

Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE

NEW YORK, N. Y. 10017

September 14, 1970

ATTACHMENT "A"

Docket Section
National Highway Safety Bureau
Room 4223
400 Seventh Street S.W.
Washington, D.C. 20591

Subject: Docket No. 70-17. Notice #1
Air Brake Systems; Trucks and Buses

The Friction Materials Standards Institute, Incorporated submits the following comments to the subject docket:

The scope of this Proposed Motor Vehicle Safety Standard is broad and requires such significant changes from current air brake systems, that time did not permit specific tests to be run to the proposed procedures. It has not been possible to evaluate the proposed requirements from existing data, therefore an extension to January 1, 1971 is requested for compiling supporting data. This supporting data will be a prerequisite to meaningful comments on costs and lead time required to comply with this proposal.

There are questions regarding interpretation of the proposal and comments which can be made at this time based on experience and available data.

Is it the intent of this proposal to apply only to new vehicles manufactured after the effective date?

The proposal refers to "each brake and drum assembly" being placed on an inertia dynamometer. Is the intent to dynamometer test all brakes from the vehicle or only one of each brake that may differ in size or components? Will this require a double ended dynamometer?

- S4.2.1 Stopping Distance. The stopping distances specified require unrealistically high average deceleration rates, up to 17.9 fpsps at 60 MPH. To achieve these stopping distances it will be necessary to attain deceleration rates as high as 24 fpsps for sustained periods. These are not possible with current brakes systems. Again additional time will be required for study and solutions.
- S4.2.2 Stopping distances specified with partial failure are at substantially 75% of full brake system. If a split air system is acceptable (S4.1.3) we assume a 50-50 split and would expect stopping distances to reflect the same percentage. A clarification as to what constitutes a split service brake system is requested.
- S4.2.5 Brake Retardation Force. To meet the proposed requirements will necessitate a significant increase in brake torque over those in current use. This torque increase can be

FMSI 00131

obtained by brake design, higher coefficient of friction lining or both. However, development of such friction material will require more time than permitted by the effective date of January 1, 1972.

- S4.5.1 Should be S4.2.5.1. Also reference to S5.2.5 for burnish should be S5.2.6.
Clarification is needed on the torque value to be used in this calculation. Torque output during a given stop may vary as much as 25% from minimum to maximum.
- S4.2.6 Brake Power. We are not in full agreement with this requirement as it overlooks a basic function of brake fade which warns the driver and also protects the braking system from destructive temperatures. These requirements can not be fully evaluated from the standpoint of ultimate brake temperature as current brakes will not meet these unrealistic fade requirements.
- S4.2.6.2 We would prefer to have specific data before making final comment, but it is our opinion that a 14 fpsps deceleration requirement is unrealistic within one minute following any test which results in destructive brake temperatures.
- S4.2.7 Brake Recovery - we recommend ten stops at two minute intervals to promote better cooling and a more meaningful recovery check. One minute intervals generally result in a stabilized drum and lining temperature.
- S5.1.8 It is suggested that a revised vehicle burnish procedure be considered for purposes of greater consistency for correlation and repeatability of these tests. 200 brake applications from 40 to 20 mph at 10 fpsps maintaining lining temperatures between 315°F and 385°F. Make 200 additional applications 40 to 20 mph at 10 fpsps maintaining lining temperatures between 400°F and 500°F. This will necessitate installation of plug type thermocouples as specified in SAE J843a.
- S5.2.1 A tolerance should be established for equivalent wheel load as the inertia weights on dynamometers vary and it is seldom possible to achieve the exact equivalent in inertia loading. Additional time will be required to determine what tolerances would be reasonable. We also believe that the dynamometer loading ought to reflect various friction losses in a vehicle not encountered on the dynamometer. Time, again, would be required to determine a realistic value. Current passenger car studies indicate this is .86. We believe the correction factor for trucks should be greater.
- S5.2.2 On ambient temperature, we recommend a range of 60°F to 95°F.
- S5.2.3 We would suggest that this be changed to "air at ambient temperature be directed to the drum at the rate of 2200 feet per minute". Due to variations in the shape of the air

September 14, 1970

chamber which surrounds the drum it is impossible to comply with the "uniformly and continuously" conditions.

S5.2.4 The lining temperature is measured by a plug type thermocouple installed according to SAE J843a. The drum temperature is measured by a thermocouple installed per SAE J667.

In summarizing, our immediate concern is an extension of the date for filing supporting data on these comments to January 1, 1971. It will be necessary to run tests in accordance with the proposed procedure before the full significance of this safety standard can be evaluated as to cost and particularly lead time.

Respectfully submitted,

S. S. Conway, Jr.
President

SSC/Clt

Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE
NEW YORK, N. Y. 10017

September 14, 1970

ATTACHMENT "B"

Docket Section
National Highway Safety Bureau
Room 4223
400 Seventh Street, S. W.
Washington, D. C. 20591

Subject: Docket No. 70-16; Notice #1
Air Brake Systems On Trailers

The Friction Materials Standards Institute, Incorporated submits the following comments to the subject docket:

The scope of this Proposed Motor Vehicle Safety Standard is broad and requires such significant changes from current air brake systems, that time did not permit specific tests to be run to the proposed procedures. It has not been possible to evaluate the proposed requirements from existing data, therefore an extension to January 1, 1971 is requested for compiling supporting data. This supporting data will be a prerequisite to meaningful comments on costs and lead time required to comply with this proposal.

There are questions regarding interpretation of the proposal and comments which can be made at this time based on experience and available data.

Is it the intent of this proposal to apply only to new vehicles manufactured after the effective date?

The proposal refers to "each brake and drum assembly" being placed on an inertia dynamometer. Is the intent to dynamometer test all brakes from the vehicle or only one of each brake that may differ in size or components?

- S3 "Curb Weight" definition is not applicable to trailers as stated.
- S4.2.1 Stopping capability, "Vehicle at curb weight" is subject to interpretation. Does this refer to trailer only or also include towing motor vehicle. If weight of towing motor vehicle is included what provision is made for stopping this additional weight?
- S4.2.4 Brake Retardation Force. To meet the proposed requirements will necessitate a significant increase in brake torque over brakes in current use. This torque increase can be obtained by brake design, higher coefficient of friction lining, or both. However, development of such friction material will require more time than permitted by the effective date of January 1, 1972.
- S4.2.4.1. Clarification is needed on the torque value to be used in this calculation. Torque output during a given stop may vary as much as 25% from minimum to maximum.

- S4.2.5. Brake Power. We are not in full agreement with this requirement as it overlooks basic functions of brake fade which warns the driver and protects the braking system from destructive temperatures. These requirements can not be fully evaluated from the standpoint of ultimate brake temperature as current brakes will not meet these unrealistic fade requirements.
- S4.2.5.2. We would prefer to have specific data before making final comment, but it is our opinion that a 14 fpsps deceleration requirement is unrealistic within one minute following any test which results in destructive brake temperatures.
- S4.2.6. Brake Recovery. We recommend ten stops at two minute intervals to promote better cooling and a more meaningful recovery check. One minute intervals generally result in a stabilized drum and lining temperature.
- S5.1.1. The term Gross Vehicle Weight Rating (GVWR) when applied to a trailer is subject to interpretation as written. If the GVWR includes the towing vehicle the Gross Axle Weight Rating (GAWR) of the trailer does not comply with GAWR definition in S3. If the vehicle is loaded to comply with GAWR definition, what provision is made for stopping additional weight of towing vehicle, to prevent penalizing the trailer brakes?
- S5.1.6. Conditions for burnishing trailer brakes are subject to clarifications requested in S5.1.1. It is suggested the following trailer brake burnish procedure be considered as solution to the clarification needed in S5.1.1.: 200 trailer brake applications 40 MPH to 20 MPH at 10 fpsps maintaining lining temperatures between 315° F and 385° F. Make 200 additional applications 40 MPH to 20 MPH at 10 fpsps maintaining lining temperature between 400° F and 500° F. This will necessitate installation of a plug type thermocouple as specified in SAE J843a.
- S5.2.1. A tolerance should be established for equivalent wheel load as the inertia weights on dynamometers vary and it is seldom possible to achieve the exact equivalent in inertia loading. Additional time will be required to determine what tolerances would be reasonable.
- We also believe that the dynamometer loading ought to reflect various friction losses in a vehicle not encountered on the dynamometer. Time, again, would be required to determine a realistic value. Current passenger car studies indicate this factor is .86. We believe the correction factor for trucks should be greater.
- S5.2.2. On ambient temperature, we recommend a range of 60° F to 95° F.

Docket Section
National Highway Safety Bureau
Washington, D. C. 20591

-3-

September 14, 1970

S5.2.3. We would suggest that this be changed to "air at ambient temperature be directed to the drum at the rate of 2200 feet per minute." Due to variations in the shape of the air chamber which surrounds the drum, it is impossible to comply with the "uniformly and continuously" conditions.

Docket 70-16 does not specify thermocouples. As both drum and lining temperatures are referenced, S5.2.5. and S5.2.6. suggest specifying lining thermocouple per SAE J843a and drum thermocouple per SAE J667.

In summarizing, our immediate concern is an extension of the date for filing supporting data on these comments to January 1, 1971. It will be necessary to run tests in accordance with the proposed procedures before the full significance of this safety standard can be evaluated as to cost and particularly lead time.

Respectfully submitted,

S. S. Conway, Jr.
President

COMMENTS TO BE MADE IN WASHINGTON ON HEARING OCTOBER 20, 1970 -- DOCKETS 70-16 & 70-17.

My name is Robert Nelson and I am speaking on behalf of the Friction Material Standards Institute, Incorporated. As brake lining manufacturers we are very much concerned with the effects the proposed standards on air brake systems for trucks, buses and trailers will have on our industry. We share and wholeheartedly support the objectives of the Bureau toward improving the stopping ability of vehicles equipped with air brake systems. We are, however, also concerned with the effects these proposals will have on vehicle performance and the role which we can perform toward achieving these objectives.

While our concern is directly with the friction materials, these are an integral part of the brake system, and so our comments must, of necessity, also include other components in the foundation brake. Because the principal performance requirements of the brake are detailed under the dynamometer test sections in both dockets, we will make only one comment, which is equally appropriate to each docket.

We have attempted insofar as it has been possible in the short time available to run dynamometer tests representing a rather broad spectrum of friction materials that are currently available. Our objective was to establish the performance of currently accepted brake designs and friction materials used by vehicle manufacturers under the proposed procedure. We have also evaluated other

brake linings that are available but not normally used with current brake designs. These, unfortunately, are not in-depth studies but do represent a broad cross section of what is available.

Our first concern is the very significant torque increase called for in Brake Chamber Pressure versus Retardation in Fig. 3. Based on various brake designs, weight ratings and tire sizes, these requirements are as much as fifty per cent above current new vehicle brake performance. While some increase in torque capability may be desirable on some vehicles, we do not believe that increasing the torque level to that specified in Fig. 3 will ensure reduced stopping distance or safer overall brake performance. Further, tests show that the response of the brake to increases in pressure are not linear. Therefore, to meet the upper limits of this curve means extremely sensitive brakes at lower application pressures. This variation in retardation force versus brake chamber pressure is not isolated to the specific brake lining characteristics but rather is affected by several factors within the foundation brake. Higher pressures tend to distort the drum and other components such as shoes, anchor pins, etc. Higher pressures also increase the stroke of the air chamber, which results in reduced push rod force. All of these result in a reduction in torque output versus input pressure.

Our tests to date indicate that no combination of linings on current design

S-cam or wedge type brakes will meet the full requirements stipulated in Fig. 3.

Materials with extremely high coefficients of friction have only been able to meet this requirement at lower pressures. We have had no opportunity to evaluate the effects of these very high coefficients of friction on other factors of brake performance such as drum wear, lining wear and brake noise, which is now being considered a form of pollution. Further, there is a tendency for brake linings with very high coefficients of friction to be less stable at higher temperatures. We have had no opportunity to evaluate the effect of less stable friction on the overall brake performance, stopping distance, and the interaction this may have on anti-wheel lock devices.

The necessity for compromise in designing any brake system has long been recognized. When any one phase of brake performance is stressed it must be at the expense or at least the partial expense of some other characteristic. As has just been cited, very high coefficients of friction tend to be less stable with temperature.

Similarly, extreme fade resistance can be accomplished but generally at the expense of recovery properties. While there are brake linings available that possess exceptional fade resistance, they still have destructive temperature limits. The very few tests in which we were able to complete the fade schedule and meet the requirements resulted in drum temperatures exceeding 1,000°F. In some tests the

brakes caught on fire, terminating the test. This is above the destruction temperature for brake lining and, as such, they become quite unstable with unpredictable recovery characteristics.

We know that brake drum weight is an important factor in the ultimate temperature reached in a fade test. Some work has been done toward using heavier drums which do indicate improved fade resistance due to the lower brake temperatures. Heavier drums also cool slower so tend to have some adverse effect on recovery. Tests also show that materials with high coefficients of friction and good fade resistance tend to over-recover. Our tests indicate that very few materials are capable of meeting the fade requirements even with heavier drums and none of these will meet the recovery requirements as they all over-recovered. This combined with what we believe to be an error in the lower limit of 45 psi for 12 fpsps deceleration in the recovery makes it impossible to meet these requirements. We have already questioned the high torque requirements established in Fig 3. At 12 fpsps this indicates a maximum pressure of 37 psi, yet in the recovery we must achieve this with a minimum pressure of 45 psi. These are very adverse conditions and (we) should recognize the fact that the friction level of brake linings tends to be less stable following extremely high temperatures. We propose this minimum value for recovery be reduced to 30 psi. We do not believe that a brake temporarily at this

torque level is overly sensitive, particularly if used with anti-wheel lock devices. While we recognize a potential problem of controllability with very high friction, we believe that from a pure safety standpoint it is better to have some excess torque capability under these conditions than not enough.

Raising the inputs or actuation forces to the brake is another method by which high torques and increased fade resistance can be achieved. As brake lining manufacturers, we have been able to do very little work in this respect and at this time do not know what effect this may have on the friction material and other components of the foundation brake.

In summary, we recognize and wholly support the objectives of the Bureau in increasing the stopping ability of air braked vehicles. We also know there are a number of factors which, individually and collectively, will affect brake performance. We have not had sufficient time to study the effects of these individual changes much less the interaction and relationship involving combinations of these changes. This program is further complicated by the fact that there are very few inertia dynamometers capable of conducting the proposed tests. Screening tests such as those proposed can be run relatively easily and quickly, however there is no substitute for long term vehicle tests of these changes in actual service to fully evaluate the interrelationship of these various factors and to prove their

reliability. Anything short of this may indeed result in a reduction in overall vehicle safety rather than an improvement.

* * *

Robert E. Nelson

October 20, 1970

607-1170
Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE
NEW YORK, N. Y. 10017

October 20, 1970

ATTACHMENT "D"

Mr. George Nield
National Highway Safety Bureau
Room #5234
400 Seventh Street, S.W.
Washington, D. C. #20591

Subject: Docket 70-17 Air Brake Systems,
Trucks and Buses

Dear Mr. Nield:

These comments are submitted as supplemental to those filed by the Friction Materials Standards Institute, Inc. on September 14, 1970. These comments apply also to Docket 70-16, Air Brake Systems on Trailers.

As brake lining manufacturers we are very much concerned with the effects the proposed standards on air brake systems for trucks, buses and trailers will have on our industry. We share and wholeheartedly support the objectives of the Bureau toward improving the stopping ability of vehicles equipped with air brake systems. We are, however, also concerned with the effects these proposals will have on vehicle performance and the role which we can perform toward achieving these objectives.

While our concern is directly with the friction materials, these are an integral part of the brake system, and so our comments must, of necessity, also include other components in the foundation brake. Because the principal performance requirements of the brake are detailed under the dynamometer test sections in both dockets, #70-16 and #70-17, these comments will apply equally to both dockets.

We have attempted insofar as possible in the short time available to run dynamometer tests representing a rather broad spectrum of friction materials that are currently available. Our objective was to establish the performance of currently accepted brake designs and friction materials used by vehicle manufacturers under the proposed procedure. We have also evaluated other brake linings that are available but not normally used with current brake designs. These, unfortunately, are not in-depth studies but do represent a broad cross section of what is available.

Our first concern is the very significant torque increase called for in Brake Chamber Pressure versus Retardation in Fig. 3. Based on various brake designs, weight ratings and tire sizes, these requirements are as much as fifty per cent above current new vehicle brake performance. While some increase in torque capability may be desirable on some vehicles, we do not believe that increasing the torque level to that specified in Fig. 3 will ensure reduced stopping distance or safer overall brake performance. Further, tests show that the response of the brake to increases in pressure are not generally linear. Therefore, to meet the upper limits of this curve means extremely sensitive brakes at lower application pressures. This variation in retardation force versus brake chamber pressure

FMSI 00143

October 20, 1970

is not isolated to the specific brake lining characteristics but rather is affected by several factors within the foundation brake. Higher pressures tend to distort the drum and other components such as shoes, and anchor pins, and to increase the stroke of the air chamber. All of these result in a reduction in torque output versus input pressure.

To date we have been able to run ten dynamometer tests to evaluate current production brakes and friction materials and also demonstrate the effects of such changes as increased coefficient of friction, drum weight, various wheel loads and AL factors.

We have attached plots on each of the dynamometer tests and identified these "A" thru "J". The test conditions such as brake size, type, AL factor, wheel load, drum weight and friction material have been detailed on each plot. The first discussion will deal with the retardation force or effectiveness. The second discussion will combine brake power (fade), hot stop and recovery as we consider these closely related.

Effectiveness:

It should be noted that all tests failed to meet at least some portions of the proposed requirements. This includes variations in coefficient of friction from medium to very high, loadings, drum weights and AL factors.

In all tests the slope of the curves produced by the data does not agree with the slope of the proposed minimum acceptable line. Low pressure points nearly meet or exceed the proposal. However as pressure is increased the curve from the data falls far away from the acceptability line. We do not have sufficient data to determine if this relationship should be linear or expressed in curve form.

We feel there may be a variability in dynamometer calibration which should be further investigated. Some dynamometers have the capability of controlled output while others must be manually operated by controlling input pressure. As long as the current state of the art cannot produce adequate margins for compliance, the dynamometer testing procedures must be more definitive.

Our tests to date indicate that no combination of linings on current design S-cam or wedge type brakes will meet the full requirements stipulated in Fig. 3. Materials with extremely high coefficients of friction have only been able to meet this requirement at lower pressures. We have had no opportunity to evaluate the effects of these very high coefficients of friction on other factors of brake performance such as drum wear, lining wear and brake noise, which is now being considered a form of pollution. Further, there is a tendency for brake linings with very high coefficients of friction to be less stable at higher temperatures. We have had no opportunity to evaluate the effect of less stable friction on the overall brake performance, stopping distance, and the interaction this may have on anti-wheel lock devices.

The necessity for compromise in designing any brake system has long been recognized. When any one phase of brake performance is stressed it must be at the expense or at least the partial expense of some other characteristic. As has just been cited, very high coefficients of friction tend to be less stable with temperature.

Fade:

It is a recognized fact within the brake lining industry that fade and recovery characteristics are the most difficult to reproduce. Extreme fade resistance can

Mr. George Nield
National Highway Safety Bureau
Washington, D.C.

-3-

October 20, 1970

be accomplished but generally at the expense of recovery properties. While there are brake linings available that possess exceptional fade resistance, they still have destructive temperature limits. The very few tests in which we were able to complete the fade schedule and meet the requirements resulted in drum temperatures exceeding 1,000°F. See curves A, B & G. In another test of a lining that had passed, the brake caught on fire when run with a lighter weight drum. See tests A & D. This is above the destruction temperature for brake lining and, as such, they become quite unstable with unpredictable recovery characteristics.

We know that brake drum weight is an important factor in the ultimate temperature reached in a fade test. Some work has been done toward using heavier drums which do indicate improved fade resistance due to the lower brake temperatures. Heavier drums also cool slower so tend to have some adverse effect on recovery. Tests also show that materials with high coefficients of friction and good fade resistance tend to over-recover. See test B. Our tests indicate that very few materials are capable of meeting the fade requirements even with heavier drums and none of these will meet the recovery requirements as they all over-recovered. This combined with what we believe to be an error in the lower limit of 45 psi for 12 g fspss deceleration in the recovery makes it impossible to meet these requirements. We have already questioned the high torque requirements established in Fig. 3. At 12 fspss this indicates a maximum pressure of 37 psi, yet in the recovery we must achieve this with a minimum pressure of 45 psi. These are very adverse conditions and we should recognize the fact that the friction level of brake linings tends to be less stable following extremely high temperatures. We are not in a position to propose minimum value until Fig. 3 has been properly adjusted. While we recognize a potential problem of controllability with very high friction, we believe that from a pure safety standpoint it is better to have some excess torque capability under these conditions than not enough.

Raising the inputs or actuation forces to the brake is another method by which high torques and increased fade resistance can be achieved. As brake lining manufacturers, we have been able to do very little work in this respect and at this time do not know what effect this may have on the friction material and other components of the foundation brake.

In summary, we recognize and wholly support the objectives of the Bureau in increasing the stopping ability of air braked vehicles and basing these tests on an inertia dynamometer. We also know there are a number of factors which, individually and collectively, will affect brake performance. We have not had sufficient time to study the effects of these individual changes much less the interaction and relationship involving combinations of these changes. We recommend the final performance levels be accomplished in a minimum of two steps allowing two years to complete each step. Screening tests such as those proposed can be run relatively easily and quickly. However, there is no substitute for long term vehicle tests of these changes in actual service to fully evaluate the inter-relationship of these various factors and to prove their reliability. Anything short of this may indeed result in a reduction in overall vehicle safety rather than an improvement.

Respectfully submitted,

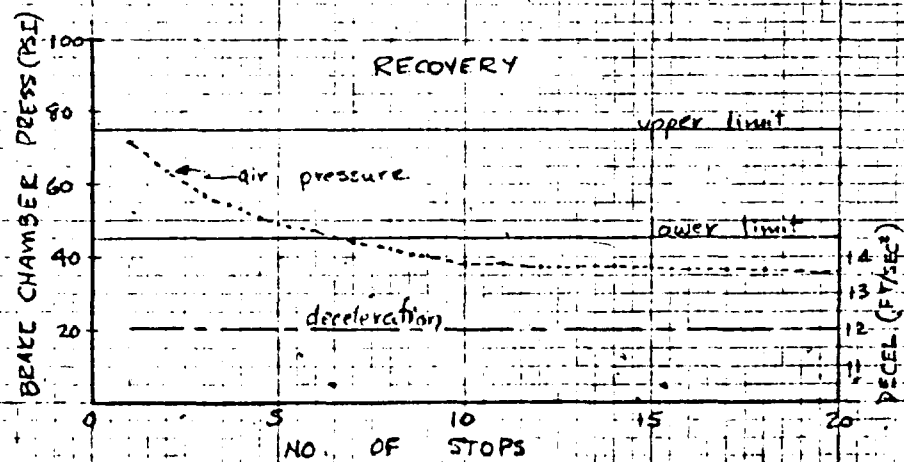
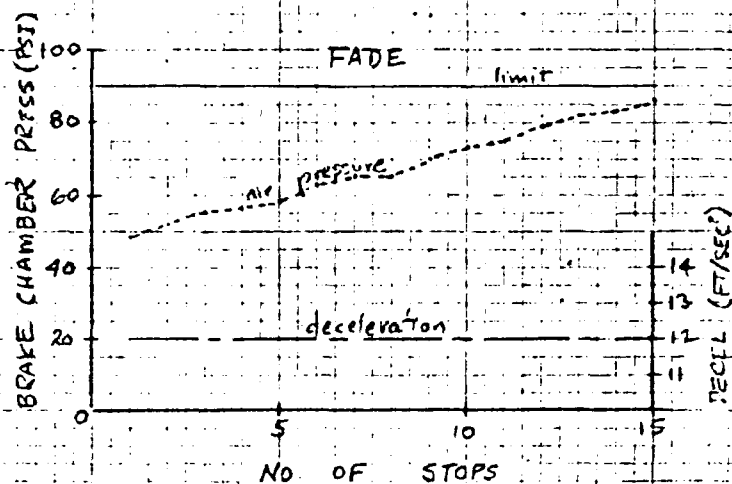
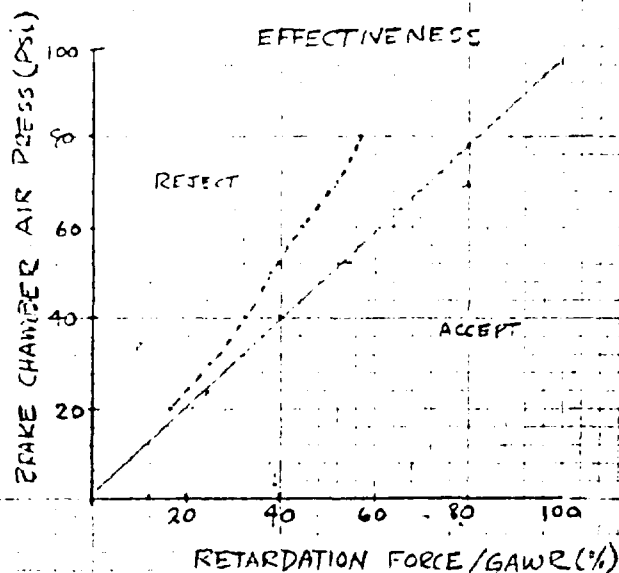
S. S. Conway
President

SSC/clt
Enclosures

FMSI 00145

10 X 10 TO THE INCH 359-5
NEUFEL & EBER CO. BOSTON, U.S.A.

MATL. MA 417A
TCUM WT 112 lbs
WHEEL LOAD 10,500 lbs
AL FACTOR 180
BRAKE SIZE 16 1/2 x 7
BRAKE TYPE 'S' cam



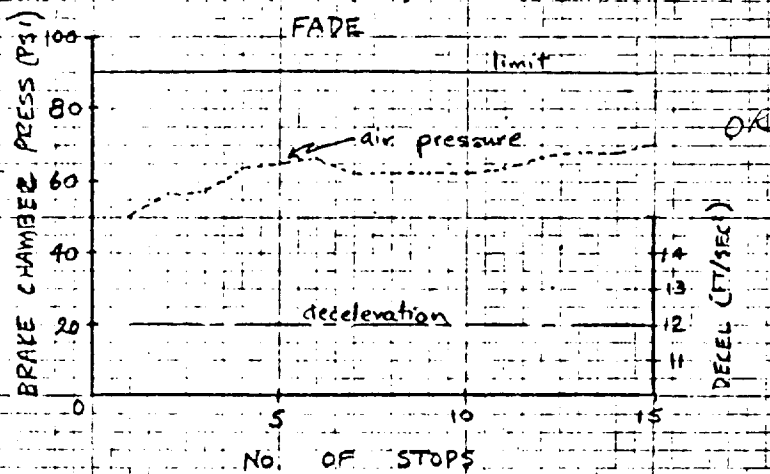
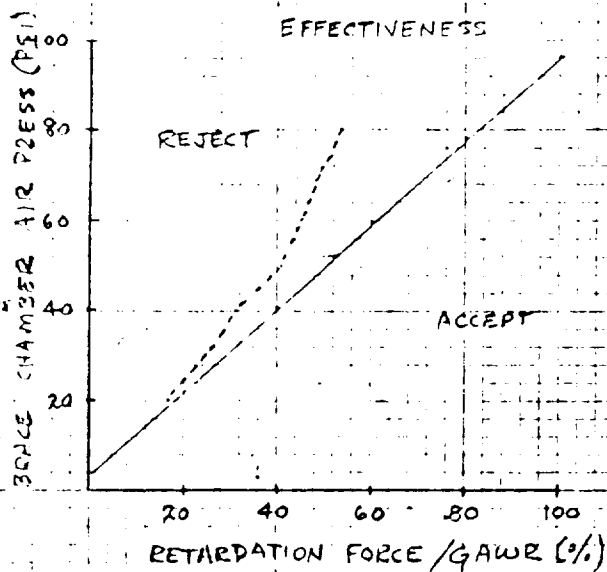
HOT STOP
90 PSI
74 FT/SEC²

TEST A

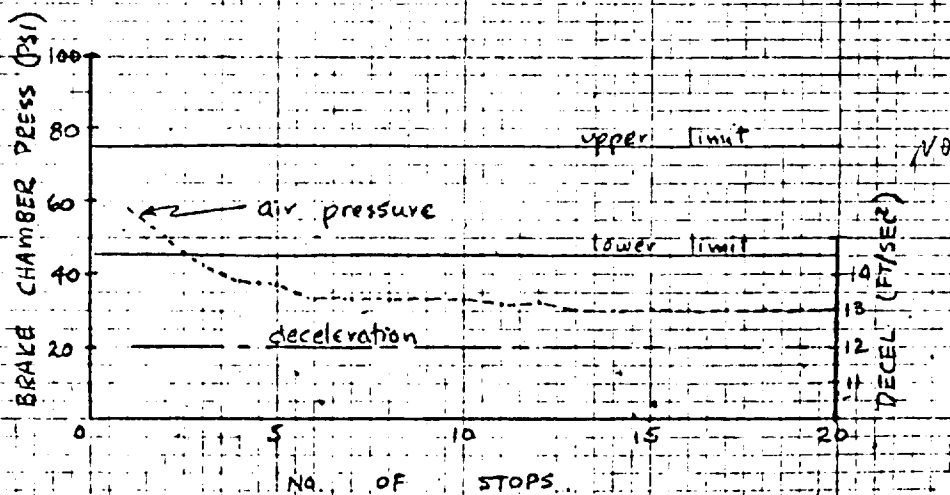
10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. 47011001

MATL. M-4952
DRUM WT. 112 lbs
Wheel LOAD 10,500 lbs
AL. FACTOR 180
BRAKE SIZE 16 1/2 x 7
BRAKE TYPE - "S" CAM

TEST B



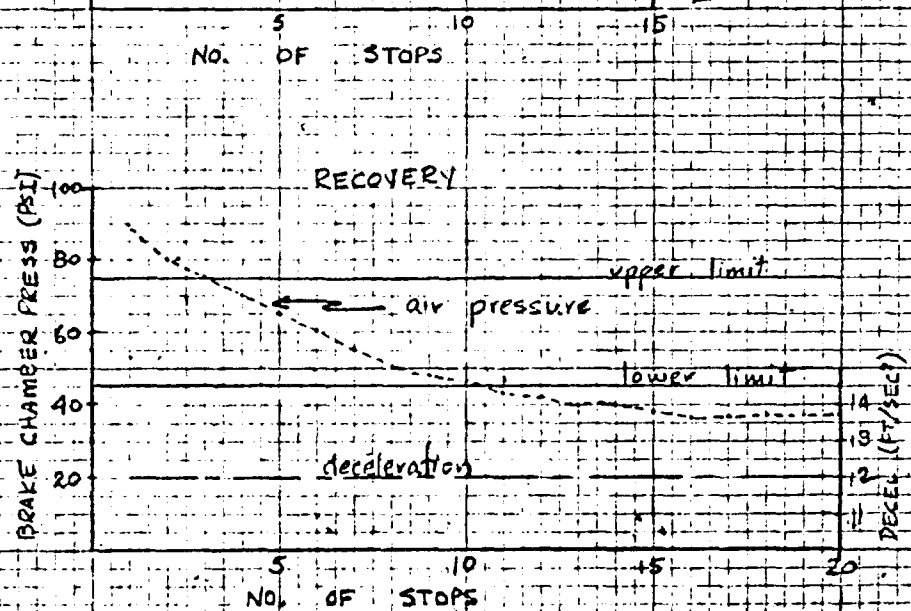
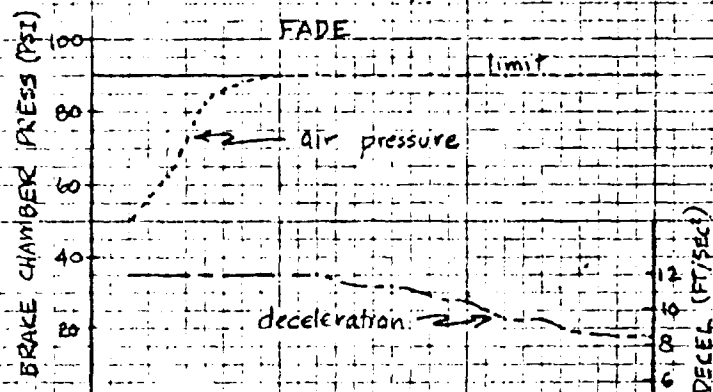
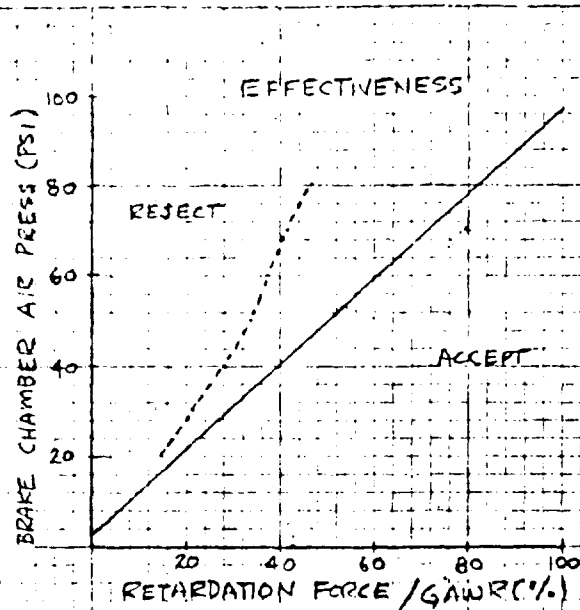
HOT STOP
68 PSI
14 FT/SEC²



TEST B

10 X 10 TO THE INCH 359-S
K&E
KUFFEL & PETER CO. MADE IN U.S.A.

MATL. M-3382E/M
M-473P
DRUM WT. 112 lbs
WHEEL LOAD 10,500 lbs
AL FACTOR 180
BRAKE SIZE 1 1/2" x T
BRAKE TYPE "S" CAM.



HOT STOP
90 PSI
14 FT/SEC²

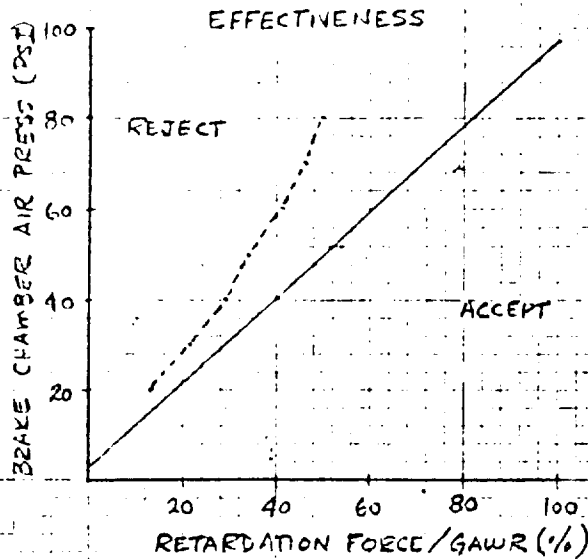
TEST C

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KEUFFEL & ESSER CO. BOSTON, U.S.A.

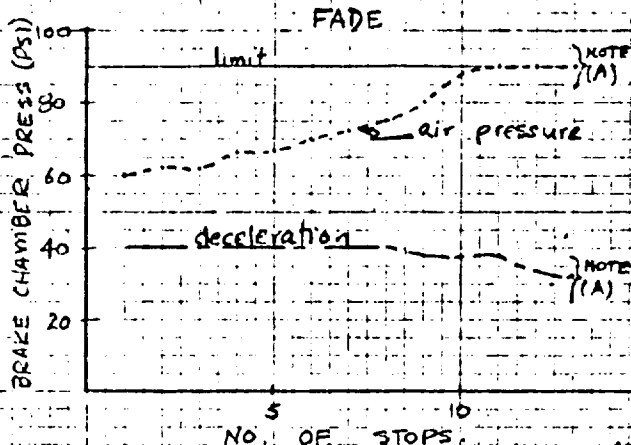
14
12

MATL MA 417A
DCUM WT 75 lbs
WHEEL LOAD 10,500 lbs
AL FACTOR 180
BRAKE SIZE 16 1/2 x 7
BRAKE TYPE "S" CAM

TEST D



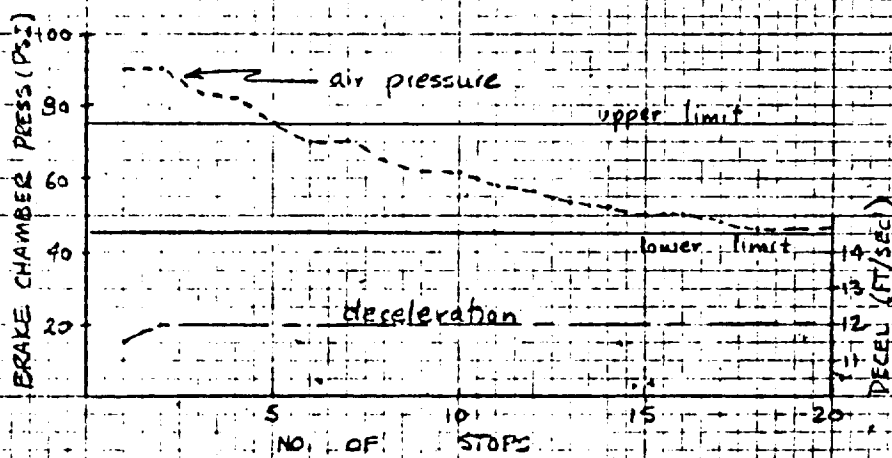
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OK

NOTE (A) - FADE TERMINATED
BRAKE AFIRE

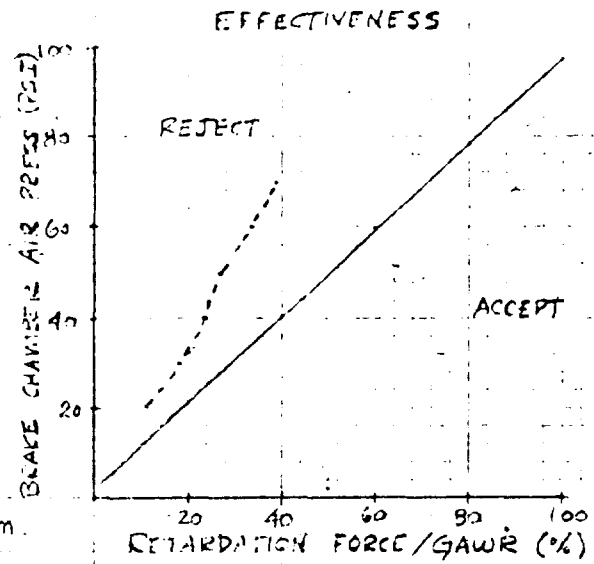
HOT STOP
90 PSI
9 FT/SEC²



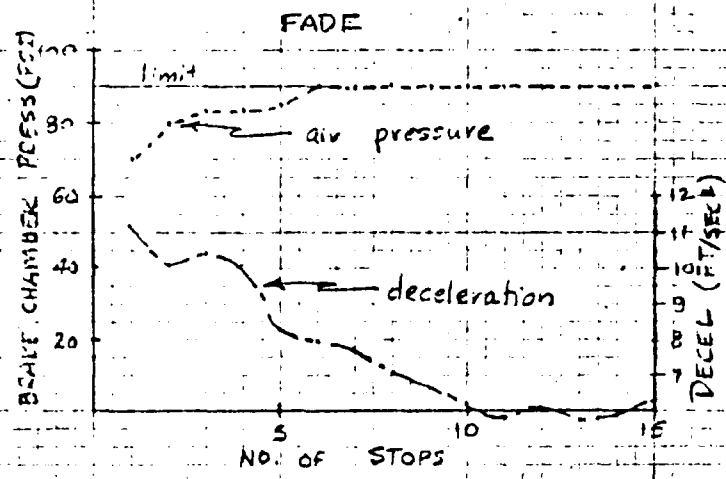
TEST D

MATL P 1093
 DRAIN WT
 WHEEL LOAD 8130 lbs
 AL FACTOR 210
 BRAKE SIZE 16 1/2 x 7
 BRAKE TYPE "S" CAM

TEST E

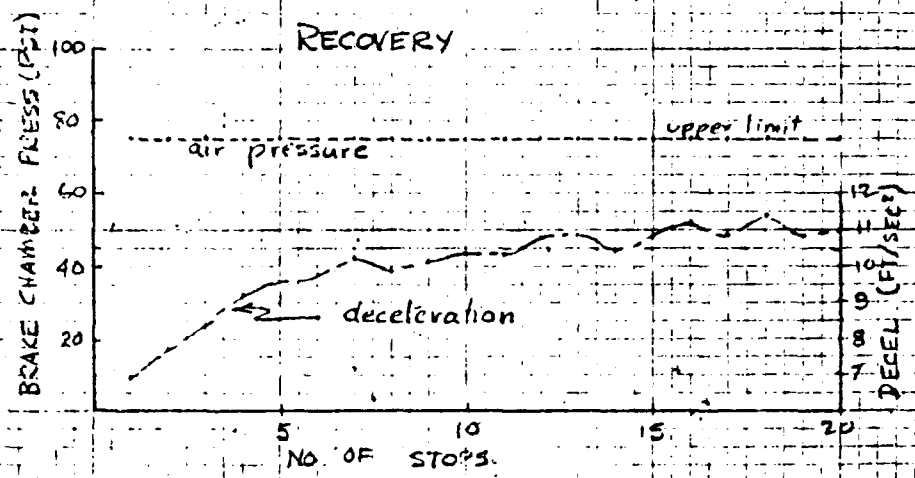


NO



NO

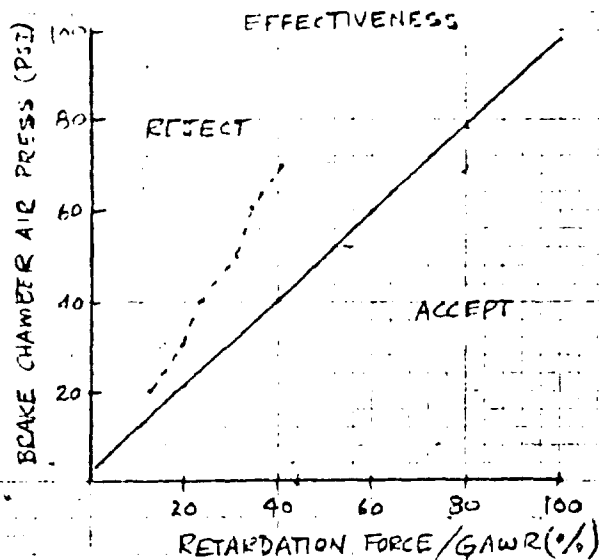
HOT STOP
 38 PSI
 4.6 FT/SEC²



TEST E

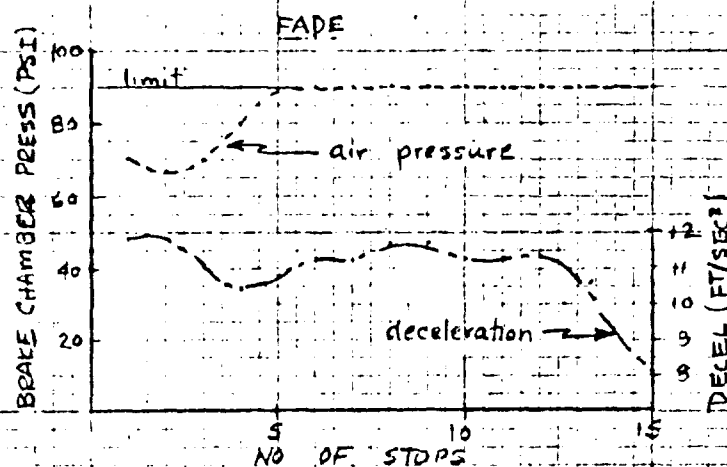
10 X 10 TO THE INCH 350-5
 KODAK SAFETY FILM

MATL 131-M1
 DRUM WT
 WHEEL LOAD 9250 lbs
 AL FACTOR DNA
 BRAKE SIZE
 BRAKE TYPE "WEDGE"

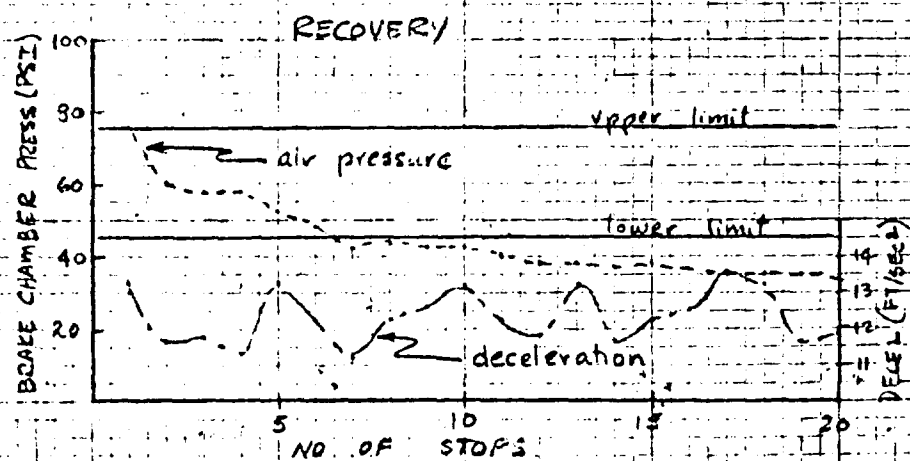


TEST F

NO



OK



HOT STOP

90 PSI

12.3 FT/SEC²

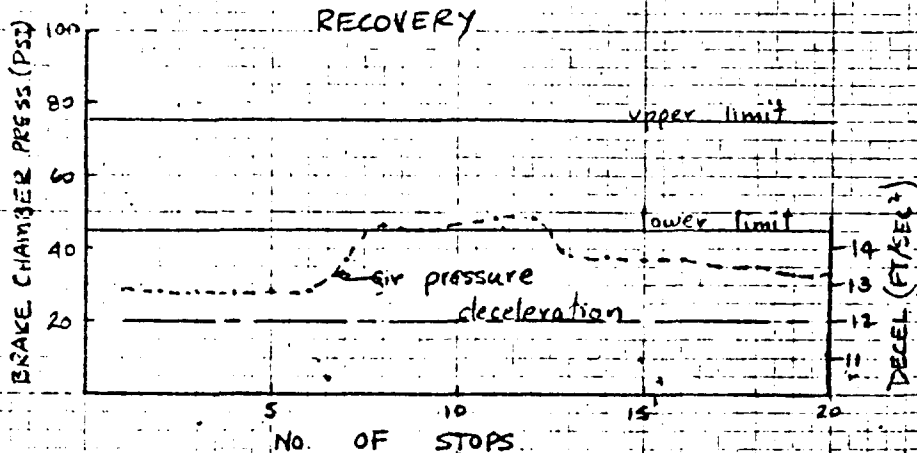
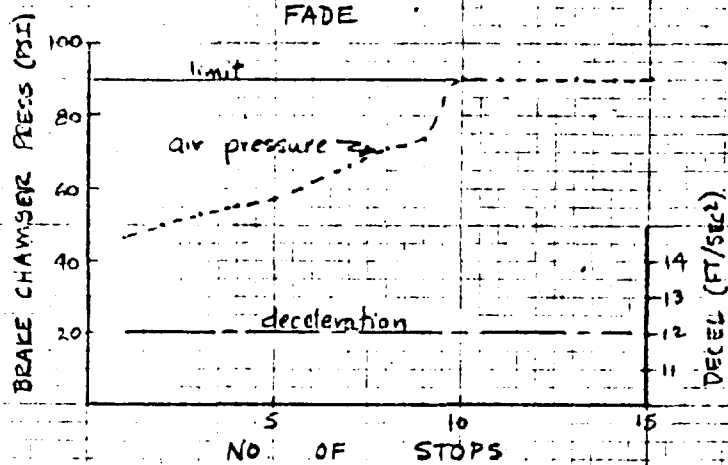
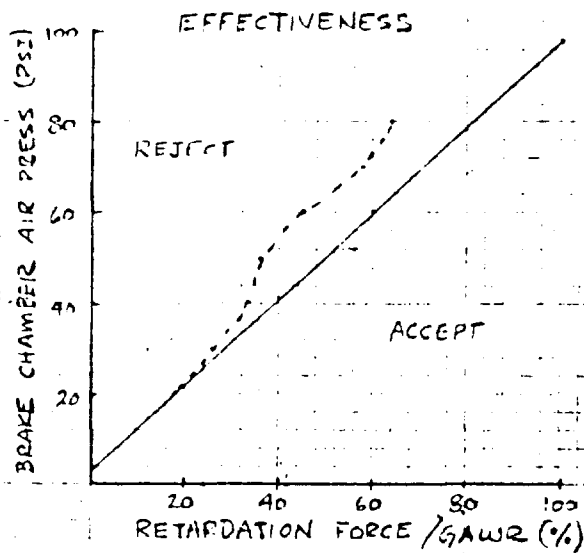
TEST F

10 X 10 TO THE INCH 350-5
PENNELL & SISK CO. PHOENIX, AZ

K-2

MATL D 42
DRUM WT 79 lb
WHEEL LOAD 11250 lb
AL FAKTOR
BRAKE SIZE 16 1/2 x 7
BRAKE TYPE 'S' cam

TEST G

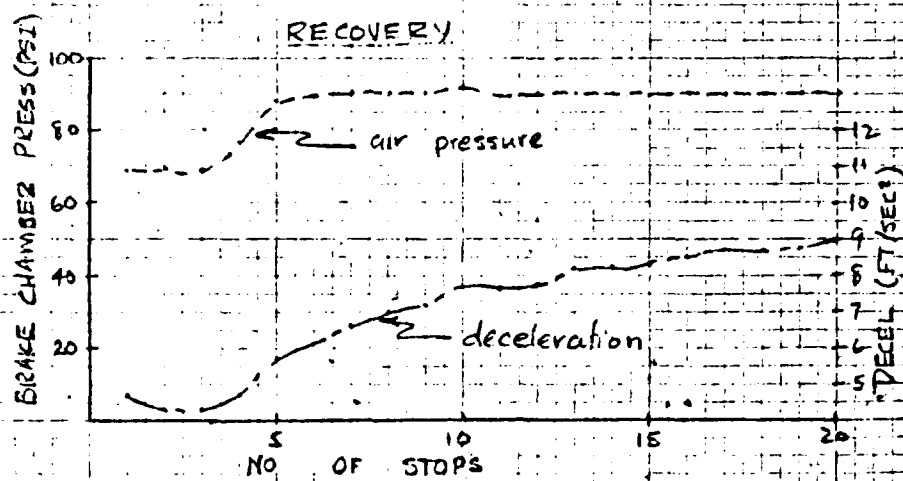
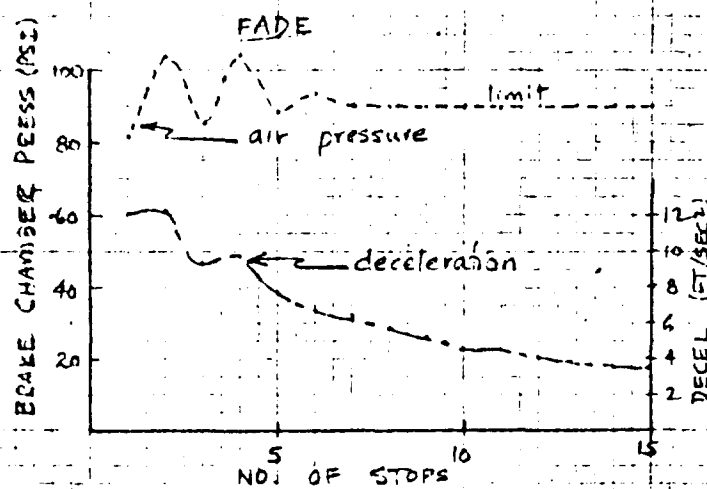
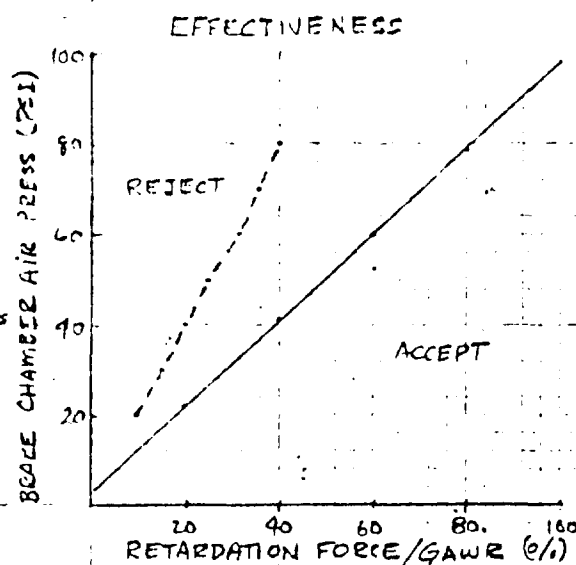


HOT STOP
81 PSI
14 FT/SEC²

TEST G

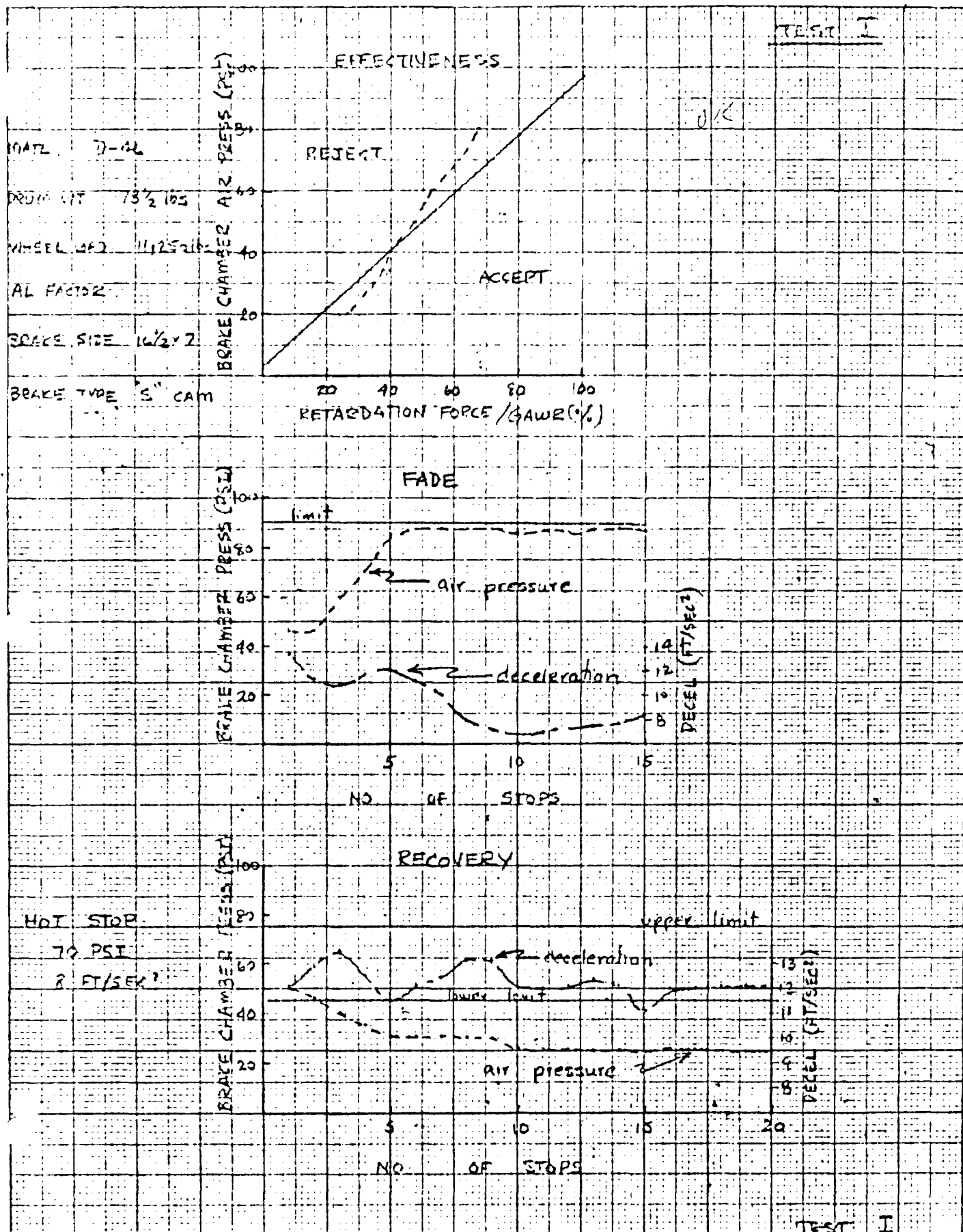
MATL D-45
 IDOM WT 79lbs
 WHEEL LOAD 11,250lbs
 AL FACTOR
 BRAKE SIZE 16 1/2 x 7
 BRAKE TYPE "S" cam

TEST H



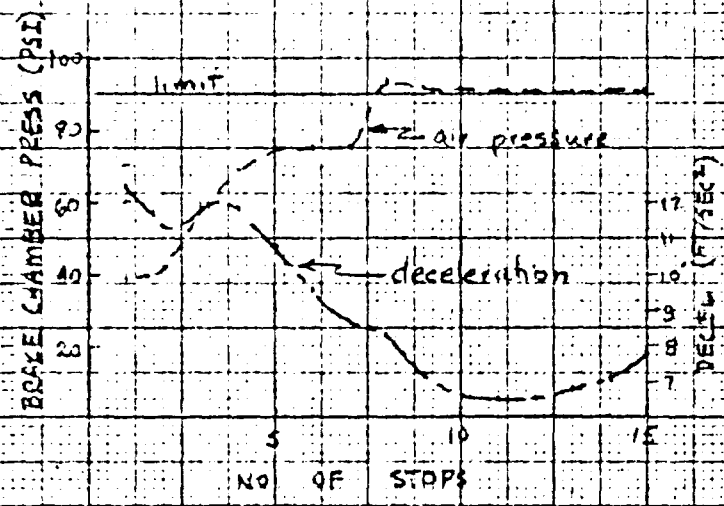
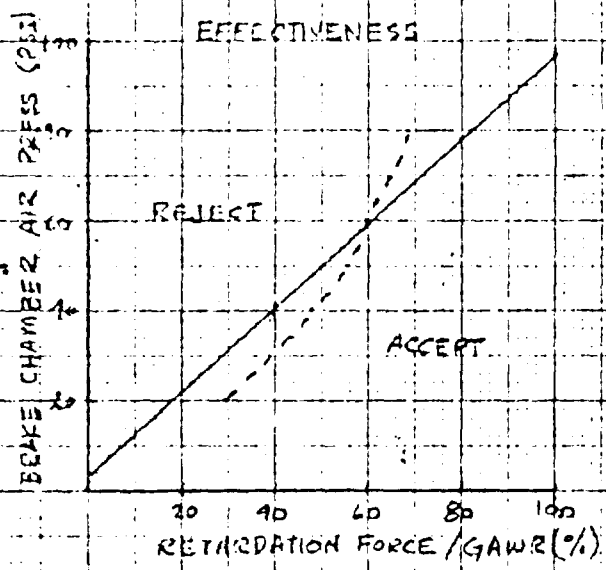
HOT STOP
 78 PSI
 6.3 FT/SEC²

TEST H

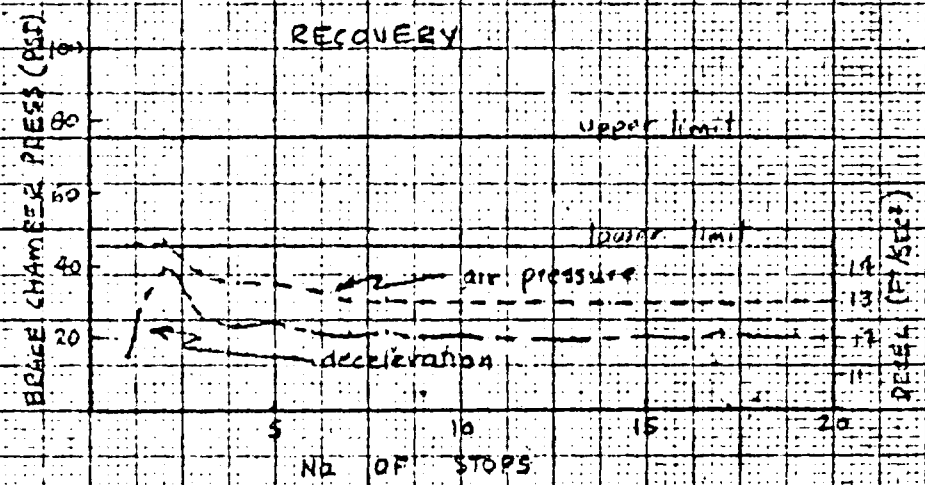


TEST J

MATL D-47
 DRUM WT 7 1/2 lbs
 WHEEL LWD 11, 250 lbs
 AL FACTOR
 BRAKE SIZE 16" x 7"
 BRAKE TYPE S C.M.



HOT STOP
 59 PSI
 9.4 F/SEC²



TEST J

Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE

NEW YORK, N. Y. 10017

ATTACHMENT "E"

January 25, 1971

Docket Section,
National Highway Safety Bureau
Room 4223
400 Seventh St., S. W.
Washington, D. C. 20591

Subject: Docket 70-27, Hydraulic Brake Systems

Gentlemen:

These comments are submitted for your consideration, by the Friction Materials Standards Institute, Inc., whose members include most of the manufacturers of brake linings in the United States. Our comments are supplementary to those made at the October 3, 1969 hearing on the up-grading of FMVSS-105, which at that time pertained to passenger cars only (Docket 1-1).

Testing Requirements and Facilities

The two-stop fade requirement that is to be made at a speed approximately 5 MPH under the top speed of the vehicle is a test essentially beyond the capacity of the brake lining manufacturers when it is applied to vehicles where the top speed exceeds 105 MPH. The brake lining manufacturers are aware of the need for high speed brake testing and capabilities, and have tested at speeds of 80 MPH, 90 MPH and 100 MPH. Brake data developed at these high speeds has been extrapolated to insure that linings have extreme high speed capabilities. Beyond extrapolation, the brake lining manufacturers do not have the facilities to specifically warrant compliance where maximum vehicle speeds in excess of 105 MPH are possible. We question whether such specifications and requirements serve the interests of vehicle safety, not only for those doing the testing in industry and government, but for the general public where brake capabilities at speeds up to 140 MPH may be a license for operating a vehicle at these speeds. Would not the interest of vehicle safety be better served by limiting the speed?

Performance and Fade Orientation of Test

The brake lining manufacturers feel that the high performance requirements may be met with existing equipment, but that these requirements are the high limit which can only be met with brake lining formulations aimed at passing this test only. This test is operated at conditions in the destructive range for existing linings. For example, a sacrifice may be made which will promote rapid lining wear, continuous degradation of friction, poor friction when cold, and brake stability problems.

With linings formulated to pass this performance test of only a few hundred miles of vehicle operation, it is conceivable that rapid wear to only 1/16" or 1/8" of the shoe may accelerate problems of brake system deterioration specifically noted in the docket when final inspection is made. While guarding the brake performance for the heavy-footed driver, the majority of the drivers will most likely pay in shorter brake lining life. Further, with existing brake linings geared for performance

FMSI 00156

Docket Section,
National Highway Safety Bureau
Washington, D. C. 20591

-2-

January 25, 1971

there usually is an increase in imbalance problems such as brake pull at decelerations below the lock-up protection afforded by anti-skid devices. Such sacrifices in wear resistance and stability for the tens of thousands of miles most drivers expect - and should expect - from their linings, will most likely be the price for requiring brake linings formulated for the specific purpose of passing an extreme performance test.

Anti-skid and Load-Proportioning Systems

The requirements in Docket 70-27 imply that industry must have "Antilocking Systems" and "Brake Proportioning Systems", in not just trucks but in all vehicles covered by this docket. These systems present an entire new factor as regards the testing and capabilities of brake lining. The brake lining manufacturers have minimum background on the possible effects that may result from their use on all vehicles. Concern is expressed by most manufacturers for linings used in multipurpose vehicles, and heavy trucks, where design frequently uses linings with different friction characteristics on front and rear brakes.

Summary

In our earlier response to Docket 1-1 on the initial up-grading of FMVSS-105, we expressed concern about requirements beyond the existing state of the art in braking passenger cars. We noted the lack of testing facilities, and the characteristics of brake fade. These comments apply equally to Docket 70-27.

In our response to Dockets 70-16 and 70-17 (Air Brake Systems) we enclosed test data to support our position on the difficulties inherent in requirements of those dockets. We wish to emphasize that the brake lining industry is just as concerned with the requirements of Docket 70-27 as with these earlier dockets, but we could not perform tests to evaluate these severe requirements, as the brake lining industry simply does not have the facilities on which these tests can be run.

Respectively submitted,

S. S. Conway
President

FMSI 00157

FRICTION		MARCH 1971	
37	3/30		

Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE
NEW YORK, N. Y. 10017

March 26, 1971

ATTACHMENT "F"

Docket Section
National Highway Traffic Safety Administration
Room 4223
400 Seventh Avenue, S. W.
Washington, D. C. #20591

Subject: Federal Motor Vehicle Safety Standard #121

Gentlemen:

These comments are submitted for your consideration by the Friction Materials Standards Institute, Inc., whose members include most of the manufacturers of brake linings in the United States. These comments are to supplement those made earlier in our September 14, 1970 and October 20, 1970 responses to Dockets 70-16 and 70-17.

The Institute's members had run various dynamometer and vehicle tests prior to the hearings on Dockets 70-16 and 70-17. While there have been changes incorporated in FMVSS 121, we have not had sufficient time to run additional tests. However, based on past tests, the members of the Institute wish to comment on the stopping distance requirement.

STOPPING DISTANCE REQUIREMENT

FMVSS #121

20 MPH
33'

60 MPH
245'

The 20 MPH requirement does not present a problem. However, the 60 MPH minimum stopping distance requirement is not attainable with today's good commercial linings on existing braking systems. By "good commercial" linings, we wish to emphasize wear resistance, absence of noise and stability problems, as well as friction and fade characteristics.

For example, in one member's tests, using a high friction lining (rated "GG" using SAE recommended practice J866a), the 20 MPH stopping distance requirement was met. However, the 60 MPH requirement could not be met. The brakes were 16 -1/2 x 7 "S Cams", on a single axle. The use of a "GG" lining for these brakes is not necessarily good practice, and in normal service we would expect to use linings below "GG" in friction.

We compute the deceleration rate used in Standard 121 using .30 second actuation time. This is consistent with Standard 121, Section 5.3.3, where 0.25 seconds maximum will be allowed to read 60 p.s.i. air. Pressures in excess of 60 p.s.i. will be required for stopping distance tests.

The tabulation shows that approximately 17.7 ft/sec² deceleration is required for Standard 121 stopping distances, computed as above. (Note, the 40 MPH - 108 ft stopping distance is not linear with the other stopping distances). This standard does not allow for speed sensitivity characteristics of the brake and brake linings.

March 26, 1971

DECELERATION AND STOPPING DISTANCE

SPEED MPH	FMVSS 121		FMSI RECOMMENDATION	
	DECEL (FT/SEC ²)	DISTANCE (FT)	DECEL (FT/SEC ²)	DISTANCE (FT)
20	17.7	33	17.7	33
25	17.7	49	17.4	50
30	17.7	68	17.2	70
35	17.7	90	16.9	93
40	19.0	108	16.6	120
45	17.7	143	16.4	151
50	17.7	174	16.1	187
55	17.7	208	15.8	228
60	17.7	245	15.6	274

Allowing for current state of the art, a 3% fall-off in deceleration rates should be expected for each 10 MPH increase in speed. Allowing for this speed sensitivity, we believe the deceleration rates and stopping distances shown in the last two columns of this table are attainable. Without such an allowance, the speed sensitivity inherent in brakes and brake linings, is being ignored.

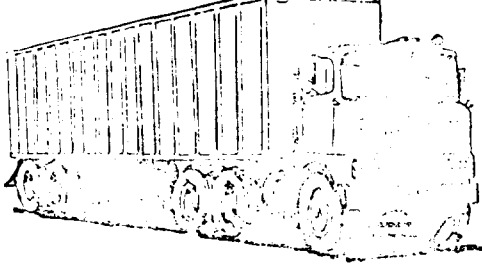
SUMMARY

We wish to emphasize that with existing brake systems, brake linings cannot be expected to meet the stopping distance requirements of FMVSS #121 at the higher speeds.

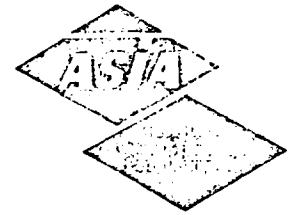
Also, allowing for what we believe is an error in the 40 MPH - 108 ft requirement, we recommend that the stopping distance requirements be adjusted to allow for speed sensitivity, in line with the values shown by our tabulation.

Respectfully submitted,

S. S. Conway
President



**NATIONAL TRAFFIC
& MOTOR VEHICLE
SAFETY ACT OF
1966**



Route

AUTOMOTIVE SERVICE INDUSTRY ASSOCIATION

230 North Michigan Avenue, Chicago, Illinois 60601 (312) 236-8720

THE INDUSTRY'S ONLY FULL SERVICE ASSOCIATION

**PROPOSED FEDERAL RULE
ACTION REQUIRED**

MANUFACTURER IDENTIFICATION

The National Highway Traffic Safety Administration has proposed a new section, Part 566, to the Code of Federal Regulations that would require motor vehicle manufacturers and motor vehicle equipment manufacturers to submit identifying information and a description of the items they produce for which a motor vehicle safety standard applies.

The purpose of this part is to "facilitate the regulation of manufacturers under the National Traffic and Motor Vehicle Safety Act, and to aid in establishing a code numbering system for all regulated manufacturers".

Manufacturers would be required to furnish basic information on their corporate and business status and residence, a description of each type of motor vehicle or of equipment they produce, and information on production capacity.

The proposed effective date is July 26, 1971 and interested persons are invited to submit data, views, and arguments concerning the proposed regulations by the close of business on June 28, 1971. Comments must refer to the docket number, No. 71-11; Notice 1, and should be submitted to: Docket Section, National Highway Traffic Safety Administration, Room 5217, 400 Seventh Street, S.W., Washington, D.C. 20591. It is requested, but not required, that 10 copies be submitted.

The full text of the proposed regulations as they appeared in the Federal Register of April 28, 1971 is attached.

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HEAVY DUTY VEHICLE and EQUIPMENT- PARTS DISTRIBUTORS DIVISION

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FMSI 00160

FOR INFORMATION ONLY / FILE UNDER " " / " " / " " / " "

National Highway Traffic Safety
Administration

[49 CFR Part 566]

[Docket No. 71-11; Notice 1]

MANUFACTURER IDENTIFICATION

Notice of Proposed Rule Making

This notice proposes to adopt a new Part 566 in Title 49, Code of Federal Regulations, that would require manufacturers of motor vehicles, and of motor vehicle equipment to which a motor vehicle safety standard applies, to submit identifying information and a description of the items they produce.

Section 112(c) of the National Traffic and Motor Vehicle Safety Act requires manufacturers of motor vehicles and motor vehicle equipment to "provide such information as the Secretary may reasonably require to enable him to determine whether such manufacturer has acted or is acting in compliance with this title and motor vehicle safety standards prescribed pursuant to this title. . . ." Section 119 further grants the Secretary general authority to "issue, amend, and revoke such rules and regulations as he deems necessary to carry out this title."

In order to carry out the provisions of the Act, it is often necessary to have certain basic information about the manufacturers of motor vehicles or vehicle equipment subject to the Act. This is particularly so in the area of enforcement and in carrying out the several requirements for communication, inspection, and reporting. It is necessary to have centrally organized and collected information regarding the manufacturer's corporate status, mailing address, items manufactured, and manufacturing location. Moreover, it is necessary to assemble this information so as to make it readily accessible to those having enforcement responsibility under the Act, and provide a means for identifying and classifying manufacturers according to the types of motor vehicles or equipment which they manufacture. A system is also needed whereby the NHTSA can provide information to manufacturers of various types of vehicles or equipment.

For these reasons, the National Highway Traffic Safety Administration proposes to establish a new Part 566 in Title 49, Code of Federal Regulations, which would require manufacturers to report specified information to the Administrator within 90 days of the effective date of the proposed regulations. The regulation applies to all manufacturers of motor vehicles and of motor vehicle equipment to which a motor vehicle safety standard applies, and utilizes the definitions of "intermediate" and "final stage" manufacturer set out in 49 CFR Part 568 (36 F.R. 7054). The information required includes basic information on the manufacturer's corporate and business status and residence, the items produced, and information on production capacity.

Proposed effective date: 90 days after issuance. Interested persons are invited to submit data, views, and arguments concerning the proposed regulations. Comments should refer to the docket number and be submitted to: Docket Section, National Highway Traffic Safety Administration, Room 5217, 400 Seventh Street SW., Washington, DC 20591. It is requested, but not required, that 10 copies be submitted. All comments received before the close of business June 28, 1971 will be considered, and will be available in the docket at the above address for examination both before and after the closing date. To the extent possible, comments filed after the above date will also be considered by the Administration. However, the rulemaking action may proceed at any time after that date, and comments received after the closing date and too late for consideration in regard to the action will be treated as suggestions for future rulemaking. The Administration will continue to file relevant material, as it becomes available, in the docket after the closing date, and it is recommended that interested persons continue to examine the docket for new materials.

This notice of proposed rulemaking is issued under the authority of sections 112 and 119 of the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1401 and 1407), and the delegations of authority at 49 CFR 1.51 and 49 CFR 501.8.

Issued on April 16, 1971.

RODOLFO A. DIAZ,
Acting Associate Administrator,
Motor Vehicle Programs.

PART 566—MANUFACTURER
IDENTIFICATION

§ 566.1 Scope.

This part requires manufacturers of motor vehicles, and of motor vehicle equipment to which a motor vehicle safety standard applies, to submit identifying information and a description of the items they produce.

§ 566.2 Purpose.

The purpose of this part is to facilitate the regulation of manufacturers under the National Traffic and Motor Vehicle Safety Act, and to aid in establishing a code numbering system for all regulated manufacturers.

§ 566.3 Application.

This part applies to all manufacturers of motor vehicles, and to manufacturers of motor vehicle equipment to which a motor vehicle safety standard applies (hereafter referred to as "covered equipment").

§ 566.1 Definitions.

All terms defined in the Act and the rules and standards issued under its authority are used as defined therein. Specifically "intermediate manufacturer" and "final-stage manufacturer" are used as defined in Part 568, Vehicles Manufactured in Two or More Stages.

§ 566.5 Requirements.

Each manufacturer of motor vehicles, and each manufacturer of covered equipment, shall furnish the information specified in paragraphs (a) through (d) of this section to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street SW., Washington, DC 20591.

(a) Full individual, partnership, or corporate name of the manufacturer.

(b) Residence address of the manufacturer and State of incorporation if applicable.

(c) Description of each type of motor vehicle or of covered equipment manufactured by the manufacturer, including, for motor vehicles, the approximate ranges of gross vehicle weight ratings for each type. Except as noted below, the description may be of general types, such as "passenger cars" or "brake fluid." In the case of multipurpose passenger vehicles, trucks, and trailers, the description shall be specific enough also to indicate the types of use for which vehicles are intended, such as "tank trailer," "motor home," or "cargo van." In the case of motor vehicles produced in two or more stages, if the manufacturer is an intermediate manufacturer or a final-stage manufacturer, the description shall so state and include a brief description of the work performed.

EXAMPLE: "Multipurpose passenger vehicles: Motor homes with GVWR from 8,000 to 12,000 pounds. Final-stage manufacturer—add body to bare chassis."

(d) Estimated annual production of each type vehicle or covered equipment listed in response to paragraph (c) of this section.

§ 566.6 Time of submittal of information.

Each manufacturer required to submit information under § 566.4 shall submit the information not later than _____

After that date, each person who begins to manufacture a type of motor vehicle or covered equipment for which he has not submitted the required information shall submit the information specified in paragraphs (a) through (d) of § 566.4 not later than 30 days after he begins manufacture.

[FR Doc.71-5978 Filed 4-27-71;8:48 am]