FAA APPROVED
ROTORCRAFT FLIGHT MANUAL SUPPLEMENT
TO THE

BELL MODEL 412, 412EP, and 412CF
ROTORCRAFT FLIGHT MANUAL
WHEN EQUIPPED WITH THE

Sandel Avionics ST3400H Helicopter Terrain Awareness and Warning System

Serial Number:_____ Registration. No.: _____

This document must be attached to the FAA Approved Bell Model 412, 412EP, or 412CF Rotorcraft Flight Manual, when the rotorcraft is modified by the installation of Sandel Avionics ST3400H Helicopter Terrain Awareness and Warning System in accordance with FAA

STC No. SR02355LA

For rotorcraft approved to operate in accordance with the provisions of this Rotorcraft Flight Manual Supplement, the information contained herein supplements the information of the basic flight manual. For limitations, procedures, and performance data not contained in this supplement, consult the basic flight manual.

FAA Approved: _____

Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office
Transport Airplane Directorate

Date: ___January 14, 2014___

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-STC29-09

LOG OF PAGES

Rev	PAGE No.	PAGE Date	DESC.	FAA APPROVED
Orig	Title(i)	14-Jan-2014	Complete Supplement - Installation of Sandel Avionics ST3400H TAWS	
	ii	14-Jan-2014		
	iii	14-Jan-2014		Mgr., Flt. Test Br., ANM-160L
	iv	14-Jan-2014		Federal Aviation Administration
	1	14-Jan-2014		Los Angeles ACO
	2	14-Jan-2014		Transport Airplane Directorate
	3	14-Jan-2014		
	4	14-Jan-2014		Date Jan. 19, 2014
	5	14-Jan-2014		
	6	14-Jan-2014		
	7	14-Jan-2014		
	8	14-Jan-2014		

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

TABLE OF CONTENTS

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-STC29-09

[Intentionally Blank]

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-STC29-09

SECTION 1: GENERAL

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 GPWS modified for rotorcraft operations, present aircraft position and course line display approved for enroute navigation, and optional Radar altimeter and Traffic displays.

Terrain protection is enabled during all airborne phases of flight - Departure, Enroute, Terminal, and Approach and in any selected display mode.

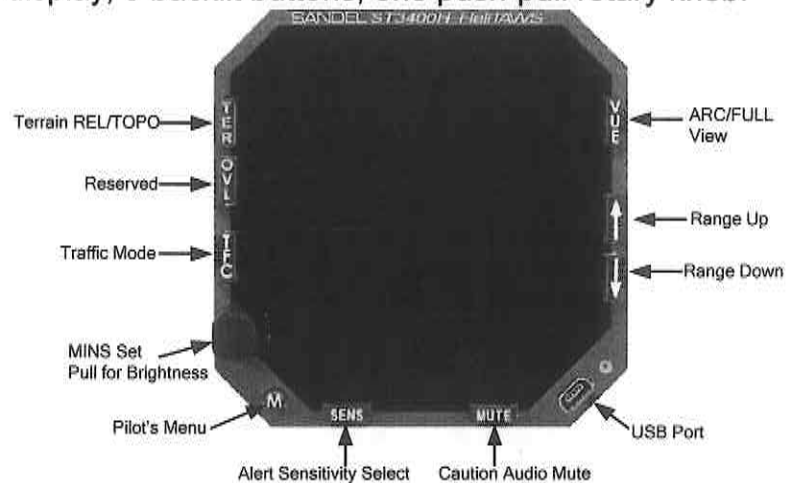The ST3400H physical layout consists of a full three inch display, 9 backlit buttons, one push-pull rotary knob.

Figure 1: ST3400H Pilot Interface

SANDEL®
2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

Track/Heading
Display Orientation
Terrain View
Alert Sensitivity and Mode
Map Range
Fail Annunciator
Present Position
Heading Pointer
Traffic
Courseline
Traffic Mode
Obstacle
Brightness (Knob Pulled)
Radar Altitude
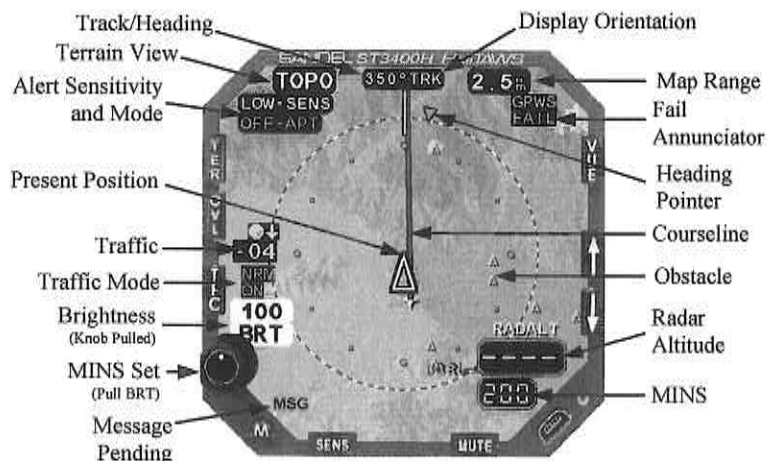MINS Set (Pull BRT)
MINS
Message Pending

Figure 2: ST3400H Display Functions

The upper display area presents data from the heading source as well as several annunciators.

The lower display area displays RADALT (Radar Altitude), the "MINS" setting window, The "BRT" setting annunciator, a message indicator as well as terrain and obstacle visual alerts.

The control knob when pulled displays the "BRT" setting (0-100) and changes the brightness setting when rotated. The ST3400H will power up in the last brightness setting.

The control knob when in the normal in position changes the value in the "MINS" setting window.

If the Traffic Display function is installation enabled:

Pressing the TFC button will toggle between the two traffic display modes, On or Auto. See Section 8 of this manual for definition of On and Auto.

SANDEL®
2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

SECTION 2: LIMITATIONS

The HTAWS Terrain and Obstacle displays shall NOT be used for navigation purposes.

The course line and present aircraft position shall NOT be used for approach and departure navigation.

Note: The Terrain and Obstacle Displays are intended to serve as a terrain and awareness tool only. The Display and database may not provide the accuracy or fidelity on which to base navigation decisions and plan routes to avoid terrain or obstacles.

The Obstacle Database does not include power lines.

The HTAWS is an alerting system. It is intended for use in rotorcraft in VMC and in IMC while operating under instrument flight rules (IFR). The system does NOT guarantee successful recovery from a conflict due to factors such as pilot response, aircraft performance and database limitations. No standardized recovery technique is defined as recovery maneuvers may vary.

Low Sensitivity or Off Airport Modes must not be selected when operating under IMC conditions except as required when performing offshore platform IMC Approach Procedures or other Special Procedures.

The ST3400H must utilize FAA approved software version 1.01 or later FAA approved version.

The ST3400H Pilots Guide, SPN 82046-PG (applicable revision) must be immediately available to the flight crew.

Data loading and maintenance mode operation are prohibited during normal flight operation.

SANDEL®
2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

The "CRC Self Test Failed" message must not appear on power-up if flight operations are predicated on the use of the ST3400H.

SECTION 3: EMERGENCY PROCEDURES

No Change

SECTION 4: NORMAL PROCEDURES

Pre-Flight

Before each flight a TAWS Pre-Flight Test should be conducted. Press the "M" button to enter the PILOTS MENU and then press the "TEST" softkey. Verify Caution followed by Warning audio are clear and distinct matching the visual presentation on the display.

Sensitivity Mode Selection

Press the SENS button to toggle the Sensitivity from NORM to LOW. When in LOW the text "LOW – SENS" is annunciated in the upper left hand corner of the display.

Off Airport Mode Selection

To avoid un-wanted alerts when landing at an airport that is not in the airport database, Press and HOLD the SENS button to toggle the OFF-APT mode. When in this mode the text "OFF – APT" is annunciated in the upper left hand corner of the display.

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

Terrain or Obstacle Awareness Caution

When a terrain or obstacle awareness CAUTION occurs, verify the aircraft flight path and correct it, if required.

Terrain or Obstacle Awareness Warning

When a terrain or obstacle awareness WARNING occurs, immediately initiate a maneuver that will provide maximum terrain or obstacle clearance, until all alerts cease.

Refer to the ST3400H Pilots Guide document 82046-PG for further operating details.

Minimums Setting

Rotate the control knob in the normal (not pulled) position.

Brightness Setting

Pull and rotate the control knob.

SECTION 5: ABNORMAL PROCEDURES

TAWS Inhibit

FLTA alerting, can be inhibited by pressing the "M" button and then pressing the "TAWS INHIBIT" softkey. When TAWS is inhibited, the text "TAWS INH" is annunciated in the upper left hand corner of the display. This feature may be used for:

- Abnormal failure of GPS/FMS resulting in erroneous data. A conventional (flagged) GPS/FMS failure will automatically fail alerts and the terrain display.

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

- If a TAWS alert is previously determined to be erroneous and is repetitive at a specific location. Perceived nuisance alerts should be brought to the attention of Sandel Avionics for analysis.

Be aware that the TAWS INH function cancels all FLTA alerts and inhibits GPWS alerts. Callouts remains active.

AUDIO Inhibit

For operations in day VFR conditions where terrain clearance may be assured visually and HTAWS audio alerts will hamper aircrew performance, the MUTE button may be pushed to silence an occurring CAUTION alert for 15 seconds. WARNING alerts cannot be muted.

During Caution alerts the MUTE button will highlight with a white bar as an aid to locating the MUTE button.

In the special case of a GPWS Altitude Loss After Take-off alert, pressing MUTE button will disarm the alert completely until the next takeoff.

If the MUTE button is pressed when a CAUTION alert is not present, the text "NOT AVAIL" will display on the screen.

SECTION 6: PERFORMANCE DATA

No Change.

SECTION 7: WEIGHT AND BALANCE DATA

See current weight and balance data.

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

SECTION 8: SYSTEM DESCRIPTIONS

To facilitate low altitude operations unique to helicopters, the ST3400H supports two pilot selectable alert sensitivity modes: Normal Sensitivity and Low Sensitivity.

In NORM Sensitivity the Design Cruise Altitude is 500' AGL. In LOW Sensitivity, the Design Cruise Altitude is 300' AGL - allowing standard operations closer to the ground.

In addition to changing the alerting criteria, the selected Sensitivity adjusts the relative altitude display colors to provide a black display screen at the design cruise altitude to prevent color flooding.

In addition, an Off Airport Mode is pilot selectable which operates at either Sensitivity.

Normally, alerts are automatically suppressed during the landing phase at an airport or helipad. OFF-APT mode suppresses alerts for landing at non-airport locations, such as for EMS operations. When this mode has been selected, no further pilot action is required and no alerts will be generated when landing anywhere. Normal alerting criteria are automatically established when not landing.

If the Radar Altimeter Display function is installation enabled:

> The "MINS" setting is compared to the Radar Altitude and activates the "MIN" annunciator when the Radar Altitude is less than or equal to the "MINS" setting.

SANDEL®

2401 Dogwood Way
Vista, CA 92081 USA

RFM SUPPLEMENT to
Bell Model 412, 412EP & 412CF
Sandel ST3400H HTAWS
STC No. SR02355LA

Supplement No. 82046-AMLSTC29-09

If the Traffic Display function is installation enabled two traffic display modes are available:

ON: Enables display of all targets within the selected map range.

AUTO: Traffic will be displayed only when alerting traffic is present (TA or RA). The ST3400H will auto-scale to an appropriate range to show the traffic on-screen. This can be useful in busy terminal areas where the display of all traffic may cause the screen to become too cluttered.

Refer to the ST3400H Pilot's Guide referenced in Section 2 of this manual for other procedures, error messages, alerts and more detailed operating information.