

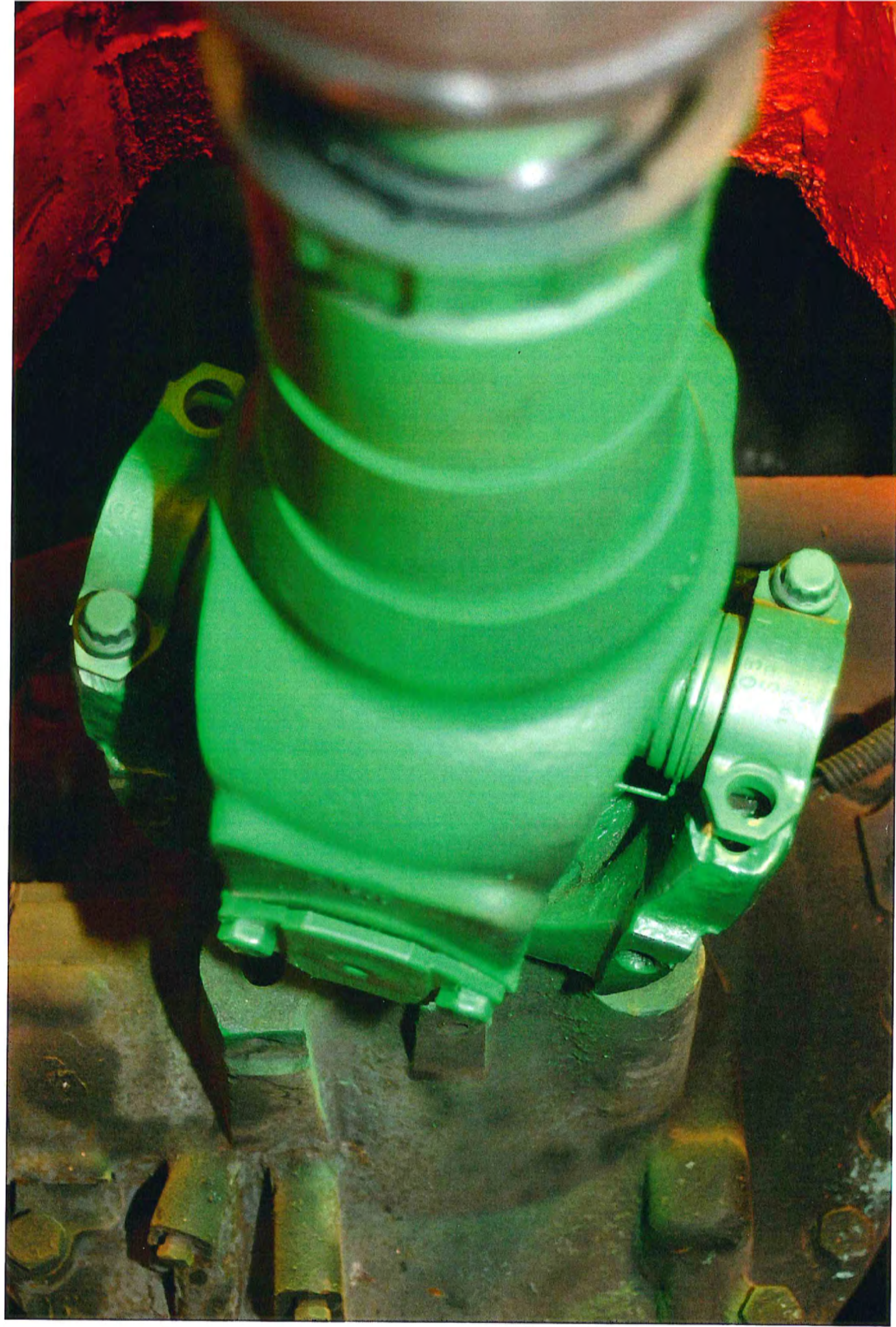
PE12-007

MCI

4-27-2012

Response 10

Attachment A-1



Attachment A-1

PE12-007

MCI

4-27-2012

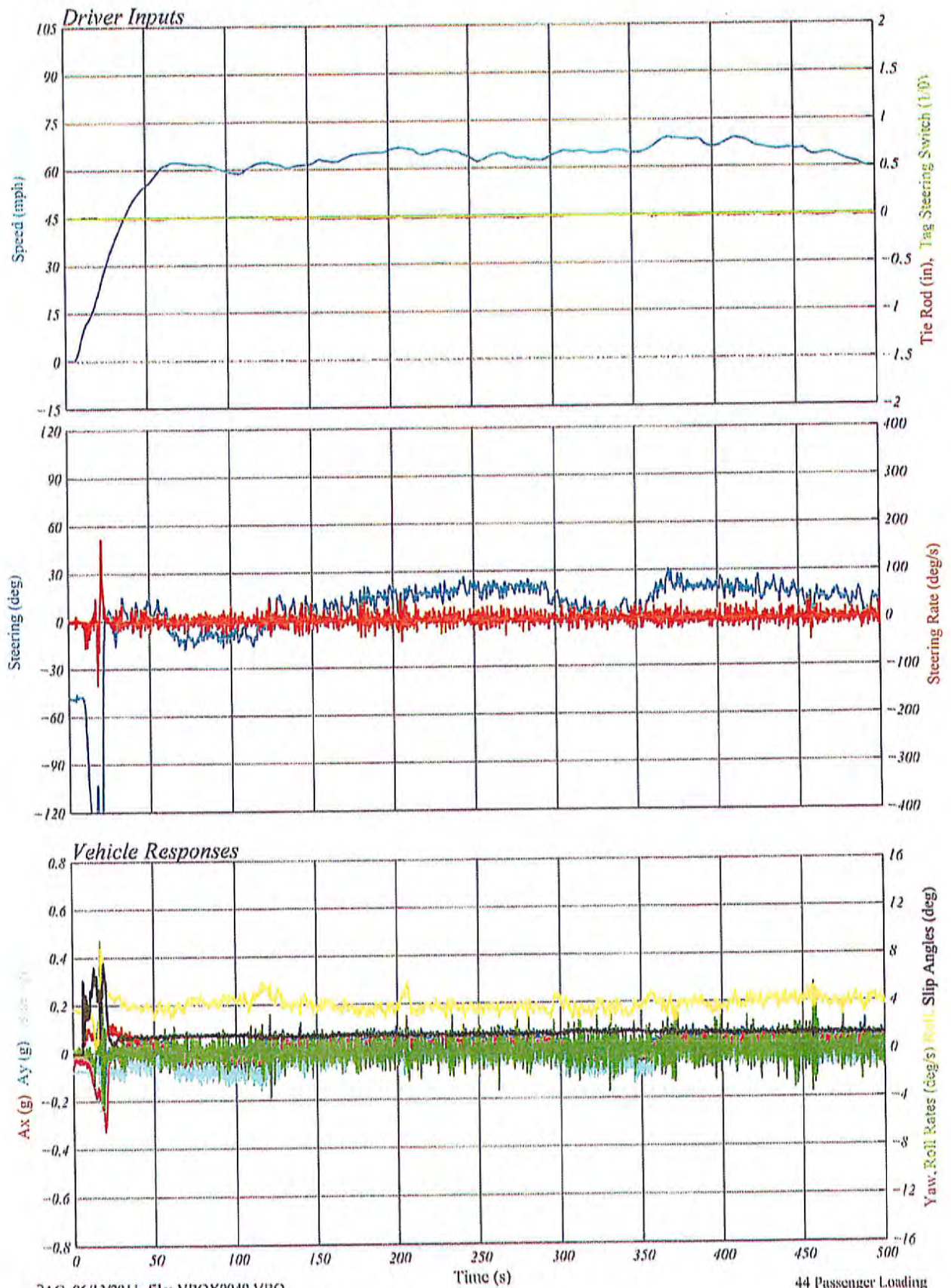
Response 10

Attachment A-2

Test: 48

1995 MCI 102DL3

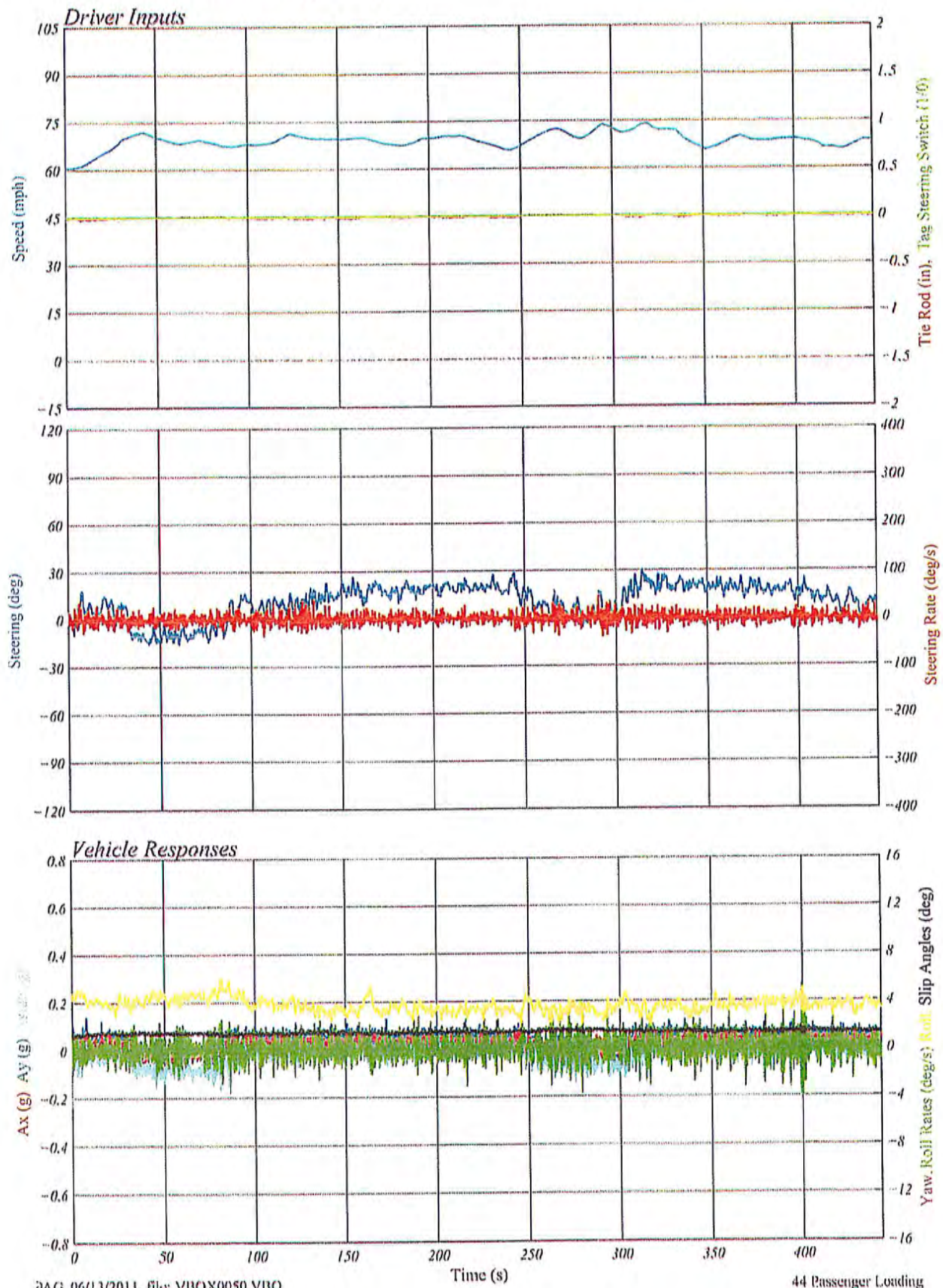
Modified U-Joint Bearing – Lap 1



Test: 49

1995 MCI 102DL3

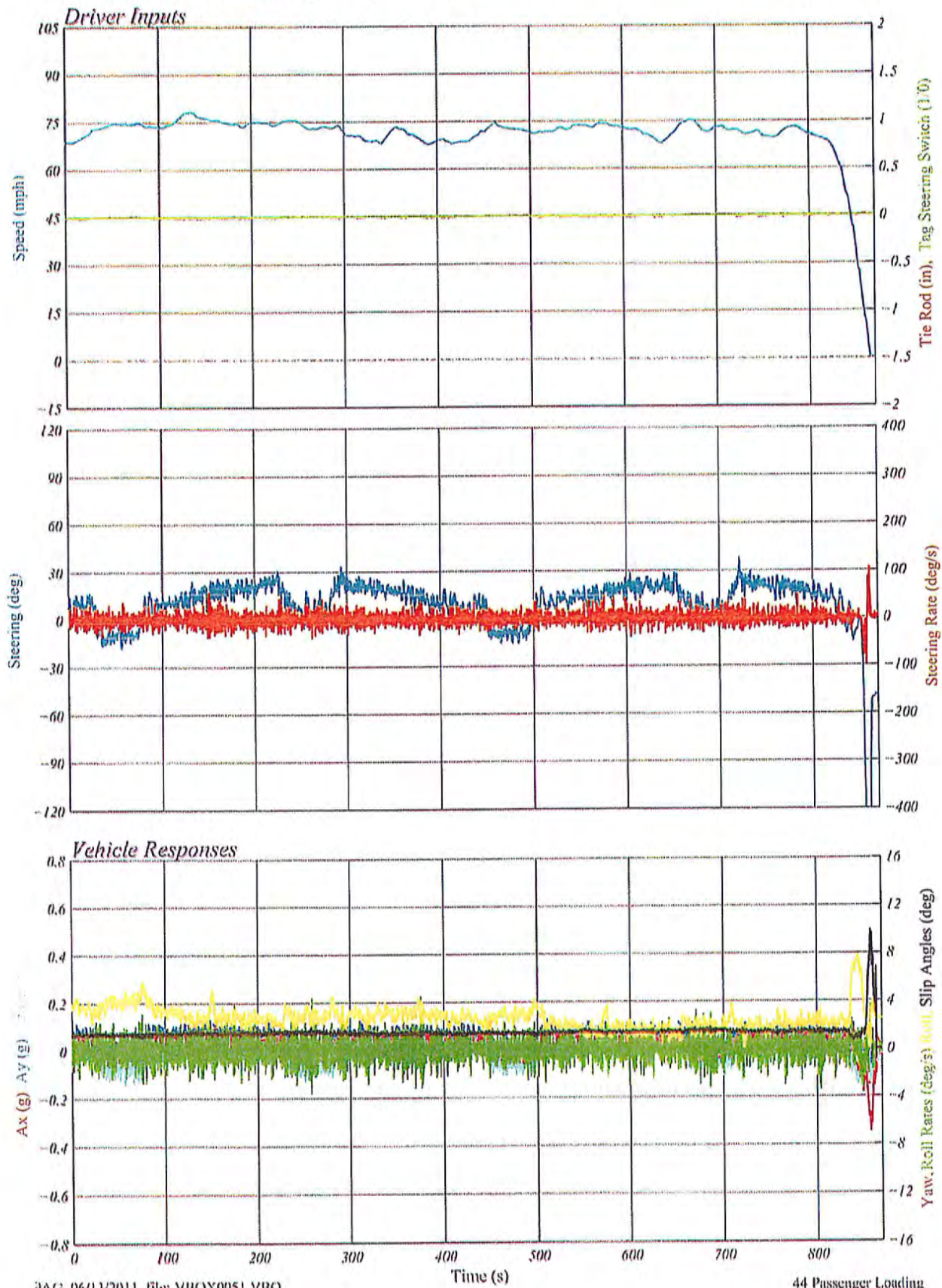
Modified U-Joint Bearing – Lap 2



Test: 50

1995 MCI 102DL3

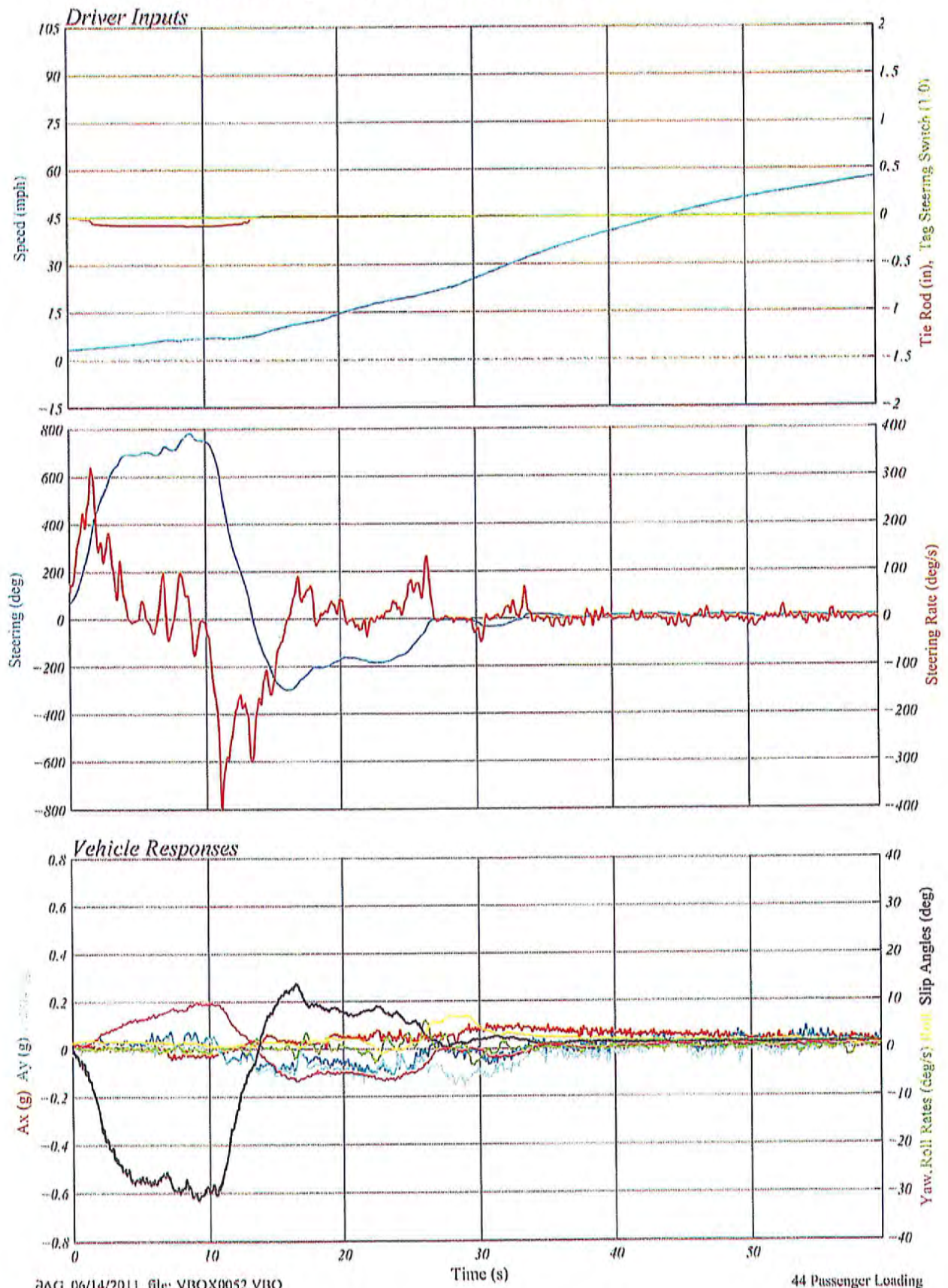
Modified U-Joint Bearing – Laps 3 and 4



Test: 51

1995 MCI 102DL3

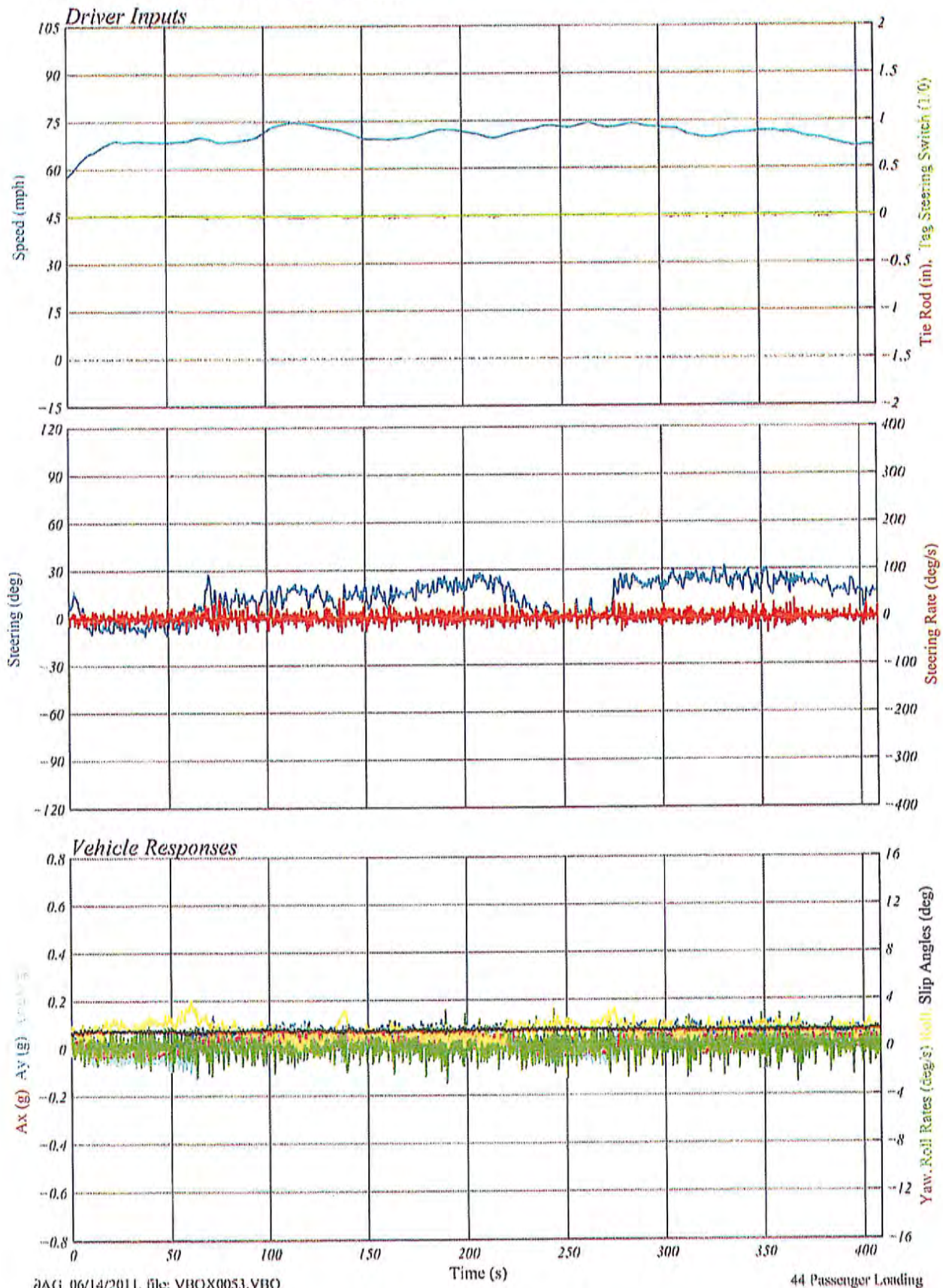
Modified U-joint Bearing – Lap 5, Incomplete Data



Test: 52

1995 MCI 102DL3

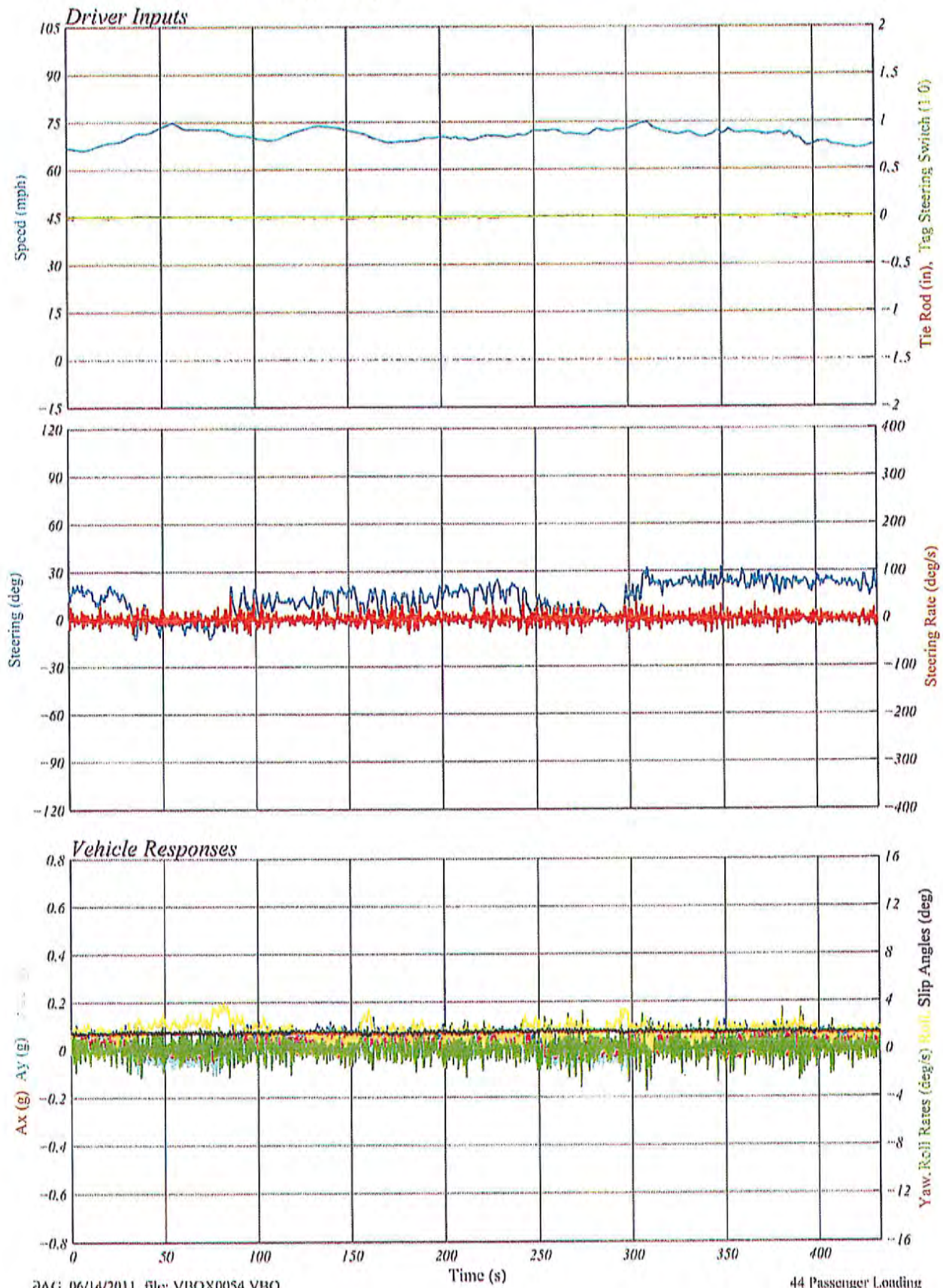
Modified U-joint Bearing – Lap 6



Test: 53

1995 MCI 102DL3

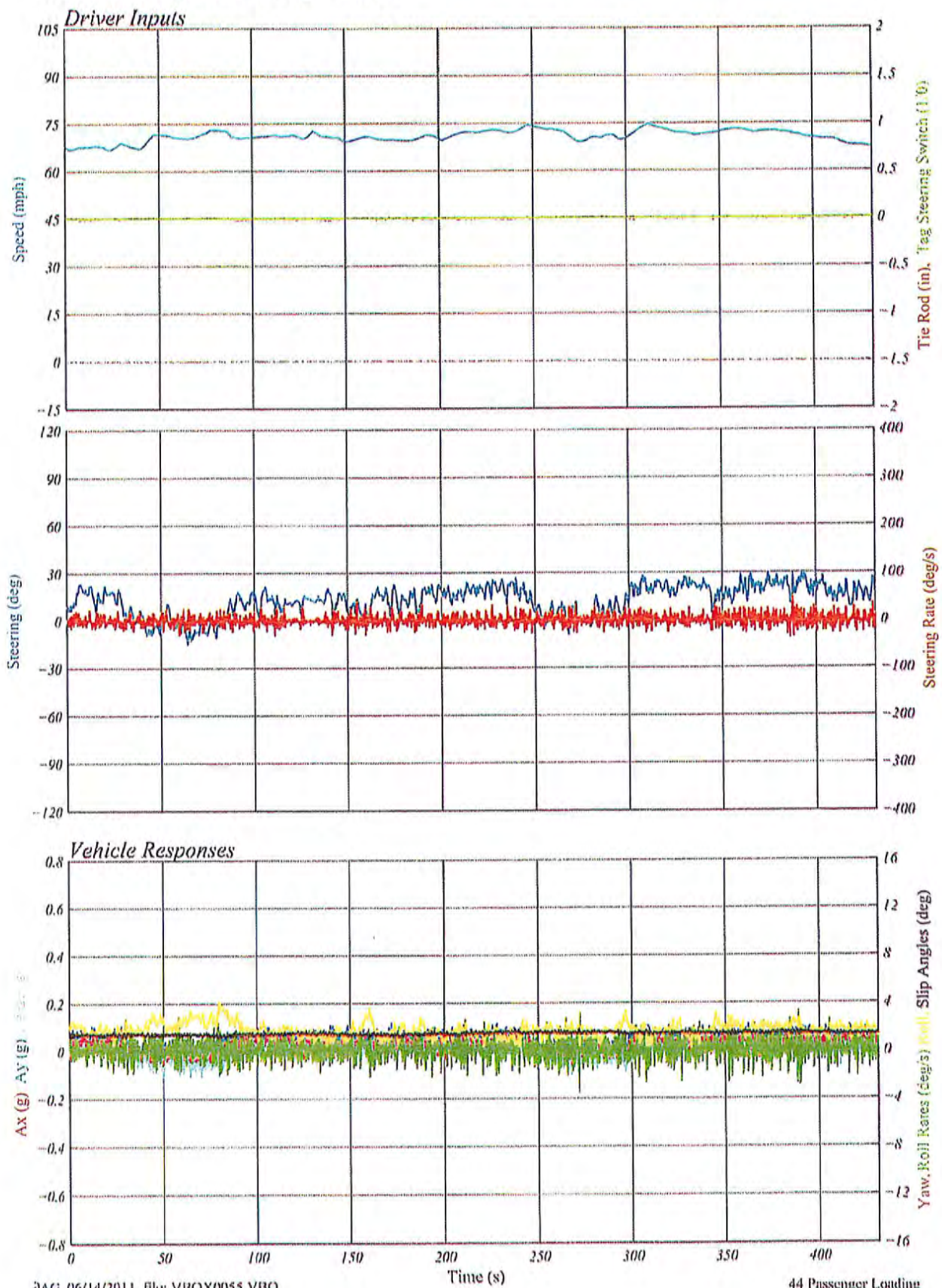
Modified U-joint Bearing - Lap 7



Test: 54

1995 MCI 102DL3

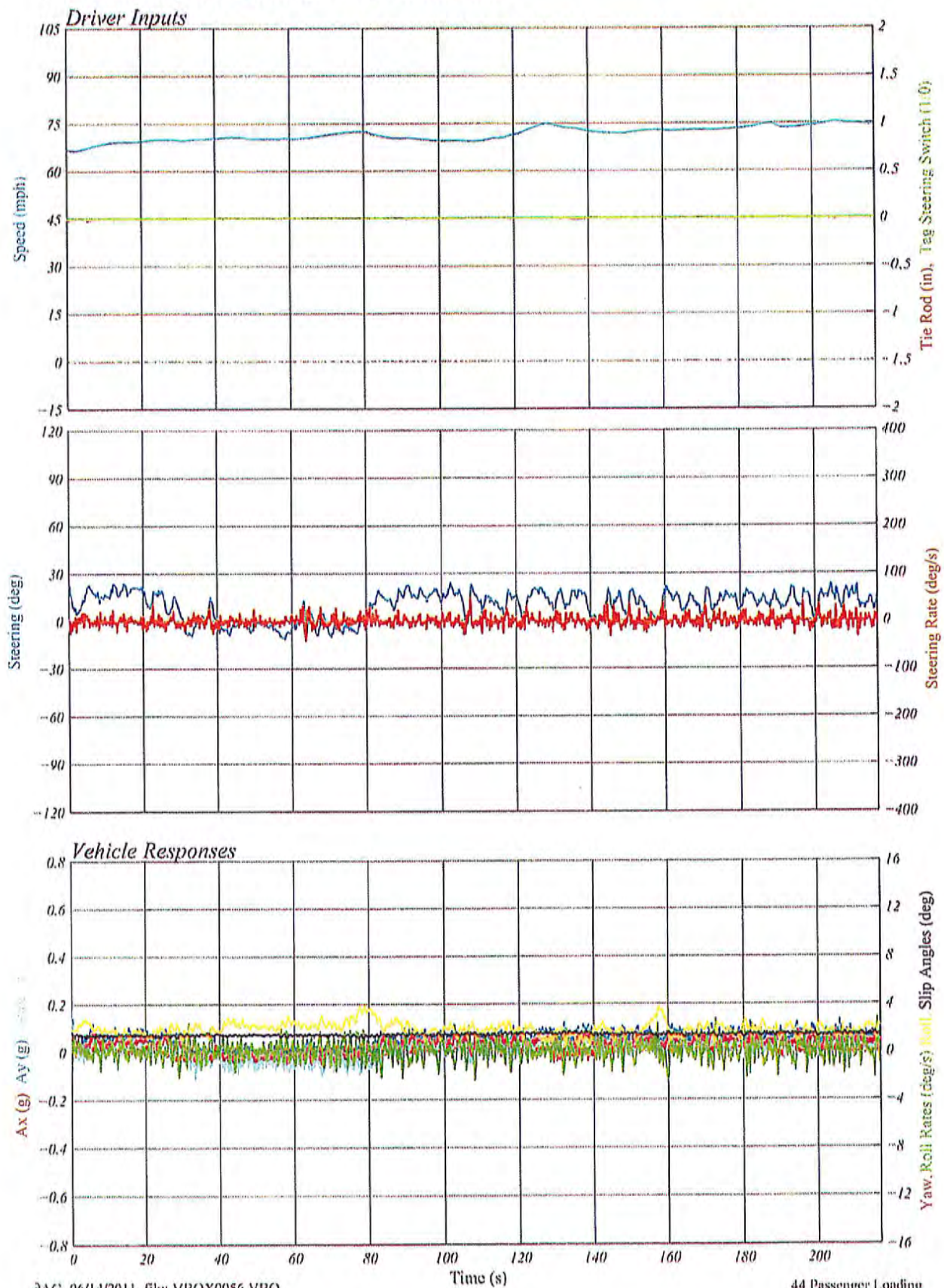
Modified U-joint Bearing – Lap 8



Test: 55

1995 MCI 102DL3

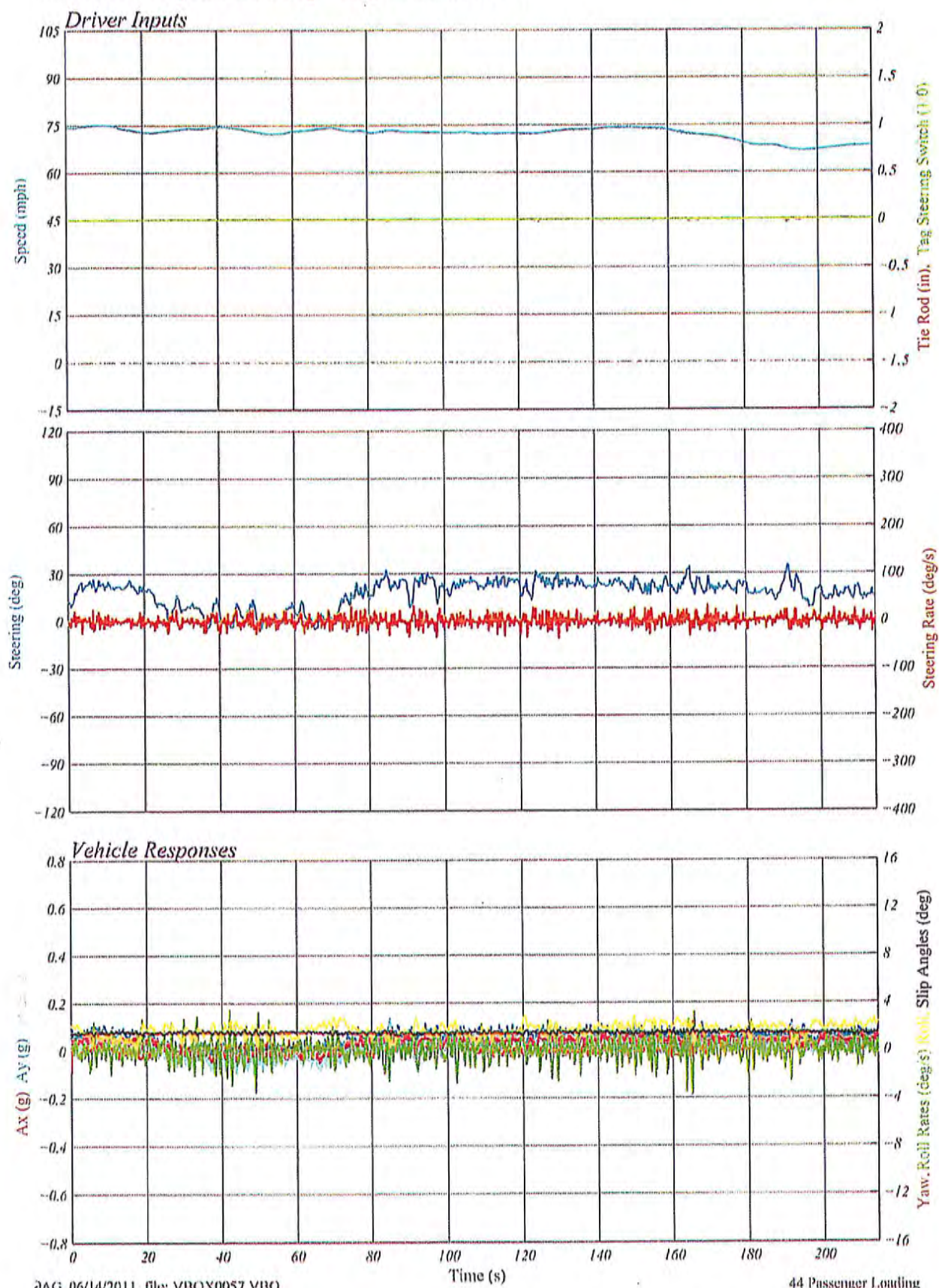
Modified U-joint Bearing – Lap 9, first half



Test: 56

1995 MCI 102DL3

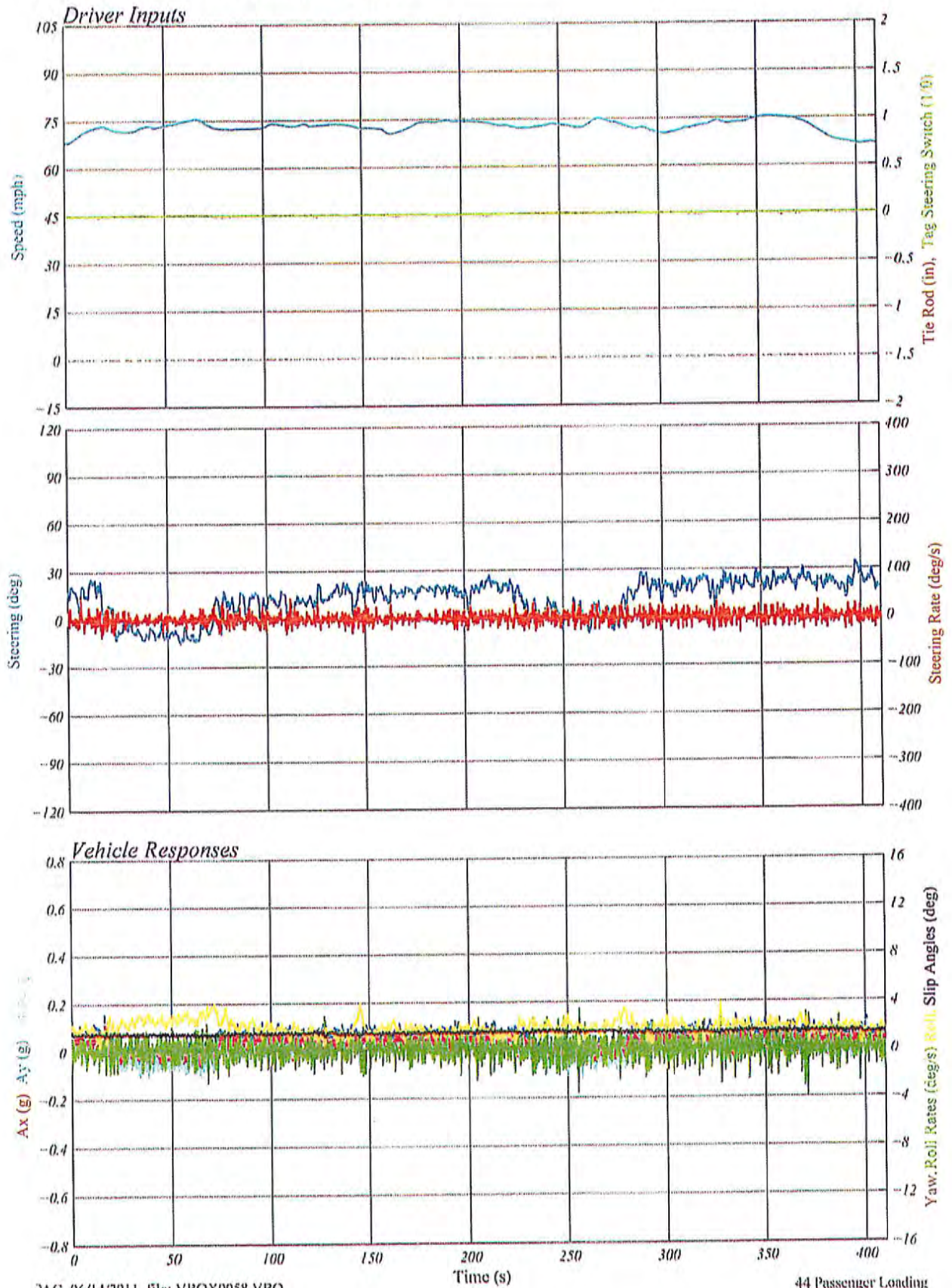
Modified U-joint Bearing -- Lap 9, second half



Test: 57

1995 MCI 102DL3

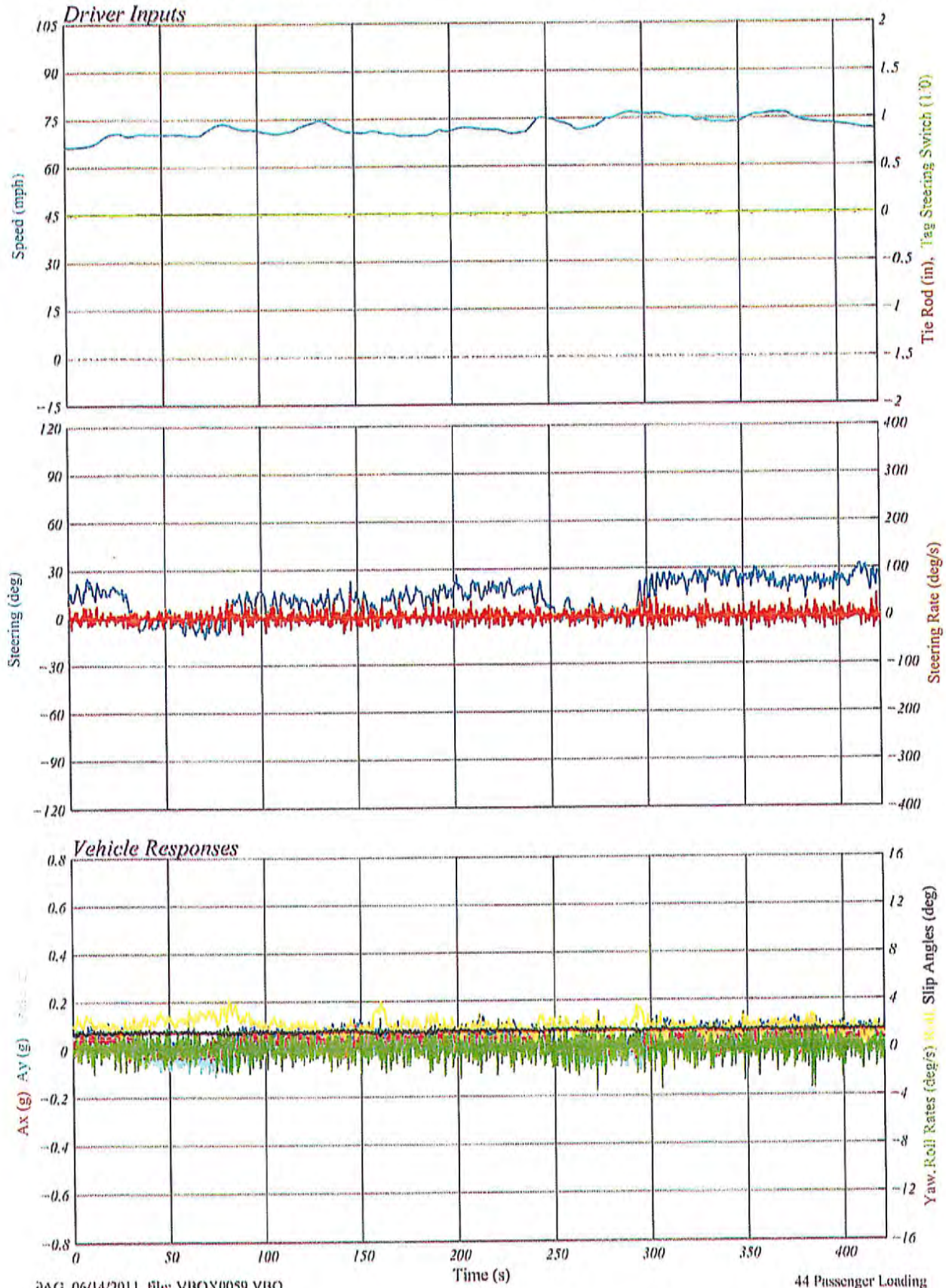
Modified U-joint Bearing – Lap 10



Test: 58

1995 MCI 102DL3

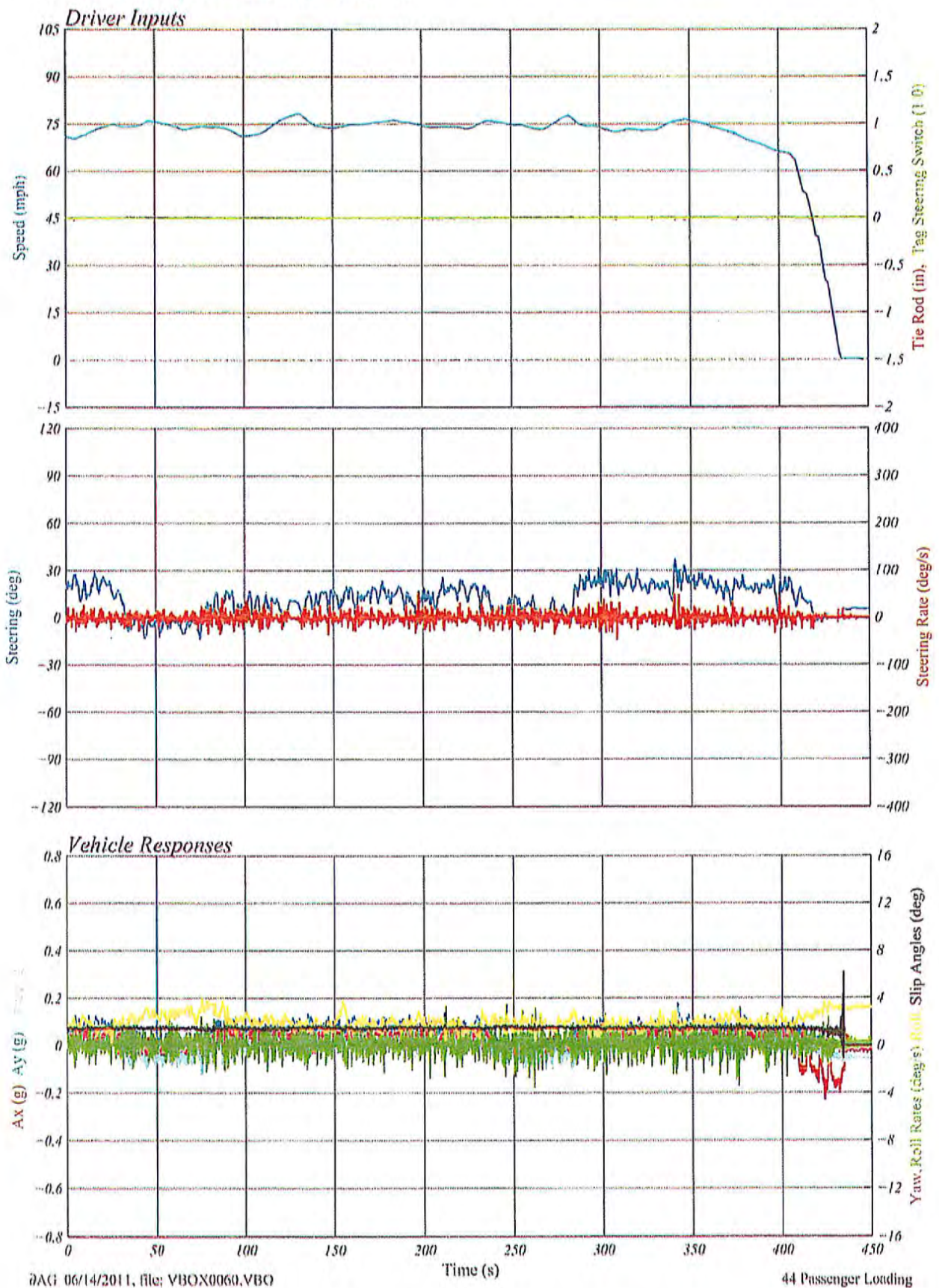
Modified U-joint Bearing – Lap 11



Test: 59

1995 MCI 102DL3

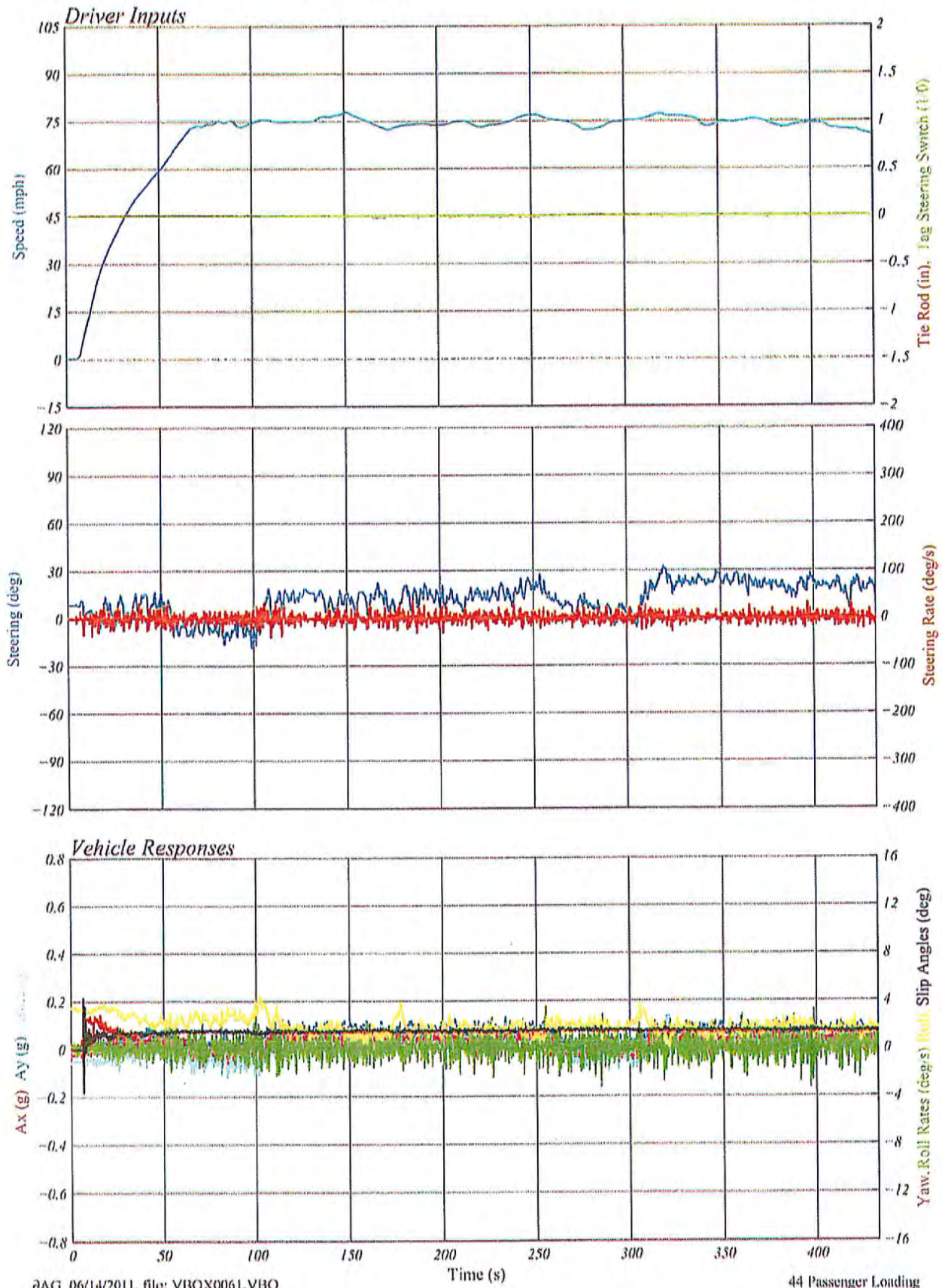
Modified U-joint Bearing – Lap 12



Test: 60

1995 MCI 102DL3

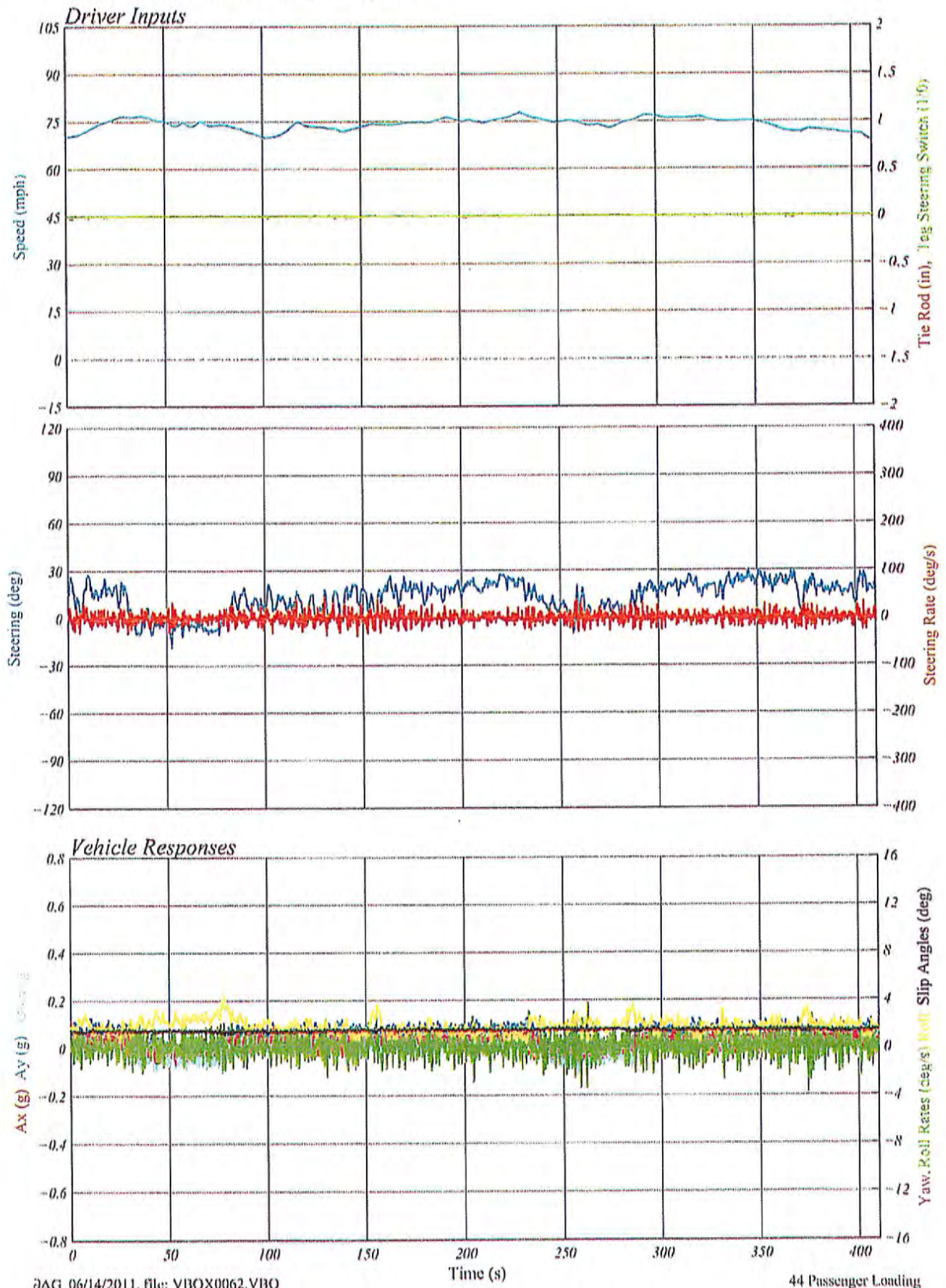
Modified U-joint Bearing – Lap 13



Test: 61

1995 MCI 102DL3

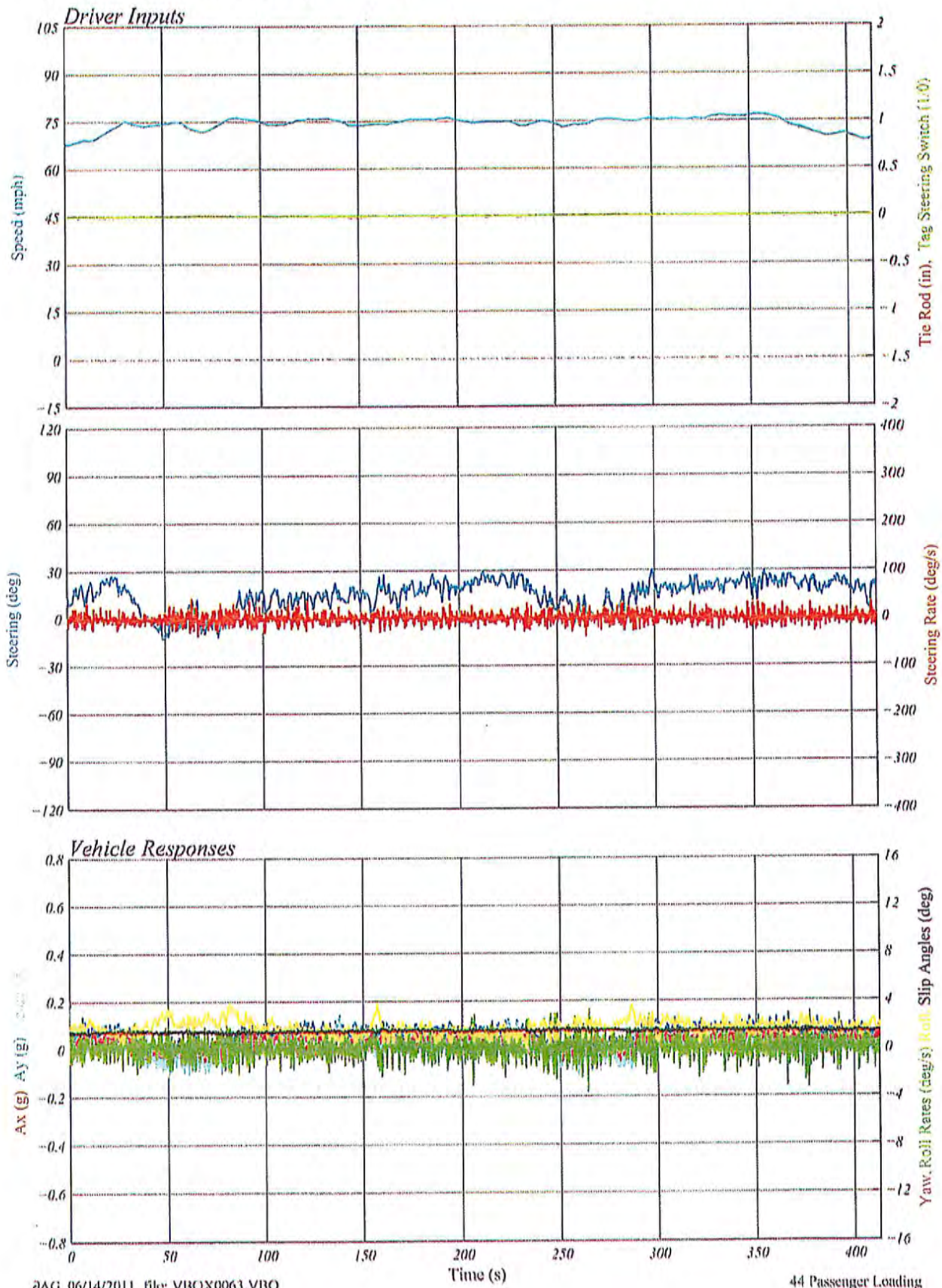
Modified U-joint Bearing – Lap 14



Test: 62

1995 MCI 102DL3

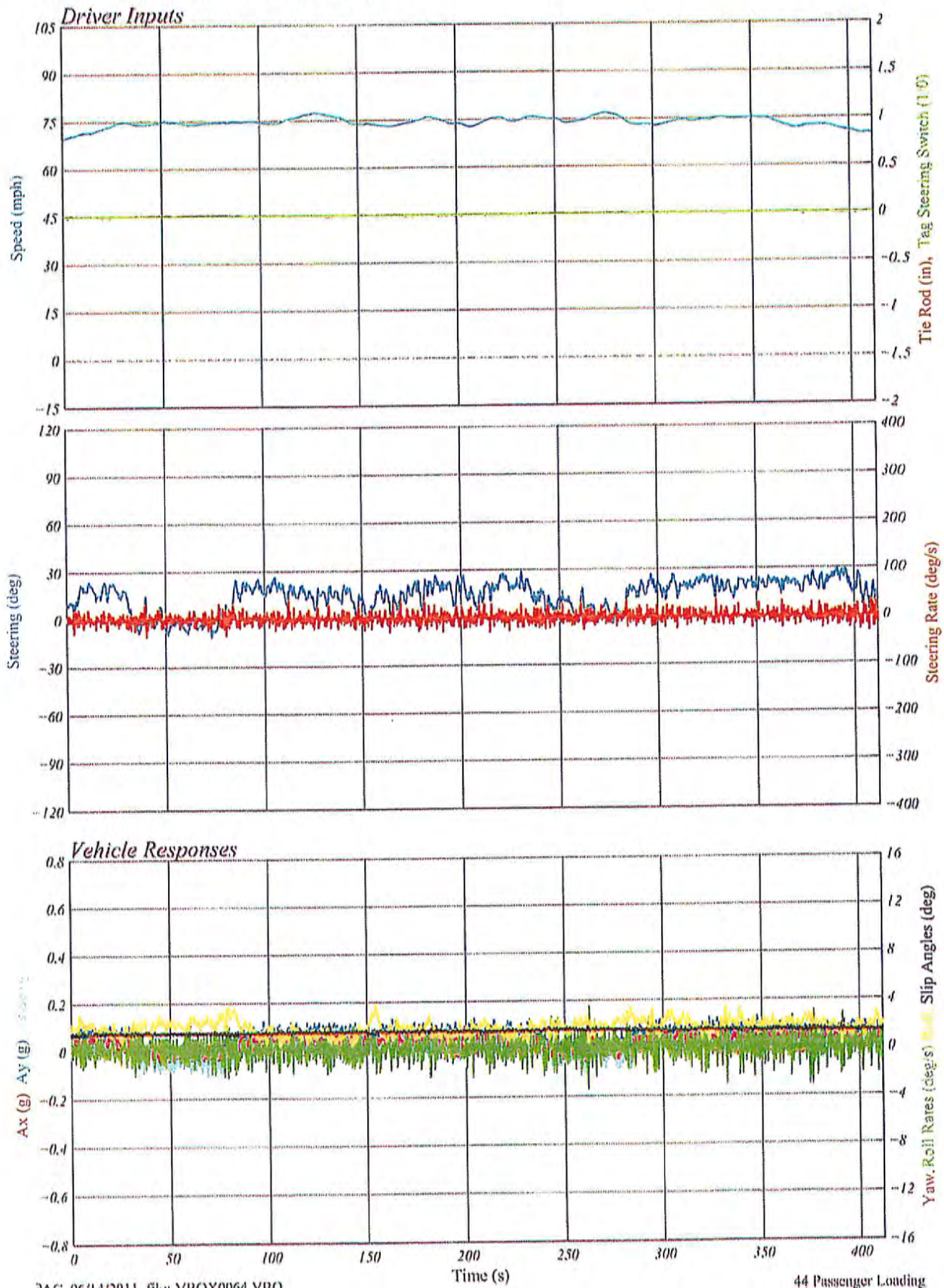
Modified U-joint Bearing – Lap 15



Test: 63

1995 MCI 102DL3

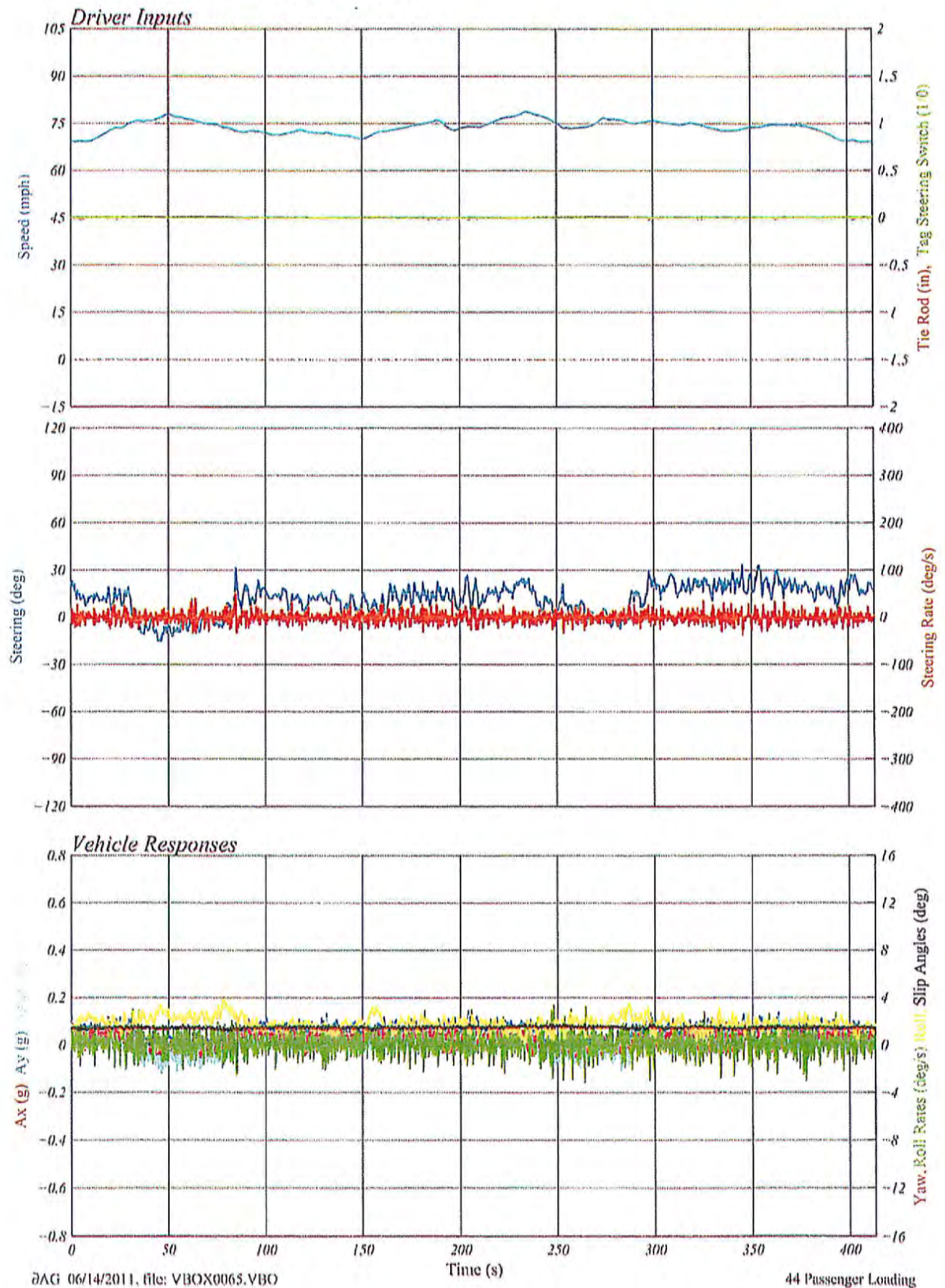
Modified U-joint Bearing – Lap 16



Test: 64

1995 MCI 102DL3

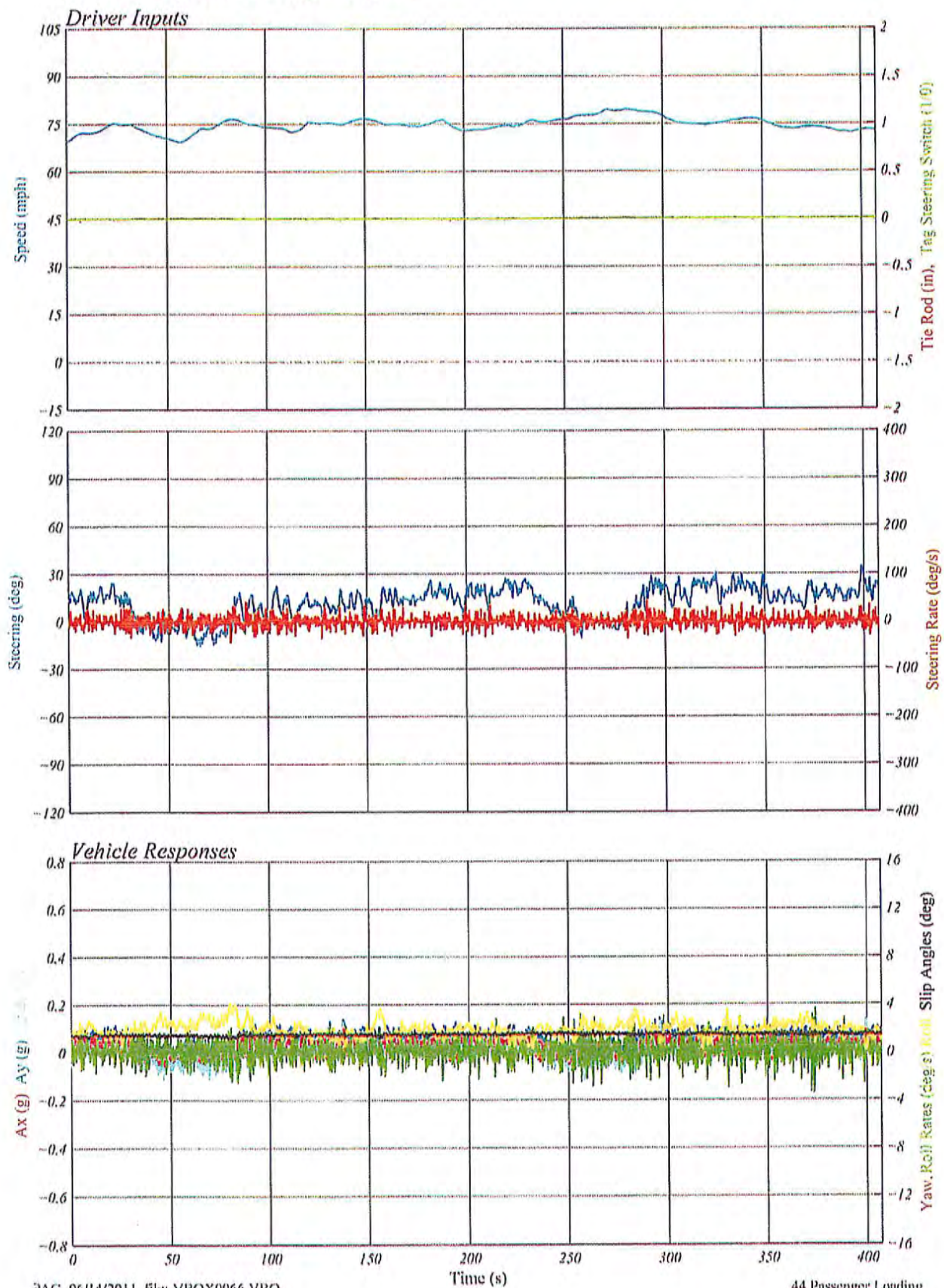
Modified U-joint Bearing – Lap 17



Test: 65

1995 MCI 102DL3

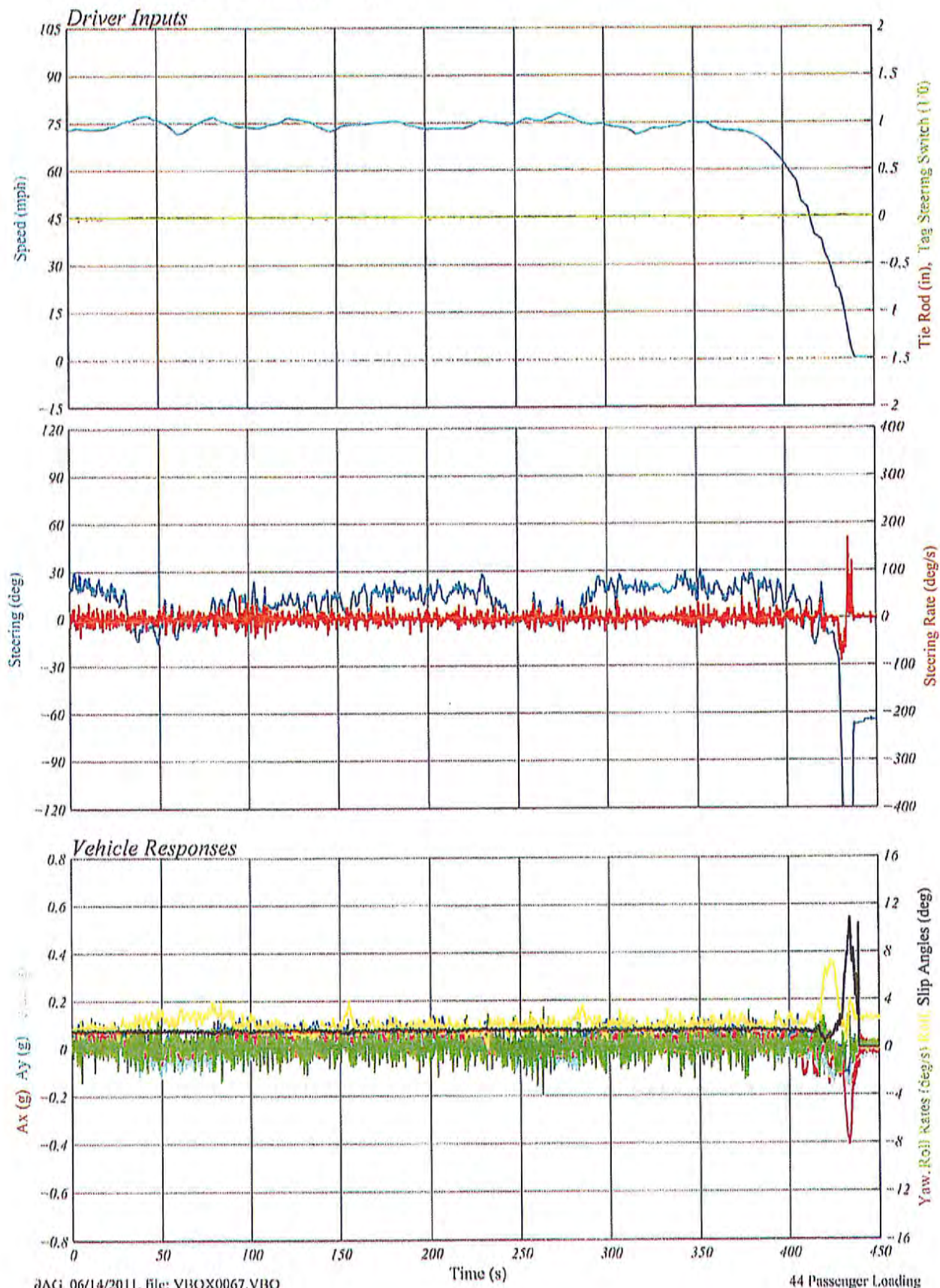
Modified U-joint Bearing – Lap 18



Test: 66

1995 MCI 102DL3

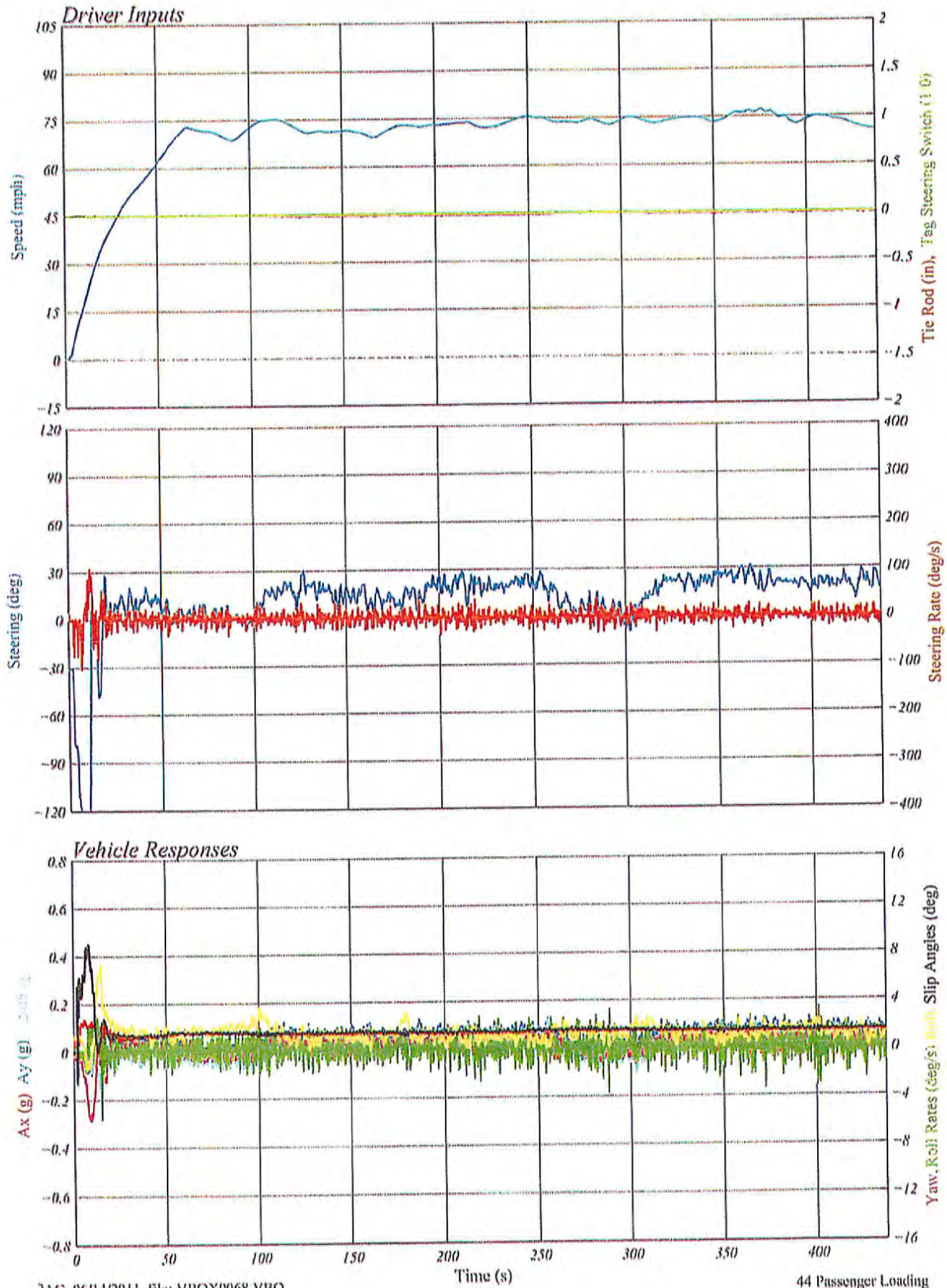
Modified U-joint Bearing - Lap 19



Test: 67

1995 MCI 102DL3

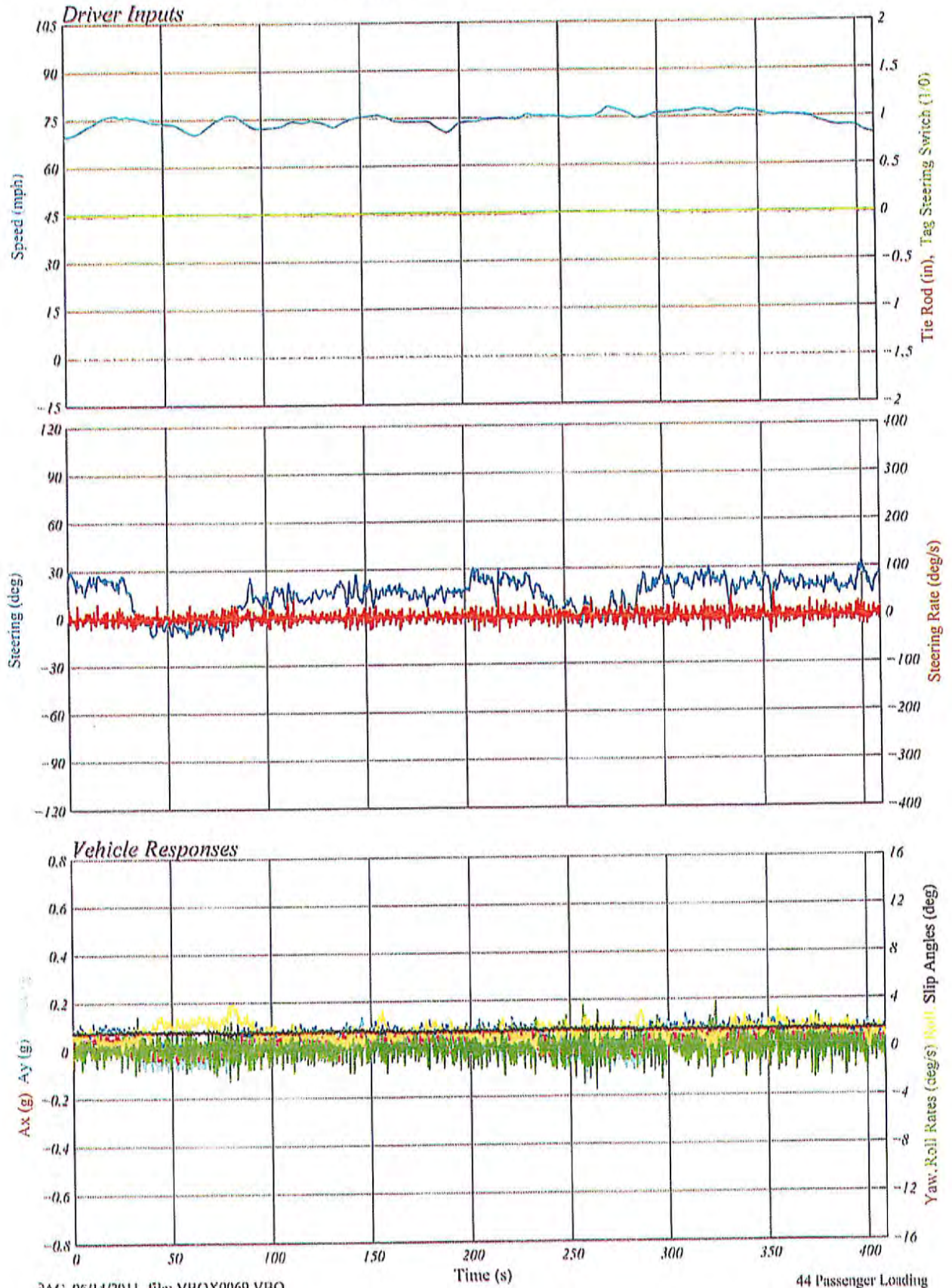
Modified U-joint Bearing -- Lap 20



Test: 68

1995 MCI 102DL3

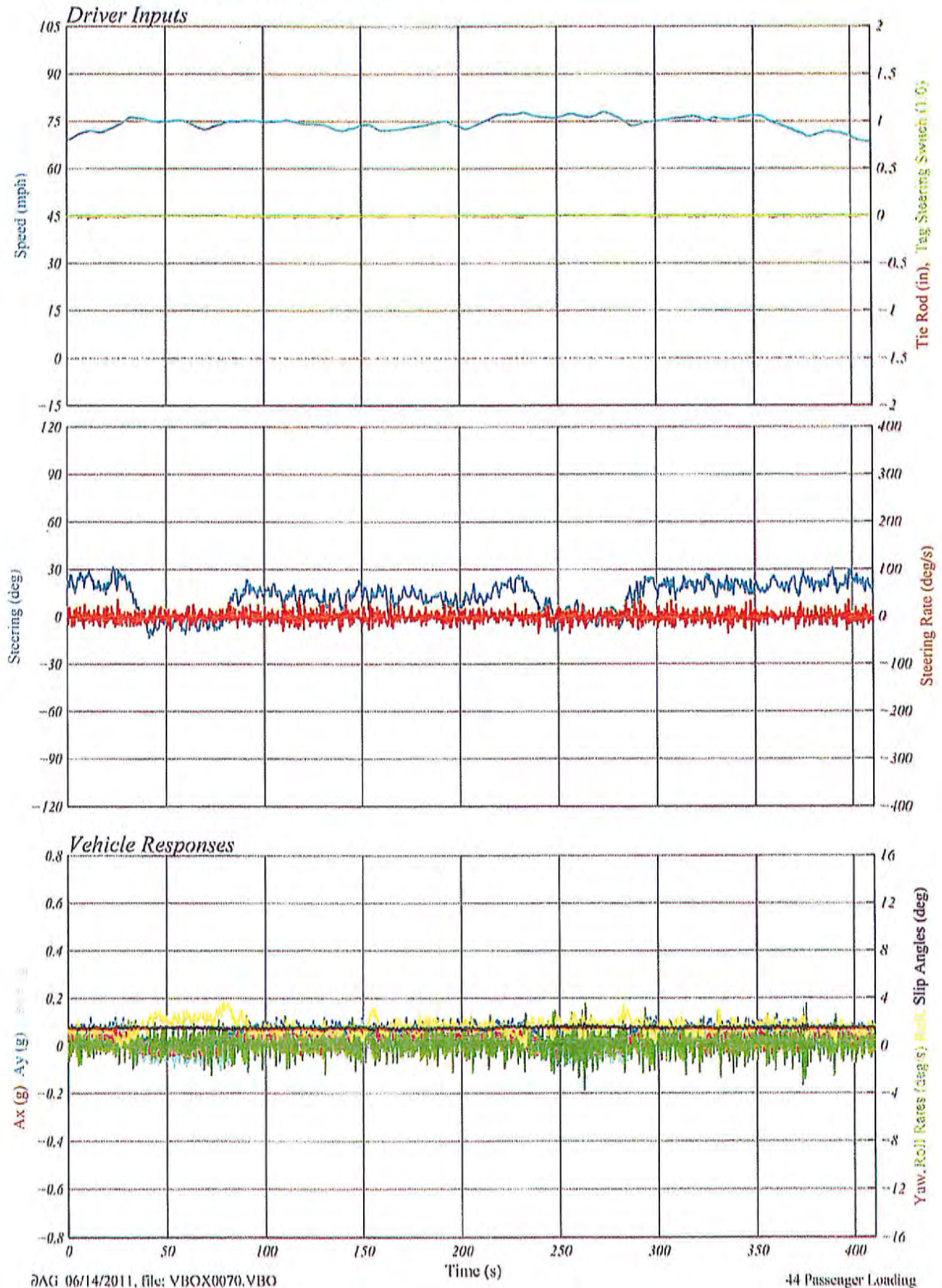
Modified U-joint Bearing – Lap 21



Test: 69

1995 MCI 102DL3

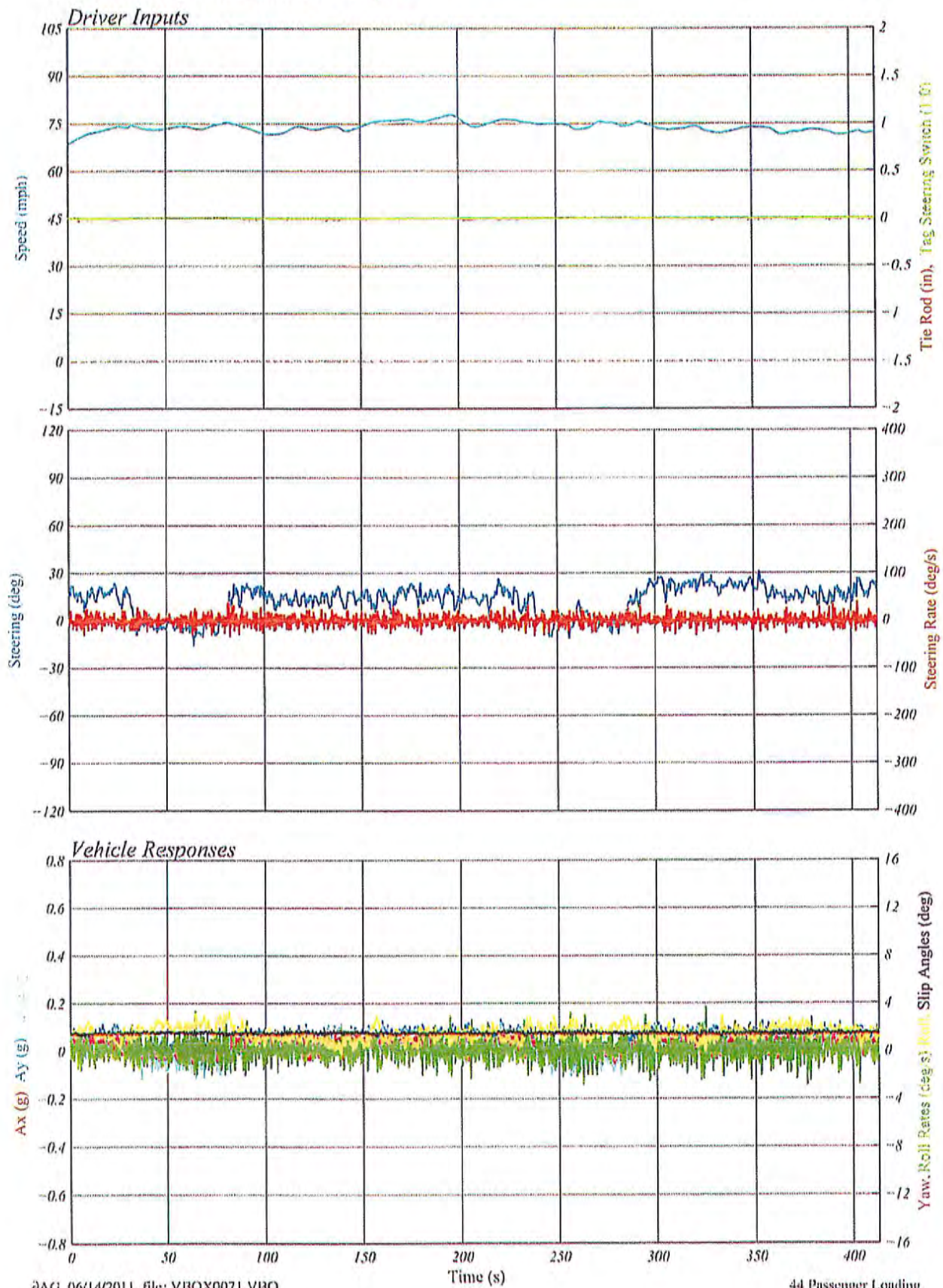
Modified U-joint Bearing - Lap 22



Test: 70

1995 MCI 102DL3

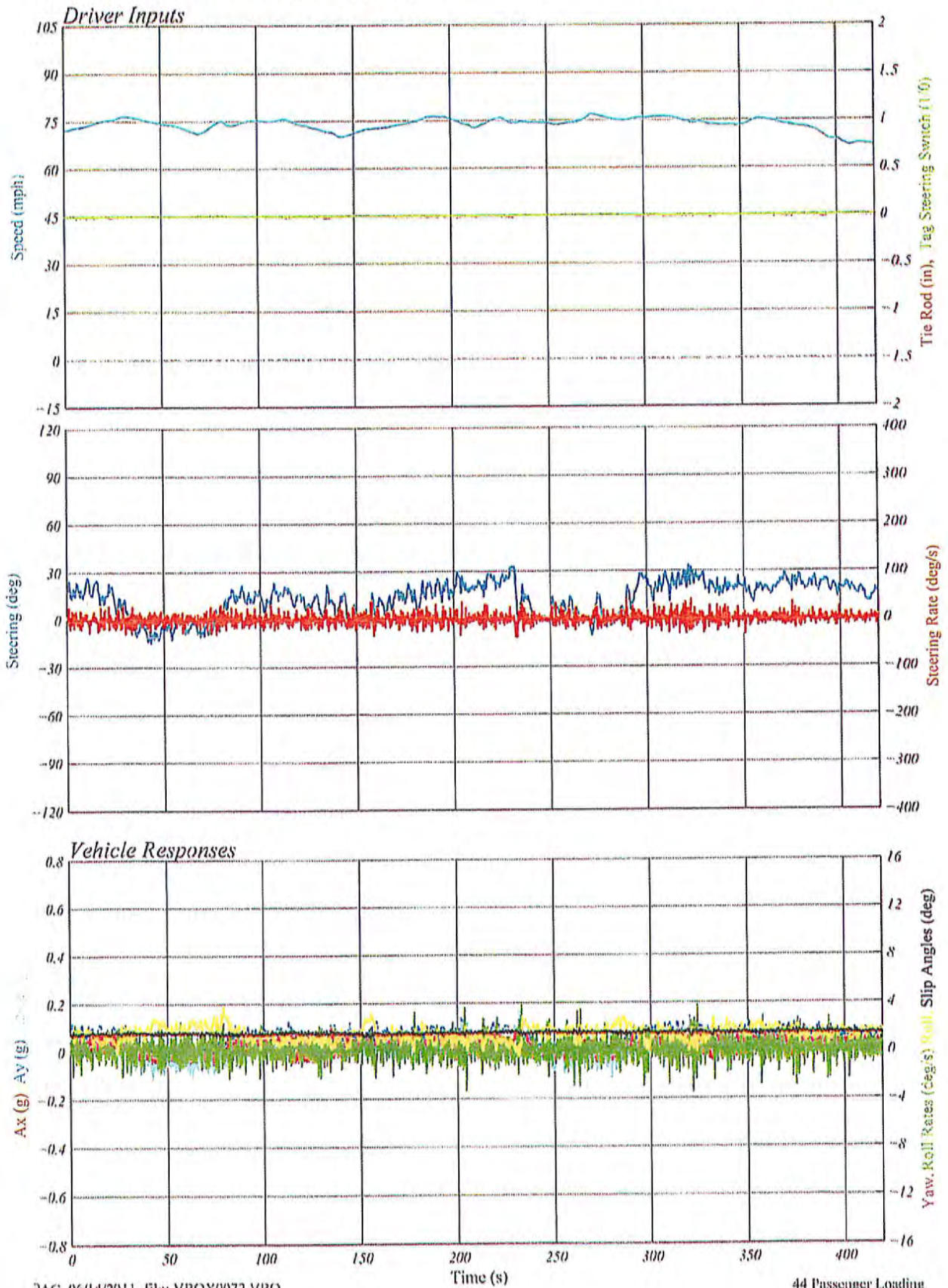
Modified U-joint Bearing – Lap 23



Test: 71

1995 MCI 102DL3

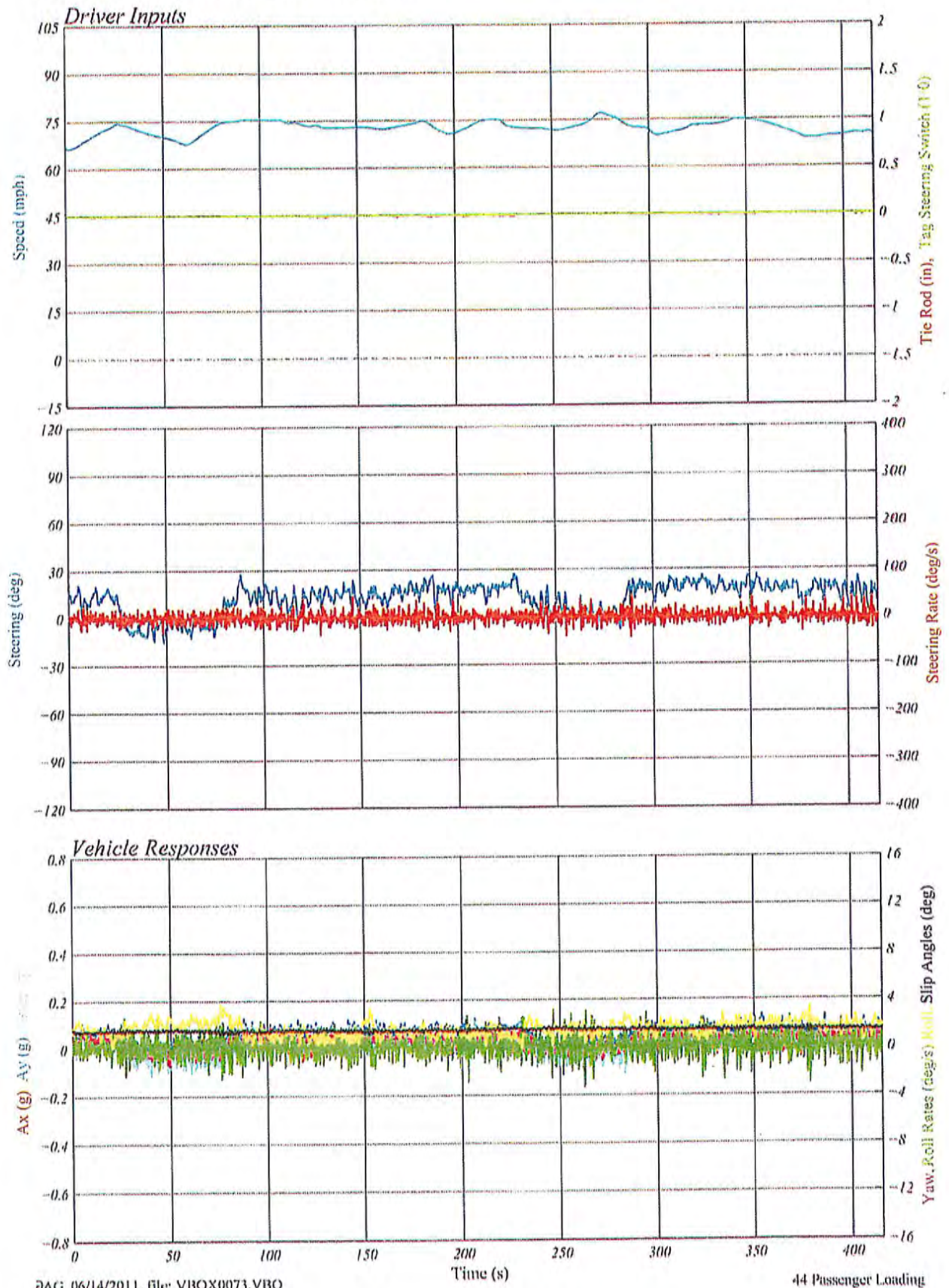
Modified U-joint Bearing – Lap 24



Test: 72

1995 MCI 102DL3

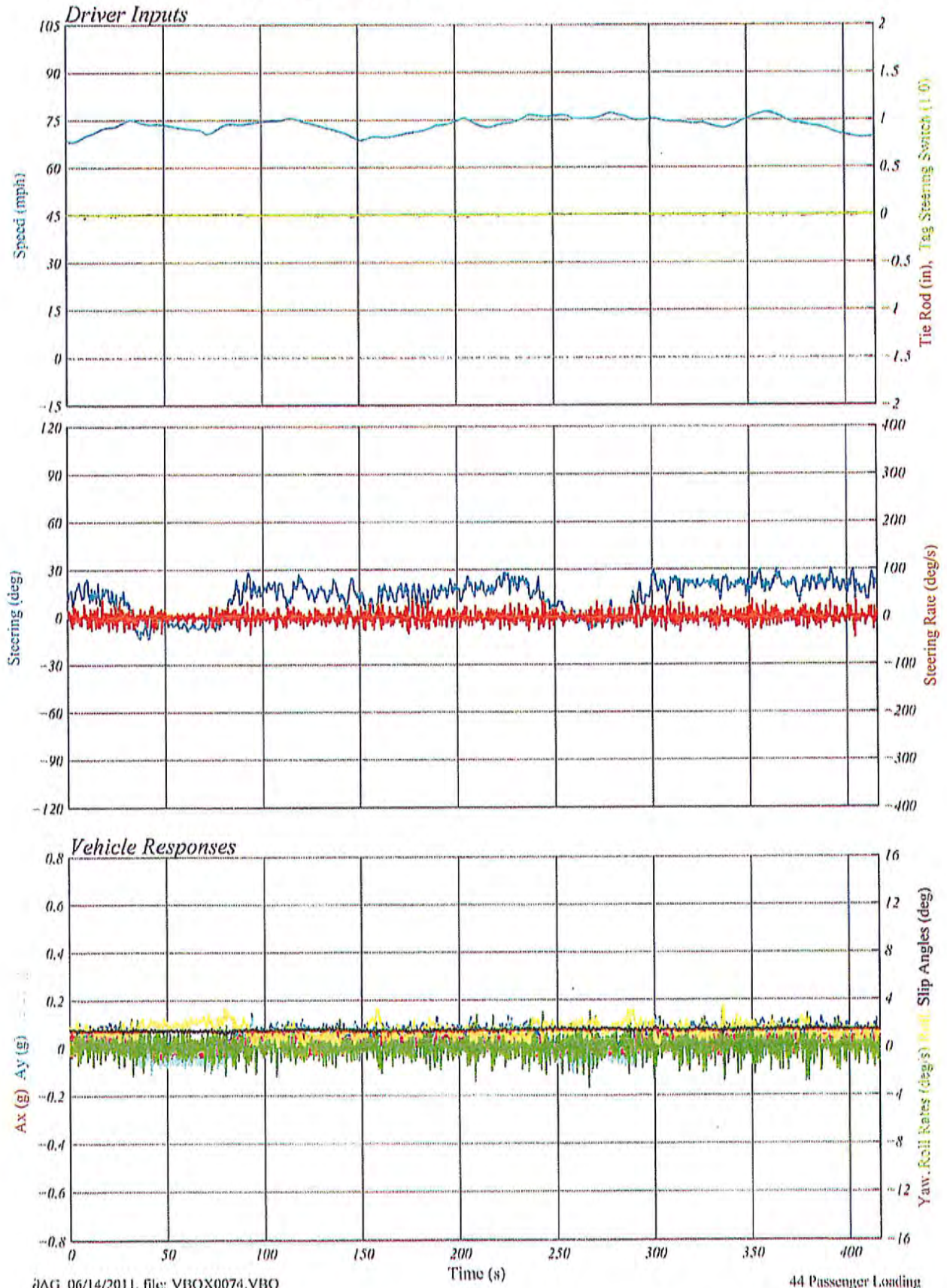
Modified U-joint Bearing – Lap 25



Test: 73

1995 MCI 102DL3

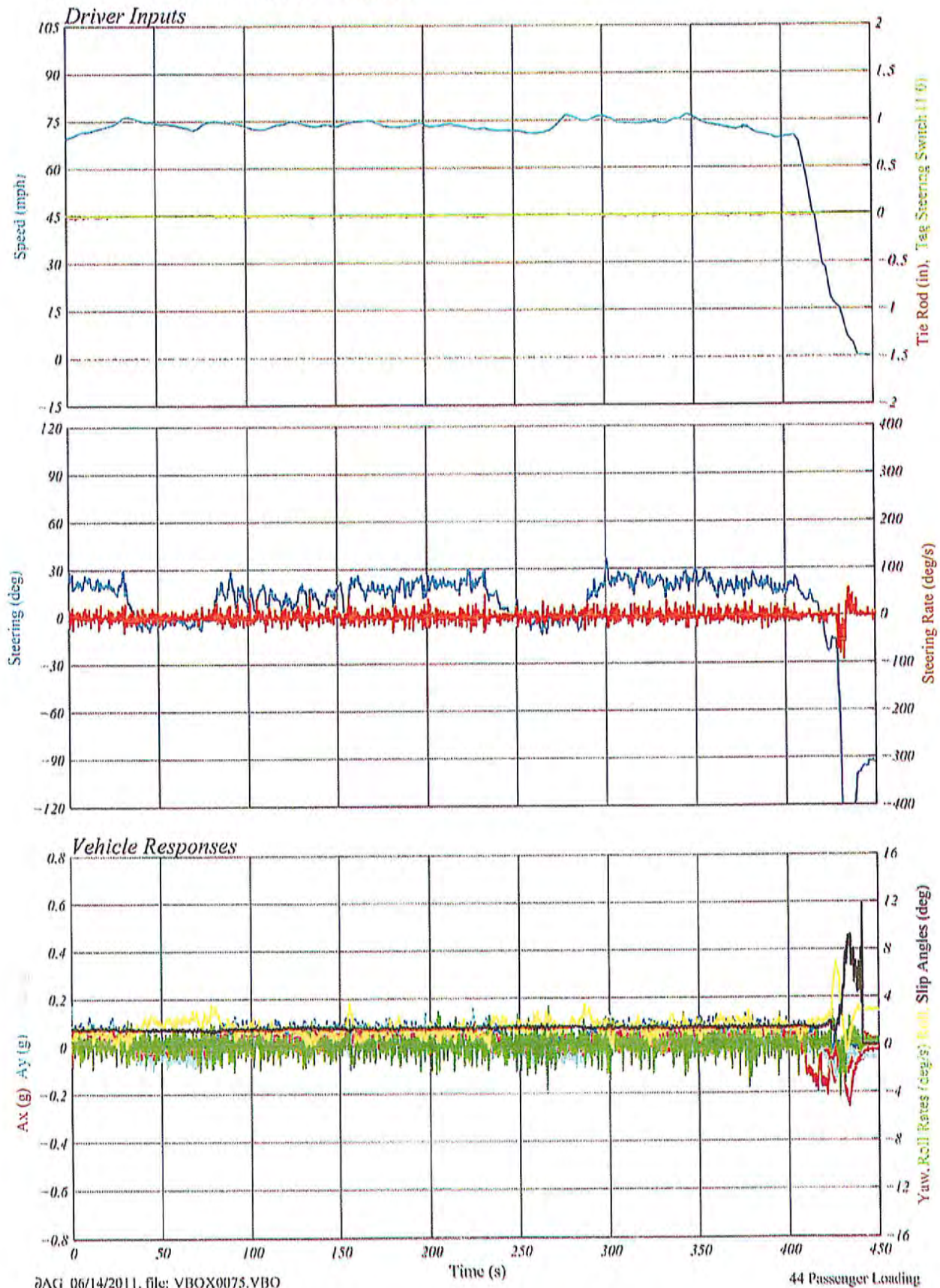
Modified U-joint Bearing – Lap 26



Test: 74

1995 MCI 102DL3

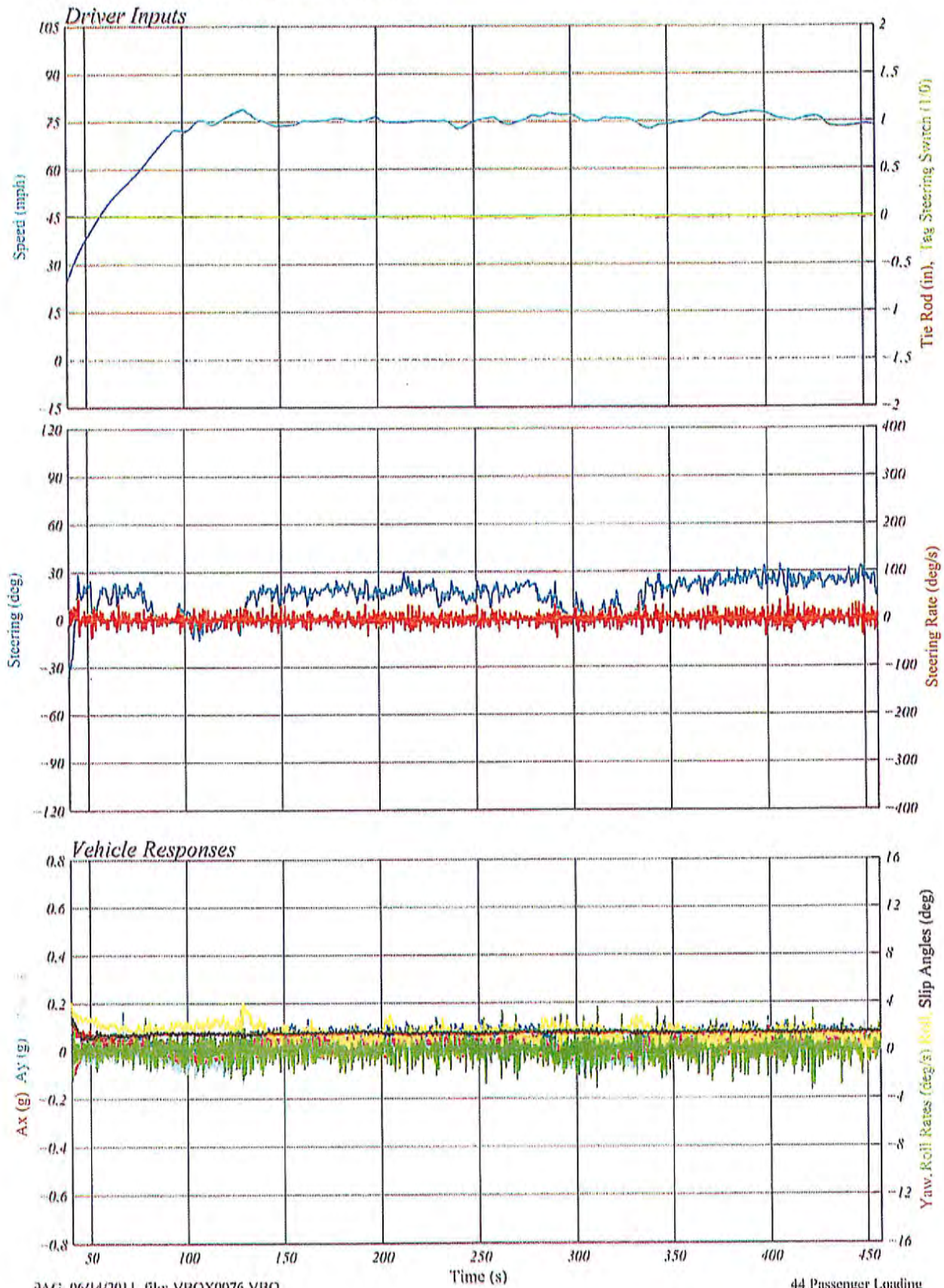
Modified U-joint Bearing – Lap 27



Test: 75

1995 MCI 102DL3

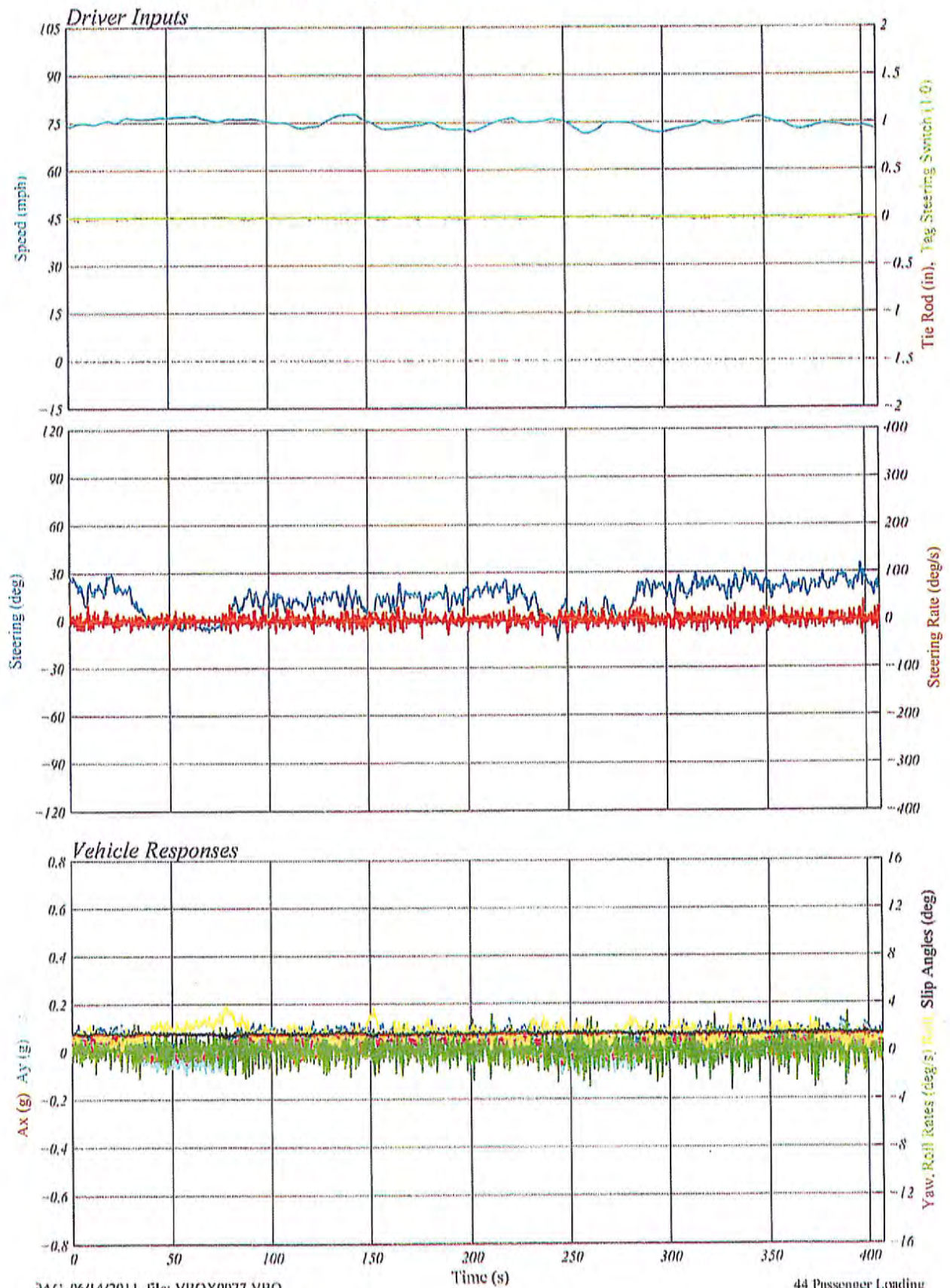
Modified U-joint Bearing – Lap 28



Test: 76

1995 MCI 102DL3

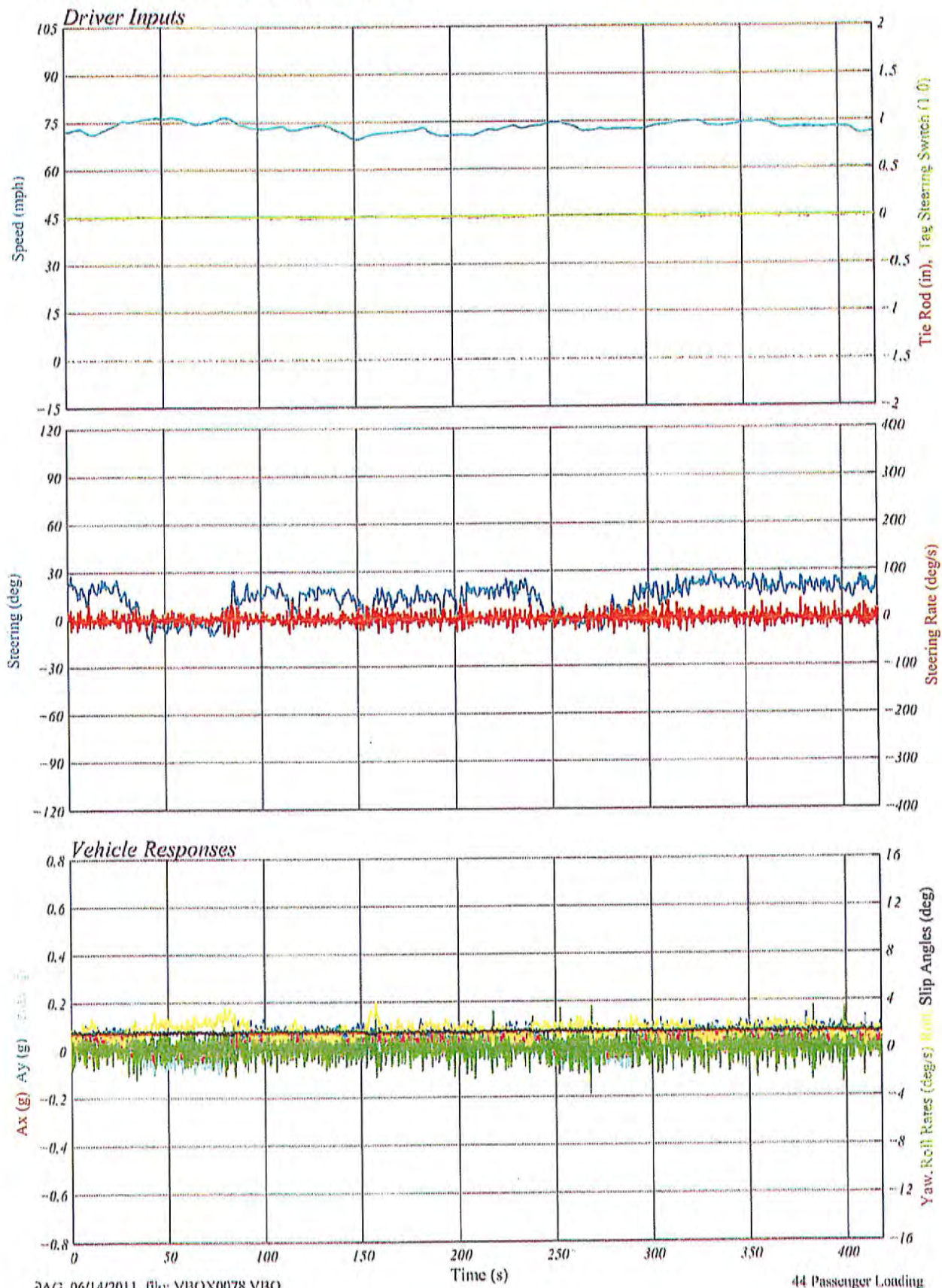
Modified U-joint Bearing – Lap 29



Test: 77

1995 MCI 102DL3

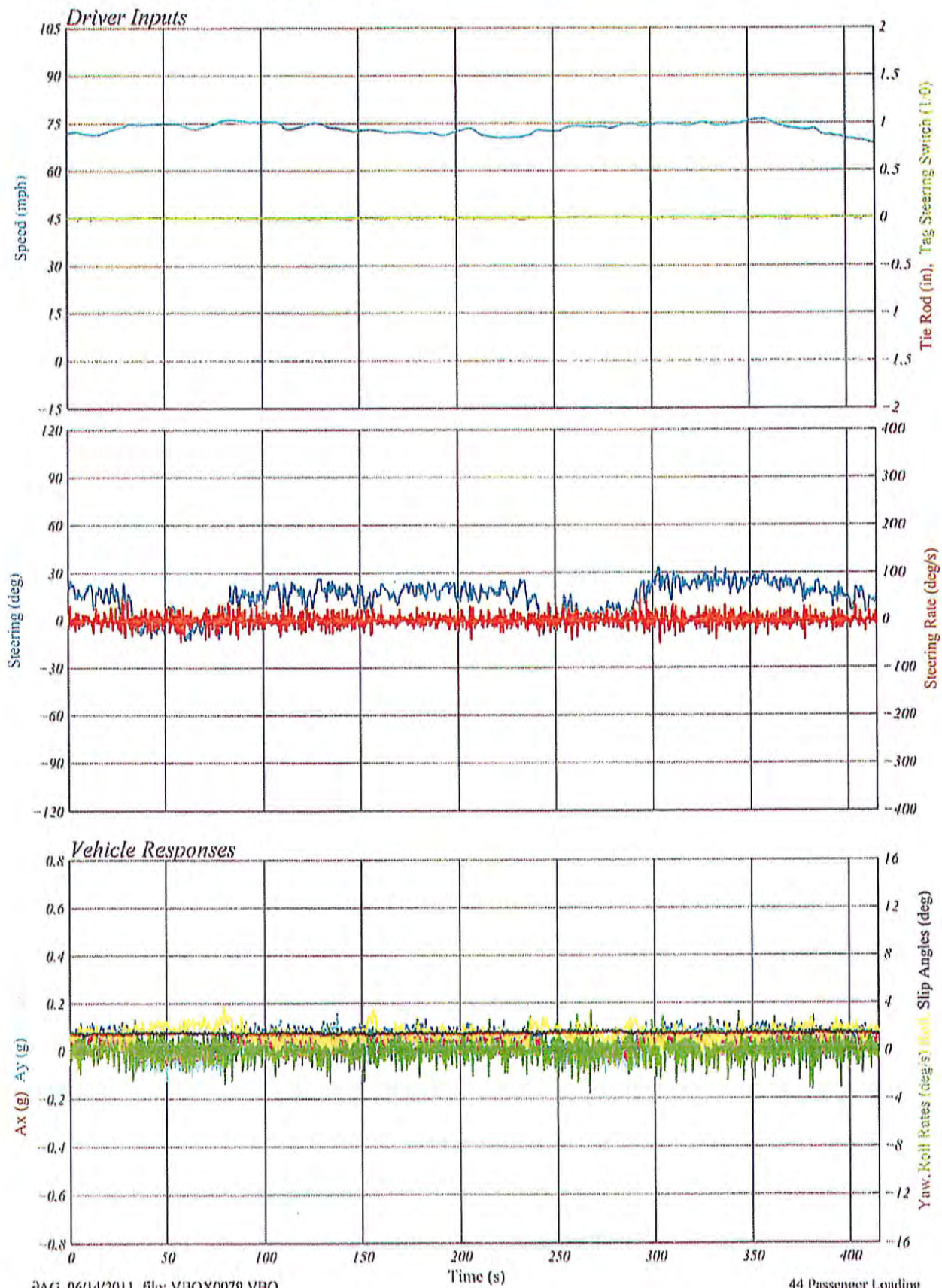
Modified U-joint Bearing – Lap 30



Test: 78

1995 MCI 102DL3

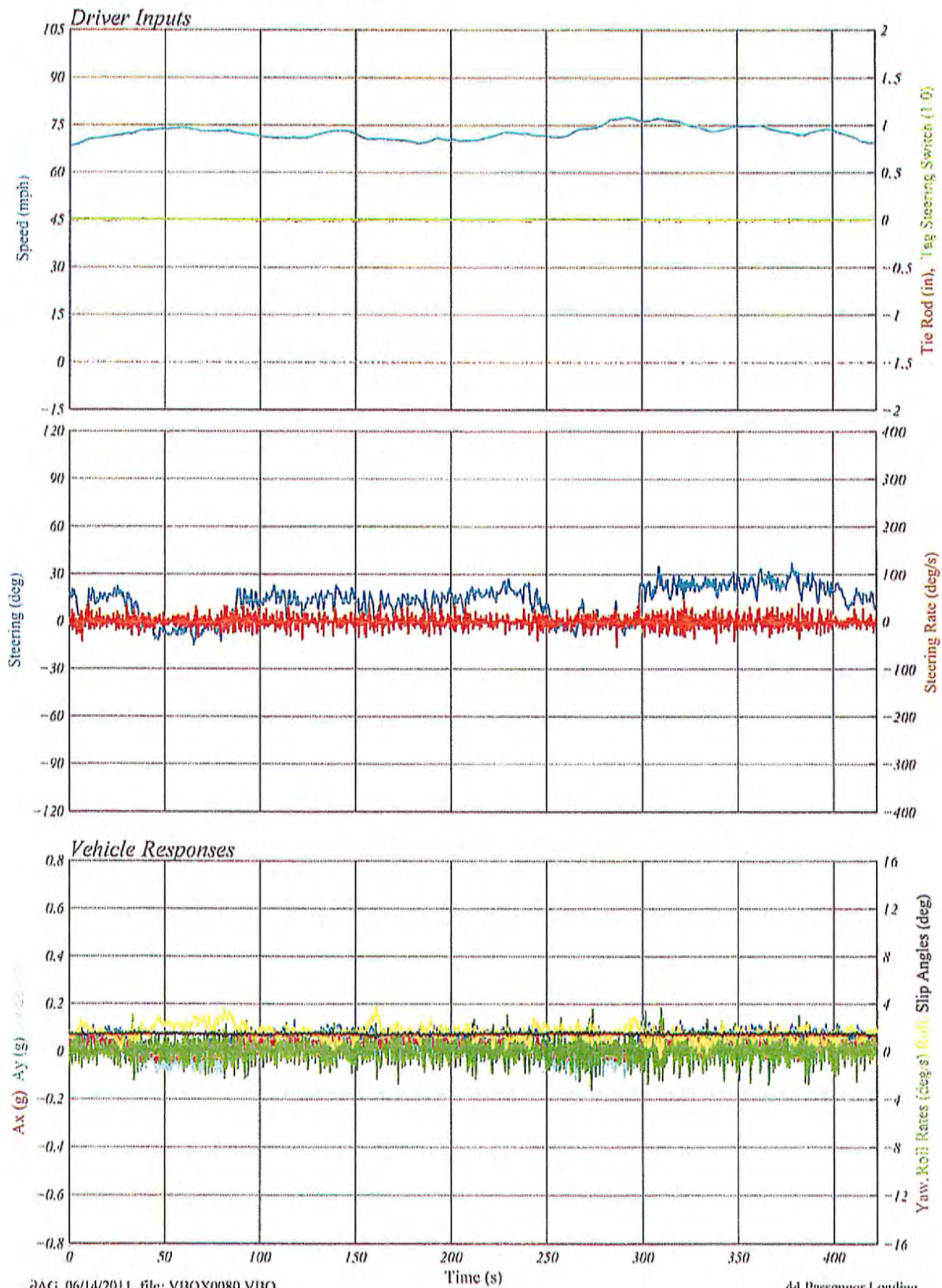
Modified U-joint Bearing – Lap 31



Test: 79

1995 MCI 102DL3

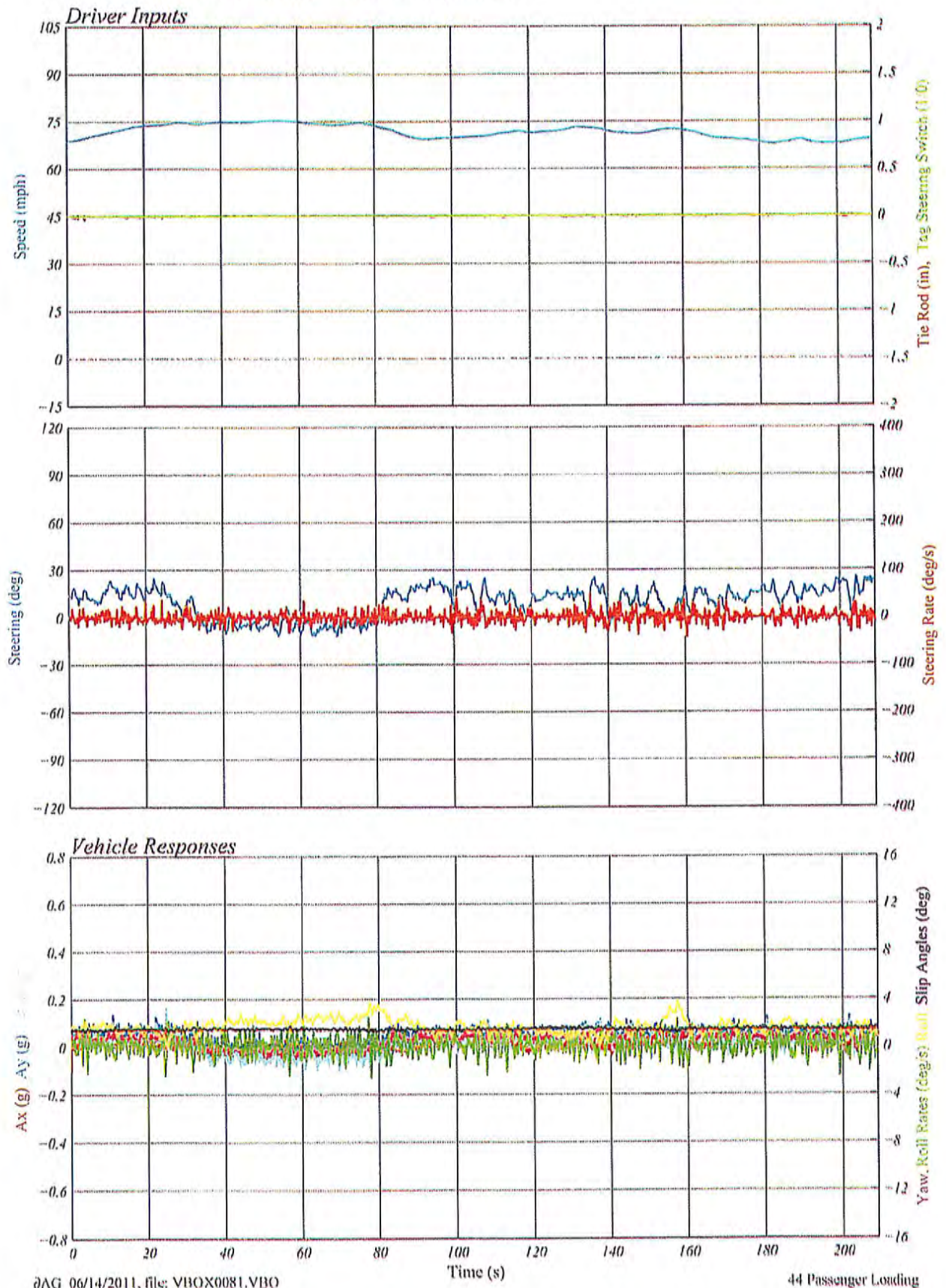
Modified U-joint Bearing – Lap 32



Test: 80

1995 MCI 102DL3

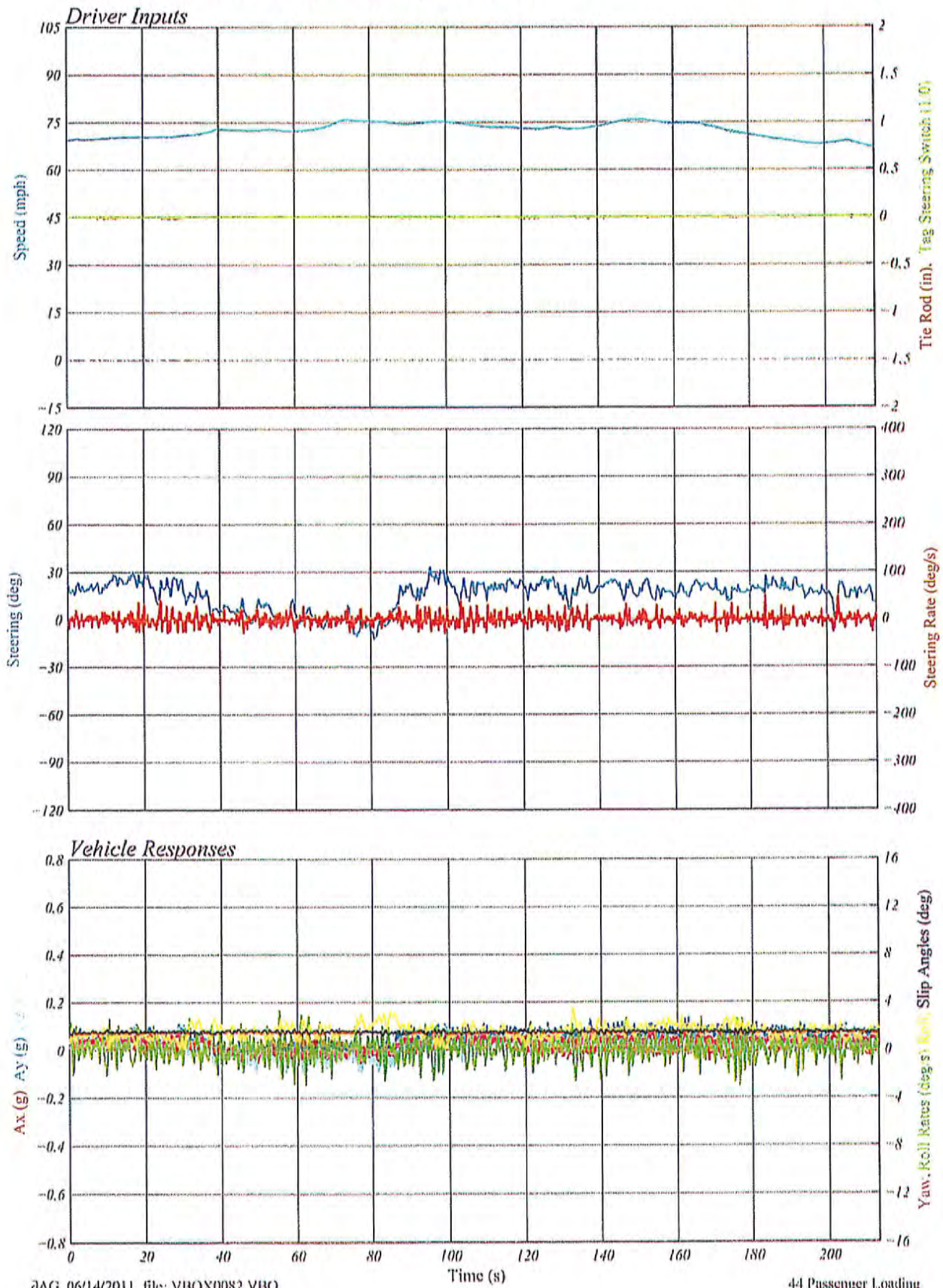
Modified U-joint Bearing - Lap 33, first half



Test: 81

1995 MCI 102DL3

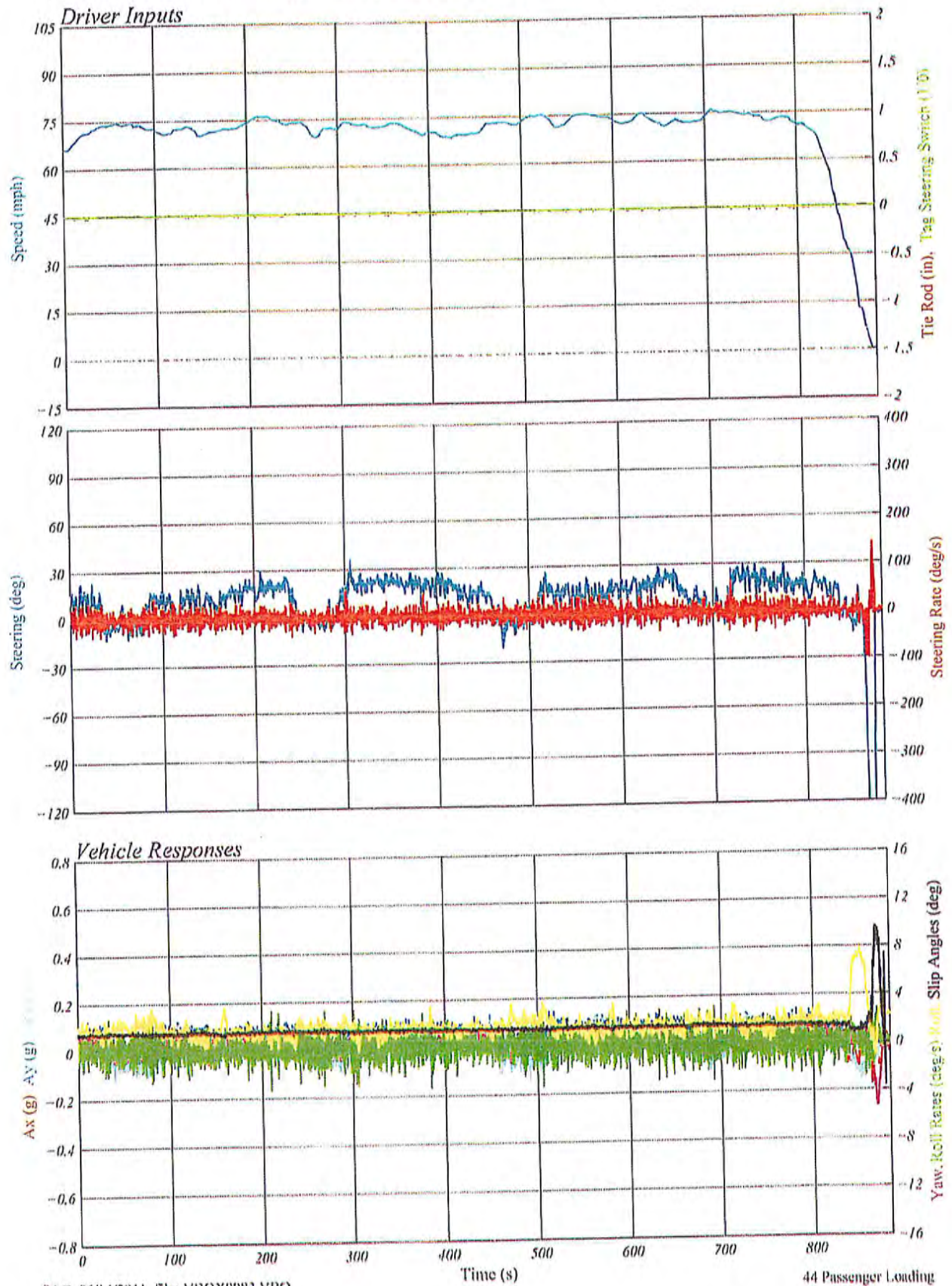
Modified U-joint Bearing – Lap 33, second half



Test: 82

1995 MCI 102DL3

Modified U-joint Bearing -- Laps 34 & 35



1995 MCI 102DL3

TEST INDEX

Test	Description	Nominal Speed (mph)	Driver	Loading Condition
1	Low Speed Turn, Unlocked	10	KJG	44 Passenger Loading
2	Low Speed Turn, Locked	10	KJG	44 Passenger Loading
3	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
4	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
5	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
6	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
7	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
8	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
9	Dynamic Unlock in a Curve, Downhill to the Left	70	KJG	44 Passenger Loading
10	Dynamic Unlock in a Curve, Uphill to the Right	70	KJG	44 Passenger Loading
11	Dynamic Unlock in a Curve, Uphill to the Left	70	KJG	44 Passenger Loading
12	Dynamic Unlock in a Curve, Downhill to the Right	70	KJG	44 Passenger Loading
13	Frequency Response, Locked	62	KJG	44 Passenger Loading
14	Frequency Response, Locked	62	KJG	44 Passenger Loading
15	Frequency Response, Unlocked	62	KJG	44 Passenger Loading
16	Frequency Response, Unlocked	62	KJG	44 Passenger Loading
17	On-Center Handling, Locked	62	KJG	44 Passenger Loading
18	On-Center Handling, Locked	62	KJG	44 Passenger Loading
19	On-Center Handling, Unlocked	62	KJG	44 Passenger Loading
20	On-Center Handling, Unlocked	62	KJG	44 Passenger Loading
21	Road Edge & Crown, Locked	62	KJG	44 Passenger Loading
22	Road Edge & Crown, Locked	62	KJG	44 Passenger Loading
23	Road Edge & Crown, Unlocked	62	KJG	44 Passenger Loading
24	Road Edge & Crown, Unlocked	62	KJG	44 Passenger Loading
25	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
26	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
27	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
28	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
29	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
30	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
31	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
32	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
33	Open Loop Lane Change, Locked	70	KJG	44 Passenger Loading
34	Open Loop Lane Change, Locked	70	KJG	44 Passenger Loading
35	Open Loop Lane Change, Unlocked	70	KJG	44 Passenger Loading
36	Open Loop Lane Change, Unlocked	70	KJG	44 Passenger Loading
37	Dynamic Unlock in a Curve, Downhill to the Right with Braking	70	KJG	44 Passenger Loading
38	Dynamic Unlock, Downhill to Right, Intentional Steer Toward Shoulder	70	KJG	44 Passenger Loading

Test	Description	Nominal Speed (mph)	Driver	Loading Condition
39	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Braking	70	KJG	44 Passenger Loading
40	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder & Left, Braking	70	KJG	44 Passenger Loading
41	Extended Driving, Locked	70	KJG	44 Passenger Loading
42	Extended Driving, Unlocked	70	KJG	44 Passenger Loading
43	Surprise Unlock	70	KJG	44 Passenger Loading
44	Dynamic Unlock in a Curve, Downhill to the Right with Braking, Wet Surface	70	KJG	44 Passenger Loading
45	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Wet Surface	70	KJG	44 Passenger Loading
46	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Braking, Wet	70	KJG	44 Passenger Loading
47	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder & Left, Braking, Wet	70	KJG	44 Passenger Loading
48	Modified U-Joint Bearing - Lap 1	70	KJG	44 Passenger Loading
49	Modified U-Joint Bearing - Lap 2	70	KJG	44 Passenger Loading
50	Modified U-Joint Bearing - Laps 3 and 4	70	KJG	44 Passenger Loading
51	Modified U-joint Bearing - Lap 5, Incomplete Data	70	KJG	44 Passenger Loading
52	Modified U-joint Bearing - Lap 6	70	KJG	44 Passenger Loading
53	Modified U-joint Bearing - Lap 7	70	KJG	44 Passenger Loading
54	Modified U-joint Bearing - Lap 8	70	KJG	44 Passenger Loading
55	Modified U-joint Bearing - Lap 9, first half	70	KJG	44 Passenger Loading
56	Modified U-joint Bearing - Lap 9, second half	70	KJG	44 Passenger Loading
57	Modified U-joint Bearing - Lap 10	70	KJG	44 Passenger Loading
58	Modified U-joint Bearing - Lap 11	70	KJG	44 Passenger Loading
59	Modified U-joint Bearing - Lap 12	70	KJG	44 Passenger Loading
60	Modified U-joint Bearing - Lap 13	70	KJG	44 Passenger Loading
61	Modified U-joint Bearing - Lap 14	70	KJG	44 Passenger Loading
62	Modified U-joint Bearing - Lap 15	70	KJG	44 Passenger Loading
63	Modified U-joint Bearing - Lap 16	70	KJG	44 Passenger Loading
64	Modified U-joint Bearing - Lap 17	70	KJG	44 Passenger Loading
65	Modified U-joint Bearing - Lap 18	70	KJG	44 Passenger Loading
66	Modified U-joint Bearing - Lap 19	70	KJG	44 Passenger Loading
67	Modified U-joint Bearing - Lap 20	70	KJG	44 Passenger Loading
68	Modified U-joint Bearing - Lap 21	70	KJG	44 Passenger Loading
69	Modified U-joint Bearing - Lap 22	70	KJG	44 Passenger Loading
70	Modified U-joint Bearing - Lap 23	70	KJG	44 Passenger Loading
71	Modified U-joint Bearing - Lap 24	70	KJG	44 Passenger Loading
72	Modified U-joint Bearing - Lap 25	70	KJG	44 Passenger Loading
73	Modified U-joint Bearing - Lap 26	70	KJG	44 Passenger Loading
74	Modified U-joint Bearing - Lap 27	70	KJG	44 Passenger Loading
75	Modified U-joint Bearing - Lap 28	70	KJG	44 Passenger Loading
76	Modified U-joint Bearing - Lap 29	70	KJG	44 Passenger Loading
77	Modified U-joint Bearing - Lap 30	70	KJG	44 Passenger Loading

Test	Description	Nominal Speed (mph)	Driver	Loading Condition
78	Modified U-joint Bearing - Lap 31	70	KJG	44 Passenger Loading
79	Modified U-joint Bearing - Lap 32	70	KJG	44 Passenger Loading
80	Modified U-joint Bearing - Lap 33, first half	70	KJG	44 Passenger Loading
81	Modified U-joint Bearing - Lap 33, second half	70	KJG	44 Passenger Loading
82	Modified U-joint Bearing - Laps 34 & 35	70	KJG	44 Passenger Loading

Test Notes

Vehicle: 1995 MCI 102DL3
Tires: Firestone FS 400

VIN: 1M8PDMPA5SPO47805
Size: 315/80R22.5 Load Range J

Test Date(s): 6/12 - 6/14/11
Test Location(s): Uvalde
Pressures: 115/95/95

Test No.	Test Name	Driver	Loading	File No.	FileName	Date
	Data Zero	KJG	44 Passengers	1	VBOX0001.VBO	6/12/2011
1	Low Speed Turn, Unlocked	KJG	44 Passengers	2	VBOX0002.VBO	6/12/2011
2	Low Speed Turn, Locked	KJG	44 Passengers	3	VBOX0003.VBO	6/12/2011
3	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	4	VBOX0004.VBO	6/12/2011
4	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	5	VBOX0005.VBO	6/12/2011
5	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	6	VBOX0006.VBO	6/12/2011
6	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	7	VBOX0007.VBO	6/12/2011
7	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	8	VBOX0008.VBO	6/12/2011
8	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	9	VBOX0009.VBO	6/12/2011
9	Dynamic Unlock in a Curve, Downhill to the Left	KJG	44 Passengers	10	VBOX0010.VBO	6/12/2011
10	Dynamic Unlock in a Curve, Uphill to the Right	KJG	44 Passengers	11	VBOX0011.VBO	6/12/2011
11	Dynamic Unlock in a Curve, Uphill to the Left	KJG	44 Passengers	12	VBOX0012.VBO	6/12/2011
12	Dynamic Unlock in a Curve, Downhill to the Right	KJG	44 Passengers	13	VBOX0013.VBO	6/12/2011
13	Frequency Response, Locked	KJG	44 Passengers	14	VBOX0014.VBO	6/12/2011
14	Frequency Response, Locked	KJG	44 Passengers	15	VBOX0015.VBO	6/12/2011
15	Frequency Response, Unlocked	KJG	44 Passengers	16	VBOX0016.VBO	6/12/2011
16	Frequency Response, Unlocked	KJG	44 Passengers	17	VBOX0017.VBO	6/12/2011
17	On-Center Handling, Locked	KJG	44 Passengers	18	VBOX0018.VBO	6/13/2011
18	On-Center Handling, Locked	KJG	44 Passengers	19	VBOX0019.VBO	6/13/2011
19	On-Center Handling, Unlocked	KJG	44 Passengers	20	VBOX0020.VBO	6/13/2011
20	On-Center Handling, Unlocked	KJG	44 Passengers	21	VBOX0021.VBO	6/13/2011
21	Road Edge & Crown, Locked	KJG	44 Passengers	22	VBOX0022.VBO	6/13/2011
22	Road Edge & Crown, Locked	KJG	44 Passengers	23	VBOX0023.VBO	6/13/2011
23	Road Edge & Crown, Unlocked	KJG	44 Passengers	24	VBOX0024.VBO	6/13/2011
24	Road Edge & Crown, Unlocked	KJG	44 Passengers	25	VBOX0025.VBO	6/13/2011
25	Low-g Step Steer, Locked	KJG	44 Passengers	26	VBOX0026.VBO	6/13/2011
26	Low-g Step Steer, Locked	KJG	44 Passengers	27	VBOX0027.VBO	6/13/2011
27	Low-g Step Steer, Locked	KJG	44 Passengers	28	VBOX0028.VBO	6/13/2011
28	Low-g Step Steer, Locked	KJG	44 Passengers	29	VBOX0029.VBO	6/13/2011
29	Low-g Step Steer, Unlocked	KJG	44 Passengers	30	VBOX0030.VBO	6/13/2011
30	Low-g Step Steer, Unlocked	KJG	44 Passengers	31	VBOX0031.VBO	6/13/2011
31	Low-g Step Steer, Unlocked	KJG	44 Passengers	32	VBOX0032.VBO	6/13/2011
32	Low-g Step Steer, Unlocked	KJG	44 Passengers	33	VBOX0033.VBO	6/13/2011
33	Open Loop Lane Change, Locked	KJG	44 Passengers	34	VBOX0034.VBO	6/13/2011
34	Open Loop Lane Change, Locked	KJG	44 Passengers	35	VBOX0035.VBO	6/13/2011
35	Open Loop Lane Change, Unlocked	KJG	44 Passengers	36	VBOX0036.VBO	6/13/2011
36	Open Loop Lane Change, Unlocked	KJG	44 Passengers	37	VBOX0037.VBO	6/13/2011
37	Dynamic Unlock in a Curve, Downhill to the Right with Braking	KJG	44 Passengers	38	VBOX0038.VBO	6/13/2011
38	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder	KJG	44 Passengers	39	VBOX0039.VBO	6/13/2011
39	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder &	KJG	44 Passengers	40	VBOX0040.VBO	6/13/2011

Test Notes

Vehicle: 1995 MCI 102DL3 VIN: 1M8PDMPA5SPO47805 Test Date(s): 6/12 - 6/14/11
 Tires: Firestone FS 400 Size: 315/80R22.5 Load Range J Test Location(s): Uvalde
 Pressures: 115/95/95

Test No.	Test Name	Driver	Loading	File No.	FileName	Date
40	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder, Braking, & Steer To Left	KJG	44 Passengers	41	VBOX0041.VBO	6/13/2011
41	Extended Driving, Locked	KJG	44 Passengers	42	VBOX0042.VBO	6/13/2011
42	Extended Driving, Unlocked	KJG	44 Passengers	43	VBOX0043.VBO	6/13/2011
43	Surprise Unlock	KJG	44 Passengers	44	VBOX0044.VBO	6/13/2011
44	Dynamic Unlock in a Curve, Downhill to the Right with Braking, Wet Surface	KJG	44 Passengers	45	VBOX0045.VBO	6/13/2011
45	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder, Wet	KJG	44 Passengers	46	VBOX0046.VBO	6/13/2011
46	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder & Braking, Wet Surface	KJG	44 Passengers	47	VBOX0047.VBO	6/13/2011
47	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder, Braking, & Steer To Left, Wet Surface	KJG	44 Passengers	48	VBOX0048.VBO	6/13/2011
48	Modified U-Joint Bearing - Lap 1	KJG	44 Passengers	49	VBOX0049.VBO	6/13/2011
49	Modified U-Joint Bearing - Lap 2	KJG	44 Passengers	50	VBOX0050.VBO	6/13/2011
50	Modified U-Joint Bearing - Lap 3,4	KJG	44 Passengers	51	VBOX0051.VBO	6/13/2011
51	Modified U-joint Bearing - Lap 5, incomplete	KJG	44 Passengers	52	VBOX0052.VBO	6/14/2011
52	Modified U-joint Bearing - Lap 6	KJG	44 Passengers	53	VBOX0053.VBO	6/14/2011
53	Modified U-joint Bearing - Lap 7	KJG	44 Passengers	54	VBOX0054.VBO	6/14/2011
54	Modified U-joint Bearing - Lap 8	KJG	44 Passengers	55	VBOX0055.VBO	6/14/2011
55	Modified U-joint Bearing - Lap 9, first half	KJG	44 Passengers	56	VBOX0056.VBO	6/14/2011
56	Modified U-joint Bearing - Lap 9, second half	KJG	44 Passengers	57	VBOX0057.VBO	6/14/2011
57	Modified U-joint Bearing - Lap 10	KJG	44 Passengers	58	VBOX0058.VBO	6/14/2011
58	Modified U-joint Bearing - Lap 11	KJG	44 Passengers	59	VBOX0059.VBO	6/14/2011
59	Modified U-joint Bearing - Lap 12	KJG	44 Passengers	60	VBOX0060.VBO	6/14/2011
60	Modified U-joint Bearing - Lap 13	KJG	44 Passengers	61	VBOX0061.VBO	6/14/2011
61	Modified U-joint Bearing - Lap 14	KJG	44 Passengers	62	VBOX0062.VBO	6/14/2011
62	Modified U-joint Bearing - Lap 15	KJG	44 Passengers	63	VBOX0063.VBO	6/14/2011
63	Modified U-joint Bearing - Lap 16	KJG	44 Passengers	64	VBOX0064.VBO	6/14/2011
64	Modified U-joint Bearing - Lap 17	KJG	44 Passengers	65	VBOX0065.VBO	6/14/2011
65	Modified U-joint Bearing - Lap 18	KJG	44 Passengers	66	VBOX0066.VBO	6/14/2011
66	Modified U-joint Bearing - Lap 19	KJG	44 Passengers	67	VBOX0067.VBO	6/14/2011
67	Modified U-joint Bearing - Lap 20	KJG	44 Passengers	68	VBOX0068.VBO	6/14/2011
68	Modified U-joint Bearing - Lap 21	KJG	44 Passengers	69	VBOX0069.VBO	6/14/2011
69	Modified U-joint Bearing - Lap 22	KJG	44 Passengers	70	VBOX0070.VBO	6/14/2011
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72	Modified U-joint Bearing - Lap 25	KJG	44 Passengers	73	VBOX0073.VBO	6/14/2011
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74	Modified U-joint Bearing - Lap 27	KJG	44 Passengers	75	VBOX0075.VBO	6/14/2011
75	Modified U-joint Bearing - Lap 28	KJG	44 Passengers	76	VBOX0076.VBO	6/14/2011
76	Modified U-joint Bearing - Lap 29	KJG	44 Passengers	77	VBOX0077.VBO	6/14/2011

Test Notes

Vehicle: 1995 MCI 102DL3
Tires: Firestone FS 400

VIN: 1M8PDMPA5SPO47805
Size: 315/80R22.5 Load Range J

Test Date(s): 6/12 - 6/14/11
Test Location(s): Uvalde
Pressures: 115/95/95

Test No.	Test Name	Driver	Loading	File No.	FileName	Date
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78	Modified U-joint Bearing - Lap 31	KJG	44 Passengers	79	VBOX0079.VBO	6/14/2011
79	Modified U-joint Bearing - Lap 32	KJG	44 Passengers	80	VBOX0080.VBO	6/14/2011
80	Modified U-joint Bearing - Lap 33, first half	KJG	44 Passengers	81	VBOX0081.VBO	6/14/2011
81	Modified U-joint Bearing - Lap 33, second half	KJG	44 Passengers	82	VBOX0082.VBO	6/14/2011
82	Modified U-joint Bearing - Lap 34, 35	KJG	44 Passengers	83	VBOX0083.VBO	6/14/2011

1995 MCI 102DL3 Vehicle Testing

Driveshaft & U-Joints

Inspection, Disassembly,
& Modification

June 12-14, 2011

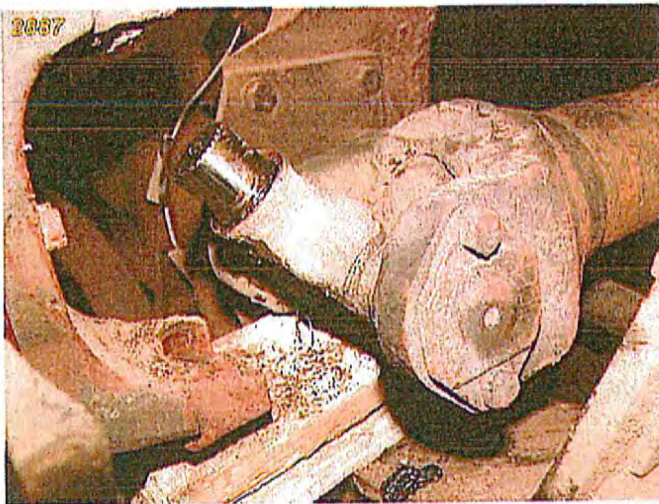
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DYNAMIC ANALYSIS GROUP LLC

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Vehicle_2888.jpg

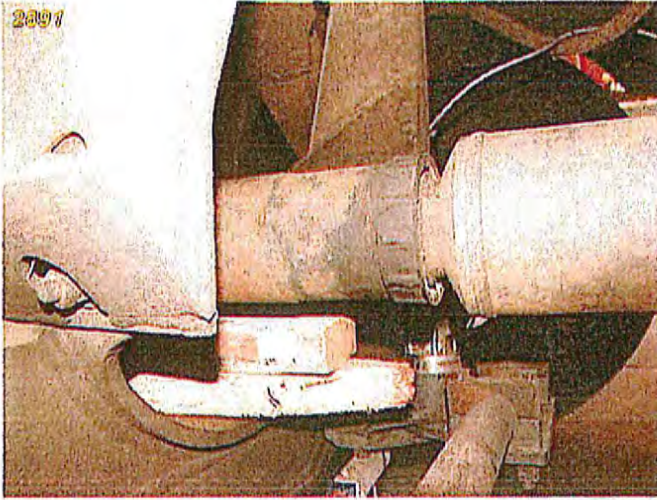


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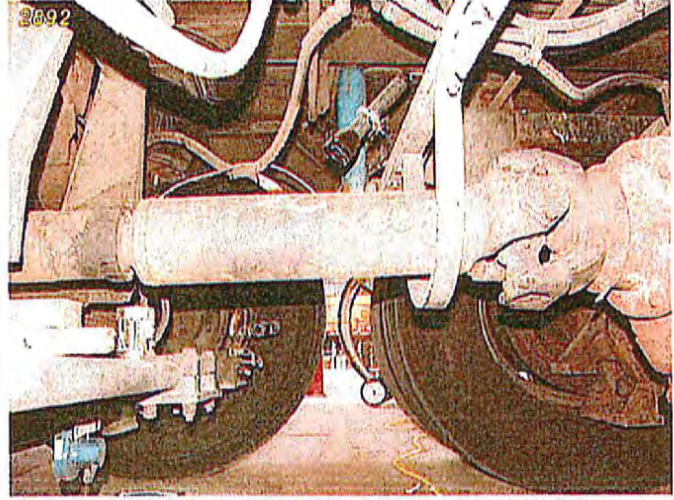


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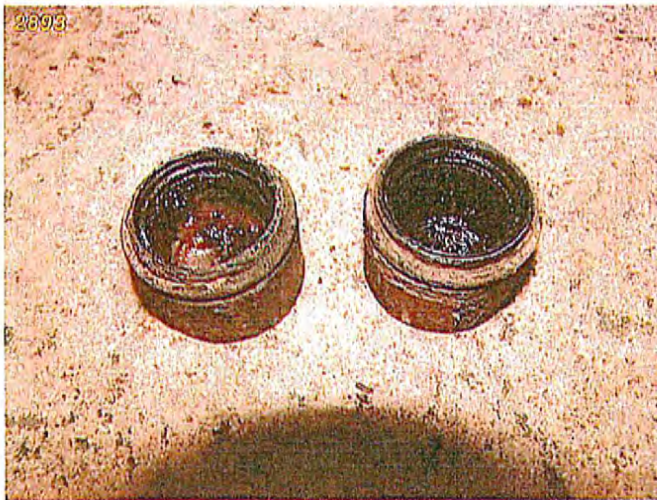
1995 MCI 102DL3 Vehicle Testing



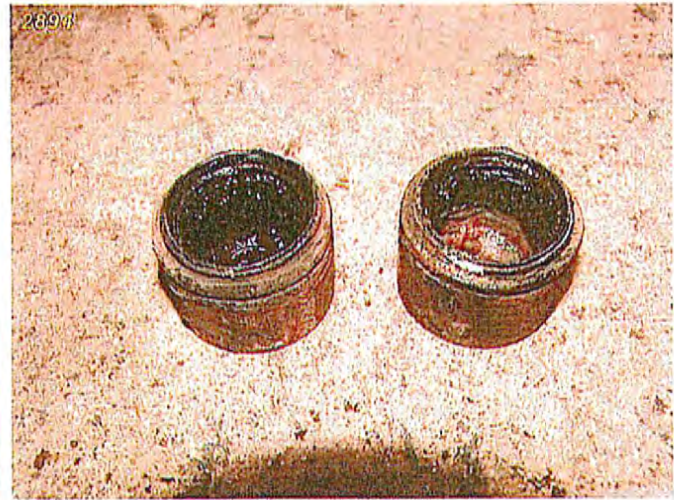
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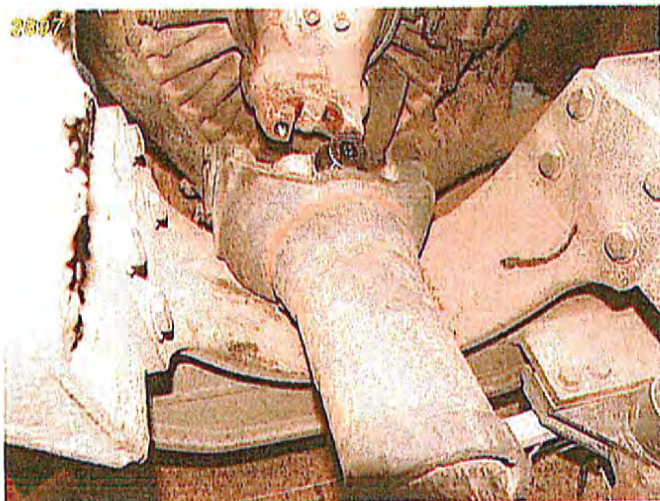


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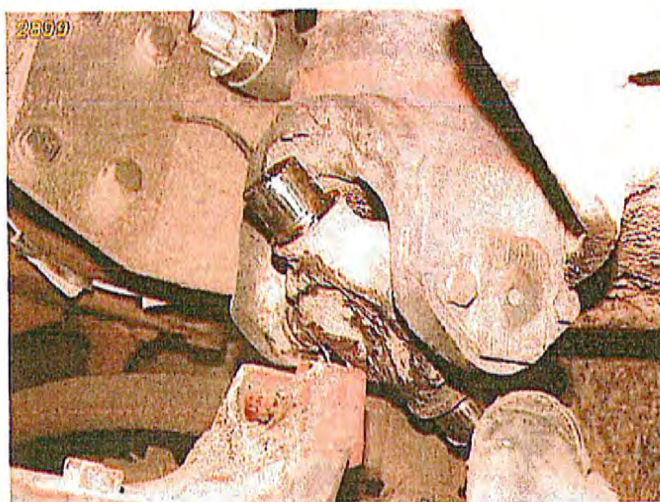
1995 MCI 102DL3 Vehicle Testing



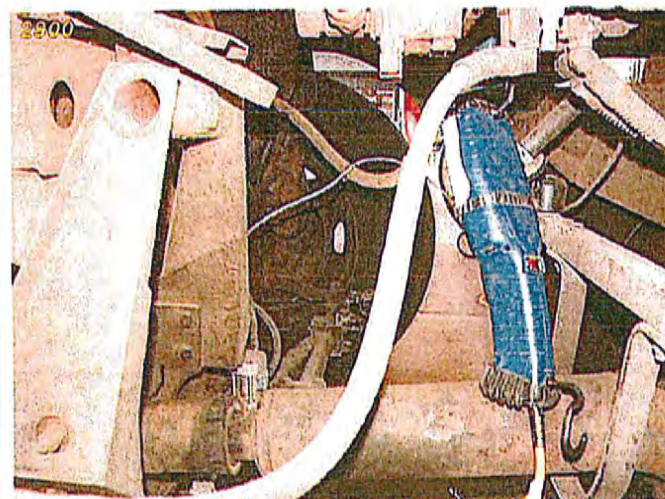
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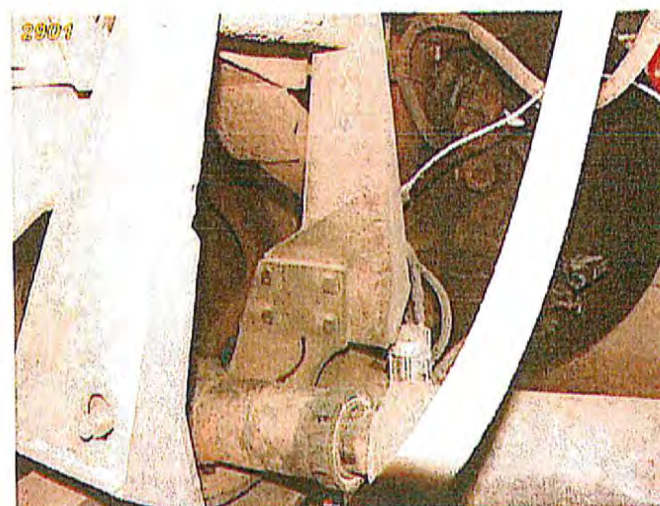
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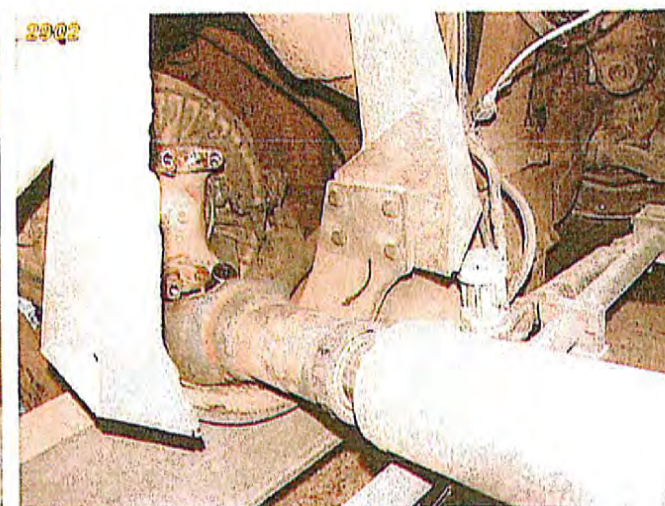
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1995 MCI 102DL3 Vehicle Testing



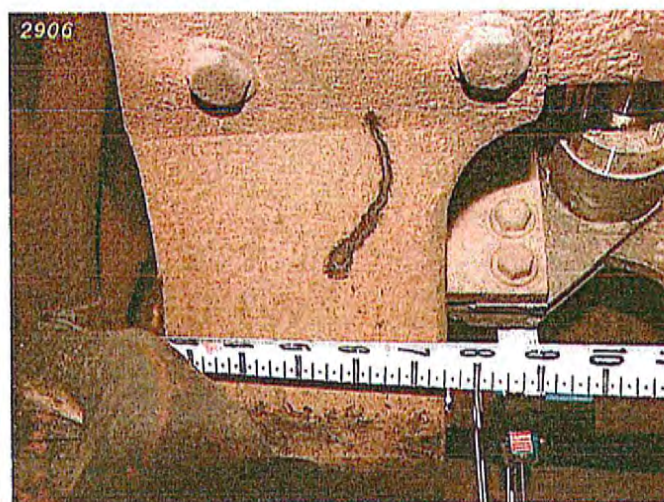
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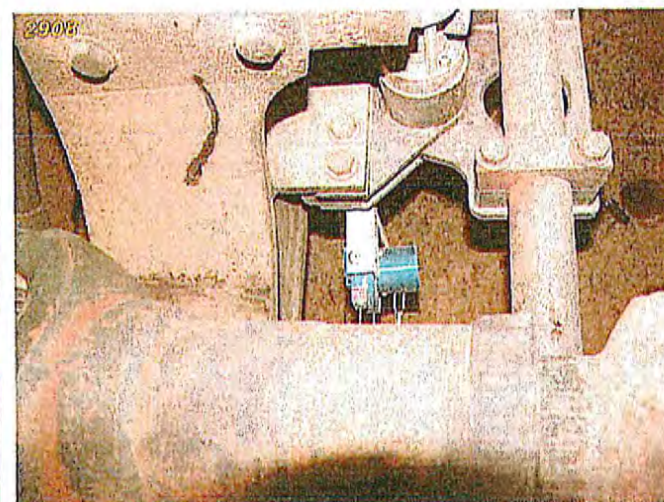
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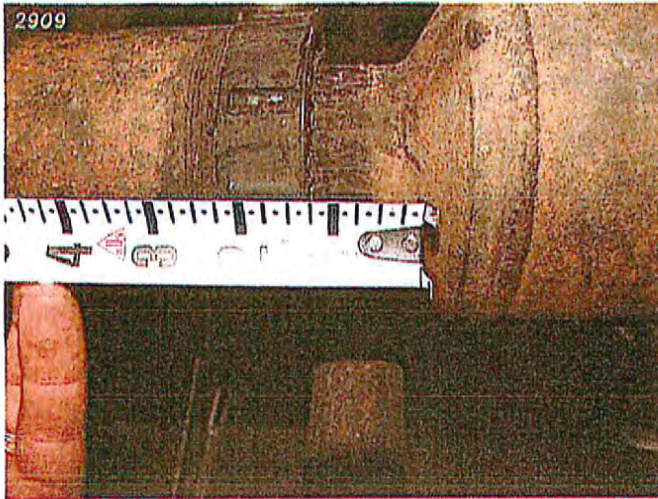


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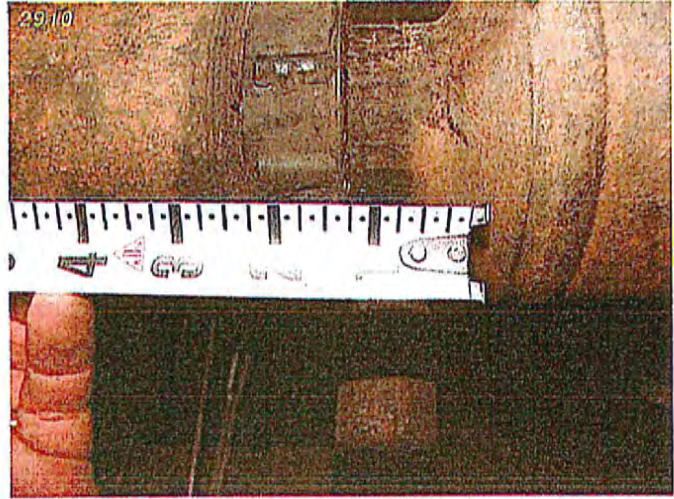


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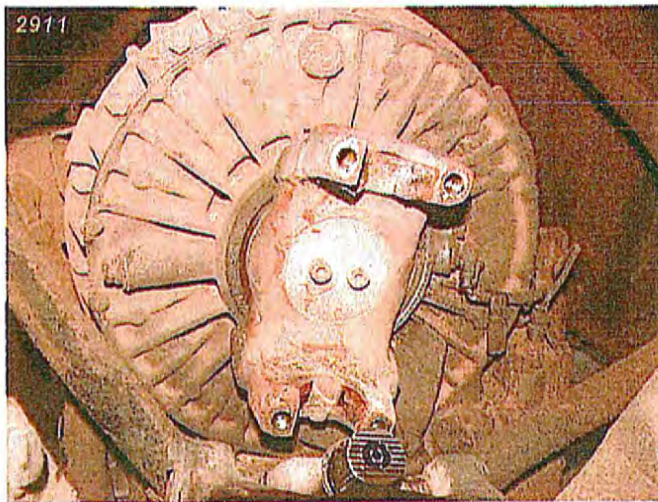
1995 MCI 102DL3 Vehicle Testing



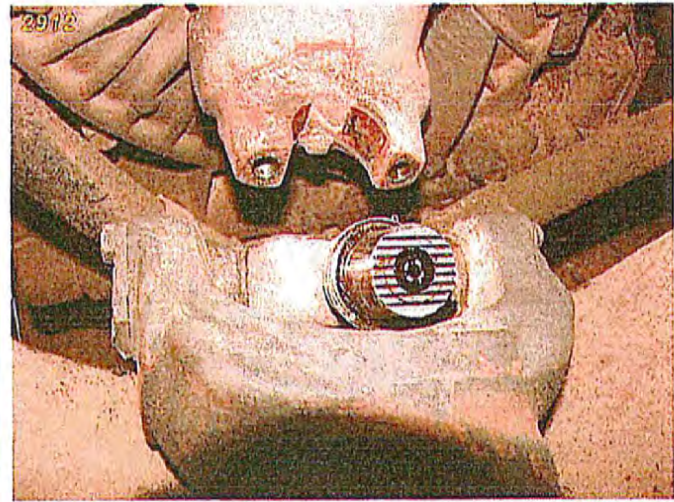
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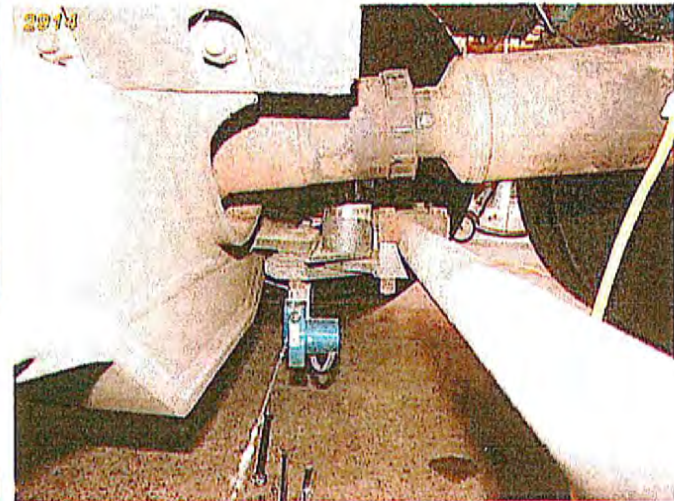
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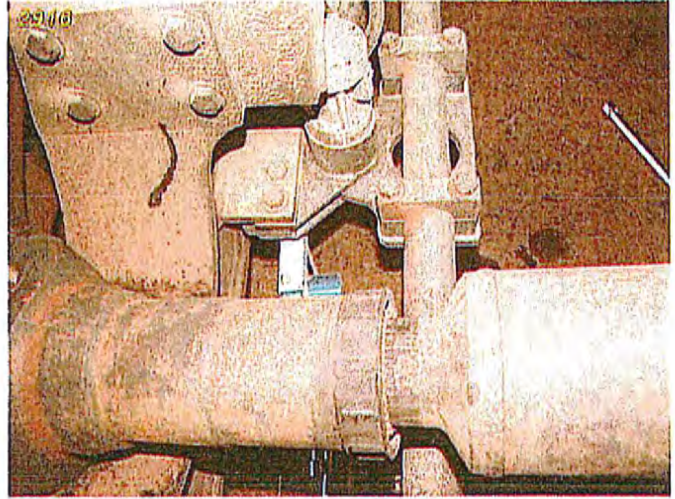


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1995 MCI 102DL3 Vehicle Testing



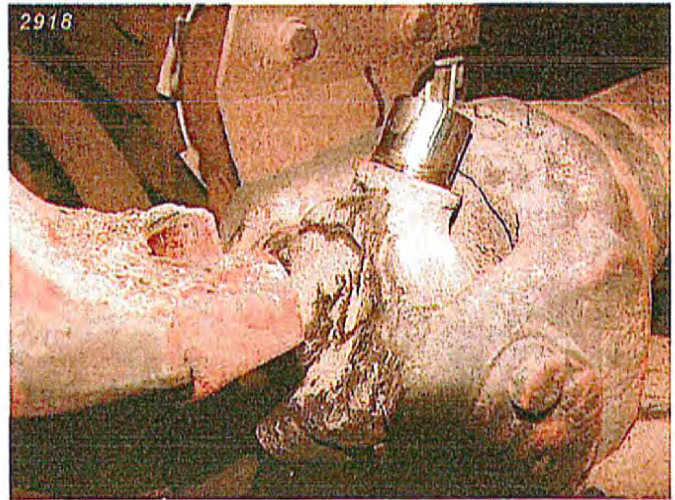
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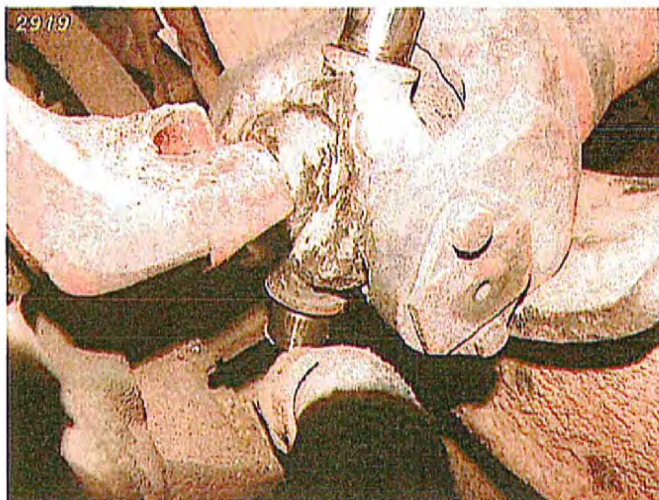
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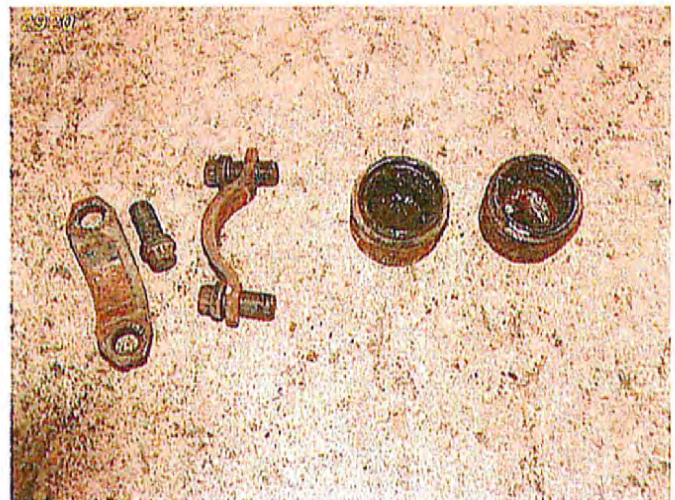
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1995 MCI 102DL3 Vehicle Testing



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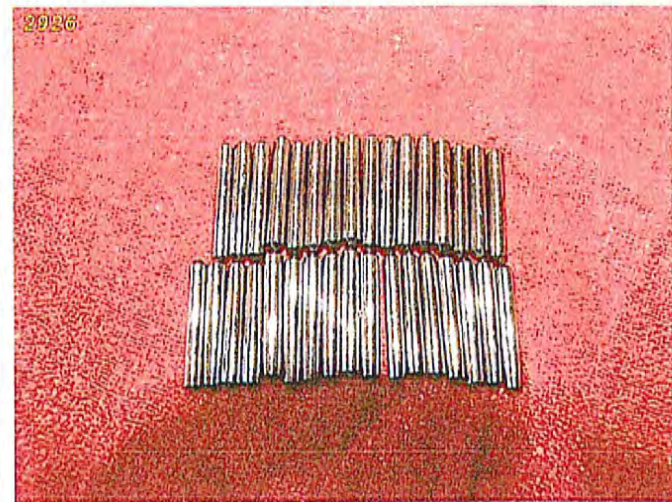
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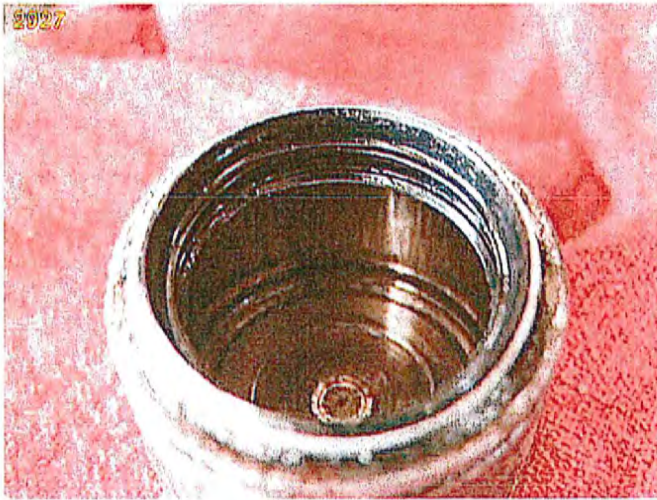


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1995 MCI 102DL3 Vehicle Testing



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Vehicle_2928.jpg



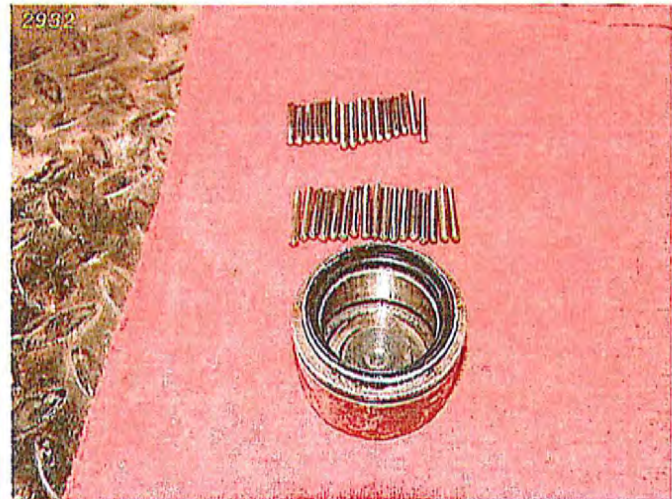
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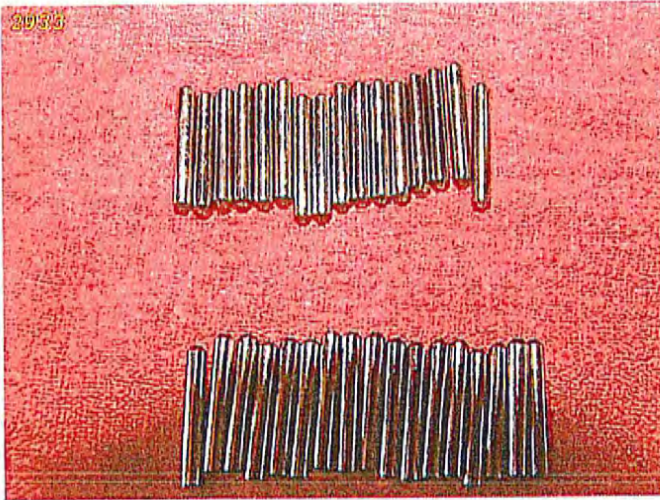


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1995 MCI 102DL3 Vehicle Testing



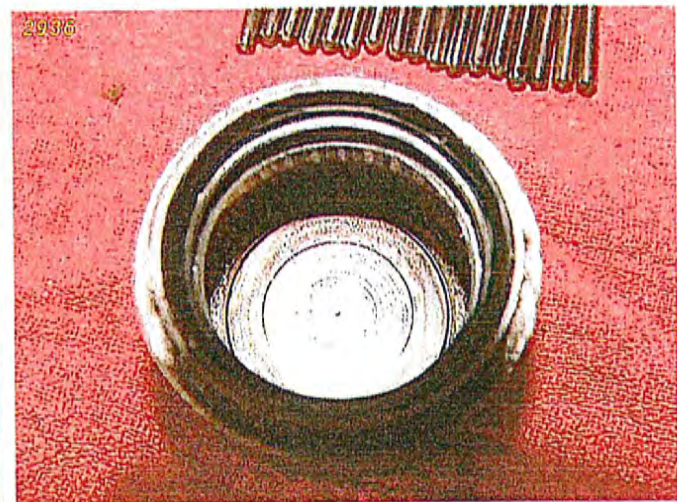
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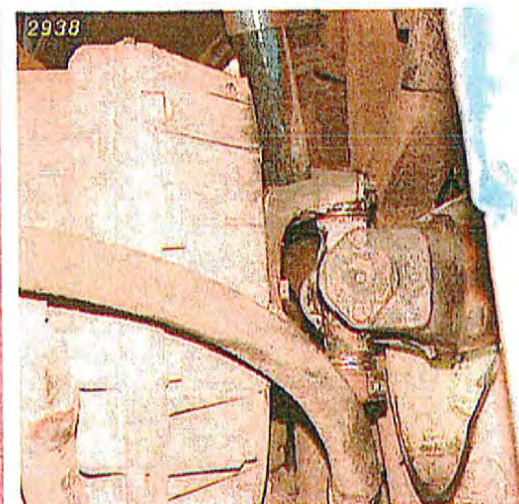
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1995 MCI 102DL3 Vehicle Testing

Driveshaft & U-Joints

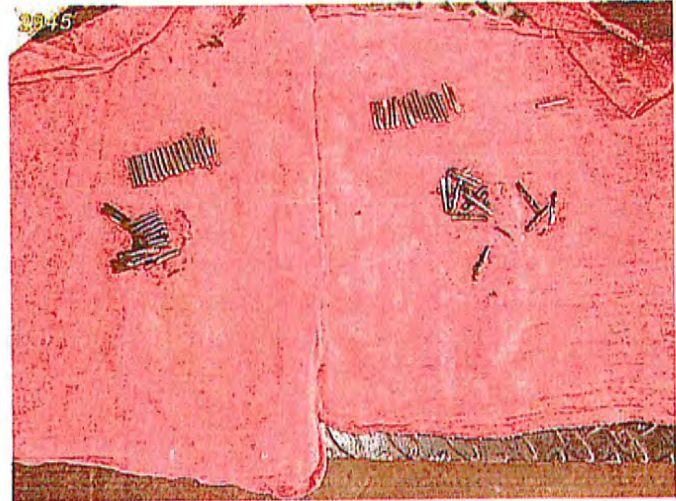
Re-Installation

June 12-14, 2011

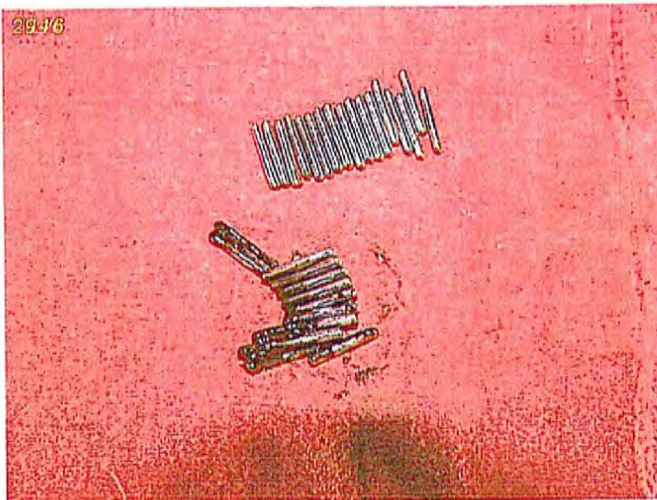
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DYNAMIC ANALYSIS GROUP LLC

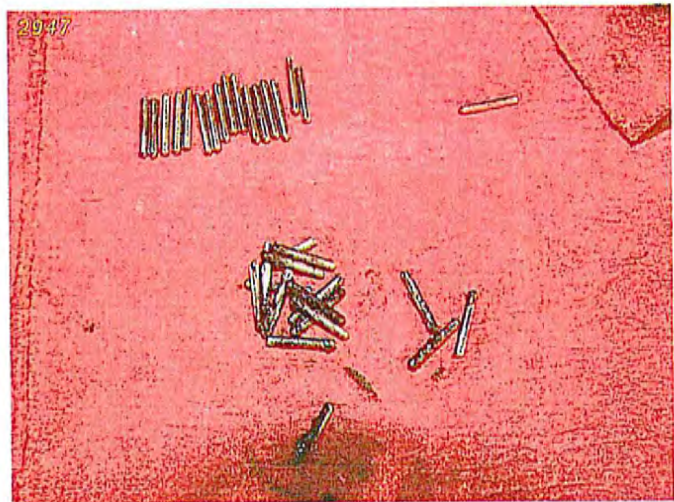
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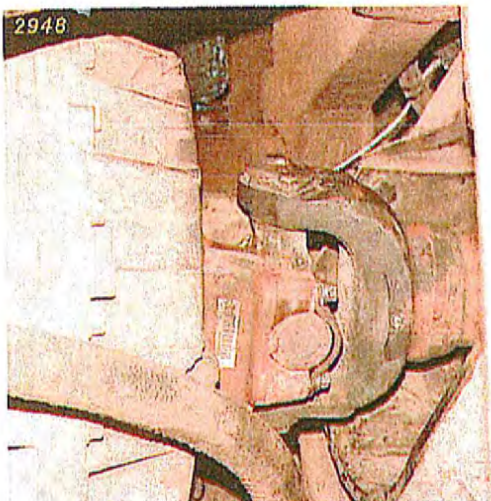
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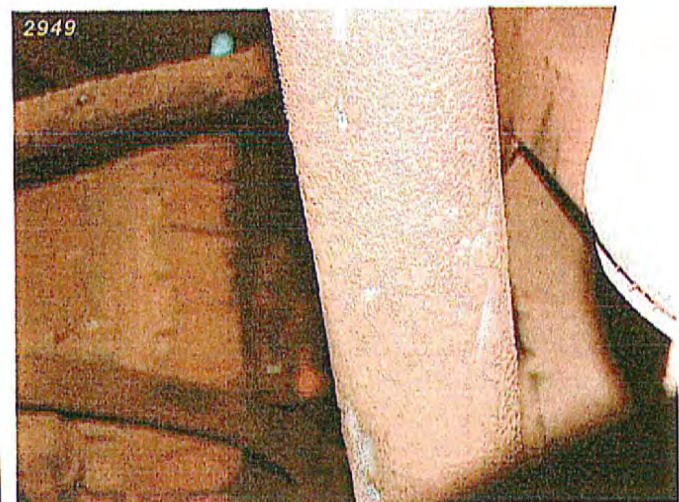
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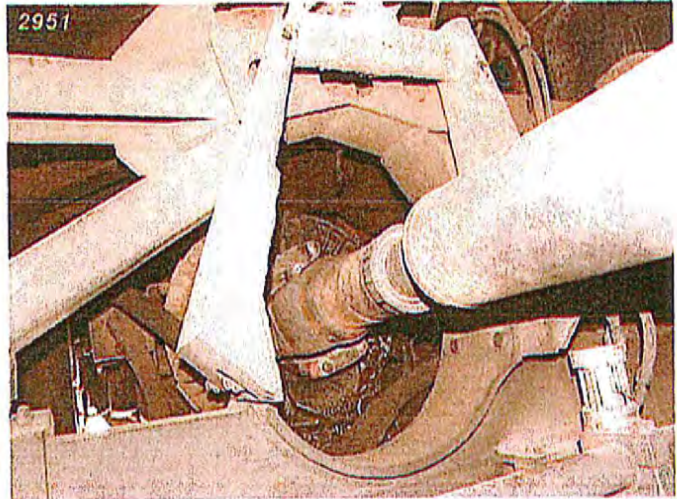


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1995 MCI 102DL3 Vehicle Testing



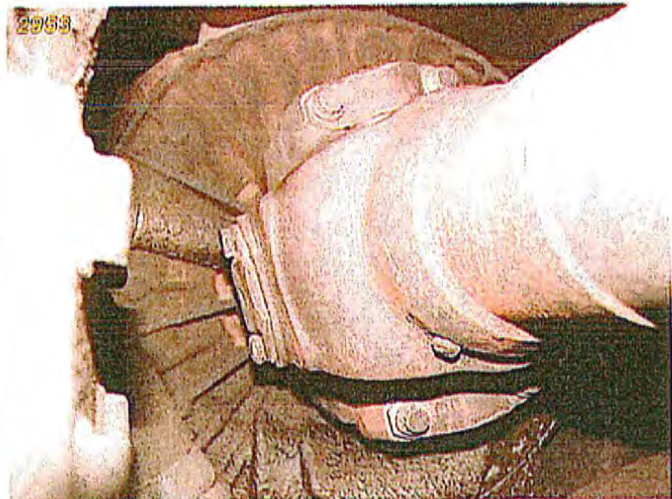
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Vehicle_2953.jpg



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1995 MCI 102DL3 Vehicle Testing



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1995 MCI 102DL3 Vehicle Testing

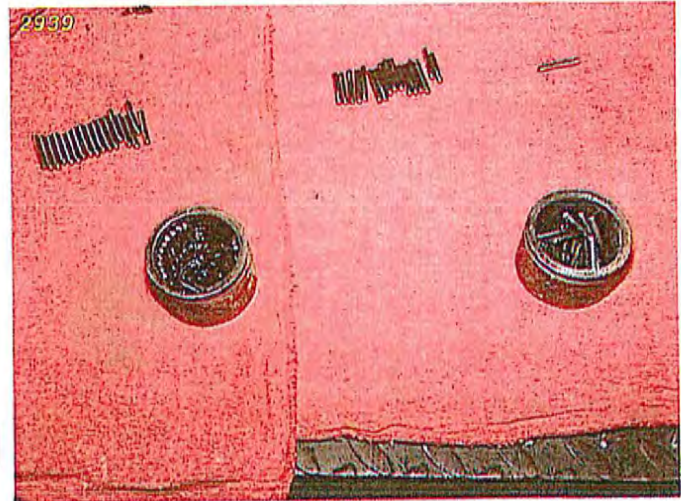
Driveshaft & U-Joints

Post-Test Inspection
First Sequence

June 12-14, 2011

DAG DYNAMIC ANALYSIS GROUP LLC

Vehicle.png



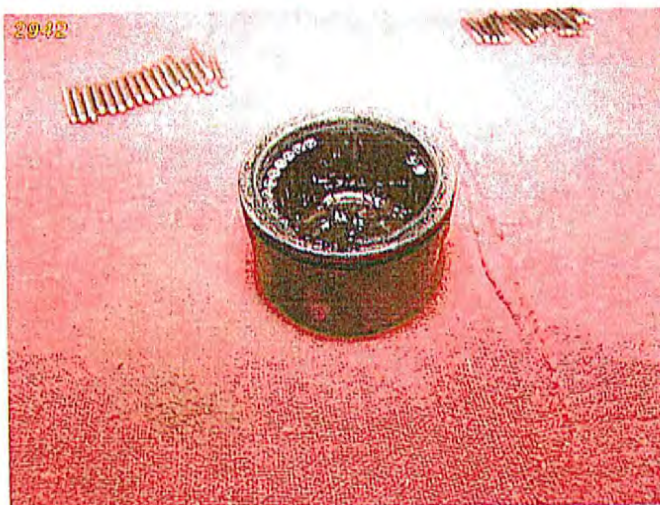
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Vehicle_2942.jpg



Vehicle_2943.jpg

1995 MCI 102DL3 Vehicle Testing



Vehicle_2944.jpg

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4-27-2012

Response 10

Attachment A-3

SECTION 14

DRIVESHAFT

The U-joint has two retaining cap journal bearings for attaching the U-joint to the driveshaft and two plain journal bearing caps for attaching the U-joints to the transmission or differential (Figure 1).

CAUTION: When assembling the driveshaft, the arrow on the tight end and slip joint end must align at the joining areas. This will align the tight end and slip joint end yoke trunnions.

MAINTENANCE

Both universal joints are provided with lubrication fittings. A third lubrication fitting is provided at the slip joint.

The driveshaft lubrication fittings should be serviced according to the recommendations contained in Section 10 of this manual.

Shaft U-joints should be checked at regular inspection intervals for loose or broken bolts. When servicing the driveshaft, use only new bolts.

The recommended torque value for the retaining cap journal bearing capscrews is 35-39 foot-pounds (47-53 N-m). The recommended torque value for the half round journal bearing capscrews (Figure 2 is 115-135 foot-pounds (156-183 N-m).

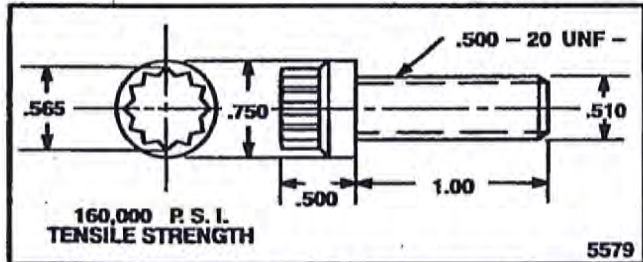


Figure 2. Driveshaft Half Round Yoke Bolts.

REMOVAL

The driveshaft may be removed from the vehicle by removing the bolts which attach the universal joints to the differential and transmission half round yokes.

To remove the driveshaft, remove the capscrews which attach the driveshaft bearing journals to the transmission and differential half round yokes. Unscrew the slip joint dust cap. Telescope the drive together at the slip joint. The shaft can then be removed. Replacement is the reverse of removal.

DISASSEMBLY OF UNIVERSAL JOINTS

Bend tangs of lock plate. Unscrew capscrews and remove lock plate. To remove the needle bearings and retaining cap subassembly use a large pair of channel-lock pliers on retaining cap edges, turn

retaining cap and bearing subassembly at the same time lifting upward to remove the subassembly from the journal trunnion diameter and out of the yoke hole. Turn the joint over and tap the exposed end of the journal cross until the opposite needle bearing is free. Use a soft round drift with flat face about $\frac{1}{32}$ -inch (0.79 mm) smaller in diameter than the hole in the yoke.

Remove the journal cross by sliding it to one side of the yoke and tilting it over the top of the yoke lug.

CLEANING AND INSPECTION

Thoroughly clean grease from bearings, journals, and other parts. Clean all lubricant passages in the cross, and the lubrication fittings. Needle bearing assemblies may be soaked in cleaning solution to soften particles of hard grease. It is extremely important that bearing assemblies be absolutely clean, since even very small particles of dirt or grit can cause rapid bearing wear. Do not attempt to disassemble needle bearings.

Cross bearing journal areas should be inspected for roughness or grooving (brinelling). Excessive wear of the needle bearings is indicated if the needles drop out of the retainer, or if marks are present on the journal bearing surface. If brinelling is indicated, the entire U-joint assembly should be replaced.

Inspect yokes for cracks, wear or distortion.

REASSEMBLY

Remove the U-joint from the box and remove all four bearing assemblies. With the cross grease fitting hole aligned with the slip joint assembly grease fitting, insert one journal of the cross into the driveshaft yoke journal as far as possible from the inside, and tilt until the opposite cross journal clears the other yoke journal and drops into position. Install the cross lubrication fitting and fill the cross reservoir with grease.

Pack retaining cap bearing assemblies approximately $\frac{1}{3}$ full with the lubricant specified in Section 10. The lips of the bearing seal **MUST** be lubricated to prevent the seal from turning inside out upon installation. Apply an anti-seize compound to the outside diameter of the two bearing assemblies.

Move one end of the cross to cause a trunnion to extend beyond the outside of the driveshaft yoke. Place a retaining cap bearing assembly over cross trunnion and align it to the yoke hole. Holding the bearing assembly aligned with the yoke hole, press the bearing assembly flush to the face of the end yoke by hand. Do not use a steel hammer for this purpose. The joints should move freely in the bearings and not bind. Also, if new bearing assemblies are not being installed, care should be taken to replace bearing assemblies in the same locations from which they were removed.

Move the cross laterally to the opposite side and through the yoke journal. Place the second retaining cap

SECTION 10

LUBRICATION

MCI 102D SERIES MAINTENANCE MANUAL

Date 1-1-95

Page 10-13[illegible]

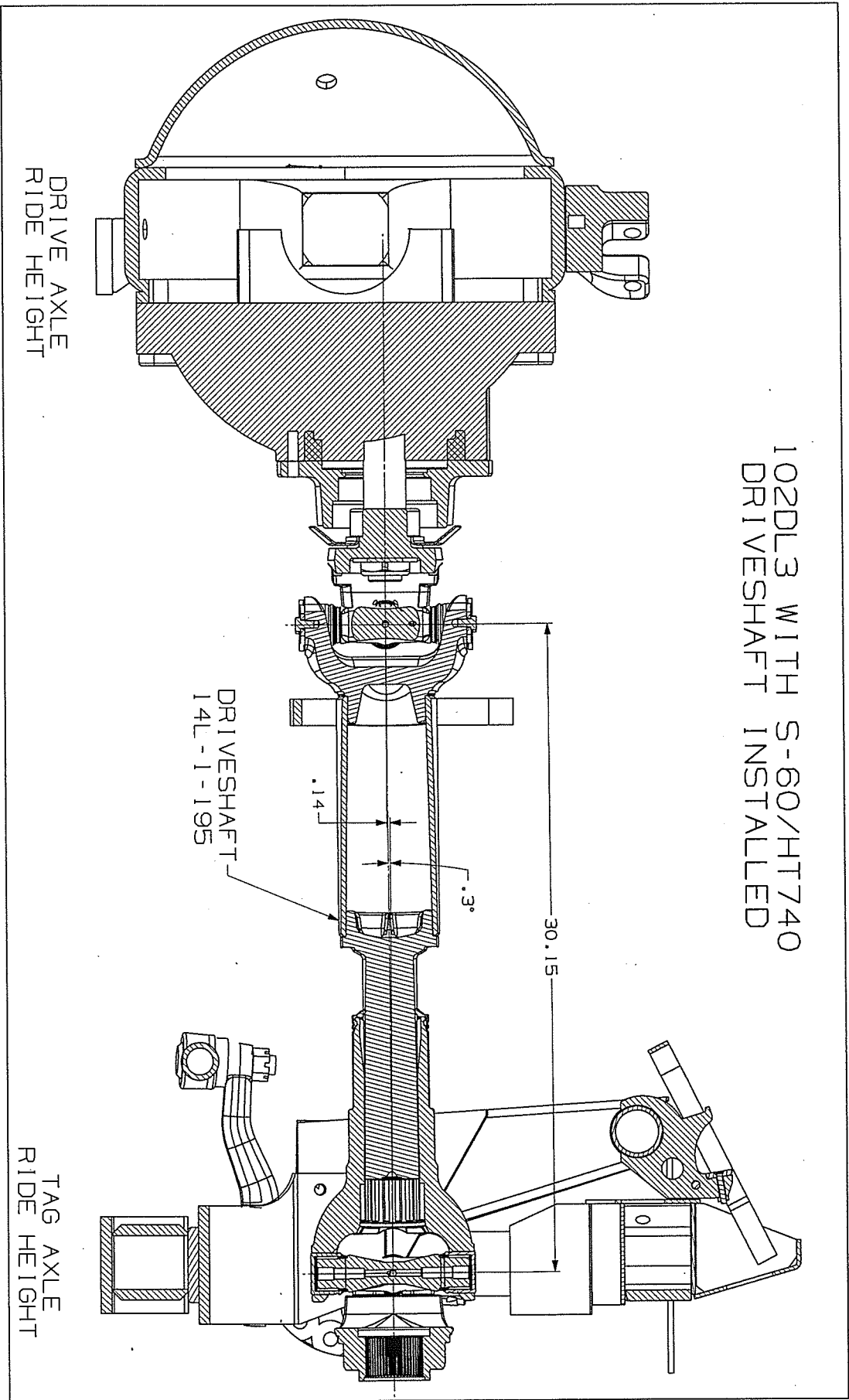
PE12-007

MCI

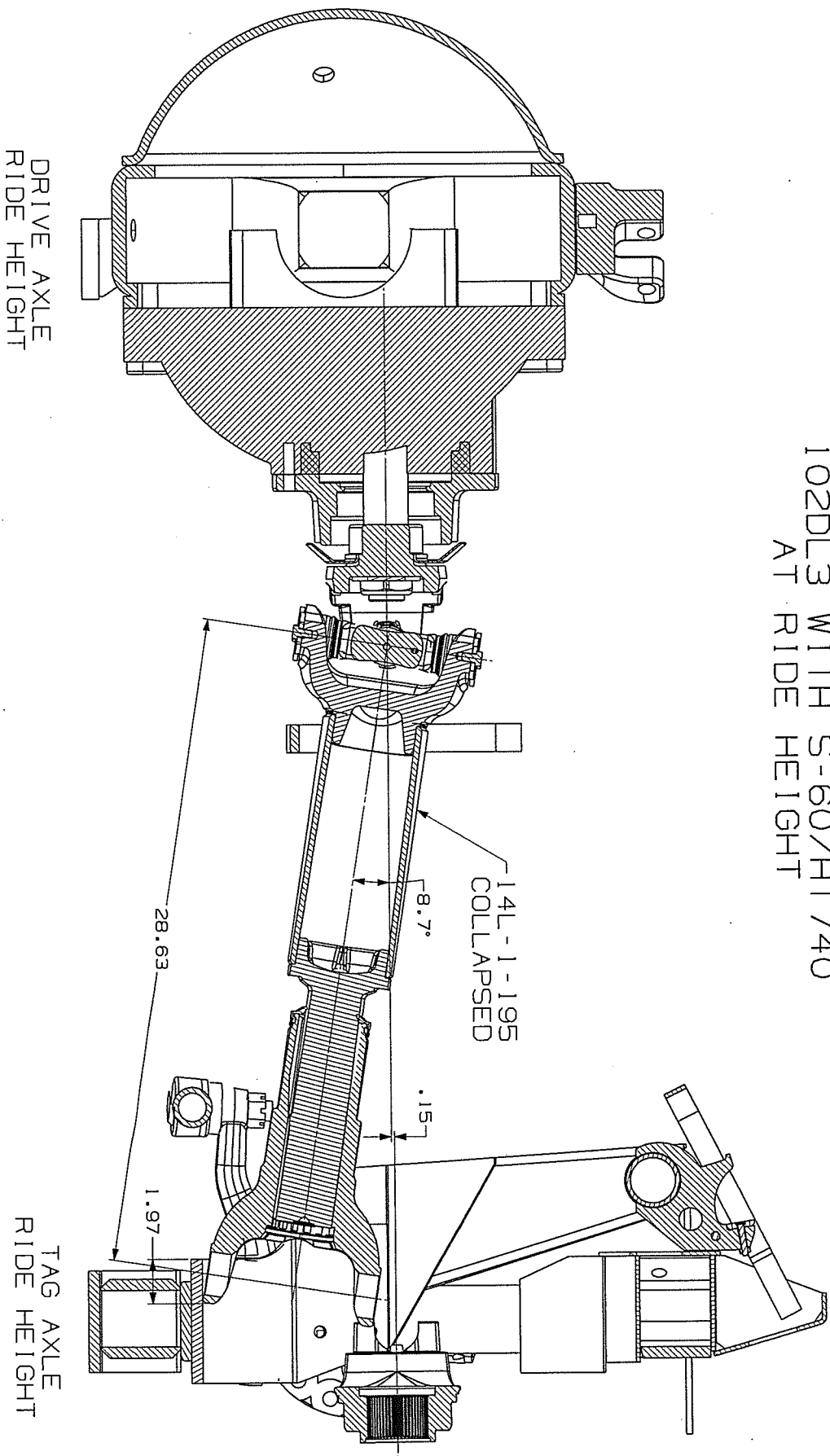
4-27-2012

Response 10

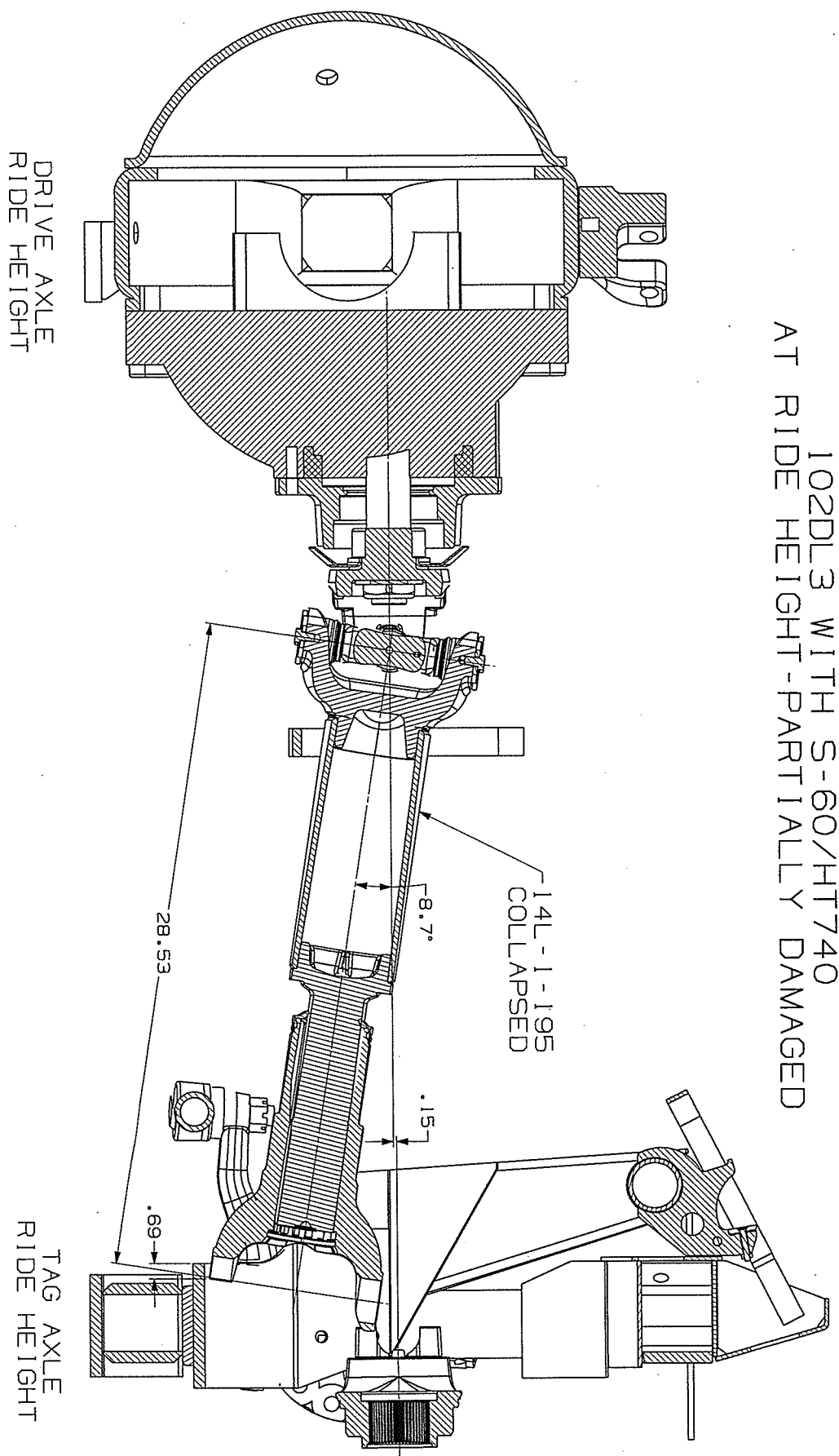
Attachment B-1



102DL3 WITH S-60/HT740
AT RIDE HEIGHT



102DL3 WITH S-60/HT740
AT RIDE HEIGHT-PARTIALLY DAMAGED



PE12-007

MCI

4-27-2012

Response 10

Attachment B-2

CAMPOS V. AMERICANOS

Report Prepared For:

Mr. John C. Dacus
Hartline, Dacus, Barger, & Dreyer, LLP
6688 North Central Expressway
Suite 1000
Dallas, Texas 75206

Prepared By:



Kevan J. Granat
August 11, 2011

Laboratory Testing of a Tag Axle Assembly

I have performed instrumented testing on a tag axle assembly to evaluate the crash forces involved during overturn of the subject coach. A test fixture was fabricated and affixed to an exemplar tag axle assembly. The fixture was designed to apply a force to the right tag axle wheel in the same direction as the ground forces would be applied to the subject coach as the tire and wheel impacted and furrowed into the median soil just prior to reaching the vehicle's point of rest. Force application was made by way of a hydraulic cylinder mounted longitudinally between the fixture and the right wheel, with the force directed from rear to front. The fixture was instrumented to measure the applied pressure, displacement of the hydraulic cylinder, and displacement of the tie rod. The test was documented with multiple video cameras. The tag axle was equipped with certain new components, including ball joints, tie rod, tie-rod-mounted locking plate, and steering damper. The locking pin was engaged into the locking plates during the test.

A peak force of approximately 16,000 pounds was applied by the hydraulic cylinder. This force level corresponds to an average acceleration of approximately 0.3 to 0.4 g's applied to the mass of a fully loaded coach. As a result of the applied force, the tie rod was placed in compression, causing it to bend forward and creating a moment about the locking pin. Upon reaching the peak force level, the tie-rod-mounted locking plate abruptly shifted forward in its slot, forcing the rearmost edge of the slot to strike the locking pin. This shifting motion gouged the rear surface of the slot in the same location as the gouges on the subject locking plate and applied a forward force to the locking pin, consistent with the displacement of the subject locking pin. The rotation of the plate was in the same rotational direction as the arcing gouge on the subject locking plate.

This testing shows that ground forces created during the impact furrowing of the right tag axle tire as it approached its rest position are consistent with the deformation and damage observed on the subject coach, including gouges on the tie-rod-mounted locking plate, forward contact of the locking pin, and forward bending of the tie rod. The peak force levels observed during testing are consistent with the levels expected during such motion of the coach.

PE12-007

MCI

4-27-2012

Response 10

Attachment B-3



Attachment B-3

PE12-007

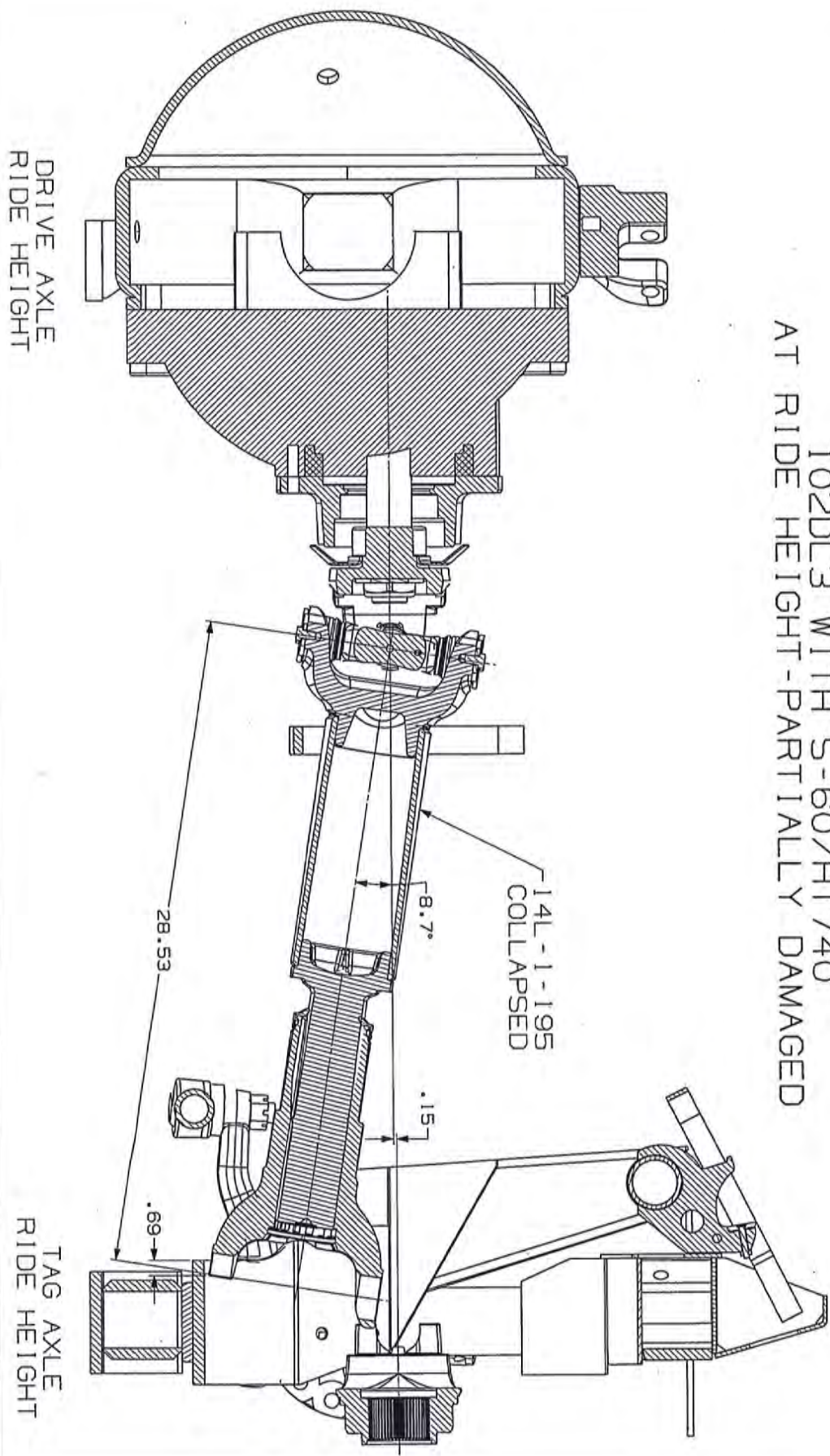
MCI

4-27-2012

Response 10

Attachment B-4

102DL3 WITH S-60/HT740
AT RIDE HEIGHT-PARTIALLY DAMAGED



PE12-007

MCI

4-27-2012

Response 10

Attachment B-5





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MCI

4-27-2012

Response 10

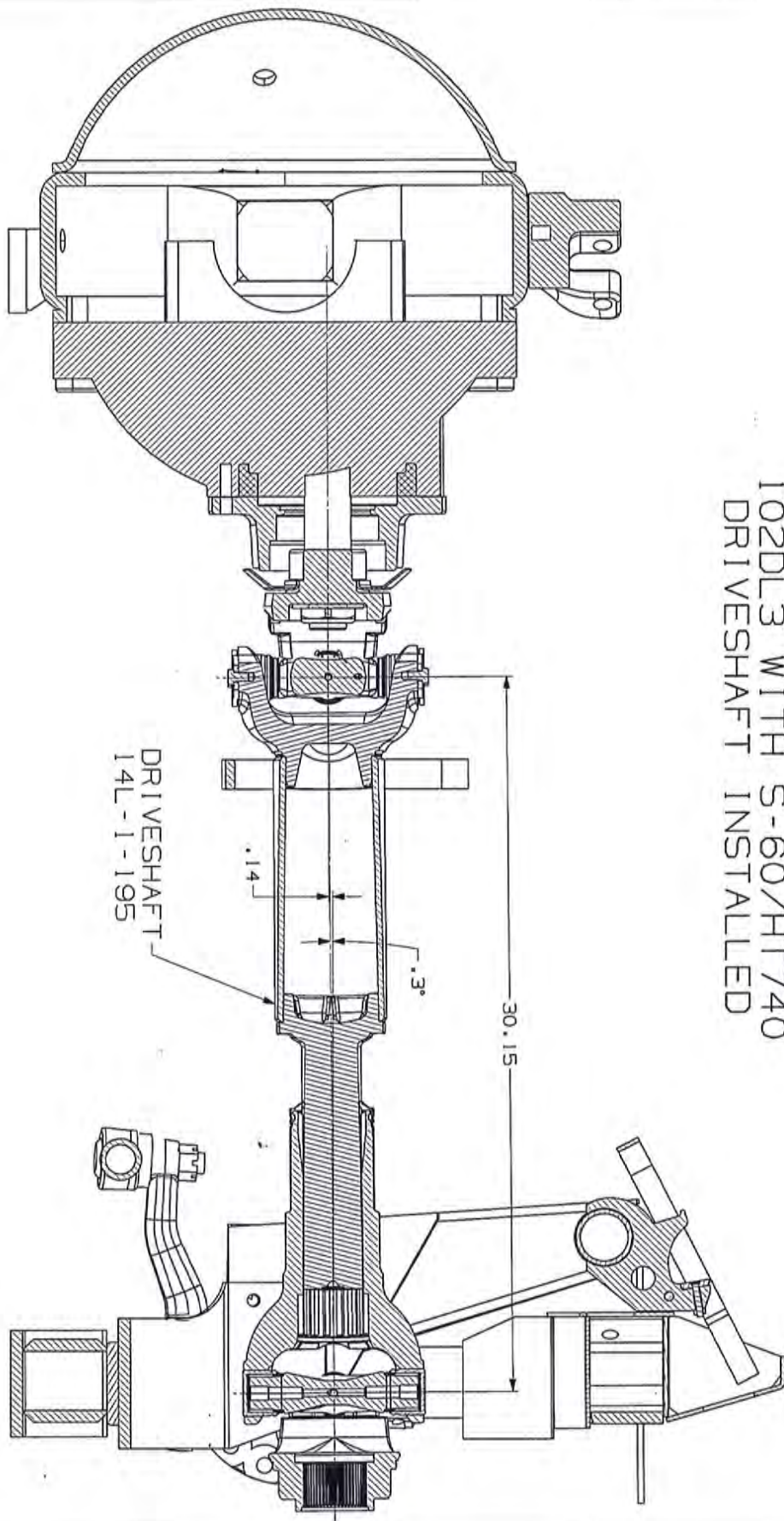
Attachment C-1

102DL3 WITH S-60/HT740 DRIVESHAFT INSTALLED

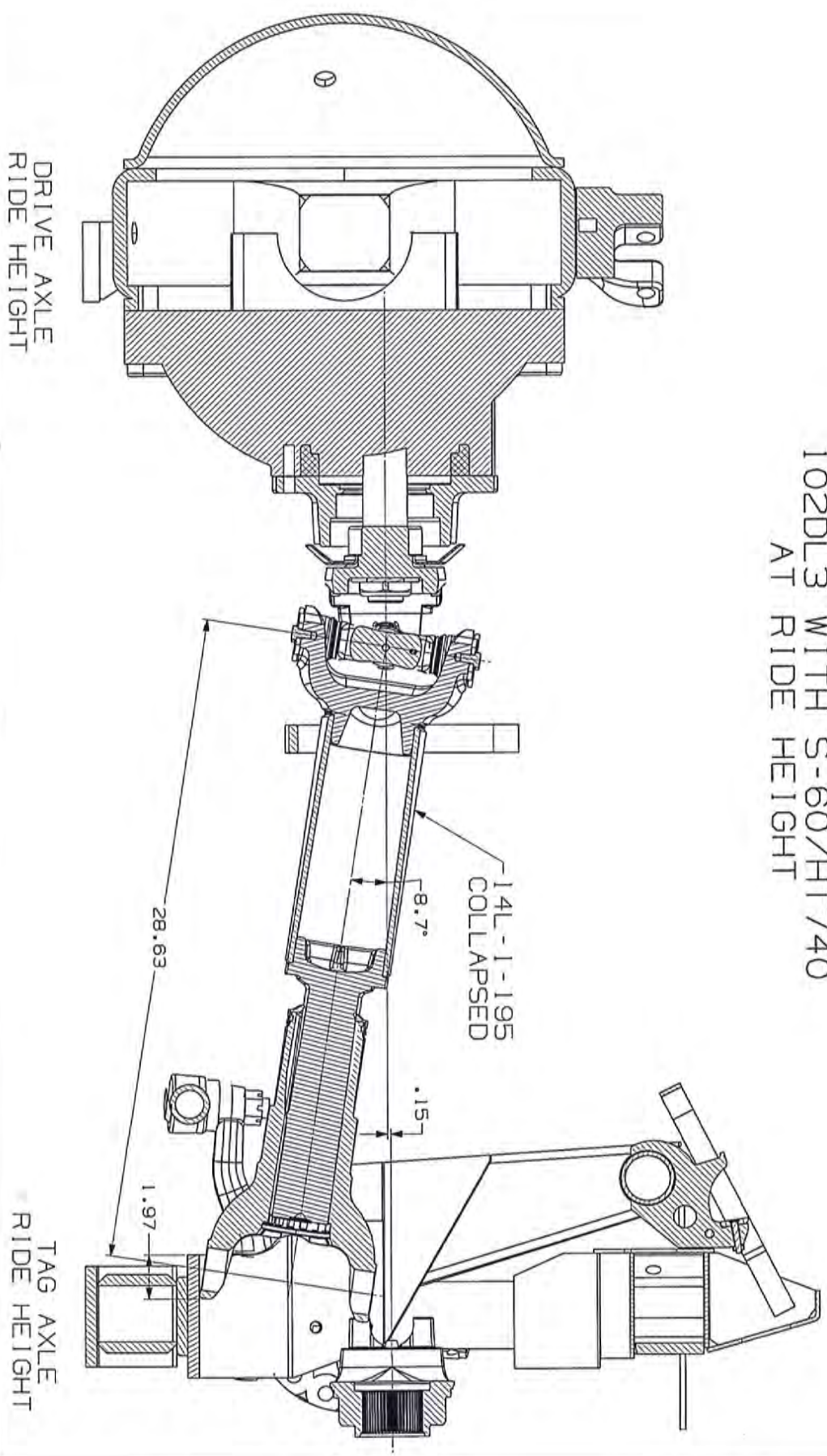
DRIVE AXLE
RIDE HEIGHT

DRIVESHAFT
14L-1-195

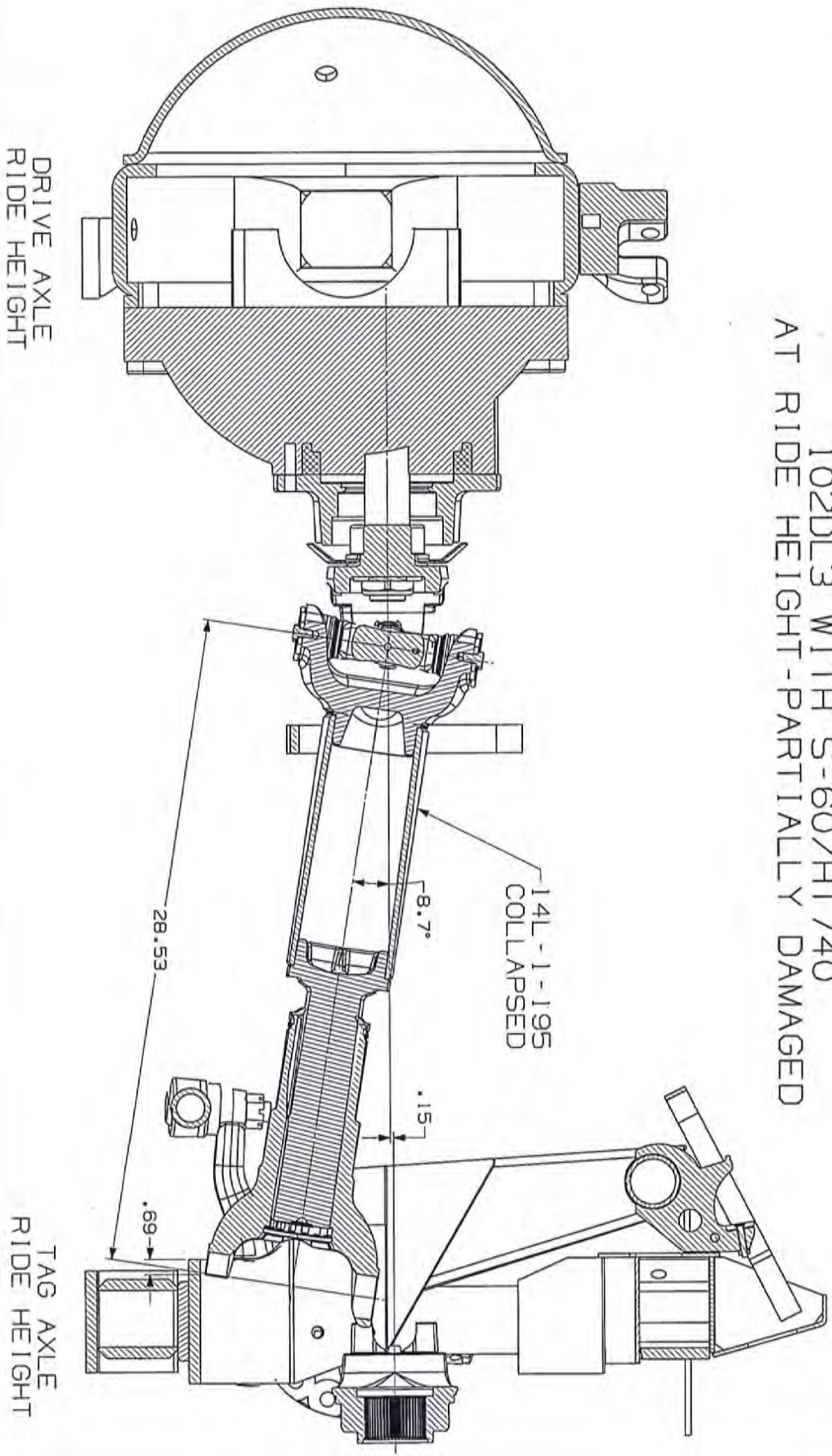
TAG AXLE
RIDE HEIGHT



102DL3 WITH S-60/HT740
AT RIDE HEIGHT



102DL3 WITH S-60/HT740
AT RIDE HEIGHT-PARTIALLY DAMAGED



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Attachment C-2



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MCI

4-27-2012

Response 10

Attachment C-3



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4-27-2012

Response 10

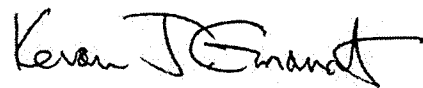
Attachment C-4

CAMPOS V. AMERICANOS

Report Prepared For:

Mr. John C. Dacus
Hartline, Dacus, Barger, & Dreyer, LLP
6688 North Central Expressway
Suite 1000
Dallas, Texas 75206

Prepared By:



Kevan J. Granat
August 11, 2011

Laboratory Testing of a Tag Axle Assembly

I have performed instrumented testing on a tag axle assembly to evaluate the crash forces involved during overturn of the subject coach. A test fixture was fabricated and affixed to an exemplar tag axle assembly. The fixture was designed to apply a force to the right tag axle wheel in the same direction as the ground forces would be applied to the subject coach as the tire and wheel impacted and furrowed into the median soil just prior to reaching the vehicle's point of rest. Force application was made by way of a hydraulic cylinder mounted longitudinally between the fixture and the right wheel, with the force directed from rear to front. The fixture was instrumented to measure the applied pressure, displacement of the hydraulic cylinder, and displacement of the tie rod. The test was documented with multiple video cameras. The tag axle was equipped with certain new components, including ball joints, tie rod, tie-rod-mounted locking plate, and steering damper. The locking pin was engaged into the locking plates during the test.

A peak force of approximately 16,000 pounds was applied by the hydraulic cylinder. This force level corresponds to an average acceleration of approximately 0.3 to 0.4 g's applied to the mass of a fully loaded coach. As a result of the applied force, the tie rod was placed in compression, causing it to bend forward and creating a moment about the locking pin. Upon reaching the peak force level, the tie-rod-mounted locking plate abruptly shifted forward in its slot, forcing the rearmost edge of the slot to strike the locking pin. This shifting motion gouged the rear surface of the slot in the same location as the gouges on the subject locking plate and applied a forward force to the locking pin, consistent with the displacement of the subject locking pin. The rotation of the plate was in the same rotational direction as the arcing gouge on the subject locking plate.

This testing shows that ground forces created during the impact furrowing of the right tag axle tire as it approached its rest position are consistent with the deformation and damage observed on the subject coach, including gouges on the tie-rod-mounted locking plate, forward contact of the locking pin, and forward bending of the tie rod. The peak force levels observed during testing are consistent with the levels expected during such motion of the coach.

CAUSE NO. 2010-03-1717-C

DANIEL CAMPOS, ET AL.,) IN THE DISTRICT COURT OF
)
VS.) 197TH JUDICIAL DISTRICT
)
AMERICANOS, U.S.A.,)
L.L.C., ET AL.) CAMERON COUNTY, TEXAS

ORAL AND VIDEOTAPED DEPOSITION OF

ROBERT RUCOBA

SEPTEMBER 21, 2011

VOLUME 1

ORAL AND VIDEOTAPED DEPOSITION of ROBERT RUCOBA,
produced as a witness at the instance of the
Defendant, Americanos U.S.A., L.L.C., and duly sworn,
was taken in the above-styled and numbered cause on
the 21st of September, 2011, from 10:14 a.m. to
5:37 p.m., before Donna J. Howson, CSR in and for the
State of Texas, reported by machine shorthand, at the
offices of Hartline Dacus Barger Dreyer & Kern, LLP,
Three Riverway, Suite 650, Houston, Texas 77056,
pursuant to the Texas Rules of Civil Procedure and the
provisions stated on the record or attached hereto.

1 It follows right here. All of a sudden now it's
 2 sitting on the outboard tandem.
 3 Q. We're talking about from E7 to E8?
 4 A. Right. Right. Then -- then you follow it
 5 and you say, okay, well, now I've got the tag axle is
 6 kind of close to that mark and all of a sudden you go
 7 down a span of just another -- not even a compete
 8 vehicle width and now the tag axle is completely off
 9 that mark. Now he's put the inboard tandem on that
 10 mark. Then he's also got the vehicle rotating
 11 clockwise. Do you see how the vehicle shape is now
 12 turned in the clockwise direction -- I'm sorry --
 13 counterclockwise direction? Then all of a sudden it
 14 goes back to the clockwise direction.
 15 Q. Down there by E10?
 16 A. Down there by E10. Then you get to E10. Now
 17 all of a sudden the vehicle takes a jump. As it goes
 18 from here to the very next shape, it takes a jump.
 19 You can see there's an offset there. So it's moving
 20 sideways, and you just physically can't do that.
 21 Q. Anything else?
 22 A. No, that's pretty much it. I think in
 23 looking at the early phase of the reconstruction, this
 24 is -- just some -- there's some glaring errors in this
 25 and --

1 Q. And is it your understanding that this is a
 2 document that was prepared by Mr. Fugger?
 3 A. Yes, I took these directly from his file.
 4 Q. What other criticisms do you have of his
 5 opinions or reconstruction analysis?
 6 A. Well, let me see if I've got --
 7 MS. DORMAN: I'll roll that up in a
 8 second. It's kind of loud.
 9 THE WITNESS: All right.
 10 A. Well, I think we've already touched on this
 11 several times where it was his opinion on Page 63
 12 where he was referring to the Americanos testing and
 13 referred to it as being a test where they replicate
 14 the dynamics that occur with a non-locked tag axle. I
 15 think we've discussed that several times that clearly
 16 that's not what's being done with the addition of the
 17 external ram mounted to the axle.
 18 Page 117 of his deposition where he
 19 talks about the first tire mark. He said it's a
 20 single tire mark, that he initially said it was coming
 21 from the tag axle. Then he changed his opinion. Now
 22 he -- in the deposition, later on he said that it come
 23 -- it came from the inner dual of the drive axle on
 24 the right side. I've already told you that we
 25 disagree on that.

1 On Page 186 of his deposition, he says
 2 that he doesn't see any physical evidence of furrowing
 3 at the rear during the lateral movement of the bus.
 4 The furrowing is occurring at the front, not the
 5 rear.
 6 I will show you some photographs that
 7 show that not only is there furrowing at the rear, but
 8 the rear axles have been buried in dirt at its point
 9 of rest. That's important because I believe there is
 10 an extensive amount of furrowing that is happening in
 11 that median as this vehicle is spinning and sliding
 12 and rolling to its point of rest.
 13 Q. (BY MR. HAYNES) Why don't you pull those
 14 photos now while we're thinking about it.
 15 A. Sure.
 16 MR. HAYNES: I think maybe some of our
 17 exhibit photographs got stuck back over there in the
 18 bottom of what he was just looking at. No, right
 19 there.
 20 MS. DORMAN: Oh, both. Yeah.
 21 MR. HAYNES: I just want to pull them
 22 out before we have to look for them later.
 23 MS. DORMAN: Good catch.
 24 A. I think this is a good photo that shows the
 25 right side Number 2 and Number 3 axles are --

1 (Exhibit Number 32 was marked.)
 2 Q. (BY MR. HAYNES) I'm going to mark that as
 3 Exhibit 32.
 4 A. That will be fine.
 5 -- are digging up dirt. At the point
 6 of rest, they've got dirt piles in front of them which
 7 are classic signs of furrowing. You can even see the
 8 outboard tandem on that right side is almost
 9 completely covered up with -- with dirt. It's down
 10 into the ground so deep. That's important.
 11 Q. Yeah. What's the significance of that in
 12 your opinion?
 13 A. It's important because there are forces that
 14 are imparted to this bus that moved that tie rod both
 15 laterally and forward, and the only place that can
 16 happen with enough force is going to be at the point
 17 where this bus is furrowing in the dirt and the dirt
 18 is providing the resistance as it digs in.
 19 Q. Why do you say that's the only way that tie
 20 rod could have been moved?
 21 A. Well, it's because of the fact that the tie
 22 rod itself, being that it's a stiff member, has no
 23 direct contact. There are no marks on the tie rod
 24 that indicate -- that are indicative of being struck
 25 by something hard. So how does the tie rod then

1 become displaced? The reason it becomes displaced is
2 it has a force applied to it that is both lateral as
3 well as from rear to front. The only time you can
4 ever generate a large enough force in the correct
5 orientation is when the vehicle is furrowing with its
6 axles in that final spinning process and rolling
7 process.

8 MS. DORMAN: Those are your exhibits.

9 MR. HAYNES: Thank you.

10 MS. DORMAN: Sure.

11 Q. (BY MR. HAYNES) So if I'm understanding you
12 right, you are saying that the tie rod was bent by the
13 furrowing in the ground as opposed to being struck by
14 the -- the driveshaft after it came loose from the
15 transmission end?

16 A. No. What I'm saying is that the tie rod is
17 indirectly loaded. It's loaded through the wheel on
18 the right side. Those forces are large because they
19 have to be lateral forces and forces that come from
20 rear to front in order to displace the tie rod in the
21 fashion that is -- that it is at its point in rest.
22 The only time you can get large enough forces like
23 that in that direction is when the bus is rolling and
24 sliding and furrowing in dirt, particularly when it's
25 on its side and its rear end is leading.

1 Q. Right. So when you say the only time you
2 could get the forces necessary to bend that tie rod
3 would be in the furrowing of the bus in the ground,
4 that means you're ruling out that it could have been
5 caused by the loose driveshaft striking it?

6 A. Correct.

7 Q. I just want to make sure we're on the same
8 page about what you believe and don't believe.

9 Do you believe that it's scientifically
10 possible for the fractured driveshaft that's loose at
11 the transmission end to bend the tie rod?

12 A. Not without leaving some physical evidence.

13 Q. Your examination of the bus did not reveal
14 any physical evidence indicative of the tie rod having
15 been struck by the driveshaft?

16 A. Correct.

17 Q. Any other criticisms of Mr. Fugger's
18 reconstruction analysis?

19 A. Yes, I disagreed with Mr. Fugger in that I
20 could tell you that when you look at those tire marks
21 that are being made by tandems on the left side,
22 particularly where they are in a wavy pattern,
23 oscillating in a wavy pattern, that those are
24 striations that are being created in the tire mark. I
25 believe Mr. Fugger is of the opinion that those are

1 not striations.

2 Q. Anything else?

3 A. Yes, I -- I would rely upon the work that was
4 done by -- by Mr. Granat in response to a question
5 that was posed to Mr. Fugger on Page 262 of his
6 deposition. The question was, "Generally, if a coach
7 is going down the road and the steerable tag axle
8 becomes unlocked, those wheels -- those tag wheels
9 will continue to caster right behind the drive wheels,
10 correct?"

11 That answer was, "That's correct.

12 Unless there is a perturbation that can get -- to get
13 that to start --"

14 And I think that the testing that was
15 done by Mr. Granat when you study the testing that was
16 done by Mr. Granat, I think it's a clear indication
17 that that opinion is -- is wrong.

18 Q. I wasn't sure from what you read what opinion
19 you're referring to.

20 A. The -- the answer that the tag wheels
21 themselves are going to start to turn one way or the
22 other due to some perturbation in the roadway. I think
23 when you look at the testing done by Mr. Granat, I
24 think that that refutes that opinion pretty clearly.

25 Q. That's based on your review of his video?

1 A. Yes, and my discussions with Mr. Granat.

2 I think in general that's it. And I
3 know we also pre -- previously touched on the test run
4 that was provided by your experts or the log of the
5 test runs that were provided by your experts. I had
6 made some notations on that, but I'd already talked
7 about that, that the reason the bus is going out of
8 control and sliding out when you look at the testing
9 is that it's a fact that the drive axle was locking
10 up. That's why the vehicle goes into a spin.

11 Q. Okay.

12 A. It's got nothing to do with the tag axle
13 being forcibly steered over.

14 Q. Yeah, we discussed that earlier. I'm not
15 sure I've seen that document with your notes on it.
16 May I see that?

17 A. Sure.

18 (Exhibit Number 33 was marked.)

19 Q. (BY MR. HAYNES) I'm going to go ahead and
20 mark this as Exhibit 33, and can you read for me your
21 notations for each test run?

22 A. Yes.

23 Q. Read that into the record.

24 A. It says Number 1 or Test Run Number 1, "no
25 test footage."

1 and leave it out here so she can make a copy of it.
 2 Otherwise, at the end of the deposition everybody will
 3 go, "Who's got that exhibit?" And nobody will be able
 4 to leave until we find it.

5 (Exhibit Number 40 was marked.)

6 Q. (BY MR. HAYNES) Okay. Let me show you what
 7 I've marked as Exhibit 40. Can you identify that
 8 document?

9 A. Yes, that's my handwritten notes of the
 10 disassembly steps that we followed as we went through
 11 the process at the exemplar vehicle inspection.

12 Q. Okay. Can I look at that one while you're
 13 looking at yours?

14 Okay. What I'd like to do is go through
 15 each of these, 1 through 5, and at the same time have
 16 you pull out photographs that document
 17 photographically what you're describing, if there are
 18 any.

19 A. Okay.

20 Q. So do you still have that stack over there?
 21 Do you want to find them first, or do you want to just
 22 find them as we go through them?

23 A. Yeah, why don't we do it, find them as we
 24 kind of go through.

25 Q. Okay. What is --

1 A. Correct.

2 Q. Then in Number 2 you took photographs of the
 3 driveshaft with the -- disconnected at the
 4 transmission end?

5 A. Right.

6 Q. And it says, "Driveshaft still constrained by
 7 'horse collar.'" What are you referring to there?
 8 Is that part of the testing? Are those your notes
 9 from that part of the testing?

10 A. Right. Right. I'm referring to the tag axle
 11 pass-through.

12 Q. And what did y'all do once -- what was the
 13 task? Once y'all disconnected it from the
 14 transmission end, what -- what did y'all do?

15 A. What we did is we looked and compressed the
 16 driveshaft and tried to see if there was a way that
 17 you could free the driveshaft out from inside the tag
 18 axle pass-through, but it was constrained.

19 Q. I guess I'm asking in a more layman's person
 20 format. Did you turn on the vehicle and observe it,
 21 the driveshaft rotate or --

22 A. No.

23 Q. What did you do?

24 A. We just manipulated it by hand. In other
 25 words, lifting it up, rotating it around, trying to

1 A. So --

2 THE VIDEOGRAPHER: I have five minutes
 3 left.

4 MR. HAYNES: Go ahead and change it and
 5 then he can be looking through the photographs.

6 THE VIDEOGRAPHER: Off the record at
 7 4:28 p.m., ending Tape 5.

8 (Recess taken, 4:28 p.m. to 4:37 p.m.)

9 (Exhibit Numbers 41 through 72 were
 10 marked.)

11 THE VIDEOGRAPHER: On the record at
 12 4:37 p.m., beginning Tape 6.

13 Q. (BY MR. HAYNES) Mr. Rucoba, I think you
 14 identified some documents while we were off the record
 15 that go along with Item 1 in Exhibit 40, "driveshaft
 16 photographed -- both U-joints attached," correct?

17 A. Direct.

18 Q. And I have marked those as Exhibits 41
 19 through 55; is that -- is that correct?

20 A. Correct.

21 Q. And then what is Item 2? That's just --

22 A. This is --

23 Q. So basically in 1 you just took photographs
 24 of the driveshaft when it was connected at the
 25 differential end and the transmission end?

1 figure out if there's a way that it could be
 2 maneuvered and manipulated to get out from the
 3 constraint of the tag axle pass-through.

4 Q. And the photographs that relate to that
 5 you've identified, and I've tried to mark them as 56
 6 through 72; is that correct?

7 A. Yes, this is with -- these would be ones that
 8 pertain to Step 2?

9 Q. Yes, sir.

10 A. Okay.

11 Q. Those are the ones you handed me, I believe,
 12 that pertain to Step 2.

13 A. Okay. Right, that's Exhibits 56 to 72.

14 Q. And do these -- do any of these photographs
 15 show -- who was attempting to manipulate it by hand to
 16 see what it would do?

17 A. It was myself and Mr. Hoogestraat and the MCI
 18 technician that was there undoing the bolts.

19 Q. Did anyone take pictures of -- take
 20 photographs of y'all attempting to manipulate it by
 21 hand to see what it might con -- come into contact
 22 with?

23 A. Nothing beyond what you might see right there
 24 in those pictures.

25 Q. Okay. I don't see anybody doing anything in

1 these pictures; would you agree?

2 A. Right. Well, in other words, we've just
3 tried to show and illustrate that this is what happens
4 with regard to its placement when you compress the
5 shaft and you lay it down in the -- in contact with
6 the tag axle pass-through.

7 Q. When you say "compress the shaft," what do
8 you mean?

9 A. I mean literally it has a spline shaft inside
10 it so that it can compress, and that's when you looked
11 at my notes earlier where it said 3 and three-quarters
12 down to 1 inch where I was measuring that gap or the
13 differences in the gap, the compression of that
14 driveshaft, that's what I was referring to.

15 Q. And why is it that y'all felt that it was
16 sufficient to just move it around by hand and see what
17 would happen versus actually start up the engine and
18 -- and watch it flail away if it's disconnected on
19 one end?

20 A. I felt this was just as adequate, didn't see
21 a need to start it up.

22 Q. Nobody mentioned that that might be a good
23 idea?

24 A. No.

25 Q. Do you think that y'all were able to simulate

1 by moving it around with your hands the same action
2 that might take place if -- and the same force that
3 might take place once the vehicle was started up with
4 the driveshaft disconnected at one end?

5 A. No, not with regard to the same force. I'm
6 sure the forces would be greater, but with regard to
7 trying to take the driveshaft and figure out what
8 objects it could or could not hit in a step-by-step
9 fashion was -- this was the best method.

10 Q. Why was that better than actually starting up
11 the engine and -- and videotaping what happened?

12 A. Because you could -- you could systematically
13 look at each individual step as we were disconnecting
14 it and as we were manipulating and moving the
15 driveshaft around. You don't have that luxury or that
16 advantage when you just start it up and let the
17 driveshaft rotate.

18 Q. I see what your -- I see your point in that
19 that would be something you would want to look at by
20 manipulating it by hand, but wouldn't the follow-up
21 true test be to start up the engine and see if it --
22 see what happens?

23 A. I think we know what happens. We've got the
24 accident vehicle pictures that show what happens, but
25 we're -- that -- that's already been done. What we

1 need to do is in a more systematic fashion.

2 Q. So no one ever brought up or discussed or
3 suggested maybe we ought to start up the engine and --
4 and see what damage is caused?

5 A. No.

6 Q. No one suggested maybe we ought to start up
7 the engine and see if it contacts the tag axle lock
8 and unlocks it?

9 A. No, sir.

10 Q. No one suggested that maybe we should start
11 up the engine and see if the drive -- disconnected
12 driveshaft will contact the tie rod and bend it?

13 A. No, sir, not starting it up.

14 Q. What do you mean "not starting it up"?

15 A. We started looking at that in the systematic
16 fashion.

17 Q. Not with the engine going?

18 A. Correct.

19 Q. And no one thought or at least no one
20 suggested or brought up in the meeting that y'all had
21 before this testing started that it might be a good
22 idea to start up the engine and see if it will unlock
23 the tag axle and bend the tie rod and move the tag
24 axle tires?

25 A. Correct.

1 Q. You didn't think of that?

2 MS. DORMAN: Object to form, asked and
3 answered.

4 Q. (BY MR. HAYNES) I'm asking if you thought
5 about it.

6 A. Again --

7 MS. DORMAN: Object to form, asked and
8 answered.

9 Q. (BY MR. HAYNES) I'm sorry. What was the
10 answer?

11 A. Again, what I felt is that the systematic
12 approach that we went through was the best approach.

13 Q. I understand you felt that was the best
14 approach. I'm asking if you thought about starting up
15 the engine to see what would happen.

16 MR. HILL: Object to form.

17 A. No, there was no need. That had already been
18 done.

19 Q. (BY MR. HAYNES) No, you did not think about
20 it?

21 A. No, I didn't think about it because that had
22 already been done.

23 Q. Okay. Did you find the pictures that
24 correspond to Number 3?

25 A. Yes, those are those right there.

1 Q. Thank you, sir.
 2 MR. HAYNES: Will you mark those?
 3 (Exhibit Number 73 through 77 were
 4 marked.)
 5 Q. (BY MR. HAYNES) All right. The notes for
 6 "transmission U-joint removed," for Number 3,
 7 "Transmission U-joint remove -- driveshaft still
 8 constrained by 'horse collar.'"
 9 Okay. So the Number 2, it's -- it was
 10 just disconnected. The driveshaft was disconnected
 11 from the U-joint for the transmission. And Number 3
 12 y'all actually removed the U-joint. Is that the
 13 distinction?
 14 A. Yes, sir.
 15 Q. And, again, did y'all just manipulate the
 16 driveshaft by hand in -- in the test for Number 3?
 17 A. Yes, sir.
 18 Q. And are the photographs in Exhibits 73
 19 through 77, do they document the testing that was done
 20 for your notes for Number 3?
 21 A. Yes, sir.
 22 Q. Thank you. What about for Number 4, have you
 23 been able to identify those photographs?
 24 A. Yes, sir.
 25 Q. Tell me what y'all did with the -- with

1 respect to your notes for Number 4.
 2 A. We disconnected the U-joint at the
 3 differential and tried to maneuver the driveshaft in
 4 its compressed state out from underneath the
 5 constraints of the loop and the tag axle pass-through.
 6 Q. So this was -- it was disconnected at both
 7 ends?
 8 A. Yes, sir.
 9 Q. And when y'all -- again, did y'all start the
 10 engine?
 11 A. No, sir.
 12 Q. So you disconnected at both ends and just
 13 laid it down in the "horse collar"? I'm trying to
 14 understand what -- if you have the photographs, maybe
 15 that will help me.
 16 A. I think you've got the photographs.
 17 (Exhibit Numbers 78 through 83 were
 18 marked.)
 19 Q. (BY MR. HAYNES) I've got the photographs.
 20 Okay. So Exhibits 78 through 83 document what was
 21 done with respect to your notes for Number 4; is that
 22 correct?
 23 A. Yes, sir.
 24 Q. So it looks like y'all disconnected it on
 25 both ends and just laid it down in the "horse collar";

1 is that right?
 2 A. With those pictures, yes. What we tried to
 3 do is raise it up on one end, lower it on the other,
 4 tried to figure out ways to move it front and back in
 5 order to make it come out of the two constraints. We
 6 were not able to do that.
 7 Q. And -- okay. Didn't turn on the engine?
 8 MS. DORMAN: Object to form, asked and
 9 answered.
 10 Q. (BY MR. HAYNES) Right?
 11 A. Correct.
 12 Q. Then for Number 5, do you have the
 13 photographs that correspond to what y'all did for
 14 Number 5?
 15 A. Yes.
 16 Q. This is the test where y'all said that you
 17 were able to get it out of the "horse collar" if you
 18 -- if you pushed up on the passenger side tires to
 19 simulate the vehicle tipping over?
 20 A. Correct.
 21 Q. So what happened when y'all did -- how did
 22 y'all push up on the passenger side tires?
 23 A. There was a lift mechanism that they brought
 24 in and we placed underneath the tires and then raised
 25 it.

1 Q. Did y'all start the engine?
 2 A. No, sir.
 3 Q. What happened when y'all raised it with the
 4 lift?
 5 A. There was enough relative movement between
 6 the tag axle pass-through and the loop such that you
 7 could then maneuver the driveshaft out from the two
 8 constraints.
 9 (Exhibit Numbers 84 through 87 were
 10 marked.)
 11 Q. (BY MR. HAYNES) And the photographs that
 12 correspond to your notes for Number 5 are 84 through
 13 87?
 14 A. Correct.
 15 Q. Then the rest of the photographs that you
 16 have there from the exemplar inspection, what do those
 17 show --
 18 A. Just some photo --
 19 Q. -- in general?
 20 A. Some photographs of the vehicle
 21 identification plates, the way that the bus was
 22 positioned on the -- the lift, some of the photographs
 23 of the parts that were removed, and some photographs
 24 of various components on the undercarriage that were
 25 in their undamaged states so that I could have those

1 for potential trial exhibits.
 2 Q. I'm just going to mark these --
 3 MR. HAYNES: What number are we on?
 4 MR. TIJERINA: 88.
 5 MR. HILL: 88 exhibits?
 6 Q. (BY MR. HAYNES) -- as --
 7 MS. DORMAN: Going for a record.
 8 Q. (BY MR. HAYNES) -- as Number 88 all
 9 together. Okay?
 10 A. That's fine.
 11 (Exhibit Number 88 was marked.)
 12 Q. (BY MR. HAYNES) All right. You say in
 13 Paragraph 8 of your report, "In my inspection of an
 14 exemplar bus, I found it impossible to replicate the
 15 contact mark between the driveshaft and the locking
 16 plates when the transmission joint was disconnected,"
 17 right? That's what it says?
 18 A. Right.
 19 Q. And what you're referring to there is what
 20 you've been describing where you disconnected the
 21 driveshaft from the transmission joint -- from the
 22 transmission side, and you, you or Mr. Hoogestraat,
 23 manually tried to maneuver it around to see if it
 24 would contact the locking plate?
 25 A. Right. In the spots it had deformation on

1 the crash vehicle.
 2 Q. And what you're saying is -- is that it
 3 wouldn't reach or it wouldn't get out of the -- the
 4 "horse collar" to make those -- to reach those places
 5 or what are you saying exactly?
 6 A. Yes, all of that.
 7 Q. Describe it for me in your own words,
 8 please.
 9 A. That it won't get out of the constraints,
 10 mainly the loop or the "horse collar."
 11 Q. Loop and the "horse collar," is that the same
 12 thing?
 13 A. No, they're two different ends.
 14 Q. Okay. And the loop and the "horse collar"
 15 made it impossible for the driveshaft to replicate the
 16 contact marks found in the bus, subject bus after the
 17 accident?
 18 A. Correct.
 19 Q. Was it -- did you -- did your inspection of
 20 the -- and testing of the exemplar bus, did you
 21 determine that it was impossible for the driveshaft
 22 when disconnected from the transmission end to make
 23 contact with the -- to unlock the tag axle?
 24 A. I'm sorry. I didn't understand that
 25 question.

1 Q. With the -- with the plate for the tag axle,
 2 was it -- was it possible to make contact with that?
 3 A. I'm sorry. You lost me.
 4 Q. It's my understanding the tag axle locks, has
 5 a locking pin.
 6 A. Yes.
 7 Q. And my question is was it -- did you
 8 determine that it was impossible for the driveshaft to
 9 make contact with that, that area of the tag axle
 10 locking plates when it was disconnected on the
 11 transmission end?
 12 A. Which area on -- which area are you talking
 13 about.
 14 Q. In your inspection and testing, did you find
 15 that it was impossible for the driveshaft disconnected
 16 at the transmission end to contact other component
 17 parts in the undercarriage?
 18 A. Outside of the contact that could be made
 19 with the tag axle pass-through?
 20 Q. Right.
 21 A. No. What we found was that only the tag axle
 22 pass-through is where contact was made in that
 23 condition.
 24 Q. And what is the tag axle pass-through? What
 25 are we talking about?

1 A. Some people call it the "horse collar."
 2 Q. Okay. So did the "horse collar" or tag axle
 3 pass-through, did that prevent the driveshaft when
 4 disconnected at the transmission end from making
 5 contact with other component parts?
 6 A. Yes, that and the loop itself.
 7 Q. What is the loop?
 8 A. The loop is the loop that's down at the other
 9 end near the driveshaft differential --
 10 Q. Differential?
 11 A. -- differential connection.
 12 Q. Okay. So your testing showed that the loop
 13 at the differential end and the tag axle pass-through
 14 or "horse collar" prevented the driveshaft from
 15 disconnecting at the transmission end, from making
 16 contact with other component parts in the
 17 undercarriage?
 18 A. Correct.
 19 Q. So based on that testing, do you believe that
 20 in this accident that the driveshaft did not make
 21 contact with other component parts and that the
 22 markings found in the subject bus after the accident
 23 were not caused by contact with the driveshaft?
 24 MS. DORMAN: Object to form.
 25 A. Certainly with regard to the -- the marks

1 that were made on the -- we'll call it the -- the rear
 2 side of the -- of the tie rod, it does not appear
 3 likely that you can get contact in that area. So in
 4 other words, you cannot get a force behind the tie rod
 5 or between the tie rod and the tag axle to force the
 6 tie rod forward and become disengaged. That was not
 7 possible given the constraints that are on the
 8 undercarriage of this bus.

9 What I said in my dep -- in my report
 10 was that only after disconnecting the driveshaft on
 11 both ends and only after loading up the passenger side
 12 such that you could put the tires in jounce, then we
 13 were able to create an opening whereby the driveshaft
 14 could be maneuvered out from underneath the
 15 undercarriage of the bus, and only then would you get
 16 into a situation where you would be able to come into
 17 contact with any of the undercarriage components.

18 Q. (BY MR. HAYNES) So your testing showed that
 19 without doing that, it's not possible because it's --
 20 the driveshaft is constrained by the "horse collar"
 21 and the loop at the differential end?

22 A. Yes, it's constrained by those two objects
 23 once both U-joints have separated.

24 Q. But if it's only -- if the driveshaft is only
 25 separated from the transmission end and still

1 connected at the differential end, then it's not going
 2 to make contact with those component parts in the
 3 undercarriage because of the loop at the differential
 4 end and the tag axle pass-through or the "horse
 5 collar"?

6 A. Correct.

7 Q. So, I mean, it sounds like your testing
 8 showed that -- that Americanos' theory that the
 9 driveshaft made contact with the component parts and
 10 caused the unlocking of the tag axle is impossible.
 11 Is that what you're saying?

12 A. Correct. I think -- I think more likely -- I
 13 think the better answer is that, as an expert, that
 14 more likely than not the science shows that you cannot
 15 create the theory that has been put forth by
 16 Americanos' experts.

17 Q. And are you saying more likely than not
 18 instead of it's impossible because you didn't start up
 19 the bus and see what would happen?

20 A. No, I'm saying that --

21 MS. DORMAN: Object to form.

22 A. No. I'm saying, as an expert, the best that
 23 you can say is more likely than not. I'm here to --
 24 I'm here to talk about probabilities, not
 25 possibilities. And being that I'm an expert, I can

1 tell you that based on our science and the work that
 2 we did, the Americanos theory cannot happen.

3 Q. (BY MR. HAYNES) You're -- you're saying that
 4 it's not just improbable, but it cannot happen?

5 A. I think we're saying the same thing. It is
 6 unlikely. It is improbable.

7 Q. And cannot happen?

8 A. Cannot happen.

9 Q. And you believe that even though you only
 10 manipulated it by hand and didn't actually start up
 11 the bus to see what would happen --

12 MS. DORMAN: Object to form.

13 Q. (BY MR. HAYNES) -- in a dynamic situation?

14 MS. DORMAN: Object to form.

15 A. I do.

16 Q. (BY MR. HAYNES) You don't think that if you
 17 had started up the bus and -- with the transmission
 18 end disconnected and see what would happen in a
 19 dynamic situation that the results would have been any
 20 different?

21 MS. DORMAN: Object to form.

22 A. Correct.

23 Q. (BY MR. HAYNES) Now, the last sentence in
 24 your report in Paragraph 8 -- sorry -- in the --
 25 Page 3 of Paragraph 8 says, "To date, no clear

1 evidence has been produced that shows the impact mark
 2 on the locking plate while the bus was on its side at
 3 the point of rest." What are you talking about there?

4 A. Well, there is a mark that has been pointed
 5 out by your experts which is supposed to be indicative
 6 of the driveshaft striking the locking plates. And I
 7 went and studied all of the photos that have been
 8 produced to date before the vehicle was righted, and
 9 there is no clear picture which shows that contact
 10 mark on those plates prior to the vehicle getting
 11 turned back onto its wheels.

12 Q. Is there a clear picture of that contact mark
 13 before and after the vehicle gets righted?

14 A. There are certainly marks after. There are
 15 certainly photos that show those marks after the
 16 vehicle has been righted.

17 Q. What I'm asking is you're saying that there
 18 is a contact mark in the photo after the vehicle was
 19 righted that Americanos' experts have pointed to.

20 A. Sure.

21 Q. I'm asking is there the -- a photo of the
 22 same location before the vehicle was righted that
 23 shows there was no contact mark?

24 A. No, there is no good photo that's been taken
 25 in that area.

PE12-007

MCI

4-27-2012

Response 10

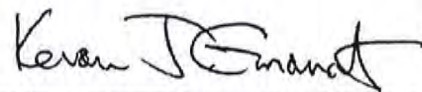
Attachment C-5

CAMPOS V. AMERICANOS

Report Prepared For:

Mr. John C. Dacus
Hartline, Dacus, Barger, & Dreyer, LLP
6688 North Central Expressway
Suite 1000
Dallas, Texas 75206

Prepared By:



Kevan J. Granat
August 11, 2011

the vehicle's rest position show the tag axle steering lock disengaged and the tie rod bent forward. The driveshaft's rest position was located downstream from the vehicle's point of rest. At its rest position, the right tag axle tire and the outer right drive axle tire are embedded into the median soil as the rear portion of the coach traveled into the opposing slope of the median. The furrows associated with the right side tires are broad and deep.

Data on the electronic control module of the coach's Detroit Diesel engine was imaged by request of the DPS investigators. I have reviewed and analyzed this information by processing the data to calculate the longitudinal acceleration of the vehicle as recorded from the speed sensor. The calculated acceleration values would represent a rapid deceleration rate that would not be achievable by brake application alone. The imaged data included two separate events of this nature, including a last stop record and a separate hard brake record. This information, combined with the results of the inspection of the speed sensor, indicates that a deficiency with the speed sensor likely existed prior to the subject crash.

Testing of Vehicle Performance

I evaluated the steering and handling characteristics of the 102DL3 model coach under various conditions, including the dynamic disengagement of the tag axle steering at freeway speeds. The test vehicle was a 1995 MCI 102DL3, substantially similar to the subject coach. The vehicle was equipped with a manual switch that bypassed the vehicle's speed switch, allowing the operator to manually actuate the tie rod locking cylinder, disengaging the locking mechanism dynamically. The vehicle was instrumented to measure the steering wheel rotation, tag axle tie rod displacement, status of the manual lock/unlock switch, vehicle speed, vehicle position, rotational rates in three directions, translational acceleration in three directions, roll angle, pitch angle, heading, and slip angle. On-board and external video cameras documented the tests. The vehicle was ballasted to simulate loading with 44 passengers and cargo. Testing was conducted on the 8.5 mile high speed oval at Continental Tire's Uvalde Proving Grounds.

I performed numerous tests with the tag axle steering locked or unlocked, as well as dynamically disengaged under varying conditions. I evaluated the stability characteristics of the coach using common handling and stability tests, including frequency response, on-center handling, low-g step steer, and high speed lane changes. I performed these tests at freeway speeds multiple times; with the tag axle steering locked as well as with the steering lock disengaged. Under all conditions, the vehicle remained stable, controllable, and predictable, with a high turning capacity. The tag axle tires exhibited stable performance, following the motion of the vehicle in a controlled manner.

I evaluated the effect of dynamically disengaging the steering lock at freeway speeds, nominally at 70 miles per hour, with some tests as high as 80 miles per hour. These tests were run under varied conditions, including straight-ahead travel, in a left or right turn, on a level surface, or on an uphill or downhill slope while in a left or right turn. I further evaluated the effect of driver input during and after a dynamic disengagement, including intentionally steering before and after disengagement, as well as steering and braking in combination. This was done with the pavement dry as well as with the surfaced wetted by a water truck. Under all conditions, the vehicle remained stable, controllable, and predictable, with a high turning capacity. The immediate effect of a dynamic disengagement would be a slight disturbance input, similar to a light wind loading or slight change in the road surface, and would typically be controlled with small steering adjustments on the order of five to twenty-five degrees. Such adjustments were consistent with the normal operating

FULL VEHICLE TESTING AND TAG AXLE STEERING ANALYSIS



1995 MCI 102DL3

JUNE 12 – 14, 2011



<i>Test Vehicle:</i>	<i>Configuration</i>	<i>1</i>
	<i>Vehicle Photographs</i>	<i>2</i>
	<i>Weights</i>	<i>3</i>
	<i>Instrumentation</i>	<i>4</i>
<i>Test Facility:</i>	<i>Location</i>	<i>5</i>
<i>Test Results:</i>	<i>Index of Tests</i>	<i>6</i>
	<i>Data Plots</i>	<i>7</i>
	<i>Analysis</i>	<i>8</i>
		<i>9</i>
		<i>10</i>
		<i>11</i>
		<i>12</i>
		<i>13</i>
		<i>14</i>
		<i>15</i>

Test Vehicle Specifications

Model Year:	1995	
Manufacturer:	MCI	
Model:	102DL3	
VIN:	1M8PDMPA5SP047805	
Date of Manufacture:	August 1995	
Vehicle Type:	Bus	
Color:	White	
Seating Capacity:	55 passengers	
Mileage:	626,384 indicated	
Engine:	Detroit Diesel Series 60	
Transmission:	Allison	
GVWR:	44,400	(lbs)
Front GAWR:	14,400	(lbs)
Intermediate GAWR:	22,500	(lbs)
Rear GAWR:	12,000	(lbs)
Front Tires:	Firestone FS 400	
Tire Size:	315/80R22.5 Load Range J	
Tire Pressures:	115/95/95	(psi)
Rim Size:	8.25 x 22.5	
Wheelbase:	342	(in)
Front Axle to Intermediate Axle:	318	(in)
Intermediate Axle to Rear Axle:	48	(in)
Front Track Width:	85.6	(in)
Intermediate Track Width:	76.6	(in)
Rear Track Width:	85.6	(in)
Roof Height:	136.9	(in)
Overall Width:	102	(in)
Overall Length:	541.9	(in)

VIN number: 1M8PDMPA5SP047805
DECODED: MCI - 102DL3 Intercity (1995)

Model Year	1995
Make	MCI
Model	102DL3 Intercity
Series	MCI Series
Body Type	Intercity Coach
Manufacturer	Motor Coach Industries Inc.
Production Seq. Number	047805
Engine Type	L6, 12.7L (775 CID)
Engine Manufacturer	Detroit Diesel
Fuel Type	Diesel
Horsepower	370-450HP
Engine Code	P
Engine Series Code	Series 60
Vehicle Type	Bus
Vehicle Class	Intercity/Tour Bus
Brake System	Air
Country	UNITED STATES
Assy. Plant	Pembina, ND
Check Digit	5

Scroll down for more content when viewing on computer monitor.



Report type: **BASIC**

VIN: 1M8PDMPA5SP047805

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MCI 102DL3 MAINTENANCE MANUAL

Date 3-1-93

Page III

GENERAL DATA

The data below includes only general information on coach models covered by this manual.

MODEL DATA

VEHICLE LENGTH - MAXIMUM	45.16 ft. in. 13.767 m
VEHICLE HEIGHT - MAXIMUM (TO TOP OF ROOF HATCH)	136.92 in. 3477.8 mm
VEHICLE WIDTH	102 in. 2590.8 mm
TURNING RADIUS AT FRONT BUMPER (RH Turn)	50 ft. 5 in. (15.37 m)
(LH Turn)	50 ft. 5 in. (15.37 m)
WHEELBASE - CENTER OF FRONT AXLE TO CENTER OF DRIVE AXLE	318 in. 8077.2 mm
TRACK, FRONT	85.6 in. 2174 mm
TRACK, REAR - AT CENTER OF DUAL WHEELS	76.6 in. 1946 mm
TRACK, REAR TRAILING AXLE	85.6 in. 2174 mm
VEHICLE NET WEIGHT	27,250 lbs. 12358.3 kg
GROSS VEHICLE WEIGHT	44,400 lbs. 20,139.8 kg
FUEL TANK CAPACITY Standard, (approx)	192 Gal. U.S. 726.7 liters
COOLING SYSTEM CAPACITY	32.5 Gal. U.S. 123 liters
ENGINE CRANKCASE CAPACITY (SAE-30 OR 40 Engine Oil)	28 qts. 26.5 liters
AUTOMATIC TRANSMISSION CAPACITY Dexron Transmission Oil	8.25 Gal. U.S. 31.2 liters (Does not include external circuits.)
STANDARD TRANSMISSION CAPACITY SAE 30 OR 40 Engine Oil	22 pts. U.S. 10.4 liters
STEERING SYSTEM CAPACITY SAE 10W-40 MS OR DS Service	7.5 qts. 7.1 liters
REAR AXLE CAPACITY	28 qts.* 26.5 liters*

* 1992 Production - identify axle model by data plate on housing (Model 61143).

ENGINE DATA

Model	8V-92TA
Type	2 Cycle
No. of Cylinders	8
Bore (Inches)	4.84
Bore (mm)	123
Stroke (Inches)	5
Stroke (mm)	127
Compression Ratio (Turbo)	17:1
Compression Ratio (NA)	---
Total Displacement (Cubic Inches)	736
Total Displacement (Liters)	12.07
No. of Main Bearings	5

Vehicle Photographs

2

1995 MCI 102DL3 Vehicle Testing

Test Vehicle

1995 MCI 102DL3

VIN: 1M8PDMPA5SP047805

June 12-14, 2011

0AG

DYNAMIC ANALYSIS GROUP LLC

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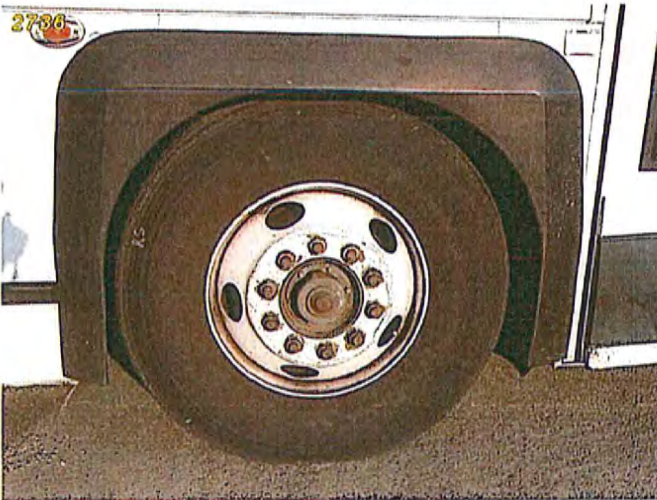
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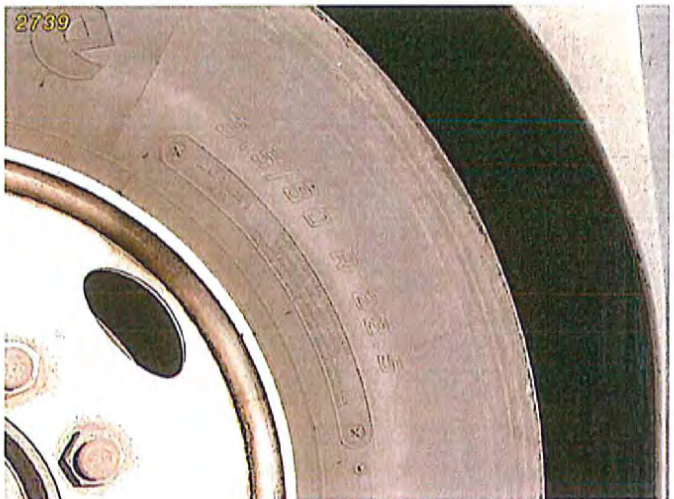
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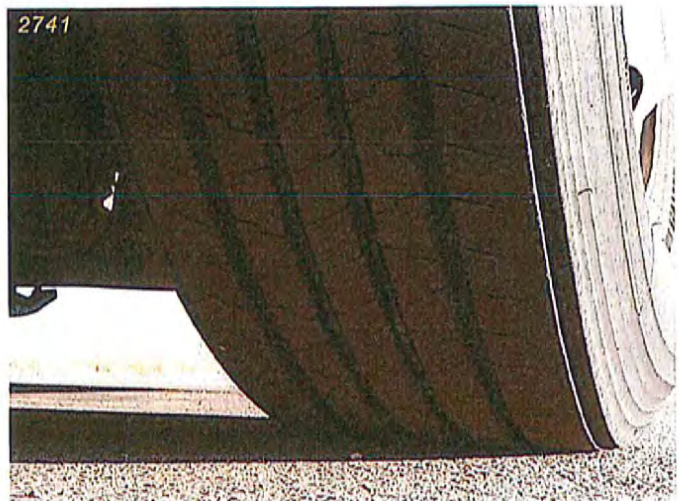


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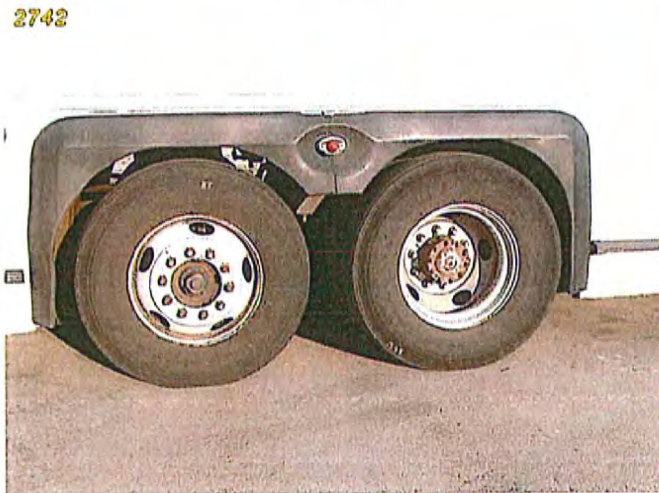
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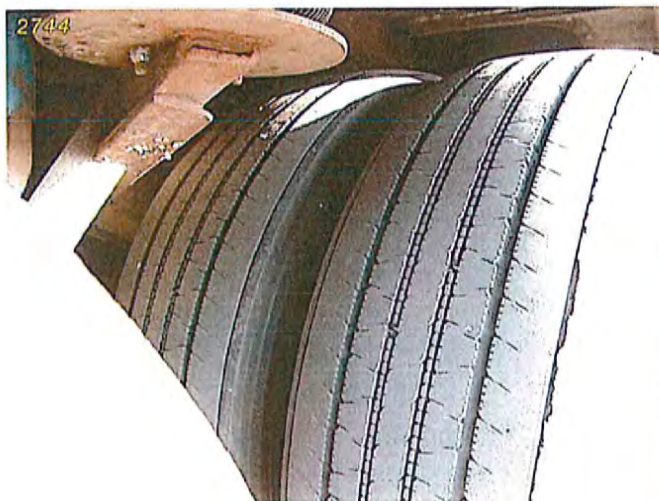
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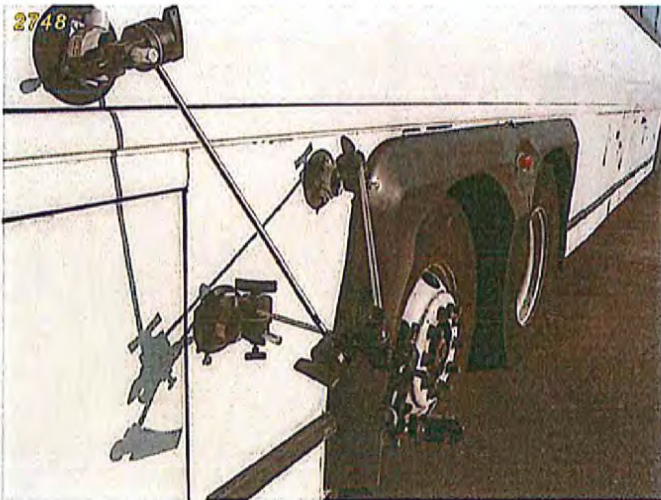
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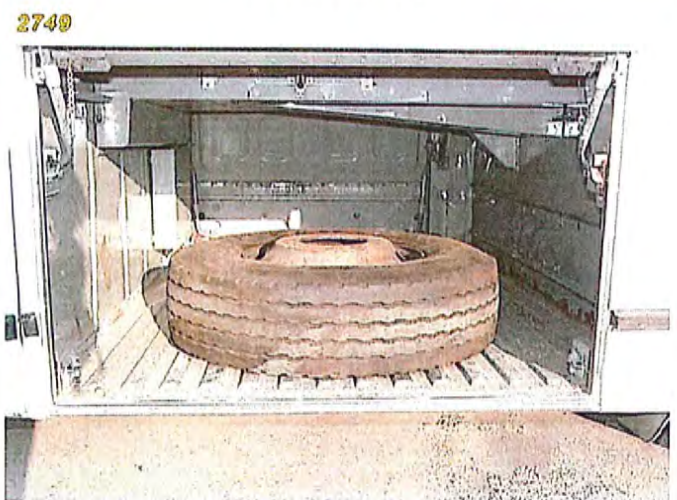
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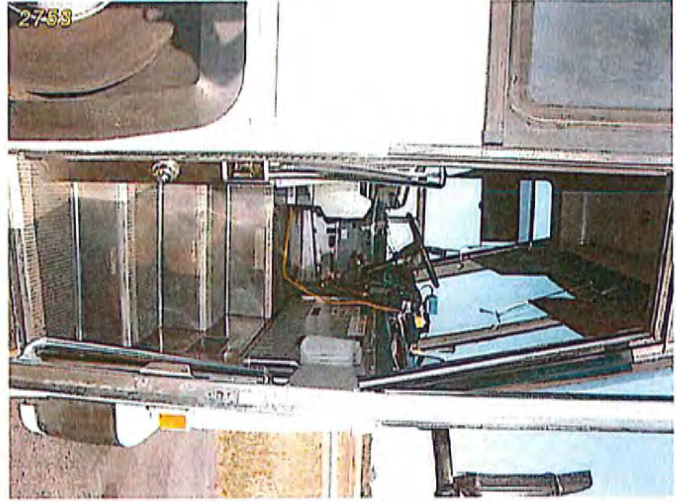


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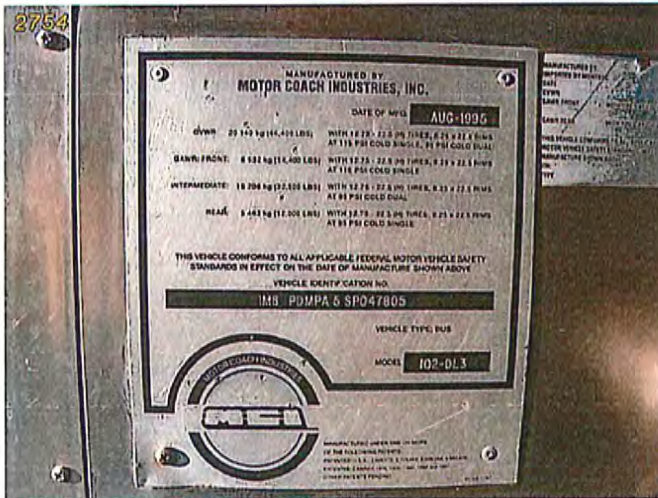
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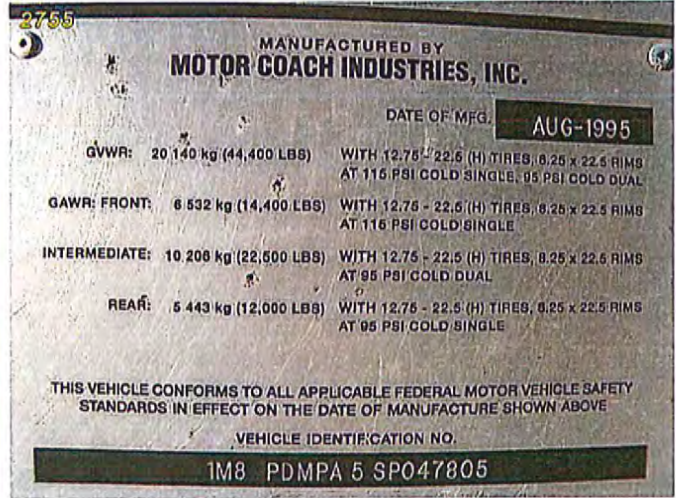
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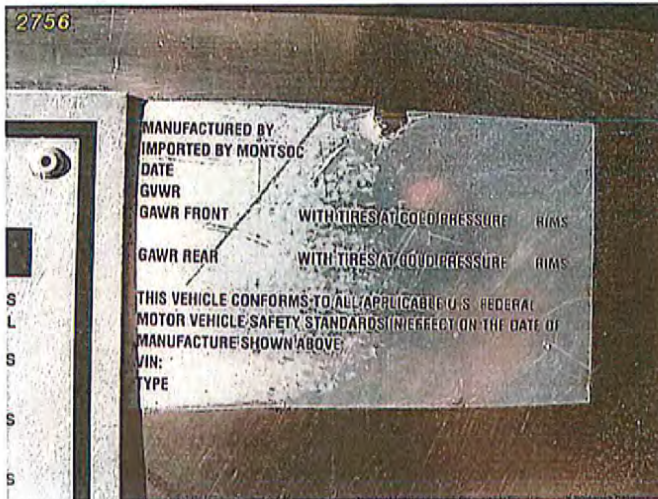
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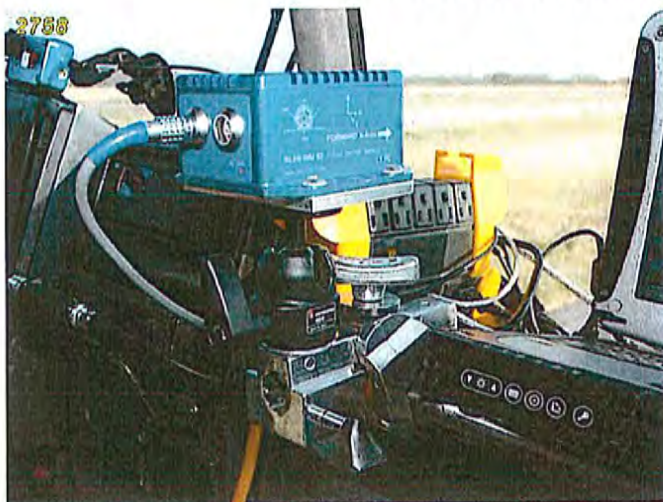


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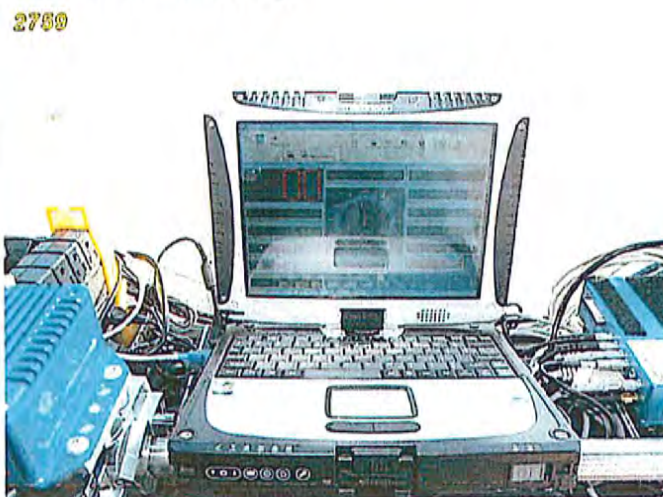


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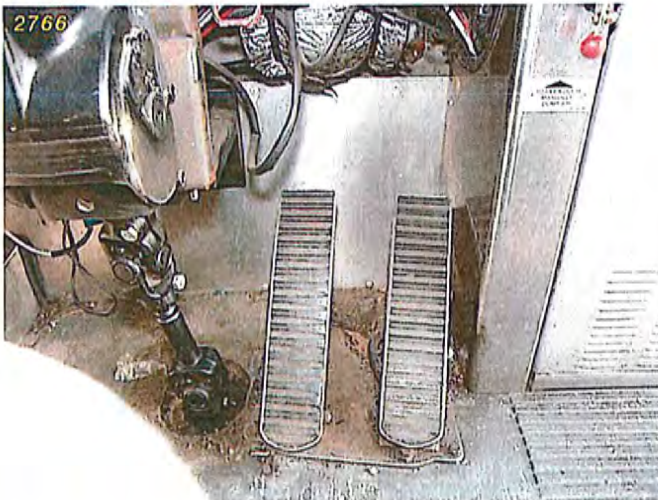
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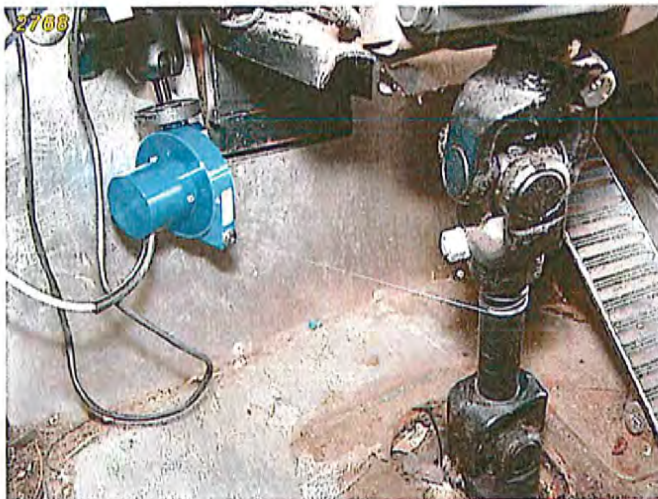
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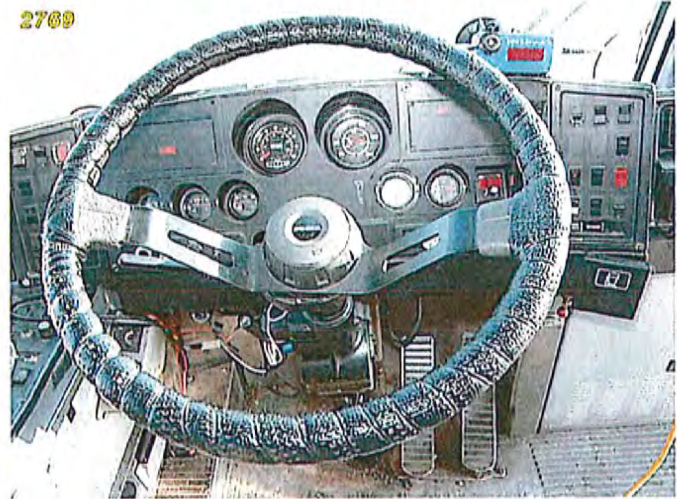
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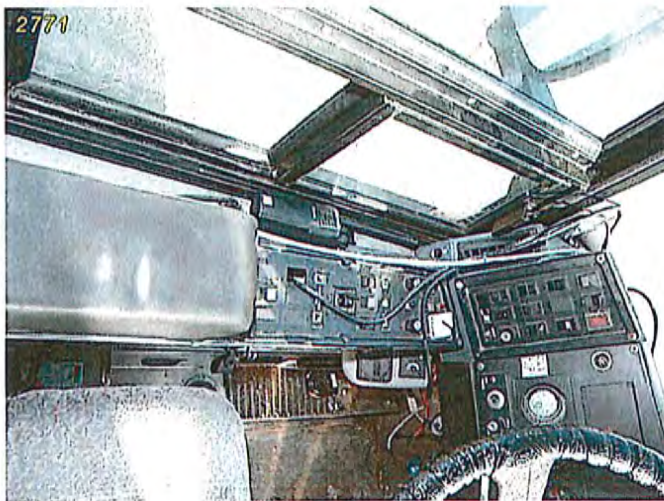


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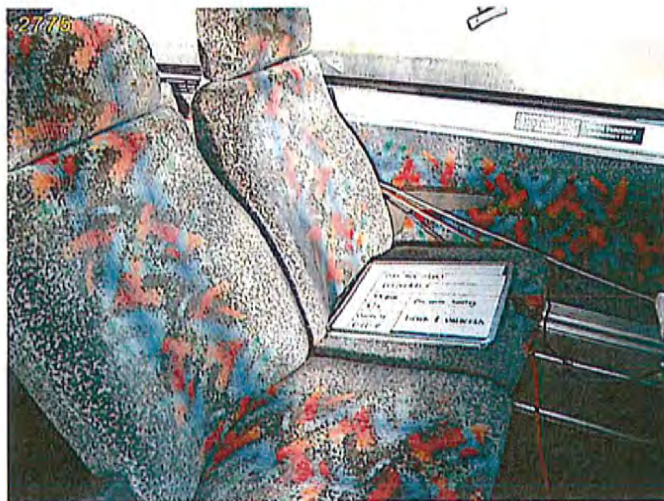
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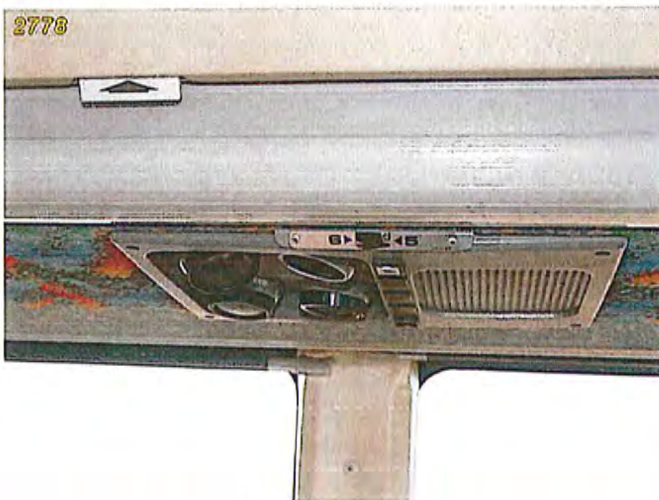
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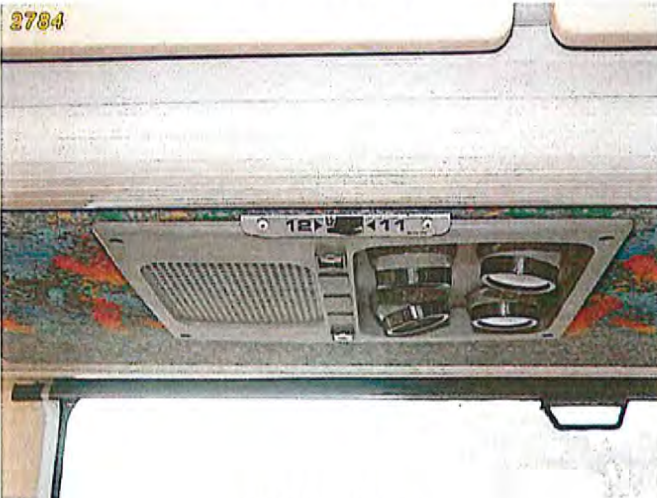
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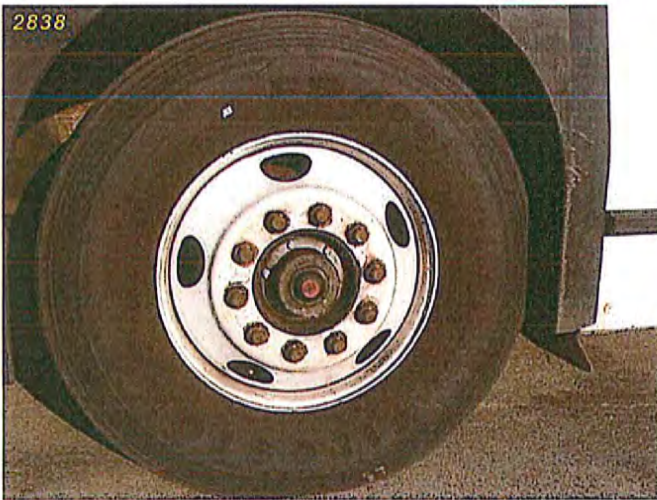
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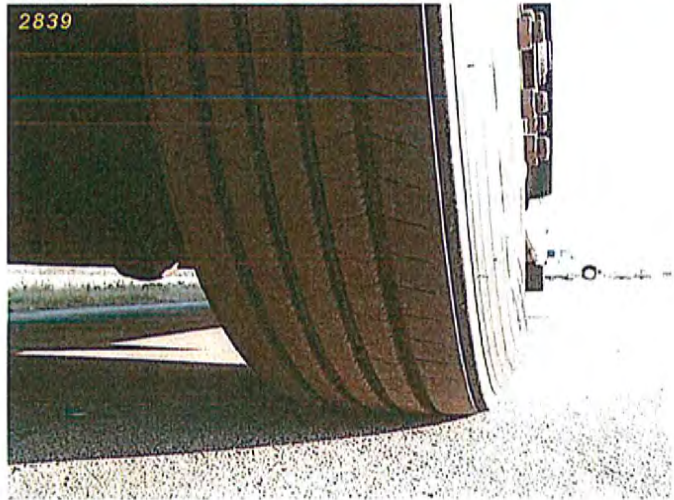
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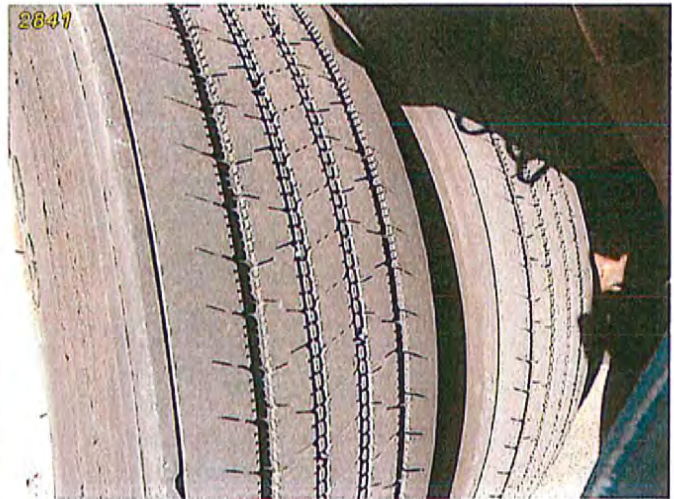
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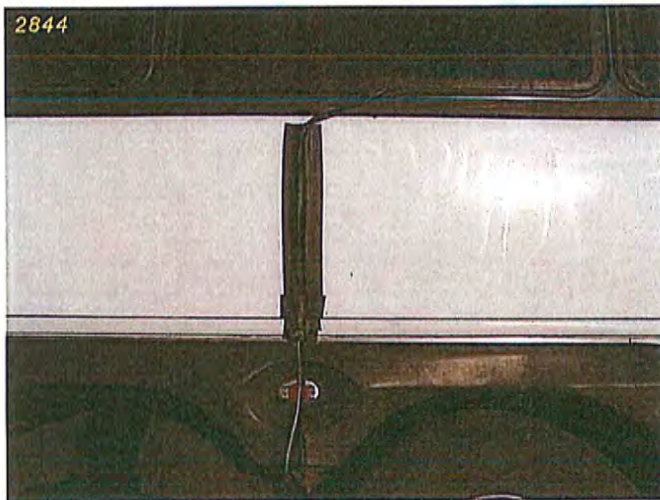
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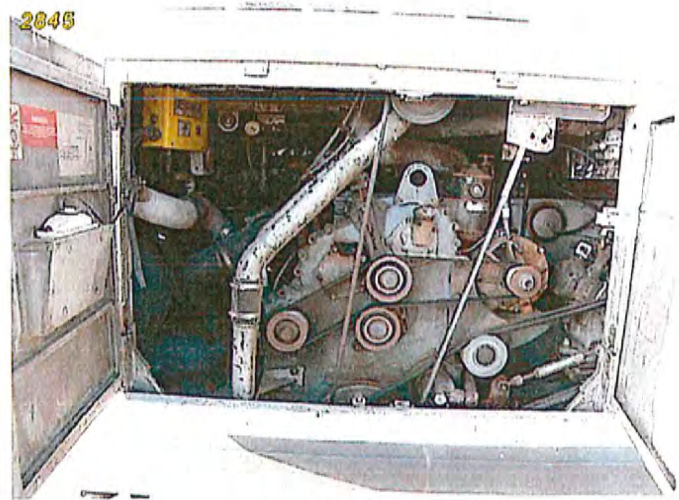
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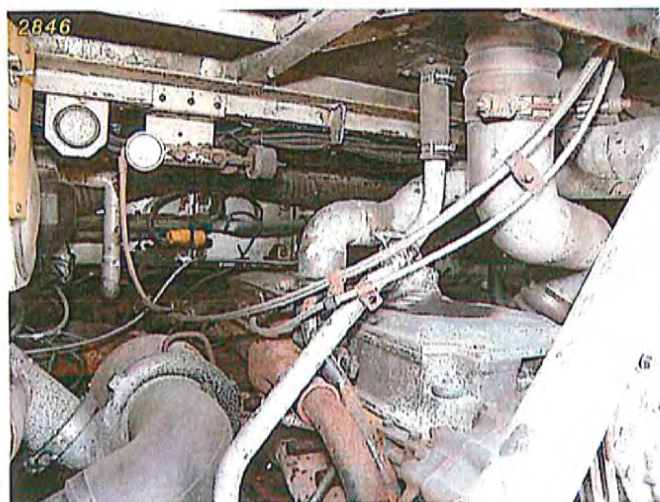
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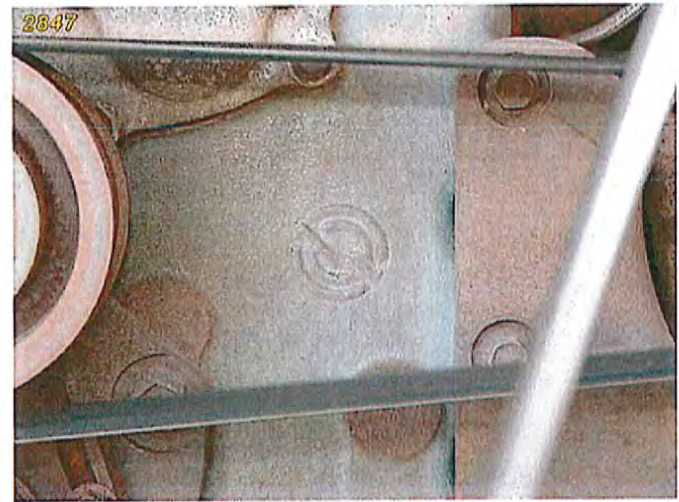
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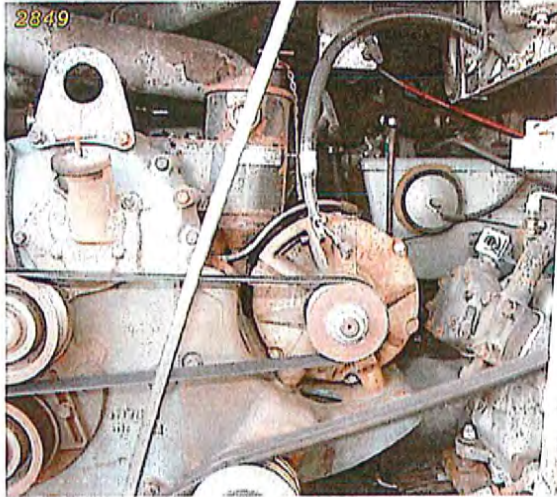


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1995 MCI 102DL3 Vehicle Testing



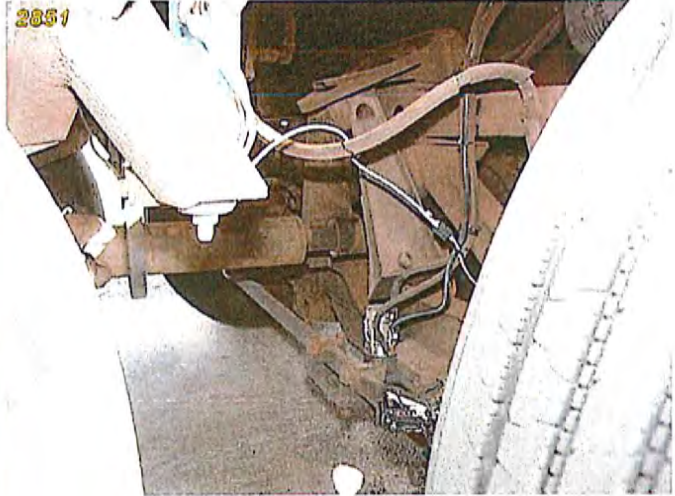
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MCI 102DL3_2849.jpg



MCI 102DL3_2850.jpg



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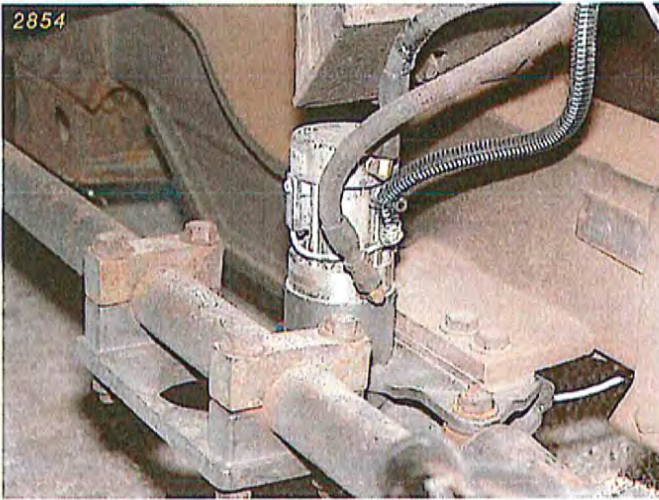


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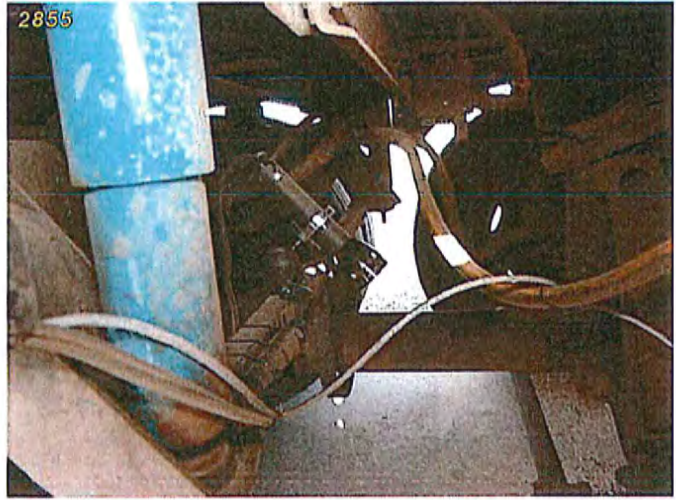


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1995 MCI 102DL3 Vehicle Testing



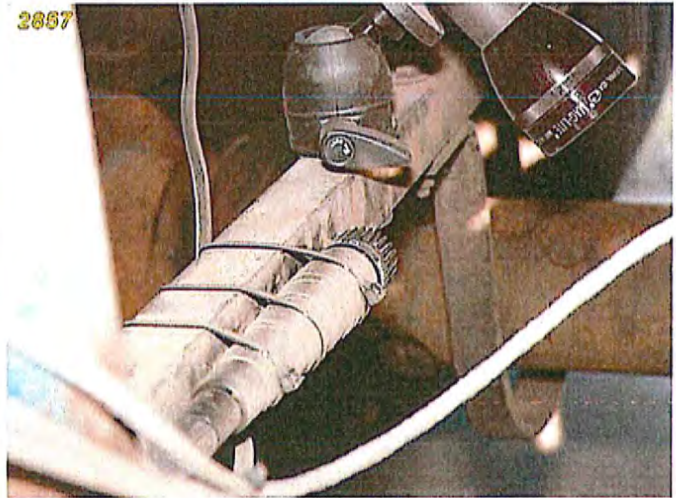
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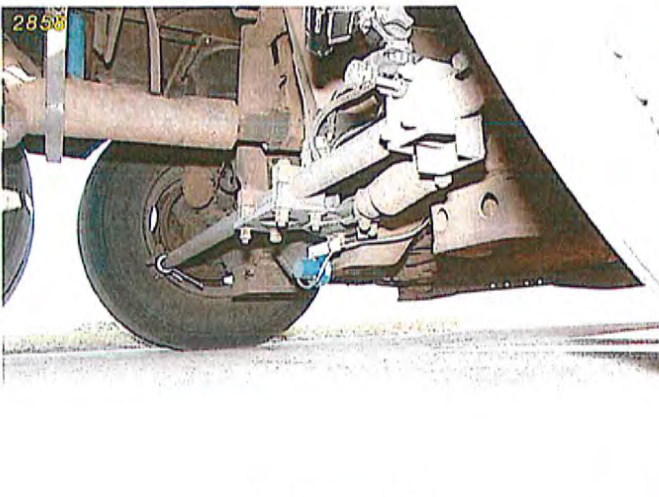
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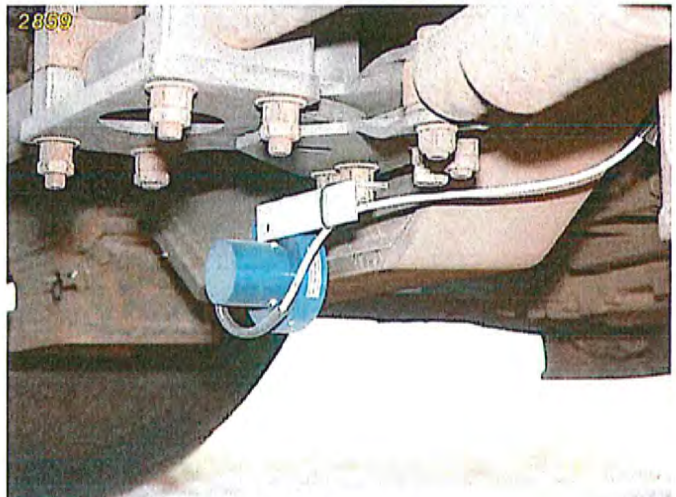
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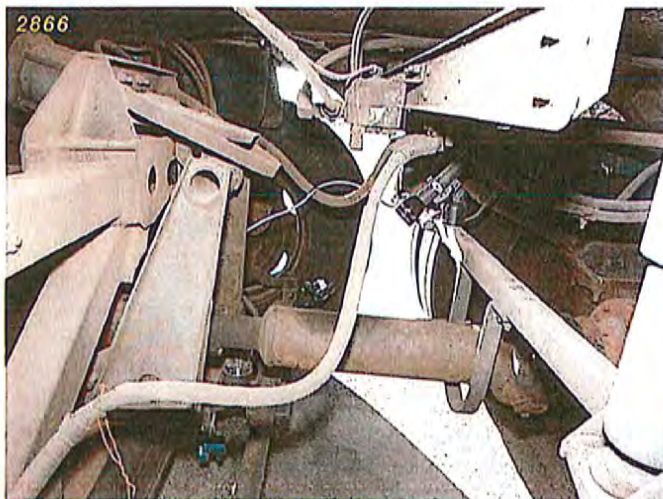


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MCI 102DL3_2859.jpg

1995 MCI 102DL3 Vehicle Testing



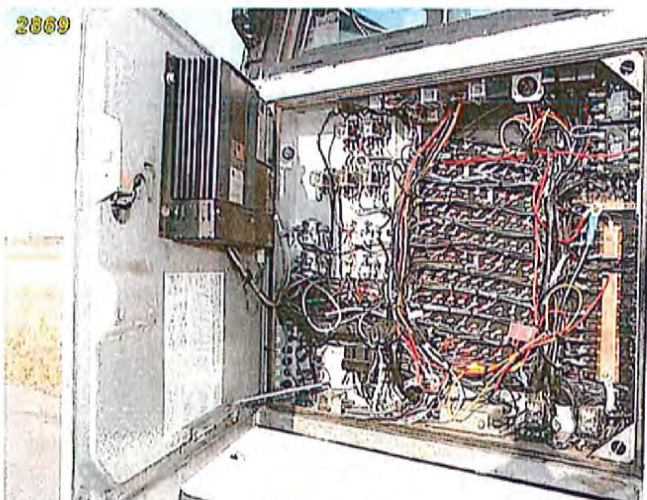
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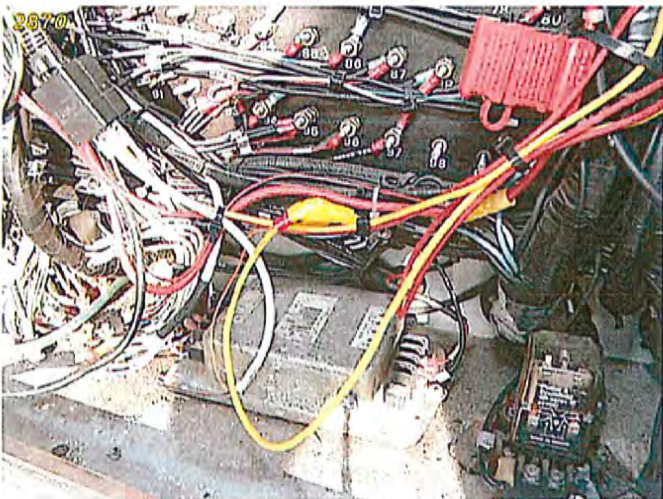
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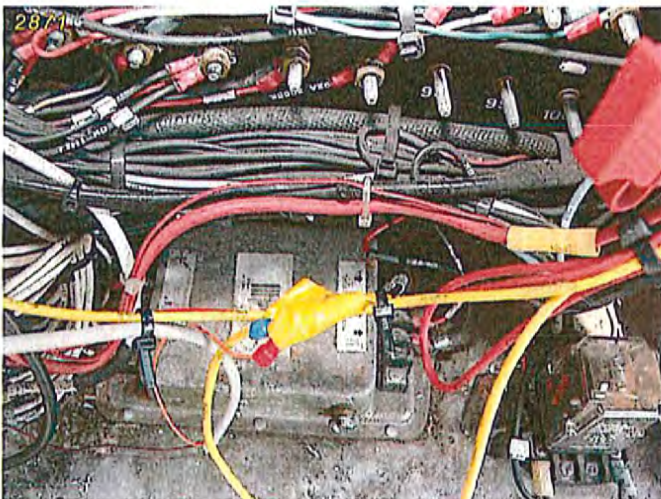
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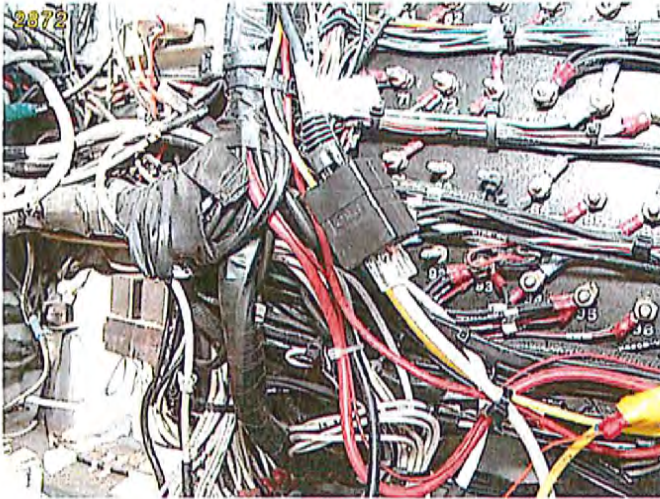


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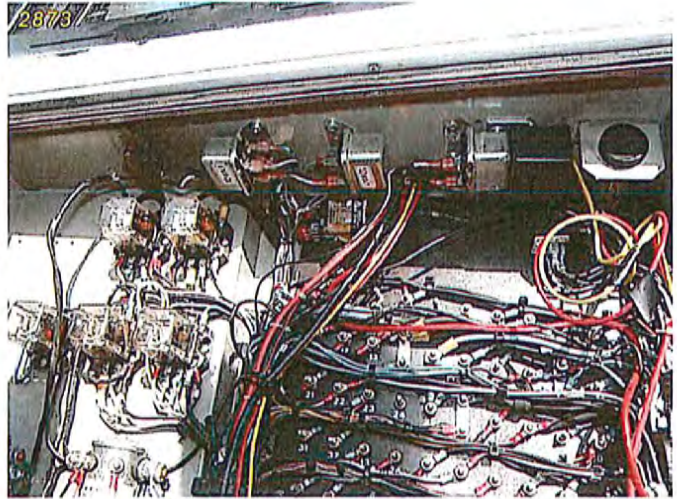


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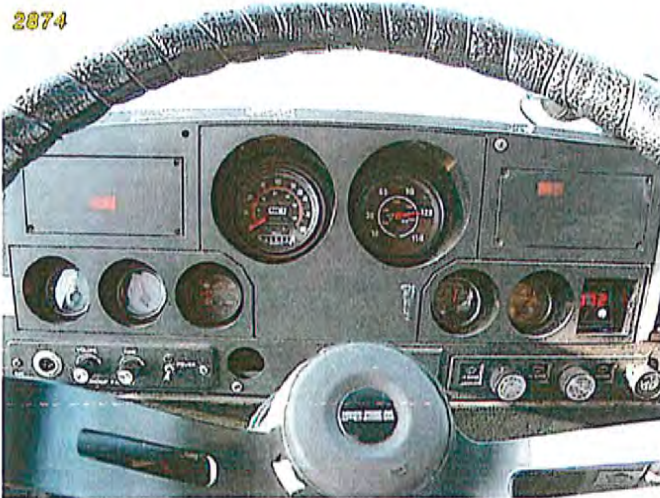
1995 MCI 102DL3 Vehicle Testing



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MCI 102DL3_2873.jpg



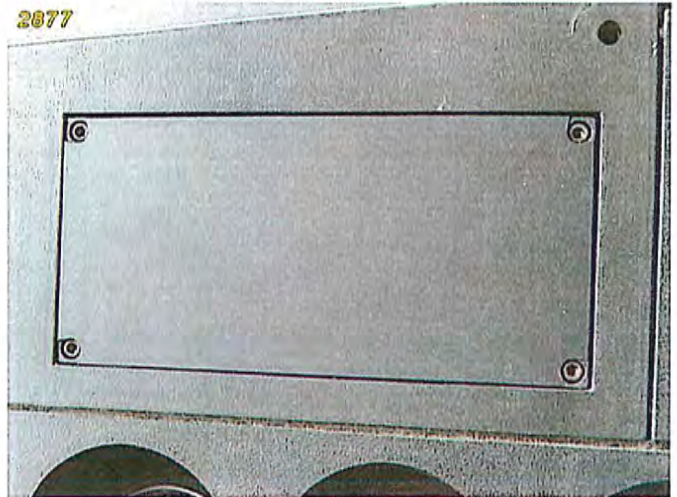
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MCI 102DL3_2875.jpg

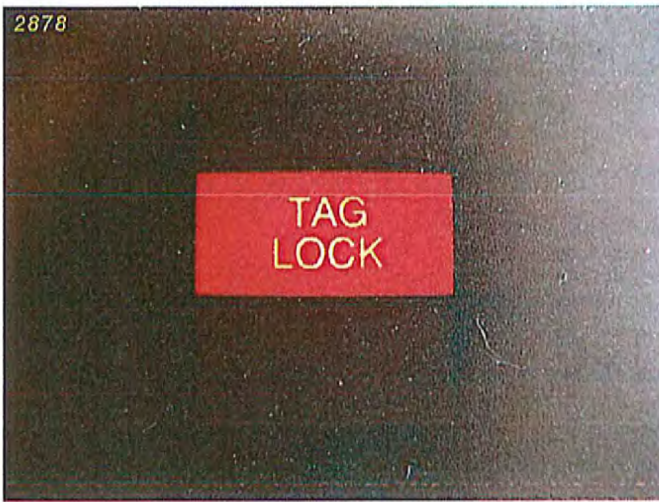


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MCI 102DL3_2877.jpg

1995 MCI 102DL3 Vehicle Testing



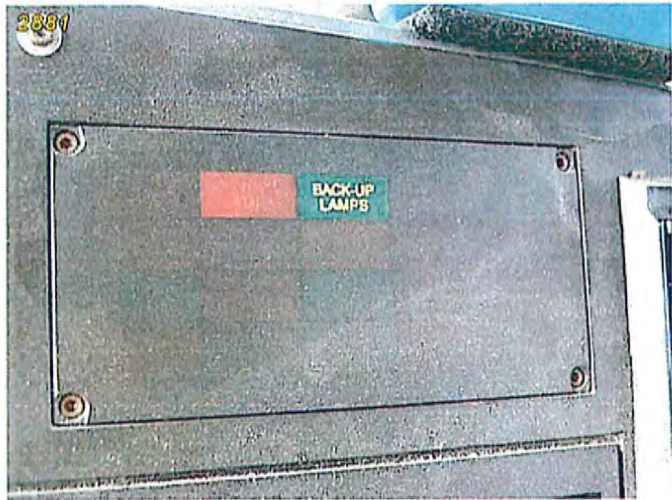
MCI 102DL3_2878.jpg



MCI 102DL3_2879.jpg



MCI 102DL3_2880.jpg



MCI 102DL3_2881.jpg

0AG

Weights 3

Test Weights

Vehicle: 1995 MCI 102DL3

VIN: 1M8PDMPA55PO47805

Tires: Firestone FS 400

Size: 315/80R22.5 Load Range J

Date: June 12, 2011

Loading: Driver, Equipment, 44 Passengers, Cargo, Tire & Wheel, Full Fuel

Description 50-lb nominal sand bags, 3 sandbags each of 44 passenger seating positions

Additional sandbags as ballast in baggage compartments calculated equivalent to 35 lbs per passenger

	Left	Right	Total	Percent	Rating
Front	6427	6851	13278	29.6%	14400
Intermediate	10811	10376	21187	47.2%	22500
Rear	5009	5396	10405	23.2%	12000
Total	22247	22623	44870	100.0%	44400
	49.6%	50.4%			

Date: June 16, 2011

Loading: Curb Load

Description Full Fuel, Tire & Wheel

	Left	Right	Total	Percent	Rating
Front	4609	5059	9668	27.5%	14400
Intermediate	8212	8781	16993	48.3%	22500
Rear	4487	3999	8486	24.1%	12000
Total	17308	17839	35147	100.0%	44400
	49.2%	50.8%			

Calculation of Actual Sandbag Weight

Total Cargo Loading:	9723 lbs
Driver & Equipment:	320 lbs
Total Sandbag Ballast:	9403 lbs
Actual Sandbags in Seats:	132
Actual Sandbags in Cargo:	32
Total Actual Sandbags:	164
Calculated Weight per Sandbag	57.3 lbs

Instrumentation

4

Vehicle: 1995 MCI 102DL3
Tires: Firestone FS 400

VIN: 1M8PDMPA5SP047805
Size: 315/80R22.5 Load Range J

Test Instrumentation Log

	Instrumentation	Manufacturer	Model
1	Speed and Displacement GPS-based speed sensor and data logger	RaceLogic	VBox3
2	Inertial Transducer, 6-Degrees of Freedom Rotational Rates and Translational Accelerations	RaceLogic	RLVBIMU02
3	Steering Wheel Angle Linear Displacement Potentiometer	FirstMark Controls	162-3405-C8SU
4	Tag Axle Tie Rod Displacement Linear Displacement Potentiometer	FirstMark Controls	162-3405-C8SU

CERTIFICATE OF CALIBRATION



Customer
Location
Customer ID #
In tolerance as received (Y/N)
Certificate No.
Temperature
Humidity

Dynamic Analysis Group
VBOX USA
NA
Y
8040
24.1C
30%

Equipment
Model
Serial number
Calibration date
Calibration due
Engineer

GPS Data-logger
VBOX3
0030901
4/14/2011
4/13/2012
Mark Kibble

Calibration Procedure

The unit under test was subjected to the standard production test procedure. This procedure covers measured velocity by the VBOX over a simulated test course. Simulation data is provided via a calibrated LabSat GPS simulator. Analogue output voltage and digital output frequency are checked for calibration against simulated speed. Voltage output range is configured to 5 volts at 100km/h. Frequency output is configured to 25Hz per Km/h. VBOX indicated values are taken from the serial output of the VBOX.

Equipment used

	Equipment	Serial number	CAL Cert No.	CAL due
Simulation of GPS	LabSat	009922	HC102704001	9/1/2011
Analogue Voltage	LabSat	009922	HC102704001	9/1/2011
Frequency	LabSat	009922	HC102704001	9/1/2011

Results

Accuracy of analogue and digital output signals

Applied Speed	Analogue Output 1			Analogue Output 2		
	Expected	As received	As returned	Expected	As received	As returned
30 Km/h	1.500 V +/- 5.0mV	1.502 V	1.502 V	1.500 V +/- 5.0mV	1.502 V	1.502 V
60 Km/h	3.000 V +/- 5.0mV	3.002 V	3.002 V	3.000 V +/- 5.0mV	3.001 V	3.001 V
100 Km/h	5.000 V +/- 5.0mV	5.000 V	5.000 V	5.000 V +/- 5.0mV	5.000 V	5.000 V

Applied Speed	Frequency Output 1		
	Expected	As received	As returned
30 Km/h	750 Hz +/-2.5Hz	749.5 Hz	749.5 Hz
60 Km/h	1500 Hz +/-2.5Hz	1499.8 Hz	1499.8 Hz
100 Km/h	2500 Hz +/-2.5Hz	2500.3 Hz	2500.3 Hz

Simulation of constant speed by LabSat

Applied simulated value	VBOX Indicated speed		
	Criteria	As received	As returned
30 Km/h	+/-0.1 Km/h	29.98	29.98
60 Km/h	+/-0.1 Km/h	60.01	60.01
100 Km/h	+/-0.1 Km/h	100.01	100.01
400 Km/h	+/-0.1 Km/h	400.00	400.00

Simulation of constant heading by LabSat

Applied simulated value	VBOX indicated heading		
	Criteria	As received	As returned
0 deg	+/-0.1deg	0.00deg	0.00deg
90 deg	+/-0.1deg	89.97deg	89.97deg
180 deg	+/-0.1deg	179.96deg	179.96deg
270 deg	+/-0.1deg	269.96deg	269.96deg

Summary

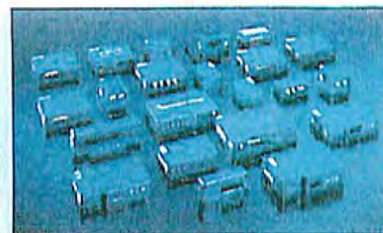
The unit VBOX3 0030901 passed all standard production tests and was found to be fully compliant with the product specification. Racelogic certifies the above instrument meets or exceeds published specifications and has been calibrated using instruments and standards of known accuracies, which are traceable to UKAS United Kingdom Accreditation Service

Calibration Engineer:

Racelogic Ltd. Unit 10 Swan Business Centre, Osler Way, Buckingham MK18 1TB
Tel +44 (0)1280 823803 Fax +44 (0)1280 823595



Certificate of Conformity



Customer Name: Dynamic Analysis Group Equipment: VBOX Inertial Measurement Unit
Location: U.S.A. Model: RLVBIMU02
Issue Date: 24-03-11 Serial Number: 008366

Procedure

RLVBIMU02 modules are tested as detailed in the following document to ensure their accuracy matches that stated on the relevant product data / specification sheets.

Function Tests

Gyros

Gyro calibration is performed in a temperature Chamber on a turntable. Temperature and angular table rate are both microprocessor controlled using temperature feedback from the units under test. Chamber time is as follows:

Product	Chamber Time	Minimum Temperature Range	Maximum Temperature Range	Tolerance of Yaw Rate(s)
YAW03	¾ hour	-10°C	+50°C	±0.5°/s
IMU02	2 ¼ hours	-10°C	+50°C	±0.5°/s

Accelerometers

Accelerometers are calibrated against gravity. Data is collected in 6 orientations as below:

Step	Acceleration (g)	Tolerance (g)
1	X +1	±0.01
2	X -1	±0.01
3	Y +1	±0.01
4	Y -1	±0.01
5	Z +1	±0.01
6	Z -1	±0.01

All collected data is post-processed to generate unique calibration values for each unit.

Final Tests

Post calibration tests are performed to check null offset and scale.

Racelogic certify that this product matches or betters the specifications stated on the relevant product data sheet.

Signed: _____

For Racelogic Ltd

Head Office: Unit 10, Swan Business Centre, Osier Way, Buckingham, Bucks MK18 1TB, England

Tel: +44 (0)1280 823 803 Fax: +44 (0)1280 823 595 Email: sales@racelogic.co.uk Web: www.racelogic.co.uk



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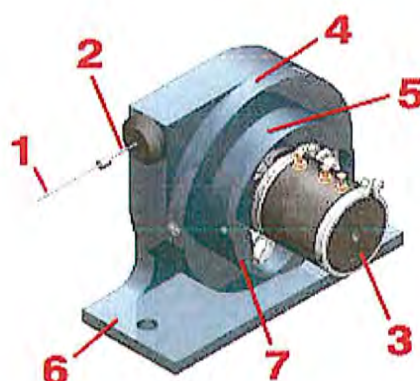
Data Sheet - Series 161H and 162H Miniature Position Transducers with High Cable Tension

Analog-Output Miniature Position Transducers

Shaded characteristics are verified during production and test. All others are for REFERENCE and information only.

Key Features

1. High Cable Tension for Enhanced Frequency Response
2. 42.5-Inch (1080-mm) Maximum Travel (Series 162)
3. Analog Signal Using Precision Conductive Plastic or Hybrid Potentiometers
4. AccuTrak™ Threaded Drum for Enhanced Repeatability
5. Bearing-Mounted Rotating Components
6. Optional Flexible Mounting Bases
7. DirectConnect™ Sensor-To-Drum Technology = Zero Backlash, No Torsion Springs or Clutches



Potentiometer Specifications

	1-turn	3-turn	5-turn
Potentiometer Type	1-turn, precision, conductive plastic	3-turn, precision, hybrid	5-turn, precision, hybrid
Resistance: Value, Tolerance	5K ohms, $\pm 20\%$	5K ohms, $\pm 5\%$	5K ohms, $\pm 5\%$
Travel: Electrical, Mechanical	340°, 360°	1080°, 1080° +10° -0°	1800°, 1800° +10° -0°
Mechanical Life	10 million shaft revolutions min	5 million shaft revolutions min	5 million shaft revolutions min
Output Signal	analog signal from 0 to supply voltage (voltage divider circuit)		
Power Rating	1.0 W at 158° F (70° C)	1.5 W at 158° F (70° C)	2.0 W at 158° F (70° C)
Supply Current	12 mA max		
Supply Voltage	35 VDC max (using voltage divider circuit)		
Independent Linearity Error	$\pm 1.0\%$ max per VRCL-P-100A	$\pm 0.5\%$ max per VRCL-P-100A	$\pm 0.35\%$ max per VRCL-P-100A
Output Smoothness	< 0.1% max	0.5% max	0.35% max
Insulation Resistance	100 Mohms at 1000 VDC min	1000 Mohms at 500 VDC min	1000 Mohms at 500 VDC min
Dielectric Strength	1000 VDC min	1000 VDC min	1000 VDC min

Resolution	infinite signal	infinite signal	infinite signal
Operating Temperature	-40° to 257° F (-40° to 125° C)	-67° to 257° F (-55° to 125° C)	-67° to 257° F (-55° to 125° C)
Electrical Connection	3-terminal (1, 2, 3)	3-terminal (CW,CCW,S)	3-terminal (CW,CCW,S)
Shock	50 g for 11 ms	100 g for 6 ms	100 g for 6 ms
Vibration	10 to 2000 Hz at 15 g	10 to 2000 Hz at 15 g	10 to 2000 Hz at 15 g
Temperature Coefficient	±400 ppm/°C max	±0.007%/°C max	±0.007%/°C max

The potentiometer type of a specific position transducer part number is designated by the 8th digit of the part number counting left to right. Example: 161-0361H-AND contains a 1-turn potentiometer while 162-3405H-BSD contains a 5-turn potentiometer.

Other Specifications

Case/Drum Materials	precision-machined anodized 2024 aluminum				
Displacement Cable	0.027-inch (0.69-mm) dia., 7-by-7 stranded stainless steel, 90-lb (400-N) min breaking strength				
Displacement Cable Hardware	1 each of 300196 loop sleeve , 300292 copper sleeve , 160032 copper sleeve , 300688 ball-end plug , 300495 pull ring , and 301003 nickel swivel ; all items provided uncrimped				
Electrical Connections	three solder terminals; electrical cable and connector options available				
Nominal Mass	<table> <tr> <th>Series 161H</th><th>Series 162H</th></tr> <tr> <td>7 oz 198 g</td><td>10 oz 284 g</td></tr> </table>	Series 161H	Series 162H	7 oz 198 g	10 oz 284 g
Series 161H	Series 162H				
7 oz 198 g	10 oz 284 g				
Environmental Protection	NEMA 4 / IP 56, DO-160D (ED-14D) Env. Cat. E1E1ABXHRFDFSAXXXXXXXXXXX (with optional sensor cover)				

Model Numbers and Ordering Codes

Model	Range		Nominal Displacement Cable Tension Range (Full Extraction to Full Retraction)			
	inches	mm	Opt A: -090 spring		Opt B: -100 spring	
			oz.	N	oz.	N
161-0361H	4.50	114	65 to 95	18 to 26	79 to 170	22 to 47
161-0461H	5.75	146	65 to 95	18 to 26	70 to 150	19 to 42
161-1143H	14.25	362	75 to 180	21 to 50	75 to 300	21 to 83
161-1283H	16.00	406	50 to 130	14 to 36	75 to 200	21 to 56
161-1443H	18.00	457	35 to 150	10 to 42	70 to 130	19 to 36
161-1915H	23.88	606	45 to 215	13 to 60	50 to 245	14 to 68
161-2145H	26.75	679	40 to 190	11 to 53	65 to 240	18 to 67
161-2405H	30.00	762	30 to 160	8 to 44	50 to 260	14 to 72
162-0521H	6.50	165	55 to 85	15 to 24	105 to 135	29 to 38
162-0651H	8.13	206	75 to 120	21 to 33	105 to 135	29 to 38
162-2735H	34.13	867	40 to 140	11 to 39	75 to 160	8 to 44
162-2945H	36.75	933	56 to 130	16 to 36	75 to 160	8 to 44
162-3205H	40.00	1016	25 to 120	7 to 33	35 to 175	10 to 49
162-3405H	42.50	1080	10 to 105	3 to 29	30 to 145	8 to 40

Bolded entries are standard cable tension.

Order Codes

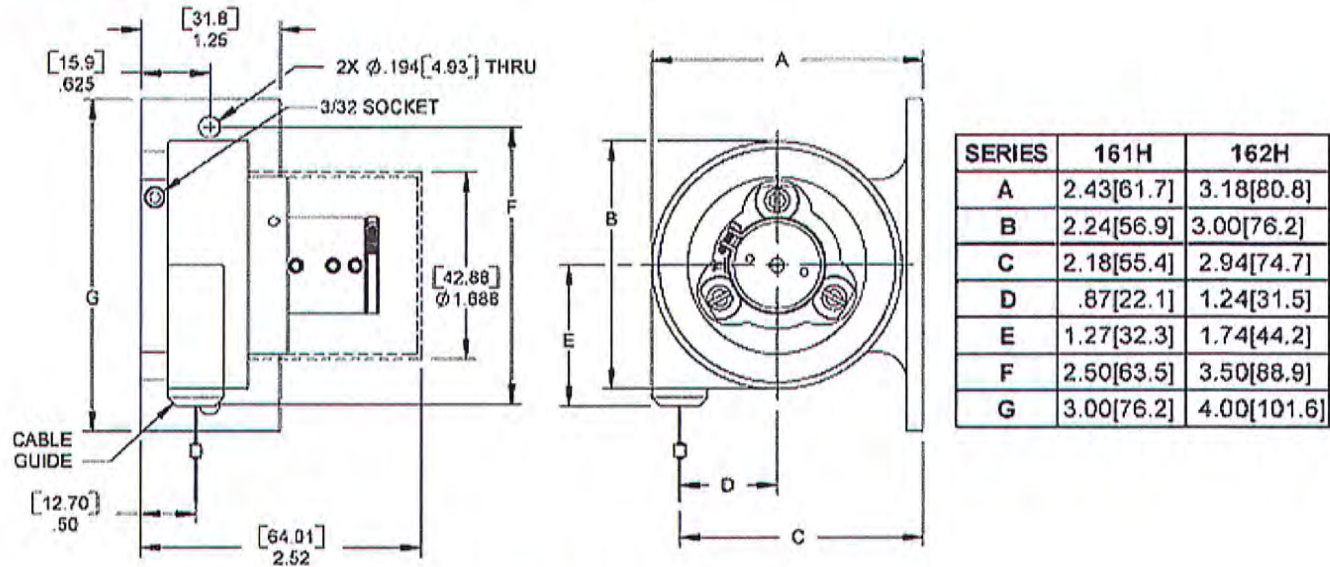
16 _ _ _ _ H-abc (example: 161-0361H-BSB (cable tension: -100, sensor cover, and base: big foot))

Series 161H	a	A	cable tension: -090
		B	cable tension: -100
	b	N	no sensor cover (_61)
		S	sensor cover (_61); pn 160060
	c	D	base: mounting disk (_6_); pn 160040-1
		S	base: standard (_61); pn 160015-3
		U	base: universal (_61); pn 160030-3
		B	base: big foot (_60/_61); pn 160015-13
Series 162H	a	A	cable tension: -090
		B	cable tension: -100
	b	N	no sensor cover (_62)
		S	sensor cover (_62); pn 160060
	c	D	base: mounting disk (_6_); pn 160040-1
		S	base: standard (_62); pn 160015-5
		U	base: universal (_62); pn 160030-5
		B	base: big foot (_62); pn 160015-15

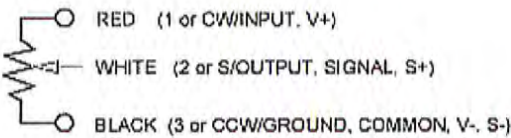
Displacement Cable Maximum Acceleration by Model Number

Model	Max Cable Acceleration (g)	
	Opt A: -090 spring	Opt B: -100 spring
161-0361H	100+	100+
161-0461H	100+	100+
161-1143H	337	100+
161-1283H	346	100+
161-1443H	215	100+
161-1915H	256	512
161-2145H	401	1354
161-2405H	100+	397
162-0521H	100+	100+
162-0651H	83	109
162-2735H	100+	100+
162-2945H	100+	100+
162-3205H	157	184
162-3405H	100+	100+

Drawing



Shown with big foot base (pn 160015-13).



For crimping of hardware to displacement cable, consider the [160001-01 installation kit](#). Need something not shown? Complete a [Custom Solution Request](#).

All dimensions are REFERENCE and are in inches [mm] Data Sheet Series 161H and 162H Rev. A

[Firstmark Controls](#) • info@Firstmarkcontrols.com
An ISO9001:2000/AS9100B-Compliant Company
1176 Telecom Drive • Creedmoor, NC 27522 USA
Phone: 1-919-956-4203 • Fax: 919-682-3786 • Toll Free: 1-866-912-6232

Business hours: Mon-Fri, 8:00am to 5:00pm (Eastern time)
All specifications subject to change without notice.
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CERTIFICATE OF CALIBRATION

CUSTOMER: Dynamic Analysis Group

THIS IS TO CERTIFY THAT THE MEASURING INSTRUMENT LISTED BELOW HAS BEEN TESTED AND CALIBRATED IN ACCORDANCE WITH PRECISION TOOLS CALIBRATION PROCEDURES WHICH INCLUDES MEASUREMENTS CERTIFIED AND TRACED TO N.I.S.T STANDARDS. CERTIFICATIONS PERFORMED ARE IN COMPLIANCE WITH ISO 9001. ALL CALIBRATIONS PERFORMED AT (72) DEG-F +/- (2) DEGREES WITH LESS THAN 65% HUMIDITY.

MANUFACTURE		CERT #	T1819-1	CAL DATE	8/26/2010
MODEL					
S/N	R012007	DESCRIPTION:	PRESSURE GUAGE	DUE DATE	8/26/2011
CAPACITY	0-150 psi	TEMP	72		
		HUM	65	ID #	

PRESSURE APPLIED	AS - FOUND READING	AS-LEFT READING
PSI	PSI	PSI
0.0	0.0	0.0
50.0	50.0	50.0
100.0	99.5	99.5
150.0	149.5	149.5

PROCEDURE USED: MFG. SPECS

PRECISION TOOLS
5829 W. SAM HOUSTON PKWY N.
SUITE 308
HOUSTON, TEXAS 77041



MIKE JAVADI
CERTIFIED TECHNICIAN

Test Facility:

Location

5

Uvalde You can *PROVE IT*...

at the Uvalde Proving Grounds,
Uvalde Texas, USA

- **MAIN TRACK**

8.5-mi (13.7-km) 3-lane oval

- **BRAKING/TRACTION TESTING**

ABS & Traction Trailer Testing
on 6 Surfaces (dry & wet)

- **WET TESTING FACILITIES**

Wet Handling (Contidrom Design)
Lateral Grip and 200-m Circles
Hydroplaning lat. & longitudinal

- **VEHICLE DYNAMICS FACILITY**

800' x 800' Platform (dry & wet)
Dry Handling Track
Ride Evaluation Course

- **OFF-ROAD COURSES**

10 tracks for Handling and Durability
300' x 150' Sand Basin
Sand and Grass Hill Climbs, 3 slopes,
Mud Track

- Year-round climate
- Privacy
- Terrific support staff
- Engineering, Testing, Consulting,
European & US-Standards

Contact: Ella Samarron, Marketing Representative
Uvalde Proving Grounds
Phone: +1 830.591.7064 Fax: +1 830.591.7090
ella.samarron@conti-na.com

DVD Facility Tour available!

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Continental 

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Uvalde

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If you have something to prove, we have the place to prove it. The secluded compound of the Uvalde Proving Grounds features three of the most comprehensive Vehicle Dynamics, Traction, and Wet Grip Testing facilities available today. With over a dozen specialized tracks, a wide range of surfaces and configurations, and various off-road courses, virtually anything that rolls can prove its worth in vehicular construction, performance characteristics, or component quality. When you're ready to put your best to the test, we'll be ready for you.



A Unique Place for Special Events

For a product launch, professional meet and greet, or memorable ride and drive...we've got what it takes to make your next event unforgettable.

Whether they're automotive experts or enthusiasts, your attendees will receive safety training and instruction on an exciting array of asphalt and gravel courses including the 8.5-mile main oval and the huge wet pad! Test courses are plotted with driving areas suitable for your instructional needs. Group transportation and catering services can add that special touch of Southwestern hospitality.



Alert to Your Safety and Security

One of our top priorities is the safety and security of Uvalde personnel, visitors, and clients. All receive orientation on safety policies and operating procedures. Drivers receive specific instructions for all courses. Security is maintained 24/7/365. The Uvalde Proving Grounds compound offers the entire 5000-acre facility. The facility is surrounded by Texas ranchland, providing an additional buffer of privacy.

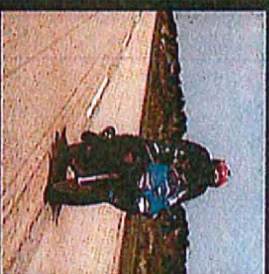


Uvalde

PROVING GROUNDS

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TIRE

PROVING GROUNDS



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Uvalde PROVING GROUNDS

1 MAIN TRACK

8.5-mi (13.7-km) oval track; suitable for testing vehicle components and handling at a wide range of speeds

- 3 lanes
- 1-mi (1.6-km) radius turns
- 1.1-mi (1.8-km) straightaway



2 VEHICLE DYNAMICS FACILITY

Featuring three courses (wet handling, dry handling, ride evaluation); provides ideal conditions for evaluating vehicle ride and handling performance - from suspension to components, and more

2 Wet Handling Pad

At 15 acres (one of North America's largest), this state-of-the-art pad can be wetted over its full surface and cone-configured for any test-course preference

- 800-ft x 600-ft (244-m x 244-m) asphalt pad
- 100-ft (30-m) paved surround
- 2 asphalt, high-speed approaches (2,200-ft/670-m; 1,800-ft/549-m)
- Vehicle Speeds: Vary by course configuration



3 Dry Handling Road Course

Our 1.07-mi (1.72-km) asphalt dry course includes multiple curves and twists, and a straightaway for on-center feel, lane-change, slalom, and other maneuvers

- 6 curve types - from 100-ft (30.5-m), to 500-ft (152.4-m) radius
- Straightaway: 1,200-ft (366-m) long, 70-ft (21.3-m) wide
- Vehicle Speeds: up to 80-mph (130-kph)



4 Ride Evaluation Course

A 3-mi (4.8-km), multi-lane oval featuring various paved surfaces and impacts for measuring ride and impacts for measuring ride comfort, impact dampening, noise, suspension, durability, and component quality

- 4-lane straightaway
- Virtually level surfaces
- 1,432-ft (436-m) radius curves



5 TRACTION TESTING FACILITY

Designed to meet strict auto manufacturing standards and changing customer needs, this facility features a number of lanes, surfaces, and speed ranges for evaluating tire and vehicle traction performance

5 Wet Skid Testing

A 900-ft (274-m), multi-lane area with various surfaces for assessing skid and stopping characteristics under typical consumer-driving conditions



6 Dry Skid Testing

Designed for traction trailers, with approaches 2,000-ft (610-m) long, up to 100-ft (30-m) wide



7 SPECIAL TESTING

Special test areas include

- Curb testing
- Rapid air loss
- Pothole test



8 WET GRIP FACILITIES

Designed as exact replicas of those featured at the Continental Proving Grounds in Germany



8 Lateral Grip Circle

For both objective/subjective evaluations, as well as testing of vehicle-control systems

- Surface: wet asphalt
- Inner Diameter: 180-ft (55-m)
- Water Depth: adjustable to accommodate customer needs, typically 0.04-in (1-mm)
- Typical Speeds: up to 30-mph (50-kph)

9 200-m Circle

Simulates water puddles in curves on public roads

- Inner Diameter/Surfaces: 650-ft (200-m) dry asphalt; 66-ft (20-m) wet asphalt
- Water Supply: embedded water lines; typical depth: 0.24-in (6-mm)
- Speeds: up to 60-mph (97-kph) on dry surface



10 Wet Handling Road Course

A challenging asphalt wet-road course

- Dimensions: 5,100-ft (1,555-m) length; 20-ft (6.1-m) width
- Water Supply: trickle system; typical depth: 0.04-in (1-mm)
- Speeds: up to 70-mph (110-kph)



Continental TIRE

OFF-ROAD COURSES

Ten courses available

- 5 dirt/gravel road courses (Hill Climb, A, N, P, R)
- 3 gravel road courses (L, F, K)
- 1 cut and chip rock course (C)
- 1 mud course (R)



Hill Climb Course

Ideal for off-road truck tire development, off-road vehicle construction, automotive component testing

- Composition: native stone and clay
- Inclines: 9%, 15%

A-Course

- 3-mi (4.8-km) triangular course
- Composition: includes "chert" (razor-sharp flint) for testing tires' ability to endure harsh off-road conditions
- Max. Speed: 45-mph (72-kph)

C-Course

For very demanding vehicle and automotive component testing

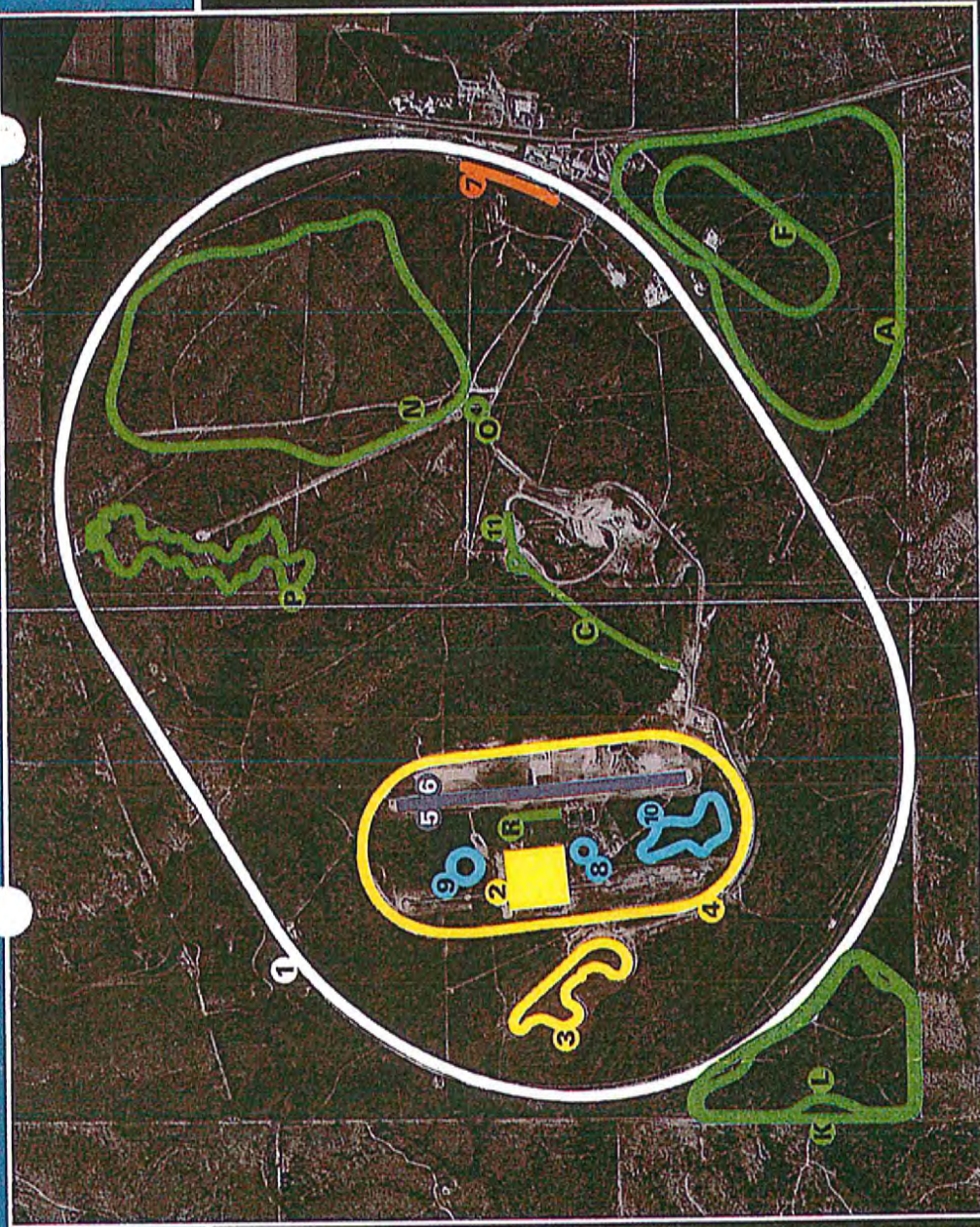
- Composition: Kuippa traprocks, with a total depth of 5-inches (13-cm)
- 0.5-mi straightaway, with turnaround loops at each end

F-Course

- One-lane, 1.5-mi (2.4-km) oval
- Composition: "Caliche" gravel mixture
- Max Speed: 45-mph (72-kph)

K-Course

- Serpentine, 2-mi (3.2-km) circular
- Composition: clay-based gravel
- Limestone aggregate surface



P-Course

- Serpentine, 2-mi (3.2-km) "Baja"-type course for higher-speed testing on gravel, flint, rock and dirt
- Steep 4-wheel drive hill climb
- Adjacent mud, sand, and gravel pits

R-Course

- With straight section course that can be wetted for "mud" testing
- 300-ft (91-m) long, 20-ft (6-m) wide

L-Course

Serpentine, clay-based gravel road, limestone aggregate

N-Course

Semi-circular, 3-mi (4.8-km), compacted native soils/gravel

O-Course

Gravel bed ideal for checking stone retention of tread designs

Uvalde

PROVING GROUNDS



CUSTOMER SERVICE:

Our Customer Service Department handles all customer requests and bookings for customers interested in utilizing our facilities.

Additional services offered by Customer Service include coordination and arrangements for:

- Customer testing resources and support
- Specific catering needs
- Support for special events
- Transportation from local and San Antonio Airports
- Other services provided are vehicle rental arrangements, hotel reservations, airline reservation changes, etc.

CONTACT:

Sales & Marketing

telephone: 830-591-7064

e-mail: info@uvaldeprovinggrounds.com

www.uvaldeprovinggrounds.com

Continental Tire North America, Inc.
Uvalde Proving Grounds

Batesville Road

P.O. Box 480

Uvalde, Texas 78802-0480

Uvalde Overview

The Uvalde Proving Grounds of Continental Tire North America, Inc., has been raising the bar in automotive testing technology since 1959. Surrounded by remote ranchlands, yet close enough for comfort to the town of Uvalde, Texas, the 5,000-acre Proving Grounds are home to world class testing facilities for assessing vehicle and component ride, comfort, handling, durability, quality, and more.

We also welcome those outside the testing industry who seek the perfect place for their next business meeting, product presentation, or club outing.

Private offices and conference rooms, workshops areas, garages, and service bays are also available to meet your project requirements.



Climate Control

Unlike some testing facilities, Uvalde has the advantage of a climate that provides all-year accessibility. Manufacturers can assess auto and on-vehicle component performance under moderate weather conditions throughout the winter. Average winter temperature reaches 68 degrees F (20° C).

Down the Road

The Uvalde area provides a number of options for lodging, dining, and local activities that feature Southwestern charm and reasonable pricing.

Relative proximity to major highways, San Antonio's international airport and its famed Riverwalk, enhance your Uvalde Proving Grounds experience.



1995 MCI 102DL3 Vehicle Testing

Track Preparation

Uvalde Proving Grounds

June 12-14, 2011

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DYNAMIC ANALYSIS GROUP LLC

Track Preparation.png



Track Preparation_2882.jpg



Track Preparation_2883.jpg



Track Preparation_2884.jpg



Track Preparation_2885.jpg

Test Results:

Index of Tests

6

1995 MCI 102DL3

TEST INDEX

Test	Description	Nominal Speed (mph)	Driver	Loading Condition
1	Low Speed Turn, Unlocked	10	KJG	44 Passenger Loading
2	Low Speed Turn, Locked	10	KJG	44 Passenger Loading
3	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
4	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
5	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
6	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
7	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
8	Straight Line Drive, Dynamic Unlock	70	KJG	44 Passenger Loading
9	Dynamic Unlock in a Curve, Downhill to the Left	70	KJG	44 Passenger Loading
10	Dynamic Unlock in a Curve, Uphill to the Right	70	KJG	44 Passenger Loading
11	Dynamic Unlock in a Curve, Uphill to the Left	70	KJG	44 Passenger Loading
12	Dynamic Unlock in a Curve, Downhill to the Right	70	KJG	44 Passenger Loading
13	Frequency Response, Locked	62	KJG	44 Passenger Loading
14	Frequency Response, Locked	62	KJG	44 Passenger Loading
15	Frequency Response, Unlocked	62	KJG	44 Passenger Loading
16	Frequency Response, Unlocked	62	KJG	44 Passenger Loading
17	On-Center Handling, Locked	62	KJG	44 Passenger Loading
18	On-Center Handling, Locked	62	KJG	44 Passenger Loading
19	On-Center Handling, Unlocked	62	KJG	44 Passenger Loading
20	On-Center Handling, Unlocked	62	KJG	44 Passenger Loading
21	Road Edge & Crown, Locked	62	KJG	44 Passenger Loading
22	Road Edge & Crown, Locked	62	KJG	44 Passenger Loading
23	Road Edge & Crown, Unlocked	62	KJG	44 Passenger Loading
24	Road Edge & Crown, Unlocked	62	KJG	44 Passenger Loading
25	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
26	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
27	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
28	Low-g Step Steer, Locked	62	KJG	44 Passenger Loading
29	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
30	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
31	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
32	Low-g Step Steer, Unlocked	62	KJG	44 Passenger Loading
33	Open Loop Lane Change, Locked	70	KJG	44 Passenger Loading
34	Open Loop Lane Change, Locked	70	KJG	44 Passenger Loading
35	Open Loop Lane Change, Unlocked	70	KJG	44 Passenger Loading
36	Open Loop Lane Change, Unlocked	70	KJG	44 Passenger Loading
37	Dynamic Unlock in a Curve, Downhill to the Right with Braking	70	KJG	44 Passenger Loading
38	Dynamic Unlock, Downhill to Right, Intentional Steer Toward Shoulder	70	KJG	44 Passenger Loading

Test	Description	Nominal Speed (mph)	Driver	Loading Condition
39	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Braking	70	KJG	44 Passenger Loading
40	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder & Left, Braking	70	KJG	44 Passenger Loading
41	Extended Driving, Locked	70	KJG	44 Passenger Loading
42	Extended Driving, Unlocked	70	KJG	44 Passenger Loading
43	Surprise Unlock	70	KJG	44 Passenger Loading
44	Dynamic Unlock in a Curve, Downhill to the Right with Braking, Wet Surface	70	KJG	44 Passenger Loading
45	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Wet Surface	70	KJG	44 Passenger Loading
46	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Braking, Wet	70	KJG	44 Passenger Loading
47	Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder & Left, Braking, Wet	70	KJG	44 Passenger Loading
48	Modified U-Joint Bearing - Lap 1	70	KJG	44 Passenger Loading
49	Modified U-Joint Bearing - Lap 2	70	KJG	44 Passenger Loading
50	Modified U-Joint Bearing - Laps 3 and 4	70	KJG	44 Passenger Loading
51	Modified U-joint Bearing - Lap 5, Incomplete Data	70	KJG	44 Passenger Loading
52	Modified U-joint Bearing - Lap 6	70	KJG	44 Passenger Loading
53	Modified U-joint Bearing - Lap 7	70	KJG	44 Passenger Loading
54	Modified U-joint Bearing - Lap 8	70	KJG	44 Passenger Loading
55	Modified U-joint Bearing - Lap 9, first half	70	KJG	44 Passenger Loading
56	Modified U-joint Bearing - Lap 9, second half	70	KJG	44 Passenger Loading
57	Modified U-joint Bearing - Lap 10	70	KJG	44 Passenger Loading
58	Modified U-joint Bearing - Lap 11	70	KJG	44 Passenger Loading
59	Modified U-joint Bearing - Lap 12	70	KJG	44 Passenger Loading
60	Modified U-joint Bearing - Lap 13	70	KJG	44 Passenger Loading
61	Modified U-joint Bearing - Lap 14	70	KJG	44 Passenger Loading
62	Modified U-joint Bearing - Lap 15	70	KJG	44 Passenger Loading
63	Modified U-joint Bearing - Lap 16	70	KJG	44 Passenger Loading
64	Modified U-joint Bearing - Lap 17	70	KJG	44 Passenger Loading
65	Modified U-joint Bearing - Lap 18	70	KJG	44 Passenger Loading
66	Modified U-joint Bearing - Lap 19	70	KJG	44 Passenger Loading
67	Modified U-joint Bearing - Lap 20	70	KJG	44 Passenger Loading
68	Modified U-joint Bearing - Lap 21	70	KJG	44 Passenger Loading
69	Modified U-joint Bearing - Lap 22	70	KJG	44 Passenger Loading
70	Modified U-joint Bearing - Lap 23	70	KJG	44 Passenger Loading
71	Modified U-joint Bearing - Lap 24	70	KJG	44 Passenger Loading
72	Modified U-joint Bearing - Lap 25	70	KJG	44 Passenger Loading
73	Modified U-joint Bearing - Lap 26	70	KJG	44 Passenger Loading
74	Modified U-joint Bearing - Lap 27	70	KJG	44 Passenger Loading
75	Modified U-joint Bearing - Lap 28	70	KJG	44 Passenger Loading
76	Modified U-joint Bearing - Lap 29	70	KJG	44 Passenger Loading
77	Modified U-joint Bearing - Lap 30	70	KJG	44 Passenger Loading

Test	Description	Nominal Speed (mph)	Driver	Loading Condition
78	Modified U-joint Bearing - Lap 31	70	KJG	44 Passenger Loading
79	Modified U-joint Bearing - Lap 32	70	KJG	44 Passenger Loading
80	Modified U-joint Bearing - Lap 33, first half	70	KJG	44 Passenger Loading
81	Modified U-joint Bearing - Lap 33, second half	70	KJG	44 Passenger Loading
82	Modified U-joint Bearing - Laps 34 & 35	70	KJG	44 Passenger Loading

Test Notes

Vehicle: 1995 MCI 102DL3
Tires: Firestone FS 400

VIN: 1M8PDMPA5SPO47805
Size: 315/80R22.5 Load Range J

Test Date(s): 6/12 - 6/14/11
Test Location(s): Uvalde
Pressures: 115/95/95

Test No.	Test Name	Driver	Loading	File No.	FileName	Date
	Data Zero	KJG	44 Passengers	1	VBOX0001.VBO	6/12/2011
1	Low Speed Turn, Unlocked	KJG	44 Passengers	2	VBOX0002.VBO	6/12/2011
2	Low Speed Turn, Locked	KJG	44 Passengers	3	VBOX0003.VBO	6/12/2011
3	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	4	VBOX0004.VBO	6/12/2011
4	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	5	VBOX0005.VBO	6/12/2011
5	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	6	VBOX0006.VBO	6/12/2011
6	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	7	VBOX0007.VBO	6/12/2011
7	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	8	VBOX0008.VBO	6/12/2011
8	Straight Line Drive, Dynamic Unlock	KJG	44 Passengers	9	VBOX0009.VBO	6/12/2011
9	Dynamic Unlock in a Curve, Downhill to the Left	KJG	44 Passengers	10	VBOX0010.VBO	6/12/2011
10	Dynamic Unlock in a Curve, Uphill to the Right	KJG	44 Passengers	11	VBOX0011.VBO	6/12/2011
11	Dynamic Unlock in a Curve, Uphill to the Left	KJG	44 Passengers	12	VBOX0012.VBO	6/12/2011
12	Dynamic Unlock in a Curve, Downhill to the Right	KJG	44 Passengers	13	VBOX0013.VBO	6/12/2011
13	Frequency Response, Locked	KJG	44 Passengers	14	VBOX0014.VBO	6/12/2011
14	Frequency Response, Locked	KJG	44 Passengers	15	VBOX0015.VBO	6/12/2011
15	Frequency Response, Unlocked	KJG	44 Passengers	16	VBOX0016.VBO	6/12/2011
16	Frequency Response, Unlocked	KJG	44 Passengers	17	VBOX0017.VBO	6/12/2011
17	On-Center Handling, Locked	KJG	44 Passengers	18	VBOX0018.VBO	6/13/2011
18	On-Center Handling, Locked	KJG	44 Passengers	19	VBOX0019.VBO	6/13/2011
19	On-Center Handling, Unlocked	KJG	44 Passengers	20	VBOX0020.VBO	6/13/2011
20	On-Center Handling, Unlocked	KJG	44 Passengers	21	VBOX0021.VBO	6/13/2011
21	Road Edge & Crown, Locked	KJG	44 Passengers	22	VBOX0022.VBO	6/13/2011
22	Road Edge & Crown, Locked	KJG	44 Passengers	23	VBOX0023.VBO	6/13/2011
23	Road Edge & Crown, Unlocked	KJG	44 Passengers	24	VBOX0024.VBO	6/13/2011
24	Road Edge & Crown, Unlocked	KJG	44 Passengers	25	VBOX0025.VBO	6/13/2011
25	Low-g Step Steer, Locked	KJG	44 Passengers	26	VBOX0026.VBO	6/13/2011
26	Low-g Step Steer, Locked	KJG	44 Passengers	27	VBOX0027.VBO	6/13/2011
27	Low-g Step Steer, Locked	KJG	44 Passengers	28	VBOX0028.VBO	6/13/2011
28	Low-g Step Steer, Locked	KJG	44 Passengers	29	VBOX0029.VBO	6/13/2011
29	Low-g Step Steer, Unlocked	KJG	44 Passengers	30	VBOX0030.VBO	6/13/2011
30	Low-g Step Steer, Unlocked	KJG	44 Passengers	31	VBOX0031.VBO	6/13/2011
31	Low-g Step Steer, Unlocked	KJG	44 Passengers	32	VBOX0032.VBO	6/13/2011
32	Low-g Step Steer, Unlocked	KJG	44 Passengers	33	VBOX0033.VBO	6/13/2011
33	Open Loop Lane Change, Locked	KJG	44 Passengers	34	VBOX0034.VBO	6/13/2011
34	Open Loop Lane Change, Locked	KJG	44 Passengers	35	VBOX0035.VBO	6/13/2011
35	Open Loop Lane Change, Unlocked	KJG	44 Passengers	36	VBOX0036.VBO	6/13/2011
36	Open Loop Lane Change, Unlocked	KJG	44 Passengers	37	VBOX0037.VBO	6/13/2011
37	Dynamic Unlock in a Curve, Downhill to the Right with Braking	KJG	44 Passengers	38	VBOX0038.VBO	6/13/2011
38	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder	KJG	44 Passengers	39	VBOX0039.VBO	6/13/2011
39	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder &	KJG	44 Passengers	40	VBOX0040.VBO	6/13/2011

Test Notes

Vehicle: 1995 MCI 102DL3
 Tires: Firestone FS 400

VIN: 1M8PDMPA5SPO47805
 Size: 315/80R22.5 Load Range J

Test Date(s): 6/12 - 6/14/11
 Test Location(s): Uvalde
 Pressures: 115/95/95

Test No.	Test Name	Driver	Loading	File No.	FileName	Date
40	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder, Braking, & Steer To Left	KJG	44 Passengers	41	VBOX0041.VBO	6/13/2011
41	Extended Driving, Locked	KJG	44 Passengers	42	VBOX0042.VBO	6/13/2011
42	Extended Driving, Unlocked	KJG	44 Passengers	43	VBOX0043.VBO	6/13/2011
43	Surprise Unlock	KJG	44 Passengers	44	VBOX0044.VBO	6/13/2011
44	Dynamic Unlock in a Curve, Downhill to the Right with Braking, Wet Surface	KJG	44 Passengers	45	VBOX0045.VBO	6/13/2011
45	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder, Wet	KJG	44 Passengers	46	VBOX0046.VBO	6/13/2011
46	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder & Braking, Wet Surface	KJG	44 Passengers	47	VBOX0047.VBO	6/13/2011
47	Dynamic Unlock in a Curve, Downhill to the Right with Intentional Steer Toward Shoulder, Braking, & Steer To Left, Wet Surface	KJG	44 Passengers	48	VBOX0048.VBO	6/13/2011
48	Modified U-Joint Bearing - Lap 1	KJG	44 Passengers	49	VBOX0049.VBO	6/13/2011
49	Modified U-Joint Bearing - Lap 2	KJG	44 Passengers	50	VBOX0050.VBO	6/13/2011
50	Modified U-Joint Bearing - Lap 3,4	KJG	44 Passengers	51	VBOX0051.VBO	6/13/2011
51	Modified U-joint Bearing - Lap 5, incomplete	KJG	44 Passengers	52	VBOX0052.VBO	6/14/2011
52	Modified U-joint Bearing - Lap 6	KJG	44 Passengers	53	VBOX0053.VBO	6/14/2011
53	Modified U-joint Bearing - Lap 7	KJG	44 Passengers	54	VBOX0054.VBO	6/14/2011
54	Modified U-joint Bearing - Lap 8	KJG	44 Passengers	55	VBOX0055.VBO	6/14/2011
55	Modified U-joint Bearing - Lap 9, first half	KJG	44 Passengers	56	VBOX0056.VBO	6/14/2011
56	Modified U-joint Bearing - Lap 9, second half	KJG	44 Passengers	57	VBOX0057.VBO	6/14/2011
57	Modified U-joint Bearing - Lap 10	KJG	44 Passengers	58	VBOX0058.VBO	6/14/2011
58	Modified U-joint Bearing - Lap 11	KJG	44 Passengers	59	VBOX0059.VBO	6/14/2011
59	Modified U-joint Bearing - Lap 12	KJG	44 Passengers	60	VBOX0060.VBO	6/14/2011
60	Modified U-joint Bearing - Lap 13	KJG	44 Passengers	61	VBOX0061.VBO	6/14/2011
61	Modified U-joint Bearing - Lap 14	KJG	44 Passengers	62	VBOX0062.VBO	6/14/2011
62	Modified U-joint Bearing - Lap 15	KJG	44 Passengers	63	VBOX0063.VBO	6/14/2011
63	Modified U-joint Bearing - Lap 16	KJG	44 Passengers	64	VBOX0064.VBO	6/14/2011
64	Modified U-joint Bearing - Lap 17	KJG	44 Passengers	65	VBOX0065.VBO	6/14/2011
65	Modified U-joint Bearing - Lap 18	KJG	44 Passengers	66	VBOX0066.VBO	6/14/2011
66	Modified U-joint Bearing - Lap 19	KJG	44 Passengers	67	VBOX0067.VBO	6/14/2011
67	Modified U-joint Bearing - Lap 20	KJG	44 Passengers	68	VBOX0068.VBO	6/14/2011
68	Modified U-joint Bearing - Lap 21	KJG	44 Passengers	69	VBOX0069.VBO	6/14/2011
69	Modified U-joint Bearing - Lap 22	KJG	44 Passengers	70	VBOX0070.VBO	6/14/2011
70	Modified U-joint Bearing - Lap 23	KJG	44 Passengers	71	VBOX0071.VBO	6/14/2011
71	Modified U-joint Bearing - Lap 24	KJG	44 Passengers	72	VBOX0072.VBO	6/14/2011
72	Modified U-joint Bearing - Lap 25	KJG	44 Passengers	73	VBOX0073.VBO	6/14/2011
73	Modified U-joint Bearing - Lap 26	KJG	44 Passengers	74	VBOX0074.VBO	6/14/2011
74	Modified U-joint Bearing - Lap 27	KJG	44 Passengers	75	VBOX0075.VBO	6/14/2011
75	Modified U-joint Bearing - Lap 28	KJG	44 Passengers	76	VBOX0076.VBO	6/14/2011
76	Modified U-joint Bearing - Lap 29	KJG	44 Passengers	77	VBOX0077.VBO	6/14/2011

Test Notes

Vehicle:	1995 MCI 102DL3	VIN:	1M8PDMPA55PO47805	Test Date(s):	6/12 - 6/14/11
Tires:	Firestone FS 400	Size:	315/80R22.5 Load Range J	Test Location(s):	Uvalde
				Pressures:	115/95/95

Test No.	Test Name	Driver	Loading	File No.	FileName	Date
77	Modified U-joint Bearing - Lap 30	KJG	44 Passengers	78	VBOX0078.VBO	6/14/2011
78	Modified U-joint Bearing - Lap 31	KJG	44 Passengers	79	VBOX0079.VBO	6/14/2011
79	Modified U-joint Bearing - Lap 32	KJG	44 Passengers	80	VBOX0080.VBO	6/14/2011
80	Modified U-joint Bearing - Lap 33, first half	KJG	44 Passengers	81	VBOX0081.VBO	6/14/2011
81	Modified U-joint Bearing - Lap 33, second half	KJG	44 Passengers	82	VBOX0082.VBO	6/14/2011
82	Modified U-joint Bearing - Lap 34, 35	KJG	44 Passengers	83	VBOX0083.VBO	6/14/2011

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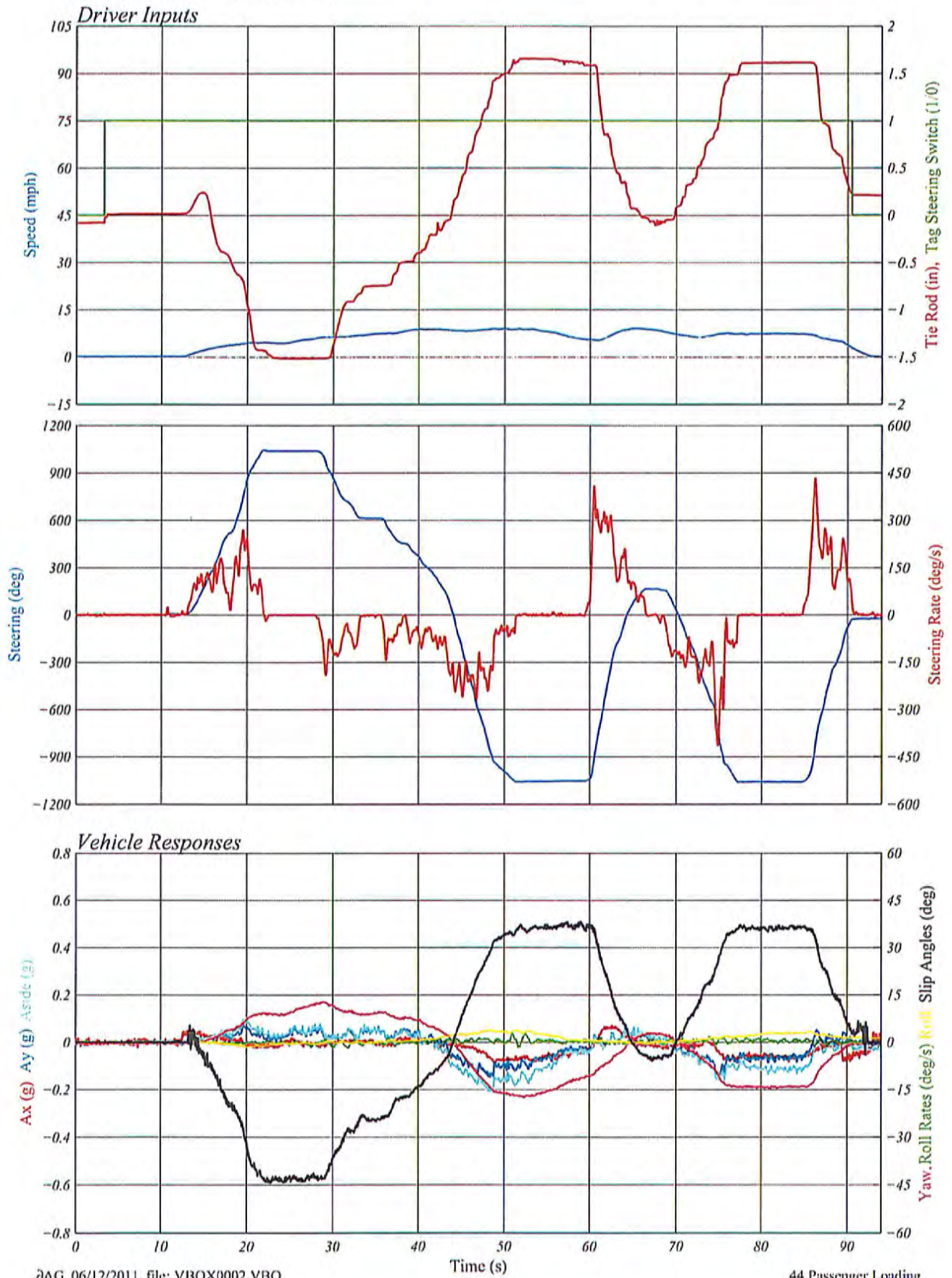
Data Plots

7

Test: 1

1995 MCI 102DL3

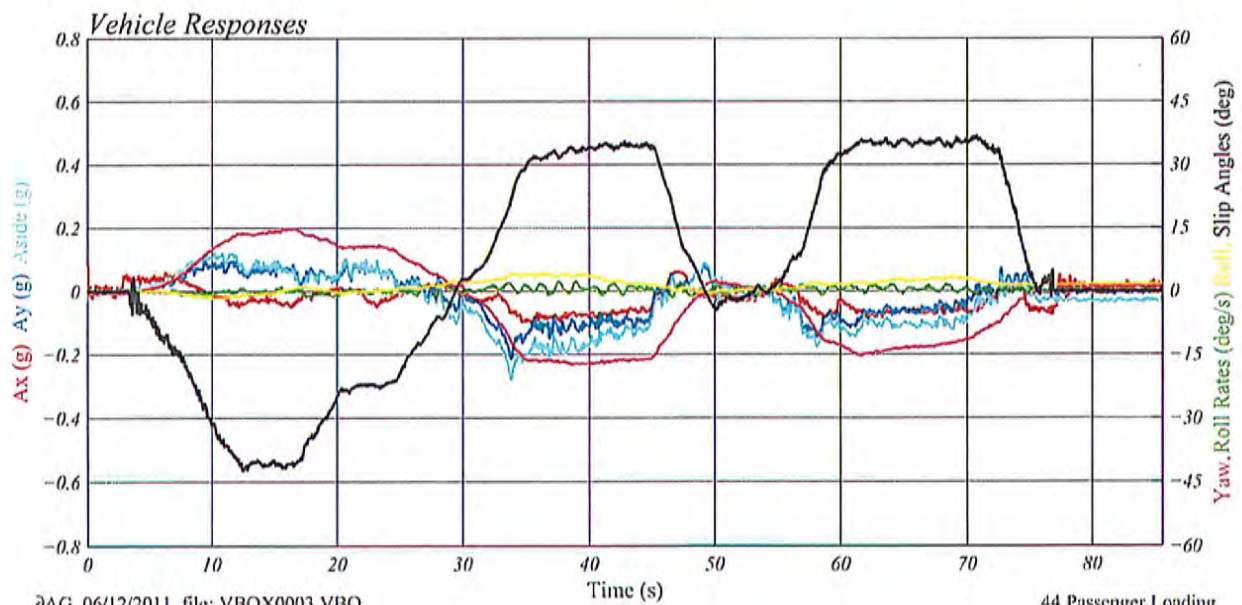
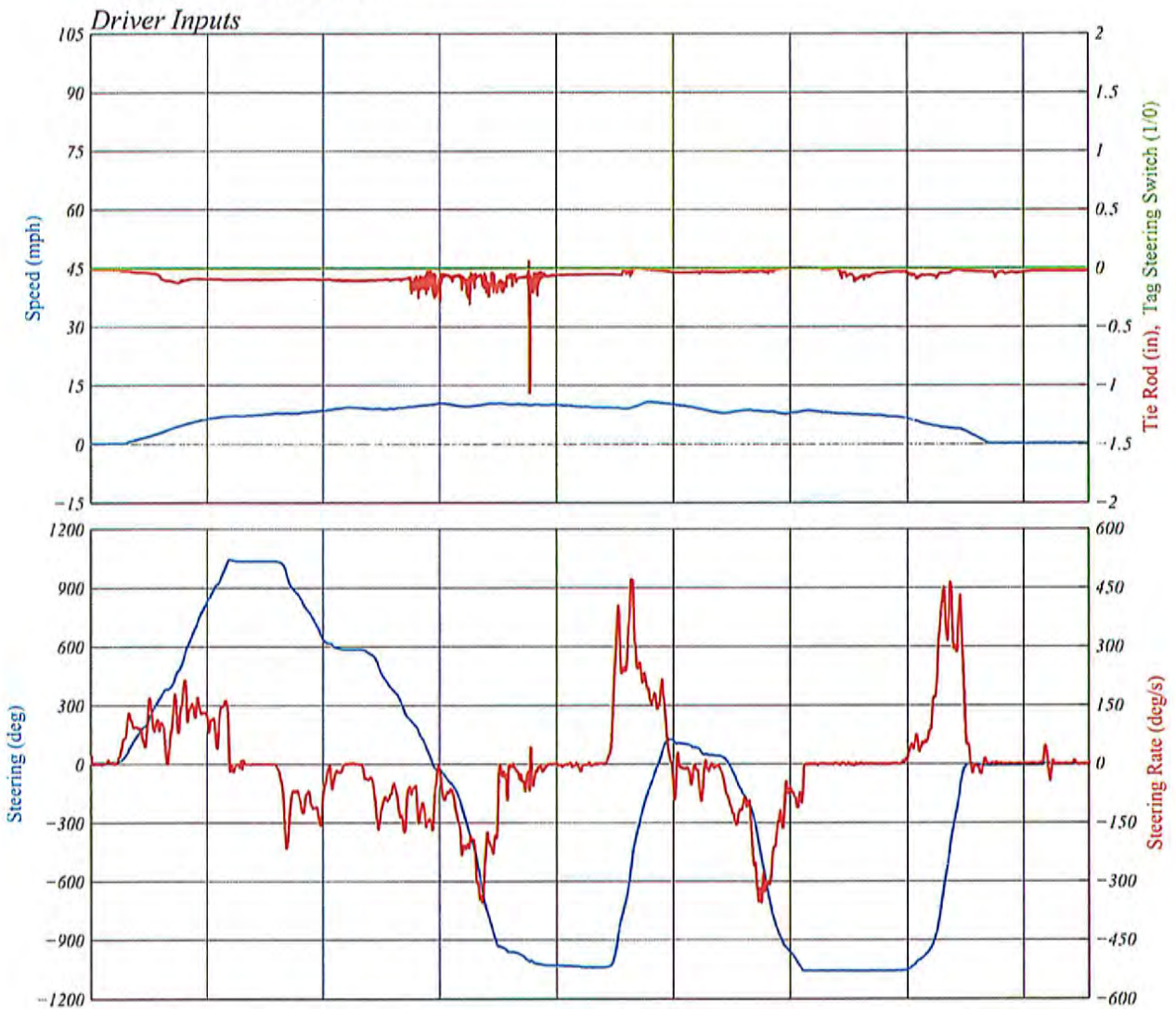
Low Speed Turn, Unlocked



Test: 2

1995 MCI 102DL3

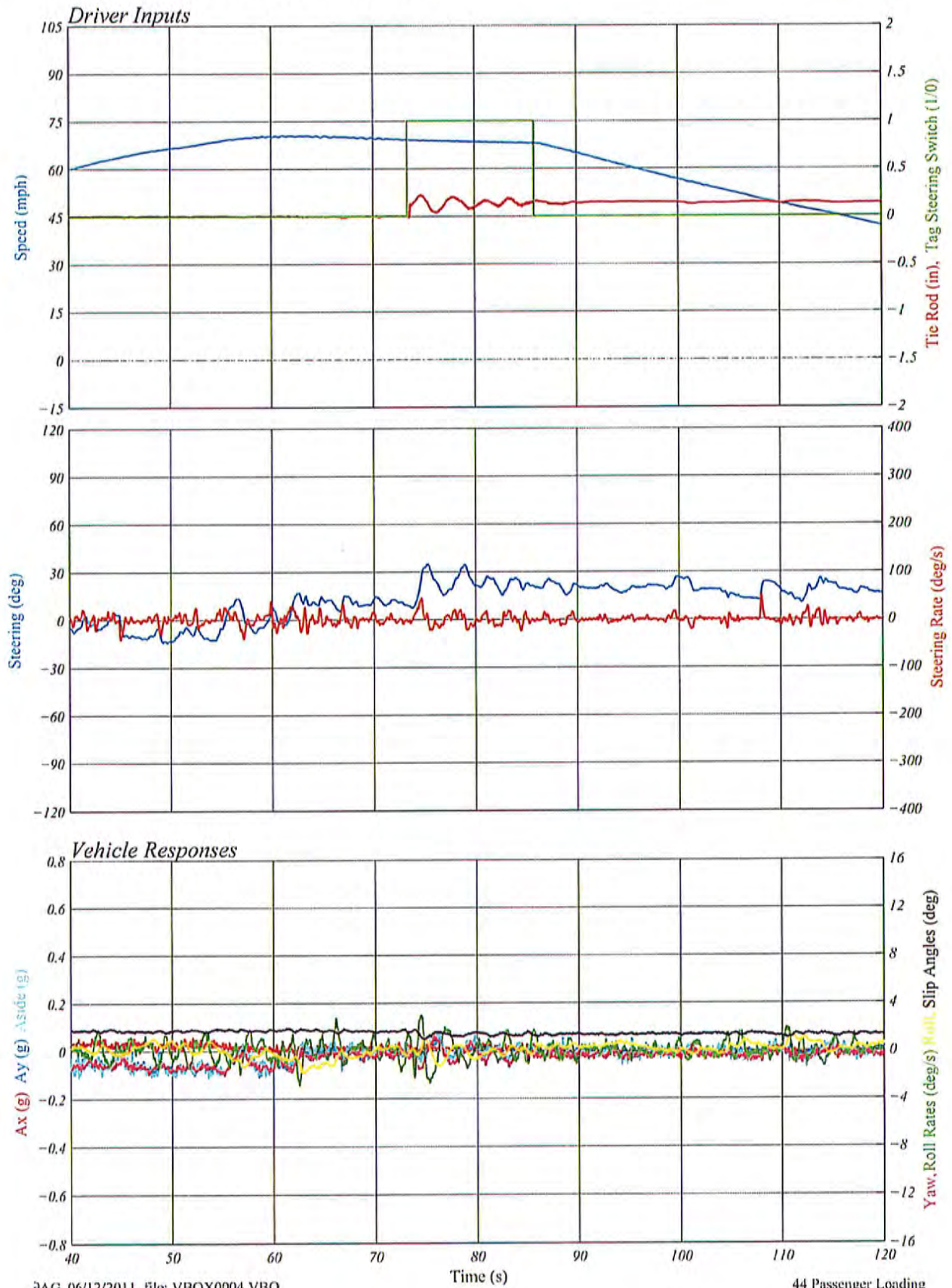
Low Speed Turn, Locked



Test: 3

1995 MCI 102DL3

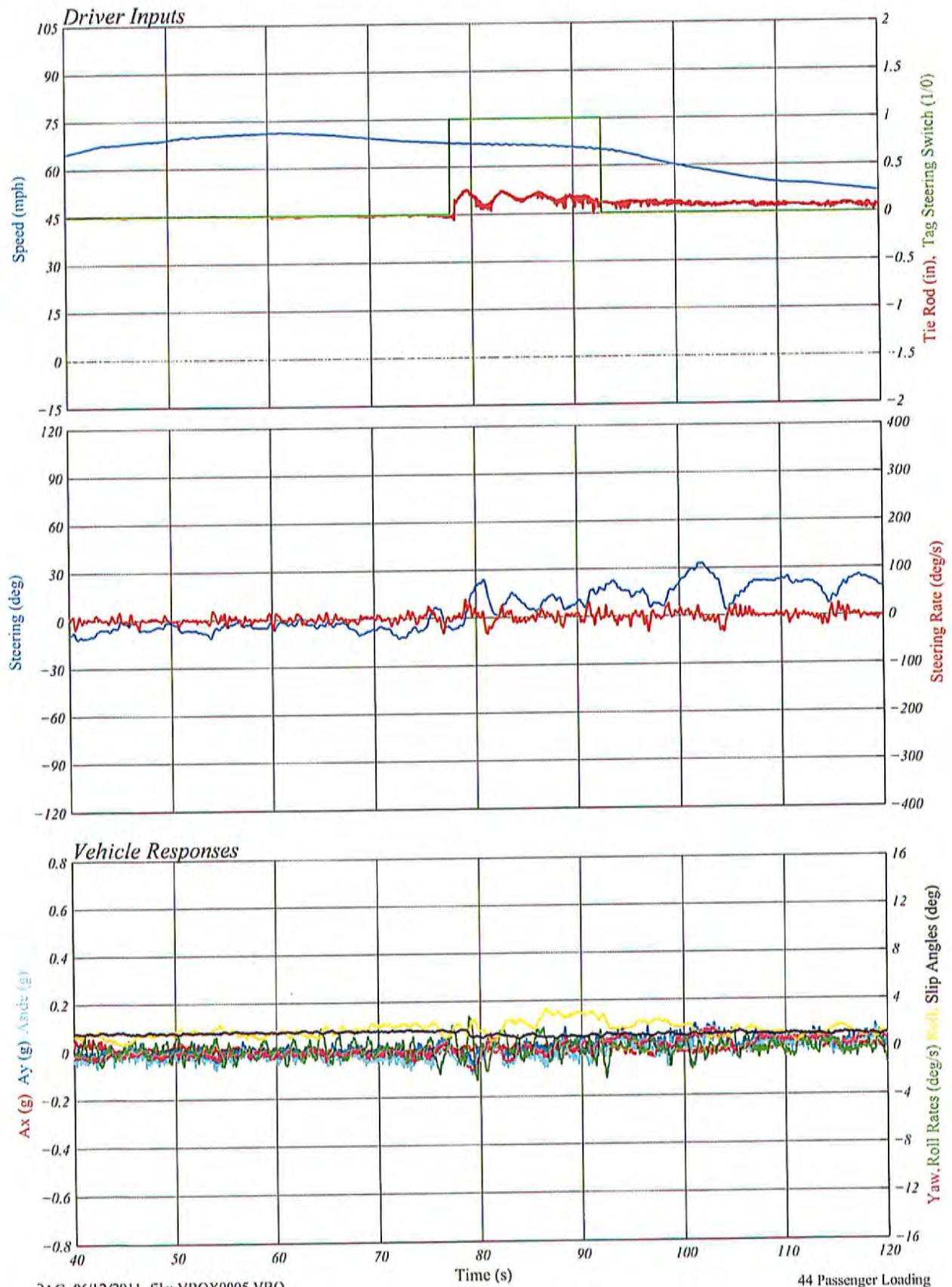
Straight Line Drive, Dynamic Unlock



Test: 4

1995 MCI 102DL3

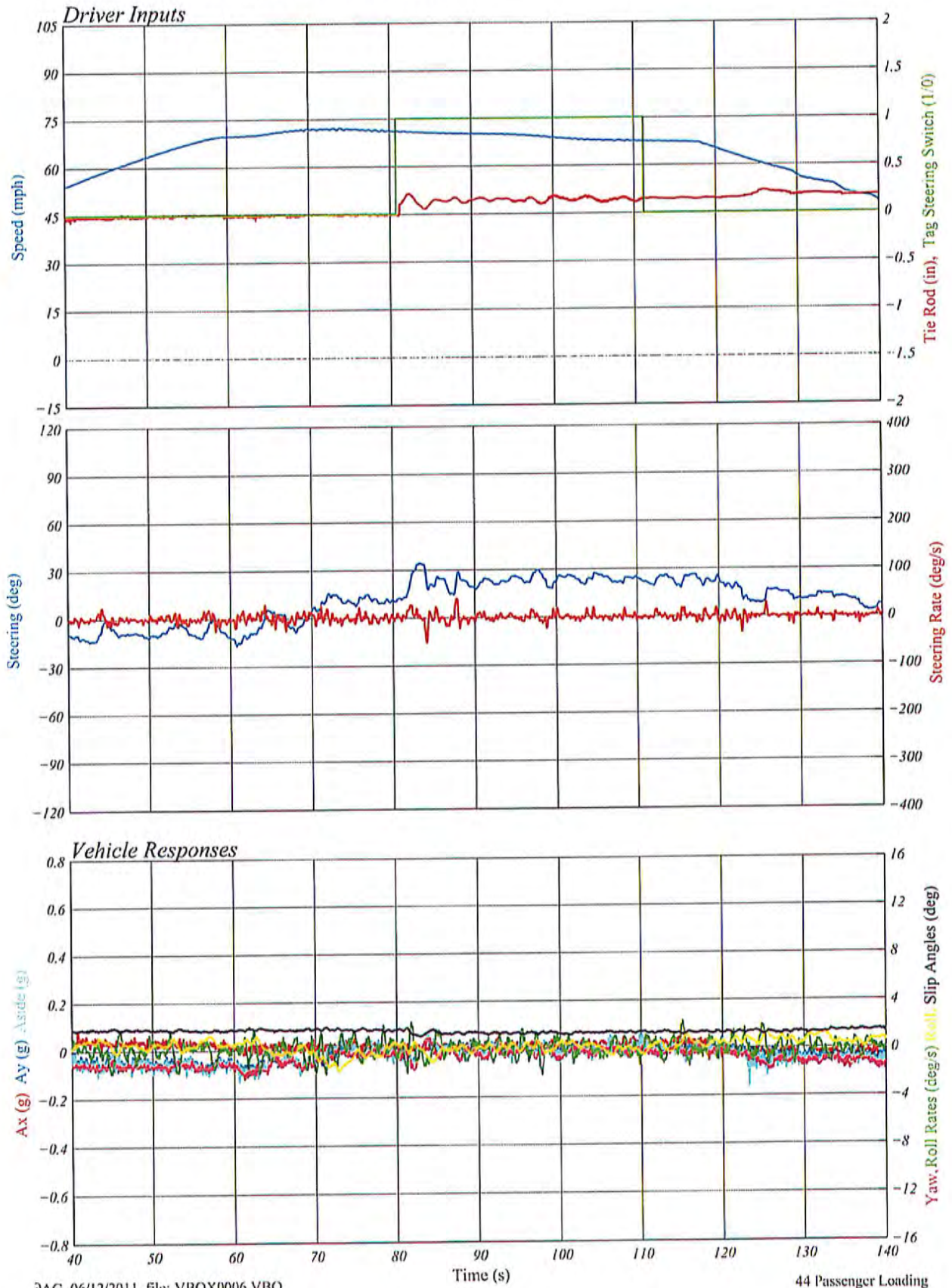
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Test: 5

1995 MCI 102DL3

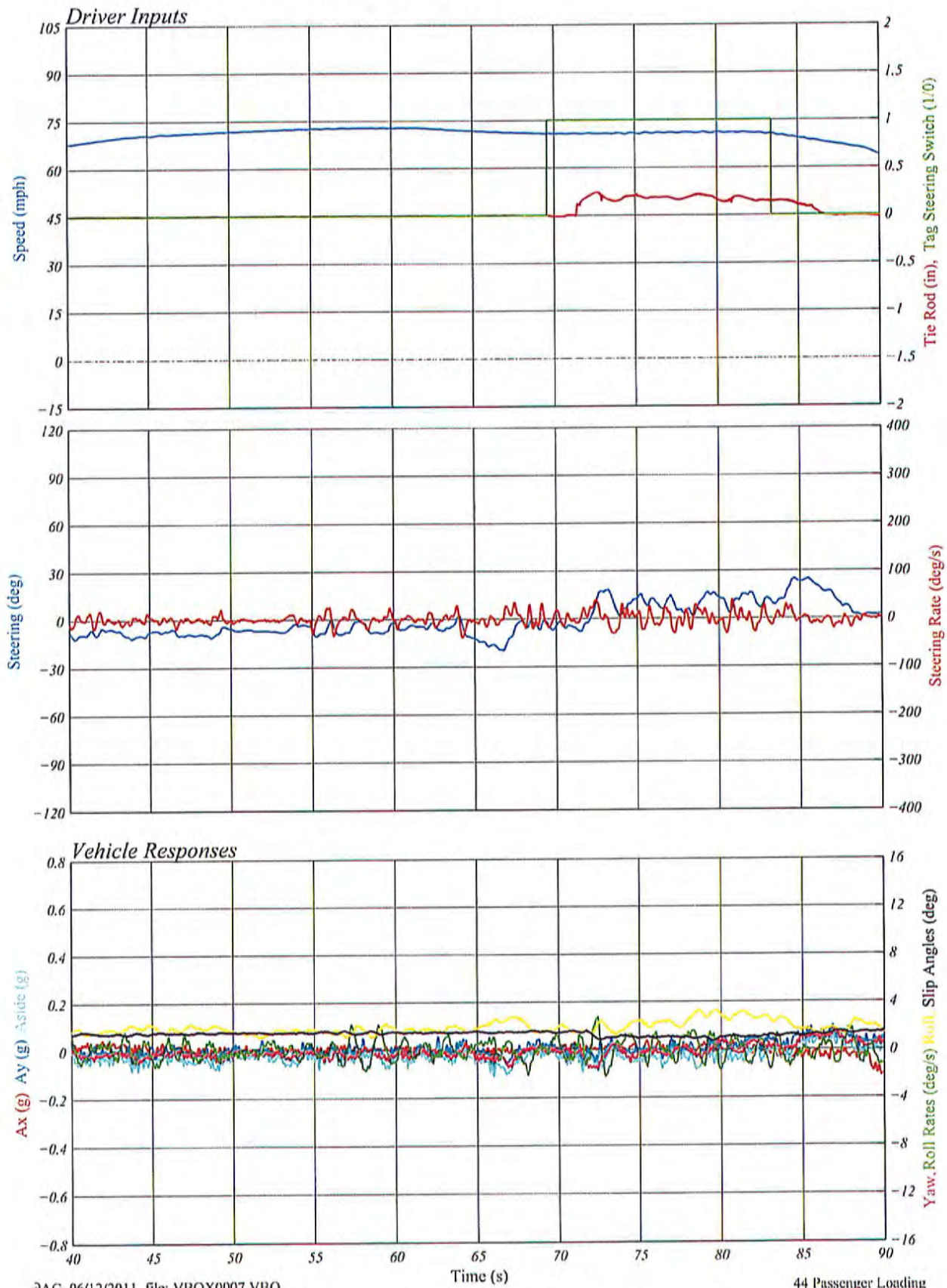
Straight Line Drive, Dynamic Unlock



Test: 6

1995 MCI 102DL3

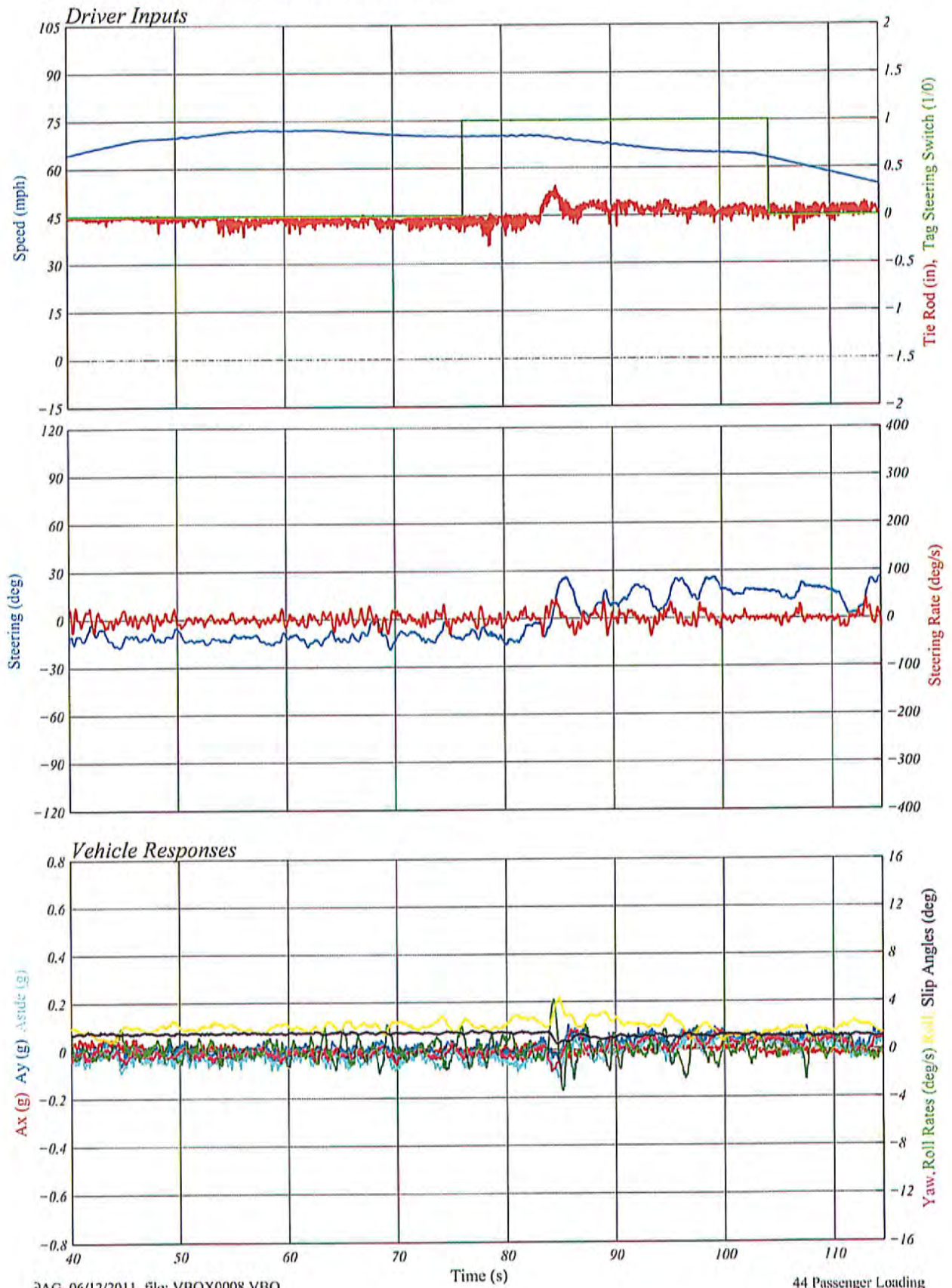
Straight Line Drive, Dynamic Unlock



Test: 7

1995 MCI 102DL3

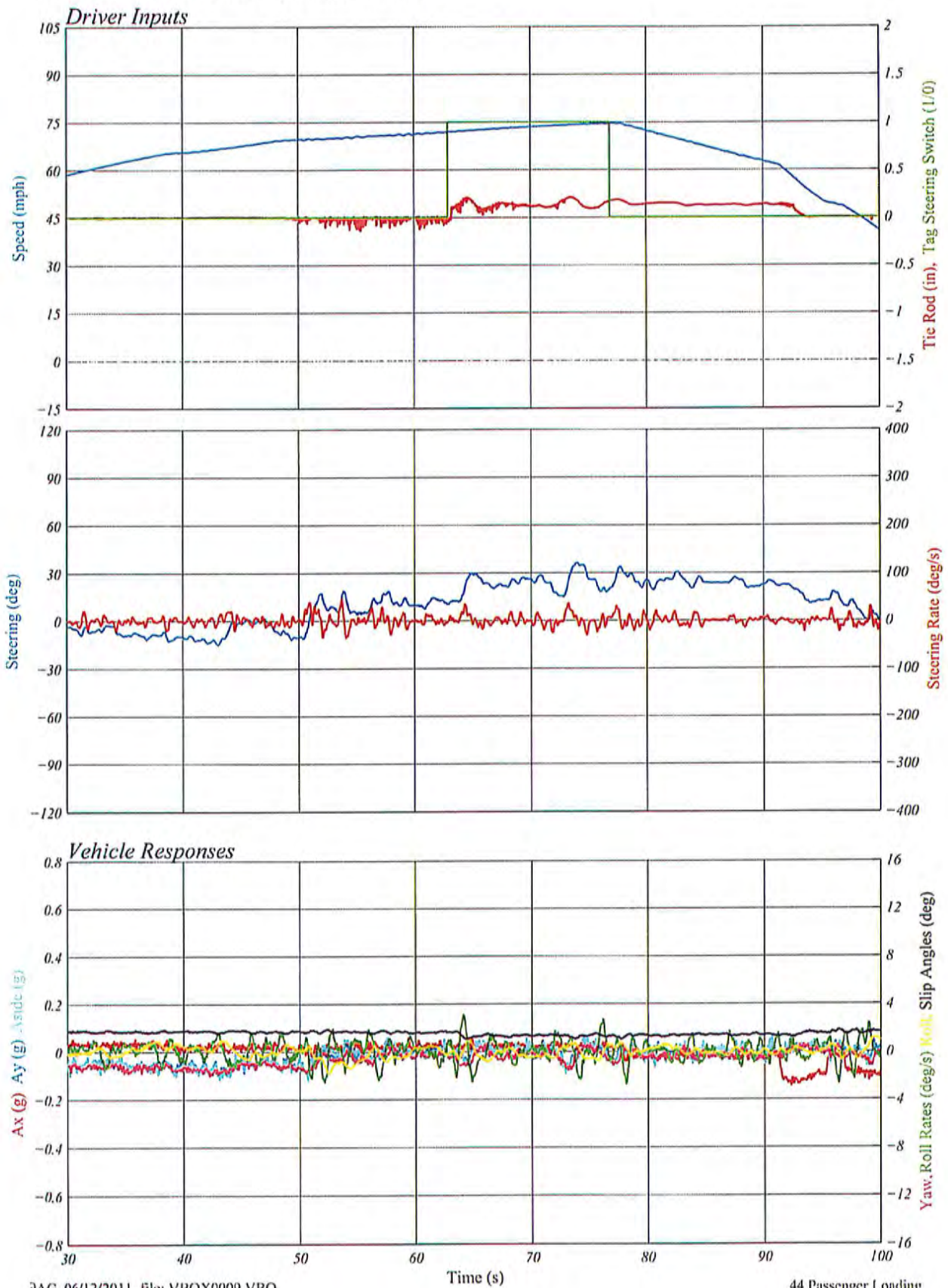
Straight Line Drive, Dynamic Unlock



Test: 8

1995 MCI 102DL3

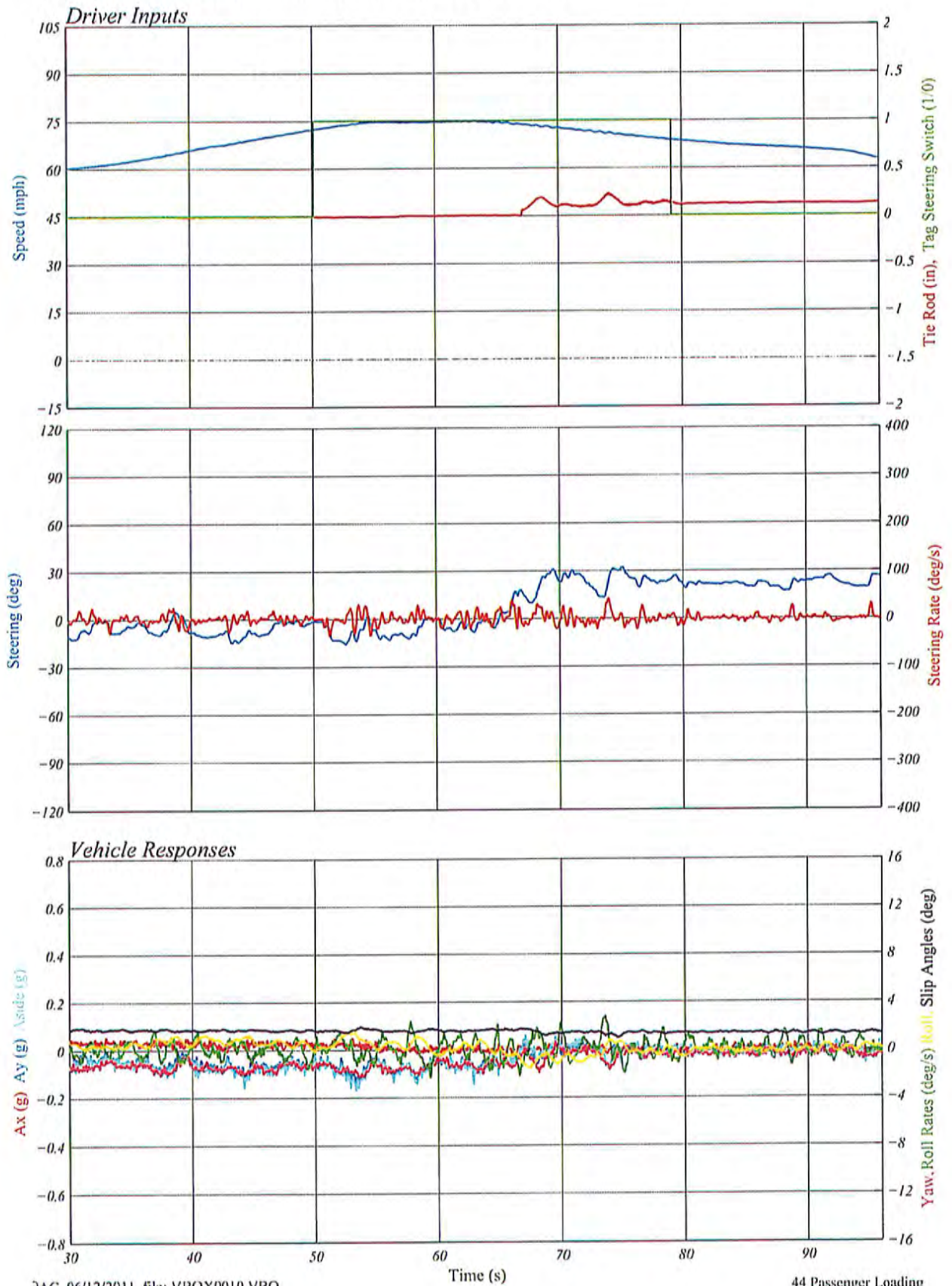
Straight Line Drive, Dynamic Unlock



Test: 9

1995 MCI 102DL3

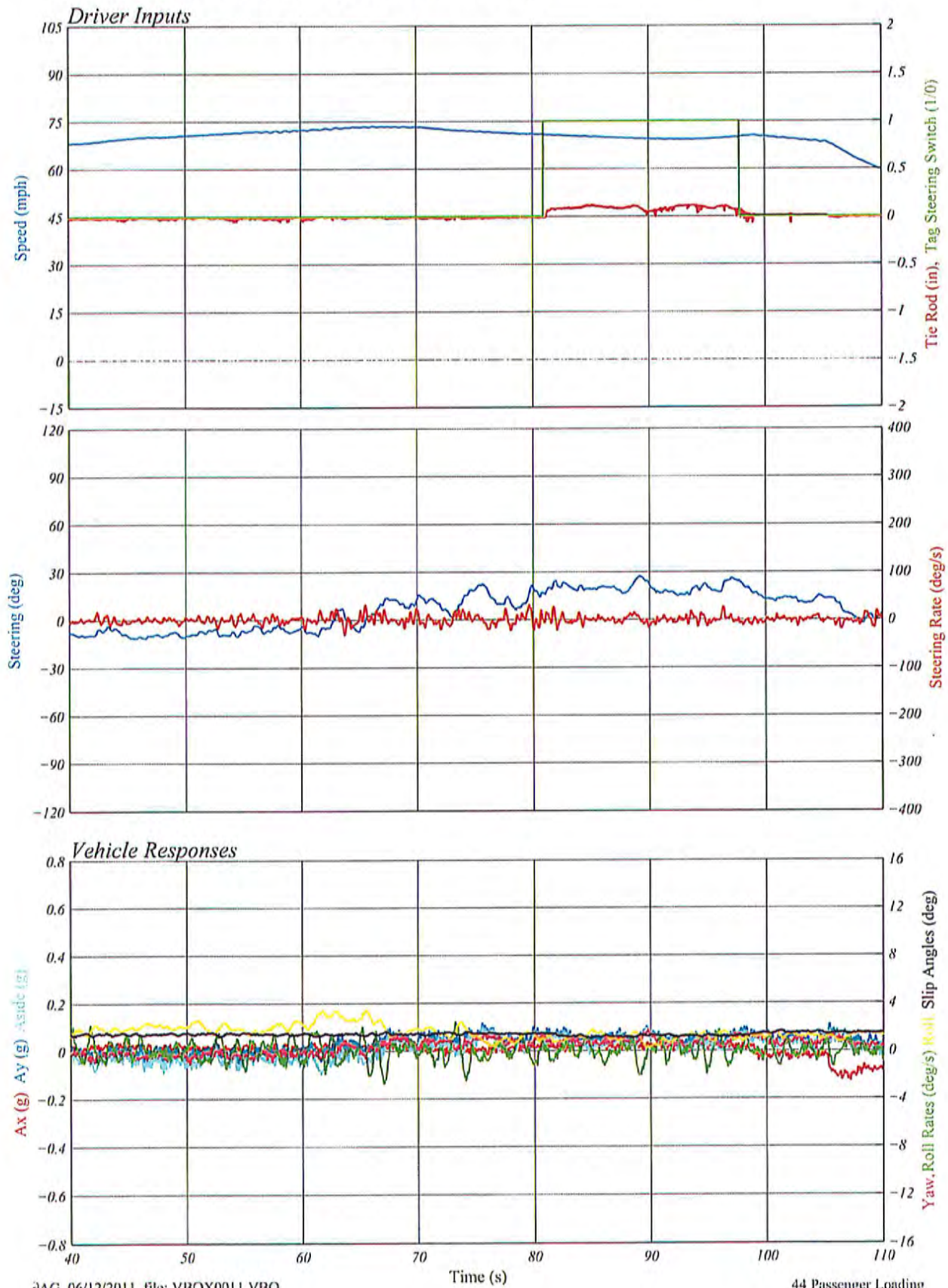
Dynamic Unlock in a Curve, Downhill to the Left



Test: 10

1995 MCI 102DL3

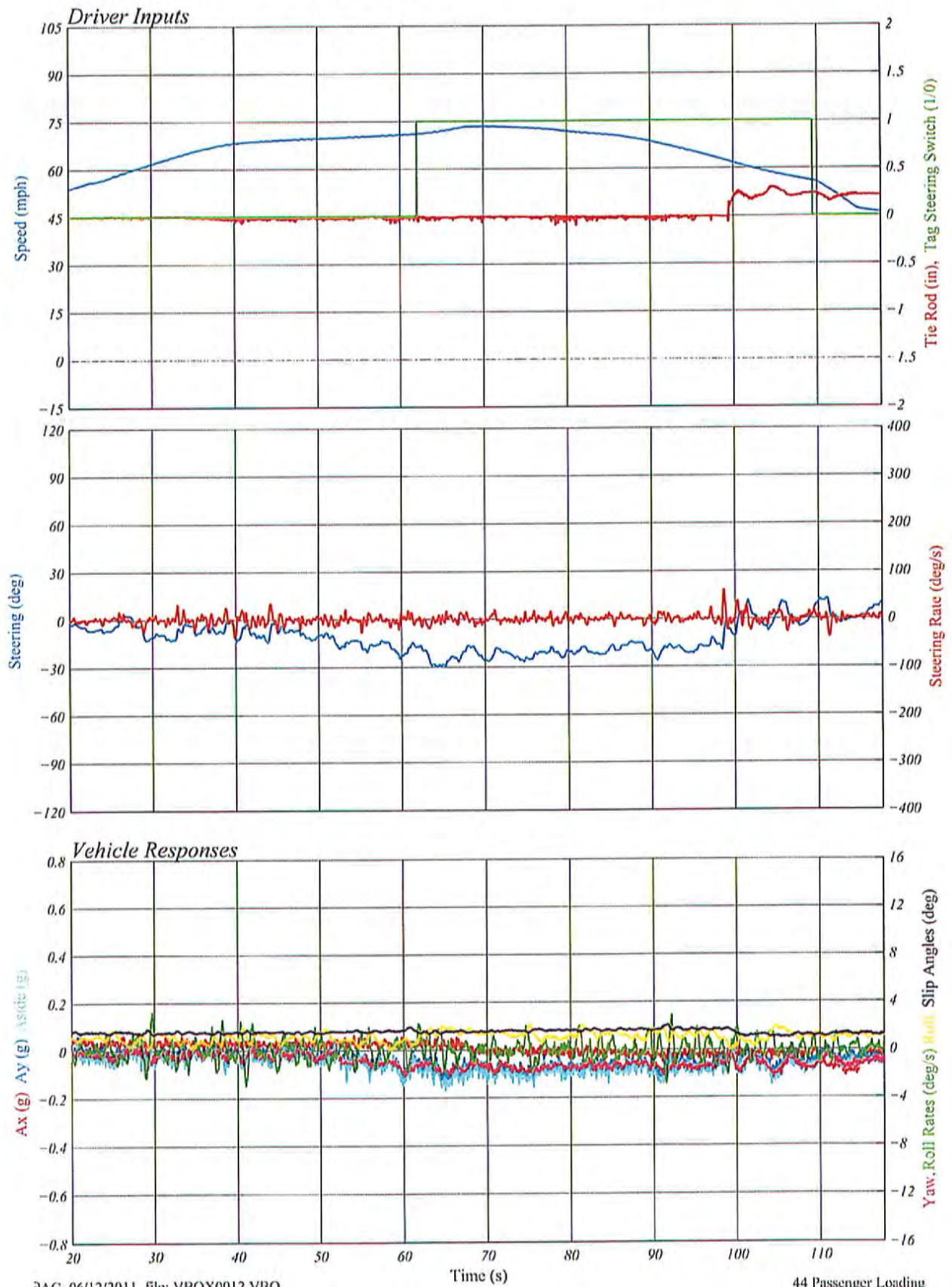
Dynamic Unlock in a Curve, Uphill to the Right



Test: 11

1995 MCI 102DL3

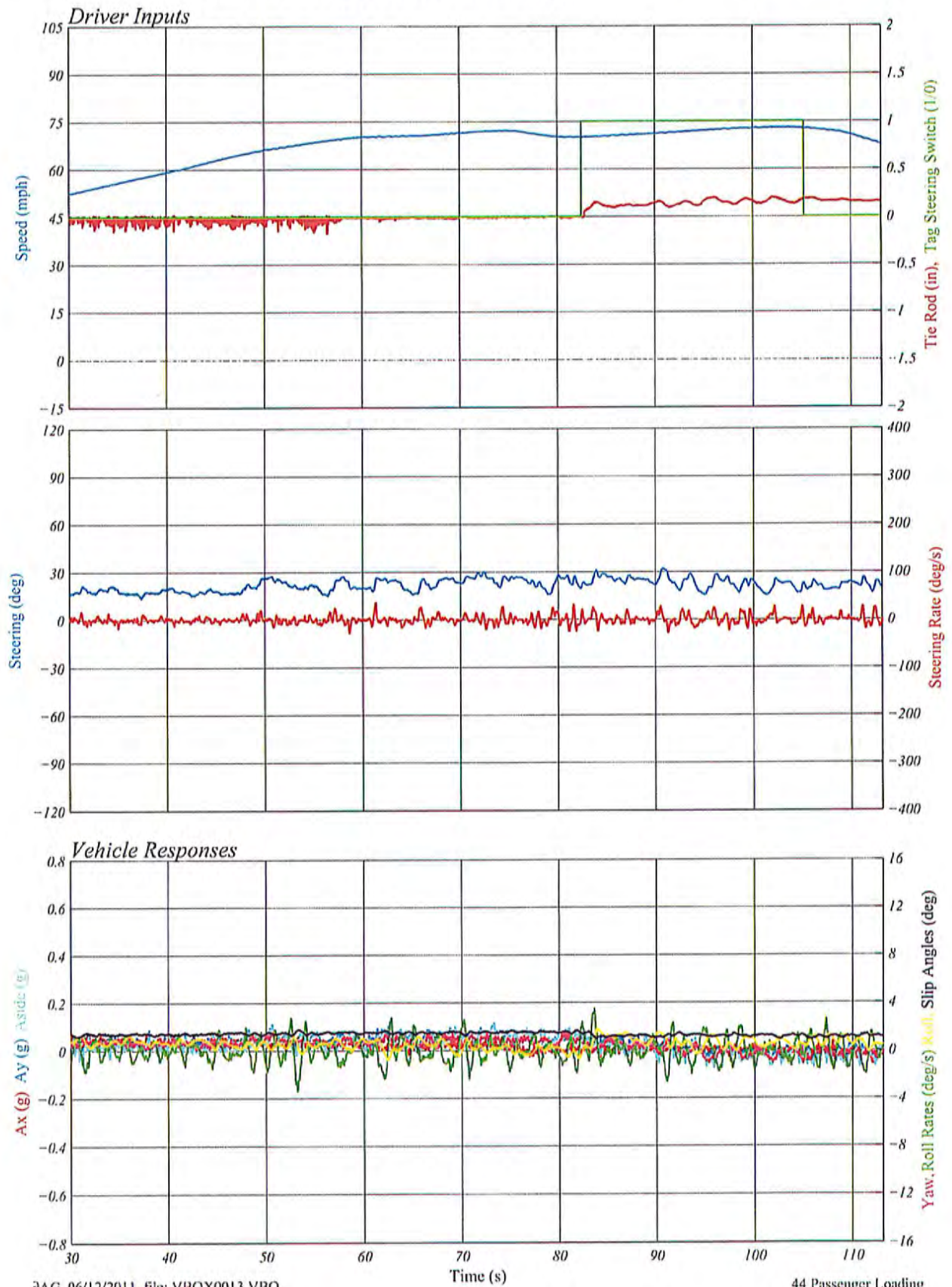
Dynamic Unlock in a Curve, Uphill to the Left



Test: 12

1995 MCI 102DL3

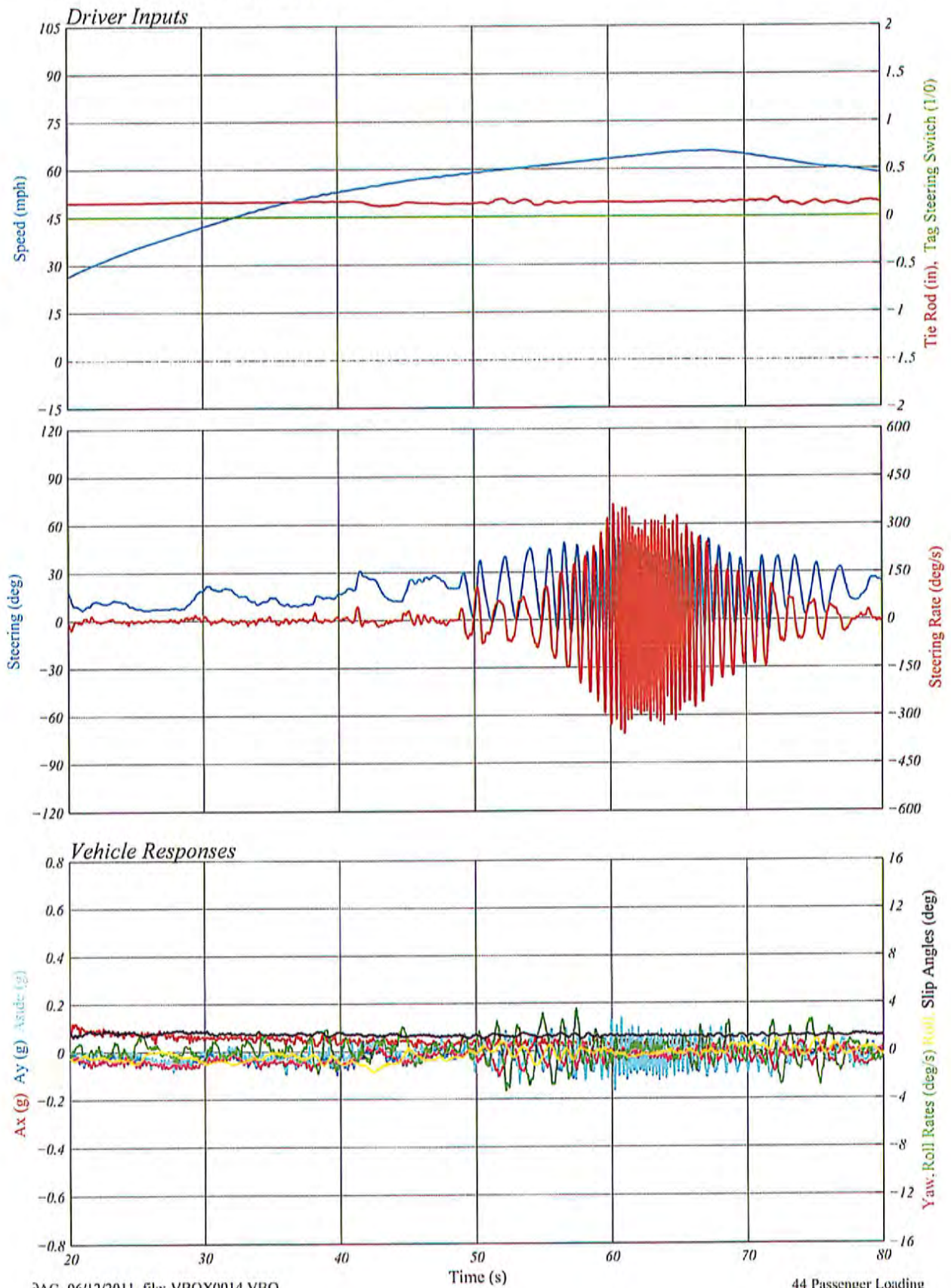
Dynamic Unlock in a Curve, Downhill to the Right



Test: 13

1995 MCI 102DL3

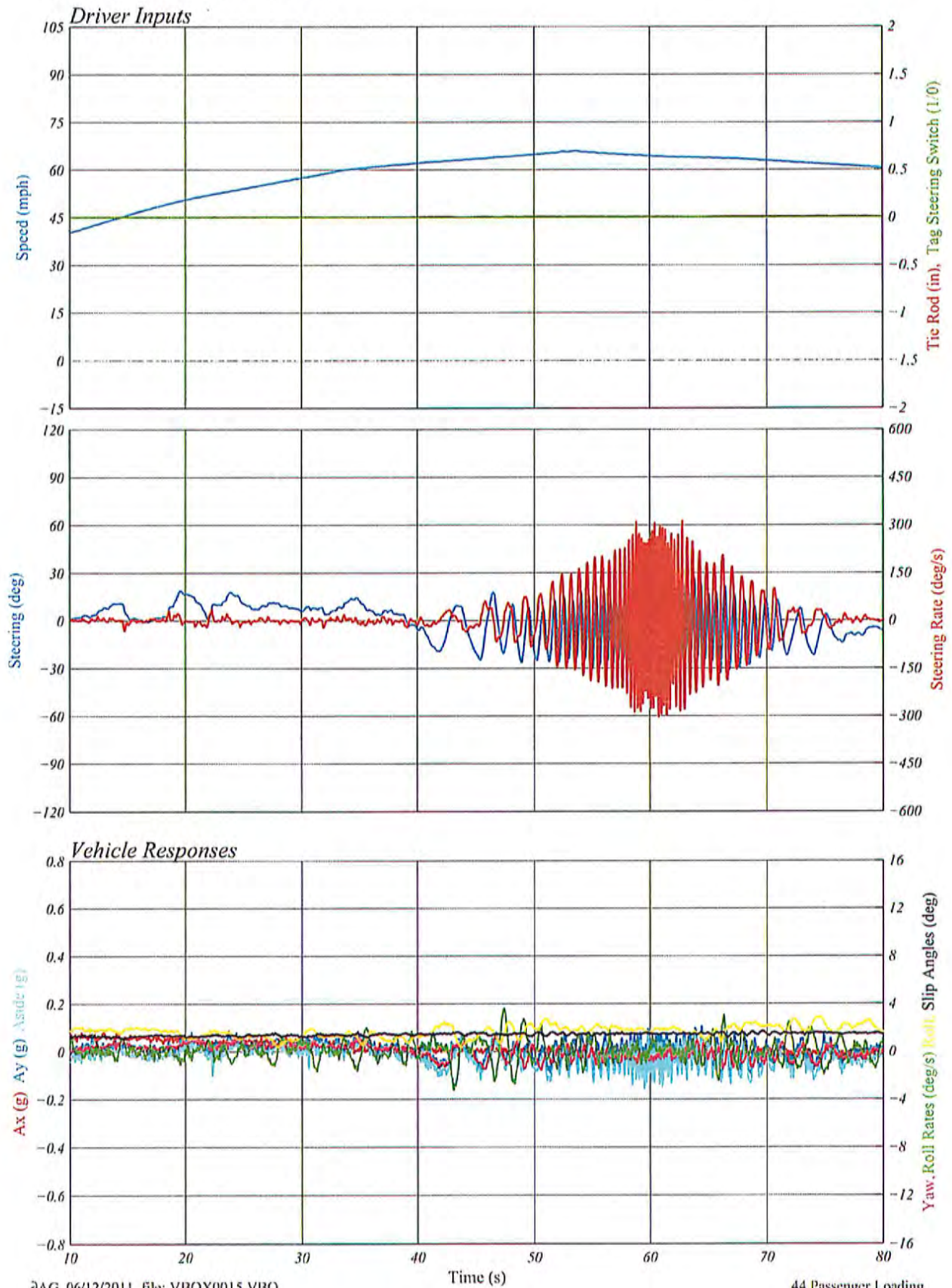
Frequency Response, Locked



Test: 14

1995 MCI 102DL3

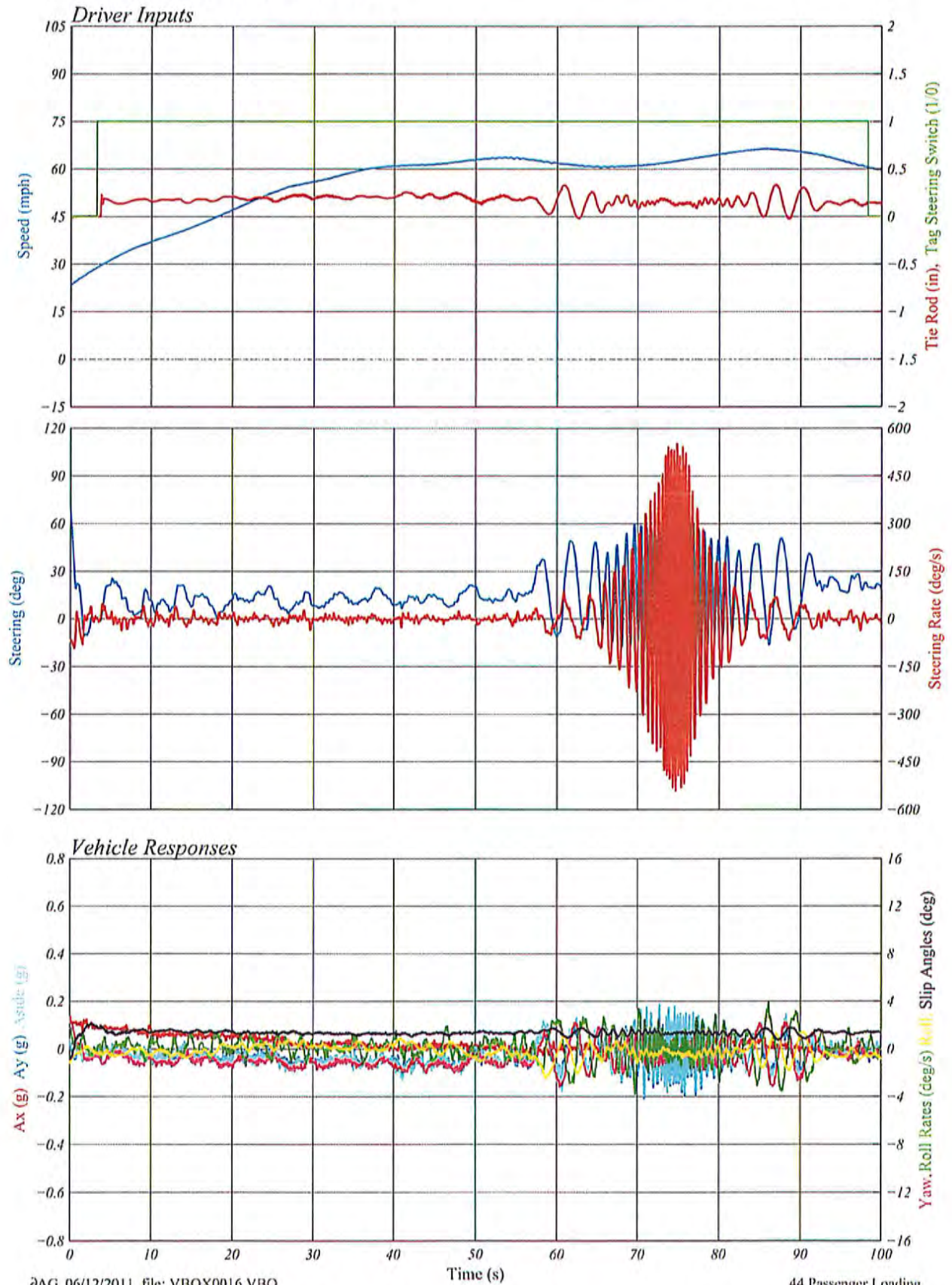
Frequency Response, Locked



Test: 15

1995 MCI 102DL3

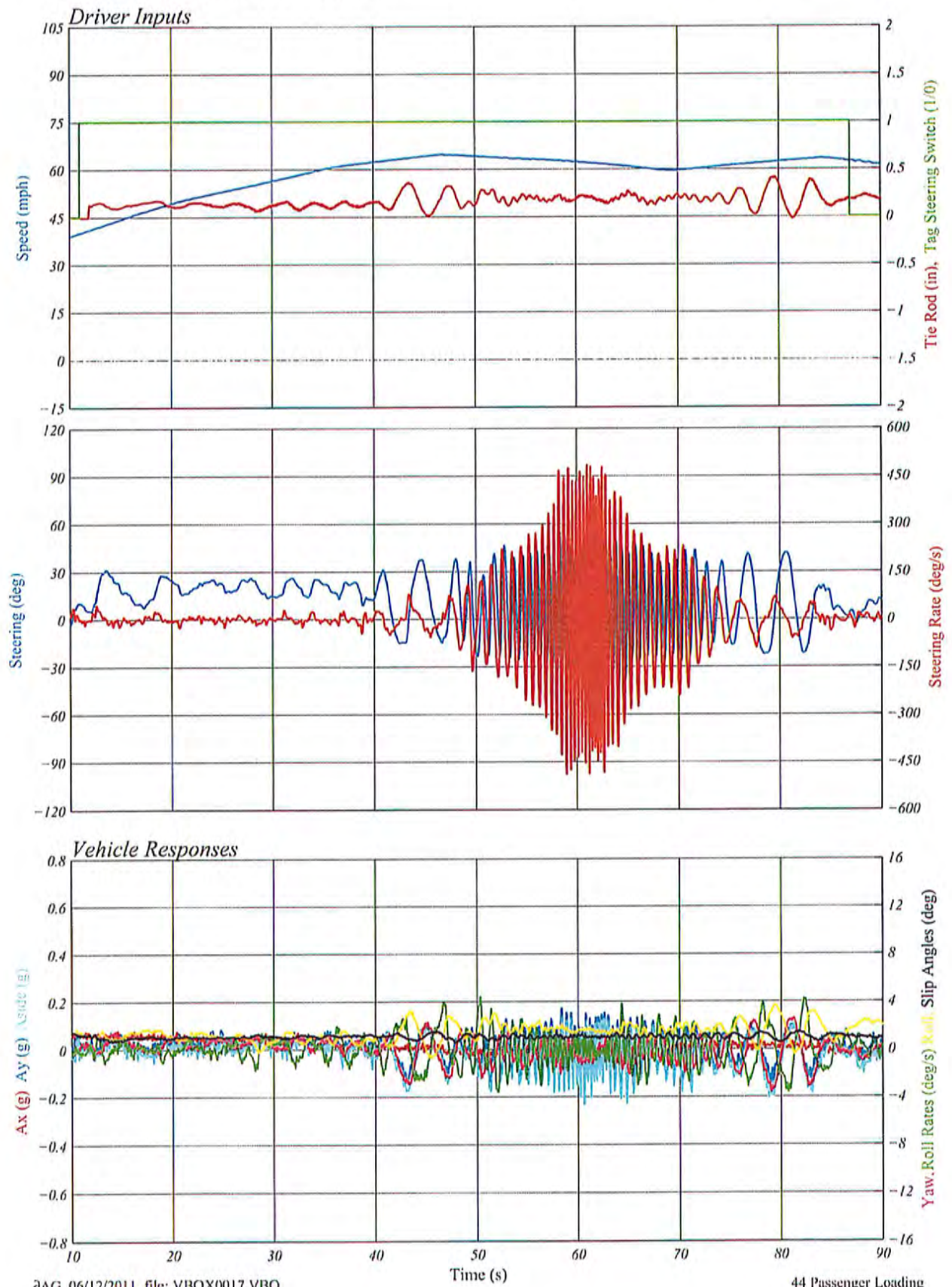
Frequency Response, Unlocked



Test: 16

1995 MCI 102DL3

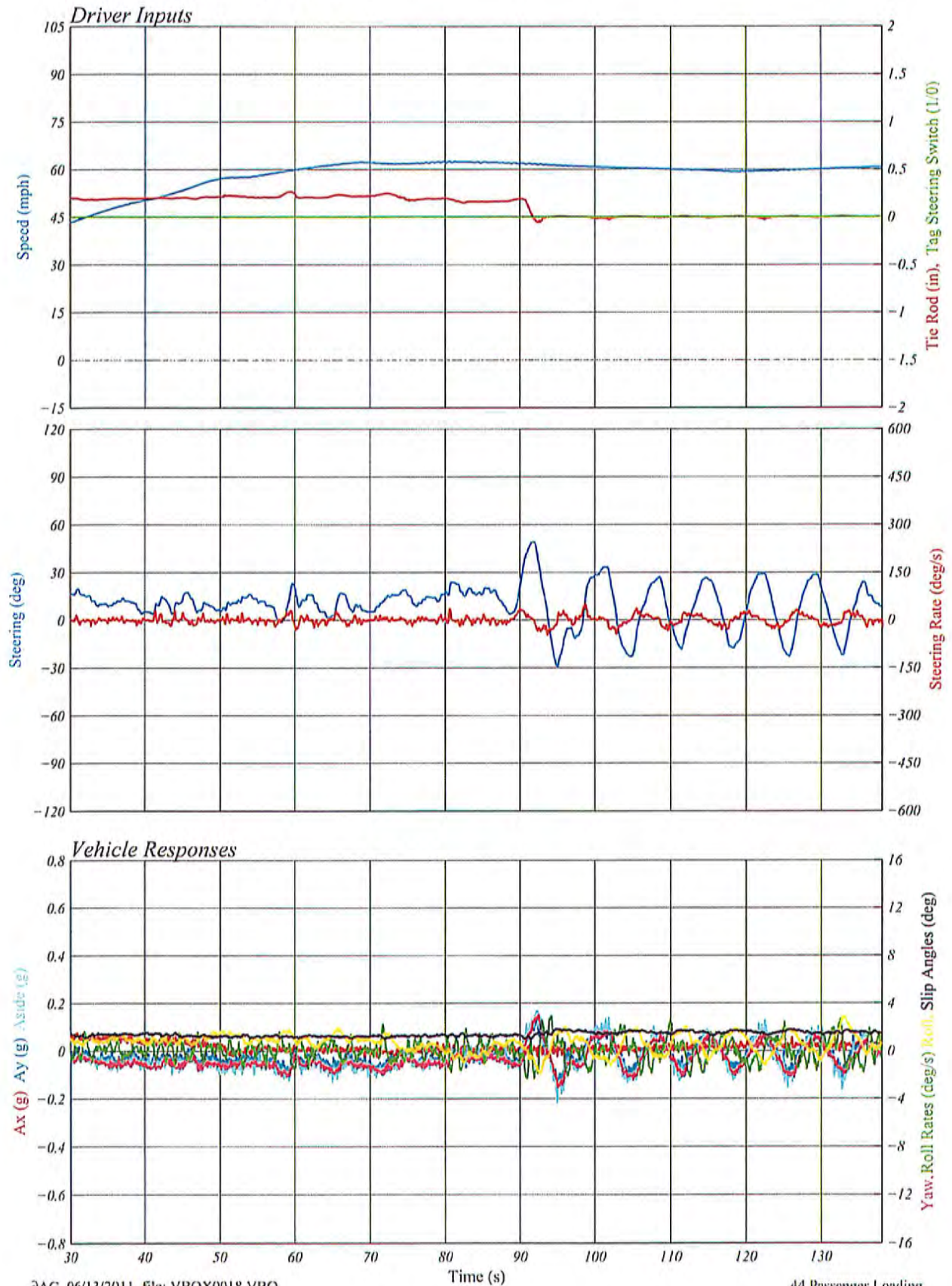
Frequency Response, Unlocked



Test: 17

1995 MCI 102DL3

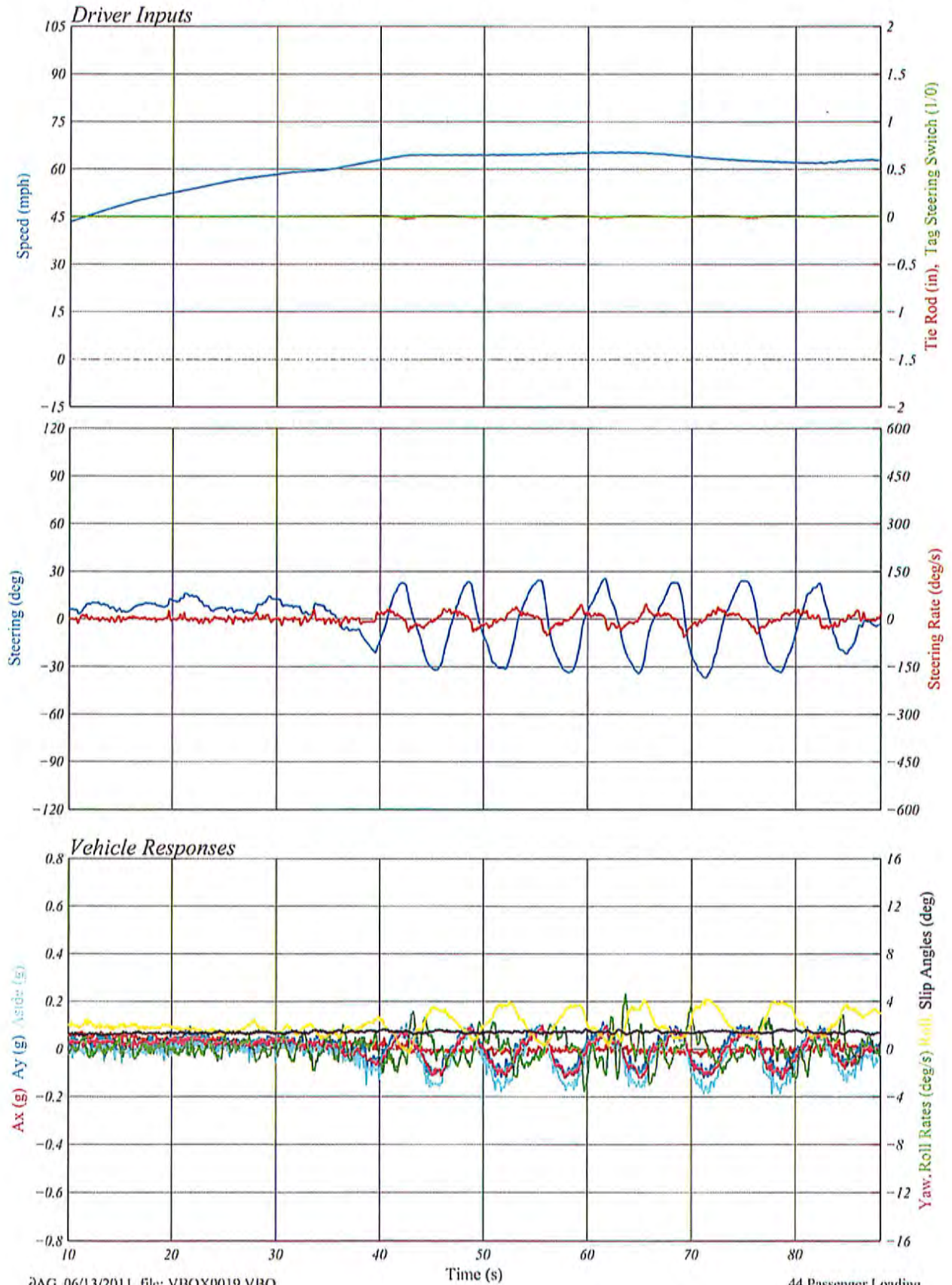
On-Center Handling, Locked



Test: 18

1995 MCI 102DL3

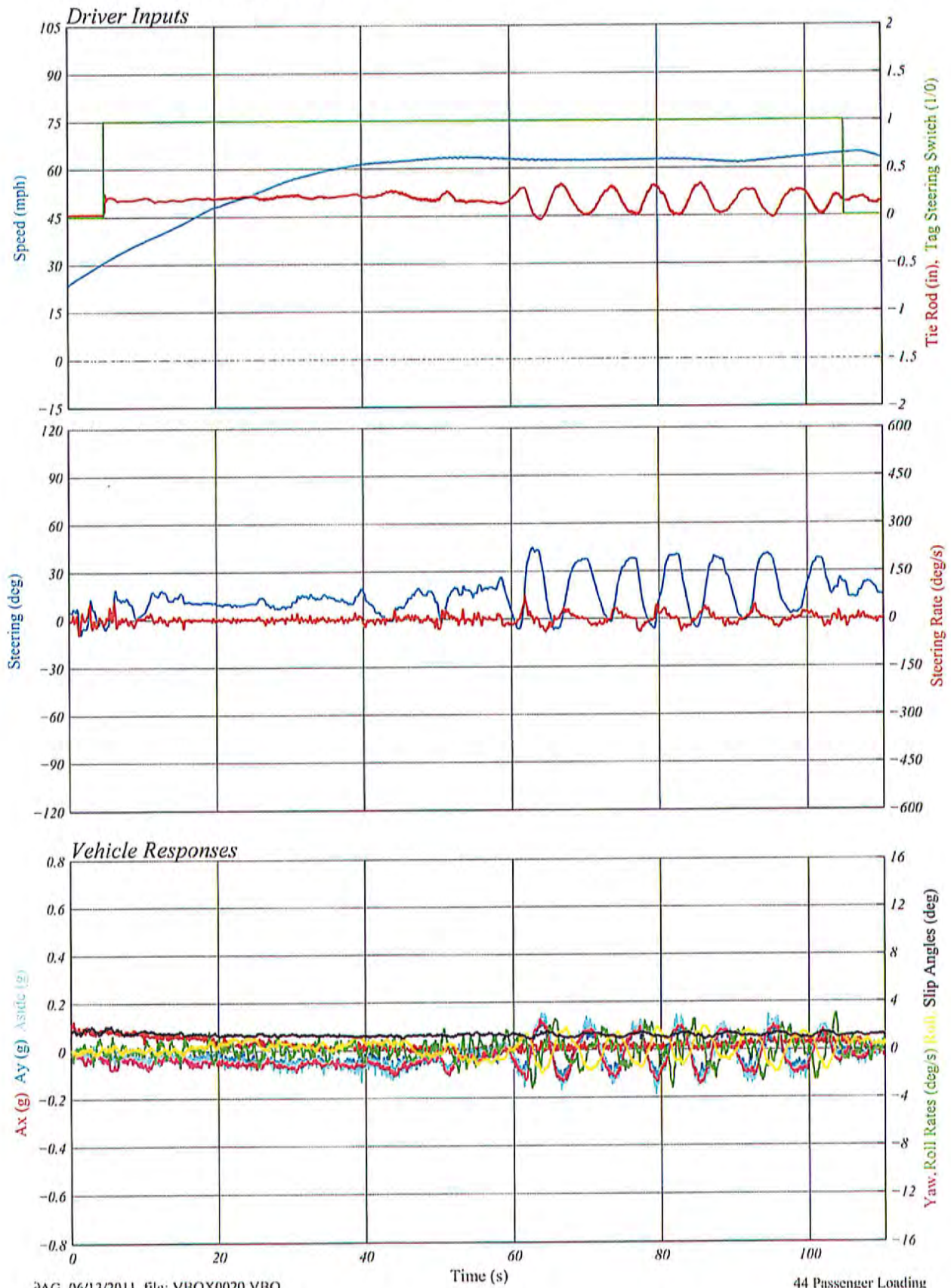
On-Center Handling, Locked



Test: 19

1995 MCI 102DL3

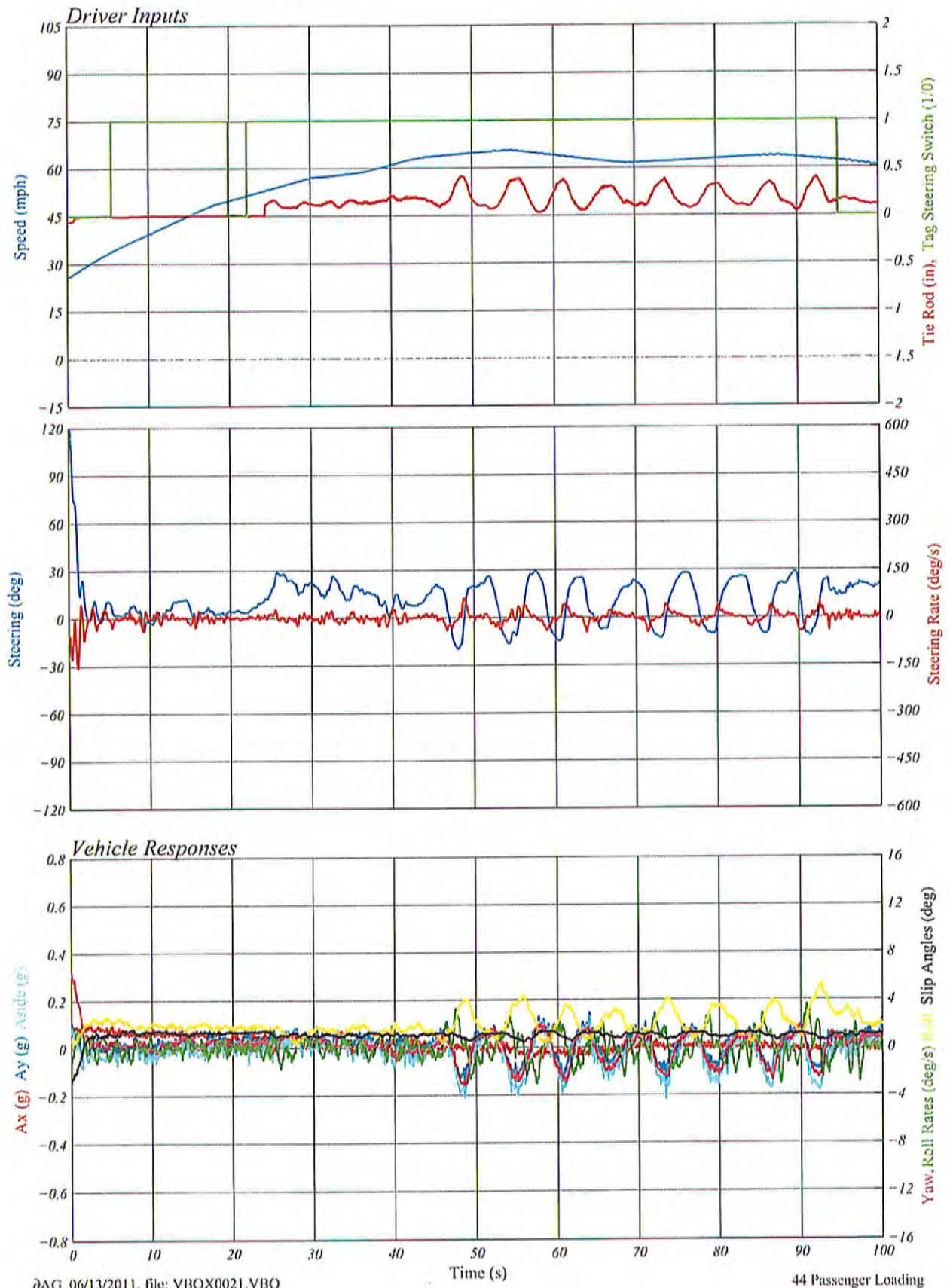
On-Center Handling, Unlocked



Test: 20

1995 MCI 102DL3

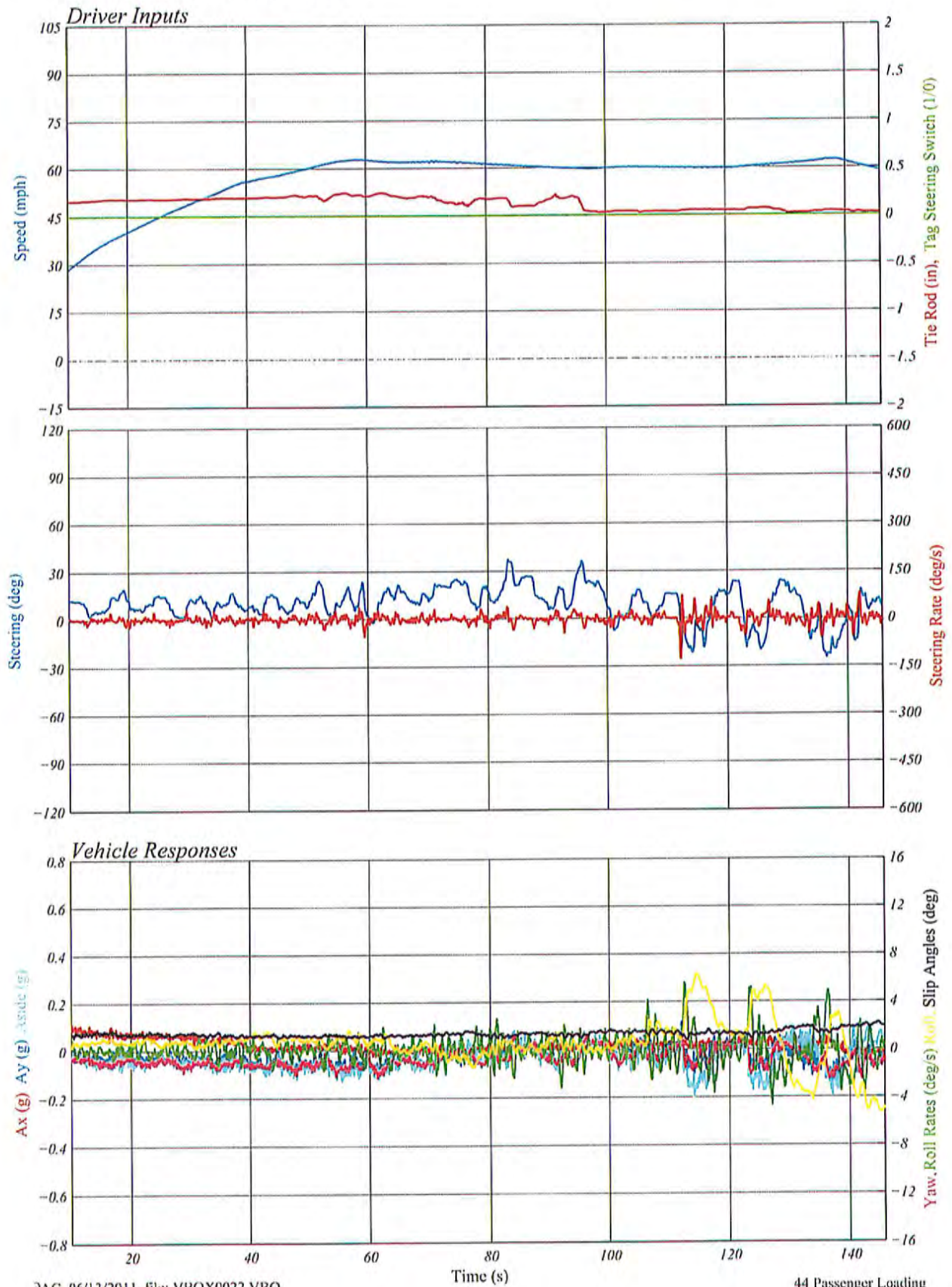
On-Center Handling, Unlocked



Test: 21

1995 MCI 102DL3

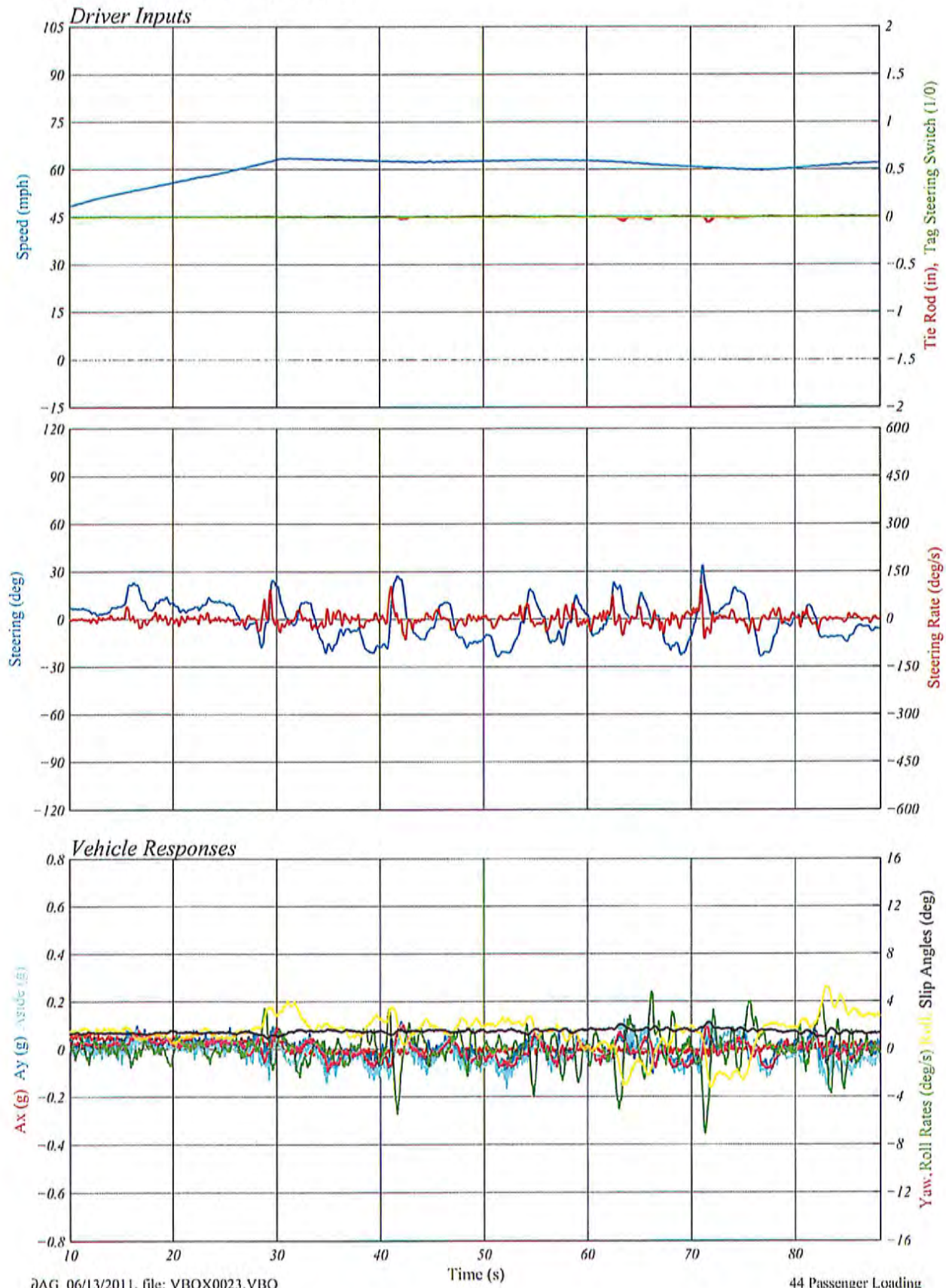
Road Edge & Crown, Locked



Test: 22

1995 MCI 102DL3

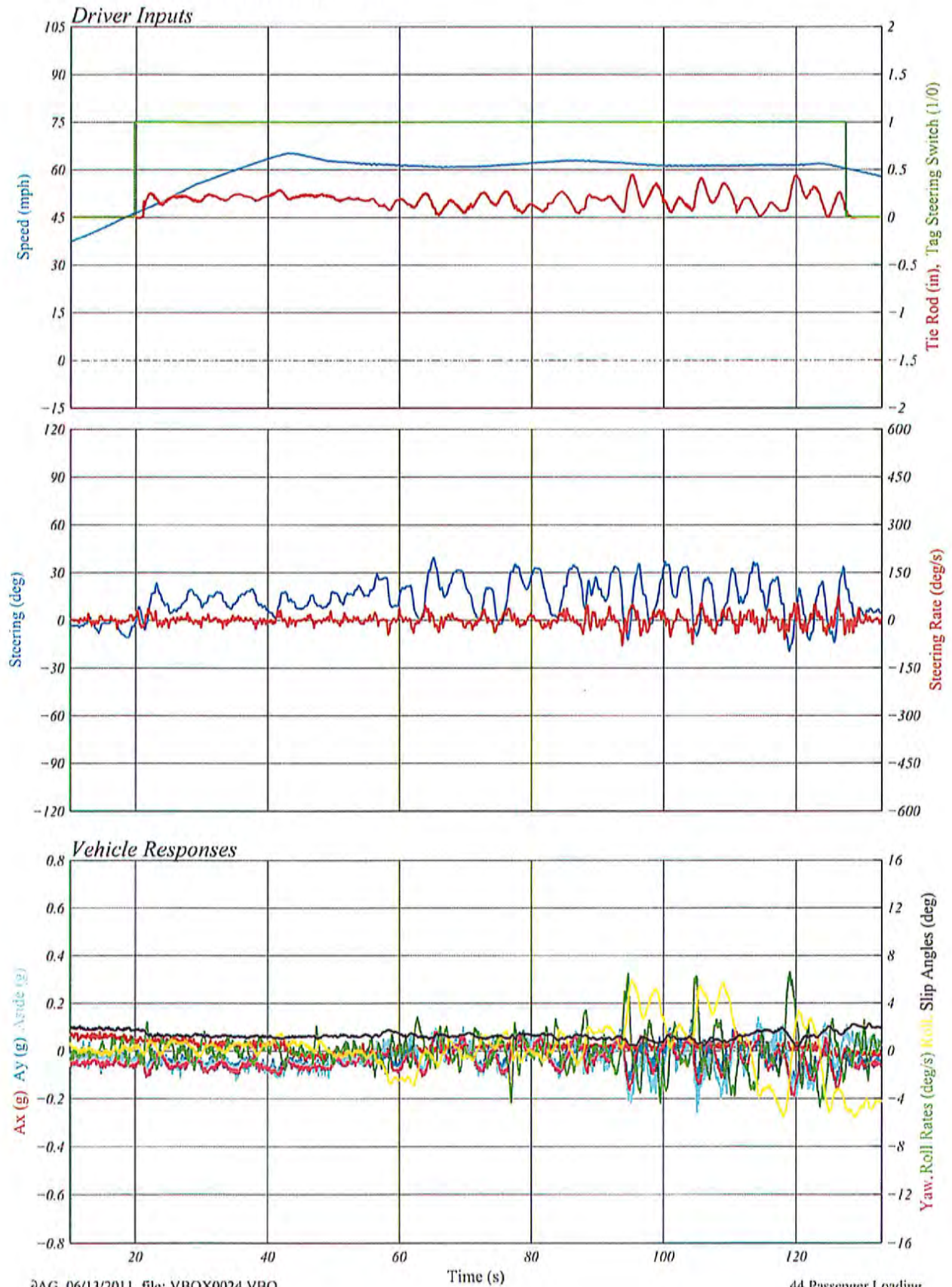
Road Edge & Crown, Locked



Test: 23

1995 MCI 102DL3

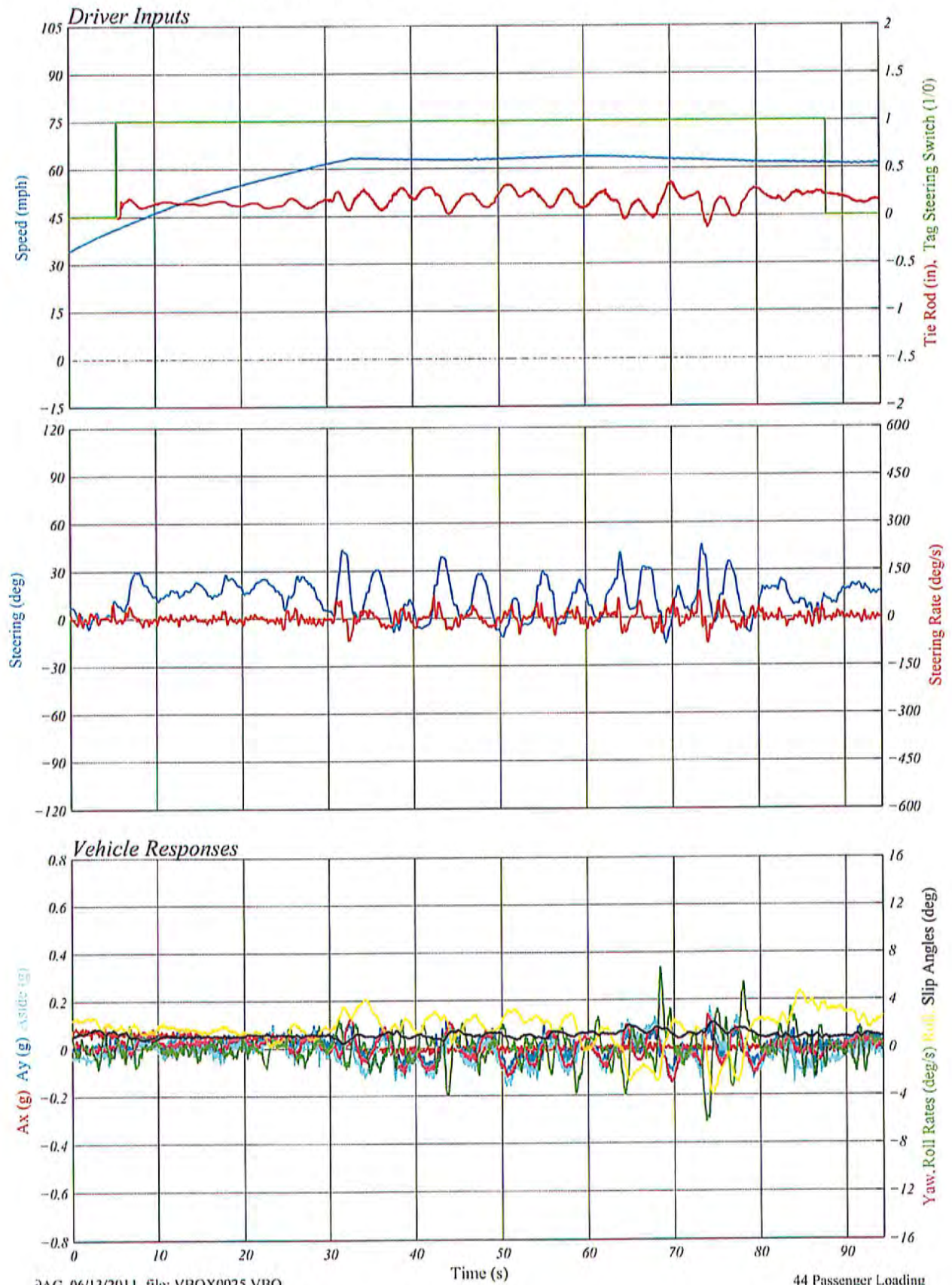
Road Edge & Crown, Unlocked



Test: 24

1995 MCI 102DL3

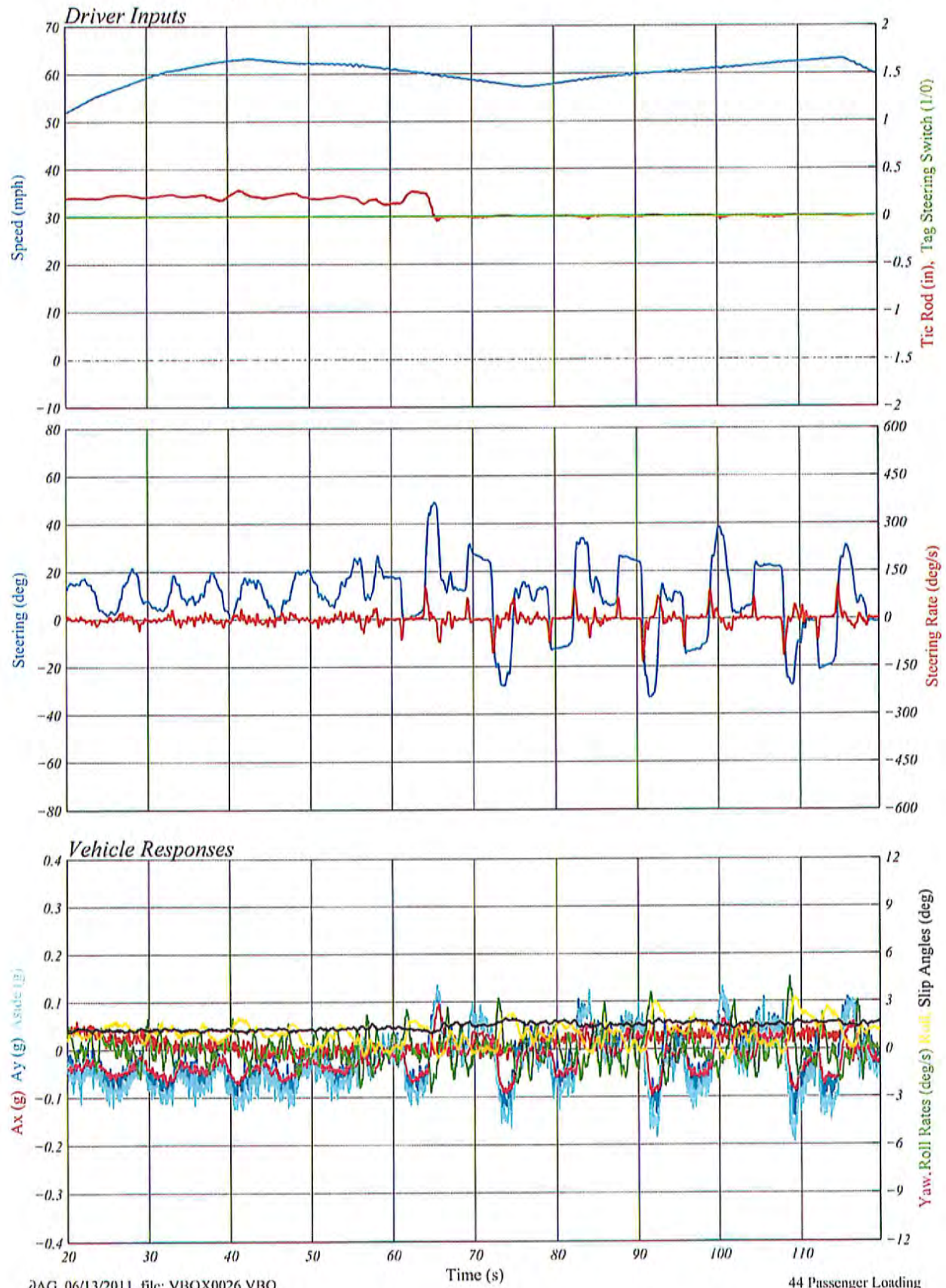
Road Edge & Crown, Unlocked



Test: 25

1995 MCI 102DL3

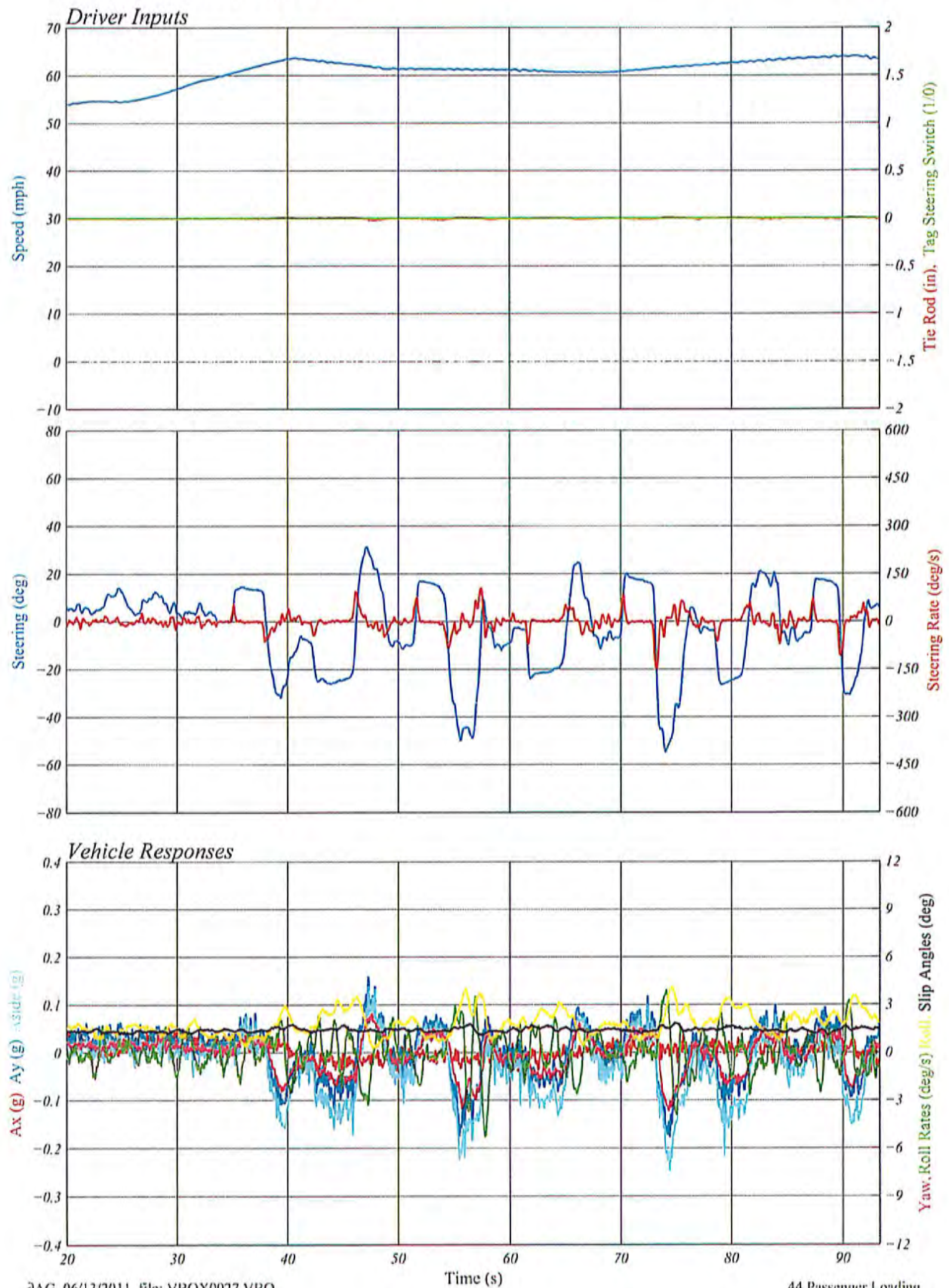
Low-g Step Steer, Locked



Test: 26

1995 MCI 102DL3

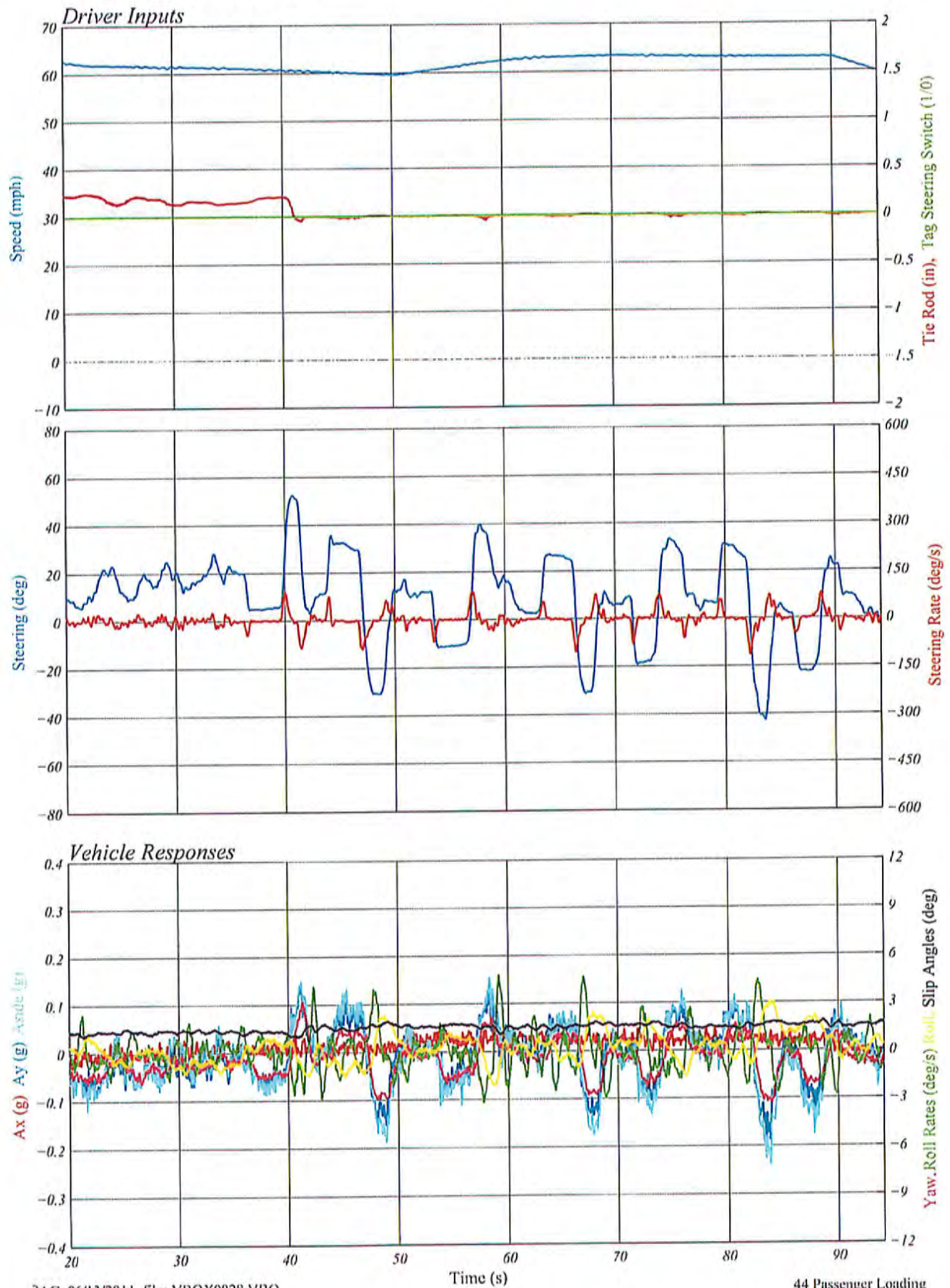
Low-g Step Steer, Locked



Test: 27

1995 MCI 102DL3

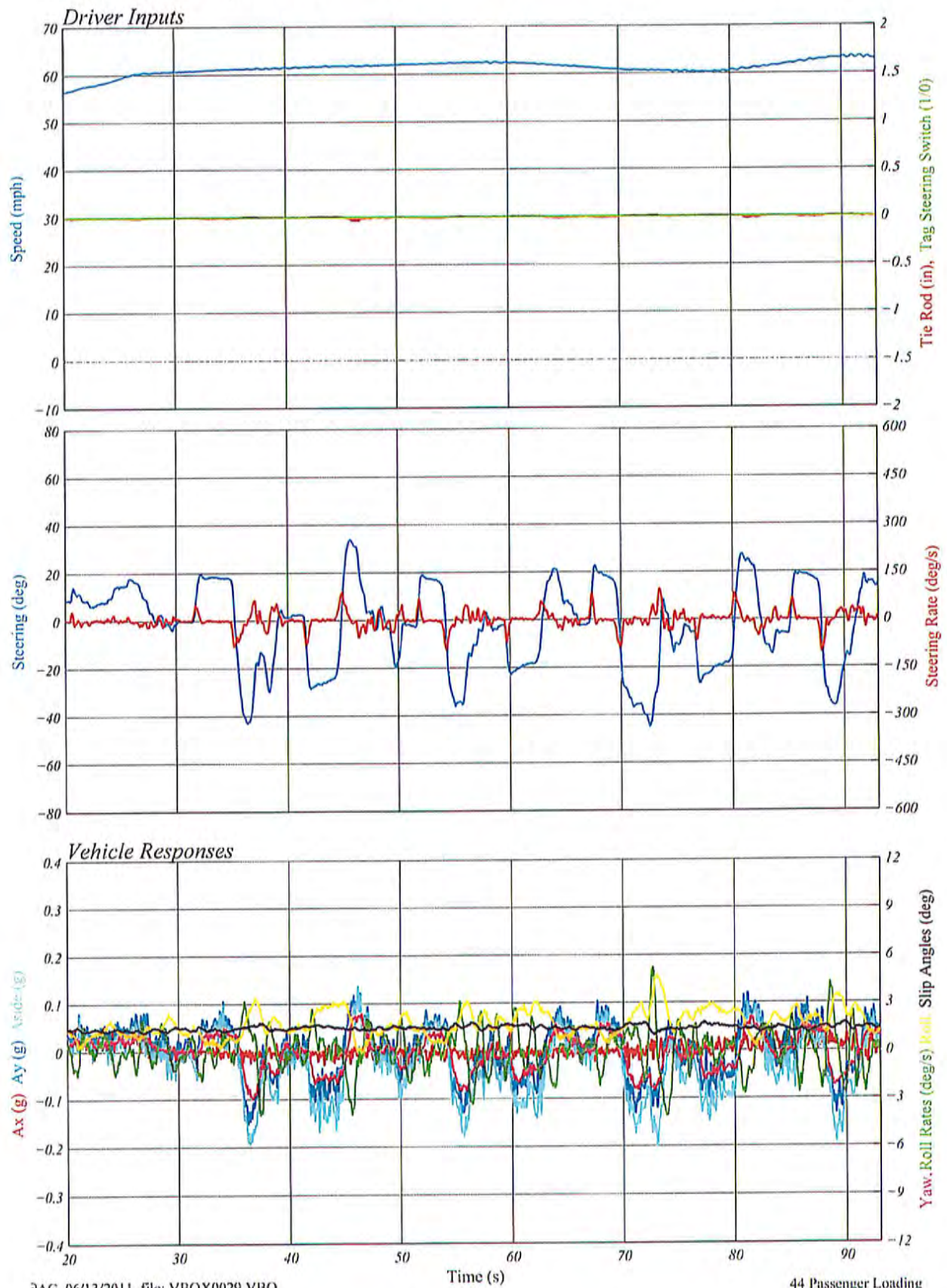
Low-g Step Steer, Locked



Test: 28

1995 MCI 102DL3

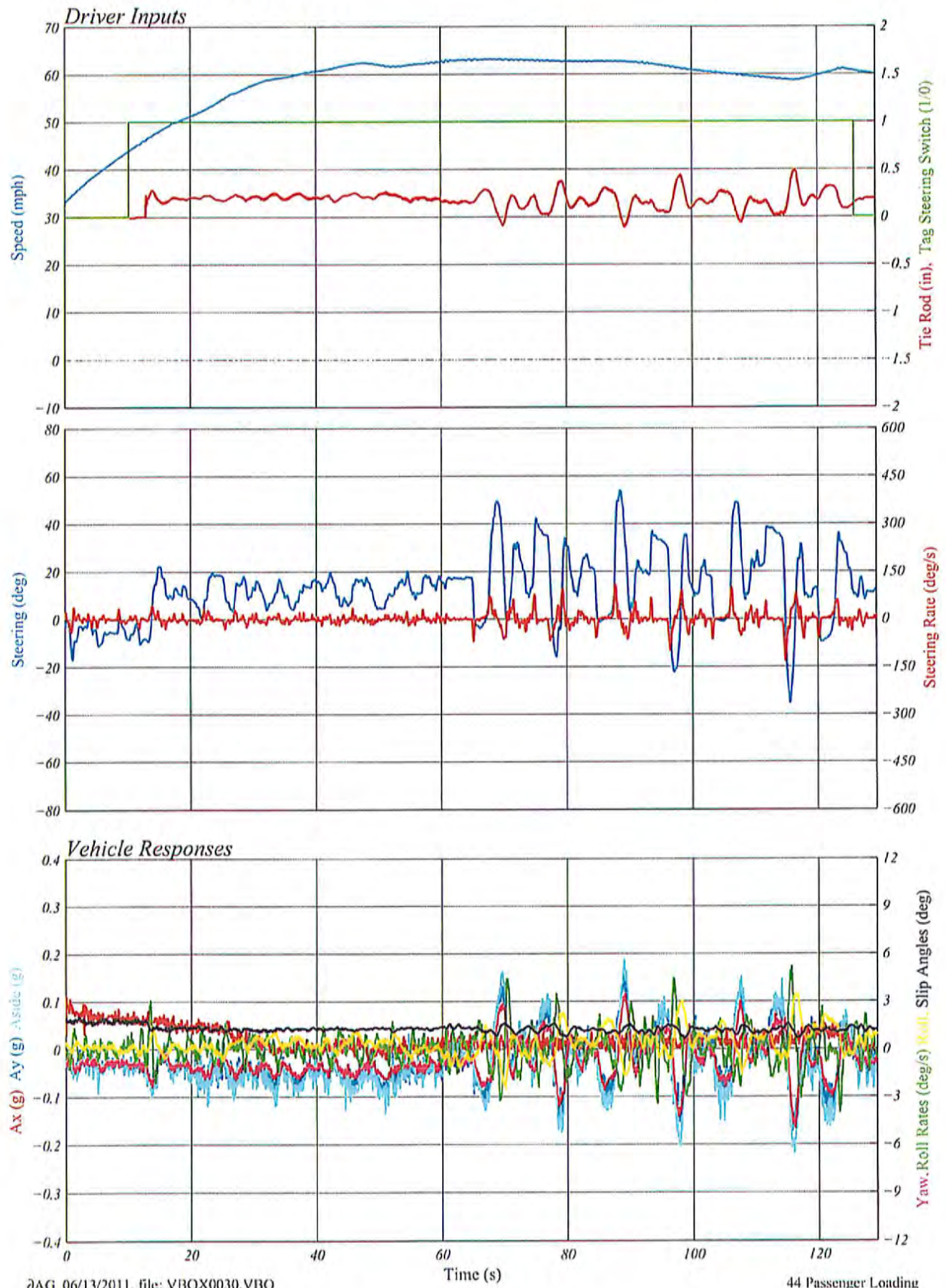
Low-g Step Steer, Locked



Test: 29

1995 MCI 102DL3

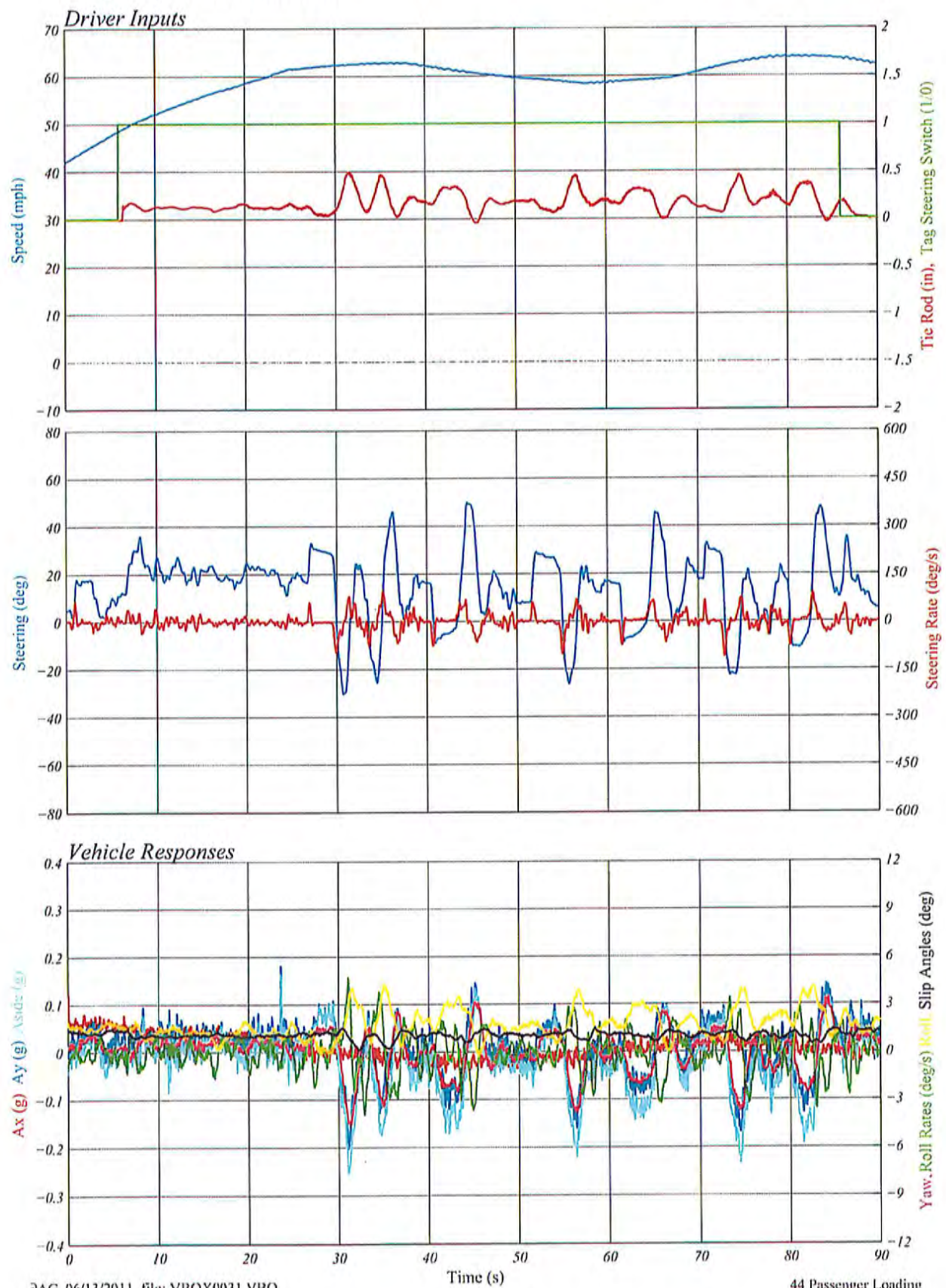
Low-g Step Steer, Unlocked



Test: 30

1995 MCI 102DL3

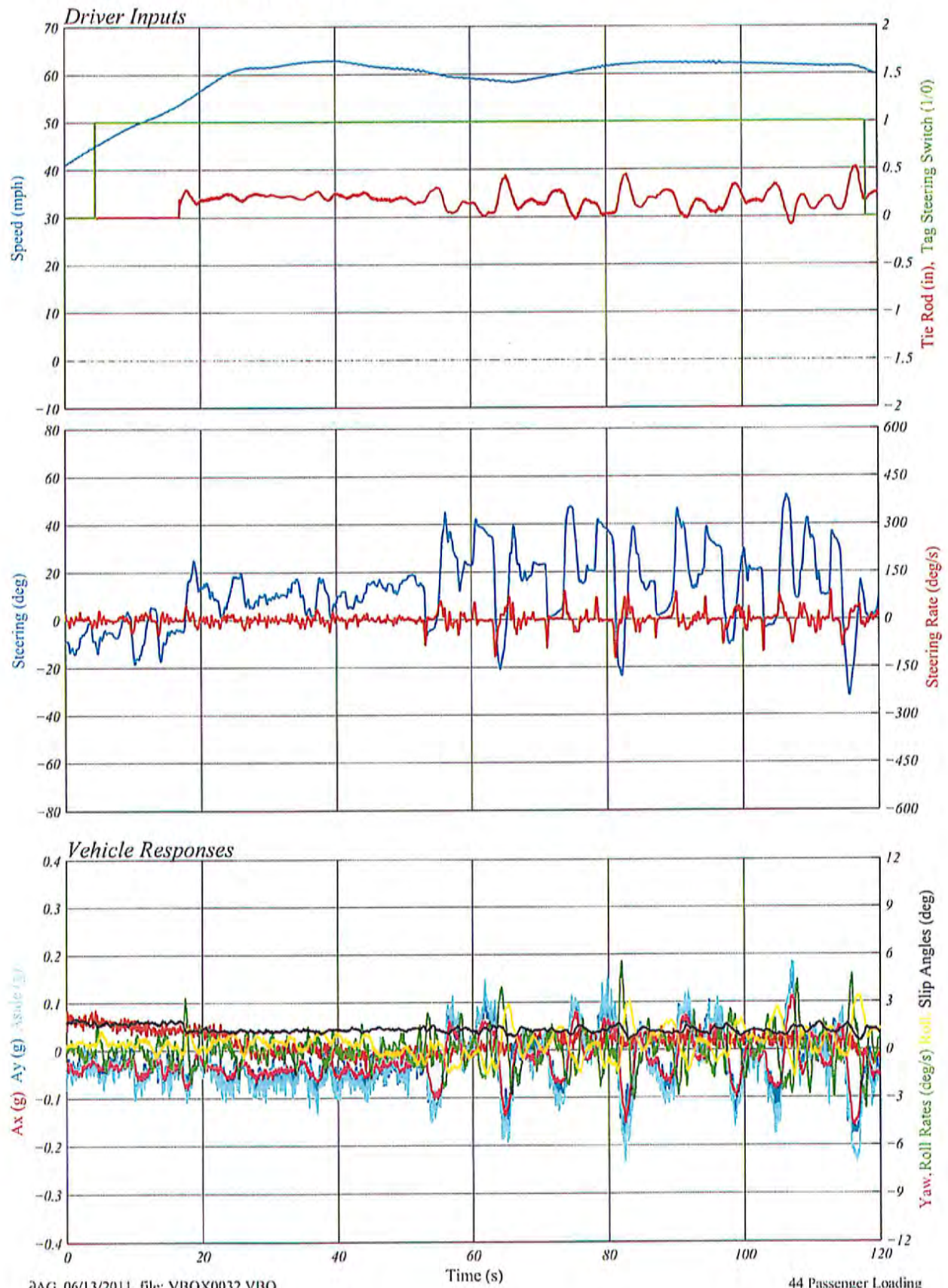
Low-g Step Steer, Unlocked



Test: 31

1995 MCI 102DL3

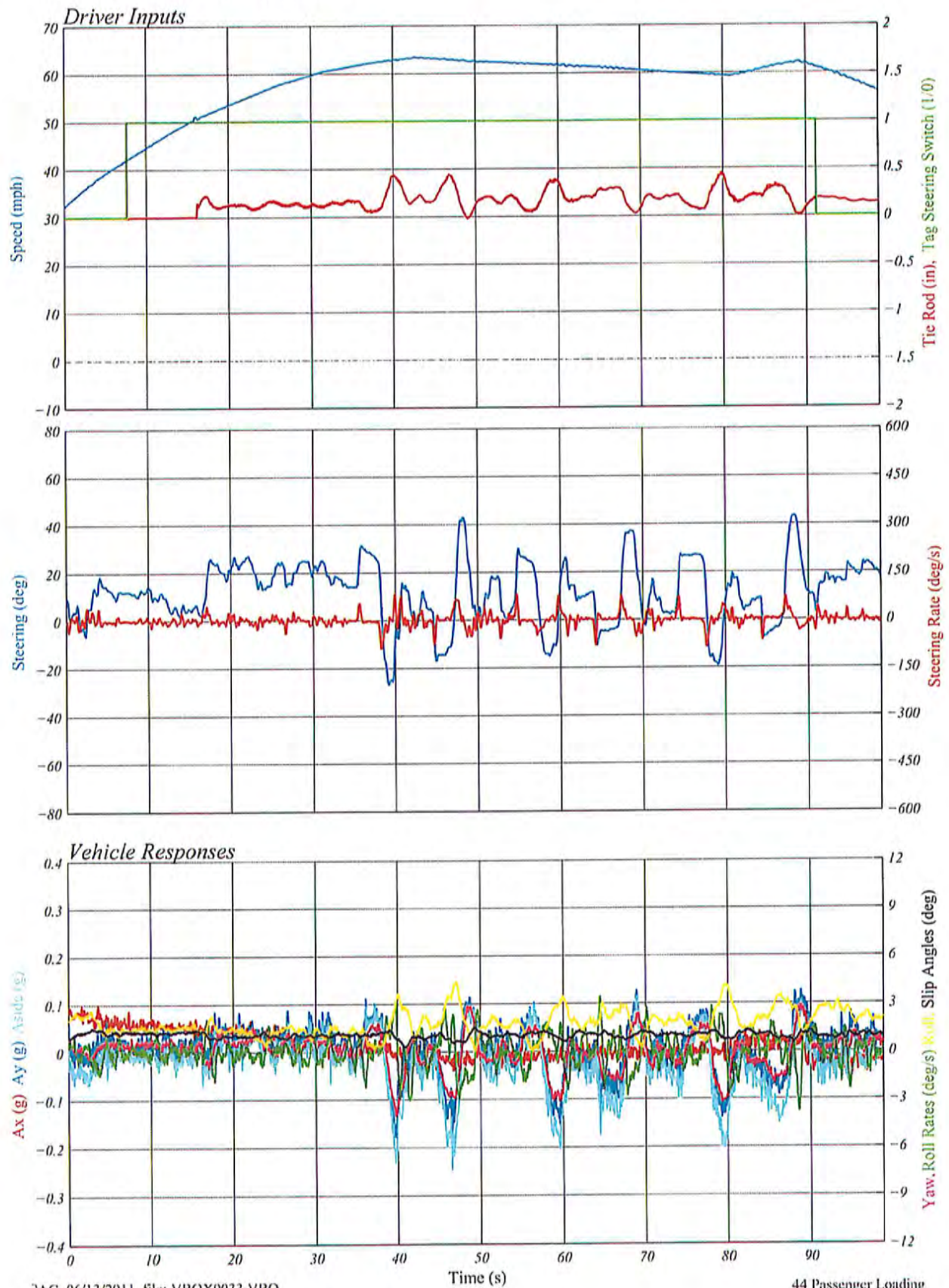
Low-g Step Steer, Unlocked



Test: 32

1995 MCI 102DL3

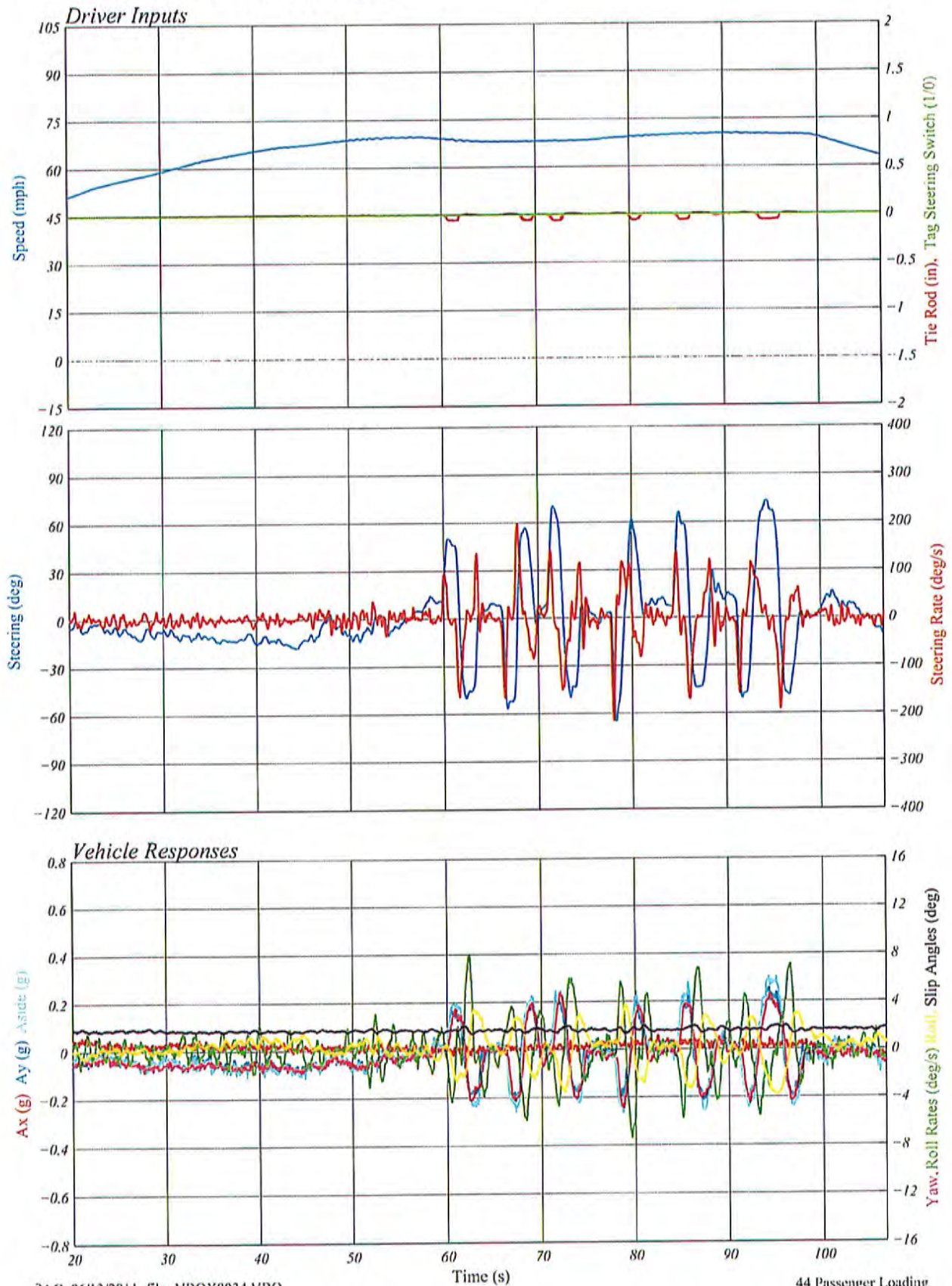
Low-g Step Steer, Unlocked



Test: 33

1995 MCI 102DL3

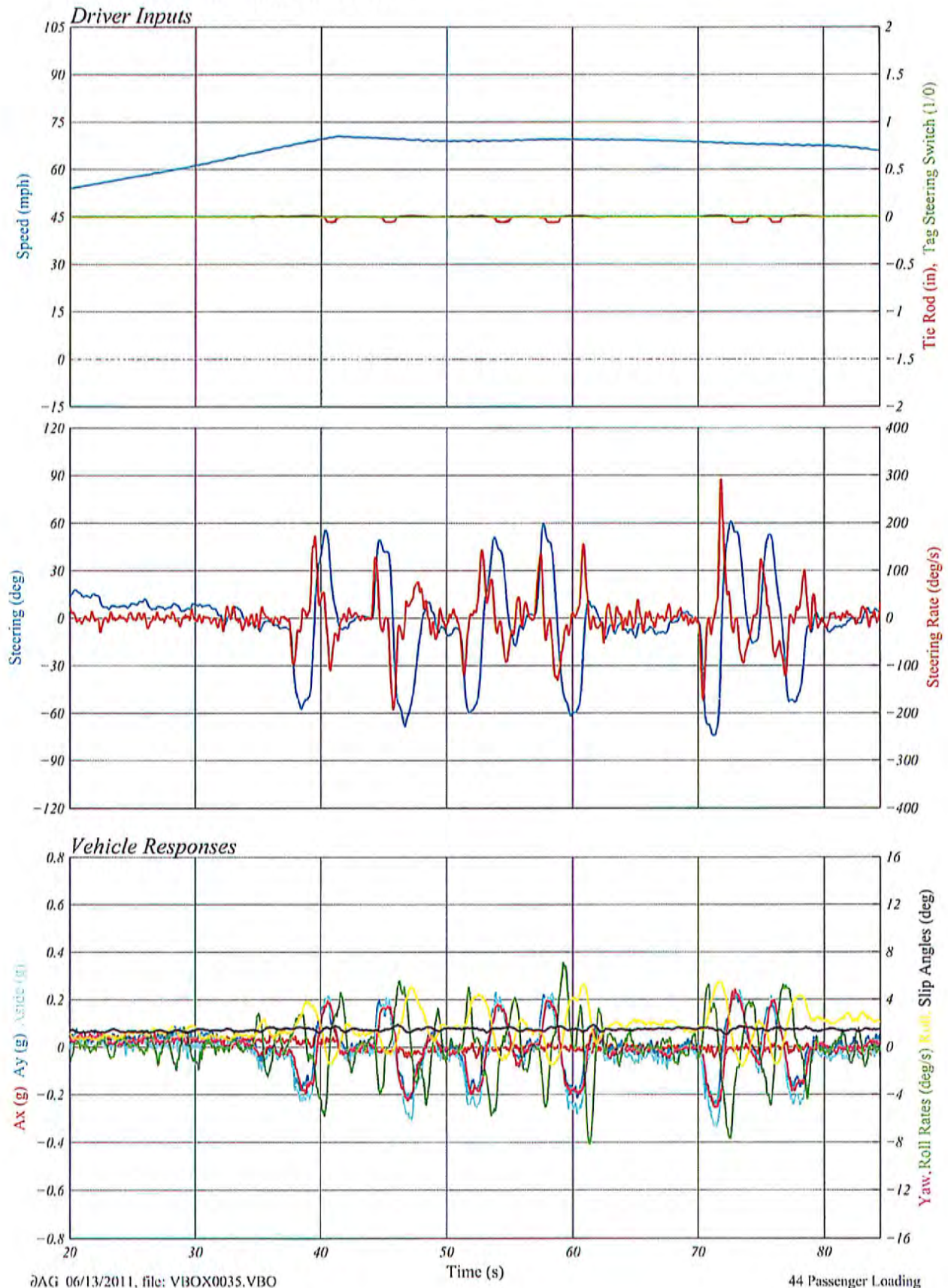
Open Loop Lane Change, Locked



Test: 34

1995 MCI 102DL3

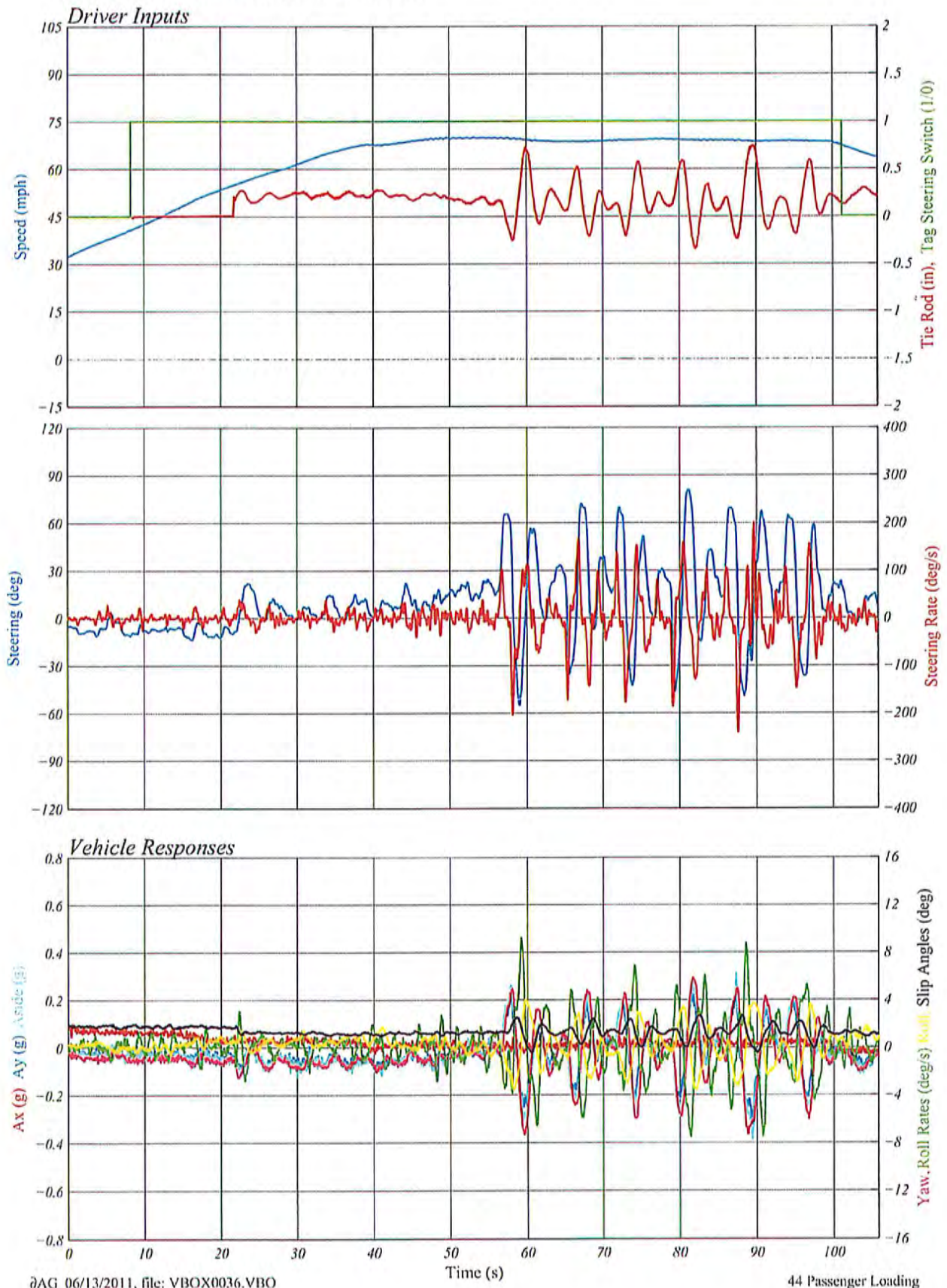
Open Loop Lane Change, Locked



Test: 35

1995 MCI 102DL3

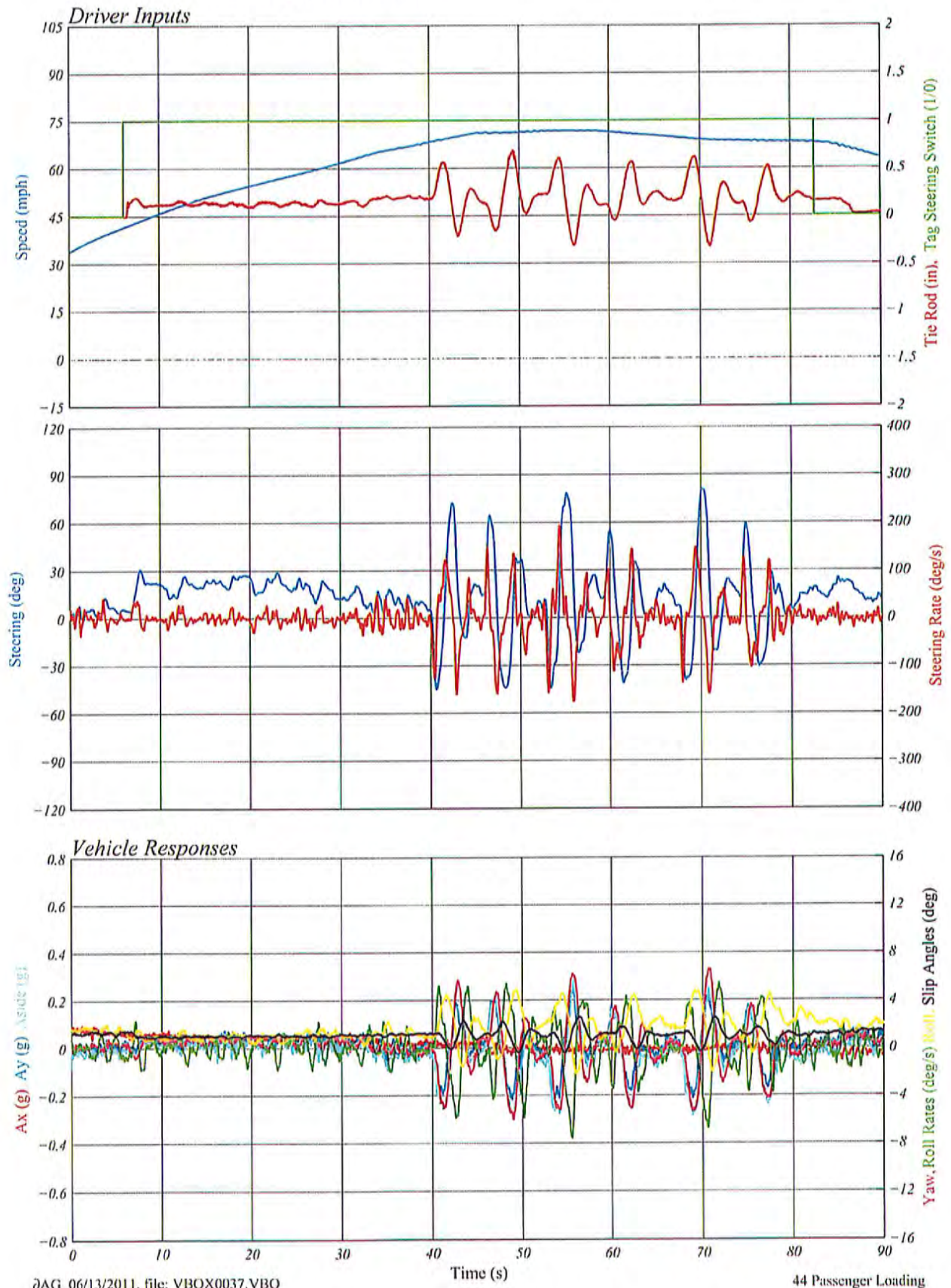
Open Loop Lane Change, Unlocked



Test: 36

1995 MCI 102DL3

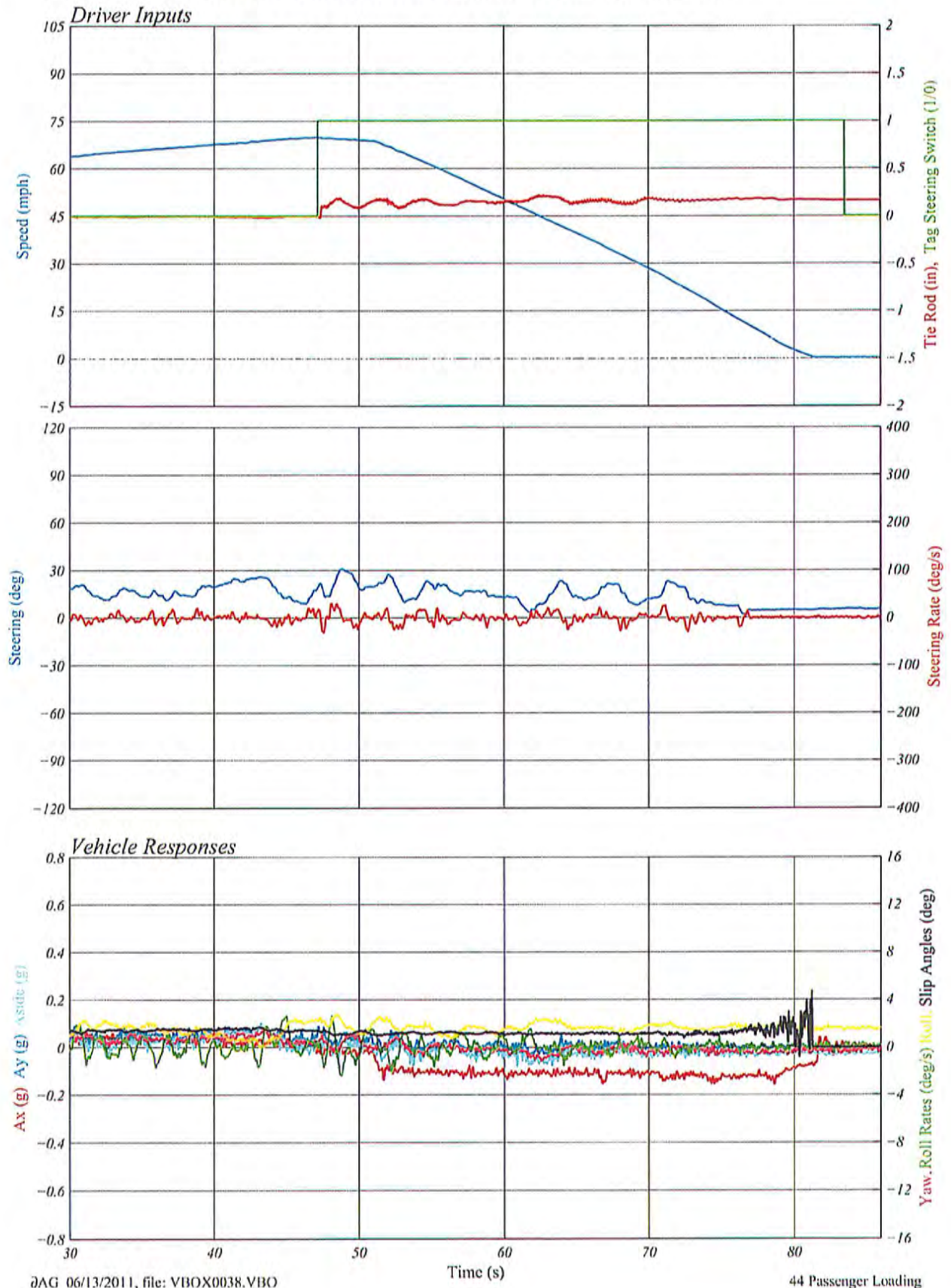
Open Loop Lane Change, Unlocked



Test: 37

1995 MCI 102DL3

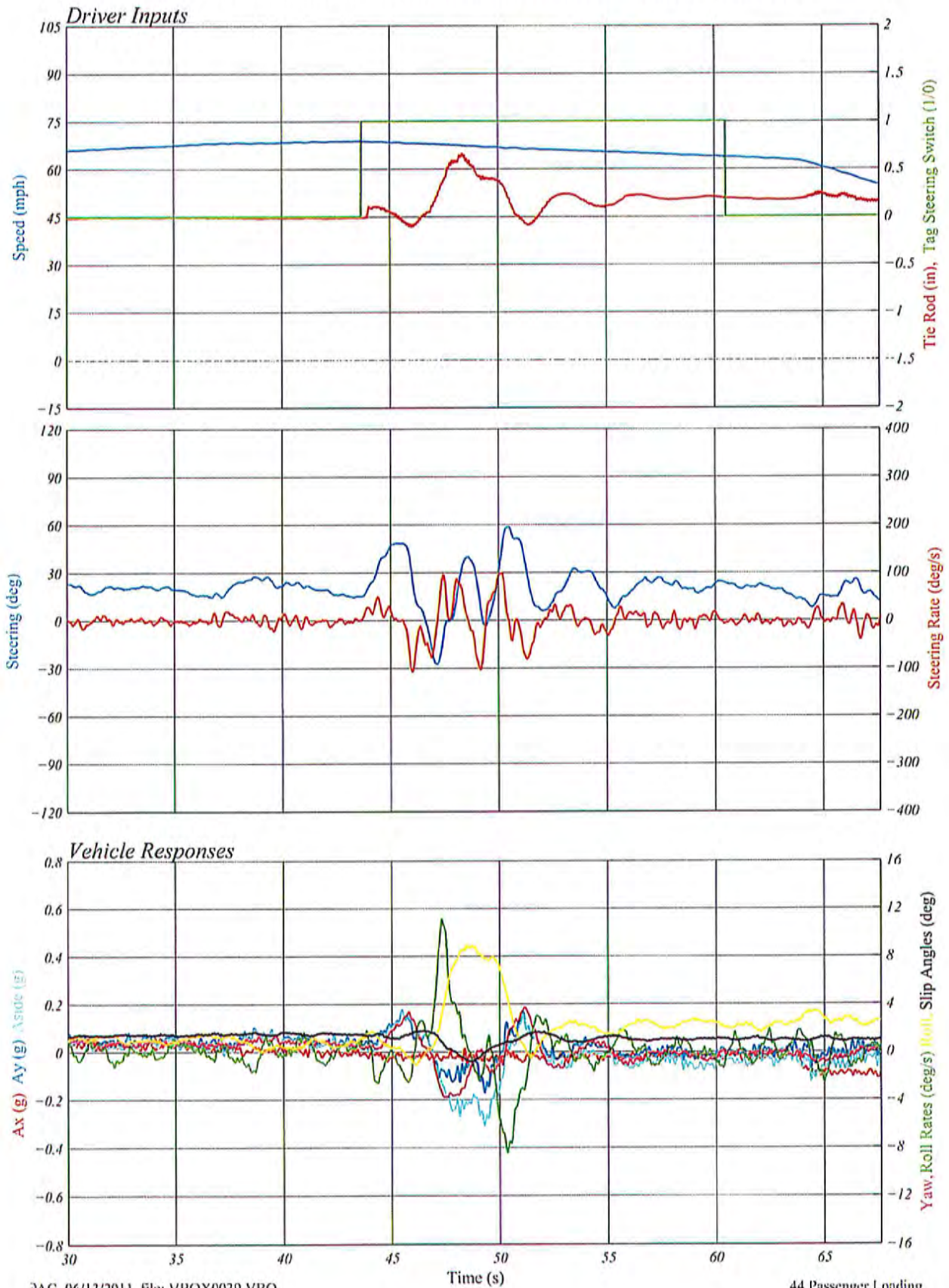
Dynamic Unlock in a Curve, Downhill to the Right with Braking



Test: 38

1995 MCI 102DL3

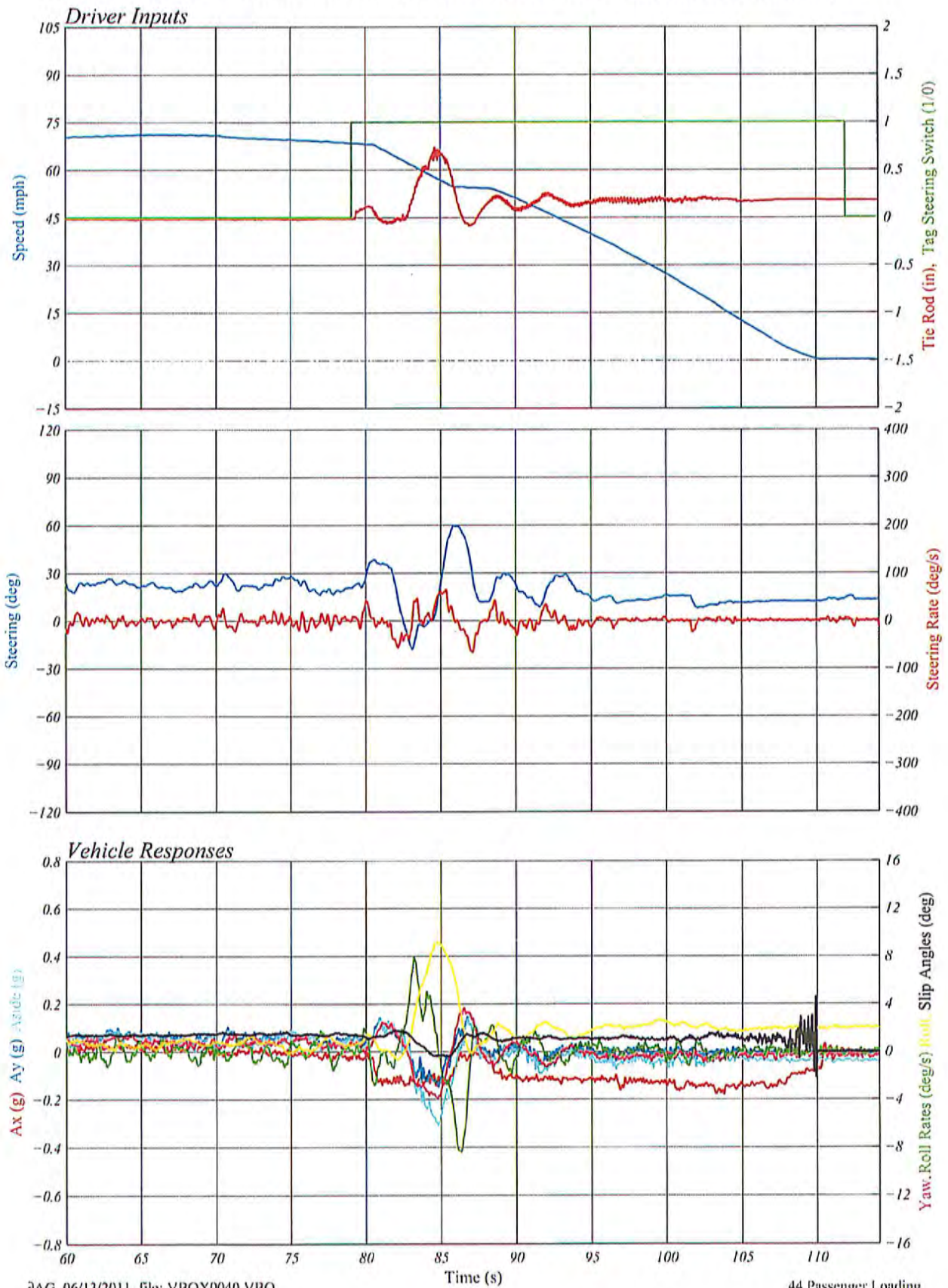
Dynamic Unlock, Downhill to Right, Intentional Steer Toward Shoulder



Test: 39

1995 MCI 102DL3

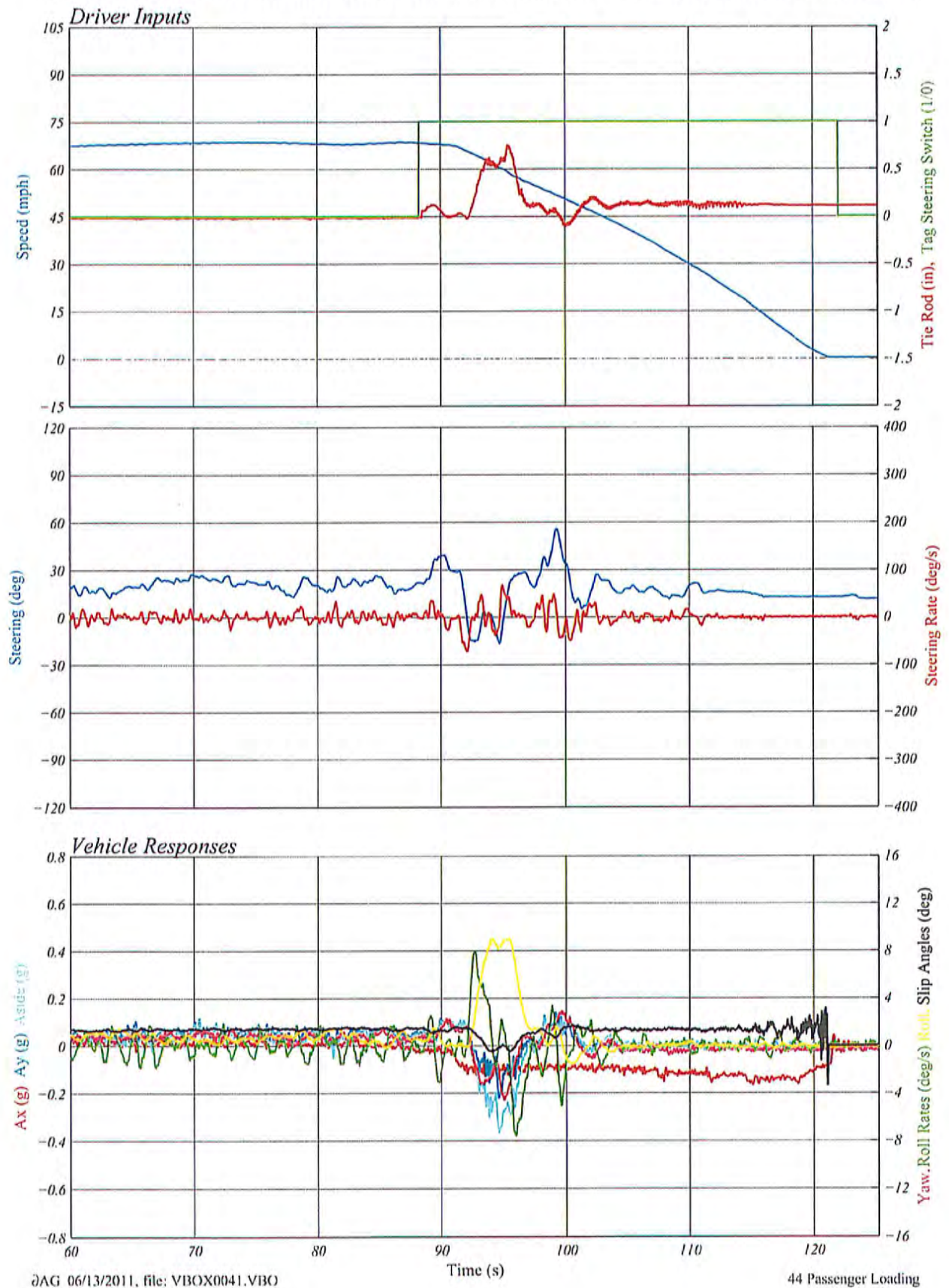
Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Braking



Test: 40

1995 MCI 102DL3

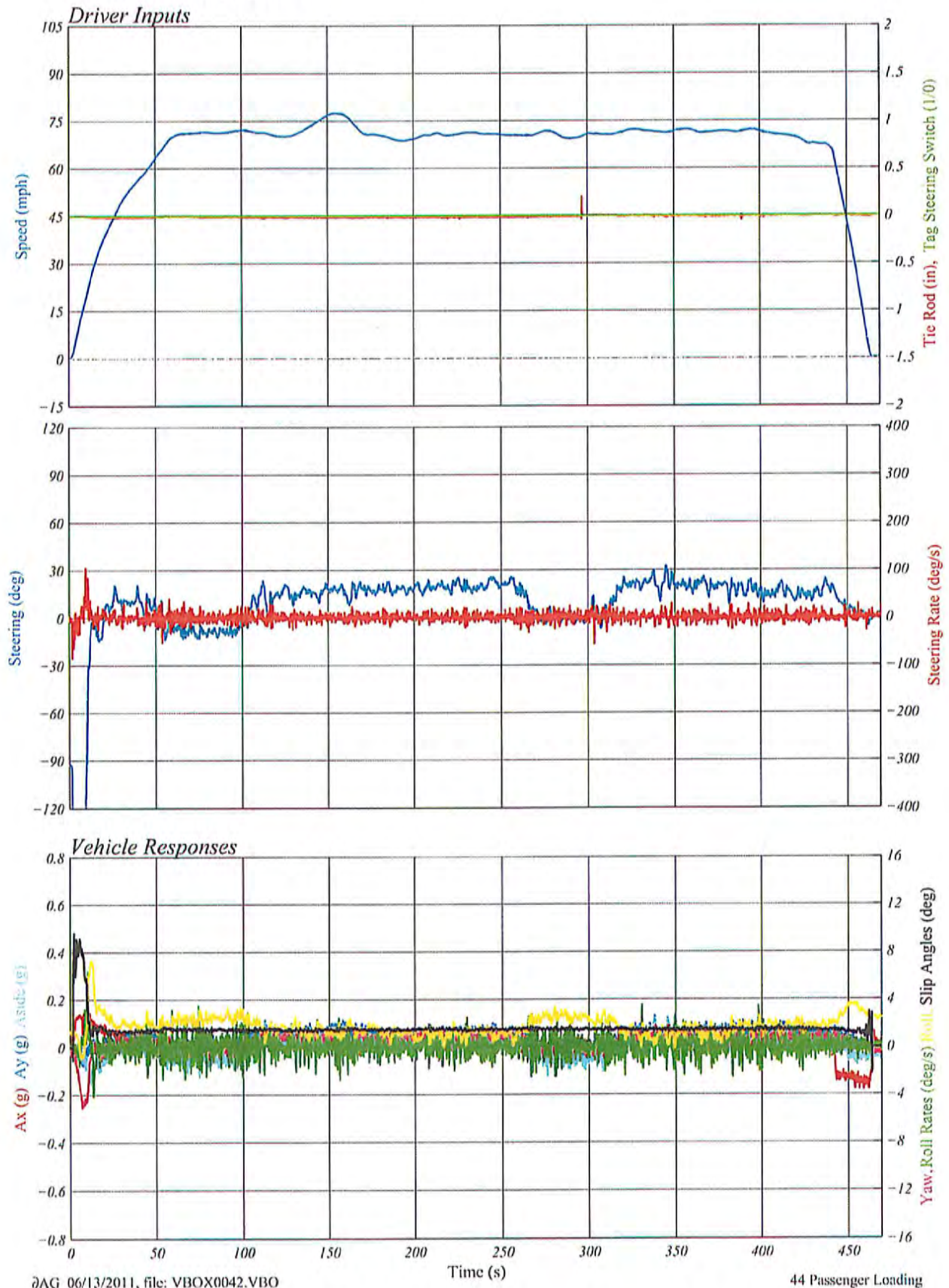
Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder & Left, Braking



Test: 41

1995 MCI 102DL3

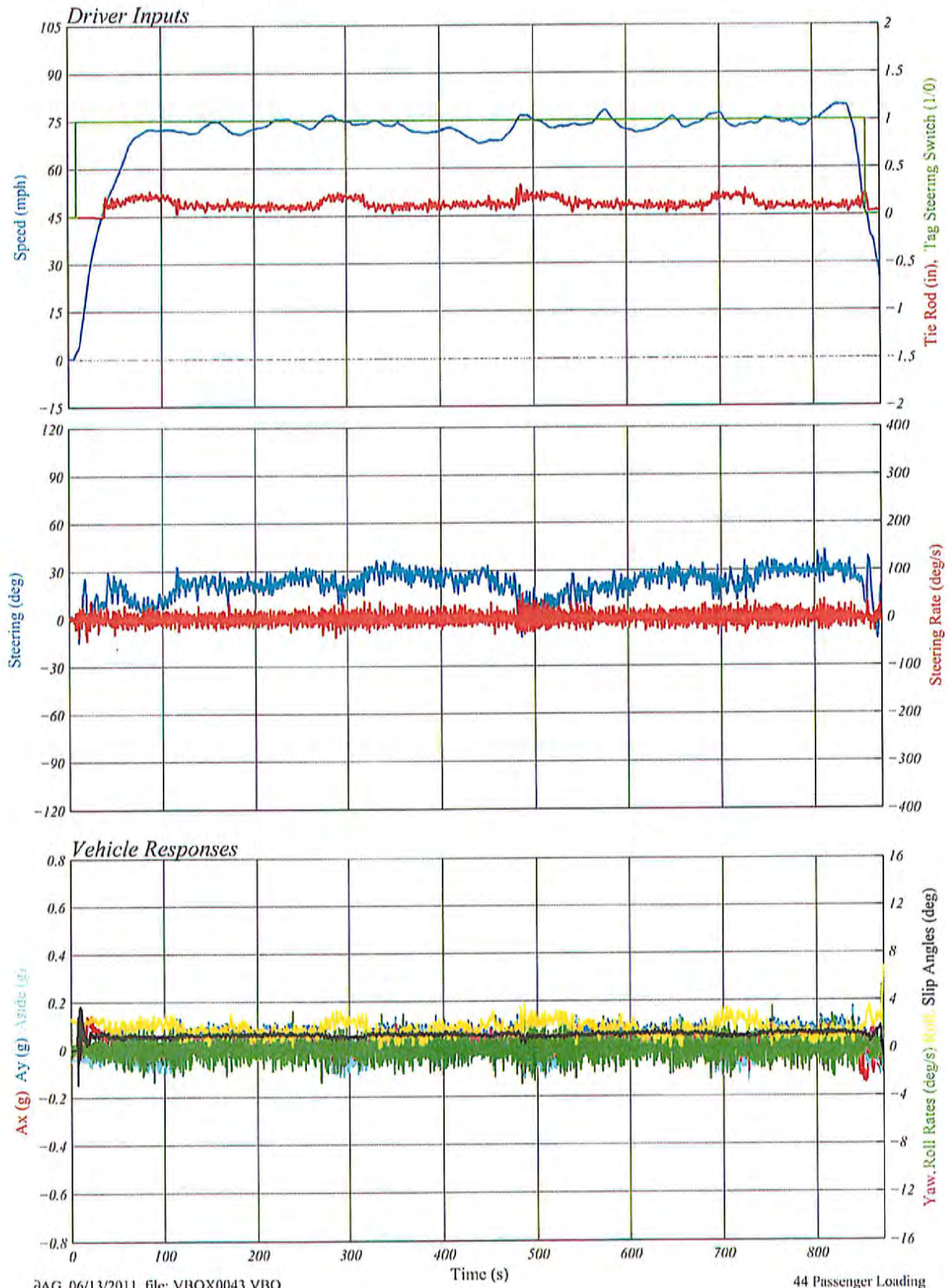
Extended Driving, Locked



Test: 42

1995 MCI 102DL3

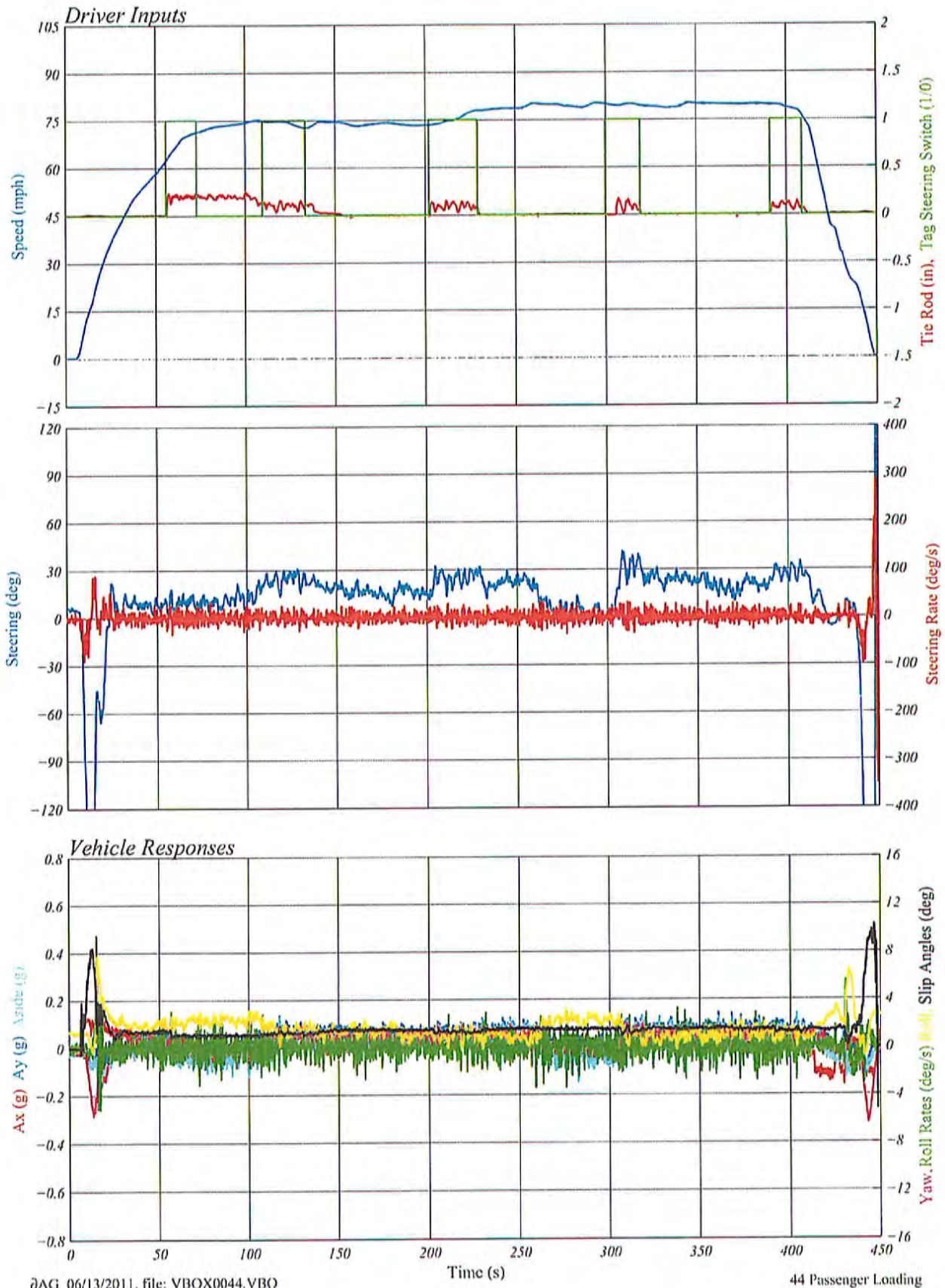
Extended Driving, Unlocked



Test: 43

1995 MCI 102DL3

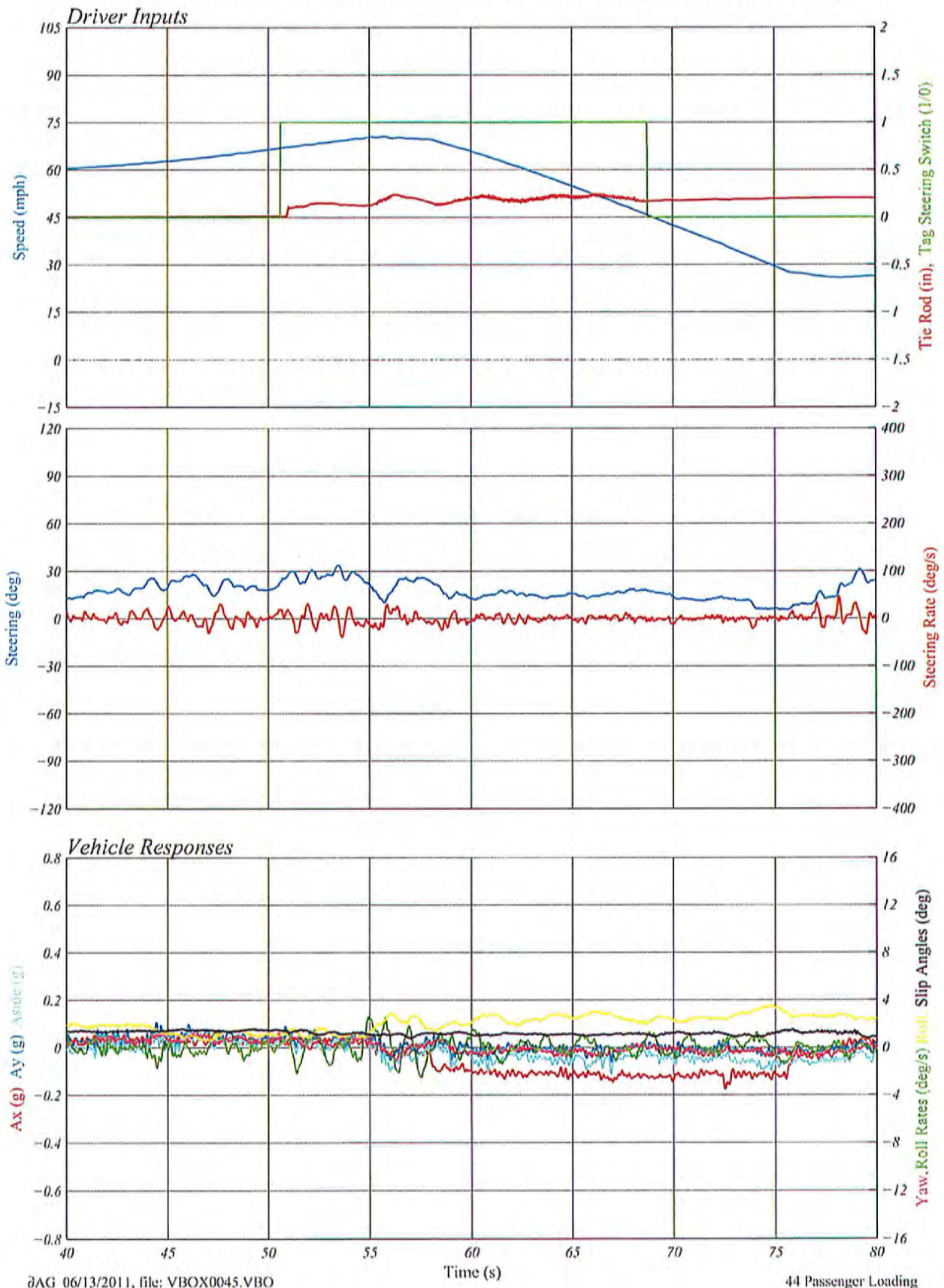
Surprise Unlock



Test: 44

1995 MCI 102DL3

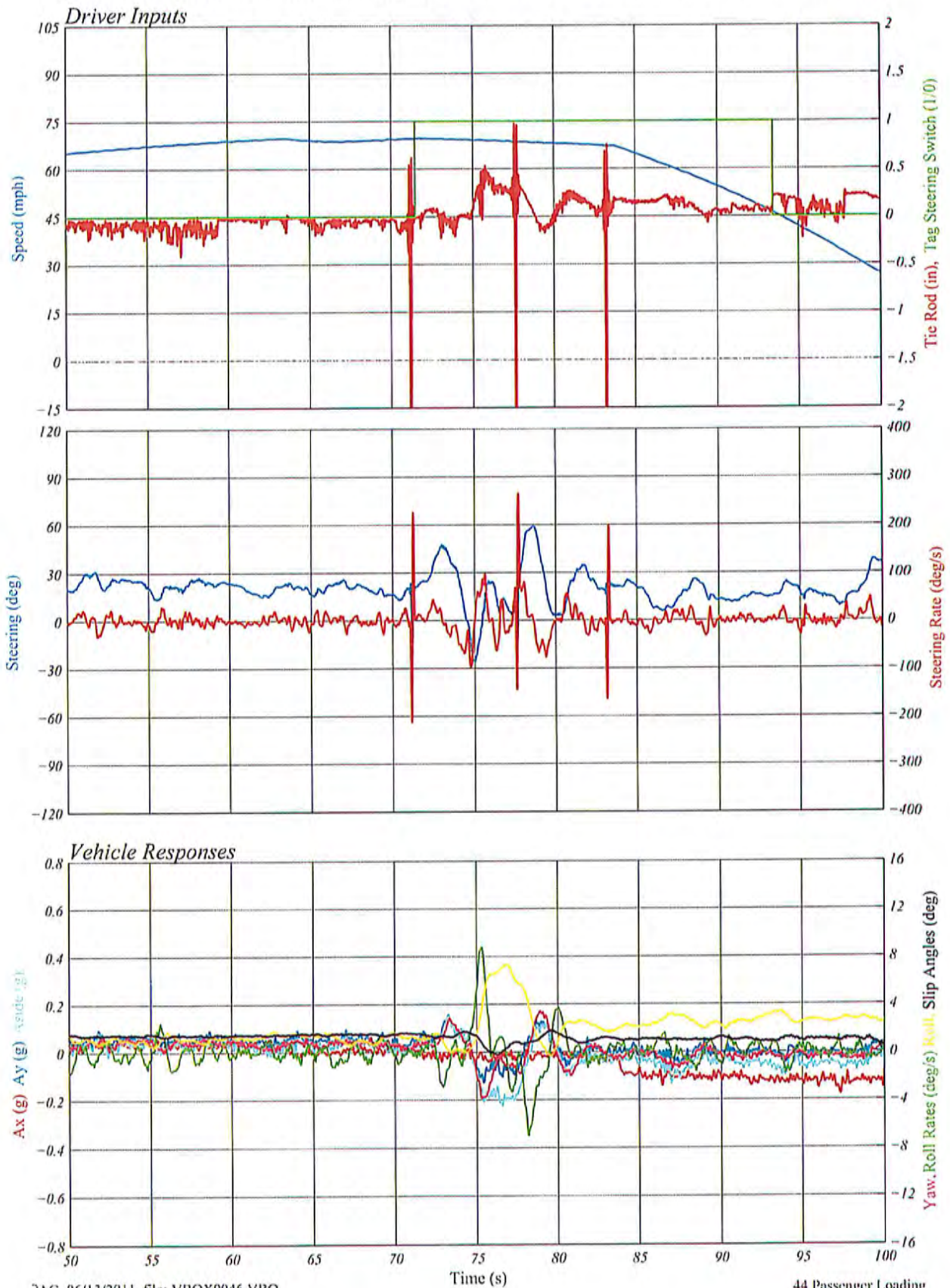
Dynamic Unlock in a Curve, Downhill to the Right with Braking, Wet Surface



Test: 45

1995 MCI 102DL3

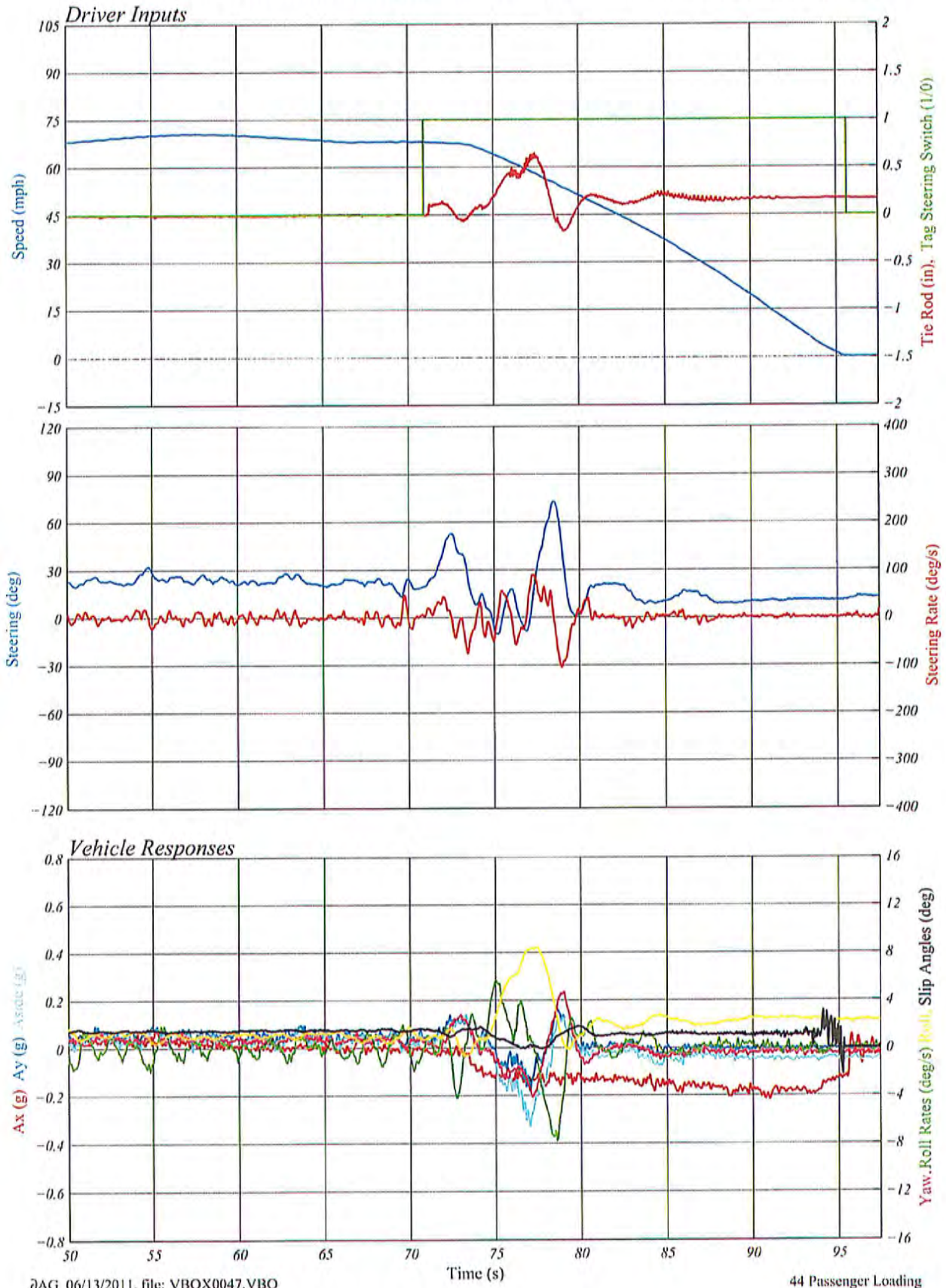
Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Wet Surface



Test: 46

1995 MCI 102DL3

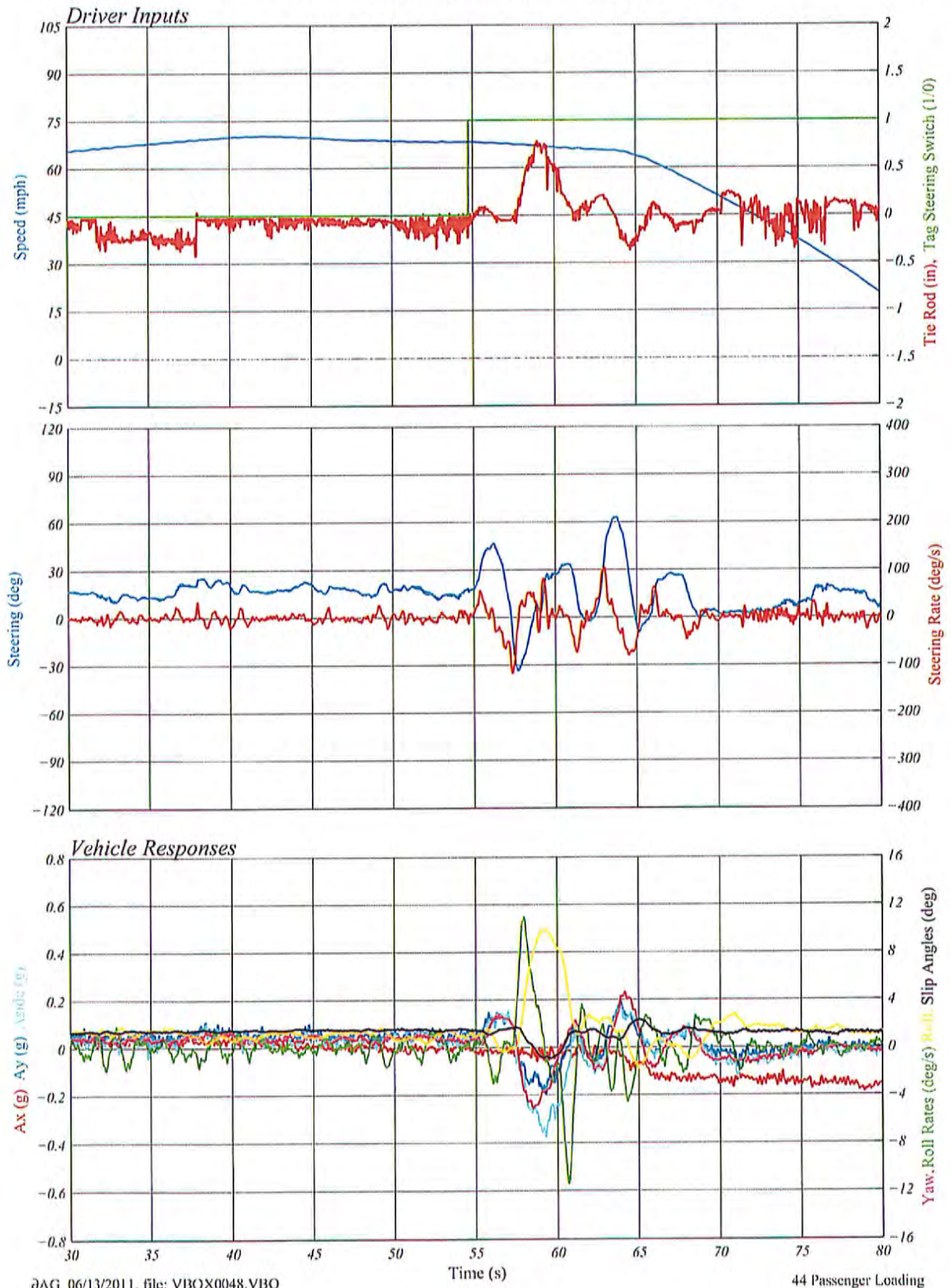
Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder, Braking, Wet



Test: 47

1995 MCI 102DL3

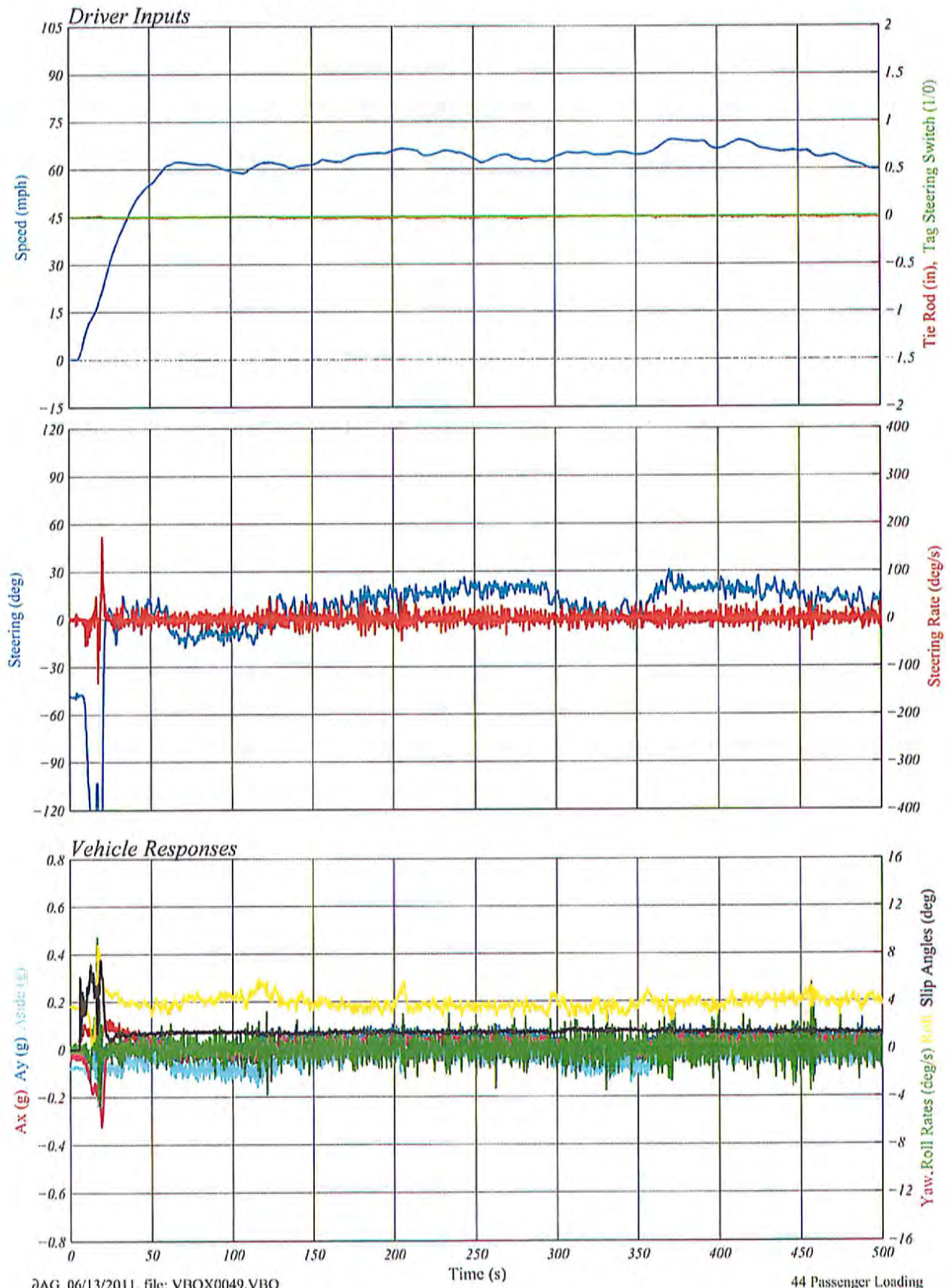
Dynamic Unlock, Downhill to Right, Intentional Steer to Shoulder & Left, Braking, Wet



Test: 48

1995 MCI 102DL3

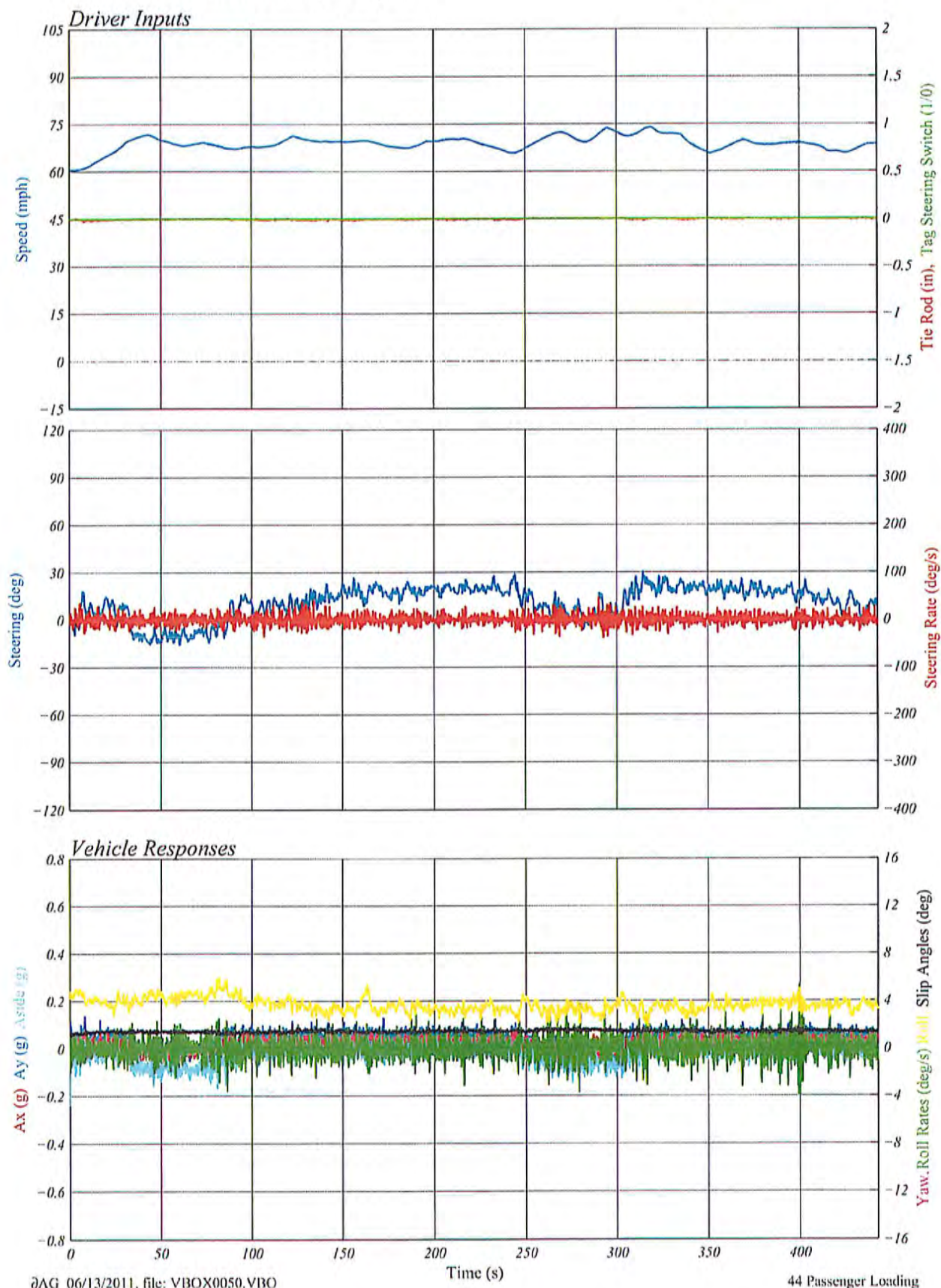
Modified U-Joint Bearing – Lap 1



Test: 49

1995 MCI 102DL3

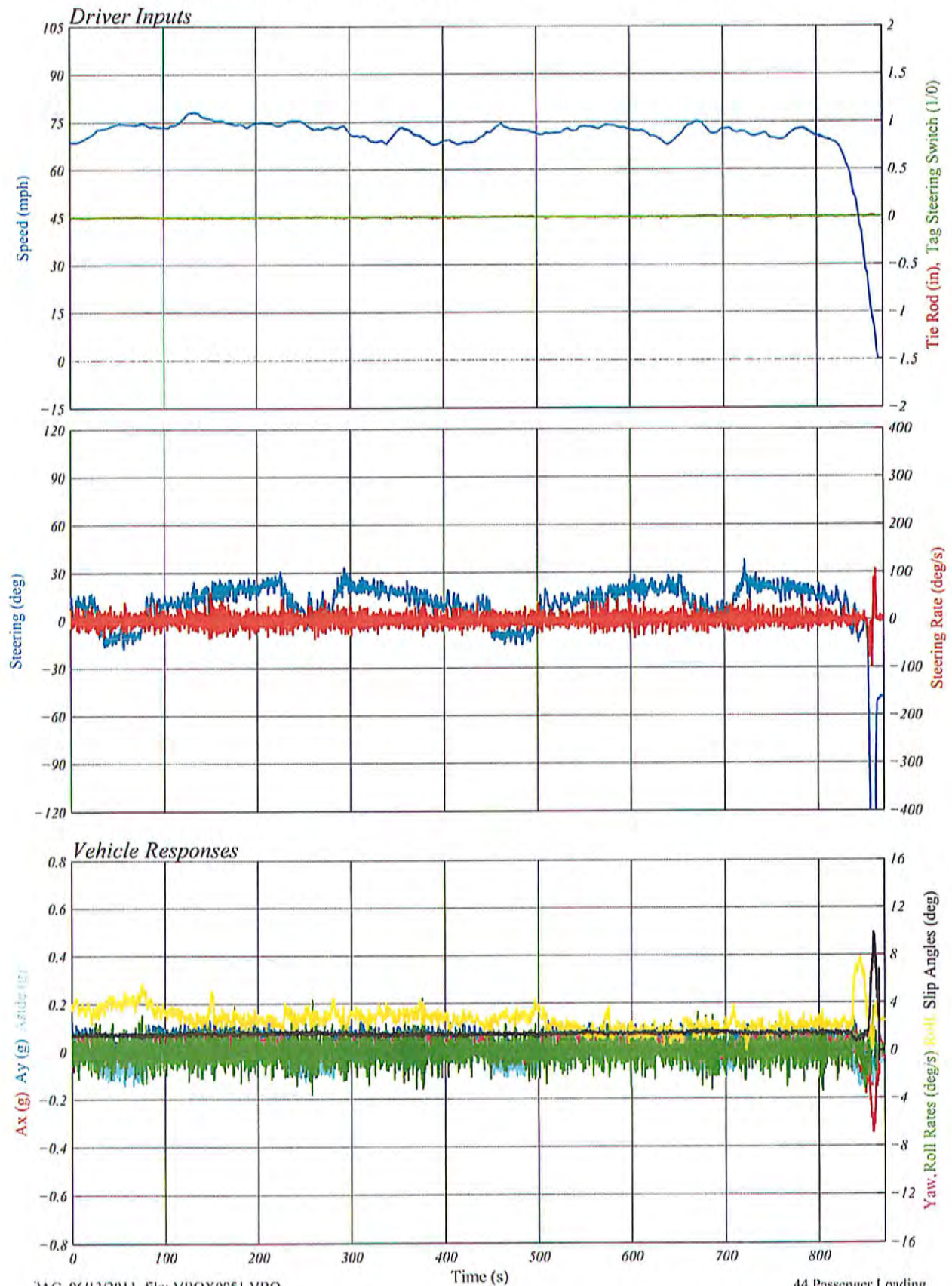
Modified U-Joint Bearing – Lap 2



Test: 50

1995 MCI 102DL3

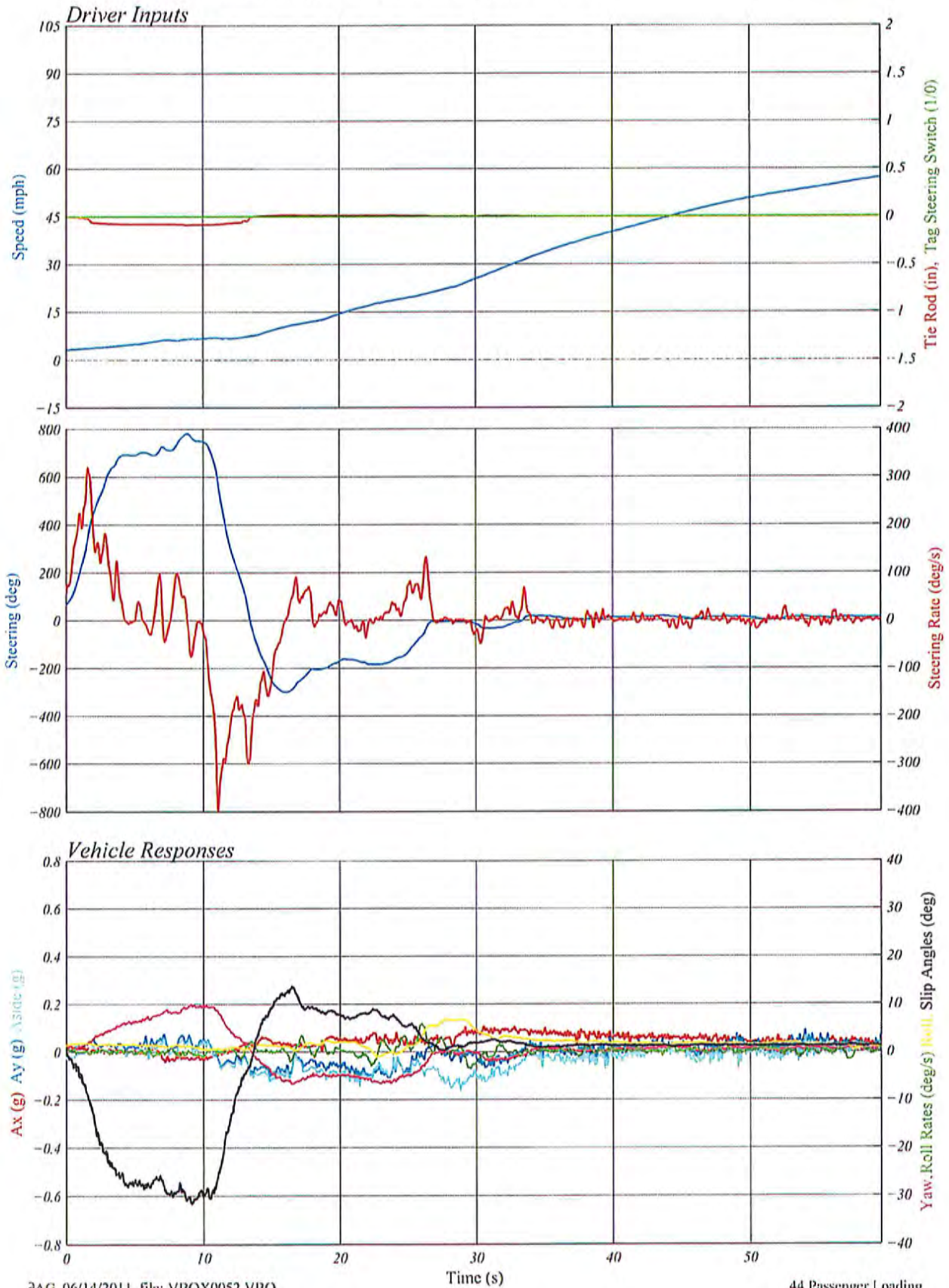
Modified U-Joint Bearing – Laps 3 and 4



Test: 51

1995 MCI 102DL3

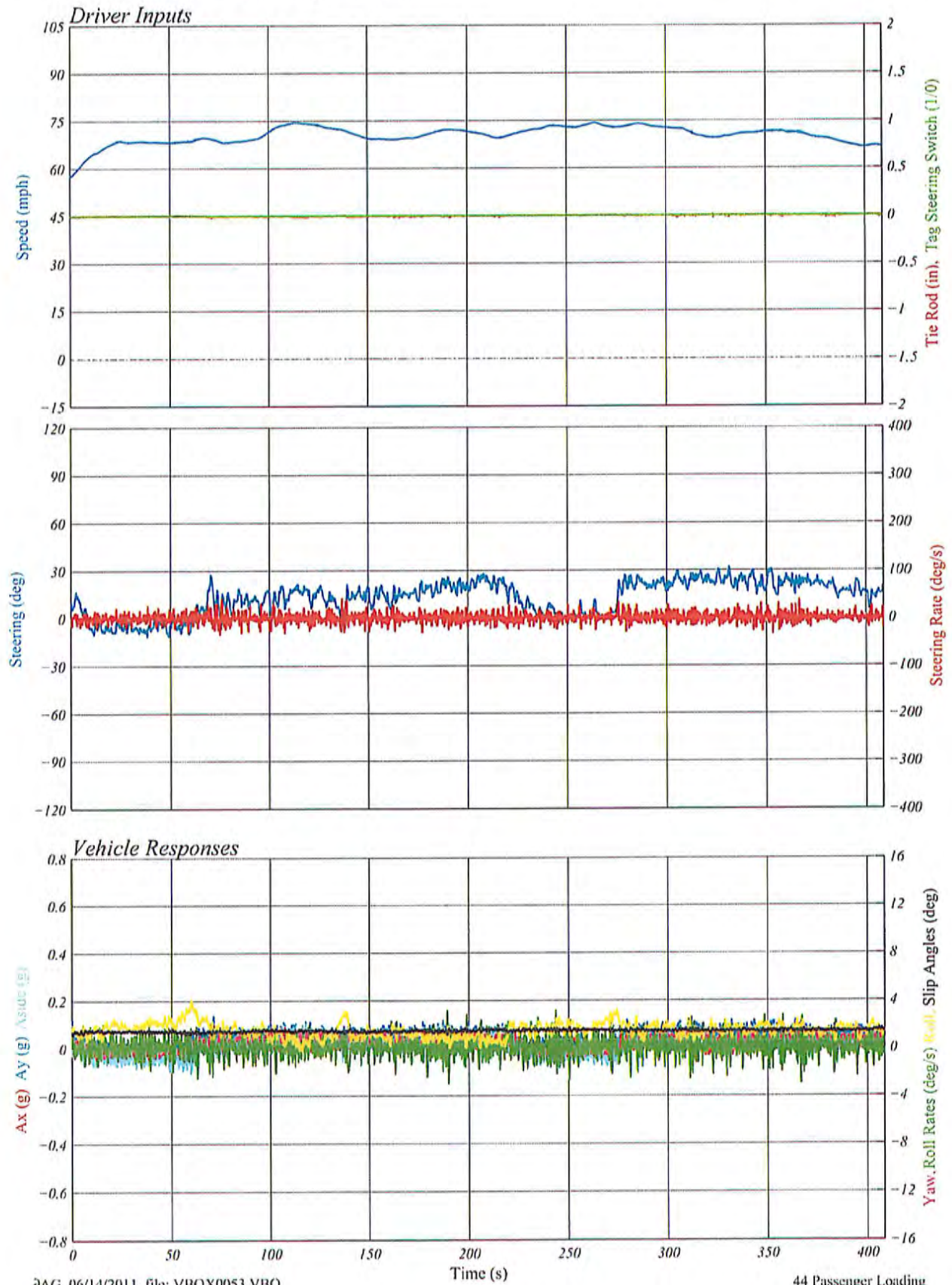
Modified U-joint Bearing – Lap 5, Incomplete Data



Test: 52

1995 MCI 102DL3

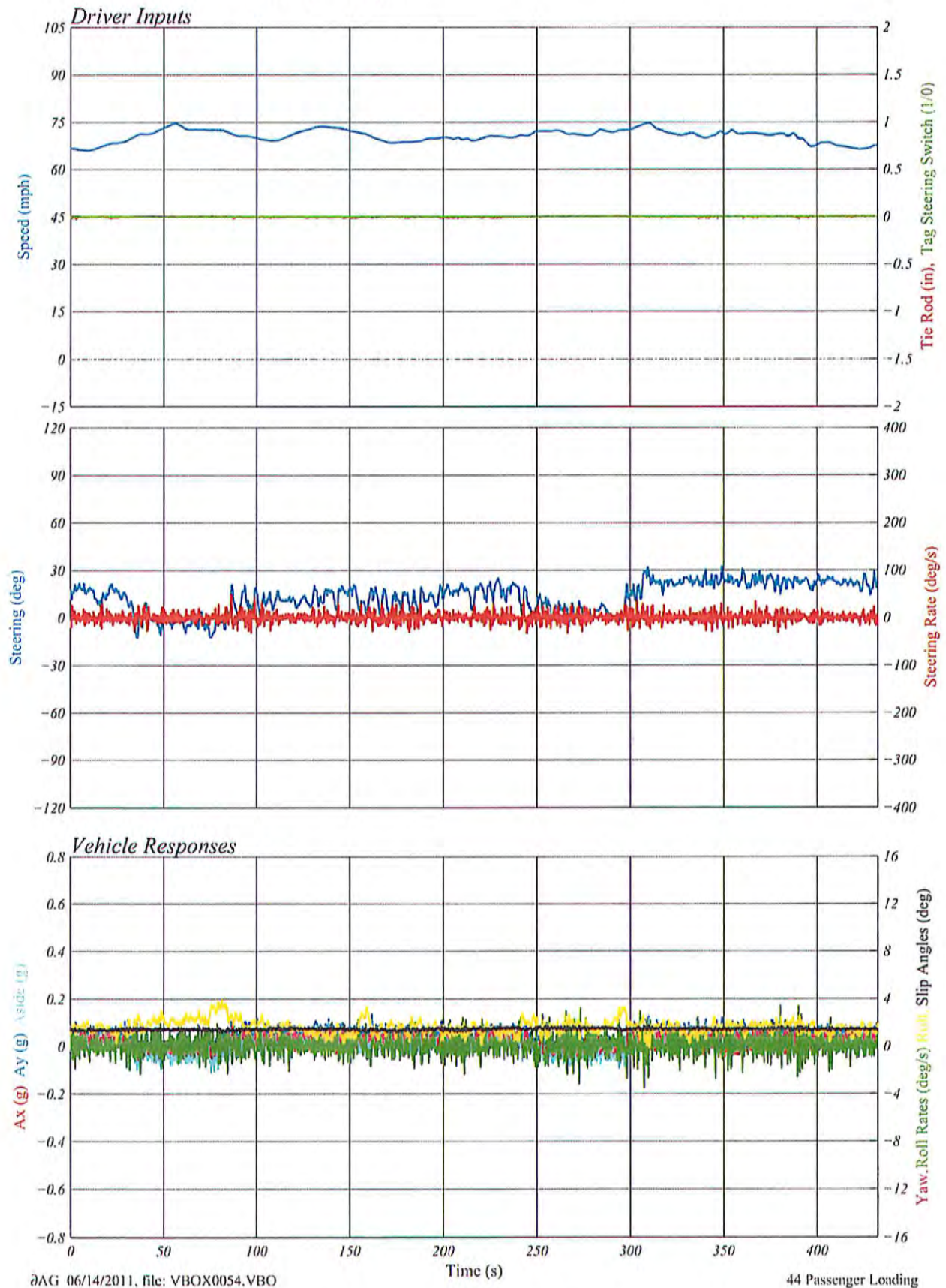
Modified U-joint Bearing – Lap 6



Test: 53

1995 MCI 102DL3

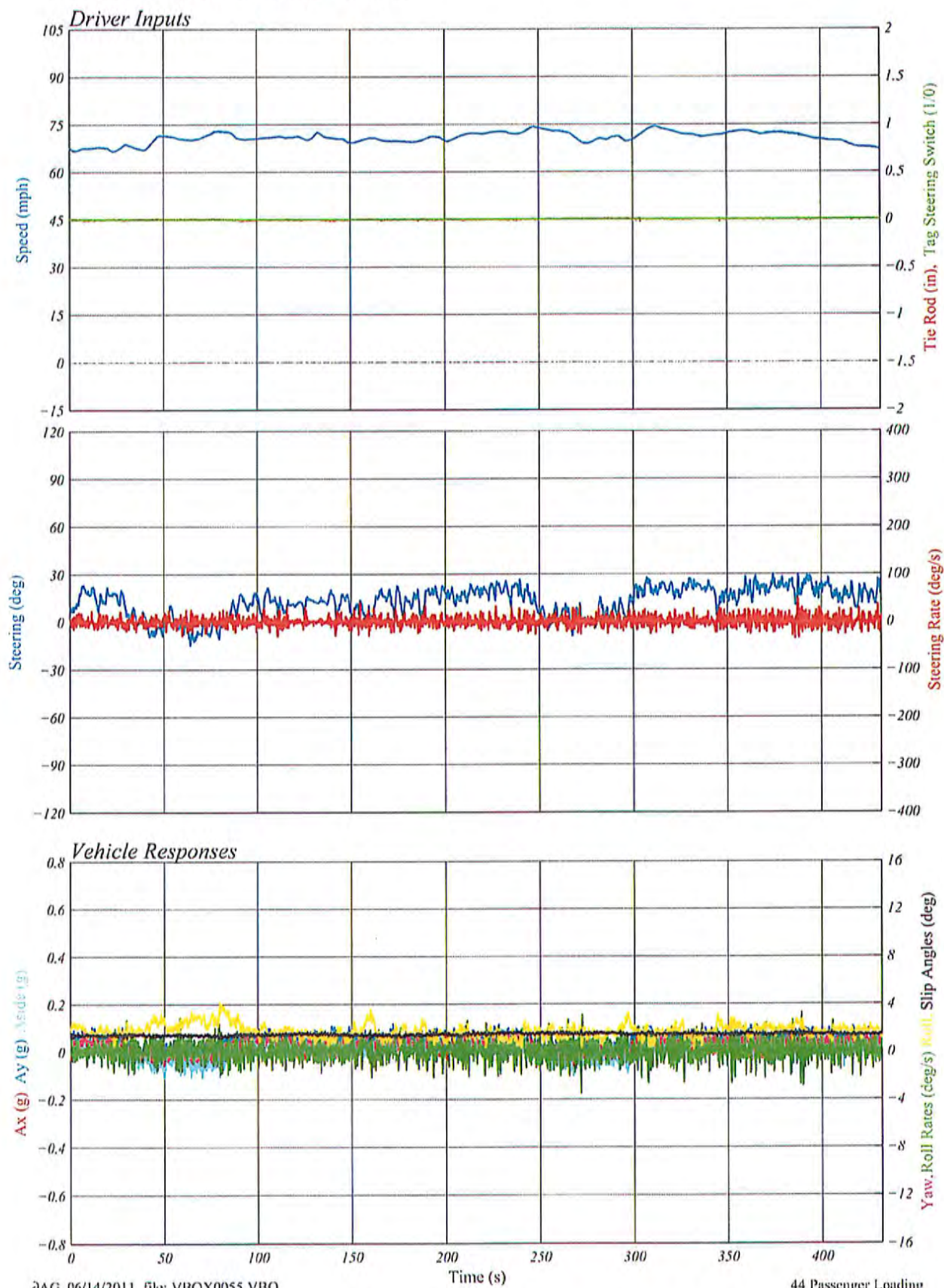
Modified U-joint Bearing – Lap 7



Test: 54

1995 MCI 102DL3

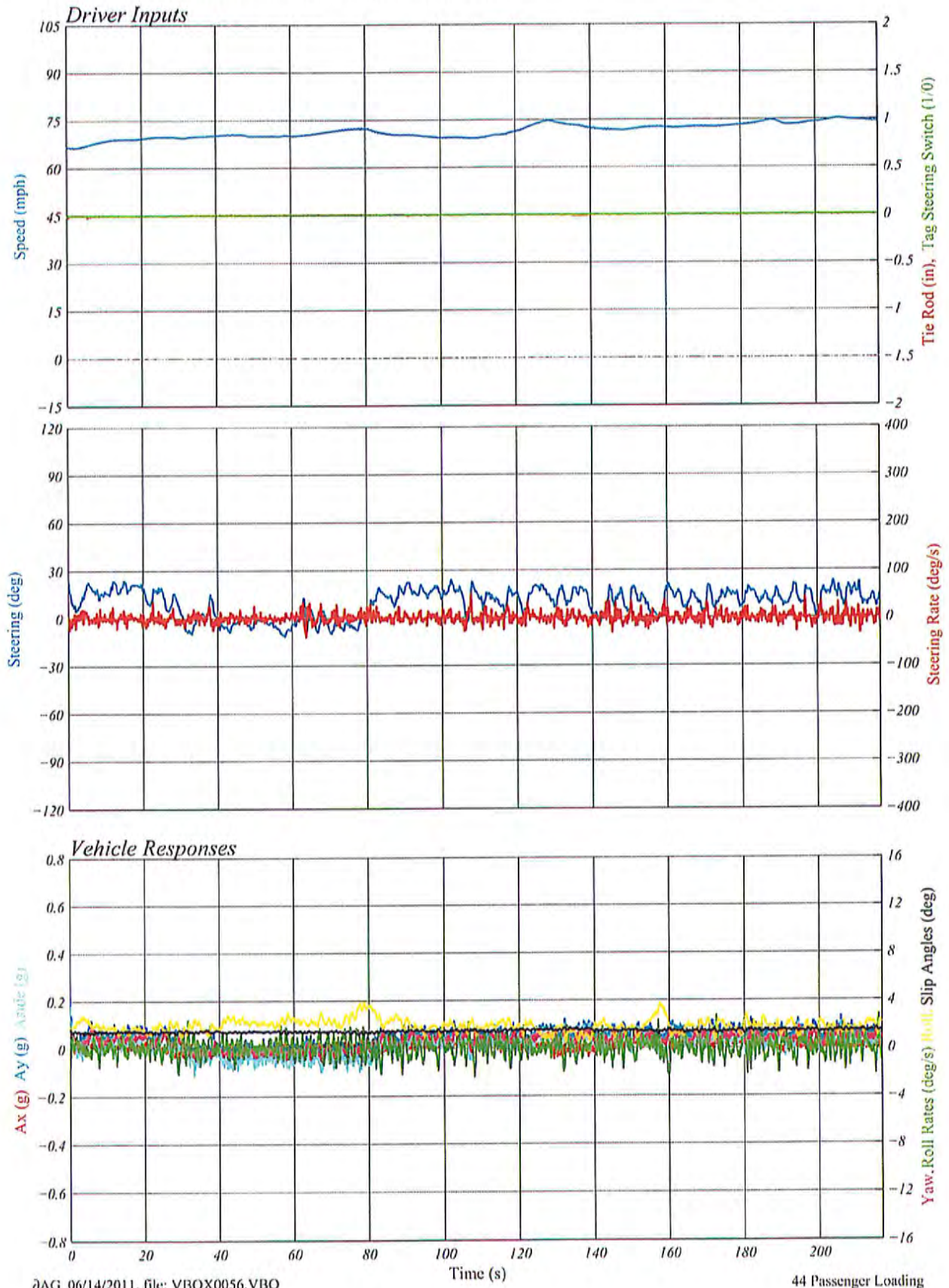
Modified U-joint Bearing – Lap 8



Test: 55

1995 MCI 102DL3

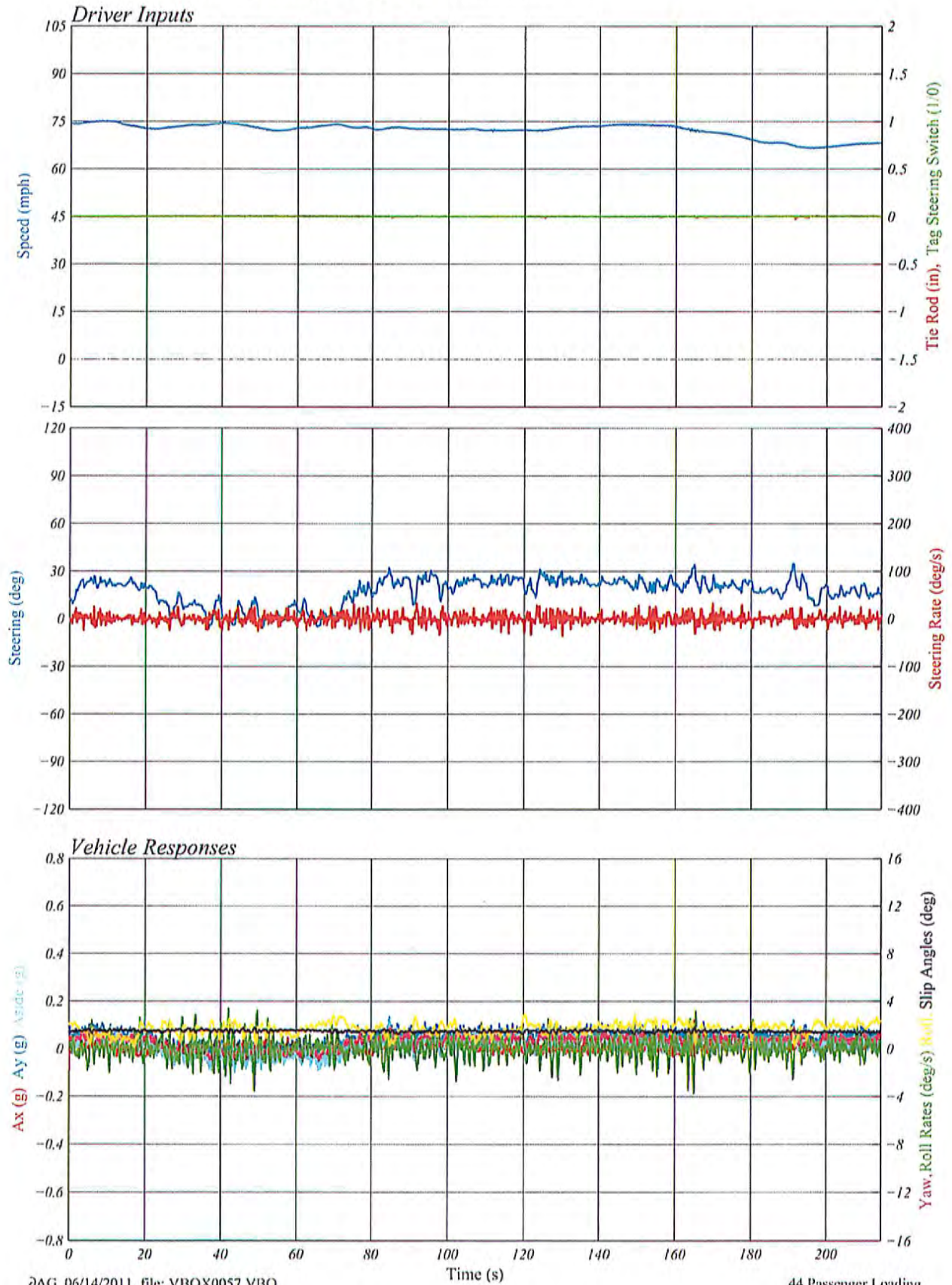
Modified U-joint Bearing – Lap 9, first half



Test: 56

1995 MCI 102DL3

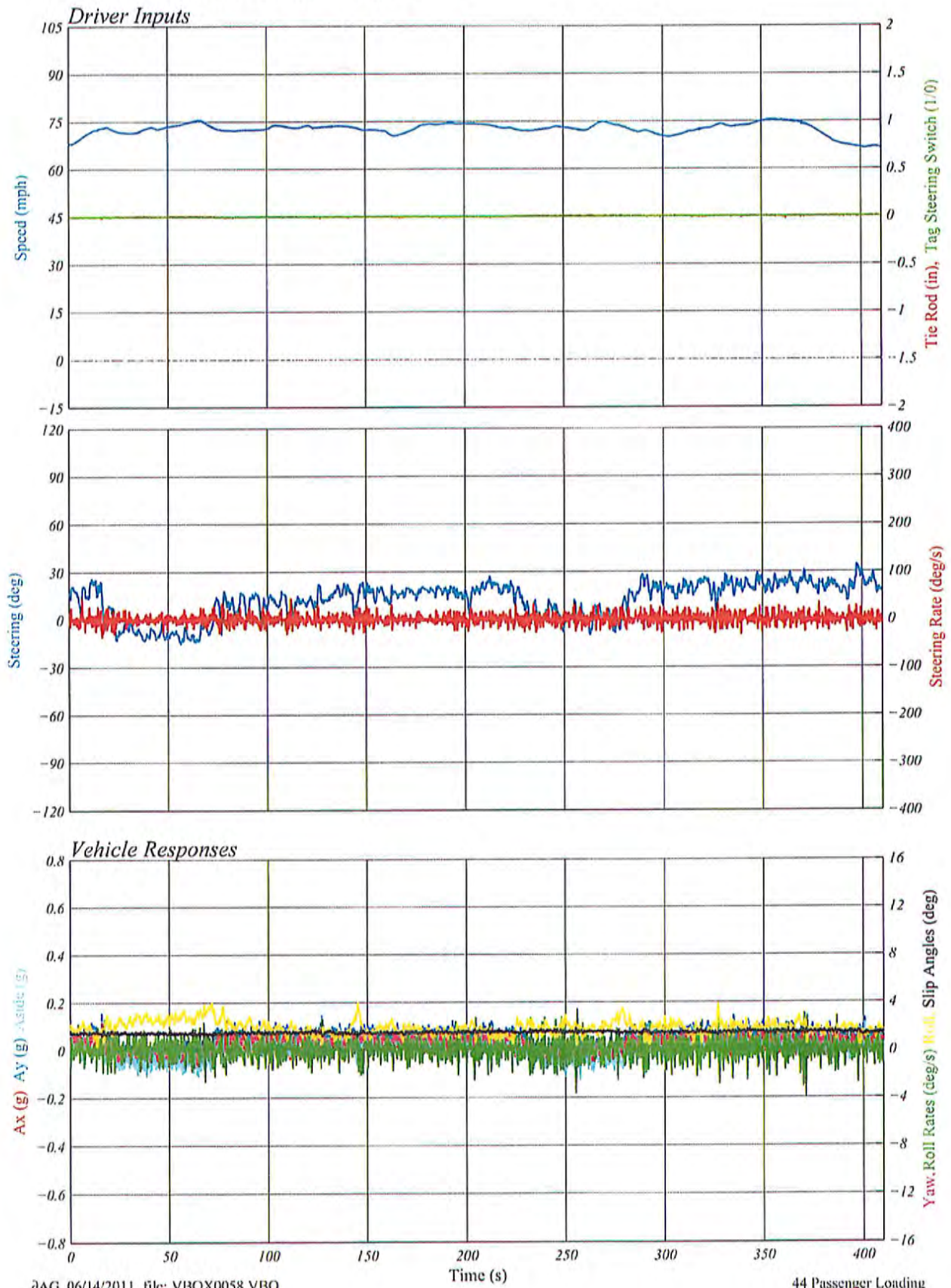
Modified U-joint Bearing – Lap 9, second half



Test: 57

1995 MCI 102DL3

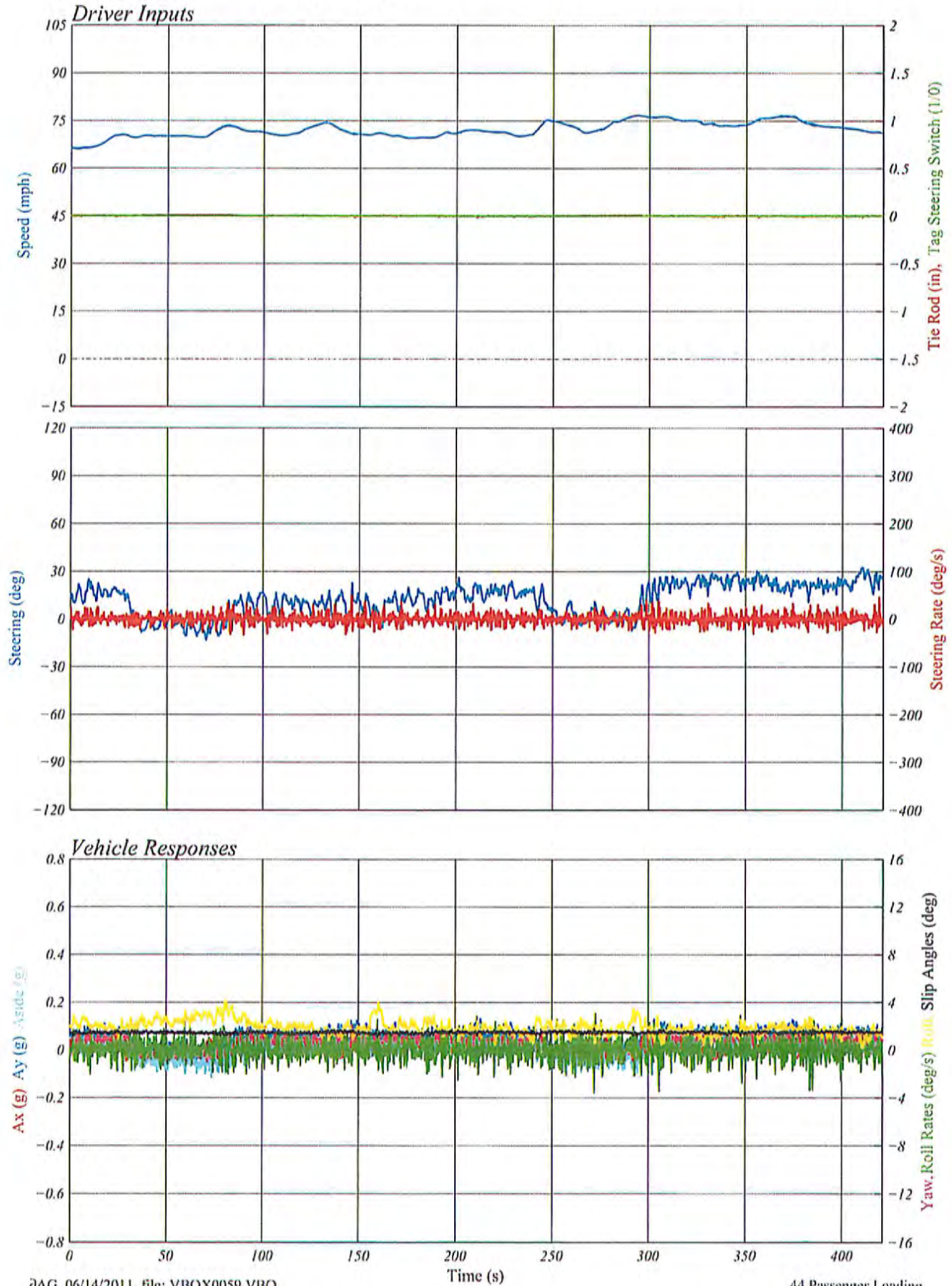
Modified U-joint Bearing – Lap 10



Test: 58

1995 MCI 102DL3

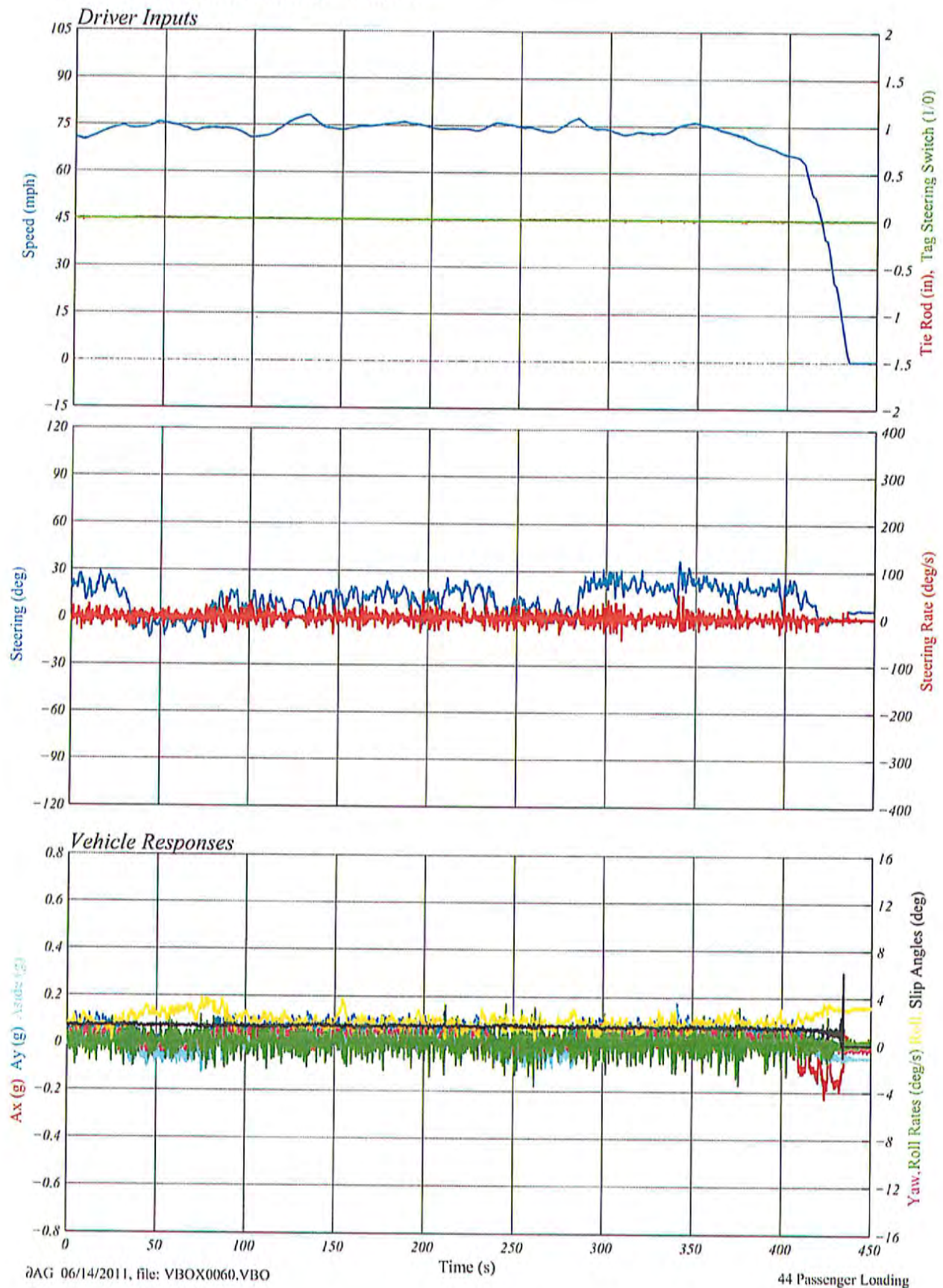
Modified U-joint Bearing – Lap 11



Test: 59

1995 MCI 102DL3

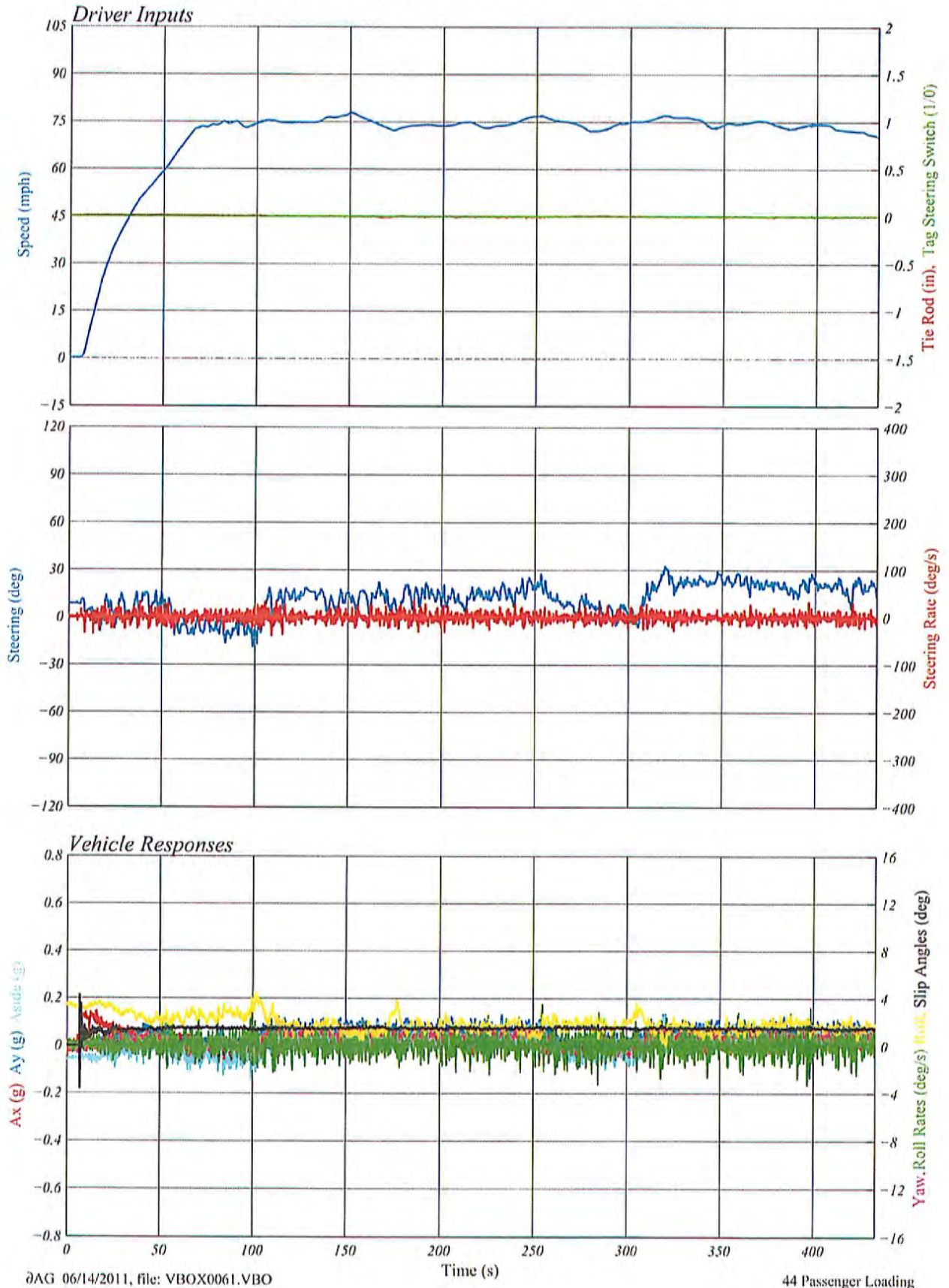
Modified U-joint Bearing – Lap 12



Test: 60

1995 MCI 102DL3

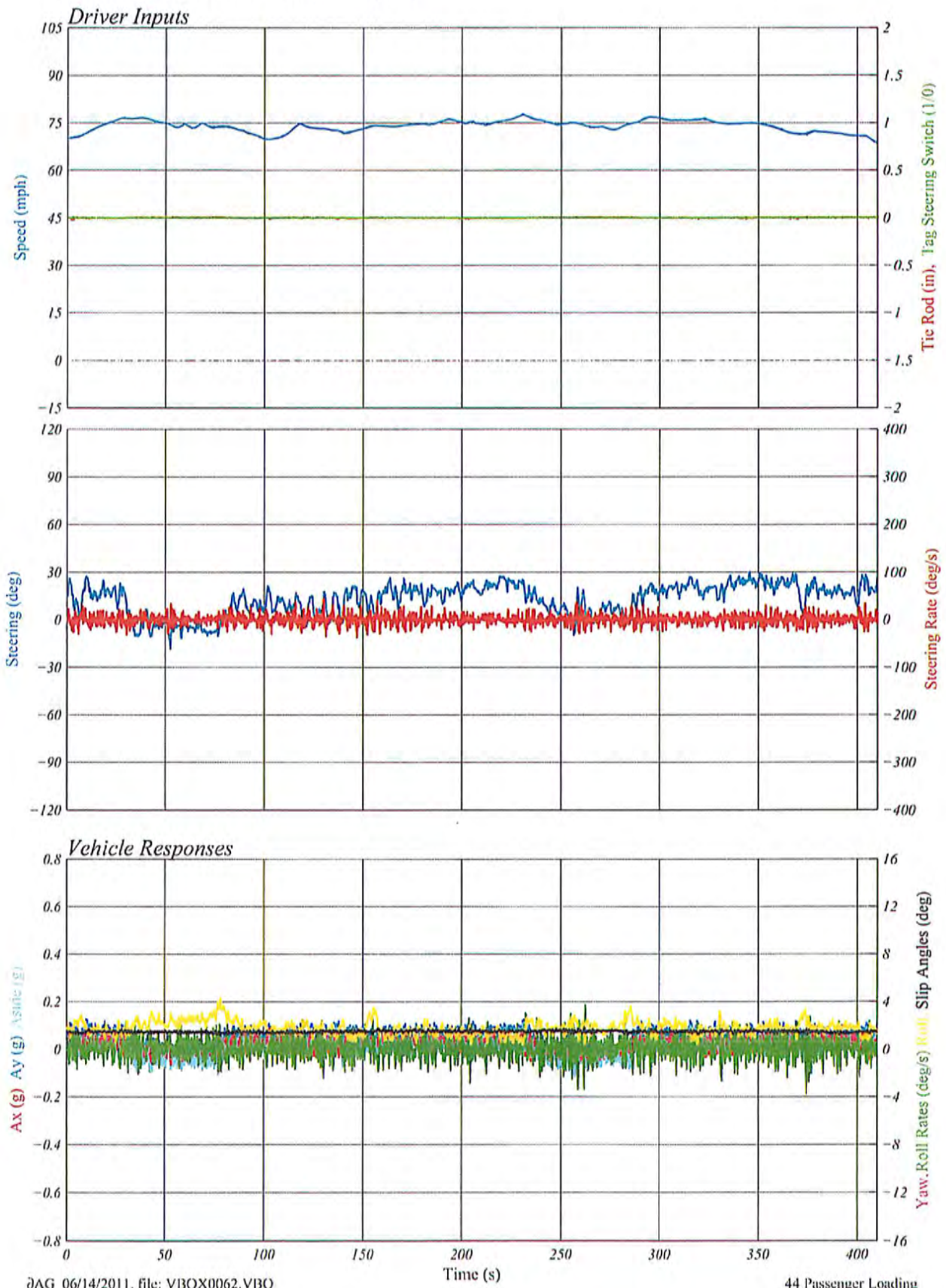
Modified U-joint Bearing – Lap 13



Test: 61

1995 MCI 102DL3

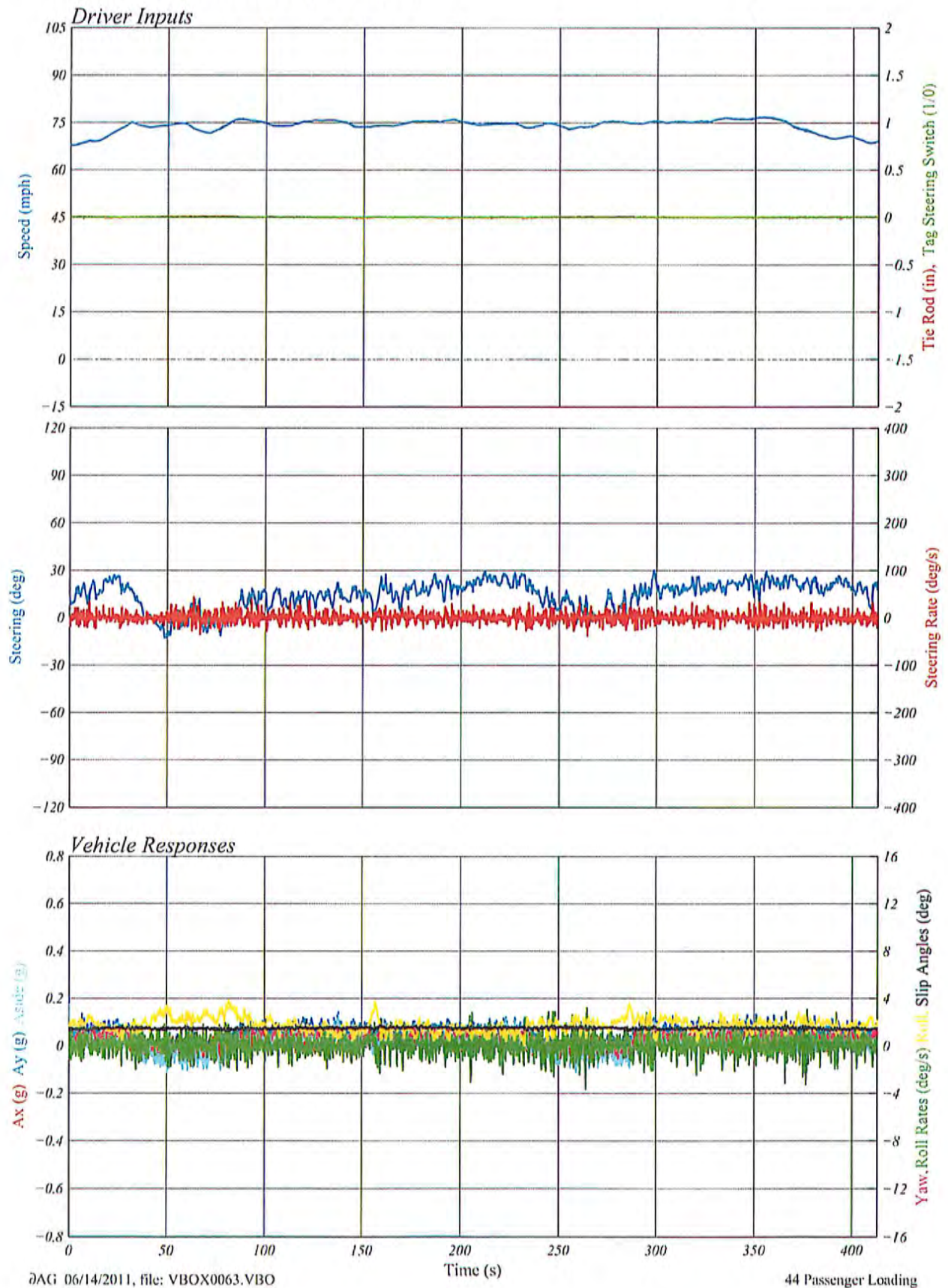
Modified U-joint Bearing – Lap 14



Test: 62

1995 MCI 102DL3

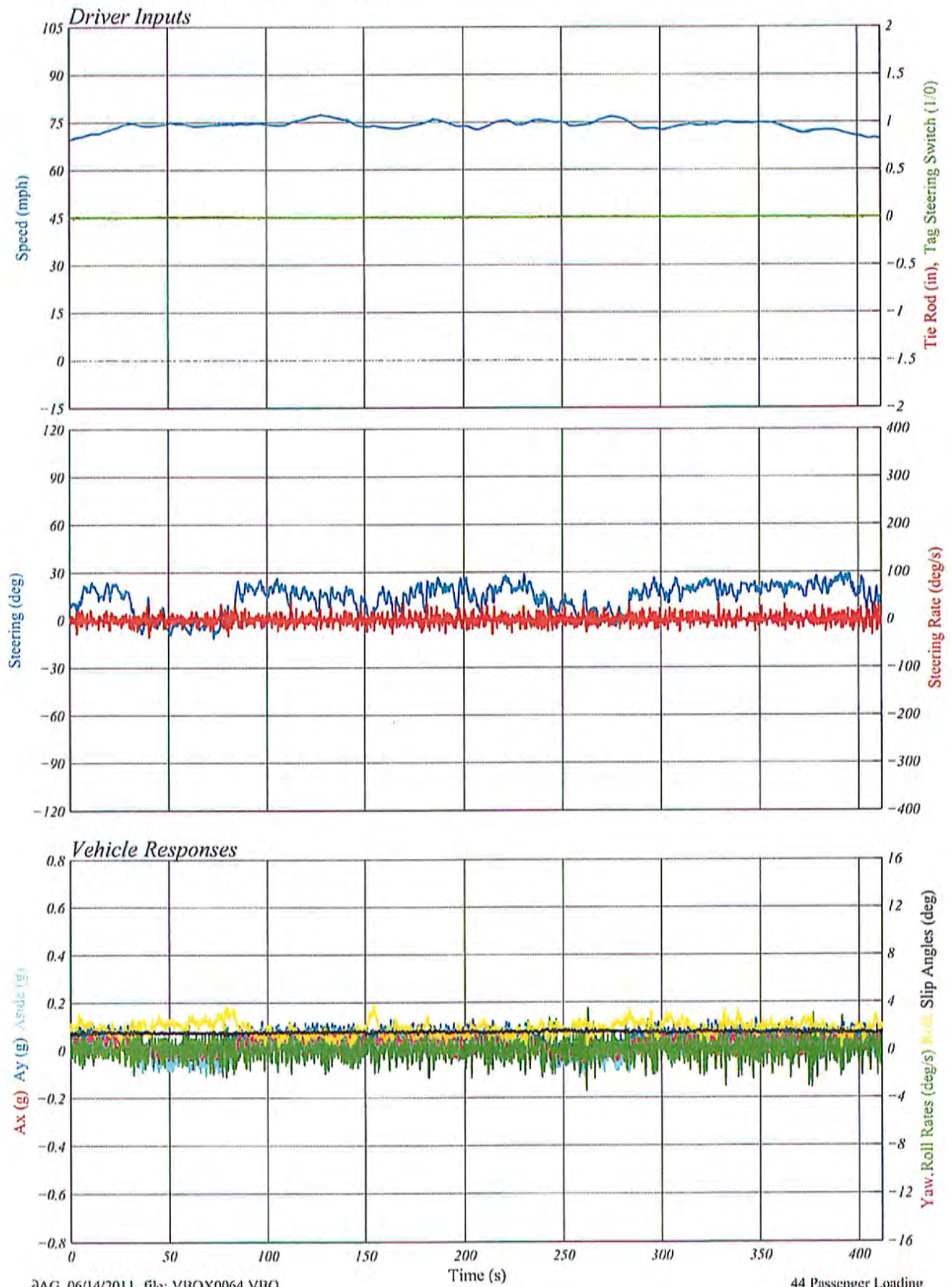
Modified U-joint Bearing – Lap 15



Test: 63

1995 MCI 102DL3

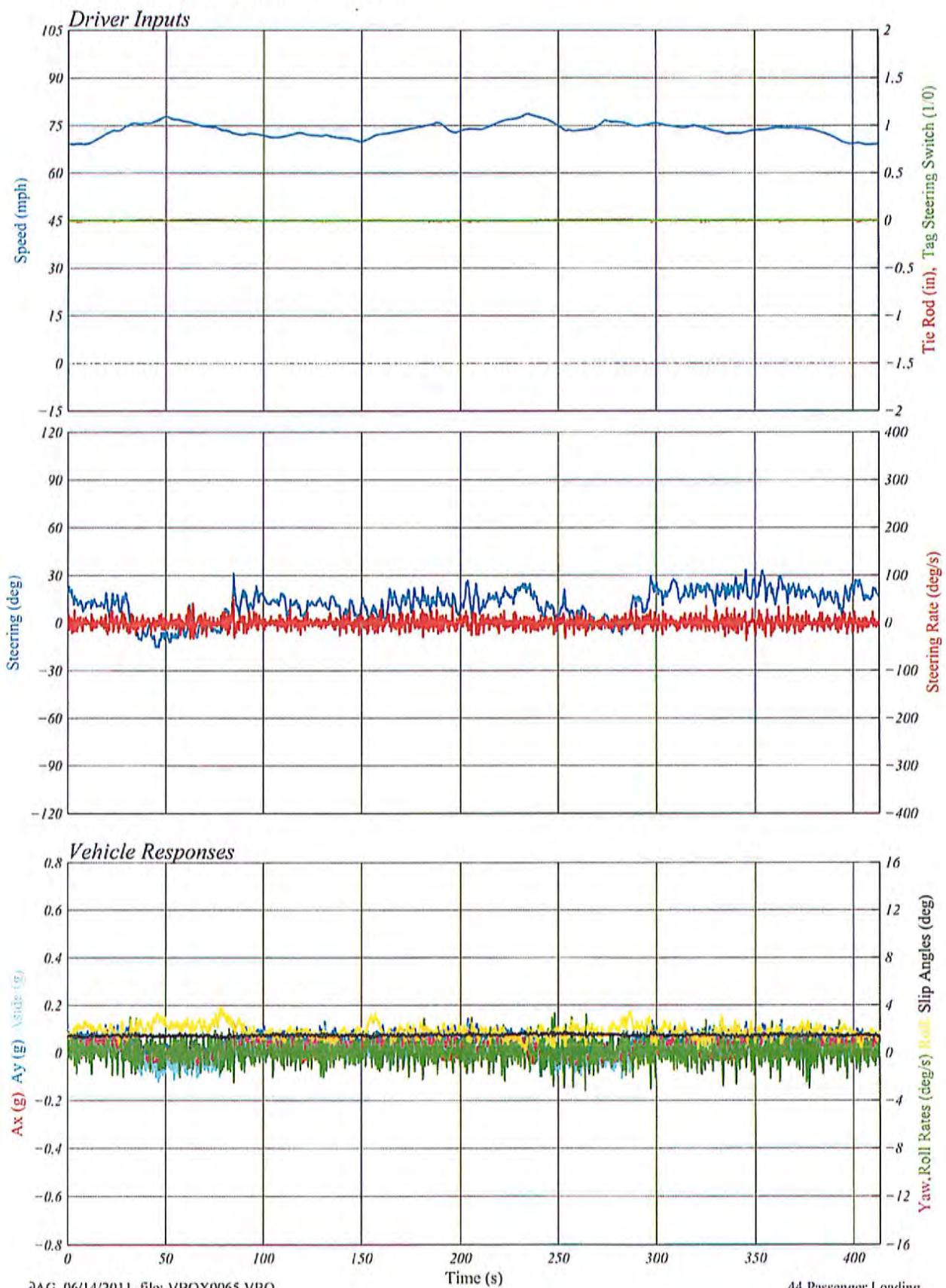
Modified U-joint Bearing – Lap 16



Test: 64

1995 MCI 102DL3

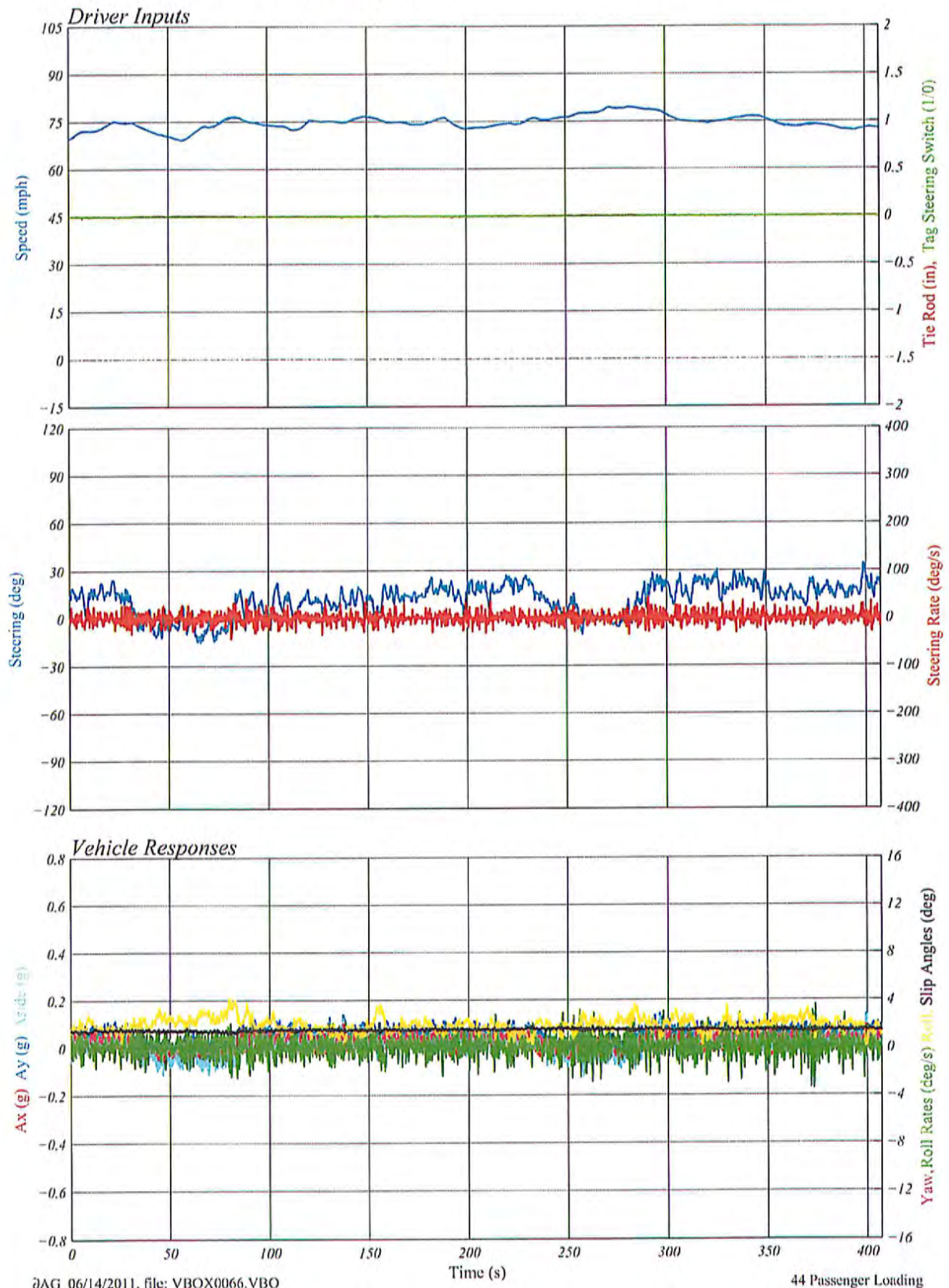
Modified U-joint Bearing – Lap 17



Test: 65

1995 MCI 102DL3

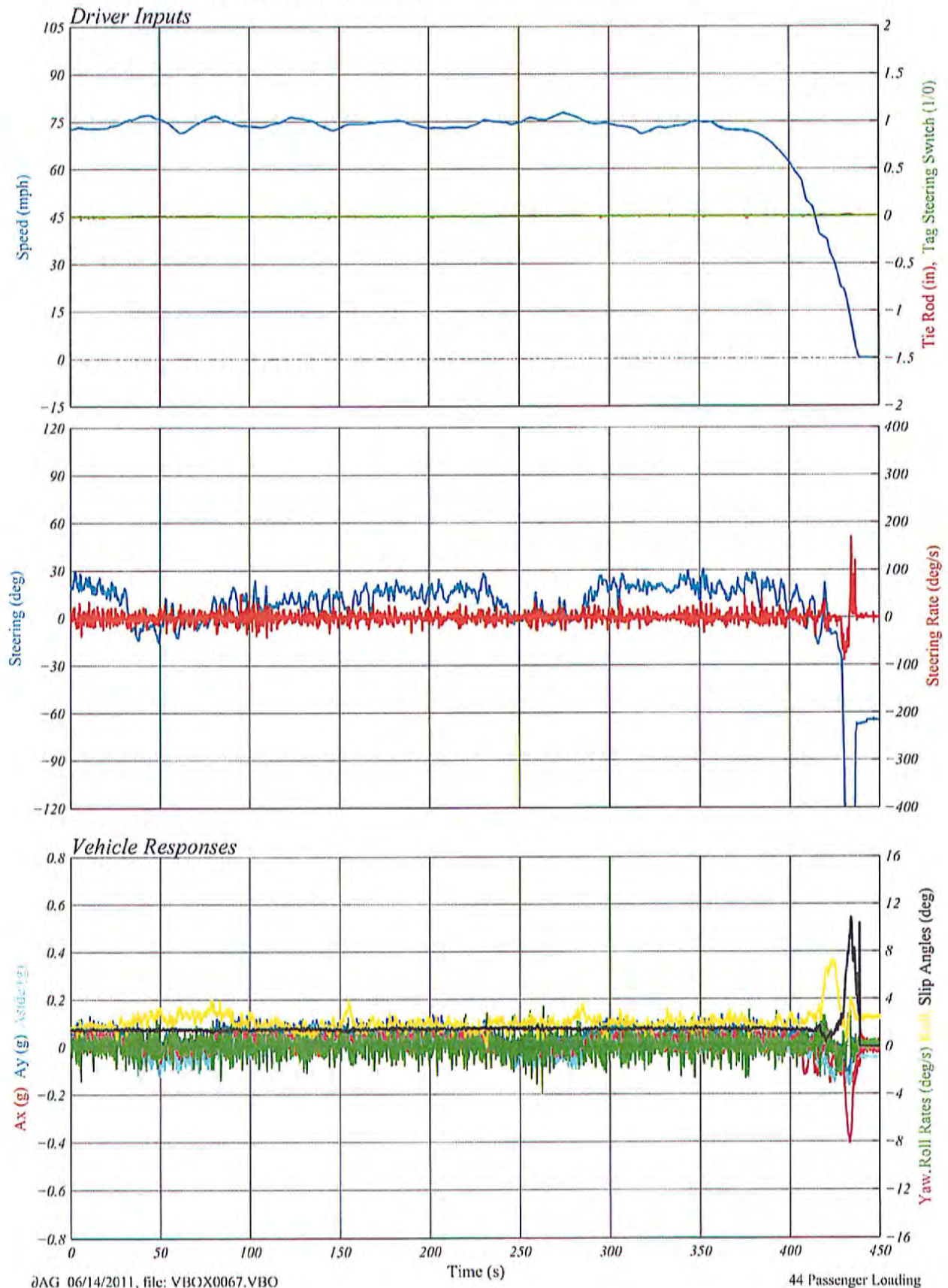
Modified U-joint Bearing – Lap 18



Test: 66

1995 MCI 102DL3

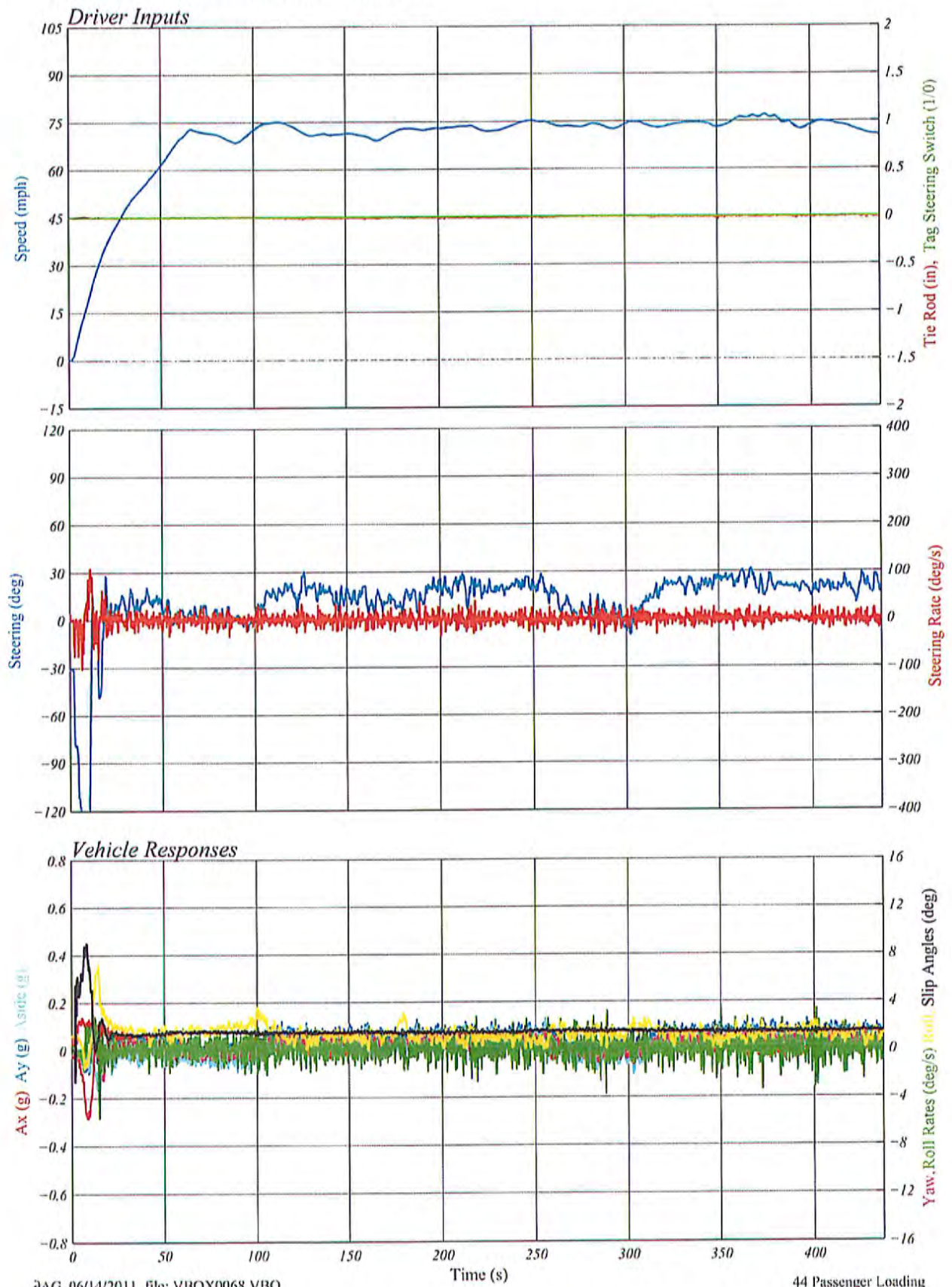
Modified U-joint Bearing – Lap 19



Test: 67

1995 MCI 102DL3

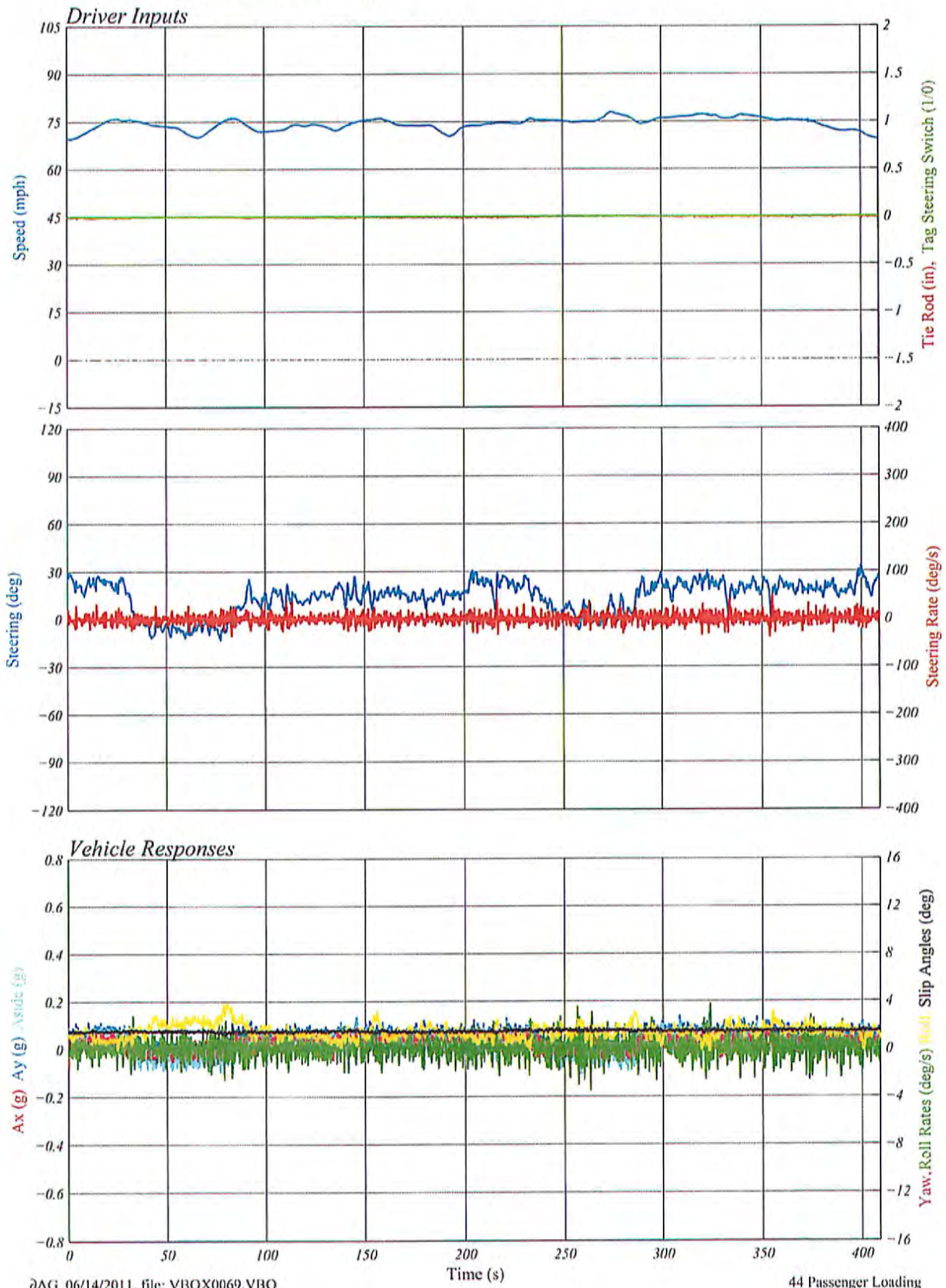
Modified U-joint Bearing – Lap 20



Test: 68

1995 MCI 102DL3

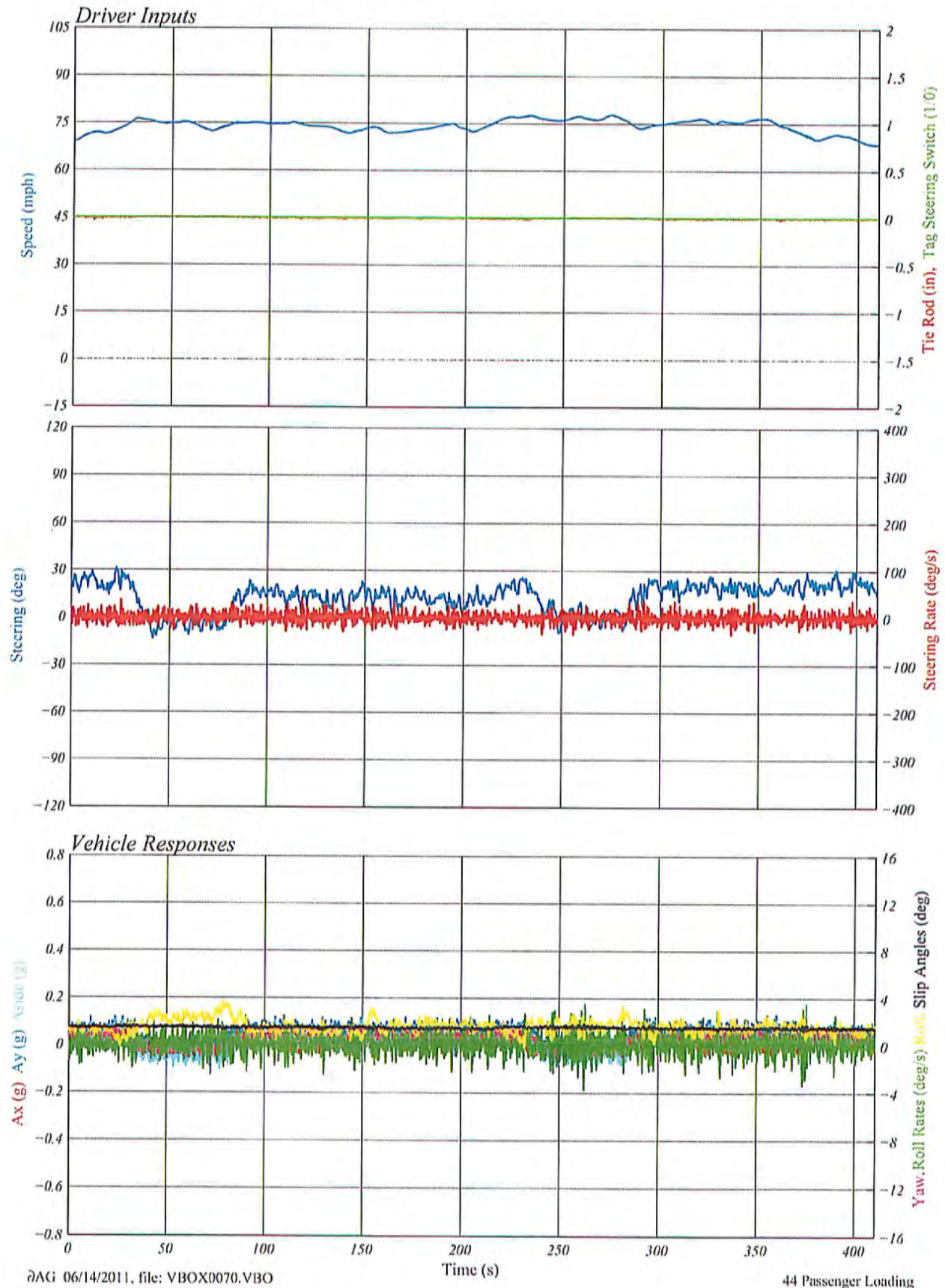
Modified U-joint Bearing – Lap 21



Test: 69

1995 MCI 102DL3

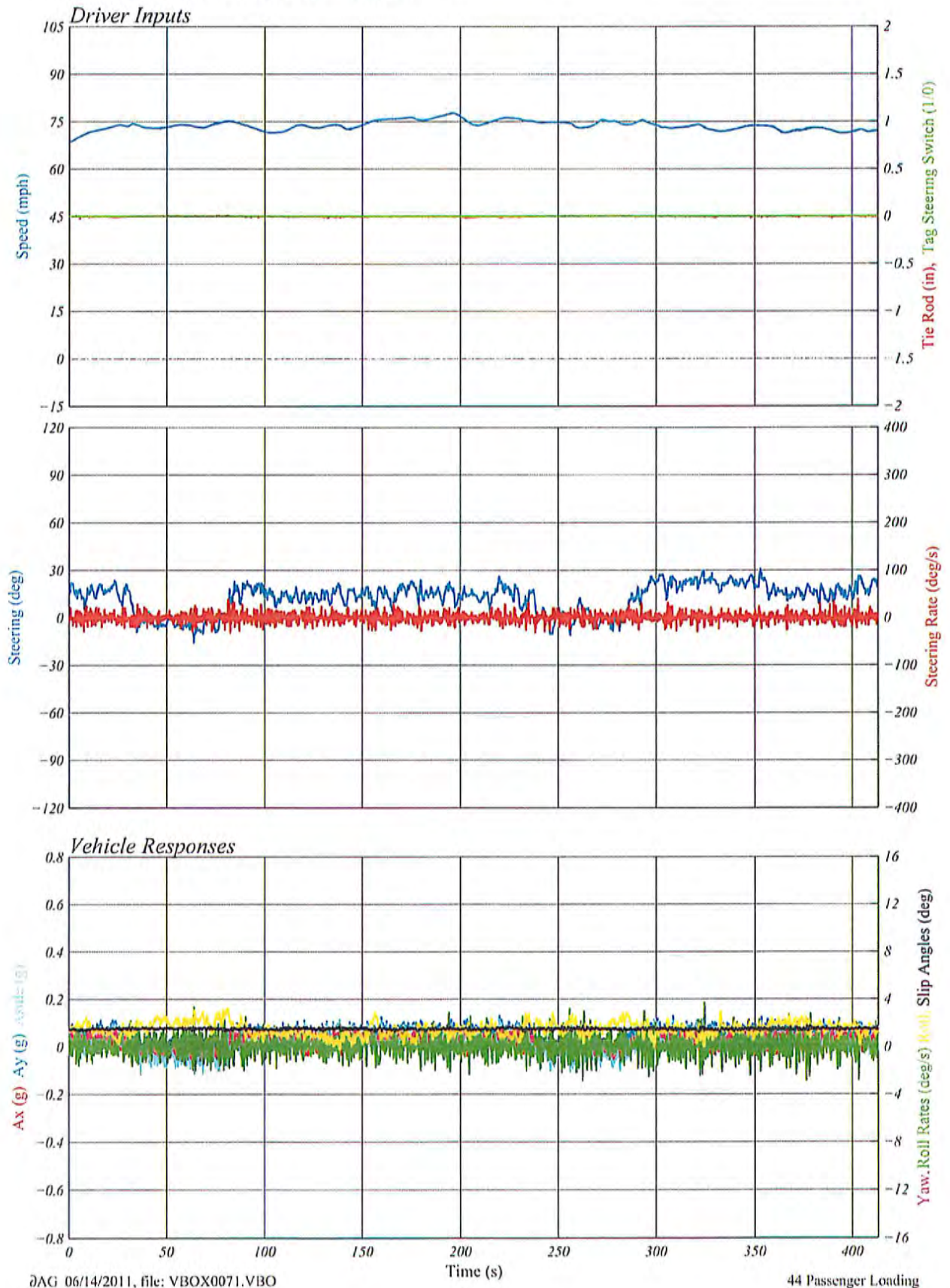
Modified U-joint Bearing – Lap 22



Test: 70

1995 MCI 102DL3

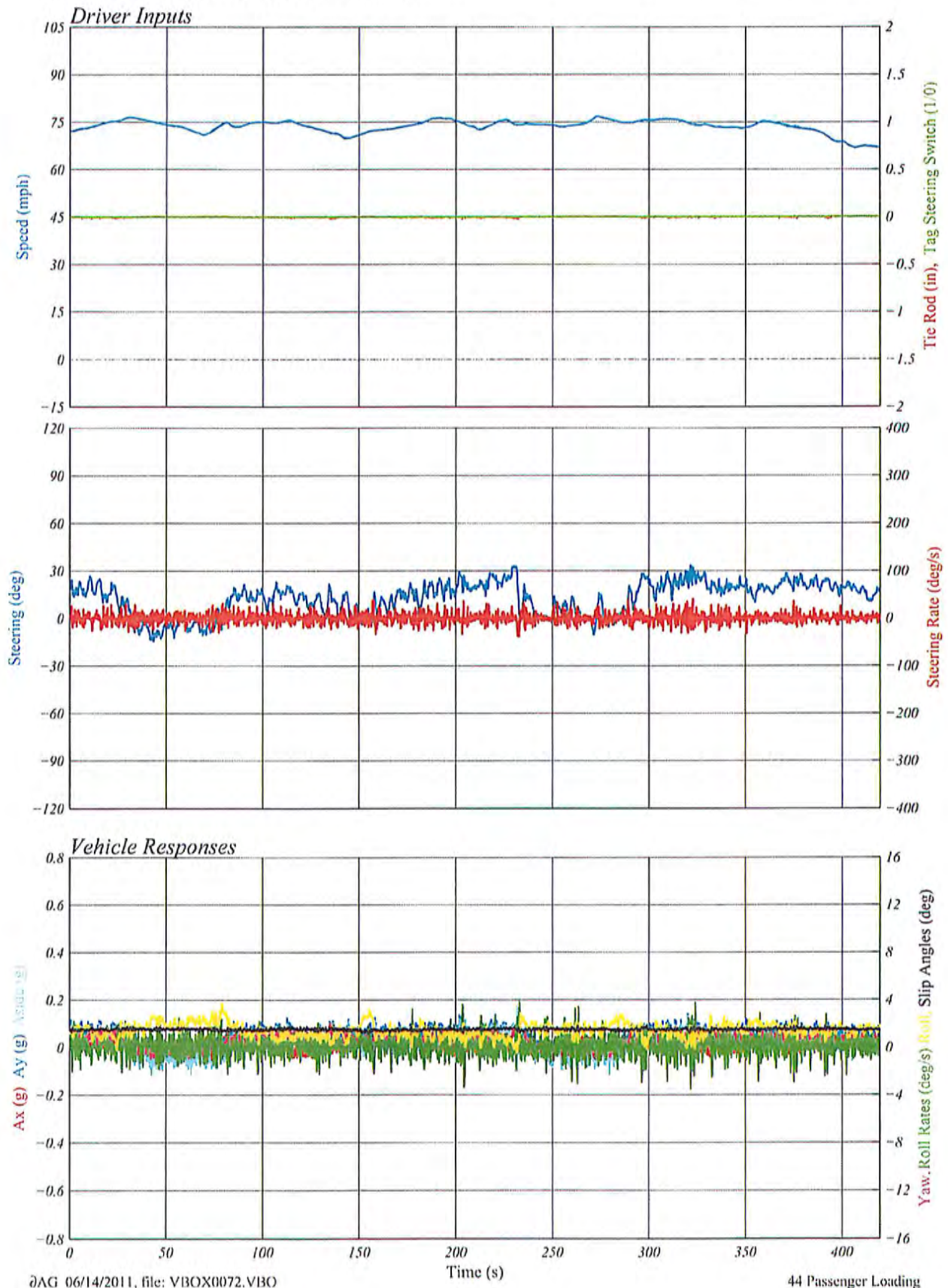
Modified U-joint Bearing – Lap 23



Test: 71

1995 MCI 102DL3

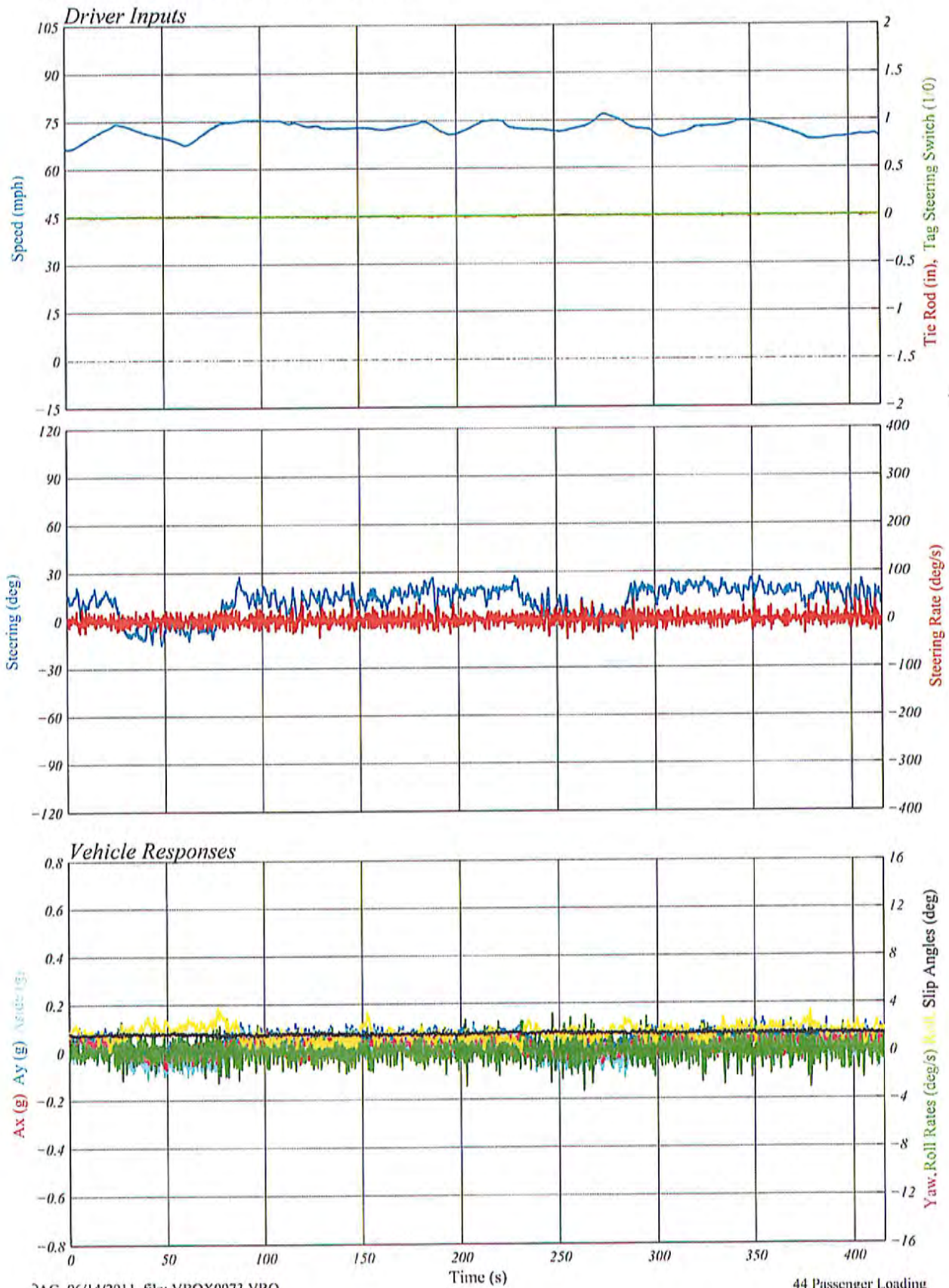
Modified U-joint Bearing – Lap 24



Test: 72

1995 MCI 102DL3

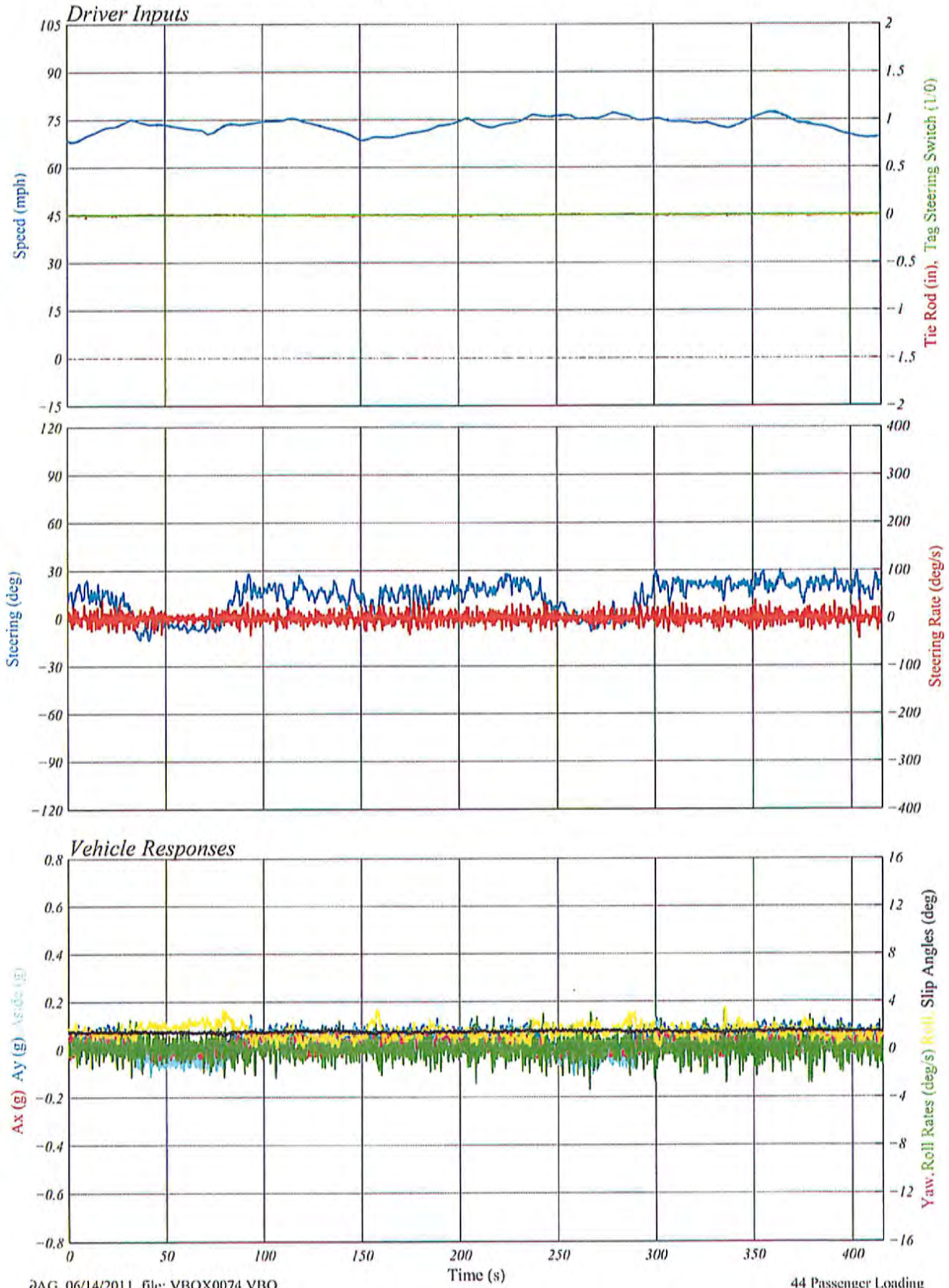
Modified U-joint Bearing – Lap 25



Test: 73

1995 MCI 102DL3

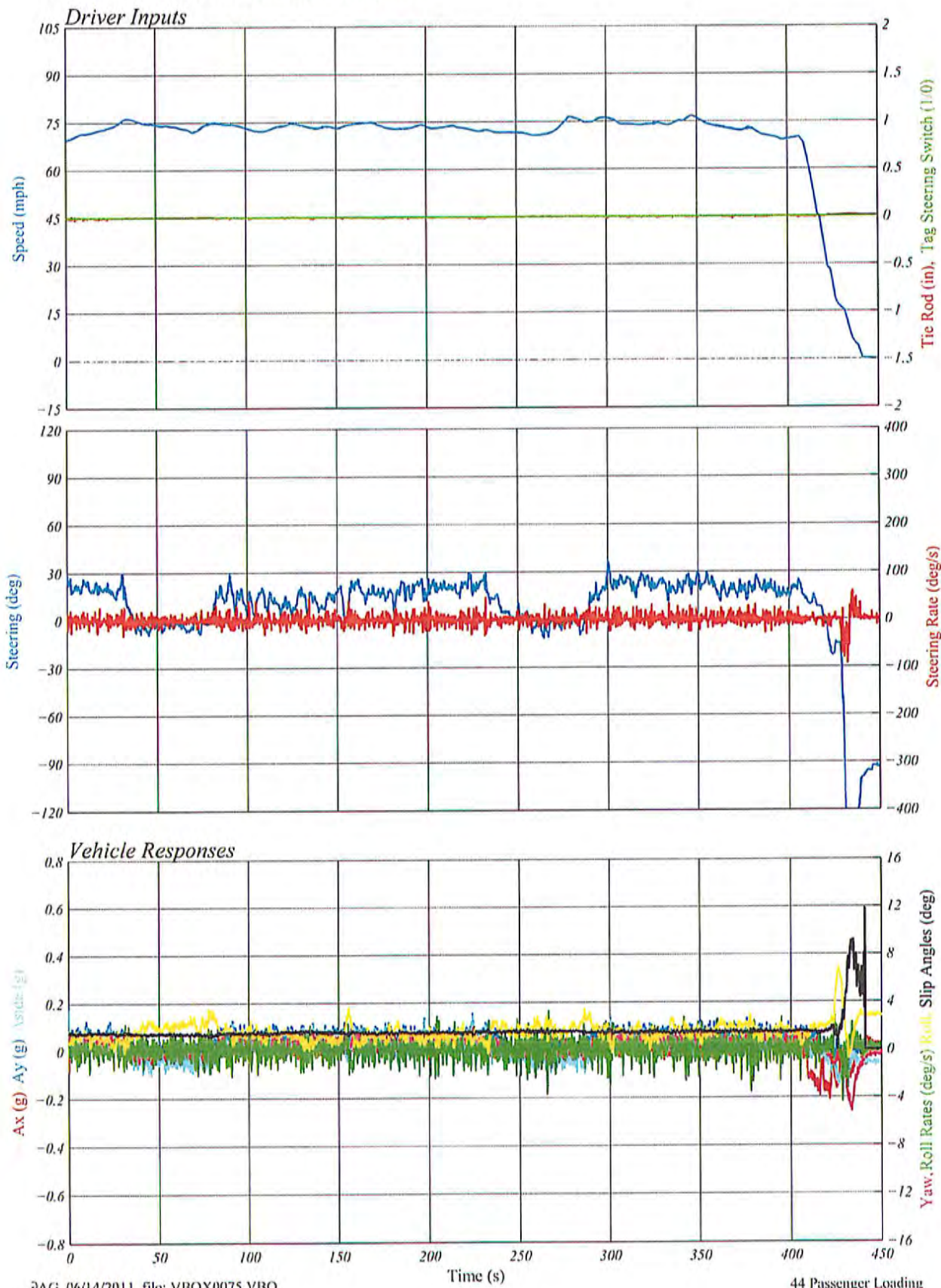
Modified U-joint Bearing – Lap 26



Test: 74

1995 MCI 102DL3

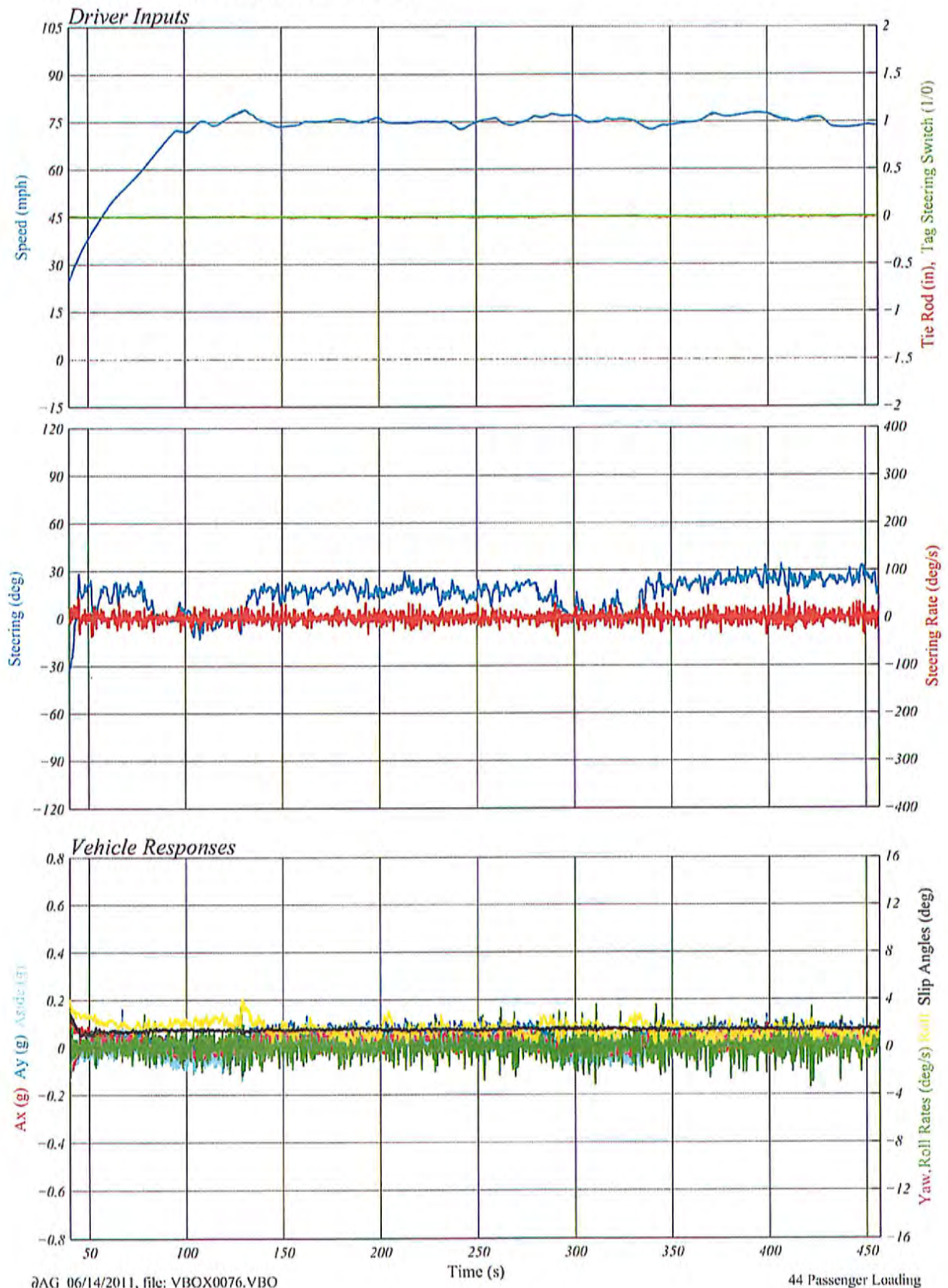
Modified U-joint Bearing – Lap 27



Test: 75

1995 MCI 102DL3

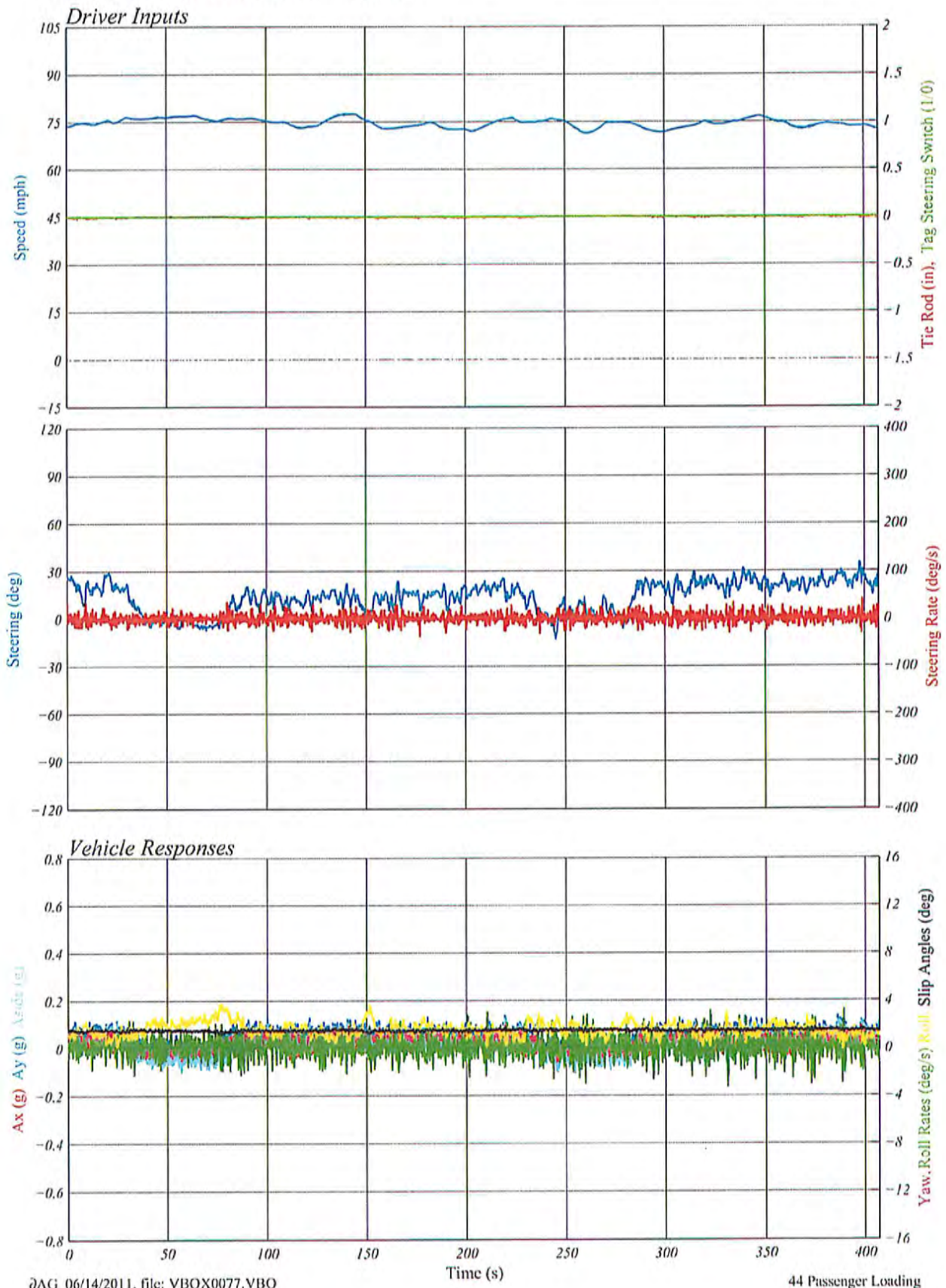
Modified U-joint Bearing – Lap 28



Test: 76

1995 MCI 102DL3

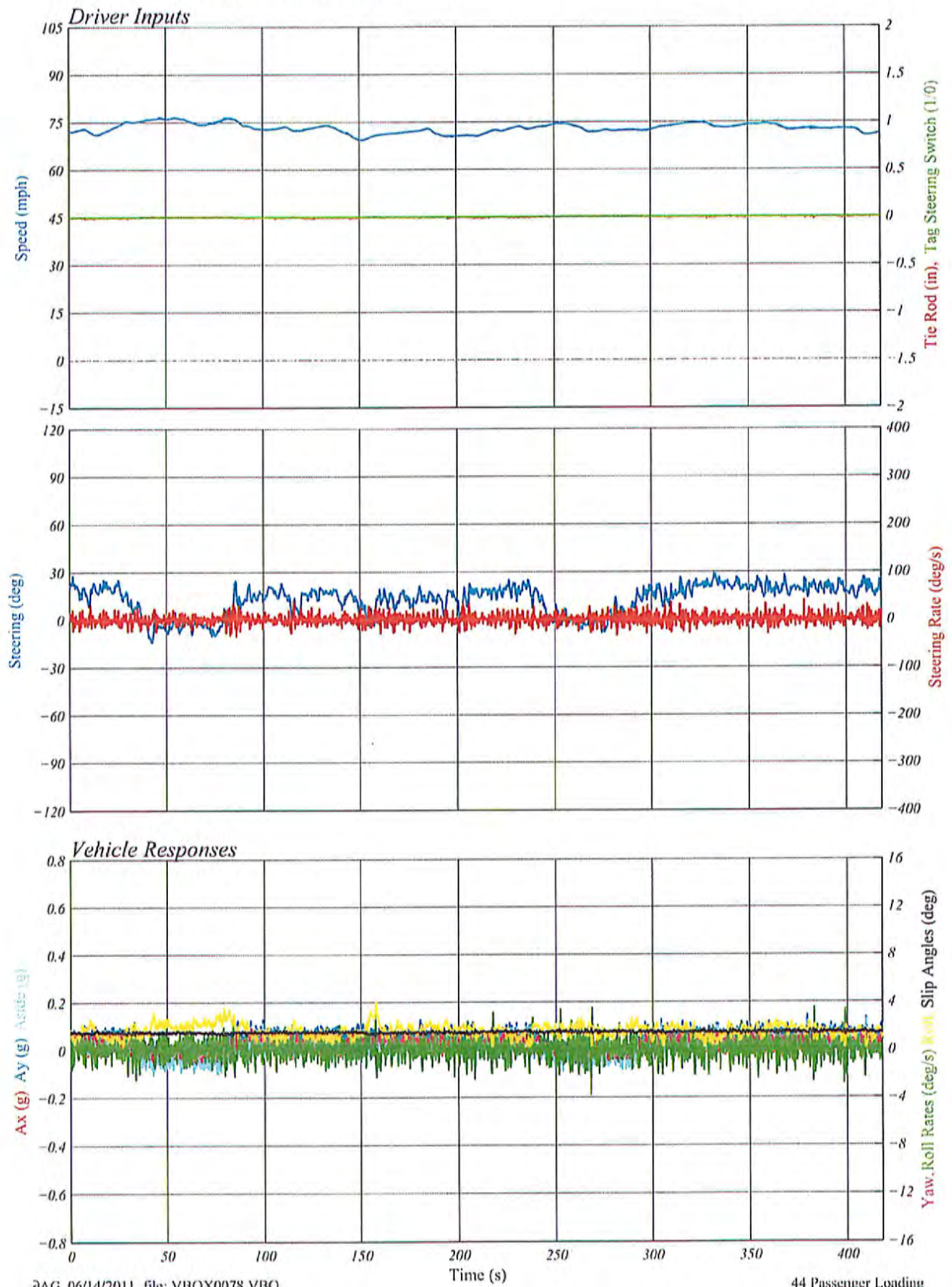
Modified U-joint Bearing – Lap 29



Test: 77

1995 MCI 102DL3

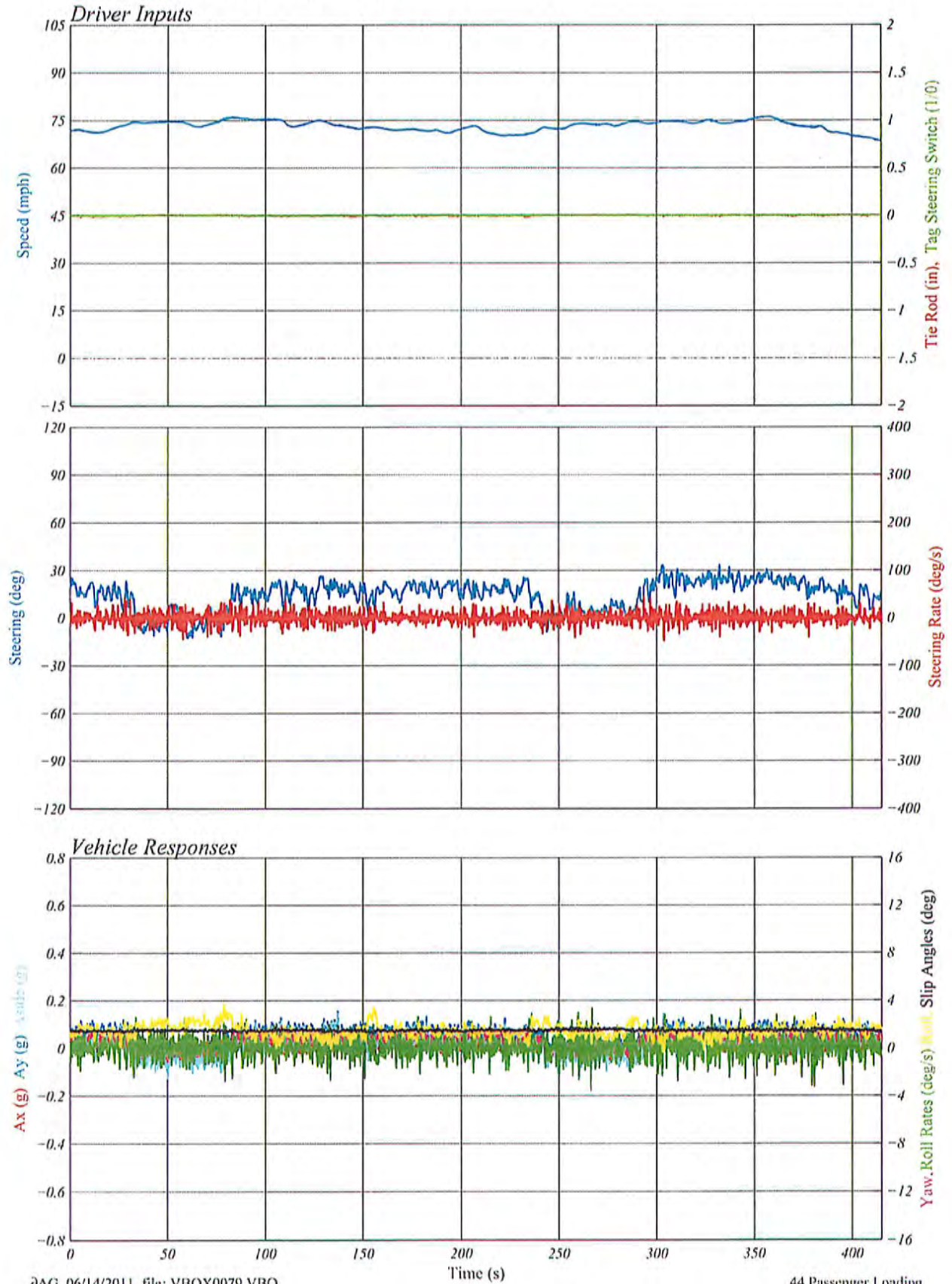
Modified U-joint Bearing – Lap 30



Test: 78

1995 MCI 102DL3

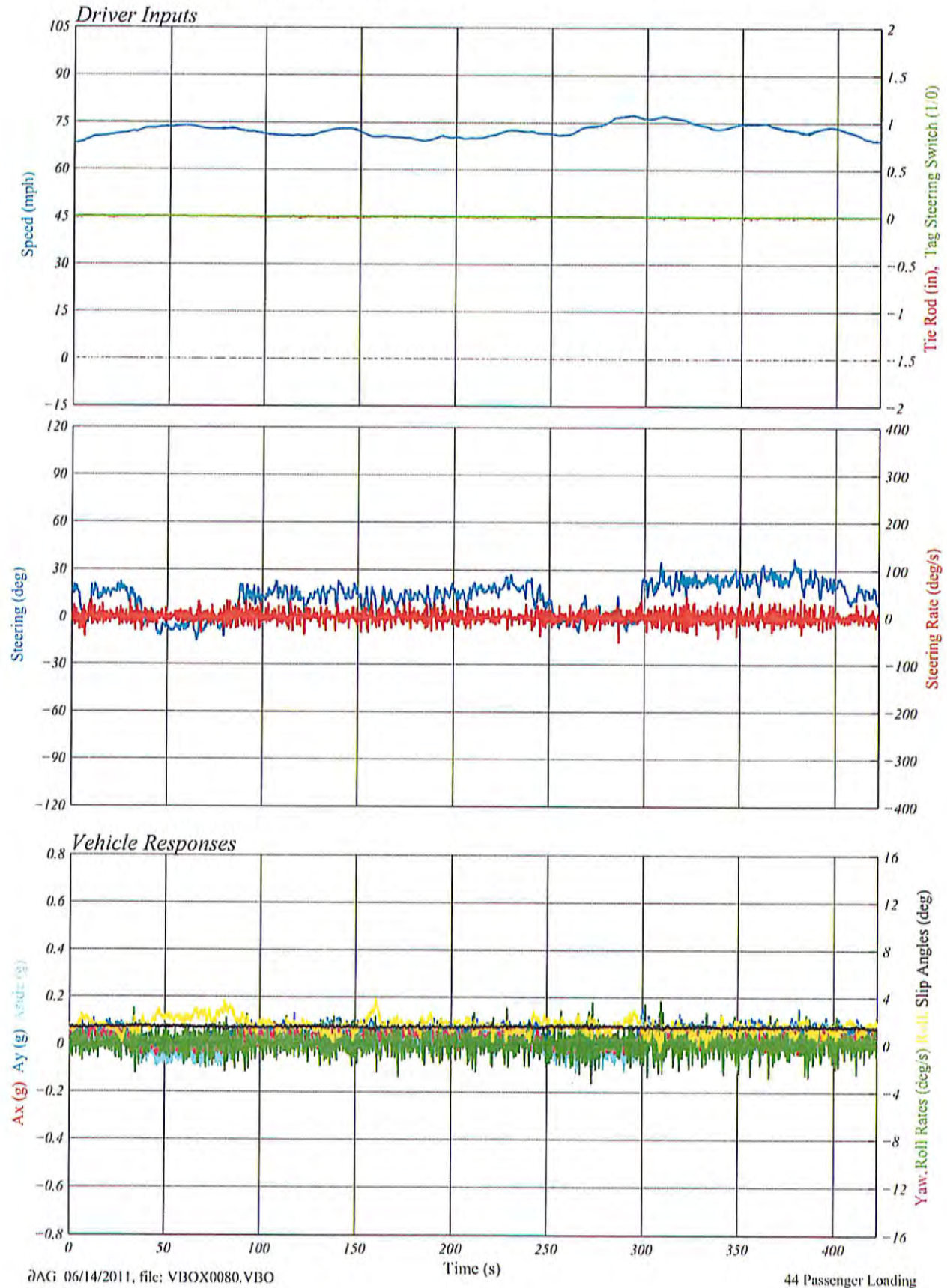
Modified U-joint Bearing – Lap 31



Test: 79

1995 MCI 102DL3

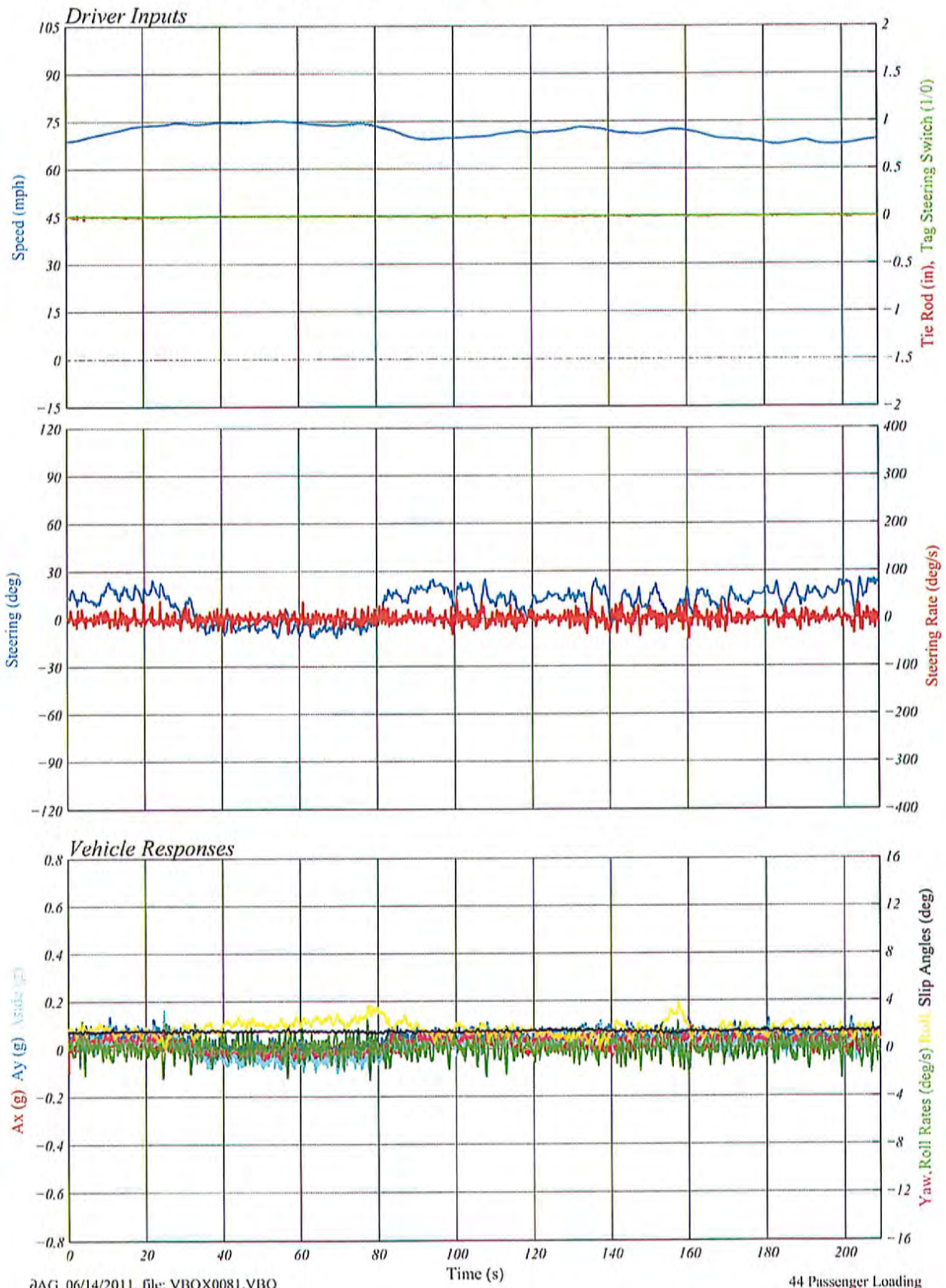
Modified U-joint Bearing – Lap 32



Test: 80

1995 MCI 102DL3

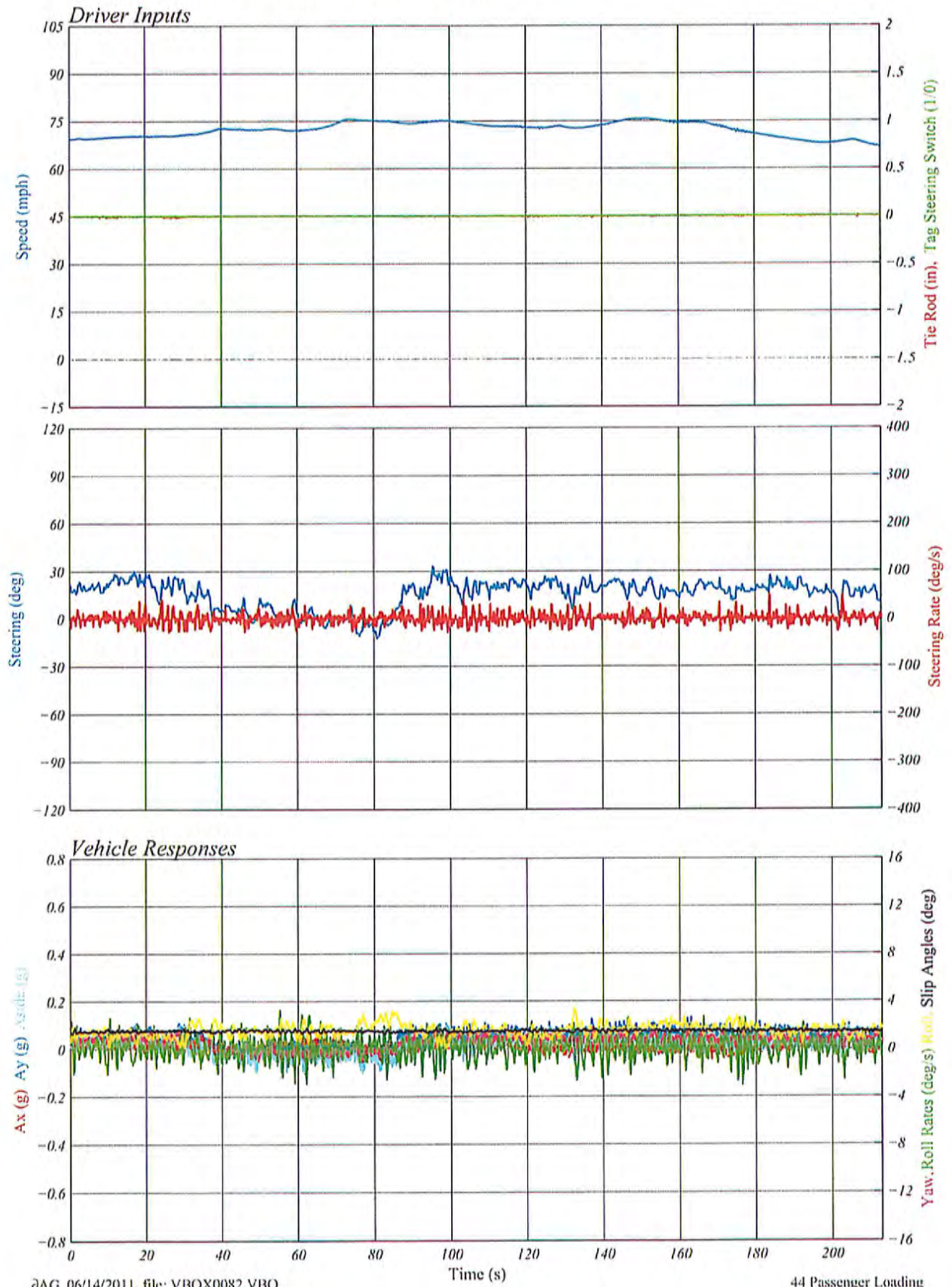
Modified U-joint Bearing – Lap 33, first half



Test: 81

1995 MCI 102DL3

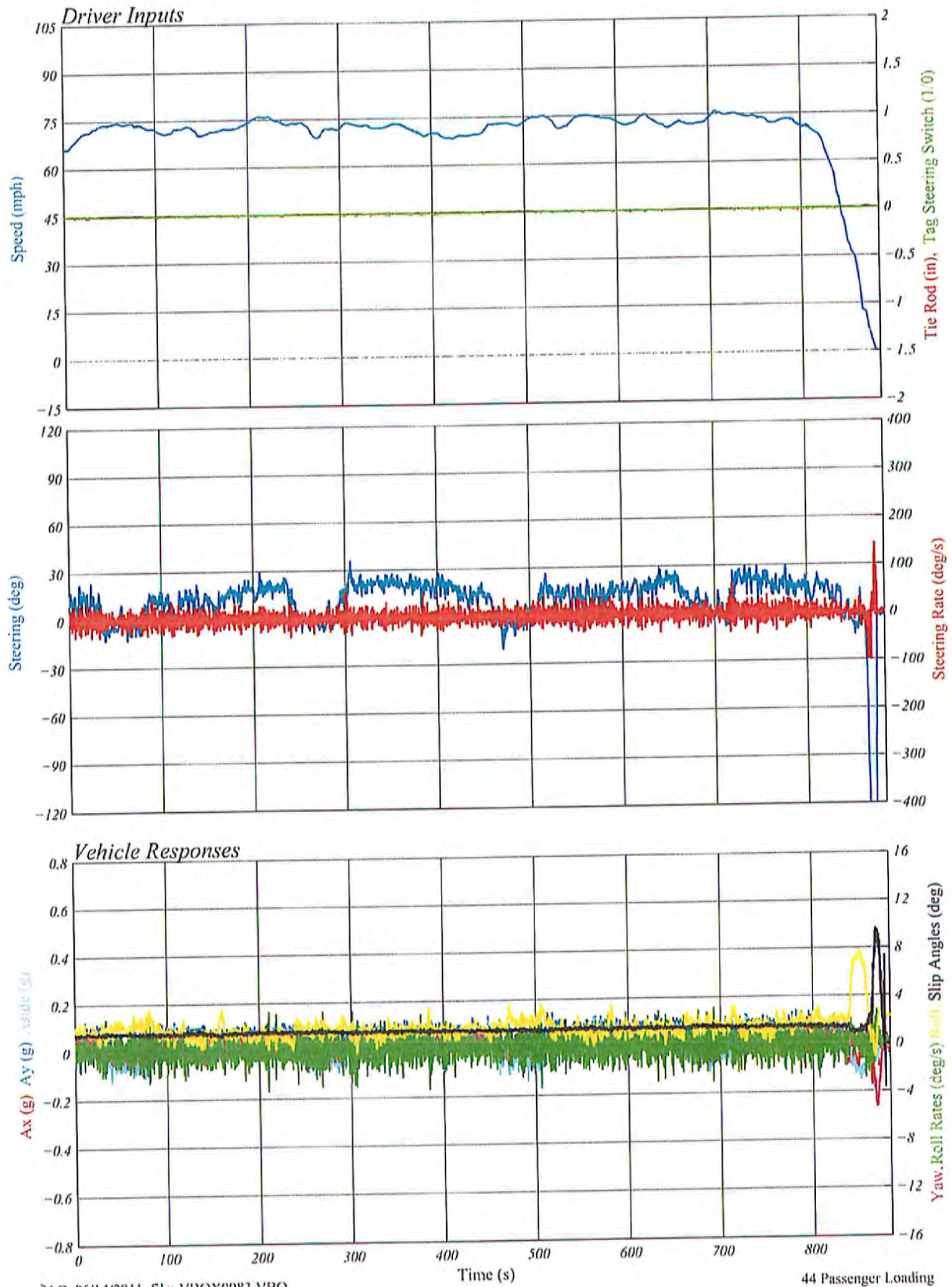
Modified U-joint Bearing – Lap 33, second half



Test: 82

1995 MCI 102DL3

Modified U-joint Bearing – Laps 34 & 35



Analysis 8

1995 MCI 102DL3 Vehicle Testing

Driveshaft & U-Joints

Inspection, Disassembly,
& Modification

June 12-14, 2011

0AG

DYNAMIC ANALYSIS GROUP LLC

Vehicle.png



Vehicle_2886.jpg



Vehicle_2887.jpg



Vehicle_2888.jpg

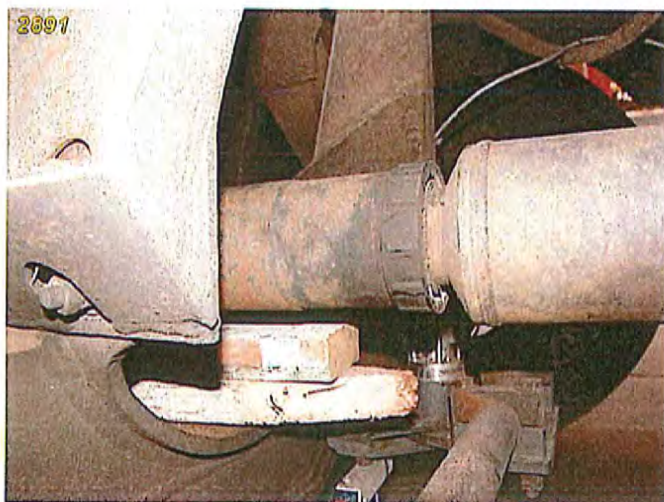


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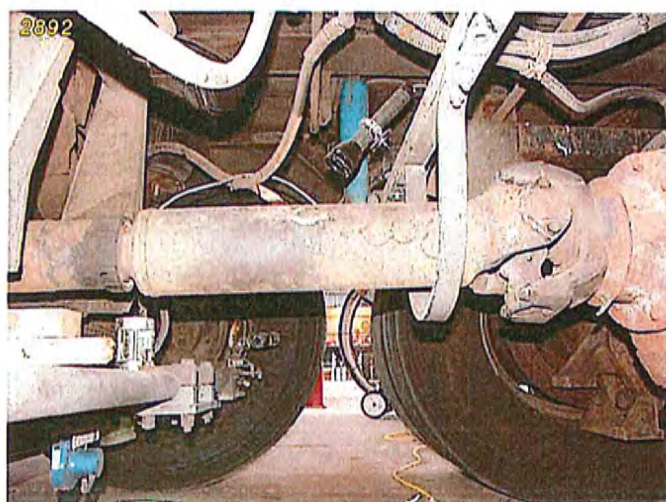


Vehicle_2890.jpg

1995 MCI 102DL3 Vehicle Testing



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Vehicle_2892.jpg



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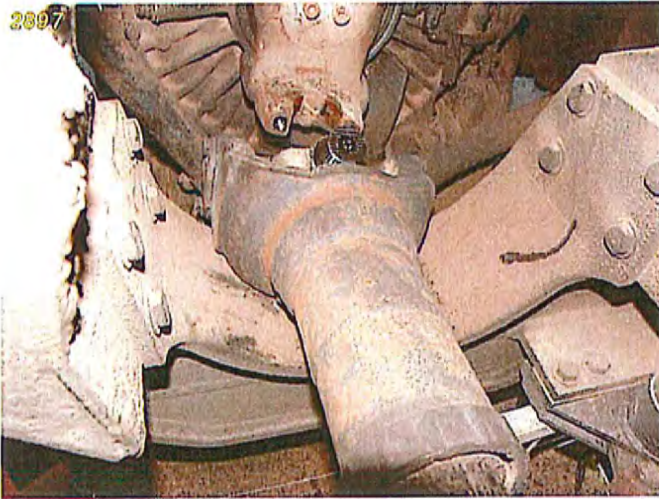


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1995 MCI 102DL3 Vehicle Testing



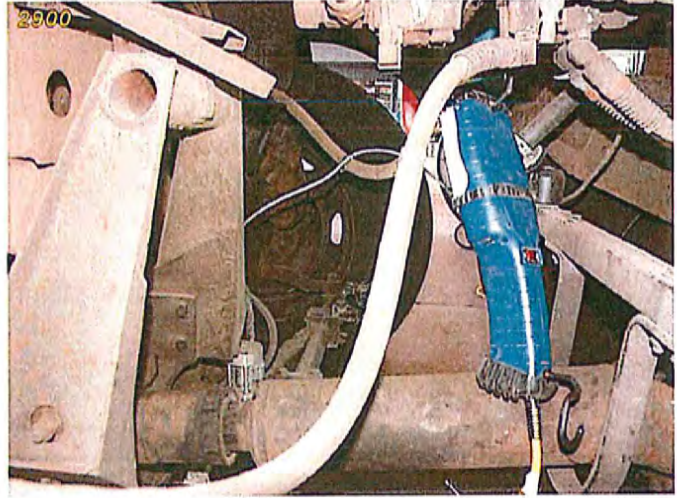
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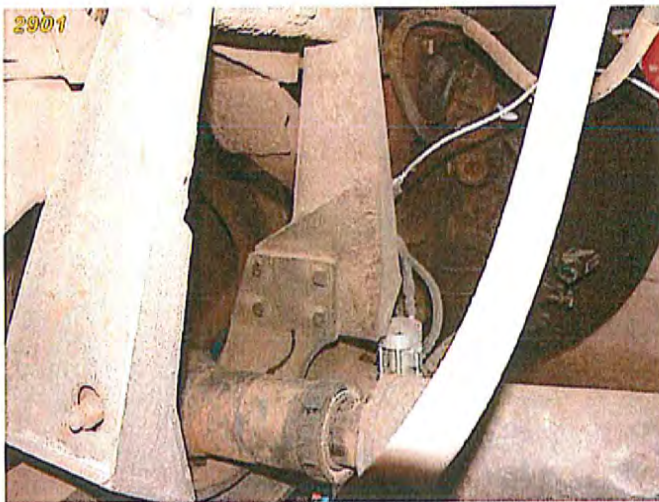
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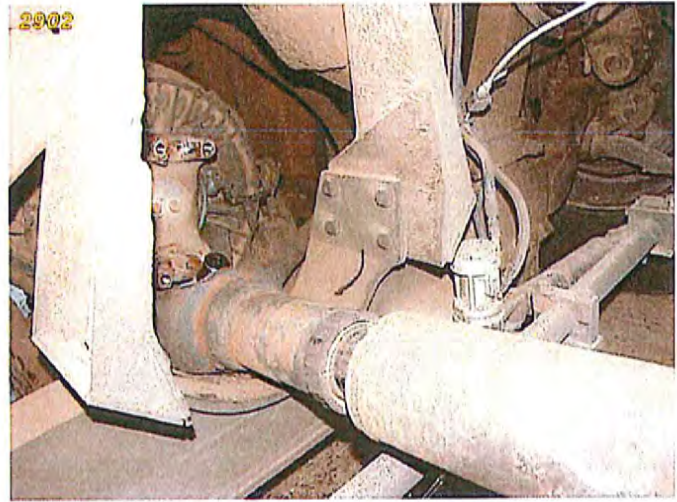
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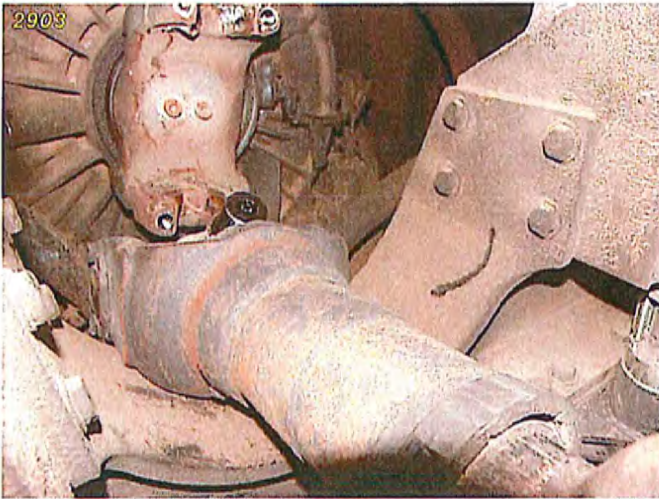


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1995 MCI 102DL3 Vehicle Testing



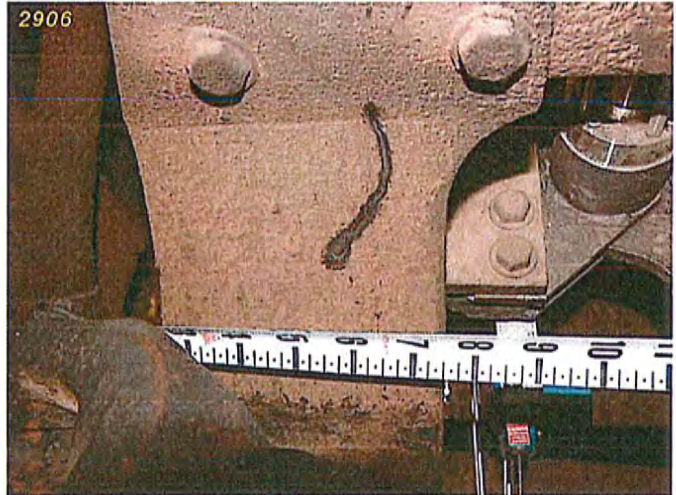
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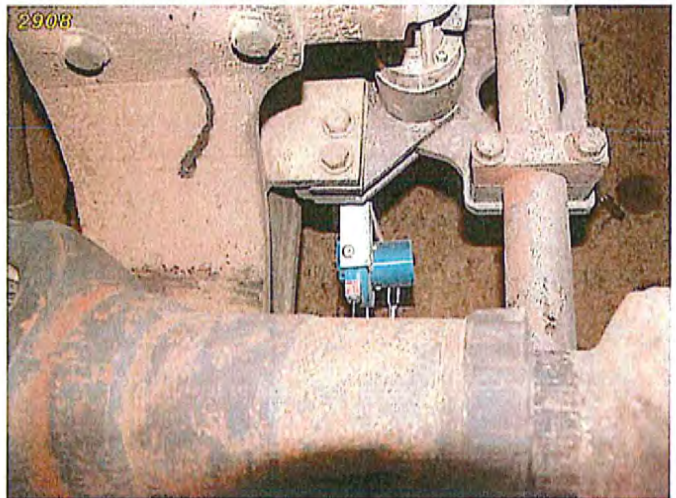
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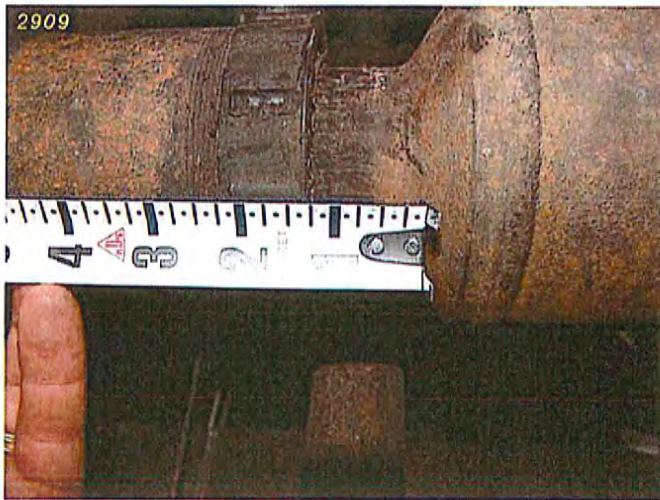


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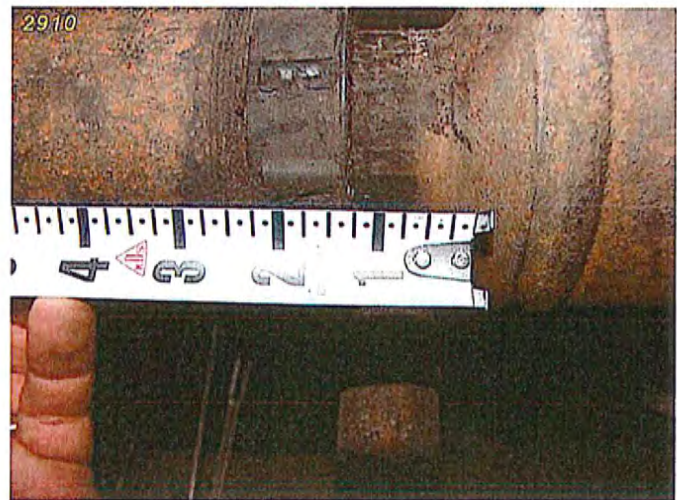


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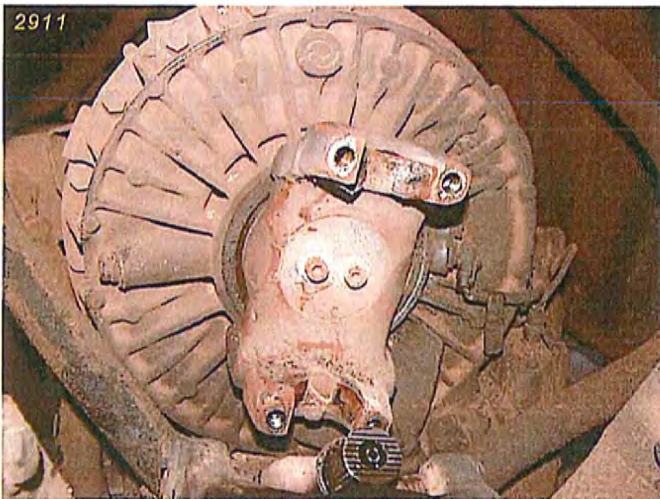
1995 MCI 102DL3 Vehicle Testing



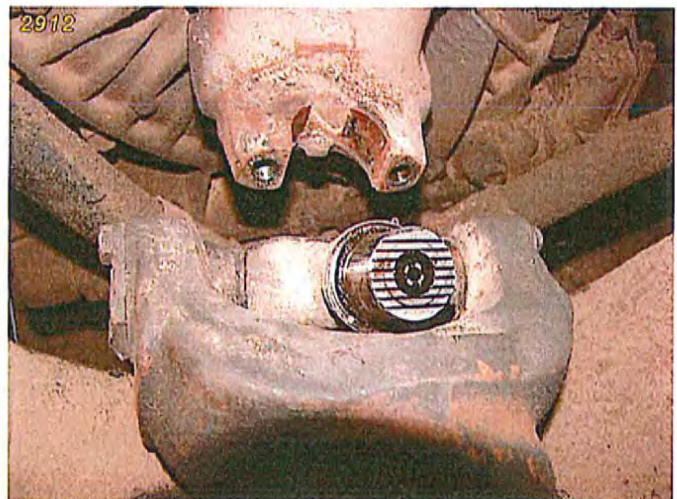
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Vehicle_2910.jpg



Vehicle_2911.jpg



Vehicle_2912.jpg



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1995 MCI 102DL3 Vehicle Testing



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1995 MCI 102DL3 Vehicle Testing



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1995 MCI 102DL3 Vehicle Testing



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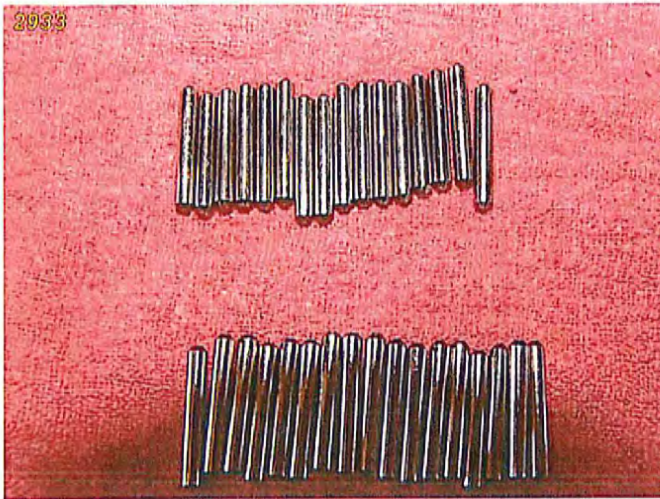


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1995 MCI 102DL3 Vehicle Testing



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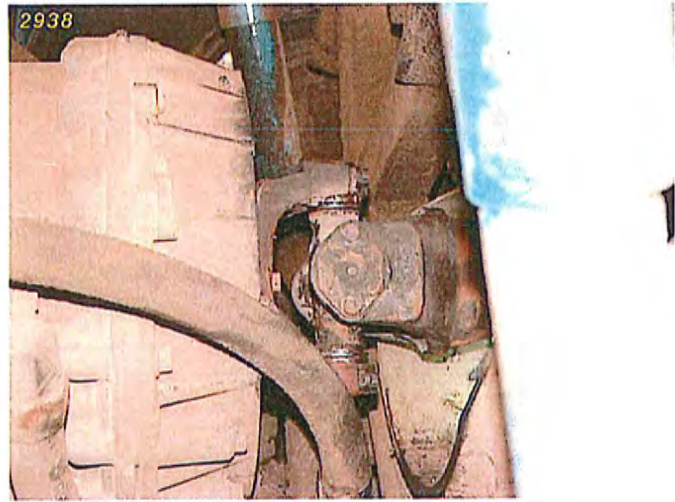
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Vehicle_2936.jpg



Vehicle_2937.jpg



Vehicle_2938.jpg

1995 MCI 102DL3 Vehicle Testing

Driveshaft & U-Joints

Re-Installation

June 12-14, 2011

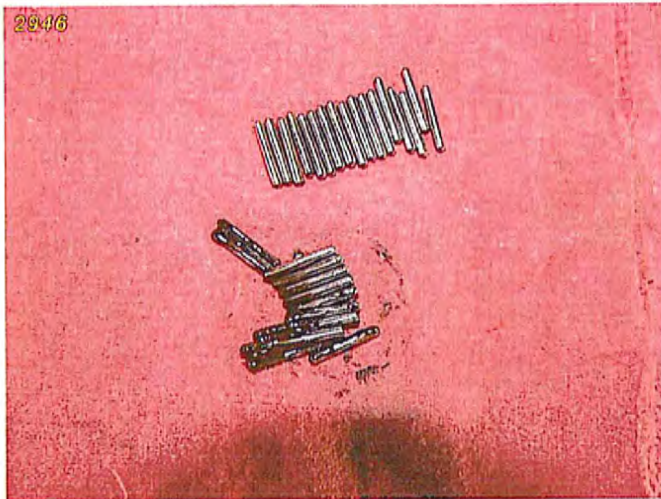
DAG

DYNAMIC ANALYSIS GROUP LLC

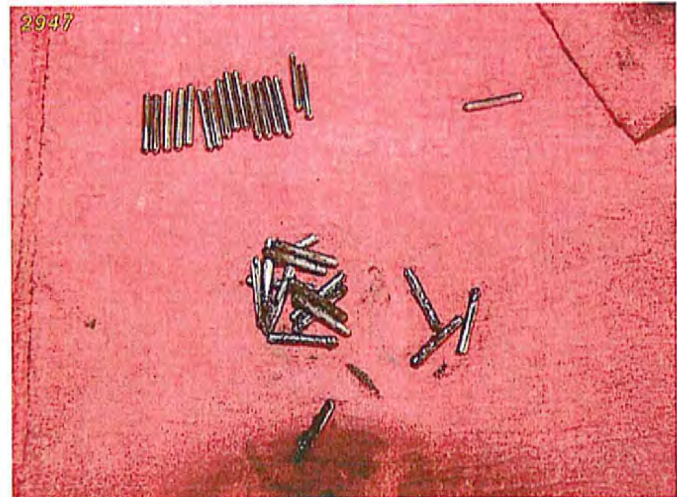
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Vehicle_2947.jpg

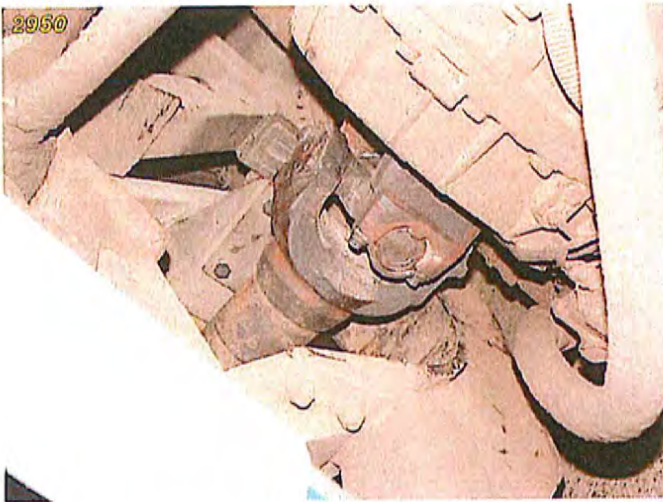


Vehicle_2948.jpg

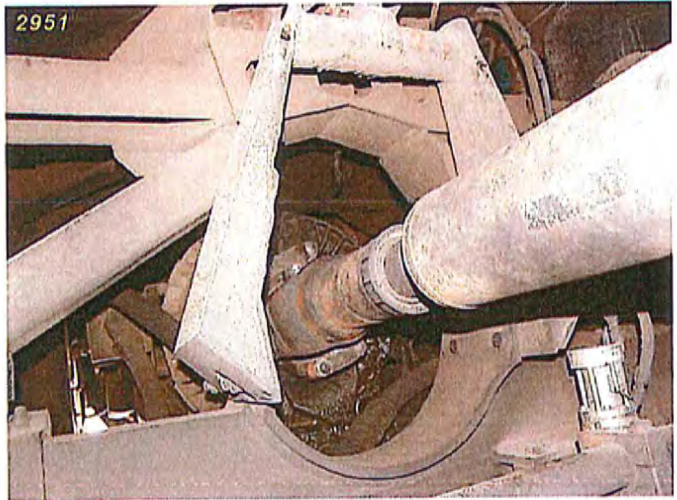


Vehicle_2949.jpg

1995 MCI 102DL3 Vehicle Testing



Vehicle_2950.jpg



Vehicle_2951.jpg



Vehicle_2952.jpg



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Vehicle_2954.jpg



Vehicle_2955.jpg

1995 MCI 102DL3 Vehicle Testing



Vehicle_2956.jpg



Vehicle_2957.jpg

1995 MCI 102DL3 Vehicle Testing

Driveshaft & U-Joints

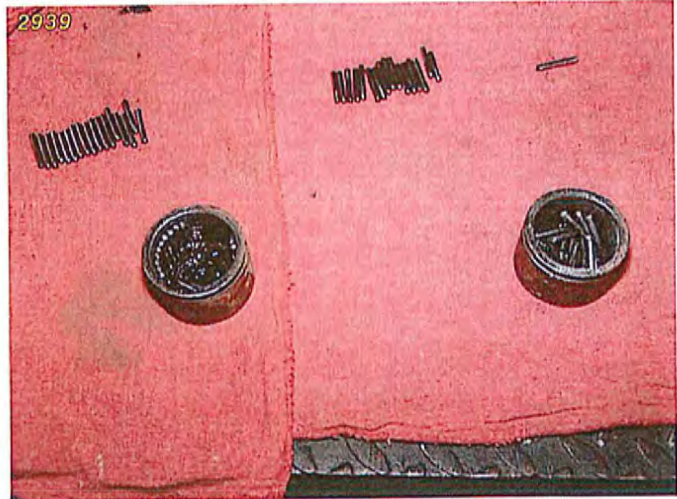
Post-Test Inspection First Sequence

June 12-14, 2011

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DYNAMIC ANALYSIS GROUP LLC

Vehicle.png



Vehicle_2939.jpg



Vehicle_2940.jpg



Vehicle_2941.jpg



Vehicle_2942.jpg



Vehicle_2943.jpg

1995 MCI 102DL3 Vehicle Testing



Vehicle_2944.jpg

PE12-007

MCI

4-27-2012

Response 10

Attachment F-1

Caster Change Estimation - AUSA Test Video



Dynamic Analysis Group

Caster Change Estimation - AUSA Test Video



Dynamic Analysis Group

Caster Change Estimation - AUSA Test Video



Dynamic Analysis Group

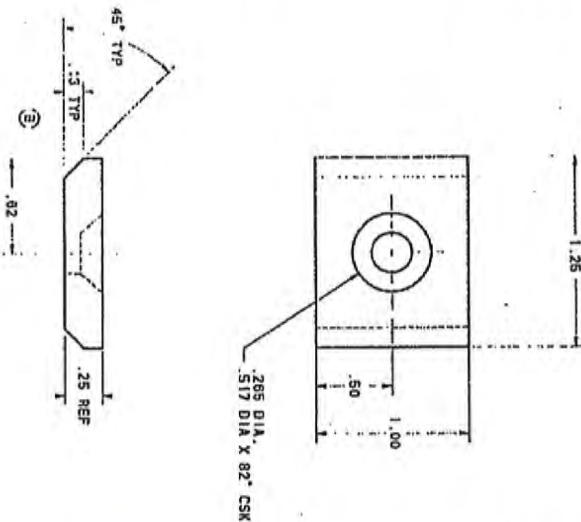




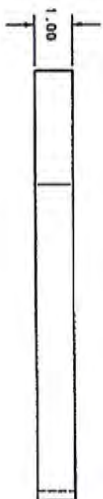
21 REMOVE ALL BURRS AND SHARP EDGES

[illegible]

NOTES :
: MATERIAL: .250
ASTM A276 - LATEST ISSUE
TYPE 304
FINISH H.R.



REV	120 00371	REV/RM	NO 26	QTY	2	REGRAN, CHAMFER ADDED
QTY	250	REV	OK	APP		REWORK
THIS DOCUMENT IS THE PROPERTY OF THE COMPANY AND IS NOT TO BE LOANED, REPRODUCED, COPIED, OR IN ANY MANNER DISCLOSED TO ANY PERSONS OR ORGANIZATIONS WITHOUT THE WRITTEN CONSENT OF THE COMPANY.						
						
THIRD ANGLE PROJECTION		UNLESS SPECIFIED OTHERWISE		DIMS IN INCHES		
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1) MATERIAL: .260
ASTM A242 - LATEST ISSUE
TYPE 1
H.R.

[illegible]



PE12-007

MCI

4-27-2012

Response 10

Attachment F-2

CAUSE NO. 2010-03-001717-C

DANIEL CAMPOS, et al.,

Plaintiffs and Intervenors,

v.

AMERICANOS U.S.A., L.L.C., et al.,

Defendants.

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IN THE DISTRICT COURT OF

CAMERON COUNTY, TEXAS

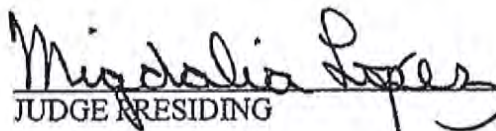
197th JUDICIAL DISTRICT

**ORDER ON AMERICANOS U.S.A., L.L.C.'S ORAL NOTICE OF NON-SUIT
OF ALL CLAIMS AGAINST MOTOR COACH INDUSTRIES, INC.
AND MCI SERVICE PARTS, INC.**

On this day came on to be heard Americanos U.S.A., L.L.C.'s Oral Notice of Nonsuit Without Prejudice of All Claims Against Defendants Motor Coach Industries, Inc. and MCI Service Parts, Inc. The Court, having considered the Notice, finds that it is well taken and should be in all things GRANTED; and

IT IS ACCORDINGLY ORDERED, ADJUDGED AND DECREED that all of Americanos U.S.A., L.L.C.'s claims against Defendants Motor Coach Industries, Inc. and MCI Service Parts, Inc. in this case are hereby DISMISSED WITHOUT PREJUDICE.

SIGNED on this 16th day of April, 2012.

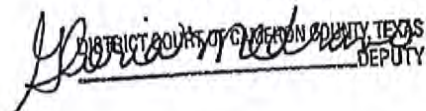

JUDGE PRESIDING

4/16/12 COPIES TO:

ALL KNOWN COUNSEL

FILED 11:00 O'CLOCK 2 M
AURORA DE LA GARZA, CLERK

APR 16 2012


DISTRICT COURT OF CAMERON COUNTY, TEXAS
DEPUTY

PE12-007

MCI

4-27-2012

Response 10

Attachment J-1

CARR ENGINEERING, INC.
12500 Castlebridge Drive
Houston, Texas 77065-4532
Telephone: 281/894-8955
Fax: 281/894-5455

February 15, 2012

Ms. Melissa Dorman
Hartline Dacus Barger Dreyer LLP
6688 North Central Expressway
Suite 1000
Dallas, TX 75206

Re: [REDACTED] v. Americanos, U.S.A. L.L.C. et. al.

Dear Ms. Dorman:

I provided an initial report that summarized my opinions in this matter as of August 11, 2011. Since the writing of that report, the attached list of materials has been analyzed. Of particular interest were the depositions of the various experts and the supplemental reports by Americanos' experts Aaron Jones, Thomas Fugger and Lawrence Yohe. Messrs. Jones, Fugger and Yohe provided supplemental opinions related to exemplar bus testing and several exemplar buses that had experienced driveshaft failures allegedly similar to the crash-involved bus. The opinions expressed in my initial report have not been changed and/or modified. However, the additional opinions that have been reached as a result of my review of the new materials are as follows:

Unit 6352

1. This was a 2000 MCI model 102DL3 that allegedly experienced a driveshaft failure similar to the [REDACTED] bus. Unit 6352 was involved in a crash on the Pennsylvania Turnpike on August 13, 2011. I have analyzed the police report and news video/photos/articles. The crash occurred as the bus was traveling westbound on the Pennsylvania Turnpike in Lancaster County, PA. 18 passengers were onboard. In the area of the crash, the highway is a four lane paved asphalt roadway with improved, paved shoulders. The westbound and eastbound lanes are divided by a concrete median barrier. The posted speed limit is 65 miles per hour. The police report indicates that at the time of the crash the roadway surface was "dry", the weather conditions were "no adverse conditions" and the illumination was "daylight". The road is downhill and curves to the right in the westbound direction. To the north of the pavement lies an earthen embankment.

2. According to the police information, the bus was "traveling westbound in the left lane. The driver lost control and struck the Jersey Barrier." The bus then traveled along the barrier for approximately 432 feet, turned to the right and traveled across both westbound travel lanes. The bus subsequently collided with the earthen embankment on the north side of the highway. The embankment impact caused the bus to overturn driver's side leading. The bus continued sliding and spinning in the clockwise direction while on its driver's side and roof. The bus came to rest on its driver's side in the westbound travel lanes with its front end pointing towards the east. The investigating officer found the "Prime Factor Driver Action" to be "driver was distracted".
3. The police drawing indicates that the first sign of physical evidence was the point of impact between the bus and the concrete median barrier. The police did not find any bus components or bus pieces preceding the barrier impact. The police report indicates that the "drive axle (sic) also became separated and was found underneath the bus after the bus had been uprighted."
4. The crash scene was inspected on February 1, 2012. To date, limited information has been provided in the area of the initial barrier contact. According to a Pennsylvania Turnpike representative, there were no tire marks on the roadway leading up to the initial contact with the median barrier. The representative also indicated that the bus's impact with the concrete median barrier was of a large enough magnitude that it required the damaged barrier sections to be replaced. At the time of the scene inspection, two new sections of concrete were visible in the barrier wall. The limited news coverage documented the bus's path as it traveled post-impact with the barrier. The bus traveled across the westbound lanes, slammed into the earthen embankment and slid/spun to its point of rest. A single tire mark was found which lead up to a "scar" in the earthen embankment created by the bus's front end. Various bus pieces and glass fragments were found on the side of the embankment. The news photographs/video footage was used to locate the point of the rest of the bus.
5. The crash bus was inspected on January 25, 2012. Based on the layout of the highway, it is likely that the left front wheel first collided with the barrier. Concrete residue was found on the ends of the left front lug nuts. The impact forces caused the bus to rotate abruptly in the clockwise direction. This caused the left side of the tag and drive axle wheels to slam into the vertical face of the barrier. Examination of the undercarriage revealed that the secondary impact with the barrier caused the entire tag axle to be shifted substantially from left to right. This lateral shift was found to be approximately 4.5" in the static state. The upper and lower radius rods were buckled on the left and right side. The lateral movement of the tag axle was large enough such that the tag axle pass through came into contact with the transmission/driveshaft universal joint and pinned it against the inner surface of the pass through. This pinning action of the universal joint literally tore the universal joint apart freeing the transmission end of the driveshaft. Once the driveshaft end was free to rotate, it contacted the tie rod and tag axle locking plates and disabled the tag axle locking mechanism. The lateral displacement of the tag axle from left to right, resulting in moving the tag axle locking cylinder and locking plates closer to the centerline of the coach and thus closer to the flailing end of the driveshaft.

The tag axle caster latch arm was found castered forward which is improperly positioned for forward travel. No evidence of direct contact was noted on the latch arm assembly. Based on the absence of direct contact, a likely reason for the latch arm assembly to be mispositioned is due to the huge amount of lateral displacement in the tag axle and the deformed suspension components.

The driveshaft was found completely separated from the bus. Both ears on the transmission side yoke were broken in half. Notably absent were the circumferential scratches on the exterior of the driveshaft near the differential connection. The presence of those scratches indicates that the driveshaft is rotating while in contact with the loop for an extended period of time. The absence of those scratches indicates that the driveshaft did not rotate a substantial amount prior to getting torn free from the bus.

Numerous scratches were found on the bus's exterior along the driver's side and roof. The scratches indicated that the bus initially rolled onto its driver's side and then rolled onto its roof while positioned on the embankment. The bus slid on its roof backwards while in contact with the embankment before eventually sliding/spinning back into the westbound travel lanes. It rolled back onto its driver's side prior to coming to rest.

Dirt and grass were found imbedded in the front face and under the front bumper of the bus. The presence of the dirt/grass across the front end of the bus indicated that the bus was upright when it collided with the earthen embankment.

The bus was inspected for mechanical problems that could have caused or contributed to the crash. No problems were found.

6. Based on my reconstruction to date, I have determined that that the Pennsylvania Unit 6352 bus crash is not substantially similar to the [REDACTED] bus crash. Although each crash involves the same model MCI bus and both buses had separated driveshafts, the crashes are significantly different in the following ways:

- In the Pennsylvania crash the loss of control was likely due to driver distraction. The driver failed to steer or brake his bus before colliding with the barrier. The cause of the loss of control in the [REDACTED] crash was due to the bus driver steering and braking in response to a mechanical failure.
- In the Pennsylvania crash there was no physical evidence from the bus prior to the barrier impact. In the Pennsylvania crash there were no driveshaft components or tire marks left on the roadway prior to the loss of control and barrier collision. In the [REDACTED] crash, the police found pieces from the driveshaft universal joint prior to the loss of control and distinctive tire marks created once the driveshaft was disconnected on one end.
- In the Pennsylvania crash, the driveshaft universal joint was torn apart because the tag axle was pushed laterally to the point where it impacted/impinged and then stopped the rotating universal joint. In the [REDACTED] crash the universal joint failed due to the improper maintenance and it was not an impact induced failure. In the [REDACTED] crash, the lateral movement of the tag axle was essentially negligible.

- In the Pennsylvania crash, the bus's driveshaft did not have the circumferential scratches on the exterior of the driveshaft near the differential connection. The absence of those scratches indicates that the driveshaft did not rotate a substantial amount prior to getting torn free from the bus. In the [REDACTED] crash, the driveshaft had numerous scratches around the circumference. This was indicative of the driveshaft rotating for an extended period of time while in contact with the loop.
- In the Pennsylvania crash, the bus was caused to overturn due to the impact forces from the bus slamming into the embankment, front end leading. Those impact forces literally caused the bus to enter into a sudden clockwise rotation which overcame the stability of the bus. In the [REDACTED] crash, the bus was caused to overturn due a combination of steering and braking forces which ultimately got the bus sliding sideways and furrowing into the earth. The [REDACTED] bus rollover was a steering/braking induced rollover not an impact induced rollover.

Unit 6468

1. This was a 2000 MCI model 102DL3 that allegedly experienced a driveshaft failure similar to the [REDACTED] bus. Based on the information that has been provided to date, this bus was not involved in a crash. Per Aaron Jones, this bus had been recently refurbished.
2. The bus was inspected on January 25, 2012. Examination of the undercarriage revealed that the driveshaft experienced a universal joint separation at the transmission connection. There were numerous impact marks on the tag axle pass through. There were also some contact marks on the upper tag axle locking plate. The tie rod locking plate and locking pin had been displaced forward, but the tag axle lock assembly was still locked in place.

The tag axle caster latch arm was found properly positioned for forward travel. (In Aaron Jones' report he noted that the tag axle caster latch arm was "displaced from its correct position for forward driving". This comment disagrees with my findings and what is shown in Jones' inspection photographs.)

The driveshaft was not available for inspection. Photographs of the driveshaft indicate that both ears on the transmission side yoke were broken in half. Circumferential scratches were present on the exterior of the driveshaft near the differential connection. The presence of those scratches indicates that the driveshaft was rotating while in contact with the loop for an extended period of time. At this time the cause of the driveshaft universal joint failure is unknown.

3. Based on my analysis to date, I have determined that the Unit 6468 bus incident is not substantially similar to the [REDACTED] bus. Although each case study involves the same model MCI bus and both buses had separated driveshafts, the evidence in both cases is significantly different in the following ways:

- Based on the information that has been provided and my inspection of [REDACTED] it does not appear that the [REDACTED] bus driver ever lost control of the bus. Unlike the crash-involved [REDACTED] bus, [REDACTED] was not involved in any type of loss of control or rollover crash. It is worthwhile noting that [REDACTED] case study shows that even in the presence of a failed driveshaft, a driver is able to maintain control of an MCI model 102DL3.
- The tag axle lock assembly for [REDACTED] never became unlocked under any condition during the incident. In the [REDACTED] crash, the tag axle was found in the unlocked position at the bus's point of rest.
- The tag axle caster latch arm for [REDACTED] was found properly positioned for forward travel. In the [REDACTED] crash, the tag axle latch arm was found to be mispositioned for forward travel at the bus's point of rest while the bus was laying on its side.

Unit 6934

1. This was a 2000 MCI model 102DL3 that allegedly experienced a driveshaft failure similar to the [REDACTED] bus. Based on the information that has been provided to date, this bus was not involved in a crash. Per [REDACTED] this bus had been recently refurbished.
2. The bus was inspected on January 25, 2012. Examination of the undercarriage revealed that the driveshaft experienced a universal joint separation at the transmission connection. There were numerous impact marks on the tag axle pass through. The tag axle locking plates were found unbolted from the bus. Both plates were bent downward. To date, there has not been enough information provided to determine if the tag axle became unlocked during the incident.

The tie rod was found in the interior of the bus. The tie rod was bent and there was a gouge mark in the tie rod at the location of the maximum bend.

The tag axle caster latch arm was found properly positioned for forward travel.

The driveshaft was not available for inspection. At this time the cause of the driveshaft universal joint failure is unknown.

The transmission housing was cracked. Several pieces were found in the interior of the bus.

3. Based on my analysis to date, I have determined that the [REDACTED] bus incident is not substantially similar to the [REDACTED] bus. Although each case study involves the same model MCI bus and both buses had separated driveshafts, the evidence in both cases is significantly different in the following ways:
 - Based on the information that has been provided and my inspection of [REDACTED] it does not appear that the [REDACTED] bus driver ever lost control of the bus. Unlike the crash-involved [REDACTED] bus, [REDACTED] was not involved in any type of loss of control or rollover crash. It is worthwhile noting that [REDACTED] case study shows that even in the presence of a failed driveshaft (and possibly an unlocked tag axle lock cylinder), a driver is able to maintain control of an MCI model 102DL3.

- Based on the information to date, it cannot be determined if the tag axle locking cylinder for [REDACTED] ever became unlocked under any condition during the incident. In the [REDACTED] crash, the tag axle was found in the unlocked position at the bus's point of rest.
- The [REDACTED] tag axle caster latch arm was found properly positioned for forward travel. In the [REDACTED] crash, the tag axle latch arm was found to be mispositioned for forward travel.

[REDACTED]

1. This was an MCI model 102DL3 that was used in several tests performed by Americanos' experts.
2. In June 2011, [REDACTED] was initially used by Americanos' experts in driving demonstrations at the [REDACTED]
3. On August 25, 2011 and September 9, 2011, [REDACTED] was used by Americanos' experts to demonstrate a "newly designed" driveshaft guard. The experts intentionally caused the driveshaft universal joint to detach at the transmission connection. According to Aaron Jones' report, in the August 2011 test the "tag axle castered forward after being impacted with the driveshaft". The tests were videotaped and "Video 12" and "Video 15" were submitted as part of that testing. To date, Video 1 to Video 11, Video 13 and Video 14 have not been submitted for review nor have the driveshafts from those tests.
4. On September 20, 2011, [REDACTED] was used by Americanos' experts in a driveshaft test. The experts intentionally caused the driveshaft universal joint to detach at the transmission connection. According to Aaron Jones' report, prior to the start of this test the "tag axle caster lock assembly had been damaged and the axle was castered forward". That test was videotaped and high speed and regular speed camera views have been submitted.
5. The bus and the 9/20 driveshaft were inspected on January 24, 2012. Examination of the undercarriage revealed that the driveshaft made numerous contacts inside and around the exterior of the tag axle pass through and tie rod. The tag axle locking cylinder had been unlocked such that the locking plates were separated from the tie rod plate and the locking plates were bent upwards.
6. The driveshaft was found completely separated from the bus. Both ears on the transmission side yoke were broken in half. Circumferential scratches were present on the exterior of the driveshaft near the differential connection. The presence of those scratches indicates that the driveshaft was rotating while in contact with the loop for an extended period of time.

7. One of Jones' main conclusions from the August/September driveshaft testing with the secondary guard was that "the testing also shows that the flailing driveshaft impacts the tag axle support structure and can cause unlatching of the tag axle caster mechanism." While that may state an accurate result from the Americanos test, this result was created under artificial conditions. By placing a secondary guard near the transmission end of a flailing driveshaft the second loop artificially causes the driveshaft to remain positioned up near the latch arm assembly thereby increasing the opportunity to strike the latch arm assembly. Indeed, the tag axle caster mechanism was so extensively damaged during the Americanos testing with the secondary guard that the mechanism wasn't functional when Americanos conducted testing in the coach's as-designed condition. The Americanos driveshaft tests were never able to replicate the tag axle caster mechanism being knocked out of position in the MCI as-designed condition (absent a secondary guard).

Unit 60624

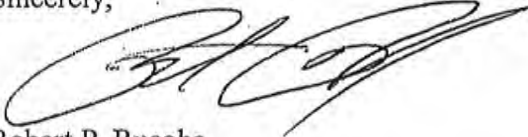
1. This was an MCI model 102DL3 that was used in several driving tests performed by Americanos' experts.
2. On January 13 and 14, 2012, Unit 60624 was tested by Americanos' experts in two circle tests and eleven braking tests. The tests were documented with instrumentation, videotapes and digital photographs. The bus was modified with a pneumatic actuator to apply steering to the tag axle.
3. I have not had time or opportunity to fully analyze the Americanos test data. However, there are a few opinions that I have reached based on my limited review of the test data.
 - The initial theory put forth by Americanos' experts was that once the driveshaft/transmission universal joint failed, the flailing driveshaft (1) struck the tie rod and (2) unlocked the tag axle lock cylinder causing the tag axle to turn to the left which caused the bus to enter into a right turn. The defense experts refuted this theory by analyzing the flaws in the Americanos testing which "supported" this initial theory. Defense experts also provided their own testing which showed that the bus was indeed controllable and provided a margin of safety in the event of a tag axle unlocking. This most recent round of Americanos testing refutes the Americanos initial theory and replicates the findings in the defendant's initial bus testing. Americanos tests #5, #6, and #7 were all performed with the tag axle unlocked. The Americanos testing clearly demonstrates that when the tag axle is unlocked under driving conditions, the bus is controllable and can be safely brought to a stop.

- The newest theory recently put forth by the Americanos experts is that once the driveshaft/transmission universal joint failed the flailing driveshaft (1) struck the tie rod and (2) unlocked the tag axle lock cylinder and (3) also struck the tag axle caster mechanism and (4) unlocked the mechanism which caused it to be mispositioned to a position that is designed for rearward travel. The Americanos theory is that these two tandem events caused the bus to “veer relatively sharply to the right” and ultimately caused the bus driver to lose control. The testing that comes closest to replicating their theory are Americanos tests #9, #12, and #13 which were all performed with the tag axle unlocked and the tag axle caster mechanism mispositioned as the test driver applied braking. What is consistent in those three Americanos tests is that during the braking phase there are simultaneous brake marks being created on the pavement by the left and right side tires. The left and right side tire marks begin and end at approximately the same points on the road. The analysis of the braking marks in the [REDACTED] crash shows uneven side-to-side brake mark creation. Most notably, in the initial braking phase of the [REDACTED] crash, the right rear tag axle and the right front tire were creating tire marks and none of the left side tires were creating tire marks. This brake imbalance is what ultimately caused the bus to move to the right and the driver to overcorrect. The Americanos testing shows that even when the bus is placed under their theoretical conditions, if the brake system is properly “balanced” the bus does not deviate from the lane of travel under hard braking while the bus is traveling at highway speeds.
- Another opinion that can be made about Americanos tests #9, #12, and #13 has to do with controllability. Even with the tag axle unlocked and the tag axle caster mechanism mispositioned, the Americanos test driver was able to maintain control and bring the bus to a controlled stop. In tests #9 and #12, the bus driver was able to keep the bus in the initial lane of travel and stop primarily in its initial lane of travel. In test #13, the bus exited the left side of the travel lane near the end of the test but it still came to rest on pavement. Even if one were to extrapolate the final rest position of test bus #13 to the [REDACTED] scene, test bus #13 would have still come to rest primarily on the pavement.

As stated in my first report and in my deposition, the cause of the [REDACTED] crash was due to driver error combined with an improperly maintained bus. The precipitating event was the failure of the transmission/driveshaft universal joint. The bus driver responded to the driveshaft universal joint failure by steering and braking her vehicle into a right turn. After the driver steered her vehicle onto the paved shoulder she overcorrected back to the left. Americanos experts Larry Yohe, Thomas Fugger and Ricardo Palacios have also concluded that the bus is placed in a left turn due to steering inputs by the bus driver. All experts have concluded that no amount of change in the suspension components will cause the bus to transition from a right turn to a left turn in the absence of driver steer inputs. The transition from right turn to left turn must be initiated by driver input. The reentry path confirms that driver steered her vehicle abruptly rather than remaining in the shoulder and slowing her vehicle down in a controlled manner. There were no obstacles or obstructions which would have prevented the driver from staying on the paved shoulder and stopping her vehicle.

All of the opinions in this report are expressed with a reasonable degree of engineering certainty. It is my understanding that there has recently been produced Americanos test footage and data. I reserve the right to supplement or modify my opinions once this new information is received or in response to the work and opinions of opposing experts.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rucoba', with a large, sweeping flourish extending from the end of the name.

Robert P. Rucoba

CAUSE NO. 2010-03-1717-C

DANIEL CAMPOS, ET AL. X IN THE DISTRICT COURT
X
VS. X 197TH JUDICIAL DISTRICT
X
AMERICANOS, U.S.A., L.L.C., X
ET AL. X CAMERON COUNTY, TEXAS

ORAL DEPOSITION OF

ROBERT RUCOBA

March 23, 2012

VOLUME 2

ORAL DEPOSITION OF ROBERT RUCOBA, VOLUME 2, produced
as a witness at the instance of the Defendant Americanos
U.S.A., L.L.C., and duly sworn, was taken in the above-styled
and above-numbered cause on the 23rd day of March, 2012, from
9:35 a.m. to 2:09 p.m., before Laura D. Glenn, CSR in and for
the State of Texas, reported by machine shorthand, at the law
offices of Hartline, Dacus, Barger, Dreyer & Kern,
6688 North Central Expressway, Suite 1000, located in the city
of Dallas, state of Texas, pursuant to the Rules of Civil
Procedure and the provisions stated on the record.

1 MS. DORMAN: -- to Tamara Wednesday evening,
2 so -- but feel free.

3 MR. HAYNES: Yeah -- okay.

4 Q. (BY MR. HAYNES) What have I marked as Exhibit 6?

5 A. You've marked my CD of photos that say, roll I,
6 Mt. Gretna crash site inspection, February 1st, 2012.

7 Q. And what is Exhibit 7?

8 A. This is my set of photos that say, roll D, E, F, G
9 and H. This is my inspection of the Mt. Gretna bus in January
10 of 2012.

11 Q. And for the record, the -- when you're talking about
12 Mt. Gretna, you're talking about unit 6352?

13 A. Right. Right.

14 Q. What's next?

15 A. And actually, before I -- let me stop you there.
16 That's actually my roll D, E, F, G and H are actually all of
17 the units that I inspected, they're all going to be contained
18 in this binder.

19 Q. Oh, in Exhibit 7?

20 A. Right. Roll E, for example, is unit 6352 here.
21 Roll F is going to be unit 6934, which we'll been talking
22 about shortly.

23 Q. Okay. Thanks for making that clear.

24 A. Okay. Next one. This is a CD that, I believe,
25 contains news articles that I was provided or that I had found

1 on the Internet that pertained to the Mt. Gretna bus crash.

2 Q. We'll mark that as Exhibit 8.

3 A. This is, I think, Aaron Jones' photographs of the --
4 the Mt. Gretna bus.

5 Q. I'm not going to mark that one if you want to put it
6 back.

7 A. Sure. CD one of two and CD two of two.

8 Q. Okay.

9 A. This next document is a preliminary reconstruction
10 diagram that I generated based on my inspection of the
11 Mt. Gretna bus as well as the crash site.

12 Q. Let's mark that as Exhibit 9. What's next?

13 A. These are a few selective photographs of the caster
14 latch mechanism that I had taken from either photos taken by
15 Kevan Granat or Aaron Jones.

16 Q. And this is also from that same Pennsylvania bus
17 accident?

18 A. Yes.

19 Q. All right. I'm going to mark those as Exhibit 10.
20 And they're paperclipped and there are one, two -- eight
21 photos, correct?

22 A. Correct.

23 Q. That will all be part of Exhibit 10.

24 Can you describe for us why you pulled those
25 specifically and what you think is significant about them --

1 A. Yes, I --

2 Q. -- in your opinions in this case?

3 A. Yes, I pulled them because I wanted to document the
4 position of the caster latch mechanism in this particular
5 unit.

6 Q. All right. And what is documented here?

7 A. What I had found, when I looked at these particular
8 pictures, was that I had noted that the caster latch mechanism
9 was in a forward setting or in a setting that would be in a
10 setting for vehicles that are being driven in reverse.

11 Q. I'm going to take the paperclip off just so we can
12 look at them easier.

13 Can you -- for a layperson, can you just pick
14 out one or more of those photos in Exhibit 10 that
15 specifically show what you're talking about?

16 A. Well, sure. I think all of them do show that. Let
17 me zoom in on one of them here and that's sort of down in the
18 middle of the stack. And you'll see here, this is the lead
19 horn that's in the -- the caster latch mechanism. And you can
20 see that the lead horn is now positioned forward of the hole
21 that is in the plate, it's positioned forward of the wear tab.
22 And what that does is it tells you that it's in a near for --
23 full forward -- or full forward position.

24 Q. So is this -- I'm having trouble orienting myself.

25 Is this taken from underneath, or on top?

1 A. It's taken from underneath. It's as if you're
2 looking up -- as if you're laying on your back and you're
3 looking up. This is the top of the latch arm assembly. This
4 is a strap which we'll be talking about today. This is a
5 tongue plate. And then this is the -- the caster ring horn
6 that there's -- there's two horns that are on this upper end
7 of the latch arm assembly.

8 And as they rotate fore and aft, this lead one
9 will either be positioned in the hole, or will be positioned
10 forward of the hole, depending upon the caster latch setting.

11 Q. And it's my understanding there's two holes, if you
12 will, correct?

13 A. Correct.

14 Q. And in this picture that we're going to call 10B,
15 are you saying that what we're looking at is the -- the
16 caster -- what are you calling this?

17 A. The horn.

18 Q. -- caster horn is in the more forward hole for
19 travel in reverse --

20 A. It's actually --

21 Q. -- or is it out of both holes?

22 A. It's out of the hole, right.

23 Q. So there's --

24 A. There's --

25 Q. Unlatched, I guess we could say?

1 A. Right. There's two --

2 Q. Or unlocked?

3 A. Right.

4 THE REPORTER: I'm sorry. What was -- would
5 you repeat that?

6 Q. (BY MR. HAYNES) Unlatched or unlocked; is that
7 fair?

8 A. That is fair. There's two horns, there's two holes.
9 And as it gets positioned either fore or aft, the horn is
10 either in the holes, or they're going to be moved forward
11 relative to the holes. And what you're looking at is the most
12 forward horn that is positioned forward of the hole that's in
13 the plate.

14 Q. It's positioned forward of -- of both holes in the
15 plate?

16 A. Yes.

17 Q. Okay. I just want to make sure we're --

18 A. Yes.

19 Q. -- understanding each other.

20 A. I think we are.

21 Q. All right. I'm understanding you. That's what I
22 mean.

23 A. Do I put these back, then?

24 Q. Yes. Okay.

25 A. This is -- the next documents that are in my binder

1 are eight pages of site inspection notes of the Mt. Gretna
2 crash site that I performed on February 1st of 2012.

3 Q. Okay. I'm going to mark those as Exhibit 11. And
4 I'm also going to re-paperclip these color photos we were
5 talking about.

6 All right. And Exhibit 11 is eight pages, you
7 said?

8 A. Yes, sir.

9 Q. Is this part of --

10 A. Uh-huh. Yes. Plus a cover sheet.

11 Q. Okay. Got you. We'll paperclip those pages
12 together on Exhibit 11 as well. All right. And the cover
13 sheet says February 11, 2012.

14 Is that when you performed your inspection?

15 A. February 1st of 2012.

16 Q. Sorry. February 1st of 2012. All right. What's
17 next?

18 A. Next are a series of photographs that I took on the
19 day of that inspection.

20 Q. All right. Let's go ahead and mark those as 12.

21 How many pages do we have?

22 A. Oh, well, a lot.

23 Q. Well, tell me which ones go together.

24 A. These pages right here are the ones that go
25 together.

1 Q. All right.

2 A. There you go.

3 Q. Thank you. Is there anything significant in these
4 photos to your opinions regarding the Pennsylvania accident?
5 I assume there is.

6 A. Yes. Yes. There's several things that are in
7 there.

8 Q. Can you point them out for me and identify the pick
9 of the photos that are part of Exhibit 12?

10 A. Sure.

11 Q. Okay, thanks.

12 A. I think that first off what you see is -- in these
13 early pictures, you can see that the roadway has a
14 straightaway and then it begins to curve to the right. I
15 think that's important given the information I've been
16 provided in that the police concluded that the driver was
17 distracted and that's why he ultimately ran into the median
18 barrier on the left side of the road.

19 Being distracted would certainly explain why he
20 struck the wall on the left side given that the road is
21 curving to the right and if you're distracted, then he
22 wouldn't curve to the right and go right into the wall, which
23 is consistent with the physical evidence on the vehicle.

24 The photo that I've got here labeled I4 shows a
25 section of a wall. In my inspection of the crash site, there

1 was a gentleman there from the highway department who had told
2 me that this is the section of wall that was replaced by -- or
3 after the crash because it was damaged in the crash when the
4 motorcoach collided with the wall.

5 I think the next photo that I found useful was
6 photo number 16. Photo 16 was a lone tire mark that was still
7 present on the shoulder leading up to a large scar that was on
8 the dirt embankment on the right-hand side and that you start
9 to see that scar in -- in photo number 15.

10 And then I think anywhere from 17 on through 20
11 is a -- is my photos that show where the -- the motorcoach
12 collided with the -- the embankment and then subsequently
13 rolled up against the embankment depositing some debris and
14 disturbing the earth. And all of that, I think, is useful to
15 help me to explain what happened in this particular crash.

16 Skipping ahead to number 25 down through number
17 34 are photos that I took that show various types of debris
18 from the bus along the embankment. We see glass and plastic
19 pieces. That's what those photos document.

20 And look at photo number 46 is a -- a view from
21 the -- up on top of the embankment looking down and you can
22 see the -- the tire mark there that was on the shoulder that
23 led up to the -- the embankment and impact. I don't know if
24 you can see the green -- the green dashes there that are on
25 the shoulder.

1 Q. That's in photo 46?

2 A. Yes, sir.

3 Q. Okay.

4 A. 46 -- it's captured in 47 and 48 as well. And then
5 all of these other photos sort of document the condition of
6 the roadway and artifacts that were present on the inside
7 lane.

8 I -- at this time, I do not know if some of
9 these marks and gouges that were present on the inside lane
10 are or are not related to this crash. I am still awaiting
11 some police information to confirm that.

12 And then there's a few more photos that are
13 sort of close-up pictures of the embank -- excuse me -- of the
14 median wall that's been repaired. They begin at item
15 number -- or photo number 77, 78, go -- they go all the way
16 down to looks like photo number 84 showing the new section of
17 the median barrier.

18 And then just got a few photos that sort of
19 show the various gouges and things that were on the roadway
20 that I had said I wasn't sure if they are or not related. At
21 this time, I'm still awaiting some police information. And
22 they are photos 41 through 44.

23 Q. Okay. Thank you for that explanation.

24 What comes after Exhibit 12 in your notebook?

25 A. The next series of pages are 12 pages plus a cover

1 page of the -- the bus inspection that I performed in
2 Richmond, Virginia of the -- the Mt. Gretna bus.

3 Q. And that's -- that's unit number 6352?

4 A. Right.

5 Q. All right. And we're marking those pages as
6 Exhibit 13.

7 And then is the next thing photos of the
8 inspection?

9 A. Correct. Those are my pictures. And they are in
10 this stack right here.

11 Q. We'll mark that as 14. I'm -- well, I'm -- I won't
12 clip them yet.

13 Can you point out the photos in Exhibit 14
14 that -- well, first, what are -- let me ask you this first:
15 What are your opinions regarding the Pennsylvania bus crash
16 with respect to its similarity or not with the accident in
17 this case?

18 A. It's my opinion that the Mt. Gretna bus crash is not
19 substantially similar to the Campos bus crash.

20 Q. First tell me the ways in which you think it is not
21 similar.

22 A. Well, I think in terms of --

23 Q. Do you want to look at your report?

24 A. That would be great. Because I've got them all
25 itemized there. We might as well go through them --

1 Q. Where would your report be?

2 A. It will be in that red binder.

3 Q. Okay. Here you go. We'll go ahead and mark your
4 report while we've got it out as Exhibit 15.

5 Your supplemental report dated February 15,
6 2012, correct?

7 A. Correct.

8 Q. Okay. And you were about to tell me what your
9 inspection and findings were regarding the Pennsylvania bus
10 accident that show it is not similar -- the ways in which it
11 is not similar to the accident in our case.

12 A. Right. Going to my report and looking at paragraph
13 number six, the first bullet point, it says that the initial
14 cause of the loss of control was driver distraction in the
15 Pennsylvania crash. Versus in the Campos crash, it's clear
16 that the loss of control was the -- the bus driver steering
17 and braking in response to a mechanical failure.

18 Q. All right. How else did you find that the two
19 accidents were not similar?

20 A. Okay. In the Pennsylvania crash, there's no
21 physical evidence from the bus prior to the -- to the barrier
22 impact. In the Pennsylvania crash, there were no driveshaft
23 components or tire marks that were left on the roadway prior
24 to the loss of control and the barrier collision.

25 In the Campos crash, the police found pieces of

1 the driveshaft, universal joints prior to the loss of control
2 and distinctive tire marks were created on the -- on the
3 driveshaft on the end that was connected to -- on the -- on
4 the -- excuse me -- on the driveshaft that was connected to
5 the differential end.

6 Q. All right. Was there any other ways that you felt
7 that the Pennsylvania accident and the accident in this case
8 were not similar?

9 A. Yes. The -- in the Pennsylvania crash, it was clear
10 that the driveshaft universal joint was torn apart because the
11 tag axle was pushed laterally to the point where it had
12 impacted or impinged and stopped the -- the rotating universal
13 joint.

14 In the Campos crash, the universal joint failed
15 due to improper maintenance and it was not an impact induced
16 failure. In the Campos crash, the lateral movement of the
17 tack axle was essentially negligible.

18 Q. Anything else?

19 A. Yes. In the Pennsylvania crash, the -- the bus's
20 driveshaft did not have the circumferential scratches on the
21 exterior of the driveshaft near the differential connection.
22 The absence of those scratches indicates that the -- the
23 driveshaft did not rotate a substantial amount prior to
24 getting torn free from the bus.

25 In the Campos crash, the driveshaft had

1 numerous scratches around the circumference. This was
2 indicative of the driveshaft rotating for an extended period
3 of time while it was in contact with that -- with that loop in
4 the undercarriage.

5 Q. Is that it?

6 A. The -- in the Pennsylvania crash, the bus was caused
7 to overturn due to impact forces from the bus slamming into
8 the embankment front end leading. It's those impact forces
9 with the embankment that literally caused the bus to -- to
10 enter into a -- a sudden clockwise rotation, which ultimately
11 overcame the stability of the bus.

12 In the Campos crash, the bus was caused to
13 overturn due to a combination of steering and braking forces
14 which ultimately got the bus sliding sideways where it
15 eventually furrowed in the earth and that's what caused the
16 rollover.

17 So the Campos bus rollover was a steering and
18 braking induced rollover, not an impact induced rollover like
19 the Pennsylvania crash.

20 Q. Now, going back to Exhibit 14, which I think we
21 previously identified as the photos of your inspection of the
22 bus involved in the accident in Pennsylvania, correct?

23 A. Yes, sir.

24 Q. Can you show me the photos in Exhibit 14 that best
25 support the opinions that you just read from your report?

1 A. That the two crashes are different?

2 Q. Yes, sir.

3 A. Well, I guess in the -- and the long and the short
4 of it is that all of them -- all of them show that.

5 Q. Well, let's try to pick, you know, three or four
6 ones that you think are especially helpful to demonstrate the
7 opinions that you were just reading to me.

8 A. Okay.

9 Q. I assume you're not going to show them all to the
10 jury, so --

11 A. I'll try to pull out a few of them here today, but
12 I -- you know, I think all of them are helpful in some
13 respect. I don't know quite what I'll be using in front of
14 the jury. Going to the --

15 Q. And I guess I'm more interested in the photos that
16 have to do with the -- underneath the bus as opposed to the
17 damage on the -- you know, on the outside. But pick whichever
18 ones you're -- you think best -- are the best examples of the
19 opinions that you were just reading to me.

20 A. Okay. All right. Going to the photos that show
21 the -- the damage, first off, with regard to the impact
22 because the impact is what sets up the lateral movement of
23 the -- of the tag axle assembly.

24 And if you look at my photos that are numbered
25 beginning with 25 -- 25 to 33, you see that it's a photo that

1 shows the damage that's concentrated on the tag axle on the
2 driver's side. And in particular, you'll see there's some --
3 a cap that has been broken, but more importantly, you've got
4 some damage to the ends of the lugs that have been damaged
5 from the contact with the -- the median wall.

6 It's a pretty big impact that's happening to
7 this tag axle. It's the one that ultimately shifts the tag
8 axle from the left to the right.

9 Q. And so that's -- that photo number -- did you say
10 25? I apologize.

11 A. Yeah, what I said was, I think if you begin by
12 looking at photo 25 and get closer and closer down through
13 photo number 33, that gives you an idea of what's going on
14 with that particular component.

15 Q. All right. And that's the tag tire on the driver's
16 side.

17 A. Yes, sir.

18 Q. Okay.

19 A. And there's a series of photos that have to do with
20 the left front of the motorcoach. Those begin with photo 86
21 and get closer and closer to looking at the wheel itself and
22 the -- the lug nuts that are -- and the lug studs that are on
23 the left front. And you can see that there is abrasions and
24 what look like residue, concrete residue in the ends of those
25 lugs.

1 Q. And this is, again, on the tag wheel on the driver's
2 side?

3 A. This is actually on the steer tire on the left front
4 of the -- of the bus.

5 Q. All right.

6 A. That's important to understand the interaction of
7 the -- the two ends of the bus as it interacted with the wall.
8 Because it's what sets up the large impact on the tag axle.
9 It's the collision between the left front area of the bus that
10 rotates and swings the tag axle into the median wall for the
11 second impact. That's where you generate the large forces
12 that ultimately shift the tag axle from left to right.

13 Q. Okay. What other photos are significant, in your
14 opinion?

15 A. The next series of photos are the driveshaft that
16 were -- that I took of the -- the driveshaft from the -- the
17 Pennsylvania crash bus. And it's -- it's beginning at photo
18 number 170 and it goes to photo -- looks like 176.

19 And what I found useful in that particular
20 series of photos was the absence of a circumferential abrasion
21 that's on the driveshaft. What it tells you is that the
22 driveshaft didn't see a lot of rotation when it was uncoupled
23 from the transmission.

24 It's a -- it's an artifact -- it's a piece of
25 physical evidence that shows up on some of the other case

1 study buses. In particular, it shows up on the Campos bus,
2 but it's not present on this bus. That tells you that there's
3 something different that happened about this particular
4 failure.

5 Q. Well, what is the significance of having those
6 marks?

7 A. The significance tells you that it failed and that
8 there was a large amount of rotation between the driveshaft
9 and the loop that was taking place. What this tells --

10 Q. Subsequent to the separation from the transmission
11 end?

12 A. Correct. Correct. We see that in the Campos case.
13 We do not see that in this particular case.

14 Q. And what does that tell you?

15 A. What it tells you is that there isn't a lot of
16 rotation that took place, it tells you that the failure
17 mechanism, when it occurred, is different than the -- the --
18 the failure mechanism, when it occurs and the things that
19 happen afterwards are different in this particular driveshaft
20 and in this particular crash than they were in the Campos
21 case.

22 Q. Okay. Aside from just being different, what do you
23 think happened here?

24 A. What I think happened here is I think that that
25 secondary impact -- the first one being with the wall and the

1 left front, and then the secondary impact with the tag axle
2 and the wall shifted the tag axle assembly laterally from left
3 to right.

4 That housing literally ran into that driveshaft
5 and it seized up that driveshaft and it fractured and it broke
6 apart. And that's the failure mechanism for this particular
7 case.

8 Once that happened, there wasn't a whole lot of
9 rotation that took place once this driveshaft -- or once the
10 crash finally ended. There wasn't a lot of interaction
11 between this driveshaft and the loop that's on the
12 undercarriage.

13 Q. On the differential end?

14 A. Yes, sir.

15 Q. Why do you think there wasn't a lot of rotation
16 after this driveshaft separated at the transmission end?

17 A. It's the absence of the abrasions from the loop.

18 Q. Well, the absence of the abrasions are what tell us
19 that there wasn't a lot of rotation, right?

20 A. Right.

21 Q. The -- my question is, why do you believe there
22 wasn't a lot of rotation after the transmission separated --
23 after the driveshaft separated at the transmission end?

24 A. Because I don't see a lot of abrasions on the
25 exterior of that shaft.

1 Q. I guess I'm not being clear. I understand that
2 you're saying the absence of the evidence of the abrasions
3 tells you there wasn't a lot of rotation after separation at
4 the transmission end.

5 A. Uh-huh.

6 Q. My question is, why do you believe that the
7 driveshaft did not continue to rotate and cause those
8 abrasions after it separated at the transmission end?

9 A. Well, I think what we see is that we see the absence
10 of the abrasions themselves, I think, tells you that.

11 Q. I'm not disputing whether it did continue to rotate,
12 I'm asking you why it didn't.

13 A. Why it didn't continue to rotate?

14 Q. Right.

15 A. Well, there's either -- either this piece is -- is
16 stopping its rotation and if it's still connected to the
17 transmission, then the only thing that can do that would be to
18 have the drive axle stop rotating. And I don't have enough
19 information on that to tell you that one way or the other.

20 Q. Okay. Keep going.

21 A. This is a series of pictures now we begin to just
22 sort of look at the amount of lateral displacement of the tag
23 axle assembly itself.

24 So what you're looking at is the -- the tag
25 axle assembly, it begins in photo number 177. You're looking

1 towards the rear of the bus and you're looking here on the --
2 the left rear tire of the tag axle.

3 And I'm just trying to illustrate the amount of
4 lateral displacement by showing the comparison between various
5 components on the driver's side versus various components on
6 the passenger side.

7 Q. And would you identify the numbers for these photos,
8 just for the record?

9 A. Yes, they begin in 177 and go all the way through
10 198.

11 Q. What's the difference between the lateral force that
12 you -- that was in -- that was imparted to the tie rod in the
13 Pennsylvania accident and the lateral force that has been
14 opined by several experts that was imparted to the tie rod in
15 the -- in our accident when the motorcoach left the roadway?

16 Does that make sense?

17 A. No, I'm having trouble with that question. I'm
18 sorry.

19 Q. Well, if I understand right, you're saying the --
20 the tie rod was bent in the Pennsylvania accident because of
21 the lateral force of the motorcoach hitting the median
22 barrier; is that correct?

23 A. That's not correct.

24 Q. Okay. Explain it to me.

25 A. Actually, what I'm talking about is the actual tag

1 axle assembly itself. I'm talking about the shift of that
2 entire axle assembly happens in the impact with the wall.

3 Q. But that's -- but you're saying that that all
4 shifted and the tie rod bent because of that impact with the
5 median wall?

6 A. No, I -- I think that what's -- you're -- you're
7 going to have this lateral shifting that's going to take place
8 and that's going to seize up that universal joint. And it's
9 going to just fracture and tear apart because it gets stopped
10 because of the movement of the housing as it moves laterally,
11 literally stops that universal joint from rotating. And then
12 it just keeps -- there's enough torque there where it just
13 tears apart.

14 And once that happens, then there's some
15 interaction that's taking place with the -- the tag axle -- or
16 I'm sorry -- with the -- the driveshaft and the tie rod and
17 the plates and that's where we're seeing the residuals of
18 that.

19 Q. So let me ask you hopefully a better question.

20 In the Pennsylvania accident, what caused the
21 bending of the tie rod that is seen in the photograph 177?

22 A. Well, I'd expect that there's some of that damage is
23 going to be created from the lateral movement of the tag axle
24 assembly itself. And then some of that damage is going to be
25 created because of the driveshaft struck it as it was flailing

1 around inside the -- the -- under the undercarriage.

2 Q. Can you distinguish what bending was caused by the
3 lateral movement or the lateral forces imparted to the bus by
4 hitting the median wall versus what bending of the tie rod was
5 caused by the driveshaft hitting it after it separated at the
6 transmission end?

7 A. No.

8 Q. But it's your opinion that some of the bending was
9 caused by the lateral forces generated by the motorcoach
10 hitting the median wall on the -- on the motorcoach's left
11 side, right?

12 A. Correct.

13 Q. And it's also your opinion that some of the bending
14 of the tie rod was caused by the driveshaft hitting it after
15 it separated at the transmission end?

16 A. Yes, sir.

17 Q. What else is significant about these photographs?

18 A. I think you can see the lateral displacement of the
19 axle itself relative to some of the fixed components, for
20 instance, if you look at the top of the left rear wheel.

21 Q. That's in 179?

22 A. Photo 179, right. And you compare that to the
23 distance in the -- in the components for -- that are shown in
24 photo number 191 which is of the right rear tag axle tire.

25 Q. And tell me again in your opinion, what caused the

1 tag axle to unlock in this accident?

2 A. What caused the tag axle to unlock. The tax axle
3 unlocks, it appears, from the driveshaft striking it.

4 Q. What else do these photos show?

5 A. Then you've got the -- a few photos that show the
6 caster latch mechanism which are shown in photos 196, 197.
7 Got a few more photos that show the --

8 Q. Will you show me those again? I'm sorry.

9 A. Yes, 196 and 197.

10 Q. Okay. Sorry to stop you.

11 A. And there's a few photos that show the -- the tie
12 rod and the connection down at the transmission end and the
13 loop, all of which are contained in photos 198 to 210.

14 Q. In the Pennsylvania accident, do you have an opinion
15 whether the driveshaft, after it separated at the transmission
16 end, for lack of a better word, escaped the harness or horse
17 collar before striking the tie rod and tag axle, or was it
18 still contained within the harness or horse collar when it
19 struck the tag axle and the tie rod?

20 MS. DORMAN: Object to form.

21 Q. (BY MR. HAYNES) Do you understand my question?

22 A. No, I didn't. I'm sorry.

23 Q. The -- it's my understanding that -- that you told
24 me that in the Pennsylvania accident, after the driveshaft
25 separated at the transmission end, it struck the tag axle and

1 unlocked it and it also struck the tie rod and that was, at
2 least in part, the reason for it being bent.

3 And so my question is, after it's -- the
4 driveshaft separated at the transmission end, do you have an
5 opinion whether it was able to strike the tie rod and the tag
6 axle without escaping the harness at the differential end, or
7 did it escape the harness and then hit those two items, if you
8 have an opinion?

9 MS. DORMAN: Object to form.

10 A. The -- it -- it -- there are contact marks which
11 indicates that the driveshaft was contacting the tag axle
12 assembly inside the pass through. That's -- so to answer your
13 question, yes, there is contact there. And then there is
14 contact that appears that the driveshaft has struck the -- the
15 tie rod and the latching mechanism for the -- the tie rod.
16 That happens as well.

17 Q. (BY MR. HAYNES) Okay. I'm -- maybe I'm
18 misunderstanding you.

19 There is a harness, if I -- or horse collar at
20 the differential end for the driveshaft, correct?

21 A. Yes, sir.

22 Q. And my question is, did the -- after the driveshaft
23 separated at the transmission end, did it strike the tag axle
24 with or -- after escaping that harness or without escaping
25 that harness, was it still able to strike the tag axle?

1 MS. DORMAN: Object to form.

2 A. I guess I don't know the answer to that.

3 Q. (BY MR. HAYNES) Okay. That was my question,
4 whether you had an opinion about it.

5 A. I don't.

6 Q. And do you have an opinion whether, after the
7 driveshaft separated at the transmission end, if it was able
8 to strike and -- the tie rod after escaping from that harness
9 at the differential end or while it was still within the
10 harness?

11 A. Again, I --

12 MS. DORMAN: Object to form.

13 A. -- I don't have enough information to be able to
14 answer that.

15 Q. (BY MR. HAYNES) Okay. Thanks. I just wanted to
16 know if you had an opinion.

17 Anything else in these photos?

18 MS. DORMAN: Object to form.

19 Q. (BY MR. HAYNES) Anything else in these photos that
20 you think are significant to your opinions about the
21 Pennsylvania bus accident?

22 A. Yeah, I think that --

23 Q. As it relates to our accident.

24 A. -- again, looking at the photos that begin at 220
25 and go to 222, it shows just some of the undercarriage

1 components that have been deformed or displaced because of the
2 lateral shifting of that tag axle assembly.

3 Q. And if -- again, if I'm understanding you right --
4 and correct me if I'm not -- the lateral shifting of the tag
5 axle assembly was caused by -- you believe was caused by the
6 impact with the median barrier wall?

7 A. Correct.

8 Q. I think what I asked you earlier -- and maybe we got
9 off -- off of it was, do you believe in the -- in our
10 accident, in this case, that there was any significant lateral
11 forces imparted to the tag axle assembly or tag axle system
12 including the tie rod when the motorcoach in question entered
13 the median up until the point that it rolled over?

14 A. There are lateral forces that are being imparted to
15 the -- to the motorcoach in the Campos crash, sure. I mean,
16 there's lateral forces throughout this event. I'm not quite
17 sure if -- if you're looking for something more than that.

18 Q. Well, I just -- that was my initial question.

19 How did the lateral forces in the -- in our
20 accident, in your mind, compare to the lateral forces in the
21 Pennsylvania accident?

22 A. The lateral forces in the Pennsylvania accident are
23 orders of magnitude greater than what we see in the Campos
24 crash.

25 Q. What does orders of magnitude mean?

1 A. Well, I can't quantify it any more than that, other
2 than just look at the physical evidence, you don't see any
3 lateral shifting of this magnitude in the Campos bus crash or
4 the subject bus. There's nothing even close to this, both
5 either in direct contact or in indirect induced damage.
6 There's nothing of that magnitude in the way you look and see
7 in these photos that show the lateral shifting in the
8 Pennsylvania crash.

9 Q. Have you attempted to measure the forces -- lateral
10 forces generated in the impact in the Pennsylvania crash?

11 A. I have not.

12 Q. Is that something that you've been asked to do?

13 A. I have not.

14 Q. Is that something that you've offered to do?

15 A. I have not.

16 Q. Have you attempted to measure the lateral forces
17 generated on the tag axle assembly and system in the -- in our
18 case?

19 A. Yes, in my speed calculations that I discussed in my
20 first deposition, I've got some lateral force values, drag
21 force values that I used in my speed calculations.

22 Q. I'm not sure I'm following you. Can you explain?

23 A. Yeah. For instance, I'll just use the -- in the
24 example where it's furrowing, where the vehicle was furrowing
25 in the median in the subject crash, I had drag factors that I

1 utilized for the furrowing phase. Those drag factors were
2 being applied in some portion in that phase in a lateral
3 sense. Ultimately, they get applied in the longitudinal sense
4 as the -- the passenger side tag axle gets displaced from rear
5 to front.

6 Q. Okay. So you're telling me that the -- you did
7 measure the -- the lateral forces on the tag axle assembly and
8 tie rod in the -- in our accident?

9 A. Yes, for the speed calculations that I needed, I had
10 to come up with some drag factors that would be applied
11 primarily in the lateral direction. I think we've got some of
12 those values that can be seen at my speed calculations, you
13 bet.

14 Q. Okay. I guess what I'm -- maybe I need to ask it
15 this way: If Ms. Dorman said, you know, Mr. Rucoba, I really
16 want you to tell me what the amount of the lateral force
17 exerted on the tag axle assembly and tie rod in -- in our
18 accident was, is that the way you would do it, or would you do
19 something else?

20 A. No, I think I would take what I've done. I'd
21 take -- take the speed calculations and you can look at the
22 speed calculations and you can figure out where I've got the
23 speed at the -- of the vehicle along the various sequences in
24 the crash.

25 And if you know where the speed -- what the

1 speed is and you know the radius of the path, which is all
2 defined in the drawings that I provided, sure, you can
3 calculate the lateral forces that are being imparted to the
4 tag axle throughout the crash.

5 Q. I guess -- my question, though, is not whether you
6 could do it that way.

7 Is that the way you would go about answering
8 her question and giving her that information, or would there
9 be other ways to do it?

10 A. Yes, with regard to the Campos crash, that's what I
11 would do. That would be one -- that would be the method I
12 would recommend if you're trying to figure out what kind of
13 lateral forces are being imparted to the tag axle in the
14 Campos case. That would not be the method that I would adopt
15 for this Pennsylvania crash.

16 Q. Why is that?

17 A. They're two different types of -- of forces that are
18 being applied in -- in two different manners. We've got an
19 impact force versus forces generated by just normal or -- or
20 braking and steering tire forces. We've got impact forces
21 versus tire forces. They're completely different.

22 They're both generating lateral forces. Both
23 buses see lateral forces. One is being generated through tire
24 friction interaction, the other is being generated through an
25 axle assembly slamming into a concrete median wall.

1 Q. Maybe I've been misunderstanding and -- it's very
2 likely. But what I understood that Mr. Granat has been
3 telling us is that the tie rod in the -- in our accident was
4 bent because of the lateral forces imparted on the --
5 underneath the bus as a result of the motorcoach going into
6 the median and the furrowing into the ground.

7 A. Yes. Right.

8 Q. Okay. So why are you talking about on the roadway?

9 A. But it -- but it's -- well, you had asked me if I
10 could calculate the lateral forces on this vehicle.

11 Q. Well, maybe we're talking across purposes.

12 A. Well --

13 Q. I was trying to find out from you how you would
14 calculate the force generated by -- the lateral force
15 generated on this tag axle assembly and tie rod as a result of
16 Mr. Granat's theory that, you know, there was force generated
17 longitudinally when the bus went into the median and dug into
18 the ground.

19 A. Right. Right. And that's what I was saying. I
20 think earlier, when we were looking at the small phase of the
21 crash where the vehicle was furrowing, my speed calculations
22 have drag factors that are being applied to the bus as it's
23 furrowing in the dirt. Then they are both lateral.

24 But because of the spinning nature of the bus,
25 those forces ultimately turn into a longitudinal direction.

1 But drag is still drag. Furrowing is still furrowing. If
2 you're furrowing -- if you're furrowing sideways or if you're
3 furrowing with the rear end leading, as long as you're
4 furrowing and sliding, the drag factor will be the same. So
5 those are values that are in my speed calculations.

6 I think the way that -- that you would then
7 look at that would be to do the things that Mr. Granat did,
8 which is put a vehicle into a fixture and then quantify the
9 force.

10 Q. Okay. So if I'm understanding you right, you're
11 saying that if you had been asked to quantify the -- the
12 forces generated on the tag axle assembly and tie rod in our
13 accident, the way you would have done it would just be what
14 you've already done in this case, which is use a drag factor?

15 A. Yes. You could do that. Sure. You could do that.

16 Q. And I guess I'm getting hung up when you keep
17 saying, well, yeah, that's one way to do it or you can do it
18 that way because it makes me think there's other ways you
19 could do it.

20 A. And that's why I said there is another way that you
21 could do it and you could --

22 Q. What is the other way?

23 A. -- do it like Mr. Granat did, put it in a fixture,
24 test it, load it up to a force. But just --

25 Q. That would -- that would tell you what the force

1 generated -- force necessary to bend the tie rod, but that
2 doesn't tell you the force generated in the accident.

3 A. You could compare that force to the force from the
4 calculations.

5 Q. And have you done that?

6 A. I haven't. I think Mr. Granat has, though.

7 Q. Okay.

8 A. But, again, that's not how you would do that for
9 this case, for the Mt. Gretna crash.

10 Q. How would you do it in this case -- in the
11 Mt. Gretna crash?

12 A. Well, like I said, it's -- it's -- now it's orders
13 of magnitude. I think that the -- what you would have to do
14 is literally put a bus in a fixture and apply a lateral force
15 to the assembly through the use of some sort of pneumatic
16 device and load it up laterally until you got deformation that
17 matched the undercarriage deformation that we see here.

18 And I -- and -- and I can tell you that that
19 would be orders of magnitude greater than what we see in our
20 Campos crash.

21 Q. I guess I don't understand why -- why would that not
22 be the way to do it in -- in this case, the Campos crash as
23 well?

24 A. I think it -- that Mr. Granat did do it. Mr. Granat
25 did do that. He put that in a fixture and he did calculate

1 those forces or quantify those forces.

2 Q. So that would be a way to do it and then you're
3 saying do it that way and compare it to your numbers for the
4 drag factor?

5 A. Sure. Sure. You don't have that luxury in this
6 particular case in the -- in the Pennsylvania crash because
7 it's not forces that are generated through tire forces.

8 Q. Any other photos that are significant for the
9 Pennsylvania bus accident?

10 A. Yes. The -- the next series of photos are photos
11 that were taken from the either news sources or Internet
12 articles that show the bus at its point of rest. I used
13 these -- these pictures to help me locate the approximate
14 point of rest at the time of my scene inspection.

15 It helped me to understand the motion of the
16 bus as it collided with the embankment and then spun and slid
17 to its point of rest. Something that was different than the
18 Campos case in that this was an impact induced rollover versus
19 Campos, which is a braking and steering induced rollover.

20 There's an outside maintenance purchase order
21 entry --

22 Q. Let's -- we're finished with the photos, then, that
23 I guess we've marked as Exhibit 14, correct?

24 A. Yes.

25 Q. Okay. What's next in this notebook?

PE12-007

MCI

4-27-2012

Response 10

Attachment J-2

DANIEL CAMPOS, INDIVIDUALLY AND AS
REPRESENTATIVE OF THE ESTATE OF
CHRISTINA LOZANO CAMPOS,
DECEASED; MARIA L. LOZANO; ANNA B.
SCHERMERHORN; ADRIANA L. PRUITT;
AMALIA F. HEATHER; AND DANIEL N.
CAMPOS, et al,

Plaintiffs,

VS.

AMERICANOS U.S.A., L.L.C., FIRSTGROUP
AMERICA, INC., GREYHOUND LINES, INC.,
IRMA MENDOZA MORADO, MOTOR
COACH INDUSTRIES, INC., MCI SERVICE
PARTS, INC. AND ARVINMERITOR, INC.,

Defendants.

IN THE DISTRICT COURT

197th JUDICIAL DISTRICT

CAMERON COUNTY, TEXAS

**ORDER GRANTING MCI'S MOTION TO COMPEL
PRESERVATION AND INSPECTION OF MOTOR COACHES**

On this day came to be Motor Coach Industries, Inc. ("MCI") and MCI Service Parts, Inc. ("MCISP") (collectively herein "MCT"), and file this Motion To Compel Preservation and Inspection of Motor Coaches. After examining the pleadings and the evidence, and being apprised of the arguments of all sides, the Court finds that the Motion should in all things be GRANTED;

It is accordingly ORDERED, ADJUDGED, AND DECREED that MCI's Motion to Compel Preservation and Inspection of Motor Coaches is in all things GRANTED.

It is accordingly ORDERED, ADJUDGED, AND DECREED that Americanos must preserve and allow all parties an inspection of those motor coaches in Nappanee, Indiana that were used by Americanos in driveshaft testing. It is ORDERED that Americanos must preserve

and allow all parties an inspection of those coaches in Richmond, Virginia that were allegedly involved in incidents of driveshaft failure. Americanos is ordered to preserve the above-mentioned coaches in Nappanee, Indiana and Richmond, Virginia until the parties can inspect the motor coaches. *within 60 days.*

It is further ORDERED that Defendant Americanos USA, LLC must produce the documents requested by MCI on September 23, 2011.

SIGNED this 14th day of December, 2011.

gr
12/20/11 COPIES TO:
ALL KNOWN COUNSEL

Miguelina Lopez
RESIDING JUDGE

FILED 9:00 O'CLOCK a M
AURORA DE LA GARZA, CLERK

DEC 20 2011

Gloria Medina
DISTRICT COURT OF CAMERON COUNTY, TEXAS
DEPUTY

PE12-007

MCI

4-27-2012

Response 10

Expert Report - Kevan Granat

CAMPOS
V.
AMERICANOS

Supplemental Report Prepared for:

Mr. John C. Dacus
Hartline, Dacus, Barger, & Dreyer, LLP
6688 North Central Expressway
Suite 1000
Dallas, Texas 75206

Prepared By:



Kevan J. Granat
February 15, 2011

Introduction

I have reviewed additional materials provided regarding the Campos v. Americanos matter. I have reviewed the supplemental reports submitted by consultants for Greyhound and conducted inspections of several coaches referred to in those reports. I have reviewed documentation provided regarding tests performed on a modified MCI 102DL3 coach. A list of these additional materials I have received and reviewed is attached.

Other Incident Coaches

I inspected three coaches that were involved in other incidents under circumstances that were reported by Greyhound's consultants to be similar in some characteristics to the subject crash. These coaches were inspected at a Greyhound garage in Richmond, Virginia on January 25, 2012.

Unit 6468

This coach was a 2000 MCI 102DL3 with vehicle identification number 1M8PDMRA7YP052865. The unit had been refurbished by Greyhound, with numerous components replaced and the interior updated. The coach was equipped with a Detroit Diesel Series 60 engine, ZF Astronic transmission, and a Cadec GPS-based fleet management module. Neither the engine DDEC data nor the Cadec GPS data have been made available for review at the time of this report. Documentation regarding this incident is very limited, with comments that state 'lost driver line; tow from Somerset, PA to RHM; 8/24/11.' There is no indication of a loss of control or crash and there is no physical evidence indicative of a collision or overturn.

The driveshaft and both U-joints were not available for inspection. The transmission-side yoke and the differential-side yoke had both been removed and were also not available for observation. Both drive axle shafts had been removed for towing. The tie rod locking system had previously been disabled and replaced with a fixed, non-retractable pin. The pin was engaged in the locking plates and the tag axle steering was locked. Numerous contact marks were observed on the latch arm assembly and light contact was observed on the tie rod near its midpoint. Additional contact was observed on the fixed, axle-mounted locking plates. The caster latching mechanism was shifted laterally. At the time of my inspection, the axle was in the rearward caster position, corresponding to the position for forward travel. A functional evaluation of the caster latching mechanism was not possible during this inspection.

This coach was involved in an incident where the driveshaft apparently became detached while the vehicle was in motion. The driver was apparently able to maintain control of the vehicle and no crash resulted. This vehicle had recently been refurbished, with components replaced or updated, and the cause of the driveshaft separation is undetermined at this time.

Unit 6934

This coach was a 2000 MCI 102DL3 with vehicle identification number 1M8PDMRA9YP053306. The unit had also been refurbished by Greyhound and was also equipped with a Detroit Diesel Series 60 engine, ZF Astronic transmission, and a Cadec GPS-based fleet management module. Neither the engine DDEC data nor the Cadec GPS data have been made available for review at this point. The limited service documentation regarding this incident states that the unit was 'Towed in to us, driveshaft came out. Driveshaft missing. Damaged other parts.

Broke yoke, bent tag tie rod, broke tag lock.’ There is no indication of a loss of control or crash and there is no physical evidence indicative of a collision or overturn.

This vehicle had been serviced after the incident and a number of components had been replaced, including the driveshaft, both U-joints, the tag axle tie rod, and the fixed tie rod locking plates. The separated driveshaft and both U-joints were not available for inspection. The tie rod locking system had previously been disabled and replaced with a fixed, non-retractable pin. As inspected, the pin was engaged in the locking plates and the tag axle steering was locked. The transmission housing was fractured and the transmission output shaft was displaced from its normal position. The replacement U-joint at the transmission end was resting on top of the tag axle, at the bottom of the pass-through opening. Contact marks were observed on the latch arm assembly. At the time of my inspection, the axle was in the rearward caster position, corresponding to the position for forward travel. The original tie rod was observed separate from the vehicle, without its locking plate and clamps attached. The tie rod exhibited a bend adjacent to the position of the right side clamp, witness marks from both clamps, and a gouge between the clamp positions. The fixed tie rod locking plates were also observed separate from the vehicle. These plates exhibited deformation and contact damage, and the lock cylinder mounting boss was detached, with its welds fractured. The mounting boss and fixed pin were apparently unavailable for inspection. A functional evaluation of the caster latching mechanism was not possible during this inspection.

This coach was involved in an incident where the driveshaft apparently became detached while the vehicle was in motion. The driver was apparently able to maintain control of the vehicle and no crash resulted. This vehicle had recently been refurbished, with components replaced or updated, and the cause of the driveshaft separation is undetermined at this time.

Unit 6352, Mount Gretna Crash

This coach was a 2000 MCI 102DL3 with vehicle identification number 1M8PDMRAXYP052682. The unit was not part of the refurbishment program as the previously discussed units were. The coach was equipped with a Detroit Diesel Series 60 engine, ZF Astronic transmission, and a Cadec GPS-based fleet management module. Neither the engine DDEC data nor the Cadec GPS data have been made available for review at this point. The Cadec module’s compact flash card slot was observed to be empty; the recording media had apparently been removed prior to this inspection.

This coach was involved in a single vehicle crash that occurred on the morning of August 13, 2011 on the Pennsylvania Turnpike near the town of Mount Gretna. According to the Pennsylvania State Police, ‘The crash occurred while Unit #1 was traveling westbound in the left lane. The driver lost control and struck the Jersey barrier. Upon impact, Unit #1 traveled along the barrier. Unit #1 then crossed the travel lanes and struck the north side embankment. Unit #1 then rolled onto its left side facing southeast blocking both lanes. Approx. 18 people plus the driver were on board. Several people were taken to area hospitals for treatment. One passenger was extricated.’ After the crash, the bus driver indicated that he observed an object in the travel lane, turned to avoid hitting it, lost control, and struck the concrete median barrier. The investigating officers determined that ‘driver action’ was the prime factor in causing the crash.

The vehicle exhibited chassis deformation, sheet metal abrasions, and other damage consistent with the police description of the event. I inspected the chassis and observed substantial deformation of the right side tag axle suspension links, consistent with a substantial lateral impact to the axle. The entire tag axle was shifted toward the right and the left tag axle tire and wheel exhibited evidence consistent with an impact with the concrete median barrier. The tag axle was shifted such that the left side of the latch arm was pushed into contact with the transmission end U-

joint. Marks and gouges were observed on the tag axle, consistent with contact from the driveshaft and U-joint. The latch arm assembly, however, did not exhibit any impact marks or gouges as the latch arm in the Campbellton crash coach did. There was no steering stop installed on the left tag axle steering knuckle, while the right stop was apparently fractured off. The steering stop mounting threads and exposed surfaces were covered in residue, indicating that both stops were not functional for an extended period of time prior to the crash. The tie rod locking cylinder had been forcibly detached from its mounting boss and its air supply fittings were fractured. The locking cylinder was not observed with the vehicle. The tag axle tie rod was bent near the right locking plate clamp and the locking plates were disengaged. The caster latching mechanism was observed to be in an intermediate position, not latched in the rearmost position corresponding to forward travel and not in the foremost position corresponding to rearward travel. The driveshaft end U-joint was separated, with one strap and cup remaining attached to the driveshaft yoke and the other strap fractured. The driveshaft loop was deformed from its normal shape. The driveshaft itself was observed separate from the vehicle. Both lobes of the transmission end yoke were fractured and displayed contact damage. Unlike the Campbellton driveshaft, this driveshaft tube exhibited only a light mark indicative of contact between the body-mounted driveshaft loop and the driveshaft itself. This mark did not extend around the circumference of the tube, indicating that there was no extended rotation of the driveshaft while in contact with the loop. The tag axle steering damper was fractured at its mount to the tie rod. The front suspension stabilizer bar system showed evidence of a lateral shift of that axle, as well. A functional evaluation of the caster latching mechanism was not possible during this inspection.

The physical evidence observed on this coach is consistent with the investigating officer's description of the crash. The damage observed on the tag axle is indicative of an impact force which displaced the axle laterally toward the right. As a result of this deformation, the driveshaft was likely contacted by the left side of the tag axle pass-through structure, and subsequently separated. The evidence observed on this vehicle was dissimilar to the Campbellton vehicle in the specific locations of driveshaft contact and in the substantial lateral displacement of the tag axle. The likely cause of this crash is that the driver allowed his vehicle to depart his lane of travel and collide with the concrete median barrier.

Americanos' Brake Testing

I have reviewed materials provided regarding tests performed on an MCI 102DL3 on January 13-14, 2012. The nature of the testing was described in the supplemental reports of Larry Yohe and Thomas Fugger. These reports indicate that the coach was modified such that the operator could directly control the tag axle locking cylinder, the tag axle caster latching cylinder, and an additional pneumatic cylinder installed to force tag axle steering. Thirteen tests were performed, including driving at low speed in a circle and braking tests with the tag axle in various configurations.

Photographs which document the test vehicle configuration show that as many as twelve video cameras were installed on the vehicle, while footage from only four has been provided for review. An additional, external camera was observed, although no footage from that camera has been reviewed as well. The photographs show that the vehicle was instrumented with GPS-based speed and position sensors, accelerometers, and steering input sensors. I inspected the vehicle on January 25, 2012. This coach was a 1994 MCI 102DL3 with vehicle identification number 1M8PDMPAXRP046725. The coach was equipped with a Detroit Diesel Series 60 engine, an

Allison HD740 transmission, and a Cadec GPS-based fleet management module. At the time of my inspection, the instrumentation was no longer installed on the coach. The tag axle system had been modified with the addition of the auxiliary pneumatic cylinder and its mounting brackets, as well as by addition of a second driveshaft loop and supporting structure. The auxiliary cylinder was observed separate from the vehicle, and the vehicle was ballasted with weight bags in each passenger seating area. At the time of my inspection, the caster latch mechanism was observed to be in an intermediate position, not latched in the rearmost position corresponding to forward travel and not in the foremost position corresponding to rearward travel.

A preliminary review of the testing has been performed. I intend to perform a more complete analysis once additional video footage has been provided and after the deposition of the test driver has been reviewed. From my understanding of the reports provided and the theories put forth, it appears that the test most representative of the controllability claim would be brake test number thirteen. Test thirteen was performed with the tie rod steering unlocked and the caster latch mechanism shifted forward, corresponding to the position for rearward travel. After application of the vehicle's service brakes, the vehicle was yawed counter-clockwise and the driver applied a counter steer toward the right, maintaining directional control of the vehicle. The peak yaw rate during this period was approximately six degrees per second, and, as a result of this steer to the right, the vehicle's yaw rate had been brought back to zero. Subsequently, the driver steered the vehicle toward the left, removing all counter-steer input and turning an addition forty degrees toward the left. In response to this input, the vehicle yawed toward the left, with a peak yaw rate approaching eleven degrees per second, and traveled across the adjacent lanes. Throughout this sequence, the vehicle remained controllable and responded to the driver's steering and braking inputs. The driver was able to safely bring the vehicle to a stop completely on the paved surface.

A conclusion drawn from this testing, as relayed in the previously mentioned reports, is that the testing was representative of the mechanical failure that occurred in the Campbellton crash, and that, once this failure occurred, 'the driver was basically in an uncontrollable situation.' This conclusion is in contradiction with the testing itself. During these tests, the driver was able to maintain control of the vehicle, with the vehicle responding to both steering and braking inputs. The tests were performed with an apparently functional caster latching mechanism that was actuated with an apparently unrestricted compressed air system. This system allowed for the mechanism to be indexed between the forward and rearward positions. Contrary to this, the compressed air system that supplied the caster latching mechanism on the Campbellton coach was not functional and was unable to be indexed into either position directly.

My analysis to date is based on a partial review of the testing that was performed, based on the information provided. I understand that depositions of the consultants involved will be provided in the near future, and I understand that additional data are to be provided similarly. I reserve the right to supplement or modify my opinions based on this new information is received and based on additional work that may be performed.

Americanos' Driveshaft Testing

I have reviewed the video and photographs provided regarding tests that were performed on a stationary coach to simulate driveshaft failures. I inspected this coach on January 24, 2012 in Nappanee, Indiana. This coach was Americanos unit 60628 which had been previously used for track testing. The drive axles of the vehicle were elevated off the ground and were supported on jack stands. The tag axle tires were partially unloaded due to elevation of the drive axle. The right

outer drive wheel had been removed and the axle shaft had been modified to connect to a second stationary 'power' coach. This second coach was not available for inspection. The tag axle latch arm assembly displayed contact damage from the free end of the driveshaft and the tie rod locking plate was detached from the fixed locking plates. A functional evaluation of the caster latching mechanism was not possible during this inspection.

According to the documentation provided, this coach had been used for multiple tests, including three tests for which video has been reviewed. Two of these video files are labeled 'video 12' and 'video 15' and they correspond to testing of a secondary driveshaft loop. No additional videos have been provided for review. An additional test was performed by ITC Experts and discussed in a supplemental report by Aaron Jones. This report indicates that the caster latching mechanism was damaged during the prior test runs, but was not repaired and was left in the forward position, corresponding to the position for rearward travel. The U-joint attachment bolts were modified to produce rapid failure of the transmission end U-joint. Operators of the test coach and the power coach attempted to synchronize throttle inputs to approach a target driveshaft rotational rate. This rate was not reached prior to the separation of some U-joint elements and so the operators applied full throttle until the U-joint completely separated.

This testing was performed on a tag axle assembly that had been damaged by prior, repeated driveshaft failure tests. At this point, it is unknown how many tests were performed prior to the ITC test. Use of these components that have been compromised by earlier tests may significantly affect the circumstances or outcome of the subsequent tests that were reported on, as is the case with the caster latching mechanism. The test vehicle was artificially supported above the ground, with the tag axle tires partially unloaded. Unloading of the tag axle tires would have transferred additional load to the drive axle suspension, effectively loaded through the jack stands. This artificially alters the relative heights of the differential and transmission, placing the driveshaft at an angle that is not consistent with the normally loaded suspension position. At this point, the DDEC reports for the test coach and power coach have not been provided for review, so the effect of the operators' attempt at synchronizing throttle inputs and the effect of applying full throttle have not been fully evaluated, although these circumstances certainly differ from the circumstances of the Campbellton subject crash.

Additional Work

In an effort to better understand some of the conclusions reached in the supplemental reports, I have evaluated the performance of an exemplar caster latching mechanism and tag axle. I have cycled the latching cylinder under pneumatic power and also evaluated its positioning without a functioning compressed air source. The latching cylinder is a dual-acting pneumatic cylinder that requires compressed air to index it into a retracted or extended position. The cylinder is controlled by a spool valve that supplies compressed air to one of the cylinder inputs, while exhausting air pressure to the other input. The spool valve is controlled electrically, based on the reverse gear selector status. Under normal operation, the latching mechanism indexes between the forward and rearward positions by extending a clevis attached to the cylinder rod. The clevis contains rollers which contact trapezoidal cams attached to the underside of the latch tongue assembly. When cycled forward, the position corresponding to rearward vehicle travel, the rollers contact the cams and lift the latch tongue up, disengaging the tongue from the latch arm and indexing the latch arm to the forward position. As it moves toward this forward position, the rollers travel beyond the cam, allowing the tongue to return to its prior vertical position and to re-engage with the latch arm

assembly in its forward position. Replaceable wear inserts are present on the tongue and the latch arm at the engagement locations.

When there is no compressed air supplied to the latching cylinder it can be moved by hand, with some effort. When operated with air pressure levels consistent with the vehicle supply pressure, the latching mechanism indexes quickly and distinctly into the two latched positions. When operated at pressures well below the vehicle supply pressure, the cylinder cannot complete the indexing motion and is placed in an intermediate position. Once in this intermediate position, manual rotation of the latch arm, consistent with drive torque application or braking application, does not cause the latch tongue to completely re-engage the latch arm. Thus, faulty air supply to the latching cylinder can cause the mechanism to remain in an intermediate position and can prevent it from latching in either the forward or rearward position. An operator would be alerted to this condition by functional warning lights. The position of the caster latch mechanism will not alter the steer angle of the tag axle tires on a coach that also has no compressed air supplied to the tie rod locking cylinder, as was the case with the Americanos subject coach.

Additional Materials Received and Reviewed

1. Report written by Patrick Mears (08/09/11)
2. Report written by Gregory Wright (08/10/11)
3. Report written by David Coates (08/11/11)
4. Report written by Virgil Hoogestraat (08/11/11)
5. Report written by Robert Rucoba (08/11/11)
6. Supplemental report written by Larry Yohe (01/15/12)
7. Supplemental report written by Thomas Fugger (01/16/12)
8. Supplemental report written by Aaron Jones (01/16/12)
9. David Coates' GLI bus inspection photographs and notes (1/24-25/12)
10. Bob Rucoba GLI bus inspection photographs (1/24-25/12)
11. Carr Engineering exemplar vehicle inspection photographs (08/02/11)
12. Bus and bus parts inspection photographs (06/30/11)
13. Photos of Coach at Jeff's Auto Rebuilders
14. Driveshaft Test video (09/22/11)
15. Aaron Jones photographs (09/20/11)
16. Virgil Hoogestraat Volume I deposition (06/09/11)
17. Virgil Hoogestraat Volume II deposition (07/14/11)
18. Virgil Hoogestraat Volume III deposition and exhibits (09/23/11)
19. Jeffrey Barta deposition (08/10/11)
20. Michael Barta deposition (08/10/11)
21. David Stopper deposition and exhibits (08/12/11)
22. Andrew D. Irwin deposition and exhibits (08/31/11)
23. Glen Reuschling deposition (09/08/11)
24. Thomas Fugger Volume I deposition and exhibits (09/09/11)
25. Raul Longoria deposition and exhibits (09/12/11)
26. Ricardo Palacios deposition and exhibits (09/13/11)
27. Aaron Jones deposition and exhibits (09/14/11)
28. Juan Herrera deposition (09/15/11)
29. Larry Yohe deposition (09/19/11)
30. Frank Brown deposition (09/19/11)
31. Robert Rucoba deposition and exhibits (09/21/11)
32. Thomas Fugger Volume II deposition (02/10/12)
33. Protective Order
34. Defendant Americanos U.S.A., L.L.C.'s First Supplemental Responses to Motor Coach Industries, Inc.'s First Request for Production
35. Defendant Americanos U.S.A., L.L.C.'s Second Supplemental Responses to Motor Coach Industries, Inc.'s First Request for Production
36. Plaintiffs' Notice of Intention to Take the Oral and Videotaped Deposition of Kevan J. Granat, with Subpoena Duces Tecum
37. Plaintiffs' First Amended Notice of Intention to Take the Oral and Videotaped Deposition of Kevan J. Granat with Subpoena Duces Tecum
38. Defendant's First Amended Cross-Notice of Intention to Take the Oral and Videotaped Deposition of Kevan Granat and Subpoena Duces Tecum
39. Americanos & Greyhound's 08/16/11 Supplemental Discovery Responses to all Request for Production
40. Americanos USA, LLC, Greyhound Lines, Inc., and Irma Morado's Sixteenth Supplemental Responses to Plaintiffs and Intervenors' Requests for Disclosures and Second Supplemental Designation of Expert Witnesses with attachments
41. Americanos USA, LLC, Greyhound Lines, Inc., and Irma Morado's Fourteenth Supplemental Responses to Plaintiffs and Intervenors' Request for Disclosure
42. Tom Fugger's Raw Data I & II, emails, notes
43. Aaron Jones' expert file
44. Frank Brown file materials
45. Larry Yohe file materials
46. Locking Procedures
47. Bus 60630 Mileage Report

48. Job Tickets
49. MCI Training Certifications
50. DPS Inspection file for Americanos (2007- present)
51. Mount Gretna crash information
52. Video clip of axle testing
53. Bosch Test Track Chart
54. Test Run Log
55. 1036132-Unit 6132 Turning Angle Measurements
56. 1016934-Unit 6934
57. 1016468-Unit 6468
58. 100ND70S-Unit 6352
59. Documents concerning the three GLI coaches
60. Test 10 Brake Test photographs and DDEC report
61. AUSA000592 – AUSA001135: Vehicle Inspection Report
62. AUSA001762 – AUSA001781-1: Additional scene photographs produced by Americanos
63. AUSA006608 – AUSA006901: Service Standards, Tests, etc.
64. AUSA009354 – AUSA009946: Fleet Maintenance History
65. AUSA010714 – AUSA010716: Driveshaft test w-OE video
66. AUSA11639 – AUSA11755: Documents pertaining to Units 6352, 6934, 6468
67. AUSA011600 – AUSA011613: Documents pertaining to Units 6352, 6394, 6498
68. AUSA011614-0011634: Loop Installs by GLI
69. AUSA011635-011636: AUSA loop installation
70. AUSA001637-011638: Lancaster Police Reports
71. AUSA0011756: Continental vbox Tests and DDEC Files Pre Tests
72. AUSA0011757: ARB Tests 1-9 and Test Setups
73. AUSA0011758: ARB Tests 10-13

Kevan J. Granat

Specialized Professional Competence

- Crash reconstruction, failure analysis, and risk assessment.
- Vehicle dynamics testing and instrumentation.
- Design, testing, and evaluation of automotive chassis systems.
- Computer aided engineering, computer modeling of design, and design verification.

Professional Qualifications

- Master of Science - Mechanical Engineering (MSME), Purdue University, 1992
 - Thesis: "The Use of Interpolated Eigenvectors to Position Coupling Elements between Sub-Structures."
 - Graduate Research Associate: Performed automotive structural analysis and computer modeling of chassis systems for body-on-frame vehicles.
 - Graduate Teaching Associate: Taught an undergraduate mechanical engineering course on vehicle analysis, design, and fabrication.
- Bachelor of Science - Mechanical Engineering (BSME), Purdue University, 1990
 - Elective concentration in automotive design and vehicle dynamics.
 - Recipient of the General Motors GM Scholar scholarship award.
 - Recipient of a National Merit Finalist Scholarship.
 - Recipient of the Society of Automotive Engineers Chapter Contribution Award.
- Dynamic Analysis Group, LLC (2007 to present) Principal Engineer
- Granat Technical Consulting, LLC (2006 to 2007) Principal Engineer
- Tandy Engineering & Associates, Inc. (2002 to 2006)
Performed vehicle handling evaluation, vehicle testing, accident reconstruction, failure analysis, vehicle test instrumentation, and computer aided engineering.
- Carr Engineering, Inc. (1997 to 2002)
Performed vehicle handling evaluation, vehicle testing, accident reconstruction, failure analysis, vehicle test instrumentation, and computer aided engineering.
- Ford Motor Company (1993-1997) Vehicle Dynamics Engineer
Light Truck Chassis Dynamics Department and Advanced Vehicle Technology Department. Designed, analyzed, and tested chassis systems on various light truck platforms, including computer modeling and testing of vehicle handling performance.
- Ford Motor Company (1992-1993) Chassis Design Engineer
Performed design, analysis, and testing of automotive chassis systems.
- Member: Society of Automotive Engineers

Kevan J. Granat Publication List

1. "Use of Interpolated Eigenvectors to Position Coupling Elements Between Substructures, Part I: Theory" K.J. Granat, J.M. Starkey – *Modal Analysis: The International Journal of Analytical and Experimental Modal Analysis* (1066-0763). Vol. 11, no. 1/2, pp. 26-38. July 1996
2. "Use of Interpolated Eigenvectors to Position Coupling Elements Between Substructures, Part II: Applications" K.J. Granat, J.M. Starkey – *Modal Analysis: The International Journal of Analytical and Experimental Modal Analysis* (1066-0763). Vol. 11, no. 1/2, pp. 10-25. July 1996
3. "An Analysis of Yaw Inducing Drag Forces Imparted During Tire Tread Belt Detachments" D. Tandy, K. Tandy, N. Durisek, K. Granat, R. Pascarella, L. Carr, R. Liebbe – SAE 2007-01-0836
4. "Comparative Dynamic Analysis of Tire Tread Belt Detachments and Stepped Diameter ('Lumpy') Tires" N. Durisek, D. Tandy, K. Granat, K. Tandy, R. Pascarella, L. Carr – SAE 2007-01-0846
5. "Vehicle Response Comparison to Tire Tread Separations Induced by Circumferentially Cut Tires and Distressed Tires" D. Tandy, K. Granat, N. Durisek, K. Tandy, J. Baldwin, R. Pascarella – SAE 2007-01-0733
6. "Industry Implementation of Automotive Electronic Stability Control (ESC) Systems" N. Durisek, K. Granat – SAE 2008-01-0593
7. "Analysis of Front Suspension Ball Joint Separations in Motor Vehicle Crashes" N. Durisek, K. Granat, E. Holmes – SAE 2009-01-0101
8. "Repeatability and Bias Study on the Vehicle Inertia Measurement Facility (VIMF)" N. Durisek, K. Granat, G. Heydinger, D. Guenther – SAE 2009-01-0447

Kevan J. Granat Testimony List

Loper (Melody) v. Mack Truck Eastern Dist., LA; 95-1350, 99-2358, Sec L3	Deposition	02/19/01
Loper (Melody) v. Mack Truck Eastern Dist., LA; 95-1350, 99-2358, Sec L3	Deposition	02/27/01
Loper (Melody) v. Mack Truck Eastern Dist., LA; 95-1350, 99-2358, Sec L3	Trial	03/01
Rexwinkel (Brian) v. Loomis Fargo Washoe Co., NV; CV00-1227	Deposition	07/31/01
Kraft (Deborah & Michael) v. Ford Wise Co., TX; 00-12-734	Deposition	11/07/01
Clayton (William) v. Employers Mutual Casualty Ins. Orleans Parish, LA; 99-10447	Deposition	11/13/01
Freedman (Jimm) v. Ford U.S. Dist., NV; CV-S-01-0424-RHL-LRL	Deposition	05/14/02
Zachary (Martin) v. Ford Atlanta, GA; 1-01-CV-0531	Deposition	05/28/02
Rodriguez (Maria del Carmen) v. Ford Hidalgo Co., TX; C-512-00-A	Deposition	06/21/02
Grapsas (Constantine) v. Ford So. Dist., IN; IP-01-5299-B-B/S	Deposition	07/26/02
Tyson (Graciela) v. Ford Travis Co., TX; GN200282	Deposition	01/09/03
Nowakowski (Marisela) v. Ford Hidalgo Co., TX ;C-124-02-B	Deposition	01/16/03
Walkup (Leslie) v. Toyota Eastern Dist., MI; 01-60027	Deposition	03/21/03

Farr (Michael Derek) v. Toyota Hinds County., MS; 96-1170	Deposition	03/25/03
Brymer (Thomas) v. Ford Eastern Dist., TX; 2-02CV-155	Deposition	04/24/03
Walkup (Leslie) v. Toyota Eastern Dist., MI; 01-60027	Trial	06/03
Flores (Sacramento Baez) v. Ford Davidson Co., TN; 01C-1115	Deposition	07/02/03
Rodriguez (Jesus Vidal) v. Ford Davidson Co., TN; 01C-315	Deposition	07/02/03
Ojeda (Engracia Torres) v. Ford Davidson Co., TN; 00C-2979	Deposition	07/02/03
Hutton (Bill) v. Ford Dallas Co., TX; 02-4658	Deposition	08/05/03
Hernandez (Graciela Gomez) v. Ford Hidalgo Co., TX; C-093-02-F	Deposition	08/26/03
Stephen (Cheryl Lynn) v. Ford Los Angeles Co., CA; 00CC11492	Deposition	10/02/03
Perez (Jesus Carlos) v. Ford Nueces Co., TX; 02-61912-4	Deposition	12/02/03
Harrington (George) v. Ford East Baton Rouge Parish, LA; 475874	Deposition	01/29/04
Flores (Jorge Alberto) v. Ford Cameron County, TX; 2002-10-4004-C	Deposition	04/07/04
Smith (Yvonne) v. Alamo Rent-a-Car Western Dist., MO; 2-004045-WAK	Deposition	06/28/04
Westerly (Suzanne) v. Ford Central Dist., CA; CV 02-02123 NM (MCx)	Deposition	07/01/04
Quiroga (Reynaldo) v. Ford Harris County, TX; 2003-06069	Deposition	07/21/04
Loredo (Luis) v. Ford Webb County, TX; 2003CVE000385D2	Deposition	07/28/04

Ellis (Brenda) v. Ford Tarrant County, TX; 067-197473 03	Deposition	08/03/04
Sandoval (Hugo Zacarias) v. Ford Southern Dist., IN; IP03C5787B/S	Deposition	08/16/04
Vuittonet (Juan Marco) v. Kelsey-Hayes Fourth Dist., ID; CV PI 0100323D, CV OC 0103616D	Deposition	08/30/04
Frede (Alicia L.) v. Ford St. Louis, MO; 022-09936	Deposition	09/03/04
Moore (Bertha) v. Ford Marshall County, MI; M-01-347	Deposition	09/22/04
Cavazos (Arthur) v. Ford Travis County, TX; GN301739	Deposition	09/29/04
Graves & Long v. Ford Hinds County, MS; 251-01-953CIV	Deposition	10/08/04
Beatty (Anita) v. Ford Eastern Dist., KY; 6:02-577-DCR	Deposition	11/11/04
Gobert (Mathew) v. Ford Hidalgo Co., TX; C-933-03-F	Deposition	12/01/04
Mead (Kenneth Wayne) v. Ford Matagorda Co., TX; 03-H-0089-C	Deposition	01/19/05
Moody (Ruth Jeanette) v. Ford Robertson Co., TX; 03-0516687-CV	Deposition	03/04/05
Moody (Kevin) v. Ford Northern District, OK; 03-CV784E(C)	Deposition	03/31/05
Munoz (Rose Marie) v. Mazda Nueces Co., TX; 03-3353-B	Deposition	04/08/05
Reynoso (Isabel) v. Ford Brownsville, TX; B-03-120	Deposition	05/05/05
Marroquin (Carlos) v. Ford Nueces Co., TX; 04-61218-1	Deposition	07/22/05
Morales (Claudia) v. Ford Webb Co., TX; 2003-CVE-000801-D1	Deposition	08/05/05

Marroquin (Carlos) v. Ford Nueces Co., TX; 04-61218-1	Trial	09/05/05
Isom, (Anjanae) v. Ford Clark Co., NV; A438131	Deposition	12/02/05
Isom, (Anjanae) v. Ford Clark Co., NV; A438131	Deposition	12/09/05
Phillips (William David) v. Ford Mingo Co., WV; 05-C-1	Deposition	01/10/06
Munoz (Rose Marie) v. Ford Nueces Co., TX; 03-3353-B	Trial	01/20/06
Page (Sandra) v. Land Rover Wood Co., TX; 2003-445	Trial	01/24/06
Jackson (Charlie) v. Ford Jefferson Co., TX; A 174-536	Deposition	04/13/06
Williams (Barry) v. Ford Maricopa Co., AZ; CV2004-011576	Deposition	04/27/06
Reno (Mary) v. Ford Santa Fe Co., NM; D-0101-CV-2005-421	Deposition	08/03/06
Henderson (Sammy) v. Ford N. Dist., MS; 2:04cv21 1-M-B	Deposition	08/21/06
Reno (Mary) v. Ford San Miguel Co., NM; D-0101 CV 2005-421	Trial	09/18/06
Matey (Chris) v. Ford Blaine Co., ID; CV-2005-400	Deposition	10/19/06
Jackson (Charlie) v. Ford Jefferson Co., TX; A 174-536	Trial	11/08/06
Moody (Kevin) v. Ford Northern District, OK; 03-CV784E(C)	Trial	11/16/06
Cardenas (Jose) v. Ford San Diego Co. Superior Court, GIC 850655	Deposition	12/06/06
Pitts (Willie) v. Ford Solano Co. Superior Court, CA; FCS026087	Deposition	12/12/06

Matey (Chris) v. Ford Blaine Co., ID; CV-2005-400	Trial	03/06/07
Khan (Shoukat) v. Ford Eastern District, CA; 1:05-CV-00303-REC-DLB	Deposition	06/21/07
Khan (Shoukat) v. Ford Eastern District, CA; 1:05-CV-00303-REC-DLB	Deposition	07/18/07
Garcia de Mendoza v. Ford Maricopa Co., AZ; CV2003-022124	Trial	11/14/07
Hamada v. Goodyear Los Angeles Co., CA; KC048625	Deposition	05/01/08
Hamada v. Goodyear Los Angeles Co., CA; KC048625	Trial	06/03/08
Moore v. Ford St. Louis Co. , MO; 06CC-03222	Deposition	07/07/08
Mondaca v. Ford Arizona US District Court; CIV05259 TUC FRZ	Deposition	07/10/08
Gurule v. Ford Rio Arriba Co., NM; D-0117-CU-200700214	Deposition	07/14/08
Gurule v. Ford Rio Arriba Co., NM; D-0117-CU-200700214	Trial	08/20/08
Smith v. Michelin Western District, TX; A08CA886SS	Deposition	01/14/10
Grewal v. Mercedes Benz California Superior Court, Ventura Co.; 56-2008-00334158-CU-MT-VTA	Deposition	03/02/10
Anderson v. Greyhound Southern District, NY; 06 CIV 13371, 07 CIV 9299	Deposition	09/29/10
Heinzel v. Ford Clark Co. District Ct., NV; 07-A550264-C	Deposition	11/30/10
Williams v. Daimler Trucks North America Ohio Co. District Ct., WV; 09-C-419	Deposition	10/05/11
Campos v. Americanos Cameron Co. District Ct., TX; 2010-03-001717	Deposition	10/14/11

Soldano v. Daimler Trucks North America Southern District TX, Houston; 4:10-CV-03388	Deposition	12/07/11
Smith v. Daimler Trucks North America 40th District, Ellis County, TX; 80263	Deposition	02/08/12

DOCUMENTS REVIEWED – KEVAN GRANAT

1. Campos Plaintiffs' First Amended Petition
2. Scheduling Order
3. Plaintiffs' Designation of Expert Witnesses
4. Recorded interviews of Jerricah Capers and Nina Feddereson
5. Testing Protocol (July 2010 Inspection)
6. Testing Protocol (October 2010)
7. Photographs – 07/22/10 Inspection of Evidence Photos
8. Photographs - Bob Rucoba's Inspection Photos taken 07/27/10
9. Photographs – H. Zuschlag Exemplar Photos taken at 07/2010 Inspection
10. Photographs - H. Zuschlag Photos of (Subject Bus) Coach 46918
11. Photographs – 316 photographs of scene and coach produced by Americanos in response to Plaintiffs' RFP dated 06/17/10 (photographs taken 01/14/07, 01/15/07, 03/16/10, 03/17/10 and 04/26/10 - ARACC)
12. Photographs – 83 photographs of scene taken 03/16/10 - produced by Americanos in response to Plaintiffs' RFP dated 06/17/10
13. Photographs – 17 photographs of scene and passengers produced by Medina on 07/08/10 in response to Americanos discovery requests
14. Photographs – Dr. David J Coates' Photos taken at 07/29/10 Vehicle Inspection
15. Photographs – 06/23/2010 Supplemental Photos to Ex. 15, produced 7-27-10
16. Photographs – 48 photographs of coach taken 06/22/10 produced by Americanos on 07/23/10
17. Photographs – Dr. David J. Coates' January 14, 2011 Subject Bus Inspection Photos
18. Photographs – Bob Rucoba's 01/21/2011 Scene Inspection Photos and Notes
19. Photographs – Photos & Video of June 30-July 1, 2011 Inspection of Subject Coach
20. Photographs - Photo Nos.: 6828-6834 and 6838-6849 (from Photos & Video of June 30-July 1, 2011 Inspection of Subject Coach)
21. Photographs – Dr. David Coates' 01/20/2011 Inspection Photos

22. Photographs – Greg Wright’s Inspection Photographs:
 - a. Boroscope Photos
 - b. 06/30/2011 Inspection Photos
 - c. Sensor Test Results
23. Metallurgy Examination Results from MSi Testing & Engineering, Inc.
24. Final Vehicle Records for the Americanos Test Coach
25. Bosch Test Track
26. Brian Lawson Notes
27. Reduced Scale Drawing
28. MSi Reports
29. Backup docs
30. Campbellton Passenger Height-Weight Matrix
31. October 26, 2010 letter from Americanos' counsel regarding additional protocols for destructive testing and advising that they are no longer going to be doing the alignment testing, paragraphs 1-5 of the protocol entitled "Protocol for Examination of the Subject Coach."
32. Defendant Greyhound Lines, Inc.’s Responses to Motor Coach Industries, Inc.’s First Request for Production
33. Defendant Greyhound Lines, Inc.’s Responses to Motor Coach Industries, Inc.’s First Set of Interrogatories
34. Defendant Americanos U.S.A., L.L.C.’s Responses to Motor Coach Industries, Inc.’s First Request for Production
35. Defendant Americanos U.S.A., L.L.C.’s Responses to Motor Coach Industries, Inc.’s First Set of Interrogatories
36. Accident Report by TX DPS Trooper Kellert (Campos Plaintiffs 252808-000540)
37. Texas Department of Public Safety District 6C Reconstruction Investigation Report (Campos 252808-000797 - 252808-000800)
38. TX DPS – Lt. Lite Accident Records (Campos 252808-000812)
39. MCI000001-004022

40. AUSA000001-2778, AUSA000001-591, AUSA001226-1257, AUSA001460-1487, AUSA001803-2313, AUSA002830-3860, AUSA003189-3805, AUSA004999-5117, AUSA006608-6901, AUSA006961, AUSA006962-9177, Folder 2010-06-23, AUSA 001488-1802, P000367- P000372
41. Deposition transcripts and exhibits for: Leonor Aguilar, Selina Aguilar, Denise Alvarado, Sylvia Bandala, Daniel Campos, Daniel N. Campos, Carlos Cantu, Deborah Chavez, Trooper Wesley Cooper, Ashli Taylor Decena, Desiree Flores, Eva Garcia, Rogelio Garcia, Miranda Gibson, Amalia Heather, Bianca Herrejon, Eldridge Hughey, Trooper James Kellert, Lt. Timothy Lite, Adrian Lopez, Diana Ann Medina, Jacob Medina, Roman Medina, Margarita Miramontes, Irma Morado, Corporal Keith Olive, Carmen Paz, David Perez, Adriana Pruitt, Victoria Romero, Minerva Santiago, Anna Schermerhorn, Carlos Torres Teran, Sandra Valdez
42. Rough draft of the August 10, 2011 deposition of Jeff Barta
43. Expert Report – Patrick Mears (August 11, 2011)
44. Expert Report – Gregory Wright (August 11, 2011)
45. Expert Report – Dr. David Coates (August 11, 2011)
46. Expert Report – Virgil Hoogestraat (August 11, 2011)
47. Expert Report – Bob Rucoba (August 11, 2011)
48. Bob Rucoba’s 08-02-11 Exemplar Vehicle Inspection Photos
49. Bosch Test Track Chart, Test Bus AAU 60628 Test Run Log
50. AUSA-000592 – AUSA-001135
51. AUSA006608 – AUSA-006901
52. AUSA-009354 – AUSA-009946
53. Photos of the June 30, 2011 Bus Inspection which we received from counsel for Stewart & Stevenson Truck Holding, LLC d/b/a On the Border Freightliner of El Paso; and
54. Photos of the Bus Parts Inspection taken on June 30, 2011 which we received from counsel for Stewart & Stevenson Truck Holding, LLC d/b/a On the Border Freightliner of El Paso
55. Protective Order signed by all counsel on 07-16-10
56. DPS Inspection File for Americanos
57. Greyhound’s 2nd Supplemental Responses to MCI’s 1st Request for Production

58. Americanos 1st Supplemental Response to MCI's Request for Production
59. Morado's 1st Supplemental Response to Perez Request for Production
60. Americanos 1st Supplemental Responses to Perez Request for Production
61. Greyhound's 1st Supplemental Responses to Perez Request for Production
62. Greyhound's 1st Supplemental Objections/Responses to Medina, Medina & Bandala's Request for Production
63. Morado's 1st Supplemental Objections/Responses to Medina, Medina, Bandala's Request for Production
64. Americanos' 1st Supplemental Objections/Responses to Medina, Medina, Bandala's Request for Production
65. Americanos' 1st Supplemental Objections/Responses to Garcia & Dominguez Requests for Production
66. Americanos' 10th Supplemental Objections/Responses to Campos Request for Production
67. Morado's 1st Supplemental Objections/Responses to Campos Request for Production
68. Greyhound's 2nd Supplemental Objections/Responses to Campos Request for Production
69. Morado's 1st Supplemental Responses to Herrejon's Request for Production
70. Americanos' 1st Supplemental Responses to Herrejon's Request for Production
71. Greyhound's 1st Supplemental Responses to Herrejon's Request for Production
72. Americanos' 2nd Supplemental Responses/Objections to ArvinMeritor Request for Production
73. Americanos' 1st Supplemental Responses to Garcia Request for Production
74. Greyhound's 1st Supplemental Responses to Garcia Request for Production
75. Morado's 1st Supplemental Responses to Garcia Request for Production
76. Morado's 1st Supplemental Responses to Aguilar Request for Production
77. Americanos' 1st Supplemental Responses to Aguilar Request for Production
78. Greyhound's 1st Supplemental Responses to Aguilar Request for Production
79. Photographs of Coach at Jeff's Auto Rebuilders

80. Fugger Raw Data I & II (File)
81. Aaron Jones' Documents: 100MSDCF
82. Aaron Jones' Documents: 2663K A Jones – 7.29.10
83. Aaron Jones' Documents: 2859K A Jones – 8.27.10
84. Aaron Jones' Documents: 3309K A Jones – 11.4.10
85. Aaron Jones' Documents: Inspection 6-30 – 7-1-2011
86. Aaron Jones' Documents: MSI 6-30-2011
87. Deposition Transcript Dr. Juan Herrera (September 2, 2011) without exhibits.
88. E-mails from Frank Brown (produced by Americanos).
89. Meritor axle FG956 CAD model 2L-6-632.
90. Transcript of Glen Reuschling
91. Aaron Jones' Expert File
92. Larry Yohe's Expert File
93. Frank Brown's Expert File
94. Deposition and exhibits of Andrew Irwin
95. Aaron Jones' Documents–Campos Inspection 01-12-2011
96. Aaron Jones' file: 100ND70S – unit 6352
97. Aaron Jones' file: 1016468 – unit 6468
98. Aaron Jones' file: 1016934 – unit 6934
99. Aaron Jones' file: 1036132 – unit 6132 turning angle measurement
100. Deposition transcript and exhibits of Raul Longoria
101. Deposition exhibits for Thomas Fugger
102. Deposition exhibits for Ricardo Palacios
103. Deposition transcript and exhibit link of Aaron Jones
104. Deposition of David Stopper, Exhibits 1-3, 7-18 and 20-24

105. David Stopper Deposition Exhibit 4
106. David Stopper Deposition Exhibit 5
107. David Stopper Deposition Exhibit 6
108. David Stopper Deposition Exhibit 19
109. AUSA010714 - AUSA010716
110. Deposition transcript of Richard Palacios and Kenneth DeJohn
111. September 23, 2011 Video Deposition of Virgil Hoogestraat
112. Deposition transcript and exhibits of Larry Yohe.
113. Deposition transcript and exhibits of Frank Brown.
114. June 9, 2011 Deposition transcript of Virgil Hoogestraat;
115. July 14, 2011 Deposition transcript of Virgil Hoogestraat;
116. September 23, 2011 Deposition transcript and exhibits of Virgil Hoogestraat;
117. Deposition transcript of Jeff Barta;
118. Deposition transcript of Michael Barta;
119. September 23, 2011 Deposition exhibits for Virgil Hoogestraat
120. AUSA010717 - Video Driveshaft Test & Jones Photos 09-20-11.zipx
121. September 21, 2011 Deposition of Bob Rucoba
122. AUSA10607 – AUSA010684
123. Aaron Jones' Expert File Disc 3: Campos MSI Jan 13-14-2011
124. Aaron Jones' Expert File Disc 3: Campos protocol photos 6-3-2011
125. Aaron Jones' Expert File Disc 3: Inspection 6-30--7-1-2011
126. Aaron Jones' Expert File Disc 3: MSI-6-30-2011
127. Aaron Jones' Expert File Disc 3: Photos of U-Joint artifacts transferred to Gary Fowler
128. Aaron Jones' Expert File Disc 3: Spicer
129. September 21, 2011 Deposition exhibit 17 for Bob Rucoba

130. Bob Rucoba's September 21, 2011 Deposition Exhibits
131. Aaron Jones' Expert File Disc 1: John Pratt Work – Photographs & Torque Photos
132. Aaron Jones' Expert File Disc 2
133. Aaron Jones' Expert File Disc 3: Campos MSI Jan 13-14-2011
134. Aaron Jones' Expert File Disc 3: Campos protocol photos 6-3-2011
135. Aaron Jones' Expert File Disc 3: Inspection 6-30--7-1-2011
136. Aaron Jones' Expert File Disc 3: MSI-6-30-2011
137. Aaron Jones' Expert File Disc 3: Photos of U-Joint artifacts transferred to Gary Fowler
138. Aaron Jones' Expert File Disc 3: Spicer
139. Plaintiffs' Notice of Intention to Take the Oral and Videotaped Deposition of Kevan J. Granat with Subpoena Duces Tecum
140. Plaintiffs' First Amended Notice of Intention to Take the Oral and Videotaped Deposition of Kevan J. Granat with Subpoena Duces Tecum
141. Defendants' First Amended Cross- Notice of Intention to Take the Oral and Videotaped Deposition of Kevan J. Granat and Subpoena Duces Tecum
142. Americanos & Greyhound's August 16, 2011 Supplemental Discovery Responses to All Request for Production
143. Leon Faezell's errata sheet and signature page from his August 23, 2011 deposition;
144. Reporter's Certificate Page for Raul Longoria, Ph.D., deposition taken on September 12, 2011
145. Reporter's Certificate Page for Thomas F. Fugger, Jr., P.E. deposition taken on September 9, 2011
146. Reporter's Certificate Page - Reporter's Certificate Pages for the deposition of Frank Brown, taken on September 19, 2011.
147. Reporter's Certificate Page - Reporter's Certificate Pages for the deposition of Lawrence Yohe, taken on September 19, 2011.
148. AUSA010717 - Video Driveshaft Test & Jones Photos 09-20-11
149. AUSA011583 - Video Driveshaft Failure w-o Loop
150. Video 12.wmv

151. Video 15.wmv
152. 100ND70S - unit 6352
153. 1016468_ - unit 6468
154. 1026934_ - unit 6934
155. 1036132_ - unit 6132 turning angle measurement
156. Aaron Jones September 20, 2011 Photos
157. Aaron Jones Deposition Exhibit 7
158. Aaron Jones Deposition Exhibit 8
159. Aaron Jones Deposition Exhibit 9
160. Aaron Jones Deposition Exhibit 13
161. Kevan Granat Depo Exhibit 34 (binder)
162. Larry Yohe's January 15, 2012 Supplemental Expert Report
163. Thomas Fuggers' January 16, 2012 Supplemental Expert Report
164. Aaron Jones' January 16, 2012 Supplemental Expert Report
165. Americanos, Greyhound, and Morado's Sixteenth Supplemental Response to Plaintiffs' and Intervenors' Request for Disclosure and Second Supplemental Expert Designation
166. Attachments produced with Americanos, Greyhound, and Morado's Sixteenth Supplemental Response to Plaintiffs' and Intervenors' Request for Disclosure and Second Supplemental Expert Designation (*Not Bates Labeled*)
167. AUSA011639 – AUSA011755
168. AUSA011600 – AUSA011613
169. Dr. David Coates' January 24-25, 2012 Nappanee and Richmond Virginia GLI Bus Inspection Photos
170. Test Run Configurations
171. MCI-001329 – MCI-001338 – 3-62A – locked (Tag Axle Lockout Procedure)
172. 1995 Parts MCI Manual Excerpt - Tag Axle
173. AUSA011756

- 174. AUSA011757
- 175. AUSA011758
- 176. Test 10
- 177. Rough draft of Thomas Fugger's February 10, 2012 deposition transcript
- 178. AUSA011614-011634-Loop Installs by GLI
- 179. AUSA011635-011636-AUSA loop installation
- 180. AUSA011637-011638-Lancaster Police Reports
- 181. MCI – Virgil Hoogestraat Photos/Drawings: 12-04-1053 a
- 182. MCI – Virgil Hoogestraat Photos/Drawings: 12-04-1053 b
- 183. MCI – Virgil Hoogestraat Photos/Drawings: 12-04-1053 c
- 184. MCI – Virgil Hoogestraat Photos/Drawings: 12-04-1053 e
- 185. MCI – Virgil Hoogestraat Photos/Drawings: 12-04-1053 f
- 186. MCI – Virgil Hoogestraat Photos/Drawings: 12-04-1053 g
- 187. MCI – Virgil Hoogestraat Photos/Drawings: DSC00396
- 188. MCI – Virgil Hoogestraat Photos/Drawings: DSC00397
- 189. MCI – Virgil Hoogestraat Photos/Drawings: DSC00398
- 190. MCI – Virgil Hoogestraat Photos/Drawings: DSC00401
- 191. MCI – Virgil Hoogestraat Photos/Drawings: DSC00403
- 192. MCI – Virgil Hoogestraat Photos/Drawings: DSC00424
- 193. MCI – Virgil Hoogestraat Photos/Drawings: DSC00425
- 194. MCI – Virgil Hoogestraat Photos/Drawings: DSC00426
- 195. MCI – Virgil Hoogestraat Photos/Drawings: DSC08675
- 196. MCI – Virgil Hoogestraat Photos/Drawings: DSC08677
- 197. MCI – Virgil Hoogestraat Photos/Drawings: DSC08679
- 198. MCI Drawing: 12L-4-312_c_1 of 1[1] part 12L-4-308 – lock cylinder assembly

199. Americanos, Greyhound, and Morado's 14th Supplemental Responses to Plaintiffs' and Intervenor's Requests for Disclosure
200. Coates Photo - Driveshaft from GLI Unit 6468 - DSC_0006
201. Coates Photo - Driveshaft from GLI Unit 6468 - DSC_0015
202. Coates Photo - Driveshaft from GLI Unit 6468 - DSC_0017
203. Coates Photo - Driveshaft from GLI Unit 6468 - DSC_0024
204. Coates Photo - Driveshaft from GLI Unit 6468 - DSC_0031
205. Coates Photo - Driveshaft from GLI Unit 6468 - DSC_0034
206. Bob Rucoba's January 24-25, 2012 Nappanee and Richmond Virginia GLI Bus Inspection Photos

NO. 2010-03-1717-C

DANIEL CAMPOS, ET AL,	)	IN THE DISTRICT COURT
	)	
Plaintiffs	)	
	)	
VS.	)	197TH JUDICIAL DISTRICT
	)	
AMERICANOS, U.S.A.,	)	
L.L.C., ET AL,	)	
	)	
Defendants	)	CAMERON COUNTY, TEXAS

ORAL DEPOSITION OF

KEVAN GRANAT

MARCH 22, 2012

Volume 2

ORAL DEPOSITION OF KEVAN GRANAT, Volume 2, produced as a witness at the instance of the DEFENDANT, AMERICANOS USA, L.L.C., and duly sworn, was taken in the above-styled and numbered cause on MARCH 22, 2012, from 9:40 a.m. to 3:47 p.m., before STEFANIE COX, CSR in and for the State of Texas, reported by machine shorthand, at the law offices of Hartline, Dacus, Barger, Dreyer & Kern, L.L.C., 6688 North Central Expressway, Suite 1000, Dallas, Texas 75206, pursuant to the Texas Rules of Civil Procedure and the provisions stated on the record or attached hereto.

1 A. -- understand it.
 2 (Exhibit No. 1 marked.)
 3 Q. And I've issued a subpoena for you to bring
 4 some documents and tangible things with you today. Have
 5 you seen Exhibit 1 previously?
 6 A. I have.
 7 Q. Did you bring the items responsive to Exhibit
 8 1?
 9 A. I brought my entire file. I believe that is
 10 everything responsive --
 11 Q. I didn't --
 12 A. -- in Exhibit 1.
 13 Q. I did not see any invoices in your file. Did
 14 you bring that?
 15 A. Yes. That's in this binder here under the
 16 correspondence and invoices, which would be tab 6 in
 17 this one. They're at the end of the correspondence.
 18 (Exhibit No. 2 marked.)
 19 Q. Okay. We'll go ahead and mark that binder
 20 Exhibit 2. Can you describe what Exhibit 2 is to the
 21 ladies and gentlemen of the jury?
 22 A. Sure.
 23 Q. Okay.
 24 A. Exhibit 2 basically contains my file since the
 25 first deposition. I could go through each of the tabs

1 in some general terms here. The first tab includes
 2 inspection notes and photographs, inspections that I
 3 have done on some of the other incident coaches, as well
 4 as the drive shaft from one of those coaches, and then
 5 also the test vehicle that we inspected in -- two test
 6 vehicles, one in Nappanee and one in Richmond.
 7 Tab number 2 contains reports provided by
 8 other folks in this case and then my report as well.
 9 Tab number 3 contains a number of my
 10 calculations and photographs and analysis that I've done
 11 since the previous deposition.
 12 Tab number 4 contains some analysis of
 13 some of the test data that was provided. And that test
 14 data is referring to the Uvalde testing performed by
 15 Mr. Yohe and Mr. Fugger.
 16 Tab number 5 includes some excerpts from
 17 depositions. These have been depositions that I've
 18 reviewed since deposition number one. And these are
 19 excerpts from the deposition of the full deposition in
 20 the rest of the file.
 21 Tab number 6 includes correspondence,
 22 written correspondence, e-mail correspondence, and then
 23 also the invoices that we just discussed.
 24 Tab number 7 is a copy of the deposition
 25 notice for today.

1 Tab number 8 has a collection of CDs or
 2 DVDs. They include the inspection notes and photographs
 3 from the other incident coaches and the test coaches and
 4 then there's also some DVDs that include file materials
 5 that are in this binder.
 6 Q. All right. And your last deposition was in
 7 October of last year, correct?
 8 A. I believe that's true.
 9 Q. And would it be fair to say that all of the
 10 work that you've done since your last deposition in
 11 October of last year has been into -- in response to
 12 work performed by other experts in the case?
 13 MS. DORMAN: Object to form.
 14 A. I would say primarily I'm evaluating
 15 additional work that was produced by other experts. And
 16 also, you know, in having reviewed some of the
 17 depositions, I'm doing some work in response to that.
 18 Primarily that's the case.
 19 Q. (BY MS. RODRIGUEZ) All right. And those
 20 other experts being the Americanos experts, correct?
 21 A. Yes.
 22 Q. Have you done any work since your deposition
 23 in October 2001 (sic) that you took on your own
 24 initiative, irregardless of whatever work that any other
 25 expert has done in the case?

1 MR. HAYNES: 2011.
 2 Q. (BY MS. RODRIGUEZ) 2011. Thank you.
 3 MS. DORMAN: Object to the form.
 4 A. Well, the nature of this entire process is I'm
 5 evaluating the claims made by other experts. So
 6 fundamentally, everything that I've done in the entire
 7 case is in response to -- in some degree or another, to
 8 what other folks have done.
 9 Since the last deposition I've evaluated
 10 an exemplar tag axle caster latching mechanism and the
 11 entire suspension. That work, I would say, kind of fits
 12 your description but it also kind of fits the
 13 description I'm doing that in response to work that
 14 other people have done as well because there are some
 15 new claims in the case regarding the caster latching
 16 mechanism, so I evaluated that further.
 17 Q. All right. But you wouldn't have or hadn't
 18 evaluated the caster latch system until those claims
 19 were made by the Americanos experts about the caster
 20 latch system, correct?
 21 A. Well, I evaluated that system and I -- and I
 22 studied that and understood that and -- and have, you
 23 know, obviously done testing where that system is part
 24 of the coach. But I did not specifically test that as a
 25 component that was -- that would have been a component

1 caster.

2 And what I find in my results is that when
3 the vehicle is being driven forward with positive caster
4 or with the latch in the rearward position, we've got
5 2.9 to 4.3 inches, a range of total trail. And that --
6 that would be as designed, 2.9 to 4.3.

7 When the caster is reversed, the
8 mechanical trail now, instead of being due to positive
9 3 degrees of caster, is negative 3 degrees of caster.
10 That mechanical trail added to the pneumatic trail
11 results in a total trail of approximately .7 to
12 2 inches. So the total trail remains positive but is
13 reduced from the previous values to this .7 to 2-inch
14 range.

15 Q. Well, what's the practical effect of the trail
16 being reduced?

17 A. Well, the trail basically defines where the
18 lateral forces act on the tire. And if that trail goes
19 negative then -- then we can get an effect where the
20 tire will steer. As long as that trail remains
21 positive, the -- the forces -- the lateral forces act
22 behind the pivot point and that means there will be a
23 stability of that tire. Meaning, if you have a
24 disturbance, lateral disturbance of that tire, it will
25 still self-center.

1 Now, if you go much, much beyond -- for
2 example, much beyond this negative 3 degrees of caster
3 you can create a negative trail. And in that case, when
4 you have a lateral force disturbance you can get a steer
5 effect of the tire.

6 Q. And what would be the value amounts where you
7 estimate there would be a steer effect of the tire?

8 A. Well, I've done some photographic or
9 videographic analysis of some of the testing that was
10 done by Americans in -- in Uvalde. And I've
11 determined, based on the caster angle that I see in the
12 video, and that's based on the -- the movement of the
13 latch arm, the movement of the latch arm in that testing
14 was beyond -- well -- well beyond this second indexed
15 position, which I would call the position for reverse
16 travel. The caster was not minus 3 degrees. It was
17 much, much greater than that. I've estimated it at
18 about minus 15-degrees. And that's basically a rough
19 estimate, based on the video, but it's clearly far
20 beyond the minus 3 degrees of the caster.

21 And in doing the calculations to figure
22 out what the trail is, the total trail is, as a result
23 of that caster change, I get approximately 3.9 to
24 2.5 inches of -- of negative caster. I'm sorry. Of
25 negative trail.

1 Now, of course, in those videos we see
2 that the tires do steer and you do have confirmation
3 that you have a negative trail.

4 Q. All right. You said that 2.9 to 4.3 inches of
5 trail is as by design. What did you mean by that?

6 A. Well, the typical forward travel position, the
7 total trail of the tire lateral forces is at the range
8 of 2.9 to 4.3 inches.

9 Q. Where do you get that figure from?

10 A. That's based on my calculations that's in tab
11 3 here.

12 Q. If someone much smarter than me, an engineer,
13 say, were to look at those calculations, do you have
14 your work set out so that they could under see -- they
15 could understand how you reach the calculations?

16 A. Absolutely. I think it's very clear. There
17 are references in this document and then the -- the
18 specific reference, at least a cover sheet of the
19 reference, and the page where the information was found
20 is included right behind the calculations.

21 Q. Have you --

22 A. I think --

23 Q. Oh. I'm sorry.

24 A. I think it's all self-contained.

25 Q. Have you ever done these calculations before?

1 A. Sure.

2 Q. In what context?

3 A. Well, when I was an engineer at Ford I worked
4 on suspension design and that included also steering
5 system design. So part of my work on a daily basis in
6 that position was to calculate very, very specific
7 parameters such as caster, caster change, the actual
8 trail of the -- the tires, the self-aligning moment,
9 which is kind of a function of this trail.

10 I've also -- in my experience at Ford I've
11 tested hundreds of tires on a flat track tire tester to
12 produce tire test data. And that test data is a
13 representation of -- of these lateral forces and
14 aligning moments that reflect exactly this parameter
15 that I'm talking about, the pneumatic trail.

16 Q. So are you relying on your experience at Ford
17 and the work that you did at Ford, whether it be out at
18 the test track or, as you say, in the office doing
19 calculations, in support of your experience for arriving
20 at your work in this case?

21 A. Certainly in part, yes.

22 Q. Okay. Now, let's go back to the 2.9 to
23 4.3 inches of trail. Is that anywhere documented by
24 MCI?

25 A. Not that I'm aware of.

1 and the tag axle unlocked?

2 A. I have not.

3 Q. You said that you did some videographic
4 analysis at the Uvalde testing to look at the movement
5 of the latch arm?

6 A. Correct.

7 Q. And you estimated that the caster angle was at
8 about 15 degrees?

9 A. Negative 15 degrees.

10 Q. I'm sorry. Negative 15 degrees?

11 A. Yes.

12 Q. How did you reach that measurement?

13 A. Basically that's an estimate looking at frames
14 that are grabbed from the video. And looking at how
15 much the latch would move when normally indexed from the
16 rear position to the forward position, and then
17 incrementally how much further than that position did it
18 move in their testing.

19 Q. So did you just eyeball it or did you try to
20 measure it somehow?

21 A. I tried to measure it. It's -- and while I
22 did do some photo analysis to measure it, I would say
23 that that's an approximate just because I'm familiar
24 with the camera that was used underneath there. It's a
25 GoPro helmet camera and they're very wide angle cameras,

1 so there's distortion, what we would call a fisheye
2 effect of that.

3 So apart from actually setting up another
4 camera and physically moving a latch arm to that
5 position, this is the best I could evaluate that. So
6 I've got some documentation in here that shows how I
7 investigated that.

8 Q. All right. When using those standards that we
9 talked about early on in the deposition about issuing
10 statements only in an objective and truthful manner, how
11 scientifically reliable is that negative 15 degrees?

12 MS. DORMAN: Object to form.

13 A. I think it's good. I mean, it's clearly
14 within a couple of degrees, 1 or 2 degrees either way.

15 Q. (BY MS. RODRIGUEZ) And you think that's a
16 scientific way to reach that measurement is to look at
17 it from skewed video cameras?

18 MS. DORMAN: Object to form.

19 A. Sure. I've -- I've evaluated the -- the
20 images pulled from that and I've tried to evaluate how,
21 as you said skewed, but how fisheye that portion of the
22 video is and that's -- I've satisfied myself that that
23 is a reasonable way of looking at that.

24 Q. (BY MS. RODRIGUEZ) How did you evaluate how
25 fisheye that portion of the video camera was?

1 A. Well, there's a -- there's a hole on the horn
2 of the latch arm assembly that moves with that horn.
3 And I just evaluated that looking at that as an ellipse,
4 does the shape of that change as it goes from one
5 position to the next. And based on, you know, the
6 quality of this video, it's essentially the same shape
7 ellipse as you go from one position to the next and that
8 means to me that there's not a tremendous amount of
9 fisheye distortion going on in that area.

10 Q. Let's talk about the tag tires for a minute.
11 The tag tires, as you understand, are designed to travel
12 behind in the same direction behind the dual tires,
13 correct?

14 A. Well, when the coach is going forward, sure.

15 Q. All right. And then -- well, how would you
16 describe that movement of the tires traveling behind the
17 dual tires? What would you call that?

18 MS. DORMAN: Object to form.

19 A. I'm not sure I follow your question because, I
20 mean, that's just -- if I understand your question, it's
21 just that the tires are behind the drive tires. I'm not
22 sure I'm following it.

23 Q. (BY MS. RODRIGUEZ) Okay. Thank you for
24 letting me know. Are you aware of any condition where
25 the tires cock out of that alignment where they're no

1 longer traveling behind the dual tires?

2 A. Well, they're always -- if the coach is going
3 forward, they're always traveling behind the dual tires.
4 You refer to the tires cocking out of position, and I'm
5 not sure I follow your question. But if you mean
6 they're steering into the different position then that's
7 part of the design of the coach. It will -- they will
8 steer under certain circumstances. And then we have,
9 you know, extreme examples of that in the -- the testing
10 that was done by Americanos as well.

11 Q. All right. So but you can see that it is --
12 that the tag tires are capable of cocking out of
13 alignment up against the wheel stop so that they're no
14 longer traveling behind the dual tires, correct?

15 MS. DORMAN: Object to form.

16 A. Yeah. I'm not sure the terminology is working
17 out here because they're always -- if the coach is going
18 forward, they're always traveling behind the dual tires.
19 I mean, it's just a very simple placement of the axle.
20 And when you say "cocking," I'm assuming you mean
21 steering, but maybe -- maybe I'll ask you to rephrase
22 the question.

23 (Exhibit No. 3 marked.)

24 Q. (BY MS. RODRIGUEZ) Well, let me come around
25 to you for a minute. All right. You see I've drawn

1 MS. RODRIGUEZ: Objection, nonresponsive.

2 Q. (BY MS. RODRIGUEZ) Just the simple question
3 of, do you think it's a good idea to have a second drive
4 shaft loop on a 102-DL3 at the transmission end? Do you
5 think that's a good idea, Mr. Granat?

6 MS. DORMAN: Object to form.

7 A. I think it's fine. I don't think it would
8 necessarily have a different result in the subject crash
9 though.

10 MS. RODRIGUEZ: Objection, nonresponsive
11 after the word "fine."

12 Q. (BY MS. RODRIGUEZ) So you would agree with me
13 though that if you have a second drive shaft loop on a
14 102-DL3 at the transmission end that it would protect
15 the steering components like the caster latch and the
16 tag axle lock, right?

17 MS. DORMAN: Object to form.

18 A. Well, I believe from my understanding of Aaron
19 Jones' testimony is that it actually created damage to
20 the caster latch in one of the early tests. I
21 haven't -- you know, seen photographs before and after
22 that test, but that's my understanding of his testimony
23 which would be in disagreement with that.

24 Q. (BY MS. RODRIGUEZ) All right. Then would you
25 agree with me then that if you put a second drive shaft

1 loop on a 102-DL3 at the transmission end that that
2 would prevent damage occurring to the tag axle lock in
3 the event of a drive shaft separation at the
4 transmission end?

5 MS. DORMAN: Object to form.

6 A. I would say that that's a potential if the --
7 as the drive shaft separates from the differential it
8 could prevent that. It could prevent damage to that
9 lock, sure.

10 Q. (BY MS. RODRIGUEZ) And you saw that the
11 videos of the drive shaft loop that Greyhound installed
12 did prevent damage to -- from occurring to the tag axle
13 lock and the tie bar, correct?

14 A. Right. In the -- well, the two videos I saw,
15 one of them didn't have continued rotation of the drive
16 shaft so that's of limited value, but in the other video
17 there was no damage to the tag lock.

18 Q. Or to the tie bar, right?

19 A. To the tie rod?

20 Q. The tie rod --

21 A. Correct.

22 Q. -- yes.

23 And as a design engineer, that's something
24 that would be desirable to you to prevent damage to the
25 steering components like the tie rod and the tag axle

1 lock, correct?

2 MS. DORMAN: Object to form.

3 A. I think that's one way of -- of designing the
4 system. I think there are other ways. And I've
5 evaluated the way MCI designed this, the combination of
6 caster latch and the tie rod. And I think the way that
7 they designed it is actually a good way of designing it
8 as well. So either -- either way, I think, is fine.

9 Q. (BY MS. RODRIGUEZ) So you're saying the way
10 MCI has designed it is it prevents damage from occurring
11 to a tie rod in a tag axle lock the way it's currently
12 designed?

13 A. I think the way MCI designs it is such that
14 the -- the caster latch and the tie rod lock, any sort
15 of damage that's caused to those, whether it's based on
16 road debris, drive shaft contact or service issues, any
17 of that kind of damage means that you still have
18 positive trail on the tag axle as the coach is going
19 forward.

20 And regardless of what the position of
21 that latch arm assembly is from all the way rearward
22 against the tag axle all the way forward to the strap,
23 they've assured through their design that the -- that
24 the trail remains positive, meaning that the tires will
25 trail. They will not steer as you see in the -- the

1 UPG, or, I'm sorry, the Uvalde testing by Mr. Yohe and
2 Mr. Fugger. So I think the way that they did it is just
3 another way of achieving the same ends.

4 Q. And that's based on your calculation and not
5 actual track testing that you've done, right?

6 MS. DORMAN: Object to form.

7 A. Well, based on my calculations, but it's also
8 confirmed very clearly in the testing that Mr. Yohe and
9 Mr. Fugger did.

10 Q. (BY MS. RODRIGUEZ) All right. The Greyhound
11 testing on the second drive shaft loop, do you have any
12 criticisms of that validation testing?

13 A. I really haven't evaluated it to that regard.
14 I observed the video, but I haven't tried to study it in
15 more detail than that.

16 Q. And do you have any criticisms of the
17 contain -- the second drive shaft loop that Greyhound
18 has put in the 102-DL3s?

19 MS. DORMAN: Object to form.

20 A. Well, certainly in the -- the testing that was
21 done by Yohe and Fugger, there appears to be contact
22 between that second loop and the -- the drive shaft
23 itself. That wouldn't be a desirable characteristic
24 there. However, I think that's primarily due to the --
25 the absence of the limiting strap on the tag axle. So

1 that --

2 Q. (BY MS. RODRIGUEZ) On the tag axle?

3 A. That's not a condition -- correct. The
4 limiting strap that's mounted at the -- the latch
5 assembly position. That was not present on that coach.

6 So in that circumstance, there was some
7 contact between the -- the second loop and the drive
8 shaft. I don't think that's a normal circumstance
9 though.

10 Q. You know, on the MCI drawings, did you see
11 that there was always a latch strap?

12 A. I'm sorry. Again?

13 MS. DORMAN: Object to form.

14 Q. (BY MS. RODRIGUEZ) The MCI drawings of the
15 102-DL3 you said you recently looked at the caster latch
16 assembly, right?

17 A. I'm not sure what you're saying. You mean the
18 drawings or the -- or the actual exemplar that I looked
19 at.

20 Q. The drawings. I'm talking about the MCI
21 drawings.

22 A. I have seen several. I have not specifically
23 evaluated ones that you might be talking about.

24 Q. Do you know if MCI always had the strap?

25 A. I don't know.

1 Q. Okay.

2 A. Certainly on the subject coach it's there.

3 Q. All right. With regard to the testing that
4 Mr. Jones did, in your report you state that the
5 operators of the test coach and the power coach
6 attempted to synchronize throttle inputs. Where did
7 that get that information?

8 A. That was my understanding from his
9 description. Basically my understanding is they've got
10 both outboard brakes locked and then they've got both
11 coaches powering independently. And so they -- they're
12 trying to synchronize that application of throttle. And
13 I think he even had a video that showed the
14 synchronization of them.

15 Q. And what was the rate that -- the target rate
16 that you say they were trying to reach prior to the
17 separation?

18 A. The target rate?

19 Q. Right.

20 A. You mean -- I'm not sure what you mean by
21 target rate.

22 Q. You say that synchronized power incident to
23 approach a target drive shaft rotational rate. What was
24 that rate?

25 A. Oh. My understanding from Aaron Jones' either

1 report or deposition, I don't recall which one, was he
2 was looking for something on the order of -- I want to
3 say 1800 rpm, but I may have that number wrong. Yeah,
4 the specific target number.

5 Q. Do you know what that would have correlated in
6 terms of the rotational rate on the accident bus at the
7 time of the drive shaft separation?

8 A. I haven't tried to correlate that to a
9 specific speed. I haven't evaluated that. But my
10 understanding from his testimony is he was trying to
11 match the speed of the subject coach based on the DDEC
12 data.

13 Q. You say that use of the components that have
14 been comprised by earlier tests may significantly affect
15 the circumstances for outcome of the subsequent tests.
16 Did they?

17 A. Well, certainly the motion of the caster latch
18 assembly that you see in the video is affected by the --
19 the fact that it was compromised earlier.

20 Q. Any other effect that you saw?

21 A. Well, we talked a little bit before about the
22 forces that are transferred from the caster latch to the
23 tag axle structure itself. I think we've already
24 covered that. Other than that, that's the primary --
25 primary effect I'm talking about.

1 Q. As a design engineer or mechanical engineer, can
2 you think of any reason why they would purposely leave
3 the componentry the way it was for subsequent tests?

4 A. I've not tried to put myself in their shoes
5 and -- and guess that.

6 Q. Well, I'm not asking you to guess what they
7 were thinking. I want to know if you, as an engineer,
8 can think of a way -- of a reason why you would want to
9 leave the componentry the way it was for subsequent
10 tests?

11 MS. DORMAN: Object to form.

12 A. I'm not sure what you mean. You mean after
13 tests -- the tests that were creating video 12 and 15?

14 Q. (BY MS. RODRIGUEZ) Well, you know what --
15 we're talking about your report here. And you say, use
16 of these components that have been compromised by
17 earlier tests may significantly affect the circumstances
18 or outcome of a subsequent test.

19 And I'm asking you: Is there any reason
20 as an engineer why you would leave the componentry the
21 way it was for subsequent tests?

22 A. Nothing's coming to mind right now. Maybe you
23 can clarify the question a little bit because I'm not --
24 I don't think I'm following it.

25 Q. You wouldn't be interested to know how the --

1 dependent on the forces that are acting on it. And
 2 clearly, if you have the pneumatic or the air pressure
 3 that is trying to keep this latch arm latched, then
 4 that's a force that would have -- would have been there
 5 with a properly -- properly functioning pneumatic
 6 system. And the -- the clevis and the rollers and the
 7 latch actively pull back on that rearward pawl.

8 So there's a force that by design is meant
 9 to be there. That's to keep that pawl in place. And
 10 where it keeps the pawl in place is down within the
 11 engagement of the latch itself or the tongue. So if
 12 that's in an intermediate position, we've already gone
 13 past this first safeguard, and that first safeguard is
 14 what keeps the -- the latch arm assembly caster rearward
 15 for forward travel.

16 Q. If the Americanos theory is correct that the
 17 drive shaft struck the caster latch mechanism and
 18 unlatched it, either from the rear position for forward
 19 travel or this -- well, from the rear position for
 20 forward travel, if that's true, how would the air system
 21 being clogged be relevant to the accident?

22 A. Well, it depends on how that drive shaft would
 23 have interacted with the top of the latch arm, you know,
 24 and created forces present at the horn and present at
 25 those pawls. So, I can't say specifically how that

1 interaction would have changed. But clearly if you have
 2 a restraining force on that rearmost pawl, that will
 3 help restrain that pawl within the latch. I don't
 4 believe there's been any testing to show that with
 5 properly functioning air system that that latch comes
 6 unlatched. That's why --

7 Q. Even if it's hit by the drive shaft, struck by
 8 the drive shaft as it escapes the retaining harness?

9 A. Well, that's why --

10 MS. DORMAN: Object to form.

11 A. We talked earlier, I believe, about the -- the
 12 fact that the Nappanee test was run with the caster
 13 latch already compromised. So that means we don't have
 14 a test that evaluates that, with it properly latched
 15 rearward and with a properly functioning air system and
 16 with a properly conditioned pawl and wear pad that those
 17 two cams separate. We don't have something that tells
 18 us that.

19 Q. Do you have any other criticisms of the Fugger
 20 and Yohe testing in Uvalde that we haven't discussed
 21 today --

22 MS. DORMAN: Object to form.

23 Q. (BY MR. HAYNES) -- so far today?

24 MS. DORMAN: Object to form.

25 A. There are a few.

1 Q. (BY MR. HAYNES) Yeah. I just want to make
 2 sure we have them all on the record because I know there
 3 have been some that were discussed. If we have any
 4 others, if you'd tell me what they are, I'd appreciate
 5 it.

6 A. Well, the first and foremost is the absence of
 7 the strap that we talked about. Secondly, the --

8 Q. For the -- for the caster latch mechanism?

9 A. Correct. Secondly, the condition of the pawl.
 10 And both of those circumstances were not, as I can
 11 understand it, you know, intentional by either
 12 Mr. Fugger or Yohe because they didn't really look under
 13 the coach and evaluate how that system was functioning.
 14 They were kind of operating under the assumption that
 15 the strap was there and that everything was in proper
 16 condition. And that's the way they testified.

17 They -- and then also Mr. Hazmir testified
 18 he thought the strap would have been there. He didn't
 19 know why it wouldn't be there. So that's -- that all is
 20 one criticism there and that is also, you know, the fact
 21 that they didn't really -- Mr. Fugger and Mr. Yohe
 22 didn't really look underneath there to see that it was
 23 not an original equipment configuration.

24 Also, the testing that they did, they did
 25 not -- they primarily did heavy braking testing. And

1 all of the instances where we get some sort of steering
 2 to the tag axle tires, some sort of dynamic steering
 3 effect, all of those are under braking conditions that I
 4 would say exceed what you would expect a -- a commercial
 5 vehicle operator to do if they're faced with some sort
 6 of a mechanical issue on their vehicle.

7 You know, the standard accepted method is
 8 to release the throttle, get the vehicle under control,
 9 and then steer toward the shoulder and slowly bring the
 10 vehicle to rest. The testing that they've done is
 11 primarily heavy braking testing. That's the limit of
 12 the vehicle's braking capacity.

13 I reviewed their testing that they've got
 14 an actuator underneath there and I don't think that's
 15 very valid testing. But I think they actually stepped
 16 away from that and really didn't place much value in
 17 that either, so I don't really have a criticism that
 18 means a whole lot there. But that would be the same
 19 criticism as when we talked about the Bosch test track
 20 testing with the actuator.

21 As far as other criticisms, since they
 22 were doing testing that they described as brake testing,
 23 I would have liked to have seen some data regarding
 24 the -- either brake pedal force or brake tire
 25 pressure -- brake actuation pressure. I've not seen

1 that.

2 They have a video from the first several
3 runs that seem to capture brake application pressure and
4 then that video got misdirected or adjusted somehow.
5 They -- they no longer had brake application pressure
6 captured.

7 Q. When it was captured, how would you
8 characterize the direction?

9 A. It was apparently all the way up to the full
10 pressure that the vehicle was supplying. I think it was
11 on the order of 110 psi which would have been consistent
12 with the full air pressure.

13 Q. And that would be heavy braking, in your
14 opinion?

15 A. Right. And that also corresponds to the
16 longitudinal acceleration. Those values are consistent
17 with heavy braking as well. That's kind of a surrogate
18 for brake effort. Rather than looking at the actual
19 pedal force, I was able to at least look at longitudinal
20 acceleration of the vehicle, at least the -- at least
21 the vehicle response to the braking.

22 Q. How did you measure the level of braking or
23 brake force in your Uvalde testing?

24 A. Well, my testing wasn't specifically brake
25 testing. So I would say I generally measured it the

1 same kind of way. I measured the response of the
2 vehicle.

3 Q. Any additional criticisms?

4 A. Well, even that one, I think, is kind of a
5 secondary criticism. My understanding of Mr. Fugger's
6 deposition is that there were additional VBOX units
7 placed on the coach. And this isn't really a criticism
8 but I don't have -- I haven't seen the data for those
9 other VBOXs. So that's something else I need to be able
10 to look at eventually.

11 My understanding from his deposition is he
12 said that there were four units on the coach. At this
13 point we've got data for one of the VBOX 3 units and one
14 of the video VBOX units.

15 Q. Say that again. You have data for the VBOX 3
16 and what else?

17 A. And one of the video VBOX units. My
18 understanding is that there's two of both of those units
19 so there should be two more sets of data.

20 Q. And you don't have that right now?

21 A. Right. I think in general terms that that
22 covers my criticisms for the most part.

23 Q. Did you in your testing at Uvalde analyze the
24 controllability of the motor coach with the tag axle
25 unlocked with different levels of braking?

1 A. I didn't specifically evaluate different
2 levels of brakes, but in some of the tests I did do
3 moderate braking, both steering and braking to
4 evaluate -- to evaluate that, but I did not do a
5 specific series of brake tests.

6 Q. I think I remember seeing in your deposition
7 that you said the peak steer input that you performed in
8 your testing at Uvalde was 70 something degrees; is that
9 right?

10 A. I think that's right. That's for the dynamic
11 tests at frequent speeds. Obviously the low speed tests
12 were higher.

13 Q. What about did you measure the -- the brake
14 force that you used in any of your testing at Uvalde?

15 A. The peak longitudinal acceleration, basically
16 the vehicle response. I measured it. I don't have a
17 number for you -- for you specifically what that would
18 be, but it's within the data.

19 Q. And that -- would it correspond to moderate
20 breaking?

21 A. That is my recollection, I would say.

22 Q. Would it -- would it be fair to say that you
23 didn't test the controllability of the coach with the
24 tag axle unlocked beyond moderate braking?

25 A. I think that's fair to say. I did not do any

1 heavy braking that I recall, but I would have to go back
2 and look at it to refresh my memory, to be honest. I
3 think some of the -- some of the brake stops when I
4 drove the vehicle onto the shoulder and then back onto
5 the roadway, they were fairly aggressive. But my
6 recollection is they were on the order of 4/10th of a G
7 rather than 6/10ths of a G.

8 Q. And you may have told us this already but it's
9 my understanding that your testing at Uvalde did not
10 include a condition where the tag axle was unlocked and
11 the caster latch was either unlatched or in the --
12 locked in the reverse -- in the forward position for
13 reverse. Does that make sense?

14 A. Yes. And that's true. I did not evaluate the
15 caster at that time. It was not a -- a theory that was
16 put forth.

17 Q. So when -- when you did your testing in
18 Uvalde, the caster latch mechanism was always locked in
19 the reverse position for forward travel?

20 A. That's correct. Apart from simple reversing
21 of the vehicle between tests, that's correct.

22 Q. You never positioned the caster latch
23 mechanism in the forward position for reverse and
24 traveled forward during any of your testing?

25 A. Right. That's correct. That wasn't the

1 intention of that test.

2 Q. And you never performed any testing at Uvalde
3 where the tag axle was unlocked and the caster latch was
4 unlatched; is that correct?

5 A. Unlatched and meaning it's at an intermediate
6 position --

7 Q. Yes, sir.

8 A. -- or unlatched? I did not, that's correct.

9 Q. Did you perform any testing at Uvalde where
10 the tag tires were turned during forward travel to any
11 significant degree?

12 MS. DORMAN: Object to form.

13 A. For the low speed evaluation of the tag axle
14 function, I steered around a tight radius circle. In
15 those tests the tag axle tires were steered. I don't
16 recall specific amount, but I believe it was an inch and
17 a half of tie rod travel whereas the limit would be
18 approximately 2 inches.

19 Q. (BY MR. HAYNES) Did you do any testing at
20 Uvalde at speeds significantly above 20 miles per hour
21 where the tie rod travel equal an inch and a half?

22 MS. DORMAN: I need to lodge an objection
23 and also warn my counsel that we're not covering
24 information that was already discussed at the prior
25 deposition. Since Mr. Granat's already been deposed

1 about his Uvalde testing, we're not getting into
2 rehashing old testimony. So if you could just keep the
3 questions about what's been done since his first
4 deposition, that would be in line with what your lead
5 counsel has imposed on the rest of us.

6 MR. HAYNES: Well, I'm just about
7 through.

8 MS. DORMAN: Okay.

9 Q. (BY MR. HAYNES) But if you'd answer that, I
10 would appreciate it.

11 A. I would have to look at the data. Some of the
12 lane changes I recall getting some motion of that tie
13 rod, certainly some level that I recorded in that data.
14 The specific level I would have to actually look at the
15 data. I don't recall.

16 Q. Do you agree that the Fugger and Yohe testing
17 in Uvalde demonstrated that the motor coach was
18 difficult to control when the tag axle system was
19 compromised?

20 MS. DORMAN: Object to form.

21 A. Well, I think the -- that general statement
22 wouldn't be a fair statement. The -- in that particular
23 testing, the tag axle system was compromised. It was
24 also in some form damaged and modified beyond what
25 their -- their own theories have been in the case.

1 And in his driving of the coach, Mr. Yohe
2 is applying heavy braking and maintains that heavy
3 braking. And you can see in the video that's recorded
4 that whenever braking is released, this caster latch arm
5 returns back to a more vertical position. Meaning, the
6 only reason he keeps a negative trail on those tires and
7 keeps the dynamic steering effect of those tires is
8 because he stays on the brake. And -- and I don't think
9 that's a representative way of doing that testing.
10 Obviously I wouldn't expect a -- a commercial vehicle
11 driver to do that if they had some sort of a mechanical
12 issue on the road.

13 Q. (BY MR. HAYNES) so you don't think it's fair
14 in determining whether the tag axle system is designed
15 correctly to consider the motor coach driver might apply
16 heavy braking?

17 MS. DORMAN: Object to form.

18 A. Well, I consider that you can -- you can
19 evaluate that, but that doesn't mean that that's a
20 prudent thing to do.

21 Q. (BY MR. HAYNES) That's not something that you
22 evaluated though in your Uvalde testing?

23 MS. DORMAN: Object to form.

24 Q. (BY MR. HAYNES) The effect of heavy braking
25 on either the tag axle being unlocked or the caster

1 system -- caster latch mechanism being in any position
2 other than the reverse position for forward travel?

3 A. I think --

4 MS. DORMAN: Object to form.

5 A. -- generally that's a fair statement because I
6 did moderate braking during my testing and I have tested
7 with a caster latch in the rearmost position.

8 Q. (BY MR. HAYNES) Would you agree that -- do
9 you agree that there were no significant steering inputs
10 by Mr. Yohe during the Uvalde testing?

11 MS. DORMAN: Object to form.

12 A. No significant?

13 Q. (BY MR. HAYNES) Right.

14 A. Oh, no. He was steering the vehicle. I think
15 there were some fairly significant inputs.

16 Q. He was steering the vehicle, sure, but --
17 okay. Maybe we're using bad terminology. Would you
18 agree that there were no excessive steering inputs by
19 Mr. Yohe in the Uvalde testing?

20 MS. DORMAN: Object to form.

21 A. Well, no. I think he had some steer inputs
22 that -- that would match, you know, fairly substantial
23 steering. That description of it, but I don't think
24 it's to the level of inappropriate because some of the
25 steering that he did, for example, in run 13 he -- he

1 did some corrective steering to the right and he was
2 able to suppress all the yaw velocity of the vehicle.
3 So basically he -- he responded by steering to the right
4 and was able to bring the yaw rate of the vehicle down
5 to zero. And then, you know, he subsequently
6 straightened to the left again after that. But I think
7 there's -- you know, what I would call a fairly sizable
8 steering input, but it was not something that I would
9 call inappropriate under that circumstance.

10 Q. Do you make any determination of the amount of
11 that steer input?

12 A. Well, sure. I've got the test data that was
13 provided by Mr. Fugger and Mr. Yohe. So I've got --
14 under fab 4 of Exhibit 2 I've got plots of all their
15 steering traces.

16 Q. What did you show it to be for test 13?

17 A. Test 13 is --

18 Q. That's the one we're talking about, right?

19 A. That's the one I was talking about, yes. Test
20 13, the peak steering is about 180 degrees.

21 Q. Is that to the left or right?

22 A. That is to the right. And that's from an
23 initial angle of about 40 degrees. So that's a change
24 in the steering wheel of about 140.

25 Q. And you said that that's stand -- I think you

1 additional testing to either MCI or their attorneys?

2 A. I brought up the idea that we could do
3 additional testing. I'm not sure at this point of
4 the -- the value of doing that though.

5 Q. What additional testing would you let them
6 know that could be done?

7 A. Well, the testing that was done by Americanos
8 has, as we discussed, a few of the components
9 compromised. And I think it might be valuable to look
10 at doing testing without all those compromised inputs.
11 But at this point, given the analysis that I've done of
12 this testing, that may not be necessary.

13 Q. Okay. And just to make sure I understand, you
14 said that you advised MCI and/or their attorneys that
15 additional testing could be performed with components
16 that are not compromised as you say they were in the
17 Americanos test at Uvalde, right?

18 A. I would say they -- I need to evaluate whether
19 the additional testing should be performed. And that's
20 based on reviewing and analyzing the data that we've got
21 here. At this point I don't know that there's any real
22 utility to that because I have a pretty good
23 understanding of the vehicle dynamics, based on this
24 testing.

25 Q. I understand, but I'm just trying to go back

1 described that as substantial steer input but not
2 inappropriate because of the yaw in the back of the
3 motor coach?

4 A. Well, he's responding to the motion of the
5 vehicle. So for that particular motion of the vehicle
6 he applied a steering input to suppress the yaw. So
7 under that circumstance, it's an adequate or an
8 appropriate amount of steering input.

9 Q. It's an appropriate response?

10 A. For that specific situation, sure.

11 Q. Do you remember what the peak yaw rates was
12 for your Uvalde testing?

13 A. I do not.

14 Q. Has MCI or their attorneys suggested any
15 additional testing for you to do between now and trial?

16 A. Not specifically, but I have to evaluate that.

17 Q. What does that mean?

18 A. Well, I think there's a little bit more data
19 to review from this testing, so I'd have to evaluate
20 whether that warrants doing additional testing. I think
21 the -- the testing that was done here, although there
22 are issues with that, it does demonstrate nicely the --
23 the point that I was making with my calculations about
24 caster trail and pneumatic trail.

25 Q. At this point have you suggested any

1 to what you said a moment ago. You said that additional
2 testing could be performed that would involve not having
3 the components compromised that you were criticizing in
4 the Americanos test, right?

5 A. Well, I'm saying I would need to evaluate
6 whether that test should be done.

7 Q. Would that be the only -- only difference?
8 I'm not sure I even understand what you're saying
9 because it -- I'm assuming that in the -- the test that
10 you've already performed you would say that the
11 component -- none of the components on the buses --
12 motor coach you were using were compromised, right?

13 MS. DORMAN: Object to form.

14 A. That's true.

15 Q. (BY MR. HAYNES) And so if you were going to
16 do additional testing, what other things would you be
17 testing?

18 A. Well, basically what I'm talking about is
19 testing that's similar to the Americanos testing,
20 meaning positioning of the caster latch in a different
21 position but not with the other issues that we talked
22 about.

23 Q. Okay. I get that. And then also testing with
24 additional braking perhaps?

25 A. I -- I really don't see the value of that. I

1 don't think under the circumstances of the subject crash
2 that heavy braking is something that the driver should
3 have done. So I don't think there's much value in
4 evaluating that.

5 Q. Well, but that -- that's -- obviously there's
6 a disagreement about that, right?

7 MS. DORMAN: Object to form.

8 A. I'm not really sure.

9 Q. (BY MR. HAYNES) Assuming with me that
10 there's -- that -- that Mr. Yohe may have a difference
11 of opinion with you about that and whether her response
12 was reasonable or not, wouldn't it be relevant to find
13 out under the circumstances that you think are
14 appropriate what would be the effect of heavy braking
15 with the caster lock -- caster latch in the position
16 that it was found after the accident?

17 A. I would have to evaluate that. I mean,
18 that -- my position is basically the heavy braking under
19 the circumstances of the subject crash wouldn't be a
20 prudent thing.

21 Q. So don't test it?

22 A. Well --

23 MS. DORMAN: Object to form.

24 Q. (BY MR. HAYNES) Don't test it and see what
25 happens?

1 MS. DORMAN: Object to form.

2 A. I don't think it's relevant but --

3 Q. (BY MR. HAYNES) What's your understanding
4 regarding whether the tag axle system is designed for
5 the tag axle to be unlocked and the caster latch
6 mechanism be either unlatched or locked in the forward
7 position for reverse travel at forward speeds in excess
8 of 20 miles per hour?

9 MS. DORMAN: Object to form.

10 A. I'm not sure I followed that.

11 Q. (BY MR. HAYNES) That was a long question,
12 wasn't it?

13 A. Uh-huh. A long question for three o'clock in
14 the afternoon.

15 Q. What's your understanding regarding whether
16 the tag axle system is designed for speeds in excess of
17 20 miles per hour with the tag axle unlocked and the
18 caster latch mechanism in the -- locked in the forward
19 position for reverse travel?

20 A. Well, that's part of the analysis that I did
21 on the trail in looking at whether the trail remains
22 positive under those circumstances. So that's kind of
23 my understanding of the design under those conditions.
24 And like I said, that remains to have positive trail at
25 that point, so there is a stabilizing effect on the

1 steer of those tires.

2 Q. So if I'm understanding you right, you're
3 saying that the tag axle system is designed so that even
4 at speeds over 20 miles per hour or substantially over
5 20 miles per hour, there shouldn't be tag axle steer
6 even if the tag axle is unlocked and the caster latch
7 mechanism is locked in the position for reverse travel?

8 A. Well, I can't -- the way that you worded the
9 question, I think you said that the tag axle system is
10 designed that way, I don't really know the specific
11 steps that MCI went through, you know, historically to
12 design the system. All I can say is that the
13 configuration of the system is such that under those
14 conditions you'd still have positive trail and you'd
15 still have positive self-aligning moment or a positive
16 aligning moment.

17 MR. HAYNES: Just give me a couple of
18 minutes. I'm about through.

19 MS. DORMAN: You want to take a quick
20 restroom break?

21 MR. HAYNES: If you need one.

22 THE WITNESS: I'm okay.

23 MR. HAYNES: We'll finish up here in five
24 more minutes. Melissa, bear with me. This will be real
25 quick.

1 Q. (BY MR. HAYNES) I was confused by something I
2 read in your first deposition. You said you do have
3 opinions about the tire marks, right?

4 A. I do.

5 Q. How did you characterize what caused the tire
6 marks at the accident site before any part of the motor
7 coach entered the right shoulder?

8 A. Well, before any part of the motor coach
9 entered the right shoulder there's a combination of
10 braking marks and then there's some oscillating tire
11 marks that are attributable to the drive tires.
12 Meaning, we have two parallel -- parallel oscillating
13 tire marks very distinctive in the photographs. That's
14 as the coach is approaching the shoulder.

15 Q. And are you saying those are caused by
16 excessive braking or -- or not?

17 A. Well, there are brake marks associated with
18 that portion of travel. Not all the tires are leaving
19 locked wheel skids, so they're not that kind of braking
20 marks. But the -- the oscillating marks are going to be
21 due to a combination of braking and then also the
22 rotational and balance of the drive shaft con --
23 connected to the differential. Meaning, the
24 differential is being kind of bounced around and as the
25 drive axle tires are being braked and steered, then it's

1 leaving those oscillating marks on the roadway.

2 Q. Is there a difference in your mind between
3 locked wheel skid marks and marks -- tire marks that are
4 left by braking?

5 A. Certainly there can be a difference. There's
6 a different degree of braking associated with those. In
7 the -- the oscillating tire marks, for example, you can
8 see where those oscillate as the drive shaft is spinning
9 and then toward the end of this right turn motion of the
10 vehicle the oscillations just kind of taper down to
11 nothing and the tire marks become kind of the more
12 typical longitudinal striations of --

13 Q. Locked wheel skid marks?

14 A. If not locked wheel, very, very close to
15 locked wheel skid marks.

16 Q. And then --

17 A. And then those marks cease because the brakes
18 are released.

19 Q. And then those locked wheel marks, those are
20 in the area where the motor coach is heading on -- or
21 the front part of the motor coach is on the right
22 shoulder?

23 A. It may already be on the right shoulder at
24 that point. I'm not really sure --

25 Q. And --

1 MS. DORMAN: Object to form.

2 A. Well, the braking that Mr. Yohe did is -- at
3 least in many of the tests, is hard braking throughout,
4 meaning he attains, you know, .5 Gs and stays there.
5 The evidence that I see in the subject crash is that
6 there -- there is a period of some pretty heavy braking,
7 for instance, where we talked about the drive axle tires
8 going from oscillating marks to more longitudinal
9 striations. That would be a consistent level with what
10 Mr. Yohe did but it's on a different duration because
11 those marks go a certain distance and then they
12 basically cease or they stop making that kind of tire
13 mark and that would be indicating that she released the
14 brakes at some point there and then --

15 Q. When the motor coach was on the right
16 shoulder --

17 A. Right.

18 Q. -- is that what you're talking about?

19 A. Well, as it's approaching. I don't think the
20 entire motor coach is on the right shoulder but a
21 portion of it is.

22 Q. Before or contemporaneous with the left turn
23 steer?

24 A. Correct. Well, in general terms
25 contemporaneous, but it may be plus or minus a second,

1 A. -- specifically.

2 Q. Okay. Before that, the tire marks on the
3 road, in your opinion, are any of those locked wheel
4 skid marks or not?

5 A. I don't know if I've determined specifically
6 if those are locked wheel skids. I would say the tire
7 marks are indicative of pretty heavy braking. I don't
8 recall at this point whether they would show you
9 characteristics of a locked wheel skid. My recollection
10 is, no, they don't have real distinct longitudinal
11 striations in them.

12 Q. That's what I understood from Mr. Irwin and I
13 just wanted to see if you agreed with that. You did --

14 A. You understood from who?

15 Q. Andrew Irwin. Andy Irwin.

16 A. Okay. Well --

17 Q. Basically I wanted to see if that was your
18 opinion as well or if you have a different opinion.

19 A. I haven't read his deposition but if you're
20 saying what I just said matches what he said, then, yes,
21 I would agree.

22 Q. Do you think that the heavy braking as you
23 characterized it that Mr. Yohe did at the Uvalde testing
24 is comparable of the braking of Ms. Morado in this
25 accident?

1 I'm not sure.

2 Q. I guess what I'm asking is -- is the brake
3 force that Mr. Yohe used in the Uvalde testing, was that
4 comparable to what Ms. Morado was doing in this accident
5 sequence or is there some distinction that you would
6 make beyond what you just said, what you just told me?

7 MS. DORMAN: Object to form.

8 A. I think the distinction is what I just said
9 primarily. I think the levels in brief moments might be
10 similar or were likely similar, but I don't think the
11 duration was nearly the same. Meaning, there's a much
12 longer duration applied by Mr. Yohe.

13 Q. (BY MR. HAYNES) Was it your assignment in
14 this lawsuit to evaluate our -- Americanos' specific
15 theories or to analyze and determine what happened to
16 cause this accident?

17 MS. DORMAN: Object to form.

18 A. Well, I guess it's a little bit of both.

19 Q. (BY MR. HAYNES) I think that's all the
20 questions I have. Oh, no, no, no. I've got a couple --
21 I just want to clarify what these are. This is
22 attachment -- attachment page 8 and page 9 of your
23 report where it lists documents reviewed. In number
24 170, test run configurations, what does that refer to?

25 A. That's attached to the supplemental report?

1 Probably.

2 Q. I thought so.

3 A. Well, here, I've got a supplemental report.
4 What page is it did you say?

5 Q. Page 8 is number 170. It says, test run
6 configurations and page 9, 176, it says, test 10. And I
7 was just curious what those are?

8 A. Could I see that --

9 Q. Yeah, sure.

10 A. -- because that doesn't match this.

11 Q. Maybe it's the first report. I'm not sure.
12 That's all I have.

13 A. Is this a document that you created? It's not
14 mine.

15 MS. DORMAN: No. That's from our
16 designation. That's from the first one.

17 MR. HAYNES: Oh. Okay.

18 THE WITNESS: Can I say this --

19 MR. HAYNES: Sorry.

20 MS. DORMAN: That's okay.

21 MR. HAYNES: I didn't create it.

22 A. Okay. My -- my recollection of the item
23 called test run configuration --

24 MS. DORMAN: Yeah. Actually this -- this
25 is recent because it's after -- because we've got the

1 is a collection of documents that were produced by
2 Americanos, if I recall right. I think that's the case.
3 Yeah. It's got some training information and some
4 service information from Americanos.

5 Q. Let me go ahead and mark it just to be --

6 MS. DORMAN: What are the Bates numbers?

7 Q. (BY MR. HAYNES) -- to be safe.

8 MS. DORMAN: AUSA-011539 through
9 AUSA-011581.

10 MR. HAYNES: Okay. Let's go ahead and
11 mark that as an exhibit. Thanks.

12 (Exhibit No. 6 marked.)

13 Q. (BY MR. HAYNES) Okay. That's it. I
14 appreciate your time.

15 A. Okay. Thank you.

16 (Reporter's time: 3:30 p.m.)

17 EXAMINATION

18 BY MS. DORMAN:

19 Q. Kevan, I have a couple of follow-ups for you.
20 Do you need a break?

21 A. No.

22 Q. Okay. You mentioned that some of the
23 Americanos driving tests that were done at Uvalde
24 actually support your theories and your opinions in this
25 case; is that correct?

1 January 2012 information in there too so.

2 A. And I think this test run configuration refers
3 to there was a PDF of the notes taken by Mr. Fugger, I
4 believe, in January -- in the January testing. That is
5 called test run configurations, I believe.

6 Q. (BY MR. HAYNES) And then the next page circle
7 is test 10?

8 A. Test 10 I think is the CD or DVD that was in
9 there that was just labeled test 10. It was one of
10 several disks that included the testing from the January
11 testing.

12 Q. Americanos' testing --

13 A. Yes.

14 Q. -- at Uvalde?

15 A. Yes.

16 Q. Okay. Was there anything significant about
17 Americanos's test 10 in Uvalde that you can recall?

18 A. My recollection is that is run with the
19 actuators, so I didn't really -- didn't really place
20 much weight on that.

21 Q. Do you recall what this document, certificate
22 of attendance from MCI regarding a webinar on August 24,
23 2011, if that was produced at your last deposition or
24 not?

25 A. I think it was produced since. I think this

1 A. Well, the evaluation that I did that we talked
2 about in depth, the caster trail and pneumatic trail,
3 those calculations basically predict when you would have
4 some sort of a dynamic steering of the tag axle and the
5 testing, and my observation of the testing supports that
6 that's accurate.

7 Q. Okay. Are there any other test results that
8 you saw that would support any of your opinions in this
9 case regarding the handling and stability of the
10 102-DL3?

11 A. I think there were additional tests run by
12 Mr. Yohe that were similar to the configuration that I
13 would have run just in the sense that he ran a test with
14 a caster latch in the rearmost position of forward
15 travel and with the tie rod unlocked, which would be
16 similar to the testing that I ran, and the response of
17 the vehicle from that is that is very stable and I think
18 Mr. Yohe's opinion was that the stability of the coach
19 under that circumstance is appropriate, and that's what
20 I also concluded from my testing.

21 Q. Okay. Which of Americanos Uvalde -- Uvalde
22 tests show the most dramatic results from the vehicle,
23 the most movement, the most change in the vehicle's
24 direction?

25 A. Well, tests 9 through 13 all show some yaw

1 Q. What do you attribute the -- if I'm
2 understanding you right, you're saying that at the
3 accident site, the oscillating tire marks are not that
4 long and they're -- there are some and then there's no
5 oscillating marks and then there's some more oscillating
6 marks; is that right?

7 A. I think in general terms, right. They don't
8 go from beginning to end of the tire marks whereas in
9 the Uvalde test, once -- once Mr. Yohe applies the
10 brakes and gets those tires to turn, they oscillate and
11 they stay in that position from inception to the rest
12 position.

13 Q. In talking about the oscillating tire marks at
14 the accident site, what do you attribute them to in
15 terms of why they don't go from beginning to end?

16 A. Well, in simple terms I don't think the tires
17 have dynamically steered over as -- as I understand the
18 Americanos theory to be. The -- had the tires steered
19 over and she's applying the brakes throughout the
20 sequence, then you'd expect more tire marks like
21 Mr. Yohe's tire marks and you'd expect both left tag
22 tire mark and right tag tire mark.

23 I'm not sure if I answered your question
24 or if I got off on a tangent there so.

25 Q. Well, I think -- I think you answered the

1 A. Correct.

2 Q. She's braking harder as the motor coach is
3 heading onto the right shoulder and there's less
4 rotation of the drive shaft, is that what you're saying?

5 A. Right. As you look at the end of those tire
6 marks you can see that virtually all of the oscillation
7 ceases at that point and it gives away to a more of a
8 traditional braking mark with longitudinal striations.
9 And then subsequent to that, apparently the brakes
10 are -- are either released or reduced and -- and that
11 mark kind of ceases.

12 Q. Okay. Thank you. I appreciate it.

13 A. Thank you.

14 MS. DORMAN: You're done.

15 (Deposition concludes at 3:47 p.m.)
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1 general question. I was asking more about -- you were
2 explaining -- I think you just kind of answered why the
3 tire marks are the way they are at the Uvalde testing in
4 your opinion, but I was asking for your opinion about
5 why they are the way they are at the accident site?

6 A. Well, the -- the oscillation, I think, is due
7 to a combination of two factors. One of them is the
8 application of the brakes and I think that's probably a
9 lesser factor and then the second one is the -- the
10 imbalance and the rotation of the drive shaft that's
11 still attached to the drive axle or to the differential.

12 So that creates an oscillating motion of
13 the drive axle and that's what creates the oscillating
14 motion of the drive tires. That mark begins oscillating
15 and then the oscillating ends because we've got a change
16 in the braking of the tires. So toward the end of that
17 oscillating tire mark, as she applied more and more
18 brakes, the rotational motion of the drive shaft starts
19 to diminish. Basically, as she's slowing down those
20 tires, the differential slowing down the drive shaft
21 rotation is slowing down. So you get less and less
22 oscillation, and then it kind of gives away to a braking
23 tire mark. So there's kind of a smooth transition there
24 from a heavily oscillating tire or pair of tire marks.

25 Q. Or she's not braking as hard to where --

1 CHANGES AND SIGNATURE

2 WITNESS NAME: KEVAN GRANAT

3 DATE OF DEPOSITION: MARCH 22, 2012

4 PAGE LINE CHANGE REASON
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CAMPOS V. AMERICANOS

Report Prepared For:

Mr. John C. Dacus
Hartline, Dacus, Barger, & Dreyer, LLP
6688 North Central Expressway
Suite 1000
Dallas, Texas 75206

Prepared By:



Kevan J. Granat
August 11, 2011

Introduction

As requested, I have reviewed materials pertaining to the design of the MCI 102DL3 coach as well as documentation of the subject crash. I have conducted inspections of the subject coach, the various related chassis components, the scene of the subject crash, and exemplar 102DL3 coaches. I have performed instrumented, on-track testing of an exemplar 102DL3 coach to evaluate its steering and handling performance under various conditions. I have performed laboratory testing of chassis systems to evaluate the crash forces involved in the subject crash. A list of all materials I have received and reviewed is attached.

Qualifications

I have worked as an automotive engineer for more than twenty years and I have formal training as an engineer. I earned undergraduate and graduate degrees in mechanical engineering from Purdue University in West Lafayette, Indiana, where I performed research on automotive structural analysis as a research assistant on a project sponsored by Ford Motor Company. I presented a thesis to earn a master's degree in mechanical engineering and published peer-reviewed journal articles describing my research.

I subsequently joined Ford Motor Company in 1992 as a chassis engineer for Light Truck Operations in Dearborn, Michigan. I performed design, analysis, and testing of Ford trucks primarily related to vehicle dynamics, ride control, load carrying capacity, and limit handling. I personally instrumented and tested vehicles at Ford's proving ground facilities in Arizona, Michigan, and Florida on vehicle types including light and medium trucks. I also performed component testing and analyzed the design of steering system components, suspension components, and tires. I later moved to Ford's Advanced Vehicle Technology group where I performed further testing, analysis, and simulation of all truck types, from compact pickups to heavy commercial vehicles.

Since 1997, I have been employed in Houston, Texas as an automotive consulting engineer specializing in the analysis of vehicle design, vehicle dynamics, failure analysis, and crash reconstruction. I have performed instrumented, on-track testing of various vehicle types, including passenger cars, pickup trucks, utility vehicles, vans, medium trucks, buses, and heavy trucks. I have performed numerous tests to evaluate vehicle performance before, during, or after the disablement of various steering components, suspension components, or tires. I have published peer-reviewed articles related to disablement testing, as well as other research.

In 2007, I formed Dynamic Analysis Group LLC with another consulting engineer as my business partner. At Dynamic Analysis Group LLC, I continue to consult as an automotive engineer in the areas of vehicle design, vehicle dynamics, failure analysis, and crash reconstruction. Dynamic Analysis Group LLC charges \$250 per hour for my services in this matter. A resume which summarizes my education and experience is attached, along with a list of my previous testimony and publications.

Crash Background

According to the information available, the subject crash occurred on March 16, 2010, on

Interstate Highway 37 near Campbellton, Texas. This was a single vehicle crash involving an Americanos bus with 45 occupants on board. The bus operator was Irma Mendoza Morado, a 47 year-old female and an employee of Americanos.

The Texas Department of Public Safety (DPS) investigated the crash and created a detailed Major Crash Investigation report. The investigating officers determined that “U1 [Americanos coach] was traveling [southbound] on IH-37 when the driver heard a loud noise from underneath the vehicle when a U-joint broke from the driveshaft. U1 driver reacted, locked up the brakes, and skidded onto the improved shoulder. U1 driver overcorrected left and sent U1 into a side skid across the [southbound] lanes and into the center median. The rear end rotated 180 degrees, simultaneously rolling onto the passenger side. U1 sustained right passenger and top damage. The drive shaft was detached from the undercarriage where the bus came to rest. U1 was red, white, blue, and green in color and had 45 occupants including the driver.”

The investigating officers documented the crash-related physical evidence with survey measurements, photographs, and notes. Investigators for the Texas DPS District 6C Reconstruction team concluded that a U-joint had separated from the transmission and that “...the driver (Morado) should have been able to bring Unit 1 to a safe stop despite the mechanical failure. The heavy application of brakes by the driver (Morado) caused her to lose control. It is the opinion of the reconstruction team this crash was caused by Irma Mendoza Morado’s faulty evasive action.”

Vehicle Design Considerations

The subject vehicle is a 55-passenger bus manufactured by Motor Coach Industries (MCI) with the model designation of 102DL3. It was manufactured in November of 1994 as a 1995 model year vehicle with a vehicle identification number of 1M8PDMPA2SP046918. The 102DL3 model coach has a nominal overall length of 45 feet and an overall width of 102 inches. The chassis has three axles: the front, steered axle; a dual-wheel drive axle; and a trailing, or tag, axle. The vehicle’s axle capacities, or gross axle weight ratings (GAWRs), are specified as 14,400 pounds for the front axle, 22,500 pounds for the drive axle, and 12,000 pounds for the tag axle. The gross vehicle weight rating (GVWR) is specified as 44,400 pounds.

The tag axle on the 102DL3 is a self-steering design which allows for improved maneuverability and reduced tire wear at low travel speeds. At speeds above approximately twenty miles per hour, the tag axle steering system is locked and performs as a non-steerable trailing axle. At travel speeds below approximately twenty miles per hour, the tag axle steering lock is disengaged and the tag axle tires are allowed to self-steer, following the path of the vehicle. Steering of the tag axle is accomplished passively, due to the self-aligning forces inherent in the suspension geometry and in the tire forces. The self-aligning forces result, in part, from the axle caster and the tire aligning moment, or pneumatic trail. On the subject model coach, there is no driver-operated or mechanically-operated system that actively steers the tag axle. This is in direct contrast to the front axle, which is actively steered by driver input, while simultaneously being subject to the same passive, self-aligning forces as the tag axle.

The tag axle steering system is similar to that of the front axle, but with a forward positioned tie rod, steering locking system, and reversing pivot. The tag axle tie rod is equipped with a steel locking plate which is aligned between two mating plates affixed to the axle itself. The three plates are slotted to accept a locking pin which locks the plates in a double-shear fashion. The pin is applied from above and is spring loaded and pneumatically loaded downward into the locked position. A pneumatic cylinder is used to retract the pin based on an electrical signal from the

vehicle's speed sensor, processed by a 'speed switch.' The speed switch actuates the cylinder when the speed sensor signal reflects travel below approximately twenty miles per hour, thereby retracting the cylinder pin and disengaging the steering lock for improved maneuvering. When operated in reverse, the tag axle is designed to pivot about its axis to allow proper trailing operation.

The vehicle's drivetrain is a typical rear-engine design with a driveshaft connecting the transmission output shaft to the drive axle differential. The driveshaft is a steel assembly with two U-joints and a splined slip joint. Near the forward end of the driveshaft, or differential end, a steel loop is mounted to the frame as a constraint to limit driveshaft motion in the event of U-joint failure. Toward the rear end of the driveshaft, or transmission end, the tag axle truss itself forms a substantial steel loop around the driveshaft. The rear end of the driveshaft extends completely through the tag axle pass-through loop and attaches to the transmission output shaft, rearward of the aft edge of the tag axle truss.

The Crash Vehicle

I inspected the subject vehicle on November 4, 2010 at a facility in Louisville, Kentucky. The coach was identified with the Americanos unit number 60630. At the time of my inspection, the instrument panel odometer indicated 941,063 miles. I observed sheet metal abrasions and contact damage, primarily on the right side, consistent with overturn on an unpaved surface. All right-side glass surfaces were fractured out. The entry door was detached and observed in the baggage compartment. The axle shafts for the drive axle had been removed post-crash for towing, and the drive shaft was observed separate from the vehicle. All driver controls were found to be in place, including the brake and throttle pedals, steering wheel, shift lever, and dash-mounted switches. The vehicle was equipped with Michelin XZA2 Energy 315/80R22.5 load range L tires at all positions.

I inspected the chassis for crash-specific damage and documented its configuration and condition with measurements, photographs, and notes. The front suspension and steering system were found to be essentially intact, with all steering components connected, from the steering wheel to the road wheels. The drive axle was also found to be mainly intact, although the driveshaft was detached and observed separate from the vehicle. The axle was manufactured by Rockwell International and was equipped with a differential with a 3.07 final drive ratio. The U-joint yoke on the differential was in place, as were the two yoke straps, although one of the straps was separated from the yoke at one end. The corresponding yoke on the driveshaft still had the U-joint cross attached to it. Contact marks were observed around the surface near the differential end of the driveshaft tube, consistent with the location of the body-mounted driveshaft restraint loop. Corresponding marks were observed on the driveshaft loop itself. At the transmission end of the driveshaft, the yoke was fractured, with a portion of the steel lobe missing. Oxidation was observed on the fracture surfaces. The corresponding yoke was still attached to the transmission output shaft. One yoke strap was detached completely, with both strap bolts fractured off. The second yoke strap was attached with one bolt, while the second bolt was fractured off. Contact marks were observed near the transmission end of the driveshaft, consistent with the location of the passage through the tag axle truss. The tag axle structure itself exhibited contact marks and gouges consistent with driveshaft interaction. Marks were observed primarily on the lower portion of the pass-through structure and on the upper portion of the truss. Further damage was observed, consistent with impact level forces, including damage to the axle truss structure and bending of the tie rod. The tie

rod did not exhibit any significant contact marks that would suggest a direct impact from the driveshaft.

The tie-rod-mounted locking plate was observed to be disengaged from the two fixed plates on the axle and was positioned beneath the lower fixed plate. Worn surfaces and contact marks were present on the tie-rod-mounted plate in the shape of the mating portion of the fixed plates. No marks were observed on the plates that would indicate side-to-side oscillatory motion. The gap between the fixed plates was widened toward the front of the plates and contact marks were observed on the fixed plates toward the right side. The right side steering stop was contacted and deformed forward and the steering damper clamp was shifted on the tie rod. The slot of the tie-rod-mounted locking plate exhibited gouging from the locking pin toward the rear end of the slot. The gouge was angled, with metal flow curved in an arc toward the left side of the plate. This damage was caused by counter-clockwise rotation of the locking plate relative to the pin, as viewed from above. The slot exhibited readily apparent wear along both sides and was covered with oxidation. Wear patterns from the mating fixed plates reveal that contact between the plates was rearward on the top of the tie-rod-mounted plate and forward on the bottom. This wear pattern would be indicative of misalignment of the plates over an extended period of time, with the rear of the tie-rod-mounted plate rotated downward. The locking pin was observed to be connected to the lock cylinder and was bent forward.

At the time of my inspection, the deformation of the tag axle tie rod was observed to be less than that seen in police photographs. In photographs taken immediately after the crash, the tie rod is seen to be bent in a forward direction. Some photographs of the recovery effort show that steel chains were bound to the tag axle around the tie rod, the locking plates, and the locking cylinder. This binding apparently altered the condition of those parts. Testimony of individuals involved in the recovery effort indicates that the steel under-reach structure of the heavy vehicle wrecker truck was used to forcibly straighten the tag axle tie rod prior to transport. Unfortunately, there are no known photographs which document the immediate post-crash condition of the tag axle steering system in more detail. Functionality of the pneumatic and electrical control system for the tag axle locking system was evaluated by other engineers. It was determined that the speed sensor output signal was deficient and that air lines controlling the locking cylinder were blocked, preventing retraction of the locking pin via pneumatic cylinder operation.

Circumstances of the Subject Crash

I inspected the crash scene on August 10, 2011 and documented its configuration with notes and photographs. This crash occurred near Campbellton, Texas on southbound Interstate 37 in a rural area. In this area, Interstate 37 is a four-lane, divided freeway with asphalt travel lanes and shoulders. Northbound and southbound lanes are separated by a sloped, wide grass median with sandy soil. In the area approaching the scene of the crash, the roadway curves toward the right and goes downhill.

According to the police investigation, the crash occurred at approximately 9:50 in the morning. The investigating officer indicated that the weather was cloudy and there was light rain. The speed limit was posted at 70 miles per hour. Photographs taken by the police show numerous tire marks on the southbound pavement leading up the median, followed by deep furrows in the median soil, and the bus at its rest position on its right side. The tire marks on the pavement indicate an initial clockwise yaw followed by a counter-clockwise yaw into the median. Preceding the tire marks, the officers documented debris consistent with the separated U-joint. Photographs of

the vehicle's rest position show the tag axle steering lock disengaged and the tie rod bent forward. The driveshaft's rest position was located downstream from the vehicle's point of rest. At its rest position, the right tag axle tire and the outer right drive axle tire are embedded into the median soil as the rear portion of the coach traveled into the opposing slope of the median. The furrows associated with the right side tires are broad and deep.

Data on the electronic control module of the coach's Detroit Diesel engine was imaged by request of the DPS investigators. I have reviewed and analyzed this information by processing the data to calculate the longitudinal acceleration of the vehicle as recorded from the speed sensor. The calculated acceleration values would represent a rapid deceleration rate that would not be achievable by brake application alone. The imaged data included two separate events of this nature, including a last stop record and a separate hard brake record. This information, combined with the results of the inspection of the speed sensor, indicates that a deficiency with the speed sensor likely existed prior to the subject crash.

Testing of Vehicle Performance

I evaluated the steering and handling characteristics of the 102DL3 model coach under various conditions, including the dynamic disengagement of the tag axle steering at freeway speeds. The test vehicle was a 1995 MCI 102DL3, substantially similar to the subject coach. The vehicle was equipped with a manual switch that bypassed the vehicle's speed switch, allowing the operator to manually actuate the tie rod locking cylinder, disengaging the locking mechanism dynamically. The vehicle was instrumented to measure the steering wheel rotation, tag axle tie rod displacement, status of the manual lock/unlock switch, vehicle speed, vehicle position, rotational rates in three directions, translational acceleration in three directions, roll angle, pitch angle, heading, and slip angle. On-board and external video cameras documented the tests. The vehicle was ballasted to simulate loading with 44 passengers and cargo. Testing was conducted on the 8.5 mile high speed oval at Continental Tire's Uvalde Proving Grounds.

I performed numerous tests with the tag axle steering locked or unlocked, as well as dynamically disengaged under varying conditions. I evaluated the stability characteristics of the coach using common handling and stability tests, including frequency response, on-center handling, low-g step steer, and high speed lane changes. I performed these tests at freeway speeds multiple times; with the tag axle steering locked as well as with the steering lock disengaged. Under all conditions, the vehicle remained stable, controllable, and predictable, with a high turning capacity. The tag axle tires exhibited stable performance, following the motion of the vehicle in a controlled manner.

I evaluated the effect of dynamically disengaging the steering lock at freeway speeds, nominally at 70 miles per hour, with some tests as high as 80 miles per hour. These tests were run under varied conditions, including straight-ahead travel, in a left or right turn, on a level surface, or on an uphill or downhill slope while in a left or right turn. I further evaluated the effect of driver input during and after a dynamic disengagement, including intentionally steering before and after disengagement, as well as steering and braking in combination. This was done with the pavement dry as well as with the surfaced wetted by a water truck. Under all conditions, the vehicle remained stable, controllable, and predictable, with a high turning capacity. The immediate effect of a dynamic disengagement would be a slight disturbance input, similar to a light wind loading or slight change in the road surface, and would typically be controlled with small steering adjustments on the order of five to twenty-five degrees. Such adjustments were consistent with the normal operating

characteristics of a motor coach. The vehicle's performance during braking was also stable and predictable, with a high turning capacity while braking.

I evaluated the vehicle's performance further by running 'surprise' disengagements, with the actuation switch being operated at undetermined intervals by a passenger. For these tests the dash indicator lights were covered, the switch was moved to a location behind the driver, and sounds were masked with fan noise. During these surprise disengagements, the coach's response remained stable and predictable and required no significant response from the driver.

Additionally, I intentionally degraded the transmission end U-joint of the driveshaft of a 102DL3 and operated the coach at freeway speeds for an extended period of time. Degradation of the joint was achieved by removing more than half, and then subsequently all, of the needle bearings from both bearings on the transmission yoke and removing the grease from the bearing. The vehicle was driven over 250 miles at 70 miles per hour. The degraded bearing produced a vibration that was sensed when the throttle was released at speed that slowly grew more pronounced as the test progressed. Under these circumstances, significant degradation of U-joint bearings would likely occur over a much longer period than that of this test and would produce vibration that would be perceived by an alert operator.

Laboratory Testing of a Tag Axle Assembly

I have performed instrumented testing on a tag axle assembly to evaluate the crash forces involved during overturn of the subject coach. A test fixture was fabricated and affixed to an exemplar tag axle assembly. The fixture was designed to apply a force to the right tag axle wheel in the same direction as the ground forces would be applied to the subject coach as the tire and wheel impacted and furrowed into the median soil just prior to reaching the vehicle's point of rest. Force application was made by way of a hydraulic cylinder mounted longitudinally between the fixture and the right wheel, with the force directed from rear to front. The fixture was instrumented to measure the applied pressure, displacement of the hydraulic cylinder, and displacement of the tie rod. The test was documented with multiple video cameras. The tag axle was equipped with certain new components, including ball joints, tie rod, tie-rod-mounted locking plate, and steering damper. The locking pin was engaged into the locking plates during the test.

A peak force of approximately 16,000 pounds was applied by the hydraulic cylinder. This force level corresponds to an average acceleration of approximately 0.3 to 0.4 g's applied to the mass of a fully loaded coach. As a result of the applied force, the tie rod was placed in compression, causing it to bend forward and creating a moment about the locking pin. Upon reaching the peak force level, the tie-rod-mounted locking plate abruptly shifted forward in its slot, forcing the rearmost edge of the slot to strike the locking pin. This shifting motion gouged the rear surface of the slot in the same location as the gouges on the subject locking plate and applied a forward force to the locking pin, consistent with the displacement of the subject locking pin. The rotation of the plate was in the same rotational direction as the arcing gouge on the subject locking plate.

This testing shows that ground forces created during the impact furrowing of the right tag axle tire as it approached its rest position are consistent with the deformation and damage observed on the subject coach, including gouges on the tie-rod-mounted locking plate, forward contact of the locking pin, and forward bending of the tie rod. The peak force levels observed during testing are consistent with the levels expected during such motion of the coach.

Review and Analysis of Work by Others

I have reviewed the expert reports provided by other parties to the subject lawsuit. I anticipate the opportunity to review in detail the materials that form the bases of these reports in the future, and I reserve the right to supplement or modify my opinions based on this preliminary review.

A report provided by Greyhound addressed the controllability of a three axle vehicle under varying circumstances. The analysis outlined in the report was a first order mathematical approximation of the handling properties of a three axle vehicle. However, an actual MCI 102DL3 is a complex, nonlinear, high degree-of-freedom mechanical system that is not well characterized by a simple model. A more accurate method to evaluate the handling properties of the 102DL3 design is by performing instrumented, full-vehicle testing on an actual coach, as discussed previously.

Additional reports provided by Greyhound outline testing that was performed on a modified MCI 102DL3 model coach. The coach was modified with a pneumatic actuator to rapidly steer the tag axle to the left. The test coach was driven to speed on a Jennite surface and a right steering input was applied, followed by actuation of the pneumatic cylinder and very aggressive application of the coach's service brakes. I inspected the modified coach on August 8, 2011 and observed that the right side steering stop was fractured from the tag axle, indicating that the steering input applied was of a greater magnitude than would be possible for the subject coach with its intact steering stop. The Greyhound reports provide no basis for the modifications made to the test coach, the magnitude of the steering input applied, or the aggressive brake application. In the tests reviewed, when the coach was steered toward the right, no attempt was made to steer left and maintain a straight course. When the coach was driven straight and the tag steering applied, no loss of control resulted and the vehicle appeared to track in a stable manner. In tests where steering was applied to the right and held, in the direction that would augment any yaw from the applied tag axle steering, and the service brakes were applied aggressively and held, the yaw motion was allowed to progress to a high slip angle. A conclusion reached in the Greyhound report was "the only way the bus would have veered to the right at highway speeds was through the influence of a tag axle that was unlocked and/or was steering to the left relatively early in the accident sequence." However, this conclusion is negated by a statement several sentences earlier: "While holding the steering wheel steady so the bus would travel in a straight line, the bus when into a right curve at about the same curve radius as in previous tests where the bus was intentionally steered to the right." If the response of the vehicle is the same, whether due to driver input or due to forced steering of the tag axle, then an investigator cannot conclude that the response could only be generated by the forced steering of the tag axle. I anticipate the opportunity to review any test data and documentation in more detail.

An additional report provided by Greyhound discussed some of the damage to the tag axle tie rod, concluding that the bend of the tie rod was due to direct interaction with the driveshaft. In its operating position, the driveshaft is essentially horizontal. On an exemplar coach, I manually detached the transmission end U-joint and pivoted the driveshaft about the differential U-joint, and I evaluated the envelope in which the driveshaft can move. Substantial structures of the tag axle prevent the driveshaft from contacting the tie rod, the tie rod locking plates, and the locking cylinder. Further, with the driveshaft attached at the differential, contact forces applied by the moving driveshaft to a component below it would be directed primarily downward rather than in the forward direction as the physical evidence shows. A force directed downward on the tie rod would not produce the counter-clockwise rotation of the locking plate as evidenced by the gouges present.

Summary

1. The subject coach was being driven southbound on Interstate 37 at freeway speed when the rear U-joint of the driveshaft separated. The forward U-joint remained attached for a period, causing the driveshaft to continue to rotate and creating a significant imbalance applied to the differential and drive axle. This imbalance caused the drive axle to oscillate and create a distinctive wavy characteristic in the dual tire marks on the road surface.
2. The driver steered the vehicle to the right and applied the brakes, placing the vehicle in a clockwise yaw. The driver subsequently steered the vehicle to the left while braking aggressively, causing the vehicle to yaw counter-clockwise and enter the soil median at a high sideslip angle. The vehicle was overturned onto its passenger side, causing the right rear tag axle tire and wheel to gouge into the soil surface.
3. The physical evidence from the subject crash indicates that the right tag axle tire and wheel were acted upon by substantial forces during impact and gouging of the median soil. These forces caused displacement and deformation of the tag axle structure and steering system causing it to become disengaged as the vehicle came to rest.
4. The front U-joint detached from the differential as the chassis interacted with the soil in the median. Detachment from the differential allowed the driveshaft to be displaced rearward and exit from the forward driveshaft loop. Subsequently, the driveshaft was likely displaced forward, exiting from the tag axle pass-through and traveling free of the vehicle to its rest position.
5. Dynamic disengagement of the tag axle steering lock at freeway speeds does not cause the MCI 102DL3 coach to go out of control. Such disengagement produces an effect that is similar to a light wind disturbance that is easily controlled with small steering inputs.
6. The MCI 102DL3 coach with unlocked tag axle steering does not become unstable or uncontrollable. With the steering lock disengaged, the steering and handling properties of the vehicle remain stable and predictable, with a high turning capacity.
7. I evaluated the characteristics of the tag axle system on the MCI 102DL3 coach and found them to be appropriate in design, manufacture, and function. I found no evidence of a defect of design, manufacture, or function.
8. The cause of the subject crash was that the driver responded to the U-joint separation by aggressively applying the brakes and steering excessively, ultimately placing the vehicle in a severe counter-clockwise yaw that led to overturn, rather than releasing the throttle, slowing gradually, and coming to a controlled stop.

All of the opinions in this report are expressed within a reasonable degree of engineering certainty. These opinions are based on my work as described above, my inspections related to this crash, all materials I have received and reviewed related to the subject crash and the MCI 102DL3 coach, my training as an engineer, my education and experience, my review of technical literature, and the laws of physics. I reserve the right to supplement or modify my opinions if new

information is received, additional work is performed, or in response to the work and opinions of other experts.

Materials Received and Reviewed

1. Accident Report
2. Police photographs
3. Texas DPS Reconstruction Investigation
4. Lt. Timothy Lite accident records
5. Report written by H. David Feltoon (01/18/11)
6. Report written by David Stopper (06/09/11)
7. Report written by Andrew D. Irwin (06/10/11)
8. Report written by Edward P. Cox (06/10/11)
9. Report written by John L. Caviar (06/10/11)
10. Report written by Richard Cortez (06/10/11)
11. AUSA photographs of subject vehicle (06/23/10)
12. H. Zuschlag photographs (07/10)
13. Evidence inspection photographs (07/22/10)
14. Carr Engineering vehicle inspection photographs (07/27/10)
15. David Coates photographs (07/29/10)
16. David Coates vehicle inspection photographs (01/14/11)
17. Bob Rucoba scene inspection notes and photographs (01/21/11)
18. Photographs produced by Americanos
19. Greg Wright sensor test results photographs
20. Greg Wright vehicle inspection photographs (06/30/11)
21. Greg Wright boroscope photographs
22. David Coates vehicle inspection photographs (07/20/11)
23. Subject vehicle inspection photographs and video taken June 30-July 1, 2011
24. DDEC download photographs
25. AUSA color photographs of bus and scene
26. Recorded statement of Jerrica Capers
27. Recorded statement of Nina Feddersen
28. Daniel Campos deposition & exhibits (08/26/10)
29. Daniel N. Campos deposition & exhibits (08/26/10)
30. Amalia F. Heather deposition & exhibits (08/26/10)
31. Adriana L. Pruitt deposition & exhibits (08/26/10)
32. Anna B. Schermerhorn deposition & exhibits (10/06/10)
33. Leonor Aguilar deposition & exhibits (10/27/10)
34. Selina Aguilar deposition & exhibits (10/27/10)
35. Trooper Wesley Cooper deposition & exhibits (11/08/10)
36. Denise Alvarado deposition & exhibits (11/19/10)
37. Adrian Lopez deposition & exhibits (11/19/10)
38. Rogelio Garcia deposition & exhibits (12/07/10)
39. Deborah Chavez deposition & exhibits (12/20/10)
40. David Rodriguez Perez deposition & exhibits (12/21/10)
41. Victoria Romero deposition & exhibits (01/05/11)
42. Minerva Santiago deposition & exhibits (01/05/11)
43. Margarita Miramontes deposition (01/10/11)
44. Bianca Herrejon deposition & exhibits (01/17/11)
45. Ashli Taylor Decena deposition & exhibits (01/20/11)
46. Miranda Gibson deposition & exhibits (01/20/11)
47. Sylvia Bandala deposition & exhibits (01/24/11)
48. Ramon Medina deposition & exhibits (01/25/11)
49. Diana Medina deposition & exhibits (01/25/11)
50. Sandra Valdez deposition & exhibits (01/27/11)
51. Eva Garcia deposition & exhibits (01/28/11)
52. Carlos Torres Teran deposition & exhibits (01/28/11)
53. Jacobs Medina deposition & exhibits (02/22/11)
54. Carmen Paz deposition & exhibits (02/22/11)
55. Irma Mendoza Morado deposition & exhibits Vol. I (04/07/11)

56. Irma Mendoza Morado deposition & exhibits Vol. II (04/08/11)
57. Trooper James Kellert deposition & exhibits (04/25/11)
58. Lt. Timothy Lite deposition & exhibits (04/27/11)
59. Carlos Cantu deposition & exhibits (06/15/11)
60. Eldridge Hughey deposition & exhibits (06/16/11)
61. Corporal Keith Olive deposition & exhibits (06/23/11)
62. Jeffrey Barta deposition (08/10/11)
63. Plaintiffs' First Amended Petition
64. Plaintiffs' Objections and Responses to Defendant Americanos, U.S.A., LLC's First Request for Production
65. Defendant Greyhound Lines, Inc.'s Response to Motor Coach Industries, Inc.'s First Request for Production
66. Defendant Greyhound Lines Inc.'s Responses to Motor Coach Industries, Inc.'s First Set of Interrogatories
67. Defendant Americanos U.S.A., L.L.C.'s Response to Motor Coach Industries, Inc.'s First Request for Production
68. Defendant Americanos U.S.A., L.L.C.'s Response to Motor Coach Industries, Inc.'s First Set of Interrogatories
69. Plaintiffs' Designation of Expert Witnesses
70. Agreed Scheduling Order
71. Medical Providers List
72. Passenger Height-Weight Matrix
73. Back-up documents for Matrix
74. Final Vehicle Record for Americanos Test Coach
75. Campbellton Metallurgy Examination Results from MSI Testing & Engineering, Inc. (01/14/11)
76. Greyhound proposed protocols – alignment testing, removal of parts
77. Protocol for Destructive Testing – July 2010
78. Bosch Test Track video
79. Brian Lawson notes
80. MSI Reports
81. Brian Lawson's reduced Scale efile
82. MCI 102D Series Maintenance Manual (January 1995)
83. 102AW3 Parts Manual
84. Section 10 – Transmission Parts Manual
85. Section 8 – Engine Parts Manual
86. MCI 102D Series Maintenance Manual (April 1994)
87. D-Series Operators Manual
88. MCI Maintenance Manual (January 1994)
89. 102DL3 Maintenance Manual (January 1995)
90. 102DL3 Parts Manual (January 1995)
91. CM0241 Campaign Detail by Campaign, Model, Serial Number
92. MCI documents produced – MCI000001– MCI004022
93. AUSA documents produced – AUSA000001 – AUSA009177

PE12-007

MCI

4-27-2012

Response 10

Expert Report - Bob Rucoba -
WITH Attachments

CARR ENGINEERING, INC.
12500 Castlebridge Drive
Houston, Texas 77065-4532
Telephone: 281/894-8955
Fax: 281/894-5455

February 15, 2012

Ms. Melissa Dorman
Hartline Dacus Barger Dreyer LLP
6688 North Central Expressway
Suite 1000
Dallas, TX 75206

Re: Campos v. Americanos, U.S.A. L.L.C. et. al.

Dear Ms. Dorman:

I provided an initial report that summarized my opinions in this matter as of August 11, 2011. Since the writing of that report, the attached list of materials has been analyzed. Of particular interest were the depositions of the various experts and the supplemental reports by Americanos' experts Aaron Jones, Thomas Fugger and Lawrence Yohe. Messrs. Jones, Fugger and Yohe provided supplemental opinions related to exemplar bus testing and several exemplar buses that had experienced driveshaft failures allegedly similar to the crash-involved bus. The opinions expressed in my initial report have not been changed and/or modified. However, the additional opinions that have been reached as a result of my review of the new materials are as follows:

Unit 6352

1. This was a 2000 MCI model 102DL3 that allegedly experienced a driveshaft failure similar to the Campos bus. Unit 6352 was involved in a crash on the Pennsylvania Turnpike on August 13, 2011. I have analyzed the police report and news video/photos/articles. The crash occurred as the bus was traveling westbound on the Pennsylvania Turnpike in Lancaster County, PA. 18 passengers were onboard. In the area of the crash, the highway is a four lane paved asphalt roadway with improved, paved shoulders. The westbound and eastbound lanes are divided by a concrete median barrier. The posted speed limit is 65 miles per hour. The police report indicates that at the time of the crash the roadway surface was "dry", the weather conditions were "no adverse conditions" and the illumination was "daylight". The road is downhill and curves to the right in the westbound direction. To the north of the pavement lies an earthen embankment.

2. According to the police information, the bus was “traveling westbound in the left lane. The driver lost control and struck the Jersey Barrier.” The bus then traveled along the barrier for approximately 432 feet, turned to the right and traveled across both westbound travel lanes. The bus subsequently collided with the earthen embankment on the north side of the highway. The embankment impact caused the bus to overturn driver’s side leading. The bus continued sliding and spinning in the clockwise direction while on its driver’s side and roof. The bus came to rest on its driver’s side in the westbound travel lanes with its front end pointing towards the east. The investigating officer found the “Prime Factor Driver Action” to be “driver was distracted”.
3. The police drawing indicates that the first sign of physical evidence was the point of impact between the bus and the concrete median barrier. The police did not find any bus components or bus pieces preceding the barrier impact. The police report indicates that the “drive axle (sic) also became separated and was found underneath the bus after the bus had been uprighted.”
4. The crash scene was inspected on February 1, 2012. To date, limited information has been provided in the area of the initial barrier contact. According to a Pennsylvania Turnpike representative, there were no tire marks on the roadway leading up to the initial contact with the median barrier. The representative also indicated that the bus’s impact with the concrete median barrier was of a large enough magnitude that it required the damaged barrier sections to be replaced. At the time of the scene inspection, two new sections of concrete were visible in the barrier wall. The limited news coverage documented the bus’s path as it traveled post-impact with the barrier. The bus traveled across the westbound lanes, slammed into the earthen embankment and slid/spun to its point of rest. A single tire mark was found which lead up to a “scar” in the earthen embankment created by the bus’s front end. Various bus pieces and glass fragments were found on the side of the embankment. The news photographs/video footage was used to locate the point of the rest of the bus.
5. The crash bus was inspected on January 25, 2012. Based on the layout of the highway, it is likely that the left front wheel first collided with the barrier. Concrete residue was found on the ends of the left front lug nuts. The impact forces caused the bus to rotate abruptly in the clockwise direction. This caused the left side of the tag and drive axle wheels to slam into the vertical face of the barrier. Examination of the undercarriage revealed that the secondary impact with the barrier caused the entire tag axle to be shifted substantially from left to right. This lateral shift was found to be approximately 4.5” in the static state. The upper and lower radius rods were buckled on the left and right side. The lateral movement of the tag axle was large enough such that the tag axle pass through came into contact with the transmission/driveshaft universal joint and pinned it against the inner surface of the pass through. This pinning action of the universal joint literally tore the universal joint apart freeing the transmission end of the driveshaft. Once the driveshaft end was free to rotate, it contacted the tie rod and tag axle locking plates and disabled the tag axle locking mechanism. The lateral displacement of the tag axle from left to right, resulting in moving the tag axle locking cylinder and locking plates closer to the centerline of the coach and thus closer to the flailing end of the driveshaft.

The tag axle caster latch arm was found castered forward which is improperly positioned for forward travel. No evidence of direct contact was noted on the latch arm assembly. Based on the absence of direct contact, a likely reason for the latch arm assembly to be mispositioned is due to the huge amount of lateral displacement in the tag axle and the deformed suspension components.

The driveshaft was found completely separated from the bus. Both ears on the transmission side yoke were broken in half. Notably absent were the circumferential scratches on the exterior of the driveshaft near the differential connection. The presence of those scratches indicates that the driveshaft is rotating while in contact with the loop for an extended period of time. The absence of those scratches indicates that the driveshaft did not rotate a substantial amount prior to getting torn free from the bus.

Numerous scratches were found on the bus's exterior along the driver's side and roof. The scratches indicated that the bus initially rolled onto its driver's side and then rolled onto its roof while positioned on the embankment. The bus slid on its roof backwards while in contact with the embankment before eventually sliding/spinning back into the westbound travel lanes. It rolled back onto its driver's side prior to coming to rest.

Dirt and grass were found imbedded in the front face and under the front bumper of the bus. The presence of the dirt/grass across the front end of the bus indicated that the bus was upright when it collided with the earthen embankment.

The bus was inspected for mechanical problems that could have caused or contributed to the crash. No problems were found.

6. Based on my reconstruction to date, I have determined that that the Pennsylvania Unit 6352 bus crash is not substantially similar to the Campos bus crash. Although each crash involves the same model MCI bus and both buses had separated driveshafts, the crashes are significantly different in the following ways:
 - In the Pennsylvania crash the loss of control was likely due to driver distraction. The driver failed to steer or brake his bus before colliding with the barrier. The cause of the loss of control in the Campos crash was due to the bus driver steering and braking in response to a mechanical failure.
 - In the Pennsylvania crash there was no physical evidence from the bus prior to the barrier impact. In the Pennsylvania crash there were no driveshaft components or tire marks left on the roadway prior to the loss of control and barrier collision. In the Campos crash, the police found pieces from the driveshaft universal joint prior to the loss of control and distinctive tire marks created once the driveshaft was disconnected on one end.
 - In the Pennsylvania crash, the driveshaft universal joint was torn apart because the tag axle was pushed laterally to the point where it impacted/impinged and then stopped the rotating universal joint. In the Campos crash the universal joint failed due to the improper maintenance and it was not an impact induced failure. In the Campos crash, the lateral movement of the tag axle was essentially negligible.

- In the Pennsylvania crash, the bus's driveshaft did not have the circumferential scratches on the exterior of the driveshaft near the differential connection. The absence of those scratches indicates that the driveshaft did not rotate a substantial amount prior to getting torn free from the bus. In the Campos crash, the driveshaft had numerous scratches around the circumference. This was indicative of the driveshaft rotating for an extended period of time while in contact with the loop.
- In the Pennsylvania crash, the bus was caused to overturn due to the impact forces from the bus slamming into the embankment, front end leading. Those impact forces literally caused the bus to enter into a sudden clockwise rotation which overcame the stability of the bus. In the Campos crash, the bus was caused to overturn due a combination of steering and braking forces which ultimately got the bus sliding sideways and furrowing into the earth. The Campos bus rollover was a steering/braking induced rollover not an impact induced rollover.

Unit 6468

1. This was a 2000 MCI model 102DL3 that allegedly experienced a driveshaft failure similar to the Campos bus. Based on the information that has been provided to date, this bus was not involved in a crash. Per Aaron Jones, this bus had been recently refurbished.
2. The bus was inspected on January 25, 2012. Examination of the undercarriage revealed that the driveshaft experienced a universal joint separation at the transmission connection. There were numerous impact marks on the tag axle pass through. There were also some contact marks on the upper tag axle locking plate. The tie rod locking plate and locking pin had been displaced forward, but the tag axle lock assembly was still locked in place.

The tag axle caster latch arm was found properly positioned for forward travel. (In Aaron Jones' report he noted that the tag axle caster latch arm was "displaced from its correct position for forward driving". This comment disagrees with my findings and what is shown in Jones' inspection photographs.)

The driveshaft was not available for inspection. Photographs of the driveshaft indicate that both ears on the transmission side yoke were broken in half. Circumferential scratches were present on the exterior of the driveshaft near the differential connection. The presence of those scratches indicates that the driveshaft was rotating while in contact with the loop for an extended period of time. At this time the cause of the driveshaft universal joint failure is unknown.

3. Based on my analysis to date, I have determined that the Unit 6468 bus incident is not substantially similar to the Campos bus. Although each case study involves the same model MCI bus and both buses had separated driveshafts, the evidence in both cases is significantly different in the following ways:

- Based on the information that has been provided and my inspection of Unit 6468, it does not appear that the Unit 6468 bus driver ever lost control of the bus. Unlike the crash-involved Campos bus, Unit 6468 was not involved in any type of loss of control or rollover crash. It is worthwhile noting that Unit 6468 case study shows that even in the presence of a failed driveshaft, a driver is able to maintain control of an MCI model 102DL3.
- The tag axle lock assembly for Unit 6468 never became unlocked under any condition during the incident. In the Campos crash, the tag axle was found in the unlocked position at the bus's point of rest.
- The tag axle caster latch arm for Unit 6468 was found properly positioned for forward travel. In the Campos crash, the tag axle latch arm was found to be mispositioned for forward travel at the bus's point of rest while the bus was laying on its side.

Unit 6934

1. This was a 2000 MCI model 102DL3 that allegedly experienced a driveshaft failure similar to the Campos bus. Based on the information that has been provided to date, this bus was not involved in a crash. Per Aaron Jones, this bus had been recently refurbished.
2. The bus was inspected on January 25, 2012. Examination of the undercarriage revealed that the driveshaft experienced a universal joint separation at the transmission connection. There were numerous impact marks on the tag axle pass through. The tag axle locking plates were found unbolted from the bus. Both plates were bent downward. To date, there has not been enough information provided to determine if the tag axle became unlocked during the incident.

The tie rod was found in the interior of the bus. The tie rod was bent and there was a gouge mark in the tie rod at the location of the maximum bend.

The tag axle caster latch arm was found properly positioned for forward travel.

The driveshaft was not available for inspection. At this time the cause of the driveshaft universal joint failure is unknown.

The transmission housing was cracked. Several pieces were found in the interior of the bus.

3. Based on my analysis to date, I have determined that the Unit 6934 bus incident is not substantially similar to the Campos bus. Although each case study involves the same model MCI bus and both buses had separated driveshafts, the evidence in both cases is significantly different in the following ways:
 - Based on the information that has been provided and my inspection of Unit 6934, it does not appear that the Unit 6934 bus driver ever lost control of the bus. Unlike the crash-involved Campos bus, Unit 6934 was not involved in any type of loss of control or rollover crash. It is worthwhile noting that Unit 6934 case study shows that even in the presence of a failed driveshaft (and possibly an unlocked tag axle lock cylinder), a driver is able to maintain control of an MCI model 102DL3.

- Based on the information to date, it cannot be determined if the tag axle locking cylinder for Unit 6934 ever became unlocked under any condition during the incident. In the Campos crash, the tag axle was found in the unlocked position at the bus's point of rest.
- The Unit 6934 tag axle caster latch arm was found properly positioned for forward travel. In the Campos crash, the tag axle latch arm was found to be mispositioned for forward travel.

Unit 60628

1. This was an MCI model 102DL3 that was used in several tests performed by Americanos' experts.
2. In June 2011, Unit 60628 was initially used by Americanos' experts in driving demonstrations at the Bosch Proving Grounds.
3. On August 25, 2011 and September 9, 2011, Unit 60628 was used by Americanos' experts to demonstrate a "newly designed" driveshaft guard. The experts intentionally caused the driveshaft universal joint to detach at the transmission connection. According to Aaron Jones' report, in the August 2011 test the "tag axle castered forward after being impacted with the driveshaft". The tests were videotaped and "Video 12" and "Video 15" were submitted as part of that testing. To date, Video 1 to Video 11, Video 13 and Video 14 have not been submitted for review nor have the driveshafts from those tests.
4. On September 20, 2011, Unit 60628 was used by Americanos' experts in a driveshaft test. The experts intentionally caused the driveshaft universal joint to detach at the transmission connection. According to Aaron Jones' report, prior to the start of this test the "tag axle caster lock assembly had been damaged and the axle was castered forward". That test was videotaped and high speed and regular speed camera views have been submitted.
5. The bus and the 9/20 driveshaft were inspected on January 24, 2012. Examination of the undercarriage revealed that the driveshaft made numerous contacts inside and around the exterior of the tag axle pass through and tie rod. The tag axle locking cylinder had been unlocked such that the locking plates were separated from the tie rod plate and the locking plates were bent upwards.
6. The driveshaft was found completely separated from the bus. Both ears on the transmission side yoke were broken in half. Circumferential scratches were present on the exterior of the driveshaft near the differential connection. The presence of those scratches indicates that the driveshaft was rotating while in contact with the loop for an extended period of time.

7. One of Jones' main conclusions from the August/September driveshaft testing with the secondary guard was that "the testing also shows that the flailing driveshaft impacts the tag axle support structure and can cause unlatching of the tag axle caster mechanism." While that may state an accurate result from the Americanos test, this result was created under artificial conditions. By placing a secondary guard near the transmission end of a flailing driveshaft the second loop artificially causes the driveshaft to remain positioned up near the latch arm assembly thereby increasing the opportunity to strike the latch arm assembly. Indeed, the tag axle caster mechanism was so extensively damaged during the Americanos testing with the secondary guard that the mechanism wasn't functional when Americanos conducted testing in the coach's as-designed condition. The Americanos driveshaft tests were never able to replicate the tag axle caster mechanism being knocked out of position in the MCI as-designed condition (absent a secondary guard).

Unit 60624

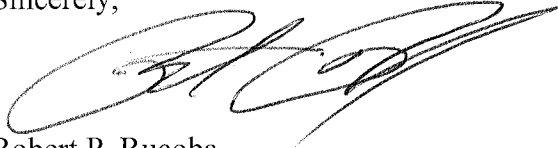
1. This was an MCI model 102DL3 that was used in several driving tests performed by Americanos' experts.
2. On January 13 and 14, 2012, Unit 60624 was tested by Americanos' experts in two circle tests and eleven braking tests. The tests were documented with instrumentation, videotapes and digital photographs. The bus was modified with a pneumatic actuator to apply steering to the tag axle.
3. I have not had time or opportunity to fully analyze the Americanos test data. However, there are a few opinions that I have reached based on my limited review of the test data.
 - The initial theory put forth by Americanos' experts was that once the driveshaft/transmission universal joint failed, the flailing driveshaft (1) struck the tie rod and (2) unlocked the tag axle lock cylinder causing the tag axle to turn to the left which caused the bus to enter into a right turn. The defense experts refuted this theory by analyzing the flaws in the Americanos testing which "supported" this initial theory. Defense experts also provided their own testing which showed that the bus was indeed controllable and provided a margin of safety in the event of a tag axle unlocking. This most recent round of Americanos testing refutes the Americanos initial theory and replicates the findings in the defendant's initial bus testing. Americanos tests #5, #6, and #7 were all performed with the tag axle unlocked. The Americanos testing clearly demonstrates that when the tag axle is unlocked under driving conditions, the bus is controllable and can be safely brought to a stop.

- The newest theory recently put forth by the Americanos experts is that once the driveshaft/transmission universal joint failed the flailing driveshaft (1) struck the tie rod and (2) unlocked the tag axle lock cylinder and (3) also struck the tag axle caster mechanism and (4) unlocked the mechanism which caused it to be mispositioned to a position that is designed for rearward travel. The Americanos theory is that these two tandem events caused the bus to “veer relatively sharply to the right” and ultimately caused the bus driver to lose control. The testing that comes closest to replicating their theory are Americanos tests #9, #12, and #13 which were all performed with the tag axle unlocked and the tag axle caster mechanism mispositioned as the test driver applied braking. What is consistent in those three Americanos tests is that during the braking phase there are simultaneous brake marks being created on the pavement by the left and right side tires. The left and right side tire marks begin and end at approximately the same points on the road. The analysis of the braking marks in the Campos crash shows uneven side-to-side brake mark creation. Most notably, in the initial braking phase of the Campos crash, the right rear tag axle and the right front tire were creating tire marks and none of the left side tires were creating tire marks. This brake imbalance is what ultimately caused the bus to move to the right and the driver to overcorrect. The Americanos testing shows that even when the bus is placed under their theoretical conditions, if the brake system is properly “balanced” the bus does not deviate from the lane of travel under hard braking while the bus is traveling at highway speeds.
- Another opinion that can be made about Americanos tests #9, #12, and #13 has to do with controllability. Even with the tag axle unlocked and the tag axle caster mechanism mispositioned, the Americanos test driver was able to maintain control and bring the bus to a controlled stop. In tests #9 and #12, the bus driver was able to keep the bus in the initial lane of travel and stop primarily in its initial lane of travel. In test #13, the bus exited the left side of the travel lane near the end of the test but it still came to rest on pavement. Even if one were to extrapolate the final rest position of test bus #13 to the Campos scene, test bus #13 would have still come to rest primarily on the pavement.

As stated in my first report and in my deposition, the cause of the Campos crash was due to driver error combined with an improperly maintained bus. The precipitating event was the failure of the transmission/driveshaft universal joint. The bus driver responded to the driveshaft universal joint failure by steering and braking her vehicle into a right turn. After the driver steered her vehicle onto the paved shoulder she overcorrected back to the left. Americanos experts Larry Yohe, Thomas Fugger and Ricardo Palacios have also concluded that the bus is placed in a left turn due to steering inputs by the bus driver. All experts have concluded that no amount of change in the suspension components will cause the bus to transition from a right turn to a left turn in the absence of driver steer inputs. The transition from right turn to left turn must be initiated by driver input. The reentry path confirms that driver steered her vehicle abruptly rather than remaining in the shoulder and slowing her vehicle down in a controlled manner. There were no obstacles or obstructions which would have prevented the driver from staying on the paved shoulder and stopping her vehicle.

All of the opinions in this report are expressed with a reasonable degree of engineering certainty. It is my understanding that there has recently been produced Americanos test footage and data. I reserve the right to supplement or modify my opinions once this new information is received or in response to the work and opinions of opposing experts.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rucoba', with a large, sweeping flourish extending from the end of the name.

Robert P. Rucoba

Attachment A – File Materials

- CD containing: Documents produced by Americanos, Documents produced by MCI, Vehicle photographs
- Greg Wright Inspection photographs 06/30/11
- Boroscope Pictures
- David Coates Inspection photographs 07/20/11
- Sensor Tester Results
- CD containing: Vehicle Inspection photographs and videos 06/30/11 and 07/01/11
- Depositions: Sylvia Bandala (01/24/11 + exhibits), Daniel Campos (08/26/10 + exhibits), Daniel N. Campos (08/26/10), Carlos M. Cantu (06/15/11 + exhibits), Ashli Taylor (01/20/11), Miranda Nicole Gibson (01/20/11), Amalia F. Heather (08/26/10 + exhibits), Bianca Herrejoin (01/17/11 + exhibits), Diana Ann Medina (01/25/11 + exhibits), Ramon Medina (01/25/11 + exhibits), Corporal Keith Olive (06/23/11 + exhibits), Adriana L. Pruitt (08/26/10 + exhibits), Leonor Aguilar (10/27/10 + exhibits), Selina Aguilar (10/27/10), Denise Alvarado (11/19/10 + exhibits), Deborah Chavez (12/20/10 + exhibits), Desiree Flores (01/17/11 + exhibits), Eva Garcia (01/28/11 + exhibits), Rogelio Garcia (12/07/10 + exhibits), Adrian Lopez (11/19/10 + exhibits), Jacob Medina (02/22/11 + exhibits), Margarita Miramontes (01/10/11 + exhibits), Carmen Paz (02/22/11 + exhibits), David Rodriguez Perez (12/21/10 + exhibits), Victoria Romero (01/05/11 + exhibits), Minerva Santiago (01/05/11 + exhibits), Anna B. Schermerhorn (10/06/10 + exhibits), Carlos Torres Teran (01/28/11 + exhibits), Sandra Valdez (01/27/11 + exhibits), Jeff Barta Rough Draft, Andrew D. Irwin (08/31/11), Ricardo Palacios (09/13/11), Dr. Juan Herrera (09/02/11), Thomas F. Fugger, Jr., P.E. (09/09/11), Raul G. Longoria Rough Draft (08/08/11), Glen F. Reuschling (09/08/11), Raul Longoria, Ph.D. (09/12/11), Aaron J. Jones (09/14/11 + exhibits), David A. Stopper (08/12/11 + exhibits), Ricardo Palacios (09/13/11), Frank Brown (09/19/11), Lawrence Yohe (09/19/11), Virgil Hoogestraat Vol. 1 (06/09/11), Virgil Hoogestraat Vol. 2 (07/14/11), Virgil Hoogestraat Vol. 3 (09/23/11), Jeffrey Evan Barta (08/10/11), Michael Barta (08/10/11), Leon Feazell (08/23/11), Brian Lawson (09/20/11 + exhibits), Kevin J. Granat (10/14/11), Robert Rucoba (09/21/11), Shawn Genereau (04/20/11 + exhibits), Edward P. Cox (08/17/11), Thomas Fugger Vol. 2 (2/10/2012 rough draft)
- Bosch Test Track Chart
- CD's containing: Documents produced by Americano's, Scene Inspection photographs, Vehicle Inspection photographs by K. Granat, Testing produced by MCI
- Protective Order
- CD's containing: Bus and Bus Part Inspection 06/30/11
- CD containing: Def. Greyhound Lines, Inc.'s second supplemental responses to Motor Coach Industries, Inc.'s first request for production, Def. Greyhound Lines, Inc.'s first supplemental responses to Plaintiff's first request for production, Def. Americanos, U.S.A., LLC's second supplemental responses to Motor Coach Industries, Inc.'s first request for production, Def. Americanos, U.S.A., LLC's first supplemental responses to Plaintiff's first request for production, Def. Irman Morado's first supplemental responses to Plaintiff's first request for production
- Vehicle part photographs
- DPS Inspection File Records
- CD's containing: Fugger Raw Data

- Plaintiff's cross-notice of intention to take Depo of Bob Rucoba 09/21/11
- Exhibits to Officer Keith Olive's Depo
- Report by Raul Longoria
- Report on Simulations by Raul Longoria
- Raul Longoria's File Materials
- Exhibits to J. Barta's Depo
- Report & CV by Virgil Hoogestraat
- Report by Kevan J. Granat
- Report by Gregory Wright
- Report by Patrick Mears
- Accident Scene photos
- Correspondence File of Frank Brown
- CD's containing: Exhibits to Andrew Irwin's Depo, Report & CV by Frank Brown, File Materials by Larry Yohe
- Vehicle Inspection photos by Aaron Jones
- CD's containing: Vehicle Inspection photographs
- Meritor Axle CAD Model
- Exhibits to Thomas Fugger's Depo
- Exhibits to Ricardo Palacios' Depo
- GLI Test Coach Inspection photos
- CD containing: 1995 MCI Tag Axle Steering Testing
- Tag axle lab test data
- Download: Exhibits to Glen Reuschling's Depo
- Video Driveshaft Test
- CD containing: Driveshaft Testing
- Exhibits to Hoogestraat's Depo
- CD containing: Exhibits to Virgil Hoogestraat Vol. 3 Depo
- Download: Video Driveshaft Test and Jones photographs
- Download: Vehicle Inspection photographs, Campos MSI Jan 13-14-2011, Campos protocol photographs 6-3-2011, Inspection 6-30--7-1-2011 MSI-6-30-2011
- Photographs of U-Joint artifacts transfered to Gary
- CD containing: Video of Driveshaft Test 09/22/11, Aaron Jones Photos 09/20/11
- Errata Sheet of Leon Feazell's Depo
- Download: U-Joint Artifacts Inspection photographs by Gary Fowler
- CD's containing: Exhibits to Bob Rucoba's Depo
- CD's containing: Aaron Jones File Materials and photos
- Errata Sheet for Raul Longoria's Depo
- Errata sheet for Thomas Fugger's Depo
- CD containing: G. Reuschling TranCon Photographs, Exhibits to Kevin Granat's Depo
- CD containing: Documents by Americanos AUSA010718-AUSA011272
- Exhibits to Virgil Hoogestraat's Depo
- Accident Reports
- Exhibits to Herrera's Depo
- Errata Sheet to Frank Brown's Depo,
- Errata Sheet to Lawrence Yohe's Depo
- Pennsylvania Police Report

- News Video of Accident Scene
- CD containing: Vehicle Inspection photographs by Aaron Jones, Greyhounds Driveshaft Testing Videos
- Supplemental Report by Lawrence Yohe
- Supplemental Report by Thomas F. Fugger, Jr., P.E.
- Supplemental Report by Aaron J. Jones, P.E.
- Americanos USA, LLC, Greyhound Lines, Inc. and Irma Morado's sixteenth supplemental responses to Plaintiff's and intervenor's requests for disclosure and second supplemental designation of expert witnesses
- Vehicle purchase and Maintenance Records
- First amended scheduling order
- CD containing: Vehicle Inspection photographs
- Vehicle Maintenance Records
- CD's containing: GLI Bus Inspection photographs and notes by Dr. David Coats, GLI Bus Inspection photographs and notes by Kevan Granat
- Tests run configurations
- Videos: Vbox Tests
- 4 CDs labeled AUSA 011756,57,58 and Test 10 Disk 3
- GLI 6468 driveshaft photographs
- Americanos Supplementary Discovery Responses
- Loop install documents
- Tag axle suspension drawing
- Lock cylinder assembly drawing

DOCUMENTS REVIEWED – DR. DAVID COATES

1. Accident Report by TX DPS Trooper Kellert (Campos Plaintiffs 252808-000540)
2. MCI000001-001211
3. MCI000469-000470
4. AUSA002861-AUSA002880
5. P000367-P000372
6. Scheduling Order
7. Plaintiff's Designation of Expert Witnesses
8. MCI Standard 25-24-0001 (Raw Material Standard – Raw Material Selection – Steel Products)
9. Steel Stainless – AISI 304, UNS S30400
10. Bosch Test Track
11. Brian Lawson Notes
12. Reduced Scale Drawing
13. MSi Reports
14. Photographs - 316 photographs of scene and coach produced by Americanos in response to Plaintiff's Request for Production dated June 17, 2010 (photos taken January 14, 2007, January 15, 2007, March 16-17, 2010, and April 26, 2010 ARAAC)
15. Photographs - 83 photographs of scene produced by Americanos in response to Plaintiff Request for Production dated June 17, 2010
16. Photographs – 48 photographs of coach taken 06/22/10 produced by Americanos on 07/23/10
17. Photographs – Campbellton Photos from DPS Evidence Inspection
18. Photographs – Campbellton DPS Evidence Inspection
19. Photographs - Bob Rucoba's Inspection Photos taken 07/27/10
20. Photographs - Campbellton Inspection –Photo No. L1010152 (from Photos of Items Collected by GLI Investigator at Scene)

21. October 26, 2010 letter from Americanos' counsel regarding additional protocols for destructive testing and advising that they are no longer going to be doing the alignment testing, paragraphs 1-5 of the protocol entitled "Protocol for Examination of the Subject Coach."
22. Ameircanos' July 2007 Transmission Change – Driveline Removal
23. 102DL3 Maintenance Manual Regarding Removal of Driveshaft
24. November 1, 2010 letter from Americanos' counsel regarding this week's inspection and testing
25. Drawing – 141-1-71_k_1 of 1 – yoke half round end
26. Deposition transcript and exhibits for: Trooper Wesley Cooper
27. Defendant Greyhound Lines, Inc.'s Responses to Motor Coach Industries, Inc.'s First Request for Production
28. Defendant Greyhound Lines, Inc.'s Responses to Motor Coach Industries, Inc.'s First Set of Interrogatories
29. Defendant Americanos U.S.A., L.L.C.'s Responses to Motor Coach Industries, Inc.'s First Request for Production
30. Defendant Americanos U.S.A., L.L.C.'s Responses to Motor Coach Industries, Inc.'s First Set of Interrogatories
31. Bob Rucoba's 08-02-11 Exemplar Vehicle Inspection Photos
32. Photos of the June 30, 2011 Bus Inspection which we received from counsel for Stewart & Stevenson Truck Holding, LLC d/b/a On the Border Freightliner of El Paso; and
33. Photos of the Bus Parts Inspection taken on June 30, 2011 which we received from counsel for Stewart & Stevenson Truck Holding, LLC d/b/a On the Border Freightliner of El Paso
34. Protective Order signed by all counsel on 07-16-10
35. DPS Inspection File for Americanos
36. Greyhound's 2nd Supplemental Responses to MCI's 1st Request for Production
37. Americanos 1st Supplemental Response to MCI's Request for Production
38. Morado's 1st Supplemental Response to Perez Request for Production
39. Americanos 1st Supplemental Responses to Perez Request for Production

40. Greyhound's 1st Supplemental Responses to Perez Request for Production
41. Greyhound's 1st Supplemental Objections/Responses to Medina, Medina & Bandala's Request for Production
42. Morado's 1st Supplemental Objections/Responses to Medina, Medina, Bandala's Request for Production
43. Americanos' 1st Supplemental Objections/Responses to Medina, Medina, Bandala's Request for Production
44. Americanos' 1st Supplemental Objections/Responses to Garcia & Dominguez Requests for Production
45. Americanos' 10th Supplemental Objections/Responses to Campos Request for Production
46. Morado's 1st Supplemental Objections/Responses to Campos Request for Production
47. Greyhound's 2nd Supplemental Objections/Responses to Campos Request for Production
48. Morado's 1st Supplemental Responses to Herrejon's Request for Production
49. Americanos' 1st Supplemental Responses to Herrejon's Request for Production
50. Greyhound's 1st Supplemental Responses to Herrejon's Request for Production
51. Americanos' 2nd Supplemental Responses/Objections to ArvinMeritor Request for Production
52. Americanos' 1st Supplemental Responses to Garcia Request for Production
53. Greyhound's 1st Supplemental Responses to Garcia Request for Production
54. Morado's 1st Supplemental Responses to Garcia Request for Production
55. Morado's 1st Supplemental Responses to Aguilar Request for Production
56. Americanos' 1st Supplemental Responses to Aguilar Request for Production
57. Greyhound's 1st Supplemental Responses to Aguilar Request for Production
58. Photographs of Coach at Jeff's Auto Rebuilders
59. October 14, 2011 Deposition Transcript and Exhibits of Kevan Granat
60. Defendant Americanos' 2nd Amended Notice of Intention to Take Oral Deposition of David Coates and Subpoena Duces Tecum

61. AUSA010717 - Video Driveshaft Test & Jones Photos 09-20-11
62. AUSA011583 - Video Driveshaft Failure w-o Loop
63. Video 12.wmv
64. Video 15.wmv
65. 100ND70S - unit 6352
66. 1016468_ - unit 6468
67. 1026934_ - unit 6934
68. 1036132_ - unit 6132 turning angle measurement
69. Aaron Jones' September 20, 2011 Photos
70. Aaron Jones' Deposition Exhibit 7
71. Aaron Jones' Deposition Exhibit 8
72. Aaron Jones' Deposition Exhibit 9
73. Aaron Jones' Deposition Exhibit 13
74. Larry Yohe's January 15, 2012 Supplemental Expert Report
75. Thomas Fugger's January 16, 2012 Supplemental Expert Report
76. Aaron Jones' January 16, 2012 Supplemental Expert Report
77. Attachments produced with Americanos, Greyhound, and Morado's Sixteenth Supplemental Response to Plaintiffs' and Intervenors' Request for Disclosure and Second Supplemental Expert Designation (*Not Bates Labeled*)
78. AUSA011639 – AUSA011755
79. AUSA011600 – AUSA011613
80. Kevan Granat's January 24-25, 2012 Nappanee and Richmond Virginia GLI Bus Inspection Photos
81. MCI-001329 – MCI-001338 – 3-62A – locked (Tag Axle Lockout Procedure)
82. Bob Rucoba's January 24-25, 2012 Nappanee and Richmond Virginia GLI Bus Inspection Photos

CAUSE NO. 2010-03-1717-C

DANIEL CAMPOS, ET AL.	X	IN THE DISTRICT COURT
	X	
VS.	X	197TH JUDICIAL DISTRICT
	X	
AMERICANOS, U.S.A., L.L.C.,	X	
ET AL.	X	CAMERON COUNTY, TEXAS

ORAL DEPOSITION OF

ROBERT RUCOBA

March 23, 2012

VOLUME 2

ORAL DEPOSITION OF ROBERT RUCOBA, VOLUME 2, produced as a witness at the instance of the Defendant Americanos U.S.A., L.L.C., and duly sworn, was taken in the above-styled and above-numbered cause on the 23rd day of March, 2012, from 9:35 a.m. to 2:09 p.m., before Laura D. Glenn, CSR in and for the State of Texas, reported by machine shorthand, at the law offices of Hartline, Dacus, Barger, Dreyer & Kern, 6688 North Central Expressway, Suite 1000, located in the city of Dallas, state of Texas, pursuant to the Rules of Civil Procedure and the provisions stated on the record.

Page 13 1 MCI or the engineers for Americanos. I think all of those 2 things are things I will talk about. 3 Q. Okay. So you plan to give testimony about the -- 4 what would have been a reasonable response by Ms. Morado in 5 the face of a mechanical failure on the motorcoach on the date 6 of the accident? 7 A. Yes, in part; however, I'll also talk about options 8 or choices that were available to Ms. Morado based on my 9 reconstruction and investigation of the crash. 10 Q. Why don't you tell me all your opinions about that 11 while I'm looking through the rest of the e-mails. 12 A. Well, sure. I -- I think that going to this newest 13 theory -- well, let me back up. There was an original theory 14 that the tag axle unlocked when the driveshaft failed. And 15 that that, in and of itself, was what caused the vehicle to go 16 out of control. 17 I think that given the most recent round of 18 testing and what I've seen in the most recent round of 19 depositions, it appears that the Americanos' experts have 20 abandoned that theory. It's a theory that does not lead to 21 loss of control. I think that's something that, I think, was 22 best described by Mr. Yohe in his deposition where he just 23 said that he felt he could drive across country with the tag 24 axle unlocked. 25 So I think that put that theory to -- to rest	Page 15 1 slide in a left turn, that the Americanos testing shows that 2 provided you had good, well-functioning brakes, that the 3 vehicle would be brought to a stop in the middle of the road. 4 And I'm also going to talk about the roadside 5 itself, the options that were available to Ms. Morado. You've 6 got a paved shoulder, you've got a vehicle that is on a 7 trajectory that is sending it towards the paved shoulder. 8 There were some other choices that were 9 available to Ms. Morado. She could have decided to straighten 10 her vehicle out, stay on the shoulder, bring it to a 11 controlled stop and not reentered the roadway in a slide. 12 She also has the option to enter the grassy 13 area, either partially or fully. My measurements of that 14 scene indicate you've got an ample amount of room on the 15 right-hand side once you even get beyond the pavement such 16 that provided Ms. Morado straightens her vehicle out, does not 17 try to reenter the roadway, she would be able to bring her 18 vehicle to a stop in a controlled fashion, even if she was 19 partially or fully in the grass area. She would not run into 20 trees, she would not run into obstacles on the right side of 21 the road. 22 I think in -- I think in short, that sort of 23 summarizes a -- a lot. And probably a lot more than you 24 wanted in your question. But there's a lot of subsets that go 25 underneath those opinions, but I think that's the gist of it.
Page 14 1 and it's something that I had opined about in my first 2 deposition that -- that, in and of itself, would not cause 3 a -- a loss of control. 4 I think the second thing is now having to do 5 with the newest theory that's been put forth by the 6 Americanos' experts, and that is that not only does the tag 7 axle have to be unlocked, but the caster mechanism has to also 8 be unlocked. 9 And I think the testing that has been performed 10 by the Americanos' experts shows that that is a controllable 11 event, even in the event that you have both of those 12 mechanical failures get created when the driveshaft separates. 13 The vehicle is controllable, that it can be steered, it can be 14 braked, it can be brought to a stop on the roadway. 15 I'm also going to give opinions with regard to 16 the path of the vehicle that it followed as it went off the 17 right side of the road. The vehicle follows a distance of 18 about 300 feet. It's my opinion that given that path, that 19 the testing performed by the Americanos' experts show that the 20 vehicle can be brought to a stop within around 400 feet. 21 I'm also going to talk about today that given 22 the speed of the vehicle with a properly functioning brake 23 system, that this vehicle can be brought to a stop even in the 24 events that the driver decides to put in a huge amount of 25 steering and cause the vehicle to go -- to go into a broadside	Page 16 1 Q. Okay. And I actually -- I've forgotten the question 2 now, but I -- I think I was asking about -- and I appreciate 3 you kind of giving me a summary of all your opinions. 4 I think what I was asking you was about what 5 opinions you have with regards to the conduct of the driver 6 and whether you thought it was reasonable or not, if you were 7 going to give opinions about that and -- and to tell me about 8 them. And so I think we kind of got off track a little bit, 9 although you did talk about that at the end, right? 10 A. Uh-huh. Yeah, I -- I believe that -- I think I 11 answered your question maybe with just a little too much 12 information. But I -- I think I've given you everything that 13 was responsive to the question. 14 Q. And more. 15 A. And more. 16 Q. Okay. I -- what I've done, you gave me a big folder 17 of -- of correspondence. And I've tried to separate out -- 18 and I'll let you look at it -- what appears to be subsequent 19 to your first deposition and I've marked that as Exhibit 5. 20 If you'll just take a look at that and see if I haven't left 21 anything in there that's from before September 21st. I mean, 22 I should have only left in that folder what's before 23 September 21st, and the stuff marked as Exhibit 5 should be 24 after that date. 25 A. I think you've -- I think you've got it.

Page 77 1 whether you believe that this could only happen under the 2 conditions in this testing involving unit 60628, or whether it 3 could actually happen under roadway conditions. Just trying 4 to find out what your opinion is. 5 A. I think I'd have to -- 6 Q. Or if you have one. 7 A. I think I'd have to have more information in order 8 to be able to give you an opinion. I'd have to look at the 9 physical evidence on the roadway as well as on the vehicle to 10 be able to -- to answer that question. 11 Q. Okay. So as we sit here today, you don't have an 12 opinion whether or not under roadway conditions if a 13 driveshaft separated at the transmission end, whether it could 14 escape the harness on the differential end and cause damage to 15 the tag axle assembly and system -- 16 MS. DORMAN: Object to form. 17 Q. (BY MR. HAYNES) -- is that correct? 18 MS. DORMAN: Object to form. 19 A. Right. Again, I -- I think I'd -- I'd have to look 20 at all of the physical evidence that's created under that kind 21 of condition in order to be able to answer your question. 22 Q. (BY MR. HAYNES) So it's -- if I'm hearing you 23 right, you're saying it might be possible, but I'd have to see 24 the evidence, I don't have a complete opinion at this time? 25 A. Correct.	Page 79 1 Q. -- involving a driveshaft separation -- 2 A. I -- 3 Q. -- to see what would happen? 4 A. I have not. 5 Q. Have you recommended that that be done? 6 A. No, I haven't. 7 Q. Why not? 8 A. I haven't seen it necessary. We already know what 9 happens when a driveshaft separates. 10 Q. Well, what do you mean, we already know? 11 A. Well, we've got physical evidence that's very 12 distinctive that's created in this particular case in this 13 Campos crash, it's well documented. And there are a number of 14 things that you can look at to help you determine what exactly 15 is going on with this particular driveshaft, what is it 16 actually doing with this vehicle. And its documented both in 17 the physical evidence on the vehicle, as well as on the 18 roadway. So there really isn't a need to go do that. 19 Q. Okay. Well, but you -- you're obviously very 20 familiar with Americanos' theory that the driveshaft separated 21 on the transmission end while the motorcoach was still on the 22 roadway and that it escaped the harness on the differential 23 end and caused damage to the tag axle system while the 24 motorcoach was still on the roadway, right? 25 I mean, you understand that's Americanos'
Page 78 1 Q. Okay. What else is in here, in these photos that's 2 significant to your opinions? 3 A. Just the circumferential abrasions again present on 4 the exterior of the driveshaft. They're indicative of a 5 driveshaft that's rotating around in a loop, so we know 6 what -- what it is that's causing that and how that gets 7 created and, again, it goes back to the issue that we were 8 talking about earlier. 9 Q. Right. 10 A. I think that's -- that's it for that section. 11 Q. If I remember right -- and I haven't reviewed your 12 first deposition in a while -- did -- you were present at the 13 inspection with Mr. Hoogestraat -- I think it was you -- where 14 the -- where the -- a driveshaft was separated manually at the 15 transmission end and then it was kind of moved around within 16 the harness to see what it would come into contact with. 17 Was that you? 18 A. Yes, we talked about that in the first deposition. 19 Q. Okay. And -- but as far as I know, you've not been 20 involved in any testing of a driveshaft failure in any way 21 similar to what Americanos did with unit 60628; is that right? 22 A. Are you saying have I done any testing where we've 23 had a driveshaft rotating dynamically? 24 Q. Dynamic testing -- 25 A. Dynamic testing --	Page 80 1 theory? 2 A. That it escaped the loop on the -- 3 Q. Differential. 4 A. -- on the differential side? No, that's not my 5 understanding of their theory. 6 Q. Okay. So your understanding is that it separated on 7 the transmission end and -- driveshaft separated on the 8 transmission end and made contact with the tag axle system 9 while the motorcoach was still on the roadway? 10 A. Yes, sort of. More specifically, the theory is that 11 the driveshaft separated and made contact with the tag axle 12 lock assembly and disconnected it or unlatched it and also 13 made contact with the caster latch mechanism and unlatched 14 that as well. That is the theory as it currently stands. 15 Q. And you haven't recommended any dynamic testing to 16 test that theory? 17 A. No, I have not. 18 Q. And my question is, why haven't you recommended any 19 dynamic testing to test that theory? 20 A. I think there's been enough information in this case 21 generated both in crash, as well as testing by your own folks 22 that indicate that that's not necessary. 23 Q. Why do you think it's not necessary? 24 A. Well, because in general, if you look at the testing 25 that was conducted by Americanos, there isn't a loss of

Page 81 1 control. The vehicle can be controlled, the vehicle can be 2 brought to a stop, the vehicle can be steered. 3 But if you accept the testing and -- on its 4 face value, there are problems with the testing -- there are 5 serious problems with the testing that have to do with the way 6 that the vehicle was set up, which made the science invalid. 7 But if you set that aside and you just look at 8 the testing itself, it tells you -- 9 Q. And what -- and just, you know, like you said, 10 there's been a lot of testing, so when you're talking about 11 testing, which specific testing are you talking about? 12 A. I'm specifically talking about the -- the on-road 13 testing that was just recently completed. 14 Q. Okay. 15 A. And I think that if you look at that and you look at 16 the physical evidence that's created under those conditions 17 and compare it to the physical evidence that was created on 18 the -- in the Campos crash, it tells you, A, there's enough 19 information out there where you don't need to do any more 20 dynamic testing necessarily. 21 And the type -- and B, the testing that has 22 been done basically tells you that the theory put forth by the 23 Americanos experts doesn't agree with the physical evidence 24 left on the roadway. 25 Q. Tell me if I'm hearing you right. What I think I	Page 83 1 Mr. Yohe testified to that in the most -- the 2 three tests that are the most case related, number nine, 12 3 and 13. He says that he still had control of the vehicle. 4 Q. So you have not recommended or participated in any 5 driveshaft separation testing? 6 MS. DORMAN: Object to form. 7 Q. (BY MR. HAYNES) Is that true? 8 A. Again, if we're talking about something that's 9 happening dynamically -- 10 Q. Dynamically. 11 A. -- no, I have not. 12 Q. Has Carr Engineering performed any driveshaft 13 separation testing on a 102DL3 for any client, to your 14 knowledge? 15 A. Not to my knowledge. 16 Q. Who would know whether that's been done at 17 Carr Engineering? 18 A. Me. 19 Q. No one else? 20 A. Correct. 21 Q. Okay. So you're -- you deny that Carr Engineering 22 performed any driveshaft separation testing on a 102DL3 in 23 August 2011? 24 A. Yes, sir. 25 Q. Or any other time while this case has been pending?
Page 82 1 hear you saying is that you're perfectly willing to accept 2 Americanos' theory about what happened underneath the bus on 3 the roadway, but you just don't think any further dynamic 4 testing is necessary because even if it happened that way, it 5 doesn't cause a loss of control of the motorcoach? 6 MS. DORMAN: Object to form. 7 Q. (BY MR. HAYNES) Is -- am I hearing you right, or 8 not? 9 A. I'm not willing to accept the theory put forth by 10 Americanos, let's be clear on that. Number one, I think that 11 theory is wrong. 12 Q. And so that's -- that's my question, then. 13 If you think the theory is wrong, why haven't 14 you suggested any dynamic testing to prove that it's wrong? 15 A. Because I don't think we need to. We don't need to. 16 Q. And you're saying that you don't need to test that 17 theory because you think even if it's true, there's no loss of 18 control of the motorcoach? 19 MS. DORMAN: Object to form. 20 Q. (BY MR. HAYNES) Is that right? 21 A. Well, I think -- correct. And I think if you look 22 at the theory that has been put forth by the Americanos 23 engineers and you look at their test results and you look at 24 the testimony of their bus driver, Mr. Yohe, control isn't 25 lost in those tests. The vehicle is still controllable.	Page 84 1 A. Yes, sir. 2 Q. Okay. What else is -- do we have? 3 THE WITNESS: How are we doing on lunch -- 4 MS. DORMAN: It's about lunchtime. I'll see if 5 lunch is here. 6 THE WITNESS: Great. 7 MR. HAYNES: Want to try to get through this 8 one real quick before we break for lunch? Is that okay? 9 MS. DORMAN: It all depends on you guys. 10 MR. HAYNES: It's up to you. 11 THE WITNESS: Sure. We can do this one. 12 MR. HAYNES: Okay. I think it will probably go 13 pretty fast. 14 Q. (BY MR. HAYNES) The next section in your notebook 15 involves, I believe, your inspection of the bus that was used 16 for the Uvalde testing by Fugger and Yohe in January 2012? 17 A. Right. 18 Q. And that's unit 60624? 19 A. Correct. 20 Q. Okay. What disks do you have there? 21 A. These are disks that contain video and data that 22 were provided by the Americanos experts for that series of 23 tests. Yeah. I think every video or -- sorry -- every CD 24 that's in here contains either videos or raw data. 25 Q. Okay.

1 A. This is a -- a document that was provided as
2 associated with the testing as sort of the test matrix --

3 Q. Right.

4 A. -- what the results were.

5 Q. Right. I've got that.

6 Is there any -- do you have any writing on
7 here?

8 A. Yes, I do. I made some notations on what they were
9 as far as the types of tests and things that I could see. For
10 instance, if there was -- the -- the horns that were on the
11 caster latch mechanism, they were forward of the -- the plate.
12 I made a couple of notations on that where I could see that
13 and pick that out from a video of my preliminary evaluation of
14 that videotape.

15 Q. Let me go ahead and just mark that, then, because it
16 has some additional information on there. And we'll label it
17 as Exhibit 33.

18 What's next?

19 A. It's just a couple of screen captures of some of the
20 testing that was performed by the Americanos folks. This is
21 screen captures from test 13 just showing the caster latch
22 mechanism in a couple of different positions, most notably in
23 the position during braking where the caster latch mechanism
24 the horns are extended -- or hyperextended in the forward
25 direction during braking.

1 Q. We'll mark those photographs as Exhibit 34.

2 What's next?

3 A. And -- and going back to these last ones. And the
4 reason for that is that there is an important component that's
5 been removed from the undercarriage of the test bus.

6 Q. And what is that?

7 A. It's the strap. It's the strap that we were talking
8 about before. That's what allows these caster mechanism -- or
9 caster horns to rotate so far forward on the braking.

10 Q. What's the effect of the caster rotating forward in
11 the position that we see in the photos in Exhibit 34?

12 A. Well, you're going to increase the negative caster
13 angle of the tag axle assembly. And by doing that, what
14 you're going to do is you're going to end up likely to be
15 creating tire forces and tire marks on the roadway surface
16 during the testing. Things that may not even be present
17 because you've increased this caster angle to such a severe
18 angle in comparison to the case vehicle.

19 So you're maybe in a situation here where
20 you've got yourself in such a large caster angle that you now
21 are creating marks artificially on the roadway surface where
22 you wouldn't see that if that strap had been in place.

23 Q. What's next? Anything else about that?

24 A. No, sir.

25 Q. Okay. What's next?

1 A. This is just some pictures of the caster latch
2 mechanism that I had selected from photos taken by Mr. Granat,
3 Dr. Coates showing the positioning of the caster latch
4 mechanism at the time of the -- the inspection.

5 Q. Okay. We'll mark those as Exhibit 35.

6 So that's just for comparison; is that right?

7 MS. DORMAN: Object to form.

8 A. It's --

9 Q. (BY MR. HAYNES) Oh, no, no, this is -- I'm sorry.
10 Finish what you were going to say.

11 A. I was going to say I don't quite understand what
12 your question was.

13 Q. Okay. Is there anything else that the photos in
14 Exhibit 35 are significant for?

15 A. No, sir.

16 Q. Did you take any measurements or anything like that
17 when you did the inspection regarding the caster latch --

18 MS. DORMAN: Object to form.

19 Q. (BY MR. HAYNES) -- that are shown in Exhibit 35?

20 MS. DORMAN: Object to form.

21 Q. (BY MR. HAYNES) I guess I'm looking at the ones
22 here with the -- that were --

23 A. That's -- that's a photo taken by Mr. Granat.

24 Q. Okay. So that's not measurements that you took?

25 A. Right.

1 Q. These are photographs that were -- photos in
2 Exhibit 35 were taken by other experts. Some say Granat, some
3 say Coates.

4 Does that represent who took the photos?

5 A. Yes, sir.

6 Q. Okay. Okay. What's next?

7 A. Next are a series of notes that I made at the time
8 of my inspection of unit 60624.

9 Q. We'll mark those as Exhibit 37.

10 What's next?

11 A. Next is a series of photographs that I made to
12 document the -- the test -- test coach from the way I found
13 it. So I began at the exterior and then took some pictures of
14 the interior and then noted some of the markings that were on
15 the tires. And there was a -- a ram that was in the cargo
16 area and documented that as well.

17 And just sort of generally just documented
18 the -- the condition of the coach as I found it with some --
19 some equipment still on it -- or at least some measuring
20 devices were still present on it. Those were the ones that
21 were there before I got to the inspection. And just wanted to
22 record the -- the findings as I saw the test coach.

23 Q. All right. And I skipped Exhibit 36. So we're
24 going to mark these photos as Exhibit 36 or we're going to
25 have a big problem at the end of the day.

1 What is significant about the photos contained
2 in Exhibit 36 to your opinions about the Fugger and Yohe
3 Americanos Uvalde testing?

4 A. It just was sort of generally documenting the way
5 that we -- we found the -- the coach and the condition it was
6 in. It was really nothing more than that. I think the most
7 notable thing about this particular coach is the absence of
8 the strap that's on the undercarriage at the leading edge of
9 the -- the plate.

10 Q. Okay. Have we finished the white notebook?

11 A. Yes.

12 MR. HAYNES: All right. It's lunchtime.

13 MS. DORMAN: Okay.

14 (Recess from 12:10 to 12:52 p.m.)

15 (Eric Green left the proceedings.)

16 Q. (BY MR. HAYNES) All right. Now we've moved from
17 the white notebook to the red.

18 And what I'd like you to do, Mr. Rucoba, is
19 identify for us in this red notebook the documents that have
20 either been generated by Carr Engineering or sent to you since
21 your first deposition.

22 A. Okay. The first thing I did was add some larger
23 pictures of some photographs of the caster latch mechanism for
24 the subject bus. They're photos that are either taken by
25 myself or by Mr. Jones. And I've just put those and added

1 those into the book.

2 Q. Okay. We'll mark that set of photos as Exhibit 38.
3 And if you could identify for us in this set of photos
4 identified as Exhibit 38 any in particular that you believe
5 show something significant to your opinions in this case.

6 A. Again, the presence of the strap, which is important
7 that you can see it's in front of the plate. The -- the photo
8 that I selected which shows the -- the clevis in the roller on
9 the -- on the driver's side or on the left side of the vehicle
10 and you can see that there is a -- a trapezoidal ramp that is
11 missing. That's a trapezoidal ramp that actually was found
12 out at the crash site. If you look at the --

13 Q. And just -- if you don't mind, if you'll show me
14 that photograph again.

15 A. Sure.

16 Q. Was -- is there a better one of what you were
17 talking about, or is that --

18 A. That's a pretty good one. Here's another one. It's
19 a little closer -- closer view of --

20 Q. Why don't we just -- we'll call it 38B.

21 A. And then I've got another photo which shows the --
22 the clevis and the roller that's on the passenger side or on
23 the right side of the bus has slipped off of the trapezoidal
24 ramp that's welded to the bottom of the -- of the plate. And
25 that's that photo that shows that.

1 And what you can see is that there's been a
2 lateral shift in the caster latch mechanism. That's why the
3 roller has fallen off the --

4 Q. What do you think --

5 A. -- ramp.

6 Q. What do you think is responsible for the lateral
7 shift in the caster latch mechanism?

8 A. During the crash, there was some lateral movement of
9 the caster latch mechanism which shifted laterally and that's
10 what knocks this roller off of the ramp and that's likely what
11 also broke off the ramp on the other side.

12 Q. And -- but what do you think is responsible for
13 causing that lateral shift?

14 A. Well, I think that if anything, there's got to be
15 some movement that's happening likely as it's down near the
16 point where it's furrowing would be one of the locations. It
17 could be something that's happening up on the roadway, say,
18 early on where there was some movement there to the structure.
19 I just really don't know. I've got a variety of locations
20 where that could happen.

21 But the presence of the -- the -- the -- one
22 side slipping off the ramp can be explained possibly as it's
23 furrowing as it sees the loading in the dirt. The side that's
24 got the ramp broken off must happen up on the roadway because
25 that's why the ramp would be found up on the roadway.

1 Q. Can you show me that again about the -- being broken
2 off, the part on -- you think probably happened on the
3 roadway?

4 A. Yeah, that would be this part right here. This --
5 this picture that you marked as 38B, the ramp is missing. The
6 ramp that is present there on the passenger side is gone.

7 Q. Is that what you said was found at the scene?

8 A. Yes, sir.

9 Q. Where was it found?

10 A. I can show you on my diagram.

11 Q. Okay.

12 A. But it's a -- it's a -- one of the times that's
13 identified in the police -- the police measurements.

14 Q. While we're on this, can you go ahead and just show
15 me?

16 A. Yeah. I believe it's this item that's been marked
17 as -- I think it's E7. Better go look at the police photos,
18 but I believe it's E7.

19 Q. And how could we, in words, identify what that
20 location is?

21 A. On my diagram, it's approximately at the 550 foot
22 station near the white edge stripe.

23 THE REPORTER: Did you say edge --

24 A. Stripe.

25 Q. (BY MR. HAYNES) And what is your opinion about what

Page 93 1 is responsible for causing that piece to come loose and be 2 deposited on the roadway? 3 A. The only thing I could really see would be some sort 4 of lateral shifting of the -- the clevis and the roller 5 somewhere in this crash that would knock that piece off or 6 break that piece off. I had a hard time trying to visualize 7 how -- how else you could do that. 8 Q. Well, what -- what could be responsible for the 9 lateral shifting -- 10 A. I don't know -- 11 Q. -- that would knock that piece off? 12 A. I don't know what -- what would do that. 13 Q. Is there any indication in the photographs of there 14 being an impact mark in that area or anything that would be 15 consistent with knocking it loose? 16 A. Nothing that I could see. Nothing that I could see 17 conclusively. 18 Q. Do you have an opinion whether the driveshaft could 19 have impacted that area and knocked that piece loose? 20 A. I had a hard time trying to see how it could get the 21 driveshaft in there, into that spot. 22 Q. What is this mark in 38B? 23 A. Looks like some sort of a -- of a contact mark of 24 some sort, now rusted over. 25 Q. At the time of the photograph?	Page 95 1 your opinions in this case? 2 A. No. 3 Q. Okay. 4 A. Just a general understanding of how the assembly is 5 put together, what the components look like. I think those 6 were the kind of things that I learned. I think it -- it was 7 helpful from a standpoint of, say, for instance, looking at 8 this particular piece here which has got the two horns on it 9 for the -- the caster latch mechanism, it was helpful for me 10 to be able to see this to understand what kind of 11 modifications I could see were being made to this particular 12 piece in the test subject performed by the Americanos folks 13 Q. Anything else? 14 A. No. That's it. 15 Q. What's next that's new? 16 A. This is a -- a series of photos that I notated. 17 They're either pictures of the crash taken on the day of the 18 crash or photos that were taken by various Americanos folks 19 during their most recent round of testing and was just making 20 some notations about what I see in those various pictures. 21 Q. Okay. And we're going to mark this set of 22 photographs as Exhibit 40. Okay. 23 Well, I guess we need to go through them and 24 you can explain to me what's important. 25 A. Sure.
Page 94 1 A. Yes. 2 Q. Do you know who took this particular set of 3 photographs? 4 A. Yes. I did. 5 Q. Okay. That's you? 6 A. Yes, sir. 7 Q. Okay. Is that an even closer-up view? 8 A. Yes, sir. 9 Q. Okay. What's next? 10 A. Next were a series of drawings that were sent to me. 11 They were helpful in just giving me an understanding of what 12 the -- the various components look like, just getting -- that 13 help me with just grasping how the layout is between all these 14 components and -- 15 Q. These are components of the caster latch? 16 A. It's pretty much various drawings of various 17 components for the latch arm assembly itself. You have things 18 like the -- like the plate and the -- the clevis and the 19 rollers. Kind of a -- pretty much everything there. 20 Q. We're going to mark that as Exhibit 39. 21 Who sent these documents to you? 22 A. I believe I got those from Mr. Dacus. 23 Q. Okay. What's next? 24 And before we leave that, is there anything 25 that you learned from these documents that's significant to	Page 96 1 Q. Go ahead. 2 A. The first one is a -- a photo that was taken on the 3 day of the crash. And this is the first sign of physical 4 evidence as far as tire marks go. This is the one that's 5 being created by the tag axle on the passenger side. 6 What's noticeable about this one -- this 7 particular mark is that you see some ribbed striations that 8 are inside this mark, it's a locked wheel and brake mark. 9 The other thing that you see is that it's 10 clear, when you look at this -- this photo that there isn't 11 another mark associated with this one. In other words, 12 there's -- you don't see two marks, one from the passenger 13 side tag axle and one from the driver's side tag axle. This 14 is a lone mark by itself. 15 Q. Anything else? 16 A. No. 17 Q. Okay. What's next? And we'll call this 40B since 18 we're talking about them individually. 19 A. Okay. Another view of the -- the tag axle tire 20 mark. This is the -- the vehicle would be coming at you in 21 this particular photograph. And you're looking at the 22 striations, ribbed striations being made by the locked tag 23 axle tire on the passenger side. 24 Now you're starting to see some of the wavy 25 marks that you and I discussed in the first deposition. Wavy

Page 97 1 marks being made by the number two drive axle on the -- on the 2 driver's side. 3 Q. Okay. What's next? We'll mark this one as 40C. 4 A. Little bit further down the road is another photo 5 taken on the day of the crash. And it's showing the -- the 6 tag axle on the right side leaving a pronounced ribbed 7 striation like it has from the very beginning, meaning that 8 it's locked up. 9 Q. What's next? We'll mark this as 40D. 10 What does 40D show? 11 A. 40D is a photo that was taken by the Americanos 12 engineers. This is a photo of test number nine. There's a 13 couple of things that you see here are the two tire marks, 14 very pronounced, very noticeable, but it's a pair of tire 15 marks that are being made by the tag axle in their 16 demonstration. Always you see two marks being made. 17 As I indicated before in the other one, in the 18 earlier police pictures, there's only one mark being made by 19 the tag axle. What you don't see in the Americanos photos are 20 any ribbed striations either. You'll just see this -- kind of 21 a mark here where you're seeing something in the way of a wavy 22 mark, but you're not seeing any ribbed striations. 23 So there's some noticeable differences in the 24 results and the findings from the Americanos tests when you 25 compare them to the physical evidence on the -- the crash --	Page 99 1 braking system? 2 A. Correct. 3 Q. What was the specific imbalance? 4 A. There's just not -- you're not getting equal amounts 5 of braking from left to right. The imbalance on the right 6 side is what initially starts to pull her towards the right. 7 It's also the thing that she's doing is steering. So it's a 8 combination of her steering and braking that send this vehicle 9 off to the right. 10 Q. Let me show you what I've marked as marked as 40E. 11 Can you describe what's significant in this 12 photograph? 13 A. Yes. It's a -- a view of test number 12. This is 14 Americanos picture. Again, tag axle tire marks, they're in 15 pairs. Noticeable pairs. We don't see any ribbed striations 16 in this one either. So, again, it's another piece of physical 17 evidence that does not match what we see on the -- the day of 18 the crash. 19 Q. This next photograph I'm going to mark as 20 Exhibit 40F. 21 And what is significant about this photograph 22 to make you include it in Exhibit 40? 23 A. Same thing. Now we're looking at -- we're looking 24 at two tire marks. Again, this is something that it's being 25 made by the tag axles. You don't see any ribbed striations
Page 98 1 on the day of crash. 2 Q. Anything else about 40D? 3 A. I think it also is -- is illustrative of what 4 happens when you get a balanced braking system in a vehicle. 5 And I think what you'll see here in the Americanos vehicle is 6 that you've got balanced brakes, you've got brakes that are 7 functioning on both sides and you always leave tire marks with 8 both the left side and the right side, noticeable tire marks 9 with the left side and the right side, things that are not 10 being seen on the day of the crash. 11 Things that have to do with what I had talked 12 about in my first deposition, why there was an imbalanced 13 brake system in the Campos bus versus what we're seeing, for 14 example, in these pictures, in the Americanos pictures where 15 you've got balanced braking creating even marks on both sides. 16 Q. So if I'm understanding you right, you're saying 17 that at the accident scene, we're only getting marks from one 18 tag tire because there was an imbalance in the braking -- 19 brake system? 20 A. Correct. In addition to other marks. You're going 21 to see drive side tire marks -- drive -- you'll see number two 22 axle driver's side tire marks being made by the subject bus 23 and not -- you will not see those same kind of marks that 24 match up with the passenger side drive axle. 25 Q. And you think that's because of an imbalance in the	Page 100 1 present in these tire marks. So what you're looking at is 2 something, again, that's different from what we see on the day 3 of the -- of the crash. And this is photo -- a photo taken of 4 test 12. It's a little further down toward the rest of the 5 test spots. 6 Q. I'm sorry. Tell me again which tires are making the 7 marks that we see in -- 8 A. The most -- 9 Q. -- 40F. 10 A. The most pronounced are being made by the tag axle. 11 Q. On both sides? 12 A. Yes, sir. 13 Q. Are there any other tire marks visible? 14 A. Yes. You see some tire marks that are visible from 15 the drive axles on both sides. So you have a pair of tandems 16 that are light. 17 Q. Let me ask you this: The darker marks further along 18 closer to where the motorcoach has stopped, are those -- do 19 you know which tires are making those marks? 20 A. Well, certainly the ones on the right side, now you 21 can start to see three tire marks there. You start to see the 22 tag axle sort of going in between the two drive axles. 23 Q. Anything else significant about 40F? 24 A. No, sir. 25 Q. All right. The next one that you included in --

Page 101 1 cover up the tire marks. The next one you included in this 2 set of photos that we've marked as Exhibit 40 we're going to 3 label 40G. 4 Can you tell us what's significant about this 5 photograph? 6 A. Yes. This is another photo of test number 12, now a 7 little bit closer to the point of rest of the test bus. And 8 now you're starting to see a couple of things that happen 9 here. You've got the number two drive axle here on the 10 passenger side is leaving two pronounced locked wheel skid 11 marks. But they're not of a wavy nature, so you're not seeing 12 that same wavy pattern that we saw in the photos taken on the 13 day of the crash. 14 Again, you're seeing two noticeable tag axle 15 tire marks that go from beginning of the test all the way down 16 to the point of rest of the vehicle, there's a noticeable set 17 of tag axle marks that are being made. 18 MS. DORMAN: Can we go off just one second? 19 MR. HAYNES: Sure. 20 (Off the record from 1:11 to 1:12 p.m.) 21 Q. (BY MR. HAYNES) Did we finish talking about 40G -- 22 A. Yes. 23 Q. -- before we were so unceremoniously interrupted? 24 MS. DORMAN: You can say rudely. 25 A. I think we have.	Page 103 1 show you that in test number 13, the photo captures the two 2 tag axle tires creating noticeable marks. And they're 3 creating them in a wavy pattern, something that you don't see 4 on the day of the crash. And also, you don't see those ribbed 5 striations that are present that we see on the day of the 6 crash. 7 So again, it's telling you that the evidence 8 that's getting created in this test and all the other tests 9 are not reflective of what actually happened out there that 10 day. And out there that day, I mean, on the day of the crash. 11 Q. Yeah, I understood what you meant. The next 12 photograph I've marked as 40J. 13 A. Right. This is another photo of test 13. The same 14 thing. Illustrating that you've got noticeable tag axle tire 15 marks created in a pair, they're created in a wavy shape that 16 you do not see on the roadway on the day of the crash. You do 17 not see any rib striations being made in these tire marks like 18 you did on the day of the crash. 19 Q. So basically the same -- you're making the same 20 point, just with a different photograph from test 13? 21 A. Right. And also showing that it's -- this is not 22 just a -- sort of a small little snapshot in the test and that 23 I've only taken a picture from one section of the test. I 24 took three photos to show you that this is a pattern that's 25 consistent throughout all the way down to the point of rest of
Page 102 1 Q. (BY MR. HAYNES) Okay. We'll mark the next one as 2 40H. 3 What is significant about this one? 4 A. Significant about this one is this is a photo that 5 was taken by one of the Americanos engineers. This is a photo 6 of test 13. This is at the very beginning of the test. And 7 here you see, again, two clear tag axle tire marks being 8 created on the pavement. 9 Q. And this goes back to what you were saying earlier 10 about we only see one in the accident site because of the 11 imbalance in the brakes? 12 A. Exactly. 13 Q. I mean, that's the point -- 14 A. That's the point. The other point is that you 15 remember when we were looking at the accident scene 16 photographs, you saw that striation being made by the tag 17 axle. It's pretty much straight. So the tag axle isn't wavy, 18 it isn't moving around, it's lined up straight ahead and 19 that's why it's leaving ribbed striations. You don't see that 20 in these tire pictures. What you see is a wavy mark, you 21 don't see any ribbed striations. 22 Q. Anything else about 40H? 23 A. No, sir. 24 Q. Let's mark the next photo at 40I. 25 A. Same kind of a thing where I'm basically trying to	Page 104 1 the test bus. 2 Q. Is that all of Exhibit 40, or is this part of it? 3 A. That's all of them. 4 Q. Okay. All right. What's next that's new in the red 5 notebook? 6 A. Okay. I -- I read in the depositions of a couple of 7 your experts that there was some discussion about the trees 8 posing some sort of obstacle to Ms. Morado and prevented her 9 from pulling off the side of the road even in the grassy area 10 because of the presence of these trees. 11 So I went and I found the -- the crash site on 12 Google Earth and I had the roadway and I could scale off where 13 the tree line was relative to the pavement edge and it's 14 approximately 28 feet from the pavement edge to the tree line. 15 And you can see that in the photograph that you've got ample 16 amount of room. 17 So my opinion is that, yes, Ms. Morado is 18 heading off this -- towards the -- the side of the road, she 19 does have an ample amount of shoulder from which to maneuver 20 her vehicle. But in the event that she continues and goes 21 into the grassy area either fully or partially, she would 22 still be able to straighten out her vehicle, bring it to a 23 controlled stop and wouldn't have to worry about running into 24 any of these trees because they're over -- almost they're 25 28 feet off the pavement edge. Provided that she doesn't

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1 Q. (BY MR. HAYNES) And then on the last page, there's
 2 an item called tests run configurations.
 3 What is that? Do you want to look at it?
 4 A. Yeah. Oh. Yes. That is the matrix. That's the
 5 test -- the test matrix that we looked at earlier which I
 6 believe got marked because I had some handwritten notations on
 7 there.
 8 Q. The one from the Americanos --
 9 A. Yes.
 10 Q. -- Fugger, Yohe testing?
 11 A. Right.
 12 Q. Correct me if I'm wrong, but it seems like you have
 13 not performed a standard accident reconstruction in this case.
 14 A. You're wrong.
 15 Q. Okay. So is there anything that you haven't done in
 16 this case that you would normally do if you were going to
 17 reconstruct an accident?
 18 A. I think --
 19 MS. DORMAN: Object to form.
 20 A. I think I've done everything I would normally do
 21 with regard to accident reconstruction.
 22 Q. (BY MR. HAYNES) Okay. Have you suggested any
 23 additional testing to the attorneys from MCI?
 24 A. No, sir.
 25 Q. Do you see your role in this case as solely to

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1 criticize the Americanos' theories, or also to determine what
 2 caused this accident?
 3 MS. DORMAN: Object to form.
 4 A. I see my role as someone that's been asked to
 5 analyze, investigate and reconstruct this crash.
 6 Q. (BY MR. HAYNES) And as part of your reconstruction,
 7 do you see your role as helping to determine what caused this
 8 accident?
 9 A. Yes, sir.
 10 Q. Since your first deposition, have you been hired
 11 either by MCI or MCI's attorneys to work on or look at any
 12 other accidents or cases?
 13 A. No, sir.
 14 Q. What's your overall impression of the Fugger, Yohe
 15 Americanos' testing in Uvalde in January 2012?
 16 MS. DORMAN: Object to form.
 17 A. Overall, it's flawed and unscientific. And in
 18 addition, it -- it should not be presented as being
 19 representative of an MCI bus in its as-designed configuration.
 20 So not only the -- the results, but also the
 21 physical evidence that gets generated from that has been
 22 grossly skewed by the hyperextension of the caster latch
 23 mechanism in that series of tests. And it should, therefore,
 24 not be used at all because it's not been in a -- under
 25 scientific -- under the proper scientific conditions.

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1 Q. And if I'm -- tell me if I'm understanding you
 2 right.
 3 Is your criticism based primarily on -- on the
 4 issue involving the caster latch and the absence of the strap?
 5 A. Yes. Specifically that. Because that is the key
 6 theoretical component that's left with the Americanos theory.
 7 The tag axle unlatching by itself is no longer their theory.
 8 Their own expert, Mr. Yohe, has testified that
 9 driving the bus with an unlocked tag axle was just fine, he
 10 would drive it across the United States that way.
 11 So now you're down to the one key component
 12 which is you've got to have an unlocked tag axle and an
 13 unlocked caster latch mechanism. So the caster latch
 14 mechanism becomes the key point in the theory.
 15 And what they've done is gone and removed a
 16 strap which now creates a completely different configuration
 17 that's far removed from the as-designed configuration and,
 18 therefore, is now skewed and made the scientific data invalid.
 19
 20 Q. In your opinion, did Mr. Granat's testing analyze
 21 the effect of the tag tires becoming steerable on a driver's
 22 ability to control the motorcoach at highway speeds?
 23 A. Yes. Yes, I believe he did. I think we kind of
 24 discussed that in my first deposition that I felt that
 25 Mr. Granat's testing did show that.

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1 Q. During any of Mr. Granat's testing in Uvalde, did
 2 the tag tires turn to the extent that they could steer the
 3 bus -- motorcoach?
 4 A. In its as-designed configuration, that will not
 5 happen. And I think Mr. Granat showed that.
 6 Q. In light of your testimony about taking the
 7 motorcoach off the road to the right as a viable option for
 8 Ms. Morado, do you fault her for trying to keep the motorcoach
 9 on the road?
 10 MS. DORMAN: Object to form.
 11 A. Well, finding fault is kind of a legal term. That's
 12 not really what engineers do. But clearly the cause of this
 13 crash is the driver's steering and braking actions in the
 14 presence of that driveshaft failure.
 15 But the final thing is that overcorrection by
 16 Ms. Morado that ultimately puts the vehicle into a roadside
 17 slide and causes it to slide into the median and roll over.
 18 Q. (BY MR. HAYNES) Let me change the wording.
 19 Do you criticize Ms. Morado for trying to keep
 20 the motorcoach on the roadway instead of driving it off the
 21 roadway to the right?
 22 A. I --
 23 MS. DORMAN: Object to form.
 24 A. Again, I think, as I said in my first deposition, I
 25 haven't been hired to be a critic, but it's the reentry path

CAUSE NO. 2010-03-1717-C

DANIEL CAMPOS, ET AL.,) IN THE DISTRICT COURT OF
)
VS.) 197TH JUDICIAL DISTRICT
)
AMERICANOS, U.S.A.,)
L.L.C., ET AL.) CAMERON COUNTY, TEXAS

ORAL AND VIDEOTAPED DEPOSITION OF

ROBERT RUCOBA

SEPTEMBER 21, 2011

VOLUME 1

ORAL AND VIDEOTAPED DEPOSITION of ROBERT RUCOBA,
produced as a witness at the instance of the
Defendant, Americanos U.S.A., L.L.C., and duly sworn,
was taken in the above-styled and numbered cause on
the 21st of September, 2011, from 10:14 a.m. to
5:37 p.m., before Donna J. Howson, CSR in and for the
State of Texas, reported by machine shorthand, at the
offices of Hartline Dacus Barger Dreyer & Kern, LLP,
Three Riverway, Suite 650, Houston, Texas 77056,
pursuant to the Texas Rules of Civil Procedure and the
provisions stated on the record or attached hereto.

1 Mr. Hoogestraat, regarding how the tag axle works, how
2 it's put together?

3 A. Yes, but it actually began even earlier than
4 that. It actually begins with looking at the
5 photographs that were taken on the day of the crash to
6 understand what components have been displaced, what
7 components are not in their as-designed position that
8 gave me the initial understanding of something has --
9 is now out of alignment; something has failed as the
10 vehicle is laying on its side. And it's that initial
11 process that is sort of a step-by-step process that
12 ultimately led up to the review of the documents, the
13 conversations with Mr. Hoogestraat, the inspection of
14 the bus. So this -- all of those things and --
15 combined provided me with the knowledge about the tag
16 axle and its operations and the way it looked post --
17 post-crash.

18 Q. Have you been provided any information
19 regarding the Americanos testing that was done by
20 Larry Yohe at the Bosch test grounds?

21 A. Yes, I've been provided with the videotapes,
22 as I understand it, of the work that was performed by
23 Mr. Yohe. I have been provided with some of the
24 materials that were written and generated at the time
25 of those tests, and I've looked at that. That was

1 material that was attached to the deposition of, say,
2 Mr. Fugger. It's my understanding that there are
3 other depositions that are coming to me of folks that
4 participated or have knowledge about that test, such
5 Mr. Reuschling, Mr. Yohe. I intend to review those as
6 well.

7 Q. As it stands right now, do you have any
8 criticism of the testing that was performed?

9 A. Yes. Based on the information I've been
10 provided, I think there are a couple of things that
11 can be said about the tests. The first and foremost
12 is that I believe the tests are unscientific. What
13 makes them unscientific is that there has been an
14 intentional instrumentation added to the vehicle, the
15 test vehicle, which has skewed the results by
16 artificially applying forces to the tires on the tag
17 axle.

18 If the purpose was to monitor and record
19 the dynamics of the bus with an unlocked tag axle,
20 it's bad science to introduce a hydraulic device which
21 applies external forces above and beyond the normal
22 driving forces that this bus would see and applying
23 those forces in a way that renders the results
24 useless.

25 Q. So how --

1 A. The --

2 Q. -- would you have done it?

3 A. The other -- the other thing is that if you
4 look at the test data itself --

5 Q. Well --

6 A. -- that the -- the issue that comes out of
7 the data is that it's clear that even though they were
8 still turning the axle with this external device, that
9 it had no bearing on causing the bus to spin. The
10 reason that the bus spins out of control is because
11 the drive axle was locked up under the two tests where
12 you can see that the manipulation of the tag axle has
13 no bearing on causing that spin.

14 I'm sorry. I didn't mean to cut you
15 off, but those are the two main issues that one can
16 see from looking at those tests.

17 Q. I think you were saying with respect to the
18 first issue that it was unscientific to introduce an
19 artificial way to turn the tag tires to see how the
20 bus would react?

21 A. Correct.

22 Q. So my question was if you were going to try
23 to do some type of testing to evaluate the handling of
24 the bus when the tag tires are turned, how would you
25 have done it?

1 A. Well, I'm going to go back to the purpose of
2 the test as I read it in the testimony of Mr. Fugger.
3 If the purpose of the test is to monitor the dynamics
4 of the bus in the presence of a locked or unlocked tag
5 axle, then that's what you do. You simply lock or
6 unlock the tag axle. It's the introduction of
7 external instrumentation that renders this -- the test
8 useless and unscientific.

9 So to answer your question directly, if
10 that was my purpose, I would have never put on
11 external instrumentation which cause some external
12 forces to be applied to the tag axle because you're
13 now skewing the data. You're skewing your results by
14 introducing that external force.

15 Q. Let me ask --

16 A. I think a better -- I think a most
17 representative type of test program would be, say, the
18 one that was conducted by Mr. Granat where Mr. Granat
19 truly let the bus operate under the normal driving
20 conditions and let the tag axle in its unlocked state
21 react to whatever driving forces were out there on the
22 roadway surface without the addition of any external
23 instrumentation.

24 MR. HAYNES: Objection, nonresponsive.

25 Q. (BY MR. HAYNES) My -- my question,

1 Mr. Rucoba, is if you were attempting to evaluate the
2 handling of the bus if the tag tires were turned, how
3 would you have accomplished that test?

4 A. I would have accomplished it the exact same
5 way I just said. If you're trying to determine how
6 the bus handles in the presence of an unlocked tag
7 axle, which means that it would be free to turn or not
8 turn under normal roadway conditions, I would have run
9 it the way that Mr. Granat ran it. I would not have
10 added an external instrument to the bus to cause
11 external forces to be applied to the tag axle that
12 aren't present. In other words, none of these buses
13 are equipped with this added ram that applies forces
14 to the tag axle. So, therefore, an experiment that
15 does that is creating an artificial situation.

16 MR. HAYNES: Objection, nonresponsive.

17 Q. (BY MR. HAYNES) Help -- help me understand
18 this in case we're talking past one another. It's my
19 understanding that a tag axle can be unlocked, and
20 that does not necessarily mean that the tag tires are
21 going to be turned; is that true?

22 A. No, that's not true.

23 Q. Okay. Explain it to me.

24 A. If you look at the way that this tag axle is
25 designed, under low speed conditions, this tag axle is

1 allowed to turn through an angle, through various
2 angles at low speeds. That is the purpose of the tag
3 axle.

4 Q. Okay. So if the -- it's your understanding
5 that if the tag axle is unlocked that the tag tires
6 will -- will turn?

7 A. Yes, as designed under a certain speed, yes.
8 That is the intention of unlocking the tag axle to
9 allow for maneuverability. That maneuverability comes
10 in part due to the fact that you are able to let the
11 tag axle's wheels and tires attain an angle as any
12 turning -- in a turning mode.

13 Q. How is that angle controlled when the tag
14 axle is unlocked?

15 A. It's controlled through normal tire forces,
16 roadway forces, and the motion of the vehicle itself
17 turning.

18 Q. So if I'm understanding you right, you're
19 saying that the only way to evaluate the effect of
20 turned tag tires on the handling of the bus when the
21 tag axle is unlocked is just to unlock it and see what
22 happens?

23 A. Yes. If you're going to evaluate it in a
24 scientific manner to determine what effect an unlocked
25 tag axle has on the dynamics of this particular bus

1 through whatever maneuver you're going to create, that
2 would be the proper way to evaluate it in a scientific
3 fashion.

4 What makes it unscientific is when you
5 add instrumentation which applies forces which are not
6 going to be present or forces that are above and
7 beyond the normal driving conditions.

8 Q. Do you know from Mr. Granat's -- Granat's
9 testing if the -- the tag -- I understand the tag axle
10 was unlocked in his testing?

11 A. Yes. In my discussions with Mr. Granat, he
12 ran a number of tests, some of which had the tag axle
13 locked, some of which -- some of which had the tag
14 axle unlocked.

15 Q. You were not present during that testing?

16 A. I was not.

17 Q. Have you reviewed all of the documentation
18 regarding his testing?

19 A. Regarding his testing?

20 Q. Yes, sir.

21 A. No. I have only seen the test footage and
22 then had discussions with him.

23 Q. What other documentation do you understand is
24 out there?

25 A. It's my understanding that he had several

1 pieces of instrumentation affixed to the bus to record
2 the dynamics of the bus during his various tests, and
3 all of that material I have not reviewed.

4 Q. Has it been provided to you yet?

5 A. It has not been provided to me yet.

6 Q. Have you requested it?

7 A. Yes, I have.

8 Q. What's your understanding of when it's going
9 to be provided?

10 A. I don't have an idea of when I'll be getting
11 that.

12 Q. Do you know whether all of his test runs were
13 instrumented and documentation recorded?

14 A. Yes, it's my understanding that all of his
15 test runs were instrumented and recorded.

16 Q. Does that include videotaping?

17 A. Yes.

18 THE VIDEOGRAPHER: I have about two
19 minutes on tape.

20 MR. HAYNES: Okay. Go ahead.

21 THE VIDEOGRAPHER: Off the record at
22 1:10 p.m., ending Tape 2.

23 (Recess taken, 1:10 p.m. to 1:15 p.m.)

24 THE VIDEOGRAPHER: On the record at
25 1:15 p.m., beginning Tape 3.

1 Q. (BY MR. HAYNES) What is your understanding
2 of how Mr. Granat's test bus was instrumented?

3 A. I don't know if I can describe all of the
4 instrumentation that he had on there because he had
5 quite a bit, but I believe he had told me that he had
6 a steering potentiometer, a 3-axis accelerometer, a
7 GPS, a 3-axis speed sensor, a roll rate analyzer, and
8 numerous cameras either on-board or following or
9 off-board, and I think that's it in a nutshell. There
10 -- there may be more, but that's all I can recall
11 right now off the top of my head.

12 Q. Is it my -- it's my understanding from
13 hearing you talk about this that Mr. Granat tested the
14 handling of the bus both with the tag axle locked and
15 unlocked?

16 A. That is my understanding.

17 Q. How did he simulate a driveshaft failure?

18 A. Simulate a driveshaft failure? I don't
19 believe he did simulate a driveshaft failure. His
20 purpose was to simulate a dynamic condition where the
21 axle -- tag axle was locked and unlocked.

22 Q. So in his test -- testing when the tag axle
23 was unlocked, the driveshaft was -- was still working?

24 A. That is my understanding.

25 Q. It's your understanding from watching the

1 video and talking to Mr. Granat that there was no
2 difference in the handling of the test bus that he
3 drove between when the tag axle was locked or
4 unlocked?

5 A. I think there may be subtle differences
6 between the two. I think Mr. Granat can get into
7 those subtle differences. On a global sense, I can
8 tell you that Mr. Granat -- Mr. Granat's findings were
9 that even under aggressive conditions the unlocked tag
10 axle and the maneuverability of the bus under those
11 conditions was such that it was controllable; it was
12 something that a driver would be able to drive through
13 various type of maneuvers and would be able to bring
14 the bus safely to a stop even in the conditions where
15 the tag axle was unlocked.

16 Q. Did you find out from Mr. Granat when the tag
17 axle was unlocked, the degree of movement of the tag
18 tires in any of his test runs?

19 A. I did not go into that level of specifics
20 with him. I think that would be a question more
21 appropriate for him.

22 Q. Have you done anything to date other than
23 watching the video and talking to Mr. Granat, have you
24 done anything to validate his testing?

25 A. No, sir.

1 Q. Would it be fair to say that you really
2 couldn't validate his testing until you've had a
3 chance to at least look at the data --

4 A. Sure.

5 Q. -- produced from his testing?

6 A. Sure, I'd like to see that.

7 Q. Did you and he discuss any problems with the
8 tires?

9 A. I am sorry. I don't understand what you
10 mean.

11 Q. It's my understanding that there was a right
12 rear tag axle tire that was changed either before,
13 during, or after the testing. Do you know anything
14 about that?

15 A. I saw that. I think that was in Mr. Fugger's
16 deposition. I have not gone into any discussions with
17 Mr. Granat about the -- about the tag axle tire and
18 what happened to it during this test or after the
19 test.

20 Q. He didn't bring it up and you didn't know
21 about it; so, you didn't ask him about it?

22 A. Right, I didn't go into that level of detail.

23 Q. Did Mr. Granat tell you that all of his test
24 runs were videotaped and instrumented and recorded?

25 A. Yes, I think that he did mention that

1 everything that he had done has been recorded, but,
2 again, that's a good question to ask Mr. Granat, not
3 me.

4 Q. What did you recommend to Mr. Granat about
5 the testing when you talked to him before it happened?

6 A. I didn't make any recommendations with regard
7 to the testing. I merely provided him with an
8 understanding of my reconstruction.

9 Q. How do you characterize Ms. Morado's braking
10 in this accident?

11 MS. DORMAN: Object to form.

12 A. It appears that, at least at the point where
13 physical evidence is being created, that she has
14 applied the brakes to the point where some or all of
15 the tires are creating brake marks. At some point in
16 time, it's clear that she must be letting off the
17 brakes because she's put the vehicle into a
18 counterclockwise slide. In order to do that, she has
19 to have released the brakes at some point in time.

20 Now, prior to the first sign of physical
21 evidence, it's my -- my opinion that Ms. Morado must
22 be applying both steering and braking based on her
23 testimony and based on the trajectory of the bus that
24 I see at the first sign of physical evidence.

25 MR. HAYNES: I think we are going to

1 Q. May I see it? Which is the mark that's
2 alleged to have some waviness in it?
3 A. Sure, I'll get you that.
4 Q. Okay.
5 A. Here's a photo. The marks that -- that
6 people have been talking about when they were talking
7 about these wavy marks are the marks that are being
8 made by the tandem on the driver's side. Here's a
9 good picture that illustrates that. I think here you
10 can see the two dark tire marks running parallel to
11 each other.
12 Q. Let me mark this as Exhibit --
13 A. Sure.
14 Q. -- 25.
15 A. Right.
16 (Exhibit Number 25 was marked.)
17 A. First off, do you see the two black tire
18 marks that are running parallel to each other?
19 Q. (BY MR. HAYNES) Sure.
20 A. Okay, good. Now, if you look at those tire
21 marks, do you see how the tire marks themselves are
22 making a kind of an "S" pattern going side to side?
23 Do you see that?
24 Q. Yeah, that's very visible.
25 A. Okay, great. Now, do you also see in those

1 tire marks that not only are they going side to side,
2 but they're going side to side at the same time? In
3 other words, they're running in sequence with each
4 other side by side. When one goes to the right, the
5 other goes to the right. When one goes to the left,
6 the other goes to the left.
7 Q. Right.
8 A. Do you see that?
9 Q. Yes.
10 A. Okay. That tells you that you've got to have
11 two tires that are simultaneously seeing the same
12 force at the same moment. There's only two tires that
13 can possibly do that. That has to be the tandem on
14 the driver's side.
15 Okay. I'm going to take you one step
16 further. If you look at those marks and you see how
17 those marks are going side to side, if you look
18 closely in those two marks, you should see some lines,
19 some striation lines that all go to the left, go to
20 the right in each individual tire mark.
21 Q. What does that mean to you?
22 A. Those are locked wheel striations.
23 Q. Why are they wavy like that?
24 A. They're wavy like that because it's a tandem
25 axle, and it's a tandem axle with the driveshaft still

1 connected to the differential which is attached to the
2 tandem axle. So the reason it's making the wavy marks
3 is that those tires are locked and at the same time
4 the driveshaft is rotating and creating this
5 oscillation effect on the tire marks.
6 Q. Before this accident, had -- had you ever
7 seen that?
8 A. No, I've never seen marks like that. They're
9 highly unusual.
10 Q. Have -- have you ever -- have you done any
11 testing or reviewed anyone else's testing to show that
12 that's the kind of mark that would be created by the
13 driveshaft being only connected at the differential
14 end?
15 A. I did a literature search on driveshaft
16 failures to see what was available in the public
17 domain, and there is nothing out there.
18 Q. Okay. We kind of got off track here. I
19 think the last one we specifically numbered was the
20 inboard tandem which was shown in Exhibit 22, correct?
21 A. Yes, sir.
22 Q. Then what's the fourth tire mark? Let me
23 give you these, back to you.
24 MR. HAYNES: We need to start rolling up
25 here on the left.

1 MS. DORMAN: Okay. Do you want to leave
2 the first bus out or --
3 MR. HAYNES: No, we can --
4 MS. DORMAN: Okay.
5 MR. HAYNES: I just want to start
6 catching up to where we are now.
7 MS. DORMAN: Okay.
8 THE VIDEOGRAPHER: I've got about four
9 minutes left on tape.
10 MR. HAYNES: Okay. I guess change it
11 while he's looking.
12 THE VIDEOGRAPHER: Off the record at
13 2:14 p.m., ending Tape 3.
14 (Recess taken, 2:14 p.m. to 2:24 p.m.)
15 THE VIDEOGRAPHER: On the record at
16 2:24 p.m., beginning Tape 4.
17 Q. (BY MR. HAYNES) Mr. Rucoba, earlier I was
18 asking you, we were discussing the -- the Bosch
19 testing and Mr. Granat's testing. I want to -- I was
20 trying to ask you about how you would scientifically
21 go about evaluating the handling of the bus if the tag
22 axle tires were turned. I think what I understood you
23 to say was that you would simply lock or unlock the
24 tag axle and drive the bus --
25 A. Sure.

1 Q. -- or the motor coach?

2 A. Yes.

3 Q. Is that right?

4 A. If -- yes. If your evaluation is going to be

5 evaluating the bus under normal roadway conditions,

6 yes, that's what I would do.

7 Q. I think you know this, that Americanos'

8 theory in the case is that the -- the driveshaft came

9 loose on the transmission end, that the tag axle

10 became unlocked; the tire rod was bent and forced the

11 tag axle into the tag tire and turned it.

12 Now, whether you agree that's what

13 happened or not, how would you test scientifically the

14 handling of the motor coach? How would you evaluate

15 that with the tag tires turned, assuming that's what

16 happened?

17 A. Well, I think first off you've got to go back

18 and evaluate what the bus does under normal conditions

19 with and without the tag axle unlocked. I think you

20 need a baseline, and you need to evaluate that in the

21 fashion that Mr. Granat tested the vehicle because

22 only then do you get an understanding of just what

23 this bus does outside of any kind of external

24 influences such as adding rams to the bus and

25 deflecting it.

1 Q. That would then give you your baseline?

2 A. That would give you your baseline. That

3 would certainly tell you what this thing can do, what

4 this axle can do under normal or even excessive

5 handling maneuvers and at least give you a baseline

6 for that. Now --

7 Q. How would you take the next step, though, and

8 test the handling or evaluate the handling of the bus

9 when the -- assuming that the tag tires were turned?

10 A. Well, I think you've got to go back and then

11 look at the physical evidence that's on the tag axle

12 and make sure that you've got a theory that agrees

13 with the physical evidence. That would be the next

14 step. Then I think you've got to take it to a level

15 at least that puts in reasonable amounts of steer that

16 are going to evaluate what this axle does relative to

17 your baseline.

18 I don't think that when you break off of

19 a steering stop or a wheel stop and you attach a chain

20 to the axle and artificially start introducing angles

21 and design changes to the bus that are of the extreme

22 level that the Americanos testing followed, now you're

23 getting outside of the realm of anything scientific or

24 out of the realm of anything that has to do with this

25 kind of a crash and the handling capability of this

1 bus under those conditions.

2 MR. HAYNES: Objection, nonresponsive.

3 Q. (BY MR. HAYNES) I'm not really asking for

4 the criticism you have of the Americanos test at this

5 point. What I'm asking is if you were given the task

6 of evaluating the handling of the bus with the tag

7 tires turned, how would you go about scientifically

8 testing that?

9 A. I can't answer the question any other way

10 than I've just answered it.

11 Q. You haven't told me anything about how you

12 would do anything other than the baseline testing.

13 A. Well, I think that's where you start, but I

14 don't think that you --

15 Q. I understand that's where you start. I'm

16 asking you --

17 MS. DORMAN: Please let him finish.

18 A. But again, I think that getting to that

19 level, I think, gives you a baseline for understanding

20 just what levels you can take this to.

21 Q. (BY MR. HAYNES) Okay. Do you --

22 A. Now --

23 Q. Go ahead.

24 A. Now, when you take it to the level that the

25 Americanos testing did, I think you're getting outside

1 of the realm of science.

2 Q. What I'm asking you is whether you have --

3 you would have any recommendations for any testing to

4 evaluate the handling of the bus with the tag tires

5 turned beyond the baseline testing you've described.

6 A. No. I think if you're going to test it under

7 real world conditions, I think that's the way you

8 would test it, in the baseline condition.

9 Q. Okay. We are going to go back to where we

10 were when we took a break about you were going to

11 identify Tire Mark Number 4.

12 A. Right. That's, I think, a photo that --

13 we'll start with that and --

14 Q. Okay. We'll mark this as Exhibit 26.

15 (Exhibit Number 26 was marked.)

16 Q. (BY MR. HAYNES) And which is Tire Mark 4 --

17 A. Tire --

18 Q. -- in Exhibit 26?

19 A. Tire Mark Number 4 is the tire mark that is

20 coming into view in the upper portion of the photo

21 right about near the tip of my finger. It's the tire

22 mark that is closest to the center line of the

23 roadway.

24 Q. What tire mark is making that mark?

25 A. That's going to be the outer tandem.

1 as y'all think she did. That what sent the vehicle
2 into the counterclockwise rotation was the unlocked
3 tag axle turning the tag tires.

4 A. Uh-huh.

5 Q. If Americanos' theory is correct, would you
6 still be saying that Ms. Morado caused the accident?

7 MS. DORMAN: Object to form.

8 A. Well --

9 Q. (BY MR. HAYNES) Ms. -- Ms. Morado's driving
10 or improper driving caused the accident?

11 MS. DORMAN: Object to form.

12 A. Sure. I think that there's still other
13 choices that are available to her. I mean, she could
14 just apply the brakes and not put any steering in
15 whatsoever and just let her vehicle go off onto the
16 shoulder. She doesn't have to do any steering
17 whatsoever.

18 Let's go back to the theory of
19 Americanos. And first off, I think you'd have to
20 support that theory with science. Right now there
21 isn't any that's out there that I've seen. So if
22 we're talking in terms of a hypothetical, it's -- it's
23 an unsupported hypothetical right now. I don't know
24 of any science that's been provided that supports it.
25 But I'm just trying to answer your question that there

1 are still other options available to her.

2 Q. (BY MR. HAYNES) And it's a hypothetical.
3 Okay. I'm not trying to say that it's not.

4 A. I appreciate that.

5 Q. I'm asking you a hypothetical question, and
6 I'm saying that if you assume for the purpose of
7 argument that Americanos' theory is correct about what
8 caused this counterclockwise rotation, you would not
9 still be criticizing Ms. Morado as having caused this
10 accident, right?

11 MS. DORMAN: Object to form.

12 A. I think you'd have to evaluate that
13 hypothetical with more science. I can't answer that
14 hypothetical without having more scientific data.

15 Q. (BY MR. HAYNES) I'm not asking you to agree
16 with it because I know you're never going to do that.
17 I'm just asking you that if it's right, then she
18 didn't cause this accident, her driving didn't cause
19 this accident?

20 MR. HILL: Object to form.

21 A. Again, I don't know any other way I can
22 answer your question. I would need more data to be
23 able to answer that.

24 Q. (BY MR. HAYNES) And what I hear you saying
25 is you don't want to answer that hypothetical without

1 the data backing it up?

2 A. Sure. I think that would be a good thing for
3 an expert.

4 Q. Okay. So unless you see evidence that the
5 broken driveshaft caused the tag axle to unlock and
6 turn those tag tires and -- and make the vehicle go
7 into this counterclockwise rotation, then you believe
8 the sole cause of the accident was driver error?

9 A. Again, if we're going to talk about in terms
10 of a hypothetical, let's support it with some science.
11 Right now there hasn't been any, but I can tell you
12 that even if there is that out there, there is an
13 option that's available to her that has nothing to do
14 with steering. She has the ability to steer this
15 vehicle off the right side of the road just like we've
16 talked about, and if this vehicle is traveling
17 straight, once she turns it straight, all she has to
18 do is just apply the brakes and keep the steering
19 wheel straight; she has enough room to be able to get
20 herself out of trouble.

21 Q. So you're saying that even if Americanos'
22 theory in the end proves to be scientifically correct
23 and accurate, then Ms. Morado's driver error still
24 caused the accident?

25 A. Because there are other options available to

1 her. Had she chose them, she would have been able to
2 get herself out of trouble.

3 Q. So when she drove over onto the right
4 shoulder and let -- let her foot off the brake, you're
5 saying just the fact of turning the wheel to the left
6 to straighten out the motor coach on the shoulder was
7 enough driver error to cause this accident?

8 MS. DORMAN: Object to form.

9 A. No. If we're -- we're talking back into --
10 into the realm of this particular crash, no, that's
11 not what she does. What she does is she aggressively
12 steers this vehicle to the left, hard enough to put
13 this vehicle into a slide.

14 Q. (BY MR. HAYNES) Right.

15 A. But the --

16 Q. And I'm asking you to assume she didn't do
17 that, that she didn't turn the wheel aggressively
18 enough to the left to put the vehicle into a slide.
19 I'm asking you to assume that in some distant future
20 Americanos scientifically proves that the
21 counterclockwise rotation to the left was not caused
22 by driver input.

23 MS. DORMAN: Object to form.

24 Q. (BY MR. HAYNES) Are you -- are you with me?

25 A. I believe I am.

1 Q. Okay.
 2 A. Yes, sir.
 3 Q. Under those conditions where that was
 4 scientifically proven, then you would not blame this
 5 accident on driver error. Would that be fair?
 6 A. I'd like to see the data in order to answer
 7 that question.
 8 Q. Without seeing the data, you can't answer the
 9 question?
 10 A. No, sir.
 11 Q. Just out of curiosity, if you were driving a
 12 motor coach down the highway at 69 -- 67 to 69 miles
 13 an hour and you wanted to bring it to a stop as
 14 quickly as possible, how long and how far would it
 15 take you?
 16 MS. DORMAN: Object to form.
 17 A. I guess it depends on -- on what kind of
 18 deceleration you're going to be applying. Are you
 19 talking about panic braking? Are you talking about
 20 just normal deceleration, gradual type braking? I'm
 21 not --
 22 Q. (BY MR. HAYNES) Both. Give me both
 23 alternatives.
 24 A. Well, let me -- let me write it out and I can
 25 tell you.

1 Q. You've got to do something like that or it's
 2 not a real accident reconstruction deposition if
 3 nobody asked you to do that.
 4 A. Okay. What was -- what was our -- I'm sorry.
 5 What was your initial velocity?
 6 Q. Let's say 69 miles per hour. We're going to
 7 do normal braking to a stop and hard braking to a
 8 stop.
 9 MS. DORMAN: With this coach?
 10 Q. (BY MR. HAYNES) With this motor coach. Are
 11 you ready?
 12 A. I was going to wait for Melissa.
 13 Q. Okay.
 14 A. Okay. For what I would consider normal
 15 deceleration rate from 69 miles per hour, it would
 16 take you approximately 794 feet to decelerate from
 17 69 miles per hour under what I would consider to be
 18 more panic braking. You're going to be stopping at
 19 approximately 345 feet.
 20 Q. So what -- what do you classify or how do you
 21 characterize panic braking?
 22 A. I used the middle of my range for dry
 23 deceleration rates in my calculations. I used
 24 0.46 g's.
 25 Q. Well, to a layperson, how would you describe

1 panic braking?
 2 A. To the point where you're going to be locking
 3 up wheels.
 4 Q. In that case you could bring the motor coach
 5 to a stop in about 345 feet from 69 miles per hour?
 6 A. Approximately.
 7 Q. Right. On the diagram here as the motor
 8 coach is kind of below the line with Number 17 as the
 9 motor coach is going onto the shoulder, it's look --
 10 it looks like if it's at an angle that if it continued
 11 in that same path would take it off the road to the
 12 right; is that accurate?
 13 A. Actually, no. There is a vehicle shape right
 14 here in the middle that is essentially parallel to the
 15 roadway. There's -- there's a vehicle shape here
 16 which is angled off the road. There's a vehicle shape
 17 here which is angled back onto the road. Then there's
 18 actually one more vehicle shape which is positioned
 19 right here --
 20 Q. Right. I'm talking about --
 21 A. -- that's parallel.
 22 Q. -- the -- the first one.
 23 A. Oh, yes.
 24 Q. Okay. At that angle, if that same path
 25 continued to be followed, would it be accurate to say

1 that it would take the vehicle off the road to the
 2 right?
 3 A. Sure, if you didn't change the tra -- the
 4 trajectory, yes.
 5 Q. So as she was exiting the road at the angle
 6 shown under Line 17, you don't disagree that she
 7 needed to straighten the wheel -- straighten out the
 8 vehicle by turning the wheel somewhat to the left.
 9 You're just -- I hate to use the word. You're -- but
 10 you're critical of what you consider the oversteer
 11 that put the vehicle into a counterclockwise rotation?
 12 A. Let's not confuse oversteer because oversteer
 13 is a real specific vehicle dynamic term. It's an
 14 overcorrection, and, yes, she has to put in some left
 15 steer.
 16 Q. We both agree that she needed to put in some
 17 left steer as she was coming off onto the shoulder to
 18 straighten it out and not go off the road but not an
 19 aggressive -- we both agree that she shouldn't have
 20 put in an aggressive left steer that would have put
 21 the vehicle into a counterclockwise rotation, if
 22 that's what happened?
 23 A. If that's what happened? That is what
 24 happened, but, yes, it is --
 25 Q. I understand that's your opinion.

1 become displaced? The reason it becomes displaced is
 2 it has a force applied to it that is both lateral as
 3 well as from rear to front. The only time you can
 4 ever generate a large enough force in the correct
 5 orientation is when the vehicle is furrowing with its
 6 axles in that final spinning process and rolling
 7 process.

8 MS. DORMAN: Those are your exhibits.

9 MR. HAYNES: Thank you.

10 MS. DORMAN: Sure.

11 Q. (BY MR. HAYNES) So if I'm understanding you
 12 right, you are saying that the tie rod was bent by the
 13 furrowing in the ground as opposed to being struck by
 14 the -- the driveshaft after it came loose from the
 15 transmission end?

16 A. No. What I'm saying is that the tie rod is
 17 indirectly loaded. It's loaded through the wheel on
 18 the right side. Those forces are large because they
 19 have to be lateral forces and forces that come from
 20 rear to front in order to displace the tie rod in the
 21 fashion that is -- that it is at its point in rest.
 22 The only time you can get large enough forces like
 23 that in that direction is when the bus is rolling and
 24 sliding and furrowing in dirt, particularly when it's
 25 on its side and its rear end is leading.

1 Q. Right. So when you say the only time you
 2 could get the forces necessary to bend that tie rod
 3 would be in the furrowing of the bus in the ground,
 4 that means you're ruling out that it could have been
 5 caused by the loose driveshaft striking it?

6 A. Correct.

7 Q. I just want to make sure we're on the same
 8 page about what you believe and don't believe.

9 Do you believe that it's scientifically
 10 possible for the fractured driveshaft that's loose at
 11 the transmission end to bend the tie rod?

12 A. Not without leaving some physical evidence.

13 Q. Your examination of the bus did not reveal
 14 any physical evidence indicative of the tie rod having
 15 been struck by the driveshaft?

16 A. Correct.

17 Q. Any other criticisms of Mr. Fugger's
 18 reconstruction analysis?

19 A. Yes, I disagreed with Mr. Fugger in that I
 20 could tell you that when you look at those tire marks
 21 that are being made by tandems on the left side,
 22 particularly where they are in a wavy pattern,
 23 oscillating in a wavy pattern, that those are
 24 striations that are being created in the tire mark. I
 25 believe Mr. Fugger is of the opinion that those are

1 not striations.

2 Q. Anything else?

3 A. Yes, I -- I would rely upon the work that was
 4 done by -- by Mr. Granat in response to a question
 5 that was posed to Mr. Fugger on Page 262 of his
 6 deposition. The question was, "Generally, if a coach
 7 is going down the road and the steerable tag axle
 8 becomes unlocked, those wheels -- those tag wheels
 9 will continue to caster right behind the drive wheels,
 10 correct?"

11 That answer was, "That's correct.

12 Unless there is a perturbation that can get -- to get
 13 that to start --"

14 And I think that the testing that was
 15 done by Mr. Granat when you study the testing that was
 16 done by Mr. Granat, I think it's a clear indication
 17 that that opinion is -- is wrong.

18 Q. I wasn't sure from what you read what opinion
 19 you're referring to.

20 A. The -- the answer that the tag wheels
 21 themselves are going to start to turn one way or the
 22 other due to some perturbation in the roadway. I think
 23 when you look at the testing done by Mr. Granat, I
 24 think that that refutes that opinion pretty clearly.

25 Q. That's based on your review of his video?

1 A. Yes, and my discussions with Mr. Granat.

2 I think in general that's it. And I
 3 know we also pre -- previously touched on the test run
 4 that was provided by your experts or the log of the
 5 test runs that were provided by your experts. I had
 6 made some notations on that, but I'd already talked
 7 about that, that the reason the bus is going out of
 8 control and sliding out when you look at the testing
 9 is that it's a fact that the drive axle was locking
 10 up. That's why the vehicle goes into a spin.

11 Q. Okay.

12 A. It's got nothing to do with the tag axle
 13 being forcibly steered over.

14 Q. Yeah, we discussed that earlier. I'm not
 15 sure I've seen that document with your notes on it.
 16 May I see that?

17 A. Sure.

18 (Exhibit Number 33 was marked.)

19 Q. (BY MR. HAYNES) I'm going to go ahead and
 20 mark this as Exhibit 33, and can you read for me your
 21 notations for each test run?

22 A. Yes.

23 Q. Read that into the record.

24 A. It says Number 1 or Test Run Number 1, "no
 25 test footage."

1 Test Run Number 2, "no slide out."
 2 Q. What does that mean?
 3 A. Meaning that the bus does not slide out. It
 4 just tracks and comes to a stop.
 5 Test Run Number 3, "drive axle locked
 6 up, spin."
 7 Q. What are you attempting to say there?
 8 A. What I'm saying is that in this test, the
 9 drive axle wheels locked up and the vehicle went into
 10 a spin.
 11 Number -- Test Run Number 4, "no slide
 12 out."
 13 Test Run Number 5, "drive axle locked
 14 up, spin."
 15 MR. BULLION: Hello.
 16 A. Test -- Test Run Number 6, "no slide out."
 17 Test Run Number 7, there is no video.
 18 So, I have no comments.
 19 Test Run Number 8, "no slide out."
 20 Test Run Number 9, "no slide out."
 21 Q. (BY MR. HAYNES) Okay. And I think there was
 22 a diagram or something under this.
 23 A. Yes, this is --
 24 Q. What is that?
 25 A. -- Brian Lawson's notes. They were provided

1 by Mr. Fugger.
 2 Q. What expertise do you have in identifying
 3 whether tire marks on a roadway are from locked tires?
 4 A. Are we done talking about Mr. Fugger's
 5 things?
 6 Q. Did you have something else?
 7 A. I did. I did, one more thing.
 8 Q. Well, thanks for --
 9 A. Sure.
 10 Q. -- pointing that out.
 11 A. Sure, no problem.
 12 Q. Tell me what it is.
 13 A. When you look at the material that was
 14 provided by Mr. Fugger, there were a number of
 15 simulations that were outputs of his HVE program.
 16 There is one simulation where the bus rolls over and
 17 slides out to a stop. I've gone through all of the
 18 HVE simulations that Mr. Fugger provided and that
 19 simulation, the input and the output parameters and
 20 the computer simulation run itself that is associated
 21 with that animation are not in his file materials.
 22 It's labeled as Animation Number 4 or, I'm sorry,
 23 Accident View 4, and there is no computer simulation
 24 that -- that follows and re-creates that motion that
 25 is seen in that animation file.

1 What Mr. Fugger had said in his
 2 deposition was he said if you take the animation that
 3 he created, which was called Simon Texas, and you ran
 4 that and you turned on the dimesh feature -- dimesh is
 5 a option that is in the HVE program -- that the bus
 6 would roll over. Well, I did that. And when I turned
 7 on the dimesh that, the bus does not roll over. It
 8 just slides out on its wheels. So I am missing the
 9 simulation that shows the bus falling onto its side
 10 and sliding and spinning out to a stop.
 11 Q. Anything else?
 12 A. No, I think that's -- that's it.
 13 Q. What expertise do you have in identifying
 14 whether tire marks on a roadway are from locked tires?
 15 A. Well, there's a lot of areas of expertise
 16 that I have -- bring to bear in that -- in that area.
 17 Number one --
 18 Q. Let me just kind of try to go by area, and
 19 then you tell me within the different areas. Any
 20 education about that?
 21 A. Sure. I've gone and taken a couple of
 22 different courses that have to do with accident
 23 reconstruction, but most notably, one of them is put
 24 on by Northwest Traffic Institute. It's a computer --
 25 I'm sorry. It's a reconstruction class that has to do

1 with basic and accident reconstruction and
 2 investigation. It's sort of a foundational class.
 3 It's nationwide, well known. It's one of the ones
 4 where you get the initial examples of various types of
 5 skid marks and tire marks that are made on roadway
 6 surfaces.
 7 Secondly, there are a number of
 8 different accident reconstruction periodicals and
 9 treatises that are out there that have to do with the
 10 creation of tire marks under various conditions. Carr
 11 Engineering maintains a library of all of those type
 12 of documents. I have reviewed everything on accident
 13 reconstruction in the Carr Engineering library, and I
 14 stay abreast on that by staying in touch with the
 15 accident reconstruction articles that come out on a
 16 yearly basis from the Society of Automotive
 17 Engineers.
 18 Then lastly, I've performed numerous
 19 types of braking tests and turning tests or steering
 20 tests and a variety of vehicle dynamics type tests
 21 which basically show what kind of tire marks are
 22 created under various types of handling conditions, be
 23 they braking marks, be they acceleration marks, be
 24 they yaw marks, be they a combination thereof. Over
 25 the years having done that kind of testing with a

CARR ENGINEERING, INC.
12500 Castlebridge Drive
Houston, Texas 77065-4532
Telephone: 281/894-8955
Fax: 281/894-5455

August 11, 2011

Mr. John Dacus
Hartline Dacus Barger Dreyer LLP
6688 North Central Expressway
Suite 1000
Dallas, TX 75206

Re: Campos v. Americanos, U.S.A. L.L.C. et. al.

Dear Mr. Dacus:

Per your request, I have investigated the events leading up to the referenced bus crash. As part of that investigation, the attached list of materials has been analyzed.

Work Summary

Several tasks were performed in order to reach the opinions and conclusions presented in this report. The following is a brief summary of those tasks:

- Conduct a vehicle inspection of the incident bus
- Conduct a site inspection and site survey
- Construct a detailed accident reconstruction, including vehicle speeds and vehicle motion
- Conduct a vehicle inspection of an exemplar bus

Based on the investigation to date, the following opinions and conclusions have been reached:

1. The crash occurred on March 16, 2010, as a 1995 MCI/Americanos USA Model 102DL3 bus was driving southbound on Interstate Highway 37 (IH-37) in Atascosa County, Texas. 45 passengers were onboard. In the area of the crash, IH-37 is a four lane paved asphalt roadway with improved, paved shoulders. The northbound and southbound lanes are divided by a grassy median. The posted speed limit is 70 miles per hour. The police report indicates that at the time of the crash the roadway surface was "wet" and the weather conditions were "cloudy".

2. According to the police information, the bus was in the right hand lane when the “the driver heard a loud noise from underneath the vehicle when a U-Joint broke from the driveshaft. (Bus) driver reacted, locked up the brakes, and skidded onto the improved shoulder. (Bus) driver overcorrected left and sent (bus) into a side skid across the (southbound) lanes into the center median”. The bus slid into the median, passenger’s side leading. The bus’s tires furrowed into the earth and the bus rolled onto its passenger side. The bus continued sliding rear end leading and spinning in the counterclockwise direction while on its passenger side. The bus came to rest on its passenger side in the median with its front end pointing towards the northwest. During the crash, two occupants were fatally injured.
3. The scene evidence shows that the bus was being continuously steered and braked in a right turn for approximately 300 feet until it exited the right lane and entered the paved shoulder. The driver then abruptly steered the bus to the left causing the bus to exit the paved shoulder, slide across the two southbound travel lanes and enter the median. The bus slid on the pavement in a left turn for approximately 208 feet. The bus then furrowed in the grass median for approximately 44 feet and then began to overturn. The bus rolled/slid on its passenger side for approximately 61 feet before coming to rest.
4. The first physical evidence located by the police was pieces of metal from the bus’s driveshaft universal joint. The first piece of metal was located approximately 230 feet north of the start of first tire mark. Based on my analysis and investigation, I have concluded that the universal joint that connects the driveshaft to the transmission failed first and the pieces of metal found at the crash scene were from that universal joint. After the driveshaft became disconnected at the transmission, the undercarriage damage and tire markings indicate that it continued to rotate while still connected to the differential on the #2 axle. The driveshaft remained connected to the #2 axle differential while the bus was still moving on the pavement throughout the right turn. The driveshaft/differential universal joint subsequently failed fully freeing the driveshaft from all connections. Based on my exemplar bus inspection, physical limitations in the undercarriage prevent the driveshaft from being ejected out from under the bus while the bus remained upright on all tires. Once the bus rolls significantly onto its passenger’s side tires, the driveshaft is able to slide out from its undercarriage constraints and get ejected from the bus. This explains why the driveshaft was found in the median south of the bus point of rest and not left behind on the pavement.
5. The first tire mark was a braking mark which began in the right hand southbound lane and it was determined to be from the passenger side tag axle (#3) tire. Approximately 78 feet further south a second tire mark began. This tire mark was a braking mark created by the right front tire. Approximately 34 feet further south a third braking tire mark began and it was determined to be from the driver side inboard tandem drive axle (#2). Lastly, at approximately 55 feet further south a fourth braking tire mark began and it was determined to be from the driver side drive axle (#2) tire. An analysis was performed on the tire marks created by the bus while it was in a right turn. The two skid marks made by the #2 axle have an unusual “wavy” appearance. Nothing on the roadway surface could have caused or contributed to the tire mark appearance. The “waviness” of the #2 drive axle tire marks is more consistent with the rotating driveshaft – unconnected at the transmission but still connected at the #2 axle differential - causing an oscillation in the #2 axle

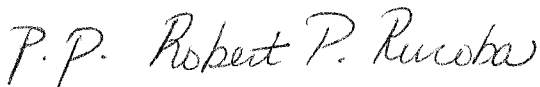
6. The bus was inspected by the police for mechanical problems that could have caused or contributed to the crash. Officer Hughey testified in his deposition that the steering linkage was found intact and functional. I also found the steering linkage to be intact. The vehicle's path confirms that the bus's steering system was working properly and responding to the driver's inputs. The police inspected the bus brake system and found "brake drums on axle 2 and 3 left side had rust on drum, linings were not making contact with brake drum although there is push rod movement it doesn't appear that the linings are making contact with the brake drum." In the early phases of the crash when the bus was traveling straight and in a right turn, the driver applied a hard brake application to the point of creating locked wheel skid marks. The fact that some tires locked and others did not on the same axle indicates that there was some brake imbalance. The bus was able to be steered to the right because the driver's brake application only locked up the right front tire but not the left front tire.
7. The cause of the crash was due to driver error combined with an improperly maintained bus. The precipitating event was the failure of the transmission/driveshaft universal joint. My discussions with other defense experts in this matter indicate that the universal joint failed due to improper maintenance and was not caused by improper design. The bus driver responded to the driveshaft universal joint failure by steering and braking her vehicle into a right turn. The fact that the initial locked wheel marks were being made by right side tires only would have contributed to forces directing the bus to the right. After the driver steered her vehicle onto the paved shoulder she overcorrected back to the left. The reentry path confirms that driver steered her vehicle abruptly rather than remaining in the shoulder and slowing her vehicle down in a controlled manner. There were no obstacles or obstructions which would have prevented the driver from staying on the paved shoulder and stopping her vehicle.
8. The cause of the crash was not due to an unlocked tag (#3) axle. I have reviewed the reports by plaintiff's and Americanos, Inc. representatives. Americanos' representatives have attributed the cause of the crash to the failure of the driveshaft universal joint followed by an impact between the rotating driveshaft and the tag axle locking plate. Allegedly, that impact caused the tag axle to unlock. For example, Americanos expert Aaron Jones opines that "the deformation on the clamping plates is consistent with the rotational direction of the driveshaft when the bus is moving forward. This damage generated by the driveshaft resulted in opening of the clamping plates near the locking pin." In my inspection of an exemplar bus, I found it impossible to replicate the contact mark between the driveshaft and the locking plates when the transmission joint was disconnected. I found it possible for the driveshaft to contact the locking plates when both the transmission and differential u-joints are disconnected, however; the motion required to move the driveshaft into the contact zone did not agree with the laws of physics or the physical evidence. To date, no clear evidence has been produced that shows the impact mark on the locking plate while the bus was on its side at the point of rest.

In Thomas Fugger's report he opined that the tag axle unlocked "at some point prior to or during the movement toward the right." Fugger also stated that "if the tag axle became unlocked during the movement to the right this would precipitate the counterclockwise yaw condition that the motorcoach went into in the subject accident." Americanos representative Lawrence Yohe opined in his report that "the only way the bus would have veered to the right at highway speeds was through the influence of a tag axle that was unlocked and/or was steering to the left relatively early in the accident sequence." Yohe further opined that "regarding the driver overcorrecting to the left, forces were at work in the rear of the bus that would make it extremely difficult to judge how far to turn the steering wheel to the left to keep the bus from going off the roadway." Additionally, Yohe states "the driver was basically in an uncontrollable situation." During my inspection of an exemplar bus, I disconnected both ends of the driveshaft universal joints. I have reviewed the extensive handling evaluations and tests performed by Kevan Granat on an exemplar MCI 102DL3. His work confirms that the MCI bus possesses a margin of safety when the tag axle is unlocked and the bus is traveling at highway speeds. Even with the tag axle unlocked, the bus will accommodate reasonable driver demands and can be brought to a controllable stop.

9. The bus was equipped with a Detroit Diesel Electronic Control (DDEC) IV event data recorder. The bus originally came with a DDEC III and it is unknown at this time when the DDEC IV unit was installed in the crash-involved bus. The DDEC data indicates that the bus attained a speed of approximately 69 miles per hour just prior to the brakes being applied. To date, a complete copy of the DDEC output report has not been provided. At this time is not possible to verify the overall accuracy of the DDEC results.
10. The cause of the overturn was due to forces generated by; (1) the speed of the bus, (2) the bus was sliding near broadside and (3) the bus tires furrowing into the earth. These types of forces will cause the overturn of all vehicle types.

All of the opinions in this report are expressed with a reasonable degree of engineering certainty. I reserve the right to supplement or modify my opinions if new information is received or in response to the work and opinions of opposing experts. Attached to this report are my CV, rate sheet and testimony list.

Sincerely,

A handwritten signature in cursive script that reads "P.P. Robert P. Rucoba".

Robert P. Rucoba

Attachment A – File Materials
Miscellaneous Materials

- Petition
- Vehicle Records
- News Articles
- Sales Order
- Warranty Records
- Recorded Interview of Jerricah Capers
- Recorded Interview of Nina Feddersen
- Plaintiffs' obj. and responses to Def. Americanos, U.S.A., LLC.'s first request for production
- Crash Scene photos
- Police Accident Investigation Report and file
- Agreed Scheduling Order
- CDs containing: Operators Manuals, Parts Manuals, Maintenance Manuals (MCI000459-MCI000468), MCI000471-MCI001211 - MCI Production documents inc Service Manuals, Technical Bulletins, Training Manuals; MCI000001-MCI000458 Protective Order Documents - MCI Technical Documents including design materials.
- Photographs by Kevin Granat
- Americanos photos, 7/22/10 Evidence inspection photos
- Def Greyhound Lines and Americano's Resp to Motor Coach Industries 1st Req for Prod and 1st Set of Interrog
- Repair/Towing Records
- Americanos USA LLC's Obj and Resp to Pltfs' Req for Prod, Exhibit 10- DDEC Data
- Photographs by David J. Coates, Ph.D. 01/14/11
- DPS Reconstruction Investigation Report
- Campbellton Metallurgy Examination Results from MSI Testing & Engineering, Inc.
- Police Dept. Records
- Agreed Scheduling Order
- Americanos USA, LLC, Greyhound Lines, Inc. and Irma Morado's seventh supplemental responses to Plaintiff's and intervenors' request for disclosure
- Exhibits to Trooper James Kellert's Depo
- Plaintiff's designation of expert witnesses
- Reports by David Stopper, Andrew D. Irwin, Edward P. Cox, John L. Cayias, Richard Cortez, David Feltoon, Frank G. Brown, Leon Feazell, Thomas F. Fugger, Jr., David W. Hall, Juan Herrera, Aaron J. Jones, Raul G. Longoria, Ricardo J. Palacios, John D. Pratt, Lawrence L. Yohe
- Bosch Test Track testing
- Brian Lawson notes and drawing
- MSi Testing and Engineering Report

Depositions

- Trooper Wesley Cooper (11/8/10)
- Trooper James Kellert (04/25/11)
- LT. Timothy A. Lite (04/27/11 + exhibits)
- Eldridge Hughey (06/16/11 + exhibits)
- Irma Morado (4/7/11 and 4/8/11 + exhibits)

PE12-007

MCI

4-27-2012

Response 10

Aaron Jones

09:11:43 1 testified about --

09:11:45 2 Q. On September 14th.

09:11:46 3 A. Correct.

09:11:48 4 Q. Have you done additional work in this case
09:11:51 5 since September 14, 2011?

09:11:54 6 A. Yes.

09:11:56 7 Q. I'd like you to outline for me what
09:11:59 8 additional work you have done in connection with
09:12:02 9 this case since September 14, 2011?

09:12:07 10 A. What I've done since September 14, 2011
09:12:10 11 would include drive shaft testing on an exemplar
09:12:15 12 102DL3 coach, made physical geometric measurements
09:12:22 13 of that coach and several exemplar coaches that I've
09:12:27 14 examined, and I've composed a report and I've done
09:12:33 15 some photogrammetric analysis of some of the work
09:12:38 16 performed by Mr. Granite.

09:12:49 17 I've also read depositions of the experts
09:12:53 18 that were deposed after my deposition and analyzed
09:12:59 19 those. I have also -- I think that summarizes it.
09:13:08 20 If something else comes to mind, I'll let you
09:13:10 21 know.

09:13:11 22 Q. All right.

09:13:13 23 The drive shaft testing that you performed
09:13:17 24 with an exemplar coach, let's start with that
09:13:23 25 particular piece of your additional work. When was

09:13:28 1 that work performed?

09:13:30 2 A. I believe it was performed on September 20,
09:13:32 3 2011.

09:13:37 4 Q. And the -- was there just one day or test
09:13:47 5 that you performed on September 20, 2011?

09:13:53 6 A. There was one test performed on
09:13:54 7 September 20, 2011.

09:13:59 8 Q. And how was the test setup recorded?

09:14:07 9 A. It was recorded with video and photographs
09:14:17 10 and high-speed video.

09:14:22 11 Q. We'll get into this in more detail later,
09:14:25 12 but essentially what was the situation that you were
09:14:30 13 testing on September 2011 -- 20, 2011?

09:14:37 14 A. We were attempting to determine if the
09:14:39 15 drive shaft could escape the tag axle structure, and
09:14:44 16 we were -- we wanted to characterize the damage that
09:14:49 17 would occur if that -- if the drive shaft did escape
09:14:53 18 the structure.

09:14:57 19 Q. And is that the only test that you've ever
09:15:02 20 performed or participated in regarding that test
09:15:11 21 purpose?

09:15:13 22 A. I'm sorry. I don't understand your
09:15:14 23 question.

09:15:15 24 Q. Well, you described what the purpose was,
09:15:17 25 and I'm trying to find out if that's the only test

09:15:20 1 that you've ever performed or participated in where
09:15:24 2 that was the purpose?

09:15:26 3 A. In regards to this case, yes.

09:15:29 4 Q. Have you performed such testing yourself or
09:15:35 5 participated in such testing yourself with respect
09:15:39 6 to any other cases?

09:15:42 7 A. No. I have looked at some -- I've looked
09:15:46 8 at some drive shaft issues in the past where I've
09:15:49 9 looked at rotational speeds of drive shafts and
09:15:52 10 things of that nature in unrelated nonlitigation
09:15:56 11 matters.

09:15:58 12 Q. And did you do that -- who did you do that
09:16:01 13 work for?

09:16:03 14 A. Boy, this was ten years ago. I'm not sure.
09:16:07 15 It may -- it may have been for one of the
09:16:11 16 automakers.

09:16:12 17 Q. Have you ever done that kind of test --
09:16:15 18 testing in regard to a motor coach?

09:16:19 19 A. No, sir.

09:16:31 20 Q. And the testing that you did about ten
09:16:33 21 years ago, was that testing that you were in charge
09:16:37 22 of, or was that testing that you were helping
09:16:40 23 somebody else with?

09:16:42 24 A. I was helping other -- other engineers at
09:16:46 25 Packer Engineering.

09:16:48 1 COURT REPORTER: Packer?

09:16:49 2 THE WITNESS: Packer.

09:16:58 3 BY MR. DACUS:

09:16:58 4 Q. Who else was involved in this testing that
09:17:01 5 you performed on September 20, 2011?

09:17:06 6 A. It was myself; Greg Baker, who is my
09:17:12 7 videographer, Dennis Hasamear of Greyhound;
09:17:19 8 Ms. Rodriguez was present; and Mr. Cook was
09:17:24 9 present.

09:17:25 10 Q. Alex Cook?

09:17:30 11 A. Yes.

09:17:31 12 Q. Who set up the equipment that was being
09:17:36 13 tested?

09:17:40 14 MS. RODRIGUEZ: Objection, form.

09:17:42 15 BY THE WITNESS:

09:17:42 16 A. The physical setup was performed by
09:17:45 17 Mr. Hasamear.

09:17:47 18 Q. And by "physical setup," please describe
09:17:51 19 for us what you mean by that?

09:17:55 20 A. He prepared the -- he prepared the coach
09:17:57 21 for testing.

09:18:03 22 Q. And are you familiar with what Mr. Hasamear
09:18:07 23 did with regard to setting up the coach for
09:18:12 24 testing?

09:18:13 25 A. Yes.

09:18:14 1 Q. Okay. What did --

09:18:16 2 A. It was done at my direction.

09:18:18 3 Q. What did he do?

09:18:20 4 A. We elevated the drive axle on the test
09:18:22 5 coach. We then removed the right -- one of the
09:18:30 6 right-side drive wheels, and we connected that coach
09:18:34 7 to another coach to power the test coach.

09:18:43 8 Q. Was the other coach elevated also?

09:18:46 9 A. Yes.

09:18:47 10 Q. Just the drive axle?

09:18:48 11 A. Just the drive axle.

09:18:52 12 Q. Was anything else done to set up the
09:18:55 13 equipment for the testing?

09:18:59 14 A. That's a broad question. Yes. We -- the
09:19:06 15 left-side brake on the drive axle of the test coach
09:19:11 16 was locked, and the right-side brake on the power
09:19:17 17 coach was locked. The tag axle was -- the air
09:19:24 18 supply to the tag axle was shut off.

09:19:36 19 Q. Anything else that was done to set up the
09:19:40 20 coach or actually it sounds like coaches for
09:19:45 21 testing?

09:19:45 22 A. I'd say there's one test coach, and the
09:19:47 23 other coach was simply a mech- -- a vehicle for
09:19:51 24 powering the test coach.

09:19:52 25 Q. Was anything else done to either of the

09:19:54 1 coaches for that test?

09:20:03 2 A. The proper drive shaft was installed in the
09:20:04 3 coach, and obviously cameras were set up in
09:20:11 4 positions to capture and document the testing.

09:20:21 5 Q. Is that testing that you performed on
09:20:24 6 September 20, 2011 the first testing that you had
09:20:27 7 ever been involved in where you were testing drive
09:20:34 8 shaft separation or disengagement from a motor
09:20:43 9 coach?

09:20:46 10 A. Yes.

09:20:50 11 Q. Did Mr. Hasamear indicate that he had been
09:20:52 12 involved in performing that type of testing
09:20:56 13 previously?

09:20:59 14 A. Yes, he did.

09:21:02 15 Q. On how many occasions?

09:21:05 16 A. That I'm aware of, two.

09:21:11 17 Q. Did you ever specifically ask Mr. Hasamear
09:21:13 18 how many times he had been involved in performing
09:21:17 19 similar testing on other motor coaches?

09:21:20 20 A. I may have, but I don't recall.

09:21:31 21 Q. And was there any report of this test
09:21:35 22 prepared other than the supplemental report that you
09:21:39 23 prepared on -- or that's dated January 16, 2012?

09:21:46 24 A. A formal report was not prepared.

09:21:51 25 Q. Were any notes taken?

09:21:56 1 A. No notes were taken. Every -- no.

09:22:08 2 Q. How did you document or record the test
09:22:15 3 setup and the test conditions for this testing?

09:22:18 4 A. That was documented -- when you say "the
09:22:22 5 test setup," the test setup was documented using a
09:22:25 6 total station.

09:22:34 7 Q. In any other way was the test setup
09:22:36 8 documented?

09:22:40 9 A. Between the total station and the
09:22:43 10 photographs and the -- the total station,
09:22:50 11 photographs, and the video, that would be the extent
09:22:54 12 of the documentation.

09:22:59 13 Q. Were any changes made to electrical or
09:23:05 14 pneumatic equipment in connection with this testing?

09:23:13 15 A. As I stated previously, there was no air
09:23:17 16 supplied to the air bags on the tag axle suspension.

09:23:27 17 Q. Was air supplied to the tag axle castering
09:23:36 18 lock cylinder or tag axle steering lock cylinder?

09:23:41 19 MS. RODRIGUEZ: Objection, form.

09:23:44 20 BY THE WITNESS:

09:23:44 21 A. The tag axle lock cylinder was -- pardon
09:23:49 22 me, the caster lock cylinder was inoperable at the
09:23:55 23 time of the testing, and the tag axle steer -- the
09:24:03 24 steer lock was powered.

09:24:15 25 Q. And in this test setup, how was the tag

09:24:21 1 axle castering cylinder rendered inoperative?

09:24:28 2 A. The caster lock cylinder, the upper so
09:24:31 3 we're clear, had been fractured in a previous test.

09:24:41 4 Q. What position was the tag axle castering
09:24:45 5 mechanism in or what was its latching status at the
09:24:52 6 time of this test?

09:24:53 7 A. It was forward.

09:24:58 8 Q. Was that because you couldn't readily move
09:25:01 9 it due to the tag axle castering cylinder having
09:25:07 10 been fractured in a previous test?

09:25:12 11 A. Yes.

09:25:12 12 Q. Or was that a conscious decision that's
09:25:16 13 where you wanted the castering mechanism to be for
09:25:20 14 the test?

09:25:22 15 A. It would have been difficult to repair in
09:25:26 16 the time frame, and our analysis of the geometry of
09:25:31 17 that tag axle structure shows that if the tag axle
09:25:35 18 is castered forward, the distance between the tag
09:25:38 19 axle structure and the differential is actually
09:25:41 20 shortened. So I made the decision that it was
09:25:45 21 conservative with it castered forward, and I left it
09:25:48 22 that way.

09:25:58 23 Q. Was the tag axle latch mechanism actually
09:26:04 24 latched in the forward position for this test coach?

09:26:10 25 A. It was captured by the mechanical mechanism

09:26:13 1 that captures it.

09:26:16 2 Q. Okay. I want to be sure I understand. Do
09:26:22 3 you have any photographs of what the tag axle
09:26:25 4 casting latch mechanism was?

09:26:29 5 A. Yes, I do.

09:26:30 6 Q. Do you have them with you?

09:26:31 7 A. Yes.

09:26:31 8 Q. Okay. Could you show me a photograph or
09:26:34 9 photographs of the tag axle casting latch
09:26:38 10 mechanism as it was situated when you performed this
09:26:44 11 test on September 20, 2011?

09:26:48 12 A. I could if you have a computer.

09:26:52 13 Q. I do.

09:26:57 14 MR. DACUS: Let's take a short break here.

09:26:59 15 THE VIDEOGRAPHER: Off the record, 9:23.

09:27:01 16 (A short break was had.)

09:35:03 17 THE VIDEOGRAPHER: On the record, 9:31.

09:35:08 18 BY MR. DACUS:

09:35:09 19 Q. Mr. Jones, during the break you have
09:35:12 20 assisted us to find in a flash drive some
09:35:19 21 photographs from your September 20, 2011 testing,
09:35:22 22 correct?

09:35:23 23 A. Correct.

09:35:23 24 Q. And we've looked at a couple of the
09:35:29 25 photographs. Particularly you're looking at

09:35:32 1 photograph No. 24 from that set. At present it's
09:35:39 2 labeled DSC0024, correct?

09:35:45 3 A. Correct.

09:35:45 4 Q. And does that show the position of the tag
09:35:49 5 axle casting latch mechanism on the test coach
09:35:54 6 that you were using for your testing on
09:35:57 7 September 20?

09:35:59 8 A. Correct.

09:36:01 9 Q. And did the casting latch position change
09:36:08 10 at all from beginning to end of the test from the
09:36:14 11 position that we see it in on that photograph?

09:36:19 12 A. It may have rocked back and forth during
09:36:23 13 the testing. I don't recall right now.

09:36:24 14 Q. At the end of the testing, was it in the
09:36:26 15 same position we see it in on this photograph 24?

09:36:31 16 A. As I recall, it was pretty close.

09:36:37 17 Q. Did the casting latch mechanism ever come
09:36:41 18 unlatched or move to any other latch position during
09:36:48 19 the testing?

09:36:50 20 A. I think I just answered that question.

09:36:54 21 Q. I'm sorry?

09:36:56 22 COURT REPORTER: Put your mic back on.

09:36:58 23 THE WITNESS: Oh, pardon me.

09:36:59 24 BY THE WITNESS:

09:36:59 25 A. I think I just answered that question. It

09:37:02 1 may have moved back and forth during the test.

09:37:05 2 Q. But you don't know?

09:37:06 3 A. I don't recall. I'd have to review the
09:37:08 4 video again.

09:37:16 5 Q. What did you believe you learned from the
09:37:18 6 testing?

09:37:21 7 A. Well, the first thing we learned from the
09:37:23 8 testing is that it is possible for the drive shaft
09:37:27 9 to escape the tag axle structure, and the damage
09:37:33 10 induced or caused by the drive shaft separating or
09:37:38 11 exiting that structure, it is capable of causing
09:37:43 12 damage that is very similar to the damage observed
09:37:48 13 on the subject coach.

09:37:58 14 Q. Any other things that you learned from that
09:38:01 15 testing?

09:38:17 16 A. I think that summarizes it.

09:38:21 17 Q. Was the testing that you performed
09:38:26 18 essentially the same testing that had been performed
09:38:29 19 by someone from Greyhound previously with this
09:38:38 20 coach?

09:38:40 21 A. It was similar -- it was a similar setup.

09:38:44 22 Q. Okay. And how was the testing you
09:38:46 23 performed different than what Greyhound had
09:38:48 24 previously performed with this coach?

09:38:51 25 A. There was obviously no secondary guard on

09:38:54 1 the system. I think the testing performed by
09:38:59 2 Greyhound, it looks -- from the video that I've
09:39:04 3 seen, it looks like they were doing it at a higher
09:39:07 4 speed than the test that I conducted.

09:39:15 5 Q. The test that you conducted, was it a test
09:39:20 6 in which it wasn't the rolling of the drive axle
09:39:27 7 wheels on the road which caused the tag axle -- I
09:39:36 8 mean, excuse me, the drive shaft to flail about?

09:39:42 9 A. I'm sorry. Could you -- I don't understand
09:39:44 10 the question.

09:39:44 11 Q. The testing that you performed on
09:39:47 12 September 20, it used an attachment to a driving
09:39:52 13 coach to turn the drive axle and the differential
09:40:02 14 and the drive shaft after the drive shaft separated
09:40:08 15 from the transmission, correct?

09:40:13 16 A. I don't understand the question. The --
09:40:17 17 the secondary coach was used to continue to power --
09:40:23 18 power the drive shaft at the test coach differential
09:40:28 19 after separation.

09:40:32 20 Q. And the rolling of the drive wheels on the
09:40:38 21 road was not used to continue to power the
09:40:46 22 differential --

09:40:49 23 A. No. The drive --

09:40:52 24 Q. -- in that test?

09:40:52 25 A. The drive wheels were off the ground. So

09:40:55 1 they were not in contact with the road.

09:40:58 2 Q. Tell us what the operator of the power
09:41:14 3 coach was instructed to do in each phase of the
09:41:22 4 test.

09:41:23 5 A. The operator of the power coach was
09:41:28 6 instructed that both coaches were intended to be
09:41:33 7 accelerated up to a speed to cause separation. At
09:41:41 8 that point after separation the intent of the test
09:41:43 9 was to allow the test coach -- or pardon me, the
09:41:49 10 power coach to then free decel- -- freely decelerate
09:41:56 11 with its inertia to a lower speed.

09:42:04 12 Q. And in this test, the drive wheels of the
09:42:07 13 power coach as well as the drive wheels of the test
09:42:10 14 coach were raised off the ground so that neither
09:42:17 15 coach was actually rolling on the road, correct?

09:42:21 16 A. That's correct.

09:42:28 17 Q. And at what point would the operator of the
09:42:30 18 power coach know to stop powering the drive wheels?

09:42:39 19 A. When he could hear the separation or
09:42:43 20 shortly thereafter.

09:42:50 21 Q. Was any recording made of the RPMs or other
09:43:01 22 measurements of what was happening with the power
09:43:04 23 coach during this test?

09:43:09 24 A. I recorded the throttle position, throttle
09:43:14 25 pedal position, and I then calculated the drive

09:43:18 1 shaft speeds from the high-speed video.

09:43:23 2 Q. And what did you calculate the drive shaft
09:43:32 3 speeds to be?

09:43:35 4 A. At the time of separation it was
09:43:37 5 approximately 1,240.

09:43:42 6 Q. RPMs?

09:43:43 7 A. RPM.

09:43:45 8 Q. And this is drive shaft RPMs?

09:43:47 9 A. That is correct.

09:43:54 10 Q. And how long did that 1,240 drive shaft
09:44:02 11 RPMs continue before it decayed?

09:44:11 12 A. Actually, during the test, the speed of the
09:44:13 13 drive shaft went up and down.

09:44:19 14 Q. Up initially or --

09:44:23 15 A. I do believe it went up initially.

09:44:25 16 Q. Okay. And do you know what it went to?

09:44:27 17 A. I think the maximum that I -- I'd have to
09:44:31 18 look at my notes, but I think the maximum that we
09:44:34 19 saw was in the area of 1,500. I believe the
09:44:39 20 exact -- the number's in my report.

09:44:47 21 Q. And how does the 1,500 RPM relate to the
09:44:56 22 drive shaft RPMs of a coach traveling on the road at
09:45:01 23 68 or 69 miles per hour?

09:45:07 24 A. I don't understand your question.

09:45:09 25 Q. Is it higher, lower, about the same? The

09:45:16 1 drive shaft RPMs of 1,500 RPMs which you said you
09:45:21 2 found in the tested coach, how does that relate to
09:45:25 3 the drive shaft RPMs on a coach traveling down the
09:45:29 4 road at 68 or 69 miles per hour?

09:45:32 5 A. It's lower.

09:45:39 6 Q. How much?

09:45:39 7 A. At least 300 RPM, as I recall.

09:45:49 8 Q. Have you made any calculations or have any
09:45:55 9 opinions about what the RPMs coming from the drive
09:46:03 10 axle powering the end of the drive shaft on the
09:46:12 11 actual coach involved in this accident?

09:46:19 12 A. Well, we know that when the separation
09:46:21 13 occurred it was rotating at about -- I believe the
09:46:23 14 number is 1,880 RPM, in that range, to be 68 to
09:46:30 15 70 miles an hour.

09:46:38 16 Q. And did you analyze or calculate how that
09:46:50 17 drive shaft RPM changed after the initial separation
09:46:59 18 of the drive shaft from the transmission of the
09:47:06 19 accident coach?

09:47:13 20 A. After separation did I characterize -- no,
09:47:16 21 I did not.

09:47:19 22 Q. So you haven't studied that or worked that
09:47:25 23 into your work in the -- in connection with the
09:47:31 24 accident; is that correct?

09:47:33 25 A. I don't know how to -- I don't know that it

09:47:36 1 would be something that would be ready cal- --
09:47:40 2 readily calculable because of wheel slip and things
09:47:43 3 of that nature, but the work that I did was very
09:47:48 4 conservative in terms of the amount of energy being
09:47:51 5 exerted compared to what the energy that -- compared
09:47:55 6 to the energy that would have been exerted upon
09:48:02 7 separation at the subject coach.

09:48:05 8 Q. Did you -- well, let me ask this. In the
09:48:10 9 accident coach, would the application of the air
09:48:16 10 brakes tend to slow down the wheel speed of the
09:48:29 11 drive axle?

09:48:35 12 A. The application of the brakes, I would
09:48:37 13 expect it would cause it to slow.

09:48:38 14 Q. And once the drive shaft is no longer
09:48:41 15 connected to the transmission but remains connected
09:48:49 16 to the differential, does the application of brakes
09:48:52 17 also slow the rotation speed of the drive shaft?

09:48:59 18 A. The application of the brakes is going to
09:49:01 19 slow the rotation speed of the drive shaft to some
09:49:04 20 extent.

09:49:07 21 Q. And, in fact, if the brakes are locked so
09:49:09 22 that the drive axle wheels are no longer turning but
09:49:15 23 are sliding, does that mean that the rotation of the
09:49:19 24 drive shaft, assuming it's still connected at that
09:49:25 25 point to the differential, is going to slow or stop

09:49:29 1 as well?

09:49:30 2 A. If both drive wheels are locked, the
09:49:32 3 drive -- the drive shaft will not turn.

09:49:37 4 Q. And if both drive wheels are slowed, does
09:49:42 5 it mean that the drive shaft, if it's still
09:49:45 6 connected to the differential but separated from the
09:49:48 7 transmission, will slow?

09:49:53 8 A. Yes.

09:49:56 9 Q. Have you ever made any study of what the
09:50:03 10 speed -- rotational speed of the drive shaft was at
09:50:09 11 any point in the accident sequence involving
09:50:13 12 Ms. Morado and the Americanos bus?

09:50:18 13 A. No, I have not.

09:51:01 14 Q. And from your report that you gave on
09:51:05 15 January 16, you indicated that the drive shaft
09:51:20 16 disconnected from the differential at the end of the
09:51:24 17 test at approximately 1,500 RPM; is that correct?

09:51:28 18 A. If that's the number stated in my report,
09:51:30 19 that's the number that was calculated.

09:51:34 20 Q. Okay. And that was calculated by examining
09:51:38 21 the high-speed video that you took of the drive
09:51:40 22 shaft?

09:51:41 23 A. Correct.

09:51:53 24 Q. So in your test, rather than the drive
09:51:58 25 shaft rotational speed decreasing as brakes were

09:52:03 1 applied, the drive shaft rotational speed actually
09:52:12 2 increased from 1,240 RPMs up to 1,500 RPMs at the
09:52:21 3 end of the test, correct?

09:52:22 4 A. During the course of our test the drive
09:52:24 5 shaft speed increased.

09:52:25 6 Q. And it increased -- you said that the drive
09:52:30 7 shaft separated from the transmission -- from the
09:52:33 8 time the drive shaft separated from the transmission
09:52:36 9 until it separated from the rear differential was
09:52:40 10 approximately 5.6 seconds, correct?

09:52:43 11 A. Correct.

09:52:51 12 Q. So were you trying to increase the
09:52:55 13 rotational speed of the drive shaft from the point
09:52:59 14 of separation of the drive shaft from the
09:53:04 15 transmission, or was that just the way it happened?

09:53:07 16 A. That was the way it happened because the
09:53:10 17 drive shaft started to -- because the drive shaft
09:53:13 18 started to separate at a lower speed than we
09:53:17 19 antic- -- than we anticipated or wanted, and at that
09:53:25 20 point I heard the noise and indicated the operator
09:53:28 21 to accelerate the bus in order to put some speed
09:53:32 22 into the drive shaft. After the separation, I don't
09:53:37 23 know why, I don't know if he was startled, but he
09:53:40 24 did not remove his foot from the pedal.

09:53:45 25 Q. Who was the operator of the power coach?

09:53:52 1 A. I think it was Mr. Hasamear. I don't
09:53:55 2 recall. It may have been Alex Cook or
09:54:03 3 Mr. Hasamear.

09:54:13 4 Q. So what you were trying to do in the test
09:54:15 5 was you were trying to have a separation at the
09:54:24 6 transmission based upon how you set it up with a
09:54:29 7 less strong connection at the -- at the
09:54:35 8 transmission, correct?

09:54:36 9 A. We were attempting to weaken the connection
09:54:39 10 at the transmission in order to produce a separation
09:54:43 11 at the transmission.

09:54:44 12 Q. Okay. And you succeeded with that,
09:54:47 13 correct, in the test?

09:54:48 14 A. Yes, we succeeded with that.

09:54:50 15 Q. And then the plan was to, as soon as you
09:54:57 16 had a separation at the transmission, to let off on
09:55:01 17 the speed of the powering coach drive wheels so that
09:55:07 18 you could coast -- coast down; is that correct?

09:55:13 19 A. The idea was to allow it to coast down
09:55:16 20 more -- more closely to how it would coast down on
09:55:19 21 the roadway.

09:55:20 22 Q. But, in fact, what happened is that instead
09:55:25 23 of letting off on the speed of the powering coach,
09:55:30 24 which would tend to lower the rotational speed of
09:55:35 25 the drive shaft still connected to the differential

09:55:38 1 of the test coach, you actually increased speed
09:55:42 2 until the end of the test, correct?

09:55:48 3 A. The speed went up and down during the
09:55:50 4 course of the test.

09:55:52 5 Q. And when the drive shaft of the test coach
09:55:57 6 separated from the differential, was that at the
09:56:05 7 maximum speed that had been reached in the test?

09:56:12 8 A. I think the max- -- I think the maximum
09:56:15 9 speed that was reached in the test was slightly
09:56:18 10 higher.

09:56:18 11 Q. But it certainly wasn't a coasting down
09:56:20 12 from the speed at which the transmission connection,
09:56:27 13 which had been weakened, failed; is that right?

09:56:34 14 A. It was at a -- it was at a speed higher
09:56:37 15 than the separation of the trans- -- at the
09:56:40 16 separation of the transmission and considerably
09:56:42 17 lower than the road speed of the bus at the time of
09:56:45 18 the separation. Therefore it was conservative.

09:56:50 19 Q. What were you doing during the time that
09:56:56 20 the test was actually being performed?

09:57:00 21 A. I was standing approximately a hundred
09:57:02 22 feet, 200 feet in front of the coach.

09:57:07 23 Q. Were you filming or photographing or just
09:57:10 24 observing?

09:57:12 25 A. Well, the video cameras had previously been

09:57:15 1 set up, and I was not photographing during the test
09:57:18 2 itself.

09:57:30 3 Q. Was there another operator in the test
09:57:33 4 coach during this test?

09:57:37 5 A. There was an operator in both coaches.

09:57:38 6 Q. Who was the operator in the test coach?

09:57:41 7 A. Hasamear or Cook.

09:57:58 8 Q. Was there any impact damage from previous
09:58:00 9 tests performed with this coach that you had to
09:58:07 10 account for and recognize was present during your
09:58:13 11 test?

09:58:14 12 A. Yes, there was.

09:58:15 13 Q. And how did you note what damage was
09:58:23 14 present from previous tests so that you wouldn't
09:58:28 15 consider it to be damage from your test?

09:58:31 16 A. It was done in two ways. First, it was
09:58:34 17 documented photographically. Secondly, we chalked
09:58:39 18 that area so we could identify fresh witness marks.

09:58:52 19 Q. And the previous damage, was it noted in
09:58:58 20 your photographs before the area was chalked?

09:59:02 21 A. Yes.

09:59:03 22 Q. And what kind -- what color of chalk did
09:59:07 23 you use to cover the areas?

09:59:10 24 A. It was orange chalk.

09:59:14 25 Q. Was that something you did or something

09:59:16 1 that Mr. Cook or Mr. Hasamear did?

09:59:20 2 A. That's something that I did.

09:59:25 3 Q. Did it appear that area had ever been
09:59:28 4 chalked before?

09:59:31 5 A. I don't believe so. I had cleaned it prior
09:59:36 6 to applying the chalk.

09:59:54 7 Q. And I believe you said that you used a
10:00:02 8 total station to document the condition of the test
10:00:05 9 coach and the components underneath; is that
10:00:09 10 correct?

10:00:10 11 A. Yes.

10:00:13 12 Q. And the total station -- total station
10:00:20 13 produces some coordinates of points; is that
10:00:23 14 correct?

10:00:24 15 A. Yes. It captures locations.

10:00:27 16 Q. Okay. And where did you set up your total
10:00:30 17 station?

10:00:32 18 A. We set it up on the right side of the
10:00:34 19 coach.

10:00:39 20 Q. And did you record data with the total
10:00:42 21 station during the test?

10:00:46 22 A. No, sir.

10:00:47 23 Q. It was just a pretest --

10:00:50 24 A. It was done post-test.

10:00:51 25 Q. Post-test. Okay.

10:01:01 1 And the post-test total station
10:01:06 2 measurements that you got, those were not a
10:01:13 3 real-time kind of recording of positions; they were
10:01:18 4 just a this is how it was after the test
10:01:23 5 measurements; is that correct?

10:01:26 6 A. Yes. It documented the condition after the
10:01:27 7 test.

10:01:29 8 Q. Did you have any total station measurements
10:01:33 9 of conditions before the test?

10:01:36 10 A. No, sir.

10:01:42 11 Q. And were the total station measurements
10:01:44 12 something that is also on this drive?

10:01:48 13 A. Yes, sir.

10:01:52 14 Q. And can you tell me what they're called?

10:01:55 15 A. They would probably -- I believe they're in
10:01:58 16 a folder -- excuse me. I believe they're in a
10:02:01 17 folder called "Geometric analysis."

10:02:07 18 Q. Okay.

10:02:20 19 After your testing performed on
10:02:21 20 September 20, 2011, did you feel that you had any
10:02:25 21 need for additional testing?

10:02:30 22 A. Additional drive shaft testing?

10:02:32 23 Q. Additional testing of any kind.

10:02:34 24 A. The only work that we felt we should do
10:02:36 25 after that was to document the geometry of that

What actually should occur in the event of a transmission-detached drive shaft is quite different than the drive shaft testing which has been submitted to NHTSA by First Group/Greyhound Lines. In those tests, the coach drive wheels were not allowed to coast down unpowered as would be expected in such an event occurring on the road. Instead the tests show elevated drive wheels (and drive shaft) which were powered by the engine, transmission and elevated drive wheels of an adjacent "power coach." Not only do those tests show powered drive wheels on the tested coach, they also show that efforts were made to increase the drive wheel speed and the rotational speed of the drive shaft as soon as a transmission detachment occurred.

TESTIMONY FROM 2/16/12 DEPOSITION OF AARON JONES:

7

11 Q. We'll get into this in more detail later,
12 but essentially what was the situation that you were
13 testing on September 2011 -- 20, 2011?

14 A. We were attempting to determine if the
15 drive shaft could escape the tag axle structure, and
16 we were -- we wanted to characterize the damage that
17 would occur if that -- if the drive shaft did escape
18 the structure.

9

22 Q. And are you familiar with what Mr. Hasamear
23 did with regard to setting up the coach for
24 testing?

25 A. Yes.

10

1 Q. Okay. What did --

2 A. It was done at my direction.

3 Q. What did he do?

4 A. We elevated the drive axle on the test

5 coach. We then removed the right -- one of the

6 right-side drive wheels, and we connected that coach

7 to another coach to power the test coach.

8 Q. Was the other coach elevated also?

9 A. Yes.

10 Q. Just the drive axle?

11 A. Just the drive axle.

12 Q. Was anything else done to set up the

13 equipment for the testing?

14 A. That's a broad question. Yes. We -- the

15 left-side brake on the drive axle of the test coach

16 was locked, and the right-side brake on the power

17 coach was locked. The tag axle was -- the air

18 supply to the tag axle was shut off.

18

2 Q. Tell us what the operator of the power

3 coach was instructed to do in each phase of the

4 test.

5 A. The operator of the power coach was

6 instructed that both coaches were intended to be

7 accelerated up to a speed to cause separation. At

8 that point after separation the intent of the test

9 was to allow the test coach -- or pardon me, the

10 power coach to then free decel- -- freely decelerate

11 with its inertia to a lower speed.

12 Q. And in this test, the drive wheels of the

13 power coach as well as the drive wheels of the test

14 coach were raised off the ground so that neither

15 coach was actually rolling on the road, correct?

16 A. That's correct.

17 Q. And at what point would the operator of the

18 power coach know to stop powering the drive wheels?

19 A. When he could hear the separation or

20 shortly thereafter.

21 Q. Was any recording made of the RPMs or other

22 measurements of what was happening with the power

23 coach during this test?

24 A. I recorded the throttle position, throttle

25 pedal position, and I then calculated the drive

19

1 shaft speeds from the high-speed video.

2 Q. And what did you calculate the drive shaft

3 speeds to be?

4 A. At the time of separation it was

5 approximately 1,240.

6 Q. RPMs?

7 A. RPM.

8 Q. And this is drive shaft RPMs?

9 A. That is correct.

10 Q. And how long did that 1,240 drive shaft

11 RPMs continue before it decayed?

12 A. Actually, during the test, the speed of the

13 drive shaft went up and down.

14 Q. Up initially or --

15 A. I do believe it went up initially.

16 Q. Okay. And do you know what it went to?

17 A. I think the maximum that I -- I'd have to

18 look at my notes, but I think the maximum that we

19 saw was in the area of 1,500. I believe the

20 exact -- the number's in my report.

21 Q. And how does the 1,500 RPM relate to the

22 drive shaft RPMs of a coach traveling on the road at

23 68 or 69 miles per hour?

24 A. I don't understand your question.

25 Q. Is it higher, lower, about the same? The

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1 drive shaft RPMs of 1,500 RPMs which you said you

2 found in the tested coach, how does that relate to

3 the drive shaft RPMs on a coach traveling down the

4 road at 68 or 69 miles per hour?

5 A. It's lower.

6 Q. How much?

7 A. At least 300 RPM, as I recall.

8 Q. Have you made any calculations or have any
9 opinions about what the RPMs coming from the drive
10 axle powering the end of the drive shaft on the
11 actual coach involved in this accident?

12 A. Well, we know that when the separation
13 occurred it was rotating at about -- I believe the
14 number is 1,880 RPM, in that range, to be 68 to
15 70 miles an hour.

16

21

8 Q. Did you -- well, let me ask this. In the
9 accident coach, would the application of the air
10 brakes tend to slow down the wheel speed of the
11 drive axle?

12 A. The application of the brakes, I would
13 expect it would cause it to slow.

14 Q. And once the drive shaft is no longer
15 connected to the transmission but remains connected
16 to the differential, does the application of brakes
17 also slow the rotation speed of the drive shaft?

18 A. The application of the brakes is going to
19 slow the rotation speed of the drive shaft to some
20 extent.

21 Q. And, in fact, if the brakes are locked so
22 that the drive axle wheels are no longer turning but
23 are sliding, does that mean that the rotation of the
24 drive shaft, assuming it's still connected at that
25 point to the differential, is going to slow or stop

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1 as well?

2 A. If both drive wheels are locked, the
3 drive -- the drive shaft will not turn.

4 Q. And if both drive wheels are slowed, does
5 it mean that the drive shaft, if it's still
6 connected to the differential but separated from the
7 transmission, will slow?

8 A. Yes.

9 Q. Have you ever made any study of what the
10 speed -- rotational speed of the drive shaft was at
11 any point in the accident sequence involving
12 Ms. Morado and the Americanos bus?

13 A. No, I have not.

14 Q. And from your report that you gave on
15 January 16, you indicated that the drive shaft
16 disconnected from the differential at the end of the
17 test at approximately 1,500 RPM; is that correct?

18 A. If that's the number stated in my report,

19 that's the number that was calculated.

20 Q. Okay. And that was calculated by examining

21 the high-speed video that you took of the drive

22 shaft?

23 A. Correct.

24 Q. So in your test, rather than the drive

25 shaft rotational speed decreasing as brakes were

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1 applied, the drive shaft rotational speed actually

2 increased from 1,240 RPMs up to 1,500 RPMs at the

3 end of the test, correct?

4 A. During the course of our test the drive

5 shaft speed increased.

6 Q. And it increased -- you said that the drive

7 shaft separated from the transmission -- from the

8 time the drive shaft separated from the transmission

9 until it separated from the rear differential was

10 approximately 5.6 seconds, correct?

11 A. Correct.

12 Q. So were you trying to increase the

13 rotational speed of the drive shaft from the point

14 of separation of the drive shaft from the

15 transmission, or was that just the way it happened?

16 A. That was the way it happened because the

17 drive shaft started to -- because the drive shaft
18 started to separate at a lower speed than we
19 antic- -- than we anticipated or wanted, and at that
20 point I heard the noise and indicated the operator
21 to accelerate the bus in order to put some speed
22 into the drive shaft. After the separation, I don't
23 know why, I don't know if he was startled, but he
24 did not remove his foot from the pedal.
25 Q. Who was the operator of the power coach?

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1 A. I think it was Mr. Hasamear. I don't
2 recall. It may have been Alex Cook or
3 Mr. Hasamear.
4 Q. So what you were trying to do in the test
5 was you were trying to have a separation at the
6 transmission based upon how you set it up with a
7 less strong connection at the -- at the
8 transmission, correct?
9 A. We were attempting to weaken the connection
10 at the transmission in order to produce a separation
11 at the transmission.
12 Q. Okay. And you succeeded with that,
13 correct, in the test?
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15 Q. And then the plan was to, as soon as you
16 had a separation at the transmission, to let off on
17 the speed of the powering coach drive wheels so that
18 you could coast -- coast down; is that correct?

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20 more -- more closely to how it would coast down on
21 the roadway.

22 Q. But, in fact, what happened is that instead
23 of letting off on the speed of the powering coach,
24 which would tend to lower the rotational speed of
25 the drive shaft still connected to the differential

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4 course of the test.

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10 higher.

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25 Q. Is it higher, lower, about the same? The

20

1 drive shaft RPMs of 1,500 RPMs which you said you

2 found in the tested coach, how does that relate to

3 the drive shaft RPMs on a coach traveling down the

4 road at 68 or 69 miles per hour?

5 A. It's lower.

6 Q. How much?

7 A. At least 300 RPM, as I recall.

8 Q. Have you made any calculations or have any
9 opinions about what the RPMs coming from the drive
10 axle powering the end of the drive shaft on the
11 actual coach involved in this accident?

12 A. Well, we know that when the separation
13 occurred it was rotating at about -- I believe the
14 number is 1,880 RPM, in that range, to be 68 to
15 70 miles an hour.

16

21

8 Q. Did you -- well, let me ask this. In the
9 accident coach, would the application of the air
10 brakes tend to slow down the wheel speed of the
11 drive axle?

12 A. The application of the brakes, I would
13 expect it would cause it to slow.

14 Q. And once the drive shaft is no longer
15 connected to the transmission but remains connected
16 to the differential, does the application of brakes
17 also slow the rotation speed of the drive shaft?

18 A. The application of the brakes is going to
19 slow the rotation speed of the drive shaft to some
20 extent.

21 Q. And, in fact, if the brakes are locked so
22 that the drive axle wheels are no longer turning but
23 are sliding, does that mean that the rotation of the
24 drive shaft, assuming it's still connected at that
25 point to the differential, is going to slow or stop

22

1 as well?

2 A. If both drive wheels are locked, the
3 drive -- the drive shaft will not turn.

4 Q. And if both drive wheels are slowed, does
5 it mean that the drive shaft, if it's still
6 connected to the differential but separated from the
7 transmission, will slow?

8 A. Yes.

9 Q. Have you ever made any study of what the
10 speed -- rotational speed of the drive shaft was at
11 any point in the accident sequence involving
12 Ms. Morado and the Americanos bus?

13 A. No, I have not.

14 Q. And from your report that you gave on
15 January 16, you indicated that the drive shaft
16 disconnected from the differential at the end of the
17 test at approximately 1,500 RPM; is that correct?

18 A. If that's the number stated in my report,

19 that's the number that was calculated.

20 Q. Okay. And that was calculated by examining

21 the high-speed video that you took of the drive

22 shaft?

23 A. Correct.

24 Q. So in your test, rather than the drive

25 shaft rotational speed decreasing as brakes were

23

1 applied, the drive shaft rotational speed actually

2 increased from 1,240 RPMs up to 1,500 RPMs at the

3 end of the test, correct?

4 A. During the course of our test the drive

5 shaft speed increased.

6 Q. And it increased -- you said that the drive

7 shaft separated from the transmission -- from the

8 time the drive shaft separated from the transmission

9 until it separated from the rear differential was

10 approximately 5.6 seconds, correct?

11 A. Correct.

12 Q. So were you trying to increase the

13 rotational speed of the drive shaft from the point

14 of separation of the drive shaft from the

15 transmission, or was that just the way it happened?

16 A. That was the way it happened because the

17 drive shaft started to -- because the drive shaft
18 started to separate at a lower speed than we
19 antic- -- than we anticipated or wanted, and at that
20 point I heard the noise and indicated the operator
21 to accelerate the bus in order to put some speed
22 into the drive shaft. After the separation, I don't
23 know why, I don't know if he was startled, but he
24 did not remove his foot from the pedal.
25 Q. Who was the operator of the power coach?

24

1 A. I think it was Mr. Hasamear. I don't
2 recall. It may have been Alex Cook or
3 Mr. Hasamear.
4 Q. So what you were trying to do in the test
5 was you were trying to have a separation at the
6 transmission based upon how you set it up with a
7 less strong connection at the -- at the
8 transmission, correct?
9 A. We were attempting to weaken the connection
10 at the transmission in order to produce a separation
11 at the transmission.
12 Q. Okay. And you succeeded with that,
13 correct, in the test?
14 A. Yes, we succeeded with that.

15 Q. And then the plan was to, as soon as you
16 had a separation at the transmission, to let off on
17 the speed of the powering coach drive wheels so that
18 you could coast -- coast down; is that correct?

19 A. The idea was to allow it to coast down
20 more -- more closely to how it would coast down on
21 the roadway.

22 Q. But, in fact, what happened is that instead
23 of letting off on the speed of the powering coach,
24 which would tend to lower the rotational speed of
25 the drive shaft still connected to the differential

25

1 of the test coach, you actually increased speed
2 until the end of the test, correct?

3 A. The speed went up and down during the
4 course of the test.

5 Q. And when the drive shaft of the test coach
6 separated from the differential, was that at the
7 maximum speed that had been reached in the test?

8 A. I think the max- -- I think the maximum
9 speed that was reached in the test was slightly
10 higher.

11 Q. But it certainly wasn't a coasting down
12 from the speed at which the transmission connection,

13 which had been weakened, failed; is that right?

14 A. It was at a -- it was at a speed higher

15 than the separation of the trans- -- at the

16 separation of the transmission and considerably

17 lower than the road speed of the bus at the time of

18 the separation. Therefore it was conservative.

PE12-007

MCI

4-27-2012

Response 10

2012-04-16 Americanos Notice
of Nonsuit against MCI and
MCISP - Signed

CAUSE NO. 2010-03-001717-C

DANIEL CAMPOS, et al.,

Plaintiffs and Intervenor,

v.

AMERICANOS U.S.A., L.L.C., et al.,

Defendants.

§
§
§
§
§
§
§
§

IN THE DISTRICT COURT OF

CAMERON COUNTY, TEXAS

197th JUDICIAL DISTRICT

**ORDER ON AMERICANOS U.S.A., L.L.C.'S ORAL NOTICE OF NON-SUIT
OF ALL CLAIMS AGAINST MOTOR COACH INDUSTRIES, INC.
AND MCI SERVICE PARTS, INC.**

On this day came on to be heard Americanos U.S.A., L.L.C.'s Oral Notice of Nonsuit Without Prejudice of All Claims Against Defendants Motor Coach Industries, Inc. and MCI Service Parts, Inc. The Court, having considered the Notice, finds that it is well taken and should be in all things GRANTED; and

IT IS ACCORDINGLY ORDERED, ADJUDGED AND DECREED that all of Americanos U.S.A., L.L.C.'s claims against Defendants Motor Coach Industries, Inc. and MCI Service Parts, Inc. in this case are hereby DISMISSED WITHOUT PREJUDICE.

SIGNED on this 16th day of April, 2012.

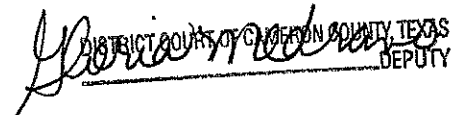

JUDGE RESIDING

4/16/12 COPIES TO:

ALL KNOWN COUNSEL

FILED 11:00 O'CLOCK 2 M
AURORA DE LA GARZA, CLERK

APR 16 2012


DISTRICT COURT OF CAMERON COUNTY, TEXAS
DEPUTY

PE12-007

MCI

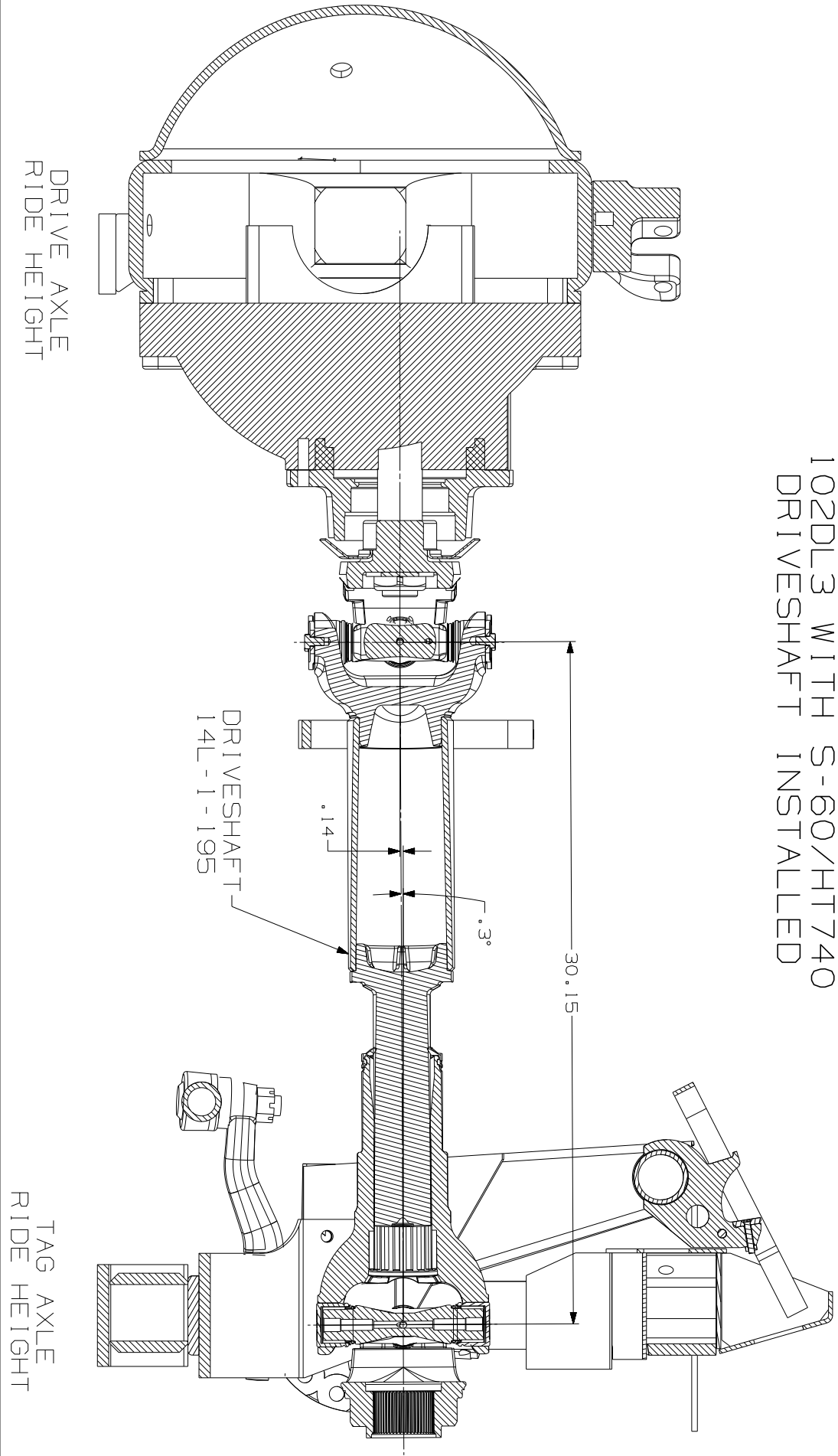
4-27-2012

Response 10

DRIVESHAFT_RIDE_HEIGH

T_sh1 installed

102DL3 WITH S-60/HT740
DRIVESHAFT INSTALLED



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4-27-2012

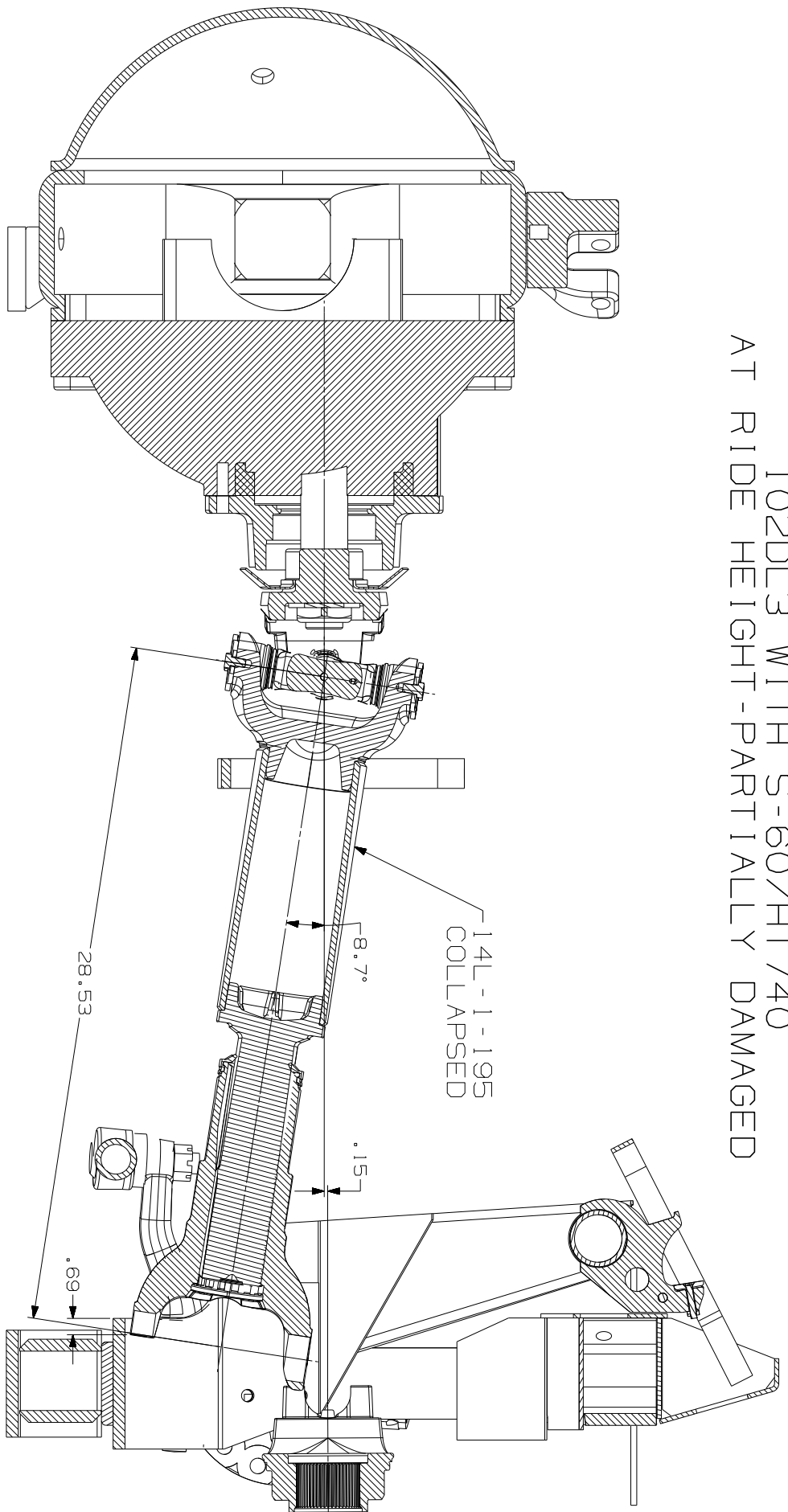
Response 10

RIDE_HEIGHT_S60_HT740_
ONE_EYE_sh1

102DL3 WITH S-60/HT740
AT RIDE HEIGHT - PARTIALLY DAMAGED

DRIVE AXLE
RIDE HEIGHT

TAG AXLE
RIDE HEIGHT



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4-27-2012

Response 10

Section 10

SECTION 10

LUBRICATION

[illegible]

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4-27-2012

Response 10

Section 14

SECTION 14

DRIVESHAFT

The U-joint has two retaining cap journal bearings for attaching the U-joint to the driveshaft and two plain journal bearing caps for attaching the U-joints to the transmission or differential (Figure 1).

CAUTION: When assembling the driveshaft, the arrow on the tight end and slip joint end must align at the joining areas. This will align the tight end and slip joint end yoke trunnions.

MAINTENANCE

Both universal joints are provided with lubrication fittings. A third lubrication fitting is provided at the slip joint.

The driveshaft lubrication fittings should be serviced according to the recommendations contained in Section 10 of this manual.

Shaft U-joints should be checked at regular inspection intervals for loose or broken bolts. When servicing the driveshaft, use only new bolts.

The recommended torque value for the retaining cap journal bearing capscrews is 35-39 foot-pounds (47-53 N-m). The recommended torque value for the half round journal bearing capscrews (Figure 2) is 115-135 foot-pounds (156-183 N-m).

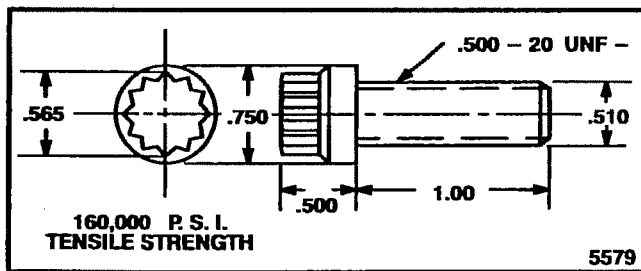


Figure 2. Driveshaft Half Round Yoke Bolts.

REMOVAL

The driveshaft may be removed from the vehicle by removing the bolts which attach the universal joints to the differential and transmission half round yokes.

To remove the driveshaft, remove the capscrews which attach the driveshaft bearing journals to the transmission and differential half round yokes. Unscrew the slip joint dust cap. Telescope the drive together at the slip joint. The shaft can then be removed. Replacement is the reverse of removal.

DISASSEMBLY OF UNIVERSAL JOINTS

Bend tangs of lock plate. Unscrew capscrews and remove lock plate. To remove the needle bearings and retaining cap subassembly use a large pair of channel-lock pliers on retaining cap edges, turn

retaining cap and bearing subassembly at the same time lifting upward to remove the subassembly from the journal trunnion diameter and out of the yoke hole. Turn the joint over and tap the exposed end of the journal cross until the opposite needle bearing is free. Use a soft round drift with flat face about $\frac{1}{32}$ -inch (0.79 mm) smaller in diameter than the hole in the yoke.

Remove the journal cross by sliding it to one side of the yoke and tilting it over the top of the yoke lug.

CLEANING AND INSPECTION

Thoroughly clean grease from bearings, journals, and other parts. Clean all lubricant passages in the cross, and the lubrication fittings. Needle bearing assemblies may be soaked in cleaning solution to soften particles of hard grease. It is extremely important that bearing assemblies be absolutely clean, since even very small particles of dirt or grit can cause rapid bearing wear. Do not attempt to disassemble needle bearings.

Cross bearing journal areas should be inspected for roughness or grooving (brinelling). Excessive wear of the needle bearings is indicated if the needles drop out of the retainer, or if marks are present on the journal bearing surface. If brinelling is indicated, the entire U-joint assembly should be replaced.

Inspect yokes for cracks, wear or distortion.

REASSEMBLY

Remove the U-joint from the box and remove all four bearing assemblies. With the cross grease fitting hole aligned with the slip joint assembly grease fitting, insert one journal of the cross into the driveshaft yoke journal as far as possible from the inside, and tilt until the opposite cross journal clears the other yoke journal and drops into position. Install the cross lubrication fitting and fill the cross reservoir with grease.

Pack retaining cap bearing assemblies approximately $\frac{1}{3}$ full with the lubricant specified in Section 10. The lips of the bearing seal **MUST** be lubricated to prevent the seal from turning inside out upon installation. Apply an anti-seize compound to the outside diameter of the two bearing assemblies.

Move one end of the cross to cause a trunnion to extend beyond the outside of the driveshaft yoke. Place a retaining cap bearing assembly over cross trunnion and align it to the yoke hole. Holding the bearing assembly aligned with the yoke hole, press the bearing assembly flush to the face of the end yoke by hand. Do not use a steel hammer for this purpose. The joints should move freely in the bearings and not bind. Also, if new bearing assemblies are not being installed, care should be taken to replace bearing assemblies in the same locations from which they were removed.

Move the cross laterally to the opposite side and through the yoke journal. Place the second retaining cap

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Yohe Depo Excerpt 2-15-12 Pg
307

LAWRENCE YOHE - 2/15/2012
VOLUME 2

IN THE DISTRICT COURT
197TH JUDICIAL DISTRICT
CAMERON COUNTY, TEXAS

DANIEL CAMPOS, INDIVIDUALLY AND AS	)	
REPRESENTATIVE OF THE ESTATE OF	)	
CHRISTINA LOZANO CAMPOS, DECEASED;	)	
MARIA L. LOZANO; ANNA B.	)	
SCHERMERHORN; ADRIANA L. PRUITT;	)	Cause No.
AMALIA F. HEATHER; AND DANIEL N.	)	2010-03-001717-C
CAMPOS, et al,	)	Volume II
	)	
Plaintiffs,	)	
	)	
vs	)	
	)	
AMERICANOS, U.S.A., L.L.C.,	)	
FIRSTGROUP AMERICA, INC., GREYHOUND	)	
LINES, INC., IRMA MENDOZA MORADO,	)	
MOTOR COACH INDUSTRIES, INC., MCI	)	
SERVICE PARTS, INC. AND	)	
ARVINMERITOR, INC.,	)	
	)	
Defendants.	)	
	)	

The Videotaped Deposition of LAWRENCE YOHE

Date: Wednesday, February 15, 2012

Time: 10:22 a.m.

Place: Hilton Garden Inn
53995 Indiana State Road 933
South Bend, Indiana 60018

Called as a witness by the Defendants in
accordance with the Texas Rules of Civil
Procedure pursuant to Notice.

Before Charolette A. Martinez, CSR 11983
Notary Public, St. Joseph County, Indiana

MIDWEST REPORTING, INC.
1448 Lincolnway East
South Bend, Indiana 46613

Merrill Corporation - Dallas

800-966-4567

www.merrillcorp.com/law

7b9fc60d-ae87-462a-b9c3-1748184e4452

9 Q. And do you agree that from the testing that you've
10 done, that simply driving with an unlocked tag
11 axle steering on a 102DL3 coach is not something
12 that would cause you to lose control of the coach?
13 A. I agree with you, simply unlocked. I've done it.
14 Wouldn't be afraid to do it. There would be --
15 there would be certain caveats. In other words,
16 like if I was on a rough country road, maybe
17 crossing railroad tracks, hitting bumps, I would
18 want to be more careful. But basically I wouldn't
19 be afraid to take a bus across country with the
20 tag axle unlocked.

MIDWEST REPORTING, INC.

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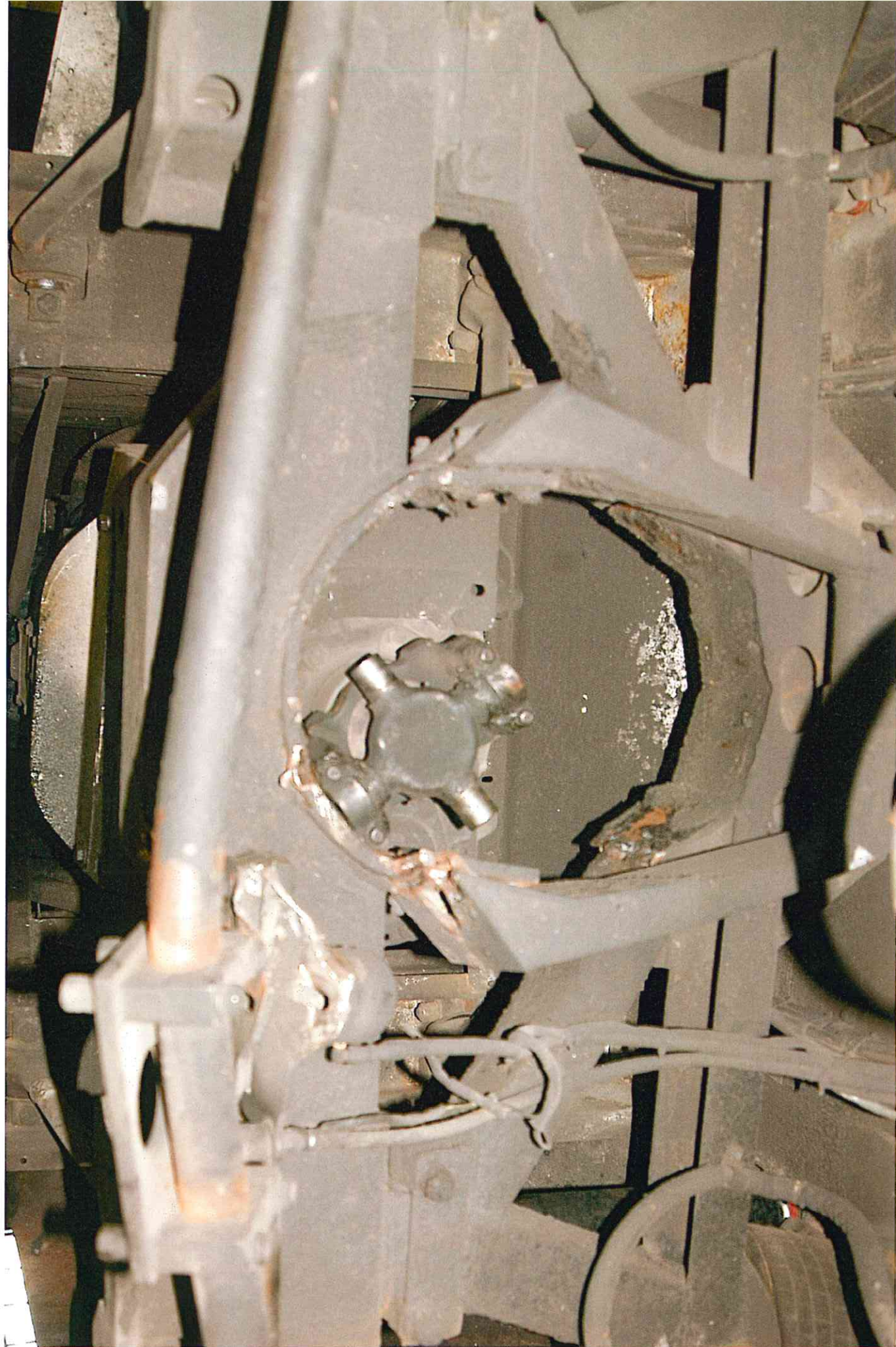
Photos - Bent Tie Rod - Loop -
Torn Stra

PHOTOS OF BENT TIE ROD, LOOP AND TORN STRAP

H:\MCI\Campbellton\Photos\BRucoba Feb 1, 2012 Nappanee-Richmond-Mt Gretna\Bus
Unit 6352 Photos & Inspect Notes

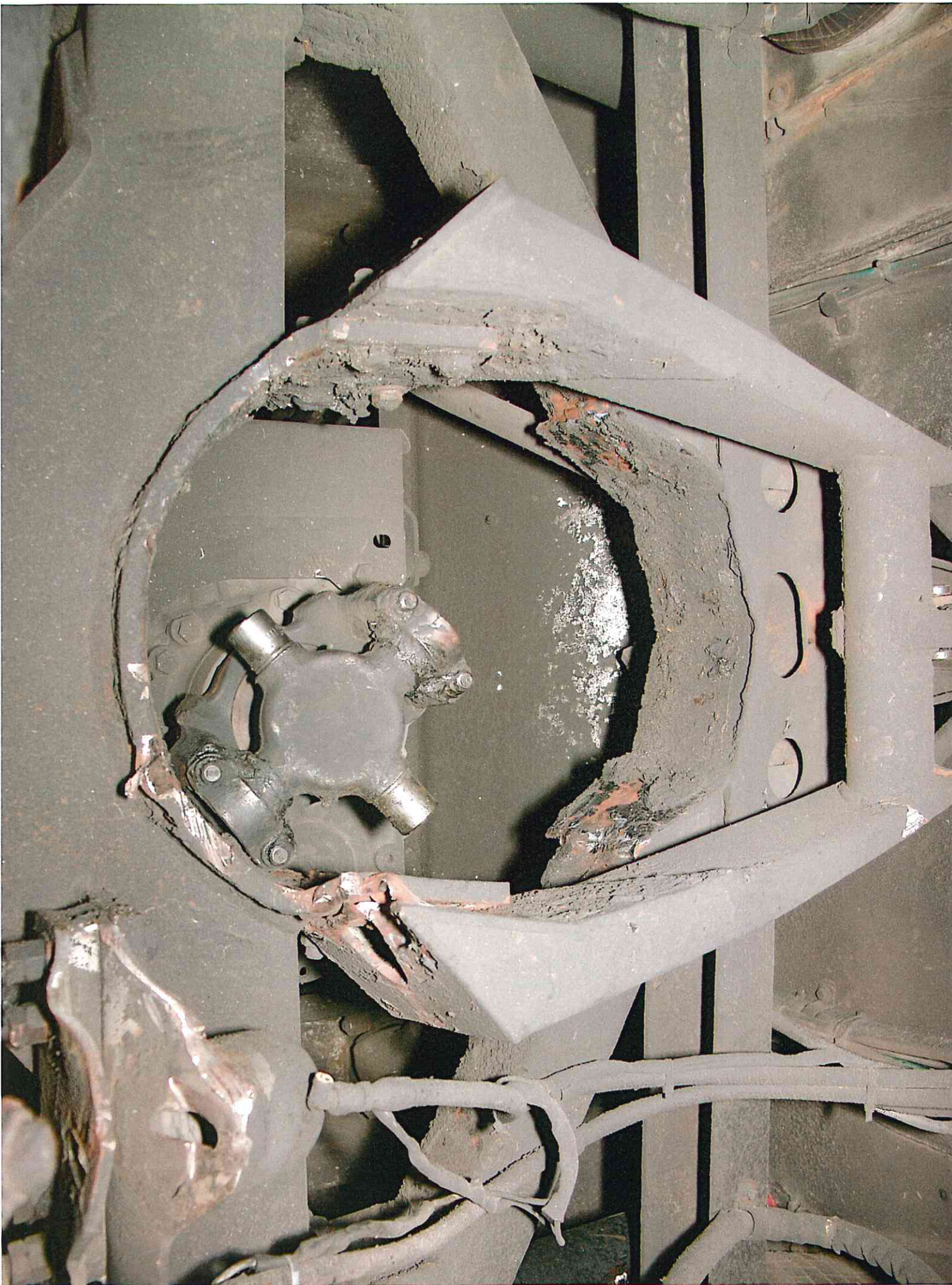
*L this date is wrong. All photos of
Mt. Gretna bus were taken on 1/25/12*

H:\MCI\Campbellton\Photos\KGranat - 01-24-2012 & 01-25-2012 Nappanee & Richmond
GLI Bus Inspection & Notes\Coach 6352 - Mt Gretna Crash\Photos - Full Resolution





177



6895



6904



6901



6909



69076913



6217



PE12-007

MCI

4-27-2012

Response 10

Photos - Damage Rear Drivers
Side

**PHOTOS OF
DAMAGE TO
REAR
DRIVER'S
SIDE**



105
COLD

105
COLD





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Photos - Damage to Front Left

**PHOTOS OF
DAMAGE TO
FRONT LEFT**





102101







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Photos of Driveshaft

PHOTOS OF DRIVESHAFT



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Photos of Rollover Damage

PHOTOS OF ROLLOVER DAMAGE



