SOCIETY OF AUTOMOTIVE ENGINEERS, INC. • TWO PENNSYLVANIA PLAZA • NEW YORK, NEW YORK 10001

LAND SEA AIR SPACE

TECHNICAL REPORT J225

BRAKE SYSTEM TORQUE BALANCE TEST CODE — COMMERCIAL VEHICLES — SAE J225

SAE Recommended Practice

Report of Brake Committee and Automotive Safety Committee approved January 1971.

1. Purpose—This code provides a method to determine the brake system torque balance (brake system effectiveness) for commercial vehicles.

2. Scope—The code provides the test procedure and instructions for:

2.1 Instrumentation and equipment.

2.2 Vehicle preparation.

2.3 Calculation of torque balance.

2.4 Test of single unit and combination vehicles.

3. Instrumentation and Equipment

3.1 Each test vehicle must be equipped with:

3.1.1 A decelerometer.

3.1.2 A fifth wheel speed indicator or calibrated speedometer or tachometer.

3.1.3 A calibrated line pressure gage.

3.1.4 A stopwatch.

3.1.5 Shutoff valves to permit cutoff of front or rear brakes for truck tests and cutoff of tractor brakes for combination vehicle tests. (Shutoff valve use should not permit bypassing of any system proportioning valve features.)

3.2 Test should be conducted on a dry, substantially level roadway (not to exceed a ±1% grade).

4. Vehicle Information and Data

4.1 Vehicle Information Sheet (Fig. 1) to be filled in prior to starting test.

4.2 Data Sheet—Brake Balance Test (Fig. 2) to be filled out and used during conduct of the test and for calculating brake balance.

5. Vehicle Condition

5.1 Brakes to be adjusted to manufacturer's specifications.

5.2 Although balance may be determined under any condition of loading, testing will generally be facilitated when test vehicles are loaded close to the manufacturer's rated gvw with load distributed so that the load on each axle is proportionate to its rated capacity.

5.3 While balance may be determined for any lining condition (new, controlled burnish or in-service), a controlled burnish of new or unburnished production linings with vehicle loaded to manufacturer's rated gvw is recommended. This may be done by using any published SAE procedure or as follows:

5.3.1 Burnish—Make 200 brake applications, not less than 50 in a series, from 40 to 20 mph, at 10 fpsps. All applications are to be made in highest gear range. Application interval to be 1.5 miles. Accelerate to 40 mph at moderate acceleration after each snub, and drive 40 mph between snubs.

5.4 **Temperature Conditioning**—The first test of any day should be preceded by a series of 10 snubs from 40 mph to 20 mph at 12 fpsps at 2 mile intervals.

6. Brake Balance Test

6.1 Single Unit Vehicle

6.1.1 TEST PROCEDURES

6.1.1.1 Fill out the vehicle information portion of the Data Sheet—Brake Balance Test (Fig. 2).

VEHICLE INFORMATION SHEET

TEST NO. _____

TEST FACILITY AND LOCATION _____

VEHICLE MAKE AND MODEL _____

WEIGHT DISTRIBUTION: FRONT AXLE _____ REAR AXLE(S) _____ TOTAL _____

TRAILER AXLE(S) _____

GROSS TOTAL _____

SPECIAL CONDITIONS WHICH MIGHT AFFECT BRAKE PERFORMANCE _____

ARE BACKING PLATES OR DUSTSHIELDS INSTALLED? FRONT _____ REAR _____ TRAILER _____

TIRE SIZE: FRONT _____ MEASURED STATIC ROLLING RADIUS FRONT _____

REAR _____ REAR _____

TRAILER _____ TRAILER _____

TYPE OF WHEELS: FRONT _____ REAR _____ TRAILER _____

(CAST STEEL SPOKE, STEEL DISC, ALUMINUM DISC, ETC.)

TYPE OF RIM: FRONT _____ REAR _____ TRAILER _____

(FLAT BASE, DROP CENTER, ETC.)

BRAKE DRUM:	WEIGHT	TYPE	MAKE	PART NO.
FRONT				
REAR-FORWARD				
REAR-REAR				
TRAILER				

BRAKES:	SIZE	MAKE	TYPE	LINING	ASSY. NO.
FRONT					
REAR-FORWARD					
REAR-REAR					
TRAILER					

ACTUATION DETAILS: (FILL OUT PER HEADINGS FOR EITHER HYDRAULIC OR AIR BRAKES.)

	IF HYD. VACUUM BOOSTER OR AIR CHAMBER TYPE & SIZE	PEDAL RATIO AND USABLE TRAVEL	MASTER CYL DIA AND STROKE	WHEEL CYL DIA(S)
IF AIR	AIR CHAMBER TYPE & SIZE	SLACK ADJ. LENGTH OR WEDGE ANGLE	CAM RADIUS	CAM ROTATION (WITH OR OPP. DRUM)
FRONT				
REAR-FORWARD				
REAR-REAR				
TRAILER				

ADJUSTMENT (AUTOMATIC) (MANUAL)	FRONT	REAR-FORWARD	REAR-REAR	TRAILER

FIG. 1—VEHICLE INFORMATION SHEET

BRAKE BALANCE TEST

VEHICLE (CIRCLE ONE): TRUCK TRACTOR-TRAILER

TRUCK OR TRACTOR

MAKE _____

MODEL _____

TRAILER

MAKE _____

MODEL _____

VEHICLE	AXLE	WEIGHT, LB VEHICLE RATING	WEIGHT, LB TEST WEIGHT
TRUCK OR TRACTOR	FRONT		
	REAR(S)		
	TOTAL		
TRAILER	AXLE(S)		

TEST DATA

1. TEMPERATURE CONDITIONING REMARKS: _____

2. ALL BRAKES (20 TO 10 MPH AT 9-1/2 FPSPS 1/4 MILE INTERVALS BETWEEN SNUBS)

	LINE PRESSURE	DECELERATION
SNUB #1	_____ PSI	_____ FPSPS
SNUB #2	_____ PSI	_____ FPSPS
SNUB #3	_____ PSI	_____ FPSPS
AVERAGE LINE PRESSURE	_____ PSI	
AVERAGE DECELERATION		_____ FPSPS

3. FRONT BRAKES (TRUCK) OR ALL TRACTOR BRAKES (20 TO 10 MPH AT AVERAGE LINE PRESSURE OBTAINED UNDER ITEM 2, 1/4 MILE INTERVALS BETWEEN SNUBS)

SNUB #1 _____ FPSPS

SNUB #2 _____ FPSPS

SNUB #3 _____ FPSPS

AVERAGE _____ FPSPS

4. REAR BRAKES (TRUCK) OR ALL TRAILER BRAKES (RUN SAME AS ITEM 3)

SNUB #1 _____ FPSPS

SNUB #2 _____ FPSPS

SNUB #3 _____ FPSPS

AVERAGE _____ FPSPS

5. DRIFT TIME MEASUREMENT (TWO REQUIRED: 20 TO 10 MPH IN DIRECTION(S) DECELERATION DATA WAS OBTAINED)

_____ SEC (T_1)

_____ SEC (T_2)

AVERAGE (T_{avg}) _____ SEC

DRIFT DECELERATION = $\frac{14.67}{T_{avg}}$ = _____ FPSPS

6. BRAKING PERCENTAGE (NUMERALS INDICATE AVERAGE DECELERATION VALUES FROM CORRESPONDING ENTRIES ABOVE.)

TRUCK FRONT AXLE OR TRACTOR $\frac{(3-5)}{(2-5)} \times 100$ OR $\frac{(2-4)}{(2-5)} \times 100$ = _____ %

TRUCK REAR AXLE OR TRAILER $\frac{(4-5)}{(2-5)} \times 100$ OR $\frac{(2-3)}{(2-5)} \times 100$ = _____ %

FIG. 2—DATA SHEET—BRAKE BALANCE TEST