

Engine Life Indicators for Gas Turbine Engines

by Mike Zucco

Recently, electronics has become more important in the operation of gas turbine engines. The mechanical fuel controls of the past are being replaced with electronic fuel controls. This transition is analogous to the shift from the carbureted autos of the past, to the new, computer electronic controlled, fuel injected autos.

The new gas turbine electronic fuel controls make available engine information via digital electronic signals. These signals are available for engine monitoring and diagnostics. This is where the Engine Life Indicator (ELI) steps in. The ELI can be connected to the control, or wired directly to various engine sensors, such as speed pickups for the compressor and power turbine, thermocouples for exhaust gas and other temperatures, or fuel flow and torque sensors. This information is stored in the ELI, to aid airline maintenance personnel.

The ELI counts mechanical and thermal damage which occurs over time in life-limited parts such as turbine disks and blades. This "summing" of part damage gives the airline the ability to schedule maintenance more closely matched to the needs of the engines. The ELI will make possible a longer period of time before an engine must be overhauled when it is not heavily used. This would provide a significant savings to airlines.

The ELI is mounted on the airframe. Maintenance personnel plug into the ELI via a portable computer, and the engine data files resident in the ELI are downloaded into the portable computer. Using Lotus 123, a popular piece of computer software, the maintenance person verifies that the data has been completely transmitted. The files are now stored so that further analysis can be performed and maintenance action determined.

The maintenance procedure for the use of ELI is listed below:

- The aircraft engine is shut down, while maintaining power to the ELI.
- Maintenance personnel look at the front of the ELI to determine if an overspeed or an over temperature has occurred.
- The portable computer is connected to the ELI so that the engine data can be downloaded and then verified.
- The engine data files can be loaded into a larger computer which performs a more detailed analysis and stores fleet data.
- When the analysis of the data is complete, proper preventative or immediate maintenance can be performed.
- When a life-limited part is replaced with a new part, a new file will be established for that new part.

The Engine Life Indicator is being developed under the IRAD program. It has run



ELI Studies

Members of our Engineering staff studying Engine Life Indicator (ELI) equipment (l. to r.): Assoc. Engineer Nelson Kuo, Diagnostics Technology Manager Ken Collinge, and Engineer Mike Zucco.

on the ATDE engine and will soon be installed on the T55 engine.

The Engine Life Indicator is another example of how electronics is contributing to Avco Lycoming Textron turbine engine technology.

Give . . . and Feel Good

continued from p. 1
securities having a quoted market value.

- Matching contributions cannot be used as educational tuition or related costs, alumni dues, membership fees or in any other way substitute for an expense incurred by the individual or anyone else.

Eligible Organizations

Cultural organizations primarily supported by funds from individuals or the general public are the most likely candidates. These include museums, performing arts centers, libraries and public broadcasting. Individual artists or social service agencies are not eligible.

Educational institutions must be accredited by an appropriate regional or professional accreditation association. Alumni funds, foundations or associations are also eligible if they are an integral part of the school and transmit all funds to the school.

Hospitals must be located in the U.S. and be accredited. Nursing homes, state institutions and human service agencies, such as the American Cancer Society, are not eligible.

How to Contribute

Obtain an application from Human Resources, Ext. 3428. Complete Sections A and B and send it to the selected organization along with your contribution.

The financial officer of the organization must certify receipt of the gift and return the application within 90 days to the Textron Matching Gift Programs.

You can double the pleasure you get from giving and see your gift work harder by assisting with a Textron Matching Gift.

Welcome Aboard!

Drennon Allen Jr., 80Y; Peter Barzach, 80C; Mark Cascio, 31M; Gregory Cushing, 21P; Paul Danick, 253C; John Davies, 32D; Denis De Barber, 28D; Keith Duly, 15A; Richard Edinborg, 70V; Glenn Ewaske, 71M; Edward Faynor, 23P; Fernando Fierro, 25D; William Gergely II, 5P; Sammie Grable, 1CS; Sandor Horvath, 84M; Gisele Joseph, 4E; Marilyn Kilian, 71MOC; Lucjan Konopka, 23D; Gary Kozlar, 131Q; Lois Lewis, 51A; John Lipke, 108D; Mark Lloret, 50V; Damian Macaluso, 1D; Timothy Moon Sr., 3CS; Stephen Murphy, 80Y; Michael Nevelus, 4DS; Robert Paige, 16S; David Platneri, 10T; Alfred Parady Jr., 105Q; Laurence Patrick, LSD4; Robert Pedros, 101D; Jean Pettrno, 35D; Eric Pfeiffer, LSE6; Frank Piazza, 23D; Larry Schroll, 5D; Jeff Seiffertlein, 107Q; John Sibiiski, 84M; Stephen Smith, LSF2; Edward Stone, LSK1; Leonel Tapanes, 22M; John Trapp III, 108Q; Ira Whaley, 22P; Mark Williams, 3Y; Theodore Williams, 71MOC; Terrence Zuk, 1MA.