AD 2 AERODROMES

RJOI AD 2.1 AERODROME LOCATION INDICATOR AND NAME

RJOI - IWAKUNI

RJOI AD 2.2 AERODROME GEOGRAPHICAL AND ADMINISTRATIVE DATA

1	ARP coordinates and site at AD	340842N/1321449E 196° / 1.2km from RWY 20 THR		
2	Direction and distance from (city)	1.3nm SE of Iwakuni Railway Station		
3	Elevation/ Reference temperature	10ft (3m) / 30.5°C (87°F)		
4	Geoid undulation at AD ELEV PSN	105ft		
5	MAG VAR/ Annual change	6.6°W(2008) / 0.0°W		
6	AD Administration, address, telephone, telefax, telex, AFS, e-mail and/or Web-site addresses	U.S. Military: Marine Corps Air Station (MCAS) Operations Department PSC 561 Box 1876 FPO, AP 96310-0019 (0827) 79-5501 Operations Department, BOX 1876 Iwakuni Kokukichi Misumi-cho, Kanyuchi, 1-chome Iwakuni-city, Yamaguchi 740-0025 (0827) 79-5501		
7	Types of traffic permitted (IFR/VFR)	IFR / VFR		
8	Remarks	Iwakuni Airport Office(Civil Aviation Bureau) 3-15-2, Asahimachi , Iwakuni, Yamaguchi Pref Tel: 0827-24-8221,8224		

RJOI AD 2.3 OPERATIONAL HOURS

1	AD Administration	2230-0730 MON-FRI (CIV 2230-1330 MON-SUN)	
2	Customs and immigration	On request Customs: 0827-21-7138 Immigration: 0834-21-1329	
3	Health and sanitation	Quarantine(human): On request(0834-21-1091) Quarantine(animal, plant): Nil	
4	AIS Briefing Office	Nil	
5	ATS Reporting Office(ARO)	Nil	
6	MET Briefing Office	H24 (FUKUOKA)	
7	ATS	APPROACH CONTROL 2130-1400 (MON-SUN) Other time by PPR TOWER 2130-1400 (MON-SUN) Other time by PPR	
8	Fuelling	U.S. Military and U.S. DOD contracted aircraft only	
9	Handling	To be issued as required	
10	Security	H24	
11	De-icing	Nil	
12	Remarks	72HR PPR for all flights outside of published AD hours HR of service at CAB OPS section 2230-1330	

RJOI AD 2.4 HANDLING SERVICES AND FACILITIES

1	Cargo-handling facilities	U.S. Military and U.S. DOD charter aircraft		
2	Fuel/ oil types	JP-5 (for U.S. Military and U.S. DOD charter aircraft) JET A-1(for Civil ACFT)		
3	Fuelling facilities/ capacity	U.S. Military and U.S. DOD charter aircraft Fuel truck refueling(for Civil ACFT)		
4	De-icing facilities	Nil		
5	Hangar space for visiting aircraft	Nil		
6	Repair facilities for visiting aircraft	Nil		
7	Remarks	For non U.S. Military aircraft handling services and facilities contact Civil Commercial Airport authorities for information.		

RJOI AD 2.5 PASSENGER FACILITIES

1	Hotels	In Iwakuni City
2	Restaurants	In Iwakuni City
3	Transportation	Bus and taxi
4	Medical facilities	In Iwakuni City
5	Bank and Post Office	In Iwakuni City
6	Tourist Office	Nil
7	Remarks	Nil

RJOI AD 2.6 RESCUE AND FIRE FIGHTING SERVICES

1	AD category for fire fighting	ICAO CAT 8
2	Rescue equipment	USMC: ARFF foam / Chemical fire fighting truck x 6, Rescue truck w/lighting x 2, Incident command vehicle x 1, Water re-supply tanker x 2 JSDF-M: ARFF foam / Chemical fire fighting truck x 2 CAB: Emergency medical equipments conveyance truck x 1, Lightning power supply truck x 1
3	Capability for removal of disabled aircraft	Nil
4	Remarks	H24; Emergency ARFF(Aircraft Rescue Fire Fighting) Dispatch (0827) 79-3211

RJOI AD 2.7 SEASONAL AVAILABILITY-CLEARING

1	Types of clearing equipment	Nil
2	Clearance priorities	Nil
3	Remarks	Any contaminants on runway center lines, landing strips and lighting aids shall be removed as and when necessary so as to provide good contact with the runway.

RJOI AD 2.8 APRONS, TAXIWAYS AND CHECK LOCATIONS DATA

1	Apron surface and strength	Visiting Aircraft Ramp (VAL) Surface: Concrete Strength: PCN 76/R/C/W/T
		Civil Apron: Surface: Cement Concrete, Strength: PCN 71/R/C/X/T
2	Taxiway width, surface and	TWY: A, A1, A2, A3, A4, B, B1, B2, B3, B4, B5, E, F, G
	strength	Width: 23m (75ft)
		Surface: Concrete
		Strength: PCN 65/R/B/W/T
		Civil Airport Connecting TWY H
		Width: 23m (75ft)
		Surface: Cement Concrete, Strength: PCN 71/R/C/X/T
		Surface: Asphalt Concrete, Strength: PCN 60/F/B/X/U
		TWY: C
		Width: 45m (150ft)
		Surface: Concrete
		Strength: PCN 76/R/C/W/T
		TWY: All other TWY
		Width: 23m (75ft)
		Surface: Concrete
		Strength: To be issued later
3	ACL and elevation	Not available
4	VOR checkpoints	Nil
5	INS checkpoints	Spot NR
		1: 340943.49N 1321358.92E (for nose-in and push-back)
		: 340943.38N 1321359.57E (for power-in and power-out)
		2: 340941.23N 1321359.71E
6	Remarks	ARST E-28 installed on TWY A; 914m from TWY south end, in emergency situations, when the RWY is not available, VFR landings of aircraft with wingspans of 40m or less may conducted

RJOI AD 2.9 SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM AND MARKINGS

1	Use of aircraft stand ID signs, TWY guide lines and Visual dock- ing/ parking guidance system of	Aircraft stand taxi lane : See AD2.24
	aircraft stands	
2	RWY and TWY markings and LGT	RWY: RWY02/20 (Marking): RWY designation, RWY CL, RWY THR, RWY THR stripe, Fixed DIST, TDZ, RWY side stripe, RWY lead-on/lead-off lines, RWY shoulder Other: simulated carrier deck, RWY AG cable disks (LGT): RTHL, REDL, RENL, RWY DIST marker LGT, Arresting gear marker(AGM) Other LGT: Simulated carrier deck LGT(CDL) TWY:ALL TWY (Marking): TWY CL, TWY side stripe, Shoulder marking, Intermediate HLSD PSN, INST hold, RWY HLDG PSN, RWY mandatory hold surface painted sign, mandatory instruction marking Other Marking: Helicopter landing spot markings (LGT): TWY edge LGT, TWY end, TWY entrance, Taxiing Guidance Sign, RWY guard LGT(elev WIG-WAG) TWY: H (LGT):TWY CL LGT, TWY edge LGT, Taxiing Guidance Sign
3	Stop bars	Nil
4	Remarks	(LGT): APN flood LGT, WDI inset simulated carrier deck LGT (CDL) 97.5m from THR RWY 02 LEFT of RWY CL

RJOI AD 2.10 AERODROME OBSTACLES

In approach/TKOF areas

RWY/ Area affected	Obstacle type	Coordinates	Elevation	Markings/ LGT	Remarks
RWY 02	Water Pump House	340933.70N/1321453.12E	50ft		345°/1277ft FM DER
RWY 02	Incineration Facility	341008.40N/1321451.61E	90ft		355°/0.8NM FM DER
RWY 02	Tower	340940.61N/1321400.67E	168ft	Markings/ LGTD	293°/0.85NM FM DER
RWY 20	Tower	340754.48N/1321342.17E	168ft	Markings/ LGTD	262°/0.83NM FM DER
RWY 20	Port Crane	340753.40N/1321500.40E	198ft		119°/1830ft FM DER

In circling area and at AD

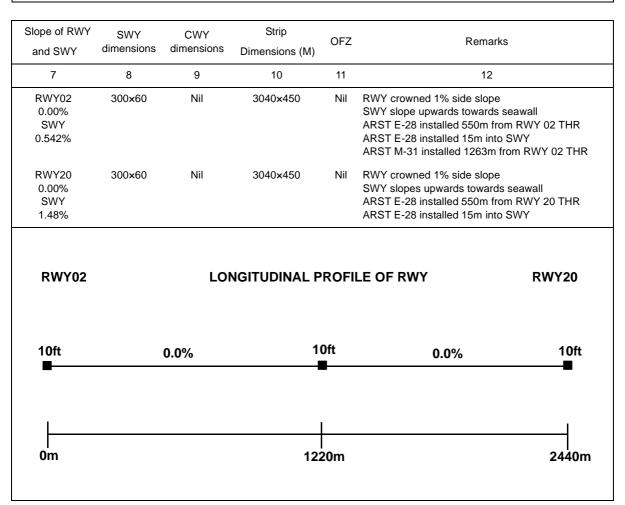
Obstacle type	Coordinates	Elevation	Markings/ LGT	Remarks
Terrain	341324.89N/1322443.13E	1778ft		060°/9.5NM FM ARP
Terrain	340935.89N/1322359.24E	1509ft		083°/7.7NM FM ARP
Terrain	341134N/1321829E	670ft		047°/4.2NM FM ARP
Terrain	340717.22N/1321851.08E	335ft	- / LGTD	113°/3.63NM FM ARP

RJOI AD 2.11 METEOROLOGICAL INFORMATION PROVIDED

1	Associated MET Office	FUKUOKA
2	Hours of service	H24 (FUKUOKA)
	MET Office outside hours	
3	Office responsible for TAF preparation	Nil
	Periods of validity	
4	Trend forecast	Nil
	Interval of issuance	
5	Briefing/ consultation provided	Briefing is available upon inquiry at FUKUOKA
6	Flight documentation	С
	Language(s) used	En
7	Charts and other information available	S ₆ , U ₈₅ , U ₇ , U ₅ , U ₃ , U ₂₅ , U ₂ /T _r , P _S , P ₅ , P ₃ , P ₂₅ , P _{SWE} , P _{SWF} , P _{SWG} , P _{SWI} ,
	for briefing or consultation	P _{SWM} , P _{SW} (domestic), E, C, W _E , W _F , W _G , W _I , W, N
8	Supplementary equipment	Nil
	available for providing information	
9	ATS units provided with information	TWR, APP, ATIS
10	Additional information	Observation is made by Marine Corps Air Station
	(limitation of service, etc.)	

RJOI AD 2.12 RUNWAY PHYSICAL CHARACTERISTICS

Designations RWY NR	TRUE BRG	Dimensions of RWY(M)	Strength(PCN) and surface of RWY	THR coordinates THR geoid undulation	THR elevation and highest elevation of TDZ of precision APP RWY
1	2	3	4	5	6
02	009.2°	2440×60	PCN 65/R/B/W/T	340802.616N	THR ELEV: 10.4ft (3m)
			Concrete	1321441.524E	TDZ ELEV: 10.41ft (3m)
				32m	
20	189.2°	2440×60	PCN 65/R/B/W/T	340920.798N	THR ELEV: 10.2ft (3m)
			Concrete	1321456.697E	
				32m	



RJOI AD 2.13 DECLARED DISTANCES

RWY Designator TORA (m)		TODA (m)	ASDA (m)	LDA (m)	Remarks
1	2	3	4	5	6
02	2440	2440	2740	2440	
20	2440	2440	2740	2440	

RJOI AD 2.14 APPROACH AND RUNWAY LIGHTING

RWY Designator	APCH LGT type LEN INTST	RTHL Color WBAR	PAPI (VASIS) Angle DIST FM THR MEHT	RTZL LEN	RCLL LEN Spacing Color INTST	REDL LEN Spacing Color INTST	RENL Color WBAR	STWL LEN Color
1	2	3	4	5	6	7	8	9
02	ALSF-1 (CAT-I) 900m LIH	Green Green	PAPI 3.00° / LEFT 393m 62ft	Nil	Nil	2440m 60m Coded color Yellow/White LIH	Red	Nil
20	Nil	Green -	PAPI 3.00° / LEFT 372m 60ft	Nil	Nil	2440m 60m Coded color Yellow/White LIH	Red	Nil
				Remarks				
				10				

RJOI AD 2.15 OTHER LIGHTING, SECONDARY POWER SUPPLY

1	ABN/IBN location, characteristics and hours of operation	ABN: 340838N/1321354E, U.S. Military Dual Peak White/Green, 6 RPM, 18 FPM, HN&HO				
2	LDI location and LGT Anemometer location and LGT	Nil				
3	TWY edge and center line lighting	TWY edge light for H: AVBL				
		TWY CL LGT for H: AVBL				
4	Secondary power supply/ switch- over time	ALL LGT 100% generator back-up within 15 second				
5	Remarks	WDI LGT x 3				
		SEAPLANE TRANS-SHOT LGT				
		Yellow Helipad perimeter LGT				

RJOI AD 2.16 HELICOPTER LANDING AREA

Primary Helipads: "N", "7" and "R" 206m east of RWY 02 CL

Concrete

PCN 23/R/B/W/T

(ICAO Code E)

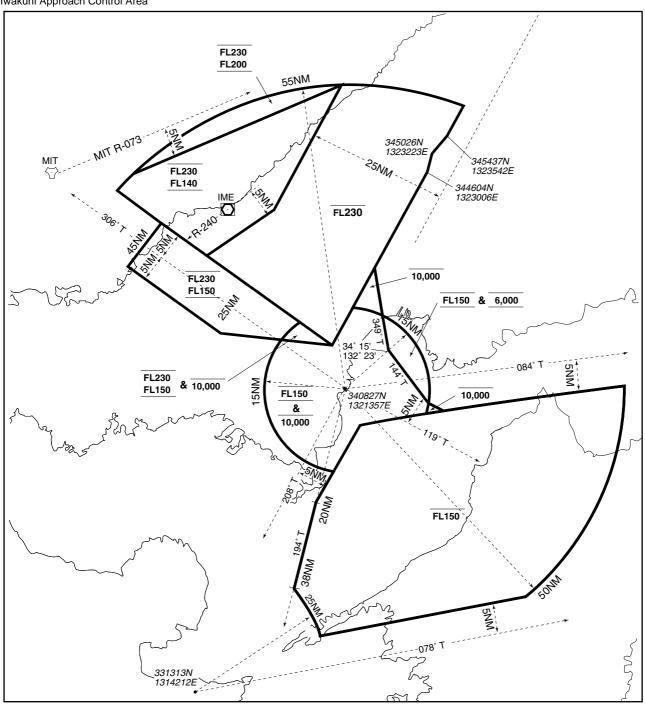
Simultaneous VFR operations between RWY 02 / 20 and Helipads "N", "7" and "R" are authorized, contact base operations department for scheduling and procedures.

RJOI AD 2.17 ATS AIRSPACE

De	esignation and lateral limits	Vertical limits (ft)	Airspace classification	ATS unit call sign Language	Remarks
	1	2	3	4	6
(340842N/1321449E)		Up to but not including 3000 AGL	D	IWAKUNI TOWER	
IWAKUNI ACA*	SEE RJOI ATTACHED CHART		Е		*ACA: APPROACH CONTROL AREA

岩国進入管制空域

Iwakuni Approach Control Area



RJOI AD 2.18 ATS COMMUNICATION FACILITIES

Service			Hours of	
designa-	Call sign	Frequency	operation	Remarks
tion			operation	
1	2	3	4	5
APP	Iwakuni Approach Control	236.2MHz 250.6MHz 131.4MHz 128.0MHz 243.0MHz(E) 121.5MHz(E)	2130-1400 MON-SUN 72HR PN	
DEP	Iwakuni Departure Control	363.8MHz 131.4MHz 121.5MHz(E) 243.0MHz(E)	2130-1400 MON-SUN 72HR PN	
TWR	Iwakuni Tower	340.2MHz 123.8MHz 243.0MHz(E) 121.5MHz(E)	2130-1400 MON-SUN 72HR PN	
GND	Iwakuni Ground Control	360.2MHz 121.3MHz	2130-1400 MON-SUN 72HR PN	
Clearance delivery	Iwakuni Clearance Delivery	135.7MHz 310.6MHz	2130-1400 MON-SUN 72HR PN	
ATIS	Marine Corps Air Station Iwakuni	283.0MHz 128.4MHz	2130-1400 MON-SUN 72HR PN	
Dispatch	lwakuni Dispatch	258.6MHz 134.1MHz	2030-1400 MON-SUN 72HR PN	
MET	Iwakuni Metro	344.6MHz	24H	Pilot forecaster servic (Military)
GCA-ASR PAR	Iwakuni Approach Control and Iwakuni Radar Final Control	343.4MHz 289.4MHz 270.6MHz 119.45MHz 260.6MHz 323.4MHz 255.8MHz 305.0MHz	2130-1400 MON-SUN 72HR PN	ASR RWY 02 PAR RWY 02 Glide path 3.00°

AIP Japan IWAKUNI

RJOI AD 2.19 RADIO NAVIGATION AND LANDING AIDS

Type of aid	ID	Frequency	Hours of operation	Position of transmitting antenna coordinates	Elevation of DME transmitting antenna	Remarks
1	2	3	4	5	6	7
TACAN (VAR:6°W)	NEU	996MHz (CH-35X)	H24	340930.27N/ 1321443.81E	38ft	TACAN unusable: 201°-359° beyond 19nm BLW 14000ft.
ILS-LOC RWY02	IIJO	110.15MHz	H24	340931.15N/ 1321455.02E	14.79ft	LOC:308m(1011ft) outside FM RWY20, 92.955m(305ft) W of RCL, LOC off-set angle 1.5° BRG (MAG) 014° Unusable:LOC beyond 22nm
ILS-GS RWY02		334.25MHz	H24	340812.80N/ 1321439.40E	8.45ft	GP: 301.5m (989ft) inside FM RWY 02 THR, 103m (338ft) W of RCL GP angle 3.0°
ILS-DME RWY02	IIJO	1125MHz (CH-38Y)	H24	340812.74N/ 1321439.86E	7.60ft	DME: 301m (987ft) inside FM RWY 02 THR, 91m (300ft) W of RCL

RJOI AD 2.20 LOCAL TRAFFIC REGULATIONS

1.	Air	port	regu	lations

Will be provided as required, contact AD administration for details.

- 2. Taxiing to and from stands
 - 2.1 Standard taxi route for Civil Commercial aviation aircraft. Arrival and Departure Route is as follows: RWY 02
 - Departure H-G-B-B5-A4-A-A1
 - Arrival B5-B-G-H

RWY 20

- Departure H-G-B-B5
- Arrival A1-A-A4-B5-B-G-H
- 2.2 DoD Visiting aircraft will be escorted by ground guide vehicle as required, otherwise taxiing instruction will be issued by ATC ground control.
- Parking area for small aircraft(General aviation)

Nil

4. Parking area for helicopters

|--|

8.

5. Apron - taxiing during winter conditions

Nil

- 6. Taxiing limitations
 - 6.1. Restricted Taxiways. Commercial aircraft shall not taxi on any portion of TWY B south of TWY F.
 - 6.2. Aircraft commanders shall exercise caution at the midpoint of TWY F overpass location. Aircraft shall avoid any sudden braking movement or stopping while on the overpass
 - 6.3. Do not enter TWY A2 east of TWY A; Seadrome entrance only.
 - 6.4. Civil aircraft B777 shall execute judgmental over-steering at all turns due to turn radius limitations.
- 7. School and training flights technical test flights use of runways

	Nil
Hel	licopter traffic - limitation
	Nil

9. Removal of disabled aircraft from runways

To be issued as required.

RJOI AD 2.21 NOISE ABATEMENT PROCEDURES

- (1) Flight west of the RWY is prohibited within 12nm at below 4000 feet MSL.
- (2) The industrial area north-west of the RWY is a noise sensitive area. Aircraft should minimize their noise impact on the area. Transport and heavy aircraft requesting an off-duty RWY 20 departure to avoid the area will be afforded the same priority as aircraft using the duty RWY
- (3) The city of Hiroshima shall not be over flown at an altitude less than 6,500 ft and should be avoided if at all possible. Kure, Matsuyama, and the peninsula at 33°28'N, 132°18'E shall not be over flown at altitudes less than 6,500 ft.
- (4) Noise abatement hours are also in effect for multiple U.S. and Japanese holidays. Contact AD administration office for further details.
- (5) Departures and arrivals should maneuver in visual flight conditions to avoid direct overflight of Atada Island below 4,000ft.

RJOI AD 2.22 FLIGHT PROCEDURES

1. WX MINIMA CONCERNING PAR AND ASR APCH PROCEDURES

	RWY	GS/TCH/RPI	CAT	DH/ MDA-VIS	HAT/HA	ATh CEIL-VIS	
PAR 1146	02	3.00°/55/1055	ABCDE	230-1/2	220	(300-1/2)	
ASR ②⑤①	02		AB	420-5/8	410	(500-5%)	
			CDE	420-3/4	410	(500-3/4)	
c CIR ③			AB	460- 1	450	(500-1)	
_			С	460- 1½	450	(500-11/2)	
			D	560- 2	550	(600-2)	
			E	980- 3	970	(1000-3)	
3 Circling no 4 VGSI not o				·			
© CAUTION 23 46.00E.	: ASR Missed A	Approach Minimur	n Climb Rate	to 2100, terrain	1457' MSL 3	34 09 22.00N 132	
© CAUTION 23 46.00E.	I: PAR Missed A	Approach Minimu	m Climb Rate	to 2100, terrain	1457′ MSL 3	34 09 22.00N 132	
		Knots	60 12	20 180	240	300 360	
PAR ⑥	Rwy 02	FPM	210 42	20 630	840	1050 1260	
ASR ⑤	Rwy 02	FPM	240 48	30 720	960	1200 1440	

2. PAR AND ASR MISSED APPROACH PROCEDURE

Unless otherwise instructed by ATC, execute each missed approach procedure as follows. Runway 02: Fly heading 015 and climb and maintain 3,300 ft. Leaving 500 ft, turn right heading 125.

Note: Aircraft can expect radar vectors from ATC upon reaching 3,300 ft.

3. LOST COMMUNICATIONS PROCEDURE FOR ARRIVAL AIRCRAFT UNDER RADAR NAVIGATIONAL GUIDANCE

If no transmissions are received for one minute in the pattern or five (fifteen) seconds on final, attempt contact tower on 340.2/123.8 and proceed VFR. If unable, proceed with ILS runway 02 approach (circle to runway two-zero, if appropriate), maintain (appropriate altitude but not lower than 3,300), until MUTHA.

Note: Procedures other than above will be issued when required.

4. DIVERSE DEPARTURE PROCEDURE

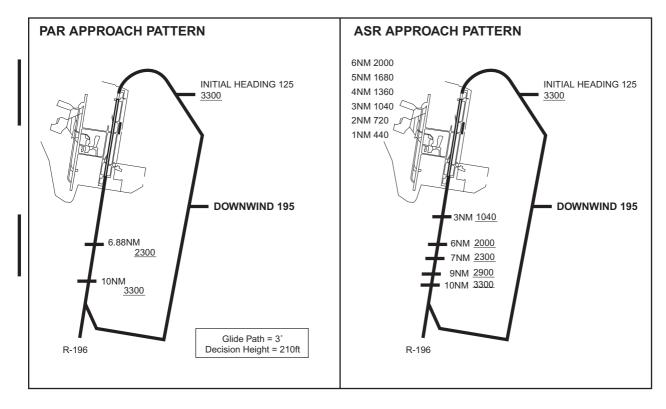
- (1) RWY 02: Diverse departures only authorized within 25 NM between 044 DEG through 165 DEG clockwise, standard with minimum climb rate of 300ft/NM to 2300.
- (2) RWY 20: Diverse departures only authorized within 25 NM between 155 DEG through 042 DEG counterclockwise, standard with minimum climb rate of 240ft/NM to 2300.
- (3) Contact AD administration, reference DoD Flight Information Publication series.

5. STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS)

Aircraft flying under control of Iwakuni Approach in the Approach Control Area will be instructed to reply with discrete beacon code on Mode A/3 and Mode C.

If an aircraft with non-discrete beacon code capability is instructed to reply with discrete beacon code, it shall advise ATC accordingly.

6. APPROACH PATTERN

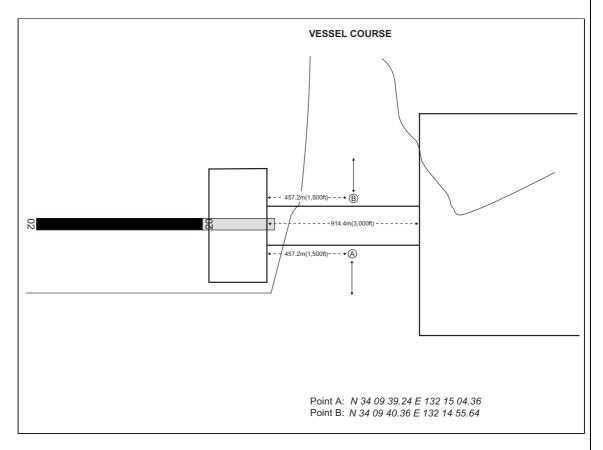


RJOI AD 2.23 ADDITIONAL INFORMATION

- 1. Bird hazard on approach to RWY 02/20.
- 2. Mt terrain W of airfield, Oshima Island(NEU R-189/13DME) at 2280ft may cause Ground Avoidance Proximity Warning alert for aircraft at 3300ft.
 - 3. Hang Glider/Parasailing in vicinity of IAFs for all instrument approaches(STADK/PPOPS/MUTHA/SHIMN) NEU R-189/13DME (Oshima Island) at or below 2500ft AGL. OPR daily spring/summer months.
 - 4. Passage of vessel across RWY02 departure area or RWY20 approach area

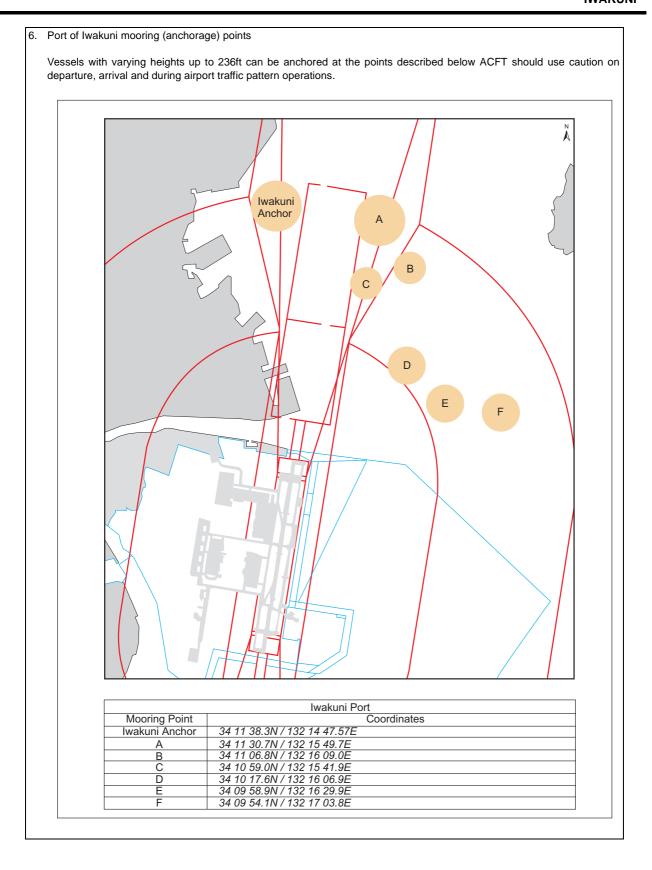
While vessel with height that affects ACFT operations is passing across RWY02 departure area or RWY20 approach area Obstacle Free Zone (OFZ), the following action will be taken.

- 1) The information of vessel will be provided by NOTAM RJOI or ATC.
- 2) While vessel is crossing between point A and point B, holding instruction may be issued in the following situations.
 - a) ACFT for landing RWY02
 - When vessel height is above 3m/MSL: all arrival ACFT
 - b) ACFT for take-off/landing RWY02
 - When vessel height is above 3m/MSL: all departure ACFT
 - c) ACFT for landing RWY20
 - When vessel height is above 3m/MSL: all arrival ACFT



5. Schedule maintenance on the RWY

Scheduled RWY unserviceability due to RWY and facilities maintenance. (See NOTAM RJOI)



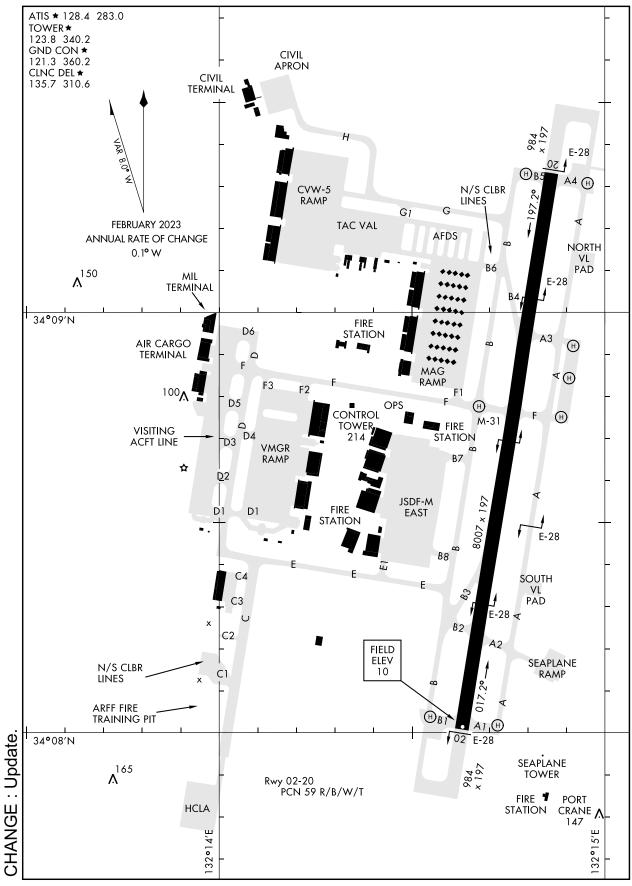
RJOI AD 2.24 CHARTS RELATED TO AN AERODROME

Aerodrome/Heliport Chart
Aircraft Parking/Docking Chart (for civil)
Standard Departure Chart - Instrument (MATSUYAMA SOUTHEAST)
Instrument Approach Chart (ILS RWY02)
Instrument Approach Chart (RNAV (GPS) RWY02)
Other Chart (LDG CHART)

Other Chart (MVA CHART)

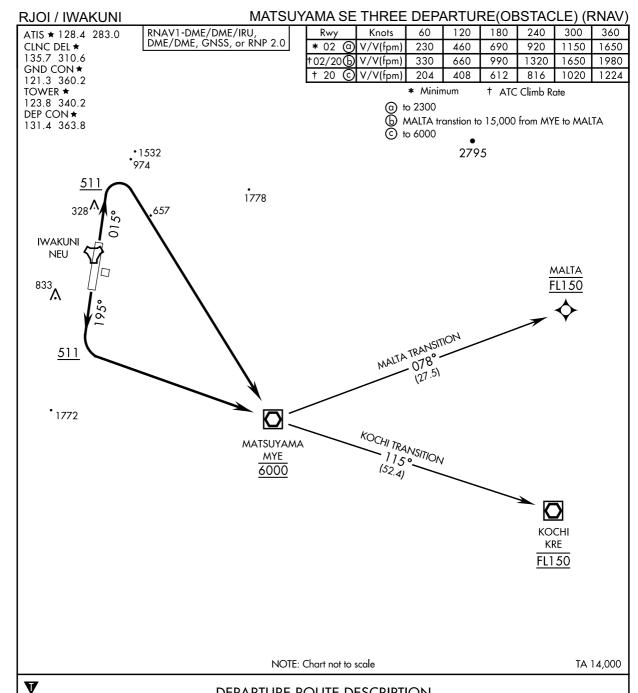


RJOI/IWAKUNI AD CHART





STANDARD DEPARTURE CHART - INSTRUMENT



DEPARTURE ROUTE DESCRIPTION

TAKEOFF RWY 02: Climb heading 015° to 511, then on depicted route. Cross MATSUYAMA VOR/DME (MYE) at 6000 thence...

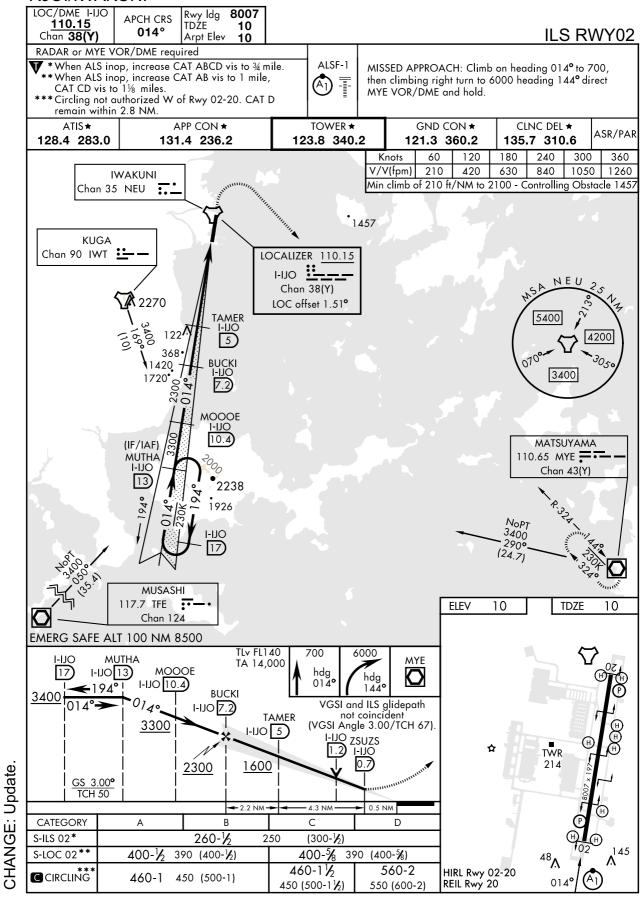
TAKEOFF RWY 20: Climb heading 195° to 511, then on depicted route. Cross MATSUYAMA VOR/DME (MYE) at 6000 thence...

KOCHI TRANSITION: As depicted. Cross KOCHI (KRE) at FL150. Maintain FL150 or higher as assigned.

MALTA TRANSITION: As depicted. Cross MALTA at FL150, maintain FL150 or higher as assigned.

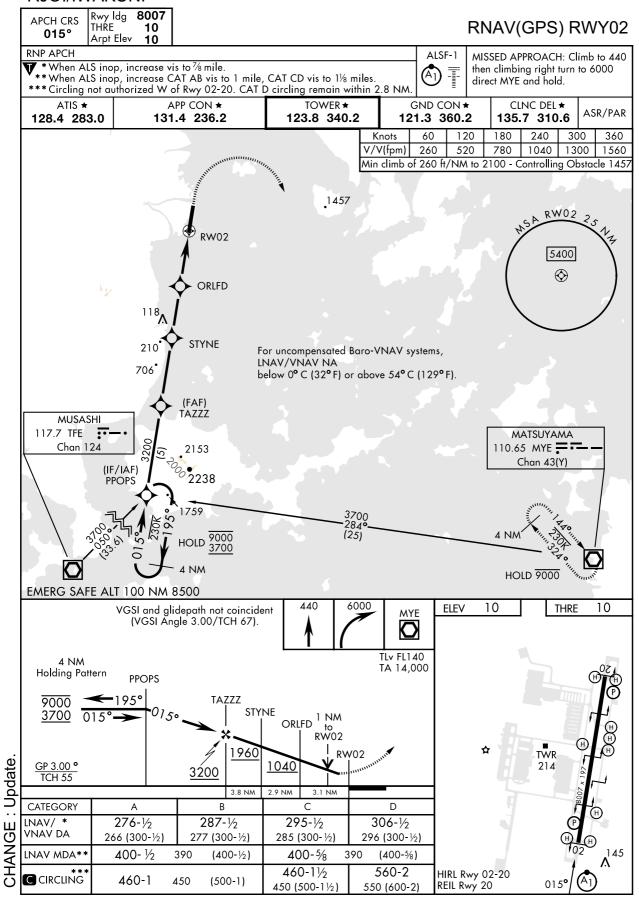
INSTRUMENT APPROACH CHART

RJOI/IWAKUNI



INSTRUMENT APPROACH CHART

RJOI/IWAKUNI



RJOI / IWAKUNI LDG CHART **SEALANE PATTERNS & VFR ARR PATTERNS** N Initial (R-020 4NM) 3000 DESCENDING TO 1500' - SEALANE PATTERNS VFR ARRIVAL VFR ARRIVAL PATTERNS WING LEVEL AUTH DESCENT to 1000 sland VFR HOLDING RWY 02-Left ORBIT RWY 20-Right ORBIT Chinaman's Ha (Kabuto jima) HEL ALT 500' PROP entry (R-130 4NM) 1000 S Initial (R-189 6NM) 33007 DESCENDING TO 1500 Field Elev. 10 IWAKUNI SEALANE(TOWER): 122.0 - 123.1x - 228.2 - 319.0 **IWAKUNI APP: WEST** 131.4 - 236.2 EAST 128.0 - 250.6 **IWAKUNI TWR:** 123.8 - 340.2 VTOL FW FW SEAPLANE RAMP FR FW FG FW

