

**MiniRec**  
**Motorola Flash Innovation 2003**  
**Project Number: F3061**

## General Description

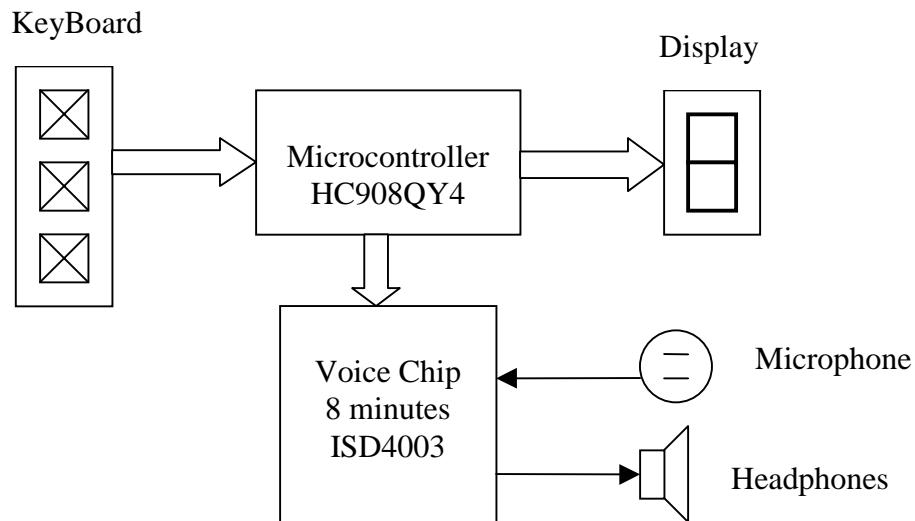
Minirec is a personal voice recording system. This system is a device with which you can record voice messages and to listen to them by means of earphones. It allows to record up to 15 messages, playback any in anytime and erase. The user can see the current record in a 7-segment display. With this device you can record any voice message and to use it as calendar, memo, telephones and until lessons of eight minutes of duration. It is very portable and easy to use. It is very economic because work with two AAA batteries.

## Operating instructions

MiniRec has four operation modes: IDLE, Playing, Recording and pausing. In each mode the three control keys work different. The 7-segment display shows de current record. It has an intern microphone and a jack for headphones.

## Block Diagram

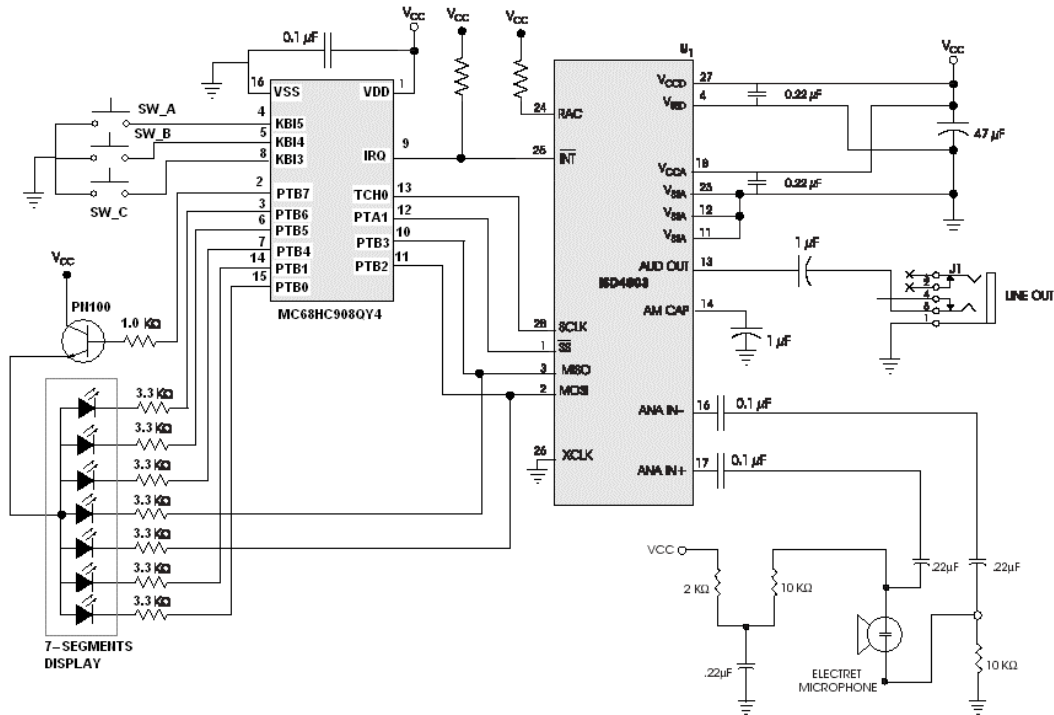
The block diagram of entire system is showed in figure 1. The core is the microcontroller MC68HC908QY4 from Motorola. The voice recording system is based in the ISD4003-8 ChipCorder® ([www.isd.com](http://www.isd.com)). This chip has capacity for 8 minutes of voice data.



**Figure 1. Block Diagram**

## Hardware Description

Hardware schematic is showed in figure 2.



**Figure 2.** Hardware schematic

The hardware for the ChipCorder is based in recommendations of ISD4003-8 datasheet and application brief 22A ([www.isd.com](http://www.isd.com)). The communication between ChipCorder and MCU is with a SPI port. Because the 908QY4 only have 14 I/O ports, it was necessary to share two ports of the interface SPI and display.

The keyboard is connected to ports of keyboard interrupt module (KBI) of MCU (3 pins).  
 The SPI port use 4 pins more IRQ pin. (5 pins)  
 The display use eight ports (6 ports more 2 shared )

The system works with 3V. The HC908QY4 has internal oscillator, for that reason is not necessary more components

### Software Description

The software was developed in C language, using Metrowerks CodeWarrior. The system was structured in modules, using MACROS and type definitions. In this way, the system is easily configurable. Furthermore, it is made for facility the work of developing software. In the figure 3 is showed the project manager of Codewarrior.

The software is low power oriented because MiniRec is a portable device. It use STOP and WAIT modes of the CPU08. The flow diagram of main routine is showed in figure 4.

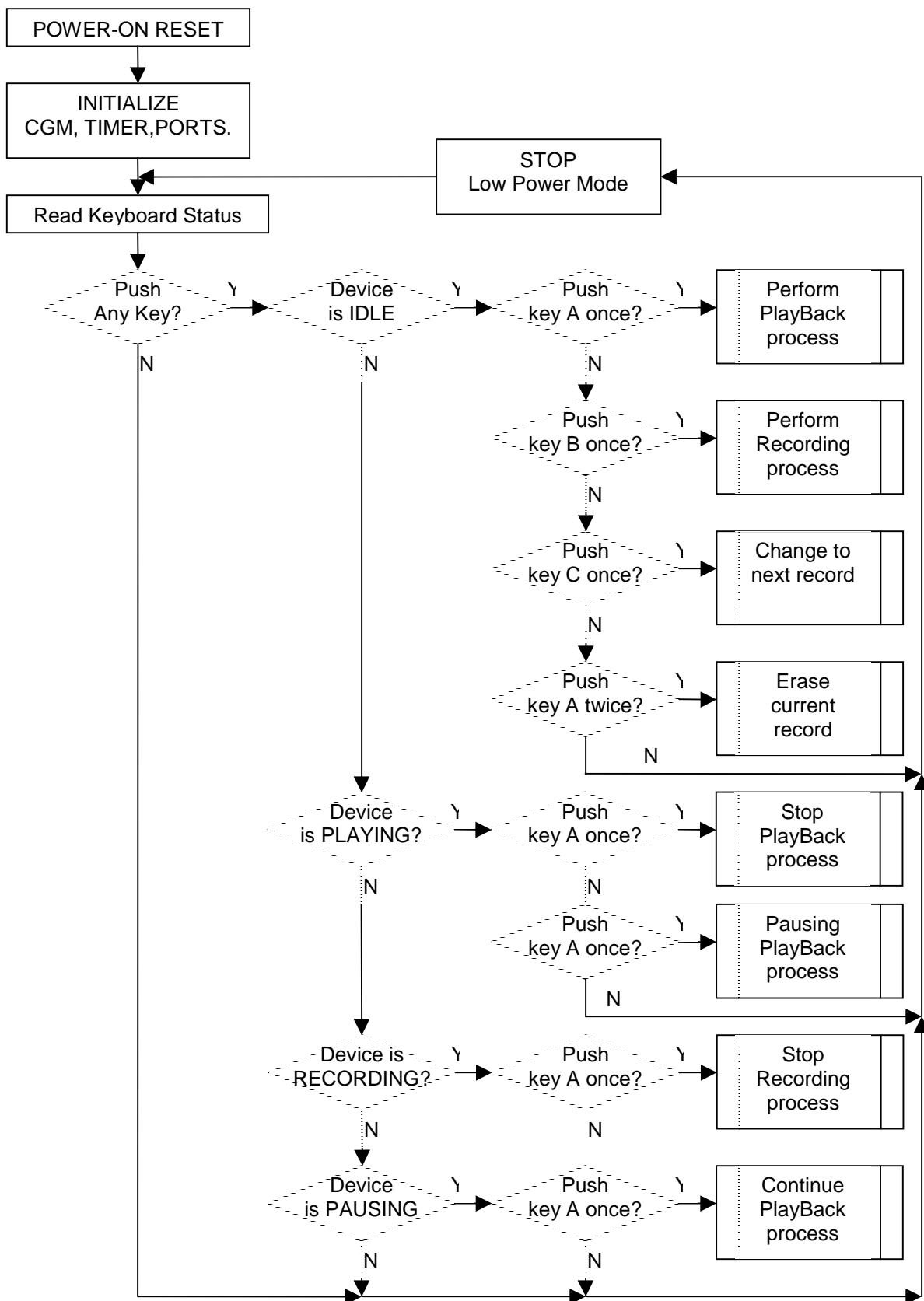


Figure 4. Main routine Flow Diagram

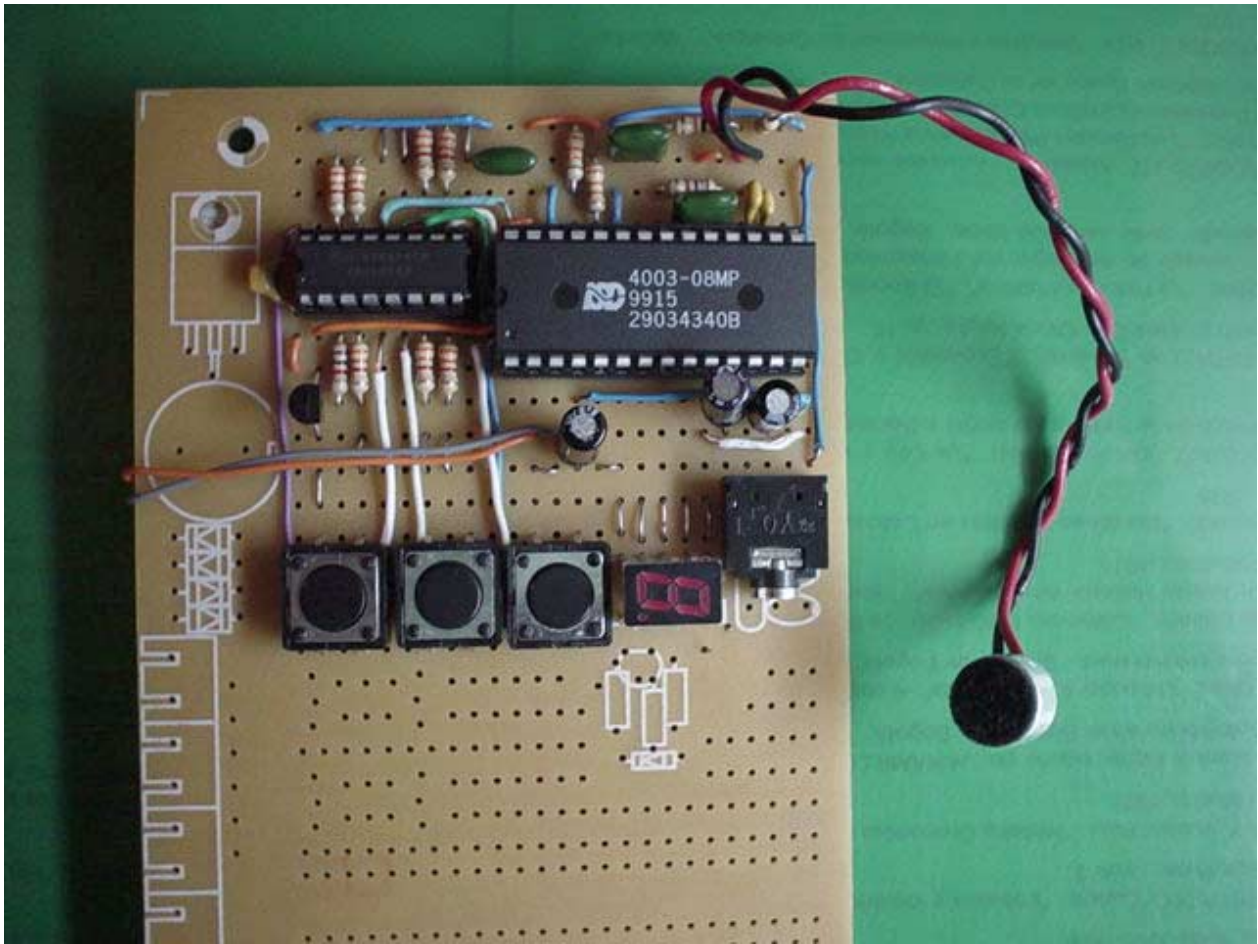


Figure 5. MiniRec Picture