Technical Update

Eastern Rail-Highway Safety Conference
October 3, 2007

John Sharkey, Safetran Systems Corp.
General Manager-Technology & Standards
Chairman AREMA 36 – Highway/Rail Warning Systems
• Review a few key government and industry recommendations
  – NTSB
  – AREMA
• Review how today’s products meet and or lead in compliance with the recommendations
NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

HIGHWAY/RAILROAD ACCIDENT REPORT

Collision of Northeast Illinois Regional Commuter Railroad Corporation (METRA) Train and Transportation Joint Agreement School District 47/155 School Bus at Railroad/Highway Grade Crossing in Fox River Grove, Illinois, on October 25, 1995
As a result of its investigation of this accident, the National Transportation Safety Board makes the following recommendations:

--to the U.S. Secretary of Transportation:

Develop a comprehensive and periodic railroad-highway grade crossing safety inspection program to be conducted jointly by railroads and public entities and also require railroads and public entities to coordinate any changes to railroad-highway grade crossings before implementation. (R-96-4)

Notify, in cooperation with the American Association of State Highway and Transportation Officials, the National Association of County Engineers, the American Public Works Association, the Institute of Transportation Engineers, the Association of American Railroads, the American Short Line Railroad Association, and the American Public Transit Association, railroads and public entities about the importance of exchanging information about railroad-highway grade crossings. (L-96-7)

Develop a common glossary of railroad-highway grade crossing terms and disseminate this glossary to railroads and public entities. (L-96-8)

Develop a training program in the design and operation of railroad-highway grade crossings that includes the interaction between rail and highway signal systems. Require representatives of the railroads, public entities, and others who design and maintain grade crossing signal systems to complete the training program. (L-96-9)

Require the use and maintenance of railroad and highway traffic signal recording devices on all new and improved installations at railroad-highway grade crossings that have active warning train detection systems and are interconnected/preempted to highway signal systems. These devices should record sufficient parameters to allow railroad and highway personnel to readily determine that the highway signals and railroad-activated warning devices are coordinated and operating properly. Require that the information from these devices be used during comprehensive and periodic joint inspections. (L-96-10)

Require that existing recording devices for railroad and highway signals systems at interconnected/preempted grade crossings be retained or upgraded as necessary. Require that these recording devices be maintained and that the information from these devices be used during the comprehensive and periodic joint inspections. (L-96-11)

--to the Federal Highway Administration:

Develop guidelines and amend the Manual on Uniform Traffic Control Devices for Streets and Highways to provide methods to delineate the area (zone) that a train, or its cargo, or both, may occupy or the track or tracks of a railroad grade crossing so motorists have visual reference points that enable them to ascertain whether their vehicle is encroaching on the travel path of the train, or its cargo, or both. (R-96-40)

Disseminate safety information, in cooperation with the National Highway
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NATIONAL TRANSPORTATION SAFETY BOARD
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RAILROAD ACCIDENT REPORT

COLLISION OF NATIONAL RAILROAD PASSENGER CORPORATION (AMTRAK)
TRAIN 59 WITH A LOADED TRUCK-SEMITRAILER COMBINATION AT A
HIGHWAY/RAIL GRADE CROSSING IN
BOURBONNAIS, ILLINOIS, MARCH 15, 1999
Recommendations

As a result of its investigation of the March 15, 1999, grade crossing accident in Bourbonnais, Illinois, the National Transportation Safety Board makes the following safety recommendations:

New Recommendations

To the U.S. Department of Transportation:

Provide Federal highway safety incentive grants to States to advance innovative pilot programs designed to increase enforcement of grade crossing traffic laws at both active and passive crossings. (R-02-1)

To the Federal Railroad Administration:

For all railroads that install new or upgraded grade crossing warning systems that include crossing gates and that are equipped with event recorders, require that the information captured by those event recorders include the position of the deployed gates. (R-02-1)

To All Class I Railroads:
To All Regional Railroads:

For all your new and upgraded grade crossing warning systems that include crossing gates and that are equipped with event recorders, ensure that the information captured by those event recorders includes the position of the deployed gates. (R-02-2)

To the National Railroad Passenger Corporation:

In fulfilling your Federal mandate to help prepare emergency responders to respond to an accident involving Amtrak equipment, emphasize to those responders the possibility that such an accident could result in large quantities of burning diesel fuel and urge them to be prepared to respond to this specific hazard. (R-02-3)
To the Federal Railroad Administration:

For all railroads that install new or upgraded grade crossing warning systems that include crossing gates and that are equipped with event recorders, require that the information captured by those event recorders include the position of the deployed gates. (R-02-1)

To All Class I Railroads:
To All Regional Railroads:

For all your new and upgraded grade crossing warning systems that include crossing gates and that are equipped with event recorders, ensure that the information captured by those event recorders includes the position of the deployed gates. (R-02-2)
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

COLLISION OF AMTRAK TRAIN 304-26 WITH A HIGHWAY VEHICLE AT A HIGHWAY-RAIL GRADE CROSSING
MCLEAN, ILLINOIS
SEPTEMBER 26, 1999
Recommendations

As a result of its investigation, the National Transportation Safety Board makes the following safety recommendations:

To the Federal Railroad Administration

Modify 49 Code of Federal Regulations 219.201(b) as necessary to ensure that the exemption from mandatory postaccident drug and alcohol testing for those involved in highway-rail grade crossing accidents does not apply to any railroad signal, maintenance, and other employees whose actions at or near a grade crossing involved in an accident may have contributed to the occurrence or severity of the accident. (R-01-17)

To the Union Pacific Railroad

Provide your signal maintenance personnel with dedicated jumper wire warning systems or other equipment that will automatically alert them if they attempt to leave a work site without retrieving all jumper wires they have used at that location. (R-01-18)

Establish procedures to immediately secure the signal case associated with any grade crossing accident until an appropriate, authorized Union Pacific Railroad or government official is on the scene to supervise entry to the signal case. (R-01-19)

To the Brotherhood of Railroad Signalmen

Inform your members of the circumstances of the September 26, 1999, grade crossing accident in McLean, Illinois, and emphasize the importance of conducting operational tests and accounting for all jumper wires after performing maintenance or repair tasks. (R-01-20)
To the Union Pacific Railroad

Provide your signal maintenance personnel with dedicated jumper wire warning systems or other equipment that will automatically alert them if they attempt to leave a work site without retrieving all jumper wires they have used at that location. (R-01-18)

Establish procedures to immediately secure the signal case associated with any grade crossing accident until an appropriate, authorized Union Pacific Railroad or government official is on the scene to supervise entry to the signal case. (R-01-19)

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GCP4000
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• Complete crossing system - “Crossing in a box”
• 6 Track system is the equivalent of having in one integrated product all the interconnected wiring that contains the following:
  – Three fully loaded double track GCPs including Intelligent Processor Islands and 8 DAX outputs
  – Two 20 Amp Crossing Controllers
  – A SEAR II CPU Event Analyzer/Recorder and I/O Module
  – Multiple Vital Timers and Vital AND Gates
  – Embedded PC for programming and diagnostics
SEARiili Module (Independent Recorder)

- 12-pin I/O Connector
- 2 Digital Inputs
- 2 Relay Outputs
- External Temperature Probe Connection
- External Battery Input

* Also contains 6 digital outputs *

- RS232/RS422 Serial Port, DB-25 (radio/modem interface)
- RS232 Serial Port, DB-9 (printer/PC interface)

- Echelon® Service Push Button
- Echelon® Service LED

- ID Labels for Application Programmable LEDs
- HEALTH LED
- POWER LED

Application Programmable LEDs
SEAR IIi/II System Components

SEAR IIi/SEAR II
Evaluates all crossing warning equipment and inputs from I/O points and sensors. Contains logic for alarms, events and inspections. User programmable and configurable.

Gate tip sensor
Determines gates are level and extending over the traffic lane.

Mini Trackside sensor
Interfaces trackside sensors to SEAR IIi and brings in gate up/down contacts in gate mechanism.

Ground Fault Tester
Interfaces to SEAR IIi and provides ground detection alarms. Can be tested automatically for proper operation.

iLOD
Determines if the lamps are all lit and flashing correctly.

Integrated Bell sensor as part of Electronic Bell
Determines if the bell is operating properly.
Monitoring Philosophy

• The GCP4000 reports its logic states to the SEAR IIi for use in alarm calculations and event storage
• The SEAR IIi monitors the actual I/O points on the back-plane for the GCP4000
• The SEAR IIi receives information from the trackside equipment through its trackside sensor package

LOGIC + I/O POINTS + TRACKSIDE OPERATION =

TOTAL CROSSING MONITORING
Monitoring Philosophy

- The SEAR IIi knows what the GCP4000 wants to do (LOGIC)
- The SEAR IIi knows what the GCP4000 tried to do (I/O POINTS)
- The SEAR IIi knows what actually happened trackside (SENSORS)
Argus – New Recorder designed for legacy replacement

- 2 line 20 character display
- 12 digital inputs
- 3 battery inputs
- Ethernet and USB Ports
GCP 4000 Display Interface
Calibration
Troubleshooting
Office Configuration Editor
Out of Service

Office Configuration Editor
ADVANCED: out of service

*OOS Control: Display
*OOS Timeout: Yes
OOS Timeout: 1 hrs

Set Parameter

Current Value:
OOS Control=Display

New Value:

Display
Display+OOS.IP
OOS.IP
4000 Case OOS.IP
Out of Service

- Advanced options are available to take tracks or groups of tracks out of service to facilitate troubleshooting or track maintenance work
  - Optional use of the display module with a configurable out of service vital timer that returns tracks to service when the timer expires
  - Can require the use of an external vital input (jumper) with or without the display and out of service timer
  - System allows troubleshooting and calibration while in out of service mode
  - Out of service events stored in the event log
  - OOS condition or jumper turns off MC light
Preemption
Implementation Report of the USDOT Grade Crossing Safety Task Force

Report to Secretary Rodney E. Slater

June 1, 1997
Highway-Rail Grade Crossing Warning System and Highway Traffic Signals are Interconnected.

**BEFORE MODIFICATION** is made to any operation which connects to or controls the timing of an active railroad warning system and/or timing and phasing of a traffic signal the appropriate party(ies) shall be notified and, if necessary, a joint inspection conducted.

U.S. DOT/AAR Crossing Number: ____________________________

1. Highway Agency: ______________________________________
   Phone Number: ____________________________

2. Railroad: ___________________________________________
   Phone Number: ____________________________

3. Other: ___________________________________________
   Phone Number: ____________________________
Thank you!