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Airman Knowledge Testing Supplement for Commercial Pilot

U.S. Department of Transportation

Federal Aviation Administration

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"Computer Testing Supplement for Commercial Pilot"

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Airman Knowledge Testing Supplement for Commercial Pilot

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U.S. Department of Transportation
FEDERAL AVIATION ADMINISTRATION
Flight Standards Service

Preface

This computer testing supplement is designed by the Flight Standards Service of the Federal Aviation Administration (FAA) for use by computer testing designees (CTDs) and testing centers in the administration of airman knowledge tests in the following knowledge areas:

Commercial Pilot—Airplane (CAX)
Commercial Pilot—Glider (CGX)
Commercial Pilot—Lighter-Than-Air–Airship (CLA)
Commercial Pilot—Rotorcraft/Gyroplane (CRG)
Commercial Pilot—Rotorcraft/Helicopter (CRH)
Commercial Pilot—Balloon Gas (CBG)
Commercial Pilot—Balloon–Hot Air (CBH)
Military Competence—Airplane (MCA)
Military Competence—Rotorcraft/Helicopter (MCH)

FAA-CT-8080-1D supercedes FAA-CT-8080-1C, Computer Testing Supplement for Commercial Pilot, dated 2005.

Comments regarding this supplement, or any AFS-630 publication, should be sent, in email form, to the following address:

AFS630comments@faa.gov

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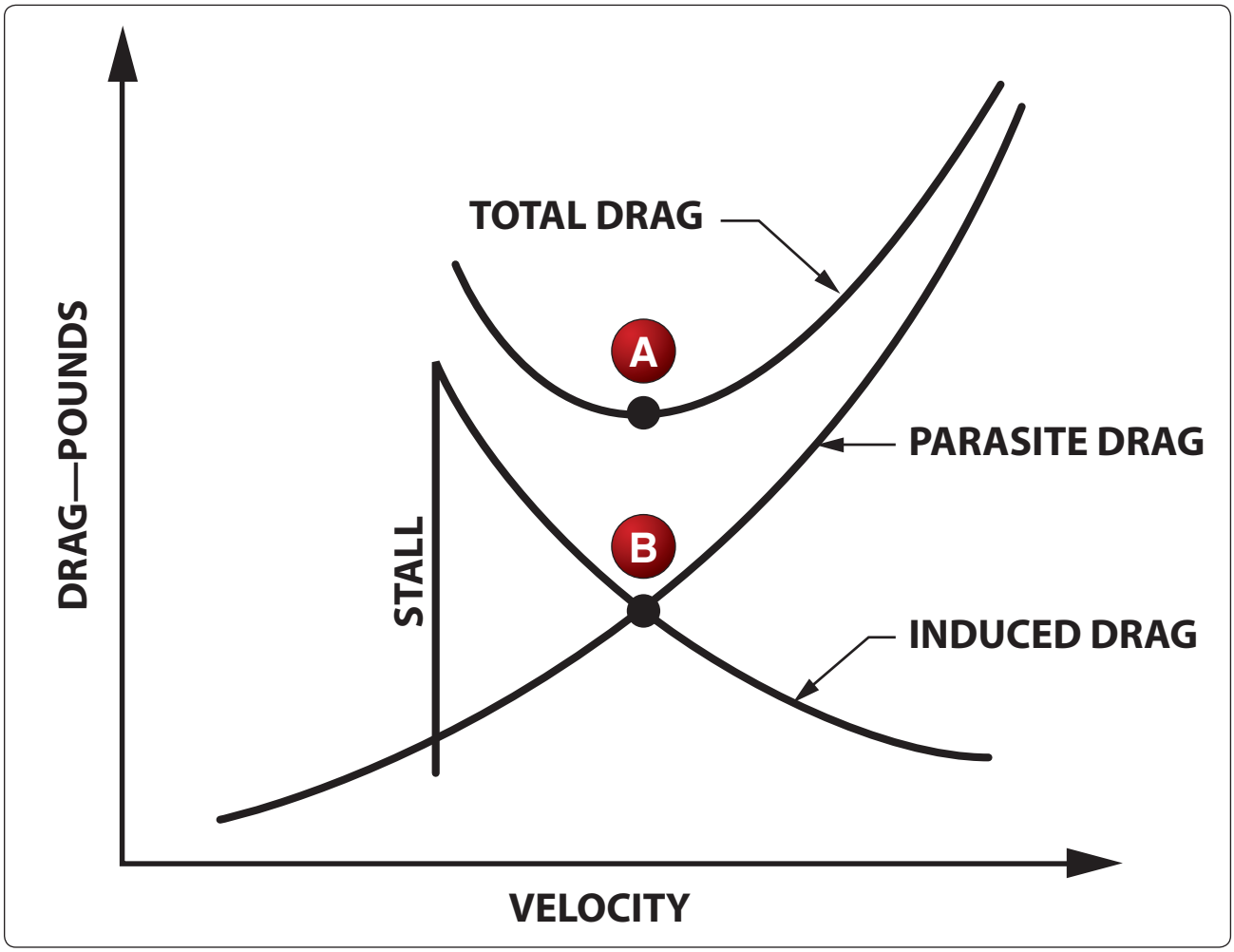


FIGURE 1.—Drag vs. Velocity.

GROSS WEIGHT 2,750 LB		ANGLE OF BANK			
		LEVEL	30°	45°	60°
POWER		GEAR AND FLAPS UP			
ON	MPH	62	67	74	88
	KTS	54	58	64	76
OFF	MPH	75	81	89	106
	KTS	65	70	77	92
		GEAR AND FLAPS DOWN			
ON	MPH	54	58	64	76
	KTS	47	50	56	66
OFF	MPH	66	71	78	93
	KTS	57	62	68	81

FIGURE 2.—Stall Speeds.

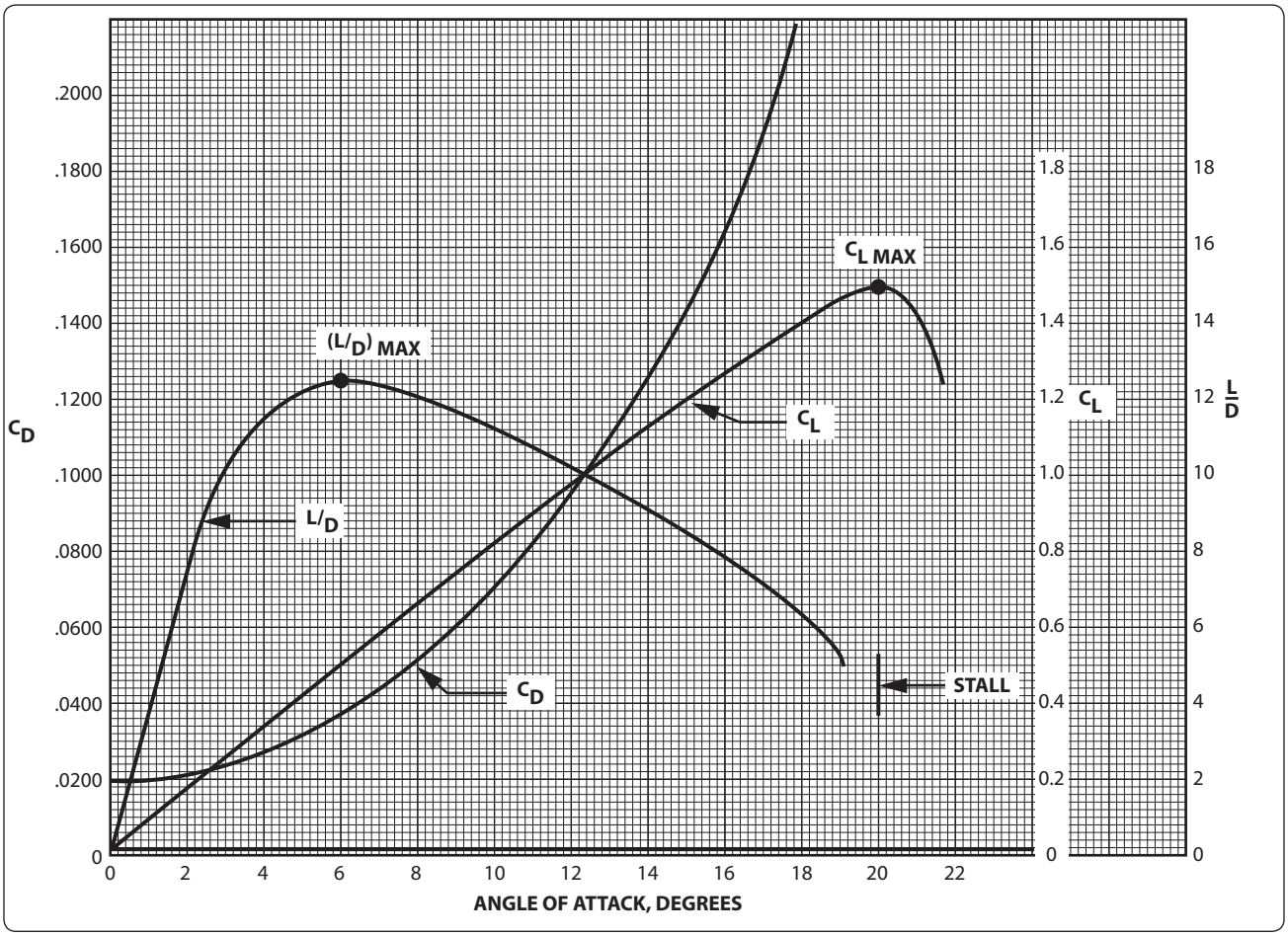


FIGURE 3.—Angle of Attack vs. Lift.

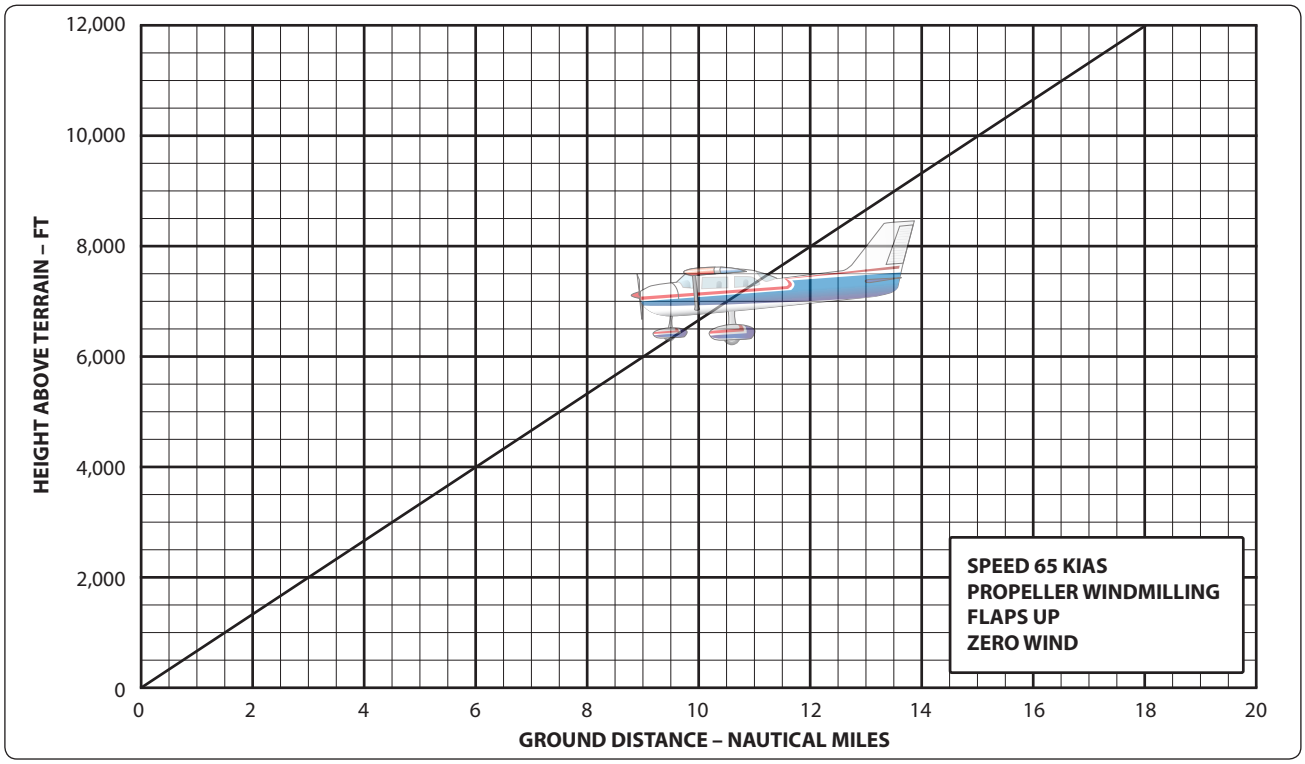


FIGURE 3A.—Maximum Glide Distance.

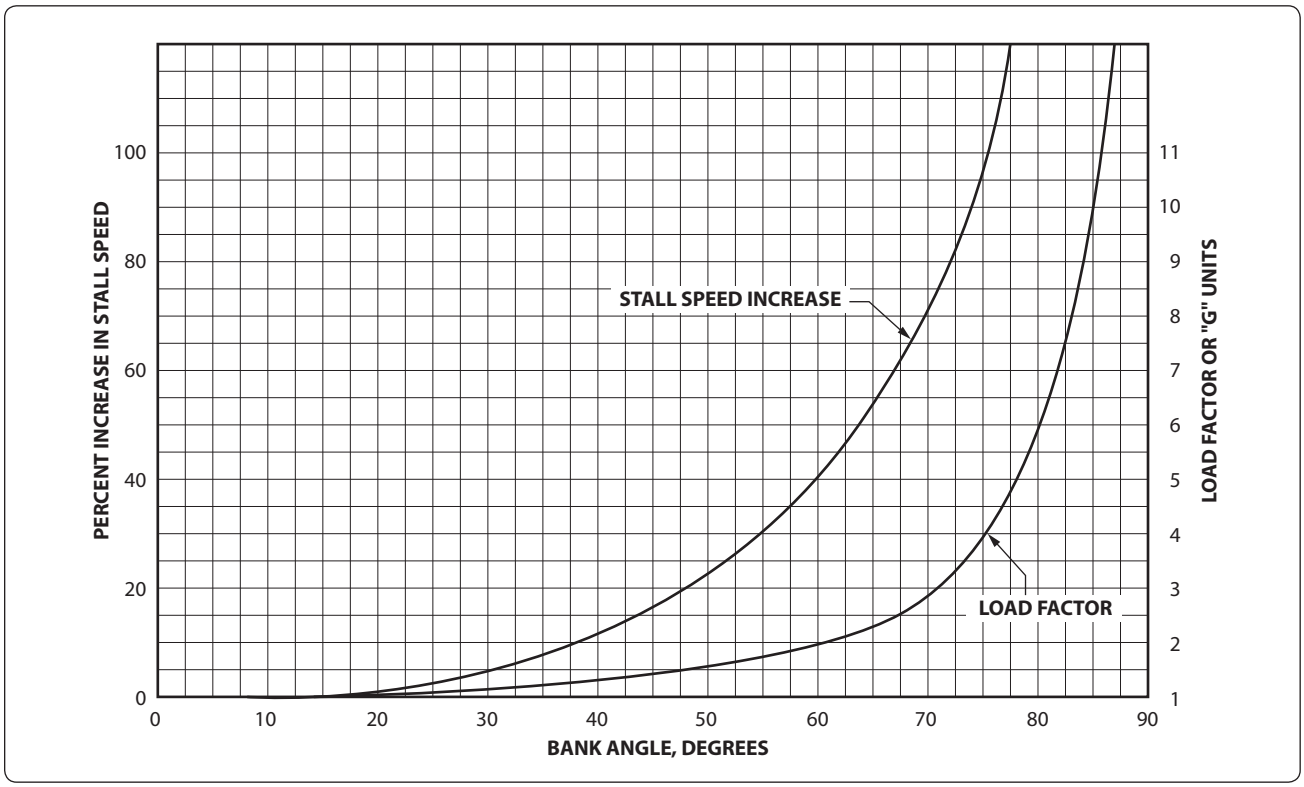


FIGURE 4.—Stall Speed vs. Load Factor.

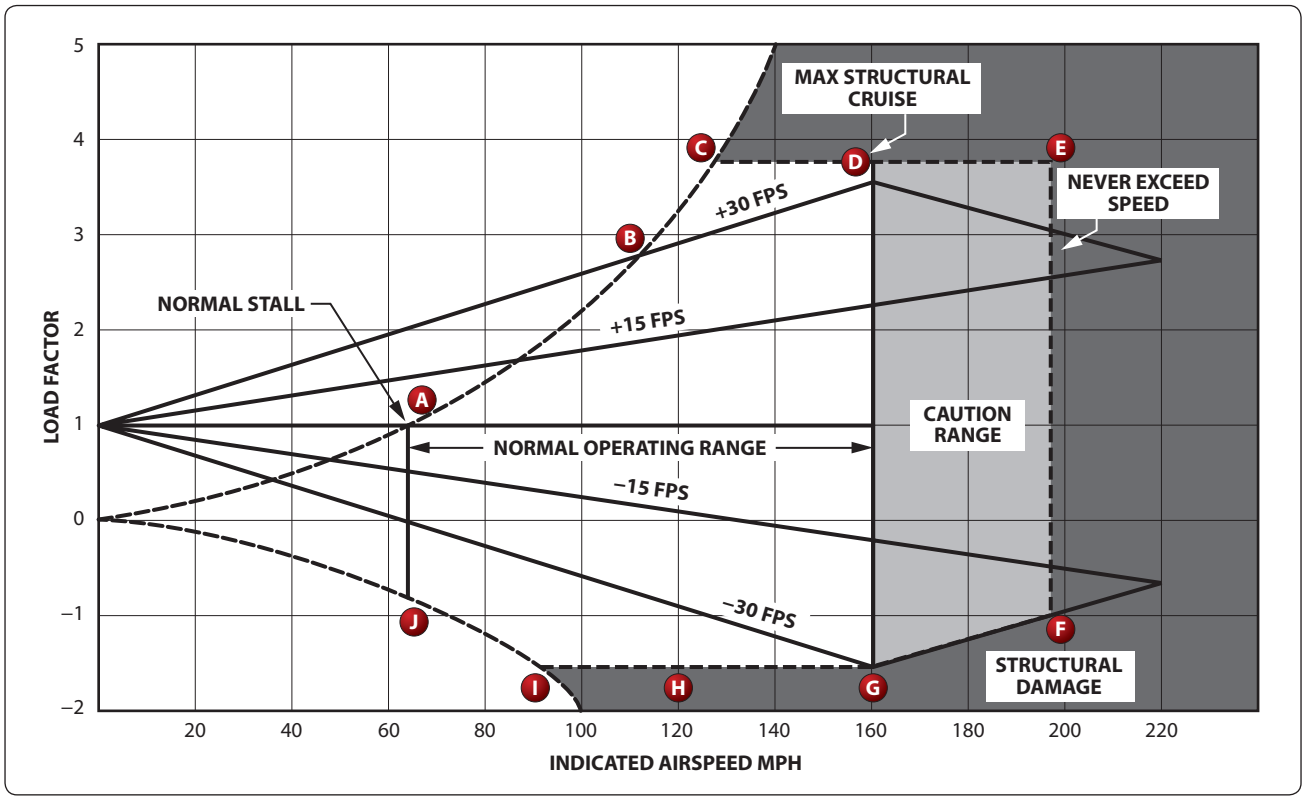


FIGURE 5.—Velocity vs. Load Factor.

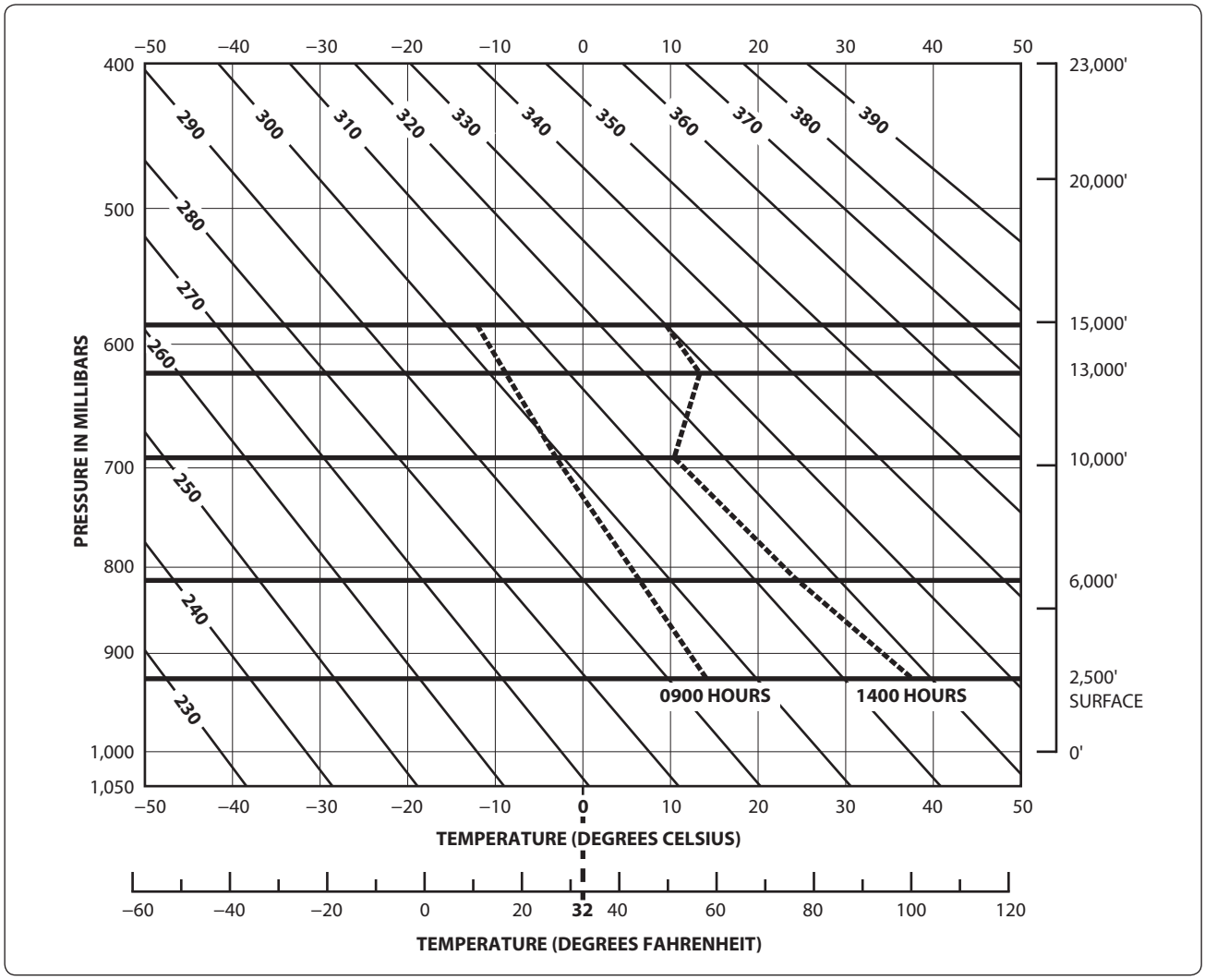


FIGURE 6.—Adiabatic Chart.

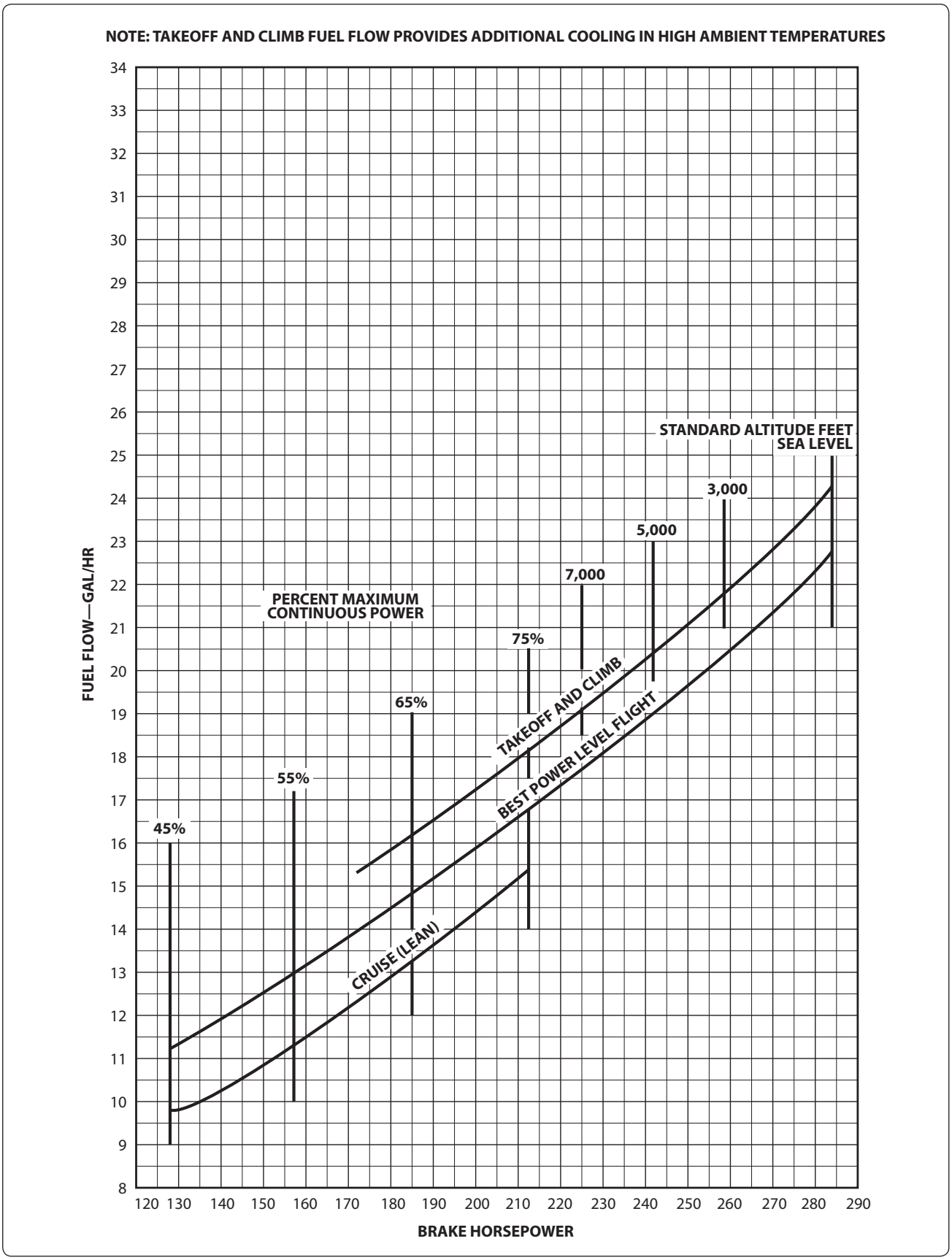


FIGURE 8.—Fuel Consumption vs. Brake Horsepower.

NORMAL CLIMB—100 KIAS

CONDITIONS:
FLAPS UP
GEAR UP
2,550 RPM
25 INCHES MP OR FULL THROTTLE
COWL FLAPS OPEN
STANDARD TEMPERATURE

MIXTURE SETTING	
PRESS ALT	PPH
S.L. to 4,000	108
8,000	96
12,000	84

NOTES:
1. INVERSE TIME, FUEL, AND DISTANCE BY 10% FOR EACH 10 °C ABOVE STANDARD TEMPERATURE.
2. ADD 12 POUNDS OF FUEL FOR ENGINE START, TAXI, AND TAKEOFF ALLOWANCE.
3. DISTANCES SHOWN ARE BASED ON ZERO WIND.

WEIGHT (LB)	PRESS ALT (FT)	RATE OF CLIMB (FPM)	FROM SEA LEVEL		
			TIME (MIN)	FUEL USED (LB)	DISTANCE (NM)
3,800	S.L.	580	0	0	0
	2,000	580	3	6	6
	4,000	570	7	12	12
	6,000	470	11	19	19
	8,000	365	16	27	28
	10,000	265	22	37	40
	12,000	165	32	51	59
3,500	S.L.	685	0	0	0
	2,000	685	3	5	5
	4,000	675	6	11	10
	6,000	565	9	16	16
	8,000	455	13	23	23
	10,000	350	18	31	33
	12,000	240	25	41	46
3,200	S.L.	800	0	0	0
	2,000	800	2	4	4
	4,000	795	5	9	8
	6,000	675	8	14	13
	8,000	560	11	19	19
	10,000	445	15	25	27
	12,000	325	20	33	37

FIGURE 9.—Fuel, Time, and Distance to Climb.

MAXIMUM RATE OF CLIMB

CONDITIONS:
FLAPS UP
GEAR UP
2,700 RPM
FULL THROTTLE
MIXTURE SET AT PLACARD FUEL FLOW
COWL FLAPS OPEN
STANDARD TEMPERATURE

MIXTURE SETTING	
PRESS ALT	PPH
S.L.	138
4,000	126
8,000	114
12,000	102

NOTES:
1. ADD 12 POUNDS OF FUEL FOR ENGINE START, TAXI, AND TAKEOFF ALLOWANCE.
2. INCREASE TIME, FUEL, AND DISTANCE BY 10% FOR EACH 10 °C ABOVE STANDARD TEMPERATURE.
3. DISTANCES SHOWN ARE BASED ON ZERO WIND.

WEIGHT (LB)	PRESS ALT (FT)	CLIMB SPEED (KIAS)	RATE OF CLIMB (FPM)	FROM SEA LEVEL		
				TIME (MIN)	FUEL USED (LB)	DISTANCE (NM)
3,800	S.L.	97	860	0	0	0
	2,000	95	760	2	6	4
	4,000	94	660	5	12	9
	6,000	93	565	9	18	14
	8,000	91	465	13	26	21
	10,000	90	365	18	35	29
	12,000	89	265	24	47	41
3,500	S.L.	95	990	0	0	0
	2,000	94	885	2	5	3
	4,000	93	780	5	10	7
	6,000	91	675	7	16	12
	8,000	90	570	11	22	17
	10,000	89	465	15	29	24
	12,000	87	360	20	38	32
3,200	S.L.	94	1,135	0	0	0
	2,000	92	1,020	2	4	3
	4,000	91	910	4	9	6
	6,000	90	800	6	14	10
	8,000	88	685	9	19	14
	10,000	87	575	12	25	20
	12,000	86	465	16	32	26

FIGURE 10.—Fuel, Time, and Distance to Climb.

GROSS WEIGHT – 2,300 LB
STANDARD CONDITIONS
ZERO WIND LEAN MIXTURE

NOTE: MAXIMUM CRUISE IS NORMALLY LIMITED TO 75% POWER.

ALT.	RPM	% BHP	TAS MPH	GAL/ HOUR	38 GAL (NO RESERVE)		48 GAL (NO RESERVE)	
					ENDR (HOURS)	RANGE (MILES)	ENDR (HOURS)	RANGE (MILES)
2,500	2,700	86	134	9.7	3.9	525	4.9	660
	2,600	79	129	8.6	4.4	570	5.6	720
	2,500	72	123	7.8	4.9	600	6.2	760
	2,400	65	117	7.2	5.3	620	6.7	780
	2,300	58	111	6.7	5.7	630	7.2	795
	2,200	52	103	6.3	6.1	625	7.7	790
5,000	2,700	82	134	9.0	4.2	565	5.3	710
	2,600	75	128	8.1	4.7	600	5.9	760
	2,500	68	122	7.4	5.1	625	6.4	790
	2,400	61	116	6.9	5.5	635	6.9	805
	2,300	55	108	6.5	5.9	635	7.4	805
	2,200	49	100	6.0	6.3	630	7.9	795
7,500	2,700	78	133	8.4	4.5	600	5.7	755
	2,600	71	127	7.7	4.9	625	6.2	790
	2,500	64	121	7.1	5.3	645	6.7	810
	2,400	58	113	6.7	5.7	645	7.2	820
	2,300	52	105	6.2	6.1	640	7.7	810
10,000	2,650	70	129	7.6	5.0	640	6.3	810
	2,600	67	125	7.3	5.2	650	6.5	820
	2,500	61	118	6.9	5.5	655	7.0	830
	2,400	55	110	6.4	5.9	650	7.5	825
	2,300	49	100	6.0	6.3	635	8.0	800

FIGURE 11.—Cruise and Range Performance.

PRESSURE ALTITUDE – 18,000 FEET

CONDITIONS:
4,000 POUNDS
RECOMMENDED LEAN MIXTURE
COWL FLAPS CLOSED

NOTES:
FOR BEST FUEL ECONOMY AT 70% POWER OR LESS, OPERATE AT 6 PPH LEANER THAN SHOWN IN THIS CHART OR AT PEAK EGT.

		20 °C BELOW STANDARD TEMPERATURE –41 °C			STANDARD TEMPERATURE –21 °C			20 °C ABOVE STANDARD TEMP –1 °C		
RPM	MP	% BHP	KTAS	PPH	% BHP	KTAS	PPH	% BHP	KTAS	PPH
2,500	30	---	---	---	81	188	106	76	185	100
	28	80	184	105	76	182	99	71	178	93
	26	75	178	99	71	176	93	67	172	88
	24	70	171	91	66	168	86	62	164	81
	22	63	162	84	60	159	79	56	155	75
2,400	30	81	185	107	77	183	101	72	180	94
	28	76	179	100	72	177	94	67	173	88
	26	71	172	93	67	170	88	63	166	83
	24	66	165	87	62	163	82	58	159	77
	22	61	158	80	57	155	76	54	150	72
2,300	30	79	182	103	74	180	97	70	176	91
	28	74	176	97	70	174	91	65	170	86
	26	69	170	91	65	167	86	61	163	81
	24	64	162	84	60	159	79	56	155	75
	22	58	154	77	55	150	73	51	145	65
2,200	26	66	166	87	62	163	82	58	159	77
	24	61	158	80	57	154	76	54	150	72
	22	55	148	73	51	144	69	48	138	66
	20	49	136	66	46	131	63	43	124	59

FIGURE 12.—Cruise Performance.

MAXIMUM RATE OF CLIMB

CONDITIONS:
FLAPS UP
GEAR UP
2,600 RPM
COWL FLAPS OPEN
STANDARD TEMPERATURE

MIXTURE SETTING		
PRESS ALT	MP	PPH
S.L. TO 17,000	35	162
18,000	34	156
20,000	32	144
22,000	30	132
24,000	28	120

NOTES:
1. ADD 16 POUNDS OF FUEL FOR ENGINE START, TAXI, AND TAKEOFF ALLOWANCE.
2. INCREASE TIME, FUEL, AND DISTANCE BY 10% FOR EACH 10 °C ABOVE STANDARD TEMPERATURE.
3. DISTANCES SHOWN ARE BASED ON ZERO WIND.

WEIGHT (LB)	PRESS ALT (FT)	CLIMB SPEED (KIAS)	RATE OF CLIMB (FPM)	FROM SEA LEVEL		
				TIME (MIN)	FUEL USED (LB)	DISTANCE (NM)
4,000	S.L.	100	930	0	0	0
	4,000	100	890	4	12	7
	8,000	100	845	9	24	16
	12,000	100	790	14	38	25
	16,000	100	720	19	52	36
	20,000	99	515	26	69	50
	24,000	97	270	37	92	74
3,700	S.L.	99	1,060	0	0	0
	4,000	99	1,020	4	10	6
	8,000	99	975	8	21	13
	12,000	99	915	12	33	21
	16,000	99	845	17	45	30
	20,000	97	630	22	59	42
	24,000	95	370	30	77	60
3,400	S.L.	97	1,205	0	0	0
	4,000	97	1,165	3	9	5
	8,000	97	1,120	7	19	12
	12,000	97	1,060	11	29	18
	16,000	97	985	15	39	26
	20,000	96	760	19	51	36
	24,000	94	485	26	65	50

FIGURE 13.—Fuel, Time, and Distance to Climb.

NORMAL CLIMB – 110 KIAS

CONDITIONS:
FLAPS UP
GEAR UP
2,500 RPM
30 INCHES HG
120 PPH FUEL FLOW
COWL FLAPS OPEN
STANDARD TEMPERATURE

NOTES:
1. ADD 16 POUNDS OF FUEL FOR ENGINE START, TAXI, AND TAKEOFF ALLOWANCE.
2. INCREASE TIME, FUEL, AND DISTANCE BY 10% FOR EACH 7 °C ABOVE STANDARD TEMPERATURE.
3. DISTANCES SHOWN ARE BASED ON ZERO WIND.

WEIGHT (LB)	PRESS ALT (FT)	RATE OF CLIMB (FPM)	FROM SEA LEVEL		
			TIME (MIN)	FUEL USED (LB)	DISTANCE (NM)
4,000	S.L.	605	0	0	0
	4,000	570	7	14	13
	8,000	530	14	28	27
	12,000	485	22	44	43
	16,000	430	31	62	63
	20,000	365	41	82	87
3,700	S.L.	700	0	0	0
	4,000	665	6	12	11
	8,000	625	12	24	23
	12,000	580	19	37	37
	16,000	525	26	52	53
	20,000	460	34	68	72
3,400	S.L.	810	0	0	0
	4,000	775	5	10	9
	8,000	735	10	21	20
	12,000	690	16	32	31
	16,000	635	22	44	45
	20,000	565	29	57	61

FIGURE 14.—Fuel, Time, and Distance to Climb.

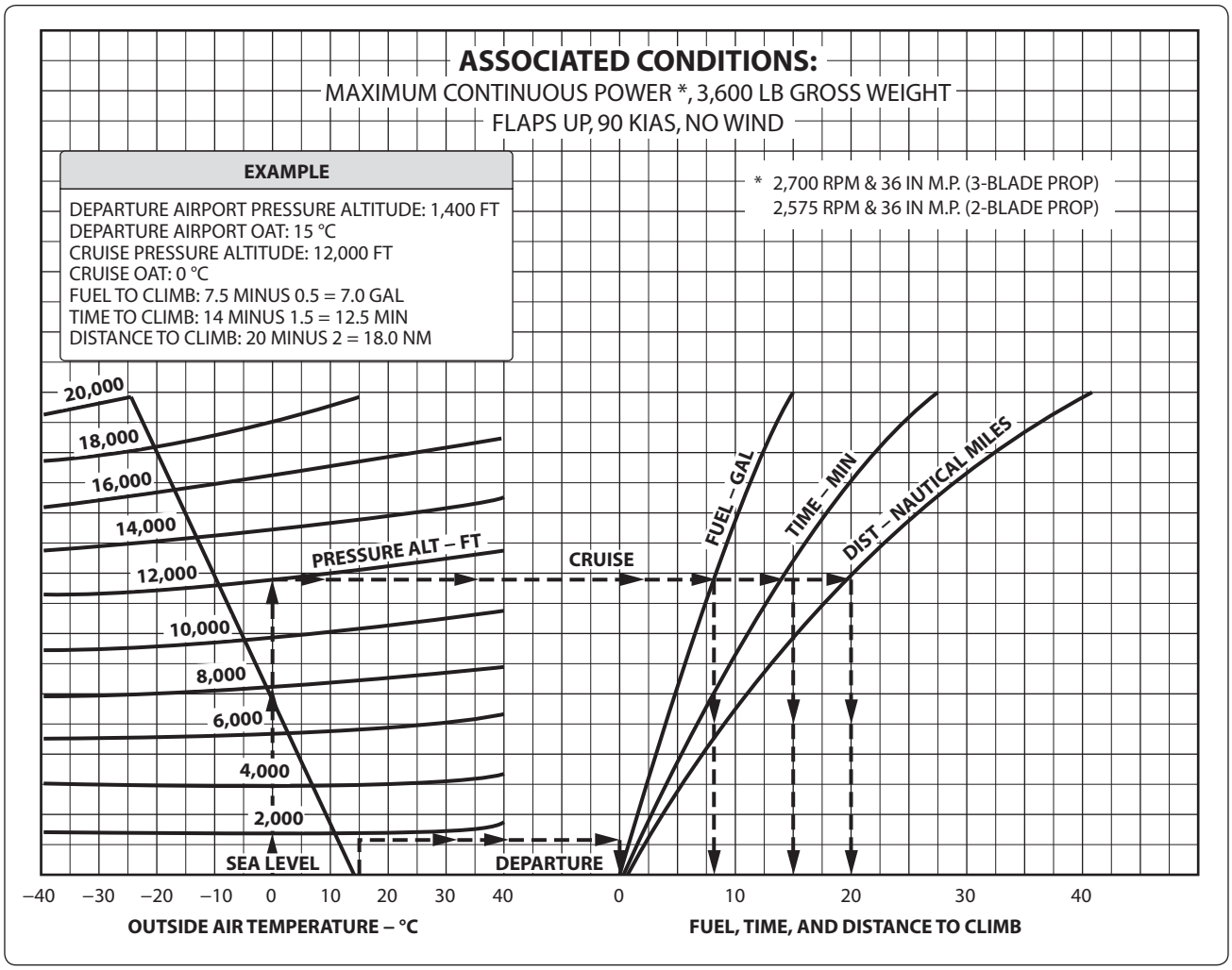


FIGURE 15.—Fuel, Time, and Distance to Climb.

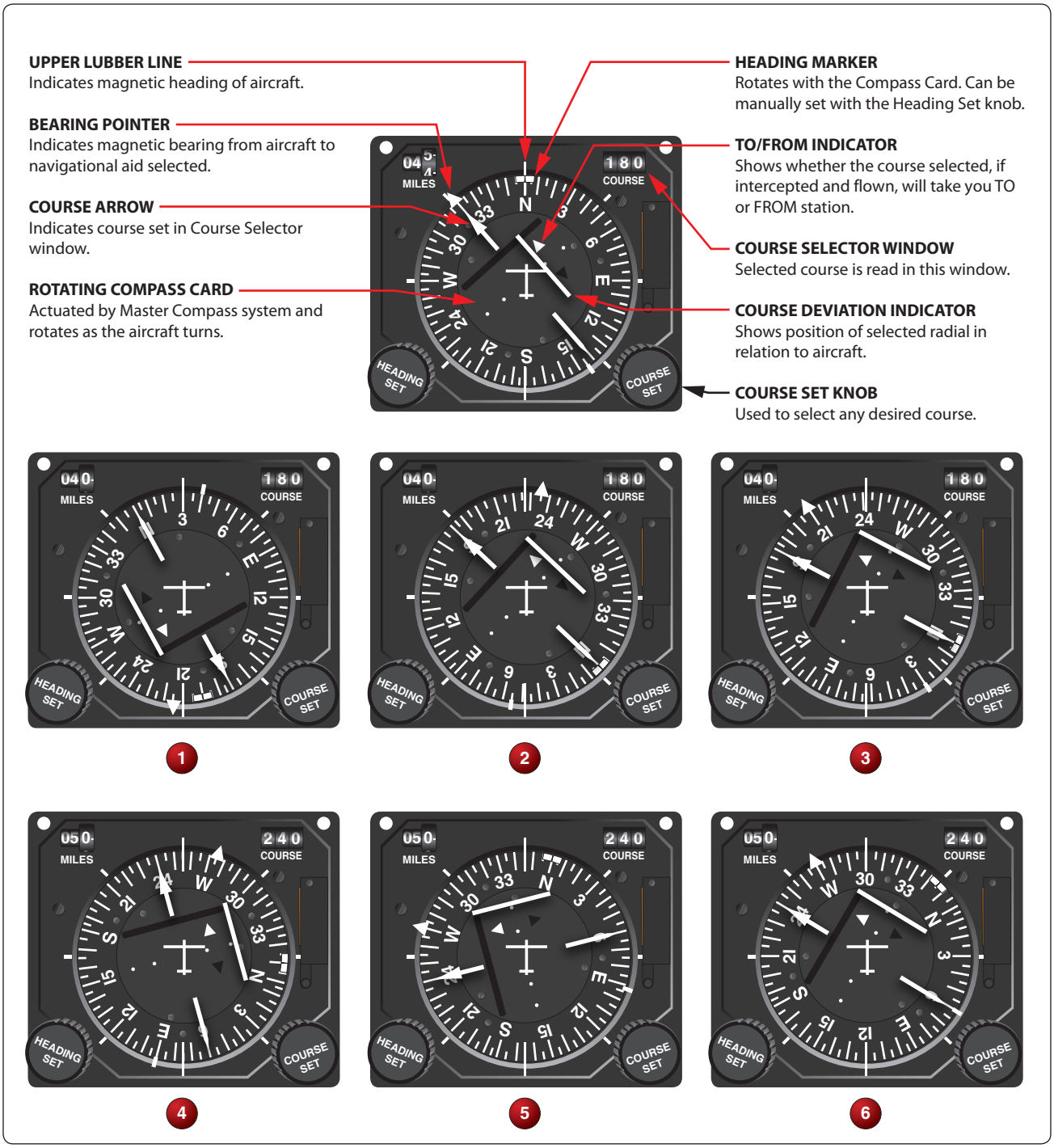


FIGURE 17.—Horizontal Situation Indicator (HSI).

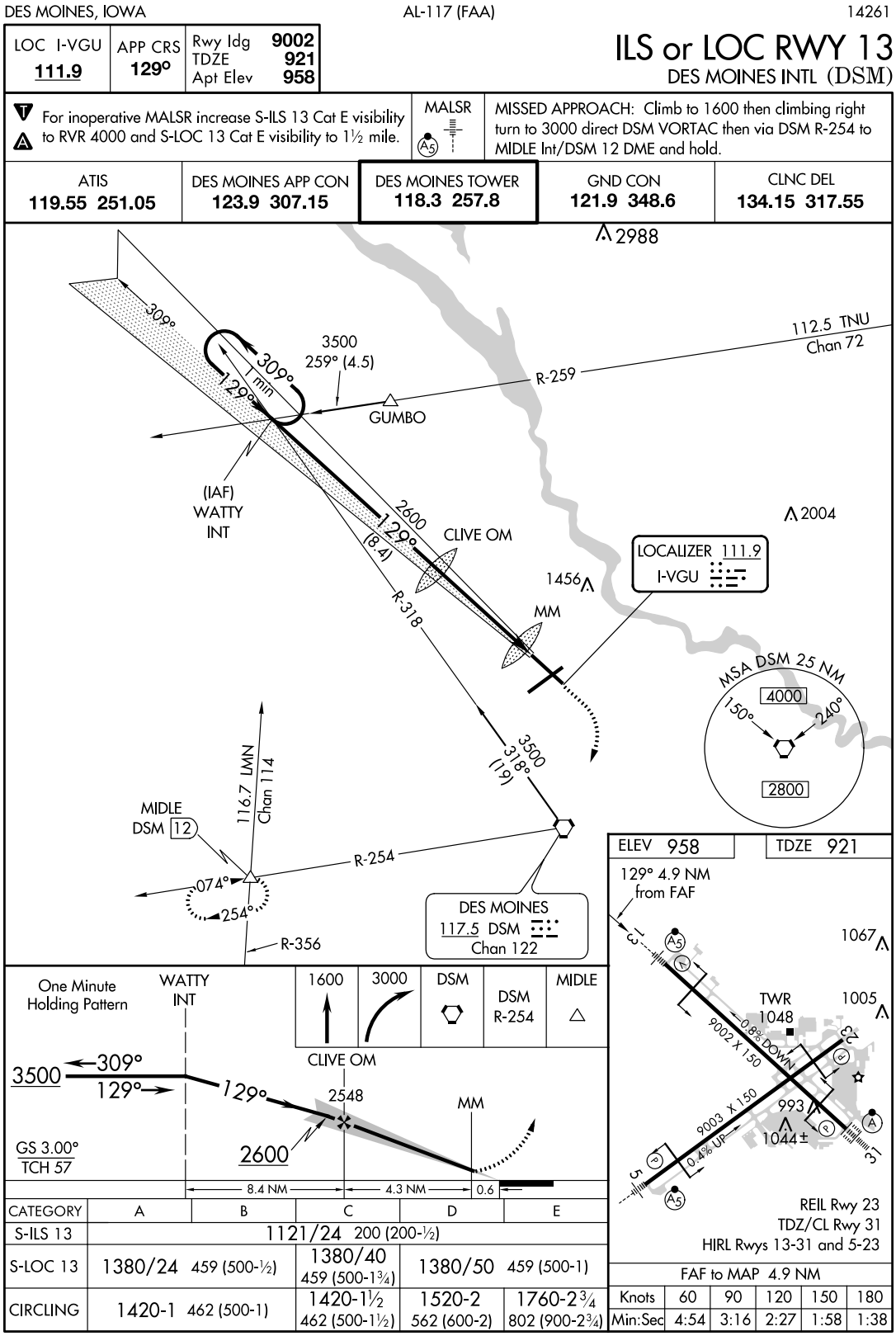


FIGURE 25.—ILS or LOC RWY 13 (DSM).

LOS ANGELES, CALIFORNIA

AL-237 (FAA)

14317

ILS or LOC RWY 24R
LOS ANGELES INTL (LAX)

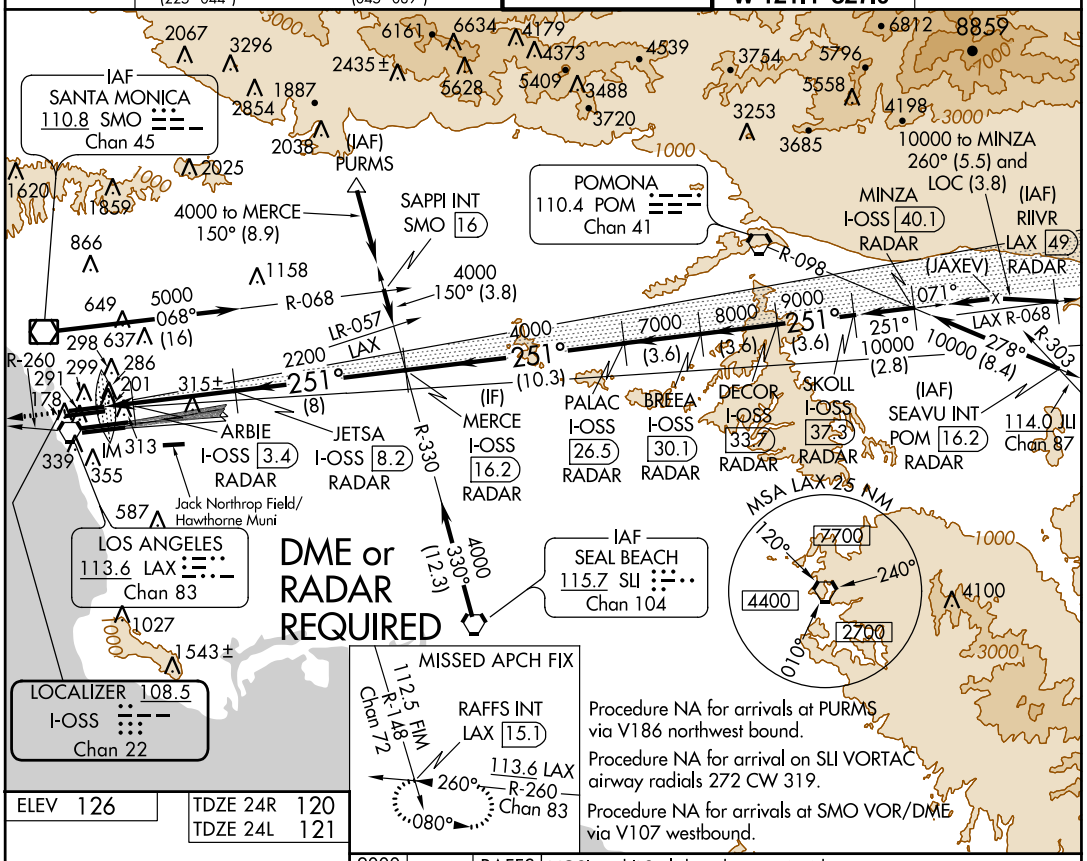
LOC/DME I-OSS	APP CRS	Rwy ldg	24R	24L
108.5	251°	TDZE	8926	10285
Chan 22		Apt Elev	120	121
			126	126

Inoperative table does not apply to Sidestep Rwy 24L Cats A/B. For inoperative MALSR, increase S-LOC Rwy 24R Cat D visibility to RVR 5000. Simultaneous approach authorized with LAX 25L/R. Simultaneous approach authorized with HHR 25.

ALSF-2 Rwy 24R (A) | MALSR Rwy 24L (A5)

MISSED APPROACH: Climb to 2000 via heading 251° and LAX R-260 to RAFFS INT/ LAX 15.1 DME and hold.

ATIS	SOCAL APP CON		LOS ANGELES TOWER	GND CON	CLNC DEL
ARR 133.8	124.3 363.2 (APCH FM WEST)	124.9 269.0 (090°-224°)	N 133.9 239.3	N 121.65 327.0	120.35 327.0
DEP 135.65	124.5 235.975 (225°-044°)	128.5 360.7 (045°-089°)	S 120.95 379.1	S 121.75 327.0	
				W 121.4 327.0	



Procedure NA for arrivals at PURMS via V186 northwest bound.

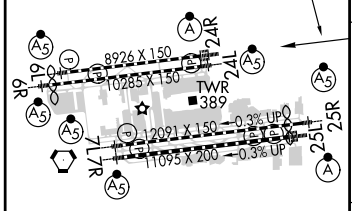
Procedure NA for arrival on SLI VORTAC airway radials 272 CW 319.

Procedure NA for arrivals at SMO VOR/DME via V107 westbound.

ELEV 126

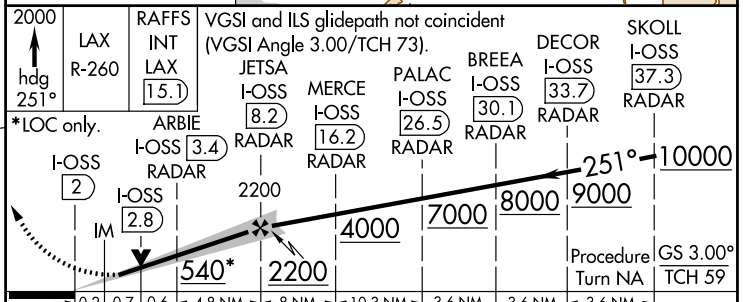
TDZE 24R	120
TDZE 24L	121

251° 6.3 NM from FAF



TDZ/CL Rwys 6R, 7L, 24R, and 25L
HIRL all Rwys

FAF to MAP 6.3 NM					
Knots	60	90	120	150	180
Min:Sec	6:18	4:12	3:09	2:31	2:06



CATEGORY	A	B	C	D
S-ILS 24R	320/18 200 (200-½)			
S-LOC 24R	460/24 340 (400-½)			460/40 340 (400-¾)
SIDESTEP RWY 24L	580/50 459 (500-1)			580-1½ 459 (500-1½)

LOS ANGELES, CALIFORNIA

Amdt 24C 24JUL14

33°57′N-118°24′W

LOS ANGELES INTL (LAX)

ILS or LOC RWY 24R

FIGURE 26.—ILS or LOC RWY 24R (LAX).

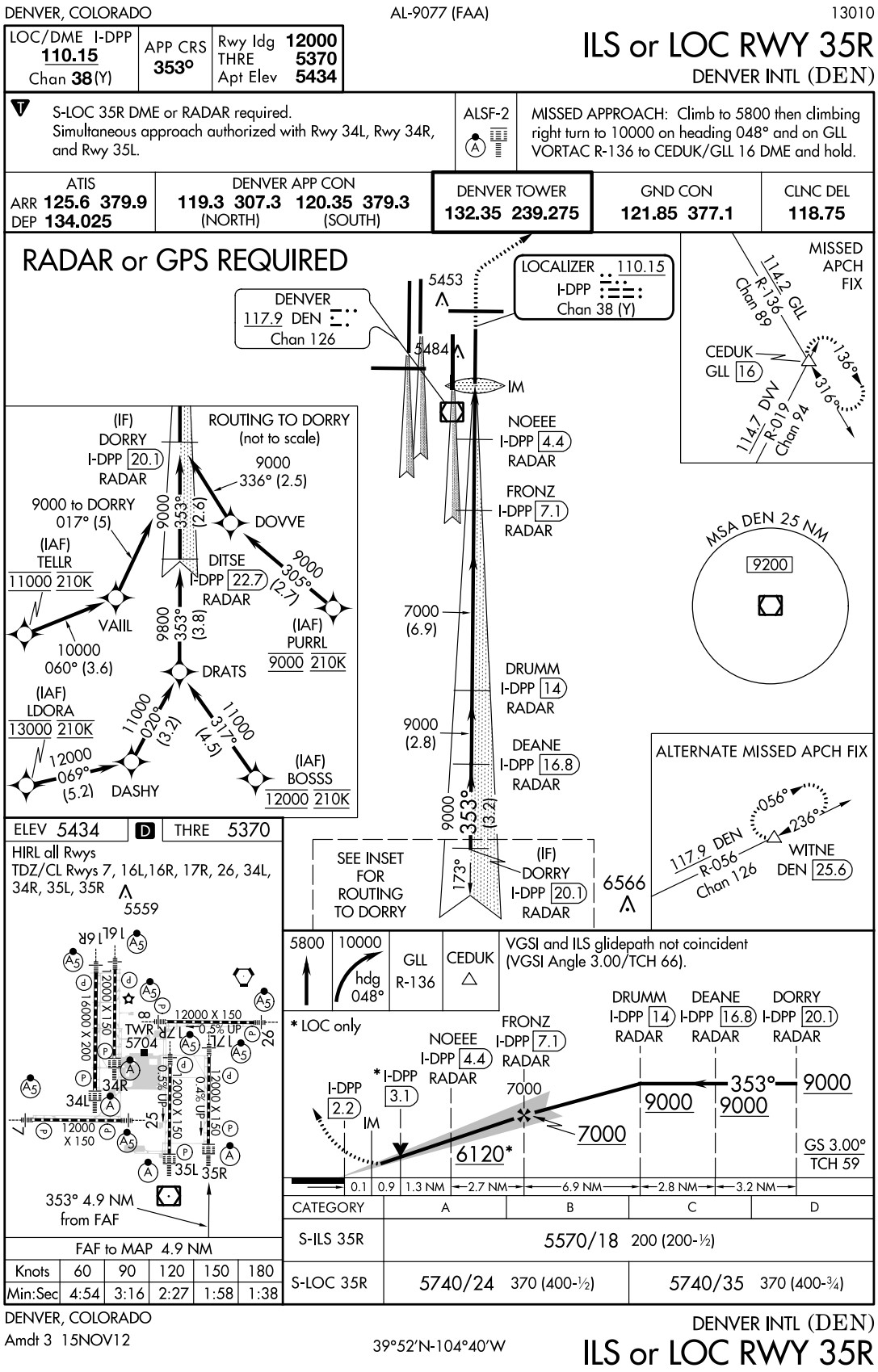


FIGURE 27.—ILS or LOC RWY 35R (DEN).

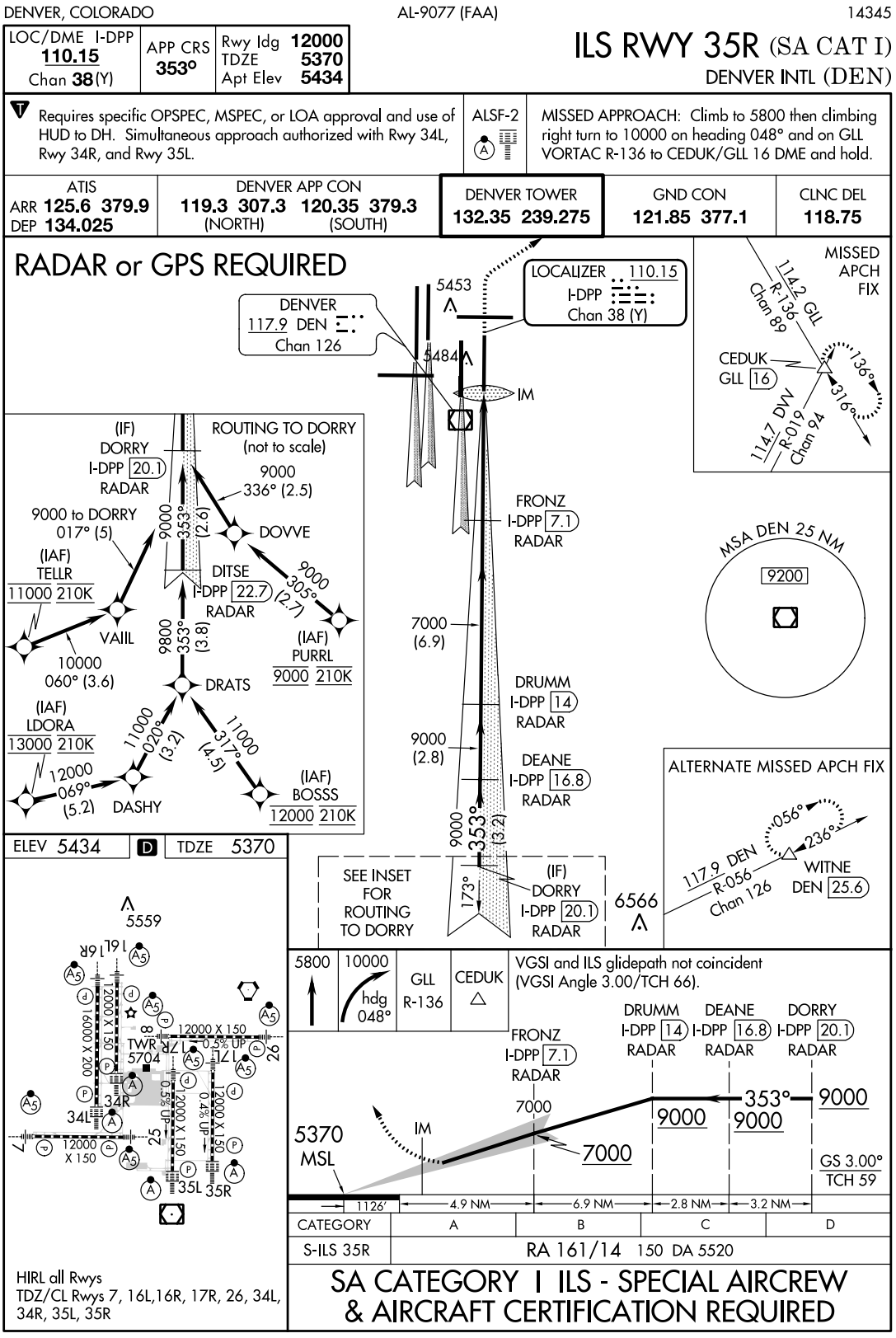


FIGURE 27A.—ILS RWY 35R (SA CAT I) (DEN).

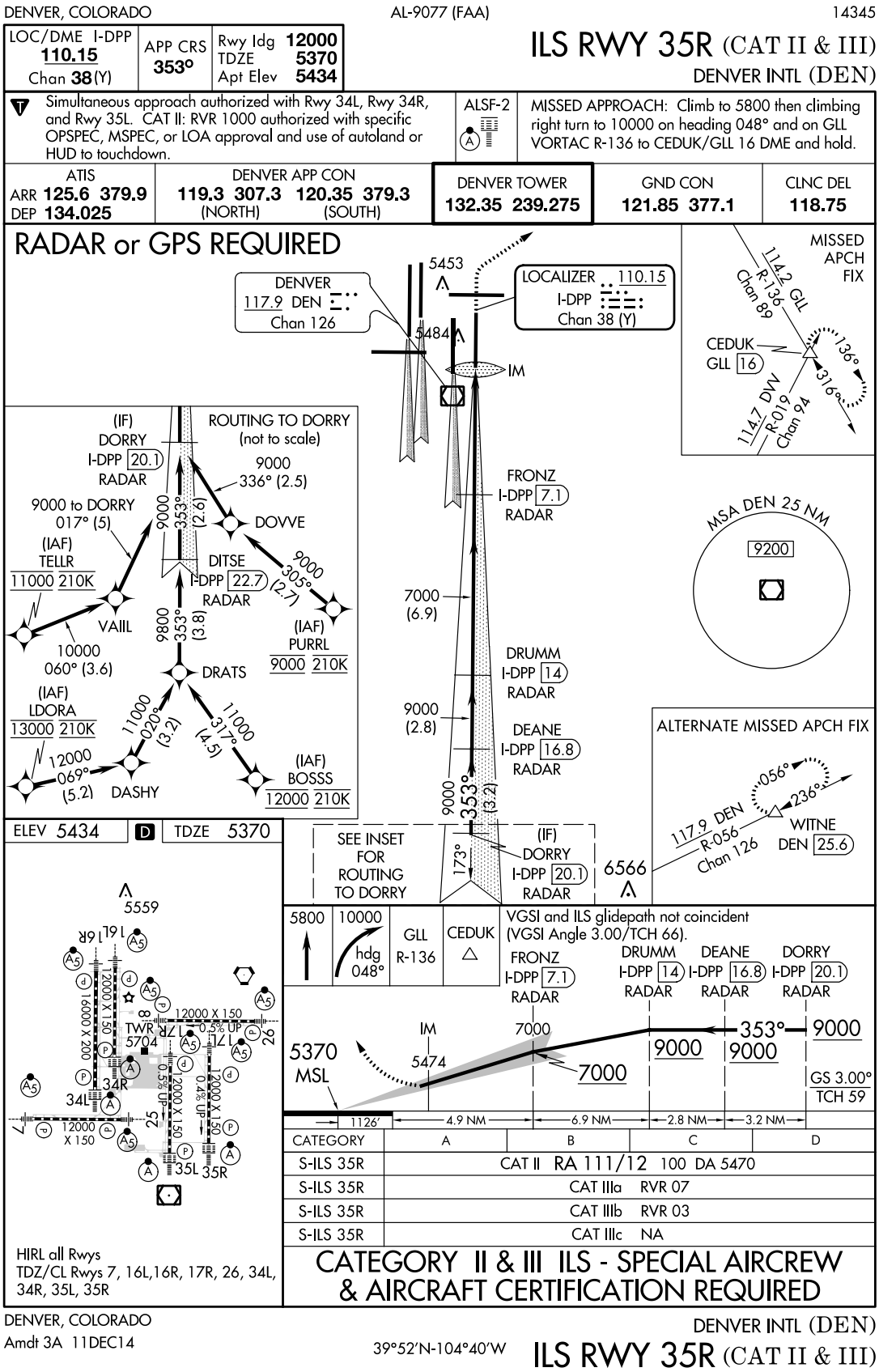


FIGURE 27B.—ILS RWY 35R (CAT II & III) (DEN).

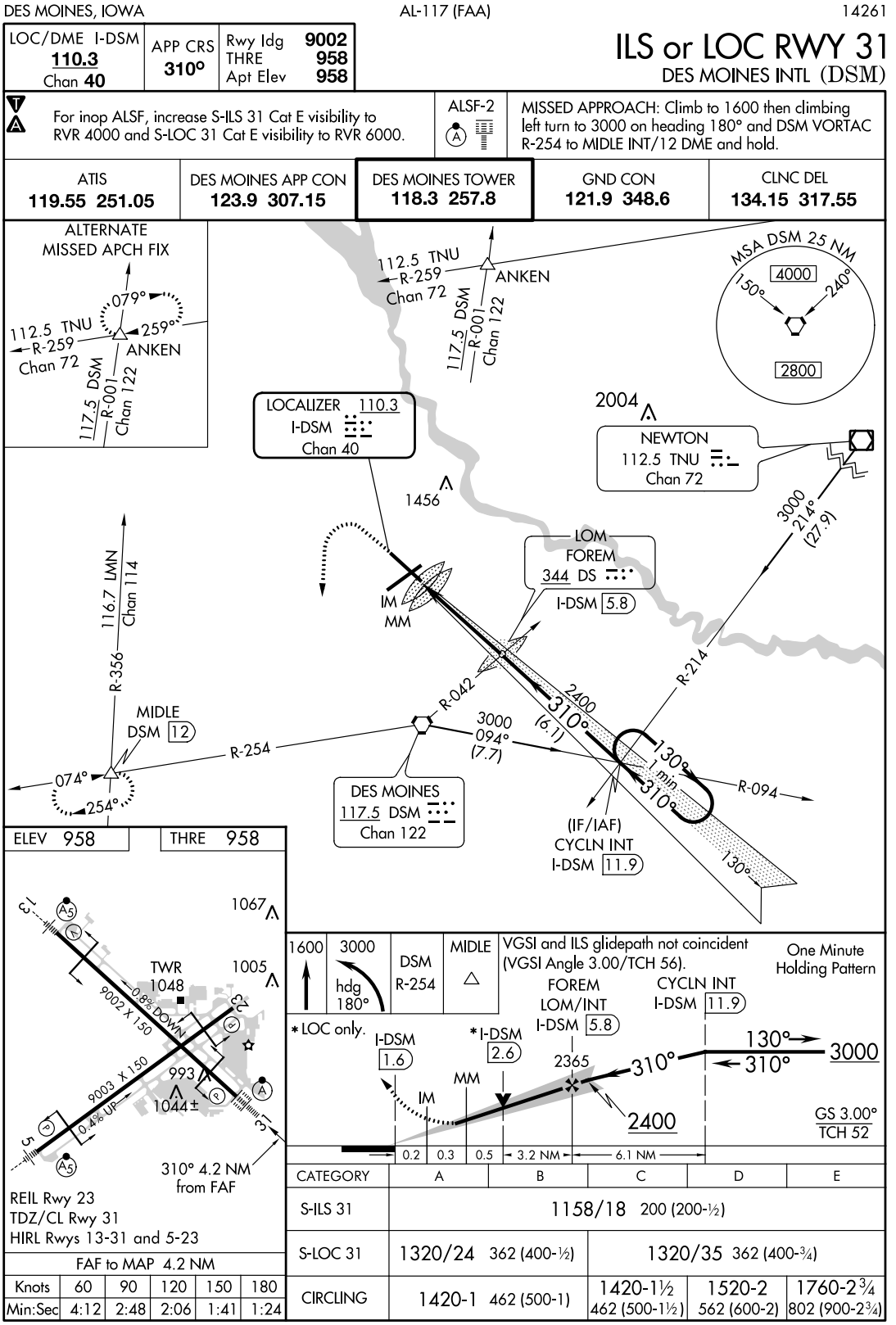


FIGURE 28.—ILS or LOC RWY 31 (DSM).

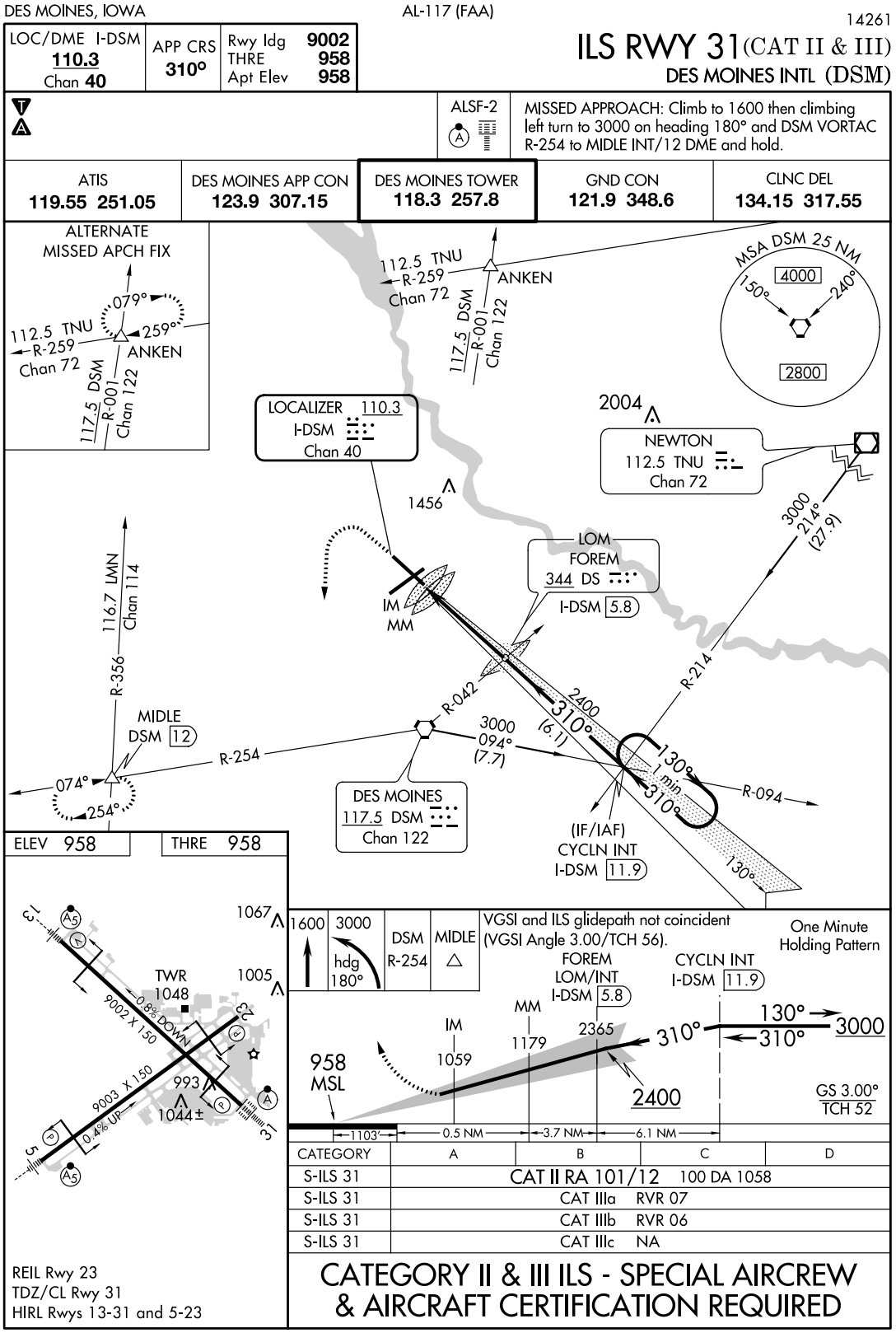


FIGURE 28A.—ILS RWY 31 (CAT II & III) (DSM).

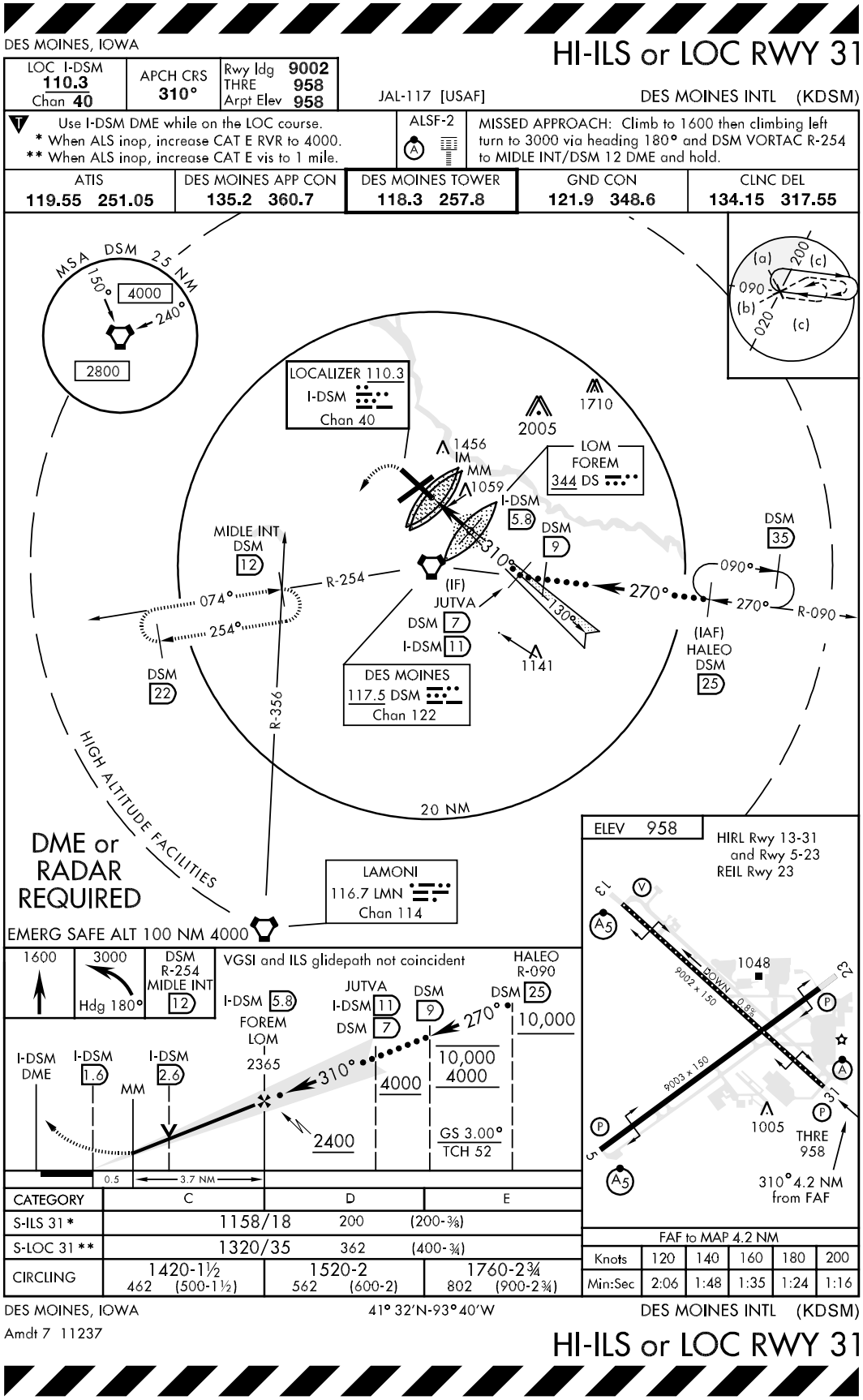


FIGURE 28B.—HI-ILS or LOC RWY 31 (KDSM).

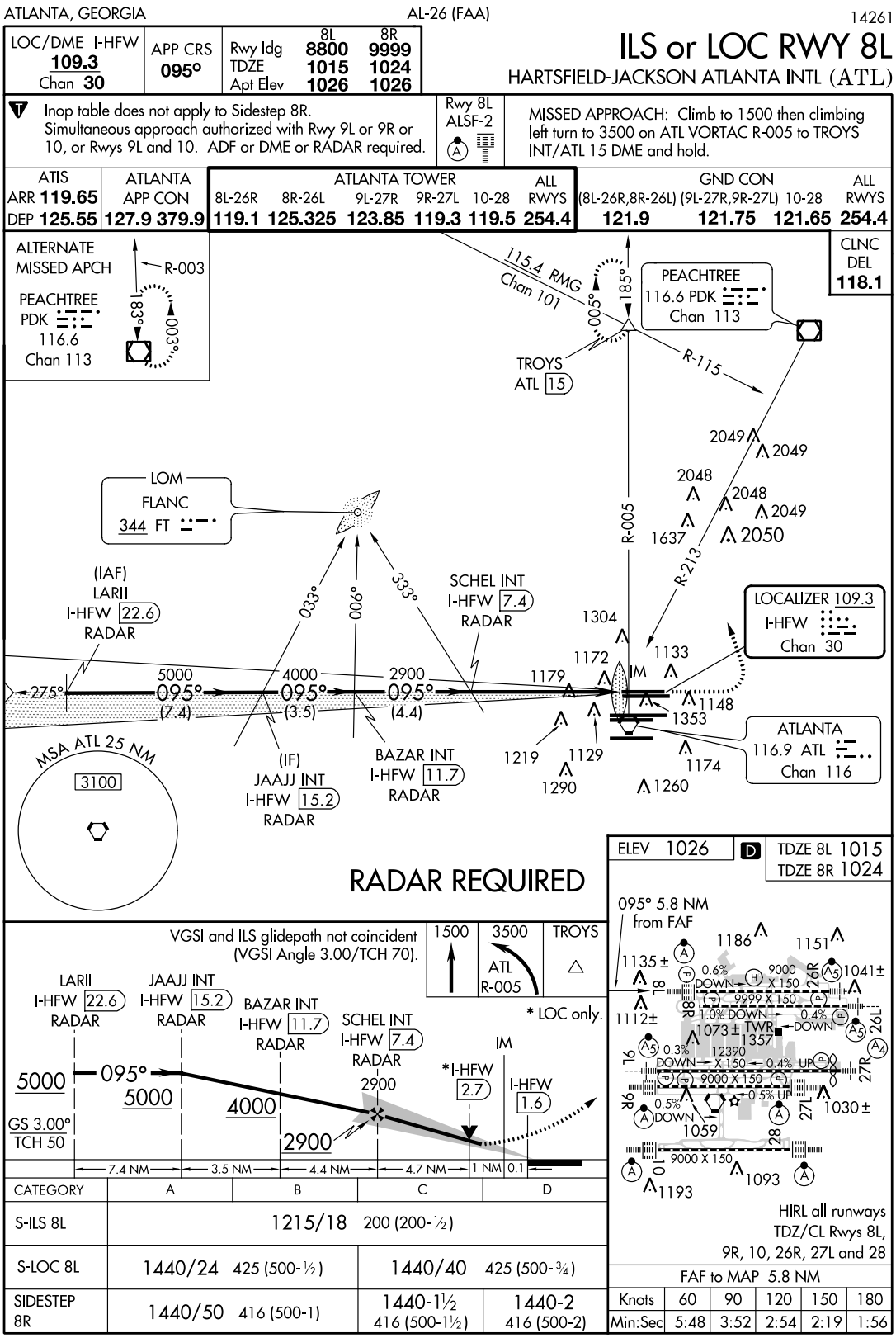


FIGURE 29.—ILS or LOC RWY 8L (ATL).

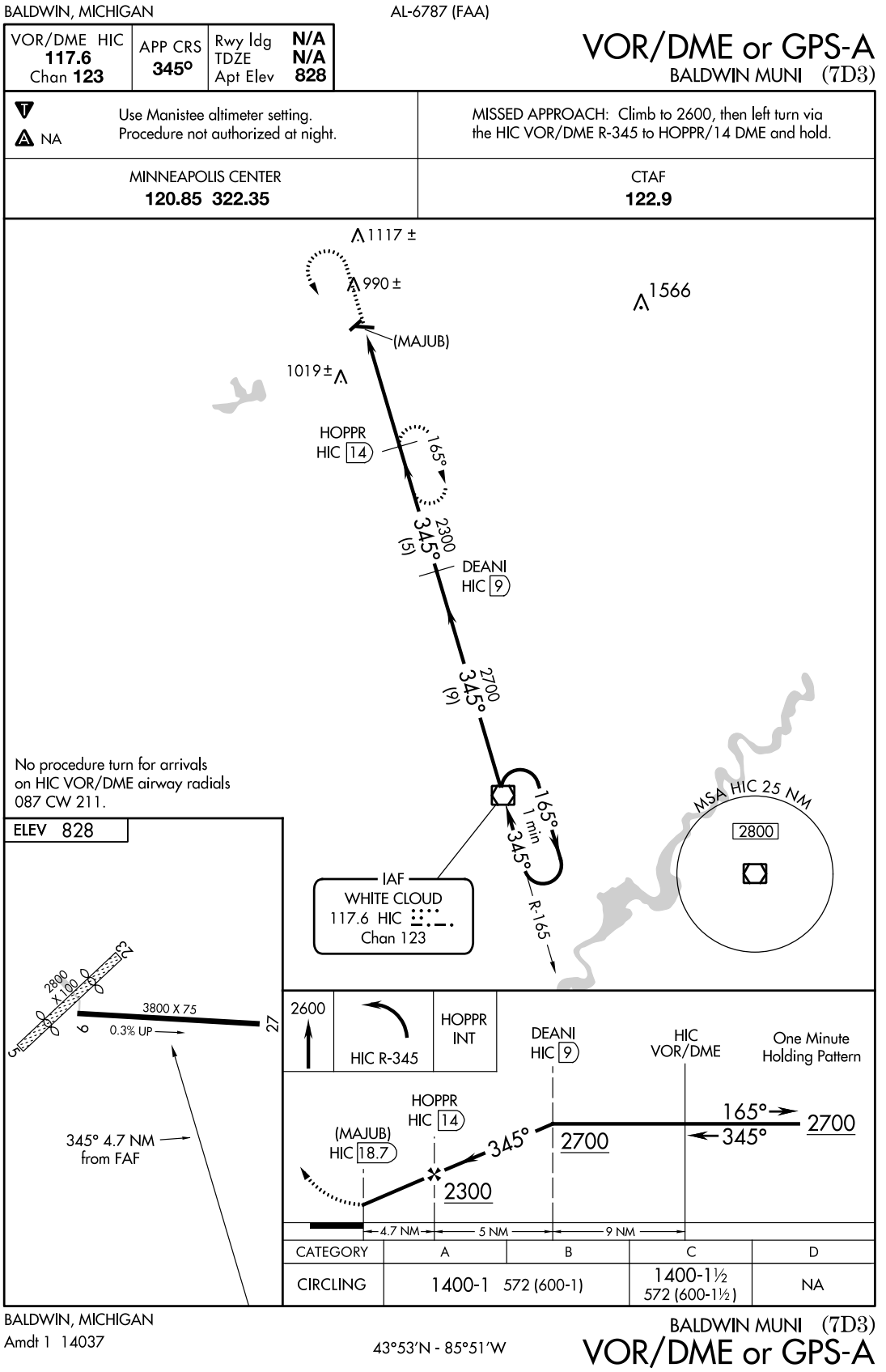


FIGURE 30.—VOR/DME or GPS-A (7D3).

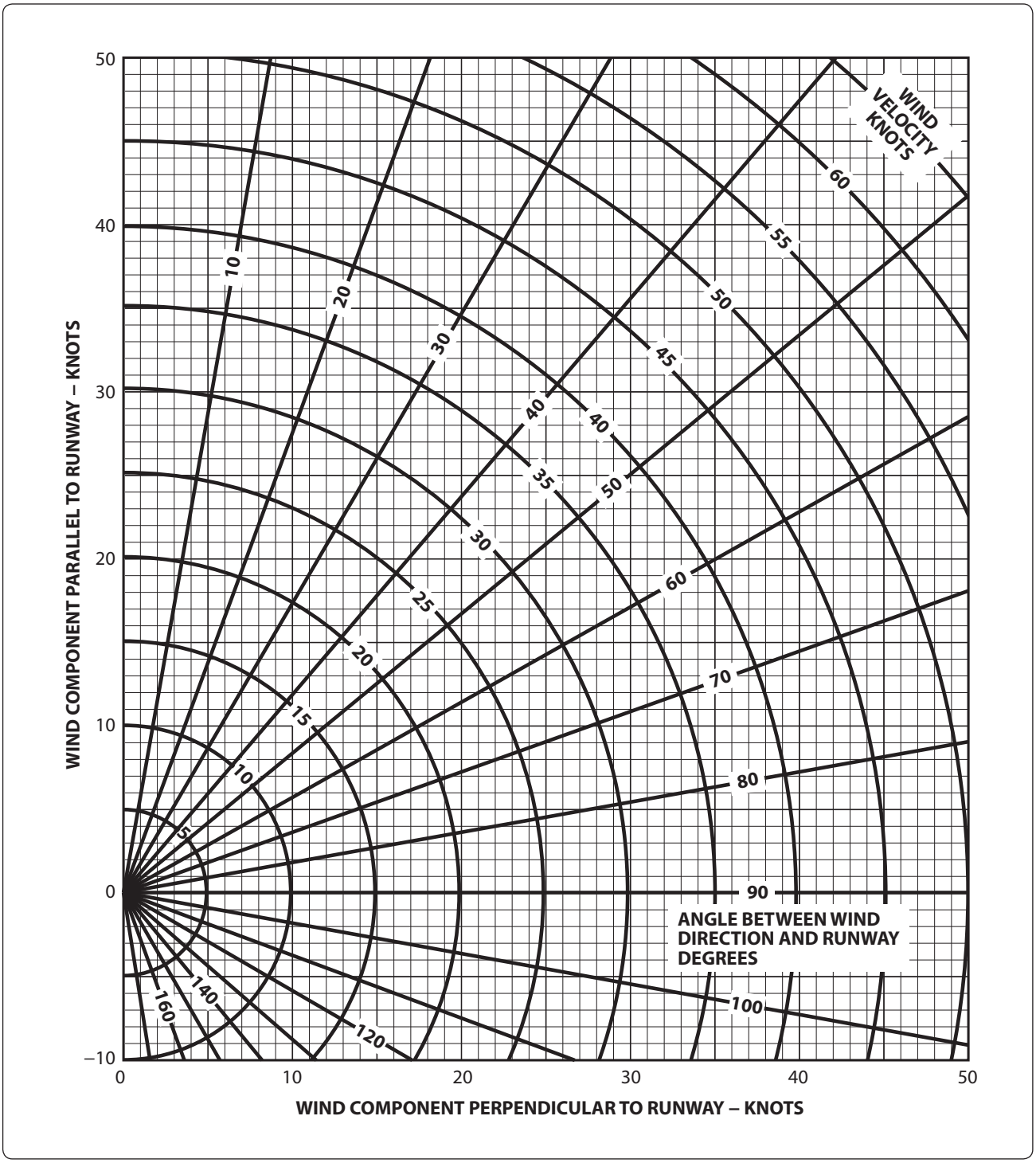


FIGURE 31.—Wind Component Chart.

ASSOCIATED CONDITIONS:

POWER	TAKEOFF POWER SET BEFORE BRAKE RELEASE
FLAPS	20°
RUNWAY	PAVED, LEVEL, DRY SURFACE
TAKEOFF SPEED	IAS AS TABULATED

NOTE: GROUND ROLL IS APPROX 73% OF TOTAL TAKEOFF DISTANCE OVER A 50 FT OBSTACLE

EXAMPLE:

OAT	75 °F
PRESSURE ALTITUDE	4,000 FT
TAKEOFF WEIGHT	3,100 LB
HEADWIND	20 KNOTS
TOTAL TAKEOFF DISTANCE OVER A 50 FT OBSTACLE	1,350 FT
GROUND ROLL (73% OF 1,350)	986 FT
IAS TAKEOFF SPEED	
LIFT-OFF	74 MPH
AT 50 FT	74 MPH

WEIGHT (LB)	IAS TAKEOFF SPEED (ASSUMES ZERO INSTR ERROR)			
	LIFT-OFF		50 FEET	
	MPH	KNOTS	MPH	KNOTS
3,400	77	67	77	67
3,200	75	65	75	65
3,000	72	63	72	63
2,800	69	60	69	60
2,600	66	57	66	57
2,400	63	55	63	55

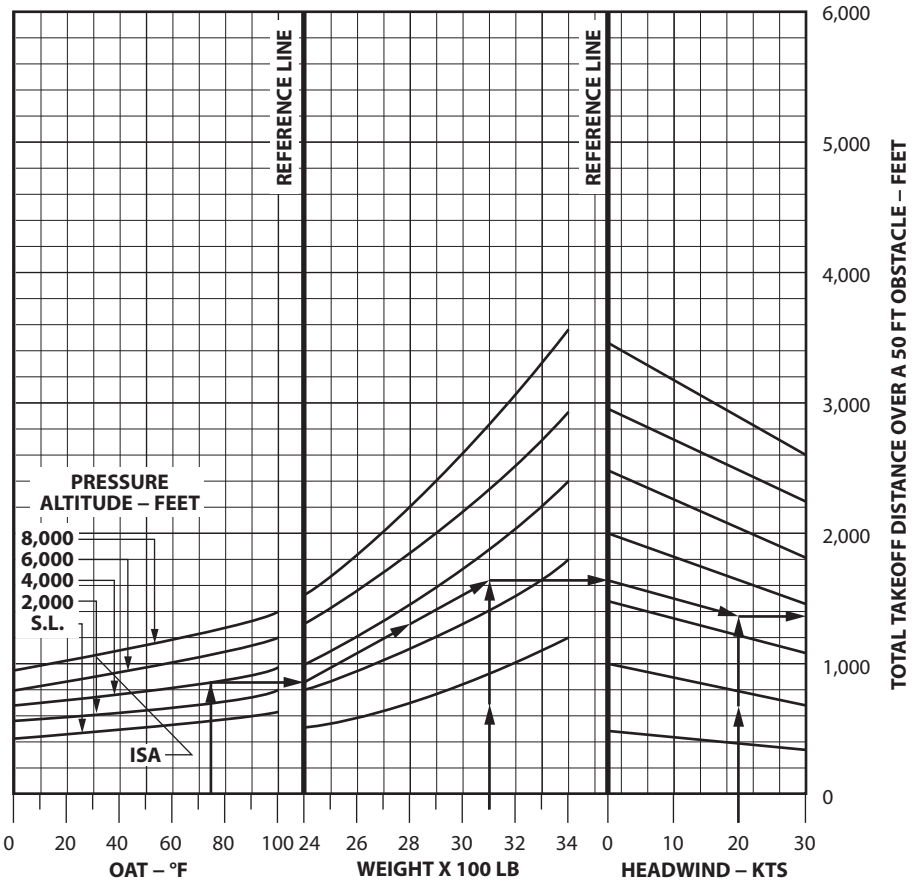


FIGURE 32.—Obstacle Take-off Chart.

CONDITIONS:
FLAPS UP
GEAR UP
2,600 RPM
COWL FLAPS OPEN

PRESS ALT	MP	PPH
S.L. TO 17,000	35	162
18,000	34	156
20,000	32	144
22,000	30	132
24,000	28	120

WEIGHT (LB)	PRESS ALT (FT)	CLIMB SPEED (KIAS)	RATE OF CLIMB (FPM)			
			–20 °C	0 °C	20 °C	40 °C
4,000	S.L.	100	1,170	1,035	895	755
	4,000	100	1,080	940	800	655
	8,000	100	980	840	695	555
	12,000	100	870	730	590	---
	16,000	100	740	605	470	---
	20,000	99	485	355	---	---
	24,000	97	190	70	---	---
3,700	S.L.	99	1,310	1,165	1,020	875
	4,000	99	1,215	1,070	925	775
	8,000	99	1,115	965	815	670
	12,000	99	1,000	855	710	---
	16,000	99	865	730	590	---
	20,000	97	600	470	---	---
	24,000	95	295	170	---	---
3,400	S.L.	97	1,465	1,320	1,165	1,015
	4,000	97	1,370	1,220	1,065	910
	8,000	97	1,265	1,110	955	795
	12,000	97	1,150	995	845	---
	16,000	97	1,010	865	725	---
	20,000	96	730	595	---	---
	24,000	94	405	275	---	---

FIGURE 33.—Maximum Rate of Climb Chart.

PRESSURE ALTITUDE 6,000 FEET

CONDITIONS:
3,800 POUNDS
RECOMMENDED LEAN MIXTURE
COWL FLAPS CLOSED

		20 °C BELOW STANDARD TEMPERATURE −17 °C			STANDARD TEMPERATURE 3 °C			20 °C ABOVE STANDARD TEMPERATURE 23 °C		
RPM	MP	% BHP	KTAS	PPH	% BHP	KTAS	PPH	% BHP	KTAS	PPH
2,550	24	---	---	---	78	173	97	75	174	94
	23	76	167	96	74	169	92	71	171	89
	22	72	164	90	69	166	87	67	167	84
	21	68	160	85	65	162	82	63	163	80
2,500	24	78	169	98	75	171	95	73	172	91
	23	74	166	93	71	167	90	69	169	87
	22	70	162	88	67	164	85	65	165	82
	21	66	158	83	63	160	80	61	160	77
2,400	24	73	165	91	70	166	88	68	167	85
	23	69	161	87	67	163	84	64	164	81
	22	65	158	82	63	159	79	61	160	77
	21	61	154	77	59	155	75	57	155	73
2,300	24	68	161	86	66	162	83	64	163	80
	23	65	158	82	62	159	79	60	159	76
	22	61	154	77	59	155	75	57	155	72
	21	57	150	73	55	150	71	53	150	68
2,200	24	63	156	80	61	157	77	59	158	75
	23	60	152	76	58	153	73	56	154	71
	22	57	149	72	54	149	70	53	149	67
	21	53	144	68	51	144	66	49	143	64
	20	50	139	64	48	138	62	46	137	60
	19	46	133	60	44	132	58	43	131	57

FIGURE 34.—Cruise Performance Chart.

ASSOCIATED CONDITIONS:

POWER	AS REQUIRED TO MAINTAIN 800 FT/MIN DESCENT ON APPROACH
FLAPS	DOWN
RUNWAY	PAVED, LEVEL, DRY SURFACE
APPROACH SPEED	IAS AS TABULATED

NOTE: GROUND ROLL IS APPROX 53% OF TOTAL LANDING DISTANCE OVER A 50 FT OBSTACLE.

EXAMPLE:

OAT	75 °F
PRESSURE ALTITUDE	4,000 FT
LANDING WEIGHT	3,200 LB
HEADWIND	10 KNOTS
TOTAL LANDING DISTANCE OVER A 50 FT OBSTACLE	1,475 FT
GROUND ROLL (53% OF 1,475)	782 FT
IAS TAKEOFF SPEED	87 MPH IAS

WEIGHT (LB)	IAS APPROACH SPEED (ASSUMES ZERO INSTR ERROR)	
	MPH	KNOTS
3,400	90	78
3,200	87	76
3,000	84	73
2,800	81	70
2,600	78	68
2,400	75	65

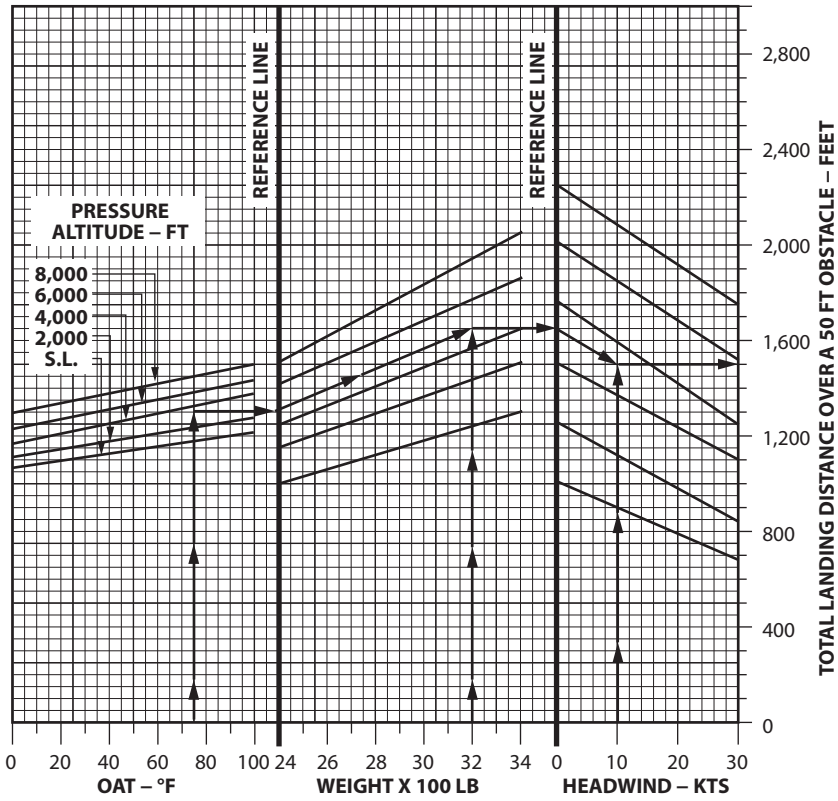


FIGURE 35.—Normal Landing Chart.

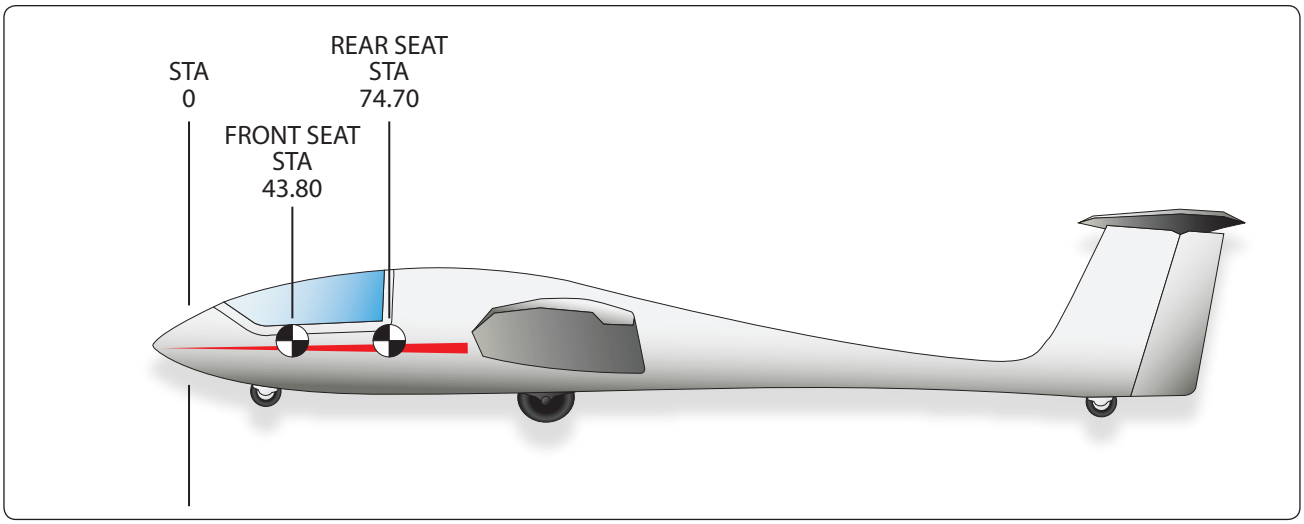


FIGURE 36.—Stations Diagram.

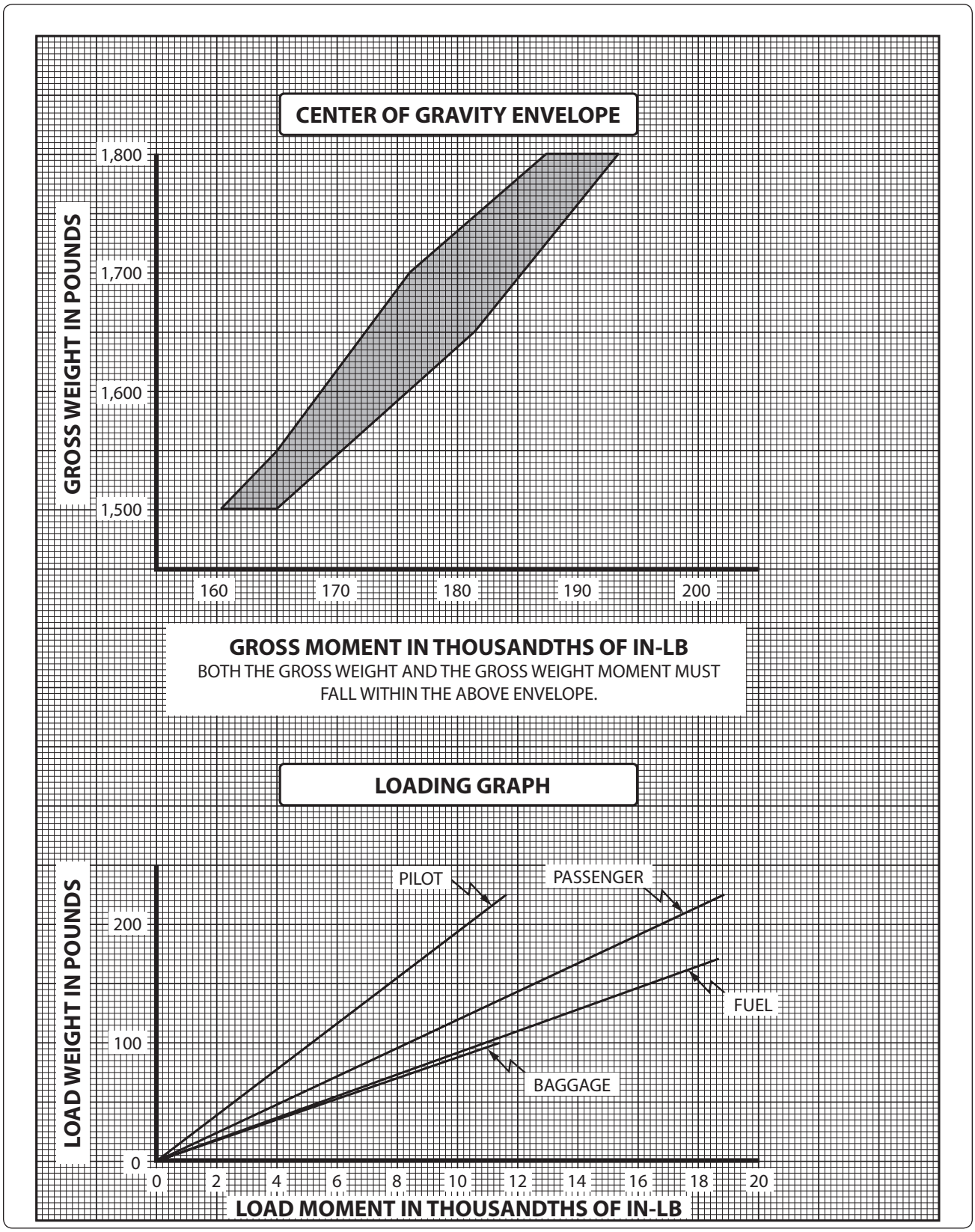
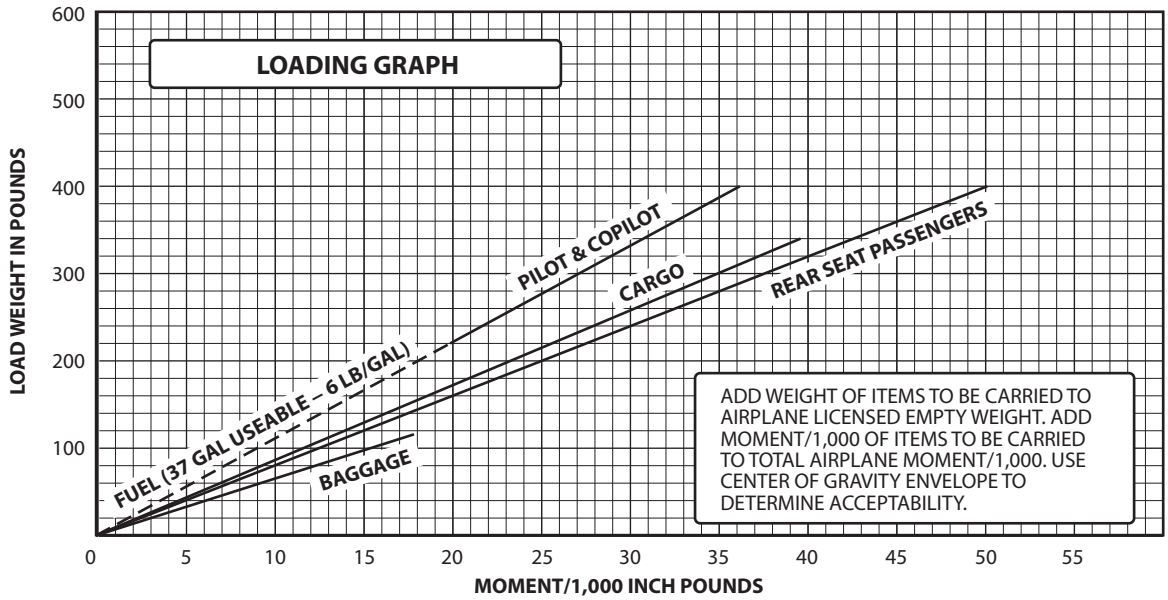


FIGURE 37.—Center of Gravity Envelope and Loading Graph.



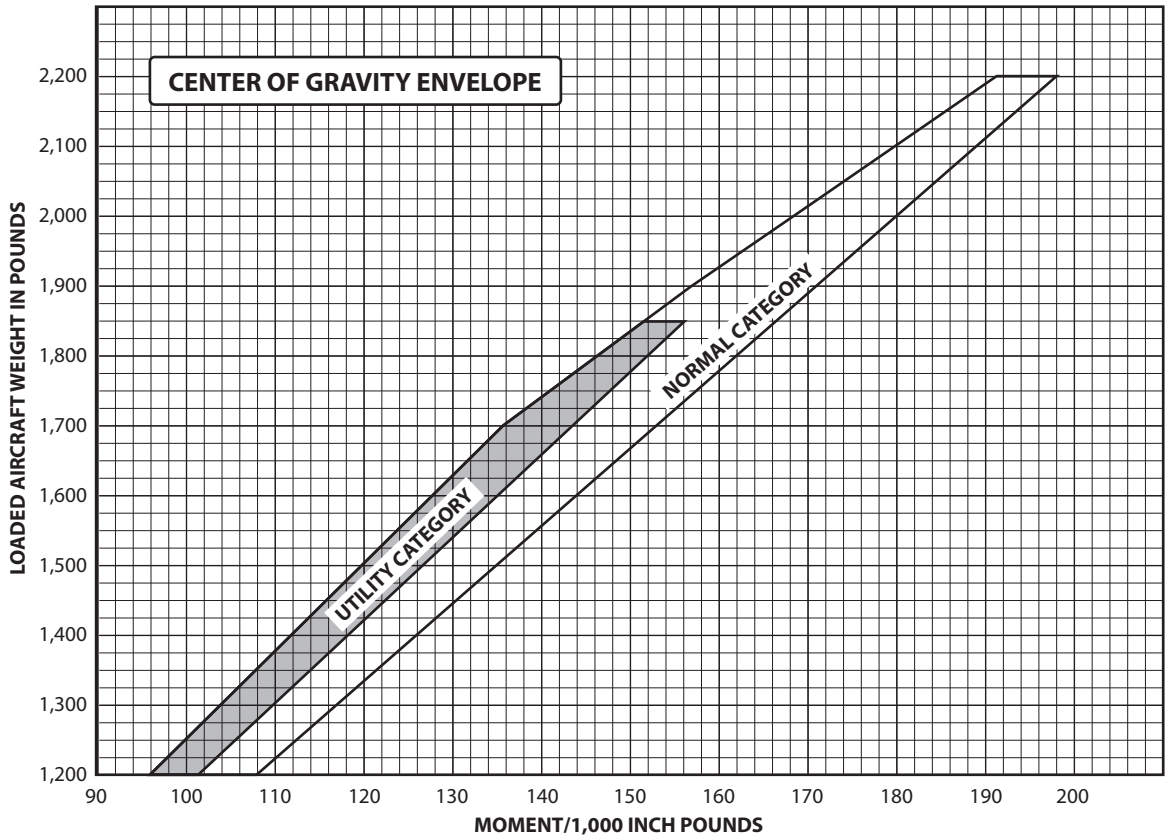


FIGURE 38.—Loading Graph and Center of Gravity Envelope.

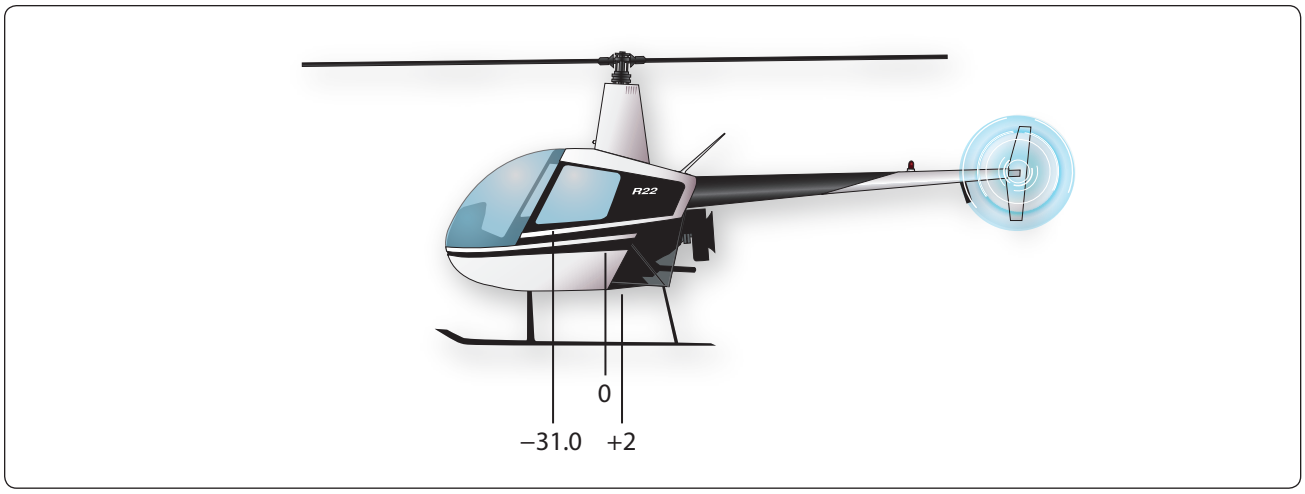


FIGURE 39.—Stations Diagram.

THE FOLLOWING CG LOCATIONS MAY BE USED WHEN DETERMINING THE HELICOPTER CG POSITION.

ITEM	LONG CG	LAT CG
PILOT & BAGGAGE UNDER “R” SEAT	79.0	+10.7
PASSENGER & BAGGAGE UNDER “L” SEAT	79.0	−9.3
MAIN FUEL	108.6	−11.0
AUX FUEL (OPTIONAL)	103.8	+11.2

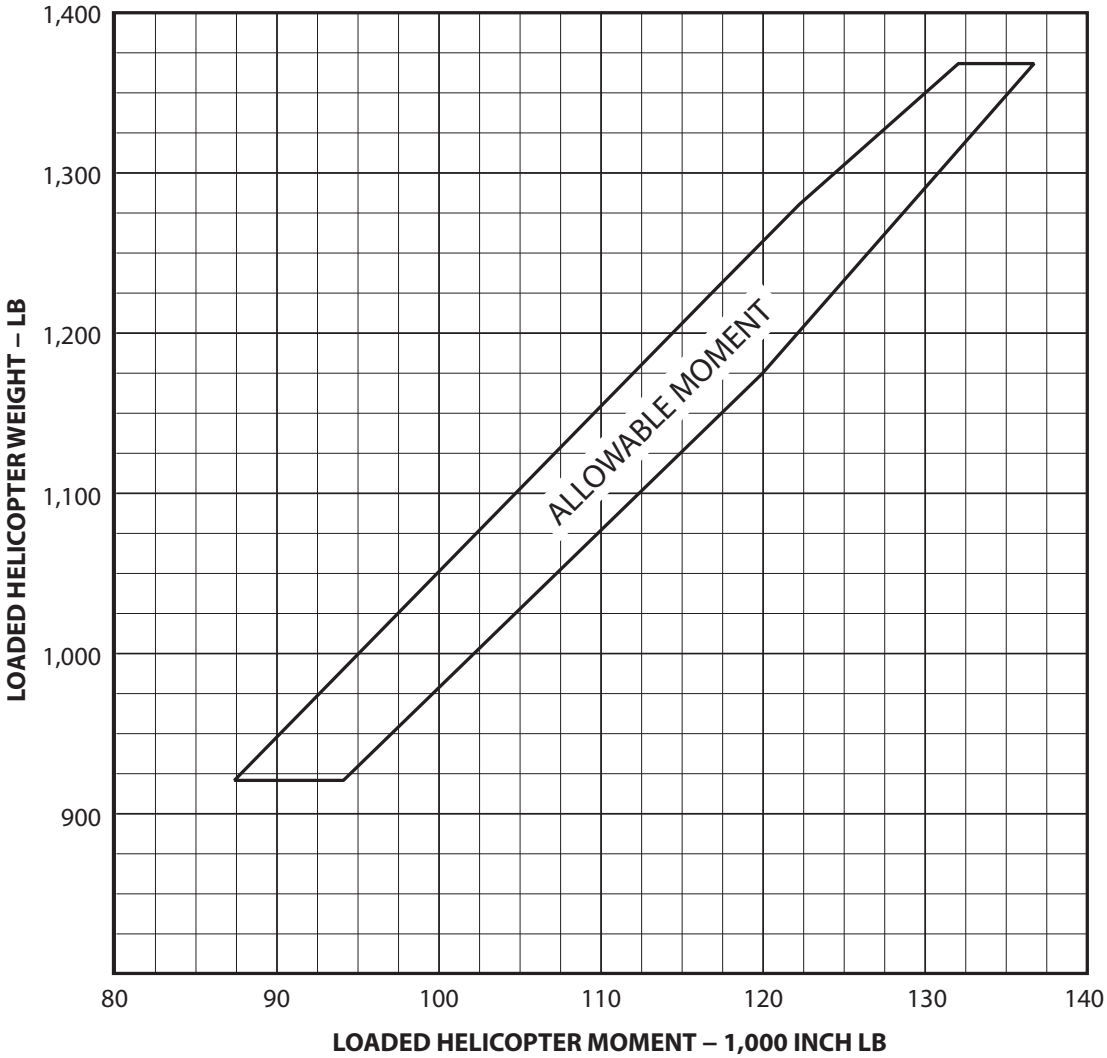


FIGURE 40.—Weight and Balance Chart.

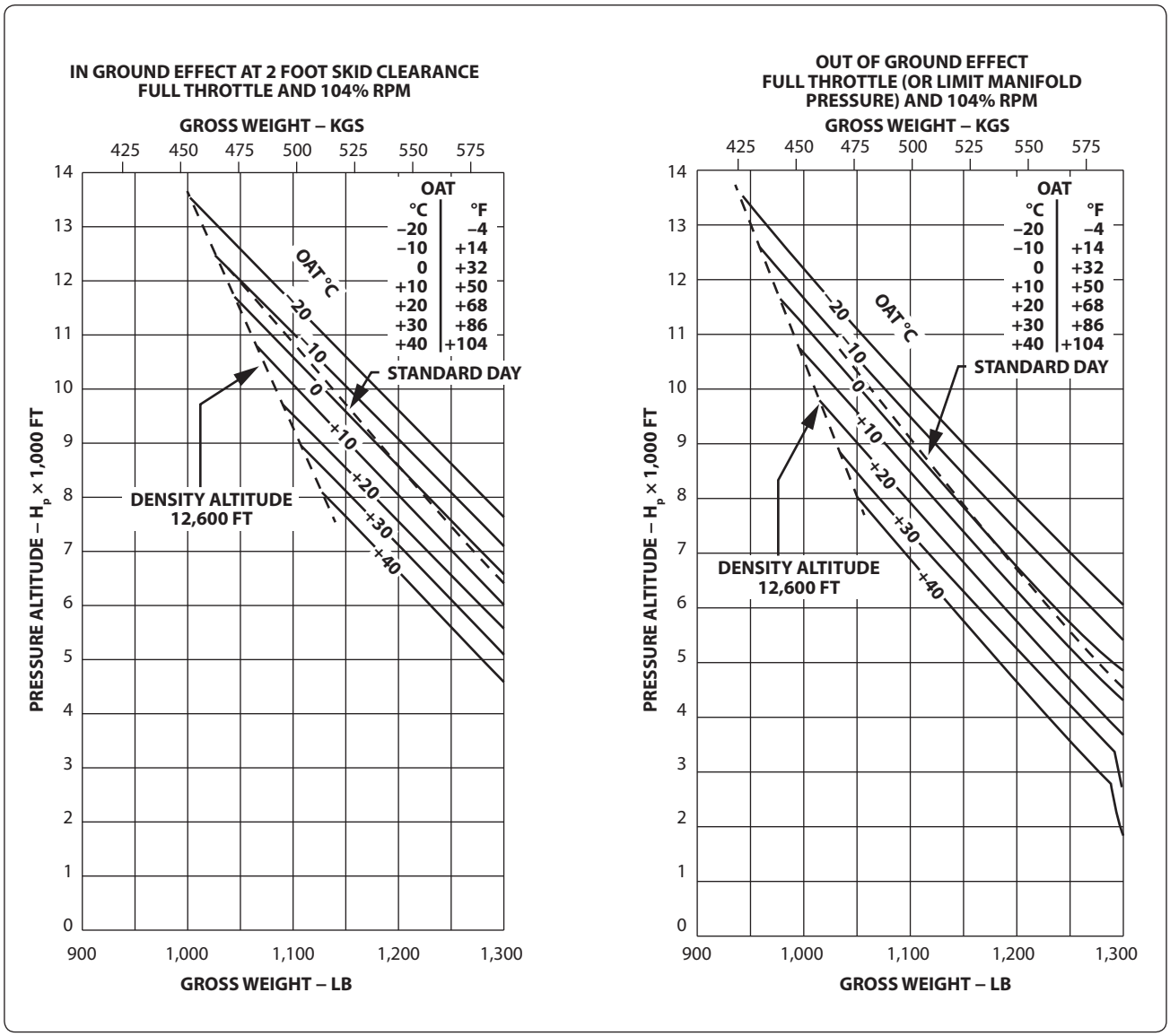


FIGURE 41.—Hover Ceiling vs. Gross Weight.

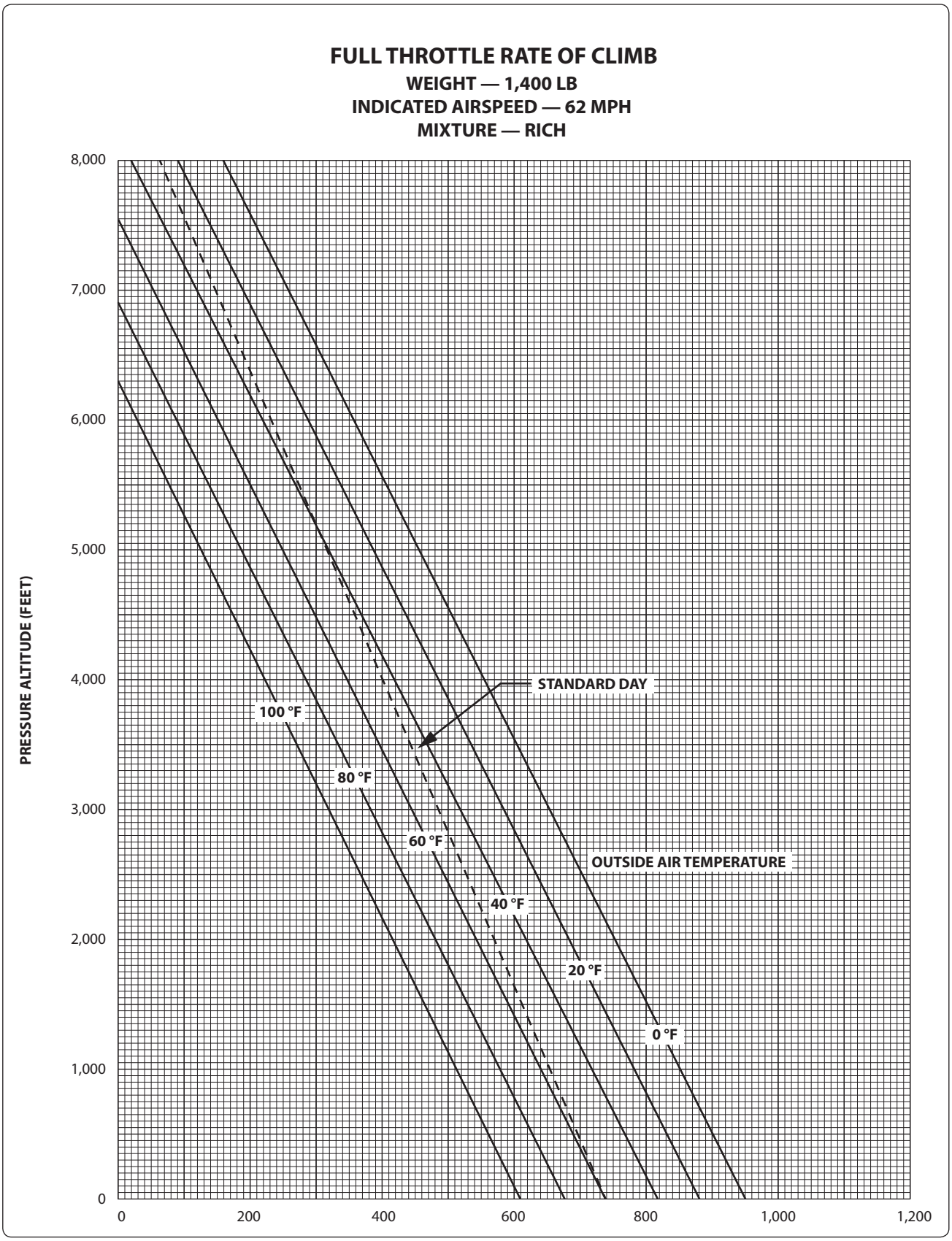


FIGURE 42.—Rate of Climb (FT/MIN).

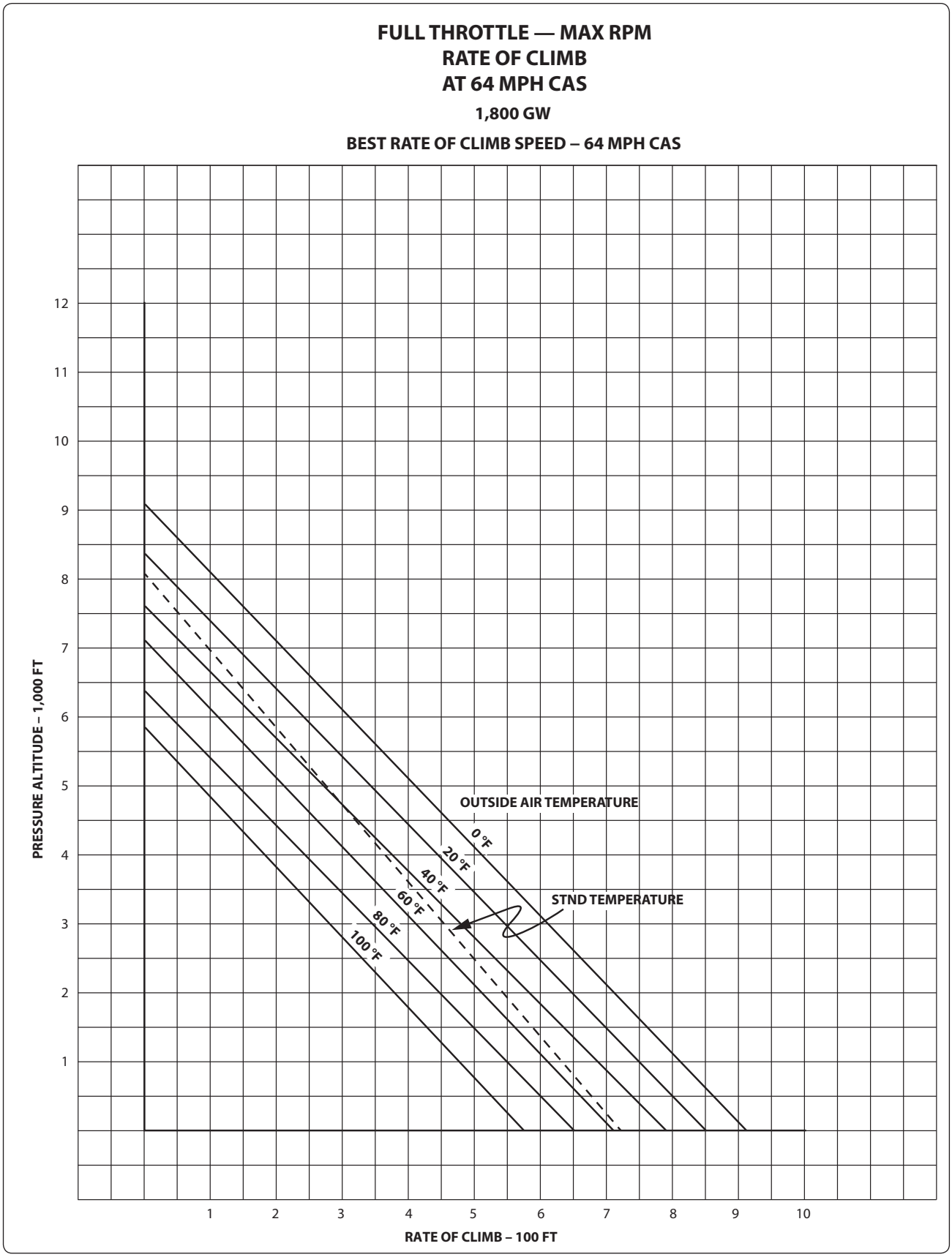


FIGURE 43.—Best Rate of Climb Speed.

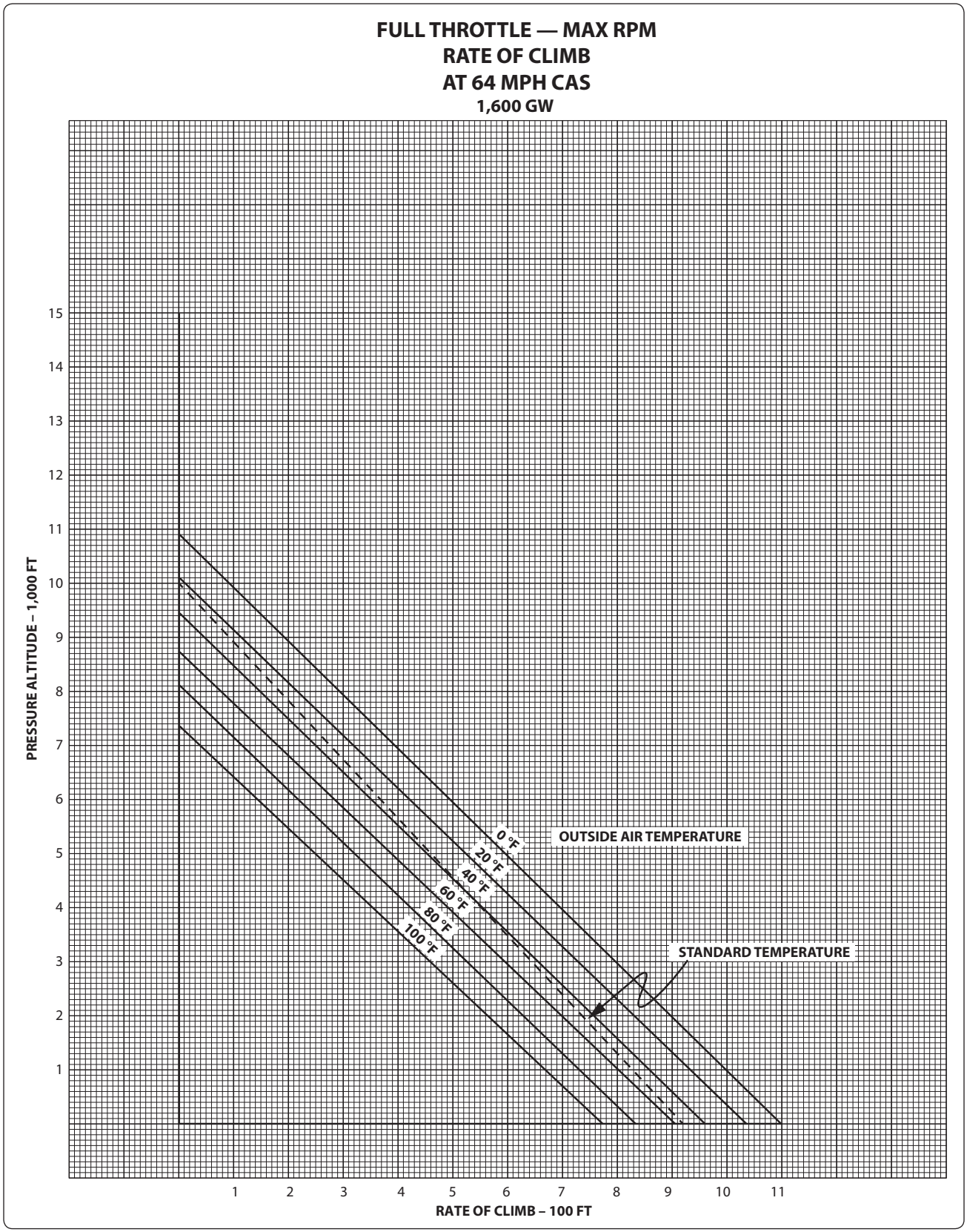


FIGURE 44.—Rate of Climb.

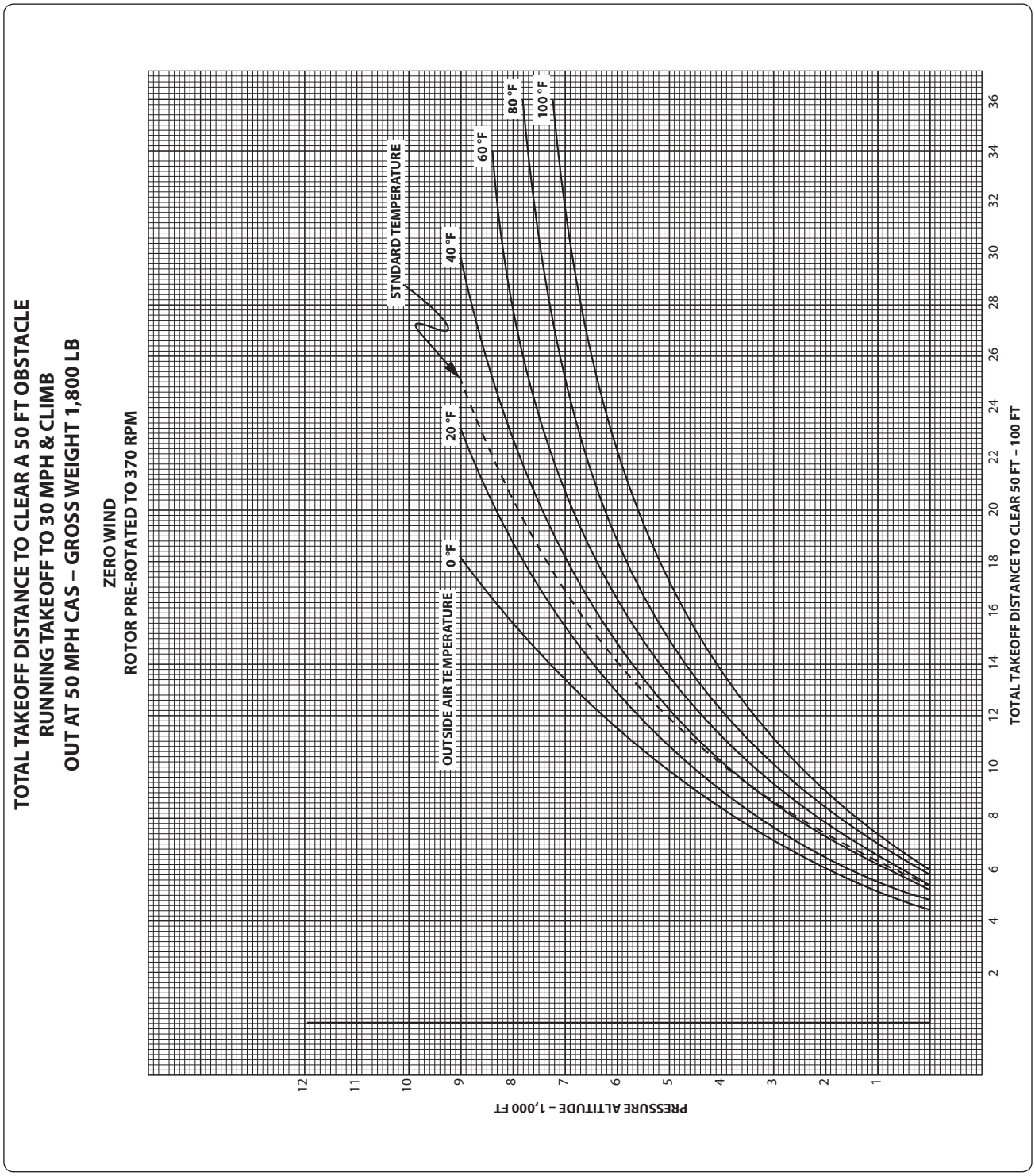


FIGURE 45.—Running Takeoff.

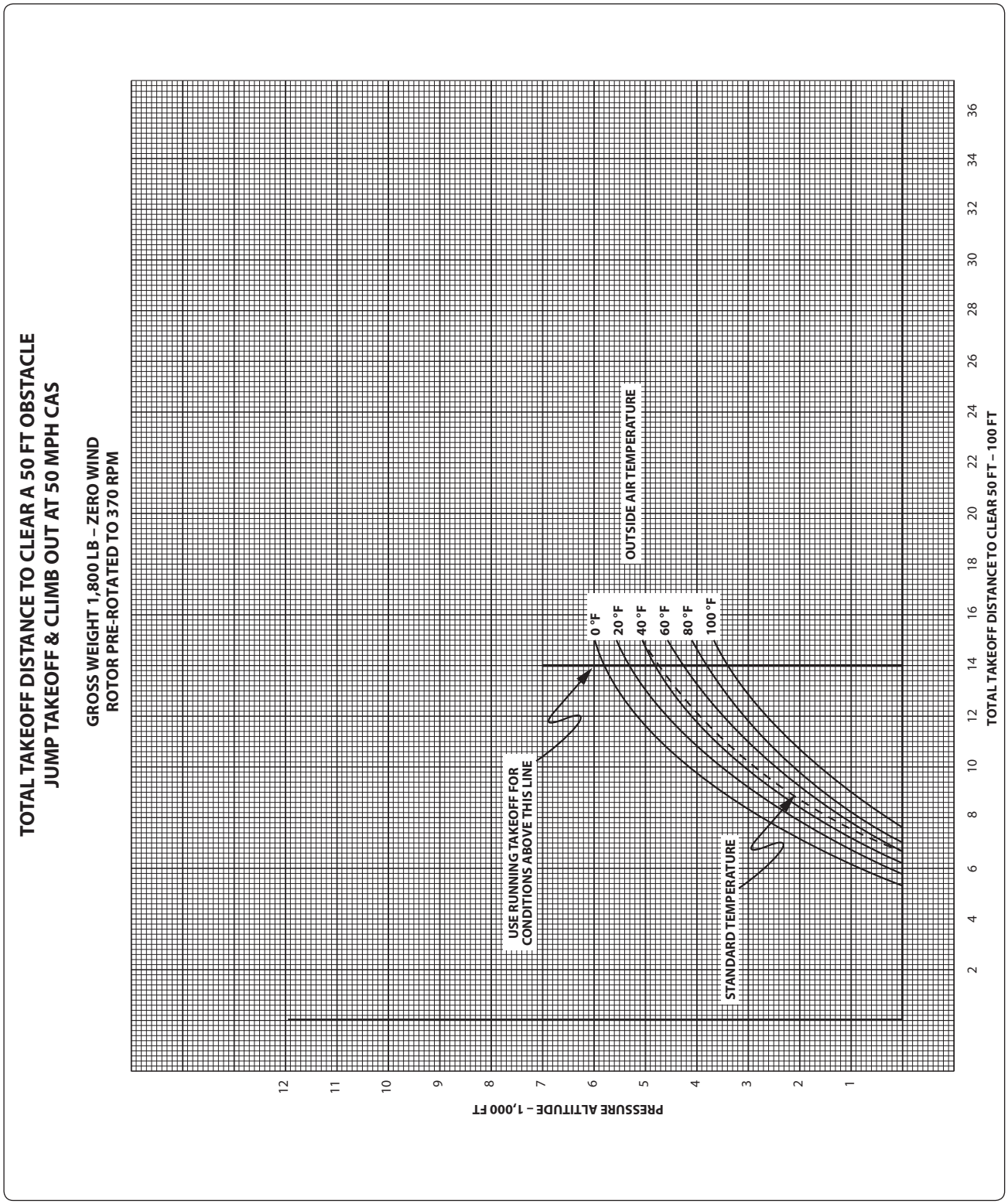


FIGURE 46.—Jump Takeoff.

DESIGN DATA

WING SPAN	51'	EMPTY WEIGHT	600 LB
LENGTH	25' 9"	GROSS WEIGHT	1,040 LB
HEIGHT	9' 3-½"	WING AREA	219.5 SQ FT
ASPECT RATIO	11.85	WING LOADING	4.74 PSF

PERFORMANCE

MAX SPEED	98 MPH	STALL (DUAL)	35 MPH
AIRPLANE TOW	98 MPH	L/D MPH (SOLO)	22.25 TO 1 AT 45
AUTO WINCH	69 MPH	L/D MPH (DUAL)	22.25 TO 1 AT 52
DRIVE BRAKE			
EXTEND. MAX	98 MPH	SINK SPEED (SOLO)	2.6 FPS AT 38
STALL (SOLO)	31 MPH	SINK SPEED (DUAL)	3.1 FPS AT 42

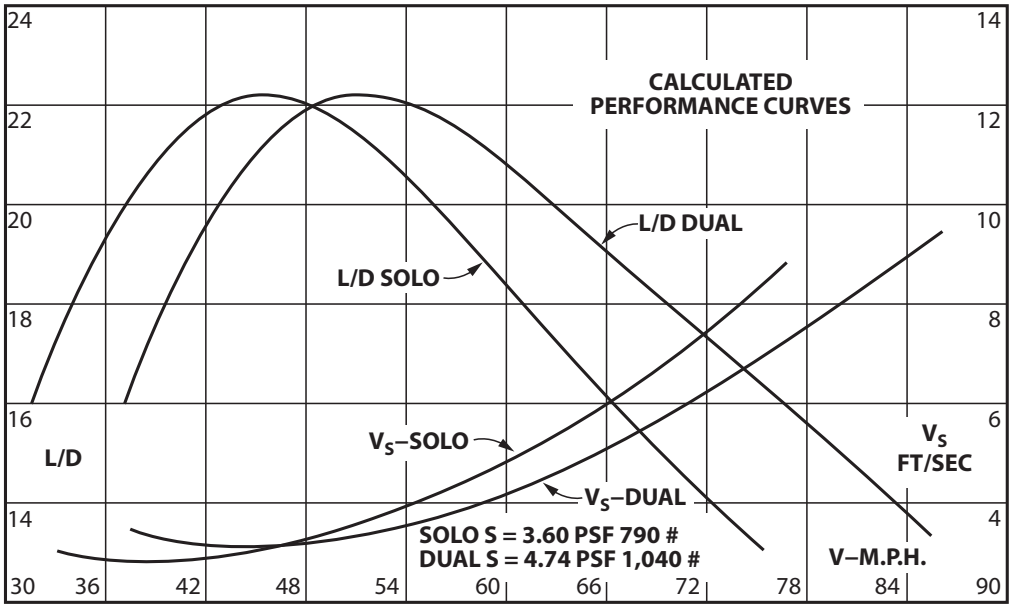


FIGURE 48.—Performance Curves Chart.

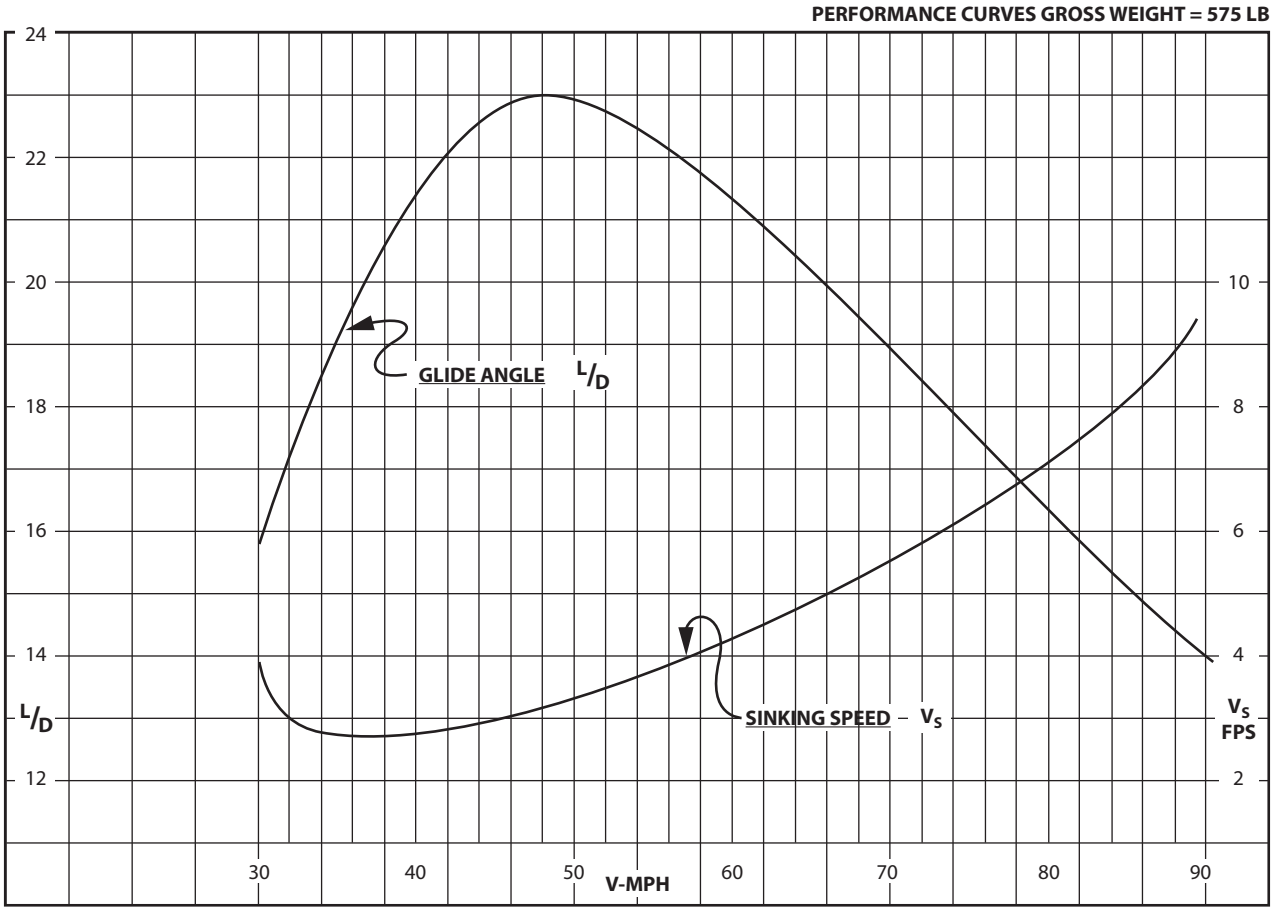


FIGURE 49.—Performance Curves Chart.

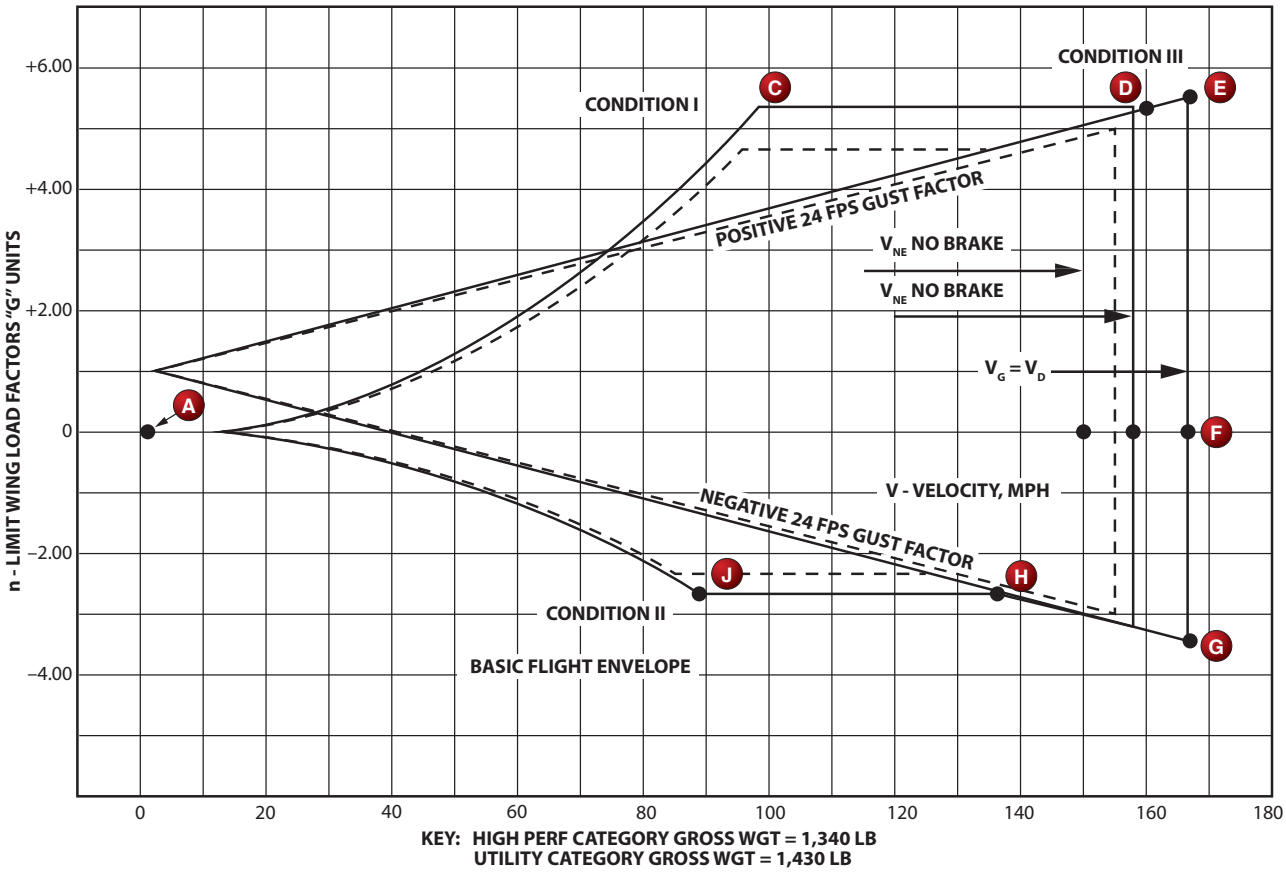


FIGURE 50.—Flight Envelope.

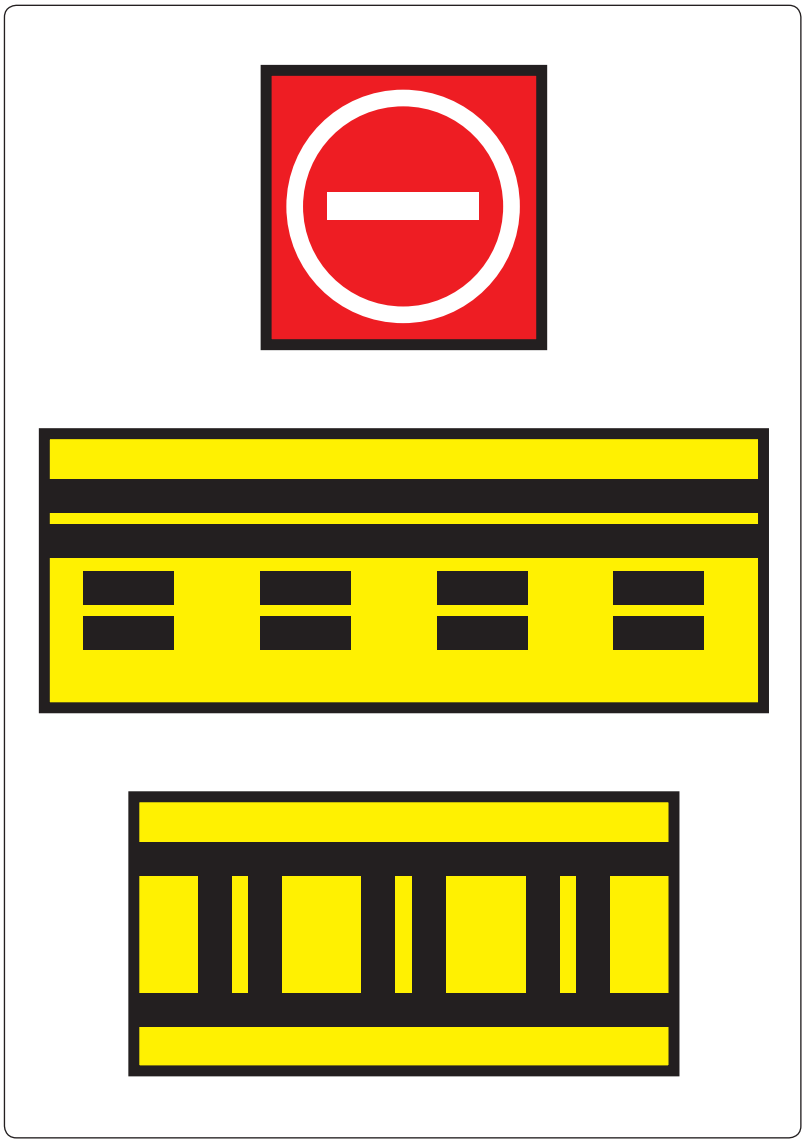


FIGURE 51.—Airport Signs.

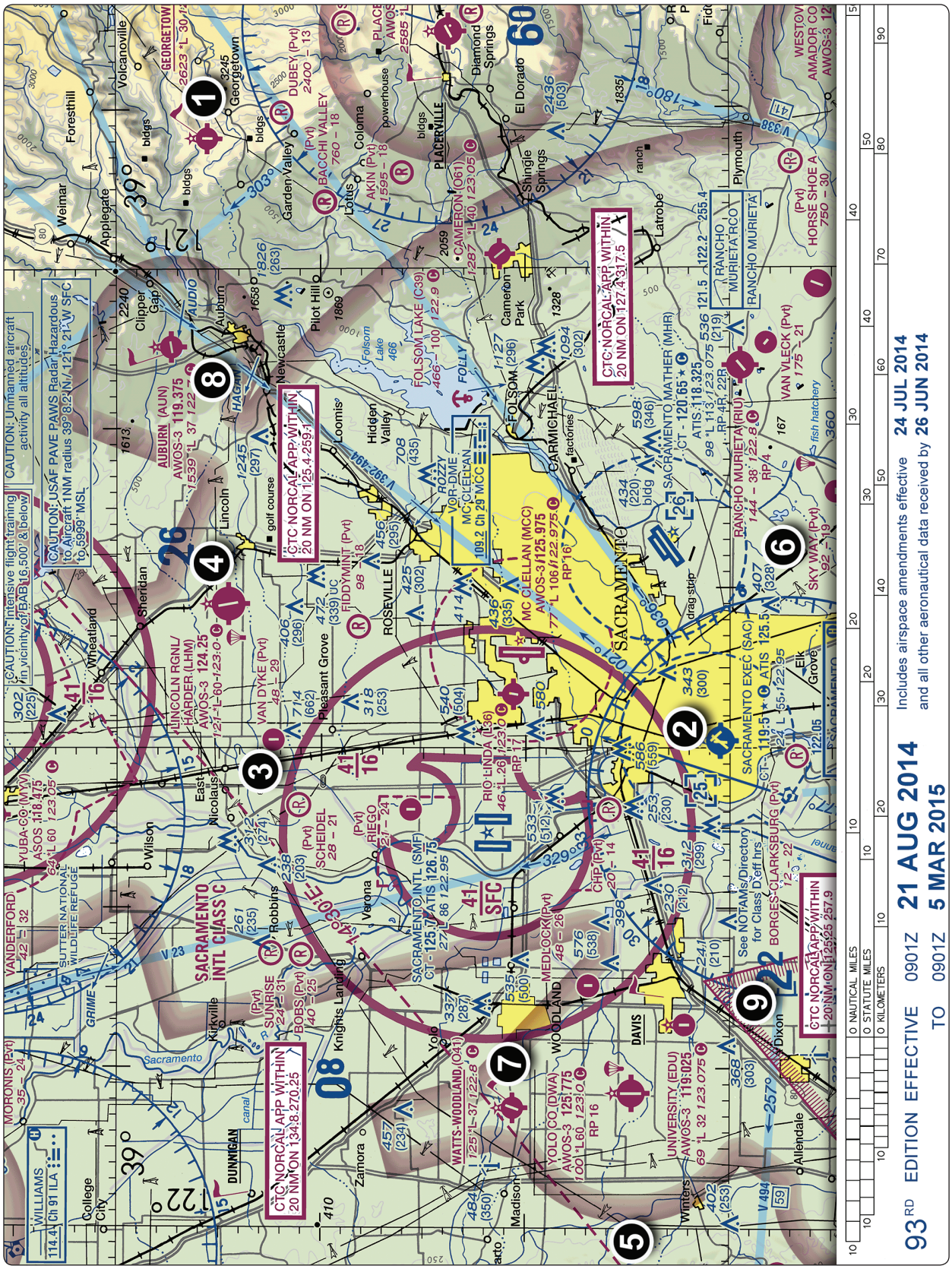


FIGURE 52.—Sectional Chart Excerpt.

NOTE: Chart is not to scale and should not be used for navigation. Use associated scale. Chart is for testing purposes only.

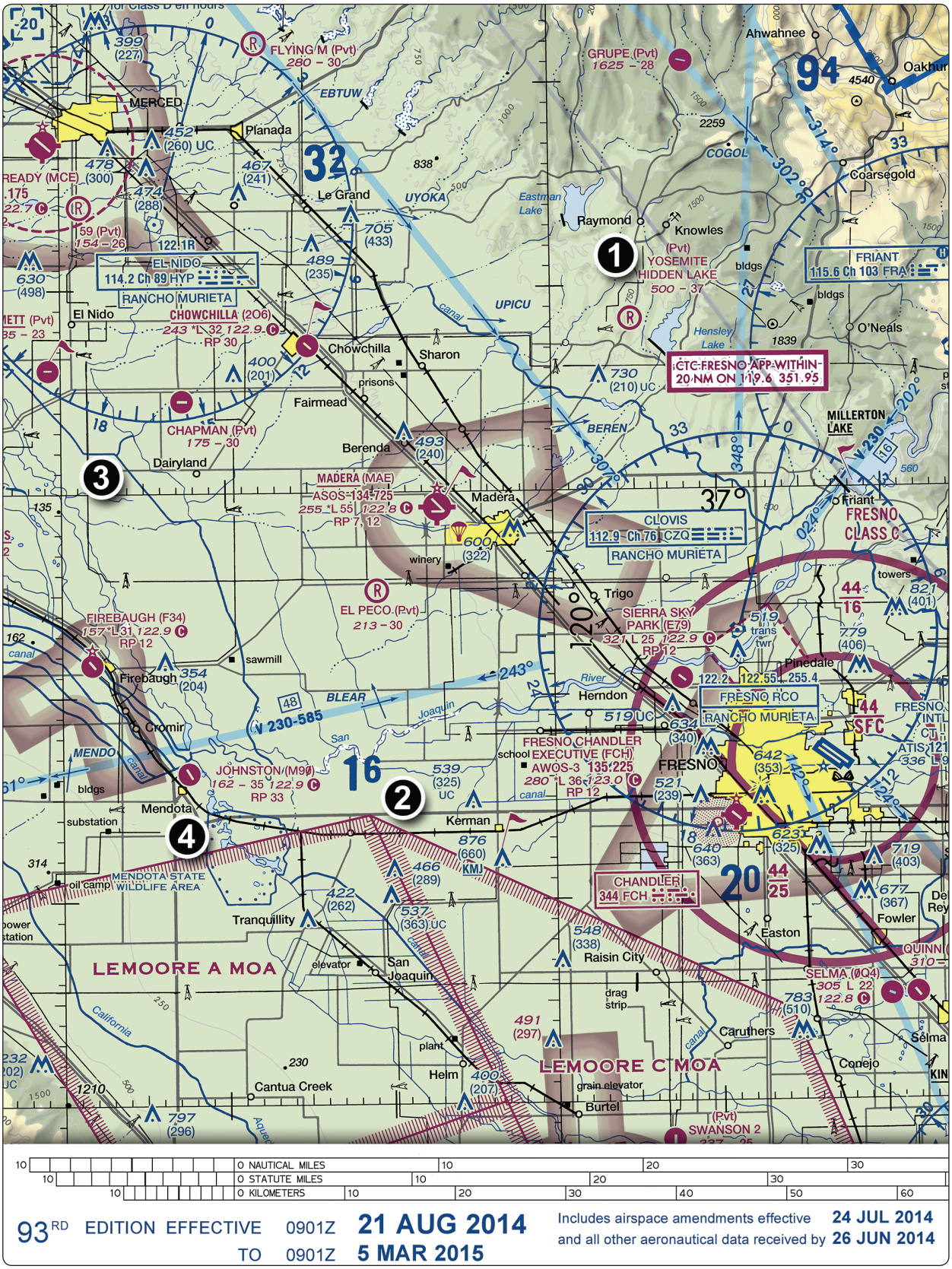


FIGURE 53.—Sectional Chart Excerpt.

NOTE: Chart is not to scale and should not be used for navigation. Use associated scale. Chart is for testing purposes only.

FIGURE 54.—Sectional Chart Excerpt.

NOTE: Chart is not to scale and should not be used for navigation. Use associated scale. Chart is for testing purposes only.

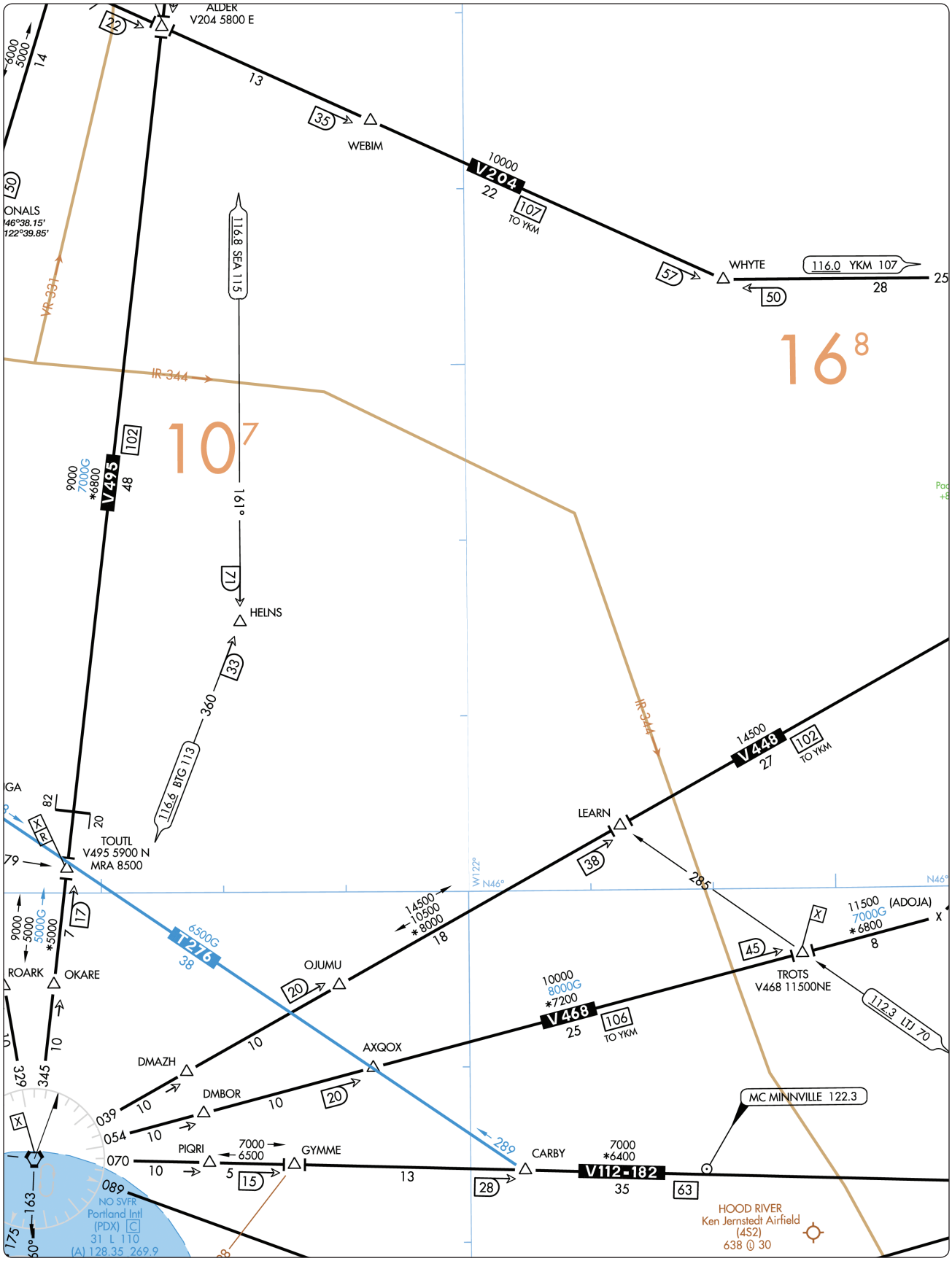


FIGURE 55.—En Route Low Altitude Segment.

NOTE: Chart is not to scale and should not be used for navigation. Chart is for testing purposes only.

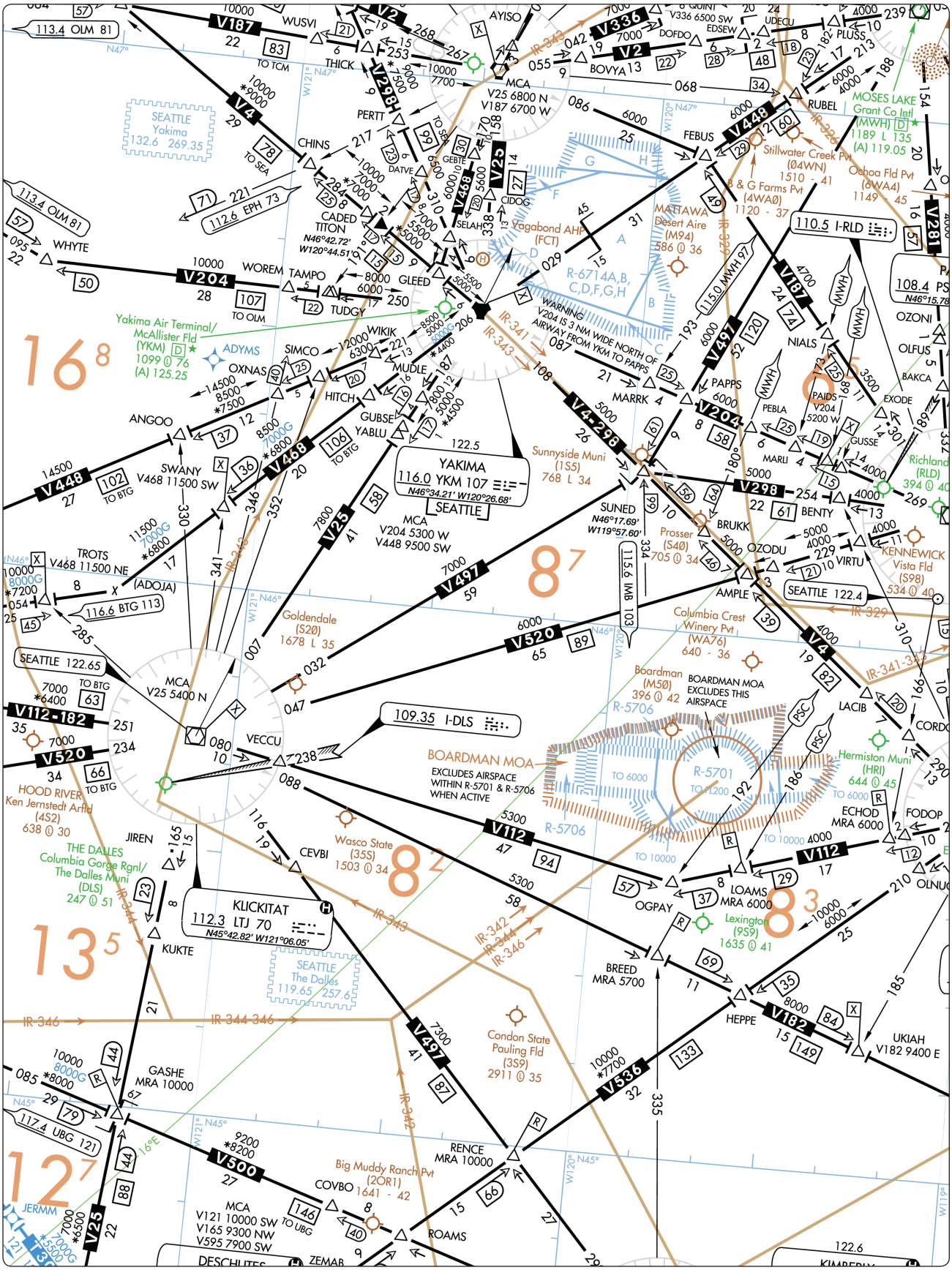


FIGURE 55A.—En Route Low Altitude Segment.

NOTE: Chart is not to scale and should not be used for navigation. Chart is for testing purposes only.

FIGURE 56.—Two signs.

FIGURE 57.—Sign.

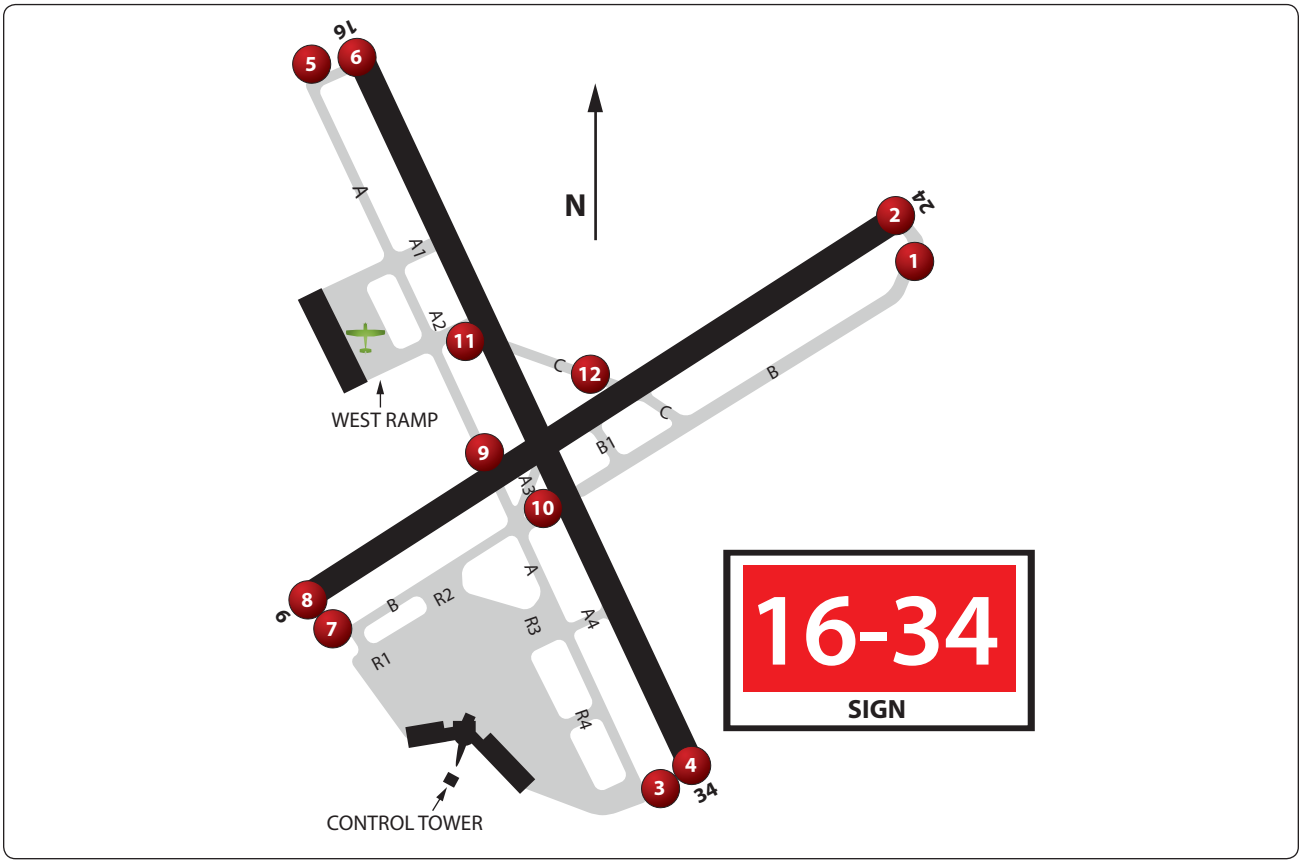


FIGURE 58.—Airport Diagram and Sign.

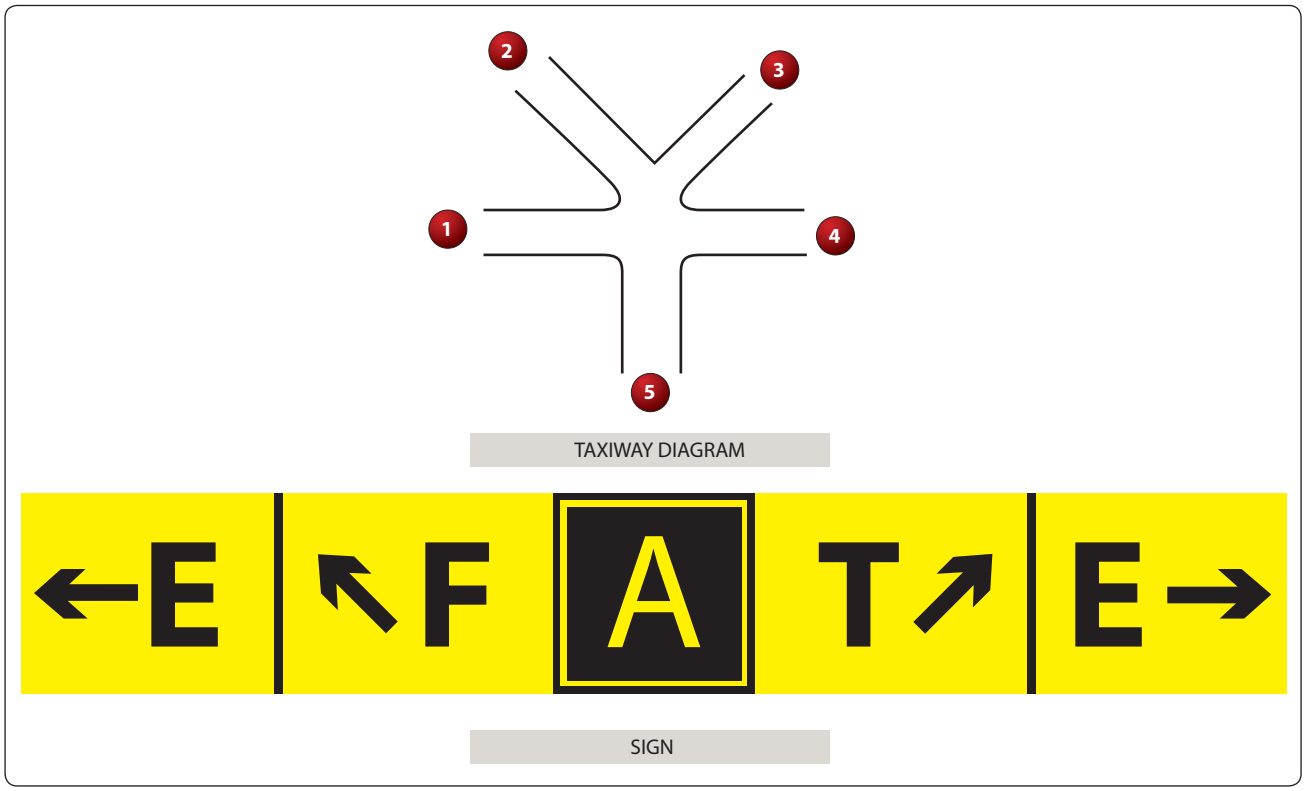


FIGURE 59.—Taxiway Diagram and Sign.

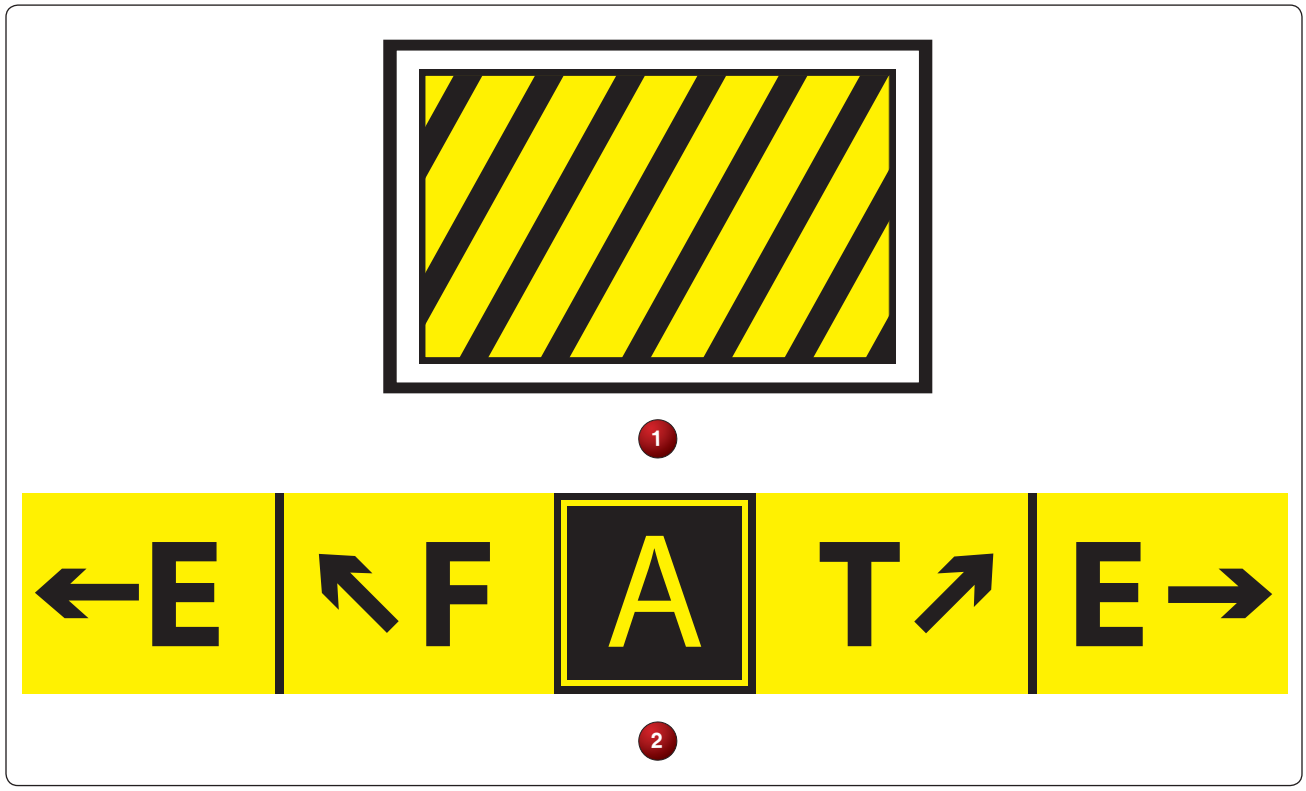


FIGURE 60.—Two Signs.

FIGURE 61.—Sign.

FIGURE 62.—Sign.

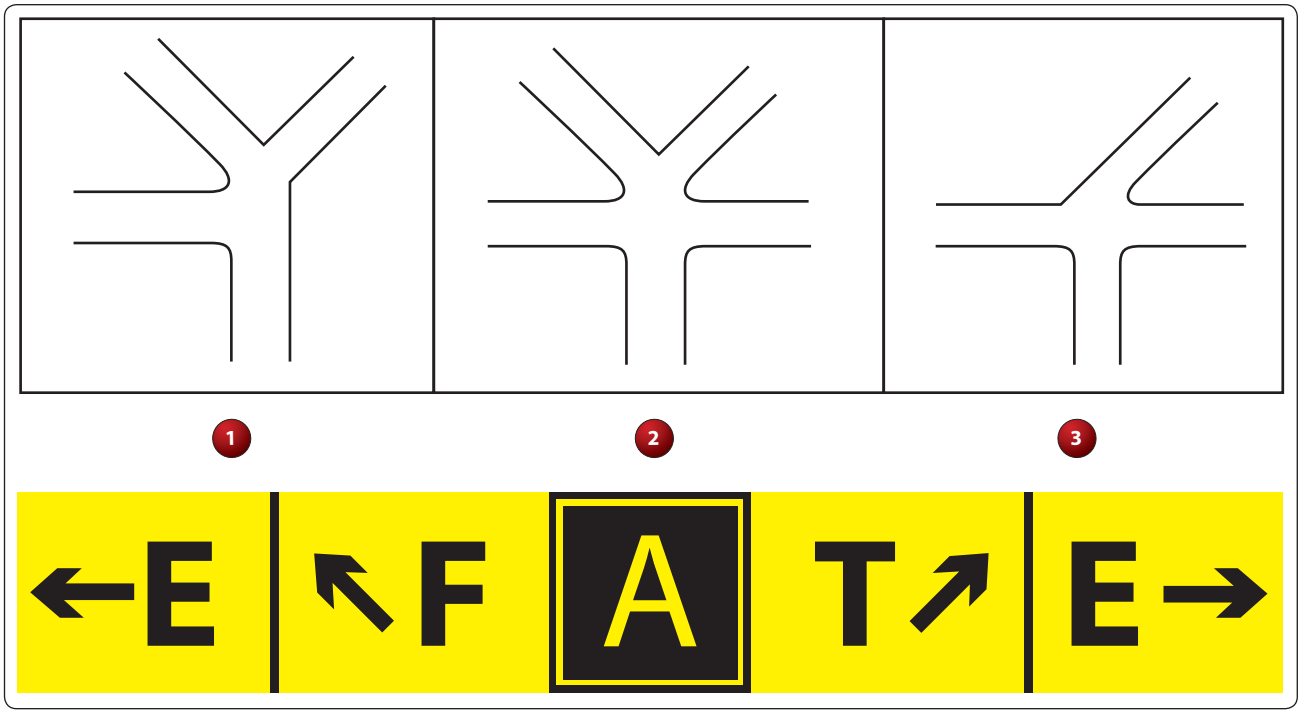


FIGURE 63.—Sign and Intersection Diagram.

FIGURE 64.—Sign.

FIGURE 65.—Sign.