SOUTH AFRICAN

CIVIL AVIATION AUTHORITY

LONG RANGER

BELL 206L

FOR EXAMINATION PURPOSES ONLY

PLEASE DO NOT MARK OR DAMAGE THIS MANUAL IN ANY WAY

FLIGHT MANUAL INDEX

PART 1

TC APPROVED SECTIONS

PART 2

MANUFACTURER'S DATA

Section 1

OPERATING LIMITATIONS

INTRODUCTION

Compliance with limitations section is required by appropriate operating rules. Anytime an operating limitation is exceeded, an appropriate entry shall be made in helicopter logbook. Entry shall state which limit was exceeded, duration of time, extreme value attained, and any additional information essential in determining maintenance action required.

Intentional use of transient limits is prohibited.

Torque events shall be recorded. A torque event is defined as a takeoff or lift, internal or external load.

TYPE OF OPERATION

The basic helicopter is approved for seven place seating and is certified for land operation under day or night VFR nonicing conditions.

The Engine (Automatic) Re-Ignition and Snow Deflector Kits shall be installed when conducting flight operations in falling and/or blowing snow. Refer to BHT-206L-FMS-7 and BHT-206L-FMS-8.

FLIGHT WITH DOOR(S) OFF

Vne is 100 MPH (87 knots) with any combination of door(s) off. All unsecured items must be removed from cabin before flight. Protracted rearward and sideward flight prohibited.

Actual weight change shall be determined after doors, etc., have been removed and ballast readjusted, if necessary, to return empty weight center of gravity to within allowable limits.

FLIGHT WITH OPTIONAL EQUIPMENT INSTALLED

Refer to appropriate Flight Manual Supplement(s) for additional Limitations, Procedures, and Performance Data.

BHT-206L-FM-1

FLIGHT CREW

The minimum flight crew consists of one pilot who shall operate the helicopter from the right crew seat.

The left crew seat may be used for an additional pilot when the approved dual controls are installed.

ALTITUDE LIMITATIONS

Maximum operating pressure altitude is 20,000 feet.

AIRSPEED LIMITATIONS

NOTE

All airspeed values given throughout this Flight Manual are for Calibrated Airspeed (CAS), except when Indicated Airspeed (IAS) is specifically stated.

Basic Vne 150 MPH (130 knots) IAS sea level to 3000 feet density altitude. Decrease Vne for ambient conditions in accordance with Airspeed Limitations Placard.

ANY COMBINATION OF DOOR(S) OFF
Vne 100 MPH (87 knots)

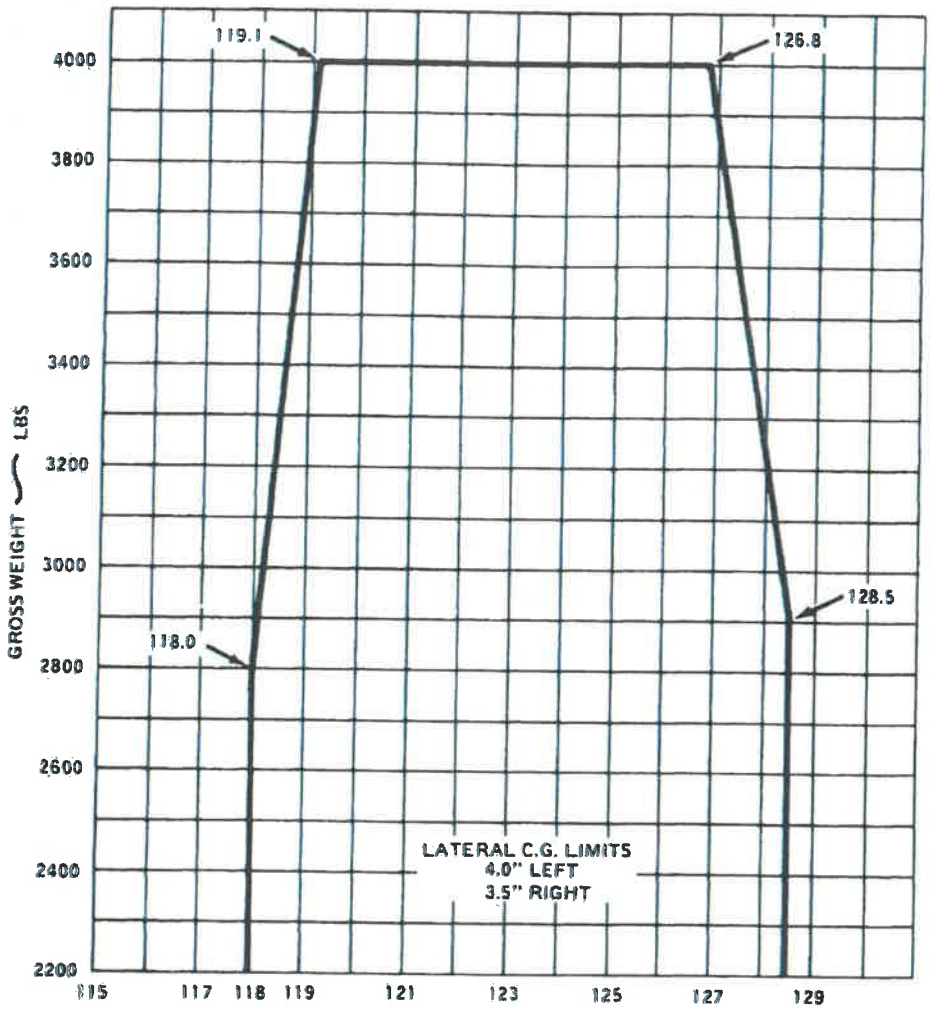
88 TO 100% TORQUE TAKEOFF POWER RANGE
Vne 92 MPH (80 knots)

WEIGHT LIMITATIONS

Maximum approved gross weight is 4000 pounds for takeoff and landing.

BHT-206L-FM-1

CENTER OF GRAVITY VS GROSS WEIGHT



WEIGHT LIMITATIONS (Cont)

FRONT SEAT TOTAL WEIGHT LIMITS — SELECTIVE PASSENGER LOADING

Minimum 170 pounds.

CAUTION

When both crew seats are occupied only one mid-passenger is permitted unless there are two aft passengers.

LONGITUDINAL CENTER OF GRAVITY LIMITS

For gross weight and longitudinal center of gravity limits, refer to Center of Gravity vs Gross Weight chart and Section 6.

The standard helicopter (standard seating and fuel system) is ballasted in accordance with the Weight Empty Center of Gravity chart in the maintenance manual. The SELECTIVE PASSENGER LOADING placard shall be installed and may be used for loading passengers only within appropriate weight limitations without computing center of gravity. When passengers are seated other than in accordance with the selective loading placard or the baggage compartment is utilized, the pilot is responsible for determining weight and balance to ensure gross weight and center of gravity will remain within limits throughout each flight.

The helicopter with nonstandard fuel system or seating arrangement is not ballasted in accordance with the Weight Empty Center of Gravity chart in the maintenance manual. Selective passenger loading does not apply and the ALTERNATE PLACARD shall be installed. The pilot is responsible for determining weight and balance to ensure gross weight and center of gravity will remain within limits throughout each flight.

Refer to Section 6 for loading tables and instructions.

WEIGHT LIMITATIONS (Cont)

LATERAL C.G. LIMITS

4.0 inches left of helicopter center line.

3.5 inches right of helicopter center line.

POWER PLANT LIMITATIONS

ENGINE

Allison Model 250-C20B/J Engine with Bendix fuel control.

POWER TURBINE (N2) OPERATING RPM

Maximum — 100%

POWER PLANT LIMITATIONS (CONT)

POWER TURBINE (N_2) OPERATING RPM (CONT)

WARNING

USE OF THE THROTTLE TO CONTROL RPM IS NOT AUTHORIZED. (REFER TO SECTION 3, EMERGENCY PROCEDURES FOR EXCEPTION.)

Continuous operation	97 to 100%
Minimum	97%
Steady-state operation	75 to 88% N_2 and engine torque greater than 20% is prohibited. Transient operation through the range is permissible.
Transient, 15 seconds	105%

NOTE

Refer to Rolls-Royce Operation and Maintenance Manual for operation in the N_2 speed avoidance range and for transient overspeed limits.

GAS PRODUCER (N_1) RPM

Maximum	105% RPM
Transients	106% (maximum of 15 seconds)

TEMPORARY REVISION

THIS PAGE HAS AN ASSOCIATED TEMPORARY REVISION.

POWER PLANT LIMITATIONS (CONT)

FUELS

Turbine fuel ASTM D-6615, or MIL-DTL-5624, Grade JP-4, may be used at all temperatures.

Turbine fuel ASTM D-1655, Type A, or A-1, or MIL-DTL-5624, Grade JP-5, or MIL-DTL-83133, JP-8, is limited to ambient temperatures above -17.8°C (0°F) when equipped with fuel pressure gauge P/N 206-075-676-003 (without a red triangle at 8 PSI).

Turbine fuel ASTM D-1655, Type A, or A-1, or MIL-DTL-5624, Grade JP-5, or MIL-DTL-83133, JP-8, is limited to ambient temperatures -32°C (-25°F) and above when equipped with fuel pressure gauge P/N 206-075-676-109 (with a red triangle at 8 PSI).

Helicopters equipped with airframe-mounted fuel filter do not require use of anti-icing additive at any ambient temperature. Refer to Rolls-Royce Operation and Maintenance Manual for AVGAS mix, Cold Weather Fuel and Blending Instructions.

FUEL PRESSURE

P/N 206-075-676-003 (without red triangle at 8 PSI)	P/N 206-075-676-109 and subsequent (with red triangle at 8 PSI)
Minimum — 4 PSI	Minimum — 4 PSI
Continuous operation — 4 to 25 PSI	Continuous operation — 4 to 25 PSI
Maximum — 25 PSI	Maximum — 25 PSI
	Minimum for use of type A, A-1, JP-5, or JP-8 fuel, or any mixture of these, at ambient temperature below -17.8°C (0°F) — 8 PSI

CAUTION

FUEL BOOST PUMPS SHALL BE ON AT ALL TIMES WHEN THE ENGINE IS OPERATING.

POWER PLANT LIMITATIONS (CONT)

OIL

Turbine oil, MIL-PRF-7808, MIL-PRF-23699, or DOD-PRF-85734. (Refer to Section 8 for list of approved lubricants.)

Operation with MIL-PRF-23699 and DOD-PRF-85734 limited to ambient temperatures above -40°C (-40°F).

MIXING OF OILS

Refer to Rolls-Royce Model 250 series engine data regarding mixing of oils of different brands, types, and manufacturers.

OIL PRESSURE

Below 78.5% gas producer RPM — 50 to 90 PSI.

Between 78.5 and 94.2% gas producer RPM — 90 to 115 PSI.

Above 94.2% gas producer RPM — 115 to 130 PSI.

OIL TEMPERATURE

Continuous operation — 0 to 107°C.

Maximum — 107°C.

ENGINE POWER LIMITATIONS

TORQUE

Take-off — 100% (5 MINUTE LIMIT).

Transient — 105% (5 seconds maximum; intentional use prohibited).

Maximum continuous — 88.0%.

ENGINE POWER LIMITATIONS (CONT)

TURBINE OUTLET TEMPERATURE (TOT).

Maximum takeoff (5 minute limit) — 810°C.

Maximum continuous — 738°C.

Maximum transient — 843°C. (Do not exceed 6 seconds above 810°C.)

WARNING

Exceeding the limits of 810°C TOT or 100% torque may cause N1 topping with resultant rotor droop.

Maximum starting and shutdown — 927°C. (Do not exceed 10 seconds above 810°C.)

Some helicopters may be equipped with a red warning light on the TOT gage. The light illuminates when either of the following conditions are exceeded.

812 to 927°C for 10 seconds.

927°C or higher for 1 second.

Some helicopters may be equipped with a red warning light and a range mark at 999°C on the TOT gage.

NOTE

During shutdown, if TOT exceeds 927°C (810°C for 10 seconds), refer to Allison Engine Maintenance Manual.

BHT-206L-FM-1

ENGINE STARTER LIMITATIONS

Limit starter energizing time to the following:

External Power	Battery
25 Seconds — ON	40 Seconds — ON
30 Seconds — OFF	60 Seconds — OFF
25 Seconds — ON	40 Seconds — ON
30 Seconds — OFF	60 Seconds — OFF
25 Seconds — ON	40 Seconds — ON
30 Minutes — OFF	30 Minutes — OFF

ENGINE ANTI-ICE LIMITATIONS

The maximum ambient temperature for use of engine anti-ice is 4.4°C (40°F).

Engine anti-icing shall be ON for flight in visible moisture in temperature below 4.4°C (40°F).

LOADMETER LIMITATIONS

Maximum — 83%.

TRANSMISSION LIMITATIONS

OIL PRESSURE LIMITS

Minimum — 30 PSI.

Continuous operation for S/N 45004 through 45079 — 30 to 50 PSI. (P/N 206-075-188-001)

Continuous operation for S/N 45080 and subs — 40 to 70 PSI. (P/N 206-075-188-005)

Maximum — 70 PSI.

TRANSMISSION LIMITATIONS (CONT)

OIL TEMPERATURE LIMITS

Continuous operation — 15 to 110°C.

Maximum — 110°C.

TRANSMISSION AND TAIL ROTOR GEARBOX OILS

Oil type — MIL-PRF-7808, MIL-PRF-23699, or DOD-PRF-85734. (Refer to Section 8 for list of approved lubricants.)

Operation with MIL-PRF-23699 and DOD-PRF-85734 limited to ambient temperature above -40°C (-40°F).

Mixing of oils — Refer to Section 8 regarding mixing of oils of different brands, types, and manufacturers.

ROTOR LIMITATIONS

ROTOR RPM (N_R) LIMITS — POWER ON

Maximum — 100%.

Minimum — 97%.

50 – 60% accelerate through this range with cyclic in neutral position.

NOTE

Transient rotor RPM droop down to 95% is permitted, but should not exceed 5 seconds.

ROTOR RPM (N_R) LIMITS — POWER OFF

Maximum — 107%.

Minimum — 90%.

TEMPORARY REVISION

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BHT-206L-FM-1

INSTRUMENT MARKINGS

ENGINE OIL TEMPERATURE

0°C to 107°C Continuous Operation

107°C Maximum

ENGINE OIL PRESSURE

50 to 90 PSI Conditional Operation below 78.6% NI RPM

90 to 115 PSI Continuous Operation below 94.2% NI RPM

115 to 130 PSI (double wide arc) Continuous Operation (any NI RPM)

50 PSI Minimum, 130 PSI Maximum

TRANSMISSION OIL PRESSURE

30 to 50 PSI Continuous Operation

30 PSI Minimum, 70 PSI Maximum

TRANSMISSION OIL TEMPERATURE

15° to 110°C Continuous Operation

110°C Maximum

TRANSMISSION OIL PRESSURE

40 to 70 PSI Continuous Operation

30 PSI Minimum, 70 PSI Maximum

TRANSMISSION OIL TEMPERATURE

15° to 110°C Continuous Operation

110°C Maximum

P/N 206-075-188-001

NOTE: Either gage may be installed

P/N 206-075-188-005 AND SUB.

LOADMETER

83% Maximum

FUEL PRESSURE

4 PSI Minimum

4 to 25 PSI Continuous Operation

25 PSI Maximum

P/N 206-075-676-003

NOTE: Either gage may be installed

LOADMETER

83% Maximum

FUEL PRESSURE

4 PSI Minimum

4 to 25 PSI Continuous Operation

P/N 206-075-676-109 AND SUB.

8 PSI Minimum -- Type A, A-1, or JP-5 fuel below −18°C (°F)

INSTRUMENT MARKINGS

FUEL QUANTITY

On Empty

AIRSPEED

0 to 150 MPH (0 to 130 Knots) Continuous Operation

150 MPH (130 Knots) Maximum

115 MPH (100 Knots) Maximum for Autorotation

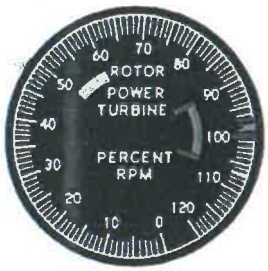
INSTRUMENT MARKINGS

TORQUEMETER

- 0 to 88% Continuous Operation
- 88 to 100% Take-off Power Range
- 100.0% Maximum (5 Minute Limit)

DUAL TACHOMETER
POWER TURBINE INDICATOR

- 97% Minimum Operation
- 97 to 100% Continuous Operation
- 100% Maximum



ROTOR INDICATOR

- 90.0% Minimum Operation
- 50.0 to 60.0% Accelerate through this Range
- 90.0 to 107.0% Normal Operation
- 107.0% Maximum

GAS PRODUCER

- 60.0 to 105.0% Normal Operation
- 105.0% Maximum

TEMPORARY REVISION

THIS PAGE HAS AN ASSOCIATED TEMPORARY REVISION.

206075-237-1A

INSTRUMENT MARKINGS

*TURBINE OUTLET TEMPERATURE

0 to 738°C Continuous Operation

738 to 810°C Take-off Power Range
(5 Minute Limit)

810°C Maximum

927°C Maximum During Starting and Shutdown
(10 second max.)

*TURBINE OUTLET TEMPERATURE

100 to 738°C Continuous Operation

738 to 810°C Take-off Power Range

810°C Maximum (5 Minute Limit)

927°C Maximum During Starting and Shutdown (10 Seconds Maximum)

Red Warning Light
The light illuminates when either of the following conditions are exceeded:
812 to 927°C for 10 Seconds
927° or Higher for 1.0 Seconds

*NOTE
Any one of the three turbine outlet temperature gages may be installed in helicopter.

206075-237-2A

PLACARDS AND STENCILS

These Placards located on the inside of
Baggage Compartment Door

MAXIMUM ALLOWABLE WEIGHT 250 LBS.
MAXIMUM ALLOWABLE WEIGHT PER SQ. FT. 86 LBS.

CARGO MUST BE SECURED IN ACCORDANCE WITH FLIGHT MANUAL INSTRUCTION

AVOID 75% TO 88% N2 ABOVE 20% TQ

Location: Instrument panel.

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PLACARDS AND STENCILS (Cont)

SELECTIVE PASSENGER LOADING PLACARD

THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS SPECIFIED IN THE APPROVED HELICOPTER FLIGHT MANUAL.

MINIMUM COCKPIT WEIGHT 170 LBS.

SELECTIVE PASSENGER LOADING
WHEN BOTH CREW SEATS ARE OCCUPIED ONLY ONE (1) MID PASSENGER IS PERMITTED UNLESS THERE ARE TWO (2) AFT PASSENGERS

REFER TO RFM WEIGHT AND BALANCE FOR ADDITIONAL LOADING INFORMATION

ALTERNATE PLACARD

THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS SPECIFIED IN THE APPROVED HELICOPTER FLIGHT MANUAL.

THIS HELICOPTER IS NOT BALLASTED IN ACCORDANCE WITH THE WEIGHT EMPTY CENTER OF GRAVITY CHART IN THE MAINTENANCE MANUAL OR IS A NONSTANDARD CONFIGURATION.

THE PILOT IS RESPONSIBLE FOR DETERMINING WEIGHT AND BALANCE TO ENSURE GROSS WEIGHT AND CENTER OF GRAVITY WILL REMAIN WITHIN LIMITS THROUGHOUT EACH FLIGHT.

REFER TO RFM WEIGHT AND BALANCE FOR ADDITIONAL LOADING INFORMATION

PLACARDS

AIRSPEED LIMITATIONS

H_p ~ FT/1000	0	2	4	6	8	10	12	14	16	18	20
OAT~°C	V_{NE} ~IAS~MPH										
46	150	—	—	—	—	—	—	—	—	—	—
40	150	146	—	—	—	—	—	—	—	—	—
20	150	150	145	138	131	123	116	—	—	—	—
0	150	150	150	145	138	130	123	115	108	101	93
-20	150	150	150	150	145	137	130	123	115	108	100
-40	147	142	138	132	128	123	119	114	110	105	101
-50	135	130	126	121	117	112	108	104	100	96	92

L206075-338

Placard required with MPH airspeed indicator installed.

AIRSPEED LIMITATIONS

H_p ~ FT/1000	0	2	4	6	8	10	12	14	16	18	20
OAT~°C	V_{NE} ~IAS~KTS										
46	130	—	—	—	—	—	—	—	—	—	—
40	130	127	—	—	—	—	—	—	—	—	—
20	130	130	126	120	114	107	101	—	—	—	—
0	130	130	130	126	120	113	107	100	94	88	81
-20	130	130	130	130	126	119	113	107	100	94	87
-40	128	123	120	115	111	107	103	99	96	91	88
-50	117	113	109	105	102	97	94	90	87	83	80

L206075-339

Placard required with KNOTS airspeed indicator installed.
Hp is pressure altitude.

NOTE

Airspeed limits shown are valid only for the corresponding altitudes and temperatures. Dashes indicate conditions which exceed approved temperature or density altitude limitations.

Section 5

PERFORMANCE DATA

The Bell 206L performance data is contained in this section. The data listed on the graphs is derived from actual flight test and is intended to provide information to be used in conducting flight operations.

OPERATION IN ALLOWABLE RELATIVE WIND

Satisfactory stability and control has been demonstrated for speeds up to and including 30 MPH (26 knots) rearward and 35 MPH (30 knots) sideward for all loading conditions.

POWER CHECK PROCEDURE

The Power Check Chart will indicate the percent torque that should be available from a minimum Specification Allison Engine. The engine must develop these values to meet the performance data contained in this flight manual. The take-off power limits of the 250C20B engine are:

Maximum torque — 100% (5 minutes)
Maximum TOT (turbine outlet temperature) — 810° C (5 minutes)
Maximum gas producer RPM (N1) — 105%.

WARNING

Ensure altitude, temperature, and gross weight will permit safe hovering height. Refer to Height-Velocity Diagram.

On cold days the percent torque limit may be reached before the TOT limit is reached. On hot days or at high altitudes, the TOT will be the limiting factor. To perform a power check, ensure the anti-ice switch is OFF. Increase power until a stabilized TOT equal to or above 738°C, or a percent torque limit is reached. Do not exceed maximum TOT or torque limits.

POWER CHECK PROCEDURE (CONT)

Record the following information from cockpit instruments:

Outside Air Temperature — °C	Example 22°C
Turbine Outlet Temperature — °C	Example 738°C
Pressure Altitude — Ft.	Example 4,000 ft.
Percent Torque — %	(Take your actual reading)

Enter Power Check Chart at observed OAT (Example 22°C), proceed vertically to intersection of TOT (Example 738°C) and follow horizontally to intersection with pressure altitude (Example 4,000 ft.), drop vertically to read chart percent torque (70%).

If your actual reading of % torque is the same or greater than the chart % torque, the power check is acceptable.

If your actual reading of % torque is less than the chart % torque, the power check is NOT acceptable and the cause MUST be determined. Refer to the appropriate maintenance manual.

NOTE

When the chart % torque reading is met during the Power Check, it indicates a minimum specification engine and that Flight Manual Performance can be achieved.

HOVERING CEILING

The following example is for use with the Hovering Ceiling In-Ground-Effect, Take-Off Power, Anti-Ice Off Chart and is typical for use of Hovering Ceiling Charts.

EXAMPLE:

Assume a pressure altitude of 10,000 feet and OAT of 0°C. Determine helicopter's hovering gross weight.

Enter vertical scale at 10,000 feet, proceed horizontally to intersection of 0°C OAT curve, then proceed down to horizontal scale and read 3480 pounds, which is the maximum gross weight that can be hovered in zero wind

HOVERING CEILING (CONT)

with Anti-Ice OFF. With Anti-Ice ON the IGE hover gross weight capability will be reduced 285 lbs. on this chart and is variable as shown on the other charts. (Example: 3480 lbs. — ice off minus 285 lbs. = 3195 lbs. hover gross weight with anti-ice ON.)

RATE OF CLIMB

The following example is for use with Rate of Climb — Maximum with Take-Off Power. The example is typical for use with both Rate of Climb Charts.

EXAMPLE:

Assume an ambient OAT of 0°C, a Pressure Altitude of 4000 feet and a gross weight of 4000 lbs.

PART 1 ANTI-ICE OFF

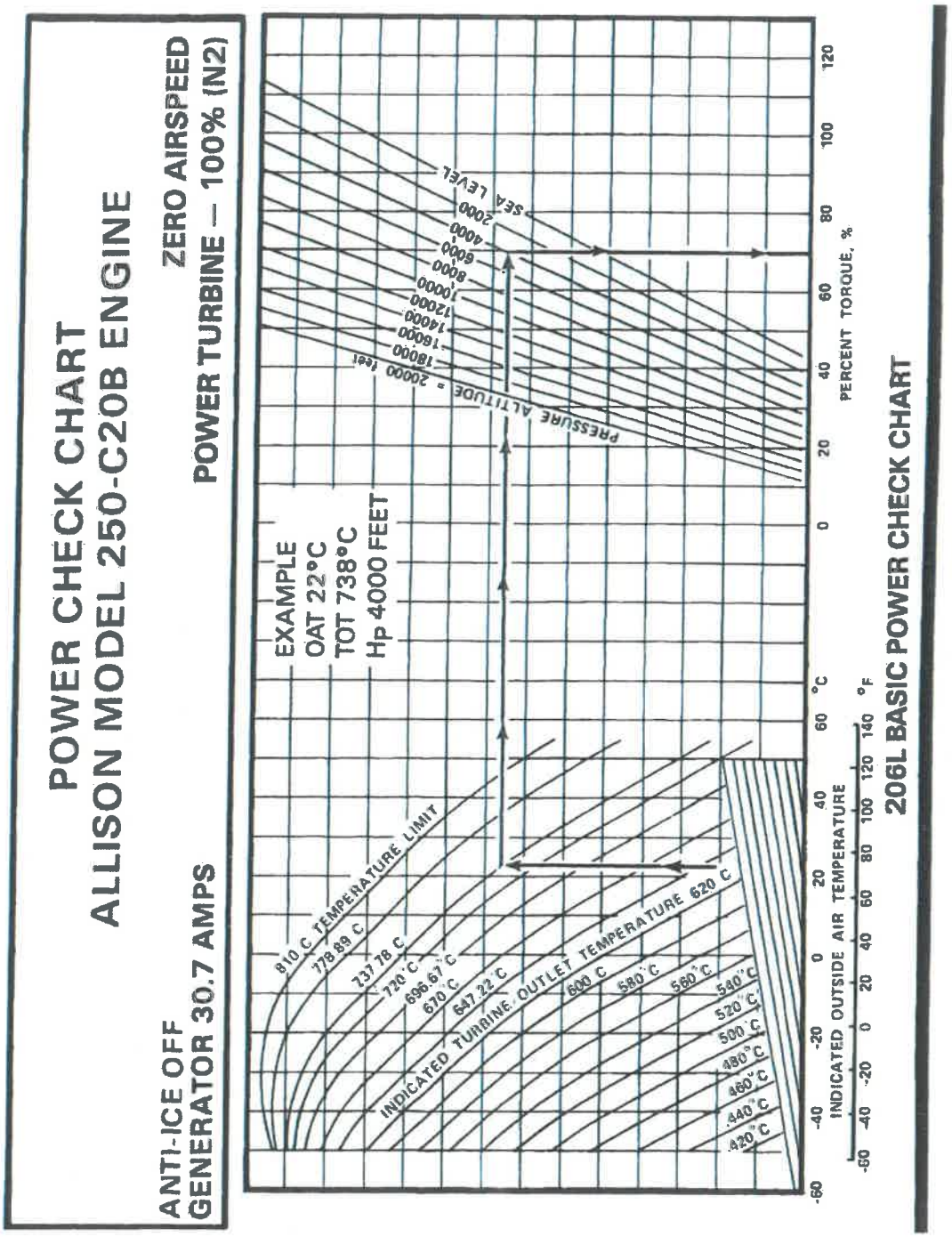
Enter temperature scale at 0°C, proceed vertically to intersection of the 4000 feet pressure altitude curve, from this point move horizontal to the right to intersect the 4000 lb. gross weight line and then proceed vertical down and read anti-ice OFF rate of climb of 1220 ft. per minute.

PART 2 ANTI-ICE ON

From intersection of horizontal example line at 4000 lbs. gross weight, proceed vertical to the upper △ R/C FT. MIN section of the chart diagonal line and then move horizontal to the right and read 280 ft./min. Subtract 280 ft./min. △ R/C from the 1220 ft./min. anti-ice OFF R/C and the anti-ice ON R/C is determined to be 940 ft./min. for the same 4000 lbs. gross weight.

RATE OF CLIMB — DOOR(S) OFF

Reduce any Rate of Climb Chart data 100 feet per minute when operating with forward door(s) off, aft door(s) off, or any combination of door(s) off.


POWER CHECK CHART
ALLISON MODEL 250-C20B ENGINE
ZERO AIRSPEED
POWER TURBINE – 100% (N2)
ANTI-ICE OFF
GENERATOR 30.7 AMPS
EXAMPLE
OAT 22°C
TOT 738°C
Hp 4000 FEET
PRESSURE ALTITUDE - 20000 feet
SEA LEVEL
2000
4000
6000
8000
10000
12000
14000
16000
18000
PERCENT TORQUE, %
INDICATED OUTSIDE AIR TEMPERATURE
°C
°F
INDICATED TURBINE OUTLET TEMPERATURE
810 C TEMPERATURE LIMIT
778 89 C
737 78 C
720 °C
696 67 C
670 C
647 22 C
620 C
600 C
580 °C
560 °C
540 °C
520 °C
500 °C
480 °C
460 °C
440 °C
420 °C
206L BASIC POWER CHECK CHART

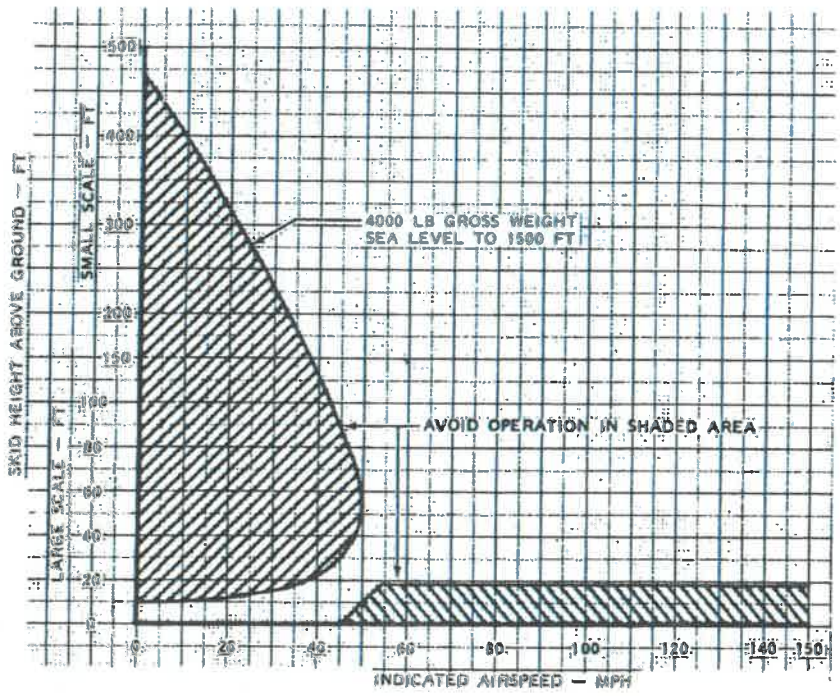
AIRSPEED INSTALLATION CORRECTION TABLE

INDICATED CRUISE A/S — MPH	CALIBRATED A/S — MPH
40	42
50	51
60	60
70	69
80	78
90	88
100	97
110	107
120	117
130	127
140	137
153	150

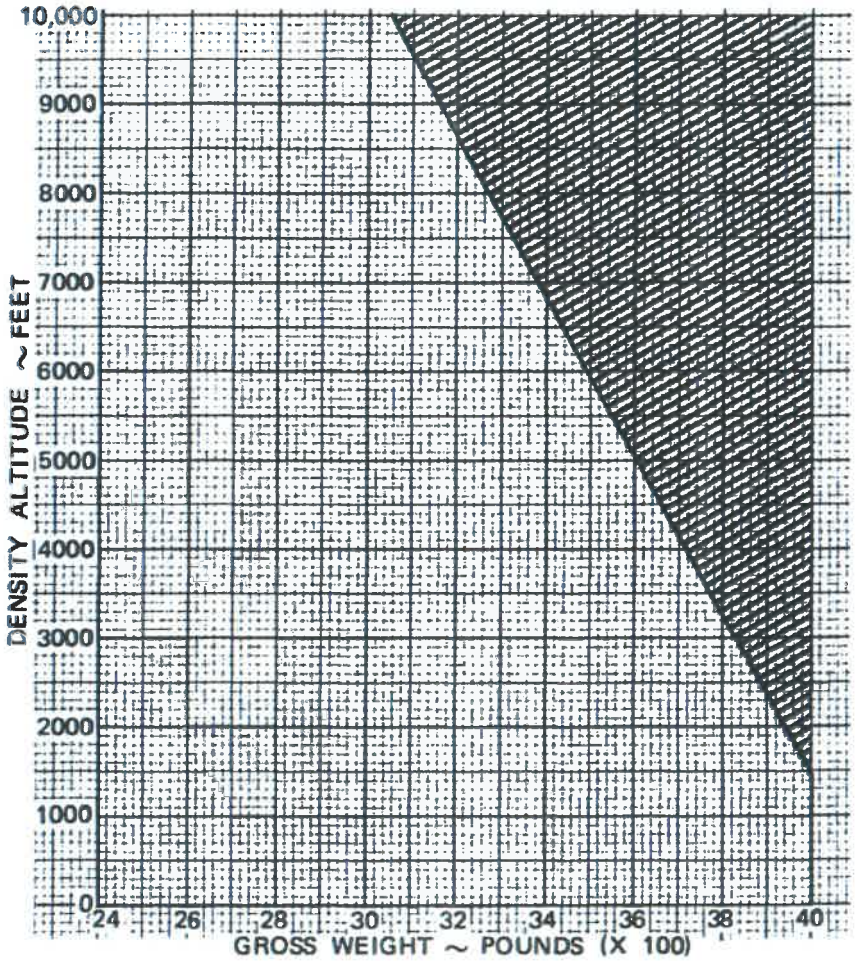
Indicated Airspeed (IAS) corrected for position and instrument error equals Calibrated Airspeed (CAS). Determine Calibrated Airspeed (CAS) from the above table.

Best Rate of Climb Speed is 60 MPH VCAL — 66 MPH IAS.

HEIGHT VELOCITY DIAGRAM



ALTITUDE VS GROSS WEIGHT LIMITS FOR HEIGHT VELOCITY DIAGRAM



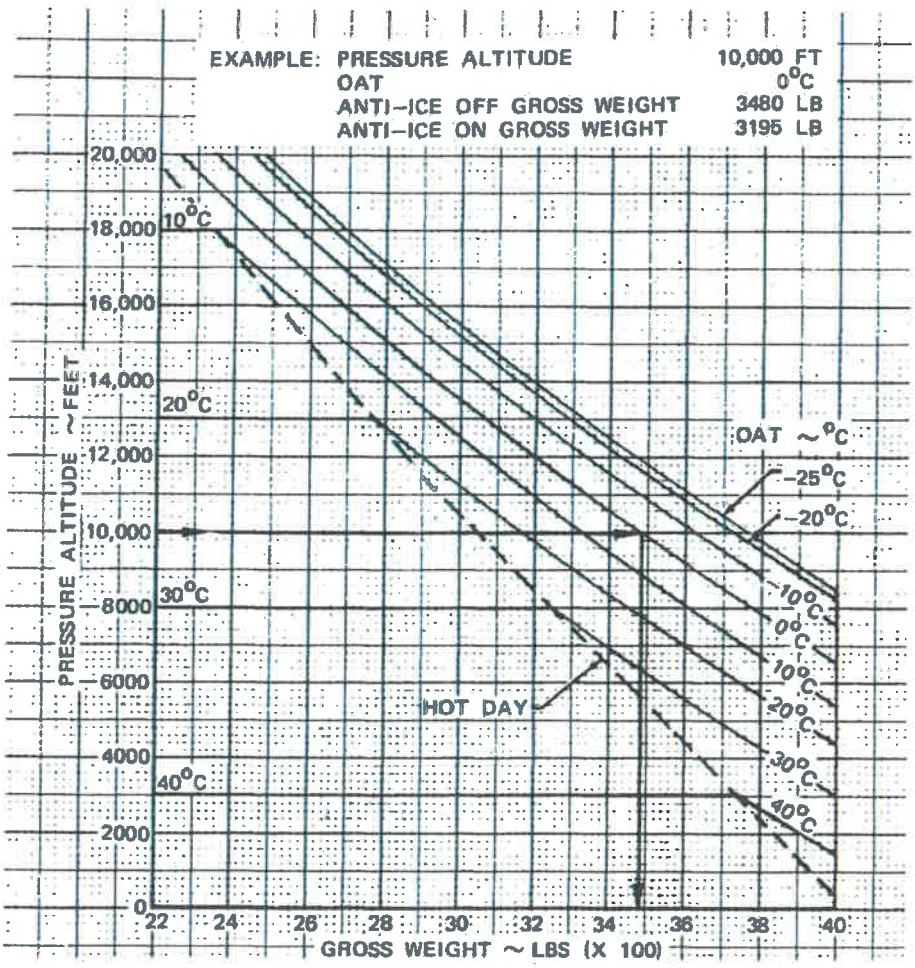
HOVERING CEILING

IN GROUND EFFECT

TAKEOFF POWER

GENERATOR 30.7 AMPS ANTI-ICE OFF
SKID HEIGHT 2.5 FT. POWER TURBINE — 100% RPM (N2)

WITH ANTI-ICE ON GROSS WEIGHT IS 285 LBS. LESS

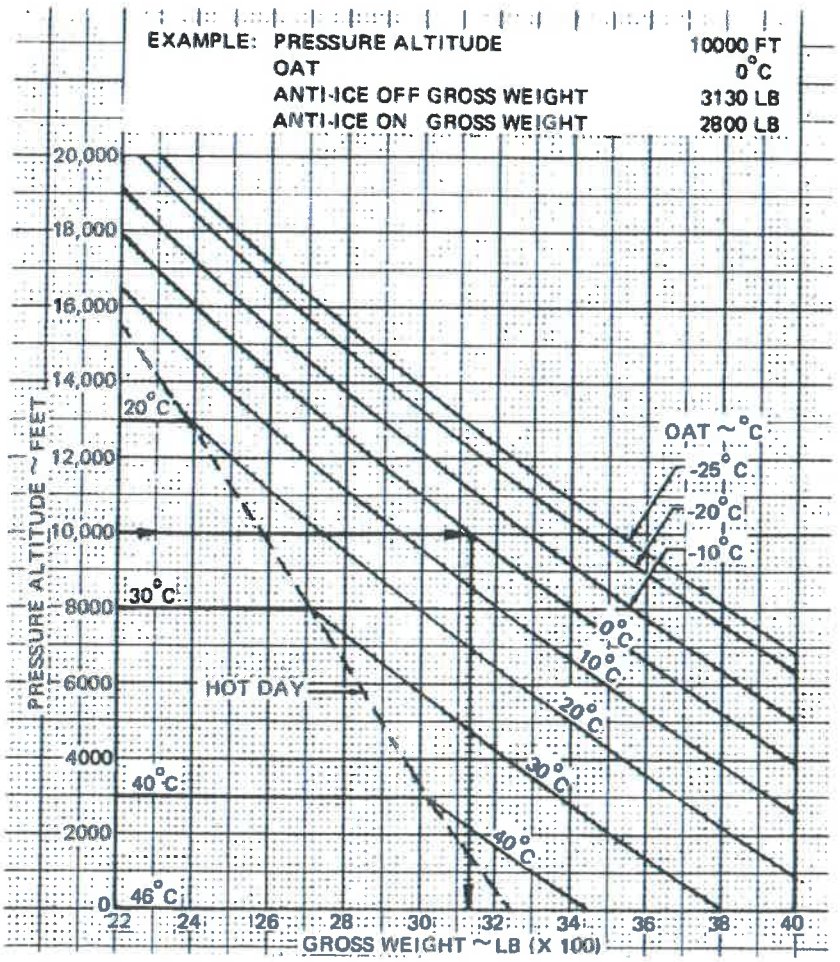


HOVERING CEILING

IN GROUND EFFECT

MAXIMUM CONTINUOUS POWER

GENERATOR 30.7 AMPS ANTI-ICE OFF
SKID HEIGHT 2.5 FT. POWER TURBINE — 100% RPM (N2)
WITH ANTI-ICE ON GROSS WEIGHT IS 330 LBS. LESS



HOVER CEILING

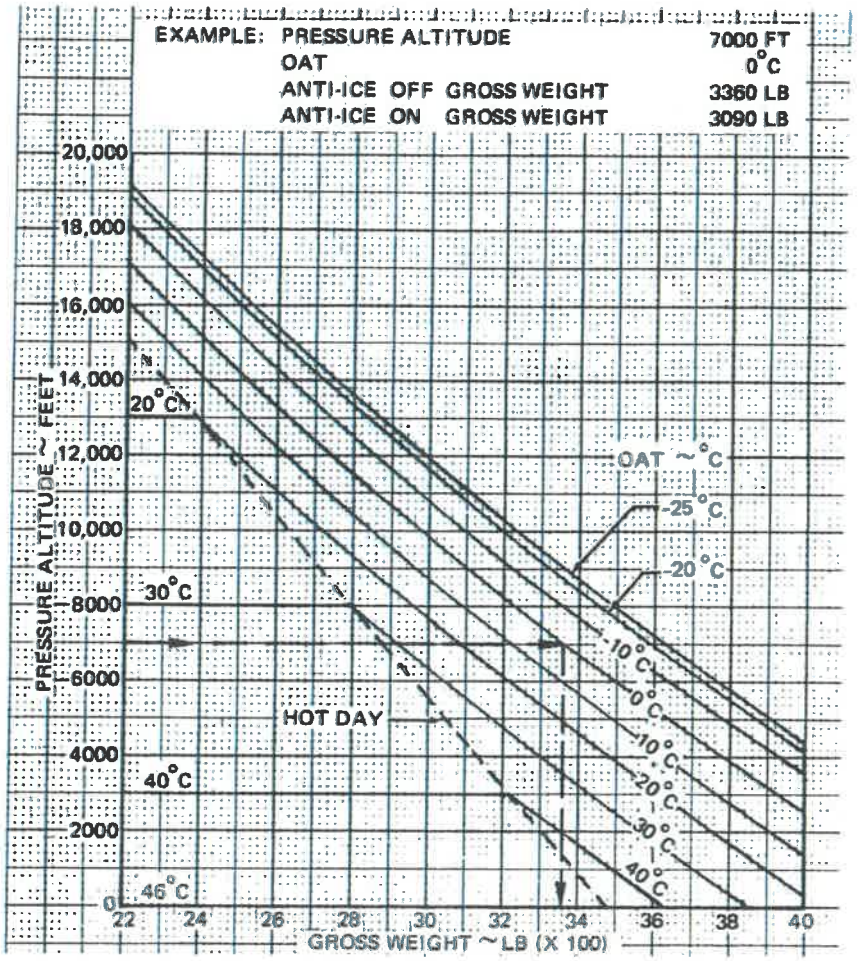
OUT OF GROUND EFFECT

TAKEOFF POWER

GENERATOR 30.7 AMPS ANTI-ICE OFF

SKID HEIGHT 40 FT. POWER TURBINE — 100% RPM (N2)

WITH ANTI-ICE ON GROSS WEIGHT IS 270 LBS. LESS



HOVERING CEILING

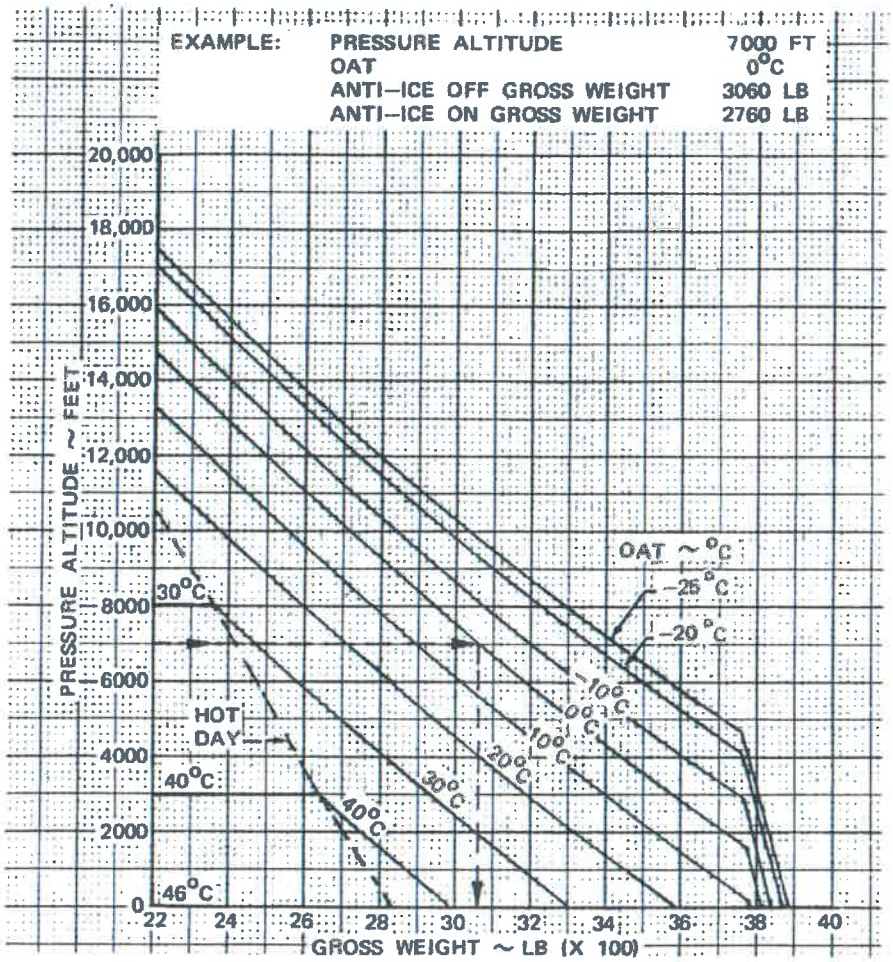
OUT OF GROUND EFFECT

MAXIMUM CONTINUOUS POWER

GENERATOR 30.7 AMPS ANTI-ICE OFF

SKID HEIGHT 40 FT. POWER TURBINE — 100% RPM (N2)

WITH ANTI-ICE ON GROSS WEIGHT IS 300 LBS. LESS



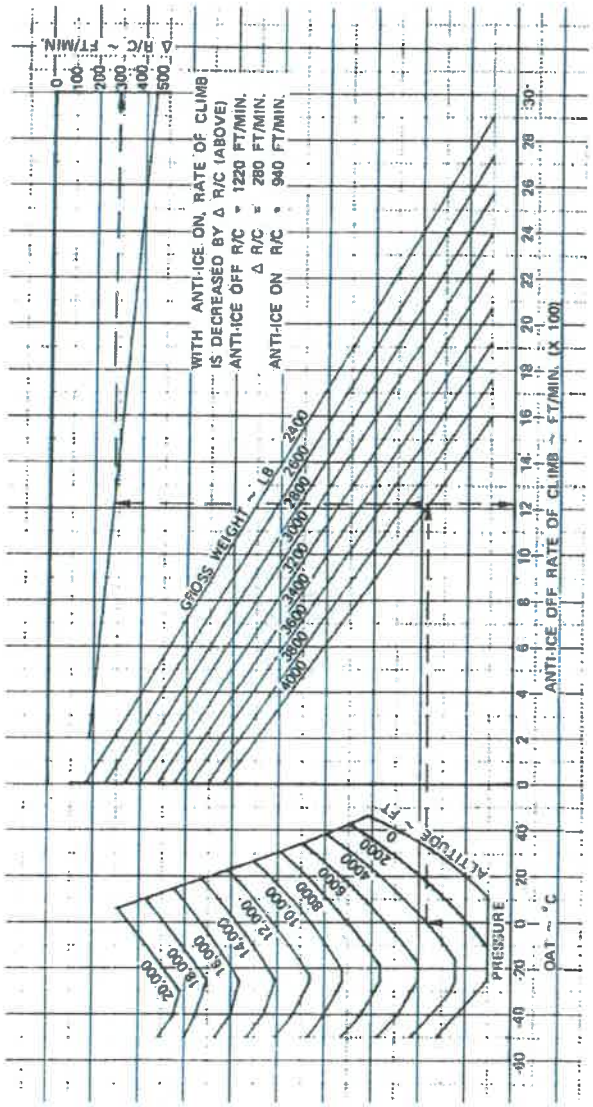
RATE OF CLIMB — MAXIMUM

TAKEOFF POWER

ANTI-ICE OFF OR ON

VCAL 60 MPH 52 KNOTS

GENERATOR 30.7 AMPS POWER TURBINE — 100% RPM (N2)

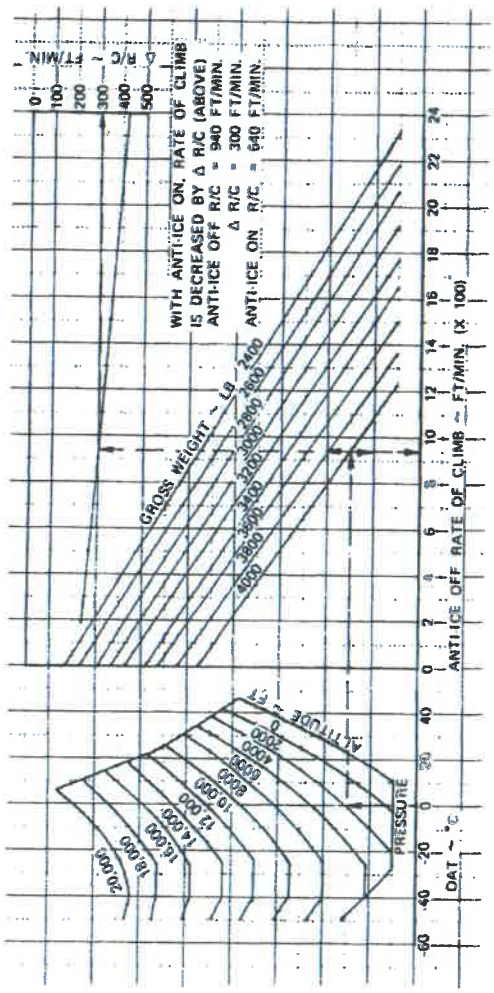


RATE OF CLIMB — MAXIMUM

MAXIMUM CONTINUOUS POWER
ANTI-ICE OFF OR ON

VCAL 60 MPH 52 KNOTS

GENERATOR 30.7 AMPS POWER TURBINE — 100% RPM (N2)



Section 6

WEIGHT AND BALANCE DATA

INTRODUCTION

This section presents loading information and instructions necessary to ensure that flight can be performed within the approved gross weight and center of gravity limitations defined in Section 1.

WEIGHT EMPTY CENTER OF GRAVITY

The weight empty condition consists of the basic helicopter with required equipment, optional equipment kits, transmission and gearbox oils, hydraulic fluid, unusable fuel, undrainable engine oil, and fixed ballast. The weight empty and center of gravity are recorded on the Actual Weight Record, a copy of which should be carried in the helicopter to enable weight and balance computations.

A Weight Empty Center of Gravity chart is provided in the maintenance manual as a guide to simplify computing ballast requirements. The chart was derived from the gross weight longitudinal center of gravity limits in the flight manual using the most forward and most aft useful loads for standard seating and fuel.

USEFUL LOADS

Useful load consists of usable fuel, engine oil, crew, passengers, baggage, and cargo. Combinations of these items which have the most adverse effect on helicopter center of gravity are known as the most forward and most aft useful loads. Whenever cargo and/or baggage are carried, the useful loads may be different for each flight, and weight and balance must be computed to ensure gross weight and center of gravity will remain within limits throughout flight.

USEFUL LOADS (Cont)

The standard most forward and most aft useful loads are combinations of fuel, crew, and passenger loading only. The selective seating criteria, which are displayed on the SELECTIVE PASSENGER LOADING placard, are the basis for determining these useful loads. The selective loading plan allows passengers only (no baggage or other cargo) to be carried within appropriate weight limitations without computing center of gravity for each flight.

If the helicopter has a nonstandard fuel system or seating arrangement or is not ballasted in accordance with the Weight Empty Center of Gravity chart in the maintenance manual, the SELECTIVE PASSENGER LOADING placard does not apply and the ALTERNATE placard must be installed. (Refer to Section 1.) The pilot must determine weight and balance to ensure gross weight and center of gravity will remain within limits throughout each flight.

GROSS WEIGHT CENTER OF GRAVITY

The gross weight condition is the weight empty condition plus the useful load.

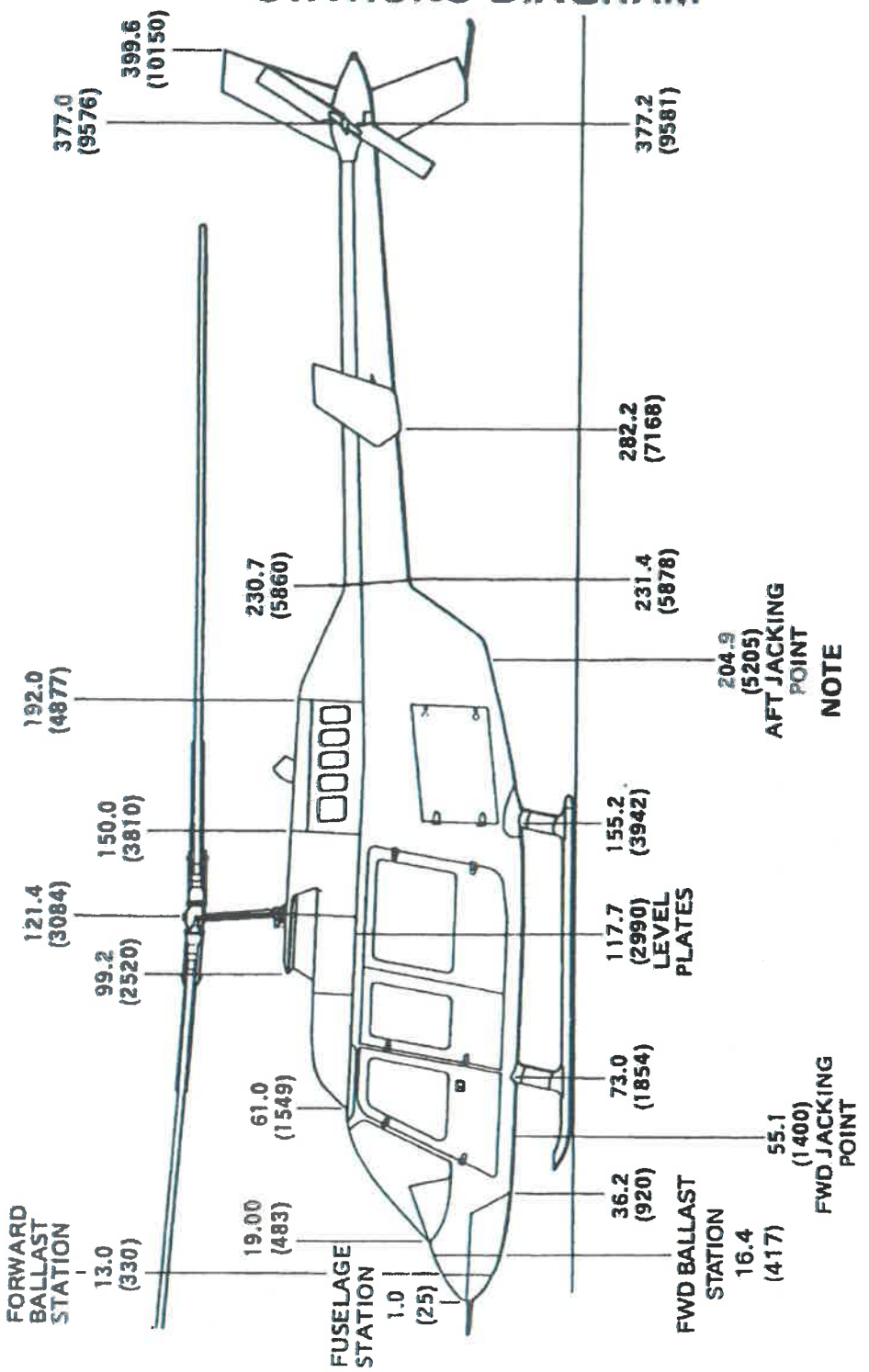
It is the responsibility of the pilot to ensure that the helicopter is properly loaded to maintain the center of gravity throughout each flight within the gross weight center of gravity limits shown in Section 1 or appropriate supplement. Gross weight longitudinal and lateral center of gravity can be calculated using the Actual Weight Record, the diagrams and loading tables in this section, and loading tables in applicable flight manual supplements.

When carrying cargo or nonstandard loads (passengers loaded contrary to selective loading plan), the effects of fuel consumption and the addition/deletion of passengers, cargo, or baggage at intermediate points should be checked prior to flight.

Significant fuselage stations are shown in the Stations Diagram chart, and significant buttock lines are shown in the Buttock Lines Diagram chart, to aid in weight and balance computations.

BHT-206L-FM-1

STATIONS DIAGRAM



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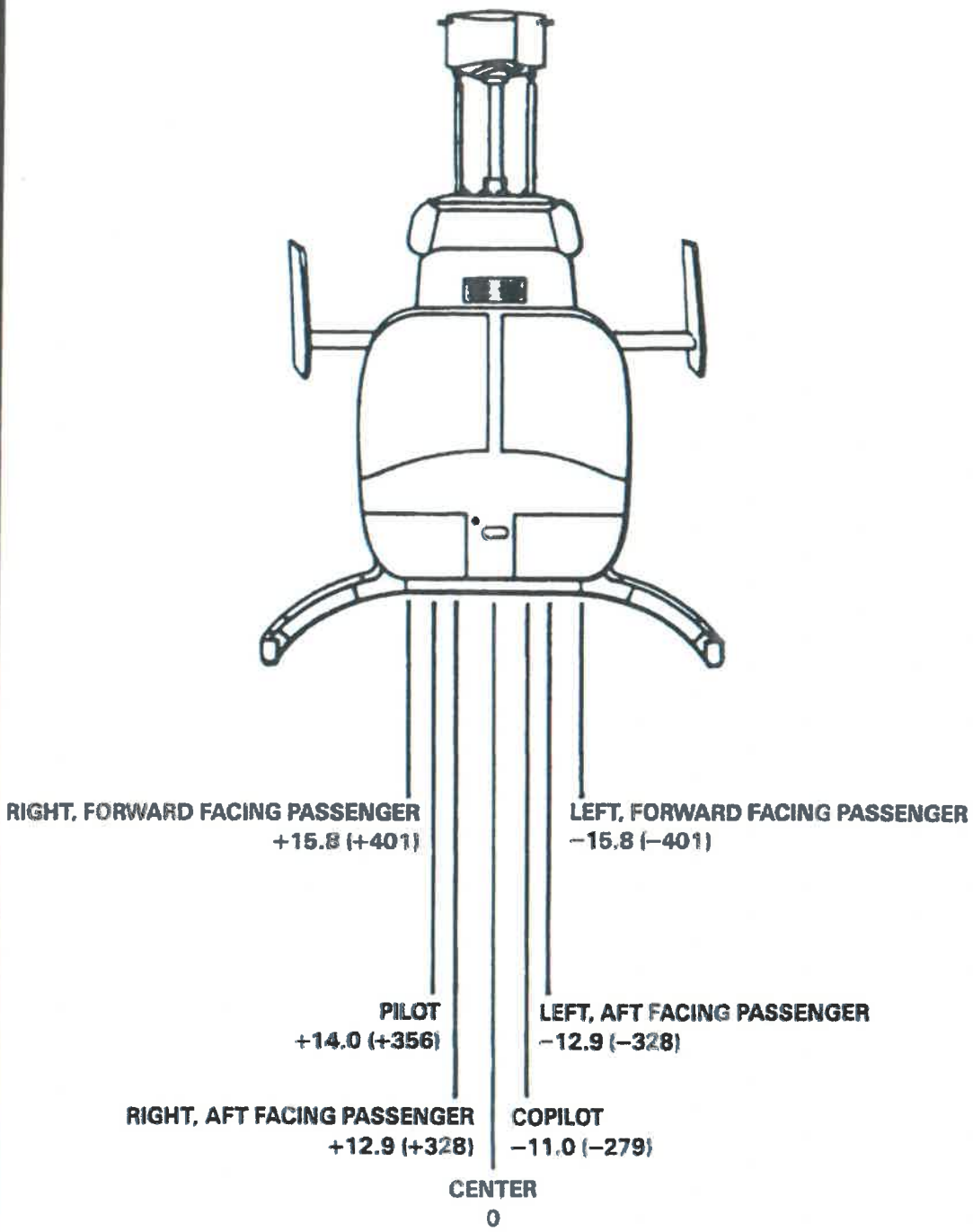
BUTTOCK LINES DIAGRAM



BUTTOCK LINES INCHES (MILLIMETERS)

FUEL LOADING

The longitudinal center of gravity of the fuel shifts as it is consumed. (See Fuel Center of Gravity chart.) The extreme effects of fuel consumption on helicopter center of gravity for the standard fuel system are as follows:

- The critical fuel for computing most aft useful load is 47.1 gallons (178.3 liters).
- The critical fuel for computing most forward useful load is when all fuel is expended.

The Fuel Loading tables list usable fuel quantities, weights, and moments in both U. S. and metric units.

CABIN LOADING

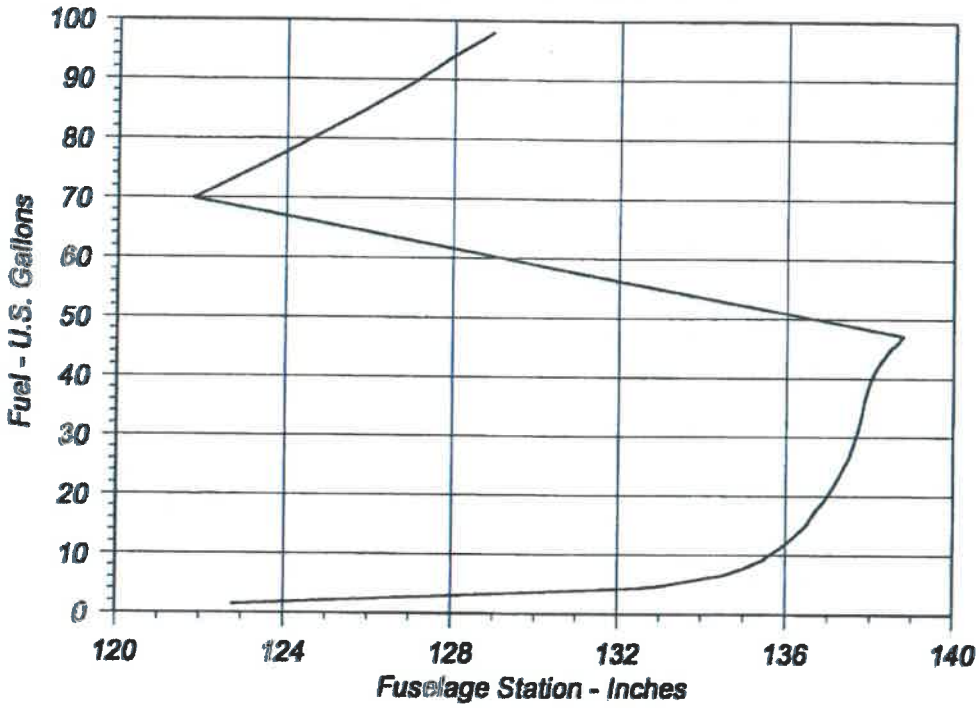
SELECTIVE PASSENGER LOADING PLAN

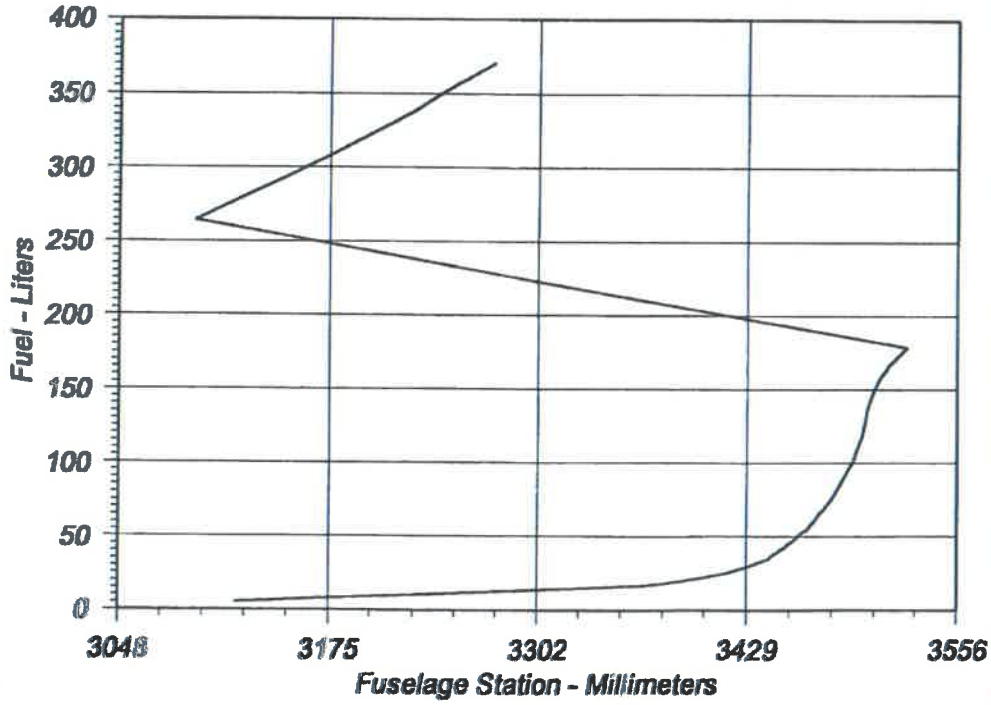
The following selective passenger loading plan is applicable only when the helicopter has a standard fuel system (97.9 gallons usable fuel), standard seating arrangement, and is ballasted in accordance with the Weight Empty Center of Gravity chart in the maintenance manual. The plan is based on crew and passenger weights of 170 pounds (77.1 kilograms) each.

- LONGITUDINAL LOADING
  - A minimum weight of 170 pounds (77.1 kilograms) is required in cockpit at fuselage station 65.0.
  - If both crew seats are occupied, only one mid passenger is permitted unless there are two aft passengers.

BHT-206L-FM-1

FUEL CENTER OF GRAVITY





BHT-206L-FM-1

FUEL LOADING TABLE

ASTM TYPE JET B (JP-4)

U.S. GALLONS

Gal.	Weight 6.5 lbs/gal	C.G. (in)	Moment (in-lbs)	Gal.	Weight 6.5 lbs/gal	C.G. (in)	Moment (in-lbs)
□ 0	0.0	0.0	0	60	390.0	129.2	50388
5	32.5	133.2	4329	65	422.5	125.5	53024
10	65.0	135.6	8814	**69.8	454.0	121.8	55297
15	97.5	136.5	13309	75	487.5	123.3	60109
20	130.0	136.9	17797	80	520.0	124.7	64844
25	162.5	137.3	22311	85	552.5	126.0	69615
30	195.0	137.6	26832	90	585.0	127.2	74412
35	227.5	137.8	31350	95	617.5	128.3	79225
40	260.0	138.0	35880	⊙97.9	636.4	128.9	82032
45	292.5	138.5	40511				
Δ 47.1	306.3	138.8	42514				
50	325.0	136.5	44363				
55	357.5	132.9	47512				

□ Critical Fuel for Most Forward C.G. condition
Δ Critical Fuel for Most Aft C.G. Condition
** Most Fwd Fuel C.G.
⊙ Full Fuel

LITERS

Liters	Weight 0.78 Kg/Lit	C.G. (mm)	Moment (mm-Kg)/100	Liters	Weight 0.78 Kg/Lit	C.G. (mm)	Moment (mm-Kg)/100
□ 0	0.0	0	0.0	195	152.1	3442	5235.3
15	11.7	3335	390.2	210	163.8	3371	5521.7
30	23.4	3432	803.1	225	175.5	3297	5786.2
45	35.1	3454	1212.4	240	187.2	3223	6033.5
60	46.8	3470	1624.0	255	198.9	3152	6269.3
75	58.5	3477	2034.0	**264.2	205.9	3094	6370.5
90	70.2	3485	2446.5	270	210.6	3104	6537.0
105	81.9	3493	2860.8	285	222.3	3134	6966.9
120	93.6	3498	3274.1	300	234.0	3162	7399.1
135	105.3	3500	3685.5	315	245.7	3188	7832.9
150	117.0	3505	4100.9	330	257.4	3213	8270.3
165	128.7	3513	4521.2	345	269.1	3239	8716.1
Δ178.3	138.9	3526	4897.6	360	280.8	3260	9154.1
180	140.4	3515	4935.1	⊙370.6	288.7	3275	9454.9

□ Critical Fuel for Most Forward C.G. condition
Δ Critical Fuel for Most Aft C.G. Condition
** Most Fwd Fuel C.G.
⊙ Full Fuel

BHT-206L-FM-1

FUEL LOADING TABLE

ASTM TYPE JET A & A-1 (JP-5 and JP-8)

U.S. GALLONS

Gal.	Weight 6.8 lbs/gal	C.G. (in)	Moment (in-lbs)	Gal.	Weight 6.8 lbs/gal	C.G. (in)	Moment (in-lbs)
□ 0	0.0	0.0	0	60	408.0	129.2	52714
5	34.0	133.2	4529	65	442.0	125.5	55471
10	68.0	135.6	9221	**69.8	475.0	121.8	57855
15	102.0	136.5	13923	75	510.0	123.3	62883
20	136.0	136.9	18618	80	544.0	124.7	67837
25	170.0	137.3	23341	85	578.0	126.0	72828
30	204.0	137.6	28070	90	612.0	127.2	77846
35	238.0	137.8	32796	95	646.0	128.3	82882
40	272.0	138.0	37536	⊙97.9	665.7	128.9	85809
45	306.0	138.5	42381				
Δ 47.1	320.4	138.8	44472				
50	340.0	136.5	46410				
55	374.0	132.9	49705				

□ Critical Fuel for Most Forward C.G. condition
Δ Critical Fuel for Most Aft C.G. Condition
** Most Fwd Fuel C.G.
⊙ Full Fuel

LITERS

Liters	Weight 0.78 Kg/Lit	C.G. (mm)	Moment (mm-Kg)/100	Liters	Weight 0.78 Kg/Lit	C.G. (mm)	Moment (mm-Kg)/100
□ 0	0.0	0	0.0	195	158.9	3442	5469.3
15	12.2	3335	406.9	210	171.2	3371	5771.1
30	24.5	3432	840.8	225	183.4	3297	6046.7
45	36.7	3454	1267.6	240	195.6	3223	6304.2
60	48.9	3470	1696.8	255	207.8	3152	6549.9
75	61.1	3477	2124.4	**264.2	215.3	3094	6661.4
90	73.4	3485	2558.0	270	220.0	3104	6828.8
105	85.6	3493	2990.0	285	232.3	3134	7280.3
120	97.8	3498	3421.0	300	244.5	3162	7731.1
135	110.0	3500	3850.0	315	256.7	3188	8183.6
150	122.3	3505	4286.6	330	269.0	3213	8643.0
165	134.5	3513	4725.0	345	281.2	3239	9108.1
Δ178.3	145.3	3526	5123.3	360	293.4	3260	9564.8
180	146.7	3515	5156.5	⊙370.6	302.0	3275	9890.5

□ Critical Fuel for Most Forward C.G. condition
Δ Critical Fuel for Most Aft C.G. Condition
** Most Fwd Fuel C.G.
⊙ Full Fuel

- LATERAL LOADING
  - Crew and passengers should be loaded laterally as symmetrically as possible.
- MOST FORWARD AND MOST AFT CG

Using the selective loading plan, the following combinations of passenger loading will cause the most extreme effects on longitudinal center of gravity, assuming equal weights for all passengers.

- Most forward cg will occur with all seats, except one aft passenger seat, occupied and all fuel expended.
- Most aft cg will occur with one crew seat and three aft passenger seats occupied and fuel quantity of 47.1 gallons (178.3 liters).

ALTERNATE LOADING

Loading of crew and passengers in any arrangement other than as prescribed in the selective passenger loading plan can be accomplished; however, such alternate loading will require the pilot to compute weight and balance to ensure gross weight and center of gravity will remain within limits throughout flight.

CABIN FLOOR LOAD LIMIT

The cabin floor load limit is 75 pounds per square foot (3.7 kilograms per 100 square centimeters).

BAGGAGE COMPARTMENT LOADING

BAGGAGE LOAD LIMITS

The baggage compartment structural load limits are as follows.

- 250 pounds (113.4 kilograms) total weight.
- 86 pounds per square foot (4.2 kilograms per 100 square centimeters).

BAGGAGE EFFECT ON CG

When weight is loaded into the baggage compartment, the pilot is required to compute weight and balance, regardless of passenger loading.

BAGGAGE LOADING PLAN

- Loading of the baggage compartment should be from front to rear.
- The load shall be secured to tiedown fittings if shifting of load in flight could result in structural damage to the baggage compartment or in gross weight center of gravity limits being exceeded.
- If the load is not secured, the center of gravity must be computed with the load in the most adverse position.

CABIN AND BAGGAGE LOADING TABLES

Cabin and Baggage Compartment and Table of Moments charts provide weights and moments for each passenger station, litter patient, and baggage compartment in both U. S. and metric units.

CABIN AND BAGGAGE LOADING TABLES (Cont)

To find moments for weights in excess of those shown on tables, multiply weight by fuselage station at which he center of gravity of the object is located. An alternate method is to calculate the amount of weight in excess of maximum weight listed on table, then read the moment for this excess weight from table and add it to the moment for maximum weight shown on table. This will give the desired moment for the object.

- EXAMPLE:

Find the moment for a 450-pound load at the aft passenger station as follows:

450 pounds –350 pounds = 100 pounds

	WEIGHT	MOMENT
	350 pounds	45150
	+100 pounds	12900
TOTAL:	450 pounds	58050

DOORS REMOVED

When one or more cabin doors are removed, meeting the selective passenger loading criteria will NOT assure that the gross weight center of gravity will remain within limits. There is also no such assurance for flight with no passengers aboard. Either a ballast adjustment to offset the weight/moment change is necessary or the pilot must compute gross weight center of gravity for each flight.

BHT-206L-FM-1

CABIN AND BAGGAGE COMPARTMENT TABLE OF MOMENTS

Weight (Pounds)	Front Seat F.S. 65	Mid-Pass (Facing Aft) F.S. 91	Aft-Pass (Facing Fwd.) F.S. 129	Litter Patient(s) F.S. 108	Baggage F.S. 174
40	2600	3640	5160	4320	6960
50	3250	4550	6450	5400	8700
60	3900	5460	7740	6480	10440
70	4550	6370	9030	7560	12180
80	5200	7280	10320	8640	13920
90	5850	8190	11610	9720	15660
100	6500	9100	12900	10800	17400
110	7150	10010	14190	11880	19140
120	7800	10920	15480	12960	20880
130	8450	11830	16770	14040	22620
140	9100	12740	18060	15120	24360
150	9750	13650	19350	16200	26100
160	10400	14560	20640	17280	27840
170	11050	15470	21930	18360	29580
180	11700	16380	23220	19440	31320
190	12350	17290	24510	20520	33060
200	13000	18200	25800	21600	34800
210	13650	19110	27090	22680	36540
220	14300	20020	28380	23760	38280
230	14950	20930	29670	24840	40020
240	15600	21840	30960	25920	41760
250	16250	22750	32250	27000	43500
260	16900	23660	33540	28080	
270	17550	24570	34830	29160	
280	18200	25480	36120	30240	
290	18850	26390	37410	31320	
300	19500	27300	38700	32400	
310	20150	28210	39990	33480	
320	20800	29120	41280	34560	
330	21450	30030	42570	35640	
340	22100	30940	43860	36720	
350	22750	31850	45150	37800	

CABIN BAGGAGE COMPARTMENTS TABLE OF MOMENTS MM-Kg / 100

KILOGRAMS

Weight (Kg)	Front Seat F.S. 1651.0 mm	Mid-Pass (Facing Aft) F.S. 2311.4 mm	Aft-Pass (Facing Fwd) F.S. 3276.6 mm	Litters Patient(s) F.S. 2743.2 mm	Baggage F.S. 4419.6 mm
18.1	298.8	418.4	593.1	496.5	800.0
22.7	374.8	524.7	743.8	622.7	1003.2
27.2	449.1	628.7	891.2	746.2	1202.1
31.8	525.0	735.0	1042.0	872.3	1405.4
36.3	599.3	839.0	1189.4	995.8	1604.3
40.8	673.6	943.1	1336.9	1119.2	1803.2
45.4	749.6	1049.4	1487.6	1245.4	2006.5
49.9	823.8	1153.4	1635.0	1368.9	2205.4
54.4	898.1	1257.4	1782.5	1492.3	2404.3
59.0	974.1	1363.7	1933.2	1618.5	2608.6
63.5	1048.4	1467.7	2080.6	1741.9	2806.4
68.0	1122.7	1571.8	2228.1	1865.4	3005.3
72.6	1198.6	1678.1	2378.8	1991.6	3208.6
77.1	1272.9	1782.1	2526.3	2115.0	3407.5
81.6	1347.2	1886.1	2673.7	2238.5	3606.4
86.2	1423.2	1992.4	2824.4	2364.6	3809.7
90.7	1497.5	2096.4	2971.9	2488.1	4008.6
95.3	1573.4	2202.8	3122.6	2614.3	4211.9
99.8	1647.7	2306.8	3270.1	2737.7	4410.8
104.3	1722.0	2410.8	3417.5	2861.2	4609.6
108.9	1797.9	2517.1	3568.2	2987.3	4812.9
113.4	1872.2	2621.1	3715.7	3110.8	5011.8
117.9	1946.5	2725.1	3863.1	3234.2	
122.5	2022.5	2831.5	4013.8	3360.4	
127.0	2096.8	2935.5	4161.3	3483.9	
131.5	2171.1	3039.5	4308.7	3607.3	
136.1	2247.0	3145.8	4459.5	3733.5	
140.6	2321.3	3249.8	4606.9	3856.9	
145.1	2395.6	3353.8	4754.3	3980.4	
149.7	2471.5	3460.2	4905.1	4106.6	
154.2	2545.8	3564.2	5052.5	4230.0	
158.8	2621.8	3670.5	5203.2	4356.2	

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DOORS REMOVED (Cont)

DOOR WEIGHTS AND MOMENTS

The Door Weights and Moments chart present weight and moment adjustments for cabin doors. The sign convention for buttock lines used to compute lateral moments is as follows:

- Left is negative.
- Right is positive.

Compute lateral moment changes as follows:

ACTION	MOMENT CHANGE	
	LEFT DOOR	RIGHT DOOR
Remove	Positive (+)	Negative (–)
Install	Negative (–)	Positive (+)

- EXAMPLE:

When removing a left door only, subtract the positive weight value and negative moment value shown on the table. The net effect on the helicopter is a reduction in weight and a shift in lateral cg to the right (positive direction).

BALLAST CHANGE

The following checks can be made to determine if a ballast change is necessary after doors are removed or installed.

- For helicopters without ballast or with nose ballast, apply the weight and moment changes to the most aft useful load condition to determine if an increase in nose ballast is required.
- For helicopters with tail ballast, apply the weight and moment changes to the most forward useful load condition to determine if a reduction in tail ballast is allowed.

DOOR WEIGHTS AND MOMENTS (U.S.)

DOOR	WEIGHT (LB)	LONGITUDINAL CG (IN)	LONGITUDINAL MOMENT (IN-LB)	LATERAL CG (IN)	LATERAL MOMENT (IN-LB)
One crew door	13	64	832	±25	±325
Both crew doors	26	64	1664	0	0
One passenger door	16	122	1952	±22	±352
Both passenger doors	32	122	3904	0	0
Left passenger door and litter door	31	108	3348	–23	–713

DOOR WEIGHTS AND MOMENTS (Metric)

DOOR	WEIGHT (kg)	LONGITUDINAL CG (mm)	LONGITUDINAL MOMENT (mm–kg÷100)	LATERAL CG (mm)	LATERAL MOMENT (mm–kg÷100)
One crew door	5.9	1626	95.9	±635	±37.5
Both crew doors	11.8	1626	191.9	0	0
One passenger door	7.3	3099	226.2	±559	±40.8
Both passenger doors	14.5	3099	449.4	0	0
Left passenger door and litter door	14.1	2743	386.8	–584	–82.3

DOORS REMOVED (Cont)

NOTE

Ballast changes are performed by maintenance personnel. After any ballast change, the Actual Weight Record must be revised to show the new weight empty condition.

SAMPLE LOADING PROBLEM

A Sample Loading Problem showing derivation of critical gross weights and center of gravity locations for a typical mission is presented in U. S. and metric units. The method shown derives a gross weight at zero fuel for each load condition to be checked then adds the appropriate fuel weight and moment read directly from the Fuel Loading table. The center of gravity for each condition is calculated by dividing the total moment by the total weight.

SAMPLE LOADING PROBLEM (ENGLISH UNITS)

A helicopter is chartered to transport 4 passengers plus pilot and 200 pounds of baggage for a trip that will require approximately 83 gallons of Jet A or A-1 (JP-5 or JP-8) fuel. The 200 pound pilot will return alone. Determine gross weight and extreme CG conditions for both trips.

OUTBOUND FLIGHT

	WEIGHT (LB)	CG (IN)	MOMENT (IN-LB)
Weight Empty	★2060.0	★130.7	★269201
+ Oil	13.0	205.0	2665
+ Pilot	200.0	65.0	13000
+ Forward Passenger	200.0	65.0	13000
+ Mid Passenger (1)	200.0	91.0	18200.0
+ Aft Passengers (2)	400.0	129.0	51600
+ Baggage	200.0	174.0	34800
Gross Weight at Zero Fuel	3273.0	123.0	402466
+ Full Fuel (JP-5)	665.7	128.9	85809
+ Water-Alcohol Solution	23.0	159.5	3669
Takeoff Condition	3961.7 ✓	124.2 ✓	491944
Gross Weight at Zero Fuel	3273.0	123.0	402466
+ Critical Fuel for Most Aft CG (JP-5)	320.4	138.8	44472
+ Water-Alcohol Solution	23.0	159.5	3669
Most Aft CG Condition	3616.4 ✓	124.6 ✓	450607
Gross Weight at Zero Fuel	3273.0	123.0	402466
+ Critical Fuel for Most Fwd CG (JP-5)	475.0	121.8	57855
* Most Forward CG Condition	3748.0 ✓	122.8 ✓	460321
Gross Weight at Zero Fuel	3273.0	123.0	402466
+ Landing Fuel (15 Gal) (JP-5)	102.0	136.5	13923
+ Water-Alcohol Solution	23.0	159.5	3669
Landing Condition	3398.0 ✓	123.6 ✓	420058

SAMPLE LOADING PROBLEM (ENGLISH UNITS) (Continued)

OUTBOUND FLIGHT (Continued)

	WEIGHT (LB)	CG (IN)	MOMENT (IN-LB)
Gross Weight at Zero Fuel	3273.0	123.0	402466
+ Landing Fuel (15 Gal) (JP-5)	102.0	136.5	13923
Alternate Landing Condition	3375.0 ✓	123.4 ✓	416389

RETURN FLIGHT

	WEIGHT (LB)	CG (IN)	MOMENT (IN-LB)
Weight Empty	★2060.0	★130.7	★269201
+ Oil	13.0	205.0	2665
+ Pilot	200.0	65.0	13000
Gross Weight at Zero Fuel	2273.0	125.3	284866
+ Full Fuel (JP-5)	665.7	128.9	85809
+ Water-Alcohol Solution	23.0	159.5	3669
Takeoff Condition	2961.7 ✓	126.2 ✓	374344
Gross Weight at Zero Fuel	2273.0	125.3	284866
+ Critical Fuel for Most Aft CG (JP-5)	320.4	138.8	44472
+ Water-Alcohol Solution	23.0	159.5	3669
Most AFT CG Condition	2616.4 ✓	127.3 ✓	333007
Gross Weight at Zero Fuel	2273.0	125.3	284866
+ Critical Fuel for Most Fwd CG (JP-5)	475.0	121.8	57855
* Most Forward CG Condition	2748.0 ✓	124.7 ✓	342721
Gross Weight at Zero Fuel	2273.0	125.3	284866
+ Landing Fuel (15 Gal) (JP-5)	102.0	136.5	13923
+ Water-Alcohol Solution	23.0	159.5	3669
Landing Condition	2398.0 ✓	126.1 ✓	302458

SAMPLE LOADING PROBLEM (ENGLISH UNIT) (Continued)

RETURN FLIGHT (Continued)

	WEIGHT (LB)	CG (IN)	MOMENT (IN-LB)
Gross Weight at Zero Fuel	2273.0	125.3	284866
+ Landing Fuel (15 Gal) (JP-5)	102.0	136.5	13923
Alternate Landing Condition	2375.0 ✓	125.8 ✓	298789

★ Example only. Refer to Actual Weight Record for actual Weight Empty data.

✓ A check of the weight and cg values against the gross weight center of gravity limits chart shows that the loading will be within limits throughout flight.

* In this sample loading problem, the critical fuel for Most Forward CG condition was most forward fuel (69.8 gal) in both the outbound and return flights due to loading. This example illustrates the need for weight and balance computations when operating with non-standard loading.

SAMPLE LOADING PROBLEM (METRIC UNITS)

A helicopter is chartered to transport 4 passengers plus pilot and 90.7 kg of baggage for a trip that will require approximately 314 liters of Jet A or A-1 (JP-5 or JP-8) fuel. The 90.7 kg pilot will return alone. Determine gross weight and extreme CG conditions for both trips.

OUTBOUND FLIGHT

	WEIGHT (KG)	CG (mm)	MOMENT (KG-mm/100)
Weight Empty	★934.4	★3320	★31022.8
+ Oil	5.9	5207	307.2
+ Pilot	90.7	1651	1497.5
+ Forward Passenger	90.7	1651	1497.5
+ Mid Passenger (1)	90.7	2311	2096.1
+ Aft Passengers (2)	181.4	3277	5944.5
+ Baggage	90.7	4420	4008.9
Gross Weight at Zero Fuel	1484.5	3124	46374.5
+ Full Fuel (JP-5)	302.0	3275	9890.5
+ Water-Alcohol Solution	10.4	4051	421.3
Takeoff Condition	1796.9 ✓	3155 ✓	56686.3
Gross Weight at Zero Fuel	1484.5	3124	46374.5
+ Critical Fuel for Most Aft CG (JP-5)	145.3	3526	5123.3
+ Water-Alcohol Solution	10.4	4051	421.3
Most Aft CG Condition	1640.2 ✓	3165 ✓	51919.1
Gross Weight at Zero Fuel	1484.5	3124	46374.5
+ Critical Fuel for Most Fwd CG (JP-5)	215.3	3094	6661.4
* Most Forward CG Condition	1699.8 ✓	3120 ✓	53035.9
Gross Weight at Zero Fuel	1484.5	3124	46374.5
+ Landing Fuel (56.8 Liters) (JP-5)	46.3	3467	1605.2
+ Water-Alcohol Solution	10.4	4051	421.3
Landing Condition	1541.2 ✓	3140 ✓	48401.0

SAMPLE LOADING PROBLEM (METRIC UNITS) (Continued)

OUTBOUND FLIGHT (Continued)

	WEIGHT (KG)	CG (mm)	MOMENT (KG-mm/100)
Gross Weight at Zero Fuel	1484.5	3124	46374.5
+ Landing Fuel (56.8 Liters) (JP-5)	46.3	3467	1605.2
Alternate Landing Condition	1530.8 ✓	3134 ✓	47979.7

RETURN FLIGHT

	WEIGHT (KG)	CG (mm)	MOMENT (KG-mm/100)
Weight Empty	★934.4	★3320	★31022.8
+ Oil	5.9	5207	307.2
+ Pilot	90.7	1651	1497.5
Gross Weight at Zero Fuel	1031.0	3184	32827.5
+ Full Fuel (JP-5)	302.0	3275	9890.5
+ Water-Alcohol Solution	10.4	4051	421.3
Takeoff Condition	1343.4 ✓	3211 ✓	43139.3
Gross Weight at Zero Fuel	1031.0	3184	32827.5
+ Critical Fuel for Most Aft CG (JP-5)	145.3	3526	5123.3
+ Water-Alcohol Solution	10.4	4051	421.3
Most Aft CG Condition	1186.7 ✓	3234 ✓	38372.1
Gross Weight at Zero Fuel	1031.0	3184	32827.5
+ Critical Fuel for Most Fwd CG (JP-5)	215.3	3094	6661.4
* Most Forward CG Condition	1246.3 ✓	3168 ✓	39488.9
Gross Weight at Zero Fuel	1031.0	3184	32827.5
+ Landing Fuel (56.8 Liters) (JP-5)	46.3	3467	1605.2
+ Water-Alcohol Solution	10.4	4051	421.3
Landing Condition	1087.7 ✓	3204 ✓	34854.0

SAMPLE LOADING PROBLEM (METRIC UNITS) (Continued)

RETURN FLIGHT (Continued)

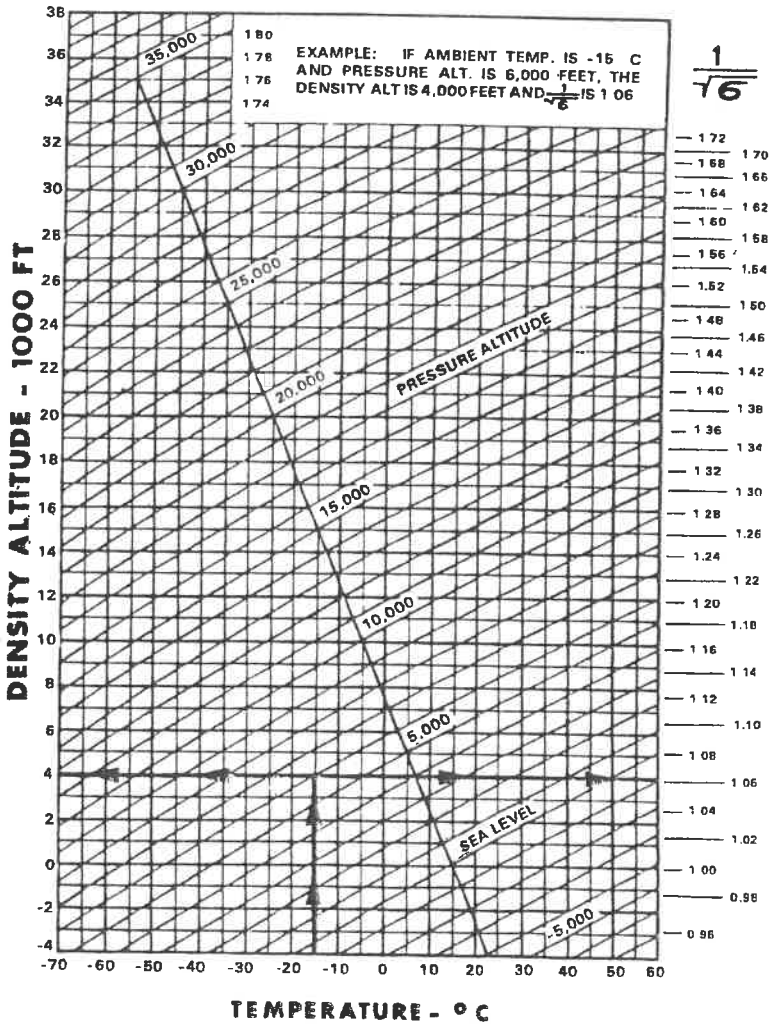
	WEIGHT (KG)	CG (MM)	MOMENT (KG-mm/100)
Gross Weight at Zero Fuel	1031.0	3184	32827.5
+ Landing Fuel (56.8 Liters) (JP-5)	46.3	3467	1605.2
Alternate Landing Condition	1077.3 ✓	3196 ✓	34432.7

★ Example only. Refer to Actual Weight Record for actual Weight Empty data.

✓ A check of the weight and cg values against the gross weight center of gravity limits chart shows that the loading will be within limits throughout flight.

* In this sample loading problem, the critical fuel for Most Forward CG condition was most forward fuel (264.2 liters) in both the outbound and return flights due to loading. This example illustrates the need for weight and balance computations when operating with non-standard loading.

DENSITY ALTITUDE CHART



INCREASED PERFORMANCE — HOVERING AND CLIMB RATE

To realize the increased hovering gross weight capability and the increased rate of climb capability, it is first necessary to perform the engine power check using the appropriate chart for the power condition required (takeoff or maximum continuous power). After obtaining the % torque value that is exceeded during the power check in Section 5, use the applicable charts as presented in Section 9 to obtain the increased performance.

These increased values of gross weight, for hovering performance and rate of climb, for climb performance are to be added to the previously determined hovering or climb values obtained using the appropriate charts and methods as presented in Section 5 or any of the FAA approved kit supplements.

Hovering Performance

WARNING

Do not exceed Maximum Gross Weight Limitations as outlined in Section 1 of this flight manual.

The following example is applicable for use with both IGE and OGE increased gross weight hover performance charts, as presented in Section 9.

EXAMPLE

Assuming you have used the appropriate chart to determine the gross weight IGE hover capability and the power check resulted in the % torque being 6% greater.

Enter the horizontal scale at 6 and read up vertically to the intersection of the line, then proceed back horizontally to read 235 pounds. This weight can be added to the already determined gross weight that was based on a minimum specification engine. Do not exceed Maximum Gross Weight Limitations as outlined in Section 1 of this flight manual.

INCREASED PERFORMANCE — HOVERING AND CLIMB RATE (Cont)

Climb Performance

The following example is applicable for use of the increased rate of climb chart.

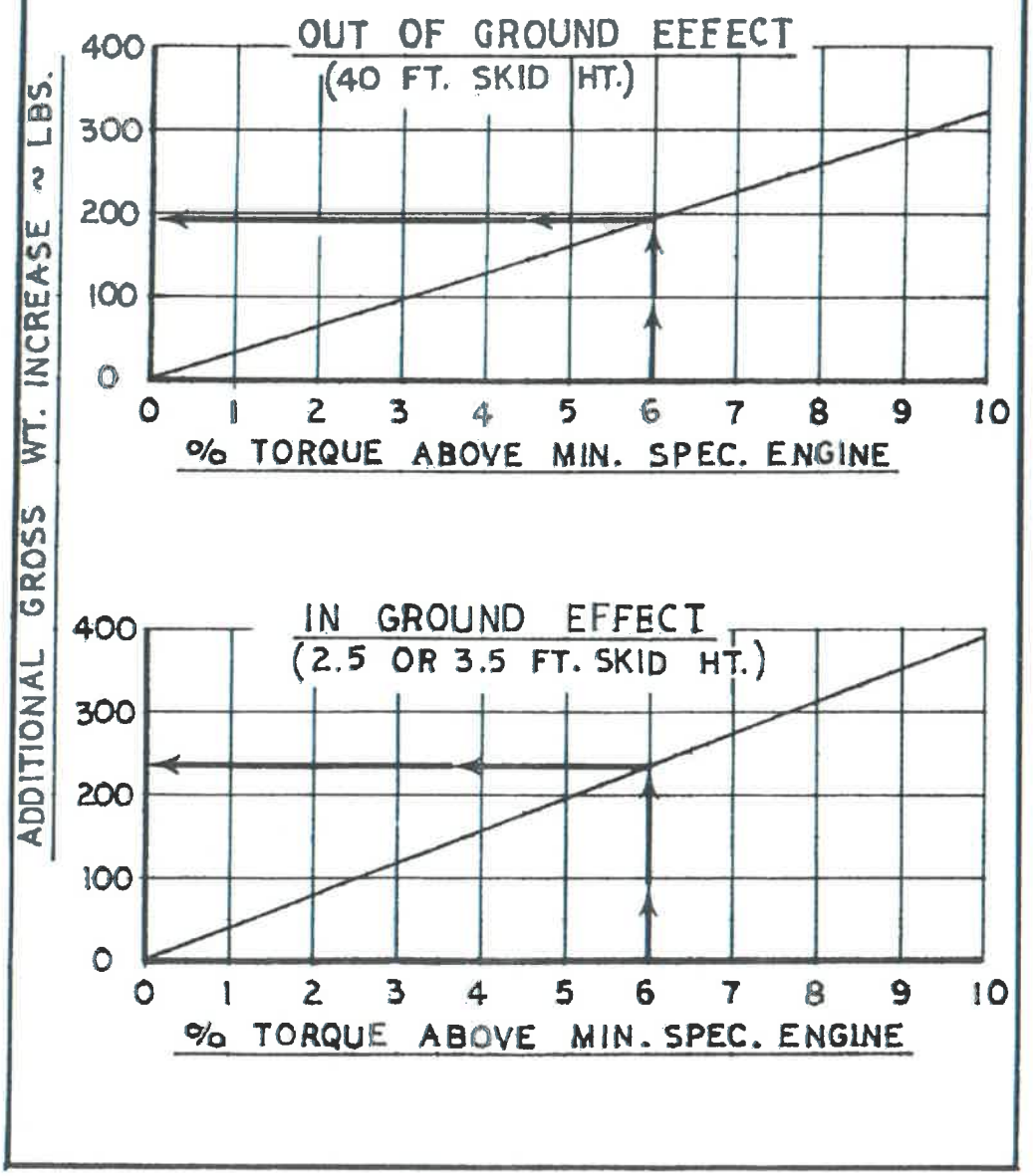
EXAMPLE

Assuming a takeoff gross weight of 3600 pounds and having used the appropriate chart to determine the maximum rate of climb and the power check resulted in the % torque being 6% greater and your weight is 3600 pounds.

Enter the horizontal scale at 6 and read up vertically to the intersection of the 3600 pound gross weight line, then proceed back horizontally to read 195 ft/min. This increased rate of climb can be added to the already determined rate of climb based on a minimum specification engine.

INCREASED GROSS WEIGHT HOVERING CAPABILITY

IN GROUND EFFECT — OUT OF GROUND EFFECT TAKE-OFF POWER OR MAX. CONT. POWER



INCREASED MAXIMUM RATE OF CLIMB CAPABILITY

TAKE-OFF POWER OR MAX. CONT. POWER