STRUCTURES LABORATORY - - STATUS REPORT (12/03/90)

To: K. S. Bagga, R. D. Blough, M. Bossio, B. S. Brown, S. C. Brown, D. F. Buser, C. T. Chon, S. M. Cischke, W. T. Cumiskey, J. A. Ernster, W. M. Esser, A. S. Foster, S. J. Furr, R. O. Geiss, F. J. Glasgow, F. J. Hiber, T. J. Hildebrandt, P. I. Hsieh, J. R. Love, D. C. MacDonald, J. E. MacAfee, G. E. McCarron, C. A. Mesa, W. W. McVinnie, N. Omholt, D. N. Renneker, R. A. Rider, F. W. Salo, A. P. Speth, T. R. Street, S. C. Surratt, R. J. Theodoroff, O. J. Viergutz, L. D. Zahn

NEW PLATFORM ENGINEERING/JEEP TRUCK ENGINEERING

Current Production

N-Truck 4x4 Extended Cab A500-Critical Speed Evaluation (Noe)

A critical speed test was performed on an N-truck 4x4 extended cab with an A500 four speed automatic transmission and a 3½" steel prop shaft. The 3½" prop shaft is only used with the 3.9L V6 engine. The truck was evaluated with the worst case axle/tire combination (3.9 axle ratio with 235/75/15 tires). The transmission, adapter and transfer case showed adequate fatigue life at the critical speed requirement (85 mph).

A cast damper weight bracket will be available the first week in December and will be strain gaged prior to running the K-4 schedule at the Proving Grounds

1992 Model Year

N-Truck Fuel System Integrity Impact Validation Tests - B Van & D-Truck Design Direction (Gierak)

Two production N-trucks were modified to represent the 1992 multi-point fuel injection system. A flat front impact test was conducted on a vehicle equipped with a 3.9L - V6 engine. Fuel system containment requirements of Federal Motor Vehicle Safety Standard 301 were met. Another flat front impact test was conducted with the 5.2L - V8 engine configuration. This vehicle also met the FMVSS 301 requirements. Based on these test results, the fuel systems for the D and N-Truck 3.9L and 5.2L engines will incorporate a straight steel quick connect, new fuel rails, and teflon braided fiberglass fuel lines. The B-Van will also be equipped with these items, except the straight quick connect will be made of plastic instead of steel.

1992½ Model Year

ZJ Rear Impact Validation Test (Khalifa)

A program level ZJ vehicle was subjected to a rear impact validation test to verify conformance to the Federal Motor Vehicle Safety Standard 301. This vehicle did not meet the FMVSS 301 requirements. The fuel tank was punctured by an unfriendly corner on the track bar mounting bracket. This bracket has been modified and a new test has been scheduled.

ZJ Steering Gear Loosening and Frame Rail Cracking (Bazinski)

JTE has reported rail cracking on the ZJ Proving Grounds vehicles. The left front rail cracked near the steering gear attachment points. It was also noted that the steering gear attaching bolts lost torque. Testing is being conducted at the RTS Satellite Room to compare endurance of the ZJ design with that of the XJ model in an effort to resolve the problem.

Frame rail test fixtures have been fabricated to permit the frame rail and steering gear of each vehicle model to be subjected to steering link and track bar loading. The steering gear bolts were strain gaged to monitor torque loss and were torqued to minimum specification. The load schedule was from data previously collected during vehicle operation on the K4 course at the Proving Grounds.

The XJ design survived 48K to 50K cycles but the lower steering gear fasteners had loosened and frame rail cracking was exhibited at the end of the test.

The ZJ frame rail showed lower rear steering gear fastener loosening (50%) after only 1400 cycles. The test was stopped due to frame rail cracking at 14,900 cycles. A proposed fix has been tested and has endured for 54K cycles. Fastener loosening is still occurring early in the program. Testing is continuing on proposals which show the most promise as a result of FEA modelling. A video tape has been made to document the steering gear deflections under load.

1993 Model Year

LH Body Testing (Talley)

Program Body-in-White #A02 is undergoing standard structural tests. Door vertical load/deflection tests are in progress. The body is being prepared for seatbelt and child seat tether pull testing. The body modal is complete.

LH Roof Crush Test (Tsai)

A program level LH Body-in-White was subjected to a roof crush resistance evaluation. The unloaded vehicle weight was 3500 pounds. The test result was satisfactory and met the FMVSS 216 requirements.

B-Van Door Strength Tests (Tsai)

A production B-Van Body-in-White was subjected to a door crush intrusion test to determine conformance to Federal Motor Vehicle Safety Standard 214. The test results were not satisfactory. A second B-Van Body-in-White with an added horizontal beam in the door was also evaluated and current FMVSS 214 requirements were met.

XJ-Body Roof Crush Resistance (Tsai)

A two door and a four door Body-in-White were subjected to roof crush resistance tests to determine conformance to Federal Motor Vehicle Safety Standard 216. The test results were not satisfactory and did not meet the current FMVSS 216 requirements. A design review of the pillar and roof sections is in progress.

B-Van/Wagon A-Pillar Stiffness Evaluation (Mac Pherson)

An instrumented production level B-350 127" wheelbase wagon was modified to simulate changes planned for the 1993½ model year. Twist and beam tests were conducted to evaluate comparative stiffness levels and changes in local strain. Four configurations were evaluated. The data is currently being analyzed. A second production level B-van was similarly modified and then delivered to the Road Test Simulator for additional testing.

Fog Lamp Usage (Hill)

Fog lamp usage was requested by Vehicle Systems (NPE) in April of 1990. Fog lamp cycles and on time are being recorded on two overnight duty cycle vehicles and fourteen lease vehicles. Three samples per week of fog lamp usage are collected on the two overnight duty cycle vehicles: 1990 N-truck and 1991 XJ. The N-truck is scheduled to be torn down the first week of December.

Eleven '90 model year and three '91 model year AN-Body lease vehicles have been instrumented to record fog lamp usage. One sample per vehicle per season is collected for the lease vehicles. Out of 25 samples of fog lamp usage collected during the summer (June, July & August) only 5 drivers used the fog lamps. More usage during the summer is needed in order to predict the mean and 95th % customer. Out of 64 samples collected during the fall of 1990 (September, October and November) 29 drivers have used the fog lamps. Fall usage of the fog lamps will be reduced and an interim report prepared in December, 1990. This project is ongoing until usage for all four seasons is collected.

LH 3.5L Throttle Body, Throttle Position Sensor and Map Sensor Dynamic Analysis (Wilber)

The Structures Laboratory is analyzing the vibration characteristics of the 3.5L throttle body link, throttle position sensor, and map sensor. A vibration schedule for the throttle body and throttle position sensor was derived from measurements of operating loads. This schedule will be used to determine a link configuration which produces acceptable loading on the throttle bodies. Throttle shafts are being strain gaged to evaluate the load produced by the link and the vibration data for the map sensor is being analyzed.

1994 Model Year

T-300 Development - Torsional Stiffness Study of Competitive Vehicle (Bazinski)

JTE has requested that a static torsional stiffness test be performed on a 1990 Chevrolet 1500 4x4 cab and front end. The data from this target competitive vehicle will be used for finite element analysis on the T-300.

A second iteration of the front end torsional stiffness test has been performed to generate greater deflections and improve the accuracy of the "cab only" stiffness measurements. Cab torsion tests were conducted with and without the sliding backlite. A fully bonded backlite has been installed in accordance with the JTE test plan. Analysis of the test data is being performed.

1995 Model Year

JA-Body Twist and Beam Test (Talley)

A twist and beam test was requested by the JA-Body Structure Analysis Group. Two sets of tests were conducted on an A-Body-in-White: one at the current wheelbase, and another at the proposed JA wheelbase. The data has been reduced. Body bending and twist stiffness plots have been made and a report is in progress.

B-Van Left Angular Impact Development Tests (Gierak)

A B-250 and a B-350 were subjected to left angular impact barrier tests to determine conformance to the occupant protection criteria of Federal Motor Vehicle Safety Standard 208. The vehicles were modified to represent either the 1992 3.9L or the 5.2L MPI gasoline engine installation and the driver's side air bag scheduled for 1995. The front passenger dummy for each test was restrained by a three point belt, but was not instrumented. Preliminary test results indicated that the driver's air bag, when used without the three point belt, did not permit the FMVSS 208 head injury criteria to be met on the B250 van equipped with a 3.9L MPI engine. The B350 van equipped with a 5.2L MPI engine met the FMVSS 208 occupant protection criteria. The driver's air bag restraint system is under review.

B-Van Front Impact Development Test (Gierak)

A B-350 was subjected to a flat front impact barrier test to determine conformance to the occupant protection criteria of Federal Motor Vehicle Safety Standard 208. The vehicle was modified to represent the 1992 5.2L MPI gasoline engine installation and the driver's side air bag scheduled for 1995. The front passenger dummy was restrained by a three point belt. Preliminary test results indicated that the driver's air bag, when used without the three point belt, did not permit the FMVSS 208 chest injury and femur load criteria to be met. The front passenger dummy was not instrumented. The driver's air bag restraint system is under review.

To: R. D. Blough
514-17-53
From: 418-42-22