INSTALL, FODR SYSTEM MANUAL

This document provides information intended for use by persons who, in accordance with current regulatory requirements, are qualified to operate and/or install the equipment described herein. For further information, please contact: info@eitavionics.com or 309 Kelly's Ford Plaza, SE, Leesburg, VA 20175 or phone 703-344-7410.

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Approvals

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DRAWN	JWB	1/9/2019
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Revision History

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D	81334	1/30/2019		MJM
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F	81371	1/9/2020	Add radar altimeter support, changes include: Figure 6, Figure 8, Figure 9 Table 9, Table 10 2.10, 2.11.4.11, 4.1.4	MJM

Contents

References

14 CFR Part 135.607

Robinson:

RTR 460, Volume I, “Robinson Helicopter Company R44 Maintenance Manual and Instructions for Continued Airworthiness”

RTR 460, Volume II, “Robinson Helicopter Company R44 Illustrated Parts Catalog”

EIT Avionics
93226, INSTALL, FODR
93227, INSTALL, FODR SYSTEM HARNESS
93228, INSTALL, ESAID PANEL MOUNT
93235, TOP KIT, FODR SYSTEM
93255, INSTALL, OAT PROBE
93256, INSTALL, GPS ANTENNA
93259, INSTALL MANUAL, FODR SYSTEM
93262, INSTALL ESAID, BOW MOUNT
93263, INSTALL ESAID, SURFACE MOUNT
93277, TECH DOC, PILOT GUIDE, FODR SYSTEM
93338, TECH DOC, INSTRUCTIONS FOR CONTINUED AIRWORTHINESS, FODR System
93342, TECH DOC, ROTORCRAFT FLIGHT MANUAL SUPPLEMENT, FODR System

Definitions and Abbreviations

Abbreviation	Definition
5MP	*Five Minute Power. Defined by aircraft OEM in Operating Limitations*
AFM	*Aircraft Flight Manual, FAA approved and required reference for aircraft operating information and limitations*
Aircraft	*A device that is used or intended to be used for flight in the air. Inclusive of: AIRPLANE, GLIDER, ROTORCRAFT, BALLON, POWERED-LIFT, LIGHTER THAN AIR*
CAN	*Controller Area Network*
DA	*Density Altitude*
ESAID	*Enhanced Situational Awareness Information Display.*
EXCEEDANCE	*An event outside of approved limitations that affects safety of flight*
FODR	*Flight Operational Data Recorder*
FOQA	*Flight Operations Quality Assurance*
GAMA	*General Aviation Manufacturers Association*
GWT	*Gross Weight. The operational flight weight used to calculate performance and limitations in the applicable POH.*
HFDM	*Helicopter Flight Data Monitoring*
IAS	*Indicated Airspeed*
IAW	*In Accordance With*
IGE	*In Ground Effect Hover ceiling*
LH	*Left Hand*
LRU	*Line Replaceable Unit. A modular component of an aircraft or system.*
MAP	*Manifold Pressure*
MCP	*Maximum Continuous Power. Defined by aircraft Operating Limitations*
OAT	*Outside Air Temperature*
OGE	*Out of Ground Effect Hover ceiling*
POH	*Pilots Operating Handbook, FAA approved and required reference for aircraft operating information and limitations. A GAMA defined document format which includes information required in an AFM/RFM, plus additional information.*
RA	*Radar Altitude*
Reference Datum	*A vertical plane from which tho4rizontal distance are measured for balance purposes. The longitudinal reference datum is 100 inches forward of the main rotor shaft centerline for the R44 II.*
RFM	*Rotorcraft Flight Manual, FAA approved and required reference for rotorcraft operating information and limitations*
RHC	*Robinson Helicopter Company*
SMS	*Safety Management System*
STA	*fuselage STAtion*
Station	*For-and-aft location along the helicopter fuselage given in terms of distance in inches from the longitudinal reference datum.*
TSO	*Technical Standard Orders. A minimum performance standard which may be referenced for FAA design and production approval.*
VNE	*Never Exceed Speed*
VSI	*Vertical Speed Indicator*

Abbreviation	Definition

Table 1: Definitions and Abbreviations

WARNING: These products are not designed or intended to provide primary reference for flight. The installer must consider the supplemental nature of these products during installation such that no primary or required equipment is compromised.

WARNING: Do not fly with a unit that appears to have been opened or damaged. Return to EIT for diagnostics and recalibration or repair.

WARNING: Tampering with or causing destruction of data contained in these units may carry civil and criminal penalties in a court of law. The USB interface to FODR is to be used for user download of data only.

WARNING: These products do not contain any field serviceable parts. Opening units will void warranty. See 93277, TECH DOC, PILOT GUIDE, FODR SYSTEM *for return and warranty information.*

1. General Description

The FODR *System* refers to the Flight Operations Data Recorder modular system designed to digitally record data from aircraft and engine sensors and optionally interface with additional equipment. It is intended to permanently record 2200 hours of operational data and provide owner/operator access to data for maintenance, enhance flight crew performance and flight training. FODR recorded data can assist in maintenance evaluation of airworthiness should exceedances occur. FODR recorded data can be fully integrated into safety systems such as HFDM, FOQA and SMS. FODR recorded data can assist crash investigation.

The FODR System has multiple configurations. When interfaced with optional components, the FODR System can further enhance operational safety by providing real time display and aural annunciation of aircraft limitations by correlating dynamic flight conditions with published limitations (FAA approved data from Placards, AFM, RFM, or POH) and display of radar altitude. This supplements pilot awareness of complicated performance charts in flight and enhances pilot situational awareness to avoid unintentional operational exceedances such as: engine and rotor over-speeds, unintentional low altitude flight, and hazardous flight conditions which lead to mishaps.

The premise of the FODR System is that the complex, interrelated and changing nature of various performance limitations, combined with high workload situations or in-flight distractions, often results in pilots exceeding important POH performance limitations. These exceedances are well known in NTSB accident records to be events found in minor and catastrophic fatal accidents. Additionally, during circumstances of in-flight task saturation, the pilot may be operating closer to aircraft limitations, obstructions, and the surface than intended. Low altitude flight is a widely recognized safety of flight risk factor. By providing supplemental information displays and aural alerts, the FODR System can greatly improve pilot situational awareness, reduce the chance of exceedances, and increase safety.

The FODR System is intended to provide supplemental information to enhance pilot situational awareness. Any discrepancies in-flight or on the ground must be reconciled with the existing primary systems on the aircraft. If the FODR System provides an aural alert or displays information indicating an exceedance, the pilot must take appropriate action to reduce risk and cross check with primary references. Post-flight, FODR System data can be downloaded via USB cable and all recorded parameters reviewed. The FODR Data Viewer can be downloaded at www.eitavionics.com.

Greater detail on FODR System operation is found in the FODR SYSTEM PILOTS GUIDE 93277.

1.1. FODR System Components

1.1.1. FODR (Flight Operations Data Recorder)

Figure 1: FODR LRU

FODR (Figure 1: FODR LRU) is a stand-alone unit which automatically records operational data and meets the requirements of 14 CFR Part 135.607. FODR is interfaced with existing pneumatic and electrical signals, plus an independent GPS antenna. Optionally, it can be interfaced with a radar altimeter, and EIT Avionics ESAID display. A USB interface is provided for operator and maintenance access to download FODR data. The FODR physical properties include: size (W x H x D) 4.6” x 4.3” x 1.3”, weight 1.0 lbs.

1.1.2. ESAID (Enhanced Situational Awareness Information Display)

Figure 2: ESAID LRU

ESAID (Figure 2: ESAID LRU) is a display unit which displays non-required, safety enhancing data for use by the flight crew. A touchscreen (compatible with gloves) is used for menu selection and data input. ESAID provides aural alerts to the flight crew when interfaced with existing aircraft audio. No pilot input is typically required during flight. The ESAID physical properties include: size (W x H x D) 3.3” x 3.3” x 1.4”, weight 0.5lbs.

When interfaced with FODR, ESAID provides secondary display of pneumatic and engine data. ESAID is designed to increase operational safety by providing annunciation of exceedances not provided by existing systems. ESAID also displays an alert to the pilot in the event exceedances are recorded, which remains until evaluated and cleared manually (the displayed alert can be cleared, however, FODR recorded data cannot be erased).

When interfaced with a radar altimeter and FODR, ESAID displays height above surface information and provides height callouts.

1.1.3. OAT Probe (Outside Air Temperature)

Figure 3: OAT Probe

The OAT probe (Figure 3: OAT Probe) is a passive sensor for measurement of the outside air temperature. The OAT probe physical properties include: size (DIA x H) ⌀0.815" x 2.3", weight 0.1lbs.

1.1.4. GPS Antenna

Figure 4: GPS Antenna

The GPS antenna (Figure 4: GPS Antenna) is an active antenna that provides global positioning data to the FODR system. The GPS Antenna physical properties include: size (DIA x H) ⌀1.9" x 1.9", weight 0.4 lbs.

1.2. FODR System Configurations

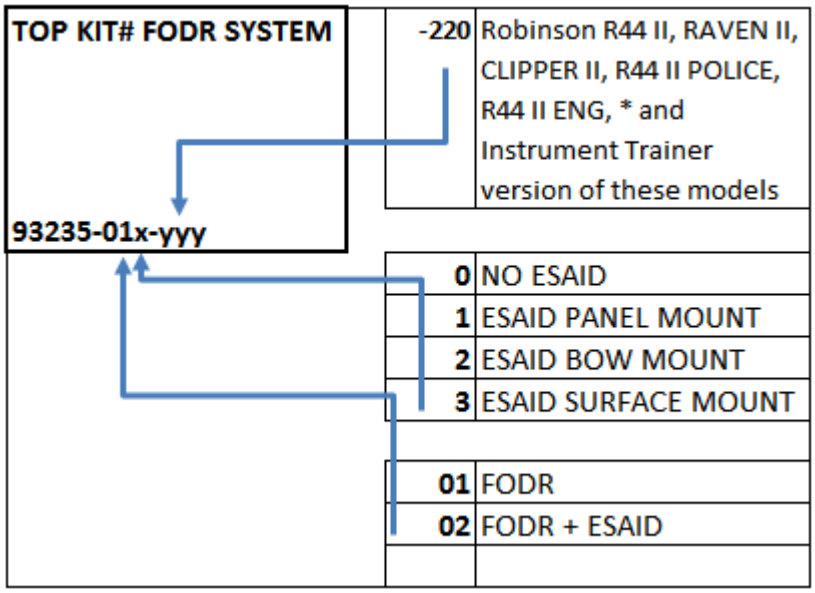

Figure 5: Top Kit Numbering Convention

EIT Avionics uses a Top Kit numbering system (Figure 5: Top Kit Numbering Convention). The prefix 93235 denotes the FODR System, and the following digits defining configuration and installation applicability. After the first dash, the FODR System Component LRU configurations are defined by two digits, and the third digit defines ESAID mounting configuration. The three

digit suffix defines applicability to specific model(s) of aircraft. The installer must ensure the top kit number is appropriate to the intended installation. Refer to Figure 5: Top Kit Numbering Convention.

1.3. Scope

This manual provides information about the physical, electrical and pneumatic installation of all FODR System configurations specific to the EIT Avionics Top Kit# 93235-xxx-220 on the Robinson R44 II, RAVEN II, CLIPPER II, R44 II POLICE, R44 II ENG, * and Instrument Trainer version of these models.

1.4. FODR System Labels

Each FODR system LRU is marked with EIT Avionics and the device name. A label contains the part number, serial number, the “MOD” or modification number representing notable changes to the unit, if any, and CAGE code. The 2D bar code is for EIT Avionics internal use only.

Typical label:

2. Installation

The installer must consider what equipment is near the installation of the FODR system. Allow for clearance of the units as well as associated electrical and pneumatic connections and routing. Be aware of routing cables near other electronics or with other wire bundles that may have high energy flow. Avoid sharp bends in cabling or hoses. Avoid routing near aircraft control cables or push rods. Avoid proximity to sources of heat or chafing that could damage wires, hoses or cause undesirable effects.

Longitudinal location reference is provided using the Robinson R44 II datum, in which the datum is 100" forward of the main rotor centerline. Lateral location reference is provided using the main rotor centerline, with left butt line (copilot side) values being negative. Location is also referenced by specific distance from prominent R44 features.

This document is organized to follow the following general sequence of work: install the FODR System LRU's, then route harnesses, install and terminate electrical and related components, followed by installation checks, testing and return to service.

IMPORTANT: READ ALL OF THIS DOCUMENT, REFERENCED DRAWINGS AND REVIEW INFORMATION SPECIFIC TO THE AIRCRAFT TO BE MODIFIED WITH THE FODR SYSTEM BEFORE BEGINNING THE INSTALLATION.

2.1. General Arrangement

LRU general arrangement is shown Figure 6 FODR System General Arrangement. A summary of installation locations relative to Robinson Helicopter Company (RHC) Reference Datum are provided, see Table 2: FODR System Component Locations.

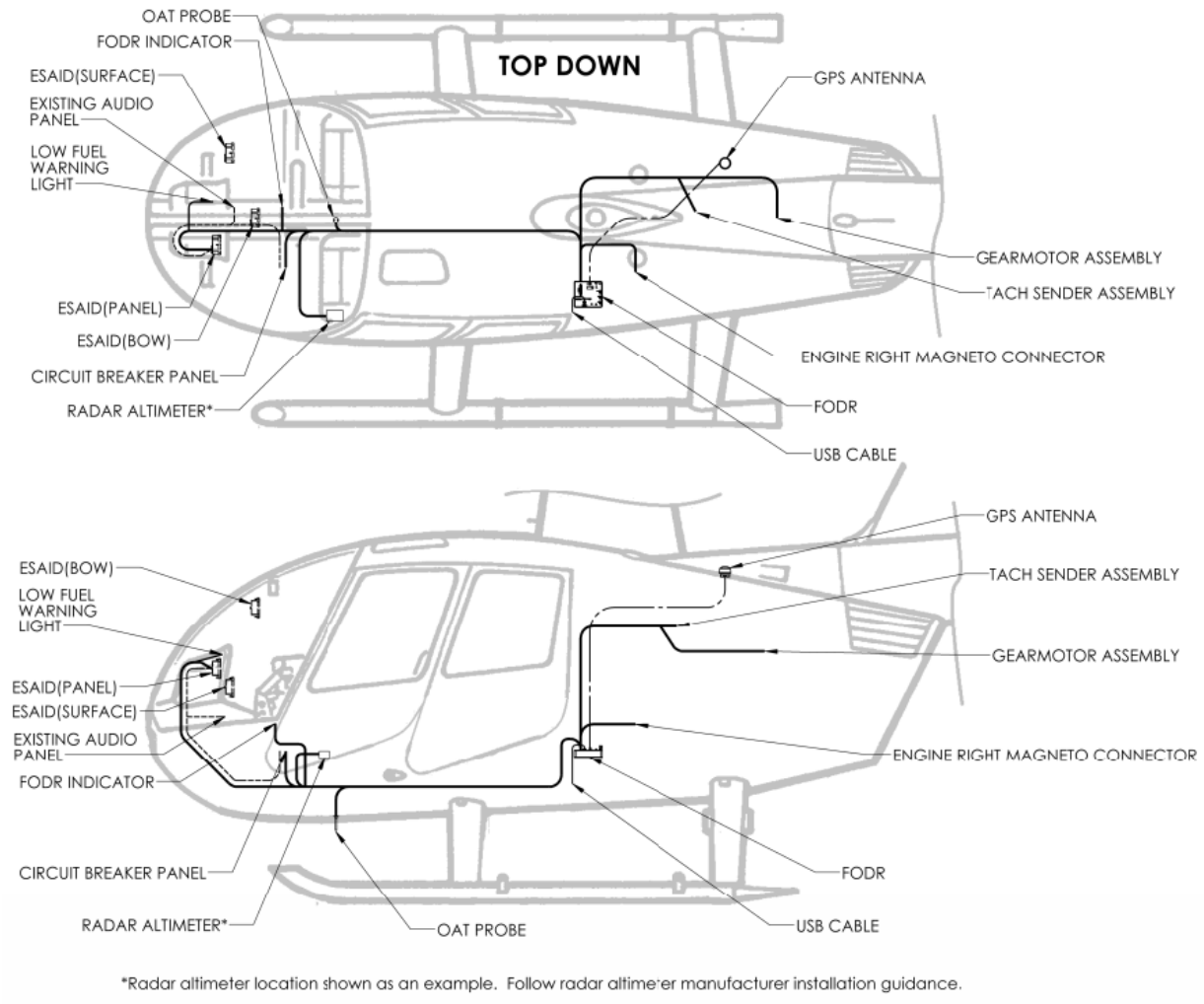

Figure 6 FODR System General Arrangement

Installed Device	Longitudinal STA	Butt Line
FODR	89.0 +/-1”	LBL 18.0 +/-1”
ESAID(PANEL)	16.0 +/-1”	LBL 7.0 +/-1”
ESAID(BOW)	22.0 +/-1”	RBL 0.0 +/-1”
ESAID(SURFACE)	27.0 +/-1”	RBL 11.5 +/-1”
OAT	42.0 +/-1”	RBL 0.0 +/-1”
GPS	116.0 +/-1”	RBL 9.5 +/-1”

Table 2: FODR System Component Locations

2.1.1. FODR Location

FODR is mounted in the cabin behind the left rear passenger seat back. FODR is not accessible by the crew during flight operations. Post-flight, FODR data can be read via USB connector for analysis of all recorded operational data.

2.1.2. ESAID Location

ESAID is installed in the instrument panel (3-1/8" standard cut out) using the ESAID Panel Mount, or mounted forward of the compass on the windshield center brace using the ESAID Bow Mount, or on top of the pilot's side console using the ESAID Surface Mount. ESAID primary functions are automated, and typically no ESAID touchscreen inputs are required after start up.

2.1.3. OAT Probe Location

The OAT probe will be installed on the belly of the helicopter on the forward access panel.

2.1.4. GPS Antenna Location.

The GPS Antenna is mounted on the top of the helicopter, right of center line, on the panel aft of the aux fuel tank.

2.2. Special Tools

It is assumed that the installer has a complement of tools. A list of specialty, or less common, tools is provided see table Table 3: Tools.

Reference	Description	Manufacturer	Part Number
T001	Ring terminal crimper, 22-26AWG (2-323916-1, 326875)	Tyco	46121
T002	Pin Extractor (60619-5, 60617-5)	Tyco	1804030-1
T003	Pin Insertion Tool (60619-5, 60617-5)	Tyco	91002-1
T004	Hand Crimp Tool (60619-5)	Tyco	91504-1
T005	Hand Crimp Tool (60617-5)	Tyco	91528-1
T006	Hand Crimp Tool (requires Positioner) (204370-2, 205089-1, 204351-1)	Tyco	601966-1 (M22520/2-01)
T007	Positioner for Hand Crimp Tool (204370-2)	Tyco	601966-6 (M22520/2-09)
T008	Insertion/Extractor Tool (204370-2, 204351-1)	Tyco	91067-1 (M81969/1-04)
T009	Positioner for Hand Crimp Tool (205089-1)	Tyco	601966-5 (M22520/2-08)
T010	Insertion/Extractor Tool (205089-1)	Tyco	91067-2 (M81969/1-02)
T011	Hand Crimp Tool (D-406-0002,D-406-0002)	Tyco	AD-1522
T012	Positioner for Hand Crimp Tool (204351-1)	Tyco	601966-4 (M22520/2-06)

Table 3: Tools

2.3. Installed Weight & Arm

The FODR System installed weight and arm, when installed IAW R44 II locations in this document, is provided in Table 4: Installed Weight & Arm.

Top Kit#	**FODR System LRU Configuration**	FODR System Weight (lbs)	FODR System Arm – Longitudinal (inches)	FODR System Arm – Lateral (inches)
93235-010-220	FODR	4.50	85.96	-10.76
93235-021-220	FODR + ESAID panel mount	5.60	73.11	-10.20
93235-022-220	FODR + ESAID bow mount	5.75	72.40	-9.2
93235-023-220	FODR + ESAID surface mount	5.70	73.46	-7.87

Table 4: Installed Weight & Arm

2.4. Electrical Loads

Refer to Table 5: FODR System Power Requirements for the power requirements of the FODR System. Identify the FODR System configuration and add the FODR System maximum continuous load to the installed load on the R44 II helicopter to be modified.

Top Kit#	**FODR System LRU Configuration**	**FODR System Maximum Continuous Load**	**FODR System Maximum Intermittent Load (reference)**
93235-01x-220	FODR	0.21 Amps	0.71 Amps
93235-02x-220	FODR + ESAID	0.42 Amps	1.56 Amps

Table 5: FODR System Power Requirements

Refer to Section 14.000 Electrical and Avionics Systems and Section 14.500 Component Loads in the current R44 Maintenance Manual. The modified helicopter total maximum continuous load must not exceed the maximum continuous alternator load applicable to the helicopter to be modified. Table 6 is provided for reference.

System Voltage	**Alternator Rating**	**Maximum Continuous Load**
28V	70 amp	64 amps
28V	130 amp	85 amps

Table 6: Max Continuous Loads

2.5. FODR System R44 Installation Access

Disconnect aircraft battery and plan work safety requirements prior to modification of the aircraft. The required R44 access is the same for all FODR System configurations. Refer to appropriate sections of the Robinson R44 Maintenance Manual and Illustrated Parts Catalog.

2.5.1. R44 Cabin Area

Remove Panels (C474-1 and C474-2) and Trim (C474-3) covering the area between the rear seats and the aft cabin panel, which covers the lower portion of the main rotor system push-pull tubes. Remove LH rear seat back Panel C465-1. Remove RH rear seat back Panel C465-2.

Remove 2 screws on each side of the Instrument Panel Assembly inboard of the pilot and copilot pedals, allowing the Instrument Panel Assembly to hinge up and aft for access.

Access the Circuit Breaker Panel Assembly by removing 10 screws located at the Circuit Panel Assembly forward edge and the copilot under seat storage area.

2.5.2. R44 Belly Area

Remove the Forward Panel (C794-1) and Panel (C794-2 or -3) on the belly.

2.5.3. R44 Engine and Main Gearbox Area

Open all aft cowling access doors. Remove Tailcone Cowling Assembly (C706-1 or -2), which includes Panel (C706-3). Remove the left side engine Cowling Assembly (C377-1).

2.5.4. R44 Mast Fairing

Remove screws on right side of Mast Fairing Assembly (C261-1) to gain access to the pitot drain hole.

2.6. FODR Installation

Install FODR, per 93226 INSTALL FODR, with the following additional instructions.

2.6.1. FODR Mounting Location

Install FODR on the equipment shelf behind the LH rear seat back, on the equipment shelf outboard of the Governor Controller Assembly (D278-1 or -2), centered at R44 Raven II Longitudinal STA 89.0 +/-1", **Butt Line** LBL 18.0 +/-1".

Orient FODR with the FODR pneumatic fittings (pitot, static and manifold pressure) aft, against the firewall, and the "X" arrow graphic (reference Figure 1: FODR LRU), depicted on the upper surface of FODR, pointing aft.

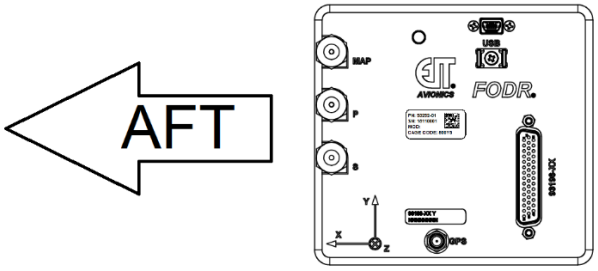

Figure 7: FODR Installed Orientation

2.6.1.1. FODR Drill Template

Verify drill template is to scale. If drawing is not printed to scale, locate drill locations by referenced dimensions on drill template.

Orient the drill template so that the side with 3” hole spacing is installed facing aft and parallel to the firewall, with the FODR chassis outboard of the Governor Controller Assembly (D278-2).

2.6.2. FODR Connections

The FODR LRU interfaces to the rest of the FODR System and the aircraft through three electrical connectors (USB, GPS, and DSUB) and three pneumatic connections. Refer to Section 2.11.4 for more information regarding the electrical connections. See below for additional pneumatic connection information.

2.6.2.1. Pneumatic Connections

The pneumatic installation parts supplied with FODR are nylon Tee compression fittings and nylon tubing. Proper consideration must be given to pneumatic hose routing and minimum bend radii 1 ¼”. When determining tubing length, be sure that the unit can be installed and removed from its mounting location.

Install Tees in the existing pitot and manifold pressure lines located in the main control tunnel between the rear seats, under Panels C474-1 and C474-2. Install Tee in the existing static line located behind LH rear seat back Panel (C465-1). Route and clamp pneumatic tubing with existing bundles to FODR ensuring no interference with aircraft controls or existing systems. Any routing of tubing near rotorcraft controls should make use of existing clamping. Clamping should be either expanded, or replaced as necessary.

2.7. OAT Probe Installation

Install the OAT Probe, per 93255 INSTALL OAT PROBE, with the following additional instructions.

2.7.1. OAT Probe Mounting Location

Install the OAT Probe on the belly of the helicopter, clear of existing heat sources, at R44 Raven II Longitudinal STA 42.0 +/-1”on the Forward Panel (C794-1).

2.7.1.1. OAT Probe Drill Template

Verify drill template is to scale. If drawing is not printed to scale, locate drill locations by referenced dimensions on drill template.

Center the OAT Probe Drill Template 16.25” ±0.25” forward of the aft edge of the Forward Panel (C794-1), on the panel centerline ±0.25”. Orient the OAT Probe Drill Template such that all three holes are aligned with the longitudinal axis of the aircraft.

2.7.2. OAT Probe Connections

The OAT probe interfaces to the FODR System through a single connector. Refer to Section 2.11.4 for more information.

2.8. GPS Antenna Installation

Install the GPS antenna, per 93256 INSTALL GPS ANTENNA, with the following additional instructions.

2.8.1. GPS Antenna Mounting Location

Install the GPS Antenna with a clear view of the sky, a minimum distance of 12” from other antennas, on the top of the fuselage, right side, aft of the aux tank (if installed) at Robinson R44 Longitudinal STA 116.0 +/-1” **Butt Line** RBL 9.5 +/-1”, on Panel (D042-3).

2.8.1.1. GPS Antenna Drill Template

Verify drill template is to scale. If drawing is not printed to scale, locate drill locations by referenced dimensions on drill template.

Center GPS Antenna Drill Template 2 1/8” aft of the forward edge of Panel (D042-3) and 3¾” above access Door (D042-2).

2.8.2. GPS Antenna Connections

The GPS antenna interfaces to the FODR System through a single, coax connector. Refer to Section 2.11.4 for more information.

2.9. ESAID Installation (Optional)

Determine ESAID configuration to be installed, as defined by Top Kit#. Refer to Section 1.2 for reference.

2.9.1. ESAID Panel Mount

Install ESAID, per 93228 INSTALL ESAID PANEL MOUNT, with the following additional instructions.

2.9.1.1. Mounting Location

Install ESAID Panel Mount plate in the upper left 3 1/8" Instrument cut out in the R44 Nine-Instrument Console Assembly at R44 Raven II Longitudinal STA 16.0 +/-1", **Butt Line** LBL 7.0 +/-1" on Face B206-1.

2.9.2. ESAID Bow Mount

Install ESAID, per 93262 INSTALL ESAID BOW MOUNT, with the following additional instructions.

2.9.2.1. Mounting Location

Install ESAID Bow Mount on the windshield bow brace, at R44 Raven II Longitudinal STA 22.0 +/-1", **Butt Line** RBL 0.0 +/-1" on Bow Assembly (C238-2), with ESAID Bow Mount Clamp 4" forward (toward the aircraft nose) of the Compass Mount.

2.9.3. ESAID Surface Mount

Install ESAID, per 93263 INSTALL ESAID SURFACE MOUNT, with the following additional instructions.

2.9.3.1. Mounting Location

Install ESAID Surface Mount on the top of the Pilot's Side Avionics Console, at R44 Raven II Longitudinal STA 27.0 +/-1", **Butt Line** RBL 11.5 +/-1" on the Shell Assembly (D184-1).

2.9.3.2. ESAID Surface Mount Drill Template

Verify drill template is to scale. If drawing is not printed to scale, locate drill locations by referenced dimensions on drill template.

Orient ESAID Surface Mount Drill Template centered on the aft, flat, raised glare shield section of the Pilot's Side Avionics Console with ESAID facing aft and parallel to the aft edge of Shell Assembly (D184-1). Ensure the bottom footprint of the ESAID Bracket is as far aft as possible (towards the pilot seat) but does not impinge on the Shell Assembly Trim or curved areas of the Shell Assembly.

2.9.4. ESAID Connections

The ESAID LRU interfaces to the FODR System with a single, DSUB connector. Refer to Section 2.11.3 for more information.

2.10. Radar Altimeter Installation (optional)

If not already installed, install radar altimeter following radar altimeter manufacturer installation instructions.

2.11. FODR System Wiring Harness Installation

The FODR System Wiring Harness interconnections FODR, ESAID (optional), and radar altimeter (optional) to various aircraft signals, power and ground.

FODR System wiring harnesses are provided with additional length and unterminated leads. If further wiring is required the following wire is recommended: single conductor wire M22759/16-22, two conductor un-shielded M27500-22TG2U, or two conductor shielded M27500-22TG2T14.

The installer must consider what equipment is near the installation of the FODR system. Allow for clearance of the units as well as associated electrical and pneumatic connections and routing. Be aware of routing cables near other electronics or with other wire bundles that may have high energy flow. Avoid sharp bends in cabling or hoses. Avoid routing near aircraft control cables or push rods. Avoid proximity to sources of heat or chafing that could damage wires, hoses or cause undesirable effects. Installers should be aware the above is not a comprehensive list and follow industry accepted practices regarding aircraft wiring and applicable regulatory requirements and guidance.

Follow existing runs and clamping, ensuring no interference with flight controls and existing systems.

The FODR System Wiring Harness Installation depends on the specific FODR System LRU configuration and ESAID mounting configuration. For reference, FODR System configurations are provided in Table 7: FODR System LRU Configurations. For FODR System block diagrams, refer to Section 2.11.1 FODR System Block Diagram. For FODR System Harness pin numbering and wire designations, refer to Section 2.11.2 FODR System Electrical Schematic.

Top Kit#	**FODR System LRU Configuration**
93235-**01**x-220	FODR
93235-**02**x-220	FODR + ESAID

Table 7: FODR System LRU Configurations

IMPORTANT: The FODR System wiring harness routes cables to locations all over the aircraft. Thoroughly read and understand the location information in 93227 and this installation manual, before beginning the harness installation. Configurations that include ESAID require special consideration to incorporate FODR harness wires into the ESAID harness, during routing.

2.11.1. FODR System Block Diagram

The FODR System Block Diagram is used to provide an overview of the FODR System connections. Each harness is composed of a collection of marked cables. Each marked cable contains color-coded wires, with unique wire numbers. The wire numbers are used to associate individual wires to specific cables, found in the block diagram. For example, the ESAID Harness cable marked “93201-01 C4 (W57-W58)” contains wires W57 through W58. The AIRCRAFT SYSTEM CONNECTIONS nomenclature is consistent with RHC R44 Maintenance Manual.

FODR System block diagrams are provided, for reference, in Figure 8, and Figure 9.

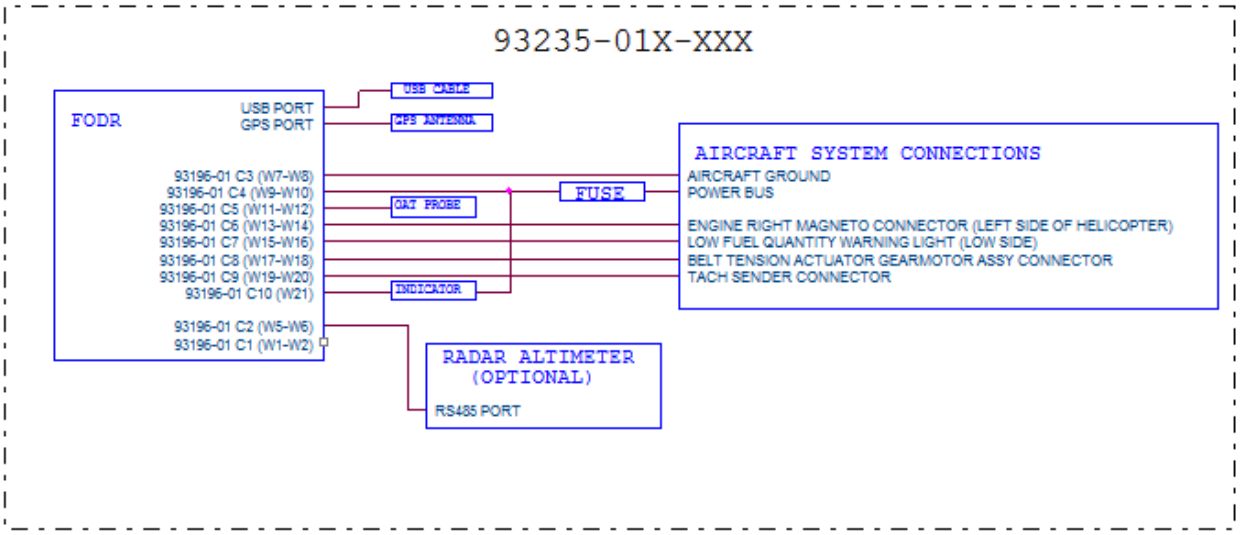

Figure 8: 93235-01X-XXX Block Diagram

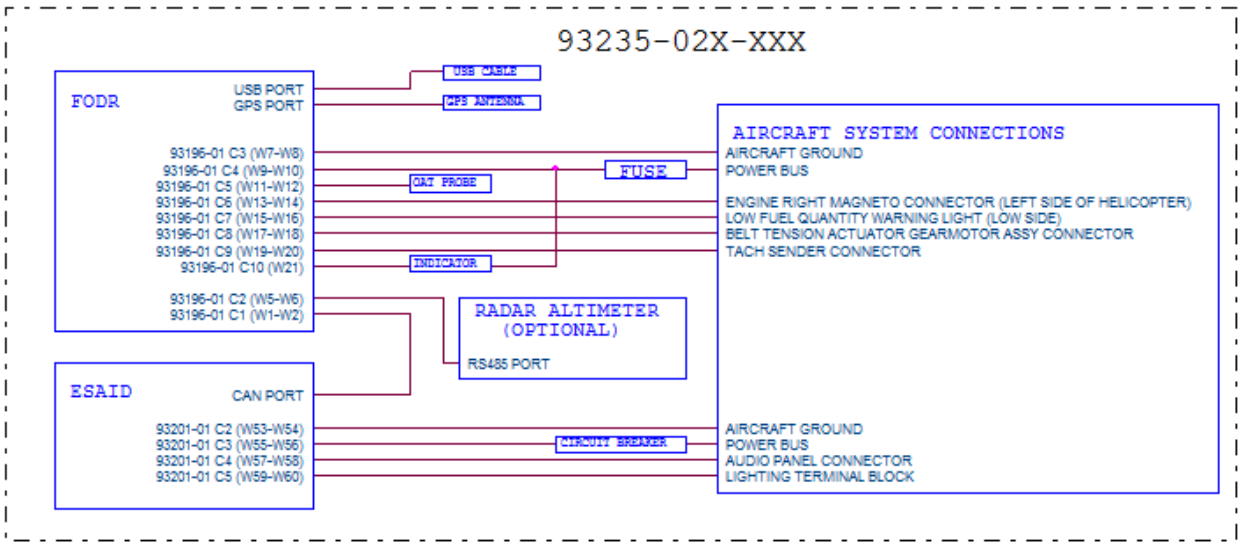

Figure 9: 93235-02X-XXX Block Diagram

2.11.2.FODR System Electrical Schematic

The FODR System electrical connections provide pin numbers and existing aircraft wire numbers, to which the FODR System Harness is to be connected. FODR System electrical schematics are provided in 93227, INSTALL, FODR SYSTEM HARNESS, for reference and use during the FODR System Wiring Harness Installation.

2.11.3.ESAID Wiring Harness Installation (Optional)

Install the ESAID Wiring Harness, per 93227 INSTALL FODR SYSTEM HARNESS, with the following additional instructions. Reference Figure 6 FODR System General Arrangement for general routing detail.

Routing and securing of wires should follow AC43-13-1B chapter 11 section 8-13. Any routing of wires, or bundles, near rotorcraft controls should make use of existing clamping. Clamping should be either expanded, or replaced as necessary.

2.11.3.1. ESAID Circuit Breaker

Locate for use the second position, from the left, in the aft row of the main Circuit Breaker Panel Assembly (C490-8), for the ESAID circuit breaker mounting location.

2.11.3.2. ESAID Ground Connection

Locate for use the ground bus inside the lower console assembly on Panel (C359-2), approximately 16” aft of the windshield on the right side.

2.11.3.3. ESAID Dimmer Connection

Locate the Navigation Lights Switch Assembly (B184-3) and Potentiometer (B398-1) in the center console.

2.11.3.4. ESAID Audio Panel Connection

Locate for use existing audio panel. Connect the ESAID Audio cable to an un-switched audio input on the existing Audio Panel.

2.11.3.5. ESAID Harness Routing

ESAID Harness routing varies, depending on the mounting configuration. If necessary, the ESAID Harness bundle must first be routed from ESAID to inside the Instrument Console. Add wires (refer to 2.11.4.10) from FODR to ESAID routing, prior to installing clamping and cable sleeve. Refer to the following sections 2.11.3.5.1 through 2.11.3.5.3 for specific routing instructions.

2.11.3.5.1. ESAID Panel Mount

Route ESAID harness following existing runs and clamping, allowing harness sufficient length for the Instrument Panel Assembly to hinge up, and aft, for access.

2.11.3.5.2. ESAID Surface Mount

Routing through the instrument console is required. Remove pilot’s side Avionics Console Shell. For the specific hole size and grommet to use, refer to 93227 INSTALL FODR SYSTEM HARNESS.

Locate the hole on the right side Lower Console Assembly on Panel (C359-2), 2.375” (±0.2”) below the top edge of Panel C359-2 and 1.125” (±0.2”) forward of the forward screw hole that secures the Instrument Panel Assembly. Before drilling, ensure this hole location does not conflict with existing mounted equipment.

Ensure FODR wires are incorporated in ESAID wiring harness. (See 2.11.3.5).

Install ESAID Black Cable Sleeving on the ESAID Wiring Harness to cover all portions of the harness visible to the pilot or that might reflect in the windshield.

Route the ESAID harness along the top center of Pilot's Side Avionics Console, to the right side Lower Console Assembly on Panel (C359-2), and through the grommet in the drilled hole.

Secure the harness with at least three (3) cable tie bases: one within 4" of the ESAID backshell, one within 4" of the forward edge of the Pilot's Side Avionics Console, and one 4" (±1") forward of the grommet hole drilled in Panel C359-2. For the specific cable tie bases to use, refer to 93227 INSTALL FODR SYSTEM HARNESS.

Re-install the pilot's side Avionics Console Shell.

2.11.3.5.3. ESAID Bow Mount

Routing through the instrument console is required. For the specific hole size and grommet to use, refer to 93227 INSTALL FODR SYSTEM HARNESS.

Locate the hole on the right side Lower Console Assembly on Panel (C359-2), 2.375" (±0.2") below the top edge of Panel C359-2 and 1.125" (±0.2") forward of the forward screw hole that secures the Instrument Panel Assembly. Before drilling, ensure this hole location does not conflict with existing mounted equipment.

Install one (1) cable tie base 4" (±1") forward of the grommet hole drilled in Panel C359-2, between the hole and windshield.

Figure 10: Grommet and Cable Tie Base Installation

Install three (3) ESAID Bow Mount Cable Clamps on the windshield bow brace: one within 4" of the ESAID backshell, another within 4" of the bottom of the windshield, and locate the middle clamp equally between top and bottom clamps.

Ensure FODR wires are incorporated in ESAID wiring harness. (See 2.11.3.5).

Install ESAID Black Cable Sleeving on the ESAID Wiring Harness to cover all portions of the harness visible to the pilot or that might reflect in the windshield.

Route ESAID harness from ESAID, along center windshield bow, to the right side Lower Console Assembly on Panel (C359-2), and through grommet in the drilled hole. Secure the ESAID Harness to each Bow Mount Cable Clamp and cable tie base.

2.11.3.5.4. ESAID General Routing

Route the ESAID Audio cable with existing bundles from behind the instrument console to the existing Audio Panel.

Route the ESAID Dimmer cable with existing bundles from behind the instrument console to the Navigation Lights Switch Assembly.

Route the ESAID Power cable with existing bundles from behind the instrument console, to the center control tunnel area in the belly, to the area behind the Circuit Breaker Panel Assembly, to the ESAID circuit breaker. Use the access hole, approximately 5" above the Ground Connection, to route to the circuit breaker from the center control tunnel area.

Terminate each wire in the ESAID Power cable with a ring terminal.

Route the ESAID Ground cable with existing bundles from behind the instrument console to the Ground Connection.

Terminate each wire in the ESAID Ground cable with a ring terminal.

2.11.4.FODR Wiring Harness Installation

Install the FODR Wiring Harness, per 93227 INSTALL FODR SYSTEM HARNESS, with the following additional instructions. Reference Figure 6 FODR System General Arrangement for general routing detail. At minimum, all cables are routed with existing bundles from the FODR installation location through an existing hole in the vertical panel, between the compartment in which FODR is installed and the center control tunnel area.

Routing and securing of wires should follow AC43-13-1B chapter 11 section 8-13. Any routing of wires, or bundles, near rotorcraft controls should make use of existing clamping. Clamping should be either expanded, or replaced as necessary.

Refer to each section, below, for routing to specific locations.

2.11.4.1. Aircraft System Connections

2.11.4.1.1. Engine Right Magneto

Locate the Engine Right Magneto connector on the left side of the aircraft.

Route the FODR Engine cable with existing bundles from FODR, to the center control tunnel area, through the existing hole in the vertical firewall, to the Engine Right Magneto connector.

De-pin and remove existing pins at connector, add FODR System wire to existing wires, re-terminate with new pin.

2.11.4.1.2. Low Fuel Quantity Warning Light

Locate the Low Fuel warning light.

Remove the warning and caution light lenses and post light lenses as needed to remove the Instrument Panel Face (B206-1) from Shell Assembly G051-8.

Route the FODR Low Fuel cable with existing bundles from FODR, through the center control tunnel area, to the top of the main instrument panel, to the Low Fuel warning light.

Splice into the existing aircraft wire and extend the ground wire, using a splice, to the aircraft ground bus, located near the back of the Instrument console.

Re-install the Instrument Panel Face in the Shell Assembly.

Re-install warning and caution light lenses and post light lenses.

2.11.4.1.3. Belt Tension Actuator Gearmotor Assembly

Locate the Gearmotor Assembly (D276-1 or -3) connector under the Tailcone Cowling.

Route the FODR ClutchSensor cable with existing bundles from FODR, across the center control tunnel area, behind the RH rear seat back, with existing bundles through the existing hole to the area above the horizontal firewall, along the Welded Frame Assembly, through the Bulkhead Assembly, to the Gearmotor Assembly connector.

De-pin and remove existing pins at connector, add FODR System wire to existing wire, re-terminate with new pin.

2.11.4.1.4. Tach (Rotor) Sender

Locate the Tach Sender Assembly (B320-2) connector under the Tailcone Cowling, near the rotor brake assembly.

Route the FODR Rotor cable with existing bundles from FODR, across the center control tunnel area, behind the RH rear seat back, with existing bundles through the existing hole to the area above the horizontal firewall, to the Tach Sender Assembly connector.

De-pin and remove existing pins at connector, add FODR System wire to existing wire, re-terminate with new pin.

2.11.4.2. FODR Fuse Holder

Locate for use the power bus that supplies power to the circuit breakers.

Install the FODR Fuse holder below the Circuit Breaker Panel Assembly (C490-8) within 3” of the Main Power Bus terminal.

Secure the Fuse Holder to existing bundles, ensuring that the Circuit Breaker Panel Assembly may be installed without crushing, pinching, or damaging existing wires.

Using a white permanent marker pen, mark fuse holder “FODR”.

2.11.4.3. FODR Indicator

Install FODR Indicator on Cyclic Cover Assembly (C444-1, -3, or -5), 1.0” inboard of the right edge, 1.25” aft of the front edge. See Figure 11: FODR Indicator Location. Before drilling, ensure there is no conflict with installed equipment.

Figure 11: FODR Indicator Location

Route the FODR Indicator cable with existing bundles from FODR, through the center control tunnel area, to the installed FODR Indicator.

Terminate the FODR Indicator cable to the FODR Indicator with a splice.

2.11.4.4. FODR Indicator Power Connection

Locate for use the fused side of the FODR fuse holder.

Route the supplied Hookup Wire with existing bundles from the FODR Indicator, to the main instrument console, to the FODR fuse holder.

See section 2.11.4.5 FODR Power Connection for common termination connection to FODR fuse holder.

2.11.4.5. FODR Power Connection

Route the FODR Harness power cable with existing bundles from FODR, through the center control tunnel area, through the access hole to the FODR Fuse Holder located behind the Circuit Breaker Panel Assembly (C490-8). The existing access hole is approximately 5” above the Ground Connection, to route to area behind the Circuit Breaker Panel Assembly.

Terminate both FODR power wires and FODR Indicator Power Connection (reference section 2.11.4.4 FODR Indicator Power Connection) to FODR FuseHolder.

2.11.4.6. FODR Ground Connection

Locate for use the ground post, approximately 12” inboard of the FODR mounting location, on the control rod tunnel.

Route the FODR Harness Ground cable with existing bundles from FODR to the Ground Connection.

Terminate both wires in the FODR Ground cable to one ring terminal.

2.11.4.7. FODR USB Cable

FODR USB port is used for data download only. The FODR USB cable provides the user a field replaceable part to accommodate frequent downloading of FODR USB data. The FODR USB connector is routed to the accessible storage area below the LH rear seat bottom, on the underside of the equipment shelf, and secured to a cable tie base, approximately 2.5” (±0.5”) outboard of the equipment shelf right edge and 3.5” (±0.5”) forward of the vertical firewall, with a serviceable length to allow user USB access.

2.11.4.8. GPS Antenna Connection

Route the GPS Antenna cable with existing bundles from the GPS Antenna, through the center control tunnel area, to FODR.

2.11.4.9. OAT Probe Connection

Route the FODR OAT cable with existing bundles from FODR, through the center control tunnel area, to the OAT Probe. Secure FODR System Harness to ensure no interference with rotorcraft controls, while providing enough serviceable length to allow for removal and installation of the Forward Panel (C794-1).

2.11.4.10. ESAID Communications Bus

Route the FODR CAN cable with existing bundles from FODR, through the center control tunnel area, to the area behind the Instrument Console, to the ESAID LRU.

2.11.4.11. Radar Altimeter Communications Bus

Route the FODR RS485 cable with existing bundles from FODR, through the center control tunnel area, to the radar altimeter.

Secure FODR System Harness to ensure no interference with rotorcraft controls, while providing enough serviceable length to allow for removal and installation of the radar altimeter.

3. Operation

Refer to 93277 FODR SYSTEM PILOTS GUIDE for information regarding system operation. Subsequent sections require operational knowledge of the installed FODR System.

4. Post Installation Checks

Perform Ground Test prior to power on and closing aircraft panels.

4.1. GROUND TEST

4.1.1. Pin to Pin Harness Test

After all terminations are completed, prior to power on, perform PIN to PIN continuity checks at all FODR System connectors on all installed harnesses. Refer to 93227, INSTALL, FODR SYSTEM HARNESS for electrical connections. Correct any discrepancies.

4.1.2. Power and Ground Harness Test

With all FODR System LRU connectors disconnected, check ground connections are present in all specified pins where ground should be present. Close FODR System circuit breakers and check FODR fuse is installed, then Master switch ON. Check all pins ensuring power is present only on pins specified to have power. Refer to 93227, INSTALL, FODR SYSTEM HARNESS for electrical connections. Correct any discrepancies.

4.1.3. Pitot/Static Leak Test

Perform required Pitot/Static leak test procedure, refer to aircraft Maintenance Manual. Note: the Robinson R44 pitot drain hole is located on the bottom of the pitot mast elbow, internal to the Mast Fairing Assembly (C261-1). Correct any discrepancies, and make the required log entry.

4.1.4. FODR System Installation Test

1. If ESAID is installed, close the ESAID circuit breaker.
2. If radar altimeter is installed, close the radar altimeter circuit breaker.
3. Master switch ON.
4. Verify the FODR LRU powers up and both the FODR Indicator on the chassis and the external FODR Indicator blink 5-10 times before becoming steady green.
5. If ESAID is installed, complete steps (6) through (10), and step (11.a).
6. Verify that ESAID displays the part number, software number, software version, aircraft type, and PDIF matching the installation documentation for the applicable make/model aircraft.
7. Select SETTINGS screen, enter 2500 lbs for Gross Weight.
    a. De-select all boxes for optional configuration (DOORS OFF, FIXED FLOATS, etc..).
    b. Verify the audio level can be adjusted to reasonable levels.
8. Observe displayed values, verify valid FODR data is being received by ESAID.
    a. Verify displayed OAT value is close to the existing aircraft OAT probe.

b. Verify manifold pressure reasonably matches the primary manifold pressure gauge.
c. Verify airspeed reasonably matches the primary indicated airspeed gauge.
d. Verify density altitude reasonably matches the density altitude calculated from the primary pressure altitude gauge, OAT gauge, and appropriate POH table
e. If radar altimeter is installed, observe radar altitude display value consistent with manufacturer's performance specifications.
f. Verify INFO screen calculated values reasonably match POH values
g. Verify FLIGHT screen values and limitation ranges reasonably match POH values

9. De-select the Auto Dimming feature.
    a. Verify the display brightness can be manually adjusted to reasonable levels.
10. Select the Auto Dimming feature.
    a. Verify the display brightness automatically adjusts with the NAV lights ON and when panel dimmer is operated.
11. Press the Low Fuel Test button for 10 seconds.
    a. Verify the ESAID Low Fuel Warning Alert is annunciated.
12. If ESAID is not installed, allow FODR to collect data for a total time of at least 1 minute.
13. Master switch OFF.
14. Download the FODR data associated with the above test, using the installed USB cable.
    a. Review the downloaded data.
    b. Verify the Low Fuel signal was recorded.
    c. Verify the OAT value is close to the existing aircraft OAT probe
    d. Verify manifold pressure reasonably matches the primary manifold pressure gauge.
    e. Verify airspeed reasonably matches the primary indicated airspeed gauge.
    f. Verify density altitude reasonably matches the density altitude calculated from the primary pressure altitude gauge, OAT gauge, and appropriate POH table.
    g. Verify time/date matches time of test.

4.2. CLOSE AIRCRAFT for GROUND RUN UP

Perform work inspection and close all areas opened for installation IAW Robinson R44 Maintenance Manual, except access to the FODR fuse under the circuit breaker panel, and access as needed to hookup digital engine tachometer is required. Remove the aft engine cowling if needed. All other work should be completed, all panels closed and all loose items removed.

4.3. GROUND RUN UP, DUAL TACH CHECK and EMI TEST

Install and secure digital engine tachometer such that it can be read near the dual tach during run up. Reference the R44 Maintenance Manual section 6.240 and figure 6-5 for a method of digital engine tach mounting.

Provided all indications are normal, Ground Run Up, Dual Tach Check and EMI Test can be accomplished together.

4.3.1. GROUND RUN UP

1. Move the helicopter to area suitable for ground run up to 102% engine and rotor rpm.
2. Conduct normal preflight, Before Starting Engine, and Starting Engine and Run-Up per the R44 POH.

3. Verify existing systems show normal indications.

4.3.2. DUAL TACH CHECK

Verify the R44 Dual Tach is calibrated with the engine running per the R44 Maintenance Manual section 14.100 using an independent digital tachometer.

1. FODR System OFF: OPEN ESAID BREAKER and REMOVE FODR FUSE from the fuse holder
2. Establish engine rpm per R44 MM section 14.100
3. VERIFY Dual Tach is calibrated using the digital tach reference, Adjust Dual tach if needed per R44 MM section 14.100
4. FODR System ON: CLOSE ESAID BREAKER and INSTALL FODR FUSE in the fuse holder
5. VERIFY Dual Tach is unchanged
6. VERIFY Dual Tach remains calibrated using the digital tach reference

No change between the FODR System OFF and ON condition is permissible to the DUAL TACH indications or calibration. Correct any discrepancies before flight.

4.3.3. EMI TEST

The EMI test is conducted with the engine running.

1. FODR System OFF: OPEN ESAID BREAKER and REMOVE FODR FUSE from the fuse holder.
2. DOCUMENT EMI TEST ITEMS in Table 8 with the FODR SYSTEM OFF.
3. FODR System ON: CLOSE ESAID BREAKER and INSTALL FODR FUSE in the fuse holder.
4. DOCUMENT EMI TEST ITEMS in Table 8 with the FODR SYSTEM ON.

Item No.	Installed Equipment	FODR System	
		OFF condition	ON condition
1	Compass		
2	Transponder		
3	ADF audio		
4	ADF indicator		
5	VOR 1 audio		
6	VOR 1 indicator		
7	VOR 2 audio		
8	VOR 2 indicator		
9	DG slaved		
10	DME audio		
11	DME indicator		
12	Audio panel		
13	Intercom		
14	GPS 1		
15	GPS 2		
16	LOC 1		
17	LOC 2		
18	GS 1		
19	GS 2		
20	COM 1		

Item No.	Installed Equipment	FODR System	
		OFF condition	ON condition
21	COM 2		
22	Rotor Tach		
23	Engine Tach		
24	Marker Beacon audio		
25	Marker Beacon indicator		
26	Noise cancelling headsets		
27	Air Conditioner		
28	Strobes		
29	Nav lights		
30	Landing lights		
31	Engine Governor		
32			
33			
34			
35			
36			

Table 8: Example Equipment List for EMI Test

No change between the FODR System OFF and ON condition is permissible to any EMI test item or any existing aircraft system. Correct any discrepancies before flight.

Perform a post ground run inspection, check for security of installed FODR system components and wiring, correct any deficiencies before flight. Install circuit breaker panel. Install aft engine cowling if removed.

4.4. CLOSE AIRCRAFT

Perform final work inspection and close all areas opened for installation IAW Robinson R44 Maintenance Manual. Update aircraft configuration equipment list and empty weight and center of gravity (lateral and longitudinal). Evaluate, correct and document any required changes to fixed ballast prior to return to service. See Robinson R44 POH section 6 and form 6-2. Complete required Log entries for FODR System installation prior to flight.

4.5. FLIGHT TEST

Ensure required Log entries for FODR System installation are complete prior to flight. The described flight tests, below, may be completed as a single flight.

4.5.1. FODR Flight Test

Observe existing aircraft instruments throughout the flight for normal behavior.

1. Verify free range of motion of controls, prior to flight.
2. Verify required pre-flight checklist is followed, particularly the use of the low fuel warning light test button.
3. Note when the Clutch warning light is active at the beginning and end of the flight, corresponding to the engaging and disengaging of the clutch belt tension actuator gearmotor.

4. Perform at least one normal takeoff.
5. Travel at normal altitudes and cruise speeds.
6. Perform normal pattern maneuvers at least once.
7. Perform at least one normal landing.
8. Note any unusual behavior from any existing aircraft instrument.
9. During flight, log instrument data and time observed as provided in Table 9: FODR Operation Verification (see below). The table provides for an input range that requires any singular observation within this range. Time will be used to located FODR recorded time. Note, minimum performance levels do not indicate system performance levels. Consult 93277, TECH DOC, PILOT GUIDE, FODR SYSTEM for LRU absolute performance.
10. After the flight, download and review the FODR data, verifying that the data is consistent with flight performed. Use Table 9 to verify component operation and minimum performance criteria provided

FODR Operation Verification and Minimum Performance Criteria				
FODR Function	FODR Minimum Performance	Tested Range (any value within this range is acceptable)	Observed Value and time	FODR Recorded Value
Status Input (Low Fuel)	No units, verify operation	Activation of Low Fuel test button		
Time/Date	+/-1 minute	Any (UTC/zulu)		
Manifold Pressure	+/-1 in-Hg	<20in-hg		
OAT	+/-2 degrees C	-20C to +40C		
Density Altitude*	+/-1000 feet	Any		
Air Speed	+/-5 kts	60 to 130kts		
Clutch Belt Tension Actuator Gearmotor	No units, verify operation	Activation of clutch belt tensioner		
Rotor RPM	+/-2%	>60%		
Engine RPM	+/-2%	>60%		
Radar Height (estimate)	***	>5ft		
Latitude/Longitude	+/-1 minute	Note actual Lat/Long		
FODR Chassis Temperature**	-5 to +15C	-20C to +50C		
* Use Pilot's Hand Book for calculation of Density Altitude ** Estimate temperature of FODR installation location. *** Refer to radar altimeter manufacturer's performance specification.				

Table 9: FODR Operation Verification

4.5.2. ESAID Flight Test

4.5.2.1. ESAID Flight Test

Observe existing aircraft instruments throughout the flight to verify normal operation and correlation to ESAID displayed values. ESAID Flight observations may be aided by a video camera, if the camera has high enough resolution to read the instruments for comparison against ESAID.

1. Perform at least one normal takeoff.
2. Travel at normal altitudes and cruise speeds.
3. Perform normal pattern maneuvers at least once.
4. Perform at least one normal landing.
5. Observe behavior during flight:
    a. Verify the airspeed reasonably matches and follows the existing indicated airspeed gauge.
    b. Verify the manifold pressure reasonably matches and follows the existing manifold pressure gauge.
    c. Verify the OAT reasonably matches the existing aircraft OAT.
    d. Verify the VSI reasonably matches the existing aircraft VSI.

4.6. Installation and Test Completion

Log entry FODR System ground and flight test for return to service.

5. Instructions for Continued Airworthiness

For instructions for continued airworthiness, refer to 93338 “Instructions for Continued Airworthiness for EIT Avionics FODR System in Robinson R44 II Rotorcraft”

5.1. Instructions for software updates

Go to www.eitavionics for applicable FODR System software versions and updates.

See 93277, TECH DOC, PILOT GUIDE, FODR SYSTEM for return and warranty information.

6. Installation Troubleshooting Guide

6.1. FODR Troubleshooting Guide.

LRU: FODR **Issue:**	**Possible Causes/Suggested Actions**
FODR Remote Status Indicator not lit	• FODR not powered or functioning. • Remote indicator not powered. • Indicator not connected to FODR, verify cable pin to pin. • Indicator reversed if polarized. Check orientation. • Indicator failed, remove/test/replace.
FODR local status indicator not lit	• FODR not powered. Check power. • FODR not functioning. No user serviceable items, contact to manufacturer.
FODR status light intermittent after ~5 second startup self-test period	• Contact factory for additional guidance
FODR USB data download unsuccessful	• Verify USB cable is attached to FODR. • Retry with known good USB cable • Verify user computer and current application software
Status Input (Low Fuel) not functioning	• Verify connections to low fuel sense location.
Time/Date Inaccurate	• Verify GPS operation, real time clock synchronizes to GPS automatically.
Time/Date Not Functioning	• FODR LRU real time clock battery, return to EIT Avionics.
Manifold Pressure not functioning	• Verify pneumatic connection to manifold.
OAT not functioning	• Verify connection to OAT probe. • Verify within operating temperature range.
Density Altitude not functioning	• Verify OAT probe operation. • Verify pneumatic connection to static pressure. • Verify static pressure operation.
Air Speed not functioning	• Verify pneumatic connections to pitot and static pressure.
Clutch Belt Tension Actuator not functioning	• Check wiring to clutch belt tension actuator gearmotor.
GX/GY/GZ not functioning	• FODR not operable, contact factory
Rotor RPM not functioning	• Confirm wiring to rotor sensor.
Engine RPM not functioning	• Confirm wiring to engine sensor.
Radar Height not functioning	• Confirm radar altimeter connection and wiring • Check radar altimeter manufacturer installation guide.
Latitude/Longitude not functioning	• Confirm GPS antenna connection to FODR. • Confirm GPS has clear view of sky and GPS satellite constellation. • GPS may require a few minutes to acquire a lock.
FODR Chassis Temperature	• FODR not operable, contact factory.

Table 10: FODR Trouble shooting Guide

6.2. ESAID Troubleshooting Guide

LRU: ESAID **Issue:**	**Possible Causes/Suggested Actions**
ESAID display blank or corrupted	• Verify ESAID has power. • Verify display dimmer is disabled. • With ESAID off, pushing (holding) the lower right corner of the touch screen display, turn ESAID power on. This will reset the ESAID to default settings.
ESAID startup unsuccessful	• ESAID not functioning. No user serviceable items, contact manufacturer.
ESAID touchscreen not functioning or erratic	• ESAID not functioning. No user serviceable items, contact manufacturer.
ESAID data value appears as "---"	• FODR not providing valid data. Trouble shoot FODR.
ESAID alerts not audible	• Verify ESAID volume setting. • Verify audio panel is correctly configured for ESAID output. • Check audio wiring.
ESAID Density Altitude value appears high or low	• Verify OAT temperature provided on ESAID. Refer to FODR debugging if inaccurate.
ESAID parameter(s) appear inaccurate	• Refer to FODR debugging if inaccurate.

Table 11: ESAID Trouble shooting Guide