



Eaton has maintained a position of leadership in lube system early failure detection devices for more than 50 years. Starting with the successful introduction of a basic magnetic plug and self-closing valve combination that allowed physical examination for debris without loss of oil, the company kept pace, and at times, anticipated the needs of airframe, engine, gearbox and secondary power systems manufacturers. This is especially apparent in the development of electric chip detectors and, later, pulsed electric chip detectors, and electronic quantitative debris monitoring systems.

Pulsed Electric Chip Detectors (Zapper)

The function of an electric chip detector located in a lube oil passage in a gearbox or engine is to announce the arrival of ferrous particles that indicate wear or possible impending failure of the rotating components. Since a multiple particle buildup can give the same indication as a single large particle, a way to discriminate between these conditions would be a valuable feature in the chip detector function. Rotorcraft, in particular, that are required to respond to 'chip light' episodes with actions that can include unscheduled landings, often find normal wear debris as the cause for such actions.

Eaton's Tedeco[®] product line offers the Zapper Electric Chip Detector that incorporates a capacitor circuit that discharges a low energy pulse through the conductive debris bridge, causing enough local heating in the gap to open or disturb the debris material in a manner similar to the blowing of a fuse. If the discharge current reopens the circuit, the "burn-off" event is recorded and the chip

detector system is returned to the monitoring mode. If the debris is too large to burn off, it is considered significant and the cockpit light remains illuminated. In this case, the pilot will follow normal precautionary procedures.

The typical helicopter system consists of a power module and a number of magnetic chip detectors that may be located in engine lube system, transmission, tail rotor and intermediate gearboxes. It is available for manual operation, in which the operator actuates a switch in response to a 'chip light' in an effort to clear the ferrous debris. An automatic system will initiate the burnoff attempt and, if successful, will continue the procedure until significant debris buildup will cause a persistent chip indication.

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AS 9100

Millions of hours of flight experience have demonstrated that the Zapper will perform as promised. Following is a partial list of programs that incorporate Zapper in original design or as a retrofit.

AIRCRAFT	APPLICATION	COMMENTS
AGUSTA		
A109A	Engines/Transmission	STC
A129	Transmission	OEM
BELL		
206A/B	Engine/Transmission	STC
206L, L1, L3, L4	Engine/Transmission	STC
TH57	Engine/Transmission	OEM
212/412	Engine/Transmission	STC
214ST	Transmission	OEM
AH-1	Engine/Transmission	Oil Debris Detection System (ODDS) (Retrofit)
AH-1W	Transmission	OEM
OH58D (AHIP)	Transmission	OEM
UH-1	Engine/Transmission	Oil Debris Detection System (ODDS) (Retrofit)
UH-1N	Engine/Transmission	Oil Debris Detection System (ODDS) (Retrofit)
EUROCOPTER		
AS332	Transmission	OEM
AS350	Engine/Transmission	STC
AS355	Engines/Transmission	STC
B0105	Engines/Transmission	STC
BK117	Engines/Transmission	STC
KAMAN		
SH-2G	Transmission	OEM
K1200	Transmission	OEM
LOCKHEED		
C-130	Engines	Retrofit
P-3	Engines	Retrofit
MD HELICOPTERS		
H500	Engine/Transmission	STC
MD Explorer	Transmission	OEM
NORTHROP GRUMMAN		
E2/C2	Engines	Retrofit (Evaluation)
SIKORSKY		
H60 Series	Transmission	OEM/ Retrofit Zapper Plus
CH53E	Transmission	OEM
S76A (Allison Engines)	Engines*/Transmission	OEM Trans. *STC Engines
S76B (P&W Engines)	Engines/Transmission	OEM
S76C (Arriel Engines)	Engines*/Transmission	OEM Trans. *STC Engines