Research on Modular Development of Vehicle Air Braking System

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Abstract: **With the increase of the national railway mileage and the development of the railway transportation, the braking system of vehicle is developing rapidly. Fine and modular are the development directions at present, people focus on safety, light, easy maintenance and so on. The EP09 braking system is a research on modular development of vehicle air braking system.**

Keywords: Braking control unit; Metro vehicle; Easy maintenance

1. Introduction

At present, most of metro vehicles use air braking, the braking principle is transforming the electric signal into air signal to control the braking cylinder of vehicles, then the brake pads press the brake disc to realize the braking actions. The control units of air braking are composed of braking control unit BCU and electric control unit ECU. EP09 braking control system is a new structure of BCU.

The traditional railway vehicles, locomotives and other low speed vehicles are using 101 or 120 valves and other traditional systems, the components in those systems are mostly cast in iron, high weight, large volume, delayed response time and other issues should be taken into consideration. With the development of science and technology and the increase of vehicle speed, it is necessary to improve the traditional braking system to meet the market requirements.

2. Description of Structure and Operating Principle

Pneumatic sketch of control system is shown on Figure 1. It includes main adjustment valve assembly, remote control valve, ABS anti slide control valve, combined control valve and other valves, but also includes the air spring pressure sensor, parking pressure sensor, spare pressure sensor, etc.

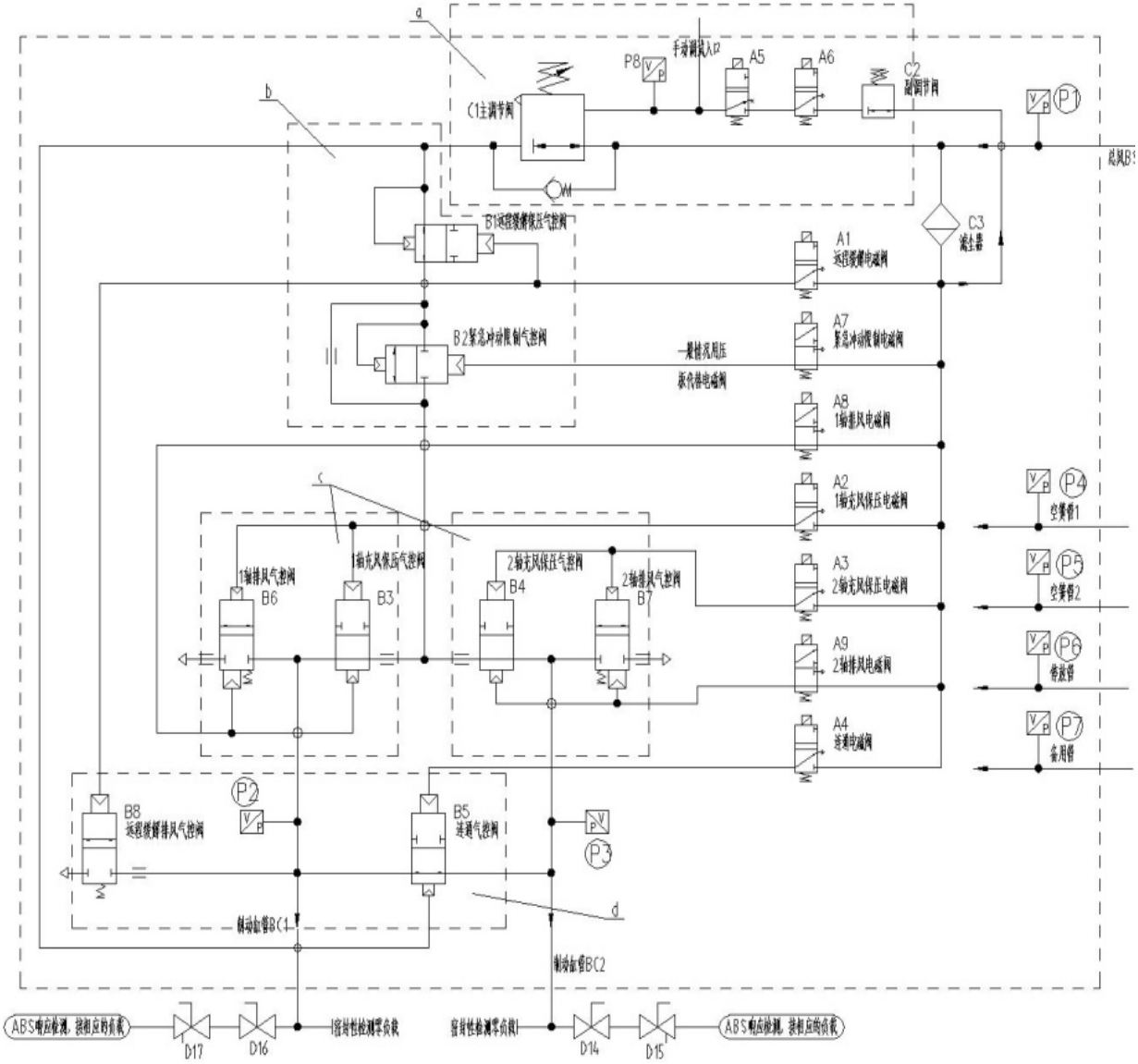

Figure 1. Pneumatic sketch

Main adjustment valve assembly. It can adjust the braking pressure of the total pneumatic pipelines, it can also limit the minimum braking pressure. To meet the load variation progress during service, the deputy valve receives pressure from the air spring and adjusts the control hole of main adjustment valve according to the actual weight of vehicles.

Remote control valve. It can be a main pressure control or a closure control of the downstream ABS anti slide control valve. AS the limitation control of vehicle pressure keeping brake and emergency brake.

ABS anti slide control valve. It can control the pressure of braking cylinder rapidly to realize the anti slide brake of vehicles. There are two valves in a system, respectively, to control the axle 1 and axle 2. This valve is the key progress to anti slide braking control, comparing to the traditional diaphragm structure, the piston structure can meet the relevant requirements of response time and life.

Combined control valve. The valve is the outlet of pressure of the system, it can achieve the pressure delivery between axle 1 and axle 2, to meet the exhaust brake and ease of vehicles.

3. Research and Development Process

The vehicle braking system consists of load sensing system, brake pressure adjustment system, cab remote control system, ABS anti slide system, parking brake

system. In original whole vehicle system, each products are separately installed in their executive positions. All of the systems should be integrated into a control box to meet the requirements of easy inspection and maintenance, it can also optimize the response time of whole vehicle system.

Electronic technologies and electromagnetic technologies are more and more widely used in the word thanks to their advantages. EP09 braking system has more executive units using electromagnetic control than traditional system. The system can collect the pressure from air supply and the braking axle so as to get better feedback and control.

4. Conclusion

EP09 braking system is composed of above 5 valves that realizes the modular development of braking system. The inter structure of those products are fully new designed. It has the advantages of easy production and maintenance, compact appearance.

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