

Electromagnetic Missile Launcher

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Abstract- The projectile launcher conceived in 1983 at the University of Washington that uses chemical energy to accelerate projectiles to hypersonic speed. Although it resembles a conventional long barreled cannon, the principle of operation of the ram accelerator is notably different, being closely related to that of a supersonic air breathing ramjet engine. But now days a new system developed for missile launch. It does not any type fuel or gas to accelerate projectile. Electromagnetic antinuclear missile launcher.

In this project we are developing the electromagnetic antinuclear launcher for missile launching and space shuttle launching, this work on principle of magnetizing and demagnetizing of coil. There is a wide length tube and the object to be fired is placed in tube. Over the tube, coils are wounded. When the supply is given, first coil is get energized it try to attract an object and suddenly object get attracted towards it. After attraction the first coil De-energized and suddenly second coil is energized, then object get attracted towards that coil and so on.

Electromagnet launcher can accelerate a projectile up to 52,493 (16,000 meters) per second. The electromagnetic launcher is a type of electromagnetic mass launcher that uses the Lorentz force to accelerate a projectile. A launcher consists of a stack of outer coils forming the "barrel" (stator) that generates a magnetic field which pushes a second, coaxial, single coil axially along a guide way.

Keywords- Electromagnetic missile launcher, Coil and Barrel, SPDT Relay, Microcontroller 89S51, Anti Nuclear Missile, RF Module, Radio Frequency, 7-segment LCD Display, Switching ON/OFF

I. INTRODUCTION

Electromagnetic launch technology has made significant progress. Some researchers have begun to study the missile which is accelerated by a rail gun to supersonic speed. Compared to conventional missile, an electromagnetic launch missile has the advantages of high muzzle velocity and easy to operate than existing system. We design a kind of double layer shielding for missile in rail gun.

A Electromagnetic antinuclear missile is a type of projectile accelerator consisting of one or more coils used as electromagnets in the configuration of a linear motor that

accelerate a ferromagnetic or conducting projectile to high velocity. In almost all Electromagnetic antinuclear launcher configurations, the coils and the gun barrel are arranged on a common axis. Electromagnetic antinuclear launchers generally consist of one or more coils arranged along a barrel, so the path of the accelerating projectile lies along the central axis of the coils. The coils are switched on and off in a precisely timed sequence, causing the projectile to be accelerated quickly along the barrel via magnetic forces. SPDT relays are used to swichting the coil.

II. WORKING PRINCIPLE

The basic operating principle of the electromagnetic launcher. An electromagnetic launcher consists of two interacting parts, the coil and the projectile. Suppose we take something like a short rod of iron or steel and place it next to the coil, the rod is attracted into the coil. This attraction occurs because the coil magnetizes the rod, effectively creating two separate magnets. The rod is magnetised in the same sense as the coil so the end of the rod which faces the coil 'sees' an opposing pole. Regardless of which end of the coil the rod is placed, it will experience an attraction since the coil will always magnetize the rod in the same sense as its own magnetic field. The diagram above shows a coil and rod in close proximity. The rod is magnetised such that it 'sees' the opposite pole when it faces the coil.

Specification of System are

- 1) Power Supply
- 2) Microcontroller 89s51
- 3) LCD Display
- 4) Relay
- 5) Coil & Barrel
- 6) RF Modules

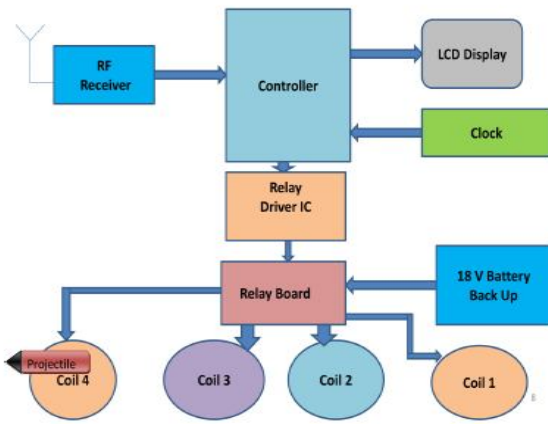


Fig.1 Block diagram of electromagnetic missile

III. WORKING OF ELECTROMAGNETIC MISSILE LAUNCHER

In this project we are developing the Electromagnetic antinuclear launcher for missile launching and space shuttle launching, this works on principal of magnetizing and demagnetizing coil. There is a wide length tube and the object to be fired is placed in tube, coil are wounded .when supply is given, first coil get energized it try to attract an object and suddenly object get attracted towards it. After attraction the first coil De-energized and suddenly second coil is energized, Then the object get attracted towards that coil. This procedure of energizing and this running process the object will get a large force and energy, that the object is fired from the tube with the sound speed and to the decided direction. The speed of the object can be control by varying supply voltage by voltage regulator as shown in fig no 2.

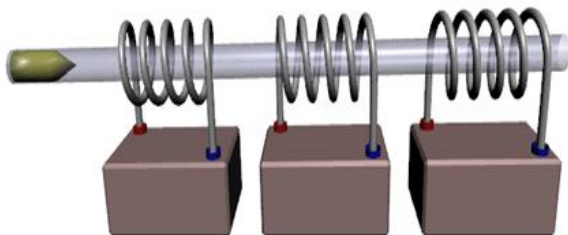


Fig 2 Working of electromagnetic missile

IV. SYSTEM COMPONENT

4.1 RF MODULES

1) An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices.

- 2) In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through Radio Frequency (RF) communication.
- 3) RF Modules typically incorporate a Printed circuit board, transmit or receive circuit, Antenna, and Serial interface for communication to the host processor.

Transmitter module
Receiver module

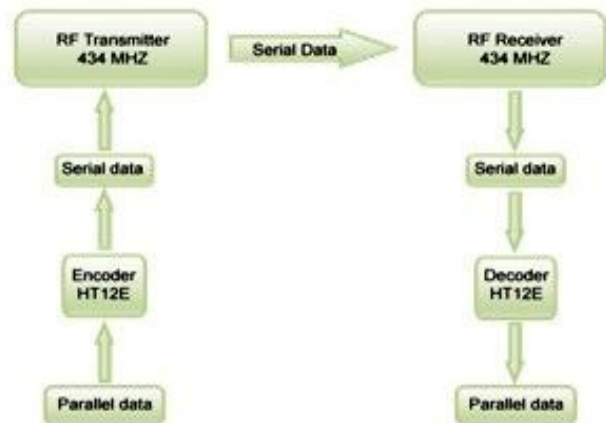


Fig.3 Block diagram of RF module

4.2 RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. In system single pole double double through relay are used for switching coil on-off.

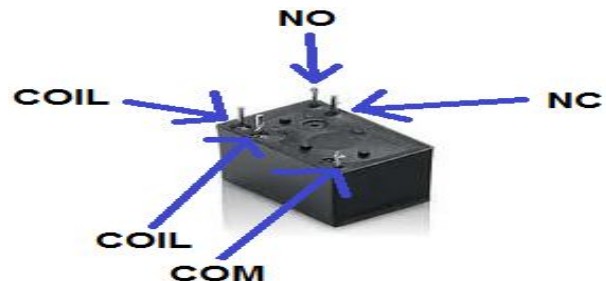


Fig.4 Terminals of relay

4.3 COIL AND BARREL

Electromagnetic antinuclear launchers generally consist of one or more coils arranged along a barrel, so the path of the accelerating projectile lies along the central axis of

the coils. The coils are switched on and off in a precisely timed sequence, causing the projectile to be accelerated quickly along the barrel via magnetic forces.

4.4 MICROCONTROLLER 89S51

The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In System Programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with In-System Programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a high flexible and cost-effective solution to many application control.

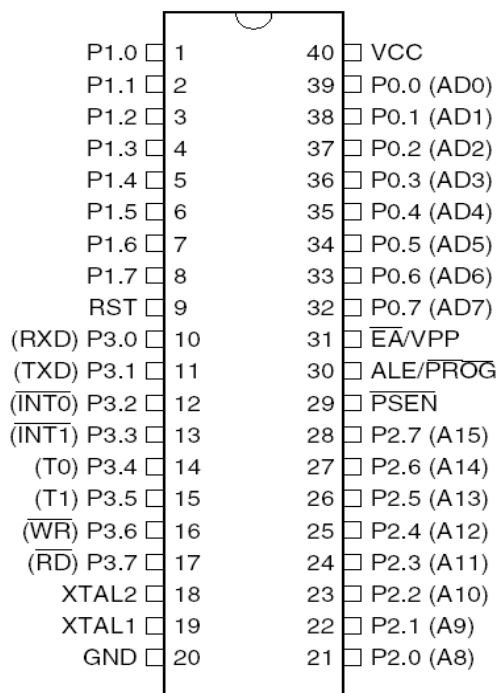


Fig.5 Pin diagram of Microcontroller 89s51

IV. ADVANTAGES

- 1) Weights less.
- 2) Occupies less space.
- 3) Requires less maintenance and manpower.
- 4) More reliable.
- 5) Recharges more quickly.
- 6) Uses less energy.
- 7) The EML could be more easily incorporated into a ramp.
- 8) EML can control the launch performance with greater precision.

- 9) The EML more efficient than the 5-percent efficiency of steam catapults.

V. CONCLUSION

In this project we are understanding the effect of electromagnetic & how to change the behaviour of magnet, if we increase and decrease the field and that's affect the speed. Increasing the conversion efficiency above 5%. This may be possible by implementing a new winding scheme and trying shorter coils. The coil gun is currently designed for a single type of nail and ferrite at certain voltage; it would need to be adjusted to take multiple nail sizes and operate at different voltages. The firing speed should be adjustable as well.

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