# LDG RTx Remote Tuner Controller

## Hardware & Software Descriptions


Software Graphical User Interface


KMTronic 4-ch Relay Module

*Remote Tuner* Tuning
From Your Computer Desktop

***K5PA Design Concepts***

*https://www.k5pa.com*

# Contents

# Introduction

The ***LDG RTx Remote Tuner Controller*** allows the users of the RT-600 or RT-100 LDG tuners to be put into tune mode on demand from the user's desktop computer screen. The user manual for the RT-600/RT-100 explains that when the LDG tuner has its DC power line interrupted, the tuner will automatically go into an auto-tune sequence. That is what the ***LDG RTx Remote Tuner Controller*** does, it will allow the user to begin an auto-tune sequence from their computer desktop. This is important for times when the physical LDG RC-600 control box (a simple on/off push button with built-in Bias-T DC power injection to the coaxial cable) is unavailable due to placement or when operating the radio over the Internet using remote desktop (RDP) programs such as AnyDesk or TeamViewer.

This document discusses the hardware and software that implements the ***LDG RTx Remote Tuner Controller***. The controller software connects to a KMTronic USB Relay module that interrupts the 13.8 VDC Power that connects to the RT-600/RT-100 controller. The software can interrupt the DC power for a defined time, e.g., 1000 mS or 2000 mS. It can also interrupt the power for an indefinite period by the operator, all under software configuration control.

There are only two cables to connect to the tuner controller. One is the USB cable that connects computer's USB port to the KMTronic USB Relay module and the other is the KMTronic USB relay contacts to the DC power connected to the RT-600/RT-100 remote tuner.

# LDG Remote Tuner Auto-Tuning Information

The operation of the LDG remote tuner is best described in their User Manual. An excerpt is attached on the next page, **Figure 1**, taken from the LDG RT-100 Operations Manual, Manual REV C, ***Operation***, *Automatic Operation*, pages 11-12. The LDG Remote Tuner, RT-600, operates in a similar fashion. The yellow highlights were created by me to emphasize the pertinent sections.

*Force a Full Tuning Cycle*

In some instances you may wish to force the RT-100 to begin a full tuning cycle instead of the usual memory cycle. Turn off power to the RT-100 by switching off power to the Bias Tee, begin transmitting a carrier, and while still keying the radio, turn on power to the Bias Tee; an automatic tuning cycle will begin. Continue transmitting the tuning carrier until the automatic tuning cycle ends with the SWR settled below about 1.7, then unkey and continue to operate normally. If you are using an RC-100 controller, transmit a carrier, press the **Tune** button on the RC-100 for one second then release. Continue transmitting the tuning carrier until the tuning cycle ends.

*Re-tuning Termination*

Very rarely, when an antenna is used far from its resonant frequency, the RT-100 may erroneously continue a tuning cycle, even though it has already found a good match for the current antenna and frequency. In these cases simply turn the RT-100 off by removing power from the Bias Tee. The latching relays in the tuner will keep the current match settings even with power off, but the tuner will stop attempting to re-tune.

*Recovering from a "hang-up"*

On rare occasions your RT-100 may seem to "hang", and stop operating correctly. In that case, follow these steps to recover normal operation:

- Put your radio in AM mode
- Push the PTT and hold it
- Press the Tune button on the RC-100 and hold for 2 seconds, then release
- Keep the PTT pressed while the tuner tunes
- When tuning cycle ends, check for good SWR, release PTT
- Resume normal operation
- If using your own Bias-Tee, change bands, force a tune, then return to the desired band

**Figure 1. LDG RT-100 User Manual Extracts (Similar for RT-600)**

## Controller Schematic Diagram

The schematic diagram for the relay controller wiring is shown in Figure 2. A larger size drawing is shown in the Appendix-3.

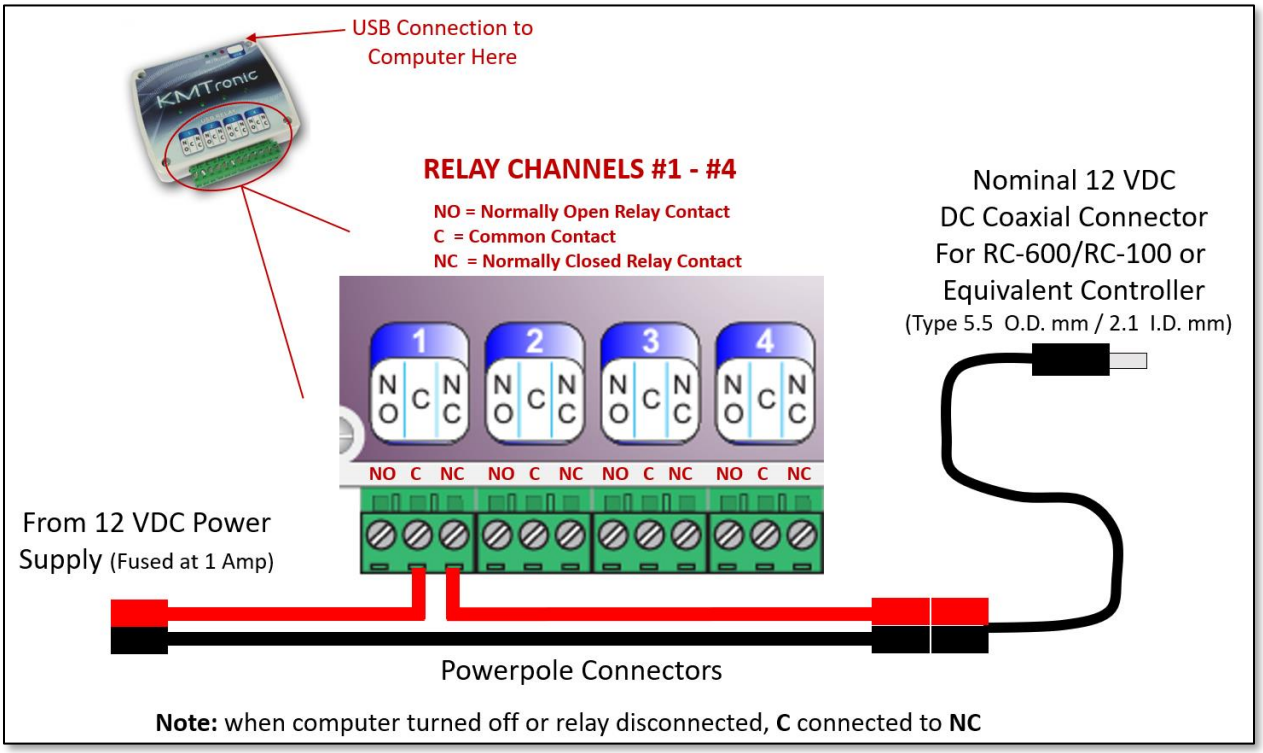



**Figure 2. The Controller Schematic**

# APPENDIX 1 – LDG RTx Remote Tuner Controller Software User Manual

## Introduction

**User Manual Version:** v1.0

**Software Version:** v1.0 or latest version for site

**KMTronic Relay Module:** 4 Relay Module, U4CRB

The **controller** interfaces to the **KMTronic USB 4-Relay** unit that via a USB cable. The start icon from the computer's desktop is shown in **Figure 3**.

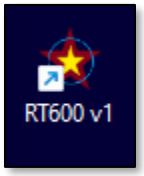



**Figure 3. Program Icon**

The GUI uses radio buttons that allow selections commands, one at a time, as shown in **Figure 4**. By selecting **Exit**, all relays **will be reset to off** prior to program exit. Due to the wiring of each relay, since only the common (C) and normally closed (N.C.) contacts are used, resetting the relay module will allow the RT-600/RT-100 to be powered all the time. Thus, the program will not affect the remote tuner's normal operation.


**Figure 4. Main Window Display**

If an **Exit** is clicked, then the program will pop-up a window, shown in **Figure 5**, asking you to enter a 1 or 0 to confirm (**1=YES or 0=NO**). This is designed to keep an inadvertent closing of the program.

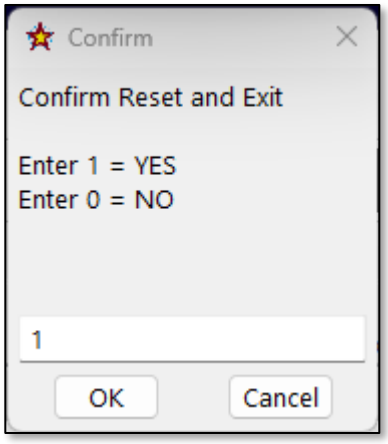



**Figure 5. Pop-up Confirmation Window**

If an improper response, other than 1 or 0, is provided, a reminder message is generated as shown in **Figure 6**.

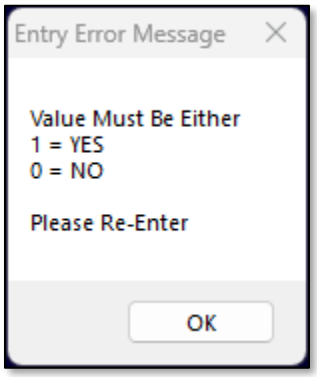



**Figure 6. Pop-up Entry Error Message**

## File Installation

The following programs files shown in **Figure 7** are needed to run the program. There is an executable, a configuration file, and the USBRelay.exe file to interface with the KMTronic relay module. These files should be placed in the program working folder.

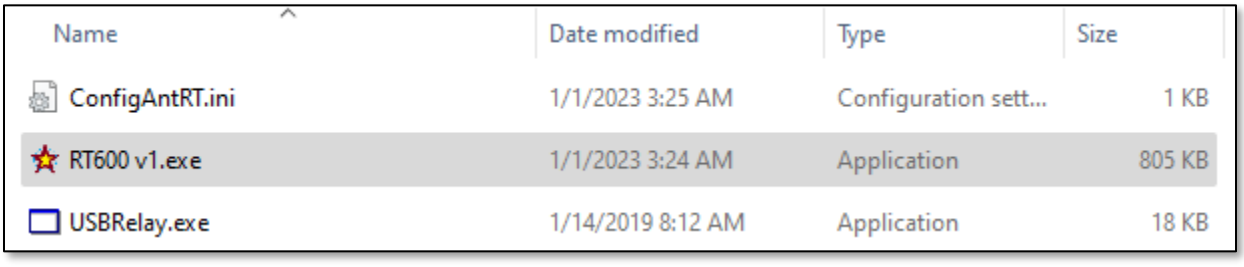



**Figure 7. Program Files in Working Directory**

You should create a shortcut to the **RT-600 v1.exe** program and then move the shortcut to your desktop for easy access.

## File - ConfigAntRT.ini

Prior to starting the program, this configuration file needs to be updated with user information.

**[General]**
TopTitle=LDG RTx Tuner Controller
Callsign=YOURCALLSIGN <-- Prefix Callsign Letters, will be placed on the program GUI
GridSquare= YOURLOCATION <-- Your grid square, will be placed on the program GUI
ScanPeriod (mSec)=500 <-- Timing delay for the program (mS), 500 is a typical value to use to scan the radio buttons located on the GUI.

**[USB PORT]**
KMTronicUSB Computer Port=14 <-- USB port number for the relay module on the computer; change to match the port number assigned to the relay module during initial installation.

**[LABELS]**
ShortDelay=1000 <-- Short delay interval in units of milliseconds (mS)
LongDelay=2000 <-- Long delay interval in units of milliseconds (mS)
PwrOff=RT-600 PWR OFF <-- Label that will be placed on GUI, you can change to RT-100
PwrOn=RT-600 PWR ON <-- Label that will be placed on GUI, you can change to RT-100

The configuration file opened with Notepad program is shown in **Figure 8**.

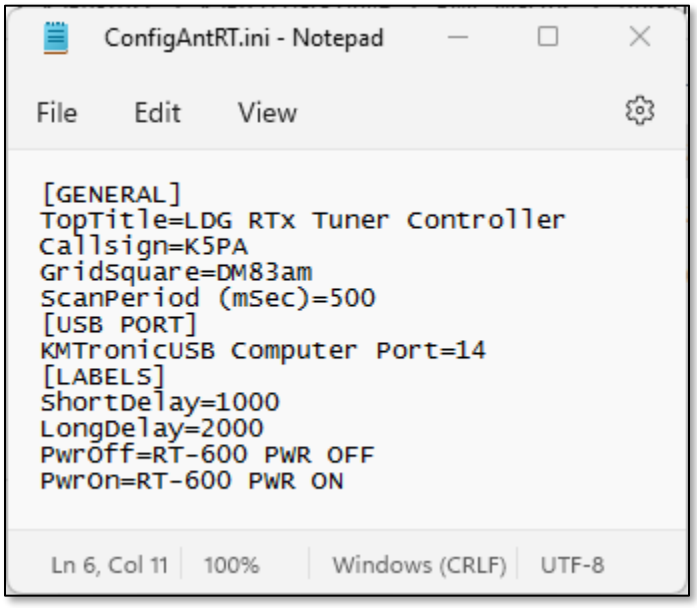



**Figure 8. Configuration File Opened with Notepad in the Working Directory**

# APPENDIX 2 - Specifications

**Physical**

| Unit | W (in.) | D (in.) | H (in.) | Weight (oz.) |
|---|---|---|---|---|
| **KMTronic USB Relay (4 ch) Product Code: U4CRB** | 4.25 | 4.0 | 1.0 | 6 |
| | | | | |
| | | | | |

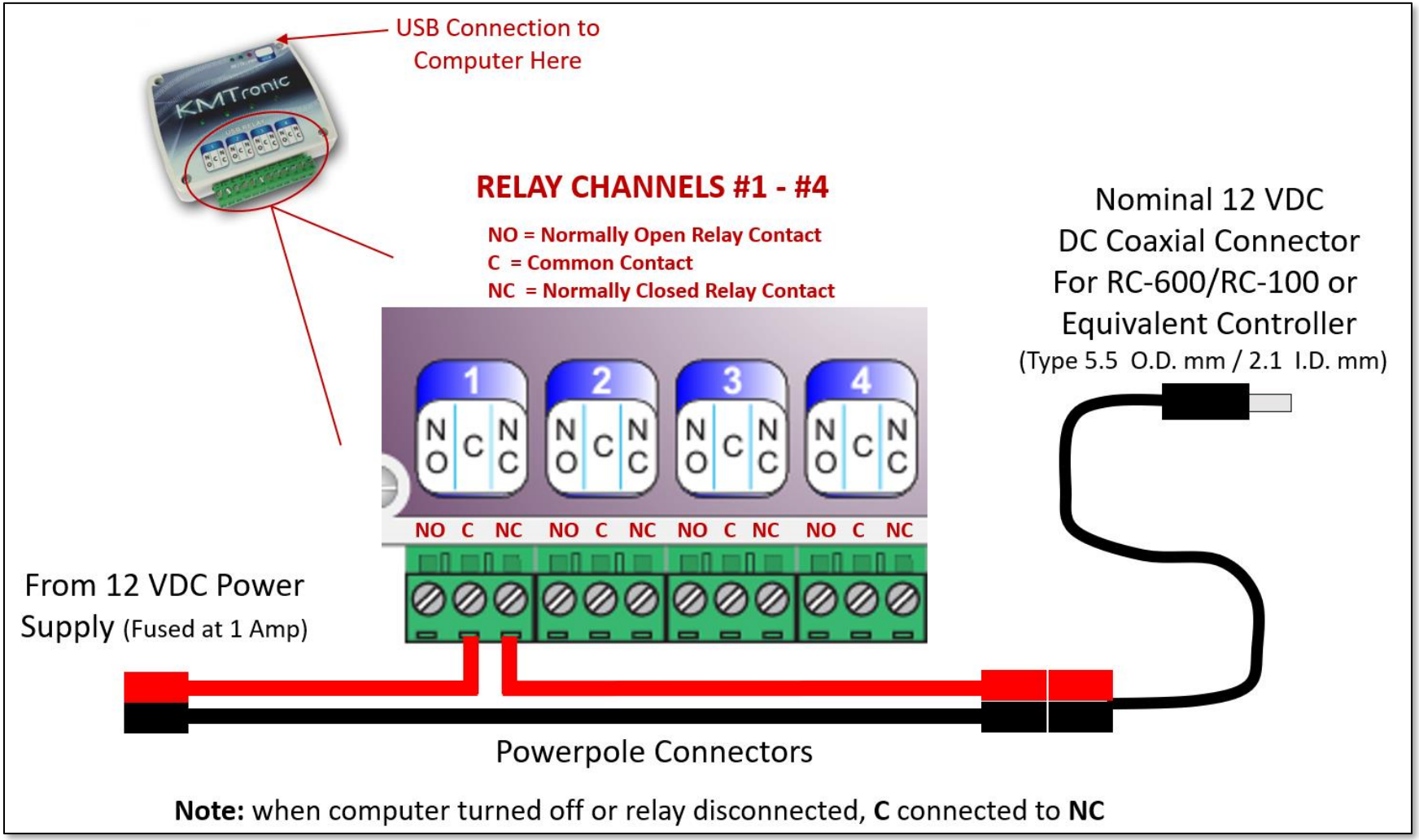
**Electrical**

| Unit | Volts (DC) | Amps | Source |
|---|---|---|---|
| **KMTronic USB Relay (4 ch) Product Code: U4CRB** | 5 VDC (USB) | 1 | USB Connection provides power to relay module |
| **Relay Contacts** | 12 or 24 VDC | 15 A | |

**Software Compatibility**

| Unit | MS Windows | Program Size (kB) | Notes |
|---|---|---|---|
| **O/S Software Compatibility** | 10, 11 | 805 kBytes | **Tested** with Win 10 and Win 11 O/S software |
| **Virus Scan** | | | The program may need to be ***Excluded*** from user's virus scanning software if an alert is given. |

# APPENDIX 3 – Controller Schematic



# APPENDIX 4 – USB Relay Factory Information

**A general purpose USB Relay controller for connection to a PC's USB port using VCP (Virtual COM port). Control devices using your PC. USB Relay controller allows a PC to control a external devices using simple RS232 commands. Relay is fully powered from the USB bus. Free test software.**

**Features:**
- Fully assembled and tested.
- Fully powered from USB
- For 12V/24V DC 15A or 120V/220V AC at 10A max.
- Can be used with LabVIEW, ProfiLab, DAQFactory, TestPoint, DASYLab, VEE

**Model:**
U4CRB

**Complete including:**
- One USB Four relay board

**Dimensions (PCB board):**
76 mm / 59 mm

**Drivers:**
http://www.ftdichip.com/Drivers/VCP.htm

**Drivers are available to work with the following operating systems:**
All Windows Systems, Linux, Mac OS X, Mac OS 9, Mac OS 8, Windows CE.NET (Version 4.2 and greater)

**Communication Parameters:**
8 Data, 1 Stop, No Parity
Baud rate : 9600

**Commands:**
*FIRST channel commands:*
OFF command : FF 01 00 (HEX) or 255 1 0 (DEC)
ON command : FF 01 01 (HEX) or 255 1 1 (DEC)

*SECOND channel commands:*
OFF command : FF 02 00 (HEX) or 255 2 0 (DEC)
ON command : FF 02 01 (HEX) or 255 2 1 (DEC)

*THIRD channel commands:*
OFF command : FF 03 00 (HEX) or 255 3 0 (DEC)
ON command : FF 03 01 (HEX) or 255 3 1 (DEC)

*FOURTH channel commands:*
OFF command : FF 04 00 (HEX) or 255 4 0 (DEC)
ON command : FF 04 01 (HEX) or 255 4 1 (DEC)