APPENDIX B

DEPARTMENT OF STATE
S-61N HOVER PERFORMANCE DATA & CHARTS

Appendix B is an effort to create a stand alone document that provides a brief data summary of the Department of State (D.O.S.) hover performance “Spot Check” and resulting hover performance charts.

Executive Summary

A joint Sikorsky Aircraft/Carson Helicopters OGE hover performance flight test was recently conducted at Carson’s facility in Perkasie, PA on an S-61N (N3173U). The flight test was designed to acquire sufficient test data to serve as a “spot check” with respect to existing predicted performance models. The test data from this joint evaluation correlated well with the Sikorsky Aircraft predicted performance models which are based on data obtained during the VH-3 Performance Improvement Program (aluminum blade only) and the more recent VH-3 Lift Improvement Program (aluminum and composite blade data). As a result, the predicted performance model curves will serve as the basis for HIGE and HOGE performance charts for DOS configuration S-61N aircraft. It should be noted that i) the charts are for clean aircraft configuration with land gear and non folding rotor head (but excluding mission kits such as engine air particle separators, chaff & flare system, cargo hook, etc); and ii) the charts are for a long body configuration and are conservatively also applicable to a short body configuration.

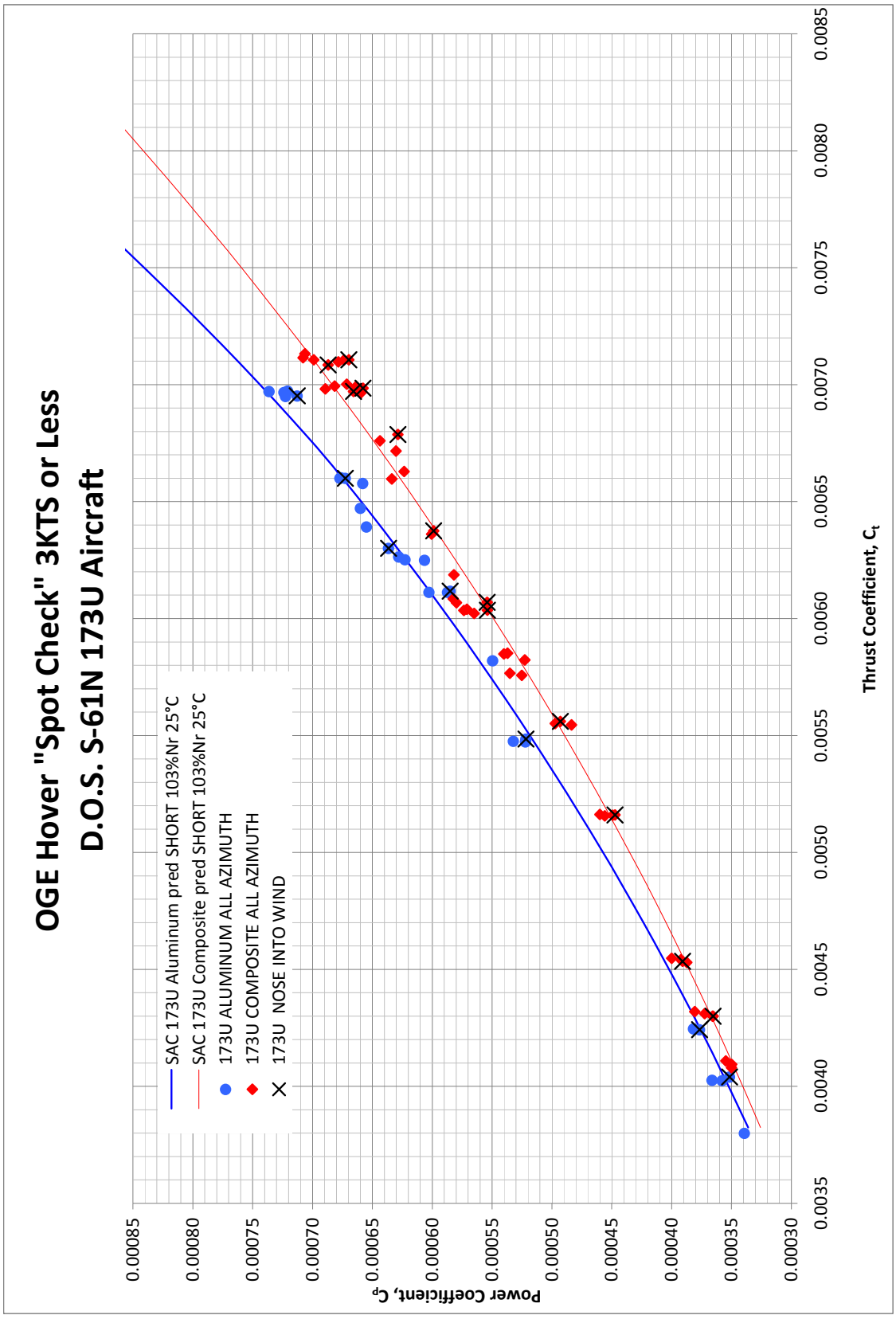
The following contains a data summary table and plot of all credit data acquired during the D.O.S. hover performance “Spot Check” along with resulting In Ground Effect (IGE) and Out of Ground Effect (OGE) hover performance charts.

D.O.S. FREE HOVER PERFORMANCE DATA SUMMARY.

RDF	RUN	MANEUVER	AVG TORQUE (%)	TOTAL SHP (SHP)	RADAR ALTITUDE (FT)	A/C PRESS ALTITUDE (FT)	ROTOR SPEED (%)	SONDE WIND MAG (KTS)	SONDE WIND DIR (DEG)	A/C HEAD (DEG)	SONDE OAT (°C)	SONDE REL HUM (%)	TEST GW (LBS)	DENSITY ALTITUDE (FT)	Cw	Ct	BLADES CS/AL
NOTE:	**GW = TEST GW INCLUDING EXTERNAL LOADS**																
	SHP = .1215 * Q% * NR%, PER ENGINE																
	100%NR = 203 RPM																
186_007	14	HOGE 103%NR NOSE	96.7	2421	135.5	651	103.1	2.5	285	310	22.7	92.1	21171	2018	0.006787	0.0006286	CS
186_007	16	HOGE 103%NR TAIL	99.1	2484	140.3	657	103.1	3.0	285	140	22.7	92.1	21111	2025	0.006760	0.0006437	CS
186_007	20	HOGE 100%NR TAIL	98.0	2389	134.0	653	100.3	3.0	285	130	22.9	91.2	20971	2043	0.007106	0.0006737	CS
186_007	22	HOGE 100%NR NOSE	97.3	2369	137.6	656	100.2	2.9	285	310	23.1	90.6	20931	2071	0.007107	0.0006697	CS
186_007	23	HOGE 100%NR LEFT	98.6	2400	135.2	651	100.2	2.9	285	50	23.1	90.6	20911	2064	0.007098	0.0006784	CS
186_008	9	HOGE 106%NR RIGHT	102.4	2645	118.6	737	106.3	2.9	295	240	24.0	83.4	22134	2261	0.006717	0.0006302	CS
186_008	25	HOGE 106%NR RIGHT	100.6	2589	132.1	743	105.9	2.9	326	230	23.7	82.9	21694	2229	0.006629	0.0006235	CS
186_008	43	HOGE 106%NR TAIL	72.9	1878	128.0	745	106.1	2.5	13	210	23.5	83.2	16964	2206	0.005160	0.0004494	CS
186_008	44	HOGE 106%NR RIGHT	74.4	1918	139.1	759	106.0	3.0	13	300	23.5	83.2	16944	2223	0.005163	0.0004600	CS
186_008	45	HOGE 106%NR NOSE	72.3	1864	159.3	776	106.0	2.8	13	20	23.5	83.2	16924	2244	0.005161	0.0004473	CS
186_008	46	HOGE 106%NR LEFT	73.6	1895	161.2	779	106.0	2.8	13	115	23.5	83.2	16884	2248	0.005157	0.0004558	CS
186_008	47	HOGE 100%NR TAIL	102.0	2484	139.7	758	100.2	3.0	4	210	23.5	83.9	20894	2225	0.007132	0.0007064	CS
186_008	48	HOGE 100%NR RIGHT	102.3	2492	145.9	766	100.2	2.8	4	300	23.5	83.9	20854	2235	0.007115	0.0007079	CS
186_008	49	HOGE 100%NR NOSE	99.5	2426	144.1	764	100.3	2.5	4	20	23.5	83.9	20814	2232	0.007085	0.0006869	CS
186_008	55	HOGE 106%NR TAIL	57.2	1470	119.8	736	105.8	2.1	354	210	23.6	84.1	13434	2211	0.004109	0.0003547	CS
186_008	56	HOGE 106%NR RIGHT	56.5	1456	126.0	744	105.9	2.5	354	305	23.6	84.1	13414	2220	0.004094	0.0003499	CS
186_008	58	HOGE 106%NR LEFT	56.6	1458	126.3	743	106.0	2.7	354	115	23.6	84.1	13374	2220	0.004080	0.0003502	CS
186_008	59	HOGE 103%NR TAIL	58.0	1452	130.4	745	102.9	2.1	3	200	23.6	83.6	13354	2220	0.004320	0.0003808	CS
186_008	60	HOGE 103%NR RIGHT	56.9	1424	125.9	744	103.0	2.0	3	300	23.6	83.6	13354	2220	0.004311	0.0003723	CS
186_008	61	HOGE 103%NR NOSE	55.9	1399	133.1	752	103.1	1.8	3	30	23.6	83.6	13334	2228	0.004300	0.0003654	CS
186_008	62	HOGE 103%NR LEFT	55.9	1401	137.3	752	103.1	1.4	3	120	23.6	83.6	13334	2229	0.004300	0.0003657	CS
186_008	63	HOGE 100%NR TAIL	57.7	1406	143.3	754	100.2	1.1	357	200	23.7	83.4	13314	2244	0.004548	0.0004001	CS
186_008	64	HOGE 100%NR RIGHT	56.7	1381	133.8	751	100.2	1.1	357	290	23.7	83.4	13314	2240	0.004542	0.0003922	CS
186_008	65	HOGE 100%NR NOSE	56.5	1376	135.2	750	100.2	1.7	357	25	23.7	83.4	13294	2239	0.004535	0.0003909	CS
186_008	66	HOGE 100%NR LEFT	56.0	1363	121.5	739	100.2	1.8	357	115	23.7	83.4	13274	2225	0.004530	0.0003873	CS
186_008	67	HOGE 100%NR TAIL	97.1	2366	143.6	759	100.3	1.6	349	210	23.7	83.3	20534	2249	0.007001	0.0006714	CS
186_008	68	HOGE 100%NR RIGHT	96.0	2340	140.5	760	100.3	1.0	349	295	23.7	83.3	20514	2250	0.006992	0.0006636	CS
186_008	69	HOGE 100%NR NOSE	95.1	2316	141.6	766	100.3	1.3	349	20	23.7	83.3	20474	2257	0.006985	0.0006578	CS
186_008	70	HOGE 100%NR LEFT	98.2	2387	139.3	757	100.1	2.3	349	115	23.7	83.3	20434	2247	0.006994	0.0006814	CS
186_009	39	HOGE 106%NR LEFT	89.3	2297	N/A	712	105.8	3.0	341	60	21.7	81.9	19190	1928	0.005820	0.0005494	AL
186_009	42	HOGE 103%NR NOSE	90.1	2254	N/A	688	102.9	3.0	345	330	21.7	80.3	19110	1893	0.006118	0.0005849	AL
186_009	43	HOGE 103%NR LEFT	90.4	2260	N/A	699	102.9	2.6	345	60	21.7	80.3	19080	1907	0.006113	0.0005871	AL
186_009	45	HOGE 103%NR RIGHT	92.6	2312	N/A	682	102.8	2.7	345	240	21.7	80.3	19040	1886	0.006112	0.0006027	AL
186_009	52	HOGE 100%NR TAIL	95.2	2314	N/A	673	100.0	3.0	343	150	21.8	78.1	18850	1880	0.006392	0.0006550	AL
186_009	54	HOGE 106%NR NOSE	103.5	2660	N/A	654	105.8	1.8	334	330	22.0	75.3	20782	1873	0.006300	0.0006365	AL
186_009	55	HOGE 106%NR LEFT	99.2	2558	N/A	673	106.1	2.1	334	60	22.0	75.3	20742	1896	0.006250	0.0006063	AL
186_009	56	HOGE 106%NR TAIL	102.4	2637	N/A	663	105.9	1.8	334	150	22.0	75.3	20722	1884	0.006264	0.0006279	AL
186_009	57	HOGE 106%NR RIGHT	101.6	2614	N/A	656	105.9	2.5	334	240	22.0	75.3	20682	1876	0.006251	0.0006227	AL
186_009	58	HOGE 103%NR NOSE	103.9	2603	N/A	653	103.1	1.6	345	330	22.0	75.6	20682	1873	0.006599	0.0006726	AL
186_009	59	HOGE 103%NR LEFT	101.7	2550	N/A	666	103.1	0.8	345	60	22.0	75.6	20632	1889	0.006578	0.0006579	AL
186_009	60	HOGE 103%NR TAIL	104.2	2608	N/A	649	103.0	2.5	345	150	22.0	75.6	20642	1868	0.006602	0.0006761	AL
186_009	61	HOGE 103%NR RIGHT	104.3	2609	N/A	647	102.9	1.3	345	240	22.0	75.6	20622	1866	0.006600	0.0006770	AL

D.O.S. FREE HOVER PERFORMANCE DATA SUMMARY CONTINUED.

RDF	RUN	MANEUVER	AVG Q TORQUE (%)	TOTAL SHP (SHP)	RADAR ALTITUDE (FT)	A/C PRESS ALTITUDE (FT)	ROTOR SPEED (%)	SONDE WIND MAG (KTS)	SONDE WIND DIR (DEG)	A/C HEAD (DEG)	SONDE OAT (°C)	SONDE REL HUM (%)	GW (LBS)	DENSITY ALTITUDE (FT)	Cw	Ct	BLADES CS/AL
NOTE:	**GW = TEST GW INCLUDING EXTERNAL LOADS SHP = .1215 * Q% * NR%, PER ENGINE 100%NR = 203 RPM**																
186_009	63	HOGE 100%NR LEFT	104.7	2543	N/A	658	100.0	2.2	340	60	22.1	74.0	20542	1886	0.006973	0.0007207	AL
186_009	64	HOGE 100%NR TAIL	105.0	2549	N/A	649	99.9	2.6	340	150	22.1	74.0	20502	1874	0.006967	0.0007239	AL
186_009	65	HOGE 100%NR RIGHT	106.6	2584	N/A	651	99.8	1.6	340	240	22.1	74.0	20462	1877	0.006971	0.0007363	AL
186_009	66	HOGE 100%NR NOSE	103.3	2508	N/A	650	99.9	2.3	342	330	22.1	75.8	20442	1882	0.006952	0.0007128	AL
186_009	67	HOGE 103%NR LEFT	104.6	2536	N/A	664	99.8	2.5	342	60	22.1	75.8	20402	1899	0.006950	0.0007224	AL
186_009	71	HOGE 103%NR RIGHT	102.0	2555	N/A	647	103.1	3.0	340	240	22.1	76.4	20282	1881	0.006472	0.0006600	AL
186_009	72	HOGE 106%NR NOSE	85.3	2197	N/A	656	106.0	2.2	345	330	22.0	76.4	18180	1879	0.005485	0.0005218	AL
186_009	73	HOGE 106%NR LEFT	85.3	2199	N/A	668	106.0	1.9	345	60	22.0	76.4	18140	1893	0.005473	0.0005221	AL
186_009	74	HOGE 106%NR TAIL	86.8	2235	N/A	660	105.9	2.9	345	150	22.0	76.4	18120	1884	0.005476	0.0005322	AL
186_009	87	HOGE 106%NR RIGHT	55.7	1437	N/A	648	106.2	2.4	347	240	22.1	72.2	12642	1868	0.003799	0.0003393	AL
186_009	88	HOGE 103%NR NOSE	54.3	1361	N/A	649	103.1	2.4	357	330	22.0	76.2	12662	1870	0.004041	0.0003516	AL
186_009	90	HOGE 103%NR TAIL	56.5	1413	N/A	643	103.0	2.4	357	150	22.0	76.2	12592	1862	0.004026	0.0003662	AL
186_009	91	HOGE 103%NR RIGHT	55.2	1381	N/A	639	103.0	2.7	357	240	22.0	76.2	12592	1858	0.004024	0.0003578	AL
186_009	92	HOGE 100%NR NOSE	55.1	1341	N/A	641	100.2	1.3	354	0	22.1	76.3	12572	1873	0.004242	0.0003768	AL
186_009	93	HOGE 100%NR LEFT	55.7	1357	N/A	662	100.2	2.2	354	90	22.1	76.3	12572	1899	0.004246	0.0003817	AL
186_011	25	HOGE 100%NR TAIL	101.9	2472	118.7	724	99.8	2.9	10	240	19.8	70.1	21013	1662	0.007107	0.0006989	CS
186_011	34	HOGE 103%NR RIGHT	98.1	2457	121.1	726	103.1	2.8	1	270	21.0	63.5	20713	1796	0.006597	0.0006337	CS
186_011	35	HOGE 100%NR NOSE	97.3	2370	121.7	728	100.2	2.8	6	0	21.2	60.1	20673	1813	0.006971	0.0006658	CS
186_011	36	HOGE 100%NR LEFT	96.4	2346	120.0	725	100.2	2.7	6	90	21.2	60.1	20653	1809	0.006966	0.0006593	CS
186_011	37	HOGE 100%NR LEFT	100.3	2437	120.1	725	100.0	2.3	6	90	21.2	60.1	20613	1808	0.006982	0.0006893	CS
186_011	40	HOGE 106%NR NOSE	80.7	2080	127.8	733	106.1	2.8	350	0	21.3	65.9	18461	1849	0.005561	0.0004929	CS
186_011	42	HOGE 106%NR TAIL	81.4	2096	124.6	722	106.0	2.7	350	180	21.3	65.9	18421	1836	0.005551	0.0004973	CS
186_011	43	HOGE 106%NR RIGHT	79.1	2039	130.1	729	106.0	2.4	350	270	21.3	65.9	18401	1845	0.005545	0.0004836	CS
186_011	45	HOGE 103%NR LEFT	83.1	2081	127.1	730	103.1	2.6	350	90	21.5	64.6	18351	1867	0.005851	0.0005371	CS
186_011	46	HOGE 103%NR TAIL	83.4	2087	125.1	723	103.0	2.5	350	180	21.5	64.6	18311	1859	0.005849	0.0005401	CS
186_011	47	HOGE 103%NR RIGHT	81.0	2030	127.6	725	103.2	3.0	350	270	21.5	64.6	18291	1861	0.005823	0.0005227	CS
186_011	52	HOGE 100%NR TAIL	84.3	2045	127.2	724	99.8	2.6	334	180	21.5	63.8	18181	1857	0.006188	0.0005820	CS
186_011	57	HOGE 103%NR TAIL	81.1	2031	130.4	725	103.1	2.7	336	180	21.7	63.4	18031	1883	0.005757	0.0005251	CS
186_011	58	HOGE 103%NR RIGHT	82.5	2064	131.0	728	103.0	2.8	336	270	21.7	63.4	18031	1886	0.005766	0.0005350	CS
186_011	59	HOGE 100%NR NOSE	81.1	1977	128.5	729	100.4	2.7	328	0	21.8	64.2	18011	1902	0.006070	0.0005541	CS
186_011	60	HOGE 100%NR LEFT	84.9	2065	124.4	723	100.1	2.9	328	90	21.8	64.2	17981	1895	0.006085	0.0005824	CS
186_011	61	HOGE 100%NR TAIL	84.6	2061	125.1	721	100.2	2.4	328	180	21.8	64.2	17961	1892	0.006067	0.0005797	CS
186_011	63	HOGE 106%NR NOSE	90.4	2327	124.1	725	106.0	1.5	351	0	22.0	54.4	19973	1890	0.006036	0.0005539	CS
186_011	64	HOGE 106%NR LEFT	93.0	2391	123.6	725	105.8	2.2	351	90	22.0	54.4	19943	1890	0.006040	0.0005710	CS
186_011	65	HOGE 106%NR TAIL	93.4	2401	122.1	720	105.8	2.2	351	180	22.0	54.4	19923	1884	0.006035	0.0005736	CS
186_011	66	HOGE 106%NR RIGHT	92.1	2369	126.9	723	105.9	1.8	351	270	22.0	54.4	19903	1887	0.006022	0.0005649	CS
186_011	67	HOGE 103%NR NOSE	92.1	2302	119.6	719	102.9	1.1	336	0	22.1	61.6	19883	1919	0.006375	0.0005987	CS
186_011	68	HOGE 103%NR LEFT	92.5	2314	123.5	725	103.0	1.4	336	90	22.1	61.6	19863	1926	0.006361	0.0006006	CS


OGE Hover "Spot Check" 3KTS or Less
D.O.S. S-61N 173U Aircraft
SAC 173U Aluminum pred SHORT 103%Nr 25°C
SAC 173U Composite pred SHORT 103%Nr 25°C
173U ALUMINUM ALL AZIMUTH
173U COMPOSITE ALL AZIMUTH
173U NOSE INTO WIND
Power Coefficient, Cp
Thrust Coefficient, Ct
0.00085
0.00080
0.00075
0.00070
0.00065
0.00060
0.00055
0.00050
0.00045
0.00040
0.00035
0.00030
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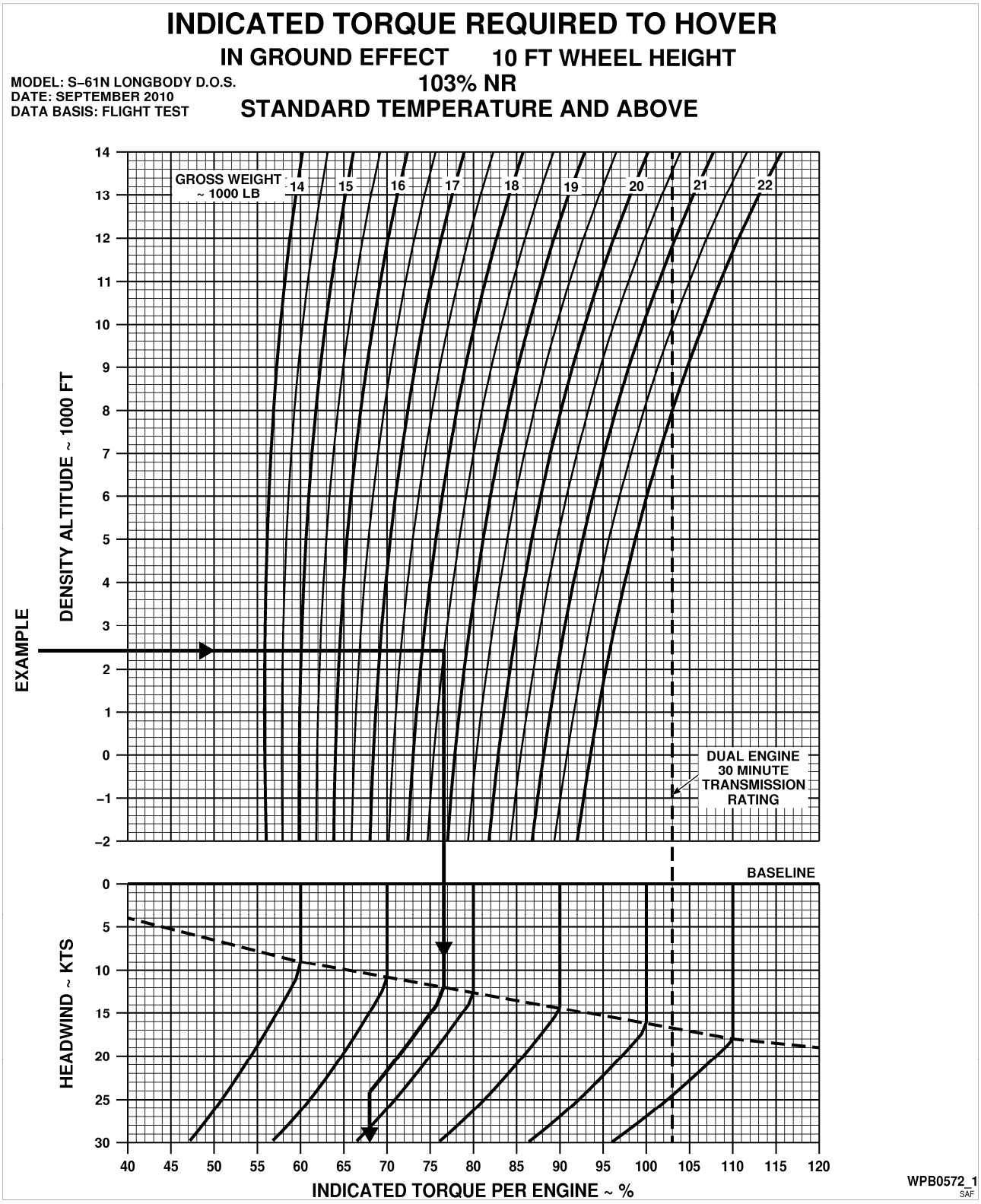
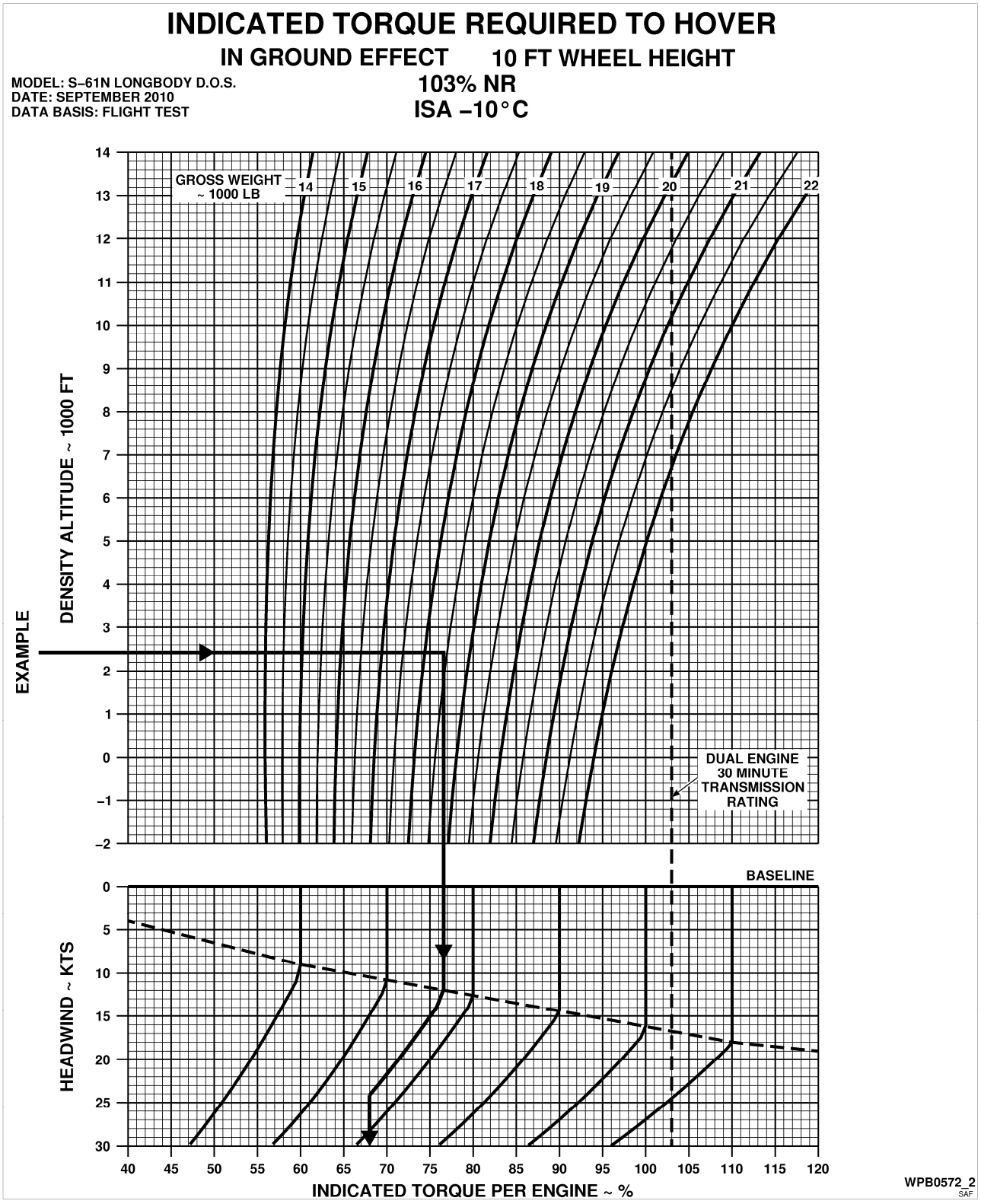
0.0050
0.0055
0.0060
0.0065
0.0070
0.0075
0.0080
0.0085


INDICATED TORQUE REQUIRED TO HOVER
IN GROUND EFFECT 10 FT WHEEL HEIGHT
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
103% NR
STANDARD TEMPERATURE AND ABOVE
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0572_1
SAF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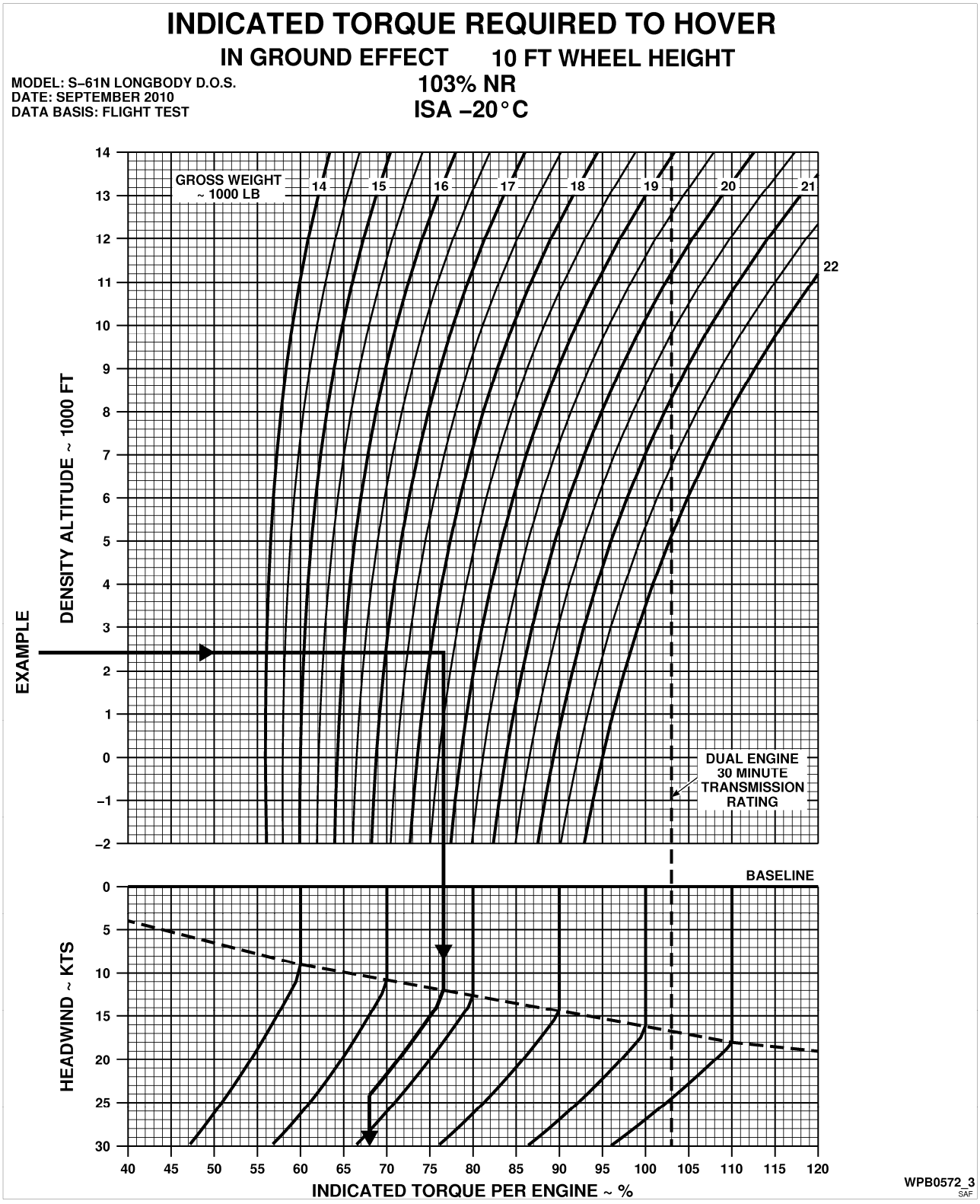
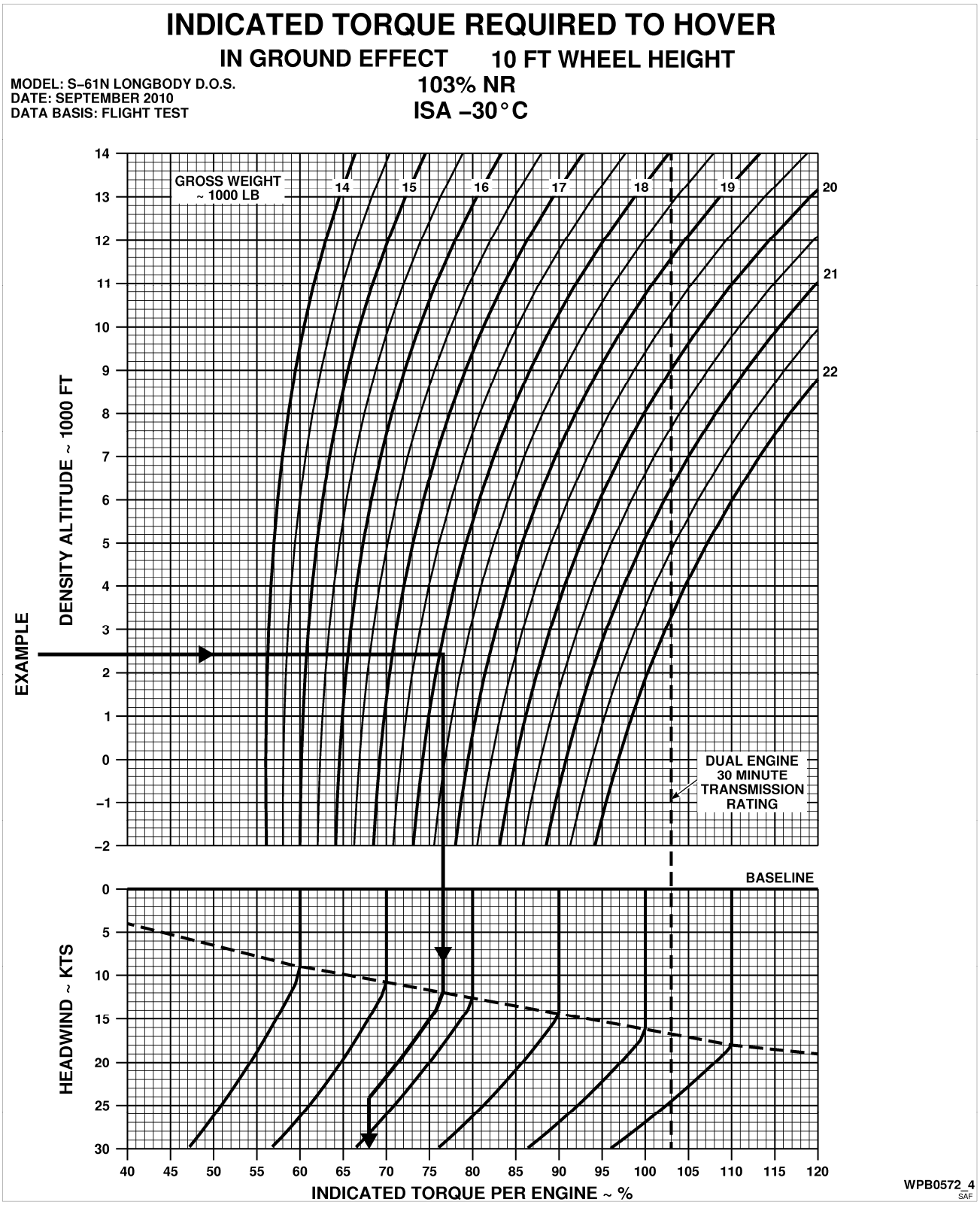
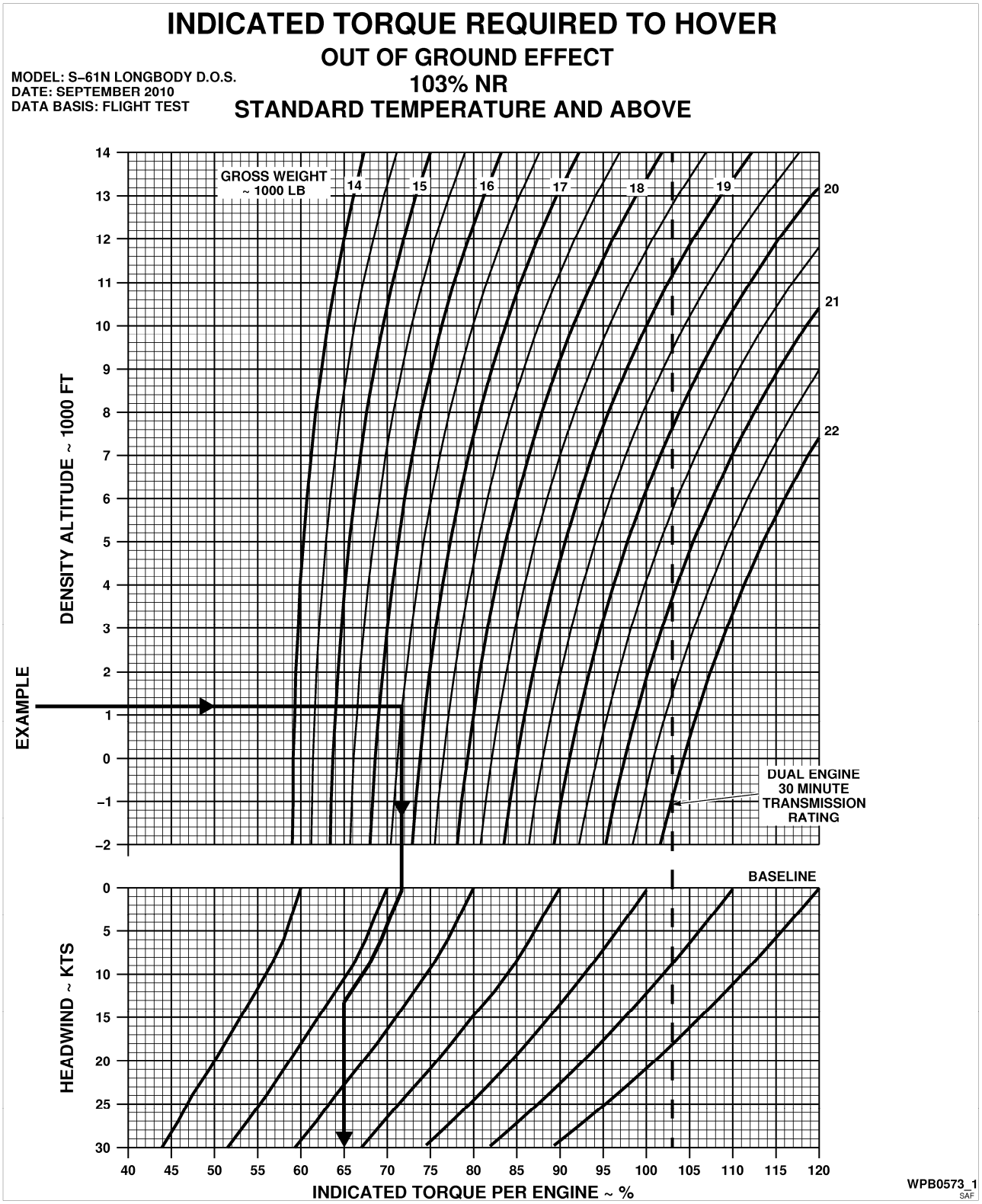
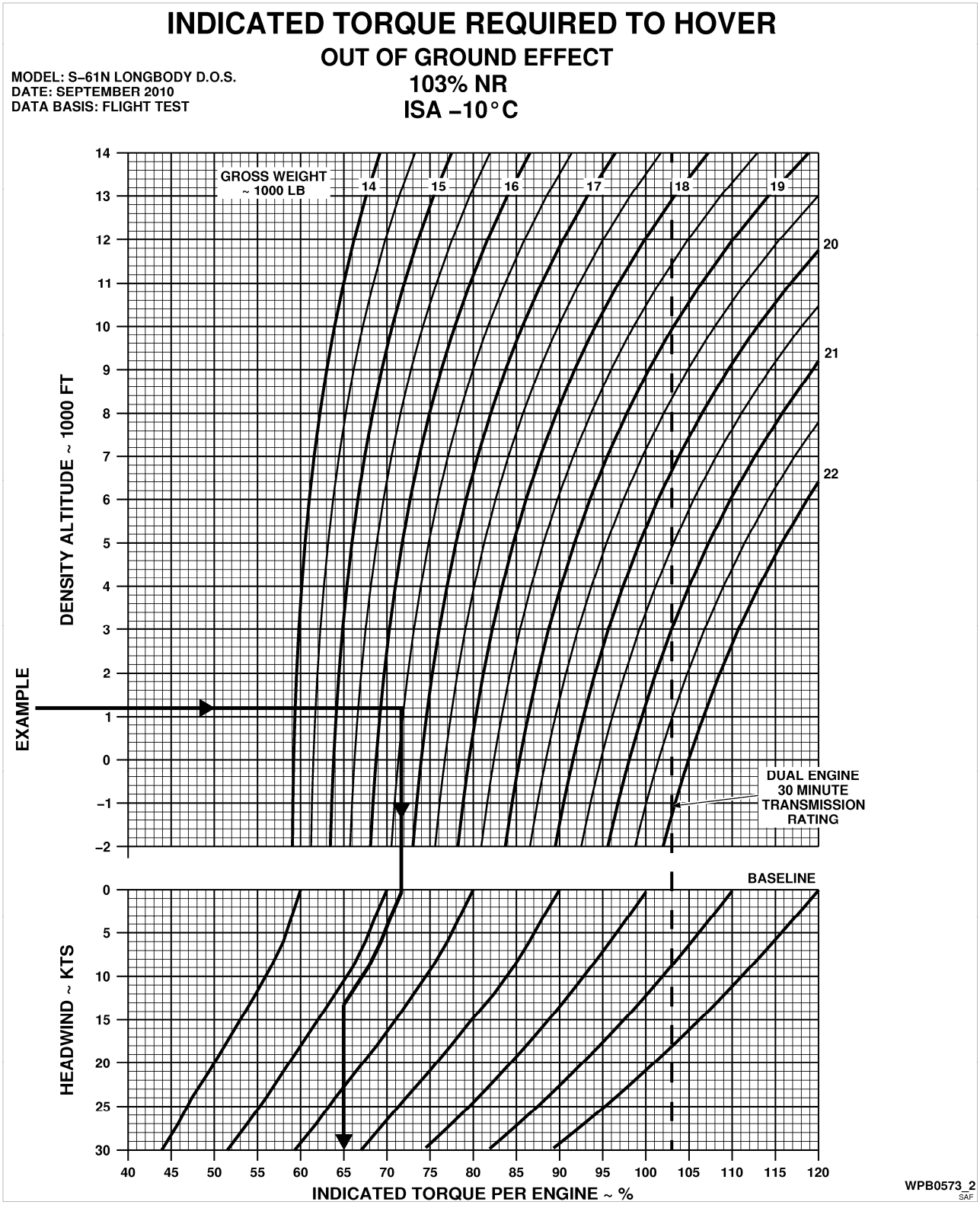
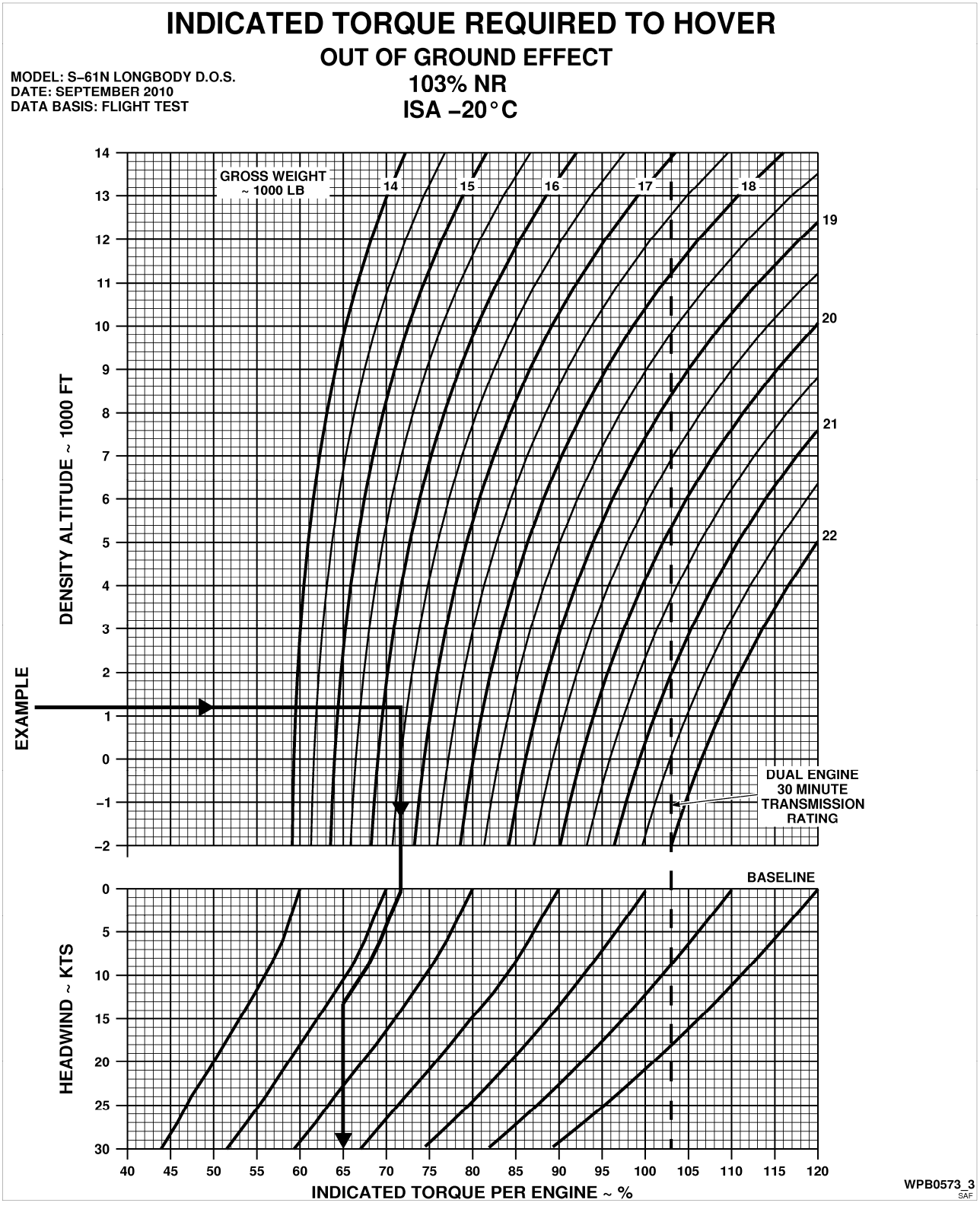
IN GROUND EFFECT 10 FT WHEEL HEIGHT
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
103% NR
ISA –10°C
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0572_2
SAF

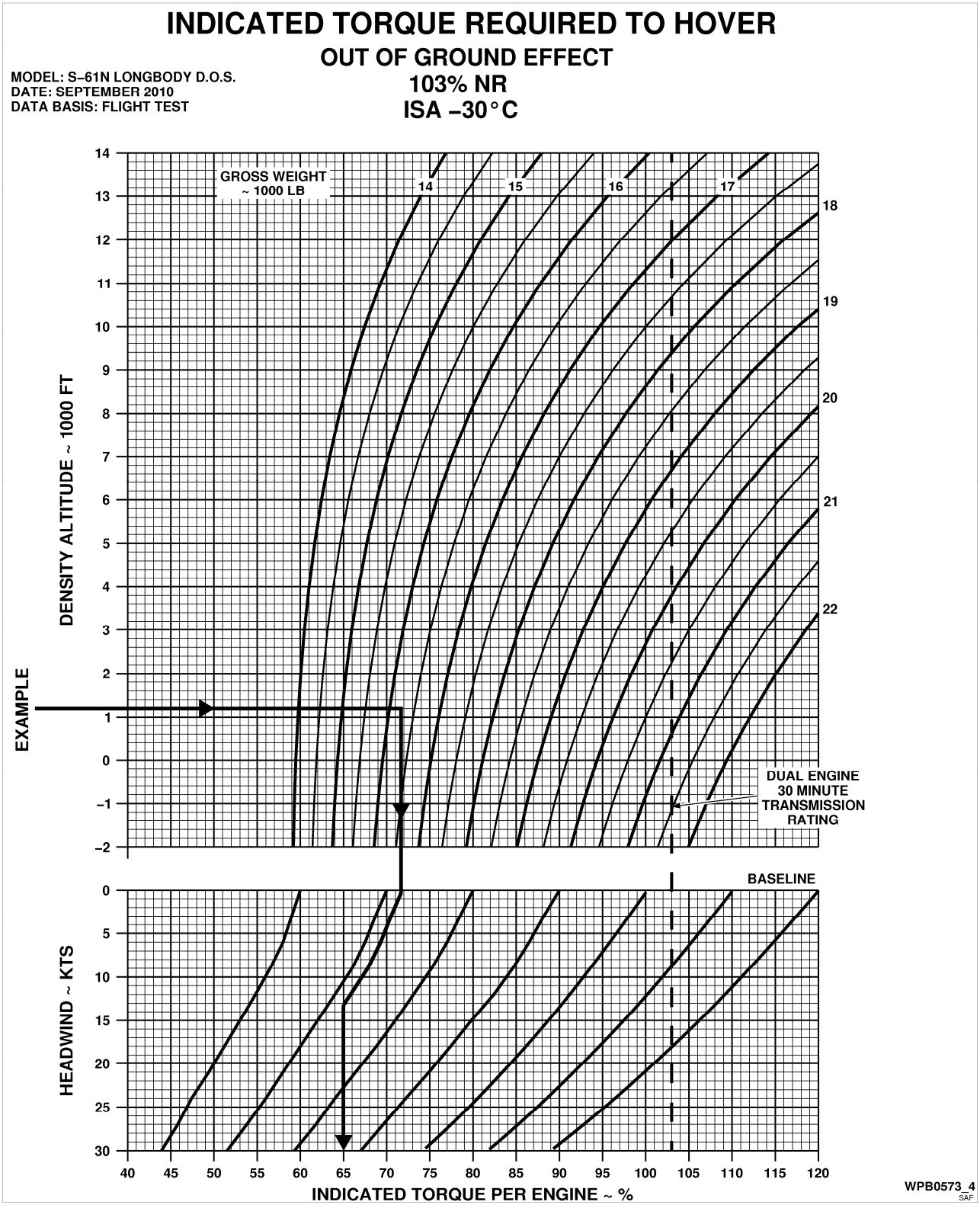

INDICATED TORQUE REQUIRED TO HOVER
IN GROUND EFFECT 10 FT WHEEL HEIGHT
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
103% NR
ISA –20°C
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0572_3
SAF


INDICATED TORQUE REQUIRED TO HOVER
IN GROUND EFFECT 10 FT WHEEL HEIGHT
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
103% NR
ISA –30°C
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0572_4
SAF


INDICATED TORQUE REQUIRED TO HOVER
OUT OF GROUND EFFECT
103% NR
STANDARD TEMPERATURE AND ABOVE
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0573_1
SAF


INDICATED TORQUE REQUIRED TO HOVER
OUT OF GROUND EFFECT
103% NR
ISA –10°C
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0573_2
SAF


INDICATED TORQUE REQUIRED TO HOVER
OUT OF GROUND EFFECT
103% NR
ISA –20°C
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0573_3
SAF


INDICATED TORQUE REQUIRED TO HOVER
OUT OF GROUND EFFECT
103% NR
ISA –30°C
MODEL: S–61N LONGBODY D.O.S.
DATE: SEPTEMBER 2010
DATA BASIS: FLIGHT TEST
GROSS WEIGHT ~ 1000 LB
14
15
16
17
18
19
20
21
22
DENSITY ALTITUDE ~ 1000 FT
EXAMPLE
DUAL ENGINE 30 MINUTE TRANSMISSION RATING
BASELINE
HEADWIND ~ KTS
INDICATED TORQUE PER ENGINE ~ %
WPB0573_4
SAF