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Load Cell Amplifier for Conventional Load Cell

Overview:

We have acquired a conventional 250 pound tension / compression load cell (LPU-250) based on a 350 Ohm strain gage bridge. We are in the process of constructing a simple DC-accurate amplifier to convert the low level output of the strain gage to a 0-5V signal suitable for our PC based acquisition system.

CIRCUIT SCHEMATIC
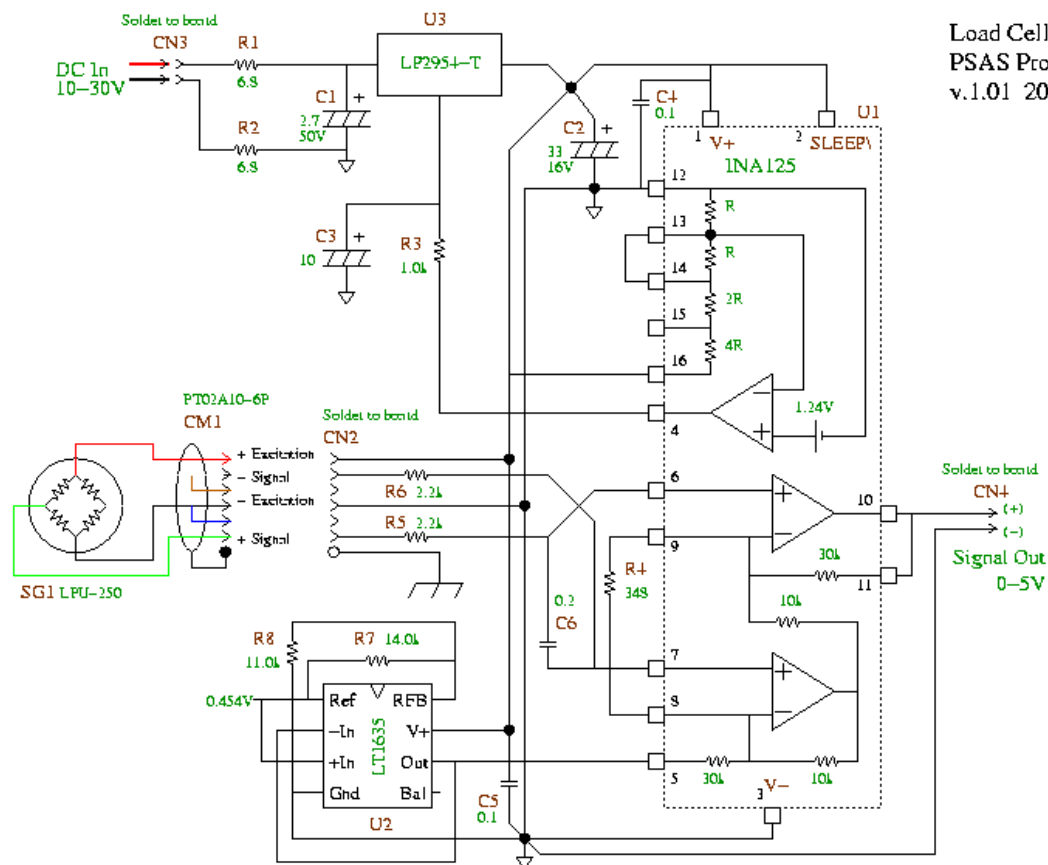
Referring to the schematic, the INA125P instrumentation amplifier (U1) does most of the work. It amplifies the approximately 30mV full scale signal into the required 0-5V range. U1 also includes an accurate 1.24V reference and buffer amplifier. These are used to drive a low drop out 3-terminal regulator (U3) to produce a stable 8.75V excitation for the strain gage. 8.75V was chosen as opposed to the more conventional 10V because we may want to run this amplifier on 12VDC and therefore require the extra headroom. Running the bridge at the lower voltage does degrade the signal somewhat (~14%), but this is regarded as acceptable for this application.

The LT1635 (U2) is an improved LM10 opamp with voltage reference. In this circuit U2 provides a stable pseudo-ground reference level to keep the output signal from clipping against ground even for worst case input offset error. This offset also allows us to read small tension loads if we need to.

ATTACHMENTS

There are three kinds of file attachments available. The schematic diagrams are provided in source (xfig) format and as PDF files as

well as in png format above. The LoadCellAmpNotes.pdf file contains detailed, and mostly accurate engineering notes for almost every component in the amplifier.

Attachments:

- LoadCellAmpNotes-1.00.pdf
- LoadCellAmpSchematic-1.00.fig
- LoadCellAmpSchematic-1.00.pdf
- LoadCellAmpSchematic.fig
- LoadCellAmpSchematic.pdf

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