SECTION 9

SUPPLEMENTS

OPTIONAL EQUIPMENT SUPPLEMENTS

The applicable supplement is required to be included in the helicopter's Pilot's Operating Handbook when any of the following equipment is installed. Information contained in the supplements applies only when the related equipment is installed.

CONTENTS

NON-U.S. SUPPLEMENTS

The following supplements contain additional information required by certain countries:

Brazilian Supplement

Canadian Supplement

EASA Supplement

FATA Supplement (Russia)

IAC AR Supplement

Indian Supplement

Ukrainian Supplement

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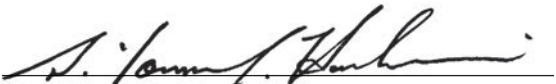
FAA APPROVED
R44 CADET PILOT'S OPERATING HANDBOOK

FIXED FLOATS SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when fixed-float landing gear is installed.

The information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: 

Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration, LAACO
Transport Airplane Directorate

DATE: April 29, 2016

LOG OF PAGES

Page No.	Date	Page No.	Date
9-5.1	29 Apr 16	9-5.7	29 Apr 16
9-5.2*	29 Apr 16	9-5.8	29 Apr 16
9-5.3	29 Apr 16	9-5.9	29 Apr 16
9-5.4	29 Apr 16	9-5.10*	29 Apr 16
9-5.5	29 Apr 16	9-5.11*	29 Apr 16
9-5.6	29 Apr 16	9-5.12*	29 Apr 16

* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when fixed-float landing gear is installed.

Float landing gear is intended for safety during flights over water. Intentional water landings for other than training purposes are not recommended.

NOTE

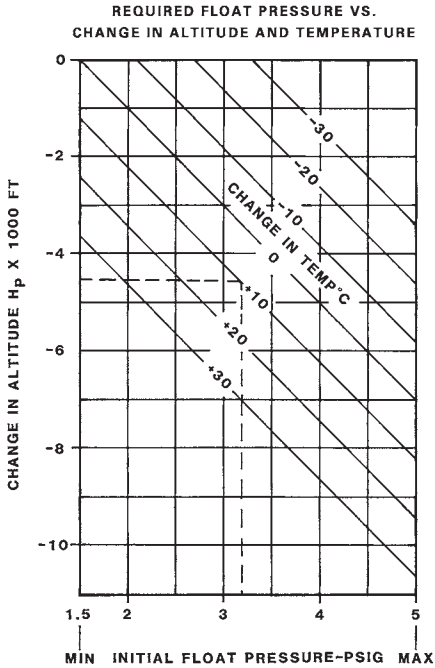
The float landing gear is approved for amphibious operation but is not certified for ditching. Some countries may prohibit certain over-water operations.

SECTION 2: LIMITATIONS

FLOAT PRESSURE LIMITS

Minimum Float Pressure: 1.5 psig (psi gage)
Maximum Float Pressure: 5 psig

A decrease in altitude or temperature reduces float pressure. If decrease in altitude or temperature is anticipated, inflate floats per chart below to ensure 1.5 psig minimum at landing. Pressure relief valves will limit pressure for an increase in altitude or temperature.



CAUTION

Failure to maintain adequate pressure can result in loss of buoyancy or in-flight instability.

EXAMPLE:

	Pressure Altitude	Temp
Conditions at destination:	1000 ft	15°C
Initial conditions:	5500 ft	5°C
Subtract to obtain change in altitude and temp:	−4500 ft	+10°C

Using graph, locate −4500 ft line, read across to +10°C line, then down for minimum initial float pressure required, approximately 3.2 psig.

SECTION 3: EMERGENCY PROCEDURES

POWER FAILURE – GENERAL

CAUTION

Lowering collective rapidly or applying excessive forward cyclic while helicopter is moving forward on water can cause floats to submerge and helicopter to nose over.

POWER FAILURE ABOVE 500 FEET AGL

Autorotation to Land: Same as in basic manual.

Autorotation to Water:

1. Lower collective immediately to maintain rotor RPM.
2. Establish steady glide at approximately 70 KIAS.
3. Adjust collective to keep RPM between 97 and 108% or apply full down collective if light weight prevents attaining above 97%.
4. If altitude permits, maneuver into wind.
5. At about 40 feet AGL, begin cyclic flare.
6. At about 8 feet AGL, apply forward cyclic and raise collective just before touchdown. Touch down in slight nose high attitude with nose straight ahead.
7. Maintain cyclic in touchdown position and do not lower collective full down until forward motion has stopped.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

POWER FAILURE BETWEEN 8 FEET AND 500 FEET AGL

Autorotation to Land: Same as in basic manual.

Autorotation to Water:

1. Lower collective immediately to maintain rotor RPM.
2. Adjust collective to keep RPM between 97 and 108% or apply full down collective if light weight prevents attaining above 97%.
3. If altitude permits, maneuver into wind.
4. Maintain airspeed until water is approached, then begin cyclic flare.
5. At about 8 feet AGL, apply forward cyclic and raise collective just before touchdown. Touch down in slight nose high attitude with nose straight ahead.
6. Maintain cyclic in touchdown position and do not lower collective full down until forward motion has stopped.

MAXIMUM GLIDE DISTANCE CONFIGURATION

Same as without floats, except airspeed approximately 80 KIAS.

EMERGENCY WATER LANDING – POWER OFF

See procedures for power failures.

EMERGENCY WATER LANDING – POWER ON

Make normal approach and landing to water.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

15. Inflatable Floats

Float Pressure . . . . . Check (See Section 2)

Float Condition . . . . . Check

CAUTION

Helicopters equipped with inflated floats have an adverse roll characteristic. When sideslipping nose left or right, helicopter will tend to roll in opposite direction and could cause loss of control. To avoid adverse roll, keep helicopter trimmed with zero sideslip. Exercise extreme caution when performing simulated power failures.

CAUTION

Avoid night flight over water beyond autorotation distance to land. Height above water may be difficult to judge during a water landing.

SECTION 4: NORMAL PROCEDURES (cont'd)

OPERATION ON WATER

Safe operation on water has been demonstrated in waves up to 1 foot (0.3 m) (trough to crest). Maximum recommended water taxi speed is 5 knots. Some application of collective is required.

Since the helicopter sits very low on water, it is likely that water will leak into the cabin. Intentional water landings should be limited to training. For training, seal the removable belly panels and landing gear cross tube cover using aluminum foil tape or duct tape. Avoid salt water if possible.

There may be limited tail rotor clearance to water, particularly at aft CG. Also, even small waves may cause enough rocking to dip the tail rotor in the water. If tail rotor contact with water is suspected, have tail rotor inspected prior to further flight. (If no noticeable change in vibration occurs after suspected water contact, helicopter may be repositioned to nearest convenient inspection site.)

CAUTION

If starting or stopping rotor on water, ensure area is clear as helicopter can rotate one or more complete turns while tail rotor RPM is low.

SECTION 4: NORMAL PROCEDURES (cont'd)

PRACTICE AUTOROTATION – WITH GROUND CONTACT

Same as in basic manual. Autorotations should only be performed to a smooth, hard surface to avoid damage to floats.

PRACTICE AUTOROTATION TO WATER

Same as practice autorotation with ground contact in basic manual except touch down in slight nose high attitude with nose straight ahead. Maintain cyclic in touchdown position and do not lower collective full down until forward motion has stopped.

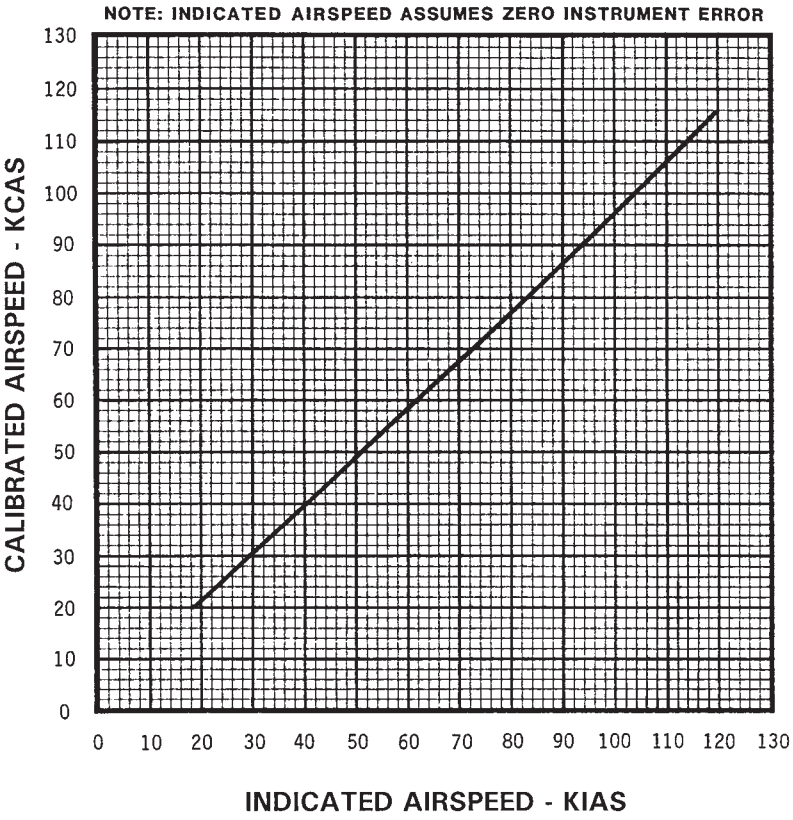
CAUTION

Lowering collective rapidly or applying excessive forward cyclic while helicopter is moving forward on water can cause floats to submerge and helicopter to nose over.

CAUTION

There may be limited tail rotor clearance to water, particularly at aft CG. Applying excessive aft cyclic may cause tail rotor to contact water.

SECTION 5: PERFORMANCE



AIRSPEED CALIBRATION CURVE

R44 CADET WITH FIXED FLOAT LANDING GEAR

SECTION 6: WEIGHT AND BALANCE

CAUTION

When changing between float and non-float configurations, weight and balance must be revised and autorotation RPM readjusted per the maintenance manual.

WEIGHT AND BALANCE RECORD

Basic empty weight and CG in float and non-float configurations is included in the Weight and Balance Summary provided with the helicopter. Modifications are to be recorded in the Weight and Balance Record.

SECTION 7: SYSTEMS DESCRIPTION

The fixed-float landing gear installation includes inflated floats, additional airframe sealing and corrosion protection, additional forward position lights in the mast fairing, longer landing gear struts, and an additional stabilizer installed at the base of the lower vertical stabilizer. Standard landing gear may be installed in place of the float landing gear per maintenance manual instructions.

SECTION 8: HANDLING AND MAINTENANCE

GROUND HANDLING

With floats installed, special ground handling wheels are required. Refer to R44 Maintenance Manual for wheel installation and removal procedures.

FLOAT TUBES

To promote long float tube life:

1. Do not inflate floats to higher pressure than required by limitations section. Do not arbitrarily inflate floats to relief valve pressure.
2. Reduce pressure in floats if solar heating is causing excessive pressure buildup.
3. Do not allow floats to sit uninflated. Maintain some pressure to keep shape when not in use.

CAUTION

When inflating chambers individually (without a manifold), increase pressure in each chamber in increments no greater than 0.5 psig.

SECTION 10: SAFETY TIPS

Flight characteristics and handling qualities with inflated floats are more critical than with conventional landing gear. Helicopters with floats installed have an adverse roll characteristic. When sideslipping nose right or left, the helicopter will tend to roll in the opposite direction out of the turn. This could be extremely dangerous if a pilot failed to apply right pedal or put in the wrong pedal during a simulated power failure. Also, aerodynamic lift produced by floats makes both RPM and pitch control more difficult during auto rotation entries. Helicopters with floats installed are also more gust sensitive and difficult to fly in turbulence.

For these reasons, it is strongly recommended that floats be removed and standard gear installed for primary flight instruction. With floats installed, pilots must keep the helicopter trimmed with zero sideslip and exercise extreme caution when performing simulated power failures.

FAA APPROVED
R44 CADET PILOT'S OPERATING HANDBOOK

HEATED PITOT SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when heated pitot is installed.

The information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: _____
Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration, LAACO
Transport Airplane Directorate

DATE: April 29, 2016

LOG OF PAGES

Page No.	Date	Page No.	Date
9-6.1	29 Apr 16	9-6.3	29 Apr 16
9-6.2	29 Apr 16	9-6.4*	29 Apr 16

* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when the heated pitot is installed.

SECTIONS 2 and 3: No change.

SECTION 4: NORMAL PROCEDURES

USE OF PITOT HEAT

When conditions conducive to pitot ice exist, switch pitot heat on until landing or until no longer in potential icing conditions.

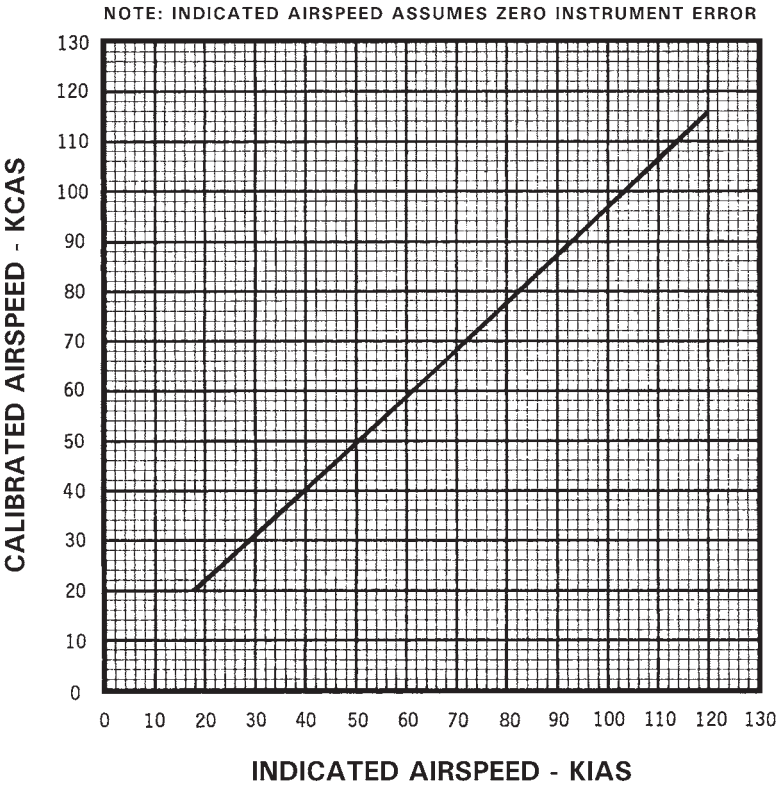
NOTE

The R44 is not certified for flight into known or suspected icing conditions.

NOTE

Continued use of pitot heat following an alternator failure will significantly increase battery drain.

SECTION 5: PERFORMANCE



AIRSPEED CALIBRATION CURVE

HEATED PITOT INSTALLATION
VALID WITH PITOT HEAT ON OR OFF

SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

HEATED PITOT INSTALLATION

The heated pitot tube is installed in the mast fairing, replacing the standard pitot tube. Pitot heat is controlled by a toggle switch located to the right of the cyclic. Power is supplied to the heated pitot through its own 10-amp circuit breaker.

SECTION 8: HANDLING AND MAINTENANCE

CAUTION

Pitot tube becomes extremely hot with pitot heat switched on. Touching pitot tube after it has been on for more than 30 seconds can result in severe burns.

FAA APPROVED
R44 CADET PILOT'S OPERATING HANDBOOK

AIR CONDITIONING SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when cabin air conditioning is installed.

Information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: _____
Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration, LAACO
Transport Airplane Directorate

DATE: April 29, 2016

LOG OF PAGES

Page No.	Date	Page No.	Date
9-11.1	29 Apr 16	9-11.3*	29 Apr 16
9-11.2	29 Apr 16	9-11.4*	29 Apr 16

* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when cabin air conditioning is installed.

SECTION 2: LIMITATIONS

No change.

SECTION 3: EMERGENCY PROCEDURES

No change.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

Add to item 9, Cowl door – Left Side:

Compressor belt tension . . . . . Check

AIR CONDITIONING OPERATION

Air conditioning is controlled by the toggle switch at the forward end of the overhead duct. The switch allows selection of OFF, LOW, and HIGH fan settings. The compressor is automatically engaged by switching the fan on. Each of the six outlets may be directed as desired.

NOTE

Evaporator condensate drains from a tube through the aircraft belly. Water drainage during ground operation is normal.

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE No change.

SECTION 7: SYSTEMS DESCRIPTION

The cabin air conditioning system consists of a compressor accessible through the left engine cowl door, a condenser mounted on the left side of the engine cooling fan scroll, an evaporator and fan assembly mounted to the aft cabin wall, an overhead outlet duct, and interconnecting lines and hoses. The system uses R-134a refrigerant.

The compressor is belt-driven from an engine accessory drive and equipped with an electromagnetic clutch. When the system is off, the compressor clutch is disengaged, allowing the compressor pulley to freewheel.

The evaporator fan draws warm cabin air through the evaporator inlet grill and evaporator where it is cooled. Cooled air is drawn through the fan and blown into the overhead duct.

The system is controlled by a toggle switch on the overhead duct which allows selection of off, low, and high fan settings. The compressor is automatically engaged by switching the fan on. A temperature switch disengages the compressor when evaporator temperature drops below freezing. Safety switches disengage the compressor if refrigerant leakage occurs or if refrigerant pressure is excessive. A full throttle switch disengages the compressor when the engine is near full throttle to ensure aircraft performance is not affected. The compressor clutch and fan circuits are protected by the A/C circuit breaker.

SECTION 8: HANDLING AND MAINTENANCE

Standard automotive-style charge ports are located inside the left engine cowl door. Normal charge is 1.00 to 1.25 lb R-134a refrigerant. Refer to R44 Maintenance Manual for complete system service procedures.

CAUTION

System must only be serviced by qualified personnel following maintenance manual procedures.

FAA APPROVED
R44, R44 II, R44 CADET
PILOT'S OPERATING HANDBOOK

HELISAS AUTOPILOT SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the HeliSAS autopilot is installed.

The information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: Hien Tong
for Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration, LAACO
Transport Airplane Directorate

DATE: September 8, 2014

LOG OF REVISIONS

Page No.	Date	Page No.	Date
9-13.1	17 Dec 19	9-13.7*	17 Dec 19
9-13.2	17 Dec 19	9-13.8*	17 Dec 19
9-13.3	17 Dec 19	9-13.9*	17 Dec 19
9-13.4	17 Dec 19	9-13.10*	17 Dec 19
9-13.5	17 Dec 19	9-13.11*	17 Dec 19
9-13.6*	17 Dec 19	9-13.12*	17 Dec 19

* Manufacturer's data, not FAA approved.

REVISIONS
APPROVED BY: Nevada Jo Ryan Digitally signed by Nevada Jo Ryan Date: 2019.12.17 10:43:46 -08'00'
Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles

DATE: 17 DEC 2019

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when the HeliSAS autopilot is installed.

CAUTION

The autopilot is intended to enhance safety by reducing pilot workload. It is not a substitute for adequate pilot skill nor does it relieve the pilot of the responsibility to monitor the flight controls and maintain adequate outside visual reference.

The primary autopilot mode is Stability Augmentation System (SAS) mode which maintains a steady helicopter attitude by applying corrective inputs to the cyclic. The autopilot does not provide any collective or pedal inputs. Additional modes providing heading hold, altitude hold, and navigation functionality are also selectable.

SECTION 2: LIMITATIONS

FLIGHT AND MANEUVER LIMITATIONS

Minimum altitude for use of autopilot ALT mode is 200 feet AGL.

For practice instrument approaches, minimum altitude for use of autopilot VRT mode is 50 feet AGL.

Pilot's hand must be on cyclic grip under the following conditions:

During autopilot engagement or intentional disengagement

At airspeeds less than 50 KIAS when less than 500 feet AGL

SECTION 3: EMERGENCY PROCEDURES

AUTOPILOT DISENGAGEMENT OR FAILURE

The autopilot is designed to automatically disengage if the system detects a fault. Disengagement is normally indicated by four beeps in the headset. If the autopilot does not automatically disengage, failure may be recognized by erratic cyclic control motion, abnormal cyclic stick forces, or deviations in pitch or roll.

1. Continue flight using manual control. If autopilot has not disengaged, manually disengage using cyclic AP OFF button or control panel SAS button.
2. If SAS annunciator on control panel is steady white, re-engagement may be attempted at pilot's discretion.

CAUTION

Due to the unstable nature of helicopters, autopilot disengagement requires immediate pilot attention. Always monitor helicopter attitude and flight controls, and be prepared to take manual control.

NOTE

The system automatically switches off all modes except SAS mode at airspeeds below 44 KIAS or above 130 KIAS, accompanied by a single beep. This is by design and not a system failure. The high speed limit is not intended to provide V_{ne} protection. It is the pilot's responsibility to observe V_{ne} limits.

NOTE

Although unlikely, it is possible for certain faults to cause disengagement without the four-beep aural warning.

SECTION 4: NORMAL PROCEDURES

GENERAL

Autopilot controls and operating modes are described in Section 7, Systems Description.

NOTE

Cyclic friction must be fully off for autopilot to work properly. Cyclic friction will degrade autopilot performance.

STARTING ENGINE AND RUN-UP

After "Hydraulic system", add:

Autopilot . . . . . Check

NOTE

For autopilot check, wear headset and ensure cyclic friction is off. Engage SAS mode. Verify cyclic exhibits centering tendency and SAS annunciator on control panel turns green. Disengage. Verify 4 beeps in headset, cyclic reverts to normal hydraulic system feel, and SAS annunciator turns white.

TAKEOFF PROCEDURE

Autopilot SAS mode may be engaged as desired on the ground or at any time during the takeoff procedure. Re-trim as necessary to eliminate undesirable cyclic forces.

SECTION 4: NORMAL PROCEDURES (cont'd)

CRUISE

Add:

Engage autopilot modes as desired. In SAS mode, re-trim as necessary to eliminate undesirable cyclic forces.

CAUTION

It is the pilot's responsibility to monitor flight controls, aircraft flightpath, traffic, and terrain even while the autopilot is engaged. The autopilot is designed to disengage in the event of a fault. Be prepared to take control if required.

SECTION 5: PERFORMANCE No change.

SECTION 6: WEIGHT AND BALANCE No change.

SECTION 7: SYSTEMS DESCRIPTION

AUTOPILOT

The HeliSAS autopilot system consists of two electric servomotors, a flight control computer, an autopilot control panel, and control buttons on the cyclic grip. One servomotor controls pitch and is installed in the control tunnel forward of the cyclic stick. The other servomotor controls roll and is installed under the pilot's seat. The servomotors are connected to the cyclic through electromagnetic clutches.

The flight control computer is installed on the forward panel under the pilot's seat, and the autopilot control panel is installed in the avionics stack.

In addition to the autopilot system components, an onboard attitude source such as an Attitude Heading Reference System (AHRS) is required.

The primary autopilot mode is Stability Augmentation System (SAS) mode which maintains a steady helicopter attitude by applying corrective inputs to the cyclic. This is felt as a light cyclic centering force. The autopilot senses aircraft attitude using a combination of sensors in the flight control computer and the onboard attitude source. The computer then sends signals to the servomotors which are connected to the bottom of the cyclic in the control tunnel. Additional modes may be layered on top of SAS mode and are described below.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

Heading Mode (HDG) – maintains the heading selected by the heading bug on the directional gyro or Horizontal Situation Indicator (HSI) display. Aircraft can be steered using the heading bug.

NOTE

For large heading or course changes, the autopilot will use a maximum of 20° bank.

Altitude Mode (ALT) – maintains altitude at the time of engagement or of last TRIM button release. The target altitude is reset each time the TRIM button is pressed and released.

NOTE

The autopilot uses pitch attitude to maintain altitude or follow an approach glidepath. It does not have any control of power setting. The pilot must manage power with the collective to control speed and rate of climb or descent. Make small, smooth power changes to allow the system to adjust to new power settings.

Navigation Mode (NAV) – tracks the active GPS or VLOC course displayed on the Course Deviation Indicator (CDI). If no CDI is installed, NAV will only track the active GPS course displayed on the GPS.

NAV may be armed prior to intercepting the active course. NAV annunciator is white when NAV is armed and turns green at course intercept. If HDG is active when NAV is armed, the autopilot will fly the selected heading until course intercept. If HDG is not active, the autopilot will select a 45° intercept angle.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

Vertical Navigation Mode (VRT) – tracks an ILS glideslope or GPS approach vertical guidance. Arm VRT (annunciator turns white when armed) prior to intercepting the glidepath. VRT annunciator will turn green at glidepath intercept.

NOTE

Pushing the ALT button while VRT is armed or active will turn off VRT. VRT must be re-armed or re-engaged as desired.

NOTE

Reducing power to approach setting just prior to glidepath intercept is recommended.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

Backcourse Mode (BC) – reverse CDI sensing for backcourse approaches. Course on HSI should be set so that tail of course pointer points toward runway (set to inbound front course).

The control panel has a row of buttons to control autopilot modes and annunciators to indicate mode status. A dark annunciator indicates that a mode is off, a white annunciator indicates that a mode is armed or on standby, and a green annunciator indicates that a mode is active.

When the avionics master is switched on, the autopilot performs a self-test and then enters SAS standby mode. All of the control panel indicators flash alternating white and green during the self-test. Four headset beeps occur at the beginning of the self-test as a check of the aural warning function. The SAS annunciator on the control panel turns steady white when the self-test is complete.

NOTE

Autopilot will not enter standby mode if attitude indicator is not functioning or indicated bank angle is greater than 6 degrees.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

The autopilot SAS mode is engaged either by pressing the SAS button on the control panel or by pressing the TRIM button on the cyclic for more than 1.25 seconds. Additional modes are engaged by pressing the appropriate button on the control panel. The additional modes are disabled and will not engage at airspeeds below 44 KIAS or above 130 KIAS.

To disengage any mode, push the appropriate button on the control panel.

NOTE

Disengaging SAS mode will also disengage all other modes.

Modes may also be disengaged using the AP OFF button on the cyclic. If only SAS mode is engaged, push the AP OFF button once to disengage. If additional modes are engaged, push the AP OFF button once to disengage all modes except SAS and a second time to disengage SAS mode, or push and hold the AP OFF button to disengage all modes including SAS.

NOTE

SAS disengagement should always be accompanied by four beeps in the headset. If beeps do not occur, maintenance is required.

Safety monitors automatically disengage individual modes or the entire system if a fault is detected. Automatic disengagement of SAS mode (or the entire system) is indicated by four beeps in the headset. Automatic disengagement of any mode other than SAS is indicated by a single beep in the headset. There is no audio indication for intentional disengagement of modes other than SAS.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

NOTE

The system also automatically reverts to SAS mode at airspeeds below 44 KIAS or above 130 KIAS, accompanied by a single beep. The high speed limit is not intended to provide V_{ne} protection. It is the pilot's responsibility to observe V_{ne} limits.

The TRIM button is used to re-set the target attitude (to re-trim) while in SAS mode. Use a small amount of force to override the autopilot and then push and release the TRIM button at the new desired condition. If the force to override is objectionable, the TRIM button may be held down during maneuvers. The system will re-trim to the attitude at which the TRIM button is released.

NOTE

The system will not re-trim to more than 6° nose down, 11° nose up, or 10° of bank. If a re-trim is attempted outside these limits, the system will trim to the limiting value.

NOTE

When engaging SAS mode from standby, the autopilot uses the helicopter attitude at the time SAS mode is engaged as the target (trim) attitude. For large pitch and roll angles at the time of engagement, a target of 2° nose up pitch and 0° (level) roll is used.

The autopilot is protected by a dedicated circuit breaker on the avionics bus (autopilot is not powered with the avionics master switch off).

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

REMOVABLE FLIGHT CONTROLS

On later aircraft, disconnect the electrical connector for the left-hand trim button located near the quick release pin before removing the left cyclic grip. Reconnect the connector when installing the left cyclic grip.

SECTION 8: HANDLING AND MAINTENANCE

No change.

SECTION 10: SAFETY TIPS

The autopilot is intended to reduce pilot workload and enhance safety. It is important that pilots do not misuse this capability and allow their attention to be diverted. Pilots should continue monitoring the flight controls and helicopter attitude as well as looking for traffic and other obstacles. Autopilot disengagement requires immediate pilot attention. Pilots must always be prepared to take manual control.

The autopilot is not certified for flight in Instrument Meteorological Conditions (IMC). Adhering to appropriate VFR weather minimums is essential for safety.

If an inadvertent loss of outside visual reference occurs, the pilot must regain visual conditions as quickly as possible while avoiding abrupt, disorienting maneuvers. The following procedure is recommended:

1. If not already engaged, immediately engage autopilot SAS mode and allow autopilot to recover from unusual attitude if one has occurred.
2. Select a heading and altitude to ensure terrain and obstacle clearance. Turns and/or climbs may be required. Engage additional autopilot modes as desired for workload reduction.
3. While maintaining terrain and obstacle clearance, maneuver toward conditions of improved visibility.

FAA APPROVED
R44 CADET PILOT'S OPERATING HANDBOOK

OPTIONAL AVIONICS SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when certain factory-supplied optional avionics are installed.

Information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: Hien Tong

Acting Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles, CA

DATE: May 7, 2018

LOG OF PAGES

Page No.	Date	Page No.	Date
9-14.1	7 May 18	9-14.6*	7 May 18
9-14.2*	7 May 18	9-14.7*	7 May 18
9-14.3	7 May 18	9-14.8*	7 May 18
9-14.4*	7 May 18	9-14.9*	7 May 18
9-14.5*	7 May 18	9-14.10*	7 May 18

* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement provides additional information for certain avionics options. A set of manufacturers' instructions for all installed avionics is provided with each new helicopter.

The following equipment is addressed in this supplement:

- Aspen Avionics EFD 1000H PFD and EFD 500H MFD
- Garmin G500H avionics system with non-touch screen display (GDU 620)
- Garmin G500H avionics system with touch screen display (GDU 1060 TXi or GDU 700L TXi)

NOTE

For all Robinson Primary Flight Display (PFD)/ Multi Function Display (MFD) installations, the airspeed indicator, altimeter, compass, tachometer, and engine instruments are retained. Pilots should use the traditional instruments as primary unless fully familiar with the installed avionics.

SECTION 2: LIMITATIONS No change.

SECTION 3: EMERGENCY PROCEDURES No change.

SECTION 4: NORMAL PROCEDURES No change.

SECTION 5: PERFORMANCE No change.

SECTION 6: WEIGHT AND BALANCE No change.

SECTION 7: SYSTEMS DESCRIPTION See below.

SECTION 8: HANDLING AND MAINTENANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

ASPEN EFD 1000H PFD AND EFD 500H MFD

The Aspen Electronic Flight Display (EFD) 1000H is a Primary Flight Display (PFD) optimized for helicopter use. It is available in a "Pilot" (basic) version or "Pro" (with more advanced navigation features) version.

The Aspen EFD 500H is a Multifunction Display (MFD) optimized for helicopter use.

Robinson configurations are either a single EFD 1000H PFD or a dual installation with one EFD 1000H PFD and one EFD 500H MFD. A typical dual-installation instrument panel is illustrated on the following page.

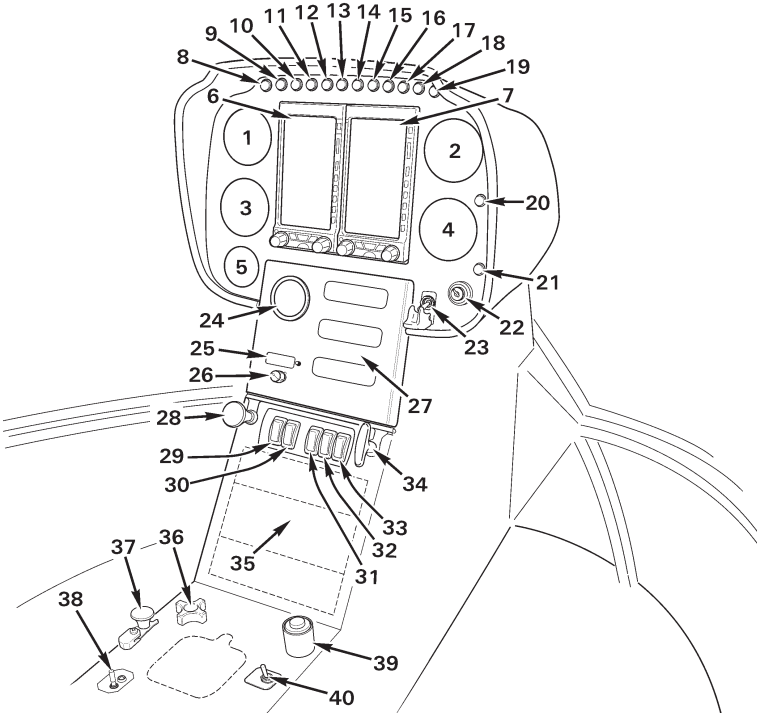
The manufacturer's documents for the EFD 1000H and EFD 500H are:

Title	Document No.
Aspen Avionics Evolution Flight Display EFD 1000H PFD Pilot's Guide	091-00012-001
Aspen Avionics Evolution Flight Display EFD 1000H/500H MFD Pilot's Guide	091-00013-001

NOTE

A Robinson part no. D327-4 light filter may be used to reduce reflections in the windshield at night. The light filter is installed by clipping it to the front of the display. Filter use is at pilot discretion.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)



1. AIRSPEED INDICATOR
2. ENGINE AND ROTOR TACHS
3. ALTIMETER
4. MANIFOLD PRESSURE GAGE
5. CLOCK
6. MULTI-FUNCTION DISPLAY
7. PRIMARY FLIGHT DISPLAY
8. CLUTCH ACTUATOR LIGHT
9. M.R. GEARBOX TEMP LIGHT
10. M.R. GEARBOX CHIP LIGHT
11. CARBON MONOXIDE LIGHT
12. STARTER-ON LIGHT
13. T.R. GEARBOX CHIP LIGHT
14. LOW FUEL LIGHT
15. LOW RPM LIGHT
16. ALT LOW VOLTAGE LIGHT
17. ENGINE FIRE LIGHT
18. OIL PRESSURE LIGHT
19. GOVERNOR-OFF LIGHT
20. FULL THROTTLE LIGHT
21. ROTOR BRAKE LIGHT
22. IGNITION SWITCH
23. CLUTCH ACTUATOR SWITCH
24. CARBURETOR AIR TEMP
25. OUTSIDE AIR TEMP/VOLTMETER
26. PANEL LIGHTS DIMMER
27. ENGINE INSTRUMENTS
28. CABIN HEAT
29. NAVIGATION LIGHTS SWITCH
30. ANTI-COLLISION LIGHT SWITCH
31. AVIONICS MASTER SWITCH
32. ALTERNATOR SWITCH
33. BATTERY SWITCH
34. CABIN AIR
35. AVIONICS STACK
36. CYCLIC FRICTION
37. CARBURETOR HEAT
38. ELT SWITCH (OPT'L)
39. MIXTURE CONTROL
40. PITOT HEAT SWITCH (OPT'L)

OPTIONAL INSTRUMENT PANEL WITH
ASPEN EFD 1000H PFD and EFD 500H MFD

(Exact panel configuration may vary with optional equipment and date of helicopter manufacture.)

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

GARMIN G500H SYSTEM WITH GDU 620 (NON-TOUCH SCREEN) DISPLAY

The Garmin GDU 620 display is a split screen PFD/MFD designed for use with Garmin's G500H helicopter avionics system.

A typical Robinson Installation is illustrated on the following page.

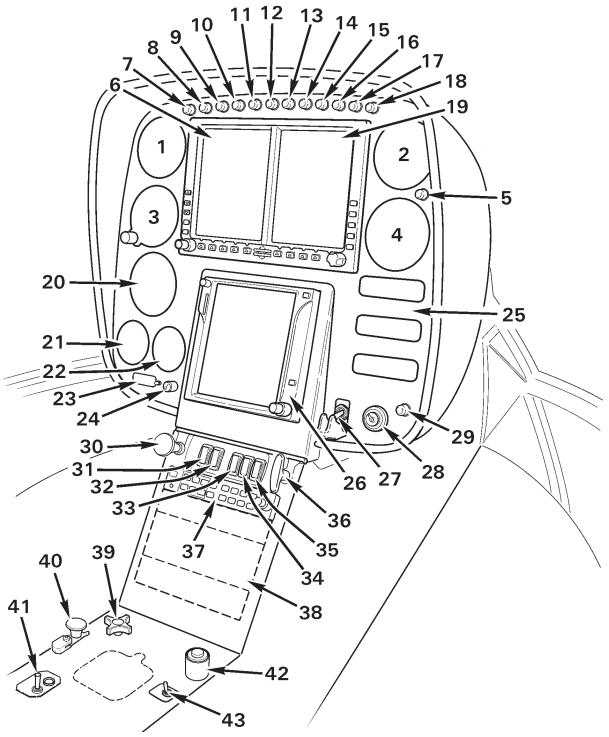
The manufacturer's document for the G500H system with GDU 620 display is:

Title	Document No.
Garmin G500H Pilot's Guide	190-01150-02

NOTE

A Robinson part no. D327-1 light filter may be used to reduce reflections in the windshield at night. The light filter is installed by clipping it to the front of the display. Filter use is at pilot discretion.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)



1. AIRSPEED INDICATOR
2. ENGINE AND ROTOR TACHS
3. ALTIMETER
4. MANIFOLD PRESSURE GAGE
5. FULL THROTTLE LIGHT
6. MULTI-FUNCTION DISPLAY
7. CLUTCH ACTUATOR LIGHT
8. M.R. GEARBOX TEMP LIGHT
9. M.R. GEARBOX CHIP LIGHT
10. CARBON MONOXIDE LIGHT
11. STARTER-ON LIGHT
12. T.R. GEARBOX CHIP LIGHT
13. LOW FUEL LIGHT
14. LOW RPM LIGHT
15. ALT LOW VOLTAGE LIGHT
16. ENGINE FIRE LIGHT
17. OIL PRESSURE LIGHT
18. GOVERNOR-OFF LIGHT
19. PRIMARY FLIGHT DISPLAY
20. OPTIONAL INSTRUMENT
21. CLOCK
22. CARBURETOR AIR TEMP
23. OUTSIDE AIR TEMP/VOLTMETER
24. PANEL LIGHTS DIMMER
25. ENGINE INSTRUMENTS
26. GPS NAVIGATOR
27. CLUTCH ACTUATOR SWITCH
28. IGNITION SWITCH
29. ROTOR BRAKE LIGHT
30. CABIN HEAT
31. NAVIGATION LIGHTS SWITCH
32. ANTI-COLLISION LIGHT SWITCH
33. AVIONICS MASTER SWITCH
34. ALTERNATOR SWITCH
35. BATTERY SWITCH
36. CABIN AIR
37. AUDIO CONTROL
38. AVIONICS STACK
39. CYCLIC FRICTION
40. CARBURETOR HEAT
41. ELT SWITCH (OPT'L)
42. MIXTURE CONTROL
43. PITOT HEAT SWITCH (OPT'L)

OPTIONAL INSTRUMENT PANEL WITH
GARMIN G500H SYSTEM WITH GDU 620 DISPLAY

(Exact panel configuration may vary with optional equipment and date of helicopter manufacture.)

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

GARMIN G500H SYSTEM WITH GDU 1060 TXi OR GDU 700L TXi TOUCH SCREEN DISPLAY

The Garmin GDU 1060 TXi is a 10.6 inch diagonal split screen PFD/MFD designed for use with Garmin's G500H Helicopter Avionics System.

The Garmin GDU 700L TXi is a 7 inch diagonal PFD/MFD designed for use with Garmin's G500H helicopter avionics system.

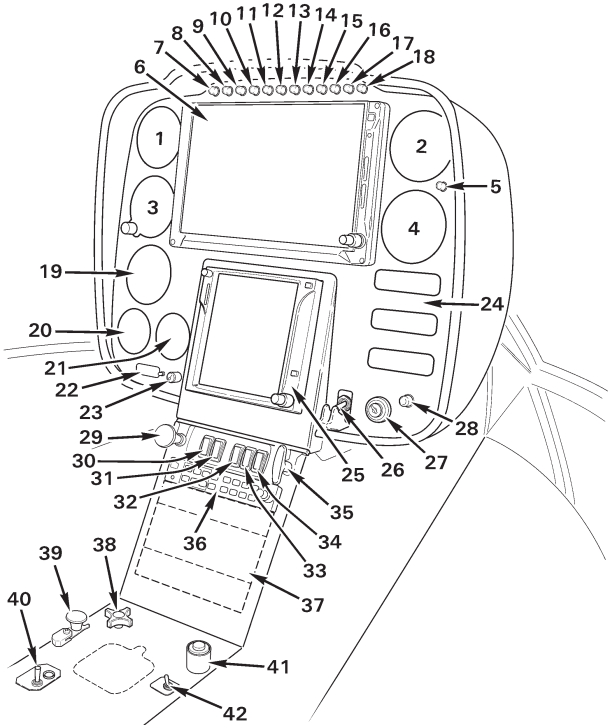
Both displays use a touch screen for pilot interface, with primary functions duplicated via knobs and buttons.

Robinson installations for each of the displays are illustrated on the following pages.

The manufacturer's document for the G500H system with GDU 1060 TXi or GDU 700L TXi display is:

Title	Document No.
Garmin G500(H)/G600/G700 TXi Pilot's Guide	190-01717-11

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

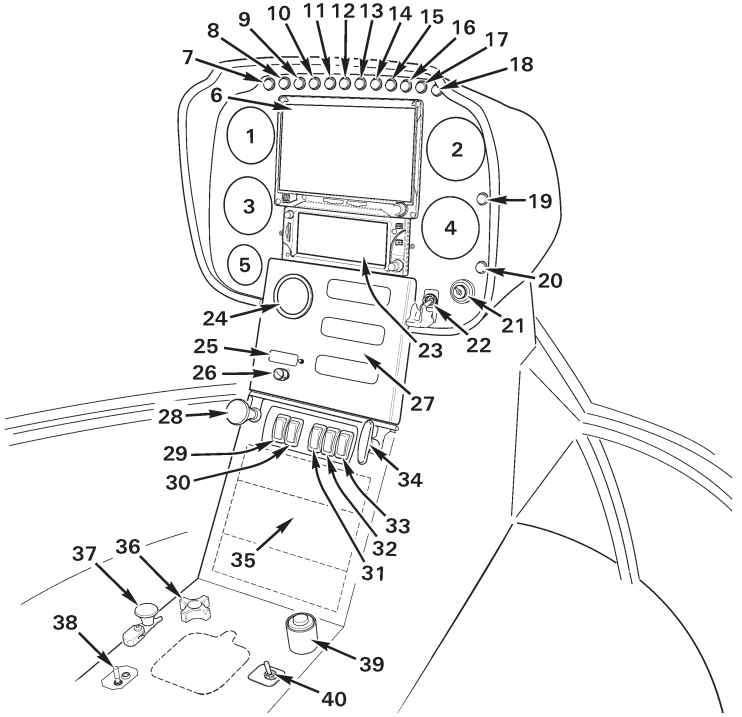


1. AIRSPEED INDICATOR
2. ENGINE AND ROTOR TACHS
3. ALTIMETER
4. MANIFOLD PRESSURE GAGE
5. FULL THROTTLE LIGHT
6. PRIMARY/MULTI FXN DISPLAY
7. CLUTCH ACTUATOR LIGHT
8. M.R. GEARBOX TEMP LIGHT
9. M.R. GEARBOX CHIP LIGHT
10. CARBON MONOXIDE LIGHT
11. STARTER-ON LIGHT
12. T.R. GEARBOX CHIP LIGHT
13. LOW FUEL LIGHT
14. LOW RPM LIGHT
15. ALT LOW VOLTAGE LIGHT
16. ENGINE FIRE LIGHT
17. OIL PRESSURE LIGHT
18. GOVERNOR-OFF LIGHT
19. OPTIONAL INSTRUMENT
20. CLOCK
21. CARBURETOR AIR TEMP
22. OUTSIDE AIR TEMP/VOLTMETER
23. PANEL LIGHTS DIMMER
24. ENGINE INSTRUMENTS
25. GPS NAVIGATOR
26. CLUTCH ACTUATOR SWITCH
27. IGNITION SWITCH
28. ROTOR BRAKE LIGHT
29. CABIN HEAT
30. NAVIGATION LIGHTS SWITCH
31. ANTI-COLLISION LIGHT SWITCH
32. AVIONICS MASTER SWITCH
33. ALTERNATOR SWITCH
34. BATTERY SWITCH
35. CABIN AIR
36. AUDIO CONTROL
37. AVIONICS STACK
38. CYCLIC FRICTION
39. CARBURETOR HEAT
40. ELT SWITCH (OPT'L)
41. MIXTURE CONTROL
42. PITOT HEAT SWITCH (OPT'L)

OPTIONAL INSTRUMENT PANEL WITH
GARMIN G500H SYSTEM WITH GDU 1060 TXi DISPLAY

(Exact panel configuration may vary with optional equipment and date of helicopter manufacture.)

SECTION 7: SYSTEMS DESCRIPTION (cont'd)



1. AIRSPEED INDICATOR
2. ENGINE AND ROTOR TACHS
3. ALTIMETER
4. MANIFOLD PRESSURE GAGE
5. CLOCK
6. PRIMARY/MULTI FXN DISPLAY
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8. M.R. GEARBOX TEMP LIGHT
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14. LOW RPM LIGHT
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20. ROTOR BRAKE LIGHT
21. IGNITION SWITCH
22. CLUTCH ACTUATOR SWITCH
23. GPS NAVIGATOR
24. CARBURETOR AIR TEMP
25. OUTSIDE AIR TEMP/VOLTMETER
26. PANEL LIGHTS DIMMER
27. ENGINE INSTRUMENTS
28. CABIN HEAT
29. NAVIGATION LIGHTS SWITCH
30. ANTI-COLLISION LIGHT SWITCH
31. AVIONICS MASTER SWITCH
32. ALTERNATOR SWITCH
33. BATTERY SWITCH
34. CABIN AIR
35. AVIONICS STACK
36. CYCLIC FRICTION
37. CARBURETOR HEAT
38. ELT SWITCH (OPT'L)
39. MIXTURE CONTROL
40. PITOT HEAT SWITCH (OPT'L)

OPTIONAL INSTRUMENT PANEL WITH
GARMIN G500H SYSTEM WITH GDU 700L TXi DISPLAY

(Exact panel configuration may vary with optional equipment and date of helicopter manufacture.)

FAA APPROVED
R44, R44 II, R44 CADET
PILOT'S OPERATING HANDBOOK

LITHIUM-ION BATTERY SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the lithium-ion main battery is installed.

Information contained herein supplements or supersedes the basic manual only in those areas listed in this supplement. For limitations, procedures, and performance information not contained in this supplement, consult the basic Pilot's Operating Handbook.

APPROVED BY: HIEN H TONG Digitally signed by HIEN H TONG Date: 2020.12.10 13:39:02 -08'00'

for Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles, CA

DATE: 10 DEC 2020

LOG OF PAGES

Page No.	Date	Page No.	Date
9-15.1	10 Dec 20	9-15.4*	10 Dec 20
9-15.2	10 Dec 20	9-15.5*	10 Dec 20
9-15.3	10 Dec 20	9-15.6*	10 Dec 20

* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains changes and additional data applicable when the lithium-ion main battery is installed.

SECTION 2: LIMITATIONS

No change.

SECTION 3: EMERGENCY PROCEDURES

WARNING/CAUTION LIGHTS

BATT FAULT — Indicates abnormal battery operation. Charging, discharging, or both may be disabled. Land as soon as practical. Alternator will continue to supply power in flight.

NOTE

Battery's internal circuitry may disable charge/discharge functions due to over-temperature, over/under voltage, or excessive current draw. A flashing light means the fault may be recoverable (battery will reset itself) either when the condition improves or during a power cycle at the next landing. A steady light means battery maintenance or replacement will likely be necessary.

SECTION 4: NORMAL PROCEDURES

STARTING ENGINE AND RUN-UP

After Battery switch ON, add:

Battery heater indicator light .....Extinguished

NOTE

The lithium-ion battery has a built-in heater. When the battery switch is ON, the BATT HEATER light illuminates during the heating cycle and extinguishes when the battery is warm enough to attempt a start. The indicator light is disabled after engine start, but the heater will continue to cycle as required to maintain optimum battery temperature.

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

ELECTRICAL SYSTEM

A 17 amp-hour lithium-ion battery replaces the standard 24-volt lead-acid main battery. The lithium-ion battery includes built-in circuitry that monitors temperature, voltage, and current draw and manages battery charge and discharge. The circuitry automatically disables charge and/or discharge if any electrical or thermal problems are detected. The circuitry will also interrupt power if a start is attempted with insufficient charge to prevent permanent battery damage. The battery uses lithium-iron-phosphate chemistry which is less susceptible to thermal runaway than some other lithium battery chemistries.

The metal battery case is designed to contain any heat or gases generated within the battery and is vented overboard. No venting should occur during normal operation.

Two annunciator panel segments, BATT FAULT and BATT HEATER, show battery status. The annunciator panel test button should cause these segments to illuminate along with the rest of the annunciator panel. The segments will also illuminate briefly when the battery switch is turned on after several hours of inactivity.

BATT FAULT illuminates if the battery has an over- or under-voltage condition, an over-temperature condition, or if current draw exceeds limits. A flashing light indicates a recoverable fault. The light may go out if the fault corrects itself (e.g. temperature decrease) or may go out as a result of a power cycle at the next landing. A steady light indicates battery maintenance or replacement may be required. The emergency procedure for a fault light (flashing or steady) is to land as soon as practical. The alternator will continue to supply electrical power during the landing.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

ELECTRICAL SYSTEM (cont'd)

The battery incorporates an internal heater for cold weather operation. The heater attempts to maintain a battery temperature of at least 50°F (10°C). When the battery is switched ON, BATT HEATER illuminates while the heater is warming the battery and extinguishes when the battery is warm enough to attempt an engine start. On very cold days, the heating cycle may take 10 minutes or more. The heater light is disabled while the engine is running but the heater will continue to function as long as the battery switch is ON.

SECTION 8: HANDLING AND MAINTENANCE

Nominal charging voltage for the lithium-ion battery is 28.8 volts. Some lead-acid chargers may not provide enough voltage to fully charge the battery. Ensure charging equipment is compatible with lithium-ion batteries.

Refer to the R44 Maintenance Manual for additional handling and maintenance instructions.

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