

## **CIRCULAR NO. 38-2-5**

### **ALTERNATIVE PARKING AND EMERGENCY BRAKE CALCULATION PROCEDURES**

#### **INTRODUCTION**

1. The procedures for parking brake calculations originally specified in form CB38 Annex C utilized dynamic foundation brake torque and the maximum foundation brake stroke, measured at 1.0E. These procedures were developed for maximum convenience and still provide a conservative estimate of park brake performance.
2. Recognizing that some trailer manufacturers may be disadvantaged by these approximate procedures, manufacturers are now allowed to calculate park brake performance using static brake torque and/or actual brake stroke, provided that foundation brake manufacturers furnish such data on form VSB 72 Annex E (approved data sheet). When such additional data appears on VSB 72 Annex E, then it must be used to calculate park brake and emergency brake performance. If static torque is not provided then dynamic torque is to be used. If the relationship between signal and stroke is not provided then the stroke at 1.0E is to be used, as in the past.
3. This Circular explains the procedures to be used when measuring static torque and when calculating parking and emergency brake performance using the relationship between foundation brake stroke and control signal.

#### **STATIC TORQUE MEASUREMENT**

4. The foundation brake manufacturer may optionally add the static torque at 1.0E to the foundation brake approved data sheet (VSB72 Annex E), clearly indicating that this torque is to be used for parking brake calculations only and referring to Circular 38-2-5 for details on its use.
5. ADR38 does not specify any procedures for measuring static torque. There are a number of acceptable methods but before any test results are submitted the test procedure to be used must be approved by the AMVCB. Applications should be addressed to:

The Chairman  
AMVCB  
PO Box 293  
CIVIC SQUARE  
ACT 2608

6. The application should be supported by complete details of the testing procedures, the test equipment and its calibration procedures, and the reporting procedure. Static

torque should be reported at five points approximately equally spaced over the range 0.2E to 1.0E. A value at 1.0E must be stated. Where a test was not conducted at 1.0E the static torque from a test conducted at 0.8E or greater may be increased pro rata to derive the static torque at 1.0E.

7. When the testing procedure has been approved a test approval number will be issued. This approval number must be quoted on all static torque test reports submitted. The approval number is only valid for testing carried out in accordance with the approved procedure using the approved, calibrated test equipment.

#### **PLOTTING CONTROL SIGNAL AGAINST STROKE**

8. The foundation brake manufacturer may optionally add to the foundation brake approved data sheet (VSB 72 Annex E) a graph of control signal against stroke. The values used on this graph must be those quoted in the appropriate CB38 Annex 1 or those obtained from an approved static torque test. The graph must be arranged with stroke (in mm) along the horizontal axis and control signal (in E) along the vertical axis. Each axis must be clearly and linearly graduated. The graph must be clearly labelled "Control signal against foundation brake stroke". A note must also be added "Refer to Circular 38-2-5 before using this graph."

#### **PERFORMING PARKING AND EMERGENCY BRAKE CALCULATIONS**

9. Static torque may be used for parking brake calculations if quoted on the foundation brake data sheet. Otherwise dynamic torque is used. In either case the torque must be corrected for any changes in brake actuator (booster) or actuator arm (slack adjuster) as detailed in Circular 38-1-1.
10. The value of the input to the parking or emergency brake (A) is obtained from the control system data sheet. Where the value of A is dependent on stroke (e.g. spring brakes) the value of A used must be corrected for the foundation brake stroke. The stroke used for this must be the actual stroke which would occur in practice if a graph of control signal against stroke is provided on the foundation brake data sheet. Otherwise the maximum stroke at 1.0E is used.
11. This actual stroke can be obtained by plotting the value of A at various strokes onto the graph of control signal against foundation brake stroke. The point where the two plots cross will give the actual stroke which can be used to determine the corresponding value of A (control signal) to be used.
12. Where the brake actuator (booster) effective area shown on the control system data sheet for the input to the parking/emergency brakes is different from the brake actuator effective area shown on the foundation brake data sheet, the values of A at each stroke must be corrected as shown below before plotting.

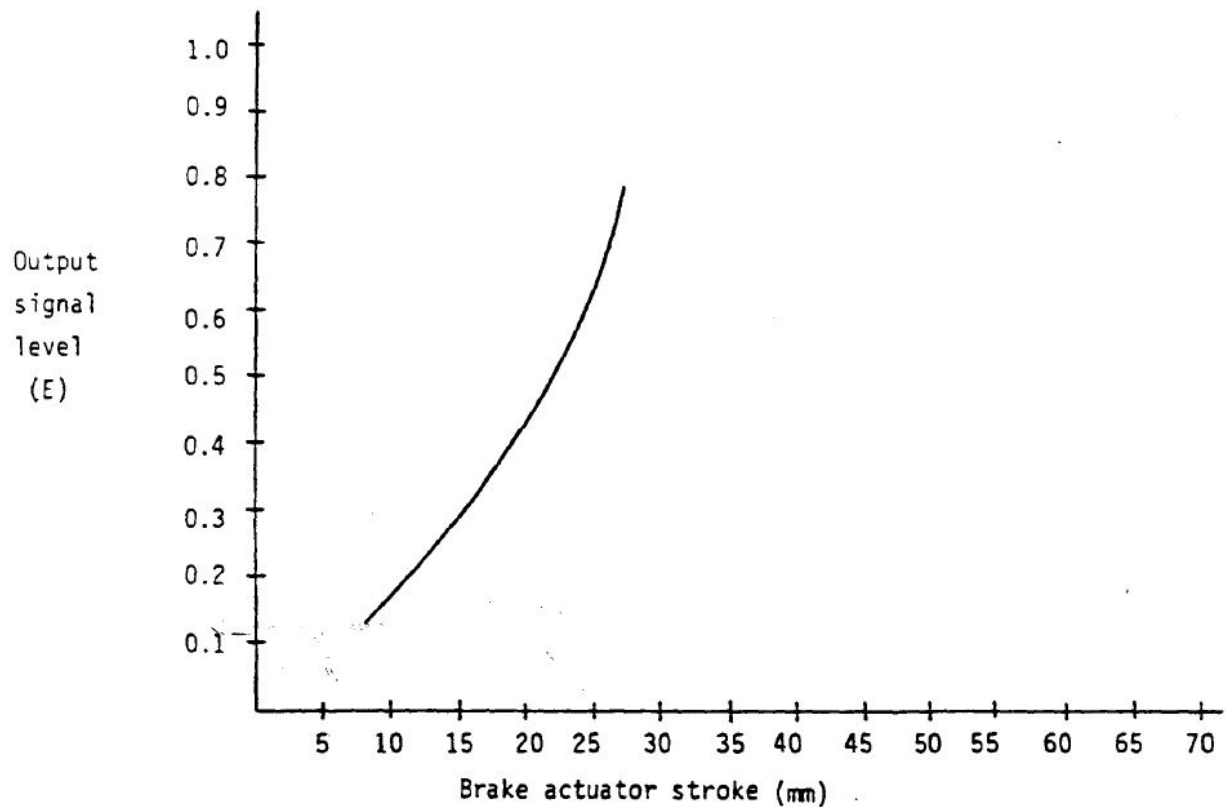
13. For example:

The control system data sheet shows the input to the parking brakes (A) as:

0.32 - 0.004xS for 155 cm<sup>2</sup>.

The brake actuator shown on the foundation brake data sheet has an effective area of 129 cm<sup>2</sup>.

The foundation brake data shows a graph of control signal against stroke thus:



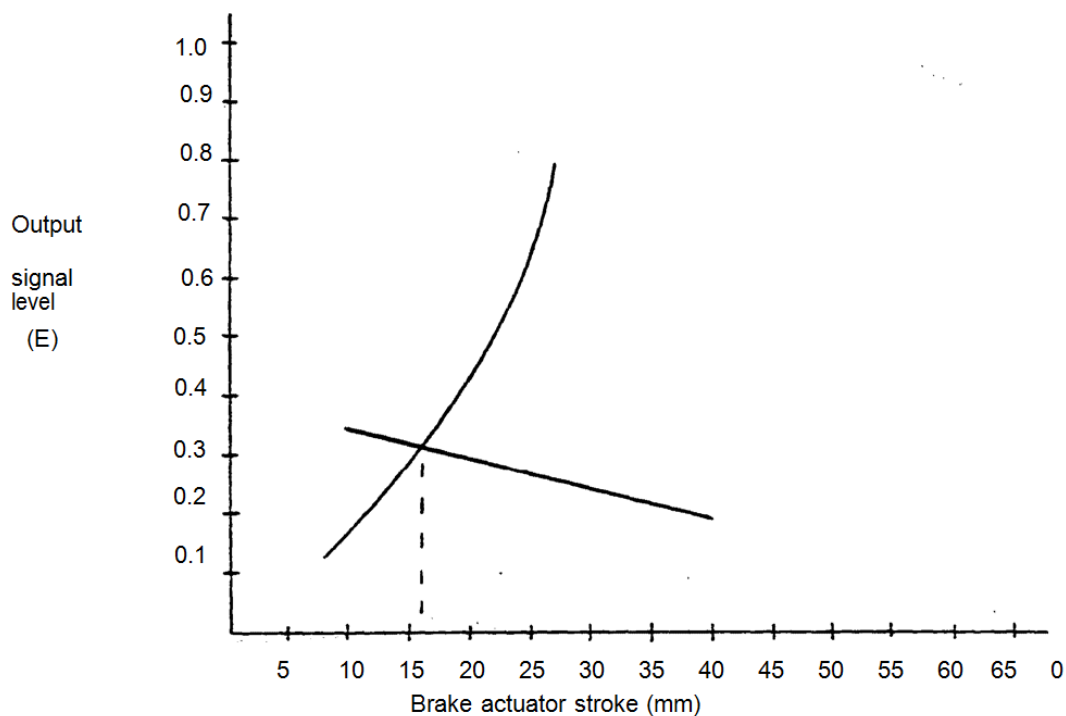
14. The values of A at various strokes can be calculated and then corrected for the change in effective area using:

$$A_{corr} = A \text{ (at stroke S)} \times \frac{\text{area in control system data}}{\text{area in foundation brake data}}$$

The values of A for various strokes will be:

Stroke	(mm)	10	20	30	40
A	(E)	.28	.24	.20	.16
A corrected	(E)	.34	.29	.24	.19

The corrected control signals are then plotted onto the graph in the foundation brake data sheet thus:



15. The point at which these two plots cross is the actual stroke (16 mm). This stroke is now used in the original expression for input to parking brakes (A) which, for a stroke of 16mm gives a value for A of

$$A = 0.32 - 0.004 \times 16 = 0.256E \text{ for } 155\text{cm}^2$$

16. If the brake actuator area used on the trailer is different from that stated in the control system approved data then this value of A must be further corrected in the usual way as detailed in Circular 38-1-1.
17. Where the actual stroke has been used to determine the value of A. the calculation must be endorsed "An actual stroke of ...mm used". A copy of the plotted graph must be forwarded as an attachment to the CB38 Annex C.
18. Whenever static torque is used for parking brake performance it will not be possible to carry over results from the emergency brake system calculation.