

To: Cetecom, Inc.,  
Re: PTCRB Project Request 59306  
Date: 02/24/2017

Exhibit A1: External photos of FAST product

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## Product Designation:

Manufacturer: Pratt & Whitney Engine Services, Inc.  
249 Vanderbilt Avenue  
Norwood, MA 02062 USA  
Marketing Name: FAST™ (Flight-data, Acquisition, Storage & Transmission)  
Part # / Rev: FAST-A-010-3 / E  
FAST-A-010-4 / E  
FCC ID: 2AJ6A-FAST34E  
IC\_ID: 22451-FAST34E

## Product Overview:

The product being submitted for PTCRB testing and registration is identified by Pratt & Whitney Engine Services, Inc., as having two variations as follows:

FAST-A-010-3 – Collects and wirelessly transmits following end of flight, full engine performance data

FAST-A-010-4 – Collects and wirelessly transmits following end of flight, summary engine performance data only.

These two product models are identical in terms of the included electronics and packaging. The FAST-A-010-4 contains a wire strap, soldered in place on the main processor board in the product. The wireless radios, both Cellular and Wi-Fi and the circuit board they are mounted on are otherwise identical in all regards including software.

It is Pratt & Whitney Engine Services (PWES) goal for PTCRB to certify both part numbers under the same registration with PTCRB.

The FAST product uses the global cellular network and customer provided wireless LAN access points for data communication between the FAST and the P&WC ground station servers across the open internet. These terrestrial communication links are only used when the aircraft is on the ground with the engines

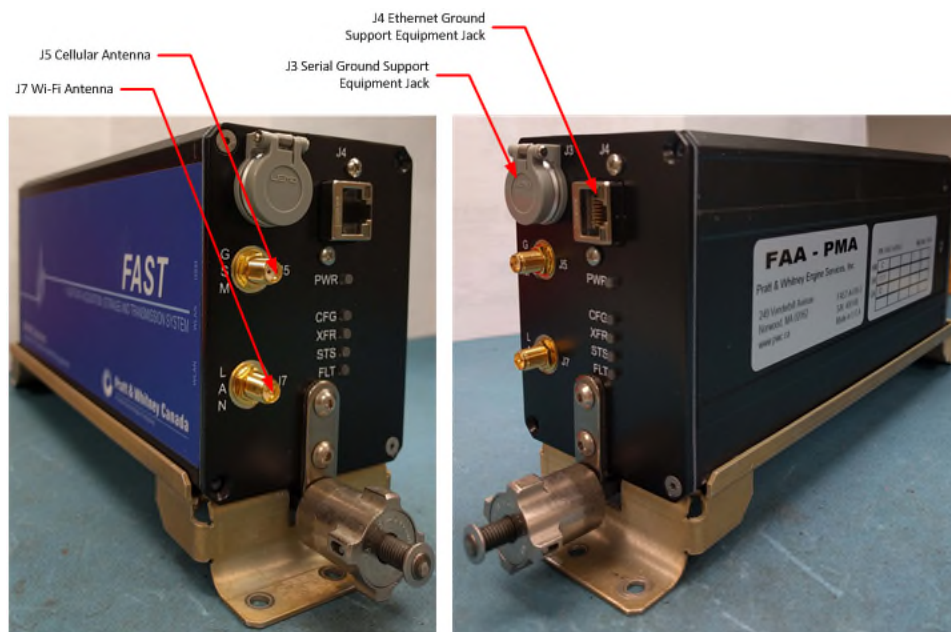
shut-down. FAST does not support any voice communications modes of operation and presently does not use SMS.

## External Photos:

Note: The photos are of current production product prior to PTCRB Registration. The label noted will be changed per the following section.

The FAST Product in its aircraft installed position is mounted on an avionics tray with a ratcheting hold-down clamp as seen in Figure 1. The product, without the tray measures 3.7”H x 2.7”W x 8”L and weighs approximately 2.2Lbs.

Figure 1: Isometric View of FAST product on mounting tray (as installed in aircraft)



The front of the product has one each of an SMA (J5) and RP-SMA (J7) connector for attaching remote antennas for the cellular modem and the Wi-Fi modems respectively as shown in Figure 1. The SIM card is accessed on the rear of the product as shown in Figure 4.

Figure 2: Left Side View



Figure 3: Front View



Figure 4: Rear View

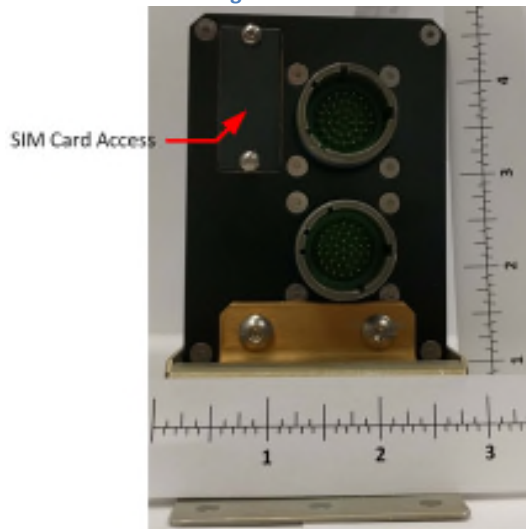


Figure 5: SIM Card Door & Tray



Figure 6: Right Side View

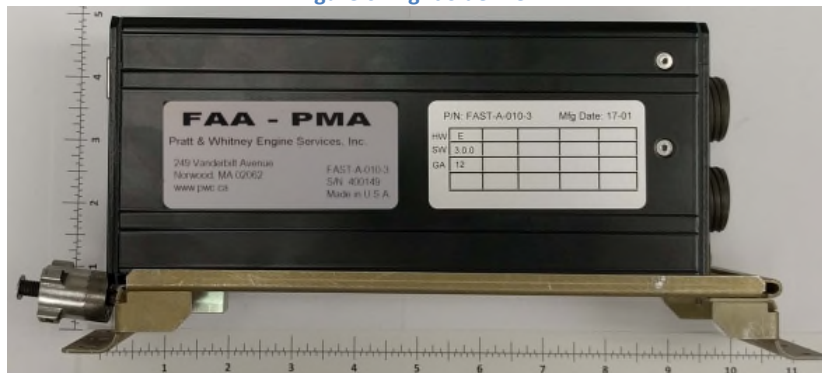


Figure 7: Bottom of Unit (off tray)

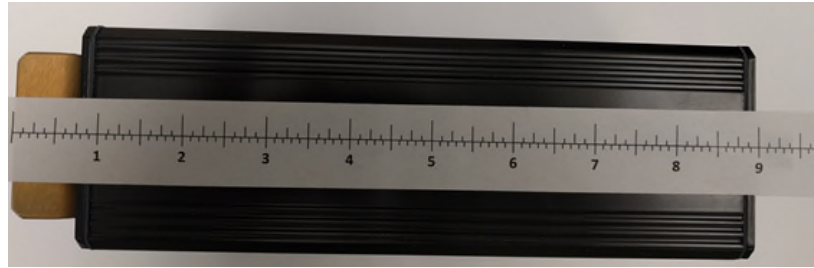
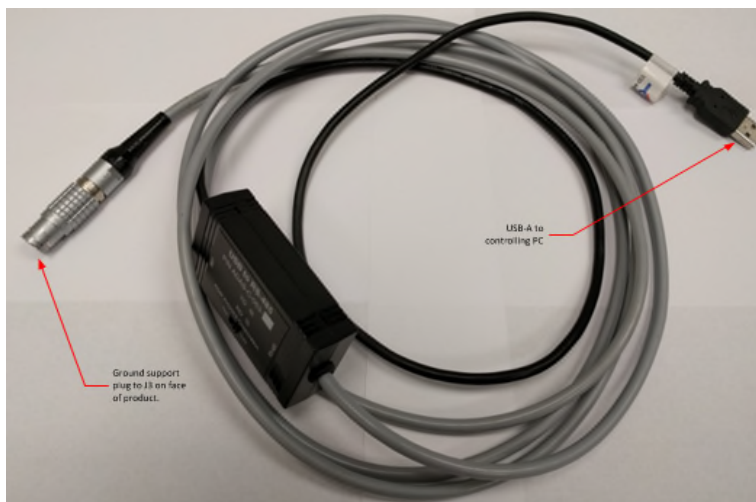


Figure 8: Top of Unit



The front of the product (Figure 3) has a J3 connector for a ground support cable (FAST-C-053-1; Figure 9) through which commands may be sent to the UUT to control the radios and to setup IP addresses for Ethernet connectivity through J4. This cable is supplied as a component in the installation kit for the product as a bundled accessory.

Figure 9: FAST-C-053-1 Ground Support Cable used for Lab Testing UUT



The right side of the product (Figure 10) shows the position of labeling that will include data to meet the certification requirements of FCC, IC and CE.

Figure 10: FAST-A-010-3, Right Side View Showing Positioning of Labels



Upon receipt of PTCRB approval, the label shown on the right in Figure 10 will be modified to add proper FCC, IC and CE markings as required.

## External Components for Testing and Registration

The following external components are typically used in conjunction with FAST installations in aircraft:

### 1. Cellular Antenna

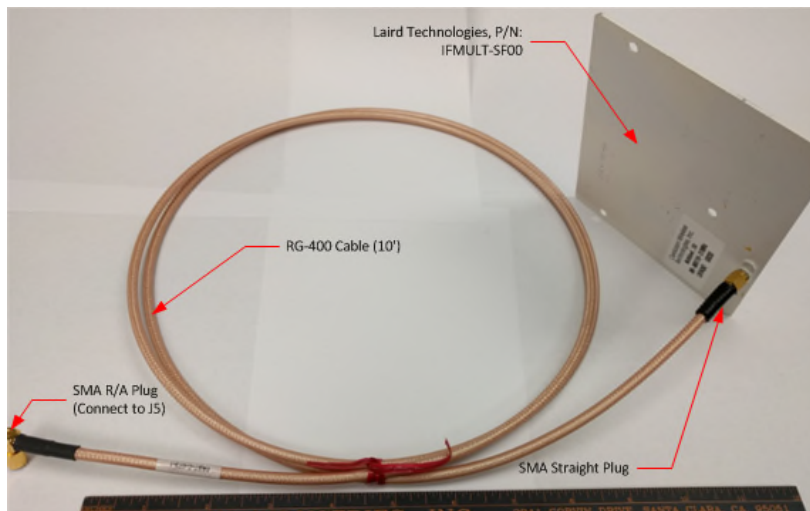
- Laird Technologies, P/N: IFMULT-SF00
- P&WES P/N: DTU-D-094-1



SPECIFICATIONS	
Element Type	Microstrip
Frequency Range	AMPS 806-896 MHz GSM 880-960 MHz DCS 1710-1880 MHz PCS 1850-1990 MHz UMTS 1920-2170 MHz
Peak Gain	3 dBi
Polarization	Linear
Impedance	50 ohms
Maximum Input Power	50 watts
VSWR	2:1
Dimensions (L x W x H)	11.2 x 13.8 x .25 cm
Housing	Acrylic
Operating/Storage Temperature	-40° to +70°C

- Antenna shall be connected to SMA connector on face of FAST by means of a 10 Ft. coaxial cable consisting of:
  - Right angle SMA Plug, Amphenol-RF P/N: 901-9874
  - Straight SMA Plug, Amphenol-RF P/N: 901-9511-1
  - Coaxial Cable, RG400; 10 Ft.

Figure 11: Cellular Antenna and RF Cable



### 2. Wireless LAN Antenna

- Laird Technologies, P/N: WRR-2400-RPSMA-B
- P&WES P/N: DTU-D-095-1





PARAMETER	SPECIFICATION
Frequency	2.4-2.5 GHz
Gain	1.3 dBi (2.45 GHz)
Polarization	Vertical, Omni-directional
Nominal Impedance	50 ohms
VSWR	2:1 max
Size (Length)	10.9 cm (180°) or 8.8 cm (90°)

- Antenna shall be connected to RP-SMA connector on face of FAST by means of a 10 Ft. coaxial cable consisting of:
  - Straight SMA Plug, Amphenol-RF P/N: 901-9511-1
  - Right Angle RP-SMA connector; Amphenol-RF P/N 132194RP
  - Coaxial Cable, RG400; 10 Ft.
  - A separate Cinch “plug to plug” adapter (142-0901-801) permits the RP-SMA antenna plug to connect to the straight SMA plug of the cable assembly above.

Figure 12: Wireless LAN Antenna and RF Cable

