FIRST

FORM 5091

Electronic Brake Monitoring for Air Disc Brake Applications utilizes proven e•STROKE® technology, and now adds a new optical sensor to monitor air disc push-rod stroke and caliper lever arm movement. (patent pending)

The e•STROKE® system for air disc brakes monitors your vehicle's braking system in real-time and can detect:

- Non functioning brakes, caused by failed, frozen or faulty air system components and connections.
- Dragging brakes, caused by failed, frozen or faulty air system components and connections.
- Over Stroke Brakes caused by caliper adjuster mechanism failure, or other mechanical failure.

Air Disc brakes are almost impossible to visually inspect since all moving components are hidden from view. The e•STROKE® system for air disc brakes continuously monitors every brake apply and release and notifies the fleet manager of braking problems via:

- Dash warning light alerting the driver to a potential braking problem.
- J-1939 real-time transmission of any fault condition which can be relayed via on board data recording and reporting systems.
- Optional integration of the e•STROKE® detection of dragging brakes to automatically intervene and de-rate the vehicle speed (OEM option).

The benefits of MGM's e•STROKE® system are:

- Reduces diagnostic time, and verifies proper function.
- Identifies problems pro-actively, potentially saving downtime and component costs.
- Reduces operating costs by keeping your vehicles in-service and on the road.
- Provides peace of mind by knowing the status of your brake system at all times (liability concerns).

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MGM BRAKES

MGM Brakes
A Division of Indian Head Industries, Inc.

Electronic Brake Monitoring

e•STROKE® Electronic Brake Monitoring System

No matter what type of brakes your commercial vehicle utilizes, drum or air disc...

We have an electronic brake monitoring system to fit your needs!

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SAFETY

Verifying proper brake setup and operation on commercial air-brake equipped vehicles has historically been a significant problem in the industry. While daily pre-trip brake inspections are required per CVSA regulations, they are seldom performed due to the time and difficulty required to conduct these inspections. This has been historically true on drum brake equipped vehicles, and is even more of an issue on today's air disc equipped vehicles.

Based on this need, MGM has designed and developed e•STROKE®, an electronic brake monitoring system for commercial vehicles. This system utilizes patented sensing technology to monitor brake stroke and convey this information to an electronic control unit (ECU) for analysis. This system can be utilized to assist in daily brake inspections, as well as provide continuous real-time brake monitoring on any air brake equipped vehicle.

The e•STROKE® system can detect the following braking issues or potential problems:

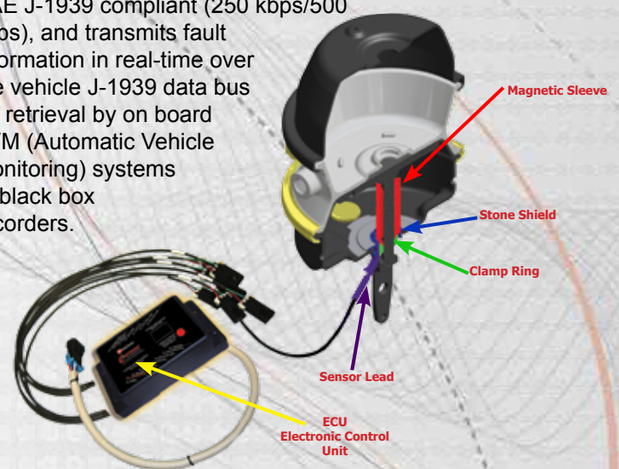
- ☑ Improper automatic slack adjuster operation or maintenance
- ☑ Caliper internal adjuster mechanism failure (disc brakes)
- ☑ Improper brake set-up or adjustment
- ☑ Air leaks or an improperly operating air system
- ☑ Defective air brake control valves
- ☑ Worn foundation components (i.e. worn bushings etc.)
- ☑ Defective or worn spring parking brakes
- ☑ Ice in the air system
- ☑ Irregular braking due to on-set of corrosion

Drum Brake Monitoring System

MGM's patented e•STROKE® brake monitoring system for drum brakes is now in its third generation, and provides quick accurate brake stroke status information for any air-brake equipped vehicle with exposed push-rod brake chambers. The system utilizes an Electronic Control Unit (ECU), a brake stroke sensor mounted inside the brake chamber, and pressure readings from the drivers brake pedal to monitor the vehicle brake system for proper operation. The e•STROKE® brake monitoring system for drum brakes can detect and report the following brake system conditions for each wheel end (wheel end specific fault reporting):

- Non Functioning Brake: Brake actuator is not properly activating
- Dragging Brake: Brake actuator is not properly returning and is stuck in advanced position
- Over-Stroke Brake: Brake actuator is beyond its normal safe operating range
- Worn Brake Linings: With optional in-pad brake lining sensors (OEM supplied)

As with previous systems, an optional dash mounted warning light notifies the driver that a braking issue has occurred, and the system also logs these occurrences into the ECU for later retrieval by vehicle maintenance personnel. The system is also fully SAE J-1939 compliant (250 kbps/500 kbps), and transmits fault information in real-time over the vehicle J-1939 data bus for retrieval by on board AVM (Automatic Vehicle Monitoring) systems or black box recorders.



Diagnostics

MGM's e•STROKE® systems instantly identify, display (optional via vehicle control systems), and record brake system faults upon occurrence. Brake fault history is easily accessible to maintenance pre and post trip using three optional methods to retrieve stored codes from the ECU.

- Laptop diagnostic software: A laptop diagnostic software package can be used to view system status, and retrieve active and inactive faults.
- J-1939 Diagnostic Tool (e•DT): An e•STROKE® handheld diagnostic tool that can be used to view system status, retrieve active and inactive faults, and monitor brake application pressure in real time.
- Warning Light Blink Codes: A warning light blink code sequence that can be used to identify active fault conditions.

Benefits

The benefits to you and your fleet by installing MGM Electronic Brake Monitoring include:

- Reduces maintenance costs by assisting the technician in quickly and accurately diagnosing brake problems before they become potentially hazardous and more costly.
- Reduces operating costs by keeping your vehicles in-service and on the road by potentially reducing down time and component costs.
- Provides peace of mind by knowing the status of your brake system at all times (liability concerns).
- Promotes better maintenance and safety practices, providing information used to keep your vehicles, drivers and passengers safe, with every stop.

If you feel MGM's Electronic Brake Monitoring Technology has benefit to you and your fleet, please contact customer service @ 1-800-527-1534 (x6021) or your local MGM Sales Representative for more information. For a complete listing of our Sales Representatives go to our website, www.mgmbrakes.com.

Air Disc Brake Monitoring System

MGM e•STROKE® Brake Monitoring for air disc brake applications continue to grow with more satisfied customers coming on board. By building on the success of MGM's patented e•STROKE® Brake Monitoring system for drum brakes, MGM has now expanded Electronic Brake Monitoring to air disc equipped vehicles.

The MGM air disc brake monitoring system has all the features and benefits of the existing e•STROKE® brake monitoring system for drum brakes, and adds the ability to monitor the air disc caliper internal lever arm (see diagram below).

This patented system utilizes existing and proven e•STROKE® technology. The e•STROKE® Air Disc Brake Electronic Monitoring system utilizes optical infrared sensing to monitor the position of the chamber push-rod, while the new spring loaded chamber ball end, monitors proper contact and movement of the caliper lever arm during each brake application.

Air disc brakes are virtually impossible to inspect (and difficult to diagnose when there is a problem). The MGM e•STROKE® brake monitoring system for disc brakes monitors the proper operation of these hidden brake components (chamber push-rod, caliper lever arm, etc.) and can identify brake problems that cannot be detected by visual inspection. Let MGM e•STROKE® for air disc be your eyes and ears for safety