# Modular Wireless Diagnostic Tool

F08-74-DIAGTOOL


Team Members:

| | |
|---|---|
| Joseph Lenox | Project Manager, Datapath Control |
| Doug Palmer | Wireless Link |
| Wesley Trendinnick | Input Calibration |
| Nick Hamann | PC Software |
| Matthew Morgan | Power |



Abstract:

Current diagnostic tools such as oscilloscopes and logic analyzers tend toward large and bulky, and are targeted towards lab or workbench applications in large companies. This design fits the hobbyist niche with a flexible platform for low-performance data acquisition and data interpretation at a low cost.


| Week of: | Jan 2 | Jan 9 | Jan 16 | Jan 23. | Jan 30. | Feb. 6 |
|---|---|---|---|---|---|---|
| Further testing and design refinement | | | | | | |
| Order and shipment of parts | | | | | | |
| PCB Fabrication | | | | | | |
| Assembly of parts | | | | | | |
| Product testing | | | | | | |
| **Total implementation time: 6 weeks** | | | | | | |

Table 1: Capital cost breakdown for the Modular Wireless Diagnostic Tool.

The total expected time to implement the design is 6 weeks. This estimate includes time for further prototype testing and design refinement, lead-time for parts order and delivery, subsequent assembly of parts and final product testing. See Table 1 for details. The total cost to implement the Wireless Modular Diagnostic Tool is $191.87. See Table 2 for a detailed breakdown of the costs.

| Suppliers | Description | Quantity | Supplier 1 | Supplier 2 | Supplier 3 | Total 1 | Total 2 | Total 3 |
|---|---|---|---|---|---|---|---|---|
| [1–3] | Resistors | 12 | $0.10 | $0.08 | $0.10 | $1.20 | $0.96 | $1.20 |
| [1–3] | Multiplexer | 1 | $1.09 | $1.58 | $1.58 | $1.09 | $1.58 | $1.58 |
| [1, 3, 4] | OpAmps | 4 | $0.25 | $0.20 | $0.29 | $1.00 | $0.80 | $1.16 |
| [?, 3, 5] | DAC | 1 | $3.49 | $3.44 | $3.50 | $3.49 | $3.44 | $3.50 |
| [?, 2, 3] | Diodes | 2 | $0.30 | $0.33 | $0.30 | $0.60 | $0.66 | $0.60 |
| [6, 7] | 68uH Inductor | 2 | $5.40 | * | * | $10.80 | $10.80 | $10.80 |
| [8] | Bluegiga WT-32 | 1 | $89.95 | * | * | $89.95 | $89.95 | $89.95 |
| [3, 5] | 1N5818 Schottky Diode | 2 | $0.14 | $0.09 | * | $0.28 | $0.18 | $0.23 |
| [9] | LT1073CN8-12 | 1 | $3.15 | * | * | $3.15 | $3.15 | $3.15 |
| [9] | LT1073CN8-5 | 1 | $3.15 | * | * | $3.15 | $3.15 | $3.15 |
| [2, 5, 10] | LED | 1 | $0.90 | $1.49 | $0.78 | $0.90 | $1.49 | $0.78 |
| [11, 12] | 3.7V Li-Ion Battery | 1 | $9.95 | $12.95 | * | $9.95 | $12.95 | $11.45 |
| [1–3] | Resistors | 3 | $0.10 | $0.08 | $0.10 | $0.30 | $0.24 | $0.30 |
| [13] | Printed circuit board | 1 | $50.00 | * | * | $50.00 | $50.00 | $50.00 |
| [14] | ATMega8515(L) | 2 | $4.58 | * | * | $9.16 | $9.16 | $9.16 |
| [15] | 74AC04 | 1 | $0.06 | * | * | $0.06 | $0.06 | $0.06 |
| [15] | 74AC245 | 10 | $0.09 | * | * | $0.89 | $0.89 | $0.89 |
| [16] | Headers | 2 | $2.95 | * | * | $5.90 | $5.90 | $5.90 |
| Totals | | | | | | $191.87 | $195.36 | $193.86 |
| | * = cost data averaged | | | | | | | |

Table 2: Capital cost breakdown for the Modular Wireless Diagnostic Tool.

## Project Description

A block diagram of the project is shown in Figure 1. Input modules capture input via probes and condition it for processing by the rest of the system. The datapath control subsystem regulates the flow of data from the input modules and serializes it for the wireless link. The wireless link transmits the data to the host PC, where an end-user runs a software interface that is used to initialize, control and display data acquisitions.

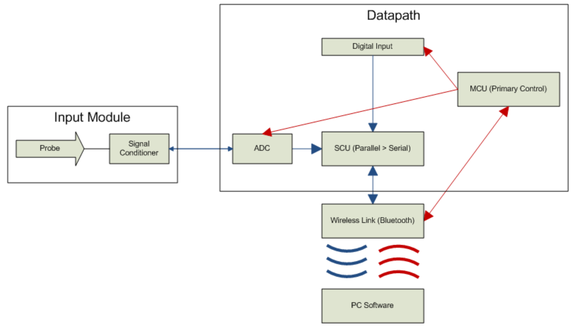
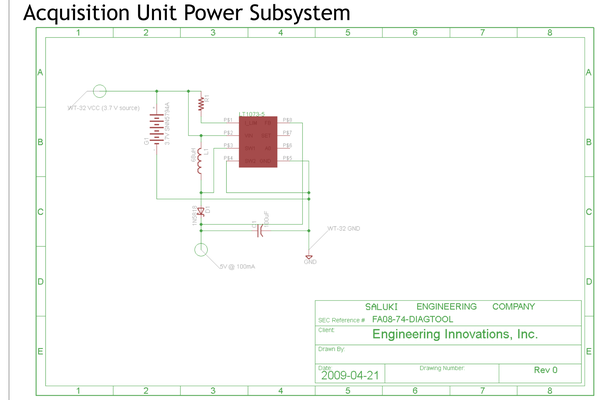



Figure 1: Modular Wireless Diagnostic Tool project block diagram.

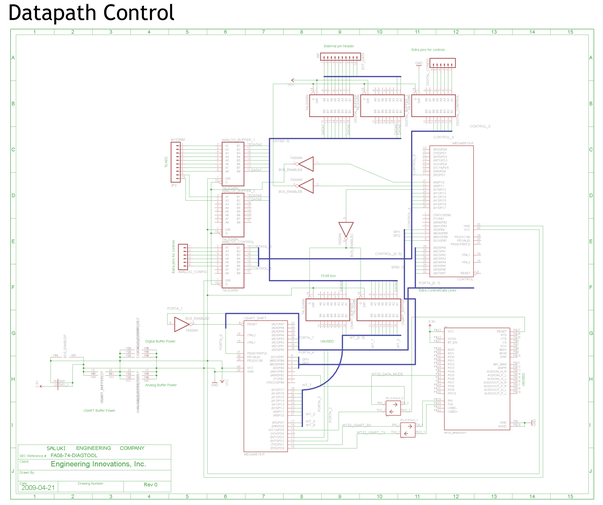
## Data Acquisition Unit

### Acquisition Unit Power Subsystem



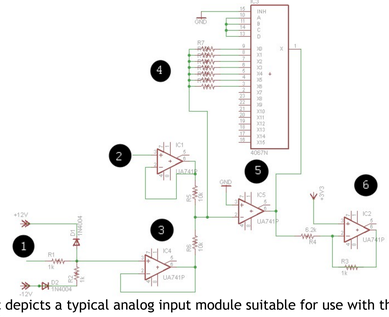

This schematic depicts the power systems of the Data Acquisition Unit.

### Datapath Control



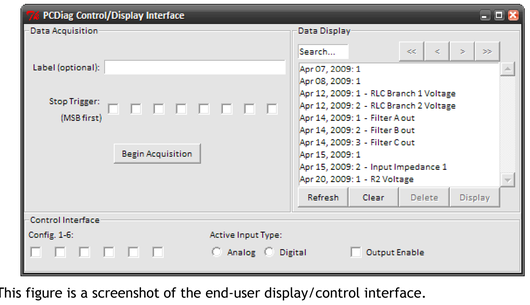
This schematic depicts the base of the Data Acquisition Unit, with attached Wireless Communications link.

### Input Subsystem



This schematic depicts a typical analog input module suitable for use with the Data Acquisition Unit.

### PC Software Subsystem




This figure is a screenshot of the end-user display/control interface.