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Air Braking System Using Alternator

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Abstract: The aim of our project is to build and develop an air brake system using a magneto-alternator and is called as “AIR BRAKING SYSTEM USING AN ALTERNATOR”. This project is designed to reduce the load on the engine drive to run the air compressor, because in this design the compressor is powered by battery. Here we are using a magneto-alternator which is rotated by means of engine crank shaft. As the magneto alternator rotates it generates AC current. Then AC current is converted to dc current using rectifier. The obtained power from rectifier is used to charge the battery as well as to run the air compressor. Thus the compressed air from air compressor is used to apply brakes.

Keywords: Alternator, Air compressor, Pneumatic valve, Pneumatic cylinder etc

I. INTRODUCTION

In this project i.e. “Air braking system using alternator” we are using components like magneto-alternator, Rectifier, DC air compressor, Pneumatic cylinder, Pneumatic valve etc. Now a days for two wheeler only mechanical effort, disc brake are used commonly for applying brake so we are modifying the new brake system into an air braking system because air is freely in atmosphere, but in hydraulic brakes we have to maintain a constant pressure or any leakages is there then the braking problem occurs or if any air bubbles occur inside the pipe of hydraulic brake then it is also a problem so to overcome this problem we have introduced an air braking system for two wheelers. Air braking system are installed in heavy vehicles such as trucks, bus etc. We can modify the same project by exhaust gas that is absolutely waste in environment we can fix dynamo in front of exhaust pipe. A brake is an device that stops the motion from absorbing energy from rotating parts of system, it is used for stopping the vehicle wheel, brakes uses friction for stopping Brakes is usually applied for rotating axles and wheels, and may take to other forms such as surface of a motion of moving fluid, Some vehicles have the combination of braking mechanisms, such as racing cars which have both wheel brakes and parachute, or airplanes with wheel brakes and drag flaps which are raised into the air while landing. In alternator winding have been made and at the sides magnets are produced, so that if the copper winding rotate against the side of magnets a AC current is produced

Types of brakes

They are classified into shoe or pad brake

- 1) Frictional brakes
- 2) Hydraulic brake
- 3) Electromagnetic brakes

Air is compressed and used as a medium for application of brakes. In this project Air brake system is compared with hydraulic brake system and found that Air braking system is more effective and low maintains cost than Hydraulic brake system. The battery used in this project is 12v rechargeable Battery which is recharged by using magneto-alternator. The alternator first produces AC current(Alternating current) and the same AC current is transferred to Rectifier to convert AC current to DC current and it also regulates the voltage.

A. 3/2 Pneumatic valve



Fig 1:3/2 Pneumatic valve

1) This valve consists of 3ports

- a) Inlet
- b) Outlet
- c) Exhaust

2) And it has two positions

- a) Forward
- b) Backward

This pneumatic valve is manually operated as the valve is operated the compressed air from compressor reservoir enter into the pneumatic cylinder causing the piston to move forward, during retardation process the piston moves backward

B. Air Compressor



Fig 2: Air Compressor

The compressor used is mini air compressor of 140psi max pressure. It sucks the air from atmosphere compresses it and sends it to the pneumatic cylinder when the valve is operated, it is powered by 12v battery.

C. Double Acting Pneumatic Cylinder



Fig 3: Double acting pneumatic cylinder

It is a double acting cylinder which is connected to the brake link as the pneumatic value is actuated the air from compressor enters into the cylinder and tends to move the piston due to which extraction process takes place, as the value is operated in opposite direction the retardation process take

D. Rectifier

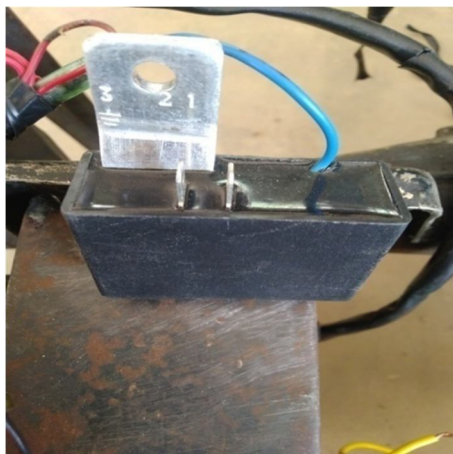


Fig 4. Rectifier

Rectifier is a device which regulates and converts the AC current into DC current, we are using a rectifier to convert the generated AC current into DC and regulate the volt to 12v to 14v, in this project the current is obtained from the magneto alternator it is transferred to rectifier which regulate and convert to DC, from rectifier it is connected to 12v battery which gets charged in running condition of vehicle. From battery the power is given to the compressor.

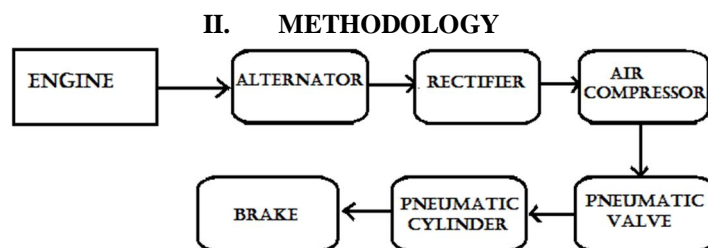


Fig 5. Process Flow Diagram of Air Braking System Using Alternator

A. We Have Used Components Like

- 1) AIR compressor
- 2) 12v battery
- 3) Pneumatic valve
- 4) Pneumatic cylinder
- 5) Two stroke engine
- 6) Pneumatic hoses
- 7) Rectifier
- 8) Magneto alternator

When the two stroke engine starts the magneto alternator due to the magneto alternator is connected to crank shaft. The magneto alternator rotates and generate AC current of about 50-60 A.C (Alternating current) voltage. Then the AC current generated by magneto alternator is passed to the rectifier. The rectifier converts AC current to DC current and regulates the voltage of about 12v-14v that we actually required to charge the battery otherwise we can directly send the DC current to run the air compressor. The DC air compressor sucks the air from the atmosphere and compresses the air in a special reservoir when the pneumatic valve is actuated the compress air from air compressor is passed to the double acting pneumatic cylinder due to which piston moves forward inside the pneumatic cylinder through which the brakes get applied. When the pneumatic valve is pushed backward the compressed air is pushed on the other side of double acting cylinder through which pneumatic piston goes back to the retardation position and extra pressure inside the cylinder is released through exhaust valve thus the brakes get disengage by which the vehicle can move free forward.

B. In Pneumatic Valve There Are 3 Ports That Is

- 1) Inlet,(for moving the piston forward to get the brake applied)
- 2) Outlet,(to get the brake disengage)
- 3) Exhaust ,(to release the air pressure created by DC compressor inside the pneumatic valve)



Fig 6.Final project photo "Air Braking System Using Alternator"

III. RESULTS

- A. By comparing hydraulic brake system with air brake system, hydraulic brake system takes 3 seconds to apply brake, where as in air brake system it takes 1 second when vehicle is under unloaded condition.
- B. An air compressor can take pressure upto 140psi(pounds per sq inch)
- C. An Alternator produces 35voltage of AC current
- D. Rectifier regulates the voltage from 12Volts to 14volts and converts to DC current.
- E. Alternator charges the 12v battery in 45miniutes under working condition.

IV. CONCLUSION

In this project we are using air for applying the brake by the use of air compressor. The air is compressed using compressor and use for activation pneumatic cylinder which is connected to brake the compressor is operated by using the battery power the battery is charge by using magneto alternator in this project a cost and maintenance of brake system is reduced compared to hydraulic brake system. This project is design the application of brake with affective and faster compared to hydraulic brake.

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