Crystaline Infotek Pvt. Ltd.

Embedding ideas...

Projects in Automotive Electronics Domain

BY

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INJECTOR CURRENT DRIVER AMPLIFIER

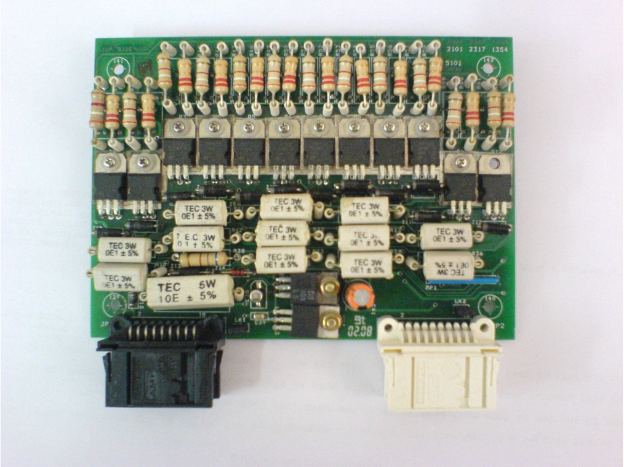
Objective of the Project

To develop an Amplifier Circuit which will take Input from ECU and will fire the Injector connected at the Load.

Customer

Leading **Multi-National Automotive Manufacturer** having annual sales of **USD10B+**

General Overview



The main purpose of the Current Driver Amplifier Circuit is to fire the Injector, which is used to inject Fuel in the Ignition Chamber of a Vehicle. The Injector operation is based on “Peak & Hold” Principle. It requires Current of 4 Ampere to open and 1 Ampere to hold it in the open condition.

The Current Driver Amplifier incorporates Injector Current Driver chips. It takes Pulse Input of 5V & 10mA from the ECU & according to the Pulse time period; it controls the conduction of the Power Darlington Transistor, which in turn controls the current flowing through the Injector. The timing of the pulse is so adjusted that, for first 2 or 3 milliseconds, there will be Peak Current of 4A flowing through the Injector and there will be Hold Current of 1A for the remaining period of the Input Pulse.

The Current Driver Amplifier has such 12 channels, so that Current from such 12 Injectors can be controlled. The Current Driver Amplifier should take Input Voltage from the Battery i.e. VBat (12V DC). The Circuit was tested to pass Insulation resistance test, reverse voltage test, Load dump (SAE J1211) test.

Challenges

Main Challenge faced was carrying out Load Dump Test on the Device, in which a Pulse of 87V DC and period of 400 millisecond is applied to the Device and the Device should withstand to this pulse.

REFERENCE DESIGN BOARD FOR AUTOMOTIVE ELECTRONICS MANUFACTURER

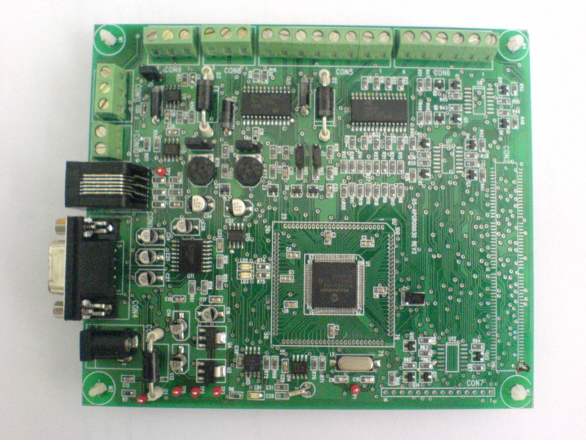
Objective of the Project:

A Reference Design Board with a 16bit Microcontroller from Microchip's PIC 24H Family (3.3V device, either 24HJ Device or 33FJ Device) interfaced with the external 5V peripheral devices. It is a board designed for developers who intend to use Microchip's 3.3V Devices effectively interfacing with Peripheral Devices operating on +5V and also, for testing programs that generate compatible signals to be transmitted using CAN and K-Line protocol for applications in Automotive Sector.

Customer

World's leading automotive component manufacturer

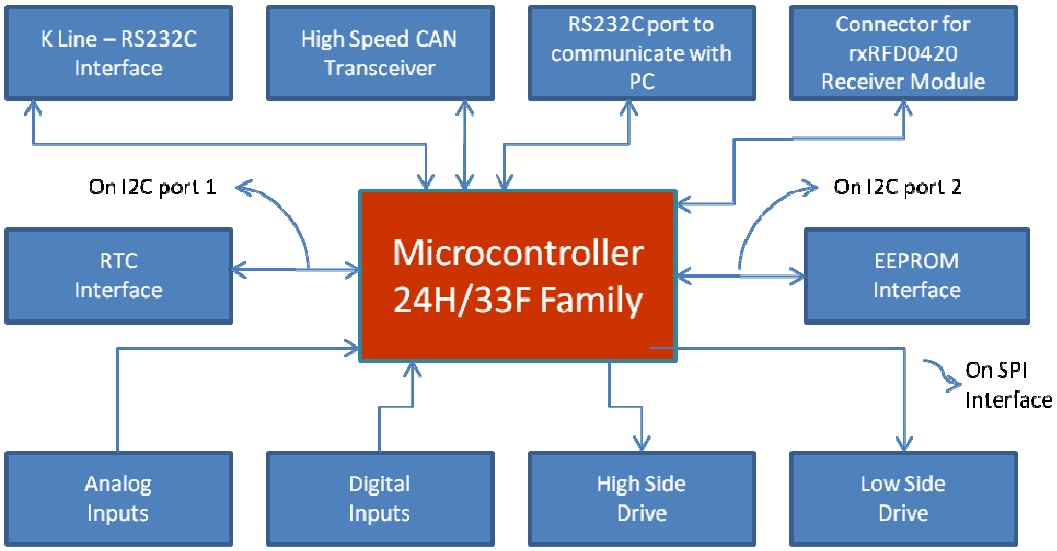
General Overview



Features

- Ideal For developers in Automotive sector
- Interfaces peripheral devices operating on 5VDC with Microchip's 3.3 VDC devices.
- Single Board for testing new applications on CAN and K Line bus.
- Compatible with MICROCHIP's MPLAB IDE for downloading & testing the routines
- PIM socket for any of PIC24HJ256GP610 or DSPIC33FJ256GP710 family devices.
- Debugger Interface.
- Analog Input – one no.
- Discrete Inputs – two nos.
- Onboard RTC .
- Onboard EEPROM .
- K Line Serial Link Interface
- High Speed CAN Transceiver
- Interface to RF Module .
- Test points for easy debugging
- User friendly test routines provided

Block Diagram



Following Devices are to be interfaced with the Microcontroller.

- PIM socket for any of PIC24HJ256GP610 or dsPIC33FJ256GP710 family devices.
- Debugger Interface.
- Analog Input – one no.
- Discrete Inputs – two nos.
- RTC (PCF8563).
- EEPROM (24LC512).
- High Side Drive (VNQ600).
- Low Side Drive (L9823).
- K Line Serial Link Interface (MC33290).
- High Speed CAN Transceiver.(TJA1050)
- Interface to RF Module (rxRFD0420 Receiver Module).

Software & APIs

Very basic hardware test software is developed for above modules. We developed APIs to test RTC, EEPROM, which included the initialization routines of these modules as well as basic test module like Read/ Write etc. also.

A basic Test Software for High Side Drive, Low Side Drive, AI & DI were written. A Communication Test Software was developed to test K-Line and CAN Protocols by connecting two such boards in back to back fashion.

A serial terminal (HyperTerminal running on PC) is connected to board on UART interface and a test menu is provided to test other on board functionality.
The board is powered from 12V DC adapter.

TRUCK/DUMPER DATA LOGGER & DATA DOWNLOADER

Objective of the Project

- To monitor the driver's habits.
- To monitor the vehicle statistics.
- To design and develop the hardware required for monitoring the hardware.

Objective of Data Downloader

To download the data from TDL/DML and when connected to a PC Side Software, copy all the data in a number of Excel Sheets.

End Customer/User

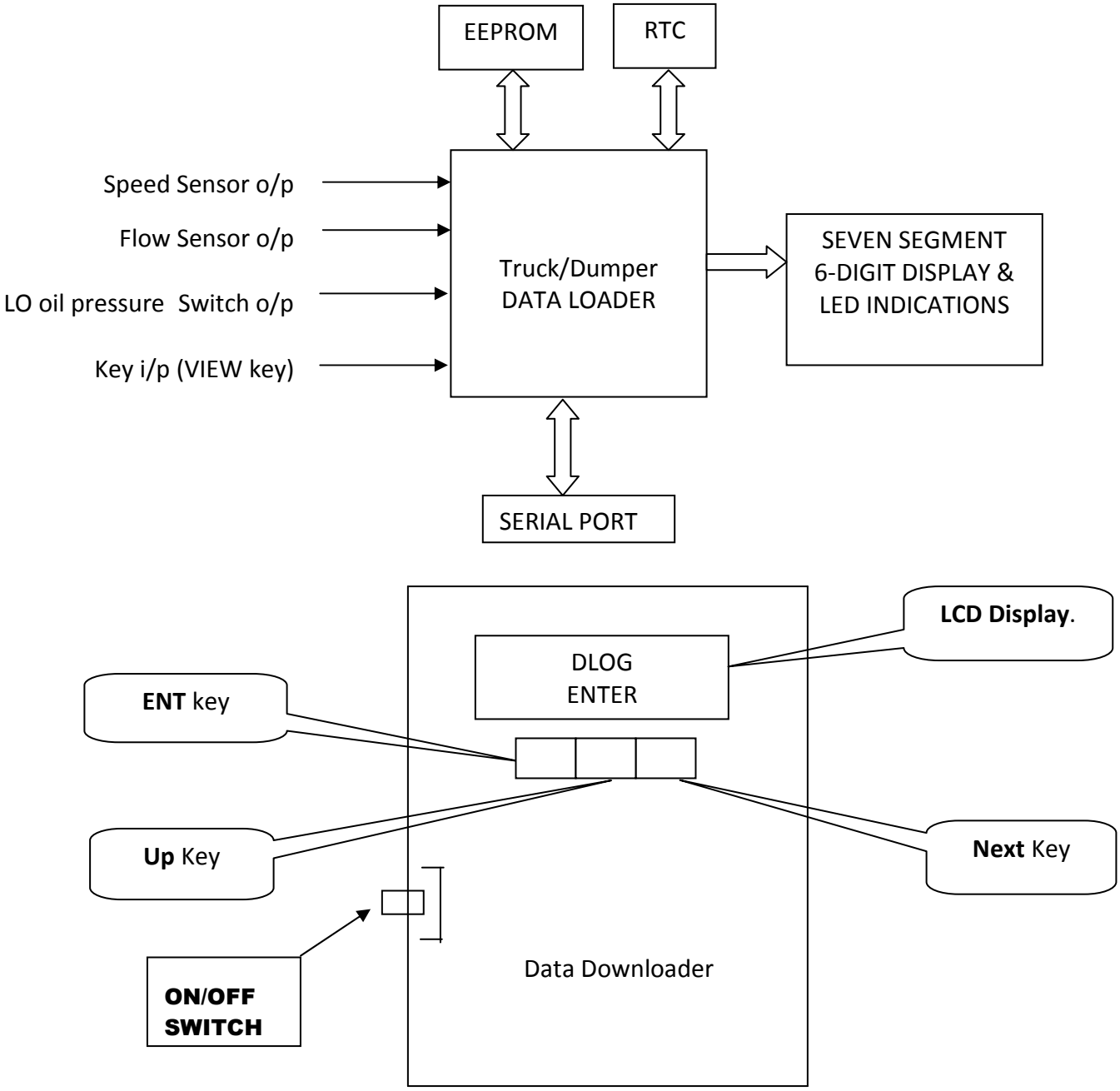
Cummins India, Pune.

General Overview

Project Description

For a fleet owner company, it was required to monitor the Driver's habits with respect to vehicle (Truck/Dumper) parameters for better utilization of fuel and maintenance of vehicle. A flow sensor for fuel consumption and speed sensor were used along with Engine RPM measurement. The three inputs were given to the on board data logger unit. The unit had 6-digit 7- segment display and had features of capturing various parameters such as Total distance traveled, Total fuel consumed, over speeding hours, Night driving hours, Engine On time, Engine Fail time, Real Time Counting etc. The logger would save about 30 Days Data in its EEPROM memory. A hand held Data collector unit (Data Downloader) was also developed to download the Data from multiple such vehicle units and send it over to PC. Software to generate & print trip reports was also developed. The reports generated by this software are well formatted reports in MS-Excel.

Block Diagram



The complete product development for the Data Logger and Handheld Data Collector was carried out by us. Both units were field tested on Trucks and other heavy vehicles. The product is currently under production.

DASH BOARD METER

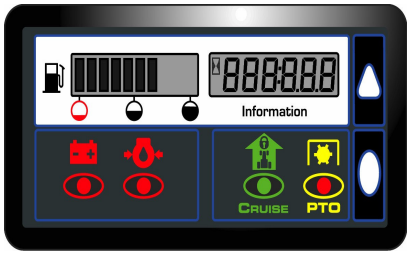
Objective of the Project

This project involved development of a Dash Board Meter. This instrument panel displays a Vehicle's Engine related parameters, a Fuel Gauge, an Hour Meter for Engine ON Time and four warning LED icon lights. For displaying these parameters, an Alpha Numeric LCD is used.

Customer

Leading American Corporation manufacturing vehicle instruments

General Overview



This instrument panel includes an LCD bar graph fuel gage, an LCD time-of-day clock and up to four warning LED icon lights. The time-of-day clock display also serves as a diagnostic warning display and an hour meter display. The LCD fuel bar graph is on the left side of the panel and the numeric LCD time-of-day Clock/Hour Meter on the right. The LED icons are in a row below the LCD. The LCD is not backlit for night operation. Two small buttons are located on the front right side of the panel for setting the clock.

The Hour Meter reading is stored in non-volatile memory. The Hour Meter is enabled when both the Key Switch (Ignition) is on and the Oil Pressure Switch is open (engine running). The Hour Meter only accumulates time when enabled to do so. A 3-second active high (B+ level) pulse at the Hour Meter Reset pin can reset the Hour Meter (and PTO) contents).

The Instrument has number of Modes of Operations viz. Sleep Mode, Deep Sleep Mode, Active (Run) Mode, Time Set Mode, Demo Mode & PTO Hours Mode etc.

The Operating Range of the Instrument is 9VDC to 16VDC. The Operating Temperature Range of the Instrument is -40°C to +85°C & Humidity 95% RH (non-condensing) at +38°C.

The Instrument also meets the Load Dump Transient Test (as per J1455 Aug. 1994), the ESD Test (as per J1113/13 Oct. 1997 at 16KV), Shock Test (as per SAE J1378 July 98) and Vibration Test (as per SAE J1378 July 98).

Challenges

Main Challenge faced was Operation of LCD at Negative Temperature particularly at -40°C. Also calibration of the Fuel Gauge with respect to the Resistive Sensor's Output was also a bit tedious. We were able to overcome both challenges.