

Digital Addressable Lighting Interface (DALI) Reference Design



Developed by
Grampp R&D HB
in association with Motorola

Motorola MCU Reference Designs

- Application notes • Design • Software • Technical training • Hardware*

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Ready-made solution for new and emerging applications:

- Eases the design process
- Speeds time-to-market
- Introduces cost-effective design solutions
- Helps reduce development costs

* Hardware boards available on selected designs through third-party consultants.

DALI Kit



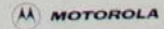
DALI Application Board

Installation

Connect 4 lamps (maximum 10 W each) to the 2-pin connectors. Connect 12V/45W supply to the terminal block (+12 V red cable, 0 V blue cable).

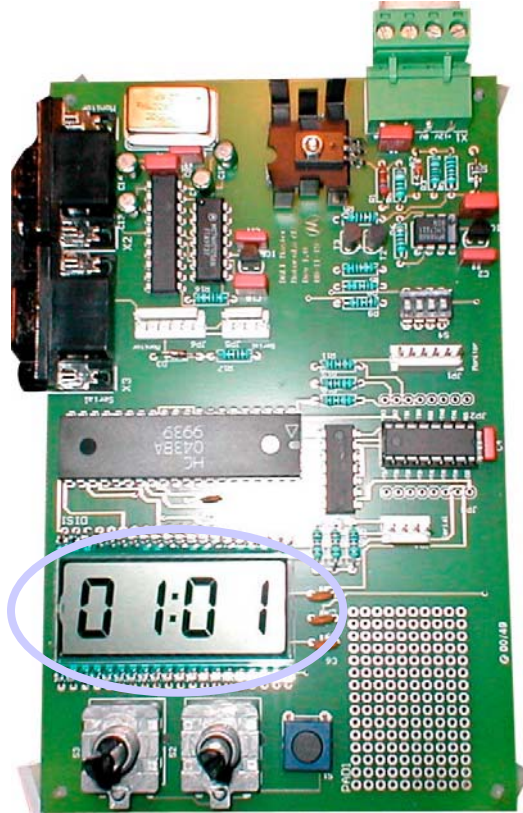
How to use

A DALI system consists of a master that sends commands to selected slaves. Using an address does the selection. The LCD shows the address on the left side and the command on the right side. To select a certain slave (lamp) the address has to be selected by the left shaft encoder. Some useful addresses are 00, 02, 04, 06 and FF, which means lamp 1 to 4 and broadcast. The right shaft encoder can be used for selecting commands. If the LSH of the address is zero this means that the right shaft encoder controls the illumination. Select a value between 0 (off) and FF (100 % on) and push the small button to regulate the illumination. If the LSH of the address is one this means this is a regular command. The address FF and the command FF is a special feature for this board for entering a demo mode. Look in the application note for a description of other available commands.

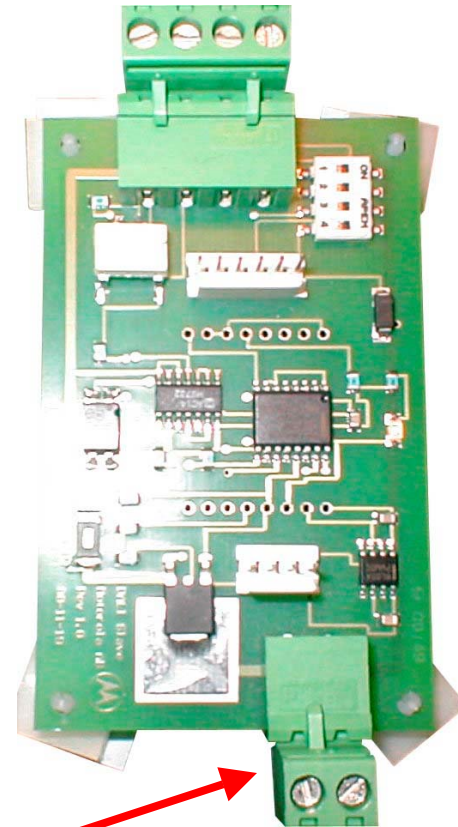


Setting Up the Boards

Master

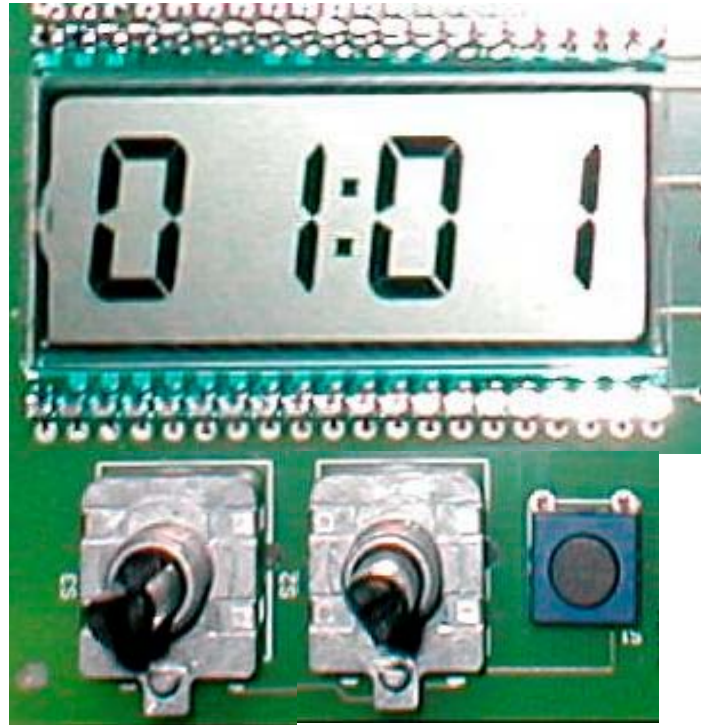


Slave

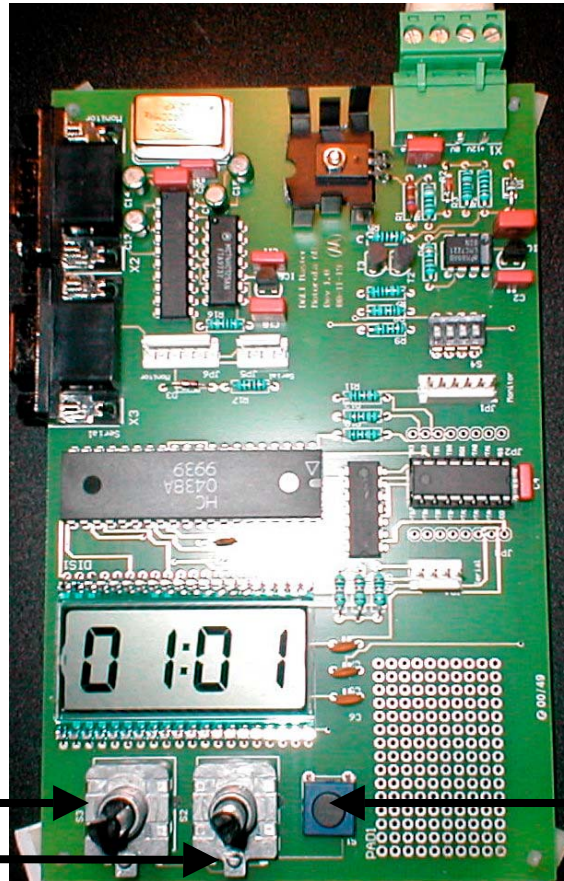


Lamps

Initialization



DAI Protocol

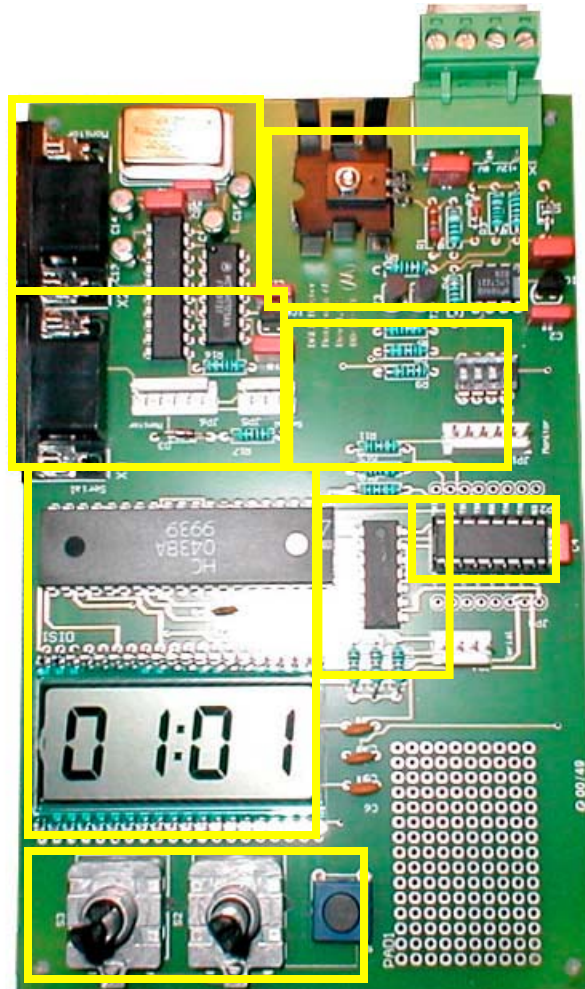


Left Shaft Encoder
Right Shaft Encoder

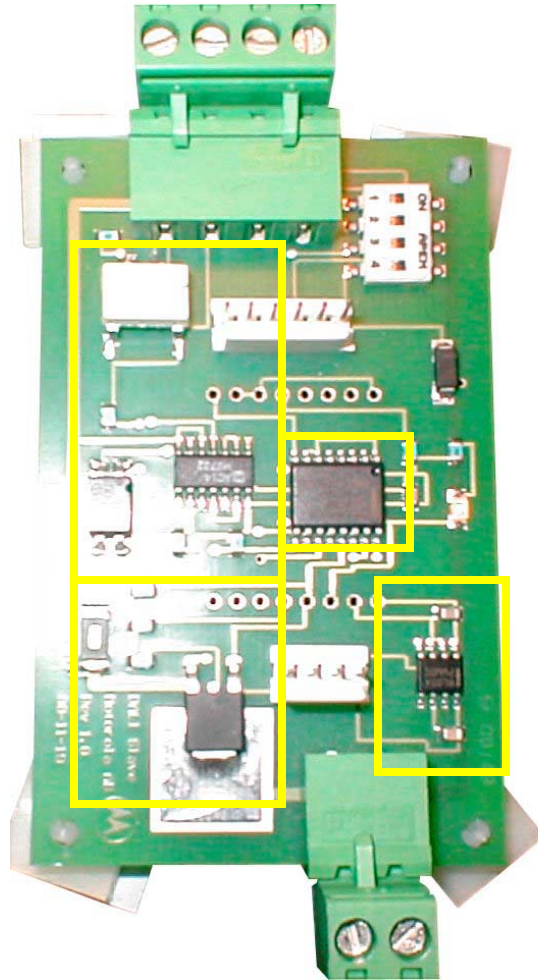
Push Button

Master Unit

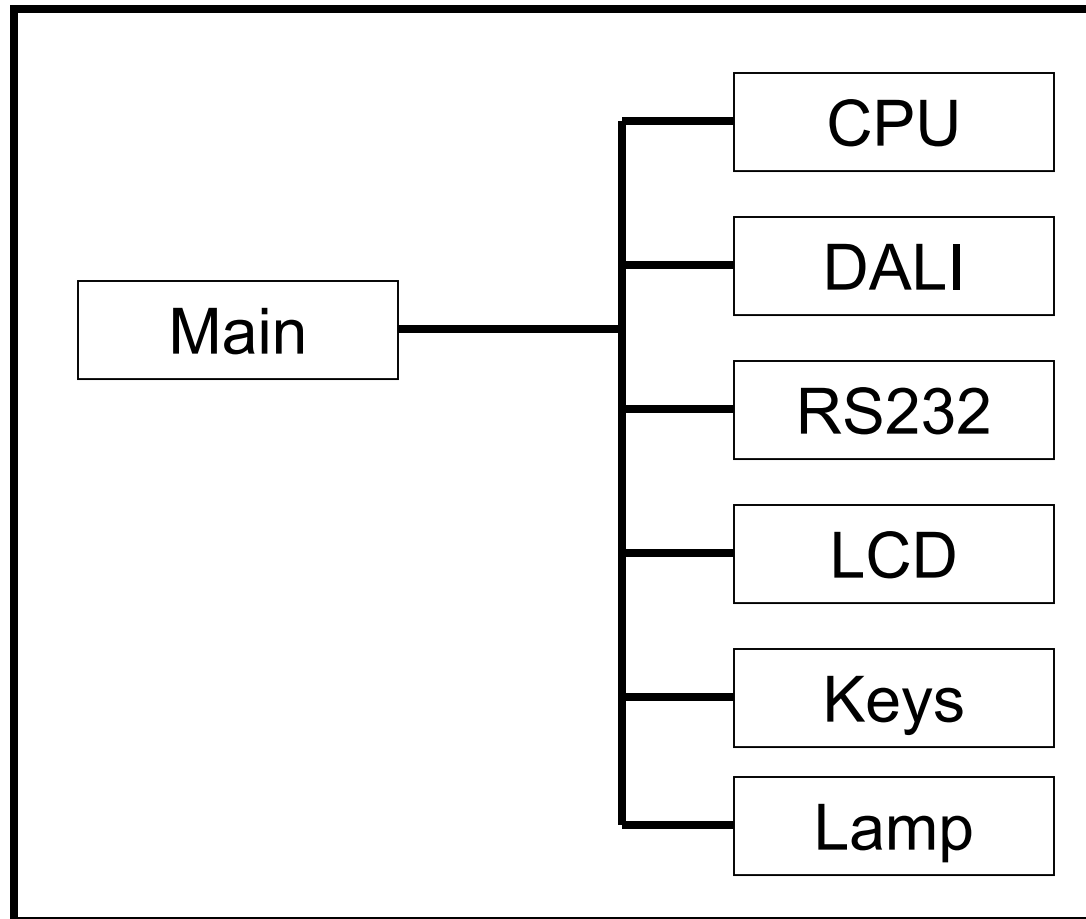
DALI Master Unit



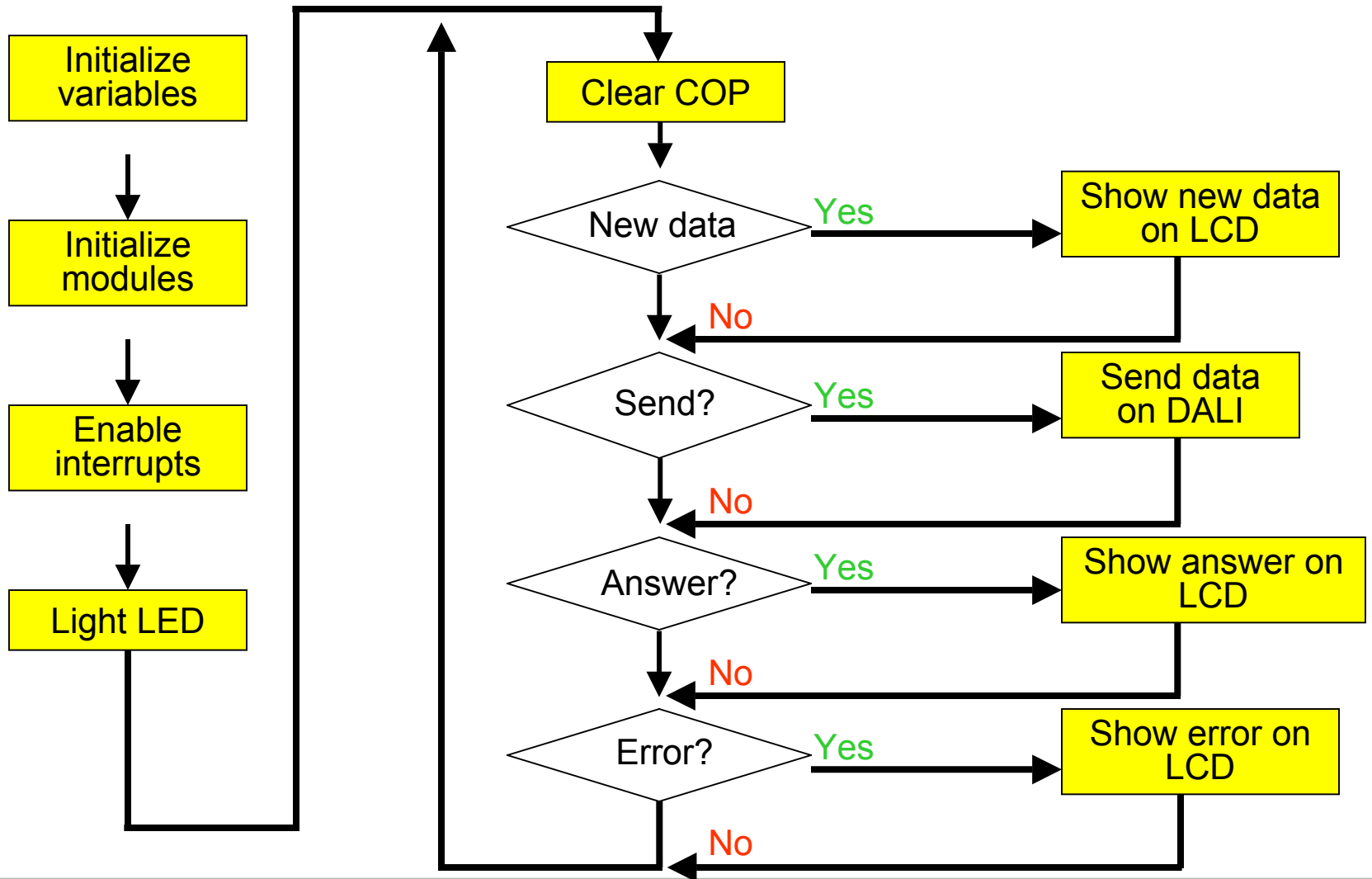
DALI Slave Unit



Master-Slave Software

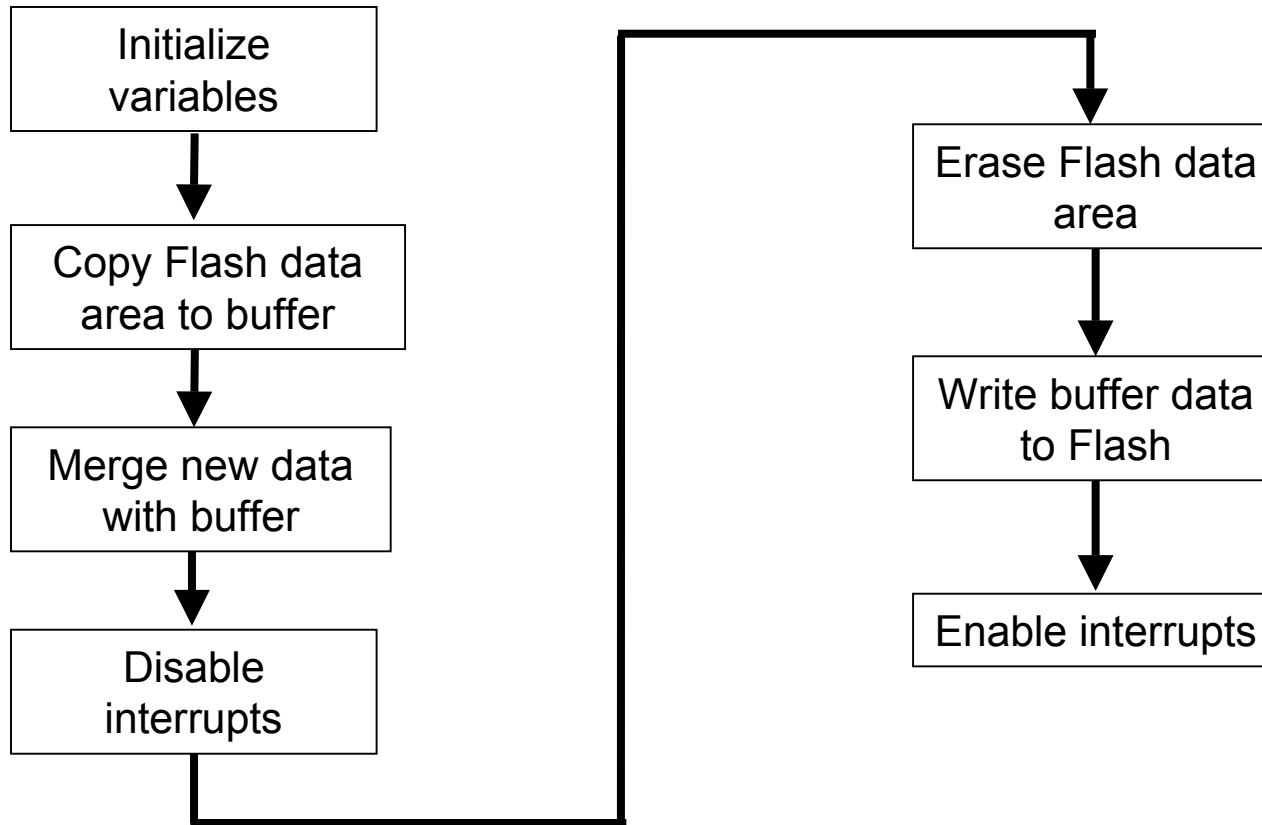


Master-Slave Software Flowchart



Master-Slave Software Flowchart

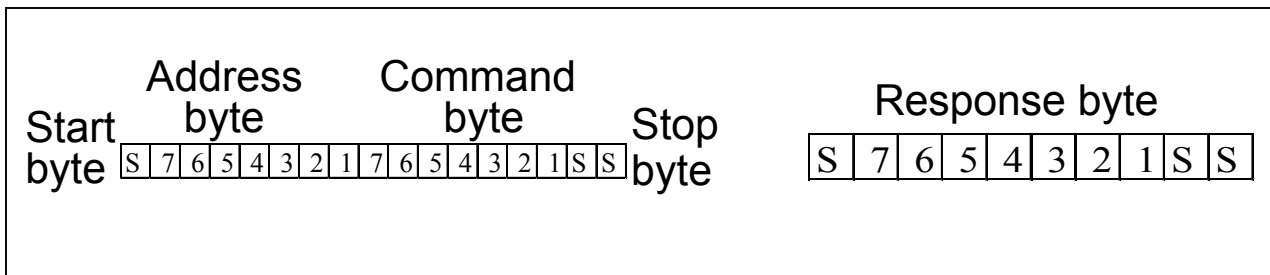
lamp_WriteFlash () Flowchart



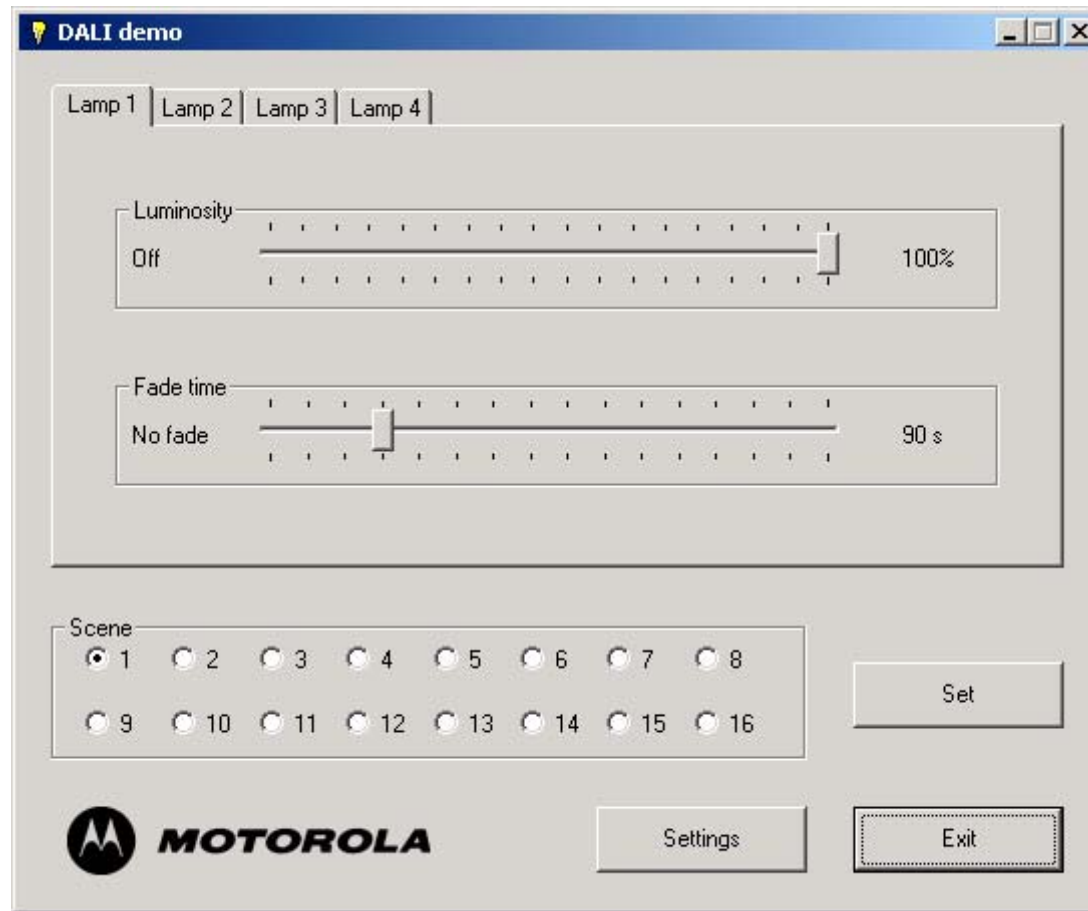
DALI Protocol Standard

Some major characteristics of the DALI protocol are:

- Asynchronous serial protocol
- 1200 baud, bi-phase encoding, half-duplex
- Two-wire differential
- Voltage difference above 9.5V means high level.
- Voltage difference below 6.5V means low level.
- Master unit controls communication.
- Sixty-four slave units can be connected.
- Each slave unit can be individually addressed.
- The master unit sends one start bit, 16 bits of data, and two stop bits.
- The slave unit sends one start bit, 8 bits data, and two stop bits.



PC Software





DALI Kit Summary

```
Metrowerks CodeWarrior
File Edit View Search Project Debug Window Help

untitled
Path: untitled

// cpu.c
// This module handles all cpu related tasks
// Prepared: Motorola AB
// Functional level: Hardware
// Revision: R1B
// Rev Date Reason/description
// F1A 001023 Initial version
// F1B 000201 Added automatic clock calibration
// R1A 010212 Released version
// R1B 011016 Adapted to new clock speed

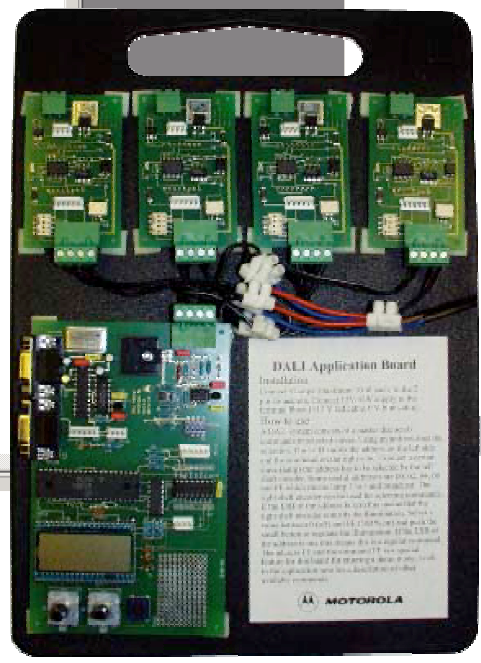
#include "common.h"
#include "iclx8.h"

#define TRIM_FACTOR_ADDR (unsigned char *)0xFDFD
#define TRIM_FACTOR *(TRIM_FACTOR_ADDR) // Internal clock generator trim factor

// Initialize
void cpu_init(void)
{
    unsigned char trimmed;
    unsigned char ser_rec;
    unsigned char dali_rec;

    // Initialize LVI to 5V
    if (TRIM_FACTOR!=0xFF)
    {
        // Initialize LVI to 5V
        CONFIG2 |= 0x08;
    }
    else
    {
        // Initialize LVI to 5V and disable COP
        CONFIG2 |= 0x09;
    }

    // Initialize ports
    DDRA = 0x00; // Initialize PTA0 to PTA4 as input registers
    PTAPUE = 0x1F; // Enable internal pullup on PTA0 to PTA4
    PTB = 0xA1; // Set initial values for PTB
}
```



Initial Reference Design Projects



Security Peripherals:
PIR detection and communication



Computer Peripherals and e-Commerce:
USB sensor-actuator interface



Gate Opening:
Alarm control panel

Contact:

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- **For more information about Motorola's semiconductors:**
www.motorola.com/semiconductors

