

SECTION 9
SUPPLEMENTS

OPTIONAL EQUIPMENT SUPPLEMENTS

Information contained in the following supplements applies only when the related equipment is installed.

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NON-U.S. SUPPLEMENTS

The following supplements contain additional information required by certain countries:

Argentine Supplement	IAC AR Supplement
Brazilian Supplement	Israeli Supplement
Canadian Supplement	UK CAA Supplement
EASA Supplement	Ukrainian Supplement
FATA Supplement (Russia)	Uruguayan Supplement

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FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

HEATED PITOT SUPPLEMENT

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

October 25, 2010

LOG OF PAGES

Page No.	Date	Page No.	Date
9-1.1	25 Oct 10	9-1.3*	25 Oct 10
9-1.2	25 Oct 10		

*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 R66 is not certified for flight into known or suspected icing conditions.

NOTE

Continued use of pitot heat following a generator failure will significantly increase battery drain.

SECTIONS 5 AND 6 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.

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R66 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: 

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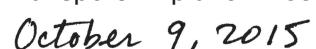
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9-2.1	9 Oct 15	9-2.4*	25 Feb 11
9-2.2	9 Oct 15	9-2.5*	9 Oct 15
9-2.3	9 Oct 15	9-2.6*	25 Feb 11

* Manufacturer's data, not FAA approved.

REVISIONS

APPROVED BY: 

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

DATE: 

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

POWER FAILURE - GENERAL

If time permits, switch air conditioning OFF to maximize glide performance.

SECTION 4: NORMAL PROCEDURES

BEFORE STARTING ENGINE

| Add:

A/C switch OFF

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 seven 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

IGE HOVER CEILING VS. GROSS WEIGHT

With air conditioning on, add 2°C to OAT.

OGE HOVER CEILING VS. GROSS WEIGHT

With air conditioning on, add 2°C to OAT.

CLIMB PERFORMANCE, 2700 LB (1225 KG) GROSS WEIGHT |

Air conditioning operation may reduce climb rate up to 50 ft/min.

CLIMB PERFORMANCE, 2200 LB (998 KG) GROSS WEIGHT |

Air conditioning operation may reduce climb rate up to 60 ft/min.

SECTION 6: WEIGHT AND BALANCE No change.

SECTION 7: SYSTEMS DESCRIPTION

The cabin air conditioning system consists of a compressor mounted to the main gearbox, a condenser and two fans mounted in the lower forward area of the engine compartment, an evaporator mounted to the front of the rear center seat, two fans mounted under the seat, an overhead outlet duct, and interconnecting lines and hoses. The system uses R-134a refrigerant.

The compressor is belt-driven from the tail rotor driveshaft and is equipped with an electromagnetic clutch. When the system is OFF, the compressor clutch is disengaged, allowing the compressor pulley to freewheel.

The fans under the rear seat draw warm cabin air through the evaporator where it is cooled. The cooled air is blown through ducts behind the center rear seat and 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. The compressor disengages when the collective is fully lowered to ensure that aircraft performance is not affected when entering autorotation. The compressor will reengage ten seconds after the collective was lowered or when the collective is raised from the full down position, whichever occurs first. 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 on the compressor. Normal charge is 2.25 lb (1.02 kg) R-134a | refrigerant. Refer to R66 Maintenance Manual for complete system service procedures.

CAUTION

System must only be serviced by qualified personnel following R66 Maintenance Manual procedures.

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R66 PILOT'S OPERATING HANDBOOK

POP-OUT FLOATS SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when pop-out floats 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:



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

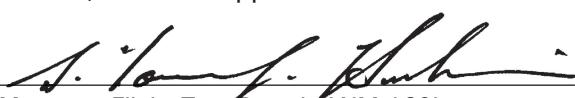
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Page No.	Date	Page No.	Date
9-3.1	19 Dec 2016	9-3.10	9 Oct 2015
9-3.2*	19 Dec 2016	9-3.11	19 Dec 2016
9-3.3	9 Oct 2015	9-3.12	14 Nov 2014
9-3.4	19 Dec 2016	9-3.13	9 Oct 2015
9-3.5	14 Nov 2014	9-3.14*	9 Oct 2015
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9-3.7	9 Oct 2015	9-3.16*	19 Dec 2016
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Manager, Flight Test Branch ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office,
Transport Airplane Directorate

DATE:

December 19, 2016

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when pop-out floats are installed.

Pop-out floats are intended for safety during over-water flights. Intentional (non-emergency) water landings for other than training purposes are not recommended.

NOTE

The pop-out floats are not certified for ditching. Some countries may prohibit certain over-water operations.

SECTION 2: LIMITATIONS

AIRSPEED LIMITS

NEVER-EXCEED AIRSPEED (V_{NE}) – FLOATS STOWED

All Weights	130 KIAS
Autorotation	100 KIAS

For V_{NE} reductions with altitude and temperature, see placards on page 9-3.5.

ADDITIONAL AIRSPEED LIMITS

65 KIAS maximum above 83% torque.

With floats stowed, 100 KIAS maximum with any combination of cabin doors removed.

80 KIAS maximum for float inflation.

80 KIAS maximum with floats inflated.

115 KIAS maximum with float system armed (safety catch in READY position). |

SECTION 2: LIMITATIONS (cont'd)

WEIGHT LIMITS

Maximum weight
for intentional water operations 2200 lb (998 kg)

FLIGHT AND MANEUVER LIMITATIONS

Maximum altitude decrease with floats inflated is 4000 feet.

CAUTION

Altitude loss greater than 4000 feet may cause floats to lose shape and rigidity due to atmospheric pressure increase. Do not inflate floats above 4000 feet AGL.

Intentional water operations at weights above 2200 lb (998 kg) are prohibited.

Intentional water operations in waves greater than 1 foot (0.3 m), trough to crest, are prohibited.

Water takeoff after an emergency water landing is prohibited unless waves are less than 1 foot (0.3 m), trough to crest, and there are no indications of damage. Subsequent flight is limited to ferrying to the nearest suitable area for inspection.

KINDS OF OPERATION LIMITATIONS

Except for an actual emergency, night operation with floats inflated is prohibited.

INSTRUMENT MARKINGS

AIRSPEED INDICATOR

Green arc	0 to 110 KIAS
Yellow arc*	110 to 130 KIAS
Red cross-hatch	100 KIAS
Red line	130 KIAS

*Earlier airspeed indicators without yellow arc must have the following placard adjacent:

DO NOT EXCEED 110 KIAS EXCEPT IN SMOOTH AIR

SECTION 2: LIMITATIONS (cont'd)

PLACARDS

Adjacent to pilot's cyclic grip:

POWER-ON V_{ne} - KIAS

PRESS	OAT - °C									
	-40	-30	-20	-10	0	10	20	30	40	50
ALT-FT										
SL	129									127
2000	124		130					126	122	
4000	119	127			129	125	121	117	114	
6000	114	122		125	121	117	113	108		
8000	109	117	121	116	112	107	102	97		
10000	105	112	112	106	101	96	91	86		
12000	100	106	101	95	90					
14000	96	95	89							NO FLIGHT
16000	90									

NOTE: 65 KIAS MAXIMUM ABOVE 83% TORQUE
DO NOT EXCEED 80 KIAS WITH FLOATS INFLATEDAUTOROTATION V_{ne} - KIAS

PRESS	OAT - °C									
	-40	-30	-20	-10	0	10	20	30	40	50
ALT-FT										
6000			100							
8000						99	94	89		
10000				98	93	88	83	78		
12000		98	93	87	82					
14000	93	87	81							NO FLIGHT
16000	82									

Near inflation lever:

DO NOT INFLATE FLOATS ABOVE 80 KIAS

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.

CAUTION

Float inflation may take up to three seconds. Squeeze inflation lever early enough to allow full inflation before water contact.

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. Reduce airspeed to below 80 KIAS.
3. Adjust collective to keep RPM between 95 and 106% or apply full down collective if light weight prevents attaining above 95%.
4. If altitude permits, maneuver into wind.
5. Inflate floats.

CAUTION

Do not inflate floats above 80 KIAS.

Do not exceed 80 KIAS with floats inflated.

6. At about 40 feet AGL, begin cyclic flare.
7. 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.
8. 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. Reduce airspeed to below 80 KIAS.
3. Adjust collective to keep RPM between 95 and 106% or apply full down collective if light weight prevents attaining above 95%.
4. If altitude permits, maneuver into wind.
5. Inflate floats.

CAUTION

Do not inflate floats above 80 KIAS.

Do not exceed 80 KIAS with floats inflated.

6. Maintain airspeed until water is approached, then begin cyclic flare.
7. 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.
8. 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 BELOW 8 FEET AGL

Over land: Same as in basic manual.

Over water:

1. Apply right pedal as required to prevent yawing.
2. Inflate floats.
3. Allow rotorcraft to settle.
4. Raise collective just before touchdown.

MAXIMUM GLIDE DISTANCE CONFIGURATION

Same as in basic manual except airspeed 80 KIAS with floats inflated.

With floats inflated, best glide ratio is about 5.2:1 or one nautical mile per 1200 feet AGL.

EMERGENCY WATER LANDING – POWER OFF

See procedures for power failures in this supplement.

EMERGENCY WATER LANDING – POWER ON

1. Reduce airspeed to below 80 KIAS.
2. Inflate floats.

CAUTION

Do not inflate floats above 80 KIAS.

Do not exceed 80 KIAS with floats inflated.

3. Make normal approach and landing to water.

SECTION 4: NORMAL PROCEDURES**DAILY OR PREFLIGHT CHECKS****9. Pop-Out Floats**

- Check float and cover condition
- Check hose and fitting condition
- Check pressure in pressure cylinder
- Verify safety pin at pressure cylinder removed
- Set inflation lever safety READY or LOCKED as desired

CAUTION

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

COLD WEATHER OPERATION

When OAT is below -10°C, there may be insufficient charge in pressure cylinder for full float inflation.

FLOAT INFLATION

The red inflation lever located under the pilot's collective is equipped with a safety catch to prevent inadvertent float inflation. Prior to overwater flight, place the safety catch in the READY position. With the safety catch in the READY position, floats may be inflated by squeezing inflation lever.

Over land, safety catch should be reset to LOCKED position.

CAUTION

Observe 115 KIAS speed limitation when safety catch is in READY position.

SECTION 4: NORMAL PROCEDURES (cont'd)

FLOAT INFLATION (cont'd)

CAUTION

The pressure cylinder also has provisions for a safety pin at the valve on the cylinder neck. This safety pin is for use during maintenance and cylinder transport only and must be removed at all other times.

NOTE

Some flapping of float covers during flight with floats inflated is normal. To minimize wear, consider removing covers if an extended flight with inflated floats is required.

SECTION 4: NORMAL PROCEDURES (cont'd)**OPERATION ON WATER**

Intentional (non-emergency) operation on water is limited to maximum wave heights of 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. 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

Except for actual emergencies, maximum weight for water operation is 2200 lb.

CAUTION

Engine thrust will cause helicopter to drift forward. Some application of collective with aft cyclic input is required to stop drift.

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 with floats stowed should only be performed to a smooth, hard surface to avoid damage to floats. Touch-down autorotations with floats inflated are not recommended due to the possibility of damage to floats.

PRACTICE AUTOROTATION TO WATER

Autorotation to water with floats inflated is 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.

SHUTDOWN PROCEDURE

Add:

Inflation lever safety LOCKED

SECTION 5: PERFORMANCE

CLIMB PERFORMANCE, 2700 LB (1225 KG) GROSS WEIGHT |

Stowed or inflated floats may reduce climb rate by as much as 250 feet per minute.

CLIMB PERFORMANCE, 2200 LB (998 KG) GROSS WEIGHT |

Stowed or inflated floats may reduce climb rate by as much as 300 feet per minute.

SECTION 6: WEIGHT AND BALANCE**WEIGHT AND BALANCE RECORD**

Basic empty weight and CG with pop-out float landing gear and pressure cylinder installed are included in the Weight and Balance Summary provided with the helicopter. If pressure cylinder is removed, update Weight and Balance Record. A charged pressure cylinder weighs 11.4 lb. The longitudinal arm of the cylinder is 79.6 inches from datum and the lateral arm is +8.3 inches from datum.

SECTION 7: SYSTEMS DESCRIPTION

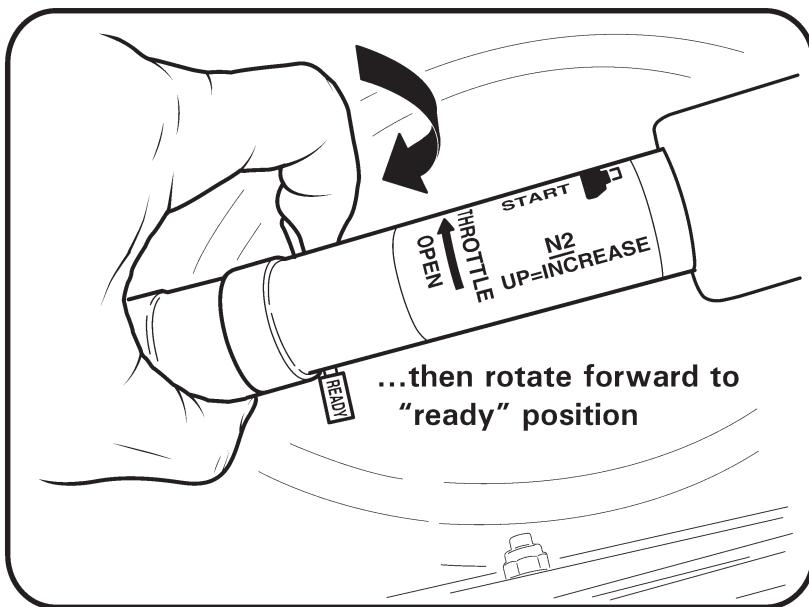
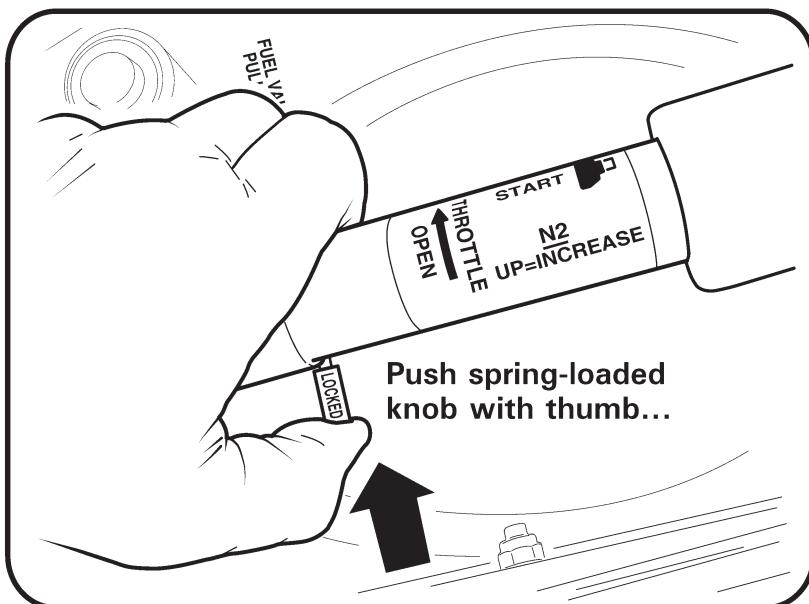
The pop-out float system consists of inflatable floats stowed in protective covers along the skid tubes, a pressure cylinder located in the compartment under the right rear seat, flexible hoses from the cylinder to the floats, an inflation lever located on the pilot's collective, an enlarged stabilizer installed at the base of the lower vertical stabilizer, and an end plate installed at the tip of the horizontal stabilizer. Sealed inspection panels and drains with check valves are installed on the cabin belly.

The pressure cylinder is of aluminum construction reinforced with carbon filament windings and is charged with helium. Proper pressure is indicated on a placard on the cylinder, and pressure can be checked using the gage on the cylinder valve.

A safety catch on the inflation lever can be set to prevent inadvertent actuation. With the safety catch in the READY position, floats are inflated by squeezing firmly on the inflation lever. (Approximately 20 lb force is required.) Float inflation time is approximately 2-3 seconds. With the safety catch in the LOCKED position, the inflation lever is locked out.

To operate the safety catch, push spring-loaded knob with thumb while rotating U-shaped pin with forefinger as shown in figure.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)



SECTION 7: SYSTEMS DESCRIPTION (cont'd)

The pop-out floats are intended for safety during over-water flights. They are not certified for ditching.

NOTE

Floats maintain full pressure for at least 1 hour after inflation and typically maintain shape for several hours. Monitor float pressure if helicopter remains on water for an extended period. Verify adequate pressure (approximately 0.5 to 2 psi) prior to takeoff after an extended period of inflation.

NOTE

Flotation stability has been substantiated for emergency water landings up to a significant wave height of 8 feet (2.4m) corresponding to World Meteorological Organization Sea State 4. However, due to random variations in real-world wind and wave conditions, there is always some chance of capsizing. Be prepared to evacuate rapidly if necessary.

SECTION 8: HANDLING AND MAINTENANCE

GROUND HANDLING

With floats installed, special ground handling wheels (Robinson part number MT980-1 and MT980-2) are required.

A safety pin is provided for installation at the pressure cylinder valve. This pin should be installed during maintenance and cylinder transport to prevent inadvertent pressure release.

CAUTION

With the safety pin installed, it is not possible to inflate the floats using the cockpit inflation lever. The safety pin is for use during maintenance and cylinder transport only and must be removed at all other times.

FLOAT TUBES AND COVERS

Immediately replace any damaged float tube cover to minimize chance of float damage. Inspect float tube condition after each inflation. Refer to R66 Maintenance Manual for periodic inspection, float repacking, and cylinder recharge instructions.

CLEANING HELICOPTER

Clean helicopter exterior per section 8 of the basic manual immediately following operation in salt water. Clean under-seat baggage compartments if damp.

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FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

POLICE VERSION SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when police equipment 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: Tim Tang
fr Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration, LAACO
Transport Airplane Directorate

DATE: September 7, 2012

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9-4.1	03 APR 20	9-4.7*	03 APR 20
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9-4.3	19 DEC 16	9-4.9*	19 DEC 16
9-4.4	03 APR 20	9-4.10*	03 APR 20
9-4.5	19 DEC 16	9-4.11*	19 DEC 16
9-4.6*	03 APR 20	9-4.12*	10 AUG 15

* Manufacturer's data, not FAA approved.

REVISIONS
APPROVED BY:

Nevada Jo Ryan

Digitally signed by Nevada Jo
Ryan
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Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles, CA

DATE: 03 APR 2020

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable to the Police Version.

The Police Version is equipped with a nose-mounted gyro-stabilized infrared camera, a flat screen monitor for viewing camera images, a video recorder, and a belly-mounted searchlight. Optional FM transceivers, a PA/Siren, Lojack equipment, and a GPS mapping system may also be installed. A dedicated, non-essential electrical bus distributes power to police equipment, and extended landing gear provides additional ground clearance for the camera and searchlight.

There are two basic cockpit configurations. See descriptions in Section 7 of this supplement.

SECTION 2: LIMITATIONS

AIRSPEED LIMITS

NEVER-EXCEED AIRSPEED (V_{ne})

All weights	130 KIAS
Autorotation	100 KIAS

For V_{ne} reductions with altitude and temperature, see placards on page 9-4.3.

FLIGHT AND MANEUVER LIMITATIONS

For cockpit configuration without left-hand cyclic grip, pilot in command must occupy right seat (see configuration description in Section 7).

SECTION 2: LIMITATIONS (cont'd)

INSTRUMENT MARKINGS

AIRSPEED INDICATOR

Green arc	0 to 110 KIAS
Yellow arc*	110 to 130 KIAS
Red cross-hatch	100 KIAS
Red line	130 KIAS

* Earlier airspeed indicators without yellow arc must have the following placard adjacent:

DO NOT EXCEED 110 KIAS EXCEPT IN SMOOTH AIR

PLACARDS

Adjacent to pilot's cyclic grip:

POWER-ON V_{ne} - KIAS

PRESS ALT-FT	OAT- °C									
	-40	-30	-20	-10	0	10	20	30	40	50
SL	129									127
2000	124			130				126	122	
4000	119	127			129	125	121	117	114	
6000	114	122		125	121	117	113	108		
8000	109	117	121	116	112	107	102	97		
10000	105	112	112	106	101	96	91	86		
12000	100	106	101	95	90					
14000	96	95	89							
16000	90									
NO FLIGHT										

NOTE: 65 KIAS MAXIMUM ABOVE 83% TORQUE

AUTOROTATION V_{ne} - KIAS

PRESS ALT-FT	OAT- °C									
	-40	-30	-20	-10	0	10	20	30	40	50
6000				100						
8000						99	94	89		
10000					98	93	88	83	78	
12000		98	93	87	82					
14000	93	87	81							
16000	82									
NO FLIGHT										

SECTION 2: LIMITATIONS (cont'd)

PLACARDS (cont'd)

Inside right rear under-seat compartment:

NO STOWAGE

On camera controller:

STOW DURING TAXI,
TAKEOFF, AND LANDING

Inside main baggage compartment:

CAUTION

- MAXIMUM DISTRIBUTED FLOOR LOAD: 50 LB/FT² (244 KG/M²)
- MAXIMUM TOTAL COMPARTMENT LOAD: 250 LB (113 KG)

or

CAUTION

- MAXIMUM TOTAL BAGGAGE LOAD:
WITHOUT AUX FUEL TANK INSTALLED: 250 LB (113 KG)
WITH LARGE (43.5 GAL) AUX TANK INSTALLED: 50 LB (22KG)
WITH SMALL (23.2 GAL) AUX TANK INSTALLED: 150 LB (68 KG)
- MAXIMUM DISTRIBUTED FLOOR LOAD: 50 LB/FT² (244 KG/M²)

SECTION 3: EMERGENCY PROCEDURES

MAXIMUM GLIDE DISTANCE CONFIGURATION

With police equipment installed, best glide ratio is about 5.1:1 or one nautical mile per 1200 feet AGL.

MINIMUM RATE OF DESCENT CONFIGURATION

With police equipment installed, minimum rate of descent is about 1400 feet per minute. Glide ratio is about 4.3:1 or one nautical mile per 1400 feet AGL.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

Add to item 2, Fuselage Right Side:

Verify searchlight secure.

Add to item 6, Fuselage Left Side:

Verify siren secure.

Add to item 7, Nose:

Verify camera and fairing secure.

TAKEOFF PROCEDURE

Stow camera controller during taxi and takeoff.

APPROACH AND LANDING

Stow camera controller.

NOTE

Stow searchlight horizontally when not in use to minimize chance of damage during a hard landing.

SECTION 5: PERFORMANCE

CLIMB PERFORMANCE, 2700 LB GROSS WEIGHT

Police equipment may reduce climb rate by as much as 160 ft/min.

CLIMB PERFORMANCE, 2200 LB GROSS WEIGHT

Police equipment may reduce climb rate by as much as 200 ft/min.

SECTION 6: WEIGHT AND BALANCE

CAUTION

Removal of nose-mounted camera causes a large shift in CG of empty helicopter. Calculate weight and balance prior to flight with camera removed to assure aft CG limit is not exceeded.

SECTION 7: SYSTEMS DESCRIPTION

GENERAL

The R66 is a four-place helicopter when police equipment is installed.

Basic descriptions of police equipment and systems are given below. More detailed information can be found in manufacturer's documents supplied with individual pieces of equipment.

FLIGHT CONTROLS

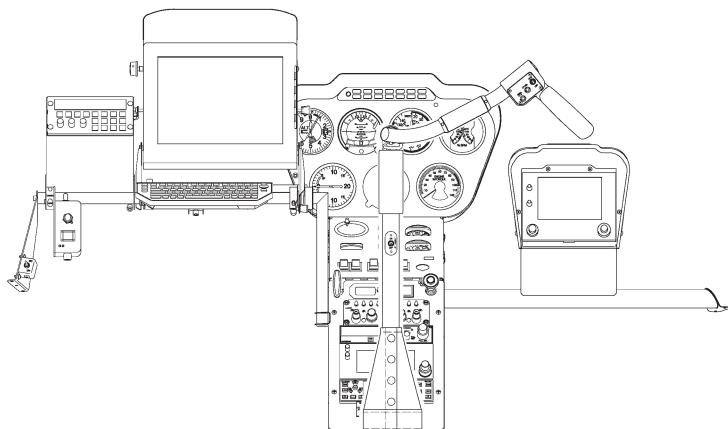
Some aircraft have a cockpit configuration that does not include the left side cyclic grip in order to prevent interference with the observer's LCD monitor.

INSTRUMENT PANEL

There are two basic cockpit configurations as shown on the following page. One configuration uses a modified cyclic control without a left-side grip because the flat screen monitor would interfere. The second configuration uses the standard cyclic control with a left-side grip.

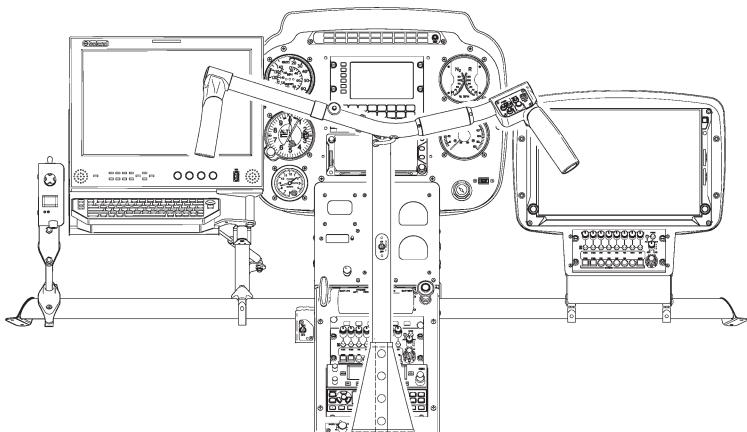
For the pilot-side flight display, a Robinson part no. D327-5 light filter may be used to reduce reflections in the windshield at night. The light filter is installed by clipping it to the front of the display. Filter use is at pilot discretion.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)



CONFIGURATION WITHOUT LH CYCLIC GRIP

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



CONFIGURATION WITH LH CYCLIC GRIP

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

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

ELECTRICAL SYSTEM

An additional circuit breaker panel on the ledge just forward of the pilot's seat contains all circuit breakers for police equipment. Depending on installed police options, the outboard section of the aft row of circuit breakers may be a 14-volt bus powered by a 28- to 14-volt converter. The police equipment master switch on the left side of the panel controls power to all police equipment.

NOTE

Police circuit breaker panel will not be powered by police equipment master switch unless avionics switch is also on.

Wiring for police equipment is in a separate harness and occupies portions of the main baggage compartment, right side under seat compartments, and right rear footwell. Protective covers isolate the wiring harness as appropriate.

AUDIO SYSTEM

Audio control panel(s) to accommodate police radios and other equipment are installed. The audio system receives power from the audio breaker on the main (left hand) circuit breaker panel. It is not connected to the police equipment master switch.

A transmit switch for the left front seat is provided on the floor near the observer's right heel. An intercom switch for the left front seat is provided either near the observer's right heel or at the outboard base of the seat box. An optional transmit switch for the left rear seat is also available. The optional switch is handheld on a cord which plugs into a jack beneath the left rear seat ICS button. Transmit functionality is tied to the selection on the observer's audio panel.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

SEATS, BELTS, AND BAGGAGE

The center rear seat has been replaced with an arm rest and storage console.

Baggage is not permitted in the right rear under-seat compartment due to electronic equipment and wiring in that compartment.

An interior wall has been added to the main baggage compartment to create an electronic equipment compartment at the aft end.

LANDING GEAR

Extended forward landing gear struts provide additional ground clearance for the camera and searchlight. The ground clearance at the tail is reduced by approximately 8 inches with the helicopter parked.

INFRARED CAMERA SYSTEM

The infrared camera system consists of a gyro-stabilized, gimbal-mounted infrared/video camera in the chin and a power junction box in the main baggage compartment behind the interior wall. The camera is operated by the observer in the left front seat via a handheld controller. A tray and strap forward of the circuit breaker panel are provided for controller stowage when not in use.

A flat screen LCD monitor is located in front of the left front seat to display camera images.

For the earlier cockpit configuration, the monitor is equipped with a visor to minimize glare. The monitor mount is hinged to retract forward and down, out of the observer's way, when not in use.

For the later cockpit configuration, the monitor has no visor but is easily dimmed using a knob on its front face. The monitor mount is hinged on its inboard edge, and the monitor folds back against the left side of the instrument console, out of the observer's way, when not in use.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

| **DIGITAL VIDEO RECORDER (OPTIONAL)**

The digital video recorder (DVR) is mounted just aft of the space between the front backrests and controlled by a switch at the observer's station. The DVR can record images from the camera and play them back on the LCD monitor.

SEARCHLIGHT

The searchlight is installed on a motorized gimbal under the belly. The searchlight power junction box is located in the right rear under-seat compartment. The searchlight is steerable in azimuth and elevation and is operated from the left front seat via a remote control. An optional slaving system allows the searchlight to be slaved to follow the camera. The searchlight should be stowed horizontally when not in use to minimize chance of damage during a hard landing.

CAUTION

The searchlight is very bright and can disorient other pilots or ground personnel at long distances.

CAUTION

The searchlight beam is hot. Exposure to the beam at close range for more than a few seconds can result in burns.

INTERIOR LIGHT

An additional observer-side interior light is operated via a momentary foot switch on the left-hand forward floor. Power is supplied to the interior light via the "GAGES" breaker in the left hand circuit breaker panel and is not disconnected by the police equipment master switch.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

PA/SIREN SYSTEM (OPTIONAL)

A 100-watt speaker is located on the aircraft belly near the left rear landing gear strut. The PA system control panel is located in the avionics stack and allows the pilot or observer to select PA, radio, yelp, or siren for broadcast through the speaker.

FM TRANSCEIVERS (OPTIONAL)

A multi-band FM transceiver may be mounted either next to the LCD monitor or in the main avionics stack. The FM transceiver band(s) are selectable from the audio control panel(s).

LOJACK (OPTIONAL)

The Lojack installation consists of a receiver installed in the main baggage compartment behind the interior wall, a display and control unit on the right side of the instrument console, and four belly-mounted stub antennas. Lojack is used to track stolen vehicles equipped with Lojack transmitters.

GPS MAPPING SYSTEM (OPTIONAL)

The GPS mapping computer is installed in the main baggage compartment behind the interior wall and allows an overhead view of the helicopter's area of operation to be displayed on the LCD monitor. The computer contains a database of streets, landmarks, and topography enabling direct navigation to street addresses and other points on the ground. The computer is accessed using a keyboard below the LCD monitor. An optional inertial monitoring unit can interface with the computer to keep the camera and/or searchlight trained on a fixed ground location while the helicopter maneuvers.

SECTION 8: HANDLING AND MAINTENANCE No change.

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FAA APPROVED
R66 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:


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

DATE:

January 20, 2015

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* Manufacturer's data, not FAA approved.

REVISIONS LAN-GLENN V TO
APPROVED BY: _____

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Date: 2022.02.16 12:33:27 -08'00' *Acting*

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

DATE: 16 FEB 2022

SECTION 1: GENERAL

INTRODUCTION

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

There are two versions of the HeliSAS autopilot. The earlier version (designated Version 51) has a BC (backcourse) button on the control panel. The later version (designated Version 52) replaces the BC button with a SPD (speed) button on the control panel.

The autopilot's primary Stability Augmentation System (SAS) mode maintains a steady helicopter attitude by applying corrective inputs to the cyclic. Additional modes providing heading hold, altitude hold, airspeed control (Version 52), and navigation functionality are also selectable. The autopilot does not provide any collective or pedal inputs. The system is designed as a "fly through" system meaning the pilot can override as desired for maneuvering without disengaging the system. Only a few pounds of force at the cyclic are required for override, and the system will not disconnect due to pilot cyclic inputs.

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.

SECTION 2: LIMITATIONS**FLIGHT AND MANEUVER LIMITATIONS**

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

During autopilot engagement or intentional disengagement

At altitudes less than 200 feet AGL

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.

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

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

SECTION 3: EMERGENCY PROCEDURES (cont'd)

AUTOPILOT DISENGAGEMENT OR FAILURE (cont'd)

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 140 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.

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.

SECTION 4: NORMAL PROCEDURES (cont'd)

STARTING ENGINE AND RUN-UP

After "Hydraulic system", add:

Autopilot Check

Airspeed and altitude bugs Set (Version 52)

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.

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.

The autopilot senses aircraft attitude using a combination of sensors in the flight control computer and an independent onboard attitude source such as the Attitude Heading Reference System (AHRS) for the Primary Flight Display (PFD). The computer then sends signals to the servomotors which are connected to the bottom of the cyclic in the control tunnel.

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. Additional modes may be layered on top of SAS mode and are described below. The pilot can override as desired for maneuvering without disengaging the system. Only a few pounds of force at the cyclic are required for override, and the system will not disconnect due to pilot cyclic inputs.

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.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)**AUTOPILOT (cont'd)**

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.

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 140 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.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

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.

NOTE

The system also automatically reverts to SAS mode at airspeeds below 44 KIAS or above 140 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. For Version 52, stick forces felt during override will gradually wash out to near zero without use of TRIM button if override is maintained.

NOTE

The system will not re-trim to angles more than approximately 10° in pitch or roll.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)**AUTOPILOT (cont'd)*****NOTE***

When engaging SAS mode from standby, for angles of less than approximately 10° in pitch and roll, SAS holds the current angles. If either pitch or roll is larger than approximately 10°, the system assumes an unusual attitude and gently levels the helicopter.

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

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.

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.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

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.

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.

Speed Mode (SPD) (Version 52 only)

Speed mode uses cyclic pitch to control airspeed. Exact behavior varies with configuration of airspeed and altitude bugs on the PFD as described below.

The altitude bug is displayed above the altitude tape and the airspeed bug is displayed above the airspeed tape. The appearance of all dashes or a blank field indicates a bug is not set.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)**AUTOPILOT (cont'd)****Speed Mode (SPD) (Version 52 only) (cont'd)**

If an airspeed bug is not set, selecting SPD holds the current airspeed. The target speed is reset each time the trim button is pressed and released.

If an airspeed bug is set, selecting SPD holds airspeed at the bug setting. Changing the bug will change the target airspeed.

If an altitude bug is set, selecting SPD will also arm ALT (ALT LED white) for altitude capture. The mode will switch from SPD to ALT if the selected altitude is crossed. There will be a brief period in capture mode with the ALT LED flashing white/green.

NOTE

Do not change the selected altitude during ALT capture (ALT LED flashing white/green). System may pitch up or down to chase bug and may not capture altitude.

NOTE

Different brands of PFD behave differently in terms of bug settings at power up and how bugs are manually set. Refer to PFD manufacturer's documents for proper use. Verify desired bug settings before engaging SPD mode.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUTOPILOT (cont'd)

- | Backcourse Mode (BC) (Version 51 only) – 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).
- | Airspeed Protection (Version 52 only) – Minimizes the possibility of the ALT mode to fly the helicopter to an airspeed below 44 KIAS due to insufficient power, or the VRT mode to fly the helicopter to an airspeed above 140 KIAS due to excess power when flying a precision approach glideslope. When triggered, it causes the longitudinal mode to change from ALT (at low airspeed) or VRT (at high airspeed) to SAS mode with a commanded pitch attitude of 2 degrees nose down. Since the mode change is not commanded by the pilot, a single warning beep is annunciated.

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.

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FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

AUXILIARY FUEL SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the auxiliary fuel system 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

Los Angeles Aircraft Certification Office,
Transport Airplane Directorate

DATE:


February 17, 2010

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* Manufacturer's data, not FAA approved.

REVISIONS

APPROVED BY:

Digitally signed by HIEN H TONG
Date: 2019.08.15 11:15:18 -07'00'

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

DATE: 15 AUG 2019

SECTION 1: GENERAL

INTRODUCTION

This supplement contains changes and additional data applicable when the auxiliary fuel system is installed. The system may be configured with either a large fuel tank with a 43.5 US gallon capacity or a small fuel tank with a 23.2 US gallon capacity.

SECTION 2: LIMITATIONS

WEIGHT LIMITS

Baggage Compartment with auxiliary fuel tank installed:

Maximum distributed load	50 lb/ft ² (244 kg/m ²)
Maximum total load	
with large tank installed	100 lb (45 kg)
with small tank installed	200 lb (90 kg)

FUEL LIMITATIONS

AUXILIARY FUEL CAPACITY

Transferable to main tank:

Large auxiliary tank	43.5 US gallons (165 liters)
Small auxiliary tank	23.2 US gallons (88 liters)
Non-transferable:	0.2 US gallons (0.8 liters)

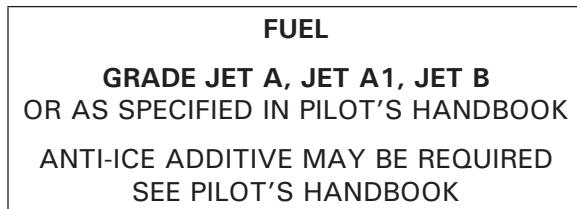
NOTE

Fuel in auxiliary tank is not usable fuel for flight planning purposes until it is transferred to the main tank.

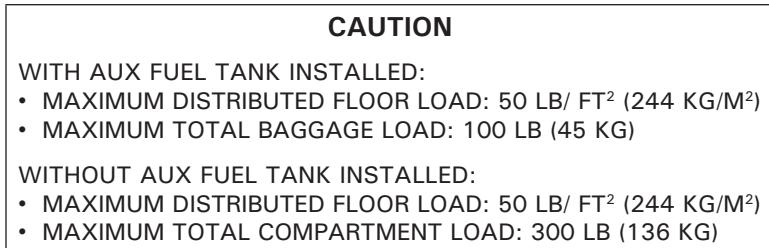
SECTION 2: LIMITATIONS (cont'd)

PLACARDS

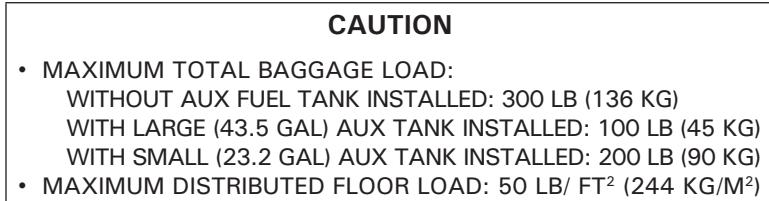
Near auxiliary fuel tank filler cap:



Inside main baggage compartment:



or



SECTION 3: EMERGENCY PROCEDURES

AMBER CAUTION INDICATORS

NO FLOW
(on AUX FUEL
panel)

When transfer pump is switched on, indicates fuel is not transferring from auxiliary tank to main tank. When pump is first switched on, it is normal for light to illuminate for approximately 5 seconds while system is priming. Otherwise, light indicates either auxiliary tank is empty or transfer pump has failed. Switch pump off to extinguish light.

NOTE

Light also illuminates when quantity button is pressed to verify circuit is functioning.

SECTION 4: NORMAL PROCEDURES**DAILY OR PREFLIGHT CHECKS**

Add to item 1, Pilot's Station:

Verify aux fuel pump is off.

While battery switch is ON, press QUANTITY button to check aux fuel quantity and verify NO FLOW light illuminates.

Add to item 2, Fuselage Right Side:

Verify aux fuel tank is secure and no leaks

Verify aux fuel quantity and filler cap secure

Sample aux fuel, drain water and contaminants

Stow drain hose and latch baggage door

BEFORE STARTING ENGINE

Add:

Aux fuel pump OFF

AUX FUEL PUMP OPERATION

After engine start, auxiliary fuel transfer pump may be turned on as desired. The aux fuel pump may be left on even when the main tank is full. Excess fuel is recirculated to the auxiliary tank. Switch aux fuel pump off when the auxiliary fuel tank is empty (indicated by the NO FLOW light).

NOTE

The fuel transfer system has no redundancy in case of pump failure. Therefore, fuel is not usable for flight planning purposes until it is transferred to the main tank.

SHUTDOWN PROCEDURE

Add:

Aux fuel pump OFF

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE**WEIGHT AND BALANCE RECORD**

Basic empty weight and CG with auxiliary fuel system installed is included in the Weight and Balance Summary provided with the helicopter.

LOADING INSTRUCTIONS

The following table may be used when calculating loaded helicopter weight and CG position.

Item	Weight (lb)	Longitudinal arm (in.)	Lateral arm (in.) (+ = right side)
Fuel, large auxiliary tank		101.0	+ 1.0
Remove large auxiliary tank	-30.0	101.0	+ 1.5
Remove large support tray	-3.0	101.0	-1.2
Fuel, small auxiliary tank		96.8	+ 2.9
Remove small auxiliary tank	-23.0	96.8	+ 3.5
Remove small support tray	-2.0	96.8	-0.4
Baggage in baggage compartment with large auxiliary tank installed		117.0	0.0
Baggage in baggage compartment with small auxiliary tank installed		113.0	0.0

CAUTION

- When large tank is full, auxiliary fuel system weighs over 320 lb (145 kg). Do not exceed helicopter weight limits.

SECTION 7: SYSTEMS DESCRIPTION

The auxiliary fuel system consists of a removable fuel tank located in the forward section of the baggage compartment, hoses connecting the auxiliary tank to the main fuel tank, and a small control panel on the instrument console.

The auxiliary fuel tank includes a crash-resistant bladder in an aluminum and fiberglass enclosure, an internal fuel transfer pump, a quantity sender, a filler port, and a sump drain. The filler port and sump drain are accessed by opening the baggage door. The tank mounts on a separate fiberglass tray which is also removable.

The pump transfers fuel to the main tank at approximately 40 gallons per hour (150 liters per hour). Venting is provided through a second hose connected to the main tank. If the main tank is full, any excess fuel transferred by the pump returns to the auxiliary tank through the vent hose.

A fuel flow sensor is located at the fitting where transferred auxiliary fuel enters the main tank (hose connection near the main tank filler port). The sensor illuminates the NO FLOW light on the control panel when the pump switch is on but the fuel transfer rate is less than ten gallons per hour.

The AUX FUEL control panel on the console includes a pump switch, a NO FLOW annunciator light, and a QUANTITY button. The pump switch engages the transfer pump. When the pump switch is on, the NO FLOW light indicates fuel is not transferring from auxiliary tank to the main tank, either because the auxiliary tank is empty or the pump has failed. It is normal for the light to illuminate for approximately five seconds when the pump is first switched on while the system is priming.

A time-delay circuit automatically switches the pump off if the NO FLOW light is illuminated for more than 15 seconds. The light will remain on even after the time delay has removed power from the pump. Turning the pump switch off will extinguish the light.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

While the QUANTITY button is depressed, the fuel quantity gage indicates fuel quantity in the auxiliary tank instead of the main tank. The NO FLOW light also comes on while the QUANTITY button is depressed to provide a test of the circuit and to confirm that the auxiliary tank quantity is being displayed on the fuel gage.

The auxiliary fuel tank has two drains through the belly of the helicopter. Any fuel spilled at the filler port is collected by the surrounding scupper and drains through a hose into the outboard belly drain location. The tank support tray has a drain at the inboard drain location. Fuel leaking from the inboard drain indicates a possible leak in the fuel bladder.

A sump drain hose stowed vertically along the right side of the tank allows preflight fuel sampling from the low point of the tank. To sample fuel, extend hose away from the helicopter and push in on the valve. The valve may be locked open to allow draining of the tank.

Operationally, the fuel transfer pump may be switched on any time at the pilot's discretion. If the main tank is full, any excess fuel transferred from the auxiliary tank will return through the vent/return hose. Note that fuel in the auxiliary tank is not considered usable for flight planning purposes because the fuel transfer system has no redundancy in case of pump failure.

The auxiliary fuel tank may be removed to provide additional baggage space. The separate support tray may also be removed. A small container which may be clipped to the outboard side of the tank is provided for stowing installation hardware. Refer to the R66 Maintenance Manual for removal and installation procedures.

SECTION 8: HANDLING AND MAINTENANCE

No change.

FAA APPROVED
R66 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:


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

DATE:



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9-8.3	23 Dec 2022	9-8.6*	23 Dec 2022

* Manufacturer's data, not FAA approved.

REVISIONS
APPROVED BY:

Nevada Ryan

Digitally signed by Nevada Ryan
Date: 2022.12.23 08:05:59
-08'00'

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

DATE: 23 DEC 2022

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

AMBER CAUTION INDICATORS

BATT FAULT Indicates abnormal battery operation. Charging, discharging, or both may be disabled. Land as soon as practical. Generator 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

COLD WEATHER OPERATION

The lithium-ion battery has a built-in heater, so battery preheating is not required. 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.

STARTING ENGINE AND RUN-UP

After Battery switch ON, add:

Battery heater indicator light Extinguished

NOTE

A battery without sufficient charge to start the engine will not have the normal indications of starter sluggishness associated with a lead-acid battery. Instead, the battery's monitoring circuit will suddenly interrupt power to the starter. If this occurs, immediately abort start by pulling fuel cutoff.

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 lead-acid main battery. The 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 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 on the left side of the aircraft. No venting should occur during normal operation.

Two annunciator panel segments, BATT FAULT and BATT HEATER, indicate battery status. Earlier aircraft have two indicator lights located to the left of the annunciator panel.

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 generator 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.

If a start is attempted with insufficient charge, the battery's safety monitors may interrupt power. In the event of a power interruption, a small backup power supply will allow the MGT and N₁ gages as well as the Engine Monitoring Unit to continue functioning. The backup power supply also provides power to the map light. The backup power supply consists of two 9-volt batteries installed in the compartment under the left front seat. The 9-volt batteries are non-rechargeable and should be replaced periodically as indicated in the R66 Maintenance Manual.

NOTE

The backup batteries will discharge if the battery switch is ON and the main battery is discharged or disconnected. Backup batteries should be replaced if battery switch was left ON without main battery power.

SECTION 8: HANDLING AND MAINTENANCE

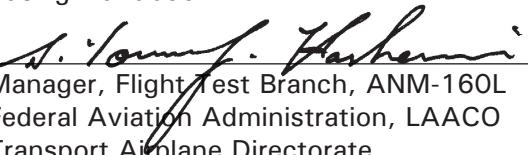
Nominal charging voltage for the lithium-ion battery is 28.8 volts. Some lead-acid chargers may not provide enough voltage to fully charge the battery. Ensure charging equipment is compatible with lithium-ion batteries.

Refer to the R66 Maintenance Manual for additional handling and maintenance instructions.

FAA APPROVED
R66 PILOT'S OPERATING HANDBOOKELECTRONIC NEWS GATHERING (E.N.G.) VERSION
SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when Electronic News Gathering (E.N.G.) equipment 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: June 30, 2017

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* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when Electronic News Gathering (E.N.G) equipment is installed.

The E.N.G. version is equipped with a nose-mounted, gyro-stabilized video camera, microwave transmitting equipment, and related video and audio components to allow on-scene video and audio recording as well as relay of video and audio to ground stations. A rear center equipment console replaces the center rear seat and houses various audio and video controls. Extended landing gear provides additional ground clearance for the nose camera and belly-mounted microwave antenna. Typical crew configuration includes a camera operator who controls the news equipment from the left rear seat. E.N.G. equipment is described in detail in section 7.

SECTION 2: LIMITATIONS

AIRSPEED LIMITS

NEVER-EXCEED AIRSPEED (V_{ne})

All weights	120 KIAS
Autorotation	100 KIAS

For V_{ne} reductions with altitude and temperature, see placards on page 9-9.4.

WEIGHT LIMITS

Baggage Compartment:

Maximum distributed floor load:	50 lb/ft ² (244 kg/m ²)
Maximum total baggage load:	250 lb (113 kg)

FLIGHT AND MANEUVER LIMITATIONS

Rear seat main monitor must be stowed below 500 feet AGL.

Camera laptop controller must be stowed during taxi, takeoff, and landing.

INSTRUMENT MARKINGS

AIRSPEED INDICATOR

Green arc	0 to 110 KIAS
Yellow arc	110 to 120 KIAS
Red cross hatch	100 KIAS
Red line	120 KIAS

SECTION 2: LIMITATIONS (cont'd)

PLACARDS

Adjacent to pilot's cyclic grip:

POWER-ON V_{ne} - KIAS

PRESS ALT-FT	OAT- C°									
	-40	-30	-20	-10	0	10	20	30	40	50
SL										
2000			120							
4000	119							117	114	
6000	114					117	113	108		
8000	109	117		116	112	107	102	97		
10000	105	112	112	106	101	96	91	86		
12000	100	106	101	95	90					
14000	96	95	89							NO FLIGHT
16000	90									

NOTE: 65 KIAS MAXIMUM ABOVE 83% TORQUE

AUTOROTATION V_{ne} - KIAS

G654-14

PRESS ALT-FT	OAT- C°									
	-40	-30	-20	-10	0	10	20	30	40	50
6000										
8000			100					99	94	89
10000					98	93	88	83	78	
12000		98	93	87	82					
14000	93	87	81							NO FLIGHT
16000	82									

On rear seat main monitor:

MONITOR MUST BE STOWED
WHEN BELOW 500 FEET AGL

On laptop camera controller:

STOW DURING TAXI, TAKEOFF,
AND LANDING

Inside right rear under-seat compartment:

NO STOWAGE

Inside main baggage compartment:

CAUTION

- MAXIMUM DISTRIBUTED FLOOR LOAD: 50 LB/FT² (244 KG/M²)
- MAXIMUM TOTAL COMPARTMENT LOAD: 250 LB (113 KG)

SECTION 3: EMERGENCY PROCEDURES

POWER FAILURE ABOVE 500 FEET AGL

Add:

If time permits, stow main rear seat monitor and laptop controller.

MAXIMUM GLIDE DISTANCE CONFIGURATION

With E.N.G. equipment installed, best glide ratio is about 4.8:1 or one nautical mile per 1300 feet AGL.

MINIMUM RATE OF DESCENT CONFIGURATION

With E.N.G. equipment installed, minimum rate of descent is about 1600 feet per minute. Glide ratio is about 3.8:1 or one nautical mile per 1600 feet AGL.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

Add to item 3, Tailcone, Empennage, and Tail Rotor:

 Verify security of camera on horizontal stabilizer

Add to item 4, Belly:

 Verify security of microwave antenna pod

Add to item 7, Nose:

 Verify security of camera and fairing

Add to item 8, Cabin area:

 Verify security or proper stowage of cameras, monitors, and control panels.

CAUTION

Talent lights and video monitors can be distracting for some pilots during dark, night conditions. Ensure proper crew coordination prior to switching on equipment, and set brightness levels to pilot preference.

TAKEOFF PROCEDURE

Add:

 Stow rear seat main monitor and laptop camera controller.

DESCENT, APPROACH, AND LANDING

Add:

 Stow rear seat main monitor and laptop camera controller.

SECTION 5: PERFORMANCE

CLIMB PERFORMANCE, 2700 LB GROSS WEIGHT

E.N.G. equipment may reduce climb rate by as much as 350 ft/min.

CLIMB PERFORMANCE, 2200 LB GROSS WEIGHT

E.N.G. equipment may reduce climb rate by as much as 450 ft/min.

SECTION 6: WEIGHT AND BALANCE

CAUTION

Removal of nose-mounted camera causes a large shift in CG of empty helicopter. Calculate weight and balance prior to flight with camera removed to assure aft CG limit is not exceeded.

SECTION 7: SYSTEMS DESCRIPTION

AIRFRAME

The R66 is a four-place helicopter when E.N.G. equipment is installed.

Basic descriptions of news gathering equipment and systems are given below. More detailed information can be found in manufacturer's documents supplied with individual pieces of equipment.

ELECTRICAL SYSTEM

An additional circuit breaker panel on the ledge just forward of the pilot's seat contains all circuit breakers for E.N.G. equipment. The forward row of circuit breakers is a 28-volt bus and the aft row is a 14-volt bus. A 28 to 14-volt converter powers the 14-volt bus. The news equipment master switch on the left side of the panel controls power to all E.N.G. equipment.

NOTE

E.N.G. circuit breaker panel will not be powered by news equipment master switch unless avionics switch is also on.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

NOSE-MOUNTED CAMERA SYSTEM

The nose-mounted camera system consists of a gyro-stabilized, gimbal-mounted video camera in the chin and a power junction box in the main baggage compartment. A fairing between the camera ball and chin minimizes the aerodynamic effects of the camera. The camera is operated from the left rear seat via a laptop controller.

When not in use, the laptop controller may be stowed and secured in the recess at the aft end of the rear equipment console.

CAUTION

The laptop controller is heavy and can cause injury if not secured during a hard landing. Always secure controller during taxi, takeoff, and landing operations.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUDIO AND INTERCOM SYSTEM

The audio system consists of four audio control panels and an audio junction box. The audio junction box is located beneath the right rear seat. Power is supplied via a 5-amp circuit breaker in the main circuit breaker panel on the left hand side of the aircraft. Power to the audio system is not disconnected by the news equipment master switch.

The pilot's audio panel is located on the accessory bar in front of the pilot's seat. Push buttons are used to select a primary (transmit and monitor) audio component. Green LEDs indicate which audio component is currently selected as primary. Additional components may be monitored by selecting their toggle switches up. Sliders control volume level for each component being monitored.

Intercom control is at the far right of the audio panel. Toggle switch down isolates the pilot from the intercom. With the toggle switch up, the ICS slider controls volume, and the VOX slider (adjacent to the left) controls voice-activation threshold. VOX slider full down is maximum threshold (keyed intercom). Pushing the ICS pushbutton (illuminating the green LED) provides hot mic regardless of VOX slider position.

The first detent of the pilot's trigger switch is the intercom key. The second detent transmits on the #1 VHF communications radio regardless of audio panel configuration. The audio panel transmit thumb button transmits on the panel-selected audio component.

A toggle switch to the left of the pilot's audio panel may be used to bypass the audio system and connect the pilot directly to Com 1. This mode is automatically engaged in the event of an audio system power failure. (The transmit indicator on the radio display can be used to verify transmission.)

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AUDIO AND INTERCOM SYSTEM (cont'd)

The left front seat audio panel operates in the same manner as the pilot's audio panel but is not connected to the bypass toggle switch. The first detent of the copilot's trigger switch is the intercom key, and the second detent transmits on the panel-selected audio component. A handheld transmit switch has been added for use when the left cyclic grip is removed.

The left front seat audio panel also controls the audio configuration for the right rear seat.

The left rear seat audio panel is connected to the left rear seat headset jack. The laptop camera controller contains intercom and transmit switches for the camera operator.

The microwave audio panel controls which signals are sent to the microwave transmitter and video recorder. Selecting the toggle switch up for a component sends its signal to the transmitter. Push buttons are not functional on this panel.

FORWARD MONITOR INSTALLATION

The forward monitor installation consists of two small LCD monitors mounted to the left and right of the instrument console. The right monitor displays nose camera, micro-camera, or video tape recorder images as selected by the video switcher. The left monitor displays TV broadcasts as selected by the TV tuner.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

AFT MONITOR INSTALLATION

The aft monitor installation consists of one large main LCD monitor mounted to the cross tube between the front seatbacks and either one or two smaller LCD monitors mounted near the longitudinal tube running above the rear center equipment console.

The large, main LCD monitor is mounted on a pivoting arm. The pivoting arm allows the monitor to be rotated between the stowed position inboard and operating position directly in front of the camera operator. A spring-loaded pin beneath the pivot locks the monitor in the stowed position. Pulling the pin releases the monitor for use. The Velcro tether attached to the monitor should be wrapped around the seat back cross tube to hold the monitor in the operating position. Detaching the tether will cause the monitor to return to the stowed position. Verify monitor locks in position after detaching tether.

NOTE

Monitor must be stowed below 500 ft AGL. If not stowed, the monitor is a potential source of head injury in an accident.

The main rear LCD monitor may be switched between three input signals. Input A displays nose camera, micro camera, or video recorder images as selected by the video switcher. Input B bypasses the video switcher and displays nose-camera images directly. The accessory input bypasses the video switcher and displays annotated nose-camera images.

One or two smaller auxiliary monitors are installed near the longitudinal tube above the rear equipment console and display TV broadcasts as selected by the TV tuner(s).

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

VIDEO SWITCHER

The video switcher is located in the rear equipment console and is used to select the video signal source (nose camera, video recorder playback, or micro cameras). The signal is then routed to the monitors, microwave transmitter, and video recorder.

TV TUNER

The TV tuner is mounted in the rear equipment console and is used to select television broadcasts to be displayed on the monitors. A second tuner is optional.

MICRO CAMERA SYSTEM

The micro camera system consists of three small cameras and their control units. The micro cameras are mounted at the tip of the horizontal stabilizer, on the windshield bow, and in the center of the cabin. The control units are located in the rear equipment console. The horizontal stabilizer camera is enclosed in a weatherproof case.

VIDEO RECORDER

The video recorder is located on the cross tube between the front seatbacks and has a built-in monitor and controls.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

MICROWAVE SYSTEM

The microwave transmitting system consists of a microwave transmitter, power amplifier, control panels, and a directional antenna pod.

The microwave transmitter is located in the main baggage compartment. The control panel for the transmitter is located in the rear equipment console.

The directional antenna pod is located beneath the aircraft belly at approximately the center of the cabin, and the power amplifier is mounted on top of it. The directional antenna pod contains a GPS tracking system which keeps the antenna aimed at a ground-based receive site. The antenna has its own control panel located in the rear equipment panel.

FM TRANSCEIVERS

FM transceiver #1 is mounted in the lower instrument panel, and FM transceivers #2 and #3 are mounted in the rear equipment console. All 3 transceivers are selectable from any of the three main audio control panels.

AM/FM RECEIVERS

An optional AM/FM receiver may be mounted in the rear equipment console. The receiver is selectable from any of the three main audio control panels.

SCANNER

A multi-band scanner may be installed in place of the AM/FM receiver and is selectable from any of the three main audio control panels.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

TALENT LIGHT

The forward talent light is mounted on the left side of the instrument console and is used to illuminate the left front seat occupant (typically a reporter) during broadcasts in low-light conditions. Beam elevation is adjustable via a friction mount. The aft talent light is mounted on top of the center-cabin camera and is used to illuminate rear seat areas as desired. The forward light is controlled by a toggle switch on the rear equipment console, and the aft light is controlled by a switch on the light itself.

CAUTION

Talent lights may cause glare for pilot at night.
Switch lights off if glare is objectionable.

SEATS, BELTS, AND BAGGAGE

Baggage is not permitted in the compartment under the right rear seat due to electronic equipment and wiring in that area.

LANDING GEAR

Extended forward landing gear struts provide additional ground clearance for the camera and directional microwave pod. Ground clearance at the tail is reduced by approximately 8 inches with the helicopter parked.

SECTION 8: HANDLING AND MAINTENANCE

For ground handling, a second set of wheel installation supports is provided forward on the landing gear skids. For ground handling using MT950 towcart, install wheels at forward supports and use cart at aft cross tube as indicated on cart instructions. For ground handling without towcart, wheels may be installed at all four support locations.

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FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

CARGO HOOK EQUIPMENT SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the factory-supplied cargo hook and associated equipment 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:

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

DATE:

July 6, 2018

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* Manufacturer's data, not FAA approved.

REVISIONS
APPROVED BY:

Nevada Ryan

Digitally signed by Nevada Ryan

Date: 2022.12.23 08:07:08 -06'00'

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

SECTION 1: GENERAL

INTRODUCTION

This supplement applies to:

- Belly-mounted cargo hook
- Electric and manual cargo release systems
- Left side cyclic control with hydraulic switch and left side collective control with start button
- Load-weigh system
- Provisions for remote control of equipment carried by cargo hook
- Forward door(s) with large bubble window
- Skid-mounted cargo mirror(s)

Limitations are found in Section 2 and equipment descriptions are found in Section 7 of this supplement.

All of the following combinations of hook-related equipment are approved flight configurations:

- Cargo hook installed or removed
- Left side cyclic with hydraulic switch and/or left side collective with start button installed or removed

NOTE

Controls without switch/button may also be substituted. In this case, observe right seat solo flight limitation from basic handbook.

- One or both doors with large bubble window installed or removed
- One or both skid mirrors installed or removed

The cargo hook installation is not compatible with pop-out floats.

SECTION 2: LIMITATIONS

AIRSPEED LIMITS

ADDITIONAL AIRSPEED LIMITS

100 KIAS maximum when one or both forward cabin doors with a large bubble window are installed.

80 KIAS maximum with any external load on hook.

CAUTION

Maximum safe airspeed with external load depends upon load configuration. It is the operator's responsibility to establish a maximum airspeed for each specific load.

POWERPLANT LIMITATIONS

During external load operations, maximum transient torque of 110% for up to 10 seconds is permitted for hover and hovering maneuvers.

NOTE

Transient torque allowance is permitted only at airspeed below effective translational lift (approximately 15 to 20 knots) to account for pilot reaction to gusts or other momentary conditions while operating with heavy external loads.

WEIGHT LIMITS

Maximum external load: 1200 lb (544 kg)

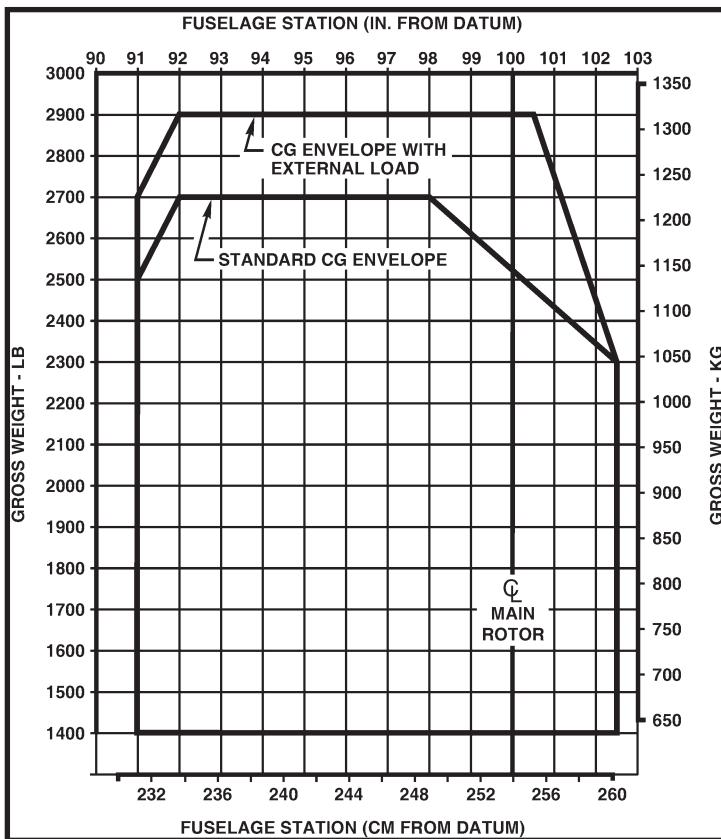
Maximum combined weight of helicopter and external load: 2900 lb (1315 kg)

(Weight above 2700 lb must be jettisonable external load. Maximum weight on landing gear is 2700 lb.)

SECTION 2: LIMITATIONS (cont'd)

CENTER OF GRAVITY LIMITS

See figure below for longitudinal CG limits for helicopter with external load. Lateral CG limits are unchanged. Weight above standard CG envelope must be jettisonable external load.



LONGITUDINAL CENTER OF GRAVITY LIMITS

SECTION 2: LIMITATIONS (cont'd)

FLIGHT AND MANEUVER LIMITATIONS

Maximum operating density altitude 7000 feet for combined weight of helicopter and external load above 2700 lb.

Solo flight from left seat permitted provided left seat cyclic with hydraulic control switch is installed, left seat collective with engine start button is installed, and forward right seat belt is buckled.

Autorotations for any reason other than an actual emergency prohibited while carrying external load.

KINDS OF OPERATION LIMITATIONS

Non-human external cargo only.

Night operations prohibited while carrying external load.

NOTE

External load equipment certification does not constitute operational approval. Operational approval for external loads must be granted by the local aviation authority.

Night operations prohibited with one or both doors with a large bubble window installed.

SECTION 2: LIMITATIONS (cont'd)

PLACARDS

Near hook on aircraft belly:

HOOK LOAD LIMIT 1200 LB (544 KG)

In clear view of pilot:

MAX SPEED WITH EXT LOAD 80 KIAS

NON-HUMAN EXTERNAL CARGO ONLY
NIGHT OPERATIONS PROHIBITED WHILE
CARRYING EXTERNAL LOAD

On door(s) with large bubble window:

WITH THIS DOOR INSTALLED:
• MAXIMUM SPEED 100 KIAS
• NIGHT FLIGHT PROHIBITED

SECTION 2: LIMITATIONS (cont'd)

PLACARDS (cont'd)

Near each cyclic release button:

HOOK RELEASE

Near each mechanical release knob:

HOOK RELEASE

The following placard is not required on left cyclic grip with hydraulic switch:

SOLO FROM RIGHT SEAT ONLY

SECTION 3: EMERGENCY PROCEDURES

POWER FAILURE – GENERAL

In case of power failure, release cargo using HOOK RELEASE after entering autorotation.

CAUTION

Consider people and property on ground when releasing cargo.

MAXIMUM GLIDE DISTANCE CONFIGURATION

With one or both doors with a large bubble window installed, best glide ratio is about 4.8:1 or one nautical mile per 1300 feet AGL.

MINIMUM RATE OF DESCENT CONFIGURATION

With one or both doors with a large bubble window installed, minimum rate of descent is about 1450 feet per minute. Glide ratio is about 4.1:1 or one nautical mile per 1500 feet AGL.

HOOK RELEASE BUTTON FAILURE

Pull manual release knob to release cargo.

SECTION 4: NORMAL PROCEDURES

RECOMMENDED AIRSPEEDS

Recommended airspeeds are not applicable with external load. Observe 80 KIAS external load speed limitation. Some loads may require lower speeds.

DAILY OR PREFLIGHT CHECKS

Add to Item 4, Belly:

Verify hook secure, no damage to hook, wiring, or surrounding structure.

Swivel hook to travel extremes. Verify no binding of release cable or wiring.

Check release cable rigging through window in manual release cover. Lightly depress manual release lever and verify slack in cable.

CAUTION

Verify no cargo lines pass over landing gear skid tubes or struts.

Add to Item 7, Nose:

Verify skid mirrors (if installed) secure, no damage.

Add to Item 8, Cabin Area:

Verify electrical plug at base of left-sided collective is inserted if collective is installed.

CAUTION

If removing or inserting plug, ensure battery switch is OFF. Removing or inserting plug is equivalent to pressing start button.

Cycle hook release buttons and manual release controls to verify proper hook function.

Cycle external load control switches to verify proper function (if applicable).

Verify cargo instruments (load meter, MGT, Torque) are unobstructed and have no visible damage.

Zero load meter (as required).

SECTION 4: NORMAL PROCEDURES (cont'd)

CARGO HOOK USE

Prior to external load operations, verify ground crew has been properly instructed regarding electrical grounding and discharge of static electricity. Helicopter should be electrically grounded prior to attaching or removing external load in order to prevent static discharge arc.

Rig external load such that only one primary load ring is in contact with the cargo hook. Do not use multiple load rings, rope, or straps directly on the hook.

CAUTION

It is the responsibility of the operator to ensure safe rigging configuration for each load carried.

Prior to lifting an external load, ground crew should verify that the hook lock indicator on the side of the hook is in the fully locked position. (Lock indicator diamond must align with engraved lines on the manual release cover).

Apply collective smoothly when lifting load.

CAUTION

Size and shape of load as well as load rigging may affect flight characteristics. It is the responsibility of the operator to establish safe operational limits for each specific load.

The hook release button at the cyclic grip opens the cargo hook to release the external load. The manual release knob may also be used to release the load.

The external load control switch at the cyclic grip controls remote functions for equipment attached to the hook.

SECTION 5: PERFORMANCE

USE OF CHARTS

HOVER PERFORMANCE

Out-of-ground-effect (OGE) hover performance for gross weights above 2700 lb is provided on page 9-10.13. Hover performance is only presented up to 7000 feet density altitude since weight is limited to 2700 lb above this altitude. For weights below 2700 lb, use the chart on page 5-8 of the basic handbook.

Note that the hover performance shown on page 9-10.13 is achieved at the 100% engine torque limit for all but the lower left corner of the chart. The engine is able to produce 100% torque without exceeding MGT limits. (Engine anti-ice may be on below 10°C and is not needed above 10°C.) However, the engine will still be near MGT limits. A torque transient above 100% or use of cabin heat could result in an MGT exceedance. Increasing torque by 10% increases MGT by approximately 30°C, and using full cabin heat increases MGT by approximately 60°C. Pilots should maintain an adequate MGT margin to allow for torque transients. This may require operating at reduced weight and/or restricting heater use.

SECTION 5: PERFORMANCE (cont'd)

OGE HOVER CEILING VS GROSS WEIGHT

Use chart on page 9-10.13 for weights above 2700 lb.

CLIMB PERFORMANCE

Due to drag variations with load type and rigging, climb performance charts may not be valid while carrying external load.

CLIMB PERFORMANCE, 2700 LB (1225 KG) GROSS WEIGHT

Climb rate may be reduced by up to 350 ft/min with one or both doors with a large bubble window installed.

CLIMB PERFORMANCE, 2200 LB (998 KG) GROSS WEIGHT

Climb rate may be reduced by up to 450 ft/min with one or both doors with a large bubble window installed.

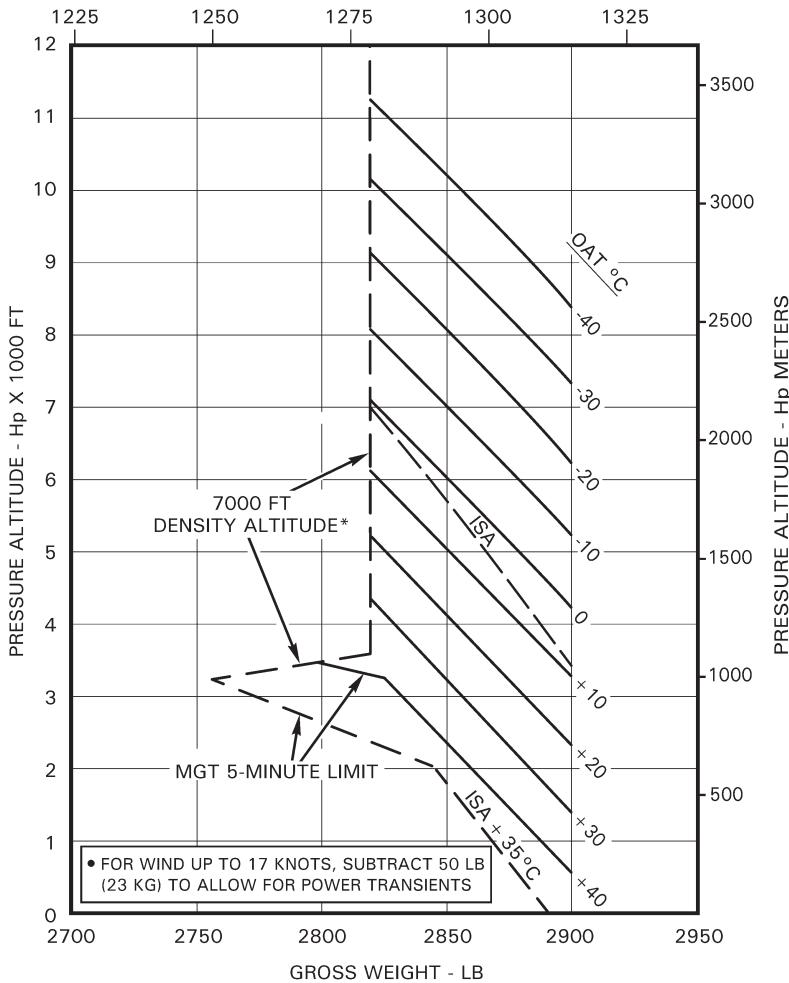
HEIGHT-VELOCITY DIAGRAM

Due to drag and handling qualities variations with load type and rigging, the height-velocity diagram may not be valid while carrying external load.

SECTION 5: PERFORMANCE (cont'd)

OUT OF GROUND EFFECT, ZERO WIND
100% TORQUE EXCEPT AS NOTED
ENGINE ANTI-ICE OFF OR ON BELOW 10°C
CABIN HEAT OFF, 50 AMP GENERATOR LOAD

GROSS WEIGHT - KG



OGE HOVER CEILING VS. GROSS WEIGHT

*Gross weight limited to 2700 lb above 7000 feet density altitude.

SECTION 6: WEIGHT AND BALANCE

The longitudinal arm of the cargo hook is 90.8 inches from the datum, and the lateral arm is -4.1 inches from the datum. These values may be used for weight and balance calculations when carrying external load. The weight and balance limits for the helicopter with external load are specified in Section 2 of this supplement.

NOTE

Doors with a large bubble window weigh more than standard doors. They should be individually weighed for weight and balance calculations. Their CG is the same as for standard doors.

SECTION 7: SYSTEMS DESCRIPTION

GENERAL

The cargo hook installation provides equipment for carrying external loads. External load operations in the United States require a valid Rotorcraft External-Load Operator Certificate in accordance with 14 CFR § 133.

The cargo hook installation consists of the following:

- Belly-mounted cargo hook.
- Electric cargo release buttons on left and right side cyclic control.
- Manual cargo release knobs for left and right front seats.
- Hydraulic switch and radio controls added to left-side cyclic (duplicates controls on right-side cyclic).
- Start button added to left-side collective (duplicates start button on right-side collective).
- A load weighing system.
- Additional MGT gage and torque meter for left seat pilot.
- Provisions for remote control of equipment carried as external load (such as remote hook on a long line).

Related equipment which may be installed with or without a cargo hook includes:

- Forward doors with a large bubble window (left, right or both).
- Skid-mounted mirrors to assist in viewing external loads (left, right, or both).

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

CARGO HOOK

A view of the cargo hook is shown on the following page. The hook is mounted to a hard point on the helicopter belly.

A hook lock indicator on the side of the hook's manual release cover provides verification that the hook is fully latched. The indicator diamond must be aligned with the engraved lines on the cover prior to lifting an external load.

A window in the manual release cover allows verification of proper rigging of the manual release cable. The cable should have a small amount of slack to ensure that cable tension does not cause an inadvertent hook release. Proper rigging should be verified during preflight by lightly depressing the manual release lever and observing a small gap between the cable's ball end and the release lever fork.

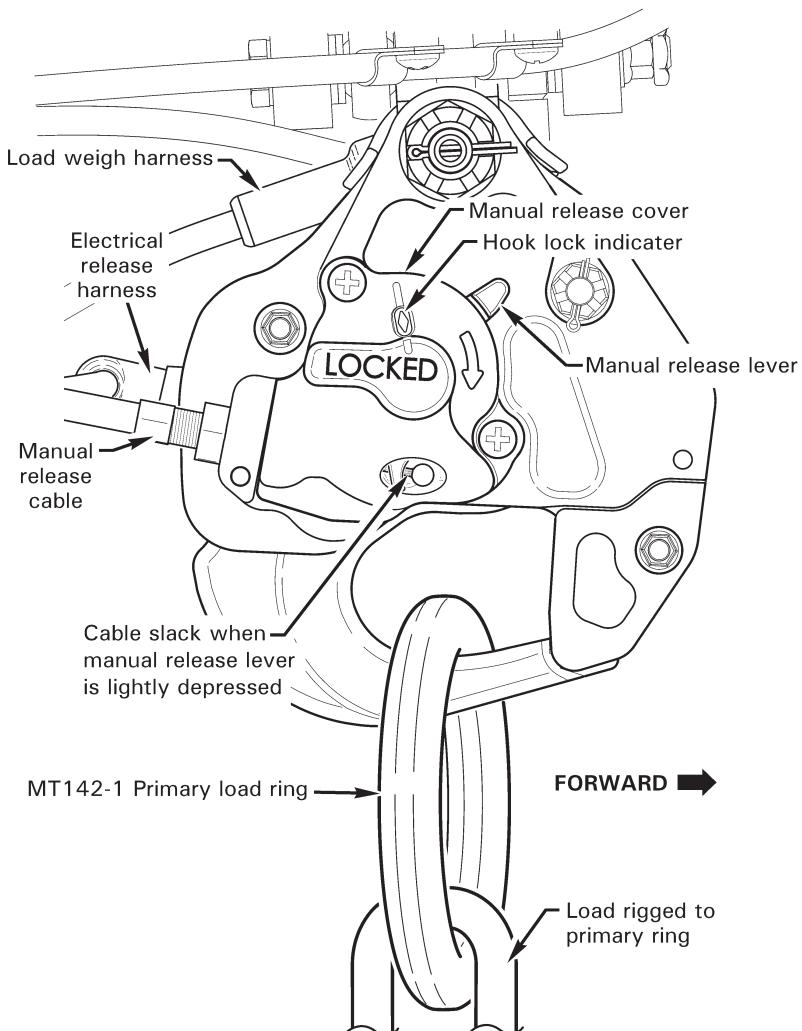
To ensure that the hook will release properly, the load should be rigged such that only a primary load ring (Robinson part no. MT142-1 or equivalent) is in contact with the hook.

Loads may be released from the hook by three methods. Primary release is by depressing the HOOK RELEASE button at the cyclic grip which energizes a solenoid that releases a latch and allows the hook to open. Manual release is by pulling the HOOK RELEASE knob located adjacent to the base of the collective. Pulling the knob pulls the inner wire of the manual release cable to open the hook latch. There is also a manual release lever on the side of the hook for use by ground crew.

All three release methods should be checked during preflight to confirm proper operation.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

CARGO HOOK (cont'd)



CARGO HOOK INSTALLATION

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

FLIGHT CONTROLS

A HOOK RELEASE button is to the right of the hydraulic switch on each cyclic grip.

The left-side cyclic for the cargo hook includes a hydraulic switch and radio control buttons similar to the right-side cyclic.

A padded elbow rest is provided at the base of the left-side collective. This allows the left-side pilot to brace against the elbow rest for stability while leaning out to see external loads. The elbow rest is adjustable up and down via a friction knob on the front face of its support. It is also removable by completely unscrewing the knob.

NOTE

When the left side cyclic for the cargo hook is installed, both hydraulic switches must be ON to enable the system.

REMOVABLE FLIGHT CONTROLS

There is an additional electrical plug where the left-side grip mates with the cyclic cross tube and an additional electrical plug at the base of the left-side collective.

CAUTION

Ensure battery switch is OFF when removing or inserting electrical plug at the base of the collective. Removing or inserting plug makes electrical contact equivalent to momentarily pressing start button.

ENGINE CONTROLS

The left-side collective incorporates an engine start button.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

ELECTRICAL SYSTEM

The cargo hook electric releases are powered by the HOOK RELEASE circuit breaker. The load cell is also powered by the HOOK RELEASE breaker.

The controls for external equipment are powered by the EXT LOAD circuit breaker.

The left-side (door sill mounted) torque meter and MGT indicator receive power from the main (panel-mounted) torque meter.

INSTRUMENT PANEL

A second torque meter and MGT indicator are provided near the left door sill. These allow the pilot to monitor power limits while leaning out to see external loads. A toggle switch in the door sill controls an instrument light for these gages.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

SEATS, BELTS, AND BAGGAGE

Anchor points in the cabin ceiling above the door posts are provided for attaching a safety tether or harness for operations which involve leaning outside the cabin. Robinson offers a part no. MT184-1 harness for pilot use during cargo hook operations.

NOTE

The MT184-1 harness is considered a pilot accessory and has no FAA approval.

EXTERNAL LOAD CONTROL

External load functions are controlled by the EXT LOAD CONTROL momentary toggle switch located below and to the left of the radio control buttons on each cyclic grip.

The EXT LOAD CONTROL switch is a 3-position switch. The center, spring-loaded position is neutral. Momentary toggle up and momentary toggle down provide switched 28-volt power to external equipment. An electrical receptacle on the aircraft belly is provided for interface with external equipment and includes a decal showing pin assignments. A Robinson part no. MT143-1 wire harness is available for connecting to the receptacle. Control functions will vary with the type of equipment being used.

CAUTION

If using an external long line, release of load from end of line may cause substantial line recoil depending on characteristics of the line.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

LOAD WEIGH SYSTEM

The load weigh system consists of a load cell incorporated in the hook attaching hardware and a display installed near the left door sill.

The display shows load on the hook in tens of pounds (e.g. 90 indicates 900 lb.). An on-off toggle switch is adjacent to the display, and the display is internally lit.

NOTE

The load weigh system is for reference only. Correct weight and balance is the responsibility of the pilot in command based on actual weighing or on reliable weight data for cargo to be carried.

DOORS WITH LARGE BUBBLE WINDOW

Doors with a large bubble window are designed such that pilots may lean their head into the bubble in order to look straight down at an external load. The left door contains a second, lower window that allows the pilot to look back inside at the torque meter, MGT indicator, and load cell display. Each door contains an electric fan to aid with defogging. The fan is controlled by a toggle switch on the fan housing. The doors can be removed and installed in the same manner as standard doors with the addition of an electrical plug for the fans.

SKID MIRRORS

Mirrors may be installed near the forward end of one or both landing gear skid tubes. The mirrors are intended to assist the pilot in viewing external loads. The mirrors are mounted on friction ball joints and may be adjusted to optimal angles prior to takeoff.

SECTION 8: HANDLING AND MAINTENANCE

CARGO HOOK

The R66 Maintenance Manual provides removal, installation, and servicing instructions for the cargo hook.

CABIN DOORS

The doors with a large bubble window may be removed and installed by maintenance personnel or pilots. Use the same procedure as for standard doors, except disconnect the fan power wire prior to door removal and reconnect it upon installation.

FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

OPTIONAL AVIONICS SUPPLEMENT

This supplement must be included in the FAA-approved Robinson R66 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 R66 Pilot's Operating Handbook.

APPROVED BY: Hin Tong

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

DATE: April 18, 2018

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* 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.

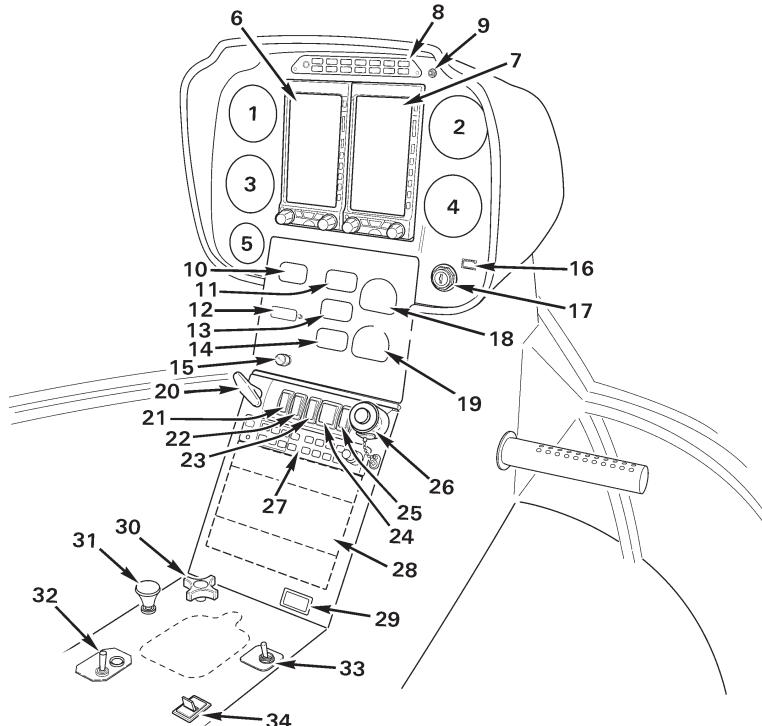
The manufacturer's documents for the EFD 1000H and EFD 500H are:

Title	Document No.
<i>Aspen Avionics Evolution Flight Display EFD 1000H PFD Pilot's Guide</i>	091-00012-001
<i>Aspen Avionics Evolution Flight Display EFD 1000H/500H MFD Pilot's Guide</i>	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	18. MGT GAGE
2. N ₁ AND ROTOR TACHOMETERS	19. N ₁ TACHOMETER
3. ALTIMETER	20. CABIN AIR
4. TORQUEMETER	21. NAVIGATION LIGHTS SWITCH
5. CLOCK	22. ANTI-COLLISION LIGHT SWITCH
6. MULTI-FUNCTION DISPLAY	23. AVIONICS MASTER SWITCH
7. PRIMARY FLIGHT DISPLAY	24. GENERATOR SWITCH
8. ANNUNCIATOR PANEL	25. BATTERY SWITCH
9. ANNUNCIATOR TEST BUTTON	26. FUEL CUTOFF WITH GUARD
10. AMMETER	27. AUDIO CONTROL
11. ENGINE OIL TEMP GAGE	28. AVIONICS STACK
12. OUTSIDE AIR TEMP/VOLTMETER	29. HOURMETER
13. ENGINE OIL PRESSURE GAGE	30. CYCLIC FRICTION
14. FUEL GAGE	31. CABIN HEAT
15. PANEL LIGHTS DIMMER	32. ELT SWITCH (OPTIONAL)
16. ROTOR BRAKE ANNUNCIATOR	33. PITOT HEAT SWITCH (OPT'L)
17. IGNITER SWITCH	34. ENGINE ANTI-ICE SWITCH

**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.

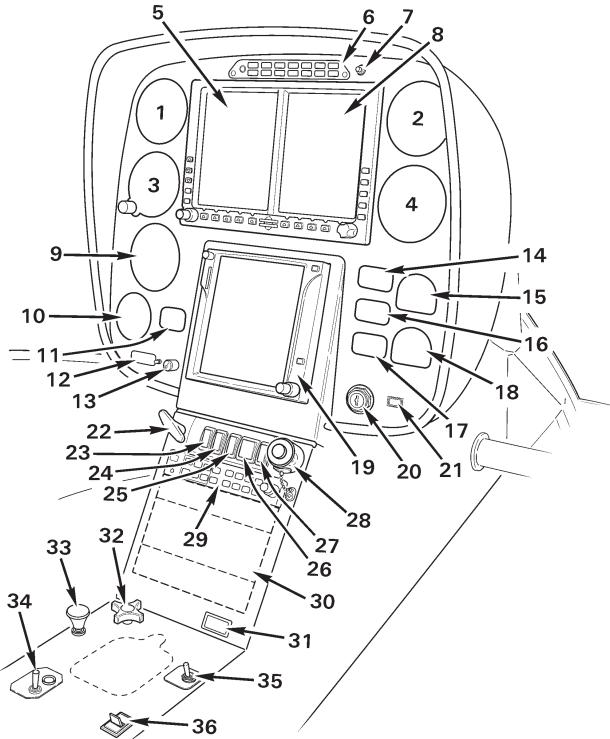
The manufacturer's document for the G500H system with GDU 620 display is:

Title	Document No.
<i>Garmin G500H Pilot's Guide</i>	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	19. GPS NAVIGATOR
2. N ₂ AND ROTOR TACHOMETERS	20. IGNITER SWITCH
3. ALTIMETER	21. ROTOR BRAKE LIGHT
4. TORQUEMETER	22. CABIN AIR
5. MULTI-FUNCTION DISPLAY	23. NAVIGATION LIGHTS SWITCH
6. ANNUNCIATOR PANEL	24. ANTI-COLLISION LIGHT SWITCH
7. ANNUNCIATOR TEST BUTTON	25. AVIONICS MASTER SWITCH
8. PRIMARY FLIGHT DISPLAY	26. GENERATOR SWITCH
9. OPTIONAL INSTRUMENT	27. BATTERY SWITCH
10. CLOCK	28. FUEL CUTOFF WITH GUARD
11. AMMETER	29. AUDIO CONTROL
12. OUTSIDE AIR TEMP/VOLTMETER	30. AVIONICS STACK
13. PANEL LIGHTS DIMMER	31. HOURMETER
14. ENGINE OIL TEMP GAGE	32. CYCLIC FRICTION
15. MGT GAGE	33. CABIN HEAT
16. ENGINE OIL PRESSURE GAGE	34. ELT SWITCH (OPTIONAL)
17. FUEL GAGE	35. PITOT HEAT SWITCH (OPT'L)
18. N ₁ TACHOMETER	36. ENGINE ANTI-ICE SWITCH

**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.

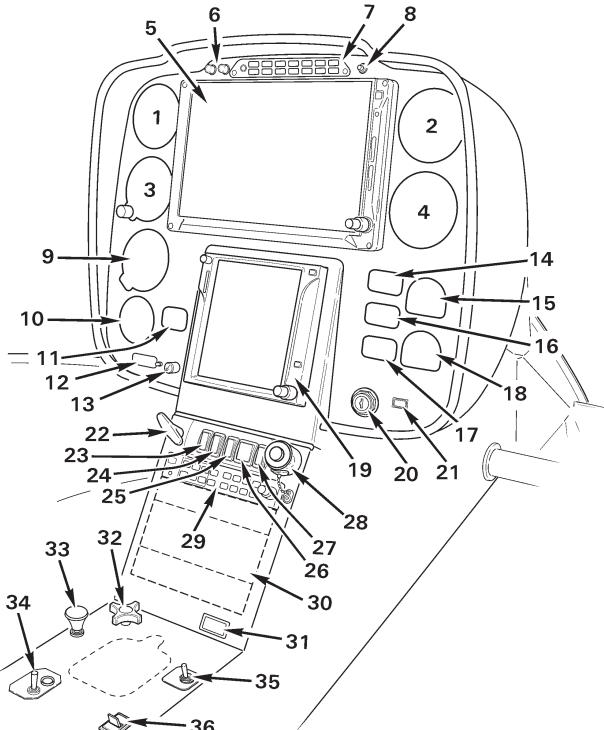
Both displays use a touch screen for pilot interface, with primary functions duplicated via knobs and buttons.

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.
<i>Garmin G500(H)/G600/G700 TXi Pilot's Guide</i>	190-01717-11

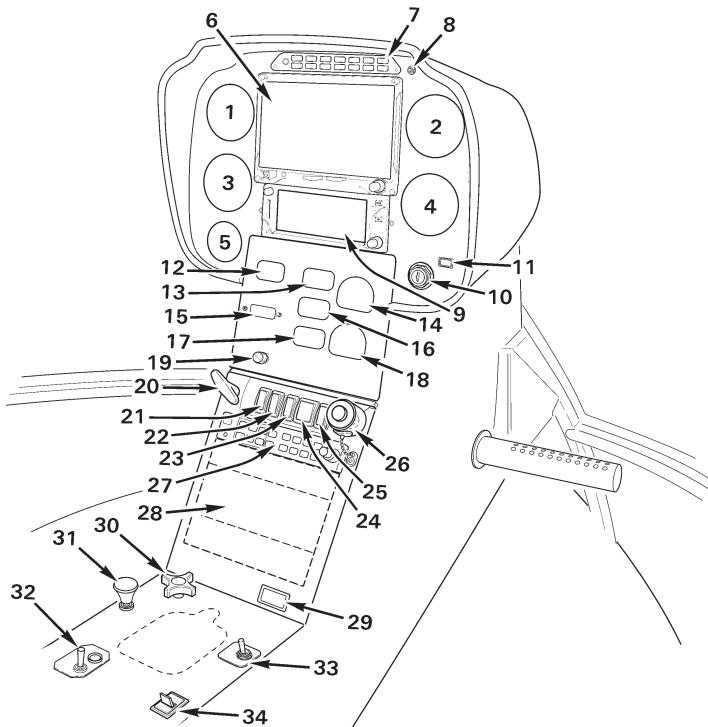
SECTION 7: SYSTEMS DESCRIPTION (cont'd)



1. AIRSPEED INDICATOR
2. N₂ AND ROTOR TACHOMETERS
3. ALTIMETER
4. TORQUEMETER
5. PRIMARY/MULTI-FxN DISPLAY
6. BATTERY STATUS LIGHT
7. ANNUNCIATOR PANEL
8. ANNUNCIATOR TEST BUTTON
9. OPTIONAL INSTRUMENT
10. CLOCK
11. AMMETER
12. OUTSIDE AIR TEMP/VOLTMETER
13. PANEL LIGHTS DIMMER
14. ENGINE OIL TEMP GAGE
15. MGT GAGE
16. ENGINE OIL PRESSURE GAGE
17. FUEL GAGE
18. N₁ TACHOMETER
19. GPS NAVIGATOR
20. IGNITER SWITCH
21. ROTOR BRAKE ANNUNCIATOR
22. CABIN AIR
23. NAVIGATION LIGHTS SWITCH
24. ANTI-COLLISION LIGHT SWITCH
25. AVIONICS MASTER SWITCH
26. GENERATOR SWITCH
27. BATTERY SWITCH
28. FUEL CUTOFF WITH GUARD
29. AUDIO CONTROL
30. AVIONICS STACK
31. HOURMETER
32. CYCLIC FRICTION
33. CABIN HEAT
34. ELT SWITCH (OPTIONAL)
35. PITOT HEAT SWITCH (OPT'L)
36. ENGINE ANTI-ICE SWITCH

**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	18. N ₁ TACHOMETER
2. N ₂ AND ROTOR TACHOMETERS	19. PANEL LIGHTS DIMMER
3. ALTIMETER	20. CABIN AIR
4. TORQUEMETER	21. NAVIGATION LIGHTS SWITCH
5. CLOCK	22. ANTI-COLLISION LIGHT SWITCH
6. MULTI-FUNCTION DISPLAY	23. AVIONICS MASTER SWITCH
7. ANNUNCIATOR PANEL	24. GENERATOR SWITCH
8. ANNUNCIATOR TEST BUTTON	25. BATTERY SWITCH
9. GPS NAVIGATOR	26. FUEL CUTOFF WITH GUARD
10. IGNITER SWITCH	27. AUDIO CONTROL
11. ROTOR BRAKE ANNUNCIATOR	28. AVIONICS STACK
12. AMMETER	29. HOURMETER
13. ENGINE OIL TEMP GAGE	30. CYCLIC FRICTION
14. MGT GAGE	31. CABIN HEAT
15. OUTSIDE AIR TEMP/VOLTMETER	32. ELT SWITCH (OPTIONAL)
16. ENGINE OIL PRESSURE GAGE	33. PITOT HEAT SWITCH (OPT'L)
17. FUEL GAGE	34. ENGINE ANTI-ICE SWITCH

**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
R66 PILOT'S OPERATING HANDBOOK
PRESSURE FUELING SUPPLEMENT

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the pressure-fueling system 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.

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*Manufacturer's data, not FAA-approved.

LOG OF REVISIONS

REV NO	FAA APPROVAL	SUMMARY DESCRIPTION
IR	Nevada Ryan, Manager, AIR-716 30 NOV 2022	Initial release
1		Changed 40 gal to 25 gal
	STEVEN THOMAS NASSAU	Digitally signed by STEVEN THOMAS NASSAU Date: 2025.06.12 11:52:19 -07'00' FTP, AIR 713 12 Jun 25
	Manager, Flight Test & Human Factors Branch, AIR-710 Federal Aviation Administration	Date

SECTION 1: GENERAL

INTRODUCTION

This supplement contains changes and additional data applicable when the pressure-fueling system is installed. The pressure-fueling port is compatible with an Emco Wheaton J71 coupler.

SECTION 2: LIMITATIONS

PLACARDS

Near pressure-fueling port:

**FUEL: GRADE JET A, JET A-1, JET B
OR AS SPECIFIED IN PILOT'S HANDBOOK**

MAX PRESSURE: 50 PSI (3.5 BAR)

NO DEFUELING

SECTION 3: EMERGENCY PROCEDURES

RED WARNING INDICATORS

TANK PRESSURE (on pressure-fueling panel) Indicates high pressure in fuel tank. Shut-off valve will latch closed preventing further fueling. Have maintenance personnel inspect system before flight.

AMBER CAUTION INDICATORS

VALVE OPEN (on pressure-fueling panel) Indicates shut-off valves are open, allowing fuel flow from fueling port to fuel tank.

AUDIO ALERTS

"FUEL HOSE" sounds if collective is raised off down stop with a fuel hose connected to the fueling port.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

Add to item 1, Pilot's Station:

Test tank pressure warning circuit.

Verify pressure fueling power switch is OFF.

NOTE

For tank pressure warning circuit test, turn pressure fueling power switch ON and press one test button. Verify red light illuminates and stays on. Turn pressure fueling power switch OFF and verify light turns off. Repeat for 2nd test button.

Add to item 2, Fuselage Right Side:

Verify fueling port cap (if installed) is secure.

NOTE

The cap is provided for protection from contamination in dirty environments or for long term non-use. Installation of the cap is not required for flight.

SECTION 4: NORMAL PROCEDURES (cont'd)**PRESSURE FUELING**

To accept fuel at the pressure-fueling port: With collective full down, switch power ON at the pressure-fueling control panel and select desired quantity (full or 25 gallons) using the quantity switch. The VALVE OPEN light indicates that the shut-off valves are open, allowing fuel flow from the fueling port to the fuel tank. A shut-off valve will automatically close to stop fuel flow when fuel quantity reaches the selected level. To fuel to other quantities, switch pressure-fueling power OFF at the desired fuel level.

NOTE

The selectable fuel quantities are determined by float switches inside the fuel tank. Fueling on a non-level surface will affect actual fuel load.

TAKEOFF PROCEDURE

Verify fuel hose is disconnected before takeoff.

SECTION 5: PERFORMANCE

No change.

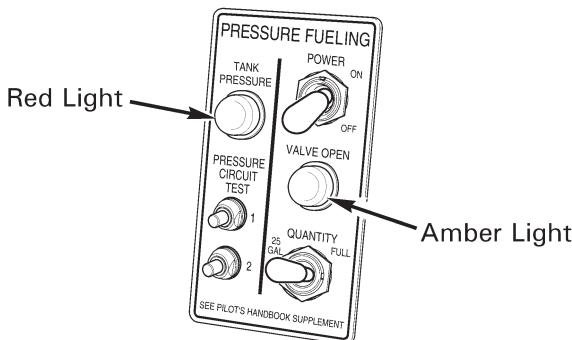
SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

The pressure-fueling system consists of a fueling port on the right side of the fuselage, two shut-off valves in series just downstream of the port, a hose from the valves to an inlet at the top of the fuel tank, fuel tank level and pressure sensors, and a control panel on the instrument panel. The fueling port is compatible with an Emco Wheaton J71 dry-break coupler (recommended Emco Wheaton part no. J71C-AVN1-E004, which fits a fuel hose with a one-inch male NPT-threaded fitting).

Two shut-off valves are used to provide redundant protection against overfueling. Both valves must be open to allow fuel to flow. Each valve is connected to an independent float switch in the fuel tank to close the valve when the tank is full as well as an independent pressure switch to close the valve if fuel tank overpressure is detected. One of the valves is also connected to a second float switch to shut off at 25 gallons (95 liters).

**TYPICAL CONTROL PANEL**

The pressure-fueling control panel includes a power switch, a quantity selector switch, a VALVE OPEN light, and a TANK PRESSURE warning light with two test buttons for testing the overpressure warning circuits. The power switch enables refueling by providing power to open the two shut-off valves.

SECTION 7: SYSTEMS DESCRIPTION (cont'd)

The fuel cap should be installed during pressure fueling to prevent overflow. Fueling may be accomplished with or without engine running. If the helicopter is running, the collective must be on the down stop for the valves to operate. The VALVE OPEN light illuminates when both shut-off valves are open, indicating the system is ready to accept fuel. The TANK PRESSURE light illuminates when excessive pressure is detected in the fuel tank. Excessive pressure will latch a shut-off valve closed until power to the system is cycled.

The pressure-fueling system feeds fuel to the top of the main fuel tank. The system cannot be used for defueling and it will not add fuel to the optional auxiliary tank in the baggage compartment. Maximum allowable pressure for ground equipment connected to the fueling port is 50 psi (3.5 bar), which provides approximately 50 gallons per minute (190 liters per minute) fuel flow. Approximate flow rates at lower pressures are 30 gpm at 20 psi, 20 gpm at 10 psi, or 100 lpm at 1 bar.

The fueling port and recommended Emco Wheaton coupler are both dry-break fittings, allowing the external fueling equipment to be connected or disconnected without fuel spillage regardless of whether the shut-off valves are open or closed. A cap is provided which may be installed on the fueling port when the system is not in use.

An optical sensor near the fueling port will detect a fuel hose if the hose is connected to the port. If the collective is raised off the down stop while a hose is connected, a "fuel hose" audio alert will repeat in the headsets. The alert is muted 15 seconds after the collective is raised to prevent a distraction in case of a false alert.

CAUTION

The audio alert is only an aid. Do not rely on audio alert to verify hose is disconnected. Pilots must visually confirm fuel hose is disconnected and area is clear before takeoff.

SECTION 8: HANDLING AND MAINTENANCE

No change.

FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

NVG COMPATIBILITY SUPPLEMENT

This supplement must be included in the FAA-Approved Pilot's Operating Handbook for helicopters configured as Night Vision Goggle (NVG) compatible.

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: **Nevada Jo Ryan** Digitally signed by Nevada Jo Ryan
Date: 2022.09.30 08:02:58 -07'00'
Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles, CA

DATE: 30 SEP 2022

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* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable for Night Vision Goggle (NVG) compatibility.

NVG compatibility is only valid for aircraft configured exactly as delivered from the factory and subject to the limitations in this supplement. Any modification, including mission-specific equipment, involving a light emitting or reflecting device requires reassessment of the cockpit to ensure NVG compatibility.

SECTION 2: LIMITATIONS

NVG COMPATIBILITY

The following NVGs are compatible with the installed lighting:

ITT AN/AVS-9 (F4949F-YG) Generation 3 Pinnacle with Class B filter. These goggles have TSO-C164 certification.

Litton/L3 AN/AVS-9 (M949) Gen III Night Vision with Class B filter. These goggles have TSO-C164 certification.

FLIGHT AND MANEUVER LIMITATIONS

During single-pilot NVG operations into and out of unimproved sites, an additional NVG-trained crewmember must use NVGs to assist in obstacle identification and clearance.

A functioning radar altimeter is required for operations using NVGs.

Use of non-NVG-compatible carry-on or personal equipment in the cockpit is prohibited during NVG operations.

KINDS OF OPERATION LIMITATIONS

The NVG-compatible configuration does not approve flight operations with night vision goggles. The operator must coordinate with the appropriate FAA Flight Standards District Office (or equivalent authority in countries other than the US) to obtain operational authorization.

PLACARDS

In clear view of pilot:

THIS AIRCRAFT CERTIFIED AS NVG COMPATIBLE
ANY MODIFICATION REQUIRES RECERTIFICATION
SEE PILOT HANDBOOK SUPPLEMENT

SECTION 3: EMERGENCY PROCEDURES

NIGHT VISION LIGHTING FAILURE

If any portion of the cockpit or exterior lighting fails or develops characteristics which degrade operation with NVGs, transition to unaided flight.

NIGHT VISION GOGGLE FAILURE

If the NVGs fail or perform abnormally, transition to unaided flight.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

Add to Item 1, Pilot's Station

Verify any non-NVG-compatible carry-on or personal equipment is switched off and stowed.

Verify NVG settings, adjustment, and focus.

Verify interior and exterior lighting function and lighting levels with and without NVGs.

TAKEOFF PROCEDURE, CRUISE, DESCENT, APPROACH, AND LANDING

NVG-aided or un-aided flight is at pilot's discretion. Lighting controls are the same as for the basic aircraft.

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

NIGHT VISION GOGGLE COMPATIBILITY

Night vision goggle compatibility consists of the helicopter interior and exterior configuration, instruments, and avionics compatible for use with Night Vision Goggles (NVGs). The primary concern is cockpit lighting, but overall geometry for reflections and external lighting has also been shown to be compatible. NVG compatibility has been demonstrated for dual tube ITT AN/AVS-9 (F4949F-YG) and Litton/L3 AN/AVS-9 (M949) Generation 3 goggles with Class B filter. The goggles are TSO-C164 certified, self-powered, and do not interface with any helicopter systems.

The NVG-compatible configuration has also been tested for unaided flight to ensure that all lighting levels and colors remain appropriate.

All installed lighting is compatible with both aided and unaided flight. There is no need to switch lighting sources. Compatibility was achieved through the installation of instruments, avionics, and lighting specifically designed to be NVG compatible. No modification should be made to these items without specialized knowledge and a re-test for compatibility.

The goggles themselves are not supplied as part of the factory installation. Use of the specified goggles is the responsibility of the operator.

Pilot certification for NVG operations is the responsibility of the operator.

SECTION 8: HANDLING AND MAINTENANCE

Any modifications to lighting, instruments, or avionics must be retested and certified for NVG compatibility.

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FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK

LASER ILLUMINATOR SUPPLEMENT

This supplement must be included in the FAA-Approved Pilot's Operating Handbook when provisions for a laser illuminator 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: Nevada Jo Ryan Digitally signed by Nevada Jo Ryan
Date: 2022.09.30 08:02:09 -07'00'
Manager, West Flight Test Section, AIR-716
Federal Aviation Administration
Los Angeles, CA

DATE: 30 SEP 2022

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* Manufacturer's data, not FAA approved.

SECTION 1: GENERAL

INTRODUCTION

This supplement contains the changes and additional data applicable when provisions for a laser illuminator are installed.

The laser illuminator is included inside certain gimbal-mounted cameras on police-version helicopters and provides the ability to illuminate a target on the ground with a light that is outside the visible spectrum. The camera operator is able to illuminate a point of interest on the ground with a spot that is only visible with the aid of night vision equipment. This is primarily to allow the camera operator to identify the target of interest to ground personnel and the pilot to facilitate maintaining the helicopter's position relative to the target.

The laser illuminator is not FAA approved for civil aircraft operations and is disabled upon delivery from the factory. Provisions are provided to allow public-use operation. Title 49 U.S.C. § 40102(a)(41) provides the definition of "public aircraft" and § 40125 provides the qualifications for public aircraft status. These statutory provisions provide the legal basis for operation of public aircraft in the United States.

SECTION 2: LIMITATIONS

FLIGHT AND MANEUVER LIMITATIONS

The laser illuminator is not FAA approved for civil aircraft operations and is disabled upon delivery from the factory.

CAUTION

The FAA has not assessed all potential hazards associated with the laser and has not validated the manufacturer's laser safety or hazard assessments.

PLACARDS

On laser arming control panel:

LASER OPERATION
NOT FAA APPROVED

SECTION 3: EMERGENCY PROCEDURES

No change.

SECTION 4: NORMAL PROCEDURES

DAILY OR PREFLIGHT CHECKS

For FAA civil aircraft operations, verify laser illuminator is disabled. As a visual indication to the pilot, the laser arming control panel is located on the left side of the main instrument console. When the laser illuminator is properly disabled, the laser arming control panel should be removed from the aircraft.

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEMS DESCRIPTION

LASER ILLUMINATOR

The laser illuminator is not FAA approved for civil aircraft operations and is disabled upon delivery from the factory. Provisions are provided to allow public-use operation.

The laser illuminator is a Class 3B laser making the direct beam hazardous to the skin and an immediate eye hazard when viewed directly at close range.

The laser illuminator has Food and Drug Administration (FDA) approval (Accession No. RH18A0084). 21 CFR 1040 requires specific purpose laser products such as the laser illuminator to meet certain Accessible Emission Limits (AELs) or obtain a variance for exceeding the established limits. The laser illuminator has been issued variance number FDA 2018 V 1069.

It is the responsibility of the public use operator to comply with the variance limitations.

SECTION 8: HANDLING AND MAINTENANCE

The laser illuminator must be disabled for all FAA civil aircraft operations. Instructions for properly disabling the laser illuminator are contained in the R66 Maintenance Manual.

FAA APPROVED
R66 PILOT'S OPERATING HANDBOOK
GARMIN GFC 600H

This supplement must be included in the FAA-approved Pilot's Operating Handbook when the Garmin GFC 600H Helicopter Flight Control System 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.

LOG OF REVISIONS

REV NO	FAA APPROVAL	SUMMARY DESCRIPTION
IR	STEVEN THOMAS NASSAU 14 May 2025	Initial release
		Configuration Version Update
1	STEVEN THOMAS NASSAU  Digitally signed by STEVEN THOMAS NASSAU Date: 2025.07.29 14:22:54 -0700'	29 JUL 25 Manager, Flight Test & Human Factors Branch, AIR-710 Federal Aviation Administration

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* Manufacturer's data, not FAA approved

SECTION 1: GENERAL**INTRODUCTION**

This supplement contains the changes and additional data applicable when the Garmin GFC 600H Helicopter Flight Control System (FCS) is installed.

APPLICABILITY

The following or later software versions must be installed for the Pilot's Operating Handbook (POH) revision to be applicable to the installation:

Configuration	Version
Standard R66	415802
Pop-out Float Equipped R66	415803

NOTE

This section is not intended to be a comprehensive list of approved software. It is intended to provide a means to determine if this Pilot Operating Handbook Supplement revision is applicable to the software that is installed in the rotorcraft. Do not use this Pilot Operating Handbook Supplement revision if the installation has a software version less than that shown above.

GARMIN GFC 600H

The GFC 600H maintains a pilot-selected rotorcraft attitude by providing inputs to the cyclic and (optional) pedals. In hover and taxi, the system provides hover position hold and ground-speed hold. In cruise flight, the system provides upper level modes including holding selected airspeed, vertical speed, altitude, heading, and tracking GPS or VHF lateral and vertical navigation signals.

SECTION 1: GENERAL (cont'd)

GARMIN GFC 600H (cont'd)

Additionally, the GFC 600H provides safety enhancing functions including single button engagement to a safe flight attitude (Level mode), tactile feedback to the pilot when certain attitude, airspeed, or G limits are exceeded (Limit Cueing), and protection from inadvertent exceedance of V_{NE} .

FCS modes are selected using controls on the GMC 605H Mode Controller, cyclic grip, and under the pilot's collective. System status and operating modes are shown on the GMC 605H Mode Controller and GDU 1060/700 TXi display.

Refer to the Garmin GFC 600H Pilot's Guide, Garmin Document number 190-02602-00, for a detailed description of the system and its components.

CAUTION

The FCS system 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.

SECTION 2: LIMITATIONS

FLIGHT AND MANEUVER LIMITATIONS

Pilot's hand must be on the cyclic grip and feet on the tail rotor pedals (if optional yaw control system is installed) under any of the following conditions:

During FCS engagement or intentional disengagement

When HOV/GSPD modes are engaged

At altitudes less than 300 feet AGL

When AHRS DGRD message is displayed on the GMC 605H

Use of all upper level modes except APR are limited to altitudes above 300 feet AGL.

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

Flight is prohibited if "PFT" is indicated on the GMC 605H.

KINDS OF OPERATION LIMITATIONS

Installation of FCS does not change the kinds of operations approved. Installation of the FCS does not approve IFR operations.

EXTERNAL LOAD

For External Load Operation including flight with any combination of large bubble doors, FCS must pass PFT and be DISENGAGED.

SECTION 2: LIMITATIONS (cont'd)

POP-OUT FLOATS

For operations with pop-out floats inflated, FCS must pass PFT and be DISENGAGED.

COUPLED STEEP APPROACHES

GFC 600H coupled approaches in GS or GP mode with glidepath angles greater than 6 degrees are prohibited.

PLACARDS

In clear view of the pilot:

CYCLIC LIMIT CUEING PROVIDES RESISTANCE TO INPUTS AT CERTAIN AIRSPEEDS AND ATTITUDES. PRESS AND HOLD FCS OFF TO DISABLE. SEE POH SUPPLEMENT.

SECTION 3: EMERGENCY PROCEDURES

The following emergency procedures incorporate changes to existing procedures in the R66 Pilot's Operating Handbook. The name of each procedure corresponds to the procedure in the basic Pilot's Operating Handbook.

NOTE

If time does not permit disengagement of FCS, pressing and holding FTR will relieve control forces.

POWER FAILURE ABOVE 500 FEET AGL

1. Power Failure Above 500 Feet AGL Procedure – Apply

NOTE

FCS may be used in attitude mode during autorotative glide if desired. FCS may provide undesirable feedback during cyclic flare and landing. If time permits, disengage FCS prior to cyclic flare, or press and hold FTR to relieve forces.

POWER FAILURE BETWEEN 8 FEET AND 500 FEET AGL

1. Power Failure Between 8 Feet and 500 Feet AGL Procedure – Apply

NOTE

FCS may be used in attitude mode during autorotative glide if desired. FCS may provide undesirable feedback during cyclic flare and landing. If time permits, disengage FCS prior to cyclic flare, or press and hold FTR to relieve forces.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

POWER FAILURE BELOW 8 FEET AGL

1. Power Failure Below 8 Feet AGL Procedure – Apply
2. FCS – If time permits, disengage.

LOSS OF TAIL ROTOR THRUST IN FORWARD FLIGHT

1. Loss of Tail Rotor Thrust in Forward Flight Procedure – Apply
2. FCS – If time permits, disengage.

LOSS OF TAIL ROTOR THRUST IN HOVER

1. Loss of Tail Rotor Thrust in Hover Procedure – Apply
2. FCS – If time permits, disengage.

HEADSET AUDIO FAILURE

1. Headset Audio Failure Procedure – Apply
2. Disengage FCS. Pilot will not hear FCS aural annunciations with a failed headset.

ENGINE FIRE IN FLIGHT

1. Engine Fire in Flight Procedure – Apply
2. FCS – If time permits, disengage.

ELECTRICAL FIRE

1. FCS – Disengage
2. Electrical Fire Procedure – Apply

HYDRAULIC SYSTEM FAILURE

1. FCS – Disengage
2. Hydraulic System Failure Procedure – Apply

NOTE

FCS does not have sufficient authority to overcome cyclic control forces of a hydraulics system failure.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

The following emergency procedures are new procedures not in the basic R66 Pilot's Operating Handbook.

FCS MALFUNCTION

If the helicopter deviates unexpectedly from the planned flight path or if control forces or motion are abnormal:

1. Cyclic and pedals – Hold firmly.
2. Maintain manual control of rotorcraft attitude.
3. Cyclic FCS OFF – Press and hold.
4. Verify FCS is disconnected.
5. If FCS still engaged, GMC 605H FCS key – Press and hold.
6. Verify FCS is disconnected.
7. If FCS is still engaged, AUTOPILOT FCS Circuit Breaker – Pull.
8. Verify FCS is disconnected.
9. If FCS cannot be disengaged, land as soon as practical.

NOTE

AUTOPILOT FCS circuit breaker is marked with a red collar for easy identification. If power to the FCS servos is lost or turned off via circuit breaker, then cyclic control forces will be slightly higher than normal.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

FCS FAILURE / ABNORMAL DISCONNECT

FCS failure is indicated by a red LED next to the FCS key on the GMC 605H Mode Controller, aural tone, "FCS FAIL" displayed on GMC 605H, or "FCS" displayed on the Primary Flight Display (PFD) in red.

1. Cyclic and pedals – Hold firmly.
2. Maintain manual control of rotorcraft attitude.
3. Cyclic FCS OFF – Press and release.

NOTE

If no failure indications (red LED) are present on the GMC 605H Mode Controller, then the pilot may attempt to re-engage the FCS by pressing and releasing the GMC 605H FCS key.

NOTE

If after failure of the FCS the GFS 83 servos are still functional, they will retain the cyclic in its position at the time of the failure. As soon as the pilot moves the cyclic out of the detent the forces will be removed.

CYCLIC CONTROL JAM

If cyclic forces are excessive or cyclic appears to be jammed:

1. Cyclic – Grip firmly.
2. Cyclic FCS OFF – Press and hold.
3. If controls still appear to be jammed, apply load to cyclic as required to break shear fuse.
4. Land as soon as practical.

CAUTION

Minimize slow airspeed maneuvering. If winds are in excess of 15 KTS, land into the wind.

NOTE

After breaking a shear fuse, control forces will be higher than normal.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

YAW AXIS FAILURE (IF INSTALLED)

If aural "YAW FAIL" annunciates and "YAW FAIL" displayed on GMC 605H and PFD:

1. Maintain manual control of yaw axis through manual inputs.
2. Set pitch and roll FCS modes as desired.

TAIL ROTOR PEDAL CONTROL JAM

If tail rotor pedal forces are excessive or pedals appear to be jammed:

1. Tail rotor pedals – Place feet firmly on pedals.
2. YAW ENABLE/DISABLE switch – Disable.
3. If pedals still appear to be jammed, disengage FCS.
4. If pedals still appear to be jammed, perform emergency procedure for "Loss of Tail Rotor Thrust in Forward Flight" or "Loss of Tail Rotor Thrust in Hover" as applicable.

PFD FAILURE

Modes which utilize data from the PFD will be affected. ALTS and APR will be unavailable. NAV mode will be limited to GPS courses only. ALT will revert to PALT mode. If VS is engaged when PFD is restored, FCS VS will change to last stored VS bug value and begin to seek that reference.

GTN NAVIGATOR FAILURE

Navigation modes which utilize GPS or navigation radio will be unavailable. HOV, GSPD, and Low Altitude Protection will be unavailable.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

GMA AUDIO PANEL FAILURE

If flying from the left pilot's seat, disengage FCS.

CAUTION

FCS aural annunciations will be provided to the right side pilot only.

LOSS OF ATTITUDE DATA

1. Cyclic and pedals – Hold firmly.
2. Maintain manual control of rotorcraft attitude.

NOTE

FCS will disconnect.

FCS PREFLIGHT TEST INCOMPLETE

Indicated by "PFT" display on GMC 605H and PFD.

The FCS system has not completed the automatic preflight test. If the preflight test does not complete as indicated by continued display of "PFT", takeoff is prohibited.

CAUTION

Failure to complete the preflight test may indicate an error with the FCS which could result in unsafe operation.

SECTION 3: EMERGENCY PROCEDURES (cont'd)**FCS PREFLIGHT TEST FAIL**

Indicated by red LED illuminated next to FCS key, "PFT FAIL" displayed on GMC 605H, "PFT" displayed in red on PFD, or aural "FCS TEST FAILED" message.

The FCS system failed the automatic preflight test. The FCS, (optional) yaw axis system, and Limit Cueing will not be operational.

FCS UNPOWERED OR FAILED

If the GFC 600H system is unpowered or is failed, the system will apply forces to the cyclic control similar to a small amount of cyclic control friction. These forces are provided to reduce movement of the cyclic in the event of a failure of the FCS while the pilot's hands are not on the controls. The amount of force provided is proportional to the rate at which the cyclic is moved.

SERVO OUT OF DETENT

Out of detent servos are indicated by "P", "R", or "Y" shown in inverse video in the FCS status field on the GMC 605H and PFD. If the controls stay out of detent for more than 30 seconds then a "P DETENT", "R DETENT", or "Y DETENT" message will be displayed on the GMC 605H. A servo out of detent indication when the pilot is not moving the flight controls may indicate excessive control system friction. Verify the cyclic friction is fully loose. If the condition persists, disengage the FCS and manually fly the rotorcraft. Land as soon as practical.

NOTE

Limit Cueing will cause a servo out of detent indication when it is active.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

LOSS OF HEADING DATA

Indicated by "HDG FAIL" displayed on PFD.

If heading fails, the FCS will revert to using GPS track in place of magnetic heading data. A "TRK MODE" message will be displayed as a message on the GMC 605H. The ground track reference will be displayed in a cyan box on the PFD and can be adjusted using the HDG knob. GPS NAV and APR modes will still be available. VOR, VAPP and LOC/GS modes will not be available. Yaw control system performance in hovering flight will be reduced resulting in the rotorcraft not returning to the reference heading after being displaced.

AHRS DEGRADED

Indicated by "AHRS DGRD" displayed on GMC 605H.

The GMC 605H ARHS is not receiving one or more data parameters (GPS, Air Data, or Magnetometer). The FCS will function normally, but an FCS disconnect is more likely to occur due to loss of AHRS data. Pilot's hand should be kept on the cyclic and feet on pedals while this message is displayed.

LOSS OF ACTIVE NAVIGATION DATA

Indicated by "GPS", "VOR", "LOC/GS", "GPS/GP" or "VAPP" flashes for 10 seconds on GMC 605H accompanied by a flashing amber FCS LED and automatic mode change aural annunciation.

If a navigation signal is lost while the FCS is tracking it, the FCS will hold the last roll reference and default to Lateral Attitude Hold mode (ATT). For loss of GS or GP, the vertical mode will revert to Pitch Attitude Hold mode (ATT) and hold the pitch attitude present when the mode reverted. Reengagement of Navigation mode may be attempted if desired.

SECTION 3: EMERGENCY PROCEDURES (cont'd)

LOW ALTITUDE

Indicated by "LOW ALT" displayed on GMC 605H and PFD, and aural "LOW ALTITUDE" annunciation.

1. Verify rotorcraft flight path relative to terrain.
2. Climb and maintain safe altitude. Assume manual control if necessary.

CAUTION

Do not intentionally use Low Altitude Protection to arrest a descent or maintain clearance from terrain.

NOTE

FCS will automatically change vertical mode to VS and remain in VS until the pilot initiates a mode change. The upper vertical mode may not be changed until the rotorcraft climbs above 300 feet GPS height above terrain. All upper modes may be disengaged or the FCS may be disengaged entirely at any altitude.

SECTION 4: NORMAL PROCEDURES

The following normal procedures incorporate changes to existing procedures in the R66 Pilot's Operating Handbook. The name of each procedure corresponds to the procedure in the basic Pilot's Operating Handbook.

GENERAL

NOTE

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

NOTE

When engaged, the FCS provides force feedback on the cyclic and pedals (if optional yaw control system is engaged).

BEFORE STARTING ENGINE

After "Fuel valve" add:

NOTE

With left cyclic removed and the cyclic balance spring not wound, the right cyclic may contact the pilot's leg when pilot's hand is off the cyclic. Performance of the FCS may be degraded. To prevent contact between the pilot's leg and the cyclic, wind up balance spring per procedure in Section 7 REMOVABLE FLIGHT CONTROLS in the main POH when left cyclic is removed.

SECTION 4: NORMAL PROCEDURES (cont'd)

STARTING ENGINE AND RUN-UP

After "Avionics switch, headsets" add:

FCS Press NAV key or cyclic FTR
FCS LED Lights Verify amber then red
PFT Verify passed

After "Hydraulic system" add:

FCS Check Perform

DOORS-OFF OPERATION

Add:

FCS use is allowed with any combination of small bubble or standard doors installed or removed.

SECTION 4: NORMAL PROCEDURES (cont'd)

The following normal procedures are new procedures not in the basic R66 Pilot's Operating Handbook.

PREFLIGHT TEST (PFT)

After power is applied to the GFC 600H system a splash screen will be displayed on the GMC 605H Mode Controller. During the PFT the servos will move the controls a small amount for approximately 1 second. Press the NAV key (display shows CONT with an arrow pointing to the correct key) or the cyclic FTR button to complete the PFT. LED lights on the GMC 605H Mode Controller will cycle through a test sequence, amber lights will illuminate for one second, followed by red lights for one second, then extinguish. Aural "FCS TEST OK" or "FCS TEST FAILED" annunciates when the preflight test is completed. If the GFC 600H passes the preflight test, the display on the GMC 605H will be blank and all LED fault lights will extinguish.

If the GFC 600H fails the PFT, "PFT FAIL" is displayed in the GMC message window, "PFT" is displayed in red on the PFD, and the FCS LED illuminates red. Do not take off if "PFT" is indicated on the GMC 605H.

CAUTION

Failure to complete the preflight test may indicate an error with the FCS which could result in unsafe operation.

SECTION 4: NORMAL PROCEDURES (cont'd)**FCS CHECK**

Perform at each pilot's station that has controls installed.
Verify pilot wears headset and cyclic friction is off.

1. Engage FCS and engage YAW (if installed).
2. Make small cyclic and pedal control inputs 2 or 3 times in each axis and verify no abnormal forces are present.
3. Disengage the system.
4. Verify disconnect tone is heard.
5. Make small cyclic and pedal control inputs 2 or 3 times in each axis.
6. Verify FCS detent forces are removed.

ENGAGE FCS

The FCS may be engaged using any one of the following methods:

FTR button Press and hold
GMC 605H FCS key Press
LVL button Press

Observe GMC and PFD for normal indications and ensure FCS is holding desired reference attitude before releasing flight controls.

ENGAGE FCS UPPER LEVEL MODES

Upper level FCS modes (HDG, NAV, APR, ALT, VS, IAS) may be activated by pressing the associated key on the GMC 605H Mode Controller when the FCS is engaged and indicated airspeed is greater than 45 knots. Observe GMC and PFD for normal indications and ensure FCS is holding desired reference attitude before releasing flight controls.

SECTION 4: NORMAL PROCEDURES (cont'd)

DISENGAGE FCS UPPER LEVEL MODES

To disengage all upper level modes simultaneously:

Cyclic FCS OFF button . . . Press and release

To disengage modes individually:

GMC 605H Mode key

(for active mode) Press and release

DISENGAGE FCS

The FCS may be disengaged using any one of the following methods:

If no upper level modes are engaged,

Cyclic FCS OFF button . . . Press and release twice or hold for at least one second

If upper level modes are engaged,

Cyclic FCS OFF button . . . Press and release twice or hold for at least one second

GMC 605H FCS key Press

ENGAGE/DISENGAGE FCS YAW

While YAW ENABLE/DISABLE switch is ENABLED, the yaw control system will engage/disengage with pitch and roll when the FCS is engaged/disengaged.

MAX SPEED

Max Speed Protection may be exited by lowering the collective, resetting the pitch reference, or changing the mode such that the current pitch reference will result in an airspeed below the stabilized airspeed for Max Speed Protection.

LOW SPEED

Low Speed Protection may be exited by raising the collective, resetting the pitch reference such that an indicated airspeed of 45 knots can be maintained, or disengaging FCS upper modes.

SECTION 5: PERFORMANCE

No change.

SECTION 6: WEIGHT AND BALANCE

No change.

SECTION 7: SYSTEM DESCRIPTION

SYSTEM COMPONENTS

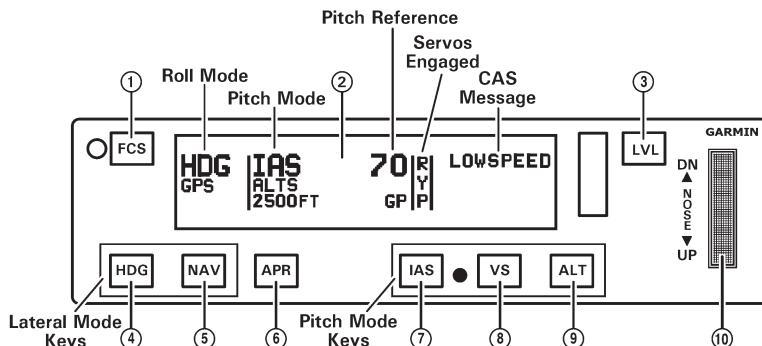
The GFC 600H system consists of a GMC 605H Mode Controller, GFS 83 electromechanical servos for the pitch, roll, and (optional) yaw axes, a GSU 75 ADAHRS, and cyclic and (optional) yaw controls. Power to the FCS is provided through the AUTOPILOT FCS circuit breaker and avionics master switch.

GMC 605H MODE CONTROLLER

The GMC 605H Mode Controller, located in the center console, is one means for the pilot to interface with the GFC 600H system. The GMC 605H display shows active modes, references, and system messages. Bezel keys provide a means to engage/disengage the FCS system and individual modes.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

GMC 605H MODE CONTROLLER (cont'd)



1. FCS Engages/disengages the Flight Control System.
2. LCD Displays FCS modes, references, and annunciations.
3. LVL Key engages the FCS in Level mode (or selects Level mode if FCS is already engaged).
4. HDG Key selects/deselects Heading Select mode.
5. NAV Key selects/deselects Navigation mode. Cancels GS mode if LOC mode is either active or armed. Cancels GP mode if GPS mode is either active or armed.
6. APR Key selects/deselects Approach mode.
7. IAS Key selects/deselects Indicated Airspeed mode.
8. VS Key selects/deselects Vertical Speed mode.
9. ALT Key selects/deselects Altitude Hold mode.
10. NOSE UP/DN Adjusts the vertical mode reference in Vertical Speed, Indicated Airspeed, and Altitude Hold modes.

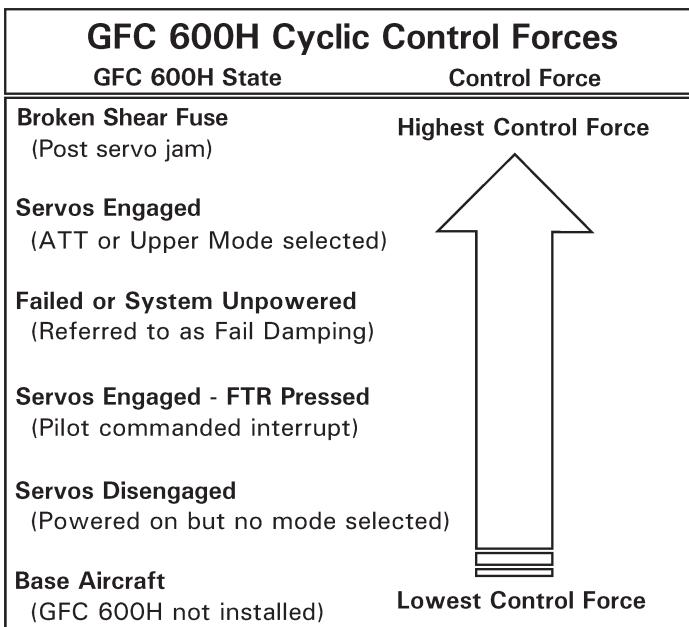
SECTION 7: SYSTEM DESCRIPTION (cont'd)**GFS 83 SERVO**

The GFS 83 is an electromechanical “smart” servo which actuates the flight controls and also performs many FCS processing functions. The GFS 83 servo is installed in parallel with the primary flight controls, resulting in cyclic and tail rotor pedal movements directly proportional to movement of the servo. The servos are installed in the pitch, roll and (optional) yaw axes. The GFS 83 provides fly through capabilities, meaning that the pilot can override the system at any time by pushing through any control forces which may be present. Upon releasing the controls, the system will return to its commanded references.

GFS 83 direct drive servos are installed in the pitch and roll axes. These servos provide a fail passive damping feature which reduces attitude deviation in the event of a servo disconnect while the pilot’s hand are not on the controls. In the event of a mechanical jam in a servo, the pilot must apply sufficient force to the affected rotorcraft flight control to break the shear fuse at the output shaft of the servo, removing the servo from the control system and allowing free movement of the flight control. Some residual friction will be felt in the control axis after breaking the shear fuse.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**GFS 83 SERVO (cont'd)**

The figure below illustrates the forces the GFS 83 servos provide to the helicopter's cyclic control system. In all cases, the pilot can overpower the system sufficiently to control the helicopter.



Optionally, a GFS 83 mechanically clutched servo is installed in the tail rotor control system. This servo contains a mechanical clutch to engage the motor drive to the servo output.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

ATTITUDE AND AIR DATA SENSORS

The GFC 600H system consists of a minimum of two attitude sources and one air data source. A Garmin GSU 75H ADAHRS provides the primary attitude data and air data. The GMC 605H Mode Controller provides the second AHRS which is used as a monitor for the system.

GPS

A Garmin GPS position source provides GPS navigation data for upper modes and aiding to AHRS. GPS data is required for Ground Speed Hold (GSPD), Hover Position Hold (HOV), and Low Altitude Protection mode.

COLLECTIVE POSITION SENSOR

A position sensor provides collective position to the GFC 600H to improve system performance and aid in determining if the helicopter is on the ground.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**CYCLIC AND PANEL MOUNTED CONTROLS**

Control	Common Name	Location	Color
FTR	Force Trim Release	Cyclic	White

Purpose:

Servos Disengaged:

Press and hold will engage FCS in all axes.

Any Engaged Mode:

Press and hold will reduce the control forces for the duration of time that the switch is depressed. After 1 second the system will annunciate "FTR" as indication that an extended press is active.

HOV or GSPD Mode:

Press and hold reduces control forces. Upon release system synchronizes forward and lateral ground speed references and (if enabled) yaw heading reference to current values.

ATT Mode:

Press and hold reduces control forces. Upon release system synchronizes the pitch and roll attitude reference to current values.

CPLD Upper Modes:

Upon release system synchronizes the pitch and roll reference (VS, ALT/ PALT, IAS, HDG) to the current value as applicable.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**CYCLIC AND PANEL MOUNTED CONTROLS (cont'd)**

Control	Common Name	Location	Color
FCS OFF	FCS DISC	Cyclic	RED

Purpose:

Momentary Press:

If upper level mode is engaged:

Disengages all upper modes. Servos remain engaged in ATT mode.

If in ATT mode:

Momentary press disengages the pitch, roll, and (optional) yaw servos.

Double momentary press OR press and hold for 1 second:

Disengages the pitch, roll, and (optional) yaw servos.

Press and hold for 5 seconds:

Toggles Limit Cueing ON/OFF.

Control	Common Name	Location	Color
TRIM ADJUST	TRIM ADJUST	Cyclic	Black

Purpose:

Single Press:

Increments the FCS references.

Press and Hold:

Slews the FCS references.

HOV or GSPD Mode:

Increments the forward or lateral ground speeds.

ATT Mode:

Increments the reference pitch and roll attitude.

CPLD Upper Modes:

Changes the reference altitude, vertical speed, indicated airspeed, or heading as applicable.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**CYCLIC AND PANEL MOUNTED CONTROLS (cont'd)**

Control	Common Name	Location	Color
LVL	Level Mode	Cyclic	Blue

Purpose:

Momentary Press:

Engages the pitch, roll, and, if enabled, optional yaw axis system in LVL mode.

Control	Common Name	Location	Color
YAW ENABLE/ DISABLE	Yaw ON/OFF	Panel adjacent pilot's side collective	White (two- position switch)

Purpose:

Enables and disables the yaw axis system. When enabled, yaw axis system will be engaged and disengaged with FCS. Enabling or disabling yaw with the FCS already engaged allows independent engagement/disengagement of yaw.

Control	Common Name	Location	Color
YAW TRIM	Yaw Trim	Panel adjacent pilot's side collective	Black (rocker switch)

Purpose:

In forward flight:

If yaw is enabled, adjusts the lateral trim reference of the yaw control system.

In low speed flight, HOV, or GSPD:

No function.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**ENGAGEMENT LIMITS**

The FCS may be engaged within the range of 30° pitch up or down and 70° roll left or right. If the pitch or roll engagement limits are exceeded while the FCS is engaged, the FCS will disconnect. The FCS command limits are 10° pitch up to 10° pitch down and 30° roll left and right. Engaging the FCS or attempting to trim the FCS outside of its command limits, but within its engagement limits, will cause the FCS to return the helicopter to the nearest command limit.

MODES OF OPERATION

The default FCS mode is Attitude Hold mode (ATT) which holds the attitude reference at the time of engagement or as modified by the pilot. If in a hover or hover taxi, HOV or GSPD mode will automatically engage. GSPD allows the forward and horizontal reference to be set to a GPS ground speed. In HOV, the ground speed reference is set to zero to help aid in holding a steady hover.

If the (optional) yaw control system is installed and enabled, the yaw system will engage with FCS pitch and roll. In hover or hover taxi, the yaw system seeks to hold a reference heading. A green bug on the PFD HSI indicates the current yaw heading reference. The yaw control system holds lateral trim in forward flight.

Engagement of the FCS is indicated by a green LED next to the FCS key and the characters "P" and "R" being displayed on the GMC 605H and PFD. "Y" is shown when the (optional) yaw control system is engaged.

Upper level modes may be coupled at airspeeds above 45 knots. The tables below describe the available vertical and lateral modes that may be engaged in the FCS.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

MODES OF OPERATION (cont'd)

Vertical Mode	Control	Annunciation	Reference Range	Reference Change Increment
Altitude Hold	ALT key	ALT xxxxx		10 ft
		PALT xxxxx		
Glidepath	APR key	GP		
		GS		
Ground Speed Hold	(See description above)	GSPD	0 to 15 kts forward or aft.	1 kt
Hover Hold	(See description above)	HOV		
IAS Hold	IAS key	IAS xxx	45 to 120 kts or 5 kts below V_{NE} .	1 kt
Level (LVL)	LVL key or Cyclic LVL button	LVL	Within $\pm 30^\circ$ pitch engagement limit.	
Low Altitude		LOW ALT	Engages at 200 feet GPS height above terrain if in VS, ALT/PALT, or IAS.	

SECTION 7: SYSTEM DESCRIPTION (cont'd)

MODES OF OPERATION (cont'd)

Vertical Mode	Control	Annunciation	Reference Range	Reference Change Increment
Low Speed		LOW SPD	Engages at 45 knots if in VS, ALT/PALT, or GP/GS. Does not engage in IAS mode.	
Max Speed		MAX SPD	In ATT mode: Engages when airspeed reaches 125 knots or 5 knots below V_{NE} [1]. In VS, ALT/PALT, or GP/GS mode: Engages when airspeed reaches 123 knots or 3 knots below V_{NE} [1].	
Pitch Attitude Hold (ATT)	(default)	ATT	10° nose up to 10° nose down.	0.5°
Pitch Limit Cue			High pitch limit cue engages above 15° nose up and/or 1.9 G. Low pitch limit cue engages below 16° nose down and/or 0.4 G.	

SECTION 7: SYSTEM DESCRIPTION (cont'd)**MODES OF OPERATION (cont'd)**

Vertical Mode	Control	Annunciation	Reference Range	Reference Change Increment
Selected Altitude Capture	[2]	ALTS	[2]	[2]
V_{NE} Limit Cue			Engages at 125 kts or 3 knots below V_{NE} [1].	
Vertical Speed	VS key	VS xxxx	+1000 to -1500 fpm	100 fpm

[1] V_{NE} calculated based on current ambient conditions.

[2] ALTS arms automatically when VS or IAS is active and a valid value is set in the PFD altitude bug.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

MODES OF OPERATION (cont'd)

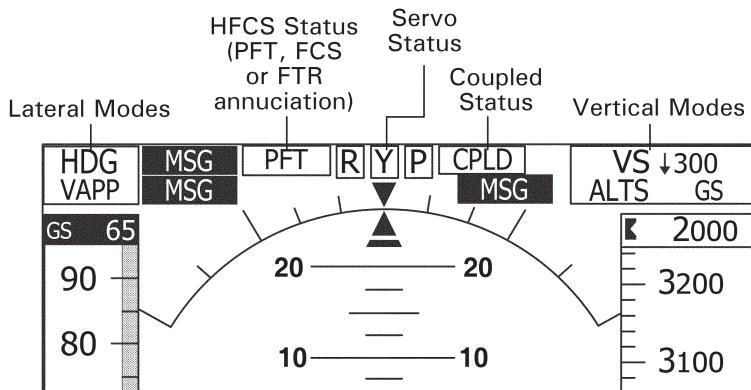
Lateral Mode	Control	Annunciation	Maximum Roll Command Limit
Roll Attitude Hold (ATT)	(default)	ATT	30° roll left and right.
Hover Hold	(See description above)	HOV	
Ground Speed Hold	(See description above)	GSPD	0 to 15 kts left or right.
Heading Select	HDG key	HDG	The lesser of 25° or standard rate. [1]
Level (LVL)	LVL key or Cyclic LVL button	LVL	70° roll engagement limit.
GPS Navigation	NAV key	GPS	30° [1]
VOR Navigation		VOR	25° [1]
LOC Navigation		LOC	25° [1]
GPS Approach	APR key	GPS	25° [1]
VOR Approach		VAPP	25° [1]
ILS/LOC Approach		LOC	25° [1]
Roll Limit Cue			Engages at 31° roll left or right.

[1] Roll command limited to 15° in upper level modes above 10,000 feet.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

FCS STATUS ANNUNCIATIONS ON GARMIN PFD

The GFC 600H interfaces with the Garmin PFD. FCS mode annunciations will be provided along the top of the PFD. The current FCS reference for VS, IAS, ALTS, and HDG will be shown on the PFD and may be controlled via the PFD in addition to the GMC 605H Mode Controller and cyclic mounted switches.



Alert Message (displayed on the PFD)	Alerting Criteria
MAXSPD	Max Speed Protection is active.
LOWSPD	Low Speed Protection is active.
FCS (red)	FCS is failed – The FCS is inoperative.
YAW FAIL	System is unable to provide yaw axis control.
PFT (white)	PFT is in progress.
PFT FAIL (red)	PFT has failed.
LOWALT	Low Altitude Protection is active.
FTR (white)	FTR button is being held.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

GMC 605H MESSAGES

Message	Description
< > KEY	The specified key on the GMC 605H is stuck in the active state.
ADC DATA	Air Data inputs to the GMC 605H have failed. Functions dependent on air data (IAS, VS, and ALT/PALT modes; Max Speed and Low Speed Protection; overspeed aural annunciation) will not function and FCS performance may be degraded. Yaw axis system will not function.
AHRS DGRD	AHRS is not receiving aiding data from one or more parameters.
FCS SWTCH	FCS OFF switch has been active for more than 30 seconds.
COLL FAIL or COLL POS	Collective position sensor has failed. Yaw axis system performance during collective changes will be degraded. ALT/PALT, VS, IAS, GS, and GP performance during collective changes will be degraded.
CYC FTR	FTR switch has been active for more than 60 seconds.
DSABLD KEY	Key is disabled because associated function is not supported in the installation.
FCS FAIL	FCS has failed.
FTR	Force Trim Release is being held.
GPS DATA	GPS aiding is unavailable. HOV, GSPD, LOW ALT will be unavailable.
HDG FAIL	System does not have valid heading. Functions that use heading data will be degraded or unavailable.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

GMC 605H MESSAGES

Message	Description
LMTQ FAIL	The Limit Cueing function has failed. The pilot should not expect tactile feedback for pitch/roll attitude, G loading, and V_{NE} exceedances. Max Speed and Low Speed Protection remain operational.
LMTQ OFF	Limit Cueing is off. The pilot should not expect tactile feedback for pitch/roll attitude, G loading, and V_{NE} exceedances. Max Speed and Low Speed Protection remain operational.
LOWSPEED	Low Speed Protection is active.
LOW ALT	Low Altitude Protection is active.
LVL SWTCH	Cyclic LVL button has been active for more than 30 seconds.
MANIFEST	Incorrect manifest versions. Maintenance is required.
MAXSPEED	Max Speed Protection is active.
ON GROUND	System senses helicopter is on the ground and will not provide any control inputs.
P DETENT	Cyclic has been out of detent in pitch axis for more than 30 seconds.
PFT	Preflight test is in progress.
PFT FAIL	Preflight test has failed. The FCS is inoperative. Red FCS LED illuminates steady.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**GMC 605H MESSAGES (cont'd)**

Message	Description
R DETENT	Cyclic has been out of detent in roll axis for more than 30 seconds.
ROLL BEEP	TRIM ADJUST in roll has been active for more than 30 seconds.
PIT BEEP	TRIM ADJUST in pitch has been active for more than 30 seconds.
TRK MODE	Heading data is unavailable, FCS has reverted from heading to GPS track mode.
Y DETENT	Tail rotor pedals have been out of detent in yaw axis for more than 30 seconds.
YAW BEEP	Yaw TRIM switch has been active for more than 30 seconds.
YAW FAIL	System is unable to provide yaw axis control.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

FCS VISUAL ANNUNCIATIONS

Normal Mode Annunciations			
FCS Status	FCS LED	GMC 605H	GDU
FCS Engaged	Steady Green	"R" & "P" illuminated. "ATT" displayed.	"R" & "P" displayed in green. "ATT" displayed in green.
FCS Coupled	Steady Green	"R" & "P" illuminated. Lateral and vertical modes displayed.	Lateral and vertical modes, and "R" & "P" displayed in green. "CPLD" displayed in green.
Yaw axis engaged		"Y" illuminated.	"Y" displayed in green.

Normal Disconnect Annunciations			
FCS Status	FCS LED	GMC 605H	GDU
FCS Disconnect	Flashing amber for 10 seconds, then extinguished.	No annunciation.	"R" & "P" & "Y" (if enabled) flashing in yellow inverse video.
Yaw axis disengaged		No annunciation.	"Y" flashing in yellow inverse video.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

FCS VISUAL ANNUNCIATIONS (cont'd)

Abnormal Disconnect			
FCS Status	FCS LED	GMC 605H	GDU
FCS Fail	Continuous flashing red until acknowledged, then steady red.	No annunciation.	Continuous FCS flashing red and white inverse video.

System Failure			
FCS Status	FCS LED	GMC 605H	GDU
FCS Fail	Continuous flashing red until acknowledged, then steady red.	FCS FAIL message displayed.	FCS displayed in red.
Yaw axis failure		YAW FAIL message displayed.	YAW message displayed in black on yellow.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**FCS AURAL ANNUNCIATIONS**

FCS System Annunciation	
Aural Annunciation	Description
Automatic mode change: Aural "DING-DING"	Indicates a pitch or roll upper mode change. No tone played for normal transition into or out of HOV or GSPD modes.
"FCS TEST OK"	PFT has passed.
"FCS TEST FAILED"	PFT has failed.
"DECOPLED"	All upper modes have been disengaged and pitch and roll are now in attitude hold.
FCS Engagement: Single tone aural "DING"	Played whenever FCS is engaged.
FCS Disconnect: Two-tone aural "BEE-BOOP"	Played whenever the FCS is disconnected automatically or by pilot action.
"LEVELING"	Level mode has been engaged.
"LIMIT CUE DISABLED"	Limit Cueing has been disabled.
"LIMIT CUE ENABLED"	Limit Cueing has been enabled.
"LOW ALTITUDE"	Low Altitude Protection is active.
"MAX SPEED"	Max Speed Protection is active.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**FCS AURAL ANNUNCIATIONS (cont'd)**

Aural Annunciation	Description
"OVERSPEED"	V_{NE} has been exceeded.
"YAW FAIL"	Yaw axis system has failed and disconnected.
"LOW SPEED"	Low Speed Protection is active.

LEVEL MODE DESCRIPTION

Level mode provides a method to establish a safe flight attitude with a single button press. Level mode reference depends on the current default mode of the FCS at the time the LVL button is pressed. In hover or hover taxi, the following Level mode references will be set:

Lateral ground speed reference will be set to zero.

The forward speed will be set to the forward speed of the helicopter when Level mode was activated. The helicopter will remain in low speed or hover flight.

If (optional) yaw control system is enabled and a heading reference was set when Level mode was activated, the system will continue to seek that heading reference. If no heading reference was set when Level mode was activated, the heading present upon activation will become the heading reference. If yaw control system is disabled, yaw will not engage when Level mode is selected.

SECTION 7: SYSTEM DESCRIPTION (cont'd)**LEVEL MODE DESCRIPTION (cont'd)**

In forward flight, the following Level mode references will be set:

Roll angle reference will be set to zero.

The pitch angle reference will be set to 2 degrees nose down. This attitude will generally keep the helicopter in forward flight.

If (optional) yaw control system is enabled, yaw system will engage and seek lateral trim. If yaw system is disabled, yaw system will not engage when Level mode is selected.

CAUTION

Airspeed may decay when Level mode is engaged. Ensure sufficient power is applied when Level mode is activated to maintain altitude.

MAX SPEED PROTECTION

Max Speed Protection prevents the FCS from trimming to references that result in a stabilized airspeed above 120 knots or a small offset below V_{NE} , whichever is less. In attitude hold mode, Max Speed Protection becomes active at 125 knots or 3 knots below V_{NE} . A gentle pitch up force will be applied to the cyclic to seek a stabilized airspeed of 120 knots or 3 knots below V_{NE} . Visual annunciation "MAXSPD" will be provided on the GMC 605H and the PFD. Max Speed Protection will remain active until the current reference attitude would result in an airspeed of less than 120 knots or 3 knots below V_{NE} . With any vertical upper level mode engaged, Max Speed Protection will become active at 123 knots or 3 knots below V_{NE} . IAS will become the active mode with a reference of 120 knots or 6 knots below V_{NE} . Visual annunciation "MAXSPD" will be provided on the GMC 605H and the PFD, and aural annunciation "MAX SPEED" will be provided. Max Speed Protection will remain active until airspeed drops below 118 knots or 8 knots below V_{NE} .

SECTION 7: SYSTEM DESCRIPTION (cont'd)**LOW SPEED PROTECTION**

Low Speed Protection prevents inadvertent deceleration below 45 knots while VS, ALT/PALT, or GS/GP is the active vertical mode. When a coupled FCS vertical mode is selected and the airspeed or airspeed trend drops below 45 knots, IAS will become the active vertical mode with a reference of 45 knots. Visual annunciation "LOWSPD" will be provided on the GMC 605H and the PFD, and aural annunciation "LOW SPEED" will be provided. Low Speed Protection will remain active until airspeed increases above 45 knots. If airspeed continues to decay below 35 knots, the FCS will transition to attitude hold mode and an automatic mode change tone will be provided.

LOW ALTITUDE PROTECTION

Low Altitude Protection prevents inadvertent descent below 200 feet GPS height above terrain (HAT) while VS, IAS, or ALT/PALT is the active vertical mode. When conditions for Low Altitude Protection are met, VS becomes the active vertical mode with a reference of 0 fpm or the current vertical speed if a positive vertical speed was present at activation. Visual annunciation "LOW ALT" will be provided on the GMC 605H and the PFD, and aural annunciation "LOW ALTITUDE" will be provided. Low Altitude Protection will remain active until the helicopter climbs above 300 feet GPS HAT. Once Low Altitude Protection is active, the vertical mode will remain VS with the current reference until the mode or reference is changed by the pilot. If the conditions for Max Speed Protection or Low Speed Protection are met concurrently with Low Altitude Protection, the speed protection mode will take priority, however visual annunciations and aural annunciations for both protection modes will be provided.

SECTION 7: SYSTEM DESCRIPTION (cont'd)

LIMIT CUEING

Limit Cueing provides resistance to cyclic inputs when pitch, roll, airspeed, or G limits associated with safe flight are exceeded. The amount of resistance provided is proportional to the deviation beyond threshold values. If the FCS is disengaged when the threshold(s) is exceeded, the servo(s) in the affected axis (axes) will automatically engage and provide resistance until the parameter(s) exceeded is below its threshold. The affected servo will give an out of detent indication when Limit Cueing is active. Limit Cueing may be disabled/re-enabled by pressing and holding the cyclic FCS OFF button for more than 5 seconds. Limit Cueing defaults on at each power cycle of the GMC 605H.

LIGHTING

GMC 605H Mode Controller lighting is controlled by integrated photocells which sense the ambient cockpit light level.

SECTION 8: HANDLING AND MAINTENANCE

No change.