DEM Engine Control System
Rotary Engine Electronic Controller

Overview

The Digital Engine Management (DEM) system is a dual-channel, fully redundant unit. This powerful unit is capable of precise control of multi-rotor engines and is readily adaptable to reciprocating engines as well. Stylized aircraft installation is shown in Illustration II.

Two Electronic Control Units (ECU) interactively manage all engine parameters (injection, ignition, wastegate management on turbocharged engines, etc) in real-time for optimal engine management. A single ECU can assume full engine control, offering complete system redundancy. Pilot interface is accomplished through a crisp, sunlight-readable display unit.

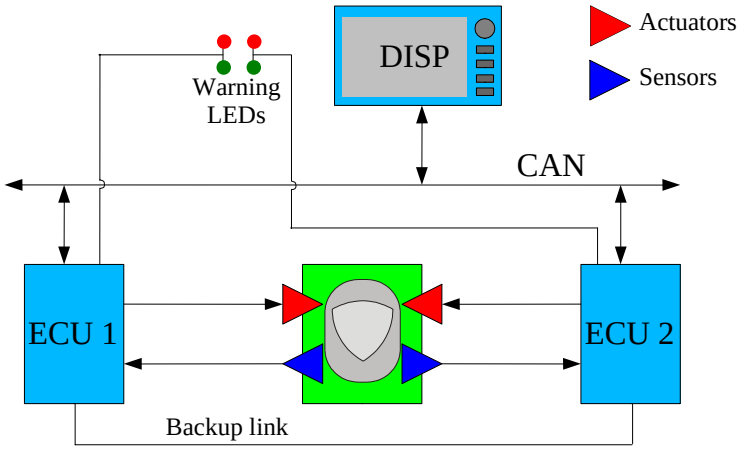


Illustration 1: *Bloc scheme of the system*

The ECUs are linked through a field bus (CAN - Controller Area Network) to exchange data and health status and to arbitrate fuel-injection management. A separate single-wire link serves as back-up in case of a CAN failure.

A separate power switch energizes respective ECUs. Each ECU indicates its functioning mode (normal, degraded or failure) by directly controlling 2 LEDs on the aircraft's instrument panel (one red and one green LED for each unit).

Display

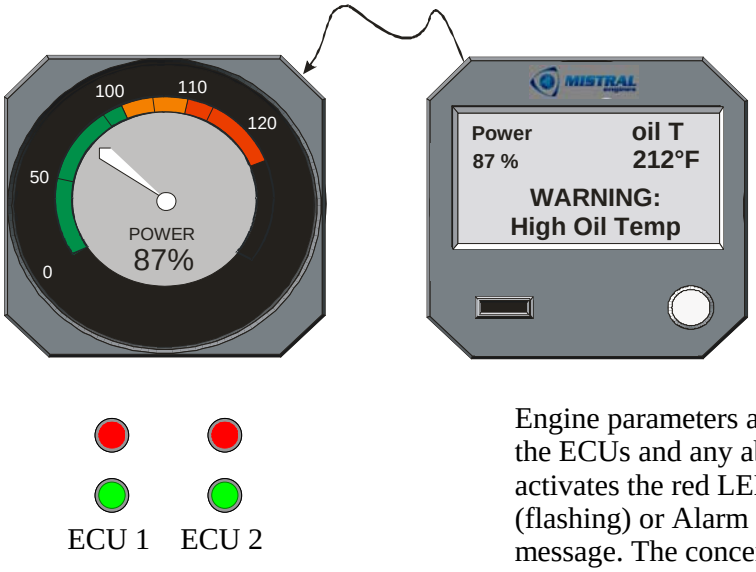
The display is the interface between the engine, the DEM system and the pilot. It communicates the engine state, engine parameters, as well as warning and alarm messages when they occur. All data are transferred from the ECUs via a 2-wire field bus (CAN). A global Master Alarm output feature is provided to drive EFIS or other installer options.

There are 3 display options:

Standard version : (experimental market only)

The Standard version consists of a 3 ATI panel-mounted LCD graphic display unit and of a standard 3 1/8" electro-mechanical gauge linked by an analog 0-5V connection. The display unit has five additionnal analog outputs which can be customized to drive any other analog engine gauges.

Illustration 2: Standard display



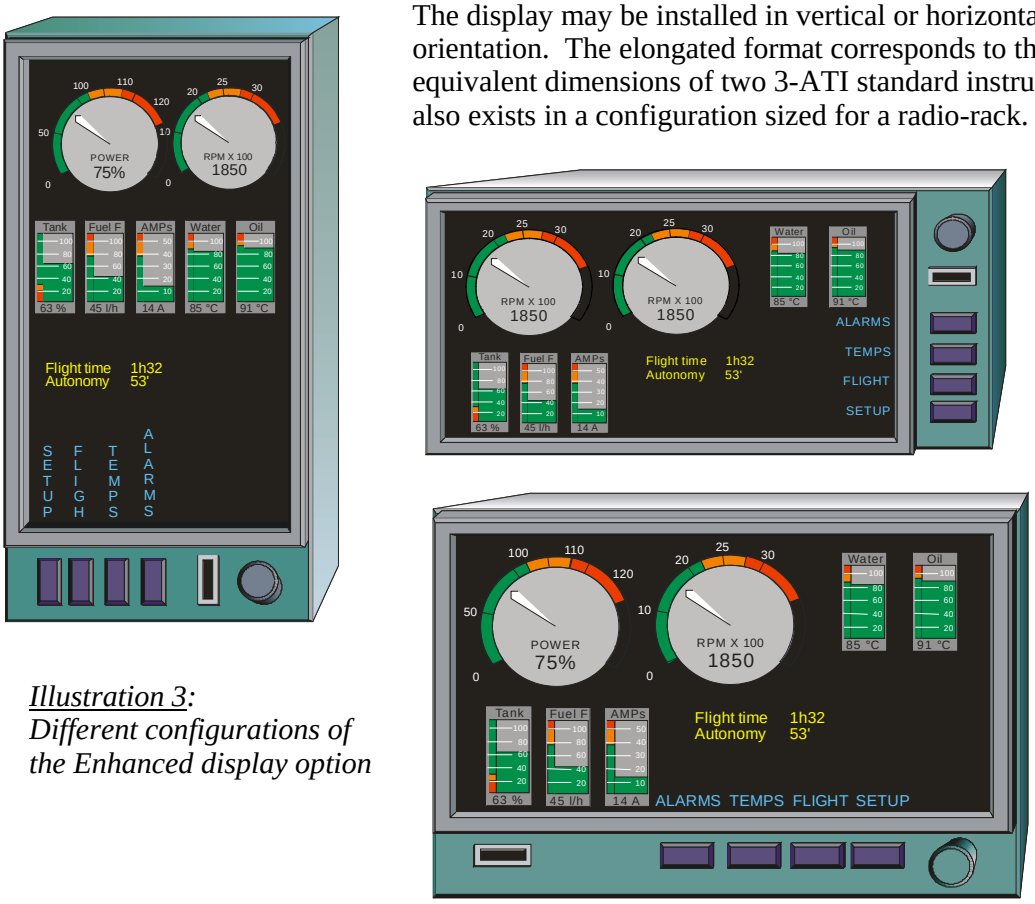
The graphic LCD display can also be customized (except in emergency modes) to display any engine parameter the pilot wishes to supervise. Menu functions are controlled by a Twist-N-Push knob. A USB port on the face of the main display allows uploading software updates or downloading data from the DEM system. The system is delivered with a USB-key.

Engine parameters are monitored in the background by the ECUs and any abnormal condition immediately activates the red LED and is displayed as a Warning (flashing) or Alarm (steady) and a plain English message. The concerned out-of-range parameter is also flashed in the upper right quadrant of the display, while engine % power remains displayed in the upper left quadrant. The pilot acknowledges the message by pressing the Twist-N-Push knob.

<u>Enhanced, color TFT screen version :</u>
(optional for experimental market, standard for certified one)

The 6.5” color transflective TFT screen offers enhanced pilot interface and high readability even in direct sunlight. Any DEM-system generated information can be displayed on the screen in bright, clear graphics, including fuel consumption, fuel used and remaining, etc. The default display and layout of information may be customized, and any parameter can be called by the pilot with the menu buttons.

The display may be installed in vertical or horizontal orientation. The elongated format corresponds to the equivalent dimensions of two 3-ATI standard instruments. It also exists in a configuration sized for a radio-rack.



<u>Illustration 3</u>:
Different configurations of the Enhanced display option

<u>EFIS version</u>:

This version is similar to the Standard version without the electro-mechanical gauge. A RS232 link drives the EFIS system, exchanging data available to, or generated by, the DEM system. The Standard version’s display serves as a DEM display back-up in case of an EFIS display failure.