AIRCRAFT CHARACTERISTICS FOR AIRFIELD-HELIPORT DESIGN AND EVALUATION

AIRCRAFT CHARACTERISTICS

A-l. This appendix presents US Army, US Air Force, and selected civil and commercial aircraft characteristics required by planners and civil engineers in the layout, design, or evaluation of airfield and heliport pavement systems. The aircraft characteristics include engine data, various weights, performance data, and aircraft classification numbers (ACN). For specific planning, design, or evaluation, the values in this appendix should be confirmed with the appropriate aircraft technical order.

A-2. The data are arranged in figure format for various military, civil, and commercial fixed-wing aircraft (figs A-l to A-463). Military and commercial rotary-wing aircraft data are presented in figures A-464 to A-573.

A-3. Fixed-wing aircraft are grouped by military (figs A-l to A-159) and civil and commercial (figs A-160 to A-463). Military aircraft are further subgrouped as follows:

a. Bomber Aircraft.

Figure	Aircraft
A-l and A-2	B-lB
A-3 and A-4	B-52G
A-5 and A-6	B-52H
A-7 and A-8	FB-111A

b. Cargo/Transport Aircraft.

Figure	Aircraft
A-9 and A-10	C-5A/B
A-11 and A-12	C-7A
A-13 and A-14	C-9A
A-15 and A-16	C-12A
A-17 and A-18	C-12C/D
A-19 and A-20	C-12F
A-21 and A-22	C-12J
A-23 and A-24	C-17A
A-25 and A-26	C-20A/B
A-27 and A-28	C-21A
A-29 and A-30	C-22B
A-31 and A-32	C-23A
A-33 and A-34	C-130B
A-35 and A-36	C-130E/H
A-37 and A-38	C-135B
A-39 and A-40	KC-135R
A-41 and A-42	C-137B
A-43 and A-44	C-137C
A-45 and A-46	C-140A/B
A-47 and A-48	C-141B
A-49 and A-50	KC-10A
A-51 and A-52	VC-25A

c. Special-Duty Aircraft.

Figure	Aircraft
A-53 and A-54	E-3A STD
A-55 and A-56	E-3B
A-57 and A-58	E-3C
A-59 and A-60	E-4B
A-61 and A-62	EC-18B
A-63 and A-64	EC-130E/H
A-65 and A-66	MC-130E/H
A-67 and A-68	WC-130E/H
A-69 and A-70	EC-135A/G/L
A-71 and A-72	EC-135C/J
A-73 and A-74	EC-135E/H/K/P/Y
A-75 and A-76	RC-135S/W
A-77 and A-78	RC-135U/V
A-79 and A-80	WC-135B
A-81 and A-82	EF-lllA
A-83	O-2A
A-84	O-2B
A-85 and A-86	OA-37B
A-87 and A-88	OV-1B
A-89 and A-90	OV-1C
A-9b and A-92	0V-1D
A-93 and A-94	OV-10A
A-95 and A-96	RC-12D/G/H/K
A-97 and A-98	U-21J
A-99 and A-100	RF-4C
A-lO1 and A-102	RU-21A and U-21A/D/G
A-103 and A-104	RU-21H
A-105 and A-106	SR-71A
A-107	TR-1A
A-108	U-2B/C
A-109	U-8F
A-l10	U-10A
A-l11	U-21F
A-112 and A-113	UV-18

d. Tactical Aircraft.

Figure	Aircraft
A-114 and A-115	A-7D/K
A-116 and A-117	A-10A
A-118 and A-119	A-37B
A-120 and A-121	AC-130A
A-122 and A-123	AC-130H/U
A-124 and A-125	F-4C
A-126 and A-127	F-4D
A-128 and A-129	F-4E
A-130 and A-131	F-5E/F
A-132 and A-133	F-l5A/B/C/D
A-134 and A-135	F-l5E
A-136 and A-137	F-16A
A-138 and A-139	F-16B
A-140 and A-141	F-16C
A-142 and A-143	F-16D
A-144 and A-145	F-100
A-146 and A-147	F-101B
A-148 and A-149	F-104G
A-l5O and A-151	F-105G
A-152 and A-153	F-106A/B
A-154 and A-l55	F-111A/E
A-156 and A-157	F-111D
A-158 and A-159	F-111F

A-4. Civil and commercial aircraft are subgrouped as follows:

a. Eight Thousand Pounds or Less, Piston and Turboprop.

(1) Single engine, high wing, tailwheel.

Figure	Aircraft
A-l60	Bellanca 7
A-161	Cessna 120/140
A-162	Cessna 170
A-163	Cessna 180
A-164	Cessna 185
A-165	Cessna 190
A-166	Cessna 195
A-167	Helio H-250
A-168	Helio H-295
A-169	Helio HST-550
A-170	Piper PA-12
A-171	Piper PA-14
A-172	Piper PA-15
A-173	Piper PA-18
A-174	Piper PA-20
A-175	Silvaire 8
A-176	Taylorcraft F-21
A-177	Univair 108

(2) Single engine, high wing, tricycle gear.

Figure	Aircraft
A-178	Bede BD-4
A-179	Cessna 150
A-180	Cessna 172
A-181	Cessna 177
A-182	Cessna 182
A-183	Cessna 206
A-184	Cessna 207
A-185	Cessna 210
A-186	Piper PA-22

(3) Single engine, low wing, tricycle gear.

Figure	Aircraft
A-187	Aerostar 415
A-188	Aerostar M-20
A-189	Aerostar M-22
A-190	Beechcraft 23
A-191	Beechcraft V-35B
A-192	Beechcraft F-33
A-193	Beechcraft F-33A
A-194	Bellanca 260
A-195	Bellanca 300
A-196	Grumman AA-l
A-197	Navion G-1
A-198	Piper PA-24
A-199	Piper PA-28-180
A-200	Piper PA-28-200
A-201	Piper PA-32
A-202	Rockwell 112

(4) Twin engine, low or mid wing, tricycle gear.

Figure	Aircraft
A-203	Aerostar 600/601
A-204	Beechcraft B-55
A-205	Beechcraft E-55
A-206	Beechcraft A-60
A-207	Cessna 310
A-208	Cessna 401/402
A-209	Cessna 421
A-210	Piper PA-23-160
A-211	Piper PA-23-250
A-212	Piper PA-30
A-213	Piper PA-31

(5) Twin engine, high wing, tricycle gear.

Figure	Aircraft
A-214	Cessna 336/337
A-215	Rockwell 500
A-216	Rockwell 560
A-217	Rockwell 680
A-218	Rockwell SHRIKE

b. More Than 8,000 to 12,500 Pounds, Piston and Turboprop.

Figure	Aircraft
A-219	Beechcraft 18
A-220	Beechcraft Turbo 18
A-221	Beechcraft Volpar Turboliner
A-222	Beechcraft A-65
A-223	Beechcraft B-80
A-224	Beechcraft A-90
A-225	Beechcraft A-l00
A-226	Beechcraft 99A
A-227	Swearingen Merlin IIB
A-228 and A-229	Swearingen Merlin III
A-230	Swearingen Merlin IV
A-231	Swearingen Metro
A-232 and A-233	De Havilland DHC-6
A-234	Hawker Siddeley Dove
A-235	Mitsubishi MU-2
A-236 and A-237	Short Brothers SC.7

c. More Than 12,500 Pounds, Piston and Turboprop.

Figure	Aircraft
A-238 and A-239	Short Brothers SC.7-3M
A-240 and A-241	Short Brothers 330
A-242 and A-243	Short Brothers 360
A-244 and A-245	Convair 240
A-246 and A-247	Convair 340
A-248 and A-249	Convair 440
A-250 and A-251	Convair 580
A-252 and A-253	Convair 600
A-254 and A-255	Convair 640
A-256 and A-257	Douglas DC-3
A-258	Fairchild F-27
A-259	Fairchild FH-227
A-260	Grumman Gulfstream I
A-261	Martin 404
A-262	Aerospatiale Nord 262
A-263	Hawker Siddeley Heron
A-264 and A-265	Hawker Siddeley HS-748
A-266	Nihon/N.A.M.C. YS-IlA
A-267 and A-268	Douglas DC-4
A-269 and A-270	Douglas DC-6
A-271 and A-272	Douglas DC-7

Figure	Aircraft
A-273 and A-274	Lockheed L-188
A-275 and A-276	Lockheed L-382 (L-l00-20)
A-277 and A-278	Lockheed L-382 (L-l00-30)
A-279	Lockheed 749A
A-280	Lockheed 1049
A-281	Lockheed 1649A
A-282	B.A.C./Vickers Viscount 745
A-283	B.A.C./Vickers Viscount 810

d. Sixty Thousand Pounds or Less, Turbojet and Turbofan.

Figure	Aircraft
A-284	Cessna Citation I
A-285	Gates Learjet 24
A-286	Gates Learjet 25
A-287	Gates Learjet 35
A-288	Gates Learjet 36
A-289	Grumman Gulfstream II
A-290 and A-291	Lockheed 1329
A-292 and A-293	Rockwell NA-265-40
A-294 and A-295	Rockwell NA-265-60
A-296 and A-297	Rockwell NA-265-75A
A-298	Avions Marcel Dassault Mystere 20
A-299 and A-300	Fokker F-28
A-301 and A-302	Hamburger-Flugzeugbau HFB-320
A-303 and A-304	Hawker Siddeley HS-125
A-305 and A-306	Israel Aircraft 1121
A-307 and A-308	Israel Aircraft 1123

e. More Than 60,000 Pounds, Turbojet and Turbofan.

Figure	Aircraft
A-309 and A-310	Boeing 707-120B
A-311 and A-312	Boeing 707-320
A-313 and A-314	Boeing 707-320B
A-315 and A-316	Boeing 707-320C
A-317 and A-318	Boeing 707-420
A-319 and A-320	Boeing 720
A-321 and A-322	Boeing 720B
A-323 and A-324	Boeing 727-100
A-325 and A-326	Boeing 727-lOOC
A-327 and A-328	Boeing 727-200
A-329 and A-330	Boeing 737-100

Figure	Aircraft
A-331 and A-332	Boeing 737-200
A-333 and A-334	Boeing 737-300
A-335 and A-336	Boeing 737-400
A-337 and A-338	Boeing 747-lOOB
A-339 and A-340	Boeing 747-200B-PASS
A-341 and A-342	Boeing 747-200C-CARGO
A-343 and A-344	Boeing 747-200C-PASS
A-345 and A-346	Boeing 747-200F-CARGO
A-347 and A-348	Boeing 747-300-PASS
A-349 and A-350	Boeing 747-400
A-351 and A-352	Boeing 747SP
A-353 and A-354	Boeing 757-200
A-355 and A-356	Boeing 767-200
A-357 and A-358	Boeing 767-200ER
A-359 and A-360	Boeing 767-300
A-361 and A-362	Boeing 767-300ER
A-363 and A-364	General Dynamics/Convair 880
A-365 and A-366	General Dynamics/Convair 990
A-367 and A-368	Lockheed L-l0ll-l
A-369 and A-370	Lockheed L-l0ll-l00
A-371 and A-372	Lockheed L-l0ll-200
A-373 and A-374	Lockheed L-1011-500
A-375 and A-376	Lockheed L-l0ll-S00 (Extended Wing)
A-377 and A-378	McDonnell Douglas DC-8-43
A-379 and A-380	McDonnell Douglas DC-8-SS
A-381 and A-382	McDonnell Douglas DC-8-SSF
A-383 and A-384	McDonnell Douglas DC-8-61
A-385 and A-386	McDonnell Douglas DC-8-61F
A-387 and A-388	McDonnell Douglas DC-8-62
A-389 and A-390	McDonnell Douglas DC-8-62F
A-391 and A-392	McDonnell Douglas DC-8-63
A-393 and A-394	McDonnell Douglas DC-8-63F
A-395 and A-396	McDonnell Douglas DC-8-71
A-397 and A-398	McDonnell Douglas DC-8-71F
A-399 and A-400	McDonnell Douglas DC-8-72
A-401 and A-402	McDonnell Douglas DC-8-72F
A-403 and A-404	McDonnell Douglas DC-8-73
A-405 and A-406	McDonnell Douglas DC-8-73F
A-407 and A-408	McDonnell Douglas DC-9-15
A-409 and A-410	McDonnell Douglas DC-9-15F
A-411 and A-412	McDonnell Douglas DC-9-21
A-413 and A-414	McDonnell Douglas DC-9-32
A-415 and A-416	McDonnell Douglas DC-9-33F
A-417 and A-418	McDonnell Douglas DC-9-41
A-419 and A-420	McDonnell Douglas DC-9-51

Figure	Aircraft
A-421 and A-422	McDonnell Douglas MD-81
A-423 and A-424	McDonnell Douglas MD-82
A-425 and A-426	McDonnell Douglas MD-83
A-427 and A-428	McDonnell Douglas MD-87
A-429 and A-430	McDonnell Douglas MD-88
A-431 and A-432	McDonnell Douglas DC-10-10
A-433 and A-434	McDonnell Douglas DC-l0-30
A-435 and A-436	McDonnell Douglas DC-l0-40
A-437	Aerospatiale/Sud-Aviation SE-210
A-438 and A-439	B.A.C. One-Eleven Model 200
A-440 and A-441	B.A.C. One-Eleven Model 400
A-442 and A-443	B.A.C. One-Eleven Model 500
A-444 and A-445	B.A.C./Vickers VC-l0, Model 1100
A-446 and A-447	B.A.C./Vickers VC-l0, Model 1150
A-448 and A-449	Ilyushin IL-62
A-450 and A-451	Airbus A300B2
A-452 and A-453	Airbus A300B4
A-454 and A-455	Airbus A300-600
A-456 and A-457	Airbus A310-300
A-458	Airbus A320
A-459 and A-460	B.A.C./SNIAS Concorde
A-461	British Aerospace 146-Model 100
A-462	British Aerospace 146-Model 200
A-463	British Aerospace 146-Model 300

A-5. The following fixed-wing aircraft characteristic information is employed in figures A-b to A-463. An entry of “†” indicates data are not available. A list of aircraft characteristics and explanation of terms are as follows:

a. Aircraft Manufacturer.

b. Aircraft engine manufacturer followed by engine identification in parenthesis.

c. Number of Engines.

d. Engine rating--rating of each engine, either horsepower or thrust.

e. Minimum take-off weight--operating weight (empty weight plus crew weight plus 30 percent fuel capacity).

f. *Minimum take-off distance at minimum take-off weight--minimum take-off distance without any safety, abort or airfield corrections at minimum take-off weight.

g. *Minimum take-off distance at minimum take-off weight with abort distance- -minimum take-off distance without any safety or airfield corrections at minimum take-off weight, but with abort distance added (Critical Field Length).

h. Maximum take-off weight peace-time- -basic mission take-off weight for military aircraft. For civil aircraft, values are the normal operating weights.

i. Maximum take-off weight war-time--maximum take-off gross weight; overload take-off gross weight for military aircraft, if appropriate. The values for civil aircraft are the maximum take-off weights as recommended by the manufacturer.

j. *Minimum take-off distance at maximum take-off weight wartime- -minimum take-off distance without any safety, abort or airfield corrections at maximum take-off weight war-time.

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*These distances are at 59°F, at sea level, with zero runway gradient, and on a clean dry runway surface.

k. *Minimum take-off distance at maximum take-off weight war time with abort distance- -minimum take-off distance without any safety or airfield corrections at maximum take-off weight wartime, but with abort distance added (Critical Field Length).

l. Minimum banding weight--basic mission banding gross weight for military aircraft. For civil aircraft, values are the zero fuel weight plus 10 percent fuel capacity.

m. Maximum landing weight--for military aircraft, the maximum gross weight established for landing by Technical Orders or design requirements. For civil aircraft, the maximum landing gross weight is that weight recommended by the aircraft manufacturer.

n. *Minimum landing distance at minimum landing weight--minimum banding distance without any safety, abort or airfield corrections at minimum landing weight.

o. *Minimum landing distance at maximum landing weight--minimum landing distance without any safety, abort or airfield corrections at maximum landing weight.

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*These distances are at 59°F, at sea level, with zero runway gradient, and on a clean dry runway surface.

p. ACN-Aircraft Classification Number. The ACN is a method to express the effect of individual aircraft on different pavements by a single unique number which varies according to pavement type and subgrade strength, without specifying a particular pavement thickness. The system is structured so that a pavement with a particular pavement classification number (PCN) value can support. without weight restrictions, an aircraft which has an ACN value equal to or less than the pavement*s PON value. ACN values are shown in tabular form for minimum landing weight, maximum landing weight, maximum take-off weight peace-time, and maximum take-off weight war-time. ACN/PCN versus allowable aircraft load relationships are presented graphically for applicable aircraft.

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*These distances are at 59°F, at sea level, with zero runway gradient, and on a clean dry runway surface.

A-6. Rotary-wing aircraft are grouped and presented in alphabetical order by aircraft manufacturer (figs A-464 to A-573). Military aircraft designation; if applicable, is identified within parenthesis of the figure title. Military and commercial helicopters are presented as follows:

Figure	Aircraft
A-464	Aerospatiale 315B
A-465	Aerospatiale 330J
A-466 and A-467	Aerospatiale 332C
A-468 and A-469	Aerospatiabe 332L
A-470	Aerospatiale 341
A-471	Aerospatiabe 350B
A-472	Aerospatiale 350D
A-473	Aerospatiale 355E
A-474	Aerospatiale 35SF
A-475	Aerospatiale 355F1
A-476	Aerospatiale 360C
A-477	Aerospatiabe 365C
A-478	Aerospatiale 365N
A-479	Agusta 109A
A-480	Agusta 109A Mk II
A-481	Bell 47G-3B (OH-13)
A-482	Bell 47G-3B (TH-13T)
A-483	Bell 47C-SA
A-484	Bell 204 (UH-1B)
A-485	Bell 204 (UH-lC)
A-486	Bell 204 (UH-1M)
A-487	Bell 205 (UH-lD)
A-488	Bell 205 (UH-lH)
A-489	Bell 205A-l
A-490	Bell 206A (OH-58A)
A-491	Bell 206A (OH-58C)
A-492	Bell 206B
A-493	Bell 206L-3
A-494	Bell 209 (AH-lG)
A-495	Bell 209 [AH-lS (Production)]
A-496	Bell 209 [AH-lS (ECAS)]
A-497	Bell 209 [AH-lS (Modernized)]
A-498	Bel 212 (UH-lN)
A-499	Bell 212
A-500	Bell 214B
A-501	Bell 214ST

Figure	Aircraft
A-502	Bell 222
A-503	Bell 222B
A-504	Bell 222UT
A-5O5	Bell 406 AHIP (OH-58D)
A-506	Bell 412
A-507	Bell/Boeing 301 (V-22)
A-508 and A-509	Boeing 107-II
A-510 and A-5ll	Boeing 114 (CH-47B)
A-512 and A-513	Boeing 114 (CH-47C)
A-514 and A-515	Boeing 114 (CH-47D)
A-516 and A-517	Boeing 234 LR
A-518 and A-519	Boeing 234 ER
A-520 and A-521	Boeing 234 MLR
A-522 and A-523	Boeing 234 UT
A-524	Boeing 360
A-525	E. H. Industries EH 101
A-526	Enstrom F28C-2
A-527	Enstrom F28F
A-528	Enstrom 280C
A-529	Enstrom 280F
A-530	Enstrom 280FX
A-531	Hynes H-2/with skid landing gear
A-532	Hynes H-2/with wheel landing gear
A-533	Hynes H-S/with skid landing gear
A-534	Hynes H-S/with wheel banding gear
A-535	MBB BO 105 CB
A-536	MBB BO 105 CBS
A-537	MBB BO 105 LS
A-538	MBB/Kawasaki BK 117
A-539 and A-540	McDonnell Douglas 77 (AH-64A)
A-541	McDonnell Douglas 500 (OH-6A)
A-542	McDonnell Douglas 500D
A-543	McDonnell Douglas 530F
A-544	Robinson R22
A-545	Rogerson Hiller RH-1100
A-546	Rogerson Hiller UH-12E
A-547	Rogerson Hiller UH-12E4
A-548	Rogerson Hiller UH-l2ET
A-549	Rogerson Hiller UH-12E4T
A-550	Schweizer 269A (TH-55A)
A-551	Schweizer 300C
A-552 and A-553	Sikorsky S-58T
A-554 and A-555	Sikorsky S-61N
A-556	Sikorsky S-62
A-557 and A-558	Sikorsky S-64 (CH-54A)
A-559 and A-560	Sikorsky S-65A (CH-53C and HH-53C)

Figure	Aircraft
A-561 and A-562	Sikorsky S-70 (HH-60A)
A-563 and A-564	Sikorsky S-70 (UH-60A)
A-565 and A-566	Sikorsky S-70C
A-567	Sikorsky S-76A
A-568	Sikorsky S-76B
A-569 and A-570	Westland 30-100-60
A-571 and A-572	Westland 30-200
A-573	Westland 30-300

A-7. The following rotary-wing aircraft characteristic information is employed in figures A-464 to A-573. An entry of "†" indicates data are not available. A list of aircraft characteristics and explanation of terms are as follows:

a. Aircraft Manufacturer.

b. Aircraft engineer manufacturer followed by engine identification in parenthesis.

c. Number of Engines.

d. Engine rating--rating of each engine, either horsepower or thrust.

e. Minimum take-off weight--operating weight (empty weight plus crew weight plus 30 percent fuel capacity).

f. Maximum take-off weight peace-time--for civil aircraft, values are the normal operating weights.

g. Maximum take-off weight war-time- -overload take-off gross weight for military aircraft if appropriate. The values for civil aircraft are the maximum take-off weights as recommended by the manufacturer.

h. Maximum Landing Weight.

i. Hover ceiling (in ground effect)--helicopter performance with theoretical flat horizontal surface just below the aircraft.

j. Hover ceiling (out of ground effect)--helicopter hovering far above nearest surface.

k. ACN-Aircraft Classification Number. The ACN is a method to express the effect of individual aircraft on different pavements by a single unique number which varies according to pavement type and subgrade strength, without specifying a particular pavement thickness. The system is structured so that a pavement with a particular pavement classification number (PCN) value can support, without weight restrictions, an aircraft which has an ACN value equal to or less than the pavement*s PCN value. ACN values are shown in tabular form for minimum take-off weight, maximum take-off weight peace-time, maximum take-off weight war-time, and maximum landing weight. ACN/PCN versus allowable aircraft load relationships are presented graphically for applicable aircraft.