

Barebones EM Field Test Kit - Build Guide

1. Overview

This guide walks you through building a minimal electromagnetic field test system. The goal is to pulse a custom waveform through a coil and observe its effects on nearby material using a simple Hall sensor.

2. Required Components

- Arduino Nano (or clone): Basic microcontroller for timing and waveform output (PWM or digital pulses). (Approx. \$5.0)
- Hand-wound EM Coil: Copper wire wound around a ferrite core (DIY or repurposed from a speaker/transformer). (Approx. \$3.0)
- Hall Sensor (e.g., A3144): Detects changes in magnetic field near coil output. (Approx. \$1.0)
- Power Source (USB or 9V Battery): Powers the Arduino and coil; can be USB or battery. (Approx. \$5.0)
- Quartz Crystal / Silica Powder: Material for EM interaction test repurposed from household sources or craft supply. (Approx. \$5.0)
- Non-conductive Base (Cardboard / Foamboard): Used to mount emitter and target material safely. (Approx. \$0.0)
- Aluminum Foil / Wire Mesh: Acts as DIY EM shielding or ground plane. (Approx. \$0.0)
- Basic Jumper Wires + Breadboard: Simple prototyping interconnects. (Approx. \$3.0)
- LED (optional): Visual feedback for field pulse or system trigger. (Approx. \$0.5)

3. Circuit Overview

Refer to the circuit diagram showing how to connect the Arduino, coil, and sensor.

4. Arduino Sample Code

```
const int coilPin = 3;
const int sensorPin = A0;

void setup() {
  pinMode(coilPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  digitalWrite(coilPin, HIGH);
  delayMicroseconds(500);
  digitalWrite(coilPin, LOW);
  delayMicroseconds(500);

  int sensorVal = analogRead(sensorPin);
  Serial.println(sensorVal);
  delay(10);
}
```

