CENTER OF GRAVITY TABLE MOMENT/100

CHART E
SHEET 12 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

GROSS WEIGHT (POUNDS)	Numbers in Italic are actual moment limits for weights indicated but not for stations shown in column head.									
	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
7900	10270	10349	10428	10507	10586	10744	10902	11060	11218	11297	11376
7925	10303	10382	10461	10540	10620	10778	10937	11095	11254	11333	11412
7950	10335	10415	10494	10574	10654	10812	10971	11130	11289	11369	11448
7975	10368	10447	10527	10607	10687	10846	11006	11165	11325	11404	11484
8000	10400	10480	10560	10640	10720	10880	11040	11200	11360	11440	11520
8025	10433	10513	10593	10673	10754	10914	11075	11235	11396	11476	11556
8050	10465	10546	10626	10707	10787	10948	11109	11270	11431	11512	11592
8075	10498	10578	10659	10740	10821	10982	11144	11305	11467	11547	11628
8100	10530	10611	10692	10773	10854	11016	11178	11340	11502	11583	11664
8125	10563	10644	10725	10860	10888	11050	11213	11375	11538	11619	11700
8150	10595	10677	10758	10840	10921	11084	11247	11410	11573	11655	11736
8175	10628	10709	10791	10873	10955	11118	11282	11445	11609	11690	11772
8200	10660	10742	10824	10906	10988	11152	11316	11480	11644	11726	11808
8225	10693	10775	10857	10939	11022	11186	11351	11515	11680	11762	11844
8250	10725	10808	10890	10973	11055	11220	11385	11550	11715	11798	11880
8275	10758	10840	10923	11006	11089	11254	11420	11585	11751	11833	11916
8300	10790	10873	10956	11039	11122	11288	11454	11620	11786	11869	11952
8325	10823	10906	10989	11072	11156	11322	11489	11655	11822	11905	11988
8350	10855	10939	11022	11106	11189	11356	11523	11690	11857	11941	12024
8375	10888	10971	11055	11139	11223	11390	11558	11725	11893	11976	12060
8400	10920	11004	11088	11172	11256	11424	11592	11760	11928	12012	12096
8425	10953	11037	11121	11205	11290	11458	11627	11795	11964	12048	12132
8450	10985	11070	11154	11239	11323	11492	11661	11830	11999	12084	12168
8475	11018	11102	11187	11272	11357	11526	11696	11865	12035	12119	12204
8500	11050	11135	11220	11305	11390	11560	11730	11900	12070	12155	12240
8525	11083	11168	11253	11338	11424	11594	11765	11935	12106	12191	12276
8550	11115	11201	11286	11372	11457	11628	11799	11970	12141	12227	12312
8575	11148	11233	11219	11405	11491	11662	11834	12005	12177	12262	12348
8600	11180	11266	11352	11438	11525	11696	11868	12040	12212	12298	12384
8625		11299	11385	11471	11558	11730	11903	12075	12248	12334	
8650	*11262*	11332	11418	11505	11591	11764	11937	12110	12283	12370	*12452*
8675		11364	11451	11538	11625	11798	11972	12145	12319	12405	
8700	*11345*	11397	11484	11571	11658	11832	12006	12180	12354	12441	*12519*
8725		11430	11517	11604	11692	11866	12041	12215	12390	12477	
8750	*11428*	11463	11550	11638	11725	11900	12075	12250	12425	12513	*12587*
8775		11495	11583	11671	11759	11934	12110	12285	12461	12548	
8800	*11519*	11528	11616	11704	11792	11968	12144	12320	12496	12584	*12654*
8825		11561	11649	11737	11826	12002	12179	12355	12532	12620	
8850		*11602*	11682	11771	11859	12036	12213	12390	12567	12656	*12722*
8875			11715	11804	11893	12070	12248	12425	12603	12691	

Chart 12-2. Chart E - loading data (Sheet 12 of 16)

CHART E
SHEET 13 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

CENTER OF GRAVITY TABLE
MOMENT/100

Numbers in Italic are actual moment limits for weights indicated but not for stations shown in column head.

GROSS WEIGHT (POUNDS)	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
8900		*11686*	11748	11837	11926	12104	12282	12460	12638	12727	*12789*
8925			11781	11870	11960	12138	12317	12495	12674	12763	
8950		*11769*	11814	11904	11993	12172	12351	12530	12709	12799	*12857*
8975			11847	11937	12027	12206	12386	12565	12745	12834	
9000		*11862*	11880	11970	12060	12240	12420	12600	12780	12870	*12924*
9025			11913	12003	12094	12274	12455	12635	12816	12906	
9050			11946	12037	12127	12308	12489	12670	12851	12942	*12987*
9075				12070	12161	12342	12524	12705	12887	12977	
9100			*12030*	12103	12194	12376	12558	12740	12922	13013	*13054*
9125				12136	12228	12410	12593	12775	12958	13049	
9150			*12115*	12170	12261	12444	12627	12810	12993	13085	*13121*
9175				12203	12295	12478	12662	12845	13029	13120	
9200			*12208*	12236	12328	12512	12696	12880	13064	13156	*13188*
9225				12269	12362	12546	12731	12915	13100	13192	
9250			*12293*	12303	12395	12580	12765	12950	13135	13228	*13255*
2975				12336	12429	12614	12800	12985	13171	13263	
9300				*12378*	12462	12648	12834	13020	13206	13299	*13318*
9325					12496	12682	12869	13055	13242	13335	
9350				*12464*	12529	12716	12903	13190	13277	13371	*13385*
9375					12563	12750	12938	13125	13313	13406	
9400				*12558*	12596	12784	12972	13160	13348	13442	*13451*
9425					12630	12818	13007	13195	13384	13478	
9450				*12644*	12663	12852	13041	13230	13419	13514	*13518*
9475					12697	12886	13076	13265	13455	13549	
9500					12730	12920	13110	13300	13490	13585	

GROSS WEIGHT LIMITATIONS:

Take-off ______________________________ *

Landing ______________________________ *

*NOTE: Service activities shall insert, or substitute, current figures from latest applicable (Technical Order) (Flight Handbook) covering operating restrictions.

Chart 12-2. Chart E - loading data (Sheet 13 of 16)

CHART E
SHEET 14 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

MISCELLANEOUS DATA
PERSONNEL CENTROIDS*

COMPARTMENT	CREW MEMBERS	ARM
B	Pilot	46.7
	Copilot	46.7
C	Passengers	85.0
	Passengers	105.0
	Passengers	117.0
	Medical Attendant	117.0
	Litter Patients	120.0
	Passengers	122.0
	Passengers	139.0
	Passengers	156.0

*See sheet 7 of 15 for seating arrangements.

DIMENSIONAL DATA

Overall Length - Blades Extended	685.4 in.
Length - M/R Blades Removed (T/R Blades F & A)	538.1 in.
Maximum Height - T/R Blades Vertical	173.5 in.
Height - T/R Blades Fore and Aft	168.8 in.
Span - Blades Rotating	576.0 in.
Span - Blades Fore & Aft	114.6 in.

Chart 12-2. Chart E - loading data (Sheet 14 of 16)

CHART E
SHEET 15 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

TYPICAL SERVICE LOADING

The items listed below are typical for the mission indicated. These load items are added to the Basic Weight to determine Operating Weight for the particular mission. (See Sheet 16 of 16 for Loading Examples.)

ITEM	ARM	BASIC MISSION		TROOP CARRIER 11 TROOPS		LITTER EVACUATION	
		Weight	Moment/100	Weight	Moment/100	Weight	Moment/100
Pilot	46.7	200	93	200	93	200	93
Troops (11)	122.3			2420	2960		
Medical Attendant (1)	117.0					200	234
Patients (6)	120.0					1500	1800
Passengers (4)	117.0	800	936				
Medical Equipment	110.0					100	110
Litters	120.0					96	115
Fuel	145.1/149.9	1040	1509	1300	1949	1300	1949
Oil - Engine	173.0	24	42	24	42	24	42
TOTALS		2064	2580	3944	5044	3420	4343

CAUTION

It is possible to exceed cg limits by overloading cabin, by improper placement of cabin load, or by carrying partial cabin load. Correct weight and placement of these variables must be determined to obtain satisfactory balance.

Chart 12-2. Chart E - loading data (Sheet 15 of 16)

CHART E
SHEET 16 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

TYPICAL LOADING EXAMPLES

In the examples below, the values for Basic Weight and Moment are assumed to be as shown. Normally these values are obtained from Chart C. To arrive at Minimum Landing Gross Weight (Operating Weight), add to the Basic Weight those load items pertinent to the mission. Refer to the Center of Gravity Table to determine if loading falls within limits. If loading is satisfactory, determine Take Off Gross Weight by adding the expendable load items to the Minimum Landing Gross Weight. Again it is necessary to check the Center of Gravity Table to determine if loading falls within the limits.

ITEM	WEIGHT	MOMENT/100
Basic Helicopter	4920	7103
Pilot	200	93
Oil - Engine	24	42
MINIMUM LANDING GROSS WEIGHT	5144	7238

The minimum Landing Gross Weight and Moment as located on the Center of Gravity Table fall within the recommended cg limits. Therefore the loading is satisfactory for landing.

ITEM	WEIGHT	MOMENT/100
Minimum Landing Gross Weight	5144	7238
Add: Fuel	1040	1509
Passengers	800	936
TAKE-OFF GROSS WEIGHT	6984	9683

Take-off Gross Weight and Moment as loacted on the Center of Gravity Table fall within the recommended cg limits; therefore, the loading is satisfactory for take-off.

Chart 12-2. Chart E - loading data (Sheet 16 of 16)

100,000 BTU HEATER WINTERIZATION KIT

ITEM	WEIGHT	ARM	MOMENT
UH-1D and UH-1H (205-706-001) Complete Heater Instl.	73.2	197.0	14421

AFT BATTERY INSTL.

ITEM	WEIGHT	ARM	MOMENT
Battery (Fwd)	80.0	5.0	400
Battery (Aft)	80.0	233.0	18640
Aft Battery Provisions (205-1682-1)	15.0	224.8	3378

ARMORED SEAT KITS

ITEM	WEIGHT	ARM	MOMENT
Pilot Seat Kit 177510	165.9	53.0	8793
Co-Pilot Seat Kit 177510	164.3	53.0	8708
Total GFE & Kit	330.2	53.0	17501

ITEM	WEIGHT	ARM	MOMENT
CFE Removed			
Standard Seats	−61.8	55.1	−3404
Inertia Reel Fittings	− 1.6	66.3	− 106
Total CFE Removed	−63.4	55.4	−3510
GFE			
Pilot Seat 177787-3	169.0	55.0	9295
Co-Pilot Seat 177755-3	165.0	55.0	9075
Total GFE	334.0	55.0	18370
Total Kit	270.6	54.9	14860

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 1 of 5)

ARMORED SEAT KITS

(Cont)

ITEM	WEIGHT	ARM	MOMENT
CFE Removed			
Standard Seats	-61.8	55.1	-3404
Inertia Reel Fittings	- 1.6	66.3	- 106
Total CFE Removed	-63.4	55.4	-3510
GFE			
Pilot Seat 178061-1	140.0	55.0	7700
Co-Pilot Seat 178062-1	135.0	55.0	7425
Total GFE	275.0	55.0	15125
Total Kit	211.6	54.9	11615

300 GALLON INTERNAL AUX. FUEL TANK

ITEM	WEIGHT	ARM	MOMENT
Tank Installation (205-706-012)			
Tank Assy., L.H.	50.8	151.3	7686
Tank Assy., R.H.	50.8	151.3	7686
Hose, Assy., L.H.	3.1	138.1	428
Hose Assy., R.H.	3.1	138.1	428
Electrical & Misc.	.4	140.0	56
Hardware	3.5	142.6	499
Total Instl. Weight	111.7	150.3	16783
Full Fuel	1950.0	151.0	294450

60 GALLON EXTERNAL AUX. FUEL TANKS

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-043)			
Tank & Pylon Adaptor Instl., L.H.	31.4	139.4	4377
Tank & Pylon Adaptor Instl., R.H.	31.4	139.4	4377
Tank Assy., L.H.	32.0	142.5	4560
Tank Assy., R.H.	32.0	142.5	4560
Aft External Stores Support Instl.	58.3	142.5	8308
Total CFE	185.1	141.4	26182

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 2 of 5)

60 GALLON EXTERNAL AUX. FUEL TANKS (Cont)

ITEM	WEIGHT	ARM	MOMENT
GFE			
Pylon Assy., L.H.	30.0	142.5	4275
Pylon Assy., R.H.	30.0	142.5	4275
Total GFE	60.0	142.5	8550
Total Kit	245.1	141.7	34732
Full Fuel	780.0	142.5	111150

100 GALLON EXT. AUX. FUEL TANKS

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-043)			
Tank & Pylon Adaptor Instl., L.H.	31.4	139.4	4377
Tank & Pylon Adaptor Instl., R.H.	31.4	139.4	4377
Aft External Stores Support Instl.	58.3	142.5	8308
Total CFE	121.1	140.9	17062
GFE			
Tank Assy., L.H.	48.4	142.5	6897
Tank Assy., R.H.	48.4	142.5	6897
Pylon Assy., L.H.	30.0	142.5	4275
Pylon Assy., R.H.	30.0	142.5	4275
Total GFE	156.8	142.5	22344
Total Kit	277.9	141.8	39406
Full Fuel	1300.0	142.5	185250

XM-23 DOOR MOUNTED M-60

ITEM	WEIGHT	ARM	MOMENT
CFE	NONE		
GFE			
Mounts & Ammunition Boxes	67.0	142.6	9555
Guns & Ejection Control Bags	56.0	142.0	7949
Total GFE & Total Kit	123.0	142.3	17504
Ammunition, 1200 Rds. 7.62 MM	78.0	140.4	10950

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 3 of 5)

M-6 SUBSYSTEM

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-024)			
Adapter, Gun Turret	7.8	74.1	578
Ammunition Tie Down Rack	13.3	81.9	1089
External Hydraulic Instl.	4.0	73.8	295
External Wiring	2.0	73.5	147
External Hardware	2.5	72.8	182
Fwd. External Stores Support Instl.	63.0	74.2	4676
Total CFE	92.6	75.2	6967
GFE			
M60-C Machine Guns	83.9	77.5	6502
02153 Ammunition Box	46.6	83.6	3896
04703 Ammunition Chutes	18.4	73.4	1351
04704 Ammunition Chutes	13.1	81.9	1073
04683 Loop Clamp	0.4	80.0	32
02234 Sight Stations	9.3	42.0	391
02109 Control Panel	5.4	50.0	270
04618 Gun Mount & Charger	130.8	73.9	9666
Total GFE	307.9	75.3	23181
Total Kit	400.5	75.3	30148
Ammunition, 7.62 MM (6000 Rounds)	390.0	83.6	32604

XM-3 FFAR SUBSYSTEM

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-041)			
Sight Support	1.6	25.0	40
Electrical Wiring, Internal Kit	3.8	118.4	450
Equipment Shelf	1.9	113.2	215
Sight Light Panel	.9	50.0	45
Hardware	.4	52.5	21
Aft External Stores Support Instl.	58.3	142.5	8308
Total CFE	66.9	135.7	9079
GFE			
Mark VIII Sight	6.0	31.0	186
Control Panel	4.0	46.0	184
External Wiring	8.0	142.0	1136

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 4 of 5)

XM-3 FFAR SUBSYSTEM (Cont)

ITEM	WEIGHT	ARM	MOMENT
Rocket Pods	268.0	146.0	39128
Pylons & Braces	33.0	147.0	4851
Cranks & Adapters	54.0	144.0	7776
Redstone Junction Box	35.0	113.0	3955
Hardware	2.0	142.0	284
Total GFE	410.0	140.2	57500
Total Kit	476.9	139.6	66579
2.75" FFAR Rockets (48)	1036.3	138.9	143942

EXTERNAL STORES SUPPORT

ITEM	WEIGHT	ARM	MOMENT
Stores Rack (205-706-013-5)			
Cross Beam Assys.	29.5	142.5	4207
Fwd. Beam Assys.	11.5	129.0	1481
Aft Beam Assys.	11.9	155.1	1843
Fwd. Sway Brace Assys.	1.1	135.3	152
Aft Sway Brace Assys.	1.2	149.7	186
Hardware	3.1	142.9	439
Total Aft Stores Instl.	58.3	142.5	8308
Stores Rack (205-706-013-11)			
Cross Beam Assys.	31.1	73.9	2301
Fwd. Beam Assys.	11.7	63.0	
Aft Beam Assys.	13.6	84.5	1148
Fwd. Sway Brace Assys.	1.9	68.4	130
Aft Sway Brace Assys.	1.5	79.7	120
Hardware	3.2	74.0	239
Total Fwd. Stores Instl.	63.0	74.2	4676

XM52 SMOKE GENERATOR SUBSYSTEM

"A" Kit	16.7	161.67	2700
"B" Kit	39.64 -20.62	120.08 122.21	4760 -2520
"C" Kit without oil in tank	117.5	127.57	14990
"C" Kit with oil in tank (50 gal)	492.5	121.81	59990

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 5 of 5)

SECTION IV WEIGHT AND BALANCE CLEARANCE FORM F, DD FORM 365F

12-15. WEIGHT AND BALANCE CLEARANCE FORM F, DD FORM 365F.

12-16. This form is the summary of the actual disposition of the load in the helicopter. It records the balance status of the helicopter, step-by-step. It serves as a work sheet on which to record weight and balance calculations and any corrections that must be made to insure that the helicopter will be within weight and cg limits. A form F is required for Models YUH-1D, UH-1D and UH-1H helicopters only when the loading is such as to seriously affect the flying characteristics and safety of the helicopter, and in all cases where alternate loading is employed.

12-17. USE. Form F is furnished in expendable pads, or as separate sheets, which can be replenished when exhausted. An original and carbon are prepared for each loading, as applicable. The original sheets, carrying the signature of responsibility can be removed and placed in the helicopter "G" files to serve as certificates of proper weight and balance as required by AR 95-16. The duplicate copy shall be retained in the helicopter for the duration of the flight. On a cross country flight, this form aids the weight and balance technician at refueling bases and stopover stations. There are two versions of this form TRANSPORT and TACTICAL.

Note

U.S. Army special mission helicopters shall use DD Form 365F titled TRANSPORT.

12-18. These two versions were designed to provide for the prospective loading arrangement of two types of helicopters. However, the general use and fulfillment of either version is the same. Specific instructions for filling out both versions of this form, applicable to Models YUH-1D, UH-1D and UH-1H helicopters, are given in the following paragraphs.

Note

The choice of which version to use is the responsibility of the weight and balance technician at the take-off base.

12-19. DD FORM 365F - TRANSPORT (SPECIAL MISSION) HELICOPTERS.

12-20. Ascertain that transport aircraft Form (F) (see Chart 12-4) entries are completed in accordance with the following instructions.

a. Insert the necessary identifying information at the top of the form. In the blank spaces of the "Limitations" table, enter the gross weight and cg restrictions obtained from Chapter 7. (See chart 12-4 for sample form.)

b. Reference 1 - Enter the helicopter basic weight and moment/100 value. Obtain these figures from the last entry on Chart C - Basic Weight and Balance Record.

Note

Enter moment/100 values throughout the form. Obtain these values from Chart E.

c. Reference 2 - Enter the quantity and weight of oil.

d. Reference 3 - Enter the number and weight of crew. Use actual crew weights if available.

e. Reference 4 - Enter weight of crew's baggage.

f. Reference 5 - Not applicable.

g. Reference 6 - Enter the weight of emergency equipment, if applicable.

h. Reference 7 - Enter the weight of any extra equipment, if applicable.

i. Reference 8 - Enter the sum of the weights of references 1 through 7 to obtain "operating weight."

j. Reference 9 - Enter the number of gallons and weight of take-off fuel. The weight of fuel used during warm-up shall not be included.

Note

List under REMARKS the fuel tanks concerned and the amount of fuel in each tank. If the external or internal fuel is carried, make appropriate entries to that effect in the space provided.

k. Reference 10 - Not applicable.

l. Reference 11 - Enter the sum of the weight for references 8 through 10 to obtain "Total Helicopter Weight."

m. Determine the "Allowable Load" based on take-off and landing by use of the "Limitations" table in the upper left-hand corner of the form as follows:

WEIGHT AND BALANCE CLEARANCE FORM F

TRANSPORT

(USE REVERSE FOR TACTICAL MISSIONS)

Cross Reference RAF Form 2870 RCAF Form F 115 C 60M 5-51 (0797)

FOR USE IN T. O. 1-1B-40 & AN 01-1B-40

DATE	AIRPLANE TYPE	FROM	HOME STATION
3-1-62	YUH-1D	FT. BRAGG, N.C.	FT. RUCKER
MISSION/TRIP/FLIGHT/NO.	**SERIAL NO.**	**TO**	**PILOT**
Courier Run	SAMPLE	FT. POLK, LA.	LT. JONES

LIMITATIONS

CONDITION	TAKEOFF	LANDING	LIMITING WING FUEL
¹ALLOWABLE GROSS WEIGHT	8600	8600	
TOTAL AIRPLANE WEIGHT (Ref. 11)	6096	X	X
OPERATING WEIGHT PLUS ESTIMATED LANDING FUEL WEIGHT	X	5256	X
OPERATING WEIGHT (Ref. 8)	X	X	5056
ALLOWABLE LOAD (Ref. 18) (use SMALLEST figure)			
²PERMISSIBLE C. G. TAKEOFF	FROM *	TO ~~(% M.A.C. or IN.)~~ 144	
²PERMISSIBLE C. G. LANDING	FROM *	TO ~~(% M.A.C. or IN.)~~ 144	
⁵LANDING FUEL WEIGHT	200		

REF	ITEM	WEIGHT	MOM/100
1	BASIC AIRPLANE (From Chart C)	4822.0	7068
2	OIL (4.5 Gal)	34.0	59
3	CREW (No.)	200.0	93
4	CREW'S BAGGAGE		
5	STEWARD'S EQUIPMENT		
6	EMERGENCY EQUIPMENT		
7	EXTRA EQUIPMENT		
8	OPERATING WEIGHT	5056.0	7220
9	TAKEOFF FUEL (Gal)	1040.0	1516
10	WATER INJ FLUID (Gal.)		
11	TOTAL AIRPLANE WEIGHT	6096.0	8736

REMARKS

* SEE CENTER OF GRAVITY LIMITS DIAGRAM P. 7-2

12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)

COMPT	UPPER COMPARTMENTS PASSENGERS NO.	WEIGHT	CARGO	COMPT	LOWER COMPARTMENTS PASSENGERS NO.	WEIGHT	CARGO	WEIGHT	MOM/100
A									
B									
C	7	200						1400.0	1510
D									
E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									
P									
FWD BELLY									
AFT BELLY									

EXAMPLE

TOTAL FREIGHT	0
TOTAL MAIL	0
COMPUTER PLATE NUMBER (If used)	

¹ *Enter constant used.*
² *Enter values from current applicable T. O.*
³ *Applicable to gross weight (Ref. 15).*
⁴ *Applicable to gross weight (Ref. 18).*
⁵ *Ref. 9 minus Ref. 17.*

REF	ITEM	WEIGHT	MOM/100
13	TAKEOFF CONDITION (Uncorrected)	7496.0	10246
14	CORRECTIONS (If required)		
15	TAKEOFF CONDITION (Corrected)	7496.0	10246
16	TAKEOFF C. G. IN ~~% M. A. C. OR IN.~~	136.7	
17	LESS FUEL	840.0	1258
18	LESS AIR SUPPLY LOAD DROPPED		
19	MISC. VARIABLES		
20	ESTIMATED LANDING CONDITION	6656.0	8988
21	ESTIMATED LANDING C. G. IN % M. A. C. OR IN.	135.0	

CORRECTIONS (Ref. 14)

COMPT	ITEM	CHANGES (+ or −) WEIGHT	MOM/100
TOTAL WEIGHT REMOVED		- 0	- 0
TOTAL WEIGHT ADDED		+ 0	+ 0
NET DIFFERENCE (Ref. 14)		0	0

COMPUTED BY: Roy Smith Civ. (SIGNATURE)

WEIGHT AND BALANCE AUTHORITY: B. Easy Capt. U.S.A. (SIGNATURE)

PILOT: F. O. Jones 1st Lt. (SIGNATURE)

DD FORM 1 SEPT 54 365F

NOTE.—THIS TRANSPORT CLEARANCE FORM HAS RESULTED FROM TRIPARTITE AGREEMENT AND NO FURTHER CHANGES MAY BE MADE TO IT WITHOUT PRIOR CONSIDERATION BY TRIPARTITE AUTHORITIES.

Chart 12-4. Sample DD form 365F - special mission

(1) Enter the "Allowable Gross Weight" for the take-off landing.

(2) Enter the "Total Helicopter Weight" (from reference 11). Estimate the fuel to be aboard at time of landing. Enter the "Operating Weight" (from reference 8) and estimate Landing Fuel Weight.

(3) Subtract the above weights from the respective "Allowable Gross Weights" to obtain the respective "Allowable Loads".

Note

The smallest of these allowable loads is the "Allowable Load" and represents the maximum amount of weight which may be distributed throughout the helicopter in the various compartments without exceeding the gross weight limits of the helicopter.

n. Reference 12 - Using the same compartment letter designation as shown in Chart E (chart 12-2), enter the number and weight of passengers and the weight of cargo (baggage, mail, etc). Use actual passenger weights, if available. Enter the total for each compartment in the weight column.

Note

The sum of the compartment totals shall not exceed the "Allowable Load" determined in the "Limitations Table".

o. Reference 13 - Enter the sum of reference 11 and the compartment totals from reference 12 opposite "Take-Off Condition" (uncorrected). At this point, if not already done, calculate and enter the moment/100 values for references 1 through 13.

p. Check the weight figure (reference 13) against the "Gross Weight Take-off" in the "Limitations" table. Check the moment/100 figure opposite 13 by means of Chart E to verify that the indicated cg is within allowable limits.

q. Reference 14 - If changes in weight or distribution of load are required, indicate necessary adjustment by proper entries in the "Corrections" table in lower left-hand corner of the form as follows:

(1) Enter a brief description of the adjustment made in the column marked "Item".

(2) Add all the weights and add all the moment decreases. Insert the total in the space oppsite "Total Weight Removed".

(3) Add all the weights and add all the moment increases. Insert the total in the space opposite "Total Weight Added".

(4) Subtract the smaller from the larger of the two totals and enter the difference (with applicable plus or minus sign) opposite "Net Difference."

(5) Transfer these "Net Difference" figures to the space opposite reference 14.

r. Reference 15 - Enter the sum of or difference between references 13 and 14. Recheck to verify that these figures do not exceed allowable limits.

s. Reference 16 - Determine the take-off cg position by referring to the cg table in Chart E. Enter this figure in the space provided opposite "Take-Off CG".

t. Reference 17 - Estimate the weight of fuel which may be expended before landing. Enter this figure together with moment/100 in the spaces provided.

Note

Do not consider reserve fuel as expended when determining "Estimated Landing Condition."

u. Reference 18 - Enter the Weight of "Air Supply Load" to be dropped before landing and its moment/100.

v. Reference 19 - Not applicable.

w. Reference 20 - Enter the difference in weight and moment/100 between reference 15 and the sum of references 17 and 18.

x. Reference 21 - By again referring to the cg table on Chart E, determine the estimated landing cg position. Enter this figure opposite "Estimated Landing CG."

Note

Check the landing cg figure with permissible cg figures in limitation block. The landing cg must be within the range shown.

y. The necessary signatures shall appear at the bottom of the form.

12-21. DD FORM 365F - TACTICAL HELICOPTERS.

12-22. Insert the necessary identifying information at the top of the form. In the blank spaces of the "Limitations" table enter the gross weight and cg restrictions obtained from Chapter 7. (See chart 12-5 for sample form.)

WEIGHT AND BALANCE CLEARANCE FORM F
TACTICAL
(USE REVERSE FOR TRANSPORT MISSIONS)

FOR USE IN T. O. 1-1B-40 & AN 01-1B-40

DATE 3-1-62	AIRPLANE TYPE YUH-1D	FROM FT. BENNING, GA.	HOME STATION FT. RUCKER
MISSION/TRIP/FLIGHT/NO. SUPPORT MISSION	SERIAL NO. SAMPLE	TO FT. RUCKER, ALA.	PILOT C.W.O. SMITH

REMARKS
* ARTILLARY IN EXTERNAL SLING
* SEE CENTER OF GRAVITY LIMITS DIAGRAM P. 7-2

COMPUTER PLATE NO. (If used)

REF	ITEM	WEIGHT	MOM/100
1	BASIC AIRPLANE (From Chart C)	4822.0	7068
	OIL (4.5 Gal.)	34.0	59
2			
3	DISTRIBUTION OF LOAD		

COMPT.	CREW NO.	CREW WEIGHT	BAGGAGE	CARGO AND MISC.	WEIGHT	MOM/100
B	1	200			200.0	93
*				3000	3000.0	4140

REF	ITEM	WEIGHT	MOM/100
4	OPERATING WEIGHT	8056.0	11360
5	AMMUNITION — COMPT. / ROUNDS / CALIBER		
6	BOMBS, ROCKETS, ETC. — FORWARD		
	AFT		
	EXTERNAL		
	ROCKETS		
7	FUEL — BUILT IN (70 Gal.)	455.0	587
	BOMB BAY (Gal.)		
	EXTERNAL (Gal.)		
8	WATER INJ. FLUID (Gal.)		
9	JATO OR RATO		
10	TAKEOFF CONDITION (Uncorrected)	8511.0	11947
11	CORRECTIONS (If required)		
12	TAKEOFF CONDITION (Corrected)	8511.0	11947
13	TAKEOFF C. G. ~~IN % M. A. C. OR IN~~	140.4	
14	LESS EXPENDABLES — JATO OR RATO		
	BOMBS		
	AMMUNITION		
	FUEL (60 GAL.)	390.0	503
	ARTILLARY	3000.0	4140
15	ESTIMATED LANDING CONDITION	5121.0	7304
16	ESTIMATED LANDING C. G. IN % M. A. C. OR IN	142.6	

Pertinent instructions to the pilot for shifting load and crew during takeoff and landing should be noted above.

CORRECTIONS (Ref. 11)

COMPT.	ITEM	CHANGES (+ or −) WEIGHT	MOM/100
	EXAMPLE		
	TOTAL WEIGHT REMOVED	−	−
	TOTAL WEIGHT ADDED	+	+
	NET DIFFERENCE (Ref. 11)		

LIMITATIONS

[1] GROSS WT. TAKEOFF (lb.) 8600	[2] GROSS WT. LANDING (lb.) 8600	
[3] PERMISSIBLE C. G. TAKEOFF	FROM *	TO ~~(% M. A. C. or IN)~~ 144
[4] PERMISSIBLE C. G. LANDING	FROM *	TO ~~(% M. A. C. or IN)~~ 144

COMPUTED BY (Signature) Roy Johnson
WEIGHT AND BALANCE AUTHORITY (Signature) CWO Smith
PILOT (Signature) C.W.O. Smith

[1] Enter constant used.
[2] Enter values from current applicable T. O.
[3] Applicable to gross weight (Ref. 12).
[4] Applicable to gross weight (Ref. 15).

DD FORM SEPT 54 365F

Chart 12-5. Sample DD form 365F - tactical

Note

Enter moment/constant values from Chart E throughout the form.

a. Reference 1 - Enter the helicopter basic weight and moment/100. Obtain these figures from the last entry on Chart C - Basic Weight and Balance Record.

b. Reference 2 - Enter the quantity and weight of oil.

c. Reference 3 - Using the compartment letter designations as shown in Chart E (helicopter diagram) enter the number and weight of the crew at their take-off stations. Use actual crew weights if available. Also, enter the weight of baggage, cargo, and miscellaneous items. Enter the total of each compartment in the "Weight" column.

d. Reference 4 - Enter the sum of the weights for references 1 through 3 to obtain "Operating Weight."

e. Reference 5 - Enter, by compartment, the number of rounds, caliber, and weight of all ammunition.

f. Reference 6 - Enter the size, distribution (forward, aft, external, etc.), and weight of all bombs torpedoes, rockets, etc.

g. Reference 7 - Enter the number of gallons and weight of fuel. If auxiliary fuel tanks are to be used, these items and their weight should also be entered as part of reference 7.

h. Reference 8 - Not applicable.

i. Reference 9 - Not applicable.

j. Reference 10 - Enter the sum of the weights for references 4 through 9 opposite "Take-Off Condition" (Uncorrected). At this point, if not already done, calculate and enter the moment/100 for references 1 through 10.

k. Check the weight figure opposite reference 10 against the "Gross Weight Take-Off" in the "Limitations" table. Check the moment/100 figure opposite reference 10 by means of Chart E to verify that the indicated cg is within allowable limits.

l. Reference 11 - If changes in weight or distribution of load are required, indicate necessary adjustments by proper entries in the "Corrections" table in lower left-hand corner of the form as follows:

(1) Enter a brief description of the adjustment in the column marked "Item".

(2) Add all the weights and add all the moment decreases. Insert the totals in the space opposite "Total Weight Removed."

(3) Add all the weights and add all the moment increases. Insert the totals in the space opposite "Net Difference."

(4) Subtract the smaller from the larger of the two totals and enter the difference (with applicable plus or minus sign) opposite "Net Difference."

(5) Transfer these net difference figures to the spaces opposite reference 11.

m. Reference 12 - Enter the sum of, or the difference between, reference 10 and 11. Recheck to verify that these figures do not exceed allowable limits.

n. Reference 13 - By referring to the cg table in Chart E, determine the take-off cg position. Enter this figure in the space provided opposite "Take-Off CG."

o. Reference 14 - Estimate the weights of ammunition (not including weight of cases and links, if retained), fuel, paratroopers (use actual weight of troops with all equipment, if available), external cargo, and any other items which may be expended before landing. Enter these figures together with their moment/100 in the space provided.

Note

Do not consider reserve fuel as expended when determining "Estimated Landing Condition."

p. Reference 15 - Enter the difference in weights and moment/100 between reference 12 and the total of reference 14.

q. Reference 16 - By again referring to the cg table in Chart E, determine the estimated landing cg position. Enter the figure opposite "Estimated Landing CG."

Note

Check the landing cg figure with permissible cg figures in limitation block. The landing cg shall be within the range of the figures shown.

r. The necessary signatures shall appear at the bottom of the form.

Note

For charts and forms refer to Weight and Balance Control Data, Military Specification MIL-W-25140.

CHAPTER 13

AIRCRAFT LOADING

SECTION I SCOPE

13-1. SCOPE OF LOADING INSTRUCTIONS.

13-2. All essential information for loading, securing, and unloading personnel and cargo is contained in this chapter.

13-3. This chapter outlines the cargo features of the helicopter and contains planning data which shall be used to obtain maximum utility.

SECTION II AIRCRAFT CARGO FEATURES

13-4. INTRODUCTION

13-5. The purpose of this chapter is to provide complete information and instructions, with complementary illustrations, to accomplish safe loading of the helicopter for the numerous types of missions the helicopter can reasonably be expected to perform. A typical loading example is also given and can be used as a guide when loading calculations need to be computed.

13-6. GENERAL CARGO FEATURES.

13-7. Cargo loading areas and dimensions, location of tie-down fittings, interior clearances, and various other cargo features are shown in figure 13-1. The cargo area, doors, tie-down equipment, and storage provisions are described in the following paragraphs.

13-8. CABIN AREA.

13-9. A large area of approximately 220 cubic feet located aft of the pilot is available for normal cargo, straight-through cargo, or personnel loading. Access to this area is provided by two doors which roll aft to open. Additional cargo loading area within the cabin may be made available by removal of the copilot's seat. Total weight in this area, however, shall be limited to 230 pounds and shall be located at station 56.6 (inches aft of reference datum). Tie-down fittings have not been provided for cargo located at the copilot's station; therefore, such cargo shall be secured to other cargo to prevent shifting.

13-10. CREW DOORS.

13-11. Access to the crew compartment is through two swingout doors hinged on the forward side (see figure 4-3). Each door has three transparent plastic windows, called the forward, upper, and adjustable window. A latch assembly, which may be opened from either side of the door, secures the door in the closed position. In an emergency, doors may be jettisoned by pulling EMERGENCY RELEASE - PULL handle on inside of each door.

13-12. CARGO - TROOP DOORS.

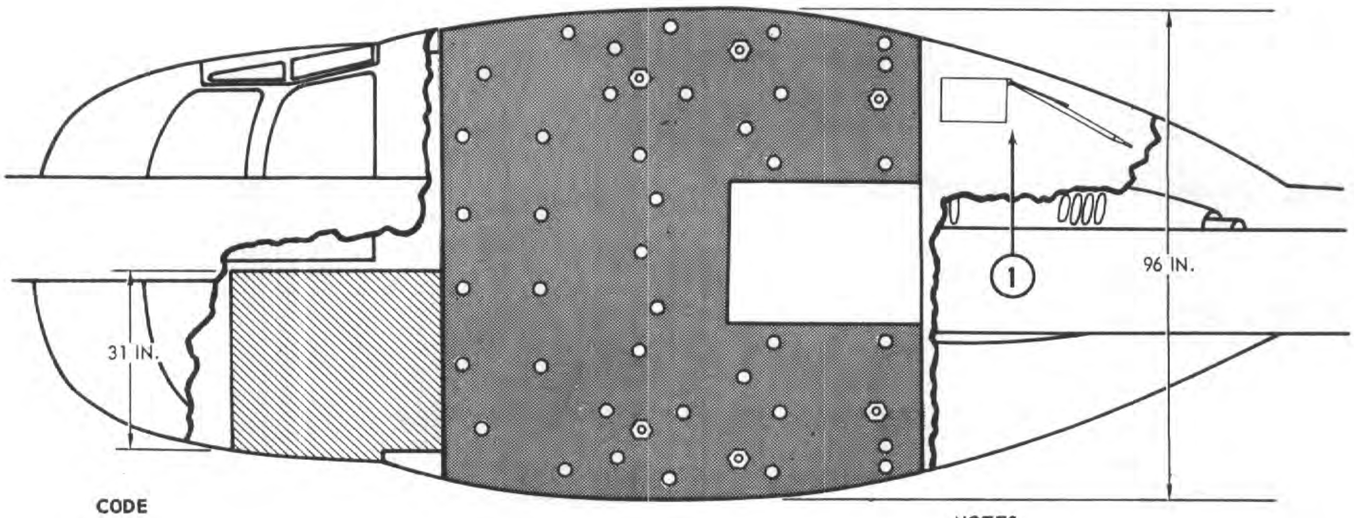
13-13. A large sliding door, operating on rollers and tracks, gives access to cargo-troop area on each side of cabin, and a hinged panel (removable door post on YUH-1D) just ahead of sliding door will provide a wider opening. Each sliding door has a latch for closed position, and two jettisonable windows which can be used as emergency escape hatches. On YUH-1D, door can be secured in open position by manually releasing the lock of a spring-loaded plunger, at the top front corner, which engages a guide in the upper frame. Plunger is automatically retracted, by means of a cable, when door latch is operated. On UH-1D, door can be secured in open position by a retractable stop located on rear bulkhead of cabin.

13-14. CARGO TIE-DOWN EQUIPMENT.

13-15. Cargo tie-down rings are provided on cabin aft bulkhead and pylon island structure, and in recessed fittings on cabin floor aft of crew seats. A three-piece cargo net is available, as loose equipment, for use in securing cargo to rings. Adjustable non-swiveling hooks with keepers are used on forward and outboard edges, and on two aft straps of center net. Fixed hooks are used on aft and inboard edges of right and left nets. Reefing rings and hooks are provided on nets for adjustment to size and shape of cargo.

13-16. STORAGE PROVISIONS.

13-17. A compartment on the right aft side of the forward fuselage between stations 178 and 211 contains bracketry for stowing the cargo rear view mirror.



CODE

1. Tie-down Fittings
2. Stanchion Fittings
3. Cargo Area, Maximum Loading Dimensions
4. Optional Loading Area, Left Seat Removed
5. Interior Clearance Above Maximum Package at ℄ of Cabin

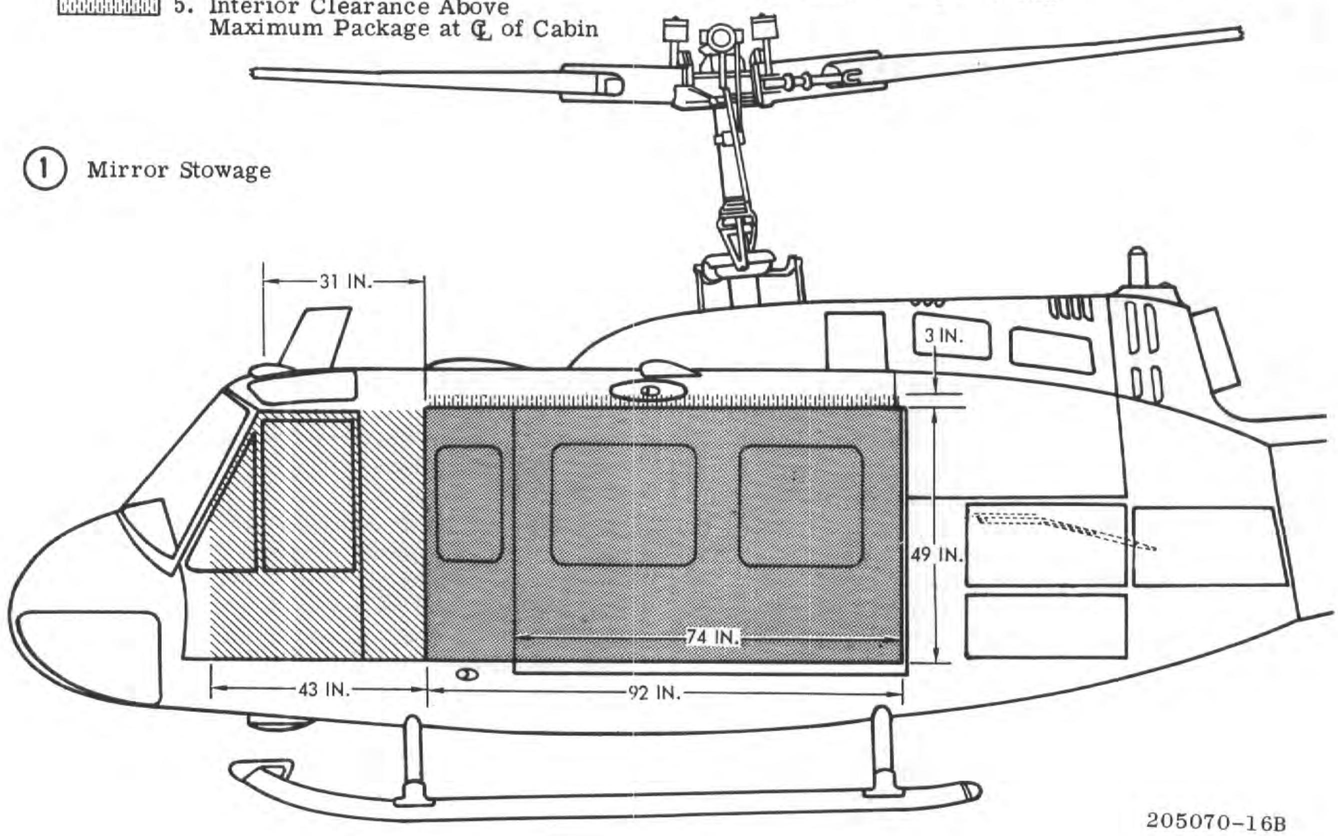
NOTES:

1. Cargo floor loading vs G load factor

Lb. Sq. Ft.	Safety Factor
300	1.0
150	2.0
100	3.0

2. Tie-down fittings, strength 1250 lb. vertical, 500 lb. horizontal load per fitting

(1) Mirror Stowage



205070-16B
AV 054584

Figure 13-1. Cargo area and tie-down fittings

SECTION III PREPARATION OF AIRCRAFT AND PERSONNEL CARGO FOR LOADING AND UNLOADING

13-18. TROOP TRANSPORT.

13-19. Description of the troop seats, and seat and litter installation and arrangement is presented in the following paragraphs.

13-20. TROOP SEATS.

13-21. The troop seats are of tubular construction with reinforced canvas webbing for support areas. The seats are attached to the floor and transmission support structure. Seats can be quickly installed for rescue missions, then folded and stowed flat; or they can be folded for cargo missions as required.

13-22. ARRANGEMENT OF TROOP SEATS. Eleven passengers can be seated in the aft area of the forward fuselage section. Either of the two following arrangements may be used for passenger seating (see figures 13-2 and 13-3).

a. Three seats facing forward, and accommodating five passengers, may be placed across the cabin immediately forward of the transmission support structure. A one-passenger seat, without back rest, is located between two-man seats which have backs. Two more two-man seats, without backs are located aft of the five-passenger seats parallel to the helicopter center line. Passengers in these seats face outboard. Two single passenger folding seats, with backs, are located just aft of the crew seats.

b. Four two-man seats, facing outboard, may be placed, two on each side of the helicopter center line, approximately in line with the side faces of the transmission support structure. The two forward seats are equipped with backs. A one-passenger seat, without back rest, is located immediately forward of the transmission support structure on the helicopter center line and faces forward. Two single-passenger folding seats, with backs, are located aft of the pilot's and copilot's seats.

Note

Single-passenger seats can be installed facing forward, aft, or toward either side of the helicopter.

13-23. TROOP SEAT BELTS. Individual lap-type seat belts are provided for all troop seats. These same belts, with web extensions, are provided for litter patients when helicopter is used for mercy rescue missions.

13-24. LITTER RACKS.

13-25. The litter rack installation (see figure 13-4) accommodates six stretchers (three on a side one above the other) parallel to cabin center line in aft cabin passenger compartment and outboard of the transmission support structure. They can be quickly installed for transporting litter patients or may be rapidly removed for carrying cargo or personnel. The medical attendant's seat is attached to the forward side of the transmission support structure in the cabin area. It is a part of the regular troop or passenger seat installation.

13-26. CARGO LOADING.

13-27. The large cargo doors, open loading area and low floor level preclude the need for special loading aids. Through loading may be accomplished by securing cargo doors in the fully open position. (Refer to paragraph 13-13.) Thirty-nine cargo tie-down fittings are located on the cabin floor for securing cargo to prevent cargo shifting during flight.

13-28. PREPARATION OF GENERAL CARGO.

13-29. The loading crew shall assemble the cargo and baggage to be transported. At time of assembly and prior to loading, the loading crew shall compile data covering weight, dimensions, center of gravity location and contact areas for each item. Heavier packages to be loaded shall be loaded first and placed in the aft section against the bulkhead for cg range purposes. Helicopter floor loading in this area shall not exceed 100 pounds per square foot maximum package size and gross weight limits. Calculation of the allowable load and loading distribution shall be accomplished by referring to Chapter 12 to determine the final cg location and remain within the allowable limits for safe operating conditions. A loading chart is located on the right-hand hinged door post (see figure 7-6).

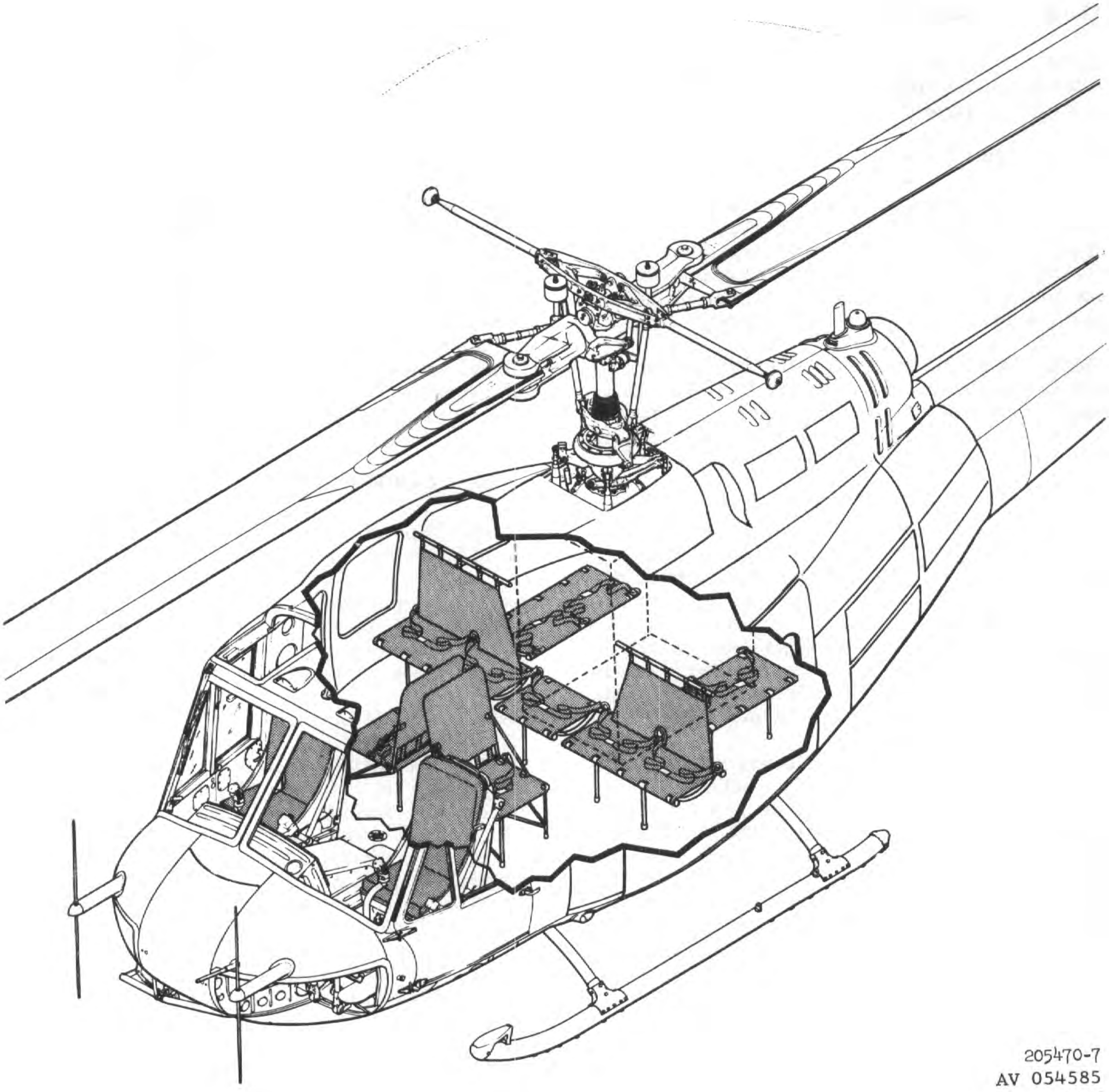


Figure 13-2. Troop seat placement

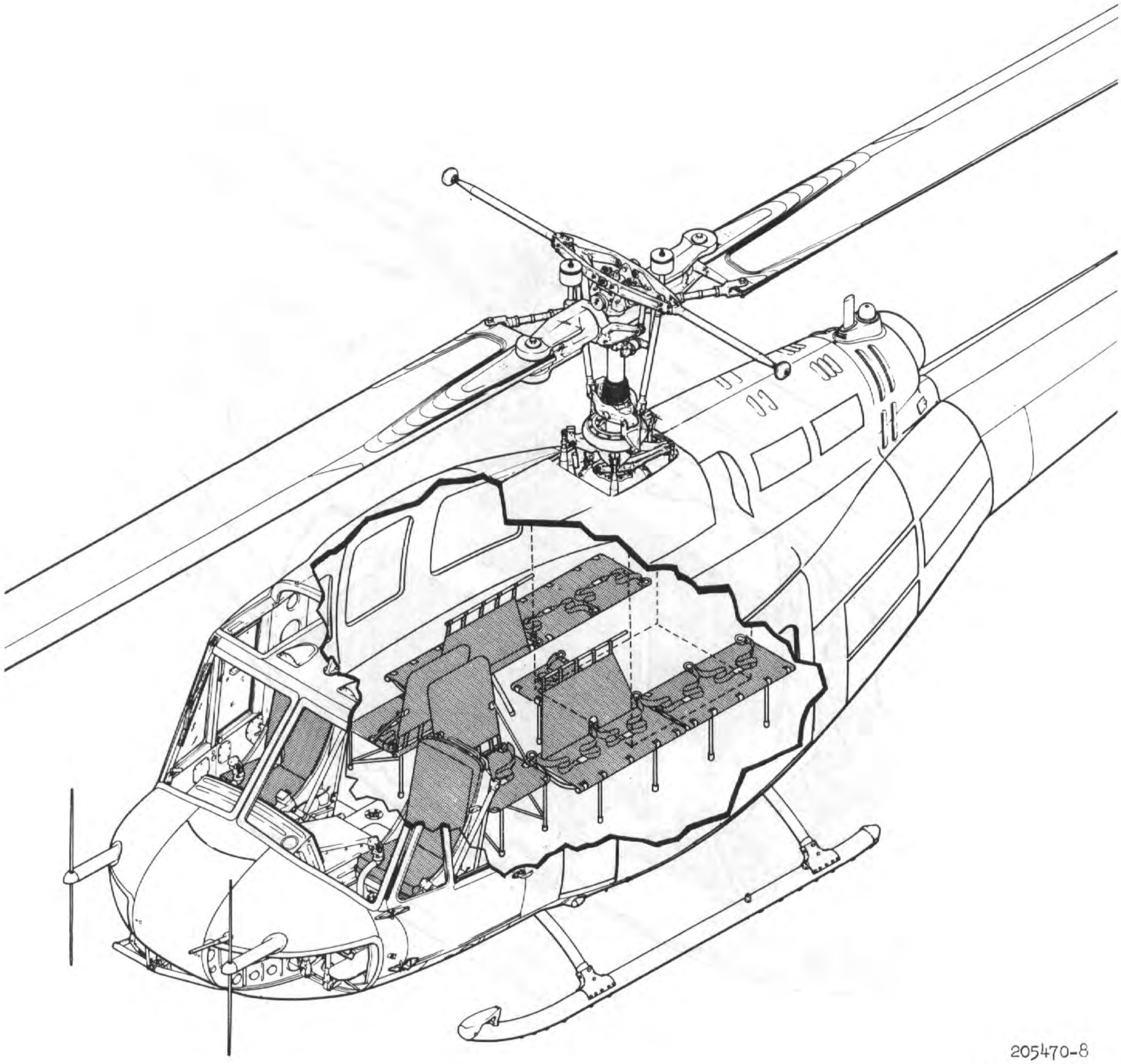


Figure 13-3. Alternate troop seat placement

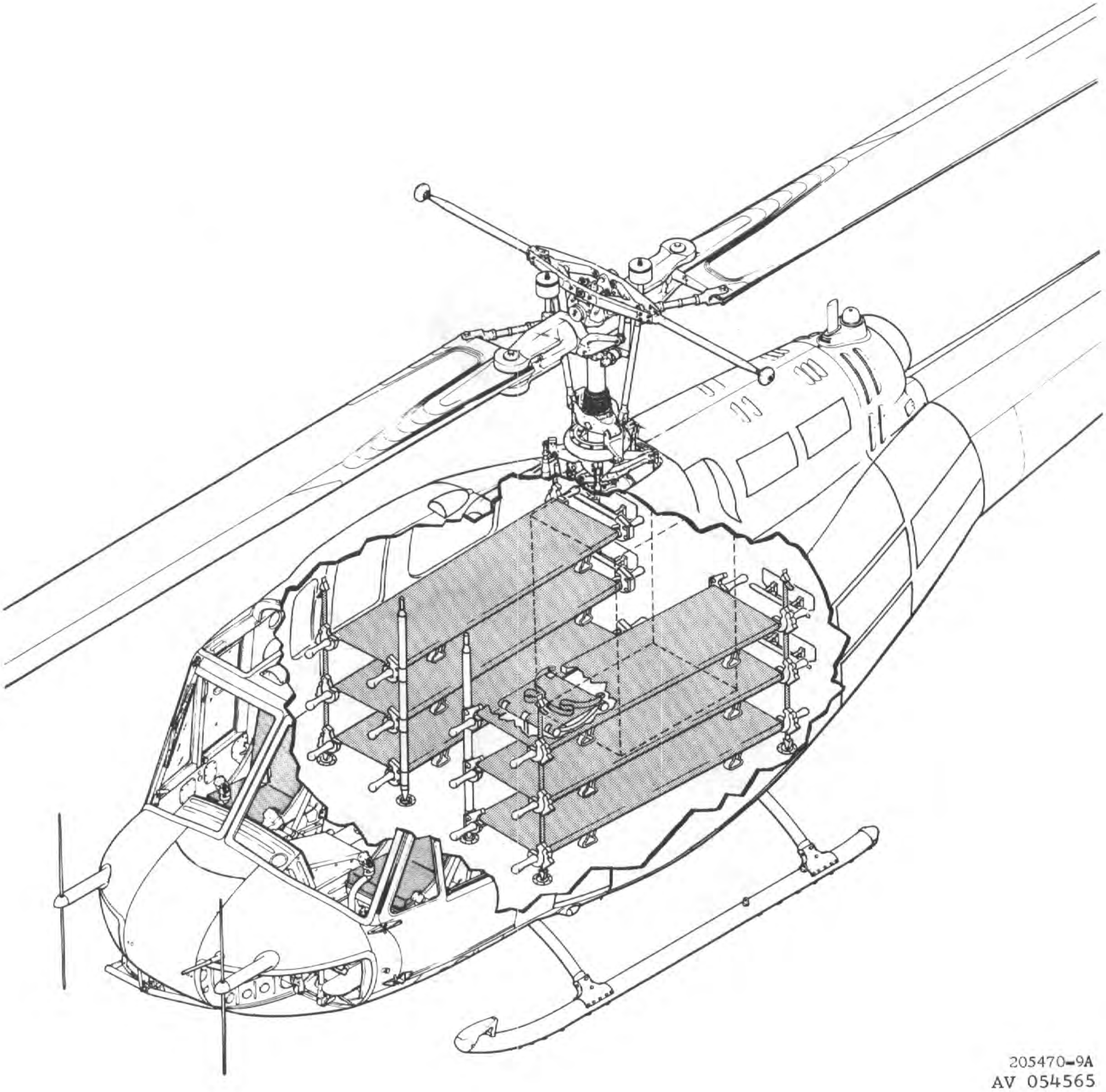


Figure 13-4. Litter installation - typical

SECTION IV GENERAL INSTRUCTIONS FOR LOADING, SECURING AND UNLOADING CARGO

13-30. CARGO CENTER OF GRAVITY PLANNING.

13-31. The items to be transported should be assembled for loading after the weight and dimensions have been recorded. Loading time will be gained if the packages are positioned as they are to be located in the helicopter. To assist in determining the locations of the various items, the individual weights and total weight must be known. When these factors are known the Loading Problem Example (see figure 13-5) can be used as a guide to determine the helicopter station at which the package cg shall be located. The information presented on the loading chart will not be affected by fuel quantity, as full to empty fuel load has been considered during data computation. Final analysis of helicopter cg location for loading shall be computed from the data presented in Chapter 12.

13-32. COMPUTATION OF CARGO CENTER OF GRAVITY. The loading data in Chart E in Chapter 12, will provide information to work a loading problem. From the loading tables, weight and moment/100 are obtained for all variable load items and are added mathematically to the current basic weight and moment/100 obtained from Chart C to arrive at the gross weight and moment. The cg of the loaded helicopter is represented by a moment figure in the center of gravity table. If the helicopter is loaded within the forward and aft cg limits, the figure will fall numerically between the limiting moments. The effect on the cg of the usable inflight items of fuel and oil may be checked by subtracting the weights and moments of such items from the take-off gross weight and moment and checking the new moment with the cg table. This check will be made to determine whether or not the cg will remain within limits during the entire flight.

13-33. LOADING PROCEDURE.

13-34. The helicopter requires no special loading preparation. The loading procedure consists of placing the heaviest items to be loaded as far aft as possible. Such placement locates the cargo nearer the helicopter cg and allows maximum cargo load to be transported, as well as maintaining the helicopter within the safe operating cg limits for flight. The mission to be performed should be known to determine the cargo, troop transport, or litter patients are to be carried on the return trip. If troops or litter patients are to be carried, troop seats and litter racks shall be loaded aboard and stowed.

13-35. SECURING LOADS. Equipment for securing cargo consists of a three piece cargo tie-down net, which attaches to tie-down rings. Nets are tightened to slip straps (refer to paragraph 13-14).

13-36. CARGO LOADING - INTERNAL.

13-37. Internal cargo is carried within the cabin, and bulk items can be accommodated.

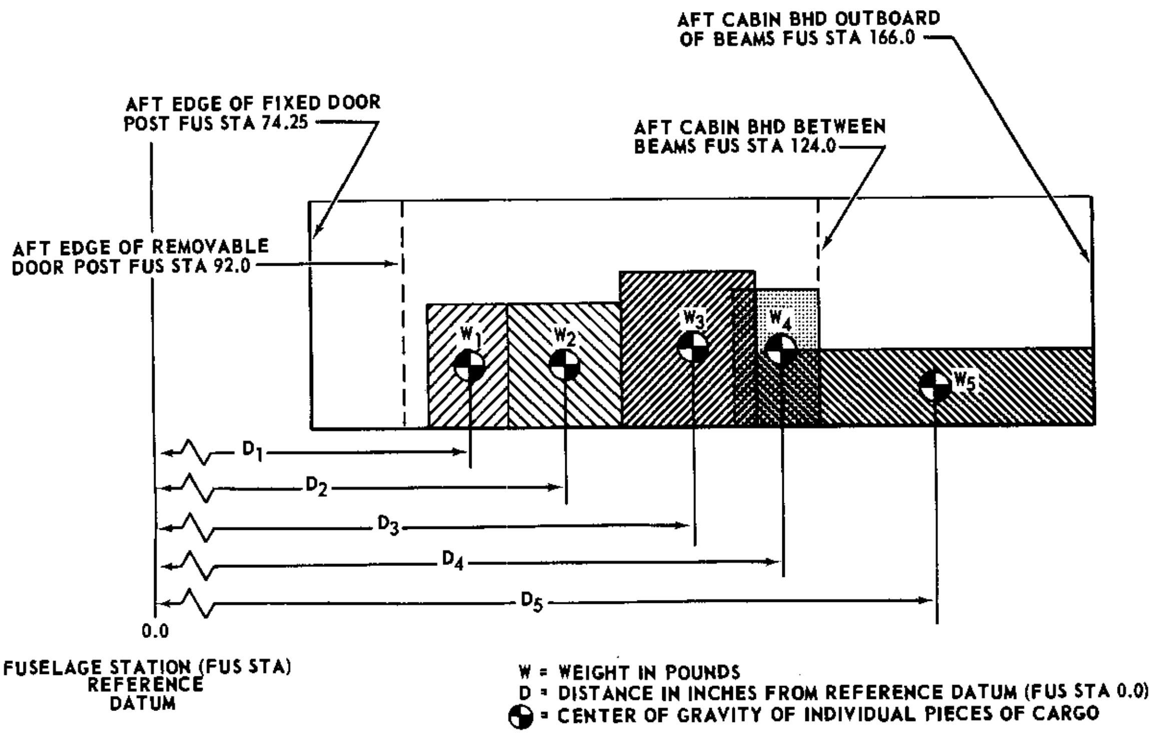
13-38. The cargo area is located aft of the crew stations and contains approximately 220 cubic feet of obstruction-free cargo load space. Ease of loading is provided by full-width sliding doors, which enclose two sides of the cargo area and provide straight-through loading capabilities. Cargo can be easily loaded without the use of specialized equipment. High density cargo distributed over the deck area to maintain 100 pounds per square foot will provide a safety load factor of 4.0 based on limit loads. The safety load factor will vary as the floor loading varies. (Load factor = 400 pounds per square foot floor loading.) Flush-mounted tie-down fittings are provided on the beam and aft cabin bulkhead. A rapid simplified visual method for placement of cargo, after cargo cg has been determined, has been provided by information in the Internal Cargo Loading Chart (refer to Chapter 7). This information, when used, will maintain the helicopter within its cg operational limits throughout its entire mission.

13-39. LOADING AND UNLOADING OF OTHER THAN GENERAL CARGO.

13-40. The helicopter is capable of transporting nuclear weapons, if required.

Warning

Before transporting nuclear weapons, the pilot shall be familiar with AR95-55 and AR385-25.



CENTER OF GRAVITY OF ENTIRE CARGO

$$CG = \frac{(W_1 \times D_1) + (W_2 \times D_2) + (W_3 \times D_3) + (W_4 \times D_4) + (W_5 \times D_5)}{W_1 + W_2 + W_3 + W_4 + W_5}$$

205470-18
AV 054587

Figure 13-5. Example loading problem

CHAPTER 14

PERFORMANCE DATA

SECTION I SCOPE

14-1. SCOPE.

14-2. The charts contained in this chapter provide data to be used with the latest operating information. The data shown on these charts originates from flight test programs and the operational experience gained through actuat helicopter usage. The performance charts are presented in tubular, graphic or profile form. Calculated figures are shown in red. The charts are arranged to give maximum facility of use for pre-flight and in-flight mission planning in a safe, efficient manner.

Note

In the discussion of the various charts in Section II, when chart forms are relatively the same, only one sample problem will be provided.

14-3. SYMBOLS AND DEFINITIONS.

SYMBOL	DEFINITION
C	Centigrade
F	Fahrenheit
LB/GAL	Pound(s) per Gallon
Kts	Knots
IAS	Indicated Airspeed
CAS	Calibrated Airspeed
GAL	Gallon(s)
PSIG	Pounds per square inch gage
SHP	Shaft Horsepower
TAS	True Airspeed
R/C	Rate of Climb
FPM	Feet per minute
N.MI	Nautical mile
FT/MIN.	Feet per minute
LBS	Pounds
LB/HR	Pounds per hour
SL	Sea level
OGE	Out of ground effect
IGE	In ground effect
FT	Foot
OAT	Outside air temperature
RPM	Revolutions per minute

SECTION II CHARTS

14-4. INTERPRETATION OF THE CHARTS.

14-5. Data is given for planning the various types of missions which can reasonably be expected to be performed. Familiarization with the charts and their functions will be necessary for proper understanding and to derive maximum benefit from their use. A description of each chart and its use is also included.

14-6. READING THE CHARTS.

14-7. It is of the utmost importance that the charts be read accurately, especially in the case of multi-variable graphs. In this type of presentation, errors in reading can be cumulative, with resulting large final errors. A hard, fine-pointed pencil should be used at all times when reading the curves, and close attention should be paid to subdivisions of the grid.

14-8. TRUE ALTITUDE.

14-9. True altitude is the actual height above sea level. It is sometimes called the "tapeline" altitude; that is, the altitude that would be measured by a tape-line dropped from the helicopter perpendicularly to the earth's surface at sea level.

14-10. PRESSURE ALTITUDE.

14-11. The pressure of air at a given tapeline altitude may depart considerably from standard. If the atmospheric pressure is measured at the helicopter level, and altitude corresponding to this pressure can be determined from a standard air table. This altitude is known as the pressure altitude of the helicopter. It is also the altitude recorded by the altimeter if the altimeter has no instrument error and is set to 29.92 inches of mercury at sea level. It will therefore indicate higher or lower than the true altitude in a nonstandard atmosphere. See Altimeter Correction Chart for actual altitude readings.

14-12. DENSITY ALTITUDE.

14-13. As with pressure, density of the air at a given true altitude may vary widely from the standard;

the less dense the air, the higher density altitude. If the density is measured at the helicopter level, an altitude corresponding to this density can be determined from a standard air table. This altitude is known as the density altitude of the helicopter.

14-14. DENSITY ALTITUDE CHART.

14-15. A high density altitude affects the performance of both the main rotor and the engine. When density altitude is high, less lift is developed by the rotor blades for any given power setting, and the engine is incapable of producing sea level rated power. Chart 14-1 shows temperature and pressure altitude versus density altitude. An example of the use of the chart is contained in the chart. Knowing pressure altitude and temperature, the density altitude can be determined. The explanation of($\sqrt{\frac{1}{\sigma}}$) used in chart 14-1 is as follows: The reciprocal of the square root of density ration, at the appropriate density altitude. The Greek letter sigma (σ) is used to represent the density ratio.

14-16. STANDARD ATMOSPHERIC CHART.

14-17. To provide a convenient reference, the National Advisory Committee for Aeronautics (NACA) has established a set of values for temperature, density, and pressure at sea level (zero tapeline altitude). This is known as standard atmosphere, or just "standard day." The first row of numbers in chart 14-2 lists this relationship at sea level for standard air. In addition, a variation of these values with an increase in tapeline altitude has been established.

14-18. LIFT CAPABILITY CHART.

14-19. The lift capability chart shown in chart 14-4 provides the pilot with a means of quickly estimating whether or not the helicopter is capable of performing a given mission. The information required to use the chart can be obtained directly from the instrument panel, i.e., the pressure altimeter and the OAT indicator. Estimated capabilities derived from the chart are valid for the T53-L-9, -9A, and -11 series engines; however, the chart is actually based on the T53-L-9 engine. Consequently, when any wind is present, or when a T53-L-11 series or -13 engine is installed, the helicopter will be capable of better performance than indicated by the chart. Two examples will be given to demonstrate how the chart may be used. The first example will determine the gross weight which can be lifted at a specified altitude and outside air temperature. The second example will determine what the maximum outside air temperature should be for a specified gross take-off weight and pressure altitude.

14-20. EXAMPLE 1.

14-21. The pressure altitude indicated is 6000 feet; the OAT indication is 17°C. What is the maximum gross weight of the helicopter, both in- and out-of-ground effect? Referring to Graph A on chart 14-4, trace the dotted line upward from 17°C to the 6000 feet pressure altitude line, then to the right onto Graph B, stopping at the 6000 foot pressure altitude line on the graph. The maximum gross weight is immediately indicated at this point as 7350 pounds. The available engine torque under the specified conditions is also indicated by extending the dotted line downward and reading 36 psig torque.

14-22. EXAMPLE 2.

14-23. The gross take-off weight and pressure altitude are known; it is desired to estimate at what outside air temperature the helicopter's capabilities could become marginal. Using the same pressure altitude and weight as in Example 1, the dotted line extends from Graph B to the 6000 foot pressure altitude line on Graph A and then downward to the 17°C indication. At any OAT above this temperature, the helicopter's capabilities could become marginal and off-loading of fuel or cargo should be considered.

14-24. TEMPERATURE CONVERSION CHART.

14-25. The temperature conversion chart (see figure 14-5) provides a list of temperatures from minus 54°C (minus 85°F) to 793°C (2660°F) and is grouped in columns of three. These columns allow the direct conversion of a temperature reading to either centrigrade or fahrenheit.

14-26. AIRSPEED INSTALLATION CORRECTION CHART.

14-27. Airspeed installation correction chart (chart 14-6) is provided to supply the correction required to determine calibrated airspeed (CAS). Indicated airspeed (IAS), as read from the instrument and corrected for instrument error, plus or minus installation correction, equals calibrated airspeed. Because of the speed range at which the helicopter operates, compressibility correction is negligible; therefore, it has been intentionally omitted. An approximate true airspeed (TAS) for a standard day can be obtained from CAS by adding 1-1/2 percent of CAS per 1000 feet density altitude to CAS.

14-28. ENGINE OPERATING LIMITS CHART.

14-29. Maximum power available for the T53-L-9, -9A, and -11 series engines is given in chart 14-7 (14-8 for T53-L-13 engine). These powers are based on the engine manufacturer's specifications and guarantees. Correction based on flight tests are included for installation losses of the engine in the helicopter.

14-30. Performance data given in this manual are based on an engine which can produce specification or rated power. Ordinarily, the engine installed in the helicopter is capable of producing more power; therefore, unless engine deterioration has occurred, adequate power should be available for loading and ceilning limits given in this manual. If deterioration in engine output is suspected, the curves in chart 14-7 or 14-8 may be used to make a rough comparison of actual and rated engine performance, using the flight instruments available to the pilot. To make the comparison, mentally record pressure altitude and OAT; and, at the same time apply full power. Now note the torquemeter reading. Enter the curves at the recorded pressure altitude and temperature, and read torque pressure available. The torquemeter reading attained in flight should be at least as great as that shown on the curve. It is emphasized that such comparisons are approximate, and they can result in low engine power indications. This is due to several factors: (1) the high rate of climb when full power is applied, which in turn results in rapidly changing air pressure and temperatures; (2) manufacturing tolerances in the torquemeter and flight instruments; (3) readability of flight instruments; (4) and pilot techniques. In addition, two precautions should be observed by the pilot when making the flight check. (1) Avoid hovering with full power in-ground effect, except for take-off and translational lift, due to the decrease in power caused by an engine inlet temperature rise when in-ground effect (2) more torque will be obtained if engine rpm is allowed to drop below 6600 when full power is applied.

14-31. If the engine does not appear to be producing specification power and torque, allowable hovering ceiling or load limits as given in this manual will be decreased. Conservative rules of thumb in this event are to reduce gross weight 200 pounds for each psig of deficient torque - or reduce hovering ceiling 1000 feet for each psig of deficient torque. These increments may be subtracted directly from the maximum take-off gross weight and ceiling which the pilot determines from the curves and tables given elsewhere in the manual. The curves and tables are entered normally at the actual or anticipated air temperature and pressure altitude of the flight, then the increments in gross weight or altitude are subtracted.

14-32. TAKE-OFF DISTANCE CHART.

14-33. The take-off distance charts (charts 14-9 and 14-10) list minimum take-off distances for various pressure altitudes, air temperatures, and gross weights. Take-off distances are given for maximum performance take-off procedures only, as distinguished from normal take-off procedures described in Chapter 3. Maximum performance take-offs result in the minimum take-off distance.

14-34. One set of charts lists take-off distances using the maximum performance hover and level acceleration method. Engine speed is maintained at 6600 rpm. If the helicopter can hover out-of-ground effect, take-off distances and climb-out airspeeds are given as zero. This procedure requires a vertical lift-off and a vertical climb to an altitude above the obstacle before accelerating into forward flight. If the take-off distance is greater than zero, this means the helicopter cannot hover out-of-ground effect. In these cases, the helicopter takes off vertically to a skid height of two feet above the ground, accelerates to the climb-out airspeed given in the charts, and climbs over the obstacle at that airspeed. If the climb-out airspeed is greater or less than the value given in the chart, take-off distances will be increased. If the skid height is greater than two feet prior to obtaining climb-out airspeed, the take-off distances will be greater. Under power limited conditions (two foot hover and full power available) a greater than normal nose-down flight attitude is required during acceleration. If loss of lift occurs in the area just prior to translational lift, the helicopter shall be leveled to avoid ground contact with the forward portion of the skids. If ground contact does occur, take-off distances will be greatly increased in addition to possible skid damage. If the helicopter cannot hover two feet off the ground, take-off distances are not shown and the gross weight should be reduced.

Note

When the take-off distance is zero, the climb-out airspeed is also zero (vertical climb is possible). In the charts, the accelerating run column is deleted and the climb-out airspeed is given adjacent to each take-off distance.

14-35. The second method involves hovering with the helicopter light on skids and then increasing airspeed and altitude simultaneously. Engine speed is maintained at 6600 rpm. If the helicopter can hover out-of-ground effect, take-off distances and climb-out airspeed are given as zero. This procedure requires a vertical lift-off and a vertical climb to an altitude above the obstacle before accelerating into forward flight. If the take-off distance is greater than zero, this means the helicopter cannot hover out-of-ground effect. In these cases, the helicopter is brought to a hover, light on skids. As power is applied and the helicopter leaves the ground, hold constant pitch altitude until airspeed starts to register. When this occurs, fine pitch attitude adjustments are required to obtain the desired airspeed. Once airborne, the pilot should allow airspeed and altitude to increase simultaneously until the obstacle is cleared. The airspeed and altitude should then be increased as soon as possible to avoid operation in the restricted area of the height-velocity diagram. If the climb-out airspeed is greater or less than the value given in the chart, take-off distances will be increased. If the helicopter cannot hover light on skids, take-off distances are not shown and the gross weight should be reduced.

14-36. The third method involves hovering the helicopter at a 15-foot skid height and then increasing airspeed and altitude simultaneously. Engine speed is maintained at 6600 rpm. This is primarily for use when carrying external cargo on the sling. When the helicopter can hover out-of-ground effect, take-off distances and climb-out airspeeds are given as zero in the charts. For these cases, climb vertically until the sling load will clear the obstacle, then proceed into forward flight. When take-off distances are greater than zero, the take-off procedure is as follows: Apply sufficient power to hover at a skid height of 15 feet. Apply power and allow airspeed and altitude to increase simultaneously until the obstacle is cleared. As power is applied, hold a constant pitch attitude until the airspeed starts to register. When this occurs, fine pitch attitude adjustments are required to obtain the desired airspeed. When the obstacle is cleared, the airspeed and altitude should be increased as soon as possible to avoid operation in the restricted area of the height-velocity diagram. If the climb-out airspeed is greater or less than the value given in the chart, take-off distances will be increased. If the helicopter cannot hover at 15 feet, take-off distances are not shown and the gross weight should be reduced.

14-37. The last set of charts, with the red border, lists take-off distances using rpm bleed-off. As in the first set of charts, the take-off distance is given as zero when the helicopter can hover out-of-ground effect. It is when the helicopter cannot hover out-of-ground effect that use of the bleed-off method can reduce take-off distances or permit a greater load to be carried by experienced pilots. When take-off distances are greater than zero, the take-off procedure is as follows: Apply sufficient power at 6600 engine rpm to maintain helicopter light on the skids. Increase collective pitch to lift the helicopter off the ground and apply forward cyclic control to start forward movement of the helicopter. Accelerate into forward flight, allowing the engine speed to decrease to a minimum of 6400 rpm. When translational lift is attained, increase collective pitch to decrease engine speed to a minimum of 5900 rpm. Just prior to obtaining climb-out airspeed given in the chart, rotate the helicopter nose up and climb at that airspeed, maintaining 5900 engine rpm. When clear of obstacle, reduce pitch slightly to regain 6600 engine rpm. If the climb-out airspeed is greater or less than the chart value, take-off distance will be increased. If the helicopter has insufficient power to hover light on the skids, take-off distances are not shown and gross weight should be reduced.

Warning

The procedure for maximum performance take-off using rpm bleed-off requires precise application and timing with respect to rpm control and obtaining optimum climb-out airspeed. All charts with red borders are for emergency use only.

14-38. TAKE-OFF GROSS WEIGHT LIMITATIONS.

14-39. The take-off gross weight limitation curve (chart 14-11) is used in determining maximum take-off gross weight as limited by vertical climb performance. Maximum take-off gross weights are given as a function of pressure altitude, outside air temperature, and the desired vertical rate of climb. Engine speed is 6600 rpm and take-off power is used. The take-off gross weight which, for a given altitude and temperature, results in a 100 foot-per-minute vertical rate of climb is the overload limit. The gross weight, altitude, and temperature which results in a 300-foot-per-minute rate of climb is the normal limit.

14-40. HOVERING CHART.

14-41. The hovering charts (chart 14-12, 14-13, 14-14, and 14-15) provide information to determine the maximum gross weights at which the helicopter can hover. The first charts are for hovering out-of-ground effect at various pressure altitudes, temperatures, and wind velocities. The last charts are for hovering in-ground effect at various pressure altitudes and temperatures. Both sets of charts are for operation at 6600 rpm.

14-42. Charts for hovering out-of-ground effect are shown for both take-off and normal rated power. The chart for normal rated power should be used if prolonged hovering is to be accomplished. Charts for hovering in-ground effect are shown for take-off power only but for both a normal 2°C inlet temperature rise and a 10°C inlet temperature rise. For short periods of hovering in-ground effect (less than one minute) the 2°C temperature rise chart should be used. For longer periods the 10°C temperature chart should be used since for prolonged periods of hovering in-ground effect the inlet temperature rises due to recirculation of the air into the engine inlet.

14-43. The known conditions necessary to use the out-of-ground effect with take-off power chart, are pressure altitude, temperature, and wind velocity. The chart contains two graphs, both of which are used to determine the operating capabilities of the helicopter. The top graph contains the pressure altitude scale and temperature gradient curves which are used for the initial entrance into the chart for problem solution. The bottom graph contains a vertical scale for headwind in knots and flow curves, to be followed before the drop to the gross weight scale at the bottom of the graph. The out-of-ground effect with normal rated power chart and the in-ground effect chart are used in a similar manner except that the wind velocity curves have been omitted.

14-44. The following problem and example are for use with the Hovering Out-of-Ground Effect chart with take-off rated power; however, the procedure to obtain the gross weight operating limits is applicable for both charts.

PROBLEM	CLIMATIC CONDITION
Take-off Rated Power	
Pressure Altitude	7000 feet
Temperature	15°C (59°F)
Head Wind	10 knots

14-45. EXAMPLE:

14-46. (See chart 14-12.) Enter the upper chart at 7000 feet pressure altitude and move to the right to intersect the 15°C temperature curve. From this point drop vertically to the wind chart. Follow the flow curve on the wind scale to the 10 knot windline. Drop vertically from the 10 knot point to the weight scale and read 7410 pounds maximum hovering weight for the existing conditions with 6600 engine rpm.

14-47. CLIMB CHART.

14-48. The climb chart (charts (14-16 and 14-17) data includes rate of climb, distance, time, and quantity of fuel used to climb to altitude. The figures stated are for normal power performance, based upon the use of optimum climbing speed schedules shown. Use of climbing speeds other than those shown on the climb chart will result in a reduced rate of climb, and increase in fuel use, and an increase in time required at all altitudes. On warm days, rates of climb will be less than the chart values.

14-49. EXAMPLE:

14-50. (See chart 14-16.) Determine the time required to climb to 4000 feet and quantity of fuel required for a gross weight of 7000 pounds. At the top of the chart, find 7000 pounds gross weight and in the center column locate 4000 feet altitude. By reading horizontally on the chart at this altitude, the following are obtained. The best climbing speed is 53 knots IAS, fuel consumed to climb from sea level is 47 pounds (which includes 23 pounds required for warm-up and take-off), time required during climb in 2.2 minutes, the distance traveled is two nautical miles, and the rate of climb at 4000 feet is 1826 feet per minute.

14-51. RANGE CHART.

14-52. The range chart (charts 14-18 and 14-19) shows the range and endurance capacities for various power conditions and fuel allowance. This chart may be used for inflight and preflight planning. The initial conditions are gross weight, actual pressure altitude of the helicopter, and fuel quantity.

Note

$$\text{Ferry Mission Range} = \frac{\text{Range for 100 lb Fuel x Fuel Available.}}{1000}$$

14-53. The chart is divided into four main sections, gross weight, pressure altitude, power settings, and range in nautical miles for various fuel quantities as listed above fuel columns. Fuel allowances must be made for various contingencies such as take-off, climb, wind, and landing conditions. All data in the range chart is for standard day conditions (i.e., 15°C at sea level). On days when free air temperature is other than standard, range performances will be slightly different from values given.

Note

> Cargo mirror should be removed and stowed in the fuselage unless external sling load is being carried. Cargo mirror installation will reduce range by eight percent.

14-54. To use the range chart, refer to the chart for the appropriate cruise condition. Enter the chart at gross weight and altitude and read the approximate fuel consumption and airspeed. Read range under the fuel quantity for the desired flight condition. At any time before or during the flight, the pilot may refer to the chart with actual conditions of weight, altitude, and fuel to obtain range remaining.

14-55. EXAMPLE:

14-56. (See chart 14-18.) The helicopter is to fly at 4000 feet altitude (Long Range-Cruise Speed) with take-off gross weight of 8000 pounds.

a. It is desired to have 160 pounds of fuel in reserve and from the climb chart (chart 14-16) it is found that approximately 53 pounds of fuel are required for warm-up and climb to 4000 feet altitude from sea level. Adding 160 pounds reserve and 53 pounds for climb and subtracting the total from the total fuel load of 1430 pounds gives a fuel balance for cruise of 1217 pounds.

b. Enter the (Long Range-Cruise Speed) range chart at 8000 pounds, and 4000 feet altitude, and a fuel quantity of 1200 pounds.

c. Read 240 nautical miles range in a no-wind condition; fuel consumption 543 pounds per hour; and indicated airspeed (IAS) 97 knots.

14-57. MAXIMUM ENDURANCE CHART.

14-58. The maximum endurance chart (charts 14-20 and 14-21) shows the maximum available flight time with various gross weight conditions at sea level and at increasing altitudes. All data in the chart is for standard day conditions (i.e., 15°C at sea level).

14-59. EXAMPLE:

14-60. The helicopter is to fly at 2000 feet altitude with a take-off gross weight of 8000 pounds and a fuel load of 1430 pounds. It is desired to have 150 pounds of fuel in reserve. From the climb chart (chart 14-16), it is found that approximately 38 pounds of fuel are required for warm-up, take-off and climb to 2000 feet altitude from sea level. Subtracting desired fuel reserve and fuel required for climb from total fuel load gives a fuel balance for cruise of 1242 pounds.

14-61. Enter the maximum endurance chart (chart 14-20) at 8000 pounds gross weight, 2000 feet pressure altitude, and a fuel quantity of 1200 pounds, and read a maximum endurance of 2.9 hours, with an engine rpm of 6600. Under these conditions, the rate of fuel consumption is 418 pounds per hour at 56 knots IAS.

14-62. HOVERING ENDURANCE CHART.

14-63. The hovering endurance chart (charts 14-22 and 14-23) shows the maximum endurance possible while hovering with various gross weight conditions at sea level and at increasing altitudes. All chart data is for standard day conditions; therefore, when the free air temperature is other than standard (i.e., 15°C at seal level and decreasing at 2°C per 1000 feet), hovering endurance performance will be slightly different from that shown on the chart.

14-64. EXAMPLE:

14-65. (See chart 14-22.) The helicopter is to hover at 4000 feet altitude with a take-off gross weight of 7500 pounds with an alloted 1430 pounds of fuel to be used. Enter the hovering endurance chart at 7500 pounds gross weight, 4000 feet pressure altitude, and a fuel quantity of 1430 pounds. Read hovering endurance of 2.3 hours with an engine rpm of 6600. Under these conditions the engine will be using 618 pounds of fuel an hour.

14-66. LANDING DISTANCE CHART.

14-67. Two sets of landing distance charts are furnished. Both sets of charts give maximum possible landing distances. The power-on chart (charts 14-24 and 14-26) shows minimum landing distances over a 50-foot obstacle with power on. The landing distances are less than those required if the normal operating procedures in Chapter 3 are followed. Whenever the helicopter can hover out-of-ground effect, landing distances are given as zero. Corresponding approach speeds over the 50-foot obstacle are also zero. When the helicopter can hover in-ground effect, landing distance will be other than zero. When the helicopter cannot hover in-ground effect, a ground run distance is included in the distance to clear a 50-foot obstacle. A note is added to the power-on charts that a safer, more normal approach and landing will result if the power-off landing distances in charts 14-25 and 14-27 are used. The power-off chart shows helicopter requirements where autorotational landing technique is used as recommended in Chapter 4. Both sets of charts list landing distances for various pressure altitudes. air temperatures, and gross weights. Greater landing distances are required at higher altitude, on warm, humid days, and for heavier gross weights.

14-68. EXAMPLE:

14-69. (See chart 14-24.) Power-On landing gross weight 8000 pounds, pressure altitude 6000 feet, and outside air temperature plus 15°C (plus 59°F). Select the 8000 pounds gross weight line at 6000 feet altitude, and move horizontally across chart to the plus 15°C temperature column. Note that the best approach speed is 14 knots, zero ground roll is required, and 29 feet distance is necessary to clear a 50-foot obstacle.

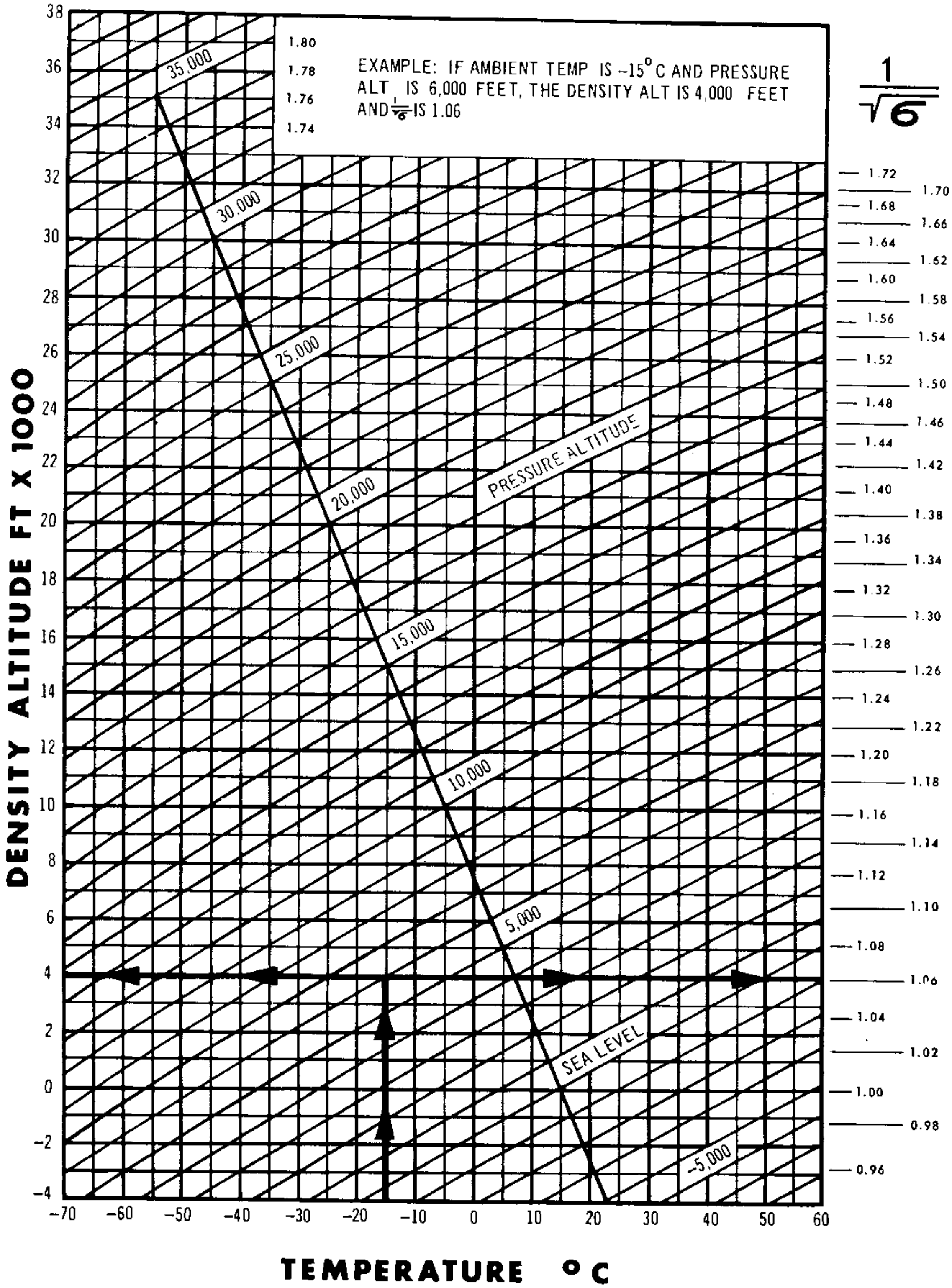


Chart 14-1. Density altitude chart

Standard Sea Level Air:
T = 15°C (59°F) W = 0.07651 lb/cu ft P_O = 0.002378 slugs/cu ft
P = 29.921 in. of Hg 1 in of Hg = 70.732 lb/sq ft = 0.4912 lb/sq in.
This table is based on NACA Technical Report No. 218 a_o = 1116 ft/sec

Altitude-feet	Density Ratio-P/P_O	$\frac{1}{\sqrt{\sigma}}$	Temperature Deg C	Temperature Deg F	Speed of Sound Ratio-a/a_o	Pressure In. of Hg	Pressure Ratio-P/Po
0	1.0000	1.0000	15.000	59.000	1.0000	29.92	1.0000
1000	.9710	1.0148	13.019	55.434	.997	28.86	.9644
2000	.9428	1.0299	11.038	51.868	.993	27.82	.9298
3000	.9151	1.0454	9.056	48.301	.990	26.81	.8962
4000	.8881	1.0611	7.075	44.735	.986	25.84	.8636
5000	.8616	1.0773	5.094	41.169	.983	24.89	.8320
6000	.8358	1.0938	3.113	37.603	.979	23.98	.8013
7000	.8106	1.1107	1.132	34.037	.976	23.09	.7716
8000	.7859	1.1280	-0.850	30.471	.972	22.22	.7427
9000	.7619	1.1456	-2.831	26.904	.968	21.38	.7147
10000	.7384	1.1637	-4.812	23.338	.965	20.58	.6876
11000	.7154	1.1822	-6.793	19.772	.962	19.79	.6614
12000	.6931	1.2012	-8.774	16.206	.958	19.03	.6359
13000	.6712	1.2206	-10.756	12.640	.954	18.29	.6112
14000	.6499	1.2404	-12.737	9.074	.950	17.57	.5873
15000	.6291	1.2608	-14.718	5.507	.947	16.88	.5642
16000	.6088	1.2816	-16.699	1.941	.943	16.21	.5418
17000	.5891	1.3029	-18.680	-1.625	.940	15.56	.5202
18000	.5698	1.3247	-20.662	-5.191	.936	14.94	.4992
19000	.5509	1.3473	-22.643	-8.757	.932	14.33	.4790
20000	.5327	1.3701	-24.624	-12.323	.929	13.75	.4594
21000	.5148	1.3937	-26.605	-15.890	.925	13.18	.4405
22000	.4974	1.4179	-28.586	-19.456	.922	12.63	.4222
23000	.4805	1.4426	-30.568	-23.022	.917	12.10	.4045
24000	.4640	1.4681	-32.549	-26.588	.914	11.59	.3874
25000	.4480	1.4940	-34.530	-30.154	.910	11.10	.3709
26000	.4323	1.5209	-36.511	-33.720	.906	10.62	.3550
27000	.4171	1.5484	-38.493	-37.287	.903	10.16	.3397
28000	.4023	1.5768	-40.474	-40.853	.899	9.720	.3248
29000	.3879	1.6056	-42.455	-44.419	.895	9.293	.3106
30000	.3740	1.6352	-44.436	-47.985	.891	8.880	.2968
31000	.3603	1.6659	-46.417	-51.551	.887	8.483	.2834
32000	.3472	1.6971	-48.399	-55.117	.883	8.101	.2707
33000	.3343	1.7295	-50.379	-58.684	.879	7.732	.2583
34000	.3218	1.7628	-52.361	-62.250	.875	7.377	.2465
35000	.3098	1.7966	-54.342	-65.816	.871	7.036	.2352
36000	.2962	1.8374	-55.000	-67.000	.870	6.708	.2242
37000	.2824	1.8818	-55.000	-67.000	.870	6.395	.2137
38000	.2692	1.9273	-55.000	-67.000	.870	6.096	.2037
39000	.2566	1.9738	-55.000	-67.000	.870	5.812	.1943
40000	.2447	2.0215	-55.000	-67.000	.870	5.541	.1852
41000	.2332	2.0707	-55.000	-67.000	.870	5.283	.1765
42000	.2224	2.1207	-55.000	-67.000	.870	5.036	.1683
43000	.2120	2.1719	-55.000	-67.000	.870	4.802	.1605
44000	.2021	2.2244	-55.000	-67.000	.870	4.578	.1530
45000	.1926	2.2785	-55.000	-67.000	.870	4.364	.1458
46000	.1837	2.3332	-55.000	-67.000	.870	4.160	.1391
47000	.1751	2.3893	-55.000	-67.000	.870	3.966	.1325
48000	.1669	2.4478	-55.000	-67.000	.870	3.781	.1264
49000	.1591	2.5071	-55.000	-67.000	.870	3.604	.1205
50000	.1517	2.5875	-55.000	-67.000	.870	3.436	.1149

Chart 14-2. Standard atmospheric (altitude) chart

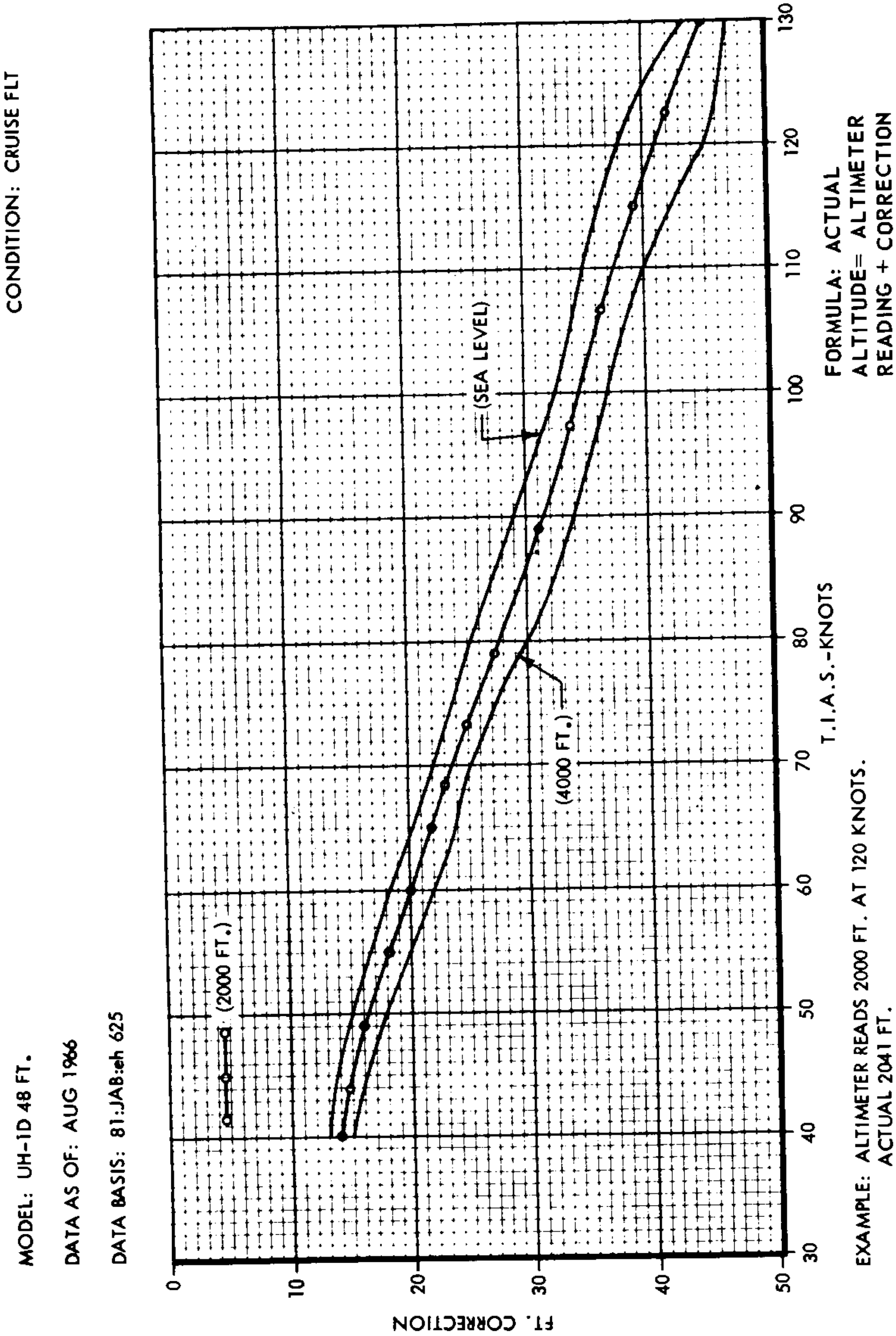
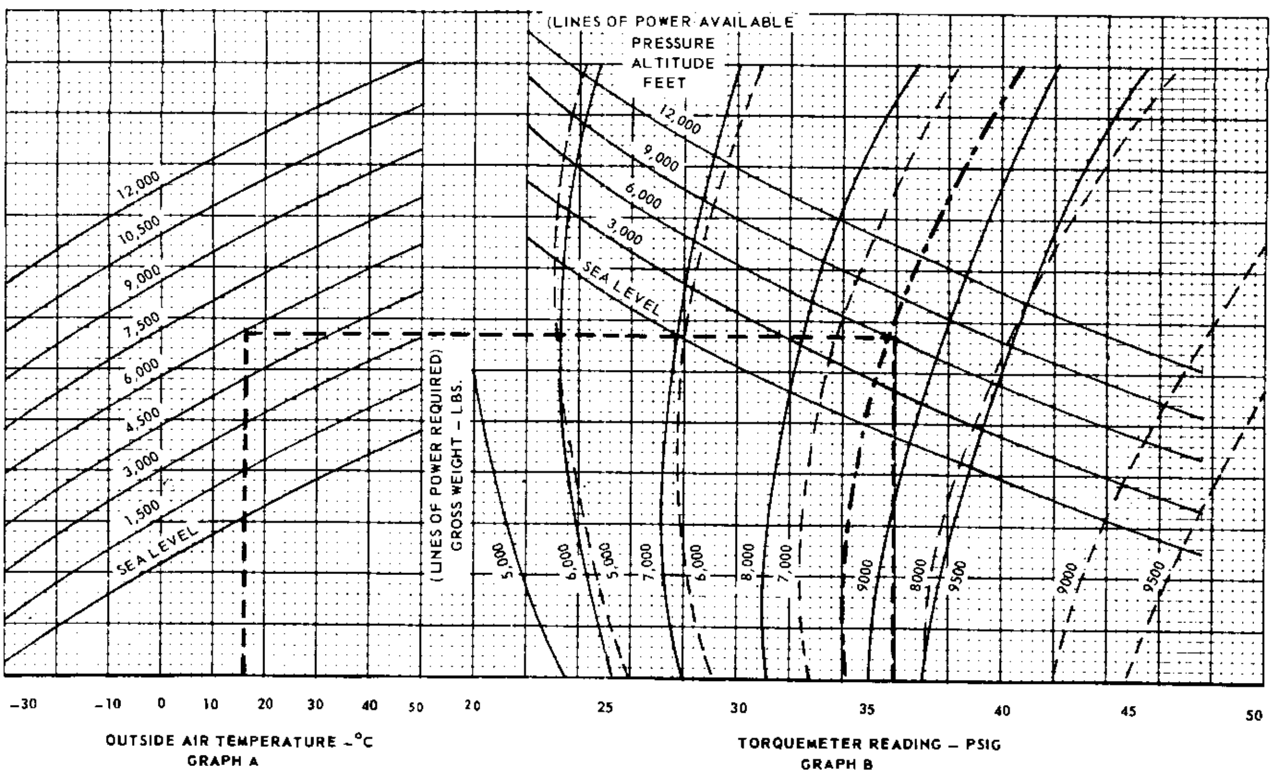


Chart 14-3. Altimeter correction chart

LIFT CAPABILITY
OAT and PRESSURE ALTITUDE
vs TORQUEMETER PRESSURE
and GROSS WEIGHT

MODEL: UH-1D
DATA AS OF : MARCH 1967
DATA BASIS : CAT. II FLIGHT TEST

ENGINE: T53-L-11
FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL
———— IGE
-------- OGE



EXAMPLE: IF OUTSIDE AIR TEMPERATURE IS 17°C
AND PRESSURE ALTITUDE IS 6,00. FEET;
MAXIMUM POWER AVAILABLE–36 PSIG.
OUT-OF-GROUND EFFECT–7350 LB
IN-GROUND EFFECT–8675 LB

REMARKS:

Chart 14-4. Lift capability - OAT and pressure altitude versus torquemeter pressure and gross weight

Look up reading in middle column; if in degrees Centigrade, read Fahrenheit equivalent in right-hand column; if in degrees Fahrenheit, read Centrigrade equivalent in left-hand column.

C		F
-54	-65	- 85
-51	-60	- 76
-46	-50	- 58
-40	-40	- 40
-34	-30	- 22
-29	-20	- 4
-23	-10	14
-17.8	0	32
-17.2	1	33.8
-16.7	2	35.6
-16.1	3	37.4
-15.6	4	39.2
-15.0	5	41.0
-14.4	6	42.8
-13.9	7	44.6
-13.3	8	46.4
-12.8	9	48.2
-12.2	10	50.0
-11.7	11	51.8
-11.1	12	53.6
-10.6	13	55.4
-10.0	14	57.2
- 9.4	15	59.0
- 8.9	16	60.8
- 8.3	17	62.6
- 7.8	18	64.4
- 7.2	19	66.2
- 6.7	20	68.0
- 6.1	21	69.8
- 5.6	22	71.6
- 5.0	23	73.4
- 4.4	24	75.2
- 3.9	25	77.0
- 3.3	26	78.8
- 2.8	27	80.6
- 2.3	28	82.4
- 1.7	29	84.2
- 1.1	30	86.0
- 0.6	31	87.8
0.0	32	89.6
0.6	33	91.4
1.1	34	93.2
1.7	35	95.0
2.2	36	96.8
2.8	37	98.6
3.3	38	100.4
3.9	39	102.2
4.4	40	104.0
5.0	41	105.8

C		F
5.6	42	107.6
6.1	43	109.4
6.7	44	111.2
7.2	45	113.0
7.8	46	114.3
8.3	47	116.6
8.9	48	118.4
9.4	49	120.2
10.0	50	122.0
10.6	51	123.8
11.1	52	125.6
11.7	53	127.4
12.2	54	129.2
12.8	55	131.0
13.3	56	132.8
13.9	57	134.6
14.4	58	136.4
15.0	59	138.2
15.6	60	140.0
16.1	61	141.8
16.7	62	143.6
17.2	63	145.4
17.8	64	147.2
18.3	65	149.0
18.9	66	150.8
19.4	67	152.6
20.0	68	154.4
20.6	69	156.2
21.1	70	158.0
21.7	71	159.8
22.2	72	161.6
22.8	73	163.4
23.3	74	165.2
23.9	75	167.0
24.4	76	168.8
25.0	77	170.6
25.6	78	172.4
26.1	79	174.3
26.7	80	176.0
27.2	81	177.8
27.8	82	179.6
28.3	83	181.4
28.9	84	183.2
28.4	85	185.0
30.0	86	186.8
30.6	87	188.6
31.1	88	190.4
31.7	89	192.2
32.2	90	194.0

C		F
32.8	91	195.8
33.3	92	197.6
33.9	93	199.4
34.4	94	201.2
35.0	95	203.0
35.6	96	204.8
36.1	97	206.6
36.7	98	208.4
37.2	99	210.2
37.8	100	212.0
38	101	212
43	110	230
49	120	248
54	130	266
60	140	284
66	150	302
71	160	320
77	170	338
82	180	356
88	190	374
93	200	392
99	210	410
100	212	413.6
104	220	428
110	230	446
116	240	464
121	250	482
127	260	500
132	270	518
138	280	536
143	290	554
149	300	572
154	310	590
160	320	608
166	330	626
171	340	644
177	350	662
182	360	680
188	470	698
193	380	716
199	390	734
204	400	752
210	410	770
216	420	788
221	430	806
227	440	824
232	450	842
238	460	860
243	470	878

C		F
249	480	896
254	490	914
260	500	932
266	510	950
271	520	968
277	530	986
282	540	1004
288	550	1022
293	560	1040
299	570	1058
304	580	1076
310	590	1094
316	600	1112
321	610	1130
327	620	1148
332	630	1166
338	640	1184
343	650	1202
349	660	1220
354	670	1238
360	680	1256
366	690	1274
371	700	1292
377	710	1310
382	720	1328
388	730	1346
393	740	1364
399	750	1382
404	760	1400
410	770	1418
416	780	1436
421	790	1454
427	800	1472
432	810	1490
438	820	1508
443	830	1526
449	840	1544
454	850	1562
460	860	1580
466	870	1598
471	880	1616
477	890	1634
482	900	1652
488	910	1670
493	920	1688
499	930	1706
504	940	1724
510	950	1742
516	960	1760

C		F
521	970	1778
527	980	1796
532	990	1814
538	1000	1832
543	1010	1850
549	1021	1868
554	1031	1886
560	1040	1904
566	1050	1922
571	1060	1940
577	1070	1958
582	1080	1976
588	1090	1994
593	1100	2012
599	1110	2030
604	1120	2048
610	1130	2066
616	1140	2084
621	1150	2102
627	1160	2120
632	1170	2138
638	1180	2156
643	1190	2174
649	1200	2192
654	1210	2210
660	1220	2228
666	1230	2246
671	1240	2264
677	1250	2282
682	1260	2300
688	1270	2318
693	1280	2336
699	1290	2354
704	1300	2372
710	1310	2390
716	1320	2408
721	1330	2426
727	1340	2444
732	1350	2462
738	1360	2480
743	1370	2498
749	1380	2516
754	1390	2534
760	1400	2552
766	1410	2570
771	1420	2588
777	1430	2606
782	1440	2624
788	1450	2642
793	1460	2660

Chart 14-5. Temperature conversion

AIRSPEED INSTALLATION CORRECTION TABLE

CLEAN CONFIGURATION

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test, FTC-TDR-64-27.
Nose Mounted Pitot Static Tube

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

	Indicated Airspeed* (IAS)-Kts	Airspeed Correction --Kts	Calibrated Airspeed (CAS)-Kts
Level Flight & Climb*	20	4.5	24.5
	30	4.5	34.5
	40	4.5	44.5
	50	4.5	54.5
	60	4.5	64.5
	70	4.5	74.5
	80	4.5	84.5
	90	4.5	94.5
	100	4.5	104.5
	110	4.5	114.5
	120	4.5	124.5
	130	4.5	134.5
Autorotation	40	7	47
	50	6	56
	60	6	66
	70	5	75
	80	6	86
	90	6	96
	100	7	107

Add Correction To Indicated Airspeed*
To Obtain Calibrated Airspeed

*Corrected For Instrument Error

Chart 14-6. Airspeed installation correction - D (Sheet 1 of 3)

AIRSPEED INSTALLATION CORRECTION TABLE

CLEAN CONFIGURATION

Model(s): UH-1H
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test, FTC-TDR-64-27.
Nose Mounted Pitot Static Tube

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

	Indicated Airspeed* (IAS)-Kts	Airspeed Correction -- Kts	Calibrated Airspeed (CAS)-Kts
Level Flight and Climb*	20	4.5	24.5
	30	4.5	34.5
	40	4.5	44.5
	50	4.5	54.5
	60	4.5	64.5
	70	4.5	74.5
	80	4.5	84.5
	90	4.5	94.5
	100	4.5	104.5
	110	4.5	114.5
	120	4.5	124.5
	130	4.5	134.5
Autorotation	40	7	47
	50	6	56
	60	6	66
	70	5	75
	80	6	86
	90	6	96
	100	7	107

Add Correction To Indicated Airspeed*
To Obtain Calibrated Airspeed

*Corrected For Instrument Error

Chart 14-6. Airspeed installation correction - **H** (Sheet 2 of 3)

AIRSPEED INSTALLATION CORRECTION TABLE

CLEAN CONFIGURATION

Model(s): UH-1D and UH-1H
Data as of: September 23, 1966
DATA BASIS: Bell Helicopter Company Flight Tests With Roof Mounted Pitot Static Tube

Engine(s): Lycoming T53-L-11/L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

	Indicated Airspeed* (IAS)-Kts	Airspeed Correction --Kts	Calibrated Airspeed (CAS)-Kts
Level Flight	20	5.5	25.5
	30	3.0	33.0
	40	1.5	41.5
	50	-0.0	50.0
	60	-1.5	58.5
	70	-2.0	68.0
	80	-3.0	77.0
	90	-3.2	86.8
	100	-3.5	96.5
	110	-3.7	106.3
	120	-4.0	116.0
	130	-4.2	125.8
Climb	40	+5.0	45.0
	50	+6.0	56.0
	60	+5.0	65.0
	70	+2.0	72.0
	80	+1.2	81.2
Autorotation	40	0.0	40.0
	50	-2.4	47.6
	60	-5.0	55.0
	70	-6.2	63.8
	80	-8.0	72.0
	90	-9.0	81.0
	100	-10.0	90.0

Add Correction To Indicated Airspeed* To Obtain Calibrated Airspeed

*Corrected For Instrument Error

Chart 14-6. Airspeed installation correction - D & H (Sheet 3 of 3)

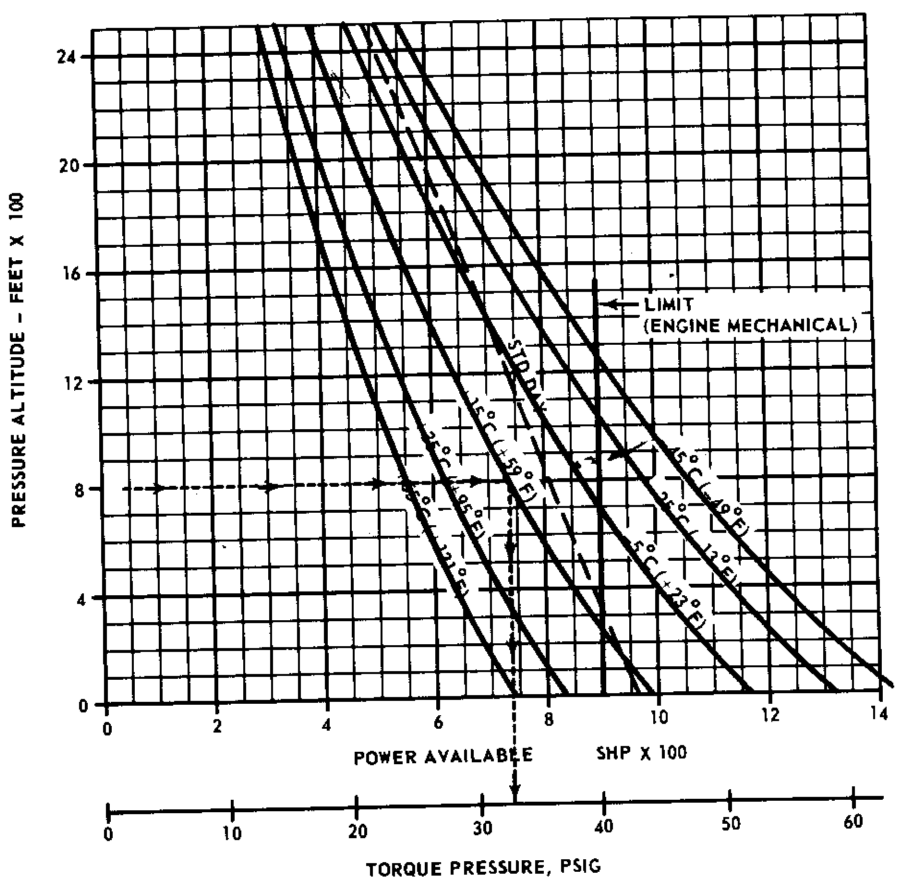
ENGINE OPERATING LIMITS

NORMAL POWER AVAILABLE

2°C INLET TEMPERATURE RISE

ARMY MODEL(S): UH-1D
DATA AS OF: MARCH 1963
DATA BASIS: CALCULATED FROM FTC-TDR-62-21 "YUH-1B CATEGORY II PERFORMANCE TESTS" AND LYCOMING ENGINE SPECIFICATION NO. 104.28

ENGINES: Lycoming T53-L-9/9A/11
ENGINE SPEED: 6400 RPM
FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL



REMARKS:

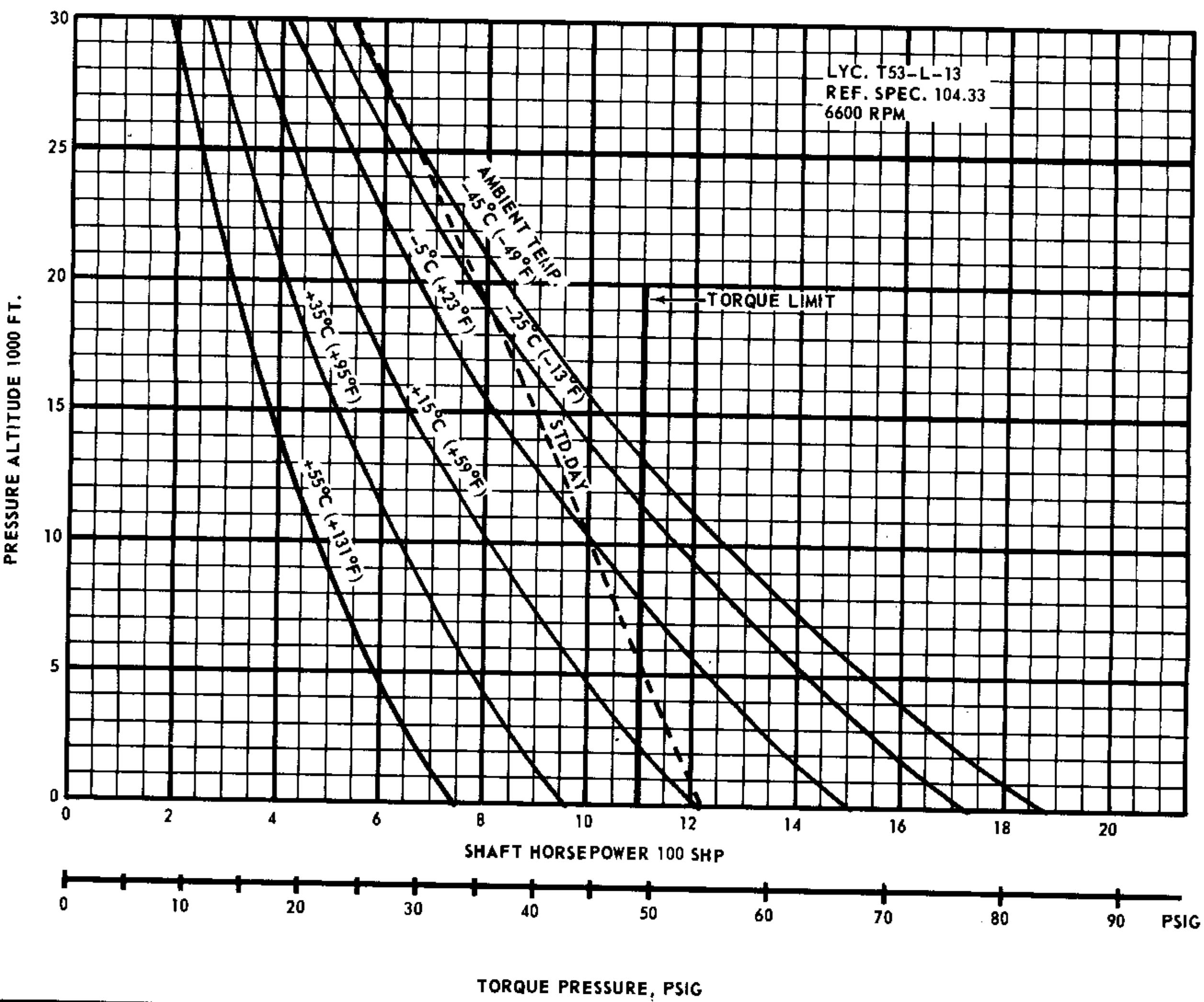
Chart 14-7. Engine operating limits - D

ENGINE OPERATING LIMITS

NORMAL POWER AVAILABLE
2°C INLET TEMPERATURE RISE

ARMY MODEL UH-1H
DATA AS OF: AUGUST 1966
DATA BASIS: CALCULATED, Lycoming Engine
Spec. No. 104.33 (Engine Installed)

ENGINES: Lycoming T53-L-13
ENGINE SPEED: 6600 RPM
FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL.



REMARKS:

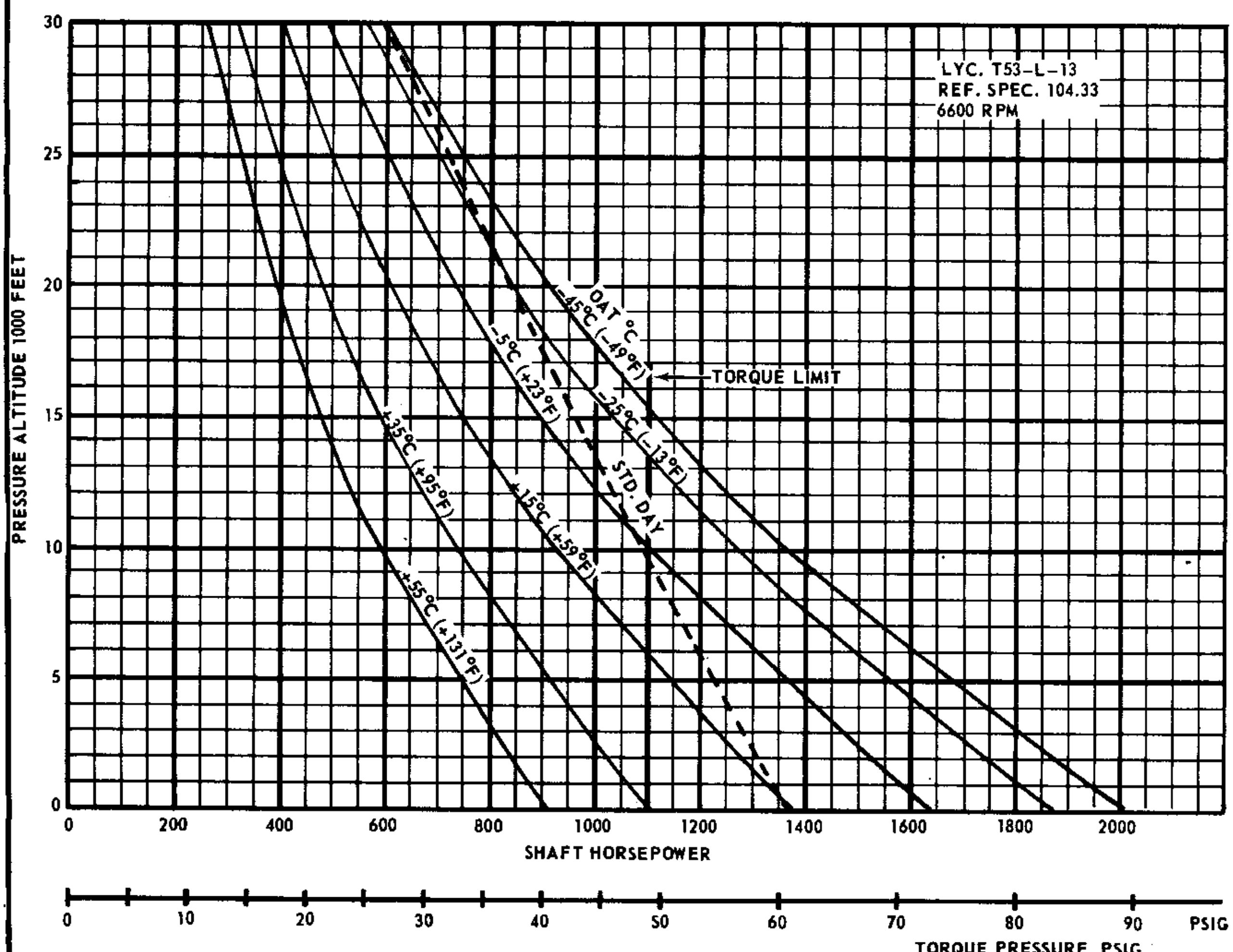
Chart 14-8. Engine operating limits - H - normal power (Sheet 1 of 2)

ENGINE OPERATING LIMITS

MILITARY POWER AVAILABLE
2°C INLET TEMPERATURE RISE

ARMY MODEL: UH-1H
DATA AS OF: AUGUST 1966
DATA BASIS: CALCULATED, Lycoming Engine Spec. No. 104.33 (Engine Installed)

ENGINES: Lycoming T53-L-13
ENGINE SPEED: 6600 RPM
FUEL GRADE JP-4
FUEL DENSITY: 6.5 LB/GAL.



REMARKS:

Chart 14-8. Engine operating limits - H - military power (Sheet 2 of 2)

TAKE-OFF DISTANCE — FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
5000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	14000	0.0	0.	0.0	0.	0.0	0.	21.4	387.	----	----
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----
	20000	0.0	0.	19.7	282.	----	----	----	----	----	----
5500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.7	343.
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	14000	0.0	0.	0.0	0.	18.9	243.	----	----	----	----
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----
	18000	0.0	0.	----	----	----	----	----	----	----	----
	20000	19.6	279.	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 1 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Grade: JP-4
Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
6000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.4	386.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	19.3	266.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
	18000	19.8	289.	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
6500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.8	414.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	19.6	277.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
	16000	19.6	279.	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 2 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
7000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.9	422.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	8000	0.0	0.	0.0	0.	19.6	277.	----	----	----	----
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----
	12000	0.0	0.	----	----	----	----	----	----	----	----
	14000	19.1	255.	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
7500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.7	408.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	6000	0.0	0.	0.0	0.	19.4	268.	----	----	----	----
	8000	0.0	0.	0.0	0.	----	----	----	----	----	----
	10000	0.0	0.	19.8	288.	----	----	----	----	----	----
	12000	18.5	225.	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 3 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
8000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	4000	0.0	0.	0.0	0.	19.0	249.	----	----	----	----
	6000	0.0	0.	0.0	0.	----	----	----	----	----	----
	8000	0.0	0.	19.2	256.	----	----	----	----	----	----
	10000	17.7	193.	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
8500	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----
	6000	0.0	0.	18.4	224.	----	----	----	----	----	----
	8000	0.0	0.	----	----	----	----	----	----	----	----
	10000	----	----	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 4 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
9000	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----
	6000	0.0	0.	----	----	----	----	----	----	----	----
	8000	----	----	----	----	----	----	----	----	----	----
	10000	----	----	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
9500	0.	0.0	0.	0.0	0.	20.3	319.	----	----	----	----
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----
	4000	0.0	0.	----	----	----	----	----	----	----	----
	6000	19.0	251.	----	----	----	----	----	----	----	----
	8000	----	----	----	----	----	----	----	----	----	----
	10000	----	----	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 5 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
5000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	12000	0.0	0.	0.0	0.	0.0	0.	20.0	322.	----	----
	14000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----
	20000	0.0	0.	20.0	286.	----	----	----	----	----	----
5500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	307.
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	14000	0.0	0.	0.0	0.	20.0	272.	----	----	----	----
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----
	18000	0.0	0.	----	----	----	----	----	----	----	----
	20000	20.0	285.	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 6 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
6000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	321.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	12000	0.0	0.	0.0	0.	20.0	280.	----	----	----	----
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----
	16000	0.0	0.	----	----	----	----	----	----	----	----
	18000	20.0	289.	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
6500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	330.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	10000	0.0	0.	0.0	0.	20.0	284.	----	----	----	----
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----
	14000	0.0	0.	----	----	----	----	----	----	----	----
	16000	20.0	285.	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No. wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 7 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
7000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	333.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	8000	0.0	0.	0.0	0.	20.0	284.	----	----	----	----
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----
	12000	0.0	0.	----	----	----	----	----	----	----	----
	14000	20.0	276.	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
7500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	328.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	6000	0.0	0.	0.0	0.	20.0	281.	----	----	----	----
	8000	0.0	0.	0.0	0.	----	----	----	----	----	----
	10000	0.0	0.	20.0	288.	----	----	----	----	----	----
	12000	20.0	264.	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 8 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
8000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	4000	0.0	0.	0.0	0.	20.0	274.	----	----	----	----
	6000	0.0	0.	0.0	0.	----	----	----	----	----	----
	8000	0.0	0.	20.0	277.	----	----	----	----	----	----
	10000	20.0	251.	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
8500	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----
	6000	0.0	0.	20.0	264.	----	----	----	----	----	----
	8000	0.0	0.	----	----	----	----	----	----	----	----
	10000	----	----	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 9 of 20)