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E-SJ-20-0018 Rev IR

STC Overview

Curtiss Wright Fortress Recorder System

Part 25 AML

FAA STC: ST01070DE

1. INTRODUCTION

The system installed by this Supplemental Type Certificate (STC) installs the Curtiss-Wright Fortress combination Cockpit Voice Recorder (CVR) and a Cockpit Image Recorder (CIR), referred to as the Crash-Survivable Recording System (CSRS), on eligible Approved Model List (AML) airplanes.

The instructions presented within this document assume that the new equipment is installed as an upgrade to the existing CVR. If the equipment is adding a recorder to the aircraft instead of replacing the existing CVR, then additional approvals are required for installation details beyond the scope of this document.

The Fortress CVR functionality was evaluated for compliance with the applicable Federal Aviation Administration (FAA) regulations.

In addition to this functionality, the Fortress recording system provides flight deck video and acceleration data from newly installed sensors. The video is used to provide Cockpit Image Recorder (CIR) functionality of the Fortress recorder. The CIR functionality is intended to allow operators to demonstrate compliance to international standards or requirements such as, but not limited to:

- International Civil Aviation Organization (ICAO), International Standards and Recommended Practices: Annex 6 to the Convention of International Civil Aviation, Part I – International Commercial Air Transport - Aeroplanes, Eleventh Edition Dated July 2018.
- Official Mexican STANDARD NOM-022-SCT3-2011, which establishes the use of flight recorders installed on aircraft operating in Mexican airspace, as well as their characteristics.

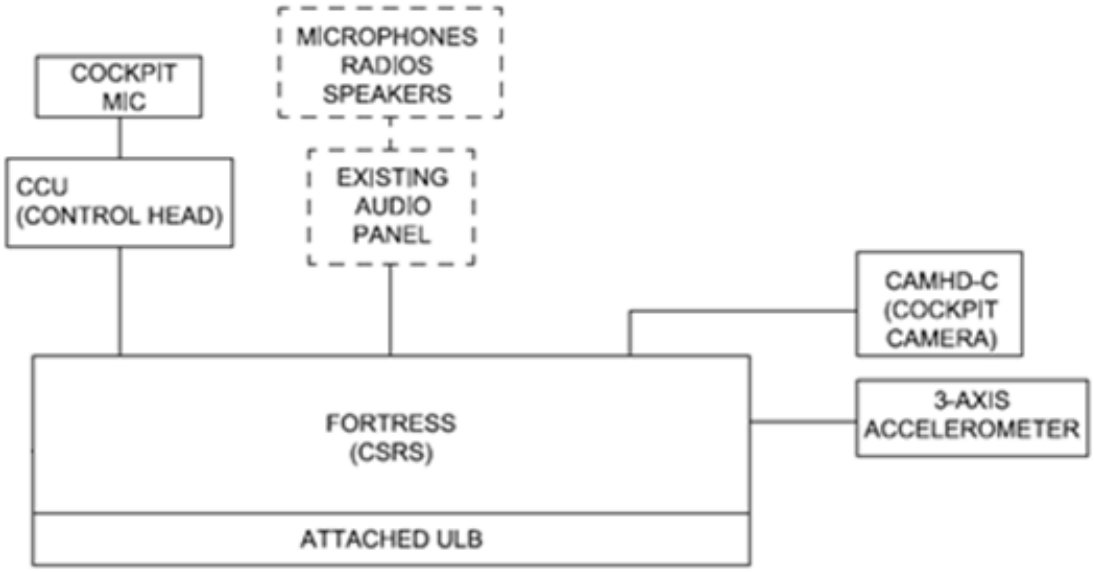

Figure 1: STC Installed Equipment Block Diagram

Figure 2 depicts how the cockpit camera provides cockpit image recording functionality.

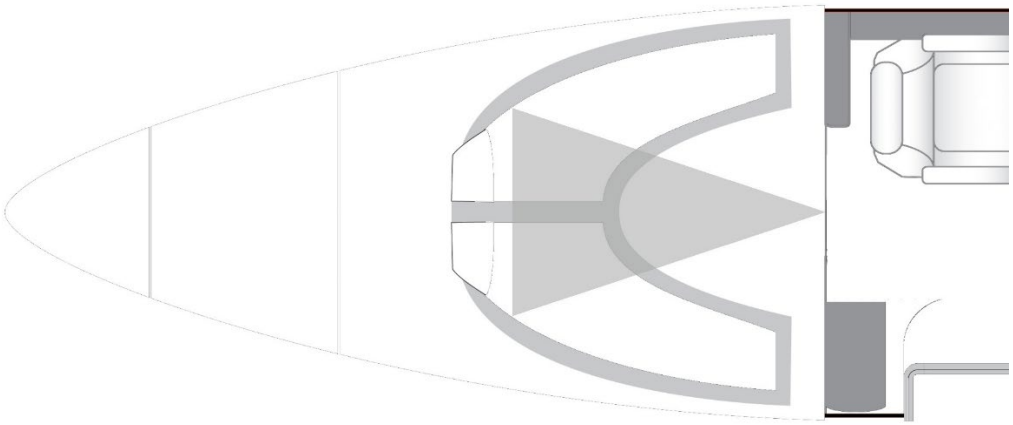

Figure 2: Cockpit Image Recording

Figure 3: Example Image from CSRS Camera

Table 1 identifies equipment installed by this STC.

Table 1: System Components

Manufacturer	Qty	Model	Part Number
Curtiss-Wright	1	Fortress Recorder w/Dukane DK290 ULB	D51701-003
	1	Cockpit Control Unit (CCU)	D51616-102
	1	Cockpit Area Microphone (CAM)	D51702-05
	1	High-Definition Camera	D51687-02
Ametek	1	Tri-Axis Accelerometer	3001-01-111-2
L3			17A542-03-00
Peregrine	1	Camera Mounting Bracket Assembly	PA-200626-323
	1	Fortress Recorder Mounting Bracket	PA-200626-301

1.1. Approved Models

Item	Aircraft Make	Aircraft Model
1.	Beechcraft Corporation	BAe.125 Series 800A. BAe.125 Series 800B BAe.125 Series 1000A, BAe.125 Series 1000B Hawker 750, Hawker 800, Hawker 1000 Hawker 800XP, Hawker 850XP, Hawker 900XP
2.	Learjet Inc.	31, 31A, 35, 36, 35A (C-21A), 26, 36A
3.	Learjet Inc.	45
4.	Textron Aviation Inc.	750

2. LIMITATIONS

The scope of these installation instructions is limited to the replacement of previously existing CVR equipment on the aircraft models allowed on the AML. If the equipment is adding a recorder to the aircraft instead of replacing the existing CVR, then additional approvals are required for installation details beyond the scope of this document.

Further, this STC is limited to replacing CVR installations that do not include a Redundant Independent Power Supply (RIPS). The highest amendment of § 25.1457 demonstrated under this project is 25-65. Therefore, no aircraft manufactured after 4/6/2010 are eligible for this installation.

This installation is limited to applications which do not require pressure-vessel penetration for wire routing and equipment installation.

For AML airplanes operating within the FAA National Airspace System (NAS), this STC provides CVR functionality to meet applicable FAA operational requirements. Operation of the equipment as an airborne image recorder does not satisfy FAA operational requirements for a flight data recorder under current rules. The airborne image recording functionality may be evaluated to satisfy international operational requirements for data recording.

3. EQUIPMENT DESCRIPTIONS

This STC specifically supports installation of the Curtiss-Wright Fortress Recorder and supporting equipment

3.1. Fortress Recorder

The Curtiss-Wright FORTRESS Recorder, Part Number (P/N D51701-003) is a combined cockpit voice, image, datalink and flight data recorder. It has been designed in accordance with European Organization for Civil Aviation Equipment (EUROCAE) document (ED)-112A, *Minimum Performance Specifications for Crash Protected Airborne Recorder Systems*, incorporating the characteristics defined in Aeronautical Radio Incorporated (ARINC) 757, *Cockpit Voice Recorder*.

The FORTRESS Recorder is certified under the following Technical Standard Orders (TSO)

- TSO-C123c, Cockpit Voice Recorder Systems
- TSO-C124c, Flight Data Recorder Systems
- TSO-C176a, Aircraft Cockpit Image Recorder Systems
- TSO-C177a, Data Link Recorder Equipment

Figure 4: Curtiss Wright Fortress Recorder

The Fortress can receive analogue audio from three aircrew audio control panels and one cockpit area microphone. The recorder is capable of storing twenty-five hours of audio data in its crash protected memory.

The unit receives digital image data from the High Definition (HD) camera via an Ethernet interface. The recorder is capable of storing two hours of video data in crash protected memory.

The device receives acceleration data from an external tri-axial accelerometer and is capable of storing twenty-five hours of acceleration data in its crash protected memory.

The recorded data is synchronized via an Aeronautical Radio Incorporated (ARINC) 429 Universal Time Coordinated (UTC) input.

Figure 5: Recorder and Accelerometer Mounting

Figure 6: Recorder Typical Installation

3.2. Underwater Locator Beacon

The Fortress Recorder is equipped with the Dukane Seacom DK290-11 Underwater Locator Beacon (ULB). This unit provides 90 days worth of recovery signal.

3.3. Accelerometer

The Fortress Recorder records acceleration data it receives from a newly installed tri-axial accelerometer. This accelerometer, either the Ametek P/N 3001-01-111-2 or L3 P/N 17A542-03-00. The Ametek part has been qualified to TSO-C51a and the L3 component carries TSO-C124b qualifications. Note that TSO C51a was superseded by TSO C124b.

3.4. Cockpit Control Unit

The Curtiss-Wright Cockpit Control Unit (CCU) (P/N D51616-102) is installed on the flight deck and provides the human/machine interface for the recorder system.

The CCU includes two pushbuttons (TEST and ERASE), a momentary toggle switch (FDR and RCDR), two system fail annunciators (CVR and FDR), and a Headphone Jack. The CCU is certified to TSO-C123c.

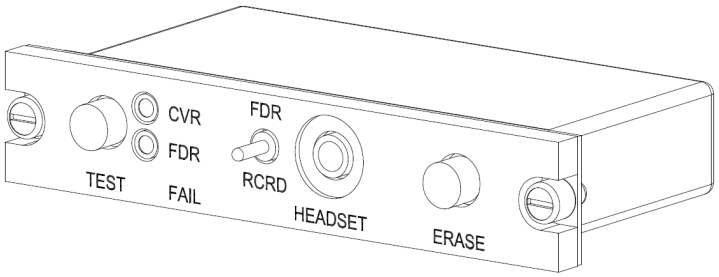

Figure 7: Fortress CCU

3.5. Cockpit Area Microphone (CAM)

A Curtiss-Wright Cockpit Area Microphone (P/N D51702-05) is installed on the glareshield, centered, above the forward instrument panel. The CAM is intended to capture voice communications from the pilot, co-pilot, and other crewmembers on the flight deck. The CAM is certified to TSO-C123c.

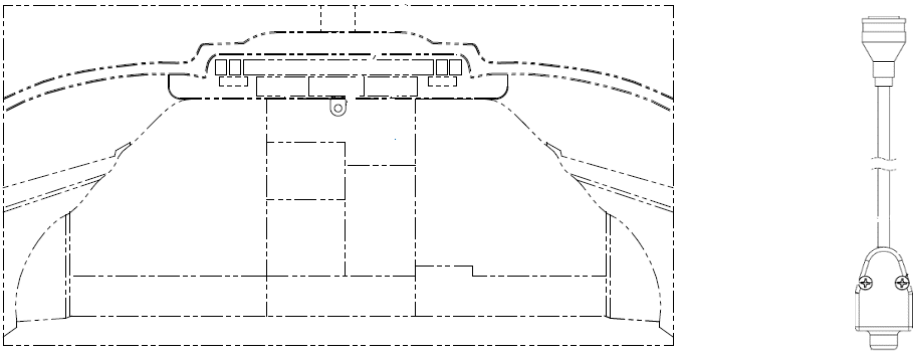

Figure 8: Fortress CAM

3.6. HD Camera

The Curtiss-Wright HD Camera (P/N D51687-02) is installed on the flight deck ceiling to capture digital video of the cockpit. This video is recorded in the Fortress recorder crash protected memory. This configuration is classified in ED-112A, Part III, as a Class C Recorder. Under certain regulatory bodies, Class C recorders are allowed as a means for recording flight data where it is not practical or prohibitively expensive to record on an FDR, or where an FDR is not required.

Figure 9: Curtiss Wright HD Camera

3.6.1. Camera Mounting Bracket

The installation requires a new bracket assembly (P/N PA-200626-323) for mounting the Fortress camera in the aircraft. The bracket, installed on the cockpit ceiling, allows the camera to be positioned to provide a general view of the cockpit area, instruments, and control panel displays.

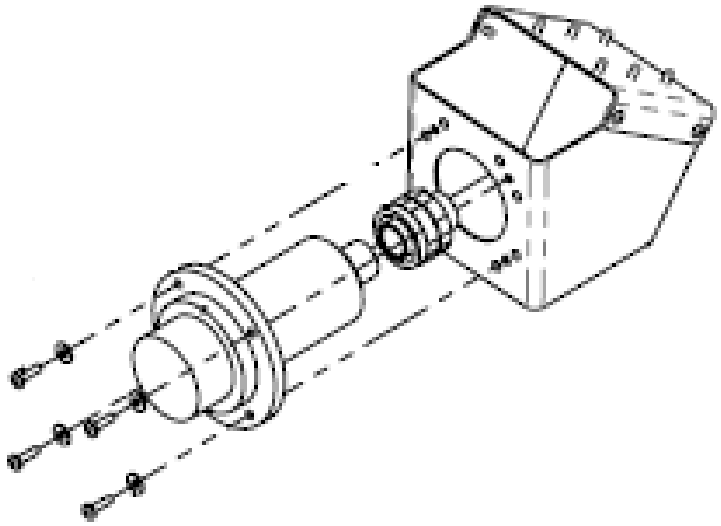

Figure 10: Camera Mounting Bracket

3.7. HD Camera Installation

For each model approved by this STC, the camera location is specified to allow the image recorder to capture the appropriate flight instrumentation, engine parameters, and flight control settings. The camera mounting bracket is attached to the centerline stringer cap at a position approximately 48” from the center of the instrument panel.

The specific positioning and attachment of the camera bracket to the stringer cap is identified in the model specific drawings identified in E-SJ-20-0002, *Master Drawing List*.

The calibration instructions provide by the STC validate that all appropriate parameters are visible and recorded by the installed camera.

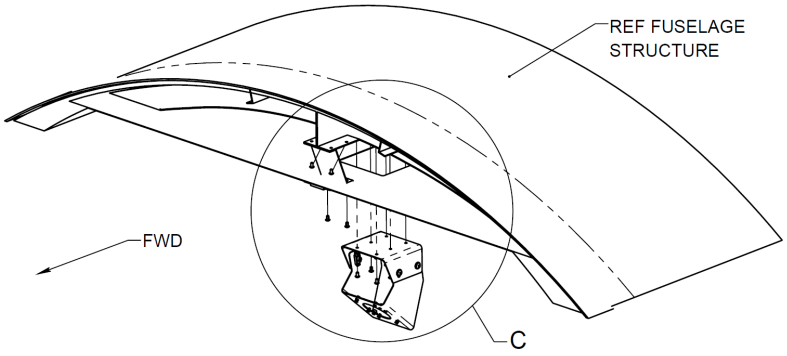

Figure 11: Camera Mounting

Figure 12: Typical Camera Installation

7. EQUIPMENT CONFIGURATION

Calibration of the camera is accomplished per the installation for operators seeking international operational approval to ensure proper parameters are captured. The design data presented by this STC positions the camera to capture the appropriate flight instrumentation, engine parameters, and flight control settings as shown in the example image in Figure 3.

The STC installation instructions include specific steps for the installer the calibrate and verify the viewing angle of the installed camera. The data parameter review also instructs the installer the verify that the camera records the following parameters in a legible manner:

System recorded parameters (on video)

1. Pressure Altitude
2. Indicated or Calibrated Airspeed
3. Heading
4. Pitch
5. Roll
6. Push To Talk Switch Activation*
7. Engine Parameters
8. Flap Position
9. Power Lever & Thrust Reverser Position
10. Airbrake Position
11. Outside Air Temperature
12. Autopilot Mode Annunciations

Other system recorded parameters (not on video)

13. Time (Greenwich Mean Time)
14. Acceleration, Lateral
15. Acceleration, Longitudinal
16. Acceleration, Normal

**Note: PTT switch activation is also captured by recorded audio.*

8. DATA DOWNLOAD

The system installation allows for a maintenance computer to be connected via an ethernet port for system configuration, troubleshooting, or data download. This interface allows for data download with removal from the aircraft. Downloaded data can be processed by a Curtiss Wright dealer or service center. Once processed, the audio and video files may be reviewed by any conventional audio/video player capable of playing *.wav audio files or *.avi video files.