ALASKA LEGISLATURE COMMITTEE FILES 1985-1986 8672

3727 HSTA HB 684

603

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0251
RECOMMENDATION NUMBER: H-80-070
ISSUE DATE: 10/21/80
ADDRESSEE: CALIFORNIA, GOVERNOR
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE GOVERNOR OF CALIFORNIA: REVISE SECTION 1098 OF THE CALIFORNIA ADMINISTRATIVE CODE TO MATCH THE MINIMUM TREAD DEPTH REQUIREMENTS OF THE FEDERAL MOTOR CARRIER SAFETY REGULATIONS, SECTION 343.75(B) AND (C), WHICH ARE MORE IN KEEPING WITH TIRE STANDARDS RECOMMENDED BY CURRENT RESEARCH.

LOG NUMBER: H-0251
RECOMMENDATION NUMBER: H-80-071
ISSUE DATE: 10/21/80
ADDRESSEE: CALIFORNIA, GOVERNOR
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE GOVERNOR OF CALIFORNIA: CIRCULATE THE COACHELLA ACCIDENT REPORT, WITH ITS FINDINGS OF THE INADEQUATE INSPECTION OF THE TRUCK, AMONG CALIFORNIA COMMERCIAL VEHICLE INSPECTORS.

LOG NUMBER: H-0251
RECOMMENDATION NUMBER: H-80-072
ISSUE DATE: 10/21/80
ADDRESSEE: CALIFORNIA, GOVERNOR
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE GOVERNOR OF CALIFORNIA: INVESTIGATE THE POTENTIAL OR LIMITED IMPROVEMENTS ALONG CALIFORNIA STATE ROUTE 86 BETWEEN COACHELLA AND WESTMORELAND, CALIFORNIA, THAT WILL AT LEAST SERVE AS INTERIM SAFETY IMPROVEMENTS WHILE LONGER-TERM IMPROVEMENTS ARE UNDER CONSIDERATION.

LOG NUMBER: H-0252
RECOMMENDATION NUMBER: H-80-073
ISSUE DATE: 10/23/80
ADDRESSEE: NHTSA
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: TAKE IMMEDIATE ACTION TO FULFILL ITS COMMITMENT TO URGE THE STATES TO ADOPT A SCHOOLBUS SEATING POLICY THAT FRONT AND REAR SEATS BE LEFT VACANT WHEN FEASIBLE AND TO REVISE NHTSA PUPIL TRANSPORTATION SAFETY MANUALS TO INCLUDE THIS POLICY.

LOG NUMBER: H-0253
RECOMMENDATION NUMBER: H-80-074
ISSUE DATE: 10/21/80
ADDRESSEE: NATIONAL SCHOOL TRANSPORT
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE NATIONAL SCHOOL TRANSPORTATION ASSOCIATION: INFORM ITS MEMBERS OF THE NATIONAL TRANSPORTATION SAFETY BOARD RECOMMENDATION THAT FRONT AND REAR SEATS OF SCHOOLBUSES BE LEFT VACANT WHEN FEASIBLE.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0230 RECOMMENDATION NUMBER: H-81-070 ISSUE DATE: 9/24/81 ADDRESSEE: NEW YORK, YORKTOWN, TOWN NTSB STATUS: CLOSED - ACCEPTABLE ACTION	THE NTSB RECOMMENDS THAT THE YORKTOWN HIGHWAY DEPARTMENT: CONDUCT A TRAFFIC ENGINEERING STUDY OF THE INTERSECTION OF AQUEDUCT STREET AND OLD CROTON DAM ROAD TO DETERMINE WHAT TRAFFIC CONTROL DEVICES ARE WARRANTED TO IMPROVE SAFE OPERATION AT THIS INTERSECTION AND MAKE APPROPRIATE CHANGES.
LOG NUMBER: H-0322 RECOMMENDATION NUMBER: H-82-010 ISSUE DATE: 5/25/82 ADDRESSEE: MISSISSIPPI DEPARTMENT OF NTSB STATUS: CLOSED - ACCEPTABLE ACTION	AS A RESULT OF THE INVESTIGATION OF THIS ACCIDENT, THE NATIONAL TRANSPORTATION SAFETY BOARD RECOMMENDS THAT THE MISSISSIPPI DEPARTMENT OF HIGHWAYS: INSTALL APPROPRIATE ADVANCE WARNING SIGNS TO ALERT MOTORISTS OF THE POTENTIAL HAZARD FROM TURNING TRUCKS LOADED WITH LOGS OR OTHER OBJECTS WITH EXTENSIVE REAR OVERHANG AT THE INTERSECTION OF U.S. ROUTE 45 AND INDUSTRIAL PARK ROAD AND AT ALL OTHER INTERSECTIONS WITHIN THE STATE OF MISSISSIPPI WHERE A SIMILAR HAZARD MAY EXIST.
LOG NUMBER: H-0322A RECOMMENDATION NUMBER: H-82-011 ISSUE DATE: 5/25/82 ADDRESSEE: MISSISSIPPI, GOVERNOR NTSB STATUS: CLOSED - UNACCEPTABLE ACTION	AS A RESULT OF THE INVESTIGATION OF THIS ACCIDENT, THE NTSB RECOMMENDS THAT THE GOVERNOR OF THE STATE OF MISSISSIPPI: INTRODUCE AND SUPPORT LEGISLATION TO REQUIRE THAT THE DRIVER OF ANY MOTOR VEHICLE WITH A SEATING CAPACITY OF MORE THAN 16 PASSENGERS, WHETHER SO EMPLOYED OR ACTING VOLUNTARILY, SHALL POSSESS, IN ADDITION TO A PROPERLY CLASSIFIED STATE DRIVER'S LICENSE, A CERTIFICATE NOT MORE THAN 2 YEARS OLD AUTHENTICATING SUCH DRIVER'S SUCCESSFUL COMPLETION OF A BUSDRIVER TRAINING COURSE WHICH CONFORMS TO HIGHWAY SAFETY PROGRAMS STANDARD NO. 17, PUPIL TRANSPORTATION SAFETY.
LOG NUMBER: H-0322A RECOMMENDATION NUMBER: H-82-012 ISSUE DATE: 5/25/82 ADDRESSEE: MISSISSIPPI, GOVERNOR NTSB STATUS: CLOSED - UNACCEPTABLE ACTION	AS A RESULT OF THE INVESTIGATION OF THIS ACCIDENT, THE NTSB RECOMMENDS THAT THE GOVERNOR OF THE STATE OF MISSISSIPPI: TAKE STEPS TO ASSURE THAT REFERENCE TO THE POTENTIAL HAZARD FROM TRUCKS HAULING FOREST PRODUCTS OR OTHER OBJECTS WITH EXTENSIVE REAR OVERHANG, PARTICULARLY THE HAZARD FROM THE SWINGING OVERHANG DURING A TURNING MANEUVER, IS INCLUDED AS PART OF THE CURRICULUM FOR ALL SCHOOLBUS DRIVER TRAINING PROGRAMS AND DRIVER'S EDUCATION PROGRAMS THROUGHOUT THE STATE OF MISSISSIPPI.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0323
RECOMMENDATION NUMBER: H-82-013
ISSUE DATE: 5/25/82
ADDRESSEE: AL,GA,LA,MS,AR,SC,FL,TX;G
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

AS A RESULT OF THE INVESTIGATION OF THIS ACCIDENT, THE NTSB RECOMMENDS THAT THE GOVERNORS OF THE STATES OF FLORIDA, GEORGIA, SOUTH CAROLINA, ALABAMA, MISSISSIPPI, LOUISIANA, ARKANSAS, AND TEXAS: CONDUCT A STUDY WITHIN EACH STATE TO DETERMINE WHETHER TRUCKS HAULING LOGS OR OTHER OBJECTS WITH EXTENSIVE REAR OVERHANG REPRESENT A SIGNIFICANT SAFETY HAZARD TO THE MOTORING PUBLIC. IF THE STUDY DETERMINES THAT EXTENSIVE REAR OVERHANG ON TRUCKS HAULING LOGS OR OTHER OBJECTS WITH EXTENSIVE REAR OVERHANG IS A SIGNIFICANT SAFETY HAZARD, TAKE APPROPRIATE REMEDIAL ACTION.

LOG NUMBER: H-0344
RECOMMENDATION NUMBER: H-82-037
ISSUE DATE: 10/05/82
ADDRESSEE: U.S. DEPARTMENT OF HEALTH
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE ADMINSTRATION FOR CHILDREN, YOUTH AND FAMILIES OF THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES: ADVISE ALL HEAD START GRANTEES AND DELEGATE AGENCIES OF THE CIRCUMSTANCES OF THIS ACCIDENT AND ADOPT AND EMPHASIZE THE NEED FOR ADHERENCE TO THE POLICIES AND GUIDELINES PROVIDED BY THE PUPIL TRANSPORTATION SAFETY STANDARD, HIGHWAY SAFETY PROGRAM STANDARD NUMBER 17.

LOG NUMBER: H-0345
RECOMMENDATION NUMBER: H-82-038
ISSUE DATE: 10/06/82
ADDRESSEE: NHTSA
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: EXAMINE THE CRASH PERFORMANCE OF VANS IN ROLLOVERS AND ALL ACCIDENT TYPES, THROUGH ITS CRASH TESTING AND ACCIDENT INVESTIGATION PROGRAMS, TO DETERMINE IF THERE IS ANY TENDENCY FOR DOORS AND OTHER ESCAPE AREAS TO UNNECESSARILY JAM OR BE BLOCKED IN LOW-SPEED CRASHES. IF NECESSARY, ESTABLISH ADDITIONAL CRASH PERFORMANCE STANDARDS FOR VAN ESCAPE AREAS, ESPECIALLY THOSE USED FOR PUBLIC TRANSPORTATION.

LOG NUMBER: H-0346
RECOMMENDATION NUMBER: H-82-039
ISSUE DATE: 10/05/82
ADDRESSEE: MISSISSIPPI, CLAIBORNE CO
NTSB STATUS:
CLOSED - UNACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE CLAIBORNE COUNTY BOARD OF SUPERVISORS: PROVIDE ENGINEERING ASSISTANCE TO ALL PUBLIC AND PRIVATE SCHOOLS IN THE COUNTY IN PLANNING SCHOOLBUS ROUTES AND TRANSPORTATION POLICIES FOR INCLEMENT WEATHER THAT WOULD AVOID, TO THE EXTENT POSSIBLE, HAZARDOUS OR SUBSTANDARD ROUTES.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0352
RECOMMENDATION NUMBER: H-83-003
ISSUE DATE: ‥20/83
ADDRESSEE: MISSOURI PACIFIC RAILROAD
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE MISSOURI PACIFIC RAILROAD: EXPAND THE COMPANY'S ONGOING NEAR MISS REPORTING PROGRAM IN THE LOUISIANA DIVISION TO REQUIRE THAT OPERATING AND ENGINE CREWS ALSO REPORT VEHICLES OTHER THAN HAZARDOUS MATERIAL TRUCKS AND SCHOOLBUSES THAT VIOLATE GRADE CROSSING SAFETY LAWS.

LOG NUMBER: H-0357
RECOMMENDATION NUMBER: H-83-007
ISSUE DATE: 4/27/83
ADDRESSEE: ARKANSAS HIGHWAY AND TRAN
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT: ELIMINATE OR REDUCE THE ILLUSIONAL EFFECTS OF A STRAIGHTER ROAD AND THE 'WASH-OUT' EFFECTS OF HEADLIGHT GLARE ON STATE HIGHWAY 214 AT THE CURVED APPROACH TO THE INTERSECTION WITH STATE HIGHWAY 18.

LOG NUMBER: H-0357
RECOMMENDATION NUMBER: H-83-008
ISSUE DATE: 4/27/83
ADDRESSEE: ARKANSAS HIGHWAY AND TRAN
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT: FURTHER IMPROVE THE TRAFFIC CONTROL FEATURES ON STATE HIGHWAY 214 AT THE CURVED APPROACH TO ITS INTRSECTON WITH STATE HIGHWAY 18.

LOG NUMBER: H-0357
RECOMMENDATION NUMBER: H-83-009
ISSUE DATE: 4/27/83
ADDRESSEE: ARKANSAS HIGHWAY AND TRAN
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT: IDENTIFY SIMILAR LOCATIONS WITH SHARPLY CURVED APPROACHES TO INTERSECTIONS IN ARKANSAS, DETERMINE THE NEED FOR FURTHER TRAFFIC CONTROL IMPROVEMENTS, AND IMPROVE THESE LOCATIONS AS NECESSARY.

LOG NUMBER: H-0366
RECOMMENDATION NUMBER: H-83-039
ISSUE DATE: 9/28/83
ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR

THE NTSB RECOMMENDS THAT THE GOVERNORS OF THE 50 STATES AND THE MAYOR OF THE DISTRICT OF COLUMBIA: REVIEW STATE LAWS AND REGULATIONS, AND TAKE ANY NECESSARY LEGISLATIVE ACTION, TO ENSURE THAT PASSENGERS IN SMALL (MORE THAN 10 PASSENGERS AND LESS THAN 10,000 GVWR) SCHOOLBUSES AND SCHOOL VANS ARE REQUIRED TO USE AVAILABLE RESTRAINT SYSTEMS WHENEVER THE VEHICLE IS IN MOTION; ENSURE THAT ALL USERS OF SUCH VEHICLES ARE AWARE OF AND COMPLY WITH THESE PROVISIONS.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JERSEY, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR
ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR
ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: AMERICAN SAMOA, GOVERNOR
ADDRESSEE: VIRGIN ISLANDS, GOVERNOR
ADDRESSEE: PUERTO RICO, GOVERNOR
ADDRESSEE: GUAM, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0366
RECOMMENDATION NUMBER: H-83-040
ISSUE DATE: 9/28/83
ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JE[illegible]Y, GOVERNOR
ADDRESSEE: NEW MEX[illegible]O, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR
ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR

THE NTSB RECOMMENDS THAT THE GOVERNORS OF THE 50 STATES AND THE MAYOR OF THE DISTRICT OF COLUMBIA: REVIEW STATE LAWS AND REGULATIONS, AND TAKE ANY NECESSARY LEGISLATIVE ACTION, TO ENSURE THAT VEHICLES DESIGNED TO CARRY MORE THAN 10 PASSENGERS AND WEIGHING LESS THAN 10,000 POUNDS GVWR, USED TO TRANSPORT CHILDREN TO AND FROM SCHOOL, SCHOOL-RELATED EVENTS, CAMP, DAY CARE CENTER, OR SIMILAR PURPOSES MEET ALL FEDERAL MOTOR VEHICLE SAFETY STANDARDS APPLICABLE TO SMALL SCHOOLBUSES.

ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: AMERICAN SAMOA, GOVERNOR
ADDRESSEE: VIRGIN ISLANDS, GOVERNOR
ADDRESSEE: PUERTO RICO, GOVERNOR
ADDRESSEE: GUAM, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0366
RECOMMENDATION NUMBER: H-83-041
ISSUE DATE: 9/28/83

THE NTSB RECOMMENDS THAT THE GOVERNORS OF THE 50 STATES AND THE MAYOR OF THE DISTRICT OF COLUMBIA: REVIEW STATE LAWS AND REGULATIONS, AND TAKE ANY NECESSARY LEGISLATIVE ACTION, TO ENSURE THAT DRIVERS OF SCHOOLBUSES ARE REQUIRED TO WEAR THEIR SEATBELTS WHENEVER THE VEHICLE IS IN MOTION, THAT ALL SCHOOLBUS DRIVERS ARE MADE AWARE OF THIS REQUIREMENT, AND THAT PERIODIC MONITORING OF SCHOOLBUS DRIVER SEATBELT USE IS CONDUCTED.

ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JERSEY, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR

ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR
ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: AMERICAN SAMOA, GOVERNOR
ADDRESSEE: VIRGIN ISLANDS, GOVERNOR
ADDRESSEE: PUERTO RICO, GOVERNOR
ADDRESSEE: GUAM, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0365
RECOMMENDATION NUMBER: H-83-042
ISSUE DATE: 9/26/83
ADDRESSEE: ARKANSAS HIGHWAY AND TRAN
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT: REVISE THE BALL BANK INDICATOR READINGS USED TO SELECT AND POST ADVISORY SPEEDS FOR CURVES TO CONFORM TO THE GUIDELINES PUBLISHED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS.

LOG NUMBER: H-0365
RECOMMENDATION NUMBER: H-83-043
ISSUE DATE: 9/26/83
ADDRESSEE: ARKANSAS HIGHWAY AND TRAN
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT: DETERMINE IF THE DESIGN OF THE RUMBLE STRIPS INSTALLED AT THE APPROACH TO THE CURVE ON STATE HIGHWAY 214 HAS CREATED A HAZARD BECAUSE OF TRAFFIC MANUEVERING INTO THE OPPOSING TRAFFIC LANE TO AVOID THE RUMBLE STRIPS, AND TAKE ACTION TO CORRECT THE PROBLEM IF IT IS DETERMINED THAT A HAZARD EXISTS.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0365A
RECOMMENDATION NUMBER: H-83-044
ISSUE DATE: 9/26/83
ADDRESSEE: NHTSA
NTSB STATUS:
OPEN - UNACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: INCLUDE IN HIGHWAY SAFETY PROGRAM STANDARD (HSPS) 17--PUPIL TRANSPORTATION SAFETY AND IN THE 'PROGRAM MANUAL' FOR HSPS 17 THE REQUIREMENT THAT THE STATES INSTITUTE QUALITY CONTROL PROCEDURES FOR SCHOOLBUS REPAIRS TO DETERMINE IF NEEDED REPAIRS HAVE BEEN PERFORMED ADEQUATELY OR IF MAJOR REPAIRS ARE REQUIRED.

LOG NUMBER: H-0365A
RECOMMENDATION NUMBER: H-83-045
ISSUE DATE: 9/26/83
ADDRESSEE: NHTSA
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: INCLUDE IN THE 'PROGRAM MANUAL' OF HIGHWAY SAFETY PROGRAM STANDARD 17--PUPIL TRANSPORTATION SAFETY: 1. SPECIFIC, WELL-DEFINED QUALIFICATIONS FOR HIRING SCHOOLBUS MECHANICS; 2. SPECIFIC SKILL AREAS FOR SCHOOLBUS MECHANICS FOR WHICH CERTIFICATION OF PROFICIENCY IS REQUIRED; 3. A BIBLIOGRAPHY OF AVAILABLE COURSES THAT CAN BE ATTENDED OR COURSE CURRICULA THAT CAN BE USED AS AN EXAMPLE TO OBTAIN CERTIFICATION OF PROFICIENCY IN THE REQUIRED SKILL AREAS; 4. A REQUIREMENT TO INSTITUTE AND ENFORCE PROCEDURES TO PREVENT SCHOOL ACTIVITY GROUPS FROM ORGANIZING, BEGINNING, OR CONTINUING TRIPS IN MECHANICALLY UNSAFE VEHICLES; AND 5. REQUIREMENTS TO PLACE FIRE EXTINGUISHERS AT THE FRONT AND REAR OF SCHOOLBUSES, POST SIGNS IN SCHOOLBUSES ON THE LOCATION AND USE OF EMERGENCY EQUIPMENT, AND BRIEF PASSENGERS ON THE LOCATION AND USE OF EMERGENCY EQUIPMENT, BOTH PERIODICALLY AND BEFORE BEGINNING ACTIVITY TRIPS.

LOG NUMBER: H-0365B
RECOMMENDATION NUMBER: H-83-046
ISSUE DATE: 9/26/83
ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR

THE NTSB RECOMMENDS THAT ALL STATES AND THE DISTRICT OF COLUMBIA: UPGRADE THE QUALITY OF SCHOOLBUS INSPECTION AND REPAIR BY EXAMINING AND REVISING, AS REQUIRED, THE QUALIFICATIONS AND TRAINING OF AND FACILITIES FOR INSPECTORS AND MECHANICS AND BY INSTITUTING QUALITY CONTROL PROCEDURES TO DETERMINE IF NEEDED REPAIRS HAVE BEEN PERFORMED ADEQUATELY OR IF MAJOR REPAIRS ARE REQUIRED.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JERSEY, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR
ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR
ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: AMERICAN SAMOA, GOVERNOR
ADDRESSEE: VIRGIN ISLANDS, GOVERNOR
ADDRESSEE: PUERTO RICO, GOVERNOR
ADDRESSEE: GUAM, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0365B
RECOMMENDATION NUMBER: H-83-047
ISSUE DATE: 9/26/83
ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JERSEY, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR
ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR

THE NTSB RECOMMENDS THAT ALL STATES AND THE DISTRICT OF COLUMBIA: INSTITUTE AND ENFORCE PROCEDURES TO PREVENT ACTIVITY GROUPS AND DRIVERS FROM ORGANIZING, BEGINNING, OR CONTINUING TRIPS IN MECHANICALLY UNSAFE VEHICLES.

ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: AMERICAN SAMOA, GOVERNOR
ADDRESSEE: VIRGIN ISLANDS, GOVERNOR
ADDRESSEE: PUERTO RICO, GOVERNOR
ADDRESSEE: GUAM, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0365B
RECOMMENDATION NUMBER: H-83-048
ISSUE DATE: 9/26/83

THE NTSB RECOMMENDS THAT ALL STATES AND THE DISTRICT OF COLUMBIA: PLACE FIRE EXTINGUISHERS AT THE FRONT AND REAR OF SCHOOLBUSES, POST SIGNS IN SCHOOLBUSES ON THE LOCATION AND USE OF EMERGENCY EQUIPMENT, AND BRIEF PASSENGERS ON THE LOCATION AND USE OF EMERGENCY EQUIPMENT, BOTH PERIODICALLY AND BEFORE BEGINNING ACTIVITY TRIPS.

ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JERSEY, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR

ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR
ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: AMERICAN SAMOA, GOVERNOR
ADDRESSEE: VIRGIN ISLANDS, GOVERNOR
ADDRESSEE: PUERTO RICO, GOVERNOR
ADDRESSEE: GUAM, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0377
RECOMMENDATION NUMBER: H-83-065
ISSUE DATE: 12/14/83
ADDRESSEE: CALIFORNIA, DEPARTMENT OF
NTSB STATUS:
OPEN - INITIAL RESPONSE RECEIVED

THE NTSB RECOMMENDS THAT THE STATE OF CALIFORNIA DEPARTMENT OF MOTOR VEHICLES: EXPAND ITS MEDICAL QUALIFICATIONS REQUIREMENTS FOR A CLASS 1 AND 2 MOTOR VEHICLE OPERATOR'S LICENSE TO INCLUDE A PROVISION WHICH REQUIRES AN APPLICANT TO SUBMIT COMPLETE AND EXPLICIT MEDICAL INFORMATION, INCLUDING ONE'S MEDICAL HISTORY.

LOG NUMBER: H-0377
RECOMMENDATION NUMBER: H-83-066
ISSUE DATE: 12/14/83
ADDRESSEE: CALIFORNIA, DEPARTMENT OF
NTSB STATUS:
OPEN - INITIAL RESPONSE RECEIVED

THE NTSB RECOMMENDS THAT THE STATE OF CALIFORNIA DEPARTMENT OF MOTOR VEHICLES: CONSIDER ENACTING APPROPRIATE LEGISLATION TO PROHIBIT THE FALSIFICATION AND/OR OMISSION OF MEDICAL INFORMATION PURSUANT TO OBTAINING A CLASS 1 AND 2 MOTOR VEHICLE OPERATOR'S LICENSE IF CURRENT ADMINISTRATIVE AUTHORITY WILL NOT PERMIT THE PRESENT MEDICAL QUALIFICATIONS TO BE EXPANDED.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0378
RECOMMENDATION NUMBER: H-83-067
ISSUE DATE: 12/14/83
ADDRESSEE: CALIFORNIA DEPARTMENT OF
ADDRESSEE: WASHINGTON, STATE BOARD O
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE CALIFORNIA STATE DEPARTMENT OF EDUCATION AND THE WASHINGTON STATE BOARD OF EDUCATION: INITIATE A PROGRAM TO RETROFIT (EXCEPT WHERE THE DESIGN MAKES RETROFITTING ECONOMICALLY PROHIBITIVE) ALL TRANSIT-TYPE SCHOOLBUSES WITHIN YOUR FLEET THAT ARE NOT EQUIPPED WITH FEDERAL MOTOR VEHICLE SAFETY STANDARD (FMVSS) 222 APPROVED SEATS WITH FMVSS 222 APPROVED SEAT AND RESTRAINING BARRIERS IF THESE SCHOOLBUSES ARE REFURBISHED DURING THEIR NORMAL SERVICE LIFE.

LOG NUMBER: H-0379
RECOMMENDATION NUMBER: H-83-068
ISSUE DATE: 12/14/83
ADDRESSEE: FHWA
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE FEDERAL HIGHWAY ADMINISTRATION: REVISE FEDERAL MOTOR CARRIER SAFETY REGULATION 49 CFR 391.43 TO INCORPORATE A PROVISION, SIMILAR TO THAT SPECIFIED IN 14 CFR 67.20(A) FOR AIRMEN MEDICAL CERTIFICATION, WHICH WILL PROHIBIT THE FALSIFICATION OR OMISSION OF MEDICAL INFORMATION IN CONNECTION WITH A MEDICAL CERTIFICATION PHYSICAL EXAMINATION.

LOG NUMBER: H-0421
RECOMMENDATION NUMBER: H-84-070
ISSUE DATE: 9/24/84
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

THE NTSB RECOMMENDS TO THE GOVERNORS OF NEVADA, GEORGIA, NORTH CAROLINA, SOUTH CAROLINA, KANSAS, MINNESOTA, AND WASHINGTON: REVISE CURRENT STATE MOTOR VEHICLE LICENSING PROCEDURES TO REQUIRE ALL APPLICANTS FOR COMMERCIAL OR NONCOMMERCIAL BUS LICENSES TO TAKE AN APPROPRIATE WRITTEN EXAMINATION AND A ROAD TEST IN THE SIZE VEHICLE FOR WHICH THE LICENSE IS TO BE ISSUED.

LOG NUMBER: H-0422
RECOMMENDATION NUMBER: H-84-071
ISSUE DATE: 9/24/84
ADDRESSEE: TEXAS, LIBERTY COUNTY, CO
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE COMMISSIONER'S COURT OF LIBERTY COUNTY TEXAS: DEVELOP A DISASTER PLAN TO INCLUDE ALL FIRE, POLICE, MEDICAL, AND EMERGENCY SUPPORT AGENCIES WITHIN THE COUNTY AS WELL AS ADJACENT COUNTIES WHICH PROVIDES CLEAR GUIDELINES ON JURISDICTION, LOGISTICAL REQUIREMENTS, MEDICAL RESOURCE AVAILABILITY, COMMUNICATION NEEDS, AND THE NEED FOR ESTABLISHING A TRIAGE SYSTEM IN THE EVENT OF A CATASTROPHIC ACCIDENT.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0423
RECOMMENDATION NUMBER: H-84-072
ISSUE DATE: 9/24/84
ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
ADDRESSEE: FLORDIA, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR
ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

THE NTSB RECOMMENDS TO THE GOVERNORS OF ARIZONA, IDAHO, SOUTH DAKOTA, KENTUCKY, WISCONSIN, OHIO, WEST VIRGINIA, NEW MEXICO, FLORIDA, MISSISSIPPI, TENNESSEE, IOWA, NEBRASKA, OKLAHOMA, ARKANSAS, MISSOURI, ALABAMA, ALASKA, VERMONT, UTAH, OREGON, AND THE MAYOR OF THE DISTRICT OF COLUMBIA: ENACT APPROPRIATE LEGISLATION TO REQUIRE ALL PROSPECTIVE OPERATORS OF NONCOMMERCIAL BUSES TO DEMONSTRATE THEIR DRIVING SKILLS BY TAKING AN APPROPRIATE WRITTEN EXAMINATION AND ROAD TEST IN THE SIZE VEHICLE FOR WHICH THE LICENSE IS TO BE ISSUED.

LOG NUMBER: H-0425
RECOMMENDATION NUMBER: H-84-074
ISSUE DATE: 10/05/84
ADDRESSEE: MASSACHUSETTS, TOWN OF RE
NTSB STATUS:
CLOSED - ACCEPTABLE ACTION

THE NTSB RECOMMENDS THAT THE TOWN OF REHOBOTH, MASSACHUSETTS, SCHOOL DISTRICT: IMPLEMENT PROCEDURES TO NOTIFY SCHOOLBUS DRIVERS OF OPERATOR'S LICENCE AND ENDORSEMENT EXPIRATION DATES, AND FOLLOW-UP ON THESE NOTIFICATIONS TO ENSURE DRIVERS' COMPLIANCE WITH THE LICENSING REQUIREMENTS OF THE COMMONWEALTH OF MASSACHUSETTS.

ALL SCHOOL BUS
NTSB SAFETY RECOMMENDATIONS
-- AS OF 10/03/85 --

LOG NUMBER: H-0437
RECOMMENDATION NUMBER: H-85-004
ISSUE DATE: 3/22/85
ADDRESSEE: ALABAMA, STATE DIRECTOR O
ADDRESSEE: ALASKA, STATE DIRECTOR OF
ADDRESSEE: ARIZONA, STATE DIRECTOR O
ADDRESSEE: ARKANSAS, STATE DIRECTOR
ADDRESSEE: CALIFORNIA, STATE DIRECTO
ADDRESSEE: COLORADO, STATE DIRECTOR
ADDRESSEE: CONNECTICUT, STATE DIRECT
ADDRESSEE: DELAWARE, STATE DIRECTOR
ADDRESSEE: DISTRICT OF COLUMBIA, DIR
ADDRESSEE: FLORIDA, STATE DIRECTOR O
ADDRESSEE: GEORGIA, STATE DIRECTOR O
ADDRESSEE: HAWAII, STATE DIRECTOR OF
ADDRESSEE: IDAHO, STATE DIRECTOR OF
ADDRESSEE: ILLINOIS, STATE DIRECTOR
ADDRESSEE: INDIANA, STATE DIRECTOR O
ADDRESSEE: IOWA, STATE DIRECTOR OF P
ADDRESSEE: KANSAS, STATE DIRECTOR OF
ADDRESSEE: KENTUCKY, STATE DIRECTOR
ADDRESSEE: LOUISIANA, STATE DIRECTOR
ADDRESSEE: MAINE, STATE DIRECTOR OF
ADDRESSEE: MARYLAND, STATE DIRECTOR
ADDRESSEE: MASSACHUSETTS, STATE DIRE
ADDRESSEE: MICHIGAN, STATE DIRECTOR
ADDRESSEE: MINNESOTA, STATE DIRECTOR
ADDRESSEE: MISSISSIPPI, STATE DIRECT
ADDRESSEE: MISSOURI, STATE DIRECTOR
ADDRESSEE: MONTANA, STATE DIRECTOR O
ADDRESSEE: NEBRASKA, STATE DIRECTOR
ADDRESSEE: NEVADA, STATE DIRECTOR OF
ADDRESSEE: NEW HAMPSHIRE, STATE DIRE
ADDRESSEE: NEW JERSEY, STATE DIRECTO
ADDRESSEE: NEW MEXICO, STATE DIRECTO
ADDRESSEE: NEW YORK, STATE DIRECTOR
ADDRESSEE: NORTH CAROLINA, STATE DIR
ADDRESSEE: NORTH DAKOTA, STATE DIREC
ADDRESSEE: OHIO, STATE DIRECTOR OF P
ADDRESSEE: OKLAHOMA, STATE DIRECTOR
ADDRESSEE: OREGON, STATE DIRECTOR OF
ADDRESSEE: PENNSYLVANIA, STATE DIREC
ADDRESSEE: RHODE ISLAND, STATE DIREC
ADDRESSEE: SOUTH CAROLINA, STATE DIR
ADDRESSEE: SOUTH DAKOTA, STATE DIREC
ADDRESSEE: TENNESSEE, STATE DIRECTOR
ADDRESSEE: TEXAS, STATE DIRECTOR OF
ADDRESSEE: UTAH, STATE DIRECTOR OF P
ADDRESSEE: VERMONT, STATE DIRECTOR O
ADDRESSEE: VIRGINIA, STATE DIRECTOR
ADDRESSEE: WASHINGTON, STATE DIRECTO

THE NTSB RECOMMENDS THAT THE STATE DIRECTORS OF PUPIL TRANSPORTATION OF THE 50 STATES AND THE DISTRICT OF COLUMBIA: ENCOURAGE LOCAL SCHOOL JURISDICTIONS TO ESTABLISH AND ENFORCE PROCEDURES TO SYSTEMATICALLY MONITOR SCHOOLBUS DRIVER COMPLIANCE WITH RAILROAD CROSSING STOP REQUIREMENTS AND ROUTING REQUIREMENTS WHICH INCLUDE ON SCENE OBSERVATIONS OF DRIVER PERFORMANCE.

ADDRESSEE: WEST VIRGINIA, STATE DIRE
ADDRESSEE: WISCONSIN, STATE DIRECTOR
ADDRESSEE: WYOMING, STATE DIRECTOR O
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0437
RECOMMENDATION NUMBER: H-85-005
ISSUE DATE: 3/22/85
ADDRESSEE: ALABAMA, STATE DIRECTOR O
ADDRESSEE: ALASKA, STATE DIRECTOR OF
ADDRESSEE: ARIZONA, STATE DIRECTOR O
ADDRESSEE: ARKANSAS, STATE DIRECTOR
ADDRESSEE: CALIFORNIA, STATE DIRECTO
ADDRESSEE: COLORADO, STATE DIRECTOR
ADDRESSEE: CONNECTICUT, STATE DIRECT
ADDRESSEE: DELAWARE, STATE DIRECTOR
ADDRESSEE: DISTRICT OF COLUMBIA, DIR
ADDRESSEE: FLORIDA, STATE DIRECTOR O
ADDRESSEE: GEORGIA, STATE DIRECTOR O
ADDRESSEE: HAWAII, STATE DIRECTOR OF
ADDRESSEE: IDAHO, STATE DIRECTOR OF
ADDRESSEE: ILLINOIS, STATE DIRECTOR
ADDRESSEE: INDIANA, STATE DIRECTOR O
ADDRESSEE: IOWA, STATE DIRECTOR OF P
ADDRESSEE: KANSAS, STATE DIRECTOR OF
ADDRESSEE: KENTUCKY, STATE DIRECTOR
ADDRESSEE: LOUISIANA, STATE DIRECTOR
ADDRESSEE: MAINE, STATE DIRECTOR OF
ADDRESSEE: MARYLAND, STATE DIRECTOR
ADDRESSEE: MASSACHUSETTS, STATE DIRE
ADDRESSEE: MICHIGAN, STATE DIRECTOR
ADDRESSEE: MINNESOTA, STATE DIRECTOR
ADDRESSEE: MISSISSIPPI, STATE DIRECT
ADDRESSEE: MISSOURI, STATE DIRECTOR
ADDRESSEE: MONTANA, STATE DIRECTOR O
ADDRESSEE: NEBRASKA, STATE DIRECTOR
ADDRESSEE: NEVADA, STATE DIRECTOR OF
ADDRESSEE: NEW HAMPSHIRE, STATE DIRE
ADDRESSEE: NEW JERSEY, STATE DIRECTO
ADDRESSEE: NEW MEXICO, STATE DIRECTO
ADDRESSEE: NEW YORK, STATE DIRECTOR
ADDRESSEE: NORTH CAROLINA, STATE DIR
ADDRESSEE: NORTH DAKOTA, STATE DIREC
ADDRESSEE: OHIO, STATE DIRECTOR OF P
ADDRESSEE: OKLAHOMA, STATE DIRECTOR
ADDRESSEE: OREGON, STATE DIRECTOR OF
ADDRESSEE: PENNSYLVANIA, STATE DIREC
ADDRESSEE: RHODE ISLAND, STATE DIREC

THE NTSB RECOMMENDS THAT THE STATE DIRECTORS OF PUPIL TRANSPORTATION OF THE 50 STATES AND THE DISTRICT OF COLUMBIA: ENCOURAGE LOCAL SCHOOL JURISDICTIONS TO ISSUE AN ANNOUNCEMENT TO PARENTS AND STUDENTS AT OR NEAR THE START OF EACH SCHOOL YEAR WHICH (1) STATES THE JURISDICTION'S RULES REGARDING SCHOOLBUSES STOPPING AT RAILROAD CROSSINGS, (2) REQUESTS THAT SCHOOLBUS DRIVERS WHO FAIL TO COMPLY BE REPORTED TO A DESIGNATED SCHOOL OFFICIAL, AND (3) PROVIDE THE NAME AND TELEPHONE NUMBER OF THE OFFICIAL.

ADDRESSEE: SOUTH CAROLINA, STATE DIR
ADDRESSEE: SOUTH DAKOTA, STATE DIREC
ADDRESSEE: TENNESSEE, STATE DIRECTOR
ADDRESSEE: TEXAS, STATE DIRECTOR OF
ADDRESSEE: UTAH, STATE DIRECTOR OF P
ADDRESSEE: VERMONT, STATE DIRECTOR O
ADDRESSEE: VIRGINIA, STATE DIRECTOR
ADDRESSEE: WASHINGTON, STATE DIRECTO
ADDRESSEE: WEST VIRGINIA, STATE DIRE
ADDRESSEE: WISCONSIN, STATE DIRECTOR
ADDRESSEE: WYOMING, STATE DIRECTOR O
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0437
RECOMMENDATION NUMBER: H-85-006
ISSUE DATE: 3/22/85
ADDRESSEE: ALABAMA, STATE DIRECTOR O
ADDRESSEE: ALASKA, STATE DIRECTOR OF
ADDRESSEE: ARIZONA, STATE DIRECTOR O
ADDRESSEE: ARKANSAS, STATE DIRECTOR
ADDRESSEE: CALIFORNIA, STATE DIRECTO
ADDRESSEE: COLORADO, STATE DIRECTOR
ADDRESSEE: CONNECTICUT, STATE DIRECT
ADDRESSEE: DELAWARE, STATE DIRECTOR
ADDRESSEE: DISTRICT OF COLUMBIA, DIR
ADDRESSEE: FLORIDA, STATE DIRECTOR O
ADDRESSEE: GEORGIA, STATE DIRECTOR O
ADDRESSEE: HAWAII, STATE DIRECTOR OF
ADDRESSEE: IDAHO, STATE DIRECTOR OF
ADDRESSEE: ILLINOIS, STATE DIRECTOR
ADDRESSEE: INDIANA, STATE DIRECTOR O
ADDRESSEE: IOWA, STATE DIRECTOR OF P
ADDRESSEE: KANSAS, STATE DIRECTOR OF
ADDRESSEE: KENTUCKY, STATE DIRECTOR
ADDRESSEE: LOUISIANA, STATE DIRECTOR
ADDRESSEE: MAINE, STATE DIRECTOR OF
ADDRESSEE: MARYLAND, STATE DIRECTOR
ADDRESSEE: MASSACHUSETTS, STATE DIRE
ADDRESSEE: MICHIGAN, STATE DIRECTOR
ADDRESSEE: MINNESOTA, STATE DIRECTOR
ADDRESSEE: MISSISSIPPI, STATE DIRECT
ADDRESSEE: MISSOURI, STATE DIRECTOR
ADDRESSEE: MONTANA, STATE DIRECTOR O
ADDRESSEE: NEBRASKA, STATE DIRECTOR
ADDRESSEE: NEVADA, STATE DIRECTOR OF
ADDRESSEE: NEW HAMPSHIRE, STATE DIRE
ADDRESSEE: NEW JERSEY, STATE DIRECTO
ADDRESSEE: NEW MEXICO, STATE DIRECTO

THE NTSB RECOMMENDS THAT THE STATE DIRECTORS OF PUPIL TRANSPORTATION OF THE 50 STATES AND THE DISTRICT OF COLUMBIA: ENCOURAGE LOCAL SCHOOL JURISDICTIONS TO: DISCUSS WITH DRIVER APPLICANTS DURING THE SELECTION PROCESS THE PHYSICAL AND MENTAL DEMANDS PLACED UPON SCHOOLBUS DRIVERS, ENCOURAGE IN-SERVICE DRIVERS TO DISCUSS THEIR PROBLEMS AND THEIR SATISFACTION WITH THE PRESENT JOB ASSIGNMENT WITH THEIR SUPERVISORS DURING ROUTINE CONTACTS AND DURING PERFORMANCE EVALUATIONS, AND ENCOURAGE SUPERVISORS TO HAVE FREQUENT CONTACT WITH THEIR SCHOOLBUS DRIVERS TO DISCUSS AND RESOLVE BEHAVIOR PROBLEMS CONCERNING SCHOOLBUS PASSENGERS.

ADDRESSEE: NEW YORK, STATE DIRECTOR
ADDRESSEE: NORTH CAROLINA, STATE DIR
ADDRESSEE: NORTH DAKOTA, STATE DIREC
ADDRESSEE: OHIO, STATE DIRECTOR OF P
ADDRESSEE: OKLAHOMA, STATE DIRECTOR
ADDRESSEE: OREGON, STATE DIRECTOR OF
ADDRESSEE: PENNSYLVANIA, STATE DIREC
ADDRESSEE: RHODE ISLAND, STATE DIREC
ADDRESSEE: SOUTH CAROLINA, STATE DIR
ADDRESSEE: SOUTH DAKOTA, STATE DIREC
ADDRESSEE: TENNESSEE, STATE DIRECTOR
ADDRESSEE: TEXAS, STATE DIRECTOR OF
ADDRESSEE: UTAH, STATE DIRECTOR OF P
ADDRESSEE: VERMONT, STATE DIRECTOR O
ADDRESSEE: VIRGINIA, STATE DIRECTOR
ADDRESSEE: WASHINGTON, STATE DIRECTO
ADDRESSEE: WEST VIRGINIA, STATE DIRE
ADDRESSEE: WISCONSIN, STATE DIRECTOR
ADDRESSEE: WYOMING, STATE DIRECTOR O
NTSB STATUS:
OPEN - ACCEPTABLE ACTION

LOG NUMBER: H-0437A
RECOMMENDATION NUMBER: H-85-007
ISSUE DATE: 3/22/85
ADDRESSEE: PUPIL TRANSPORTATION SERV
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE VIRGINIA DEPARTMENT OF EDUCATION: CONSULT WITHOUT DELAY WITH THE VIRGINIA MEDICAL SOCIETY TO PROMULGATE OBJECTIVE MINIMUM PHYSICAL STANDARDS FOR SCHOOLBUS DRIVERS AS SPECIFIED BY SECTION 22.1-178 OF THE CODE OF VIRGINIA, AS AMENDED IN 1979. INCORPORATE THE STANDARDS IN THE PRESCRIBED PHYSICAL EXAMINATION FORMS, AND SPECIFY THE HEALTH HISTORY THAT MEDICAL EXAMINERS SHALL OBTAIN WHEN EXAMINING SCHOOLBUS DRIVER APPLICANTS.

LOG NUMBER: H-0440
RECOMMENDATION NUMBER: H-85-009
ISSUE DATE: 6/04/85
ADDRESSEE: FLORIDA DEPARTMENT OF HIG
NTSB STATUS:
OPEN - INITIAL RESPONSE RECEIVED

THE NTSB RECOMMENDS THAT THE STATE OF FLORIDA, DEPARTMENT OF HIGHWAY SAFETY AND MOTOR VEHICLES: ADOPT REGULATIONS TO REQUIRE THE OWNER OF A PRIVATE BUS TO DECLARE ANNUALLY WHEN THE VEHICLE IS REGISTERED IF THE BUS IS TO BE USED FOR PUPIL TRANSPORTATION, AND INSTITUTE PROCEDURES TO USE THE DATA TO IDENTIFY ALL PRIVATELY-OWNED AND PRIVATELY-OPERATED SCHOOLBUSES THAT ARE SUBJECT TO THE VEHICLE INSPECTION AND DRIVER CERTIFICATION REQUIREMENTS IN FLORIDA STATE STATUTE 316.615.

LOG NUMBER: H-0440
RECOMMENDATION NUMBER: H-85-011
ISSUE DATE: 6/04/85
ADDRESSEE: FLORIDA DEPARTMENT OF H.S
NTSB STATUS:
OPEN - INITIAL RESPONSE RECEIVED

THE NTSB RECOMMENDS THAT THE STATE OF FLORIDA, DEPARTMENT OF HIGHWAY SAFETY AND MOTOR VEHICLES: INSTRUCT LAW ENFORCEMENT OFFICERS TO VERIFY ON A CONTINUING BASIS COMPLIANCE WITH THE REQUIREMENT FOR ANNUAL INSPECTION OF PRIVATELY-OWNED SCHOOLBUSES STATED IN FLORIDA STATE STATUTE 316.615 THROUGH A SYSTEMATIC PROGRAM OF ROADSIDE VEHICLE CHECKS AND ON EACH OCCASION A PRIVATE SCHOOLBUS IS STOPPED FOR A DRIVER VIOLATION ON A SPECIFIC VEHICLE SAFETY VIOLATION.

LOG NUMBER: H-0441
RECOMMENDATION NUMBER: H-85-012
ISSUE DATE: 6/04/85
ADDRESSEE: ALABAMA, GOVERNOR
ADDRESSEE: ALASKA, GOVERNOR
ADDRESSEE: ARIZONA, GOVERNOR
ADDRESSEE: ARKANSAS, GOVERNOR
ADDRESSEE: CALIFORNIA, GOVERNOR
ADDRESSEE: COLORADO, GOVERNOR
ADDRESSEE: CONNECTICUT, GOVERNOR
ADDRESSEE: DELAWARE, GOVERNOR
ADDRESSEE: FLORIDA, GOVERNOR
ADDRESSEE: GEORGIA, GOVERNOR
ADDRESSEE: HAWAII, GOVERNOR
ADDRESSEE: IDAHO, GOVERNOR
ADDRESSEE: ILLINOIS, GOVERNOR
ADDRESSEE: INDIANA, GOVERNOR
ADDRESSEE: IOWA, GOVERNOR
ADDRESSEE: KANSAS, GOVERNOR
ADDRESSEE: KENTUCKY, GOVERNOR
ADDRESSEE: LOUISIANA, GOVERNOR
ADDRESSEE: MAINE, GOVERNOR
ADDRESSEE: MARYLAND, GOVERNOR
ADDRESSEE: MASSACHUSETTS, GOVERNOR
ADDRESSEE: MICHIGAN, GOVERNOR
ADDRESSEE: MINNESOTA, GOVERNOR
ADDRESSEE: MISSISSIPPI, GOVERNOR
ADDRESSEE: MISSOURI, GOVERNOR
ADDRESSEE: MONTANA, GOVERNOR
ADDRESSEE: NEBRASKA, GOVERNOR
ADDRESSEE: NEVADA, GOVERNOR
ADDRESSEE: NEW HAMPSHIRE, GOVERNOR
ADDRESSEE: NEW JERSEY, GOVERNOR
ADDRESSEE: NEW MEXICO, GOVERNOR
ADDRESSEE: NEW YORK, GOVERNOR
ADDRESSEE: NORTH CAROLINA, GOVERNOR
ADDRESSEE: NORTH DAKOTA, GOVERNOR
ADDRESSEE: OHIO, GOVERNOR
ADDRESSEE: OKLAHOMA, GOVERNOR
ADDRESSEE: OREGON, GOVERNOR

THE NTSB RECOMMENDS THAT ALL STATES AND THE DISTRICT OF COLUMBIA: DEVELOP A MODEL INSTRUCTIONAL PROGRAM TO BE USED BY LOCAL SCHOOL DISTRICTS TARGETED AT DRIVERS OF PRIVATELY-OWNED AND PRIVATELY-OPERATED PUPIL TRANSPORTATION VEHICLES THAT INCLUDES A REVIEW OF ALL APPLICABLE LAWS, REGULATIONS, AND POLICIES GOVERNING PUPIL TRANSPORTATION SAFETY, FIRST-AID, AND PRETRIP INSPECTIONS, AND ENCOURAGE DRIVERS OF PRIVATELY-OWNED AND PRIVATELY-OPERATED PUPIL TRANSPORTATION VEHICLES TO PARTICIPATE IN THE PROGRAM.

ADDRESSEE: PENNSYLVANIA, GOVERNOR
ADDRESSEE: RHODE ISLAND, GOVERNOR
ADDRESSEE: SOUTH CAROLINA, GOVERNOR
ADDRESSEE: SOUTH DAKOTA, GOVERNOR
ADDRESSEE: TENNESSEE, GOVERNOR
ADDRESSEE: TEXAS, GOVERNOR
ADDRESSEE: UTAH, GOVERNOR
ADDRESSEE: VERMONT, GOVERNOR
ADDRESSEE: VIRGINIA, GOVERNOR
ADDRESSEE: WASHINGTON, GOVERNOR
ADDRESSEE: WEST VIRGINIA, GOVERNOR
ADDRESSEE: WISCONSIN, GOVERNOR
ADDRESSEE: WYOMING, GOVERNOR
ADDRESSEE: DISTRICT OF COLUMBIA, MAY
NTSB STATUS:
OPEN - INITIAL RESPONSE RECEIVED

LOG NUMBER: H-0442
RECOMMENDATION NUMBER: H-85-013
ISSUE DATE: 6/04/85

THE NTSB RECOMMENDS THAT THE DIRECTORS OF PUPIL TRANSPORTATION OF ALL STATES AND THE DISTRICT OF COLUMBIA: INCORPORATE INTO EXISTING AND FUTURE PUPIL TRANSPORTATION CONTRACTS WITHIN YOUR STATE OR DISTRICT MINIMUM STANDARDS FOR SCHOOLBUS DRIVER CERTIFICATION, LICENSING, AND TRAINING, AND FOR SCHOOLBUS INSPECTION AND MAINTENANCE COMPARABLE TO THOSE APPLICABLE TO PUBLICLY OPERATED SCHOOLBUSES AND DRIVERS OF PUBLIC SCHOOLBUSES. ENFORCE THESE VEHICLE AND DRIVER STANDARDS.

ADDRESSEE: ALABAMA, DIRECTOR OF PUPI
ADDRESSEE: ALASKA, DIRECTOR OF PUPIL
ADDRESSEE: ARIZONA, DIRECTOR OF PUPI
ADDRESSEE: ARKANSAS, DIRECTOR OF PUP
ADDRESSEE: CALIFORNIA, DIRECTOR OF P
ADDRESSEE: COLORADO, DIRECTOR OF PUP
ADDRESSEE: CONNECTICUT, DIRECTOR OF
ADDRESSEE: DELAWARE, DIRECTOR OF PUP
ADDRESSEE: GEORGIA, DIRECTOR OF PUPI
ADDRESSEE: FLORIDA, DIRECTOR OF PUPI
ADDRESSEE: HAWAII, DIRECTOR OF PUPIL
ADDRESSEE: IDAHO, DIRECTOR OF PUPIL
ADDRESSEE: ILLINOIS, DIRECTOR OF PUP
ADDRESSEE: INDIANA, DIRECTOR OF PUPI
ADDRESSEE: IOWA, DIRECTOR OF PUPIL T
ADDRESSEE: KANSAS, DIRECTOR OF PUPIL
ADDRESSEE: KENTUCKY, DIRECTOR OF PUP
ADDRESSEE: LOUISIANA, DIRECTOR OF PU
ADDRESSEE: MAINE, DIRECTOR OF PUPIL
ADDRESSEE: MARYLAND, DIRECTOR OF PUP
ADDRESSEE: MASSACHUSETTS, DIRECTOR O
ADDRESSEE: MICHIGAN, DIRECTOR OF PUP
ADDRESSEE: MINNESOTA, DIRECTOR OF PU
ADDRESSEE: MISSISSIPPI, DIRECTOR OF
ADDRESSEE: MISSOURI, DIRECTOR OF PUP
ADDRESSEE: MONTANA, DIRECTOR OF PUPI
ADDRESSEE: NEBRASKA, DIRECTOR OF PUP
ADDRESSEE: NEVADA, DIRECTOR OF PUPIL
ADDRESSEE: NEW HAMPSHIRE, DIRECTOR O

ADDRESSEE: NEW JERSEY, DIRECTOR OF P
ADDRESSEE: NEW MEXICO, DIRECTOR OF P
ADDRESSEE: NEW YORK, DIRECTOR OF PUP
ADDRESSEE: NORTH CAROLINA, DIRECTOR
ADDRESSEE: NORTH DAKOTA, DIRECTOR OF
ADDRESSEE: OHIO, DIRECTOR OF PUPIL T
ADDRESSEE: OKLAHOMA, DIRECTOR OF PUP
ADDRESSEE: OREGON, DIRECTOR OF PUPIL
ADDRESSEE: PENNSYLVANIA, DIRECTOR OF
ADDRESSEE: RHODE ISLAND, DIRECTOR OF
ADDRESSEE: SOUTH CAROLINA, DIRECTOR
ADDRESSEE: SOUTH DAKOTA, DIRECTOR OF
ADDRESSEE: TENNESSEE, DIRECTOR OF PU
ADDRESSEE: TEXAS, DIRECTOR OF PUPIL
ADDRESSEE: UTAH, DIRECTOR OF PUPIL T
ADDRESSEE: VERMONT, DIRECTOR OF PUPI
ADDRESSEE: VIRGINIA, DIRECTOR OF PUP
ADDRESSEE: WASHINGTON, DIRECTOR OF P
ADDRESSEE: WEST VIRGINIA, DIRECTOR O
ADDRESSEE: WISCONSIN, DIRECTOR OF PU
ADDRESSEE: WYOMING, DIRECTOR OF PUPI
ADDRESSEE: DISTRICT OF COLUMBIA, DIR
NTSB STATUS:
OPEN - AWAIT REPLY

LOG NUMBER: H-0443
RECOMMENDATION NUMBER: H-85-014
ISSUE DATE: 6/04/85
ADDRESSEE: NATIONAL PARENT-TEACHER A
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE NATIONAL PARENT-TEACHER ASSOCIATION: ENCOURAGE LOCAL PARENT-TEACHER ASSOCIATIONS AND LOCAL SCHOOL BOARDS IN EACH STATE AND THE DISTRICT OF COLUMBIA TO CONDUCT SURVEYS TO IDENTIFY DRIVERS OF PUBLIC SCHOOLBUSES AND PRIVATELY-OWNED SCHOOLBUSES WHO ENGAGE IN UNSAFE PUPIL TRANSPORTATION PRACTICES, AND REPORT THE FINDINGS TO THE STATE OR LOCAL POLICE.

LOG NUMBER: H-0443
RECOMMENDATION NUMBER: H-85-015
ISSUE DATE: 6/04/85
ADDRESSEE: NATIONAL PARENT-TEACHER A
NTSB STATUS:
OPEN - AWAIT REPLY

THE NTSB RECOMMENDS THAT THE NATIONAL PARENT-TEACHER ASSOCIATION: URGE LOCAL PARENT-TEACHER ASSOCIATIONS TO CONDUCT PROGRAMS TO INFORM PARENTS ABOUT STATE SAFETY REQUIREMENTS FOR SCHOOLBUS DRIVERS AND SCHOOLBUS INSPECTIONS.

SCHOOL BUS SAFETY STUDY

VOLUME 1

REPORT

PREPARED FOR: TRAFFIC SAFETY STANDARDS AND RESEARCH
TRANSPORT CANADA

PREPARED BY : G.H. FARR, P. ENG.
AUTOMOTIVE SAFETY ENGINEER
CRASHWORTHINESS SECTION

DATE : JANUARY 1985

TABLE OF CONTENTS
VOLUME I

NOTE: Appendices to this report are contained in Volume II. They are available upon request from Transport Canada.

ABSTRACT

The safety of children on school buses is an issue of considerable concern. Canadian Motor Vehicle Safety Standards pertaining to the crashworthiness features of school buses were introduced in 1980 with the objective of better protecting children in the event of an accident. While there is not yet sufficient accident data available in Canada to document the effects of these regulations there are indications in the U.S. that similar regulations have been effective in accomplishing this goal. The suggestion has been made by many groups, on many occasions, that perhaps seat belts should be made mandatory in school buses in order to provide an enhanced level of occupant safety.

This report details the results of an overall study of school bus safety. It includes the results of a literature survey, discussions with bus manufacturers and operators of school buses utilizing seat belts and a crash test program for three different school buses.

The crash test program provided data and photographic evidence to compare the reaction of three belted and three unbelted dummies in a 48 km/h frontal collision. Three different seat spacings were also used.

The results indicated that the belted dummies experienced higher head accelerations, lower chest accelerations and more severe neck extension than did the unbelted ones. This indicates that if lap belts are installed on current designs of school bus seats, a greater potential for head injury may exist.

Other observations suggest that further study is required in the areas of glazing strength, attachment of seats to floor, fuel filler mounting and driver protection.

SUMMARY

This School Bus Safety Study indicates that careful deliberation must be exercised before deciding whether or not to add lap belts to exisiting designs of occupant protection systems found on todays school buses. The barrier crash test results showed that the potential for head injury in frontal collisions increased, when lap belts were employed.

This conclusion was reached after the subject of school bus safety was investigated in considerable detail. The investigation included a review of existing literature, discussions with bus manufacturers and operators and a dynamic barrier crash program. The crash program provided data and photographic evidence, not before available, to compare the reaction of belted and unbelted test dummies in a frontal collision.

Three different sizes of school buses were subjected to a barrier collision at 48 km/h. The large conventional type bus was a 66 passenger Blue Bird model. The mid size bus was a 22 passenger Thomas Minotour I built on a Ford Chassis. The third bus was a 20 passenger van conversion type, manufactured by Campwagon, using a Dodge B350 van. Each bus contained six 5th percentile adult female test dummies. Three of the dummies were restrained

by type I* seat belts and three were left unrestrained. The Thomas & Campwagon buses had a Gross Vehicle Weight Rating (GVWR) of less than 4500 kg while the Blue Bird had a GVWR greater then 4500 kg.

For the bus with a GVWR greater then 4500 kg, all dummies exhibited HIC** values which were less than 1000. The value of 1000 is the generally accepted threshold, above which serious injury or death is likely to occur. However, the HIC for the belted dummies was approximately three times greater than the HIC for the unbelted ones. For both busses with a GVWR less than 4500 kg, all HIC values for restrained dummies exceeded 1000. By contrast, all HIC values for unrestrained dummies were below 1000. The differences in HIC values were significant enough to reach the conclusion stated above. A summary of test results is presented in Table 3. In addition, several belted dummies experienced severe rearward neck flexure, as a result of pivoting about the lap belt and striking the seat back in front with their head. This in itself was judged to cause at least serious injury.

* A type I seat belt consists of a lap belt only, for restraining movement of the pelvis

**HIC = Head Injury Criteria - refer to Appendix A, clause (11). Refer to BACKGROUND section for further explanation of HIC. Appendices are referenced throughout volume 1 of this report. They are contained in Volume II.

Further conclusions are summarized below:

1. The passive occupant restraint system (compartmentalization) provides excellent protection for occupants during a frontal impact,

2. The use of a type I seat belt system in any current design of school bus may result in more severe head and neck injuries for a belted occupant than an unbelted one, in a severe frontal collision.

3. The use of lag screws to attach seats/barriers to the bus floor should be examined.

4. The body shift along the chassis during a frontal collision presents a life threatening hazard to the bus driver.

5. The body joint strength regulation (CMVSS 221) is adequate to prevent joint separation in a school bus with a GVWR greater than 4500 kg during a frontal collision.

6. The window retention regulation (CMVSS 217) should be reviewed to determine if a minimum force should be applied to the windows before they are permitted to shatter or become dislodged from their frame.

7. The femur loads measured on all dummies were well below the limit of 2500 lbs.

8. There are few statistics available concerning school bus accidents. Further collections and analysis of such data should be pursued. In particular, the direction of impact with the bus and the type of injuries encountered should be documented more fully.

BACKGROUND

Accident data shows that school buses are the safest means of transporting students to and from school. The latest available Canadian analysis, entitled "School Bus Accident Study"[1*] concluded that a student is 8 times more liable to be injured while travelling to or from school in a vehicle other than a school bus.

Unlike passenger cars, whose more aggressive interior, lower mass and more severe deceleration behaviour in a crash situation makes the fitment of seat belts essential for occupant safety, the school bus presents a different problem with respect to occupant protection. There are, at present, a total of thirty five federal safety standards which are applicable to school buses. These are summarized in Appendix B. New safety standards for school buses were introduced in 1980. These ensured that school buses would be constructed with increased body joint strength (CMVSS 221), improved window retention (CMVSS 217), better fuel system integrity (CMVSS 301) and improved occupant protection (CMVSS 222).

*The numbers which appear as superscripts are the references listed at the end of this report.

As the result of extensive testing in the U.S. [8, 9] and Canada, the occupant protection capability of a school bus was greatly improved by requiring the use of high-backed, heavily padded, closely spaced seats. The old steel post and modesty panel which was ahead of the front row of seats was replaced by a high, padded barrier. Performance criteria were introduced to ensure that the seats were capable of absorbing a specific amount of energy if they were impacted by an occupant. The method of attaching the seats to the floor and attaching the seat cushion to the seat frame was upgraded. These features are collectively referred to as the "compartmentalization" concept. Since the introduction of similar passive protection features in the U.S. in 1977, child deaths in school buses have been reduced from 60 to 9 with over 400,000 school buses operating daily.[2] A table illustrating this reduction in fatalities is provided in Appendix C.

Because of this "compartmentalization" concept, and the controlled seat spacing, the students tend to sit more upright on the seats. In the event of a collision, the occupant slides forward into the back of the seat in front. This results in the forces being spread more evenly over the upper torso. A head protection zone as described in Appendix A, clause(1) is provided in each bus to minimize head contact with the roof of the bus.

CMVSS 222 "School Bus Passenger Seating and Crash Protection" was first proposed in the Canada Gazette Part I on February 4, 1978. The proposed effective date was September 1, 1978. The proposal would have required that seat belts be installed at each designated seating position (DSP) in all school buses having a Gross Vehicle Weight Rating (GVWR) of 4500 kg or less and that seat belt attachment points be provided on seats in school buses with a GVWR greater than 4500 kg.

Due to the many adverse representations received from manufacturers, school boards, operators etc, the seat belt requirements were withdrawn. This was done with the understanding that a thorough review would be conducted in order to examine more fully the effect that seat belts would have on school bus occupants and to further investigate the areas of concern raised by commentators to the Part I. Representors questioned the following:

a) Cost-benefit ratio due to the low number of accidents involving school buses.

b) Adverse effect of seat belts on the undeveloped bone structure of young children.

c) operational problems such as replacement of damaged belts, and maintenance of belts.

d) monitoring the students to ensure that the belts are worn and are properly adjusted.

e) use of belts as weapons to strike another student.

f) liability of the operator or driver if the belts are not worn and/or are improperly adjusted and the bus is involved in an accident.

CMVSS 222 without the seat belt requirement became effective September 30, 1980.* It followed the "compartmentalization" concept for occupant protection.

In the U.S., school buses with a GVWR of 10,000 lbs (4500 kg) or less must have a seat belt installed at each DSP. This regulation, FMVSS 222, became effective on April 1, 1977. There are however some significant differences between the existing Canadian and U.S. regulations. In Canada, a padded barrier must be installed in front of each DSP that does not have another seat back within 533 mm** of the Seating Reference Point (SRP). This

* SOR 80-161, Canada Gazette Part II, Vol. 114, No. 5, March 12, 1980.

** A proposal has been submitted to increase this to 610 mm. Sled tests performed in the U.S.[8] have shown that seat spacing can be increased up to 610 mm without impairing the concept of compartmentalization.

barrier is not mandatory in the U.S.. In addition, the head protection zone and seat spacing requirements*, specified in the Canadian regulation, are not applicable in the U.S. for buses with a GWR of 10,000 lbs (4500 kg) or less.

The "School Bus Testing Program" was planned to determine the reaction of belted and unbelted test dummies in all classes of school buses during a frontal barrier collision. No such data presently exists. An investigation of the head and chest contact of the dummy with the seat back was needed for both belted and unbelted dummies, to properly assess the effect seat belts would have on school bus occupants and to determine whether or not the regulat introduced in 1980 provide the anticipated level of protection. It was suspected that the pivoting of the anthropomorphic test device (ATD) about the seat belt could result in greater head injuries than if the ATD were unrestrained.

The barrier crash program was designed to measure and compare the effect of a 48 km/h frontal barrier crash on both belted and unbelted dummy occupants. In addition, three different seat spacings were used to determine if this

* A copy of CMVSS 222 is attached as Appendix A. Clause (1) defines the head protection zone and clause (10) defines the seat spacing requirement.

variable has an effect on .e reaction of the dummies. Instrumentation was installed to determine the deceleration of the vehicle during the crash phase. Six instrumented but uncertified 5th percentile adult female anthropomorphic test devices (ATD)* were installed in each bus to determine the chest deceleration, the head deceleration and the femur loads** during the impact. Slow motion films were made to provide a record of the motion of the dummies within the vehicle.

Instrumentation consisted of triaxial accelerometers in the heads and chests of the ATD's and load cells in the femurs and on both sides of the lower torso belts. From this raw data accelerations were plotted against time. Chest severity indices, peak accelerations and the head injury criterion (HIC) were then calculated.

The question of which injury criteria to rely on deserves some consideration. Peak resultant head acceleration gives some indication of injury potential but, particularly when the peak occurs over a short duration, it is difficult to relate this to human tolerance. The onset rate, duration and presence of angular acceleration all contribute to the severity of injury. The HI[illegible]

* The ATD's are dimensioned in accordance with CMVSS 100 and conform to FMVSS part 572 specifications.
**Only ATD numbers 4, 5 and 6 could be instrumented to record femur loads.

developed to provide a mathematical relationship between resultant acceleration and time and is expressed as

$$HIC = \left[\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} a\,dt \right]^{2.5} (t_2 - t_1).^{*}$$

A tolerance for human head injury has been set somewhat arbitrarily, at the level of HIC $\leq$ 1000. The level of 1000 has been challenged by researchers in France and other countries and the validity of the mathematical expression itself can be questioned.[10] The expression has been developed from studies of human cadaver head impacts to flat plates, animal studies and cadaver studies and it is not certain how well suited the expression or the limit of 1000 is to head impacts of the type found in this study. Certainly, a HIC of 1000 is probably not the best value for a limit of human tolerance for children. Unfortunately, the fundamental research necessary to provide a reliable head injury criterion for children has not been completed. HIC in the form currently used worldwide in automotive testing probably provides an indication of a certain level of injury to the human child head and it is included here, along with peak resultant acceleration. The chest accelerations are also included. An injury criterion of a maximum of 60 g's chest acceleration over 3 milliseconds is used in some standards. It is probable that child tolerance in the area of chest impact would exceed that for adults due to the greater elasticity of the bone structure.

*For explanation of terms, see Appendix A clause(11).

It seems reasonable to assume that the injury criteria commonly used for adults (HIC and chest acceleration) give some relative indication of injury potential for children but the limits are suspect. In the absence of better measures these values are quoted here.

Eight of ten Canadian provinces have legislation which makes the wearing of seat belts mandatory if the belts are installed by the vehicle manufacturer. Children in seven of these eight provinces are required to be secured by an approved occupant restraint in the family car from the time they leave the hospital as a new born in an infant carrier. The only vehicle which they may encounter which does not have seat belts is a bus. Many people argue that this break in the continuity of seat belt deployment can have adverse effects on the wearing rates in vehicles other than buses. However, there is no data available to either confirm or disprove this theory.

Additional studies included conducting a literature search to try to determine if the compartmentalization concept is a valid one, visiting bus manufacturers to examine their products and manufacturing techniques and visiting bus operators who employ seat belts to discuss their experiences. The results are found in the section entitled "FIN[illegible]".

APPROACH

In order to properly evaluate the situation concerning school bus safety, it was necessary to contact a number of sources. Computer data bases in the Transport Canada library were searched for published literature concerning school bus safety and testing. A major literature search, conducted by Biokinetics and Associates Ltd. as part of the TES Limited Study[3] on the school bus safety shield, was reviewed as part of this study.

Construction methods used in the manufacture of school busses were examined at the bus manufacturers factories and the issue of seat belt use in busses was discussed with key personnel. School busses which employ seat belts were examined at to the Etobicoke Board of Education in Etobicoke and Allways Transportation in Scarborough. The experience of the fleet managers with seat belts in their busses was discussed.

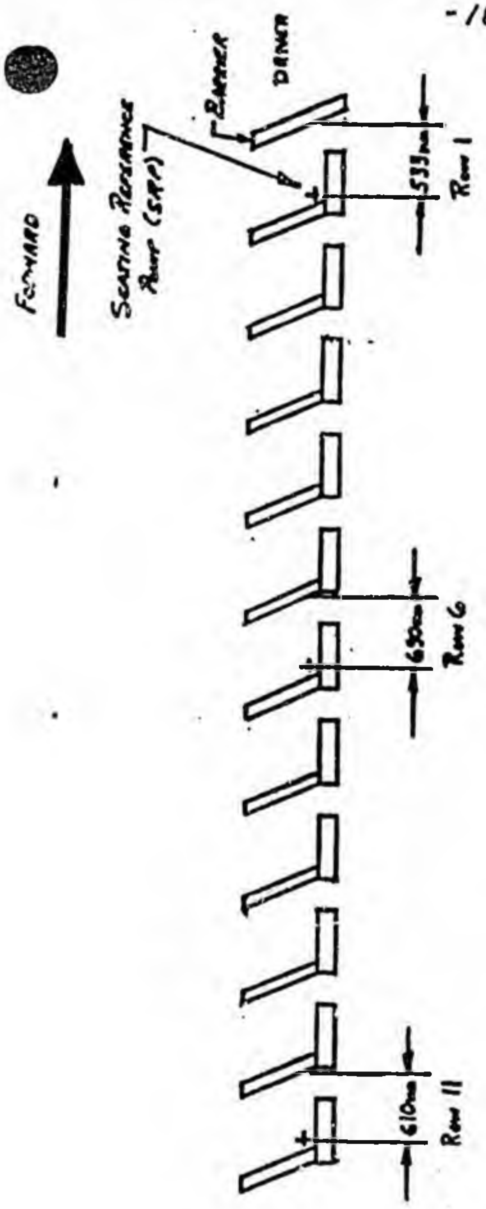
It was determined that no data existed to compare the reaction between belted and unbelted occupants in a school bus, during a frontal collision. In order to generate such data, the "School Bus Testing Program" was developed.

For this barrier crash program, three busses representing the majority of types of busses in use in Canada were selected. The first was a 1984 Bluebird, 66 passenger full size bus (GVWR 11340 kg). The second was a 1984 Campwagon van conversion type, 20 passenger (GVWR 3861 kg) built on a Dodge B350 Maxivan chassis. The third was a 1984 Thomas Minotour 1, 22 passenger (GVWR 4535 kg), built on a Ford school bus chassis. Neither the chassis nor body of the busses was altered for testing. The seating arrangement was altered in accordance with the following:

1. **BLUEBIRD BUS - VIN 1BVLM0GM2EHA22630**

There are eleven rows of seats in this bus. Row 1 is at the front immediately behind the barrier and row 11 is at the rear. The spacing between the seats and the front barrier or seat back was adjusted as shown in figure 1. The seats with seat belts installed were purchased from Blue Bird - part number 39" DOT-77*, with type I lap belt assemblies. The seat belt was manufactured by Indiana Mills, model 1130-4100-0001-00, manually adjustable, no retractors.

* Imperial units are used in many instances in this section because the bus manufacturers instructions for installing seats specified imperial fasteners and torque requirements.



NOTE:
1. ON L.H. SIDE, LAP BELT INSTALLED IN ROW 3 ONLY
2. ON R.H. SIDE, LAP BELT INSTALLED IN ROWS 1 AND 11.
3. DIMENSIONS TAKEN AT CENTER OF SEAT, ON HORIZONTAL PLANE, THROUGH SRP.
4. ALL SEATS ARE 990mm WIDE (3 DSP)

SEAT SPACING - BLUE BIRD BUS

FIGURE 1

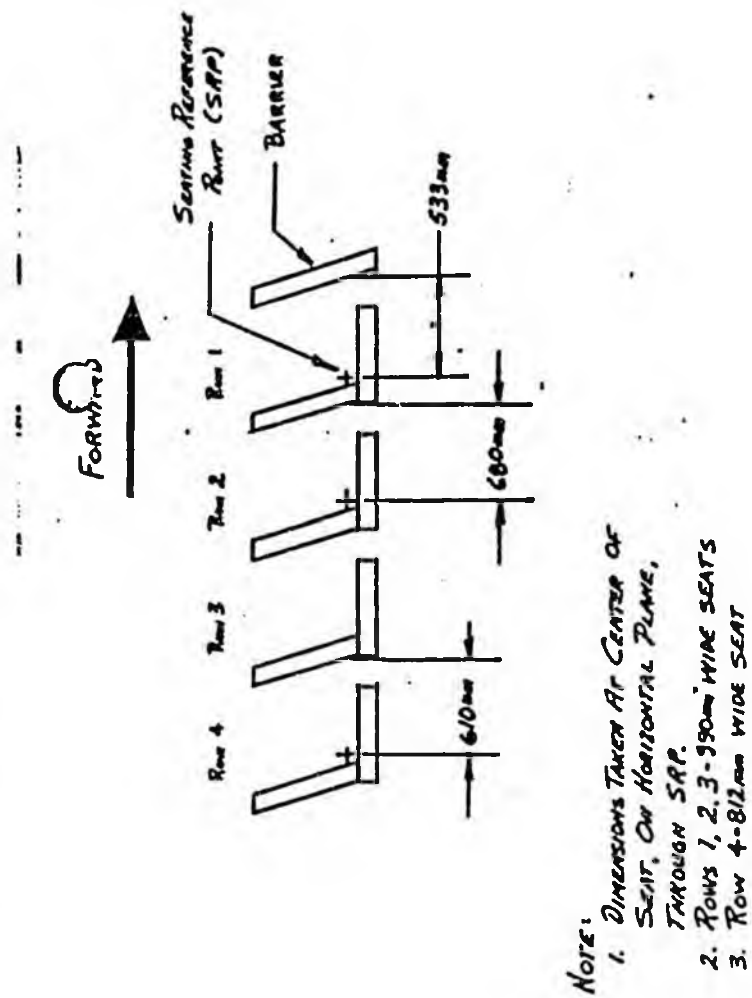
When a seat was moved to obtain the desired spacing, 11/32 diameter pilot holes were drilled through the floor and 5/16" x 2" machine bolts and nuts were installed. The nuts were torqued to 10-12 ft-lbs. The attachment of the seat frame to the sidewall was accomplished by using 3 - 5/16 x 3/4 long machine bolts and nuts in 11/32 diameter pilot holes. Nuts were torqued to 18-20 ft-lbs. All hardware and instructions were supplied by Blue Bird.

Barriers and seats not requiring relocation were tested as installed in the bus by Blue Bird.

Refer to photos #1 to 14 for both pre and post test conditions.

2. THOMAS BUS - VIN 1FAJR37G1KHA83615

The seats in the Thomas bus were moved to obtain the spacings shown in figure 2. The instructions and hardware were supplied by Thomas. Three seats (rows 1, 2 & 4) on the LH side were removed and replaced with reinforced seats, complete with type I seat belts. These seat assemblies were purchased from Thomas, complete with seat belts installed on the frame.



SEAT SPACING - THOMAS BUS

FIGURE 2

While attaching the seats to the floor several of the leg screws could not be torqued to the specified 16-18 ft-lbs., due to stripping of the threads in the plywood.

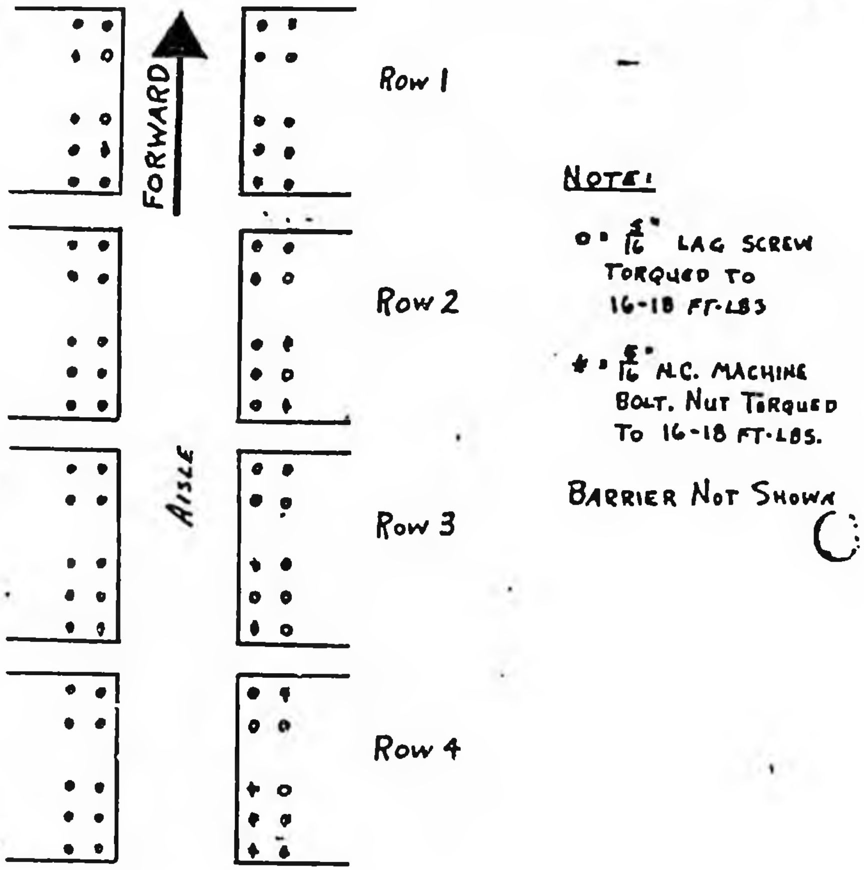
These leg screws were removed and replaced with 5/16 NC machine bolts and self locking nut/washer. The location of the bolts is shown in figure 3. The barriers were tested as installed in the bus by Thomas.

The seat belts were all located on the left side of the vehicle. Belts were manufactured by Beams, model J1800F (male) and model J1800B (female), manually adjustable. Retractors were not used.

Refer to photos #29 to 42 for both pre and post test conditions.

3. <u>CAMPWAGON BUS - VIN 2B7KB33T0KK278915</u>

Since Campwagon does not have a seat belt option for their van co[illegible]ersion school buses, it was necessary to use 3-660 mm wide seats, complete with seat belts, manufactured by Thomas bus. The seat spacing was altered in accordance with figure 4. All seat belts were located on



THOMAS BUS - LOCATION OF BOLTS IN FLOOR

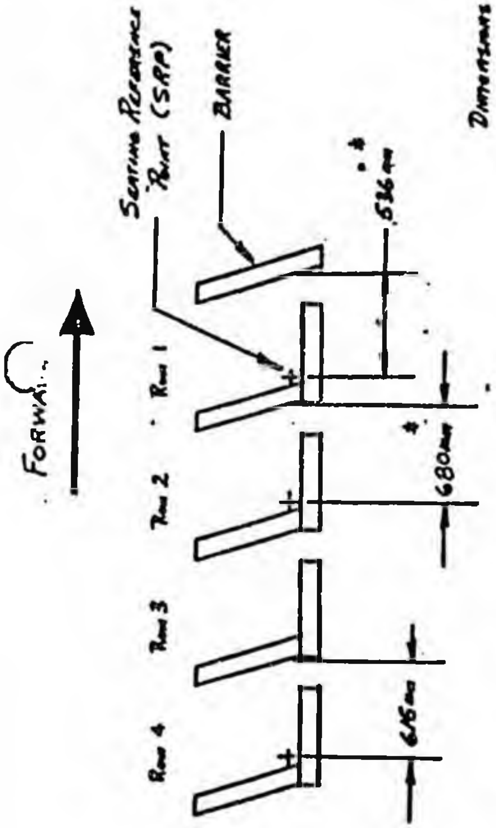
FIGURE 3

the left side of the vehicle. Seats on the right side of the vehicle were the type supplied with the bus. All seats were bolted through the floor, where possible, using 5/16 NC machine bolts with nuts and lock washers. Where cross members or gas tank prevented bolting, 5/16 x 1-1/2 lag screws were used. The securing nuts and lag screws were torqued to 12 ft-lbs. Figure 5 shows location of bolts and lag screws.

Seat frames were bolted to the side angle with 2 - 5/16 NC machine bolts with lockwasher and nut. Nuts were torqued to 17 ft.-lbs. Seat belt mounting bracket, Thomas part number 4600-9290 was used to attach the seat belt to the side angle. The bracket was attached to the angle with 2 - 5/16 NF x 1-1/4 machine bolts, lockwasher and nut. Nuts were torqued to 17 ft-lbs. The seat belt was attached to the belt mounting bracket per instructions supplied by Thomas Bus.

The two front barriers were tested as installed by Campwagon.

Refer to photos #15 to 28 for both pre and post test conditions.



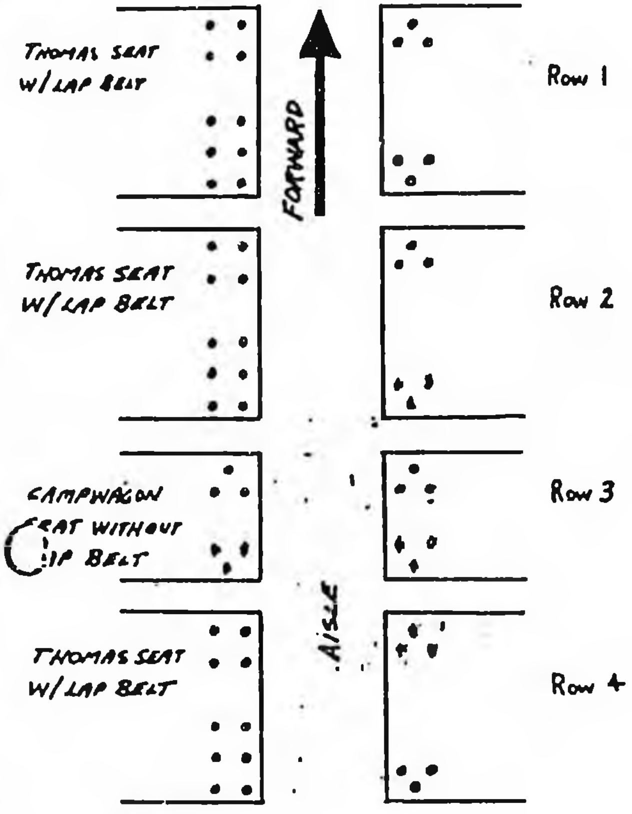
Dimensions shown are for L.H. side of vehicle. For R.H. Side, Dimensions marked ♦ = 685mm, ✱ = 527mm

NOTE:

1. Dimensions taken at center of seat, on horizontal plane, through S.R.P.
2. All seats are 660mm wide (2 DSP)
3. On L.H. side of vehicle, seats in Rows 1, 2 and 4 are Thomas Bus Seats with seat belts.
4. Seat in Row 3 on L.H. side and all seats on R.H. side are Campwagon seats.

SEAT SPACING - CAMPWAGON BUS

FIGURE 4



NOTE:

• 5/16" NC Machine Bolt Nut Torqued To 16-18 FT-LBS.

♦ 5/16" x 1 1/2" Lag Screw Torqued To 17 FT-LBS.

All Seats On R.H. Side Are Campwagon Seats.

Barrier Not Shown

CAMPWAGON BUS - LOCATION OF BOLTS IN FLOOR

FIGURE 5

4. <u>SEAT SPACING</u>

Regulation CMVSS 222(10)*, requires that a restraining barrier be provided in front of every DSP that does not have the rear surface of another school bus passenger seat within 533 mm of the SRP, measured horizontally through the SRP. Sled tests performed in the U.S.[8] have shown that seat spacing can be increased up to 610 mm without impairing the concept of compartmentalization. An amendment is presently being processed to increase this seat spacing to 610 mm. Thus, the 533 mm and 610 mm spacing used in the test were chosen to reflect the current and proposed regulation.

The erect sitting height of the 5th percentile adult female ATD is 784.8 mm (30.9"). The normal sitting height is 751.8 mm (29.6"). The vertical height from the seat bench to the SRP of the ATD is approximately 96.5 mm (3.0"). By subtracting the SRP height from the sitting height gives a dummy torso pivotal arm of approximately 685 mm. The SRP is located approximately 133 mm horizontally from the seat back. Thus a theoretical distance of approximately 813 mm from seat back to seat back is required to have minimal contact between the ATD head and the seat back in front. The physical size of the two

* Refer to Appendix A

smaller buses also prevented the third seat spacing from exceeding 813 mm. A larger spacing would have caused contact between the seat backs of row 2 and the seat bases of row 3. This spacing was used in the larger bus as well, to maintain a consistent test format.

The barrier crashes were performed at the Transport Canada Motor Vehicle Test Centre, at Blainville P.Q. Arvin-Calspan Corporation (Calspan) of Buffalo, New York was the contractor engaged to prepare the buses and conduct the tests. Calspan brought the necessary test equipment from Buffalo to record dynamic ATD data and film ATD movement within the buses. The seat spacing within the buses was altered by Transport Canada personnel, in accordance with instructions provided by the bus manufacturers.

Six 5th percentile adult female ATD's were placed in each bus. This dummy was chosen to simulate a large elementary school student. (the ATD weighs 46.4 kg (102 lbs.)). The next commonly available ATD, the 50th percentile adult male, weighs 74.5 kg (164 lbs) and was judged to be too large for our purposes. Three were secured in placed with the seat belts and three were unrestrained. Each dummy was instrumented to determine chest and head accelaration during the crash. The HIC values were then calculated for each ATD. Three of the six ATD's were instrumented to measure loads imposed on the femurs. In addition, two 6 year old ATD's were placed in the Blue Bird bus, in row 5 on the left side of the vehicle. Then dummies, weighing 21.9 kg (48.3 lbs), were used to simulate a small elementary school child. They were uninstrumented and unrestrained and were used to provide a comparison between the kinematics of this size of ATD and those of the 5th percentile adult females.

The Blue Bird bus was crashed on September 13, the Campwagon van on September 18 and the Thomas Minotour on September 20, 1984, as planned.

FINDINGS

Safety Record

"School busses are involved in very few accidents (only 6% of all school buses in service have accidents in one year) and of these accidents only 20% result in any injury at all to bus passengers. Further, of these injuries only 2% are more than moderately severe. In addition, all of this data is based on pre CMVSS 222 seats. Post CMVSS 222 seats are forecast to further reduce injuries to approximately 40% of previous buses."[3]

Children in school busses are commuting in perhaps the safest mode of transportation. Very few accidents occur and when they do, the injuries to passengers are generally of a minor nature. However, when serious injuries do occur in a school bus, the accident usually receives wide publicity.

School busses travel during specific times of the day, on predetermined routes. They are a unique colour and employ special flashing lights and in many provinces, stop arms to warn other motorists when they are stopped for loading and unloading. They generally travel at low speeds between stops. In addition, it is an offense to pass a stopped school bus, with its warning lights activated while it is loading or unloading students.

A review of existing literature[3] indicates that the causes of school bus accidents, in decreasing order are as follows: school bus driver error, other driver error, bus defects, environmental conditions, other vehicle defects. In a crash situation, the major injury causing devices within the bus, in decreasing order, are as follows: seat backs, sidewalls, seat legs, other occupants, windows. The majority of injuries to passengers are to the head and face. This data is based on seats constructed prior to the introduction of the CMVSS 222 regulation.

Accident and injury statistics are difficult to find. The "School Bus Accident Study"[1] by Gutoskie concluded the following:

a) the estimated number of school bus accidents in Canada in 1975 was 2150 resulting in 1300 injuries (See table 1).

b) the total number of school bus collision-related fatalities in 1975 was 17. Of these, only 2 were killed within the bus while 8 were killed while crossing the road to and from the bus or were struck by the bus (See table 2).

c) In 1975, the probability of a school bus being involved in a reportable accident was 1 in 16. For all vehicles, the probability was 1 in 10.

d) In 1975, the estimated occupant injury rate for school busses was 0.1 per million passenger-miles and for all vehicles was 0.8 per million passenger-miles. That is, it is estimated that a passenger is 8 times more liable to be injured while travelling in a vehicle other than a school bus.

The latest accident statistics, taken from 1981 police reports, indicate that approximately 55% of accidents involving school busses are head-on type collisions.

- Pupils injured inside school buses - (age group 5-19)	600
- Pedestrians injured by school buses, or other vehicles, while crossing the road to or from a school bus	120
- School bus drivers injured when their vehicle collided with other vehicles or fixed objects	150
- Occupants of other vehicles injured in collision with school buses.	430
Total	1,300

TABLE 1 - Injuries Resulting From School-Bus Collisions During 1975 in Canada[7]

- Estimated number of pupils killed within school buses	2
- Estimated figure of pupils killed as a result of being struck by a school bus, or other vehicle, while crossing the road to or from a bus	8
- Estimated number of school bus drivers killed in collisions	1
- Occupants of other vehicles killed as a result of collision with school buses	6
Total	17

Table 2 - School Bus Collision-Related Fatalities During 1975 in Canada[7]

LITERATURE REVIEW

A study conducted in 1977 by Southwest Research Institute for the California Highway Patrol entitled "A Study Relating to Seat Belts for use in Buses"[4] concluded that seat belts should not be installed in any category of bus in the State of California. They also stated that research on seat belts in automobiles and aircraft has proven that the entire seating system must be considered as a unit to provide maximum protection for the passenger.

In the U.S. Federal Register of December 8, 1977, the NHTSA commented as follows: "NHTSA is aware of no data indicating that small buses, that is, those with a GVWR of 10,000 lbs or less do not require the extra protection afforded by seat belts." One of the most convincing reports to support this statement is "Statistical Evaluation of the Effectiveness of FMVSS 222"[5] compiled by the Center for the Environment and Man Inc. (CEM) in October 1980. 82 Multidisciplinary Accident Investigation (MDAI) school bus accident reports were analysed in detail.
An opinion was presented as to the probable outcome of the accident if the buses had been constructed in compliance with FMVSS 222. Two assumptions were made in the report.

i) In the small busses, if constructed to FMVSS 222 requirements, the available seat belts would have been used.

ii) If ejection occured as a result of non-use of seat belts, the use of a seat belt would have prevented the ejection.

A total of 8 small school bus accident reports were reviewed, involving 90 passengers. Of these, 75 were injured and 7 were killed. The following opinions were expressed in the report

1) Of the 7 fatalities, six would have had injuries reduced to minor ones (AIS 1 or 0)* if the occupant had worn a seat belt in a bus constructed to FMVSS 222 requirements. No conclusion was reached for the seventh fatality. This occupant was standing, in the process of changing seats when the accident occured.

2) Most of the 75 injured occupants would have had their injury severity reduced to AIS level 0 or 1 (i.e. minor injuries) if they had been wearing seat belts.

* AIS - Abbreviated Injury Scale - See Appendix D

As outlined in the BACKGROUND section of this report, when the original proposal for CMVSS 222 was issued, a requirement that seat belts be installed at each DSP in small school busses* was proposed. Several objections to this proposal were received from various sources. The seat belt proposal was subsequently withdrawn with the understanding that the objections raised would be investigated. The results of this investigation are presented below.

Commentators to the Part I, Canada Gazette proposal of 1978 questioned the suitability of seat belts for use on school age children. They suggested that perhaps the use of seat belts on children might even increase the severity of injury. This subject was researched and a report issued by Biokinetics and Associates Ltd. The report "The Restraint of School Age Children in Automobiles - A Literature Review"[6] reached the following conclusions:

a) children in automobile accidents do not sustain injuries to the same extent and degree as do adults

* A small school bus is one with a GVWR of 4500 kg or less.

b) children of all ages can benefit substantially from the use of on-board restrain systems in automobiles with minimum likelihood of receiving injuries, including belt related ones.

c) present performance standards (e.g. CMVSS 209) have not resulted in systems which are incompatible with school age children. Indeed, such occupants appear to be afforded more protection than the adults for whom the systems are designed.

Commentators also questioned w[illegible]r or not seat belts would be used by the students. The[illegible]stulated that the belts would be vandalized by the stude[illegible] or used as a [illegible] against other students.

[illegible]e effectiveness of a seat belt in reducing [illegible]jury and death is, of course, dependent upon it's proper use. Ensuring use would be an ongoing educational task to be undertaken by the school authorities and bus operators. The Etobicoke Board of Education, where all large buses employ seat belts and Allways Transportation in Scarborough, where all small buses employ belts, report high usage rates. Greenburgh, New York, another jurisdiction which has belts installed in all buses, reports usage rates in the 80% range. Etobicoke Board of Education reports that in ten

years of operation with seat belts, only 10 belts have been deliberately cut. They report no incidences of the belts or buckles being used as weapons. In fact, seat belt usage has cut down on pupil movement and "horseplay" within the buses.

Another objection to the installation of seat belts was that small children would not be able to release themselves in case of an accident and subsequent fire or rollover.

In such an emergency, which is a very rare occurence, the belted occupant has a much greater chance of remaining conscious and alert. The un[illegible]elted occupant could be thrown about the vehicle and co[illegible] be badly injured or unconscious.

The question of maintenance of belts was raised. Many bus fleet operators felt this would be a costly problem. Children wouldn't use the belts if they became dirty or soiled.

Discussions with bus operators presently employing seat belts indicate that maintenance is not a significant problem. Typically, the original seat belts last the seven year life of the bus. The occasional buckle must be replaced because of breakage, but this is an infrequent event and is considered to be normal maintenance of the system. A retractor system can easily be used to prevent belts from falling to the floor.

Field Investigation

A visit was made to the Etobicoke Board of Education and Allways Transportation Systems in Etobicoke and Scarborough respectively to examine buses with seat belt installed and to discuss the use of the belts by the students.

Etobicoke operates 25 large school buses - typically 72 passenger models. All seats are designed to accommodate 3 students with one seat belt for each student. Retractors are used to keep the belts off the floor to prevent them from becoming dirty.

Allways employs mainly school buses with a GVWR less than 4500 kg - typically 20 passenger models. The busses are manufactured by Girardin and have a seat belt at each DSP. The belts are installed by the bus manufacturer and do not employ retractors. The seats are designed to accommodate 2 students.

The following points were noted during the examination of the busses and discussions with the personnel.

1. The seat belts normally last the life of the bus. The buses are normally replaced after 7 years of use.

2. Retractors used in Etobicoke buses are dismantled, cleaned and lubricated at least annually.

3. The belts easily become twisted and thus will not properly retract. A student using a jammed retractor could easily find the belt too short or too long for proper fitment.

4. Students deliberately jam retractors from time to time with candy wrappers, etc. However, this is a fairly rarely occuring event.

5. The driver tells embarking students to secure their seat belts and assumes that they do it. If older students are on the bus, they may be used as monitors. This is at the discretion of the driver. Use of belts seems to be directly related to driver interest.

6. Etobicoke has experienced only 10 deliberately cut belts in the 10 year life of their program.

7. Buckle breakage is a rare occurence.

8. There have been no incidences of the belts/buckles being used as a weapon on other students.

9. Etobicoke estimates their cost to be $2500-$3000 extra to have the belts installed in the busses. The belts are retrofitted by a subcontractor.

10. Etobicoke distributes educational material concerning the use of seat belts through the schools. The proper adjustment of the belts is the responsibility of the children.

11. The busses are regularly used for activity trips as well as normal student transportation.

12. The operators would prefer that a properly designed seat incorporating belt retractors be made available. At present, the retractors must be retrofitted by a contractor.

13. The new 1984 buses have the aisle side retractors mounted in the centre aisle space. These cut down on the effective width of the aisle by approximately 50-75 mm. Children also strike the housing with their legs, causing bruises and injury.

14. One of the major concerns of these operators is that if seat belts are made mandatory in school buses, provinces which have mandated seat belt use must deal with the question of responsibility for ensuring that students wear the belts - especially small children.

BUS CRASH PROGRAM

The barrier crash program entailed crashing three buses into a concrete barrier at approximately 48 km/h. This type of collision is a very severe type of accident in reality.

The barrier crash program showed that for a small school bus*, in all cases, the ATD secured by a seat belt experienced a HIC value exceeding 1000. In the small school buses, all unrestrained ATD's exhibited a HIC value of less than 1000. From these results, it must be concluded that, for frontal impacts, the restrained occupant would receive more severe head injuries than the unrestrained one. One can further conclude that injuries could very likely be life threatening. A visual analysis of the filmed motion of the dummies indicated that in many cases, the restrained dummies experienced severed rearward neck flexure as a result of the head contacting the seat back in front. In some cases, this flexure alone is judged to be severe enough to cause serious injury.

* A small school bus is one having a GVWR<4500 kg

Even in the large conventional size bus, the HIC values for the restrained ATD's were approximately three times greater than for the unrestrained ones.

A summary of the resultant HIC and chest accelerations is presented in Table 3. A tabulation of test data for each bus is presented in tables 4, 5 and 6. Note the following anomalies:

(i) ATD #2 in the Campwagon van conversion was ejected from its seat. When it contacted the restraining barrier, the lag screws holding the barrier to the floor withdrew, allowing the ATD to pass over the barrier and strike the dash with its head. The final position of the ATD was upside down on the front door operating mechanism (See photos #21, 22 & 28). This trajectory would probably cause injury to the occupant. However, the test results showed a relatively low HIC value (369). If the barrier had remained attached to the floor, the ATD probably would have been contained within its seating compartment.

(ii) ATD #5 in the Campwagon van had a high HIC value (1711). However, the head of this ATD did not contact the seat back in front of it. Rather, it pivoted about the torso and struck its head on the

DUMMY NUMBER	LOCATION IN BUS	SEAT SPACING mm	BELTED	UNBELTED	HIC	CHEST ACCELERATION (g)	
1	Front LH	533		X	*	60.4	LARGE BUS BLUEBIRD 66 PASSENGER
2	Front RH	533	X		649	40.8	
3	Centre LH	690	X		629	28.1	Vehicle Wt 8147 kg Vehicle Velocity 48.8 km/h Vehicle Decel. 35 g
4	Centre RH	680		X	220	34.2	Dynamic Crush 1371 mm Body Slide 775 mm
5	Rear LH	610		X	206	48.2	
6	Rear RH	610	X		731	25.0	*Data not valid due to technical problems
1	Front LH	533	X		2,506	40.1	MEDIUM BUS
2	Front RH	533		X	893	47.9	THOMAS MINITOUR 22 PASSENGER
3	Centre LH	683	X		1,144	38.6	
4	Centre RH	680		X	742	58.8	Vehicle Wt 4033 kg Vehicle Velocity 47.0 km/h Vehicle Decel. 38.5 g Dynamic Crush 729 mm
5	Rear LH	610	X		1,173	42.4	Body Slide 381 mm
6	Rear RH	610		X	494	44.9	
1	Front LH	536	X		2,016	32.5	SMALL BUS VAN CONVERSION TYPE [illegible]
2	Front RH	527		X	369	21.1	20 PASSENGER
3	Centre LH	680	X		2,195	32.2	
4	Centre RH	685		X	944	42.0	Vehicle Wt 3056 kg Vehicle Velocity 47.1 km/h Vehicle Decel. 49 g Dynamic Crush 495 mm
5	Rear LH	613	X		1,711	37.5	Body Slide 0
6	Rear RH	615		X	607	24.4	

TABLE 3 SUMMARY OF DYNAMIC TEST RESULTS

Table 4

DUMMY INJURY CRITERIA VALUES
1984 CANADIAN BLUE BIRD

Pos. No.	Maximum Accelerations "Gs"								Head **			
	Head				Chest							
	X	Y	Z	R	X	Y	Z	R*	HIC	T1 Sec.	T2 Sec.	Ave. Acc
1	*** -110	***	141	420.3	-53	-24	-43	60.4	*** 68372	.0741	.1134	313.5
2	-216	40	41	217.6	-40	12	-44	40.8	649.6	.0964	.1041	105.4
3	-78	5.9	74	104.5	-16	-9.2	32	28.1	629.2	.1239	.1404	68.0
4	-31	-6.2	28	41.5	-36	-5.6	17	34.2	220.4	.1491	.2172	25.4
5	-40	4.5	40	42.6	-51	-2.5	23	48.2	205.8	.1330	.1962	25.5
6	-135	10	40	136.5	-25	-7.3	-32	25.0	731.8	.1164	.1236	100.7

Pos. No.	Maximum Seat Belt Loads (lbs.)	
	Right Belt	Left Belt
2	340	352
3	540 ***	720
6	755	785

Pos. No.	Maximum Seat Belt Loads (lbs.)	
	Right Femur	Left Femur
4	525	835
5	980	990
6	50	32

* Defined as exceeding .003 sec. duration
** As defined in CMVSS No. 208
*** Not Valid Data

Table 5

DUMMY INJURY CRITERIA VALUES
1984 CAMPAGON VAN CONVERSION

Pos. No.	Maximum Accelerations "Gs"								Head **			
	Head				Chest				HIC	T1 Sec.	T2 Sec.	Ave. Acc
	X	Y	Z	R	X	Y	Z	R*				
1	-357	-20	225	421.2	-29	7.8	33	32.5	2016.2	.0789	.0810	247.1
2	-280	-120	-64	307.5	-22	23	26	21.1	369.2	.1101	.1113	156.8
3	-132	-8	133	185.6	-27	-11	36	32.2	2195.0	.0822	.1029	102.4
4	-191	-58	-73	199.0	-48	32	25	42.0	946.2	.0990	.1092	97.0
5	-310	58	128	332.1	-53	17	38	37.8	1711.4	.1278	.1296	246.2
6	-161	-88	108	195.0	-21	18	30	24.4	607.3	.1092	.1158	96.7

Pos. No.	Maximum Seat Belt Loads (lbs.)	
	Right Belt	Left Belt
1	1350	1200
3	1645	1250
5	1450	1365

Pos. No.	Maximum Seat Belt Loads (lbs.)	
	Right Femur	Left Femur
4	1400	1400
5	65	710
6	1010	760

* Defined as exceeding .003 sec. duration
** As defined in CMVSS No. 208

Table 6

DUMMY INJURY CRITERIA VALUES
1984 THOMAS BUS

Pos. No.	Maximum Accelerations "Gs"								Head **			
	Head				Chest				HIC	T1 Sec.	T2 Sec.	Ave. Acc
	X	Y	Z	R	X	Y	Z	R*				
1	-313	19	76	322.1	-26	-8.0	35	40.1	2505.9	.0954	.0987	225.0
2	-216	-30	-58	223.3	-64	-13	18	47.9	893.6	.1104	.1137	149.0
3	-102	-16	78	125.3	-42	-18	35	38.6	1144.2	.1017	.1278	71.9
4	-109	-11	-60	116.2	-65	-8.0	24	59.8	741.2	.1140	.1240	86.0
5	-169	-24	58	179.8	-36	16	28	42.4	1173.7	.0981	.1050	123.7
6	- 97	8.4	54	97.7	-45	-5.0	18	44.9	494.2	.1017	.1152	66.9

Pos. No.	Maximum Seat Belt Loads (lbs.)	
	Right Belt	Left Belt
1	850	830
3	1890	1565
5	1190	1240

Pos. No.	Maximum Seat Belt Loads (lbs.)	
	Right Femur	Left Femur
4	1150	1315
5	70	275
6	650	770

* Defined as exceeding .003 sec. duration
** As defined in CMVSS No. 208

leg tibias. This would account for the high HIC value. However, considering the dynamic reaction of the ATD, it would probably not have sustained serious head injury.

While the objective of these tests did not include testing for CMVSS 221 "Joint Strength" or CMVSS 301 "Fuel System Integrity", comments concerning these features are noteworthy. Only school buses with a GVWR greater than 4500 kg must satisfy CMVSS 221. This regulation was developed to prevent interior panel joint failures which could result in sharp, hazardous edges or surfaces being created in case of an accident. For the three buses tested, the integrity of the passenger compartment was maintained. No joint failures or separations were noted.

The following observations were made concerning the fuel system:

1) On the large Blue Bird bus, the chain which secures the filler cap to the tank became jammed in the pressure relief disc built into the cap (see photo #45). This in effect opened the gas tank to atmosphere. If rollover had occurred, a significant leakage of fuel would probably have occured.

2) On the Thomas Minotour bus, the gasoline tank is secured to the chassis while the filler neck and cap are secured to the body. A short length of rubber hose connects the filler neck to the gas tank. When the body shifted forward during the impact, this rubber hose separated from the tank (See photo #46). If even a partial rollover had occured, a major fuel spill would have happened.

3) During the van conversion collision, two of the three left side windows shattered early in the event. This resulted in a tremendous number of small shards of glass being hurled about the interior of the bus. This glass could easily become lodged in the occupants eyes and clothing, causing serious injury. (See photo #47) The windows on the right side of the vehicle remained intact.

ANALYSIS

School Bus Testing Program

Introduction

The analysis presented here deals with the results of the School Bus Testing Program. Much of the analysis is based on an upper limit for HIC of 1000. The HIC value is defined in Appendix A, clause (11). There is some question in the literature as to whether or not a HIC value of 1000 is a conclusive measure of serious head injury, particularly for children. More research is presently being conducted in this area. However, as discussed in the BACKGROUND section of this report, it is the best available measure for determining the possible severity of head injuries. For the bus crash program, the comparison between HIC values for belted and unbelted dummies provides an indication of the effect the seat belt has in increasing the severity of head injury. This, along with an analysis of the slow motion films, provides a good basis for the conclusions reached.

In general, the observations made regarding neck flexion, peak resultant acceleration and HIC values tend to support each other for the conclusions reached regarding

head and neck injury potential. The head accelera[illegible] traces showed very severe peaks, particularly when the head of the dummy contacted the area of the seat containing the structural steel tubing. This is partly due to the fact that the ATD's used are very stiff. It also indicates that the foam padding over the support structure of the seat became fully compressed. The lighter head of the fifth percentile female ADT, relative to the standard fiftieth percentile adult male ATD, may also partly account for these sharp peaks.

The exact point of head contact with the seat back is very important. There may yet be improvements which can be made to the seat design in order to minimize injury as a result of head contact, whether or not seat belts are used.

The use of one ATD per seat in these tests somewhat limits the scope of the results since different ATD kinematics may have occurred if two or three had been placed in each seat.

Observations of the two unrestrained six year old ATD's on the large school bus showed a tendency to spread the forces of the impact over the body. The ATD's head impacted the seat back below the horizontal seat back frame member. It is expected that this size of child would be better protected by the "compartmentalization" concept than a larger child.

In addition to the criteria specified in CMVSS 222(11), CMVSS 208(18) specifies that in a 48 km/h frontal collision against a fixed barrier, the HIC must not exceed 1000. This clause also specifies that the resultant chest acceleration may not exceed 60g. This is the upper limit used to determine the acceptability of chest data.

The forces of the impact resulted in severe rear neck flexure for several ATD's. This reaction is also discussed in the following sections. There is, however, no criteria available to judge the possible severity of injury that could result from this bending. It is worth noting that the ATD neck is exceptionally stiff, much more so than that of a human.

1. Blue Bird Bus

A copy of the Arvin/Calspan test results, including data traces, is contained in Appendix E.

ATD Position #1 - (unrestrained, LH front, 533mm seat spacing)

During the collision, the dummy's knees, chest and head struck the restraining barrier. The dummy's head was

rotated rearward, as a result of striking the top of the barrier. The rotation, however, was only slight. The dummy experienced a resultant chest acceleration of 60.4g which is marginally above the limit of 60g. Due to a technical problem with the instrumentation, the head acceleration was not valid. It is estimated that the HIC value would have been relatively low. (See photo #5)

ATD Position #2 - (restrained, RH front, 533mm seat spacing)

During the collision, the barrier in front of this dummy moved rearward approximately 380mm and upward. This was due to the shift of the bus body on the chassis. The dummy slid approximately 254mm along the seat cushion before being pivoted about the lap belt. The knees and head contacted the barrier. The head made contact with the top rear edge of the barrier at about eye level. This resulted in the head being rotated rearward approximately 90° to the torso. (See photo #6)

The resultant head acceleration was 217.6g. The HIC was 649, well below the limit of 1000. The resultant chest acceleration was 40.8g, also well below the limit of 60g.

<u>ATD Position #3</u> - (restrained, LH centre, 690mm seat spacing)

The knees of the dummy made slight contact with the seat back in front. The dummy pivoted about the seat belt and struck its head at about the forehead level, approximately 100mm below the top edge of the seat back. The head pivoted slightly to the rear. (See photo #7 & 8)

The resultant head acceleration was 104.5g. The HIC was 629 and the resultant chest acceleration was 28.1g.

<u>ATD Position #4</u> (unrestrained, RH centre, 690mm seat spacing)

The dummy slid forward and the knees made contact with seat back in front. This contact appeared to be sufficient to dislodge the seat cushion from the seat in front. The dummy's neck contacted the top of the seat back. On rebound, the dummy struck the front edge of the seat cushion with the small of its back. It then rotated in-board and ended up laying in the aisle. (See photo #9)

The resultant head acceleration was 41.5g. The HIC value was 220, and the resultant chest accel[illegible]ation was 34.2g.

<u>ATD Position #5</u> - (un...

spacing)

The dummy slid forward on the seat. The [illegible] and chest made contact with the seat back in front. The chin and neck of the dummy contacted the top edge of the seat back. (See photo #10 & 11)

The resultant head acceleration was 42.6g. The HIC value was 205 and the resultant chest acceleration was 48.2g.

<u>ATD Position #6</u> - (restrained, RH rear, 610mm seat spacing)

This dummy pivoted about the lap restraint. Neither the knees nor the chest contacted the seat back in front. The head, however, made full facial contact with the seat back starting with the forehead striking the rear top edge of the seat back. This resulted in the head rotating rearward approximately 75° in relation to the torso. (See photo #12 & 13).

The resultant head acceleration was 136.5g. The HIC value was 731 and the resultant chest acceleration was 25.0g.

ATD Positions #7 & #8 - (unrestrained, LH centre, 508mm seat spacing)

These two dummies were 6 year old child type and were uninstrumented. The were placed in the seat ahead of ATD #3. The seat spacing was as installed at the factory.

Both dummies slid forward with the knees, chest and facing making contact with the seat back. The dummies tended to stand up spreading the force of the impact over the upper torso. They rebounded onto the seat and ended up sitting on the front edge of the seat cushion (see photo #14).

The values for head acceleration and chest acceleration were not recorded. However, the effect of the impact on these two dummies did not appear to be very violent. The dummies were retained within their seating compartment.

General Comments

During the collision, the bus body slid forward on the chassis rails approximately 775mm. (See Photo #3) This motion undoubtedly absorbed much of the energy of the collision. However, in doing so, the front right side door was rendered inoperable for evacuation purpose (see photo #2). The hood of the vehicle penetrated the windshield. With the windshield encroaching from the front and the body sliding forward, the driver's compartment was severely crushed. It is doubtful if the driver would have survived this collision.

The spring which holds the relief disc shut in the gasoline filler cap became wedged between the cap body and the disc during the collision (see photo #45). This undoubtedly would have resulted in a major fuel spill if the bus had rolled over.

The force of the collision also caused both rear leaf springs to break in the area of the front spring eye. The rear emergency door and both side emergency windows were operable after the crash. All of the side windows remained intact. There were no joint separations in the bus body. The integrity of the passenger compartment was maintained.

2. Campwagon Bus

A copy of the Arvin/Calspan test report, including data traces, is contained in Appendix F.

ATD Position #1 - (restrained, LH front, 533mm seat spacing)

The dummy slid forward on the seat approximately 254mm before pivoting about the lap belt. The knees made contact with the restraining barrier. The pivoting torso struck its forehead on the top rear edge of the restraining barrier. The head was rotated approximately 45° rearward in relation to the torso. (See photos #17, 20 & 21).

The resultant head acceleration was 421.2g. This resulted in a HIC value of 2016, and a resultant chest acceleration of 32.5g.

The contact of the dummy's knees and head with the barrier caused the leg screws which secured the barrier leg to the floor, to start withdrawing from the floor.

ATD Position #2 - (unrestrained, RH front, 533mm seat spacing)

This dummy slid forward and the knees and head contacted the restraining barrier. The force of this contact caused the lag screws which held the leg of the barrier to the floor to withdraw. The aisle side part of the barrier was deflected toward the outboard side of the bus. The dummy continued its forward motion until its head contacted the dash. The dummy then rotated to an upside down position and ended up resting on the door operating mechanism (see photo 18, 21 & 22).

The resultant head acceleration was 307.3g. The calculated HIC value was 369 and the resultant chest acceleration was 21.1g.

ATD Position #3 - (restrained, LH centre, 680mm seat spacing)

This dummy slid forward approximately 254mm before pivoting about the seat belt. The knees made contact with the seat back in front. The upper torso pivoted about the lap belt, causing the head to contact the seat back approximately 250mm down from the top. The face of the dummy became buried in the seat back as the head rotated rearward. (see photo #17 & 23). The head was rotated rearward approximately 90° with respect to the torso.

The resultant head acceleration was 185.6g. The HIC value was 2195, one of the highest values recorded and more than double the limit of 1000. The resultant chest acceleration was 32.2g.

ATD Position #4 - (unrestrained, R.H. centre, 685mm seat spacing)

This dummy slid forward on the seat cushion. When the knees contacted the seat back, the dummy pivoted about the hips and made head contact at about eye level with the top rear edge of the seat back. Final head contact was from the nose to the chin. The dummy then stood up. While it was rebounding, in a near vertical position, its head made contact with the sidewall of the raised roof portion of the van. The dummy rebounded onto its seat and laid down toward the aisle (see photo #18, 19 & 23).

The resultant head acceleration was 199.0g. This motion resulted in a HIC value of 946. The resultant chest acceleration was 42.0g.

ATD Position #5 - (restrained, L.H. rear, 615mm seat spacing)

This dummy pivoted about the lap belt. The 55 Kg ballast, which was secured to the seat frame in front of this dummy position, was sufficient to cause the three lag screws holding the rear seat leg to the floor to withdraw and to cause the seat back to deflect forward (see photo #49). The dummy pivoted about the lap belt but because of the seat back deflection, did not contact the seat back. It did pivot enough to make head contact with its own lower legs at 125 milliseconds. (See photos #17, 25 & 26)

The resultant head acceleration was 332.1g. The calculated HIC value was 1711. This, however, is an unrealistic value since contact was made with the dummy legs only. The resultant chest acceleration was 37.5g.

ATD Position #6 - (unrestrained, R.H. rear, 615mm seat spacing)

This dummy slid forward and made knee and full facial contact approximately 75-100mm below the top of the seat back. The force of the knees caused the aisle side seat leg to break where it joins the floor mounting foot (see photo #48). This caused the seat back to be rotated outboard. As a result the dummy was rotated to the right and rebounded into the centre aisle (see photo #19, 25, 26 & 27)

The resultant head acceleration was 195.0g. The calculated HIC value was 607 and the resultant chest acceleration was 24.4g.-

General Comments

During the impact, the left front side window and left rear side window shattered. A tremendous amount of broken glass was hurled about as a result of this. The drivers door was not operable after the collision but the passenger side door was. The rear emergency door was operable after the collision. There was no evidence of fuel spillage.

3. THOMAS MONITOUR I BUS

A copy of the Arvin/Calspan test report, including data traces, is contained in Appendix G.

ATD Position #1 - (restrained, L.H. front, 533mm seat spacing)

The dummy slid forward approximately 254mm before pivoting about the lap belt. The knees made contact with the barrier. The forehead contacted the top rear edge of

the barrier which caused the head to rotate rearward approximately 90° in relation to the torso. The dummy's shoulders also made contact with the barrier. (see photo #32 & 36).

The resultant head acceleration was 322.1g. The HIC value was 2505, the highest recorded during this program and more than 2½ times the limit of 1000. The resultant chest acceleration was 40.1g.

ATD Position #2 - (unrestrained, R.H. front, 533mm seat spacing)

This dummy slid forward during the impact. The knees, chest and head made contact with the barrier. Head contact occurred at about nose level with the upper rear edge of the barrier. The seat cushion became dislodged as a result of knee loads imposed by the dummy behind position #2. As a result, upon rebound, the dummy ended up laying partially in the aisle (see photo #33 & 37).

The resultant head acceleration was 223.3g. The HIC value was 893, and the resultant chest acceleration was 47.9.

ATD Position #3 - (restrained, L.H. centre, 680mm seat spacing)

This dummy pivoted about the seat belt after sliding slightly on the seat. The knees made minimal contact with the seat back. The head made full face contact with the seat back starting with forehead contact approximately 100mm below the top edge of the seat back. This resulted in the head rotating rearward approximately 60° with respect to the torso. (See photo #32 & 38)

The resultant head acceleration was 125.3g. The calculated HIC value was 1144 and the resultant chest acceleration was 38.2g.

ATD Position #4 - (unrestrained, RH centre, 680mm seat spacing

This dummy slid forward and contacted the seat back with its knees, chest and head. The head contacted the top of the seat back with its mouth and chin. (See photo #33 & 39). The force of the knees caused the seat cushion on the seat in front to become dislodged. The dummy rebounded and sat down on the seat.

The resultant head acceleration was 116.2g. The calculated HIC value was 741 and the resultant chest acceleration was 59.8g.

ATD Position #5 - (restrained, L.H. rear, 610mm seat spacing)

This dummy slid approximately 250mm along the seat before pivoting about the lap belt. The knees did not contact the seat back. The head contacted the seat back and rotated rearward in excess of 90°, relative to the torso. The forehead made initial contact with the rear top edge of the seat back. As the head rotated, the dummy's face contacted the seat back. During the head contact phase, the seat back started to rebound rearward. This rebound put compressive forces on the already severely bent neck of the dummy. (See photos #34 & 40).

The resultant head acceleration was 179.8g. The calculated HIC value was 1173, and the resultant chest acceleration was 42.4g.

ATD Position #6 - (unrestrained, R.H. rear, 610mm seat spacing)

The interior camera used to record the dynamics of this dummy did not function during this test. However, the cameras which recorded the vehicle motion did provide some details of the dummy movement.

This dummy slid forward and contacted the seat back with its knees, hard enough to deform the lower portion of the seat back. The dummy then pivoted about the hips and struck its lower face on the top edge of the seat back (see photo #35 & 41).

The resultant head acceleration was 97.7g. The calculated HIC value was 494, and the resultant chest acceleration was 44.9g.

GENERAL COMMENTS

A 50th percentile, uninstrumented, adult male test dummy was installed in the drivers seat. It was restrained in place with the type II* seat belt supplied with the

* A type II seat belt is a combination pelvic and upper torso restraint assembly.

vehicle chassis. During the collision, the steering wheel was displaced vertically upward. The head of the driver pivoted downward and struck the centre of the steering wheel. The femurs of the dummy became jammed under the dash panel. It is judged that the driver would have suffered serious injury or death. (See photos #43 & 44).

During the collision, the bus body shifted approximately 361mm along the chassis rails (see photo #31). The window in the driver's door was cracked but the door was operable.

The right hand front entry door flew open early in the crash event. It was open at the conclusion and could have been used for evacuation purposes. The side emergency window exits and rear emergency door remained operable after the collision. There were no body joint separations.

This particular vehicle design has the fuel tank secured to the chassis and the filler cap and neck secured to the body. There is a short length of rubber hose which connects the two. When the body shifted forward, this rubber hose became separated from the fuel tank (see photo #46). The fuel tank was thus open to the atmosphere and a serious leak would have occurred if the vehicle had tipped or rolled.

The highest HIC value recorded was at ATD position #1, behind the driver. The bus body becomes wider behind the driver and there is a bulkhead approximately twelve inches wide between the body and the chassis cab. The restraining barrier, which is installed ahead of the first row of seat, is behind this bulkhead at the driver's side. During the collision, this bulkhead acted as a rigid surface to prevent the barrier from deflecting forward and absorbing the energy it was designed to absorb. This rigid bulkhead probably contributed to the high HIC value calculated for dummy #1.

CONCLUSIONS

1. The passive occupant restraint system (compartmentalisation) required by CMVSS 222 since 1980 functions as intended during frontal impacts and provides excellent protection for occupants.

2. The use of a type I seat belt system in any current design of school bus may result in more severe head and neck injuries for a belted occupant than an unbelted one, in a severe frontal collision.

3. The use of lag screws to attach seats/barriers to the bus floor should be examined.

4. The body shift along the chassis during a frontal collision presents a life threatening hazard to the bus driver.

5. The body joint strength regulation (CMVSS 221) is adequate to prevent joint separation in a school bus with a GVWR > 4500 kg during a frontal collision.

6. The window retention regulation (CMVSS 217) should be reviewed to determine if a minimum force should be applied to the windows before they are permitted to shatter or become dislodged from their frame.

7. The femur loads measured on ATD 4,5 and 6 were well below the limit of 2500 lbs.

8. There are few statistics available concerning school bus accidents. Further collection and analysis of such data should be pursued. In particular, the direction of impact with the bus and the type of injuries encountered should be documented more fully.

Questions Raised About Installing Seat Belts For Pupil Passengers in School Buses

Engineering

1. What is the best way to anchor the seat belts to the Seats?
2. How many anchors should be installed in each seat?
3. What buckle is best for children, the button or lever release?
4. How long is belt life or what is the replacement period?
5. Are buckles designed to eliminate tiny fingers from being caught?
6. Are belts designed for easy cleaning and removal?
7. Should pre-April 1, 1977 buses be retrofitted for belts?
8. What evidence exists to indicate that a child would not be injured when his upper body pivots about the belt and strikes the seat ahead?
9. What is the cost benefit ratio for adding seatbelts?
10. Would the installation of seatbelt place an obligation upon the Schools to provide grab-bars overhead or straps for the 1,280,000 children who stand during their ride to school each day?

Human

1. How can the driver be assured all belts are fastened properly?
2. What policy should be followed concerning mandatory use of belts?
3. What can be done about vandalism which makes belts unusable?
4. What is the potential for using the buckle as a weapon?
5. Which belts should two high school students use in a seat equipped with three belts?
6. In the event of fire what effect would seat belts have in creating panic among small children?
7. In the event of a rollover accident how serious are the hazards to children hanging upside down from their belts?
8. Under what circumstances are adult monitors necessary to see that seatbelts are used properly?
9. What issues regarding liability have been identified?
10. What is the cost of insuring a school bus equipped with seatbelts for pupil passengers? Which companies offer such insurance?
11. Because of the seat spacing, passengers cannot climb over each other and fastened belts would not permit a seated passenger to slide to the outboard seat. How much disruption and delay would this cause during the loading operation? What potential would this delay have for accidents?
12. What cautions does the medical profession mention with respect to possible injuries to K-4th grade children due to improperly fastened seatbelts?
13. Does "horseplay" with seatbelts provide any opportunities for possible injury to pupil passengers?
14. What evidence exists that the public, the school bus drivers, the State Director of Transportation would support the requirement for seatbelts?

Prepared 11/2/77
David H. Soule

NATIONAL MINIMUM STANDARDS FOR SCHOOL BUSES
NATIONAL MINIMUM STANDARD UNIFORM ACCIDENT REPORT FORM AND NATIONAL MINIMUM STANDARD GUIDELINES FOR SCHOOL BUS OPERATIONS

1985 Revised Edition

Recommendations of

THE TENTH NATIONAL CONFERENCE ON SCHOOL TRANSPORTATION

Central Missouri State University
Warrensburg, Missouri
May 19-24, 1985

Co-sponsored by:

National Association of State Directors of Pupil Transportation Services
National Association for Pupil Transportation
National School Transportation Association
School Transportation Section, National Safety Council
School Bus Manufacturers Institute
Central Missouri State University

This publication is available from the National Safety Council,
444 North Michigan Ave., Chicago, Illinois 60611.
Price information available upon request.

RESOLUTIONS

SPECIAL RESOLUTION BY THE DELEGATES OF THE TENTH NATIONAL CONFERENCE ON SCHOOL TRANSPORTATION

Whereas, the nation's greatest resource is children and their safety is a high public priority; and

Whereas, the transportation of children in certified school buses is recognized as the safest mode of passenger transportation available on the highways today; and

Whereas, behavioral research conducted by public and private agencies has indicated that passive restraint systems may offer more passenger protection for children who are not immediately supervised by adults; and

Whereas, research conducted by the United States government resulted in radically improved construction design and seating systems for collision protection and passive restraint systems for passenger protection in school buses manufactured after April 1, 1977; and

Whereas, extensive research conducted by the United States and Canadian governments, and other public and private agencies have yielded negative conclusions on the safety of seat belts installed in school buses, therefore, be it resolved

1. That local, state and federal governments and the general public recognize and affirm the outstanding safety record of school buses; and

2. That local, state and federal governments and the general public recognize the passive restraint system in school buses manufactured after April 1, 1977, has been proven to be a more effective passenger protection system in school buses than the protection provided by seat belts; and

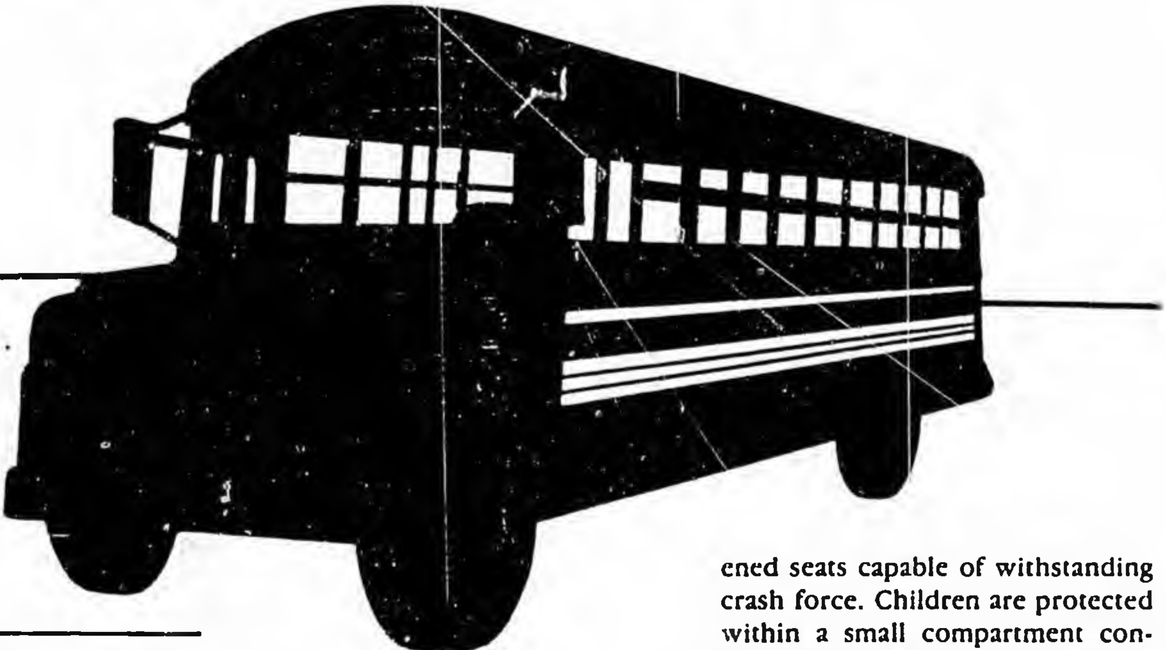
3. That local, state and federal governments discourage the mandatory installation and use of seat belts in school buses until such time that extensive and scientific research proves them to be more effective in injury prevention than the existing passive restraint systems; and

4. That local, state and federal governments and interested organizations conduct sound, comprehensive testing on current occupant protection systems in school buses and determine if the passive restraint system currently mandated in school buses can be further improved to increase the safety of passengers; and

5. That all states are encouraged to accelerate the replacement of school buses manufactured prior to April 1, 1977; and

6. That a copy of this resolution be transmitted to the President of the United States, and to the leadership of the United States Congress and the governors of ea h state.

SHOULD SCHOOL BUSSES CARRY SEATBELTS?



If six seat belts in a car are a good idea, how about 60 in a school bus?

With mandatory seat belt laws for passenger cars now enacted in 16 states, many parents, legislators, and teachers are also asking, "Why not seat belts in school busses, too?"

However appealing the idea may seem, seat belts for children on busses are not the only — nor even the most important — means of reducing school bus accident injuries and fatalities. In fact, safety authorities emphasize that perhaps greater attention should be paid to safety factors outside the bus — where more children are actually killed or injured than are children who are inside.

Although researchers continue to investigate seat belts for school busses, the National Highway Traffic Safety Administration (NHTSA) has this to say: "In view of the effectiveness of the current safety standards, and the excellent safety record of school busses generally, we do not believe that a federal requirement for safety belts in large school busses is warranted." (NHTSA Report, June, 1985).

The federal safety standards referred to in NHTSA's report have been in effect since 1976 and apply to all busses manufactured since 1977. One standard, for school bus rollover protection, insures adequate structural integrity of the bus during a rollover crash which minimizes crushed roofs and permits students to escape through the emergency exits.

Compartmentalization, another federal standard, requires strengthened seats capable of withstanding crash force. Children are protected within a small compartment consisting of their seat, their seat back, and the back of the seat or restraining barrier immediately in front. High seat backs help prevent whiplash in rear impacts. Padded seat backs, required to yield, reduce injuries to the child immediately behind in frontal impacts and help absorb crash forces.

The federal standards also allow school districts to order seat belts in school busses, and some have.

However, no matter what safety standards are adopted, there will probably never be a time when school bus transportation accidents cease to occur, although recently both the number of fatalities and injuries has declined. In 1983, 55 children died in school bus accidents. Sixty died in 1982; 60 in 1981. In each of these three years, only ten were inside the school bus; the rest were killed outside the bus. More than half of the students killed outside the bus were hit while in the bus loading zone, and by the same bus they were attempting to enter or leave.

As for injuries, the National Safety Council (NSC) also reports a decline: 4,300 pupils injured in 1981, 4,200 in 1982, and 3,300 in 1983.

Though declining, the statistics concern parents, teachers, and legislators. When parents feel that their children might turn into human missiles in school bus accidents, the seat belt issue becomes emotional. But some safety authorities caution that seat belt advocates may not be aware of the federally mandated school bus safety standards, all designed to minimize injuries without the use of seat belts.

Seat belt proponents want NHTSA, even though it does not believe seat belts are warranted, to promulgate a rule specifying exactly how seat belts should be installed. School districts voluntarily equipping busses with seat belts and the manufacturers producing seat belts will then have guidelines to follow.

If these rules are adopted, NHTSA would first have to distinguish between "safety belts" and "restraining belts." A restraining belt is a lap belt or convenience belt. It merely keeps a passenger from sliding out of the seat, but is not required to meet any performance standards.

Safety belts involve more than just a belt. The safety seat restraint system includes the belt, buckle, anchorage to the seat frame, the seat structure itself, and the anchorage of the seat frame to the floor frame. This system will withstand forces of 5,000 pounds per passenger.

C. Morris Adams, Thomas Built Busses' vice president of corporate affairs, estimates adding restraining belts to a new bus would add another $1,000 to its price. Safety belts, on the other hand, would cost approximately $100 per three-passenger seat.

Obviously, many school districts cannot afford to order seat belts in new school busses. In addition, costs may prohibit school districts from adding seat belts to old busses.

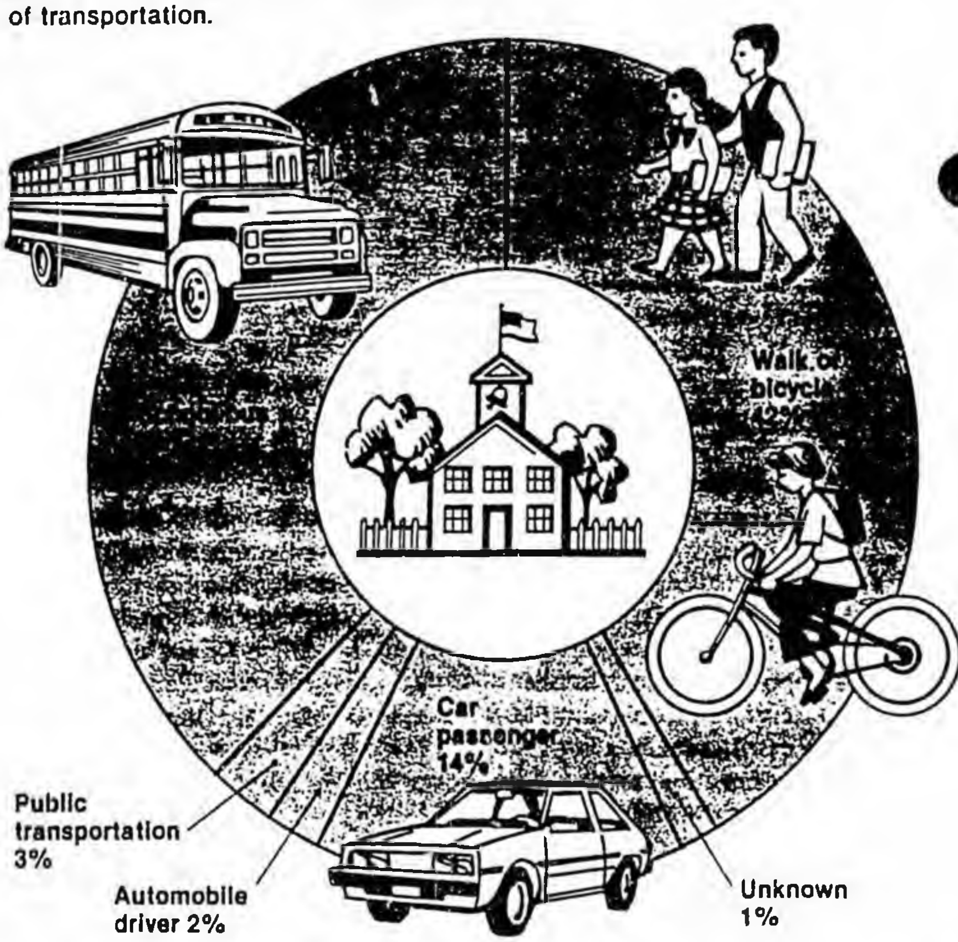
However, groups promoting seat belts in school busses argue that children accustomed to buckling up in the family car are being denied the right to reinforce the seat belt habit and the right to the same protection while in a bus.

The school bus, though, is not an automobile and should not be treated a such. The school bus has its own unique identity and color. It is not a fast vehicle and by nature of its design, children do not sit near a door that might fly open, causing them to be thrown out.

Safety advocates worried about accidents must also consider the

Figure 1. Methods of Travel to Schools

This circle graph shows the percentage of children who travel by each mode, or way, of transportation.



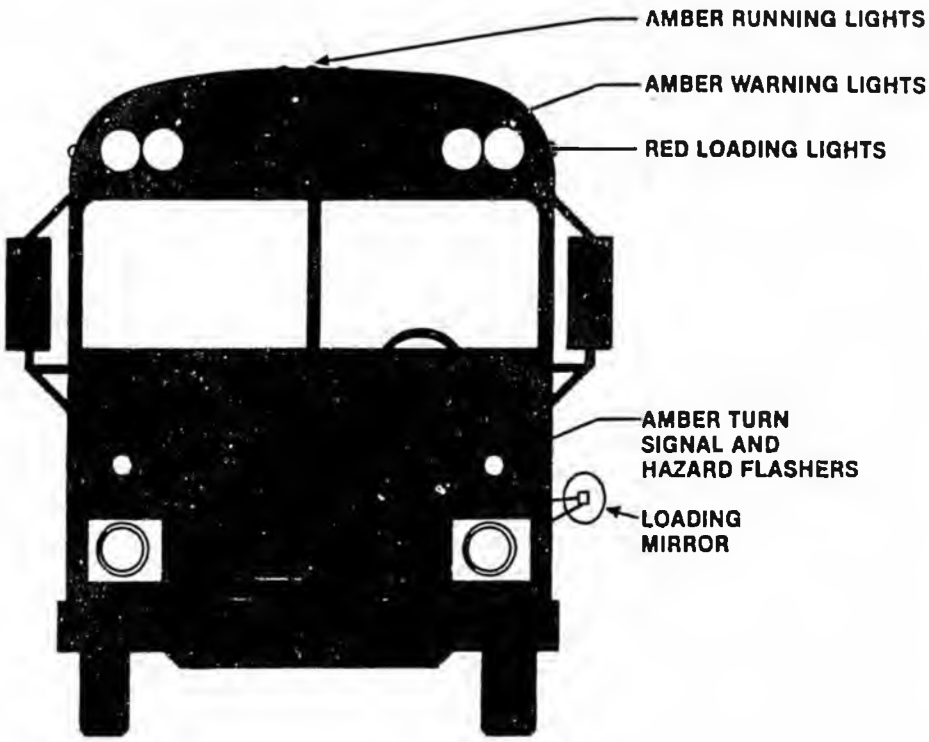
Source U S Department of Transportation

number of students standing, not sitting, in school busses. Thirteen states do not prohibit standees on busses. Some states allowing standees actually condone them by allowing school districts to "overbook" a bus, much as an airline overbooks, expecting a certain percentage of no-shows. There really isn't much point in talking about mandating seat belts in school busses until all kids are first given a seat.

Cars that illegally pass school busses stopped to load or discharge passengers also have the potential to take many lives. During a 1984 pilot study, conducted for the Insurance Institute for Highway Safety (IIHS) by the Texas Transportation Institute, observers in two large urban school districts reported that on an average day, each school bus observed was passed illegally by about seven cars. (IIHS's *Status Report*, May 11. 1985, Vo. 20, No. 5)

Illegal passing is sometimes the result of deliberate decision-making by the motorist, but IIHS researchers conclude some of the illegal passing may be the result of confusion.

Figure 2. Warning and Identification Signals — Front of School Bus.



Source: IIHS

Observing six bus routes, the pilot study found over 77 percent of all the illegal passes occurred on multiple lane highways. However, 25 percent of the illegal passing occurred only after the passing vehicle first slowed down and many vehicles stopped when they were not required to do so.

"The rear of a new bus is equipped with 12 signal lights plus three running lights," the *IIHS Status Report* states. (See figure 3) "Two of them are large red brake lights, and two of them are small red brake lights. There are two large yellow warning lights and two large red loading lights. There are also multiple sets of lights on the fronts of busses. In general, the public is required to stop only for the flashing red loading lights and may proceed with caution at any other time."

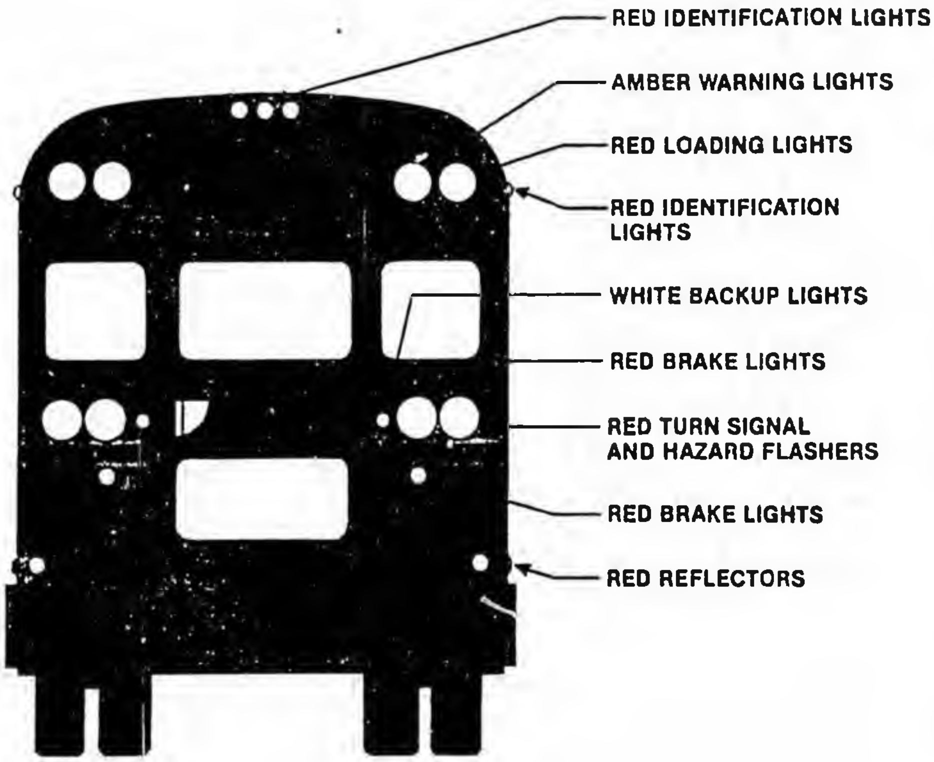
Another Texas study, which evaluated the effects of adding a swing-out stop arm activated when red loading lights are illuminated, revealed that the stop arm lowered the likelihood of illegal passing by 30 percent or more.

The Texas Transportation Institute, which was mandated by the Texas legislature to conduct this study, assumed that the 30 percent reduction in illegal passes is 50 percent effective in reducing collisions. The Institute concluded, that in Texas, "45 accidents (involving student pedestrians) could be eliminated in ten years."

According to an article in NSC's 1985 July/August *Traffic Safety* magazine, many motorists ignore the flashing lights and stop arms and pass standing school busses knowing that in most jurisdictions they cannot be successfully prosecuted because school bus operators are unable to make a positive identification.

In some jurisdictions, an owner can be held liable for a violation if the license plate is identified at the scene and the owner cannot identify another person as operating the vehicle. The article, "Let's Not Neg-

Figure 3. Warning and Identification Signals — Rear of School Bus.



Source IIHS

lect The Needs That Transcend The Seat-Belt Controversy!," reports installation of strobe lights on the stop arm is a proven way to decrease the number of passing violations. "Strobe warning lights, costing about $100 per bus, can penetrate fog, smoke, blinding snow, or dust with a warning to other motorists of the presence of a school bus."

Before strobe lights on stop arms can be legally used, however, legislation must be passed in many states. The *Traffic Safety* article emphasizes that we "need an aroused citizenry to insist that legislators put teeth into school bus stop laws."

Legislation is not the only means of reducing the number of fatalities and injuries resulting from cars illegally passing school busses.

Parents can contribute in two ways. First, when driving, observe the local district's school bus safety rules and policies.

Second, discuss with children the fact traffic may not always stop for the busses' flashing lights. Encourage children to look themselves before crossing. Also, warn children all motorists have decreased visibility in poor weather, so extra caution should be used when crossing in front of or behind a bus.

Since most student injuries related to school bus accidents happen in loading and unloading zones outside the school bus, public awareness of warning lights and enforcement of traffic laws are important issues.

Bus testing continues

Industry and safety leaders initiated formal school bus crash-worthiness and seat belt testing in 1966. Publicity and the need to fund more extensive research and testing succeeded in involving the then newly established U.S. Department of Transportation (DOT) in standards for the construction and operation of school busses.

Early tests revealed that seat structures were the greatest contributors to passenger injuries. Upon impact, unbelted passengers were thrown into unpadded iron seat rails or stanchions. On the other hand, impact forces tended to jackknife belted passengers, causing serious head and facial injuries by contact with the unpadded seat rails immediately in front of each seated position.

Testing engineers determined that at least 40 inches of unobstructed space immediately in front of each seated position was necessary to avoid this type of injury to passengers wearing belts — not a very practical solution since it would more than double the number of busses needed to provide the same amount of transportation. In addition, 1984 pupil transportation costs would have increased from approximately five billion dollars to more than ten billion.

In 1973, NHTSA began formally considering improving school bus safety standards. The final school bus occupant protection rule, Federal Motor Vehicle Safety Standard (FMVSS) 222, was issued in 1976.

NHTSA did indicate lap belt anchorages would be further studied and that in the meantime, lap belts could safely be attached to seat frames by the users. But for smaller busses under 10,000 pounds, the agency required that they be equipped with lap belts, citing that the busses' smaller size could result in much more severe crashes. Large busses are required only to provide the driver with a lap belt.

Again in 1983, NHTSA noted that the safety board did not recommend the installation of belts, noting it would "impose a financial burden on all school bus purchasers, regardless of whether they intend to install belts in the busses. Under the present standards, districts...that want belts in their busses are free to order busses with belts or to install them in busses they own."

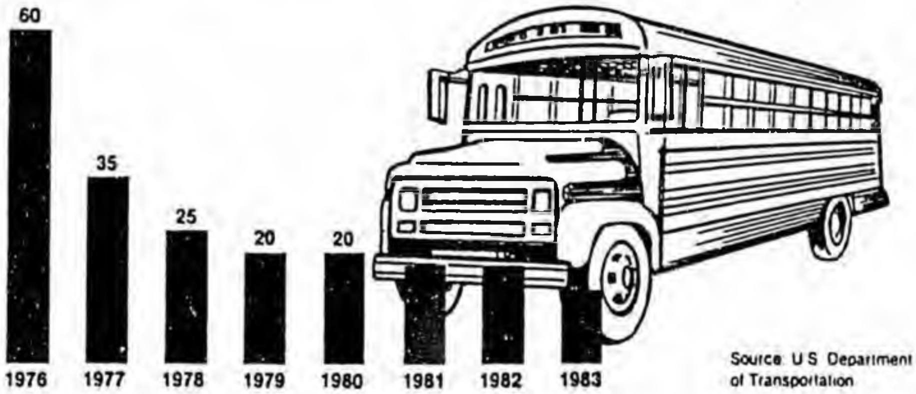
Transport Canada conducted barrier crash tests of three school busses in late 1984 to determine the adequacy of current occupant protection regulations in preventing death and injury and to determine the effect of lap belts on the level of occupant protection.

The results of these tests show that, in a severe frontal collision, the passive occupant protection system presently required in school busses provides excellent protection for students. Further, the use of lap belts may result in more severe head and neck injuries for belted occupants. Since these tests did not investigate the effect of side impact or rollovers on occupant injury, further investigation would be warranted in these areas.

NHTSA's 1985 "Safety Belts in School Busses" report says the dollars used to buy lap belts might be better spent on special mirrors to help drivers see small children in front of the busses, and to improve bus driver education, and maintenance.

Figure 4. School Bus Occupant Fatalities, 1976—1983

As shown above, National Safety Council records show a steady decline in school bus occupant fatalities—from 60 in 1976 to 9 last year.



Most transportation industry experts advocate several different approaches aside from restraint systems. The solutions can be categorized into two groups: safety technology and training programs.

The safety devices include convex mirrors, stop arms, and warning light systems, stop signs which swing out from the driver's side, and crossing control arms.

Only some states mandate any of these devices, and NHTSA only recently implemented the convex mirror regulation. Thirty-six states as of mid-1984 had mandated the eight-light warning system, and 28 states required driver operated stop sign arms. None of these other devices had been made mandatory, although several states had tested the crossing control arm.

The other proposed solution, training programs, encompasses selecting, licensing and training of drivers; inspection of busses and maintenance requirements; and education of the pupils in on-bus behavior, bus stop behavior, and emergency procedures.

Proper driver training and supervision will do much to improve the attitude and safety awareness of school bus operators, in turn reducing accidents and enhancing passenger safety. Citizens interested in school bus safety should contact their local school transportation director and review the driver training program.

Inspecting each bus for compliance with all applicable vehicle standards and for proper functioning of all vehicle components will also improve school bus safety.

Citizens can also help educate children by promoting and participating in bus monitor programs. Bus drivers need to focus their attention on the road rather than on the children seated behind them.

Monitors' duties could include helping children cross the street at bus stops, maintaining discipline on the bus, and assisting in emergencies. Observing the bus driver, the monitor can also report poor driving habits to the school transportation director or the proper authority.

School bus transportation safety is, and should be, a concern of parents, teachers, and legislators. The seat belt debate will continue, but groups promoting this issue might well consider shifting their major emphasis to promoting safety outside the bus. ■

Seat Belts on School Buses — Are Children Safer Without Them?

by Roscoe Bernard

I am a little saddened whenever I learn of well-meaning but sometimes misguided parents who, while believing that they are acting in the best interests of their children, create situations with consequences substantially worse than those they initially set out to avoid.

Typical is the young suburban Kansas City mother who withdrew her seven-year-old daughter from school because the school bus was not equipped with seat belts or air bags. Lacking an operable automobile, she felt she had no way to get the child to and from school.

Such deep-seated dedication to a cause can only be described as commendable; but in order to be meaningful, it must be accompanied by a degree of understanding and willingness to listen to and investigate opposing factors. This particular mother, when questioned regarding her decision replied, "My deepest regret is that I cannot exercise the same responsibility for all the children." *The Kansas City Star*, Friday, May 20, 1983.

Although she is a former English teacher who feels that "academically there's no problem," she still wishes her child "was back in school for the social aspects." When considering the questionable state of some of our educational programs, she is possibly correct academically, but who is to say whether or not there may be emotional or psychological damage done to the child? The fact that the little girl was permitted to ride her school bus for most of the term might cause some to question the mother's motive and why she waited so long if she felt strongly that the bus was unsafe. I should think that even a seven-year-old child would question this. Most of us recognize that school teachers and school bus drivers play an important role in a seven-year-old's exciting new world.

In any event, what about the issue which caused this dilemma? Exactly why was this mother willing to take such drastic action when, by her own admission, she wishes her child was back in school?

Safety Is Not Taken Lightly

The safety of children on school buses is and has always been a volatile and highly emotional issue. Although those in the school bus industry frequently grumble about the lack of favorable publicity and the excessive coverage afforded accidents or problems, they are grateful for the degree of public concern for the safety and welfare of children. Without this concern and occasional criticism, it is probable that many of the improvements would not have come about. So, in effect, they are blessings in disguise.

Many people fail to realize, however, that the transportation industry has long been concerned about the seat belt issue. It doesn't take a tragedy such as the one which recently occurred near Jonesboro, Ark., to get its attention. For many years it has been carrying on research, conducting sled tests and simulating accidents. Volumes of data have been compiled which overwhelmingly oppose the advisability of installing seat belts on large school buses.

If the yellow school bus were an unsafe vehicle, it is possible that transportation officials would not feel so strongly. Statistically however, it is the safest vehicle on the road. The chances of sustaining injury or death on a yellow school bus are dramatically less than they would be in an automobile.

In a 1971 report prepared by a National Highway Traffic Safety Administration Task Force, it was determined that a school bus passenger is 37 times less likely to be injured than a rider in a passenger car. Since that time there have been major improvements in body strength and stability, brakes, mirrors, seat spacing and padding.

Seat belt and sled tests, initiated by the NHTSA in the late 1970s, supported earlier tests conducted by the University of Southern California. These tests recommended compartmentalization for pupils between high-strength, high-backed and well-padded seats.

Roscoe Bernard, R. W. Harmon & Sons, Belton, Mo., is president of the Missouri School Bus Contractors Association.

The NHTSA was ultimately directed to issue standards on several aspects of school bus safety. Seating was included as a priority item. In February of 1973, Federal Motor Vehicle Safety Standard (FMVSS-222) regarding school bus passenger seating and crash protection was issued and it became effective in April of 1977. Included in the standard were three primary aspects of seating occupant protection: (1) seat and restraining barrier height and surface area, (2) seat and seat anchorage strength, and (3) the padding on contactable surfaces within the occupant's seat space.

Based on research and requirements established in FMVSS-222, NHTSA determined that although children should be protected on school buses, it did not support a requirement of seat belts for passengers in large school buses.

Referring once again to the Jonesboro, Ark., tragedy, there is overwhelming evidence to support the premise that human error was largely responsible. An unfamiliar and poorly-marked curve (portions of reflectors were either knocked down or missing), poor light conditions, excessive speed and possible illusionary problems all contributed to the fatal accident. The human element, however, was the dominant factor, and had it been removed or adequately compensated for, the accident would not in all probability have occurred.

The Anticipated Reaction

Regardless of the cause or consequences, there was an almost immediate clamor for legislation requiring seat or lap belts on all school buses. One Congresswoman, lamenting the failure of earlier legislation that would have required the installation of seat belts on school buses, "vowed to sponsor similar legislation in the next General Assembly." *The Arkansas Democrat*, March 26, 1983.

The same was true in 1976, when near Martinez, Calif., twenty-nine occupants died when a charter bus failed to negotiate a curve, jumped a guard rail and landed on its roof. The dynamic forces imposed on the roof of the inverted vehicle were beyond and outside the realm of all practical design limitations and the roof was crushed down to the window level. Although the Southwest Research Institute (SWRI), and the National Transportation Safety Board (NTSB), stressed the need for improved preventive maintenance practices and inspection procedures and concluded that proper maintenance practices would have discovered a deteriorated drive belt, they also concluded that there was no evidence to indicate that the use of occupant restraints would have reduced the severity of injuries sustained. In similar fashion to the more recent Arkansas tragedy, the loss of cross sectional integrity of the bus body because of the failure of window posts and deformations of the roof down to the window level contributed heavily to the crushing and compression type injuries. In neither case is there any supporting evidence that passengers restrained by seat belts would have survived. On the contrary, because of the crushing effect, it is probable that some who otherwise survived might have been killed because they would have been restricted to a particular position.

Theories such as those previously offered are, of course, impossible to substantiate and must remain highly speculative unless or until reliable tests could be conducted that would exactly duplicate such an accident situation.

Little Guys and Little Bodies

There are, however, a number of reliable arguments opposing mandatory seat belts. One such opinion was stated by Dr. H. Rolf Noer, an orthopedic surgeon who testified before the Child Restraint Subcommittee of the Society of Automotive Engineers. "Amongst the striking characteristics of the child's skeleton as compared with an adult, is that its prominences taken as a whole are much less pronounced, and the bones present a rounded appearance. If we devise a restraint to hook over a particular prominence, we may find that in the child, the prominence is in fact not there at all. A case in point is the familar seat belt. If the belt is permitted to ride up above the iliac crest, there is nothing from a skeletal standpoint between it and the backbone. We are seeing visceral lesions produced by seat belts, including crushed kidneys and ruptured bladders. If the seat belt is worn properly as a lap belt, it hooks between the thigh bones and the anterior-superior iliac spines of the pelvis. These are broad, strong bony projections, hooking slightly downward, that completely prohibit such injuries which can occur only when the seat belt is worn too loose and the individual slides out from under, or when it is worn too high. In a child, however, these bony prominences are too rounded. The thigh is relatively larger and the pelvis itself is smaller. It is accordingly almost impossible to apply a seat belt to a youngster in such a way that, with a decelerative force, the child's weight will not be thrown directly upon the viscera." Dr. Noer concluded by stating, "I don't really know how you would ever get anything approaching any lap belt I have ever seen that would be safe to put on a young child, much less effective. I don't know how old a child must be to safely wear a lap belt, but I would guess the age of 10 or 11." The foregoing quotation was presented in testimony opposing House Resolutions 11210 and 11160, January 1972.

In Need of Answers

In addition to possible physical injury to the small child by the seat belt itself, there are numerous questions which need to be answered. Some of them have been answered to the satisfaction of those directly involved but many have not.

An early (1960) study conducted by Harran Transportation Company of North Merrick, New York, pointed out that "seat belts were more often used as weapons than as safety devices." Supervisors reported that they "didn't have any accidents, but they certainly had a rash of incidents." They felt they were far more trouble than they were worth.

Some of the more pertinent unanswered questions are:

1) *Who would be responsible for adjusting the seat belt to the size of the pupils occupying the seat? In respect to the earlier statement by Dr. Noer, a loose seat belt is not fully effective and may well contribute to injury of the pupil wearing it.*

What many fail to realize is the fact that school buses may have a variety of pupils riding at given times, i.e., a first run may be senior high, a second, junior or middle school, a third elementary and a fourth kindergarten. This is standard procedure, and even worse perhaps is the fact that many loads contain pupils of all ages, K-12.

2) *Should the seat belts be anchored to the seat or to the school bus floor?*

In the event that they were anchored to the floor, there is a strong likelihood that pupils sitting to the rear of a given seat would exert pressure against the belt with their feet, thus drawing it so tight that the pupil ahead could not release the buckle.

Assuming that three belts per seat would be required, a standard 65-passenger bus would necessarily need 130 holes bored in its floor. The question of ventilation and structural weakening would need to be addressed. Would this affect the existing structural standards for floor strength, and would the floor as presently designed be able to withstand the impact when 60 to 65 pupils were fastened to it?

3) *What steps would be necessary to insure that belts were kept clean and not permitted to fall to the floor, where they would doubtless become wet and dirty to the point that no pupil would want to use them?*

When one considers the fact that a 65-passenger bus may accommodate up to 250 children morning and afternoon, it is easily understood that an appreciable amount of mud, snow, water and assorted dirt will be tracked on. It is also unrealistic to think that seat belts would always be kept out of the grime.

4) *How badly would schedules be affected if the driver were solely responsible for checking the belts after pupils are seated at each stop?*

When it was suggested that drivers could not force the children to fasten their belts, the Congresswoman from Arkansas stated that she did not believe it. "Passengers on airplanes automatically, without complaining, fasten their seat belts." She added, "the airplane is not going to take off until everybody buckles their seat belts." *The Arkansas Democrat*, March 26, 1983.

It is a little difficult to see the comparison between an airplane and a school bus, but a couple of basic differences are readily apparent. As far as I know, the plane makes very few starts and stops, and generally speaking, the seat belt sign is on only during take off and landing. Are we to assume that the pupils can unbuckle as soon as the bus is safely moving?

Continued on page 44

SEAT BELTS ON SCHOOL BUSES

Continued from page 34

Then too, I don't ever recall seeing the pilot leave his seat and go back to check seat belts; the stewardess normally does this. However, let us keep things in proper perspective and assume that he does. How late would he be for his scheduled take off? No airline is going to put up with that, nor is the flying public. And remember, he makes only one stop whereas the school bus driver makes many. There is no possible way a driver could leave his/her seat at each stop to check seat belts. One can partially understand the problem by merely following a loading school bus. The time you spend waiting for the children to board and seat is infinitesimal compared to what it would be if a driver had to leave the seat and check each belt at each stop.

Summary

The question of seat belts on school buses is extremely difficult to address without sounding negative and defensive. The emotional factor alone is sufficient to cause many to follow the easiest possible route. Some choose to ignore the question altogether, while others adopt a wait and see attitude.

When, however, the advantages and disadvantages are compared, and the possibility of added dangers is considered, it becomes much easier to take a position.

If the school bus industry as a whole could be assured that the several major problems previously outlined would not exist, I feel rather sure that there would be very little opposition even though there are numerous other problems that would have to be resolved. School transportation people, both public and private, have consistently championed safety and safety-related programs. Safety of the individual child has always been first and last without too much thought being given to increased costs.

I firmly believe that the American public subscribes to this theory as well, and if it were fully convinced that seat belts on buses were the safest way to go, I have little doubt but that they would soon be universally adopted.

Until such time, however, I for one will remember a solitary picture drawn as only a kindergartener can. The crude drawing was of a school bus on its top with lots of litte ones hanging upside down by their seat belts. When one considers the ability or lack of ability of five and six-year-olds to manipulate belts and buckles under less than stressful conditions, there is little room for doubt regarding what could happen in an emergency.

An issue so vital to the overall safety of children is deserving of thorough investigation, and we must not permit the emotion of the moment to affect our thinking. The decisions we make today can have far reaching effects on the children of tomorrow. ■

Note: Federal legislation has been introduced to establish national child passenger restraint requirements. However the proposed bill applies only to passenger vehicles or motor trucks of less than 6,001 pounds and owned by the parent or guardian.

SUPERVISION BY VIDEO-TAPE

Continued from page 35

being resolved to anyone's satisfaction until Carey decides to play his trump. "John, do you have a few minutes to review some video tapes with me?" he asks. "I promise this won't take but a few minutes of our time." At this point he leaves a somewhat startled John Doe sitting in the room while he retrieves a can of tape from his office nearby. "Pour yourself another cup of coffee if you'd like," he adds, leaving the door ajar so that he can observe a visibly shaken driver as he leaves the room.

Momentarily, he returns and inserts a cassette into the converter which is plugged into a nearby outlet. As the objects begin to form, he casts a guarded glance at Doe who sips nervously on the remnants of a cold cup of coffee. The bus is observed on a typical country road that could be on Doe's route. A railroad looms in the distance and as the bus approaches, it becomes obvious that the bus won't stop. Whose bus is this? Doe seems to be wondering. Could it possibly be mine? The images continue to change except for the bus which is as true to life as ever. Only Carey on the other side of the room is more real and Doe knows it. Then the bus makes a left turn and his heart leaps to his throat as an easily recognizable number appears. That's my bus he seems to be thinking. When did he make this film? I must be dreaming. Did I really do these things? I can't believe it. What'll I do?

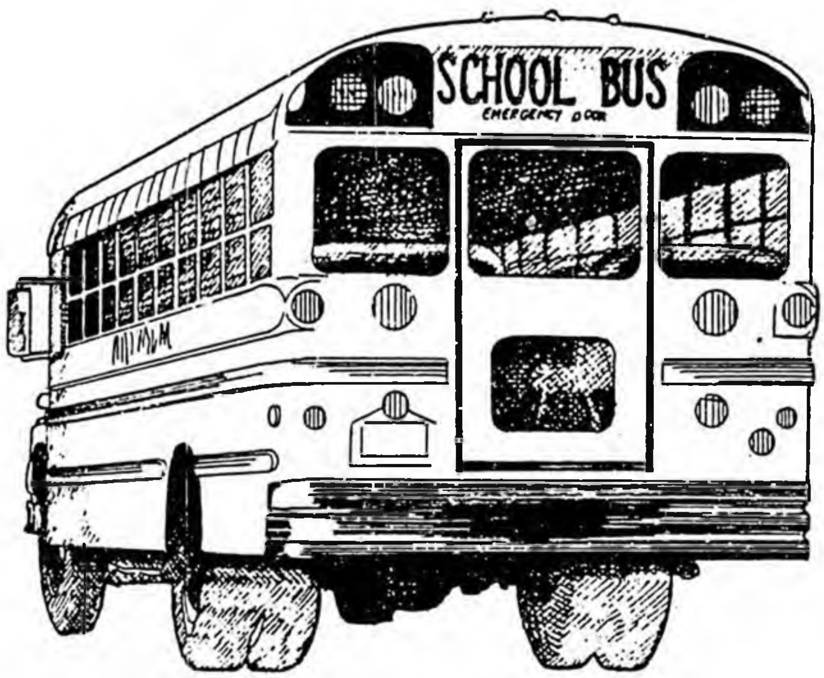
Carey breaks the silence and ends this moment of disbelief for a most chagrined school bus driver. "John," he says, "the school district is disappointed in your driving performance. You're a better driver than this. Your record over the years confirms it but such carelessness will not be tolerated any longer. You were lucky this time. Let's make sure that it doesn't happen again. OK?"

John Doe nods in agreement, deposits his cup on a counter top and leaves the room a sadder but wiser man, but visibly shaken by the experience.

The use of video equipment is not limited to the supervision of bus driver personnel in the Gibson County School District. It is used to effect program improvements in a number of ways. Video tapes, for example, are made of route hazards that are featured in both pre-service and in-service meetings with driver personnel. Loading and unloading procedures are filmed and reviewed with school principals for the purpose of correcting noted practices that could be injurious to transported pupils. Footage of the school bus fleet is used to justify the district's position on equipment needs. The list goes on and on, and Bill Carey is not the only person in the school district impressed with or aware of its seemingly unlimited potential. ■

Note: Bill Carey is currently serving as Superintendent of the Gibson County Special School District. His successor, Hardy Key, is proving to be just as determined and responsible as an administrator of pupil transportation services.

SAFETY LEGISLATION CONCERNING SCHOOL BUSES



American Transportation Corporation

Published By

AMERICAN TRANSPORTATION CORPORATION
Highway 65 South
Conway, Arkansas 72032

Publication Date: May 16, 1984
(Revised: July 24, 1984)

FOREWORD

Every person involved with School Transportation - from drivers to state transportation directors - places paramount importance on the safety of our precious cargo---children.

Over the past 50 years, school transportation has become the safest form of transportation because of just that type of concern. Safety councils at every level, legislators at every level, and manufacturers at every level have combined to accomplish this result. Almost every school bus accident during these years has been analyzed in detail in order to determine new means to avoid repeats. The regulations and design specifications which resulted form an important, yet very complex, starting base for anyone considering new legislation in this important area.

For this reason, AmTran has prepared the following summary, which attempts to outline briefly, in layman terms, the more important regulations covering school bus design.

We hope this information will prove helpful by providing a knowledge base from which new and innovative suggestions for improvements will be launched.

Jerry D. Williams
Senior Vice President - Marketing
AMERICAN TRANSPORTATION CORPORATION

CONTENTS