

# Maintenance Worksheet

Acft Model: <u>BK117C2</u>	Acft Reg.#: <u>N146DU</u>	Acft S/N: <u>9474</u>	#1 Engine S/N: <u>47292</u>	#2 Engine S/N: <u>47346</u>
Log Page No.: <u>1425510</u>	Log Card No.: <u>LC -105917-16</u>			
DISCREPANCY/COMMENT		CORRECTIVE ACTION		
✓ # 11		Replaced mag seal IAW Turbomeca Arriel 1E2 MM 72-61-00-900-807-A01		
Insp & Section #:				
Task Code:				
Name: Nate Allen				
#1 Starter mag seal is leaking		Signature: [Redacted]	Date: 12-20-16	Time: <u>1500</u>
		Employee #: [Redacted]	P/N Off: /	Acft TT: 2300+15
		Cert. Type & #: [Redacted]	S/N Off: /	Eng. TT: 2300+15
		CYA Initials:	RII Signature: [Redacted]	Cert. Type & #: [Redacted]
✓ # 12		Main Rotor track and balnce completed IAW BK117-C2 AMM 18-10-00,5-1. Op Checked Good		
Insp & Section #:				
Task Code:				
Name: Nate Allen				
Main Rotor track and balance required for replacement of PCR rod end replacement		Signature: [Redacted]	Date: <u>12-23-16</u>	Time: <u>1200</u>
		Employee #: [Redacted]	P/N Off: /	Acft TT: <u>2300+15</u>
		Cert. Type & #: [Redacted]	S/N Off: /	Eng. TT: /
		CYA Initials:	RII Signature: [Redacted]	Cert. Type & #: [Redacted]
✓ # 13		Replaced overspeed drain valve IAW Turbomeca Arriel 1E2 MM 73-16-20-900-801-A01. op checked good.		
Insp & Section #:				
Task Code:				
Name: Nate Allen				
Overspeed drain valve is leaking around seal		Signature: [Redacted]	Date: <u>12-23-16</u>	Time: <u>1200</u>
		Employee #: [Redacted]	P/N Off: <u>0174120040</u>	Acft TT: <u>2300+15</u>
		Cert. Type & #: [Redacted]	S/N Off: <u>1428</u>	Eng. TT: <u>2300+15</u>
		CYA Initials:	RII Signature: [Redacted]	Cert. Type & #: [Redacted]
# 14		Complied with Adm Automatic Flight Following System? Flight Data System 12 month! Periodic Inspection IAW Doc 117NICA31301. op check good.		
Insp & Section #:				
Task Code:				
Name: Nate Allen				
Adm Automatic Flight Following System? Flight Data System 12 month! Periodic Inspection is due		Signature: [Redacted]	Date: <u>12-23-16</u>	Time: <u>1200</u>
		Employee #: [Redacted]	P/N Off: /	Acft TT: <u>2300+15</u>
		Cert. Type #: [Redacted]	S/N Off: /	Eng. TT: /
		CYA Initials:	RII Signature: [Redacted]	Cert. Type & #: [Redacted]

United States of America  
Department of Transportation -- Federal Aviation Administration  
**Supplemental Type Certificate**

*Number* SR09619RC

*This certificate issued to* Aviation Design Management  
808 Red Oak Court  
Crowley, TX 76036

*certifies that the change in the type design for the following product with the limitations and conditions therefor as specified herein meets the airworthiness requirements of Sect. 29 of the Federal Aviation Regulations.*

*Original Product - Type Certificate Number:* H13EU  
*Make:* Eurocopter Deutschland GmbH (ECD)  
*Model:* MBB-BK 117 C-2

*Description of Type Design Change:* Installation of a Flight Data System in accordance with North Flight Data Systems, LLC, Master Installation List, Document No. 117NL3130002, Revision C, dated May 17, 2012, or later Federal Aviation Administration (FAA) approved revision.

*Limitations and Conditions:* Only Flight Data System installations found in Top Level Installation-EC145, Document No. 117ND3130100, Revision B, dated April 16, 2012, are FAA approved installations and limited to 117ND3130100-01, -03, -05 & -07 Flight Data Systems installations. North Flight Data Systems, LLC, Rotorcraft Flight Manual Supplement,

(See continuation sheet 3 of 3)

*This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.*

*Date of application:* April 01, 2011

*Date reissued:*

*Date of issuance:* May 17, 2012

*Date amended:*



*By direction of the Administrator*

*(Signature)*  
Scott A. Horn, Acting Manager  
Rotorcraft Certification Office  
Southwest Region

*(Title)*

United States of America  
Department of Transportation -- Federal Aviation Administration

# Supplemental Type Certificate

(Continuation Sheet)

*Number* SR09619RC

Date of Issuance: May 17, 2012

*Limitations and Conditions* (Continued): Document No. 117NF3130001, Revision -, dated May 17, 2012, or later FAA approved revision is required. Aviation Design Management, Instruction for Continued Airworthiness, Document No. 117NICA31301, Revision -, dated April 24, 2012, or later revision is required. Compatibility of this design change with previously approved modifications must be determined by the installer. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.



**AVIATION DESIGN MANAGEMENT**

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**INSTRUCTIONS  
FOR  
CONTINUED AIRWORTHINESS**

**AUTOMATIC FLIGHT FOLLOWING SYSTEM  
&  
FLIGHT DATA SYSTEM**

**EUROCOPTER DEUTSCHLAND MODEL  
BK117C-2**

**Document No. 117NICA31301**

**Revision -**

**April 24, 2012**



Doc. No. 117NICA31301

Revision -

**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

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**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

**LOG OF REVISIONS**

Rev.	Date	Description
-	2012 0424	Original Release

**PROPRIETARY NOTICE**

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Doc. No. 117NICA31301

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**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

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**LIST OF REVISIONS**

**LIST OF EFFECTIVE PAGES**

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**APPENDIX A**

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## **AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

### **1.0 INTRODUCTION**

This Instruction of Continued Airworthiness has been created by North Flight Data Systems, LLC to provide for continued operation, maintenance and repair of the Automatic Flight Following System and/or Flight Data System as installed on the Eurocopter Deutschland Models BK117C-2 aircraft.

Wiring and components included in this manual pertain only to the wiring and components that have been designed by North Flight Data Systems.

This manual is intended to provide instructions not included in the Eurocopter Deutschland maintenance manual. The maintenance manuals supplied by North Flight Data Systems, LLC and various other vendors are intended to supplement these instructions for continued airworthiness. When necessary, the user will be referred to the Eurocopter Deutschland, North Flight Data Systems, LLC or associated vendor maintenance manuals for further details or clarification.

**NOTE:** It is recommended that all supplemental maintenance manuals, as well as all vendor maintenance/operators manuals remain accessible during maintenance periods.

The ability of maintenance personnel is recognized, and those procedures that are considered common to all aircraft have been either briefly referenced or omitted; however, prior to performing any procedure, ensure that all instructions have been thoroughly read and completely understood.

This document and the installation data maintained by this document are controlled by Aviation Design Management (ADM) STC SR0\_\_\_\_\_RC until further notice is given or transfer of STC ownership. Contact ADM for questions or comments regarding this document at the following:

**Aviation Design Management  
808 Red Oak Court  
Crowley, Texas 76036  
Office 817-877-0005**

### **1.1 DISTRIBUTION**

These instructions are provided for use with Eurocopter Deutschland Model BK117C-2 aircraft equipped Automatic Flight Following System and/or Flight Data System. Any and all airworthiness or flight safety revisions will be immediately sent to the aircraft operators and owners.



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## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### 2.0 DESCRIPTION

#### List of Installed Equipment

<b>Automatic Flight Following System:</b>	
N004-5000 CP3i Transceiver	N000-0039 Transmit Line Filter
N000-1552 GPS/SATCOM Receive Antenna	N000-1553 Transmit Antenna
<b>Flight Data System:</b>	
N007-0007-11-NVG Video & Voice Recorder	N009-1010 Multi-Function Data Acquisition Unit
N007-0007 OVVR Voice & Video Recorder	N009-1030 Quick Access Recorder
N007-0007-11 Video & Voice Recorder	N011-0019 Auto Iris
N007-0007-NVG OVVR Voice & Video Recorder	FD600CAM-2 Camera
N008-0061 Area Microphone	

The Automatic Flight Following System, as installed, incorporates (one) N004-5000 CP-3i Transceiver installed in the aft overhead section of the aircraft just forward of the clamshell doors (ref DWG 117ND3130990), (one) N000-1552 GPS/Satcom receive antenna installed on top of the vertical fin of the aircraft, (one) N000-1553 transmit antenna installed on left side of the tailboom, and (one) N000-0039 transmit Line Filter installed aft overhead section of the aircraft just forward of the clamshell doors.

The CP-3i Transceiver and ancillary components as mounted require no forced air cooling when operated within normal aircraft operating temperature ranges.

The CP-3i can transmit various aircraft sensor data, crew text message inputs and aircraft position information as well as receives message via a SATCOM satellite.

The CP-3i Transceiver when installed with the N007-0007 series Video & Voice panel and the CP-3i Transceiver receives aircraft electrical power by circuit breaker interface with the aircraft Essential 28V DC directly from a 5 Amp circuit breaker identified as "SATCOM" located in the overhead circuit breaker panel. No switch action is required to provide power the CP-3i Transceiver.

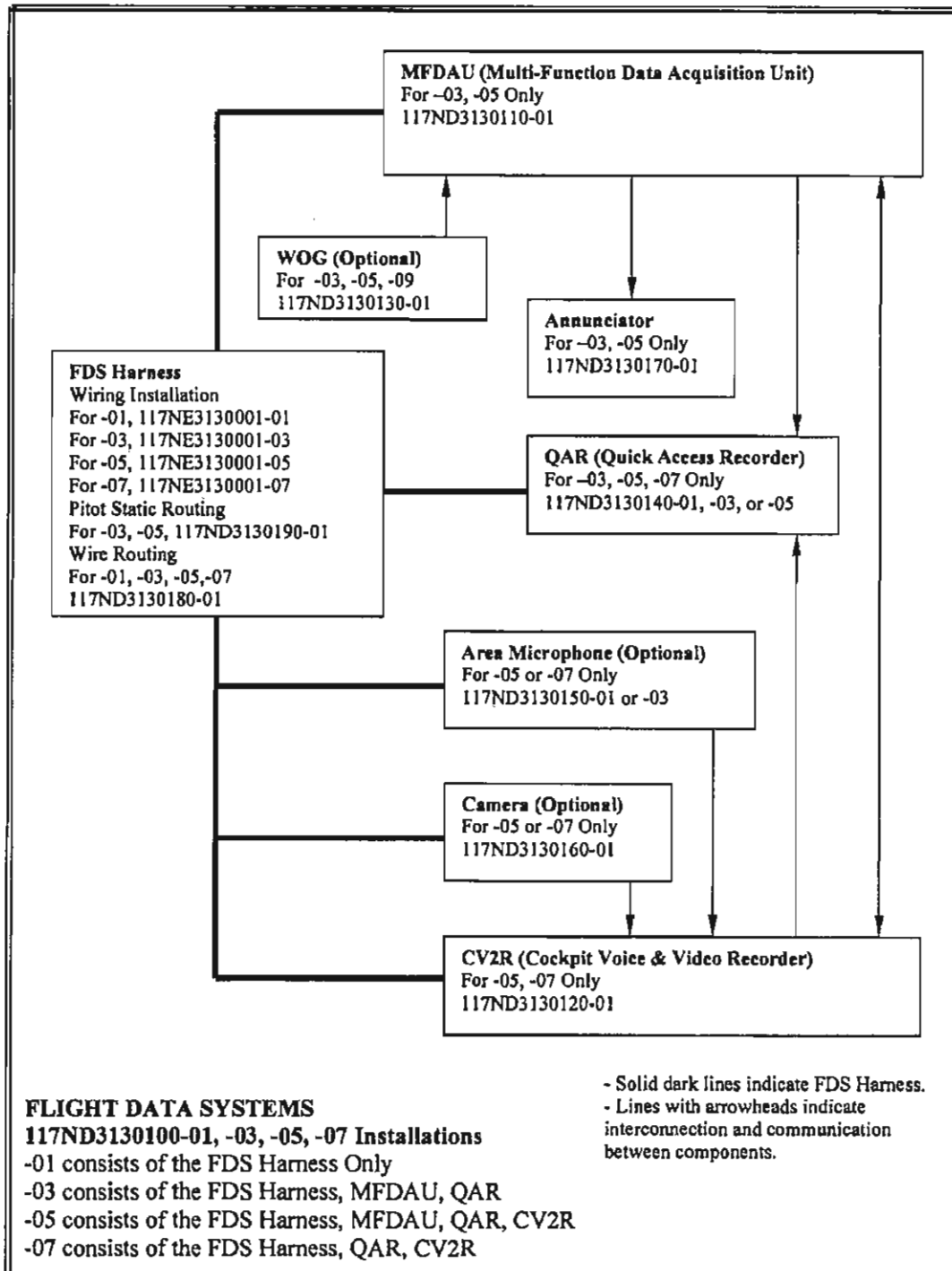
The Flight Data System (FDS) records flight operations, video, and/or voice data for review by the aircraft operator. The system begins with the FDS harness which is the required installation basis of the system. From there, the operator may pick and choose components, such as camera, or area microphone, to be added into the flight data system for specific recording and review purposes. Data is gathered at the Video & Voice Recorder or MFDAU and stored on the Video & Voice Recorder and/or the QAR for data retrieval purposes. The MFDAU does not store data.

The block diagrams beginning on the next page represent specific aircraft installation configurations as outlined in drawing 117ND3130100.



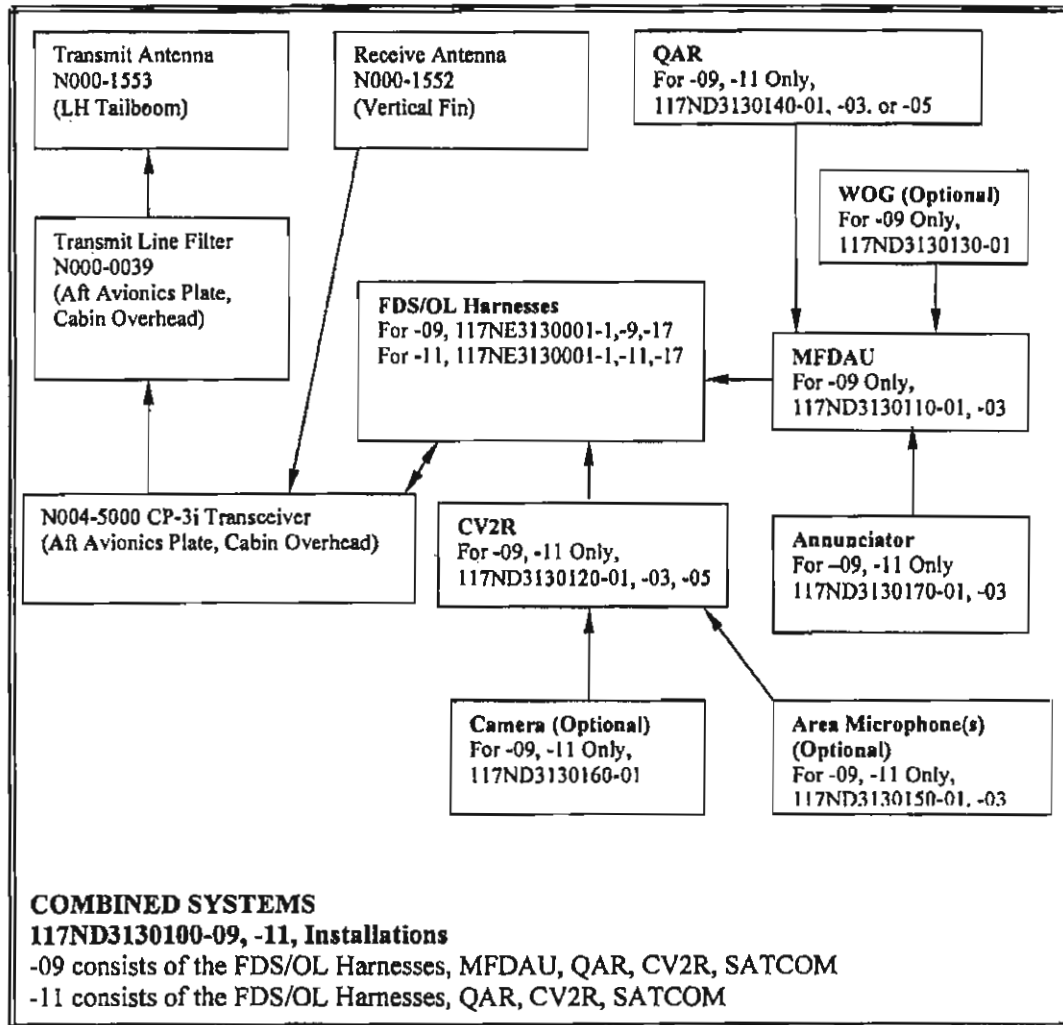
### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

Reference the block diagrams below for installation recognition:





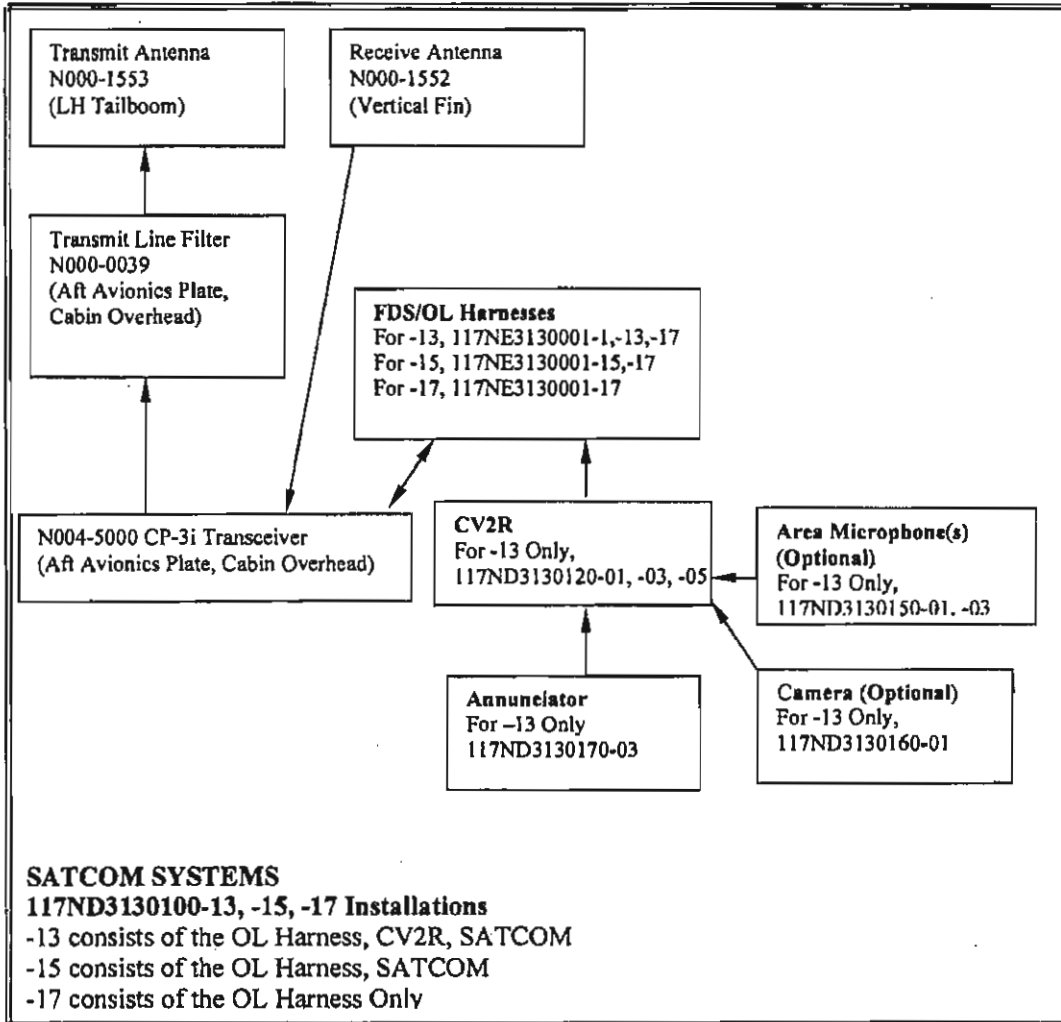
### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM







### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM





## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### 3.0 MAINTENANCE

Regular periodic maintenance is not required for any component as installed. Operation is "on condition" and service is required only when a malfunction is detected.

The contents of this section relates to the electrical wiring and component installations, which make up the Automatic Flight Following System and Flight Data System contains the appropriate recommended maintenance checks that must be performed on those components.

**WARNING: ENSURE THE CIRCUIT BREAKERS IN THE OVERHEAD CIRCUIT BREAKER PANEL HAS BEEN PULLED AND COLLARED IN THE OPEN POSITION PRIOR TO PERFORMING ANY MAINTENANCE ON THE AUTOMATIC FLIGHT FOLLOWING SYSTEM AND/OR FLIGHT DATA SYSTEM.**

The purpose of this section is to familiarize the operator with the precautions that should be taken to inspect and protect the aircraft prior to performing maintenance. An inventory list should be prepared for any components being removed from the aircraft.

The following is a listing of general maintenance practices/checks:

When disconnecting connectors, do not use excessive force and do not pull attached wires. When reconnecting connectors, ensure the connector body is fully seated and that there is no tension on the harness wiring.

Ensure that all wiring is maintained in a mechanically and electrically sound manner and adequately supported throughout the entire harness routing.

Harnesses should be installed and routed to protect from chaffing or abrasion; being used as handholds; damage from moving aircraft components; damage from solvents and fluids.

When performing aircraft maintenance or repair around wiring harnesses, care should be taken to protect wire bundles and connectors to ensure all metal shavings and debris are cleaned up after work is completed.

All repairs should conform to manufactures recommended maintenance practices to be considered permanent and would not require rework.

### 3.1 INSPECTIONS

#### 3.1.1 PERIODIC INSPECTIONS

It is not required to remove the CP-3i Electronics Unit, Multi-Function Data Acquisition Unit (MFDU), Cockpit Voice & Video Recorder (CV2R), Quick Access Recorder (QAR), or other minor integrated components for inspection.

Visually inspect the CP-3i Electronics Unit, Transmit / Receive Antenna and Flight Data System (FDS) component fasteners and electrical connectors for general condition, scratches, nicks, etc. Ensure that the FDS components are securely fastened to the aircraft and connectors are adequately seated. Do not over tighten. If any damage is noted during inspection refer to the section 3.2 for repair instructions.

Inspect placards for readability and replace any missing or eligible placards.

Inspect annunciator lights for general condition and function.



## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### 3.1.2 ANNUAL INSPECTIONS

Remove panels to perform inspections as required.

Check required placards readability and replace any missing or eligible placards that are part of the normal installation.

Clean all wiring and pitot/static lines before inspecting. Assure wiring and pitot/static lines are free of contaminants such as fluids, dust, lint, and other foreign particles that may compromise the integrity of the wiring or pitot/static lines.

Check pitot lines for any accumulated moisture and clear the moisture via provided drain fittings.

Inspect lighted Annunciators for broken or damaged wiring, proper functionality and security.

Inspect Circuit Breakers for broken or damaged wiring, proper functionality and security.

Inspect Terminal Junction Blocks for broken or damaged wiring, proper functionality and security.

Inspect the CP-3i Transceiver and component wiring for insulation damage (nicks, discoloration) and electrical connectors for nicks, scratches, and shell damage.

Inspect the Flight Data System (FDS) component wiring for insulation damage (nicks, discoloration) and electrical connectors for nicks, scratches, and shell damage.

Inspect electrical bonding of the FDS to the airframe for a bonding meter reading of less than or equal to 2.5 milliohms of resistance.

Reference electrical installation drawings in Appendix A.

### 3.1.3 SPECIAL INSPECTIONS

#### **Rotor Strike, Hard Landing, & Lightning Strike**

*Structural* - If a rotor strike, hard landing, or lightning strike of the airframe or other systems occurs perform a visual damage assessment before performing an electrical inspection. Pay very close attention to damaged equipment and the equipment fasteners. Check fasteners, mounting holes, and part surfaces for abrasions, cracks, and defects. If any structural parts are found to be damaged or defective, before removing the parts for replacement or overhaul, proceed to the electrical inspection below.

*Electrical* - If a rotor strike, hard landing, or lightning strike of the airframe or other systems occurs, make sure that the SATCOM, OVVR/CV2R and MFDAU circuit breakers are pulled from power before performing any inspections.

Power the system by pushing the SATCOM, OVVR/CV2R and MFDAU circuit breakers into powering position. A FDS will power on automatically when the power bus for the installation system circuit breaker is operational. Allow the FDS to operate long enough to record some of the known parameters that can be recorded while on the ground, including voice and video, if available. Remove power and collect recorded data from the FDS per operational instructions OVVR-DR-01 Data Retrieval Manual. The data must be verified for proper recording prior to the aircraft being returned to service ). Communicate via aircraft radio or by other means, that the SATCOM is communicating position data to the operations communication center. If the center is receiving correct position data then check the system further by communicating a series of messages and maydays via the CDU. These messages and maydays require response from the communications center.

If the center is receiving messages from the aircraft and the aircraft is not receiving acknowledgement from the center, then the receive antenna or CP-3i may have an operational defect. If the center is receiving position data but not receiving messages, then the EFB, CDU, OVVR/CV2R is not fully operational or connected into the system properly.



## **AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

MFDAU data acquisition memory cards are required to be verified for recording operation. If the data on the memory cards is missing or corrupted the OVVR/CV2R, MFDAU, or QAR may be displaying inoperative functions.

If it is found that a piece of equipment has been isolated for inoperative functions, remove that equipment or component per Section 5.0 and overhauled per Section 6.0.

### **3.2 REPAIR**

Repair of wiring in accordance with system wiring installation drawings in Appendix A.

Repair of corrosion on aluminum component mounting shelf, support brackets, and support braces as follows:

Lightly polish the affected area using Scotch-Brite pads to remove corrosion, taking care to remove as little as the original protective coating as possible.

Clean polished area with alcohol, Alodine bare aluminum areas using MIL-C-5541 or equivalent, and paint area to match existing finish.

#### **3.2.1 CV2R/OVVR & MFDAU Internal Battery**

The internal batteries for the CV2R/OVVR & MFDAU should be replaced on an annual basis. There is no requirement for battery testing. To remove and replace the batteries for these equipment, please refer the instructions beginning on the next page.



## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### 3.2.1.1 CV2R/OVVR Battery Replacement

These instructions are to be used for initially installing a replacement CV2R/OVVR or annual replacement of the internal battery.

The CV2R/OVVR is shipped with the battery unplugged to keep it from being discharged too low. This is caused by the CV2R/OVVR sitting on a shelf for an extended period of time. With the battery connected while sitting on the shelf, the CV2R/OVVR has a minimal current draw, roughly 0.5mA. By shipping the OVVR with the battery unplugged, it can sit on the shelf for a prolonged period of time without discharging or damaging the battery.

#### Tools Required

- #1 Philips Screw Driver
- 3/16" Nut Driver
- 9/16" Wrench

#### Removing the Cover

- 1) Remove six jack screws from around the d-sub connectors using the 3/16" nut driver.



- 2) Remove the nut and washer on the BNC video connector using the 9/16" wrench.



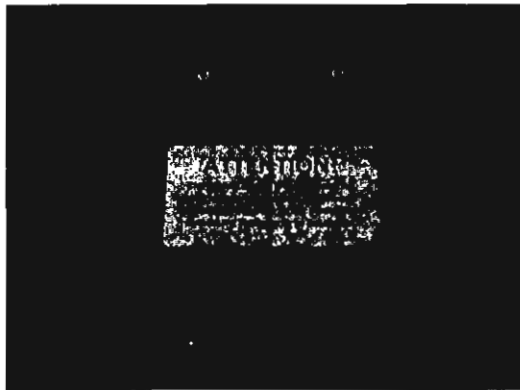


### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 3) Remove the eight 4-40 flathead screws, six on top and two on the bottom of the unit, using the #1 Phillips screw driver.

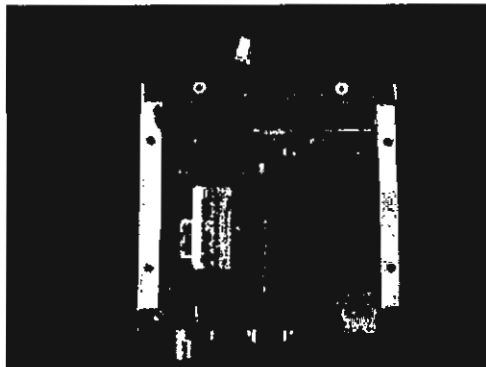


- 4) Carefully slide the cover away from the front panel to clear the connectors on the back panel and remove the cover.



#### Connecting the Battery

- 1) Locate the battery inside the unit.





## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 2) Locate the connector that is attached to the leads of the battery.



- 3) Locate the connector that is attached to the leads going to the PCB.



- 4) Plug the connectors together so the locking tab lines up with the pin it locks on to.

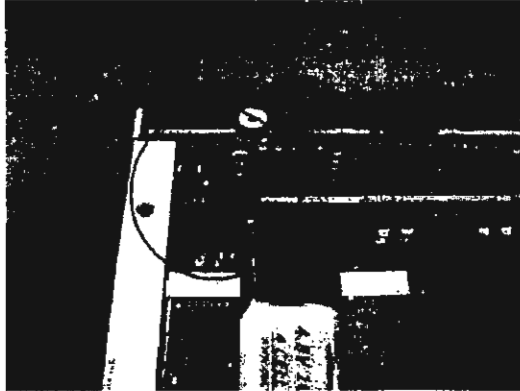


- 5) Verify the connectors are plugged all the way together by pulling them apart gently. The locking tab should keep you from being able to pull them apart.



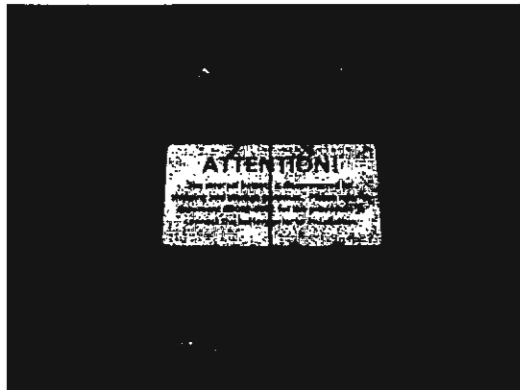
## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 6) Carefully tuck the connectors in the open area next to the front panel switches.

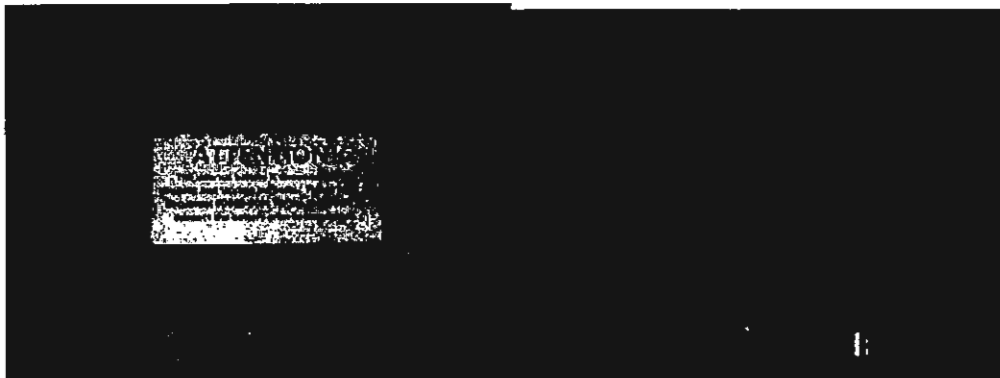


### Re-Installing the Cover

- 1) Carefully slide the cover onto the unit clearing the connectors on the back panel.



- 2) Re-Install the eight 4-40 flathead screws, six on top and two on the bottom of the unit, using the #1 Phillips screw driver.







### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

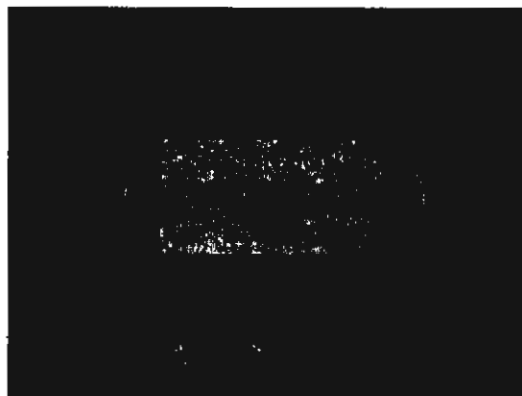
- 3) Install six jack screws around the d-sub connectors using the 3/16" nut driver.



- 4) Install the nut and washer on the BNC video connector using the 9/16" wrench.



- 5) Remove the "ATTENTION" sticker from the top of the cover.





## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### 3.2.1.2 MFDAU Battery Replacement

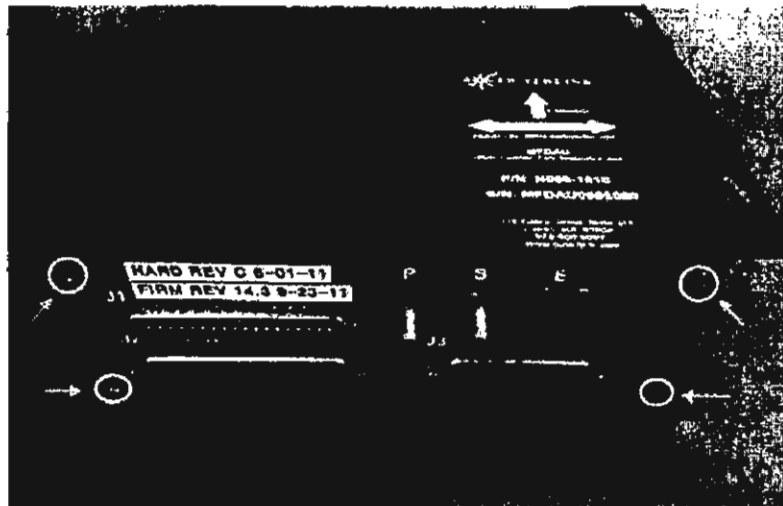
Follow these instructions for replacing the 12.0V NiMH battery that is used in the MFDAU to keep the unit running in the event of a loss of power.

#### Tools Required

- #2 Phillips Screw Driver
- 8mm Socket & Ratchet

#### Removing the Battery

- 1) Remove the four #2 Phillips head screws from the rear connector end of the unit.



- 2) Remove the four #2 Phillips head screws from the front face of the unit.





### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 3) Grip side flange and pull upward to remove.



- 4) Remove front face panel.



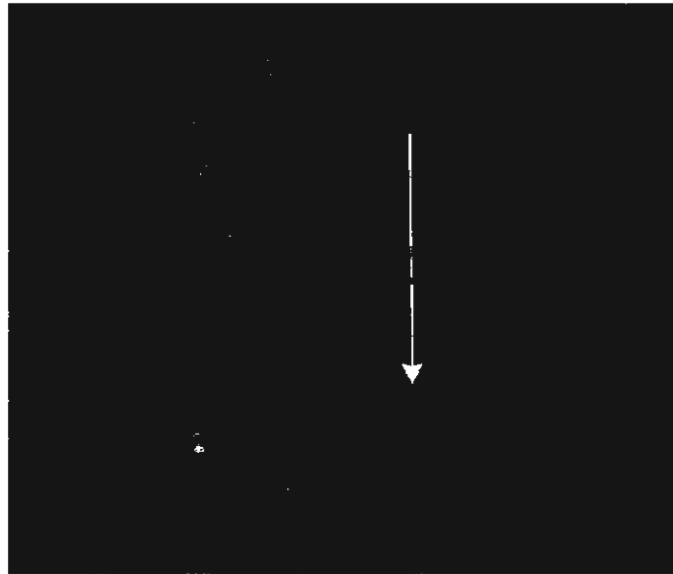
- 5) Unplug Battery Connector.



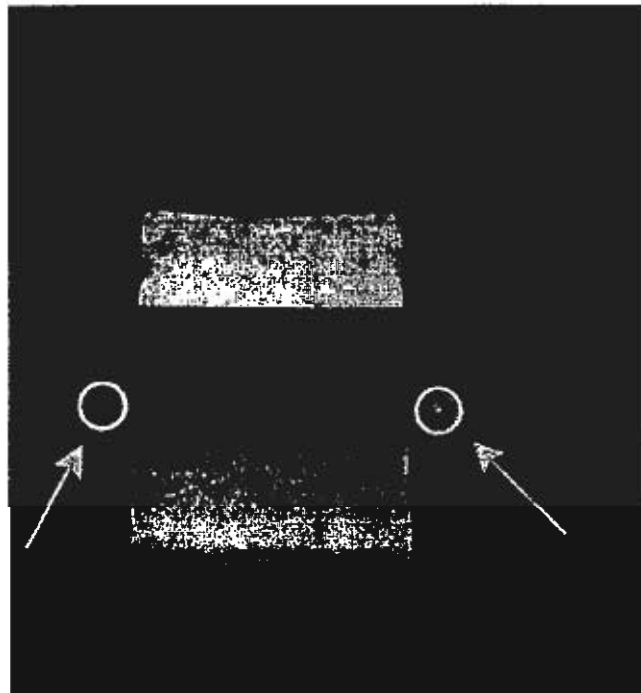


### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 6) Carefully slide back and remove top cover.



- 7) Remove the two 8mm locknuts and securing the battery bracket and lift upwards to remove.





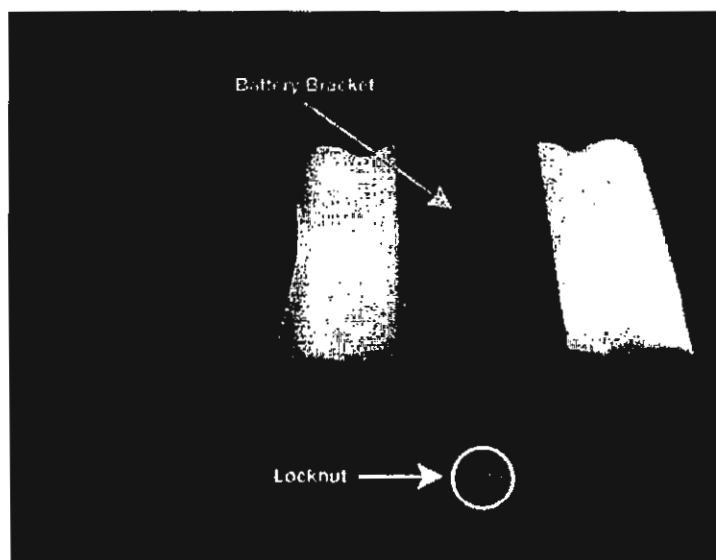
## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### Installing New Battery

- 1) Place new battery on battery pad as shown.



- 2) Secure using Battery Bracket and 8mm locknuts.





### AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 3) Re-install top cover plate and slide forward.



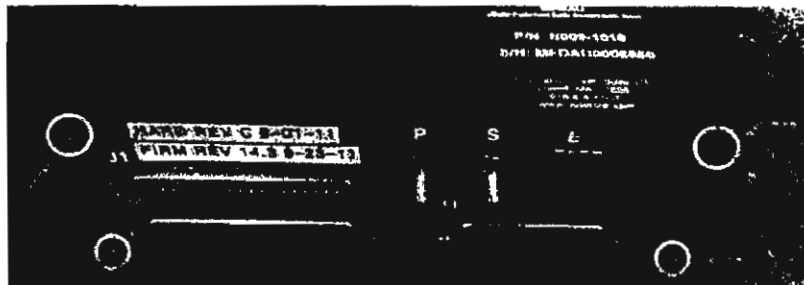
- 4) Re-install front face plate and side mounting flanges.





## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

- 5) Re-install the eight #2 Philips Head screws on the front and back of unit.



### 3.2.2 Charge Replacement Battery

Apply aircraft or aircraft bench +28 VDC power to CV2R/OVVR or MFDAU for a minimum of 4 hours to completely charge a new battery replacement.



**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

**3.3 WEIGHT & BALANCE INFORMATION**

Add appropriate Weight & Balance information below to aircraft record upon installation completion.

Installation No.	System/Component	Weight		Longitudinal		Lateral	
		(lb)	(kg)	Arm (mm)	Moment (kg-mm)	Arm (mm)	Moment (kg-mm)
117ND3130110-01	MFDAU	3.0	1.36	6471	8824	4406	6009
117ND3130110-03	MFDAU	3.0	1.36	6456	8804	5568	7592
117ND3130120-01	CV2R (Avionics Shelf)	2.3	1.05	6296	6582	3677	3845
117ND3130120-03	CV2R (Avionics Shelf)	2.3	1.05	6296	6582	5161	5396
117ND3130120-05	CV2R (Fwd Console)	2.0	0.91	**	**	**	**
117ND3130130-01	WOG Switch	0.6	0.27	3188	869	2323	633
117ND3130140-01	QAR (Console Fwd)	1.1	0.50	**	**	0	0
117ND3130140-03	QAR (Console Aft)	1.1	0.50	2495	1248	0	0
117ND3130140-05	QAR (Console Aft)	1.1	0.50	2495	1248	0	0
117ND3130150-01	Area Mic (Console Fwd)	0.4	0.18	**	**	0	0
117ND3130150-03	Area Mic (Console Aft)	0.2	0.09	**	**	0	0
117ND3130160-01	Camera	0.6	0.27	2740	747	1355	370
117ND3130990-01	CP-31	5.0	2.27	6289	14293	4355	9897
117ND3130990-03	Line Filter	0.8	0.36	6783	2467	5484	1994
117ND3130990-05	Transmit Antenna	0.4	0.18	8906	1619	-45	-8
117ND3130990-07	Receive Antenna	0.4	0.18	10402	1891	0	0

\* Negative values for lateral arm indicate LBL.

\*\* Once installed, record actual STA and BL location and calculate applicable moment in the space provided.



**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM****4.0 TROUBLESHOOTING**

Do not remove or replace the CP-3i Transceiver or Flight Data Systems equipment until all associated sensors or subsystems and their interfaces have been verified per established maintenance procedures and the fault is isolated to the CP-3i or Flight Data System.

Use the troubleshooting methods provided in the CP-3i Aircraft Data Terminal Installation / Maintenance Manual, (Appendix B) or Flight Data System Installation Manual appendices to identify system faults.

Fault isolation in the installation or associated sensors or subsystem should be performed using the rotorcraft installation and wiring diagrams found in Appendix A and in accordance with established maintenance procedures.

Use the troubleshooting methods provided in the original equipment manufacturer, North Flight Data Systems, LLC document number D009-0002, Flight Data System Installation Manual appendices to identify system faults or the method below.

The faults are:

Instrument Panel AVDR Annunciator

A & V annunciation is not yet supported by the system.

A = Illuminated "A"udio is not supported. If it is illuminated, there is a fault in the annunciator wiring.

V = Illuminated "V"ideo is not supported. If it is illuminated, there is a fault in the annunciator wiring.

D = Illuminated "D"ata indicates that the system is acquiring data for recording. If the "D" is not illuminated, there is a system fault with the MFDAU.

R = Illuminated "R"ecording indicates that the QAR is communicating with the MFDAU and recording aircraft systems data, audio data (when Area Microphone is installed), and video data (when Camera is installed). If the "R" is not illuminated, there is a system fault with the MFDAU, OVVR/CV2R, and/or QAR.

If all the systems below are operating properly to specification, the AVDR function may be compromised by a missing or "burned out" light.

MFDAU Procedure:

Verify internal battery for proper voltage. If the battery has sufficient power, check connectors within the system for a disconnection. If the battery has inadequate power, try charging the battery outside the aircraft on the bench overnight or replacing the battery with a fresh charged one. See Section 3.2.1.2 of this ICA for MFDAU battery procedures. If a fault continues after battery replacement, contact NFDS to discuss the operation and faults prior to return shipping the MFDAU to NFDS.

QAR Procedure:

Check connectors within the system for disconnection. When the FDS is operating, ensure the lights located on the QAR are illuminated a solid green to indicate operation and/or read/write capability to the SD cards. Verify two SD cards are loaded into the QAR and the door is properly secured with the ¼ turn fastener. If any lights are any color other than green a fault is/has occurred. If a fault continues, contact NFDS to discuss the operation and faults prior to return shipping the QAR to NFDS.

OVVR/CV2R Procedure:

If the QAR fails to record audio (when Area Microphone is installed) or video (when Camera is installed), the MFDAU, the OVVR/CV2R (when installed), and/or the QAR may be in QAR are in fault. A technician will have to first know that the SD card had failed to record sound or images. The OVVR also has an internal battery installed just as the MFDAU. Verify internal battery for proper voltage. If the battery has sufficient power, check connectors within the system for a disconnection. If the battery has inadequate power, try charging the battery outside the aircraft on the bench overnight or replacing the battery with a



## **AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

fresh charged one. See Section 3.2.1.1 of this ICA for OVVR/CV2R battery procedures. In addition, refer Section 7 of 117NM3130001 Installation Manual for OVVR/CV2R functional checkout procedures. If a fault continues after battery replacement or replacement of the other components, contact NFDS to discuss the operation and faults prior to return shipping the OVVR/CV2R to NFDS

Fault isolation in the installation or associated sensors or subsystem should be performed using the rotorcraft installation and wiring diagrams found in Appendix A of this document and in accordance with established maintenance procedures.

If the troubleshooting methods determine that a Flight Data System component is faulty, then the component should be removed and replaced. Contact and route the faulty component to the North Flight Data System, LLC authorized repair facility for final disposition.



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**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

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**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM****5.0 REMOVAL AND INSTALLATION**

**WARNING:** ENSURE THE SATCOM CIRCUIT BREAKER IN THE OVERHEAD CIRCUIT BREAKER PANEL HAS BEEN PULLED AND COLLARED IN THE OPEN POSITION PRIOR TO PERFORMING ANY MAINTENANCE ON THE AUTOMATIC FLIGHT FOLLOWING SYSTEM AND ELECTRONIC FLIGHT BAG PROVISIONS

**NOTE:** Reference structural installation, electrical installation and wiring routing drawings in Appendix A. In addition, CP-3i equipment preparation in Section 3 and system operation verification in Section 5 of 117NM3130001 Installation Manual must be followed when replacing any components listed in the description of these Instructions for Continued Airworthiness.

**Removal – CP-3i Transceiver**

1. Disconnect all electrical connectors from the CP-3i. Stow for reconnection.
2. Remove four (4) AN4-3 bolts with flat washers from the CP-3i and supports. Retain hardware for reinstallation.
3. Remove CP-3i and store in a safe place.

**Installation – CP-3i Transceiver**

1. Before installation, only if the Unit is a replacement, it must be prepared per Section 3 of 117NM3130001 Installation Manual.
2. Check the surfaces of Avionics Plate for corrosion or any nicks to unprimed and/or unpainted area. As required, repair in accordance with Section 3.2 or restore corrosion protection by application of chemical film. Prime and paint if needed.
3. Install as shown on 117ND3130990 sheet 4. Upon installation, torque all bolts 25 to 40 inch lbs. Reference AC43.13-1B, Section 7, Paragraph 40, Table 7-1.
4. Reconnect all electrical connectors to the CP-3i. Ensure all connector bodies are fully seated and that there is no tension on the harness wiring. Do not over tighten.
5. Perform system operation verification per Section 5 of 117NM3130001 Installation Manual.

**Removal – Line Filter**

1. Disconnect all electrical connectors from the Line Filter. Stow for reconnection.
2. Remove four (4) MS35206-230 screws with flat washers from the support. Retain hardware for reinstallation.
3. Remove Line Filter and store in a safe place.

**Installation – Line Filter**

1. Check the mounting surfaces of the Avionics Plate for general condition. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
2. Install line filter to structure as shown on 117ND3130990 sheet 4. Upon installation, torque all screws 12 to 25 inch lbs. Reference AC43.13-1B, Section 7, Paragraph 40, Table 7-1.
3. Reconnect coaxial connectors to the line filter. Ensure the coaxial connector bodies are fully seated and that there is no tension on the coaxial cable. Do not over tighten.
4. Perform system operation verification per Section 5 of 117NM3130001 Installation Manual.

**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM****Removal – Transmit Antenna (Tailboom)**

1. Remove antenna from mounting assembly by removing sealant from around edges of antenna and removing four (4) NAS1635-06-8 screws. Retain hardware for reinstallation.
2. Disconnect coaxial connector and electrical bonding strap from the antenna. Stow for reinstallation.
3. Remove antenna and store in a safe place.

**Installation – Transmit Antenna (Tailboom)**

1. Check the mounting surfaces of 117ND3130001-07 for general condition. Remove any old sealant. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
2. Reconnect coaxial connector to the receive antenna. Ensure the connector body is fully seated and that there is no tension on the coaxial cable. Do not over tighten. Reconnect electrical bonding strap to the antenna per Structural Installation Drawing 117ND3130990 sheet 5.
3. Install as shown on 117ND3130990 sheet 5. Upon installation, torque all screws and nuts 12 to 15 inch lbs. Reference AC43.13-1B, Section 7, Paragraph 40, Table 7-1.
4. Perform system operation verification per Section 5 of 117NM3130001 Installation Manual.

**Removal – Receive Antenna (Vertical Fin)**

1. Remove Vertical Fin Tip Cap per Eurocopter Deutschland Maintenance Instructions.
2. Remove antenna from the Tip Cap by removing sealant from around edges of antenna and removing four (4) NAS1635-06-8 screws, NAS1149EN616P washers and MS21043-06 nuts. Retain hardware for reinstallation.
3. Disconnect coaxial connector and electrical bonding strap from the antenna. Stow for reinstallation.
4. Remove antenna and store in a safe place.

**Installation – Receive Antenna (Vertical Fin)**

1. Check the mounting surfaces of Tip Cap for general condition. Remove any old sealant. As required. If cracked, repair or replace Tip Cap per Eurocopter Deutschland Maintenance Instructions.
2. Reconnect coaxial connector to the transmit antenna. Ensure the connector body is fully seated and that there is no tension on the coaxial cable. Do not over tighten. Reconnect electrical bonding strap to the antenna per Structural Installation Drawing 117ND3130990 sheet 6.
3. Install as shown on 117ND3130990 sheet 6. Upon installation, torque all screws and nuts 12 to 15 inch lbs. Reference AC43.13-1B, Section 7, Paragraph 40, Table 7-1.
4. Perform system operation verification per Section 5 of 117NM3130001 Installation Manual.

**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM****Removal – OuterLink Voice Video Recorder (OVVR) or Cockpit Voice & Video Recorder (CV2R)  
(Baggage Compartment Avionics Rack or Center Console)**

1. Remove control panel by unscrewing four (4) DZUS capsulated screws.
2. Disconnect the connector from the control panel. Stow for reconnection.
3. Remove control panel and store in a safe place.
4. For detailed instructions for battery removal see Section 3.2.1.

**Installation – OuterLink Voice Video Recorder (OVVR) or Cockpit Voice & Video Recorder (CV2R)  
(Baggage Compartment Avionics Rack or Center Console)**

1. Check the mounting surfaces of the control panel or unit and pedestal mounting rails for general condition. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
2. For detailed instructions for battery replacement see Section 3.2.1.
3. Reconnect connector to the control panel. Ensure the connector body is fully seated and that there is no tension on the harness wiring.
4. Locate and install the OVVR/CV2R as shown on 117ND3130120 sheet 3 or 4.

**Removal – Disconnect/Cockpit Area Microphone Panel (Cockpit Center Console)**

1. Remove panel by unscrewing four (4) DZUS capsulated screws.
2. De-pin connectors as necessary using the appropriate de-pinning tool.
3. Remove panel and store in a safe place.

**Installation – Disconnect/Cockpit Area Microphone Panel (Cockpit Center Console)**

1. Check the surfaces of the panel and console mounting rail for corrosion or any nicks to unprimed and/or unpainted area. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
2. Install as shown on 117ND3130150 sheet 3.

**Removal – Camera**

1. Locate camera in aft end of cockpit overhead between pilot and co-pilot seat.
2. Remove four (4) MS27039-0807 screws and (4) NAS1149FN832C washers from the bottom of the camera mount to uninstall the camera.
3. Pull out camera and cover from the mount and snip cable ties up to the camera disconnect. Uncouple the connectors and complete removal of the camera and its cover.
4. Store camera and cover in a safe place.

**Installation – Camera**

1. Check the surfaces of the camera mount and air conditioning duct for corrosion or any nicks to unprimed and/or unpainted area. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
2. Install camera as shown on 117ND3130160 sheet 3.

**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM****Removal – Quick Access Recorder (QAR)**

1. For -01 installation, locate quick access recorder in the forward section of the center console. For -03 installation, locate quick access recorder in the aft section of the center console.
2. **SD Card Removal. (No power on system)**
  - a. There is a door with a quarter turn fastener to access two well marked SD card slots in the QAR; one for OVVR voice, video & GPS data and the other for aircraft data.
  - b. To remove each card, push it in and this action will cause each card to pop out from its connection.
  - c. Remove each SD card and store in a safe place.
3. Disconnect incoming cables to the QAR and stow the disconnected ends.
4. Unscrew four (4) AN525-10R6 screws (for -01) or four (4) AN3-3 (for -03) bolts to uninstall QAR from the aircraft.
5. Store QAR in a safe place.

**Installation – Quick Access Recorder (QAR)**

1. Check the surfaces of the equipment deck and the QAR fasteners for corrosion or any nicks to unprimed and/or unpainted area. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
2. **SD Card re-installation, if required.**
  - a. There is a door with a quarter turn fastener to access two well marked SD card slots in the QAR; one for OVVR voice, video & GPS data and the other for aircraft data.
  - b. Check each slot for an SD Card. If SD Cards are loaded, close the access door and secure it with the quarter turn fastener and go to step 3.
  - c. SD cards are required to be operating system formatted prior to installation. Formatting is to be completed using Microsoft Windows XP operating format procedures for a new storage device so that the MFDAU & QAR operating system can read and write files to the SD card.
  - d. After ensuring each SD card is properly formatted, to install each card, push it in and this action will cause each card to set into its connection for operation.
  - e. Once SD Cards are loaded, close the access door and secure it with the quarter turn fastener.
3. Install QAR as shown on 117ND3130140 sheet 3 or sheet 4.

**Removal – Multi-function Data Acquisition Unit (MFDAU)**

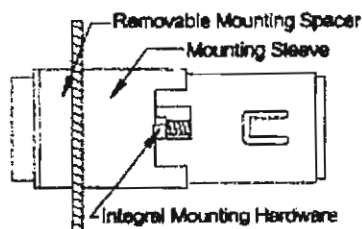
1. Locate multi-function data acquisition unit baggage compartment ceiling, aft of the compartment doors.
2. Disconnect incoming cables and pitot/static tubing to the MFDAU and stow the disconnected ends.
3. For -01 installation, unscrew four (4) MS27039-1-20 screws and (4) NAS1149F0332P washers to uninstall MFDAU from the aircraft.
4. Store MFDAU in a safe place.
5. For detailed instructions for battery removal see Section 3.2.1

**AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM****Installation – Multi-function Data Acquisition Unit (MFDAU)**

1. Before installation, only if the Unit is a replacement, it must be prepared per Section 3 of 117NM3130001 Installation Manual.
2. Check the surfaces of the equipment deck and the MFDAU fasteners for corrosion or any nicks to unprimed and/or unpainted area. As required, repair in accordance with section 3.2 or restore corrosion protection by application of chemical film.
3. Install the MFDAU as shown on 117ND3130110 sheet 3, and reconnect pitot/static lines as shown on 117ND3130190.
4. Perform Pitot/Static System check per Eurocopter maintenance instructions.
5. For detailed instructions for battery replacement see Section 3.2.1

**Removal – AVDR Lighted Annunciator/ Switch for FDS Operation**

1. See removal of control panel above.
2. Pull indicator / switch lens out of the switch base. A bail retains the cap to the base, which allows for switch base removal, but does not allow for full removal of the lens cap.
3. Locate retained screw (integral mounted hardware see Figure 1) opposite cap bail attachment point, and using a small screwdriver, gingerly turn screw counterclockwise until the mounting lug is retracted.
4. From the backside of the control panel, slide the annunciator sleeve off the base, and remove the switch from the panel.

**Figure 1****Installation – AVDR Lighted Annunciator/ Switch**

1. Installation is opposite of removal.
2. Ensure that the annunciator lenses are correctly positioned during installation.

**Removal – OL MSG Annunciator/ Switch for SATCOM Operation**

1. See removal of control panel above.
2. Pull indicator / switch lens out of the switch base. A bail retains the cap to the base, which allows for switch base removal, but does not allow for full removal of the lens cap.
3. Locate retained screw (integral mounted hardware see Figure 1) opposite cap bail attachment point, and using a small screwdriver, gingerly turn screw counterclockwise until the mounting lug is retracted.
4. From the backside of the control panel, slide the annunciator sleeve off the base, and remove the switch from the panel.





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## AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM

### Installation – Lighted Annunciator/ Switch

1. Installation is opposite of removal.
2. Ensure that the annunciator lenses are correctly positioned during installation.



## **AUTOMATIC FLIGHT FOLLOWING SYSTEM & FLIGHT DATA SYSTEM**

### **6.0 RECOMMENDED OVERHAUL PERIODS**

No replacements or overhauls are required.

For evaluation of operation, performance, and component inspection, please contact North Flight Data Systems for further instructions.

### **7.0 AIRWORTHINESS LIMITATIONS**

The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14CFR, Part 43.16 and Part 91.403 of Federal Aviation Regulations unless an alternative program has been FAA approved.

Component replacement will occur upon the discovery of damage or faulty components discovered during maintenance, inspection, or system checkout.

**NORTH FLIGHT DATA SYSTEMS, LLC**

7100 Hwy 287, Suite 100  
Arlington, Texas 76001

Flight Manual Supplement for  
Eurocopter Deutschland Models  
BK117C-2 (EC145)

**FAA APPROVED  
ROTORCRAFT FLIGHT MANUAL SUPPLEMENT  
FOR**

**FLIGHT DATA SYSTEM  
INSTALLED ON EUROCOPTER DEUTSCHLAND MODEL BK117C-2**

REGISTRATION NO. 114504

SERIAL NO. 9421

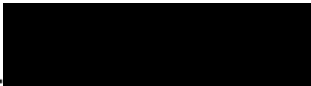
This supplement shall be attached to the appropriate FAA approved Eurocopter Deutschland Model BK117C-2 Flight Manual when the **FLIGHT DATA SYSTEM** are installed in accordance with STC No. SR09619RC.

The information contained herein supplements the information of the Basic Flight Manual. For limitations, procedures, and performance data not contained in this supplement, consult the Basic Flight Manual and applicable Flight Manual Supplements.

FAA Approved:

  
\_\_\_\_\_  
Scott A. Horn  
Acting Manager, Rotorcraft Certification Office  
FEDERAL AVIATION ADMINISTRATION  
Fort Worth, Texas

**LOG OF REVISIONS**

Rev	Description	Affected Page(s)	FAA Approved
-	Original Release	All	FAA Approved:   Scott A Horn, Acting Manager, Rotorcraft Certification Office, FEDERAL AVIATION ADMINISTRATION, Fort Worth, Texas

**PROPRIETARY NOTICE**

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## GLOSSARY

### ACRONYM

### DEFINITION

AVDR ----- Audio and Video Data Recorder

CV2R ----- Cockpit Voice & Video Recorder (North Flight Data Systems)

IOM----- Installation, Operation and Maintenance Manual

MFDAU----- Multi Function Data Acquisition Unit

NFDS ----- North Flight Data Systems, LLC

POM----- Pilot Operations Manual

OVVR ----- OuterLink Voice and Video Recorder

QAR ----- Quick Access Recorder

SD ----- Secure Data

**SECTION 1  
GENERAL**

No change.

**SECTION 2  
LIMITATIONS**

No change.

**SECTION 3  
EMERGENCY PROCEDURES**

**SECTION 3.2  
QAR & MFDAU FAILURE INDICATIONS**



↓  
If the **R** is not illuminated, QAR is not recording data.

If the **D** is not illuminated, QAR is not acquiring data.

↓  
**CONTINUE THE FLIGHT**

## **SECTION 4 NORMAL PROCEDURES**

### **4.3. STARTING PROCEDURES**

#### **NOTE**

Once aircraft power is applied, the pilot ensures the FDS is functioning properly by verifying the illumination of the "D" and "R" on the AVDR annunciator. Illumination of both the "D" and "R" may require up to 2.5 minutes.

#### **NOTE**

If the door on the QAR in the cockpit center console is not closed, the QAR will not acquire and record data and the "D" and "R" will not be illuminated.

## **SECTION 5 PERFORMANCE**

No change.



**COMPLEMENTARY  
FLIGHT MANUAL  
BK117C-2**

**SECTION 6  
WEIGHT AND BALANCE**

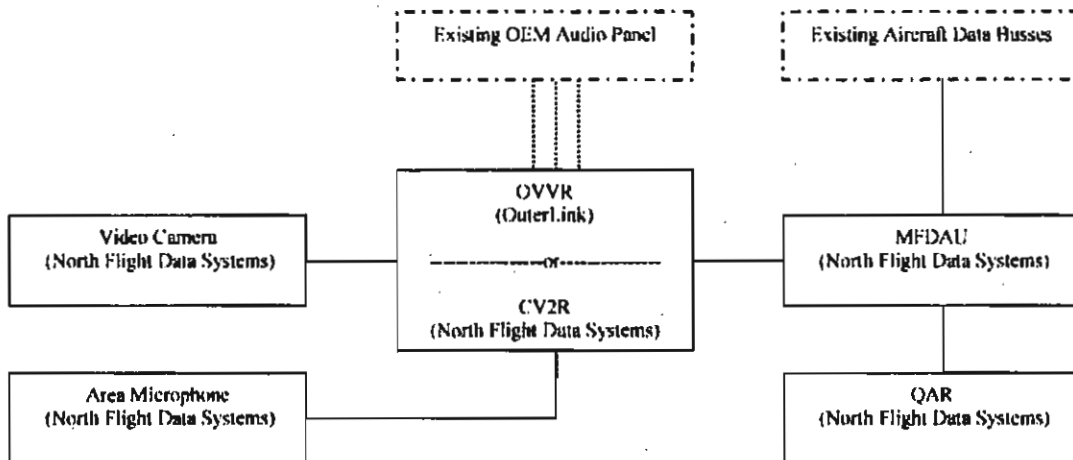
**FLIGHT DATA SYSTEM COMPONENTS**

Installation No.	Component	Weight		Longitudinal		Lateral	
		(lb)	(kg)	Arm (mm)	Moment (kg-mm)	Arm (mm)	Moment (kg-mm)
117ND3130110 -01	MFDAU	3.0	1.36	6471	8824	4406	6009
117ND3130110 -03	MFDAU	3.0	1.36	6456	8804	5568	7592
117ND3130120 -01	OVRV/CV2R	2.3	1.05	6296	6582	3677	3845
117ND3130120 -03	OVRV/CV2R	2.3	1.05	6296	6582	5161	5396
117ND3130120 -05	OVRV/CV2R	2.0	0.91	**	**	**	**
117ND3130130 -01	WOG Switch	0.6	0.27	3188	869	2323	633
117ND3130140 -01	QAR	1.1	0.50	**	**	0	0
117ND3130140 -03	QAR	1.1	0.50	2495	1248	0	0
117ND3130140 -05	QAR	1.1	0.50	2495	1248	0	0
117ND3130150 -01	Area Microphone	0.4	0.18	**	**	0	0
117ND3130150 -03	Area Microphone	0.2	0.09	**	**	0	0
117ND3130160 -01	Camera	0.6	0.27	2740	747	1355	370

\* Negative values for lateral arm indicate LBL.

\*\* Once installed, record actual STA and BL location and calculate applicable moment in the space provided.

**SECTION 7  
SYSTEMS AND DESCRIPTION**



**FLIGHT DATA SYSTEM DIAGRAM**

The basic Flight Data System consists of a Multi Function Data Acquisition Unit (MFDAU) and a Quick Access Recorder module (QAR).

The MFDAU is a self contained data acquisition unit which acquires aircraft dynamic information and a variety of data from external analog and digital inputs. The MFDAU connects to the OVVR or CV2R by a RS232 connection. Please note that the OVVR is a Voice and Video Recorder originally produced by OuterLink Corporation. North Flight Data Systems now owns all production rights of the OVVR from OuterLink and repackages the unit as a CV2R Voice and Video Recorder.

The MFDAU has data outputs for aircraft attitude, lateral acceleration (trim ball), turn rate, altitude, airspeed and magnetic heading data. The MFDAU uses output from an accelerometer and rate gyro sensors to calculate the aircraft attitude. Additionally, the unit has input provisions for auxiliary analog, serial GPS data, ARINC429, ARINC717 and RS485 data. These allow aircraft systems information and warning / caution / advisory messages to be recorded. Other sensors will provide additional data which can be used to obtain the aircraft flight performance and navigation data. The unit contains auxiliary RS232 and ARIN429 outputs for connection to external devices.

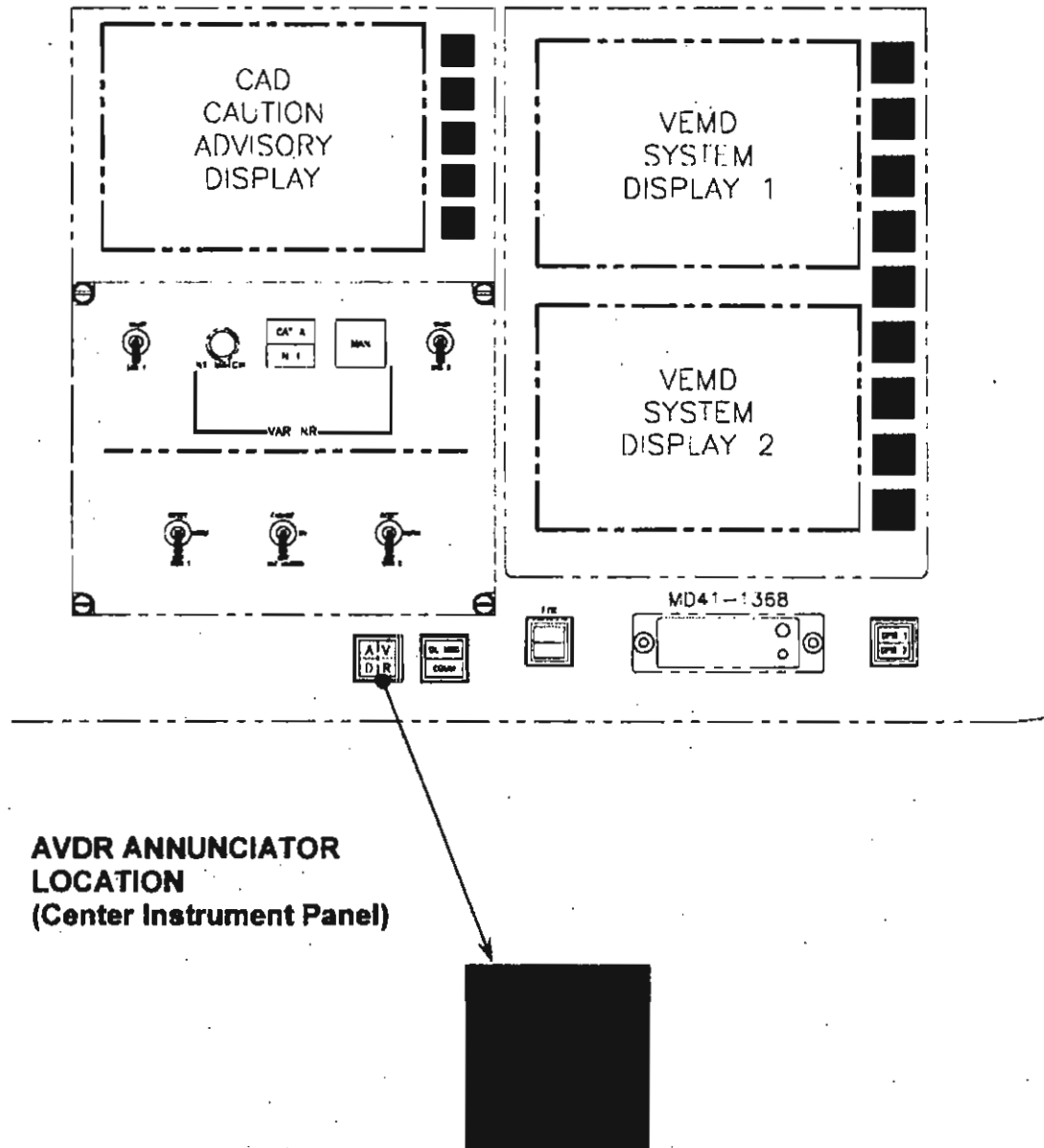
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Eurocopter Deutschland Models  
BK117C-2 (EC145)**

The QAR is a data storage module which can store data onto a Secured Data (SD) flash memory card of up to 16GBytes in capacity. The QAR contains 2 external Ethernet interfaces; one Ethernet interface is used to connect to the MFDAU to record aircraft data and the other Ethernet interface is used to interface to the OVVR/CV2R to enable the OVVR/CV2R to send voice and video data to the other QAR SD card as well as receive and record aircraft data onto the OVVR/CV2R's internal 8 GB compact flash memory card.

The Voice & Video Recorder (OVVR/CV2R) works to provide voice and video recording. The ambient sounds are recorded through cockpit and/or a cabin remote area microphone. The pilot's microphone and headset and the copilot's headset are also being recorded from independent audio channels. Video is recorded from an overhead cockpit mounted video camera.



**AVDR ANNUNCIATOR  
LOCATION  
(Center Instrument Panel)**

**A. FDS Circuit Breakers**

The following circuit breakers are associated with the Flight Data System:

<b>Circuit Breaker</b>	<b>Amps</b>	<b>Location</b>	<b>Bus</b>
OVR or CV2R	5.0	Overhead Circuit Breaker Panel	28 VDC ESSENTIAL BUS I
OVR/FDR	5.0	Overhead Circuit Breaker Panel	28 VDC ESSENTIAL BUS I
MFDAU	5.0	Overhead Circuit Breaker Panel	28 VDC ESSENTIAL BUS I

**B. Annunciators**

**1. AVDR Annunciator**

The AVDR annunciator is located low on the Lower Center Instrument Panel underneath the Engine Start Panel.



When FDS is powered and operating correctly the annunciator quadrant will illuminate.
D – MFDAU Acquiring data.
R – QAR Recording data.



When FDS is not powered or operating incorrectly the annunciator quadrants are black-faced.
D – MFDAU Not acquiring data.
R – QAR Not recording data.

**C. Controls**

There are no cockpit controls for the Flight Data System.

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**SECTION 8  
SERVICING**

No change.

**SECTION 9  
OPERATIONAL INFORMATION**

No change.

**SECTION 10  
ADDITIONAL PERFORMANCE**

No change.

