FCC CLASS B COMPLIANCE TEST REPORT

for

Electromagnetic Emissions

of

GARAGE DOOR OPENER AND GARAGE DOOR TRANSMITTER

Model Number: GR-300M AND CT-300
Serial Number: Prototype
FCC ID: NUQ-CT300

PROJECT #: 01SC02507

Prepared for:

MIKADO TECHNOLOGY COMPANY

1435 Huntington Avenue #C
South San Francisco, CA 94080

Prepared by:

Underwriters Laboratories, Incorporated

11825 Niles Canyon Road
Sunol, CA 94586
(925) 862-9051

REPORT DATE: FEBRUARY 19, 2001

FCC CLASS B
COMPLIANCE TEST REPORT

FOR

GARAGE DOOR OPENER AND GARAGE DOOR TRANSMITTER
MODEL GR-300M AND CT-300

Prepared for:

MIKADO TECHNOLOGY CO.
South San Francisco, CA 94080

Prepared by: Underwriters Laboratories, Inc.

	Signature	**Date**
TEST TECHNICIAN	Wayne Fisher	4-12-01
TEST SUPERVISOR	Daryl Smith	4-12-01

LIST OF REVISIONS

REVISION NUMBER AND DATE	PAGE CHANGED	PAGE SUBSTITUTED	PAGE ADDED

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VERIFICATION OF COMPLIANCE

Equipment Under Test:	Garage Door Opener and Garage Door Transmitter
Model Numbers:	GR-300M and CT-300
Serial Number:	Prototype
Company:	Mikado Technology Co. 1435 Huntington Ave. #C S. San Francisco, CA 94080
Test Specification:	FCC Class B (ANSI C63.4, 1992)
Type of Test:	Conducted 450 kHz - 30 MHz Radiated 30 MHz - 1 GHz
Performance Criteria:	**Garage Door Opener** For Line Conducted test, emissions must not exceed the limits stated in CFR 47 Part 15, Subpart B, Section 107-(a). **Garage Door Transmitter** For Radiated test, emissions must not exceed the limits stated in CFR 47 Part 15, Subpart C, Section 15.231. **Garage Door Opener** For Radiated test, emissions must not exceed the limits stated in CFR 47 Part 15, Subpart B, Section 109-(a).
Date Tested:	January 31, 2001
Tested By:	Wayne Fisher

The above equipment was tested by Underwriters Laboratories, Inc., for compliance with the requirements set forth in the FCC Class B Rules and Regulations. This said equipment in the configuration described in the report, shows that maximum emission levels emanating from the equipment are within the compliance requirements.

GENERAL INFORMATION

Customer:	Mikado Technology Co. 1435 Huntington Ave. #C S. San Francisco, CA 94080
Contact Person:	Sammy Wu
Phone Number:	(650) 615-9466
Equipment Under Test:	Garage Door Opener and Garage Door Transmitter
Model Number:	GR-300M and CT-300
Serial Number:	Prototype
FCC ID Number:	NUQ-CT300
Test Standard:	CFR 47 Part 15, Subpart B 1999 (ANSI C63.4-1992), Class B CFR 47 Part 15, Supbart C 1999
Type of Test:	Conducted 450 kHz - 30 MHz Radiated 30 MHz - 1 GHz
Performance Criteria:	**Garage Door Opener** For Line Conducted test, emissions must not exceed the limits stated in CFR 47 Part 15, Subpart B, Section 107-(a). **Garage Door Transmitter** For Radiated test, emissions must not exceed the limits stated in CFR 47 Part 15, Subpart C, Section 15.231. **Garage Door Opener** For Radiated test, emissions must not exceed the limits stated in CFR 47 Part 15, Subpart B, Section 109-(a).
Deviation:	None

GENERAL INFORMATION (continued)

Test Results:

Line Conducted--Line conducted scans for the Garage Door Opener ranged from 450 kHz to 30 MHz on both Line 1 (hot side) and Line 2 (neutral side) in accordance with FCC Class B test standard. All line conducted emissions were within the FCC Class B requirements for compliance. (See Data)

Radiated--Radiated scans for the Garage Door Opener ranged from 30 MHz to 1 GHz in both the horizontal and vertical antenna polarization. All emissions observed were within FCC class B requirements for compliance.

Radiated--Radiated scans for Garage Door Transmitter the ranged from 30 MHz to 1 GHz in both the horizontal and the vertical antenna polarization. All spurious emissions were within the FCC subpart C section 15.231 (b)(3) requirements for compliance. (See Data)

Radiated--Radiated scans for the Garage Door Transmitter at fundamental frequency 391.16MHz to 391.26MHz were performed in both the horizontal and the vertical antenna polarization. The fundamental emissions were within the FCC subpart C section 15.231 (b)(2) and requirements for compliance. (See Data)

Radiated--Radiated scans for the Garage Door Transmitter at fundamental frequency 391.16MHz were performed to determine "On time of transmitter after deactivating 'on' switch". The fundamental emissions were within the FCC subpart C section 15.231 (a)(1) and requirements for compliance. (See Plot)

Radiated--Radiated scans for the Garage Door Transmitter at fundamental frequency 391.12MHz were performed to determine the fundamental bandwidth for Center Frequency. The fundamental emissions were within the FCC subpart C section 15.231 (c) and requirements for compliance. (See Plot)

LETTER OF AUTHORIZATION

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Gentlemen :

We, the undersigned, hereby authorize Underwriters Laboratories, Inc. to act on our behalf in all matters relating to applications for equipment authorizations, including the signing of all documents relating to these matters. Any and all acts carried out by Underwriters Laboratories, Inc. on our behalf shall have the same effect as acts of our own.

The applicant certifies that, in the case of an individual applicant is not subject to a denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a), or, in the case of a non-individual applicant (e.g. corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits, that includes FCC benefits, pursuant to that section.

Sincerely,

Sammy Wu
CEO

1435 Huntington Ave. Suite C • South San Francisco CA 94080 • phone: 650.615.9966 • fax: 650.615.9900

SYSTEM DESCRIPTION

Equipment Under Test

Garage Door Opener and Garage Door Transmitter

Support Equipment

None

EUT Test Program: EUT was operated in transmit/receive and idle modes.

FUNCTIONAL DESCRIPTION

The Garage Door Opener (receiver) and Garage Door Transmitter, models GR-300M and CT-300

The receiver (GR-300M) is typically mounted inside the user's garage and is connected to the manual switch wires of garage door openers. The GR-300M has a stranded wire for an antenna.

The transmitter (CT-300) is capable of sending three different signals to activate up to three separate garage door openers, via the receiving unit. It's designed to be either mounted in the dashboard of an automobile, or carried as on a key chain. The user selects which door to activate 1, 2 or 3 by depressing either button 1, for door one, or 2 for door two. Door three is selected by depressing buttons 1 and 2 simultaneously. The CT-300 sends different digital codes on singular frequency depending on what buttons are depressed. The antenna for the transmitter is a spiral integral to the printed circuit board. The CT-300 had a fresh battery installed for testing.

PRODUCT INFORMATION

Description of Equipment Under Test: Garage Door Opener and Garage Door Transmitter Model GR-300M and CT-300 are capable of sending three different signals to activate up to three different garage door openers via the receiving unit.

The EUT and/or support equipment was received at Underwriters Laboratories, Inc. on January 31, 2001 in good condition.

Housing Type: Plastic

Power Supply: External

AC Power Requirements: 120 VAC / 60 Hz 12 VDC

Power Supply Manufacturer: Motorola

Model Number: 481609003NT

Serial Number: 9715

Power Line Cord From External Supply to EUT: Unshielded **Length:** 2 Meters

OSC./Clock Frequency: 391 MHz

I/O PORT TYPE	QTY	TESTED WITH
Door Opener	3	3

FCC ID LABEL

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

RE: FCC ID: NUQ-CT300

Gentlemen:

The FCC identification number for the NUQ-CT300 is engraved on the outside of the housing of the transmitter.

FCC ID:	NUQ-CT300
COMPANY NAME:	Mikado Technology Company
EQUIPMENT NAME:	Panel-Mounted Garage Door Transmitter
MATERIAL TYPE:	Plastic
COLOR OF DECAL:	Same Color as Plastic Housing
DECAL SIZE:	25mm W x 7mm H

Note: The device shall bear the following statement in a conspicuous location on the device:
Operation is subject to the following two conditions: (1) This device may not cause; harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Sincerely,

Sammy Wu
CEO
Jan. 31, 2001

1435 Huntington Ave. Suite C • South San Francisco CA 94080 • phone: 650.615.9966 • fax: 650.615.9900

FCC ID LABEL PLACEMENT

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

RE : FCC ID: NUQ-CT300

Gentlemen :

See Figure A-2 on Page 28

(CD Page 38)

The above drawing is an illustration of the FCC label placement on our product upon grant of this application.

Sincerely,

Sammy Wu
CEO
Jan. 31, 2001

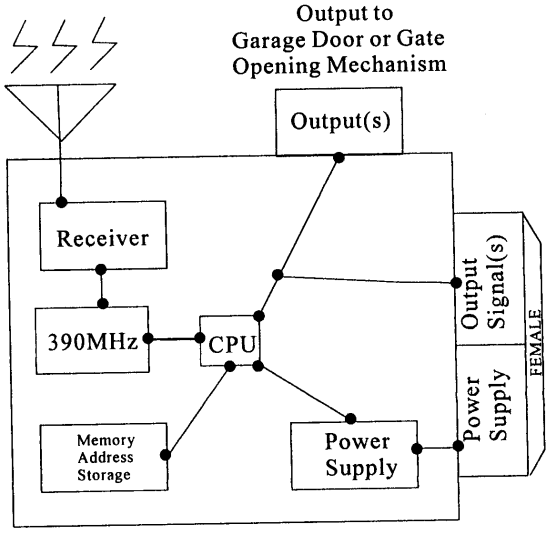
1435 Huntington Ave. Suite C • South San Francisco CA 94080 • phone: 650.615.9966 • fax: 650.615.9900

BLOCK DIAGRAM(S)

FCC:NUQ-CT300

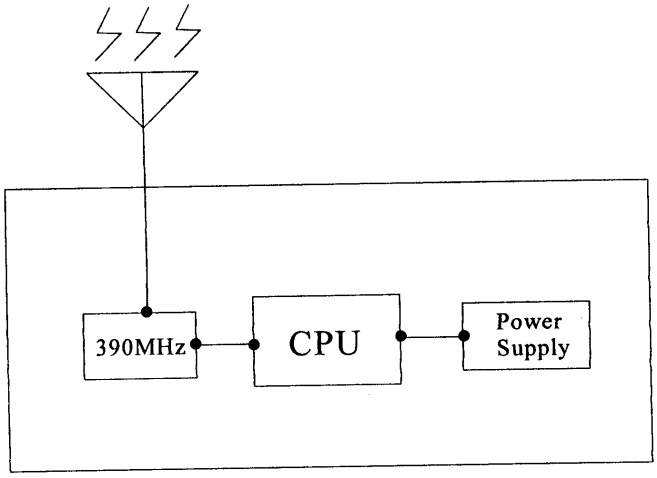
Model:GR-300M

(Receiver)

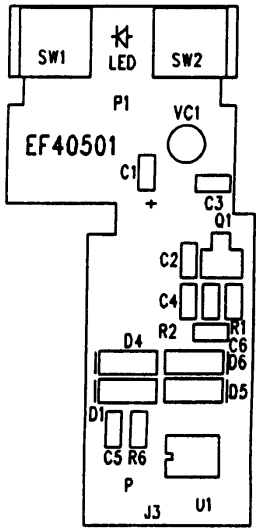


Model:CT-300

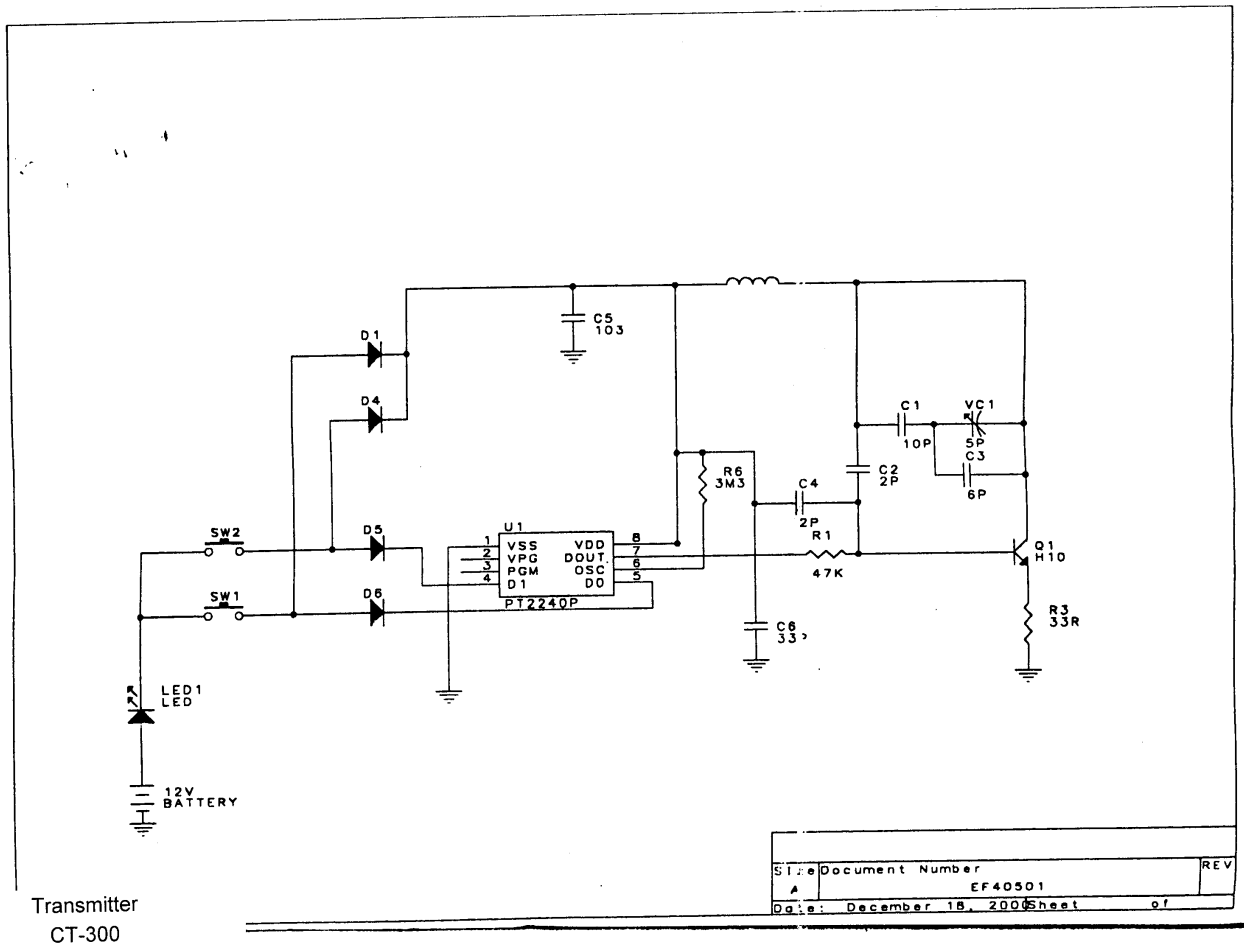
(Transmitter)



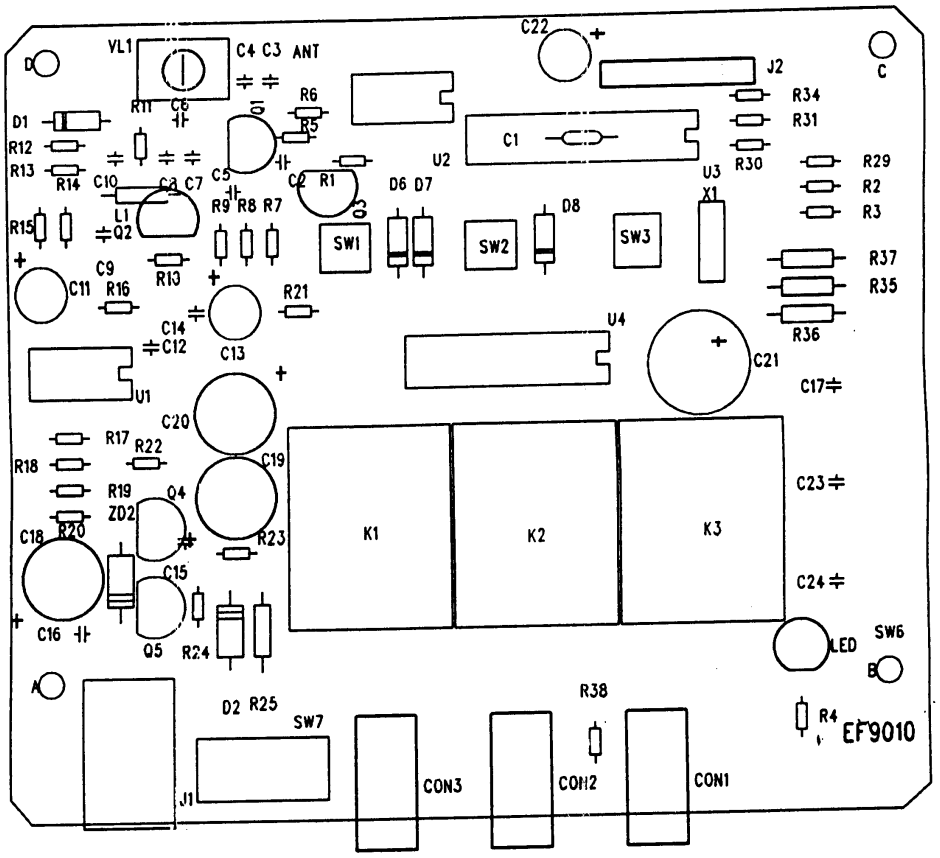
SCHEMATICS



Transmitter
CT-300

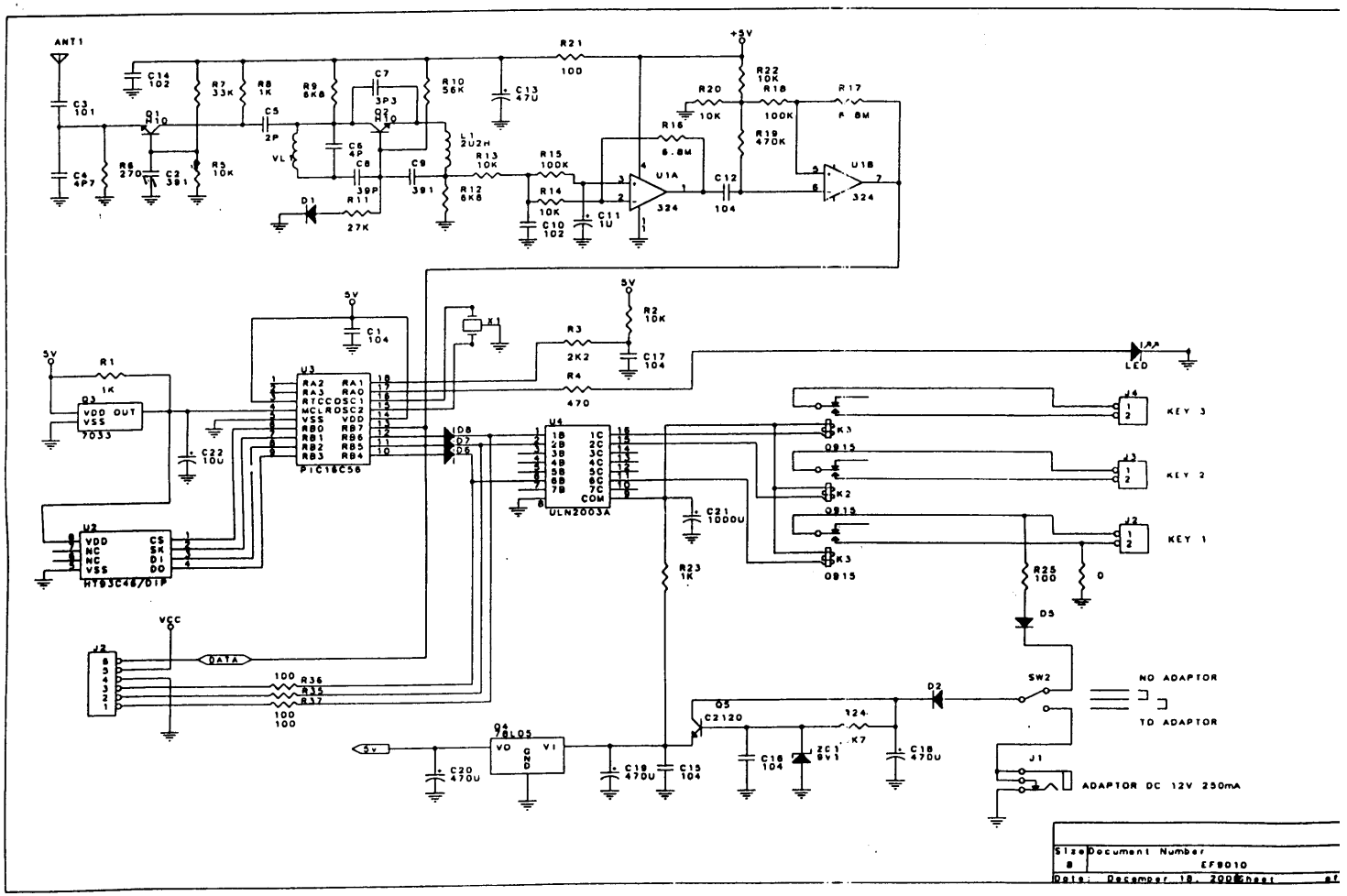


Transmitter
CT-300



1mm 3mm *3

Receiver Opener
GR-300M



Receiver Opener
GR-300M

OPERATION MANUAL

* SEE SEPARATE ENCLOSURE FOR THE OPERATION MANUAL.

The enclosed manual is for the EUT name. As you will notice on Page 1 of this manual is the FCC WARNING about radio and television interference as per the requirement set forth in Part 15 of the FCC Rules.

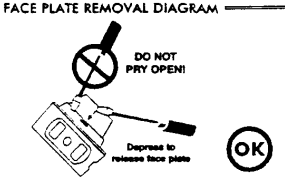
Owner's Manual

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

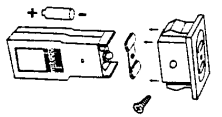
Universal Garage Door Remote Control

FCC ID : NUQ-CT300
Receiver
Model : GR-300M
Transmitter
Model : CT-300

FACE PLATE REMOVAL DIAGRAM



REMOTE ASSEMBLY DIAGRAM



12 Volt
Alkaline Battery
23A, VR22, EL12,
GP23 or GP12A

WARNING

- ⚠ Electrical shock can cause serious injury or death. Before installing or making any changes, please make sure you unplug the garage door unit(s) and the Mikado receiver's AC Adapter from the electrical socket.
- ⚠ Garage door(s) can cause serious injury or death. Before you open or close the garage door(s), make sure people are away from the garage door(s).
- ⚠ Do not allow children to operate the Mikado receiver or iDT.
- ⚠ Do not allow children to play near the garage door(s).
- ⚠ Please contact a trained professional if you need help installing the unit.

LIMITED WARRANTY

What is and is Not Covered : This warranty covers all defects in workmanship or materials in your Mikado Programmable Remote unit ("Unit"). This warranty does not cover any previously altered, repaired, or serviced Unit if performed by anyone other than Mikado International, Inc ("Mikado") ; any Unit on which the serial number has been altered or removed ; any Unit damaged by accidents, misuse, abuse, or operated contrary to the instruction contained in the accompanying manual; any labor or expenses associated with (re-) installation and/or removal of the Unit. This warranty also does not cover batteries, battery replacements.

Except to the extent prohibited by applicable law, this shall be the exclusive written warranty and neither this warranty nor any other warranty, express or implied, including a warranty of merchantability and fitness for a particular purpose, shall extend beyond the period of coverage stated in this warranty. Mikado shall not be liable for any loss or damage, direct, incidental, or consequential, arising out of the use of, or inability to use, this product. As used in this warranty, incidental damage includes, but is not limited to, expenses associated with transportation to and from the dealer or manufacturer to get warranty service, loss of time, loss of use, or other such damages; consequential damage includes, but is not limited to, the cost of repairing or replacing other property which is damaged when this appliance does not work properly. This warranty is only valid in the USA and Canada.

For How Long : This warranty coverage runs for three (3) year on parts, one (1) year on labor from the original date of purchase of this Unit.

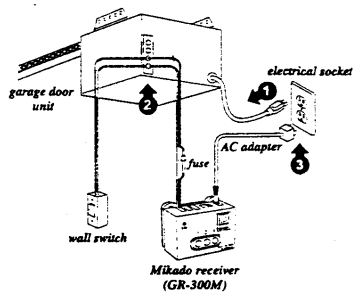
What Mikado Will Do : Mikado will, at its option, repair the defective Unit at no cost to you, or replace the defective Unit with a new or remanufactured functionally equivalent Unit of equal value.

How to Get Service : Ship the Unit, freight prepaid, to Mikado International, Inc., 1428 Huntington Ave., Ste. C, South San Francisco, CA 94080. The Unit must be packaged in such a way as to reasonably protect it from possible shipping damage. In many instances, the carton in which the dealer sells the Unit is not adequate, and additional packaging is required. Evidence of proof of purchase in the form of the bill of sale or invoice must be included. Please specify the problem in detail to insure expedited service. Call Customer Service at 1-888-9-MIKADO for further information.

Your Rights under State Law : Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Mikado Technology 1-888-9-MIKADO

Installation



Operation

Figure A

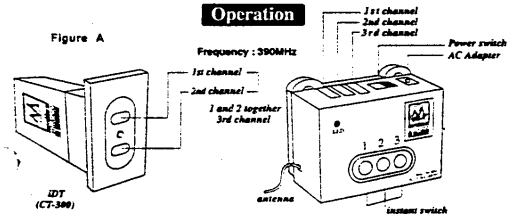


Figure B

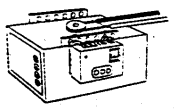


Figure C

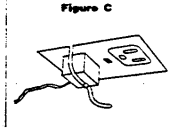
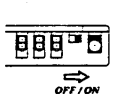


Figure D



Installation

Step 1 Unplug the garage door unit(s) from the electrical socket. (see figure A) Use the two 15cm white releasable tie straps to secure the Mikado receiver on or near the garage door unit(s). (see figure B) If you have three garage doors, secure the Mikado receiver on or near the center garage door unit in order for the two 6 meter output wires to reach the other two garage door units.

Step 2 Connect the red output wire from the Mikado receiver to either one of the two garage door wall switch terminals on the garage door unit. Connect the white output wire to the other wall switch terminal on the garage door unit. (see figure 3) Because the Mikado receiver and the iDT are preset to match, you must connect the wiring harness to the appropriate terminal on the receiver. For example, if you want to use channel one on the iDT, you must connect the wiring harness to channel one on the receiver. (see figure A)

Step 3 Connect the AC adapter to the Mikado receiver and plug the AC adapter and the garage door unit(s) back into the electrical socket. (see figure 3) If your electrical socket is on the ceiling, please use the 30cm white releasable tie strap to secure the AC adapter onto the electrical socket cover to prevent the adapter from falling down. (see figure C)

Operation

After installing the Mikado receiver, the LED light on the receiver should start to flash, which means the receiver is working. If the LED light is not flashing, make sure the power switch is switched to the right. (see figure D) If the LED light is flashing, press the Mikado receiver's instant switch and the garage door motor should start to work. If the garage door motor does not work, check the fuse on the connecting wire. If the fuse is okay, go back to step 2 in the Installation Instructions and check your connections.

Make sure you have connected the red and white output wires from the Mikado receiver to the wall switch terminals on the garage door unit. Before making any changes, please make sure you unplug the garage door unit(s) and the Mikado receiver's AC Adapter from the electrical socket.

Test the reception of the Mikado receiver by pressing the button on the iDT to open the garage door. If necessary, change the location of the Mikado receiver to increase the reception of the unit. The 15cm white tie straps are releasable.

Please contact a trained professional if you need help installing the unit.

or

For additional information contact us at :

1-888-9-MIKADO

www.mikadotech.com

PRODUCT CABLING INFORMATION

Equipment Under Test (EUT): Garage Door Opener and Garage Door Transmitter

Cable: Switch **Unshielded**

Used **From:** Door One **Port On:** EUT

To: Unterminated

Connector Type: Molex **Length:** 30 feet

Cable used during test was unbundled.

Cable: Switch **Unshielded**

Used **From:** Door Two **Port On:** EUT

To: Unterminated

Connector Type: Molex **Length:** 15 feet

Cable used during test was unbundled.

Cable: Switch **Unshielded**

Used **From:** Door Three **Port On:** EUT

To: Unterminated

Connector Type: Molex **Length:** 15 feet

Cable used during test was unbundled.

TEST SUMMARY

Equipment Under Test: Garage Door Opener GR-300M and Garage Door Transmitter CT-300

Requirements: FCC CFR 15.0

Modifications Made to EUT: No

Test Results:

Requirement	Results
15.231(a)	Passed
15.231(a)(1)	Passed
15.231(a)(2)	N/A
15.231(a)(3)	N/A
15.231(a)(4)	N/A
15.231(b)(1)	N/A
15.231(b)(2)	Passed
15.231(b)(3)	Passed
15.231(c)	Passed
15.231(d)	N/A
15.231(e)	N/A
15.107(b)	Passed
15.109(b)	Passed

Part 15, subpart B for receiver requirements.

TEST RESULTS

FCC 47 CFR Part 15 Subpart C

CT-300 Garage Door Opener/Transmitter

15.231(a) Periodic operation in the band 40.66-40 .70 MHz and above 70MHz

CT-300 operates at 391.16MHz

Transmission signal types: Control signals (See Manual)

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivated the transmitter within not more than 5 seconds of being released.

The CT-300 unit was triggered hand and its output signal was measured using a spectrum analyzer.

CT-300 unit on time = 2.5 seconds. (See Page51)

The remote unit was triggered by hand using the push bottom and its output was measured using a spectrum analyzer

CT-300 unit on time after release = 37.5 milliseconds (See Page 53)

15.231(a)(2) N/A EUT is not automatically activated

15.231(a)(3) N/A EUT does not operate at regular predetermined intervals

15.231(a)(4) N/A EUT is not for emergency use

TEST RESULTS (Continued)

15.231(b)(1)(2) Emission field strength limit of fundamental frequency

CT-300 Unit

The CT-300 unit was handheld 3 meters from the antenna and was triggered by hand using the 1 and 2 buttons. This was done many time in order to capture the signal.

15.231(b)(3) Emission Field Strength of Spurious Emissions

GR-300M and CT-300 Units

The GR-300M unit was placed on a wooden table 0.8 meters high located on a 3 meter open field test site.

A wiring harness was connected to the GR-300M unit

The hand held remote unit was used to activate the GR-300M unit

The GR-300M and CT-300 units were found to be within the limits. (See Pages 56 and 57)

15.231(c) Bandwidth shall be no wider than 0.25% of the center frequency at the 20dB down points

Center frequency = 391.16 MHz

0.25% = 0.9779MHz

Transmitter = 490.0 kHz (See Page 50)

The CT-300 was within the 0.25% BW limit

TEST RESULTS (Continued)

15.231(d) **N/A** EUT Operates at 391.16 MHz

15.231(e) **N/A** EUT does not operate at a periodic rate exceeding that specified in paragraph (a)

FCC 47 CFR Part 15, Subpart B

15.107 Conducted Emissions (Class B)

GR-300M Garage Door Opener Receiver

15.109 Field Strength of Radiated Emission (Class B)

The base unit was placed on a wooden table 0.8 meters high, located on a 3 meter open field test site.

A wiring harness was connected to the base unit

SUMMARY

Company: Mikado Technology Co.

Equipment Under Test: Garage Door Receiver

Model Number: GR-300M

Test Specification: FCC Class B

Test Type: Line Conducted **Location:** Lab #2

Tested By: Wayne Fisher

EUT was scanned in the following setup(s): Mode: Receiving **Configuration:** Standard

The highest emissions recorded were in test setup #1 above.

Support Equipment: None

EUT Power: 120 VAC / 60 Hz **Power Cord:** Unshielded

Modification(s) made to EUT: None

Test Results: Passed

(The chart below shows the six highest readings taken from the final data)

FREQ MHz	CORR'D dBµV	SITE CF	LIMIT		MARGIN		LINE
			QP	AVG	QP	AVG	
0.454	25.8PK	6.0	48.0		-22.2		Line 1
0.583	21.8PK	6.0	48.0		-26.2		Line 1
0.460	24.0PK	6.0	48.0		-24.0		Line 1
0.519	20.0PK	6.0	48.0		-28.0		Line 2
0.660	17.4PK	6.0	48.0		-30.6		Line 2
28.110	19.5PK	6.0	48.0		-28.5		Line 2

L1 = Line One (hot side)/**L2** = Line Two (neutral side)

SUMMARY

Company: Mikado Technology Co.

Equipment Under Test: Garage Door Transmitter

Model Number: CT-300

Test Specification: FCC Class B

Test Type: Radiated **Location:** 3 Meter Test Site #1

Tested By: Wayne Fisher

EUT was scanned in the following setup(s): Mode: Receiving **Configuration:** Standard

The highest emissions recorded were in test setup #1 above.

Support Equipment: None

EUT Power: 120 VAC / 60 Hz **Power Cord:** Unshielded

Modification(s) made to EUT: None

Test Results: Passed

Note: See Final Test Data