Brake Study Attachment – Ford FMVSS-105 Compliance Summary of Performance

Schoharie, NY

HWY19MH001

(9 pages)

LIGHT TRUCK FMVSS 105-75 ROAD TEST SUMMARY OF PERFORMANCE [redacted]

ORIGINAL

GVW'S FROM 8000 TO 10000 LBS (EXCEPT SCHOOL BUSES)

REFERENCE ENGINEERING TEST PROCEDURE ST-2 AND

ENGINEERING DESIGN STANDARD DD 6.00-151

TEST NO.	AC4939	**MODEL YEAR**	2000	**SERIES**	U137	**MODEL**	4X4 **FAMILY** 00-13-J
VEHICLE NO.	316W093	**WHEELBASE**	137in	**ENGINE**	5.4L	**LOADING**	HF (GVW) HF (LL)
WHEELS	16x7	**TIRES**	LT265/75R16 A/T	**TRANS.**	A4OD	**AXLE RATIO**	
FR. BRAKES	DISC-PIN SLIDE	**SIZE**	2 x 54mm			**PROP VALVE**	EDRP
RR. BRAKES	DISC-PIN SLIDE	**SIZE**	2 x 44.5mm			**WHEEL CYL.**	
MASTER CYL	1 3/8	**SERVICE BRAKE PEDAL RATIO**	4.2:1			**BOOSTER**	VACUUM BOOST 250 TANDE
CONT. VALV	ABS-310P	**PARK BRAKE PEDAL RATIO**				**HAND**	**FOOT** XX
FRONT LINING INNER/OUTER	ABEX 1222-1A/ABEX 1222-1A					**REAR LINING INNER/OUTER**	ABEX 1222-1A/ABEX 1222-1A
GVWR LOAD	**FRONT/REAR** 4496/4704	**TOTAL**	9200 LBS			**CG HEIGHT**	
LL LOAD	**FRONT/REAR** 4298/3669	**TOTAL**	7967 LBS			**CG HEIGHT**	
TEST DRIVE	APG - KOGER	**DATE STARTED**	10/29/1998			**DATE COMPLETE**	11/09/1998

TEST OBJECTIVE/PROGRAM : U137 CERT TEST

TEST		REQUIREMENTS (Targets) MAXIMUM STOPPING DISTANCE OR DECELERATION		RESULTS STOP DIST.	RESULTS SKID (XX)	RESULTS MAX P.E	REMARKS
First Effectivenes	30 MPH	72 FT. (64)		49.4		146.4	
	60 MPH	267 FT. (240)		196.4		138.2	
Second Effectivenes	30 MPH	57 FT. (51)		47.4		145.4	
	60 MPH	216 FT. (194)		181.0		146.2	
Parking Brak	20% Grade	Meet Requirements of Section 5.2 Foot 125 lb (112) GV	GVW UP	114.0^	DN	108.0^	
		Hand 90 lb (81)	LL UP	102.0	DN	110.0	
	Warning Light	Parking Brake Indicator Light Operates	YES	X	NO		
Third Effect.	60 MPH	216 FT. (194)		177.5		144.4	
Partial Systems	60 MPH ROLL	517 FT. (465)		391.8		147.8	
	60 MPH FOLL	517 FT. (465)		260.6		146.9	
	60 MPH ROGV	517 FT. (465)		394.9		147.2	
	60 MPH FOGV	517 FT. (465)		302.5		146.4	
	Warning Light	Warning Light Meets Req. of Section 5.3.1 a (Diff. Press.)	YES		NO		
	Warning Light	Warning Light Meets Req. of Section 5.3.1 b (Fluid Level)	YES	X	NO		
Inoperable Anti-Lock or Proportioning Valve		517 FT. (465)		201.8		116.2	
		Warning Light When Electrical Supply Disconnects	YES	X	NO		
Inoperable Power Assist		517 FT. (465)		429.2		150.0	
First Fade and Recovery	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	25.6	
	Fade Stops	5 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				125.9	
	Recovery Stops	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				34.8	
		5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	16.4/43.6			24.2	
Second Fade and Recovery	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	25.8	
	Fade Stops	10 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				76.2	
	Recovery Stops	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				28.9	
		5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	16.5/43.8			23.7	
Fourth Effec	30 MPH	72 FT. (64)		46.2		135.4	
	60 MPH	267 FT. (240)		170.6		138.8	
	80 MPH	510 FT. (459)		323.1		146.7	
Water Recov	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lb.			AVG	26.3	
	Recovery Stop	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lb. (135)				38.7	
	Recovery Stop	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	16.9/66.3			42.6	
Spike Stops	30 MPH	10 Stops with 200 lb. Pedal Effort Applied Within 0.08 Seconds		X			
ASE	60 MPH	267 FT. (240)		176.1		142.7	
Inspection	Mechanical	Brake Sys. Components Free of Fracture or Detachment	YES	X	NO		
	Fluid	Brake Components Free of Brake Fluid Contamination	YES	X	NO		
	Lights	Brake Warning Light Complies in Operation and Appearanc	YES	X	NO		

NOTE: Unless otherwise specified, P.E. limits are 15 to 150 lbs.

I certify that to the best of my knowledge this test was conducted with parts and related systems signed off by the design engineer as representing a design level adequate for certification test.

Development Engineer: [redacted] **Date:** [redacted]

The undersigned is familiar with and concurs in the components tested, the type of fixtures used, the procedure stated in the report, and based on the reported test results, the conclusions arrived at with respect to FMVSS compliance.

Development Supervisor: [redacted] **Date:** [redacted]

COMMENTS:

* Driver did not perform third reapply at 112 lbs or less. See results of test AC5752 for a proper apply sequence on the same weight vehicle.

^ This portion of the test was reran under AD1019 with updated parking brake components.

[redacted]

Date Printed: 02/15/1999

Date Created:12/30/98

Date Revised: 1/30/99

LIGHT TRUCK FMVSS 105-75 ROAD TEST SUMMARY OF PERFORMANCE

GVW'S FROM 8000 TO 10000 LBS (EXCEPT SCHOOL BUSES)

REFERENCE ENGINEERING TEST PROCEDURE ST-2 AND

ENGINEERING DESIGN STANDARD DD 6.00-151

ORIGINAL

[redacted]

TEST NO.	AC5616	**MODEL YEAR**	2000	**SERIES**	U137	**MODEL**	4X2 **FAMILY** 00-13-K
VEHICLE NO.	316W080	**WHEELBASE**	137in	**ENGINE**	5.4L	**LOADING**	HR (GVW) HR (LL)
WHEELS	16x7	**TIRES**	LT265/75R16 A/T	**TRANS.**	A4OD	**AXLE RATIO**	
FR. BRAKES	DISC-PIN SLIDE	**SIZE**	2 x 54mm			**PROP VALVE**	EDRP
RR. BRAKES	DISC-PIN SLIDE	**SIZE**	2 x 44.5mm			**WHEEL CYL.**	
MASTER CYL	1 3/8	**SERVICE BRAKE PEDAL RATIO**	5.4:1			**BOOSTER**	HYDRO-BOOST
CONT. VALV	ABS-310P	**PARK BRAKE PEDAL RATIO**				**HAND**	**FOOT** XX

FRONT LINING INNER/OUTER ABEX 1222-1A/ABEX 1222-1A **REAR LINING INNER/OUTER** ABEX 1222-1A/ABEX 1222-1A

GVWR LOAD	**FRONT/REAR** 3615/4985	**TOTAL** 8600 Lbs	**CG HEIGHT**		
LL LOAD	**FRONT/REAR** 3447/3471	**TOTAL** 6918 Lbs	**CG HEIGHT**		
TEST DRIVE	APG - KOGER/MORTON	**DATE STARTED** 11/04/1998	**DATE COMPLETE**	11/17/1998	

TEST OBJECTIVE/PROGRAM : U137 CERT TEST

TEST		REQUIREMENTS (Targets) MAXIMUM STOPPING DISTANCE OR DECELERATION		RESULTS STOP DIST.		RESULTS MAX P.E	REMARKS
First Effectivenes	30 MPH	72 FT. (64)		46.0		136.8	
	60 MPH	267 FT. (240)		167.4		140.7	
Second Effectivenes	30 MPH	57 FT. (51)		50.2		85.9	
	60 MPH	216 FT. (194)		168.5		112.0	
Parking Brak	20% Grade	Meet Requirements of Section 5.2 Foot 125 lb (112) GV	GVW UP	112.0^	DN	95.0^	
		Hand 90 lb (81)	LL UP	109.0	DN	110.0	
	Warning Light	Parking Brake Indicator Light Operates	YES	X	NO		
Third Effect.	60 MPH	216 FT. (194)		157.9		138.1	
Partial Systems	60 MPH ROLL	517 FT. (465)		329.7		142.2	
	60 MPH FOLL	517 FT. (465)		237.6		139.5	
	60 MPH ROGV	517 FT. (465)		321.7		146.9	
	60 MPH FOGV	517 FT. (465)		*		*	
	Warning Light	Warning Light Meets Req. of Section 5.3.1 a (Diff. Press.)	YES		NO		
	Warning Light	Warning Light Meets Req. of Section 5.3.1 b (Fluid Level)	YES	X	NO		
Inoperable Anti-Lock or Proportioning Valve		517 FT. (465)		178.4		61.5	
		Warning Light When Electrical Supply Disconnects	YES	X	NO		
Inoperable Power Assist		517 FT. (465)		377.1		147.5	
First Fade and Recovery	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	19.3	
	Fade Stops	5 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				45.3	
	Recovery Stops	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				25.6	
		5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	10.3/37.3			17.6	
Second Fade and Recovery	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	19.1	
	Fade Stops	10 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				40.5	
	Recovery Stops	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				21.2	
		5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	10.1/37.1			17.5	
Fourth Effec	30 MPH	72 FT. (64)		46.2		67.0	
	60 MPH	267 FT. (240)		164.1		121.8	
	80 MPH	510 FT. (459)		292.3		104.6	
Water Recov	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lb.			AVG	20.0	
	Recovery Stop	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lb. (135)				26.2	
	Recovery Stop	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	11/60			26.0	
Spike Stops	30 MPH	10 Stops with 200 lb. Pedal Effort Applied Within 0.08 Seconds		X			
ASE	60 MPH	267 FT. (240)		163.8		138.4	
Inspection	Mechanical	Brake Sys. Components Free of Fracture or Detachment	YES	X	NO		
	Fluid	Brake Components Free of Brake Fluid Contamination	YES	X	NO		
	Lights	Brake Warning Light Complies in Operation and Appearanc	YES	X	NO		

NOTE: Unless otherwise specified, P.E. limits are 15 to 150 lbs.

I certify that to the best of my knowledge this test was conducted with parts and related systems signed off by the design engineer as representing a design level adequate for certification test.

Development Engineer: [redacted] **Date:** [redacted]

The undersigned is familiar with and concurs in the components tested, the type of fixtures used, the procedure stated in the report, and based on the reported test results, the conclusions arrived at with respect to FMVSS compliance.

Development Supervisor: [redacted] **Date:** [redacted]

COMMENTS: * Data was lost for these stops. Driver asssures that stopping distances were met. TEST AC5752 Was ran at the same test weights and met the targets.

^This portion of the test was reran under AD1018 with updated parking brake components.

[redacted]

Date Created:12/20/98
Date Revised: 01/25/98

LIGHT TRUCK FMVSS 105-75 ROAD TEST SUMMARY OF PERFORMANCE [redacted]

GVW'S FROM 8000 TO 10000 LBS (EXCEPT SCHOOL BUSES)

REFERENCE ENGINEERING TEST PROCEDURE ST-2 AND

ENGINEERING DESIGN STANDARD DD 6.00-151

ORIGINAL

TEST NO.	AC5752	**MODEL YEAR**	2000	**SERIES**	U137	**MODEL**	4X4 **FAMILY** 00-13-K
VEHICLE NO.	316W093	**WHEELBASE**	137in	**ENGINE**	5.4L	**LOADING**	HF (GVW) HF (LL)
WHEELS	16x7	**TIRES**	LT265/75R16 A/T	**TRANS.**	A4OD	**AXLE RATIO**	
FR. BRAKES	DISC-PIN SLID	**SIZE**	2 x 54mm			**ROP VALVE**	EDRP
RR. BRAKES	DISC-PIN SLID	**SIZE**	2 x 44.5mm			**WHEEL CYL.**	
MASTER CY	1 3/8	**SERVICE BRAKE PEDAL RATIO**	5.4:1			**BOOSTER**	HYDRO-BOOST
CONT. VALV	ABS-310P	**PARK BRAKE PEDAL RATIO**				**HAND**	FOOT XX
FRONT LINING INNER/OUTE	ABEX 1222-1A/ABEX 1222-1A					**REAR LINING INNER/OUTER**	ABEX 1222-1A/ABEX 1222-1A
GVWR LOAD	**FRONT/REAR** 4496/4704	**TOTAL**	9200 LBS			**CG HEIGHT**	
LL LOAD	**FRONT/REAR** 4298/3669	**TOTAL**	7967 LBS			**CG HEIGHT**	
TEST DRIVE	APG - YURICEK	**DATE STARTED**	11/19/1998			**DATE COMPLETE**	12/03/1998

TEST OBJECTIVE/PROGRAM : U137 CERT TEST

TEST		REQUIREMENTS (Targets) MAXIMUM STOPPING DISTANCE OR DECELERATION		RESULTS STOP DIST.	RESULTS SKID (XX)	RESULTS MAX P.E	REMARKS
First Effectivenes	30 MPH	72 FT. (64)		49.6		70.6	
	60 MPH	267 FT. (240)		191.2		95.5	
Second Effectivenes	30 MPH	57 FT. (51)		49.0		76.6	
	60 MPH	216 FT. (194)		186.2		115.0	
Parking Bra	20% Grade	Meet Requirements of Section 5.2 Foot 125 lb (112) GV	GVW UP	98.0	DN	101.0	
		Hand 90 lb (81)	LL UP	101.0	DN	100.0	
	Warning Light	Parking Brake Indicator Light Operates	YES	X	NO		
Third Effect.	60 MPH	216 FT. (194)		182.2		55.2	
Partial Systems	60 MPH ROLL	517 FT. (465)		396.0		41.0	
	60 MPH FOLL	517 FT. (465)		273.5		54.2	
	60 MPH ROGV	517 FT. (465)		365.8		59.8	
	60 MPH FOGV	517 FT. (465)		266.0		76.2	
	Warning Light	Warning Light Meets Req. of Section 5.3.1 a (Diff. Press.)	YES		NO		
	Warning Light	Warning Light Meets Req. of Section 5.3.1 b (Fluid Level)	YES	X	NO		
Inoperable Anti-Lock or Proportioning Valve		517 FT. (465)		214.8		42.6	
		Warning Light When Electrical Supply Disconnects	YES	X	NO		
Inoperable Power Assist		517 FT. (465)		384.5		144.8	
First Fade and Recovery	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	24.8	
	Fade Stops	5 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				78.1	
	Recovery Stops	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				29.9	
		5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	15.8/42.8			21.8	
Second Fade and Recovery	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	23.0	
	Fade Stops	10 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				71.7	
	Recovery Stops	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				28.3	
		5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	14/41			22.2	
Fourth Effec	30 MPH	72 FT. (64)		48.1		59.0	
	60 MPH	267 FT. (240)		173.6		66.0	
	80 MPH	510 FT. (459)		322.6		68.7	
Water Recov	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lb.			AVG	26.0	
	Recovery Stop	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lb. (135)				34.0	
	Recovery Stop	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	16.6/66			34.0	
Spike Stops	30 MPH	10 Stops with 200 lb. Pedal Effort Applied Within 0.08 Seconds		X			
ASE	60 MPH	267 FT. (240)		173.6		149.9	
Inspection	Mechanical	Brake Sys. Components Free of Fracture or Detachment	YES	X	NO		
	Fluid	Brake Components Free of Brake Fluid Contamination	YES	X	NO		
	Lights	Brake Warning Light Complies in Operation and Appearan	YES	X	NO		

NOTE: Unless otherwise specified, P.E. limits are 15 to 150 lbs.

I certify that to the best of my knowledge this test was conducted with parts and related systems signed off by the design engineer as representing a design level adequate for certification test.

Development Engineer: [redacted] **Date:** [redacted]

The undersigned is familiar with and concurs in the components tested, the type of fixtures used, the procedure stated in the report, and based on the reported test results, the conclusions arrived at with respect to FMVSS compliance.

Development Supervisor: [redacted] **Date:** [redacted]

COMMENTS:

[redacted]

Date Created:12/30/98
Date Revised: 1/30/99

LIGHT TRUCK FMVSS 105-75 ROAD TEST SUMMARY OF PERFORMANCE

GVW'S FROM 8000 TO 10000 LBS (EXCEPT SCHOOL BUSES)

REFERENCE ENGINEERING TEST PROCEDURE ST-2 AND

ENGINEERING DESIGN STANDARD DD 6.00-151

ORIGINAL

[redacted]

TEST NO.	AC5757	**MODEL YEAR**	2000	**SERIES**	U137	**MODEL**	4X2 **FAMILY** 00-13-J
VEHICLE NO.	316W080	**WHEELBASE**	137in	**ENGINE**	5.4L	**LOADING**	HR (GVW) HR (LL)
WHEELS	16x7	**TIRES**	LT265/75R16 A/T	**TRANS.**	A4OD	**AXLE RATIO**	
FR. BRAKES	DISC-PIN SLID	**SIZE**	2 x 54mm			**ROP VALVE**	EDRP
RR. BRAKES	DISC-PIN SLID	**SIZE**	2 x 44.5mm			**WHEEL CYL.**	
MASTER CY	1 3/8	**SERVICE BRAKE PEDAL RATIO**	4.2:1			**BOOSTER**	VACUUM BOOST 250 TAND
CONT. VALV	ABS-310P	**PARK BRAKE PEDAL RATIO**				**HAND**	**FOOT** XX
FRONT LINING INNER/OUTE	ABEX 1222-1A/ABEX 1222-1A					**REAR LINING INNER/OUTER**	ABEX 1222-1A/ABEX 1222-1A
GVWR LOAD	**FRONT/REAR** 3615/4985	**TOTAL**	8600 Lbs			**CG HEIGHT**	
LL LOAD	**FRONT/REAR** 3447/3471	**TOTAL**	6918 Lbs			**CG HEIGHT**	
TEST DRIVE	APG - CARLEY	**DATE STARTED**	11/19/1998			**DATE COMPLETE**	12/02/1998

TEST OBJECTIVE/PROGRAM : U137 CERT TEST

TEST		REQUIREMENTS (Targets) MAXIMUM STOPPING DISTANCE OR DECELERATION		RESULTS STOP DIST.	RESULTS SKID (XX)	RESULTS MAX P.E	REMARKS
First	30 MPH	72 FT. (64)		49.5		138.0	
Effectivenes	60 MPH	267 FT. (240)		192.0		145.7	
Second	30 MPH	57 FT. (51)		47.6		142.3	
Effectivenes	60 MPH	216 FT. (194)		174.3		144.1	
	20%	Meet Requirements of Section 5.2 Foot 125 lb (112) GV	GVW UP	101.0	DN	100.0	
Parking Bra	Grade	Hand 90 lb (81)	LL UP	90.0	DN	85.0	
	Warning Light	Parking Brake Indicator Light Operates	YES	X	NO		
Third Effect.	60 MPH	216 FT. (194)		170.3		137.3	
	60 MPH ROLL	517 FT. (465)		364.0		138.3	
	60 MPH FOLL	517 FT. (465)		241.0		145.4	
Partial	60 MPH ROGV	517 FT. (465)		352.1		147.5	
Systems	60 MPH FOGV	517 FT. (465)		289.5		144.1	
	Warning Light	Warning Light Meets Req. of Section 5.3.1 a (Diff. Press.)	YES		NO		
	Warning Light	Warning Light Meets Req. of Section 5.3.1 b (Fluid Level)	YES	X	NO		
Inoperable Anti-Lock or		517 FT. (465)		174.1		135.0	
Proportioning Valve		Warning Light When Electrical Supply Disconnects	YES	X	NO		
Inoperable Power Assist		517 FT. (465)		416.8		148.3	
First	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	23.4	
Fade	Fade Stops	5 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				75.6	
and	Recovery	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				30.1	
Recovery	Stops	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	14.4/41.4			21.1	
Second	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	22.5	
Fade	Fade Stops	10 Stops at 15 FPSPS / 5 Stops at 5 to 15 FPSPS				53.0	
and	Recovery	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				23.7	
Recovery	Stops	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	13.5/40.5			21.8	
	30 MPH	72 FT. (64)		46.1		144.9	
Fourth Effec	60 MPH	267 FT. (240)		161.7		138.9	
	80 MPH	510 FT. (459)		305.5		140.2	
	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lb.			AVG	24.3	
Water Recov	Recovery Stop	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lb. (135)				32.6	
	Recovery Stop	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	15.3/64.3			29.8	
Spike Stops	30 MPH	10 Stops with 200 lb. Pedal Effort Applied Within 0.08 Seconds		X			
ASE	60 MPH	267 FT. (240)		168.0		142.4	
	Mechanical	Brake Sys. Components Free of Fracture or Detachment	YES	X	NO		
Inspection	Fluid	Brake Components Free of Brake Fluid Contamination	YES	X	NO		
	Lights	Brake Warning Light Complies in Operation and Appearan	YES	X	NO		

NOTE: Unless otherwise specified, P.E. limits are 15 to 150 lbs.

I certify that to the best of my knowledge this test was conducted with parts and related systems signed off by the design engineer as representing a design level adequate for certification test.

Development Engineer: [redacted] **Date:** [redacted]

The undersigned is familiar with and concurs in the components tested, the type of fixtures used, the procedure stated in the report, and based on the reported test results, the conclusions arrived at with respect to FMVSS compliance.

Development Supervisor: [redacted] **Date:** [redacted]

COMMENTS:

[redacted]

Date Created:12/30/98
Date Revised: 1/30/99

Similar F-Series System ORIGINAL

LIGHT TRUCK FMVSS 105-75 ROAD TEST SUMMARY OF PERFORMANCE
GVW'S OVER 10000 LBS (EXCEPT SCHOOL BUSES)
REFERENCE ENGINEERING TEST PROCEDURE ST-22 AND
ENGINEERING DESIGN STANDARD DD 6.00-151

[redacted]

TEST NO.	AA1781	**MODEL YEAR**	1999	**SERIES**	F-350 4x2 DRW	**MODEL**	S/Cab **FAMILY** 99-18-B
VEHICLE NO.	308W281	**WHEELBASE**	158"	**ENGINE**	5.4L	**LOADING**	HR(GVW) HR (LL)
WHEELS	16x6	**TIRES**		**TRANS.**	E4OD	**AXLE RATIO**	
FR. BRAKES	DISC- PIN SLIDER	**SIZE**	2 x 54mm			**PROP VALVE**	EDRP
RR. BRAKES	DISC- PIN SLIDER	**SIZE**	2 X 44.5mm			**WHEEL CYL.**	
MASTER CYL	1 3/8	**SERVICE BRAKE PEDAL RATIO**	4.2:1			**BOOSTER**	Vacuum - 250mm Tandem
CONT. VALVE	ABS- 310P	**PARK BRAKE PEDAL RATIO**				**HAND**	**FOOT** XX
FRONT LINING INNER/OUTER	ABEX 1222-1A/ABEX 1222-1A					**REAR LINING INNER/OUTER**	ABEX 1222-1A/ABEX 1222-1A
GVWR LOAD **FRONT/REAR**	3338/7915	**TOTAL**	11253 LBS			**CG HEIGHT**	
LL LOAD **FRONT/REAR**	3375/2899	**TOTAL**	6274 LBS			**CG HEIGHT**	
TEST DRIVER	APG - Porterfield	**DATE STARTED**	5/7/97			**DATE COMPLETE**	5/14/97

TEST OBJECTIVE/PROGRAM : PHN 131 CERT TEST

TEST		REQUIREMENTS (Targets) MAXIMUM STOPPING DISTANCE OR DECELERATION		RESULTS STOP DIST.		RESULTS MAX P.E	REMARKS
First Effectiveness	30 MPH	88/N/R FT. (79/ N/A)		54.8		141.4	
	60 MPH	388/N/R FT. (349/ N/A)		209.3		137.9	
Second Effectiveness	30 MPH	81/70 FT. (72/63)		52.9		140.5	
	60 MPH	388/280 FT. (349/252)		200.7		145.0	
Parking Brake	20% Grade	Meet Requirements of Section 5.2	GVW UP	93.0	DN	95.0	Held 30% also
			LL UP	82.0	DN	89.0	" "
	Warning Light	Parking Brake Indicator Light Operates	YES	X	NO		
Third Effect.	60 MPH	N/R /280 (349/252)		169.4		104.5	
Partial Systems	60 MPH ROLL	613 FT. (551)		393.4		109.2	
	60 MPH FOLL	613 FT. (551)		251.9		100.3	
	60 MPH ROGVW	613 FT. (551)		449.2		144.2	
	60 MPH FOGVW	613 FT. (551)		414.0		139.0	
	Warning Light	Warning Light Meets Req. of Section 5.3.1 a (Diff. Pres	YES		NO		
	Warning Light	Warning Light Meets Req. of Section 5.3.1 b (Fluid Lev	YES	X	NO		
Inoperable Anti-Lock or Proportioning Valve		613 FT. (551)		243.7		78.9	
		Warning Light When Electrical Supply Disconnects	YES	X	NO		
Inoperable Power Assist		613 FT. (551)		494.2		146.8	
First Fade and Recovery	Check Stops	3 Snubs from 40 to 20 MPH at 10 FPSPS			AVG	27.4	
	Fade Stops	10 Snubs from 40 to 20 MPH at 10 FPSPS				35.9	
	Recovery Stops	4 Snubs at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				23.5	
		5th Snub at 10 FPSPS / P.E. Limits (min/max) lbs.	17.5/45.4			21.3	
Second Fade and Recovery	Check Stops	3 Snubs at 10 FPSPS / Pedal Effort 10 to 60 lbs.			AVG	27.5	
	Fade Stops	20 Snubs from 40 to 20 MPH at 10 FPSPS				39.0	
	Recovery Stops	4 Snubs at 10 FPSPS / Pedal Effort 5 to 150 lbs. (135)				25.3	
		5th Snub at 10 FPSPS / P.E. Limits (min/max) lbs.	17.6/45.5			26.7	
Water Recover	Check Stops	3 Stops at 10 FPSPS / Pedal Effort 10 to 60 lb.			AVG	28.1	
	Recovery Stop	4 Stops at 10 FPSPS / Pedal Effort 5 to 150 lb. (135)				40.7	
	Recovery Stop	5th Stop at 10 FPSPS / P.E. Limits (min/max) lbs.	18.0/82.1			36.9	
Inspection	Mechanical	Brake Sys. Components Free of Fracture or Detachment	YES	X	NO		
	Fluid	Brake Components Free of Brake Fluid Contamination	YES	X	NO		
	Lights	Brake Warning Light Complies in Operation and Appeara	YES	X	NO		

NOTE: Unless otherwise specified, P.E. limits are 15 to 150 lbs.

I certify that to the best of my knowledge this test was conducted with parts and related systems signed off by the design engineer as representing a design level adequate for certification test.

Development Engineer: [redacted] **Date:** [redacted]

The undersigned is familiar with and concurs in the components tested, the type of fixtures used, the procedure stated in the report, and based on the reported test results, the conclusions arrived at with respect to FMVSS compliance.

Development Supervisor: [redacted] **Date:** [redacted]

COMMENTS:

[redacted]

Date Created: 2/17/97
Date Revised: 2/17/97

FMVSS - 105 Light Truck Requirements
(Ford Targets)

Test Procedure	Test Requirements 4/	Load	Test Sequence	MPH	Maximum Stopping Distance or Deceleration 8,000 to 10,000 lbs GVW
S7.3	S5.1.1.1	GVW	First Effect (Pre-burnish) 3/	30	69 ft (62) 1/ ; 72 ft (64)
				60	267 ft (240)
S7.4		GVW	Burnish		200 stops from 40 mph at 12 fpsps
S7.5	S5.1.1.2	GVW	Second Effectiveness 3/	30	57 ft (51)
				60	216 ft (194)
S7.6		GVW	First Reburnish		35 stops from 40 mph at 12 fpsps
S7.7	S5.2	GVW & LL	Parking Brake	Key Release	Trans. in park pos to release key (report applicable type)
				Uphill/Downhill	20% grade - 5 min 125# (112) foot / 90# ((81) hand
					30% grade - 5 min 125# (112) foot / 90# ((81) hand 1/
				Light	Parking brake indicator light operates (report function)
S7.8	S5.1.1.3	LL	Third Effectiveness 3/	60	242 ft (217)
S7.9	S5.1.2	LL	Partial System	Roll 60	517 ft (465)
		LL		Foll 60	517 ft (465)
		GVW		ROGVW 60	517 ft (465)
		GVW		FOGVW 60	517 ft (465)
	S5.3.1			Warning light	225 (202) psi line pressure or 25# (22) power; 50# (45) manual max P.E. or min. fluid level
	S5.5/5.1.2	GVW	Inop Anti-lock & Var Prop	60	517 ft (465)
	S5.3.1(c)		Warning Light - A/lock or PV		Anti-lock warning lamp opeation (report function)
S7.10	S5.1.3.1	GVW	Inoperable Power Assist	60	517 ft (465)
S7.11	S5.1.4	GVW	First Fade & Recovery	Check (A)	3 stops at 10 fpsps from 30 mph, 10/60# P.E. (comply)
				Fade	5 stops at 15 fpsps + 5 stops at 5/15 fpsps from 60 mph:
					150# (135) max P.E.
				Recovery	4 stops at 10 fpsps from 30 mph: 150 # (135) max P.E.
					5th stop at 10 fpsps from 30 mph
					Max P.E. = avg check (A) + 20 # (18)
					Min P.E. = avg check (A) - 10 # (-9) 2/
					Min. P.E. = avg check (A) x 60% 2/
					Min. P.E. = not less than 5 #
S7.12		GVW	Second Reburnish		35 stops from 40 mph at 12 fpsps
S7.13	S5.1.4	GVW	Second Fade & Recovery	Check (B)	3 stops at 10 fpsps from 30 mph, 10/60# P.E. (comply)
				Fade	10 stops at 15 fpsps + 5 stops at 5/15 fpsps from 60 mph:
					150 # (135) max P.E.
				Recovery	4 stops at 10 fpsps from 30 mph; 150# (135) max P.E.
					5th stop at 10 fpsps from 30 mph
					Same as first recovery except use check (B)
S7.14		GVW	Third Reburnish		35 stops from 40 mph at 12 fpsps
S7.15	S5.1.1.4	GVW	Fourth Effectiveness 3/	30	65 ft (58) 1/ ; 72 ft (64)
				60	267 ft (240)
				80	510 ft (459)
S7.16	S5.1.5	GVW	Water recovery	Check (C)	3 stops at 10 fpsps from 30 mph; 10/60 # P.E. (comply)
				Soak	2 min at 5 mph forward and/or reverse in 6" of water
				Recovery	4 stops at 10 fpsps from 30 mph: 150# (135) max P.E.
					5th stop at 10 fpsps from 30 mph
					Max. P.E. = avg check (C) + 45 # (40)
					Max. P.E. = not more than 90 # (81)
					Min. P.E. = avg check (C) - 10 # (-9) 2/
					Min. P.E. = avg check (C) x 60% 2/
					Min. P.E. = not less than 5 #
S7.17	S5.1.6	GVW	Spike	30	10 successive stops at 200 # P.E.
			After spike effectiveness 3/	60	267 ft (240)
S7.18	S5.6	GVW	Inspection	Mechanical	No brake system component fractured or detached (comply)
				Fluid	No fluid leakage on brake component (comply)
				Master Cylinder	Sufficient reservoir volume; correct label (comply)
				Light	Brake waring light operation & appearance (comply)

1/ Applicable to school bus only. School bus must also meet other non-school bus requirements

2/ The minimum P.E. allowable is the lowest of these two values.

3/ All effectiveness tests, except 80 mph, consist of six stops from speed indicated.
At least one stop must meet stopping distance requirements (80 mph has 4 stops).

[redacted]

Date Created: 01/07/99
Date Revised: 01/25/99

2000 F-Series and Large Utility
F-250/350/450/550 and Utility (O) 8500# GVW BRAKE SYSTEM FAMILIES

Brake Family	Cert Test	Prod. Date	Veh. Description	FRONT BRAKES			REAR BRAKES			ABS / ACTUATION	
				Caliper	Rotor	Lining	Disc/Drum	Rotor/Drum	Lining	ABS	Booster/M.C./Ratio
2000-13-A	FMVSS 105	Aug-99	F-250/350 4x2 & 4x4 SRW w/Gas Eng. 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	RABS - ZWAL	250mmT/1.375 in/4.2:1
2000-13-B	FMVSS 105	Aug-99	F-250/350 4x2 & 4x4 SRW with Gas Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	250mmT/1.375 in/4.2:1
2000-13-C	FMVSS 105	Aug-99	F-250/350 4x2 & 4x4 SRW w/Diesel Eng. 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	RABS - ZWAL	Hydr./1.375in/5.4:1
2000-13-D	FMVSS 105	Aug-99	F-250/350 4x2 & 4x4 SRW with Diesel Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	Hydr./1.375in/5.4:1
2000-13-E	ECE R13 N2	Aug-99	F-250 4x2 SRW 121" W/B South Am with Gas Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	DSSA 1.125" W/Cyl.	Drum 12 x 3.0	Abex 1143 -155/162	RABS - SWAL	250mmT/1.250 in/4.2:1
2000-13-F	ECE R13 N2	Aug-99	F-250/350 4x2 SRW 121 &141" W/B South Am with Diesel Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	DSSA 1.125" W/Cyl.	Drum 12 x 3.0	Abex 1143 -155/162	RABS - SWAL	Hydr./1.250 in/5.4:1
2000-13-G	ECE R13 N2	Aug-99	F-250 4x2 SRW 121" W/B South Am with Gas Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	250mmT/1.375 in/4.2:1
2000-13-H	ECE R13 N2	Aug-99	F-250 4x2 SRW 121" W/B South Am with Diesel Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	Hydr./1.375in/5.4:1
2000-13-J	FMVSS 105	Aug-99	F-250 Heavy Duty Wagon 4x2 & 4x4 SRW with Gas Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	250mmT/1.375 in/4.2:1
2000-13-K	FMVSS 105	Aug-99	F-250 Heavy Duty Wagon 4x2 & 4x4 SRW with Diesel Engines 8,500 < GVW < 10,000	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	Hydr./1.375in/5.4:1

NOTE : Hyroboost is used on all vehicles with diesel engines; all DRW vehicles with gas engines and GVW'S > 12,000#; and all Chassis cabs except Mexico.

2000 F-Series and Large Utility
F-250/350/450/550 and Utility (O) 8500# GVW BRAKE SYSTEM FAMILIES

Brake Family	Cert Test	Prod. Start Date	Veh. Description	FRONT BRAKES			REAR BRAKES			ABS / ACTUATION	
				Caliper	Rotor	Lining	Disc/Drum	Rotor/Drum	Lining	ABS	Booster/M.C./Ratio
2000-13-L	ECE R13 N1	Aug-99	F-250 4x2 SRW 121" W/B South Am with Gas Engines 7700 GVW	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	DSSA 1.125" W/Cyl.	Drum 12 x 3.0	Abex 1143 -155/162	RABS - SWAL	250mmT/1.250 in/4.2:1
2000-13-M	ECE R13 N1	Aug-99	F-250/350 4x2 SRW 121 &141" W/B South Am with Diesel Engines 7700 GVW	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	DSSA 1.125" W/Cyl.	Drum 12 x 3.0	Abex 1143 -155/162	RABS - SWAL	Hydr./1.250 in/5.4:1
2000-13-N	ECE R13 N1	Aug-99	F-250 4x2 SRW 121" W/B South Am with Gas Engines 7700 GVW	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	250mmT/1.375 in/4.2:1
2000-13-O	ECE R13 N1	Aug-99	F-250 4x2 SRW 121" W/B South Am with Diesel Engines 7700 GVW	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	Hydr./1.375in/5.4:1
2000-16-A	FMVSS 105	Aug-99	F-350 4x2 & 4x4 DRW - Mexico & Venezuela Gas Engines only Chassis Cabs only 11,200# GVW only	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	DSSA 1.188" W/Cyl. F-Series Brake	Drum 12 1/8 x 3.5	BBA Pri - 1001T Sec - 1002T	400/.59 PROP	250mmT/1.250 in/4.2:1
2000-18-A	FMVSS 105	Aug-99	F-350 4x2/4x4 DRW All Chassis Cabs & Diesel Engines All Gas Engines with GVW's>11200#	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	Hydr./1.375in/5.4:1
2000-18-B	FMVSS 105	Aug-99	F-350 4x2/4x4 DRW Pick-ups with Gas Engines 10,000 < GVW ≤ 11,200	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2x44.5mm	326mm x 30mm	Abex 1222-1A Semi-Met	4WABS w/Elec. Prop	250mmT/1.375 in/4.2:1
2000-24-A	FMVSS 105	Aug-99	F-Super Duty - USA 15,000 < GVW ≤ 19,500	Disc 2x60mm	369 mm x 38 mm	PMI 3001 Semi-Met	Disc 2x60mm	395mm x 38mm	PMI 3001 Semi-Met	4WABS w/Elec. Prop	Hydr./1.375in/5.4:1
2000-24-B	ECE R13	Aug-99	F-Super Duty - South America 15,000# GVW only	2-54mm Pin-slider	331mm x 38mm	Abex 1222-1A Semi-Met	Disc 2-54mm	331mm x 38mm	Abex 1222-1A Semi-Met	RABS - ZWAL	Hydr./1.375in/5.4:1

NOTE : Hyroboost is used on all vehicles with diesel engines; all DRW vehicles with gas engines and GVW'S > 12,000#; and all Chassis cabs except Mexico.