The device we deconstructed and analyzed was a Programmable Logic Controller (PLC). Our team decided to deconstruct a PLC because members of our team had just learned about PLC’s in our electrical engineering courses. Seeing an opportunity not only to apply newly learned knowledge but to learn more about the internal components of a circuit, we decided to take apart a PLC and analyze the components in the circuit to see what components make up a PLC and what those components are used for

Inside the PLC we deconstructed were mostly resistors, capacitors, and LEDs. The rest of the components are logic gates, buffers, transistors, switches, diodes, a dual differential line driver, and a dual differential line receiver. Of those components, only two were Texas Instruments components. They were the Dual Differential Line Driver (SN75158P J832X2) and the Dual Differential Line Receiver (UA9637ACP J631A2).

According to our research, a dual differential line driver operates by taking two inputs and giving four outputs, two pairs of a non-inverted and an inverted signal. A dual differential line receiver receives the signals from the driver and converts them to two outputs. The purpose of the line driver in this circuit is to provide a positive and negative output. This output is feeded to the line receiver and it provides a high and low output voltage.

In conclusion, the importance of the two TI components in the PLC we took apart was to drive certain components in the circuit according to the needs of the controller.

**PLC Board 1:**

**TI Component - SN75158P J832X2 - Dual Differential Line Driver**

**TI Component - UA9637ACP J631A2 - Dual DIfferential Line Receiver**

1x - 47nF capacitor

2x - Resistor pack (9) 7k Ohms

2x - Resistor pack (6) 10k Ohms

11x - .1𝛍Fcapacitorss

1x - 2k Ohm Resistor -5% tolerance

1x - 3k Ohm Resistor -5% tolerance

16x - diodes

5x- 1k Ohm Resistor - 5% tolerance

3x - 680 Ohm Resistor - 5% tolerance

1x - 330 Ohm Resistor - 5% tolerance

2x - A733 AQ188 Transistor

2x - 270 pF Capacitor - 20% tolerance

1x- 2.2 nF Capacitor - 20% tolerance

1x- 1 pF Capacitor

1x- 2 pF Capacitor

1x- 100µF Capacitor

2x - HD14503BP

1x - Processor FRN5/ (JAPAN) 8838 R0012SS0 HN27C64G-20

1x - (Toshiba) TC5517AP (JAPAN) 8864HBK

1x - TP8CC3BH L7400017

1x - HD74HC373P

1X - TC40H367P (Toshiba)

1X - HD74HCOOP

1X - BA12004809624A

1X - μPC177C - 88300 (NEC Jap1an)

2X - Capacitors - Unknown Capacitance - 10% tolerance

2X - Resistors - 7.5k Ohms - 5% tolerance

2X - Resistors - 23 Ohms - 1% tolerance

7X - 680 pF Capacitors

1x - 1nF Capacitor

1X - 39k Ohms

1X - 700K Ohms - 5% tolerance

1X - 70K Ohms - 5% tolerance

1X - 510K Ohms - 5% tolerance

1X - 41 Ohms - 5% tolerance

1X - 55K Ohms - 5% tolerance

1X - 430K Ohms - 5% tolerance

1X - 480K Ohms - 5% tolerance

1X - 100 Ohms - 5% tolerance

2X - 10K Ohms - 5% tolerance

1X - 23 Ohms - 1% tolerance

1X - 4.8K Ohms - 5% tolerance

1X - 100K Ohms - 5% tolerance

1X - 8.5K Ohms - 2% tolerance

2X - 4.8K Ohms - 5% tolerance

3X - 1K Ohms - 5% tolerance

1X - TC40H174P (Toshiba)

1X - TC40H000P (Toshiba)

1X - HD74HC139P

1X - HD74HC02P

1X - Transistor - C945 Q188A

**PLC Board 2:**

459221-0032 - solder board

10X - Capacitors (Marcon) - AC 132 Volts - 0.222 MicroFarads - 6 Volts

3X - μPC177C - 8832D (NEC Japan)

10X - PC814 (Sharp)

13X - Blue Generic Capacitors = code 104k - 0.1 μF

1X - Capacitors - 50V 2200 MicroFarads

2X - Capacitors - CE-US88238TB - 50V 330 MicroFarads

1X - Capacitors - CE-US88328VC - 16V 100 MicroFards

2X - Transistors - TD525081

1X - T2B81 (Japan)

10X - Red Capacitors = code 104 - 0.1μF

1X - 2T12G478W2

1X - TWR26247KBV3

1X - Transformer 01400883 (SUMIDA)

1X - BA6993808659

1X - TJ8J

10X - Multiple connection resistor

10X - Resistors = 33K Ohms +- 5

10X - Resistors = 4.7K Ohms +-5

10X - Resistors = 3K Ohms +- 5

20X - Generic Maroon Capacitors - small black band

4X - Resistors = 1K Ohm +-5

1X - Resistors = 200K +- 5

1X - Resistors = 10K Ohm +-5

1X - Resistors 4.7K Ohm

1X - 150 Ohm +- 5

1X - Resistors 1k Ohm

1X - Resistors 47 Ohm +-5

**PLC Board 3:**

45921-0071 = solder board

6X - JY18H-K-501 (Takamisawa) = J-K Flip Flops

6X - Capacitors - 3A223K (Marcon) - 0.022 μF Caps

6X - Resistors - 4.7k +- 5 Ohms

12X - Diodes

1X - Switch - A-12

**PLC Board 4:**

B15S459221-0110 - solder board

18X - Red LEDs - 1

1X - Yellow LEDs - 2

2X - Green LEDs - 3

 





