

**ARJ21-700**

**Ramp Servicing Operation Instructions**  
**RSOI**

**Number:** TP700072  
**(PMC:** ARJ21-SVV19-13120-00)



Commercial Aircraft Corporation of China, Ltd.

**Original:2023.01.29**

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## TRANSMITTAL LETTER

2023.01.29

To: All holders of this technical publication.

This revision is applicable to Ramp Servicing Operation Instruction.

## REVISION DESCRIPTION

For printed technical publications, pages shall be replaced, inserted, deleted or reinstated revised as per the List of Effective Pages (LEP). In the LEP, amendments proceeded by the letters C, N, D and RR refer to Changed, New, Deleted and Reinstated revised. Revised and deleted pages in this revision shall be removed and destroyed.

For electronic manuals, this revision supersedes all previous revisions.

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## Highlights Highlights

Data Module	Description of Change	Applicable to

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## List of Effective Data Modules

Code N, C, D or RR indicates data modules which are New, Changed, Deleted or Reinstated revised respectively.

Data module code	Revision Status	Issue Date
<a href="#">ARJ21-A-00-40-35-00A-001A-A</a>		2023.01.29
<a href="#">ARJ21-A-00-40-35-00A-021A-A</a>		2023.01.29
<a href="#">ARJ21-A-00-40-35-00A-023B-A</a>		2023.01.29
<a href="#">ARJ21-A-00-40-35-00A-00UA-A</a>		2023.01.29
<a href="#">ARJ21-A-00-40-35-00A-00SA-A</a>		2023.01.29
<a href="#">ARJ21-A-00-40-35-00A-00TA-A</a>		2023.01.29
<a href="#">ARJ21-A-00-40-35-01A-01BA-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-00-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-00-02A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-00-03A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-01-01A-913A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-02-01A-174A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-03-01A-174A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-04-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-05-01A-913A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-06-01A-522A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-07-01A-722A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-08-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-10-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-11-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-12-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-13-01A-989A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-14-01A-030A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-15-01A-250A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-16-01A-510A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-17-01A-730A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-18-00A-913A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-18-01A-211A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-18-02A-221A-A</a>		2023.01.29

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Data module code	Revision Status	Issue Date
<a href="#">ARJ21-A-13-12-18-03A-211A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-18-04A-221A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-22-01A-216A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-23-01A-226A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-24-01A-228A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-25-01A-261A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-26-01A-561A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-27-01A-761A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-28-01A-730A-A</a>		2023.01.29
<a href="#">ARJ21-A-13-12-29-01A-730A-A</a>		2023.01.29

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## Change Record

Make sure that previous revisions to this manual have been filed.  
Enter the date filed and the name of the person filing.

Issue No	Issue Date	Filed date	Filed by

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## Introduction - Front matter

### 1. General

- A. The Ramp Servicing Operation Instructions (RSOI), prepared by COMAC, contains information necessary to support the ARJ21 aircraft servicing, which agrees with S1000D 4.1 international specification for technical publications. These procedures are standards that are recommended by the manufacturer, including aircraft dimensions, servicing access, emergency access and equipments, routine fluid replenishment procedure and general servicing of the aircraft. This instruction contains 3 parts:
- (1) Aircraft characteristics
  - (2) Aircraft handling
  - (3) Servicing points and procedures
- B. RSOI is not the continuous airworthiness document, just for the ground crew to train and learn. If RSOI and continuous airworthiness document conflict, the continuous airworthiness document shall prevail.
- C. Both RSOI and ACAP provide the aircraft characteristics, ACAP focus on airport planning and airport operation, RSOI focus on airplane ground servicing and procedure.

### 2. Content

- A. RSOI includes:

Aircraft characteristics	General aircraft dimensions
	Ground Clearances
	External panels
Aircraft handling	Safety precautions for towing
	Tow the aircraft by towbar.
	Tow the aircraft by towbarless tractor.
	Ground maneuvering
	Airplane grounding
	Aircraft protection equipment-Removal
	Aircraft protection equipment-Installation
	Cargo compartment
	Cargo nets
	Hazard Areas of aircraft
	Emergency exits
	Fire-fighting and rescue
	Emergency equipment

## Ramp Servicing Operation Instruction

Servicing points and procedures	Aircraft cleaning
	External air conditioning source - Disconnect
	External air conditioning source - Connect
	Precautions and limits for the refuel/defuel operation
	Gravity refuel
	Suction refuel
	Pressure refuel
	Pressure Defuel
	Potable water system-Fill with water
	Potable water system-Drain water
	Water waste system
	Deicing/Anti-icing
	External power - De-energize electrical
	External power - Energize electrical
	Passenger boarding bridge docking
	Passenger boarding stairs docking

### 3. Instructions

- A. Before performing ground servicing, you should make sure the aircraft configuration status: This may be done by maintenance person or ground staff. These configuration status include, but may not be limited to:
- (1) Circuit breaker status
  - (2) Electrical power status
  - (3) Hydraulic system status
  - (4) Doors status
  - (5) Engine and APU status
  - (6) Water tank and waste tank
  - (7) Aileron, elevator and rudder are in the neutral position
  - (8) Flap, slat is in the retraction position
- B. The ground person who trained and certified by the operator can perform the procedures.

### 4. Effectivity

- A. The RSOI is applicable for ARJ21 STD and ER, not for other ARJ21 models(for example: cargo model, medical model).

### 5. Revision Description

- A. The revision of this manual will be performed upon manufacturer decision.
- B. After the data module is revised, mark vertical black lines in the blank area on the left of the revised text.
- C. If the content of data is added, no change mark is required.
- D. After the data module is deleted, mark Deleted in the position of the text and mark deleted line.

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# **Chapter Aircraft Characteristics**

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## General aircraft dimensions - Technical data

### 1. General

This section contains the dimensions for the wing, horizontal stabilizer, vertical stabilizer and fuselage. It also contains areas for the wing and stabilizer surfaces.

### 2. Preparation

#### A. References

Number	Nomenclature
SM110A0001	ARJ21 three-view drawing

#### B. Zonal

Number	Location
100	Lower fuselage: Whole radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The Zone of Lower Fuselage is the area under the Fuselage Reference Plane)
200	Upper fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)
300	Empennage
400	Power plant and Pylon
500	Left wing
600	Right wing
700	Landing Gear and Landing Gear Doors
800	Doors (Subjected to the Pressurized Loads)

### 3. Main Procedure

#### A. DIMENSIONS

##### (1) Aircraft

- (a) Height 8.442 m(332.36 in)

**NOTE:** Operation empty weight(OEW) is **24955 kg**.

- (b) Length 33.46 m(1317.44 in)

- (c) Wing span (including winglets) 27.29 m(1074.33 in)

##### (2) Engine

- (a) Engine nacelle to ground clearance - 1.795 (70.67)

**NOTE:** Operation empty weight is **24955 kg**.

- (b) Centerline of power plant fwd mount plane to fuselage symmetry plane - 2.92m (114.81in)

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## (3) FUSELAGE

## (a) Height :

- 1) Above fuselage reference plane - 2.34m (92.13 in)
- 2) Below fuselage reference plane - 1.27m (50 in)

(b) Fuselage total length - 30.43 m (1197.99 in)

(c) Maximum fuselage width - 3.34m (131.62 in)

## (4) Horizontal Tail:

(a) Length 10.51 m (413.78 in )

(b) Wingtip chord - 1.19 m(46.77 in)

## (5) Landing Gear:

(a) Main wheel span - 4.68 m(184.25 in)

(b) Nose landing gear span - 2.30m (90.64in)

(c) Wheelbase - 14.88m (585.75in)

## (6) Vertical Tail:

(a) Root chord - 4.74m (186.50 in)

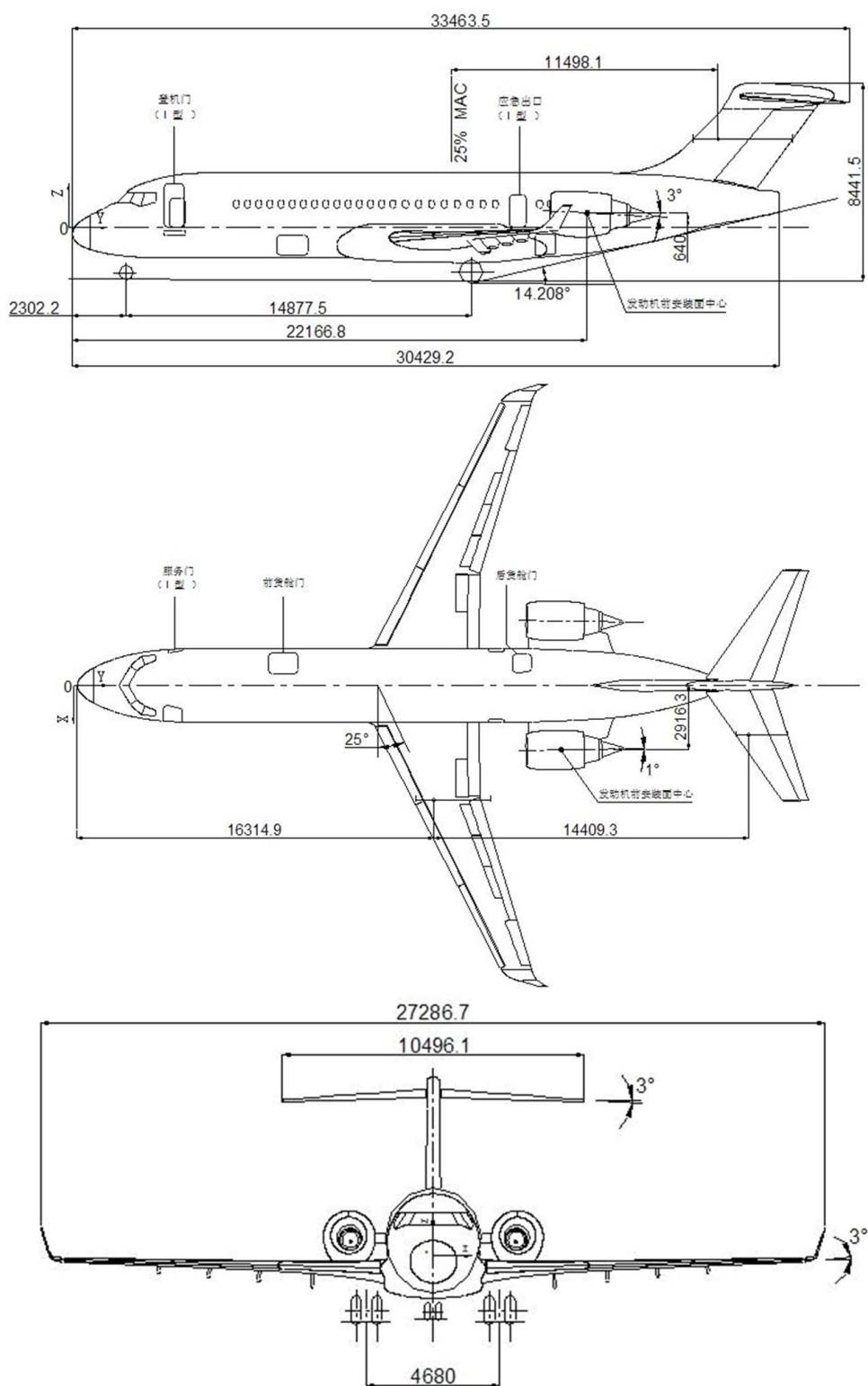
## (7) Wing:

(a) Root chord - 4.97m (195.47 in)

(b) Wingtip chord - 1.29 m(50.91 in)

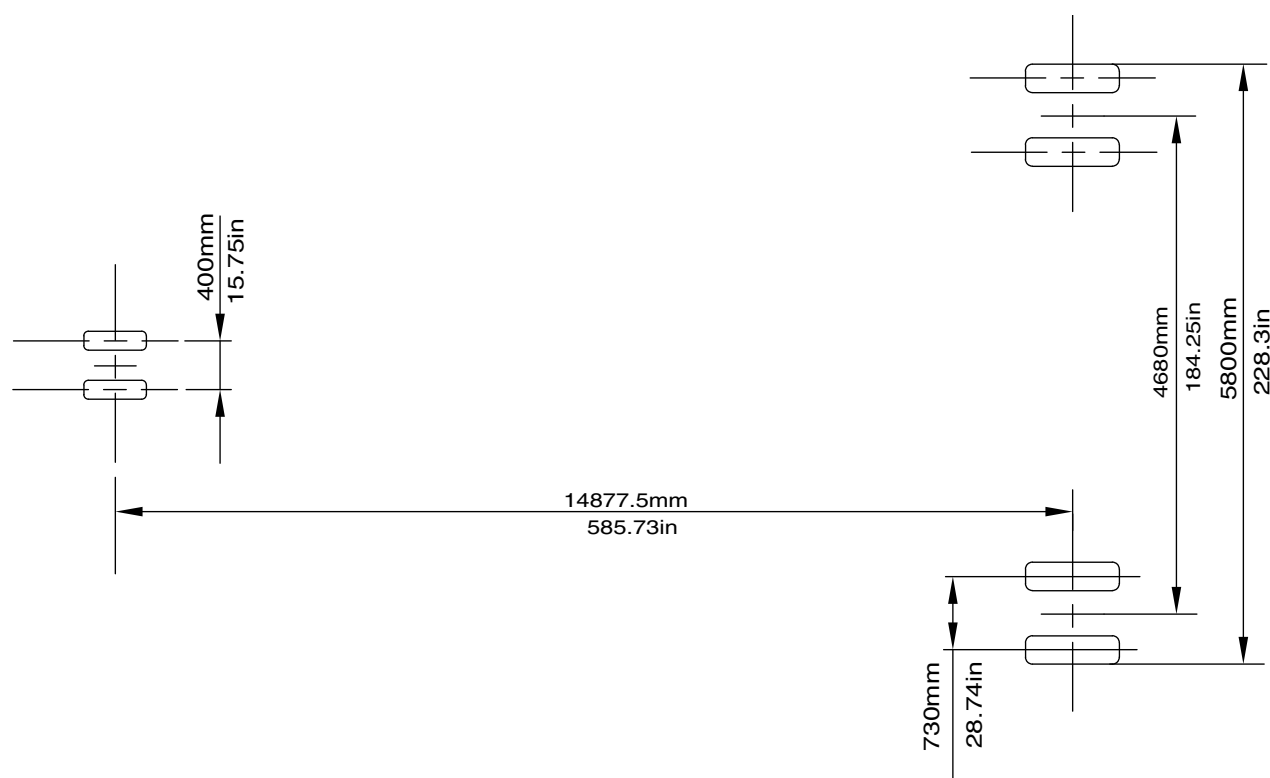
**B. Area**(1) Horizontal Tail Reference Area - 23.22 m<sup>2</sup> (249.89 ft<sup>2</sup>)(2) Vertical Tail Reference Area - 14.96 m<sup>2</sup>( 161.03 ft<sup>2</sup>)(3) Wing Reference Area - 79.86 m<sup>2</sup>(859.60 ft<sup>2</sup>)





ICN-ARJ21-A-192002-A-SVV19-10696-A-001-01

Figure 1 Aircraft three view drawing (Sheet 1 of 1)

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ICN-ARJ21-A-131200-A-SVV19-26153-A-001-01

**Figure 2 Tire Distance (Sheet 1 of 1)**

## Ground Clearances - Technical data

### 1. General

This part provides the ground clearances of aircraft in different satus.

### 2. Preparation

Number	Location
100	Lower fuselage: Whole radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The Zone of Lower Fuselage is the area under the Fuselage Reference Plane)
200	Upper fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)
300	Empennage
400	Power plant and Pylon
500	Left wing
600	Right wing
700	Landing Gear and Landing Gear Doors
800	Doors (Subjected to the Pressurized Loads)

### 3. Main Procedure

**Table 1 Ground Clearances (see figure 1)**

Dimension No.	Dimension Description	Dimension No.	Dimension Description
A	Ground Clearances of Vertical Tail Highest Point	H	Ground Clearances of Service Door
B	Fuselage Highest Point Ground Clearances	I	Emergency Exit Door Ground Clearances
C	Engine Lowest Point Ground Clearances	J	FWD Cargo Door Ground Clearance
D	Fuselage Lowest Point Ground Clearances	K	AFT Cargo Door Ground Clearances
E	Horizontal Tail Highest Point Ground Clearances	L	Vertical Tail Root Ground Clearances
F	Wingtip Ground Clearances	M	Horizontal Tail Rear Part Ground Clearances

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Dimension No.	Dimension Description	Dimension No.	Dimension Description
G	Passenger Entry Door Ground Clearances	N	MID-AFT Fuselage Jacking Point Ground Clearances

Note: Elastic distortion of wing structure is not taken into consideration in F (ground clearance of wing highest point).

**Table 2 Ground Clearances at OEW**

	OAT 15°		OAT 0°		OAT -10°	
Number	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
A	8606	338.8	8590	338.2	8579	337.8
B	4747	186.9	4727	186.1	4713	185.6
C	1909	75.2	1891	74.4	1879	74.0
D	888	35.0	869	34.2	857	33.7
E	8085	318.3	8069	317.7	8058	317.2
F	3352	132.0	3334	131.3	3322	130.8
G	2461	96.9	2440	96.1	2426	95.5
H	2440	96.1	2419	95.2	2405	94.7
I	2391	94.1	2372	93.4	2360	92.9
J	1213	47.8	1193	47.0	1180	46.5
K	1198	47.2	1180	46.5	1168	46.0
L	4636	182.5	4619	181.9	4608	181.4
M	7955	313.2	7939	312.6	7928	312.1
N	1444	56.9	1426	56.1	1415	55.7
	OAT -20°		OAT -30°		OAT -40°	
Number	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
A	8568	337.3	8558	336.9	8548	336.5
B	4699	185.0	4686	184.5	4672	183.9
C	1868	73.5	1856	73.1	1845	72.6
D	844	33.2	832	32.8	820	32.3
E	8047	316.8	8037	316.4	8027	316.0
F	3310	130.3	3299	129.9	3288	129.4
G	2412	95.0	2398	94.4	2385	93.9
H	2391	94.1	2378	93.6	2364	93.1
I	2348	92.4	2337	92.0	2325	91.5

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J	1167	45.9	1153	45.4	1140	44.9
K	1156	45.5	1145	45.1	1133	44.6
L	4597	181.0	4586	180.6	4575	180.1
M	7918	311.7	7908	311.3	7898	310.9
N	1403	55.2	1392	54.8	1381	54.4

**Table 3 Ground Clearances at MTW (STD)**

Number	OAT 15°				OAT 0°			
	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
	C.G. FWD Limit		C.G. AFT Limit		C.G. FWD Limit		C.G. AFT Limit	
A	8600	338.6	8508	335.0	8583	337.9	8494	334.4
B	4643	182.8	4667	183.7	4627	182.2	4650	183.1
C	1859	73.2	1817	71.5	1842	72.5	1802	70.9
D	810	31.9	799	31.5	794	31.3	783	30.8
E	8079	318.1	7987	314.4	8062	317.4	7973	313.9
F	3299	129.9	3260	128.3	3282	129.2	3245	127.8
G	2311	91.0	2382	93.8	2296	90.4	2365	93.1
H	2290	90.2	2361	93.0	2276	89.6	2344	92.3
I	2325	91.5	2300	90.6	2309	90.9	2285	90.0
J	1092	43.0	1130	44.5	1077	42.4	1114	43.9
K	1140	44.9	1107	43.6	1123	44.2	1092	43.0
L	4611	181.5	4540	178.7	4595	180.9	4526	178.2
M	7967	313.7	7854	309.2	7949	313.0	7840	308.7
N	1403	55.2	1350	53.1	1386	54.6	1336	52.6
Number	OAT -10°				OAT -20°			
	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
	C.G. FWD Limit		C.G. AFT Limit		C.G. FWD Limit		C.G. AFT Limit	
A	8572	337.5	8485	334.1	8561	337.0	8476	333.7
B	4616	181.7	4639	182.6	4605	181.3	4628	182.2
C	1832	72.1	1792	70.6	1821	71.7	1783	70.2
D	784	30.9	773	30.4	774	30.5	763	30.0
E	8050	316.9	7964	313.5	8039	316.5	7955	313.2

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F	3272	128.8	3235	127.4	3261	128.4	3226	127.0
G	2287	90.0	2353	92.6	2277	89.6	2342	92.2
H	2267	89.3	2332	91.8	2257	88.9	2321	91.4
I	2299	90.5	2275	89.6	2288	90.1	2265	89.2
J	1067	42.0	1103	43.4	1057	41.6	1092	43.0
K	1113	43.8	1082	42.6	1102	43.4	1072	42.2
L	4584	180.5	4517	177.8	4573	180.0	4507	177.4
M	7938	312.5	7832	308.3	7927	312.1	7823	308.0
N	1376	54.2	1326	52.2	1365	53.7	1317	51.9
OAT -30°					OAT -40°			
Number	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
	C.G. FWD Limit		C.G. AFT Limit		C.G. FWD Limit		C.G. AFT Limit	
A	8550	336.6	8468	333.4	8539	336.2	8459	333.0
B	4595	180.9	4552	179.2	4584	180.5	4605	181.3
C	1811	71.3	1773	69.8	1800	70.9	1764	69.4
D	763	30.0	753	29.6	753	29.6	743	29.3
E	8029	316.1	7947	312.9	8018	315.7	7938	312.5
F	3251	128.0	3216	126.6	3241	127.6	3207	126.3
G	2268	89.3	2330	91.7	2258	88.9	2319	91.3
H	2247	88.5	2309	90.9	2238	88.1	2298	90.5
I	2278	89.7	2256	88.8	2268	89.3	2246	88.4
J	1047	41.2	1081	42.6	1037	40.8	1070	42.1
K	1092	43.0	1063	41.9	1082	42.6	1053	41.5
L	4562	179.6	4499	177.1	4552	179.2	4490	176.8
M	7916	311.7	7815	307.7	7905	311.2	7807	307.4
N	1354	53.3	1307	51.5	1344	52.9	1298	51.1

**Table 4 Ground Clearances at Status of MTW (ER)**

OAT 15°					OAT 0°			
Number	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
	C.G. FWD Limit		C.G. AFT Limit		C.G. FWD Limit		C.G. AFT Limit	
A	8578	337.7	8516	335.3	8562	337.1	8502	334.7

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B	4626	182.1	4646	182.9	4610	181.5	4630	182.3
C	1842	72.5	1810	71.3	1826	71.9	1796	70.7
D	797	31.4	792	31.2	782	30.8	777	30.6
E	8057	317.2	7995	314.8	8041	316.6	7980	314.2
F	3283	129.3	3235	127.4	3267	128.6	3220	126.8
G	2306	90.8	2356	92.8	2292	90.2	2340	92.1
H	2286	90.0	2341	92.2	2272	89.4	2325	91.5
I	2311	91.0	2296	90.4	2295	90.4	2281	89.8
J	1084	42.7	1114	43.9	1069	42.1	1098	43.2
K	1124	44.3	1104	43.5	1109	43.7	1089	42.9
L	4592	180.8	4544	178.9	4576	180.2	4530	178.3
M	7943	312.7	7866	309.7	7926	312.0	7852	309.1
N	1386	54.6	1351	53.2	1370	53.9	1336	52.6
OAT -10°					OAT -20°			
Number	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
	C.G. FWD Limit		C.G. AFT Limit		C.G. FWD Limit		C.G. AFT Limit	
A	8551	336.7	8493	334.4	8541	336.3	8484	334.0
B	4600	181.1	4619	181.9	4589	180.7	4609	181.5
C	1816	71.5	1786	70.3	1806	71.1	1776	69.9
D	771	30.4	767	30.2	761	30.0	757	29.8
E	8030	316.1	7971	313.8	8020	315.7	7962	313.5
F	3257	128.2	3210	126.4	3246	127.8	3201	126.0
G	2283	89.9	2330	91.7	2273	89.5	2319	91.3
H	2262	89.1	2314	91.1	2252	88.7	2303	90.7
I	2285	90.0	2271	89.4	2275	89.6	2261	89.0
J	1059	41.7	1087	42.8	1050	41.3	1077	42.4
K	1098	43.2	1079	42.5	1088	42.8	1070	42.1
L	4565	179.7	4521	178.0	4555	179.3	4511	177.6
M	7916	311.7	7843	308.8	7905	311.2	7834	308.4
N	1359	53.5	1327	52.2	1349	53.1	1317	51.9
OAT -30°					OAT -40°			

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Number	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)	Metric (mm)	English (in)
	C.G. FWD Limit		C.G. AFT Limit		C.G. FWD Limit		C.G. AFT Limit	
A	8530	335.8	8475	333.7	8520	335.4	8466	333.3
B	4579	180.3	4598	181.0	4569	179.9	4587	180.6
C	1796	70.7	1767	69.6	1786	70.3	1758	69.2
D	751	29.6	747	29.4	742	29.2	737	29.0
E	8009	315.3	7954	313.1	7999	314.9	7945	312.8
F	3236	127.4	3191	125.6	3227	127.0	3182	125.3
G	2263	89.1	2308	90.9	2254	88.7	2297	90.4
H	2243	88.3	2292	90.2	2233	87.9	2282	89.8
I	2265	89.2	2252	88.7	2255	88.8	2242	88.3
J	1040	40.9	1067	42.0	1030	40.6	1056	41.6
K	1078	42.4	1060	41.7	1068	42.0	1051	41.4
L	4545	178.9	4502	177.2	4535	178.5	4493	176.9
M	7895	310.8	7826	308.1	7884	310.4	7818	307.8
N	1339	52.7	1308	51.5	1329	52.3	1299	51.1

**Table 5 Ground Clearances at Jacked Status**

Dimension No.	Metric (mm)	Imperial in
A	9022	355.2
B	5052	198.9
C	2266	89.2
D	1209	47.6
E	8506	334.9
F	3706	145.9
G	2686	105.8
H	2666	105.0
I	2728	107.4
J	1477	58.1
K	1544	60.8
L	5027	197.9



Dimension No.	Metric (mm)	Imperial in
M	8395	330.5
N	1813	71.4

**NOTE:** Landing Gear Fully-Extended Status on The Jacks.

**Table 6 Ground Clearance at Flap Fully Extended Status of Each Flap (Figure 2)**

Out- side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
15°C	Flap 1 Inboard (F1IN)	1048	41.3	965	38.0	950	37.4	979	38.5	958	37.7
	Flap 1 Outboard (F1OUT)	1366	53.8	1283	50.5	1262	49.7	1297	51.1	1276	50.2
	Flap 2 Inboard (F2IN)	1367	53.8	1284	50.6	1263	49.7	1298	51.1	1277	50.3
	Flap 2 Outboard (F2OUT)	1786	70.3	1711	67.4	1673	65.9	1726	68.0	1695	66.7
0°C	Flap 1 Inboard (F1IN)	1030	40.6	950	37.4	935	36.8	963	37.9	943	37.1
	Flap 1 Outboard (F1OUT)	1348	53.1	1267	49.9	1247	49.1	1281	50.4	1261	49.6
	Flap 2 Inboard (F2IN)	1348	53.1	1268	49.9	1248	49.1	1282	50.5	1262	49.7
	Flap 2 Outboard (F2OUT)	1768	69.6	1695	66.7	1658	65.3	1710	67.3	1680	66.1
-10°C	Flap 1 Inboard (F1IN)	1018	40.1	940	37.0	925	36.4	953	37.5	933	36.7
	Flap 1 Outboard (F1OUT)	1335	52.6	1257	49.5	1237	48.7	1271	50.0	1251	49.3
	Flap 2 Inboard (F2IN)	1336	52.6	1258	49.5	1238	48.7	1272	50.1	1252	49.3
	Flap 2 Outboard (F2OUT)	1756	69.1	1685	66.3	1649	64.9	1699	66.9	1670	65.7

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Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
-20°C	Flap 1 Inboard (F1IN)	1006	39.6	929	36.6	915	36.0	943	37.1	923	36.3
	Flap 1 Outboard (F1OUT)	1323	52.1	1247	49.1	1228	48.3	1260	49.6	1241	48.9
	Flap 2 Inboard (F2IN)	1324	52.1	1248	49.1	1228	48.3	1261	49.6	1242	48.9
	Flap 2 Outboard (F2OUT)	1744	68.7	1675	65.9	1639	64.5	1689	66.5	1660	65.4
-30°C	Flap 1 Inboard (F1IN)	994	39.1	919	36.2	906	35.7	932	36.7	913	35.9
	Flap 1 Outboard (F1OUT)	1311	51.6	1237	48.7	1218	48.0	1250	49.2	1231	48.5
	Flap 2 Inboard (F2IN)	1312	51.7	1238	48.7	1219	48.0	1251	49.3	1232	48.5
	Flap 2 Outboard (F2OUT)	1732	68.2	1665	65.6	1630	64.2	1679	66.1	1650	65.0
-40°C	Flap 1 Inboard (F1IN)	982	38.7	910	35.8	896	35.3	922	36.3	904	35.6
	Flap 1 Outboard (F1OUT)	1300	51.2	1227	48.3	1208	47.6	1240	48.8	1221	48.1
	Flap 2 Inboard (F2IN)	1301	51.2	1228	48.3	1209	47.6	1241	48.9	1222	48.1
	Flap 2 Outboard (F2OUT)	1721	67.8	1655	65.2	1620	63.8	1668	65.7	1641	64.6

**Table 7 Ground Clearances at Flap Fully Extended Status of Flap Track Fairing (Figure 3)**

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
15°C	Flap Track 1 (FTE1)	1250	49.2	1164	45.8	1147	45.2	1177	46.3	1161	45.7
	Flap Track 2 (FTE2)	1418	55.8	1333	52.5	1312	51.7	1347	53.0	1328	52.3
	Flap Track 3 (FTE3)	1545	60.8	1463	57.6	1437	56.6	1477	58.1	1455	57.3
	Flap Track 4 (FTE4)	1699	66.9	1620	63.8	1587	62.5	1635	64.4	1608	63.3
0°C	Flap Track 1 (FTE1)	1232	48.5	1148	45.2	1132	44.6	1162	45.7	1146	45.1
	Flap Track 2 (FTE2)	1400	55.1	1318	51.9	1297	51.1	1331	52.4	1313	51.7
	Flap Track 3 (FTE3)	1527	60.1	1447	57.0	1422	56.0	1461	57.5	1440	56.7
	Flap Track 4 (FTE4)	1681	66.2	1605	63.2	1573	61.9	1619	63.7	1593	62.7
-10°C	Flap Track 1 (FTE1)	1220	48.0	1138	44.8	1122	44.2	1151	45.3	1136	44.7
	Flap Track 2 (FTE2)	1387	54.6	1308	51.5	1287	50.7	1321	52.0	1303	51.3
	Flap Track 3 (FTE3)	1514	59.6	1437	56.6	1412	55.6	1451	57.1	1430	56.3
	Flap Track 4 (FTE4)	1669	65.7	1594	62.8	1563	61.5	1608	63.3	1583	62.3
-20°C	Flap Track 1 (FTE1)	1208	47.6	1128	44.4	1113	43.8	1141	44.9	1126	44.3
	Flap Track 2 (FTE2)	1375	54.1	1297	51.1	1277	50.3	1310	51.6	1293	50.9
	Flap Track 3 (FTE3)	1502	59.1	1427	56.2	1402	55.2	1440	56.7	1420	55.9
	Flap Track 4 (FTE4)	1657	65.2	1584	62.4	1553	61.1	1598	62.9	1573	61.9

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
-30°C	Flap Track 1 (FTE1)	1196	47.1	1118	44.0	1103	43.4	1131	44.5	1116	43.9
	Flap Track 2 (FTE2)	1363	53.7	1287	50.7	1268	49.9	1300	51.2	1283	50.5
	Flap Track 3 (FTE3)	1491	58.7	1417	55.8	1392	54.8	1430	56.3	1410	55.5
	Flap Track 4 (FTE4)	1645	64.8	1574	62.0	1543	60.7	1588	62.5	1564	61.6
-40°C	Flap Track 1 (FTE1)	1184	46.6	1108	43.6	1093	43.0	1120	44.1	1106	43.5
	Flap Track 2 (FTE2)	1352	53.2	1278	50.3	1258	49.5	1290	50.8	1274	50.2
	Flap Track 3 (FTE3)	1479	58.2	1407	55.4	1383	54.4	1420	55.9	1400	55.1
	Flap Track 4 (FTE4)	1633	64.3	1564	61.6	1534	60.4	1577	62.1	1554	61.2

**Table 8 Ground Clearances at Flap Detent 2 Status of Flap Track Fairing (Figure 4)**

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
15°C	Flap Track 1 (FTF1)	1285	50.6	1197	47.1	1182	46.5	1211	47.7	1196	47.1
	Flap Track 2 (FTF2)	1441	56.7	1356	53.4	1335	52.6	1370	53.9	1352	53.2
	Flap Track 3 (FTF3)	1559	61.4	1476	58.1	1450	57.1	1490	58.7	1469	57.8
	Flap Track 4 (FTF4)	1708	67.2	1629	64.1	1597	62.9	1644	64.7	1618	63.7

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
0°C	Flap Track 1 (FTF1)	1266	49.8	1182	46.5	1167	45.9	1195	47.0	1180	46.5
	Flap Track 2 (FTF2)	1423	56.0	1340	52.8	1320	52.0	1354	53.3	1337	52.6
	Flap Track 3 (FTF3)	1540	60.6	1460	57.5	1435	56.5	1474	58.0	1453	57.2
	Flap Track 4 (FTF4)	1690	66.5	1613	63.5	1582	62.3	1628	64.1	1603	63.1
-10°C	Flap Track 1 (FTF1)	1254	49.4	1172	46.1	1157	45.6	1185	46.7	1170	46.1
	Flap Track 2 (FTF2)	1411	55.6	1330	52.4	1310	51.6	1343	52.9	1327	52.2
	Flap Track 3 (FTF3)	1528	60.2	1450	57.1	1425	56.1	1463	57.6	1443	56.8
	Flap Track 4 (FTF4)	1678	66.1	1603	63.1	1572	61.9	1617	63.7	1593	62.7
-20°C	Flap Track 1 (FTF1)	1242	48.9	1162	45.7	1147	45.2	1174	46.2	1160	45.7
	Flap Track 2 (FTF2)	1399	55.1	1320	52.0	1301	51.2	1333	52.5	1317	51.9
	Flap Track 3 (FTF3)	1516	59.7	1440	56.7	1416	55.7	1453	57.2	1433	56.4
	Flap Track 4 (FTF4)	1666	65.6	1593	62.7	1562	61.5	1607	63.3	1583	62.3
-30°C	Flap Track 1 (FTF1)	1230	48.4	1152	45.4	1137	44.8	1164	45.8	1150	45.3
	Flap Track 2 (FTF2)	1387	54.6	1310	51.6	1291	50.8	1323	52.1	1307	51.5
	Flap Track 3 (FTF3)	1504	59.2	1430	56.3	1406	55.4	1443	56.8	1424	56.1
	Flap Track 4 (FTF4)	1654	65.1	1583	62.3	1553	61.1	1596	62.8	1573	61.9

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
-40°C	Flap Track 1 (FTF1)	1218	48.0	1142	45.0	1127	44.4	1154	45.4	1140	44.9
	Flap Track 2 (FTF2)	1375	54.1	1300	51.2	1281	50.4	1312	51.7	1297	51.1
	N0.3 Flap Track	1492	58.7	1420	55.9	1396	55.0	1433	56.4	1414	55.7
	N0.4 Flap Track	1642	64.6	1573	61.9	1543	60.7	1586	62.4	1563	61.5

**Table 9 Ground Clearances at Flap Smooth Status of Flap Track Fairing (Figure 5)**

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
15°C	Flap Track 1 (FTR1)	1285	50.6	1197	47.1	1182	46.5	1211	47.7	1196	47.1
	Flap Track 2 (FTR2)	1441	56.7	1356	53.4	1335	52.6	1370	53.9	1352	53.2
	Flap Track 3 (FTR3)	1559	61.4	1476	58.1	1450	57.1	1490	58.7	1469	57.8
	Flap Track 4 (FTR4)	1708	67.2	1629	64.1	1597	62.9	1644	64.7	1618	63.7
0°C	Flap Track 1 (FTR1)	1266	49.8	1182	46.5	1167	45.9	1195	47.0	1180	46.5
	Flap Track 2 (FTR2)	1423	56.0	1340	52.8	1320	52.0	1354	53.3	1337	52.6
	Flap Track 3 (FTR3)	1540	60.6	1460	57.5	1435	56.5	1474	58.0	1453	57.2
	Flap Track 4 (FTR4)	1690	66.5	1613	63.5	1582	62.3	1628	64.1	1603	63.1

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
-10℃	Flap Track 1 (FTR1)	1254	49.4	1172	46.1	1157	45.6	1185	46.7	1170	46.1
	Flap Track 2 (FTR2)	1411	55.6	1330	52.4	1310	51.6	1343	52.9	1327	52.2
	Flap Track 3 (FTR3)	1528	60.2	1450	57.1	1425	56.1	1463	57.6	1443	56.8
	Flap Track 4 (FTR4)	1678	66.1	1603	63.1	1572	61.9	1617	63.7	1593	62.7
-20℃	Flap Track 1 (FTR1)	1242	48.9	1162	45.7	1147	45.2	1174	46.2	1160	45.7
	Flap Track 2 (FTR2)	1399	55.1	1320	52.0	1301	51.2	1333	52.5	1317	51.9
	Flap Track 3 (FTR3)	1516	59.7	1440	56.7	1416	55.7	1453	57.2	1433	56.4
	Flap Track 4 (FTR4)	1666	65.6	1593	62.7	1562	61.5	1607	63.3	1583	62.3
-30℃	Flap Track 1 (FTR1)	1230	48.4	1152	45.4	1137	44.8	1164	45.8	1150	45.3
	Flap Track 2 (FTR2)	1387	54.6	1310	51.6	1291	50.8	1323	52.1	1307	51.5
	Flap Track 3 (FTR3)	1504	59.2	1430	56.3	1406	55.4	1443	56.8	1424	56.1
	Flap Track 4 (FTR4)	1654	65.1	1583	62.3	1553	61.1	1596	62.8	1573	61.9
-40℃	Flap Track 1 (FTR1)	1218	48.0	1142	45.0	1127	44.4	1154	45.4	1140	44.9
	Flap Track 2 (FTR2)	1375	54.1	1300	51.2	1281	50.4	1312	51.7	1297	51.1
	Flap Track 3 (FTR3)	1492	58.7	1420	55.9	1396	55.0	1433	56.4	1414	55.7
	Flap Track 4 (FTR4)	1642	64.6	1573	61.9	1543	60.7	1586	62.4	1563	61.5

# Ramp Servicing Operation Instruction

Table 10 Ground Clearances at Aileron Down Status (Figure 6)

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
15°C	Aileron Inboard (ADIN)	1976	77.8	1901	74.8	1864	73.4	1916	75.4	1886	74.3
	Aileron Outboard (ADOUT)	2095	82.5	2022	79.6	1979	77.9	2038	80.2	2003	78.9
0°C	Aileron Inboard (ADIN)	1958	77.1	1885	74.2	1849	72.8	1900	74.8	1870	73.6
	Aileron Outboard (ADOUT)	2077	81.8	2006	79.0	1964	77.3	2022	79.6	1988	78.3
-10°C	Aileron Inboard (ADIN)	1946	76.6	1875	73.8	1839	72.4	1889	74.4	1861	73.3
	Aileron Outboard (ADOUT)	2065	81.3	1996	78.6	1954	76.9	2011	79.2	1978	77.9
-20°C	Aileron Inboard (ADIN)	1935	76.2	1865	73.4	1830	72.0	1879	74.0	1851	72.9
	Aileron Outboard (ADOUT)	2053	80.8	1986	78.2	1945	76.6	2000	78.7	1969	77.5
-30°C	Aileron Inboard (ADIN)	1923	75.7	1855	73.0	1820	71.7	1868	73.5	1841	72.5
	Aileron Outboard (ADOUT)	2041	80.4	1976	77.8	1935	76.2	1990	78.3	1959	77.1



Out- side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
-40°C	Aileron Inboard (ADIN)	1911	75.2	1811	71.3	1845	72.6	1858	73.1	1832	72.1
	Aileron Outboard (ADOUT)	2030	79.9	1926	75.8	1966	77.4	1980	78.0	1950	76.8

Table 11 Ground Clearances at Aileron Raise Status (Figure 7)

Out- side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
15°C	Aileron Inboard (AUIN)	2324	91.5	2249	88.5	2212	87.1	2264	89.1	2233	87.9
	Aileron Outboard (AUOUT)	2339	92.1	2267	89.3	2223	87.5	2282	89.8	2248	88.5
0°C	Aileron Inboard (AUIN)	2306	90.8	2233	87.9	2197	86.5	2248	88.5	2218	87.3
	Aileron Outboard (AUOUT)	2321	91.4	2251	88.6	2208	86.9	2266	89.2	2233	87.9
-10°C	Aileron Inboard (AUIN)	2294	90.3	2223	87.5	2187	86.1	2237	88.1	2208	86.9
	Aileron Outboard (AUOUT)	2309	90.9	2241	88.2	2199	86.6	2256	88.8	2223	87.5
-20°C	Aileron Inboard (AUIN)	2282	89.8	2213	87.1	2177	85.7	2227	87.7	2198	86.5
	Aileron Outboard (AUOUT)	2297	90.4	2231	87.8	2189	86.2	2245	88.4	2213	87.1

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Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
-30°C	Aileron Inboard (AUIN)	2271	89.4	2203	86.7	2168	85.4	2216	87.2	2189	86.2
	Aileron Outboard (AUOUT)	2286	90.0	2220	87.4	2180	85.8	2235	88.0	2203	86.7
-40°C	Aileron Inboard (AUIN)	2259	88.9	2158	85.0	2193	86.3	2206	86.9	2179	85.8
	Aileron Outboard (AUOUT)	2274	89.5	2170	85.4	2211	87.0	2224	87.6	2194	86.4

Table 12 Ground Clearances at Spoiler Raise Status (Figure 8)

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
15°C	No.1 Spoiler Inboard (SP1IN)	2440	96.1	2353	92.6	2339	92.1	2366	93.1	2351	92.6
	No.1 Spoiler Outboard (SP1OUT)	2523	99.3	2435	95.9	2419	95.2	2449	96.4	2433	95.8
	No.2 Spoiler Inboard (SP2IN)	2477	97.5	2390	94.1	2372	93.4	2404	94.6	2388	94.0
	No.2 Spoiler Outboard (SP2OUT)	2470	97.2	2386	93.9	2363	93.0	2400	94.5	2380	93.7
	No.3 Spoiler Inboard (SP3IN)	2470	97.2	2385	93.9	2363	93.0	2399	94.4	2380	93.7

Out- side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
	No.3 Spoiler Outboard (SP3OUT)	2454	96.6	2373	93.4	2345	92.3	2387	94.0	2364	93.1
	No.4 Spoiler Inboard (SP4IN)	2454	96.6	2372	93.4	2345	92.3	2387	94.0	2364	93.1
	No.4 Spoiler Outboard (SP4OUT)	2442	96.1	2363	93.0	2331	91.8	2377	93.6	2351	92.6
0°C	No.1 Spoiler Inboard (SP1IN)	2421	95.3	2337	92.0	2324	91.5	2350	92.5	2335	91.9
	No.1 Spoiler Outboard (SP1OUT)	2504	98.6	2420	95.3	2404	94.6	2433	95.8	2418	95.2
	No.2 Spoiler Inboard (SP2IN)	2458	96.8	2375	93.5	2357	92.8	2388	94.0	2372	93.4
	No.2 Spoiler Outboard (SP2OUT)	2451	96.5	2370	93.3	2348	92.4	2384	93.9	2365	93.1
	No.3 Spoiler Inboard (SP3IN)	2451	96.5	2370	93.3	2348	92.4	2384	93.9	2365	93.1
	No.3 Spoiler Outboard (SP3OUT)	2436	95.9	2357	92.8	2330	91.7	2371	93.3	2349	92.5
	No.4 Spoiler Inboard (SP4IN)	2436	95.9	2357	92.8	2330	91.7	2371	93.3	2349	92.5
	No.4 Spoiler Outboard (SP4OUT)	2423	95.4	2347	92.4	2316	91.2	2361	93.0	2336	92.0

# Ramp Servicing Operation Instruction

Out-side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
-10°C	No.1 Spoiler Inboard (SP1IN)	2409	94.8	2327	91.6	2314	91.1	2340	92.1	2325	91.5
	No.1 Spoiler Outboard (SP1OUT)	2492	98.1	2410	94.9	2394	94.3	2423	95.4	2408	94.8
	No.2 Spoiler Inboard (SP2IN)	2446	96.3	2365	93.1	2347	92.4	2378	93.6	2362	93.0
	No.2 Spoiler Outboard (SP2OUT)	2439	96.0	2360	92.9	2338	92.0	2373	93.4	2355	92.7
	No.3 Spoiler Inboard (SP3IN)	2439	96.0	2360	92.9	2338	92.0	2373	93.4	2355	92.7
	No.3 Spoiler Outboard (SP3OUT)	2424	95.4	2347	92.4	2320	91.3	2360	92.9	2339	92.1
	No.4 Spoiler Inboard (SP4IN)	2424	95.4	2347	92.4	2320	91.3	2360	92.9	2339	92.1
	No.4 Spoiler Outboard (SP4OUT)	2411	94.9	2337	92.0	2306	90.8	2351	92.6	2326	91.6
-20°C	No.1 Spoiler Inboard (SP1IN)	2397	94.4	2317	91.2	2304	90.7	2330	91.7	2315	91.1
	No.1 Spoiler Outboard (SP1OUT)	2480	97.6	2400	94.5	2384	93.9	2412	95.0	2398	94.4
	No.2 Spoiler Inboard (SP2IN)	2434	95.8	2355	92.7	2337	92.0	2367	93.2	2352	92.6

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
	No.2 Spoiler Outboard (SP2OUT)	2427	95.6	2350	92.5	2328	91.7	2363	93.0	2345	92.3
	No.3 Spoiler Inboard (SP3IN)	2427	95.6	2350	92.5	2328	91.7	2363	93.0	2345	92.3
	No.3 Spoiler Outboard (SP3OUT)	2412	95.0	2337	92.0	2311	91.0	2350	92.5	2329	91.7
	No.4 Spoiler Inboard (SP4IN)	2412	95.0	2337	92.0	2310	90.9	2350	92.5	2329	91.7
	No.4 Spoiler Outboard (SP4OUT)	2399	94.4	2327	91.6	2296	90.4	2340	92.1	2316	91.2
-30℃	No.1 Spoiler Inboard (SP1IN)	2385	93.9	2307	90.8	2294	90.3	2319	91.3	2305	90.7
	No.1 Spoiler Outboard (SP1OUT)	2468	97.2	2390	94.1	2374	93.5	2402	94.6	2388	94.0
	No.2 Spoiler Inboard (SP2IN)	2422	95.4	2345	92.3	2328	91.7	2357	92.8	2342	92.2
	No.2 Spoiler Outboard (SP2OUT)	2415	95.1	2340	92.1	2319	91.3	2352	92.6	2335	91.9
	No.3 Spoiler Inboard (SP3IN)	2415	95.1	2340	92.1	2318	91.3	2352	92.6	2335	91.9
	No.3 Spoiler Outboard (SP3OUT)	2400	94.5	2327	91.6	2301	90.6	2340	92.1	2319	91.3

# Ramp Servicing Operation Instruction

Out-side air temperature	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		Aft CG		FWD CG		Aft CG	
		Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)	Met-ric (mm)	Eng-lish (in)
	No.4 Spoiler Inboard (SP4IN)	2400	94.5	2327	91.6	2301	90.6	2340	92.1	2319	91.3
	No.4 Spoiler Outboard (SP4OUT)	2388	94.0	2317	91.2	2286	90.0	2330	91.7	2307	90.8
-40°C	No.1 Spoiler Inboard (SP1IN)	2373	93.4	2297	90.4	2284	89.9	2309	90.9	2295	90.4
	No.1 Spoiler Outboard (SP1OUT)	2456	96.7	2380	93.7	2364	93.1	2392	94.2	2378	93.6
	No.2 Spoiler Inboard (SP2IN)	2410	94.9	2335	91.9	2318	91.3	2347	92.4	2332	91.8
	No.2 Spoiler Outboard (SP2OUT)	2403	94.6	2330	91.7	2309	90.9	2342	92.2	2325	91.5
	Spoiler 3 inboard	2403	94.6	2330	91.7	2309	90.9	2342	92.2	2325	91.5
	No.3 Spoiler Outboard (SP3OUT)	2388	94.0	2317	91.2	2291	90.2	2329	91.7	2310	90.9
	No.4 Spoiler Inboard (SP4IN)	2388	94.0	2317	91.2	2291	90.2	2329	91.7	2309	90.9
	No.4 Spoiler Outboard (SP4OUT)	2376	93.5	2307	90.8	2277	89.6	2320	91.3	2297	90.4

Table 13 Ground Clearances at Leading Edge Slat Extended Status (Figure 9)

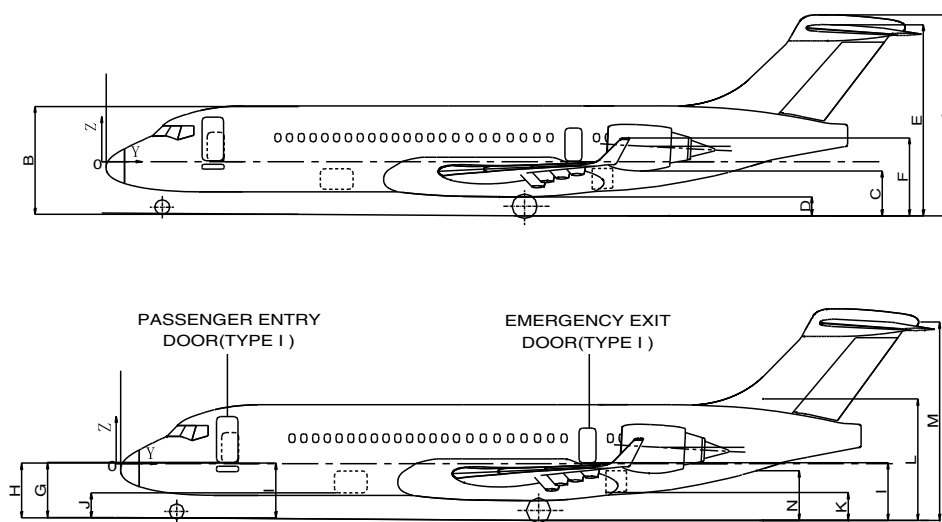
Out- side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		AFT CG		FWD CG		AFT CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
15°C	Slat 1 Inboard (SL1IN)	1598	62.9	1490	58.7	1497	58.9	1501	59.1	1512	59.5
	Slat 1 Outboard (SL1OUT)	1801	70.9	1702	67.0	1695	66.7	1714	67.5	1713	67.4
	Slat 2 Inboard (SL2IN)	1801	70.9	1703	67.0	1696	66.8	1715	67.5	1714	67.5
	Slat 2 Outboard (SL2OUT)	1967	77.4	1877	73.9	1856	73.1	1891	74.4	1878	73.9
	Slat 3 Inboard (SL3IN)	1967	77.4	1878	73.9	1856	73.1	1891	74.4	1878	73.9
	Slat 3 Outboard (SL3OUT)	2106	82.9	2027	79.8	1989	78.3	2041	80.4	2015	79.3
0°C	Slat 1 Inboard (SL1IN)	1579	62.2	1475	58.1	1482	58.3	1486	58.5	1496	58.9
	Slat 1 Outboard (SL1OUT)	1782	70.2	1687	66.4	1680	66.1	1699	66.9	1698	66.9
	Slat 2 Inboard (SL2IN)	1782	70.2	1688	66.5	1680	66.1	1699	66.9	1698	66.9
	Slat 2 Outboard (SL2OUT)	1948	76.7	1862	73.3	1841	72.5	1875	73.8	1862	73.3
	Slat 3 Inboard (SL3IN)	1948	76.7	1862	73.3	1841	72.5	1875	73.8	1863	73.3
	Slat 3 Outboard (SL3OUT)	2088	82.2	2011	79.2	1974	77.7	2025	79.7	2000	78.7

# Ramp Servicing Operation Instruction

Out-side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		AFT CG		FWD CG		AFT CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
-10°C	Slat 1 Inboard (SL1IN)	1566	61.7	1465	57.7	1472	58.0	1475	58.1	1485	58.5
	Slat 1 Outboard (SL1OUT)	1769	69.6	1677	66.0	1670	65.7	1689	66.5	1687	66.4
	Slat 2 Inboard (SL2IN)	1770	69.7	1678	66.1	1670	65.7	1689	66.5	1688	66.5
	Slat 2 Outboard (SL2OUT)	1936	76.2	1852	72.9	1831	72.1	1864	73.4	1852	72.9
	Slat 3 Inboard (SL3IN)	1936	76.2	1852	72.9	1831	72.1	1865	73.4	1853	73.0
	Slat 3 Outboard (SL3OUT)	2076	81.7	2001	78.8	1964	77.3	2015	79.3	1990	78.3
-20°C	Slat 1 Inboard (SL1IN)	1553	61.1	1455	57.3	1461	57.5	1465	57.7	1475	58.1
	Slat 1 Outboard (SL1OUT)	1757	69.2	1667	65.6	1660	65.4	1678	66.1	1677	66.0
	Slat 2 Inboard (SL2IN)	1757	69.2	1668	65.7	1660	65.4	1679	66.1	1678	66.1
	Slat 2 Outboard (SL2OUT)	1924	75.7	1842	72.5	1821	71.7	1854	73.0	1842	72.5
	Slat 3 Inboard (SL3IN)	1924	75.7	1842	72.5	1821	71.7	1854	73.0	1843	72.6
	Slat 3 Outboard (SL3OUT)	2064	81.3	1991	78.4	1955	77.0	2004	78.9	1980	78.0
-30°C	Slat 1 Inboard (SL1IN)	1541	60.7	1445	56.9	1451	57.1	1455	57.3	1464	57.6
	Slat 1 Outboard (SL1OUT)	1745	68.7	1657	65.2	1650	65.0	1668	65.7	1667	65.6
	Slat 2 Inboard (SL2IN)	1745	68.7	1658	65.3	1650	65.0	1669	65.7	1667	65.6
	Slat 2 Outboard (SL2OUT)	1912	75.3	1832	72.1	1811	71.3	1844	72.6	1832	72.1

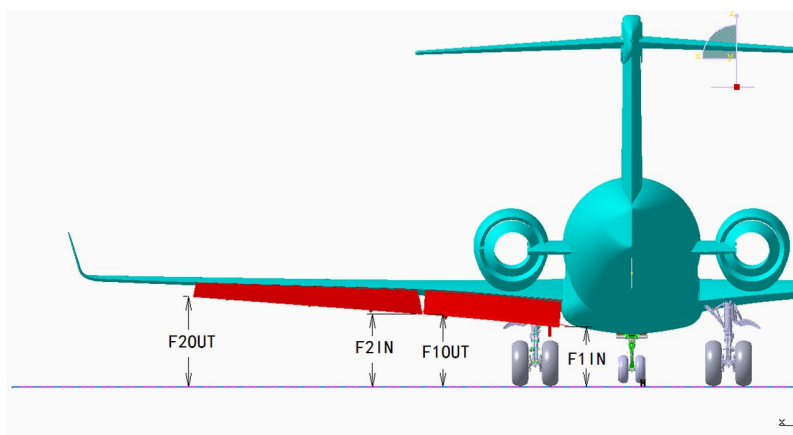


Out- side air tem- pera- ture	Description	Operating Empty Weight		Maximum Taxi Weight-ER				Maximum Taxi Weight-STD			
				FWD CG		AFT CG		FWD CG		AFT CG	
		Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)	Met- ric (mm)	Eng- lish (in)
-40°C	Slat 3 Inboard (SL3IN)	1912	75.3	1832	72.1	1811	71.3	1844	72.6	1833	72.2
	Slat 3 Outboard (SL3OUT)	2052	80.8	1981	78.0	1945	76.6	1994	78.5	1971	77.6
	Slat 1 Inboard (SL1IN)	1528	60.2	1436	56.5	1441	56.7	1445	56.9	1454	57.2
	Slat 1 Outboard (SL1OUT)	1732	68.2	1647	64.8	1640	64.6	1658	65.3	1657	65.2
	Slat 2 Inboard (SL2IN)	1733	68.2	1648	64.9	1641	64.6	1659	65.3	1657	65.2
	Slat 2 Outboard (SL2OUT)	1900	74.8	1822	71.7	1801	70.9	1834	72.2	1822	71.7
	Slat 3 Inboard (SL3IN)	1900	74.8	1822	71.7	1802	70.9	1834	72.2	1823	71.8
	Slat 3 Outboard (SL3OUT)	2040	80.3	1971	77.6	1936	76.2	1984	78.1	1961	77.2

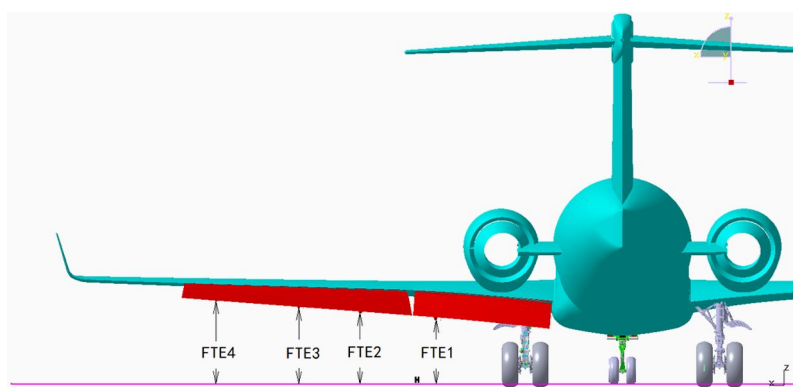


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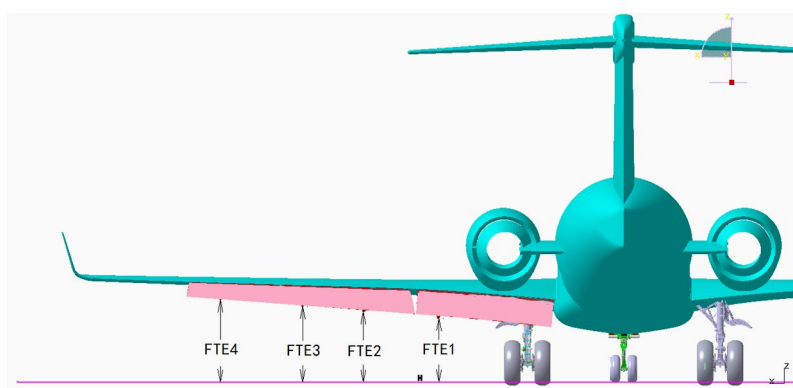
Figure 1 Ground Clearances (Sheet 1 of 1)



ICN-ARJ21-A-192002-A-SVV19-92334-A-001-01

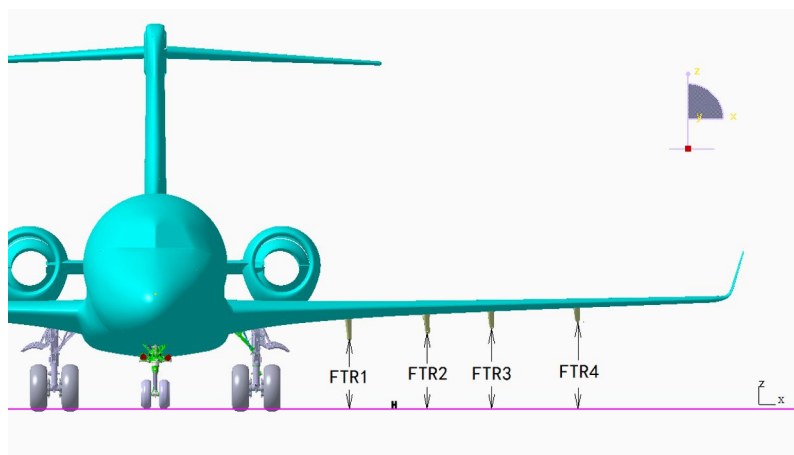
**Figure 2 Ground Clearances at Flap Fully Extended Status of Each Flap (Sheet 1 of 1)**

ICN-ARJ21-A-192002-A-SVV19-92335-A-001-01

**Figure 3 Ground Clearances at Flap Fully Extended Status of Flap Track Fairing (Sheet 1 of 1)**

ICN-ARJ21-A-192002-A-SVV19-92336-A-001-01

**Figure 4 Ground Clearances at Flap Detent 2 Status of Flap Track Fairing (Sheet 1 of 1)**



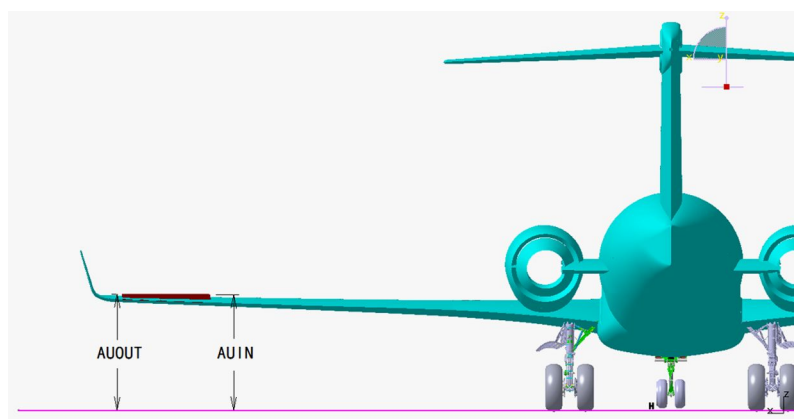
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**Figure 5 Ground Clearances of Flap Track Fairing (Sheet 1 of 1)**



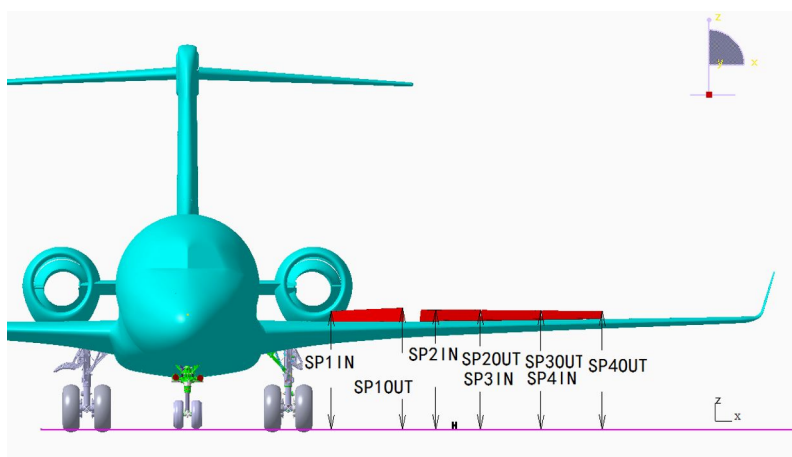
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**Figure 6 Ground Clearances at Aileron Down Status (Sheet 1 of 1)**

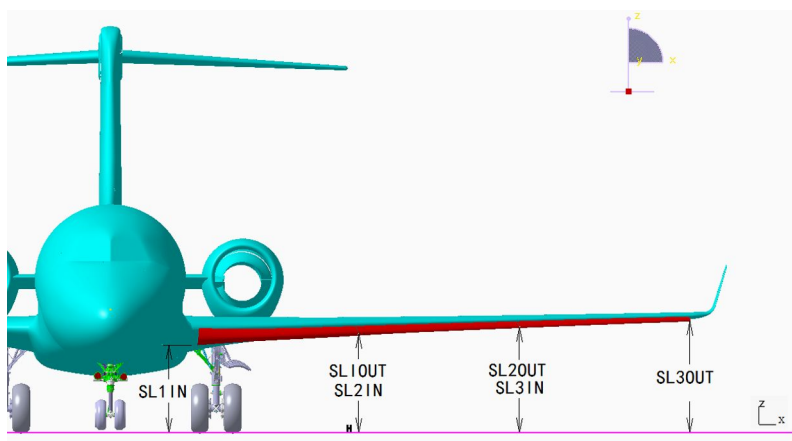


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**Figure 7 Ground Clearances at Aileron Raise Status (Sheet 1 of 1)**



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**Figure 8 Ground Clearances at Spoiler Raise Status (Sheet 1 of 1)**

ICN-ARJ21-A-192002-A-SVV19-92341-A-001-01

**Figure 9 Ground Clearances at Leading Edge Slat Extended Status (Sheet 1 of 1)**

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## External panel - Technical data

### 1. General

- A. This section provides the ground service connections standard and location information.

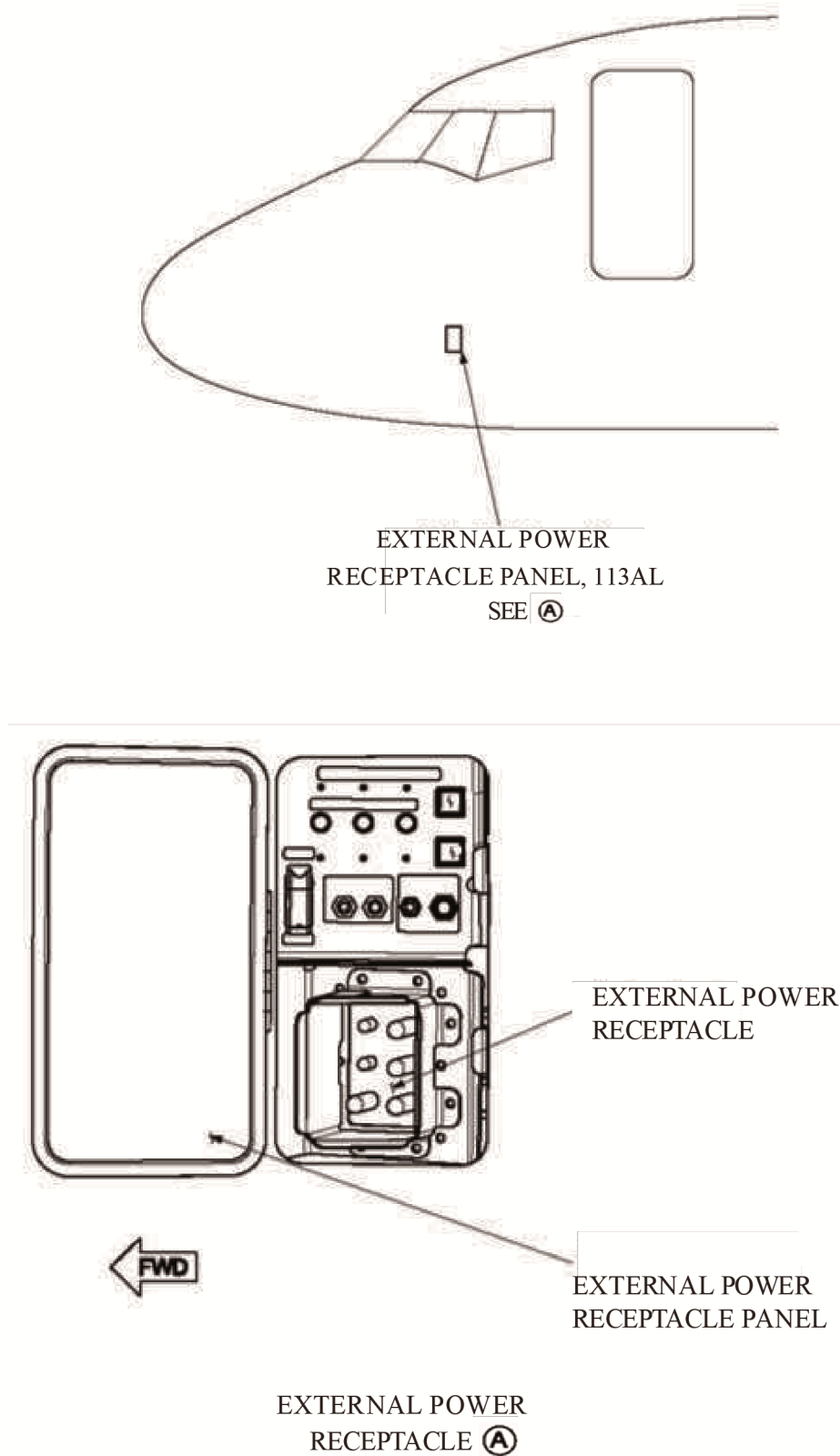
### 2. External power connection

#### A. External Power Panel

- (1) External power receptacle is located in the nose left, 1.71m mean height from ground.
- (2) External power receptacle is 6-plug, comply with ISO R461 standard.
- (3) External power provides 40kVA, 115V 400HZ three-Phase alternating Current.
- (4) AVAIL Light:
  - (a) Light on: EXT PWR is engaged in and parameters are normal.
  - (b) Light off: EXT PWR is disengaged.
- (5) IN USE Light:
  - (a) Light on: It indicates that the EXT PWR is supplying the aircraft electrical network.
  - (b) Light off: It indicates that the EXT PWR is not supplying the aircraft electrical network.

#### B. Ground power unit

- (1) Ground power unit should be complied with SAE AS81790 standard.
- (2) The normal continuous load is 40kV-A, overload is 52.5kV-A for 5 minutes, overload is 70kV-A for 5 seconds.



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Figure 1 External Power Receptacle (Sheet 1 of 1)

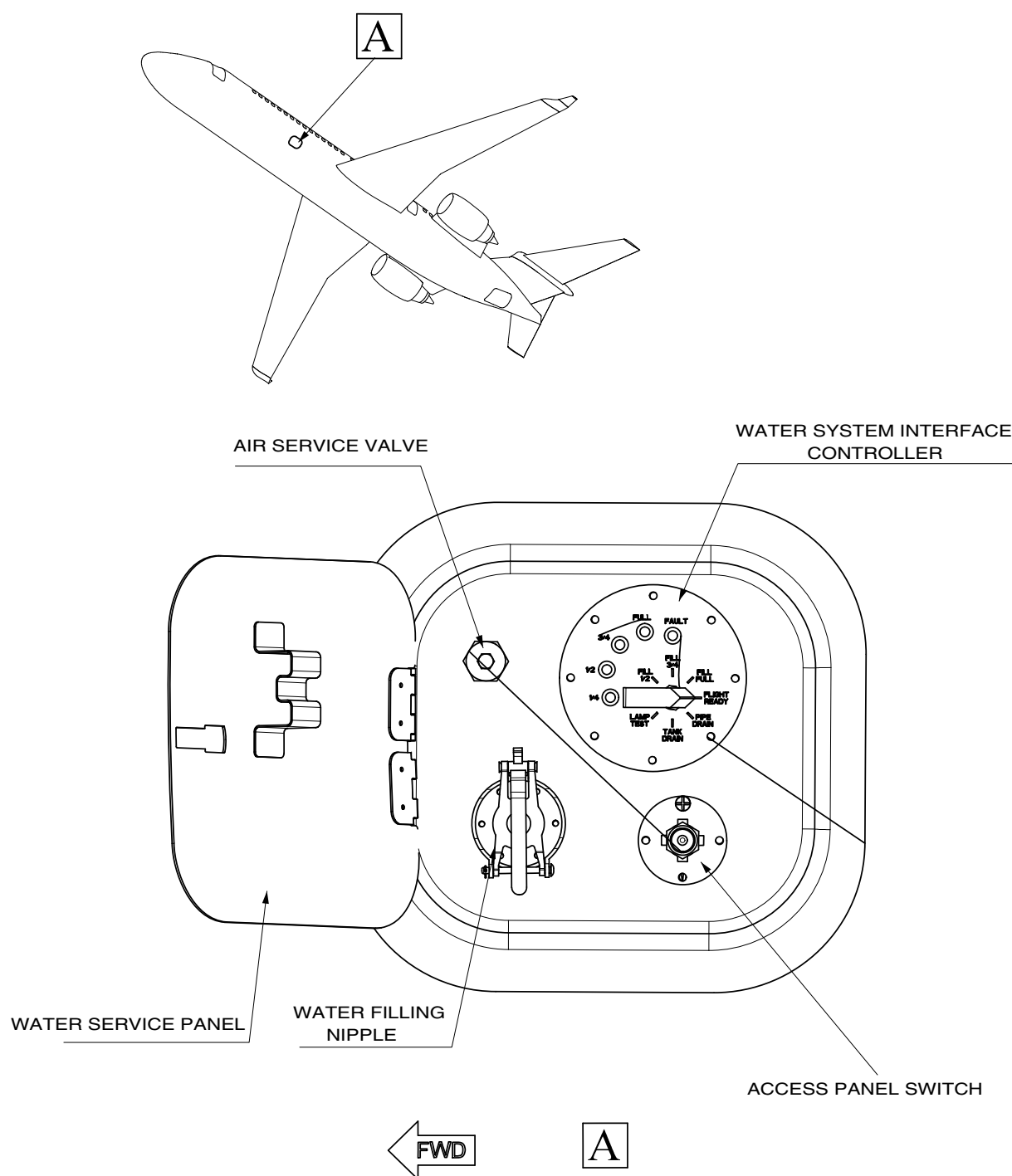
### 3. Potable drinking water interface.

#### A. Potable drinking water panel

- (1) Potable drinking water service panel is located in the middle fuselage, 1.93m mean height from ground.
- (2) Water tank capacity: 83L.
- (3) Maximum filling water pressure: 3.45bar(50psi)
- (4) Eight positions:
  - (a) FLIGHT READY
  - (b) FILL FULL
  - (c) FILL 3/4
  - (d) FILL 1/2
  - (e) FILL 1/4
  - (f) PIPE DRAIN
  - (g) TANK DRAIN
  - (h) LAMP TEST
- (5) Five indicator lights are:
  - (a) 1/4 indicator (Turn the knob to FILL 1/4 position. When the potable water tank is filled to 1/4 position, the indicator light comes on to notify the ground crew of the completion of filling 1/4 water)
  - (b) 1/2 indicator (indicating that 1/2 water is filled and the principle is the same as that of 1/4 indicator)
  - (c) 3/4 indicator (indicating that 3/4 water is filled and the principle is the same as that of 1/4 indicator)
  - (d) FULL indicator (indicating that water is filled and the principle is the same as that of 1/4 indicator)
  - (e) FAULT indicator light (FAULT annunciator comes on when the system has a fault)

#### B. Potable water vehicle

- (1) Potable water vehicle should comply with RDS11-16(ISO/DIS 17775) standard.



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**Figure 2 Potable drinking water ground service panel. (Sheet 1 of 1)**

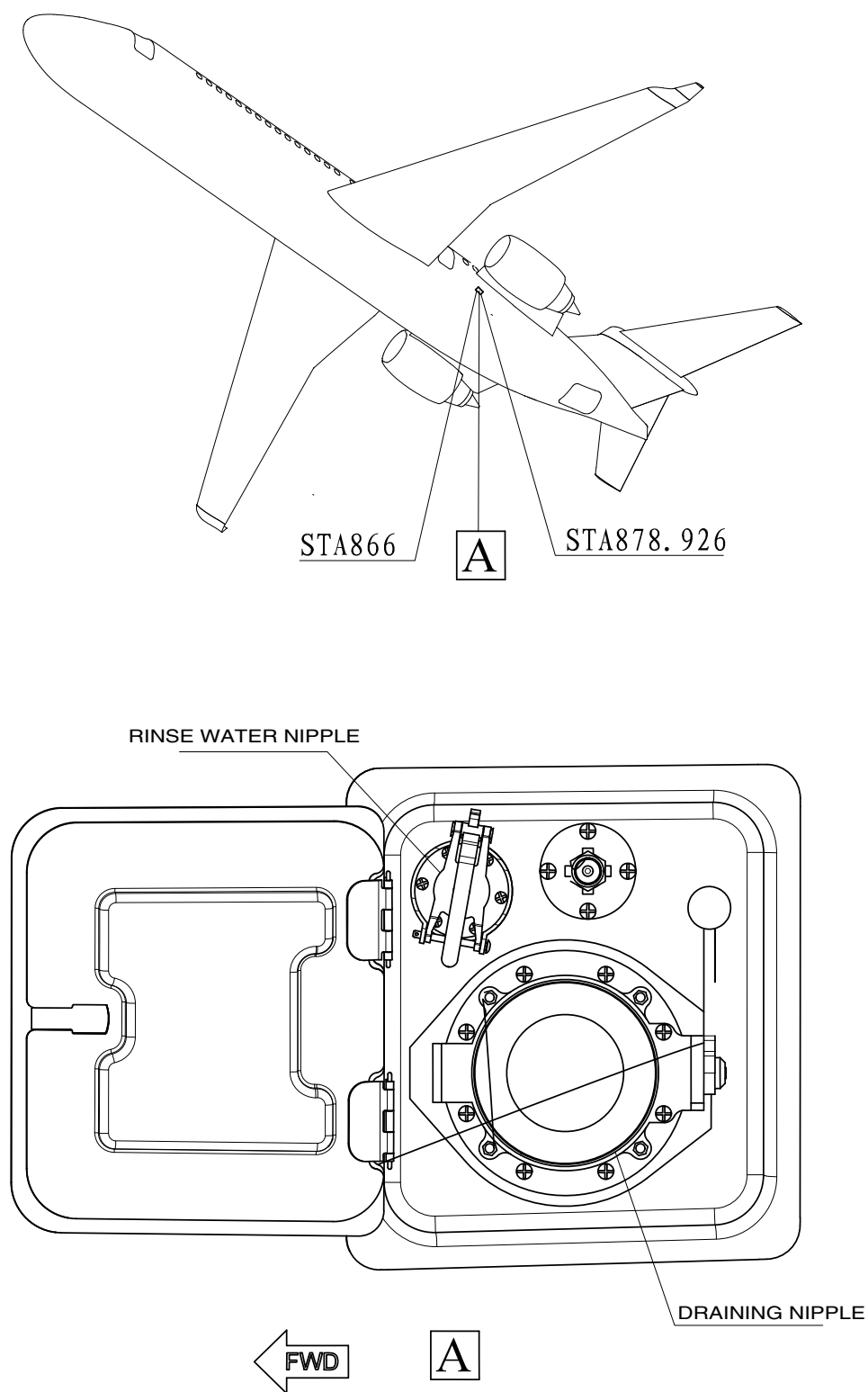
#### 4. Waste water interface.

A. Waste water service panel.

- (1) Waste water service panel is located in the middle fuselage, 1.60m mean height from ground.



- (2) Waste water service panel has flushing nipple and drain fitting.
  - (a) The flushing nipple: comply with ISO/DIS 17775, inner diameter 1 in.
  - (b) The drain fitting: comply with ISO/DIS 17775, inner diameter 4 in.
- (3) Waste tank capacity: 68L.
- (4) Waste flushing pressure: 50PSI.

**Ramp Servicing Operation  
Instruction**

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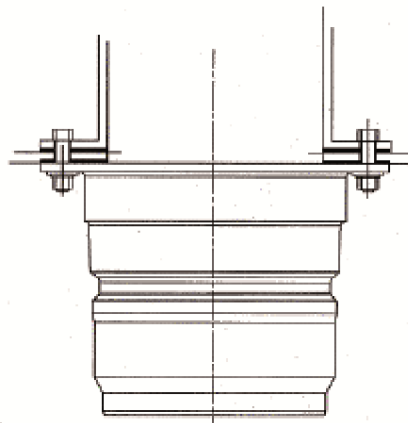
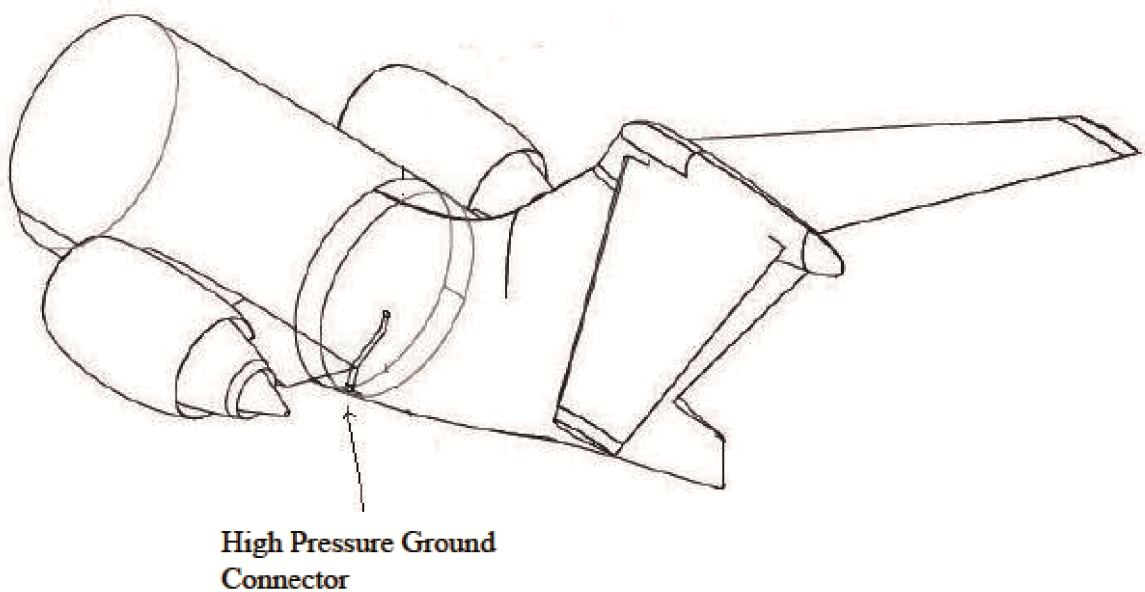
**Figure 3 Waste water service panel (Sheet 1 of 1)****5. High pressure pneumatic**

**A. High pressure pneumatic panel.**

- (1) High pressure pneumatic panel is located in the after fuselage, 1.59m mean height from ground.
- (2) High pressure pneumatic connector diameter is 3in, check Valve, comply with MS33740 standard.

**B. Ground Air Cart**

- (1) The air supply flow: more than 95.1ppm.
- (2) The air supply pressure: 41-60psig.
- (3) The air supply temperature: lower than 260°C.



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**Figure 4 High pressure connector (Sheet 1 of 1)****6. Low pressure ground connector(air condition)**

**Ramp Servicing Operation  
Instruction**

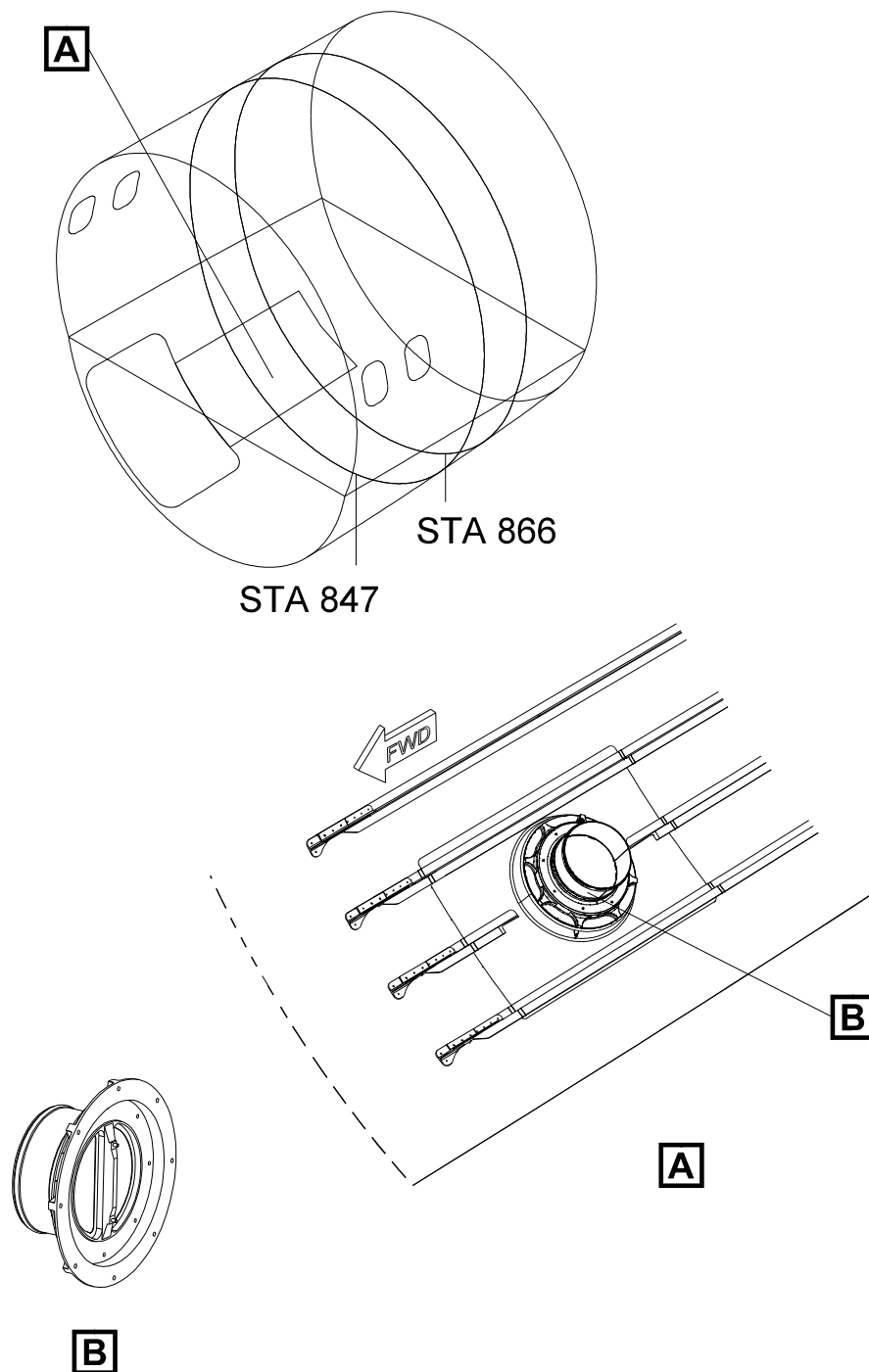
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**A. Low pressure ground panel**

- (1) Low pressure ground panel is located in the after fuselage right, 1.64m mean height from ground.
- (2) Low pressure ground connector diameter is 8in, check Valve, comply with DIN ISO 1034 standard.
- (3) The distance from the nose is about 21.5m.

**B. Air condition unit.**

- (1) Air supply temperature: 3°C - 70°C ( 37.4 °F - 158 °F )
- (2) The air supply flow: lower than 38.6 kg/min (85 lbm/min).
- (3) The air supply pressure: lower than 0.45psi.

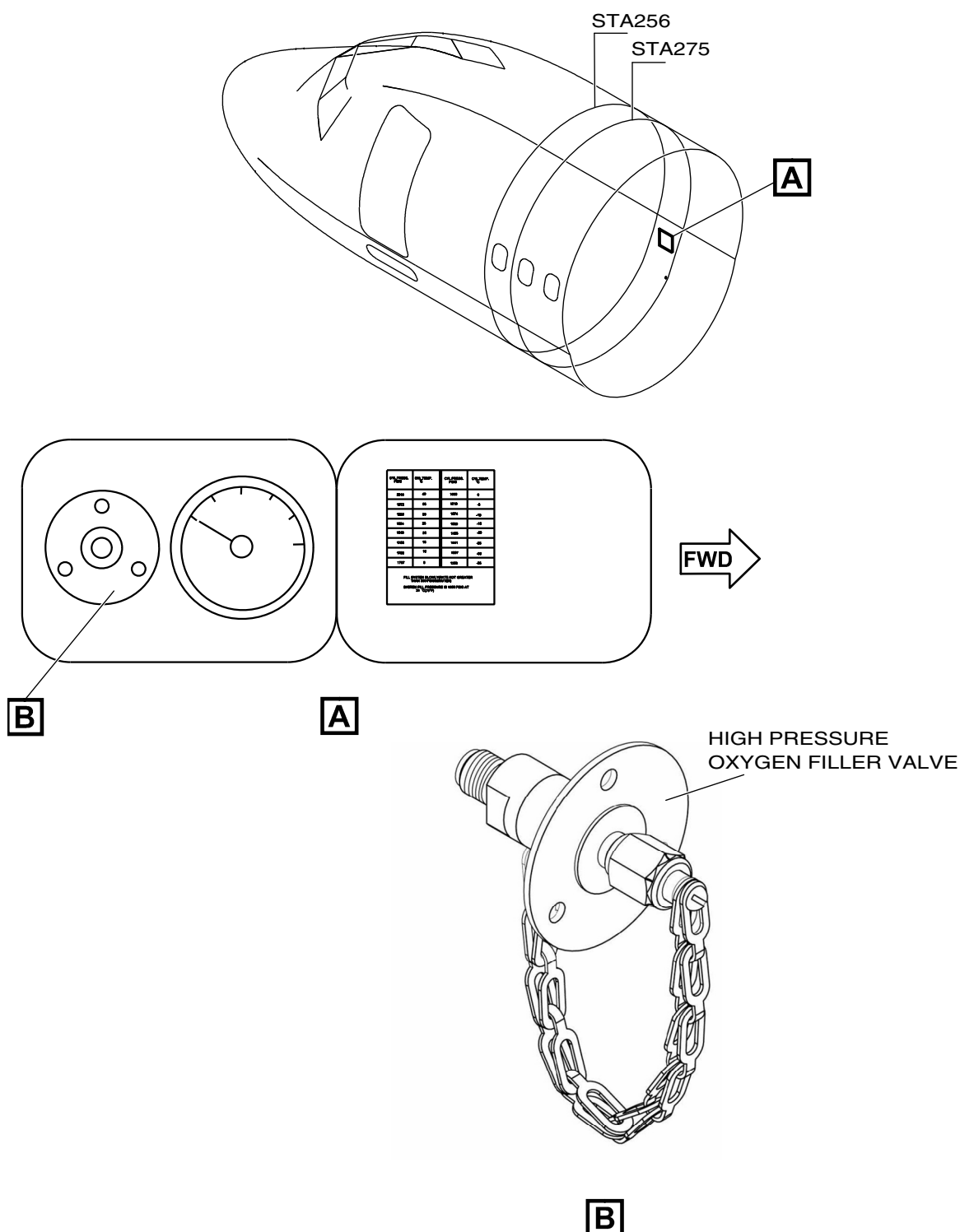


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**Figure 5 Conditioned air distribution system (Sheet 1 of 1)**

## 7. Oxygen filler fitting

- A. Oxygen filler fitting panel is located in the after fuselage right, 1.89m mean height from ground.
- B. The oxygen supply connector diameter is 0.25in.
- C. The oxygen cylinder volume is 77 ft<sup>3</sup>.



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**Figure 6 The oxygen supply connector (Sheet 1 of 1)**

## 8. Refuel and defuel

### A. Refuel and defuel panel

## Ramp Servicing Operation Instruction

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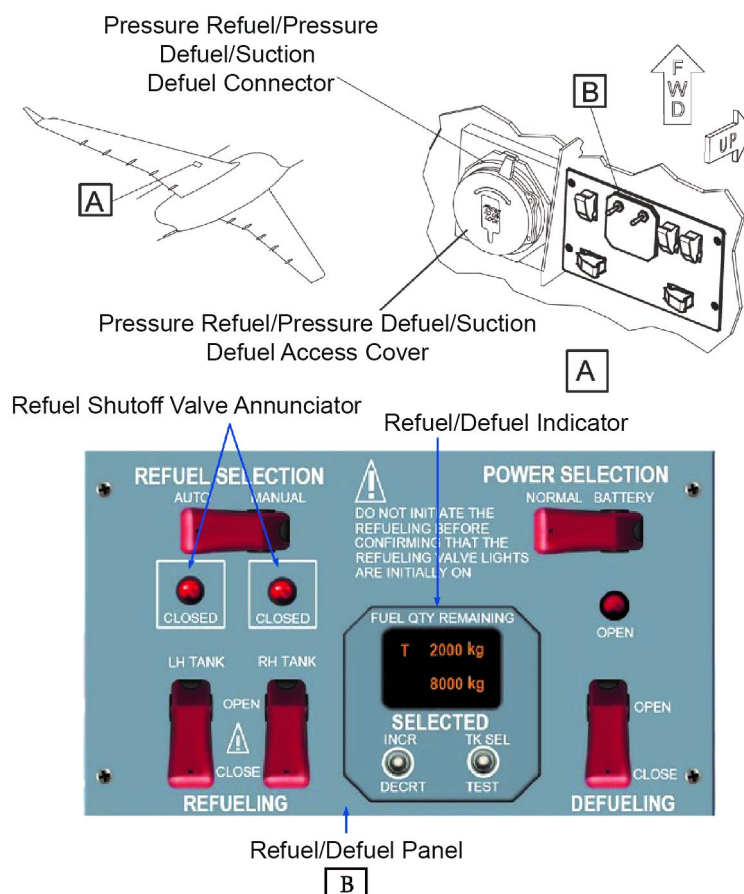
- (1) Refuel and defuel panel is located in the right wing between 3-4 rib, 1.90m mean height from ground.
- (2) Refuel and defuel connector diameter is 2.5in, comply with ISO 45 standard.
- (3) The refuel pressure: 3.45 bar  $\pm$  0.345 bar (50 psi  $\pm$  5 psi).

### B. Refuel and defuel panel

- (1) REFUEL SELECTION Switch (red guarded)
  - (a) AUTO: Automatic Refueling Mode. In this mode, fuel quantity reaches the preset value, the Refuel Shutoff Valve will be closed.
  - (b) MANUAL: Manual Refueling Mode. The refuel shutoff valve needs to be manually controlled.
- (2) Left(Right) Refuel Shutoff Valve CLOSED (LH (RH) TANK CLOSED) Indicator
  - (a) While applying refueling pressure to the refueling system, the light illuminates to indicate that the Left(Right) Refuel Shutoff Valve is automatically closed.
- (3) Refuel/Defuel indicator
  - (a) It indicates the tank fuel quantity and related fault messages. The upper column shows current total fuel quantity. The preselect quantity shows on the lower column during automatic refueling and shows 0 during manual refueling.
- (4) POWER SELECTION Switch (red guarded)
  - (a) NORMAL: Use normal power.
  - (b) BATTERY: Use DC battery power.
- (5) Defuel Shutoff Valve OPEN (DEFUELING OPEN) Indicator
  - (a) This light comes on to indicate that the Defuel Shutoff Valve is in OPEN position.
- (6) LH (RH) TANK REFUELING Switch (red guarded)
  - (a) OPEN: Open the left (right) tank Refuel Shutoff Valve.
  - (b) CLOSE: Close the left (right) tank Refuel Shutoff Valve.
- (7) INCR/DECR Switch
  - (a) It is a three-position switch and is used to increase and decrease the preselect refuel quantity in Automatic Refueling Mode.
  - (b) Middle position: Default position. When you set the switch to other positions and then release it, the switch will automatically move back to the neutral position.
  - (c) INCR: Momentarily set the switch to INCR to increase the preselect refuel quantity.
  - (d) DECRT: Momentarily set the switch to DECRT to decrease the preselect refuel quantity.
- (8) TK SEL/TEST Select Switch
  - (a) It is a three-position switch and is used to switch between fuel quantity indications and test the fuel quantity indicating system.
  - (b) Middle position: Default position. When you set the switch to other positions and then release it, the switch will automatically move back to the neutral position.



- (c) TK SEL: When the switch is momentarily set to TK SEL, the top line on the fuel quantity indicator will alternately show total fuel quantity, left tank fuel quantity and right tank fuel quantity. The left and right tank fuel quantities are shown momentarily.
- (d) TEST: Momentarily set the switch to TEST to initiate self-test of fuel quantity indicating system. Fault codes will show on the indicator following completion of the self-test.
- (9) DEFUELING Switch (red guarded)
  - (a) OPEN: Open the defuel shutoff valve.
  - (b) CLOSE: Close the defuel shutoff valve.



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**Figure 7 Fuel system interface. (Sheet 1 of 1)**

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# **Chapter Aircraft Handling**

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## Safety precautions for towing - General Maintenance Safety Procedure

### 1. Common Information

- A. This section gives the safety precautions to tow the ARJ21-700.
- B. To ensure clarity in the procedure, refer to towing definitions that follow:

Pushback towing	Moving a fully loaded aircraft (passengers, cargo and fuel) from the parking position to the taxiway. The movement includes: push back to turn, one stop, short-distance forward towing to make the front wheel direction consistent with the aircraft direction.
Maintenance towing	the movement of the aircraft for maintenance or remote parking (for example: movement from the gate to the hangar). In maintenance towing, the airplane usually does not load and only contains a very small amount of fuel.
Dispatch towing	Refers to towing a routine flight (containing passengers, fuel and cargo until the aircraft Maximum Ramp Weight) from the parking area of the boarding gate to the nearby area of the available runway, and the moving distance can reach several kilometers.

### 2. Procedures

- A. Obey all the towing safety precautions:

**NOTE:** The following procedures((2)-(3) and (13)-(17) are done by tow tractor driver, the procedure((1) (4)-(12) and (9)-(10) are done by aircraft maintenance person.

- (1) For a safer towing operation, 4 persons are recommender in four positions, who in the flight compartment, the left wing tip, the right wing tip, behind the tail.
- (2) Tow the aircraft from the nose landing gear.
- (3) When tow or push the aircraft on paved rigid runway by a towbar connected to the nose landing gear shock strut, the maximum allowable towing angle of the nose wheel is 102° left or right of the neutral position.
- (4) With deflated tires on one landing gear, you should replace the deflated tires with serviceable tires before towing to prevent damage to the tires and wheels.
- (5) During all phases of ground towing and maintenance, the center of gravity (CG) of the aircraft must be within the CG limits. Make sure that you have an certified operator to perform weight balance.
- (6) Make sure the communication is clear between the maintenance person on ground, tow tractor driver and the maintenance onboard. Otherwise, unexpected situation may occur.

## Ramp Servicing Operation Instruction

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- (7) Do not tow/taxi the aircraft with landing gear shock struts fully compressed to prevent damage to the shock struts.
- (8) Do not let the shock strut of the nose landing gear extend more than the maximum permitted extension (389 mm). An extension more than 389 mm can cause the centering cam to engage and cause damage to the shock strut during a turn. It can also make the aft center of gravity limits change and cause the nose up and tail down.
- (9) If the active steering mode of the nose landing gear is not disarmed, make sure that the pressure in no.2 hydraulic system is completely removed before towing the airplane. Otherwise, injury to persons and damage to equipment can occur.
- (10) When you tow an airplane with a towbar in the high wind conditions, in order to prevent injury to personnel and damage to equipment caused by the movement of the airplane after the nlg active steering mode is disarmed: connect the towbar. Then disarm the active steering mode when the nlg wheel is in the neutral position, the cockpit is attended, and the active steering system is not operated.
- (11) Before you tow the aircraft, open the external power receptacle access door at the lower left side of the fuselage, and put the NWS disarming switch in the DISARM position. After the aircraft is towed in position, close the switch protective cap down to move the NWS disarming switch to the ARM position.
- (12) The towbar used by ARJ21-700 must comply with regulations, and refer to manufacture's instructions.
- (13) Make sure that there are no sudden starts and stops before the turns or during the forward movement. otherwise, damage to airplane may occur.
- (14) When you tow the airplane with a towbar, the speed for forward towing in a straight line shall not exceed 10 KM/H (5.4 kt), the towing speed for turning shall not exceed 5 km/h (2.7 kt), the speed for backward towing in a straight line shall not exceed 5 km/h, and the minimum turning radius is 17 m (56 ft). The towing load rating of the towbar is 65.3 kn (14680 lbf). Otherwise, injury to persons and damage to equipment can occur.
- (15) When you tow the airplane, all persons must stay out of the dangerous areas around the tow vehicle, towbar, nose wheels, and main wheels. Make sure you keep the equipment that moves at least 3 m (10 ft) away from the persons on the ground. Otherwise, injury to persons can occur.
- (16) When an aircraft with APU under operation is going to pass by another aircraft with APU operating, you must keep the APU exhaust port of the aircraft a minimum of 15 m (49.3 ft ) away from another aircraft fuel vent.
- (17) Do not use the airplane brakes when you use a towbar to tow the airplane. Otherwise it can shear the shear pins. When the towbar shear pin is broken, do the procedure as following:
  - (a) Only shear pin broken, but towbar and aircraft does not disconnect. Maintenance person should immediately notice tow tractor driver, tow tractor driver should break slowly. After the tractor and the aircraft come to steady stop, the maintenance person on ground shall inform the maintenance person onboard to brake the aircraft.
  - (b) If towbar and aircraft disconnect, tow tractor should keep moving, until fully disconnected. The aircraft brakes. During pushback operation, the tow tractor driver should stop immediately, to avoid the tow tractor collide the towbar or the aircraft. Unitl the towbar and aircraft disconnect fully, the aircraft brakes.
- (18) If the no.2 hydraulic system is pressurized, stay clear of the nose landing gear. Do this when the active steering mode is restored. Otherwise, injury to persons and damage to equipment can occur.

(19) The load and Operation (turning) limits of towbarless tow of ARJ21-700 aircraft are shown [Table 1 The Load and Operation \(Turning\) Limits of Towbarless Tow of ARJ21-700 Aircraft](#).

**Table 1 The Load and Operation (Turning) Limits of Towbarless Tow of ARJ21-700 Aircraft**

No.	Item	Direction	Limitations(Maximum value)
1	Towbarless Tow Pushback Towing Load	Forward/After	23489N
2	Towbarless Tow Loads(Maximum Dynamic Load)	Forward/After	58723N
3	Towbarless Tow Operation moment (turning moment)	Left/Right Turning	1644 Nm
4	Turning Angle of Nose Landing Gear in Towbarless Tow	Left/Right Turning	81.6°

- (a)
- (b)
- (c)
- (d)

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## Tow the aircraft by a towbar - Towing

### 1. Common Information

A. The procedure provides the instructions to tow the ARJ21-700 by a towbar.

### 2. Preliminary Requirements

#### Referenced Information

Data module code	Title
RSOI ARJ21-A-13-12-01-01A-913A-A	Safety Precautions for Towing - General Maintenance Safety Procedure

#### Work Zones

Zone	Location
213	Cockpit - Left
214	Cockpit - Right
715	Nose Landing Gear

#### Equipments/Tools

Name	Part number	QTY	Remarks
Tow Tractor	No Specific	As Necessary	or Equivalent Equipment
Chock	No Specific	As Necessary	Null
Ground Crew Headset (with an anti-noise microphone, with a PPT function)	No Specific	1	Null
Portable Towbar (Opt:Mechanical Lift Towbar) (Opt:Mechanical Lift Towbar) (Opt:Mechanical Lift Towbar) (Opt:Hydraulic Lift Towbar)	609A020-C (Opt:LJ-ARJ21-QYG-000-A) (Opt:VKT-TB-A21-JXS) (Opt:609A110-A) (Opt:609A070-B)	1	Null

### 3. Procedures

A. Preparation

**NOTE:** The following procedures(1)-(16) are done by aircraft maintenance person.

(1) Make sure that the airplane is safe for maintenance.

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- (2) Obey all safety precautions. Refer to this task: . [Safety Precautions for Towing - General Maintenance Safety Procedure, RSOI ARJ21-A-13-12-01-01A-913A-A](#)
- (3) Make sure that you have a certified brake operator in the cockpit.
- (4) Make sure the aircraft center gravity meets the aircraft required.
- (5) Make sure that the tire pressure is normal.
- (6) Make sure that the chrome height of the nose landing gear shock strut is normal.
- (7) Open the external power receptacle access door at the lower left side of the fuselage and put the NWS disarming switch to the DISARM position. [Figure 1 Nose Wheel Steering System - Steering Disarming Switch](#)

**NOTE:** Before you tow the aircraft, open the external power receptacle access door at the lower left side of the fuselage, and put the NWS disarming switch in the DISARM position. After the aircraft is towed in position, close the switch protective cap down to move the NWS disarming switch to the ARM position.

- (8) Make sure the communication is clear between the maintenance person on ground, maintenance person onboard and tow tractor driver.
- (9) Make sure that the aircraft is powered.
- (10) Make sure that the pressure of No.1 or No.2 hydraulic system is normal.
- (11) Make sure the pressure of inboard and outboard wheel brake accumulators is normal.
- (12) Make sure that the ramp area and towing way are clear of all equipment and other unwanted items.
- (13) Connect the towbar to the tow tractor and to the aircraft [Figure 2 Towing Fitting](#).
- (14) Make sure that all the aircraft ground wires are removed.
- (15) Make sure that the position lights and the anti-collision lights are on, and make sure that these lights operate normally.
- (16) Close the passenger entry door, emergency exit doors, cargo doors, service doors and all service panels.

### B. Tow the aircraft.

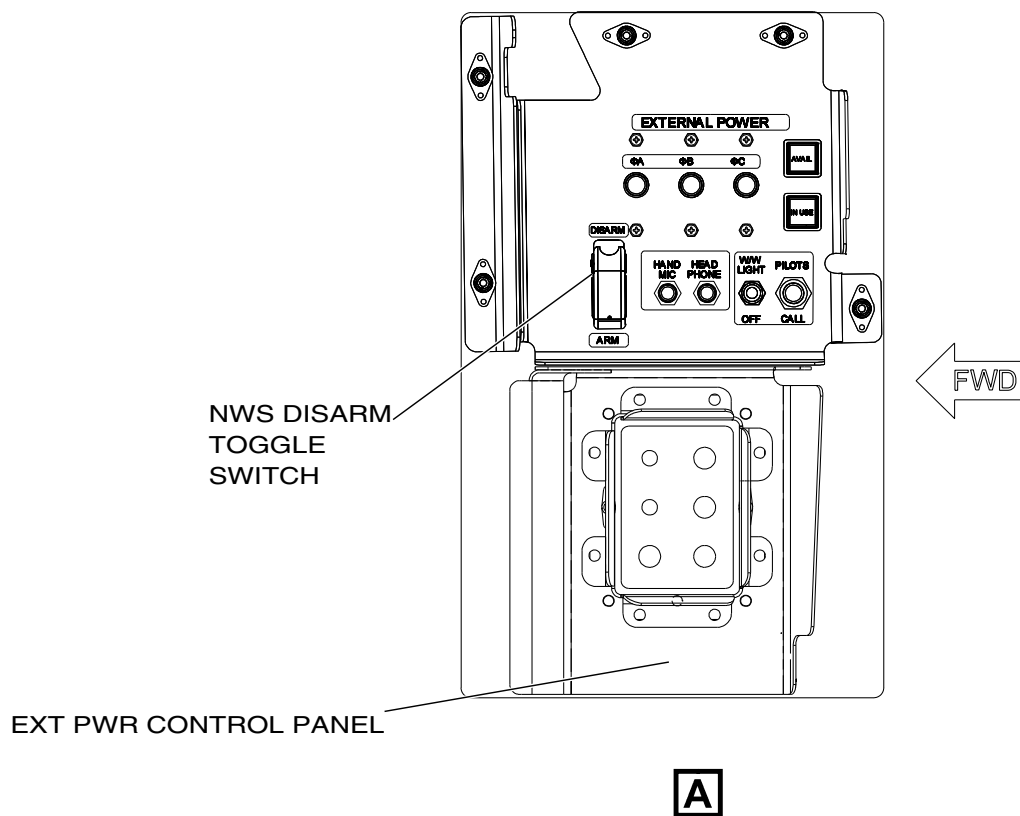
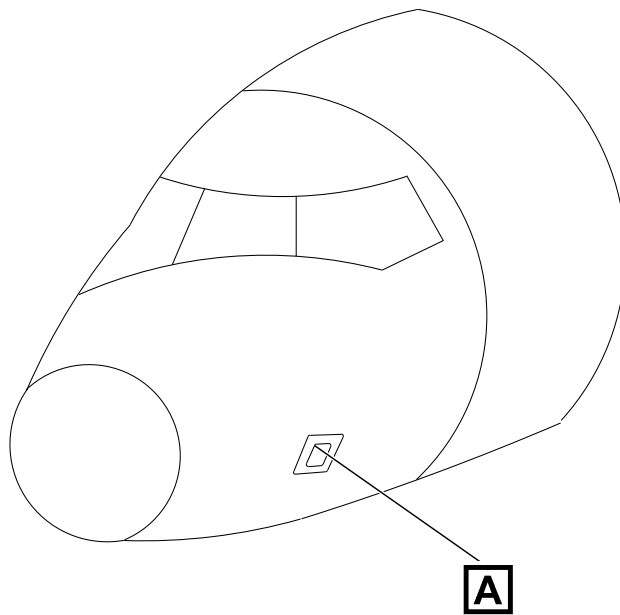
**NOTE:** The following procedures(1)-(4),(7)-(9) and (11) are done by aircraft maintenance person. The following procedures(5)-(6),and (10) are done by tow vehicle driver.

- (1) Make sure the wheel chocks are removed.
- (2) Make sure that the parking brakes are released.
- (3) Make sure EICAS appears: TOWING PERMITTED, notice the maintenance on ground to begin the towing.
- (4) Notice the tow vehicle driver to tow the aircraft.
- (5) The maximum allowable towing angle of the nose wheel is 102° left or right of the neutral position. Tow the aircraft slowly straight ahead before you try to turn.
- (6) Tow the aircraft straight ahead for at least 12 m (39.5 ft ) before completing the towing.

**NOTE:** This will remove the stresses that remain in the tires and the shock struts.

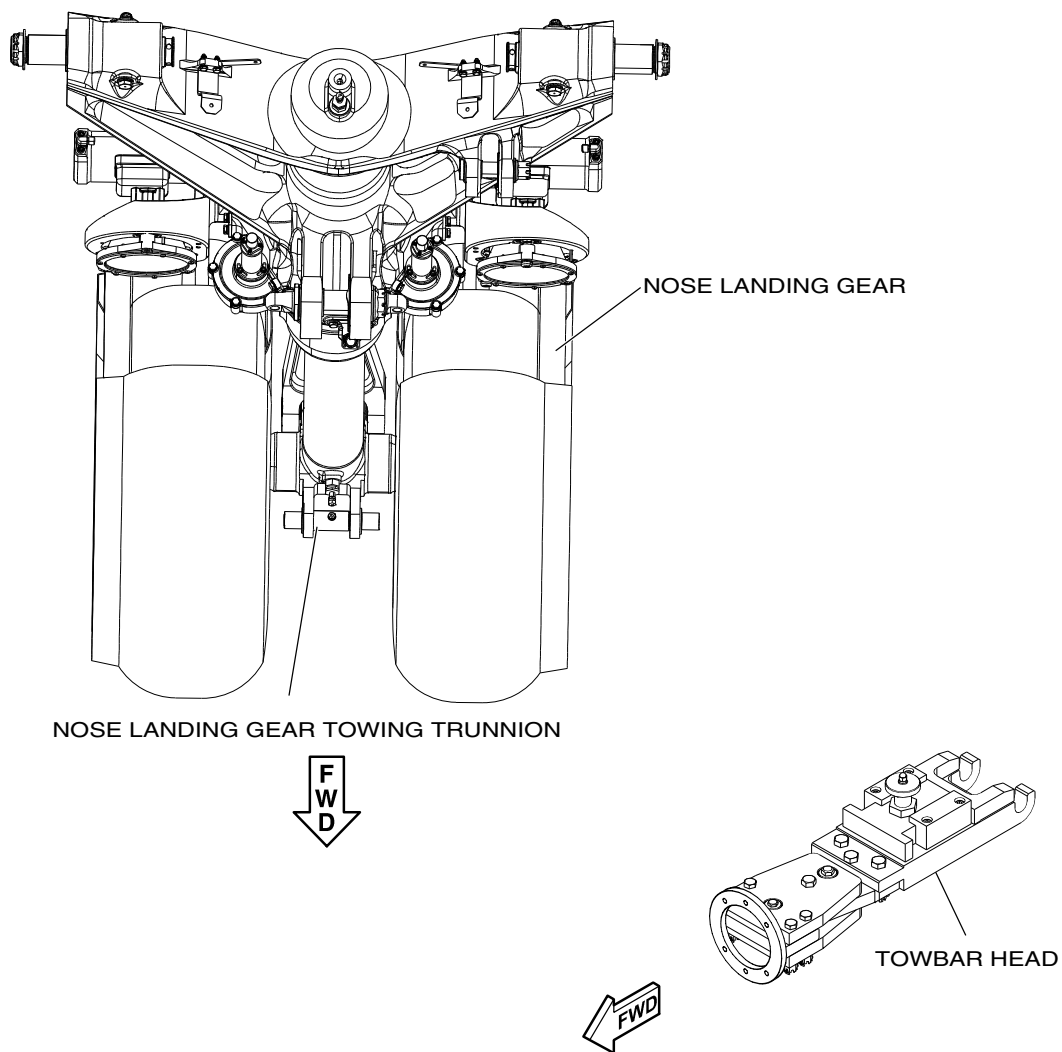
- (7) At the end of towing, put the wheel chocks fore and aft of the main landing gear tires and the nose landing gear tires.
  - (8) Set the parking brake if it is necessary.
  - (9) Disconnect the towbar.
  - (10) Make tow vehicle away.
  - (11) Push the NWS disarming switch to ARM position, and close the external power receptacle access door. [Figure 1 Nose Wheel Steering System - Steering Disarming Switch](#)
- C. Put the aircraft back to its usual condition
- NOTE:** The following procedures are done by aircraft maintenance person.
- (1) Attach the ground wires.
  - (2) Disconnect and stow the intercommunication set.
  - (3) De-energize electrical network as necessary.
  - (4) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

## Ramp Servicing Operation Instruction



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**Figure 1 Nose Wheel Steering System - Steering Disarming Switch (Sheet 1 of 1)**



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Figure 2 Towing Fitting (Sheet 1 of 1)

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## Tow the aircraft by a towbarless tractor. - Towing

### 1. Common Information

A. The procedure provides the operation to tow the ARJ21-700 by a towbarless tractor.

### 2. Preliminary Requirements

#### Referenced Information

Data module code	Title
RSOI ARJ21-A-13-12-01-01A-913A-A	Safety Precautions for Towing - General Maintenance Safety Procedure

#### Work Zones

Zone	Location
213	Cockpit - Left
214	Cockpit - Right
715	Nose Landing Gear

#### Access Panels

Number	Name
113AL	External Power Receptacle Access Panel

#### Equipments/Tools

Name	Part number	QTY	Remarks
Wheel Chock	No Specific	As Necessary	Standard tool.
TOWBARLESS TRACTOR	No Specific	1	Towbarless tractor GTL160(vendor:GUANGTAI) or TBL-50(vendor:KALMAR)
Ground Crew Headset (with an anti-noise microphone, with a PPT function)	No Specific	1	Null

### 3. Procedures

A. Preparation

**NOTE:** The following procedures(1)-(19) and (21) are done by aircraft maintenance person, the procedure(20) is done by towbarless tractor driver.

- (1) Make sure that the airplane is safe for maintenance.
- (2) Obey all safety precautions, refer to [Safety Precautions for Towing - General Maintenance Safety Procedure, RSOI ARJ21-A-13-12-01-01A-913A-A](#).

## Ramp Servicing Operation Instruction

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- (3) Make sure that you have an certified brake operator in the cockpit.
- (4) Make sure the aircraft center gravity meets the aircraft towing required.
- (5) Make sure that the tire pressure is normal.
- (6) Make sure that the chrome height of the nose landing gear shock strut is normal.
- (7) Open the external power receptacle access door at the lower left side of the fuselage [External Power Receptacle Access Panel 113AL](#) ,push the NWS disarming switch to the DISARM position [Figure 1 Nose Wheel Steering System - Steering Disarming Switch](#)

**NOTE:** Before you tow the aircraft, open the external power receptacle access door at the lower left side of the fuselage, and put the NWS disarming switch in the DISARM position. After the aircraft is towed in position, close the switch protective cap down to move the NWS disarming switch to the ARM position.

- (8) Make sure the communication is clear between the maintenance person on ground, maintenance person onboard and tow tractor driver.
- (9) Make sure that the aircraft is powered.
- (10) Make sure that the engine is shutdown.
- (11) Make sure that the pressure of No.1 or No.2 hydraulic system is normal.
- (12) Make sure the pressure of inboard and outboard wheel brake accumulators is normal.
- (13) Make sure that the ramp area and towing way are clear of all equipment and other unwanted items.
- (14) Close the passenger entry door, emergency exit doors, cargo doors, service doors and all service panels.
- (15) Make sure that all the aircraft ground wires are removed.
- (16) Make sure that the wheel chocks of the nose and main landing gear are in position.
- (17) Make sure that parking brake is set.
- (18) Make sure that the nose wheel of the airplane is in the neutral position visually.
- (19) Remove the nose gear wheel chocks.
- (20) Operate the towbarless tractor to lift the airplane nose wheel.

**NOTE:** Detailed operation steps should refer to the operation instructions of the towbarless tractor. Typical connection between tractor and aircraft refer to [Figure 2 The connection of a typical barless tractor to an aircraft](#).

- (a) The towbarless tractor enters the working position, first open the holding device and aligns it with center line of the nose landing gear.
  - (b) The towbarless tractor performs the clamping operation of the nose landing gear.
  - (c) The towbarless tractor lifts the nose landing gear, make sure the holding device is fully in place, and waits for towing instruction from the crew.
- (21) Turn on the position lights and the anti-collision lights, and make sure that these lights operate normally.

### B. Aircraft towing



**NOTE:** The following procedures(1), (6)-(8)and (11)-(12) are done by towbarless tractor driver, the procedure(2)-(5), (9)-(10) and (13) are done by aircraft maintenance person.

- (1) The towbarless tractor is braking.
- (2) Make sure the wheel chocks are removed.
- (3) Make sure that parking brake is released.
- (4) Make sure EICAS appears: TOWING PERMITTED, notice the maintenance on ground to begin the towing.
- (5) Notice the towbarless tractor driver to tow the aircraft.
- (6) Tow the aircraft.
- (7) Tow the aircraft slowly straight ahead before you try to turn.
- (8) Tow the aircraft straight ahead for at least 12 m (39.5 ft ) before completing the towing.

**NOTE:** This will remove the stresses that remain in the tires and the shock struts.

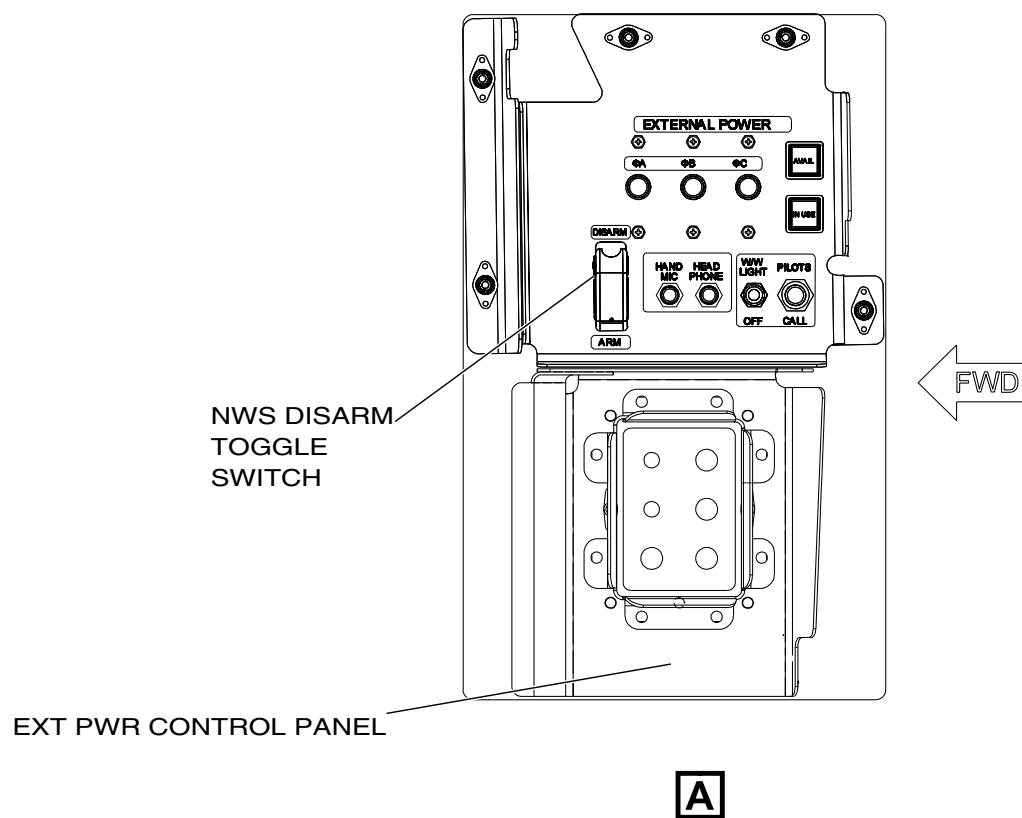
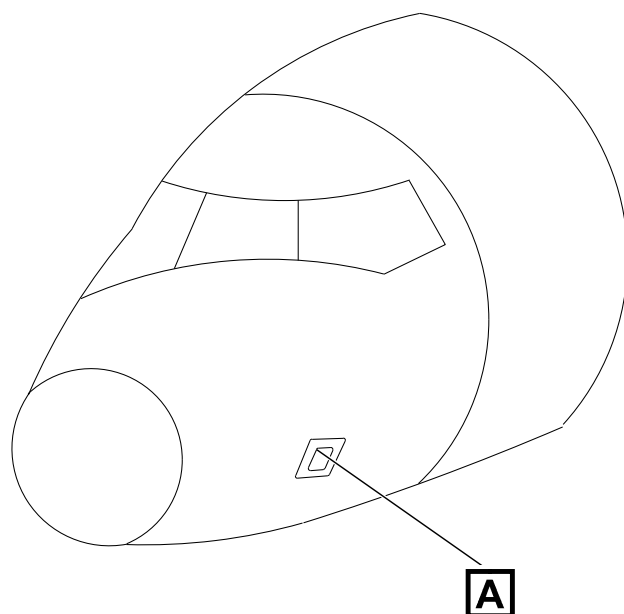
- (9) At the end of towing, put the wheel chocks fore and aft of the main landing gear tires and the nose landing gear tires.
- (10) The aircraft set parking brake.
- (11) The towbarless tractor releases the brakes.
- (12) Separate the towbarless tractor from the aircraft.
- (13) Push the NWS disarming switch to ARM position, and close the external power receptacle access door. [Figure 1 Nose Wheel Steering System - Steering Disarming Switch](#)

C. Put the aircraft back to its usual condition

**NOTE:** The following procedures are done by aircraft maintenance person,

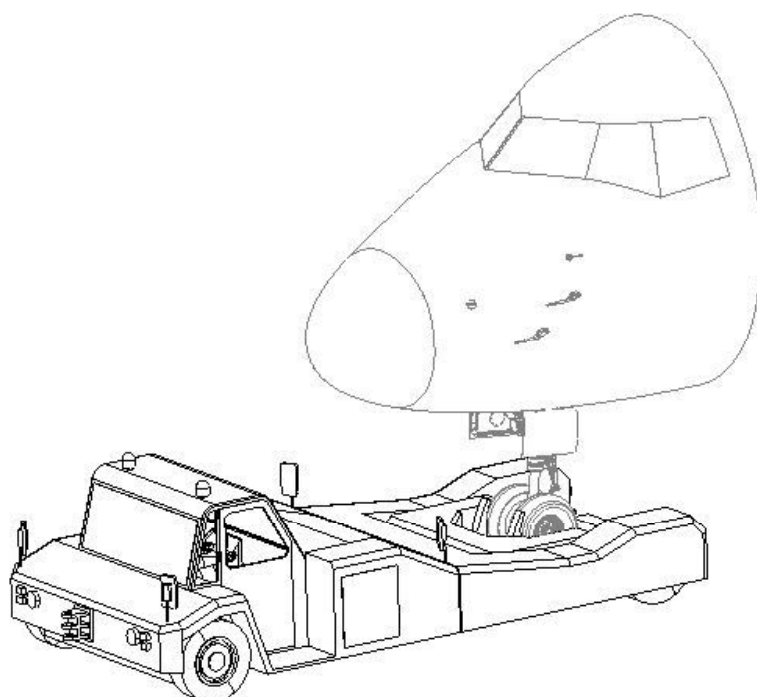
- (1) Attach the ground wires.
- (2) Disconnect and stow the intercommunication set.
- (3) Make sure that the aircraft is de-energized.
- (4) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

## Ramp Servicing Operation Instruction



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**Figure 1 Nose Wheel Steering System - Steering Disarming Switch (Sheet 1 of 1)**



ICN-ARJ21-A-091000-A-SVV19-91583-A-001-01

**Figure 2 The connection of a typical barless tractor to an aircraft (Sheet 1 of 1)**

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## Ground Maneuvering - Technical data

### 1. General

This section provides aircraft turning capability and maneuvering characteristics. For easy of presentation, this data has been determined from the theoretical limits imposed by the geometry of the aircraft. As such, it reflects the turning capability of the aircraft in favorable operating circumstances. This data should only be used as a guideline for the method of determination of such parameters and for the maneuvering characteristics of this aircraft type.

### 2. Main Procedure

The turning radii see [Figure 1 The minimum turning radii of no slip angle](#). [Figure 2 The ground minimum turning radii](#) ,

which are:

The maximum steering angle: 66°.

The maximum effective steering angle: 63°.

The maximum allowable towing angle of the nose wheel: 102°

The minimum pavement width for 180° turn: 27.46m

The minimum turning radii of nose landing gear: 17.00m

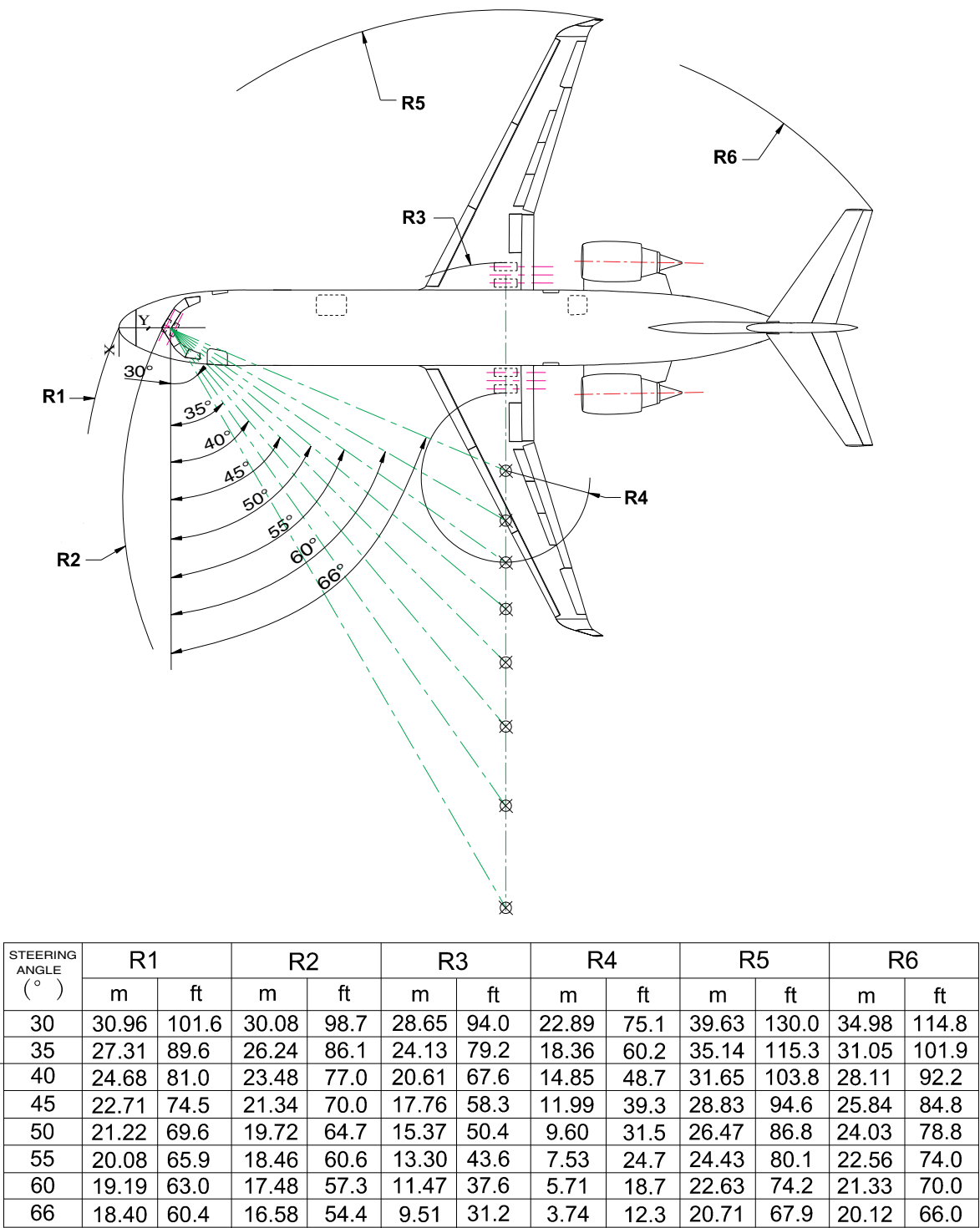
The minimum turning radii of nose: 18.94m

The minimum turning radii of wing tip: 21.62m

The minimum turning radii of tail tip: 20.70m

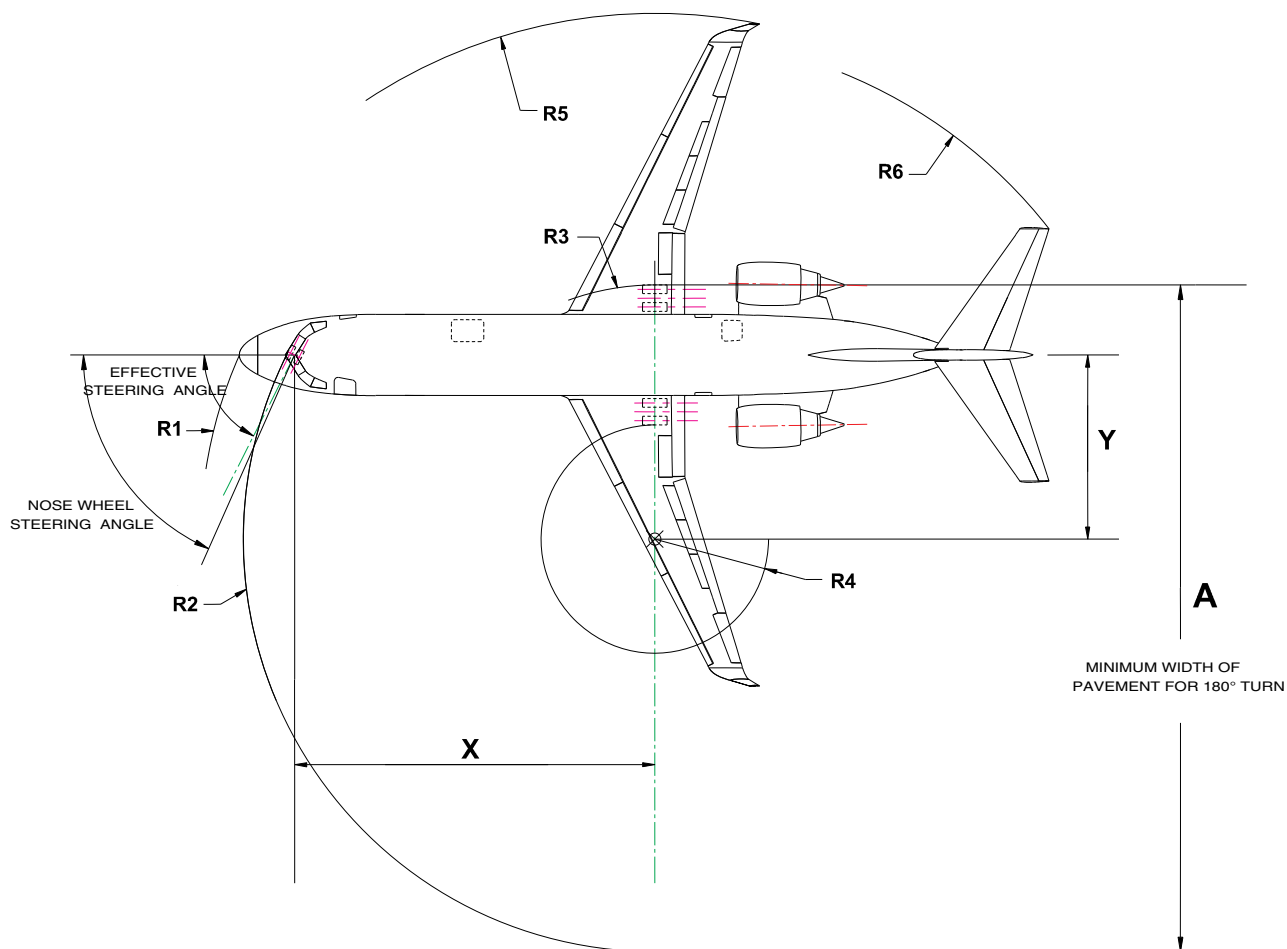
Visibility from cockpit in static position see [Figure 3 Visible angle in static position..](#)

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Figure 1 The minimum turning radii of no slip angle. (Sheet 1 of 1)

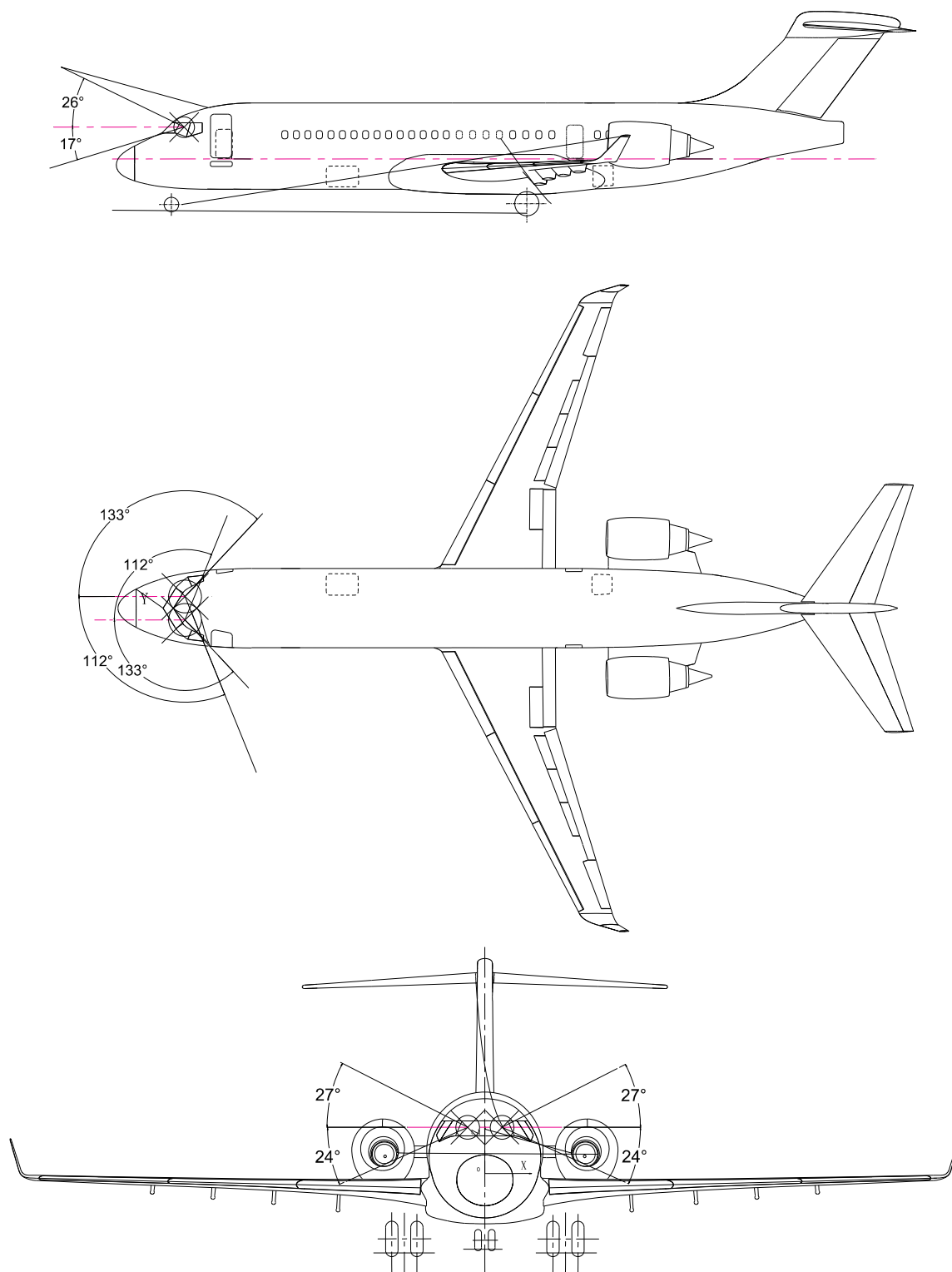


EFFECTIVE STEERING ANGLE		X	Y	A	R1	R2	R3	R4	R5	R6
63°	m	14.88	7.58	27.46	18.94	17.00	10.46	4.70	21.62	20.70
	ft	48.8	24.9	90.1	61.5	55.8	34.3	15.4	71.0	67.9

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**Figure 2 The ground minimum turning radii (Sheet 1 of 1)**

# Ramp Servicing Operation Instruction



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Figure 3 Visible angle in static position. (Sheet 1 of 1)



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## Airplane grounding - Maintenance Precautions

### 1. Common Information

- A. Static grounding is not necessary if the airplane is parked for turn around flight and no maintenance is to be done.
- B. During pressure refueling of the airplane:
  - (1) An electrical bond is necessary between the airplane and the refueling vehicle.
  - (2) Static grounding is not necessary if the conductivity between the airplane and the parking site is adequate.

**NOTE:** The operator should ensure the conductivity of the airplane and the parking site is adequate. And applicable procedures have to be established in areas where parking site conductivity is seasonal change.

**NOTE:** Parking site conductivity may be inadequate on dry snow, dry sand or in areas of low moisture.

- C. When the aircraft electrical network (e.g. the APU generator, battery and ground electrical power) is used and maintenance is carried out on the ground, extra static grounding is not required.
- D. When the equipment used for maintenance needs city electricity or industrial electricity, static grounding is required.
- E. Static grounding is necessary when performing maintenance tasks using these devices:
  - (1) power tool
  - (2) Electrical power sources
  - (3) Lights
  - (4) Tools driven by external power
  - (5) Flammable conditions
- F. When grounding is recommended in a detailed procedure, the airplane must be grounded to a common, approved, identified ground.
- G. Where all approved grounding points are interconnected in a grid system, any number of individual grounding points will provide a common ground. If an area does not have a grid system, use a single point approved and identified common ground for all grounding cables.
- H. When conditions permit, static grounding is suggested during maintenance.

**WARNING: DO NOT CONNECT THE HEADSET OR TOUCH ELECTRICAL CONNECTIONS TO THE AIRPLANE IN THUNDERSTORM AND LIGHTNING WEATHER. LIGHTNING STRIKE CAN CAUSE SEVERE INJURY.**

- I. If thunder or lightning are present in the area, stop ground servicing operations, make sure the aircraft is grounded, and keep the personnel away from the aircraft.
- J. The airplane is normally electrostatically grounded through conductive tires.
- K. The approved electrostatic grounding point on airplane is main landing gear grounding lug, which is installed on the outer cylinder of the right main landing gear shock strut.

## Ramp Servicing Operation Instruction

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
731	Left MLG Upper Door
741	Right MLG Upper Door

#### Equipments/Tools

Name	Part number	QTY	Remarks
Ground Cable	No Specific	As Necessary	Null

### 3. Procedures

A. Make sure that the aircraft is not parked on a painted ground.

**WARNING: DO NOT CONNECT THE HEADSET OR TOUCH ELECTRICAL CONNECTIONS TO THE AIRPLANE IN THUNDERSTORM AND LIGHTNING WEATHER. LIGHTNING STRIKE CAN CAUSE SEVERE INJURY.**

**WARNING: ALWAYS ATTACH THE GROUNDING CABLE TO THE GROUND CONNECTION FIRST. NEVER ATTACH THE CABLE TO THE AIRCRAFT AND THEN TO THE GROUND CONNECTION. OTHERWISE, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**

**CAUTION: ATTACH THE GROUNDING/BONDING CABLES ONLY TO SPECIFIED POINTS ON THE AIRPLANE. INCORRECTLY ATTACHED GROUNDING/BONDING CABLES CAN CAUSE SCRATCHES WHICH CAN CAUSE CORROSION AND DAMAGE TO THE CLAMPED PARTS. GROUNDING/BONDING CABLES ATTACHED TO DOORS AND COMPOSITES DO NOT GIVE GROUNDING/BONDING PROTECTION.**

B. Do these steps to ground the ground wires and then to the airplane:

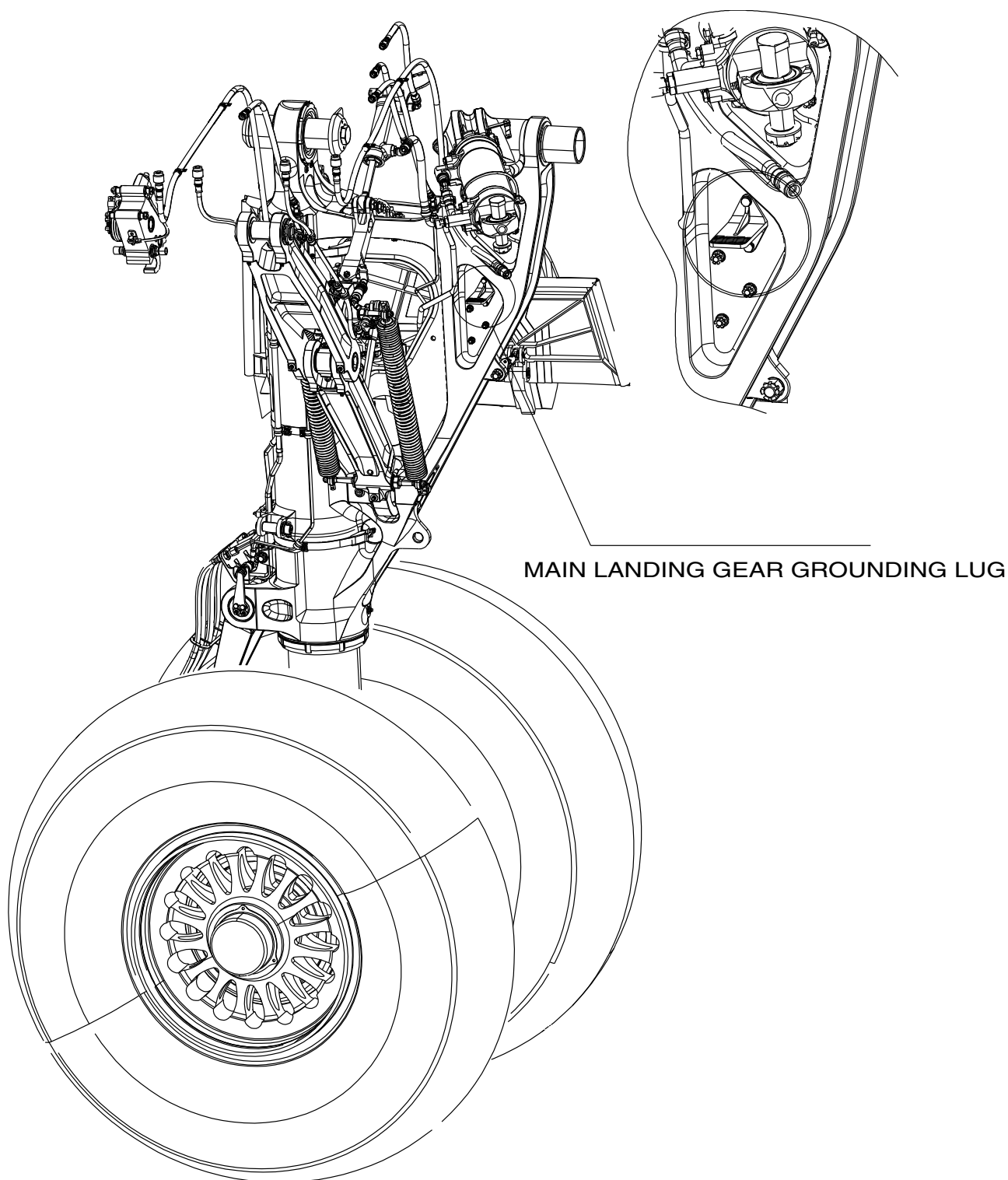
(1) Connect the ground wire with the identified grounding point.

**NOTE:** These points may be located in the parking surface or in another fixed location.

(2) Connect the ground wire to an approved grounding point on the airplane.

C. Before the airplane is moved, remove the ground wires from the grounding point on the airplane in the reverse sequence that you attached them.

D. Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



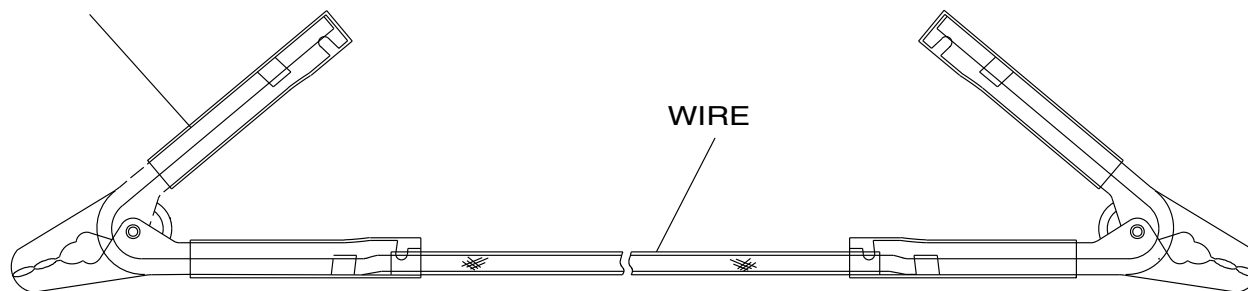
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**Figure 1 Grounding Point on the Airplane (Sheet 1 of 2)**

Ramp Servicing Operation  
Instruction

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METALLIC CLIP



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**Figure 1 Grounding Point on the Airplane (Sheet 2 of 2)**

## Aircraft protection equipment - Support equipment removal

### 1. Common Information

A. This section provides information to remove the following protective equipment from the aircraft.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
100	Lower half of the fuselage: all radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The lower half is the area below the fuselage reference plane)
200	Upper half of the fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)
300	Fuselage Tail
400	Powerplant and Pylon
500	Left Wing
600	Right Wing
700	Landing Gear and Landing Gear Doors

#### Equipments/Tools

Name	Part number	QTY	Remarks
Torque Wrench	No Specific	As Necessary	Torque range: 100lbf.in ~ 130 lbf.in ( 11.3N.m ~ 14.7 N.m )
Workstand or Climb Ladder	No Specific	As Necessary	Null
Nose Landing Gear Protective Cover	632A110-A	2	Null
Main Landing Gear Tire Cover	632A100-A	4	Null
Engine Exhaust Nozzle Blanking Cap (Left) (Opt:Engine Exhaust Nozzle Blanking Cap (Left)) (Opt:Engine Exhaust Nozzle Blanking Cap (Left))	604C5818-019 (Opt:604C5818-009) (Opt:604C5818-019)	1	Null
(Opt:Engine Exhaust Nozzle Blanking Cap (Left))	(Opt:604C5818-009)		

**Ramp Servicing Operation  
Instruction**

Name	Part number	QTY	Remarks
Engine Exhaust Nozzle Blanking Cap (Right)  (Opt:Engine Exhaust Nozzle Blanking Cap (Right))  (Opt:Engine Exhaust Nozzle Blanking Cap (Right))	604C5818-020  (Opt:604C5818- 010)  (Opt:604C5818- 020)	1	Null
(Opt:Engine Exhaust Nozzle Blanking Cap (Right))	(Opt:604C5818- 010)		
Blanking Cap of APU Compartment Cooling Air Inlet	610A050-C	1	Null
AOA Cover	610A070-B	2	Null
Windshield Cover	610A090-B	1	Null
Ram Air Inlet Protective Cover  (Opt:Ram Air Inlet Protective Cover)	610A110-A  (Opt:SBE2200)	1	Null
Pitot/Static Probe Cover  (Opt:Pitot/Static Probe Cover)  (Opt:Cover - Pitot/Static Probe)	610A230-C  (Opt:KPC3-825-8)  (Opt:610A420-A)	4	Null
Engine Inlet Cover    (Opt:Engine Inlet Cover)	610A190-D    (Opt:604C5915- 001)	2	Engine inlet cover (Left) and engine inlet cover (right) can be replaced by engine inlet cover.
Engine Inlet Cover (Left)  (Opt:Engine Inlet Protective Cover (Left Engine))	610A191-C  (Opt:610A191-E)	1	Null
Engine Inlet Cover (Right)  (Opt:Engine Inlet Cover (Right))	610A192-C  (Opt:610A192-E)	1	Null
Fuel Tank Vent Plug	610A210-B	2	Null
Blanking Cap of APU Exhaust Silencer	610A220-C	1	Null

Name	Part number	QTY	Remarks
Total Air Temperature Sensor Cover	610A240-B	1	Null
Ice Detector Cover (Opt:Ice Detector Cover) (Opt:Ice Detector Cover)	610A100-C (Opt:SBE2080) (Opt:610A100-D)	2	Null
Blanking Cap of Engine Anti-Ice Duct Exhaust (Opt:Blanking Cap of Engine Anti-Ice Duct Exhaust)	604C5900-001 (Opt:610A340-A)	2	Null
Ram Air Outlet Protective Cover	610A330-A	2	Null

### 3. Procedures

**WARNING:** 1、PITOT/STATIC PRESSURE PROBE COVERS MUST BE VISIBLE FROM THE GROUND AND A WARNING NOTICE INSTALLED ON THE LEFT CONTROL WHEEL. 2、PITOT/STATIC PRESSURE PROBE COVERS MUST BE REMOVED BEFORE FLIGHT. OTHERWISE, MAY LEAD TO LOSS OF SAFE FLIGHT.

**CAUTION:** WHENEVER AN OPENING IS COVERED, MAKE SURE THAT THE COVER IS VISIBLE FROM THE GROUND. ENGINES SHOULD NOT BE OPERATED WITH COVERS IN PLACE BECAUSE THE COVERS CAN COME OFF AND DAMAGE THE ENGINES.

**CAUTION:** MAKE SURE THE COVER IS IN GOOD WORKING CONDITION WITH NO EVIDENCE OF DAMAGE, ESPECIALLY FRAYING AROUND THE COVER OPENING. FRAYED FIBERS FROM THE COVER COMBINED WITH OTHER SUBSTANCES (SUCH AS SAND, GREASE, ETC.) CAN CAUSE OBSTRUCTION IN THE PROBE.

**CAUTION:** COUNT THE NUMBER OF PINS ON THE PROTECTIVE COVER DURING INSTALLATION AND REMOVAL. MAKE SURE THAT THE PINS ARE WELL CONNECTED WITH THE PROTECTIVE COVER. SEPARATION OF PINS MAY CAUSE DAMAGE TO THE ENGINE OR THE AIRPLANE.

**CAUTION:** DURING INSTALLATION AND REMOVAL OF THE AOA SENSOR COVER, DO NOT APPLY FORCE TO THE VANE BLADES OR DRAG THE VANE BLADES. OTHERWISE, DAMAGE TO THE SENSOR CAN OCCUR.

#### A. Procedure

(1) Remove the protective equipment and warning tags from the following components:

- (a) All pitot-static probes
- (b) Engine inlet
- (c) Engine exhaust nozzle

**NOTE:** After the engine exhaust nozzle blanking cap is removed,install the screw (NAS1155E5) back onto the thrust reverser with a torque of 100 lbf.n - 130 lbf.in (11.3 N.m - 14.7 N.m ).

- (d) APU exhaust port

**Ramp Servicing Operation  
Instruction**

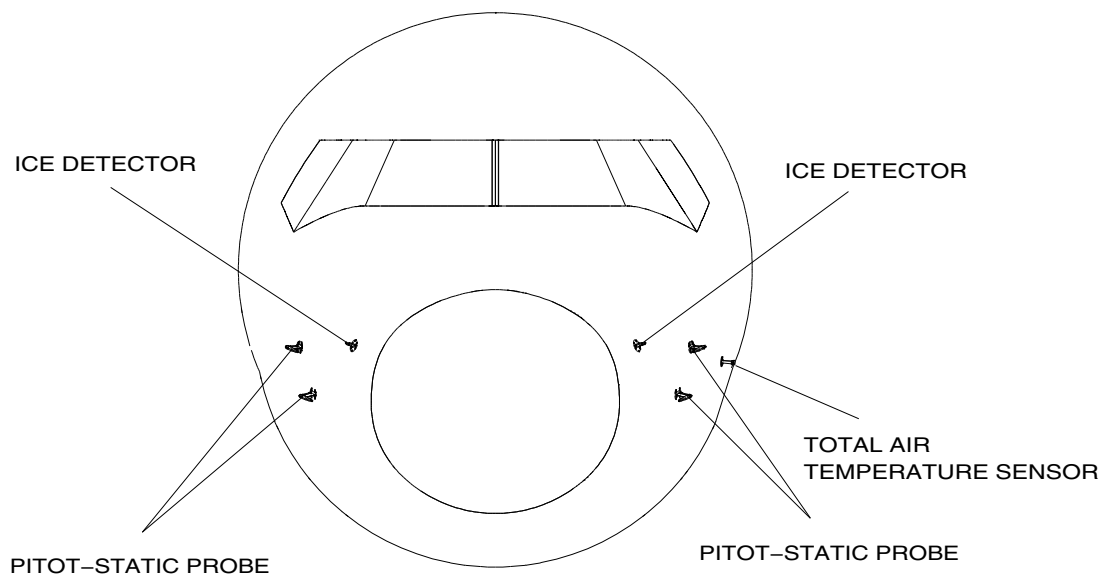
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- (e) APU compartment cooling air inlet
- (f) Fuel tank vent
- (g) Ram air inlet
- (h) Total air temperature sensor
- (i) Angle of attack sensor
- (j) Ice detector
- (k) Windshield
- (l) Landing gear tire
- (m) Ram air outlet
- (n) Engine anti-ice exhaust duct
- (o) Remove the red PITOT-STATIC PROBES COVERED tag from the left control wheel in the cockpit.
- (p) Make sure that all the doors and access panels are closed.

**B. Final procedure**

Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.





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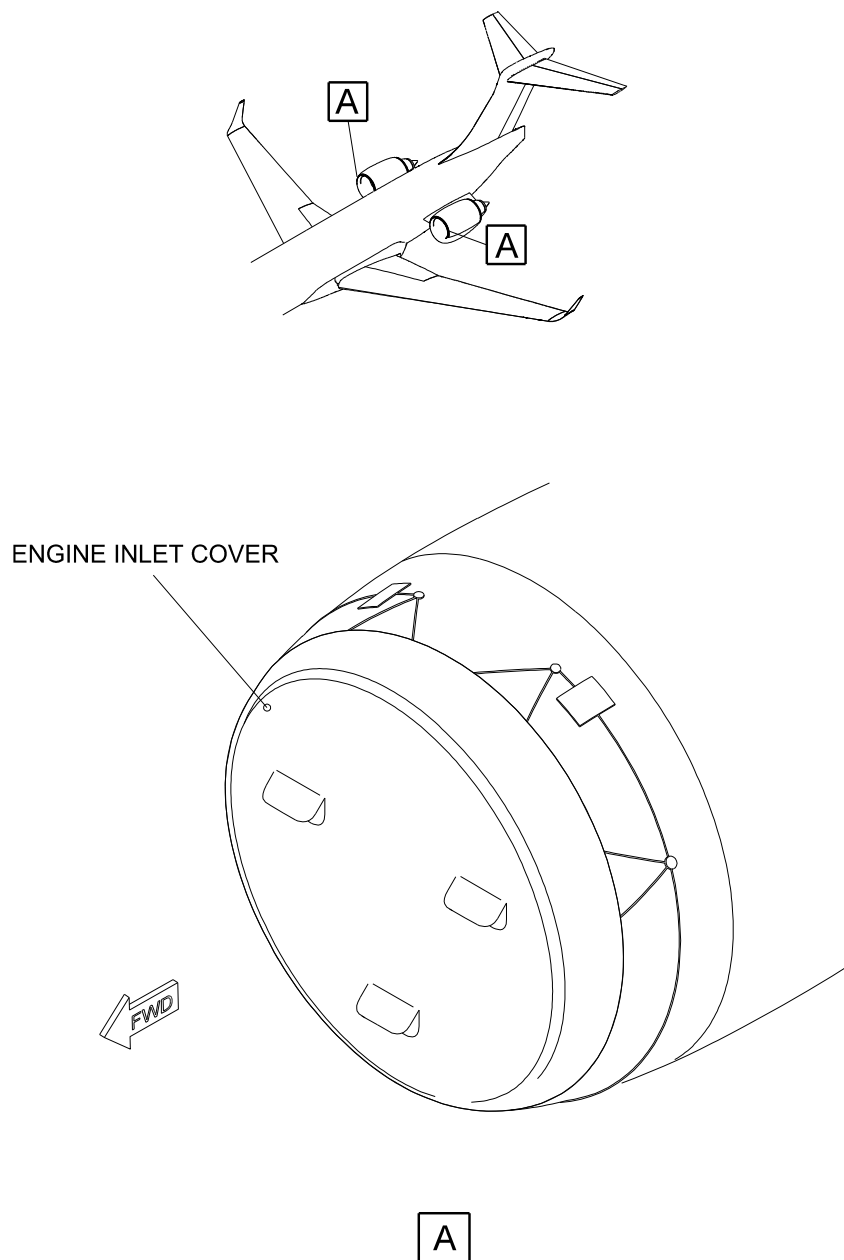
Figure 1 Probe Location (Sheet 1 of 1)



LANDING GEAR TIRE COVER

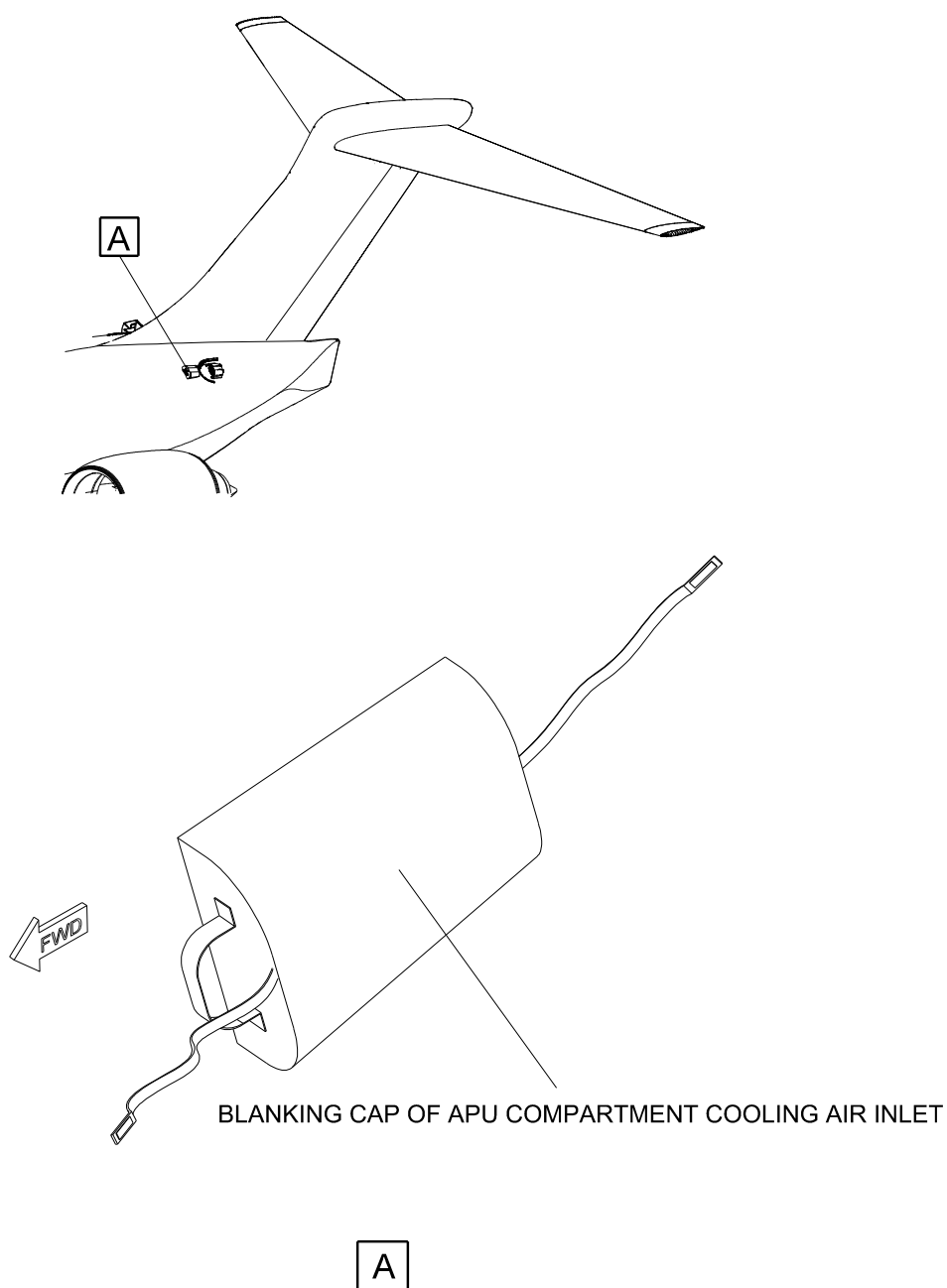
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Figure 2 Landing Gear Tire Cover (Sheet 1 of 1)



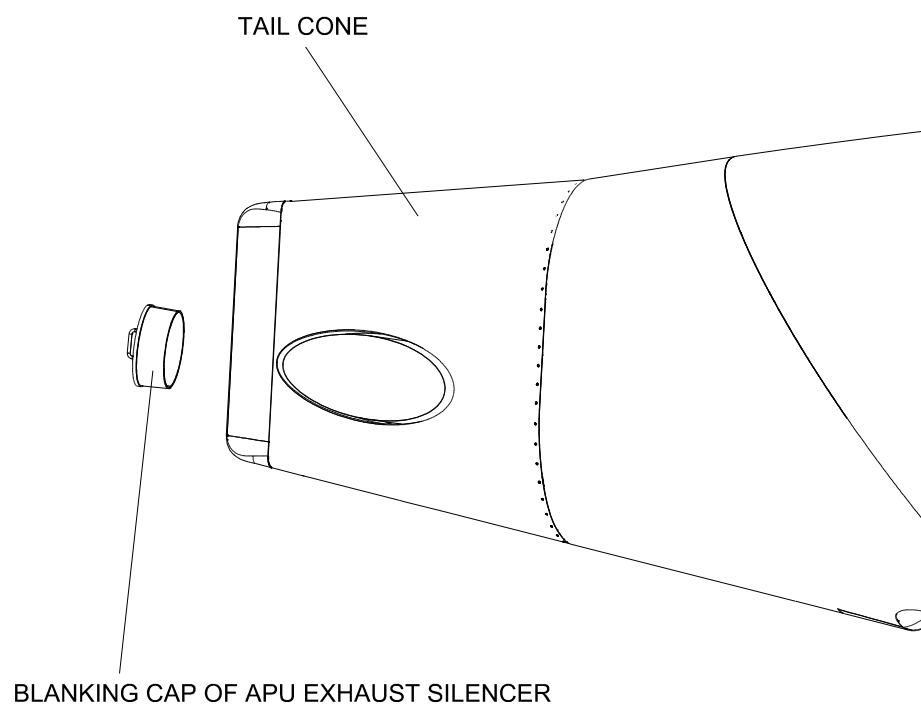
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**Figure 3 Engine Inlet Protective Cover (Sheet 1 of 1)**



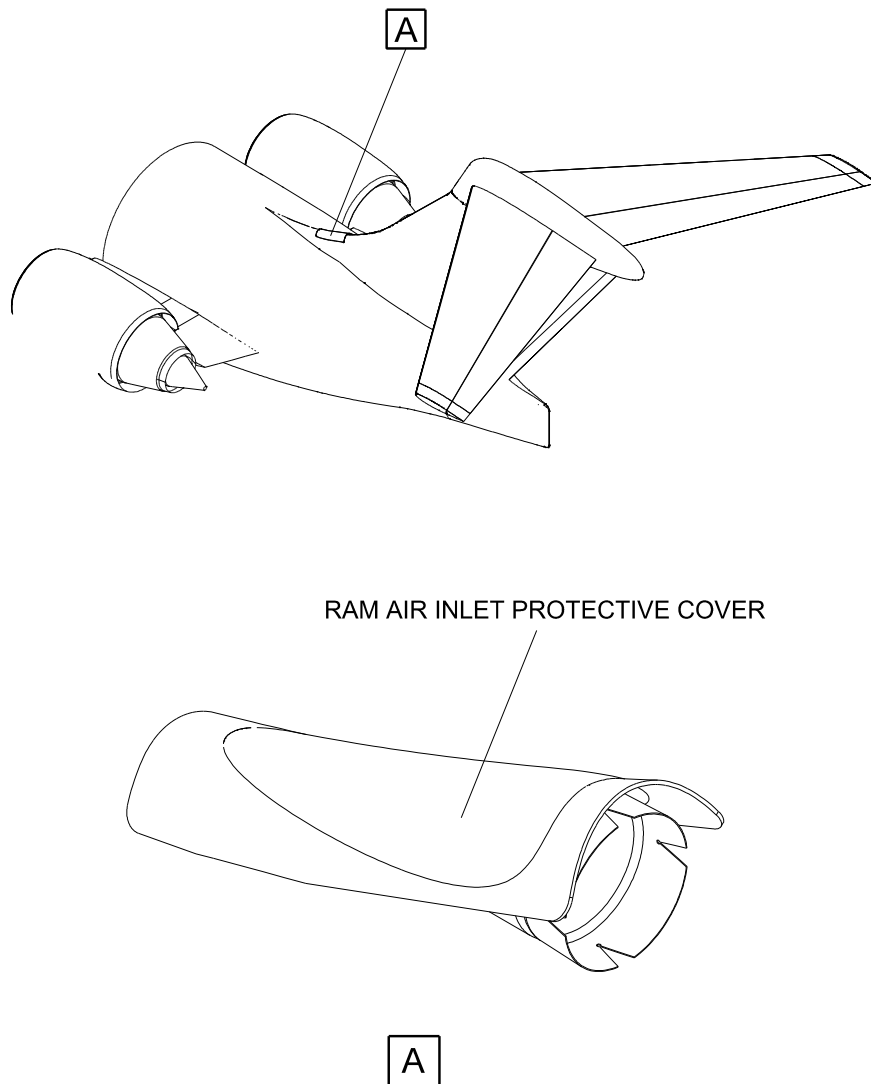
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Figure 4 Blanking Cap of APU Compartment Cooling Air Inlet (Sheet 1 of 1)



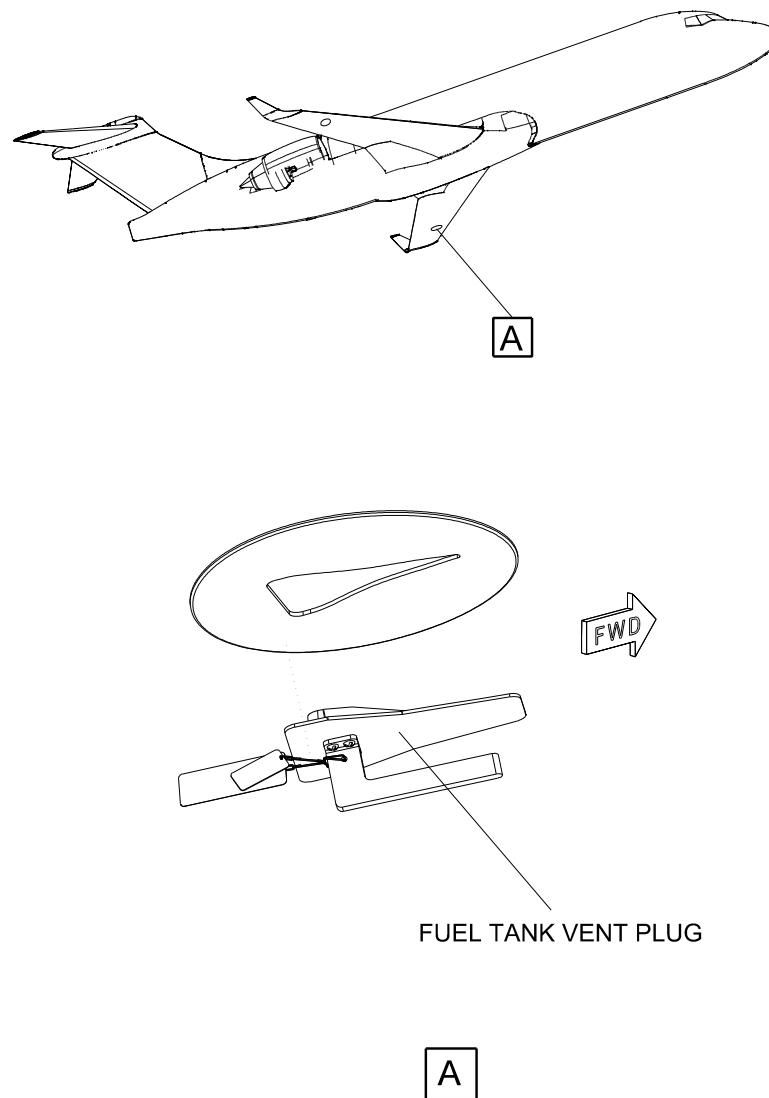
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**Figure 5 Blanking Cap of APU Exhaust Silencer (Sheet 1 of 1)**



ICN-ARJ21-A-101101-A-SVV19-00521-A-001-01

**Figure 6 Ram Air Inlet Protective Cover (Sheet 1 of 1)**



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**Figure 7 Fuel Tank Vent Plug (Sheet 1 of 1)**

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## Aircraft protection equipment - Support equipment Installation

### 1. Common Information

A. This section provides information to install the following protective equipment on the aircraft.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
100	Lower half of the fuselage: all radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The lower half is the area below the fuselage reference plane)
200	Upper half of the fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)
300	Fuselage Tail
400	Powerplant and Pylon
500	Left Wing
600	Right Wing
700	Landing Gear and Landing Gear Doors

#### Equipments/Tools

Name	Part number	QTY	Remarks
Torque Wrench	No Specific	As Necessary	Torque range: 100lbf.in - 130 lbf.in ( 11.3N.m - 14.7 N.m )
Workstand or Climb Ladder	No Specific	As Necessary	Null
Nose Landing Gear Protective Cover	632A110-A	2	Null
Main Landing Gear Tire Cover	632A100-A	4	Null
Engine Exhaust Nozzle Blanking Cap (Left) (Opt:Engine Exhaust Nozzle Blanking Cap (Left)) (Opt:Engine Exhaust Nozzle Blanking Cap (Left))	604C5818-019 (Opt:604C5818-009) (Opt:604C5818-019)	1	Null
(Opt:Engine Exhaust Nozzle Blanking Cap (Left))	(Opt:604C5818-009)		

**Ramp Servicing Operation  
Instruction**

Name	Part number	QTY	Remarks
Engine Exhaust Nozzle Blanking Cap (Right)  (Opt:Engine Exhaust Nozzle Blanking Cap (Right))  (Opt:Engine Exhaust Nozzle Blanking Cap (Right))	604C5818-020  (Opt:604C5818-010)  (Opt:604C5818-020)	1	Null
(Opt:Engine Exhaust Nozzle Blanking Cap (Right))	(Opt:604C5818-010)		
Blanking Cap of APU Compartment Cooling Air Inlet	610A050-C	1	Null
AOA Cover	610A070-B	2	Null
Windshield Cover	610A090-B	1	Null
Ram Air Inlet Protective Cover  (Opt:Ram Air Inlet Protective Cover)	610A110-A  (Opt:SBE2200)	1	Null
Pitot/Static Probe Cover  (Opt:Pitot/Static Probe Cover)  (Opt:Cover - Pitot/Static Probe)	610A230-C  (Opt:KPC3-825-8)  (Opt:610A420-A)	4	Null
Engine Inlet Cover     (Opt:Engine Inlet Cover)	610A190-D     (Opt:604C5915-001)	2	Engine inlet cover (Left) and engine inlet cover (right) can be replaced by engine inlet cover.
Engine Inlet Cover (Left)  (Opt:Engine Inlet Protective Cover (Left Engine))	610A191-C  (Opt:610A191-E)	1	Null
Engine Inlet Cover (Right)  (Opt:Engine Inlet Cover (Right))	610A192-C  (Opt:610A192-E)	1	Null
Fuel Tank Vent Plug	610A210-B	2	Null
Blanking Cap of APU Exhaust Silencer	610A220-C	1	Null

Name	Part number	QTY	Remarks
Total Air Temperature Sensor Cover	610A240-B	1	Null
Ice Detector Cover (Opt:Ice Detector Cover) (Opt:Ice Detector Cover)	610A100-C (Opt:SBE2080) (Opt:610A100-D)	2	Null
Blanking Cap of Engine Anti-Ice Duct Exhaust (Opt:Blanking Cap of Engine Anti-Ice Duct Exhaust)	604C5900-001 (Opt:610A340-A)	2	Null
Ram Air Outlet Protective Cover	610A330-A	2	Null

### 3. Procedures

#### A. Procedure

- (1) Make sure with maintenance man to install protective equipment.

Put the protective equipments with warning tags on these components to prevent contamination from sand, dust, debris, and volcanic ash.

- (a) Engine inlet
- (b) Engine exhaust nozzle
- (c) APU exhaust duct
- (d) APU compartment cooling air inlet
- (e) Fuel tank vent
- (f) Ram air inlet
- (g) Total air temperature sensor
- (h) Angle of attack sensor
- (i) Ram air outlet

**WARNING: 1、PITOT/STATIC PRESSURE PROBE COVERS MUST BE VISIBLE FROM THE GROUND AND A WARNING NOTICE INSTALLED ON THE LEFT CONTROL WHEEL. 2、PITOT/STATIC PRESSURE PROBE COVERS MUST BE REMOVED BEFORE FLIGHT. OTHERWISE, MAY LEAD TO LOSS OF SAFE FLIGHT.**

**CAUTION: WHENEVER AN OPENING IS COVERED, MAKE SURE THAT THE COVER IS VISIBLE FROM THE GROUND. ENGINES SHOULD NOT BE OPERATED WITH COVERS IN PLACE BECAUSE THE COVERS CAN COME OFF AND DAMAGE THE ENGINES.**

**CAUTION: MAKE SURE THE COVER IS IN GOOD WORKING CONDITION WITH NO EVIDENCE OF DAMAGE, ESPECIALLY FRAYING AROUND THE COVER OPENING. FRAYED FIBERS FROM THE COVER COMBINED WITH OTHER SUBSTANCES (SUCH AS SAND, GREASE, ETC.) CAN CAUSE OBSTRUCTION IN THE PROBE.**

## Ramp Servicing Operation Instruction

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- (2) Attach a red paper tag that has PITOT-STATIC PROBES COVERED printed on it in black letters, to the top of the left control wheel in the flight deck.

**NOTE:** Put the pitot-static probe covers on the pitot-static probe to prevent contamination from sand, dust, debris, volcanic ash and other substances.

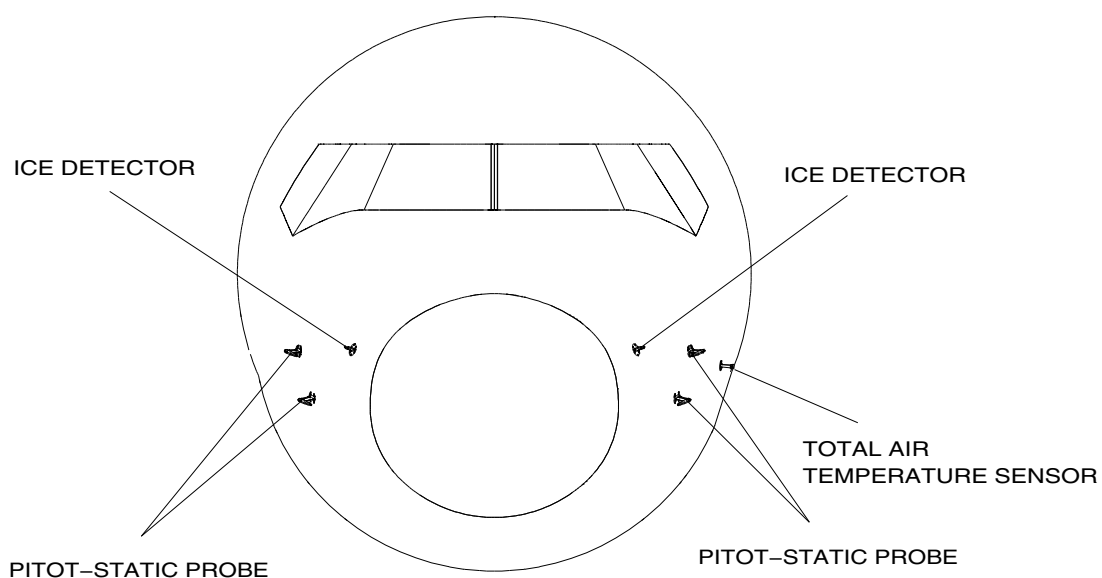
- (3) Put the protective covers on these components as necessary, and attach associated warning tags:

**NOTE:** Install the covers to protect these parts against wind and rain.

- (a) Windshield
- (b) Landing gear tire

### B. Final procedure

Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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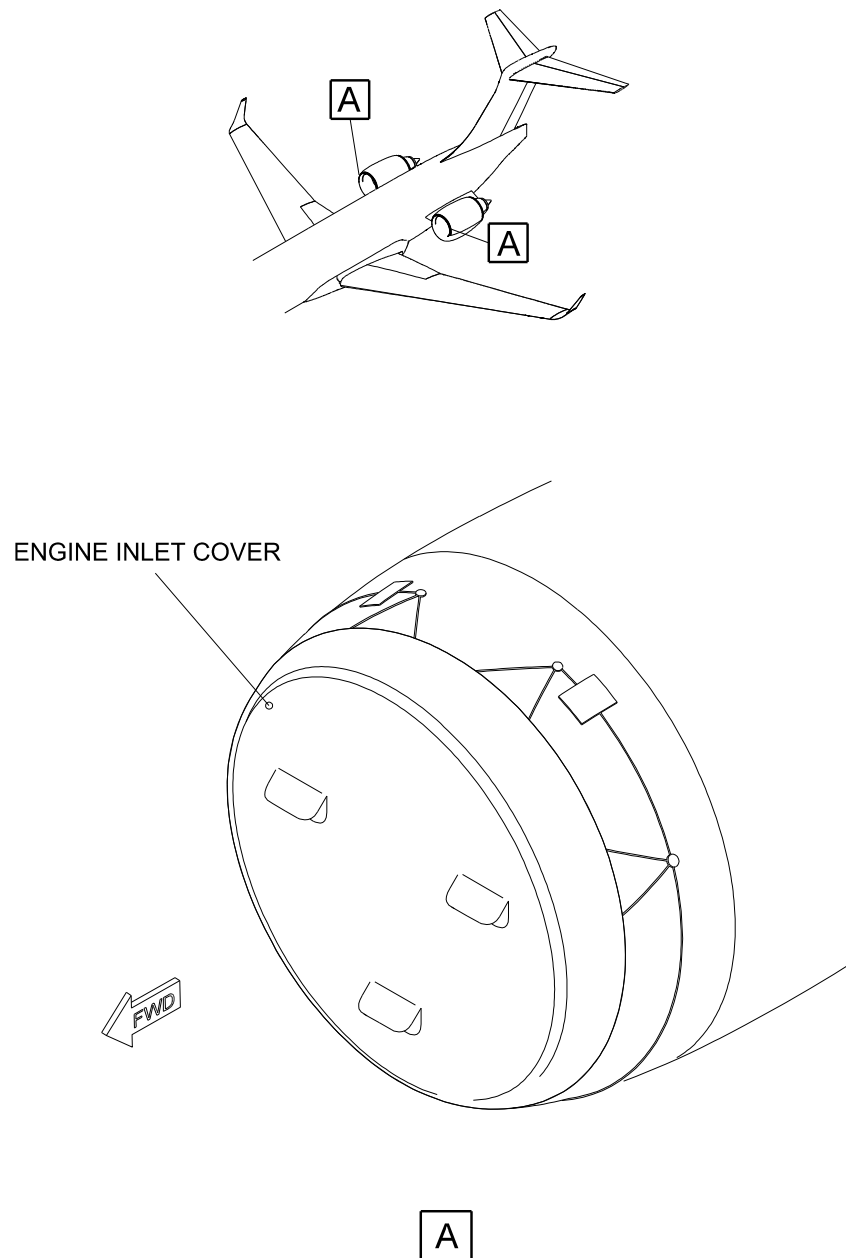
Figure 1 Probe Location (Sheet 1 of 1)



LANDING GEAR TIRE COVER

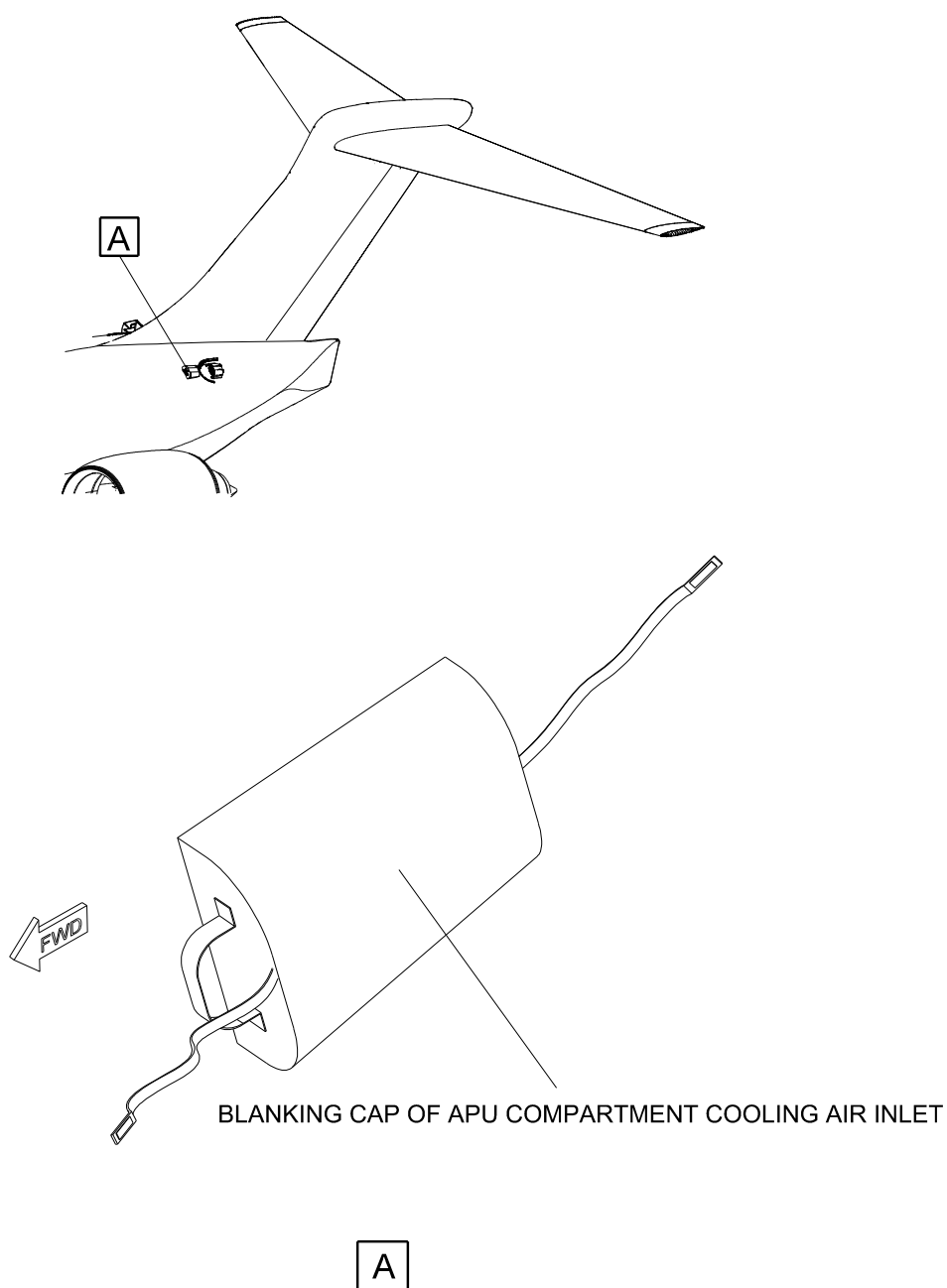
ICN-ARJ21-A-101101-A-SVV19-00517-A-001-01

Figure 2 Landing Gear Tire Cover (Sheet 1 of 1)



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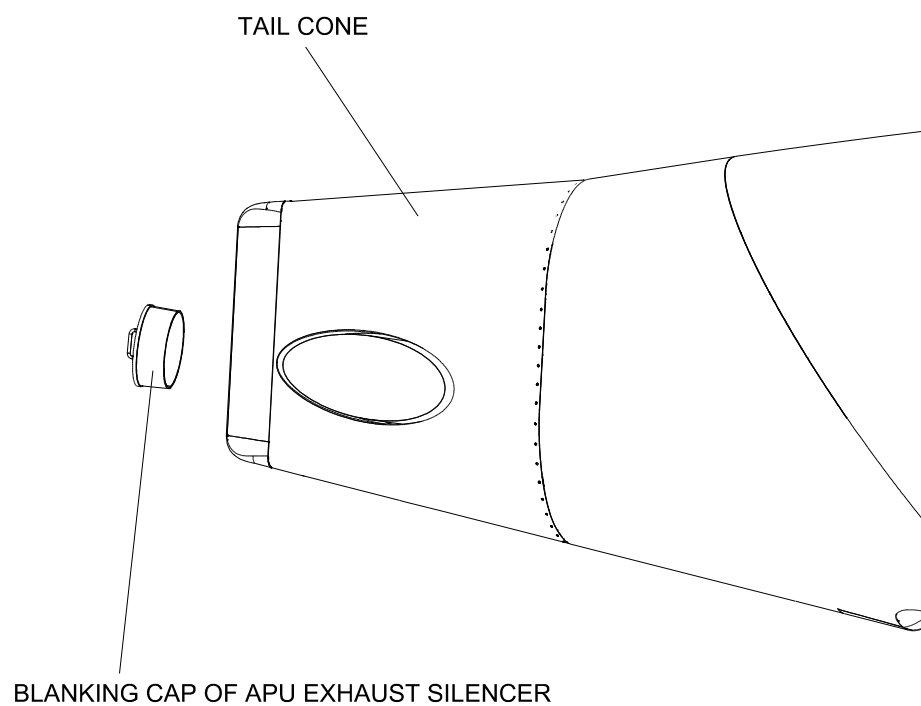
**Figure 3 Engine Inlet Protective Cover (Sheet 1 of 1)**



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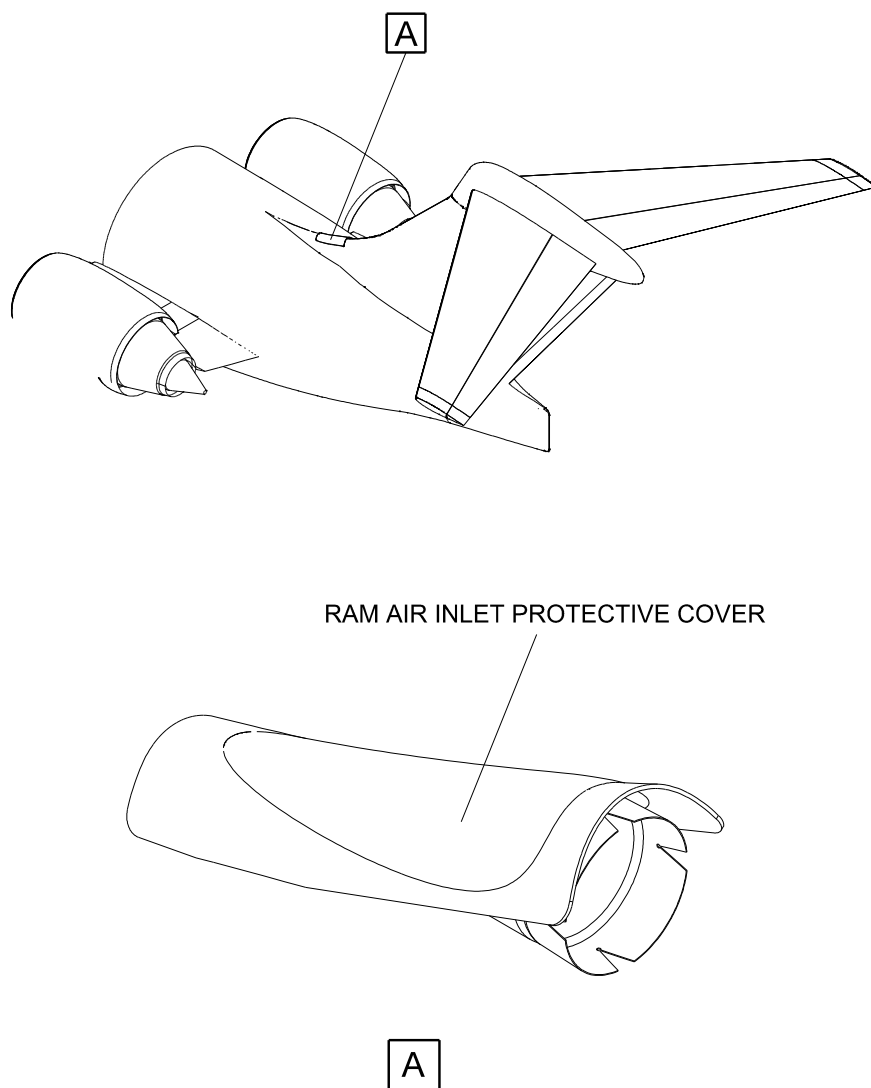
**Figure 4 Blanking Cap of APU Compartment Cooling Air Inlet (Sheet 1 of 1)**





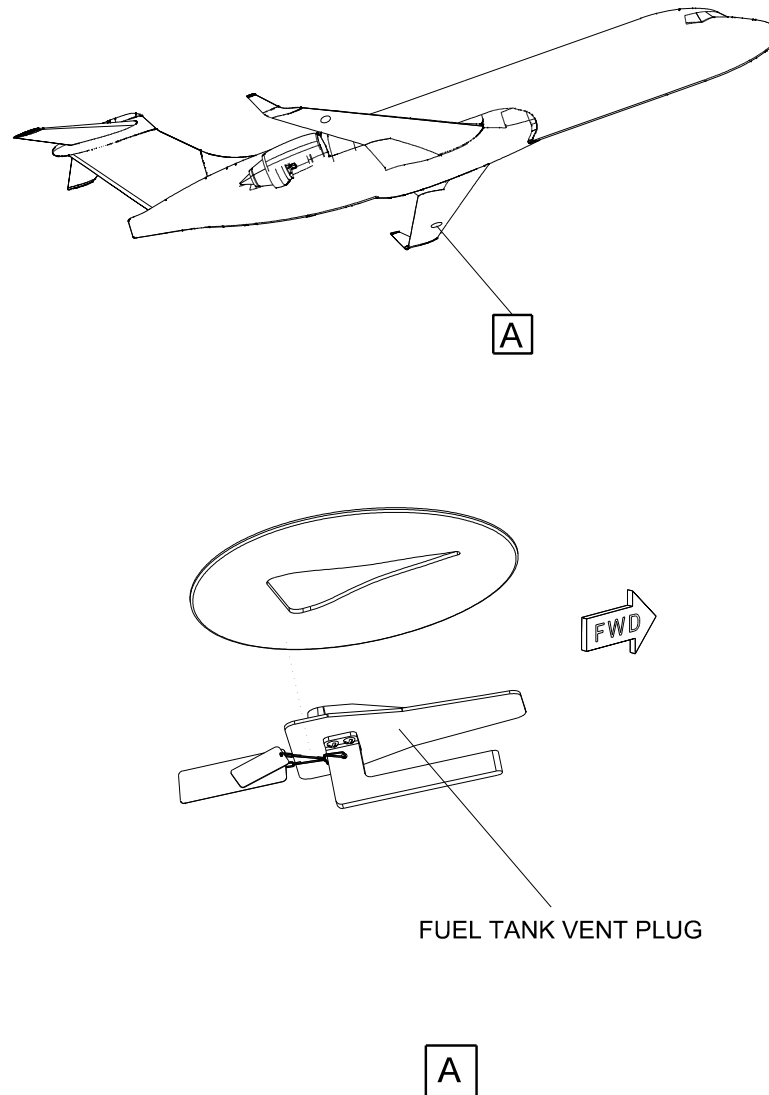
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**Figure 5 Blanking Cap of APU Exhaust Silencer (Sheet 1 of 1)**



ICN-ARJ21-A-101101-A-SVV19-00521-A-001-01

**Figure 6 Ram Air Inlet Protective Cover (Sheet 1 of 1)**



ICN-ARJ21-A-101101-A-SVV19-00522-A-001-01

Figure 7 Fuel Tank Vent Plug (Sheet 1 of 1)

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## Cargo compartment - Technical data

### 1. General

This part mainly describes technical parameters of cargo compartment, including cargo compartment capacity, cargo compartment environment, cargo compartment structure, cargo compartment lighting and some basic equipments instruction.

### 2. Preparation.

#### A. References

Number	Nomenclature
TP700009	Weight Balance Manual

#### B. Zonal

Number	Location
100	Lower fuselage: Whole radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The Zone of Lower Fuselage is the area under the Fuselage Reference Plane)
200	Upper fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)

### 3. Main Procedure

#### A. Cargo Compartment Capacity

The forward cargo compartment capacity is 14.643m<sup>3</sup>/517.12ft<sup>3</sup>. The aft cargo compartment capacity is 5.502m<sup>3</sup>/194.307ft<sup>3</sup>.

**NOTE:** The max dimensions of baggage or cargo must fit to the clearance of the cargo doors.

#### B. Cargo Compartment Environment

- (1) Fwd Cargo Compartment (FCC) and Aft Cargo Compartment (ACC) all have ventilation ability. The temperature in cargo compartment is always above 0 degree centigrade.
- (2) The special heating system should be installed in Fwd Cargo Compartment (FCC), if the aircraft has live animals transportation option.

#### C. Cargo Compartment Structure

- (1) Cargo compartment floor and shoring structure is designed to have 733.02kg/m<sup>2</sup>(150lb/ft<sup>2</sup>) maximum load carrying capacity.
- (2) The maximum available line load of Fwd Cargo Compartment (FCC) is 428.6kg/m(24lb/in). The maximum available line load of Aft Cargo Compartment (ACC) is 401.8kg/m(22.5lb/in).
- (3) The over load requirements of freight facility are following:

## Ramp Servicing Operation Instruction

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Longitudinal-Forward 3g, Afterward 1.5g

Lateral-Left 1.5g, Right 1.5g

Vertical-Up 2g, Down 4.5g

### D. Security

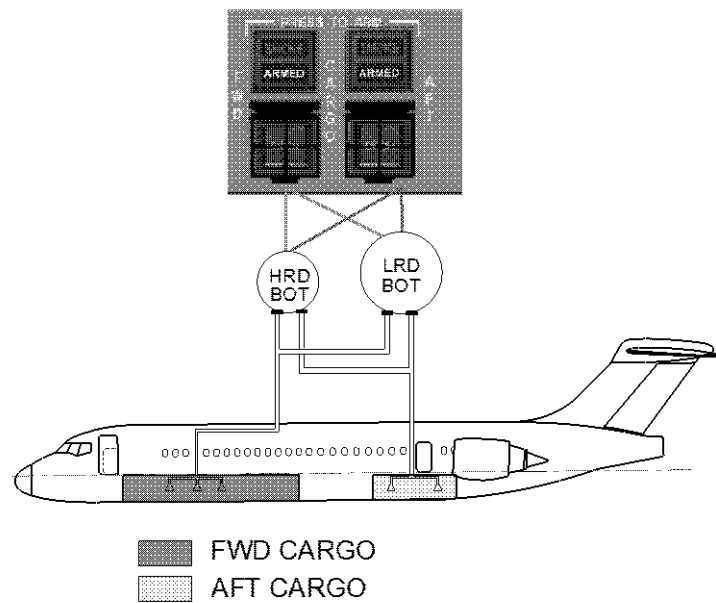
- (1) Cargo compartment facilities should be affordable to attack and vibration from aircraft flying, aircraft operation on the ground and loading and unloading in cargo compartment.
- (2) The minimum gap between aircraft structure and cargo or facility is 150mm(5.91in). This requirement can make sure there is no collision between aircraft and cargo. Also the channel to do check or operation for workers must be retained.
- (3) There is a baffle inside the cargo compartment door. It is designed to avoid the dropment of baggages when the cargo compartment door is opening. Also it can avoid the cargo compartment door stuck when the door is closing.

### E. Maintainability

- (1) Cargo compartment design is standard. Equipments in the same aircraft configuration can interchange.
- (2) Cargo nets will not tangled when the baggages are loaded.
- (3) The decorative board and the equipments covered on floor are demountable.

### F. Fire protection requirement

- (1) A High-Rate Discharge (HRD) fire extinguisher and a Low-Rate Discharge (LRD) fire extinguisher are installed in the right triangular area in the FWD cargo compartment.
- (2) The Fire and Overheat Control Unit (FOCU) monitors fire extinguisher pressure via the temperature compensated pressure switch on the fire extinguisher.



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**Figure 1 Instruction - Cargo Fire Extinguishing (Sheet 1 of 1)**

#### G. Mooring Facility

- (1) There is a baffle inside the cargo compartment door. It is designed to avoid the cargo compartment door stuck when the door is opening and closing.
- (2) There are tracks, nets, ropes and attachment fittings in cargo compartment to fasten and fix the cargo.

#### H. Lighting Requirement

- (1) Light switch is next to cargo door.
- (2) Average illuminance measured on floor is at least 5 ft and the minimum illuminance is 2 ft.
- (3) Cargo lights should be protected. They need to avoid the collision with baggage and cargo when the cargo is loading and unloading. Also, the condition includes when the airplane is in the turbulence. Another please take care when cargo lights need to be maintained.
- (4) Cargo lights need to avoid burning, breaking cargo and bringing hazard to baggages.

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## Cargo net - Technical data

### 1. General

This chapter provides the technical requirements of cargo nets in ARJ21 aircraft.

### 2. Preparation

#### A. Zonal

Number	Location
100	Lower fuselage: Whole radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The zone of lower fuselage is the area under the fuselage reference plane)
200	Upper fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)

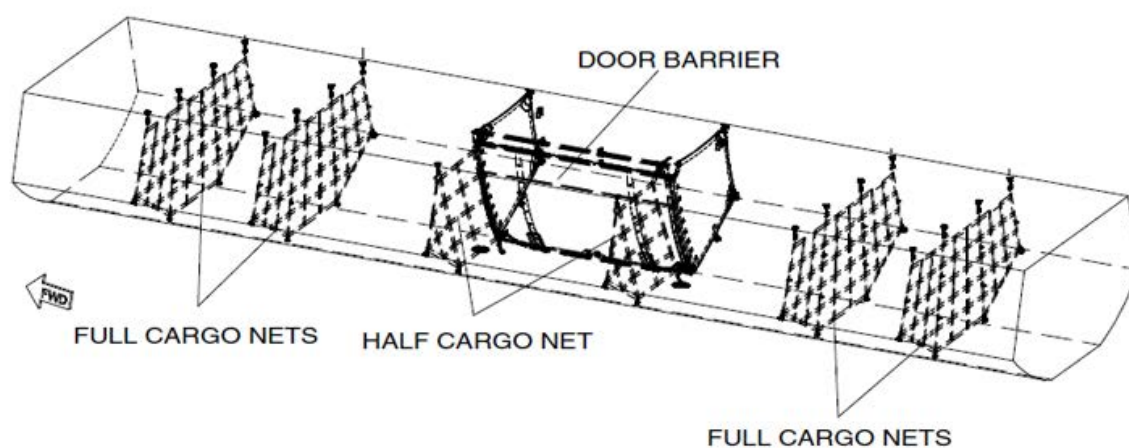
### 3. Main Procedure

#### 1) The function of cargo nets:

- The nets are used to divide the cargo, and to prevent the load of the whole cargo from acting on the cargo structure in a certain direction when the flight attitude of aircraft changes during takeoff, landing or flight, resulting in damage to cargo structure.
- The nets can divide the goods to balance the weight.

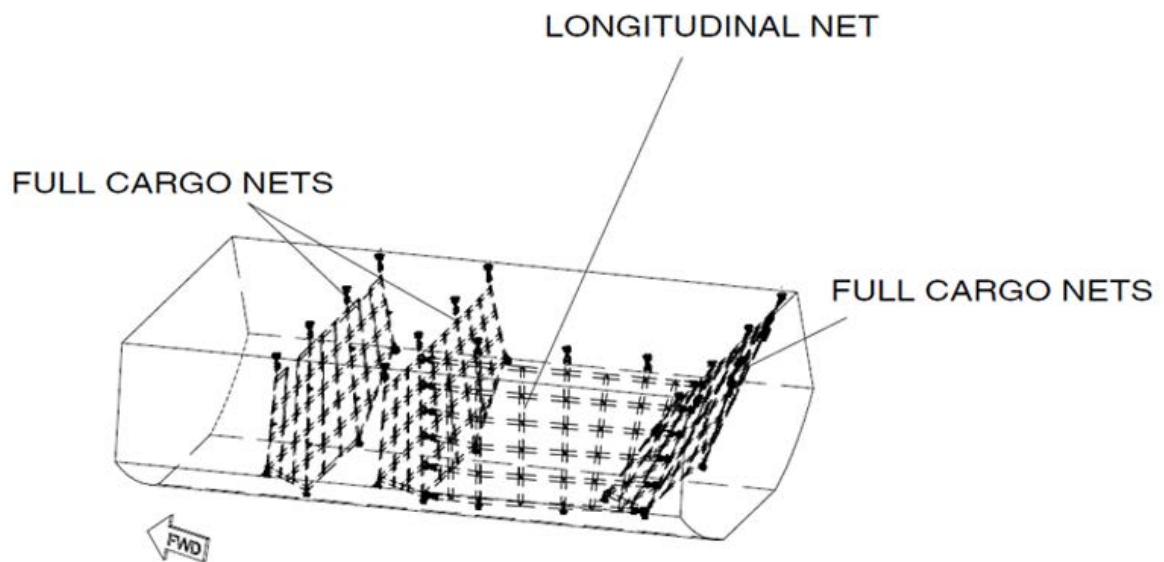
#### 2) The main nets in cargo compartment are as follows (The specific arrangement is shown in figure 1 and figure 2) .

- Fwd cargo door barrier is near the door.
- Fwd cargo full nets' positions are SD256, SD294, SD465 and SD503.
- Fwd cargo half nets are at left of the door baffle boards (Aft looking forward).
- Aft cargo full nets' positions are SD748.5, SD790 and SD828.



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Figure 1 Arrangement of fwd cargo net (Sheet 1 of 1)



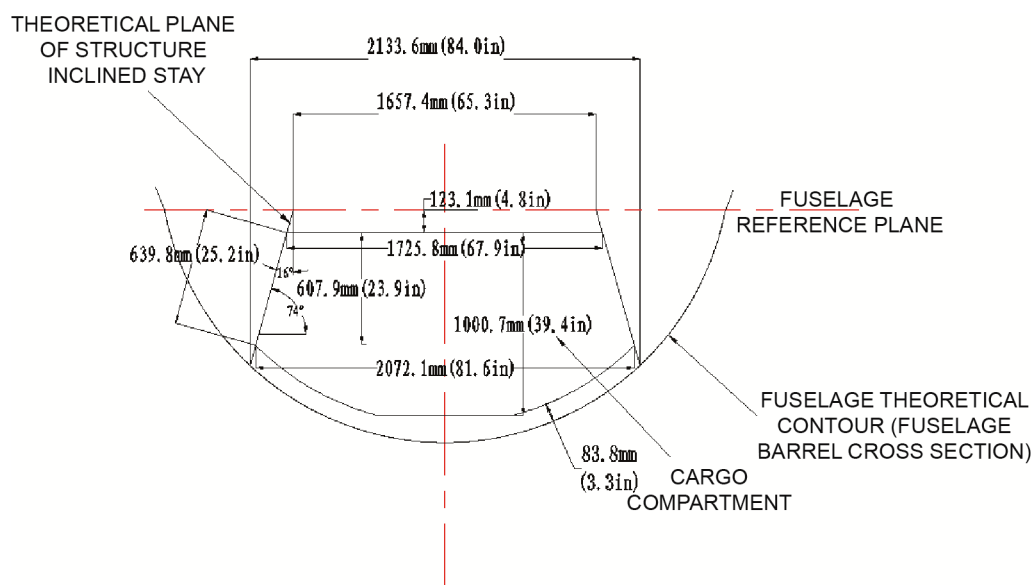
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**Figure 2 Arrangement of aft cargo net (Sheet 1 of 1)**

3) Section dimensions of cargo compartment

3.1 The typical section dimensions of cargo compartment is shown in figure 3. Unit: mm (in)

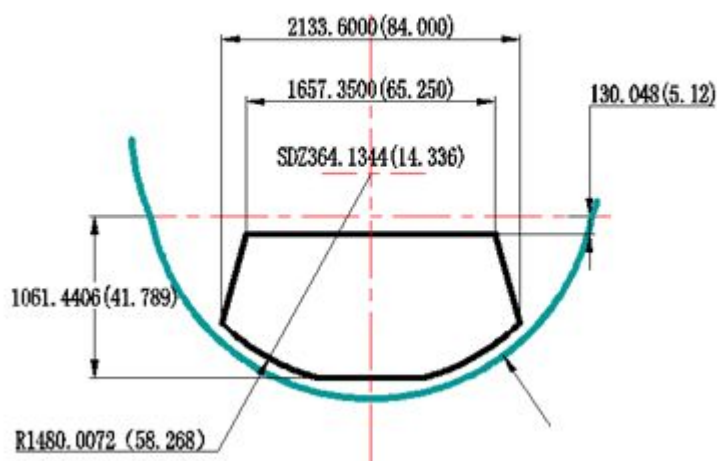
## Ramp Servicing Operation Instruction



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**Figure 3 The typical section of ARJ21-700 cargo (The same diameter segment of fuselage) (Sheet 1 of 1)**

3.2 The full nets are at aft cargo SD828 station. This station is in the contracted segment of fuselage. The cargo section dimensions of this station is shown in figure 4. Unit: mm (in)



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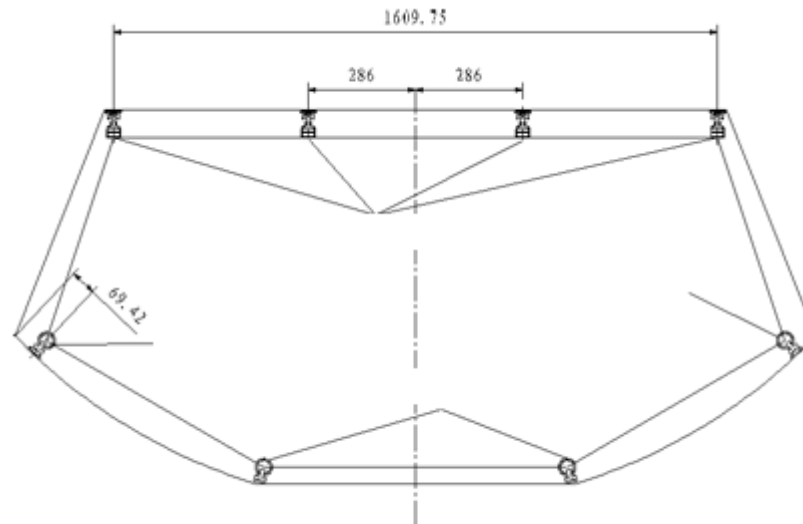
**Figure 4 Aft cargo compartment section dimensions (Sheet 1 of 1)**

4) Generally, cargo nets can be installed/removed manually. Nets which are installed in different positions on the airplane and have the same functions shall be exchanged.

5) Cargo nets cannot twist when they are stored. Nets storage year should not be less than 10 years. And nets usage year should not be less than 5 years. The weight of nets and half nets in cargo compartment should less than 20 kg. The color of nets is blue.

6) Attachment section of cargo nets and structure

6.1 The arrangement of attachment points of cargo full nets and structure is shown in figure 5.

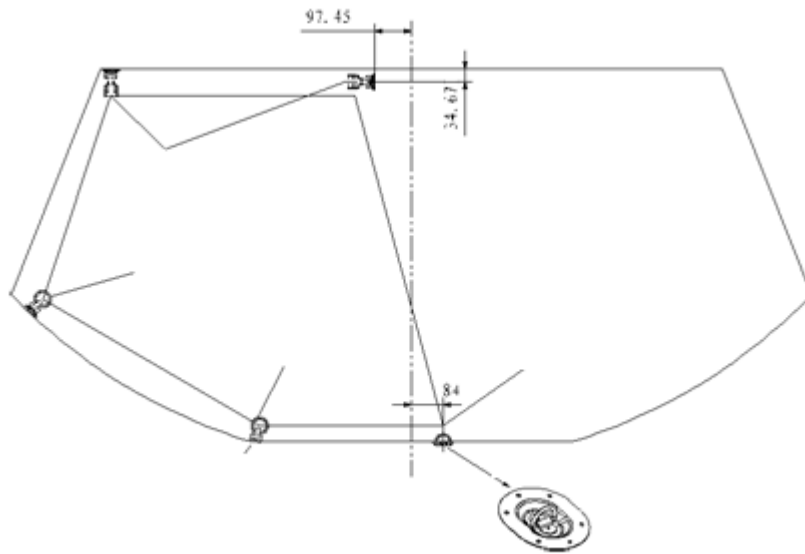


ICN-ARJ21-A-131212-A-SVV19-12568-A-001-01

**Figure 5 The arrangement of full nets attachment points (Sheet 1 of 1)**

6.2 The arrangement of attachment points of cargo half nets and structure is shown in figure 6.

## Ramp Servicing Operation Instruction



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**Figure 6 The arrangement of half nets attachment points (Sheet 1 of 1)**

### 6.3 Attachment fittings and connecting brackets of cargo nets and structure

Attachment fittings should make ARJ21 aircraft cargo nets adjustable. Normal fittings should be general and interchangeable.

### 6.4 The numbers of cargo nets and connecting brackets are shown in table 1.

**Table 1 Aircraft cargo nets equipment list**

	FORWARD CARGO COMPARTMENT	AFTER CARGO COMPARTMENT
full cargo nets (Type 1) includes fittings	4	2
full cargo nets (Type 2) includes fittings		1(SD828)
half cargo nets includes fittings	2	
Mount	30	18

### 6.5 Distribution of load in aircraft cargo compartment

The maximum available line load of Fwd Cargo Compartment (FCC) is 428.6kg/m(24lb/in). The maximum available line load of Aft Cargo Compartment (ACC) is 401.8kg/m(22.5lb/in).

The design over load requirements of cargo nets are following:

Longitudinal\_Foward 3g, Afterward 1.5g

Lateral\_Left 1.5g, Right 1.5g

---

## Hazard Areas of aircraft - Technical data

### 1. General

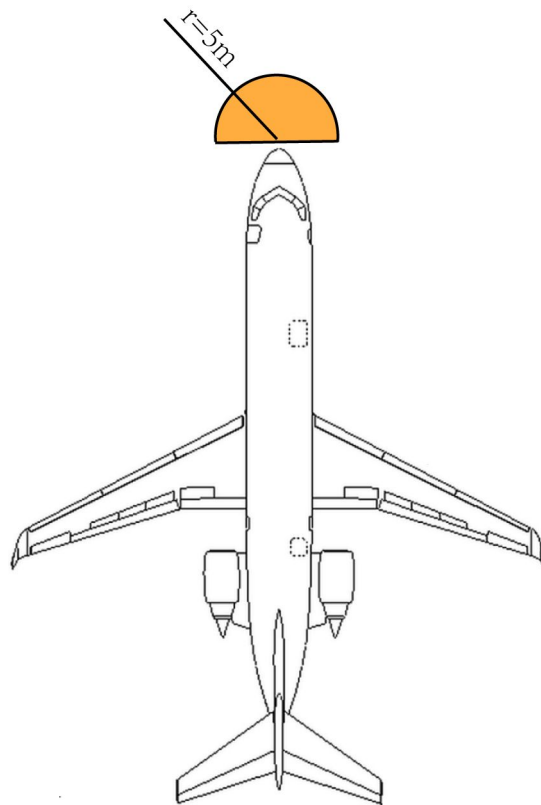
- A. This procedure provides engines and weather radar hazard area for aircraft ground service people.

### 2. Hazard area of weather radar

- A. Please make sure that there is no people in 5 meters around weather radar when weather radar is in active status or test. Or people will be radiating.
- B. Refueling, defueling and oxygenating are prohibited when weather radar is transmitting electromagnetic wave. Or the operation will cause explosion.
- C. Weather radar is prohibited to turn on when the aircraft is in hangar or there is wall around work
- D. Weather Radar Hazard Area refers to [Figure 1 Hazard area of weather radar](#).

### 3. Engine Hazard Area

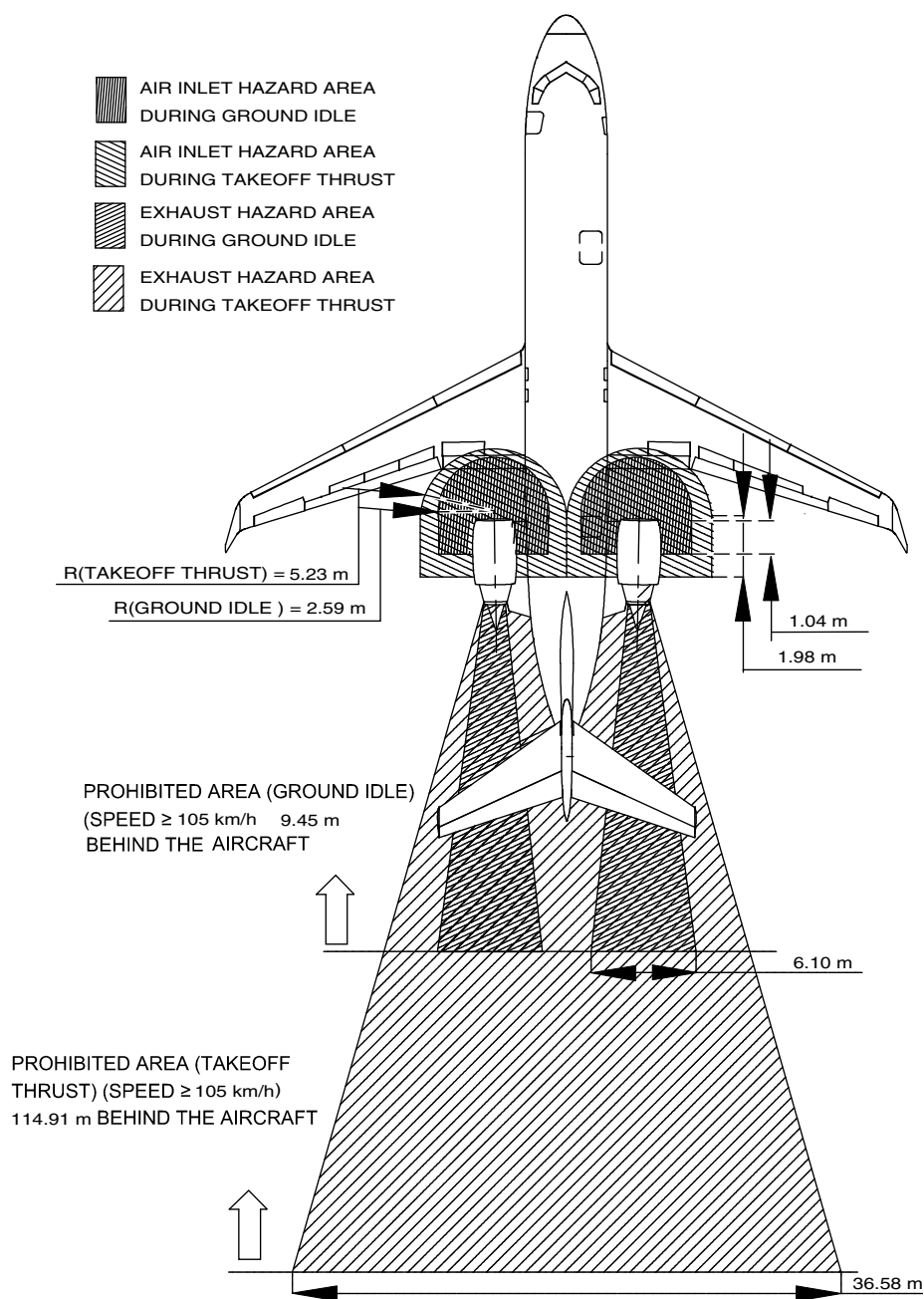
- A. It is dangerous to work around engines. Stay out of the inlet and exhaust areas when the engine is in operation.
- B. These are the hazards around an engine in operation:
  - (1) Low pressure area will be produced around inlet cowling. People and FOD are prohibited around engine inlet cowling hazard area. Inlet cowling hazard area refers to [Figure 2 Engine ground safety precautions](#)
  - (2) Exhaust velocity of engine is fast. People and FOD are prohibited around engine exhaust velocity hazard area. Exhaust velocity hazard area refers to [Figure 3 Engine ground safety precautions](#).
  - (3) Exhaust gas temperature of engine is high. People and FOD are prohibited around engine exhaust gas high temperature hazard area. Exhaust gas high temperature hazard area refers to [Figure 3 Engine ground safety precautions](#).
  - (4) The noise of engine will cause damage to ears. When you are near an engine in operation, always use ear protection to minimize the noise to your ears.



ICN-ARJ21-A-131211-A-SVV19-12525-A-001-01

**Figure 1 Hazard area of weather radar (Sheet 1 of 1)**



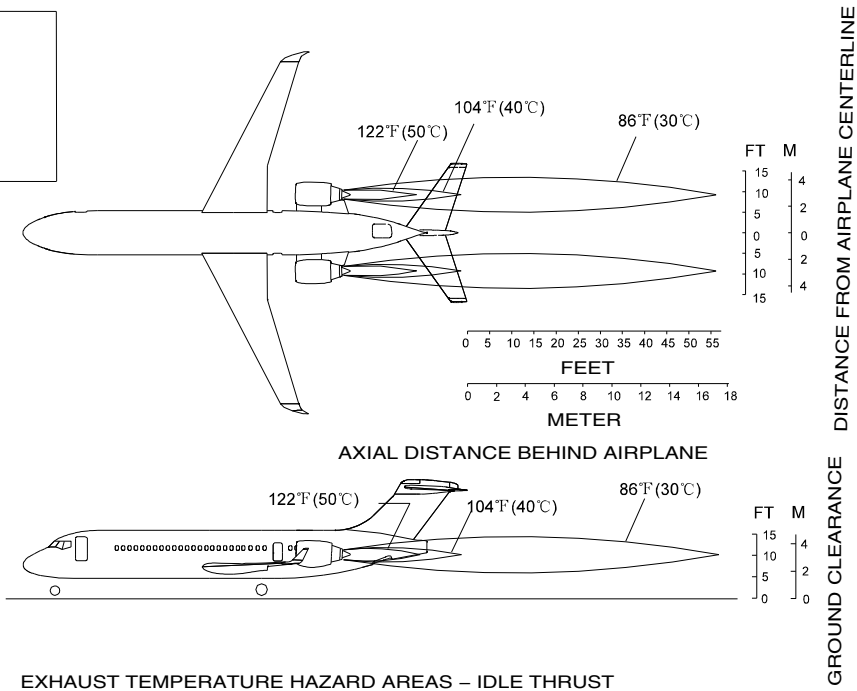


ICN-ARJ21-A-710000-A-SVV19-05442-A-003-01

**Figure 2 Engine ground safety precautions (Sheet 1 of 1)**



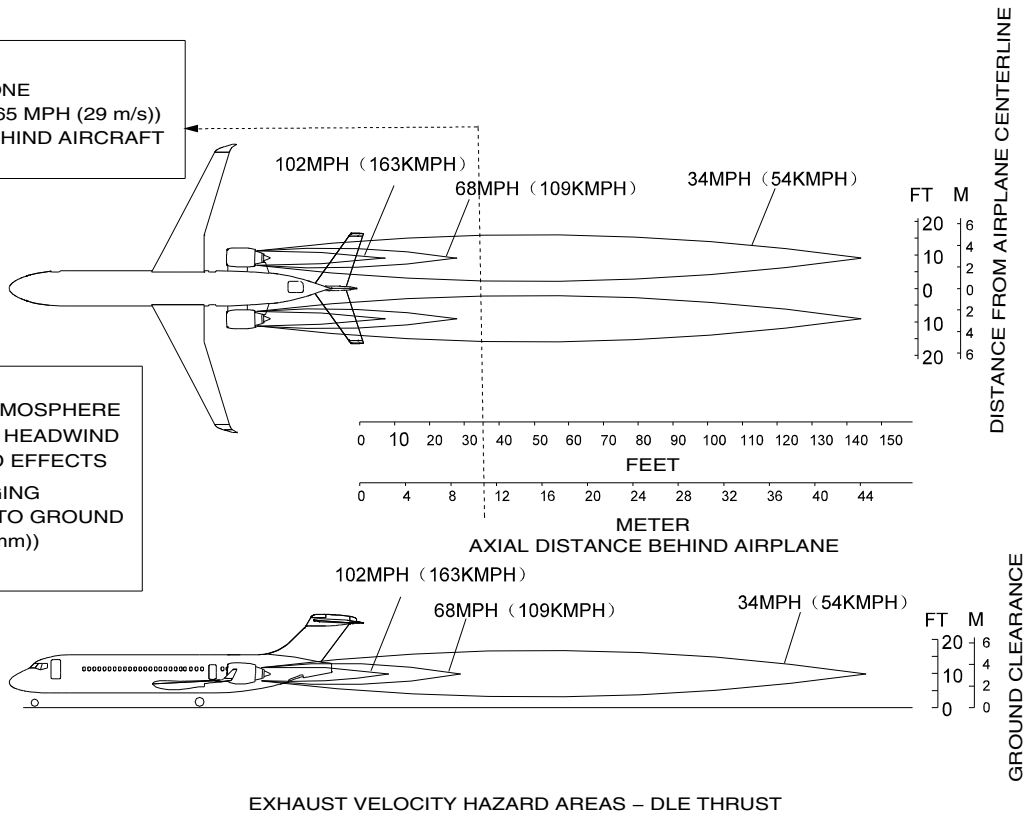
SEA LEVEL  
STANDARD ATMOSPHERE  
20 kt (10.2 m/s) HEADWIND  
STATIC AIRPLANE



EXHAUST TEMPERATURE HAZARD AREAS – IDLE THRUST

KEEP-OUT ZONE  
(VELOCITY = 65 MPH (29 m/s))  
36 ft (11 m) BEHIND AIRCRAFT

SEA LEVEL  
STANDARD ATMOSPHERE  
20 kt (10.2 m/s) HEADWIND  
WITH GROUND EFFECTS  
(ASSUME ENGING  
CENTRELINE TO GROUND  
=123 in (3124 mm))



EXHAUST VELOCITY HAZARD AREAS – IDLE THRUST

ICN-ARJ21-A-710000-A-SVV19-05444-A-001-01

Figure 3 Engine ground safety precautions (Sheet 1 of 1)

ARJ21-A-13-12-11-01A-030A-A

Applicable to: ALL

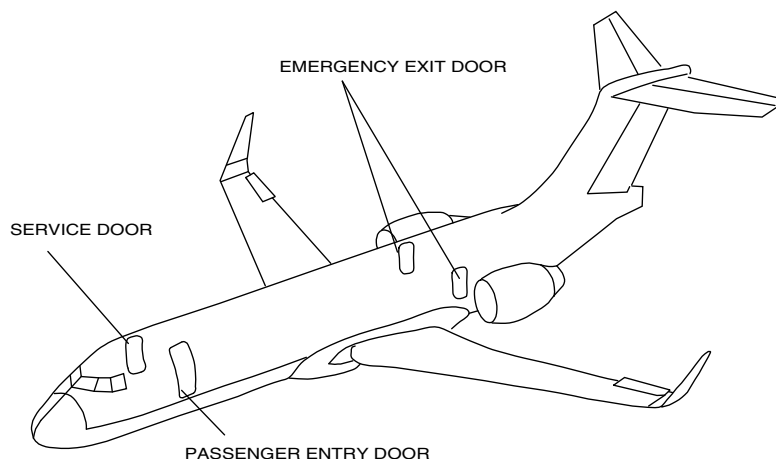
Issue 001, 2023-01-29

End of data module

## Emergency Exits and Evacuation - Technical data

### 1. General

- A. This procedure provides aircraft emergency exits and evacuation.
- B. There are four doors in ARJ21 aircraft. Four doors are all type I. Every door has emergency evacuation slide and can be use as emergency exits.
  - (1) One passenger entry door (Left-Front of aircraft)
  - (2) One service door (Right-Front of aircraft)
  - (3) Two emergency exit doors (Left and Right-After of aircraft)



ICN-ARJ21-A-191107-A-SVV19-00121-A-001-01

**Figure 1 Airplane doors (Sheet 1 of 1)**

### 2. Emergency exit

#### A. Passenger entry door

Passenger entry door is used as channel for passengers and crews. This door can be opened from inside or outside.

The size of passenger entry door is 1.82m×0.79m (high×width). And the door opening radius is 1.03m.

The clearance of the passenger entry door refers to [Ground Clearances - Technical Data, RSOI ARJ21-A-13-12-00-02A-030A-A](#).

- (1) Open procedure (Opening from outside)
  - (a) Make sure that there is enough space for ground crew to move back when the door is opening.
  - (b) Make sure that the warning strap is not visible through the viewing window of the passenger entry door.
  - NOTE:** The door cannot be opened from outside when the red warning strap is visible through the viewing window. Because slide is armed now.
  - (c) Pull the outer handle out of the handle box.

## Ramp Servicing Operation Instruction

---

- (d) Turn the outer handle counterclockwise to OPEN to unlatch the door.

**NOTE:** When the exterior handle is turned, the inner handle moves synchronously.

- (e) Move the passenger entry door horizontally and turn it inside.
- (f) Pull the passenger entry door outward and forward along the heading until the door is held in the completely opened position.

### B. Service Door

Service door is used as channel for cabin service. This door can be opened from inside or outside.

The size of service door is 1.22m×0.67m (high×width). And the door opening radius is 0.78m.

The clearance of the service door refers to [Ground Clearances - Technical Data, RSOI ARJ21-A-13-12-00-02A-030A-A](#).

#### (1) Open procedure (Opening from outside)

- (a) Make sure that there is enough space for ground crew to move back when the door is opened.
- (b) Make sure that the warning strap is not visible through the viewing window of the service door.

**NOTE:** The door cannot be opened from exterior when the red warning strap is visible through the viewing window. Because slide is arming now.

- (c) Pull the outer handle out of the handle box.
- (d) Turn the outer handle counterclockwise to OPEN to unlatch the door.

**NOTE:** When the exterior handle is turned, the inner handle moves at the same time.

- (e) Move the service door horizontally and turn it inside.
- (f) Pull the service door outward and forward until it is locked on the fuselage by the gust lock.

### C. Emergency exit door

The emergency exit doors are used for personnel to escape in case of emergency. The door can be opened from inside or outside.

The size of emergency door is 1.37m×0.64m (high×width).

The clearance of the emergency door refers to [Ground Clearances - Technical Data, RSOI ARJ21-A-13-12-00-02A-030A-A](#).

#### (1) Open procedure (Opening from outside)

- (a) Make sure that there is enough space for ground crew to move back when the door is opened.
- (b) Make sure that the warning strap is not visible through the viewing window of the emergency exit door.

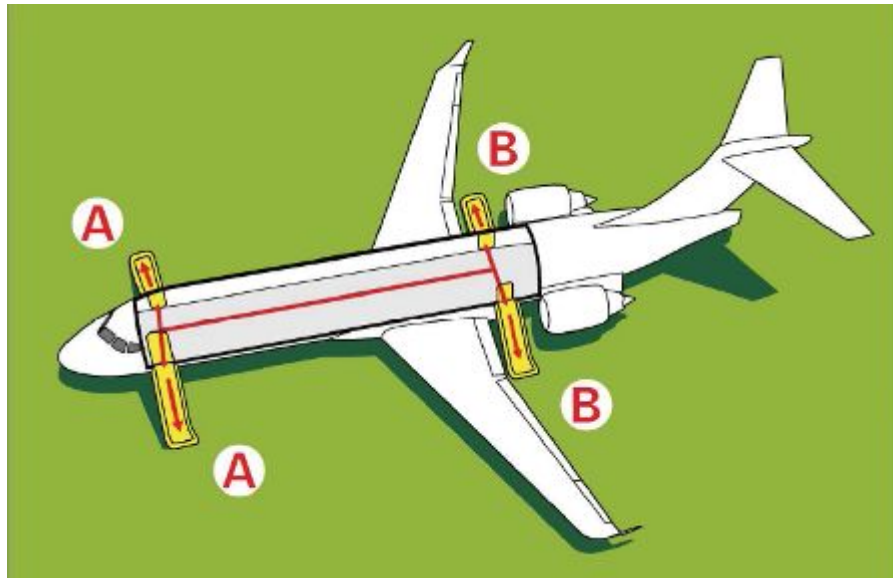
**NOTE:** The door cannot be opened from exterior when the red warning strap is visible through the viewing window. Because slide is arming now.

- (c) Press the round end of the outer handle, and pull the outer handle outward from the handle box.
- (d) Turn the outer handle to OPEN until the door lock is unlocked, and lift the door until the uplock is locked.

**NOTE:** When the exterior handle is turned, the inner handle moves at the same time.

### 3. Evacuation

Aircraft emergency evacuation instruction is shown in the following picture.



ICN-ARJ21-A-131212-A-SVV19-12589-A-001-01

**Figure 2 Emergency Evacuation Instruction (Sheet 1 of 1)**

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## Fire rescue - Fire-fighting and rescue

### 1. Common Information

A. This procedure provides rescue procedures when the aircraft is on fire.

### 2. Procedures

A. Procedure

- (1) Execute rescue according to the following procedures when the aircraft is on fire.

**NOTE:** People can participate the aircraft fire-fighting only if he has finished the relative training.  
Fire-fighting is dangerous and may cause people injury or death.

- (2) Pay attention to the position of dangerous goods.

- (a) FUEL
- (b) Hydraulic fluid
- (c) OIL
- (d) Aircraft batteries
- (e) Flight crew oxygen cylinder
- (f) Flammable in cabin and cargo compartment

- (3) Help passengers evacuate aircraft.

**NOTE:** Keep clean around the escape slide. Prevent fire from destroying escape slide.

- (4) If possible, move the aircraft to a safe area.

- (5) If possible, release fire fighting agents of the following zones as needed.

- (a) Left Engine
- (b) Right Engine
- (c) APU
- (d) Forward cargo compartment

- (6) Pay attention to the temperature of wheel brake and use water to low down this temperature.

**NOTE:** The thinnest parts of wheel are two sides of the wheel. In order to avoid people injury, please close to wheel from front and rear.

- (7) The following fire fighting agents are recommended.

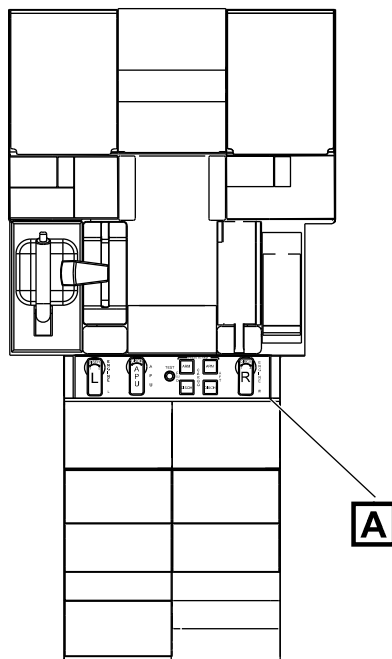
**Table 1 Recommend fire fighting agents**

Fire zone	Fire fighting agents
The engine is on fire.	Clean agent or dry chemical
APU is on fire.	Clean agent or dry chemical
Fuel tank is on fire.	Dry chemical Use foam to the zones with leaked oil on the ground.
Wheel brakes are on fire.	Water

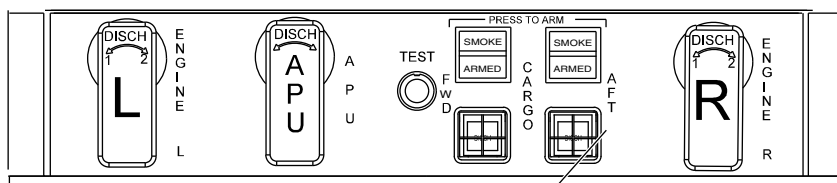
**Ramp Servicing Operation  
Instruction**

<b>Fire zone</b>	<b>Fire fighting agents</b>
Batteries are on fire.	Clean agent or dry chemical
Flight compartment or cabin is on fire.	Clean agent, dry chemical or water based agent
Cargo compartments are on fire.	Clean agent





CENTRAL PEDESTAL



FIRE CONTROL PANEL

A

ICN-ARJ21-A-260000-A-SVV19-00389-A-001-01

Figure 1 Fire Protection - System Description (Sheet 1 of 1)

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## Location of emergency equipment - Technical data

### 1. General

This section describes the distribution of aircraft emergency equipment.

### 2. Work preparation

#### A. Zonal

Number	Location
100	Lower fuselage: Whole radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The Zone of Lower Fuselage is the area under the Fuselage Reference Plane)
200	Upper fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)
300	Tail
400	Power plant and Pylon
500	Left wing
600	Right wing
700	Landing Gear and Landing Gear Doors
800	Doors (Subjected to the Pressurized Loads)

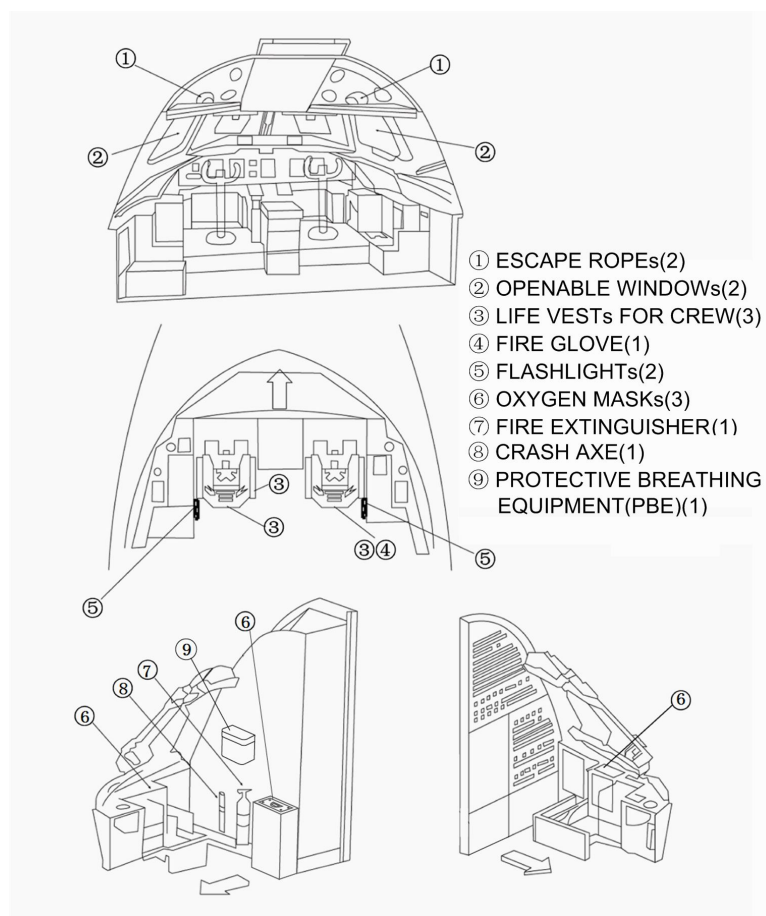
### 3. Main Procedure

#### A. Cockpit Emergency Equipment

The emergency equipment in the cockpit is located as shown in the figure below:

(1) Cockpit Emergency Equipment

## Ramp Servicing Operation Instruction

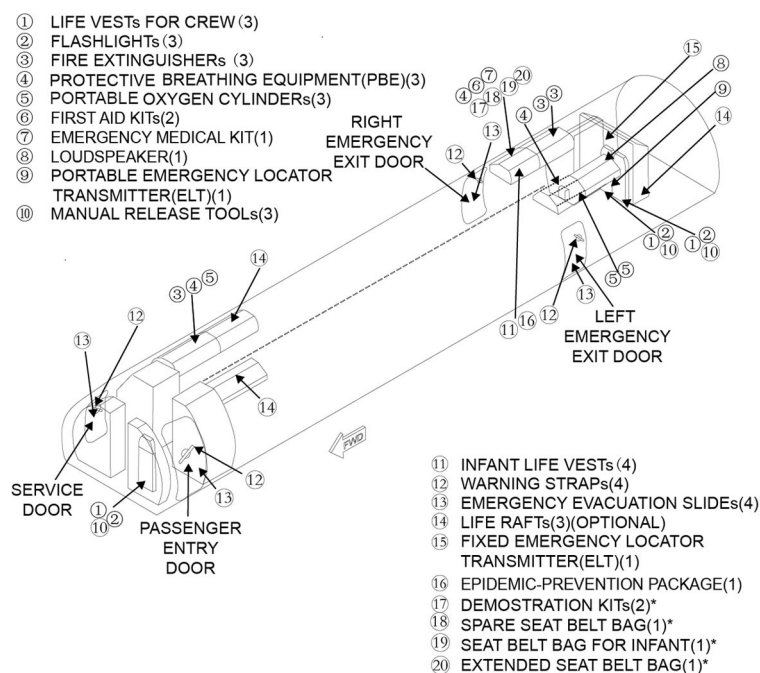


ICN-ARJ21-A-170125-A-SVV19-00920-A-002-01

**Figure 1 Cockpit Emergency Equipment (Sheet 1 of 1)**

### B. Cabin Emergency Equipment

The emergency equipment in the cabin is located as shown in the figure below:



ICN-ARJ21-A-170125-A-SVV19-00127-A-002-01

**Figure 2 Cabin Emergency Equipment (Sheet 1 of 1)**

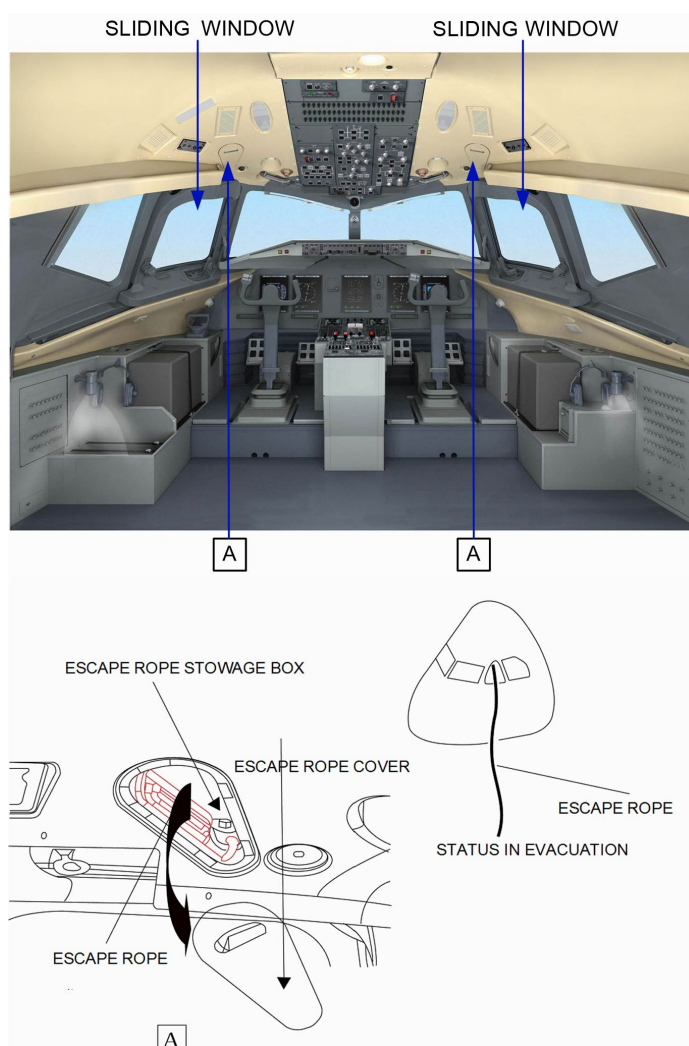
### C. Emergency Evacuation for the Cockpit Crew

Open the sliding windows. Refer to [系统描述 - System Description, ARJ21-A-17-01-52-10A-84AA-A](#).

After the sliding window is opened, remove the escape rope cover on the ceiling panel and deploy the rope overboard.

Evacuate from the aircraft using the escape rope.

## Ramp Servicing Operation Instruction



ICN-ARJ21-A-170125-A-SVV19-00124-A-001-01

**Figure 3 Evacuation by escape rope (Sheet 1 of 1)**

# **Chapter Servicing Points and Procedures**

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## Aircraft cleaning - Cleaning and application surface protection

### 1. Common Information

- A. Use this procedure to clean and polish the external surfaces of the aircraft. Clean the external surfaces frequently to help prevent corrosion and to extend the life of the aircraft structure. Clean the surfaces that do not have paint more frequently than the painted surfaces.
- B. The liquids used in this procedure can cause injury to the skin and eyes, or damage to the aircraft. Always wear protective clothing when you clean the aircraft. The cleaner can cause corrosion if they are not removed completely from the aircraft surfaces. The solvent that is mixed with the cleaner is flammable. Keep the solvent away from sources of heat.
- C. Failure to remove covers over pitot-static probes before flight may cause large errors in airspeed-sensing and altitude-sensing signals, which may lead to loss of safe flight.
- D. This section includes these procedures:
  - (1) Remove contaminants (dust and dirt) from smooth surfaces.
  - (2) Remove contaminants around sensitive components.
  - (3) Remove unwanted hydraulic fluid.
- E. Do the cleaning of sensitive surfaces and components, including mechanical control surfaces, landing gear and its wheel well, electronic probe sensors or hydraulic components. Pay attention to prevent mechanical damage and chemical damage (such as chemical splash), improper operation can cause damage to components.
- F. To clean large areas, use non-atomizing spray equipment, swabs, and brushes. To clean small areas, use rags, brushes, and sponges. Do not clean an area so large that the cleaner dry on the surface before you can flush it with water.
- G. When cleaning the aircraft, you can choose the appropriate cleaner or only use clean water to work according to the actual situation.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
100	Lower half of the fuselage: all radome of STA7 - STA37, and STA37 - STA897.926 lower half of the bulkhead. (The lower half is the area below the fuselage reference plane)
200	Upper half of the fuselage: STA37 - STA897.926 bulkhead. (The upper half is the area above the fuselage reference plane)
300	Fuselage Tail
400	Powerplant and Pylon
500	Left Wing
600	Right Wing
700	Landing Gear and Landing Gear Doors
800	Doors (withstanding pressurization load)

## Ramp Servicing Operation Instruction

### Equipments/Tools

Name	Part number	QTY	Remarks
Pitot/Static Probe Cover (Opt:Pitot/Static Probe Cover) (Opt:Cover - Pitot/Static Probe) (Opt:Pitot/Static Probe Cover) (Opt:Cover - Pitot/Static Probe) (Opt:Pitot/Static Probe Cover) (Opt:Pitot/Static Probe Cover)	610A230-C (Opt:KPC3-825-8) (Opt:610A420-A) (Opt:610A230-C) (Opt:610A420-A) (Opt:KPC3-825-8) (Opt:610A230-C)	4	Null
(Opt:Pitot/Static Probe Cover) (Opt:Cover - Pitot/Static Probe)	(Opt:KPC3-825-8) (Opt:610A420-A)		
Blanking Cap of APU Compartment Cooling Air Inlet	610A050-C	1	Null
Blanking Cap of APU Exhaust Silencer	610A220-C	1	Null
Engine Inlet Cover (Left) (Opt:Engine Inlet Protective Cover (Left Engine)) (Opt:Engine Inlet Cover (Left))	610A191-C (Opt:610A191-E) (Opt:610A191-C)	1	Null
(Opt:Engine Inlet Protective Cover (Left Engine))	(Opt:610A191-E)		
Engine Inlet Cover (Right) (Opt:Engine Inlet Cover (Right)) (Opt:Engine Inlet Cover (Right))	610A192-C (Opt:610A192-E) (Opt:610A192-C)	1	Null

# Ramp Servicing Operation Instruction

Name	Part number	QTY	Remarks
(Opt:Engine Inlet Cover (Right))	(Opt:610A192-E)		
Engine Inlet Cover  (Opt:Engine Inlet Cover)  (Opt:Engine Inlet Cover)	610A190-D  (Opt:604C5915-001)  (Opt:610A190-D)	2	Engine inlet cover (Left) and engine inlet cover (right) can be replaced by engine inlet cover.   (Opt:Engine inlet cover (Left) and engine inlet cover (right) can be replaced by engine inlet cover.)
(Opt:Engine Inlet Cover)	(Opt:604C5915-001)		
Blanking Cap of Engine Anti-Ice Duct Exhaust (Opt:Blanking Cap of Engine Anti-Ice Duct Exhaust) (Opt:Blanking Cap of Engine Anti-Ice Duct Exhaust)	604C5900-001 (Opt:610A340-A) (Opt:604C5900-001)	2	Null
(Opt:Blanking Cap of Engine Anti-Ice Duct Exhaust)	(Opt:610A340-A)		
Blanking Cap of Cold Air Inlet of Air Intake (Opt:Blanking Cap of Cold Air Inlet of Air Intake) (Opt:Plug - Engine NACA Scoop) (Opt:Plug - Engine NACA Scoop) (Opt:Blanking Cap of Cold Air Inlet of Air Intake) (Opt:Blanking Cap of Cold Air Inlet of Air Intake) (Opt:Blanking Cap of Cold Air Inlet of Air Intake)	604C5910-001 (Opt:610A360-A) (Opt:604C5910-003) (Opt:604C5910-003) (Opt:604C5910-001) (Opt:604C5910-001) (Opt:610A360-A)	2	Null
(Opt:Blanking Cap of Cold Air Inlet of Air Intake)	(Opt:610A360-A)		

**Ramp Servicing Operation  
Instruction**

Name	Part number	QTY	Remarks
(Opt:Plug - Engine NACA Scoop)	(Opt:604C5910-003)		
Engine Exhaust Nozzle Blanking Cap (Left)	604C5818-009	1	Null
(Opt:Engine Exhaust Nozzle Blanking Cap (Left))	(Opt:604C5818-019)		
(Opt:Engine Exhaust Nozzle Blanking Cap (Left))	(Opt:604C5818-009)		
(Opt:Engine Exhaust Nozzle Blanking Cap (Left))	(Opt:604C5818-019)		
Engine Exhaust Nozzle Blanking Cap (Right)	604C5818-010	1	Null
(Opt:Engine Exhaust Nozzle Blanking Cap (Right))	(Opt:604C5818-020)		
(Opt:Engine Exhaust Nozzle Blanking Cap (Right))	(Opt:604C5818-010)		
(Opt:Engine Exhaust Nozzle Blanking Cap (Right))	(Opt:604C5818-020)		
Main Landing Gear Tire Cover	632A100-A	4	Null
Nose Landing Gear Protective Cover	632A110-A	2	Null
Fuel Tank Vent Plug	610A210-B	2	Null
Ice Detector Cover	610A100-C	2	Null
(Opt:Ice Detector Cover)	(Opt:SBE2080)		
(Opt:Ice Detector Cover)	(Opt:610A100-D)		
(Opt:Ice Detector Cover)	(Opt:610A100-D)		
(Opt:Ice Detector Cover)	(Opt:610A100-C)		
(Opt:Ice Detector Cover)	(Opt:610A100-C)		
(Opt:Ice Detector Cover)	(Opt:SBE2080)		
(Opt:Ice Detector Cover)	(Opt:SBE2080)		
(Opt:Ice Detector Cover)	(Opt:610A100-D)		
Total Air Temperature Sensor Cover	610A240-B	1	Null
AOA Cover	SK103956	2	Null

## Ramp Servicing Operation Instruction

Name	Part number	QTY	Remarks
Ram Air Inlet Protective Cover (Opt:Ram Air Inlet Protective Cover) (Opt:Ram Air Inlet Protective Cover)	610A110-A (Opt:SBE2200) (Opt:610A110-A)	1	Null
(Opt:Ram Air Inlet Protective Cover)	(Opt:SBE2200)		
Wing Working Pad (Left)	610A131-B	1	Null
Wing Working Pad (Right)	610A132-B	1	Null
Compressed Air Source	No Specific	As Necessary	Null
Spray Equipment	No Specific	As Necessary	Null
Brush	No Specific	As Necessary	Commercial
Gloves	No Specific	As Necessary	Null
Respirator Mask	No Specific	As Necessary	SPEC35L is model number. Standard tool.
Goggles	No Specific	As Necessary	Null

### Consumable Materials

Reference	Name	Remarks
11-008	Cleaning Agent of Airplane Hydraulic Fluid	Null
11-037	Interior and Exterior Aircraft Cleaner	Null
11-038	Alkaline aqueous cleaner	Null
11-058	Alkaline Cleaner	Null
18-040	Pressure-Sensitive Plastic Coated Waterproof Tape	Null
18-041	Transparent Polyvinyl Film	Null

### Safety Conditions

**WARNING: WEAR SAFETY BELTS WHEN YOU WORK IN THE AREA THAT IS HIGHER THAN 2 METERS TO AVOID INJURY OR DEATH CAUSED BY FALLING DOWN.**

### 3. Procedures

#### A. Preparation

**WARNING: MAKE SURE THAT THE WHEEL CHOCKS ARE IN POSITION TO PREVENT THE INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT CAUSED BY AIRPLANE MOVEMENT.**

- (1) Park the aircraft into the wind.

**NOTE:** Be careful when you clean the aircraft in very hot weather. The heated surface of the aircraft can dry the cleaners before you can flush them with water. The dried cleaners can stain the surface.

**NOTE:** If the temperature of the aircraft surface is so high that you feel uncomfortable when you touch the aircraft surface, you must cool the aircraft surface with water before cleaning.

**WARNING: KEEP ALL OF THE EQUIPMENT THAT YOU USE WITH FLAMMABLE SOLVENTS AWAY FROM SOURCES OF HEAT. IF THERE IS WIND, MAKE SURE THAT THE SOLVENTS DO NOT FALL ON EQUIPMENT OR WARM COMPONENTS. IT PREVENTS EXPLOSION OR FIRE THAT CAN CAUSE INJURY TO PERSONS.**

- (2) Move all of the equipment that you will use with flammable solvents away from sources of heat.
- (3) Close all of the passenger entry door, service door, cargo doors, emergency exit doors, and access panels.

**NOTE:** If the doors cannot be closed because of other servicing, make sure that no fluid gets into the cabin area.

**WARNING: 1、PITOT/STATIC PRESSURE PROBE COVERS MUST BE VISIBLE FROM THE GROUND AND A WARNING NOTICE INSTALLED ON THE LEFT CONTROL WHEEL. 2、PITOT/STATIC PRESSURE PROBE COVERS MUST BE REMOVED BEFORE FLIGHT. OTHERWISE, MAY LEAD TO LOSS OF SAFE FLIGHT.**

**CAUTION: WHENEVER AN OPENING IS COVERED, MAKE SURE THAT THE COVER IS VISIBLE FROM THE GROUND. ENGINES SHOULD NOT BE OPERATED WITH COVERS IN PLACE BECAUSE THE COVERS CAN COME OFF AND DAMAGE THE ENGINES.**

**CAUTION: DURING CLEANING, USE COVERS AND ADHESIVE TAPES TO KEEP LIQUIDS OUT OF AREAS THAT CONTAIN MECHANICAL, ELECTRICAL, OR HYDRAULIC COMPONENTS. LIQUIDS THAT GET INTO THESE AREAS CAN CAUSE CORROSION, FREEZE DURING FLIGHT, OR DETERIORATION OF LUBRICATING OIL.**

- (4) Install covers on these components:

**CAUTION: MAKE SURE THE COVER IS IN GOOD WORKING CONDITION WITH NO EVIDENCE OF DAMAGE, ESPECIALLY FRAYING AROUND THE COVER OPENING. FRAYED FIBERS FROM THE COVER COMBINED WITH OTHER SUBSTANCES (SUCH AS SAND, GREASE, ETC.) CAN CAUSE OBSTRUCTION IN THE PROBE.**

**CAUTION: COUNT THE NUMBER OF PINS ON THE PROTECTIVE COVER DURING INSTALLATION AND REMOVAL. MAKE SURE THAT THE PINS ARE WELL CONNECTED WITH THE PROTECTIVE COVER. SEPARATION OF PINS MAY CAUSE DAMAGE TO THE ENGINE OR THE AIRPLANE.**

**CAUTION: DURING INSTALLATION AND REMOVAL OF THE AOA SENSOR COVER, DO NOT APPLY FORCE TO THE VANE BLADES OR DRAG THE VANE BLADES. OTHERWISE, DAMAGE TO THE SENSOR CAN OCCUR.**

- (a) All pitot-static probes
- (b) Ice detector
- (c) Total air temperature sensor
- (d) Angle of Attack Sensor

**NOTE:** Don't let the angle of attack sensor impacted by the water flows directly. To prevent the moisture from entering the angle of attack sensor and base connected structure, it's recommended to increase waterproof around the angle of attack sensor.

- (e) Cold air inlet of air intake
- (f) Engine inlet

**NOTE:** When installing the engine inlet cover, make sure that the FADEC cooling air inlet in the 12 o'clock position of the engine air intake is covered.

**NOTE:** The engine air inlet protective cover has the risk of fading when encountering the aircraft cleaner. During cleaning, avoid the cleaner splashing on the protective cover and causing the protective cover to fade and contaminate the engine air inlet.

- (g) Engine exhaust nozzle
- (h) Engine anti-ice duct exhaust
- (i) APU compartment cooling air inlet
- (j) APU exhaust silencer
- (k) Wheel, brake and tire.
- (l) Ram air inlet (you can also use [Transparent Polyvinyl Film \(18-041\)](#) and [Pressure-Sensitive Plastic Coated Waterproof Tape \(18-040\)](#) to for protection)
- (m) Fuel tank vent (you can also use [Pressure-Sensitive Plastic Coated Waterproof Tape \(18-040\)](#) )

- (5) Attach a red paper tag that has PITOT-STATIC PROBES COVERED printed on it in black letters, to the top of the left control wheel in the flight deck.

**CAUTION:** WHENEVER AN OPENING IS COVERED, MAKE SURE THAT THE COVER IS VISIBLE FROM THE GROUND. ENGINES SHOULD NOT BE OPERATED WITH COVERS IN PLACE BECAUSE THE COVERS CAN COME OFF AND DAMAGE THE ENGINES.

**CAUTION:** DO NOT SPRAY DETERGENT OR WATER DIRECTLY INTO OR AT ANY OF THE OPENINGS LISTED BELOW UNDER ANY CIRCUMSTANCES, OTHERWISE DAMAGE TO THE AIRPLANE COULD OCCUR.

- (6) Use [Pressure-Sensitive Plastic Coated Waterproof Tape \(18-040\)](#) to protect these cutout areas:
  - (a) APU exhaust port
  - (b) Outflow valve

**CAUTION:** PUT A COVER ON THE WHEEL BEARINGS OF THE LANDING GEAR BEFORE YOU CLEAN THE AIRPLANE. WATER OR CLEANING SOLUTIONS CAN CAUSE DAMAGE TO THE WHEEL BEARINGS.

- (7) Use [Transparent Polyvinyl Film \(18-041\)](#) to cover these areas to protect related components:
  - (a) All the gaps between the ailerons, flaps, slats, spoilers and the wings

**Ramp Servicing Operation  
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- (b) All landing gear, wheel bearing seals

**WARNING: TAKE CARE WHILE WALKING (STANDING) ON THE WET AIRPLANE SURFACES DURING AIRPLANE CLEANING. BECAUSE THE CLEANER IS IRRITANT TO SKIN AND EYES, WEAR PROTECTIVE CLOTHING AND EQUIPMENT TO PREVENT INJURY TO PERSONS.**

- (8) Wear gloves and goggles to prevent injury to your skin and eyes. Fasten a safety belt when you are on the wet aircraft surface.
- (9) Do not let the tires stay in the cleaner that was used to clean the aircraft.

**CAUTION: MAKE SURE THAT MIXTURE OF WATER AND CLEANER DOES NOT GET IN THE BRAKE DISKS. THE MIXTURE CAN CAUSE DAMAGE TO WHEEL BRAKES.**

- (10) Make sure that the brakes are properly covered.

**CAUTION: DO NOT USE A CLEANER IF IT IS IN A STRATIFIED (NOT MIXED) CONDITION. A CLEANER THAT IS STRATIFIED CAN CAUSE A STAIN OR CORROSION ON THE AIRPLANE SURFACES.**

- (11) Examine the cleaner before you use it. If the cleaner does not look mixed, then mix it again. Examine the cleaner again after 1. Discard the cleaner if it does not stay in a mixed condition.

**NOTE:** Interior and Exterior Aircraft Cleaner (11-037) and Alkaline Cleaner (11-058) . For the dust, slight grease and dirt, prepare the solution as follows: Mix Alkaline Cleaner (11-058) with water in a proportion of 1 to 3, Mix Alkaline Cleaner (11-058) with water in a proportion of 1 to 4. For heavy grease and dirt, prepare the solution as follows: Interior and Exterior Aircraft Cleaner (11-037) with water in a proportion of 1 to 3. A whole concentration of Alkaline Cleaner (11-058) cleaner.

**NOTE:** Alkaline aqueous cleaner (11-038) and Alkaline Cleaner (11-058) are interchangeable.

**B. Procedure**

- (1) Remove contaminants (dust and dirt) from smooth surfaces.

**NOTE:** Start from the upwind side so as to prevent splashes from contaminating clean surfaces.

- (a) Move the flaps/slats to the fully retracted position.

**NOTE:** To clean the flaps/slats in the fully extended position, refer to the Remove Contaminants Around Sensitive Components procedure.

- (b) In accordance with the contamination of the aircraft, use a moistened cloth to scrub the dust and dirt on the surface of the aircraft.

**NOTE:** If any dirt remains, do not scrub with strong force to avoid damage to the surface of the aircraft. Use cleaning agent to clean it.

**NOTE:** If you can completely clean the aircraft surface with clean water, using the cleaning agent is not necessary later.

- (c) Dry the work area with clean cloth.

- (2) Use the cleaning agent to clean the aircraft surface.

**CAUTION: DO NOT USE THE CLEANERS IN HIGHER CONCENTRATIONS THAN SHOWN IN THE SPECIFICATION. HIGHER CONCENTRATIONS CAN CAUSE DAMAGE TO WINDOW PANES, STAINS ON AIRPLANE SURFACES, AND CORROSION ON METALS.**

- (a) Select the water soluble cleaning agent for the condition of the surface that you will clean.



**WARNING: DO NOT USE HIGH-PRESSURE SPRAY EQUIPMENT TO CLEAN MECHANICAL, ELECTRICAL, OR HYDRAULIC COMPONENTS. LIQUIDS THAT GET INTO THESE AREAS CAN CAUSE CORROSION, FREEZE DURING FLIGHT, OR DETERIORATION OF LUBRICATING OIL.**

**CAUTION: KEEP THE NOZZLE OF THE SPRAY EQUIPMENT AT LEAST 12 IN (305 MM) AWAY FROM THE SURFACE OF THE AIRPLANE. THE SPRAY CAN CAUSE DAMAGE TO THE SURFACE.**

- (b) Apply water to the area that you will clean.
- (c) Apply the cleaner to the related area with non-atomizing spray equipment, swabs, or brushes.

**NOTE: To prevent scratches on the surface, soak the brushes in the cleaning agent before you use them.**

- (d) Let the aircraft surface soaked with the cleaner for approximately 5 min. Apply the cleaner again if necessary to keep the surface wet.
- (e) Rub the surface with a brush to help remove unwanted contaminants.

**CAUTION: FLUSH THE SURFACE COMPLETELY TO REMOVE ALL OF THE CLEANER. OTHERWISE, THE CLEANER CAN CAUSE CORROSION TO THE EQUIPMENT.**

- (f) Flush the surface with clean and warm water(160°F(71°C)maximum).
- (g) Dry the wet surface with dry air or towels.

(3) Remove contaminants around sensitive components.

- (a) To clean the flaps/slats, extend them to the fully down position.
- (b) Select the water soluble cleaning agent for the condition of the surface that you will clean.

**WARNING: DO NOT USE HIGH-PRESSURE SPRAY EQUIPMENT TO CLEAN MECHANICAL, ELECTRICAL, OR HYDRAULIC COMPONENTS. LIQUIDS THAT GET INTO THESE AREAS CAN CAUSE CORROSION, FREEZE DURING FLIGHT, OR DETERIORATION OF LUBRICATING OIL.**

- (c) Apply the cleaning agent to the related area with swabs or brushes.

**NOTE: To prevent scratches on the surface, soak the brushes in the cleaning agent before you use them.**

- (d) Let the cleaner soak for approximately 5 min.

**NOTE: Apply the cleaner again if necessary to keep the surface wet.**

**CAUTION: DO NOT REMOVE THE GREASE FROM MECHANICAL JOINTS. THIS GREASE LUBRICATES THE JOINTS AND PREVENTS CORROSION.**

- (e) Carefully rub the surface with a clean brush to remove contaminants.

**CAUTION: FLUSH THE SURFACE COMPLETELY TO REMOVE ALL OF THE CLEANER. OTHERWISE, THE CLEANER CAN CAUSE CORROSION TO THE EQUIPMENT.**

- (f) Flush the surface with clean and warm water (160°F (71°C) maximum).
- (g) Dry the wet surfaces with dry air or towels (or air dry).

**CAUTION: LUBRICATE ALL THE BEARINGS AND JOINTS IN THE AREA YOU CLEANED. OTHERWISE, DAMAGE TO THE COMPONENTS IN THAT AREA MAY OCCUR.**

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- (h) Lubricate all bearings and joints in the cleaned area (excluding lubrication points with grease nipples).
- (4) Remove unwanted hydraulic fluid.
  - (a) Clean the unwanted hydraulic fluid with rags.

**CAUTION:** DO NOT USE WATER OR CLEANERS THAT CONTAIN FLAMMABLE SOLVENTS TO CLEAN WARM COMPONENTS. WARM COMPONENTS CAN CAUSE THE FLAMMABLE SOLVENTS TO BURN.

- (b) Select [Cleaning Agent of Airplane Hydraulic Fluid \(11-008\)](#) to clean the hydraulic fluid from warm components.
- (5) Clean acoustic panel surfaces of engine thrust reverser.
  - (a) Special attention must be paid to prevent water and cleaner from entering the honeycomb structure of the acoustic panel. Follow the steps below to minimize the ingestion of cleaner and water into the honeycomb structure of the acoustic panel.

**CAUTION:** MAKE SURE THAT WATER AND CLEANER TRAPPED INSIDE THE ACOUSTIC PANEL ARE REMOVED. OTHERWISE, THEY CAN CAUSE CORROSION OF THE HONEYCOMB SANDWICH STRUCTURE.

- 1) Wipe the area that you will clean with a clean cloth, damp, but not saturated, with cleaner.
- 2) Remove all the residues with clean cloth moistened with water.
- 3) Wipe using a clean dry cloth to remove all moisture.
- (b) Use only cleaners that meet the requirements of [step A.\(11\)](#) when cleaning the acoustic panels.

**CAUTION:** DO NOT SUBJECT AREAS CONTAINING PERFORATED SKINS TO HIGH-PRESSURE SPRAYING, OR SUBMERGE IN SOLVENTS OR WATER. OTHERWISE, DAMAGE TO EQUIPMENT MAY OCCUR.

- (c) If pressure washing is required for areas around acoustic panels, the acoustic portion of the engine nacelle must be covered to prevent ingestion of the cleaner.

### C. Put the aircraft back to its usual condition

**WARNING:** 1、PITOT/STATIC PRESSURE PROBE COVERS MUST BE VISIBLE FROM THE GROUND AND A WARNING NOTICE INSTALLED ON THE LEFT CONTROL WHEEL.  
2、PITOT/STATIC PRESSURE PROBE COVERS MUST BE REMOVED BEFORE FLIGHT. OTHERWISE, MAY LEAD TO LOSS OF SAFE FLIGHT.

**CAUTION:** WHENEVER AN OPENING IS COVERED, MAKE SURE THAT THE COVER IS VISIBLE FROM THE GROUND. ENGINES SHOULD NOT BE OPERATED WITH COVERS IN PLACE BECAUSE THE COVERS CAN COME OFF AND DAMAGE THE ENGINES.

**CAUTION:** MAKE SURE THE COVER IS IN GOOD WORKING CONDITION WITH NO EVIDENCE OF DAMAGE, ESPECIALLY FRAYING AROUND THE COVER OPENING. FRAYED FIBERS FROM THE COVER COMBINED WITH OTHER SUBSTANCES (SUCH AS SAND, GREASE, ETC.) CAN CAUSE OBSTRUCTION IN THE PROBE.

**CAUTION:** COUNT THE NUMBER OF PINS ON THE PROTECTIVE COVER DURING INSTALLATION AND REMOVAL. MAKE SURE THAT THE PINS ARE WELL CONNECTED WITH THE PROTECTIVE COVER. SEPARATION OF PINS MAY CAUSE DAMAGE TO THE ENGINE OR THE AIRPLANE.

- (1) Remove covers and warning streamers from the following components:
  - (a) All pitot-static probes
  - (b) Ice detector
  - (c) Total air temperature sensor
  - (d) Angle of Attack Sensor

**NOTE:** Remove the waterproof cover you put before the cleaning operation from the angle of attack sensor.
  - (e) Cold air inlet of air intake
  - (f) Engine inlet
  - (g) Engine exhaust nozzle
  - (h) Engine anti-ice duct exhaust
  - (i) APU compartment cooling air inlet
  - (j) APU exhaust silencer
  - (k) Wheel, brake and tire.
  - (l) Ram air inlet (or remove [Transparent Polyvinyl Film \(18-041\)](#) and [Pressure-Sensitive Plastic Coated Waterproof Tape \(18-040\)](#) )
  - (m) Fuel tank vent (or remove [Pressure-Sensitive Plastic Coated Waterproof Tape \(18-040\)](#) )
- (2) Remove the red PITOT-STATIC PROBES COVERED tag from the left control wheel in the cockpit.

**CAUTION:** WHENEVER AN OPENING IS COVERED, MAKE SURE THAT THE COVER IS VISIBLE FROM THE GROUND. ENGINES SHOULD NOT BE OPERATED WITH COVERS IN PLACE BECAUSE THE COVERS CAN COME OFF AND DAMAGE THE ENGINES.
- (3) Remove all [Pressure-Sensitive Plastic Coated Waterproof Tape \(18-040\)](#) from these cutout areas:
  - (a) APU exhaust port
  - (b) Outflow valve
- (4) Remove all [Transparent Polyvinyl Film \(18-041\)](#) from these areas:
  - (a) All the gaps between the ailerons, flaps, slats, spoilers and the wings
  - (b) All landing gear, wheel bearing seals
- (5) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

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## External air conditioning facility - Disconnect procedure

### 1. Common Information

A. This program provides the disconnection procedure for the external air conditioning facility.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
166	Recirculation Fan Compartment - Right

#### Access Panels

Number	Name
162ARW	Ground low-pressure A/C door

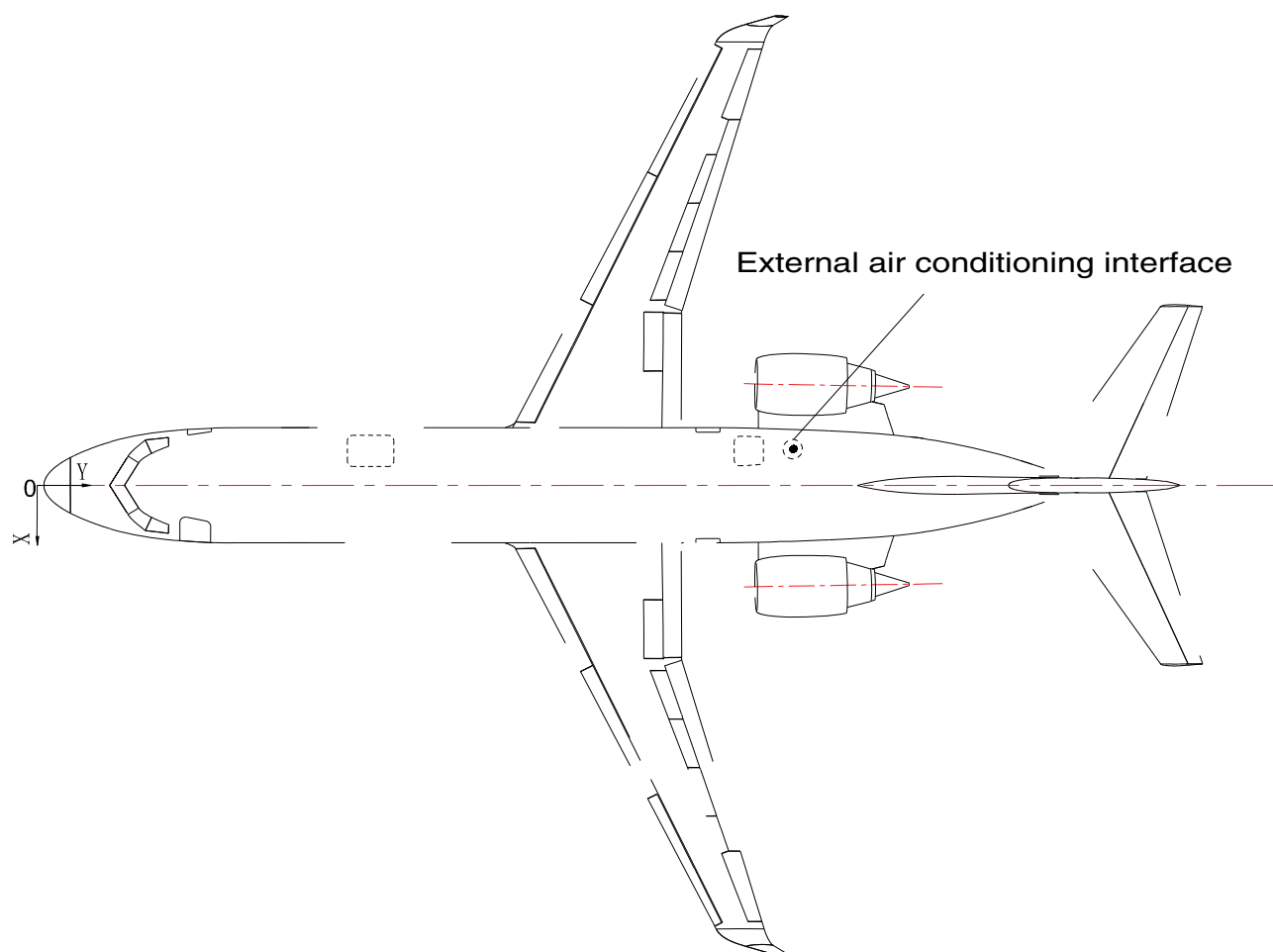
### 3. Procedures

#### A. Procedure

- (1) Confirm with maintenance personnel before remove the low-pressure ground air source.
- (2) Stop air supply first, then remove the low-pressure ground air source, remove the air conditioning interface when the air pressure is reduced.
- (3) Remove the fitting of the low-pressure ground pneumatic equipment from the airborne low-pressure ground pneumatic interface.
- (4) If a tie or tape is used to fix the cover of the ground interface to the fuselage, remove the cover.
- (5) Close the ground pneumatic interface cap.
- (6) Close this (these) access panel(s): [Ground low-pressure A/C door 162ARW](#)

#### B. Final procedure

- (1) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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Figure 1 External air conditioning interface (Sheet 1 of 1)

## External air conditioning facility - Connection Procedure

### 1. Common Information

- A. Make sure that the ground air source is normal and the low pressure ground connection operates correctly.
- B. When ARJ21-700 aircraft is supplied with low pressure ground air source, make sure that the air supply parameters meet these requirements:
  - (1) Air supply temperature: 3°C-70°C (37.4°F-158°F)
  - Air supplied flow: does not above 38.6 kg/min (85 lbm/min),
  - Air supply pressure: does not exceed 0.45 psi (gage pressure 3.1kPa).

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
213	Cockpit - Left
214	Cockpit - Right
166	Recirculation Fan Compartment - Right

#### Access Panels

Number	Name
162ARW	Ground low-pressure A/C door

#### Consumable Materials

Reference	Name	Remarks
08-102 (Opt:18-099)	Adhesive tape (Opt:Strap)	Null

### 3. Procedures

#### A. Preparation

**CAUTION:** WHEN USING GROUND AIR SOURCE TO SUPPLY AIR, MAKE SURE THE RECIRCULATION SYSTEM IS CLOSED, OTHERWISE, IT CAN CAUSE DAMAGE TO EQUIPMENT.

- (1) Make sure that the L and R PACK pushbuttons, the RECIRC pushbutton and the TRIM pushbutton on the AIR CONDITION control panel are off. Confirm with maintenance personnel before connect the air conditioning.
- (2) :After maintenance personne agrees, open this (these) access panel(s): [Ground low-pressure A/C door 162ARW](#)
- (3) Open the ground pneumatic interface cap.

**CAUTION:** WHEN AIRCRAFT IS SUPPLIED WITH LOW PRESSURE GROUND AIR SOURCE, THE BLOCKING COVER OF THE GROUND AIR SOURCE INTERFACE IS HUNG

## Ramp Servicing Operation Instruction

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**OUTSIDE THE AIRPLANE, WHICH MAY COLLIDE WITH THE FUSELAGE DUE TO STRONG WIND BLOWING, CAUSING DAMAGE TO THE APPEARANCE OF THE FUSELAGE.**

- (4) When using the ground air supply in strong windy weather, to prevent the ground interface cap from colliding with the airframe, use [Adhesive tape \(08-102\)](#) or [Strap \(18-099\)](#) to fix the cap onto the fuselage structure.

**NOTE:** The strong wind here refers to the wind with a speed of above 17.2 m/s, namely strong wind of level 8 and above.

**NOTE:** When using adhesive tape, pay attention that: Do not leave sticking marks on the surface of the aircraft. The adhesive tape should have a color that is different to the color of the area on the aircraft for easy identification.

- (5) Connect the fitting of the low-pressure ground air source to the interface of the airborne low-pressure ground air source.

**WARNING: MAKE SURE THAT THE CONDITIONED AIR CAN BE EXHAUSTED OUTBOARD. IF CONDITIONED AIR IS CONTINUOUSLY SUPPLIED TO THE PRESSURIZED CABIN, CABIN OVERPRESSURE AND PERSONNEL INJURY OR DEATH MAY OCCUR.**

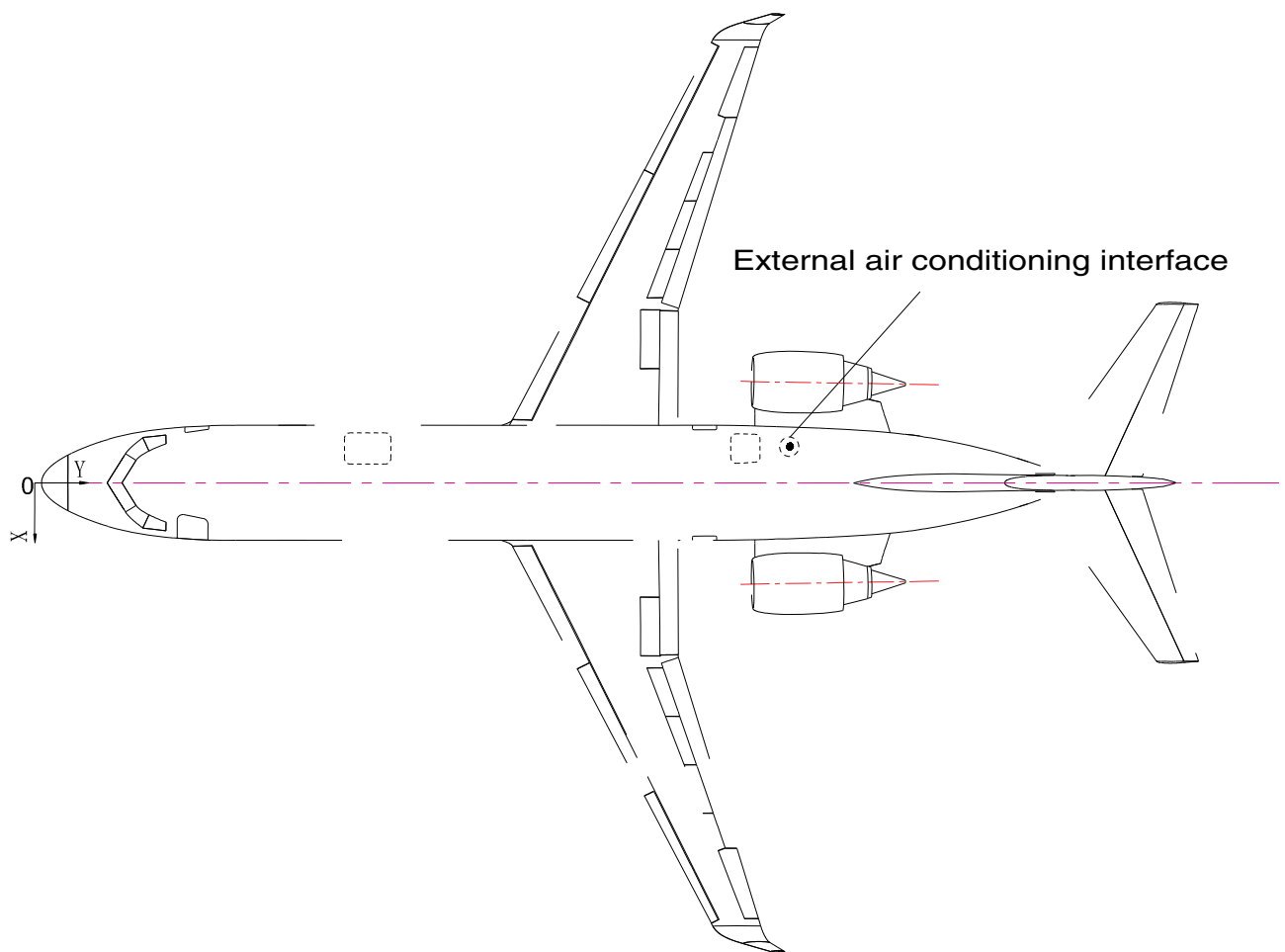
- (6) Confirm with maintenance personnel that the outflow valve or passenger entry door is open, make sure that the conditioned air can be exhausted outboard.

### B. Procedure

**CAUTION: WHEN LOW PRESSURE GROUND AIR SOURCE IS IN USE, IF THE AIRFLOW OR AIR PRESSURE EXCEEDS THE LIMIT, DAMAGE TO THE EQUIPMENT OF THE AIRPLANE CAN OCCUR.**

- (1) Follow the operating instructions for the low pressure ground air source to supply conditioned air to the cabin.





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Figure 1 External air conditioning interface (Sheet 1 of 1)

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## Precautions and limits for the refuel/defuel operation - Maintenance Precautions

### 1. Common Information

- A. This procedure provides safety precautions that must be obey when refueling/ defueling the aircraft.
- (1) Emergency Procedures
  - (2) Fuel spill procedure
  - (3) Refueling while passengers are on board
  - (4) Airplane system precautions
  - (5) Airplane separation distance limits
  - (6) Electrical/electronic systems separation distance limits
  - (7) Fuel specifications
  - (8) Fuel servicing equipment precautions
  - (9) Refueling Zone
  - (10) Refueling Precautions
- B. Each operator should comply with the CAAC Regulations regarding civil aircraft refueling and defueling.
- C. Make sure all procedures used during the refueling operation give sufficient protection to persons and equipment.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
140	Center Wing - STA560.722 to STA648
520	Left Outer Wing Box
620	Right Outer Wing Box

### 3. Procedures

- A. Procedure
- (1) Emergency Procedures
    - (a) Obey all fire protection, rescue and fuel spill emergency procedures provided by the airport and operator. Emergency procedures include these subjects:
      - 1) Location of emergency fuel shutoff
      - 2) Airport fire department phone numbers
      - 3) Fuel spill procedure
      - 4) Location and use of fire extinguishers

## Ramp Servicing Operation Instruction

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5) Responsibilities of fuel and aircraft servicing personnel.

(2) Fuel Spill Procedure

- (a) Variables such as the size of the spill, weather conditions, equipment location, aircraft occupancy, emergency equipment and personnel available will determine the correct response to control the fire hazard.
- (b) During refueling, continuously monitor the aircraft for fuel leaks and fuel spills at the wingtip.
- (c) If a fuel spill occurs, do these steps:
  - 1) Stop the refueling operation immediately, and stop the fuel flow.
  - 2) Notify personnel onboard the aircraft.
  - 3) Follow emergency procedures on fuel spill and fire protection provided by the fire department and the operator.
  - 4) Inspect enclosed areas to make sure that they are free of fuel vapor.

**WARNING: OBEY THE PASSENGER PROTECTION PRECAUTIONS DURING REFUELING OPERATION. IF YOU DO NOT OBEY THESE REQUIREMENTS, INJURY TO PERSONS CAN OCCUR.**

(3) Refueling while passengers are on board

- (a) If there are any passengers onboard during airplane refueling, obey the related procedures provided by the airport and the operator.
- (b) When boarding or off loading passengers during refueling, put barriers in position to prevent passengers from entering the hazard zone.

(4) Airplane System Precautions

**WARNING: OBEY THE AIRPLANE SYSTEM PRECAUTIONS DURING REFUEL/DEFUEL OPERATION. IF YOU DO NOT OBEY THESE REQUIREMENTS, A FIRE OR AN EXPLOSION CAN OCCUR.**

- (a) Do not operate these aircraft systems during a refueling/ defueling operation:

**WARNING: DO NOT OPERATE THE HF RADIO SYSTEM WHILE YOU PUT THE FUEL/DEFUEL IN THE AIRPLANE. OTHERWISE, AN EXPLOSION CAN OCCUR.**

- 1) Do not operate the HF radio communication system or the radar system.

**CAUTION: DO NOT OPERATE THE FLAP/SLAT SYSTEM DURING REFUELING/DEFUEL. OTHERWISE, THE AIRPLANE STRUCTURE MAY BE DAMAGED.**

- 2) Do not operate the flap/slat system.

**WARNING: THE ANTI-COLLISION LIGHTS AND STROBE LIGHTS MUST HAVE BEEN SET TO OFF BEFORE REFUEL/DEFUEL, OTHERWISE, A FIRE OR AN EXPLOSION CAN OCCUR.**

- 3) You must turn off the aircraft strobe lights and anti-collision lights before refueling/ defueling.
- 4) Do not connect or disconnect battery charging.
- 5) Do not connect or disconnect ground electrical power.
- 6) Do not test the electrical power.

- 7) Do not fill or change oxygen cylinders.
- 8) Do not remove electrical power.
- 9) Do not start refueling/ defueling if the landing gear is unusually hot.
- (b) Do these inspections before refueling/ defueling:
  - 1) Make sure that the flaps are in retracted position.
  - 2) Make sure that the fuel tank vents are not blocked, and the wingtips are well ventilated.
- (c) Examine the refuel adapter before connecting the refuel nozzle:
  - 1) Examine the refuel adapter before refueling.
  - 2) Make sure that the mating surface between the refuel nozzle and refuel adapter is clean and free from unwanted material.
  - 3) Make sure that the cap binding wire is not missing or damaged.
- (5) Airplane Separation Distance Limits
  - (a) Keep the distance between aircraft and equipment or ignition sources as required in.

**Table 1 The distance of the aircraft from equipment or Fire Sources**

Equipment or Fire Sources	Distance
Adjacent aircraft engine or APU	50 ft (15 m)
Fuel servicing equipment - measured from engine or exhaust system	10 ft (3 m)
Ground power	20 ft (6 m)
Aircraft servicing equipment - measured from the engine or exhaust system	10 ft (3 m)
Electrical equipment that is likely to cause arcs or sparks	50 ft (15 m)
Photographic equipment	10 ft (3 m)
Battery powered equipment	10 ft (3 m)
Aircraft servicing equipment - refueling vehicle	Not under the trailing edge of the wing

**WARNING: OBEY THESE REQUIREMENTS FOR FUEL GRADE. OTHERWISE, THE INCORRECT GRADE OF FUEL CAN CAUSE ENGINE FLAMEOUT, ENGINE PERFORMANCE DETERIORATION, OR DAMAGE TO THE ENGINE.**

- (6) Fuel Specifications
  - (a) All fuel added must meet requirements of the aircraft, engines and APU.
  - (b) Permitted fuels of different brands can be mixed.

**WARNING: OBEY THE PRECAUTIONS FOR REFUELING ZONE. OTHERWISE FIRE OR EXPLOSION, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**

- (7) Refueling Zone

## Ramp Servicing Operation Instruction

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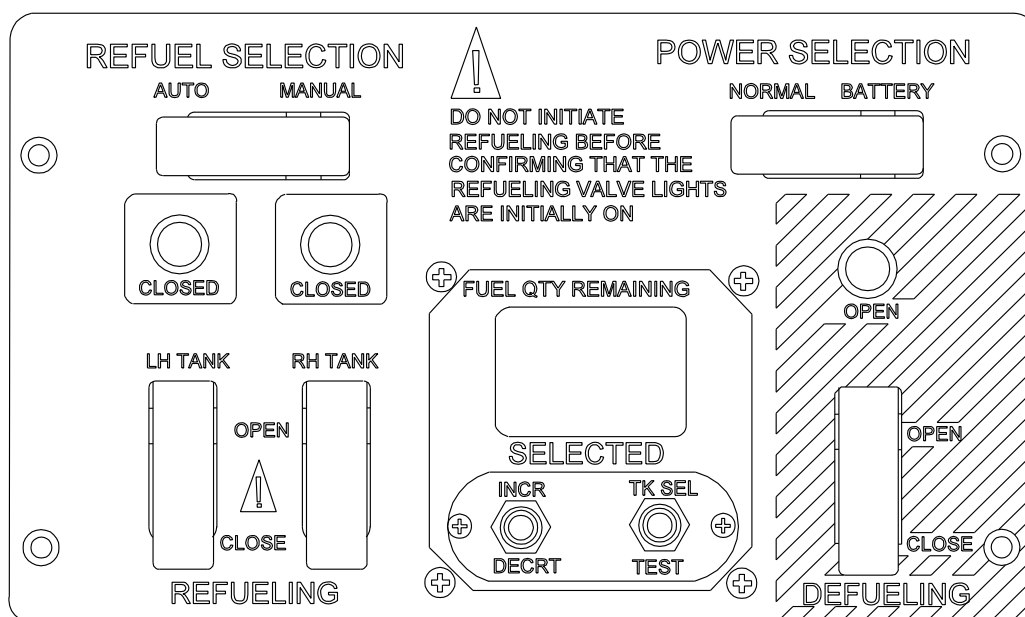
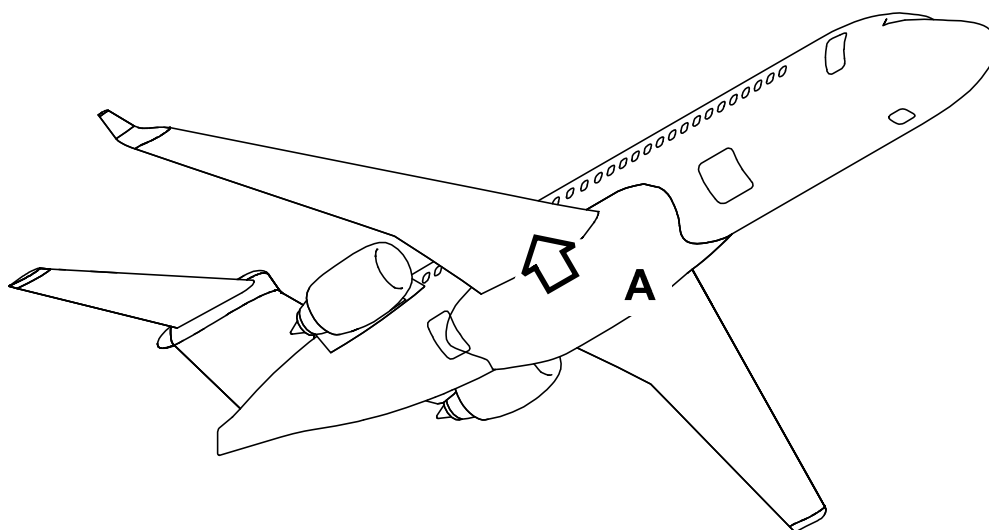
- (a) Refueling operations must only be done in airport approved areas.
- (b) A refueling zone identification must be set up around an aircraft when preparing for or during a refueling operation.
- (c) Fire protection equipment, emergency rescue equipment, and approved fire extinguishers must be available in the refueling zone.
- (d) Within the refueling zone, obey these requirements:
  - 1) Obey the equipment separation requirements.
  - 2) Only authorized personnel and vehicles are permitted.
  - 3) Passengers are not permitted.
  - 4) Maintenance operations on the aircraft must be put on a limit to reduce the risk of ignition of fuel vapor.
  - 5) All electrical equipment must be rated for the hazardous location zone where it will operate.
  - 6) Metal wheels or studded tires are not permitted.
- (8) Refueling Precautions
  - (a) Put almost the same quantity of fuel in the left wing tank and the right wing tank. .
  - (b) Make sure that the fueling vehicle pressurizes the fuel system for a maximum of 55 psi(379.2 kPa).

**NOTE:** The pressure of the refuel nozzle is 50psi±5 psi (344.7 34.5). If the fuel pressure at the refuel adapter is more than 55 psi (379.2) , the fueling vehicle will automatically stop the refueling operation.
  - (c) The maximum refueling rate of fuel tank is 1400 L/min.

**WARNING: MAKE SURE THAT ALL THE EQUIPMENT BELOW THE WINGTIPS ARE REMOVED DURING REFUELING , OTHERWISE IT CAN CAUSE EXPLOSION , AND INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**
  - (d) Make sure that no ground equipment is parked below the wings during the refueling operation.
    - 1) The weight of the fuel can get wings a bit downward during refueling.
    - 2) The wingtips moves down more than the rest of the wing.
    - 3) During refueling, air exits the fuel tanks through the wingtip fuel vents.
    - 4) The wingtips moves down more than the rest of the wing.

### B. Final procedure

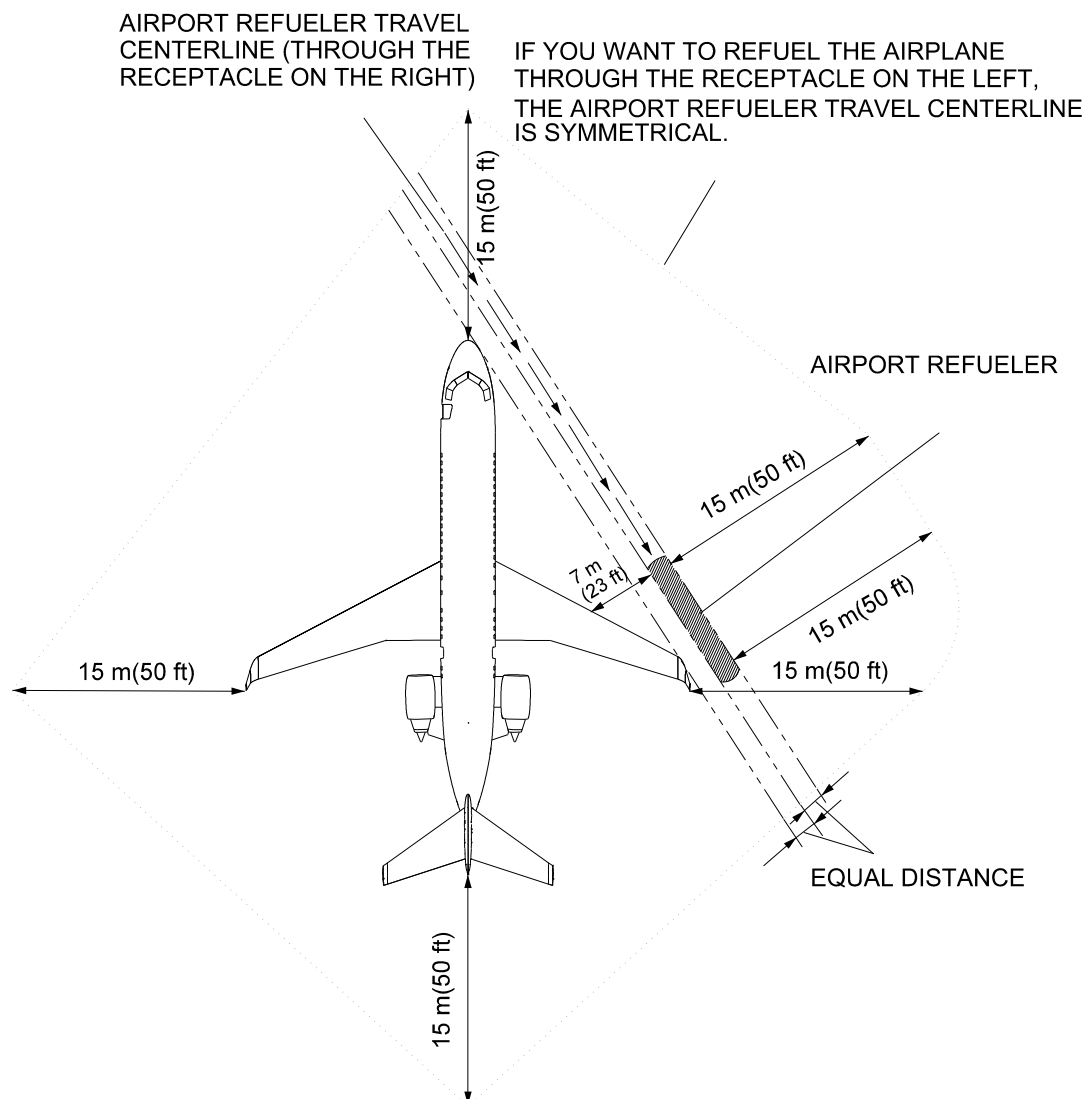
- (1) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.


**A**

REFUEL/DEFUEL CONTROL PANEL

ICN-ARJ21-A-282100-A-SVV19-10070-A-001-01

**Figure 1 Refuel/Defuel Control Panel (Sheet 1 of 1)**



ICN-ARJ21-A-121100-A-SVV19-00756-A-001-01

**Figure 2 Safe Fueling Zone (Sheet 1 of 1)**



## Gravity refuel - refuel

### 1. Common Information

- A. This procedure provides the operating procedures of gravity refuel.
- B. Permitted fuels of different brands can be mixed.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
522	Outer Wing Tank (Rib 8 to Rib 17)
622	Outer Wing Tank (Rib 8 to Rib 17)

#### Access Panels

Number	Name
611CB	Inboard Leading Edge Access Door No. 3 - Right

### 3. Procedures

#### A. Preparation

**WARNING: MAKE SURE THAT THE AIRPLANE IS IN A SAFE CONDITION BEFORE YOU START THE REFUEL/DEFUEL PROCEDURE. IF YOU DO NOT OBEY THIS WARNING, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**

- (1) When refueling the aircraft, you must read the precautions and limits for the refuel/defuel operation carefully and obey it strictly.
- (2) Do the task of aircraft static grounding.
- (3) Use bonding jumpers to connect the refuel vehicle to approved grounding or bonding connections.

**CAUTION: DO NOT OPERATE THE FLAP/SLAT SYSTEM IF THE ACCESS PANEL 611CB IS OPENED.**

- (4) Open this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#).
- (5) Set the POWER SELECTION switch on the refuel/defuel control panel to the BATTERY position.

**NOTE: If battery or external electrical power is not available, use the magnetic level indicator to measure fuel quantity.**

#### B. Procedure

- (1) Do these steps to do gravity refueling:
  - (a) For the left fuel tank, open the left tank gravity fill cap.
  - (b) For the right fuel tank, open the right tank gravity fill cap.
  - (c) Put the refuel nozzles into the gravity fill adapters.
  - (d) Monitor the fuel tank quantity when start refueling operation.

## Ramp Servicing Operation Instruction

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- (e) Stop the refueling operation and disconnect the refuel nozzles when the target quantity of fuel is reached.

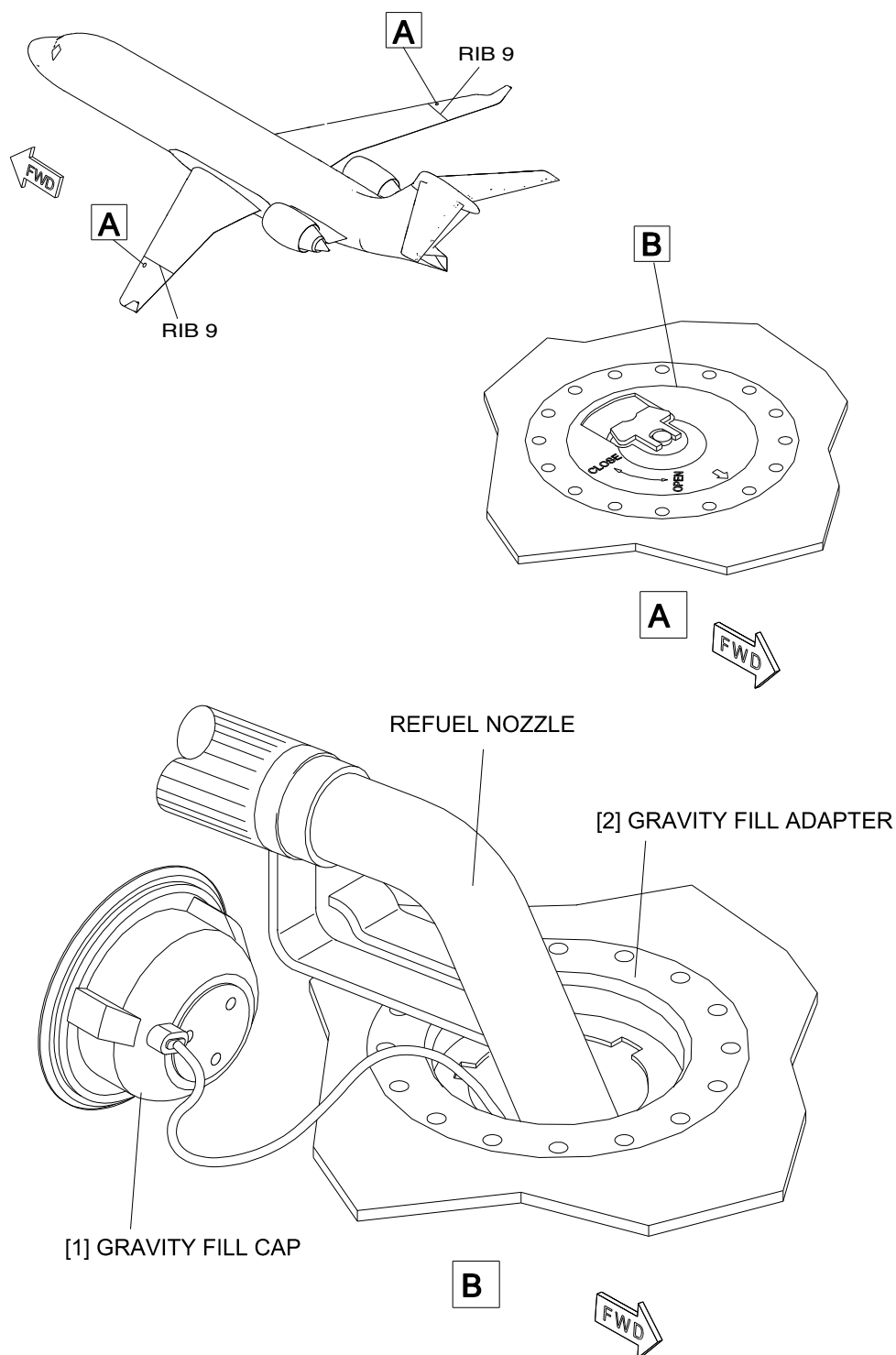
**NOTE:** Confirm that no fuel imbalance occurs during gravity refueling.

- (f) Install the gravity fill caps on the left and the right fuel tanks.

**NOTE:** Make sure that the fuel level is below the level of the cap before you install the cap. Otherwise, fuel can flow from the port to the surface of the wing.

### (2) Final procedure

- (a) Set the POWER SELECTION switch on the refuel/defuel control panel to the NORMAL position, and cover it with the protective cap.
- (b) Close this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#).
- (c) Disconnect the bonding cables between the refueling vehicle and the aircraft.
- (d) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



ICN-ARJ21-A-121100-A-SVV19-00758-A-001-01

**Figure 1 Fuel tank - Gravity refueling (Sheet 1 of 1)**

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## Suction defueling - Drain fuel

### 1. Common Information

A. This procedure provides the operating procedures of suction defueling.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
210	STA37 - STA148.55 Fwd Accessory Compartment and Cockpit
610	Right Wing Leading Edge

#### Access Panels

Number	Name
611CB	Inboard Leading Edge Access Door No. 3 - Right

### 3. Procedures

A. Preparation

**WARNING: MAKE SURE THAT THE AIRPLANE IS IN A SAFE CONDITION BEFORE YOU START THE REFUEL/DEFUEL PROCEDURE. IF YOU DO NOT OBEY THIS WARNING, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**

- (1) When defueling the aircraft, you must read the precautions and limits for the refuel/defuel operation carefully and obey it strictly.
- (2) Do the task of aircraft static grounding.
- (3) Use bonding jumpers to connect the refuel vehicle to approved grounding or bonding connections.

**CAUTION: DO NOT OPERATE THE FLAP/SLAT SYSTEM IF THE ACCESS PANEL 611CB IS OPENED.**

- (4) Open this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#).
- (5) Set the POWER SELECTION switch on the refuel/defuel control panel to the BATTERY position.

**NOTE: If battery or external electrical power is not available, use the magnetic level indicator to measure fuel quantity.**

B. Procedure

- (1) Do the these steps to suction defuel the aircraft:
  - (a) Remove the refuel/defuel adapter cap.
  - (b) Connect the refuel nozzle to the refuel/defuel adapter. Rotate the handle at the end of the refuel nozzle to open the shutoff valve.
  - (c) Set the related switches on the refuel/defuel control panel to the following positions:

## Ramp Servicing Operation Instruction

Switch Name	Position/Status
REFUEL SELECTION	MANUAL
LH TANK REFUELING	CLOSED
RH TANK REFUELING	CLOSED
DEFUELING	OPEN

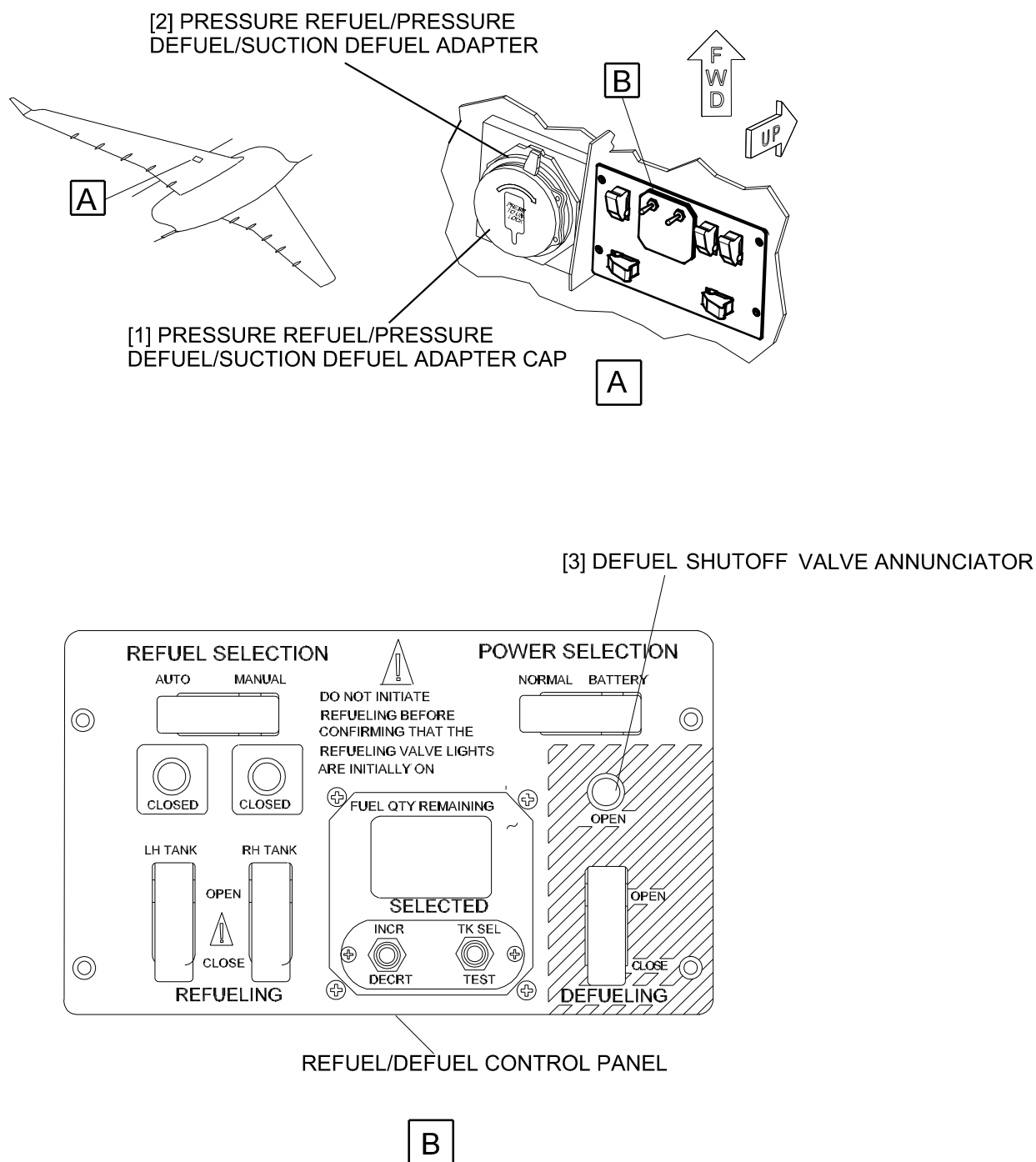
- (d) Check the defuel shutoff valve OPEN annunciator is illuminated.
- (e) Press in the X FEED VALVE pushbutton on the overhead FUEL control panel of the cockpit to the OPEN position.
- (f) Start the defueling pump on the fuel vehicle to start suction defueling.
- (g) When the fuel quantity reaches the target level, or when defueling is completed, press out the X FEED VALVE pushbutton.

**NOTE:** When the flow indicator on the defuel equipment shows that the flow rate is zero, the defuel operation can be considered to be completed.

- (h) On the refuel/defuel control panel, set the DEFUELING switch to the CLOSE position. Make sure that the defuel shutoff valve annunciator is off.
- (i) Stop the fuel vehicle defueling pump.
- (j) Rotate the handle at the end of the refuel nozzle to close the shutoff valve, and disconnect the refuel nozzle from the refuel/defuel adapter.
- (k) Install the refuel/defuel adapter cap on the refuel/defuel adapter. Make sure that the adapter and the cap are intact.
- (l) Remove any spilled fuel at the refuel adapter, with a dry cotton cloth wipe.

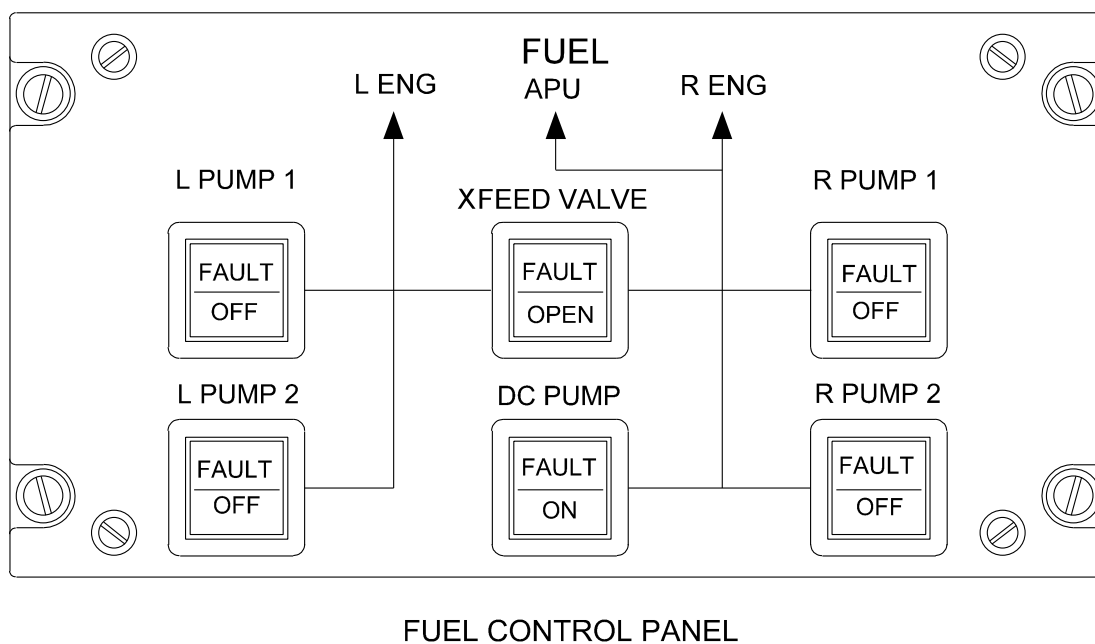
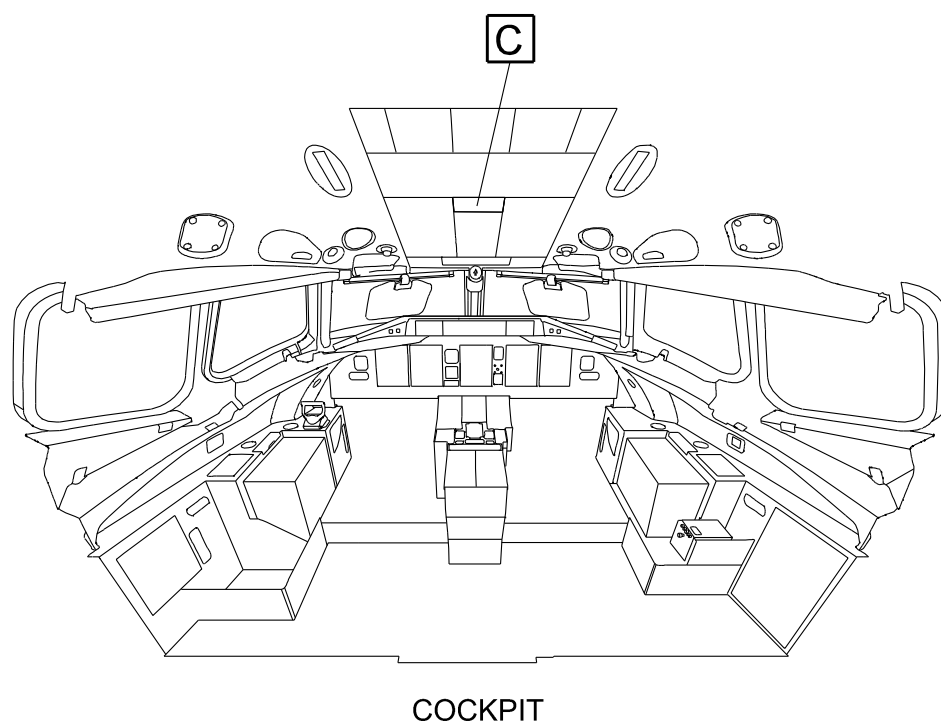
### (2) Final procedure

- (a) Set the POWER SELECTION switch on the refuel/defuel control panel to the NORMAL position, and cover it with the protective cap.
- (b) Close this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#).
- (c) Disconnect the bonding cables between the refueling vehicle and the aircraft.
- (d) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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**Figure 1 Fuel tank - Suction defueling (Sheet 1 of 1)**



C

ICN-ARJ21-A-121100-A-SVV19-00762-A-001-01

Figure 2 Fuel tank - Suction defueling (Sheet 1 of 1)



## Pressure refueling - refueling

### 1. Common Information

- A. This task is applicable to automatic and manual control of pressure refueling.
- B. Permitted fuels of different brands can be mixed.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
610	Right Wing Leading Edge

#### Access Panels

Number	Name
611CB	Inboard Leading Edge Access Door No. 3 - Right

### 3. Procedures

#### A. Preparation

**WARNING: MAKE SURE THAT THE AIRPLANE IS IN A SAFE CONDITION BEFORE YOU START THE REFUEL/DEFUEL PROCEDURE. IF YOU DO NOT OBEY THIS WARNING, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**

- (1) When refueling the aircraft, you must read the precautions and limits for the refuel/defuel operation carefully and obey it strictly.

**NOTE:** When the tank that supplies fuel to the APU is with a fuel quantity less than the alert quantity, do not refuel through APU power supply mode. Otherwise, during the long time of preparation, the fuel may run out causing the APU to shut down.

**NOTE:** If the fuel in either tank is more than 4500kg(9921lbm) before refueling, the tank cannot be pressure refueled to the maximum theoretical refueling quantity 5193kg(11449lbm), due to the actuation of float high level valve. Defuel the tank till its fuel gets to less than 4500kg( 9921lbm) , and then fill the tank full at one time. Or refuel the tank by gravity, but the maximum refueling quantity can not exceed 5193kg(11449lbm).

- (2) Do the task of aircraft static grounding.
- (3) Use bonding jumpers to connect the refuel vehicle to approved grounding or bonding connections.

**CAUTION: DO NOT OPERATE THE FLAP/SLAT SYSTEM IF THE ACCESS PANEL 611CB IS OPENED.**

- (4) Open this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#).
- (5) Do one of these steps to supply electrical power:
  - (a) When external power is used for refueling, set the POWER SELECTION switch to NORMAL position on the refuel/defuel control panel.
  - (b) When APU generator is used for refueling, set the POWER SELECTION switch to NORMAL on the refuel/defuel control panel.

## Ramp Servicing Operation Instruction

- (c) When battery power is used for refueling, set the POWER SELECTION switch to BATTERY on the refuel/defuel control panel.

**NOTE:** The aircraft battery power supply can be used if the external power supply is not available. The only limitation to this operation is the battery discharge time. Complete the refueling operation as soon as possible. A fully charged battery can operate the refueling system for 15-20min.

### B. Procedure

#### (1) Automatic Pressure Refueling

- (a) Make sure that the related switches on the refuel/defuel control panel are set to these positions:

Switch Name	Position/Status
REFUEL SELECTION	AUTO
LH TANK REFUELING	CLOSED
RH TANK REFUELING	CLOSED
DEFUELING	CLOSED

- (b) Make sure that the related annunciators on the refuel/defuel control panel show as follows:

Switch Name	Position/Status
LH TANK CLOSED	Off
RH TANK CLOSED	Off
DEFUELING OPEN	Off

- (c) Remove the refuel/defuel adapter cap in the fwd refuel compartment at the right wing front spar.
- (d) Do an inspection of the refuel/defuel adapter before you connect the refuel nozzle.
- 1) Make sure that there are no fuel leaks.
  - 2) Make sure that the mating surface between the refuel nozzle and refuel adapter is free from unwanted material and not damaged.
  - 3) Make sure that the cap binding wire is not missing or damaged.
- (e) Connect the refuel nozzle to the refuel/defuel adapter. Rotate the handle at the end of the refuel nozzle to open the shutoff valve.
- (f) Pressurize the refueling system to 35 psi ~ 50 psi(241.3 kPa ~ 344.7 kPa).

**NOTE:** Refueling under a lower pressure is allowed, however, it will take much longer time.

- (g) Make sure that there is no fuel flow at this time, and the annunciators on the refuel/defuel control panel show as follows (precheck of the shutoff function):

## Ramp Servicing Operation Instruction

Switch Name	Position/Status
LH TANK CLOSED	On
RH TANK CLOSED	On
DEFUELING OPEN	Off

- (h) Enter the desired total quantity of fuel with the INCR/DECRT switch on the refuel/defuel panel.

**NOTE:** Even if the scheduled refueling quantity for this flight is the same with the preselect fuel quantity shown on the refuel/defuel indicator, it is still necessary to operate the INCR/DECRT switch to set the target refueling quantity.

**CAUTION:** CHECK THE LEFT AND RIGHT FUEL TANKS FOR FUEL OVERFLOW DURING THE REFUELING PROCESS. EXCESSIVE REFUELING WILL CAUSE FLOWING OF UNWANTED FUEL TO THE NACA VENT AND DAMAGE TO THE AIR-FRAME STRUCTURE.

- (i) Set the LH TANK REFUELING and RH TANK REFUELING switches to the OPEN position. Make sure that the LH TANK and RH TANK refuel shutoff valve CLOSED annunciators are off and the refueling operation is started.
- (j) When the target fuel quantity is reached, the refueling operation stops automatically. Make sure that the LH TANK and RH TANK refuel shutoff valve CLOSED annunciators are on.
- (k) Stop the refueling operation.
- (l) Set the LH TANK REFUELING and RH TANK REFUELING switches to the CLOSED position.
- (m) Make sure that the POWER SELECTION switch is in the NORMAL position.
- (n) Rotate the shutoff valve handle of the refuel nozzle to the closed position, disconnect the refuel nozzle from the refuel/defuel adapter.
- (o) Install the refuel/defuel adapter cap on the refuel/defuel adapter.
- (p) Remove any spilled fuel at the refuel adapter, with a dry cotton cloth wipe.
- (2) Manual Pressure Refueling

- (a) Make sure that the related switches on the refuel/defuel control panel are set to these positions:

Switch Name	Position/Status
REFUEL SELECTION	MANUAL
LH TANK REFUELING	CLOSED
RH TANK REFUELING	CLOSED
DEFUELING	CLOSED

- (b) Make sure that the related annunciators on the refuel/defuel control panel show as follows:

## Ramp Servicing Operation Instruction

Switch Name	Position/Status
LH TANK CLOSED	Off
RH TANK CLOSED	Off
DEFUELING OPEN	Off

- (c) Remove the refuel/defuel adapter cap in the fwd refuel compartment at the right wing front spar.
- (d) Do an inspection of the refuel/defuel adapter before you connect the refuel nozzle.
  - 1) Make sure that there are no fuel leaks.
  - 2) Make sure that the mating surface between the refuel nozzle and refuel adapter is free from unwanted material and not damaged.
  - 3) Make sure that the cap binding wire is not missing or damaged.
- (e) Connect the refuel nozzle to the refuel/defuel adapter. Rotate the handle at the end of the refuel nozzle to open the shutoff valve.
- (f) Pressurize the refueling system to 35 psi ~ 50 psi(241.3 kPa ~ 344.7 kPa).

**NOTE:** Refueling under a lower pressure is allowed, however, it will take much longer time.

- (g) Make sure that there is no fuel flow at this time, and the annunciators on the refuel/defuel control panel show as follows (precheck of the shutoff function):

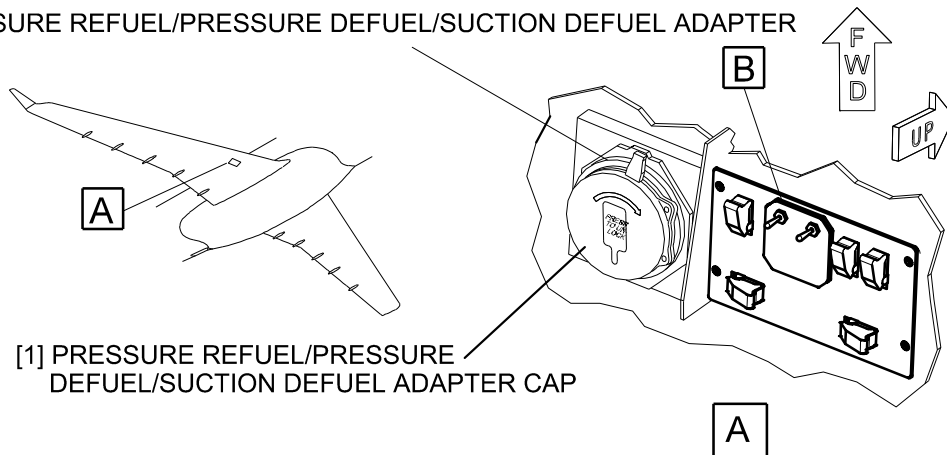
Switch Name	Position/Status
LH TANK CLOSED	On
RH TANK CLOSED	On
DEFUELING OPEN	Off

**CAUTION:** CHECK THE LEFT AND RIGHT FUEL TANKS FOR FUEL OVERFLOW DURING THE REFUELING PROCESS. EXCESSIVE REFUELING WILL CAUSE FLOWING OF UNWANTED FUEL TO THE NACA VENT AND DAMAGE TO THE AIR-FRAME STRUCTURE.

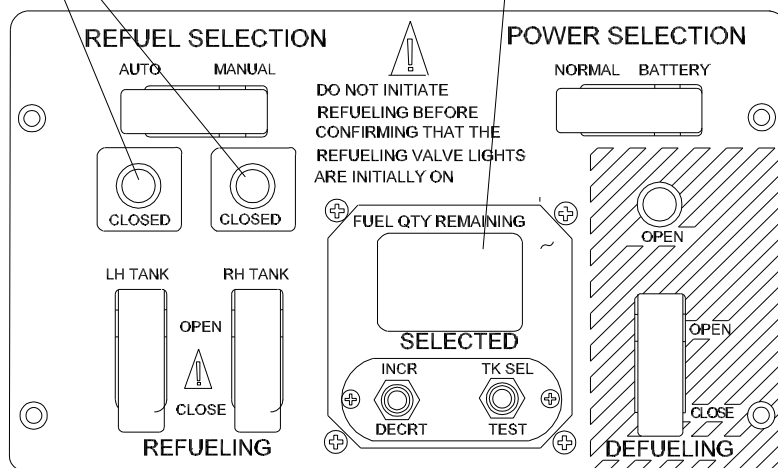
- (h) Set the LH TANK REFUELING and RH TANK REFUELING switches to the OPEN position. Make sure that the LH TANK and RH TANK refuel shutoff valve CLOSED annunciators are off and the refueling operation is started.
- (i) Stop the refueling operation when the target quantity of fuel is reached. Make sure that the LH TANK and RH TANK refuel shutoff valve CLOSED annunciators are on.
- (j) Stop the refueling operation.
- (k) Set the LH TANK REFUELING and RH TANK REFUELING switches to the CLOSED position.
- (l) Make sure that the POWER SELECTION switch is in the NORMAL position.
- (m) Rotate the shutoff valve handle of the refuel nozzle to the closed position, disconnect the refuel nozzle from the refuel/defuel adapter.
- (n) Install the refuel/defuel adapter cap on the refuel/defuel adapter.
- (o) Remove any spilled fuel at the refuel adapter, with a dry cotton cloth wipe.

- (3) Final procedure
  - (a) If the POWER SELECTION switch on the refuel/defuel control panel is in the BATTERY position (electrical power is supplied from the aircraft battery), set the switch to the NORMAL position, and cover it with the protective cap.
  - (b) Close this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#).
  - (c) Disconnect the bonding cables between the refueling vehicle and the aircraft.
  - (d) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

[2] PRESSURE REFUEL/PRESSURE DEFUEL/SUCTION DEFUEL ADAPTER

[1] PRESSURE REFUEL/PRESSURE  
DEFUEL/SUCTION DEFUEL ADAPTER CAP[3] REFUEL SHUTOFF VALVE  
ANNUNCIATOR

[4] REFUEL/DEFUEL INDICATOR



REFUEL/DEFUEL CONTROL PANEL

B

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Figure 1 Pressure refueling (Sheet 1 of 1)

## Pressure defuel - Drain fuel

### 1. Common Information

A. This procedure provides the operating procedures of pressure defueling.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
210	STA37 - STA148.55 Fwd Accessory Compartment and Cockpit
610	Right Wing Leading Edge

#### Access Panels

Number	Name
611CB	Inboard Leading Edge Access Door No. 3 - Right

### 3. Procedures

#### A. Preparation

**WARNING: MAKE SURE THAT THE AIRPLANE IS IN A SAFE CONDITION BEFORE YOU START THE REFUEL/DEFUEL PROCEDURE. IF YOU DO NOT OBEY THIS WARNING, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.**

- (1) When defueling the aircraft, you must read the precautions and limits for the refuel/defuel operation carefully and obey it strictly.
- (2) Do the task of aircraft static grounding.
- (3) Use bonding jumpers to connect the refuel vehicle to approved grounding or bonding connections.

**CAUTION: DO NOT OPERATE THE FLAP/SLAT SYSTEM IF THE ACCESS PANEL 611CB IS OPENED.**

- (4) Open this (these) access panel(s): Inboard Leading Edge Access Door No. 3 - Right 611CB.
- (5) Supply external power/APU power to the airplane.

**NOTE: If APU operation or power supply is necessary during defueling, pay attention to the fuel quantity of the tank that supplies fuel. If the fuel level in the tank is lower than the fuel low level, the APU may shut down.**

#### B. Procedure

**WARNING: AFTER THE FUEL TANK IS DEFUELED, DO NOT LET THE TANK FUEL PUMP CONTINUE OPERATING FOR MORE THAN 15 MINUTES TO PREVENT EXPLOSION AND DAMAGE TO EQUIPMENT.**

- (1) Do these steps to pressure defuel the aircraft:
  - (a) Set the POWER SELECTION switch on the refuel/defuel control panel to the NORMAL position.

## Ramp Servicing Operation Instruction

- (b) Make sure that the defuel shutoff valve annunciator is OFF.
- (c) Remove the refuel/defuel adapter cap in the fwd refuel compartment at the right wing front spar.
- (d) Connect the refuel nozzle to the refuel/defuel adapter. Rotate the handle of the refuel nozzle to open the shutoff valve.
- (e) Make sure that the related switches on the refuel/defuel control panel are set to these positions:

Switch Name	Position/Status
REFUEL SELECTION	MANUAL
LH TANK REFUELING	CLOSED
RH TANK REFUELING	CLOSED
DEFUELING	OPEN

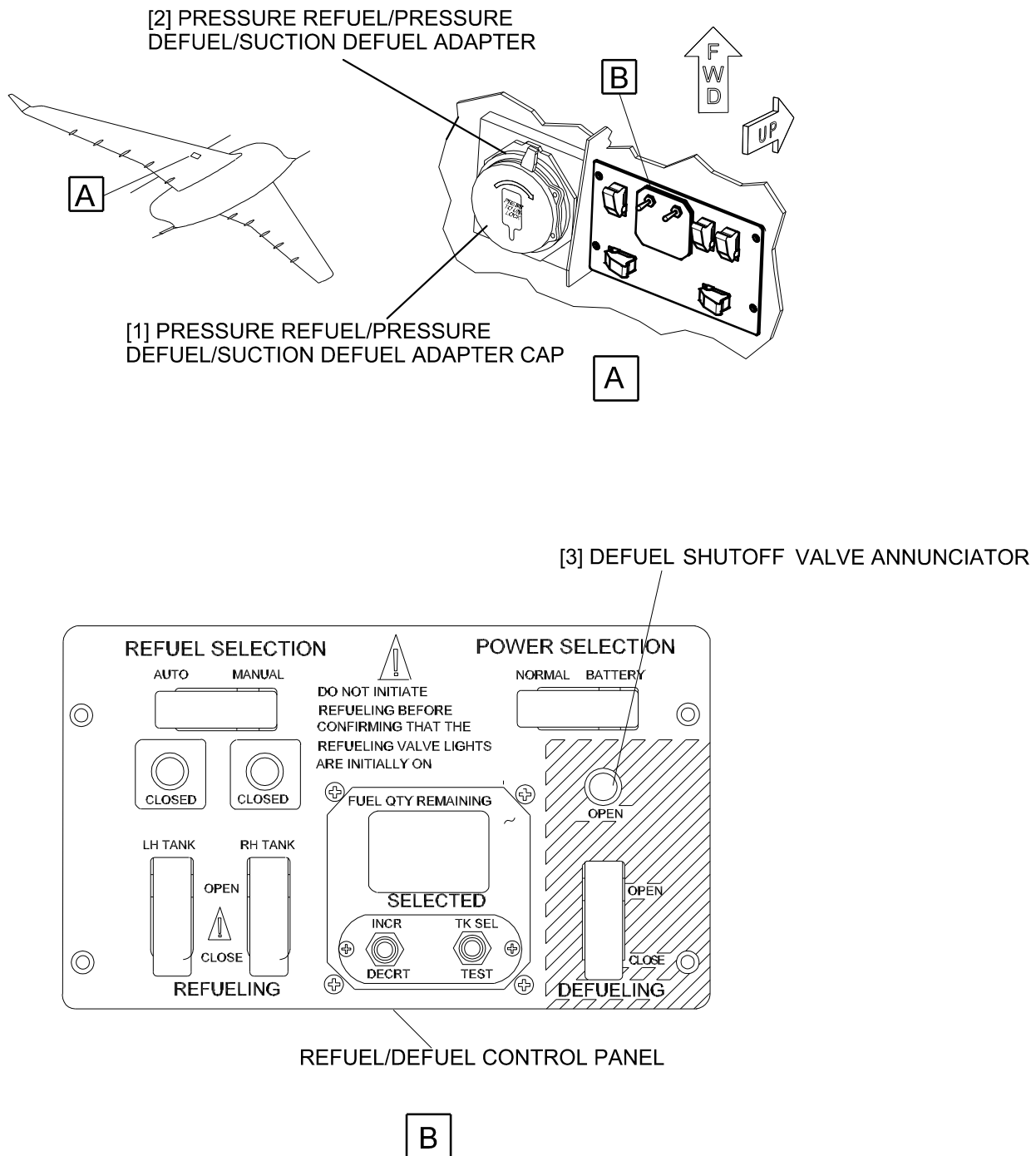
- (f) Check the defuel shutoff valve OPEN annunciator is illuminated.
- (g) Set the X FEED VALVE pushbutton on the overhead FUEL control panel of the cockpit to the applicable position:
  - 1) If both fuel tanks are defueled at the same time, set the XFEED VALVE pushbutton to OPEN.
  - 2) To defuel the left fuel tank, set the XFEED VALVE pushbutton to OPEN.
  - 3) To defuel the right fuel tank, press out the XFEED VALVE pushbutton.
- (h) Set the PUMP pushbuttons on the overhead FUEL control panel of the cockpit to related positions:
  - 1) If both fuel tanks are defueled at the same time, press in the four PUMP pushbuttons.
  - 2) To defuel the left fuel tank, press in the L PUMP 1 and L PUMP 2 pushbuttons.
  - 3) To defuel the right fuel tank, press in the R PUMP 1 and R PUMP 2 pushbuttons.
- (i) When defuel quantity reaches the expected value, or the fuel quantity readout on the refuel/defuel control panel stops decreasing, or the flow indicator on the defuel equipment shows a stable flow, the defuel operation is considered to be completed.
- (j) On the refuel/defuel control panel, set the DEFUELING switch to the CLOSED position, and close the protective cover. Make sure that the defuel shutoff valve annunciator is off.
- (k) Rotate the handle at the end of the refuel nozzle to close the shutoff valve, and disconnect the refuel nozzle from the refuel/defuel adapter.
- (l) Press out the XFEED VALVE pushbutton on the overhead FUEL control panel of the cockpit.
- (m) Press out the PUMP pushbuttons of the pumps used for defueling on the overhead FUEL control panel of the cockpit to OFF position.
- (n) Install the refuel/defuel adapter cap on the refuel/defuel adapter. Make sure that the adapter and the cap are intact.
- (o) Remove any spilled fuel at the refuel adapter, with a dry cotton cloth wipe.

### (2) Final Procedure



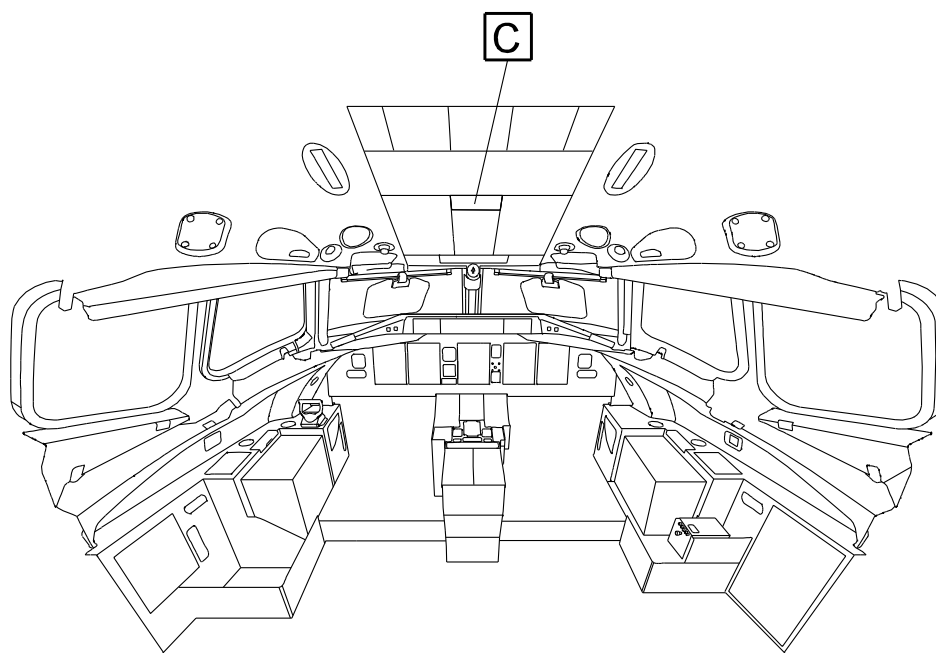
- (a) Remove the electrical power of the aircraft.
- (b) Close this (these) access panel(s) [Inboard Leading Edge Access Door No. 3 - Right 611CB](#)
- (c) Disconnect the bonding cables between the refueling vehicle and the aircraft.
- (d) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

## Ramp Servicing Operation Instruction

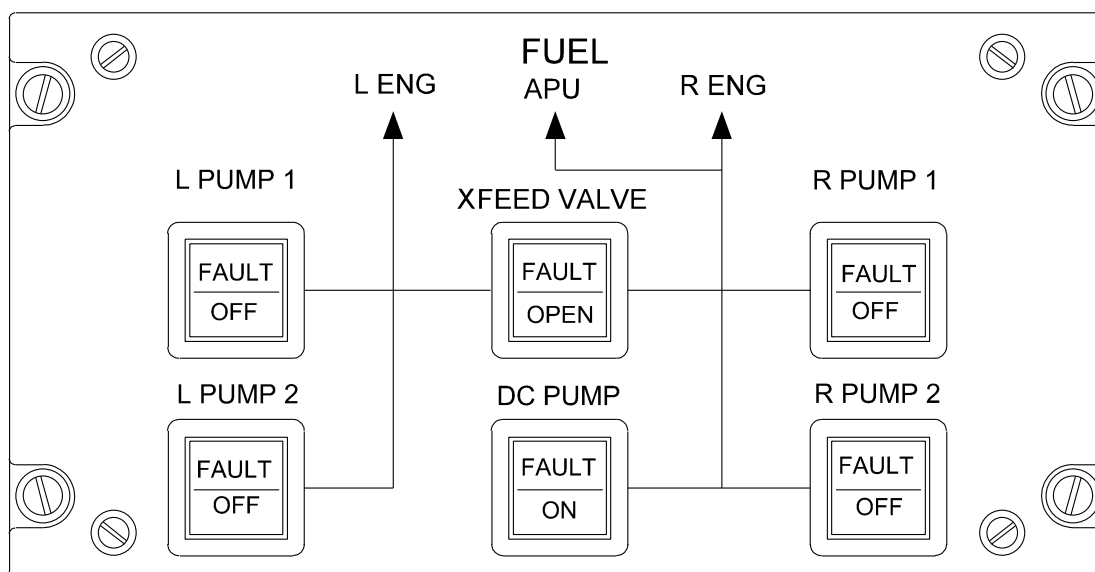


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Figure 1 Fuel tank - Pressure defueling (Sheet 1 of 1)



COCKPIT



FUEL CONTROL PANEL

C

ICN-ARJ21-A-121100-A-SVV19-00762-A-001-01

Figure 2 Fuel tank - Pressure defueling (Sheet 1 of 1)

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## Potable water system - Fill water

### 1. Common Information

- A. This procedure provides the operating procedures of aircraft potable water.
- B. The capability of the ARJ21 aircraft potable water tank is 83L.
- C. The water system interface panel is a control interface for maintenance and ground service personnel to operate water system, water tank filling and drain controlling interface and system fault display interface. There are one eight-knob switch and five indicator lights on the control panel.

**Table 1 Grade and corresponding function**

Grade	FUNCTION AND USAGE
FLIGHT READY	Take OFF
FILL FULL	FILL FULL
FILL3/4	FILL3/4
FILL1/2	FILL1/2
FILL1/4	FILL1/4
PIPE DRAIN	PIPE DRAIN
TANK DRAIN	TANK DRAIN
LAMP TEST	LAMP TEST

**Table 2 Indicator Light and corresponding indicating**

Indicator Light	Meaning
1/4 annunciator	Turn the knob to FILL 1/4 position. When the potable water tank is filled to 1/4 position, the indicator light comes on to notify the ground crew of the completion of filling 1/4 water.
1/2 annunciator	indicating that 1/2 water is filled and the principle is the same as that of 1/4 annunciator
3/4 annunciator	indicating that 3/4 water is filled and the principle is the same as that of 1/4 annunciator
FULL	indicating that full water is filled and the principle is the same as that of 1/4 annunciator
FAULT	FAULT annunciator comes on when the system has a fault

### 2. Preliminary Requirements

#### Work Zones

**Ramp Servicing Operation  
Instruction**

Zone	Location
130	STA218 - STA560.722 Fwd Cargo Compartment, Middle Equipment Compartment

**Access Panels**

Number	Name
135ALW	Water Service Door

**3. Procedures****A. Procedure**

- (1) Confirm the aircraft status with the site maintenance operator before fill the water and can filling the water.
- (2) Open [Water Service Door 135ALW](#).
- (3) Connect the fitting of the potable water service vehicle to the water filling nipple at the water system service panel.
- (4) Select the required water quantity on the water system interface panel.
- (5) Open the valve of the potable water vehicle and start adding water.

**NOTE:** Make sure the filling water pressure is 20psig-45psig.

**NOTE:** The entire water tank filling time from empty to full is no more than 1 min under normal conditions.

- (6) When the amount of water increases to the set value, the water system interface panel lights up the corresponding indicator.

**NOTE:** When the indicator light is on,the water system interface panel will turn off the water filling automatically.

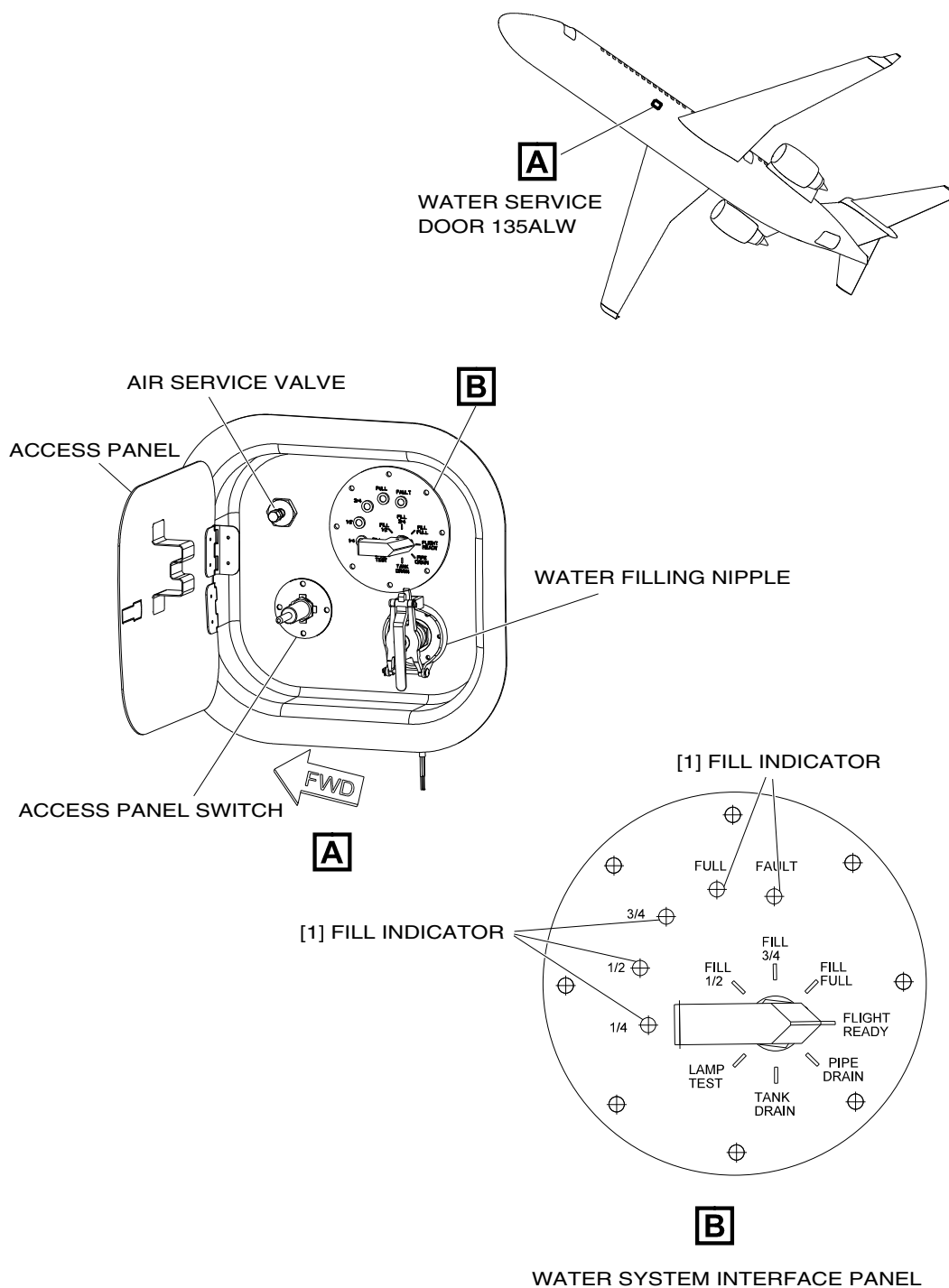
- (7) Shut ff the valve of the potable water vehicle and turn off the water filling.

**NOTE:** If the water supply is not shut off in time, water flows overboard through the fuselage drain unit.

- (8) Turn the selector switch on the potable water system interface panel to the FLIGHT READY position.
- (9) Follow these steps to disconnect the water supply hose:
  - (a) Disconnect the water supply hose from the water filling nipple.
  - (b) Let all water drain from the water supply hose.
- (10) Close [Water Service Door 135ALW](#).

**B. Final Procedure**

- (1) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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Figure 1 Potable Water Tank - Drainage (Sheet 1 of 1)

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## Potable water system - Drain water

### 1. Common Information

- A. This procedure provides the potable water system drain water.
- B. The Water/Waste Status Panel (WWSP) is located above the fwd passenger entry door attendant seats. It is used to indicate the operating condition of the system and the water level in the potable water tank.
- C. When the airplane is on the ground for servicing, the water level sensor detects that the water quantity is less than 5% and the water system interface controller (WSIC) controls the air compressor not to pressurize, the service needs to drain the remaining water clean through water drainage with pressure.
- D. In cold weather, if the water in the tank or pipe is not discharged clean, the pipe may freeze and burst.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
130	STA218 - STA560.722 Fwd Cargo Compartment, Middle Equipment Compartment

#### Access Panels

Number	Name
135ALW	Water Service Door

### 3. Procedures

- A. Procedure
  - (1) Tank drain (Normal line service)
    - (a) Before drain water for the aircraft, confirm the aircraft inspection with the site maintenance operator, and start draining.
    - (b) Open [Water Service Door 135ALW](#).
    - (c) Make sure that the manual isolation valves in the lavatories and galleys are in the OPEN position.
    - (d) Turn the selector switch on the water system interface panel to the TANK DRAIN position.
    - (e) The waste water flows from the drain port on the fuselage belly, it is recommended to use a proper container to collect the water.
    - (f) Make sure that the water flow at the drain port of the fuselage is stopped.
    - (g) Open the water filling nipple to drain the water from the water filling lines.
    - (h) Check the potable water quantity indication shows zero on the WWSP that is located above the fwd passenger entry door attendant seats.
    - (i) Close the water filling nipple.

## Ramp Servicing Operation Instruction

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**CAUTION:** AFTER DRAINAGE AND DEPRESSURIZATION OF THE POTABLE WATER SYSTEM, YOU MUST TURN THE KNOB ON THE WATER SYSTEM INTERFACE PANEL TO FLIGHT READY FIRST. AFTER ABOUT 10 SECONDS, REMOVE THE ELECTRICAL POWER AND CLOSE THE ACCESS PANEL, OTHERWISE, DAMAGE TO THE AIRPLANE MAY OCCUR.

- (j) Turn the selector switch on the water system interface panel to the FLIGHT READY position.
- (2) Water drainage with pressure (Cold weather additional operation)
  - (a) Make sure the selector switch on the water system interface panel to the FLIGHT READY position.
  - (b) Remove the protective cover from air service valve.
  - (c) Connect the ground air connector and the air service valve.

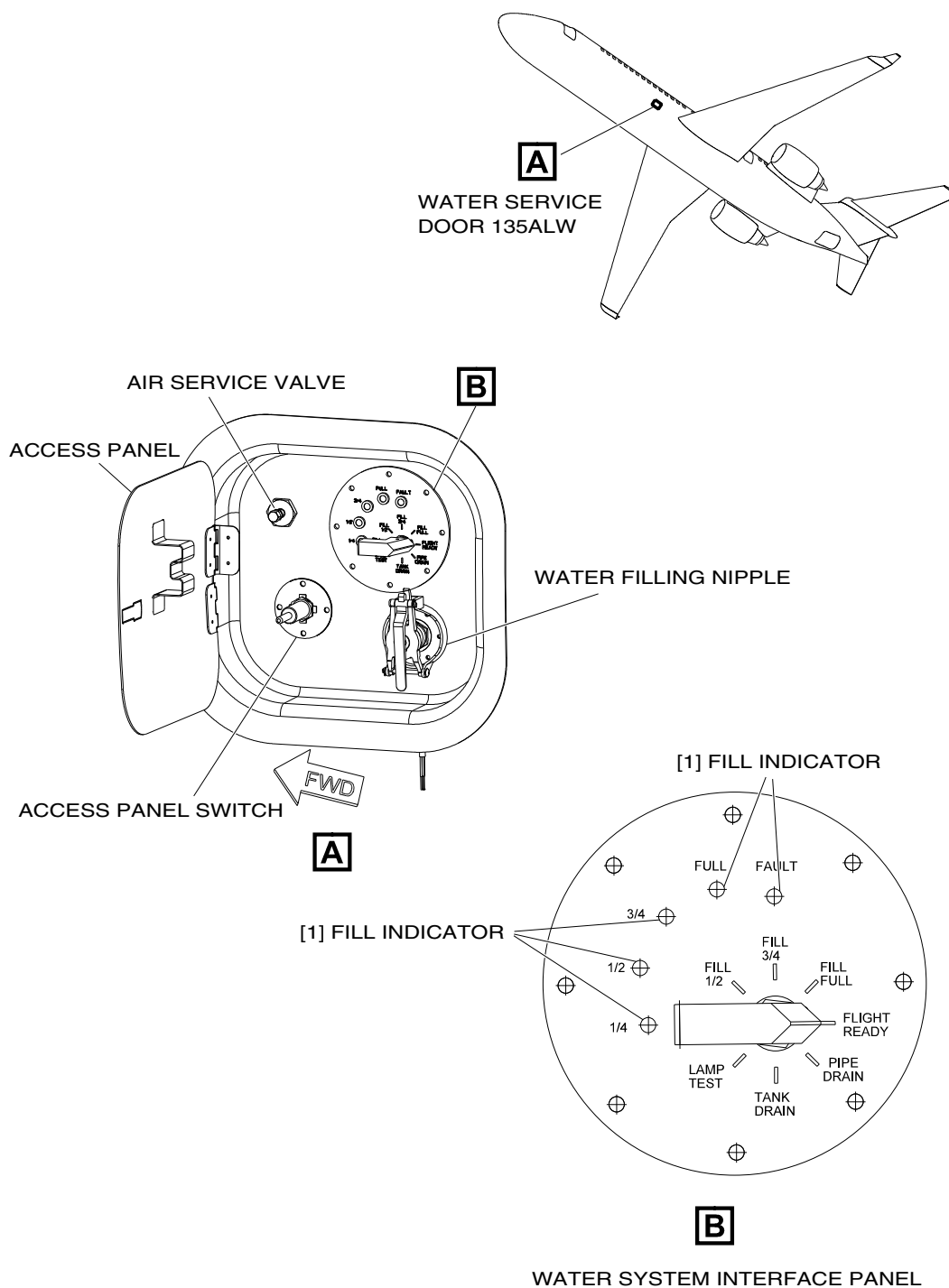
**NOTE:** The input port of the air service valve conforms to Standard MS20813.
  - (d) Adjust pressure gage of the ground hydraulic power cart to 36 psi.
  - (e) Open the ground air source, and continuously pressurize the water system for 3min-5min.

**NOTE:** The recommended input pressure range is 33 psi ~ 37.5 psi.
  - (f) Close the ground pneumatic interface cap.
  - (g) Open the water filling nipple.

**NOTE:** While turning the select knob on the water system interface panel to TANK DRAIN, pay attention as moisture may spray from the water fill fitting.
  - (h) Turn the select knob on the water system interface panel to TANK DRAIN to drain water in the water supply lines and water tank.
  - (i) Repeat above steps (d) to (g) until there is no obvious residual water flows out.
  - (j) Disconnect the ground air connector and the air service valve.
  - (k) Install the protective cover from air service valve.
  - (l) Turn the selector switch on the water system interface panel to the FLIGHT READY position.

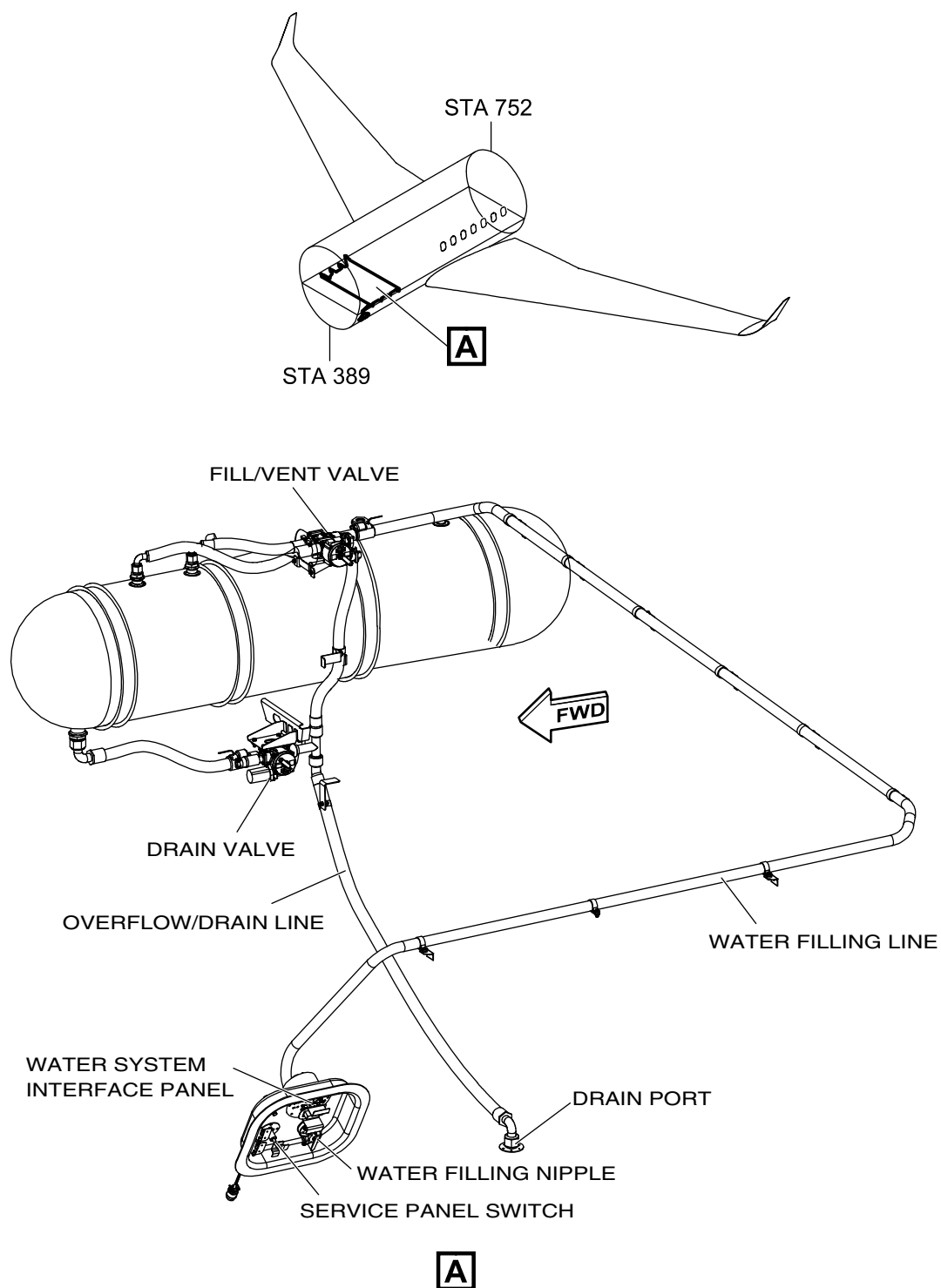
### B. Final procedure

- (1) Close [Water Service Door 135ALW](#).
- (2) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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Figure 1 Potable Water Tank - Drainage (Sheet 1 of 1)



ICN-ARJ21-A-381300-A-SVV19-01219-A-002-01

**Figure 2 Water Service, Indication and Control - System Description (Sheet 1 of 1)**

## Waste System - Drain other liquid

### 1. Common Information

- A. This procedure provides the drain water and flush the waste tank.
- B. The drainage pipe can be properly extended to avoid collision between the drain water truck and the engine. It is recommended that the pipe length extended to 7.5m.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
242	Aft Service Area - Right

#### Access Panels

Number	Name
161ALW	Waste Service Door

### 3. Procedures

- A. Drain the waste tank
  - (1) Before drain water for the aircraft, confirm the aircraft inspection with the site maintenance operator, and start draining.
  - (2) Open [Waste Service Door 161ALW](#).
  - (3) The drain water truck approach the drain panel.  
**NOTE:** Keep the safe distance between the drain water truck and the engine.
  - (4) Connect the waste drain hose from the lavatory service vehicle to the waste tank drain ball valve assembly on the waste service panel.
  - (5) Push the drain ball valve lever downwards to open the waste tank drain ball valve.
  - (6) Drain the waste tank.  
**NOTE:** While the tank drains, feel the waste drain hose to make sure that the liquid flows into the lavatory service vehicle.
- B. Flush the waste tank
  - (1) Push the rinse fitting handle on the waste service panel upwards to open the rinse fitting.
  - (2) Connect a rinse water hose from the lavatory service vehicle to the rinse fitting on the waste service panel.  
**CAUTION:** WHEN FLUSHING THE WASTE WATER TANK, IT IS NECESSARY TO DRAIN THE WASTE WATER AT THE SAME TIME. OTHERWISE, THE WASTE WILL SOLIDIFY ON THE INNER WALL OF THE WASTE TANK, RESULTING IN REDUCTION OF THE VOLUME OF WASTE TANK AND THE FAULT OF ULTRASONIC LEVEL SENSOR.
  - (3) Make sure that the water pressure meets the requirements, and the rated pressure is 50 psi (345 kPa).

## Ramp Servicing Operation Instruction

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**NOTE:** If the water pressure is low, the waste tank will not get cleaned thoroughly.

- (4) Flush the waste tank.

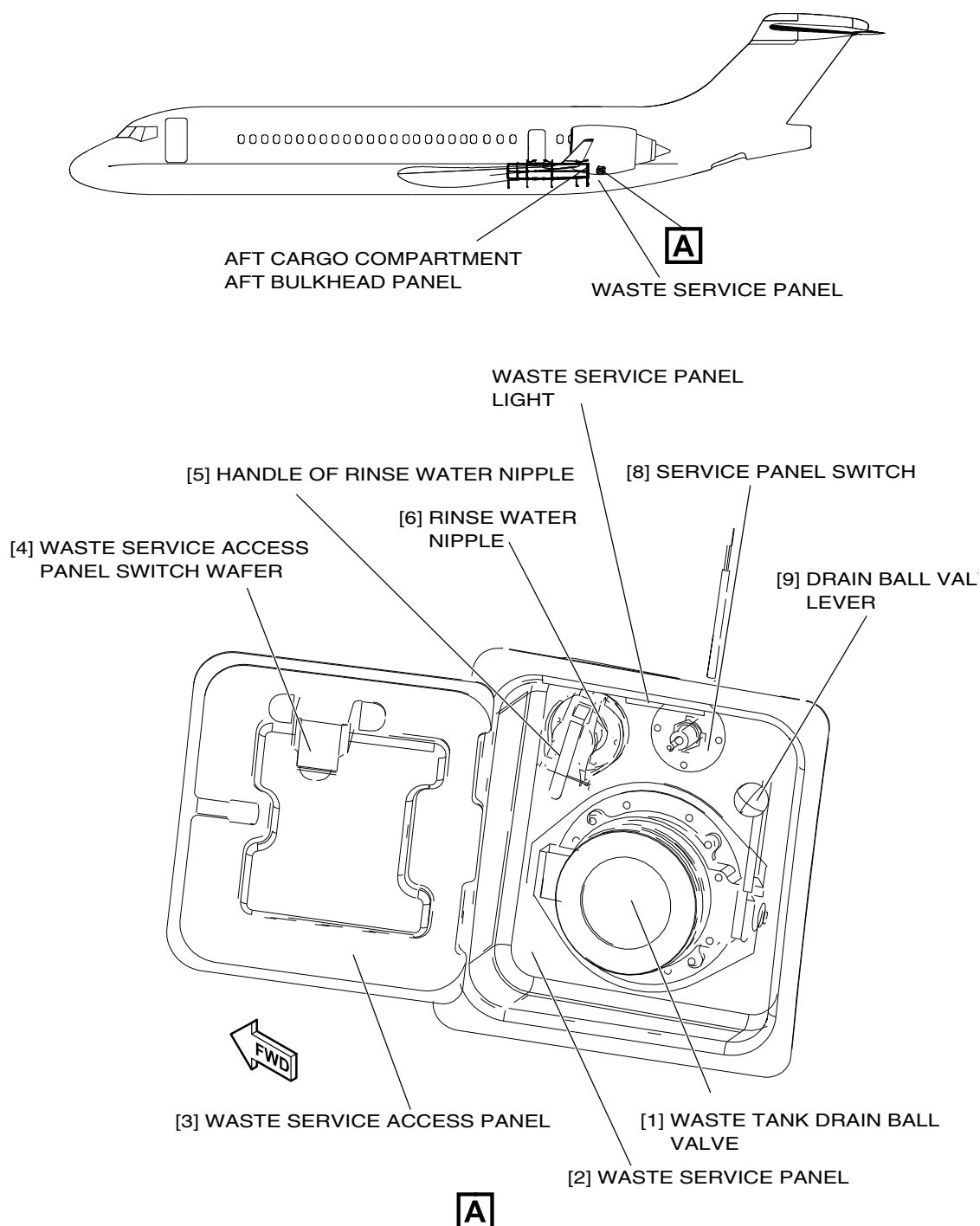
**NOTE:** Flush the waste tank with 10 to 50 L of water.

**NOTE:** Feel the rinse water hose to make sure that the liquid flows into the waste tank.

- (5) Make sure that the waste tank drains fully.
- (6) Reset the waste tank drain ball valve lever to close the waste tank drain ball valve .

### C. Final procedure

- (1) Close [Waste Service Door 161ALW](#).
- (2) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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Figure 1 Waste service door (Sheet 1 of 1)

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## ANTI-ICE/DEICING - Deicing

### 1. Common Information

- A. This procedure provides aircraft deicing/anti-icing operation.
- B. Deicing is a procedure to remove the frost, ice or snow from the surface of the aircraft.
- C. Anti-icing is a precautionary procedure to prevent frost, ice and snow from forming on certain aircraft surfaces within a specific period.
- D. Holdover time is the approximate time deicing/anti-icing fluids keep aircraft surfaces off the frost, ice, or snow.
- E. Ground icing conditions: In general, the meteorological conditions in which the outside air temperature is below 5°C, visible moisture (rain, snow, sleet, ice crystals, fog with visibility less than 1.5 kilometers, and so on) exists or there is standing water, slush, ice or snow on the runway, or meteorological conditions in which the outside air temperature is below 10°C, and the outside air temperature reaches or is below dew point.

### 2. Procedures

- A. Deicing/Anti-icing Fluid
  - (1) Use the recommended material or the substitute material that meets any of these requirements:
    - (a) The substitute material has been approved or authorized by the Airworthiness Certification Department of Civil Aviation Administration of China.
    - (b) The standard or specification used to manufacture the substitute material conforms to that of the anti-icing fluid to be replaced.
    - (c) All liquids must be used in accordance with manufacturer recommendations, health and environmental regulations, and operator requirements.
    - (d) The protective properties of type II, III and IV liquids will degrade if they are contaminated, improperly transported or stored, overheated, or shear forces are excessive during transfer or use.
  - (2) Type I, Type II and Type IV anti-icing fluids are commonly used deicing/anti-icing fluids.
    - (a) Type I liquids must be heated to provide effective de-icing.
    - (b) According to different usage procedures, concentrated Type I liquid must be diluted with water to obtain an appropriate freezing point.
    - (c) In order to provide maximum anti-icing protection, Type II and Type IV liquids should be used under undiluted conditions.
    - (d) Type II and Type IV liquids have higher viscosity and can form a more viscous liquid covering layer on the wing than Type I liquid.

**NOTE:** For Type I deicing/anti-icing fluid, refer to SAE AMS 1424 or the latest version of MH-T 6001-2000.

**NOTE:** For Type II and Type IV deicing/anti-icing fluids, refer to the latest version of SAE AMS 1428.
  - (3) Fluids that follow can be used for the deicing:
    - (a) Type I fluid,
    - (b) Mixture of water and Type I fluid

## Ramp Servicing Operation Instruction

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- (c) Mixture of water and Type II fluid
- (4) Fluids that follow can be used for the anti-icing:
  - (a) Type I fluid,
  - (b) Mixture of water and Type I fluid
  - (c) Type II fluid
  - (d) Mixture of water and Type II fluid
  - (e) Type IV fluid
  - (f) Mixture of water and Type IV fluid.

**WARNING: DO NOT WALK ON THE WINGS OR HORIZONTAL STABILIZERS. BECAUSE THE ICE AND SNOW ON THE SURFACES CAN CAUSE PEOPLE TO FALL DOWN AND EQUIPMENT TO BE DAMAGED.**

**WARNING: IF AIRPLANE DEICING/ANTI-ICING FOR SPECIFIC AIRPORT ARE NEEDED, DO IT WHEN THE ENGINE (SINGLE ENGINE OR BOTH ENGINE) IS (ARE) IN IDLE CONDITION. ALL THE PERSONS MUST STAY AWAY FROM THE DANGEROUS AREA.**

**WARNING: WEAR SAFETY BELTS WHEN YOU WORK IN THE AREA THAT IS HIGHER THAN 2 METERS TO AVOID INJURY OR DEATH CAUSED BY FALLING DOWN.**

**CAUTION: BEFORE DE-ICING OR ANTI-ICING, STOP THE APU OR ENGINES IF THEY ARE IN OPERATION (THE HAZARDOUS DEICING FLUID WILL GO INTO THE AIR-CONDITIONING SYSTEM THROUGH THE APU OR ENGINE BLEED AIR), AND DO NOT USE THE AIR CONDITIONING PACK.**

**CAUTION: DURING DE-ICING OR ANTI-ICING, IF THE APU OR ENGINES ARE IN OPERATION, DO NOT SPRAY THE DEICING FLUID DIRECTLY INTO THE ENGINE OR APU AIR INLETS. OTHERWISE DAMAGE TO THE ENGINES OR APU WILL OCCUR IF THEY INGEST A LARGE AMOUNT OF DEICING FLUID DURING OPERATION .**

**CAUTION: BEFORE YOU USE THE ENGINES, IF YOU CAN SEE ICE ON THE MID-AFT FUSELAGE OF THE AIRCRAFT, UPPER SURFACE OF THE WING, AND THE EMERGENCY DOOR, DO THE DE-ICING MANUALLY BEFORE YOUR START THE ENGINE. OTHERWISE, DAMAGE TO ENGINES CAN OCCUR IF THE ENGINES SUCK IN THE SLUSH OR ICE.**

**CAUTION: DO NOT USE THE HARD OR SHARP TOOLS TO REMOVE ICE FROM THE AIRPLANE SURFACE. OTHERWISE, DAMAGE TO THE AIRPLANE SURFACE (PAINTING, PROTECTIVE FILM, OXIDE LAYER, ETC.) MAY OCCUR.**

### B. Deicing/Anti-icing Procedure

- (1) Selects the appropriate deicing /anti-icing steps according to the actual situation.

**NOTE:** Make sure that the left & right wings and the left & right sides of horizontal stabilizer are in the same condition and completely symmetrical after deicing/anti-icing.

**NOTE:** When you use the heated Type I diluent to remove the ice, snow, frost and other pollutants from the aircraft surfaces, fluid residues on the aircraft surfaces can only give limited protection. The outside air temperature and the meteorological condition can be taken into account to select proper deicing/anti-icing fluids.

**NOTE:** Before you move an aircraft out of a warm hangar during icing conditions, do the anti-icing procedure on the aircraft. This will reduce the possibility that ice or snow will melt when it touches the warm aircraft and freeze again.

**NOTE:** After deicing/anti-icing is completed, if you find any ice attached to the surface again, do the deicing/anti-icing procedure again.

(2) Snow Removal Procedure

**NOTE:** It is recommended to remove snow from a parked aircraft regularly. This will make sure that a large quantity of snow will not collect and possibly freeze on the aircraft surface.

**NOTE:** Do not push the snow into the cavities or holes in the control surface during the snow removal.

**NOTE:** Make sure that ice and/or snow is not pushed into the flight control area during ice and snow removal.

(a) The use of the following tools to deicing large quantity of snow from aircraft surfaces, rather than using deicing/anti-icing fluids, can reduce costs and reduce environmental impact:

- 1) Use hangar
- 2) Use a rubber spatula/broom
- 3) Use a blade hair dryer and mop
- 4) High pressure air

**NOTE:** The air is hot when leaving the nozzle, after several feet becomes the same as ambient temperature.

(b) Use mechanical mean to remove the snow on the wing surface, fuselage surface, horizontal stabilizer surface.

(3) One-Step Deicing/Anti-Icing Procedure

(a) When you use the heated deicing fluid diluent to remove the ice from the aircraft surfaces, fluid residues on the aircraft surfaces can give limited protection.

(b) According the desired holding time, outside air temperature and the meteorological condition to select proper deicing fluids.

(c) The fluid mixed with the water can be Type I, Type II, or Type IV deicing/anti-icing fluid. The holdover time will be longer with the Type II and Type IV deicing/anti-icing fluids. Use the data that follow to confirm the concentration of each fluid in the mixture.

(4) Two-Step Deicing/Anti-Icing Procedure

(a) It consists of two different steps:

- 1) Step one: Use the heated deicing fluid to complete the deicing work. The deicing fluid should be correctly selected according to the outside air temperature.
- 2) Step two: Use the anti-icing fluid to complete the deicing work. The anti-icing fluid should be correctly selected according to the desired holding time, outside air temperature and the meteorological.

(b) The two-step deicing/anti-icing procedure is usually used when the precipitation conditions are continuous.

(c) The second step is generally carried out within 3 minutes as soon as possible. If necessary, it shall be applied one by one. If the aircraft critical part freezes again, it shall repeat the first step.

(5)

## Ramp Servicing Operation Instruction

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**NOTE:** It is not allowed to use tool to knock and scrap the ice.

Handling the ice layer on the aircraft.

- (a) Heating the ice layer by the hot liquid, until the aircraft surface is exposed.
  - (b) Repeat the steps to destroy the large ice area.
  - (c) Clean all the ice.
- (6) Deicing/Anti-icing configuration requirements
- (a) Before you do the deicing/anti-icing operation, make sure that the control surfaces are in the deicing/anti-icing configuration:
    - 1) Slats, flaps, spoilers and engine thrust reverser are retracted.
    - 2) Ailerons, rudder and elevator are in neutral positions.
- (7) Deicing/Anti-icing communication Procedure
- (a) Before the de-icing, make sure the aircraft is in deicing/anti-icing configuration.
  - (b) After the de-icing, the following information must be provided to the crew:
    - 1) The start and the end time.
    - 2) Type of the deicing and anti-icing liquid.
- (8) The order of deicing is very important. First is the fuselage, second is the wing surface, third is the tail surface.
- (9) Use the following guidelines to spray the deicing fluid:

**NOTE:** Determine spraying pressure in accordance with the standard deicing/anti-icing requirement of the airport.

**NOTE:** The direction of the deicing vehicle is vehicle to the fuselage.

- (a) Fuselage: Spray deicing fluids from the top centerline of fuselage and then outward. Ice from the nose to the engine thrust reverser must be removed to prevent the ice/snow from falling and getting into the engines.

**NOTE:** While spraying deicing fluid to the fuselage, take care not to spray deicing fluid into the APU inlet and cooling air ram inlet.

**NOTE:** Do not spray directly to passenger windows and pilot windows.

- (b) Spray deicing fluid from tip to the root area, and from the highest point of the camber to the lowest point.

**NOTE:** Pay attention to lowering the hot air gun from the wings root to 1/3 of the wings to prevent large amount of deicing fluid from splashing into the engine air intake.

- (c) Winglet: Spray the deicing fluid along the airflow direction. Keep the spraying pressure as low as possible.
- (d) Vertical stabilizer: Spray deicing fluid from top to the bottom.

**NOTE:** Spray deicing fluid from the side of the vertical tail leading edge. Keep the spraying line not more than 45° to the aircraft centerline. Prevent the deicing fluid from entering the APU inlet door, cooling air ram inlet and ram air inlet.

**NOTE:** While doing de-icing/anti-icing operation for the vertical stabilizer, try to prevent the anti-icing fluid from flowing into the cooling vent of aft equipment compartment as possible.

- (e) Spray deicing fluid from top to the bottom.
- (f) Landing gear and wheel well: It is recommended to remove the ice manually or by heat. Do not spray deicing fluid or water.

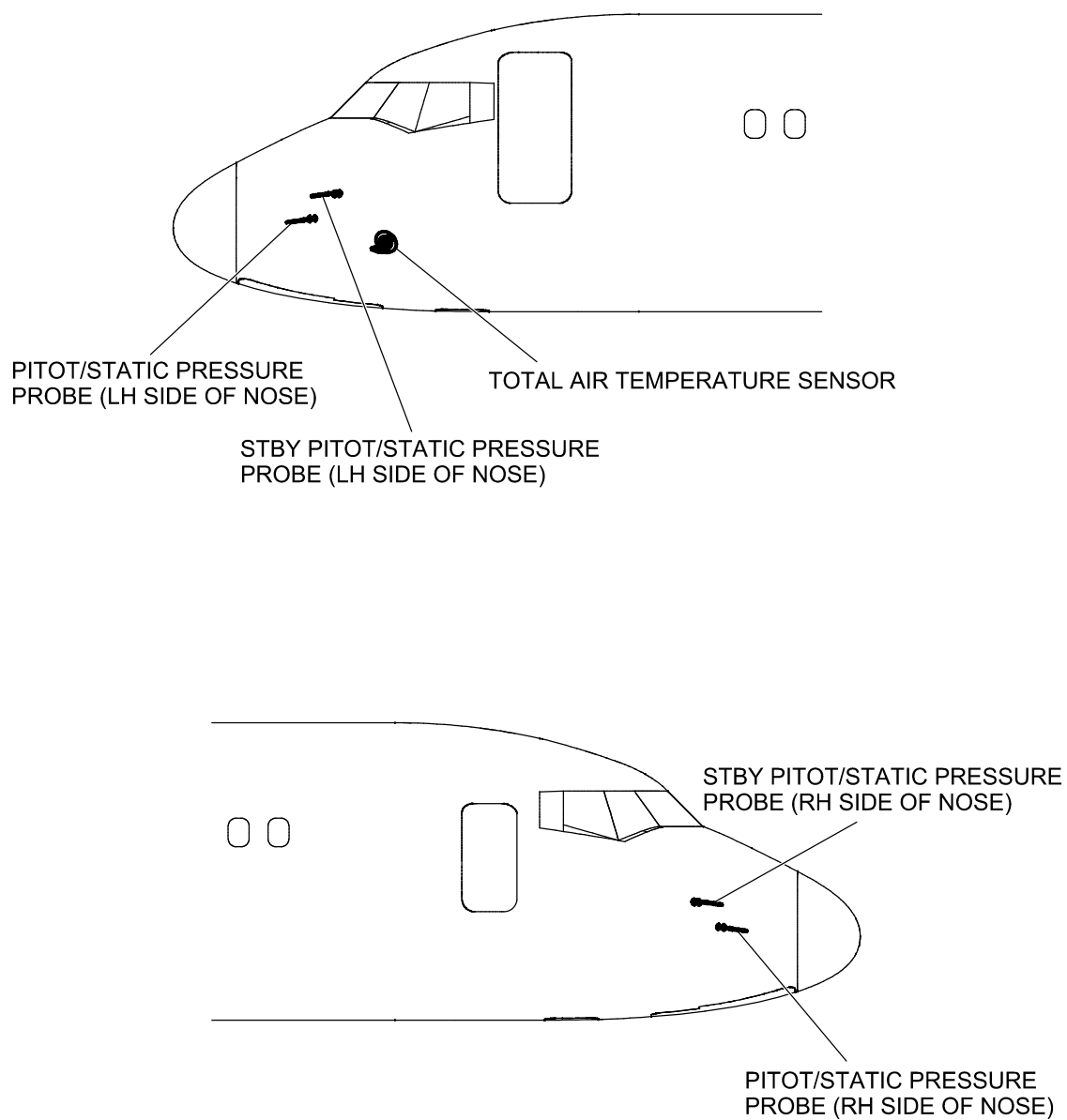
**NOTE:** Install suitable covers for anti-icing on the wheels and brakes when it is permitted.

- (g) Engine: Do not directly use the deicing fluid to remove the ice from the engine. The mechanical method (brooms or brushes) can be used to remove the snow collected at the engine inlet. Hot air or other methods recommended by the engine manufacturer can be used to remove all frozen materials on the lower surface of the inlet and on the fan blades.
  - (h) Flaps/slats: If you consider that there are contaminations in the flaps or slats, it must put down the flaps/slats to check the area.
- (10) Take special care not to let the hanging basket and operator point the spray of deicing/anti-icing fluids directly into the engine, APU inlet, cooling air ram inlet, ram air inlet, APU exhaust port, exhaust port, engine thrust reverser, angle of attack sensor, pitot-static probe, TAT sensor, ice detector, exhaust/drain port, wheel and brake, etc.
  - (11) After the last flight of the day when deicing procedure had been performed, it is necessary to remove the remaining de-icing fluid from the APU compartment.
  - (12) Make sure the maximum pressure of the sprayed deicing fluid does not exceed the limit. Do not point a continuous flow of fluid directly at the aircraft surfaces.
  - (13) Spray the same amount of de-icing fluid to the right and the left side of the aircraft (such as the left wing and right wing) and get them fully covered with the fluid for the best de-icing effect.
  - (14) After a de-icing procedure is completed, do a de-icing procedure again before doing an anti-icing procedure for subsequent flights or aircraft maintenance within a long period of time.

**NOTE:** After the holdover time is exceeded, the aircraft will freeze again.

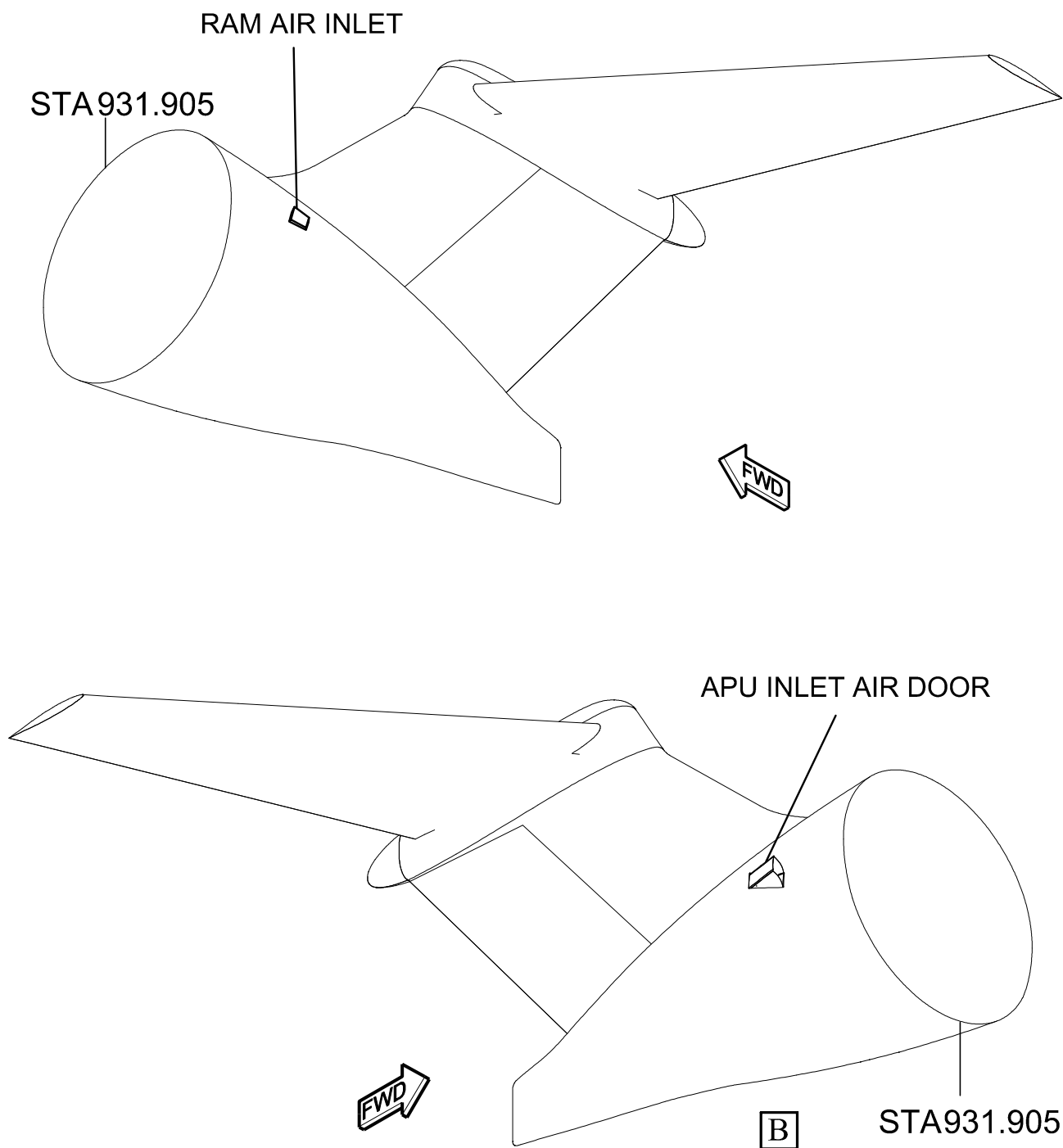
#### C. Final procedure

- (1) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

**Ramp Servicing Operation  
Instruction**

ICN-ARJ21-A-123101-A-SVV19-00916-A-001-01

**Figure 1 Probe Location (Sheet 1 of 1)**



ICN-ARJ21-A-123101-A-SVV19-00920-A-002-01

**Figure 2 APU inlet door, cooling air ram inlet and exhaust port (Sheet 1 of 1)**

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## External power for airplane - De-energize electrical - De-energize electrical network

### 1. Common Information

A. This procedure provides for disconnecting the external power supply from the aircraft.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
213	Cockpit - Left

#### Access Panels

Number	Name
113AL	External Power Receptacle Access Panel

### 3. Procedures

#### A. Main Procedure

- (1) Confirm the aircraft configuration with the site maintenance operator, and can disconnect the external power.
- (2) Make sure that the AVAIL indicator light on the aircraft external power receptacle board comes on and IN USE indicator light goes out.
- (3) Make sure that the AVAIL indicator light on the ELEC PWR in cockpit control panel comes on.
- (4) Make sure that the AVAIL indicator light on the ground service power in cockpit control panel comes on.
- (5) Turn off the external power pushbutton.

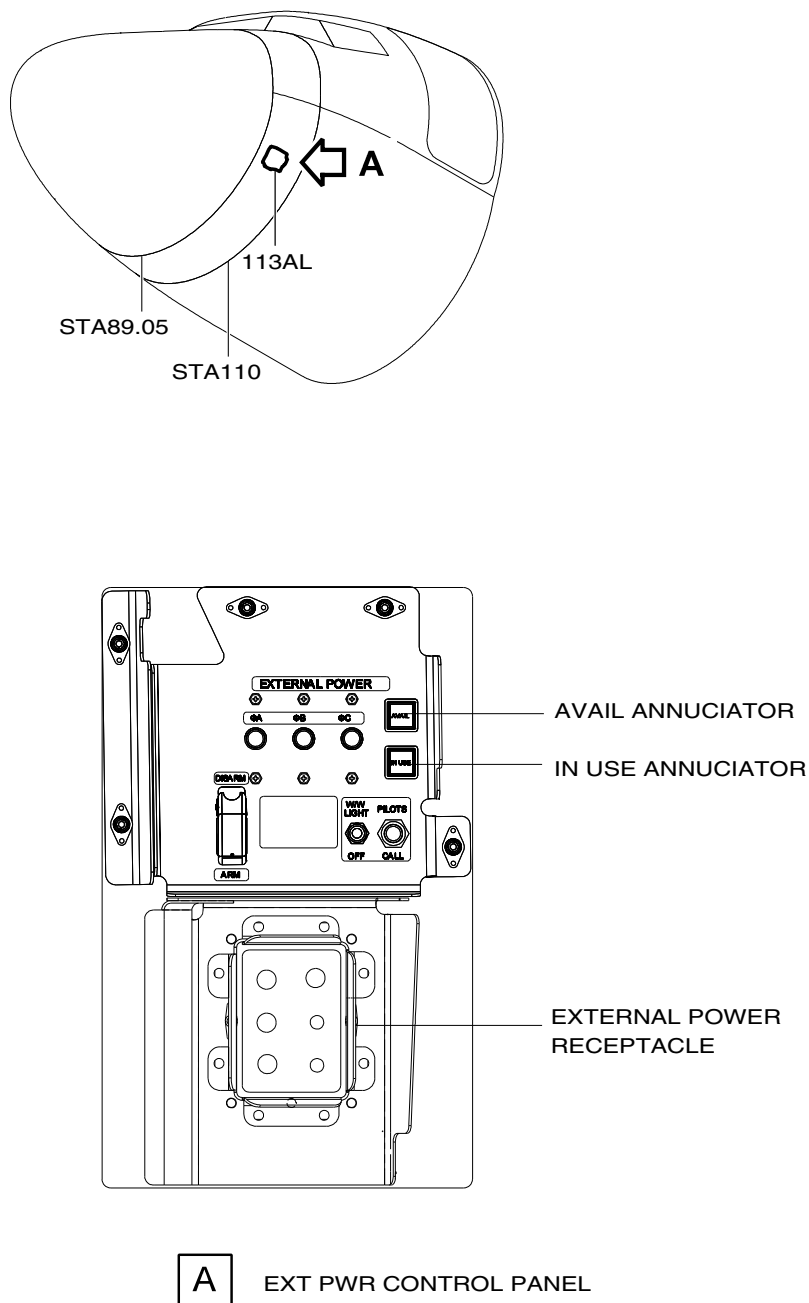
**NOTE:** Follow manufacturer's instructions to turn off the external power pushbutton.

- (6) Disconnect the external power connector.
- (7) Open [External Power Receptacle Access Panel 113AL](#), and make sure the clip is closed in place.
- (8) Retract the external power cable.

**NOTE:** If the external power cable is not recovered properly, it may be damage the aircraft.

#### B. Final procedure

- (1) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



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Figure 1 External power for airplane - Energize electrical network (Sheet 1 of 1)



ICN-ARJ21-A-131227-A-SVV19-11654-A-001-01

**Figure 2 GND SERV ELEC PWR Switch (Sheet 1 of 1)**



ICN-ARJ21-A-131227-A-SVV19-11655-A-001-01

**Figure 3 Cockpit ELEC PWR control panel (Sheet 1 of 1)**

## External power for airplane - Energize electrical - Energize electrical network

### 1. Common Information

- A. This procedure provides for supplying the external power of the aircraft.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
213	Cockpit - Left

#### Access Panels

Number	Name
113AL	External Power Receptacle Access Panel

### 3. Procedures

#### A. Procedure

- (1) Before supply the external power for the aircraft, confirm with the site maintenance operator, can start working.
- (2) Open [External Power Receptacle Access Panel 113AL](#).
- (3) Before you supply external power to the aircraft, make sure the external power crew operates normally and do a visual inspection of the electrical harness, connector and the external electrical power receptacle.
  - (a) Make sure that there is no damaged, contamination or ablation on the electrical harness.
  - (b) Make sure there is no ablation, indentation, bend and no water accumulation of the pin.
  - (c) Make sure there is no overheat or deformation on the external power receptacle.

**CAUTION: DO NOT USE HOOKS TO HANG THE EXTERNAL POWER PLUG ON THE AIRCRAFT SKIN.**

- (4) Connect the external power to the external power receptacle, the external power cable release sufficient margin.
- (5) Turn on the external power generator.

**NOTE:** Follow manufacturer's instructions to turn on the external power pushbutton.

- (6) Energize for aircraft.
  - (a) Make sure that the AVAIL indicator light on the aircraft external power receptacle board comes on and IN USE indicator light is OFF.
  - (b) Make sure that the AVAIL indicator light on the ELEC PWR control panel in cockpit is ON.
  - (c) Make sure that the AVAIL indicator light on the ground service power control panel in cockpit is ON.
- (7) Press the EXT PWR pushbutton on the ELEC PWR control panel in cockpit.

## Ramp Servicing Operation Instruction

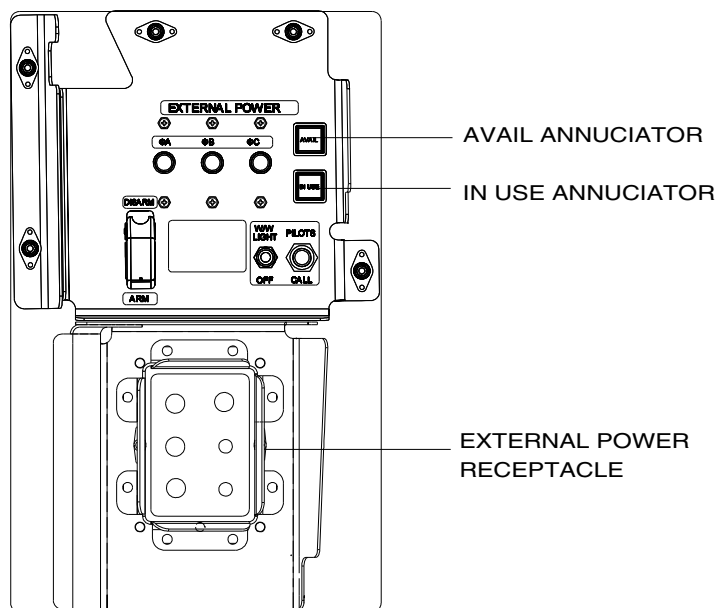
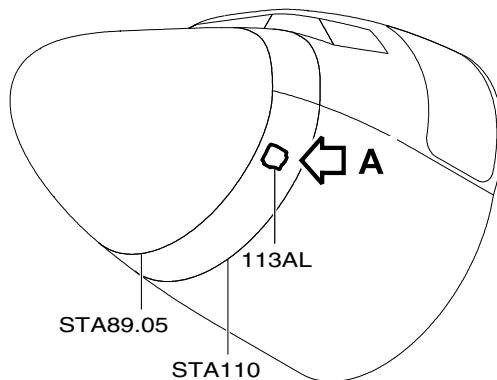
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- (8) Make sure that the ON indicator light on the EXT PWR pushbutton is ON.
- (9) Make sure that the three AVAIL indicator lights is OFF.
  - (a) Make sure that the AVAIL indicator light on the external power receptacle board is OFF and the IN USE indicator light is ON.
  - (b) Make sure that the AVAIL indicator light on the ELEC PWR control panel in cockpit is ON.
  - (c) Make sure that the AVAIL indicator light on the ground service power control panel in cockpit is OFF
- (10) Check the external power.
  - (a) Observe the ELECTRICAL synoptic page on MFD to make sure that the power supply status of external power is normal and related circuits of EXT PWR are green.
  - (b) Make sure that EICAS does not show external power system alert message.

**NOTE:** During the transfer between the APU power supply and the external power supply, alert messages such as IPC MISCONFIG, FLT CTRL NO DISPATCH appear temporarily.

### B. Final procedure

- (1) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.



**A** EXT PWR CONTROL PANEL

ICN-ARJ21-A-244000-A-SVV19-01367-A-003-01

**Figure 1 External power for airplane - Energize electrical network (Sheet 1 of 1)**



ICN-ARJ21-A-131227-A-SVV19-11654-A-001-01

Figure 2 GND SERV ELEC PWR Switch (Sheet 1 of 1)





ICN-ARJ21-A-131227-A-SVV19-11655-A-001-01

Figure 3 Cockpit ELEC PWR control panel (Sheet 1 of 1)

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## Passenger Boarding Bridge Docking - Connection Procedure

### 1. Common Information

A. This program provides the procedure for boarding bridge docks the aircraft.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
831	Passenger Entry Door

### 3. Procedures

#### A. Procedure

- (1) After the aircraft is berthed completely and the wheel chock is placed, the boarding bridge docking operation is carried out after confirmation the apron maintenance operator.
- (2) First confirm that the boarding bridge and its sensors can work normally.
- (3) The boarding bridge should not touch any sensors when docking the passenger door.
- (4) The height of passenger door is lower than common narrow-body aircraft, pay attention that the slope of the boarding bridge should avoid excessive when boarding bridge docking, and keep the safe distance from the antennas and sensors on the nose of aircraft. Refer to table below for the ground clearance and size information of ARJ21-700's passenger door.
- (5) Handle the safety shoe gently and slowly to avoid bumping the fuselage.
- (6) The width of the seal under the passenger door is 40 mm. The safety shoe can be squeezed with the seal under the passenger door, however, the structure of the fixed seal at the lower part of the passenger door and the out skin of the cabin door shall not contract the safety shoe.
- (7) Observe the situation around the boarding bridge during the process of docking, stop docking immediately if any obstacle is found, to avoid the accidental collision resulting in injury of people and damage of the aircraft and the boarding bridge.

#### B. Final procedure

Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

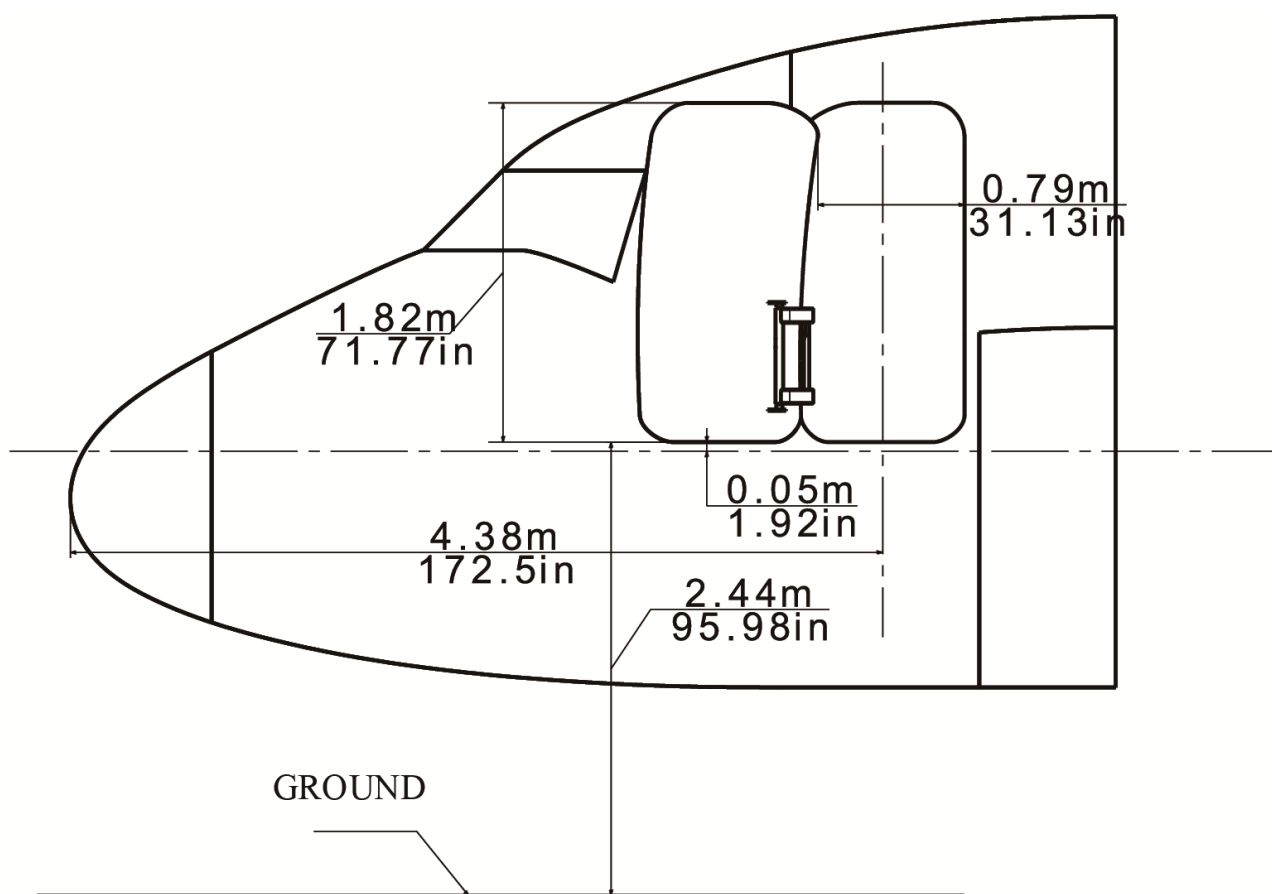
**Table 1 ARJ21-700, type STD, Height Difference in different circumstances**

ARJ21-700, type STD, Height Difference on departure/arrival in different circumstances(mm)					
Temperature	Empty Weight	Maximum Taxi Weight		Height Difference	
		Fwd CG limit	Max Aft CG	Fwd CG limit	Max Aft CG
40°C	2495	2335	2411	160	84
30°C	2482	2325	2399	157	83
15°C	2461	2311	2382	150	79
0°C	2440	2296	2365	144	75

**Ramp Servicing Operation  
Instruction**

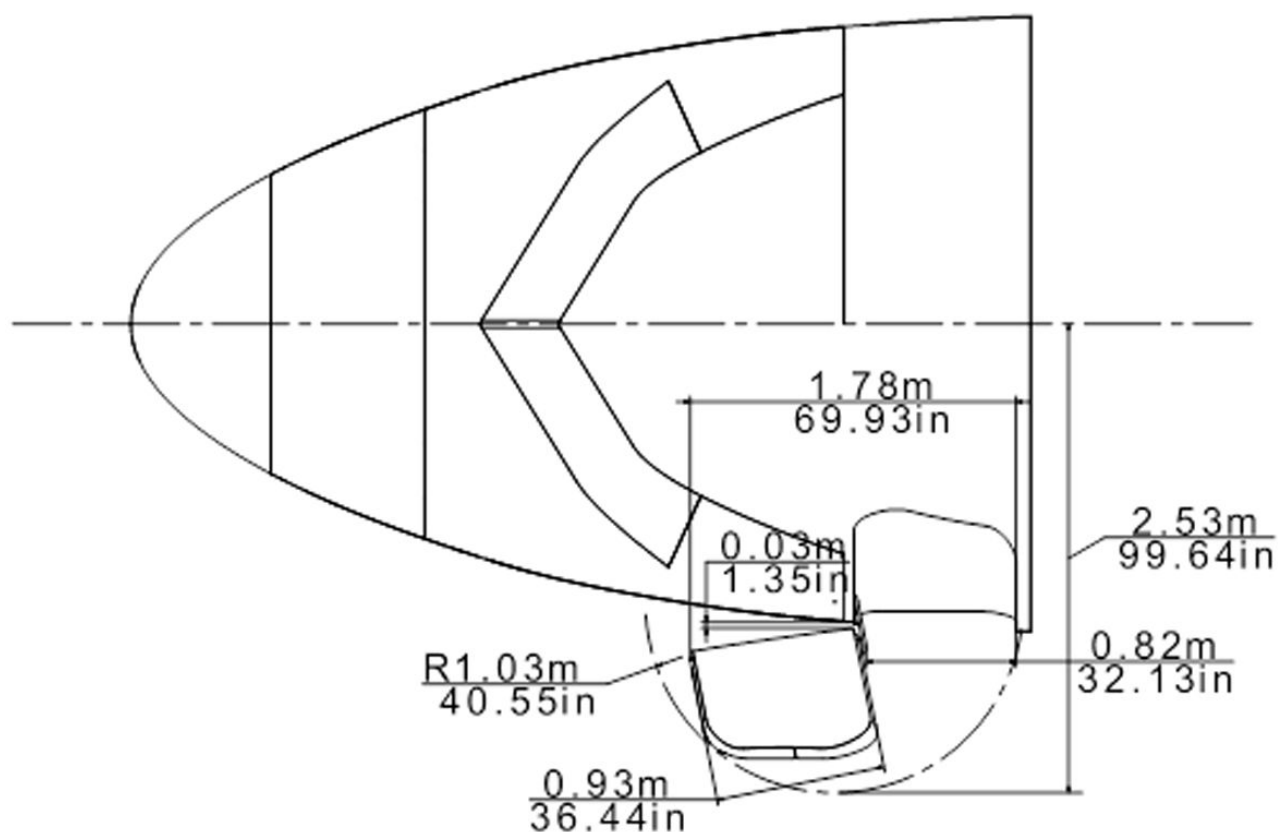
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-10°C	2426	2287	2353	139	73
-20°C	2412	2277	2342	135	70
-30°C	2398	2268	2330	130	68
-40°C	2385	2258	2319	127	66



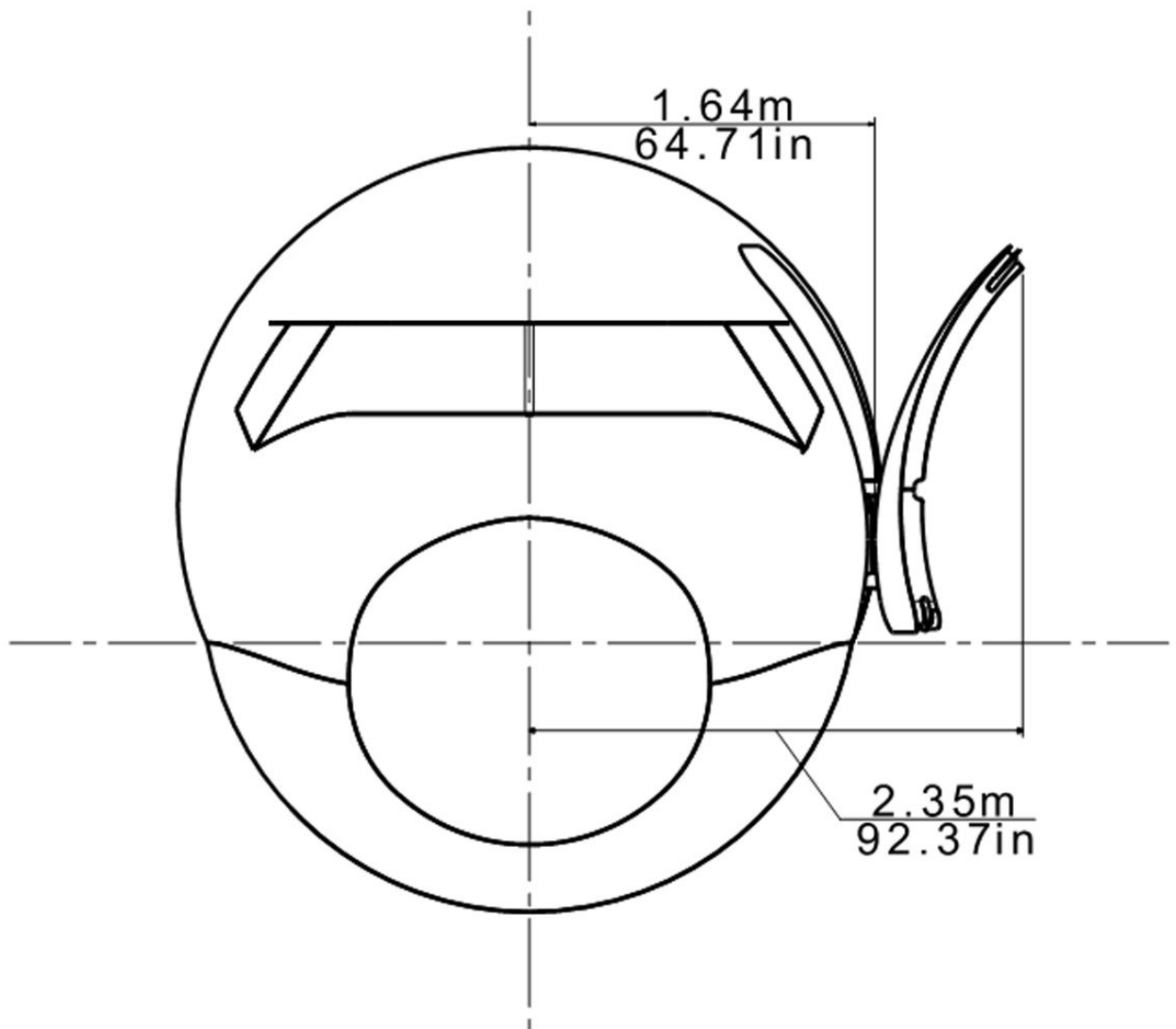
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**Figure 1 Passenger entry door clearance -1 (Sheet 1 of 1)**



ICN-ARJ21-A-192002-A-SVV19-10716-A-001-01

Figure 2 Passenger entry door clearance -2 (Sheet 1 of 1)



ICN-ARJ21-A-192002-A-SVV19-10718-A-001-01

**Figure 3 Passenger entry door clearance -3 (Sheet 1 of 1)**

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## Passenger Boarding Stairs Docking - Connection Procedure

### 1. Common Information

- A. This program provides the procedure for passenger boarding stairs docking.

### 2. Preliminary Requirements

#### Work Zones

Zone	Location
831	Passenger Entry Door

### 3. Procedures

#### A. Procedure

- (1) Check the condition of passenger stairs before use, including yellow warning light is available, tire pressure is sufficient, there is no leakage.
- (2) Confirm that the passenger stairs platform and armrest baffle is in the retracted position.
- (3) The passenger stairs should arrive at the designated parking place at the specified speed and route.
- (4) After the aircraft is stopped, engines are shut down, anti-collision lights is turned off, and the wheel is blocked, the passenger stairs slowly approaches the passenger door on the left side of the aircraft after received the signal from the commander that it can approach the aircraft.

**NOTE:** The passenger stairs should not touch any sensors when docking the passenger door.

- (5) Adjust the height of passenger stairs, keep a position matching with the passenger door.

**NOTE:** The height of passenger door is low than common narrow-body aircraft, the passenger stairs should avoid bumping when approaching. Refer to table 1 below for the ground clearance and size information of ARJ21-700's passenger door.

- (6) After docking, keep a sufficient safe distance between the platform of the passenger stairs and the bottom edge of the passenger door(10cm is recommended).

**NOTE:** The platform of the passenger stairs can be squeezed with the seal under the passenger door, however, the structure of the fixed seal at the lower part of the passenger door and the out skin of the door shall not contract the platform of the passenger stairs.

- (7) After the passenger stairs is stable, block the wheel and shut down the engine.
- (8) pull out the guardrail after open the passenger door, keep enough safety distance between guardrail and door(10cm is recommended).

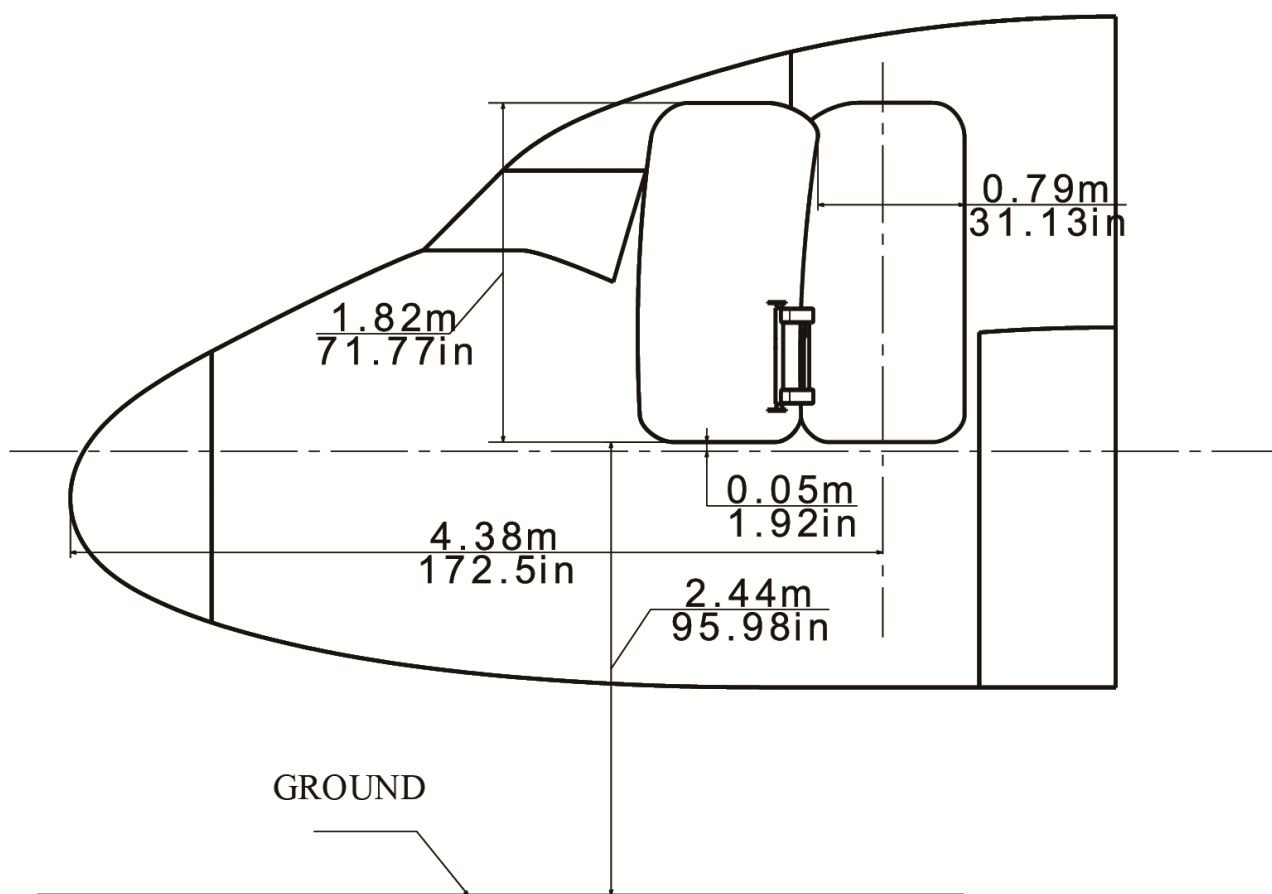
**NOTE:** The ARJ21's passenger door is inverted, wait for the attendant to open the passenger door before pulling out the left guardrail.

#### B. Final procedure

- (1) Remove wheel chock, evacuate passenger stairs with normal procedure.
- (2) Make sure that the work area is clean. Remove all tools, equipment and unwanted materials from the work area.

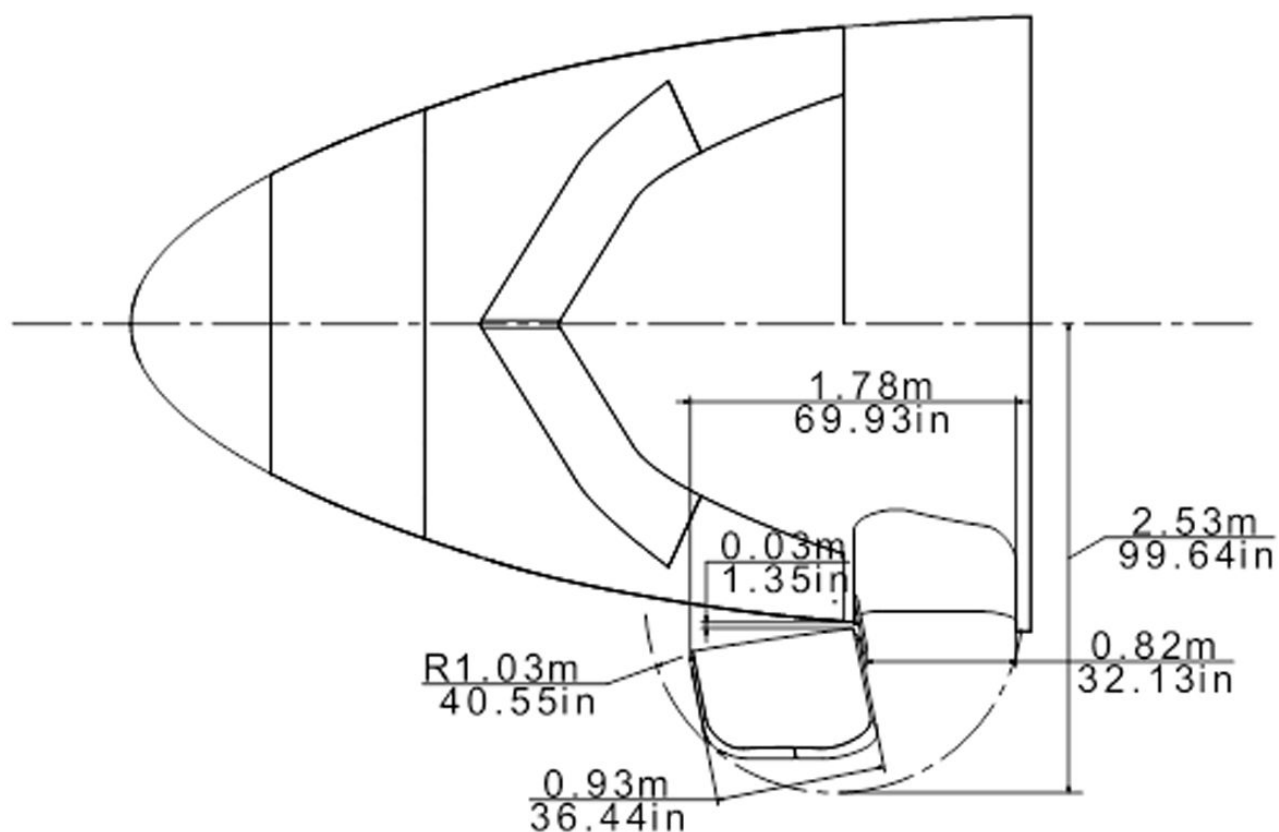
**Ramp Servicing Operation  
Instruction**
**Table 1 ARJ21-700, type STD, Height Difference in different circumstances**

ARJ21-700, type STD, Height Difference on departure/arrival in different circumstances(mm)					
Temperature	Empty Weight	Maximum Taxi Weight		Height Difference	
		Fwd CG limit	Max Aft CG	Fwd CG limit	Max Aft CG
40°C	2495	2335	2411	160	84
30°C	2482	2325	2399	157	83
15°C	2461	2311	2382	150	79
0°C	2440	2296	2365	144	75
-10°C	2426	2287	2353	139	73
-20°C	2412	2277	2342	135	70
-30°C	2398	2268	2330	130	68
-40°C	2385	2258	2319	127	66



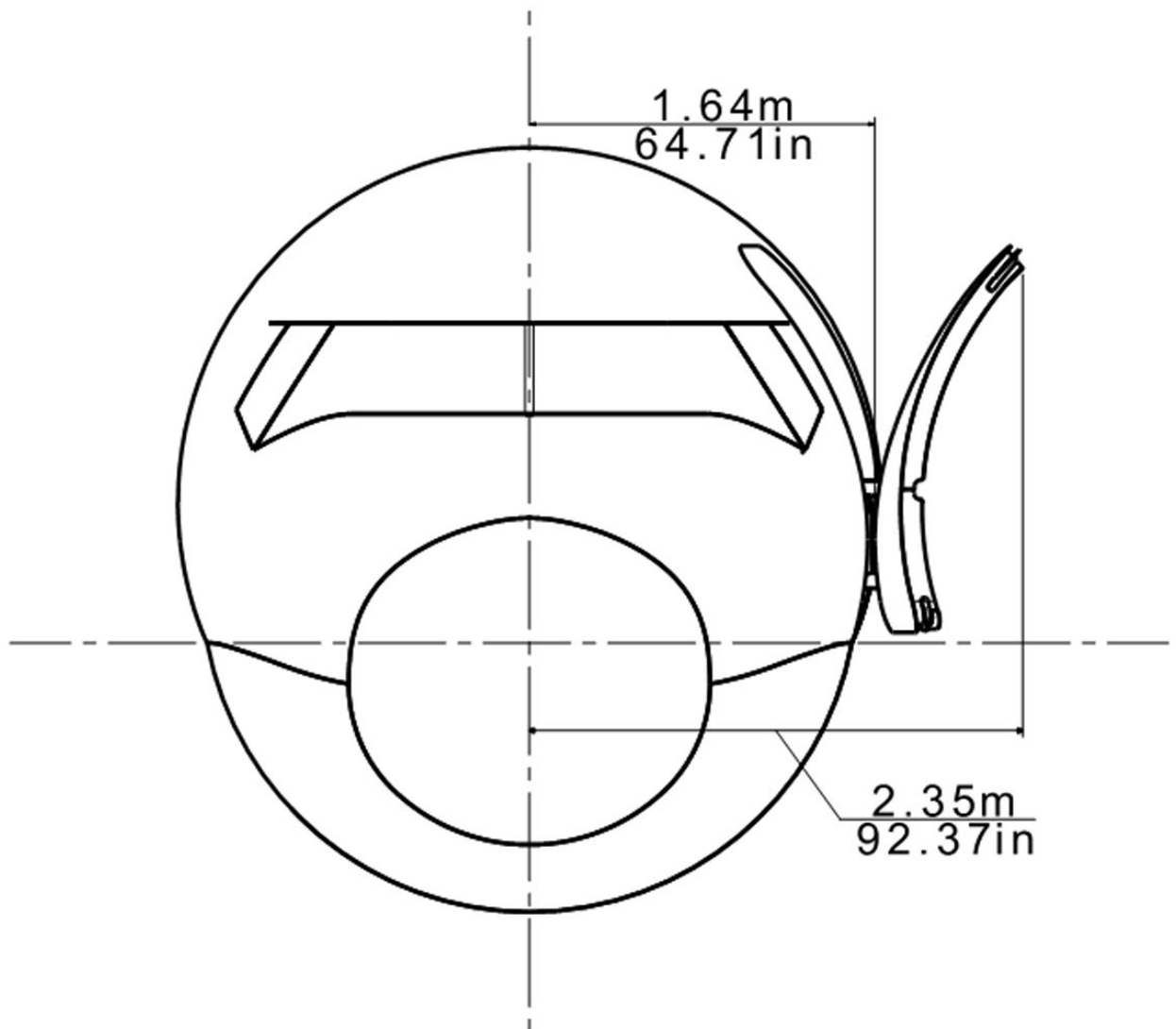
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**Figure 1 Passenger entry door clearance -1 (Sheet 1 of 1)**



ICN-ARJ21-A-192002-A-SVV19-10716-A-001-01

Figure 2 Passenger entry door clearance -2 (Sheet 1 of 1)



ICN-ARJ21-A-192002-A-SVV19-10718-A-001-01

**Figure 3 Passenger entry door clearance -3 (Sheet 1 of 1)**

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