



INSTALLATION GUIDE

**IMPROVED RF SECTION
WITH
ENHANCED
RANGE!**



RADIO FREQUENCY GATEWAY WITH ADJUSTABLE ANTENNA

RFG

CONGRATULATIONS!

Thank you for purchasing the **RFG Radio Frequency Gateway with Adjustable Antenna** from Niles. With proper installation and operation, you should enjoy years of trouble-free use.

Niles manufactures the industry's most complete line of custom installation components and accessories for audio/video systems. To see the complete Niles product assortment, visit us on the Internet at: www.nilesaudio.com

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INTRODUCTION

The Niles RFG Radio Frequency Gateway is a highly flexible tool that allows system designers to add a ZigBee® radio transmitter/receiver to Niles MultiZone products or extend the Radio Frequency Receiver of a Niles HT-MSU Home Theater Main System Unit.

FEATURES AND BENEFITS

MULTI-MODE DIPSWITCHES

Two dipswitches are used to select the operation mode: Master Base, Repeater Base, Wireless Keypad, and Not Assigned.

NEW EXTERNAL ADJUSTABLE ANTENNA

An external antenna improves reception coverage, range and reliability and is easily adjustable, regardless of installation restrictions.

INSTALLATION FLEXIBILITY

The low-profile housing, accessible connections, and wall-mount hole wings enable the RFG to be installed behind components or along a baseboard. The high-impact plastic housing is heat resistant, so the RFG works well in an attic. Multiple RFGs can be cascade wired over a single CAT-5 cable run.

RELIABLE ZIGBEE® RF COMMUNICATION

The RFG uses a ZigBee based 2.4 Gigahertz radio frequency that works well in “noisy” RF environments. The 15-channel* and 15-network ID capability allows multiple RFGs to be used near each other and in multiple-dwelling units.

*: RFG EX has 10 channels

QUICK AND EASY SET-UP WITH WIZARD-BASED NILES CONFIGURATION SOFTWARE

An RFG can be added to any network based Niles MultiZone Receiver or Home Theater Main System Unit (HT-MSU) using the Niles System Configuration Software. The software is wizard-based and guides the installer/programmer through basic and advanced system designs.

Configuration is stored in non-volatile memory within the RFG. This safeguards against accidental loss of programming for the entire life of the product.

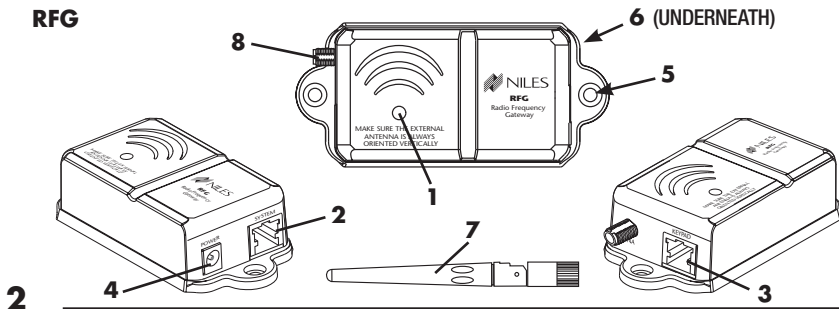
CONTENTS

Check that your RFG Radio Frequency Gateway contains the following:

- RFG (Radio Frequency Gateway)
- Ferrite Bead
- Antenna

PARTS GUIDE

RFG



1) Power LED - The blue LED indicates that the RFG has power. This LED also indicates the connection status to the Niles MultiZone Receiver or Home Theater Main System Unit.

2) System Connection - This RJ-45 connection is used when the RFG is connected to a Niles MultiZone receiver.

3) Keypad Connection - This RJ-45 connection is used when the RFG is connected to a keypad, a Niles HT-MSU Home Theater Main System Unit, or to continue the CAT-5 cable run to other RFGs.

4) Power Connection - This barrel type jack is where the power supply connects to the RFG. A Niles FG01035 Power Supply (optional) is required for certain system configurations. The ferrite bead is used on the end of the power plug connected to the RFG.

5) Mounting Wings - The RFG can be conveniently mounted to a baseboard, wooden stud, or directly to the wall. (Mounting screws not included).

6) Set-up Dipswitches - These switches allow the RFG to be configured for one of four operation modes: Master Base, Repeater Base, Wireless Keypad, and Not Assigned.

7) External Adjustable Antenna - This is the ZigBee Antenna. The RFG should always be positioned so that the antenna is vertical.

8) Antenna Connection - This screw terminal allows the adjustable antenna to be attached.

SYSTEM DESIGN CONSIDERATIONS

The Niles RFG Radio Frequency Gateway is a highly flexible tool that allows system designers to add a ZigBee radio transmitter/receiver to Niles MultiZone products or extend the Radio Frequency receiver of the Niles HT-MSU Home Theater Main System Unit.

Multiple RFGs are used to create an RF mesh network. RF mesh networks require at least a transmitter and a receiver, however in large installations repeater bases can be used.

ZIGBEE TERMINOLOGY

To understand how to use the RFG, the system designer needs to understand ZigBee terminology.

MASTER BASE

The Master Base is the coordinator of the RF mesh network. Its job is to receive information from the Repeater Bases and End-Points in the system, consolidate that information, and send it to the main controlled source. The Master Base is like a head coach in football. His job is to listen to the assistant coaches and players to create and send the game plan to those that execute it. The Master Base should be located centrally and as high as possible within the system design. A Master Base is hard-wired to the main controlled source, the MultiZone receiver, or Home Theater Main System Unit.

END-POINT

The End-Point is where the RF transmitted information starts and stops. For the RFG, the End-Point is typically a MultiZone system keypad. A system design can have multiple End-Points (keypads). End-Points can be spread over a large area and communicate directly to the Master Base, or through a Repeater Base to the Master Base. By its nature an End-Point will not repeat RF information to other End-Points.

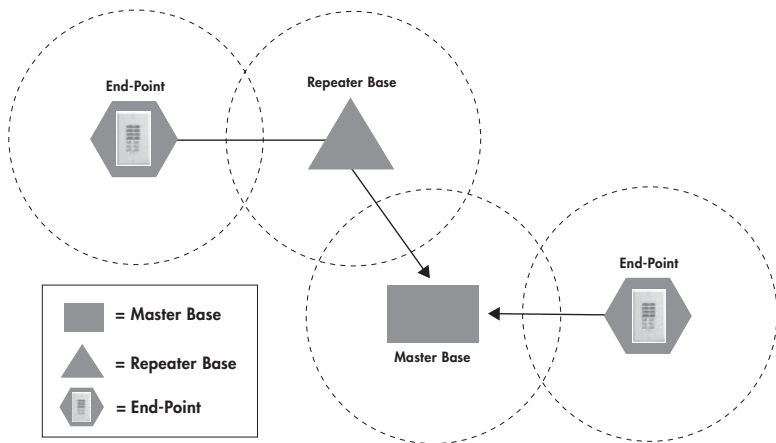
REPEATER BASE

The job of a Repeater Base is to listen for any network RF information, take that information and re-transmit it so that other bases can pick it up if they are too far away for direct communication.

ZIGBEE RF NETWORK

When designing an RF network it is important to know that at least one Master Base and one End-Point are needed. Repeater bases are used to expand the coverage area of the RF network. Multiple hops can be used in an RF network design, however great care should be used to not exceed more than four hops. To count the hops, start from an end-point, and then add one for each Repeater Base used between the End-Point and the Master Base. See **Figure 1** for basic RF network system design.

Figure 1. Basic RF Network



RFG USAGE WITH NILES NETWORK-BASED MULTIZONE RECEIVERS

The RFG can be used with Niles Network-based MultiZone receivers allowing the installer to create “wireless keypads.” Typically, control keypads are connected to the MultiZone receiver via a CAT-5 cable. In installations that do not allow a run of CAT-5 cable (such as a retrofit or a detached area from the main equipment area), use the RFG to overcome the hard-wired limitation. The dipswitches pre-configure each RFG to the application for which it is being used. See *Setting the Dipswitches* section.

RFG USAGE WITH A NILES iC2™ HOME THEATER AUTOMATION & CONTROL SYSTEM

The Niles iC2 uses RF communication between the iC2 Tabletop Controller and the Home Theater Main System Unit (HT-MSU). In other words, there is a Master Base built inside of the HT-MSU and the iC2 remote is an End-Point. The HT-MSU is typically located behind the home theater gear in an equipment rack. That is usually the worst place for the Master Base to be located due to the metal and noise (interference) created by the home theater sources. One RFG can be used to **replace and extend** the built-in Master Base to an area where there will be little or no interference. The RFG is hard-wired to the HT-MSU using CAT-5 cable terminated with RJ-45 plugs. Please see the *Installation Section* for proper termination wiring.

SETTING THE DIPSWITCHES

The two dipswitches on the RFG allow for it to be pre-configured to one of the four modes:

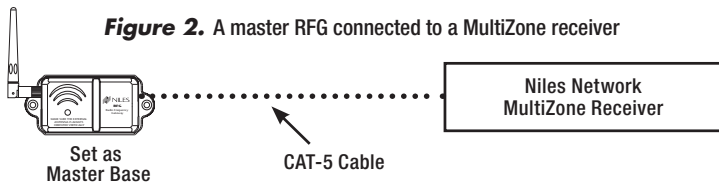
- 1) *MASTER BASE*
- 2) *REPEATER BASE*
- 3) *WIRELESS KEYPAD (END-POINT)*
- 4) *NOT ASSIGNED*

SYSTEM DESIGN WIRING FOR RFG

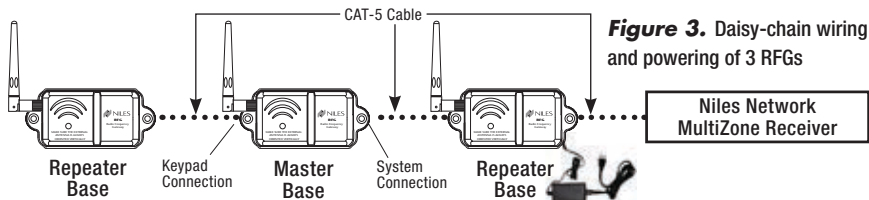
The RFG has two RJ-45 connections for wiring into the system. The connection used depends on the mode and overall system design.

A MASTER RFG CONNECTED TO A NILES NETWORK-BASED MULTIZONE RECEIVER:

An RFG with dipswitches set for Master Base mode must be connected directly to the MultiZone receiver using CAT-5 cable as detailed in **Figure 2**. No power supply is needed.



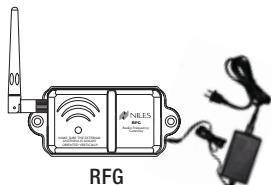
A master RFG can be wired with repeater RFGs by wiring the CAT-5 cable from the MultiZone Receiver's Communications port to the System connection of the first RFG, and then from the first RFG's Keypad connection port to the System connection of the next RFG. Two RFGs can be daisy chained to the receiver without an additional power supply. If three RFGs are daisy chained, a Niles power supply (FG01035) must be connected to an RFG in the chain. If more RFGs are required, note that the Niles power supply can supply power to up to three adjacent RFGs in the chain.



A REPEATER RFG NOT WIRED TO A MULTIZONE RECEIVER

An RFG set for Repeater Base Mode and not connected to a MultiZone receiver (stand alone) must have an optional power supply connected.

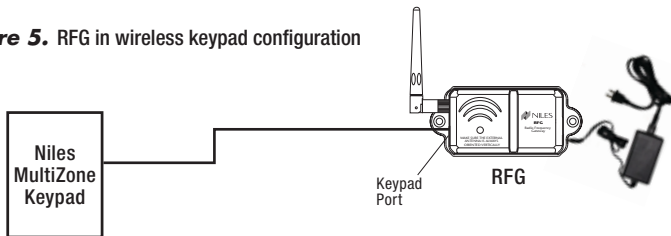
Figure 4. RFG wired as a stand alone repeater



AN RFG SET FOR WIRELESS KEYPAD MODE

An RFG set for Wireless Keypad must have the optional power supply and a CAT-5 cable connected to the keypad.

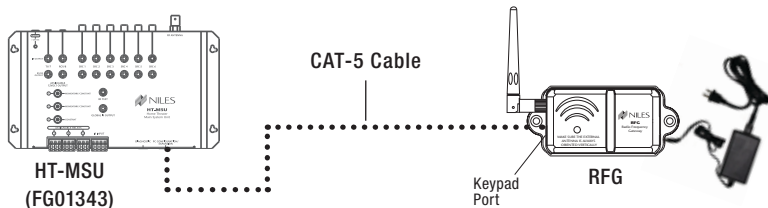
Figure 5. RFG in wireless keypad configuration



AN RFG EXTENDING THE RADIO OF THE NILES HT-MSU

The RFG dipswitches should be set for Master Base mode and an optional power supply must be used. Connect from the HT-MSU Expansion port to the RFG's Keypad connection (**Figure 6**). (See more detail in HT-MSU manual, available online at www.nilesaudio.com).

Figure 6. RFG extending the radio of a HT-MSU



INSTALLATION CONSIDERATIONS

PLACEMENT OF THE RFG

Niles recommends placing the RFG along a baseboard or in an attic. Generally, the unit should be placed in a concealed location because its indicator and connections are only used during installation. Placement possibilities include:

- 1) *Baseboard (affixed to the back of the equipment cabinet or a nearby wall)*
- 2) *Attic (attached to a ceiling joist)*

ANTENNA CONSIDERATIONS

Communication between RFGs is RF-based with a frequency of 2.4 Gigahertz. Effective range of communication is 75 feet (22.86 meters) in open air. The RFG's antenna is adjustable in a 3D axis, so you can point the antenna vertically towards the ceiling for optimum reception, even when the RFG's chassis is oriented in another direction.

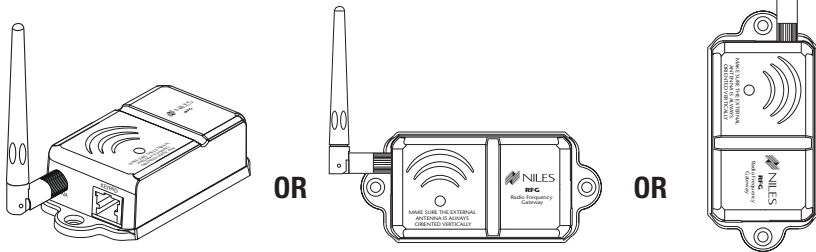


Figure 7. Example of antenna orientations

WIRING CONSIDERATIONS

The RFG requires two different types of wires run, based on set-up and system design:

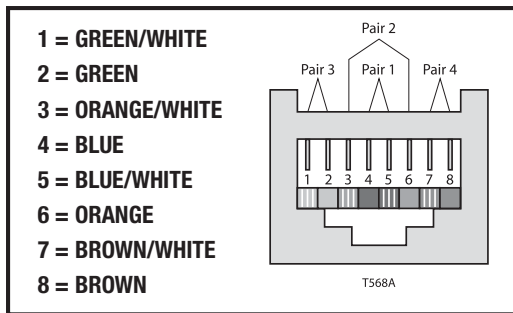
1) CAT-5 CABLE

A CAT-5 cable is used to connect the RFG to either the HT-MSU, MultiZone receiver or to a keypad. This cable must be terminated with RJ45 connectors using T568A protocol as shown in **Figure 8**.

2) POWER CABLE

A power supply is needed when the RFG is set-up as an independent Repeater Base or Wireless Keypad. A Niles FG01035 Power Supply (sold separately) is used and connected using the barrel connector.

Figure 8. T568A wire termination



INSTALLATION

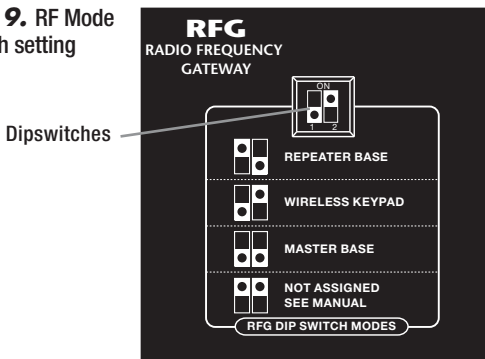
CAUTION: THE RFG ANTENNA CONNECTION IS SUSCEPTIBLE TO STATIC DISCHARGE. BE SURE TO USE A GROUNDING STRAP OR TOUCH AN EARTH GROUND PRIOR TO PICKING UP THE RFG. HANDLE THE RFG BY THE PLASTIC HOUSING. AVOID TOUCHING THE ANTENNA CONNECTION DIRECTLY.

1) **SET THE RF MODE DIPSWITCHES (Figure 9)**

2) **CONNECT CAT-5 CABLE**

Connection to a MultiZone receiver or a keypad uses CAT-5 cable terminated with RJ45 connection plugs. The CAT-5 cable must be terminated using the T568A standard wiring.

Figure 9. RF Mode Dipswitch setting



3) **CONNECT POWER SUPPLY PER RFG SET-UP**

Based on the mode of the RFG, a Niles Power Supply may be needed (see *System Considerations* section to see if optional power supply is needed).

4) **MOUNT THE RFG (see Figure 10).**

5) **ATTACH THE ANTENNA**

The external antenna screws to the RFG chassis as shown in (Figure 11).

6) **ORIENT THE ANTENNA**

Adjust the flexible joint antenna so it is vertical for maximum reception.

7) **SET RF COMMUNICATION CHANNEL**

After the RFG is installed the RF channel must be set. The default setting is RF channel 5, RF network 1. The RF communication channel is changed using configuration software. If the RFG is used as an End-Point with a Niles keypad, the communication channel is set in the keypad's installer menu (see the keypad's installation guide for installer menu information). There are no RF communication channel controls on the RFG itself.

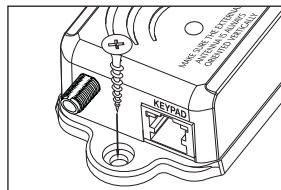


Figure 10. Wall mount placement. Use Sheetrock Screws

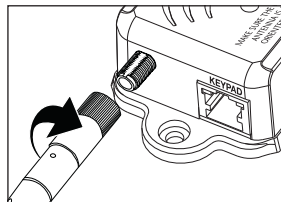


Figure 11. Antenna connection

TROUBLESHOOTING

The set-up dipswitches allow the RFG to be pre-configured for its role in the system RF mode design. With this in mind, troubleshooting the RFG comes down to two main issues:

- 1) *SET-UP ISSUES*
- 2) *HARDWARE ISSUES*

SET-UP ISSUES

PROBLEM:

1. Wrong Set-up

If the RFG is set-up for the wrong operation mode, the system will not operate properly. The symptoms could include: Power LED flickers or is off, intermittent operation, or no operation.

SOLUTIONS:

- *Check the dipswitch settings*
- *If set for wireless keypad mode, check the RF channel by accessing through the keypad's installer settings mode*
- *If dipswitches are set for Not Assigned mode, the RFG must be configured using the Niles software*

HARDWARE ISSUES

There are two basic issues that can prevent proper operation of the RFG. These issues are presented in the order of probability.

PROBLEM:

1. Bad Connections or Wiring

If the connections or wiring are wrong, loose, shorted, or open, the system will not operate properly. The symptoms could include: Blue LED flickers or is off, intermittent operation or no operation.

SOLUTIONS:

- *Test your power supply connections*
- *Test your CAT-5 cable for shorts and opens*

PROBLEM:

2. RF or Electromagnetic Interference

Digital sources, poorly shielded sources, microwave ovens, cordless telephones, cell phones, high definition television sets, light dimming controls and other sources of electromagnetic fields can induce radio frequency noise and interfere with your radio frequency gateway. The symptoms could include: Blue LED on RFG continuously flickering or poor range, intermittent operation or no operation.

SOLUTIONS:

- *Move your RFG to a new mounting location*
- *Check to make sure the orientation of the external antenna is vertical*
- *Change the RF Channel the RFG is communicating on*

NOTE: THERE ARE ZIGBEE “SNIFFING” TOOLS AVAILABLE ON THE MARKET THAT ALLOW AN INSTALLER TO SEE RF CHANNEL USAGE BY WI-FI AND OTHER ZIGBEE DEVICES

ACCESSORIES OF THE RFG

1.25A 12VDC UNIVERSAL POWER SUPPLY



FG01035

12V power supply for powering the RFG when in “wireless keypad” mode or “stand alone” repeater.

IC2 HOME THEATER AUTOMATION AND CONTROL SYSTEM



FG01342

Home theater automation and control system that includes table top remote control, main system unit, two power supplies, master key labels, ZigBee Antenna and Extension Kit



SPECIFICATIONS

Power Requirements: 12VDC from either connection to Niles Network based MultiZone receiver or optional Niles power supply (FG01035)

Unit Dimensions: 4.68" L x 2.15" W x 1.15" H : Chassis
(11.89cm x 5.46cm x 2.92cm)

Antenna: 4.1" (10.5cm) long

RF Section: 2.4GHz frequency ZigBee wireless mesh technology

Signal Range: 75 to 100 feet or greater open air (22.86 meters to 30.48 meters)

Wiring Requirements: CAT-5 cable

Shipping Weight: 1 lb.

Warranty: Two-year limited

FCC COMPLIANCE STATEMENT

COMPLIANCE STATEMENT (PART 15.19)

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.*

WARNING (PART 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC INTERFERENCE STATEMENT (PART 15.105 (B))

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

INDUSTRY CANADA COMPLIANCE - SECTION 7.1.5 OF RSS-GEN

Operation is subject to the following two conditions:

1. *This device may not cause interference, and*
2. *This device must accept any interference, including interference that may cause undesired operation of the device.*

SECTION 7.1.4 OF RSS-GEN

This device has been designed to operate with the antenna(s) listed below, and having a maximum gain of 2 +/- 0.5 dB. Antennas not included in this list or having a gain greater than 2.5 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

List of all Antennas Acceptable for use with the Transmitter

NILES AN00012

SECTION 7.1.5 OF RSS-GEN

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

LIMITED WARRANTY

Niles Audio Corporation ("NILES") warrants to the original retail purchaser only that this product will be free of manufacturing defects in material and workmanship for the following periods and subject to the limitations and exclusions set forth below:

Lifetime Warranty

All Passive Loudspeaker Products (those not requiring AC or battery power).

Ten years from the date of purchase

All Other Passive Products (those not requiring AC or battery power).

Two years from the date of purchase

All Active Products (those requiring AC or battery power).

This warranty is not transferable to subsequent purchasers of the product. To obtain warranty service, contact the authorized dealer where you purchased your product or take the unit to the nearest authorized NILES dealer (with proof of purchase – claims made without proof of purchase will be denied) who will test the product and if necessary, forward it to NILES for service. If there are no authorized NILES dealers in your area, you must contact NILES to receive a factory Return Authorization Number. DO NOT RETURN ANY UNIT WITHOUT FIRST RECEIVING WRITTEN AUTHORIZATION AND SHIPPING INSTRUCTIONS FROM NILES.

Upon examination, NILES will, at its sole option and expense, repair or replace any product found to be defective. NILES will return the repaired or replaced unit to you via its usual shipping method from the factory to your address in the United States of America or Canada only. Any shipping costs for addresses outside of the United States or Canada shall be the responsibility of the purchaser. In the event that this model is no longer available and cannot be repaired effectively, NILES, at its sole option, may replace it with a different model of equal or greater value, or refund the original purchase price paid. **THE FOREGOING ARE YOUR EXCLUSIVE REMEDIES FOR BREACH OF WARRANTY.**

This Warranty does not include service or parts to repair damage caused by improper use or handling, including but not limited to damage caused by accident, mishandling, improper installation, commercial use, abuse, negligence, or normal wear and tear, or any defect caused by repair to the product by anyone other than NILES.

This warranty does not cover reimbursement for your costs of removing and transporting the product for warranty service evaluation, or installation of any replacement product provided under this warranty.

This Warranty will be void if:

- the Serial Number on the product has been removed, tampered with or defaced.
- the product was not purchased from an authorized dealer or reseller.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED AND IMPLIED WARRANTIES. NILES EXPRESSLY DISCLAIMS ALL SUCH OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT, WITH RESPECT TO THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, NILES SHALL NOT BE RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES EXCEPT TO THE EXTENT PROVIDED (OR PROHIBITED) BY APPLICABLE LAW, EVEN IF NILES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Notwithstanding the above, if you qualify as a "consumer" under the Magnusson-Moss Warranty Act, or applicable state laws, then you may be entitled to any implied warranties allowed by law for the Warranty Period. Further, some states do not allow limitations on how long an implied warranty lasts or allow the exclusion or limitation of consequential damages, so such limitations 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.

For the name of your nearest authorized NILES dealer, contact: NILES AUDIO CORPORATION, P.O. BOX 160818, Miami, Florida 33116-0818, or call 1-800-289-4434, 1-305-238-4373. Please be advised that NILES only sells its products via the Internet through a select group of authorized Internet dealers. These are listed on our website at www.nilesaudio.com. Products offered on the Internet through unauthorized Internet dealers are not covered by the NILES warranty and may be either:

- 1) goods acquired on a secondary or grey market
- 2) counterfeit or stolen goods
- 3) damaged, or defective goods

ATTENTION: TO OUR VALUED CONSUMERS:

To insure that consumers obtain quality pre-sale and after-sale support and service, NILES products are sold exclusively through authorized dealers. This warranty is VOID if the products have been purchased from an unauthorized dealer.

WARRANTY REGISTRATION CARD

Model Purchased _____	RFG	Serial Number _____
Date Purchased (month/day/year) _____	Dealer Name and Location _____	
<input type="radio"/> Dr. <input type="radio"/> Miss <input type="radio"/> Mr. <input type="radio"/> Mrs. <input type="radio"/> Ms.		
Name _____	Address _____	
City _____	State _____	Zip _____ Tel () _____

Please take a moment to fill out our warranty registration card. The information helps us to get to know you better and develop the products you want

Age:

- Under 25
- 25-34
- 35-44
- 45-54
- 55 & over

Income:

- Under \$24,999
- \$25,000-\$34,999
- \$35,000-\$44,999
- \$45,000-\$59,999
- \$60,000-\$74,999
- \$75,000-\$99,999
- Over \$99,999

Occupation:

- Arts/Entertainment
- Business Owner
- Engineer
- Finance/Accounting
- General Office
- Management
- Professional
- Sales/Marketing
- Student
- Tradesperson

Musical tastes: (Please check

all that apply)

- Alternative
- Classical
- Country
- Jazz
- New Age
- Popular
- R&B
- Rock
- Other _____

How did you hear about Niles?

- Architect/Developer
- Custom Installer
- Direct Mail
- Friend/Family
- In-Store Display
- Interior Designer
- Magazine Ad
- Mail-Order Catalog
- Newspaper Ad
- Product Brochure
- Product Review
- Retail Salesperson

What magazines do you read?

1. _____
2. _____
3. _____

Who will install the product?

- Custom Installer
- Electrician
- Friend
- Myself

Which factor(s) influenced the purchase of your Niles product?

(Please check all that apply)

- Ease of Use
- Price/Value
- Product Features
- Quality/Durability
- Reputation
- Style/Appearance
- Warranty

Do you . . . ?

- Own a House. If yes, how many square feet? _____

- Own a Town House/Condominium/Co-op
- Rent an Apartment
- Rent a House

Are you interested in receiving literature on other Niles products?

- Yes No

Are there products/capabilities that you would like to see introduced?



BLENDING HIGH FIDELITY AND ARCHITECTURE®

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