

SUBJECT: 1990 Explorer Handling Stability

BACKGROUND: Compact Utility Vehicles, as a class, are receiving increased attention from NHTSA and Consumer Groups in part due to FARS (Fatal Accident Reporting System) data quoted by Consumer Reports magazine. The Bronco II has been singled out for criticism by CU due to its alleged poor Fars record among Compact Utility vehicles and poor performance in their "Double Lane Change" test procedure. The 1990 Explorer has been designed to achieve the best possible handling stability given the fundamental constraints imposed by the vehicle package and suspension "type". Summarized below are parametric and functional comparisons of the Bronco II, Explorer and Chevrolet T-Blazer (generally recognized as B-I-C in Rollover Stability based on FARS and CU testing).

PARAMETRIC COMPARISON:

	<u>Bronco II</u>	<u>Explorer</u>	<u>T-Blazer</u>
Stability Index	2.13	2.19	2.17
Tread	56.9	58.3	56.5ft/55rr
Wheelbase	94	102 & 112	101
Base Tire	205/75R15	225/70R15	205/75R15

To achieve the stated values, the Explorer has been lowered to the maximum extent possible. The relatively high engine position of the Explorer, unchanged from Bronco II, prevents further significant improvement in Stability Index without extensive suspension, frame and sheetmetal revisions.

ENGINEERING STABILITY TESTS:

Ford Light Truck began using the J-Turn Test as its principal stability test with the introduction of the Bronco II. This test was copied from the Insurance Institute testing of the Jeep CJ5. The Bronco II and Explorer pass the J-Turn test at speeds up to 55 mph and at steer angles up to 360 deg. at maximum expected steer rates (Light Truck objective). While the BII was unable to pass the test with P215 tires, the Explorer has passed this test with P245 tires (one tire size larger than the maximum tire released). The Chevy T-Blazer passes J-Turn requirements with an apparent large margin of "reserve". The difference in "reserve" between the Explorer and T-Blazer in the J-Turn test has been traced to the differences in front suspension "roll center". The higher roll center of the Explorer reduces the effectiveness of the roll control devices (results in a transient roll overshoot) and dynamically raises the CG. No reduction in roll center is possible without major revision to the front suspension and steering systems.

CONSUMERS UNION TEST (run by Light Truck):

The Consumers Union test became an implicit requirement for the Explorer due to the potential for adverse publicity. There are many attributes of the test (especially driver variability) that cause it to be a poor tool to predict "Real World" rollover stability. The Explorer with the base tire performs significantly better in the CU test than the Bronco II. With the optional tire, the 2 dr. Explorer is approximately equal to the present Bronco II, while the 4 dr is slightly better. The Nissan Pathfinder and Dodge Raider had slightly inferior results vs Bronco II. The T-Blazer appears significantly better than all the other vehicles for this maneuver. There is some risk that, due to variability of the test, the Explorer (especially the 2dr tested with optional tires) will receive a poor rating if production vehicles are tested by Consumer's Union.

EXPECTED ROLLOVER STABILITY IN THE "REAL WORLD":

Neither parametric analyses or stability tests are, by themselves, good predictors of "real world" rollover statistics. Based on studies of FARS accidents conducted by Light Truck, ASO and outside consultants, driver demographics, wheelbase and steering sensitivity must be heavily weighed in any attempt to project FARS performance. While the Bronco II has FARS statistics in the "middle-to-poor" range, the Explorer is expected to be "near B-I-C". The reasons for this include:

- 1.) Longer Wheelbase and substantially slower steering response with more understeer (protects the driver from "over-correction", the cause of most rollover accidents.
- 2.) Improved driver demographics. With the high (80/20) mix of 4dr vehicles, we can expect a less aggressive driver profile with a corresponding reduction in all accident statistics.

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