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**Document No. 82046-STC29- 05**

**Revision D**

**Instructions for Continued Airworthiness  
for  
ST3400H Helicopter Terrain Awareness & Warning System  
Installed in  
Bell Model: 412, EP, CF**

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7.14.14

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## REVISION SHEET

REV	Date	Section(s)	DESCRIPTION OF CHANGE
D	7/09/14	Cover Page 2	Updated to add reference to all Models Applicability updated
C	6/26/14	Cover Page 1 2.1	Updated to Remove Aircraft Serial Number Reference
B	09/04/13	2.1 2.14 2.17	Added Dates to Reference Documents Updated W&B report table. Updated to clarify the role of FAA for future revisions of ICA
A	05/17/11	All	Initial Release

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## TABLE OF CONTENTS

1. INTRODUCTION .....	7
1.1 Scope.....	7
1.2 Document Control .....	7
1.3 Airworthiness Limitations Section .....	7
1.4 Permission to Use Certain Documents .....	7
1.5 Definitions .....	8
2. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS.....	9
2.1 Introduction.....	9
2.2 Description of Alteration .....	10
2.3 Control, Operating Information .....	10
2.4 Servicing Information .....	10
2.5 Periodic Maintenance Instructions .....	10
2.5.1 Cleaning the Front Panel .....	11
2.5.2 Display Light Source .....	11
2.6 Troubleshooting Information.....	11
2.7 Removal and Replacement Information .....	11
2.8 Adjustment and Test.....	11
2.9 Diagrams.....	11
2.10 Special Inspection Requirements.....	11
2.10.1 Hard Landing.....	11
2.10.2 Lightning Strike .....	12
2.11 Application of Protective Treatments.....	12
2.12 Data Relative to Structural Fasteners .....	12
2.13 Special Tools .....	12
2.14 Weight and Balance.....	12
2.15 Additional Instructions .....	13
2.16 Overhaul Period .....	13
2.17 ICA Revision and Distribution .....	13
2.18 Assistance .....	13
2.19 Implementation and Record Keeping.....	13
APPENDIX A – Removal & Installation .....	15
APPENDIX B- Bell 412EP Wiring and Installation .....	16

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## **1. INTRODUCTION**

### **1.1 Scope**

This document identifies the Instructions for Continued Airworthiness for Bell 412EP, modified by the installation of Sandel ST34300H HTAWS.

### **1.2 Document Control**

This document shall be released, archived, and controlled in accordance with the Sandel document control system. When this document is revised, refer to Section 2.17 for information on how to gain FAA acceptance or approval and how to notify customers of changes.

### **1.3 Airworthiness Limitations Section**

The Airworthiness Limitations section is FAA approved and specifies maintenance required under CFR 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

There are no additional Airworthiness Limitations associated with this Supplemental Type Design change.

### **1.4 Permission to Use Certain Documents**

Permission is granted to any corporation or person applying for approval of a Sandel ST3400H-(xxxx) to use and reference appropriate STC documents listed in the approved Master Drawing List, to accomplish the Instructions for Continued Airworthiness and show compliance with STC engineering data. This permission does not construe suitability of the documents. It is the responsibility of the applicant to determine the suitability of the documents for the ICA.

## 1.5 Definitions

The following terminology may be used within this document:

**AC:** Advisory Circular  
**ACO:** Aircraft Certification Office  
**AEG:** Aircraft Evaluation Group  
**CFR:** Code of Federal Regulations  
**DER:** Designated Engineering Representative  
**FAA:** Federal Aviation Administration  
**HTAWS:** Helicopter Terrain Awareness and Warning System  
**IAW:** In Accordance With  
**ICA:** Instructions for Continued Airworthiness  
**MFD:** Multi-Function Display unit  
**PMI:** Primary Manufacturing Inspector  
**POI:** Primary Operations Inspector  
**STC:** Supplemental Type Certificate  
**TC:** Type Certification or Type Certificate  
**TSO:** Technical Standard Order



## 2. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

### 2.1 Introduction

Content, Scope, Purpose and Arrangement:	This document identifies the Instructions for Continued Airworthiness for the modification of the aircraft by installation of the Sandel ST3400H HTAWS.
Applicability:	See cover page.
Definition of Abbreviations:	See Section 1.5
Precautions:	None
Units of measurement:	None
Retention:	This document, or the information contained within, will be included in the aircraft's permanent records.
Referenced documents:	<p>Sandel Doc. 82046-IM ST3400H Installation Manual, Rev. A (5/24/2010) or latest approved revision.</p> <p>Sandel Doc. 82046-STC29-01 Master Drawing List, Rev. A (8/11/2010) or later FAA approved revision.</p> <p>Sandel Doc. 82046-AMLSTC29-01 Master Drawing List, Rev. A (7/19/2013) or later FAA approved revision</p> <p>Sandel Doc. 82046-PG ST3400H Pilots Guide, Rev. A (08/06/2010) or latest approved revision.</p>

## **2.2 Description of Alteration**

A single ST3400H installed in the right side instrument panel (see appendix B for details). The ST3400H is a self-contained HTAWS (Helicopter Terrain Awareness Warning System) and meets the FAA requirements for Helicopter Terrain Awareness and Warning System (HTAWS). It includes an advanced HTAWS computer, graphics symbol generator and Sandel's high brightness display engine built within a standard 3-inch instrument chassis. It includes Radar altimeter features and can be used to directly replace an existing Radar altimeter indicator. It has the optional capabilities of acting as a primary or secondary traffic indicator, showing traffic in standard TCAS format overlaid on terrain when connected to an external traffic detection system.

## **2.3 Control, Operating Information**

The ST3400H is configurable and controllable to provide the information needed at any point in the flight. Configuring the ST3400H refers to selecting the data for a given display. For example, the TAWS system can be inhibited. Controlling the ST3400H refers to tailoring the display to suit the immediate situation. For example, the pilot may decide to adjust the range to a different setting.

For detailed operation instructions refer to the ST3400H Pilots Guide.

## **2.4 Servicing Information**

The ST3400H contains no field serviceable components. In the event of system failure, return the unit to the Sandel Avionics. Prior to shipping back to the factory contact customer service to obtain an RMA number. Sandel Avionics Customer Service can be reached at (760) 727-4900 Monday through Friday 6:00AM to 5:00PM PST.

## **2.5 Periodic Maintenance Instructions**

Maintenance is on condition. The ST3400H design includes a pilot initiated self test and automatic internal failure detection logic. A thorough self-test is executed automatically upon application of power to the unit, and built-in test is continuously executed. Detected errors are communicated to the user by presentation on the display. Operation of the ST3400H is not permitted unless an inspection as described in this section has been completed within the preceding 12 calendar months. Conduct a visual inspection on the ST3400H and associated interface wiring harness to insure installation integrity:

1. Inspect the unit for security of attachment.
2. Inspect all buttons for legibility.
3. Inspect the display screen and clean if necessary.
4. Inspect condition of wiring, routing and attachment/clamping.
5. Inspect knob operation.

### **2.5.1 Cleaning the Front Panel**

The front bezel, keypad, and display can be cleaned with a soft cotton cloth dampened with “Edmund Scientific TECH SPEC Lens Cleaner” or equivalent. Care should be taken to avoid scratching the surface of the display.

### **2.5.2 Display Light Source**

The display light source is rated by the manufacturer as having a usable life of 80,000 hours. This life may be more or less than the rated time depending on the operating conditions of the ST3400H. Over time, the backlight may dim and the display may not perform as well in direct sunlight conditions. The user must determine by observation when the display brightness is not suitable for its intended use. Contact the Sandel Customer Service if the light source requires service.

## **2.6 Troubleshooting Information**

If the ST3400H fails to properly operate, consult a local authorized Sandel dealer for repair. The ST3400H contains no user serviceable components.

## **2.7 Removal and Replacement Information**

For removal and replacement of the ST3400H and configuration module, if equipped, refer to appendix A of this document.

If the ST3400H is removed for repair and reinstalled, or removed and replaced with a different ST3400H, follow the applicable checkout ground test procedure(s) contained in the ST3400H Installation Manual supplied with the shipment of each ST3400H.

## **2.8 Adjustment and Test**

Refer to the ST3400H Installation Manual supplied with the shipment of each ST3400H.

## **2.9 Diagrams**

Refer to Appendix B of this document for drawings and point to point wiring diagrams applicable to this installation.

## **2.10 Special Inspection Requirements**

### **2.10.1 Hard Landing**

1. Inspect the unit for security of attachment including rear connectors.
2. Perform functional ground check in accordance with Sandel ST3400H Installation Manual.

## 2.10.2 Lightning Strike

1. Visually inspect condition of unit and wiring.
2. Perform functional ground check in accordance with Sandel ST3400H Installation Manual.

## 2.11 Application of Protective Treatments

None.

## 2.12 Data Relative to Structural Fasteners

None.

## 2.13 Special Tools

None

## 2.14 Weight and Balance

The weight and moment added/removed by this installation is as follows:

ADD/ REM	P/N	Description	Qty	Unit Wt. (Lbs)	LONGITUDINAL			LATERAL ( - LEFT / + RIGHT)		
					Total Wt. (Lbs)	Arm	Moment	Total Wt. (Lbs)	Arm	Moment
ADD	ST3400H	HTAWS	1	2.77	2.77	23.07	63.90	2.77	21.40	59.28
ADD	95-42-14-K2-EOFTC	NVIS Switch	1	.06	.06	26.93	1.62	.06	24.90	1.49
ADD	32062	Connector	1	.08	.08	17.50	1.40	.08	21.40	1.71
ADD	32063	Connector	1	.10	.10	17.50	1.75	.10	21.40	2.14
ADD	32111	Connector	1	.05	.05	17.50	.87	.05	21.40	1.07
ADD	7277-2-5	Circuit Breaker	1	.05	.05	60.00	3.00	.05	-7.00	-.35
ADD	MS3476W14-19S	Connector	1	.10	.10	17.50	1.75	.10	21.40	2.14
ADD	MS22759/16-22-9	Wire (feet)	43.59	.17	.03	14.17	.42	.14	1.11	.15
ADD	M27500-22TG2T14	Wire (feet)	209.28	2.50	.30	15.05	4.51	2.20	.95	2.09
ADD	M22759/16-20-9	Wire (feet)	160.0	.79	.51	3.77	1.92	.28	.51	.14
REM	RA-335	RADALT	1	-1.30	-1.30	23.07	-29.99	-1.30	23.07	-29.99
		<b>TOTALΔ:</b>		5.37	2.75	18.60	51.15	4.53	8.80	39.87

Total added weight = 5.37lb

## **2.15 Additional Instructions**

If any work has been done on the aircraft that could affect the system wiring or interconnected equipment, verify the ST3400H operates properly. Follow the applicable checkout ground test procedure(s) contained in the ST3400H Installation Manual supplied with the shipment of each ST3400H.

## **2.16 Overhaul Period**

The system does not require overhaul at a specific time period. The Pilot initiated test, Power on self-test and continuous BIT will monitor the health of the ST3400H. If the unit(s) indicates an internal failure, the unit may be removed and replaced.

## **2.17 ICA Revision and Distribution**

To revise this ICA, if the project is updated with a Major Type Change, the AEG would be involved for revision; a letter must be submitted to the ACO along with the revised ICA. The ACO will obtain AEG acceptance, and approve any revision to the Airworthiness Limitations Section 1.4. Once the original project document is accepted by the FAA-AEG, then minor changes to the system ICA is the responsibility of the TC or STC holder. After FAA acceptance/approval, Sandel will release the revised ICA for customer use, and provide any required notification of the revision. The latest revision of this document will be available on the Sandel website ([www.sandel.com](http://www.sandel.com)). A Sandel Service Information letter or Service Bulletin as appropriate, describing the ICA revision, will be sent to dealers if the revision is determined to be significant.

## **2.18 Assistance**

Flight Standards Inspectors or the certificate holder's PMI have the required resources to respond to questions regarding this ICA. In addition, the customer may refer questions regarding this equipment and its installation to the manufacturer, Sandel Avionics. Sandel customer assistance may be contacted Monday through Friday, 6:00AM to 5:00PM PST via telephone 760-727-4900 or email from the Sandel web site at [www.sandel.com](http://www.sandel.com).

## **2.19 Implementation and Record Keeping**

Modification of an aircraft and issuance of a new or amended Type Certificate (TC) Data Sheet or a Supplemental Type Certificate (STC) obligates the aircraft operator to include the maintenance information provided by this document in the operator's Aircraft Maintenance Manual and the operator's scheduled aircraft maintenance program.

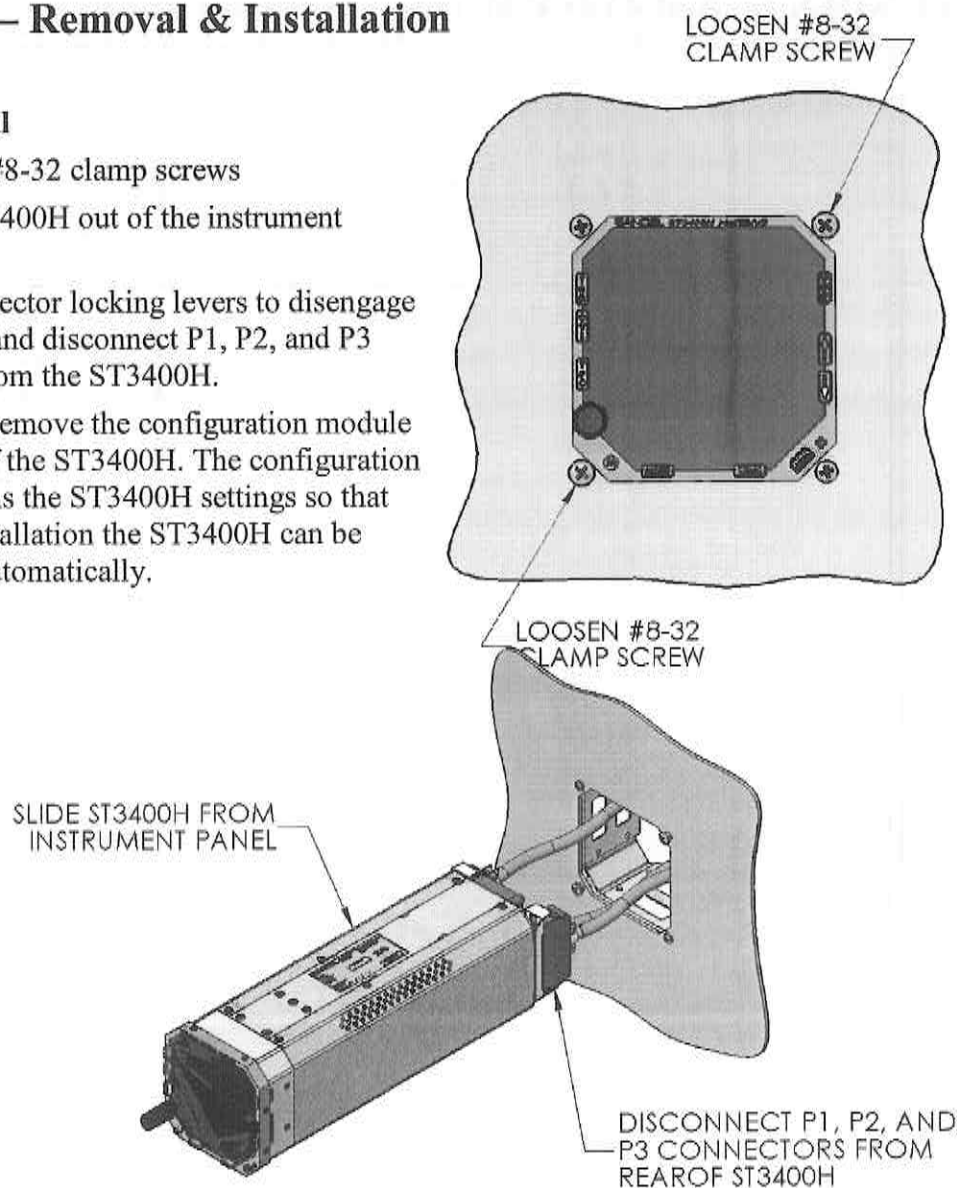
Line Replaceable Unit (LRU) part numbers and other necessary part numbers contained in the installation data package should be placed into the aircraft operators' appropriate airplane Illustrated Parts Catalog, as required.

Wiring diagram information contained in the installation data package should be placed into the aircraft operators' appropriate aircraft Wiring Diagram Manuals, as required.

## APPENDIX A – Removal & Installation

### ST3400H – Removal

1. Loosen 2 ca #8-32 clamp screws
2. Slide the ST3400H out of the instrument panel.
3. Depress connector locking levers to disengage locking tabs and disconnect P1, P2, and P3 connectors from the ST3400H.
4. If equipped, remove the configuration module at the back of the ST3400H. The configuration module retains the ST3400H settings so that during re-installation the ST3400H can be configured automatically.



### ST3400H Installation

1. Connect P1, P2, and P3 connectors to the back of the ST3400H. Ensure that connectors are fully seated and that locking tabs are engaged.
2. Connect the configuration module (if supplied) to the CONFIG connector at the back of the ST3400H.
3. Slide the ST3400 into the instrument panel until the Bezel is firmly against panel.
4. Tighten #8-32 Clamp screws to secure unit.



APPENDIX B- Bell 412EP Wiring and Installation

NEW INQUIRY SECTION  
A INITIAL RELEASE  
DATE APPROVED

700  
WIRING DIAGRAM, SANDERL ST3400H  
Document Number  
82046-STC29-07  
ISSUED JANUARY 13, 2013  
PAGE 1 OF 3  
REV A

NOTES: UNLESS OTHERWISE SPECIFIED.

1. INTERFERENCE LOCATIONS PER MIL-STD-100.
2. USE EXISTING GROUNDING WHEREVER POSSIBLE. INSTALL NEW GROUNDING IF REQUIRED PER FAA DOC SB-AC43.13-1B/2A CHAPTER 11 PAR 452 (PG 188-1, 189-1 THRU 193).
3. ALL NEW INSTALLED SINGLE WIRING IS PER WT-W-22755.
4. ALL NEW INSTALLED MULTIPLE AND SHIELDED WIRING IS PER MIL-C-27500.
5. IDENTIFY ALL NEW CABLES AND WIRE USING ONE OR COMBINATION OF METHODS AS PRACTICAL (NUMBER, DIRECT OR ROSENUMBERS) AND PRACTICAL TAG AC43.13-1B CHG 1 SECTION 16.
6. FAR FAR POLICY STATEMENT NO. FAR-01-04, NEW WIRING AND INSTALLATION NOTES NEW INTERIOR OF 14 CFR 21.2119 AND 21-27 BY THE FOLLOWING CRITERIA: INCORPORATED IN MIL. NO 82046-STC29-02, LATEST EDITION.

AC43.13-1B CHG 1:

SEC 3 (11-31, -36),  
SEC 4 (11-49, -50),  
SEC 5 (11-66),  
SEC 6 (11-85),  
SEC 8 (11-96),  
SEC 9 (11-116, THRU 11-126),  
SEC 10 (11-132, THRU 11-139),  
SEC 11 (11-145, -147),  
SEC 12 (11-163, -165, -167),  
SEC 13 (11-183, -185, -187),  
SEC 14 (11-203, THRU 11-223),  
SEC 15 (11-230, -236).

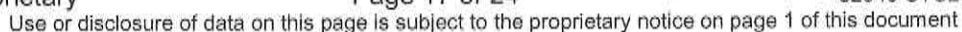
7. NEW WIRE. \_\_\_\_\_

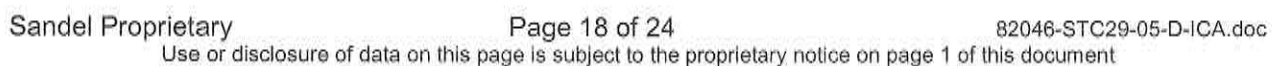
8. PRE-EXISTING WIRE. \_\_\_\_\_

9. PRE-EXISTING EQUIPMENT. \_\_\_\_\_

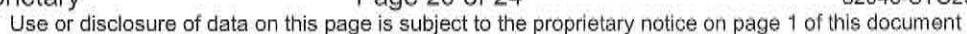
10. WHITE WIRE W. , BLUE WIRE B.

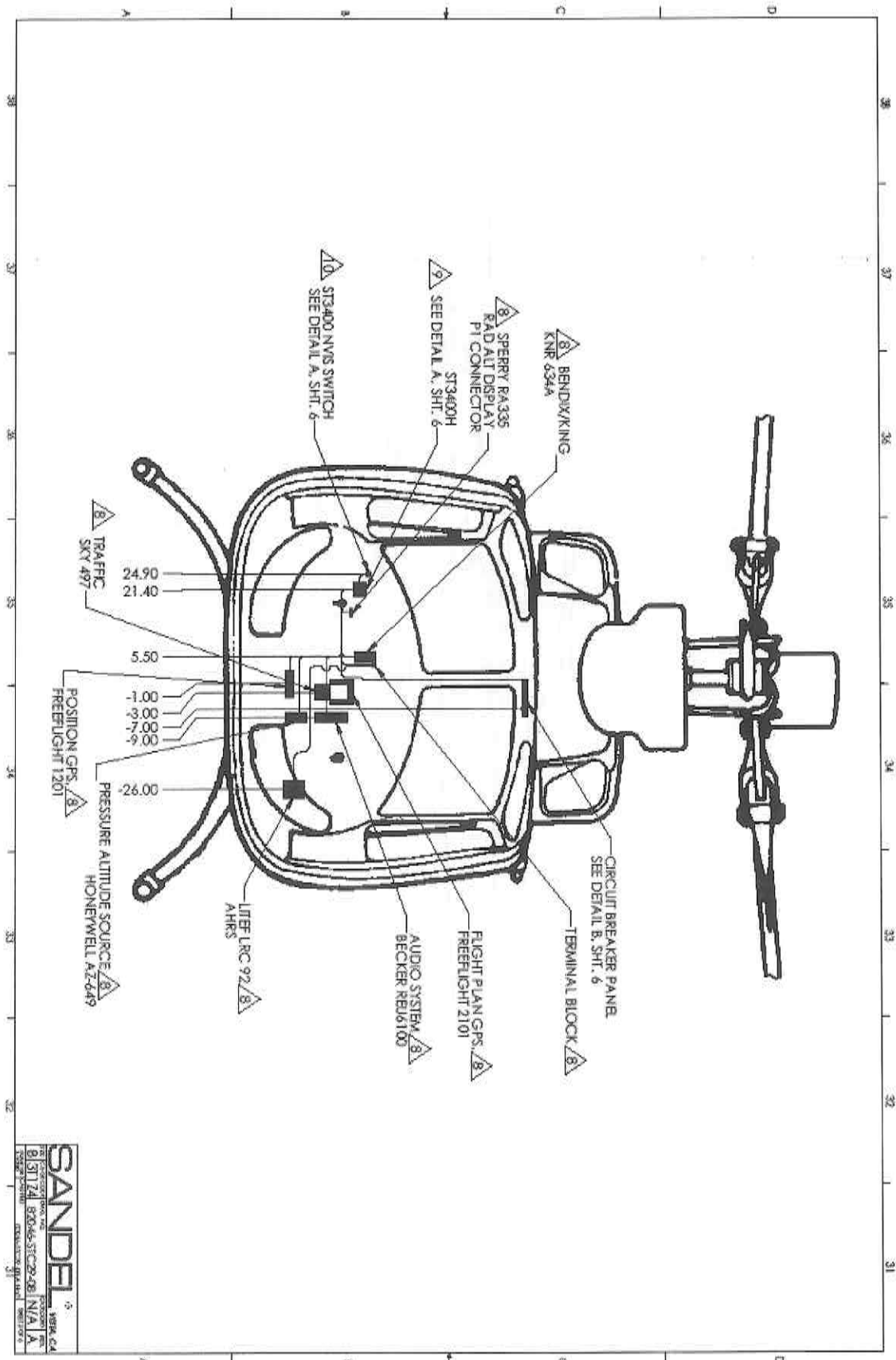


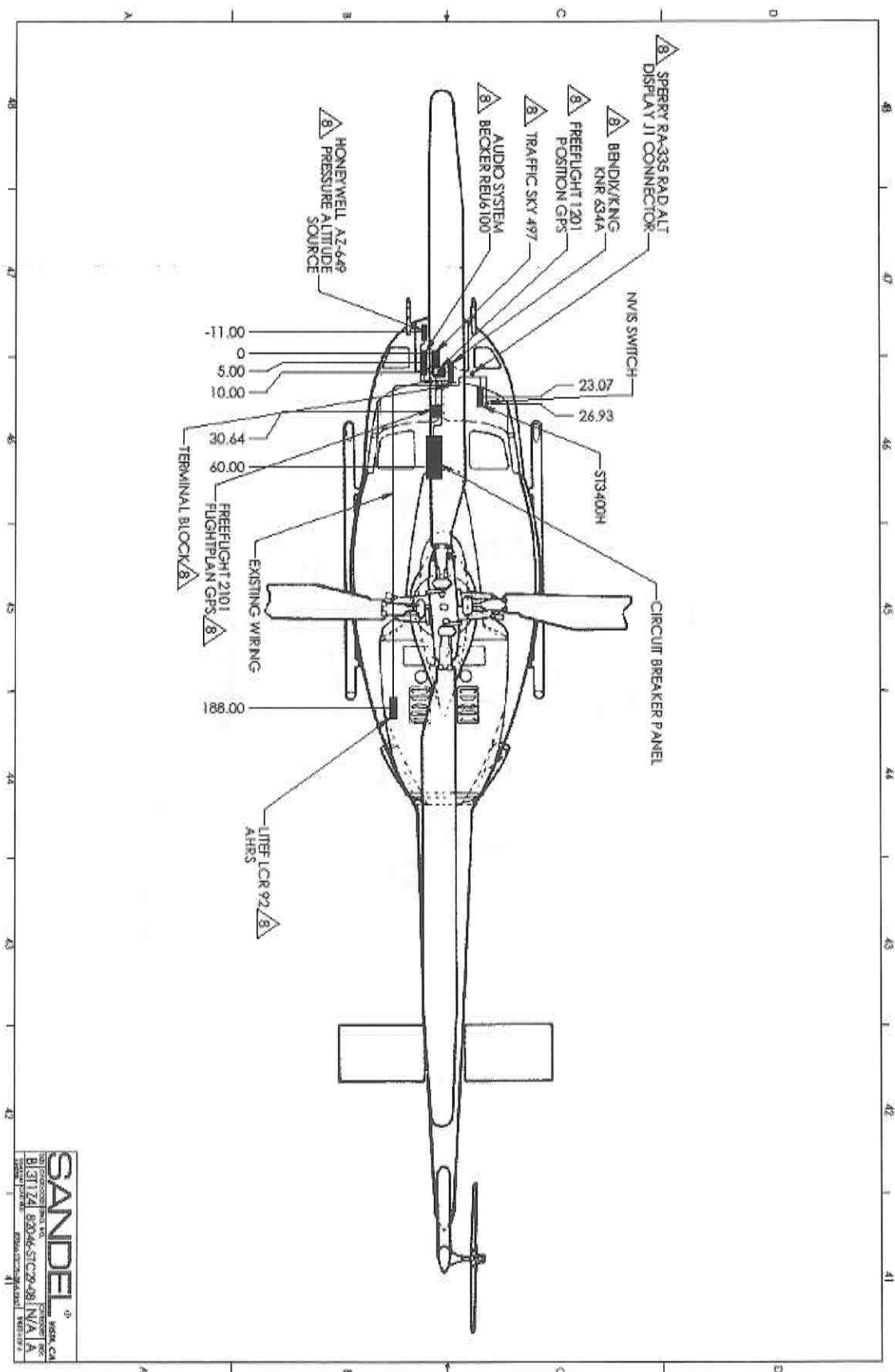




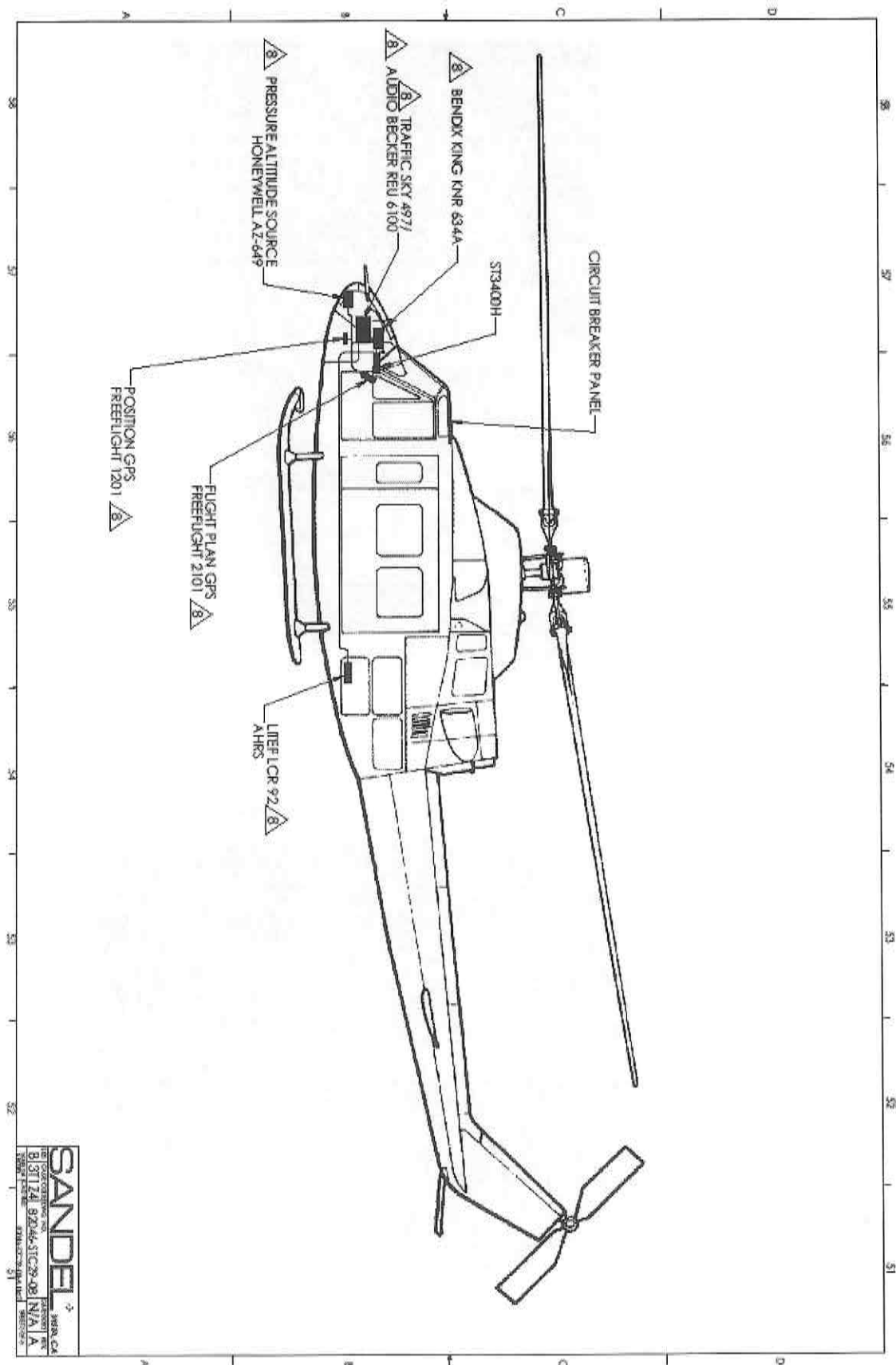
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