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R8C/2x

LIN Demo and Quick Start

Introduction

This guide aims to quickly get the standard demo for LIN up and running.

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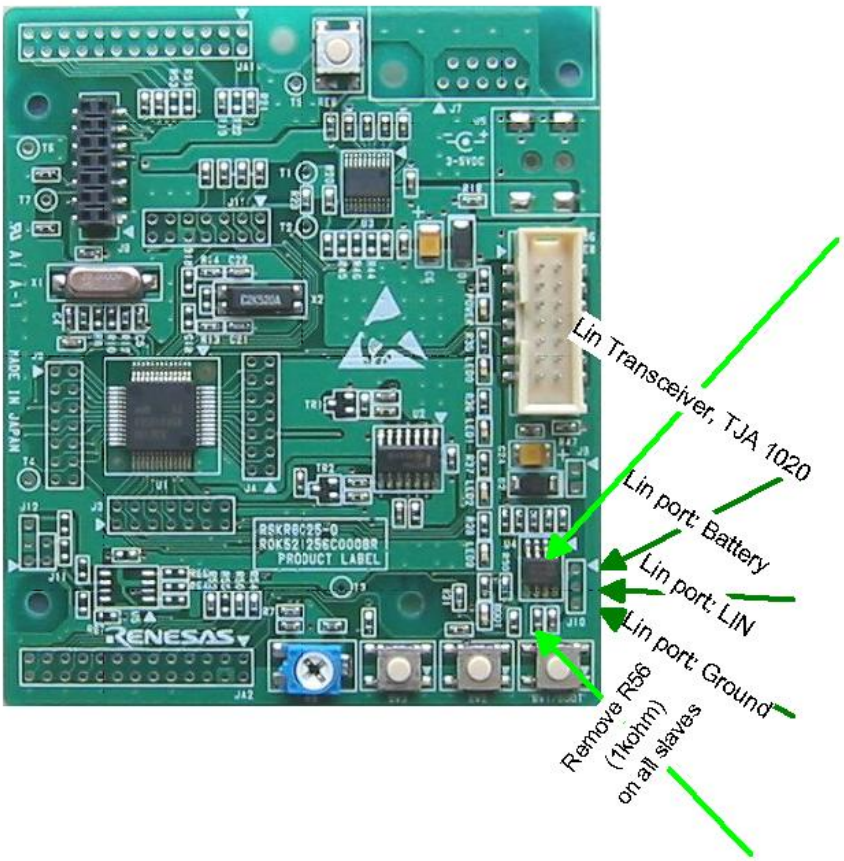
1. The RSK board

The Renesas Starter Kit boards with MCUs in the R8C/2x series that have the LIN HW peripheral are the R8C23, 25, 27, 29, 2B, 2D. These boards are populated with almost everything needed to run LIN communication. You only need to populate Jumper 10 with a three pin 1/10" header



Example: RSK25 board with LIN specific parts marked with green arrows

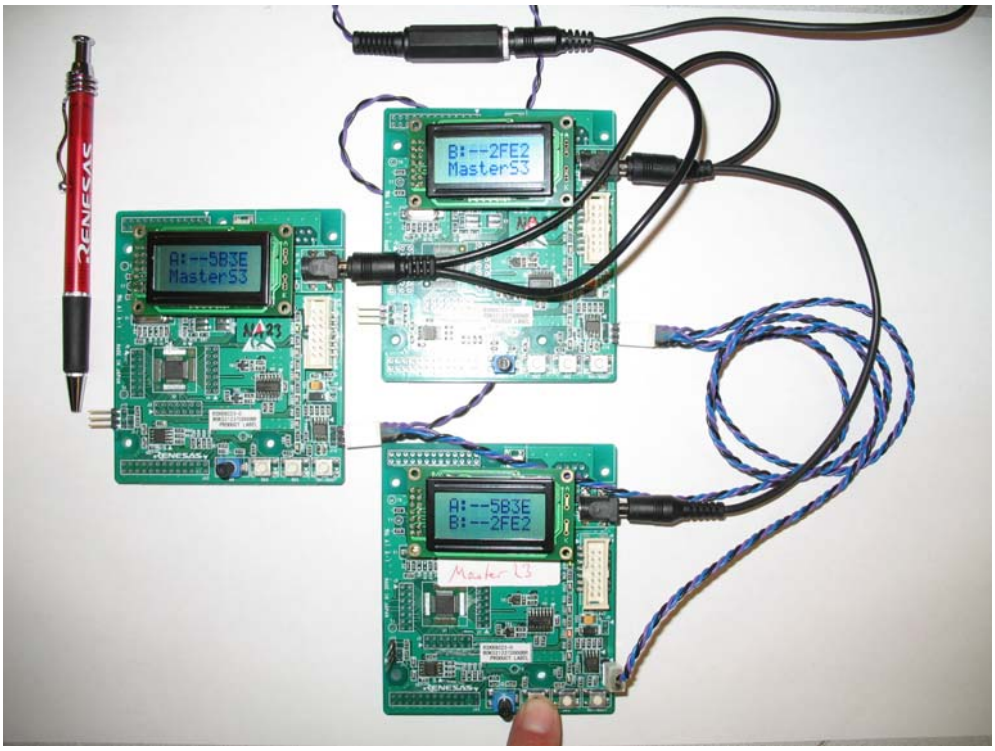
See the Quick start guide for your RSK for information on how set up and run HEW, use the debugger etc.

2. Procedure for setting up the kit

1. Remove R56 from the slave boards if you have the RSK 23. Check your RSK schematic, on the last page you can see which one to remove.
2. Soldier 1/10" connector pins to J10 of all boards.
3. Connect a battery voltage of 5 to 27 V DC to the top pin of J10 on both Master and Slave nodes. Top pin is considered to be the one marked on the board with a little white triangle (arrow).
4. If you use the **LIN demo cable:**
   Purple: Vbat, upper pin of J10, see figure.
   Blue: LIN, middle pin, see figure
   Black: Ground.
   If you do not use the prepared cable, connect ground voltage to the bottom pin of jumper J10 (closest to SW1) of both Master and Slave. Connect supply voltage, Vbat, to the top pin. You can simply take the

5V that you use to power the board and connect to the pin Vbat of the LIN transceiver. Connect the mid pin of J10 between all boards to form the LIN bus.

5. Unzip the file *LIN_R8C2x_Demo_master_slave_v1.xx.zip* **to your HEW Workspace directory**
6. Double click on *LinKit_demo.hws* to open the project.
7. Make sure project 'Ma**ster' is selected.**
8. **Compile the project.**
   Connect to the Master board using E8 with the included programming session. See your quickstart gide for details on how to connect to the RSK board and program it with the compiled .MOT-file.
   For RSK23 connect choosing device R5F21237
   For RSK25 choose R5F**21256**
   For RSK27 choose R5F21276
9. Disconnect HEW from the Master and power it separately with a 5V DC power supply included in the CAN-LIN D Kit. The board should flash as it starts up and display 'Renesas LIN demo' **or similar.**
10. Set **the active project to 'Node A'.**
11. Connect to the slave board using E8 with the included E8 Session. See "*CAN D Kit Demo & Expansion Manual"* for details on how to connect to the RSK board and download the compiled debug .X30-file to the RSK board.
12. Run the slave with Reset-Go from the Debug window.
13. Reset the Master board with the RESET switch if necessary to get it to pick up the LIN slave unit.



This picture shows the demo on a network with the master in front, and slave nodes A & B in the back.

3. The LIN demonstration

All data is carried in 'signals' that in turn are packed inside frames. The demo projects are *Master* and *Node_A and Node_B.* The data transmission is run using a schedule table for a relatively simple LIN cluster that consists of 4 signals:

3.1 Signals

3.1.1 Signals published by Master:

1. Master Switch 1-3 data

3.1.2 Signals published by Node A:

2. Node A A-D value
3. Node A Switch 1-3 data
4. Node A 1 second counter

3.1.3 Signals published by Node B:

2. Node B A-D value
3. Node B Switch 1-3 data
4. Node B 1 second counter

3.2 Frames

The schedule table of the master puts the signals into play using three unconditional message **frames**:

3.2.1 LIN_F1_Req_NodeA_AD

This frame carries Signal 1:

LIN_SIG_NodeA_AD

3.2.2 LIN_F2_Req_NodeA_Switch_and_Counter

This frame carries signals 2 and 3:

LIN_SIG_NodeA_Switch, and

LIN_SIG_NodeA_Counter

3.2.3 LIN_F3_Cmd_Switch

This frame carries signal 4

LIN_SIG_Cmd_Switch

3.3 The LEDs

The master's LEDs flash when data is received:

Green Switch signal data arrived

Yellow Counter signal data arrived

Red A-D signal data has arrived

3.4 The LCD display

3.4.1 LCD display of Slave A/B

The LCD display of slave node A and B shows the signals as follows:

XXAABBCC
YYYYYYYY

XX = A: or B:

AA = Shows if switch S1, S2, or S3 has been pressed on slave.

AA = ‘--‘ if none pressed.

BB = Shows one second counter value of slave

CC = Shows A-D reading determined by R9 of slave.

YYYYYYYY = “MasterSX” where X is switch number 1-3 of Master, if pressed.

YYYYYYYY = ‘--------‘ if none pressed.

3.4.2 The LCD of the Master shows the signals as follows:

The LCD display of slave node A and B shows the signals as follows:

XXAABBCC
YYAABBCC

XX = A:

YY = B: In case a second node is used.

AA = Switch S1, S2, S3 value transmitted from slave to master

= ‘--‘ if none pressed.

BB = One second counter value transmitted from slave

CC = A-D value transmitted from slave.

If no data is arrives (communication failure) the Master displays ‘--‘ in the corresponding signal position

4. Test

We have at our U.S Applications Engineering department run a test network consisting of three boards: one RSK25 and two RSK23s. The demo has been run at temperatures from 22 deg. C down to a low of -4 C - one test ran the demo firmware project outdoors for 12 hours. The slaves used the internal oscillator using SYNC_AUTO mode. No problems were discovered.

5. Comments

The buttons are polled, not interrupted and the demo only shows the current status of the buttons to make it a real time demo. You could change the demo to be interrupt-driven and toggle the status of XX in the display, but the display on the master would be confusing since there are three switches.

6. Reference

Item	Title	Description
	Renesas HW LIN R8C2x Demo and Quick Start.doc	This document.
	RS-R8C2x Schematics	Schematic for the RSK-R8C2x boards.
	R8C2x Hardware Manual	Guide for programming the R8C/2x series MCU.
	CAN D Kit Demo & Expansion Manual	Describes how to connect to the RSK23 board using the HEW and E8 debugging tools.
	TJA1020 LIN transceiver data sheet	TJA1020 is the interface between the LIN master/slave protocol controller and the physical LIN bus.
	High-performance Workshop User's Manual	This document describes installation and operation of Renesas' Integrated Development Environment.
	Assembler User's Manual	Guide for AS30 assembler.
	C compiler User's Manual	Guide for NC30WA C-compiler.
	E8 User's Manual	E8 Target Debugger and Programmer user's manual.

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http://www.renesas.com/
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http://www.renesas.com/inquiry
csc@renesas.com

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		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	July 6 2007	—	First edition published to RTA LIN download page.
1.01	Aug 24 2007	—	Second edition after formal review at RTA AE.

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