

CHAPTER 12: BACKUP VEHICLE STOP SENSORS

During Phase I focus group activities, equipment operators expressed an interest in technology that could detect objects behind their snowplows and help prevent accidents when they are backing up. The particular situation they described was when they need to turn around on a divided highway and can't negotiate the entire turn with one movement because of the snowplow's long wheelbase and large turning circle. As a result, they can't always make a complete turn without stopping and backing up, and during the turning process other vehicles can pull in behind the snowplow into the operator's blind spot without the operator's knowledge. If the driver backs up to complete the turn, a collision is likely.

Global System's Search-Eye Sensor System is used by many industrial and commercial fleets and on some school bus fleets. When the vehicle is in reverse and Global's sensors detect an obstacle behind the vehicle, the brakes are automatically applied.

OBJECTIVE

Conduct proof of concept regarding implementation of an automatic sensor/braking system on winter maintenance vehicles to prevent collisions with vehicles or other obstacles when the maintenance vehicles are backing up.

MEASUREMENT

The Search-Eye system is successfully installed on the prototype vehicles and performs as expected; that is, when an obstacle is behind the prototype vehicle, the sensor automatically prevents the vehicle from backing up by applying the brakes.

DISCUSSION

Global Sensor Systems, Incorporated, located in Mississauga, Ontario, provided its Search-Eye Sensor System for all three prototype vehicles. The sensor system detects the presence of objects behind the prototype vehicles when reverse gear is engaged, and automatically applies the brakes.

Global's system consists of sensors mounted on the rear of the vehicle and wired into the braking system. Placing the gearshift lever in reverse turns on the system. If an object is detected while backing up, the brakes are applied automatically, and an audible "Sonalert" and large red light on the cab control box warn the driver. Moving the gearshift to any other position turns the system off.

The normal Search-Eye installation requires two sensors on the back of the vehicle. On a snowplow vehicle, however, the sensors "saw" the salt/sand chute protruding from the rear of the vehicle as a separate object. It was necessary to install a third sensor to compensate for the

chute's interference with the other sensors' cones of vision. See Figure 12-1 for the location of the reverse obstacle sensors on the rear of Iowa's prototype vehicle.



Figure 12-1 Location of reverse obstacle sensors (circled), Iowa vehicle

The Search-Eye Sensor System can be used with either hydraulic brakes or air brakes. The units have a manual override switch that permits the operator to disable the automatic braking system when the need arises, such as when backing up to a loading dock. The audible beeping sound will continue until the manual override switch is reset. The systems that are supplied for vehicles equipped with hydraulic brakes consist of two rear-mounted sensors, a heavy-duty plunger-type solenoid, and a transceiver. The heavy-duty air brake system consists of three rear-mounted sensors, one electrically operated air relay valve, and a transceiver.

OBSERVATION

The backup sensor system was successfully installed; however, proof of concept was not conducted on their performance. Anecdotal evidence indicates the sensor system worked as expected; the prototype vehicles automatically stopped when they were backing up and approaching obstacles. Field evaluations in Phase III may indicate that, with this or similar technology on winter maintenance vehicles, operators could experience a decrease in backing accidents involving vehicles in poor visibility situations, and there could be a lower accident-related maintenance repair cost.