turning a corner, or parking, loss of power steering does not pose a significant risk to traffic safety. The loss of drive to the generator prevents the vehicle's battery from being charged, but is a progressive loss of battery power and does not represent a safety concern. Loss of engine cooling could cause the vehicle to overheat, typically resulting in coolant overflow at the radiator or a burst cooling system hose, however, there have been no reports of such incidences. Air conditioning is an auxiliary function, the loss of which does not affect the safe operation of the vehicle.

In view of the foregoing, it is unlikely that NHTSA would issue an order for the notification and remedy of the alleged safety-related defect as defined by the petitioner in the subject vehicles at the conclusion of the investigation requested in the petition. Therefore, in view of the need to allocate and prioritize NHTSA's limited resources to best accomplish the agency's safety mission, the petition is denied.

Authority: 49 U.S.C. 30162(d); delegations of authority at CFR 1.50 and 501.8.

Issued on: November 1, 2001.

Kathleen C. DeMeter,

Director, Office of Defects Investigation, Safety Assurance.

[FR Doc. 01–27869 Filed 11–5–01; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA–2001–10053–Notice 1]

Safety Rating Program for Child Restraint Systems

AGENCY: National Highway Traffic Safety Administration (NHTSA), DOT.

ACTION: Notice, request for comments.

SUMMARY: Section 14(g) of the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act requires that, by November 2001, a notice be issued to establish a child restraint safety rating consumer information program to provide practicable, readily understandable, and timely information to consumers for use in making informed decisions in the purchase of child restraint systems (CRS).

In response to this mandate, NHTSA has reviewed existing rating systems that other countries and organizations have developed, and conducted its own performance testing to explore a possible rating system for child restraints. The agency has tentatively concluded that the most effective consumer information system is one that gives the consumer a combination of information about child restraints' ease of use and dynamic performance, with the dynamic performance obtained through higher-speed sled testing and/or in-vehicle NCAP testing. The agency is also giving consideration to conducting *both* higher-speed sled tests and in-vehicle NCAP testing in conjunction with the Ease of use rating. This document provides a review of the information and reasoning used by the agency to reach that conclusion, describes the rating systems planned to meet the TREAD requirements, and seeks comment on this plan.

DATES: You should submit your comments early enough to ensure that Docket Management receives them not later than Janaury 7, 2002.

ADDRESSES: You should mention the docket number of this document in your comments and submit your comments in writing to: Docket Management, Room PL–401, 400 Seventh Street, SW., Washington, DC, 20590.

You may call Docket Management at 202–366–9324. You may visit the Docket from 10 a.m. to 5 p.m., Monday through Friday.

FOR FURTHER INFORMATION CONTACT: For issues related to a performance rating, you may call Brian Park of the New Car Assessment Program (NPS–10) at 202–366–6012.

For issues related to a compatibility/ease of use rating, you may call Lori Miller of the Office of Traffic Safety Programs (NTS–12) at 202–366–9835.

You may send mail to both officials at National Highway Traffic Safety Administration, 400 Seventh St., SW., Washington, DC, 20590.

SUPPLEMENTARY INFORMATION:

I. Overview

Congress has directed the National Highway Traffic Safety Administration (NHTSA) to develop a child restraint safety rating system that is practicable and understandable (Section 14 (g) of the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, November 1, 2000, Pub.L. 106–414, 114 Stat. 1800) and that will help consumers to make informed decisions when purchasing child restraints. Section 14(g) reads as follows:

(g) Child restraint safety rating program. No later than 12 months after the date of the enactment of this Act, the Secretary of Transportation shall issue a notice of proposed rulemaking to establish a child restraint safety rating consumer information program to provide practicable, readily understandable, and timely information to consumers for use in making informed decisions in the purchase of child restraints. No later than 24 months after the date of the enactment of this Act the Secretary shall issue a final rule establishing a child restraint

safety rating program and providing other consumer information which the Secretary determines would be useful (to) consumers who purchase child restraint systems.

In response to this mandate, the agency reviewed presentations given at a public meeting in February 2000, and comments submitted in response to a notice announcing a draft Child Restraint Systems Safety Plan. The agency also examined other existing and proposed child restraint programs. Four options that emerged were: (1) A rating based on Federal Motor Vehicle Safety Standard (FMVSS) No. 213 compliance tests (sled tests), (2) a rating based on higher-speed sled testing, (3) a rating based on in-vehicle testing, and (4) a rating based on ease of use. The agency then further explored each option to determine if it would generate information that is practicable, repeatable, and appropriate.

After considering the various options, NHTSA has tentatively concluded that the most effective consumer information system is one that gives the consumer a combination of information about child restraints' ease of use and dynamic performance, with the dynamic performance obtained through higher-speed sled testing and/or in-vehicle NCAP testing. The agency is also giving consideration to conducting *both* higher-speed sled tests and in-vehicle NCAP testing in conjunction with the ease of use rating.

This notice is arranged as follows. First, the notice will discuss the February 2000 public meeting and the draft Child Restraint Systems Safety Plan, and the comments received from the public. Second, the notice will discuss other existing and proposed performance ratings, the research NHTSA has done, and NHTSA's current plan for rating child restraint performance. Third, the notice will discuss other existing and proposed ratings based on compatibility and/or ease of use, and NHTSA's current plan for rating child restraint ease of use. Fourth, the notice will discuss why NHTSA is not planning a summary rating for child restraints. Last, the notice will briefly discuss how NHTSA plans to distribute child restraint ratings to the public.

II. 2000 Public Meeting and Draft Child Restraint Systems Safety Plan

A. 2000 Public Meeting

On February 9, 2000, NHTSA conducted a public meeting in Washington, DC, to discuss the safety performance of child restraint systems and options for giving consumers information on the safety performance of different child restraints (65 FR 1224, January 7, 2000, Docket No. NHTSA–2000–6628). The announced topics were voluntary standards, strategies for enhancing compliance margins, improved labeling, and possible ways of rating child restraint performance.

B. 2000 Child Restraint Systems Safety Plan

On November 27, 2000, NHTSA published a notice requesting comments on a draft Child Restraint System Safety Plan (65 FR 70687, Docket No. NHTSA–2000–7938). The overall goal of NHTSA's Child Restraint Systems Safety Plan was to reduce fatalities and reduce injuries to U.S. children aged 0–10 years who are involved in crashes. To realize this goal, the plan employed three key strategies: encourage correct use of child restraints for all children, ensure that child restraints provide optimal protection, and give consumers useful information about restraining their child.

C. Public Comments About Child Restraint Ratings

Several presenters at the public meeting and commenters to the plan addressed the idea of a performance rating based on compliance margins. The concept of compliance margins is based on Federal Motor Vehicle Safety Standard (FMVSS) No. 213, Child Restraint Systems (49 CFR 571.213). Under this concept, child restraints would be ranked according to how large a margin they passed the standard's performance criteria. The larger the margin that the child restraint passed the standard by, the higher the child restraint would be ranked. A Maryland Child Safety Technician suggested the use of compliance tests to develop ratings, citing sufficient differences in crash test results. However, he voiced concerns whether such a rating system could address the issue of vehicle compatibility.

Other commenters opposed the development of a CRS rating based on the compliance margin. Juvenile Products Manufacturers Association, Inc. (JPMA) stated that, ''while the current FMVSS No. 213 standard provides an exceptional rating system (essentially an easily-understood pass-fail), the industry would certainly consider some other type of performance rating system.'' However, JPMA noted that with so many variables, it is likely that a rating system may have a potentially negative effect rather than a positive one. JPMA thought it appropriate also to mention that ''the current dynamic standard, FMVSS No. 213, is more severe than about 95 percent of all crashes, and the historical performance of PROPERLY USED car seats both in testing and in the field is exceptional, better even than seat belts.'' [1] Ford Motor Company and other child safety experts suggested that the agency consider having a rating system only after revising FMVSS No. 213. They stated that the current standard sled pulse is too severe and the test protocol is outdated. These commenters recommended that the revised standard should reflect the current child passenger environment.[2]

Commenters addressed the idea of including child restraints in frontal New Car Assessment Program (NCAP) tests. Evenflo supports the addition of child restraints to NCAP tests. The company believes that because the performance requirements of FMVSS No. 213 are so demanding, all child restraints passing such a standard deserve a high rating. Evenflo believes that distinguishing safety performance between child restraints that pass FMVSS No. 213 is difficult. The company also feels that the addition of child restraints to NCAP tests will allow for an evaluation of how well the child restraint system works with the vehicles.[3] ARCCA, Inc., favors the incorporation of child restraints into NCAP tests. ARCCA stated that, NCAP tests more closely replicate real world conditions than the FMVSS No. 213 compliance tests. In addition, the incorporation of child restraints into the program would maximize its benefits.

Both Partners for Child Passenger Safety [4] and Graco Children's Products [5] oppose adding child restraint systems to NCAP crash tests. These organizations believe that the performance of child restraints in NCAP tests may be characteristic of the child restraint, the vehicle, or the restraint/vehicle interaction. This poses questions as to the significance of the results of such tests. Ford agrees with these comments, adding that vehicle/CRS interface factors and various vehicle crash pulses obscure the results of child restraint performance in NCAP tests.[6]

Consumers and consumer advocates almost universally expressed the opinion that any child restraint rating

[1] Robert Waller, Jr., Juvenile Products Manufacturers Association, Inc., Docket 6628.

[2] Comments on Child Restraint System Ratings, Ford Motor Company, Docket 7938.

[3] Evenflo Company, Inc., Randy Kiser, Docket 7938.

[4] Partners for Child Passenger Safety, Flaura K. Winston, MD, PhD, Dennis R. Durbin, MD, MSCE, Kristy Arbogast, PhD, Shannon D. Morris, Docket 7938.

[5] Graco Children's Products, Steve Gerhart, David E. Campbell, Docket 7938.

[6] Comments on Child Restraint System Ratings, Ford Motor Company, Docket 7938.

should include factors for compatibility with various vehicles and ease of use. These commenters noted that a good performance rating would be meaningless if the child restraint was not compatible with the consumer's vehicle or was difficult to use properly.

The Insurance Corporation of British Columbia (ICBC) claimed that high misuse rates of child restraints are a common finding. Children aged 3 years and older are restrained, most often, only in adult seat belts. To compensate for misuse, ICBC recommended that the NHTSA establish an ease of use rating.[7] Evenflo also feels that the most problematic area, the area in which improvement would have the greatest positive impact, is in the nonuse and misuse of child restraints.[8] The Automotive Coalition for Traffic Safety (ACTS) agreed, and stated that the dynamic performance of child restraints should not be a big issue. ACTS further suggested, however, that the recent addition of the top tether should reduce misuse. The University of North Carolina (UNC) Highway Safety Research was also a proponent of an ease of use rating. They stated that the crash test performance of child restraints is only part of the information that should be incorporated into a rating system. Safety Belt Safe concurred, mentioning that even top-rated systems are difficult to use. They stated that child restraint ratings should be based on real-world conditions and behavior, not solely on crash tests. Graco Children's Products, Inc. also asked that a rating system be based on more than simply crash performance. They suggested that other factors such as labeling and instruction clarity, ease of installation and vehicle compatibility, fit of child, and ease of use, be included.

One manufacturer expressed concern about starting an ease of use rating system. The manufacturer asked what type of person would do the evaluating. This manufacturer believed that it would be a good idea to have inexperienced people conduct the evaluation of child restraint systems. The manufacturer suggested using the same people gives consistency in test methodology. This commenter thought the agency might have difficulty getting the same people always. The child restraint manufacturers also believed that a rating system would drive the child restraint manufacturers to improve their products and provide more ease of use features.

NHTSA met with two manufacturers of child restraints, Britax and Evenflo. These two manufacturers both stated that the seats with higher cost are the restraints with more advanced features which are likely to be ease of use features. Both manufacturers described how a child restraint rating system might affect the retail market. They believed that the retail buyers would limit their purchases of child restraints to those with high ratings. Consequently, the agency might drive the retail market to the seats with the higher prices.

III. CRS Dynamic Performance Rating Programs

A. Existing Programs for Rating Dynamic Performance of CRS

1. Consumer's Union

The July 2001 issue of Consumer Reports was the Consumer's Union's most recent report on child restraints.[9] They gave a rating for the dynamic performance of each child restraint, which is part of the overall rating given to child restraints. This overall rating is the averaged score of dynamic performance, ease of use, installation, and stroller use. The installation score is determined by how securely a child restraint can be installed in three different cars with different seats and safety-belt types. Ease of use evaluates how difficult it is to adjust the straps and the harness. A stroller score is also given to applicable child restraints. This score is based on the safety, convenience, and the durability of the child restraint and stroller. The dynamic score was determined from a sled test representing a 30 mph (48 km/h) frontal crash. The seats were tested using dummies that approximate an infant, 3-year-old toddler, and 6-year-old child. Head Injury Criterion (HIC), chest G, head excursion, and knee excursion were compared with the injury criteria established by NHTSA to determine the dynamic performance rating.[10] A six-category range was used to rate child restraints based on the dummy measurements. The six categories were: Not Acceptable, Poor, Fair, Good, Very Good, and Excellent.

The child restraints of the 2001 survey were tested both with and without the top tether. The results from this study showed that all but one child restraint provided better protection while using the top tether in frontal crashes.

2. Japanese NCAP

The Ministry of Land, Infrastructure, and Transport (MLIT) in Japan recently announced a proposal to rate child restraint systems. MLIT is asking for comments at this time. Japanese NCAP proposes to evaluate baby seats (rear-facing) and infant seats (forward-facing or convertible). They do not plan to test bed-type-seats or booster seats. Nine-month-old and three-year-old child dummies will be used for the evaluation.

Child restraints will be tested in frontal sled tests. Child restraints will be tested using the ECE Reg. 44 crash pulse at 35 mph (56 km/h) in a Toyota Estima (similar to the Sienna in the U.S.) sled buck. A rating system will comprise the dummy readings, the level of physical damage, release of CRS anchorage, and dummy kinematics. A four-tier rating system will be used: Excellent, Good, Acceptable, and Not Recommended.

3. Australian CREP

The Child Restraint Evaluation Program (CREP) is a joint program run by many of the same groups as Australian New Car Assessment Program (ANCAP). CREP tests child restraints in dynamic sled tests with a top tether, which is required in Australia. Two frontal crashes are simulated at 49 and 56 km/h (30 and 35 mph). Side and rear crashes are simulated at 32 km/h (20 mph). CREP conducts another test at the same speed, but with the CRS positioned at a 45° angle relative to the sled. One additional dynamic test is done to rear-facing and convertible child restraints only. This is an inverted test conducted at 16 km/h (10 mph) to simulate a rollover.

CREP gives a rating, incorporating both the dynamic test results and ease of correct use results. They report these ratings as either preferred buy or standards approved. The preferred buy seats did well in the dynamic tests and the ease of correct use tests. The standards approved rating is given to seats that passed the 49 km/h (30 mph) test, but had excessive head movement or broke a load-bearing component during the 56 km/h (35 mph) test.[11]

[7] Identification and Publication of Relative Performance of Different Child Restraint Systems, Insurance Corporation British Columbia, Betty Brown, Docket 6628.

[8] Evenflo Company Inc., Randy Kiser, Docket Number: 7938.

[9] Consumer Reports, Traveling With Kids, July 2001.

[10] Pittle, Greenberg, Galeotafiore, Champion, Comments of Consumer Union to the National Highway Traffic Safety Administration on the Child Restraint System Plan, Docket Number: NHTSA–7938, 2001.

[11] www.nrma.com.au, July 23, 2001.

B. Existing Programs for Rating Dynamic Performance of Vehicles Equipped With CRS

1. Euro NCAP

The European New Car Assessment Program evaluates the safety of children in vehicle crash testing. The subject vehicle's manufacturer provides a recommendation for which child restraints are to be used during the tests. The Europeans install child restraints in vehicles and subject them to offset frontal and side impact tests. In the offset frontal testing, two child crash dummies are placed in the back of the test vehicle. The two types of child dummies used in the test are a 3-year-old P dummy and an 18-month-old infant P dummy. Both dummies are placed in the appropriate CRS, either forward-facing or rear-facing, designated for their ages. For the side impact test, the dummies are secured in the same model child restraint used for the offset frontal crash test.

Euro NCAP evaluates dummy kinematics. In addition, technicians evaluate ease of use, ease of installation in the vehicle, and how securely they can install the CRS. Currently, Euro NCAP does vehicle tests for child restraints without using a top tether. Euro NCAP gives points based on the dynamic performance of the child dummies during the full-scale crash tests. These points are subject to modifiers that will reduce the points earned. Such modifiers include penalties for ejection, poor seat labeling, and vehicle incompatibilities. A total of four points is possible for the child scores. These points are added to the overall total, which is used to determine the vehicle's star rating. However, if any anomaly leads to a dangerous event (e.g., if the child seat breaks or if a belt becomes unlatched), Euro NCAP notes the event to consumers in their publications and web site.[12]

2. Australia

The Australian New Car Assessment Program (ANCAP) harmonized its testing procedures with Euro NCAP in 1999. Therefore, in accordance with the Euro NCAP procedures, ANCAP does both an offset frontal crash at 64 km/h (40 mph) and a side impact test at 50 km/h (31 mph). Two child restraints are placed in the rear seat of each vehicle. TNO P1.5 (18-month) and P3 (3-year-old) dummies are used to assess injury. ANCAP plans to rate the dynamic performance of child restraints in vehicle tests, however, the rating protocol will likely be different from that published by Euro NCAP.

C. CRS Dynamic Testing by IIHS

The Insurance Institute for Highway Safety (IIHS) currently does not rate child restraints. However, IIHS recently did several vehicle frontal crash tests that included child restraints. Vehicle velocities in these car-to-car tests were 48 km/h (30 mph), and vehicle frontal engagement ranged from 49% to 89%. Dummies used in the testing were the 6-month-old Infant CRABI, the 12-month-old CRABI, and the 3-year-old Hybrid III.

IIHS evaluated the dummy results for the 6-month-old CRABI, the 12-month-old Infant CRABI, and the 3-year-old Hybrid III. They used the corresponding reference values specified in the May 12th, 2000 **Federal Register** notice for FMVSS No. 208.[13] The results for the 6-month-old CRABI and the 12-month-old CRABI were all well below the allowable limits. The results for the 3-year-old Hybrid III dummy showed all injury readings were less than the reference values except for neck tension. IIHS suggested that these results mean the current neck tension criterion overestimates the possibility of an AIS [14] $\geq$ 3 injury.[15]

D. NHTSA CRS Dynamic Testing

In response to the TREAD Act, NHTSA examined three dynamic test methods for rating child restraint systems. The first dynamic option was a sled test at 30 mph (48 km/h). This option would use the results of the FMVSS No. 213 compliance testing to determine a rating. Two possible rating schemes could be used to rate or rank the child restraint dynamic performance. One possible rating scheme would be based on the compliance margins with which a dummy met the limits of the standard on HIC, chest acceleration, head excursion, and knee excursion. A second rating scheme would use the injury risk curves that NCAP uses to rate adult occupant protection in a frontal crash. Scaling these curves to represent a 3-year-old child would produce a five-star classification system. The probability of injury for the 3-year-old child is as follows:

$P_{head} = [1+\exp(5.02 - 0.00431*HIC)]^{-1}$

$P_{chest} = [1+\exp(5.55 - 0.0756*ChestG)]^{-1}$

A second dynamic testing option examined was a high-speed sled test at 35 mph (56 km/h). This test method would be similar to the current FMVSS No. 213 compliance test; however, the sled acceleration pulse would have a greater magnitude to increase the speed to 35 mph (56 km/h). A third dynamic testing option considered was a full-scale crash test. This approach would add a child restraint in the rear seat of a vehicle when it is tested for frontal NCAP, and rate the vehicle on how well the CRS and vehicle work together to protect the child. These last two options would also use the scaled injury risk curves for a rating.

Each of the next three sections describes the testing conducted by the agency to assess each of the proposed options. The summaries review the trends of child restraint system (CRS) responses in the Federal Motor Vehicle Safety Standard (FMVSS) No. 213 sled testing, higher-speed sled testing, and frontal NCAP in-vehicle testing.

1. CRS Performance in FMVSS No. 213 Sled Testing

As specified in Standard No. 213, 49 CFR § 571.213, the agency does compliance testing of child restraints on a sled buck at a nominal speed of 30 mph (48 km/h). Currently, a Hybrid II dummy is used in testing to represent a 3-year-old child.

In model year 2000, the agency tested 50 upright, forward-facing child restraints according to FMVSS No. 213. Twenty-four seats were tested without a top tether, and 26 seats were tested with a top tether. We restrained all seats with only a lap belt (no lower anchorage or shoulder belt). The pertinent test results are tabulated in the Appendix, Table A2.

Currently, to pass the FMVSS No. 213 compliance test, a child restraint must achieve dummy injury numbers of a Head Injury Criterion (HIC) less than 1,000 and a resultant chest acceleration of less than 60 G's. For the compliance tests, HIC is calculated using an unlimited period and chest acceleration uses a 3 ms clip. As shown in Figure 1, regardless of whether we equipped the child restraints with a top tether, all child restraints achieved dummy injury readings below the maximum allowable values. Figures 2 & 3 illustrate the margin of compliance for HIC and chest acceleration, respectively. The margin of compliance is one minus the measured injury reading divided by the injury assessment reference value (IARV) times 100. Higher percentages are better, having less probability of injury. Regarding the HIC, all model year 2000

[12] *http://www.euroncap.com/results.htm,* August 23, 2001.

[13] Notice for FMVSS No. 208, Federal Register, Vol. 65, No. 93, page 30680, May 12, 2000.

[14] Association for the Advancement of Automotive Medicine, *The Abbreviated Injury Scale,* Des Plaines, 1990.

[15] Susan Meyerson & Adrian Lund, Insurance Institute for Highway Safety, ''Child Restraint Durability in High-Speed Crashes,'' 2001 SAE conference, SAE2001–01–0123.

child restraints tested easily fall within the limits specified by the FMVSS No. 213 compliance tests. Most had a compliance margin of more than 50%. Although the margin is not as large for chest acceleration, all tested child restraints passed this compliance requirement as well.

FMVSS. No. 213 also has a requirement for head and knee excursion. Head excursion is limited to 720 mm (28 in) when a top tether is used, and 813 mm (32 in) without use of a top tether. Knee excursion is limited to 915 mm (36 in). Figures 4 & 5 illustrate the margin of compliance for head excursion and knee excursion, respectively. Head and knee excursion limits are compliance limits imposed to reduce the chances of a child striking the vehicle interior or submarining (sliding under the belt feet first) in an automotive crash. Head and knee excursions are much closer to the compliance limits than HIC and chest acceleration. (This may reflect attention to occupant protection, since increases in distance traveled by the occupant reduces the forces experienced by the occupant.)

To further investigate the possibility of using FMVSS No. 213 compliance testing to rate child restraints, NHTSA performed additional sled tests to gather child restraint protection data. These sled tests were performed in accordance with the specifications outlined in FMVSS No. 213 compliance tests, with two exceptions. The three-year-old Hybrid III dummy was used to assess injury rather than the Hybrid II dummy. Also, the current compliance test secures child seats in two configurations, lap belt only and lap belt with top tether. These additional sled tests secured the child seat with the lap/shoulder belt and tether. One child restraint tested was secured with LATCH.[16]

Nine child restraints were tested. Figure 6 shows the individual plots of chest acceleration versus HIC. Injury risk curves are also plotted, and illustrate that eight of the nine child restraints would receive a 5 star rating, while the other one would be borderline 5 star/4 star.

[16] ''LATCH'' is a term used by industry and retail groups referring to the child restraint anchorage system required by Federal Motor Vehicle Safety Standard No. 225. LATCH stands for ''Lower Anchorages and Tethers for Children.'' The term is used to refer to vehicles equipped with the anchorage system (e.g., ''LATCH vehicles'') and to child restraints equipped with attachments that connect to the anchorage system (e.g., ''restrained with LATCH,'' or ''LATCH child restraints''). For convenience, we will use the term in this notice.

Advantages and Disadvantages of a Rating System Based on FMVSS No. 213 Compliance Testing

a. Advantages

—Ratings for most child restraint systems could be implemented quickly and inexpensively using Hybrid II results now obtained in Standard No. 213 compliance testing.
—The compliance testing is a simple pass and fail rating system. Carrying out a rating based on the margin of compliance is straightforward. The performances of child restraints could be used as a rating system.
—The rating system based on sled testing subjects all child restraints to the same impulse loading, so child restraint performance is assessed with little or no influence of outside variables.

b. Disadvantages

—FMVSS No. 213 is currently under revision. Ford Motor Company and others suggest that the agency consider delaying the child restraint safety rating until after the revision of FMVSS No. 213.
—A rating based on dynamic sled testing does not take into account the compatibility between child restraints and vehicles. Many people believe that a child restraint and a subject vehicle must be evaluated as a system to effectively assess child safety protection.
—To the extent that current child restraints all exceed the standard by a wide margin, as in the case for HIC, the compliance margin may not meaningfully distinguish among child restraints. For example, if we use the star rating system, nearly every child restraint would get 5 stars. If we use the percentage of compliance margin, should we tell the public a child restraint with a 60% margin is safer than one with a 55% margin? Also, it would be difficult to explain to the public which compliance margin (i.e., HIC, chest acceleration, excursions) is more important to safety.

2. CRS Performance in Higher-speed Sled Testing

Some commenters suggested that the agency should consider having a child restraint rating based on sled tests at a higher speed (35 mph) than the compliance testing (30 mph). As NCAP currently tests motor vehicles at 5 mph (8km/h) above the compliance tests, the same reasoning could be applied to the sled testing of child restraints. (It was also recommended that the rating system use a realistic vehicle pulse and a vehicle seat as part of the test condition.) To determine the viability of developing an effective rating system as a consumer program for child restraint testing, the agency has conducted higher-speed sled testing.

NHTSA conducted higher-speed sled tests using the same nine child restraints as in the previous section. The same FMVSS No. 213 test procedure was used with Hybrid III three-year-old dummies. To attain the higher speed, a sled pulse with a similar shape and duration length as that of the 213 pulse was used, except that the change-of-velocity was elevated from 30 mph (48km/h) to 35 mph (56km/h).

All of the child restraints tested produced dummy injury measurements well below the FMVSS No. 208 criteria of 570 HIC and 55g chest acceleration. Figure 7 shows the results plotted with the NCAP injury risk curves. Although the injury assessment values are slightly greater for the 35 MPH (56 km/h) sled tests than the 30 mph (48 km/h) sled test (shown in Figure 6), eight of the nine child seats fell within the 5 star range, and one fell just below in the 4 star range.

Advantages and Disadvantages of a Rating System Based on Higher-speed Sled Tests

a. Advantages

—Running tests at higher speeds is the same approach we have used for front and side crashworthiness ratings in NCAP, and would be expected to magnify performance differences among child restraint systems beyond that obtained in compliance testing.
—A rating based on sled performance would be consistent because all child restraints would be subjected to the same impulse loading and would be placed on the same simulated seat.

b. Disadvantages

—A rating based on a higher sled test speed would again not take into account compatibility between child restraints and vehicles. Many people believe that a child restraint and a subject vehicle must be evaluated as a system to effectively assess child safety protection.
—A higher test speed with the Standard No. 213 crash pulse may be so severe that the information would not be a helpful indicator of expected CRS performance in the majority of real-world crashes.
—Based on tests with nine child seats, the higher test speed may not sufficiently ''spread out'' the performance differences to allow NHTSA to provide meaningful information to the public.

3. CRS Performance in NCAP Frontal Vehicle Testing

The agency evaluates vehicle crashworthiness in frontal and side impact under the New Car Assessment Program (NCAP). Under this program, the agency conducts approximately 40 frontal and 40 side crash tests each year. For the frontal crash, the agency does these tests with two 50th percentile adult male dummies in the front seat. Historically, NCAP does not put any occupants in the rear seats of the vehicles. However, because there is room in the rear seats of most vehicles, it has been suggested that NHTSA add child restraints to the rear of NCAP frontal crash tests.

NHTSA has evaluated child restraints in frontal crash tests conducted under the New Car Assessment Program. In model year (MY) 2001 testing, NCAP used various child restraints in the rear seats of vehicles undergoing frontal NCAP crash tests. Child restraints were placed in a total of twenty NCAP vehicles, varying in type and size. The agency evaluated performances of six different five-point-harness forward-facing child restraints. The evaluation assessed (1) the variability of CRS performance in various vehicle types and sizes, (2) CRS/vehicle interaction, and (3) performance among different child restraints. CRS performance in the NCAP vehicle tests is shown in Table A1 in the Appendix.

In each vehicle tested, the subject child restraint was secured tightly, and as prescribed by the child restraint manufacturer's instructions. In addition, all child restraints, whether secured with LATCH or secured with a lap/shoulder belt, used a top tether. A Hybrid III three-year-old dummy was used to assess performance. All testing used the full instrumentation package available for the child dummy. The injury assessment reference values for FMVSS No. 208 were used to evaluate the results.

Figure 8 shows the overall child dummy performance concerning the Head Injury Criterion (HIC 15) and resultant chest acceleration, plotted with the NCAP injury probability curves scaled for the three-year-old. The performance is shown for child restraints with LATCH or with a belt restrained CRS with a top tether. As shown, many (38.7%) dummy readings exceeded the allowable injury criterion for HIC 15 (570) or the allowable chest G criterion (55 G's). Using the star rating system, most vehicles would be rated with 3 or 4 stars for rear seat child occupancy protection. Five samples had injury readings low enough for a five-star rating; only one vehicle was rated with two stars. This is in contrast to driver and right passenger frontal NCAP test results which result in about 88% 4 and 5 star ratings.

All seats tested in the NCAP vehicle crash tests used five-point harnesses, while the FMVSS No. 213 tests use all types of harnesses. Figure 9 shows the model year 2000 compliance tests results for only seats with a five-point harness and lap belt only. This graph shows that the tethered seats produced lower HIC responses than those seats without a top tether. The HIC responses for both the tethered and the non-tethered seats are clustered among their respective seat types. In comparing the data in Figures 8 and 9, we may infer that the full-scale crashes produce a greater range of values for the Head Injury Criterion. One could further infer that the greater range of HIC response shown in the NCAP data of Figure 8 is due not only to the child restraint, but also due to crash variations, such as crash pulse, belt geometry (important for child restraints that use a lap/shoulder belt), seat contour, and seat cushion stiffness.

The influence of these additional factors for crash testing is shown more clearly in Figure 10. Figure 10 shows seven vehicles that underwent NCAP crashes with the Cosco Triad child restraint. As shown, the Cosco Triad did not give the same performance in these seven NCAP vehicles. HIC injury values varied from approximately 300 to 650. The performances of the Evenflo Horizon V and the Fisher Price Safe Embrace II show like trends in vehicle testing. This is shown in Figure A1 in the Appendix.

The agency has conducted this testing to address whether a specific child restraint would do the same in various NCAP vehicles. We determined that the answer is no. The agency next examined whether various child restraints would do equally well in a specific vehicle.

Figure 11 shows the relative performance of four different CRSs crashed in two different minivans. Two crash tests were conducted with each minivan, and there were two child restraints placed in the rear seat for each test. The first Grand Caravan was tested with the Century STE and Horizon V. The second time, it was crashed with the Safe Embrace II and the Horizon V. For the Ford Windstar, the first test had two Safe Embrace II child restraints in the rear seat; in the second test, Cosco Triad child restraints were used. All child restraints in each comparison were restrained with either LATCH (which includes a top tether) or a lap/shoulder belt and a top tether. Although the data are extremely limited, and there was only one CRS (Safe Embrace II) that was used in both vehicles, CRS performance appeared to be better when tested in the Ford Windstar, and may be an indication that the vehicle has an influence on child safety protection.

Figures 12 & 13 show vehicle crash pulse duration and acceleration peak versus chest acceleration. Although there is considerable scatter in the data, there appear to be slight trends, which would indicate that the vehicle's structural response could have an influence on the child restraint performance. Figure 12 suggests that, as the time duration of the crash increases, there is a reduction in chest acceleration. Figure 13 shows that, as the peak acceleration of the vehicle increases, there is a trend toward higher chest acceleration. (The agency did not find similar trends for the Head Injury Criterion.)

Based upon this limited amount of data, it appears that a child restraint tested in a vehicle with good crash pulse characteristics (i.e., longer time duration, lower peak acceleration) could perform better than the same child restraint tested in a vehicle that does not.

Further, good performance does not depend upon cost of the CRS. The agency examined the cost of child restraints (MY 2000) versus the relative performance of forward-facing child restraints tested with the three-year-old dummy in FMVSS No. 213 sled tests. Figure 14 shows no correlation between the cost of child restraints and their performance in dynamic sled testing. For the low IARV's, (HIC < 400 and chest G <40), there are CRS from all price ranges. In addition, the two CRS with the highest HIC and chest G responses were in the $100–$150 cost range (i.e., a high cost range). Therefore, the limited available data show that a CRS need not be expensive to provide good child protection.

Advantages and Disadvantages of Rating a Vehicle Equipped With a Child Restraint

Unlike the rating systems proposed for the sled tests at 30 mph (48 km/h) and 35 mph (56 km/h) which rate only the child restraint, this option would rate the vehicle equipped with a CRS as a system in protecting the child.

The following discusses the pros and cons of basing a rating system on in-vehicle testing of child restraints.

a. Advantages

—In-vehicle testing would address the interaction of the vehicle and the child restraint in overall safety

performance, since it would encourage vehicle manufacturers to take into account child restraint performance in designing vehicles.
—Using in-vehicle testing to evaluate a child restraint in the vehicle would enhance world harmonization with Euro NCAP and ANCAP.
—CRS testing can be easily incorporated into the New Car Assessment Program. The NCAP program conducts about 40 frontal crashes annually; adding child restraints to these tests could be done at a relatively low cost.

b. Disadvantages

—Such a system would provide a rating for the vehicle rather than the child restraint. Also, the consumer may mistakenly think that some child restraints may appear to have poor performance if the agency only tests them in certain vehicles, when in actuality they may perform well in other vehicles.
—To the extent that the agency only tests a child restraint in vehicles that perform well, that information may mislead the public about the protection offered by that child restraint in lesser-performing vehicles.
—This rating system would not help consumers choose a child restraint suitable for an older vehicle model.
—Adding the CRS and dummy to the NCAP vehicle would require the removal of fluids and/or vehicle components to attain the test weight, and thereby potentially influence assessment of other NCAP crash results such as fuel leakage.

IV. Child Restraint Ease of Use Rating

A. Child Passenger Safety Selection, Use, and Installation Website

In addition to implementing a child restraint rating program, NHTSA has also been mandated by Congress to consider how to provide consumer information on the physical compatibility of child restraints and vehicle seats on a model-by-model basis (Section 14(b)(4) of the TREAD Act).

In May 1995, the Blue Ribbon Panel on Child Restraint and Vehicle Compatibility made a series of recommendations including a suggestion that vehicle manufacturers create a chart illustrating which hardware and what procedures of installation were necessary to ensure proper installation of child restraints in vehicles. In the Fall of 1995, NHTSA considered this recommendation and at the time, determined that the agency would try to develop a child restraint and vehicle compatibility database and make it available on a CD–ROM to child passenger safety advocates and others who assist the public with child safety education and proper installation. It was believed that the program would allow the cross-referencing of data regarding specific child restraints considering the weight and age of the child, vehicle make, model and year choices indicating available seating locations, resulting in a list of compatible child restraints and vehicle seating and installation information. The original plan was to have a database containing child restraint installation information for 100 different 1993–1996 model year vehicles, using 35 child restraints.

Over the course of developing this database, it became apparent that collecting data on several child restraints in hundreds of vehicles, resulting in the combination of thousands of child positioning possibilities was inherently subjective, prohibitively expensive, and very labor intensive. In addition, the information that would be available to assist consumers was limited to a certain type vehicle and a certain type child restraint, which would serve only a small number of consumers. Further, the LATCH rulemaking will greatly enhance the compatibility of child restraints and vehicles, which reduces the need for a CD–ROM database. Realizing these limitations, NHTSA began to explore ways in which we could develop a service that would provide accurate and up-to-date information to consumers on how to properly select the appropriate restraint for their child, and use and install it properly. In addition, NHTSA wanted to utilize the infrastructure of trained and certified child passenger safety technicians (over 19,000 to date) throughout the country.

In March 2001, NHTSA developed and made available an internet-based service on its website, providing recommendations for the correct use of each type of child restraint to help consumers select the most appropriate child restraint system (http://www.nhtsa.dot.gov/people/injury/childps/csr2001/csrhtml/safetyFeatures.html). It provides a current listing, along with pictures, of all new child restraints available along with a list of various features available on the child restraints that may make them easier to use and install. It provides a list of model year 2001 vehicles with child restraint features, as well as vehicle owner's manual instructions for child restraint installation. In addition, this website application includes pictures of proper use and step-by-step instruction on installation. It also describes and shows common compatibility problems between vehicles and child restraints and offers solutions to obtain the best fit. This website application allows for the continual addition of current and accurate information, at minimum cost, and significantly expands public access. The site has received thousands of visits per week since its placement in March.

This application is not specific to child restraints and vehicles on a model-by-model basis, as originally intended. However, it provides guidelines for the selection of the appropriate restraint, tips for proper use and installation, and points consumers in the proper direction for installation assistance, by linking to a listing of thousands of inspection stations located throughout the country where consumers can go and have their child restraint inspected by a certified child passenger safety technician. For these reasons, and because providing the information on a model-by-model basis has proven to be limited, impracticable, and prohibitively costly, we have decided that the web-based approach is the appropriate method of providing the consumer information to the public.

B. Summary of Existing Ratings for Ease of Use

1. Australia

The New South Wales Roads and Traffic Authority (RTA) joined with the National Roads and Motorists Association (NRMA) and the Royal Automobile Club of Victoria (RACV) to conduct a joint program to assess the relative performance of child restraints available in Australia. In addition to crash testing, the program covers installation, use and compatibility with a range of vehicles. The child restraints that performed the best were given a ''preferred buy rating.'' To be awarded a ''preferred buy rating,'' a child restraint must perform well in crash tests that are more severe than the Australian Standard and perform well for ease of correct installation and ease of use.

Child restraint/vehicle compatibility is evaluated by fitting each restraint in both the rear center and rear left seats of test vehicles. The vehicles used to evaluate compatibility are the top-selling models in each of the following categories: large sedan, large station wagon, small hatchback, medium hatchback, multipurpose vehicle, and large four-wheel drive. In addition to the determination that the restraint and vehicle are compatible, the NRMA also evaluates restraints on how easy they

were to install in vehicles and how easily children could be secured in them.

2. Consumer's Union

Consumers Union (CU), a nonprofit membership organization, has been evaluating child restraints for more than 25 years. Their child restraint ratings can be found on their web site and in their publication, Consumer Reports magazine.

Consumers Union tests child restraints for crash protection, ease of use, and the ability to install properly the restraint with different seatbelts.[17] In making its judgment about ease of use the following attributes are considered:

—Threading vehicle belt through restraint,
—Adjusting harness strap position for different size children,
—Adjusting harness strap tension,
—Adjusting ''belt positioner'' on boosters,
—Placing child in the restraint and arranging the harness,
—Engaging/disengaging the harness locking mechanism,
—Ease of installation in a vehicle with and without the detachable base,
—Ease of disengaging the restraint from a detachable base,
—Carry handle comfort with a 20 pound dummy, and
—Presence of recline angle gauges or indicators and ease of using recline level adjustment.

All of the items are evaluated subjectively on a five-point scale (Excellent, Very Good, Good, Fair, and Poor). The crash protection, ease of use, and installation ratings are also combined into an overall rating.

3. Euro NCAP

In the European New Car Assessment Program, vehicle manufacturers recommend the make/model of a child restraint suitable for a 3-year-old child and a second restraint suitable for an 18-month-old infant. These restraints are then installed in the rear seat of the vehicle during the crash tests. Technicians then provide an evaluation of the ease of installation in the vehicle when setting up the test. NHTSA is not aware of any defined criteria for this evaluation. The evaluation provides information about the compatibility of some child restraint make/models with tested vehicles. In addition, if a vehicle does not have a device for deactivating a frontal protection air bag, a notation is made about the quality of the vehicle's warning about the hazards of air bags with child restraints.

[17] If an infant restraint is sold with a stroller the stroller is also evaluated.

4. ICBC

The Insurance Corporation of British Columbia (ICBC) is a public agency in Canada that was established in 1973 to provide universal auto insurance to motorists in British Columbia, Canada. In July 1999, ICBC invited members of the child restraint usability task force of ISO/TC22/SC12/WG1 (Child Restraints) to meet in Victoria, BC. The purpose of the two-day meeting was to prepare a draft document of usability criteria and objective tests for child restraint manufacturers. Consumer and insurance representatives who evaluated the ''usability'' of child restraints sold in BC subsequently used the draft document. The findings were subsequently published in an ICBC brochure called ''Buying a Better Child Restraint.''

Depending on features and type of restraint, the ICBC strategy rates some or all of the following features:

—Ready to use
—Instructions for use,
—Ease of conversion,
—Labeling on the child restraint,
—Securing the child in the restraint,
—Installation of the child restraint, and
—Tether straps

Several factors are evaluated within each feature category by the evaluators. The participants in the initial meeting rated each of these factors A, B or C according to risk and severity of misuse. The factors with the higher risks of injury if misused were rated ''A,'' while the factors with the lower risks of injury were rated ''C.'' The evaluators then rate each factor, based on agreed upon standards, either ''good,'' ''acceptable,'' or ''poor.'' This rating is then combined with the A, B, or C weighting for that factor. All of the ratings for all of the factors for a feature are combined and an overall rating for that feature is determined. The ICBC does not combine the ratings for each feature to develop an overall rating.

5. Japan

The Japanese Ministry of Land, Infrastructure and Transport, in cooperation with the National Organization for Automotive Safety & Victims' Aid, tests and evaluates the safety of automobiles currently on the market in Japan. The results of these tests are publicly released under the title New Car Assessment Japan. Japan has proposed rating child restraints as part of its New Car Assessment program in 2002.

In addition to dynamic testing, Japan has proposed rating child restraints on ease of use. Specialists would rate the restraint in five categories. These categories are the user manual and other information (i.e., ease of understanding and accuracy), illustrations and instructions on the child restraint (i.e., ease of understanding and accuracy), the safety features of the child restraint (i.e., recline device, cover, and attachment storage), ease of installation (i.e., ease of threading belts and ability to tightly install), and how well the child restraint fits into the vehicle (i.e., ease of adjustment and buckle release mechanism).

Japan proposes to rate each item within the five categories using a 5-level rating system. NHTSA was provided with a summary of the proposal translated into English, which did not indicate what criteria would be used for each category. The category rating would then be the average level of each item within that category. A graphical representation of the ratings would be presented on a ''radar chart'' with a spoke for each of the five categories.

C. Planned Child Restraint Ease of Use Rating System

1. Assessment of Existing Ease of Use Rating Systems

After analyzing all the comments and gathered information, NHTSA has tentatively decided that it appears possible to have a fair and repeatable rating for ease of use. The agency has modeled its planned approach on that used by ICBC, because ICBC uses objective criteria for what is ''good,'' ''acceptable,'' and ''poor'' for each factor rated. NHTSA is also proposing to use a weighting system for the relative importance of each feature within each ease of use category. The agency is planning to rate ease of use features in four categories as A, B, or C, with A being the highest rating and C the lowest. In addition, NHTSA is also considering taking the ICBC rating system one step further by combining these four ratings into an overall rating for ease of use using the same scale.

Almost all of the features evaluated by the other programs NHTSA examined are included in NHTSA's planned program. The difference between ICBC and the other ease of use rating systems (Australian, CU, Euro NCAP, and Japanese) was the known objective criteria for each feature in the ICBC program and the known weighting of the features within each category in the ICBC program. To the extent that a feature evaluated by another program is not included in our program, NHTSA has tentatively determined that it is not a feature related to safety when using

the child restraint in a vehicle.[18] The additional difference between our planned approach and Euro NCAP is that Euro NCAP only evaluates those seats that have been selected by vehicle manufacturers for inclusion in the crash test. NHTSA hopes to be able to evaluate all or almost all the child restraints available in the US market at the time of the evaluation.

NHTSA personnel spent a day conducting a hands-on evaluation of the ICBC rating program to determine the repeatability of the program. With the assistance of a representative of the ICBC rating program, those present were divided into two teams. Both teams evaluated the same six seats. Their scores were put in a computer program that incorporates the weighting. The personnel compared the evaluation scores. While the teams had some minor differences in ratings for features within each category, the agency task force team evaluation resulted in 100 percent repeatability for each category.

While NHTSA agrees that overall, the features selected and rated in the ICBC program are those that are most subject to misuse, analysis of each component and review of the evaluation criteria has led NHTSA to modify slightly the ICBC program. One of the reasons why changes were made was an effort to simplify the information provided to consumers. Other changes were made to reflect child restraint standards of the United States to the extent that they are different from those in Canada. Last, some modifications were also made based on information learned from the repeatability exercise. All of the changes are explained in greater detail below.[19]

2. Four Rating Categories

Depending on features and type of restraint, the ICBC strategy rates up to seven categories:

—Ready to use,
—Instructions for use,
—Ease of conversion,
—Labeling on the child restraint,
—Securing the child in the restraint,
—Installation of the child restraint, and
—Tether straps

Based upon its assessment, NHTSA is planning to rate four categories for each restraint:

—Assembly,
—Evaluation of Labels/Instructions,
—Securing the Child,
—Installation in Vehicle,

NHTSA combined labeling and instructions into one category. In NHTSA's experience, most labels and instructions are stylistically similar, and therefore any restraint is likely to have the same rating in each of these categories. In addition, ICBC has indicated and our experience also showed, that these categories are the least objective. NHTSA believes that combining them into a single category would reduce the influence they would have on a combined rating for ease of use and/or the importance a consumer would place on the individual rating. NHTSA also moved the criteria for ''Ease of Conversion'' to a ''Securing the Child'' category, since the ease of adjusting a child restraint for different size children is directly related to the ease of securing a child in the restraint. Finally, NHTSA moved ''Tether Straps'' to the ''Installation in Vehicle'' category, because there is only one criterion related to tether straps, and because this category also relates to ease of installation in a vehicle.

a. Assembly

NHTSA has decided to include the following features in the ''Assembly'' category:

—All functional parts including seat pad or cover attached and ready to use
—Tether attached to child restraint
—Owner's manual easy to find
—Obvious storage pocket for manual

NHTSA chose not to include the ICBC feature, ''any other add-ons in box'' because it is believed that such add-ons, for example extra pads, cup holders, sun canopy, were not related to ease of use or the safety function of the child restraint. Any add-on that is to be used and is a functional part of the restraint or related to correct use of the restraint is to be included under the ''all functional parts including seat pad or cover attached and ready to use'' category.

NHTSA has chosen to modify the criteria used to evaluate the feature, ''obvious storage pocket for manual.'' ICBC defines ''good'' as ''easy access when CRS installed in all modes,'' an ''acceptable'' as ''easy access not accessible when CRS installed in all modes,'' and ''poor'' as ''none found or not easy access/storage (incl. Plastic tabs).'' During NHTSA's evaluation of the ICBC criteria using several child restraints, we found that in some cases the storage pocket for the instructions manual was easily accessible in all modes, however it was difficult to use. In other words, it was difficult to take the instructions out of the storage pocket and difficult to put them back in. With this difficulty, it is believed that if consumers take the instructions out of the storage pocket they will not put them back. Therefore, NHTSA's planned criteria are:

—A = Easily accessible when installed in all modes and manual can be removed and replaced easily
—B = Easily accessible when installed in all modes but manual cannot be removed and replaced easily (any use of plastic clips as the sole means of storing the instructions will not be higher than ''B'')
—C = Not accessible when installed in all modes.

NHTSA has also modified the criteria used to evaluate the feature ''owner's manual easy to find.'' ICBC defines a ''good'' as ''yes, attached to CRS,'' an ''acceptable'' as ''in box,'' and a ''poor'' as ''no.'' NHTSA regulations also require written instructions; therefore no child restraint manufactured for sale in the United States should receive a ''poor'' under the ICBC program. However, when evaluating the ICBC system, both infant restraints we evaluated had the written instructions attached between the restraint and the detachable base. This forces the consumer to learn how to release the base from the infant restraint without the assistance of instructions. NHTSA felt that a rating should distinguish between written instructions attached so that they were clearly visible as the restraint was removed from the box (many had them in a plastic bag attached to the harness) and those where you had to search for the written instructions. NHTSA also believes that any form of attachment is preferable to having the instructions loose in the box, and therefore has moved the ''in box'' criteria to ''C.'' [20] While NHTSA did not find any restraints that would have received a ''C,'' NHTSA is concerned that if the instructions were loose they could be lost before purchase if the box were damaged or opened for inspection. NHTSA's planned criteria are:

—A = attached to child restraint in a clearly visible location
—B = attached to child restraint but not clearly visible
—C = in box, not attached

[18] NHTSA requests comments on whether we should delete any of the features we have proposed to include, or whether we should include features that we have not included in today's proposal. For example, should rear-facing restraints be rated according to the leg room they provide, which may be a feature that would make the restraint easier to use by infants with long legs?

[19] A copy of the planned evaluation form is included in the appendices to this notice. Details of the program are discussed only to the extent that they differ from ICBC's program.

[20] The agency is mindful that Standard No. 213 requires an owner registration card to be attached to the child restraint, and that too many materials attached to the restraint could dilute the consumer's attention to the registration card. Comments are requested on whether attaching the owner's manual to the restraint will overwhelm the card.

b. Evaluation of Labels/Instructions

NHTSA has decided to evaluate the following features in the ''Evaluation of Labels/Instructions'' category:

—Clear indication of child's size range
—All mode/s of use clearly indicated e.g., rear-facing only or forward- and rear-facing if convertible
—Air bag warning in written instructions
—Shows harness slots okay to use for occupant size
—Instructions for routing for both lap belt and lap/shoulder belt in all modes
—Visibility of seat belt routing
—Visibility of tether use
—Information in written instructions and on labels match
—Durability of labels

Beyond combining two of ICBC's categories, NHTSA has deleted the feature ''is airbag warning visible no matter where CRS is installed.'' NHTSA requires an air bag warning label on rear-facing child restraints in a location that would receive a ''good'' under the ICBC program. Therefore, NHTSA feels this feature can be deleted. NHTSA is retaining the feature ''air bag warning in written instructions'' as NHTSA found a great variety in written instructions with regard to the visibility of this important information.

NHTSA has added ''information on written instructions and on labels match'' as a separate feature. While NHTSA did not encounter any child restraint during its exercise that had different information on the labels than in the written instructions, the representative from ICBC indicated that they find this commonly. For example, the height or weight ranges may be different between the two sources of information. While NHTSA suspects this results because written instructions are printed in a large quantity and therefore not updated as frequently as labels, it could be very confusing to consumers. Therefore, NHTSA felt it deserved a separate category.

NHTSA has also added a feature ''durability of labels.'' NHTSA has received complaints about labels fading and peeling. When evaluating the ICBC program, NHTSA found two child restraints with one or more labels already beginning to peel as they were removed from the box. In a recently published Notice for Proposed Rule Making (NPRM) on child restraint labels, NHTSA did not propose a durability requirement.[21] However, we believe that adding this feature to the ratings will encourage manufacturers to improve label durability. To achieve an ''A'' rating, all of the labels would have to use a technology such as molding or heat embossing. Sticky labels would receive a ''B'' rating unless any of the labels had already started to peel when the restraint was removed from the box. In the later case, the restraint will receive a ''C'' rating.

Under ICBC's program, almost all labels receive a poor for many of the features unless the label is on both sides of the restraint. NHTSA has received comments on labeling upgrades requesting us to keep in mind the limited space on child restraints. Providing a rating on whether restraints have labels on both sides will encourage manufacturers to place labels on both sides, resulting in using the limited space on the restraint for additional labels. NHTSA is considering modifying the ratings to allow for an ''A'' rating if the label meets the specified criteria and is on one side of the restraint. To this end, child restraints would not receive a ''C'' rating if the label was only on one side of the restraint. Encouraging manufacturers to make instructions more accessible, easier to use, and clearer, should provide a justifiable solution instead of encouraging labels on both sides of the child restraint.

c. Securing the Child

NHTSA has tentatively decided to evaluate the following features found in the ICBC ''Securing the Child'' category:

—Buckle can be secured in reverse (harness strap buckle)
—Harness adjustment easy to tighten and loosen when child restraint installed
—Number of harness slots/usable slots
—Ease of attaching/removing base
—Ease of conversion rear-facing to forward-facing or forward-facing to booster and back again
—Visibility of harness slots
—Ease of changing harness slot position
—Ease of reassembly if pad/cover removed for cleaning
—Ease of adjusting/removing shield

In addition to combining the two categories, the agency will slightly modify the rating criteria for two of the features. First, under ''buckle can be secured in reverse,'' (referring to the harness strap crotch buckle which on most child restraints has a red square buckle release) a ''good'' rating by ICBC is a ''no,'' an ''acceptable'' rating is ''yes, but usual release works,'' and a ''poor'' rating is ''yes & difficult to release/access.'' NHTSA has modified the rating to the following: an ''A'' rating is ''no, or yes but usual release works with same degree of effort,'' a ''B'' rating is ''yes, but usual release requires more effort,'' a ''C'' rating is ''yes, but can't use release mechanism.'' The safety concern with being able to reverse a buckle is that during an emergency a parent may be unable to release the mechanism and remove the child from the seat. NHTSA has tentatively chosen to modify this rating based on our opinion that if reversing the buckle did not make the release more difficult to use, there is not a safety concern. Further, NHTSA thought that reversing the buckle might provide a benefit for children who may have learned to unbuckle the release mechanism. With the buckle reversed, the child would be less likely to unbuckle him or herself.

The other modification is the rating criteria for the feature ''ease of changing harness slot position.'' Under the ICBC program a ''good'' rating is ''easy to attach/remove; clear slots easy to thread; easy to attach to hardware,'' an ''acceptable'' rating is ''possible for one person to do; slots may be misaligned/pad in way/in slots; hardware slot shared,'' and a ''poor'' rating is ''other, slot size too small for easy threading; loose mandatory pieces; could misroute through buckle.'' Under the NHTSA program an ''A'' rating is ''no need to rethread; possible for one person to do,'' a ''B'' rating is ''possible for one person to do, easy to attach/remove; large slots easy to thread,'' and a ''C'' rating is the same as that used by ICBC. The reason NHTSA is proposing to make a change to the evaluation criteria is that we've observed that no matter how easy it seems to rethread, some people will rethread the harness wrong.

d. Installation in Vehicle

NHTSA has decided to evaluate the following features in the ''Installation in Vehicle'' category:

—Separation of vehicle belt path
—Ease of vehicle belt routing (hand clearance)
—Ease of seat belt routing (boosters)
—Ease of use of any belt-positioning hardware on CRS including lock-off
—Tether easy to tighten and release
—Belt-positioning device allowing slack to occur

NHTSA is considering adding a feature, ''Ease of tightening belt around CRS.'' Based on experience with installing child restraints we have found some features on child restraints, specifically on infant seat bases, that made tightening of the vehicle belt system difficult, or that resulted in the tilting of the infant seat base to one side upon tightening of the vehicle's lap and shoulder belt through the infant seat base, resulting in an improperly secured

[21] Docket Number: NHTSA–2001–10916.

child restraint. Therefore, we feel there is a need to consider this aspect of installation. NHTSA would need to develop evaluation criteria on what features of a child restraint would receive an ''A,'' ''B,'' or ''C'' rating under this category. NHTSA is soliciting views and comments on this consideration.

3. Weighting the Features

The ICBC program ranks each feature within each category based upon the level of importance. These rankings were determined by the child restraint usability task force of ISO/TC22/SC12/WG1 (Child Restraints) [22] at a meeting in British Columbia. Each ease of use feature is rated as an A, B, or C according to risk of injury and severity of misuse. Component features that could be associated with a high risk of injury if misused are to be rated ''A''. Each ranking is assigned a numerical scale where A = 3 points, B = 2 points, and C = 1 point. The ratings are similarly assigned a numerical scale where good = 3 points, acceptable = 2 points, and poor = 1 point. To determine the rating for a category, the numerical value of the rating for each feature is multiplied by the numerical value of that feature's ranking. The maximum possible score is then divided into thirds to determine the point ranges for the category rating.

This notice is proposing a slightly modified version of this scheme. Whereas we agree with the ICBC relative ratings for the component elements, we do not believe that enough is known to assign weights to the four categories in terms of importance. The discussion on the overall summary rating in Section 8 elaborates on this choice. The NHTSA proposed approach is as follows:

Each component feature is assigned a numerical scale of 1–3 points, with features having the highest relationship to safety receiving 3 points. The ratings are similarly assigned a numerical scale where A = 3 points, B = 2 points, and C = 1 point. To determine the rating for a category, the numerical value of the rating for each feature is multiplied by the numerical value of that feature's ranking. Point ranges for A, B, and C are determined through a 3-part split of the range of possible points for that factor, from the minimum (if all scores were coded ''C'') to the maximum (if all scores were coded ''A'') number of points. Appendix B and Appendix C displays this scheme, with a hypothetical example seat rated.

NHTSA proposes to keep the same ranking as ICBC uses for the component features it has retained. For the four new features that we have added, we have assigned them a 2-point ranking. While we believe these features are important enough to add them to the rating system, their proposed lower ranking reflects the fact that ICBC chose not to include them.

4. Ease of Use Rating Protocol

ICBC uses two 2-person teams to evaluate each child restraint. Prior to the evaluation, the teams have a day of training. ICBC has found that, while the rating for some features may vary between the teams, the overall rating for the category tends to be the same. To the extent that the teams end up with a different rating for a category, they jointly reexamine the child restraint before a rating is determined. Child restraints are installed in a bench seat of a generic minivan for purposes of the evaluation.

NHTSA found that the ratings of the two teams we used in our evaluation also matched. Therefore, we are planning to use the same protocol for rating child restraints for ease of use.

During the evaluation, the teams would install the child restraint in the current FMVSS No. 213 bench. If and when the FMVSS No. 213 bench is updated, the team will use the updated test bench. No dummy will be used during this process.

5. Overall Ease of Use Rating

Market research in recent years has shown that most consumers prefer summary ratings or information because they find it quicker and easier to read and understand. At the same time, a certain significant percentage of consumers also like detailed information that is presented in hierarchical fashion, with the more general information presented initially. NHTSA is planning to combine the planned child restraint ease of use ratings into a summary ease of use rating. While NHTSA notes that it does not have clear information about how organizations that currently provide a summary rating determine that rating, study of the ICBC model has led to the conclusion that it is reasonable to apply a modified version of their model. The notable exception is that NHTSA does not believe it is possible to weight the importance of the four overall categories. As a result, a straight combination numerical rating is not proposed. If all of the individual scores were added to one overall numerical score, the factors containing more component elements would carry more weight. Therefore, the proposal for the combined rating is majority rule for the four categories, with two qualifiers. The two qualifiers are that a seat cannot receive a B rating if more than 1 out of 4 categories is a C and, correspondingly, a seat cannot receive an A rating if more that 1 out of 4 categories is rated other than A. In the example in Appendix C, the seat received a high number of C ratings in important components, thereby resulting in 2 out of 4 categories being rated C. Application of the qualifier gives it a C rating.

V. Discussion and CRS Rating System Proposal

The agency has not made a final determination on which of the four rating systems (three dynamic plus ease of use), or combination of those rating systems, would be most appropriate and responsive to the Congressional mandate of TREAD. However, we have tentatively concluded that the most effective consumer information system is one that gives the consumer a combination of information about child restraints' ease of use and dynamic performance, with the dynamic performance obtained through higher-speed sled testing and/or in-vehicle NCAP testing.

Section 14(g) of TREAD set forth the requirement to establish a CRS rating consumer information program. Other sections of TREAD mention providing ''consumer information on the physical compatibility of child restraints and vehicle seats on a model-by-model basis'' [14(b)(4)] and ''whether to include child restraints in each vehicle crash tested under the New Car Assessment Program'' [14(b)(9)]. From this, the agency has tentatively concluded that a rating program that rates the CRS and/or the vehicle would satisfy the Congressional mandate.

Table 1 shows six factors that were felt to be of primary importance in determining an appropriate CRS rating system. From this table, it is clear that a single rating alternative does not achieve all of the six objectives. Ease of use is the only option that potentially addresses misuse, and thus the agency feels that such a rating option could have a substantial impact on proper CRS use. However, an Ease of Use rating would not provide information on dynamic performance. Given the advantages and disadvantages regarding the various dynamic performance rating options described in the preceding sections, the agency has tentatively

[22] Working group TC22/SC12/WG1, ''Child Restraint Systems,'' to the International Organization for Standardization (ISO), a worldwide voluntary federation of ISO member bodies, is considering developing an ease of use usability rating system for child restraint systems. The group has based its preliminary work on the rating system of ICBC, which is similar to NHTSA's work thus far.

concluded that higher-speed sled tests and/or in-vehicle NCAP testing would be preferable methods for providing dynamic performance information. Comments on which dynamic rating option, individually or in conjunction with the Ease of use rating, would provide the most useful information to the consumer as well as improve overall child safety are requested. Comments are also requested on whether or not the agency should consider conducting *both* higher-speed sled tests and in-vehicle NCAP testing in conjunction with the Ease of use rating. If, in addition to the Ease of use rating, the agency were to provide both a higher-speed sled test rating for the child seat, and an in-vehicle NCAP rating of child occupant protection for the vehicle, would such information be meaningful for the consumer and worth the costs of administering the tests given the relative advantages and disadvantages of each? Also, if the agency were to implement an in-vehicle NCAP rating system, what child seat(s) should be used? Should the agency select child seat(s) from those specified in FMVSS No. 208? If so, should a procedure be based upon only one of these seats to standardize the child seat for all vehicles? If only one child seat is selected, what criteria should the agency use in selecting that seat? If not, is the protocol provided below preferable?

Possible Assessment Protocol for Higher-speed Sled Tests

The following assessment protocol for testing and rating a child restraint in a higher-speed sled test is proposed if this dynamic procedure is selected.

—The agency would select child restraints for higher-speed sled tests so that most of the forward-facing child restraint models sold in the United States would undergo the higher-speed sled test for the evaluation of child restraints.
—Forward-facing child restraints would be placed on the same seat used for the compliance test. The restraint would be secured to the using the LATCH system. Installation instructions prescribed by the manufacturer of the child restraint would be followed.
—Hybrid III three-year-old and/or 12 month CRABI dummies would be placed in the child restraint for assessing injury. Dummy selection would depend upon the weight rating of the CRS. Child restraints designed for weight classifications covering both dummies would be tested with both and provided two rating. Head and chest accelerations would be recorded. The injury assessment reference values developed for child dummies in FMVSS No. 208 would be calculated.
—A five star rating would be applied to the dynamic performance using the HIC and chest acceleration to compute probability of injury as was illustrated in Figure 7.
—Child restraints would also be examined for structural integrity after the test. The physical structural integrity evaluation specified in the FMVSS No. 213 procedure would be applied.
—A rating for the CRS would be made available to the public in a manner similar to that now employed for other NCAP vehicle results.

Possible Assessment Protocol for NCAP Frontal Vehicle Testing

The following assessment protocol for testing and rating vehicles with child restraints for in-vehicle NCAP is proposed if this dynamic procedure is selected.

—After the agency has selected the vehicles for frontal NCAP testing, each vehicle manufacturer would be asked for a recommendation of at least three forward-facing child restraints for children up to a weight of 50 pounds for each vehicle to be tested. At least one of the vehicle manufacturer-recommended child restraints must have a retail price of less than $60. A different CRS manufacturer must make each of the three restraints. An integrated child restraint may be one of the recommended child restraints. Each of the three recommended child restraints must be currently available in the market. If the vehicle manufacturer chose not to make a recommendation, then the agency would choose from any child restraint available in the market.
—One of the three vehicle manufacturer-recommended child restraints would be selected for use in the crash test. A procedure that uses the child restraint in the LATCH configuration would be followed. The agency would follow both the vehicle and child restraint manufacturers' recommendations for installing the child restraint in the passenger vehicle. Our expectation is that the vehicle manufacturer's set-up instructions would be consistent with the installation instructions for the child restraint.
—A forward-facing child restraint would be placed in the seat directly behind the right front passenger, i.e., on the right-hand side of the second row of seats. A 3-year-old Hybrid III dummy would be placed in the child restraint system. Head and chest accelerations would be recorded. The injury assessment reference values developed for child dummies in FMVSS No. 208 would be calculated. If the vehicle is equipped with a built in child seat, testing could be conducted with either or both the built in and add on child restraints.
—A five star rating would be applied to the dynamic performance using the HIC and chest acceleration to compute probability of injury as was illustrated in Figure 7.
—Child restraints would also be examined for structural integrity after the test. The physical structural integrity evaluation specified in the FMVSS No. 213 procedure would be applied.
—A rating for child protection would be added to the vehicle frontal NCAP ratings. In the process of developing the proposed rating system, the agency made several decisions.

These decisions and our rationale for making them are the following:

1. For in-vehicle testing, only frontal NCAP tests are being proposed. Child restraints are not currently compliance-tested under lateral loading conditions. Although lateral test requirements for CRS are being proposed in an upgrade to FMVSS No. 213 under a separate TREAD rulemaking action, the agency felt that the issue of a possible lateral rating should be considered following completion of the FMVSS No. 213 upgrade.

2. The in-vehicle proposed protocol rates only one CRS in the rear seat. Due to the very tight schedule available for conducting and assessing potential CRS NCAP protocol, the agency elected to concentrate on forward-facing child restraints rather than attempt to also include rear-facing child restraints and/or booster seats. The decision to concentrate on the forward-facing CRS was based on the belief that the forward-facing CRS would provide the most meaningful information to the consumer, given that development of procedures for all three systems could not be accomplished in the short time frame. Following incorporation of the forward-facing CRS, the feasibility of incorporating a rating which included rear-facing CRS and/or booster seats would subsequently be considered.

3. The in-vehicle proposed rating uses only the three-year-old dummy. Again, due to the very tight schedule, the agency felt it necessary to collect as much data as possible for one dummy and that the three-year-old would provide the most meaningful information for the consumer. Upon

incorporation of a child restraint system rating with the three-year-old dummy, consideration would subsequently be given to dummies of other sizes.

4. Higher-speed testing which was conducted by the agency used only Hybrid III three-year-old dummies. However, if the higher-speed dynamic performance is selected, utilization of both twelve month CRABI and Hybrid III three year old dummies would be proposed.

Comments on these decisions and the agency's rationale for them are requested. Also, comments regarding possible future extension of the CRS NCAP rating to side impact, other types of CRS, and dummy size are also sought.

VI. Combined Child Restraint Rating

NHTSA is not currently planning to do an overall summary rating combining ease of use and dynamic performance. To date, we have not been able to develop an acceptable methodology for a summary rating. However, we request comments and suggestions on this issue.

VII. Distribution

NHTSA currently produces a print brochure titled Buying a Safer Car that provides NCAP ratings and safety feature information for new vehicles. Because new motor vehicles are commonly introduced in the fall, NHTSA produces the first printing for each model year in the fall. Because NCAP testing cannot begin until the vehicles are available from dealers, this printing only has test results for vehicles which were tested in previous model years and which have not changed significantly. A second printing is produced in the spring after the completion of the NCAP testing program.

NHTSA also publishes an annual brochure titled Buying a Safer Car for Child Passengers. This brochure provides new vehicle safety features and other information relevant to children. The brochure identifies vehicles that have built-in child seats, manual air bag cut-off switches, rear center rear seat lap/shoulder belts, rear-seat adjustable upper belts, and interior trunk releases.

If NHTSA were to elect to have a rating based solely on a vehicle equipped with a child restraint, the existing brochures would be an appropriate venue for the distribution of the ratings. If NHTSA chooses another rating system, we believe new printed information about child restraint ratings will be needed. The current brochures are a helpful model for new print information about child restraint ratings. However, unlike vehicles, child restraint models do not tend to change on an annual cycle. Therefore, NHTSA would have to pick a date and only include in a print brochure child restraints that are available in the marketplace at that time. Representatives from ICBC have indicated that the largest concentration of new child restraint introductions seems to occur in Canada in the months of May and June. To assist us in timing a print brochure, NHTSA requests comments on whether this timing is also accurate for the United States.

NHTSA notes that a print brochure could be used in addition to our web site. Unlike printing, this site can be updated on a continuous basis. Therefore, NHTSA could test child restraints as they became available and add new models to the web site when testing was complete.

VIII. Submission of Comments

How Do I Prepare and Submit Comments?

Your comments must be written and in English. To ensure that your comments are correctly filed in the Docket, please include the docket number of this document in your comments.

Your comments must not be more than 15 pages long. (49 CFR 553.21). We established this limit to encourage you to write your primary comments in a concise fashion. However, you may attach necessary additional documents to your comments. There is no limit on the length of the attachments.

Please submit two copies of your comments, including the attachments, to Docket Management at the address given above under **ADDRESSES.**

How Can I Be Sure That My Comments Were Received?

If you wish Docket Management to notify you upon its receipt of your comments, enclose a self-addressed, stamped postcard in the envelope containing your comments. Upon receiving your comments, Docket Management will return the postcard by mail.

How Do I Submit Confidential Business Information?

If you wish to submit any information under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given above under **FOR FURTHER INFORMATION CONTACT**. In addition, you should submit two copies, from which you have deleted the claimed confidential business information, to Docket Management at the address given above under **ADDRESSES.** When you send a comment containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation. (49 CFR Part 512.)

Will the Agency Consider Late Comments?

We will consider all comments that Docket Management receives before the close of business on the comment closing date indicated above under **DATES**. To the extent possible, we will also consider comments that Docket Management receives after that date.

How Can I Read the Comments Submitted by Other People?

You may read the comments received by Docket Management at the address given above under **ADDRESSES.** The hours of the Docket are indicated above in the same location.

You may also see the comments on the Internet. To read the comments on the Internet, take the following steps:

I. Go to the Docket Management System (DMS) Web page of the Department of Transportation (http://dms.dot.gov/).

II. On that page, click on ''search.''

III. On the next page (http://dms.dot.gov/search/), type in the four-digit docket number shown at the beginning of this document. Example: If the docket number were ''NHTSA–1999–1234,'' you would type ''1234.'' After typing the docket number, click on ''search.''

IV. On the next page, which contains docket summary information for the docket you selected, click on the desired comments.

You may download the comments. However, since the comments are imaged documents, instead of word processing documents, the downloaded comments are not word searchable.

Please note that even after the comment closing date, we will continue to file relevant information in the Docket as it becomes available. Further, some people may submit late comments. Accordingly, we recommend that you periodically check the Docket for new material.

Authority: 49 U.S.C. 322, 30111, 30115, 30117, 30166, and Pub.L. 106–414, 114 Stat. 1800; delegation of authority at 49 CFR 1.50.

Issued on: October 29, 2001.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

BILLING CODE: 4910–59–P

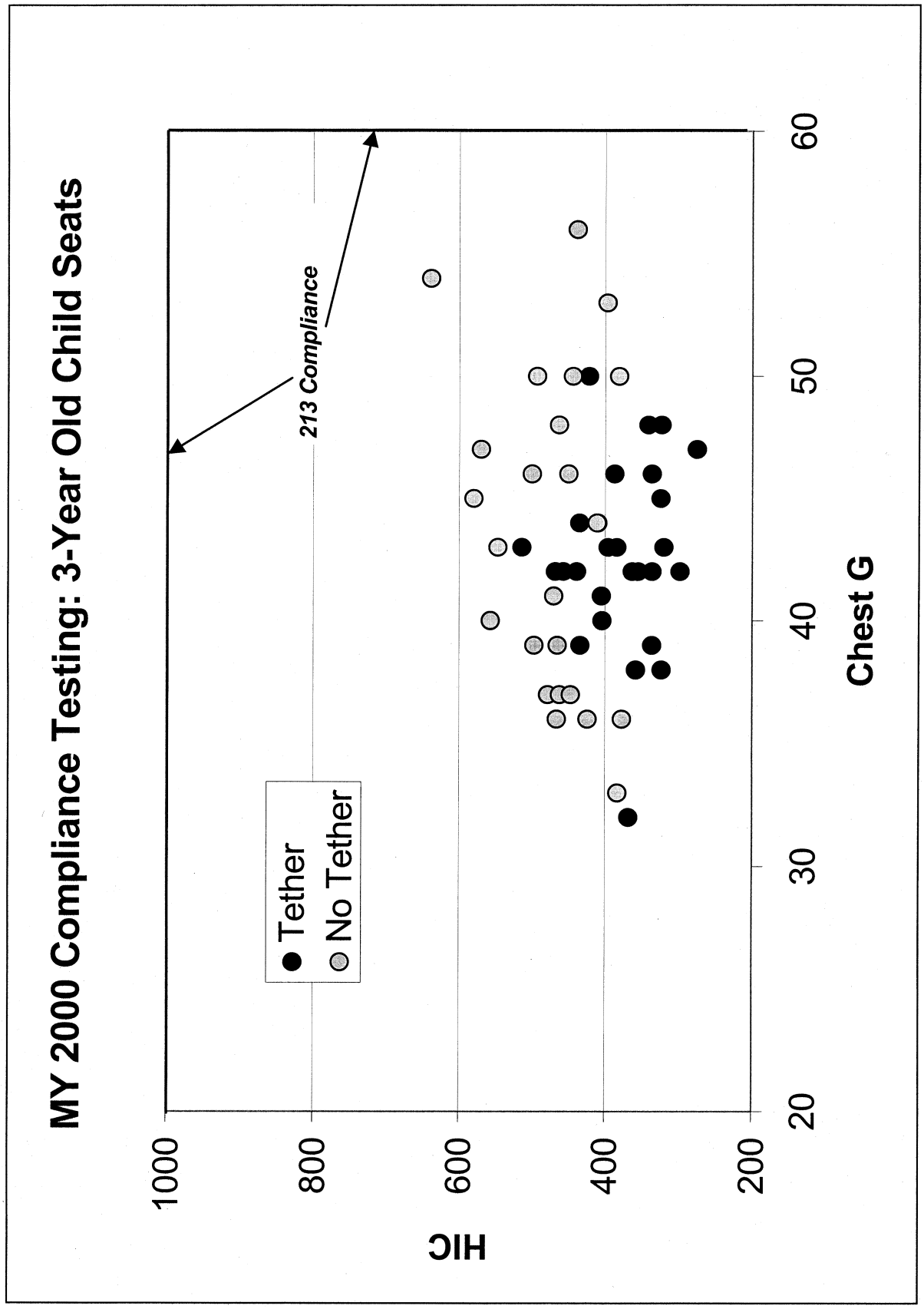


Figure 1: MY 2000 FMVSS No. 213 Sled Test Results (3-Year-Old Hybrid II Child Dummy)

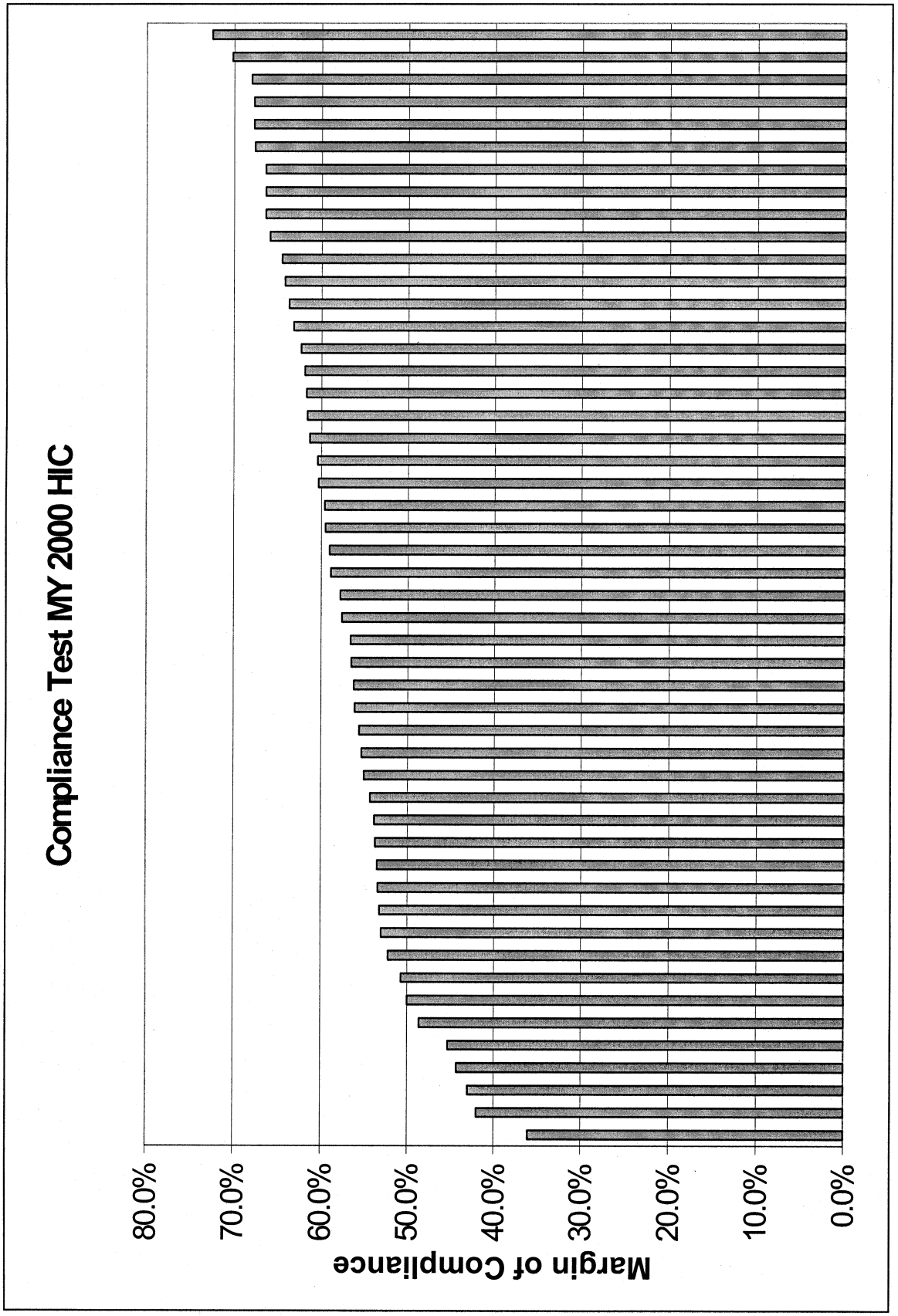


Figure 2: Margin of Compliance for Head Injury Criteria

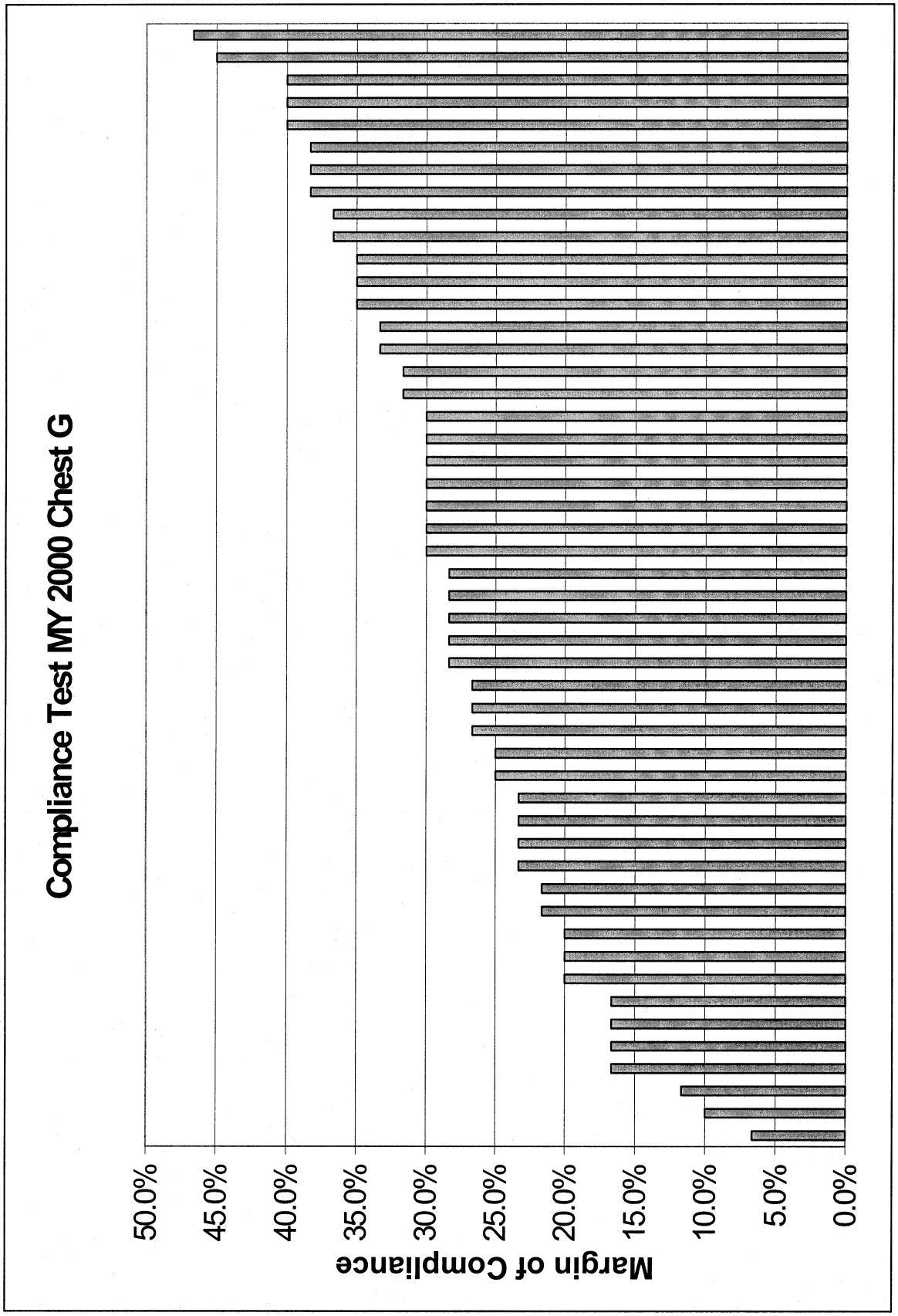


Figure 3: Margin of Compliance for Chest Acceleration

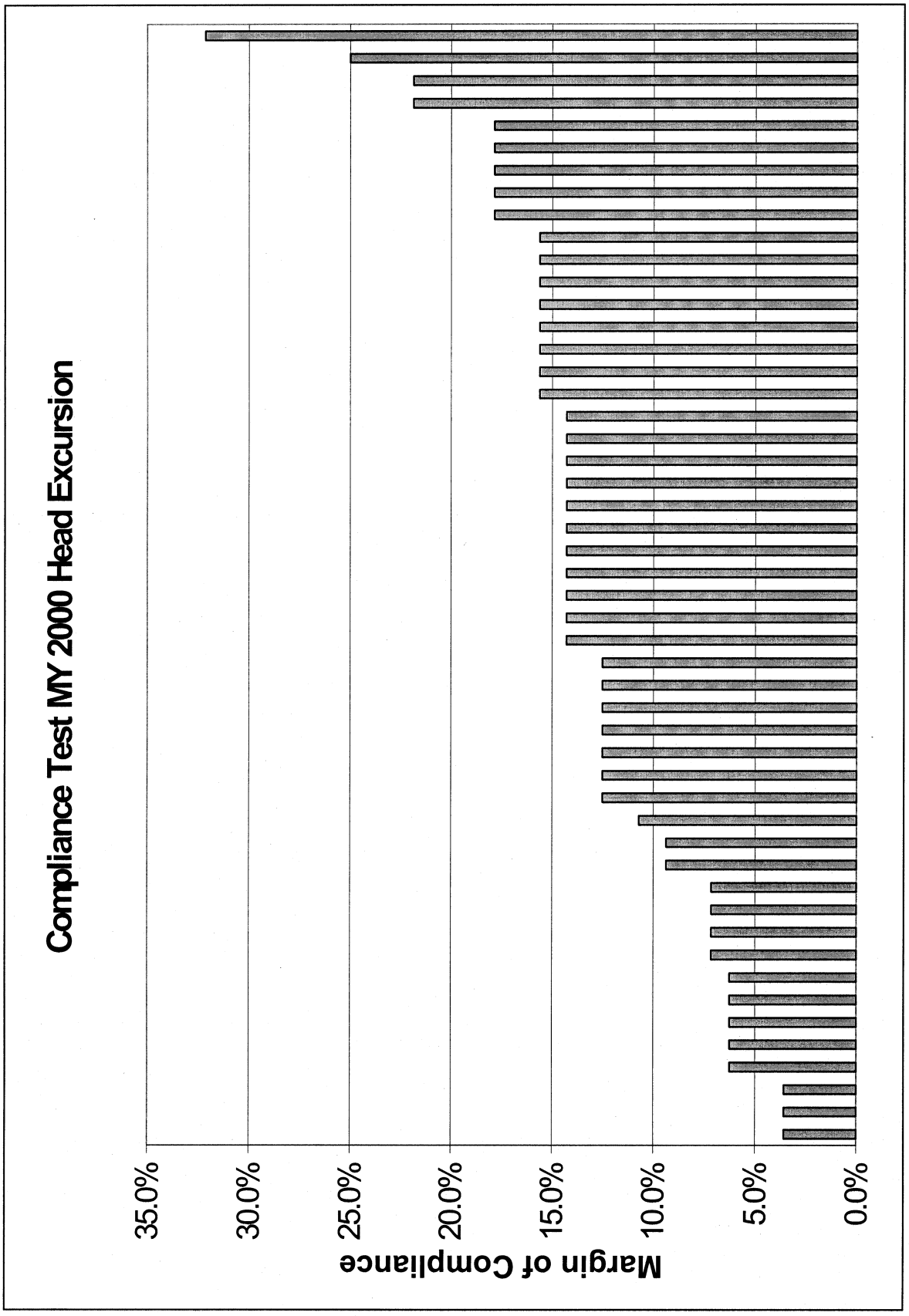


Figure 4: Margin of Compliance for Head Excursion

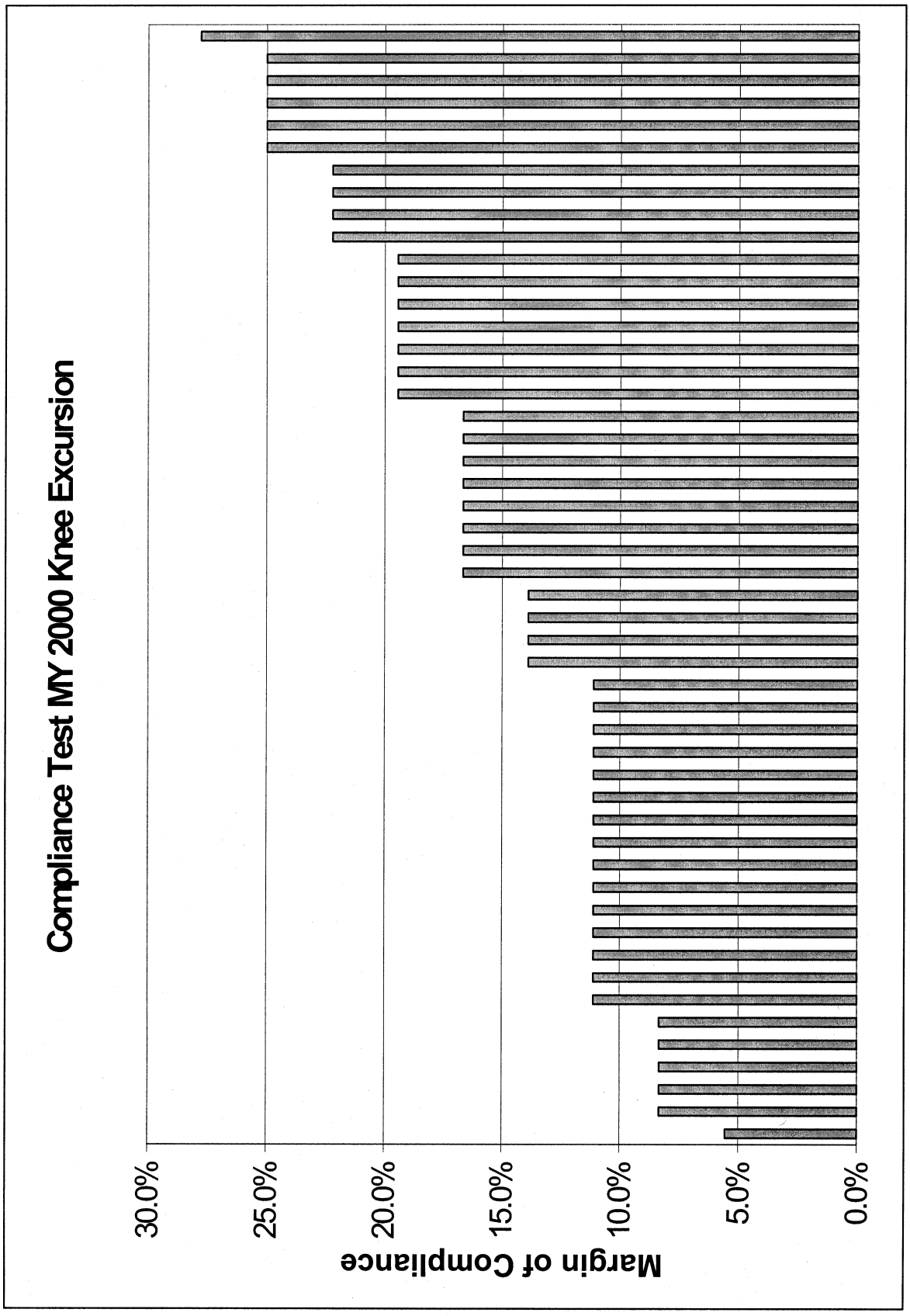


Figure 5: Margin of Compliance for Knee Excursion

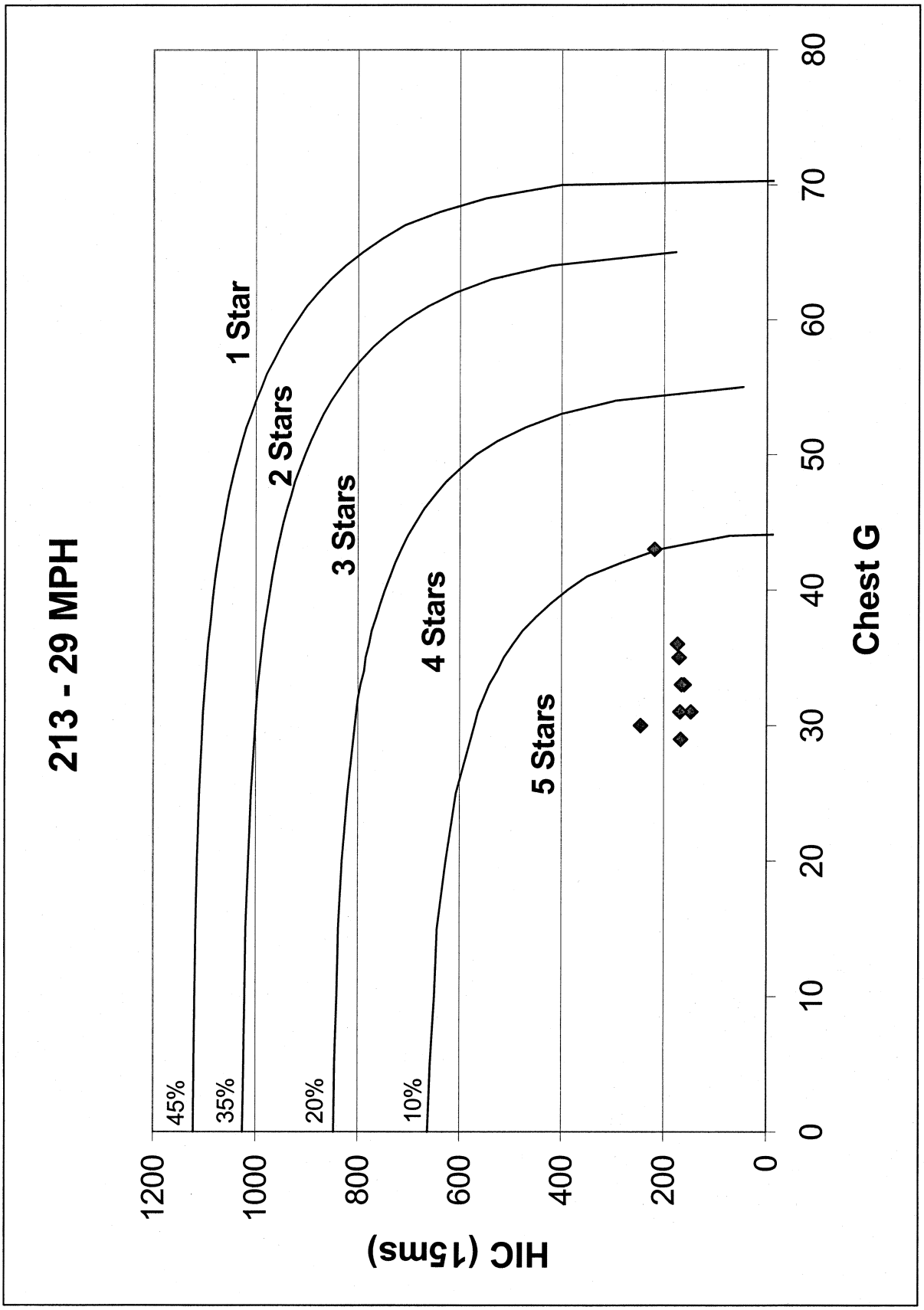


Figure 6: Compliance Test with Scaled NCAP Curves

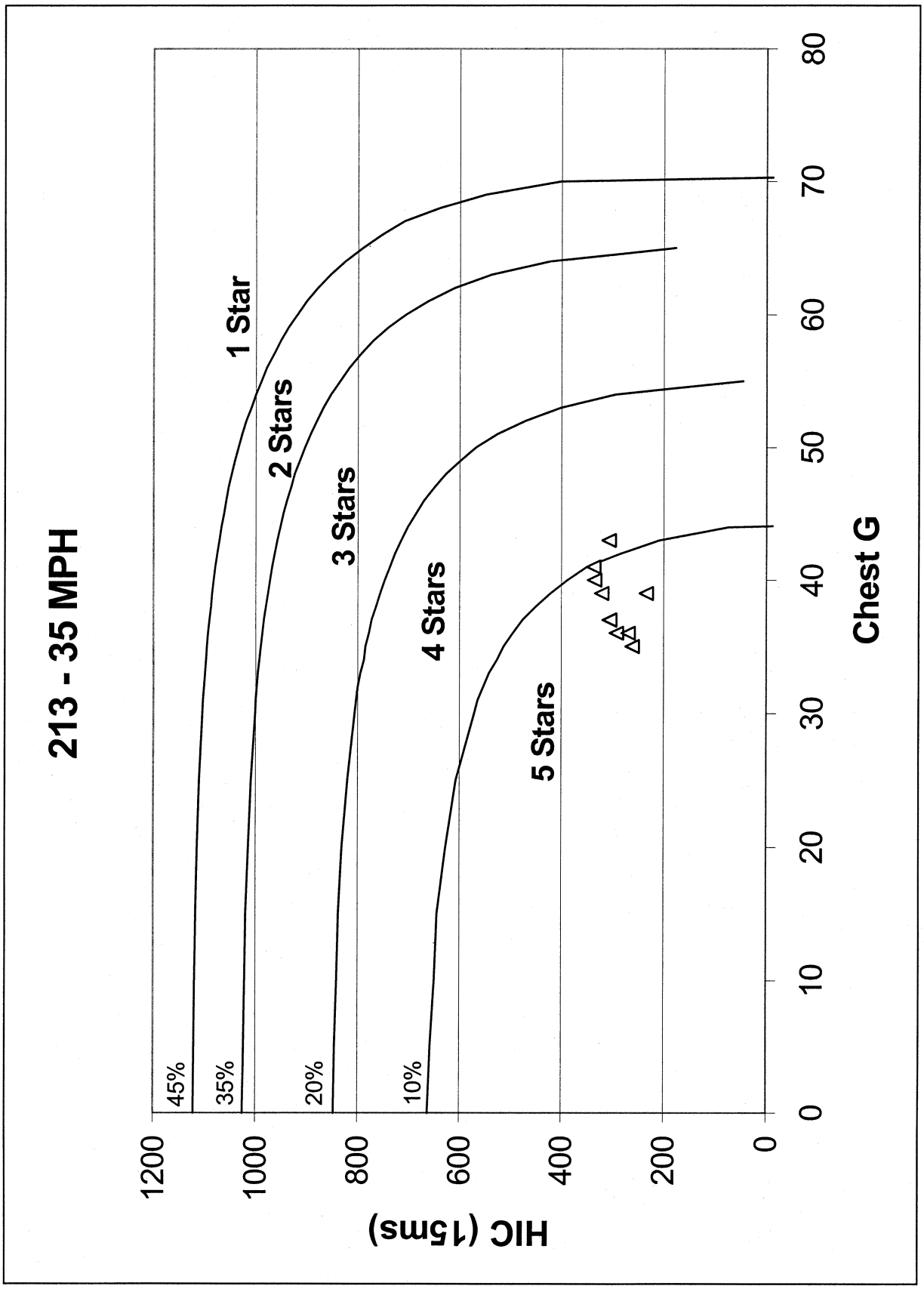


Figure 7: Higher Speed Sled Tests with Scaled NCAP Curves

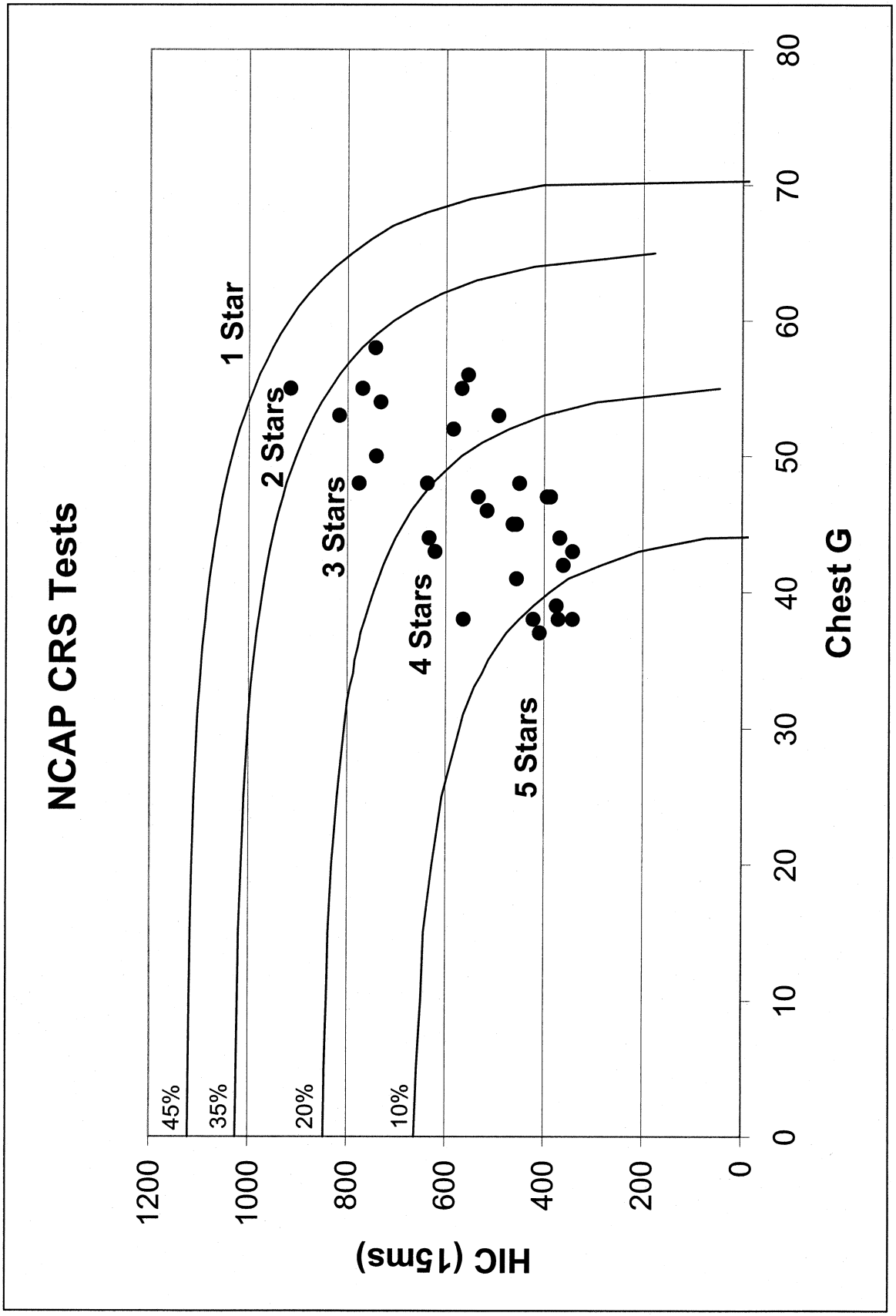


Figure 8: Vehicle NCAP Tests with Scaled NCAP Curves

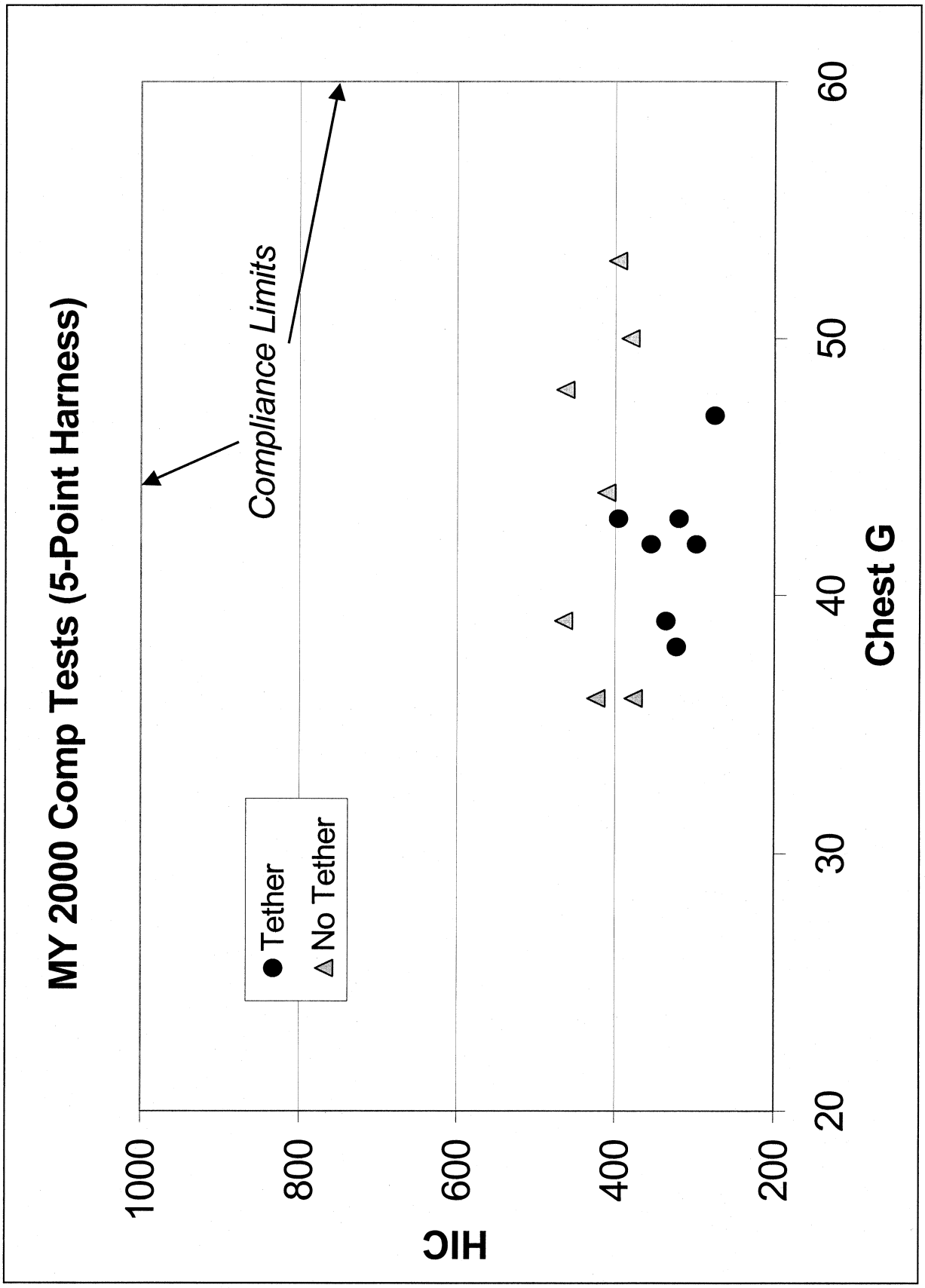


Figure 9: MY 2000 Compliance Tests, 5-Point Harness (3-Year-Old Hybrid II Child Dummy)

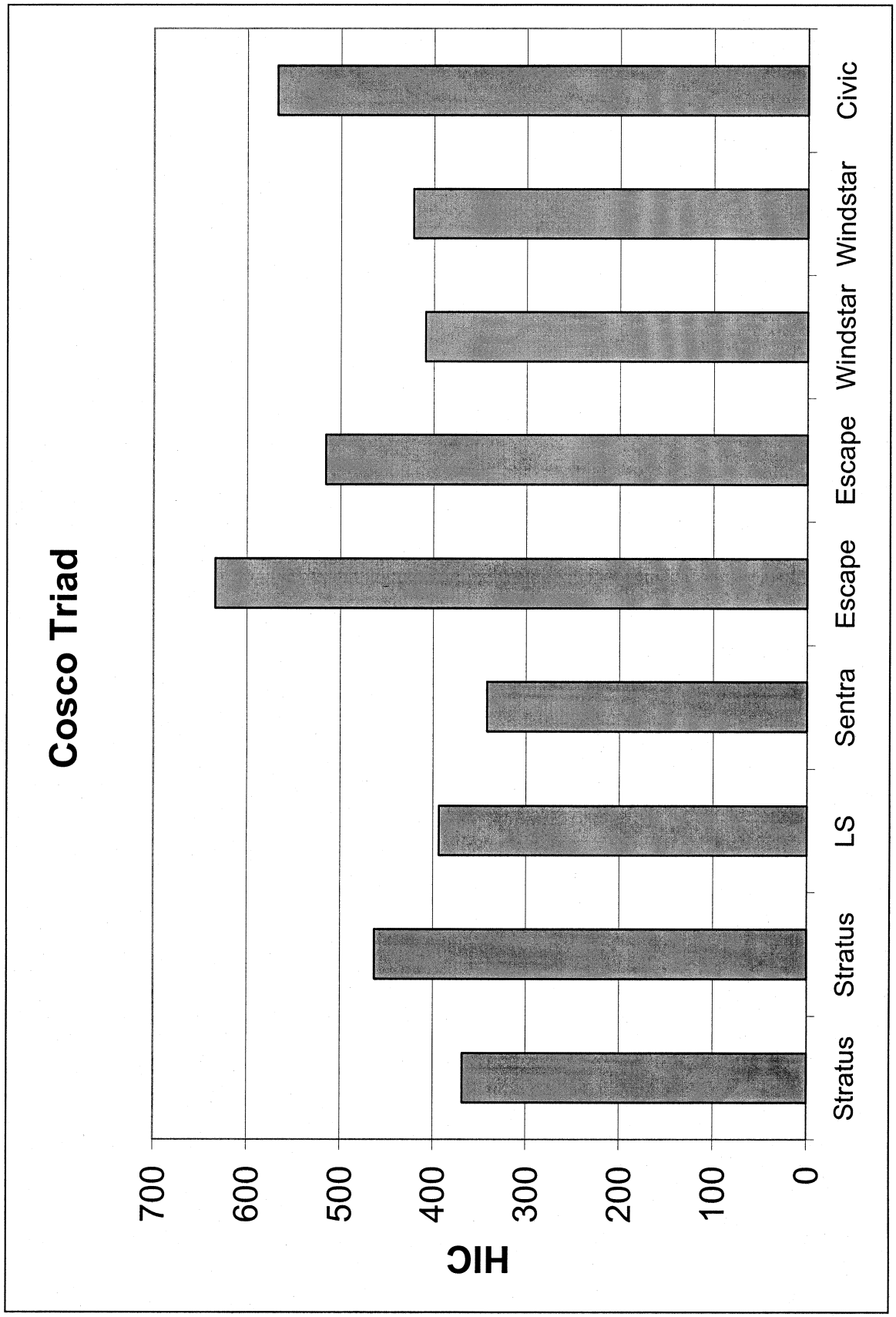


Figure 10: Performance of the Triad Child Restraint in Various Vehicles

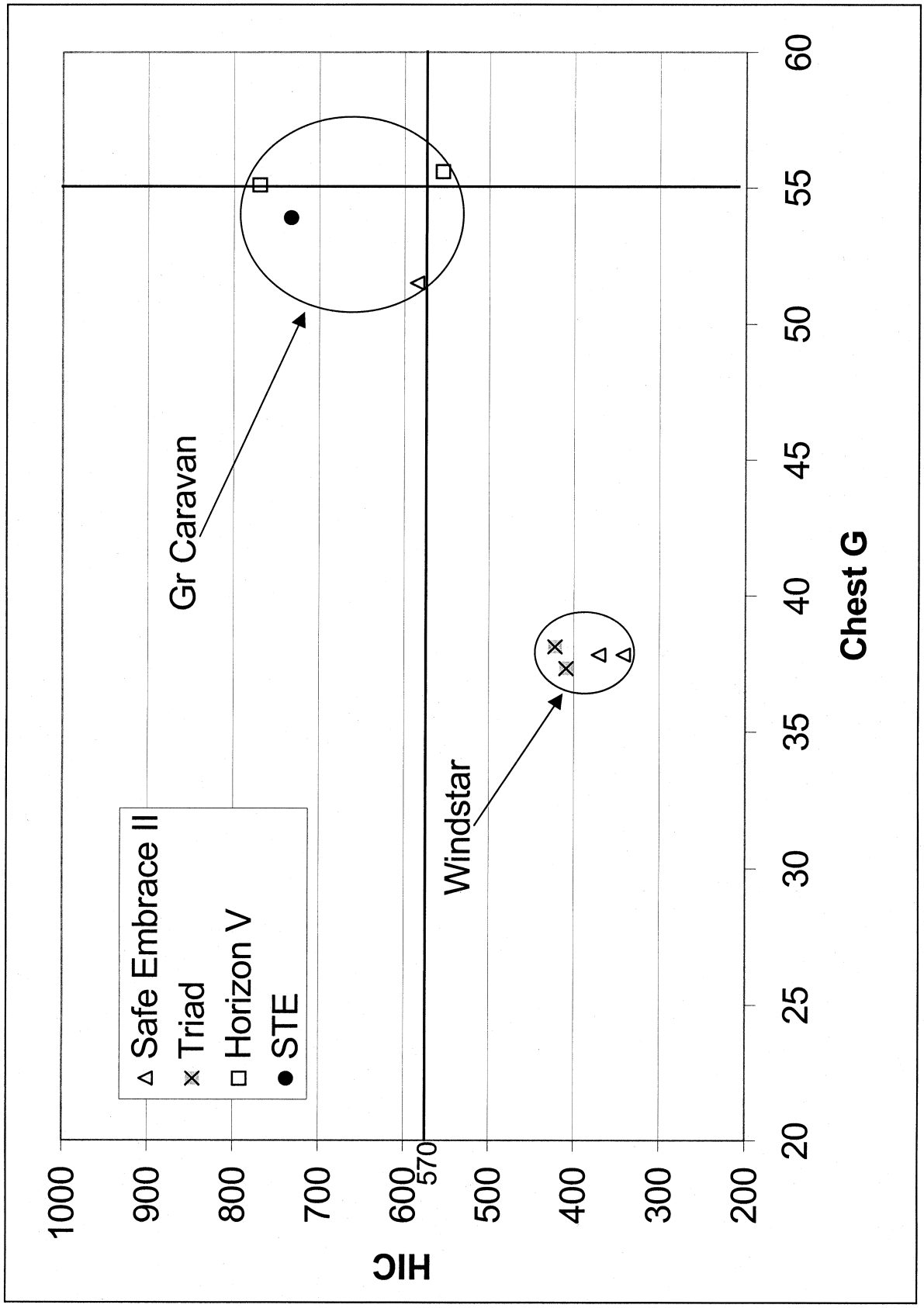


Figure 11: Example Comparison of Performance of Child Restraint Types in Same Vehicle Class (3-Year-Old Hybrid III Child Dummy)

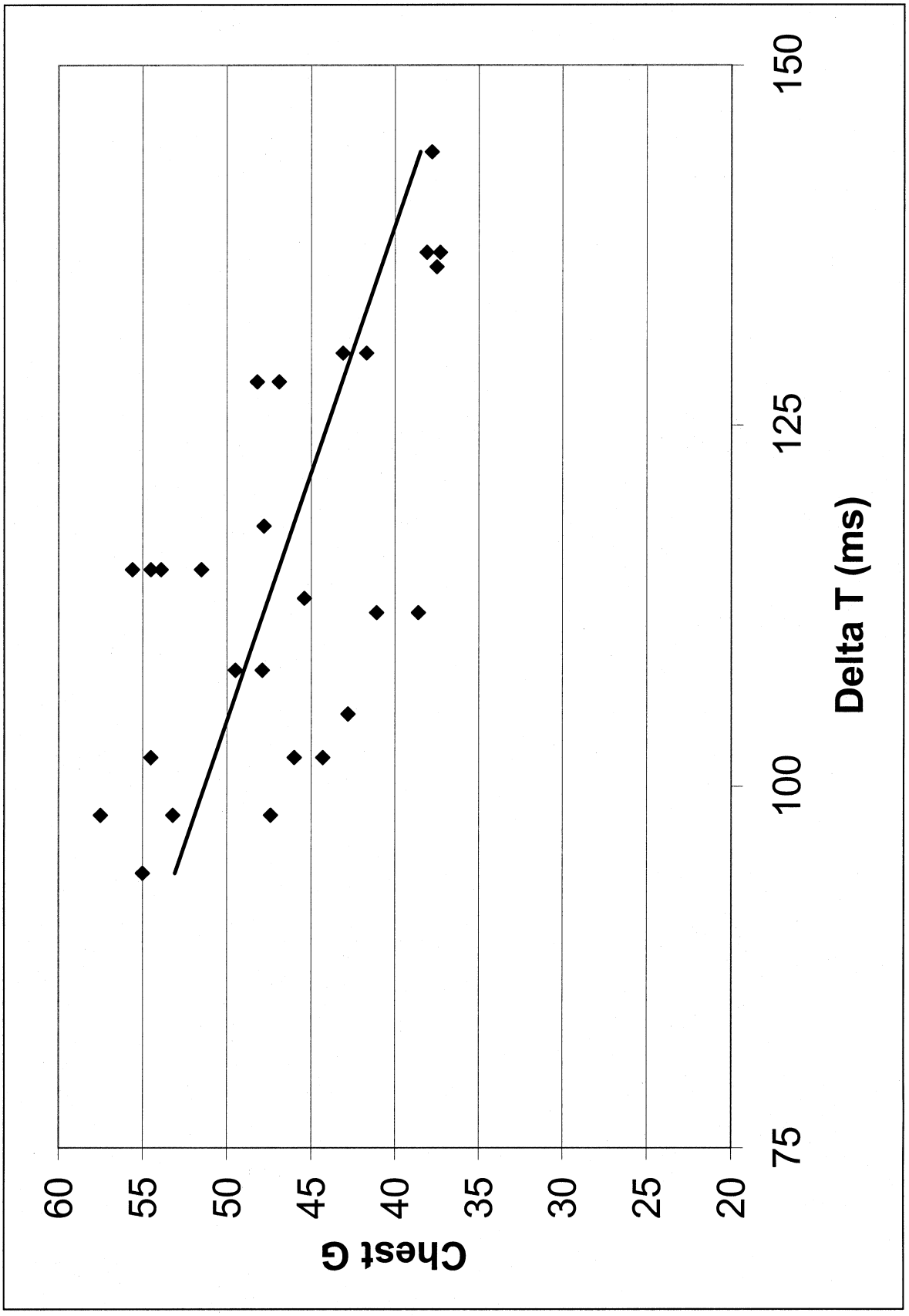


Figure 12: Child Dummy Chest G versus Time Duration of the Crash (Delta T)

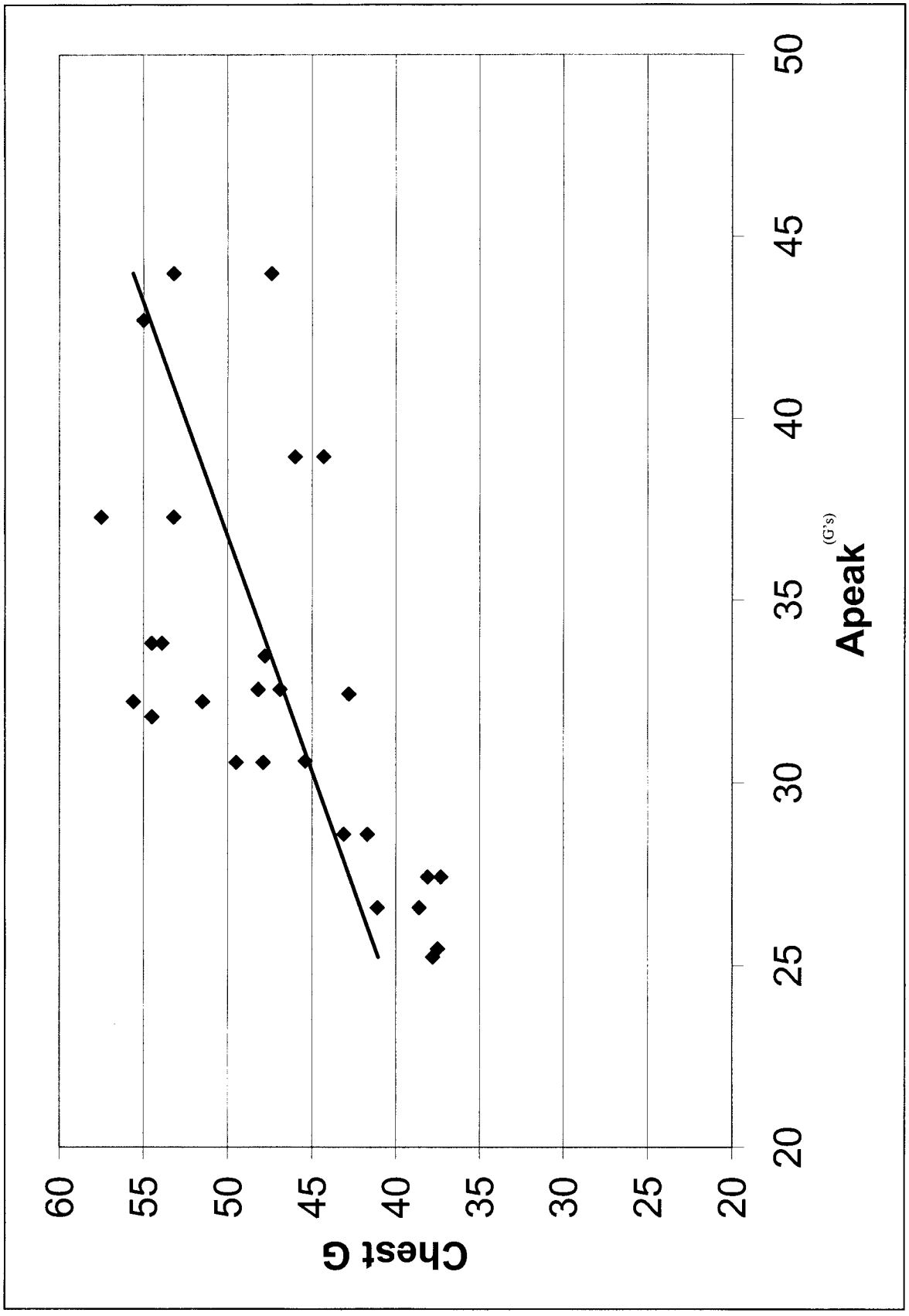


Figure 13: Child Dummy Chest G versus Peak Acceleration of the Vehicle

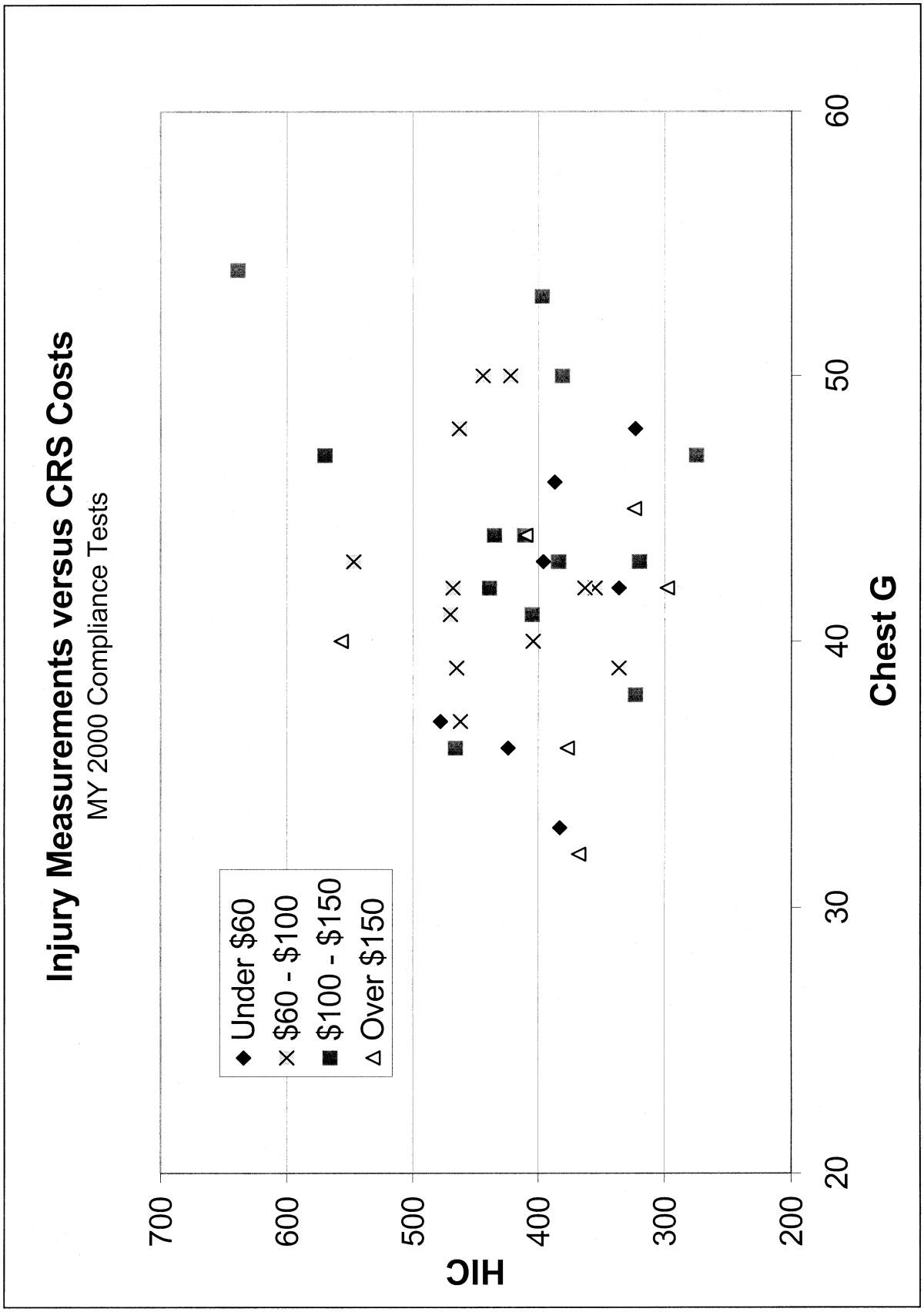


Figure 14: IARV versus CRS Cost

Table 1: Chief Factors for Child Restraint Systems Notice

Chief Factors Influencing the CRS Notice Decision	Alternative #1 - compliance margin	Alternative #2 - sled test at higher speed	Alternative #3 - CRS in-vehicle testing	Alternative #4 - Ease of Use
Gives timely information to the consumer	X	X		X
Gives meaningful information to the consumer		?	X	X
Improves safety for the population at risk		?	X	X
Ensures we evaluate many child seats	X	X		X
Considers the overall system and addresses vehicle compatibility			X	
Decreases CRS misuse				X

Appendix A Dynamic Testing

Table A1. MY2000 Frontal In-Vehicle Testing of Child Restraints @ 35 MPH

Makes	Models	CRS Makes	CRS models	LATCH	Rear posit	Head	Chest		Upper Neck Peak Values					Upper Neck Nij			
						HIC(15 msec)	CH disp mm	CH 3 ms g	Shear N	Ext Nm	Flex Nm	Comp N	Tension N	Ten-ext	Ten-flex	Com-ext	Com-flex
Chevrolet	Suburban	Britax	Roundabout	Non-LATCH	Right Rear	564	16	38	817.7	6.2	8.2	65.6	1870.2	0.27	0.00	0.94	0.89
Chevrolet	Impala	Britax	Roundabout	Non-LATCH	Right Rear	361	20	42	690.0	10.1	3.8	163.4	1699.1	0.83	0.80	0.42	0.04
Dodge	Durango	Century	STE	Non-LATCH	Left Rear	638	16	48	870.0	16.1	19.8	74.5	1713.9	1.08	1.01	0.07	0.02
Dodge	Gr Caravan	Century	STE	Non-LATCH	Left Rear	771	15	54	52.3	17.7	10.9	619.6	2235.6	0.96	1.08	0.05	0.36
Chevrolet	Impala	Century	STE	Non-LATCH	Left Rear	622	14	43	680.9	12.5	16.9	110.3	1938.5	1.08	0.76	0.20	0.09
Volvo	S60	Century	STE	Non-LATCH	Left Rear	744	12	58	767.6	14.3	18.4	271.5	2073.8	0.55	0.13	1.98	1.11
Honda	Civic	Cosco	Triad	LATCH	Right Rear	568	16	55	588.1	12.9	4.8	452.9	1884.1	0.75	0.95	0.50	0.10
Toyota	Echo	Cosco	Triad	LATCH	Right Rear	302	12	54	714.5	14.1	12.4	218.8	1390.0	0.84	0.73	0.50	0.02
Ford	Escape	Cosco	Triad	Non-LATCH	Left Rear	516	13	46	71.9	6.5	15.2	394.6	1773.2	1.00	0.80	0.20	0.19
Ford	Escape	Cosco	Triad	LATCH	Right Rear	634	N/A	44	770.0	15.7	7.4	383.7	1865.8	1.07	0.89	0.42	0.10
Lincoln	LS	Cosco	Triad	Non-LATCH	Left Rear	1029	14	53	845.0	23.3	13.8	397.3	2227.5	1.50	0.96	0.96	0.09
Lincoln	LS	Cosco	Triad	LATCH	Right Rear	394	13	47	775.4	17.3	16.3	265.2	1833.4	0.99	0.91	0.58	0.01
Nissan	Sentra	Cosco	Triad	LATCH	Right Rear	342	10	43	628.7	11.0	4.5	443.1	1617.7	0.88	0.80	0.36	0.00
Dodge	Stratus	Cosco	Triad	LATCH	Left Rear	463	18	45	56.6	11.7	7.6	202.1	1794.3	0.80	0.93	0.40	0.00
Dodge	Stratus	Cosco	Triad	LATCH	Right Rear	368	17	44	609.4	9.8	6.5	270.4	1778.4	0.85	0.89	0.32	0.00
Ford	Windstar	Cosco	Triad	Non-LATCH	Left Rear	422	12	38	632.5	11.9	8.2	260.9	1834.7	0.75	0.96	0.33	0.02
Ford	Windstar	Cosco	Triad	LATCH	Right Rear	409	13	37	619.4	13.6	7.5	211.3	1592.7	0.78	0.85	0.30	0.01
Honda	Accord	Even Flo	Horizon V	LATCH	Left Rear	456	14	41	723.3	12.1	8.8	160.2	1944.6	0.56	1.03	0.43	0.03
Dodge	Durango	Even Flo	Horizon V	Non-LATCH	Right Rear	534	21	47	1385.3	17.6	7.9	86.9	2139.1	1.03	1.09	0.69	0.01
Toyota*	Echo	Even Flo	Horizon V	LATCH	Right Rear	916	18	55	886.2	12.2	13.4	116.3	2167.5	0.92	1.12	0.32	0.02
Dodge	Gr Caravan	Even Flo	Horizon V	LATCH	Right Rear	585	18	52	604.5	15.3	9.7	414.6	1896.9	0.77	1.00	0.59	0.02
Dodge	Gr Caravan	Even Flo	Horizon V	LATCH	Right Rear	734	14	54	N/A	15.2	12.8	453.2	2052.5	N/A	N/A	N/A	N/A
Nissan	Maxima	Even Flo	Horizon V	Non-LATCH	Left Rear	742	16	49	718.5	17.0	17.5	180.8	2078.6	1.00	1.14	0.65	0.03
Nissan	Maxima	Even Flo	Horizon V	LATCH	Right Rear	777	21	48	967.9	28.8	14.3	388.1	2119.9	1.02	1.16	1.24	0.00
Volvo	S60	Even Flo	Horizon V	Non-LATCH	Right Rear	817	20	53	675.9	13.1	13.9	298.7	2148.7	0.28	0.09	1.05	1.03
Nissan	Sentra	Fisher Price	Safe Embrace II	LATCH	Right Rear	456	22	45	996.3	9.9	5.1	293.5	2182.3	1.10	0.98	0.43	0.02
Honda	Accord	Fisher Price	Safe Embrace II	LATCH	Right Rear	375	19	39	949.2	12.6	7.0	250.5	1943.0	1.10	0.93	0.50	0.02
Hyundai	Elantra	Fisher Price	Safe Embrace II	LATCH	Right Rear	450	20	48	1109.2	9.0	5.8	258.1	2351.6	1.15	1.11	0.32	0.00
Ford	Escape	Fisher Price	Safe Embrace II	Non-LATCH	Left Rear	493	15	53	104.6	10.2	18.3	329.0	2331.7	1.38	1.01	0.09	0.17
Ford	Escape	Fisher Price	Safe Embrace II	LATCH	Right Rear	387	16	47	993.4	11.7	6.8	246.1	2085.0	1.06	1.04	0.38	0.01
Dodge	Gr Caravan	Fisher Price	Safe Embrace II	LATCH	Left Rear	556	17	56	780.2	10.6	7.3	790.2	2271.0	0.75	1.14	0.53	0.01
Ford	Windstar	Fisher Price	Safe Embrace II	Non-LATCH	Left Rear	342	15	38	83.4	7.8	14.1	159.4	1889.0	0.77	0.67	0.01	0.10
Ford	Windstar	Fisher Price	Safe Embrace II	LATCH	Right Rear	371	18	38	705.8	9.7	5.7	N/A	N/A	N/A	N/A	N/A	N/A

* The top tether vehicle anchorage broke in this test.

Appendix A Dynamic Testing

Table A2: MY 2000 Compliance Testing Results: 3-Year-Old Forward-Facing (Upright) Child Seats @ 30 MPH

Test No	Child Restraint Make/Model	Tether Used	HIC	HIC Comp-%	Chest G	Chest G Comp-%	Head Excursion (inches)	Head Excursion Comp-%	Knee Excursion (inches)	Knee Excursion Comp-%
35	Britax Freeway Plus	N	410	59.0%	44	26.7%	30	6.3%	32	11.1%
36	Britax Freeway Plus	Y	324	67.6%	45	25.0%	24	14.3%	28	22.2%
41	Britax Roundabout	N	377	62.3%	36	40.0%	30	6.3%	32	11.1%
42	Britax Roundabout	Y	298	70.2%	42	30.0%	21	25.0%	27	25.0%
55	Century Bravo 5 Pt.	N	381	61.9%	50	16.7%	27	15.6%	30	16.7%
56	Century Bravo 5 Pt.	Y	323	67.7%	38	36.7%	24	14.3%	27	25.0%
61	Century Bravo Overhead Shield	N	493	50.7%	50	16.7%	28	12.5%	30	16.7%
62	Century Bravo Overhead Shield	Y	358	64.2%	38	36.7%	24	14.3%	27	25.0%
67	Century Encore 5 Pt.	N	463	53.7%	48	20.0%	28	12.5%	30	16.7%
68	Century Encore 5 Pt.	Y	336	66.4%	39	35.0%	26	7.1%	28	22.2%
73	Century Encore Overhead Shield	N	547	45.3%	43	28.3%	27	15.6%	33	8.3%
74	Century Encore Overhead Shield	Y	468	53.2%	42	30.0%	26	7.1%	28	22.2%
84	Century Room to Grow	Y	457	54.3%	42	30.0%	27	3.6%	31	13.9%
83	Century Room to Grow	N	580	42.0%	45	25.0%	27	15.6%	31	13.9%
89	Century Smart Move 5 Pt.	N	397	60.3%	53	11.7%	30	6.3%	33	8.3%
90	Century Smart Move 5 Pt.	Y	275	72.5%	47	21.7%	23	17.9%	27	25.0%
93	Cosco Alpha Omega (02331)	N	639	36.1%	54	10.0%	30	6.3%	32	11.1%
94	Cosco Alpha Omega (02331)	Y	439	56.1%	42	30.0%	24	14.3%	27	25.0%
99	Cosco Alpha Omega (02332)	N	570	43.0%	47	21.7%	30	6.3%	34	5.6%
101	Cosco Alpha Omega (02332)	Y	435	56.5%	44	26.7%	25	10.7%	29	19.4%
100	Cosco Alpha Omega (02332)	Y	384	61.6%	43	28.3%	24	14.3%	29	19.4%
107	Cosco Olympian Overhead Shield	N	470	53.0%	41	31.7%	29	9.4%	32	11.1%
108	Cosco Olympian Overhead Shield	Y	422	57.8%	50	16.7%	23	17.9%	29	19.4%
113	Cosco Touriva 5 Pt.	N	424	57.6%	36	40.0%	28	12.5%	32	11.1%
114	Cosco Touriva 5 Pt.	Y	396	60.4%	43	28.3%	23	17.9%	32	11.1%
119	Cosco Touriva Overhead Shield	N	478	52.2%	37	38.3%	28	12.5%	32	11.1%
120	Cosco Touriva Overhead Shield	Y	387	61.3%	46	23.3%	23	17.9%	28	22.2%
126	Evenflo Champion Overhead Shield	N	438	56.2%	56	6.7%	27	15.6%	32	11.1%
127	Evenflo Champion Overhead Shield	Y	341	65.9%	48	20.0%	27	3.6%	30	16.7%
133	Evenflo Conquest I	Y	323	67.7%	48	20.0%	24	14.3%	30	16.7%
138	Evenflo Conquest V	N	383	61.7%	33	45.0%	27	15.6%	32	11.1%
139	Evenflo Conquest V	Y	336	66.4%	42	30.0%	23	17.9%	30	16.7%

Appendix A — Dynamic Testing

144	Evenflo Horizon I	N	462	53.8%	37	38.3%	27	15.6%	32	11.1%
145	Evenflo Horizon I	Y	404	59.6%	40	33.3%	24	14.3%	29	19.4%
150	Evenflo Horizon V	N	465	53.5%	39	35.0%	29	9.4%	32	11.1%
151	Evenflo Horizon V	Y	355	64.5%	42	30.0%	24	14.3%	29	19.4%
156	Evenflo Medallion V	N	466	53.4%	36	40.0%	27	15.6%	32	11.1%
157	Evenflo Medallion V	Y	405	59.5%	41	31.7%	26	7.1%	31	13.9%
162	Evenflo Secure Advantage	N	444	55.6%	50	16.7%	28	12.5%	32	11.1%
163	Evenflo Secure Advantage	Y	363	63.7%	42	30.0%	24	14.3%	29	19.4%
168	Evenflo Secure Choice	N	450	55.0%	46	23.3%	25	21.9%	33	8.3%
169	Evenflo Secure Choice	Y	434	56.6%	39	35.0%	26	7.1%	30	16.7%
174	Evenflo Ultara I	N	500	50.0%	46	23.3%	28	12.5%	32	11.1%
175	Evenflo Ultara I	Y	336	66.4%	46	23.3%	24	14.3%	30	16.7%
183	Fisher-Price Safe Embrace	N	411	58.9%	44	26.7%	25	21.9%	31	13.9%
184	Fisher-Price Safe Embrace	Y	320	68.0%	43	28.3%	19	32.1%	26	27.8%
189	Kolcraft Performa	N	447	55.3%	37	38.3%	27	15.6%	33	8.3%
190	Kolcraft Performa	Y	514	48.6%	43	28.3%	24	14.3%	29	19.4%
194	Safeline Sit'n'Stroll	N	557	44.3%	40	33.3%	28	12.5%	33	8.3%
195	Safeline Sit'n'Stroll	Y	368	63.2%	32	46.7%	27	3.6%	32	11.1%
		MEAN	421.1	57.9%	43	28.2%	26	13.2%	30	15.6%
		StDev	77.8	7.8%	5.2	8.7%	2.5	5.6%	2.0	5.6%
		Min	275	36.1%	32	6.7%	19	3.6%	26	5.6%
		Max	639	72.5%	56	46.7%	30	32.1%	34	27.8%
		Range	364	36.4%	24	40.0%	11	28.6%	8	22.2%

Appendix A Dynamic Testing

Table A3: Summary of Recommended Injury Criteria for the Final Rule			
Recommended Criteria	**6YO Child**	**3YO Child**	**1YO Infant**
Head Criteria: HIC (15 msec)	700	570	390
Neck Criteria: Nij	N/A	N/A	N/A
In-Position Critical Intercept Values			
Tension (N)			
Compression (N)			
Flexion (Nm)			
Extension (Nm)			
Peak Tension (N)			
Peak Compression (N)			
Neck Criteria: Nij	1	1	1
Out-of-Position			
Critical Intercept Values			
Tension (N)	2800	2120	1460
Compression (N)	2800	2120	1460
Flexion (Nm)	93	68	43
Extension (Nm)	37	27	17
Peak Tension (N)	1490	1130	780
Peak Compression (N)	1820	1380	960
Thoracic Criteria			
1. Chest Acceleration (g)	60	55	50
2. Chest Deflection (mm)	40	34	30
	(1.6 in)	(1.4 in)	(1.2 in)
Lower Ext. Criteria:			
Femur Load (kN)	N/A	N/A	N/A

Appendix A Dynamic Testing

Table A4: CRS Performance Test Matrix

Test Matrix for Evaluating CRS Performance in Frontal Vehicle Testing			
		Type of Child Seat	
Vehicle Size	**Model**	**Left Rear**	**Right Rear**
Light	Sentra	No CRS	Triad-LAT
	Sentra	No CRS	Emb II-LAT
	Civic 4 dr	No CRS	Horizon V-NOLAT
Compact	Echo	No CRS	Triad-LAT*
	Echo	No CRS	Hoizon V-LAT
	Elantra	No CRS	Emb II-LAT
Medium	Stratus 4dr	Triad-LAT	Triad-LAT
	Volvo S60	STE	Horizon V
	Maxima	Horizon V-NOLAT	Horizon V-LAT
	Accord	HoizonV-LAT	Emb II-LAT
	Impala	STE	Roundabout
Heavy	Lincoln LS	Triad-NOLAT	Triad-LAT
SUV	Escape	Emb II-NOLAT	Emb II-LAT
	Escape	Triad-NOLAT	Triad-LAT
	Durango	STE	Horizon V
	Suburban	Emb II-NOLAT	Roundabout-NOLAT
Minivan	Grand Caravan	STE	Horizon V-LAT
	Grand Caravan	Emb II-LAT	Horizon V-LAT
	Windstar	Emb II-NOLAT	Emb II-LAT
	Windstar	Triad-NOLAT	Triad-LAT

Note:

	Frontal NCAP test
	Frontal test with with small stature dummies
Triad-LAT	Cosco Triad with LATCH configuration
Emb II-LAT	Safe Embrace II with LATCH configuration
Triad-NOLAT	Cosco Triad with no LATCH setup
Emb II-NOLAT	Safe Embrace II with no LATCH setup
Horizon V-LAT	EvenFlo Horizon V with LATCH
Roundabout-NOLAT	Britax Roundabout with no LATCH
Horizon V	Even Flo Horizon V with no LATCH configuration
STE	Century 1000 STE with no LATCH
No CRS	No child seat

* The top tether vehicle anchorage broke in this test.

Appendix A Dynamic Testing

Table A5: CRS Sled Tests, 29 MPH

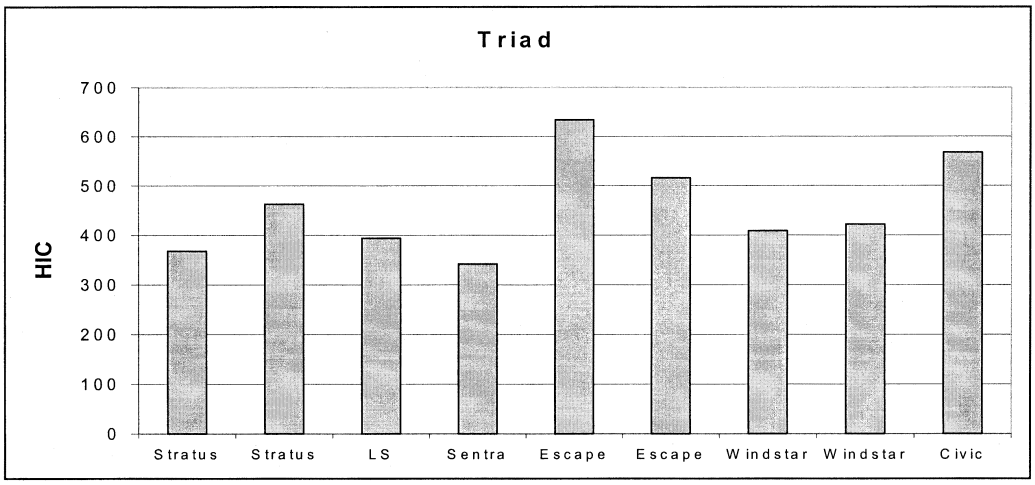
Child Restraint	HIC (15ms)	Chest G (3ms)
Britax Roundabout	160	33
Century Room-to-Grow OS	218	43
Century Smart Move	147	31
Century STE 1000	245	30
Cosco Olympian OS	170	35
Cosco Touriva	167	29
Evenflo Horizon V	168	31
Evenflo Medallion	173	36
Cosco Triad (LATCH)	165	33

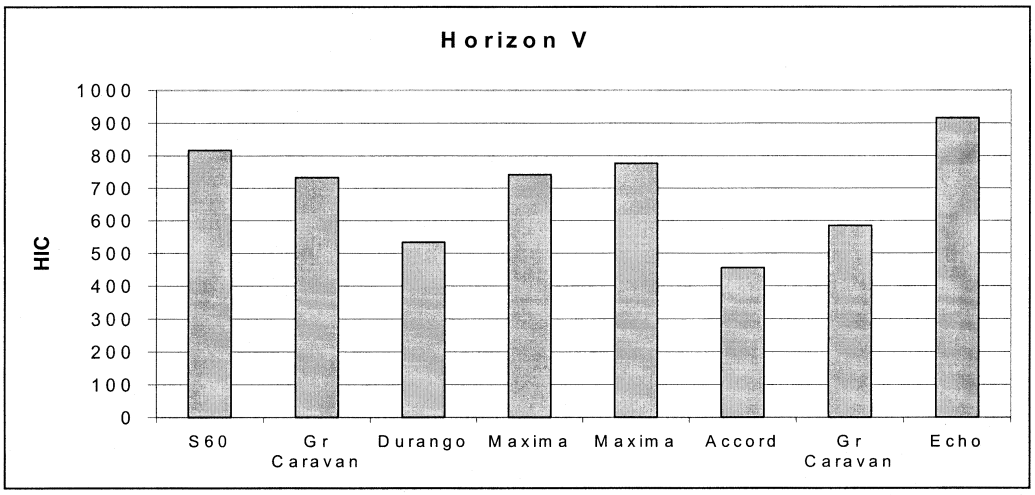
Table A6: CRS Sled Tests, 35 MPH

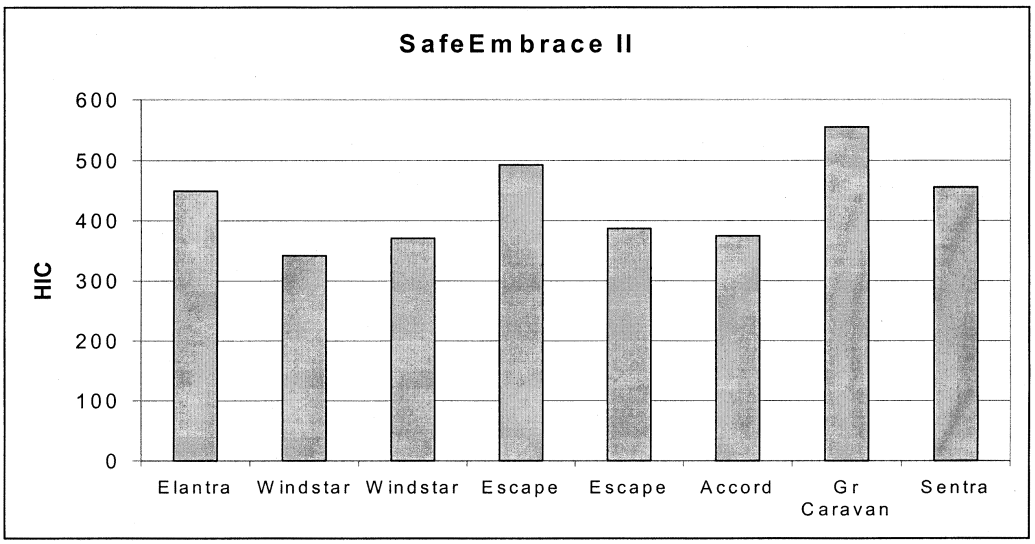
Child Restraint	HIC (15ms)	Chest G (3ms)
Britax Roundabout	307	43
Century Room-to-Grow OS	337	41
Century Smart Move	234	39
Century STE 1000	305	37
Cosco Olympian OS	321	39
Cosco Touriva	292	36
Evenflo Horizon V	261	35
Evenflo Medallion	335	40
Cosco Triad (LATCH)	269	36

Appendix A Dynamic Testing

Figure A1: Child Seat Results by Vehicle







Appendix B NHTSA Ease of Use Rating Form

NHTSA Child Restraint Usability Rating Form – 2001

Date _____ Evaluated by _____ Seat # (on tag)_____

Manufacturer_____ DOM_____

Make & Model_____ Model # (on CRS)_____

If optional base, model # on base_____ DOM on base_____

Style: ❑ Infant (RF) ❑ Convertible (RF/FF) ❑ Combination (FF harness/booster) ❑ Booster ❑ Other

Harness: ❑ 5-point ❑ "V" or 3-point ❑ T-shield ❑ OH shield ❑ Shield booster ❑ No shield booster

Measurements (imperial units for North American consumer guide) – *take out slack in seat cover*

Total number of crotch strap positions ❑ 1 ❑ 2 ❑ n/a (booster only)

Distance crotch strap opening on base to seat bight Position 1_____ Position 2_____ ❑ n/a

Lower harness slot height (bottom center slot to seat bight)_____ Upper harness slot height _____ ❑ n/a

Seat height (from seat bight) ❑ n/a (no back-booster)

Size range given in owner's manual: _____ **Date on manual:**_____

	WEIGHT (kg and lb)		HEIGHT (cm and inches)	
	Minimum	Maximum	Minimum	Maximum
RF				
FF				
Booster				

❑ Yes ❑ No, note any differences_____

_____

Infant restraint has optional base ❑ Yes ❑ No ❑ n/a (e.g. convertible)

Type: ❑ Booster Only
❑ Combination (harness/booster)

Style: ❑ No-back with non-removable shield
❑ No-back with removable shield
❑ No-back NO shield
❑ High back with soft back
❑ High back with hard back

Booster recommended for use with: Lap/torso ❑ Yes ❑ No ❑ not shown on seat

Lap belt ❑ Yes ❑ No ❑ not shown on seat

If shield booster, recommended t/belt position: ❑ front of child ❑ behind child ❑ not shown on seat ❑ n/a

Appendix B NHTSA Ease of Use Rating Form

NHTSA CHILD RESTRAINT USABILITY RATING FORM – 2001

Assembly *(When first out of box)*

	A	B	C	Notes
All functional parts including seat pad or cover attached and ready to use	Yes*		No	*parent may still need to adjust system to fit child
Tether attached to child restraint	Yes		No	n/a
Owner's manual easy to find	Attached to child restraint in a clearly location visible	Attached to child restraint but not clearly visible	In box, not attached	
Obvious storage (pocket) for manual	Easily accessible when installed in all modes and manual can be removed and replaced easily	Easily accessible When installed in all modes but manual cannot be removed and replaced easily (any use of plastic clips as the sole means of storing the instructions will not be higher than "acceptable")	Not accessible when installed in all modes	

Evaluation of Labels/Instructions

	A	B	C	Notes
Clear indication of child's size range	Separate clear text with illustrations of child in upper range	Separate clear text Independent paragraph	Size range buried in other text	
All mode/s of use clearly indicated e.g., rear-facing only or forward-and rear-facing if convertible	CRS illustration in complete vehicle seat (not FSP) Mode/s clear, no need to read text	CRS illustration in outline vehicle seat (could be front seat) Need to read text	No illustration, text only May be illustrated, but not all modes shown	*Infant restraint = RF* *Convertible = RH and FF (+tether could be separate illustration)* *Combination = FF (+harness/tether and booster)*
Air bag warning in written instructions	Separate, highlighted & illustrated	Separate &highlighted	Buried in other text or no warning	
Show harness slots okay to use for occupant size	Clear illustration or markings –no need to read text	Markings of top slot – need to read text	Other, includes text only or in manual only	n/a, all harness slots can be used
Instructions for routing for both lap belt and lap/shoulder belt in all modes	All modes illustrated clearly with CR in seat S/belt (tether) in illustration with s/b ***No need to read***	All modes illustrated with CR in seat (tether may have own illustration of s/belted CRS in seat) ***Need*** to read text	Not all illustrated (e.g. tether not shown)	*All modes = RF/FF & lap, lap/torso and for* ***infant restraint*** *if torso belt shown behind CRS, alternative if torso belt not long enough* *and for* ***FF harness systems*** *+ tether* and for **booster** – whether or not okay for both lap and lap/torso seat belt

Appendix B NHTSA Ease of Use Rating Form

NHTSA CHILD RESTRAINT USABILITY RATING FORM – 2001

Evaluation of Labels/Instructions *(Continued)*

		A	B	C	Notes
Visibility of seat belt routing (for lap belt and lap/torso) when CRS in position in vehicle i.e. is seat belt routing obvious	Without base	Clear routing illustration or clear contrast belt path marking ***both*** sides No need to read text	Markings or some form of routing illustration ***both*** sides Need to read text	Other incl illustration only ***one*** side or illustrations do not match CRS or belt direction or hidden by seat cover	
	Installing add-on base (alone) or n/a	Clear routing illustration or clear contrast belt path marking ***both*** sides No need to read text	Markings or some form of routing illustration ***both*** sides Need to read text	Other incl illustration only ***one*** side or illustrations do not match CRS or belt direction or hidden by seat cover	
Visibility of tether use		Yes		No	
Information in written instructions and on labels match		Yes		No	
Durability of labels		All labels molded or embossed	Sticky label	Sticky label if one or more are already peeling when restraint removed from box	

Securing the Child

	A	B	C	Notes
Buckle can be secured in reverse	No, or yes but usual release works with same degree of effort	Yes, but usual release requires more effort	Yes, but can't use release mechanism	
Harness adjustment easy to tighten or loosen when child restraint installed	One had to tighten Max 2 to loosen	Two hands to tighten, but easy No re-threading	Other	*Do not count one hand to support CRS*
Number of harness slots/ usable slots	3	2*	Top only	*2nd slot okay to 30 lb then top only
Ease of attaching/removing base (infant restraint systems only)	One had to attach Max two to release –handle easy to access	One hand to attach Max two to release –handle not easy access	Other includes need to tilt or tip to release	n/a, not an infant restraint n/a, no base offered with this infant restraint
Ease of conversion rear-facing to forward-facing or forward-facing to booster and back again	One had to change Easy to access	1-2 hands to change – not easy access or binds	Other	n/a, single mode
Visibility of harness slots	Clear view of both slots (slots aligned)	Clear view cloth slots, not aligned with plastic slots	Something in way when sold, e.g. pad, head hugger	n/a, no harness slots (booster only)

Appendix B NHTSA Ease of Use Rating Form

NHTSA CHILD RESTRAINT USABILITY RATING FORM – 2001

Securing the Child *(Continued)*

	A	B	C	Notes
Ease of changing harness slot position	No need to rethread Possible for one person to do	Possible for one person to do, easy to attach/remove Large slots easy to thread	Other, slot size too small for easy threading Loose mandatory pieces Could misroute through buckle	
Ease of reassembly if pad/cover removed for cleaning	No loose parts Easy to attach/remove – clear slots No realignment necessary	No loose parts Slots maybe misaligned	Loose parts, need hand tool Slot size too small for easy threading Could misroute through buckle	
Ease of adjusting/removing shield	Clear illustration simple action shield marked	Need to read text, simple action, shield not marked	Other tool/s required	n/a, no shield n/a, shield not adjustable

Installing in Vehicle

		A	B	C	Notes
Separation of vehicle belt path	Without base	No contact possible	Cover to avoid contact	Possible contact including crotch strap	
	Installing add-on base (alone) or n/a	No contact possible	Cover	Possible contact	
Ease of vehicle belt routing (hand clearance)	**Without base**	Male hand can route s/b through including flap in seat, nothing in way	Male hand fit but need to move CRS (no x-tilt), or move padding	Hand does not fit	
	Installing add-on base (alone) or n/a	Male hand can route s/b through including flap in seat	Male hand fit but need to move CRS (no x-tilt)	Hand does not fit	
Ease of seat belt routing (boosters)		Single action (could be done by child in seat)	Includes2 hands to operate belt positioning hardware	Detachable or multiple steps	
Ease of use of any belt-positioning hardware on CRS including lock-off		One hand to use	Two hands to use	Detachable or multiple steps	n/a, no belt positioning hardware
Tether easy to tighten (& release)		One hand to tighten	Two hands but easy	Other	
Does belt-positioning device allow excessive slack to occur including lock off		Guides only		Slack could be introduced	n/a, no belt positioning hardware
Ease of tightening belt around CRS		???	???	???	

Appendix C NHTSA Ease of Use Rating Sample

Evaluation Category	Feature	Possible Points for Feature	Example Rating	Example Rating: Points for Each Feature	Feature Weight	Example Rating: Weighted Points for Each Feature	Category Point Range for C Rating	Category Point Range for B Rating	Category Point Range for A Rating	Example Rating: Result for this Category
Assembly										
	All functional parts including seat pad or cover attached and ready to use	1, 3	C	1	2	2				
	Tether attached to child restraint	1, 3	C	1	2	2				
	Owner's manual easy to find	1, 2, 3	A	3	1	3				
	Obvious storage (pocket) for manual	1, 2, 3	C	1	2	2				
	Total					9	7 to 11	12 to 16	17 to 21	C
Labels/ Instructions										
	Clear indication of child's size range	1, 2, 3	A	3	2	6				
	All mode/s of use clearly indicated e.g., rear-facing only or forward- and rear-facing if convertible	1, 2, 3	A	3	2	6				
	Air bag warning in written instructions	1, 2, 3	A	3	2	6				
	Show harness slots okay to use for occupant size	1, 2, 3	C	1	3	3				
	Instructions for routing for both lap belt and lap/shoulder belt in all modes	1, 2, 3	A	3	2	6				
	Visibility of seat belt routing (for lap belt and lap/torso) when CRS in position in vehicle i.e., is seat belt routing obvious	1, 2, 3	C	1	3	3				
	Visibility of tether use	1, 3	A	3	2	6				
	Information in written instructions and on labels match	1, 3	A	3	2	6				
	Durability of labels	1, 2, 3	B	2	2	4				
	Total					46	20 to 33	34 to 47	48 to 60	B
Securing the Child										
	Buckle can be secured in reverse	1, 2, 3	C	1	3	3				
	Harness adjustment easy to tighten or loosen when child restraint installed	1, 2, 3	B	2	3	6				
	Number of harness slots/usable slots	1, 2, 3	B	2	1	2				
	Ease of attaching/removing base (infant restraint systems only)	1, 2, 3	C	1	3	3				
	Ease of conversion rear-facing to forward-facing or forward-facing to booster and back again	1, 2, 3	A	3	3	9				
	Visibility of harness slots	1, 2, 3	A	3	2	6				
	Ease of changing harness slot positions	1, 2, 3	A	3	2	6				
	Ease of reassembly if pad/cover removed for cleaning	1, 2, 3	C	1	3	3				
	Ease of adjusting/removing shield	1, 2, 3	A	3	1	3				
	Total					41	21 to 35	36 to 49	50 to 63	B
Installing in Vehicle										
	Separation of vehicle belt path	1, 2, 3	B	2	3	6				
	Ease of vehicle belt routing (hand clearance)	1, 2, 3	B	2	2	4				
	Ease of seat belt routing (boosters)	1, 2, 3	B	2	2	4				
	Ease of use of any belt-positioning hardware on CRS, including lock-off	1, 2, 3	A	3	1	3				
	Tether easy to tighten (& release)	1, 2, 3	C	1	3	3				
	Does belt-positioning device allow slack to occur	1, 3	C	1	3	3				
	Ease of tightening belt around CRS	1, 2, 3	A	3	2	6				
	Total					29	16 to 26	27 to 37	38 to 48	B
Overall Rating										B
Qualifiers:										
To be rated B, no more than one out of four categories can be rated C										
To be rated A, no more than one out of four categories can be rated less than A										

Appendix D ICBC Ease of Use Rating System

Date _____ Evaluated by _____ Seat # (on tag) _____

Manufacturer _____ DOM _____

Make & model _____ Model # (on CRS) _____

If optional base, model # on base _____ DOM on base _____

Style: ❑ Infant (RF) ❑ Convertible (RF/FF) ❑ Combination (FF harness/booster) ❑ Booster ❑ Other

Harness: ❑ 5-point ❑ "V" or 3-point ❑ T-shield ❑ OH shield ❑ Shield booster ❑ No-shield booster

Ready to use (i.e. when first out of box)

	Good	Acceptable	Poor	Notes
All functional parts incl. seat pad or cover attached and ready to use	yes*		no	*parent may still need to adjust system to fit child
Any other add-ons in box (not installed at point of sale)	no add-ons	independent canopy (not on carrying handle) optional booster shield, cup holder, head pad (can see slots)	belt positioning guide, canopy on handle, head-hugger/pad could/does cover harness slots	❑ n/a seat not assembled
Total time taken to assemble CRS				❑ n/a CRS already assembled
Tether attached to CRS	yes		no	❑ n/a
Owner's manual easy to find	yes attached to CRS	in box	no	
Obvious storage (pocket) for manual	easy access when CRS installed in all modes	easy access not accessible when CRS installed in all modes	none found or not easy access/storage (incl. plastic tabs)	

Measurements (imperial units for N. American consumer guide) – *take out slack in seat cover*

Total no. of crotch strap positions ❑ 1 ❑ 2 ❑ n/a (booster only)

Distance crotch strap opening on base to seat bight Position 1 _____ Position 2 _____ ❑ n/a

Lower harness slot hgt (bottom centre slot to seat bight) _____ Upper harness slot hgt _____ _____ ❑ n/a

Seat height (from seat bight) _____ ❑ n/a (no-back booster)

Size range given in owner's manual: **Date on manual:**

	Weight (kg and lb)		Height (cm and inches)	
	Minimum	Maximum	Minimum	Maximum
RF				
FF				
Booster				

Is size range in owner's manual same as labels on CRS itself ❑ Yes ❑ No, note any differences

Appendix D ICBC Ease of Use Rating System

Instructions for use (owner's manual)

	Good	Acceptable	Poor	Notes
Clear indication of child's size range in owner's manual	separate clear text with illus. in manual of child in upper range	separate clear text independent paragraph	size range buried in other text or different to CRS labels	
All mode/s of use clearly indicated e.g. RF only or if convertible RF & FF	CRS illus. in complete vehicle seat (not FSP) mode/s clear, no need to read text	CRS illus. in outline vehicle seat (could be front seat) need to read text	no illus, text only may be illus, but not all modes shown	*infant restraint = RF* *Convertible =RF and FF (+tether could be separate illustration)* *Combination=FF (+harness/tether) and booster)*
Airbag warning	separate, highlighted & illustrated	separate & highlighted	buried in other text or no warning	
Instructions for routing for both lap belt and lap/torso – all modes	all modes illustrated clearly with CR in seat s/belt (tether) in illus with s/b no need to read	all modes illus. with CR in seat (tether may have own illus. of s/belted CRS in seat) need to read text	not all illustrated (eg tether not shown)	*All modes = RF/FF & lap, lap/torso* *and for infant restraint if torso belt shown behind CRS, alternative if torso belt not long enough* *and for FF harness systems + tether* *and for booster – whether or not OK for both lap and lap/torso seat belt*

Ease of Conversion

	Good	Acceptable	Poor	Notes
Ease of attaching/removing base (infant restraint systems only)	one hand to attach max. two to release –handle easy to access	one hand to attach max two to release handle not easy access	other includes need to tilt or tip to release	❑ n/a not an infant restraint ❑ n/a no base offered with this infant restraint
Ease of conversion RF to FF or FF to booster	one hand to change easy to access	1-2 hands to change - not easy access or binds	other	❑ n/a, single mode
Ease of converting back FF to RF or booster to FF	one hand to change easy to access	1-2 hands to change - not easy access or binds	other	❑ n/a, single mode
Visibility of harness slots	clear view of both slots (slots aligned)	clear view cloth slots, not aligned with plastic slots	something in way when sold, e.g. pad, head hugger	❑ n/a, no harness slots (booster only)
Ease of changing harness slot position	easy to attach/remove clear slots, easy to thread easy to attach to hardware	possible for one person to do slots may be misaligned/pad in way/in slots hardware slot shared	other, slot size too small for easy threading loose mandatory pieces could misroute through buckle	❑ n/a, no harness slots (booster only) ❑ n/a, only one set of slots
Ease of re-assembly if pad removed for cleaning	no loose parts easy to attach/remove - clear slots no realignment necessary	no loose parts slots may be misaligned	loose parts, need hand tool slot size too small for easy threading could misroute through buckle	
Ease of adjusting/removing shield	clear illus. simple action shield marked	need to read text, simple action, shield not marked	other, tool/s required	❑ n/a, no shield ❑ n/a, shield not adjustable

Appendix D ICBC Ease of Use Rating System

COMPLETE IF INFANT RESTRAINT or CONVERTIBLE RF MODE Seat # (on tag) _____

Make & model _____

Infant restraint has optional base ❑ yes ❑ no ❑ n/a (eg convertible)

Evaluation of labelling on CRS without base (labels may or may not be visible when CRS in vehicle)

	Good	Acceptable	Poor	Notes
Clear indication of child's size range	separate clear text with illus. of child in upper range/s	separate clear text independent paragraph	size range buried in other text	

Securing the child

	Good	Acceptable	Poor	Notes
Number of steps to secure child	No. of steps =			*Assume harness open/loose, child in CRS, harness tightens OK 1st attempt*
Can buckle be secured in reverse	no	yes, but usual release works	yes & difficult to release/access	
Harness adjustment easy to tighten and loosen	one hand to tighten max 2 to loosen	two hands to tighten, but easy no re-threading	other	*Do not count one hand to support CRS*
No. of harness slots in pad	3	2	1	❑ *same # slots & reasonably aligned*
No. of harness slots in plastic	3	2	1	

Visibility of labels when installing CRS in vehicle

	Without base			*Installing add-on base (alone) or ❑ n/a*		
	Good	Acceptable	Poor	*Good*	*Acceptable*	*Poor*
Mode of use clearly indicated i.e. shows RF only or if convertible RF (v FF) and not in FSP or by airbag	CRS illus. in vehicle seat (not FSP) BOTH sides no need to read text	illus. or arrow BOTH sides need to read text (eg to know not with airbag/FSP)	no illus, text only or illus ONE side only	*CRS illus. in vehicle seat (not FSP) BOTH sides* *no need to read text*	*illus. or arrow BOTH sides* *need to read text (eg to know not with airbag/FSP)*	*no illus, text only or illus* *ONE side only*
Visibility of seat belt routing (for lap belt and lap/torso) when CRS in position in vehicle i.e. is seat belt routing obvious	clear routing illus. or clear contrast belt path markings BOTH sides no need to read text	markings or some form of routing illus. BOTH sides need to read text	other incl illus. only ONE side or illus. do not match CRS or belt direction or hidden by seat cover	*clear routing illus. or clear contrast belt path markings BOTH sides* *no need to read text*	*markings or some form of routing illus. BOTH sides* *need to read text*	*other incl illus. only ONE side or illus. do not match CRS or belt direction or hidden by seat cover*
Is airbag warning visible no matter where CRS being installed	clear illus. with interaction & warning in contrast BOTH sides or on seat pad		other, includes text only, poor illustration, ONE side only	*clear illus. with interaction and warning in contrast BOTH sides or on top*		*other, includes text only, poor illustration, ONE side only*

Installation in vehicle

	Without base			*Installing add-on base (alone) or ❑ n/a*		
	Good	Acceptable	Poor	*Good*	*Acceptable*	*Poor*
Separation of vehicle belt path from harness	no contact possible	cover to avoid contact	possible contact incl. crotch strap	*no contact possible*	*cover*	*possible contact*
Ease of vehicle belt routing Check hand clearance	male hand can route s/b through incl. flap in seat, nothing in way	male hand fit but need to move CRS (no x-tilt), or move padding	hand does not fit	*male hand can route s/b through incl. flap in seat*	*male hand fit but need to move CRS (no x-tilt)*	*hand does not fit*

Appendix D ICBC Ease of Use Rating System

COMPLETE IF CONVERTIBLE FF MODE or COMBINATION IN CR MODE Seat # (on tag) _____

Make & model _____

Evaluation of labelling on CRS outside vehicle (labels may or may not be visible when CRS in vehicle)

	Good	Acceptable	Poor	Notes
Clear indication of child's size range	separate, clear text + illus. child in upper range/s	separate clear text independent paragraph	size range buried in other text	*If CRS has more than one mode, evaluate mode which applies to this data sheet*
Mode of use clearly indicated i.e. shows FF plus tether	CRS illus. in vehicle rear seat no need to read text	illus/arrows but need to read text	other includes no illus. or text only and no tether info'	*If CRS has more than one mode, evaluate mode which applies to this data sheet*
Shows harness slots OK to use	clear illus. or markings – no need to read text	markings of top slot -need to read text	other, includes text only or in manual only	❑ *n/a, all harness slots can be used*

Visibility of labels when CRS IN POSITION IN VEHICLE

	Good	*Acceptable*	*Poor*	*Notes*
Visibility of seat belt routing (for lap belt and lap/torso) plus tether need when CRS is in position in vehicle i.e. is s/b routing + tether obvious	clear routing illus. or contrast belt path markings BOTH sides - no need to read text	markings or some form of routing illus. BOTH sides - need to read text	other includes illus. only ONE side or illus. do not match CRS or belt direction or hidden by seat cover	
Is airbag warning visible no matter where CRS being installed	clear illus. with interaction and contrast warning - BOTH sides or ON seat cover		other, includes text only, poor illustration, ONE side only	

Installation in vehicle

	Good	Acceptable	Poor	Notes
Separation of vehicle belt path from harness	no contact possible	cover to avoid contact	possible contact	Note if cover could give s/b slack
Ease of vehicle belt routing Check hand clearance	male hand can route s/ b (incl. flap in seat), nothing in way	male hand fit but need to move CRS (no x-tilt) or move padding	hand does not fit	
Ease of use of any belt-positioning hardware on CRS including lock-off	one hand to use	two hands to use	detachable or multiple steps	❑ n/a no belt positioning hardware
Does belt-positioning device allow excessive slack to occur incl. lock off	guides only		slack could be introduced	❑ n/a no belt positioning hardware
Tether easy to tighten (& release)	one hand to tighten	two hands but easy	other	

Securing the child

	Good	Acceptable	Poor	Notes
Number of steps to secure child	No. of steps =			*Assume harness open/loose and child in CRS and assume harness tightens OK 1st attempt*
Can buckle be secured in reverse	no	yes, but usual release works	yes, other or difficult release	
Harness easy to tighten & loosen when CRS installed	one hand to tighten max 2 to loosen	two hands to tighten, but easy no re-threading	other	*Do not count one hand to support CRS*
No. of usable harness slots-FF mode	3	2*	top only	* ❑ *2nd slot OK to 30 lb then top only*

Appendix D ICBC Ease of Use Rating System

COMPLETE IF BOOSTER or COMBINATION IN BOOSTER MODE Seat # (on tag) _____

Make & model _____

Type: ❑ Booster only ❑ Combination (harness/booster)

Style: ❑ No-back with non-removable shield ❑ No-back with removable shield ❑ No-back NO shield
❑ High back with soft back ❑ High back with hard back

Evaluation of labelling on CRS outside vehicle (labels may or may not be visible when CRS in vehicle)

	Good	Acceptable	Poor	Notes
Clear indication of child's size range	separate, clear text with illus. of child in upper range/s	separate clear text independent paragraph	size range buried in other text	*If CRS has more than one mode, evaluate mode which applies to this data sheet*
Mode of use clearly indicated i.e. with lap belt or lap/torso belt, and if combination seat, booster (v FF with harness)	CRS illus. in vehicle seat no need to read text	illus. but mode not clear need to read text	no illus. text only	*If CRS has more than one mode, evaluate mode which applies to this data sheet*

Booster recommended for use with: Lap/torso ❑ yes ❑ no ❑ not shown on seat
Lap belt ❑ yes ❑ no ❑ not shown on seat

If shield booster, recommended t/belt position: ❑ front of child ❑ behind child ❑ not shown on seat ❑ n/a

Visibility of labels when CRS IN POSITION IN VEHICLE

	Good	Acceptable	Poor	Notes
Visibility of seat belt routing (for lap belt and lap/torso) when CRS is in position in vehicle i.e. is seat belt routing obvious	clear routing illus. or clear contrast belt path markings BOTH sides no need to read text	markings or some form of routing illus. BOTH sides need to read text	other includes illus. only ONE side or illus. do not match CRS or belt direction	*To rate good or acceptable must include what to do with lap belt AND lap/torso belt*
Is airbag warning visible no matter where CRS being installed	clear illus. with interaction and warning in contrast BOTH sides OR ON seat cover		other, includes text only, poor illustration, ONE side only	

Installation in vehicle

	Good	Acceptable	Poor	Notes
Ease of seat belt routing	single action (could be done by child in seat)	includes 2 hands to operate belt positioning hardware	detachable or multiple steps	
Does belt-positioning hardware allow excessive slack to occur	guides only		slack could be introduced	❑ n/a no belt positioning hardware

Belt-positioning hardware: ❑ integral (non-removable) ❑ add-on/removable

Number of separate positions: _____

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