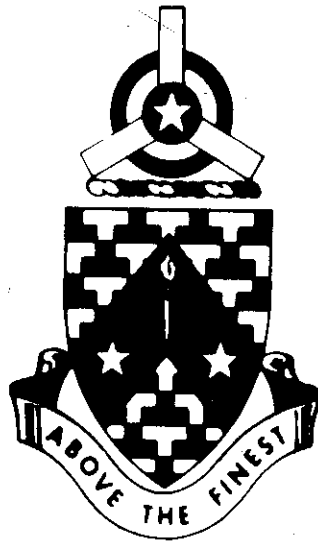


PROGRAMED TEXT

PERFORMANCE DATA CHARTS

AM 67



JANUARY 1969

**UNITED STATES ARMY
PRIMARY HELICOPTER SCHOOL
FORT WOLTERS, TEXAS**

PROGRAMED TEXT

PROGRAM TEXT

FILE NO:

AM 67

PROGRAM TITLE

PERFORMANCE DATA CHARTS

POI SCOPE: Determine the performance limitation of an aircraft using performance data charts provided in the operator's manual (-10).

INSTRUCTOR REFERENCES:

TM 55-1520-206-10, Chap 14

PREPARED BY:

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Maint/Metro Branch

DATE:

28 March 1968

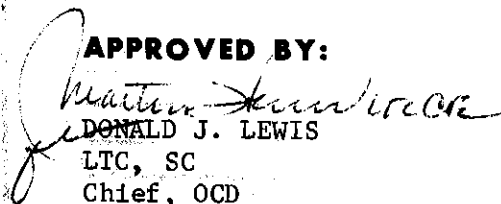
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DATE:

December 1968

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LTC, SC
Chief, OCD

DATE:

February 1969

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PROGRAMED CONFERENCE

FILE NO: AM 67

PROGRAM TITLE:

Performance Data Charts

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PREFACE

The performance of an aircraft is the most important feature which defines its suitability for specific missions. The principal items of aircraft performance deserve detailed consideration in order to better understand and appreciate the capabilities of each aircraft. Knowledge of the various items affecting aircraft performance will provide the aviator with a more complete appreciation of the operating limitation and insight to obtain the designed performance of his aircraft. The performance data section of the Operator's Manual provides the specific information regarding the capabilities and limitations of each aircraft.

Every Army Aviator must rely upon the performance data as a guide to safe and effective operation of his aircraft.

Start with frame 1 and work each frame in succession. Each frame will usually ask you a question. The correct answer is printed on the top of the next frame. If you were incorrect turn back and restudy the information before continuing on to the next frame. When you have finished the text, complete the self evaluation exercise. Now begin by studying the performance objectives on page iv.

PERFORMANCE OBJECTIVES

Given performance data charts from the Operator's Manual for a specific aircraft, and simulated weather, power and loading conditions, you will determine the performance limitations for the stated type of aircraft.

FRAME 1.

Aircraft Performance Data Charts are found in chapter 14 of the Operator's Manual.

Check the manual in which you would find Aircraft Performance Data charts.

- a. TM 55-1520-206-10
- b. TM 55-1520-206-20
- c. TM 55-1520-206-35P

CLIMB CHART FOR NORMAL POWER		
CONSIDERATION ALL		
ENGINE (2) 0-450-35P	0-450-35P	
FUEL GAUGE 0-100	0-100	
ALTITUDE 0-10,000	0-10,000	
GROSS WEIGHT (LBS) 2200		
5400	5400	5400

TURN TO PAGE 3 FOR FRAME 2

TURN TO PAGE 4 FOR FRAME 3

ANSWER: b. 2260

FRAME 12.

The Climb Charts present instantaneous rates of climb at normal power and best climb speed for various altitudes, temperatures, and gross weights.

The take-off gross weight of an OH-23D is 2190 lbs.

Place a check mark in the section of the Climb Chart that is closest to your take-off gross weight operation condition.

CLIMB CHART FOR NORMAL POWER		
MODEL(S): OH-23D	CONFIGURATION: ALL	ENGINE(S): O-435-23B
DATA AS OF: 11 APRIL 1958		FUEL GRADE: 80/87
DATA BASIS: FLIGHT TEST AND ESTIMATED		FUEL DENSITY: 6.0 LB / GAL
GROSS WEIGHT (lb.)		
2200 ✓	2450	2750

TURN TO PAGE 4 FOR FRAME 13

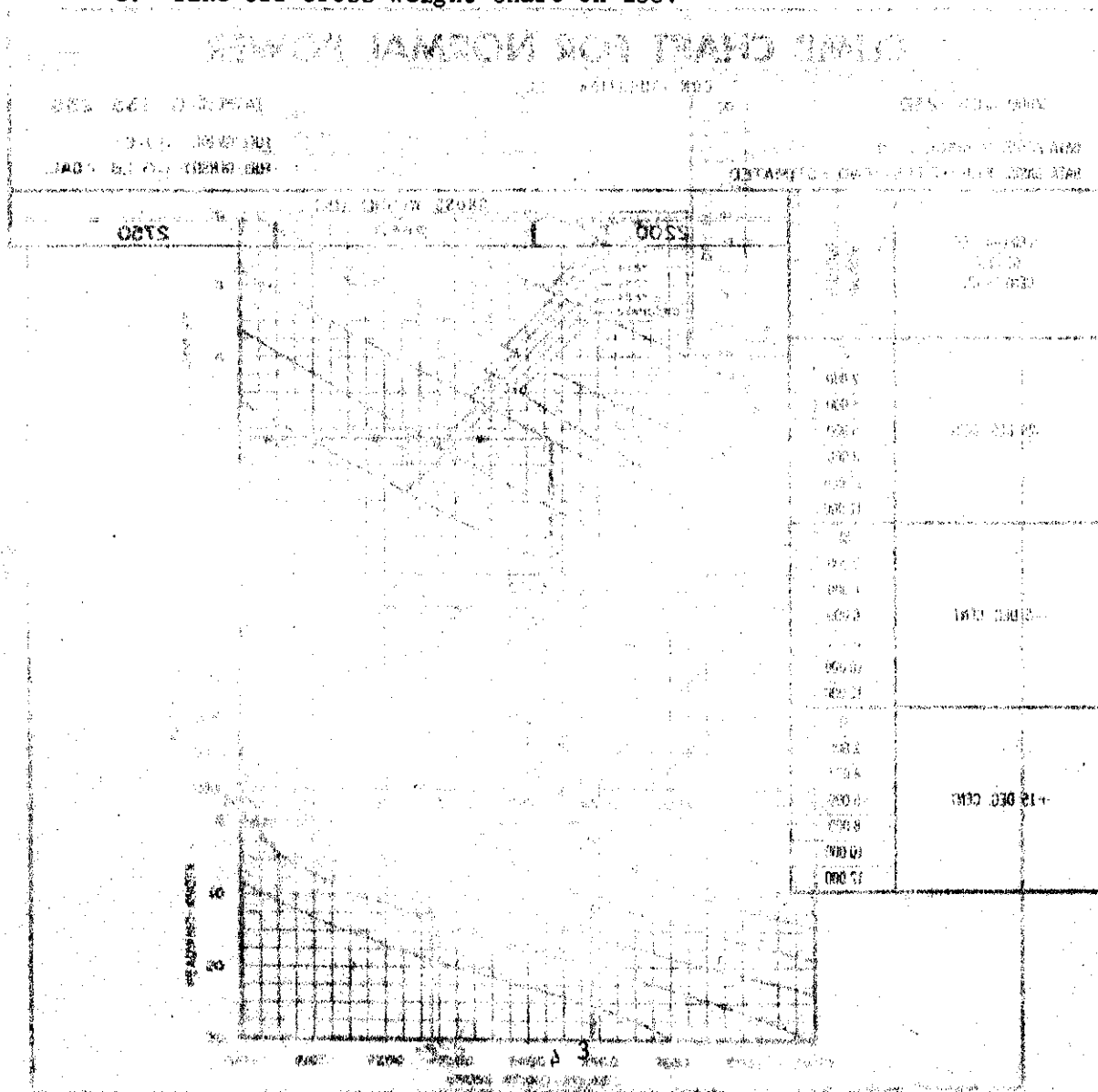
ANSWER: a. TM 55-1520-206-10 (Operator's Manual)

FRAME 2

There are six (6) basic performance data charts. Each is named for its purpose, and is designed for each model of that aircraft produced.

In what chart would you find the take-off distance to clear a barrier for an OH-23D?

- a. Hovering Charts OH-23D.
- b. Take-off Gross Weight Charts OH-23D.
- c. Take-off Distance to Clear 50 ft Obstacle Chart OH-23D.
- d. Take-off Distance to Clear 50 ft Obstacle Chart.
- e. Take-off Gross Weight Chart OH-23G.



ANSWER: 2200

FRAME 13.

Use the gross weight, temperature and pressure altitude section of the chart that is closest to the actual operating conditions.

Gross Weight: 2190 lbs
Temperature: -24°C
Pressure Altitude: 5950

Place a check mark after the gross weight, temperature, and pressure altitude lines closest to your operating condition.

CLIMB CHART FOR NORMAL POWER				
MODEL(S): OH-23D		CONFIGURATION: ALL		
DATA AS OF: 11 APRIL 1958		ENGINE(S): O-435-23B		
DATA BASIS: FLIGHT TEST AND ESTIMATED		FUEL GRADE: 80/87		
		FUEL DENSITY: 6.0 LB / GAL.		
TEMPERATURE DEGREE CENTIGRADE	PRESSURE ALTITUDE	GROSS WEIGHT (lb.)		
		2200	2450	2750
-25 DEG. CENT. ✓	SL			
	2 000			
	4 000			
	6 000 ✓			
	8 000			
	10 000			
	12 000			
-5 DEG. CENT.	SL			
	2 000			
	4 000			
	6 000			
	8 000			
	10 000			
	12 000			
+15 DEG. CENT.	SL			
	2 000			
	4 000			
	6 000			
	8 000			
	10 000			
	12 000			

ANSWER: c. Take-off Distance to Clear 50 ft Obstacle Chart OH-23D.

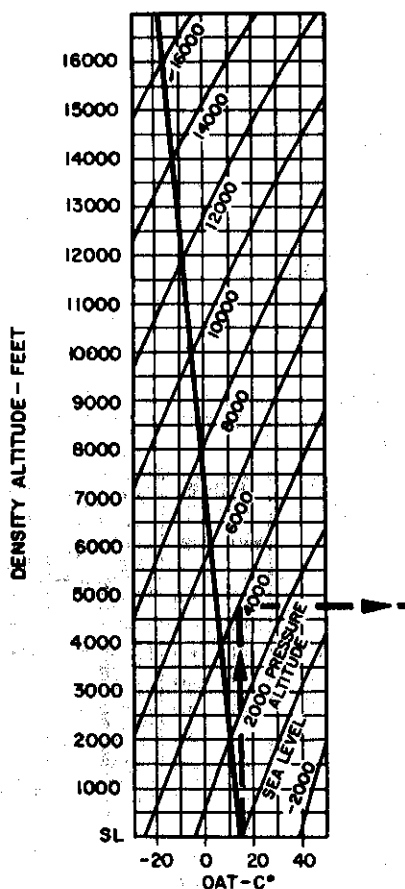
FRAME 3

STEP I

To use the Take-Off Distance Chart, use the broken arrow line as a guide. Follow the guide from the bottom of the chart at 15°C outside air temperature (OAT), move vertically until the line intersects the diagonal line at the 4000 ft pressure altitude level. The point where these lines intersect represent a Density Altitude of 4750 ft, which is read from the left margin of the chart.

What is the Density Altitude (DA) when the outside air temperature (OAT) is 0°C and the pressure altitude is 6000 ft?

- a. 5060
- b. 5050
- ☒ c. 5600
- d. 5800



ANSWER:

2200 lbs ✓

-25°C ✓

6000 ft ✓

FRAME 14.

Aircraft Weight: 2190 lbs

Temperature: -25°C

Pressure Altitude: 5950 ft

What is the best airspeed for climbing?

- a. 13 MPH 45 KN !
 b. 46 MPH 40 KN ✓
 c. 40 MPH 46 KN
 d. 45 MPH 13 KN

CLIMB CHART FOR NORMAL POWER

MODEL(S): OH-23D

CONFIGURATION: ALL

ENGINE(S): O-435-23B

DATA AS OF: 11 APRIL 1958

FUEL GRADE: 80/87

DATA BASIS: FLIGHT TEST AND ESTIMATED

FUEL DENSITY: 6.0 LB / GAL.

TEMPERATURE DEGREE CENTIGRADE	PRESSURE ALTITUDE	GROSS WEIGHT (lb.)																	
		2200						2450						2750					
		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		BEST IAS		RATE OF CLIMB FPM	FROM S.L.				
		M.P.H.	KN		TIME MIN.	FUEL USED GAL.	M.P.H.	KN		TIME MIN.	FUEL USED GAL.	M.P.H.	KN		TIME MIN.	FUEL USED GAL.			
<u>-25 DEG. CENT.</u>	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03			
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90			
	4 000	46	40	1560	2.6	3.06	46	40	1280	3.1	3.29	46	40	1000	4.0	3.70			
	6 000	46	40	1345	3.9	3.62	46	40	1075	4.8	3.98	46	40	800	6.2	4.55			
	8 000	46	40	1125	5.6	4.19	46	40	870	6.9	4.70	46	40	600	9.2	5.55			
	10 000	46	40	910	7.5	4.81	46	40	665	9.5	5.52	46	40	400	13.3	6.80			
	12 000	46	40	700	10.0	5.52	46	40	460	13.0	6.54	46	40	200	21.5	9.00			
<u>-5 DEG. CENT.</u>	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03			
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90			
	4 000	46	40	1335	2.7	3.11	46	40	1070	3.3	3.35	46	40	795	4.3	3.80			
	6 000	46	40	1120	4.3	3.68	46	40	865	5.3	4.07	46	40	600	7.2	4.75			
	8 000	46	40	910	6.3	4.29	46	40	660	8.0	4.89	46	40	405	11.4	6.05			
	10 000	46	40	705	8.7	5.00	46	40	460	11.5	6.01	46	40	205	18.8	8.10			
	12 000	46	40	500	12.1	5.88	46	40	265	17.0	7.37	46	40	30	30.8	11.15			

ANSWER: c. 5600

FRAME 4

STEP II

Following the guide from the point of intercept of the 15°C and the 4000' pressure altitude line. Move to the right horizontally until you intercept the 2450 lbs gross weight line. Mark this point with "0".

Now, from the point of intercept on the left chart where the 0°C line and the 6000 ft pressure altitude line intersect, move to the right until you intercept the 2450 lbs gross weight line. Mark this point with an "X".

TAKEOFF DISTANCE TO CLEAR 50-FOOT OBSTACLE

ALL CONFIGURATIONS

MODEL: OH-23D

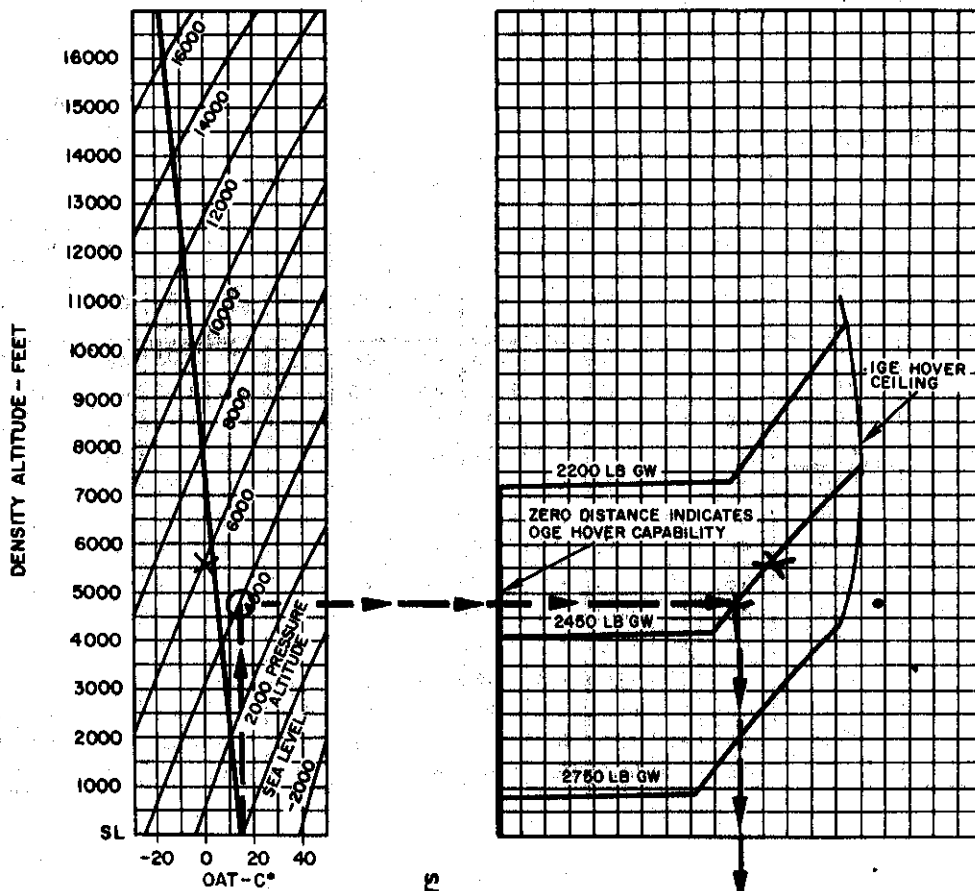
ENGINE: O-435-23B

DATE: 21 SEPTEMBER 1964

FUEL GRADE: 80/87

DATA BASIS: ESTIMATED

FUEL DENSITY: 6.0 LB/GAL



ANSWER: b. 46 MPH 40 KN

FRAME 15.

Aircraft Weight: 2200 lbs
 Temperature: -25°C
 Pressure Altitude: 6000 ft

What rate of climb would you expect?

- a. 6,000 FPM
- b. 46 FPM
- c. 40 FPM
- ☒ d. 1,345 FPM

CLIMB CHART FOR NORMAL POWER																
MODEL (S): OH-23D				CONFIGURATION: ALL				ENGINE (S): O-435-23B								
DATA AS OF: 11 APRIL 1958				FUEL GRADE: 80/87												
DATA BASIS: FLIGHT TEST AND ESTIMATED				FUEL DENSITY: 6.0 LB / GAL.												
TEMPERATURE DEGREE CENTIGRADE	PRESSURE ALTITUDE	GROSS WEIGHT (lb.)														
		2200						2450						2750		
		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		BEST IAS		RATE OF CLIMB FPM	FROM S.L.	
		M.P.H.	KN		TIME MIN.	FUEL USED GAL.	M.P.H.	KN		TIME MIN.	FUEL USED GAL.	M.P.H.	KN		TIME MIN.	FUEL USED GAL.
<u>-25 DEG. CENT.</u>	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90
	4 000	46	40	1560	2.6	3.06	46	40	1280	3.1	3.29	46	40	1000	4.0	3.70
	6 000	46	40	1345	3.9	3.62	46	40	1075	4.8	3.98	46	40	800	6.2	4.55
	8 000	46	40	1125	5.6	4.19	46	40	870	6.9	4.70	46	40	600	9.2	5.55
	10 000	46	40	910	7.5	4.81	46	40	665	9.5	5.52	46	40	400	13.3	6.80
	12 000	46	40	700	10.0	5.52	46	40	460	13.0	6.54	46	40	200	21.5	9.00
<u>-5 DEG. CENT.</u>	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90
	4 000	46	40	1335	2.7	3.11	46	40	1070	3.3	3.35	46	40	795	4.3	3.80
	6 000	46	40	1120	4.3	3.68	46	40	865	5.3	4.07	46	40	600	7.2	4.75
	8 000	46	40	910	6.3	4.29	46	40	660	8.0	4.89	46	40	405	11.4	6.05
	10 000	46	40	705	8.7	5.00	46	40	460	11.5	6.01	46	40	205	18.8	8.10
	12 000	46	40	500	12.1	5.88	46	40	265	17.0	7.37	46	40	30	30.8	11.15

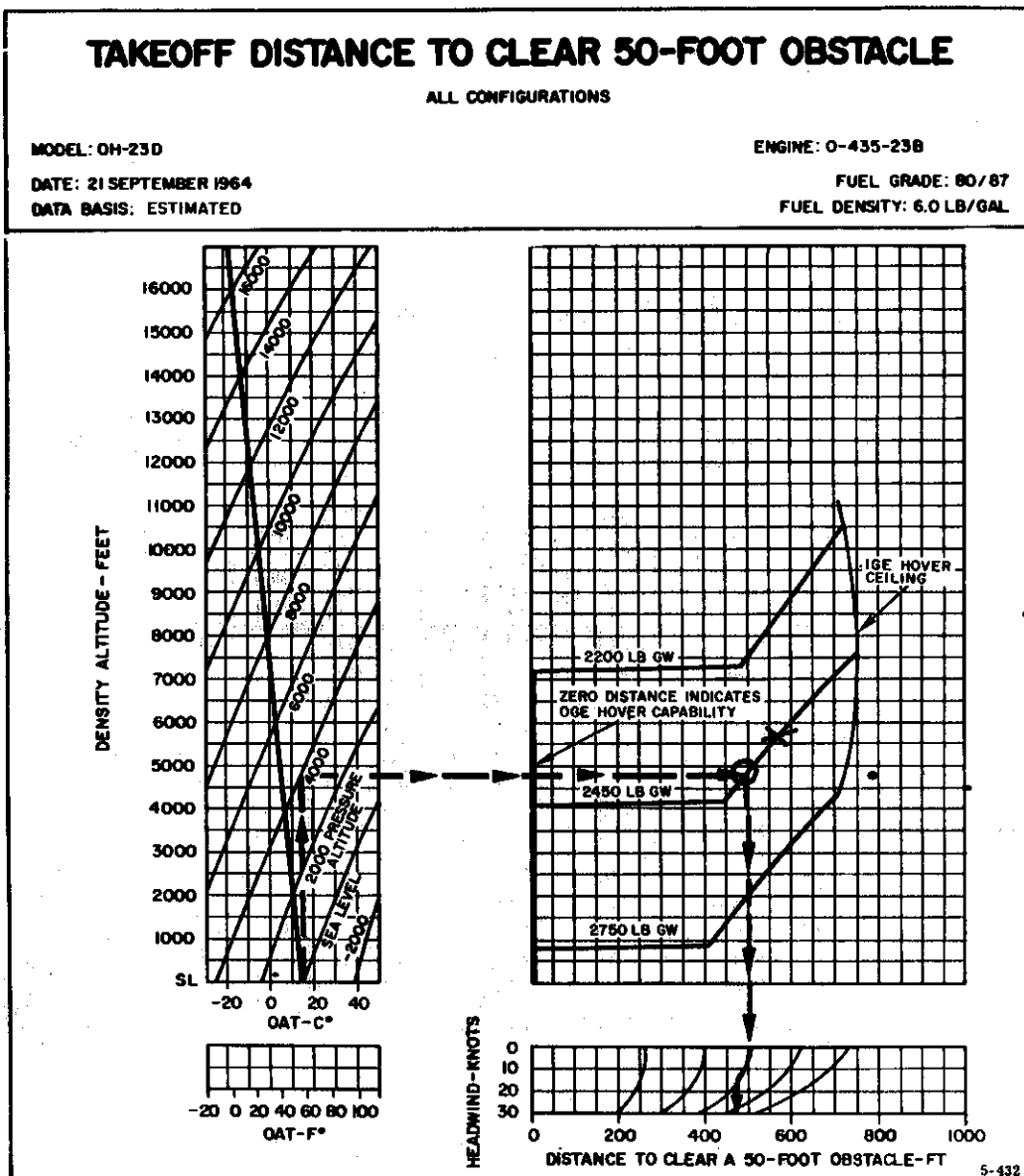
FRAME 5

STEP III

Following the guide line from the point where you marked an "O", read vertically down to the head wind grid and proceed along the curved line until you intercept 15 knot wind line. Proceed vertically to the distance scale and read 470 ft distance required to clear a 50 ft obstacle.

From the point marked X on the 2450 lb weight line. What is the take-off distance to clear a 50' obstacle with a 0 knot head wind.

- a. 470
b. 570
c. 550
d. 425



ANSWER: d. 1345 FPM

FRAME 16.

The next two (2) columns list the time and fuel required to reach 6000 ft altitude starting from sea level.

How many minutes would it require to climb to 6000 ft?

- a. 3.62 min
b. 36.2 min
c. 39 min
d. 3.9 min

How much fuel is required to climb to 6000 feet?

- a. 3.62 lbs
b. 3.62 gal
c. 3.9 gal
d. 3.9 lbs

CLIMB CHART FOR NORMAL POWER																
MODEL(S): OH-23D					CONFIGURATION: ALL					ENGINE(S): O-435-23B						
DATA AS OF: 11 APRIL 1959					FUEL GRADE: 80/87											
DATA BASIS: FLIGHT TEST AND ESTIMATED					FUEL DENSITY: 6.0 LB / GAL.											
TEMPERATURE DEGREE CENTIGRADE	PRESSURE ALTITUDE	GROSS WEIGHT (lb.)														
		2200					2450					2750				
		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		BEST IAS		RATE OF CLIMB FPM	FROM S.L.	
		M.P.H.	KN		TIME MIN.	FUEL USED GAL.	M.P.H.	KN		TIME MIN.	FUEL USED GAL.	M.P.H.	KN		TIME MIN.	FUEL USED GAL.
-25 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03
	2000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90
	4000	46	40	1560	2.6	3.06	46	40	1280	3.1	3.29	46	40	1000	4.0	3.70
	6000	46	40	1345	3.9	3.62	46	40	1075	4.8	3.98	46	40	800	6.2	4.55
	8000	46	40	1125	5.6	4.19	46	40	870	6.9	4.70	46	40	600	9.2	5.55
	10000	46	40	910	7.5	4.81	46	40	665	9.5	5.52	46	40	400	13.3	6.80
	12000	46	40	700	10.0	5.52	46	40	460	13.0	6.54	46	40	200	21.5	9.00
-5 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03
	2000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90
	4000	46	40	1335	2.7	3.11	46	40	1070	3.3	3.35	46	40	795	4.3	3.80
	6000	46	40	1120	4.3	3.68	46	40	865	5.3	4.07	46	40	600	7.2	4.75
	8000	46	40	910	6.3	4.29	46	40	660	8.0	4.89	46	40	405	11.4	6.05
	10000	46	40	705	8.7	5.00	46	40	460	11.5	6.01	46	40	205	18.8	8.10
	12000	46	40	500	12.1	5.88	46	40	265	17.0	7.37	46	40	30	30.8	11.15

ANSWER: b. 570 feet

FRAME 6.

Determine the minimum horizontal distance required to clear an obstacle using charts listed in the Operator's Manual.

Information needed - Aircraft type: OH-23D

Barrier: 50 ft trees

Outside Air Temp (OAT): 15°C

Pressure Altitude: 2000 ft

Aircraft Gross Weight: 2750 lbs

Winds: 15 K (Headwind)

a. 550 ft

b.

570 ft

c. 410 ft

d. 450 ft

TAKEOFF DISTANCE TO CLEAR 50-FOOT OBSTACLE

ALL CONFIGURATIONS

MODEL: OH-23D

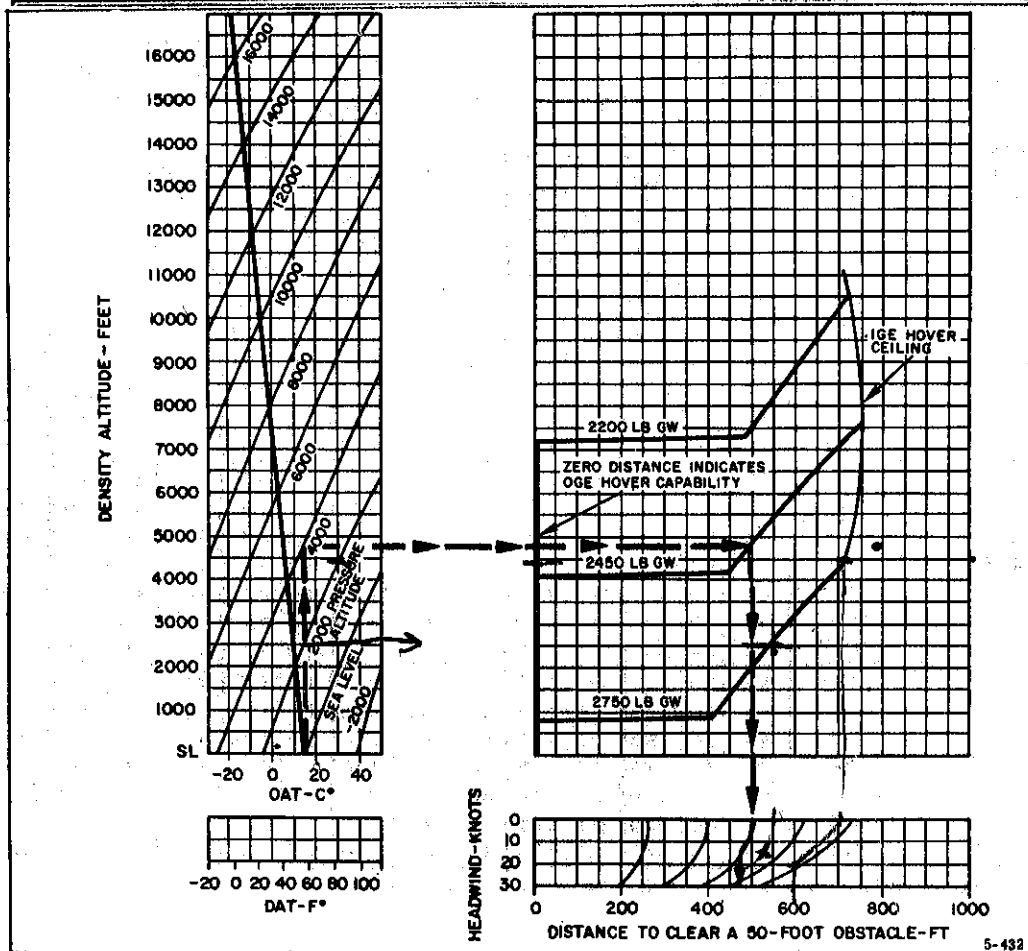
ENGINE: O-435-23B

DATE: 21 SEPTEMBER 1964

FUEL GRADE: 80/87

DATA BASIS: ESTIMATED

FUEL DENSITY: 6.0 LB/GAL



ANSWER: d. 3.9 minutes, b. 3.62 gallons

FRAME 17.

Determine the rate of climb, time and fuel required to climb to a specified altitude using performance data charts.

Information Needed: ACFT Type: OH-23D

Gross Weight: 2450

Temperature: +15°C

Pressure Altitude: 6000 ft

Answer the following: Rate of climb 670 FPM.

Time required 6.7 min.

Fuel required 4.25 gal.

NOTE: Fuel required includes 5 minutes for warm up and take-off.

CLIMB CHART FOR NORMAL POWER																	
MODEL (S): OH-23D					CONFIGURATION: ALL					ENGINE (S): O-435-23B							
DATA AS OF: 11 APRIL 1958					FUEL GRADE: 80/87												
DATA BASIS: FLIGHT TEST AND ESTIMATED					FUEL DENSITY: 6.0 LB / GAL.												
TEMPERATURE DEGREE CENTIGRADE	PRESSURE ALTITUDE	GROSS WEIGHT (lb.)															
		2200						2450						✓ 2750			
		BEST IAS		RATE OF CLIMB		FROM S.L.		BEST IAS		RATE OF CLIMB		FROM S.L.		BEST IAS		RATE OF CLIMB	
		M.P.H.	KN	FPM	TIME MIN.	FUEL USED GAL.	M.P.H.	KN	FPM	TIME MIN.	FUEL USED GAL.	M.P.H.	KN	FPM	TIME MIN.	FUEL USED GAL.	
-25 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03	
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90	
	4 000	46	40	1560	2.6	3.06	46	40	1280	3.1	3.29	46	40	1000	4.0	3.70	
	6 000	46	40	1345	3.9	3.62	46	40	1075	4.8	3.98	46	40	800	6.2	4.55	
	8 000	46	40	1125	5.6	4.19	46	40	870	6.9	4.70	46	40	600	9.2	5.55	
	10 000	46	40	910	7.5	4.81	46	40	665	9.5	5.52	46	40	400	13.3	6.80	
	12 000	46	40	700	10.0	5.52	46	40	460	13.0	6.54	46	40	200	21.5	9.00	
-5 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03	
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90	
	4 000	46	40	1335	2.7	3.11	46	40	1070	3.3	3.35	46	40	795	4.3	3.80	
	6 000	46	40	1120	4.3	3.68	46	40	865	5.3	4.07	46	40	600	7.2	4.75	
	8 000	46	40	910	6.3	4.29	46	40	660	8.0	4.89	46	40	405	11.4	6.05	
	10 000	46	40	705	8.7	5.00	46	40	460	11.5	6.01	46	40	205	18.8	8.10	
	12 000	46	40	500	12.1	5.88	46	40	265	17.0	7.37	46	40	30	30.8	11.15	
+15 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03	
	2 000	46	40	1350	1.4	2.59	46	40	1070	1.7	2.72	46	40	800	2.2	2.95	
	4 000	46	40	1130	3.0	3.15	46	40	870	3.8	3.44	46	40	600	5.2	4.00	
	6 000	46	40	925	4.9	3.76	46	40	670	6.4	4.25	46	40	415	9.2	5.21	
	8 000	46	40	720	7.4	4.46	46	40	480	9.8	5.26	46	40	230	16.0	7.15	
	10 000	46	40	520	10.8	5.33	46	40	285	15.1	6.65	46	40	-	-	-	
	12 000	46	40	320	15.4	6.50	46	40	90	25.8	9.29	-	-	-	-	-	

REMARKS: 1. CLIMB BASED ON 3200 RPM AND 27.4 INCHES Hg AT SEA LEVEL.

ANSWER: b. 510 feet

FRAME 7

The weight at which an aircraft can take off is generally governed by engine performance. Certain atmospheric conditions can reduce engine efficiency, thus reducing the load carrying capability of an aircraft. To determine an aircraft's take-off weight, we use the Take-Off Gross Weight Limit Chart.

To enter the Take-Off Gross Weight Chart, use the broken arrow as a guide. Follow the broken arrow from the 6000 ft pressure altitude line until it intercepts the diagonal +15°C air temperature line. From the point of intercept, follow the arrow until it reaches the bottom of the chart. It reads 2525 lbs take-off weight.

What is the take-off weight with a pressure altitude of 4000 ft and an outside air temperature of 38°C?

a.
b.

2620

2650

c. 2670

d. 2460

TAKEOFF GROSS WEIGHT LIMIT CHART

ALL CONFIGURATIONS

MODEL: OH-23D

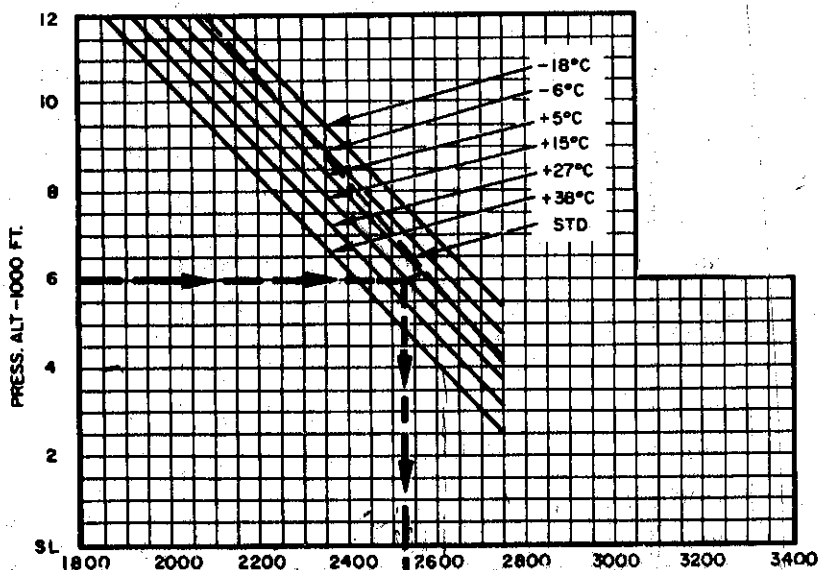
ENGINE: O-435-238

DATA AS OF: 11 APRIL 1958

DATA BASIS: FLIGHT TEST

FUEL GRADE: 80/87

FUEL DENSITY: 6.0 LB / GAL.



ANSWER: Rate of climb - 670 FPM, Time required - 6.4 min
 Fuel required - 4.25 Gal

FRAME 18

The Range Chart used in conjunction with the Climb Chart will present the maximum range you can expect with a specific fuel load and power setting.

Using the procedures outlined in the previous frames, determine the performance data for these given conditions.

MODEL OH-23D

Gross Weight: 2750 lbs

Engine speed: 3200 RPM

Press Altitude: 2000 ft

Fuel load: 276 lbs

Man Press: 23.3 INHG, Speed: 65 TAS, Fuel Used: 117 lb/hr
 Range: 151 NM.

RANGE CHART

ICAO STANDARD DAY

ALL CONFIGURATIONS

MODEL: OH-23D

ENGINE: O-435-23B

DATE: 11 APRIL 1958

FUEL GRADE: 80/87

DATA BASIS: ESTIMATED

MAXIMUM RANGE

FUEL DENSITY: 6.0 LB/GAL

MIXTURE: NOT APPLICABLE

GROSS WEIGHT POUNDS	PRESS ALT FEET	POWER SETTINGS					RANGE-NAUTICAL MILES				
		ENGINE SPEED	MAN. PRESS	APPROXIMATE			516 *LB FUEL	276 LB FUEL	200 LB FUEL	125 LB FUEL	50 LB FUEL
				TOTAL	SPEED/KNOTS						
				RPM	IN.Hg	LB/HR	TAS	CAS			
2750	8000										
	6000	3200	21.9	111	67	61	300	160	117	73	29
	4000	3200	22.6	113	66	62	291	155	113	71	29
	2000	3200	23.3	117	65	63	282	151	109	69	28
	SL	3200	24.0	120	64	64	273	146	106	68	27
2450	8000										
	6000	3200	21.3	105	67	61	316	170	123	77	31
	4000	3200	21.9	109	66	62	307	164	119	75	30
	2000	3200	22.5	112	65	63	298	159	116	73	29
	SL	3200	23.2	116	64	64	288	154	112	70	28
2200	8000		20.3	103	69	61	344	184	133	83	34
	6000	3200	21.0	104	68	62	335	179	130	81	33
	4000	3200	21.4	106	67	63	322	172	125	78	31
	2000	3200	22.0	108	66	64	313	167	121	76	30
	SL	3200	22.6	111	65	65	302	162	117	73	29

REMARKS: * INCLUDES 240 POUNDS OF FUEL IN AUXILIARY TANKS.

FIGURES WITHIN HEAVY BLACK BORDERLINES ARE ESTIMATED DATA.

ANSWER: a. 2620

FRAME 8.

To determine the effects of humidity, follow the broken arrow vertically down to the specific humidity grid. Proceed parallel along the slanted line until you intersect the 0.0075 specific humidity line. Follow the arrow until it reaches the bottom of the chart. It reads 2475 lbs take-off weight.

What is the take-off weight with a pressure altitude of 4000 ft, 38°C outside air temperature, and a specific humidity of 0.02? Mark this point with an X.

a. 2425

b. 2570

c. 2500

⑧ 2525

TAKEOFF GROSS WEIGHT LIMIT CHART

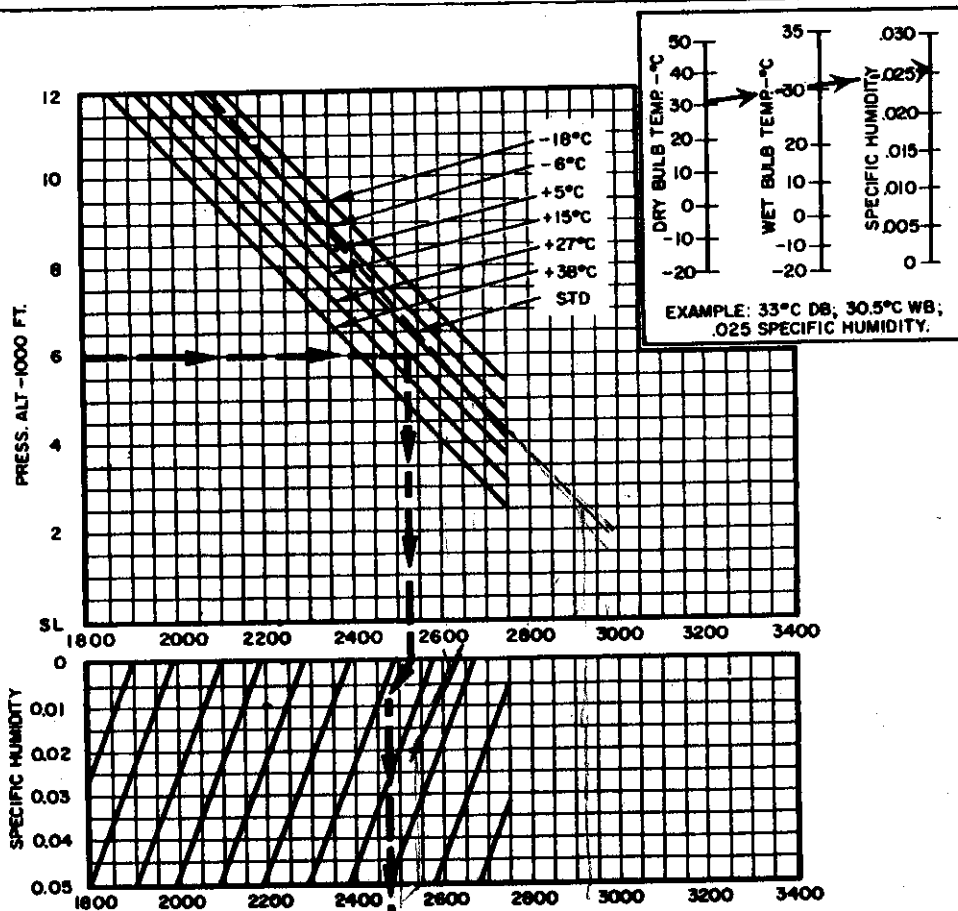
ALL CONFIGURATIONS

MODEL: OH-230

ENGINE: O-435-238

DATA AS OF: 11 APRIL 1958
DATA BASIS: FLIGHT TEST

FUEL GRADE: 80/87
FUEL DENSITY: 6.0 LB / GAL.



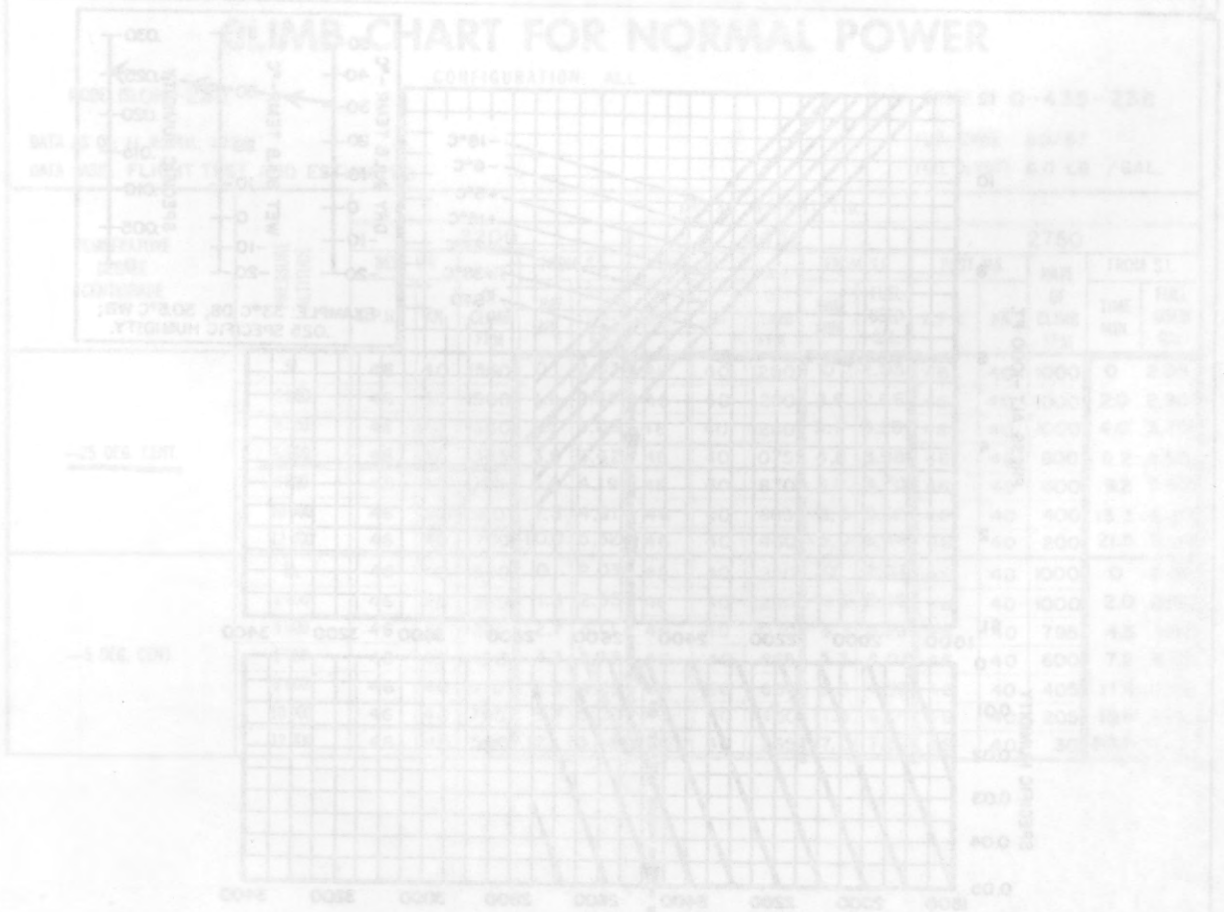
ANSWER: 23.3 in. Hg. man press.

117 lb/hr

65 Knots TAS

151 Nautical Miles

TURN TO PAGE 18



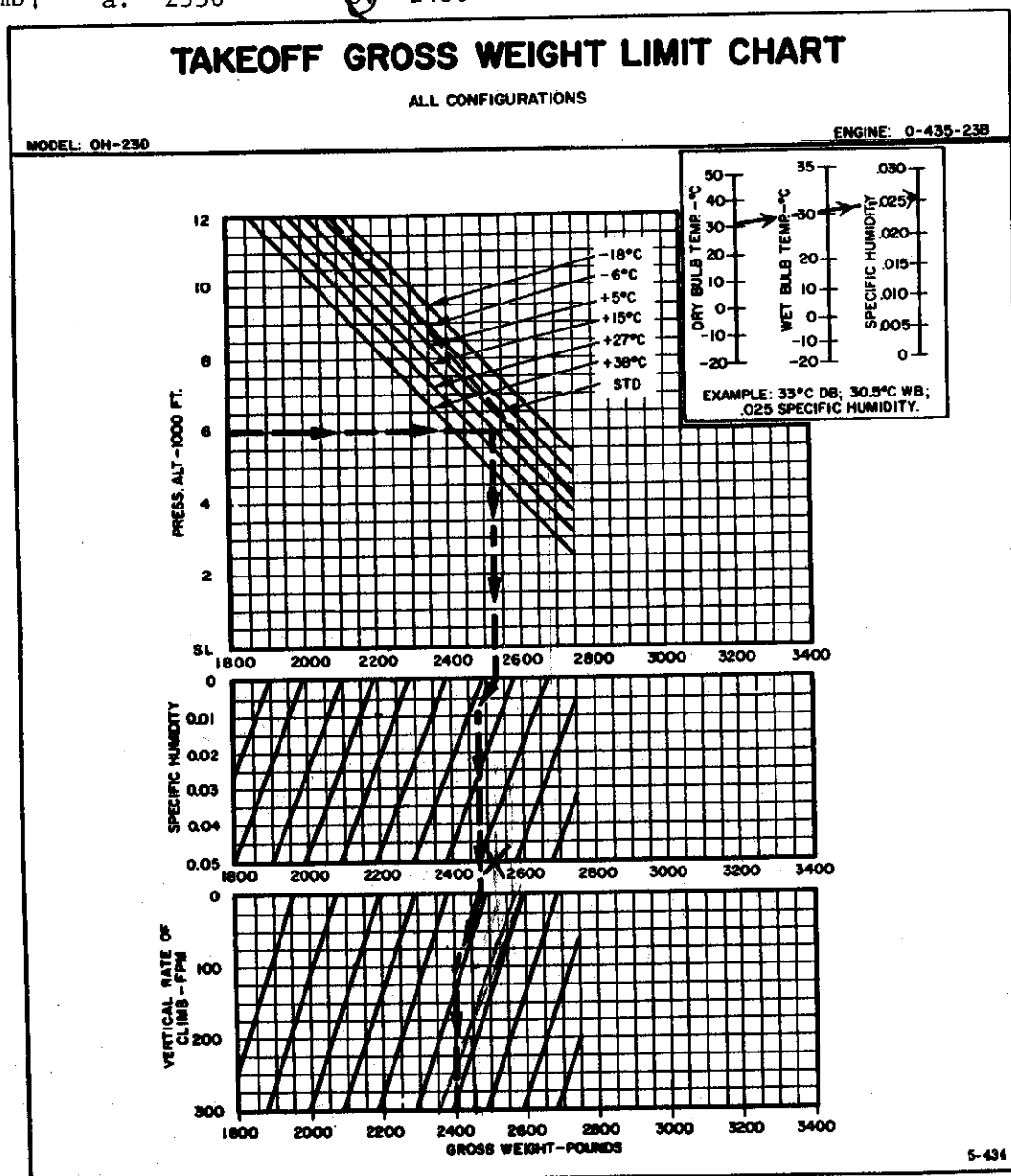
ANSWER: d. 2525 lbs take-off gross weight.

FRAME 9

Now we want to know at what gross weight we can maintain a specific rate of climb.

Follow the broken arrow from the specific humidity grid to the rate of climb chart. Move parallel to the slanted line to the 100 FPM line. Proceed vertically down to the gross weight scale and read 2400 lbs.

From the point marked "X" on the specific humidity grid, what is the maximum gross weight that we can take off and maintain a 100 FPM rate of climb? a. 2550 b. 2460 c. 2525 d. 2560



FRAME 19.

Aircraft endurance is the maximum length of time an aircraft can remain airborne with a specific amount of fuel.

The Endurance Chart is used in the same manner as the Climb Chart for normal power and Range Chart.

Determine the performance data for the following given conditions:

Model OH-23D

Gross Weight: 2750 lbs

Engine Speed: 3200 RPM

Press Altitude: 2000 ft

Fuel Load: 276 lbs

Man Press: _____ In Hg

Speed: _____ TAS

Fuel Consumption: _____ lb/hr

Endurance: _____ hours

ENDURANCE CHART

ICAO STANDARD DAY

ALL CONFIGURATIONS

MODEL: OH-230

ENGINE: O-435-23B

DATE: 11 APRIL 1958

FUEL GRADE: 80/87

DATA BASIS: ESTIMATED

MAXIMUM ENDURANCE

FUEL DENSITY: 6.0 LB/GAL

MIXTURE: NOT APPLICABLE

GROSS WEIGHT POUNDS	PRESS ALT FEET	POWER SETTINGS					ENDURANCE—HOURS				
		ENGINE SPEED	MAN. PRESS	APPROXIMATE			516 * LB FUEL	276 LB FUEL	200 LB FUEL	125 LB FUEL	50 LB FUEL
				TOTAL	SPEED/KNOTS						
		RPM	IN. Hg	LB/HR	TAS	CAS					
2750	8000										
	6000	3200	18.6	91.3	43.7	40	5.65	3.02	2.19	1.37	0.55
	4000	3200	19.1	92.5	42.5	40	5.59	2.98	2.16	1.35	0.54
	2000	3200	19.5	93.0	41.2	40	5.55	2.97	2.15	1.34	0.54
	SL	3200	19.9	93.5	40.0	40	5.51	2.95	2.14	1.34	0.53
2450	8000										
	6000	3200	17.8	86.5	43.7	40	5.96	3.19	2.31	1.45	0.58
	4000	3200	18.2	87.5	42.5	40	5.90	3.15	2.29	1.43	0.57
	2000	3200	18.6	88.0	41.2	40	5.86	3.14	2.27	1.42	0.57
	SL	3200	19.0	88.5	40.0	40	5.83	3.12	2.26	1.41	0.56
2200	8000	3200	16.5	81.3	45.0	40	6.35	3.40	2.47	1.54	0.62
	6000	3200	17.0	82.0	43.7	40	6.29	3.36	2.44	1.52	0.61
	4000	3200	17.3	83.0	42.5	40	6.20	3.32	2.41	1.51	0.60
	2000	3200	17.8	84.0	41.2	40	6.14	3.28	2.38	1.49	0.59
	SL	3200	18.2	84.3	40.0	40	6.12	3.27	2.37	1.48	0.59

REMARKS:

* INCLUDES 240 POUNDS OF FUEL IN AUXILIARY TANKS.

FIGURES WITHIN HEAVY BLACK BORDERLINES ARE ESTIMATED DATA.

ANSWER: b. 2460 lbs

FRAME 10

Determine the take-off gross weight of an OH-23D using charts listed in the Operator's Manual.

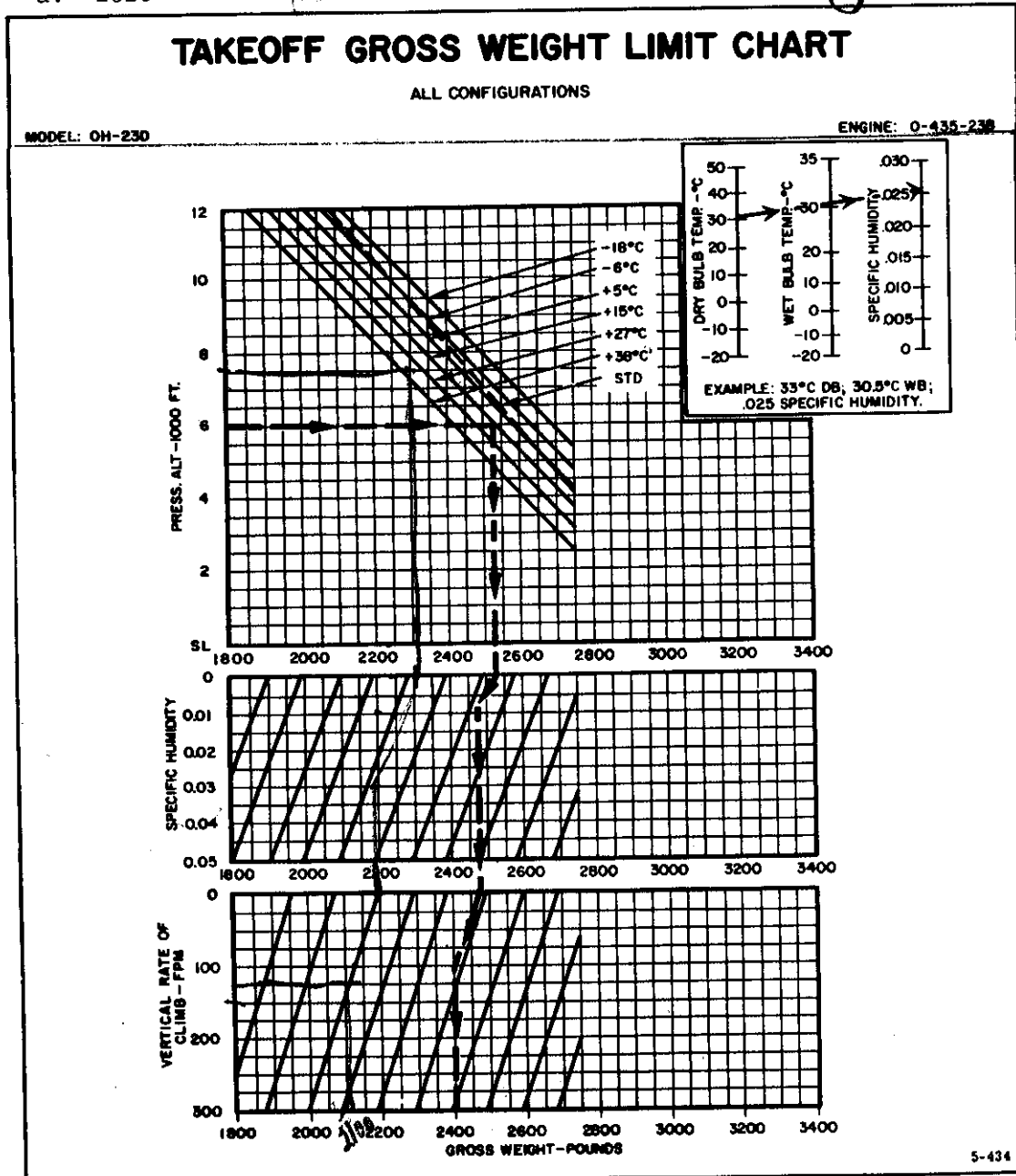
Information Needed: Aircraft Type: OH-23D Specific Humidity: 0.03
Pressure Altitude: 7,500 ft Desired Rate of Climb:
Outside Air Temp (OAT): 37°C 125 FPM

a. 2020

b. 2120

c. 2180

d. 2075



ANSWER: 19.5 In Hg
 93.0 lb/hr
 41.2 TAS
 2.97 hours

CONTINUE TO THE SELF EVALUATION EXERCISE PAGE 22

ANSWER: d. 2075

FRAME 11.

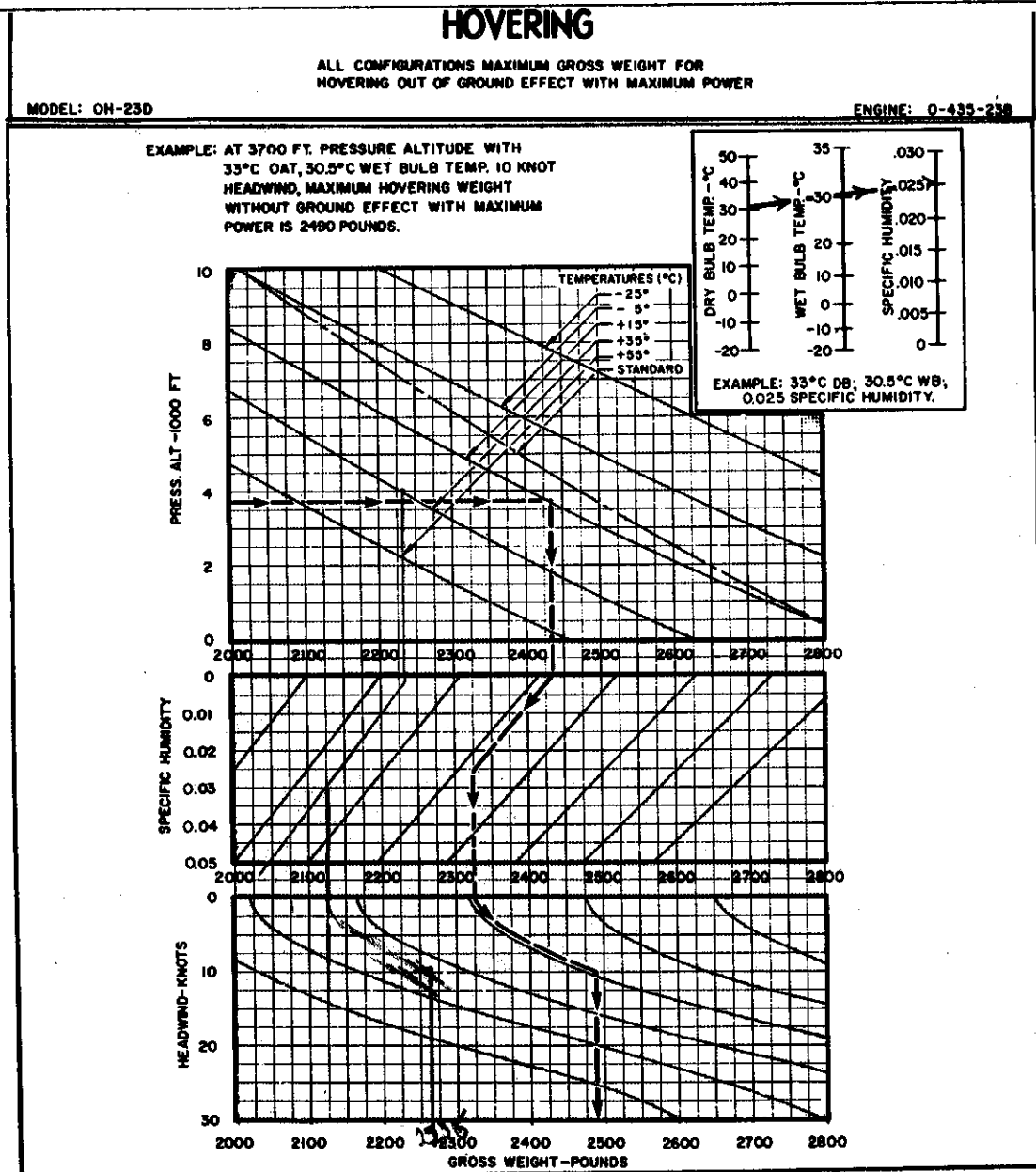
The Hovering Chart presents the maximum weight at which the aircraft can hover. The chart is read using the same principles as the Take-off Gross Weight Charts.

Determine the maximum gross weight that an OH-23D can hover out of ground effect using the chart from the Operator's Manual.

Information required: Pressure Altitude: 4000 ft. Specific Humidity: 0:03.

Temperature: 35°C Wind: 10K (headwind)

a. 2310 (b) 2260 c. 2360 d. 2200



PERFORMANCE DATA CHARTS

SELF EVALUATION EXERCISE

NOTE: Performance data charts required to complete problems 2 thru 5 are found on pages 24, 25, 26, and 27.

1. To determine performance data for a helicopter, refer to the

- a. Operator's Manual (-10).
- b. Organizational Maintenance Manual (-20).
- c. TB AVN 23-16.
- d. Engine Data Plate.

2. Using the data furnished, what is the take-off distance required for an OH-23D to clear a 50-foot obstacle?

Engine	0-435-23B	Outside Air Temperature	20°C
Fuel Grade	80/87	Pressure Altitude	2000 ft
		Gross Weight	2750 lbs
		Headwind	20 KTS

- a. 475
- b. 525
- c. 575
- d. 600

3. What is the take-off gross weight limit for an OH-23D operating under the conditions listed?

Pressure Altitude	5000 ft
Outside Air Temperature	+5°C
Specific Humidity	0.03
Rate of Climb	200 FPM

- a. 2400 **b. 2440** c. 2500 d. 2550

4. Aircraft Type	OH-23D	Temperature	+15°C
Gross Weight	2700 lbs	Pressure Altitude	6000 ft

Using the data and the climb chart furnished, determine the operating conditions that would give you the best performance.

- a. Best indicated airspeed 44 MPH 40 KN.
- b. Rate of climb 415.
- c. Time of climb from sea level 9.2 min.
- d. Fuel used (includes 5 min warmup and take-off allowance) 5.21 gal.

5. Type Aircraft: OH-23D
Gross Weight: 2690 lbs
Pressure Altitude: 2000 ft
Engine Speed: 3200 RPM
Man Pressure: 23.3 IN Hg
Fuel Load: 276 lbs

Using the data and range chart furnished,

- a. Determine the maximum range that you would be able to fly with a NO wind condition.

Range 151 KM

- b. What approximate true air speed (TAS) would you maintain?

True Airspeed 65 K

TAKEOFF DISTANCE TO CLEAR 50-FOOT OBSTACLE

ALL CONFIGURATIONS

MODEL: OH-23D

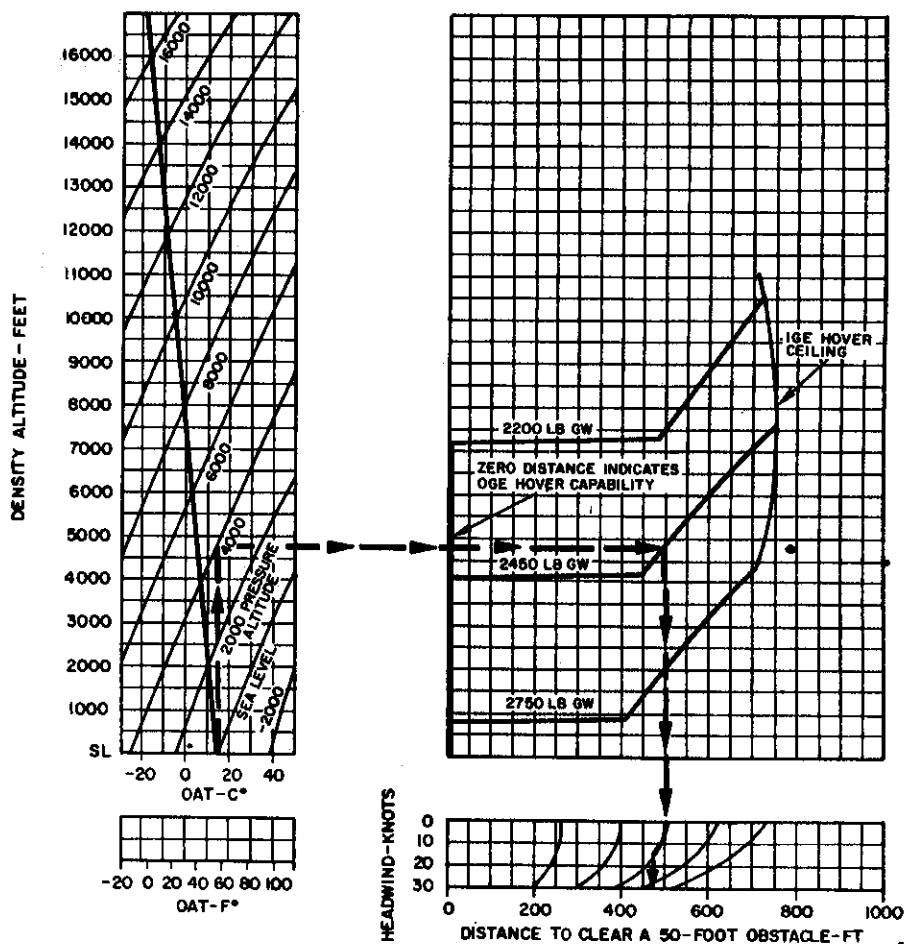
ENGINE: O-435-23B

DATE: 21 SEPTEMBER 1964

FUEL GRADE: 80/87

DATA BASIS: ESTIMATED

FUEL DENSITY: 6.0 LB/GAL



5-432

Figure 14-6. Takeoff distance to clear 50-foot obstacle, OH-23D aircraft

TAKEOFF GROSS WEIGHT LIMIT CHART

ALL CONFIGURATIONS

MODEL: OH-230

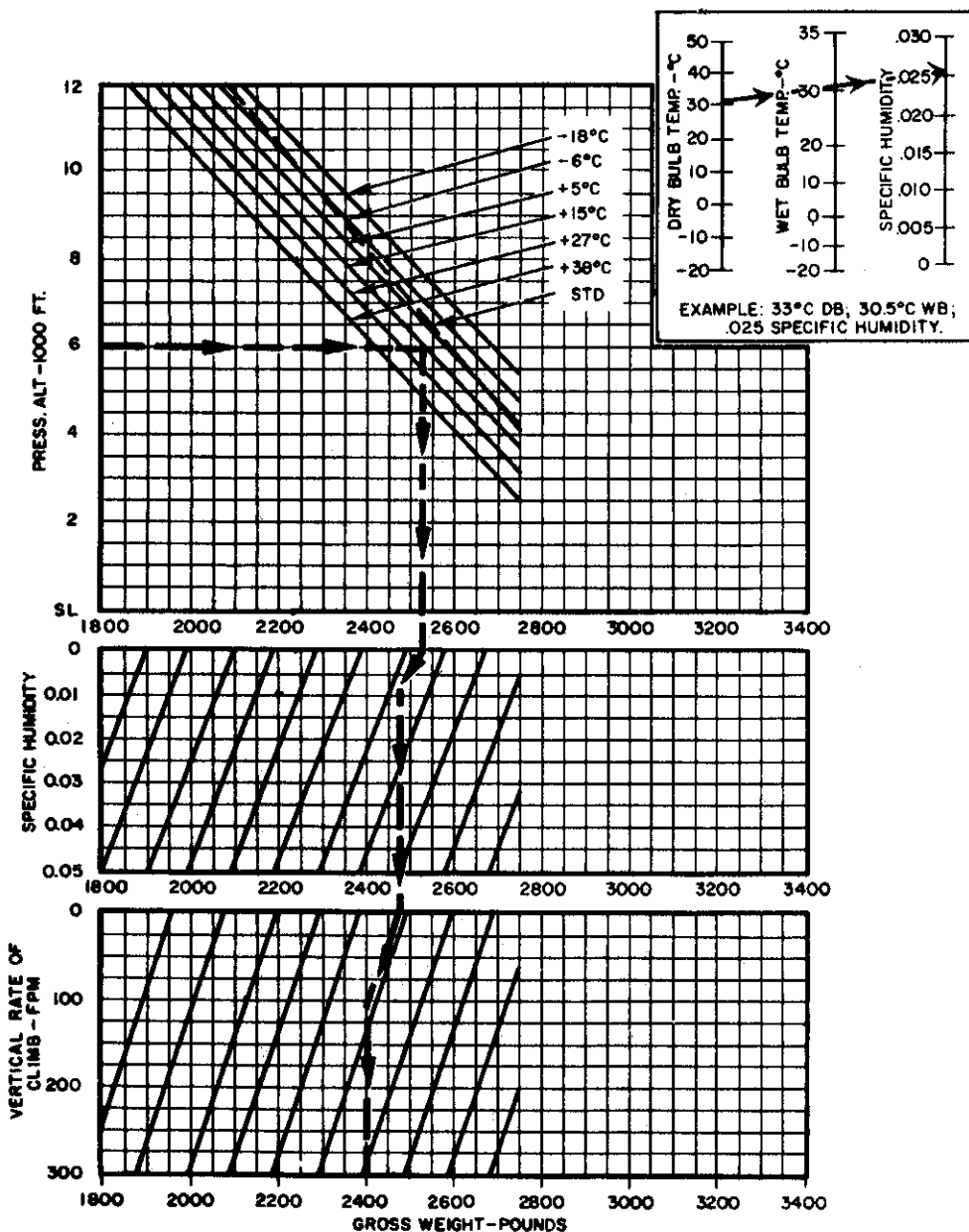
ENGINE: O-435-238

DATA AS OF: 11 APRIL 1958

DATA BASIS: FLIGHT TEST

FUEL GRADE: 80/87

FUEL DENSITY: 6.0 LB / GAL.



5-434

CLIMB CHART FOR NORMAL POWER

MODEL(S): OH-23D

CONFIGURATION: ALL

ENGINE(S): O-435-238

DATA AS OF: 11 APRIL 1958

FUEL GRADE: 80/87

DATA BASIS: FLIGHT TEST AND ESTIMATED

FUEL DENSITY: 6.0 LB / GAL.

TEMPERATURE DEGREE CENTIGRADE	PRESSURE ALTITUDE	GROSS WEIGHT (lb.)																	
		2200						2450						2750					
		BEST IAS		RATE OF CLIMB FPM	FROM S.L.		FUEL USED GAL.	BEST IAS		RATE OF CLIMB FPM	FROM S.L.		FUEL USED GAL.	BEST IAS		RATE OF CLIMB FPM	FROM S.L.		FUEL USED GAL.
		M.P.H.	KN		TIME MIN.	M.P.H.		KN	TIME MIN.		M.P.H.	KN		TIME MIN.					
-25 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03			
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90			
	4 000	46	40	1560	2.6	3.06	46	40	1280	3.1	3.29	46	40	1000	4.0	3.70			
	6 000	46	40	1345	3.9	3.62	46	40	1075	4.8	3.98	46	40	800	6.2	4.55			
	8 000	46	40	1125	5.6	4.19	46	40	870	6.9	4.70	46	40	600	9.2	5.55			
	10 000	46	40	910	7.5	4.81	46	40	665	9.5	5.52	46	40	400	13.3	6.80			
	12 000	46	40	700	10.0	5.52	46	40	460	13.0	6.54	46	40	200	21.5	9.00			
-5 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03			
	2 000	46	40	1560	1.3	2.55	46	40	1280	1.6	2.66	46	40	1000	2.0	2.90			
	4 000	46	40	1335	2.7	3.11	46	40	1070	3.3	3.35	46	40	795	4.3	3.80			
	6 000	46	40	1120	4.3	3.68	46	40	865	5.3	4.07	46	40	600	7.2	4.75			
	8 000	46	40	910	6.3	4.29	46	40	660	8.0	4.89	46	40	405	11.4	6.05			
	10 000	46	40	705	8.7	5.00	46	40	460	11.5	6.01	46	40	205	18.8	8.10			
	12 000	46	40	500	12.1	5.88	46	40	265	17.0	7.37	46	40	30	30.8	11.15			
+15 DEG. CENT.	SL	46	40	1560	0	2.03	46	40	1280	0	2.03	46	40	1000	0	2.03			
	2 000	46	40	1350	1.4	2.59	46	40	1070	1.7	2.72	46	40	800	2.2	2.95			
	4 000	46	40	1130	3.0	3.15	46	40	870	3.8	3.44	46	40	600	5.2	4.00			
	6 000	46	40	925	4.9	3.76	46	40	670	6.4	4.25	46	40	415	9.2	5.21			
	8 000	46	40	720	7.4	4.46	46	40	480	9.8	5.26	46	40	230	16.0	7.15			
	10 000	46	40	520	10.6	5.33	46	40	285	15.1	6.65	46	40	-	-	-			
	12 000	46	40	320	15.4	6.50	46	40	90	25.8	9.29	-	-	-	-	-			
+25 DEG. CENT.	SL	46	40	1360	0	1.76	46	40	1080	0	1.76	46	40	810	0	1.76			
	2 000	46	40	1150	1.6	2.32	46	40	880	2.0	2.48	46	40	615	2.9	2.75			
	4 000	46	40	940	3.5	2.92	46	40	685	4.6	3.28	46	40	415	6.8	4.00			
	6 000	46	40	740	5.9	3.61	46	40	495	8.0	4.26	46	40	235	13.4	5.90			
	8 000	46	40	540	9.0	4.45	46	40	305	13.0	5.60	46	40	55	32.2	10.80			
	10 000	46	40	345	13.5	5.57	46	40	120	22.4	7.94	-	-	-	-	-			
	12 000	46	40	150	21.6	7.42	-	-	-	-	-	-	-	-	-	-			
+55 DEG. CENT.	SL	46	40	1180	0	1.60	46	40	920	0	1.60	46	40	670	0	1.60			
	2 000	46	40	975	1.9	2.20	46	40	720	2.4	2.38	46	40	470	3.6	2.75			
	4 000	46	40	770	4.2	2.86	46	40	545	5.7	3.32	46	40	285	9.4	4.45			
	6 000	46	40	575	7.1	3.67	46	40	340	10.3	4.57	46	40	110	21.8	8.10			
	8 000	46	40	385	11.3	4.72	46	40	150	18.4	6.63	-	-	-	-	-			
	10 000	46	40	195	18.2	6.33	-	-	-	-	-	-	-	-	-	-			
	12 000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

- REMARKS:
1. CLIMB BASED ON 3200 RPM AND 27.4 INCHES Hg AT SEA LEVEL.
 2. ALL VALUES OF FUEL USED INCLUDE 5 MIN WARMUP AND TAKEOFF ALLOWANCE (WARMUP AND TAKEOFF ALLOWANCE CORRESPONDS TO FUEL USED AT SEA LEVEL).
 3. FIGURES WITHIN HEAVY BLACK BORDERLINES ARE ESTIMATED DATA.

5-438

RANGE CHART

ICAO STANDARD DAY

ALL CONFIGURATIONS

MODEL: OH-230

ENGINE: O-435-23B

DATE: 11 APRIL 1958

FUEL GRADE: 80/87

DATA BASIS: ESTIMATED

MAXIMUM RANGE

FUEL DENSITY: 6.0 LB/GAL

MIXTURE: NOT APPLICABLE

GROSS WEIGHT POUNDS	PRESS ALT FEET	POWER SETTINGS					RANGE-NAUTICAL MILES				
		ENGINE SPEED	MAN. PRESS	APPROXIMATE			516 *LB FUEL	276 LB FUEL	200 LB FUEL	125 LB FUEL	50 LB FUEL
				TOTAL	SPEED/KNOTS						
		RPM	IN. Hg	LB/HR	TAS	CAS					
2750	8000										
	6000	3200	21.9	111	67	61	300	160	117	73	29
	4000	3200	22.6	113	66	62	291	155	113	71	29
	2000	3200	23.3	117	65	63	282	151	109	69	28
	SL	3200	24.0	120	64	64	273	146	106	68	27
2450	8000										
	6000	3200	21.3	105	67	61	318	170	123	77	31
	4000	3200	21.9	109	66	62	307	164	119	75	30
	2000	3200	22.5	112	65	63	298	159	116	73	29
	SL	3200	23.2	116	64	64	288	154	112	70	28
2200	8000		20.3	103	69	61	344	184	133	83	34
	6000	3200	21.0	104	68	62	335	179	130	81	33
	4000	3200	21.4	106	67	63	322	172	125	78	31
	2000	3200	22.0	108	66	64	313	167	121	76	30
	SL	3200	22.6	111	65	65	302	162	117	73	29

REMARKS:

* INCLUDES 240 POUNDS OF FUEL IN AUXILIARY TANKS.

FIGURES WITHIN HEAVY BLACK BORDERLINES ARE ESTIMATED DATA.

5-440

1. a.

2. b.

3. b.

4. a. 46 MPH 40 KN

b. 415 FPM

c. 9.2 Min

d. 5.21 Ga1

5. a. 151 Nautical miles

b. 65 KTS