memory and RAM also contains a small amount of EEPROM. This combination allows code that is field programmable and non-volatile. The micro timing is based on an on-board oscillator with an external 4 MHz ceramic resonator, Y1. R13 and C8 form the reset timing circuit. The micro controller provides the code output, the frequency logic, the LED drive, and powers the latch that keeps the power on once a switch push is detected.

**Switches, Latch, and Regulator** - The regulator, U2, is a low-drop type at 4.75 volts which allows the micro voltage to remain in regulation for the useful life of the 2 cell, 6 volt lithium battery source. U2 also contains an electronic power switch, which along with the micro, R9, and Q2 forms the latch that keeps the power on when required. R6-R8, D1, D2, and micro pins PC1-PC5 form the circuits which detect the switch activation. The pushbutton switches, S1-S3, perform programming and transmit select functions (see programming description below). The 3 switches mean that the transmitter is capable of 3-channel operation. The red LED, D3, and the associated current limit resistor, R10, allows visual feedback for transmit indication and programming aid.

# **1. EXPOSITORY STATEMENT**

## **2. THEORY OF OPERATION**

### **3. SCHEMATIC**

## **4. PHOTOGRAPHS**



## **5. FCC LABEL DRAWING**

## **6. OPERATING INSTRUCTIONS**

## **7. TEST REPORT**