

Our department recently took delivery of 12 of these machines. So far, the Proportion Limiting Control System has failed on two machines. This resulted in the potential to deliver a mixture of approximately 13 l of nitrous oxide and 200 ml of oxygen.

Inspection of the machines revealed two problems: 1) The chain connecting the oxygen and nitrous oxide control had fallen off its sprockets. 2) Sprocket assembly in the oxygen control had become loose due to a loose set screw.

To prevent a potentially dangerous situation developing, I suggest that: 1) Ohio warns users of the

Modulus® anesthesia machine of the potential failure of the Proportion Limiting Control System. 2) Proportion Limiting Control Systems be redesigned to prevent future failure.

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In reply:—The Ohio Link 25® is a system which mechanically links the oxygen-flow control valve to the nitrous oxide-flow control valve in such a manner as to allow independent adjustment of either valve, yet, automatically intercedes to maintain the prescribed minimum nominal 25 per cent oxygen concentration of the oxygen-nitrous oxide gas mixture. This capability is accomplished in the following manner:

A sprocket is secured to the nitrous oxide needle valve stem by the use of two 8-32, stainless steel, knurled cup point set screws. A second sprocket is allowed to rotate about the oxygen-needle valve stem within a predetermined limit before engaging with a collar secured to the oxygen-needle valve stem by the use of two set screws as described above. A cable chain having a 100-lb operating tensile strength interconnects the two sprockets. A chain tensioning device is incorporated to maintain the sprocket's rotational relationship by reducing chain back lash. In operation, the oxygen sprocket becomes engaged with the collar at the prescribed minimum oxygen concen-

tration. This action links the two flow control valves together in such a manner as the rotation of one causes a proportionate rotation of the other, thereby maintaining the minimum oxygen concentration.

The day following Dr. Malone's report to us regarding the problems he encountered, Ohio Service Personnel inspected the machines involved. Both problems were traced to inadequately tightened screws within the chain link mechanism. Final assembly and inspection procedures have been reviewed and modified where necessary, in an effort to reduce the possibility of a reoccurrence in current and future production units. In addition, field inspection of existing machines is currently underway to verify integrity of the system.

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