3.10.5 WEIGHT AND BALANCE

The following information pertains to all operations. All of the tables and charts follow the discussion, procedures, and directions.

3.10.5.1 INDEXED WEIGHT LOADING SYSTEM OVERVIEW

The weight and balance is checked by using the Indexed Weight Loading System. This system is also known as a Tabular Index Loading System, Compound Number System or Adjusted Weight Index System.

The essence of the Indexed Weight Loading System is that balance units (index units) are added to each element of weight on the loadsheet, such that when these indexed weights are summed, they provide:

1. An aircraft weight, rounded to the nearest 10 pounds, indicated by the digits to the left of the decimal point; and
2. A center of gravity (CG) indicated by the last three digits and decimal point.

EXAMPLE

51,272.25 is read as 51,270 pounds and 2.25 balance units.

To ensure that the aircraft is always loaded within the certificated limits, the basic CG limits have been curtailed to allow for:

- Seating allowance
- Movements of passengers, crew, and galley carts during flight
- CG movement due to fuel usage
- CG movement due to flap and gear operation

Allowances have been made for the maximum number of out-of-balance passengers, for every possible passenger load total.

3.10.5.1.1 WEIGHT AND BALANCE LIMITATIONS

Each aircraft has specific weight and balance limits, which must be observed. The following described system will ensure that all weight limitations and balance limitations are not exceeded.

The AeroData performance system provides the Maximum Flight Plan Takeoff Weight (MFPTW) that represents the most limiting of all categories, except the takeoff criteria.

The Maximum Runway Takeoff Weight (MRTW) is the limiting weight for the takeoff criteria.

All models of the CL-65 aircraft operated by AWAC use this system.

Tables and safe loading CG envelopes can be found at the end of the Weight and Balance discussion.

3.10.5.1.2 DEFINITIONS

- Adjusted Operating Weight (Index)
  A number where units of weight and moment are combined in one figure instead of using weight and moment. In an adjusted weight, the first digit to the left of the decimal and the two digits to the right of the decimal correspond to the moment values called balance units. Balance units are the same as index.
- Balance Units
  An Index number corresponding to the aircraft's CG or the amount of change of CG for individual items loaded.
- Basic Operating Weight (BOW)
  Empty Weight plus standard operating (crew and service load) items including flight crew, potable water, passenger service equipment (food, beverages, carts, magazines, pillows & blankets etc.). Same as Operational Weight Empty (OWE).
- Center of Gravity Limits
  Specific forward and aft or lateral points beyond which the CG must not be located during ground operations and flight.
- Crew and Service Load
  Weight of crew, crew baggage, catering, stowage items, service equipment, etc... that is added to the Empty Weight for purposes of obtaining the Basic Operating Weight.
- Fuel Load
  Expendable part of the load of the aircraft. It includes only usable fuel, not fuel required to fill the lines or that which remains trapped in the tank sumps.
- Gross Weight
  Basic Operating Weight of the aircraft plus the payload and fuel.
- Index (Tabular Index Loading System)
  A number where units of weight and moment are combined in one figure instead of using weight and moment. In an adjusted weight, the first digit to the left of the decimal and the two digits to the right of the decimal correspond to the moment values called balance units. Same as Adjusted Operating Weight.
- Landing Weight
  Takeoff weight of the aircraft minus the fuel burn to destination.

- Maximum Gross Weight
  Maximum weight at which an aircraft can start a takeoff run. Max Gross Weight = MRW - fuel allowance for taxi. Same as Maximum Takeoff Weight.
- Maximum Landing Weight (MLW)
  The lesser of the following:
  - Maximum structural landing weight
  - Maximum weight limited by approach climb
  - Maximum weight limited by balked landing
  - Maximum weight limited by landing distance.

  Refer to Landing Charts in Supplemental Binder.
- Maximum Payload
  The weight difference between Operational Weight Empty (OWE) and Maximum Zero Fuel Weight (MZFW).
  Maximum payload = MZFW – OWE
- Maximum Ramp Weight (MRW)
  Maximum weight at which an aircraft can move safely on the ground. It includes fuel for ground operations.
  MRW = MTOW + fuel allowance for taxi
- Maximum Takeoff Weight (MTOW)
  Maximum weight at which an aircraft can start a takeoff run. MTOW = MRW – fuel allowance for taxi. Same as Maximum Gross Weight.

  Maximum Takeoff Weight (MTOW) for a particular flight will be determined by the lesser of the structural limit, climb limit, available takeoff distance, obstacle clearance requirements or brake energy limits. Refer to the AeroData Takeoff Report for the limiting takeoff weight.
- Maximum Zero Fuel Weight (MZFW)
  Maximum allowable weight of an aircraft without fuel onboard. MZFW = maximum weight before fueling
- Minimum Flight Weight
  Minimum weight at which an aircraft is approved to fly.
- Operating Center of Gravity (Operating CG)
  The aircraft center of gravity (arm) which has been calculated at the aircraft Basic Operating Weight.
  Operating CG = Operating moment / BOW.
- Operational Items
  Personnel, equipment and supplies necessary for a specific operation.
  Operational items = personnel + equipment + supplies.

- Operational Weight Empty (OWE)
  Empty Weight plus standard operating (Crew and Service Load) items including flight crew, potable water, passenger service equipment (food, beverages, carts, magazines, pillows & blankets etc.). Same as Basic Operating Weight or Operational Weight.
  Operational Weight = Empty Weight + Operational Items
- Payload (P/L)
  Weight of the passengers, cargo, baggage and any additional load. P/L = weight of passengers + cargo + baggage + additional load
- Planned Maximum Takeoff Weight (PMTOW)
  Anticipated take off weight for a specific aircraft with specific operational and atmospheric conditions.
- Ramp Weight
  Ramp Weight equals Takeoff Weight plus Taxi Fuel Burn.
- Safe Loading Envelope
  A graph showing all approved combinations for flight of Weight and Balance units.
- Useful Load
  The weight difference between Operational Weight Empty (OWE) and ramp weight. This includes the payload and the usable fuel. Useful load = ramp weight – OWE
- Weight Index
  The term Weight Index is a combined term (also known as compound number). The first four numbers with a “0” added as the 5^{th} digit represents the weight. The 1^{st} digit to the left of the decimal point and the two to the right of the decimal point represent the index. The index portion is also known as balance units. All weight indexes represent weights rounded to the nearest 10 pounds.
- Zero Fuel Weight (ZFW)
  Basic Operating Weight (BOW) plus the payload (P/L). It can not be more than the maximum zero fuel weight (MZFW). ZFW = OWE + P/L

3.10.5.1.3 AIRPLANE ACTUAL WEIGHT AND BALANCE DATA

This data consists of:

- Equipment Checklist
- Actual Weighing Record
- Basic Weight Change Record

The Equipment Checklist indicates the equipment that is installed in the airplane in the Basic Weight condition at the date of actual weighing.

If the equipment is changed, then the Basic Weight changes also. All equipment changes to the airplane are recorded in the Basic Weight Change Record so that an accurate current record of the weight and CG is available at all times.

After the weight is obtained, an index is derived using the basic operating weight and center of gravity of the aircraft. The weight index is located in the aircraft cockpit.

3.10.5.1.4 PASSENGERS AND BAGGAGE

For operations on Air Wisconsin's scheduled route structure, average passenger and baggage weights, as outlined below, will be used to compute passenger and baggage loads.

- 193 pounds for adult passengers (includes 12 pound personal item) from May 1 through Oct 31.
- 198 pounds for adult passengers (includes 12 pound personal item) from Nov 1 through Apr 30.
- 80 pounds for children (includes 12 pound personal item), who have not reached their 13th birthday, from May 1 through Oct 31.
- 85 pounds for children (includes 12 pound personal item), who have not reached their 13th birthday, from Nov 1 through Apr 30.
- 21 pounds for infants, who have not reached their 2nd birthday.

NOTE

Children 13 years of age and older are classified as adults. Lap children (non-ticketed children under the age of two sitting on someone's lap or in a child restraint seat) are included in weight calculations. All ticketed children who have not reached their 13th birthday are counted for weight and balance purposes.

- Default is 214 pounds for each cockpit crewmember (includes one (1) 32 pound RON bag, one (1) 4 pound flight kit). When operationally necessary, a gender based selection can be made in the ACARS computer. When FEMALE PILOT is selected, 192 pounds will be used.
- Default is 225 pounds average for flight attendant (includes one (1) 32 pound RON bag, one (1) 4 pound flight attendant kit). When operationally necessary, a gender based selection can be made in the ACARS computer. When FEMALE FA is selected, 210 pounds will be used.
- Default is 178 pounds average for the ACM. When operationally necessary, a gender based selection can be made in the ACARS computer. When a FEMALE ACM is selected, 156 pounds will be used.

The default is YES for the pilot seats and FA seat to be occupied, and the male weight is associated with this default. When the forward CG is an issue, selecting the female choices will allow less ballast to be carried; and to a lesser extent, provide a small increase in payload. Crew RON bags are reflected in the BOW and are located in the overhead bins or beneath the seats of rows 12 and 13.

NOTE

Completing a paper Weight and Balance form without the use of the ACARS computer does not have gender based choices for the pilots, FA, or ACM.

NOTE

Adjusted weights listed in the manual tables will not reflect exact multiples of the passenger weights due to rounding and the incorporation of the index into the weight number; i.e., 1 PAX = 189.91 is a weight of 193 pounds with an index of 9.92.

- 36 pounds for each piece of checked baggage.
- The CRJ-200 is a medium cabin size airplane. The CRJ-200 will be a “No Carry-On” aircraft, which means that all items other than personal items must go in the cargo bin. Personal items must be able to fit in the overhead bin or under the seat. Personal items are assigned a weight of 12 pounds and are included in each passenger weight (except infants). All items larger than this are considered carry ons.
- All “plane side” carry-on baggage (not personal items) will be tagged with a carry-on bag tag and placed in a cargo compartment of the aircraft. All “plane side” carry-on bags, which are placed in a cargo compartment, will be assigned a weight of 22 pounds per piece for the purpose of weight and balance calculations.

For all charter flights, or special flights involving carriage of special groups, average passenger weights will be used if the group is not partly or entirely comprised of athletic squads, or other special groups, the members of which are larger (or smaller) than the average passenger. If the passenger group does not conform to average size and weights, use actual passenger weights. Baggage weights for charter (or special group) flights will be determined by actual weight.

Pilots are not responsible for determining actual weights of passengers, bags, or freight. The boarding agent or a charter group representative is responsible for determining and then providing weight numbers to the pilots. If required, use the Actual Passenger Adjusted weight tables to determine the numbers to be used for passengers.

3.10.5.1.5 CABIN LOAD FORM

The following is the normal form the Flight Attendant uses to gather cabin loading data and gives to the Captain.

CRJ-200 CABIN LOAD

DATE _____

FLIGHT # _____

DESTINATION _____

ACM IN JUMPSEAT (circle one) YES NO

Do NOT include in Total Pax Count

ZONE A	(ROWS 1 THRU 3) # OF ADULTS _____ # OF CHILDREN (AGE 2-12) _____ # OF LAP INFANTS (AGE 0-2)_____
ZONE B	(ROWS 4 THRU 6) # OF ADULTS _____ # OF CHILDREN (AGE 2-12) _____ # OF LAP INFANTS (AGE 0-2)_____
ZONE C	(ROWS 7 THRU 9) # OF ADULTS _____ # OF CHILDREN (AGE 2-12) _____ # OF LAP INFANTS (AGE 0-2)_____
ZONE D	(ROWS 10 THRU 13) # OF ADULTS _____ # OF CHILDREN (AGE 2-12) _____ # OF LAP INFANTS (AGE 0-2)_____
TOTALS	# OF ADULTS _____ # OF CHILDREN (AGE 2-12) _____ # OF LAP INFANTS (AGE 0-2)_____
SPECIALS	❑ UMNR ❑ POTABLE WATER ❑ ICE ❑ LAV SERVICE/CLEAN-UP WHEELCHAIR(S) _____ OTHER _____

CABIN LOAD FORM REV DATE: APR 2021

INSTRUCTIONS

ENTER TODAY'S DATE
ENTER FLIGHT NUMBER
ENTER DESTINATION CITY

ACM IN JUMPSEAT

CIRCLE (YES) IF THERE IS A JUMPSEAT RIDER
CIRCLE (NO) IF THERE IS NOT A JUMPSEAT RIDER

Do NOT include in Total Pax Count

ZONE A	(ROWS 1 THRU 3) ENTER NUMBER OF ADULTS IN ZONE A ENTER NUMBER OF CHILDREN IN ZONE A ENTER NUMBER OF LAP INFANTS IN ZONE A
ZONE B	(ROWS 4 THRU 6) ENTER NUMBER OF ADULTS IN ZONE B ENTER NUMBER OF CHILDREN IN ZONE B ENTER NUMBER OF LAP INFANTS IN ZONE B
ZONE C	(ROWS7 THRU 9) ENTER NUMBER OF ADULTS IN ZONE C ENTER NUMBER OF CHILDREN IN ZONE C ENTER NUMBER OF LAP INFANTS IN ZONE C
ZONE D	(ROWS 10 THRU 13) ENTER NUMBER OF ADULTS IN ZONE D ENTER NUMBER OF CHILDREN IN ZONE D ENTER NUMBER OF LAP INFANTS IN ZONE D
TOTALS	(TOTAL ALL ZONES) ENTER NUMBER OF ADULTS ENTER NUMBER OF CHILDREN ENTER NUMBER OF LAP INFANTS

RON CLEANING COMPLETED *(Originating Flt Only)*

CIRCLE (YES) IF CLEANING IS COMPLETED
CIRCLE (NO) IF CLEANING IS NOT COMPLETED

RON CLEANING COMPLETED (circle one)

Originating Flight Only

CABIN	GALLEY	LAV	COCKPIT
YES NO	YES NO	YES NO	YES NO

Figure 3-9: Cabin Load Form with Instructions

If the form is temporarily unavailable, any other means of communicating the information to the Captain is acceptable, provided it contains the applicable information from the form, including previous versions of this form.

3.10.5.1.6 QUICK REFERENCE CARD

A laminated card is in the aircraft as a quick reference tool to consult for passenger, cargo, and fuel numbers. These charts are located in the Weight and Balance sub-section of the NORMAL PROCEDURES section of the FCM. The reverse side of the card indicates the MIN-MAX tables for all three envelopes combined into one table.

3.10.5.2 MANUAL WEIGHT AND BALANCE SYSTEM

The Manual Weight and Balance form shown in this section is to be used as backup for manual weight and balance calculations.

3.10.5.2.1 ACARS PROCEDURES

The primary method of computing weight and balance will be accomplished by the crew using the ACARS computer.

NOTE

The ACARS computer has been setup to act as a sophisticated calculator. The passenger and cargo numbers may be entered into the ACARS, and it will calculate total weights and determine if the aircraft is in CG.

The Ramp Agents at all stations will provide the flight crew with a Cargo Load Report, prior to passenger door closing. The number of checked bags, carry-ons, heavy bags, and cargo will be communicated to the cockpit crew using this form only.

From the Cargo Load Report form and the Flight Attendant's Cabin Load form, the crew will be responsible to enter the information into the ACARS. Use the ACARS to calculate the weight and CG. Prior to sending the W & B, the Captain or First Officer will be required to sign in on the ACARS screen by entering their Employee ID number, (no leading zero's required) and the Pilot's PIN. This represents your digital signature indicating that the W & B is accurate and complete. After the W&B has been calculated, a "SEND" line-select option will appear on the ACARS screen. When selected, this will send the W&B information via ACARS to ATW headquarters; the receiving computer will then echo that same message back to your aircraft. This ensures that correct information is on file prior to your departure. Once the ACARS box receives the message, it will display "OK for Departure"; this message is **REQUIRED** prior to takeoff.

The following situations will require different procedures.

- **NO COMM message displayed by the ACARS box**: If NO COMM is displayed, the information from the ACARS must be transferred to the paper form and a copy left with the station.
- **ACARS Inop:** If the ACARS is MEL'd, then a manual W&B calculation must be accomplished with a copy of the form left at the station.
- **The ACARS fails to receive the return transmission and does not display "OK for Departure":** You must transfer the information to the paper form and leave a copy with the station prior to starting the engines.

A signature on the release will indicate all that is implied today with the addition of indicating that you have or will be responsible for the W&B calculation being correct and acceptable for the flight.

Multiple W&B calculations may be accomplished and then sent. Only the last one will be kept on file.

If the ACARS is inoperative, then the crew must fill out the crew worksheet, add up the weight indexes and then determine from the MIN-MAX tables if the CG of the aircraft is within limits. All weights used to determine the Zero Fuel Weight must be compound numbers (weights combined with indexes). These numbers will be taken from the loading tables located in this section. After completing the form and the Captain signing it, a copy of the Crew Worksheet,
Cargo Load Report and a copy of the signed release will be given to the ramp agent or gate agent, and then the door may be closed for departure.

The ramp agent is required to sign the Cargo Load Report form; the gate agent may need to sign the form if they completed any of the blanks on the form.

After completion of the flight, the crew's copy of the crew worksheet (if used), Cargo Load Report, release, weather, and AeroData report may all be discarded.

The BOW index will be placarded next to the ACARS unit. The BOW index in the ACARS unit must be verified to match the placard weight index.

The CRJ-200 has two forward limits to check. The Gross Takeoff Weight CG point must be equal to or greater than the forward limit, the ZFW CG point must be equal to or greater than the forward ZFW limit to take into account fuel burn in flight. The CG must be equal to or less then the rearmost limit.

Three envelopes are available for use. The envelopes used are; Unrestricted, Restricted (Zones B-D Full), and Full and Ferry. The Unrestricted envelope allows for unrestricted seating (this is actually the most conservative CG envelope). Restricted (Zones B-D Full) seating specifies conditions for seating the passengers. Zones B and D must be full and then additional passengers may be seated in Zone A. Lastly, the Full and the Ferry envelopes are the same and the least conservative (widest) envelopes because it is exactly known where all persons and cargo are placed.

To check the CG use the last 3 digits of the index weight and ensure the index number is between the minimum and maximum index number for the given weight and correct envelope. Weight interpolation to enter the min-max table is acceptable or rounding the weight down to the nearest 200 pound increment will yield the most conservative envelope.

For example, if the ZFW is 41951.74 and T.O. weight is 49701.49, using the unrestricted table, enter the table at 41,800 pounds and compare the index of 1.74 with 1.5 from the FORWARD LIMIT - ZFW column and 3.14 from the AFT LIMIT column. 1.74 falls between these two limits; therefore, it is within limits.

Repeat this process with the takeoff weight using the columns labeled FORWARD LIMIT - TAKEOFF and AFT LIMIT to ensure loading is within takeoff limits.

If the index is less that the FWD limit (smallest number) or greater than the AFT LIMIT column (largest number), the flight is NOT in CG.

Below is a sample Cargo Load Report (front side) provided for illustrative use only!

Form 16007

CARGO LOAD REPORT

Flight #	Date	Station	Dest.	A/C#

Agent Signature:	
Agent I.D. #:	

By my signature, I certify the aircraft has been loaded as stated and there are no known security breaches for this flight. By handing this Load Report to the Flight Crew, the ground staff is transferring security of the aircraft to the Pilot/Officer in Command (PIC/OIC).

Baggage Information (Piece Count Only)

BAGGAGE TYPE	FWD BAGGAGE PIECES		AFT BAGGAGE PIECES	
	F1	F2/RF	R1	R2
Standard Checked				
Heavy Checked				
Gate Claim/Planeside				

Cargo Information (Weight Only)

CARGO TYPE	FWD CARGO WEIGHT		AFT CARGO WEIGHT	
	F1	F2/RF	R1	R2
Freight (lb.)				
Mail (lb.)				
CTC (Counter to Counter/Small Package Shipment) (lb.)				
COMAT (lb.)				
Ballast (lb.)				
Other (lb.)				
Total Cargo Weight Only (Baggage weight not included)				

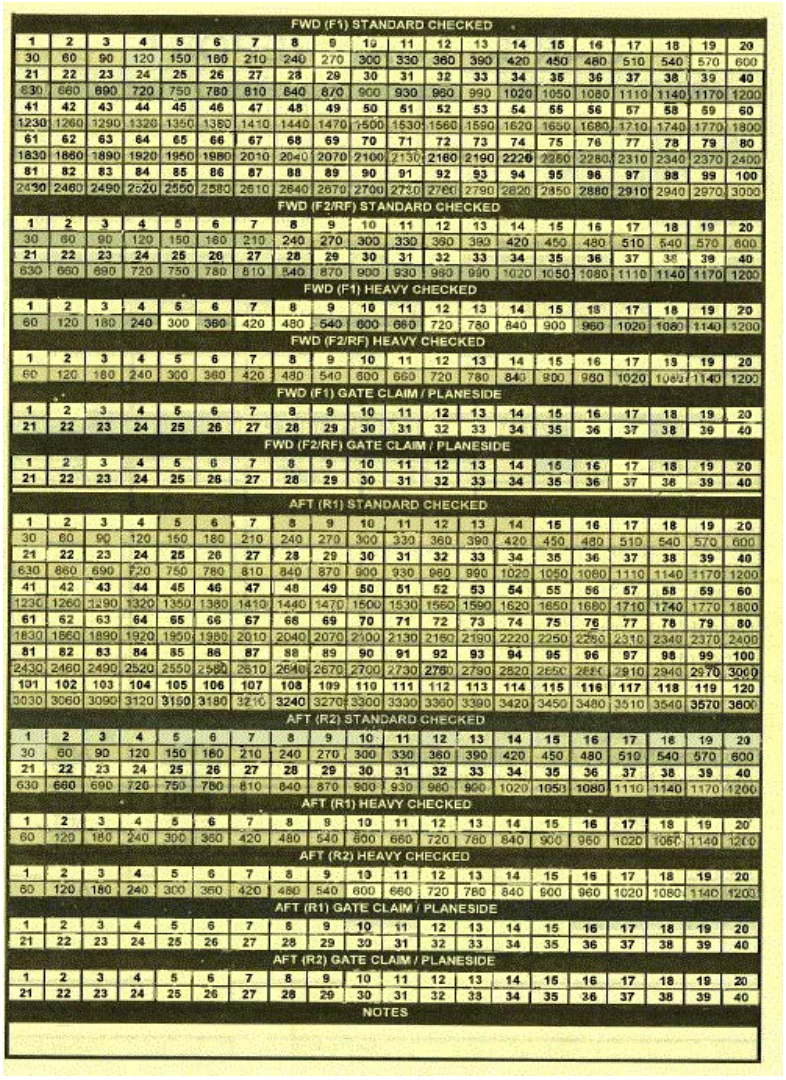
Circle As Applicable		
Motorized Mobility Aid - Spillable Battery	FWD	AFT
Motorized Mobility Aid - Non Spillable Battery	FWD	AFT
Motorized Mobility Aid - Lithium Ion Battery	FWD	AFT
DG/HM COMAT	FWD	AFT
Dry Ice	FWD	AFT
Live Animal	FWD	AFT
UN3373	FWD	AFT

Other Information

Rev. 01/12/2015

Figure 3-10: Cargo Load Report Front

Below is a sample Cargo Load Report (back side) provided for illustrative use only!



FWD (F1) STANDARD CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
630	660	690	720	750	780	810	840	870	900	930	960	990	1020	1050	1080	1110	1140	1170	1200
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1230	1260	1290	1320	1350	1380	1410	1440	1470	1500	1530	1560	1590	1620	1650	1680	1710	1740	1770	1800
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1830	1860	1890	1920	1950	1980	2010	2040	2070	2100	2130	2160	2190	2220	2250	2280	2310	2340	2370	2400
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
2430	2460	2490	2520	2550	2580	2610	2640	2670	2700	2730	2760	2790	2820	2850	2880	2910	2940	2970	3000

FWD (F2/RF) STANDARD CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
630	660	690	720	750	780	810	840	870	900	930	960	990	1020	1050	1080	1110	1140	1170	1200

FWD (F1) HEAVY CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200

FWD (F2/RF) HEAVY CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200

FWD (F1) GATE CLAIM / PLANESIDE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

FWD (F2/RF) GATE CLAIM / PLANESIDE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

AFT (R1) STANDARD CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
630	660	690	720	750	780	810	840	870	900	930	960	990	1020	1050	1080	1110	1140	1170	1200
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1230	1260	1290	1320	1350	1380	1410	1440	1470	1500	1530	1560	1590	1620	1650	1680	1710	1740	1770	1800
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1830	1860	1890	1920	1950	1980	2010	2040	2070	2100	2130	2160	2190	2220	2250	2280	2310	2340	2370	2400
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
2430	2460	2490	2520	2550	2580	2610	2640	2670	2700	2730	2760	2790	2820	2850	2880	2910	2940	2970	3000
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
3030	3060	3090	3120	3150	3180	3210	3240	3270	3300	3330	3360	3390	3420	3450	3480	3510	3540	3570	3600

AFT (R2) STANDARD CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
630	660	690	720	750	780	810	840	870	900	930	960	990	1020	1050	1080	1110	1140	1170	1200

AFT (R1) HEAVY CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200

AFT (R2) HEAVY CHECKED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200

AFT (R1) GATE CLAIM / PLANESIDE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

AFT (R2) GATE CLAIM / PLANESIDE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

NOTES

Figure 3-11: Cargo Load Report Back

3.10.5.2.2 USING MANUAL WEIGHT AND BALANCE SYSTEM

- When using manual paper procedures, the white copy is left at the UAX station. The station personnel will fax a copy to ATW Headquarters where it is kept on file for 3 months.

The generic Crew Worksheet form is used for all backup operations. The following are instructions for completing the CRJ-200 Crew Worksheet using the adjusted weight index loading system. (Refer to the sample located at the end of these steps.)

NOTE

If the booklets of blank 2-part weight and balance forms are not available at crew domiciles, make 2 copies of the blank form at the end of this discussion.

A) Enter the scheduled date of the flight, the aircraft fleet number, and the flight number.

B) Enter the departure point and the destination.

C) Circle the applicable envelope that was used to determine the final CG of the aircraft.

D) Completed the fluid brand and type and the time of the last anti-icing.

Two columns are provided: 'Planned' and 'Revised'. The 'Planned' column is used first and the 'Revised' column is only used if too many changes have occurred to make the planned column accurate and legible on the carbon copy.

E) Enter the 'Basic Operating Wt' (BOW) index for the aircraft. This will be available from the placard on the panel adjacent to the ACARS screen. If the placard is missing, contact Dispatch for the BOW.

F) The 'No Flight Attendant' box is used if it is a reposition or maintenance ferry that does not have a Flight Attendant on board or if the Flight Attendant jumpseat is inoperative and the Flight Attendant is seated in Row 1. This is a subtraction from the BOW. When the Flight Attendant is seated in the cabin, they are counted as a passenger for weight and balance purposes.

G) Enter the '(ACM)' index if the jumpseater is physically seated in the cockpit.

H) Enter the number of adults in the four zones with their corresponding weight index as well as the number of children and infants in the respective zones. Children need only be accounted for as children if the weight reduction is needed. If not needed, they may be counted as adults for simplicity.

I) Rear Cargo Bin Worksheet

(1) Enter the number of checked bags, multiply by 35 lbs, and enter the total.

(2) Enter the number of carry-on bags taken from passengers at the aircraft door and placed in the cargo bin. Multiply by 22 lbs and enter the total.

(3) If there are heavy bags, enter the number, multiply by 58 lbs, and enter the total.

(4) Enter the total weight of the cargo (excluding the above bags) placed on the aircraft.

(5) Add the four numbers together for the total weight for rear cargo bin.

(6) Round this number to the nearest 25 lb increment - round up if 13 or more and down for 12 and less. Convert this number to a weight index from the tables on the quick reference card (also in the FCM) and enter into Item J. When converting the total cargo weight to an index, interpolation of the index is allowed.

J) Enter the total weight index from item I. 6. in this row.

K) Add the Planned column to arrive at the Zero Fuel Weight (ZFW).

L) If the CG for the ZFW is out of limits, use the 'passenger redistribution' row to correct for passengers being shifted and add / subtract to the ZFW. Enter the number of the passengers moved from each zone to the other zone to get into CG.; i.e., 4 A' C.

M) Original ZFW modified with the passenger shift.

N) Enter the CG envelope limits from the MIN / MAX table. The index from the ZFW must fall between these two numbers to be in CG. To check whether the CG is within limits, separate the ZFW compound number into its components parts. The first four digits (plus a zero) represent the ZFW in pounds. The last three digits (1 to the left of the decimal and two to the right of the decimal) are the ZFW balance units.

NOTE

This same check must also be accomplished at the takeoff weight. Fuel quantity and burn significantly affects the CG of the aircraft.

O) Enter the total fuel in pounds.

P) Enter the total fuel weight with index.

Q) Add the ZFW or Modified ZFW to the fuel weight index to determine final ramp weight.

R) Enter the taxi fuel weight index in the taxi burn column. Subtract the taxi fuel weight index from the final ramp weight to determine takeoff weight index.

S) The takeoff weight is the ZFW or Modified ZFW plus the fuel weight index, minus the taxi fuel burn. This is the weight at the start of the takeoff roll. This weight must not exceed the lesser of the weight in Item U. or V.

T) Enter the CG envelope limits from the MIN / MAX chart at the takeoff weight.

U) From the AeroData report, enter the MFPTW. Do not exceed the MFPTW unless an amended takeoff report is received from Dispatch.

V) From the AeroData specific runway section, enter the MRTW.

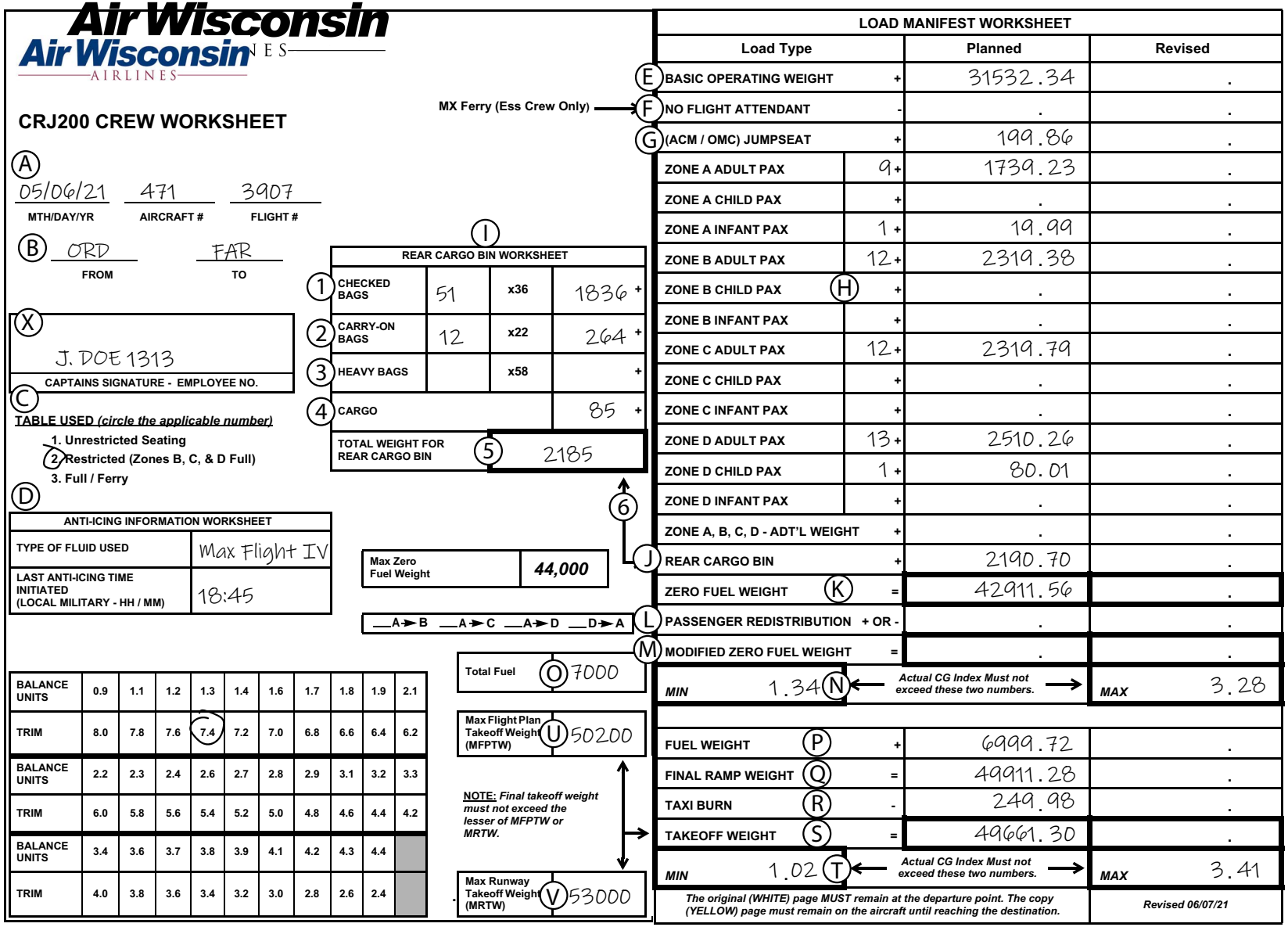
W) Circle the applicable trim setting as determined from the final takeoff weight index, round as necessary.

X) Enter the Captain’s signature - employee no., indicating that he certifies that the W&B is correct for this flight.

For those rare instances where the ACARS is operable; but there is a “NO COMM” message or an “OK for Departure” message is not received, transfer the ACARS results to the CL-65 Crew Worksheet. The following items may be omitted when filling in the worksheet:

- Item H.: Weight indices of the passengers, but do record the passenger count breakdown.
- Item I.: Weight of the bags, carry on bags and heavy bags, but do record the bag count breakdown and the cargo weight from the CLR.
- Item L.: Passenger redistribution
- Item M.: Modified Zero Fuel Weight

The original (WHITE) page of this form must remain at the departure point. The copy (YELLOW) page must remain on the aircraft until reaching the destination. The normal form will be NCR (no carbon required) type form, available in the AWA hub stations and AWA domiciles. In the event that these are not available, facsimile copies of blank forms or copies of the form from the FCM may be completed in duplicate and used.



Air Wisconsin
Air Wisconsin AIRLINES

CRJ200 CREW WORKSHEET

MX Ferry (Ess Crew Only) → F

(A) 05/06/21 (MTH/DAY/YR) | 471 (AIRCRAFT #) | 3907 (FLIGHT #)

(B) ORD (FROM) | FAR (TO)

(X) J. DOE 1313 — CAPTAINS SIGNATURE - EMPLOYEE NO.

(C) TABLE USED *(circle the applicable number)*
1. Unrestricted Seating
2. Restricted (Zones B, C, & D Full)
3. Full / Ferry

(D) ANTI-ICING INFORMATION WORKSHEET

TYPE OF FLUID USED	Max Flight IV
LAST ANTI-ICING TIME INITIATED (LOCAL MILITARY - HH / MM)	18:45

(I) REAR CARGO BIN WORKSHEET

1	CHECKED BAGS	51	x36	1836 +
2	CARRY-ON BAGS	12	x22	264 +
3	HEAVY BAGS		x58	+
4	CARGO			85 +
	TOTAL WEIGHT FOR REAR CARGO BIN (5)			2185

6 → J

Max Zero Fuel Weight **44,000**

__A→B __A→C __A→D __D→A (L)

BALANCE UNITS	0.9	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1
TRIM	8.0	7.8	7.6	7.4	7.2	7.0	6.8	6.6	6.4	6.2
BALANCE UNITS	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.1	3.2	3.3
TRIM	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.6	4.4	4.2
BALANCE UNITS	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	
TRIM	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	

Total Fuel (O) 7000

Max Flight Plan Takeoff Weight (MFPTW) (U) 50200

NOTE: *Final takeoff weight must not exceed the lesser of MFPTW or MRTW.*

Max Runway Takeoff Weight (MRTW) (V) 53000

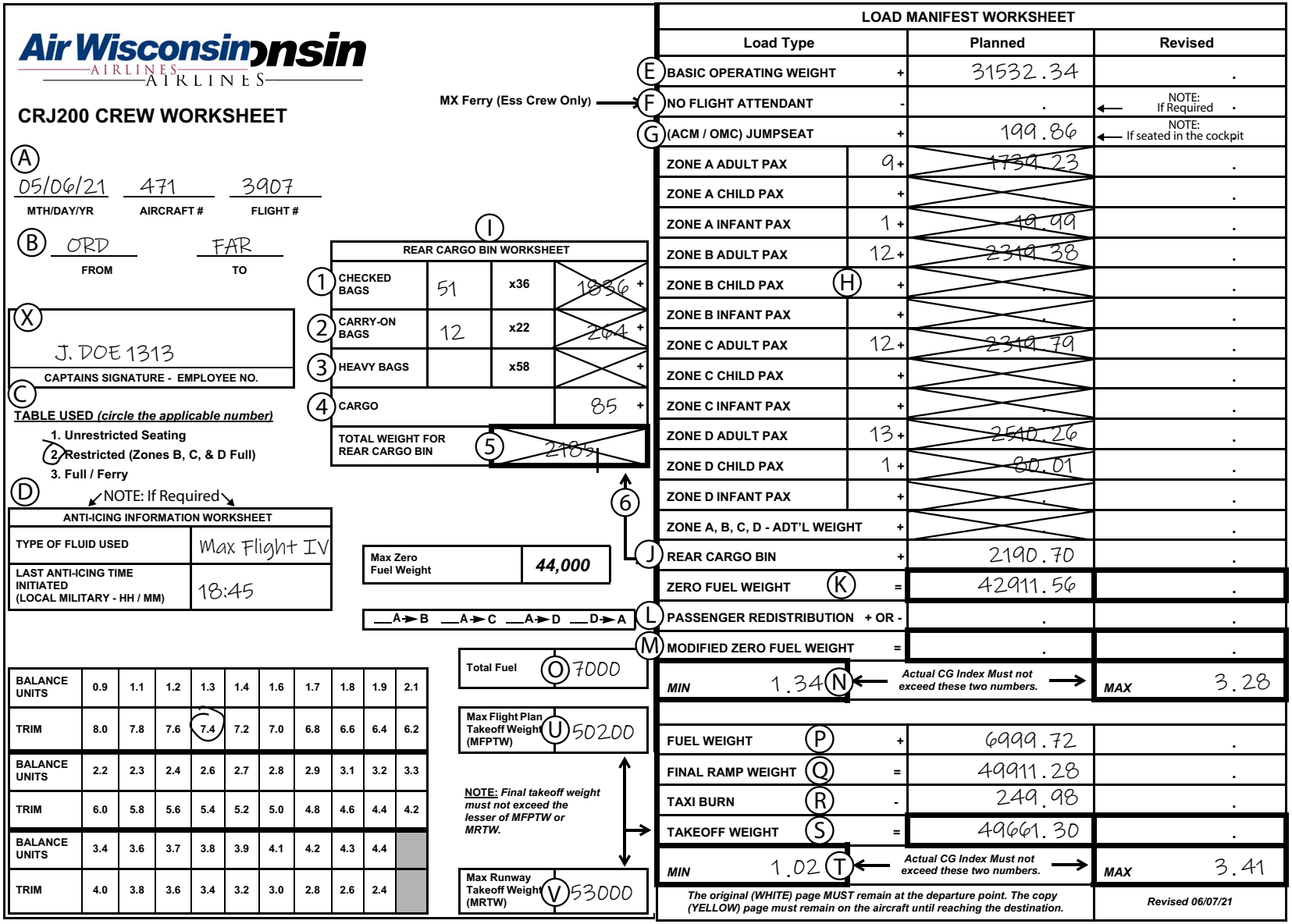
LOAD MANIFEST WORKSHEET

Load Type		Planned	Revised
(E) BASIC OPERATING WEIGHT	+	31532.34	.
(F) NO FLIGHT ATTENDANT	-	.	.
(G) (ACM / OMC) JUMPSEAT	+	199.86	.
ZONE A ADULT PAX	9 +	1739.23	.
ZONE A CHILD PAX	+	.	.
ZONE A INFANT PAX	1 +	19.99	.
ZONE B ADULT PAX	12 +	2319.38	.
ZONE B CHILD PAX (H)	+	.	.
ZONE B INFANT PAX	+	.	.
ZONE C ADULT PAX	12 +	2319.79	.
ZONE C CHILD PAX	+	.	.
ZONE C INFANT PAX	+	.	.
ZONE D ADULT PAX	13 +	2510.26	.
ZONE D CHILD PAX	1 +	80.01	.
ZONE D INFANT PAX	+	.	.
ZONE A, B, C, D - ADT'L WEIGHT	+	.	.
(J) REAR CARGO BIN	+	2190.70	.
ZERO FUEL WEIGHT (K)	=	42911.56	.
(L) PASSENGER REDISTRIBUTION	+ OR -	.	.
(M) MODIFIED ZERO FUEL WEIGHT	=	.	.
MIN 1.34 (N)	Actual CG Index Must not exceed these two numbers. →		MAX 3.28
FUEL WEIGHT (P)	+	6999.72	.
FINAL RAMP WEIGHT (Q)	=	49911.28	.
TAXI BURN (R)	-	249.98	.
TAKEOFF WEIGHT (S)	=	49661.30	.
MIN 1.02 (T)	Actual CG Index Must not exceed these two numbers. →		MAX 3.41

The original (WHITE) page MUST remain at the departure point. The copy (YELLOW) page must remain on the aircraft until reaching the destination.

Revised 06/07/21

Figure 3-12: Manual Weight and Balance CL-65 Crew Worksheet Sample. It may not reflect current weights.



Air Wisconsin AIRLINES

CRJ200 CREW WORKSHEET

MX Ferry (Ess Crew Only) → F

(A) 05/06/21 (MTH/DAY/YR) | 471 (AIRCRAFT #) | 3907 (FLIGHT #)

(B) ORD (FROM) | FAR (TO)

(X) J. DOE 1313 — CAPTAINS SIGNATURE - EMPLOYEE NO.

(C) TABLE USED *(circle the applicable number)*
1. Unrestricted Seating
2. Restricted (Zones B, C, & D Full)
3. Full / Ferry

(D) NOTE: If Required

ANTI-ICING INFORMATION WORKSHEET	
TYPE OF FLUID USED	Max Flight IV
LAST ANTI-ICING TIME INITIATED (LOCAL MILITARY - HH / MM)	18:45

(I) REAR CARGO BIN WORKSHEET

1	CHECKED BAGS	51	x36	~~1836~~ +
2	CARRY-ON BAGS	12	x22	~~264~~ +
3	HEAVY BAGS		x58	+
4	CARGO			85 +
	TOTAL WEIGHT FOR REAR CARGO BIN			5 ~~2185~~

6

Max Zero Fuel Weight: ***44,000***

__A→B __A→C __A→D __D→A (L)

BALANCE UNITS	0.9	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1
TRIM	8.0	7.8	7.6	7.4	7.2	7.0	6.8	6.6	6.4	6.2
BALANCE UNITS	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.1	3.2	3.3
TRIM	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.6	4.4	4.2
BALANCE UNITS	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	
TRIM	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	

Total Fuel (O) 7000

Max Flight Plan Takeoff Weight (MFPTW) (U) 50200

NOTE: *Final takeoff weight must not exceed the lesser of MFPTW or MRTW.*

Max Runway Takeoff Weight (MRTW) (V) 53000

LOAD MANIFEST WORKSHEET

Load Type			Planned	Revised
(E) BASIC OPERATING WEIGHT		+	31532.34	.
(F) NO FLIGHT ATTENDANT		-	.	NOTE: If Required .
(G) (ACM / OMC) JUMPSEAT		+	199.86	NOTE: If seated in the cockpit
ZONE A ADULT PAX	9	+	~~1739.23~~	.
ZONE A CHILD PAX		+	~~~~	.
ZONE A INFANT PAX	1	+	~~49.99~~	.
ZONE B ADULT PAX	12	+	~~2319.38~~	.
ZONE B CHILD PAX (H)		+	~~~~	.
ZONE B INFANT PAX		+	~~~~	.
ZONE C ADULT PAX	12	+	~~2319.79~~	.
ZONE C CHILD PAX		+	~~~~	.
ZONE C INFANT PAX		+	~~~~	.
ZONE D ADULT PAX	13	+	~~2540.26~~	.
ZONE D CHILD PAX	1	+	~~80.01~~	.
ZONE D INFANT PAX		+	~~~~	.
ZONE A, B, C, D - ADT'L WEIGHT		+	~~~~	.
(J) REAR CARGO BIN		+	2190.70	.
ZERO FUEL WEIGHT (K)		=	42911.56	.
(L) PASSENGER REDISTRIBUTION		+ OR -	.	.
(M) MODIFIED ZERO FUEL WEIGHT		=	.	.
MIN 1.34 (N) ← *Actual CG Index Must not exceed these two numbers.* →				*MAX* 3.28
FUEL WEIGHT (P)		+	6999.72	.
FINAL RAMP WEIGHT (Q)		=	49911.28	.
TAXI BURN (R)		-	249.98	.
TAKEOFF WEIGHT (S)		=	49661.30	.
MIN 1.02 (T) ← *Actual CG Index Must not exceed these two numbers.* →				*MAX* 3.41

The original (WHITE) page MUST remain at the departure point. The copy (YELLOW) page must remain on the aircraft until reaching the destination.

Revised 06/07/21

Figure 3-13: Manual Weight and Balance CL-65 Crew Worksheet Sample using ACARS (may not reflect current weights)

3.10.6 MANUAL WEIGHT & BALANCE CREW WORKSHEET

If necessary make two (2) copies of the worksheet on next page.

Air Wisconsin AIRLINES

CRJ200 CREW WORKSHEET

MX Ferry (Ess Crew Only) →

MTH/DAY/YR _____ AIRCRAFT # _____ FLIGHT # _____

FROM _____ TO _____

CAPTAINS SIGNATURE - EMPLOYEE NO.

TABLE USED *(circle the applicable number)*

1. Unrestricted Seating
2. Restricted (Zones B, C, & D Full)
3. Full / Ferry

REAR CARGO BIN WORKSHEET			
CHECKED BAGS		x36	+
CARRY-ON BAGS		x22	+
HEAVY BAGS		x58	+
CARGO			+
TOTAL WEIGHT FOR REAR CARGO BIN			

ANTI-ICING INFORMATION WORKSHEET	
TYPE OF FLUID USED	
LAST ANTI-ICING TIME INITIATED (LOCAL MILITARY - HH / MM)	

Max Zero Fuel Weight	*44,000*

__A➔B __A➔C __A➔D __D➔A

BALANCE UNITS	0.9	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1
TRIM	8.0	7.8	7.6	7.4	7.2	7.0	6.8	6.6	6.4	6.2
BALANCE UNITS	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.1	3.2	3.3
TRIM	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.6	4.4	4.2
BALANCE UNITS	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	
TRIM	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	

Total Fuel	
Max Flight Plan Takeoff Weight (MFPTW)	

NOTE: *Final takeoff weight must not exceed the lesser of MFPTW or MRTW.*

Max Runway Takeoff Weight (MRTW)	

LOAD MANIFEST WORKSHEET			
Load Type		Planned	Revised
BASIC OPERATING WEIGHT	+	.	.
NO FLIGHT ATTENDANT	-	.	.
(ACM / OMC) JUMPSEAT	+	.	.
ZONE A ADULT PAX	+	.	.
ZONE A CHILD PAX	+	.	.
ZONE A INFANT PAX	+	.	.
ZONE B ADULT PAX	+	.	.
ZONE B CHILD PAX	+	.	.
ZONE B INFANT PAX	+	.	.
ZONE C ADULT PAX	+	.	.
ZONE C CHILD PAX	+	.	.
ZONE C INFANT PAX	+	.	.
ZONE D ADULT PAX	+	.	.
ZONE D CHILD PAX	+	.	.
ZONE D INFANT PAX	+	.	.
ZONE A, B, C, D - ADT'L WEIGHT	+	.	.
REAR CARGO BIN	+	.	.
ZERO FUEL WEIGHT	=	.	.
PASSENGER REDISTRIBUTION	+ OR -	.	.
MODIFIED ZERO FUEL WEIGHT	=	.	.
MIN .	← *Actual CG Index Must not exceed these two numbers.* →		*MAX* .
FUEL WEIGHT	+	.	.
FINAL RAMP WEIGHT	=	.	.
TAXI BURN	-	.	.
TAKEOFF WEIGHT	=	.	.
MIN .	← *Actual CG Index Must not exceed these two numbers.* →		*MAX* .

The original (WHITE) page MUST remain at the departure point. The copy (YELLOW) page must remain on the aircraft until reaching the destination.

Revised 06/07/21

Figure 3-14: Manual Weight and Balance Crew Worksheet Sample

3.10.7 ADJUSTED WEIGHT TABLES

ADJUSTED WEIGHT TABLES - 50 Seat Configuration

SUMMER: May 1 - Oct 31

Standard Passenger Weight: 193 lb

ZONE A		ZONE B		ZONE C		ZONE D	
# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight
1	189.91	1	189.95	1	189.98	1	190.02
2	389.83	2	389.90	2	389.96	2	390.04
3	579.74	3	579.84	3	579.95	3	580.06
4	769.66	4	769.79	4	769.93	4	770.08
5	969.57	5	969.74	5	969.91	5	970.10
6	1159.48	6	1159.69	6	1159.89	6	1160.12
7	1349.40	7	1349.64	7	1349.88	7	1350.14
8	1539.31	8	1539.58	8	1539.86	8	1540.16
9	1739.23	9	1739.53	9	1739.84	9	1740.18
10	1929.14	10	1929.48	10	1929.82	10	1930.20
11	2119.05	11	2119.43	11	2119.81	11	2120.22
12	2318.97	12	2319.38	12	2319.79	12	2320.24
						13	2510.26
						14	2700.28

WINTER: Nov 1 - Apr 30

Standard Passenger Weight: 198 lb

ZONE A		ZONE B		ZONE C		ZONE D	
# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight
1	199.91	1	199.95	1	199.98	1	200.02
2	399.82	2	399.89	2	399.96	2	400.04
3	589.74	3	589.84	3	589.95	3	590.06
4	789.65	4	789.79	4	789.93	4	790.08
5	989.56	5	989.73	5	989.91	5	990.10
6	1189.47	6	1189.68	6	1189.89	6	1190.12
7	1389.38	7	1389.63	7	1389.87	7	1390.14
8	1579.29	8	1579.57	8	1579.86	8	1580.16
9	1779.21	9	1779.52	9	1779.84	9	1780.18
10	1979.12	10	1979.47	10	1979.82	10	1980.20
11	2179.03	11	2179.41	11	2179.80	11	2180.22
12	2378.94	12	2379.36	12	2379.78	12	2380.24
						13	2570.26
						14	2770.29

SUMMER: May 1 - Oct 31

Child Passenger Weight: 80 lb

ZONE A		ZONE B		ZONE C		ZONE D	
# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight
1	79.96	1	79.98	1	79.99	1	80.01
2	159.93	2	159.96	2	159.99	2	160.02
3	239.89	3	239.94	3	239.98	3	240.02
4	319.86	4	319.91	4	319.97	4	320.03
5	399.82	5	399.89	5	399.96	5	400.04
6	479.79	6	479.87	6	479.96	6	480.05
7	559.75	7	559.85	7	559.95	7	560.06
8	639.72	8	639.83	8	639.94	8	640.07
9	719.68	9	719.81	9	719.93	9	720.07
10	799.64	10	799.78	10	799.93	10	800.08
11	879.61	11	879.76	11	879.92	11	880.09
12	959.57	12	959.74	12	959.91	12	960.10
						13	1040.11
						14	1120.12

WINTER: Nov 1 - Apr 30

Child Passenger Weight: 85 lb

ZONE A		ZONE B		ZONE C		ZONE D	
# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight
1	89.96	1	89.98	1	89.99	1	90.01
2	169.92	2	169.95	2	169.98	2	170.02
3	259.89	3	259.93	3	259.98	3	260.03
4	339.85	4	339.91	4	339.97	4	340.03
5	429.81	5	429.89	5	429.96	5	430.04
6	509.77	6	509.86	6	509.95	6	510.05
7	599.74	7	599.84	7	599.95	7	600.06
8	679.70	8	679.82	8	679.94	8	680.07
9	769.66	9	769.79	9	769.93	9	770.08
10	849.62	10	849.77	10	849.92	10	850.09
11	939.58	11	939.75	11	939.91	11	940.10
12	1019.55	12	1019.73	12	1019.91	12	1020.10
						13	1110.11
						14	1190.12

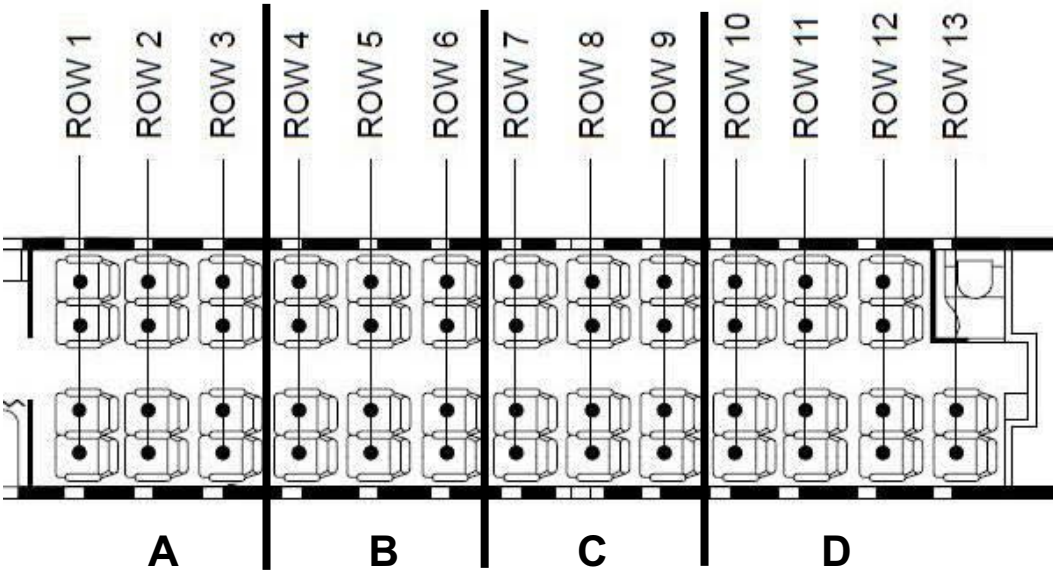
SUMMER / WINTER

Infant Passenger Weight: 21 lb

ZONE A		ZONE B		ZONE C		ZONE D	
# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight
1	19.99	1	19.99	1	20.00	1	20.00
2	39.98	2	39.99	2	40.00	2	40.00
3	59.97	3	59.98	3	59.99	3	60.01
4	79.96	4	79.98	4	79.99	4	80.01
5	109.95	5	109.97	5	109.99	5	110.01
6	129.94	6	129.97	6	129.99	6	130.01
7	149.93	7	149.96	7	149.99	7	150.02
8	169.93	8	169.95	8	169.98	8	170.02
9	189.92	9	189.95	9	189.98	9	190.02
10	209.91	10	209.94	10	209.98	10	210.02
11	229.90	11	229.94	11	229.98	11	230.02
12	249.89	12	249.93	12	249.98	12	250.03
						13	270.03
						14	290.03

Table 3-1: CRJ-200 Adjusted Weight - 50 Seat Configuration

50 SEAT CONFIGURATION



ACM WEIGHT INDEX
199.86

F/A removed weight INDEX
-209.89

# of PASSENGERS LOAD REDISTRIBUTION							
A to B		A to C		A to D		D to A	
# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight	# Pax	Adj. Weight
1	0.03	1	0.07	1	0.11	1	-0.11
2	0.07	2	0.14	2	0.21	2	-0.21
3	0.10	3	0.21	3	0.32	3	-0.32
4	0.14	4	0.27	4	0.42	4	-0.42
5	0.17	5	0.34	5	0.53	5	-0.53
6	0.20	6	0.41	6	0.63	6	-0.63
7	0.24	7	0.48	7	0.74	7	-0.74
8	0.27	8	0.55	8	0.85	8	-0.85
9	0.31	9	0.62	9	0.95	9	-0.95
10	0.34	10	0.68	10	1.06	10	-1.06
11	0.37	11	0.75	11	1.16	11	-1.16
12	0.41	12	0.82	12	1.27	12	-1.27

Table 3-2: # of Passenger Load Redistribution

ACTUAL PASSENGER ADJUSTED WEIGHTS							
ZONE A		ZONE B		ZONE C		ZONE D	
Total Actual Weight	Adjusted Weight	Total Actual Weight	Adjusted Weight	Total Actual Weight	Adjusted Weight	Total Actual Weight	Adjusted Weight
100	99.96	100	99.97	100	99.99	100	100.01
200	199.91	200	199.95	200	199.98	200	200.02
300	299.87	300	299.92	300	299.97	300	300.03
400	399.82	400	399.89	400	399.96	400	400.04
500	499.78	500	499.87	500	499.95	500	500.05
600	599.73	600	599.84	600	599.95	600	600.06
700	699.69	700	699.81	700	699.94	700	700.07
800	799.64	800	799.78	800	799.93	800	800.08
900	899.60	900	899.76	900	899.92	900	900.09
1000	999.55	1000	999.73	1000	999.91	1000	1000.10
1100	1099.51	1100	1099.70	1100	1099.90	1100	1100.11
1200	1199.47	1200	1199.68	1200	1199.89	1200	1200.12
1300	1299.42	1300	1299.65	1300	1299.88	1300	1300.13
1400	1399.38	1400	1399.62	1400	1399.87	1400	1400.14
1500	1499.33	1500	1499.60	1500	1499.86	1500	1500.15
1600	1599.29	1600	1599.57	1600	1599.85	1600	1600.16
1700	1699.24	1700	1699.54	1700	1699.85	1700	1700.17
1800	1799.20	1800	1799.52	1800	1799.84	1800	1800.19
1900	1899.15	1900	1899.49	1900	1899.83	1900	1900.20
2000	1999.11	2000	1999.46	2000	1999.82	2000	2000.21
2100	2099.06	2100	2099.44	2100	2099.81	2100	2100.22
2200	2199.02	2200	2199.41	2200	2199.80	2200	2200.23
2300	2298.98	2300	2299.38	2300	2299.79	2300	2300.24
2400	2398.93	2400	2399.35	2400	2399.78	2400	2400.25
2500	2498.89	2500	2499.33	2500	2499.77	2500	2500.26
2600	2598.84	2600	2599.30	2600	2599.76	2600	2600.27
2700	2698.80	2700	2699.27	2700	2699.75	2700	2700.28
2800	2798.75	2800	2799.25	2800	2799.75	2800	2800.29
2900	2898.71	2900	2899.22	2900	2899.74	2900	2900.30
3000	2998.66	3000	2999.19	3000	2999.73	3000	3000.31
3100	3098.62	3100	3099.17	3100	3099.72	3100	3100.32
3200	3198.58	3200	3199.14	3200	3199.71	3200	3200.33
3300	3298.53	3300	3299.11	3300	3299.70	3300	3300.34
3400	3398.49	3400	3399.09	3400	3399.69	3400	3400.35
3500	3498.44	3500	3499.06	3500	3499.68	3500	3500.36
3600	3598.40	3600	3599.03	3600	3599.67	3600	3600.37
3700	3698.35	3700	3699.01	3700	3699.66	3700	3700.38
3800	3798.31	3800	3798.98	3800	3799.65	3800	3800.39
3900	3898.26	3900	3898.95	3900	3899.64	3900	3900.40
4000	3998.22	4000	3998.92	4000	3999.64	4000	4000.41
						4100	4100.42
						4200	4200.43
						4300	4300.44
						4400	4400.45
						4500	4500.46
						4600	4600.47

Table 3-3: Actual Passenger Adjusted Weights

ACTUAL PASSENGER LOAD REDISTRIBUTION							
A to D		A to C		A to B		D to A	
Total Actual Weight	Adjusted Weight	Total Actual Weight	Adjusted Weight	Total Actual Weight	Adjusted Weight	Total Actual Weight	Adjusted Weight
100	0.05	100	0.04	100	0.02	100	-0.05
200	0.11	200	0.07	200	0.04	200	-0.11
300	0.16	300	0.11	300	0.05	300	-0.16
400	0.22	400	0.14	400	0.07	400	-0.22
500	0.27	500	0.18	500	0.09	500	-0.27
600	0.33	600	0.21	600	0.11	600	-0.33
700	0.38	700	0.25	700	0.12	700	-0.38
800	0.44	800	0.28	800	0.14	800	-0.44
900	0.49	900	0.32	900	0.16	900	-0.49
1000	0.55	1000	0.35	1000	0.18	1000	-0.55
1100	0.60	1100	0.39	1100	0.19	1100	-0.60
1200	0.66	1200	0.43	1200	0.21	1200	-0.66
1300	0.71	1300	0.46	1300	0.23	1300	-0.71
1400	0.77	1400	0.50	1400	0.25	1400	-0.77
1500	0.82	1500	0.53	1500	0.26	1500	-0.82
1600	0.88	1600	0.57	1600	0.28	1600	-0.88
1700	0.93	1700	0.60	1700	0.30	1700	-0.93
1800	0.99	1800	0.64	1800	0.32	1800	-0.99
1900	1.04	1900	0.67	1900	0.34	1900	-1.04
2000	1.10	2000	0.71	2000	0.35	2000	-1.10
2100	1.15	2100	0.74	2100	0.37	2100	-1.15
2200	1.21	2200	0.78	2200	0.39	2200	-1.21
2300	1.26	2300	0.81	2300	0.41	2300	-1.26
2400	1.32	2400	0.85	2400	0.42	2400	-1.32
2500	1.37	2500	0.89	2500	0.44	2500	-1.37
2600	1.43	2600	0.92	2600	0.46	2600	-1.43
2700	1.48	2700	0.96	2700	0.48	2700	-1.48
2800	1.53	2800	0.99	2800	0.49	2800	-1.53
2900	1.59	2900	1.03	2900	0.51	2900	-1.59
3000	1.64	3000	1.06	3000	0.53	3000	-1.64
3100	1.70	3100	1.10	3100	0.55	3100	-1.70
3200	1.75	3200	1.13	3200	0.56	3200	-1.75
3300	1.81	3300	1.17	3300	0.58	3300	-1.81
3400	1.86	3400	1.20	3400	0.60	3400	-1.86
3500	1.92	3500	1.24	3500	0.62	3500	-1.92
3600	1.97	3600	1.28	3600	0.64	3600	-1.97
3700	2.03	3700	1.31	3700	0.65	3700	-2.03
3800	2.08	3800	1.35	3800	0.67	3800	-2.08
3900	2.14	3900	1.38	3900	0.69	3900	-2.14
4000	2.19	4000	1.42	4000	0.71	4000	-2.19

Table 3-4: Actual Passenger Load Redistribution

FUEL ADJUSTED FUEL WEIGHTS							
Weight	Adjusted Weight	Weight	Adjusted Weight	Weight	Adjusted Weight	Weight	Adjusted Weight
100	99.99	3400	3399.79	7100	7099.72	10700	10699.62
200	199.98	3500	3499.79	7200	7199.72	10800	10799.61
250	249.98	3600	3599.78	7300	7299.71	10900	10899.60
300	299.97	3700	3699.78	7400	7399.72	11000	10999.59
350	349.97	3800	3799.78	7500	7499.72	11100	11099.58
400	399.97	3900	3899.77	7600	7599.72	11200	11199.57
450	449.97	4000	3999.77	7700	7699.72	11300	11299.56
500	499.96	4100	4099.77	7800	7799.73	11400	11399.55
550	549.96	4200	4199.76	7900	7899.73	11500	11499.54
600	599.95	4300	4299.76	8000	7999.73	11600	11599.53
700	699.94	4400	4399.76	8100	8099.73	11700	11699.51
800	799.94	4500	4499.75	8200	8199.73	11800	11799.50
900	899.93	4600	4599.75	8300	8299.73	11900	11899.49
1000	999.92	4700	4699.75	8400	8399.73	12000	11999.48
1100	1099.91	4800	4799.75	8500	8499.73	12100	12099.47
1200	1199.91	4900	4899.74	8600	8599.74	12200	12199.46
1300	1299.90	5000	4999.74	8700	8699.74	12300	12299.45
1400	1399.90	5100	5099.74	8800	8799.74	12400	12399.44
1500	1499.89	5200	5199.74	8900	8899.75	12500	12499.43
1600	1599.88	5300	5299.74	9000	8999.75	12600	12599.42
1700	1699.88	5400	5399.74	9100	9099.75	12700	12699.41
1800	1799.87	5500	5499.73	9200	9199.76	12800	12799.39
1900	1899.86	5600	5599.73	9300	9299.76	12900	12899.38
2000	1999.86	5700	5699.73	9380	9379.77	13000	13099.37
2100	2099.85	5800	5799.73	9400	9399.77	13100	13099.36
2200	2199.85	5900	5899.73	9500	9499.75	13200	13199.35
2300	2299.84	6000	5999.73	9600	9599.74	13300	13299.34
2400	2399.84	6100	6099.73	9700	9699.73	13400	13399.32
2500	2499.83	6200	6199.73	9800	9799.72	13500	13499.31
2600	2599.83	6300	6299.73	9900	9899.71	13600	13599.30
2700	2699.82	6400	6399.72	10000	9999.70	13700	13699.29
2800	2799.82	6500	6499.72	10100	10099.68	13800	13799.28
2900	2899.81	6600	6599.72	10200	10199.67	13900	13899.26
3000	2999.81	6700	6699.72	10300	10299.66	14000	13999.25
3100	3099.80	6800	6799.72	10400	10399.65	14100	14099.23
3200	3199.80	6900	6899.72	10500	10499.64	14200	14199.22
3300	3299.79	7000	6999.72	10600	10599.63	14300	14299.20

Table 3-5: Fuel Adjusted Weights

CARGO ADJUSTED WEIGHTS									
Weight	Adjusted Weight	Weight	Adjusted Weight	Weight	Adjusted Weight	Weight	Adjusted Weight	Weight	Adjusted Weight
25	30.01	725	730.23	1425	1430.46	2125	2130.68	2825	2830.91
50	50.02	750	750.24	1450	1450.47	2150	2150.69	2850	2850.91
75	80.02	775	780.25	1475	1480.47	2175	2180.70	2875	2880.92
100	100.03	800	800.26	1500	1500.48	2200	2200.71	2900	2900.93
125	130.04	825	830.26	1525	1530.49	2225	2230.71	2925	2930.94
150	150.05	850	850.27	1550	1550.50	2250	2250.72	2950	2950.95
175	180.06	875	880.28	1575	1580.51	2275	2280.73	2975	2980.95
200	200.06	900	900.29	1600	1600.51	2300	2300.74	3000	3000.96
225	230.07	925	930.30	1625	1630.52	2325	2330.75	3025	3030.97
250	250.08	950	950.30	1650	1650.53	2350	2350.75	3050	3050.98
275	280.09	975	980.31	1675	1680.54	2375	2380.76	3075	3080.99
300	300.10	1000	1000.32	1700	1700.55	2400	2400.77	3100	3101.00
325	330.10	1025	1030.33	1725	1730.55	2425	2430.78	3125	3131.00
350	350.11	1050	1050.34	1750	1750.56	2450	2450.79	3150	3151.01
375	380.12	1075	1080.35	1775	1780.57	2475	2480.79	3175	3181.02
400	400.13	1100	1100.35	1800	1800.58	2500	2500.80	3200	3201.03
425	430.14	1125	1130.36	1825	1830.59	2525	2530.81	3225	3231.04
450	450.14	1150	1150.37	1850	1850.59	2550	2550.82	3250	3251.04
475	480.15	1175	1180.38	1875	1880.60	2575	2580.83	3275	3281.05
500	500.16	1200	1200.39	1900	1900.61	2600	2600.83	3300	3301.06
525	530.17	1225	1230.39	1925	1930.62	2625	2630.84	3325	3331.07
550	550.18	1250	1250.40	1950	1950.63	2650	2650.85	3350	3351.08
575	580.18	1275	1280.41	1975	1980.63	2675	2680.86	3375	3381.08
600	600.19	1300	1300.42	2000	2000.64	2700	2700.87	3400	3401.09
625	625.20	1325	1330.43	2025	2030.65	2725	2730.87	~~3425~~	~~3431.10~~
650	650.21	1350	1350.43	2050	2050.66	2750	2750.88	~~3450~~	~~3451.11~~
675	680.22	1375	1380.44	2075	2080.67	2775	2780.89	~~3475~~	~~3481.12~~
700	700.22	1400	1400.45	2100	2100.67	2800	2800.90	~~3500~~	~~3501.12~~

Table 3-6: Cargo Adjusted Weights

BALANCE UNITS	0.9	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1
TRIM	8.0	7.8	7.6	7.4	7.2	7.0	6.8	6.6	6.4	6.2
BALANCE UNITS	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.1	3.2	3.3
TRIM	6.0	5.8	5.6	5.4	5.2	5.0	4.8	4.6	4.4	4.2
BALANCE UNITS	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	
TRIM	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	

Table 3-7: Stabilizer Trim Units Table

UNRESTRICED SEATING											
	Forward Limit				Forward Limit				Forward Limit		
Weight	ZFW	TAKEOFF	Aft Lmt	Weight	ZFW	TAKEOFF	Aft Lmt	Weight	ZFW	TAKEOFF	Aft Lmt
30,000	1.93	1.82	2.77	41,000	1.49	1.38	3.14	51,854	-	1.05	3.35
30,200	1.93	1.82	2.77	41,200	1.48	1.37	3.15	52,000	-	1.04	3.24
30,400	1.92	1.81	2.78	41,400	1.48	1.37	3.15	52,200	-	1.04	3.08
30,600	1.92	1.81	2.78	41,600	1.47	1.36	3.16	52,400	-	1.03	2.93
30,800	1.91	1.80	2.78	41,800	1.47	1.36	3.16	52,600	-	1.02	2.78
31,000	1.91	1.80	2.78	42,000	1.46	1.35	3.16	52,800	-	1.02	2.62
31,200	1.90	1.79	2.79	42,200	1.45	1.34	3.17	53,000	-	1.01	2.47
31,400	1.90	1.79	2.79	42,400	1.45	1.34	3.17	53,200	-	1.01	2.31
31,600	1.89	1.78	2.79	42,600	1.44	1.33	3.17	53,250	-	1.01	2.27
31,800	1.89	1.78	2.79	42,800	1.44	1.33	3.18				
32,000	1.88	1.77	2.80	43,000	1.43	1.32	3.18				
32,200	1.88	1.77	2.80	43,200	1.42	1.31	3.19				
32,400	1.87	1.76	2.80	43.400	1.42	1.31	3.19				
32,600	1.87	1.76	2.80	43,600	1.41	1.30	3.19				
32,800	1.86	1.75	2.81	43,800	1.41	1.30	3.20				
33,000	1.86	1.75	2.81	44,000	1.40	1.29	3.20				
33,200	1.85	1.74	2.81	44,200	-	1.28	3.20				
33,400	1.85	1.74	2.81	44,400	-	1.28	3.21				
33,600	1.84	1.73	2.82	44,600	-	1.27	3.21				
33,800	1.84	1.73	2.82	44,800	-	1.27	3.22				
34,000	1.83	1.72	2.82	45,000	-	1.26	3.22				
34,200	1.81	1.70	2.84	45,200	-	1.25	3.22				
34,400	1.79	1.68	2.87	45,400	-	1.25	3.23				
34,600	1.77	1.66	2.89	45,600	-	1.24	3.23				
34,800	1.75	1.64	2.91	45,800	-	1.24	3.24				
35,000	1.74	1.63	2.94	46,000	-	1.23	3.24				
35,200	1.72	1.61	2.96	46,200	-	1.22	3.24				
35,400	1.70	1.59	2.98	46,400	-	1.22	3.25				
35,600	1.68	1.57	3.00	46,600	-	1.21	3.25				
35,800	1.66	1.55	3.03	46,800	-	1.21	3.26				
36,000	1.64	1.53	3.05	47,000	-	1.20	3.26				
36,200	1.63	1.52	3.05	47,200	-	1.19	3.26				
36,400	1.63	1.52	3.06	47,400	-	1.19	3.27				
36,600	1.62	1.51	3.06	47,600	-	1.18	3.27				
36,800	1.62	1.51	3.07	47,800	-	1.18	3.27				
37,000	1.61	1.50	3.07	48,000	-	1.17	3.28				
37,200	1.60	1.49	3.07	48,200	-	1.16	3.28				
37,400	1.60	1.49	3.08	48,400	-	1.16	3.29				
37,600	1.59	1.48	3.08	48,600	-	1.15	3.29				
37,800	1.59	1.48	3.08	48,800	-	1.14	3.29				
38,000	1.58	1.47	3.09	49,000	-	1.14	3.30				
38,200	1.57	1.46	3.09	49,200	-	1.13	3.30				
38,400	1.57	1.46	3.10	49,400	-	1.13	3.30				
38,600	1.59	1.48	3.08	49,600	-	1.12	3.31				
38,800	1.56	1.45	3.10	49,800	-	1.11	3.31				
39,000	1.55	1.44	3.11	50,000	-	1.11	3.32				
39,200	1.54	1.43	3.11	50,200	-	1.10	3.32				
39,400	1.54	1.43	3.11	50,400	-	1.09	3.32				
39,600	1.53	1.42	3.12	50,600	-	1.09	3.33				
39,800	1.53	1.42	3.12	50,800	-	1.08	3.33				
40,000	1.52	1.41	3.13	51,000	-	1.08	3.33				
40,200	1.51	1.40	3.13	51,200	-	1.07	3.34				
40,400	1.51	1.40	3.13	51,400	-	1.06	3.34				
40,600	1.50	1.39	3.14	51,600	-	1.06	3.35				
40,800	1.50	1.39	3.14	51,800	-	1.05	3.35				

AFT LIMIT valid for ZFW and takeoff

Use FORWARD LIMIT - ZFW column for forward limit check of ZFW only

Use FORWARD LIMIT - TAKEOFF column for forward limit check of Takeoff weight

Table 3-8: Center of Gravity Min-Max

(Cont'd on next page)

RESTRICTED (ZONE B, C and D FULL)											
	Forward Limit		Aft		Forward Limit		Aft		Forward Limit		Aft
Weight	ZFW	TAKEOFF	Limit	Weight	ZFW	TAKEOFF	Lmt	Weight	ZFW	TAKEOFF	Limit
30,000	1.84	1.73	2.87	40,000	1.43	1.32	3.23	50,000	-	1.02	3.42
30,200	1.84	1.73	2.87	40,200	1.42	1.31	3.23	50,200	-	1.01	3.42
30,400	1.83	1.72	2.88	40,400	1.42	1.31	3.24	50,400	-	1.00	3.42
30,600	1.83	1.71	2.88	40,600	1.41	1.30	3.24	50,600	-	1.00	3.43
30,800	1.82	1.71	2.88	40,800	1.41	1.30	3.25	50,800	-	0.99	3.43
31,000	1.82	1.71	2.88	41,000	1.40	1.29	3.25	51,000	-	0.99	3.43
31,200	1.81	1.70	2.89	41,200	1.39	1.28	3.25	51,200	-	0.98	3.44
31,400	1.81	1.70	2.89	41,400	1.39	1.28	3.26	51,400	-	0.97	3.44
31,600	1.80	1.69	2.89	41,600	1.38	1.27	3.26	51,600	-	0.97	3.45
31,800	1.80	1.69	2.89	41,800	1.38	1.27	3.27	51,800	-	0.96	3.45
32,000	1.79	1.68	2.90	42,000	1.37	1.26	3.27	51,854	-	0.96	3.45
32,200	1.79	1.68	2.90	42,200	1.36	1.25	3.27	52,000	-	0.95	3.34
32,400	1.78	1.67	2.90	42,400	1.36	1.25	3.28	52,200	-	0.95	3.19
32,600	1.78	1.67	2.90	42,600	1.35	1.24	3.28	52,400	-	0.94	3.04
32,800	1.77	1.66	2.91	42,800	1.35	1.24	3.29	52,600	-	0.93	2.88
33,000	1.77	1.66	2.91	43,000	1.34	1.23	3.29	52,800	-	0.93	2.73
33,200	1.76	1.65	2.91	43,200	1.33	1.22	3.29	53,000	-	0.92	2.58
33,400	1.76	1.65	2.91	43,400	1.33	1.22	3.30	53,200	-	0.92	2.41
33,600	1.75	1.64	2.92	43,600	1.32	1.21	3.30	53, 250	-	0.92	2.37
33,800	1.75	1.64	2.92	43,800	1.32	1.21	3.31				
34,000	1.74	1.63	2.92	44,000	1.31	1.20	3.31				
34,200	1.72	1.61	2.94	44,200	-	1.19	3.31				
34,400	1.70	1.59	2.97	44,400	-	1.19	3.32				
34,600	1.68	1.57	2.99	44,600	-	1.18	3.32				
34,800	1.66	1.55	3.01	44,800	-	1.18	3.32				
35,000	1.65	1.54	3.04	45,000	-	1.17	3.33				
35,200	1.63	1.52	3.06	45,200	-	1.16	3.33				
35,400	1.61	1.50	3.08	45,400	-	1.16	3.33				
35,600	1.59	1.48	3.10	45,600	-	1.15	3.34				
35,800	1.57	1.46	3.13	45,800	-	1.15	3.34				
36,000	1.55	1.44	3.15	46,000	-	1.14	3.34				
36,200	1.54	1.43	3.15	46,200	-	1.13	3.35				
36,400	1.54	1.43	3.16	46,400	-	1.13	3.35				
36,600	1.53	1.42	3.16	46,600	-	1.12	3.35				
36,800	1.53	1.42	3.17	46,800	-	1.12	3.36				
37,000	1.52	1.41	3.17	47,000	-	1.11	3.36				
37,200	1.51	1.40	3.17	47,200	-	1.10	3.36				
37,400	1.51	1.40	3.18	47,400	-	1.10	3.37				
37,600	1.50	1.39	3.18	47,600	-	1.09	3.37				
37,800	1.50	1.39	3.19	47,800	-	1.09	3.37				
38,000	1.49	1.38	3.19	48,000	-	1.08	3.38				
38,200	1.48	1.37	3.19	48,200	-	1.07	3.38				
38,400	1.48	1.37	3.20	48,400	-	1.07	3.39				
38,600	1.47	1.36	3.20	48,600	-	1.06	3.39				
38,800	1.47	1.36	3.21	48,800	-	1.05	3.39				
39,000	1.46	1.35	3.21	49,000	-	1.05	3.40				
39,200	1.45	1.34	3.21	49,200	-	1.04	3.40				
39,400	1.45	1.34	3.22	49,400	-	1.04	3.40				
39,600	1.44	1.33	3.22	49,600	-	1.03	3.41				
39,800	1.44	1.33	3.23	49,800	-	1.02	3.41				

AFT LIMIT valid for ZFW and takeoff

Use FORWARD LIMIT - ZFW column for forward limit check of ZFW only

Use FORWARD LIMIT - TAKEOFF column for forward limit check of Takeoff weight

(Cont'd on next page)

FULL / FERRY											
	Forward Limit		Aft		Forward Limit		Aft		Forward Limit		Aft
Weight	ZFW	TAKEOFF	Limit	Weight	ZFW	TAKEOFF	Limit	Weight	ZFW	TAKEOFF	Limit
30,000	1.82	1.71	2.90	40,000	1.40	1.29	3.26	50,000	-	0.99	3.45
30,200	1.81	1.70	2.90	40,200	1.39	1.28	3.26	50,200	-	0.98	3.45
30,400	1.81	1.70	2.91	40,400	1.39	1.28	3.26	50,400	-	0.97	3.45
30,600	1.80	1.69	2.91	40,600	1.38	1.27	3.27	50,600	-	0.97	3.46
30,800	1.80	1.69	2.91	40,800	1.38	1.27	3.27	50,800	-	0.96	3.46
31,000	1.79	1.68	2.91	41,000	1.37	1.26	3.27	51,000	-	0.96	3.46
31,200	1.79	1.68	2.92	41,200	1.36	1.25	3.28	51,200	-	0.95	3.47
31,400	1.78	1.67	2.92	41,400	1.36	1.25	3.28	51,400	-	0.94	3.47
31,600	1.78	1.67	2.92	41,600	1.35	1.24	3.29	51,600	-	0.94	3.48
31,800	1.77	1.66	2.92	41,800	1.35	1.24	3.29	51,800	-	0.93	3.48
32,000	1.77	1.66	2.93	42,000	1.34	1.23	3.29	51,854	-	0.93	3.48
32,200	1.76	1.65	2.93	42,200	1.33	1.22	3.30	52,000	-	0.93	3.37
32,400	1.75	1.64	2.93	42,400	1.33	1.22	3.30	52,200	-	0.92	3.21
32,600	1.75	1.64	2.93	42,600	1.32	1.21	3.30	52,400	-	0.92	3.06
32,800	1.74	1.63	2.94	42,800	1.32	1.21	3.31	52,600	-	0.91	2.91
33,000	1.74	1.63	2.94	43,000	1.31	1.20	3.31	52,800	-	0.91	2.75
33,200	1.73	1.62	2.94	43,200	1.30	1.19	3.32	53,000	-	0.90	2.60
33,400	1.73	1.62	2.94	43,400	1.30	1.19	3.32	53,200	-	0.89	2.44
33,600	1.72	1.61	2.95	43,600	1.29	1.18	3.32	53,250	-	0.89	2.40
33,800	1.72	1.61	2.95	43,800	1.29	1.18	3.33				
34,000	1.71	1.60	2.95	44,000	1.40	1.17	3.33				
34,200	1.69	1.58	2.97	44,200	-	1.16	3.33				
34,400	1.67	1.56	3.00	44,400	-	1.16	3.34				
34,600	1.65	1.54	3.02	44,600	-	1.15	3.34				
34,800	1.63	1.52	3.04	44,800	-	1.15	3.35				
35,000	1.62	1.51	3.07	45,000	-	1.14	3.35				
35,200	1.60	1.49	3.09	45,200	-	1.13	3.35				
35,400	1.58	1.47	3.11	45,400	-	1.13	3.36				
35,600	1.56	1.45	3.13	45,600	-	1.12	3.36				
35,800	1.54	1.43	3.16	45,800	-	1.12	3.37				
36,000	1.52	1.41	3.18	46,000	-	1.11	3.37				
36,200	1.51	1.40	3.18	46,200	-	1.10	3.37				
36,400	1.51	1.40	3.19	46,400	-	1.10	3.38				
36,600	1.50	1.39	3.19	46,600	-	1.09	3.38				
36,800	1.50	1.39	3.20	46,800	-	1.09	3.39				
37,000	1.49	1.38	3.20	47,000	-	1.08	3.39				
37,200	1.48	1.37	3.20	47,200	-	1.07	3.39				
37,400	1.48	1.37	3.21	47,400	-	1.07	3.40				
37,600	1.47	1.36	3.21	47,600	-	1.06	3.40				
37,800	1.47	1.36	3.21	47,800	-	1.06	3.40				
38,000	1.46	1.35	3.22	48,000	-	1.05	3.41				
38,200	1.45	1.34	3.22	48,200	-	1.04	3.41				
38,400	1.45	1.34	3.23	48,400	-	1.04	3.42				
38,600	1.44	1.33	3.23	48,600	-	1.03	3.42				
38,800	1.44	1.33	3.23	48,800	-	1.02	3.42				
39,000	1.43	1.32	3.24	49,000	-	1.02	3.43				
39,200	1.42	1.31	3.24	49,200	-	1.01	3.43				
39,400	1.42	1.31	3.24	49,400	-	1.01	3.43				
39,600	1.41	1.30	3.25	49,600	-	1.00	3.44				
39,800	1.41	1.30	3.25	49,800	-	0.99	3.44				

AFT LIMIT valid for ZFW and takeoff
Use FORWARD LIMIT - ZFW column for forward limit check of ZFW only
Use FORWARD LIMIT - TAKEOFF column for forward limit check of Takeoff weight

| 3.10.27.3 USE OF BRAKES

The PF is responsible for the initial application of brakes during the landing roll-out. The time and duration of application may vary based on several operational considerations. These may include, but are not limited to, the length of available runway, presence of contamination, and crosswind conditions.

To achieve optimum braking effectiveness on dry or wet runways, apply steady brake pedal deflection. The anti-skid system will modulate the brake pressure for each individual wheel to give maximum braking for the existing runway conditions. Do not attempt to modulate the braking by releasing and reapplying the brakes as this can negate braking efficiency of the anti-skid system. If braking is marginal, do not release pedal pressure until reaching a safe taxi speed.

When the aircraft has slowed to 90 KIAS, the PM will call ***"90 Knots"***. The 90-knot call is the profile trigger for the pilot flying to begin stowing the thrust reversers. Thrust reversers must be reduced to idle (30% N_1) or preferably stowed by 60 KIAS. Once the aircraft has slowed to a safe taxi speed, exit the runway.

NOTE

Transfer of controls must be positive and should be briefed by the crew prior to arrival. When the FO is the PF, a transfer of controls is required. The CA may take control of the aircraft at any speed; however, transfer of controls will typically occur at speeds below 60 knots. The CA will state "My Aircraft". The FO will respond "Your Aircraft", releasing control of the rudder pedals and thrust levers. When the CA is the PF, the airspeed callouts remain the same, but the CA performs all the duties while retaining control of the aircraft.

NOTE

The FO should never relinquish control of the aircraft to the CA until the CA has initiated the transfer. This is especially important during crosswind landings. Loss of directional control may result during crosswind landings if the aileron inputs are not maintained throughout the landing roll-out.

Rudder steering is adequate for directional control at all speeds. It is only necessary to use the tiller when exiting the runway at low speeds, and when turning sharp corners during taxi. The aircraft must be slowed to taxi speeds before using the tiller.

| 3.10.27.4 CROSSWIND LANDING

The CL-65 requires traditional control inputs during a crosswind landing. The recommended crosswind landing technique is to combine crab and sideslip.

On final approach, a crab angle should be established with the wings level in order to maintain the aircraft on the desired course. When initiating the flare at 10-20 feet (see below) above the runway surface, apply rudder to align the aircraft with the runway centerline while simultaneously applying opposite aileron to correct for sideways drift. After touchdown, maintain runway centerline with rudder steering and continue to apply aileron input into the wind consistent with aircraft speed and wind velocity.

Proper timing and coordination are critical for crosswind landings. Use caution when operating in gusty conditions. A wingtip strike could occur if excessive (more than 8º roll) aileron correction is applied.

The maximum demonstrated crosswind components for landing are as follows:

Maximum demonstrated crosswind component:
- RCAM Value 6 ..... 27 knots
- RCAM Value 5 ..... 27 knots
- RCAM Value 4 ..... 20 knots
- RCAM Value 3 ..... 15 knots
- RCAM Value 2 ..... 10 knots
- RCAM Value 1 ..... 10 knots

Maximum tailwind component for takeoff or landing ..... 10 Knots

NOTE

For additional information on runway information, see the table titled RCAM WITH CROSSWIND LIMITS in subsection 6.15 of this manual.

NOTE

Applying side-slip corrections can lead to excessive sink rates if they are performed higher than the recommended altitude noted above. Crosswind corrections should be applied in the flare. It is not an approved procedure to allow cross-controlled inputs on an extended final approach segment.

NOTE

Aileron inputs, directional control via the rudder, and thrust lever / thrust reverse usage should be maintained by the PF throughout the landing rollout or until positive transfer of controls occurs. It is not necessary or desired for one pilot to hold aileron input while the other uses the tiller for directional control along the centerline. Tiller usage should only be used at low speeds when nosewheel steering, using rudder inputs, is not sufficient (sharp turns).

NOTE

Photoluminescent lights are now installed in all of our aircraft. Cabin lights are required to be on bright for at least 15 minutes prior to takeoff on the first flight of the day.

5.4.3 TAXI

Brake temperature must be monitored closely while taxiing in and after landing, especially in hot weather. If brake temperature limits are exceeded, the fusible plugs could melt, resulting in deflation of tire(s). Regardless of the- ambient temperature, braking should be kept to a minimum to allow ample time for cooling between applications. The proper technique is to allow the aircraft to accelerate, then brake to achieve a very slow taxi speed and release the brakes completely. Avoid excessive use of and / or riding the brakes.

Reverse thrust should not be used if any ramp or taxiway contamination exists, except in the interest of safety. This includes surfaces covered with snow, ice, standing water, or slush.

Taxiing in adverse weather conditions requires close awareness of surface conditions. When taxiing on a slick surface, steering and braking effectiveness may be substantially reduced. Differential braking may be more effective than nosewheel steering on very slick surfaces. Reduce speed prior to initiating a turn. At reduced speeds, the use of differential engine thrust will assist in maintaining airplane momentum through a turn.

If taxiways and runways are covered with snow, slush, or ice, consideration should be given to the use of engine cowl and wing anti-ice. If Type II or Type IV anti-ice fluid was applied, selection of wing anti-ice should be delayed until just prior to takeoff.

5.4.4 APPROACH AND LANDING

The runway touchdown area may be slick due to heavy deposits of rubber and oil that can melt in hot weather. Hydroplaning is a possibility even though the runway appears dry.

5.8 ENVIRONMENTAL CONSIDERATIONS DURING LANDING

5.8.1 CROSSWIND

In crosswind conditions, the crosswind crab angle should be maintained for as long as possible until prior to touchdown. Aim for the centerline. After touchdown, early application of reverse thrust and brakes is essential. The use of rudder pedals for steering at high speeds is recommended and slight forward pressure on the control column will increase main gear loading and improve directional control.

5.8.2 CONTAMINATED RUNWAYS

5.8.2.1 LIMITATIONS

Unless specific authorization is given by Flight Department Management, landing on a contaminated runway is prohibited when:

- Either thrust reverser is inoperative
- A system failure has occurred that would adversely affect the landing distance; e.g., anti-skid, spoilers, etc...

Landing is not allowed on runways covered by more than:

- 3/4“of standing water
- 7/8“of slush
- 1-1/2“of wet snow
- 3-3/4“of dry snow

Refer to the PERFORMANCE section for airport analysis information regarding landing on dry, wet, and contaminated runways.

5.8.2.2 TECHNIQUE

Plan on a firm positive landing to ensure initial wheel spin up and freeing of possible frozen brakes. Use the brakes during the landing roll and taxi to prevent progressive buildup of ice on the wheels and brakes.

The use of reverse thrust during crosswind conditions may aggravate directional control problems on slippery runways. If the airplane is allowed to weather vane, the reverse thrust will add to the crosswind component and cause the airplane to drift to the downwind side at a faster rate. To correct the situation, it will be necessary to reduce the reverse thrust to reverse idle and release the brakes. It may be necessary to move the thrust levers to forward idle thrust to return to the runway centerline.

The intensity and duration of reverse thrust should be minimized at low speeds. Using reverse thrust at low speeds on snow and ice covered runways can cause FOD to engines and may decrease forward visibility due to “whiteout”.

Excerpt from MHIRJ Airplane Flight Manual

CRJ200 AFM - Chapter 5 Abnormal Procedures - Hydraulic Power - D. HYD 3 LO PRESS procedure:

- **If landing gear is down-and-locked, proceed to step (11).**

Any landing gear fails to down-and-lock:

(10) LANDING GEAR MANUAL RELEASE handle ..... Stow and pull to full extension

NOTE

Step (10) may be repeated as many times as desired.

- **If landing gear is down-and-locked, proceed to step (11).**
- **If any landing gear still fails to down-and-lock, proceed to step (13).**

Landing gear is down-and-locked:

(11) LANDING GEAR MANUAL RELEASE handle ..... Stow

(12) Actual landing distance ..... Increase

Without Thrust Reversers	With Thrust Reversers
1.60 (60%)	1.50 (50%)

CAUTION

1. Anticipate the loss of inboard brakes during landing when system 3 brake accumulator depressurizes.
2. A steady brake application is recommended upon landing. Do not cycle the brakes.

NOTE

1. Select the longest runway available with minimum cross-wind and turbulence.
2. Use differential braking, rudder and engine thrust as required to assist in directional control.
3. In high cross-wind conditions, rudder effectiveness may be limited after landing with maximum reverse thrust selected.
4. Apply brakes carefully and maximize the use of reverse thrust.

Any landing gear still fails to down-and-lock: