

**BELL**  
MODEL **212**

**ROTORCRAFT  
FLIGHT MANUAL**

**SUPPLEMENT  
CARGO HOOK**

**212-706-103**

**CERTIFIED  
OCTOBER 29,1970**

**This supplement shall be attached to Bell Helicopter Model 212 Flight Manual when cargo hook kit has been installed.**

**Information contained herein supplements information of basic Flight Manual. For Limitations, Procedures, and Performance Data not contained in this supplement, consult basic Flight Manual.**

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NOTICE PAGE

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NOTE

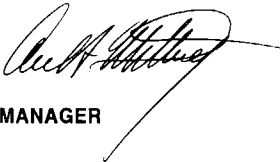
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MANAGER

ROTORCRAFT CERTIFICATION OFFICE  
FEDERAL AVIATION ADMINISTRATION  
FT. WORTH, TX 76193-0170

## GENERAL INFORMATION

External cargo suspension hook, when installed, will permit operator to utilize

helicopter for transportation of external cargo, when operated by a qualified pilot.

# Section 1

## LIMITATIONS

### 1-3. TYPES OF OPERATION

Operation of the helicopter with no load on the external cargo suspension hook is authorized under the standard airworthiness certificate under VFR or IFR conditions without removing the unit from the helicopter.

The installation and use of the rear view mirror contained in the kit is left to operators discretion.

The rear view mirror shall be covered or removed for night flight.

#### 1-3-C. VFR OPERATION

With a load attached to the suspension assembly, operation shall be conducted in accordance with appropriate operating rules for external loads under VFR conditions.

#### 1-3-D. IFR OPERATION

External load operations are permitted provided the operator substantiates to the Administrator that the rotorcraft - load combinations meets IFR handling requirements and insures that the Rotorcraft External Load Operator Certificate reflects same with appropriate restrictions.

### 1-6. WEIGHT AND CENTER OF GRAVITY

Actual weight change shall be determined after cargo hook kit is installed and ballast readjusted, if necessary, to return empty weight CG to within allowable limits.

#### 1-6-A. WEIGHT

Maximum external cargo load is 5000 pounds and shall not exceed GW listed in Basic Flight Manual.

#### 1-6-B. CENTER OF GRAVITY

Refer to Gross Weight Center Of Gravity chart in Basic Flight Manual.

Refer to Weight-altitude-temperature limitations chart in Basic Flight Manual for takeoff and landing weight limits.

#### NOTE

Refer to Section 4 for performance variation with altitude and temperature.

### 1-7. AIRSPEED

$V_{NE}$  is 80 knots at or below 10,000 feet  $H_D$  for all GW with external cargo on suspension unit. Decrease  $V_{NE}$  3 knots per thousand feet above 10,000 feet  $H_D$ .

#### CAUTION

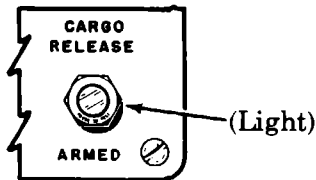
AIRSPEED WITH EXTERNAL CARGO IS LIMITED BY CONTROLLABILITY. CAUTION SHOULD BE EXERCISED WHEN CARRYING EXTERNAL CARGO AS HANDLING CHARACTERISTICS MAY BE AFFECTED DUE TO SIZE, WEIGHT, AND SHAPE OF CARGO LOAD.

### 1-20. INSTRUMENT MARKINGS AND PLACARDS

Refer to figure 1-1.

OCCUPANCY LIMITED  
TO CREW WITH  
EXTERNAL LOAD  
CLASS B LOADING  
APPROVED

(Located on forward right side of overhead console)



(Located on instrument panel)

EXTERNAL LOAD LIMIT  
5000 LBS

(Located on under side of helicopter near suspension assembly)

212-FMS3-1-1

Figure 1-1. Placards and decals

# Section 2

## NORMAL PROCEDURES

### 2-2. FLIGHT PLANNING

#### WARNING

Instruct ground personnel to discharge helicopter static electricity, before attaching cargo sling, by touching airframe with a ground wire. If a metal sling is used, hook up ring can be struck against cargo hook to discharge static electricity. If contact has been lost after initial grounding, helicopter should be electrically regrounded and, if possible, contact maintained until hook up is complete.

USE OF INAPPROPRIATELY SIZED LOAD RINGS MAY RESULT IN LOAD HANG-UP WHEN LOAD RING IS TOO SMALL OR INADVERTENT LOAD RELEASE IF LOAD RING IS TOO LARGE. REFER TO WARNING PLATE ON CARGO HOOK.

### 2-3. PREFLIGHT CHECK

Cargo hook — Condition and security. Check primary load ring and secondary load ring for condition and proper size (Table 2-1). Check for correct rigging.

Check that only one primary ring is captured in the load beam and only one secondary ring with correct cross-section dimension is captured in the primary ring. Additional rings, slings, or shackles shall be attached to the secondary load ring. See figure 2-1.

Rear view mirror (if installed) — Secure and clean.

Cargo sling — Condition, proper length.

Table 2-1. RING SIZES — CARGO HOOK WITH LONG LOAD BEAM.

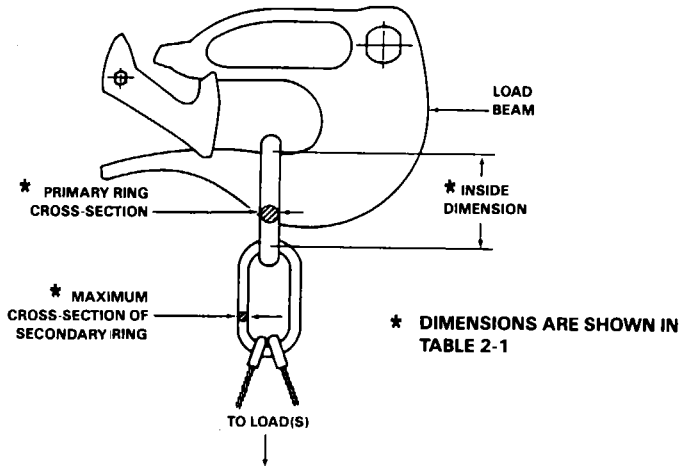
PRIMARY RING INSIDE DIAMETER	PRIMARY RING CROSS SECTION	MAXIMUM CROSS SECTION OF SECONDARY RING
3.0 to 3.1 in. (76.2 to 78.7 mm.)	1.0 in. (25.4 mm.)	0.625 in. (15.9 mm.)
3.1 to 4.0 in. (78.7 to 101.6 mm.)	1.0 in. (25.4 mm.)	0.75 in. (19.0 mm.)



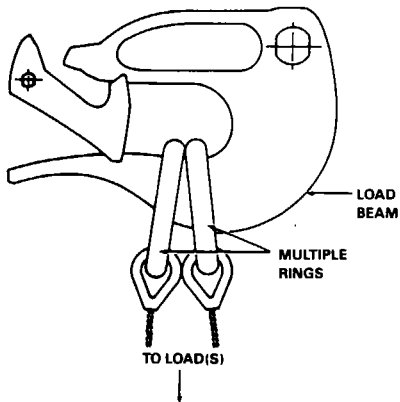
Table 2-2. RING SIZES — CARGO HOOK WITH SHORT LOAD BEAM.

PRIMARY RING INSIDE DIAMETER	PRIMARY RING CROSS SECTION	MAXIMUM CROSS SECTION OF SECONDARY RING
2.38 to 2.5 (60.5 to 63.5 mm.)	1.0 in. (25.4 mm.)	0.625 in. (15.9 mm.)
2.5 to 2.75 in. (63.5 to 69.8 mm.)	1.0 in. (25.4 mm.)	0.75 in. (19.0 mm.)

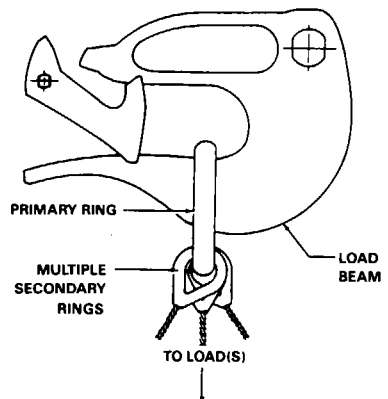
CORRECT RIGGING



INCORRECT RIGGING



INCORRECT RIGGING



212-FMS3-2-1

Figure 2-1. Effective loading practices

## **2-4. INTERIOR AND PRESTART CHECK**

**CARGO HOOK REL circuit breaker — In.**

**BATTERY switch — ON DC BUS 1.**

**CARGO REL switch — ARM; check CARGO RELEASE ARMED light illuminates.**

**Cyclic CARGO RELEASE switch — Press and hold; pull down on cargo hook, hook should open. Release switch and cargo hook; hook should close and lock.**

**Cargo release pedal — Push and hold; pull down on cargo hook, hook should open. Release pedal and cargo hook; hook should close and lock.**

### **NOTE**

Pedal release will function regardless of CARGO REL switch position.

## **2-7. BEFORE TAKEOFF**

**Cargo — Secured; sling attached to cargo.**

**Ground personnel — Positioned as required.**

**CARGO REL switch — ARM; check CARGO RELEASE ARMED light illuminates.**

## **2-8. TAKEOFF**

### **NOTE**

Avoid critical relative winds while performing external cargo

operations. Refer to Critical Relative Wind Azimuths for Hover Flight illustration in Section 4.

Hover helicopter at sufficient height to allow ground personnel to discharge static electricity and to attach cargo sling to cargo hook.

### **NOTE**

Attachment of cargo sling to cargo hook can be observed by means of rear view mirror.

Ascend vertically directly over cargo, then slowly lift cargo from surface.

**Pedals — Check for adequate directional control.**

**Hover power — Check torque required to hover with external load.**

Take off into wind if possible, allowing adequate sling load clearance over obstacles.

## **2-9. IN-FLIGHT OPERATIONS**

### **NOTE**

Control movements should be made smoothly and kept to a minimum to prevent oscillation of sling load.

**CARGO REL switch — OFF.**

**Airspeed — Within limits for adequate controllability of rotorcraft-load configuration.**

**Flight path — As required to avoid flight with external load over any person, vehicle, or structure.**

## 2-10. DESCENT AND LANDING

CARGO REL switch — ARM prior to final approach.

Flight path and approach angle — As required for wind direction and obstacle clearance.

Terminate approach to a high hover. When stabilized at a hover, descend

slowly until cargo contacts surface. Maintain tension on sling.

CARGO RELEASE switch — Press to release cargo sling from cargo hook.

### NOTE

Release of cargo sling from cargo hook can be confirmed visually through rear view mirror.

# Section 3

## EMERGENCY/MALFUNCTION PROCEDURES

### 3-15. CARGO FAILS TO RELEASE ELECTRICALLY

In the event cargo hook will not release cargo sling when CARGO RELEASE switch is pressed, proceed as follows:

Maintain tension on cargo sling.

Cargo release pedal — Push.

# Section 4

## PERFORMANCE

### 4-5. HOVER CEILING

In ground effect (IGE) and out of ground effect (OGE) hover ceiling charts (figures 4-1 and 4-2) are based upon engine manufacturer's minimum specification power for PT6T-3 or PT6T-3B engine with installation losses. These charts reflect maximum hovering capability of helicopter in zero wind conditions, whereas hover

performance shown in Basic Flight Manual is reduced to ensure adequate tail rotor control margins in relative winds up to 20 knots from any direction. Caution, therefore, should be exercised when hovering at high GW and high  $H_D$ , as tail rotor control margins may not be available, particularly when winds are within critical relative wind azimuth area (figure 4-3).

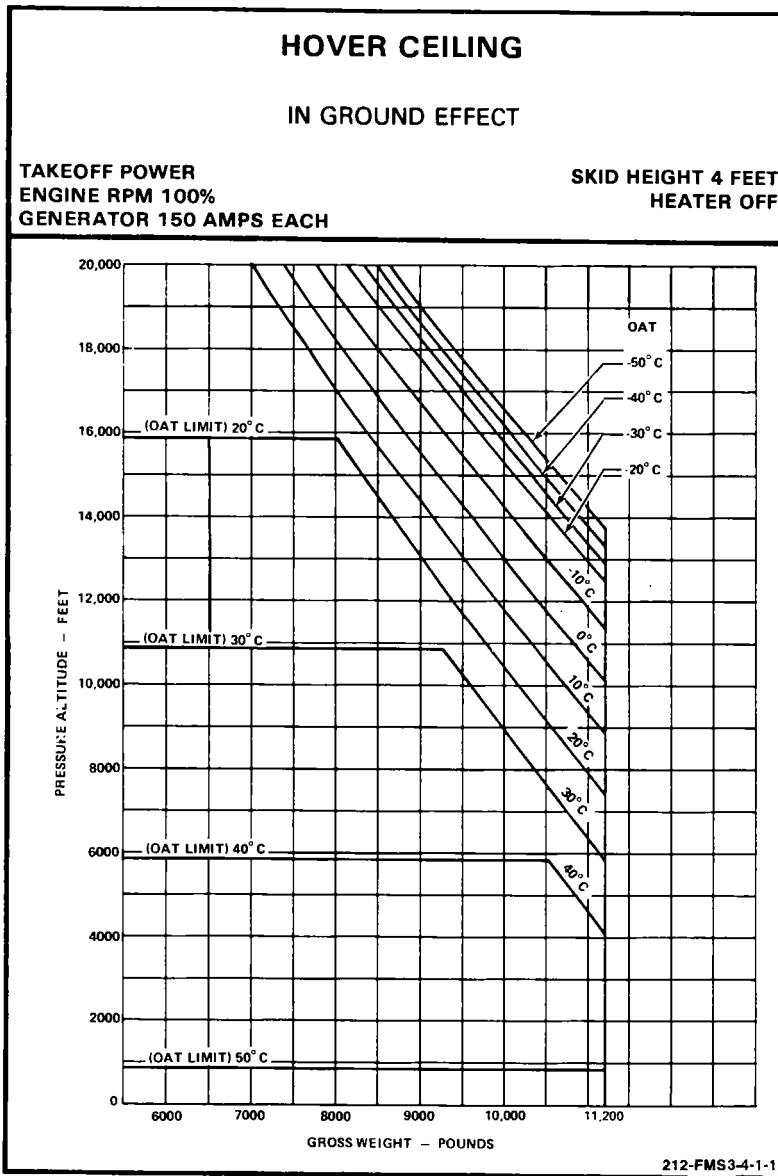


Figure 4-1. Hover ceiling in ground effect (Sheet 1 of 6)

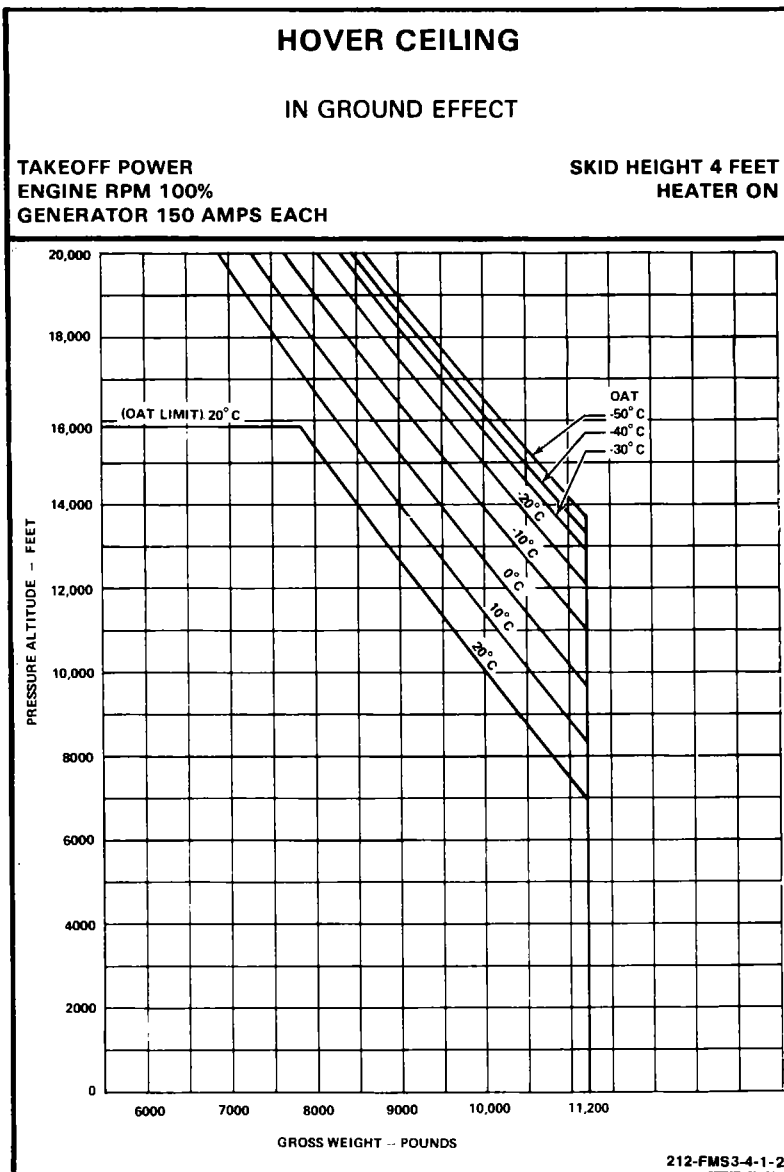


Figure 4-1. Hover ceiling in ground effect (Sheet 2 of 6)

# HOVER CEILING

IN GROUND EFFECT

MAXIMUM CONTINUOUS POWER  
ENGINE RPM 100%  
GENERATOR 150 AMPS EACH

SKID HEIGHT 4 FEET  
HEATER OFF  
GROSS WEIGHT UP TO 10,000 LBS.

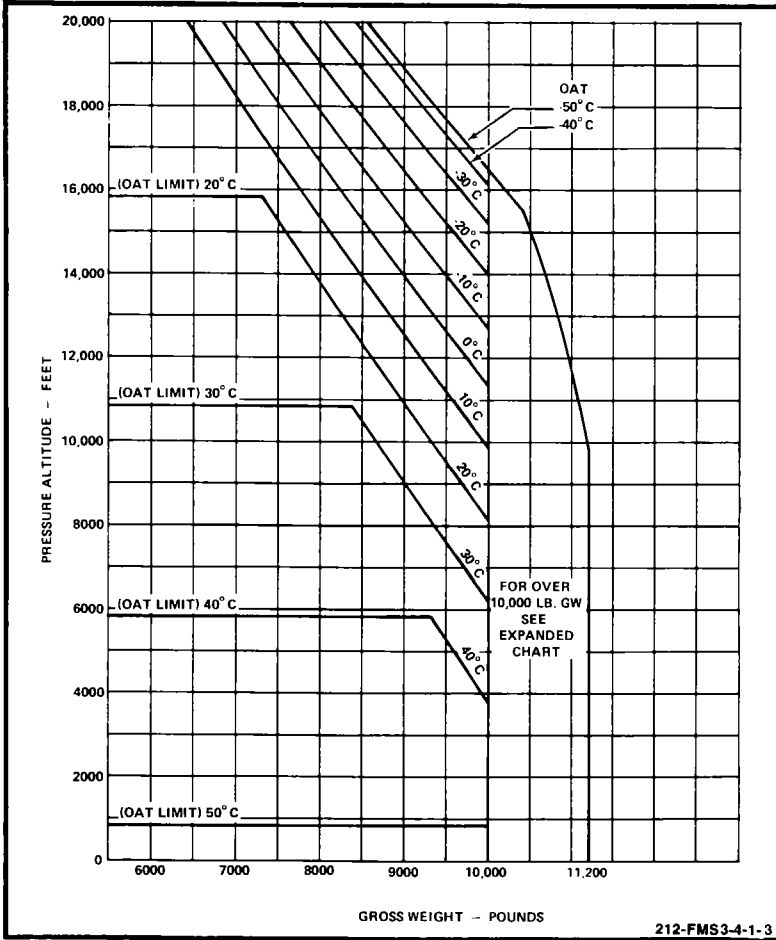


Figure 4-1. Hover ceiling in ground effect (Sheet 3 of 6)





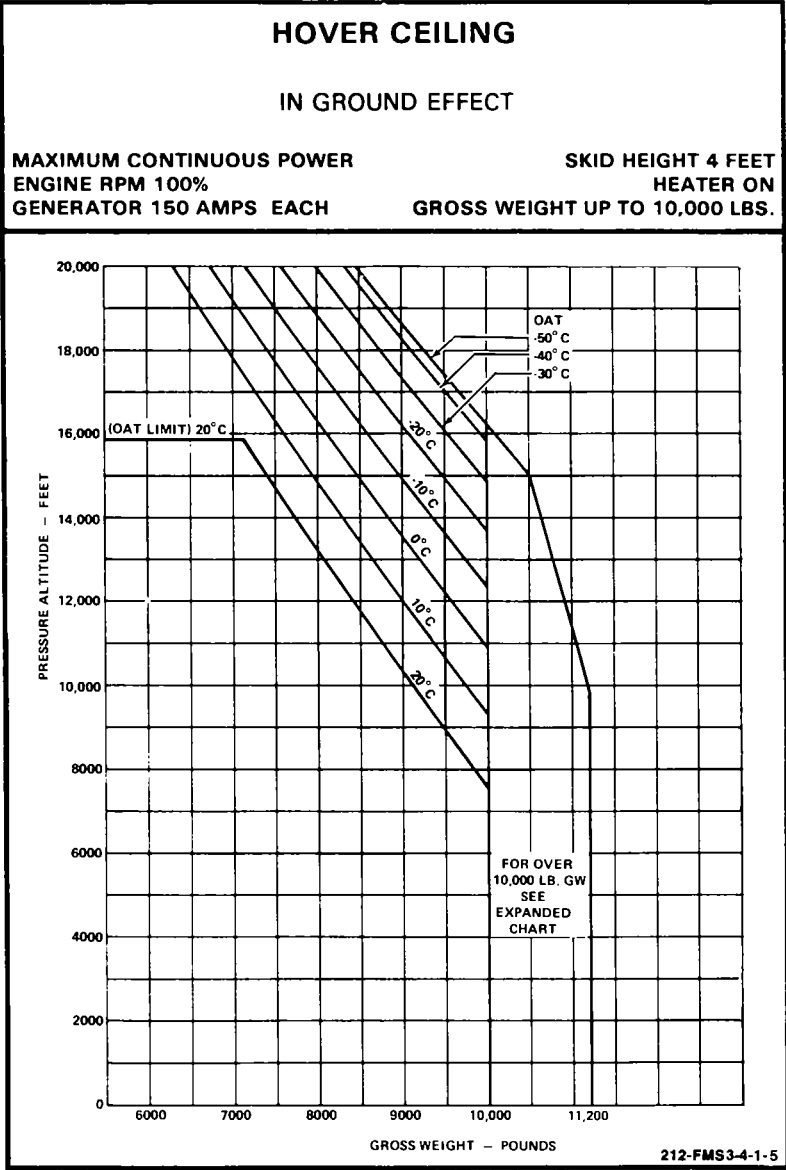


Figure 4-1. Hover ceiling in ground effect (Sheet 5 of 6)

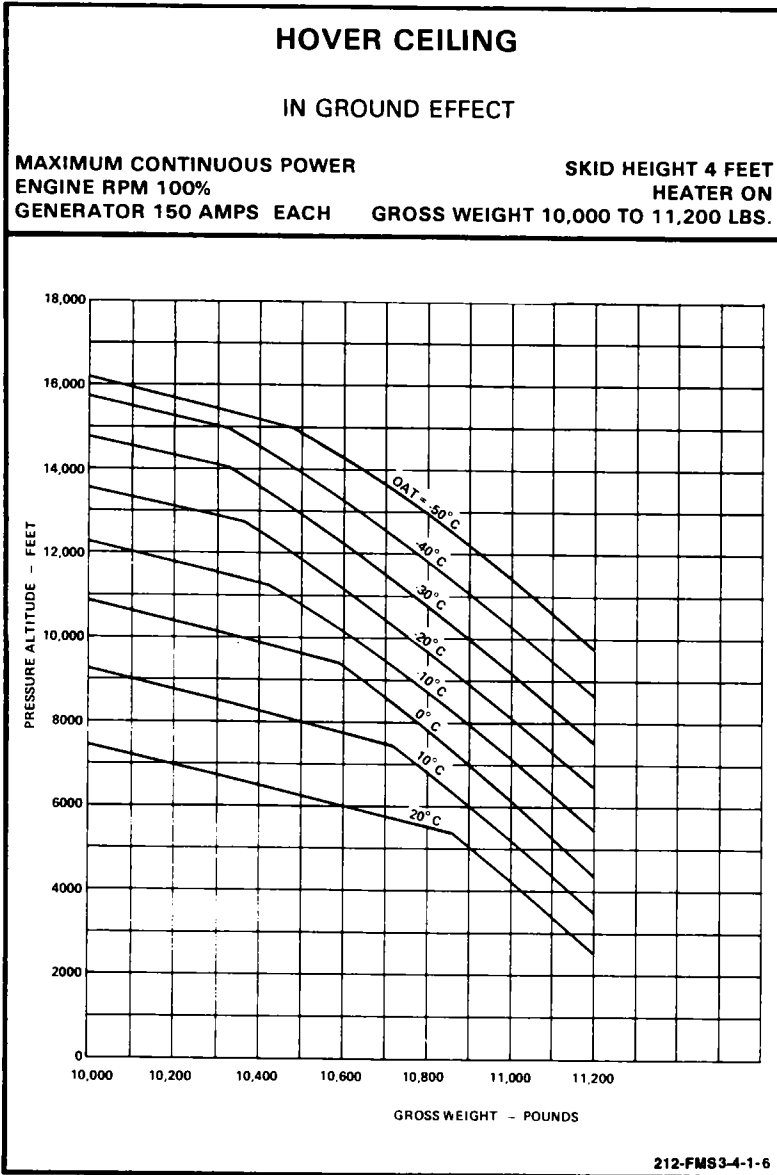


Figure 4-1. Hover ceiling in ground effect (Sheet 6 of 6)

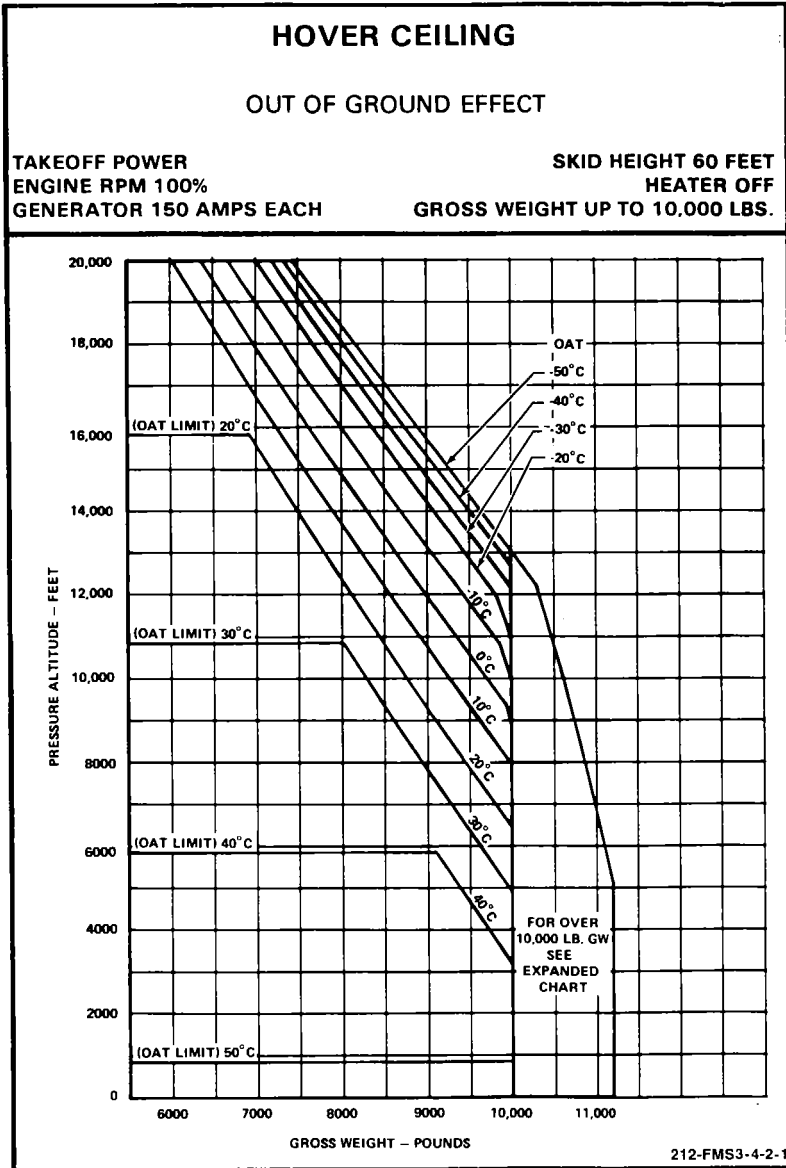


Figure 4-2. Hover ceiling out of ground effect (Sheet 1 of 8)

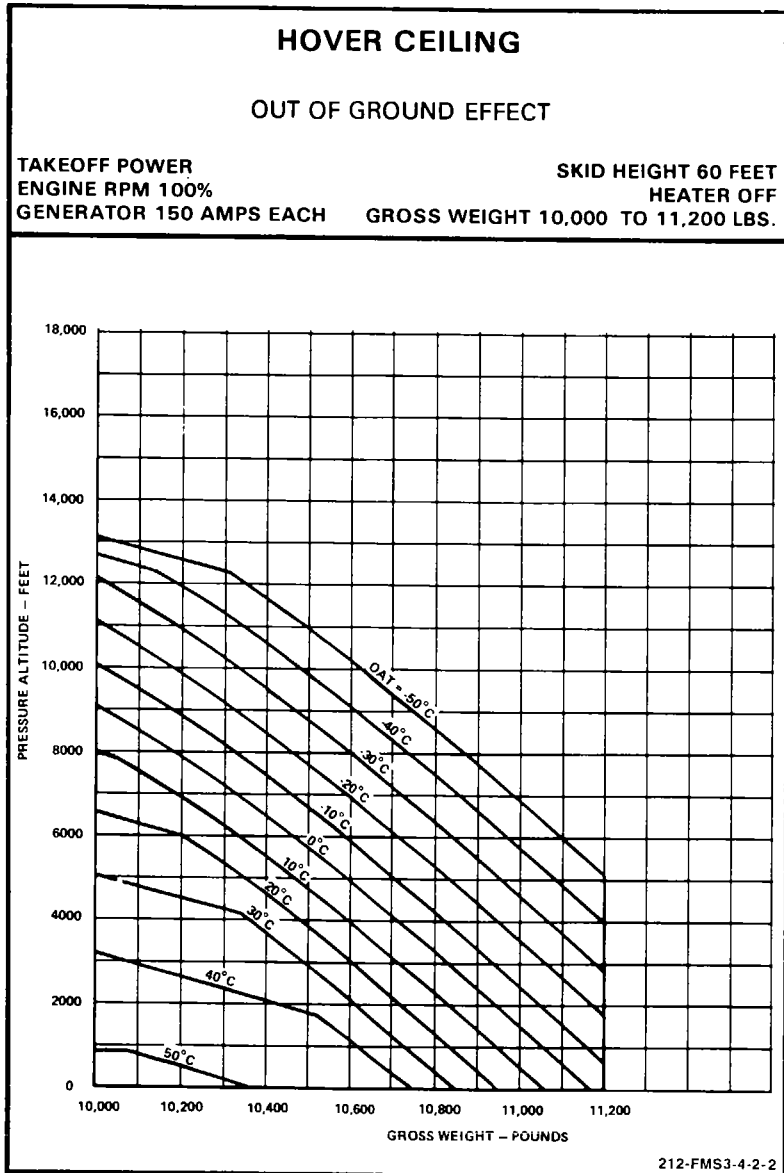


Figure 4-2. Hover ceiling out of ground effect (Sheet 2 of 8)

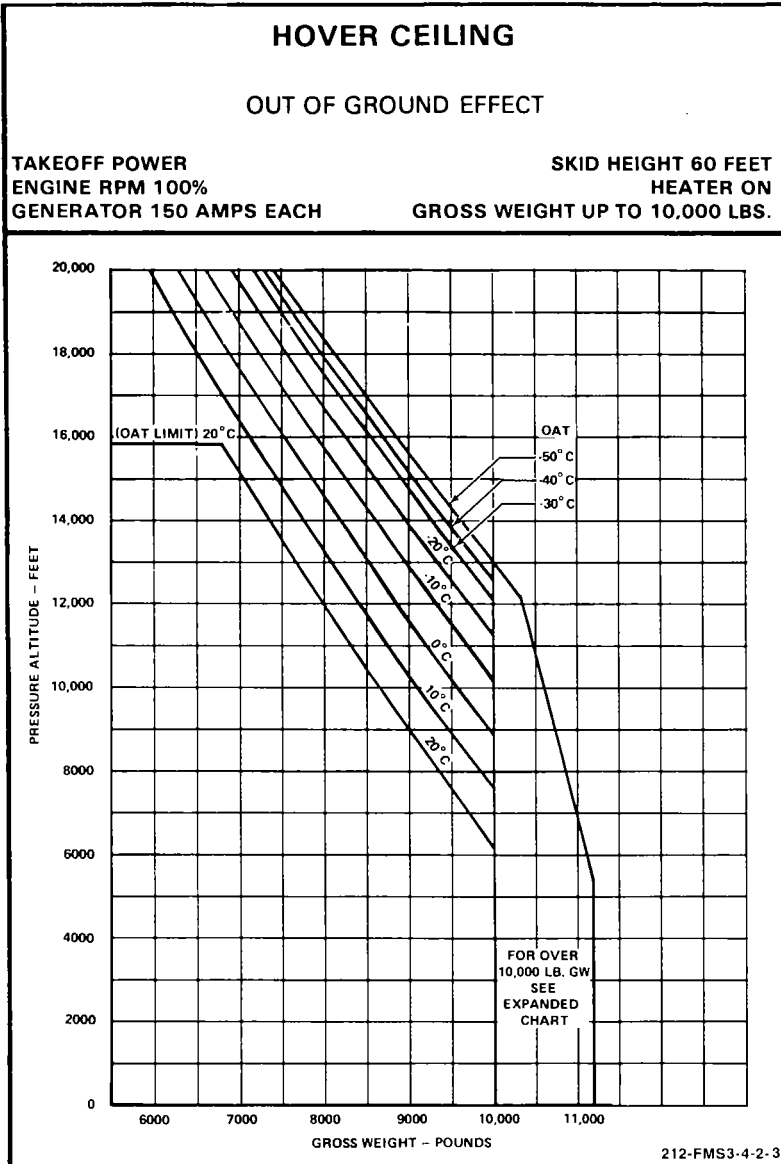


Figure 4-2. Hover ceiling out of ground effect (Sheet 3 of 8)

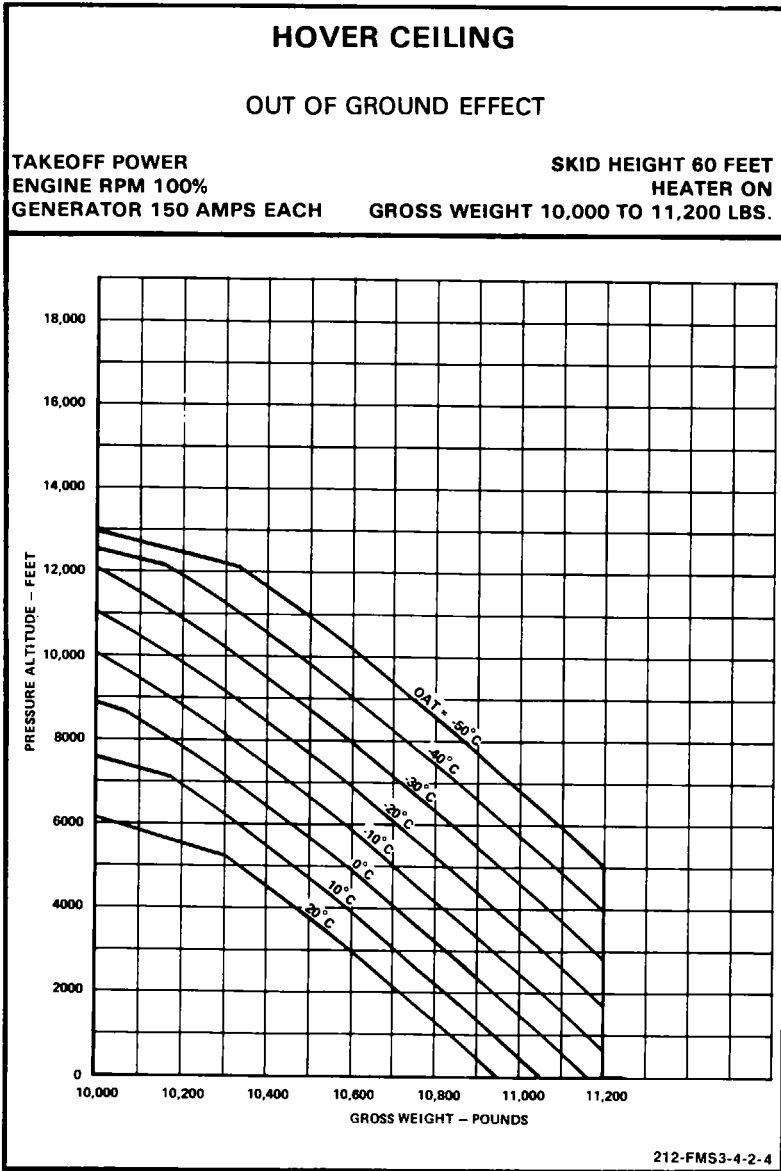


Figure 4-2. Hover ceiling out of ground effect (Sheet 4 of 8)

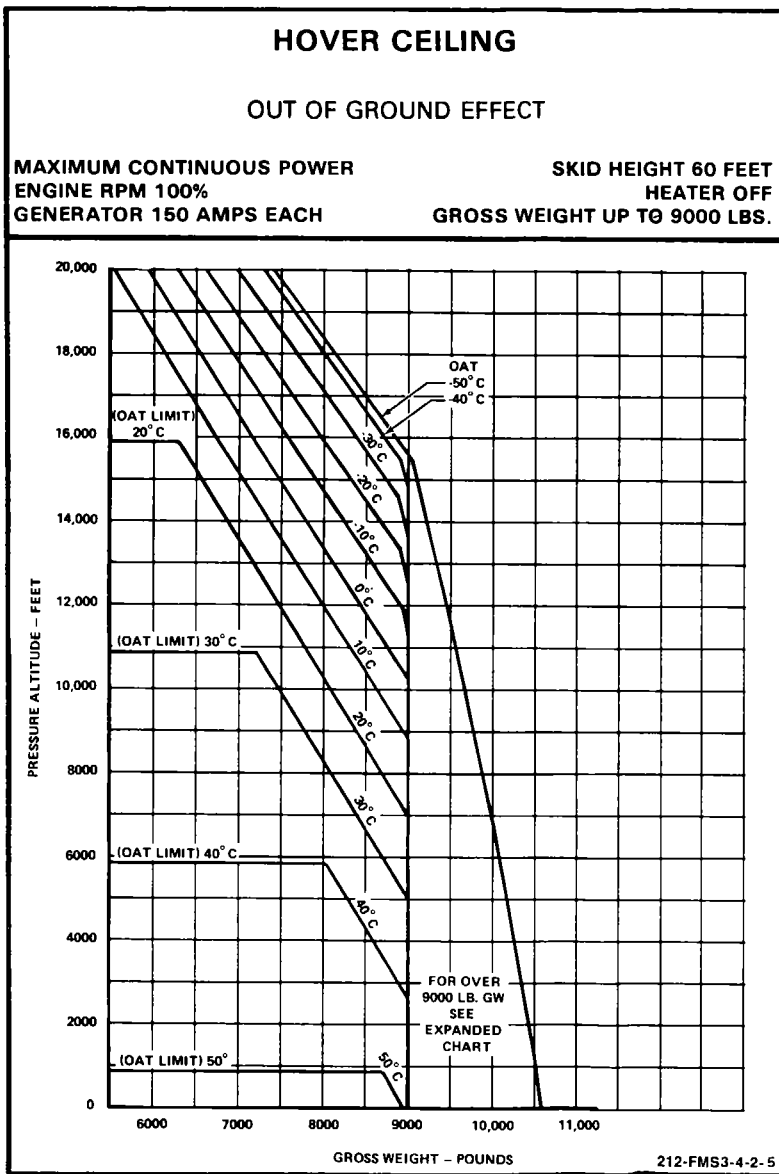


Figure 4-2. Hover ceiling out of ground effect (Sheet 5 of 8)





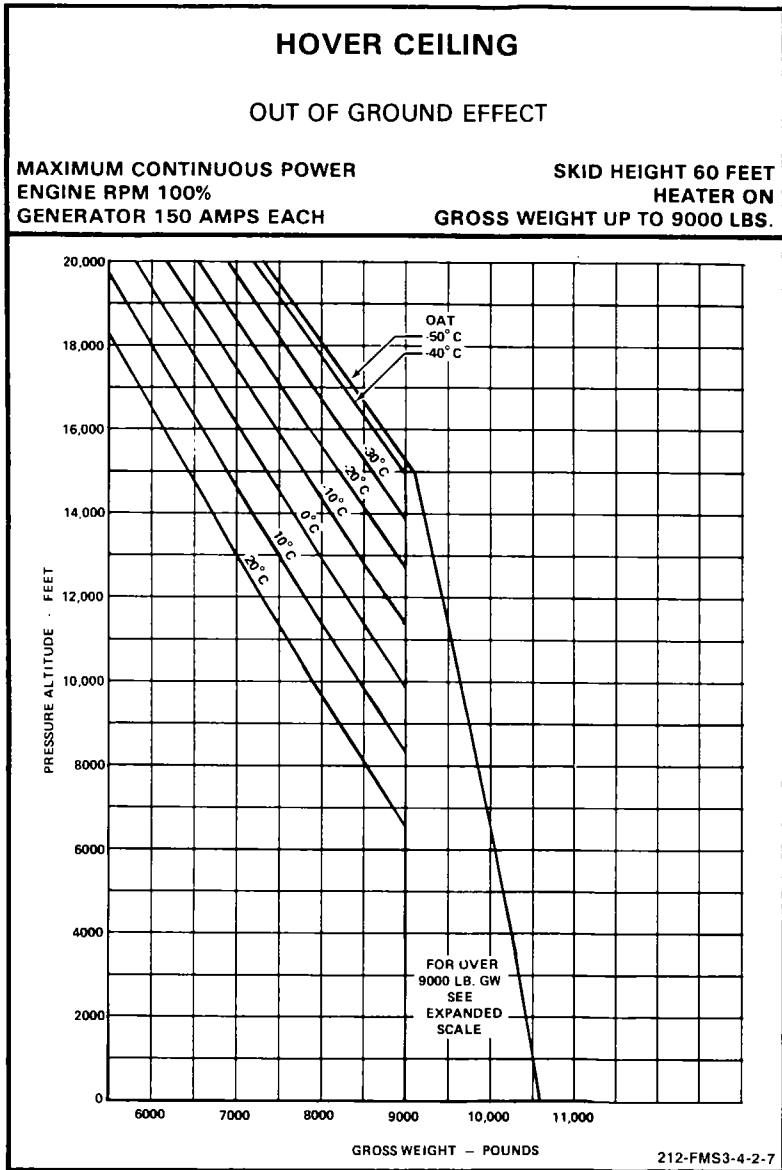


Figure 4-2. Hover ceiling out of ground effect (Sheet 7 of 8)

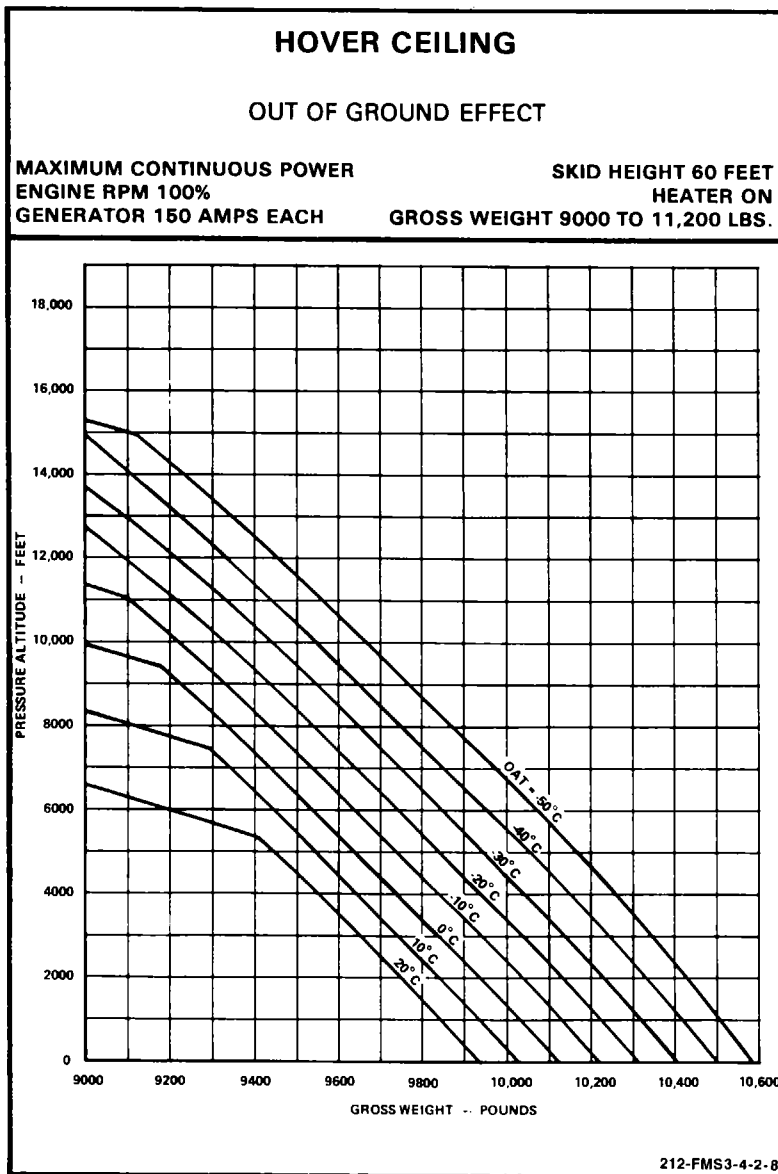
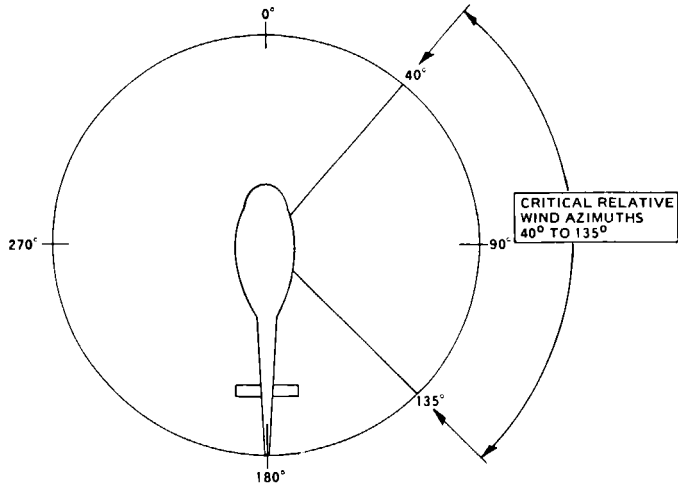


Figure 4-2. Hover ceiling out of ground effect (Sheet 8 of 8)



212-FMS3-4-3

Figure 4-3. Critical relative wind azimuths for hover flight

# ***Section 5***

## ***WEIGHT AND BALANCE***

**5-9.**

### **EXTERNAL CARGO LOADING TABLE**

External cargo weights and moments are listed in 50 pound increments from 50 through 5000 pounds and 25 kilogram increments from 25 through 2268

kilograms (table 5-1 and 5-2). Moments have been calculated for external cargo CG at fuselage station 138.0 (3505 millimeters).

Table 5-1. External cargo loading table (Imperial)

WEIGHT (LB)	MOMENT (IN-LB)	WEIGHT (LB)	MOMENT (IN-LB)
50	6900	2550	351900
100	13800	2600	358800
150	20700	2650	365700
200	27600	2700	372600
250	34500	2750	379500
300	41400	2800	386400
350	48300	2850	393300
400	55200	2900	400200
450	62100	2950	407100
500	69000	3000	414000
550	75900	3050	420900
600	82800	3100	427800
650	89700	3150	434700
700	96600	3200	441600
750	103500	3250	448500
800	110400	3300	455400
850	117300	3350	462300
900	124200	3400	469200
950	131100	3450	476100
1000	138000	3500	483000
1050	144900	3550	489900
1100	151800	3600	496800
1150	158700	3650	503700
1200	165600	3700	510600
1250	172500	3750	517500
1300	179400	3800	524400
1350	186300	3850	531300
1400	193200	3900	538200
1450	200100	3950	545100
1500	207000	4000	552000
1550	213900	4050	558900
1600	220800	4100	565800
1650	227700	4150	572700
1700	234600	4200	579600
1750	241500	4250	586500
1800	248400	4300	593400
1850	255300	4350	600300
1900	262200	4400	607200
1950	269100	4450	614100
2000	276000	4500	621000
2050	282900	4550	627900
2100	289800	4600	634800
2150	296700	4650	641700
2200	303600	4700	648600
2250	310500	4750	655500
2300	317400	4800	662400
2350	324300	4850	669300
2400	331200	4900	676200
2450	338100	4950	683100
2500	345000	5000	690000

(TABLE I.D. 911320)

**MANUFACTURER'S DATA**

**BHT-212-FMS-3**

Table 5-2. External cargo loading table (Metric)

WEIGHT (KG)	MOMENT (KG • MM/100)	WEIGHT (KG)	MOMENT (KG • MM/100)
25	876.3	1175	41183.8
50	1752.5	1200	42060.0
75	2628.8	1225	42936.3
100	3505.0	1250	43812.5
125	4381.3	1275	44688.8
150	5257.5	1300	45565.0
175	6133.8	1325	46441.3
200	7010.0	1350	47317.5
225	7886.3	1375	48193.8
250	8762.5	1400	49070.0
275	9638.8	1425	49946.3
300	10515.0	1450	50822.5
325	11391.3	1475	51698.8
350	12267.5	1500	52575.0
375	13143.8	1525	53451.3
400	14020.0	1550	54327.5
425	14896.3	1575	55203.8
450	15772.5	1600	56080.0
475	16648.8	1625	56956.3
500	17525.0	1650	57832.5
525	18401.3	1675	58708.8
550	19277.5	1700	59585.0
575	20153.8	1725	60461.3
600	21030.0	1750	61337.5
625	21906.3	1775	62213.8
650	22782.5	1800	63090.0
675	23658.8	1825	63966.3
700	24535.0	1850	64842.5
725	25411.3	1875	64718.8
750	26287.5	1900	66595.0
775	27163.8	1925	67471.3
800	28040.0	1950	68347.5
825	28916.3	1975	69223.8
850	29792.5	2000	70100.0
875	30668.8	2025	70976.3
900	31545.0	2050	71852.5
925	32421.3	2075	72728.8
950	33297.5	2100	73605.0
975	34173.8	2125	74481.3
1000	35050.0	2150	75357.5
1025	35926.3	2175	76233.8
1050	36802.5	2200	77100.0
1075	37678.8	2225	77986.3
1100	38555.0	2250	78862.5
1125	39431.3	2268	79493.4
1150	40307.5		

(TABLE I.D. 911319)