
RESEARCH PAPER ON AUTOMATIC CAR PARKING BRAKE SYSTEM USING HYDRAULIC BRAKE CIRCUIT IN ANY FOUR WHEELER.

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ABSTRACT

A parking brake is an important tool in any automotive parking system. The parking brake system is designed to use the basic hydraulic system or circuit present in the four wheeler itself. The mechanical hand brake system is quite difficult for the driver to use. However the present designed circuit operates on an additional use of a small 'ON-OFF' switch to apply parking brake to the vehicle or refuse the parking brake. It comprises of hydraulic master cylinder, high pressure parking, wheel cylinder, disc brake, solenoid valve and 'ON-OFF' switch.

Keywords: Hydraulic Brake, Master Cylinder, Disc Brake Assembly.

I. INTRODUCTION

In most passenger cars the mechanical brake is operated by hands or foot by which the brake is applied for parking and also for emergency brakes. These brakes either act on the rear wheel or are attached to transmission or to propeller shaft. The brake lever is mounted under the instrument panel to the left of the driver when the brake is applied the lever is locked in place by a ratchet for releasing the brake, different methods are used. The real wheel type parking brake, a cable or pull rod usually connects the parking lever to an ideal lever which is mounted on a cross member of frame. The two cable engaging the rear wheel brakes are also pulled when the system is applied. A parking brake controls the rear brakes and is completely separate during from vehicle regular hydraulic brakes. Its function is to keep a parked vehicle stationary, it will prevent rolling down a hill or moving. The parking brake is part of the overall braking system originally this secondary braking mechanism is intended to stop a vehicle when the main brake system fails but today it is primarily used to keep a vehicle in place. When parked especially on a steep inclines or declines.

II. SCOPE

The breaking of an automobile vehicle is a very crucial safety part so the responses from the brake pedal to the final braking must be very quick which was a failure of a mechanical type braking system and is very well achieved by the hydraulic braking system which provides quick braking. When the car is stopped or parked at an inclined or declined road and when the brakes are applied sometimes the car moves downwards. To reduce this types of accidents this mechanism is applied for safe parking of the car at an inclined or declined road. Frictional wear and tear in case of mechanical braking system was very high due to the involvement of many moving parts, which is very well reduced to the optimum level with the introduction of the hydraulic braking system which has very less moving parts as compared to the mechanical brake system. The brake force generated by the hydraulic braking system is very high as compared to the mechanical braking which is a very important factor for today's super and hyper series of vehicles.

III. LITERATURE REVIEW

Heavy goods vehicles exhibit poor braking performance in emergency situations when compared to other vehicles. Part of the problem is caused by sluggish hydraulic brake actuators, which limit the control bandwidth of their antilock braking systems. In addition, heuristic control algorithms are used that do not achieve the maximum braking force throughout the stop. In this article, a hydraulic braking system is introduced for hydraulic braked heavy goods vehicles. The conventional brake actuators are improved by placing high-bandwidth, binary-actuated valves directly on the brake chambers. Compared to the mechanical braking which is a very important factor for today's super and hyper series of vehicles.

IV. WORKING

This system is designed to operate the parking brake system using the basic components used in a hydraulic brake circuit of any car or four wheeler few component such as Non Return Valve (NRV), Solenoid valve 12 volt DC operated are provided in addition to the toggle switch and 12 volt battery. The schematic diagram shows the basic layout of the system made .Now, when the brake pedal is operated the hydraulic cylinder generated pressure on the oil there by the pressurized oil goes to the disc brake assembly on the vehicle via a spring operated Non Return Valve (NRV). This is the pressure line which operates the disc brake pads there by stopping the rotary motion of the disc. (Disc is to be rotated manually during applying the brake pedal). The disc assembly gets lock in this way which is responsible for applying of parking brake for the vehicle. The disc is the brake circuit can be kept lock in order to prevent rotary motion using this system. Now when the vehicle is started and to be moved from one place to another the toggle switch is to be made ON which operates the solenoid switch and allow the flow of high-pressure brake fluid to return it to master cylinder. Thus the vehicle can easily move from one place to another after release of parking brake.

V. MODELLING AND ANALYSIS

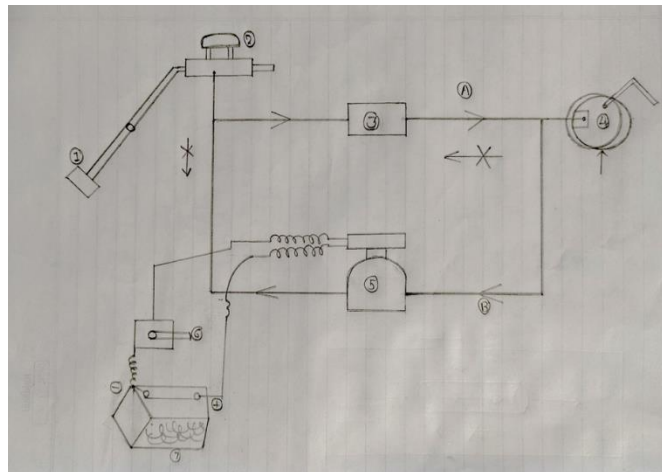


Figure 1: Schematic layout



Figure 2 : Actual Model

Table 1: Raw Material and their Cost

SR NO	PART NAME	MATERIAL	QTY	COST
1	Main Frame Fabrication out of 35x5mm Angle size 560x700x600mm(HD) Weight 28(kg)	Mild Steel	1	3800/-
2	Maruti 800 front hop with Disc brake assembly	STD	1	3500/-
3	Master Cylinder of Maruti car with Booster Cylinder	STD	1	1500/-
4	Solenoid Valve D.C. operated	STD	1	1400/-
5	Non Return Valve (NRV)	STD	1	750/-
6	Battery 7AMP 12V DC	STD	1	2100/-
7	Toggle Switch	STD	1	400/-
8	Hydraulic Connections in 1/4 th	STD	8	500/-
9	Hydraulic Piping Junction	STD	1	500/-
10	Block	STD	1	250/-
11	Coloring Expenses	-	1	600/-
12	Welding Rod Packet	STD	1	420/-
13	Cutting Wheels	STD	10	480/-
14	Grinding Wheels	STD	1	100/-
15	Brake Oil 200ml	STD	1	320/-
16	Nut bolts	STD	1	200/-
17	Teflon Tape	-	2	80/-
14	Miscellaneous Expenses Rent of Welding, Grinding, Drilling	-	-	1100/-
	TOTAL	-	-	18000/-

VI. RESULTS AND DISCUSSION

This system is built to be compact and efficient to apply the brakes of the vehicle at an inclined or declined road. The model was tested to check whether the car is parked at steady position at inclined or declined road. The test result shown that the model is capable of performing according to the design specification. It is very simple and cheap to increment this system in the vehicle. It is found that the brake system is capable to park the vehicle at steady position. This system is able to provide more safety during parking the car at and inclined or declined road and also to the passengers. The master cylinder, brake paddle, disc brake assembly and also the other parts perform according to our expectations.

VII. CONCLUSION

This system is designed to facilitate quick and easy operation of Parking Brake by using hydraulic brake circuit in the vehicle. Also, this system works as an immobilizer tool for car. Behind the designing of this system, our main aim is to improve the technique of prevention of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc. The application of hydraulics produces smooth operation. By using more techniques, they can be modified and developed according to the by implementing this project, we can reduce cost of high-end cars by giving similar kind of safety. This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We have gained practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. Towards the end of completion of the project, we felt that the project has helped us to bridge the gates between institution and industrie

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