

FAST ENGINE TREND MONITORING SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. This section gives a general description and the operation of the Flight-Data Acquisition, Storage, and Transmission (FAST) trend monitoring system. The FAST system lets the operator control and schedule the engine maintenance operations by analyzing the processed data supplied by the system. The FAST system automatically collects, conditions and processes engine performance data supplied from the Garmin G1000 system on a ARINC-429 bus. The system includes the FAST ETM Processor (UT001) and a Global System for Mobile Communications (GSM) Antenna (YC1006).

2. Tools and Equipment

- A. For a list of tools and equipment needed for FAST system maintenance refer to Engine Indicating - General, Tools and Equipment.

3. Description/Operation

- A. The FAST system ETM Processor subassemblies include a control processor, micro-server, and a Global System for Mobile communications (GSM) modem. The ETM Processor has 8 LED status lights on the front panel. The lights indicate the status of the different FAST system functions.
- B. The FAST system uses a GSM blade antenna installed on the upper fuselage for GSM air to ground communication to ground stations.
- C. Description
- (1) The FAST system, has three functions:
 - (a) Exceed preset limits event recording.
 - 1 The FAST system monitors important engine parameters and records instances when preset values are exceeded.

NOTE: If the FAST ETM records two data samples of Np above 2040 RPM, manual creep counting will be required for the entire flight. Refer to the EMM.
 - (b) Engine Trend Monitoring.
 - 1 The FAST system records and stores engine data for GSM transmission or laptop download and manual transmission for trend analysis.
 - (c) Cockpit Indication.
 - 1 The FAST system informs the pilot with a CAS message if preset engine parameters values are exceeded or if there is a FAST system fault. It can also show prior faults on engine start or shutdown.
 - (2) The FAST system data acquisition is a passive function that does not need pilot interface.
 - (3) The FAST system can record trend data manually with pilot interface.
- D. Operation.
- (1) When power is supplied to the FAST system it performs a Built-In Test (BIT). If a fault is detected the FAULT LED light comes on. The FAST initiates a reset and initializes itself.
 - (2) The FAST system collects and processes engine data from the Garmin G1000. If a SIM card is installed and cell service is activated, the data is transmitted over the local cell phone network when the airplane's engine and electrical system is shut down after each flight. The GSM modem is not powered during flight. After the airplane lands and electrical power is turned off, the FAST system latches to the battery bus power and begins its data transmission.
 - (3) Automatic Operation.
 - (a) The system automatically records engine performance data and events when performance data exceeds preset values.
 - (4) Manual operation.
 - (a) The pilot can record a 5 second data-set from all of the sensors by pushing the TRND/ACK softkey.
 - (b) The pilot can record a 4 minute data-set from all of the sensors by pushing the CAPTURE softkey. The data will include sensor information 2 minutes prior and 2 minutes after the CAPTURE softkey is pushed.
 - (5) Retrieving data.
 - (a) If GSM is activated, data is transmitted after each flight when the airplane is shut down. The data is transmitted through the GSM cellular connection to the Internet based data management service.

- (b) Data can also be retrieved by the use of a laptop and ground based software.
- (6) System configuration.
 - (a) Configuring the processor.
 - 1 When a connection is made to the ground server, the ETM FAST processor checks for new configuration files. If new files are found they are loaded to the FAST processor through the GSM connection.
 - 2 Configuration files can also be loaded by the use of a laptop and ground based software on the RS-485 port.
 - (b) Configuring the micro-server.
 - 1 Software files can be remotely loaded through the GSM connection.
 - 2 Software files can also be loaded by the use of a laptop and ground based software on the RS-485 port.

E. Support Publications

- (1) The publications that follow are needed for correct operation of the FAST ETM system. Refer to the Introduction - List of Publications for part numbers and contact information.

Publication Title	Manufacturer	Use
Monitor Transfer Module Help Manual and Reference Manual	Pratt & Whitney Canada Inc.	Provides instruction on how to use the Monitor Transfer Module Program
Abbreviated Component Maintenance Manual (ACMM)	Pratt & Whitney Canada Inc.	Provides information on how to maintain the ETM FAST Processor

4. Tools and Equipment

NOTE: **Equivalents are approved.**

NAME	MANUFACTURER	USE
Computer Laptop (with internet access)	Commercially available	To access the ETM FAST Processor and to access data and upload configurations.
Monitor Transfer Module (Monitor TM) Program	Pratt & Whitney Canada Inc. 100 Marie-Victorin Blvd. Longueuil, Quebec J4G 1A1 Canada	Ground Based Software used for configuring, system diagnostics, and real-time live sensor display
Universal Serial Bus (USB) Interface Adapter (USB Cable)	Pratt & Whitney Canada Inc.	To connect a laptop computer to the ETM FAST Processor.