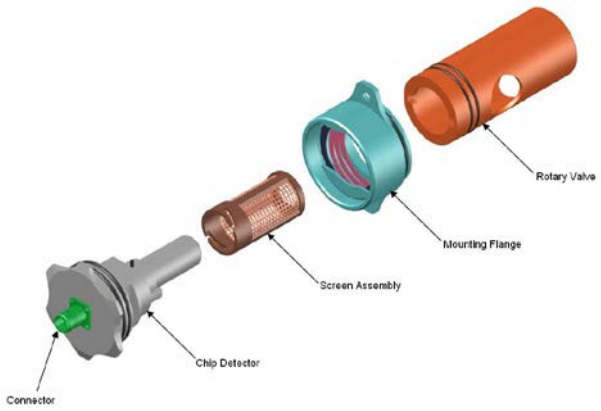
Oil debris monitoring Chip Detector electronic)

The Chip Detector （CD） is an electrical magnetic device that provides a reliable method of detecting impending failure of bearings and gears. The CD operates on the principle of a magnetic sensor strategically located in the oil system surrounded by two electrical contacts. When particles are attracted to the sensor and bridge the gap between the two contacts, a circuit is completed. This gap closure signal illuminates a chip light in the cockpit advising the operator of the presence of debris.

Advantages

- No tools are needed to inspect and remove debris.
- Enables BIT capability by integrating a resistor at the chip gap.
- Blade-type retention; eliminates common wear found in "Pin-In-Slot" type retention methods.
- Strong magnet integrity providing high ferrous capture efficiency & significant retention strength.
- Flow directional screens to improve capture efficiency.
- Circuit board integrated with ECD in order to support resistor-based wire-fault built-in-test functionality.
- Temperature switch integrated in ECD self-closing valve to halt ECD 'fuzz burn' operation if the gearbox oil temperature rises above a pre-set limit.
- Electro-less nickel plating for superior wear and corrosion protection
- Axial design that improves capture efficiency & ease of chip removal.

Technical Specifications	Detector （electronic）
Chip gap	.070" to .090"
Internal resistance	100k ohms provides continues self-test and threshold for the chip detector power unit to determine whether there is a chip or sludge present on the chip detector
Chip detector power unit	No negligible, internal resistance
Capture efficiency	~5 - 30%
Hex size （range）	.875 – 25.4
Thread size （range）	5/8-18 to 1.5"
Weight	~4.2oz
Temperature	-65°F to 230°F （-54°C to 110°C）
Magnet lift	~1.5lb carbon steel weight



Operation

Materials and Plating

1. ECD assembly is primarily aluminum to save weight
2. Electroless Nickel plating improves wear and corrosion resistance over anodize used on current model
3. Valve Housing Screen is bonded to the valve body with epoxy typical to chip collectors used in turbine engines – screen assy. is also pinned. Screen is stainless steel #12 mesh, .023 dia. wire (same as in-service)

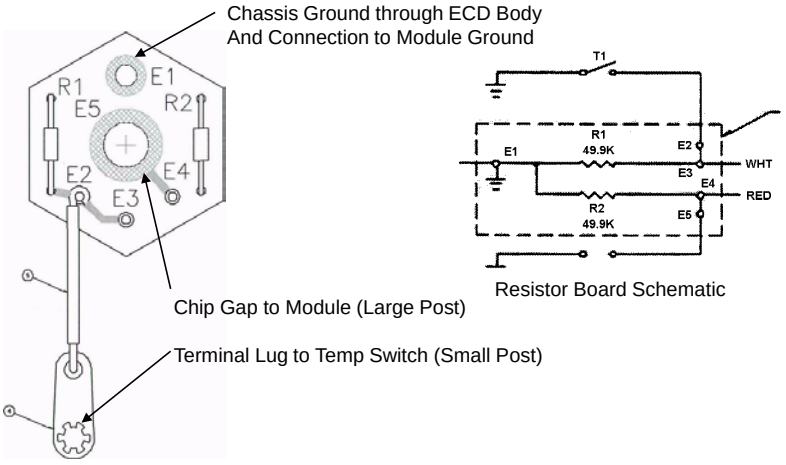
General Design And Construction

1. Flying Lead Construction
    a. Three insulated 20 ga. conductors with overbraid shield and XETFE jacket
    b. The jacket is stripped to expose enough overbraid to permit soldering a lug, too large to fit through the opening in the ECD cap – all pull strain is transferred to the jacket, not the conductors.
    c. Bending strain is relieved with shrink tubing covering the metal ECD cap and lead insulation – typical to connector strain relief
2. Chip Gap – Axial Design
    a. Easier to clean vs. radial gap type (currently fielded)
    b. Holds More Debris vs. radial gap type
    c. Rare Earth SmCo Magnet – lifts one inch steel ball
3. ECD-To-Valve Retention Lugs
    a. "Blade/Slot" design typical to FAA approved designs
    b. Blades and slots are integrally machined into ECD and valve body
        i. Eliminates assembly errors
        ii. Provides increased bearing area compared to pins/slots

iii. Wear surfaces are easily inspected
iv. Design type permits use of second spring to improve ECD retention

4. Seals
   a. O-Rings are used to seal oil
   b. Potting is used for environmental sealing of the circuit and connections, and secondary retention of nuts.
5. Springs
   a. Valve piston spring material is 302 Stainless Steel per AMS 5688
   b. Second spring material is 17-7PH flat wire

Chip detector internal wiring contacts



Chip Detector Gap Resistance Thresholds