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Should the Brake Power on Freight Cars be Increased.

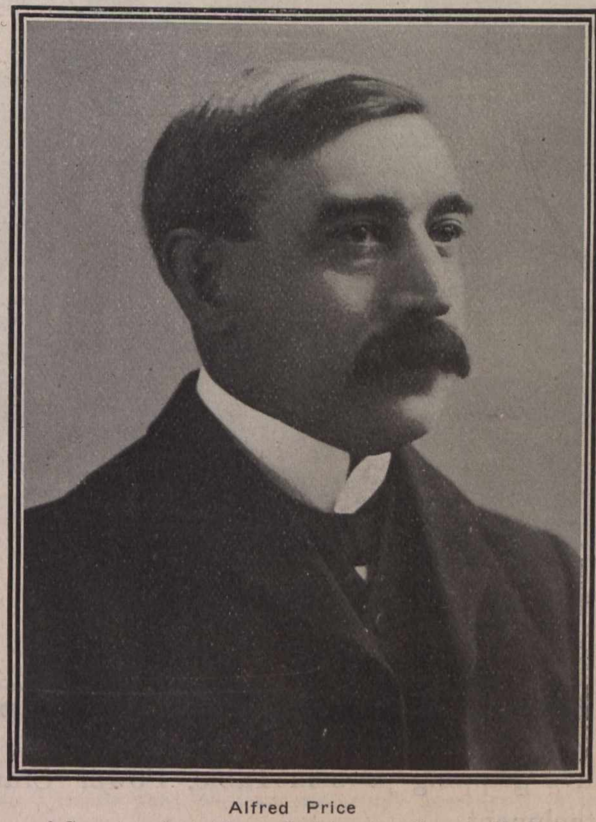
By T. Clegg, Assistant Air-Brake Instructor C. P. R., Winnipeg.

Ever since air brakes came into general use on railways, the average well-informed air brakeman has ever had before him the question, "What is the proper percentage of brake power for a freight car." This question is not so easily answered as may at first appear, for, if we enquire deeply into the subject we find there are many things to consider before we can arrive at a decisive answer and then the answer is not always unanimous.

During the past few years there have been tests made of practically everything that could be tested in regard to braking power for railway rolling stock, yet we find on most railways a braking power on the average freight car that falls below that efficiency which the service demands. This is not the fault of the air brake apparatus, for this has been brought to such a state of efficiency that, if properly maintained, it would seem almost impossible to improve it, but it is in the distribution of the power this brake is capable of developing, that the most serious inefficiency occurs. It is a remarkable fact that we do not stop the average freight train in any less distance today than we did 20 years ago. That the brake power on the average freight car today is too low cannot very well be disputed but we have got so accustomed to it that we manage to get along fairly well, but if it can be improved, even in a small degree, we need every bit of it.

Very often the engineer's mode of procedure in stopping a long loaded freight train is to shut off steam a considerable distance from the expected stopping place and let the momentum of the train decrease to some extent, then make practically a full set service brake and wait for the eventual stopping of the train, which may or may not be at the intended place, this depending on conditions and the judgment he has used in making the stop, and after making this application the engineer is left without any margin of brake power, therefore it is very apparent that if a freight train of 2,000 tons is travelling 30 miles an hour it will take considerable time and distance to bring it to a successful service stop, and we cannot regard this as an ideal method of stopping the train. It is possible to improve these conditions to some extent, and it is the purpose of this paper to provide some data in regard to freight car brakes, and to show to some extent what use we are making of our air brakes, and what use it is possible to make of them.

The average freight car is braked to 70% of its light weight, based on the emergency application of the brakes with a train-pipe pressure of 70 lbs. per sq. in. and a brake piston travel of 8 ins. There has been a tendency recently on some roads to increase this brake power to some extent and this is most assuredly a step in the right direction. There is no doubt it is a mistake to base the brake power on the emergency application, because emergency applications are only properly made in a case of absolute necessity to prevent as far as possible, damage to life and property by stopping as quickly as possible a moving train. Ordinarily the brake is used in service applications and for that reason alone the correct base of the brake power should be the full set service brake. On cars that are based on the 70% in emergency plan the brake power falls below what is the general supposition. In actual practice it means as a rule that the brake power is not 50% when the brake is set in full service on a light car, because of the many losses that occur between the pressure per square inch in the brake cylinder and the pressure of the brake shoe on the wheel and often we find if a car is loaded to its capacity that the brake power with a full set service brake falls below 10%, which fact in itself is sufficient to justify some enquiry into the problem with the object in view of increasing the brake power if at all possible. In order to show the theoretical and actual brake power on freight cars, the table on the next page has been arranged, which though not elaborate, will help to show approximately the relation that exists between the different brake power bases and the striking difference between the theoretical and actual brake power with various applications.



Alfred Price
General Superintendent Alberta Division Canadian Pacific Railway.

Having now shown approximately, the theoretical and actual brake power, I will proceed to find the cause of the difference. Elaborate tests made by W. H. Marshall, M.E., and issued by the Westinghouse Air Brake Co., in bulletin 6015, show that the friction of the brake piston packing-leather causes a loss of 9.5% of the total cylinder value when that cylinder contains a pressure of 40 lbs. per sq. in., also that the brake piston release spring causes a loss of 8% of the cylinder valve when the piston travel is 8 inches. This seems that 17.5 of the cylinder value is lost right in the brake cylinder, which on the car we are considering, would mean a total loss of 12.5 of the total brake power, which basis of loss has been used in compiling the table. The effect of this in road service is as follows: Suppose we have a train of 50 loaded cars and we make a full service application of the brakes to stop the train, what is the percentage of brake power? This application would brake the cars to (theoretically) 58.3% of their light weight. The load will reduce the percentage to 21.5, subtract from that the 12.5% lost by reason of cylinder value and behold the brake power is only 9%.

If this train was braked on the 80% in service plan the braking power would be 17% under the same application. We must now take into consideration other losses that may further reduce the above 9%. These losses might be insufficient train-pipe and auxiliary reservoir pressure, leaky brake cylinders or piston packing leather, excessive piston travel, too light reductions in making applications on long trains, friction of foundation gear, occasional brakes cut out, and so on, all of which, if present, will do their share to diminish the actual brake power.

Suppose the train consist of light cars then under the 70% in emergency plan the brake power would be about 45.8, and under the 80% in service plan, the brake power would be about 67.5% not taking into consideration the minor losses. This will show that if we braked the 80% in full service plan, we appear to be well within the limits for the reasonable prevention of slid flat