

plan. Then we conducted tests at a 5-occupant heavy load only for those vehicles in which loading differences might influence tip-up. If the vehicle had completed the maneuver without tip-up with more than three water dummies in the rear it was not necessary to retest at a lighter load. Likewise, if the vehicle tipped up in the light load (no water dummies) condition, it was not necessary to retest with three water dummies in the rear. We have never observed a vehicle for which a greater passenger load improved performance in a tip-up test.

D. Test Results

The test results in Table 1 reflect the performance either measured or

imputed as described for a heavy-load condition representing 5 occupants except for the Ford Explorer 2DR, the Chevrolet Tracker and Metro that were designed for only four occupants, and the Honda CRV, Honda Civic and Chevrolet Cavalier that could not be loaded to the 5 occupant level without exceeding a gross axle weight rating because of the additional weight of the outriggers.

Note that Table 1 includes some results collected during tests performed with alternative steering angles. Although the steering angles used during these tests were still based on the handwheel angle that would produce a steady-state lateral acceleration of 0.3 g

at 50 mph on a level paved surface, the scalars used to calculate the steering angles were smaller. These tests were performed because, for some vehicles, the methods used to calculate the steering inputs used in the J-Turn and/or Fishhook maneuvers can produce "excessive" steering—steering angles so great that maneuver severity is actually reduced (*i.e.*, the lateral force capability of the tires is exceeded). As an example, consider the Ford Ranger 4WD and Aerostar. These vehicles required a reduction of the J-Turn steering scalar from 8.0 to 7.0 (Ranger 4WD) or 6.0 (Aerostar) before J-Turn steering was able to produce two-wheel lift.

TABLE 1.—DYNAMIC MANEUVER TEST RESULTS (THE CHECK MARK INDICATES TIP-UP OBSERVED)

Veh. group number	Model range/make/model	Nominal static stability factor	Fishhook light (FL) (2 occ.)	Fishhook heavy (FH) (5 occ.)	J-turn light (JL) (2 occ.)	J-turn heavy (JH) (5 occ.)
.....	'92-'00 Mitsubishi Montero 4WD	0.95	✓	✓	.....	✓
47	'95-'03 Chevrolet Blazer 2WD	1.02	✓	✓	.....	✓
43	'95-'01 Ford Explorer 2dr 2WD	1.06	.....	.....	.....	.....
44	'95-'01 Ford Explorer 4dr 4WD	1.06	.....	✓	.....	.....
66	'96-'00 Toyota 4Runner 4WD	1.06	.....	✓	.....	.....
89	'93-'97 Ford Ranger p/u 4WD	1.07	✓	✓	✓	✓
58	'88-'97 Jeep Cherokee 4WD	1.08	.....	.....	.....	.....
59	'95-'02 Acura SLX/Isuzu Trooper 4WD	1.09	✓	✓	✓	✓
70	'88-'98 Ford Aerostar 2WD	1.10	✓	✓	✓	✓
74	'88-'02 Chevrolet Astro 2WD	1.12	.....	✓	.....	.....
53	'89-'98 Chevrolet/Geo Tracker 4WD	1.13	.....	✓	.....	.....
91	'88-'98 Chevrolet K1500 p/u 4WD	1.14	.....	.....	.....	.....
88	'93-'97 Ford Ranger p/u 2WD	1.17	.....	✓	.....	✓
85	'97-'02 Ford F-150 p/u 2WD	1.18	.....	.....	.....	.....
54	'97-'01 Honda CR-V 4WD	1.19	✓	✓	.....	✓
83	'88-'96 Ford F-150 p/u 2WD	1.19	.....	.....	.....	.....
67	'88-'95 Dodge Caravan/Plymouth Voyager 2WD	1.21	.....	.....	.....	.....
90	'88-'98 Chevrolet C1500 p/u 2WD	1.22	.....	.....	.....	.....
68	'96-'00 Dodge Caravan/Plymouth Voyager 2WD	1.23	.....	.....	.....	.....
73	'95-'98 Ford Windstar 2WD	1.24	.....	.....	.....	.....
22	'95-'01 Chevrolet/Geo Metro	1.29	.....	.....	.....	.....
19	'88-'94 Chevrolet Cavalier	1.32	.....	.....	.....	.....
18	'91-'96 Chevrolet Caprice	1.40	.....	.....	.....	.....
7	'88-'95 Ford Taurus	1.45	.....	.....	.....	.....
26	'92-'95 Honda Civic	1.48	.....	.....	.....	.....
Total Tip-ups ....	.....	.....	6	11	3	7

During some Fishhook tests, excessive steering caused some vehicles to reach their maximum roll angle response to the initial steering input before it had been fully completed (this is essentially equivalent to a "negative" T_1 in Figure 2). Since dwell time duration can have a significant effect on how the Fishhook maneuver's ability to produce two-wheel lift, we believe that excessive steering may stifle the most severe timing of the counter steer for some vehicles. In an attempt to better insure high maneuver severity, a number of vehicles that did not produce two-wheel lift with steering inputs calculated with

the 6.5 multiplier were also tested with lesser steering angles by reducing the multiplier to 5.5. This change reduced the likelihood of excessive steering, and increased the dwell times observed during the respective maneuvers. In the case of the Ford Ranger 4x2, Fishhook maneuvers with steering inputs based on the reduced multiplier were able to produce two-wheel lift. Such lift was not observed when the original steering was used (*i.e.*, when a multiplier of 6.5 was used). We have modified the Fishhook test procedure to include tests at the steering angle determined by the 5.5 multiplier for vehicles that do not

tip up using the original steering angle determination.

Each test vehicle in Table 1 represented a generation of vehicles whose model year range is given. Twenty-four of the vehicles were taken from 100 vehicle groups whose 1994–98 crash statistics in six states were the basis of the present SSF based rollover resistance ratings. The vehicle group numbers used to identify these vehicles in the prior notices (65 FR 34998 and 66 FR 3388) are given for convenience. The nominal SSFs used to describe the vehicle groups in the prior statistical studies are given. While there were some variations between the SSFs of the