



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

March 17, 2016

Attachment 12 – Weight and Balance

OPERATIONAL FACTORS

CEN16MA036

TAKEOFF EFT 1521 Chavez Marchese KFXE KSTP 11.9.15

Field Elevation (Feet): 13
Bar. Press (in. Hg or HPa): 3008
Pressure Altitude (Ft): 0
Temperature (Deg. C): 24
Wind Direction (Deg.): 090
Wind Speed (Knots): 10
Runway Heading (Deg.): 091
Runway Length (Feet): 6002
% Runway Slope (+/-): 0
FLAPS: FLAPS 15
Anti-Ice: Off

None
MAX. ALLOWABLE T.O.G.W (Lbs)...24745
TAKEOFF DISTANCE (Ft).....5939
INITIAL 2ND SEG GRAD% (NET)1.6
INITIAL 2ND SEG GRAD% (GRS)2.4
V1 (Knots).....125
VR (Knots).....125
V2 (Knots).....125
VFTO (Knots).....152
VSE (Knots).....175
Takeoff Thrust (%) APR ARMED99.2
LANDING DISTANCE (FT)2840
LANDING FIELD LENGTH (FT)4740
Vref (45 DEG) (Knots)132
Vref (25 DEG) (Knots)137
WEIGHT & BALANCE

ZERO FUEL:

Zero Fuel Weight: 15465 lbs
18% FWD 26 %MAC 29.8% AFT

TAKEOFF:

Takeoff Weight: 24745 lbs
24% FWD 32.5 %MAC 35.2% AFT

LANDING:

Landing Weight: 18545 lbs
18.3% AFT 25.2 %MAC 29.8% AFT

Seat 1: 200 lbs
Seat 2: 200 lbs
Seat 3: 200 lbs
Seat 4: 200 lbs
Seat 5: 200 lbs
Seat 6: 200 lbs
Seat 7: 200 lbs
Seat J: 0 lbs

Bag. 1: 250 lbs
Bag. 2: 0 lbs

FUEL:..... 8000 lbs
FUEL BURNED: 6200 lbs
VENTRAL FUEL: YES
DORSAL FUEL: YES
LANDING

Field Elevation (Feet): 705
Bar. Press (in. Hg or HPa): 2982
Pressure Altitude (Ft): 805
Temperature (Deg. C): 15
Wind Direction (Deg.): 33010
Wind Speed (Knots): 10
Runway Heading (Deg.): 323
Runway condition: Dry

Landing Weight (Lbs).....18545
Landing Distance (Ft).....2390
60% FACT. LANDING DIST (FT)3990
Landing Vref-45deg (Knots)115
Landing Vref-25deg (Knots)120

Flaps 0 Weight Limit (LB).....22000
Flaps 15 Weight Limit (LB).....22000
Flaps 25 Weight Limit (LB).....22000

Field Elevation (Feet): 705
Bar. Press (in. Hg or HPa): 2990
Pressure Altitude (Ft): 725
Temperature (Deg. C): 17
Wind Direction (Deg.): 330
Wind Speed (Knots): 10
Runway Heading (Deg.): 323
Runway Length (Feet): 6491
% Runway Slope (+/-): 0
FLAPS: FLAPS 15
Anti-Ice: Off

None
MAX. ALLOWABLE T.O.G.W (Lbs)...20265
TAKEOFF DISTANCE (Ft).....3248
INITIAL 2ND SEG GRAD% (NET)4.2
INITIAL 2ND SEG GRAD% (GRS)5
V1 (Knots).....112
VR (Knots).....114
V2 (Knots).....117
VFTO (Knots).....144
VSE (Knots).....156
Takeoff Thrust (%) APR ARMED99.4
LANDING DISTANCE (FT)2450
LANDING FIELD LENGTH (FT)4090
Vref (45 DEG) (Knots)120
Vref (25 DEG) (Knots)125
WEIGHT & BALANCE

ZERO FUEL:
Zero Fuel Weight: 15465 lbs
18% FWD 26 %MAC 29.8% AFT

TAKEOFF:
Takeoff Weight: 20265 lbs
18.5% FWD 24.8 %MAC 30.1% AFT

LANDING:
Landing Weight: 18565 lbs
18.3% AFT 25.2 %MAC 29.8% AFT

Seat 1: 200 lbs
Seat 2: 200 lbs
Seat 3: 200 lbs
Seat 4: 200 lbs
Seat 5: 200 lbs
Seat 6: 200 lbs
Seat 7: 200 lbs
Seat J: 0 lbs

Bag. 1: 250 lbs
Bag. 2: 0 lbs

FUEL:..... 4800 lbs
FUEL BURNED: 1700 lbs
VENTRAL FUEL: NO
DORSAL FUEL: NO
LANDING

Field Elevation (Feet): 590
Bar. Press (in. Hg or HPa): 2995
Pressure Altitude (Ft): 560
Temperature (Deg. C): 17
Wind Direction (Deg.): 070
Wind Speed (Knots): 08
Runway Heading (Deg.): 090

Landing Weight (Lbs).....18565
Landing Distance (Ft).....2340
60% FACT. LANDING DIST (FT)3900
Landing Vref-45deg (Knots)115
Landing Vref-25deg (Knots)120

Flaps 0 Weight Limit (LB).....22000
Flaps 15 Weight Limit (LB).....22000
Flaps 25 Weight Limit (LB).....22000

TAKEOFF EFT 1523 Chavez Marchese KMLI KSUS 11.9.15

Field Elevation (Feet): 590
Bar. Press (in. Hg or HPa): 2995
Pressure Altitude (Ft): 560
Temperature (Deg. C): 16
Wind Direction (Deg.): 070
Wind Speed (Knots): 08
Runway Heading (Deg.): 090
Runway Length (Feet): 10000
% Runway Slope (+/-): 0
FLAPS: FLAPS 15
Anti-Ice: Off

None
MAX. ALLOWABLE T.O.G.W (Lbs)...18565
TAKEOFF DISTANCE (Ft).....2566
INITIAL 2ND SEG GRAD% (NET)5.7
INITIAL 2ND SEG GRAD% (GRS)6.5
V1 (Knots).....101
VR (Knots).....109
V2 (Knots).....113
VFTO (Knots).....140
VSE (Knots).....148
Takeoff Thrust (%) APR ARMED99
LANDING DISTANCE (FT)2330
LANDING FIELD LENGTH (FT)3880
Vref (45 DEG) (Knots)115
Vref (25 DEG) (Knots)120
WEIGHT & BALANCE

ZERO FUEL:

Zero Fuel Weight: 15465 lbs
18% FWD 26 %MAC 29.8% AFT

TAKEOFF:

Takeoff Weight: 18565 lbs
18.3% FWD 25.2 %MAC 29.8% AFT

LANDING:

Landing Weight: 17165 lbs
18.1% AFT 25.5 %MAC 30.6% AFT

Seat 1: 200 lbs
Seat 2: 200 lbs
Seat 3: 200 lbs
Seat 4: 200 lbs
Seat 5: 200 lbs
Seat 6: 200 lbs
Seat 7: 200 lbs
Seat J: 0 lbs

Bag. 1: 250 lbs
Bag. 2: 0 lbs

FUEL:..... 3100 lbs
FUEL BURNED: 1400 lbs
VENTRAL FUEL: NO
DORSAL FUEL: NO

LANDING

Field Elevation (Feet): 463
Bar. Press (in. Hg or HPa): 2998
Pressure Altitude (Ft): 403
Temperature (Deg. C): 16

Wind Direction (Deg.): 260
Wind Speed (Knots): 08
Runway Heading (Deg.): 256
Runway condition: Dry

Landing Weight (Lbs).....17165
Landing Distance (Ft).....2210
60% FACT. LANDING DIST (FT)3680
Landing Vref-45deg (Knots)111
Landing Vref-25deg (Knots)116

Flaps 0 Weight Limit (LB).....22000
Flaps 15 Weight Limit (LB).....22000
Flaps 25 Weight Limit (LB).....22000

TAKEOFF EFT 1524 Chavez Marchese KSUS KLUK 11.9.15

Field Elevation (Feet): 463
Bar. Press (in. Hg or HPa): 2997
Pressure Altitude (Ft): 413
Temperature (Deg. C): 15
Wind Direction (Deg.): 260
Wind Speed (Knots): 9
Runway Heading (Deg.): 256
Runway Length (Feet): 7485
% Runway Slope (+/-): 0
FLAPS: FLAPS 15
Anti-Ice: Off

None
MAX. ALLOWABLE T.O.G.W (Lbs)...23625
TAKEOFF DISTANCE (Ft)....4993
INITIAL 2ND SEG GRAD% (NET)2.1
INITIAL 2ND SEG GRAD% (GRS)2.9
V1 (Knots).....125
VR (Knots).....125
V2 (Knots).....126
VFTO (Knots).....153
VSE (Knots).....170
Takeoff Thrust (%) APR ARMED98.7
LANDING DISTANCE (FT)2720
LANDING FIELD LENGTH (FT)4530
Vref (45 DEG) (Knots)129
Vref (25 DEG) (Knots)134
WEIGHT & BALANCE

ZERO FUEL:

Zero Fuel Weight: 15465 lbs
18% FWD 26 %MAC 29.8% AFT

TAKEOFF:

Takeoff Weight: 23625 lbs
21.3% FWD 27.1 %MAC 36.3% AFT

LANDING:

Landing Weight: 21425 lbs
19% AFT 25.7 %MAC 30.7% AFT

Seat 1: 200 lbs
Seat 2: 200 lbs
Seat 3: 200 lbs
Seat 4: 200 lbs
Seat 5: 200 lbs
Seat 6: 200 lbs
Seat 7: 200 lbs
Seat J: 0 lbs

Bag. 1: 250 lbs
Bag. 2: 0 lbs

FUEL:..... 8160 lbs
FUEL BURNED: 2200 lbs
VENTRAL FUEL: NO
DORSAL FUEL: NO
LANDING

Field Elevation (Feet): 483
Bar. Press (in. Hg or HPa): 2997
Pressure Altitude (Ft): 433
Temperature (Deg. C): 15
Wind Direction (Deg.): 010
Wind Speed (Knots): 9
Runway Heading (Deg.): 025
Runway condition: Dry

Landing Weight (Lbs).....21425
Landing Distance (Ft).....2530
60% FACT. LANDING DIST (FT)4220
Landing Vref-45deg (Knots)123
Landing Vref-25deg (Knots)128

Flaps 0 Weight Limit (LB).....22000
Flaps 15 Weight Limit (LB).....22000
Flaps 25 Weight Limit (LB).....22000

TAKEOFF EFT 1525 Chavez Marchese KLUK KMGY 11.10.15

Field Elevation (Feet): 483
Bar. Press (in. Hg or HPa): 2997
Pressure Altitude (Ft): 433
Temperature (Deg. C): 15
Wind Direction (Deg.): 230
Wind Speed (Knots): 6
Runway Heading (Deg.): 205
Runway Length (Feet): 6101
% Runway Slope (+/-): 0
FLAPS: FLAPS 15
Anti-Ice: Off

None
MAX. ALLOWABLE T.O.G.W (Lbs)...21265
TAKEOFF DISTANCE (Ft).....3794
INITIAL 2ND SEG GRAD% (NET)3.4
INITIAL 2ND SEG GRAD% (GRS)4.2
V1 (Knots).....116
VR (Knots).....118
V2 (Knots).....120
VFTO (Knots).....147
VSE (Knots).....161
Takeoff Thrust (%) APR ARMED98.7
LANDING DISTANCE (FT)2560
LANDING FIELD LENGTH (FT)4270
Vref (45 DEG) (Knots)123
Vref (25 DEG) (Knots)128

WEIGHT & BALANCE

ZERO FUEL:
Zero Fuel Weight: 15465 lbs
18% FWD 26 %MAC 29.8% AFT

TAKEOFF:
Takeoff Weight: 21265 lbs
18.9% FWD 25.6 %MAC 36.3% AFT

LANDING:
Landing Weight: 20665 lbs
18.5% AFT 25.1 %MAC 30.3% AFT

Seat 1: 200 lbs
Seat 2: 200 lbs
Seat 3: 200 lbs
Seat 4: 200 lbs
Seat 5: 200 lbs
Seat 6: 200 lbs
Seat 7: 200 lbs
Seat J: 0 lbs

Bag. 1: 250 lbs
Bag. 2: 0 lbs

FUEL:..... 5800 lbs
FUEL BURNED: 600 lbs
VENTRAL FUEL: NO
DORSAL FUEL: NO
LANDING

Field Elevation (Feet): 957
Bar. Press (in. Hg or HPa): 2997
Pressure Altitude (Ft): 907
Temperature (Deg. C): 15
Wind Direction (Deg.): 320
Wind Speed (Knots): 7
Runway Heading (Deg.): 026

Runway condition: Dry

Landing Weight (Lbs).....20665
Landing Distance (Ft).....2580
60% FACT. LANDING DIST (FT)4300
Landing Vref-45deg (Knots)121
Landing Vref-25deg (Knots)126

Flaps 0 Weight Limit (LB).....21987
Flaps 15 Weight Limit (LB).....22000
Flaps 25 Weight Limit (LB).....22000

TAKEOFF EFT1526 Chavez Marchese KMGY KAKR 11.10.15

Field Elevation (Feet): 957
Bar. Press (in. Hg or HPa): 2996
Pressure Altitude (Ft): 917
Temperature (Deg. C): 14
Wind Direction (Deg.): 230
Wind Speed (Knots): 6
Runway Heading (Deg.): 206
Runway Length (Feet): 5000
% Runway Slope (+/-): -.42
FLAPS: FLAPS 15
Anti-Ice: Off

None
MAX. ALLOWABLE T.O.G.W (Lbs)...23165
TAKEOFF DISTANCE (Ft)....4866
INITIAL 2ND SEG GRAD% (NET)2.3
INITIAL 2ND SEG GRAD% (GRS)3.1
V1 (Knots).....123
VR (Knots).....124
V2 (Knots).....125
VFTO (Knots).....152
VSE (Knots).....169
Takeoff Thrust (%) APR ARMED99.1
LANDING DISTANCE (FT)2760
LANDING FIELD LENGTH (FT)4600
Vref (45 DEG) (Knots)128
Vref (25 DEG) (Knots)133
WEIGHT & BALANCE

ZERO FUEL:
Zero Fuel Weight: 15465 lbs
18% FWD 26 %MAC 29.8% AFT

TAKEOFF:
Takeoff Weight: 23165 lbs
20.8% FWD 26.9 %MAC 36.3% AFT

LANDING:
Landing Weight: 21665 lbs
19.3% AFT 25.9 %MAC 30.8% AFT

Seat 1: 200 lbs
Seat 2: 200 lbs
Seat 3: 200 lbs
Seat 4: 200 lbs
Seat 5: 200 lbs
Seat 6: 200 lbs
Seat 7: 200 lbs
Seat J: 0 lbs

Bag. 1: 250 lbs
Bag. 2: 0 lbs

FUEL:..... 7700 lbs
FUEL BURNED: 1500 lbs
VENTRAL FUEL: NO
DORSAL FUEL: NO

LANDING

Field Elevation (Feet): 1068
Bar. Press (in. Hg or HPa): 2996
Pressure Altitude (Ft): 1018
Temperature (Deg. C): 15
Wind Direction (Deg.): 240

Wind Speed (Knots): 6
Runway Heading (Deg.): 249
Runway condition: Wet

Landing Weight (Lbs).....21665
Landing Distance (Ft).....3280
60% FACT. LANDING DIST (FT)5470
Landing Vref-45deg (Knots)124
Landing Vref-25deg (Knots)129

Flaps 0 Weight Limit (LB).....21964
Flaps 15 Weight Limit (LB).....22000
Flaps 25 Weight Limit (LB).....22000