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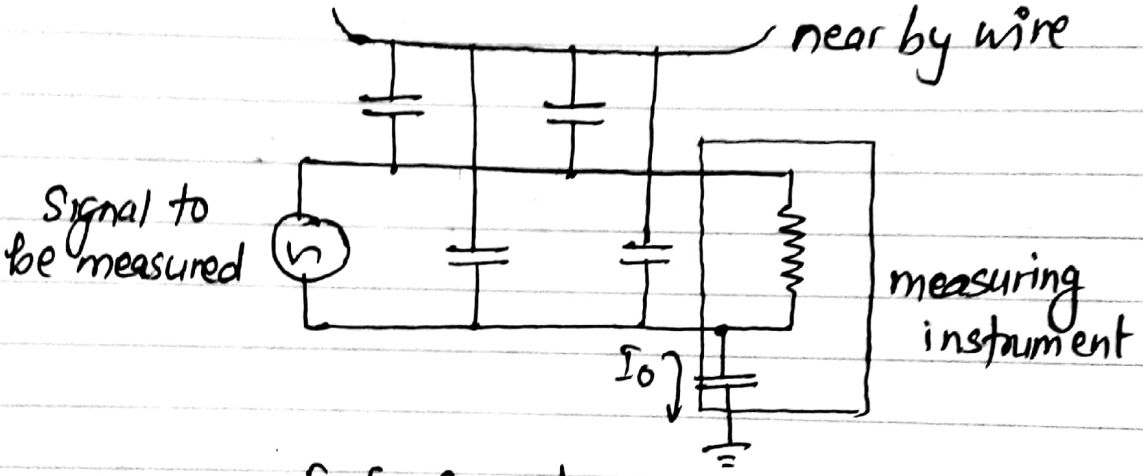
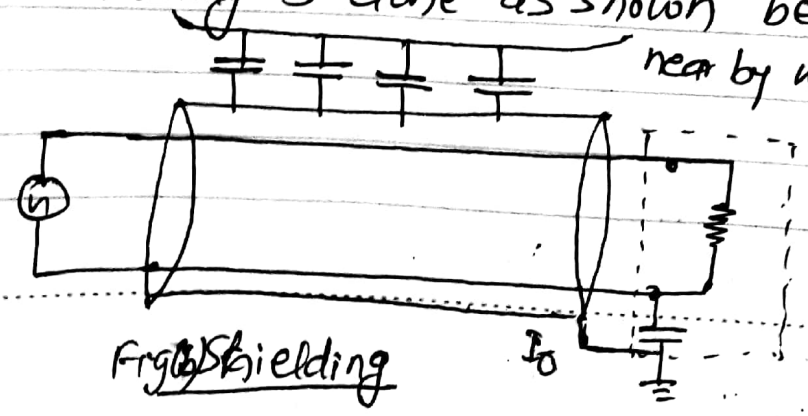
Isolation Amplifier:

To reduce the pick up of noise voltage in the connections between the transducer and the amplifier, the leads to the transducer are kept as short as possible and the amplified signal is transmitted to the required distance. There are situations where the low-level o/p of transducer must be transmitted thru some length of wire. In this case external signal pick up may occur. To reduce the noise, one method is grounding as shown below:



Fig(a) Grounding

By the addition of shield, the capacitively coupled signals from the power frequency line are coupled to the shield and are safely conducted to the instrument case and to ground. The combination of the instrument case, its ground connection and the shield extending to the signal source represents a complete shield around the entire measuring system. Shielding is done as shown below:



Fig(b) Shielding

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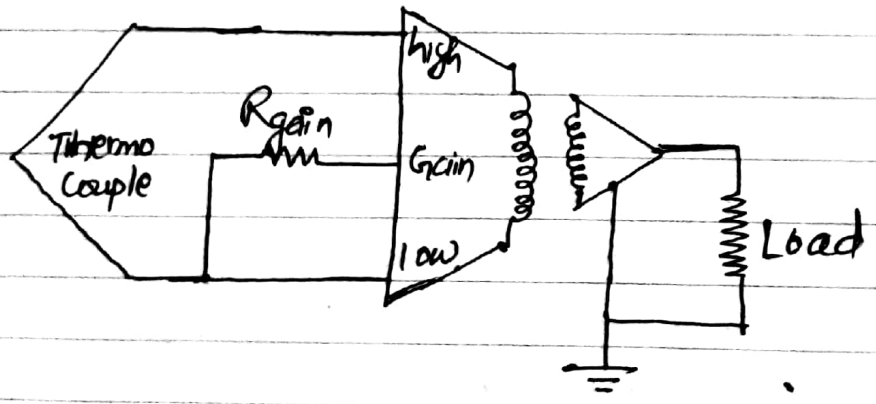
In most of the amplifier, it is necessary to connect an amplifier to ground to protect it from faults and power transients, interferences from motor, power lines, etc. This may cause excess noise problem. An isolation amplifier, special subclass of Instrumentation Amplifier, doesnot require such a ground connection (the signal is now isolated from the ground) and rejection of interfering noise may be much improved. A two port isolator and three port isolators can be used. Isolation can be achieved by several means such as by using transformers, photoresistors, Hall effect devices and thermal couplers. The isolation amplifier using transformer and LED-phototransistor coupler are as shown below:



Fig(c) Isolation Amplifier using transformer

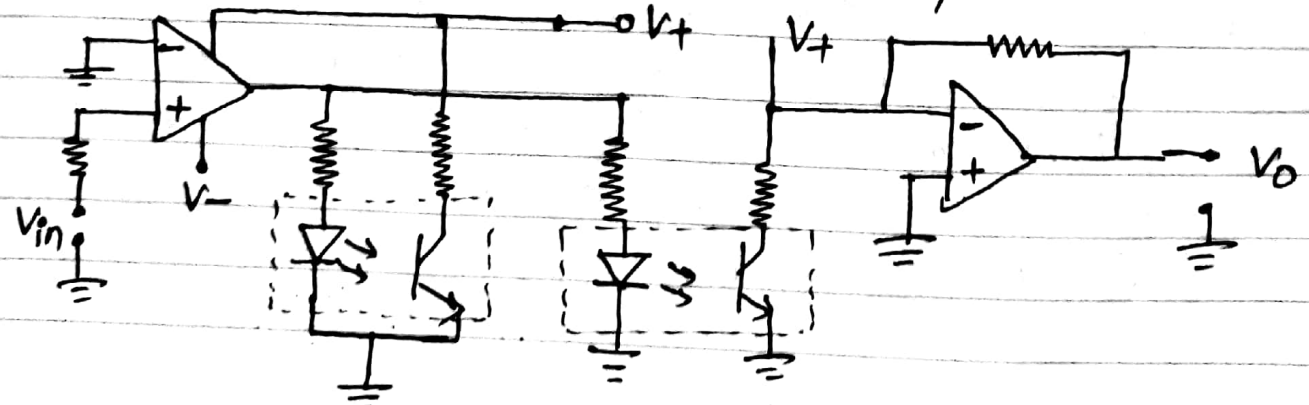


Fig: Isolation Amplifier using LED - Phototransistor

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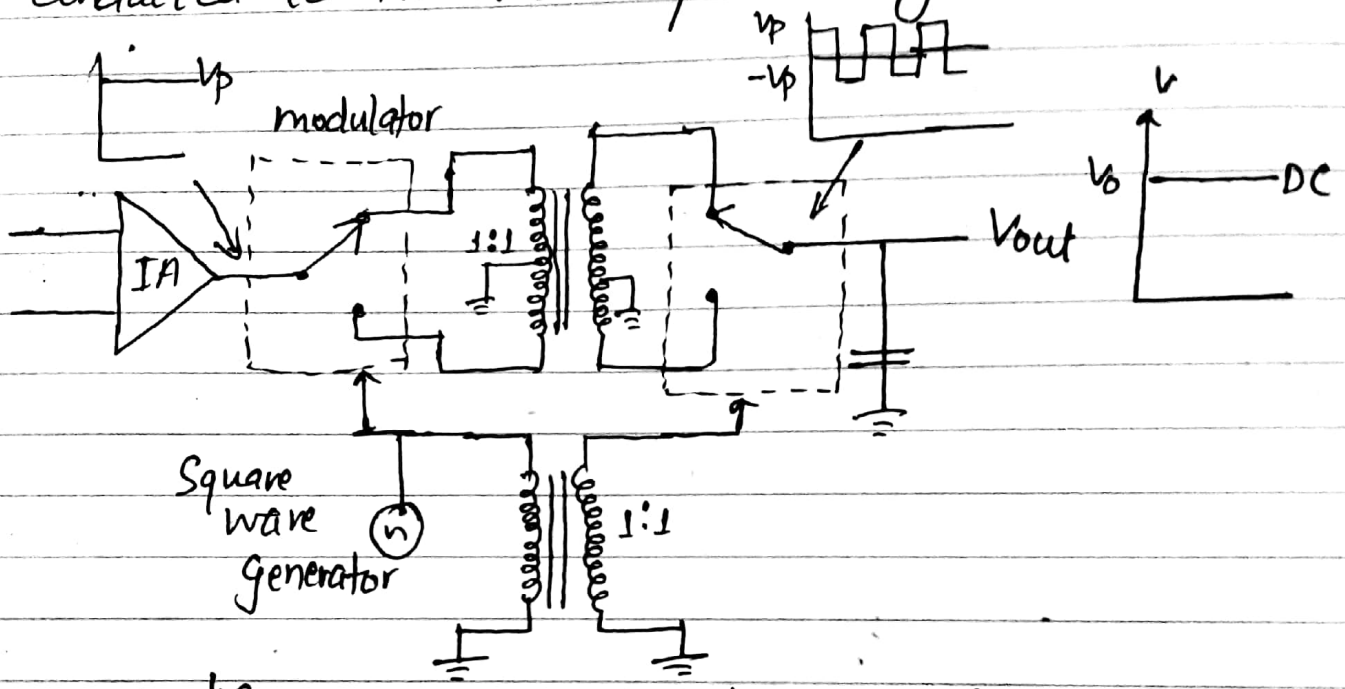
There are situations where the noise environment is so severe that conventional amplifiers cannot ~~surf~~ survive the signal levels encountered. In these situations, an isolation amplifier is used to prevent the dangerously high voltage noise signals from being conducted to the data acquisition system.



Fig(d) Schematic of an Isolation Amplifier

The o/p of the IA is fed to a balanced modulator which provides a bipolar square wave with an amplitude proportional to the signal level. The high frequency wave is carrier. The modulated signal being an ac signal with no dc level, can be coupled through a transformer to a balanced demodulator. The square wave signal generator is transformer coupled to serve as the carrier and restores the i/p level. After a small amount of filtering, the o/p of an isolation amplifier is an accurate representation of i/p voltage.