BELL 429

ROTORCRAFT FLIGHT MANUAL

SUPPLEMENT

600-POUND EXTERNAL HOIST

429-706-001

CERTIFIED
13 OCTOBER 2011

This supplement shall be attached to the BHT-429-FM-1 when the 600-Pound External Hoist kit (429-706-001) is installed.

Information contained herein supplements information in the basic Flight Manual. For Limitations, Procedures, and Performance Data not contained in this supplement, refer to the basic Flight Manual.

POST OFFICE BOX 482 • FORT WORTH, TEXAS 76101

Export Classification C, ECCN EAR99

13 OCTOBER 2011
REVISION 9 — 17 MARCH 2021

NOTICE PAGE

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LOG OF REVISIONS

Original	0	13 OCT 11	Revision	5	12 DEC 16
Revision	1	15 OCT 12	Revision	6	8 JAN 18
Revision	2	17 DEC 12	Revision	7	28 MAR 19
Revision	3	06 MAR 14	Revision	8	21 NOV 19
Revision	4	06 NOV 15	Revision	9	17 MAR 21

LOG OF PAGES

PAGE	REVISION NO.	PAGE	REVISION NO.

FLIGHT MANUAL

Title	9
NP	9
A/B	9
C/D	9
i/ii	2
1	5
2	9
3 – 4	8
5	5
6 – 11	8
12 – 18	0
19	6
20 – 23	0
24	7
25/26	0

NOTE

Revised text is indicated by a black vertical line. A revised page with only a vertical line next to the page number indicates that text has shifted or that non-technical correction(s) were made on that page. Insert latest revision pages; dispose of superseded pages.

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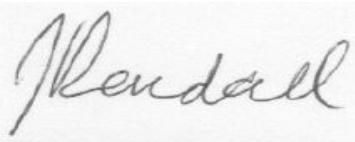
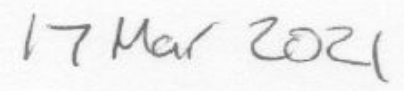
APPROVED **DATE**





CHIEF, FLIGHT TEST
FOR
DIRECTOR — NATIONAL AIRCRAFT CERTIFICATION
TRANSPORT CANADA

GENERAL INFORMATION

The 600-Pound External Hoist kit (429-706-001) meets normal category rotorcraft certification for human and non-human external cargo. It consists of a 600-pound (272-kg) capacity articulated electric hoist unit located over the right sliding passenger door, a control pendant, a cabin hoist operator control panel, two interlinked power relays, a cable cut arm switch, a guarded cable cut switch, EICAS annunciators, a hoist power switch, a pilot operated boom switch, hoist mounted flood light lamps (provision), and the associated structural modifications. As well, an additional audio connection point (close to the right sliding passenger door) is provided to allow intercommunication between the pilot and hoist operator by either the hand-held control pendant trigger or through a voice activated mic (VOX/Hot Mic) as selectable through the operator selection switch located adjacent to the pendant.

The hoist assembly comprises an electrically powered (28 VDC) and electronically controlled brushless electric motor driving an internal level-wind and storage drum assembly via a gear train. Internal limit switches control automatic acceleration, deceleration, and stopping of the cable at predetermined positions. Outside these positions, the hoist normally may be operated with variable speed control as input via the hoist operator's hand-held control pendant assembly and fixed speed control by the pilots' cyclic switch inputs. The hoist operator pendant also contains a hoist status annunciator, an intercommunication switch, boom in/out switch, and a digital cable extension meter. The hoist operator control panel is composed of a searchlight trim switch (if searchlight is installed), (safety wire locked) guarded cable cut switch, floodlight switch (provision for floodlight) and test pushbutton (labeled PTT) with four feedback LED annunciators that ensure explosive cartridge circuit integrity and arming status. The pilot hoist and searchlight controls override the hoist operator controls.

The hoist is also equipped with an internal automatic load brake, a cable cutting system, and internal slip clutch (load limiting system). The automatic load brake acts to control cable payout and secure the load when operation is halted. The cable cutting system allows the pilot or hoist operator to cut the rescue hoist cable in the event of an emergency requiring the hoist load to be jettisoned. In the event of a cable cut failure, a manual cutter is provided for the hoist operator, which is stowed in a pouch on the fuselage bulkhead aft of the cabin door. The slip clutch allows the cable to reel out automatically in the event the cable load exceeds 1500 ±300 pounds (680 ±136 kg).

The hoist has the capability to deploy up to 290 feet (88.4 m) of cable at a load lifting capacity of 600 pounds (272 kg) with a nominal speed of 200 feet per minute (61 m/min).

Section 1

LIMITATIONS

1-3. TYPES OF OPERATION

Hoist operations shall be conducted under appropriate operating rules for external loads.

The external load equipment certification approval does not constitute operational approval; operational approval for external load operations must be granted by the local aviation authority.

Hoist operations shall be conducted by visual reference only.

WARNING

A LIGHTNING STRIKE TO THE HELICOPTER COULD CAUSE PERSONAL INJURY OR LOSS OF LIFE TO PERSONNEL INVOLVED IN THE HOISTING OPERATION. HUMAN EXTERNAL CARGO HOISTING OPERATIONS SHOULD BE AVOIDED IN THE VICINITY OF THUNDERSTORMS.

1-3-A. PASSENGERS

Passenger operations with hoist installed are approved, provided hoist cable is fully reeled in and hoist electrical power is off.

Aft right side seat installation shall be per placard on hoist pendant support.

1-5. CONFIGURATION

1-5-A. REQUIRED EQUIPMENT

Float guard kit is required for emergency flotation system.

Appropriate light source other than the landing light is required for night hoisting operations.

Each personnel carrying device attached to the hoist shall be approved.

Communication between flight crew and human external cargo (HEC) shall be through established hand signals and or approved radio-ICS system.

1-6. WEIGHT AND CENTER OF GRAVITY

Actual weight change shall be determined after kit is installed and ballast readjusted, if necessary.

1-6-A. WEIGHT

Maximum hoist load is 600 pounds (272 kg). This is a structural limitation and does not ensure longitudinal or lateral GW/CG will remain within approved limits. Maximum allowable hoist load varies with CG/GW and OAT.

The maximum allowable hoist load varies with OAT as follows:

Above 0°C — Maximum hoist load is 272 kilograms (600 lb).

Between -20 and 0°C — Maximum hoist load is 249 kilograms (550 lb).

Below -20°C — Maximum hoist load is 227 kilograms (500 lb).

Maximum combined GW of helicopter and external load shall not exceed 7000 pounds (3175 kg).

1-6-B. CENTER OF GRAVITY

Load on hoist shall be included in the Gross Weight/GG for Hoist Operations.

For hoist operations, longitudinal CG limits, refer to Hoist Operations — Longitudinal Gross Weight/CG Envelope chart (Figure 1-1).

For hoist operations, lateral CG limits, refer to Hoist Operations — Lateral Gross Weight/CG Envelope chart (Figure 1-2).

1-7. AIRSPEED

Hoist operations are permitted in stationary hover and up to forward flight of 60 KIAS per the following limitations.

For hoist operations in accordance with the Hover Ceiling OGE — 2-Minute OEI Power chart (Figure 4-6), the following wind/airspeed limitations apply:

1. With wind/airspeed within ±15° of the nose of the helicopter, maximum wind/airspeed is 60 knots.
2. With wind/airspeed between ±15° and ±30° off the nose of the helicopter, maximum wind/airspeed is 50 knots.
3. For all other azimuths, maximum wind/airspeed is 35 knots.

Air taxi with external load is permitted with the load secured above the landing gear.

WARNING

MANEUVERING WITH AN EXTENDED CABLE AND LOAD ON THE HOOK CAN LEAD TO CLUTCH SLIPPAGE.

1-20. INSTRUMENT MARKINGS AND PLACARDS

Refer to Figure 1-3 for placards and decals.

1-21. PERFORMANCE

1-21-A. HUMAN EXTERNAL CARGO (HEC) REQUIRING CATEGORY A PERFORMANCE

For Human External Cargo (HEC) operations requiring Category A performance, the maximum combined gross weight of the helicopter and external load shall not exceed the gross weight indicated for the applicable ambient conditions in the Hover Ceiling OGE — 2-Minute OEI Power chart (Figure 4-6).

Using the Hoist Load/Hover Skid Height Envelope for Operations Requiring Category A Performance chart (Figure 4-13), pilot must determine hover skid height based on hoist load weight. Hoist load weight and hover skid height determined from Figure 4-13 take into account the time to winch up, bring the boom in, and transition to forward flight, all within 2 minutes using a single generator (assuming OEI operation).

1-22. HOIST OPERATOR

A hoist operator, wearing an approved safety harness in the passenger compartment, is required during all phases of hoist operations. Hoist operator shall wear protective gloves for guiding cable during operation. Hoist operator shall be familiar with hoist operating procedures and limitations.

Intercommunication between pilot and hoist operator is required during all phases of hoist operations.

1-23. HOIST CABLE LIMITS

Hoist cable angle deflection limit is 30° from vertical.

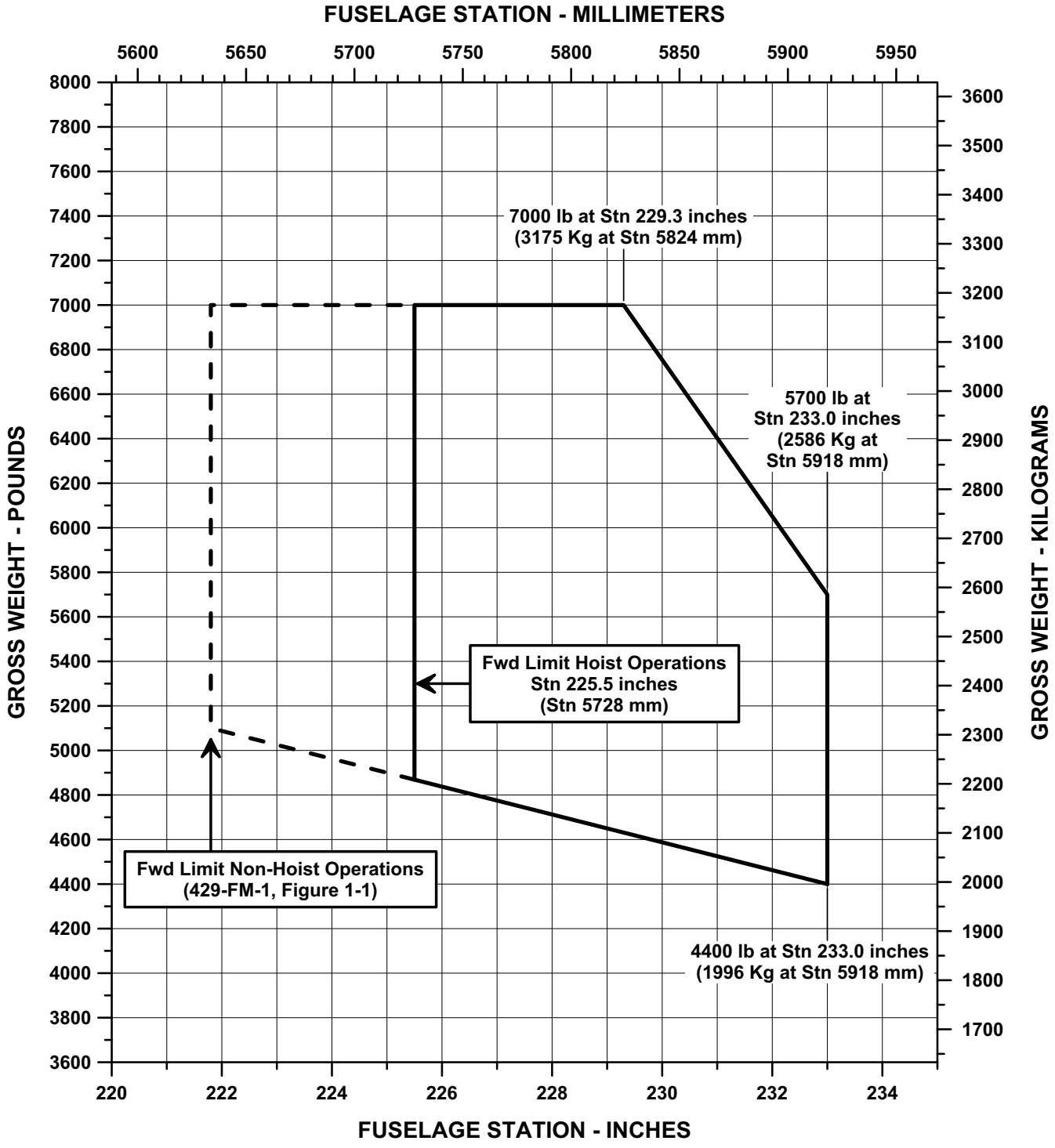


Figure 1-1. Hoist Operations — Longitudinal Gross Weight/CG Envelope

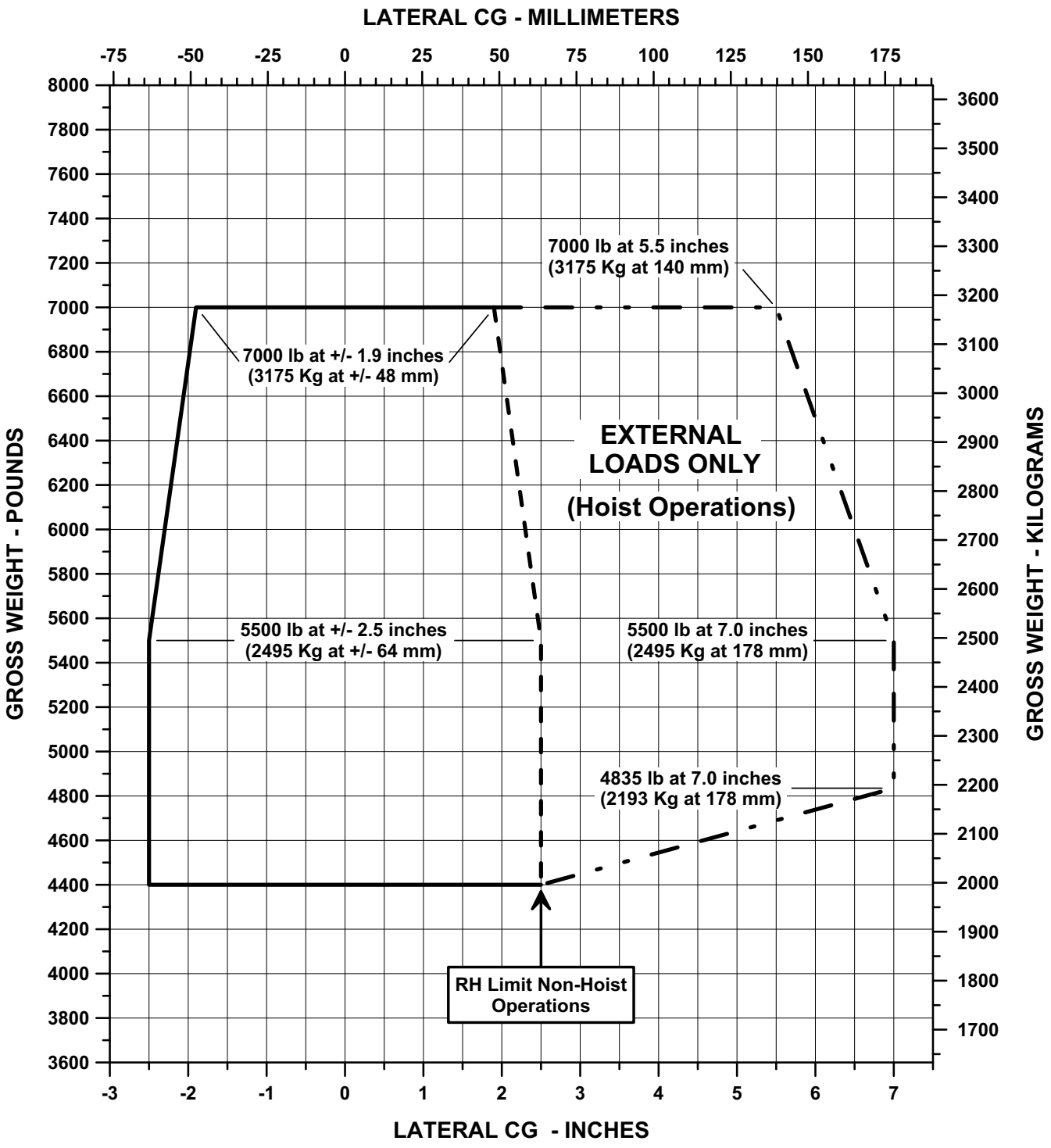


Figure 1-2. Hoist Operations — Lateral Gross Weight/CG Envelope

WARNING

HOIST CABIN PANEL "PTT" SWITCH SHALL BE RELEASED BEFORE ANY TRANSITION OF THE COCKPIT "CUT ARM" SWITCH

Location: Pedestal

OAT VS MAX HOIST LOAD	
ABOVE 0°C	272 KG (600 LBS)
BETWEEN -20°C & 0°C	249 KG (550 LBS)
BELOW -20°C	227 KG (500 LBS)

Location: Interior panel

SEAT IN AFT RIGHT POSITION PROHIBITED WHEN HOIST PENDANT SUPPORT INSTALLED

MINIMUM CLEARANCE REQUIRED BETWEEN HOIST PENDANT SUPPORT AND SEAT IS 0.5 INCH

Location: Interior panel
(Either placard can be installed)

WARNING

"PTT" SWITCH SHALL BE RELEASED BEFORE ANY TRANSITION OF THE COCKPIT "CUT ARM" SWITCH

Location: Cabin

429_FMS-4_01_0003_c02

Figure 1-3. Placards and Decals

Section 2

NORMAL PROCEDURES

2-2. FLIGHT PLANNING

CAUTION

HOIST LOAD CAN CAUSE LONGITUDINAL OR LATERAL CG LIMITS TO BE EXCEEDED. GW AND CG SHALL BE COMPUTED TO ENSURE LOADING IS WITHIN APPROVED LIMITS.

NOTE

If additional loads are carried during hoisting operations, loads shall be placed on left side of helicopter, opposite the external hoist.

GW and CG — Compute with and without hoist load.

2-3. PREFLIGHT CHECK

2-3-B. EXTERIOR CHECK

2-3-B-1. FUSELAGE — CABIN RIGHT SIDE

Hoist — Condition, security, wiring, connected.

Hook — Ensure firmly seated against bumper pad and rotates freely.

Right cabin sliding door — Operable.

Hoist gearbox oil level — Check sight glass.

2-4. INTERIOR AND PRESTART CHECK

2-4-A. INTERIOR CHECK

Hoist operator safety harness — Condition, function operation of adjusting devices and snap hooks, security of D-ring.

Secondary attachment ring — Condition and security.

Hoist operator control pendant — Installed, stowed, and wiring connected.

Manual cable cutter — Secure in pouch.

2-7. BEFORE TAKEOFF

2-7-A. HOIST OPERATIONAL CHECKS

NOTE

Perform hoist operational check if hoist operations are anticipated.

With both engines running and both generators ON, perform hoist operational check as follows:

ICS — Check all stations, pendant, and extension cord.

Cabin hoist control panel PTT (Press-to-Test) switch — Push; verify SQUIB SQ1/SQ2 lights illuminate; release, lights extinguish.

WARNING

HOIST CABIN PANEL PTT (PRESS-TO-TEST) SWITCH SHALL BE RELEASED BEFORE ANY TRANSITION OF THE COCKPIT CUT ARM SWITCH.

NOTE

Deleted

HOIST cable CUT ARM switch — CUT ARM; verify HOIST CUT ARM advisory message illuminated.

Cabin hoist control panel PTT (Press-to-Test) switch — Push; verify ARM AR1/AR2 lights illuminate; release, lights extinguish.

HOIST power ON/OFF switch — ON; verify HOIST ON advisory message illuminated, with HOIST CBL FOUL and HOIST HOT caution messages that flash for 3 seconds and then extinguish.

NOTE

If the hook is not fully stowed in the up position, SLOW annunciator will remain illuminated.

Hoist operator control pendant — When hoist power is applied, verify status annunciators CBL, TEMP, GEN, and SLOW flash for 3 seconds and then extinguish.

HOIST BOOM switch — OUT; until boom fully extended and verify HOIST BOOM caution message illuminated.

Electrical BUS INTCON switch — OVRD OFF.

GEN 1 switch — OFF. Verify GEN annunciator on pendant illuminates.

Hoist operator control pendant — Press hoist control thumbwheel — DN to lower hoist cable approximately 3 feet (1 m). SLOW annunciator on pendant illuminates.

GEN 1 switch — ON. Verify GEN annunciator on pendant extinguishes.

GEN 2 switch — OFF. Verify GEN annunciator on pendant illuminates.

CAUTION

WHEN REELING IN CABLE, APPLY A LOAD OF 25 POUNDS (11.3 KG) OR GREATER TO ENSURE CABLE IS WOUND EVENLY ONTO CABLE DRUM.

Pilot cyclic HOIST control switch — UP; to fully retrieve cable and ensure hook is firmly seated against bumper pad. SLOW annunciator on pendant extinguishes.

GEN 2 switch — ON. Verify GEN annunciator on pendant extinguishes.

Electrical BUS INTCON switch — NORM.

Hoist operator control pendant BOOM control switch — IN; until boom fully retracted and verify HOIST BOOM caution message extinguished.

HOIST cable CUT ARM switch — OFF; verify HOIST CUT ARM advisory message extinguished.

Cabin hoist control panel FLOOD LIGHT switch (if installed) — ON; verify illumination, then OFF.

Cabin hoist control panel SEARCH LIGHT switch (if installed) — Once selected ON by collective control switch, verify controllable through switch on cabin hoist control panel, then OFF by collective control switch.

HOIST power ON/OFF switch — OFF; verify HOIST ON advisory message extinguished.

Aft ICS intercom — Confirm intercommunication between pilot and hoist operator.

2-9. IN-FLIGHT OPERATIONS

WARNING

FOR IN-FLIGHT OPERATIONS, CABLE MUST BE GROUNDED PRIOR TO HOISTING TO AVOID INJURY TO PERSONNEL DUE TO STATIC DISCHARGE.

WARNING

A CABLE MISWRAP OR JAM IS CAUSE TO STOP HOISTING OPERATION. A CABLE MISWRAP COULD CAUSE CABLE TO JAM BETWEEN DRUM AND HOUSING WITH RISK OF CABLE BREAKING.

CAUTION

DO NOT EXTEND CABLE BEYOND LENGTH THAT ENABLES HOOK ASSEMBLY TO CONTACT THE GROUND UNLESS PROVISION IS MADE TO PREVENT DAMAGE OR ENTANGLEMENT OF THE CABLE.

CAUTION

WHEN REELING IN CABLE, APPLY A LOAD OF 25 POUNDS (11.3 KG) OR GREATER TO ENSURE CABLE IS WOUND EVENLY ONTO CABLE DRUM.

NOTE

Cable rate is automatically slowed to a safe speed whenever the hoist is operated near the extreme cable travel.

2-9-F. HOIST OPERATING PROCEDURES

WARNING

HOIST OPERATOR SHALL BE SECURED TO HELICOPTER WITH AN APPROVED SAFETY HARNESS DURING HOISTING OPERATIONS.

NOTE

Certain combinations of hoist load and cable length may result in roll oscillations. If this occurs, disengaging AP1 and AP2 will stop the oscillations.

Hoist operator safety harness — On and secured to attachment ring.

Right cabin sliding door — Secure fully open at 90 KIAS or less.

RPM switch — 104%; 60 KIAS or less.

HOIST power ON/OFF switch — ON; verify HOIST ON advisory message illuminated.

HOIST BOOM switch (pilot or hoist operator) — OUT; until boom fully extended and verify HOIST BOOM caution message illuminated.

NOTE

Pilot and hoist operator coordination must be maintained during hoisting operations to keep cable within travel limits as described in Section 1.

NOTE

Use care to prevent hook and cable from fouling on fuselage or landing gear.

Hoist operator control pendant (or cyclic HOIST control switch) — Press hoist control thumbwheel — DN to lower hoist cable.

Hoist operator control pendant (or cyclic HOIST control switch) — Press hoist control thumbwheel — UP to raise hoist cable.

HOIST BOOM switch (pilot or hoist operator) — IN; until boom fully retracted and verify HOIST BOOM caution message extinguished.

HOIST power ON/OFF switch — OFF; verify HOIST ON advisory message extinguished.

Hook — Ensure firmly seated against bumper pad.

RPM switch — AUTO; prior to 60 KIAS.

Right cabin sliding door — Close; prior to 90 KIAS.

2-10. POSTFLIGHT CHECK

Hoist — Condition and security.

Hook — Ensure firmly seated against bumper pad.

NOTE

After last flight of the day, if hoist has been used, hoist maintenance action is required. Refer to current Goodrich Operating/Maintenance Manual 44316-2-5 (BELL 429) for proper checks and maintenance.

Section 3

EMERGENCY AND MALFUNCTION PROCEDURES

3-1. INTRODUCTION

Amber caution lights/messages, fault conditions, and corrective actions are presented in Table 3-3.

Green and white advisory lights/messages, system conditions, and required actions are presented in Table 3-4.

Amber and green hoist status annunciators, fault conditions, and corrective actions are presented in Table 3-5.

3-3. ENGINE

3-3-A. SINGLE ENGINE FAILURE

Once N_R is stabilized, select 2 MIN OEI limiter. After hoisting is complete (cabin is secured), apply power to droop N_R to 100% for the transition to forward flight. Once forward flight is achieved, reduce power to maximum continuous OEI or 30 Minute OEI, as applicable.

3-16. EMERGENCY JETTISON

HOIST cable CUT ARM switch — CUT ARM. Cyclic or cabin hoist control panel, CABLE CUT switch — Lift guard; actuate.

If CABLE CUT switch fails, hoist cable may be severed by manual cable cutter (stowed in cabin bulkhead pouch).

Table 3-3. Caution (Amber) Lights/Messages

MESSAGE	FAULT CONDITION	CORRECTIVE ACTION
HOIST BOOM	Hoist boom is not in stowed position.	Confirm desired hoist boom position. NOTE If hoist boom fails to retract (stow), V_{NE} is 130 KIAS, or placarded V_{NE}, whichever is less, for flight to maintenance facility.

Table 3-3. Caution (Amber) Lights/Messages (Cont)

MESSAGE	FAULT CONDITION	CORRECTIVE ACTION
HOIST CBL FOUL	Hoist cable anti-foul actuator is activated, hoist operation stopped until control pendant thumbwheel (or cyclic HOIST UP/DN control switch) is cycled, then hoist operates at reduced cable speed (35 fpm).	Cycle hoist operator control pendant thumbwheel (or cyclic HOIST UP/DN control switch) to off (neutral) and then to UP/DN to clear cable jam.
HOIST HOT	Hoist motor is overheating.	Hoisting cycle in progress may continue. Allow hoist to cool before further hoisting (light extinguished).

Table 3-4. Advisory (Green, White, or Cyan) Lights/Messages

MESSAGE	SYSTEM CONDITION	REQUIRED ACTION
HOIST CUT ARM	Emergency hoist cable cut system is armed.	
HOIST ON	Hoist power in ON.	

Table 3-5. Hoist Operator Pendant — Hoist Status (Amber or Green) Annunciators

MESSAGE	FAULT CONDITION	CORRECTIVE ACTION
CBL	Hoist cable anti-foul actuator is activated, hoist operation stopped until control pendant thumbwheel (or cyclic HOIST UP/DN control switch) is cycled, then hoist operates at reduced cable speed (35 fpm).	Cycle hoist operator control pendant thumbwheel (or cyclic HOIST UP/DN control switch) to off (neutral) and then to UP/DN to clear cable jam.
TEMP	Hoist motor is overheating.	Hoisting cycle in progress may continue. Allow hoist to cool before further hoisting (light extinguished).
GEN	Hoist is operating with a single generator online. Hoist speed is reduced.	
SLOW	Hoist is in reduced speed mode.	

Section 4

PERFORMANCE

4-11. HUMAN EXTERNAL CARGO (HEC) HOISTING OPERATIONS REQUIRING CATEGORY A PERFORMANCE

4-11-A. FLIGHT PLANNING

Prior to commencement of hoisting operations requiring Category A performance, two additional factors must be determined:

a. Helicopter GW at which an OGE hover can be maintained at 2 MIN OEI power (paragraph 4-11-B).

b. Maximum hover skid height for intended operation depends upon the weight of hoist load (paragraph 4-11-C).

4-11-B. GROSS WEIGHT

To determine maximum gross weight that can be sustained in an OGE hover at 2 MIN OEI power, use the Hover Ceiling OGE — 2-Minute OEI Power chart (Figure 4-6).

4-11-C. HOVER SKID HEIGHT

To determine hover skid height, use the Hoist Load/Hover Skid Height Envelope for Operations Requiring Category A Performance chart (Figure 4-13). Pilot must determine hover skid height based on hoist load weight. Hoist load weight and hover skid height determined from Figure 4-13 take into account the time to winch up, bring the boom in, and transition to forward flight, all within 2 minutes using a single generator (assuming OEI operation).

NOTE

In the event of a OEI event, once hoisting is complete (cabin is secured), the remaining time at 2 MIN OEI power is to be used with the 2 MIN OEI limiter selected and N_R drooped to 100% for the transition to forward flight. Once forward flight is achieved, pilot reduces power to maximum continuous OEI or 30 Minute OEI, as applicable.

EXAMPLE:

What maximum gross weight and hover skid height could be expected for following conditions:

c. H_P — 1750 feet

d. OAT — +10°C

e. Wind — 37° off nose at 25 knots

f. Hoist Load — 500 pounds

SOLUTION:

a. Use Crosswind/Headwind Component Chart (Figure 4-12): Enter at 25 knots reported wind scale, follow 25 knot arc until 37°. Headwind component is 20 knots. (Factored headwind is 10 knots.)

NOTE

Unless otherwise authorized by operating regulations, pilot is not authorized to take credit for performance increase resulting from more than 50% of actual headwind component for OEI hover.

b. To determine maximum GW, use Hover Ceiling OGE — 2-Minute OEI Power chart (Figure 4-6): Enter on left of chart at 1750 feet H_P. Move right following grid lines to intersect the +10°C line. Move vertically down to top of Unfactored Headwind graph (at zero wind). Move parallel to trend lines to the 10 knot (Factored Headwind) graph line. Move vertically down to Gross Weight axis and read 6385 pounds.

c. To determine maximum hover skid height, use Hoist Load/ Hover Skid Height Envelope for Operations Requiring Category A Performance chart (Figure 4-13): Enter chart from bottom at Hoist Load, proceed vertically to limit line. Move left horizontally to Hover Skid Height axis and read 160 feet.

HOVER CEILING
OUT OF GROUND EFFECT

2 MINUTE OEI POWER
ENGINE RPM 104%
GENERATOR 150 AMPS

SKID HEIGHT 60 FT (18.3 METER)
BASIC INLET OR BARRIER FILTER
AIR COND. OFF / HEATER OFF

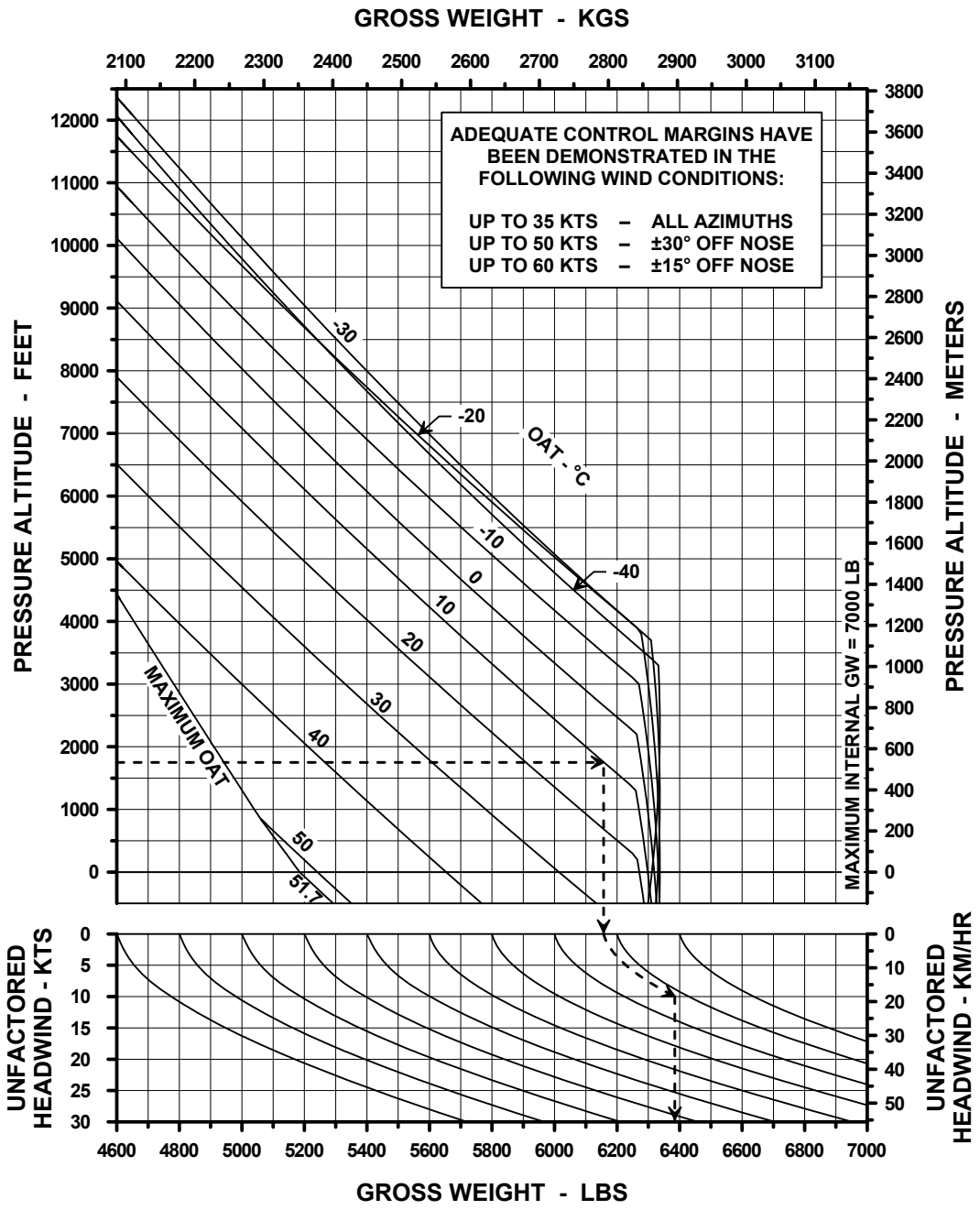
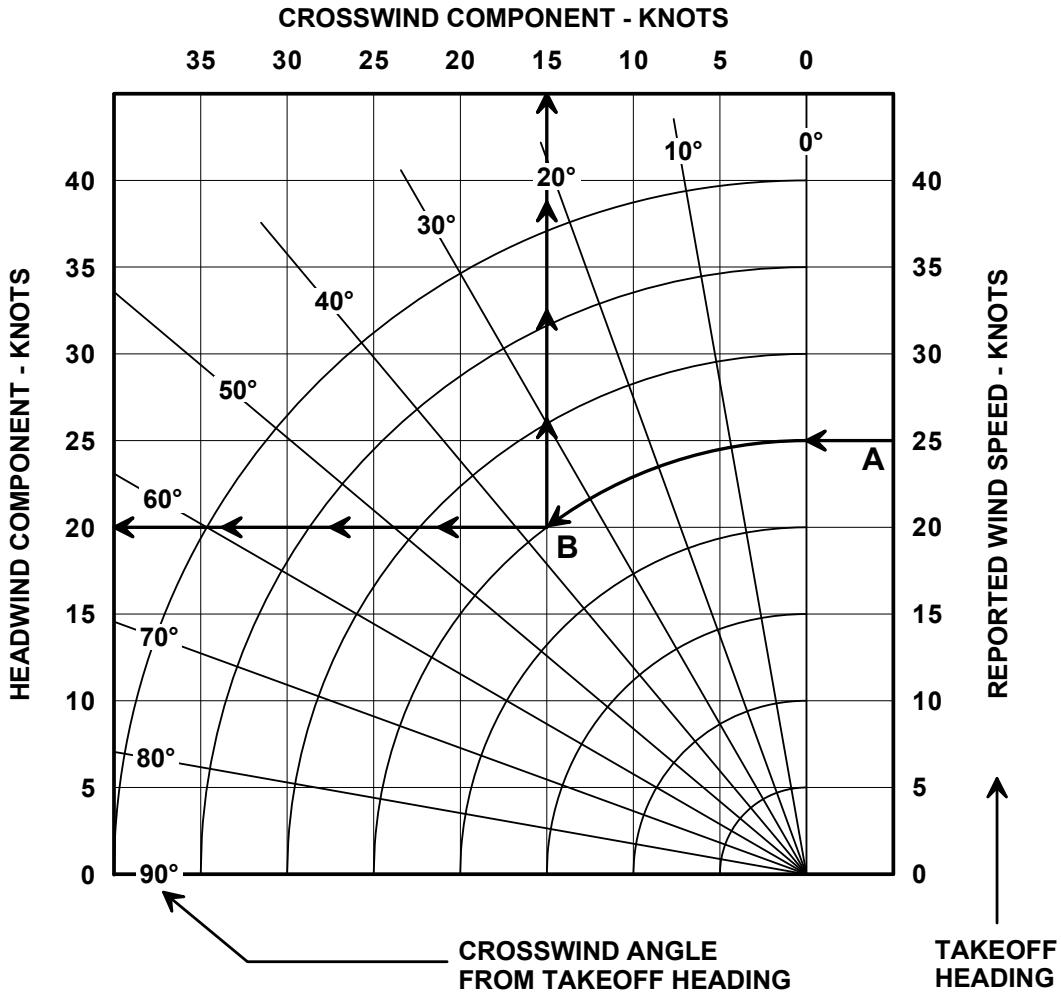


Figure 4-6. Hover Ceiling OGE — 2-Minute OEI Power



EXAMPLE:

1.	AIRCRAFT HEADING	163°
2.	REPORTED WIND DIRECTION	200°
3.	DIFFERENCE BETWEEN WIND DIRECTION AND AIRCRAFT HEADING	37°
4.	REPORTED WIND SPEED	25 KNOTS
5.	ENTER CHART AT REPORTED WIND SPEED, POINT A.	
6.	PROCEED LEFT, FOLLOWING SHAPE OF CURVED LINES, TO CROSSWIND ANGLE FROM AIRCRAFT HEADING, POINT B.	
7.	PROCEED VERTICALLY UPWARD TO CROSSWIND COMPONENT SCALE AND READ CROSSWIND COMPONENT	15 KNOTS
8.	PROCEED LEFT HORIZONTALLY TO HEADWIND COMPONENT SCALE AND READ HEADWIND COMPONENT	20 KNOTS

→ (NOTE: REDUCE HEADWIND COMPONENT BY APPROPRIATE APPROVED FACTOR AND USE RESULT AGAINST "UNFACTORED HEADWIND" SCALE IN PERFORMANCE CHARTS)

Figure 4-12. Crosswind/Headwind Component Chart

HOIST LOAD / HOVER SKID HEIGHT ENVELOPE FOR OPERATIONS REQUIRING CATEGORY A PERFORMANCE

NOTE

LOSS OF ALTITUDE, AFTER ANY FAILURE AND NORMAL PILOT REACTION, DOES NOT EXCEED 10% OF HOVER HEIGHT OR 4 FEET, WHICHEVER IS GREATER.

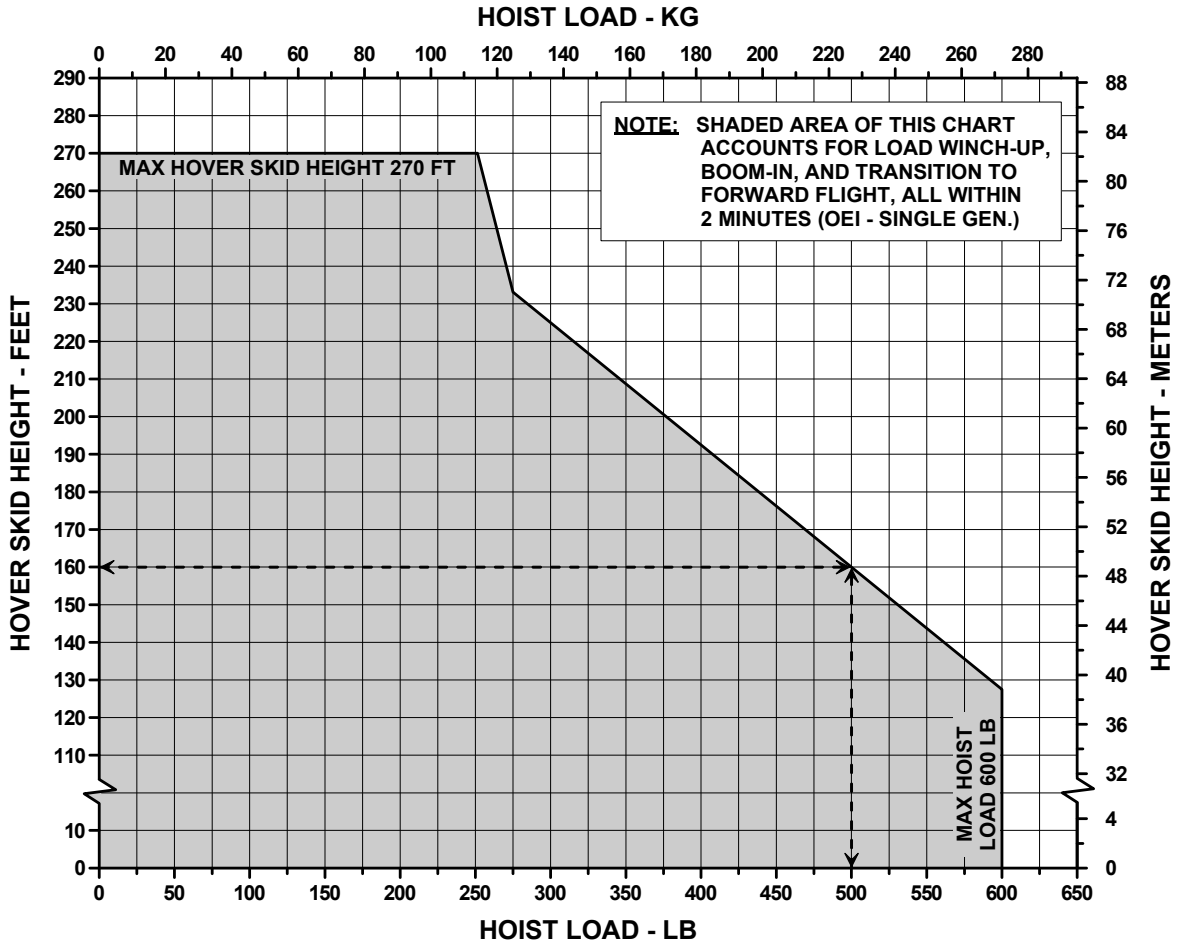


Figure 4-13. Hoist Load/Hover Skid Height Envelope for Operations Requiring Category A Performance

Section 5

WEIGHT AND BALANCE

5-9. HOIST LOADING

For all hoisting operations, it is required that the longitudinal and lateral Gross Weight/CG calculations are performed to ensure helicopter does not exceed GW/CG limits (Section 1, Figure 1-1 and Figure 1-2).

The helicopter Empty Weight configuration includes the hoist in the stowed position (boom in).

The hoist moment changes when it is in the extended position (boom out) (Table 5-6).

Table of moments (Table 5-7 and Table 5-7M) is provided to calculate the GW/CG effect of loading the hoist in both the stowed (boom in) and extended positions (boom out).

Hoist operator loading examples are provided in Table 5-8 and Table 5-8M.

Table 5-6. Moment Change When Hoist is in Fully Extended Position (Boom Out)

LONGITUDINAL		LATERAL	
MOMENT (IN-LB)	MOMENT (KG•MM)	MOMENT (IN-LB)	MOMENT (KG•MM)
1706	19654	2149	24757

Table 5-7. Location of Hoist Loading (U.S.)

HOIST (HOOK) LOCATION LOADING TABLE OF MOMENTS (INCH-POUNDS)					
BOOM IN			BOOM OUT		
WEIGHT (LB)	LONGITUDINAL (IN) FS 219.6	LATERAL (IN) BL 36.2	WEIGHT (LB)	LONGITUDINAL (IN) FS 234.3	LATERAL (IN) BL 56.7
100	21960	3620	100	23430	5670
120	26352	4344	120	28116	6804
140	30744	5068	140	32802	7938
160	35136	5792	160	37488	9072
180	39528	6516	180	42174	10206
200	43920	7240	200	46860	11340
220	48312	7964	220	51546	12474
240	52704	8688	240	56232	13608
260	57096	9412	260	60918	14742
280	61488	10136	280	65604	15876
300	65880	10860	300	70290	17010
320	70272	11584	320	74976	18144
340	74664	12308	340	79662	19278
360	79056	13032	360	84348	20412
380	83448	13756	380	89034	21546
400	87840	14480	400	93720	22680
420	92232	15204	420	98406	23814
440	96624	15928	440	103092	24948
460	101016	16652	460	107778	26082
480	105408	17376	480	112464	27216
500	109800	18100	500	117150	28350
520	114192	18824	520	121836	29484
540	118584	19548	540	126522	30618
560	122976	20272	560	131208	31752
580	127368	20996	580	135894	32886
600	131760	21720	600	140580	34020

Table 5-7M. Location of Hoist Loading (Metric)

HOIST (HOOK) LOCATION LOADING TABLE OF MOMENTS (KG•MM)					
BOOM IN			BOOM OUT		
WEIGHT (KG)	LONGITUDINAL (MM) FS 5578	LATERAL (MM) FS 919	WEIGHT (KG)	LONGITUDINAL (MM) FS 5951	LATERAL (MM) FS 1440
50	278900	45950	50	297550	72000
60	334680	55140	60	357060	86400
70	390460	64330	70	416570	100800
80	446240	73520	80	476080	115200
90	502020	82710	90	535590	129600
100	557800	91900	100	595100	144000
110	613580	101090	110	654610	158400
120	669360	110280	120	714120	172800
130	725140	119470	130	773630	187200
140	780920	128660	140	833140	201600
150	836700	137850	150	892650	216000
160	892480	147040	160	952160	230400
170	948260	156230	170	1011670	244800
180	1004040	165420	180	1071180	259200
190	1059820	174610	190	1130690	273600
200	1115600	183800	200	1190200	288000
210	1171380	192990	210	1249710	302400
220	1227160	202180	220	1309220	316800
230	1282940	211370	230	1368730	331200
240	1338720	220560	240	1428240	345600
250	1394500	229750	250	1487750	360000
260	1450280	238940	260	1547260	374400
270	1506060	248130	270	1606770	388800
272	1517216	249968	272	1618672	391680

Table 5-8. Example for Hoist Operator Loading (U.S.)

BEFORE HOISTING (OUTWARD TRIP)								
			CENTER OF GRAVITY AND MOMENTS					
			LONGITUDINAL			LATERAL		
Item Description	Weight (lb)		Arm (in)		Moment (in-lb)	Arm (in)		Moment (in-lb)
Empty Weight[1]	5040.0		236.9		1193976	-0.1		-504
+Pilot	210.0		147.0		30870	16.4		3444
+Passenger Fwd (Copilot)	190.0		147.0		27930	-15.4		-2926
+Hoist Operator (Seated) Fwd Row, Facing Aft	200.0		186.0		37200	0.0		0
+Passenger Aft Row, Facing Fwd	-		229.0		-	0.0		-
+Boom In	-		-		No moment change reqd			-
+Load on Hoist (Boom In)	0.0		219.6		0	36.2		0
+RH Sliding Door CLOSED	-		-		No moment change reqd			-
Gross Weight at Zero Fuel	5640.0		228.7		1289976	0.0		14
+Fuel (200 gal) to Max GTOW	1360.0		212.1		288456	0.0		0
Gross Takeoff Weight (GTOW)	7000.0	✓	225.5	✓	1578432	0.0	✓	14
Gross Weight at Zero Fuel	5640.0		228.7		1289976	0.0		14
+Critical Fuel for Most Forward[2]	1360.0		212.1		288456	0.0		0
Most Forward CG Condition	7000.0	✓	225.5	✓	1578432	0.0	✓	14
Gross Weight at Zero Fuel	5640.0		228.7		1289976	0.0		14
+Critical Fuel for Most Aft	0.0		0.0		0	0.0		0
Most Aft CG Condition	5640.0	✓	228.7	✓	1289976	0.0	✓	14

Table 5-8. Example for Hoist Operator Loading (U.S.) (Cont)

DURING HOISTING OPERATIONS (BOOM OUT)

		CENTER OF GRAVITY AND MOMENTS			
		LONGITUDINAL		LATERAL	
Item Description	Weight (lb)	Arm (in)	Moment (in-lb)	Arm (in)	Moment (in-lb)
Empty Weight[1]	5040.0	236.9	1193976	-0.1	-504
+Pilot	210.0	147.0	30870	16.4	3444
+Passenger Fwd (Copilot)	190.0	147.0	27930	-15.4	-2926
+Hoist Operator (In Door Opening)	200.0	225.0	45000	32.0	6400
+Passenger Aft Row, Facing Fwd	-	229.0	-	0.0	-
+Boom Out	-	-	1706	-	2149
+Load on Hoist	250.0	234.3	58575	56.7	14175
+RH Sliding Door OPEN	-	-	677	-	0
Gross Weight at Zero Fuel	5890.0	230.7	1358734	3.9	22738
+Fuel (140 gal)	952.0	211.9	201729	0.0	0
Gross Weight	6842.0 ✓✓	228.1 ✓✓	1560463	3.3 ✓✓	22738

DURING HOISTING OPERATIONS (BOOM IN)

		CENTER OF GRAVITY AND MOMENTS			
		LONGITUDINAL		LATERAL	
Item Description	Weight (lb)	Arm (in)	Moment (in-lb)	Arm (in)	Moment (in-lb)
Empty Weight[1]	5040.0	236.9	1193976	-0.1	-504
+Pilot	210.0	147.0	30870	16.4	3444
+Passenger Fwd (Copilot)	190.0	147.0	27930	-15.4	-2926
+Hoist Operator (In Door Opening)	200.0	225.0	45000	32.0	6400
+Passenger Aft Row, Facing Fwd	-	229.0	-	0.0	-
+Boom In	-	-	No moment change reqd		-
+Load on Hoist	250.0	219.6	54900	36.2	9050
+RH Sliding Door OPEN	-	-	677	-	0
Gross Weight at Zero Fuel	5890.0	229.8	1353353	2.6	15464
+Fuel (130 gal)	884.0	212.0	187408	0.0	0
Gross Weight	6774.0 ✓✓	227.5 ✓✓	1540761	2.3 ✓✓	15464

Table 5-8. Example for Hoist Operator Loading (U.S.) (Cont)

AFTER HOISTING (RETURN TRIP)

Item Description	Weight (lb)		CENTER OF GRAVITY AND MOMENTS LONGITUDINAL Arm (in)		LONGITUDINAL Moment (in-lb)	LATERAL Arm (in)		LATERAL Moment (in-lb)
Empty Weight[1]	5040.0		236.9		1193976	-0.1		-504
+Pilot	210.0		147.0		30870	16.4		3444
+Passenger Fwd (Copilot)	190.0		147.0		27930	-15.4		-2926
+Hoist Operator (Seated) Fwd Row, Facing Aft	200.0		186.0		37200	0.0		0
+Passenger Aft Row, Facing Fwd	250.0		229.0		57250	0.0		0
+Boom In	-		-		No moment change reqd			-
+Load on Hoist (Boom In)	0.0		219.6		0	36.2		0
+RH Sliding Door CLOSED	-		-		No moment change reqd			-
Gross Weight at Zero Fuel	5890.0		228.7		1347226	0.0		14
+Critical Fuel for Most Forward[2]	884.0		212.0		187408	0.0		0
Most Forward CG Condition	6774.0	✓	226.5	✓	1534634	0.0	✓	14
Gross Weight at Zero Fuel	5640.0		228.7		1289976	0.0		14
+Critical Fuel for Most Aft	0.0		0.0		0	0.0		0
Most Aft CG Condition	5640.0	✓	228.7	✓	1289976	0.0	✓	14
Gross Weight at Zero Fuel	5640.0		228.7		1289976	0.0		14
+Fuel at Landing (80 gal)	544.0		212.9		115818	0.0		0
Most Aft CG Condition	6184.0	✓	227.3	✓	1405794	0.0	✓	14

[1] Example only. Refer to Actual Weight Record for Empty Weight data.

[2] Critical fuel for most forward is Max Fuel.

✓ A check of weight and CG values against gross weight center of gravity limits chart shows that the loading will be within limits throughout flight. In lateral calculations, - is left side and + is right side.

✓✓A check of weight and CG values against gross weight center of gravity limits chart shows that the loading will be within limits throughout flight. In lateral calculations, - is left side and + is right side.

Table 5-8M. Example for Hoist Operator Loading (Metric)

BEFORE HOISTING (OUTWARD TRIP)							
		CENTER OF GRAVITY AND MOMENTS					
		LONGITUDINAL			LATERAL		
Item Description	Weight (kg)	Arm (mm)		Moment (kg•mm)	Arm (mm)		Moment (kg•mm)
Empty Weight[1]	2286.0	6017		13754862	-3		-3658
+Pilot	95.0	3734		354730	417		39615
+Passenger Fwd (Copilot)	86.0	3734		321124	-391		-33626
+Hoist Operator (Seated) Fwd Row, Facing Aft	91.0	4724		429884	0		0
+Passenger Aft Row, Facing Fwd	-	5817		-	0		-
+Boom In	-	-		No moment change reqd			-
+Load on Hoist (Boom In)	0.0	5578		0	919		0
+RH Sliding Door CLOSED	-	-		No moment change reqd			-
Gross Weight at Zero Fuel	2558.0	5809		14860600	0		-869
+Fuel (757 L) to Max GTOW	617.0	5387		3323779	0		0
Gross Takeoff Weight (GTOW)	3175.0	✓ 5727	✓	18184379	0	✓	-869
Gross Weight at Zero Fuel	2558.0	5809		14860600	0		-869
+Critical Fuel for Most Forward[2]	617.0	5387		3323779	0		0
Most Forward CG Condition	3175.0	✓ 5727	✓	18184379	0	✓	-869
Gross Weight at Zero Fuel	2558.0	5809		14860600	0		-869
+Critical Fuel for Most Aft	0.0	0		0	0		0
Most Aft CG Condition	2558.0	✓ 5809	✓	14860600	0	✓	-869

Table 5-8M. Example for Hoist Operator Loading (Metric) (Cont)

DURING HOISTING OPERATIONS (BOOM OUT)

Item Description	Weight (kg)	CENTER OF GRAVITY AND MOMENTS			
		LONGITUDINAL		LATERAL	
		Arm (mm)	Moment (kg•mm)	Arm (mm)	Moment (kg•mm)
Empty Weight[1]	2286.0	6017	13754862	-3	-6858
+Pilot	95.0	3734	354730	417	39615
+Passenger Fwd (Copilot)	86.0	3734	321124	-391	-33626
+Hoist Operator (In Door opening)	91.0	5715	520065	813	73983
+Passenger Aft Row, Facing Fwd	-	5817	-	0	-
+Boom Out	-	-	19654	-	24757
+Load on Hoist	113.0	5951	672463	1440	162720
+RH Sliding Door OPEN	-	-	7803	-	0
Gross Weight at Zero Fuel	2671.0	5859	15650701	9.8	26255
+Fuel (530 L)	432.0	5382	2325024	0	0
Gross Weight	3103.0 ✓✓	5793 ✓✓	17975725	8.4 ✓✓	26255

DURING HOISTING OPERATIONS (BOOM IN)

Item Description	Weight (kg)	CENTER OF GRAVITY AND MOMENTS			
		LONGITUDINAL		LATERAL	
		Arm (mm)	Moment (kg•mm)	Arm (mm)	Moment (kg•mm)
Empty Weight[1]	2286.0	6017	13754862	-3	-6858
+Pilot	95.0	3734	354730	417	39615
+Passenger Fwd (Copilot)	86.0	3734	321124	-391	-33626
+Hoist Operator (In Door Opening)	91.0	5715	520065	813	73983
+Passenger Aft Row, Facing Fwd	-	5817	-	0	-
+Boom In	-	-	No moment change reqd		-
+Load on Hoist	113.0	5578	630314	919	103847
+RH Sliding Door OPEN	-	-	7803	-	0
Gross Weight at Zero Fuel	2971.0	5836	15588898	59.6	176961
+Fuel (492 L)	401.0	5385	2159385	0	0
Gross Weight	3072.0 ✓✓	5777 ✓✓	17748283	57.6 ✓✓	176961

Table 5-8M. Example for Hoist Operator Loading (Metric) (Cont)

AFTER HOISTING (RETURN TRIP)

			CENTER OF GRAVITY AND MOMENTS				
			LONGITUDINAL			LATERAL	
Item Description	Weight (kg)		Arm (mm)		Moment (kg•mm)	Arm (mm)	Moment (kg•mm)
Empty Weight[1]	2286.0		6017		13754862	-3	-6858
+Pilot	95.0		3734		354730	417	39615
+Passenger Fwd (Copilot)	86.0		3734		321124	-391	-33626
+Hoist Operator (Seated) Fwd Row, Facing Aft	91.0		4724		429884	0	0
+Passenger Aft Row, Facing Fwd	113.0		5817		657321	0	0
+Boom In	-		-		No moment change reqd		-
+Load on Hoist (Boom in)	0.0		5578		0	919	0
+RH Sliding Door CLOSED	-		-		No moment change reqd		-
Gross Weight at Zero Fuel	2671.0		5810		15517921	0	-869
+Critical Fuel for Most Forward[2]	401.0		5385		2159385	0	0
Most Forward CG Condition	3072.0	✓	5754	✓	17677306	0	✓ -869
Gross Weight at Zero Fuel	2558.0		5809		14860600	0	-869
+Critical Fuel for Most Aft	0.0		0		0	0	0
Most Aft CG Condition	2558.0	✓	5809	✓	14860600	0	✓ -869
Gross Weight at Zero Fuel	2558.0		5809		14860600	0	-869
+Fuel at Landing (303 L)	247.0		5408		1335776	0	0
Most Aft CG Condition	2805.0	✓	5774	✓	16196376	0	✓ -869

[1] Example only. Refer to Actual Weight Record for Empty Weight data.

[2] Critical fuel for most forward is Max Fuel.

✓ A check of weight and CG values against gross weight center of gravity limits chart shows that the loading will be within limits throughout flight. In lateral calculations, - is left side and + is right side.

✓✓A check of weight and CG values against gross weight center of gravity limits chart shows that the loading will be within limits throughout flight. In lateral calculations, - is left side and + is right side.