



U.S. Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION (Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020
2/28/2011

Electronic Tracking Number

For FAA Use Only

INSTRUCTIONS: Print or type all entries. See Title CFR §43.9, Part 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. §44701). Failure to report can result in a civil penalty for each such violation (49 U.S.C. §46301(a)).

1. Aircraft	Nationality and Registration Mark N87567	Serial No. 129		
	Make Sky Enterprises (Republic), Inc	Model RC-3 Seabee	Series	
2. Owner	Name (As shown on registration certificate) KC Ostronik	Address (As shown on registration certificate) Address P.O. Box 371101		
		City Key Largo	State FL	Zip 33037
3. For FAA Use Only				

"The technical data identified herein has been found to comply with applicable airworthiness requirements and is hereby approved for use only on the above described aircraft, subject to conformity inspection by a person authorized in FAR 43.7"

FAA APPROVED, EA-F800-61

James R. Deane, P.A.F.
DATE: 5-4-2016

4. Type		5. Unit Identification			
Repair	Alteration	Unit	Make	Model	Serial No.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	AIRFRAME		(As described in item 1 above)	
<input type="checkbox"/>	<input type="checkbox"/>	POWERPLANT			
<input type="checkbox"/>	<input type="checkbox"/>	PROPELLER			
<input type="checkbox"/>	<input type="checkbox"/>	APPLIANCE	Type		
			Manufacturer		

6. Conformity Statement

A. Agency's Name and Address		B. Kind of Agency	
Name	Timothy P Howard, Stick'n Rudder Aero Maintenance, Inc	<input checked="" type="checkbox"/>	U.S. Certificated Mechanic
Address	240 George Ryder Rd.		Foreign Certificated Mechanic
City	Chatham State MA	C. Certificate No.	
Zip	02833 Country USA	2854191	
		Certificated Repair Station	
		Certificated Maintenance Organization	

D. I certify that the repair and/or alteration made to the unit(s) identified in item 5 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

Extended range fuel per 14 CFR Part 43 App. B <input type="checkbox"/>	Signature/Date of Authorized Individual <i>[Signature]</i> 5/6/16
------------------------------------------------------------------------	----------------------------------------------------------------------

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in item 5 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is APPROVED REJECTED

BY	FAA Fil Standards Inspector	Manufacturer	Maintenance Organization	Persons Approved by Canadian Department of Transport
	FAA Designee	Repair Station	<input checked="" type="checkbox"/>	Inspection Authorization
Certificate or Designation No. 2854191		Signature/Date of Authorized Individual <i>[Signature]</i> 5/6/16		

NOTICE

Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

N87567

Nationality and Registration Mark

5/6/16

Date

Installed King KRA 10/10A Radar Altimeter System per FAA Form 8110-3 dated Sept 21, 2014 & document # SEABEEALT-RA, Rev. IR, dated 09/18/2014 titled "Alteration to install radar altimeter system on Sky Enterprises, Inc (Republic) RC-3 Seabee serial number 129" Section 3 (Installation Instructions) & Bendix / King Manual 006-00152-0003, Rev 3.

Altimeter head installed in available lower RH instrument panel holes and antenna installed in RH wing using methods outlined in above documents and standard practices in AC 43 13-2B chapters 3 & 11

Ship weight and balance and equipment list amended to reflect this installation.

Instructions for continued airworthiness are found on Page 8 of above Form 8110-3 Copy attached.

Electrical load analysis shows that this installation does not exceed 80% of total system capacity.

Aircraft flight manual updated with supplement from document # SEABEEALT-RA, Rev. IR, 09/18/2014 regarding this installation. Copy attached.

Instructions for Continued Airworthiness:

- 1) **Introduction:** King KRA 10/10A Radar Altimeter system installed in RC-3 Seabee to provide supplemental information to the primary altimeter to aid in water landings, especially in glassy water conditions.
- 2) **Description:** King KRA 10/10A Radar Altimeter indicator head and converter installed in/behind pilot instrument panel with antenna mounted in the RH outboard wing as shown on pgs 7-8 of Doc. # SEABEEALT-RA, Rev IR, 09/18/2014.
- 3) **Control:** see pg 10 of above document # SEABEE-RA, Rev. IR, 09/18/2014 and attached Airplane Flight Manual Supplement (AFMS)
- 4) **Servicing Information:** see pg 9 of above doc # SEABEEALT-RA, Rev IR, 09/18/2014. Copy attached.
- 5) **Maintenance Information:** On Condition, see pg 9 of above doc # SEABEEALT-RA, Rev IR 09/18/2014. Copy attached
- 6) **Troubleshooting Information:** N/A
- 7) **Remove and Replacement:** Parts and repairs can be procured from Bendix/King authorized avionics shops
- 8) **Diagrams:** See pg 8 of doc # SEABEEALT-RA, Rev IR, 09/18/2014, antenna position
- 9) **Special Inspection Requirements:** N/A
- 10) **Application of Protective Treatments:** N/A
- 11) **Data:** N/A
- 12) **List of Special Tools:** N/A
- 13) **For Commuter Category Aircraft:** N/A
- 14) **Recommended Overhaul Limits:** No additional overhaul time limits
- 15) **Airworthiness Limitation Section:** No additional airworthiness limitations
- 16) **This ICA may be revised by submitting a letter with a copy of the revised 337 form and ICA. The FAA accepts the change by signing block 3 of the revised 337 form. Once revised, a maintenance entry will be made identifying the revision, it's location, and the date of the 337 form.**

END

Additional Sheets Are Attached

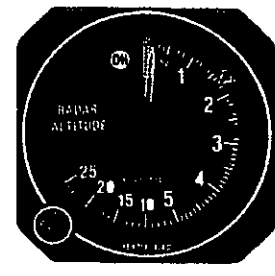
KC Ostronik Owner
 STOL (REPUBLIC) MODEL: RC-3
 SERIAL NUMBER: 129
 FAA REGISTRATION: N87657



**AIRCRAFT FLIGHT
 MANUAL
 SUPPLEMENT (AFMS)
 for the BendixKing
 KRA 10/10A Radar
 Altimeter as installed
 on the STOL
 (Republic) RC-3
 aircraft**



**DOCUMENT NO.:
 SEABEEALT-RA-AFMS**



REVISION 1
 January 20, 2016

Robert G. Mann 2-1-16
 Robert G. Mann, Manager Date
 Boston Aircraft Certification Office
 1200 District Avenue
 Burlington, MA 01803



Digitally signed by Tracy Ourhaan
 DN cn=Tracy Ourhaan, o=DERS Group
 Svc LLC, ou, email=Tourhaan@DERS-
 Group.com, c=US
 Location: Savannah, GA
 Date: 2016.01.20 23:32:26 -05'00'

01/20/16
 Applicant Project Manager Date
 Tracy Ourhaan
 FAA Consultant DER, Chart B & E
 DERS Group Svc LLC
 144 Grays Creek Dr.
 Savannah, Georgia 31410

The designs and data shown and described in this document contain certain features which have been developed in support of a standard installation of a PMA Radio Altimeter, Model KRA 10/10A, manufactured by Honeywell (Formerly AlliedSignal Aerospace, BendixKing) on a STOL (Republic) RC-3 aircraft. This Data shall not be disclosed outside the immediate recipient, or be duplicated, used or disclosed in whole or in part for any purpose other than that for which it is supplied. All use, sales, and reproduction rights are the property of DERS Group Svc LLC and the disclosure herein does not imply transfer or relinquishment of these rights

RC-3-Radar Altimeter Aircraft Flight Manual Supplement

RECORD OF REVISIONS

REVISION	DATE	PURPOSE	AUTHOR	APPROVAL BY
IR	09/18/14	Initial Release	JRG	TRO
A	01/03/16	Incorporate FAA recommended changes	TRO	TRO
B	01/20/16	Move FAA Approval Signature to front Page of Document and add Initial Location for FAA to each page thereafter per Guidance from Michael Davison, Flight Test Engineer, Aircraft Certification Service Engine & Propeller Directorate - Engine Certification Office, Boston Aircraft Certification Office.	TRO	TRO

GENERAL NOTE:

This Aircraft Flight Manual Supplement (AFMS) must be attached to the FAA approved Aircraft Flight Manual when the STOL (Republic) RC-3 S/N 129 aircraft is modified by with the installation of a Honeywell KRA 10/10A Radar Altimeter per Document No. SEABEEALT-RA. The information provided in this manual, supplement or supersedes the information of the basic Airplane Flight Manual to the operator, only in areas listed.

For all other information not listed in this document consult the basic FAA approved Airplane Flight Manual.

Reference. SEABEEALT-RA, Alteration to install a Radar Altimeter on a Republic STOL (Republic) RC-3, s/n 129, Rev. IR, Dated 18 SEP 2014 or later revision.

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2 SYSTEM OPERATION

2.1 KI 250 PREFLIGHT

- a) Turn ON primary power.
- b) Set DH bug to OFF.
- c) Depress and hold DH/Self test knob.
 - a. Indicated altitude should be 50 ±5 feet.
 - b. DH lamp should be OFF.
- d) Keep DH self test knob depressed and slowly turn it CW. When DH bug brackets the pointer.
 - a. The DH lamp should light.
 - b. A two second audio tone should sound (if connected).
- e) Release DH self test knob.

Normally the DH lamp will go out and the pointer will move CW behind the mask. However, strong reflections from nearby objects may cause pointer to remain in view. This does not indicate system malfunction.

- f) During takeoff the KRA 10A system will lock on soon after the aircraft reaches 50 feet of altitude (AGL). The DH lamp will illuminate if the DH bug set above the lock on altitude. However the audio tone will not sound unless the DH bug set above 500 feet. In the case where the DH bug is set anywhere between 500 feet and 2500 feet a short "Beep" may be heard as the pointer passes through the DH setting when climbing (ascending).

2.2 KI 250 IN FLIGHT

- a) The pointer will indicate AGL altitude from approximately 20 feet to 2500 feet, but the accuracy is 50 feet to 2000 feet.
- b) Above 2500 feet or when ground reflection no longer sufficient for the KRA 10/10A to track, the pointer will move CW behind the mask.
- c) Pointer will move CCW to the OFF position if the primary power is lost.
- d) When altitude is below DH setting DH lamp will come on.
- e) The audio tone will sound for 2 second each time the DH lamp comes on.

2.3 KI 250 APPROACH

- a) Prior to approach the DH bug should be set to desired altitude.
- b) Depress DH/Self-test knob and hold.
 - a. The pointer should indicate 50 (±5) feet.
 - b. The DH setting is above 55 feet the DH lamp and audio should be activated.
- c) Release DH/Self-test knob.

The system should return to normal operation.
- d) When the selected DH reached, the DH audio will sound 2-second tone and the DH lamp will light. The DH lamp will remain on until the aircraft descends to the approximate 20 feet AGL (the pointer then CW behind the mask), or until the aircraft climbs approximately 20 feet above DH setting.

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3 Limitations

No change.

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Flight Manual Supplement

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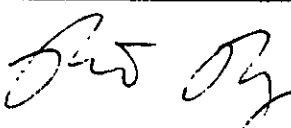
4 Emergency Procedures:

No change.

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5 Performance

No Change.

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION STATEMENT OF COMPLIANCE WITH AIRWORTHINESS STANDARDS			1 DATE September 21, 2014
AIRCRAFT OR AIRCRAFT COMPONENT IDENTIFICATION			
2 MAKE Sky Enterprises, Inc	3 MODEL NO RC-3	4 TYPE (Airplane, Engine, Propeller etc) Airplane	5 NAME OF APPLICANT KC Ostronic
LIST OF DATA			
6 IDENTIFICATION	7 TITLE		
SEEBEEALT-RA, Rev IR, Dated September 18, 2014	Alteration to Install Radar Altimeter system on Republic Sky Enterprises, Inc (Republic) RC-3 Serial Number 129 Notes: What the DER is approving. This approval is for engineering design data only. It indicates the data listed above demonstrates compliance only with the regulations specified by paragraph and subparagraph listed below as "Applicable Requirements." This form does not constitute FAA approval of all the engineering data necessary for substantiation of compliance to necessary requirements for the entire alteration/repair. What the DER cannot approve. The approval of Instructions for continued airworthiness is retained by the FAA. However, the ICA has been reviewed by the DER and it appears to satisfy the requirements. The ICA mimics those previously approved ICA for an identical installation on a different serial numbered RC-3 Aircraft. Rules excluded None Rules cited by Applicant and Not DER findings Compliance with additional regulations not listed here may be required ***END***		
8 PURPOSE OF DATA To provide approval of engineering data in support of a major alteration to RC-3 Seebee S/N 129, N87567, for the addition of a supplemental radar altimeter system installation			
9 APPLICABLE REQUIREMENTS (List specific sections) 14 CFR §§ 23.601 [23-0], 23.603 (b) [23-23], 23.609 [23-0], 23.611 [23-48], 23.1301 [23-62], 23.1309 (a) (2) [Amdt.23-61], 23.1321 (a) (d) [23-49], 23.1351 (a) (b) (1) [Amdt.23-49], 23.1365 [23-49]			
10 CERTIFICATION - Under authority vested by direction of the Administrator and in accordance with conditions and limitations of appointment under 14 CFR Part 183, data listed above and on attached sheets numbered <u>N/A</u> have been examined in accordance with established procedures and found to comply with applicable requirements of the Airworthiness Standards listed <input type="checkbox"/> Recommend approval of these data I (We) Therefore <input checked="" type="checkbox"/> Approve these data			
11. SIGNATURE(S) OF DESIGNATED ENGINEERING REPRESENTATIVE(S)  Robert Ray	12 DESIGNATION NUMBERS(S) DERT-405146-CE	13 CLASSIFICATION(S) Systems and Equipment, Electrical, Chart C2 Part 23 A1, A2, A4, A5	

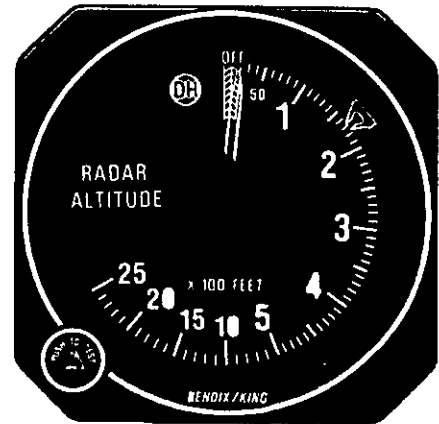
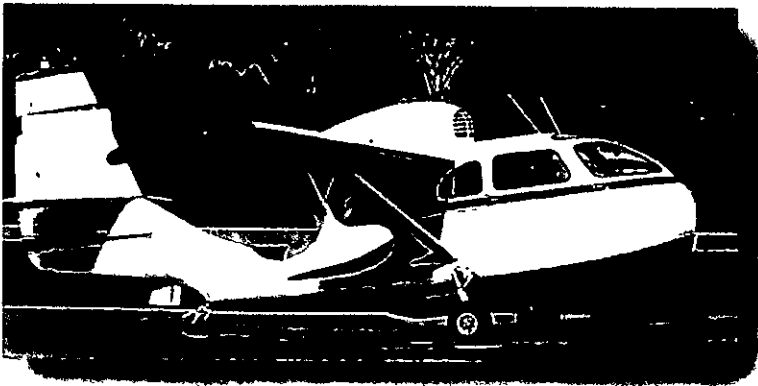
KC OstroniK Owner
SKY ENTERPRISES, INC. (REPUBLIC)
MODEL: RC 3
SERIAL NUMBER: 129
FAA REGISTRATION: N87657

Alteration to install a
Radar Altimeter on a
Republic Sky
Enterprises, Inc.
(Republic), RC-3 S/N
129



DERS Group Svc LLC

DOCUMENT NO.: SEABEEALT-RA
REVISION: IR
September 10, 2014



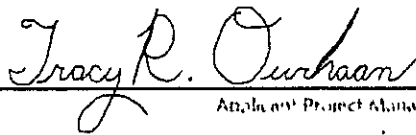
KC OstroniK, owner of the aircraft proposes a one-time alteration to his Republic RC-3 aircraft for the installation of Radar Altimeter system.

The designs and data shown and described in this document contain certain features which have been developed by owner of the aircraft KC OstroniK and shall not be disclosed outside the immediate recipient, or be duplicated, used or disclosed in whole or in part for any purpose other than that for which it is submitted. All use, sales, and reproduction rights are the property of KC OstroniK and the disclosure herein does not imply transfer or relinquishment of these rights

RC-3-Radar Altimeter Installation

RECORD OF REVISIONS / SIGNATURES

REVISION	DATE	PURPOSE	AUTHOR	APPROVAL BY
IR	09/18/2014	Initial Release	JRG	TRO


Tracy R. Ourbaan
Analyst/Project Manager


TRO
Project Engineer

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RC-3-Radar Altimeter Installation

1 INTRODUCTION

1.1 General

This Compliance Summary Report document provides the description for a one-time alteration to a Republic RC-3 aircraft. This document includes alteration description, purpose, proposed certification basis, compliance finding, safety assessment and compliance demonstration.

1.2 Scope

The Republic RC-3 aircraft is an amphibious aircraft powered with a 6 cylinder horizontally opposed 215 hp. 6A8-215-B9F engines. Mr. KC Ostronik owner of the aircraft proposes this one time alteration for installation of a Radar Altimeter and associated system. The alteration includes a Bendix/King KRA 10/10A Radar Altimeter system installation, which is manufactured by Honeywell International Inc. formerly known as AlliedSignal Aerospace.

The Radar Altimeter provides the above-ground-level (AGL) altitude i.e. height of the aircraft from the ground or from an object, such as a tower or a building. This supplemental information provided to the pilot in addition to the primary altitude altimeter. The KRA 10/10A Radar Altimeter system provides the AGL altitude information from 20 feet to 2500 feet. This additional information assists the pilot during landings and minimizes the effects of hard landings that can occur with fluctuating analog altimeter readings.

The applicant KC Mr. Ostronik has contracted DERS Group Svc LLC. (DERS Group) located at 144 Grays Creek Drive, Savannah, Georgia 31410, to act as its agent and manage this certification project and provide the FAA with all necessary documentation in support of this alteration.

This is a one time alteration and only applicable to the below specified aircraft serial number:

1.2.1 Table 1 – Applicability

AIRCRAFT / ENGINE MAKE	AIRCRAFT/ENGINE MODEL	TCDS	AIRCRAFT/ ENGINE S/N
Sky Enterprises, Inc. (Republic)	RC -3 (Seabee)	A-769	129
Franklin Sp. z.o.o.	6AB-215-B9F	E-242	--

2 SYSTEM DESCRIPTION:

The applicant has proposed to install a Bendix/King KRA 10/10A Radar Altimeter system, which consists of,

1. KA 131 Radar Altimeter Antenna installation kit

This kit includes 2 types of Antennas as follow,

- I. KA 131-00 – Designed for mounting surfaces parallel with the ground within $\pm 6^\circ$
- II. KA 131-01 – Designed for mounting surfaces that form angles from 6° to 20° with the ground (i.e. tail section of most aircraft).

2. Radar Altimeter Receiver/Transmitter (R/T) installation kit

This kit includes 2 types of R/T as follow,

- I. KA 10 R/T – Supply analog altitude information.
- II. KA 131-01 – Supply analog altitude information and has an optional altitude inhibit function.

3. KA 250 Radar Altimeter Indicator installation kit (Optional)

This kit includes 4 types of indicator as follow,

- I. 5V white lighting
- II. 5V red lighting
- III. 14V to 28V white lighting
- IV. 14V to 28V red lighting

4. KA 133 Radar Altimeter 14V to 28V Converter installation kit (Optional)

The current installation on the RC -3 (Seabee) aircraft S/N 129 includes, a KA131-00 antenna and KA 10 R/T. The RC -3 S/N 129 is equipped with the 28V electrical system and is eligible for the installation of any of the indicator listed above. The 28V electrical system also eliminates the installation of optional 14V to 28V Converter.

The KRA 10/10A Radar Altimeter system comes with the Installation Manual, Manual Number- 006-00152-0003, Revision 3, dated November 1985. This installation manual contains the system description, technical specifications of equipment's, installation instructions and operation instructions.

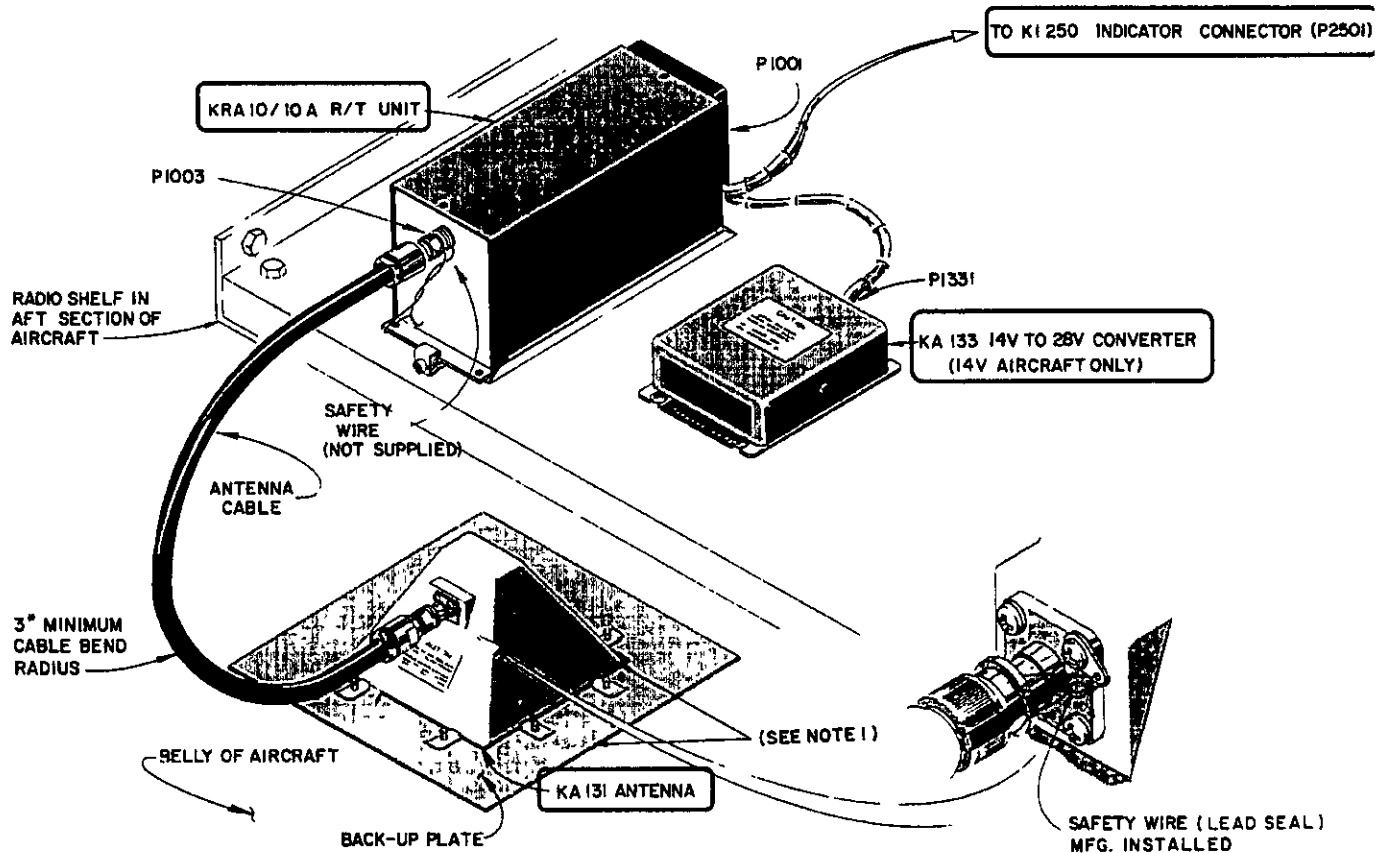
Refer SECTION I of the manual 006-00152-0003 for system description and technical specifications of equipment's.

The manual 006-00152-0003 will be separately provided with this report.

RC-3-Radar Altimeter Installation

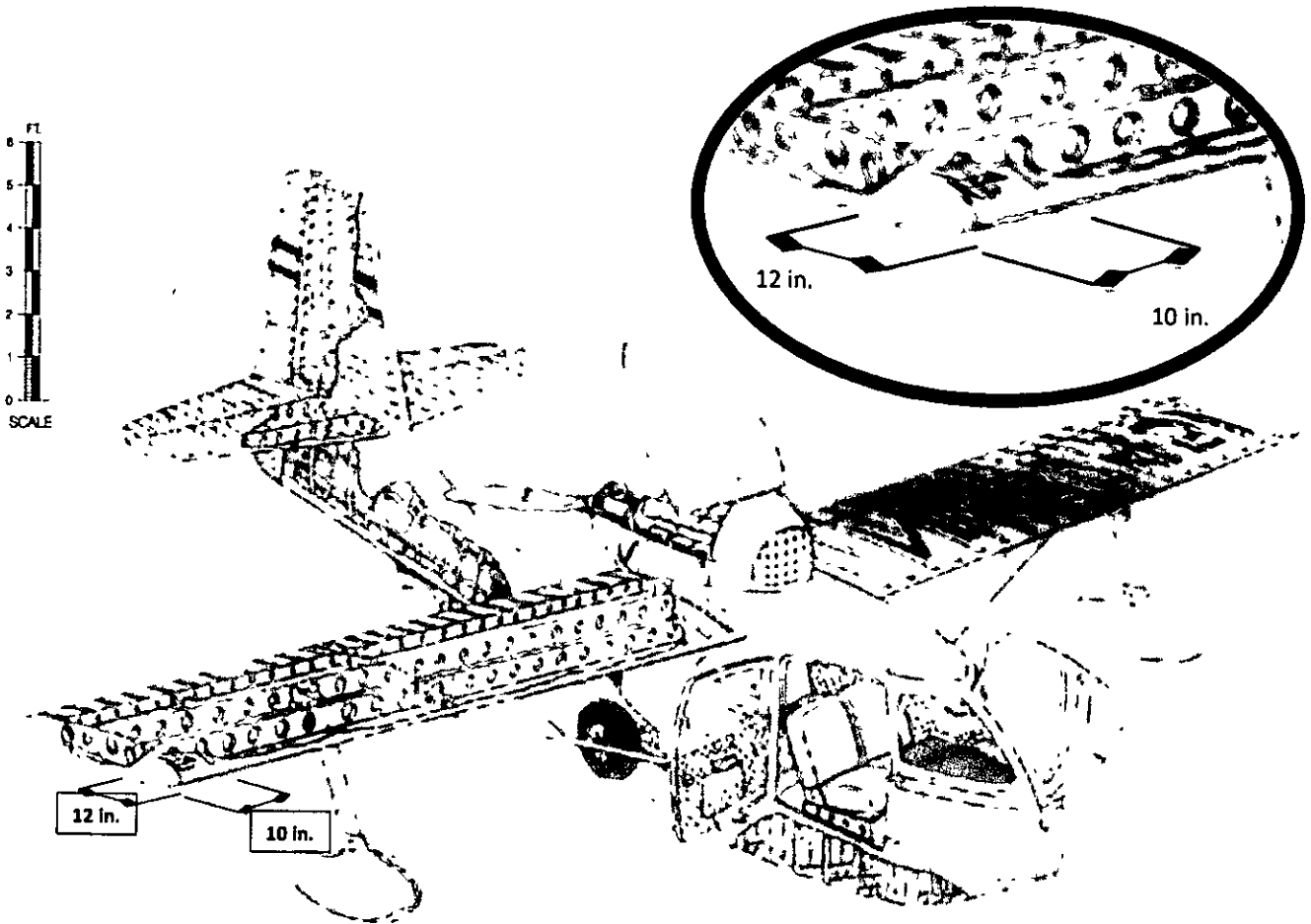
3 INSTALLATION INSTRUCTIONS

The SECTION II of the manual provides detailed installation instructions for all of the kits of the radar altimeter system. SECTION II also provides the unpacking, inspection and post installation instructions. A typical KRA 10/10A System installation layout is as shown below.



The installation location chosen for the R/T and Antenna on RC-3, satisfies the installation requirements mentioned in the installation manual. The antenna is mounted on the right wing from inside, 10-inch inboard of the wing tip and 12-inch aftward of the wing leading edge as shown below.

RC-3-Radar Altimeter Installation



Refer SECTION 2.3.2, 2.3.3, 2.3.4 2.3.5 and 2.3.6 of the manual for detailed installation instructions.

3.1 Instructions for Continued Airworthiness (ICA)

The manual 006-00152-0003, Revision 3 does not provide any maintenance instructions. Upon enquiry raised by DER Tracy Ourhaan dated September 15, 2014 to the BendixKing technical support team, it is understood that the most of the BendixKing equipment are 'On-Condition' (OC) repair or maintenance. Refer to Appendix A for the email from the BendixKing technical support team.

Considering the fact that the KRA-10/10A is an old published document hence it does not include the OC statement.

RC-3-Radar Altimeter Installation

The FAA AC 120-17A identifies the primary maintenance processes utilized by maintenance programs, and 'On-Condition' is one of them. OC is a preventive primary maintenance process which require that an appliance or part periodically inspected or checked against some appropriate physical standard to determine whether it can be continue n service. The purpose of the standard is to remove the unit from service before failure during normal operation occurs.

Considering the above facts it is concluded that the KRA 10/10A Radar Altimeter system does not require special ICA as it is 'On-Condition' maintenance.

4 OPERATING INSTRUCTIONS

The SECTION III of the manual provides instructions for installed radar altimeter system operation during preflight, in-flight, approach phases of the flight. This section also provides the altimeter system indicator factory setting and re-setting information.

All of this information has been embedded into a separate Airplane Flight Manual Supplement (AFMS). This AFMS will be supplied with this Compliance Summary Report.

RC-3-Radar Altimeter Installation

5 REGULATORY

5.1 Original Certification Basis

The Original Type Certification Basis are listed under:

- Aircraft TCDS – CAR 03 effective 13 November 1945, A-769 Rev. 15, TCH. Sky Enterprises, Inc.
- Engine TCDS – CAR 13, E-242 Rev 6 - TCH: Franklin Sp. z.o.o.

5.2 Determination of Significance

This alteration to the aircraft is considered to be a 'Major Alteration' as this alteration is not listed in the aircraft, engine or propeller specifications issued by the OEM. For this alteration the use of current regulations was used for compliance demonstration, hence further classification of alteration as Significant or Non-significant has not been performed.

5.3 Proposed Certification Basis

Applicable Part 23 regulations at current amendment levels as dated on 18 September 2014.

5.4 Compliance Checklist

Below are the rules governing the compliance applicable to this alteration.

5.4.1 Table 2 – Compliance Checklist

14 CFR	AMDT.	DESCRIPTION
23.601	Orig.	General
23.603 (b)	23-23	Materials and workmanship
23.609	Orig.	Protection of structure
23.611	23-48	Accessibility [provisions.]
23.1301	23-62	Function and installation
23.1309	23-62	Equipment, systems, and installations
23.1321 (a)(d)	23-49	Arrangement and visibility.
23.1351 (a)(b)(1)	23-49	General
23.1365	23-49	Electric cables and equipment

5.5 Compliance Demonstration

This section demonstrates the compliance with the each of applicable rule.

5.5.1 Sec. 23.601 Design and Construction: General

The suitability of each questionable design detail and part having an important bearing on safety in operations, must be established by tests.

Amdt. Orig., Eff 02/01/65

5.5.1.1 Evidence

The installation of the radar altimeter system provides the AGL altitude information, which is supplemental to the altitude information provided by the existing primary altimeter instrument and hence does not have important bearing on safety

operation of aircraft. This is also demonstrated by the Safety Assessment provided in the Section 6 of this report. Therefore, it is concluded that the radar altimeter system installation on RC-3 S/N 129 is in compliance with § 23.601.

5.5.2 23.603 (b) Design and Construction: Materials and workmanship

[(a) The suitability and durability of materials used for parts, the failure of which could adversely affect safety, must--

(1) Be established by experience or tests;]

(2) Meet approved specifications that ensure their having the strength and other properties assumed in the design data; [and

(3) Take into account the effects of environmental conditions, such as temperature and humidity, expected in service.]

(b) Workmanship must be of a high standard.

Amdt. 23-23, Eff. 12/01/78

5.5.2.1 Evidence

The installation of the radar altimeter system provides the AGL altitude information, which is supplemental to the altitude information provided by the existing primary altimeter instrument and hence does not have important bearing on safety operation of aircraft. This is also demonstrated by the Safety Assessment provided in Section 6 of this report. The detailed technical description and installation instructions provided in the manual 006-00152-0003 ensures that the system is installed correctly using the highest standard of workmanship. Therefore, it is concluded that the radar altimeter system installation on RC-3 S/N 129 is in compliance with § 23.603(b).

5.5.3 Sec. 23.609 Design and Construction: Protection of structure.

Each part of the structure must--

(a) Be suitably protected against deterioration or loss of strength in service due to any cause, including--

(1) Weathering,

(2) Corrosion; and

(3) Abrasion; and

(b) Have adequate provisions for ventilation and drainage

Amdt. Orig., Eff. 02/01/65

5.5.3.1 Evidence

The Antenna and R/T units of the radar altimeter system are installed from inside of the bottom skin of the right wing of aircraft. The indicator is also installed from inside of the aircraft, which ensures protection of all of the components of system from weathering, corrosion. The installation instruction provided in the manual 006-00152-0003 also ensures that none of the component interferes with any other existing adjacent components and is accessible for maintenance, inspection, or other servicing. Therefore, it is concluded that the radar altimeter system installation on RC-3 S/N 129 is in compliance with § 23.609.

5.5.4 Sec. 23.611 Design and Construction: Accessibility [provisions].

[For each part that requires maintenance, inspection, or other servicing, appropriate means must be incorporated into the aircraft design to allow such servicing to be accomplished.]

Amdt. 23-48, Eff. 03/11/96

5.5.4.1 Evidence

The Antenna and R/T units of the radar altimeter system are installed from inside of the bottom skin of the right wing of aircraft. The indicator is also installed from inside of the aircraft, which ensures protection of all of the components of system from weathering, corrosion. The installation instruction provided in the manual 006-00152-0003 also ensures that none of the component interferes with any other existing adjacent components and is accessible for maintenance, inspection, or other servicing. Therefore, it is concluded that the radar altimeter system installation on RC-3 S/N 129 is in compliance with § 23.611

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5.5.5 Sec. 23.1301 Equipment: Function and installation.

Each item of installed equipment must--

- (a) Be of a kind and design appropriate to its intended function;
- (b) Be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors; and
- (c) Be installed according to limitations specified for that equipment.

Amdt. 23-62, Eff. 01/31/12

5.5.5.1 Evidence

The installation of the radar altimeter system provides the AGL altitude information, which is supplemental to the altitude information provided by the existing primary altimeter instrument. The detailed technical description and installation instructions provided in the manual 006-00152-0003 ensure that the system is installed correctly using the highest standard of workmanship, which ensures that the system performs its intended function. Therefore, it is concluded that the radar altimeter system installation on RC-3 S/N 129 is in compliance with § 23.1301.

5.5.6 Sec. 23.1309(a)(2) Equipment: Equipment, system and installation.

The requirements of this section, except as identified in paragraphs (a) through (d), are applicable, in addition to specific design requirements of part 23, to any equipment or system as installed in the airplane. This section is a regulation of general requirements and does not supersede any requirements contained in another section of part 23.

- (a) The airplane equipment and systems must be designed and installed so that:
 - (1) Those required for type certification or by operating rules perform as intended under the airplane operating and environmental conditions, including the indirect effects of lightning strikes.
 - (2) Any equipment and system does not adversely affect the safety of the airplane or its occupants, or the proper functioning of those covered by paragraph (a)(1) of this section.
- (b) Minor, major, hazardous, or catastrophic failure condition(s), which occur during Type Inspection Authorization or FAA flight- certification testing, must have root cause analysis and corrective action.
- (c) The airplane systems and associated components considered separately and in relation to other systems, must be designed and installed so that:
 - (1) Each catastrophic failure condition is extremely improbable and does not result from a single failure;
 - (2) Each hazardous failure condition is extremely remote, and
 - (3) Each major failure condition is remote.
- (d) Information concerning an unsafe system operating condition must be provided in a timely manner to the crew to enable them to take appropriate corrective action. An appropriate alert must be provided if immediate pilot awareness and immediate or subsequent corrective action is required. Systems and controls, including indications and annunciations, must be designed to minimize crew errors which could create additional hazards.

Amdt. 23-62, Eff. 01/31/12

5.5.6.1 Evidence

The installation of the radar altimeter system provides the AGL altitude information, which is supplemental to the altitude information provided by the existing primary altimeter instrument. The Radar Altimeter indicator knob allows to set the Decision Height (DH) and adjusts the DH altitude. DH indicates the altitude at which the DH lamp and DH audio will be activated during descent. The indicator lamp lights when the altitude has decreased to DH setting and remains lit below that altitude. A two second 1KHz audio tone is sent to the audio panel each time the DH lamp lights. The indicator lamp will extinguish when altitude is again above DH. Hence the radar altimeter system alert the crew in timely manner if aircraft altitude decrease below set decision height. Therefore, it is concluded that the electric fuel pump installation on RC-3 S/N 129 is in compliance with § 23.1309(a)(2).

5.5.7 Sec. 23.1321(a)(d) Equipment: Arrangement and visibility

- (a) Each flight, navigation, and powerplant instrument for use by any required pilot during takeoff, initial climb, final approach, and landing must be located so that any pilot seated at the controls can monitor the airplane's flight path and these instruments with minimum head and eye movement. The powerplant instruments for these flight conditions are those needed to set power within powerplant limitations.

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(b) For each multiengine airplane, identical powerplant instruments must be located so as to prevent confusion as to which engine each instrument relates.

(c) Instrument panel vibration may not damage, or impair the accuracy of, any instrument.

[(d) For each airplane, the flight instruments required by Sec. 23.1303, and, as applicable, by the operating rules of this chapter, must be grouped on the instrument panel and centered as nearly as practicable about the vertical plane of each required pilot's forward vision. In addition:]

(1) The instrument that most effectively indicates the attitude must be on the panel in the top center position;

(2) The instrument that most effectively indicates airspeed must be adjacent to and directly to the left of the instrument in the top center position;

(3) The instrument that most effectively indicates altitude must be adjacent to and directly to the right of the instrument in the top center position; and

(4) The instrument that most effectively indicates direction of flight, other than the magnetic direction indicator required by Sec. 23.1303(c), must be adjacent to and directly below the instrument in the top center position; and

(5) Electronic display indicators may be used for compliance with paragraphs (d)(1) through (d)(4) of this section when such displays comply with requirements in Sec. 23.1311.

(e) If a visual indicator is provided to indicate malfunction of an instrument, it must be effective under all probable cockpit lighting conditions.

Amdt. 23-49, Eff. 03/11/96

5.5.7.1 Evidence

The radar altimeter indicator is installed on the instrument panel adjacent to the existing altimeter and directly to the right of the instrument in the top center position as per the instructions provided in the manual 006-00152-0003. Therefore, it is concluded that the electric fuel pump installation on RC-3 S/N 129 is in compliance with § 23.1321(a)(d)

5.5.8 Sec. 23.1351(a)(b)(1) Equipment: General.

(a) Electrical system capacity. Each electrical system must be adequate for the intended use. In addition--

(1) Electric power sources, their transmission cables, and their associated control and protective devices, must be able to furnish the required power at the proper voltage to each load circuit essential for safe operation; and

(2) Compliance with paragraph (a)(1) of this section must be shown as follows--

(i) For normal, utility, and acrobatic category airplanes, by an electrical load analysis or by electrical measurements that account for the electrical loads applied to the electrical system in probable combinations and for probable durations; and

(ii) For commuter category airplanes, by an electrical load analysis that accounts for the electrical loads applied to the electrical system in probable combinations and for probable durations.

(b) Function. For each electrical system, the following apply:

(1) Each system, when installed, must be--

(i) Free from hazards in itself, in its method of operation, and in its effects on other parts of the airplane;

(ii) Protected from fuel, oil, water, other detrimental substances, and mechanical damage; and

(iii) So designed that the risk of electrical shock to crew, passengers, and ground personnel is reduced to a minimum.

[(2) Electric power sources must function properly when connected in combination or independently.

(3) No failure or malfunction of any electric power source may impair the ability of any remaining source to supply load circuits essential for safe operation.

(4) In addition, for commuter category airplanes, the following apply:]

(i) Each system must be designed so that essential load circuits can be supplied in the event of reasonably probable faults or open circuits including faults in heavy current carrying cables;

(ii) A means must be accessible in flight to the flight crewmembers for the individual and collective disconnection of the electrical power sources from the system;

(iii) The system must be designed so that voltage and frequency, if applicable, at the terminals of all essential load equipment can be maintained within the limits for which the equipment is designed during any probable operating conditions,

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- (iv) If two independent sources of electrical power for particular equipment or systems are required, their electrical energy supply must be ensured by means such as duplicate electrical equipment, throwover switching, or multichannel or loop circuits separately routed; and
- (v) For the purpose of complying with paragraph (b)(5) of this section, the distribution system includes the distribution busses, their associated feeders, and each control and protective device.
- (c) **Generating system.** There must be at least one generator/alternator if the electrical system supplies power to load circuits essential for safe operation. In addition—
- (1) Each generator/alternator must be able to deliver its continuous rated power, or such power as is limited by its regulation system.
 - (2) Generator/alternator voltage control equipment must be able to dependably regulate the generator/alternator output within rated limits;
 - [(3) Automatic means must be provided to prevent damage to any generator/alternator and adverse effects on the airplane electrical system due to reverse current. A means must also be provided to disconnect each generator/alternator from the battery and other generators/alternators.]
 - (4) There must be a means to give immediate warning to the flight crew of a failure of any generator/alternator.
 - (5) Each generator/alternator must have an overvoltage control designed and installed to prevent damage to the electrical system, or to equipment supplied by the electrical system that could result if that generator/alternator were to develop an overvoltage condition.
- (d) **Instruments.** A means must exist to indicate to appropriate flight crewmembers the electric power system quantities essential for safe operation.
- (1) For normal, utility, and acrobatic category airplanes with direct current systems, an ammeter that can be switched into each generator feeder may be used and, if only one generator exists, the ammeter may be in the battery feeder.
 - (2) For commuter category airplanes, the essential electric power system quantities include the voltage and current supplied by each generator.
- (e) **Fire resistance.** Electrical equipment must be so designed and installed that in the event of a fire in the engine compartment, during which the surface of the firewall adjacent to the fire is heated to 2,000° F for 5 minutes or to a lesser temperature substantiated by the applicant, the equipment essential to continued safe operation and located behind the firewall will function satisfactorily and will not create an additional fire hazard.
- (f) **External power.** If provisions are made for connecting external power to the airplane, and that external power can be electrically connected to equipment other than that used for engine starting, means must be provided to ensure that no external power supply having a reverse polarity, or a reverse phase sequence, can supply power to the airplane's electrical system.
- (g) It must be shown by analysis, tests, or both, that the airplane can be operated safely in VFR conditions, for a period of not less than five minutes, with the normal electrical power (electrical power sources excluding the battery and any other standby electrical sources) inoperative, with critical type fuel (from the standpoint of flameout and restart capability), and with the airplane initially at the maximum certificated altitude. Parts of the electrical system may remain on if—
- (1) A single malfunction, including a wire bundle or junction box fire, cannot result in loss of the part turned off and the part turned on; and
 - (2) The parts turned on are electrically and mechanically isolated from the parts turned off.
- Amdt. 23-49, Eff. 03/11/96

5.5.8.1 Evidence

The installation of the radar altimeter system provides the AGL altitude information, which is supplemental to the altitude information provided by the existing primary altimeter instrument. The detailed technical description and installation instructions provided in the manual 006-00152-0003 ensure that the system is installed correctly using the highest standard of workmanship, which ensures that the system performs its intended function. The Section 6 of this report also demonstrates that the additional electrical load imposed due to installation of this radar altimeter system is not appreciable. Therefore, it is concluded that the radar altimeter system installation on RC-3 S/N 129 is in compliance with § 23.1351(a)(b)(1).

5.5.9 Sec. 23.1365 Equipment: Electric cables and equipment.

- (a) Each electric connecting cable must be of adequate capacity.

[(b) Any equipment that is associated with any electrical cable installation and that would overheat in the event of circuit overload or fault must be flame resistant. That equipment and the electrical cables must not emit dangerous quantities of toxic fumes.]

(c) Main power cables (including generator cables) in the fuselage must be designed to allow a reasonable degree of deformation and stretching without failure and must--

(1) Be separated from flammable fluid lines; or

(2) Be shrouded by means of electrically insulated flexible conduit, or equivalent, which is in addition to the normal cable insulation.

[(d) Means of identification must be provided for electrical cables, terminals, and connectors.]

(e) Electrical cables must be installed such that the risk of mechanical damage and/or damage caused by fluids vapors, or sources of heat, is minimized.

(f) Where a cable cannot be protected by a circuit protection device or other overload protection, it must not cause a fire hazard under fault conditions.]

Amdt. 23-49, Eff. 03/11/96

5.5.9.1 Evidence

The KRA 10/10A kit comes with the cables which are of industry standard and rated to handle the capacity of current, voltage, and resistance that are required to operate the system. The detailed technical description and installation instructions provided in the manual 006-00152-0003 ensure that the system is installed correctly using the highest standard of workmanship, which ensures that the risk of mechanical damage and/or damage caused by fluids vapors, or sources of heat, is minimized. Therefore, it is concluded that this alteration is in compliance with 14 CFR 23.1365(a)(b)(e).

6 SAFETY ASSESSMENT

6.1 Introduction

This section provides a qualitative safety assessment related to the installation of BendixKing KRA 10/10A Radar Altimeter system and investigates in reference to failure conditions, their classification, probability and their effects, and overall system safety level.

6.2 System Description

The system considered under this safety assessment is altimeter system, with newly installed KRA 10/10A Radar Altimeter and its associated system. The Radar Altimeter provides the above-ground-level (AGL) altitude i.e. height of the aircraft from the ground or from an object, such as a tower or a building. This is supplemental information provided to the pilot in addition of the primary altitude altimeter. This additional information assists the pilot during landings and minimizes the effects of hard landings that can occur with fluctuating analog altimeter readings. There have been no changes to the other existing aircraft system for the installation of this system.

6.3 Functional hazard assessment (FHA)

This section provides a systematic, comprehensive examination of the altered fuel system functions to identify potential minor, major, hazardous, and catastrophic failure conditions that may arise as a result of a malfunction or a failure to function.

The severity is a quantitative measure of the worst possible degree of personal injury, property damage, or system damage, which can result from a failure mode. The possible severity categories defined in FAA Advisory Circular AC 25.1309-1E are provided in Table 2.

6.3.1 Table 3 – Severity Class and Description

SEVERITY CLASS	SEVERITY DESCRIPTION
Catastrophic	Failure condition, which prevents continued safe flight and landing, and for which no effective action is realistically possible.
Hazardous	Failure condition which causes a large reduction in safety margins or functional capacity, very high increase in workload or physical stress for the crew or discomfort to occupants
Major	Failure condition, which causes a significant reduction in safety margins or functional capabilities and a significant increase in crew workload or in, conditions impairing crew efficiency or discomfort to occupants.
Minor	Failure condition which does not significantly reduce aircraft safety and/or involve crew actions that are well within their capabilities. Minor failure conditions may include for example, a slight reduction in safety margins or functional capabilities, a slight increase in crew workload, such as a routine flight plan change or some inconvenience to occupants.
No Safety Effect	Failure conditions that would have no effect on safety (that is, failure conditions that would not affect the operational capability of the airplane or increase crew workload).

Below are the failure conditions that have been identified related to the alteration.

6.4 Safety Assessment

6.4.1 Table 4 – Failure Condition

Failure Condition Hazard Description	Failure Condition Cause	Classification Of Failure Condition	Occurrence
Loss of the any component of radar altimeter system	<ul style="list-style-type: none"> Loss of electricity Malfunction of any component of radar altimeter system 	Minor	Extremely Remote

The installed radar altimeter system is maintained on the basis of 'On-Condition' maintenance process. This maintenance process ensures that the parts of the altimeter system checked periodically to determine whether it can continue in service. This ensures that the in-flight failure of the system is extremely remote.

6.4.2 Table 5 – Failure Effects

Failure Condition Hazard Description	Effect
Loss of any component of radar altimeter system	The radar altimeter system wont be able to supply the altitude information to pilot but still pilot will have the altitude information from the primary altimeter.

The failure of altimeter system or any of its components result in in-availability of the supplemental AGL altitude information and it will not affect the continue safe flight as pilot will still have the altitude information from the primary altimeter instrument. The in-availability of the supplemental AGL altitude information will not increase in work load on the crew, as crew will still have altitude information from primary instrument.

6.5 Conclusion – Criticality Determination

The safety assessment provided in this section shows that the failure condition is extremely remote and failure condition does not have any safety concern and does not result in crew work load. So, this alteration does not have any adverse effect on the previously established safety level. Hence the altered aircraft maintains the same level of safety as the original design. Therefore, it is concluded that the electric fuel pump installation on RC-3 S/N 129 is in compliance with § 23.1309.

6.6 Electric Power Load Analysis

The RC-3 S/N 129 electrical system is capable of supplying 40 amp of electricity. The KRA 10/10A Radar Altimeter system require total of ~ 260mA (R/T ~ 200mA + Indicator ~ 60mA) of electric current. The total of ~ 260mA electric load on a 40 amp electric system can be considered as not appreciable. Hence the installation of this system does not interfere with the existing electric load.

6.7 Airworthiness Directive Search Report

SEARCH PARAMETER

Manufacturer
Kit P/N

BendixKing
KRA 10/10A

SEARCH SITE

http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAD.nsf/MainFrame?OpenFrameSet

SEARCH RESULTS

A search of BendixKing returned 1 AD.
A search of KRA 10/10A returned 0 (zero) AD.

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AD Query Completed September 18, 2014 by Jayant R Ghawalkar, Certification Engineer, DERS Group Svc LLC.

6.7.1 AD Summary

The search for the 'BendixKing' returned AD 2010-05-02, which is applicable to Piltus aircraft model PC-12/47E issued to address unsafe condition due to Primary Flight Displays (PFDs), and not related to KRA 10/10A. Therefore, no further action is required.

6.8 Service Difficulties Summary Report

SEARCH PARAMETER

Manufacturer
Kit P/N

BendixKing
KRA 10/10A

SEARCH SITE

<http://av-info.faa.gov/SDRX/Query.aspx>

SEARCH RESULTS

A search of 'BendixKing' and 'KRA 10/10A' returned zero AD.

AD Query Completed September 18, 2014 by Jayant R Ghawalkar, Certification Engineer, DERS Group Svc LLC.

6.8.1 SDR Summary

The search for the 'BendixKing' and 'KRA 10/10A' both returned zero AD. Therefore, no further action is required.

7 ALTERATION SUMMARY

7.1 General:

The document explains the alteration installation of Bendix/King KRA 10/10A Radar Altimeter system for RC-3 S/N 129 aircraft. The purpose of the alteration is to provide the above-ground-level (AGL) altitude information to the pilot in addition of the primary altitude altimeter. This additional information assists the pilot during landings and minimizes the effects of hard landings that can occur with fluctuating analog altimeter readings. The additional electrical load due to this system installation is not appreciable. This alteration does not interfere any of the aircraft existing system and failure of it does not affect continued safe operation of the aircraft once properly modified per the manual.

7.2 Conclusion:

A detailed explanation has been provided about the change, change classification, installation instruction, compliance findings, and compliance demonstration. Care has been taken to consider if any of the previously issued FAA AD notes or SDR are applicable to this alteration. A safety assessment demonstrates that this altered aircraft demonstrates the same level of safety as the aircraft prior to alteration. This document addresses each of the applicable rules and demonstrates successful compliance.

APPENDIX A: BENDIXKING TECHNICAL SUPPORT TEAM

